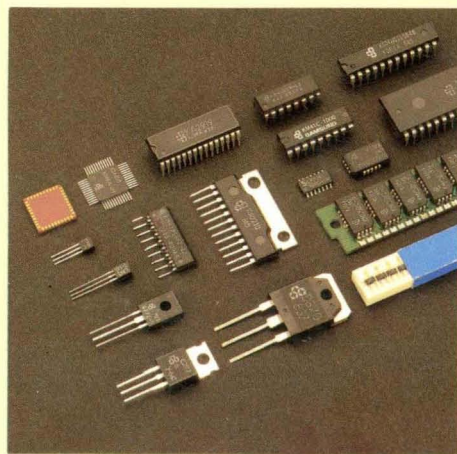




Semiconductor Product Guide



1988

PRINTED IN KOREA

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PRODUCT GUIDE

Transistors

Power MOSFETs

Linear ICs

Digital ICs

High Performance CMOS Logic ICs

Semicustom ICs

One Chip Microcomputer

Voice Synthesizer ICs

MOS Memory ICs

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- I. Semiconductor Product Guide**
- II. Transistor Data Book**
 - Vol. 1: Small Signal TR
 - Vol. 2: Bipolar Power TR
 - Vol. 3: TR Pellet
- III. Linear IC Data Book**
 - Vol. 1: Audio/Video
 - Vol. 2: Telecom/Industrial/Data Converter IC
- IV. MOS Product Data Book**
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1. SMALL SIGNAL TRANSISTORS

1.1 General Purpose Transistors

1.1.1 SOT-23 Type Transistors

Device and Polarity (Marking)		V _{CEO} (V)	I _C (A)	Condition			h _{FE}		Condition		V _{CE} (sat), V _{BE} (sat) (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	V _{CE} (sat) MAX	V _{BE} (sat) MAX	V _{CE} (V)	I _C (mA)	MIN	TYP	
MMBTA06(1G)	MMBTA56(2G)	80	0.5	1	100	50		100	10	0.25		2	10	100		
MMBTA05(1H)	MMBTA55(2H)	60	0.5	1	100	50		100	10	0.25		2	10	100		
KSC1623(C1X)	MMBT2907A(2F)	60	0.6	10	150	100	300	500	50	1.6	2.6	20	50	200	250	
	KSA812(D1X)	50	0.1	6	1	90	600	100	10	0.3	1	6	10			
	BCW69(H1)	45	0.1	5	2	120	260	10	0.5	0.3						
	BCW70(H2)	45	0.1	5	2	215	500	10	0.5	0.3						
BCW71(K1)		45	0.1	5	2	110	220	50	2.5			5	10	300	300	
BCW72(K2)		45	0.1	5	2	200	450	50	2.5			5	10			
BCX70G(AG)		45	0.1	5	2	120	220	50	1.25	0.55	1.05	5	10	125		
BCX70H(AH)		45	0.1	5	2	180	310	50	1.25	0.55	1.05	5	10	125		
BCX70J(AJ)		45	0.1	5	2	250	460	50	1.25	0.55	1.05	5	10	125		
BCX70K(AK)		45	0.1	5	2	380	630	50	1.25	0.55	1.05	5	10	125		
	BCX71G(BG)	45	0.1	5	2	120	220	50	1.25	0.55	1.05					
	BCX71H(BH)	45	0.1	5	2	180	310	50	1.25	0.55	1.05					
	BCX71J(BJ)	45	0.1	5	2	250	460	50	1.25	0.55	1.05					
	BCX71K(BK)	45	0.1	5	2	380	630	50	1.25	0.55	1.05					
MMBC1623L3(L3)	MMA811C5(C5)	45	0.05	3	0.5	135	270	20	2	0.3		6	1	75		
	MMA811C6(C6)	45	0.05	3	0.5	200	400	20	2	0.3		6	1	75		
	MMA811C7(C7)	45	0.05	3	0.5	300	600	20	2	0.3		6	1	75		
	MMA811C8(C8)	45	0.05	3	0.5	450	900	20	2	0.3		6	1	75		
	MMA812M3(M3)	40	0.1	6	1	60	120	30	3	0.5						
MMBC1623L4(L4)	MMA812M4(M4)	40	0.1	6	1	90	180	30	3	0.5						
MMBC1623L5(L5)	MMA812M5(M5)	40	0.1	6	1	135	270	30	3	0.5						
MMBC1623L6(L6)	MMA812M6(M6)	40	0.1	6	1	200	400	30	3	0.5						
MMBC1623L7(L7)	MMA812M7(M7)	40	0.1	6	1	300	600	30	3	0.5						
MMBT222A(1P)		40	0.6	10	150	100	300	500	50	1.6	2.6	20	20	300		
MMBT3903(1Y)	MMBT2907(2B)	40	0.6	10	150	100	300	500	50	1.6	2.6	20	50	200		
MMBT3904(1A)		40	0.2	1	10	50	150	50	5	0.3	0.95	20	10	250		
MMBT3904(1A)	MMBT3906(2A)	40	0.2	1	10	100	300	50	5	0.3	0.95	20	10	300		
MMBT4401(2X)	MMBT4403(2T)	40	0.6	1	150	100	300	500	50	0.75	1.2	10	10	250		
MMBTA20(1C)	MMBTA70(2C)	40	0.1	10	5	40	400	10	1	0.25		10	5	125		
MMBC1622D6(D6)		35	0.1	3	0.5	200	400	100	10	0.3		6	1	100		
MMBC1622D7(D7)		35	0.1	3	0.5	300	600	100	10	0.3		6	1	100		
MMBC1622D8(D8)		35	0.1	3	0.5	450	900	100	10	0.3		6	1	100		
BCW60A(AA)	BCW61A(BA)	32	0.1	5	2	120	220	50	1.25	0.55	1.05	5	10	125		
BCW60B(AB)	BCW61B(BB)	32	0.1	5	2	180	310	50	1.25	0.55	1.05	5	10	125		
BCW60C(AC)	BCW61C(BC)	32	0.1	5	2	250	460	50	1.25	0.55	1.05	5	10	125	200	
BCW60D(AD)	BCW61D(BD)	32	0.1	5	2	380	630	50	1.25	0.55	1.05	5	10	125		
MMBT2222(1B)		30	0.6	10	150	100	300	500	50	1.6	2.6	20	20	200		
KSC2859(E1X)	KSA1182(F1X)	30	0.5	1	100	70	240	100	10	0.25		6	20			
MMBT4123(5B)	MMBT4125(ZD)	30	0.2	1	2	50	150	50	5	0.3	0.95	20	10	250		
KSC3265(K1X)	KSA1298(J1X)	25	0.8	1	100	100	320	500	20	0.4		5	10	120		
MMBC1009F1(F1)		25	0.05	3	0.5	30	60	10	1	0.3		6	1	150		

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SOT-23 Type Transistors (Continued)

Device and Polarity (Marking)		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE} (sat), V _{BE} (sat) (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	V _{CE} (sat) MAX	V _{BE} (sat) MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
MMBC1009F2(F2)		25	0.05	3	0.5	40	80	10	1	0.3		6	1	150	
MMBC1009F3(F3)		25	0.05	3	0.5	60	120	10	1	0.3		6	1	150	
MMBC1009F4(F4)		25	0.05	3	0.5	90	180	10	1	0.3		6	1	150	
MMBC1009F5(F5)		25	0.05	3	0.5	135	270	10	1	0.3		6	1	150	
MMBT4124(ZC)	MMBT4126(C3)	25	0.2	1	2	120	360	50	5	0.3	0.95	20	10	300	
	BCW29(C1)	20	0.1	5	2	120	260	10	0.5	0.3					
	BCW30(C2)	20	0.1	5	2	215	500	10	0.5	0.3					
BCW31(D1)		20	0.1	5	2	110	220	10	0.5	0.3					
BCW32(D2)		20	0.1	5	2	200	450	10	0.5	0.3					
BCW33(D3)		20	0.1	5	2	420	800	10	0.5	0.3					

1.1.2 TO-92S Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE} (sat), V _{BE} (sat) (V)		Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	V _{CE} (sat) TYP	V _{CE} (sat) MAX	V _{BE} (sat) TYP	V _{BE} (sat) MAX	V _{CE} (V)	I _C (mA)	MIN
	KSA1150	20	0.5	1	100	40	400	500	50	0.3	0.4	1	1.3	6	10	
	KSA1378	25	0.3	1	50	70	400	300	30	0.35	0.6					
	KSB810	25	0.7	1	100	70	400	700	70	0.25	0.4	0.95	1.2	6	10	50
	KSB811	25	1	0	100	70	400	1000	100	0.5	1.2			6	10	110
KSC2710		20	0.5	1	100	40	400	500	50	0.18	0.4					
KSC3488		25	0.3	1	50	70	400	300	30	0.14	0.4					
KSD1020		25	0.7	1	100	70	400	700	70	0.2	0.4	0.95	1.2	6	10	50
KSD1021		30	1	1	100	70	400	1000	100	0.5	1.2			6	10	130

1.1.3 TO-92 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE} (sat), V _{BE} (sat) (V)		Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	V _{CE} (sat) MAX	V _{CE} (sat) MAX	V _{BE} (sat) MAX	V _{BE} (sat) MAX	V _{CE} (V)	I _C (mA)	MIN
MPSA06	MPSA56	80	0.5	1	100	50		100	10	0.25				2	10	100
MPS8099	MPS8599	80	0.5	5	1	100	300	100	10	0.3				5	10	150
KSC2003	KSA954	80	0.3	1	50	90	400	300	30	0.6	1.2			6	10	50
KSD1616A	KSB1116A	60	1	2	100	135	400	1000	50	0.3	1.2			2	100	70
KSC1008	KSA708	60	0.7	2	50	40	240	500	50	0.7	1.1			10	50	50
	MPS2907A	60	0.6	10	150	100	300	500	50	1.6	2.6			20	50	200
MPS8098	MPS8598	60	0.5	5	1	100	300	100	10	0.3				5	10	150
MPSA05	MPSA55	60	0.5	1	100	50		100	10	0.25				2	10	100
KSC2002	KSA953	60	0.3	1	50	90	400	300	30	0.6	1.2			6	10	50
KSC853	KSA545	60	0.2	1	50	40	400	150	15	0.5	1.2					
KSD1616	KSB1116	50	1	2	100	135	600	1000	50	0.3	1.2			2	100	70
KSC1072	KSA707	45	0.7	2	50	40	240	500	50	0.7	1.1					
KSC815	KSA539	45	0.2	1	0.05	40	240	150	15	0.5	1.2					
SS9014	SS9015	45	0.1	5	1	60	1000	100	5	0.3	1			5	10	150

TO-92 Type Transistors (continued)

Device and Polarity		V _{CEO} (V)	I _c (A)	Condition			h _{FE}		Condition		V _{CE} (sat), V _{BE} (sat) (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	V _{CE} (sat) MAX	V _{BE} (sat) MAX	V _{CE} (V)	I _c (mA)	MIN	TYP	
MPS6602		40	1	1	500	50	1000	100	0.6		10	50	100			
2N4401	2N4403	40	0.6	1	150	100	300	500	50	0.75	1.2	10	20	200		
MPS2222A	MPS2907	40	0.6	10	150	100	300	500	50	1.6	2.6	20	20	300		
2N4400	2N4402	40	0.6	1	150	50	150	500	50	0.75	1.2	10	20	200		
2N3903	2N3905	40	0.2	1	10	50	150	50	5	0.3	0.95	20	10	250		
2N3904	2N3906	40	0.2	1	10	100	300	50	5	0.3	0.95	20	10	300		
MPS6513	MPS6517	40	0.1	10	2	90	180	50	5	0.5		10	5	125		
MPSA10		40	0.1	10	5	40	400					10	5	125		
MPSA20	MPSA70	40	0.1	10	5	40	400					10	5	125		
KSC1330		40	0.1	6	1	70	400	30	3	0.5		6	10		300	
KSD471A		30	1	1	100	70	400	1000	100	0.5	1.2	6	10		130	
MPS3705	MPS3703	30	0.6	5	50	30	150	50	5	0.25		5	50	100		
MPS3704		30	0.6	2	50	100	300	100	5			2	50	100		
MPS2222		30	0.6	10	150	100	300	500	50	1.6	2.6	20	20	250		
KSC921		30	0.1	10	2	40	240	10	1	0.6		10	1	100	250	
KSC839		30	0.1	12	2	40	400	10	1	0.4		10	1	80	200	
SS9011		30	0.03	5	1	28	198	10	1	0.3						
SS8050	SS8550	25	1.5		100	85	300	800	80	0.5	1.2	10	50	100	190	
	KSB564A	25	1		100	70	400	1000	100	0.5	1.2	10	10	100	110	
MPS6601	MPS6651	25	1		500	50		1000	100	0.6		10	50	100		
	MPS3702	25	0.6		50	60	300	50	50	0.25			50	100		
MPS6560	MPS6562	25	0.5		500	50	200	500	50	0.5		5	10	60		
KSD227	KSA642	25	0.3		50	70	400	300	30	0.6						
MPS5172		25	0.1		10	100	500	10	1	0.25			2		120	
KSC184	KSA542	25	0.05		1	40	400	20	2	0.3		6	1		100	
MPS3706		20	0.6		50	30	600	100	5	1		2	50	100		
KSD261	KSA643	20	0.5		100	40	400	500	50	0.4	1.3	1				
SS9013	SS9012	20	0.5		50	64	202	500	50	0.6	1.2	1				

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1.1.4 TO-92L Type Transistors

Device and Polarity		V _{CEO} (V)	I _c (A)	Condition			h _{FE}		Condition		V _{CE} (sat), V _{BE} (sat) (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	V _{CE} (sat) MAX	V _{BE} (sat) MAX	V _{CE} (V)	I _c (mA)	MIN	TYP	
KSC2328A	KSA928A	30	2	2	500	100	320	1500	30	2		2	500		120	
KSC2331	KSA931	60	0.7	2	50	40	240	500	50	0.7	1.2	10	50		100	
KSC2500		10	2	1	500	140	600	2000	50	0.5		1	500		150	

1.2 Low Noise Transistors

1.2.1 SOT-23 Type Transistors

Device and Polarity (Marking)		MAX	Condition Frequency	V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} (V) MAX
NPN	PNP					V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _b (mA)	
MMBT6428(1K)		4	Audio	50	0.2	5	0.1	250	650	100	5	0.6
MMBT6429(1L)		4	Audio	45	0.2	5	0.1	500	1250	100	5	0.6
MMBT2484(1U)		3	Audio	60	0.05	5	1	250		1	0.1	0.35
	MMBT5086(2P)	3	Audio	50	0.05	5	0.1	150	500	10	1	0.3
MMBT5088(1Q)	MMBT5087(2Q)	3	Audio	30	0.05	5	0.1	300	900	10	1	0.5
		2	Audio	50	0.05	5	0.1	250	800	10	1	0.3
MMBT5089(1R)		2	Audio	25	0.05	5	0.1	400	1200	10	1	0.5

1.2.2 TO-92S Type Transistors

Device and Polarity(Marking)		NF(dB)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} (V) MAX	Condition		f _t (MHz)
NPN	PNP	TYP	Condition Frequency			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _b (mA)		V _{CE} (V)	I _c (mA)	
KSA1175		6	Audio	50	0.15	6	1	40	700	100	10	0.3	6	10	180
KSC2785		4	Audio	50	0.15	6	1	40	700	100	10	0.3	6	10	300

Audio = 10Hz to 15.7KHz

1.2.3 TO-92 Type Transistors

Device and Polarity		NF(dB)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		Saturation Voltage(V)	
NPN	PNP	TYP	Condition Frequency			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _b (mA)	V _{CE(sat)} (V) MAX	
2N6428	2N4125	6	Audio	50	0.2	5	0.1	250	650	100	5	0.6	
2N4123		6	Audio	30	0.2	1	2	50	150	50	5	0.3	
2N4124		5	Audio	30	0.2	1	2	50	150	50	5	0.4	
KSC945		5	Audio	25	0.2	1	2	120	360	50	5	0.3	
	KSA733	4	Audio	50	0.15	6	1	40	700	100	10	0.3	
	2N4126	4	Audio	25	0.2	1	2	120	360	50	5	0.4	
	MPS4249	3	Audio	60		5	0.1	100	300	10	0.5	0.25	
	2N5086	3	Audio	50	0.05	5	0.1	150	500	10	1	0.3	
2N5088	MPS6522	3	Audio	30	0.05	5	0.1	300	900	10	1	0.5	
		3	Audio	25	0.1	10	2	200	400	50	5	0.5	
MPS6520	MPS6523	3	Audio	25	0.1	10	2	200	400	50	5	0.5	
		3	Audio	25	0.1	10	2	300	600	50	5	0.5	
MPS6521	MPS4250A	3	Audio	25	0.1	10	2	300	600	50	5	0.5	
		2	Audio	60		5	0.1	250	700	10	0.5	0.25	
	2N5087	2	Audio	50	0.05	5	0.1	250	800	10	1	0.3	
	MPS4250	2	Audio	40		5	0.1	250	700	10	0.5	0.25	
	2N5210	2	Audio	25	0.05	5	0.1	400	1200	10	1	0.5	
2N6428A		*4	Audio	50	0.2	5	0.1	250	650	100	5	0.6	
		*2	Audio	50	0.05	5	0.1	200	600	10	1	0.7	
2N5209		*2	Audio	50	0.05	5	0.1	100	300	10	1	0.7	
MPS8097	KSA640	*2	Audio	40	0.2	5	0.1	250	700				
KSC1222		**40	Audio	45	0.05	3	0.5	120	1000	20	2	0.3	
KSC900		**30	Audio	25	0.05	3	0.5	120	1000	20	2	0.2	

Audio=10Hz to 15.7KHz

*=MAX, **=Noise Level

1-3. RF/VHF/UHF Amplifier Transistors

1-3-1. SOT-23 Type Transistors

Device NPN	Condition		f _r		C _{ob} (pF) MAX	V _{CEO} (V)	G _{pe} (dB) MIN	Condition		h _{FE}		NF(dB) MAX	Condition f(MHz)	I _{AGC} (mA) MAX	Condition Gain Reduction (dB)
	V _{CE} (V)	I _c (mA)	MIN	TYP				V _{CE} (V)	I _c (mA)	MIN	MAX				
KSC2734(H8Z)	10	10	1400	3500	1.5	12		10	5	20	200				
KSC3120(H9Z)	10	2	1500	2400	#0.9	15	\$12	10	5	40	200	*8	800		
KSC2759(H6X)	10	5	1250	2000	1.3	14	&10	10	5	40	180				
MMBR5179	6	5	900	2000	@1	12	15	1	3	25	250	4.5	200		
KSC2757(H3X)	10	5	800	1100	1.5	15		10	5	60	240				
KSC2758(H4Z)	10	3	750	1000	0.8	25	14	10	3	60	240	4.5	900	11	30
MMBTH10(3E)	10	4	650		@0.7	25		10	4	60					
KSC2756(H2X)	10	5	500	850	#0.5	20	\$15	10	5	60	240	*6.5	200		
MMBTH24(3A)	10	8	400	620	@0.36	30	\$19	10	8	30					
KSC2755(H1X)	10	3	400	600	#0.5	30	20	10	3	60	240	3	200	12	30
KSC2223(H5X)	6	1	400	600	*1	20		6	1	40	180	*3	100		
KSC3125(A1Z)	10	10	250	600	1.6	25		10	10	20	200				
KSC2715(B1X)	10	1	100		3.2	30	27	12	2	40	240				



1.3.2 TO-92S Type Transistors

Device (NPN)	Condition		f _r (MHz)		C _{OB} (pF) MAX	V _{CEO} (V)	G _{PE} (dB) MIN	Condition		h _{FE}		NF(dB) MAX	Condition f _r (MHz)
	V _{CE} (V)	I _C (mA)	MIN	TYP				V _{CE} (V)	I _C (mA)	MIN	TYP		
KSC2669	10	1	100	250	3.2	30		12	2	40		240	
KSC2786	6	1	400	600	*1.2	20	18	6	1	40		240	5
KSC2787	6	1	150	300	2.5	30		6	1	40		240	

1-3-2 TO-92 Type Transistors

Device NPN	Condition		f _r		C _{ob} (pF) MAX	V _{CEO} (V)	G _{pe} (dB) MIN	Condition		h _{FE}		NF(dB) MAX	Condition f(MHz)	I _{AGC} (mA) MAX	Condition Gain Reduction (dB)
	V _{CE} (V)	I _c (mA)	MIN	TYP				V _{CE} (V)	I _c (mA)	MIN	MAX				
MPS5179	6	5	900	2000	@1	12	15	1	3	25	250	4.5	200		
KSC1730	10	5	800	1100	1.5	15		10	5	40	240				
MPSH17	10	5	800		@0.9	15	*24	10	5	25	250	6	200		
KSC1070***	10	3	750	1000	0.8	25	14	10	3	40	200	4	900	11	30
SS9018	5	5	700	1100	1.7	15		5	1	28	198				
MPSH11	10	4	650		@0.7	25		10	4	60					
MPSH10	10	4	650		@0.7	25		10	4	60					
KSC1395	10	5	600	1100	1.5	15		10	5	40	240				
MPSH24	10	8	400	620	@0.36	30	\$19	10	8	30					
KSC1393	10	3	400	700	#0.5	30	20	10	2	40	240	3	200	12	30
KSC1394	10	3	400	700	#0.5	30	20	10	2	40	240	3.5	200		
MPSH20	10	4	400	620	@0.65	30	\$18	10	4	25					
SS9016	5	1	400	620	1.6	20		5	1	28	198	5	100		
KSC1187	10	3	400	700	#*0.6	20	20	10	2	40	240				
KSC1188	10	3	400	700	1	20	20	10	2	40	240				
KSC1674	6	1	400	600	*1.5	20	18	6	1	40	240	5	100		
KSC388	12.5	12.5	300		2	25	28	12	12.5	20	200				
KSC1675	6	1	150	300	2.5	20		6	1	40	240				
KSC838	10	1	100	250	3.2	30		12	2	40	240				

*=TYP, #=Cre, @=Ccb, \$=Gce, &=Gcb, *** = DISK TYPE TRANSISTOR

1-4. High Voltage Transistors

1-4-1. SOT-23 Type Transistors

Device and polarity(Marking)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition Saturation Voltage(V)				Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _b (mA)	V _{CE} MAX	V _{BE} MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MMBTA42(1D)	MMBTA92(2D)	300	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
MMBTA43(1E)	MMBTA93(2E)	200	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
	MMBT5401(2L)	150	0.5	5	10	60	240	50	5	0.5	1	10	10	100	
	MMBT5550(1F)	140	0.6	5	10	60	250	50	5	0.25	1.2	10	10	100	

1-4-2. TO-92S Type Transistors

Device and polarity(Marking)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition V _{CE} (sat), V _{BE} (sat)(V)				Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _b (mA)	V _{CE} (sat) TYP	V _{CE} (sat) MAX	V _{BE} (sat) TYP	V _{BE} (sat) MAX	V _{CE} (V)	I _c (mA)	MIN
KSC2874	KSA1174	120	0.05	6	1	200	800	10	1	0.09	0.3		6	1	50	100
		120	0.05	6	1	200	1200	10	1	0.07	0.3		6	1	50	110

1-4-3. TO-92 Type Transistors

Device and polarity(Marking)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition Saturation Voltage(V)				Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _b (mA)	V _{CE} MAX	V _{BE} MAX	V _{CE} (V)	I _c (mA)	MIN	TYP	
MPSA44	2N6520	400	0.3	10	10	50	200	10	1	0.5	0.75					
2N6517		350	0.5	10	30	30	200	30	3	0.5	0.9	20	10	40		
MPSA45		350	0.3	10	10	50	200	10	1	0.5	0.75					
MPSA42	MPSA92	300	0.5	10	30	40		20	2	0.5	0.9	20	10	50		
2N6516	2N6519	300	0.5	10	30	45	270	30	3	0.5	0.9	20	10	40		
KSC1506	2N6518	300	0.1	10	10	40	240	50	5	2		30	10	40	80	
2N6515		250	0.5	10	30	50	300	30	3	0.5	0.9	20	10	40		
MPSA43		MPSA93	200	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
2N5551			160	0.6	5	10	80	250	50	6	0.2	1	10	10	100	
	KSA709	150	0.7	2	50	40	240	200	20	0.4	1	10	50		50	
	2N5401	150	0.6	5	10	60	240	50	5	0.5	1	10	10	100		
KSC1009	2N5400	140	0.7	2	50	40	240	200	20	0.2	0.86	10	50	30	50	
2N5550		140	0.6	5	10	60	250	50	5	0.25	1.2	10	10	100		
		120	0.6	5	10	40	180	50	5	0.5	1	10	10	100		
MPSL01	KSA992	120	0.15	5	10	50	300	50	5	0.3	1.4	10	10	60		
KSC1845		120	0.05	6	1	200	800	10	1	0.3		6	1	50	100	
	MPSL51	100	0.6	5	50	40	250	50	5	0.3	1.2	10	10	60		

1-4-4. TO-92L Type Transistors

Device and polarity(Marking)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition Saturation Voltage(V)				Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _b (mA)	V _{CE} (sat) MAX	V _{BE} (sat) MAX	V _{CE} (V)	I _c (mA)	MIN	TYP	
KSC2340	KSA1013	350	0.1	10	20	30	150	10	1	0.5	10	20	50			
KSC2330		300	0.1	10	20	40	240	10	1	0.5		30	10		50	
KSC2383		160	1	5	200	60	320	500	50	1.5		5	200	15	50	
KSC2310		KSA910	150	0.05	5	10	40	240	10	1	0.8		30	10		100
KSC2316		KSA916	120	0.8	5	100	80	240	500	50	1		5	100		120

1-5. Darlington Transistors

1-5-1. SOT-23 Type Transistors.

Device and polarity(Marking)		V _{CES} (V)	I _c (A)	Condition		h _{FE}		Condition V _{CE(sat)} V _{BE(sat)} (V)				Condition f _T (MHz)			
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	V _{CE(sat)} MAX	V _{BE(sat)} MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MMBT6427(1V)	MMBTA63(2U) MMBTA64(2V)	*40	0.5	5	100	20K	200K	500	0.5	1.5	2				
MMBTA13(1M)		30	0.3	5	100	10K		100	0.1	1.5		5	10	125	
MMBTA14(1N)		30	0.3	5	100	10K		100	0.1	1.5		5	10	125	
		30	0.5	5	100	10K		100	0.1	1.5	5	10	125		
		30	0.5	5	100	10K		100	0.1	1.5	5	10	125		

*: V_{CEO}

1-5-2. TO-92 Type Transistors.

Device and Polarity		V _{CES} (V)	I _c (A)	Condition		h _{FE}		Condition V _{CE(sat)} V _{BE(sat)} (V)				Condition f _T (MHz)			
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	V _{CE(sat)} MAX	V _{BE(sat)} MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MPSA27	MPSA77	60	0.5	5	100	10K		100	0.1	1.5					
		60	0.5	5	100	10K		100	0.1	1.5					
MPSA26		50	0.5	5	100	10K		100	0.1	1.5					
	MPSA76	50	0.5	5	100	10K		100	0.1	1.5					
2N6427		*40	0.5	5	100	20K	200K	500	0.5	1.5	2				
	MPSA75	40	0.5	5	100	10K		100	0.1	1.5					
MPSA25		40	0.5	5	100	10K		100	0.1	1.5					
MPSA14	MPSA64	30	0.5	5	100	10K		100	0.1	1.5		5	10	125	
MPSA13	MPSA63	30	0.5	5	100	20K		100	0.1	1.5		5	10	125	
MPSA12	MPSA62	20	0.5	5	10	20K		10	0.01	1					

*: V_{CEO}

1-6. Digital Transistors

1-6-1. SOT-23 Type Transistors

Device and Polarity		R1	R2	V _{CEO} (V)	I _c (mA)	Condition		h _{FE}		Condition		V _(sat) (V)		Condition		f _T (MHz)
NPN	PNP	KΩ	KΩ			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	V _{CE(sat)} TYP	V _{CE(sat)} MAX	V _{CE} (V)	I _c (mA)	
KSR1101	KSR2101	4.7	4.7	50	100	5	10	20		10	0.5	0.1	0.3	10	5	250/200
KSR1102	KSR2102	10	10	50	100	5	4	30		10	0.5	0.1	0.3	10	5	250/200
KSR1103	KSR2103	22	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1104	KSR2104	47	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1105	KSR2105	4.7	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200
KSR1106	KSR2106	10	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1107	KSR2107	22	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1108	KSR2108	47	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1109	KSR2109	4.7		40	100	5	5	100	600	10	.1	0.1	0.3	10	5	250/200
KSR1110	KSR2110	10		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1111	KSR2111	22		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1112	KSR2112	47		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1113	KSR2113	2.2	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1114	KSR2114	4.7	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200

1-6-2. TO-92S Type Transistors

Device and Polarity		R1	R2	V _{CEO}	I _C	Condition				h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)
NPN	PNP	KΩ	KΩ	(V)	(mA)	V _{CE0}	I _C	MIN	MAX	I _C	I _B	V _{CE(sat)}		V _{CE}	I _C	TYP		
						(V)	(mA)			(mA)	(mA)	TYP	MAX	(V)	(mA)			TYP
KSR1201	KSR2201	4.7	4.7	50	100	5	10	20		10	0.5	0.1	0.3	10	5	250/200		
KSR1202	KSR2202	10	10	50	100	5	4	30		10	0.5	0.1	0.3	10	5	250/200		
KSR1203	KSR2203	22	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200		
KSR1204	KSR2204	47	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1205	KSR2205	4.7	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200		
KSR1206	KSR2206	10	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1207	KSR2207	22	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1208	KSR2208	47	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200		
KSR1209	KSR2209	4.7		40	100	5	5	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1210	KSR2210	10		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1211	KSR2211	22		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1212	KSR2212	47		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1213	KSR2213	2.2	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1214	KSR2214	4.7	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		

1-6-3. TO-92 Type Transistors

Device and Polarity		R1	R2	V _{CEO}	I _C	Condition				h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)
NPN	PNP	KΩ	KΩ	(V)	(mA)	V _{CE0}	I _C	MIN	MAX	I _C	I _B	V _{CE(sat)}		V _{CE}	I _C	TYP		
						(V)	(mA)			(mA)	(mA)	TYP	MAX	(V)	(mA)			TYP
KSR1001	KSR2001	4.7	4.7	50	100	5	10	20		10	0.5	0.1	0.3	10	5	250/200		
KSR1002	KSR2002	10	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200		
KSR1003	KSR2003	22	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200		
KSR1004	KSR2004	47	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1005	KSR2005	4.7	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200		
KSR1006	KSR2006	10	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1007	KSR2007	22	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1008	KSR2008	47	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200		
KSR1009	KSR2009	4.7		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1010	KSR2010	10		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1011	KSR2011	22		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1012	KSR2012	47		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200		
KSR1013	KSR2013	2.2	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		
KSR1014	KSR2014	4.7	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200		

1.7 JUNCTION FETS

1.7.1 SOT-23 Type J-FET.

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			V _{GS(OFF)} (V)			
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX
KSK123	20	2	200	0.13	0.47	4.5	0.9	1.6	4.5				
KSK211	18	10	200	1	10	10		9	10	10	1	0.4	4

1.7.2 TO-92S Type J-FET

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			V _{GS(OFF)} (V)			
				MIN	MAX	V _{DS} (V)	MIN	TYP	MAX	V _{DS}	I _D (μA)	MIN	MAX
KSK65	12	2	20	0.04	0.8	4.5	0.3	0.5	4.5				
KSK161	18	10	200	1	10	10		9	10	10	1	0.4	4

1.7.3 TO-92 Type J-FET

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			V _{GS(OFF)} (V)			
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX
KSK30	50	10	100	0.3	6.5	10	1.2		10	10	0.1	0.4	5
KSK117	50	10	300	0.6	14	10	4	15	10	10	0.1	0.2	1.5

1

2. POWER TRANSISTORS

2-1. General Purpose Transistors

2.1.1 TO-126 Type Transistors

I _c (A)	V _{CE} D (V)	Device Type		h _{FE}				V _{CE(SAT)} (V)				f _T (MHz)				P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
0.1	180	KSC2682	KSA1142	5	0.01	100	320	0.05	0.005	0.16	0.5	10	0.02		180	8
0.2	300	KSC2688		10	0.01	40	250	0.05	0.005		1.5	30	0.01	50	80	10
0.5	300	MJE340	MJE350	10	0.05	30	240									20
1.2	120	KSC2690	KSA1220	5	0.3	60	320	1	0.2	0.4	0.7	5	0.2		175	20
	160	KSC2690A	KSA1220A	5	0.3	60	320	1	0.2	0.4	0.7	5	0.2		11	20
3	30	KSD882	KSB772	2	1	60	400	2	0.2	0.3	0.5	5	0.1		80	10
	40	MJE180	MJE170	1	0.1	50	250	3	0.6		1.7	10	0.1	50		12.5
	45	KSD794	KSB744	5	0.5	60	320	1.5	0.15	0.5	2	5	0.1		45	10
	60	KSD794A	KSB744A	5	0.5	60		1.5		0.5	2	5	0.1		45	10
		MJE181	MJE171	1	0.1	50	250	3	0.6		1.7	10	0.1	50		12.5
80	MJE182	MJE172	1	0.1	50	250	3	0.6		1.7	10	0.1	50		12.5	
5	25	MJE200	MJE210	1	2	45	180	2	0.2		0.75	10	0.1	65		15
	60	KSD1691	KSB1151	1	2	100	400	2	0.2	0.1	0.3					20

2.1.2 TO-202 Type Transistors

I _c (A)	V _{CE} D (V)	Device Type		h _{FE}				V _{CE(SAT)} (V)				f _T (MHz)				P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
0.2	250	KSC1520		10	0.01	40	240	0.05	0.005		2	30	0.01	40	80	10
	300	KSC1520A		10	0.01	40	240	0.05	0.005		2	30	0.01	40	80	10
2	30	KSC1096	KSA634	5	1	40	240	1.5	0.15	0.3	0.7					10
	45	KSC1098	KSA636	5	0.5	40	240	1	0.1	0.15	0.7					10

2.1.3 TO-220 Type Transistors

Ic (A)	V _{CEO} (V)	Device Type		hFE				V _{CE(SAT)} (V)				f _T (MHz)				P _c (W)	
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP		
0.2	300	KSC1507		10	0.01	40	240	0.05	0.005		2	30	0.01	40	80	15	
1	40	TIP29	TIP30	4	1	15	75	1	0.125		0.7	10	0.2	3		30	
	60	TIP29A	TIP30A	4	1	15	75	1	0.125		0.7	10	0.2	3		30	
	80	TIP29B	TIP30B	4	1	15	75	1	0.125		0.7	10	0.2	3		30	
	100	TIP29C	TIP30C	4	1	15	75	1	0.125		0.7	10	0.2	3		30	
	250	TIP47		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40	
	300	TIP48		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40	
	350	TIP49		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40	
	400	TIP50		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40	
1.5	150	KSC2073	KSA940	10	0.5	40	140	0.5	0.05		1.5	10	0.5	4		25	
2	150	KSD401	KSB546	10	0.4	40	240					10	0.4		5	25	
3	30	KSC1173	KSA473	2	0.5	70	240	2	0.2	0.3	0.8	2	0.5		100	10	
	40	TIP31	TIP32	4	3	10	50	3	0.375		1.2	10	0.5	3		40	
	55	KSD288	KSA614	5	0.5	40	240	1	0.1	0.15	0.5					25	
	60	TIP31A	TIP32A	4	3	10	50	3	0.375		1.2	10	0.5	3		40	
		KSD880	KSB834	5	0.5	60	200	3	0.3	0.5		5	0.5		9	30	
		KSC1983		4	0.5	500		2	0.05		1	12	0.2		15	30	
	80	TIP31B	TIP32B	4	3	10	50	3	0.375		1.2	10	0.5	3		40	
100	TIP31C	TIP32C	4	3	10	50	3	0.375		1.2	10	0.5	3		40		
4	60	KSC2233		5	1	30	150	4	0.4		1	5	0.5		10	40	
	80	KSD526	KSB596	5	0.5	40	240	3	0.3	1.0	1.7	5	0.5	3		30	
5	60	KSD73		10	1	70	240	5	0.5		2	10	0.3		20	30	
	70	KSD362		5	5	20	140	5	0.5		1	5	0.5		10	40	
	100	KSC2517		5	2	40	200	3	0.3		0.6					30	
6	40	TIP41	TIP42	4	3	15	75	6	0.6		1.5	10	0.5	3		65	
	60	TIP41A	TIP42A	4	3	15	75	6	0.6		1.5	10	0.5	3		65	
	80	TIP41B	TIP42B	4	3	15	75	6	0.6		1.5	10	0.5	3		65	
	100	TIP41C	TIP42C	4	3	15	75	6	0.6		1.5	10	0.5	3		65	
	120	KSD363		5	1	40	240	1	0.1		1	5	0.5		10	40	
7	60	KSD568	KSB707	1	3	40	200	5	0.5		0.5					40	
	80	KSD569	KSB708	1	3	40	200	5	0.5		0.5					40	
	100	KSC2334	KSA1010	5	3	40	200	5	0.5		0.6					40	
	150	BU407							5	0.5		1	10	0.5	10		60
		BU407H							5	0.8		1	10	0.5	10		
	200	BU406							5	0.5		1	10	5	10		60
		BU406H							5	0.8		1	10	5	10		
BU408								6	1.2		1	10	5	10			
10	60	MJE 3055T	MJE 2955T	4	4	20	100	4	0.4		1.1	10	0.5	2		75	

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2-2. Darlington Transistors

2.2.1 TO-126 Type Transistors

Ic (A)	V _{CEO} (V)	Device Type		h _{FE}				V _{CE(SAT)} (V)				f _T (MHz)				P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _b (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
1.5	60	KSD985	KSB794	2	1	2K	3K	1A	0.001		1.5				10	
	80	KSD986	KSB795	2	1	2K	3K	1A	0.001		1.5				10	
3	60	KSD1693	KSB1150	2	1.5	2K	20K	1.5	0.0015	0.9	1.2				15	
	100	KSD1692	KSB1149	2	1.5	2K	20K	1.5	0.0015	0.9	1.2				15	
4	60	MJE800	MJE700	3	1.5	0.75K		1.5	0.03		2.5				40	
		MJE801	MJE701	3	2	0.75K		2	0.04		2.8					
	80	MJE802	MJE702	3	1.5	0.75K		1.5	0.03		2.5				40	
		MJE803	MJE703	3	2	0.75K		2	0.04		2.8					

2.2.2 TO-220 Type Transistors

Ic (A)	V _{CEO} (V)			h _{FE}				V _{CE(SAT)} (V)				f _T				P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	V _{CE} (A)	I _c (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
2	60	TIP110	TIP115	4	2	0.5K		2	0.008		2.5				50	
	80	TIP111	TIP116	4	2	0.5K		2	0.008		2.5				50	
	100	TIP112	TIP117	4	2	0.5K		2	0.008		2.5				50	
5	60	TIP120	TIP125	3	3	1K		3	0.012		2				65	
	80	TIP121	TIP126	3	3	1K		3	0.012		2				65	
	100	TIP122	TIP127	3	3	1K		3	0.012		2				65	
		KSD560	KSB601	2	3	2K	15K	3	0.003		1.5				30	
8	60	TIP100	TIP105	4	3	1K	20K	3	0.006		2				80	
	80	TIP101	TIP106	4	3	1K	20K	3	0.006		2				80	
	100	TIP102	TIP107	4	3	1K	20K	3	0.006		2				80	
	150	BU807						5	0.05		1.5				60	
	200	BU806						5	0.05		1.5				60	
10	60	TIP140T	TIP145T	4	5	1K		5	0.01		2				80	
	80	TIP141T	TIP146T	4	5	1K		5	0.01		2				80	
	100	TIP142T	TIP147T	4	5	1K		5	0.01		2				80	

2.2.3 TO-3P & TO-3P(F) Type Transistors

Ic	V _{CEO}			h _{FE}				V _{CE(SAT)}				f _T				P _c	PKG
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP		
10	60	TIP140F	TIP145F	4	5	1K		5	0.01		2				60	TO-3P(F)	
		TIP140	TIP145	4	5	1K		5	0.01		2				125	TO-3P	
	80	TIP141F	TIP142F	4	5	1K		5	0.01		2				60	TO-3P(F)	
		TIP141	TIP142	4	5	1K		5	0.01		2				125	TO-3P	
	100	TIP142F	TIP142F	4	5	1K		5	0.01		2				60	TO-3P(F)	
		TIP142	TIP147	4	5	1K		5	0.01		2				125	TO-3P	

2-3. Switching Transistors

V _{CEO} (V)	I _c (A)	Device (NPN)	h _{FE}				V _{CE(SAT)} (V)				Switching Time			P _c (W)	Package	Structure
			V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	t _{on} MAX (μS)	t _{stg} MAX (μS)	t _f MAX (μS)			
400	0.5	KSC2752	5	0.05	20	80	0.3	0.06		1	1	2.5	1	10	TO-126	
	2	KSC2333	5	0.1	20	80	0.5	0.1		1	1	2.5	1	15	TO-220	
	5	KSC2518	5	0.5	20	80	2	0.4		1	1	2.5	0.7	40	TO-220	
	7	KSC2335	5	1	20	80	3	0.6		1	1	2.5	1	40	TO-220	
	10	KSC2749	5	1	15	80	6	1.2		1	1	2.5	0.7	100	TO-3P	
	15	KSC2751	5	2	15	80	10	2	0.3	1	1	2.5	0.7	120	TO-3P	
500	3	KSC5020	5	0.3	15	50	1.5	0.3		1	0.5	3	0.3	40	TO-220	MBIT
	4	*KSC5022	5	0.3	15	50	1.5	0.3		1	0.5	3	0.3	60	TO-3P	MBIT
	5	*KSC5021	5	0.6	15	50	3	0.6		1	0.5	3	0.3	50	TO-220	MBIT
	7	*KSC5023	5	0.6	15	50	3	0.6		1	0.5	3	0.3	80	TO-3P	MBIT
	10	*KSC5024	5	0.8	15	50	4	0.8		1	0.5	3	0.3	90	TO-3P	MBIT
	15	*KSC5025	5	1.2	15	50	6	1.2		1	0.5	3	0.3	100	TO-3P	MBIT
800	1.5	*KSC5026	5	0.1	10	40	0.75	0.15		2	0.5	3	0.3	40	TO-220	MBIT
	3	*KSC5027	5	0.2	10	40	1.5	0.3		2	0.5	3	0.3	50	TO-220	MBIT
		*KSC5028	5	0.2	10	40	1.5	0.3		2	0.5	3	0.3	80	TO-3P	MBIT
		4.5	*KSC5029	5	0.3	10	40	2	0.4		2	0.5	3	0.3	90	TO-3P
	6	*KSC5030	5	0.4	10	40	3	0.6		2	0.5	3	0.3	100	TO-3P	MBIT
	8	*KSC5031	5	0.6	10	40	4	0.8		2	0.5	3	0.3	140	TO-3P	MBIT

*: Under Development.

2-4. Horizontal Deflection Output Transistors

2.4.1 TO-3P Type Transistors

V _{CEO} (V)	V _{CEO} (V)	I _c (A)	Device (NPN)	h _{FE}				V _{CE(SAT)} (V)				Switching Time			P _c (W)	Comment
				V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	t _{on}	t _{stg}	t _f		
												MAX (μS)	MAX (μS)	MAX (μS)		
1500	800	2.5	KSD5000	5	0.5	8		2	0.6		8			0.4	80	Built in Damper Diode
		3.5	KSD5001	5	0.5	8		2.5	0.8		8			0.4	80	Built in Damper Diode
		5	KSD5002	5	1	8		4	0.8		5			0.4	120	Built in Damper Diode
		6	KSD5003	5	1	8		5	1		5			0.4	120	Built in Damper Diode
		2.5	KSD5004	5	0.5	8		2	0.6		8			0.4	80	
		3.5	KSD5005	5	0.5	8		2.5	0.8		8			0.4	80	
		5	KSD5006	5	1	8		4	0.8		5			0.4	120	
		6	KSD5007	5	1	8		5	1		5			0.4	120	

2.4.2 TO-3P(F) Type Transistors

V _{CEO} (V)	V _{CEO} (V)	I _c (A)	Device (NPN)	h _{FE}				V _{CE(SAT)} (V)				Switching Time			P _c (W)	Comment
				V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	t _{on}	t _{stg}	t _f		
												MAX (μS)	MAX (μS)	MAX (μS)		
1500	800	2.5	KSD5010	5	0.5	8		2	0.6		8			0.4	50	Built in Damper Diode
		3.5	KSD5011	5	0.5	8		2.5	0.8		8			0.4	50	Built in Damper Diode
		5	KSD5012	5	1	8		4	0.8		5			0.4	60	Built in Damper Diode
		6	KSD5013	5	1	8		5	1		5			0.4	60	Built in Damper Diode
		2.5	KSD5014	5	0.5	8		2	0.6		8			0.4	50	
		3.5	KSD5015	5	0.5	8		2.5	0.8		8			0.4	50	
		5	KSD5016	5	1	8		4	0.8		5			0.4	60	
		6	KSD5017	5	1	8		5	1		5			0.4	60	

3. QUICK REFERENCE TABLE (APPLICATION)

3.1 Audio Equipment

Package Application		SOT-23	TO-92	TO-92L	TO-126	TO-220
FM	RM AMP	KSC2223	KSC1674			
	Mix, Conv	KSC2223	KSC1674			
	Local Osc	KSC2223	KSC1674, KSC1675			
	IF	KSC2715	KSC838, KSC1675			
AM	RF	KSC1623	KSC945, KSC815			
	Conv Osc	KSC2715	KSC1675, KSC945			
	IF	KSC2715	KSC838 KSC1675, KSC945 KSC838			
Diff Amp	10W	KSA812, KSC1623	KSA733, KSC945			
	20W	KSA812, KSC1623	KSA733, KSC945			
	25W	KSA812, KSC1623	KSA733, KSC945			
	30W	KSA812, KSC1623	KSA733, KSC945			
	35W	KSA812, KSC1623	KSA733, KSC945			
	40W		KSA992, KSC1845			
	50W		KSA992, KSC1845			
	60W		KSA991, KSC1845			
	80W		KSA992, KSC1845			
	100W		KSA992, KSC1845			
	150W		KSA992, KSC1845			
Pre Driver	20W		KSA954, KSC2003			
	25W		KSA954, KSC2003			
	30W			KSA910, KSC2310		
	35W			KSA910, KSC2310		
	40W			KSA910, KSC2310		
	50W			KSA910, KSC2310		
	60W			KSA910, KSC2310		
	80W			KSA910, KSC2310		
	100W			KSA910, KSC2310		
	150W				KSA1142, KSC2682	
20W				KSA1142, KSC2682		
					KSA1142, KSC2682	
Driver	3W		KSA642, KSD227			
	5W		KSA642, KSD227			
	10W		KSA954, KSC2003			
	20W		KSA954, KSC2003			
	25W		KSA954, KSC2003			
	30W		KSA954, KSC2003			
	40W			KSA916, KSC2316		
	50W			KSA916, KSC2316		
	60W				KSA1220, KSC2690	
	80W				KSA1220, KSC2690	
					KSA1220A, KSC2690A	
Output	3W			KSA928A, KSC2328A		
	5W					
	10W					
	20W					
	25W				KSB772, KSD882	
	30W				KSB744, KSD794	
	35W					KSB834, KSD880 KSA614, KSD288 KSB596, KSD526 TIP41C, TIP42C TIP41C, TIP42C

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3.2 Video Equipment

Application			Package	Color TV	B/W TV	
Tuner	VHF	RF	SOT-23	KSC2755	KSC2755	
			TO-92		KSC1393	
		MIX	SOT-23	KSC2756	KSC2756	
			TO-92	KSC1393,MPSH24	KSC1394,MPSH24	
		UHF	SOT-23	KSC2757,KSC2759,MMBR5179	KSC2757,KSC2759,MMBR5179	
			TO-92	KSC1730,MPS5179,MPSH10	KSC1730,MPS5179,MPSH10	
	UHF	RF	DISK	KSC1070	KSC1070	
			SOT-23	KSC2758	KSC2758	
		MIX	DISK	KSC1070	KSC1070	
			SOT-23	KSC2758	KSC2758	
		UHF	SOT-23	KSC2757,KSC2759,MMBR5179	KSC2757,KSC2759,MMBR5179	
			TO-92	KSC1730,MPS5179,MPSH10	KSC1730,MPS5179,MPSH10	
		Video Chroma	Output	TO-92	KSA643,KSA733	KSA733,KSC945
				TO-92L	KSC2330,KSC2340	KSC2330,KSC2340
TO-202	KSC1520A			KSC1520A		
TO-126	KSC2688					
TO-220	KSC1257			KSC1507		
Vertical Deflection	OSC		TO-92		KSC945,KSA733	
	Driver		TO-92		KSA642,KSA643,KSD227,KSD261	
			TO-92L	KSC2310,KSA910		
	Output		TO-220	KSB546,KSD401,KSA940,KSC2073	KSD880,KSD288,KSA614,KSB834	
			TO-126	KSA1220A,KSC2690A	KSA1220A,KSC2690A,KSB772,KSD882	
			TO-202		KSC1096,KSA634	
			TO-92L		KSC2328,KSA928A	
Sound	Output		TO-126	KSA1220A,KSC2690A		
			TO-220	KSB546,KSD401,KSA940,KSC2073		
			TO-202			
			TO-92L	KSC2383,KSA1013	KSC2328A,KSA928A	
			TO-92		KSD261,KSB564,KSB1116,KSA643,KSD471,KSD1616	
AGC		TO-92	KSC945,KSA733	KSC945,KSA733		
Sync Separator		TO-92	KSC945,KSA733	KSC945,KSA733		
Horizontal Deflection	OSC		TO-92	KSC945,KSA733	KSC945,KSA733	
	Driver		TO-92			
			TO-92L	KSC2330,KSC2316,KSA916		
	Output		TO-3P	KSD5000,KSD5001,KSD5002,KSD5003	KSD5004,KSD5005,KSD5006,KSD5007	
		TO-220		KSD362,KSD73		
Series Regulator	Error Amp		TO-92		KSA733,KSC945	
			TO-92L	KSC2310,KSA910		
	Driver		TO-92		KSA733,KSC945	
			TO-92L	KSC2310,KSA910		
	Output		TO-220	KSD560	KSD288,KSD880,KSB834,KSA614	
			TO-126		KSB772,KSD882	
			TO-202		KSC1096,KSA634	
Switching	Driver		TO-92	KSD471A,KSB564A,KSD261,KSA643	KSD471A,KSB564A,KSD261,KSA643	
Regulator	Output		TO-3P	KSD5007	KSD5007	

SOT-23 TYPE

I_c V_{CE0}	20mA	30mA	50mA	0.1A	0.2A	0.3A	0.5A	0.6A	0.8A	10mA
12V			MMBR5179							
14V			KSC2734 KSC2759							
15V			KSC3120 KSC2757							
20V	KSC2223	KSC2756		BCW29-33						(2mA) KSK123
25V	KSC2758		KSC3125 MMBT5089 MMBC1009F1-5	MMBTH10	MMBTA4124 MMBTA4126				KSA1298 KSC3265	
30V	KSC2755		KSC2715 MMBT5088	MMBTH24	MMBTA4123 MMBTA4125	MMBTA13 MMBTA14	KSA1182 KSC2859 MMBTA63 MMBTA64	MMBT2222		
32V				BCW60A-D BCW61A-D						
35V				MMBC1622D6-8						
40V				MMBA812M3-7 MMBC1623L3-7 MMBTA20 MMBTA70 KSR1109-12 KSR2109-12	MMBT3903 MMBT3904 MMBT3906		MMBT6427	MMBT2222A MMBT2907 MMBT4401 MMBT4403		
45V			MMBA811C5-8	BCW69-72 BCW70G-K BCW71G-K	MMBT6429					
50V			MMBT5086 MMBT5087	KSA812 KSC1623 KSR1101-8 KSR2101-8 KSR1113/4 KSR2113/4	MMBT6428					
60V			MMBT2484				MMBTA05 MMBTA55	MMBT2907A		
80V							MMBTA06 MMBTA56			
140V								MMBT5550		
150V							MMBT5401			
200V							MMBTA43 MMBTA93			
300V							MMBTA42 MMBTA92			

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TO-92S, TO-92 & TO-92L TYPE (V_{CEO}: 12V~60V)

V _{CEO} I _c	12V	15V	20V	25V	30V	35V	40V	45V	50V	60V
20mA	KSK65 (2mA)	KSC1395	KSK161(10mA) KSK211(10mA) KSC1674 KSC2786	KSC1070	KSC1393 KSC1394				KSK117 (10mA) KSK30 (10mA)	
25mA			SS9016							
30mA			KSC1187 KSC1188		SS9011 KSC838 KSC2669					
50mA	MPS5179	KSC1730 SS9018		KSA542 KSC184 KSC2787 KSC388 KSC900 2N5089	2N5088 KSC1675			KSA640 KSC1222	2N5086 2N5087 2N5209 2N5210	
0.1A		MPSH17		MPS5172 MPS6520 MPS6521 MPS6522 MPS6523 MPSH10 MPSH11	KSC839 KSC921 MPSH20 MPSH24		KSC1330 MPS6513 MPS6517 MPSA10 MPSA20 MPSA70 KSR1009-12 KSR2009-12 KSR1209-12 KSR2209-12	SS9014 SS9015	KSR1201-8 KSR1213/4 KSR2201-8 KSR2213/4 KSR1001-8 KSR2001-8 KSR1013/4 KSR2013/4	
0.15A							MPS4250		KSA1175 KSC2785 KSA733 KSC945	MPS4250A MPS4249
0.2A				2N4124 2N4126	2N4123 2N4125		2N3903 2N3904 2N3905 2N3906 MPS8097	KSA539 KSC815	2N6428 2N6428A	KSA545 KSC853
0.3A				KSC3488 KSA1378 KSA642 KSD227						KSA953 KSC2002
0.5A			MPSA12 MPSA62 KSA643 KSD261 SS9012 SS9013 KSA1150 KSC2710	MPS6560 MPS6562	MPSA13 MPSA14 MPSA63 MPSA64		2N6427 MPSA25 MPSA75		MPSA26 MPSA76	MPS8098 MPS8598 MPSA05 MPSA55 MPSA27 MPSA77
0.6A			MPS3706	MPS3702	MPS2222 MPS3703 MPS3704 MPS3705		2N4400 2N4401 2N4402 2N4403 MPS2222A MPS2907			MPS2907A
0.7A				KSB810 KSB811				KSA707 KSC1072		KSA708 KSC1008 KSA931 KSC2331

TO-92S, TO-92 & TO-92L TYPE (Continued)

V_{CE0} I_c	12V	15V	20V	25V	30V	35V	40V	45V	50V	60V
0.8A										
1A				KSB564A KSB811 MPS6601 MPS6651	KSD1021 KSD471A		MPS6602		KSB1116 KSD1616	KSB116A KSD1616A
1.5A				SS8050 SS8550						
2A	(10V) KSC2500				KSA928A KSC2328A					

TO-92S, TO-92 & TO-92L Type (V_{CE0} : 80V~400V)

V_{CE0} I_c	80V	100V	120V	140V	150V	160V	200V	250V	300V	350V	400V
20mA											
25mA											
30mA											
50mA			KSA992 KSC1845 KSA1174 KSC2874		KSA910 KSC2310						
0.1mA									KSC1506 KSC2330	KSC2340	
0.15A			MPSL01								
0.2A											
0.3A	KSA954 KSC2003									MPSA45	MPSA44
0.5A	MPS8099 MPS8599 MPSA06 MPSA56						MPSA43 MPSA93	2N6515 2N6518	2N6519 MPSA92 2N6516 MPSA42	2N6517 2N6520	
0.6A		MPSL51	2N5400	2N5550	2N5401	2N5551					

TO-92S, TO-92 & TO-92L Type (continued)

V_{CE0} I_c	80V	100V	120V	140V	150V	160V	200V	250V	300V	350V	400V
0.7A				KSC1009	KSA709						
0.8A			KSA916 KSC2316								
1A						KSA1013 KSC2383					
1.5A											
2A											

TO-126 & TO-202 TYPE (V_{CE0} : 25V~400V)

V_{CE0} I_c	25V	30V	40V	45V	60V	80V	100V	120V	160V	180V	250V	300V	400V
0.1A										KSC2682 KSA1142			
0.2A											KSC1520	KSC2688 KSC1520A	
0.5A												MJE340 MJE350	KSC2752
1.2A								KSC2690 KSA1220	KSC2690A KSA1220A				
1.5A					KSD985 KSB794	KSD986 KSB795							
2A		KSC1096 KSA634		KSC1098 KSA636									
3A		KSD882 KSB772	MJE170 MJE180	KSD794 KSB744	KSD794A KSB744A MEJ171 MJE181 KSD1693 KSB1150	MJE172 MJE182	KSD1692 KSB1149						
4A					MJE700 MJE701 MJE800 MJE801	MJE702 MJE703 MJE802 MJE803							
5A	MJE200 MJE210				KSD1691 KSB1151								

TO-220 TYPE

V_{CE0} I_c	30V	40V	55V	60V	70V	80V	100V	120V	150V	200V	250V	300V	350V	400V	500V	800V
0.2												KSC1507				
1		TIP29 TIP30		TIP29A TIP30A		TIP29B TIP30B	TIP29C TIP30C					TIP47	TIP48	TIP49	TIP50	
1.5									KSC2073 KSA940							*KSC5026
2A				TIP110 TIP115		TIP111 TIP116	TIP112 TIP117		KSD401 KSB546					KSC2333		
3A	KSC1173 KSA473	TIP31 TIP32	KSD288 KSA614	TIP31A TIP32A KSD880 KSB834 KSC1983		TIP31B TIP32B	TIP31C TIP32C								KSC5020	*KSC5027
4A				KSC2233		KSD526 KSB596										
5A				KSD73 TIP120 TIP125	KSD362	TIP121 TIP126	KSC2517 TIP122 TIP127 KSB601 KSD560							KSC2518	*KSC5021	
6		TIP41 TIP42		TIP41A TIP42A		TIP41B TIP42B	TIP41C TIP42C	KSD363						KSC2335		
7				KSD568 KSB707		KSD569 KSB708	KSC2334 KSA1010		BU407 BU407H	BU406 BU406H BU408						
8				TIP100 TIP105		TIP101 TIP106	TIP102 TIP107		BU807	BU806						
10				MJE3055T MJE2955T TIP140T TIP145T		TIP141T TIP146T	TIP142T TIP147T									

TO-3P & TO-3P(F) TYPE

V_{CE0} I_c	2.5A	3A	3.5A	4A	4.5A	5A	6A	7A	8A	10A	15A
400										KSC2749	KSC2751
500				*KSC5022				*KSC5023		*KSC5024	*KSC5025
800	KSD5000 KSD5004 KSD5010 KSD5014	*KSC5028	KSD5000 KSD5005 KSD5011 KSD5012		*KSC5029	KSD5002 KSD5006 KSD5012 KSD5016	*KSC5030 KSD5003 KSD5007 KSD5013 KSD5017		*KSC5031		

* Under Development

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1. N-CHANNEL Power MOSFETs

$V_{DSS}(V)$	$I_b(A)$	$R_{DS(on)}(\Omega)$	Package	Part Number	Remark
50.00	10.00	0.28	TO-3	SSM10N05	
	10.00	0.28	TO-3P	SSH10N05	
	10.00	0.28	TO-220	SSP10N05	
	12.00	0.20	TO-3	SSM12N05	
	12.00	0.20	TO-3P	SSH12N05	
	12.00	0.20	TO-220	SSP12N05	
60.00	0.40	3.20	TO-126	IRFA1Z3	
	3.50	0.80	TO-220	IRF513	
	4.00	0.60	TO-220	IRF511	
	7.00	0.40	TO-3	IRF123	
	7.00	0.40	TO-220	IRF523	
	8.00	0.30	TO-3	IRF121	
	8.00	0.30	TO-220	IRF521	
	10.00	0.28	TO-3	SSM10N06	
	10.00	0.28	TO-3P	SSH10N06	
	10.00	0.28	TO-220	SSP10N06	
	12.00	0.25	TO-3	IRF133	
	12.00	0.25	TO-3P	IRFP133	
	12.00	0.25	TO-220	IRF533	
	12.00	0.20	TO-3	SSM12N06	
	12.00	0.20	TO-3P	SSH12N06	
	12.00	0.20	TO-220	SSP12N06	
	14.00	0.18	TO-3	IRF131	
	14.00	0.18	TO-3P	IRFP131	
	14.00	0.18	TO-220	IRF531	
	24.00	0.11	TO-3	IRF143	
	24.00	0.11	TO-3P	IRFP143	
	24.00	0.11	TO-220	IRF543	
	27.00	0.085	TO-3	IRF141	
	27.00	0.085	TO-3P	IRFP141	
	27.00	0.085	TO-220	IRF541	
	33.00	0.08	TO-3	IRF153	
	33.00	0.08	TO-3P	IRFP153	
40.00	0.055	TO-3	IRF151		
40.00	0.055	TO-3P	IRFP151		
80.00	10.00	0.33	TO-3	SSM10N08	
	10.00	0.33	TO-3P	SSH10N08	
	10.00	0.33	TO-220	SSP10N08	
	12.00	0.18	TO-3	SSM12N08	
	12.00	0.18	TO-3P	SSH12N08	
	12.00	0.18	TO-220	SSP12N08	
100.00	0.50	2.40	TO-126	IRFA1Z0	
	3.50	0.80	TO-220	IRF512	
	4.00	0.60	TO-220	IRF510	
	7.00	0.40	TO-3	IRF122	
	7.00	0.40	TO-220	IRF522	
	8.00	0.30	TO-3	IRF120	
	8.00	0.30	TO-220	IRF520	
	10.00	0.33	TO-3	SSM10N10	
	10.00	0.33	TO-3P	SSH10N10	
	10.00	0.33	TO-220	SSP10N10	



N-CHANNEL Power MOSFETS (continued)

BV _{DSS} (V)	I _D (A)	R _{DS(on)} (Ω)	Package	Part Number	Remark
100.00	12.00	0.18	TO-3	SSM12N10	
	12.00	0.18	TO-3P	SSH12N10	
	12.00	0.18	TO-220	SSP12N10	
	12.00	0.25	TO-3	IRF132	
	12.00	0.25	TO-3P	IRFP132	
	12.00	0.25	TO-220	IRF532	
	14.00	0.18	TO-3	IRF130	
	14.00	0.18	TO-3P	IRFP130	
	14.00	0.18	TO-220	IRF530	
	24.00	0.11	TO-3	IRF142	
	24.00	0.11	TO-3P	IRFP142	
	24.00	0.11	TO-220	IRF542	
	27.00	0.085	TO-3	IRF140	
	27.00	0.085	TO-3P	IRFP140	
	27.00	0.085	TO-220	IRF540	
	33.00	0.08	TO-3	IRF152	
	33.00	0.08	TO-3P	IRFP152	
	40.00	0.055	TO-3	IRF150	
	40.00	0.055	TO-3P	IRFP150	
	120.00	7.00	0.70	TO-3	SSM7N12
7.00		0.70	TO-3P	SSH7N12	
7.00		0.70	TO-220	SSP7N12	
8.00		0.50	TO-3	SSM8N12	
8.00		0.50	TO-3P	SSH8N12	
8.00	0.50	TO-220	SSP8N12		
150.00	2.00	2.40	TO-220	IRF613	
	2.50	1.50	TO-220	IRF611	
	4.00	1.20	TO-3	IRF223	
	4.00	1.20	TO-220	IRF623	
	5.00	0.80	TO-3	IRF221	
	5.00	0.80	TO-220	IRF621	
	7.00	0.70	TO-3	SSM7N15	
	7.00	0.70	TO-3P	SSH7N15	
	7.00	0.70	TO-220	SSP7N15	
	8.00	0.60	TO-3	IRF233	
	8.00	0.60	TO-3P	IRFP233	
	8.00	0.60	TO-220	IRF633	
	8.00	0.50	TO-3	SSM8N15	
	8.00	0.50	TO-3P	SSH8N15	
	8.00	0.50	TO-220	SSP8N15	
	9.00	0.40	TO-3	IRF231	
	9.00	0.40	TO-3P	IRFP231	
	9.00	0.40	TO-220	IRF631	
	16.00	0.22	TO-3	IRF243	
	16.00	0.22	TO-3P	IRFP243	
	16.00	0.22	TO-220	IRF643	
	18.00	0.18	TO-3	IRF241	
	18.00	0.18	TO-3P	IRFP241	
	18.00	0.18	TO-220	IRF641	
	25.00	0.12	TO-3	IRF253	
25.00	0.12	TO-3P	IRFP253		

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N-CHANNEL Power MOSFETS (continued)

V_{DSS}(V)	I_D(A)	R_{DSON}(Ω)	Package	Part Number	Remark
150.00	30.00	0.085	TO-3	IRF251	
	30.00	0.085	TO-3P	IRFP251	
	40.00	0.05	TO-3	SSM40N15	
	40.00	0.05	TO-3P	SSH40N15	
180.00	7.00	0.70	TO-3	SSM7N18	
	7.00	0.70	TO-3P	SSH7N18	
	7.00	0.70	TO-220	SSP7N18	
	8.00	0.50	TO-3	SSM8N18	
	8.00	0.50	TO-3P	SSH8N18	
	8.00	0.50	TO-220	SSP8N18	
200.00	2.00	2.40	TO-220	IRF612	
	2.50	1.50	TO-220	IRF610	
	4.00	1.20	TO-3	IRF222	
	4.00	1.20	TO-220	IRF622	
	5.00	0.80	TO-3	IRF220	
	5.00	0.80	TO-220	IRF620	
	7.00	0.70	TO-3	SSM7N20	
	7.00	0.70	TO-3P	SSH7N20	
	7.00	0.70	TO-220	SSP7N20	
	8.00	0.60	TO-3	IRF232	
	8.00	0.60	TO-3P	IRFP232	
	8.00	0.60	TO-220	IRF632	
	8.00	0.50	TO-3	SSM8N20	
	8.00	0.50	TO-3P	SSH8N20	
	8.00	0.50	TO-220	SSP8N20	
	9.00	0.40	TO-3	IRF230	
	9.00	0.40	TO-3P	IRFP230	
	9.00	0.40	TO-220	IRF630	
	16.00	0.22	TO-3	IRF242	
	16.00	0.22	TO-3P	IRFP242	
	16.00	0.22	TO-220	IRF642	
	18.00	0.18	TO-3	IRF240	
	18.00	0.18	TO-3P	IRFP240	
	18.00	0.18	TO-220	IRF640	
25.00	0.12	TO-3	IRF252		
25.00	0.12	TO-3P	IRFP252		
30.00	0.085	TO-3	IRF250		
30.00	0.085	TO-3P	IRFP250		
40.00	0.05	TO-3P	SSM40N20		
40.00	0.05	TO-3	SSH40N20		
350.00	1.30	5.00	TO-220	IRF713	
	1.50	3.60	TO-220	IRF711	
	2.50	2.50	TO-3	IRF323	
	2.50	2.50	TO-220	IRF723	
	3.00	1.80	TO-3	IRF321	
	3.00	1.80	TO-220	IRF721	
	5.00	1.50	TO-3	IRF333	
	5.00	1.50	TO-3P	IRFP333	
	5.00	1.50	TO-220	IRF733	
	5.00	1.00	TO-3	SSM5N35	

N-CHANNEL Power MOSFETs (continued)

BV_{DSS}(V)	I_D(A)	R_{DS(on)}(Ω)	Package	Part Number	Remark
350.00	5.00	1.00	TO-3P	SSH5N35	
	5.00	1.00	TO-220	SSP5N35	
	5.50	1.00	TO-3	IRF331	
	5.50	1.00	TO-3P	IRFP331	
	5.50	1.00	TO-220	IRF731	
	8.00	0.80	TO-3	IRF343	
	8.00	0.80	TO-3P	IRFP343	
	8.00	0.80	TO-220	IRF743	
	10.00	0.55	TO-3	IRF341	
	10.00	0.55	TO-3P	IRFP341	
	10.00	0.55	TO-220	IRF741	
	13.00	0.40	TO-3	IRF353	
	13.00	0.40	TO-3P	IRFP353	
	15.00	0.30	TO-3	IRF351	
	15.00	0.30	TO-3P	IRFP351	
	25.00	0.20	TO-3	SSM25N35	
	25.00	0.20	TO-3P	SSH25N35	
400.00	1.30	5.00	TO-220	IRF712	
	1.50	3.60	TO-220	IRF710	
	2.50	2.50	TO-3	IRF322	
	2.50	2.50	TO-220	IRF722	
	3.00	1.80	TO-3	IRF320	
	3.00	1.80	TO-220	IRF720	
	5.00	1.50	TO-3	IRF332	
	5.00	1.50	TO-3P	IRFP332	
	5.00	1.50	TO-220	IRF732	
	5.00	1.00	TO-3	SSM5N40	
	5.00	1.00	TO-3P	SSH5N40	
	5.00	1.00	TO-220	SSP5N40	
	5.50	1.00	TO-3	IRF330	
	5.50	1.00	TO-3P	IRFP330	
	5.50	1.00	TO-220	IRF730	
	8.00	0.80	TO-3	IRF342	
	8.00	0.80	TO-3P	IRFP342	
	8.00	0.80	TO-220	IRF742	
	10.00	0.55	TO-3	IRF340	
	10.00	0.55	TO-3P	IRFP340	
	10.00	0.55	TO-220	IRF740	
	13.00	0.40	TO-3	IRF352	
	13.00	0.40	TO-3P	IRFP352	
15.00	0.30	TO-3	IRF350		
15.00	0.30	TO-3P	IRFP350		
25.00	0.20	TO-3	SSM25N40		
25.00	0.20	TO-3P	SSH25N40		
450.00	2.00	4.00	TO-3	IRF423	
	2.00	4.00	TO-220	IRF823	
	2.50	3.00	TO-3	IRF421	
	2.50	3.00	TO-220	IRF821	
	4.00	2.00	TO-3	IRF433	
	4.00	2.00	TO-3P	IRFP433	
	4.00	2.00	TO-220	IRF833	

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N-CHANNEL Power MOSFETs (continued)

$V_{DSS}(V)$	$I_D(A)$	$R_{DS(on)}(\Omega)$	Package	Part Number	Remark
450.00	4.00	1.50	TO-3	SSM4N45	
	4.00	1.50	TO-3P	SSH4N45	
	4.00	1.50	TO-220	SSP4N45	
	4.50	1.50	TO-3	IRF431	
	4.50	1.50	TO-3P	IRFP431	
	4.50	1.50	TO-220	IRF831	
	7.00	1.10	TO-3	IRF443	
	7.00	1.10	TO-3P	IRFP443	
	7.00	1.10	TO-220	IRF843	
	8.00	0.85	TO-3	IRF441	
	8.00	0.85	TO-3P	IRFP441	
	8.00	0.85	TO-220	IRF841	
	12.00	0.50	TO-3	IRF453	
	12.00	0.50	TO-3P	IRFP453	
	13.00	0.40	TO-3	IRF451	
	13.00	0.40	TO-3P	IRFP451	
	20.00	0.30	TO-3	SSM20N45	
	20.00	0.30	TO-3P	SSH20N45	
500.00	2.00	4.00	TO-3	IRF422	
	2.00	4.00	TO-220	IRF822	
	2.50	3.00	TO-3	IRF420	
	2.50	3.00	TO-220	IRF820	
	4.00	2.00	TO-3	IRF432	
	4.00	2.00	TO-3P	IRFP432	
	4.00	2.00	TO-220	IRF832	
	4.00	1.50	TO-3	SSM4N50	
	4.00	1.50	TO-3P	SSH4N50	
	4.00	1.50	TO-220	SSP4N50	
	4.50	1.50	TO-3	IRF430	
	4.50	1.50	TO-3P	IRFP430	
	4.50	1.50	TO-220	IRF830	
	7.00	1.10	TO-3	IRF442	
	7.00	1.10	TO-3P	IRFP442	
	7.00	1.10	TO-220	IRF842	
	8.00	0.85	TO-3	IRF440	
	8.00	0.85	TO-3P	IRFP440	
	8.00	0.85	TO-220	IRF840	
	12.00	0.50	TO-3	IRF452	
	12.00	0.50	TO-3P	IRFP452	
	13.00	0.40	TO-3	IRF450	
	13.00	0.40	TO-3P	IRFP450	
	20.00	0.30	TO-3	SSM20N50	
20.00	0.30	TO-3P	SSH20N50		
550.00	4.00	3.00	TO-3	SSM4N55	
	4.00	3.00	TO-3P	SSH4N55	
	4.00	3.00	TO-220	SSP4N55	
	6.00	1.80	TO-3	SSM6N55	
	6.00	1.80	TO-3P	SSH6N55	
	6.00	1.80	TO-220	SSP6N55	
	8.00	1.00	TO-3	SSM8N55	
	8.00	1.00	TO-3P	SSH8N55	

N-CHANNEL Power MOSFETs (continued)

BV_{DSS}(V)	I_D(A)	R_{DS(on)}(Ω)	Package	Part Number	Remark
550.00	15.00	0.50	TO-3	SSM15N55	
	15.00	0.50	TO-3P	SSH15N55	
600.00	4.00	3.00	TO-3	SSM4N60	
	4.00	3.00	TO-3P	SSH4N60	
	4.00	3.00	TO-220	SSP4N60	
	6.00	1.80	TO-3	SSM6N60	
	6.00	1.80	TO-3P	SSH6N60	
	6.00	1.80	TO-220	SSP6N60	
	8.00	1.00	TO-3	SSM8N60	
	8.00	1.00	TO-3P	SSH8N60	
	15.00	0.50	TO-3	SSM15N60	
	15.00	0.50	TO-3P	SSH15N60	
700.00	3.00	6.00	TO-3	SSM3N70	
	3.00	6.00	TO-3P	SSH3N70	
	3.00	6.00	TO-220	SSP3N70	
	4.00	3.30	TO-3	SSM4N70	
	4.00	3.30	TO-3P	SSH4N70	
	4.00	3.30	TO-220	SSP4N70	
	6.00	1.90	TO-3	SSM6N70	
	6.00	1.90	TO-3P	SSH6N70	
	10.00	0.80	TO-3	SSM10N70	
	10.00	0.80	TO-220	SSH10N70	

2. P-CHANNEL Power MOSFETs

BV_{DSS}(V)	I_D(A)	R_{DS(on)}(Ω)	Package	Part Number	Remark
-60.00	-2.50	1.60	TO-220	IRF9513	
	-3.00	1.20	TO-220	IRF9511	
	-5.00	0.80	TO-220	IRF9523	
	-6.00	0.60	TO-220	IRF9521	
	-10.00	0.40	TO-3	IRF9133	
	-10.00	0.40	TO-3P	IRFP9133	
	-10.00	0.40	TO-220	IRF9533	
	-12.00	0.30	TO-3	IRF9131	
	-12.00	0.30	TO-3P	IRFP9131	
	-12.00	0.30	TO-220	IRF9531	
	-15.00	0.30	TO-3	IRF9143	
	-15.00	0.30	TO-3P	IRFP9143	
	-15.00	0.30	TO-220	IRF9543	
	-19.00	0.20	TO-3	IRF9141	
	-19.00	0.20	TO-3P	IRFP9141	
-19.00	0.20	TO-220	IRF9541		
-100.00	-2.50	1.60	TO-220	IRF9512	
	-3.00	1.20	TO-220	IRF9510	
	-5.00	0.80	TO-220	IRF9522	
	-6.00	0.60	TO-220	IRF9520	

P-CHANNEL Power MOSFETs(continued)

$V_{DSS}(V)$	$I_D(A)$	$R_{DS(on)}(\Omega)$	Package	Part Number	Remark
-100.00	-10.00	0.40	TO-3	IRF9132	
	-10.00	0.40	TO-3P	IRFP9132	
	-10.00	0.40	TO-220	IRF9632	
	-12.00	0.30	TO-3	IRF9130	
	-12.00	0.30	TO-3P	IRFP9130	
	-12.00	0.30	TO-220	IRF9630	
	-15.00	0.30	TO-3	IRF9142	
	-15.00	0.30	TO-3P	IRFP9142	
	-15.00	0.30	TO-220	IRF9542	
	-19.00	0.20	TO-3	IRF9140	
	-19.00	0.20	TO-3P	IRFP9140	
	-19.00	0.20	TO-220	IRF9540	
-150.00	-1.50	4.50	TO-220	IRF9613	
	-1.75	3.00	TO-220	IRF9611	
	-3.00	2.40	TO-220	IRF9623	
	-3.50	1.50	TO-220	IRF9621	
	-5.50	1.20	TO-3	IRF9233	
	-5.50	1.20	TO-3P	IRFP9233	
	-5.50	1.20	TO-220	IRF9633	
	-6.50	0.80	TO-3	IRF9231	
	-6.50	0.80	TO-3P	IRFP9231	
	-6.50	0.80	TO-220	IRF9631	
	-9.00	0.70	TO-3	IRF9243	
	-9.00	0.70	TO-3P	IRFP9243	
	-9.00	0.70	TO-220	IRF9643	
	-11.00	0.50	TO-3	IRF9241	
	-11.00	0.50	TO-3P	IRFP9241	
	-11.00	0.50	TO-220	IRF9641	
-250.00	-1.50	4.50	TO-220	IRF9612	
	-1.75	3.00	TO-220	IRF9610	
	-3.00	2.40	TO-220	IRF9622	
	-3.50	1.50	TO-220	IRF9620	
	-5.50	1.20	TO-3	IRF9232	
	-5.50	1.20	TO-3P	IRFP9232	
	-5.50	1.20	TO-220	IRF9632	
	-6.50	0.80	TO-3	IRF9230	
	-6.50	0.80	TO-3P	IRFP9230	
	-6.50	0.80	TO-220	IRF9630	
	-9.00	0.70	TO-3	IRF9242	
	-9.00	0.70	TO-3P	IRFP9242	
	-9.00	0.70	TO-220	IRF9642	
	-11.00	0.50	TO-3	IRF9240	
	-11.00	0.50	TO-3P	IRFP9240	
	-11.00	0.50	TO-220	IRF9640	

1. AUDIO APPLICATION

A. FM Front End

Type	Package	Function			Use			Remark
		RF	OSC	MIXER	R/C	Car	Hi-Fi	
KA2249/D	7 SIP/8 SOP	*	*	*	*			V _{CC} =2~7V
†KA22495	9 SIP	*	*	*	*		*	V _{CC} =1.6~6V
††KA22496	9 SIP	*	*	*	*		*	V _{CC} =1.6~6V

B. FM/AM RF, IF and Detector System, AM Tuner System

Type	Package	Function						Use			Remark
		AM RF CONV	AM IF AMP	AM DET	FM IF AMP	FM DET	S/M	R/C	Car	Hi-Fi	
KA22461	19 ZIP	*	*	*					*		V _{CC} =8~15V
KA2243	16 DIP		*	*	*	*	*	*		*	V _{CC} =3~14V
KA2244	9 SIP				*	*	*		*		V _{CC} =8~16V
KA22441	16 ZIP				*	*	*		*		V _{CC} =6~14V
KA2245	7 SIP				*	*			*		V _{CC} =8~15V
KA2247	16 DIP	*	*	*	*	*	*	*			V _{CC} =3~ 8V
KA22471	16 DIP	*	*	*	*	*	*	*			V _{CC} =3~ 8V
KA2248A/D	16 DIP/16 SOP	*	*	*	*	*	*	*			V _{CC} =1.8~6V

C. FM Stereo Multiplex Decoder

Type	Package	PLL	Lamp Driver	VCO Stop	Sep. Cont.	Use			Remark
						R/C	Car	Hi-Fi	
KA2261	16 DIP	*	*	*	*	*	*		Sep=45dB
KA2262	16 ZIP	*	*	*	*		*		SNC/HCC
KA2263	9 SIP	*	*	*		*	*		Sep=45dB
KA2264/D	9 SIP/16 SOP	*	*	*		*			V _{CC} =1.8~5V
KA2265	16 DIP	*	*	*	*			*	VCO Non-Adjusting MPX
††KA2266	16 ZIP	*	*	*	*		*		Pilot Cancellor SNC/HCC

† New Product
 †† Under Development

D. Audio Power Amplifier

Type	Package	V _{CC} (V)	Output Power		Use			Remark
			R _L = 4 ohm	R _L = 8 ohm	R/C	Car	Hi-Fi	
KA2201/N/B	8 DIP	6		0.5W	*			V _{CC} =3~14V
		9		1.2W				
KA2206	12 DIP/F	9	2.3W×2		*			V _{CC} =4.5~11V
†KA22062	12SIP H/S	12	4.6W×2		*			V _{CC} =6~15V
KA2214	14 DIP H/S	9		1.2W×2	*			V _{CC} =3~16V
KA2209	8 DIP	3	110mW×2		*			V _{CC} =1.8~9V
KA2210	12 SIP H/S	13.2	5.5W×2			*		V _{CC} =10~16V
††KA22101	12 ZIP H/S	13.2	23W			*		V _{CC} =9~18V
KA2211	12 SIP H/S	13.2	5.8W×2			*		V _{CC} =9~18V
KA2212	9 SIP	6		0.5W	*			V _{CC} =3.5~14V
LM386/S/D	8 DIP/9 SIP/8 SOP	6		0.325W	*			V _{CC} =4~12V
†KA22131	24 SOP	3	69mW×2(R _L =16Ω)		*			V _{CC} =1.8~3.6V Included Auto Reverse Pre-AMP
KA2213	14 DIP H/S	6	1W		*			Included Pre-Amp with ALC
†KA22135	22 DIP-S	3	28mW×2(R _L =32Ω)		*			V _{CC} =2~7.5V Dual PRE-POWER AMP and DC Motor Speed Controller
††KA22132	16 DIP	3	30mW×2(R _L =32Ω)		*			V _{CC} =1.8~7.5V Dual PRE+POWER AMP with Volume Control

† New Product

†† Under Development

E. Pre-Amplifier

Type	Package	Function	Use			Remark
			R/C	Car	Hi-Fi	
KA1222	8 SIP	Dual Pre-amplifier	*			V _{CC} =2.5~6V
KA2220	9 SIP	Pre-amplifier with ALC	*		*	V _{CC} =3.5~14V
KA2221	8 SIP	Dual Pre-amplifier	*	*	*	Included Voltage Regulator
KA22211	8 SIP	Dual Pre-amplifier	*	*	*	V _{CC} =5~14V
†KA22231	28 SOP	5 Band Dual Graphic EQ AMP	*			V _{CC} =1.6~6V
KA2223	16 DIP	5 Band Mono Graphic EQ AMP	*	*	*	V _{CC} =5~13V
†KA22232	20 SOP	3 Band Dual Graphic EQ AMP	*			V _{CC} =1.6~6V
†KA22233	22 DIP	3 Band Dual Graphic EQ AMP	*	*	*	V _{CC} =5~15V
†KA22234	24 ZIP-S	5 Band Dual Graphic EQ AMP	*	*	*	V _{CC} =3.5~14V
KA22235	18 ZIP	5 Band Mono Graphic EQ AMP	*	*	*	V _{CC} =3.5~16V
KA2224	14 DIP	Dual Pre-amplifier with ALC	*		*	V _{CC} =4~13V
KA22241	9 SIP	Dual Pre-amplifier with ALC	*			V _{CC} =4.5~14V
††KA22242	10 SIP	Dual Pre-amplifier with ALC	*			V _{CC} =4~12V
KA2225/D	16 DIP/16 SOP	Dual Pre-amplifier with Mute	*			V _{CC} =1.6~5V
KA22261	16 DIP	Dual Pre-amplifier with ALC	*		*	Included REC AMP
††KA2228	21 ZIP-S	Dual Pre-amplifier system	*		*	V _{CC} =3.5~7V
††KA2229	30 DIP-S	Quad Pre-amplifier system	*		*	
†KA7226	14 DIP	Dual Pre-amplifier with ALC	*		*	V _{CC} =3~16V

F. LED Level Meter Driver

Type	Package	Function	Remark
KA2281	16 DIP	5 Dot dual red/yellow/green LED driver	VU scale, input amplifier Reference voltage included
KA2283	16 DIP	5 Dot dual red/yellow/green LED driver	VU scale, input amplifier Reference voltage included
KA2284	9 SIP	5 Dot mono green LED driver	VU scale Reference voltage included
KA2285	9 SIP	5 Dot mono red LED driver	VU scale Reference voltage included
KA2286	9 SIP	5 Dot mono red LED driver	Linear scale Reference voltage included
KA2287	9 SIP	5 Dot mono green LED driver	Linear scale Reference voltage included
†KA2288	16 DIP	7 Dot mono LED driver	VU scale Reference voltage included

† New Product

†† Under Development

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G. Music Selector

Type	Package	Function	Remark
KA2230	22 DIP	9-Program Random Selector	V _{CC} =5~14V
†KA2231	9 SIP	Audio Level Sensor	V _{CC} =3.5~14V

H. 1 Chip Radio

Type	Package	Function	Remark
KA22421/D	16 DIP/16 SOP	AM 1 Chip Radio	V _{CC} =2~5V
†KA22424	16 DIP	AM/FM 1 Chip Radio	V _{CC} =3~13V
††KA22427	16 DIP	AM/FM 1 Chip Radio	V _{CC} =3~13V
††KA2290	24 DIP-S	AM Tuner+FM IF+FM MPX	V _{CC} =3~8V

I. Noise Reduction

Type	Package	Function	Remark
††KA2270	16 DIP	dBX Type	V _{CC} =5~15V
††KA2271	16 DIP	Dolby B Type	V _{CC} =8.5~16V
††KA2272	16 DIP	FM Noise Canceller	V _{CC} =8~15V

† New Product

†† Under Development

2. VIDEO APPLICATION

A. TV Use

Application	Type	Package	Circuit Function
SIF System	KA2101	14 DIP	IF amp, IF limiter, IF detector,
SIF Subsystem for MPX	KA2105	9 SIP	IF amp, IF limiter, IF detector
	KA2106	16 DIP	(KA2105)X2
Sound System	KA2102A	14 DIP H/S	KA2101 + 2.4W audio power amp,
Sound MPX (Two Carrier System in Korea)	KA2268N	28 DIP	SIF amp, IF limiter, IF detector,
	KA22682		LED driver, Mode SW, Matrix, VCO
Sound Muting	KA2103L	9 SIP	Hori sync detector, I ntegrator, Comparater, Voltage controller
Auto Power Off + Sound Muting	KA2104	9 SIP	KA2103+auto power off control
VIF System	KA2911	16 DIP	VIF amp, Limiter, Video detector, Video amp, Noise invert, AGC detector, IF AGC, AFT, Reverse RF AGC
	KA2916	16 DIP	Forward RF AGC version of KA2911
	KA2912	14 DIP H/S	VIF amp, Limiter, Video detector, Video amp, IF AGC, Forward RF AGC, Noise canceller
VIF + SIF System	KA2913A	16 DIP	VIF amp, Limiter, Video detector, IF AGC, Forward RF AGC, SIF limiter, Sound detector
	KA2917	16 DIP	Reverse RF AGC version of KA2913A
	KA2914A	24 DIP	VIF amp, Limiter, Video detector, Video AFT, IF AGC, Reverse RF AGC, SIF amp, SIF limiter, Sound detector
	KA2918	24 DIP	Forward RF AGC version of KA2914A
	KA2919	30 DIP-S	VIF amp, Video detector, AFT, IF AGC, Reverse RF AGC, Noise canceller, Video amp, SIF detector, Limiter amp, Mute, Attenuator, AF amp
	KA2922	20 DIP	VIF amp, Video Det, AFT, Noise Canceller, IF AGC, Forward RF AGC, Limit amp, FM Det, Mute
	KA2923	20 DIP	VIF amp, Video Det, AFT, Noise canceller, IF AGC, Reverse RF AGC, Limit amp, FM Det, Mute.
VIF + SIF + Deflection	KA2915	28 DIP	VIF amp, Limiter, Video Detector, Video AFT, IF AGC, Forward RF AGC, SIF amp, SIF limiter, SIF detector, Sync separator, Hori OSC/driver/AFC, OSC/pre-driver
PAL Chroma System	KA2151	24 DIP	Chroma amp, DC chroma gain control, ACC peak detector, Burst amp, Killer detector, APC phase detector, DC uni-color control, ACC amp, Burst gate, PAL switch, flip-flop, Matrix, VCO
NTSC Chroma + Deflection + Video System	KA2153	42 DIP	ACC amp./detector, Killer detector, Phase detector, CW OSC, Demodulator, Sawtooth gen, APC, X-ray protection, Hori OSC/drive, Vert OSC/amp, Reverse amp
	KA2155	30 DIP-S	Video tone/contrast, Pedestal amp, Bright control, Color demodulator, APC, Tint control, VCO, ACC, Color killer, Hori OSC/AFC, Predriver,
	KA2156		Sync separator, Burst gate, Vert blank/driver, Ramp generator, X-ray protection

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TV Use (Continued)

Application	Type	Package	Circuit Function
PAL Chroma+Deflection + Video System	KA2154	42 DIP	ACC amp./detector, Killer detector, Phase detector, CW OSC, Demodulator, Sawtooth-gen, AFC, X-ray protection, Hori OSC/drive, Vert OSC/amp, Reverse amp
Vertical System	KA2130A	10 SIP H/S	Vert OSC/driver/output, Sawtooth generator
	KA2132	12 DIP/F	Voltage regulator, OSC flyback, generator, Sync circuit, Pre/power amp, Ramp generator
	KA2136	12 DIP/F	Synchronization circuit, OSC, Ramp generator, High power gain amplifier, flyback, Generator, Voltage regulator
Vertical Output	KA2131	10 SIP H/S	Driver, Output, Flyback generator, Pulse shaper
Horizontal System	KA2135	12 SIP	Polarity SW, AFC, Hori OSC/preamp, Pulse width adj, X-ray protector
	KA2137	16 DIP	Noise gated sync separator, Vert sync separator, Hori OSC with frequency limiter, Protection circuit phase comparator, Sync and OSC pulse, flyback and OSC pulse, Loop gain and time constant switching, Composite blanking, Key pulse generator, Output stage with high current capability
Deflection System	KA2133	16 DIP H/S	Vert OSC/driver/output, Sawtooth generator, Hori OSC/pre-driver, AFC
	KA2134	18 DIP	Sync separator, Noise detector, Hori/OSC/buffer, AFC, Vert OSC/driver/amp, Ramp generator, X-ray protector
	KA2921	16 DIP	Sync separator, Noise blanking, Voltage regulator, Vert OSC/pre-driver/amp, Hori OSC/driver, AFC, X-ray protector
Remocon Transmitter	KS5803A	16 DIP	Key In/output, Driver, Output control, OSC, Data register, Controller
	KS5803B	20 SOP	
Infrared Preamp	KA2181	8 SIP	ALC, Input separation stage, Output gain control
	KA2182	8 SIP	ALC, Input separation stage, Output gain control, Low voltage use amp
	KA2183		
	KA2184	8 SIP	ALC, Limite amp, BPF, Detector, Husteresis Comparator.
DC Volume & Tone Control	KA2107	12 SIP	Tone control, Balance control, Volume control, Output amp
Digital Volume Control	KA2611	8 DIP	Up/down counter, D/A convertor, RC OSC, Initial control, Clear circuit, Logic SW, Voltage regulator
Sync Separator	KA2605	9 SIP	Phase Inverter, Hori sync separator, Vert sync separator, Composite sync separator, Vertical filter, Horizontal filter
	KA2606	9 SIP	Phase Inverter, Hori sync separator, Hori sync compensation, Composite sync separator, Vertical filter, Horizontal filter
R.G.B. Interface	KA6101	18 DIP	R.G.B. clamp, R.G.B. amp, Contrast control, Brightness control, Clamp pulse generator, R/Y, G/Y, B/Y switch, Switching pulse generator
	KA6102	18 DIP	R.G.B. clamp, R.G.B. amp, Contrast control, Brightness control, Clamp pulse generator, R/Y, G/Y, B/Y switch, Switching pulse generator



B. VTR Use

Application	Type	Package	Circuit Function
Write & Read Amplifier	KA2944	28 DIP	Sync tip clamp, Dynamic emphasis, Main pre-emphasis, White/dark clip, Frequency modulator, REC buffer amp, FM AGC, DOC, Pre-amp, SW amp
	†KA8102	22 DIP-S	EQ amp, Current amp, Pre amp, Chrominance amp, Peaking amp, RF AGC amp
Luminance Signal Processor	KA2945	28 DIP	Video AGC, EE monitor squelch, FM limiter, FM demodulation, Dynamic de-emphasis, Noise cancel, Y/C mix. squelch, Sync separation, Video output amp
	†KA8103	48 DIP-S	Comb filter, Detail Enhancer, White clip, Picture control, Line Noise canceller, Sync LPF, Main de-emphasis, LPF, Clamp, Edit control, DOC,
Chrominance Signal Processor	†KA2988	28 DIP	Auto color, Burst pre-emphasis, Converter, AFC, APC, VCO(160fH), Sub-converter, 4-Phase 40fH Signal generator, ID input, VCO (3.579545MHz)
	†KA8104	30 DIP-S	320fH(NTSC)/321fH(PAL) VCO, REC LPF, Edit control, PB input signal level compensator, fsc Multiplier (2fsc), Field Start inhibit, High speed APC circuit, APC Reference control,
Detail Enhancer	KA8101	9 SIP	Main amp, buffer
Audio Processor	KA2983	18 DIP	REC/PB Pre-amplifier, Line amp, ALC, Analog SW, REC/PB/Muting control, REC amplifier
	KA8401	24 ZIP-S	EP/SP SW, REC/PB SW, PB/EE SW, REC/EE SW, Line muting SW, ALC, Line amp, REC amp, PB EQ amp
Digital Servo Controller	†KA8303	42 DIP-S	Speed/Phase servo for VTR drum and capstan. Many built-in functions including special playback and extended recording.
Motor Driver	KA8301	10 SIP H/S	Pre amp, Driver, Logic circuit
	†KA8304	12 SIP H/S	Control amp, CW/CCW, Hall amp, Driver
	†KA8305	10 SIP H/S	Control circuit, Input circuit, circuit Thermo-break, Driver
	†KA8306	10SIP H/S	Control, circuit, Protect circuit, Driver
Control Amplifier	KA8302	12 DIP-S	CTL amp, FG amp, Doubler, Schmitt trigger
LED & Lamp Driver	KA2615 KA2616 KA2617 KA2618	9 SIP	4 NPN TR array
A/V Switch	†KA8402	7 SIP	2 input switch
	†KA8403	9 SIP	3 input switch
RF Modulator	†KA2981	20 DIP	Video clamp, White clip AM modulator, Sound FM Modulator, Carrier OSC with SAW channel select SW

†New Product

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3. TELECOMMUNICATION APPLICATION

Application	Type	Package	Circuit Function
Tone Ringer	KA2410 KA2411	8 DIP	Adjustable warbling and 2 frequency tone External triggering or ringer disable (KA2410) Adjustable supply initiating current (KA2411) Built-in hysteresis
Tone Ringer with Bridge Rectifier	KA2418	8 DIP	Protect against over voltage Low current consumption Allow the parallel operation of 4 devices Built-in hysteresis External components are minimized High output voltage
DTMF Dialer	KS5808	16 DIP	Direct telephone line operation Standard 2 of 8 key board use Tone output: Bipolar output Mute output: N-CH open drain
	KA2413	16 DIP	Wide operating line voltage and current range Short start up time External components are minimized Internal protection of all inputs
Pulse Dialer	KS5805A/B	18 DIP	KS5805A: Pin 2; Vref KS5805B: Pin 2; Tone output RC oscillator used as frequency reference Pulse output: "O" true
DTMF/Pulse Switchable Dialer	†KS58A/B/C/D19	22 DIP	Tone/pulse switchable dialing, touch key or slide switch 32 digit redialing & PABX auto pause time Make/break ratio pin selectable KS5821 (Telephone lock function)
	†KS58A/B/C/D20	18 DIP	
	†KS58A/B/C/D21	22 DIP	
DTMF/Pulse Switchable with 10 No. Memory	††KS5823	18 DIP	10 No. X18 digit memory including a redial memory Including PABX auto pause time 10 pps/20 pps pin selectable Make/break ratio: 40%/60%
Speech Network	KA2412A	14 DIP	Transmit/Receiver amplifier Side tone control On chip regulator
Low Voltage Speech Network with Dialer Interface	KA2425A/B	18 DIP	Low Voltage Operation (1.5V) Tx, Rx & side tone gain set by external resistor Loop length equalization for Tx, Rx & sidetone Provides regulated voltage for CMOS dialer DTMF level adjustable with a single resistor A: Mute active low B: Mute active high
DTMF Receiver	††KT3170	18 DIP	Full DTMF Receiver Provides DTMF high and low group filtering Dial tone suppression Adjustable acquisition and release times Integrated bandsplit filter and digital decoder functions High quality and performance Single +5Volt power supply
Crosspoint Switch	††KS093	40 DIP	12X8 Crosspoint switch with control memory Internal control latches Low distortion & cross-talk Low on resistance Anyone of the 96 switches can be addressed by selecting the appropriate 7 input bits.

† New Product
†† Under Development

TELECOMMUNICATION (Continued)

Application	Type	Package	Circuit Function
Tone Decoder	LM567C/L	8 DIP † 8 SOP	Touch tone decoding Sequential tone decoding Communication paging High stable center frequency LM567L: Micropower (4mW at 5V) dissipation
FM IF Amplifier	MC3361	16 DIP †16 SOP	Small current dissipation (Typ. 3.5mA: V _{cc} 4.0V) Excellent input sensitivity Communication paging Used to cordless telephone parts required Work from 1.8V to 7.0V
Codec	†KT5116 ††KT8520 ††KT8521	16 DIP 24 DIP 22 DIP	μ-Law: KT5116 μ-Law: KT8520 A-Law: KT8521 ±5V operation Low power consumption Synchronous or asynchronous Operation
Codec Filter	†KT3040J	16 DIP	Exceeds all D3/D4 and CCITT spec. ±5V operation Low power consumption 20dB gain adjust range Sin X/X correction in receive filter TTL and CMOS compatible logic
Combo Codec	††KT3030J ††KT3032J ††KT3031J ††KT3033J	16 DIP 16 DIP 20 DIP 20 DIP	Exceeds all D3/D4 and CCITT spec. Complete CODEC and filtering system including ±5V operation Low power consumption TTL and CMOS compatible logic Receive push-pull power amp (KT3031/3)
Line Driver	MC1488 ††KS5788	14 DIP †14 SOP	Conformance EIA standard No. RS-232C & V28(CCITT) Quad line driver Interface between data terminal equipment (DTE) and data communication equipment (DCE) Current limited output: ±10mA typ. Power-off source impedance 300 ohms min. Compatible with DTL and TTL, HCTLS families Flexible operating supply range KS5788: Low power CMOS version
Line Receiver	MC1489/A ††KS5789	†14 DIP †14 SOP	Conformance EIA standard No. RS-232C & V28(CCITT) Quad line receiver Interface between data terminal equipment (DTE) and data communication equipment (DCE) Input signal range ±30 volts Input threshold hysteresis built in Response control a) Logic threshold shifting b) Input noise filtering KS5789: Low Power CMOS version
Line Receiver	††KA2653	16 DIP	Conformance EIA Standard No. RS-232C & V28(CCITT) Quad Line receiver Input threshold adjustable to meet "fail-safe" requirements without using external components TTL or LS compatible Standard supply voltage 5V or 12V

† New Product
†† Under Development



TELECOMMUNICATION (Continued)

Application	Type	Package	Circuit Function
Line Transceiver	††KA2654	8 DIP	Conformance EIA Standard No RS-232C & V28(CCITT) One Driver & One Receiver on chip Wide supply voltage ($\pm 4.5V \pm 15V$) Including reference regulator Response control provides TTL compatible
Line Transceiver	††KS5706	16 DIP	Conformance EIA Standard No RS-232 & V28(CCITT) Low power consumption (CMOS) 3 Drivers & Receivers one Chip
Peripheral Driver Array	††KA2655	16 DIP	Including 7 NPN darlington-connected transistors These arrays are well suited for driving lamps, relays, or printer hammers in a variety of industrial and consumer applications. High breakdown voltage and internal suppression diodes insure freedom from problems associated with inductive loads
Fluorescent Display Driver	†KA2651	18 DIP	Consisting of 8 NPN darlington output stages and associated common-emitter input stages Digit or segment drivers Low input current, internal output pull-down resistor High output breakdown voltage Single or split supply operation
8-Channel Source Driver	KA2580A	18 DIP	TTL, CMOS, PMOS, NMOS compatible High output current ratings Internal transient suppression Efficient input/output pin structure Drive telephone relays, incandescent lamps, and LEDs.
	KA2588A	20 DIP	KA2588A: Separated logic and driver supply line
Universal Asynchronous Receiver and Transmitter (UART)	††KS5824	24 DIP	The data formatting and control to interface serial asynchronous data communications between main system and subsystems. Low power, high speed CMOS process Serial/parallel conversion of data 8 and 9 bit transmission Programmable control register Optional $\div 1$, $\div 16$, and $\div 64$ clock modes Peripheral/modem control functions Double buffered Included 4 UART in one chip (KS5812)
	††KS5812	40 DIP	

† New Product
†† Under Development

4. VOLTAGE REGULATOR

A. 3-Terminal Fixed Positive Voltage Regulator

Function	Type	Package	Features	Application
Very High Output Current (3A)	KA78TXX	TO-220 TO-3P	Output current in excess of 3A Internal thermal overload protection Internal short circuit current limiting	5V, 6V, 8V, 12V, 15V, 18V and 24V fixed output voltage
	LM323	TO-3P		5V output voltage
High output Current (I _o =1A)	MC78XX series	TO-220	Maximum output current 1A External components are minimized Internal protection circuit for output short Positive voltage regulator Variable application control	5V, 6V, 8V, 8.5V, 9V, 10V, 11V, 12V, 15V, 18V and 24V fixed output voltage
	††KA340 series	TO-220	Output current in excess of 1A very low line regulation: 0.01% very low load regulation: 0.3%	5V, 6V, 8V, 8.5V, 9V, 10V, 11V, 12V, 15V, 18V and 24 fixed output voltage
Medium Output Current (I _o =500mA)	MC78MXXC AC Series	TO-220	Maximum output current 500mA External components are minimized Internal protection circuit for output short Positive fixed output voltage regulator Variable application circuit	5V, 6V, 8V, 10V, 12V, 15V, 18V and 24V fixed output voltage
Low Output Current (I _o =100mA)	MC78LXXAC series	TO-92	Output current in excess of 100mA External components minimized Internal protection circuit for output short Positive voltage regulator Variable application circuit	2.6V, 5V, 6.2V, 8V, 8.2V, 9V, 12V, 15V, 18V and 24V fixed output voltage

B. 3-Terminal Fixed Negative Voltage Regulator

Function	Type	Package	Features	Application
High output Current (I _o =500mA)	MC79XXC series	TO-220	Output current in excess of 1A Internal thermal overload protection Internal short circuit current limiting	-2V, -5V, -6V, -8V, -10V, -12V, -15V, -18V, and -24V, fixed output voltage
Low Output Current (I _o =100mA)	MC79LXXAC series	TO-92	Output current in excess of 100mA Internal short circuit current limiting External components minimized	-5V, -12V, -15V, -18V and -24V fixed output voltage

C. Precision Voltage Regulator

Function	Type	Package	Features	Application
Adjustable Regulator	LM723	14 DIP	Positive or negative supply operation Series, shunt, switching or floating operation 0.01% line and load regulation Output current up to 150mA without external pass transistor	Output voltage adjustable from 2 to 37V
33V Reference	KA33V	TO-92	Low temperature coefficient Low dynamic resistance	Electronic tuning system
Adjustable Regulator	†LM317	TO-220	Output current in excess of 1.5A Positive output adjustable from 1.2V to 37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltage
	†LM337	TO-220	Output current in excess of 1.5A Negative output adjustable from -1.2V to -3.7V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltage

† New Product

†† Under Development

D. Switching Voltage Regulator

Function	Type	Package	Features	Application
Adjustable 1.25V to 40V	KA78S40	16 DIP ††16 SOP	Peak output current of 1.5A without external transistor 80dB line and load regulation Operation from 2.5V to 40V	Step-down converter Step-up converter Inverter
PWM Controller IC	†KA3524	16 DIP	Complete PWM power control circuitry Internal short circuit current limiting Complementary Output Output current up to 100mA	Fly back converter Voltage Inverter Voltage step-down Voltage step-up
	††KA7500	16 DIP	Complete PWM power control circuitry Dead-Time control Complementary Output Output current up to 200mA	Voltage Inverter Voltage step-down Voltage step-up

5. PRECISION VOLTAGE REFERENCE

Function	Type	Package	Features	Application
Adjustable Reference	KA431	TO-92 †8 DIP ††8 SOP	Programmable output voltage from V_{ref} to 36V Voltage reference tolerance: $\pm 1.0\%$ Low output noise voltage	Switching regulator Constant current source Constant current sink
5V Reference	†KA336	TO-92	Adjustable 4V to 6V Low temperature coefficient 0.6 Ω dynamic impedance Fast Turn-on	Adjustable shunt regulator Precision power regulator

† New Product

†† Under Development

6. OPERATIONAL AMPLIFIER

Function	Type	Package	Features	Application
OP AMP	LM741	8 DIP 8 SOP	Internal frequency compensation Short circuit protection	Comparator, DC amp, Multivibrator, Summing amp, Integrator or differentiator, Narrow band or BPF
	LM301A	8 DIP 8 SOP	Slew rate of 10V/μs as a summing amplifier External frequency compensation	Variable capacitance Multiplier Sine wave oscillator
	KF351	8 SOP 8 SOP	Internally trimmed offset voltage: 10mV Low input bias current High input impedance: 10 ¹² Ω High slew rate: 13V/μs	Hi-Zin inverting amp Ultra low duty cycle pulse generator sampling and HOLD
Dual OP AMP	MC4558	8 DIP 8 SOP 9 SIP	Internal frequency compensation Low noise operation	Phone pre-amplifier Tape playback amplifier
	MC1458	8 DIP 8 SOP 9 SIP	Internal frequency compensation Short circuit protection	Filter Schmitt trigger Comparator Multivibrator
	LM358/A LM258/A LM2904	8 DIP 8 SOP 9 SIP	Internal frequency compensation for unit gain Large DC voltage gain Wide power supply range	DC summing amplifier Power amplification RC active bandpass filter Compatible with all forms of logic
	KA9256	10 SIP H/S	Internal current limiting: I _{SC} =350mA Internal frequency compensation Minimal cross over distortion	High power amplifier CD motor driver
	KS272	8 DIP ††8 SOP 9 SIP	Wide range of supply voltage : 3V~16V Common mode input voltage including the negative rail	Battery-powered application Active filter Signal buffer
Quad OP AMP	LM324/A LM224/A LM2902	14 DIP 14 SOP	Internal frequency compensation Wide supply voltage range Single supply: DC 3V~30V Dual supply: DC±1.5V~±15V	Aduo power booster DC amp, Multivibrator Switch, Comparator Schmitt trigger
	LM348 LM248	14 DIP 14 SOP	Each amplifier is functionally equivalent to the LM741C Pin compatible with LM324 Short circuit protection	Comparator with hysteresis Voltage reference
	MC3403 MC3303	14 DIP 14 SOP	Class AB output stage for minimal crossover distortion Single or split supply operation Internal frequency compensation	Comparator with hysteresis Bi-Quad filter
	KS274	14 DIP ††14 SOP	Wide range of supply voltage : 3V~16V Single supply operation Very low input bias current; Typ 1pA	Battery-powered application Energy-conserving application

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7. VOLTAGE COMPARATOR

Function	Type	Package	Features	Application
Single Comparator	LM311 ††LM211	8 DIP 8 SOP	Operates from single 5V supply Maximum input current: 250nA Maximum offset current: 50nA Differential input voltage range: ±30V	Multivibrator output is compatible with DTL and as well as MOS circuits voltage controlled oscillator
	††LM361 ††LM261	14 DIP	Independent strobes Guranteed high speed: 20nS max. Complementary TTL outputs	High speed analog to digital converter Zero-crossing detectors
	KA710C	14 DIP	Low offset and thermal drift Compatible with practically all types of integrated logic	Interface between logic types Level detector with lamp
Dual Comparator	LM393/A LM2903 LM293/A	8 DIP 8 SOP 9 SIP	High precision comparators Reduced V _{OS} drift over temperature Eliminates need for dual supply Allows sensing near ground Compatible with all forms of logic Power drain suitable for battery operation Low input biasing current: 25nA Low output saturation voltage 250mA at 4mA	Output voltage compatible with TTL, DTL, ECL and CMOS logic system Basic comparator Pulse generator MOS clock driver
	LM319 LM219	14 DIP	Two independent comparators Operates from a single 5V High common mode slew rate	Relay driver Window detector
	KA711C	14 DIP 14 SOP	Separate differential input and single output Strobing each side	Sense amplifier for core memory Dual comparator with OR'ed output Doubledended limit detector
Quad Comparator	LM339/A LM2901 LM239/A LM3302	14 DIP 14 SOP	Wide single supply voltage range or dual supplies Very low supply current drain (0.8mA)-independent of supply voltage (2mW/Comparator at +5V DC) Low input biasing current: 25nA Input common-mode voltage range included GND Low output saturation voltage 250mV at 4mA	Compatible with all forms of logic Bi-stable multivibrator One-shot multivibrator Time delay generator Square wave oscillator Pulse generator Limit comparator Crystal controlled oscillatgor

†† Under Development

8. TIMER

Function	Type	Package	Features	Application
Single Timer	NE555	8 DIP 8 SOP	Maximum operating frequency: 500KHz Adjustable duty cycle	Precision timing Pulse generator
	KS555 KS555H	8 DIP 8 SOP	Low power consumption by using CMOS process High speed operation Wide operation supply voltage: 2 to 18 volts Pin compatible with NE555	Precision timing Pulse generator
Dual Timer	NE556	14 DIP 14 SOP	TTL Compatible Dual NE555	Time delay generation
	KS556	14 DIP 14 SOP	Low power consumption by using CMOS process Pin compatible with NE556	Time delay generation
Quad Timer	NE558	16 DIP	Wide supply voltage range: 4.5 to 16V 100mA output current per section Time period equal RC	Quad monostable Sequential timing Precision timing

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9. DATA CONVERTER ICs

Function	Type	Package	Features	Application
Flash A/D, A/D+D/A Converter	††KSV3208	28 DIP	20MHz, 8-Bit flash A/D converter	Video digitizer (3X or 4X subcarrier, NTSC or PAL)
	KSV3100A	40 DIP	20MHz, 8-Bit flash A/D and 10 Bit D/A converter on the signal chip	Digital video system (3X or 4X subcarrier, NTSC or PAL) Image processing
	††KSV3110	40 DIP	Enhanced version of KSV3100A	Same as Above
Video DAC	†KSV3404	28 CERDIP	100MHz, 4-bit triple D/A converter	Digitized video signal reconstruction Image processing
	††KSV3310	28 DIP	20MHz, 10-bit single D/A converter	Same as above
General Purpose A/D, D/A Converter	KAD0808 KAD0809	28 DIP	8-Bit μ p-compatible A/D converter with 8-channel multiplexer	General purpose μ p-interface system
	KAD0820A KAD0820B	20 DIP	8-Bit high speed μ p-compatible A/D converter with track/hold function	General purpose μ p-interface system waveform recording
	††KAD0816	40 DIP	8-Bit μ p-compatible A/D converter with 16-channel multiplexer	General purpose μ p-interface system
	KDA0800	16 DIP 16 SOIC	General purpose 8-bit D/A converter (Logic threshold level adjustable)	General purpose μ p-interface system
	KDA0808	16 DIP 16 SOIC	General purpose 8-bit D/A converter (Logic level: Fixed-TTL)	Same as above
Integrating A/D converter	KS7126	40 DIP	3-1/2 digit A/D converter with direct LCD driver	Digital-Multi-Meter Thermometer, other digital measurement
Successive Approximation Register	KS25C02	16 DIP Bare chip	8-Bit successive approximation register with serial capability	Fast precision A/D converter (Hybrid, Modular)
	KS25C03	16 DIP Bare chip	8-Bit successive approximation register with expandability	Same as above
	KS25C04	24 SDIP Bare chip	12-Bit successive approximation register with serial/Expandable capability	Same as above

† New Product

†† Under Development

10. MISCELLANEOUS ICs

Function	Type	Package	Features	Application
Toy Radio Control Actuator	KA2303	9 SIP	High gain amplifier, Peak detector, T flip-flop, comparator with hysteresis, regulator, motor driver	3 Function
	KA2304	9 SIP		2 Function
	†KA2309	16 DIP	Receiver	7 Function (RX)+Turbo
	†KA2310	9 SIP	Transmitter	7 Functio (TX)+Turbo
DC Motor Speed Controller	KA2401	8 DIP	Stable voltage reference	V _{CC} =4~12V
	KA2404	TO-92L	V _{ref} =1.27V (Typ.)	
	KA2402	8 DIP	Stable current source	V _{CC} =1.8~8V
	†KA2407	TO-126	Stable voltage reference V _{ref} =1.0V (Typ.)	V _{CC} =3.5~14.4V
Earth Leakage Detector	KA2803	8 DIP	Low power consumption High noise immunity Few external components	Leakage current detector
	KA2807	8 DIP 8 SOP	Detects neutral line faults complies with U.S. UL943 Externally programmable fault current threshold & fault current integration time	Leakage current detector
Zero Voltage Switch	KA2804	8 DIP	Easy operation either through the AC line or a DC supply Supply voltage control External component are minimized Negative output current pulse up to 250mA (short circuit protection)	ON, OFF temperature control Time proportional temperature control
FDD Read AMP	KA6201	18 DIP	Combined all the active circuit. Direct connection with TTL's	FDD

†: New Product

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1. CMOS LCD Watch ICs

Device	Display					Function					Additional Features				Electrical Characteristic			Remark
	Digit	Day Flags	Marks	Duplexed LCD	Triplexed LDC	Basic 5 Function	Day Type	Year	Alarm	Snooze	Chronograph	Chime	V _{DD} (V)	I _{DD} (μ A)				
														Typ.	Max.			
KS5198	3.5	—	—	*	—	*	—	—	—	—	—	—	1.5	0.8	1.5	Internal		
KS5199A †KS5114	3.5	—	—	*	—	*	—	—	—	—	—	—	1.5	0.8	1.5	Capacitor		
KS5194	4	—	4	*	—	*	—	—	*	—	—	*	1.5	1.0	2.0			
KS5184	6	7	4	*	—	*	Flag	—	*	*	—	*	1.5	1.0	2.5			
KS5189 †KS5190	6	7	4	*	—	*	Flag	—	*	*	*	*	Chrono (1/100 sec, 24HR)	1.5	1.0	2.0		
KS5112	6	—	1	—	*	*	—	—	—	—	—	—	1.5	0.8	1.5	Internal Capacitor		

2. CMOS Analog LCD Watch

Device	Display			Fuction	Electrical Characteristic			Remark
	Hand	Segment	LCD duty		V _{DD} (V)	I _{DD} (μ A)		
						Typ	Max	
KS5113	3	120	1/6	3	1.5	1.5	2.5	Internal Capacitor

3. Analog Watch

Device	PAD	Time keeping	Time stability(ppm)	V _{DD} (V)	I _{DD} (μ A)		Remark
					Typ	Max	
††KS5243	10	Trimmer cap(OI)	Typ. 0.1	1.5	0.2	—	Motor output : Mask option

4. CMOS LCD Clock ICs

Device	Display				Function					Electrical Characteristic			Remark
	Digit	Day flags	marks	Duty	Basic 5 Function	alarm	snooze	chro graph	chime	V _{DD} (V)	I _{DD} (μ A)		
											Typ.	Max.	
KS5171	4	—	5	1/2	*	*	*	—	*	1.5	1.5	2.5	

5. CMOS Analog Clock ICs

Device	Feature	V _{DD} (V)	I _{DD} (μ A)		Osc. (Hz)	Package	Remark
			Typ	Max			
KS5206	A: 0.5 Hz Square Wave	1.5	2.0	2.5	32,768	8 DIP	2048 Hz Alarm
KS5207	Pulse Output	1.5	2.0	2.5	32,768	8 DIP	1 Hour Function
KS5209	E: 0.5 Hz, 46.9 ms Duration	1.5	1.0	2.0	32,768	8 DIP	2048 Hz Alarm
KS5210	Pulse Output	1.5	0.7	2.0	32,768	8 DIP	2048 Hz Alarm
KS5211	F: 0.5 Hz, 31.2 ms Duration	1.5	0.7	2.0	32,768	8 DIP	Internal Capacitor

6. Melody ICs

Device		Title	Time Base (Hz)	V _{DD} (V)	I _{DD} (μ A)	Package	Remark
KS5310 Series	KS5310A	Oh! Susanna	32,768	1.5		Bare Chip	1 Melody Bare Chip (At Watch)
KS5313 Series	KS5313N KS5313P KS5313R KS5313Q 5313S 5313T	Minuet (BACH) Cuckoo's Waltz Oh! Susanna Home Sweet Home Big Ben For Flise	33,000	1.5	Stand-By 0.1-0.3 Operating 20-30	KS5313: 16 DIP/ 8 DIP	KS5313 Speaker or Piezo Drive
KS5381	††KS5381	Home, Sweet Home Oh! Susanna Whispering Hope Dreaming of Home and Mother Oh My Darling Clementine Beautiful Dreamer Red River Vally	32,768	1.5 or 3.0	Stand-By 0.1-0.5 Operating 20-30 (at 1.5V operating)	Bare Chip or 24 DIP	Speaker or Piezo Drive
KS5814	5814	Sky-Lark's or Cricket's Sound	210,000	1.5	Stand-By 0.1-0.3 Operating 250-400	14 DIP	Speaker
KS5401	†KS5401A	8 Sound effect	125,000	3	Stand-By 0.4-1.5 Operating 300-600	18 DIP	Speaker

7. CALCULATOR ICs

Device	Function	A.P.O*	V _{DD} (V)	I _{DD} (μ A)		Package	Bare Chip	Remark
				Typ	Max			
KS6022A	8 Digit Basic	Enable	3.0	60	80	48 FQP	*	
KS6025	8 Digit Basic	Option	1.5	4.0	5.6	48 FQP	*	
†KS6026	8 Digit Basic	Enable	1.5	4.0	5.6	48 FQP	*	Internal voltage Limiter (application option)
†KS6027	12 Digit Desk Top	—	1.5	7.0	15	—	*	Solar cell
	12 Digit Basic	—	3.0	7.0	15	60 FQP	*	Application option
	10 Digit Basic	—	1.5	7.0	15	60 FQP	*	Application option
††KS6028	8 Digit Basic	Option	1.5	1.3	3	48 FQP	*	-Internal voltage limiter (application option) -Low current type
††KS6029	10 Digit Basic	Option	1.5	1.5		48 FQP	*	-Internal voltage limiter -Low current type
KS6041	10 Digit Scientific	Enable	3.0	70	120	48 FQP	*	56 Function

* A.P.O: Auto Power Off

† New Product

†† Under Development

8. PC ICs

Device	Fuction	V _{DD} (V)	Package	Remark
†SE2010X	PC ADDR/DATA Buffer Driver	5	84 PLCC	IBM XT
†SE2011X	PC Printer Driver	5	40 DIP	IBM XT or AT

9. MISCELLANEOUS ICs

Device	Function	V _{DD} (V)	I _{DD} (μ A)		Package	Remark
			Typ	Max		
KS5815	Clinical tremometer	1.5	—	100	Bare chip	°C/°F option
†KS5116	6 Digit up/down counter	1.5	9	16	Bare chip	Internal RC oscillator

† New Product
 †† Under Development

1. Alphanumeric Index

1). KS54/74AHCT Family

Device	Function
KS54/74AHCT00	Quad 2-Input NAND Gates
KS54/74AHCT01	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT02	Quad 2-Input NOR Gates
KS54/74AHCT03	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT04	Hex Inverters
KS54/74AHCT05	Hex Inverters with Open-Drain Outputs
KS54/74AHCT08	Quad 2-Input AND Gates
KS54/74AHCT09	Quad 2-Input AND Gates with Open-Drain Outputs
KS54/74AHCT10	Triple 3-Input NAND Gates
KS54/74AHCT11	Triple 3-Input AND Gates
KS54/74AHCT12	Triple 3-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT14	Hex Schmitt-Trigger Inverters
KS54/74AHCT20	Dual 4-Input NAND Gates
KS54/74AHCT21	Dual 4-Input AND Gates
KS54/74AHCT22	Dual 4-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT27	Triple 3-Input NOR Gates
KS54/74AHCT30	8-Input NAND Gate
KS54/74AHCT32	Quad 2-Input OR Gates
KS54/74AHCT42	BCD-to-Decimal Decoder
KS54/74AHCT51	Dual AND-OR-Invert Gates
KS54/74AHCT58	Dual AND-OR Gates
KS54/74AHCT73	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74AHCT74	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74AHCT75	Quad Bistable Transparent Latches
KS54/74AHCT76	Dual J-K Negative-Edge-Triggered Flip Flops with Preset and Clear
KS54/74AHCT77	Quad D-Type Latches
KS54/74AHCT78	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset, Common Clear and Common Clock
KS54/74AHCT86	Quad 2-Input Exclusive-OR Gates
KS54/74AHCT90	Decade Counters
KS54/74AHCT92	Divide-by-Twelve Counter
KS54/74AHCT93	4 Bit Binary Counter Divide by Two and Divide by Eight
KS54/74AHCT107	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74AHCT109	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74AHCT112	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74AHCT121	Monstable Multivibrators with Schmitt-Trigger Inputs
KS54/74AHCT123	Dual Retriggerable Monostable Multivibrators
KS54/74AHCT125	Quad Buffers with 3-State Outputs
KS54/74AHCT126	Quad Buffers with 3-State Outputs
KS54/74AHCT132	Quad 2-Input NAND Gates with Schmitt-Trigger Inputs
KS54/74AHCT133	13-Input NAND Gate
KS54/74AHCT138	3-Line to 8-Line Decoders/Demultiplexers
KS54/74AHCT139	Dual 1-of-4 Decoders/Demultiplexers
KS54/74AHCT148	8-Line to 3-Line Priority Encoders
KS54/74AHCT151	1 of 8 Data Selectors/Multiplexers
KS54/74AHCT153	Dual 1 of 4 Data Selectors/Multiplexers
KS54/74AHCT154	4-Line to 16-Line Decoders/Demultiplexers
KS54/74AHCT155	Dual 2-to-4 Line Decoders/Demultiplexers
KS54/74AHCT157	Quad 2-Line to 1-Line Data Selectors/Multiplexers
KS54/74AHCT158	Quad 2-Line to 1-Line Data Selectors/Multiplexers
KS54/74AHCT160	Synchronous 4-Bit Decade Counters
KS54/74AHCT161	Synchronous 4-Bit Binary Counters
KS54/74AHCT162	Synchronous 4-Bit Decade Counters
KS54/74AHCT163	Synchronous 4-Bit Binary Counters
KS54/74AHCT164	8-Bit Serial-In/Parallel-Out Shift Registers
KS54/74AHCT165	8-Bit Parallel-In/Serial-Out Shift Registers
KS54/74AHCT166	8-Bit Parallel-In/Serial-Out Shift Registers with Clear
KS54/74AHCT168	Synchronous 4-Bit Up/Down Decade Counters

KS54/74AHCT Family (continued)

Device	Function
KS54/74AHCT169	Synchronous 4-Bit Up/Down Binary Counters
KS54/74AHCT173	4-Bit D-Type Registers with 3-State Outputs
KS54/74AHCT174	Hex D-Type Flip-Flops with Clear
KS54/74AHCT175	Quad D-Type Flip-Flops with Clear
KS54/74AHCT181	4-Bit Arithmetic Logic Unit
KS54/74AHCT182	Look-Ahead Carry Generator
KS54/74AHCT183	Dual High Speed Adder
KS54/74AHCT190	Presettable Synchronous BCD Decade Up/Down Counter
KS54/74AHCT191	Synchronous 4-Bit Up/Down Binary Counters
KS54/74AHCT192	Presettable Synchronous BCD Decade Up/Down Counter
KS54/74AHCT193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock
KS54/74AHCT194	4-Bit Bidirectional universal Shift Registers
KS54/74AHCT195	4-Bit Bidirectional Universal Shift Registers
KS54/74AHCT210	Octal Buffers and Line Drivers With 3-State Outputs.
KS54/74AHCT238	3-Line to 8-Line Decoders/Demultiplexers
KS54/74AHCT239	Dual 1-of-4 Decoders/Demultiplexers
KS54/74AHCT240	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT241	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT242	Quad Bus Transceivers with 3-State Outputs
KS54/74AHCT243	Quad Bus Transceivers with 3-State Outputs
KS54/74AHCT244	Octal Buffers and Line Drivers With 3-State Outputs
KS54/74AHCT245	Octal Bus Transceivers With 3-State Outputs
KS54/74AHCT251	1 of 8 Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT253	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT258	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT259	8-Bit Addressable Latches
KS54/74AHCT266	Quad Exclusive-NOR Gates with Open-Drain Outputs
KS54/74AHCT273	Octal D-Type Flip-Flops
KS54/74AHCT280	9-Bit Parity Generators/Checkers with Clear
KS54/74AHCT299	8-Bit Universal Shift/Storage Registers with 3-State Outputs
KS54/74AHCT322	8-Bit Shift Registers with Sign Extend
KS54/74AHCT352	Dual 4-Line to 1-Line Data Selectors/Multiplexers
KS54/74AHCT353	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT365	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT366	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT367	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT368	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT373	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT374	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74AHCT377	Octal D-Type Flip-Flops with Clock Enable
KS54/74AHCT390	Dual 4-Bit Decade Counters
KS54/74AHCT393	Dual 4-Bit Binary Counters
KS54/74AHCT399	Quad 2-Port Registers
KS54/74AHCT423	Dual Retriggerable Monostable Multivibrators
KS54/74AHCT465	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT466	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT467	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT468	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT518	8-Bit Identity Comparators
KS54/74AHCT519	8-Bit Identity Comparators
KS54/74AHCT520	8-Bit Identity Comparators
KS54/74AHCT521	8-Bit Identity Comparators
KS54/74AHCT522	8-Bit Identity Comparators
KS54/74AHCT533	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT534	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74AHCT540	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT541	Octal Buffers and Line Drivers with 3-State Outputs



KS54/74AHCT Family (continued)

Device	Function
KS54/74AHCT563	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT564	Octal D-Type Flip-Flops with 3-State Output
KS54/74AHCT573	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT574	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74AHCT590	8-Bit Binary Counters with 3-State Output Register
KS54/74AHCT591	8-Bit Binary Counters with 3-State Output Register
KS54/74AHCT592	8-Bit Binary Counters with Input Register
KS54/74AHCT593	8-Bit Binary Counters with Bidirectional Input Register/Counter Output
KS54/74AHCT595	8-Bit Shift Registers with Output Latches
KS54/74AHCT596	8-Bit Shift Registers with Output Latches
KS54/74AHCT597	8-Bit Shift Registers with Input Latches
KS54/74AHCT612	Memory Mappers with 3-State Map Outputs
KS54/74AHCT640	Octal Bus Transceivers with 3-State Outputs
KS54/74AHCT643	Octal Bus Transceivers with 3-State Outputs
KS54/74AHCT645	Octal Bus Transceivers with 3-State Outputs
KS54/74AHCT646	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT648	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT651	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT652	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT658	Octal Bus Transceivers with Parity
KS54/74AHCT659	Octal Bus Transceivers with Parity
KS54/74AHCT664	Octal Bus Transceivers with Parity
KS54/74AHCT664	Octal Bus Transceivers with Parity
KS54/74AHCT665	Octal Bus Transceivers with Parity
KS54/74AHCT670	4-By-4 Register Files with 3-State Outputs
KS54/74AHCT679	12-Bit Address Comparators
KS54/74AHCT680	12-Bit Address Comparators
KS54/74AHCT682	8-Bit Magnitude Comparators
KS54/74AHCT684	8-Bit Magnitude Comparators
KS54/74AHCT686	8-Bit Magnitude Comparators
KS54/74AHCT688	8-Bit Identity Comparators
KS54/74AHCT689	8-Bit Identity Comparators with Open-Drain Outputs
KS54/74AHCT793	Octal Latches with Readback
KS54/74AHCT794	Octal Registers with Readback
KS54/74AHCT821	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT822	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT823	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT824	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT825	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT826	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT841	10-Bit Bus interface D-Type Latches with 3-State Outputs
KS54/74AHCT842	10-Bit Bus interface D-Type Latches with 3-State Outputs
KS54/74AHCT843	9-Bit Bus interface D-Type Latches with 3-State Outputs
KS54/74AHCT844	9-Bit Bus interface D-Type Latches with 3-State Outputs
KS54/74AHCT845	8-Bit Bus interface D-Type Latches with 3-State Outputs
KS54/74AHCT846	8-Bit Bus interface D-Type Latches with 3-State Outputs
KS54/74AHCT4049	Hex Inverting Logic Level Down Converters
KS54/74AHCT4045	Hex Logic Level Down Converters

2) KS54/74HCTLS Family (continued)

Device	Function
KS54/74HCTLS00	Quad 2-Input NAND Gates
KS54/74HCTLS01	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS02	Quad 2-Input NOR Gates
KS54/74HCTLS03	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS04	Hex Inverters
KS54/74HCTLS05	Hex Inverters with Open-Drain Outputs
KS54/74HCTLS08	Quad 2-Input AND Gates
KS54/74HCTLS09	Quad 2-Input AND Gates with Open-Drain Outputs
KS54/74HCTLS10	Triple 3-Input NAND Gates
KS54/74HCTLS11	Triple 3-Input AND Gates
KS54/74HCTLS12	Triple 3-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS14	Hex Schmitt-Trigger Inverters
KS54/74HCTLS20	Dual 4-Input NAND Gates
KS54/74HCTLS21	Dual 4-Input AND Gates
KS54/74HCTLS22	Dual 4-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS27	Triple 3-Input NOR Gates
KS54/74HCTLS30	8-Input NAND Gate
KS54/74HCTLS32	Quad 2-Input OR Gates
KS54/74HCTLS42	BCD-to-Decimal Decoder
KS54/74HCTLS51	Dual AND-OR-Invert Gates
KS54/74HCTLS58	Dual AND-OR Gates
KS54/74HCTLS73A	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74HCTLS74A	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74HCTLS75A	Quad Bistable Transparent Latches
KS54/74HCTLS76A	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74HCTLS77	Quad D-Type Latches
KS54/74HCTLS78A	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset, Common Clear and Common Clock
KS54/74HCTLS86	Quad 2-Input Exclusive-OR Gates
KS54/74HCTLS90	Decade Counters
KS54/74HCTLS92	Divide-by-Twelve Counter
KS54/74HCTLS93	4 Bit Binary Counter Divide By Two and Divide by Eight
KS54/74HCTLS107A	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74HCTLS109A	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74HCTLS112A	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74HCTLS121	Monostable Multivibrators with Schmitt-Trigger Inputs
KS54/74HCTLS123	Dual Retriggerable Monostable Multivibrators
KS54/74HCTLS125	Quad Buffers with 3-State Outputs
KS54/74HCTLS126	Quad Buffers with 3-State Outputs
KS54/74HCTLS132	Quad 2-Input NAND Gates with Schmitt-Trigger Inputs
KS54/74HCTLS133	13-Input NAND Gates
KS54/74HCTLS138	3-Line to 8-Line Decoders/Demultiplexers
KS54/74HCTLS139	Dual 1-of-4 Decoders/Demultiplexers
KS54/74HCTLS148	8-Line to 3-Line Priority Encoders
KS54/74HCTLS151	1 of 8 Data Selectors/Multiplexers
KS54/74HCTLS153	Dual 1 of 4 Data Selectors/Multiplexers
KS54/74HCTLS154	4-Line to 16-Line Decoders/Demultiplexers
KS54/74HCTLS155	Dual 2-to-4 Line Decoders/Demultiplexers
KS54/74HCTLS157	Quad 2-Line to 1-Line Data Selectors/Multiplexers
KS54/74HCTLS161A	Synchronous 4-Bit Binary Counters
KS54/74HCTLS162	Synchronous 4-Bit Decade Counters
KS54/74HCTLS163	Synchronous 4-Bit Binary Counters
KS54/74HCTLS164	8-Bit Serial-In/Parallel-Out Shift Registers
KS54/74HCTLS165	8-Bit Parallel-In/Serial-Out Shift Registers
KS54/74HCTLS166	8-Bit Parallel-In/Serial-Out Shift Registers with Clear
KS54/74HCTLS168	Synchronous 4-Bit Up/Down Decade Counters
KS54/74HCTLS169	Synchronous 4-Bit Up/Down Binary Counters
KS54/74HCTLS173	4-Bit D-Type Registers with 3-State Outputs

KS54/74HCTLS Family (continued)

Device	Function
KS54/74HCTLS174	Hex D-Type Flip-Flops with Clear
KS54/74HCTLS175	Quad D-Type Flip-Flops with Clear
KS54/74HCTLS181	4-Bit Arithmetic Logic Unit
KS54/74HCTLS182	Look-Ahead Carry Generator
KS54/74HCTLS183	Dual-High Speed Adder
KS54/74HCTLS190	Presettable Synchronous BCD Decade Up/Down Counter
KS54/74HCTLS191	Synchronous 4-Bit Up/Down Binary Counters
KS54/74HCTLS192	Presettable Synchronous BCD Decade Up/Down Counter
KS54/74HCTLS193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock
KS54/74HCTLS194	4-Bit Bidirectional Universal Shift Registers
KS54/74HCTLS195	4-Bit Bidirectional Universal Shift Registers
KS54/74HCTLS210	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS238	3-Line to 8-Line Decoders/Demultiplexers
KS54/74HCTLS239	Dual 1-of-4 Decoders/Demultiplexers
KS54/74HCTLS240	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS241	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS242	Quad Bus Transceivers with 3-State Outputs
KS54/74HCTLS243	Quad Bus Transceivers with 3-State Outputs
KS54/74HCTLS244	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS245	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS251	1 of 8 Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS253	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS258	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS259	8-Bit Addressable Latches
KS54/74HCTLS266	Quad Exclusive-NOR Gates with Open-Drain Outputs
KS54/74HCTLS273	Octal D-Type Flip-Flops
KS54/74HCTLS280	9-Bit Parity Generators/Checkers with Clear
KS54/74HCTLS299	8-Bit Universal Shift/Storage Registers with 3-State Outputs
KS54/74HCTLS322	8-Bit Shift Registers with Sign Extend
KS54/74HCTLS352	Dual 4-Line to 1-Line Data Selectors/Multiplexers
KS54/74HCTLS353	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS365	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS365	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS366	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS367	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS368	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS373	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74HCTLS374	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74HCTLS377	Octal D-Type Flip-Flops with Clock Enable
KS54/74HCTLS390	Dual 4-Bit Decade Counters
KS54/74HCTLS393	Dual 4-Bit Binary Counters
KS54/74HCTLS399	Quad 2-Port Registers
KS54/74HCTLS423	Dual Retriggerable Monostable Multivibrators
KS54/74HCTLS465	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS466	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS467	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS468	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS518	8-Bit Identity Comparators
KS54/74HCTLS519	8-Bit Identity Comparators
KS54/74HCTLS520	8-Bit Identity Comparators
KS54/74HCTLS521	8-Bit Identity Comparators
KS54/74HCTLS522	8-Bit Identity Comparators
KS54/74HCTLS533	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74HCTLS534	Octal D-Type Flip-Flops with 3-State Output
KS54/74HCTLS540	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS541	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS563	Octal D-Type Transparent Latches with 3-State Outputs

KS54/74HCTLS Family (continued)

Device	Function
KS54/74HCTLS564	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74HCTLS573	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74HCTLS574	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74HCTLS590	8-Bit Binary Counters with 3-State Output Register
KS54/74HCTLS591	8-Bit Binary Counters with 3-State Output Register
KS54/74HCTLS592	8-Bit Binary Counters with Register
KS54/74HCTLS593	8-Bit Binary Counters with Bidirectional Input Register/Counter Output
KS54/74HCTLS595	8-Bit Shift Registers with Output Latches
KS54/74HCTLS596	8-Bit Shift Registers with Output Latches
KS54/74HCTLS597	8-Bit Shift Registers with Input Latches
KS54/74HCTLS612	Memory Mappers with 3-State Map Outputs
KS54/74HCTLS640	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS643	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS645	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS646	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS648	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS651	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS652	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS658	Octal Bus Transceivers with Parity
KS54/74HCTLS659	Octal Bus Transceivers with Parity
KS54/74HCTLS664	Octal Bus Transceivers with Parity
KS54/74HCTLS665	Octal Bus Transceivers with Parity
KS54/74HCTLS670	4-By-4 Register Files with 3-State Outputs
KS54/74HCTLS679	12-Bit Address Comparators
KS54/74HCTLS680	12-Bit Address Comparators
KS54/74HCTLS682	8-Bit Magnitude Comparators
KS54/74HCTLS684	8-Bit Magnitude Comparators
KS54/74HCTLS686	8-Bit Magnitude Comparators
KS54/74HCTLS688	8-Bit Magnitude Comparators
KS54/74HCTLS689	8-Bit Identity Comparators with Open-Drain Outputs
KS54/74HCTLS793	Octal Latches with Readback
KS54/74HCTLS794	Octal Registers with Readback
KS54/74HCTLS821	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS822	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS823	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS824	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS826	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS841	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS842	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS843	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS844	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS845	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS846	8-Bit Bus interface Registers with 3-State Outputs
KS54/74HCTLS4049	Hex Inverting Logic Level Down Converters
KS54/74HCTLS4050	Hex Logic Level Down Converters

2. Functional Selection Guide

Function	Part Number KS54/74AHCT KS54/74HCTLS	Description	Package
Gates and Inverters	00	Quad 2-Input NAND Gates	14 DIP
	01	Quad 2-Input NAND Gates with Open-Drain Outputs	14 DIP
	02	Quad 2-Input NOR Gates	14 DIP
	03	Quad 2-Input NAND Gates with Open-Drain Outputs	14 DIP
	04	Hex Inverters	14 DIP
	05	Hex Inverters with Open-Drain Outputs	14 DIP
	08	Quad 2-Input AND Gates	14 DIP
	09	Quad 2-Input AND Gates with Open-Drain Outputs	14 DIP
	10	Triple 3-Input NAND Gates	14 DIP
	11	Triple 3-Input AND Gates	14 DIP
	12	Triple 3-Input NAND Gates with Open-Drain Outputs	14 DIP
	14	Hex Schmitt-Trigger Inverters	14 DIP
	20	Dual 4-Input NAND Gates	14 DIP
	21	Dual 4-Input AND Gates	14 DIP
	22	Dual 4-Input NAND Gates with Open-Drain Outputs	14 DIP
	27	Triple 3-Input NOR Gates	14 DIP
	30	8-Input NAND Gate	14 DIP
	32	Quad 2-Input OR Gates	14 DIP
	51	Dual AND-OR-Invert Gates	14 DIP
	58	Dual AND-OR Gates	14 DIP
86	Quad 2-Input Exclusive-OR Gates	14 DIP	
132	Quad 2-Input NAND Gates with Schmitt-Trigger Inputs	14 DIP	
133	13-Input NAND Gates	16 DIP	
266	Quad Exclusive-NOR Gates with Open Drain Outputs		
Buffers and Line Drivers	125	Quad Buffers with 3-State Outputs	14 DIP
	126	Quad Buffers with 3-State Outputs	14 DIP
	210	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
	240	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
	241	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
	244	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
	365	Hex Bus-Drivers with 3-State Outputs	16 DIP
	366	Hex Bus-Drivers with 3-State Outputs	16 DIP
	367	Hex Bus-Drivers with 3-State Outputs	16 DIP
	368	Hex Bus-Drivers with 3-State Outputs	16 DIP
	465	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
	466	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
	467	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
	468	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP
540	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP	
541	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP	
Level Shifters	4049	Hex Inverting Logic Level Down Converters	16 DIP
	4050	Hex Logic Level Down Converters	16 DIP
Flip-Flops	73	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	14 DIP
	74	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear	14 DIP
	76	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear	16 DIP
	78	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset, Common Clear and Common Clock	14 DIP
	107	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	14 DIP
	109	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear	16 DIP
	112	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear	16 DIP
	173	4-Bit D-Type Registers with 3-State Outputs	16 DIP
	174	Hex D-Type Flip-Flops with Clear	16 DIP
	175	Quad D-Type Flip-Flops with Clear	16 DIP
	273	Octal D-Type Flip-Flops with Clear	20 DIP
	374	Octal D-Type Flip-Flops with 3-State Outputs	20 DIP

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Functional Selection Guide (continued)

Function	Part Number KS54/74AHCT KS54/74HCTLs	Description	Package
	377	Octal D-Type Flip-Flops with Clock Enable	20 DIP
	399	Quad 2-Port Registers	16 DIP
	534	Octal D-Type Flip-Flops with 3-State	20 DIP
	564	Octal D-Type Flip-Flops with 3-State	20 DIP
	574	Octal D-Type Flip-Flops with 3-State	20 DIP
	670	4-By-4 Register Files with 3-State Outputs	16 DIP
	794	Octal Register with Readback	20 DIP
	821	10-Bit Bus Interface Registers with 3-State Outputs	24 DIP
	822	10-Bit Bus Interface Registers with 3-State Outputs	24 DIP
	823	9-Bit Bus Interface Registers with 3-State Outputs	24 DIP
	824	9-Bit Bus Interface Registers with 3-State Outputs	24 DIP
	825	8-Bit Bus Interface Registers with 3-State Outputs	24 DIP
	826	8-Bit Bus Interface Registers with 3-State Outputs	24 DIP
Latches	75	Quad Bistable Transparent Latches	16 DIP
	77	Quad D-Type Latches	14 DIP
	259	8-Bit Addressable Latches	16 DIP
	373	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP
	533	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP
	563	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP
	573	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP
	793	Octal D-Type Transparent Latches with Readback	20 DIP
	841	10-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP
	842	10-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP
	843	9-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP
	844	9-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP
	845	8-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP
846	8-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP	
Multiplexers	151	1 of 8 Data Selectors/Multiplexers	16 DIP
	153	Dual 1 of 4 Data Selectors/Multiplexers	16 DIP
	157	Quad 2-Line to 1-Line Data Selectors/Multiplexers	16 DIP
	158	Quad 2-Line to 1-Line Data Selectors/Multiplexers	16 DIP
	251	1-of-4 Data Selectors/Multiplexers with 3-State Outputs	16 DIP
	253	Dual 1-of-4 Data Selectors/Multiplexers with 3-State Outputs	16 DIP
	257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs	16 DIP
	258	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs	16 DIP
	352	Dual 1-of-4 Data Selectors/Multiplexers	16 DIP
353	1-of-4 Data Selectors/Multiplexers with 3-State Outputs	16 DIP	
Shift Registers	164	8-Bit Serial-In/Parallel-Out Shift Registers	14 DIP
	165	8-Bit Parallel-In/Serial-Out Shift Registers	16 DIP
	166	8-Bit Parallel-In/Serial-Out Shift Registers	16 DIP
	194	4-Bit Bidirectional Universal Shift Registers	16 DIP
	195	4-Bit Bidirectional Universal Shift Registers	16 DIP
	299	8-Bit Universal Shift/Storage Registers with 3-State Outputs	20 DIP
	322	8-Bit Shift Registers with Sign Extend	20 DIP
	595	8-Bit Shift Registers with Output Latches	16 DIP
	596	8-Bit Shift Registers with Output Latches	16 DIP
597	8-Bit Shift Registers with Input Latches	16 DIP	
Transceivers	242	Quad Bus Transceivers with 3-State Outputs	14 DIP
	243	Quad Bus Transceivers with 3-State Outputs	14 DIP
	245	Quad Bus Transceivers with 3-State Outputs	20 DIP
	640	Quad Bus Transceivers with 3-State Outputs	20 DIP
	643	Quad Bus Transceivers with 3-State Outputs	20 DIP
	645	Quad Bus Transceivers with 3-State Outputs	20 DIP
	646	Octal 3-State Bus Transceivers with Registers	24 DIP
	648	Octal 3-State Bus Transceivers with Registers	24 DIP



Functional Selection Guide

Function	Part Number KS54/74AHCT KS54/74HCTLs	Description	Package
	651	Octal 3-State Bus Transceivers with Registers	24 DIP
	652	Octal 3-State Bus Transceivers with Registers	24 DIP
	658	Octal Bus Transceivers with Parity	24 DIP
	659	Octal Bus Transceivers with Parity	24 DIP
	664	Octal Bus Transceivers with Parity	24 DIP
	665	Octal Bus Transceivers with Parity	24 DIP
Counters	90	Decade Counters	14 DIP
	92	Divide-by-Twelve Counters	14 DIP
	93	4 Bit Binary Counter Divide by Two and Divide by Eight	14 DIP
	160	Synchronous 4-Bit Decade Counters	16 DIP
	161	Synchronous 4-Bit Binary Counters	16 DIP
	162	Synchronous 4-Bit Decade Counters	16 DIP
	163	Synchronous 4-Bit Binary Counters	16 DIP
	168	Synchronous 4-Bit Up/Down Decade Counters	16 DIP
	169	Synchronous 4-Bit Up/Down Binary Counters	16 DIP
	190	Presettable Synchronous BCD Decade Up/Down Counter	16 DIP
	191	Synchronous 4-Bit Up/Down Binary Counters	16 DIP
	192	Synchronous 4-Bit Up/Down Binary Counters	16 DIP
	193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock	16 DIP
	390	Dual 4-Bit Decade Counters	16 DIP
	393	Dual 4-Bit Binary Counters	16 DIP
	590	8-Bit Binary Counters with 3-State Output Registers	16 DIP
	591	8-Bit Binary Counters with 3-State Output Registers	16 DIP
	592	8-Bit Binary Counters with Input Registers	16 DIP
	593	8-Bit Binary Counters with Bidirectional Input Registers/Counter Outputs	20 DIP
Decoders Encoders	42	BCD-to-Decimal Decoder	16 DIP
	138	3-Line to 8-Line Decoders/Demultiplexers	16 DIP
	139	Dual 1-of-4 Decoders/Demultiplexers	16 DIP
	148	8-Line to 3-Line Priority Encoders	16 DIP
	154	4-Line to 16-Line Decoders/Demultiplexers	24 DIP
	155	Dual 2-to-4 Line Decoders/Demultiplexers	16 DIP
	238	3-Line to 8-Line Decoders/Demultiplexers	16 DIP
	239	Dual 1-of-4 Decoders/Demultiplexers	16 DIP
Multivibrators	121	Monostable Multivibrators with Schmit-Triggere Inputs	14 DIP
	123	Dual Retriggerable Monostable Multivibrators	16 DIP
	423	Dual Retriggerable Monostable Multivibrators	16 DIP
Arithmetic Circuits	181	4-Bit Arithmetic Logic Unit	24 DIP
	182	Look-Ahead Carry Generator	16 DIP
	183	Dual High Speed Adder	14 DIP
	280	9-Bit Parity Generators/Checkers	14 DIP
	518	8-Bit Identity Comparators	20 DIP
	519	8-Bit Identity Comparators	20 DIP
	520	8-Bit Identity Comparators	20 DIP
	521	8-Bit Identity Comparators	20 DIP
	522	8-Bit Identity Comparators	20 DIP
	679	12-Bit Address Comparators	20 DIP
	680	12-Bit Address Comparators	20 DIP
	682	8-Bit Magnitude Comparators	20 DIP
	684	8-Bit Magnitude Comparators	20 DIP
	686	8-Bit Magnitude Comparators	20 DIP
	688	8-Bit Magnitude Comparators	20 DIP
	689	8-Bit Identity Comparators with Open-Drain Outputs	20 DIP
Memory Controller	612	Memory Mappers with 3-State Map Outputs	40 DIP

1. Introduction to Semicustom Design

The semi-custom IC revolution is recently the most important development in electronic technology.

By transferring IC design responsibility from manufactures to users, semi-custom IC will subtly alter size performance, cost, power dissipation, reliability and design of all electronic circuits and systems.

Therefore SST will be ready to received any user's special order when user needs some special IC of his own: for example, Linear array, Gate array and Standard cell.

The merits of semicustom design are as following:

- Faster turn around time.
- Lower development cost.
- Lower system parts count.
- Lower system cost.
- Better circuit design secrecy.
- Faster design approach.

A. Linear Array

- Bipolar standard process.
- Wide operating voltage range (20 V, 40 V)
- Optional one metal mask.

B. CMOS Gate Array

- Low power silicon-gate C-MOS technology.
 - KG10000 Series: 3 μ m geometries, single metal layer.
 - KG30000 Series: 2 μ m geometries, double metal layer.
- Propagation delay per gate (2 Input NAND, FO=2)
 - KG10000 Series: Typ. 1.8 nsec
 - KG30000 Series: Typ. 1.0 nsec
- TTL and C-MOS compatible I/O interface.
- Low voltage operating (2V~7V)

C. CMOS Standard Cell

- Low power 2.0 μ m silicon gate double metal CMOS technology
- TTL and CMOS compatible I/O interface
- Output Drive current: 4mA, 8mA, 12mA, 24mA
- Low voltage operating (2V~7V)

2. Linear Array Families: SA1000 Series

Device	Maximum Voltage(V)	Pad Count	Transistor		Schottky Diode	Total Resistor (Kohm)
			NPN	PNP		
SA1000	20	16	61	18	15	734
SA1000N	20	16	61	18	15	2,616
SA1100	40	16	60	20	—	242
SA1100N	40	16	60	20	—	1,858
SA1200	20	28	157	52	—	1,376
SA1200N	20	28	157	52	—	7,693
SA1300N	20	14	22	8	—	947

3. Gate Array Families

A. KG10000 SERIES

DEVICE		KG10200	KG10400	KG10600	KG10800	KG11200
FEATURE						
SUPPLY VOLTAGE		2V~7V				
GATE COUNT*		210	400	600	840	1184
PAD	I/O	26	36	44	52	64
COUNT	POWER	2	4	4	4	4
GATE DELAY		1.8 nsec (2 input NAND, FO=2)				
OUTPUT	SINK	Typ. 3.5 mA at V _{OL} =0.4V				
CURRENT	SOURCE	Typ. 2.4 mA at V _{OH} =4.6V				

NOTE: REFER TO 2 INPUT NAND GATE

B. KG30000 SERIES

DEVICE		KG30400	KG30600	KG30800	KG31200	KG32000	KG34000	KG36000	KG38000	KG312000
FEATURE										
SUPPLY VOLTAGE		2V~7V								
GATE COUNT*		400	600	800	1200	2000	4000	6000	8000	12000
PAD	I/O	27	32	38	46	70	102	128	154	202
COUNT	POWER	2	4	4	4	6	6	6	6	6
GATE DELAY		Typ. 1.0 nsec (2 input NAND, FO=2)								
OUTPUT	SINK	Typ. 6 mA at V _{OL} =0.4V								
CURRENT	SOURCE	Typ. 6mA at V _{OH} =2.4V								

NOTE: REFER TO 2 INPUT NAND GATE

4. Standard Cell

Kind	Primitive Cell	I/O Cell	MSI (TTL)
Count	78	29	52

1. Introduction

1.1 4-Bit One Chip Microcomputer

Device	Process	Cycle (μsec)	Pd. Typ. (mW)	Instruction	ROM (bit)	RAM (bit)	Subroutine Nesting Level	Package
KS51400	CMOS	2	5.0	40	2038×8	128×4	3	40 SD
KS51500	CMOS	2	5.0	40	2038×8	128×4	3	30 SD
KS52000	CMOS	61	0.15	54	2268×8	96×4	1	60 FQP

1.2 Application Example

A. KS51000 Series

Device	Process	Main Function	Supply Voltage	Package
KS51014	CMOS	Rice Cooker	5V	28 DIP
KS51015A	CMOS	Vehicle Alarm System Controller	5V	28 DIP
KS51016	CMOS	2-Channel Clock & Counter	5V	28 DIP
KS51018A	CMOS	Computer Fan	5V	28 DIP
KS51020	CMOS	Dice Game Controller	5V	28 DIP

B. KS51400 Series

Device	Process	Main Function	Supply Voltage	Package
KS51401	CMOS	LED Timer/Counter	5V	40 SD
KS51402	CMOS	Humidity Controller	5V	40 SD
KS51403	CMOS	Medium-Level Washing Machine	5V	40 SD
KS51404	CMOS	LED Timer Rice Cooker	5V	40 SD

C. KS51500 Series

Device	Process	Main Function	Supply Voltage	Package
KS51501	CMOS	Dish Dryer	5V	30 SD
KS51502	CMOS	Micro-Wave Oven	5V	30 SD
KS51503	CMOS	Low-Level Washing Machine	5V	30 SD
KS51504	CMOS	Electrical Fan	5V	30 SD

D. KS52000 Series

Device	Process	Main Function	Supply Voltage	Package
*KS52012H	CMOS	4-Line Phone	5V	60 FQP
KS52014	CMOS	Feature Phone	3V	60 FQP
KS52015	CMOS	Timer-X	3V	60 FQP
KS52016	CMOS	Bicycle Velocity Meter	3V	60 FQP
*KS52017	CMOS	Data Bank	3V	60 FQP
KS52018H	CMOS	LCD Timer Rice Cooker	5V	60 FQP
KS52025	CMOS	Learning Computer for Children	3V	60 FQP
*KS52026	CMOS	Learning Computer & Game	3V	60 FQP
*KS52027	CMOS	International Data Bank	3V	60 FQP
*KS52028H	CMOS	Talking Data Bank	5V	60 FQP
*KS52029	CMOS	Spell Master	3V	60 FQP
*KS52030	CMOS	Mathematic Computer	3V	60 FQP
*KS52031	CMOS	Walking Counter	3V	60 FQP
*KS52036	CMOS	Digital Ruler	3V	60 FQP

* Custom Design

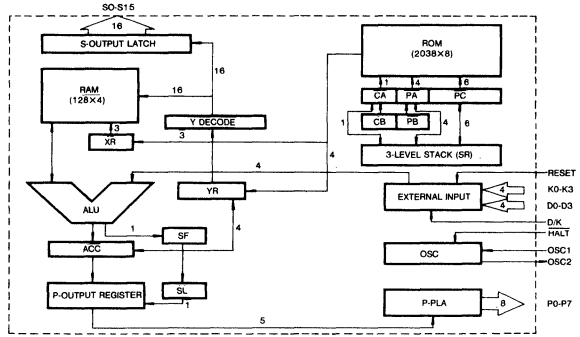
2. KS51400 SERIES

C-MOS 4-BIT ONE CHIP MICROCOMPUTER

FEATURES

- Complete one chip microcomputer
- ROM capacity: 2038 bytes
- RAM capacity: 128 words of 4 bits each
- Instruction set: 40 basic instructions
- Subroutine level: 3 level
- Inst. Cycle time: 2 μ s (at 3MHz)
- Input port K,D: 4 bits \times 2
- Output port Pi: 8 bits (parallel output)
Si: 16 bits (individual output)
- On-chip oscillator: Crystal
Ceramic resonator
External resistor
(Mask option)
- Maximum-rated voltage: 6.5V
- LED direct drive (Si, Pi output: Source 25 mA)
- Package: 40-pin shrink DIP

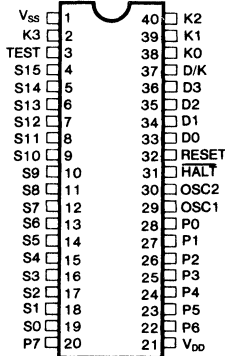
FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The KS51400 family is a series of 4-bit C-MOS microcomputers designed for dedicated applications. The C-MOS technology of the KS51400 family provides the flexibility of microcomputers for battery-backed-up applications.

PIN CONFIGURATION



Symbol	Function
K0-K3	Data input
D0-D3	Data input
D/K	K,D input selection
S0-S15	Individual output
P0-P7	Parallel output
HALT	Oscillation stop input (Active low)
RESET	External reset input
TEST	Input for chip test (should be Vss)
OSC1	Clock input
OSC2	Clock output
VDD	Power supply
VSS	Power return

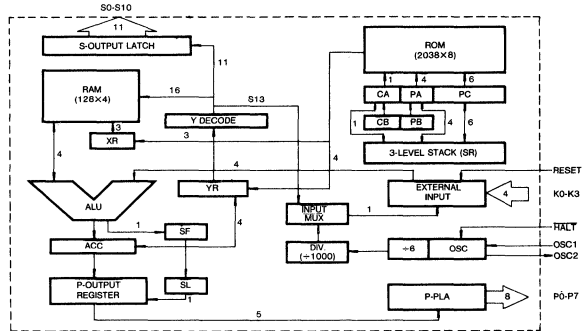
3. KS51500 SERIES

C-MOS 4-BIT ONE CHIP MICROCOMPUTER

FEATURES

- Complete one chip microcomputer
- ROM capacity: 2038 bytes
- RAM capacity: 128 words of 4 bits each
- Instruction set: 40 basic instructions
- Subroutine level: 3 level
- Inst. Cycle time: 2 μ s (at 3MHz)
- Input port: 4 bits
- Output port Pi: 8 bits (parallel output)
Si: 11 bits (individual output)
- On-chip oscillator: Crystal
Ceramic resonator
External resistor
(Mask option)
- Maximum-rated voltage: 6.5V
- LED direct drive (Si, Pi output: Source 25 mA)
- Package: 30-pin shrink DIP

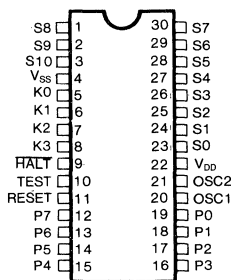
FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The KS51500 family is a series of 4-bit C-MOS microcomputers designed for dedicated applications. The C-MOS technology of the KS51500 family provides the flexibility of microcomputers for battery-backed-up applications.

PIN CONFIGURATION



Symbol	Function
K0-K3	Data input
S0-S10	Individual output
P0-P7	Parallel output
HALT	Oscillation stop input (Active low)
RESET	External reset input
TEST	Input for chip test (should be V _{SS})
OSC1	Clock input
OSC2	Clock output
V _{DD}	Power supply
V _{SS}	Power return

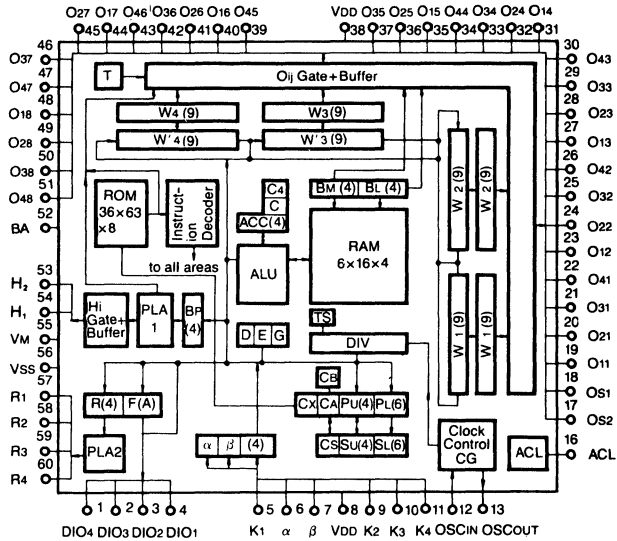
4. KS52000 SERIES

C-MOS 4-BIT ONE CHIP MICROCOMPUTER

FEATURES

- Complete one chip microcomputer
- ROM capacity : 2268 bytes
- RAM capacity : 96 words of 4 bits each
- Instruction set : 54 instructions
- Subroutine level : 1 level
- Inst. cycle time : 61 μsec (1 byte)
- Input port K input : 4 bits
- Asynchronous input : 2 bits
- Output port O_{ij} : 34 bits
 - H_i : 2 bits
 - R_i : 4 bits
- I/O port DIO : 4 bits
- Divider of 15 stages with reset
- Internal LCD drive circuit
- External RAM drive
- Internal crystal oscillator circuit
- Extremely small power consumption
- Internal low-voltage detection circuit
- 60-pin flat quad package

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

Designed in low-threshold CMOS technology, the KS52000 has a 3V supply voltage and an extremely low current consumption of 15 to 45 μA depending on the mode of operation.

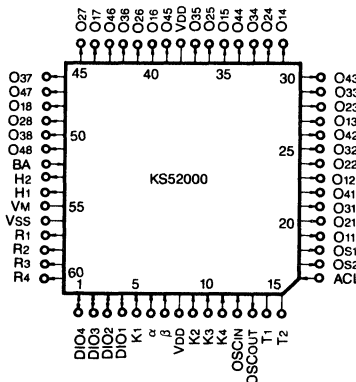
The KS52000 contains on a single silicon chip of a few square millimeters area a 2268 byte ROM, a RAM of 96 words, 8 static registers with 9 bits each, a 15-stage frequency divider, the clock oscillator, ALU and accumulator, programmable logic arrays (PLA) and other logic circuits: See Functional Block Diagram.

Due to its extremely flat construction-2mm in height-the KS52000 is suited for application in equipment no thicker than a pocket notebook.

SYMBOL DESCRIPTION

- ACC: Accumulator • ACL: Automatic clear • ALU: Arithmetic logic unit • BM, BL: RAM address register • C: Carry flag • CG: Clock generator • CA, CB, CX, PU, PL: Program counter • CS, SU, SL: Stack register • DIV: Divider • F: I/O register • K, α, β: Input register • R: Output register • W, W: Static shift register

PIN CONFIGURATION



Symbol	Description
K1 - K4	Parallel input port
α, β	Individual input port
R1 - R4	Output port
O1, O2, O11 - O48	Segment output port
H1, H2	Common output (3-level)
DIO1 - DIO4	I/O port (tri-state)
OSCIN, OSCOUT	Crystal oscillator port
ACL	Automatic clear port
VM, VSS	Center tap of VDD
VDD, VSS	Power port
T1, T2	Test port

1. Introduction

Features	KS5901A	KS5902XX	KS5911	KS5912XX
Synthesis Method	LPC	LPC	ADM	ADM
Operating Voltage	5V	5V	5V	5V
Oscillation Frequency	640 KHz (X-Tal OSC)	2.56 MHz (X-Tal OSC)	640 KHz (RC OSC)	640 KHz (RC OSC)
Sampling Frequency	8 KHz	8 KHz	8,11,16,32 KHz	8,11,16,32 KHz
Bit Rate	2.4~9.6 Kbps	2.4~9.6 Kbps	8,11,16,32 Kbps	8,11,16,32 Kbps
Control Mode	CPU/Manual	CPU/Manual /Auto	Talk-Back/ Manual	Manual
Data ROM (or RAM)	External ROM Max. 64KBytes	Internal ROM 48KBits	External RAM 64K/256DRAMx4	Internal ROM 64KBits
Speech Times	Max. 4 Min	Max. 20 Sec.	Max. 2 Min.	Max. 8 Sec.
D/A Converter Bits	9 Bits	9 Bits	10 Bits	10 Bits
PKG	60 FQP	24 DIP	48 FQP	16 DIP
Applications	Sound Information A/M	Toy Simple Sound Information	Talk-Back A/M	Toy Natural Sound Effect

2. KS5901A External ROM Type

FEATURES

- Voice synthesis method: LPC
- 640 KHz X-tal oscillation
- 8 KHz Sampling frequency
- Control mode: CPU/manual mode
- Various synthesis speed: 0.7 – 1.55 times of normal speed
- Direct access to the external ROM (x 8 Bit)
- Maximum memory size: 64 KBytes
- Easy interface with CPU
- On chip 9 Bits R-2R D/A converter
- Single 5V power supply
- PKG: 60 FQP

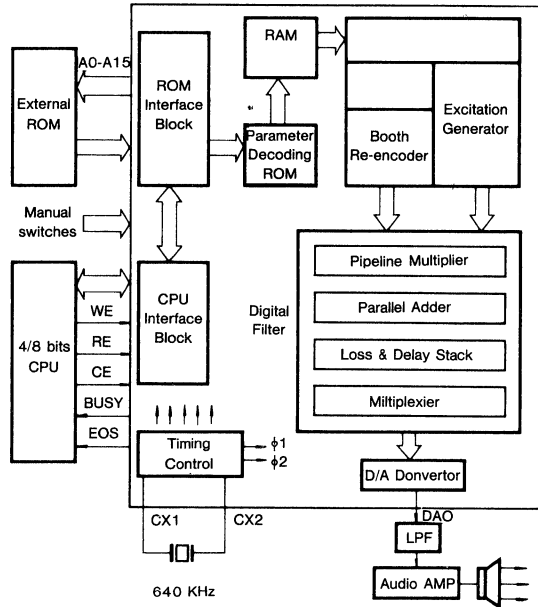
GENERAL DESCRIPTION

The KS5901A is a CMOS speech synthesis processor developed by Samsung Semiconductor and Telecommunications Co., Ltd. (SST). SST has undertaken a research & development program on an encoded reproduction algorithm called linear predictive coding (LPC). Speech is synthesized by processing an externally provided variable bit stream of LPC encoded speech data, and converting the results to the audible output with an on-chip 9 bits D/A converter.

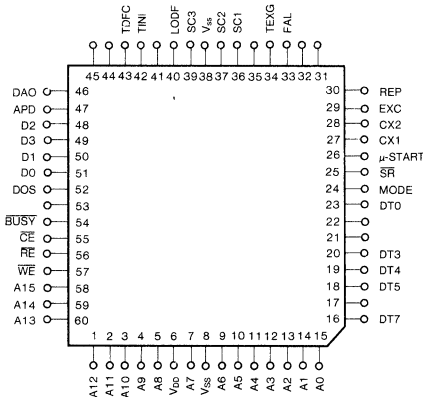
The speech synthesis system using KS5901A is composed of the following three chips:

- KS5901A : CMOS speech synthesizer
 - PROM : Commercial non-volatile memory (X8 bit)
 - Micom/ μ -processor: 4/8 bits system controller (CPU mode)
- With a considerable memory expansion and controller interfacing capacity, the KS5901A performs speech synthesis operation required for various applications. As the KS5901A is CMOS LSI, the Power consumption is small enough to satisfy the power specification.

BLOCK DIAGRAM



PIN CONFIGURATION



Name	Description
A0~A15	Address Output
DT0~DT7	Date Input
CX1-CX2	Oscillator Port
MODE	Mode select
M-Start	Manual Start
SC0-SC3	Speed select
DAO	D/A Output
APD	Audio power down
D0~D3	CU I/F Bos
EOS	END of Speech
V _{SS} V _{DD}	Power in

3. KS5902 Internal ROM Type

FEATURES

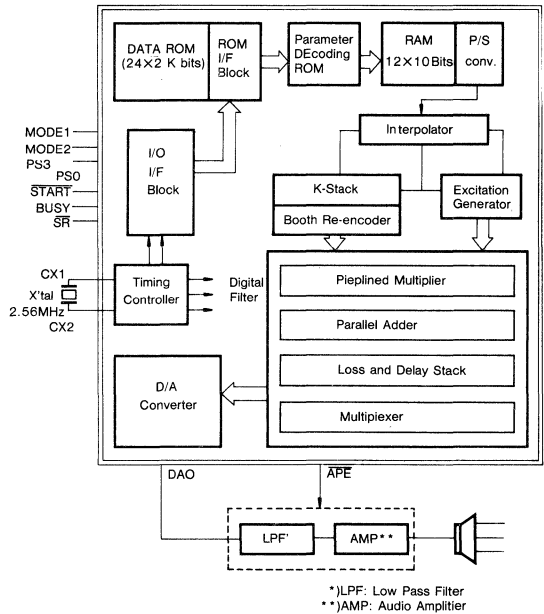
- Speech synthesis method: LPC
- 2.58 KHz X-tal oscillation
- 8 KHz sampling frequency
- Control mode: CPU/manual mode
- Various synthesis speed: 0.7 – 1.55 times of normal speed
- Various speech synthesis conditions
- 48 KBits on chip data ROM
- Easy interface with CPU
- On chip 9 Bits R-2R D/A converter
- Single 5V power supply
- Low power consumption by C²MOS structure
- PKG: 60 FQP

GENERAL DESCRIPTION

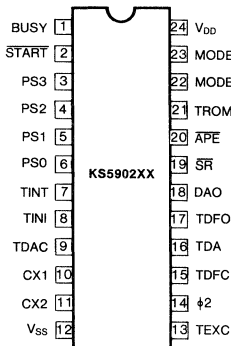
The KS5902XX is a CMOS one-chip speech synthesizer produces a good quality of human voice using LPC (Linear Predictive Coding) algorithm. It can be easily used everywhere required to produce synthesized speech with it's simplified I/O design. The KS5902XX has three operating modes. The CPU mode makes it easy to interface with 4/8 bits microprocessor or microcontroller. In the KEY mode it is operated by some keys attached to. In the auto mode, it can synthesize speech automatically according to this simple operation of externally connected switches.

The KS5902XX has has 48K bit mask programmable ROM which can produce speech during about 20 sec, continuously. It can be separated to 15 phrases. The KS5902XX also has a built-in 9 bits R-2R D/A converter. (KS5902XX is noted to KS5902 hereinafter, as the XX is 2 character assigned according to the mask option)

BLOCK DIAGRAM



PIN CONFIGURATION



Name	Description
BUSY	Busy signal output
START	Start input
PS0-PS3	Phrase select
CX1-CX2	Oscillator port
DAO	D/A converter output
SR	System reset
APE	Audio power enable
MODE1-2	Mode select
V _{DD} , V _{SS}	Power in

4. KS5911 Voice Recording & Reproducing LSI

FEATURES

- Speech analysis & synthesis mthod: ADM
- RC oscillator: 640 KHz
- Selectable but-rate: 8K, 11K, 16K, 32Kbps
- Control mode: Talking back mode/manual control mode/extension mode
- Data memory:
 - Talking back/manual control mode: 64K or 256KDRAM × 4 pcs
 - Extension mode: 64K or 256KDRAM unlimited
- Auto silence detection (Talking back mode)
- Built-In DRAM refresh counter
- Built-In microphone amplifier & 10 Bits D/A converter
- Single 5V power supply
- Low power consumption by C²MOS structure
- PKG: 48 FQP

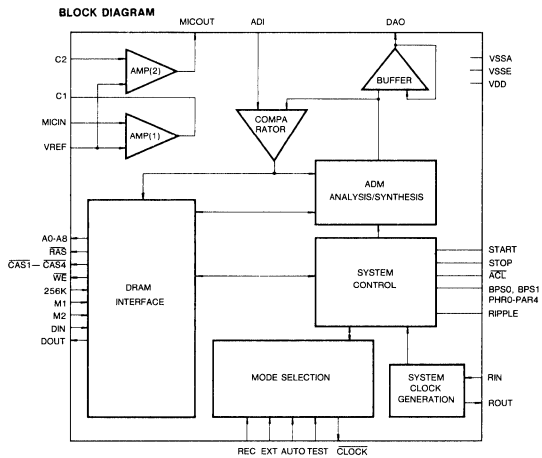
GENERAL DESCRIPTION

KS5911 is a CMOS LSI for voice (sound) recording & reproducing LSI, using the AMD (Adaptive Delta Modulation) algorithm.

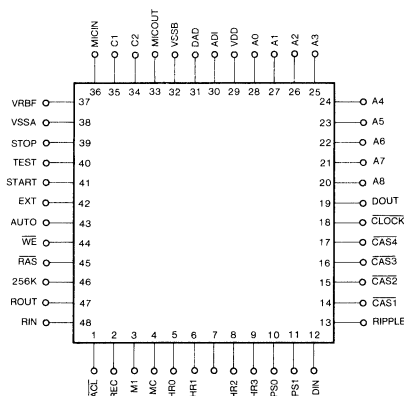
KS5911 can be used two kinds of modes, that is, normal operation model and memory extension mode as the number of using memory, and can be used manual mode and auto mode with the way of recording/ reproducing.

It can be used 64K or 256K D-RAM at normal operation mode until maximum 4pcs and expanded infinitely the area of memory at memory extension mode but it is limited pin's fan out by address.

BLOCK DIAGRAM



PIN CONFIGURATION



Name	Description
-ACL	Rest input
REL	Record select
M1-M2	Dram number select
PH0-PH3	Phrase select
BPS0-BPS-1	Bit rate select
DIN	Data input
-CAS1-4	Column address output
DOUT	Data output
A0-A8	Dram address output
ADI	Voice input
RIN-ROUT	Oscillator Port
V _{DD} , V _{SS}	Power in

5. KS5912 Internal Sound Generation

FEATURES

- Single chip voice & sound generation LSI by ADM method
- On-chip 64 Kbits mask ROM
- Simple manual control
- Repetition function (3 times/8 times)
- Selectable phrase: 4 phrase
- Maximum generation time: 8 sec (8 KHz sampling)
- Variable bit rate (make option):
32kbps/16kbps/11kbps/8kbps
- 660 KHz RC Oscillation
- On-chip 10 bit D/A converter
- Single 5V power supply
- Low power consumption by CMOS logic
- 16 DIP type

GENERAL DESCRIPTION

KS5912XX is a one chip voice/sound reproducing LSI using CVSD (Continuously Variable Slope Delta modulation) algorithm.

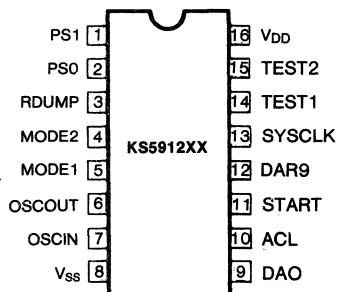
This LSI is capable of reproducing voice/sound up to 8 seconds, separating 4 phrases.

KS5912XX consists of voice reproducing logic, 64 Kbits ROM to contain encoding data, 10 bits D/A converter, control logic, RC oscillator for cost effect.

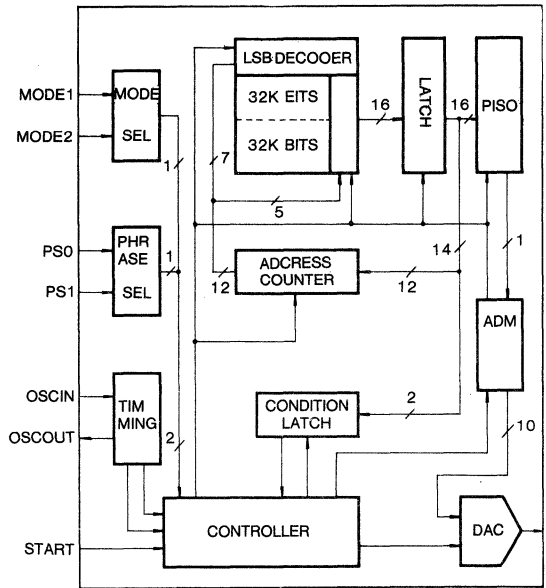
This LSI can be used for various applications required for voice and sound reproducing (especially, TOY industry), having simple control method and external circuit.

Voice and sound encoding data that have been edited by ADM tooling system are programmed into internal ROM by changing one mask during the device fabrication

PIN CONFIGURATION



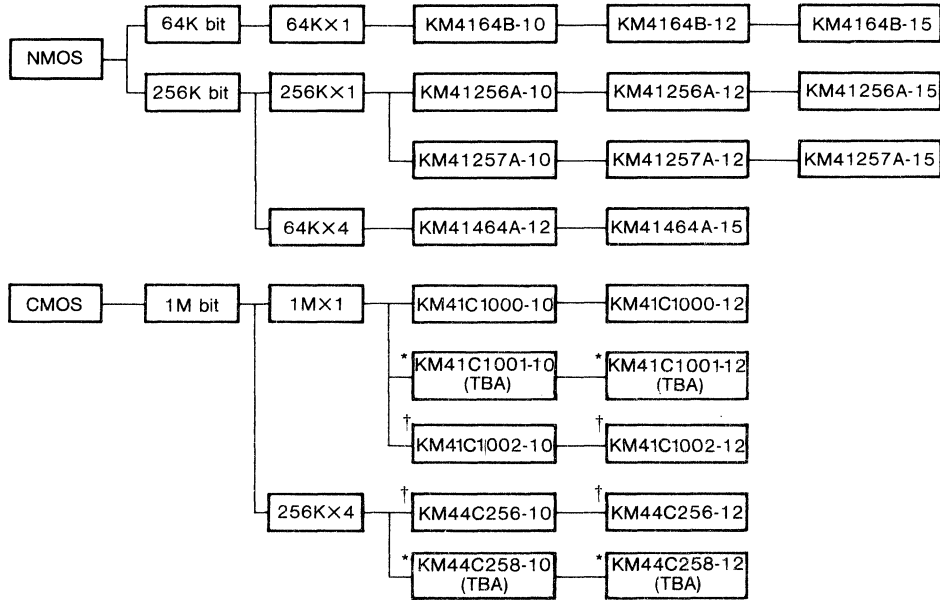
BLOCK DIAGRAM



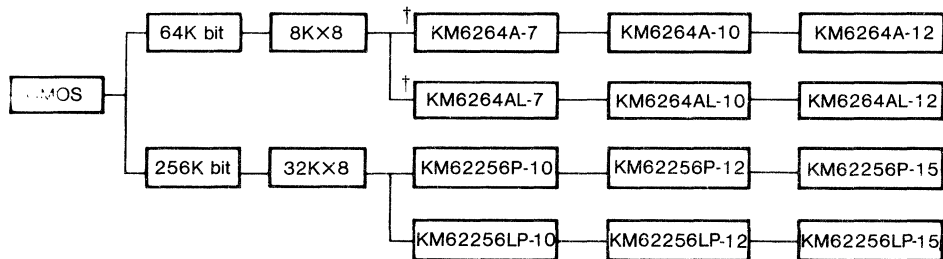
Name	Description
PS1	Phrase selection pins
PS0	(Pull-down)
RDUMP	Internal status output pin for test
MODE2	MODE selection pin 2 (pull-up)
OSCOUT	660 KHz, RC oscillator OUTPUT pin
OSCIN	660 KHz, RC oscillator INPUT pin
V _{SS}	GROUND
DAO	10 bit D/A converter output
-ACL	System reset (Low Active)
START	Start signal input pin (pull-down)
DAR9	TEST pin Normally N.C.
SYSCLK	System clock output (128 KHz)
TEST1	TEST pin (Normally Ground)
TEST2	TEST pin (Normally Ground)
V _{DD}	+4 Volt

1. INTRODUCTION

1.1 Dynamic RAM

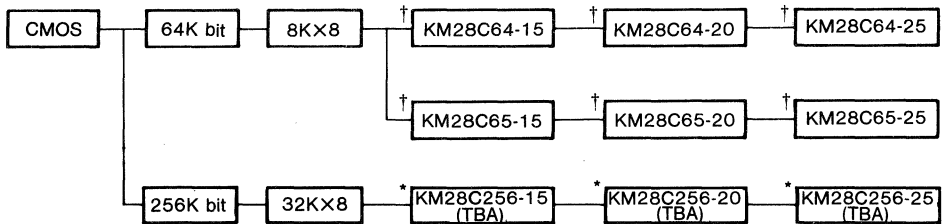
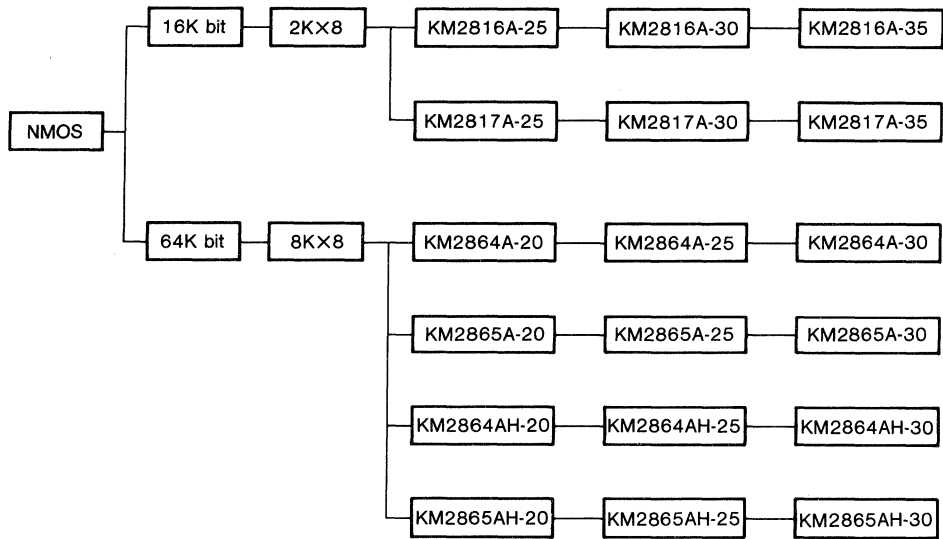


1.2 Static RAM



† New Product
 * Preliminary Product
 TBA: To Be Announced

1.3 EEPROM



† New Product
 * Preliminary Product
 TBA: To Be Announced.

2. PRODUCT GUIDE

2.1 Dynamic RAM

Capacity	Part Number	Organization	Speed (ns)	Technology	Features	Packages	Remark
64K bit	KM4164B-10	64KX1	100	NMOS	Page Mode	16-Pin DIP	Now
	KM4164B-12	64KX1	120	NMOS	Page Mode	16-Pin DIP	Now
	KM4164B-15	64KX1	150	NMOS	Page Mode	16-Pin DIP	Now
256K bit	KM41256AP-12	256KX1	120	NMOS	Page Mode	16-Pin DIP	Now
	KM41256AP-15	256KX1	150	NMOS	Page Mode	16-Pin DIP	Now
	KM41256AJ-12	256KX1	120	NMOS	Page Mode	18-Pin PLCC	Now
	KM41256AJ-15	256KX1	150	NMOS	Page Mode	18-Pin PLCC	Now
	KM41256AZ-12	256KX1	120	NMOS	Page Mode	16-Pin ZIP	Now
	KM41256AZ-15	256KX1	150	NMOS	Page Mode	16-Pin ZIP	Now
	KM41257AP-12	256KX1	120	NMOS	Nibble Mode	16-Pin DIP	Now
	KM41257AP-15	256KX1	150	NMOS	Nibble Mode	16-Pin DIP	Now
	KM41257AJ-12	256KX1	120	NMOS	Nibble Mode	18-Pin PLCC	Now
	KM41257AJ-15	256KX1	150	NMOS	Nibble Mode	18-Pin PLCC	Now
	KM41257AZ-12	256KX1	120	NMOS	Nibble Mode	16-Pin ZIP	Now
	KM41257AZ-15	256KX1	150	NMOS	Nibble Mode	16-Pin ZIP	Now
	KM41464AP-12	64KX4	120	NMOS	Page Mode	18-Pin DIP	Now
	KM41464AP-15	64KX4	150	NMOS	Page Mode	18-Pin DIP	Now
	KM41464AJ-12	64KX4	120	NMOS	Page Mode	18-Pin PLCC	Now
	KM41464AJ-15	64KX4	150	NMOS	Page Mode	18-Pin PLCC	Now
	KM41464AZ-12	64KX4	120	NMOS	Page Mode	20-Pin ZIP	Now
	KM41464AZ-15	64KX4	150	NMOS	Page Mode	20-Pin ZIP	Now
1M bit	KM41C1000P-10	1MX1	100	CMOS	Fast Page Mode	18-Pin DIP	Now
	KM41C1000P-12	1MX1	120	CMOS	Fast Page Mode	18-Pin DIP	Now
	KM41C1000J-10	1MX1	100	CMOS	Fast Page Mode	20/26-Pin SOJ	Now
	KM41C1000J-12	1MX1	120	CMOS	Fast Page Mode	20/26-Pin SOJ	Now
	KM41C1000Z-10	1MX1	100	CMOS	Fast Page Mode	20-Pin ZIP	Now
	KM41C1000Z-12	1MX1	120	CMOS	Fast Page Mode	20-Pin ZIP	Now
	*KM41C1001P-10	1MX1	100	CMOS	Nibble Mode	18-Pin DIP	TBA
	*KM41C1001P-12	1MX1	120	CMOS	Nibble Mode	18-Pin DIP	TBA
	*KM41C1001J-10	1MX1	100	CMOS	Nibble Mode	20/26-Pin SOJ	TBA
	*KM41C1001J-12	1MX1	120	CMOS	Nibble Mode	20/26-Pin SOJ	TBA
	*KM41C1001Z-10	1MX1	100	CMOS	Nibble Mode	20-Pin ZIP	TBA
	*KM41C1001Z-12	1MX1	120	CMOS	Nibble Mode	20-Pin ZIP	TBA
	†KM41C1002P-10	1MX1	100	CMOS	Static Column	18-Pin DIP	Now
	†KM41C1002P-12	1MX1	120	CMOS	Static Column	18-Pin DIP	Now
	†KM41C1002J-10	1MX1	100	CMOS	Static Column	20/26-Pin SOJ	Now
	†KM41C1002J-12	1MX1	120	CMOS	Static Column	20/26-Pin SOJ	Now
	†KM41C1002Z-10	1MX1	100	CMOS	Static Column	20-Pin ZIP	Now
	†KM41C1002Z-12	1MX1	120	CMOS	Static Column	20-Pin ZIP	Now
	†KM44C256P-10	256KX4	100	CMOS	Fast Page Mode	20-Pin DIP	Now
	†KM44C256P-12	256KX4	120	CMOS	Fast Page Mode	20-Pin DIP	Now
	†KM44C256J-10	256KX4	100	CMOS	Fast Page Mode	20/26-Pin SOJ	Now
	†KM44C256J-12	256KX4	120	CMOS	Fast Page Mode	20/26-Pin SOJ	Now
	†KM44C256Z-10	256KX4	100	CMOS	Fast Page Mode	20-Pin ZIP	Now
	†KM44C256Z-12	256KX4	120	CMOS	Fast Page Mode	20-Pin ZIP	Now
	*KM44C258P-10	256KX4	100	CMOS	Static Column	20-Pin DIP	TBA
	*KM44C258P-12	256KX4	120	CMOS	Static Column	20-Pin DIP	TBA
	*KM44C258J-10	256KX4	100	CMOS	Static Column	20/26-Pin SOJ	TBA
*KM44C258J-12	256KX4	120	CMOS	Static Column	20/26-Pin SOJ	TBA	
*KM44C258Z-10	256KX4	100	CMOS	Static Column	20-Pin ZIP	TBA	
*KM44C258Z-12	256KX4	120	CMOS	Static Column	20-Pin ZIP	TBA	

† New Product

* Preliminary Product

TBA: To Be Announced

2.2 Dynamic RAM MODULE

Part Number	Organization	Speed (ns)	Technology	Features	Packages	Remark
KMM48256-12	256K×8	120	NMOS	Page Mode	30-Pin SIP	Call Factory
KMM48256-15	256K×8	150	NMOS	Page Mode	30-Pin SIP	Call Factory
KMM58256-12	256K×8	120	NMOS	Page Mode	30-Pin SIMM	Call Factory
KMM58256-15	256K×8	150	NMOS	Page Mode	(Edge Connector) 30-Pin SIMM	Call Factory
KMM49256-12	256K×9	120	NMOS	Page Mode	30-Pin SIP	Call Factory
KMM49256-15	256K×9	150	NMOS	Page Mode	30-Pin SIP	Call Factory
KMM59256-12	256K×9	120	NMOS	Page Mode	30-Pin SIMM	Call Factory
KMM59256-15	256K×9	150	NMOS	Page Mode	(Edge Connector) 30-Pin SIMM	Call Factory
†KMM481000-10	1M×8	100	CMOS	Fast Page Mode	30-Pin SIP	Call Factory
†KMM481000-12	1M×8	120	CMOS	Fast Page Mode	30-Pin SIP	Call Factory
†KMM581000-10	1M×8	100	CMOS	Fast Page Mode	30-Pin SIMM	Call Factory
†KMM581000-12	1M×8	120	CMOS	Fast Page Mode	(Edge Connector)	Call Factory
†KMM491000-10	1M×9	100	CMOS	Fast Page Mode	30-Pin SIP	Call Factory
†KMM491000-12	1M×9	120	CMOS	Fast Page Mode	30-Pin SIP	Call Factory
†KMM591000-10	1M×9	100	CMOS	Fast Page Mode	30-Pin SIMM	Call Factory
†KMM591000-12	1M×9	120	CMOS	Fast Page Mode	(Edge Connector)	Call Factory

2.3 Static RAM

Capacity	Part Number	Organization	Speed (ns)	Technology	Current		Package	Remark
					Active, mA Typ (max)	Standby, μA Typ (max)		
64K bit	†KM6264A-7	8K×8	70	CMOS	35 (70)	(1mA)	28-Pin DIP	Now
	KM6264A-10	8K×8	100	CMOS	35 (70)	(1mA)	28-Pin DIP	Now
	KM6264A-12	8K×8	120	CMOS	35 (70)	(1mA)	28-Pin DIP	Now
	†KM6264AL-7	8K×8	100	CMOS	35 (70)	2 (0.1mA)	28-Pin DIP	Now
	KM6264AL-10	8K×8	120	CMOS	35 (70)	2 (0.1mA)	28-Pin DIP	Now
	KM6264AL-12	8K×8	150	CMOS	35 (70)	2 (0.1mA)	28-Pin DIP	Now
256K bit	KM62256P-10	32K×8	100	CMOS	35 (60)	(1mA)	28-Pin DIP	Now
	KM62256P-12	32K×8	120	CMOS	35 (60)	(1mA)	28-Pin DIP	Now
	KM62256P-15	32K×8	150	CMOS	35 (60)	(1mA)	28-Pin DIP	Now
	KM62256LP-10	32K×8	100	CMOS	35 (60)	(100μA)	28-Pin DIP	Now
	KM62256LP-12	32K×8	120	CMOS	35 (60)	(100μA)	28-Pin DIP	Now
	KM62256LP-15	32K×8	150	CMOS	35 (60)	(100μA)	28-Pin DIP	Now

† New Product

2.4 EEPROM

Capacity	Part Number	Organization	Speed (ns)	Technology	Write Cycle Time (max)	Features	Packages	Remark
16K bit	KM2816A-25	2K×8	250	NMOS	10	—	24-Pin DIP	Now
	KM2816A-30	2K×8	300	NMOS	10	—	24-Pin DIP	Now
	KM2816A-35	2K×8	350	NMOS	10	—	24-Pin DIP	Now
	KM2817A-25	2K×8	250	NMOS	10	Ready/ <u>Busy</u>	28-Pin DIP	Now
	KM2817A-30	2K×8	300	NMOS	10	Ready/ <u>Busy</u>	28-Pin DIP	Now
	KM2817A-35	2K×8	350	NMOS	10	Ready/ <u>Busy</u>	28-Pin DIP	Now
64K bit	KM2864A-20	8K×8	200	NMOS	10	Data Polling	28-Pin DIP	Now
	KM2864A-25	8K×8	250	NMOS	10	Data Polling	28-Pin DIP	Now
	KM2864A-30	8K×8	300	NMOS	10	Data Polling	28-Pin DIP	Now
	KM2865A-20	8K×8	200	NMOS	10	Data Polling Ready/ <u>Busy</u>	28-Pin DIP	Now
	KM2865A-25	8K×8	250	NMOS	10	Data Polling Ready/ <u>Busy</u>	28-Pin DIP	Now
	KM2865A-30	8K×8	300	NMOS	10	Data Polling Ready/ <u>Busy</u>	28-Pin DIP	Now
	KM2864AH-20	8K×8	200	NMOS	2	Data Polling	28-Pin DIP	Now
	KM2864AH-25	8K×8	250	NMOS	2	Data Polling	28-Pin DIP	Now
	KM2864AH-30	8K×8	300	NMOS	2	Data Polling	28-Pin DIP	Now
	KM2865AH-20	8K×8	200	NMOS	2	Data Polling, Ready/ <u>Busy</u>	28-Pin DIP	Now
	KM2865AH-25	8K×8	250	NMOS	2	Data Polling, Ready/ <u>Busy</u>	28-Pin DIP	Now
	KM2865AH-30	8K×8	300	NMOS	2	Data Polling, Ready/ <u>Busy</u>	28-Pin DIP	Now
	†KM28C64-15	8K×8	150	CMOS	5	Data Polling, Page Mode	28-Pin DIP	Now
	†KM28C64-20	8K×8	200	CMOS	5	Data Polling, Page Mode	28-Pin DIP	Now
	†KM28C64-25	8K×8	250	CMOS	5	Data Polling, Page Mode	28-Pin DIP	Now
	†KM28C65-15	8K×8	150	CMOS	5	Ready/ <u>Busy</u>	28-Pin DIP	Now
†KM28C65-20	8K×8	200	CMOS	5	Ready/ <u>Busy</u>	28-Pin DIP	Now	
†KM28C65-25	8K×8	250	CMOS	5	Ready/ <u>Busy</u>	28-Pin DIP	Now	

† New Product

1

64K X 1 Bit Dynamic RAM with Page Mode

FEATURES

• Performance range

Type	t _{RAC}	t _{CAC}	t _{RC}
KM4164B-10	100ns	55ns	190ns
KM4164B-12	120ns	60ns	220ns
KM4164B-15	150ns	75ns	260ns

- Page Mode capability
- Single +5V ±10% power supply
- Common I/O using early write
- TTL compatible inputs and output
- Schmitt Triggers on all input control lines
- RAS-only and Hidden Refresh capability
- 128 cycle/2ms refresh
- Jedec standard pinout in 16-pin DIP

GENERAL DESCRIPTION

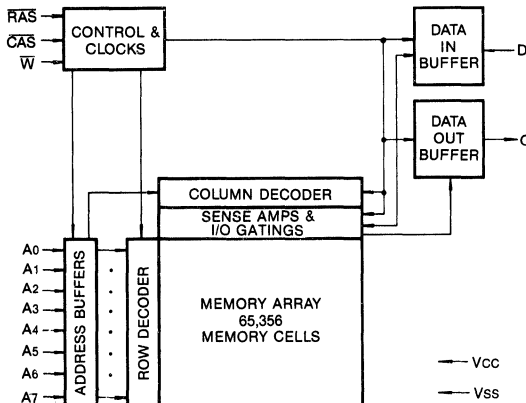
The KM4164B is a fully decoded NMOS Dynamic Random Access Memory organized as 65,536 one-bit words. The design is optimized for high speed, high performance applications such as computer memory, peripheral storage and environments where low power dissipation and compact layout are required.

The KM4164B features page mode which allows high speed random access of up to 256-bits within the same row. Multiplexed row and column address inputs permit the KM4164B to be housed in a standard 16-pin DIP.

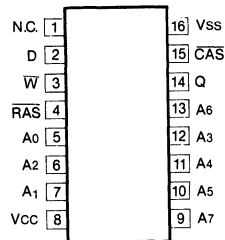
The KM4164B is fabricated using Samsung's advanced silicon gate NMOS process. This process, coupled with single transistor memory storage cells, permits maximum circuit density and minimal chip size.

Clock timing requirements are noncritical, and power supply tolerance is very wide. All inputs and output are TTL compatible.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₇	Address inputs
D	Data In
Q	Data Out
W	Read/Write Input
RAS	Row Address Strobe
CAS	Column Address Strobe
V _{CC}	Power (+ 5V)
V _{SS}	Ground

256K x 1 Bit Dynamic RAM with Page/Nibble Mode

FEATURES

• Performance range

	t _{RAC}	t _{CAC}	t _{RC}
KM41256/7A-10	100ns	50ns	200ns
KM41256/7A-12	120ns	60ns	230ns
KM41256/7A-15	150ns	75ns	260ns

- Page Mode capability-KM41256A
- Nibble Mode capability-KM41257A
- CAS-before-RAS refresh capability
- RAS-only and Hidden Refresh capability
- TTL compatible inputs and output
- Common I/O using early write
- Single +5V±10% power supply
- 256 cycle/4ms refresh
- Jedec standard pinout in 16-pin plastic DIP, 18 lead PLCC and 16-pin plastic ZIP.

DESCRIPTION

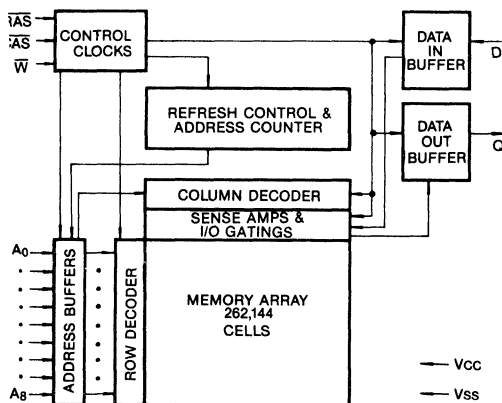
The KM41256/7A is a fully decoded NMOS Dynamic Random Access Memory organized as 262,144 one-bit words. The design is optimized for high speed, high performance applications such as computer memory, buffer memory, peripheral storage and environments where low power dissipation and compact layout are required.

The KM41256A features page mode which allows high speed random access of memory cells within the same row. The KM41257A features nibble mode which allows high speed serial access of up to 4 bits of data. CAS-before-RAS refresh capability provides on-chip auto refresh as an alternative to RAS-only refresh. Multiplexed row and column address inputs permit the KM41256/7A to be housed in a JEDEC standard 16-pin DIP.

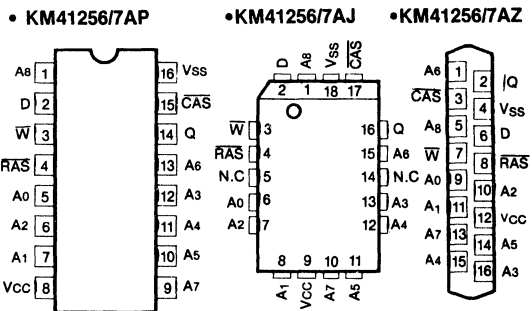
The KM41256/7A is fabricated using Samsung's advanced silicon gate NMOS process. This process, coupled with single transistor memory storage cells, permits maximum circuit density and minimal chip size.

Clock timing requirements are noncritical, and power supply tolerance is very wide. All inputs and output are TTL compatible.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATIONS



Pin Name	Pin Function
A ₀ -A ₈	Address Inputs
D	Data In
Q	Data Out
W	Read/Write Input
RAS	Row Address Strobe
CAS	Column Address Strobe
V _{cc}	Power (+5V)
V _{ss}	Ground

64K x 4 Bit Dynamic RAM with Page Mode

FEATURES

• Performance range

	t _{RAC}	t _{CAC}	t _{RC}
KM41464A-12	120ns	60ns	220ns
KM41464A-15	150ns	75ns	260ns

- Page Mode capability
- CAS-before-RAS Refresh capability
- RAS-only and Hidden Refresh capability
- TTL compatible inputs and outputs
- Early Write or Output Enable Controlled Write
- Single +5V±10% power supply
- 256 cycle/4ms refresh
- JEDEC standard pinout in 18-pin DIP, 18-lead PLCC and 20-pin ZIP.

GENERAL DESCRIPTION

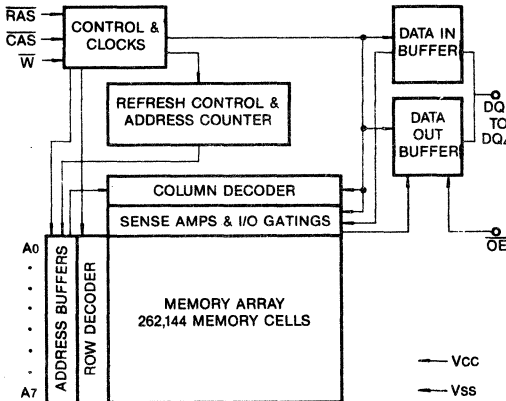
The KM41464A is a fully decoded 65,536 x 4 NMOS Dynamic Random Access Memory. The design is optimized for high speed, high performance applications such as computer memory, buffer memory, peripheral storage and environments where low power dissipation and compact layout are required.

The KM41464A features page mode which allows high speed random access of memory cells within the same row. CAS-before-RAS refresh capability provides on-chip auto refresh as an alternative to RAS-only refresh. Multiplexed row and column address inputs permit the KM41464A to be housed in a standard 18-pin DIP.

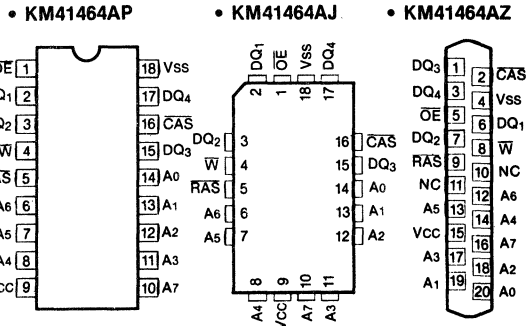
The KM41464A is fabricated using Samsung's advanced silicon gate NMOS process. This process, coupled with single transistor memory storage cells, permits maximum circuit density and minimal chip size.

Clock timing requirements are noncritical, and power supply tolerance is very wide. All inputs and outputs are TTL compliant.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₇	Address Inputs
RAS	Row Address Strobe
CAS	Column Address Strobe
W	Read/Write Input
OE	Output Enable
DQ ₁ -DQ ₄	Data In/Out
V _{cc}	Power (+ 5V)
V _{ss}	Ground

1M x 1 Bit Dynamic RAM with Fast Page Mode

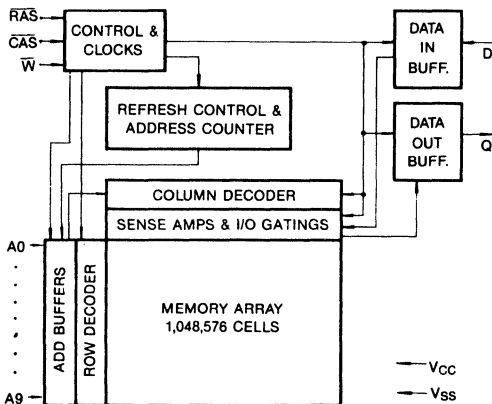
FEATURES

• Performance range:

	t _{RAC}	t _{CAC}	t _{RC}
KM41C1000-10	100ns	25ns	190ns
KM41C1000-12	120ns	30ns	220ns

- Fast Page Mode operation
- CAS-before-RAS refresh
- RAS-only and Hidden Refresh
- TTL compatible inputs and output
- Common I/O using early write
- Single +5V ± 10% power supply
- 512 cycle/8ms refresh
- 256K x 4 fast test mode
- JEDEC standard pinout available in Plastic DIP, SOJ, ZIP packages.

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The Samsung KM41C1000 is a CMOS high speed 1,048,576 x 1 Dynamic Random Access Memory. Its design is optimized for high performance applications such as mainframes and mini computers, graphics and high performance microprocessor systems.

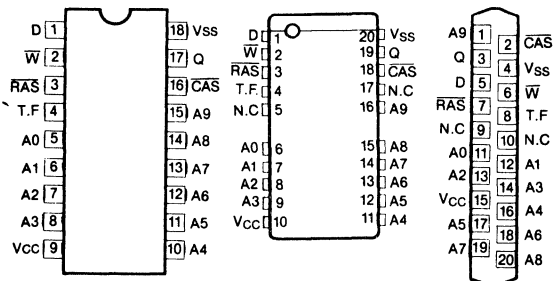
The KM41C1000 features Fast Page Mode operation which allows high speed random access of memory cells within the same row.

CAS-before-RAS Refresh capability provides on-chip auto refresh as an alternative to RAS-only Refresh. All inputs and output are fully TTL compatible.

The KM41C1000 is fabricated using Samsung's advanced CMOS process.

PIN CONFIGURATION

- KM41C1000P
- KM41C1000J
- KM41C1000Z



Pin Name	Pin Function
A ₀ -A ₉	Address Inputs
$\overline{\text{RAS}}$	Row Address Strobe
D	Data In
Q	Data Out
$\overline{\text{CAS}}$	Column Address Strobe
$\overline{\text{W}}$	Read/Write Input
V _{cc}	Power (+5V)
V _{ss}	Ground
T.F.*	Test Function
N.C.	No Connection

* See Note 11 and 12

KM41C1001

1M x 1 Bit Dynamic RAM with Nibble Mode

FEATURES

- Performance range:

	t _{RAC}	t _{CAC}	t _{RC}
KM41C1001-10	100ns	25ns	190ns
KM41C1001-12	120ns	30ns	220ns

- Nibble Mode Operation
- CAS-before-RAS Refresh
- RAS-only and Hidden Refresh
- TTL compatible inputs and output
- Common I/O using early write
- Single +5V ± 10% power supply
- 512 cycle/8ms refresh
- 256K x 4 fast test mode
- JEDEC standard pinout available in Plastic DIP, SOJ, ZIP packages.

GENERAL DESCRIPTION

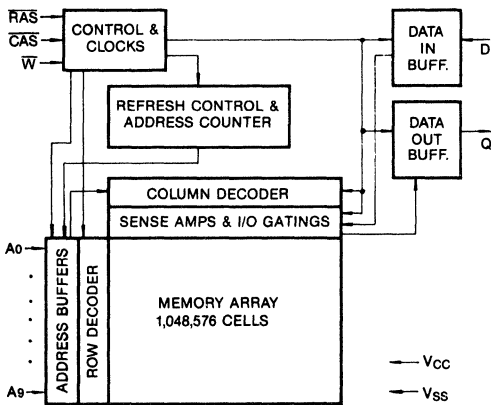
The Samsung KM41C1001 is a CMOS high speed 1,048,576 x 1 Dynamic Random Access Memory. Its design is optimized for high performance applications such as mainframes and mini computers, graphics and high performance microprocessor systems.

The KM41C1001 features Nibble Mode operation which allows high speed random access of up to 4-bits of data.

CAS-before-RAS Refresh capability provides on-chip auto refresh as an alternative to RAS-only Refresh. All inputs and output are fully TTL compatible.

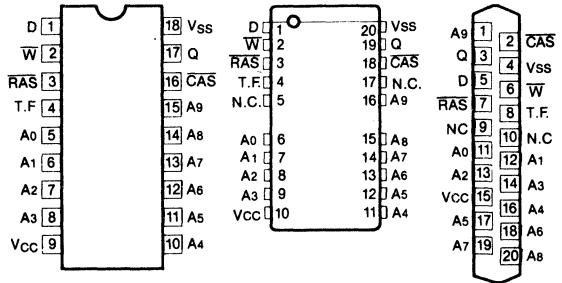
The KM41C1001 is fabricated using Samsung's advanced CMOS process.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION

- KM41C1001P
- KM41C1001J
- KM41C1001Z



Pin Name	Pin Function
A ₀ -A ₉	Address Inputs
$\overline{\text{RAS}}$	Row Address Strobe
D	Data In
Q	Data Out
$\overline{\text{CAS}}$	Column Address Strobe
$\overline{\text{W}}$	Read/Write Input
V _{CC}	Power (+ 5V)
V _{SS}	Ground
T.F	Test Function
N.C	No Connection

1M x 1 Bit Dynamic RAM with Static Column Mode

FEATURES

- Performance range:

	t _{RAC}	t _{CAC}	t _{RC}
KM41C1002-10	100ns	25ns	190ns
KM41C1002-12	120ns	30ns	220ns

- Static Column Mode operation
- CS-before-RAS Refresh
- RAS-only and Hidden Refresh
- TTL compatible inputs and output
- Common I/O using early write
- Single +5V ± 10% power supply
- 512 cycle/8ms refresh
- 256K x 4 fast test mode
- JEDEC standard pinout available in plastic DIP, SOJ and ZIP packages

GENERAL DESCRIPTION

The Samsung KM41C1002 is a CMOS high speed 1,048,576 x 1 Dynamic Random Access Memory with Static Column Mode. Its design is optimized for high performance applications such as cache based mainframes and mini computers, graphics, digital signal processing and high performance microprocessor systems.

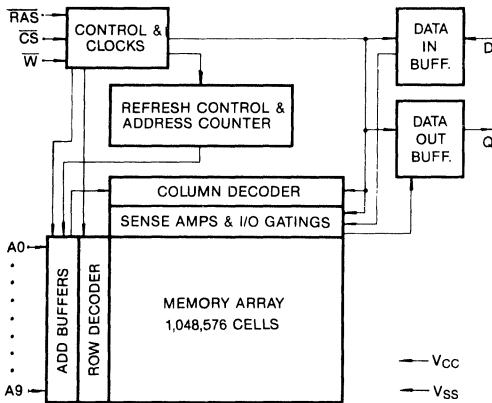
Static Column Mode operation allows high speed random or sequential access within a row.

CS-before-RAS Refresh capability provides on-chip auto refresh as an alternative to RAS-only Refresh.

The KM41C1002 offers high performance while relaxing many critical system timing requirements for fast usable speed. All inputs and output are fully TTL compatible.

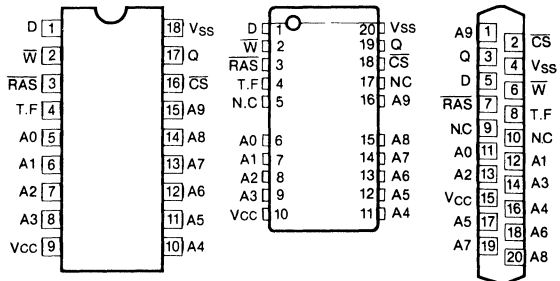
The KM41C1002 is fabricated using Samsung's advanced CMOS process.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION

- KM41C1002P
- KM41C1002J
- KM41C1002Z



Pin Name	Pin Function
A ₀ -A ₉	Address Inputs
RAS	Row Address Strobe
D	Data In
Q	Data Out
CS	Chip Select Input
W	Read/Write Input
V _{CC}	Power (+5V)
V _{SS}	Ground
T.F	Test Function
N.C	No Connection

256Kx4 Bit CMOS Dynamic RAM with Fast Page Mode

FEATURES

- Performance range:

	t _{RAC}	t _{CAC}	t _{RC}
KM44C256-10	100ns	25ns	190ns
KM44C256-12	120ns	30ns	220ns

- Fast Page Mode operation
- CAS-before-RAS refresh capability
- RAS-only and Hidden Refresh capability
- TTL compatible inputs and outputs
- Early Write or Output Enable Controlled Write
- Single +5V ±10% power supply
- 512 cycles/8ms refresh
- JEDEC standard pinout
- Available in Plastic DIP, SOJ and ZIP

GENERAL DESCRIPTION

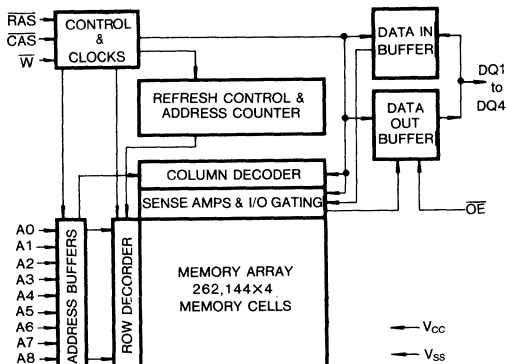
The Samsung KM44C256 is a CMOS high speed 262,144x4 Dynamic Random Access Memory. Its design is optimized for high performance applications such as mainframes and mini computers, graphics and high performance microprocessor systems.

The KM44C256 features Fast Page Mode operation which allows high speed random access of memory cells within the same row.

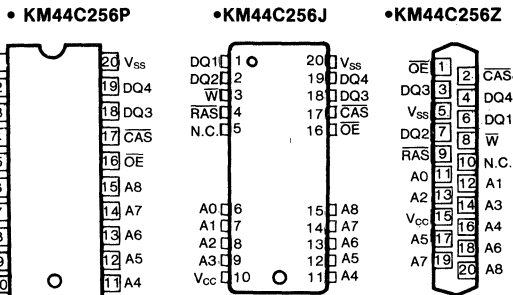
CAS-before-RAS refresh capability provides on-chip auto refresh as an alternative to RAS-only Refresh. All inputs and outputs are fully TTL compatible.

The KM44C256 is fabricated using Samsung's advanced CMOS process.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₈	Address Inputs
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{CAS}}$	Column Address Strobe
$\overline{\text{W}}$	Read/Write Input
$\overline{\text{OE}}$	Data Output Enable
DQ ₁ -DQ ₄	Data in/Data Out
V _{CC}	Power (+5V)
V _{SS}	Ground
N.C.	No Connection

KM44C258

256Kx4 Bit CMOS Dynamic RAM with Static Column Mode

FEATURES

- Performance range:

	t _{RAC}	t _{CAC}	t _{RC}
KM44C258-10	100ns	25ns	190ns
KM44C258-12	120ns	30ns	220ns

- Static Column Mode operation
- CS-before-RAS refresh capability
- RAS-only and Hidden Refresh capability
- TTL compatible inputs and outputs
- Early Write or Output Enable Controlled Write
- Single +5V ± 10% power supply
- 512 cycles/8ms refresh
- JEDEC standard pinout
- Available in Plastic DIP, SOJ and ZIP

GENERAL DESCRIPTION

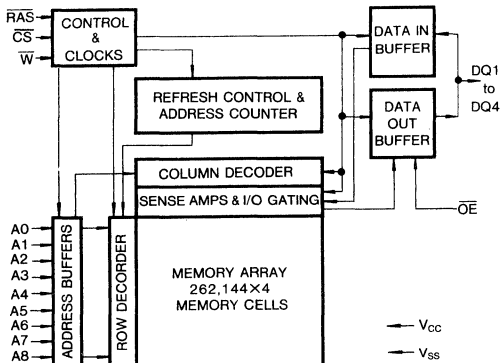
The Samsung KM44C258 is a CMOS high speed 262,144x4 Dynamic Random Access Memory. Its design is optimized for high performance applications such as cache based mainframes and mini computers, graphics signal processing and high performance microprocessor systems.

Static Column Mode Operation allows high speed random or Sequential access within a row. The KM44C258 offers high performance while relaxing many critical system timing requirements for fast usable speed.

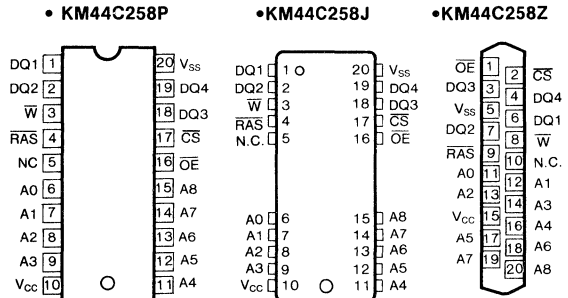
CS-before-RAS refresh capability provides on-chip auto refresh as an alternative to RAS-only Refresh. All inputs and output are fully TTL compatible.

The KM44C258 is fabricated using Samsung's advanced CMOS process.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₈	Address Inputs
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{CS}}$	Column Address Strobe
$\overline{\text{W}}$	Read/Write Input
$\overline{\text{OE}}$	Data Output Enable
DQ ₁ -DQ ₄	Data in/Data Out
V _{CC}	Power (+5V)
V _{SS}	Ground
N.C.	No Connection

256K x 8 Bit DRAM Memory Modules SIP/SIMM

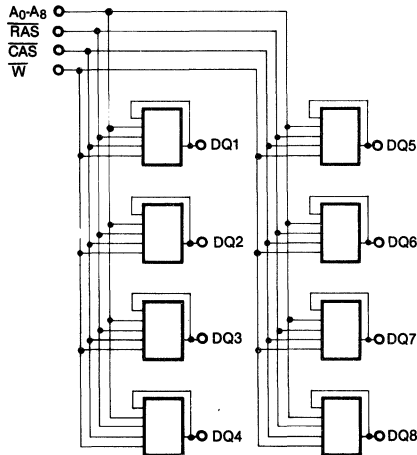
FEATURES

- 262,144 x 8-bit Organization
- Performance range:

Type	t _{RAC}	t _{CAC}	t _{RC}
KMM48256/7-12	120ns	60ns	230ns
KMM58256/7-12	120ns	60ns	230ns
KMM48256/7-15	150ns	75ns	260ns
KMM58256/7-15	150ns	75ns	260ns

- Page Mode capability: KMM48256 and KMM58256
- Nibble Mode capability: KMM48257 and KMM58257
- CAS-before-RAS Refresh capability
- RAS-only and Hidden Refresh capability
- TTL compatible inputs and outputs
- Single +5V ±10% power supply
- 256 cycle/4ms refresh

FUNCTIONAL BLOCK DIAGRAM



PART NUMBERS

KMM48256-12	120ns	SIP	Page Mode
KMM48256-15	150ns	SIP	Page Mode
KMM58256-12	120ns	SIMM	Page Mode
KMM58256-15	150ns	SIMM	Page Mode
KMM48257-12	120ns	SIP	Nibble Mode
KMM48257-15	150ns	SIP	Nibble Mode
KMM58257-12	120ns	SIMM	Nibble Mode
KMM58257-15	150ns	SIMM	Nibble Mode

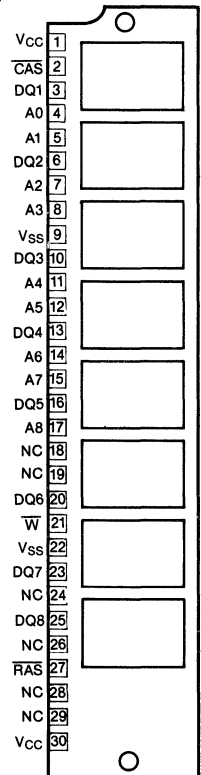
GENERAL DESCRIPTION

The Samsung KMM48256, KMM48257, KMM58256 and KMM58257 are 256K x 8 dynamic RAM high density memory modules. Samsung's 256K x 8 memory modules consists of eight KM41256/7 DRAMs in 18-pin PLCC packages mounted on a 30 pin glass-epoxy substrate. A 0.22μF decoupling capacitor is mounted under each DRAM.

The 256K x 8 DRAM modules are available in two package styles. The KMM48256 and KMM48257 are SIPs with leads suitable for through hole mounting or for mounting in a socket. The KMM58256 and KMM58257 are SIMMs with edge connections and are intended for mounting into 30 pin edge connector sockets.

PIN CONFIGURATION

Pin Name	Pin Function
A ₀ -A ₈	Address Inputs
DQ	Data In/Out
\bar{W}	Read/Write Input
$\bar{R}\bar{A}\bar{S}$	Row Address Strobe
$\bar{C}\bar{A}\bar{S}$	Column Address Strobe
V _{CC}	Power (+ 5V)
V _{SS}	Ground
N.C	No Connection



256K x 9 Bit DRAM Memory Modules SIP/SIMM

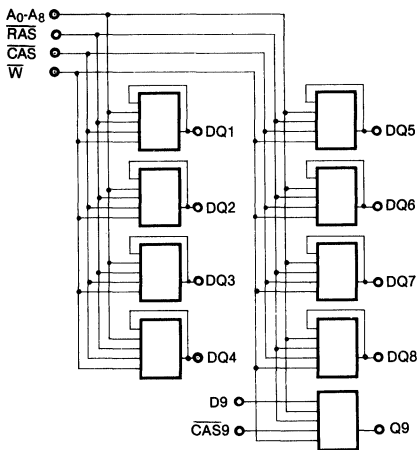
FEATURES

- 262,144 x 9-bit Organization
- Ninth device has separate D,Q and $\overline{\text{CAS}}$ for Parity applications.
- Performance range:

Type	t _{RAC}	t _{CAC}	t _{RC}
KMM49256/7-12	120ns	60ns	230ns
KMM59256/7-12	120ns	60ns	230ns
KMM49256/7-15	150ns	75ns	260ns
KMM59256/7-15	150ns	75ns	260ns

- Page Mode capability: KMM49256 and KMM59256
- Nibble Mode capability: KMM49257 and KMM59257
- $\overline{\text{CAS}}$ -before- $\overline{\text{RAS}}$ Refresh capability
- $\overline{\text{RAS}}$ -only and Hidden Refresh capability
- TTL compatible inputs and outputs
- Single +5V \pm 10% power supply
- 256 cycle/4ms refresh

FUNCTIONAL BLOCK DIAGRAM



PART NUMBERS

KMM49256-12	120ns	SIP	Page Mode
KMM49256-15	150ns	SIP	Page Mode
KMM59256-12	120ns	SIMM	Page Mode
KMM59256-15	150ns	SIMM	Page Mode
KMM49257-12	120ns	SIP	Nibble Mode
KMM49257-15	150ns	SIP	Nibble Mode
KMM59257-12	120ns	SIMM	Nibble Mode
KMM59257-15	150ns	SIMM	Nibble Mode

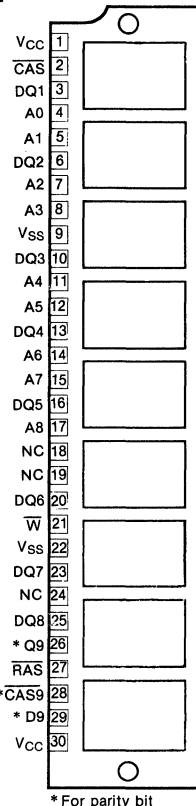
GENERAL DESCRIPTION

The Samsung KMM49256, KMM49257, KMM59256 and KMM59257 are 256K x 9 dynamic RAM high density memory modules. The ninth bit is generally used for parity and is controlled by $\overline{\text{CAS}}$. Samsung's 256K x 9 memory modules consists of nine KM41256/7 DRAMs in 18-pin PLCC packages mounted on a 30 pin glass-epoxy substrate. A 0.22 μ F decoupling capacitor is mounted under each DRAM.

The 256K x 9 DRAM modules are available in two package styles. The KMM49256 and KMM49257 are SIPs with leads suitable for through hole mounting or for mounting in a socket. The KMM59256 and KMM59257 are SIMMs with edge connections and are intended for mounting into 30 pin edge connector sockets.

PIN CONFIGURATION

Pin Name	Pin Function
A ₀ -A ₈	Address Inputs
D9	Data In
Q9	Data Out
DQ	Data In/Out
$\overline{\text{W}}$	Read/Write Input
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{CAS}}$	Column Address Strobe
$\overline{\text{CAS}}$ ₉	Column Address Strobe
V _{CC}	Power (+5V)
V _{SS}	Ground



1M x 8 Bit DRAM SIP and SIMM Memory Modules

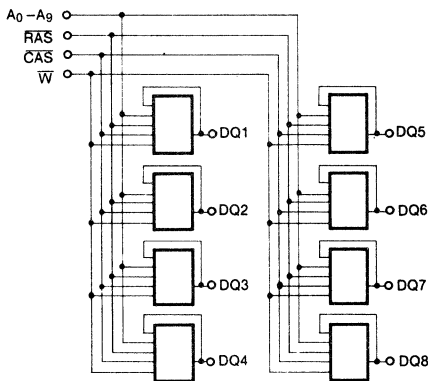
FEATURES

- 1,048,576 x 8-bit Organization
- Performance range:

	t _{RAC}	t _{CAC}	t _{RC}
KMM481000/1-10	100ns	25ns	190ns
KMM581000/1-10	100ns	25ns	190ns
KMM481000/1-12	120ns	30ns	220ns
KMM581000/1-12	120ns	30ns	220ns

- **Page Mode capability:**
KMM481000 and KMM581000
- **Nibble Mode capability:**
KMM481001 and KMM581001
- **CAS-before-RAS Refresh capability**
- **RAS-only and Hidden Refresh capability**
- **TTL compatible inputs and outputs**
- **Single +5V ± 10% power supply**
- **512 cycles/8ms refresh**

FUNCTIONAL BLOCK DIAGRAM



PART NUMBERS

KMM481000-10	100ns	SIP	Page Mode
KMM481000-12	120ns	SIP	Page Mode
KMM581000-10	100ns	SIMM	Page Mode
KMM581000-12	120ns	SIMM	Page Mode
KMM481001-10	100ns	SIP	Nibble Mode
KMM481001-12	120ns	SIP	Nibble Mode
KMM581001-10	100ns	SIMM	Nibble Mode
KMM581001-12	120ns	SIMM	Nibble Mode

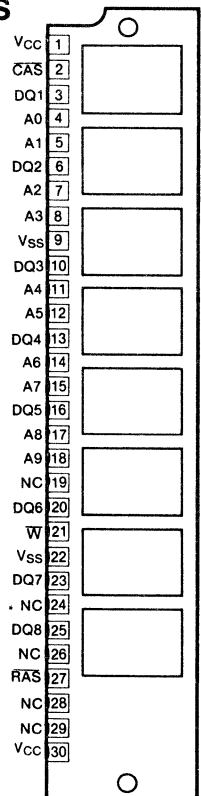
GENERAL DESCRIPTION

The Samsung KMM481000, KMM481001, KMM581000 and KMM581001 are 1M x 8 dynamic RAM high density memory modules. Samsung's 1M x 8 memory modules consist of eight KM41C1000/1 DRAMS in 20-pin SOJ packages mounted on a 30 pin glass-epoxy substrate. A 0.22µF decoupling capacitor is mounted under each DRAM.

The 1M x 8 DRAM modules are available in two package styles. The KMM481000 and KMM481001 are SIPs with leads suitable for through hole mounting or for mounting in a socket. The KMM58100 and KMM581001 are SIMMs with edge connections and are intended for mounting into 30 pin edge connector sockets.

PIN CONFIGURATIONS

Pin Name	Pin Function
A ₀ -A ₉	Address Inputs
DQ	Data In/Out
\bar{W}	Read/Write Input
$\bar{R}AS$	Row Address Strobe
$\bar{C}AS$	Column Address Strobe
V _{CC}	Power (+ 5V)
V _{SS}	Ground



*T.F.(TEST FUNCTION) WILL BE OPTIONALLY AVAILABLE

1M x 9 Bit DRAM SIP and SIMM Memory Modules

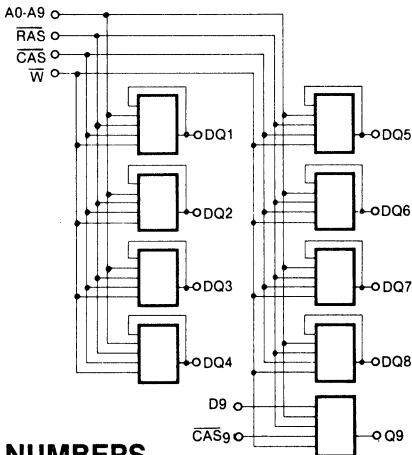
FEATURES

- 1,048,576 x 9-bit Organization
- Ninth device has separate D, Q and $\overline{\text{CAS}}$ for Parity applications.
- Performance range:

	t _{RAC}	t _{CAC}	t _{RC}
KMM491000/1-10	100ns	25ns	190ns
KMM591000/1-10	100ns	25ns	190ns
KMM491000/1-12	120ns	30ns	220ns
KMM591000/1-12	120ns	30ns	220ns

- Page Mode capability:
KMM491000 and KMM591000
- Nibble Mode capability:
KMM491001 and KMM591001
- $\overline{\text{CAS}}$ -before- $\overline{\text{RAS}}$ Refresh capability
- $\overline{\text{RAS}}$ -only and Hidden Refresh capability
- TTL compatible inputs and outputs
- Single +5V \pm 10% power supply
- 512 cycles/8ms refresh

FUNCTIONAL BLOCK DIAGRAM



PART NUMBERS

KMM491000-10	100ns	SIP	Page Mode
KMM491000-12	120ns	SIP	Page Mode
KMM591000-10	100ns	SIMM	Page Mode
KMM591000-12	120ns	SIMM	Page Mode
KMM491001-10	100ns	SIP	Nibble Mode
KMM491001-12	120ns	SIP	Nibble Mode
KMM591001-10	100ns	SIMM	Nibble Mode
KMM591001-12	120ns	SIMM	Nibble Mode

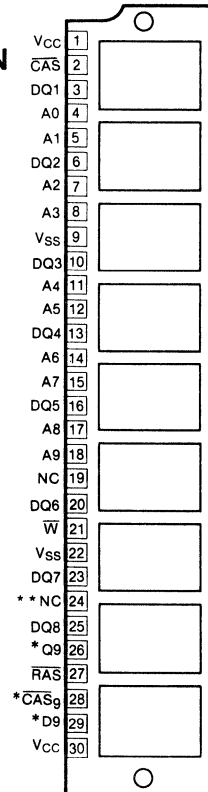
GENERAL DESCRIPTION

The Samsung KMM491000, KMM491001, KMM591000 and KMM591001 are 1M x 9 dynamic RAM high density memory modules. The ninth bit is generally used for parity and is controlled by $\overline{\text{CAS}}$, Samsung's 1M x 9 memory modules consist of nine KM41C1000/1 DRAMS in 20-pin SOJ packages mounted on a 30 pin glass-epoxy substrate. A 0.22 μ F decoupling capacitor is mounted under each DRAM.

The 1M x 9 DRAM modules are available in two package styles. The KMM491000 and KMM491001 are SIPs with leads suitable for through hole mounting or for mounting in a socket. The KMM591000 and KMM591001 are SIMMs with edge connections and are intended for mounting into 30 pin edge connector sockets.

PIN CONFIGURATION

Pin Name	Pin Function
A ₀ -A ₉	Address Inputs
DQ	Data In/Out
D9	Data In
Q9	Data Out
$\overline{\text{W}}$	Read/Write Input
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{CAS}}$	Column Address Strobe
$\overline{\text{CAS}}$ ₉	Column Address Strobe
V _{CC}	Power (+ 5V)
V _{SS}	Ground



*FOR PARITY BIT
 **T.F.(TEST FUNCTION) WILL BE OPTIONALLY AVAILABLE

8K x 8 Bit Static RAM

FEATURES

- Fast Access Time 70, 100, 120ns (max.)
- Low Standby Current: 100µA (max.)
- Low Data Retention Current: 50µA (max.)
- Capability of Battery Back-up Operation
- Data Retention Voltage: 2.0V (min.)
- Single 5V ± 10% supply
- TTL compatible inputs and outputs
- Pin compatible with 64K EPROMS
- Fully Static Operation
- Standard 28 pin DIP
- Common I/O, Tristate Output

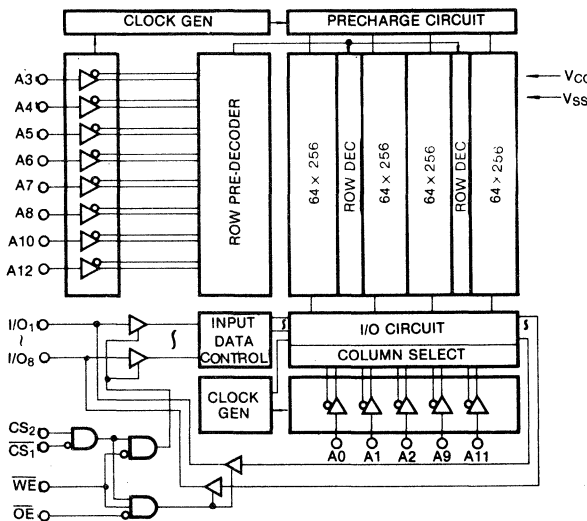
GENERAL DESCRIPTION

The KM6264A/AL is a 65,536-bit high speed Static Random Access Memory organized as 8,192 words by 8 bits. This device is fabricated using Samsung's advanced CMOS process.

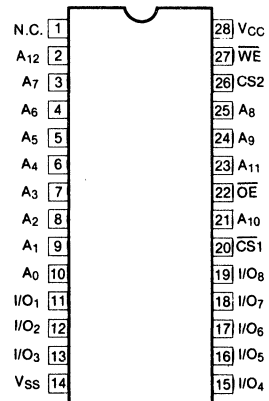
The KM6264A/AL has an output enable input for precise control of the data outputs. It also has chip enable inputs for the minimum current power down mode. The KM6264A/AL has been designed for high speed and low power applications. It is particularly well suited for battery backup non-volatile memory applications.

Two versions are available, the KM6264A and KM6264AL. The L-version is specified with lower standby and data retention currents than the standard version. Otherwise the two versions are identical.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₁₂	Address Inputs
\overline{WE}	Write Enable
$\overline{CS1}$, CS ₂	Chip Select
\overline{OE}	Output Enable
I/O ₁ -I/O ₈	Data Input/Output
V _{CC}	Power (+ 5V)
V _{SS}	Ground
N.C.	No Connection

32,768 WORD × 8 BIT CMOS STATIC RAM

FEATURES

- Fast Access Time 100, 120, 150ns (max.)
- Low Power Dissipation
 - Standby: 0.55mW (max.)
 - Operating: 248mW (max.)
- Low Data Retention Current: 50µA (max.)
- Capability of Battery Back-up Operation
- Data Retention Voltage: 2.0V (min.)
- Single 5V ± 10% supply
- TTL compatible inputs and outputs
- Pin compatible with 256K EPROMS
- Full Static Operation
 - No clock or refresh required
- Standard 28 pin DIP
- Common I/O, Tristate Output

GENERAL DESCRIPTION

The KM62256P/LP is a 262144 bit high speed Static Random Access Memory organized as 32768 words by 8 bits.

This device is fabricated using advanced SST'S CMOS technology with polysilicon resistors.

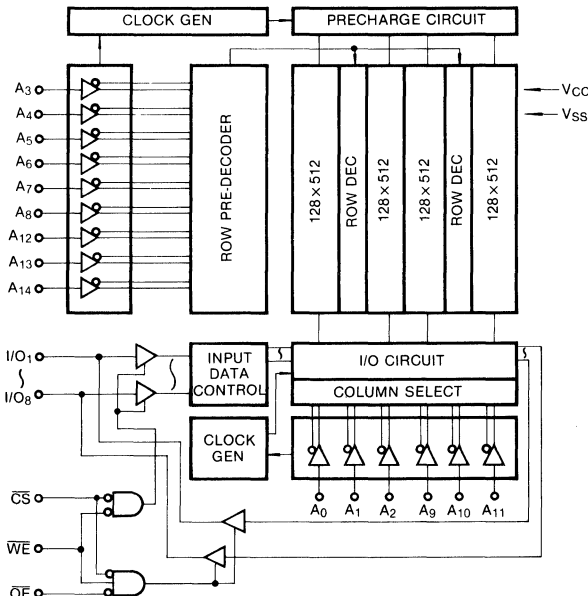
The KM62256P/LP has an output enable for precise control of the data output.

It also has a chip enable for the minimum current power down mode. The KM62256P/LP has been designed for high speed and low power applications. It is particularly well suited for battery backup non-volatile memory applications.

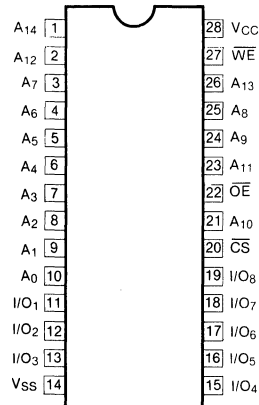
Two versions are available the KM62256P and KM62256LP. The L-version is specified with lower standby and data retention currents than the standard version.

Otherwise the two version are identical.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ ~ A ₁₄	Address
WE	Write Enable
CS	Chip Select
OE	Output Enable
I/O ₁ ~ I/O ₈	Data Inputs/Outputs
V _{CC}	+ 5V Power Supply
V _{SS}	Ground

1

2K x 8 Bit EEPROM with Latches and Auto-Write

FEATURES

- Simple Byte Write
 - Single TTL Level Write Signal
 - Latched Address and Data
 - Automatic Internal Erase-before-Write
 - Automatic Write Timing
- Enhanced Write Protection
- Single 5 volt Supply
- Byte Write: 10ms max
- Fast Access Time: 250ns
- Power: 50mA—Standby (max)
110mA—Operating (max)
- Two Line Control—Eliminates Bus Contention
- 10,000 Cycle Endurance
- JEDEC Byte-wide Memory Pinout
- Compatible with Xicor X2816A

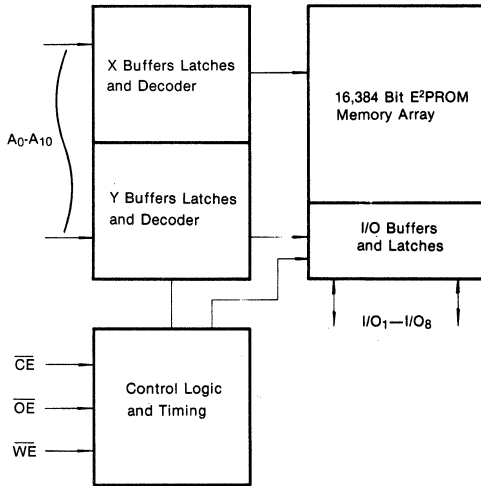
GENERAL DESCRIPTION

The KM2816A is a 16,384 bit Electrically Erasable and Programmable Read-Only-Memory organized as 2,048 words by 8-bits. Its data can be modified using simple TTL level signals and a single 5 volt power supply.

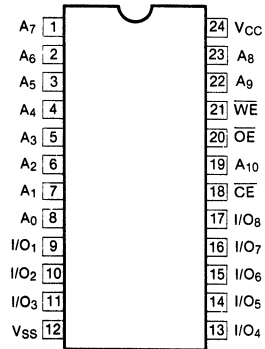
Writing data into the KM2816A is very simple. The internally self-timed write cycle latches both address and data to provide a free system bus during the 10ms (max) write period.

The KM2816A is fabricated with the well defined floating gate NMOS technology using Fowler-Nordheim tunneling for erasing and programming.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



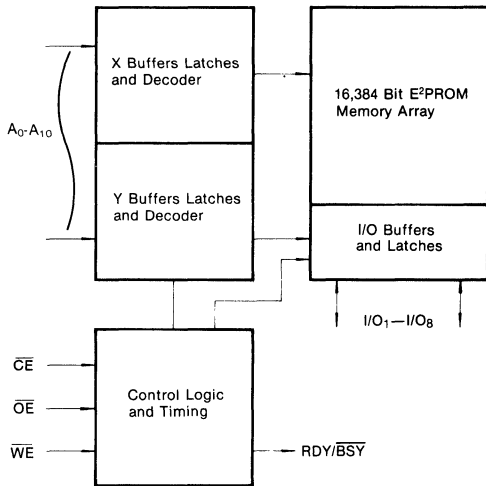
Pin Name	Pin Function
A ₀ -A ₁₀	Address Inputs
I/O ₁ -I/O ₈	Data Inputs/Outputs
CE	Chip Enable
OE	Output Enable
WE	Write Enable
V _{CC}	Power (+ 5V)
V _{SS}	Ground

2K x 8 Bit EEPROM with Ready/Busy Function

FEATURES

- Simple Byte Write
 - Single TTL Level Write Signal
 - Latched Address and Data
 - Automatic Internal Erase-before-Write
 - Automatic Write Timing
 - Ready/Busy Output Pin
- Enhanced Write Protection
- Single 5 volt Supply
- Byte Write: 10ms (max)
- Fast Access Time: 250ns
- Power: 50mA—Standby (max)
110mA—Operating (max)
- Two Line Control—Eliminates Bus Contention
- 10,000 Cycle Endurance
- JEDEC Byte-wide Memory Pinout

FUNCTIONAL BLOCK DIAGRAM



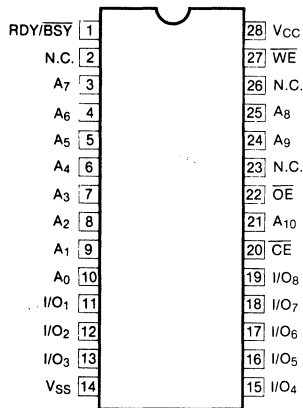
GENERAL DESCRIPTION

The KM2817A is a 16,384 bit Electrically Erasable and Programmable Read-Only-Memory organized as 2,048 words by 8-bits. Its data can be modified using simple TTL level signals and a single 5 volt power supply.

Writing data into the KM2817A is very simple. The internally self-timed write cycle latches both address and data to provide a free system bus during the 10ms (max) write period.

The KM2817A has an open-drain Ready/Busy output on pin 1 which signals when the write operation is complete. This device is fabricated with the well defined floating gate NMOS technology using Fowler-Nordheim tunneling for erasing and programming.

PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₁₀	Address Inputs
I/O ₁ -I/O ₈	Data Inputs/Outputs
\overline{CE}	Chip Enable
\overline{OE}	Output Enable
\overline{WE}	Write Enable
RDY/BSY	Ready/Busy Output
N.C.	No Connect
V _{CC}	Power (+ 5V)
V _{SS}	Ground

8K x 8 Bit EEPROM with Latches and Auto-Write

FEATURES

- Simple Byte Write
 - Single TTL Level Write Signal
 - Latched Address and Data
 - Automatic Internal Erase-before-Write
 - Automatic Write Timing
 - DATA Polling and Verification
- Enhanced Write Protection
- Single 5 volt Supply
- Byte Write: 10ms (max)—KM2864A
2ms (max)—KM2864AH
- Fast Access Time: 200ns
- Power: 50mA—Standby (max)
120mA—Operating (max)
- Two Line Control—Eliminates Bus Contention
- 10,000 Cycle Endurance
- JEDEC Byte-wide Memory Pinout

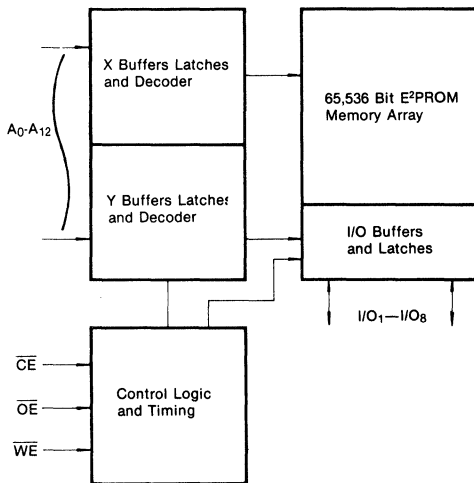
GENERAL DESCRIPTION

The KM2864A/AH is a 65,536 bit Electrically Erasable and Programmable Read-Only-Memory organized as 8,192 words by 8-bits. Its data can be modified using simple TTL level signals and a single 5 volt power supply.

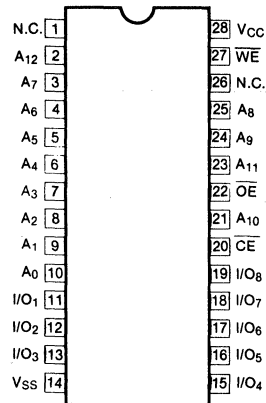
Writing data into the KM2864A/AH is very simple. The internally self-timed write cycle latches both address and data to provide a free system bus during the write period which is 10ms (max) for the KM2864A or 2ms (max) for the KM2864AH.

The KM2864A/AH features DATA Polling, a software scheme to detect the early completion of a write cycle without requiring the use of any additional external hardware. The KM2864A/AH is fabricated with the well defined floating gate NMOS technology using Fowler-Nordheim tunneling for erasing and programming.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₁₂	Address Inputs
I/O ₁ -I/O ₈	Data Inputs/Outputs
\overline{CE}	Chip Enable
\overline{OE}	Output Enable
\overline{WE}	Write Enable
N.C.	No Connection
V _{cc}	Power (+ 5V)
V _{ss}	Ground

8K x 8 Bit EEPROM with Latches and Auto-Write

FEATURES

- Simple Byte Write
 - Fast Byte Write Time
 - Single TTL Level Write Signal
 - Latched Address and Data
 - Automatic Internal Erase-before-Write
 - Automatic Write Timing
 - DATA Polling and Verification
 - Ready/Busy Output Pin
- Enhanced Write Protection
- Single 5 volt Supply
- Byte Write: 10ms (max)—KM2865A
2ms (max)—KM2865AH
- Fast Access Time: 200ns
- Power: 50mA—Standby (max)
120mA—Operating (max)
- Two Line Control—Eliminates Bus Contention
- 10,000 Cycle Endurance
- JEDEC Byte-wide Memory Pinout

GENERAL DESCRIPTION

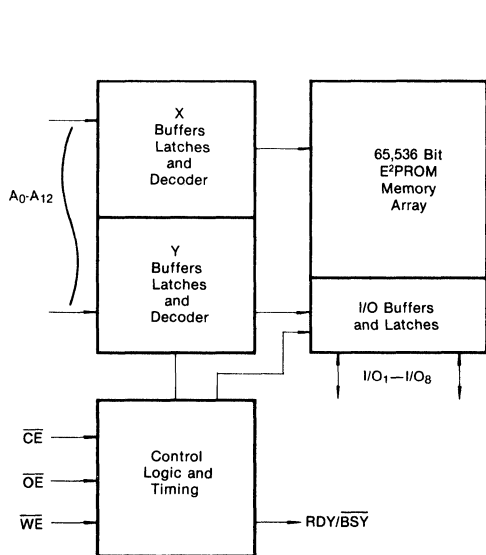
The KM2865A/AH is a 65,536 bit Electrically Erasable and Programmable Read-Only-Memory organized as 8,192 words by 8-bits. Its data can be modified using simple TTL level signals and a single 5 volt power supply.

Writing data into the KM2865A/AH is very simple. The internally self-timed write cycle latches both address and data to provide a free system bus during the write period which is 10ms (max) for the KM2865A or 2ms (max) for the KM2865AH.

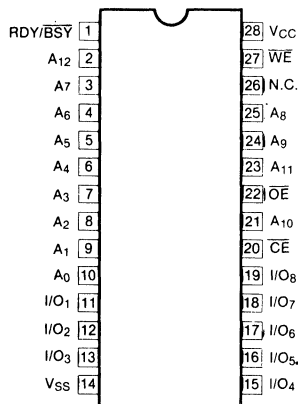
The KM2865A/AH features two end of write detection schemes to provide maximum design flexibility while enhancing the system performance. DATA Polling is a software scheme to detect the early completion of a write cycle without using any additional hardware. Ready/Busy is a hardware scheme in which Pin 1 is used to signal the status of the write operation and is especially useful in interrupt driven systems.

The KM2865A/AH is fabricated with the well defined floating gate NMOS technology using Fowler-Nordheim tunneling for erasing and programming.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



Pin Name	Pin Function
A ₀ -A ₁₂	Address Inputs
I/O ₁ -I/O ₈	Data Inputs/Outputs
CE	Chip Enable
OE	Output Enable
WE	Write Enable
RDY/BSY	Ready/Busy Output
N.C.	No Connection
V _{CC}	Power (+ 5V)
V _{SS}	Ground

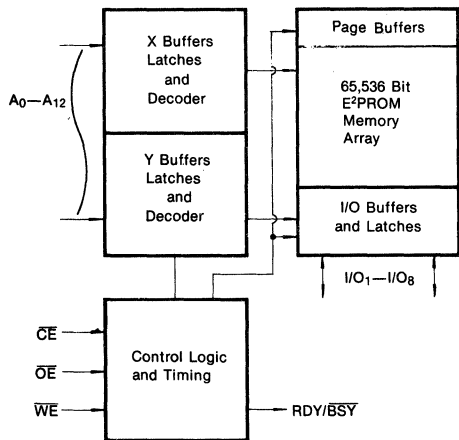


8K x 8 CMOS Electrically Erasable PROM

FEATURES

- Simple Byte Write
 - Single TTL Level Write Signal
 - Latched Address and Data
 - Automatic Internal Erase-before-Write
 - Automatic Write Timing
 - DATA Polling and Verification
 - Ready/Busy Output Pin (KM28C65)
- 32-byte page write: 5ms max
 - Effective 150µS/byte write
- Enhanced Write Protection
- Single 5 volt Supply
- Fast Access Time: 150ns
- Power: 100 µA — Standby (max)
30 mA — Operating (max)
- Two Line Control-Eliminates Bus Contention
- 10,000 Cycle Endurance
- JEDEC Byte-wide Memory Pinout

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The KM28C64/C65 is a 8,192 x 8 bit electrically erasable and programmable Read Only Memory. Its data can be modified using simple TTL level signals and a single 5 volt power supply.

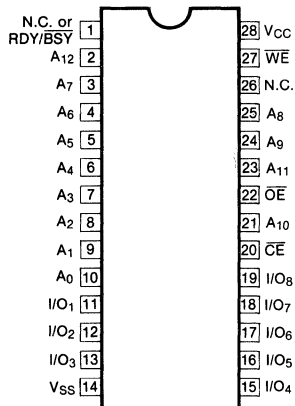
Writing data into the KM28C64/C65 is very simple. The internally self-timed write cycle latches both address bus during the 5mS (max) write period.

A 32-byte page write enables an entire chip written in 1.3 second.

The KM28C64/C65 features $\overline{\text{DATA}}$ -polling, which enables the EEPROM to signal the processor that a write operation is complete without requiring the use of any external hardware. Ready/Busy is a hardware scheme in which Pin 1 is used to signal the status of the write operation and is especially useful in interrupt driven systems.

The KM28C64/C65 is fabricated with the well defined floating gate CMOS technology using Fowler-Nordheim tunneling for erasing and programming.

PIN CONFIGURATION



Pin Name	Pin Function
A ₀ —A ₁₂	Address Inputs
I/O ₁ —I/O ₈	Data Inputs/Outputs
$\overline{\text{CE}}$	Chip Enable
$\overline{\text{OE}}$	Output Enable
$\overline{\text{WE}}$	Write Enable
RDY/BSY	Ready/Busy Output
N.C.	No Connect
V _{CC}	+5V
V _{SS}	Ground

CROSS REFERENCE GUIDE 2

Transistors	107
Power MOSFETs	115
Linear ICs	121
Digital ICs	133

TRANSISTORS

CROSS REFERENCE GUIDE

TYPE	MAKER	SAMSUNG
2SA473	TOSHIBA	KSA473
2SA480	SONY	KSA733
2SA489	TOSHIBA	KSB596
2SA494	TOSHIBA	KSA733
2SA495	TOSHIBA	KSA733
2SA509	TOSHIBA	KSA643
2SA539	N.E.C	KSA733
2SA542	N.E.C	KSA733
2SA543	N.E.C	KSA733
2SA550A	MATSUSHITA	KSA733
2SA555	FUJITSU	KSA733
2SA556	FUJITSU	KSA733
2SA557	FUJITSU	KSA733
2SA561	TOSHIBA	KSA733
2SA562	TOSHIBA	KSA539
2SA564	MATSUSHITA	KSA733
2SA564A	MATSUSHITA	KSA733
2SA567	HITACHI	KSA733
2SA568	MITSUBISHI	KSA539
2SA569	MITSUBISHI	KSA733
2SA570	MITSUBISHI	KSA733
2SA573	J R C	KSA733
2SA574	J R C	KSA733
2SA575	J R C	KSA733
2SA608	SANYO	KSA733
2SA609	SANYO	KSA733
2SA610	J R C	KSA733
2SA611	J R C	KSA733
2SA615	N.E.C	KSB596
2SA616	N.E.C	KSB596
2SA620	J R C	KSA733
2SA623	MITSUBISHI	KSA634
2SA624	MITSUBISHI	KSB744
2SA628	MITSUBISHI	KSA733
2SA628A	MITSUBISHI	KSA733
2SA633	N.E.C	KSA634
2SA634	N.E.C	KSA634
2SA642	N.E.C	KSA539
2SA643	N.E.C	KSA643
2SA659	SANYO	KSA733
2SA666	MATSUSHITA	KSA733
2SA670	HITACHI	KSB596
2SA671	HITACHI	KSB596
2SA672	HITACHI	KSA733
2SA673	HITACHI	KSA643
2SA683	MATSUSHITA	KSA643
2SA695	MITSUBISHI	KSA643
2SA699	MATSUSHITA	KSA634
2SA701	SANYO	KSA733
2SA702	SANYO	KSA733
2SA703	MITSUBISHI	KSA634
2SA707	N.E.C	KSA643

TYPE	MAKER	SAMSUNG
2SA711	N.E.C	KSA733
2SA715	HITACHI	KSB772
2SA718	N.E.C	KSA733
2SA719	MATSUSHITA	KSA643
2SA723	N.E.C	KSA539
2SA725	MATSUBISHI	KSA733
2SA726	MATSUBISHI	KSA733
2SA732	FUJITSU	KSA643
2SA733	N.E.C	KSA733
2SA738	HITACHI	KSB772
2SA740	TOSHIBA	KSA940
2SA760	N.E.C	KSA733
2SA763	J R C	KSA733
2SA767	TOSHIBA	KSA733
2SA768	SANKEN	KSB596
2SA769	SANKEN	KSB596
2SA770	SANKEN	KSB707
2SA771	SANKEN	KSB708
2SA772	SONY	KSA928A
2SA774	MATSUSHITA	KSA733
2SA774A	MATSUSHITA	KSA733
2SA776	TOSHIBA	KSA733
2SA778	HITACHI	KSA910
2SA779	HITACHI	KSA634
2SA780	HITACHI	KSB744
2SA781	HITACHI	KSA733
2SA782	ROHM	KSA733
2SA783	ROHM	KSA733
2SA784	ROHM	KSA733
2SA785	ROHM	KSA733
2SA786	ROHM	KSA733
2SA789	ROHM	KSA733
2SA803	ROHM	KSA910
2SA811	N.E.C	KSA811
2SA812	N.E.C	KSA812
2SA813	N.E.C	KSA733
2SA823	ROHM	KSA733
2SA824	ROHM	KSA733
2SA826	ROHM	KSA733
2SA827	ROHM	KSA733
2SA828	ROHM	KSA733
2SA829	ROHM	KSA733
2SA838	MATSUSHITA	KSA733
2SA839	TOSHIBA	KSB546
2SA843	MATSUSHITA	KSB546
2SA844	HITACHI	KSA733
2SA866	J R C	KSA733
2SA867	J R C	KSA733
2SA871	J R C	KSA733
2SA873	FUJISU	KSA733
2SA880	MATSUSHITA	KSA733
2SA885	MATSUSHITA	KSB772

TYPE	MAKER	SAMSUNG
2SA886	MATSUSHITA	KSB744
2SA888	MATSUSHITA	KSA733
2SA889	MATSUSHITA	KSA733
2SA890	MATSUSHITA	KSA643
2SA896	SONY	KSA910
2SA897	SONY	KSB744
2SA901	MATSUBISHI	KSA733
2SA905	MATSUBISHI	KSA910
2SA915	HITACHI	KSA910
2SA916	HITACHI	KSA910
2SA917	SONY	KSA910
2SA923	SONY	KSA910
2SA924	HITACHI	KSA733
2SA933	ROHM	KSA733
2SA937	ROHM	KSA733
2SA940	TOSHIBA	KSA940
2SA950	TOSHIBA	KSA643
2SA952	N.E.C	KSA643
2SA957	SANKEN	KSB546
2SA958	SANKEN	KSB546
2SA963	MATSUSHITA	KSB744
2SA965	TOSHIBA	KSA965
2SA972	MATSUSHITA	KSA733
2SA973	MATSUSHITA	KSA733
2SA977	MATSUSHITA	KSA910
2SA989	N.E.C	KSA733
2SA990	N.E.C	KSA733
2SA994	MITSUBISHI	KSA733
2SA999	MITSUBISHI	KSA733
2SA1004	HITACHI	KSA733
2SA1010	N.E.C	KSA1010
2SA1013	TOSHIBA	KSA1013
2SA1015	TOSHIBA	KSA733
2SA1017	SANYO	KSA910
2SA1019	SANYO	KSA910
2SA1020	TOSHIBA	KSA1220A
2SA1025	HITACHI	KSA733
2SA1026	MITSUBISHI	KSA733
2SA1027	MITSUBISHI	KSA733
2SA1029	HITACHI	KSA733
2SA1030	HITACHI	KSA733
2SA1031	HITACHI	KSA812
2SA1032	HITACHI	KSA812
2SA1033	HITACHI	KSA733
2SA1034	MATSUSHITA	KSA812
2SA1035	MATSUSHITA	KSA812
2SA1037	ROHM	KSA812
2SA1047	SANYO	KSA910
2SA1052	HITACHI	KSA812
2SA1092	MATSUSHITA	KSA733
2SA1096	MATSUSHITA	KSB744
2SA1110	MATSUSHITA	KSA1220A

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TRANSISTORS

CROSS REFERENCE GUIDE

TYPE	MAKER	SAMSUNG
2SA1121	HITACHI	KSA1182
2SA1144	TOSHIBA	KSA1142
2SA1151	N.E.C	KSA733
2SA1162	TOSHIBA	KSA812
2SA1179	SANYO	KSA812
2SA1182	TOSHIBA	KSA1182
2SA1184	TOSHIBA	KSA1220A
2SA1201	TOSHIBA	KSA1201
2SA1202	TOSHIBA	KSA1202
2SA1203	TOSHIBA	KSA1203
2SA1209	SANYO	KSA1142
2SA1210	SANYO	KSA1142
2SA1214	TOSHIBA	KSB744A
2SA1221	N.E.C	KSA1013
2SA1222	N.E.C	KSA1013
2SA1235	MITSUBISHI	KSA812
2SA1243	TOSHIBA	KSA1243
2SA1252	SANYO	KSA812
2SA1266	K.E.C	KSA733
2SA1270	K.E.C	KSA539
2SA1271	K.E.C	KSA643
2SA1275	K.E.C	KSA1013
2SA1276	K.E.C	KSA473
2SA1288	SANYO	KSB834
2SA1290	SANYO	KSB708
2SA1311	TOSHIBA	KSA811
2SA1312	TOSHIBA	KSA811
2SA1318	SANYO	KSA733
2SA1324	TOSHIBA	KSA812
2SA1325	TOSHIBA	KSA811
2SA1358	TOSHIBA	KSA1220A
2SA1359	TOSHIBA	KSB744
2SA1360	TOSHIBA	KSA1142
2SA1368	MITSUBISHI	KSA1202
2SA1369	MITSUBISHI	KSA1203
2SA1377	TOSHIBA	KSA733
2SA1380	SANYO	KSA1142
2SA1411	N.E.C	KSA812
2SA1416	SANYO	KSA1201
2SA1418	SANYO	KSA1201
2SA1463	N.E.C	KSA1203
2SA1504	K.E.C	KSA812
2SA1505	K.E.C	KSA1182
2SB434	TOSHIBA	KSB596
2SB435	TOSHIBA	KSB596
2SB511	SANYO	KSA473
2SB512/A	MATSUSHITA	KSB596
2SB513	MITSUBISHI	KSB596
2SB521	SONY	KSB596
2SB522	SONY	KSB596
2SB523	MITSUBISHI	KSB596
2SB524	MITSUBISHI	KSB596

TYPE	MAKER	SAMSUNG
2SB528	MITSUBISHI	KSB546
2SB529	MITSUBISHI	KSB772
2SB542	MITSUBISHI	KSA539
2SB546	N.E.C	KSB546
2SB559	SANYO	KSB772
2SB561	HITACHI	KSA643
2SB562	HITACHI	KSA928A
2SB563	N.E.C	KSB596
2SB565	HITACHI	KSB596
2SB566	HITACHI	KSB596
2SB568	HITACHI	KSA940
2SB572	MOTOROLA	KSB596
2SB573	MOTOROLA	KSB596
2SB574	MOTOROLA	KSB596
2SB598	SANYO	KSA643
2SB596	TOSHIBA	KSB596
2SB601	N.E.C	KSB601
2SB604	MATSUSHITA	KSB596
2SB620	MATSUSHITA	KSA733
2SB621	MATSUSHITA	KSA643
2SB628	N.E.C	KSA940
2SB641	MATSUSHITA	KSA733
2SB642	MATSUSHITA	KSA733
2SB643	MATSUSHITA	KSA642
2SB646A	HITACHI	KSA910
2SB647A	HITACHI	KSA916
2SB676	TOSHIBA	KSB601
2SB677	TOSHIBA	KSB601
2SB686	TOSHIBA	KSB601
2SB687	TOSHIBA	KSB601
2SB698	SANYO	KSA643
2SB707	N.E.C	KSB707
2SB708	N.E.C	KSB708
2SB709	MATSUSHITA	KSA812
2SB715	HITACHI	KSA910
2SB716	HITACHI	KSA910
2SB719	HITACHI	KSB546
2SB720	HITACHI	KSB546
2SB721	HITACHI	KSA643
2SB725	MATSUSHITA	KSA733
2SB738	HITACHI	KSA928A
2SB739	HITACHI	KSA928A
2SB744	N.E.C	KSB744
2SB746	HITACHI	KSA643
2SB761/A	MATSUSHITA	KSB834
2SB762/A	MATSUSHITA	KSB596
2SB766	MATSUSHITA	KSA1203
2SB767	MATSUSHITA	KSA1202
2SB772	N.E.C	KSB772
2SB782	HITACHI	KSB596
2SB783	HITACHI	KSB596
2SB786	ROHM	KSB794

TYPE	MAKER	SAMSUNG
2SB789	MATSUSHITA	KSA1201
2SB794	N.E.C	KSB794
2SB795	N.E.C	KSB795
2SB798	N.E.C	KSA1203
2SB800	N.E.C	KSA1202
2SB803	N.E.C	KSA1201
2SB805	N.E.C	KSA1201
2SB834	TOSHIBA	KSB834
2SB850	FUJI	KSB707
2SB857	HITACHI	KSB596
2SB858	HITACHI	KSB596
2SB862	FUJI	KSB601
2SB864	HITACHI	KSA733
2SB870	MATSUSHITA	KSA1010
2SB876	HITACHI	KSA1220A
2SB877	HITACHI	KSA1220A
2SB880	SANYO	KSB601
2SB885	SANYO	KSB601
2SB890	ROHM	KSA539
2SB891	ROHM	KSB744
2SB894	MATSUSHITA	KSA733
2SB895/A	MATSUSHITA	KSB794
2SB898	HITACHI	KSB834
2SB899	HITACHI	KSB834
2SB900	HITACHI	KSB596
2SB901	HITACHI	KSB596
2SB902	MATSUSHITA	KSA812
2SB919	SANYO	KSB707
2SB921	SANYO	KSA1010
2SB984	N.E.C	KSA1013
2SB988	K.E.C	KSB834
2SB992	TOSHIBA	KSA1010
2SB993	TOSHIBA	KSB708
2SB1000	HITACHI	KSA1203
2SB1004	TOSHIBA	KSB601
2SB1025	HITACHI	KSA1201
2SB1026	HITACHI	KSA1201
2SB1049	MATSUSHITA	KSA733
2SB1053	MATSUSHITA	KSA812
2SB1066	ROHM	KSB744A
2SB1067	TOSHIBA	KSB795
2SB1069	MATSUSHITA	KSB744
2SB1075	MATSUSHITA	KSB744
2SB1089	N.E.C	KSB834
2SB1115	N.E.C	KSA1201
2SB1116	N.E.C	KSB1116
2SB1121	SANYO	KSA1203
2SB1122	SANYO	KSA1201
2SB1142	SANYO	KSB772
2SB1144	SANYO	KSA1220A
2SB1188	ROHM	KSA1203
2SB1189	ROHM	KSA1201

TRANSISTORS

CROSS REFERENCE GUIDE

TYPE	MAKER	SAMSUNG
2SC22	N.E.C	KSD526
2SC23	N.E.C	KSD526
2SC24	N.E.C	KSD526
2SC28	FUJITSU	KSC945
2SC29	FUJITSU	KSC945
2SC33	N.E.C	KSC945
2SC36	MATSUSHITA	KSC945
2SC37	N.E.C	KSC945
2SC54	FUJITSU	KSC945
2SC56	FUJITSU	KSC1675
2SC65	SANYO	KSC2310
2SC66	SANYO	KSC2310
2SC120	N.E.C	KSC945
2SC121	N.E.C	KSC945
2SC122	N.E.C	KSC945
2SC123	N.E.C	KSC945
2SC124	N.E.C	KSC945
2SC125	SONY	KSC2310
2SC126	SONY	KSC2310
2SC145	OKI	KSC815
2SC146	OKI	KSC945
2SC146A	OKI	KSC945
2SC155	FUJISU	KSC1675
2SC156	FUJITSU	KSC1675
2SC157	HITACHI	KSC945
2SC158	HITACHI	KSC945
2SC160	HITACHI	KSC945
2SC170	FUJITSU	KSC945
2SC171	FUJITSU	KSC945
2SC172/A	SUJITSU	KSC945
2SC174	FUJITSU	KSC945
2SC182	N.E.C	KSC945
2SC183	N.E.C	KSC945
2SC183A	N.E.C	KSC945
2SC184	N.E.C	KSC945
2SC186	FUJITSU	KSC945
2SC187	FUJITSU	KSC945
2SC191	SONY	KSC945
2SC192	SONY	KSC945
2SC193/A	SONY	KSC945
2SC194	SONY	KSC945
2SC195	SONY	KSC945
2SC196	SONY	KSC945
2SC197	SONY	KSC945
2SC206	FUJITSU	KSC945
2SC207	FUJITSU	KSC945
2SC250	FUJITSU	KSC838
2SC263	OKI	KSC945
2SC265	OKI	KSC945
2SC266	N.E.C	KSC838
2SC268	N.E.C	KSC945
2SC273	N.E.C	KSC2310

TYPE	MAKER	SAMSUNG
2SC281	HITACHI	KSC945
2SC283	HITACHI	KSC945
2SC284	HITACHI	KSC945
2SC287A	N.E.C	KSC388
2SC288A	N.E.C	KSC388
2SC296	FUJITSU	KSC945
2SC316	MATSUSHITA	KSC945
2SC324	FUJITSU	KSC945
2SC337	OKI	KSC838
2SC338	OKI	KSC945
2SC340	OKI	KSC945
2SC342	OKI	KSC2310
2SC350	HITACHI	KSC945
2SC361	TOSHIBA	KSC945
2SC362	TOSHIBA	KSC945
2SC363	TOSHIBA	KSC945
2SC364	TOSHIBA	KSC945
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2SC375	TOSHIBA	KSC1674
2SC377	TOSHIBA	KSC1675
2SC378	TOSHIBA	KSC1675
2SC379	TOSHIBA	KSC1675
2SC380	TOSHIBA	KSC838
2SC381	TOSHIBA	KSC1675
2SC382	TOSHIBA	KSC1187
2SC383	TOSHIBA	KSC1674
2SC384	TOSHIBA	KSC1674
2SC385	TOSHIBA	KSC1674
2SC386	TOSHIBA	KSC1674
2SC388	TOSHIBA	KSC1674
2SC388A	TOSHIBA	KSC388
2SC394	TOSHIBA	KSC1675
2SC398	TOSHIBA	KSC1393
2SC399	TOSHIBA	KSC1394
2SC401	SONY	KSC945
2SC402	SONY	KSC945
2SC402A	SONY	KSC945
2SC403	SONY	KSC945
2SC403A	SONY	KSC945
2SC404	SONY	KSC945
2SC454	HITACHI	KSC838
2SC455	HITACHI	KSC838
2SC458	HITACHI	KSC945
2SC459	HITACHI	KSC1675
2SC460	HITACHI	KSC1675
2SC461	HITACHI	KSC1675
2SC462	HITACHI	KSC1393

TYPE	MAKER	SAMSUNG
2SC463	HITACHI	KSC1394
2SC464	HITACHI	KSC1393
2SC465	HITACHI	KSC1393
2SC466	HITACHI	KSC1393
2SC467	FUJITSU	KSC945
2SC469	N.E.C	KSC838
2SC470	SONY	KSC2310
2SC471	HITACHI	KSC945
2SC475	N.E.C	KSC945
2SC476	N.E.C	KSC945
2SC489	TOSHIBA	KSD526
2SC490	TOSHIBA	KSD526
2SC491	TOSHIBA	KSD526
2SC492	TOSHIBA	KSD526
2SC493	TOSHIBA	KSD526
2SC494	TOSHIBA	KSD526
2SC528	HITACHI	KSC945
2SC529	HITACHI	KSC1675
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2SC532	HITACHI	KSC1675
2SC532	HITACHI	KSC1675
2SC533	HITACHI	KSC1675
2SC534	HITACHI	KSC1675
2SC535	HITACHI	KSC1675
2SC536	SANYO	KSC945
2SC537	SANYO	KSC945
2SC538	MATSUSHITA	KSC945
2SC538A	MATSUSHITA	KSC945
2SC539	MATSUSHITA	KSC945
2SC540	N.E.C	KSC945
2SC544	SANYO	KSC1674
2SC545	SANYO	KSC1674
2SC561	FUJITSU	KSC1675
2SC562	MATSUSHITA	KSC1187
2SC581	MATSUSHITA	KSC1675
2SC593	MATSUSHITA	KSC838
2SC621	MITSUBISHI	KSC838
2SC622	MITSUBISHI	KSC838
2SC627	FUJITSU	KSC2310
2SC631	SONY	KSC838
2SC632	SONY	KSC945
2SC633	SONY	KSC838
2SC634	SONY	KSC945
2SC640	N.E.C	KSC945
2SC642	TOSHIBA	KSD818
2SC642A	TOSHIBA	KSD818
2SC643	TOSHIBA	KSD818
2SC643A	TOSHIBA	KSD818
2SC645	MATSUSHITA	KSC1675
2SC648	HITACHI	KSC945
2SC649	HITACHI	KSC945
2SC650	HITACHI	KSC945

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TRANSISTORS

CROSS REFERENCE GUIDE

TYPE	MAKER	SAMSUNG
2SC655	MATSUSHITA	KSC945
2SC660	mitsubishi	KSC1187
2SC661	MITSUBISHI	KSC1187
2SC663	MITSUBISHI	KSC1674
2SC684	HITACHI	KSC1730
2SC693	SANYO	KSC945
2SC705	SANYO	KSC1674
2SC706	SANYO	KSC1674
2SC707	HITACHI	KSC1070
2SC709	MITSUBISHI	KSC1675
2SC710	MITSUBISHI	KSC1675
2SC711	MITSUBISHI	KSC945
2SC712	MITSUBISHI	KSC945
2SC714	MITSUBISHI	KSC945
2SC715	SANYO	KSC945
2SC716	SANYO	KSC945
2SC720	FUJITSU	KSC1187
2SC721	FUJITSU	KSC1187
2SC733	TOSHIBA	KSC945
2SC734	TOSHIBA	KSC945
2SC735	TOSHIBA	KSC945
2SC738	MITSUBISHI	KSC1674
2SC739	MITSUBISHI	KSC1674
2SC752	TOSHIBA	KSC945
2SC755	N.E.C	KSC945
2SC761	MATSUSHITA	KSC1070
2SC762	MATSUSHITA	KSC1070
2SC763	MITSUBISHI	KSC1674
2SC772	SANYO	KSC1675
2SC787	TOSHIBA	KSC1070
2SC789	TOSHIBA	KSD526
2SC790	TOSHIBA	KSD288
2SC791	TOSHIBA	KSD526
2SC815	N.E.C	KSC838
2SC817	MITSUBISHI	KSC1070
2SC818	MITSUBISHI	KSC2310
2SC828	MATSUSHITA	KSC945
2SC828A	MATSUSHITA	KSC945
2SC829	MATSUSHITA	KSC838
2SC830	HITACHI	KSD526
2SC836	N.E.C	KSC1187
2SC837	N.E.C	KSC388
2SC838	N.E.C	KSC838
2SC839	N.E.C	KSC838
2SC860	SANYO	KSC1674
2SC870	MITSUBISHI	KSC945
2SC894	SONY	KSC1675
2SC899	N.E.C	KSC945
2SC900	N.E.C	KSC945
2SC912	MITSUBISHI	KSC945
2SC917	HITACHI	KSC1070
2SC918	SONY	KSC1674

TYPE	MAKER	SAMSUNG
2SC923	N.E.C	KSC838
2SC924	N.E.C	KSC838
2SC927	SANYO	KSC1674
2SC928	SANYO	KSC1674
2SC929	SANYO	KSC1675
2SC930	SANYO	KSC1675
2SC931	SANYO	KSD526
2SC932	SANYO	KSC1173
2SC937	HITACHI	KSD818
2SC945	N.E.C	KSC945
2SC949	J R C	KSC945
2SC950	J R C	KSC945
2SC951	J R C	KSC945
2SC955	J R C	KSC1675
2SC956	J R C	KSC945
2SC957	SONY	KSC1674
2SC963	FUJITSU	KSC838
2SC969	FUJITSU	KSC945
2SC983	TOSHIBA	KSC2310
2SC1004	TOSHIBA	KSD818
2SC1004A	TOSHIBA	KSD818
2SC1005	TOSHIBA	KSD820
2SC1006	N.E.C	KSC945
2SC1007	N.E.C	KSC945
2SC1013	MITSUBISHI	KSC1096
2SC1023	FUJITSU	KSC1675
2SC1024	SANYO	KSD526
2SC1026	FUJITSU	KSC1675
2SC1032	FUJITSU	KSC1675
2SC1034	SONY	KSD818
2SC1035	SANYO	KSC1070
2SC1036	SANYO	KSC1070
2SC1046	SANYO	KSD818
2SC1047	MATSUSHITA	KSC1674
2SC1060	HITACHI	KSD526
2SC1061	HITACHI	KSD526
2SC1096	N.E.C	KSC1096
2SC1170	TOSHIBA	KSD819
2SC1170B	TOSHIBA	KSD819
2SC1171	TOSHIBA	KSD818
2SC1172	TOSHIBA	KSD820
2SC1172A	TOSHIBA	KSD821
2SC1173	TOSHIBA	KSC1173
2SC1174	HITACHI	KSD819
2SC1175	SANYO	KSC945
2SC1204	HITACHI	KSC945
2SC1205	HITACHI	KSC1675
2SC1206	MITSUBISHI	KSD526
2SC1207	MITSUBISHI	KSD526
2SC1211	MITSUBISHI	KSC2003
2SC1215	MATSUSHITA	KSC1395
2SC1226	MATSUSHITA	KSC1096

TYPE	MAKER	SAMSUNG
2SC1226A	MATSUSHITA	KSC1096
2SC1240	MITSUBISHI	KSC1674
2SC1243	MITSUBISHI	KSC1096
2SC1285	SANYO	KSC945
2SC1293	SANYO	KSC1674
2SC1308	SANYO	KSD820
2SC1309	MITSUBISHI	KSD819
2SC1310	MITSUBISHI	KSC945
2SC1311	MITSUBISHI	KSC945
2SC1316	SONY	KSD818
2SC1319	N.E.C	KSC1187
2SC1320	N.E.C	KSC1187
2SC1325A	N.E.C	KSC819
2SC1342	HITACHI	KSC1674
2SC1358	N.E.C	KSD819
2SC1359	MATSUSHITA	KSC1675
2SC1361	SONY	KSC945
2SC1362	SONY	KSC945
2SC1363	SONY	KSC945
2SC1364	SONY	KSC945
2SC1367	HITACHI	KSD818
2SC1368	HITACHI	KSC1173
2SC1372	FUJITSU	KSC945
2SC1390	HITACHI	KSC1675
2SC1393	N.E.C	KSC1393
2SC1394	N.E.C	KSC1394
2SC1395	N.E.C	KSC1395
2SC1398	MATSUSHITA	KSD288
2SC1413	HITACHI	KSD821
2SC1413A	HITACHI	KSD821
2SC1417	HITACHI	KSC1674
2SC1419	HITACHI	KSD288
2SC1428	N.E.C	KSC838
2SC1429	SONY	KSC2500
2SC1438	FUJITSU	KSC2310
2SC1439	FUJITSU	KSC2310
2SC1448	TOSHIBA	KSC2073
2SC1474	SONY	KSC2500
2SC1507	N.E.C	KSC1507
2SC1515K	HITACHI	KSC2310
2SC1518	MATSUSHITA	KSC1173
2SC1537	ROHM	KSC838
2SC1539	ROHM	KSC945
2SC1540	ROHM	KSC945
2SC1541	ROHM	KSC945
2SC1542	ROHM	KSC945
2SC1544	ROHM	KSC945
2SC1568	MATSUSHITA	KSD882
2SC1602	J R C	KSC945
2SC1621	N.E.C	KSC1623
2SC1622	N.E.C	KSC1623
2SC1623	N.E.C	KSC1623

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TYPE	MAKER	SAMSUNG
2SC1631	SONY	KSC945
2SC1632	SONY	KSC945
2SC1633	SONY	KSC945
2SC1634	SONY	KSC945
2SC1639	ROHM	KSC945
2SC1640	ROHM	KSC945
2SC1641	ROHM	KSC945
2SC1642	ROHM	KSC945
2SC1643	ROHM	KSC945
2SC1644	ROHM	KSC945
2SC1647	ROHM	KSC945
2SC1648	ROHM	KSC945
2SC1653	N.E.C	KSC1653
2SC1654	N.E.C	KSC1653
2SC1670	SONY	KSC2316
2SC1674	N.E.C	KSC1674
2SC1675	N.E.C	KSC1675
2SC1683	MATSUSHITA	KSD401
2SC1684	MATSUSHITA	KSC945
2SC1685	MATSUSHITA	KSC945
2SC1686	MATSUSHITA	KSC1675
2SC1687	MATSUSHITA	KSC1674
2SC1688	MATSUSHITA	KSC1674
2SC1708	mitsubishi	KSC945
2SC1727	SONY	KSC1393
2SC1730	N.E.C	KSC1730
2SC1739	ROHM	KSC1675
2SC1766	HITACHI	KSC945
2SC1771	J R C	KSC945
2SC1776	FUJITSU	KSC945
2SC1811	SONY	KSC2310
2SC1812	SONY	KSC1070
2SC1815	TOSHIBA	KSC945
2SC1826	SANKEN	KSD526
2SC1842	N.E.C	KSC945
2SC1843	N.E.C	KSC945
2SC1849	MATSUSHITA	KSC945
2SC1850	MATSUSHITA	KSC945
2SC1853	MATSUSHITA	KSC1675
2SC1854	MATSUSHITA	KSC1675
2SC1855	HITACHI	KSC1393
2SC1856	HITACHI	KSC1393
2SC1859	SONY	KSC2328A
2SC1875	N.E.C	KSD819
2SC1881	HITACHI	KSD560
2SC1883	HITACHI	KSD560
2SC1885	MATSUSHITA	KSC2310
2SC1886	HITACHI	KSC1730
2SC1887	HITACHI	KSC1730
2SC1890	HITACHI	KSC945
2SC1892	TOSHIBA	KSD818
2SC1893	TOSHIBA	KSD819

TYPE	MAKER	SAMSUNG
2SC1894	TOSHIBA	KSD820
2SC1895	TOSHIBA	KSD821
2SC1898	J R C	KSC1393
2SC1899	J R C	KSC1393
2SC1903	FUJITSU	KSC2310
2SC1906	HITACHI	KSC1730
2SC1907	HITACHI	KSC1730
2SC1908	SONY	KSC838
2SC1913	MATSUSHITA	KSD401
2SC1915	MITSUBISHI	KSC2310
2SC1921	HITACHI	KSC2310
2SC1922	HITACHI	KSD818
2SC1923	TOSHIBA	KSC1674
2SC1928	SONY	KSC945
2SC1940	N.E.C	KSC2310
2SC1941	N.E.C	KSC2310
2SC1942	HITACHI	KSD819
2SC1951	SONY	KSC2310
2SC1954	FUJITSU	KSC1730
2SC1961	SONY	KSC1674
2SC1982	SONY	KSC2310
2SC1983	SANKEN	KSC1983
2SC1989	MATSUSHITA	KSC1675
2SC1990	MATSUSHITA	KSC1674
2SC1992	N.E.C	KSC945
2SC1993	N.E.C	KSC945
2SC1998	N.E.C	KSC2310
2SC1999	N.E.C	KSC2310
2SC2000	N.E.C	KSC945
2SC2009	SONY	KSC1674
2SC2019	SONY	KSC1674
2SC2011	SONY	KSC1393
2SC2013	SONY	KSC1393
2SC2027	HITACHI	KSD820
2SC2057	SANYO	KSC1393
2SC2072	SONY	KSC945
2SC2073	TOSHIBA	KSC2073
2SC2076	MATSUSHITA	KSC838
2SC2130	MITSUBISHI	KSC945
2SC2141	SONY	KSC2073
2SC2167	SANKEN	KSD401
2SC2168	SANKEN	KSD401
2SC2193	OKI	KSC2073
2SC2206	MATSUSHITA	KSC838
2SC2212	SONY	KSC1674
2SC2215	TOSHIBA	KSC1674
2SC2216	TOSHIBA	KSC1674
2SC2228	SANYO	KSC2310
2SC2229	TOSHIBA	KSC2310
2SC2235	TOSHIBA	KSC2316
2SC2239	TOSHIBA	KSD401
2SC2257	MATSUSHITA	KSC2310

TYPE	MAKER	SAMSUNG
2SC2263	MATSUSHITA	KSC945
2SC2294	MATSUSHITA	KSC1675
2SC2299	FUJITSU	KSD471
2SC1393	HITACHI	KSC945
2SC2309	HITACHI	KSC945
2SC2310	HITACHI	KSC945
2SC2320	MITSUBISHI	KSC945
2SC2334	N.E.C	KSC2334
2SC2335	N.E.C	KSC2335
2SC2348	TOSHIBA	KSC1393
2SC2363	SANYO	KSC2310
2SC2376	TOSHIBA	KSC2688
2SC2396	HITACHI	KSC945
2SC2438	FUJI	KSC2334
2SC2439	FUJI	ZKSC2334
2SC2440	FUJI	KSC2335
2SC2441	SANYO	KSC2310
2SC2462	HITACHI	KSC1623
2SC2463	HITACHI	KSC1623
2SC2464	HITACHI	KSC1070
2SC2466	HITACHI	KSC1070
2SC2500	TOSHIBA	KSC2500
2SC2501	SINDENKEN	KSC2335
2SC2502	SINDENKEN	KSC2335
2SC2517	N.E.C	KSC2517
2SC2535	TOSHIBA	KSC2335
2SC2542	FUJI	KSC2335
2SC2553	TOSHIBA	KSC2335
2SC2561	MATSUSHITA	KSC1675
2SC2612	HITACHI	KSC2335
2SC2613	HITACHI	KSC2335
2SC2619	HITACHI	KSC1623
2SC2621	SANYO	KSC2688
2SC2646	MATSUSHITA	KSC1730
2SC2682	N.E.C	KSC2682
2SC2688	N.E.C	KSC2688
2SC2690	N.E.C	KSC2690
2SC2704	TOSHIBA	KSC2682
2SC2712	TOSHIBA	KSC1623
2SC2718	N.E.C	KSC945
2SC2755	N.E.C	KSC2755
2SC2756	N.E.C	KSC2756
2SC2757	N.E.C	KSC2757
2SC2758	N.E.C	KSC2758
2SC2759	N.E.C	KSC2759
2SC2810	SANKEN	KSC2335
2SC2812	SANYO	KSC1623
2SC2816	HITACHI	KSC2335
2SC2824	TOSHIBA	KSC2690
2SC2826	SINDENKEN	KSC2335
2SC2827	SINDENKEN	KSC2335
2SC2882	TOSHIBA	KSC2882

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TYPE	MAKER	SAMSUNG
2SC2911	SANYO	KSC2682
2SC2912	SANYO	KSC2682
2SC2963	SINDENKEN	KSC2517
2SC2986	TOSHIBA	KSC945
2SC3000	SANYO	KSC1675
2SC3039	SANYO	KSC2335
2SC2056	FUJITSU	KSC2335
2SC3134	SANYO	KSC1623
2SC3206	K E C	KSC2310
2SC3207	K E C	KSC2330
2SC3209	N.E.C	KSC2330
2SC3242	MITSUBISHI	KSC2500
2SC3249	MITSUBISHI	KSC2330
2SC3252	SANYO	KSD880
2SC3254	SANYO	KSD569
2SC3258	TOSHIBA	KSC2517
2SC3269	ROHM	KSC2330
2SC3331	SANYO	KSC2002
2SC3332	SANYO	KSC2383
2SC3339	TOSHIBA	KSC1623
2SC3342	HITACHI	KSD820
2SC3343	HITACHI	KSD820
2SC3359	ROHM	KSC2003
2SC3382	SANYO	KSC2002
2SC3383	SANYO	KSC2002
2SC3314	HITACHI	KSC2002
2SC3416	SANYO	KSC2682
2SC3417	SANYO	KSC2688
2SC3421	TOSHIBA	KSC2690
2SC3422	TOSHIBA	KSD882
2SC3423	TOSHIBA	KSC2682
2SC3424	TOSHIBA	KSC2688
2SC3425	TOSHIBA	KSC2752
2SC3471	HITACHI	KSC2002
2SC3487	TOSHIBA	KSC945
2SC3495	SANYO	KSC1845
2SC3522	T.D.K	KSC2335
2SC3523	T.D.K	KSC2517
2SC3524	T.D.K	KSC2334
2SD43A	TOSHIBA	KSC945
2SD44	TOSHIBA	KSC945
2SD57	MITSUBISHI	KSD880
2SD58	MITSUBISHI	KSD880
2SD75	HITACHI	KSC945
2SD75A	HITACHI	KSC945
2SD77A	HITACHI	KSC945
2SD78	N.E.C	KSD880
2SD100A	TOSHIBA	KSC945
2SD122	HITACHI	KSD526
2SD141	N.E.C	KSD880
2SD142	N.E.C	KSD880
2SD143	N.E.C	KSD880

TYPE	MAKER	SAMSUNG
2SD144	N.E.C	KSD880
2SD146	FUJITSU	KSD880
2SD147	FUJITSU	KSD880
2SD148	FUJITSU	KSD880
2SD150	N.E.C	KSD880
2SD152	N.E.C	KSD526
2SD154	N.E.C	KSD526
2SD155	N.E.C	KSD526
2SD199	MATSUSHITA	KSD818
2SD200	MATSUSHITA	KSD818
2SD234	TOSHIBA	KSD880
2SD235	TOSHIBA	KSD880
2SD246	MATSUSHITA	KSD820
2SD254	N.E.C	KSD880
2SD255	N.E.C	KSD880
2SD256	SANKEN	KSD880
2SD288	N.E.C	KSD288
2SD289	N.E.C	KSD880
2SD291	SONY	KSD880
2SD292	SONY	KSD880
2SD299	MATSUSHITA	KSD820
2SD300	MATSUSHITA	KSD820
2SD312	MATSUSHITA	KSD818
2SD313	SANYO	KSD526
2SD314	SANYO	KSD526
2SD315	SANYO	KSD526
2SD317	MATSUSHITA	KSD526
2SD317A	MATSUSHITA	KSD526
2SD318	MATSUSHITA	KSD526
2SD318A	MATSUSHITA	KSD526
2SD325	SANYO	KSC1173
2SD342	SONY	KSD880
2SD343	SONY	KSD880
2SD344	SONY	KSD880
2SD345	SONY	KSD880
2SD346	SONY	KSD526
2SD347	SONY	KSD526
2SD349	N.E.C	KSC945
2SD359	MITSUBISHI	KSD880
2SD360	MITSUBISHI	KSD880
2SD361	MITSUBISHI	KSD880
2SD365/A	MATSUSHITA	KSD880
2SD366/A	MATSUSHITA	KSD880
2SD368	SANYO	KSD820
2SD380	MATSUSHITA	KSD820
2SD386/A	SANYO	KSC2073
2SD387/A	SANYO	KSC2073
2SD389	MATSUSHITA	KSD526
2SD390/A	MATSUSHITA	KSD526
2SD400	SANYO	KSD471
2SD416	SANYO	KSD818
2SD418	MATSUSHITA	KSD820

TYPE	MAKER	SAMSUNG
2SD471A	N.E.C	KSD471A
2SD475	HITACHI	KSD526
2SD476	HITACHI	KSD526
2SD477	HITACHI	KSC2073
2SD478	IHTACHI	KSC2073
2SD488	MOTOROLA	KSD526
2SD489	MOTOROLA	KSD526
2SD490	MOTOROLA	KSD526
2SD526	TOSHIBA	KSD526
2SD560	N.E.C	KSD560
2SD570	MATSUSHITA	KSD526
2SD575	SANYO	KSD819
2SD576	FUJITSU	KSC2073
2SD580	FUJITSU	KSD880
2SD589	MATSUSHITA	KSD820
2SD592	MATSUSHITA	KSD471
2SD599	SANYO	KSD471
2SD601	MATSUSHITA	KSC1623
2SD603	MATSUSHITA	KSC945
2SD627	SANYO	KSD818
2SD633	TOSHIBA	KSD560
2SD634	TOSHIBA	KSD560
2SD635	TOSHIBA	KSD560
2SD636	MATSUSHITA	KSC945
2SD637	MATSUSHITA	KSC945
2SD649	TOSHIBA	KSD818
2SD661	MATSUSHITA	KSC945
2SD666A	HITACHI	KSC2310
2SD678A	MATSUSHITA	KSD560
2SD679A	MATSUSHITA	KSD560
2SD686	TOSHIBA	KSD560
2SD687	TOSHIBA	KSD560
2SD691	MATSUSHITA	KSD560
2SD721	SANKEN	KSD560
2SD722	SANKEN	KSD560
2SD723	HITACHI	KSD526
2SD725	HITACHI	KSD821
2SD755	HITACHI	KSC2310
2SD756	HITACHI	KSC2310
2SD759	HITACHI	KSD401
2SD760	HITACHI	KSD401
2SD761	SANYO	KSD401
2SD765	HITACHI	KSD819
2SD768K	HITACHI	KSD560
2SD771	MATSUSHITA	KSC945
2SD782	HITACHI	KSC2233
2SD784	HITACHI	KSD820
2SD787	HITACHI	KSC2328A
2SD788	HITACHI	KSC2328A
2SD794	N.E.C	KSD794
2SD818	TOSHIBA	KSD818
2SD819	TOSHIBA	KSD819

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SD820	TOSHIBA	KSD820	2SD1340	SANYO	KSD869	2N6516	MOTOROLA	2N6516
2SD821	TOSHIBA	KSD821	2SD1341	SANYO	KSD820	2N6517	MOTOROLA	2N6517
2SD849	MATSUSHITA	KSD819	2SD1342	SANYO	KSD870	2N6518	MOTOROLA	2N6518
2SD850	MATSUSHITA	KSD819	2SD1343	SANYO	KSD821	2N6519	MOTOROLA	2N6519
2SD856/A	MATSUSHITA	KSD880	2SD1344	SANYO	KSD871	2N6520	MOTOROLA	2N6520
2SD857/A	MATSUSHITA	KSD526	2SD1351	K.E.C	KSD880	BCW29	MOTOROLA	BCW29
2SD866	MATSUSHITA	KSC2334	2SD1352	K.E.C	KSD526	BCW30	MOTOROLA	BCW30
2SD868	TOSHIBA	KSD868	2SD1353	TOSHIBA	KSD288	BCW31	MOTOROLA	BCW31
2SD869	TOSHIBA	KSD869	2SD1354	TOSHIBA	KSD288	BCW32	MOTOROLA	BCW32
2SD870	TOSHIBA	KSD870	2SD1357	TOSHIBA	KSD2334	BCW33	MOTOROLA	BCW33
2SD871	TOSHIBA	KSC871	2SD1358	TOSHIBA	KSD569	BCW60A	MOTOROLA	BCW60A
2SD880	TOSHIBA	KSD880	2SD1359	TOSHIBA	KSD568	BCW60B	MOTOROLA	BCW60B
2SD882	TOSHIBA	KSD882	2SD1362	TOSHIBA	KSD1221	BCW60C	MOTOROLA	BCW60C
2SD884	MATSUSHITA	KSC2335	2SD1363	TOSHIBA	KSD569	BCW60D	MOTOROLA	BCW60D
2SD885	MATSUSHITA	KSC2335	2SD1369	TOSHIBA	KSD288	BCW61A	MOTOROLA	BCW61A
2SD887	MATSUSHITA	KSD560	2SD1370	TOSHIBA	KSC2517	BCW61B	MOTOROLA	BCW61B
2SD893	MATSUSHITA	KSD985	2SD1376	HITACHI	KSD986	BCW61C	MOTOROLA	BCW61C
2SD894	SANYO	KSD985	2SD1381	ROHM	KSC2690	BCW61D	MOTOROLA	BCW61D
2SD897/A	HITACHI	KSD868	2SD1384	ROHM	KSC2328A	BCW69	MOTOROLA	BCW69
2SD898/A	HITACHI	KSD869	2SD1387	SANYO	KSC2500	BCW70	MOTOROLA	BCW70
2SD899/A	HITACHI	KSD870	2SD1389	SANKEN	KSD820	BCW71	MOTOROLA	BCW71
2SD900/A	HITACHI	KSD871	2SD1447	MISHIBISHI	KSD471	BCW72	MOTOROLA	BCW72
2SD904	SANYO	KSD869	2SD1506	ROHM	KSD794A	BCX70G	MOTOROLA	BCX70G
2SD949	MATSUSHITA	KSD868	2SD1509	TOSHIBA	KSD794A	BCX70H	MOTOROLA	BCX70H
2SD954	MATSUSHITA	KSD870	2SD1572	HITACHI	KSD560	BCX70J	MOTOROLA	BCX70J
2SD956	HITACHI	KSD868	2SD1608	MATSUSHITA	KSD560	BCX70K	MOTOROLA	BCX70K
2SD957/A	HITACHI	KSD871	2N3903	MOTOROLA	2N3903	BCX71G	MOTOROLA	BCX71G
2SD972	SANKEN	KSD560	2N3904	MOTOROLA	2N3904	BCX71H	MOTOROLA	BCX71H
2SD979	SANYO	KSC2749	2N3905	MOTOROLA	2N3905	BCX71J	MOTOROLA	BCX71J
2SD985	N.E.C	KSD985	2N3906	MOTOROLA	2N3906	BCX71K	MOTOROLA	BCX71K
2SD986	N.E.C	KSD986	2N4123	MOTOROLA	2N4123	MJE170	MOTOROLA	MJE170
2SD1022	SINDENKEN	KSD560	2N4124	MOTOROLA	2N4124	MJE171	MOTOROLA	MJE171
2SD1029	SANYO	KSD526	2N4125	MOTOROLA	2N4125	MJE172	MOTOROLA	MJE172
2SD1052	TOSHIBA	KSD560	2N4126	MOTOROLA	2N4126	MMBA811C5	MOTOROLA	MMBA811C5
2SD1069	TOSHIBA	KSC2335	2N4400	MOTOROLA	2N4400	MMBA811C6	MOTOROLA	MMBA811C6
2SD1128	FUJI	KSD560	2N4401	MOTOROLA	2N4401	MMBA811C7	MOTOROLA	MMBA811C7
2SD1131	HITACHI	KSD526	2N4401	MOTOROLA	2N4402	MMBA811C8	MOTOROLA	MMBA811C8
2SD1132	HITACHI	KSD526	2N4403	MOTOROLA	2N4403	MMBA812M5	MOTOROLA	MMBA812M5
2SD1133	HITACHI	KSD526	2N5086	MOTOROLA	2N5086	MMBA812M6	MOTOROLA	MMBA812M6
2SD1134	HITACHI	KSD526	2N5087	MOTOROLA	2N5087	MMBA812M7	MOTOROLA	MMBA812M7
2SD1135	HITACHI	KSD526	2N5088	MOTOROLA	2N5088	MMBA812M8	MOTOROLA	MMBA812M8
2SD1138	HITACHI	KSC2328A	2N5089	MOTOROLA	2N5089	MMBC1009F1	MOTOROLA	MMBC1009F1
2SD1139	HITACHI	KSC2328A	2N5209	MOTOROLA	2N5209	MMBC1009F2	MOTOROLA	MMBC1009F2
2SD1147	FUJI	KSD560	2N5210	MOTOROLA	2N5210	MMBC1009F3	MOTOROLA	MMBC1009F3
2SD1157	FUJI	KSD526	2N5400	MOTOROLA	2N5400	MMBC1009F4	MOTOROLA	MMBC1009F4
2SD1190	SANYO	KSD560	2N5401	MOTOROLA	2N5401	MMBC1009F5	MOTOROLA	MMBC1009F5
2SD1195	SANYO	KSD560	2N5550	MOTOROLA	2N5550	MMBC1622D6	MOTOROLA	MMBC1622D6
2SD1218	MATSUSHITA	KSD560	2N5551	MOTOROLA	2N5551	MMBC1622D7	MOTOROLA	MMBC1622D7
2SD1300	HITACHI	KSD819	2N6427	MOTOROLA	2N6427	MMBC1622D8	MOTOROLA	MMBC1622D8
2SD1337	SANYO	KSD818	2N6248	MOTOROLA	2N6428	MMBC1623L3	MOTOROLA	MMBC1623L3
2SD1338	SANYO	KSD868	2N6248A	MOTOROLA	2N6428A	MMBC1623L4	MOTOROLA	MMBC1623L4
2SD1339	SANYO	KSD819	2N6515	MOTOROLA	2N6515	MMBC1623L5	MOTOROLA	MMBC1623L5

TRANSISTORS

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
MMBC1623L6	MOTOROLA	MMBC1623L6	MPS4250A	MOTOROLA	MPS4250A	TIP121	T.I	TIP121
MMBC1623L7	MOTOROLA	MMBC1623L7	MPS5172	MOTOROLA	MPS5172	TIP122	T.I	TIP122
MMBT2222	MOTOROLA	MMBT2222	MPS5179	MOTOROLA	MPS5179	TIP125	T.I	TIP125
MMBT2222A	MOTOROLA	MMBT2222A	MPS6513	MOTOROLA	MPS6513	TIP126	T.I	TIP126
MMBT2484	MOTOROLA	MMBT2484	MPS6517	MOTOROLA	MPS6517	TIP127	T.I	TIP127
MMBT2907	MOTOROLA	MMBT2907	MPS6520	MOTOROLA	MPS6520	TIP29	T.I	TIP29
MMBT2907A	MOTOROLA	MMBT2907A	MPS6521	MOTOROLA	MPS6521	TIP29A	T.I	TIP29A
MMBT3903	MOTOROLA	MMBT3903	MPS6522	MOTOROLA	MPS6522	TIP29B	T.I	TIP29B
MMBT3904	MOTOROLA	MMBT3904	MPS6523	MOTOROLA	MPS6523	TIP29C	T.I	TIP29C
MMBT3906	MOTOROLA	MMBT3906	MPS6560	MOTOROLA	MPS6560	TIP30	T.I	TIP30
MMBT4123	MOTOROLA	MMBT4123	MPS6562	MOTOROLA	MPS6562	TIP30A	T.I	TIP30A
MMBT4124	MOTOROLA	MMBT4124	MPS6601	MOTOROLA	MPS6601	TIP30B	T.I	TIP30B
MMBT4126	MOTOROLA	MMBT4126	MPS6602	MOTOROLA	MPS6602	TIP30C	T.I	TIP30C
MMBT4401	MOTOROLA	MMBT4401	MPS6651	MOTOROLA	MPS6651	TIP31	T.I	TIP31
MMBT4403	MOTOROLA	MMBT4403	MPS8097	MOTOROLA	MPS8097	TIP31A	T.I	TIP31A
MMBT5086	MOTOROLA	MMBT5086	MPS8098	MOTOROLA	MPS8098	TIP31B	T.I	TIP31B
MMBT5087	MOTOROLA	MMBT5087	MPS8099	MOTOROLA	MPS8099	TIP31C	T.I	TIP31C
MMBT5088	MOTOROLA	MMBT5088	MPS8598	MOTOROLA	MPS8598	TIP32	T.I	TIP32
MMBT5089	MOTOROLA	MMBT5089	MPS8599	MOTOROLA	MPS8599	TIP32A	T.I	TIP32A
MMBT5401	MOTOROLA	MMBT5401	MPSA05	MOTOROLA	MPSA05	TIP32B	T.I	TIP32B
MMBT5550	MOTOROLA	MMBT5550	MPSA06	MOTOROLA	MPSA06	TIP32C	T.I	TIP32C
MMBT6427	MOTOROLA	MMBT6427	MPSA10	MOTOROLA	MPSA10	TIP41	T.I	TIP41
MMBT6428	MOTOROLA	MMBT6428	MPSA12	MOTOROLA	MPSA12	TIP41A	T.I	TIP41A
MMBT6429	MOTOROLA	MMBT6429	MPSA13	MOTOROLA	MPSA13	TIP41B	T.I	TIP41B
MMBTA05	MOTOROLA	MMBTA05	MPSA14	MOTOROLA	MPSA14	TIP41C	T.I	TIP41C
MMBTA06	MOTOROLA	MMBTA06	MPSA20	MOTOROLA	MPSA20	TIP42	T.I	TIP42
MMBTA13	MOTOROLA	MMBTA13	MPSA25	MOTOROLA	MPSA25	TIP42A	T.I	TIP42A
MMBTA14	MOTOROLA	MMBTA14	MPSA26	MOTOROLA	MPSA26	TIP42B	T.I	TIP42B
MMBTA20	MOTOROLA	MMBTA20	MPSA27	MOTOROLA	MPSA27	TIP42C	T.I	TIP42C
MMBTA42	MOTOROLA	MMBTA42	MPSA42	MOTOROLA	MPSA42			
MMBTA43	MOTOROLA	MMBTA43	MPSA43	MOTOROLA	MPSA43			
MMBTA55	MOTOROLA	MMBTA55	MPSA44	MOTOROLA	MPSA44			
MMBTA56	MOTOROLA	MMBTA56	MPSA45	MOTOROLA	MPSA45			
MMBTA63	MOTOROLA	MMBTA63	MPSA55	MOTOROLA	MPSA55			
MMBTA64	MOTOROLA	MMBTA64	MPSA56	MOTOROLA	MPSA56			
MMBTA70	MOTOROLA	MMBTA70	MPSA62	MOTOROLA	MPSA62			
MMBTA92	MOTOROLA	MMBTA92	MPSA63	MOTOROLA	MPSA63			
MMBTA93	MOTOROLA	MMBTA93	MPSA64	MOTOROLA	MPSA64			
MMBTH10	MOTOROLA	MMBTH10	MPSA70	MOTOROLA	MPSA70			
MMBTH24	MOTOROLA	MMBTH24	MPSA75	MOTOROLA	MPSA75			
MMBR5179	MOTOROLA	MMBR5179	MPSA76	MOTOROLA	MPSA76			
MPS2222	MOTOROLA	MPS2222	MPSA77	MOTOROLA	MPSA77			
MPS2222A	MOTOROLA	MPS2222A	MPSA92	MOTOROLA	MPSA92			
MPS2907	MOTOROLA	MPS2907	MPSA93	MOTOROLA	MPSA93			
MPS2907A	MOTOROLA	MPS2907A	MPSH10	MOTOROLA	MPSH10			
MPS3702	MOTOROLA	MPS3702	MPSH11	MOTOROLA	MPSH11			
MPS3703	MOTOROLA	MPS3703	MPSH17	MOTOROLA	MPSH17			
MPS3704	MOTOROLA	MPS3704	MPSH20	MOTOROLA	MPSH20			
MPS3705	MOTOROLA	MPS3705	MPSH24	MOTOROLA	MPSH24			
MPS3706	MOTOROLA	MPS3706	MPSL01	MOTOROLA	MPSL01			
MPS4249	MOTOROLA	MPS4249	MPSL51	MOTOROLA	MPSL51			
MPS4250	MOTOROLA	MPS4250	TIP120	T.I	TIP120			

Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement
IRF120	IRF120	IRF352	IRF352	IRF713	IRF713	IRF9620	IRF9620
IRF121	IRF121	IRF353	IRF353	IRF720	IRF720	IRF9621	IRF9621
IRF122	IRF122	IRF420	IRF420	IRF721	IRF721	IRF9622	IRF9622
IRF123	IRF123	IRF421	IRF421	IRF722	IRF722	IRF9623	IRF9623
IRF130	IRF130	IRF422	IRF422	IRF723	IRF723	IRF9630	IRF9630
IRF131	IRF131	IRF423	IRF423	IRF730	IRF730	IRF9631	IRF9631
IRF132	IRF132	IRF430	IRF430	IRF731	IRF731	IRF9632	IRF9632
IRF133	IRF133	IRF431	IRF431	IRF732	IRF732	IRF9633	IRF9633
IRF140	IRF140	IRF432	IRF432	IRF733	IRF733	IRF9640	IRF9640
IRF141	IRF141	IRF433	IRF433	IRF740	IRF740	IRF9641	IRF9641
IRF142	IRF142	IRF440	IRF440	IRF741	IRF741	IRF9642	IRF9642
IRF143	IRF143	IRF441	IRF441	IRF742	IRF742	IRF9643	IRF9643
IRF150	IRF150	IRF442	IRF442	IRF743	IRF743	IRFD120	(IRFA120)
IRF151	IRF151	IRF443	IRF443	IRF820	IRF820	IRFD123	(IRFA123)
IRF152	IRF152	IRF450	IRF450	IRF821	IRF821		
IRF153	IRF153	IRF451	IRF451	IRF822	IRF822	IRFP131	IRFP131
IRF220	IRF220	IRF452	IRF452	IRF823	IRF823	IRFP132	IRFP132
IRF221	IRF221	IRF453	IRF453	IRF830	IRF830	IRFP133	IRFP133
IRF222	IRF222	IRF510	IRF510	IRF831	IRF831	IRFP140	IRFP140
IRF223	IRF223	IRF511	IRF511	IRF832	IRF832	IRFP141	IRFP141
IRF231	IRF231	IRF512	IRF512	IRF833	IRF833	IRFP142	IRFP142
IRF232	IRF232	IRF513	IRF513	IRF840	IRF840	IRFP143	IRFP143
IRF233	IRF233	IRF520	IRF520	IRF841	IRF841	IRFP150	IRFP150
IRF240	IRF240	IRF521	IRF521	IRF842	IRF842	IRFP151	IRFP151
IRF241	IRF241	IRF522	IRF522	IRF843	IRF843	IRFP152	IRFP152
IRF242	IRF242	IRF523	IRF523	IRF9510	IRF9510	IRFP153	IRFP153
IRF243	IRF243	IRF610	IRF610	IRF9511	IRF9511	IRFP230	IRFP230
IRF250	IRF250	IRF611	IRF611	IRF9512	IRF9512	IRFP231	IRFP231
IRF251	IRF251	IRF612	IRF612	IRF9513	IRF9513	IRFP232	IRFP232
IRF252	IRF252	IRF613	IRF613	IRF9520	IRF9520	IRFP233	IRFP233
IRF253	IRF253	IRF620	IRF620	IRF9521	IRF9521	IRFP240	IRFP240
IRF320	IRF320	IRF621	IRF621	IRF9522	IRF9522	IRFP241	IRFP241
IRF321	IRF321	IRF622	IRF622	IRF9523	IRF9523	IRFP242	IRFP242
IRF322	IRF322	IRF623	IRF623	IRF9530	IRF9530	IRFP243	IRFP243
IRF323	IRF323	IRF630	IRF630	IRF9531	IRF9531	IRFP250	IRFP250
IRF330	IRF330	IRF631	IRF631	IRF9532	IRF9532	IRFP251	IRFP251
IRF331	IRF331	IRF632	IRF632	IRF9533	IRF9533	IRFP252	IRFP252
IRF332	IRF332	IRF633	IRF633	IRF9540	IRF9540	IRFP253	IRFP253
IRF333	IRF333	IRF640	IRF640	IRF9541	IRF9541	IRFP330	IRFP330
IRF340	IRF340	IRF641	IRF641	IRF9542	IRF9542	IRFP331	IRFP331
IRF341	IRF341	IRF642	IRF642	IRF9543	IRF9543	IRFP332	IRFP332
IRF342	IRF342	IRF643	IRF643	IRF9610	IRF9610	IRFP333	IRFP333
IRF343	IRF343	IRF710	IRF710	IRF9611	IRF9611	IRFP340	IRFP340
IRF350	IRF350	IRF711	IRF711	IRF9612	IRF9612	IRFP341	IRFP341
IRF351	IRF351	IRF712	IRF712	IRF9613	IRF9613	IRFP342	IRFP342

() Samsung number in Parentheses : Package alter native on possible substitution

POWER MOSFETs

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Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement
IRFP343	IRFP343	IRFP441	IRFP441	IRFP9133	IRFP9133	IRFP9241	IRFP9241
IRFP350	IRFP350	IRFP442	IRFP442	IRFP9140	IRFP9140	IRFP9242	IRFP9242
IRFP351	IRFP351	IRFP443	IRFP443	IRFP9141	IRFP9141	IRFP9243	IRFP9243
IRFP352	IRFP352	IRFP450	IRFP450	IRFP9142	IRFP9142		
IRFP353	IRFP353	IRFP451	IRFP451	IRFP9143	IRFP9143		
IRFP430	IRFP430	IRFP452	IRFP452	IRFP9230	IRFP9230		
IRFP431	IRFP431	IRFP453	IRFP453	IRFP9231	IRFP9231		
IRFP432	IRFP432	IRFP9130	IRFP9130	IRFP9232	IRFP9232		
IRFP433	IRFP433	IRFP9131	IRFP9131	IRFP9233	IRFP9233		
IRFP440	IRFP440	IRFP9132	IRFP9132	IRFP9240	IRFP9240		

MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement
MTH6N55	SSH6N55	MTM7N12	IRF233	MTM12N20	IRF242	MTP2N35	IRF723
MTH6N60	SSH6N60	MTM7N15	IRF233	MTM15N05	IRF143	MTP2N40	IRF722
MTH8N55	SSH8N55	MTM1N18	IRF232	MTM15N06	IRF143	MTP2N45	IRF823
MTH8N60	SSH8N60	MTM7N20	IRF232	MTM15N12	IRF243	MTP2N50	IRF822
MTH7N35	IRFP343	MTM7N45	IRF441	MTM15N15	IRF243	MTP2N55	
MTH7N40	IRFP342	MTM7N50	IRF442	MTM15N18	IRF242	MTP2N60	
MTH8N35	IRFP343	MTM8N08	IRF120	MTM15N20	IRF242	MTP3N12	IRF623
MTH8N40	IRFP342	MTM8N10	IRF120	MTM15N35	IRF351	MTP3N15	IRF623
MTH15N18	IRFP242	MTM8N12	IRF233	MTM15N40	IRF350	MTP3N18	IRF622
MTH15N20	IRFP242	MTM8N15	IRF233	MTM15N45	SSM20N45	MTP3N20	IRF620
MTH20N12	IRFP253	MTM8N18	IRF232	MTM15N50	SSM20N50	MTP3N35	IRF721
MTH20N15	IRFP253	MTM8N20	IRF232	MTM20N08	IRF142	MTP3N40	IRF720
MTH25N08	IRFP140	MTM8N35	IRF343	MTM20N10	IRF142	MTP3N55	SSP4N55
MTH25N10	IRFP140	MTM8N40	IRF342	MTM20N12	IRF253	MTP3N60	SSP4N60
MTH35N05	IRFP151	MTM8P08	IRF9132	MTM20N15	IRF253	MTP4N08	IRF510
MTH35N06	IRFP151	MTM8P10	IRF9132	MTM25N05	IRF141	MTP4N10	IRF510
MTM2N45	IRF421	MTM10N05	IRF133	MTM25N06	IRF141	MTP4N12	IRF623
MTM2N50	IRF422	MTM10N06	IRF133	MTM25N08	IRF140	MTP4N15	IRF623
MTM3N35	IRF321	MTM10N08	IRF132	MTM25N10	IRF140	MTP4N45	IRF833
MTM3N40	IRF320	MTM10N10	IRF132	MTM35N05	IRF151	MTP4N50	IRF832
MTM3N55	SSM4N55	MTM10N12	IRF243	MTM35N06	IRF151	MTP5N05	IRF523
MTM3N60	SSM4N60	MTM10N15	IRF243	MTM40N18	SSM40N20	MTP5N06	IRF523
MTM4N45	IRF433	MTM10N25	IRF353	MTM40N20	SSM40N20	MTP5N18	IRF620
MTM4N50	IRF432	MTM12N05	IRF133	MTP1N45	IRF823	MTP5N20	IRF620
MTM5N18	IRF220	MTM12N06	IRF133	MTP1N50	IRF822	MTP5N35	IRF731
MTM5N20	IRF220	MTM12N08	IRF132	MTP1N55		MTP5N40	IRF730
MTM5N35	IRF333	MTM12N10	IRF132	MTP1N60		MTP7N12	IRF633
MTM5N40	IRF330	MTM12N12	IRF243	MTP2N18	IRF612	MTP7N15	IRF633
MTM6N55	SSM6N55	MTM12N15	IRF243	MTP2N20	IRF612	MTP7N18	IRF632
MTM6N60	SSM6N60	MTM12N18	IRF242	MTP2N25	IRF723	MTP7N20	IRF632

MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement
MTP8N08	IRF520	MTP10N05	IRF533	MTP12N06	IRF533	MTP15N15	IRF643
MTP8N10	IRF520	MTP10N06	IRF533	MTP12N08	IRF532	MTP20N08	IRF542
MTP8N12	IRF633	MTP10N08	IRF532	MTP12N10	IRF532	MTP20N20	IRF542
MTP8N15	IRF633	MTP10N10	IRF532	MTP12N18	IRF642	MTP25N05	IRF541
MTP8N18	IRF632	MTP10N12	IRF643	MTP12N20	IRF642	MTP25N06	IRF541
MTP8N20	IRF632	MTP10N15	IRF643	MTP15N05	IRF543		
MTP8P08	IRF9532	MTP10N25	IRF743	MTP15N06	IRF543		
MTP8P10	IRF9532	MTP12N05	IRF533	MTP15N12	IRF643		

Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement
VN30AA	IRF123	VN0109N5	IRF512	VN0300D	IRF513	VN0801D	IRF532
VN33AJ	IRF123	VN0110N1	IRF122	VN0330N1	IRF323	VN1000A	IRF130
VN35AA	IRF123	VN0110N5	IRF512	VN0330N5	IRF723	VN1000D	IRF530
VN35AJ	IRF123	VN0114N1	IRF223	VN0335N1	IRF323	VN1001A	IRF132
VN40AD	IRF513	VN0114N5	IRF613	VN0335N5	IRF723	VN1001D	IRF532
VN46AD	IRF513	VN0116N1	IRF222	VN0340N1	IRF322	VN1102N1	IRF123
VN64AG	IRF123	VN0116N5	IRF612	VN0340N5	IRF722	VN1102N5	IRF523
VN66AD	IRF513	VN0120N1	IRF222	VN0345A1	IRF441	VN1103N1	IRF123
VN66AJ	IRF123	VN0120N5	IRF612	VN0345N1	IRF421	VN1103N5	IRF523
VN67AA	IRF123	VN0202N1	IRF123	VN0345N5	IRF821	VN1104N1	IRF123
VN67AD	IRF513	VN0202N5	IRF513	VN0350A1	IRF440	VN1104N5	IRF523
VN67AJ	IRF123	VN0203N1	IRF123	VN0350N1	IRF422	VN1106N1	IRF123
VN88AD	IRF512	VN0203N5	IRF513	VN0355N1	SSM4N55	VN1106N5	IRF523
VN89AA	IRF122	VN0204N1	IRF123	VN0360N1	SSM4N60	VN1109N1	IRF122
VN89AD	IRF512	VN0204N5	IRF513	VN0400A	IRF143	VN1109N5	IRF522
VN90AA	IRF122	VN0206N1	IRF123	VN0400D	IRF543	VN1110N1	IRF122
VN98AJ	IRF122	VN0206N5	IRF513	VN0401A	IRF143	VN1110N5	IRF522
VN99AA	IRF122	VN0208N1	IRF122	VN0401D	IRF543	VN1114N1	IRF223
VN99AJ	IRF122	VN0208N5	IRF512	VN0430N1	IRF341	VN1114N5	IRF611
VN0102N1	IRF123	VN0209N1	IRF122	VN0435N1	IRF341	VN1115N1	IRF223
VN0102N5	IRF513	VN0209N5	IRF512	VN0440N1	IRF340	VN1115N5	IRF611
VN0103N1	IRF123	VN0210N1	IRF122	VN0445N1	IRF453	VN1116N1	IRF222
VN0103N5	IRF513	VN0210N5	IRF512	VN0450N1	IRF440	VN1116N5	IRF612
VN0104N1	IRF123	VN0214N1	IRF223	VN0600A	IRF143	VN1120N1	IRF222
VN0104N5	IRF513	VN0214N5	IRF613	VN0600D	IRF543	VN1120N5	IRF612
VN0106N1	IRF123	VN0215N5	IRF613	VN0601A	IRF143	VN1200A	IRF241
VN0106N5	IRF513	VN0216N1	IRF222	VN0601D	IRF543	VN1200D	IRF641
VN0108N1	IRF122	VN0216N5	IRF612	VN0800A	IRF130	VN1201A	IRF243
VN0108N5	IRF512	VN0220N1	IRF222	VN0800D	IRF530	VN1201D	IRF643
VN0109N1	IRF122	VN0220N5	IRF612	VN0801A	IRF132	VN1202N1	IRF133

Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement
VN1202N5	IRF533	VN2406D	IRF713	VP0109N5	IRF9512	VP1109N1	IRF9132
VN1203N1	IRF133	VN3500A	IRF331	VP0110N5	IRF9512	VP1109N5	IRF9512
VN1203N5	IRF533	VN3500D	IRF731	VP0114N5	IRF9613	VP1110N1	IRF9132
VN1204N1	IRF123	VN3501A	IRF333	VP0202N1	IRF9133	VP1110N5	IRF9512
VN1204N5	IRF523	VN3501D	IRF733	VP0202N5	IRF9513	VP1114N1	IRF9233
VN1206D	IRF613	VN3502A	IRF321	VP0203N1	IRF9133	VP1114N5	IRF9611
VN1206N1	IRF123	VN4000A	IRF330	VP0203N5	IRF9513	VP1115N1	IRF9233
VN1206N5	IRF523	VN4000D	IRF730	VP0204N1	IRF9133	VP1115N5	IRF9611
VN1208N1	IRF122	VN4001A	IRF332	VP0204N5	IRF9513	VP1116N1	IRF9232
VN1208N5	IRF522	VN4001D	IRF732	VP0206N1	IRF9133	VP1116N5	IRF9612
VN1209N1	IRF122	VN4002A	IRF320	VP0206N5	IRF9513	VP1120N1	IRF9232
VN1209N5	IRF522	VN4501A	IRF431	VP0208N1	IRF9132	VP1120N5	IRF9612
VN1210N1	IRF122	VN4501D	IRF831	VP0208N5	IRF9512	VP1202N1	IRF9133
VN1210N5	IRF522	VN4502A	IRF433	VP0209N1	IRF9132	VP1202N5	IRF9533
VN1215N1	IRF233	VN4502D	IRF833	VP0209N5	IRF9512	VP1203N1	IRF9133
VN1215N5	IRF633	VN5001A	IRF430	VP0210N1	IRF9132	VP1203N5	IRF9533
VN1216N1	IRF222	VN5001D	IRF830	VP0210N5	IRF9512	VP1204N1	IRF9133
VN1216N5	IRF610	VN5002A	IRF432	VP0214N1	IRF9233	VP1204N5	IRF9523
VN1220N1	IRF222	VN5002D	IRF832	VP0214N5	IRF9613	VP1206N1	IRF9133
VN1220N5	IRF610	VNL001A	IRF331	VP0215N5	IRF9613	VP1206N5	IRF9523
VN1706D	IRF612	VNM001A	IRF330	VP0216N1	IRF9232	VP1208N1	IRF9132
VN2306N1	IRF141	VNM002A	IRF431	VP0216N5	IRF9612	VP1208N5	IRF9522
VN2306N5	IRF541	VNP002A	IRF430	VP0220N1	IRF9232	VP1209N1	IRF9132
VN2310N1	IRF140	VNS008A	SSM6N60	VP0220N5	IRF9612	VP1209N5	IRF9522
VN2310N5	IRF540	VNS008D	SSP6N60	VP0335N1	(IRF9232)	VP1210N1	IRF9132
VN2315N1	IRF241	VNS009A	SSM5N60	VP0335N5	(IRF9612)	VP1210N5	IRF9522
VN2315N5	IRF641	VNS009D	SSP5N60	VP0340N1	(IRF9232)	VP1215N1	IRF9233
VN2320N1	IRF242	VNT008A	SSM6N70	VP0340N5	(IRF9612)	VP1215N5	IRF9621
VN2320N5	IRF642	VNT008D	SSP6N70	VP0345N1	(IRF9232)	VP1216N1	IRF9232
VN2330N1	IRF341	VNT009A	SSM6N70	VP0345N5	(IRF9612)	VP1216N5	IRF9610
VN2330N5	IRF741	VNT009D	SSP6N70	VP1102N1	IRF9133	VP1220N1	IRF9232
VN2335N1	IRF341	VP0102N5	IRF9513	VP1102N5	IRF9523	VP1220N5	IRF9610
VN2335N5	IRF741	VP0103N5	IRF9513	VP1103N1	IRF9133	ZVN0102L	IRF513
VN2340N1	IRF340	VP0104N5	IRF9513	VP1103N5	IRF9523	ZNV0106L	IRF513
VN2340N5	IRF740	VP0106N5	IRF9513	VP1104N1	IRF9133	ZNV0108L	IRF512
VN2345N1	IRF453	VP0108N1	IRF9132	VP1104N5	IRF9513		
VN2350N1	IRF442	VP0108N5	IRF9512	VP1106N1	IRF9133		
VN2350N5	IRF842	VP0109N1	IRF9132	VP1106N5	IRF9513		

() Samsung number in parentheses : Package alter native on possible substitution

GE	SAMSUNG Direct Replacement	GE	SAMSUNG Direct Replacement	GE	SAMSUNG Direct Replacement	GE	SAMSUNG Direct Replacement
D84BK1	IRF523	D84DL2	IRF530	D84CL2	IRF120	D86EK4	IRF151
D84BK2	IRF523	D84DL3	IRF532	D86CL4	IRF122	D86EL4	IRF142
D84BK4	IRF511	D84DL4	IRF532	D86CM2	IRF221	D86EM1	IRF253
D84BL1	IRF510	D84DM1	IRF631	D86CM4	IRF221	D86EM2	IRF253
D84BL2	IRF510	D84DM2	IRF631	D86CN2	IRF220	D86EM4	IRF241
D84BL3	IRF512	D84DM4	IRF631	D86CN3	IRF222	D86EN2	IRF240
D84BL4	IRF512	D84DN1	IRF630	D86CN4	IRF222	D86EN3	IRF242
D84BM1	IRF611	D84DN2	IRF630	D86CQ1	IRF321	D86EN4	IRF242
D84BM2	IRF611	D84DN3	IRF632	D86CQ2	IRF320	D86EQ1	IRF341
D84BM3	IRF611	D84DN4	IRF632	D86CQ3	IRF323	D86EQ2	IRF340
D84BM4	IRF613	D84DQ1	IRF731	D86CQ4	IRF322	D86EQ3	IRF343
D84BN1	IRF610	D84DQ2	IRF730	D86CR1	IRF421	D86EQ4	IRF342
D84BN2	IRF610	D84DQ3	IRF733	D86CR2	IRF420	D86ER1	IRF441
D84BN3	IRF612	D84DQ4	IRF732	D86CR3	IRF423	D86ER2	IRF440
D84BN4	IRF612	D84DR1	IRF831	D86CR4	IRF422	D86ER3	IRF443
D84BQ1	IRF711	D84DR2	IRF830	D86DK1	IRF131	D86ER4	IRF442
D84BQ2	IRF710	D84DR3	IRF833	D86DK2	IRF131	D86ES1	(IRF430)
D84BQ3	IRF713	D84DR4	IRF832	D86DK3	IRF133	D86ES2	(IRF430)
D84BQ4	IRF712	D84DS1	(IRF832)	D86DK4	IRF133	D86EU2	(IRF420)
D84CK4	IRF521	D84DS2	(IRF832)	D86DL1	IRF130	D86EV1	(IRF422)
D84CK4	IRF521	D84EL2	IRF540	D86DL2	IRF130	D86EV2	(IRF422)
D84CL2	IRF520	D84EL4	IRF542	D86DL3	IRF132	D86EW1	(IRF422)
D84CL4	IRF522	D84EM2	IRF641	D86DL4	IRF132	D86EW2	(IRF422)
D84CM2	IRF621	D84EM4	IRF643	D86DM1	IRF231	D86FL2	IRF150
D84CM4	IRF623	D84EN2	IRF640	D86DM2	IRF231	D86FL4	IRF152
D84CN1	IRF620	D84EN4	IRF642	D86DM3	IRF231	D86FM2	IRF251
D84CN2	IRF620	D84EQ1	IRF741	D86DM4	IRF231	D86FN2	IRF250
D84CN3	IRF622	D84EQ2	IRF740	D86DN1	IRF230	D86FN4	IRF252
D84CN4	IRF622	D84EQ3	IRF743	D86DN2	IRF230	D86FQ1	IRF351
D84CQ1	IRF721	D84DQ4	IRF742	D86DN3	IRF230	D86FQ2	IRF350
D84CQ2	IRF720	D84ER1	IRF841	D86DN4	IRF230	D86FQ3	IRF353
D84CQ3	IRF723	D84ER2	IRF840	D86DQ1	IRF331	D86FQ4	IRF352
D84CQ4	IRF722	D84ER3	IRF843	D86DQ2	IRF330	D86FR1	IRF451
D84CR1	IRF821	D84ER4	IRF842	D86DQ3	IRF333	D86FR2	IRF450
D84CR2	IRF820	D84EU2	(IRF820)	D86DQ4	IRF332	D86FR3	IRF453
D84CR3	IRF823	D84EV1	(IRF822)	D86DR1	IRF431	D86FR4	IRF452
D84CR4	IRF822	D84EV2	(IRF822)	D86DR2	IRF430	D86FU2	(IRF432)
D84DK1	IRF531	D84EW1	(IRF822)	D86DR3	IRF433		
D84DK2	IRF531	D84EW2	(IRF822)	D86DR4	IRF432		
D83DK3	IRF533	D86CK2	IRF131	D86DS1	IRF432		
D84DK4	IRF533	D86CK3	IRF121	D86DS2	(IRF432)		
D84DL1	IRF530	D84CK4	IRF121	D86EK3	(IRF432)		

() Samsung number in parentheses : Package alter native on possible substitution

POWER MOSFETs

CROSS REFERENCE GUIDE

RCA	SAMSUNG Direct Replacement	RCA	SAMSUNG Direct Replacement	RCA	SAMSUNG Direct Replacement	RCA	SAMSUNG Direct Replacement
RCA9192A	IRF120	RFM3N45	IRF421	RFM15N12	IRF253	RFP5P12	IRF9631
RCA9192B	IRF243	RFM3N50	IRF420	RFM15N15	IRF253	RFP5P15	IRF9631
RCA9195A	IRF142	RFM4N35	IRF321	RFM18N08	IRF142	RFP6P08	IRF9520
RCA9195B	IRF253	RFM4N40	IRF320	RFM18N10	IRF142	RFP6P10	IRF9520
RCA9212A	IRF520	RFM5P12	IRF9231	RFM25N05	IRF141	RFP7N45	IRF831
RCA9212B	IRF643	RFM5P15	IRF9231	RFM25N06	IRF141	RFP7N50	IRF830
RCA9213A	IRF512	RFM6P08	IRF9132	RFP1N35	IRF713	RFP8N18	IRF630
RCA9213B	IRF613	RFM6P10	IRF9232	RFP1N40	IRF712	RFP8N20	IRF630
RCA9230A	IRF542	RFM7N45	IRF431	RFP2N08	IRF512	RFP8N08	IRF9532
		RFM7N50	IRF430	RFP2N10	IRF512	RFP8N10	IRF9532
RFK15N35	IRF353	RFM8N18	IRF230	RFP2N12	IRF611	RFP10N12	IRF643
RFK15N40	IRF352	RFM8N20	IRF230	RFP2N15	IRF611	RFP10N15	IRF643
RFK15N45	IRF441	RFM8P08	IRF9132	RFP2N18	IRF612	RFP10P12	(IRF9532)
RFK15N50	IRF440	RFM8P10	IRF9132	RFP2N20	IRF612	RFP12N08	IRF530
RFK20P08	IRF9140	RFM10N12	IRF243	RFP2P08	IRF9512	RFP12N10	IRF530
RFK20P10	IRF9140	RFM10N15	IRF243	RFP2P10	IRF9512	RFP12N20	IRF642
RFK25N18	IRF252	RFM10P12	IRF9241	RFP3N45	IRF821	RFP15N05	IRF543
RFK25N20	IRF252	RFM10P15	IRF9241	RFP3N50	IRF820	RFP15N06	IRF543
RFK30N12	IRF251	RFM12N18	IRF242	RFP4N05	IRF513	RFP15N12	(IRF643)
RFK30N15	IRF251	RFM12N20	IRF242	RFP4N06	IRF513	RFP18N10	IRF542
RFK35N08	IRF150	RFM15N05	IRF143	RFP4N35	IRF721	RFP25N05	IRF541
RFK35N10	IRF150	RFM15N06	IRF143	RFP4N40	IRF720		

Siemens	SAMSUNG Direct Replacement	Siemens	SAMSUNG Direct Replacement	Siemens	SAMSUNG Direct Replacement	Siemens	SAMSUNG Direct Replacement
BUZ10	IRF541	BUZ25	IRF140	BUZ41A	IRF830	BUZ60B	IRF732
BUZ10A	IRF543	BUZ27	IRFP140	BUZ41B	IRF831	BUZ60C	IRF733
BUZ10B	IRF533	BUZ28	IRFP141	BUZ42	IRF832	BUZ60D	IRF720
BUZ11A	IRF543	BUZ31	IRF640	BUZ42A	IRF833	BUZ63	IRF330
BUZ14A	IRF151	BUZ32	IRF630	BUZ42B	IRF820	BUZ63A	IRF331
BUZ14B	IRF153	BUZ32A	IRF631	BUZ42C	IRF821	BUZ63B	IRF332
BUZ17	IRF153	BUZ32B	IRF632	BUZ44	IRF422	BUZ63C	IRF333
BUZ18	IRF151	BUZ32C	IRF633	BUZ44A	IRF430	BUZ63D	IRF320
BUZ20	IRF530	BUZ34	IRF240	BUZ44B	IRF431	BUZ64	IRF352
BUZ20A	IRF532	BUZ35	IRF230	BUZ45	IRF452	BUZ64A	IRF353
BUZ20B	IRF520	BUZ35A	IRF231	BUZ45A	IRF452	BUZ67	IRFP340
BUZ201	IRF353	BUZ351	IRFP353	BUZ45B	IRF452	BUZ71	IRF541
BUZ21	IRF540	BUZ353	IRFP453	BUZ45C	IRF453	BUZ71A	IRF543
BUZ211	IRF452	BUZ354	IRFP453	BUZ46	IRF432	BUZ72A	IRF532
BUZ23	IRF130	BUZ36	IRF252	BUZ46A	IRF433	BUZ73A	IRF632
BUZ23A	IRF130	BUZ237	IRFP242	BUZ46B	IRF420	BUZ74	IRF820
BUZ23B	IRF120	BUZ38	IRFP240	BUZ48	IRFP450	BUZ74A	IRF822
BUZ24	IRF150	BUZ382	IRFP353	BUZ48A	IRFP452	BUZ76	IRF720
BUZ24A	IRF150	BUZ385	IRFP440	BUZ60	IRF730	BUZ76A	IRF722
BUZ24B	IRF152	BUZ41	IRF840	BUZ60A	IRF730		

() Samsung number in Parentheses : Package alter native on possible substitution



1. AUDIO LINEAR ICs

Application	SAMSUNG	SANYO	TOSHIBA	MATSUSHITA	ROHM	Others
Power Amplifier	KA2201N	LA4145		AN7116	BA527	*TBA820M
	KA2201B	LA4145		AN7116	BA527	*TBA820M
	KA2212	*LA4140	*TA7313AP	*AN7112	BA526	
	†KA22101		*TA7250BP			
	LM386		TA7336P		BA546	*LM386/*NJM386
Dual Power Amplifier	KA2206	*LA4182/3	TA7769P	AN7143	BA534	TEA2025
	†KA22062		*TA7283AP		BA5406	
	KA2209	LA4530	TA7376P	AN7118		*TDA2822M
	KA2210	*LA4445	TA7227P	AN7147	BA532	
	KA2211	LA4440	*TA7240AP	AN7178	BA532	
EQ AMP+Power	KA2214					*μPC1263C
	KA2213	*LA4160	TA7628P			μPC1165C
Dual EQ AMP+Power	†KA22131	LA4560M			*BA3502F	
	††KA22132	LA4520		*AN7108		*CXA1034P
	†KA22135					*LAG637D
EQ AMP+ALC	KA2220	*LA3210	*TA7137P	AN7320	*BA333	μPC1158H
Dual EQ AMP	KA1222	*LA3160	TA7312P			*M51521L
	KA2221	*LA3161	*TA7375P	AN7310	*BA328	*M5152L
	KA22211	*LA3160	TA7312P			*M51521L
Graphic EQ AMP	KA2223	*LA3600	TA7796P			*M5226P
	†KA22231	LA3610M				TK10586M
	†KA22232					TK10580M
	KA22233			AN7330K	BA3822L	
	†KA22234				*BA3822L	
Dual EQ AMP+ALC	KA22235				*BA3812L	
	KA2224	*LA3220		AN7312	BA343	
	KA22241	LA3225/6N			*BA3308	M51544L
	††KA22242	LA3225/6N			*BA3312N	M51544L
	††KA2228		*TA7417P		BA3416BL	
	KA22261		*TA7668BP			
	†KA7226		*TA7658P	AN7312	BA343	
Quad EQ AMP	†KA2229					M51166P
Dual EQ AMP+Mute	KA2225	LA3230	*TA7709P/F	AN7315	BA3304	
Music Selector	KA2230	LC7517	TC9167P			*IR3R24
	†KA2231	*LA2010	TA7341P	AN6262N/3N	BA335	
AM 1 Chip Radio	KA22421		*TA7641BP			*CIC7641
AM/FM 1 Chip Radio	†KA22424		*TA7613AP			*TDA1083/*ULN2204
	†KA22427		*TA7613AP			*TDA1083/*ULN2204

† New Product †† Under Development * Direct Replacement

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AUDIO LINEAR ICs (Continued)

Application	SAMSUNG	SANYO	TOSHIBA	MATSUSHITA	ROHM	Others
AM/FM IF+DET	KA2243				*BA4220	*HA12413
FM IF+DET	KA2244		*TA7303P	AN278	*BA404	
	KA22441	*LA1140		AN7277	*BA4110	
	KA2245	*LA1150	*TA7130P		*BA403	*μPC1028H
AM Tuner System	KA22461	LA1135	TA7402P	AN7250S		*μPC1215V
AM Tuner+AM/FM IF +DET	KA2247	*LA1260		AN7223	*BA4260	
	KA22471		*TA7640AP	AN7223		
	KA2248A	LA1270	*TA7687AP		BA4228L	
FM Front End	KA2249	LA1180	TA7335P	*AN7213	BA4402	
	†KA22495	*LA1185	*TA7358AP	*AN7205		
	††KA22496		*TA7358P			
FM Stereo Multiplex Decoder	KA2261	*LA3361	*TA7604P	*AN7410	*BA1330	*HA11227/*μPC1197C
	KA2262	*LA3370	TA7401AP	AN7417	BA1356	
	KA2263		*TA7343AP	*AN7420		
	KA2264	LA3330	*TA342P	*AN7421	BA1360	
	KA2265	*LA3410	TA7413AP	AN7470		
	††KA2266	*LA3375	TA7401AP			
Noise Reduction	††KA2270					*CXA1011P
	††KA2271		TA7719P			*CXA1101P
	††KA2272	*LA2110				
LED Level Meter Driver	KA2281		*TA7666P			IR2E27
	KA2283		*TA7667P			
	KA2284	*LB1403	TA7366P	*AN6884	*BA6124	
	KA2285	*LB1423	TA7366P		*BA6137	
	KA2286	*LB1433			BA656	
	KA2287	*LB1413			*BA6125	
	†KA2288					*IR2E02
IF+MPX	††KA2290	*LA1810		AN7025		

† New Product
 †† Under Development
 * Direct Replacement

2. VIDEO LINEAR ICs

A. TV Use

Application	SAMSUNG	SANYO	MATSUSHITA	TOSHIBA	HITACHI	NEC	Others
SIF System	KA2101	*LA1365	*AN240	*TA7176	*HA1125	μPC1382	*ULN2165N
SIF Subsystem	KA2105			*TA7337			
For MPX	KA2106						
SIF+Audio Output	KA2102A		AN5250		HA1364	*μPC1353C	
Sound MPX (Two Carrier System in Korea)	KA2268N KA22682						
Sound Muting	KA2103L						
Sound Muting + Auto Power Off	KA2104						
VIF System	KA2911	LA1357	AN5111	*TA7607	HA11225	μPC1356	*TDA2544
	KA2916			TA7611			
	KA2912	LA7507				*μPC1366	
VIF+SIF System	KA2913A			*TA7678		*μPC1414	
	KA2914A			*TA7680		μPC1411C	
	KA2917						
	KA2918						
	KA2919	*LA7520					
	KA2922	*LA7535					
VIF+SIF+Def	KA2923	*LA7530N					
VIF+SIF+Def	KA2915		*AN5151N				
PAL Chroma System	KA2151		AN5620	*TA7193		μPC1365	
NTSC Chroma/ Deflection	KA2153			*TA7644BP		μPC1401C	*IROPO4
	KA2155	*LA7625					
	KA2156	*LA7626					
PAL Chroma/ Deflection	KA2154			*TA7698			
Vertical System	KA2130A	*LA1385		*TA7242		*μPC1031H2	
	KA2132						*TDA1044U
	KA2136						*TDA1170N
Vertical Output	KA2131	LA7830	*AN5512			μPC1378H	
Horizontal System	KA2135		*AN5790N				
	KA2137						*TDA1180P
Def. System	KA2133					*μPC1379	
	KA2134		*AN5436				
	KA2921			*TA7609			
Remocon Transmitter	KS5803A					*μPD1913C	
	KS5803B					*μPD1943G	

† New Product †† Under Development * Direct Replacement

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TV Use (Continued)

Application	SAMSUNG	SANYO	MATSUSHITA	TOSHIBA	HITACHI	NEC	Others
Infrared Preamp	KA2181					*μPC1373H	
	KA2182/3					*μPC1374H	
	KA2184						*CX20106A
DC Volume & Tone Control	KA2107		*AN5836	TA76630P			
Digital Volume Control	KA2611						
Sync Separator	KA2605						
	KA2606						
R.G.B. Interface	KA6101		*AN5355				
	KA6102		*AN5356				



B. VTR Use

Application	SAMSUNG	HITACHI	NEC	Rohm	Others
Write & Read	KA2944	*HA11744	*μPC1534C		
Amplifier	†KA8102		*μPC2313CA		
Luminance	KA2945	*HA11745	*μPC1524A		
Processor	†KA8103		*μPC2317CA		
Chroma	†KA2988	*HA11741	*μPC1536C		
Processor	†KA8104		*μPC2315CA		
RF Modillator (VHF)	†KA2981		*μPC1507C		*TA7673
Audio	KA2983			*BA5102A	
Processor	KA8401			*BA7751LS	
Digital Servo	†KA8303				*TD6362N
Controller	††KA8307	*HD49723			
	††KA8308			*BU2738S	
Motor Driver	KA8301			*BA6209	
	†KA8304			*BA6411	
	†KA8305			*BA6238A	
	†KA8306				*TA7288P
Servo CTL AMP	KA8302				*TA8617S
LED & Lamp	KA2615				*TD62551S
Driver	KS2616				*TD62553S
	KA2617				*TD62554S
	KA2618				*TD62555S
RF Converter	†KA2981		*μPC1507C/AC		*TA7673
A/V Switch	†KA8402				*TA7347P
	†KA8403				*TA7348P
Detail Enhancer	KA8101				*LA7308
VIF & SIF	†KA2922				*LA7535
	†KA2923				*LA7530
Multi-sound	KA2268N				
System in Korea	KA22682				
System Control	†KS56000		*μPD75104		
(μ-com)	†KS56100				

† New Product †† Under Development * Direct Replacement

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3. TELECOMMUNICATION ICs

A. Dialer

Application	SAMSUNG	MOSTEK	AMI	UMC	SHARP	Others
Pulse Dialer	KS5805A KS5805B	*MK50992 *MK50993	S2560A/B	*T40992 *T40993	*LR40992 *LR40993	
DTMF Dialer	KS5808 KA2413	*MK5089 *PBD3535 (RIFA)	*S25089	*UM95089 UM95087	*LR4089 LR4087	*SBA5089 SBA5091
Tone/Pulse Switchable with Redial Memory	†KS5819 †KS5820 †KS5821	MK5370		*UM91230 *UM91210	LR48081 LR48082	*S7230A/B *LC7360
Tone/Pulse Switchable with 10 No. Memory	††KS5823	MK5380 MK5375/6		UM91250	LR4803	PCD3315

B. Tone Ringer

Application	SAMSUNG	MOTOROLA	SGS	MITEL	CHERRY	Others
Tong Ringer	KA2410 KA2411			*ML8204 *ML8205	*CS8204 *CS8205	*TA31001 *TA31002
1 Chip Tone Ringer	KA2418	MC34012 MC34017	*LS1240 *LS3240			Included Bridge Diode

C. Speech Network

Application	SAMSUNG	SGS	RIFA	ITT	ERSO	Others
Subset Amplifier	KA2412A	*LS285/A	PBL3726	TEA1045	*CIC9185	
Speech Network with Dialer Interface	KA2425A KA2425B	LS356	PBL3781			U4053/7 U4055/6 TP5700

D. Tone Decoder

Application	SAMSUNG	NATIONAL	SHARP	SIGNETICS	Others
Tone Decoder	LM567C	*LM567	*IR3N05	*NE567	*XR567 (EXAR)
	LM567L	LMC567			*XRL567 (EXAR)

E. FM IF Amplifier

Application	SAMSUNG	MOTOROLA	SHARP	SPRAGUE	Others
FM IF Amplifier	MC3361	*MC3361	IR3N06	ULN3859	*LM3361

F. DTMF Receiver

Application	SAMSUNG	HITACHI	GTE	Others
DTMF Receiver	††KT3170	*MT8870	*G8870	

† New Product †† Under Development * Direct Replacement

G. Crosspoint Switch

Application	SAMSUNG	MITEL	SGS	Others
Crosspoint Switch	††KS093	*MT8812	*M093	*GM62093 (G.S)

H. CODED, CODEC FILTER, COMBO CODEC

Application	SAMSUNG	N.S	FAIRCHILD	SGS	INTEL	MOTOROLA	THOMSON
μ-Law CODEC	††KT5116	*TP5116	*uA5116	*M5116	2910		
CODEC FILTER	††KT3040	*TP3040	*uA5912	*M5912	*2912		*ETC5040
μ-Law COMBO CODEC	††KT3031	*TP3064			2913	MC14400-5	*ETC5064
μ-Law COMBO CODEC	††KT3030	*TP3054	*uA3054		*2916		*ETC5054
A-Law COMBO CODEC	††KT3033	*TP3067					*ETC5067
A-Law COMBO CODEC	††KT3032	*TP3057	*uA3057		*2917		*ETC5057
μ-Law DODEC	††KT8520	*TP3020	μA5151		*2910		
A-Law CODEC	††KT8521	*TP3021			*2911		

2

I. INTERFACES

Application		SAMSUNG	MOTOROLA	TI	N/S	FAIRCHILD	SIGNETICS
RS-232C	Line Driver	††KS5788			*DS14C88		
		MC1488	*MC1488	*SN75188	*DS1488	*μA1488	*MC1488
	Line Receiver	MC1489	*MC1489	*SN75189	*DS1489	*μA1489	*MC1489
		MC1489A	*MC1489A	*SN75189A	*DS1489A	*μA1489A	*MC1489A
		††KS5789			*DS14C89A		
	Differ-Receiver	††KA2653		*SN75154	*DS75154	*μA75154	
	Tranceiver	††KA2654		*SN751701			
††KS5706		*MC145406					
Peripheral Driver Array	††KA2655	*MC1411	SN75476		*μA9665	(ULN2001)	

J. Driver

Application	SAMSUNG	SPRAGUE	EXAR	Others	
8ch Source Driver	KA2580A	*UDN2580A			
	KA2588A	*UDN2588A			
Florescent Display Driver	†KA2651	*UDN6118	*XR6118		

K. UART

Application	SAMSUNG	HITACHI	MOTOROLA	Others
Single UART	††KS5824	*HD6350	*MC6850	
Quad UART	†KS5812			

4. VOLTAGE REGULATOR

A. 3-Terminal Fixed Positive Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	NEC	MATSUSHITA	Package
Very High Output Current (I _o =3A)	KA78T05 KA78T06 KA78T08 KA78T12 KA78T15 KA78T18 KA78T24	MC78T05 MC78T06 MC78T08 MC78T12 MC78T15 MC78T18 MC78T24				TO-220 TO-3P
	LM323					TO-3P
MC78XXAC/C Series (I _o =1A)	MC7805AC/C MC7806AC/C MC7808AC/C MC7885AC/C MC7809AC/C MC7810AC/C MC7811AC/C MC7815AC/C MC7818AC/C MC7824AC/C	MC7805AC/C MC7806AC/C MC7808AC/C MC7812AC/C MC7815AC/C MC7818AC/C MC7824AC/C	μA7805 μA7806 μA7808 μA7885 μA7812 μA7815 μA7818 μA7824	μPC7805 μPC7808 μPC7812 μPC7815 μPC7818 μPC7824	AN7805 AN7806 AN7808 AN7812 AN7815 AN7818 AN7824	TO-220
High Output Current(I _o =1A)	**KA340					TO-220
MC78MXXC Series (I _o =0.5A)	MC78M05C MC78M06C MC78M08C MC78M10C MC78M12 MC78M15C MC78M18C MC78M24C	MC78M05C MC78M06C MC78M08C MC78M12 MC78M15C MC78M18C MC78M24C	μA78M05C μA78M06C μA78M08C μA78M12 μA78M15C μA78M24	μPC78M05 μPC78M08 μPC78M10 μPC78M12 μPC78M15 μPC78M18 μPC78M24	AN78M05 AN78M06 AN78M08 AN78M10 AN78M12 AN38M15 AN78M18 AN78M24	TO-220
MC78LXXAC (I _o =0.1A)	MC78L26AC MC78L05AC MC78L62AC MC78L08AC MC78L82AC MC78L09AC MC78L12AC MC78L15AC MC78L18AC MC78L24AC	MC78L05AC MC78L05AC MC78L12AC MC78L15AC MC78L18AC MC78L24AC	μA78L05AC μA78L62AC μA78L82AC μA78L09AC μA78L12AC μA78L15AC			TO-92

B. 3-Terminal Fixed Negative Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	NEC	MATSUSHITA	Package
MC79XXC Series ($I_o=1A$)	MC7802C					
	MC7905C	MC7905C	$\mu A7905$	$\mu PC7905$	AN7905	
	MC7906C	MC7906C			AN7906	
	MC7908C	MC7908C	$\mu A7908$	$\mu PC7908$	AN7908	
	MC7910C					
	MC7912C	MC7912C	$\mu A7912$	$\mu PC7912$	AN7912	
	MC7915C	MC7915C	$\mu A7915$	$\mu PC7915$	AN7915	
	MC7918C	MC7918C		$\mu PC7918$	AN7918	
	MC7924C	MC7924C		$\mu PC7924$	AN7924	
MC79MXXC ($I_o=0.5A$)	MC79M02C					
	MC79M05C	MC79M05C	$\mu A79M05$			TO-220
	MC79M06C		$\mu A79M08$			
	MC79M08C					
	MC79M10C					
	MC79M12C	MC79M12	$\mu A79M12$			
	MC79M15L	MC79M15	$\mu A79M15$			
	MC79M18C					
	MC79M24C					
†MC79LXXAC ($I_o=0.1A$)	MC79L05AC	MC79L05AC				TO-92
	MC79L12AC	MC79L12AC				
	MC79L15AC	MC79L15AC				
	MC79L18AC	MC79L18AC				
	MC79L24AC	MC79L24AC				

2

C. Precision Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	N/S	NEC	Package
Adjustable Voltage	LM723	MC1723	$\mu A723$	LM723		14 DIP
	†LM317	LM317	$\mu A317$	LM317		TO-220
	†LM337			LM337		TO-220
33V Regulator	KA33V				$\mu PC574$	TO-92

D. Switching Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	N/S	TI	Package
Adjustable 1.25V to 40V ($f_o=100\text{ KHz}$)	KA78S40	$\mu A78S40$	$\mu A78S40$			16 DIP
PWM Controller IC	KA3524	SG3524		LM3524	SG3524	16 DIP
	**KA7500	TL494			TL494	16 DIP

5. PRECISION VOLTAGE REFERENCE

Description	SAMSUNG	MOTOROLA	FAIRCHILD	N/S	TI	Package
Adjustable Reference (2.5V~36V)	KA431	TL431	μA431		TL431	TO-92 †8 DIP †8 SOP
5V Reference	†KA336			LM336		TO-92

6. OPERATIONAL AMPLIFIER

Description	SAMSUNG	MOTOROLA	NATIONAL	FAIRCHILD	MATSUSHITA	Others
Single OP Amp	LM741 KA301	MC1741 LM301	LM741 LM301	μA741 μA301		TLC271
	†KF351	LF351	LF351			
	†KS271					TLC271, ICL7611
Dual OP Amp	LM358/A LM258/A LM2904 MC1458 MC4558 KA9256	LM358/A LM258 LM2904 MC1458 MC4558	LM358/A LM258/A LM2904 LM1458	μA1458 μA4558	AN6562 AN4558	TA75358 NJM4558 *TA7256
	†KS272					TLC272, ICL7621
Quad OP Amp	LM324/A LM224/A LM2902 LM348 LM248 MC3403 MC3303	LM324/A LM224 LM2902 LM348 LM248 LM3403 MC3303	LM324/A LM224/A LM2902 LM348 LM248	μA324 μA224 μA2902 μA348 μA248 μA3403 μA3303	AN6564	TA75324
	†KS274					TLC274, ICL7641

7. VOLTAGE COMPARATOR

Description	SAMSUNG	MOTOROLA	NATIONAL	FAIRCHILD	MATSUSHITA	Others
Single Comparator	LM311 LM211 KA361 KA261 KA710	LM311 LM211	LM311 LM211 LM361 LM261 LM710	LM311 μA710	μA311 LM211 TL710	LM311
Dual Comparator	LM393/A LM2903 LM293 KA319 KA219	LM393/A LM2903 LM293	LM393/A LM2903 LM293 LM319 LM219		LM393/A LM2903 LM293 LM319 LM219	TA75393 AN6914
	KA711		LM711			
Quad Comparator	LM339/A LM2901 LM239 LM3302	LM339/A LM2901 LM239	LM339/A LM2901 LM239 LM3302	μA339 μA2901 μA239 μA3302	LM339 LM2901 LM239 LM3302	TA75339 AN6912
	KS374				TLC374	

8. TIMER

Description	SAMSUNG	MOTOROLA	NATIONAL	SIGNETICS	TI	Others
Single Timer	NE555 KS555H KS555	MC1455	LM555	NE555	NE555 TLC555	TA75555 ICM7555
Dual Timer	NE556 KS556		LM556	NE556	NE556 TLC556	ICM7556
Quad Timer	NE558			NE558		

9. DATA CONVERTER ICs

Description	SAMSUNG	NATIONAL	MAXIM	ANALOG DVC	PMI	Others
Flash A/D, A/D+D/A Converter	††KSV3208					Samsung Original
	KSV3100A					ITT UVC3101
	††KSV3110					Samsung Original
Video DAC	†KSV3404				TDC1334	
	††KSV3310				TDC1016	
General Purpose A/D, D/A	KAD0808 KAD0808	ADC08098 ADC0808				TI ADC0808 TI ADC0809
	KAD0820A KAD0820B	ADC0820B ADC0820C	ADC0820B ADC0820C	AD7820L AD7820K		
	††KAD0816	ADC0816				
	KAD0817	ADC0817				
	KDA0800 KDA0808	DAC0800 DAC0808	AD DAC-08	DAC-08		Motorola DAC-08
3-½ digit A/D Converter	KS7126		ICL7126			Teledyne TSC7126 Intersil ICL7126
Successive Approximation Register	KS25C02	DM2502				AMD AM2502
	KS25C03	DM2503				AMD AM2503
	KS25C04	DM2504				AMD AM2504

2

10. MISCELLANEOUS ICs

Application	SAMSUNG	TOSHIBA	NATIONAL	MATSUSHITA	NEC	Others
Toy Radio	KA2303					3 Function
	KA2304					2 Function
Control Actuator	†KA2309	TA7657D			Turbo +	7 Function (RX)
	†KA2310	TA7330			Turbo +	7 Function (TX)
DC Motor Speed Controller	KA2401				μPC1470H	
	KA2402			AN6612		*LA5521D
	KA2404			AN6610		μPC1470H
	†KA2407			*AN6651		
Earth Leakage Detector	KA2803		LM1851			*M54123
Earth leakage Detector	KA2807		LM1851			
Zero Voltage SW	KA2804				*μPC1701C	
FDD Read AMP	KA6201					*HA16631P
Dimmer controller	KS3502					
Smoke Detector	KS3501					S566

1. TIMEPIECE-WATCH/CLOCK

Application	SAMSUNG	OKI	EUROSIL	SANYO	UMC	Others
LCD Watch	KS5198 KS5199A †KS5114	MSM5001N	e1325B		UM3219	STP3691
	KS5194	MSM5004				
	KS5184			LC5641		
	KS5189 KS5190	MSM5066				
	KS5112					JT6649A
Analog LCD Watch	KS5113	MSM5008	e1330		UM3210	STP5721
Analog Watch	††KS5243	MSM6002	e1208		UM3230	STP5490
LCD Clock	KS5171	MSM5095		LC7600	UM3273	JT7654
Analog Clock	KS5206					
	KS5207					
	KS5209	MSM5093			UM3252A	
	KS5210		e1444		UM3262A	
	KS5211					RCA92461

2. CALCULATOR

Description	SAMSUNG	SHARP	TOSHIBA	UMC	EUROSIL	Remark
Basic Function	KS6022A	LI3033		UM3032A		3V Battery
	KS6025	LI3128		UM3128		
	†KS6026	LI3140		UM3135	e3141	Internal Voltage Limiter
	††KS6028	LI3135 LI3136				Low current
	††KS6029	LI3160				10 Digit Basic
Desk Top	KS6027		T6899			
Scientific	KS6041	LI3301	SC6992			

3. MELODY

Application	SAMSUNG	OKI	SEIKO	TOSHIBA	Others
Melody	KS5310A		SVM7952		
	KS5313		SVM7920		CIC3821 CIC3822
	KS5814				MN6223
	†KS5401A				HT-88
	††KS5381	MSM5041			

4. SPEECH SYNTHESIZER

Application	SAMSUNG	OKI	SEIKO	TOSHIBA	Others
Voice Synthesizer	KS5901A			T6721	
	KS5902			T6803	SP0256,LC8100
	†KS5911			T6668	UM5101
	†KS5912			T6667	CIC560
	††KS5913				

† New product

†† Under development



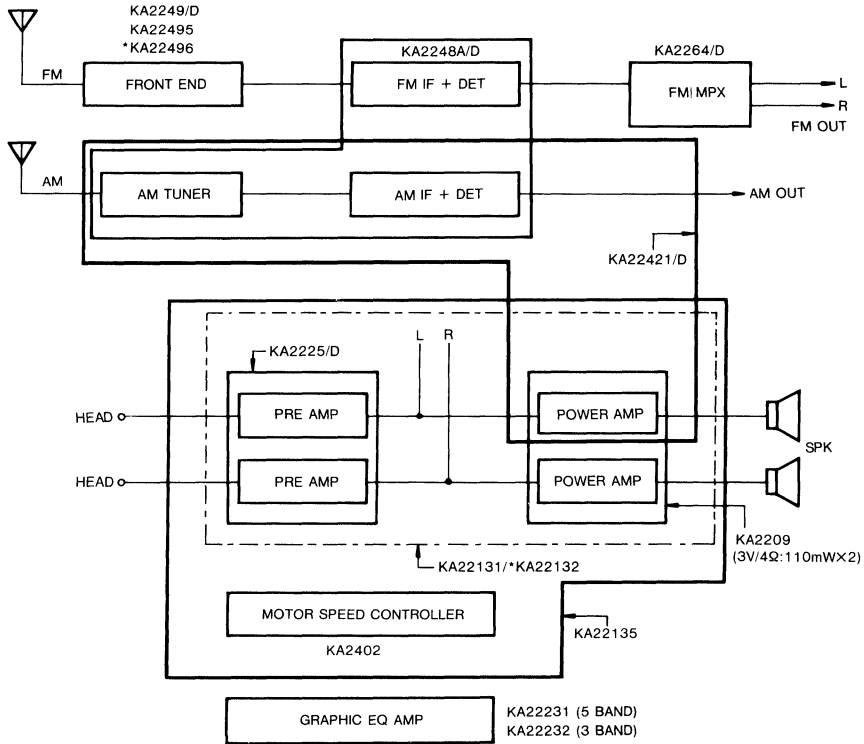
APPLICATION GUIDE 3

Audio Application	137
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Voice Synthesis IC Application	162
Calculator Application	167
Data Converter IC Application	172

1. AUDIO APPLICATION

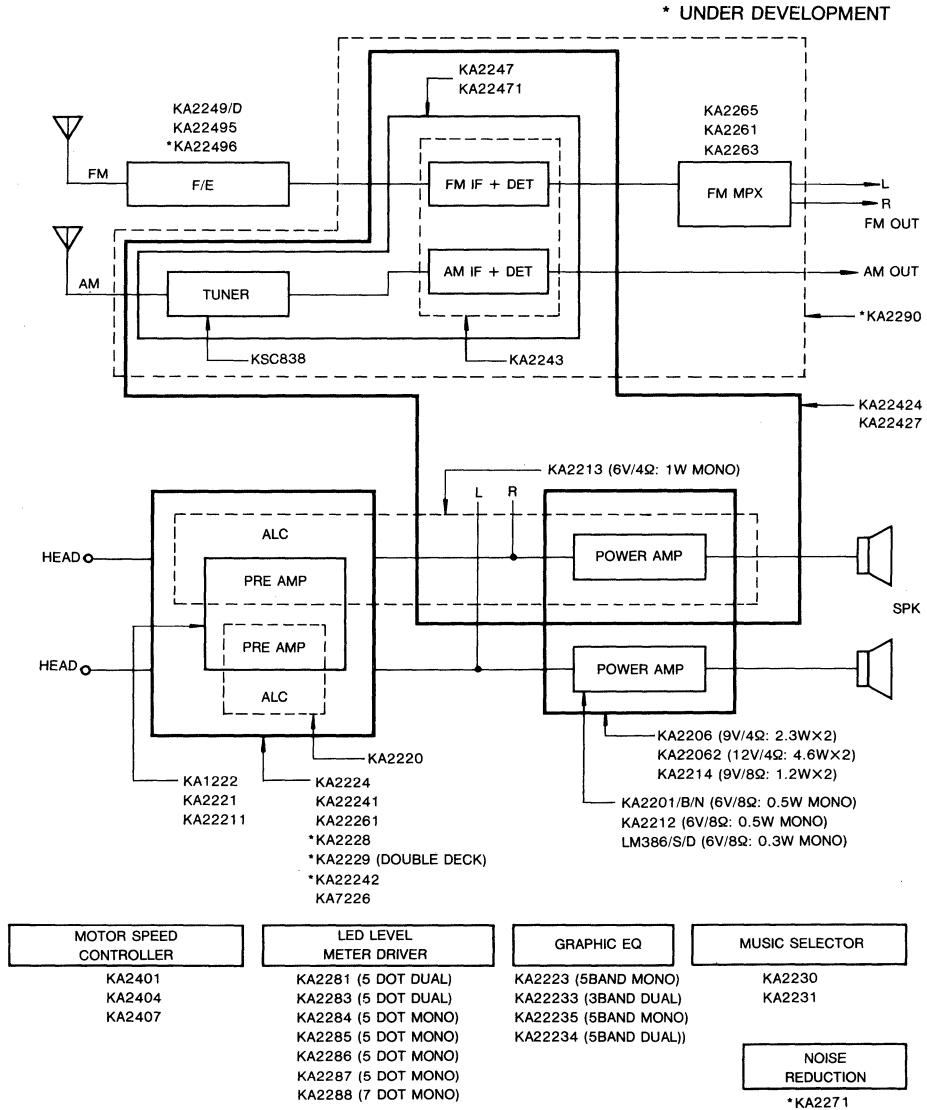
1.1 Mini Radio Cassette

* UNDER DEVELOPMENT

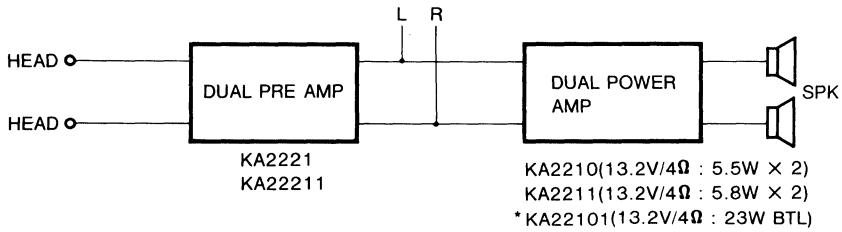
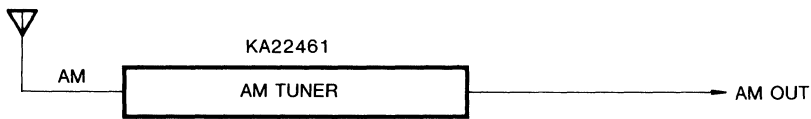
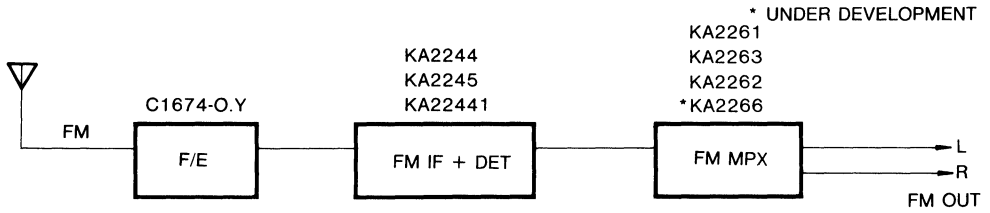


3

1.2 Portable Radio Cassette & Music Center



1.3 Car Audio



LED LEVEL METER DRIVER

KA2284
KA2285

GRAPHIC EQ

KA2223
KA22233
KA22235
KA22234

MUSIC SELECTOR

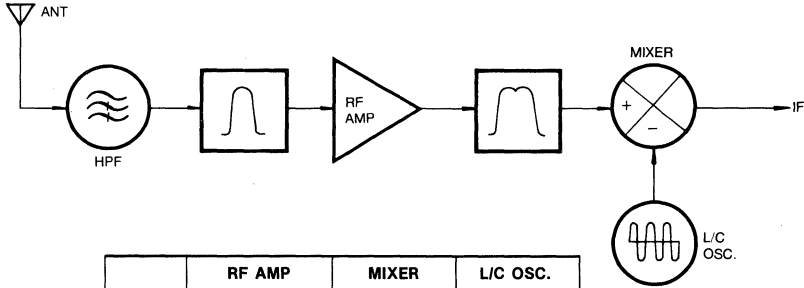
KA2230
KA2231

NOISE REDUCTION

*KA2271
*KA2272

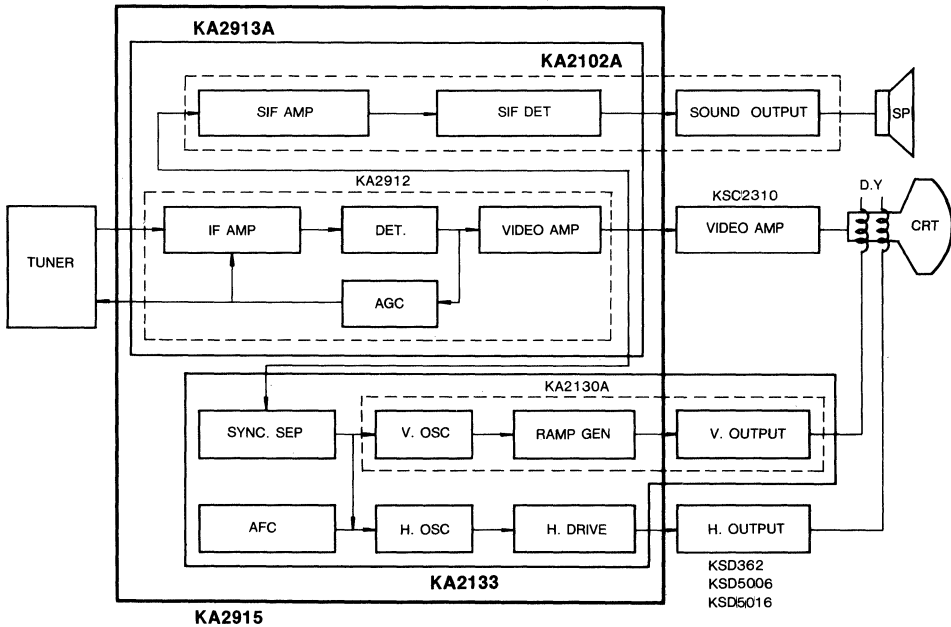
2. VIDEO APPLICATION

2.1 Tuner for TV



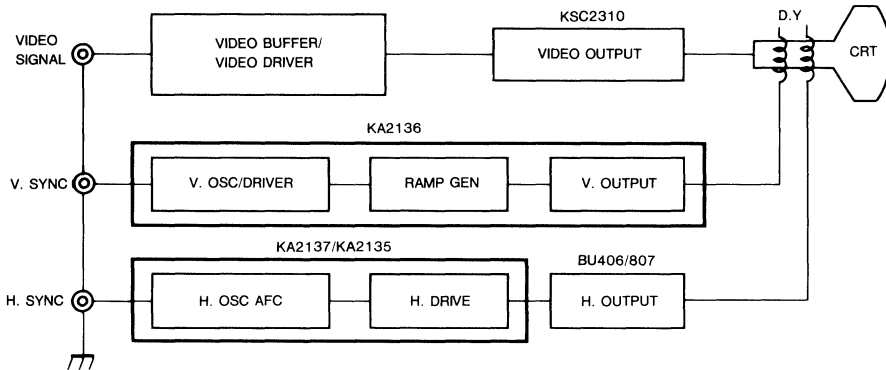
	RF AMP	MIXER	L/C OSC.
VHF	KSC1393	KSC1394	KSC1730
	KSC2755	KSC2756	KSC2757
	**K5043	KSC3120	KSC2759
		MPSH20	KSC3121
UHF	KSC2758	MPSH24	MPSH10
	KSC1070		MPSH11
	**K5044		MPS5179
			KSC3867

2.2 Linear IC for B/W TV

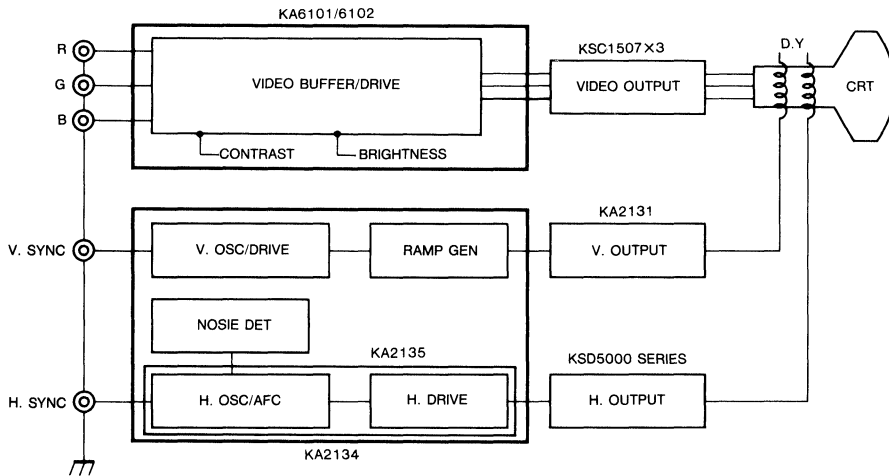


2.3 Linear IC for Monitor

2.3.1 Monochrome Monitor

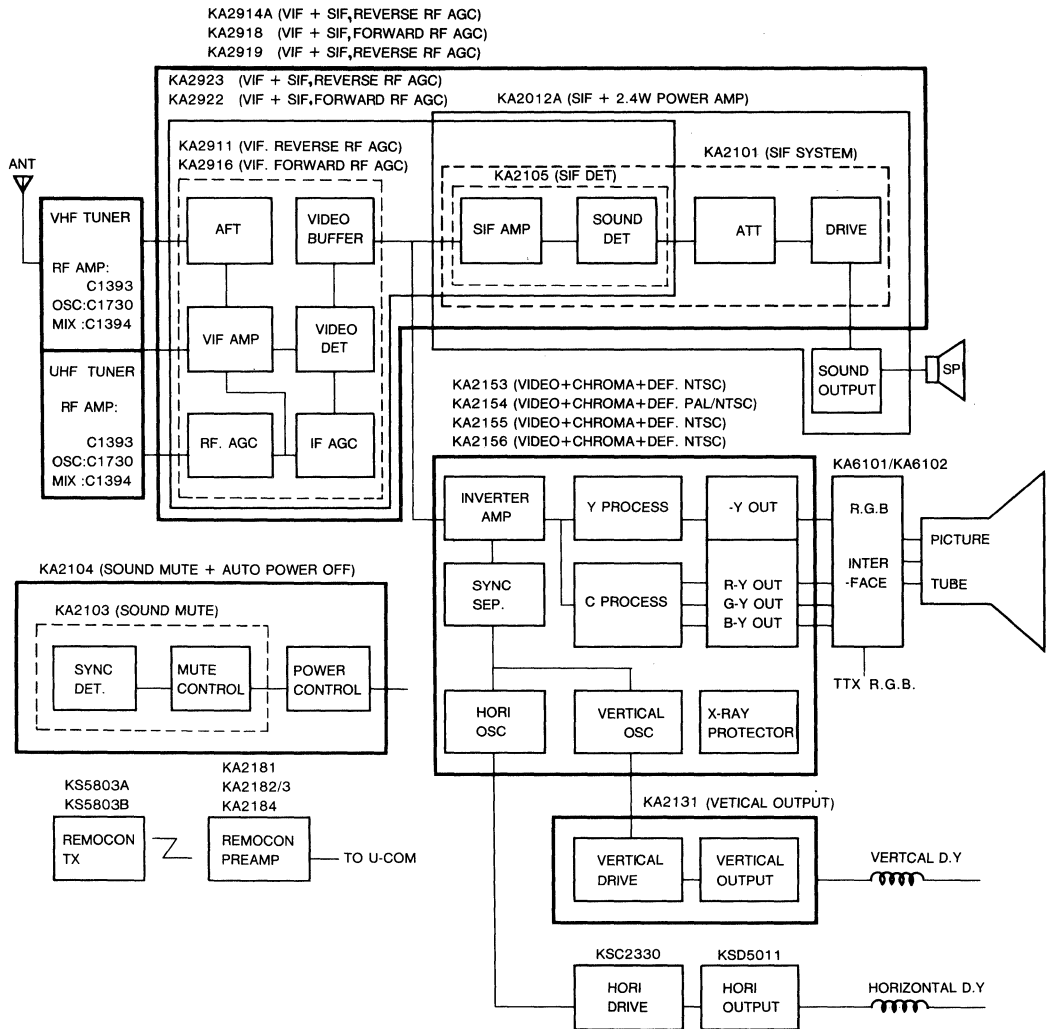


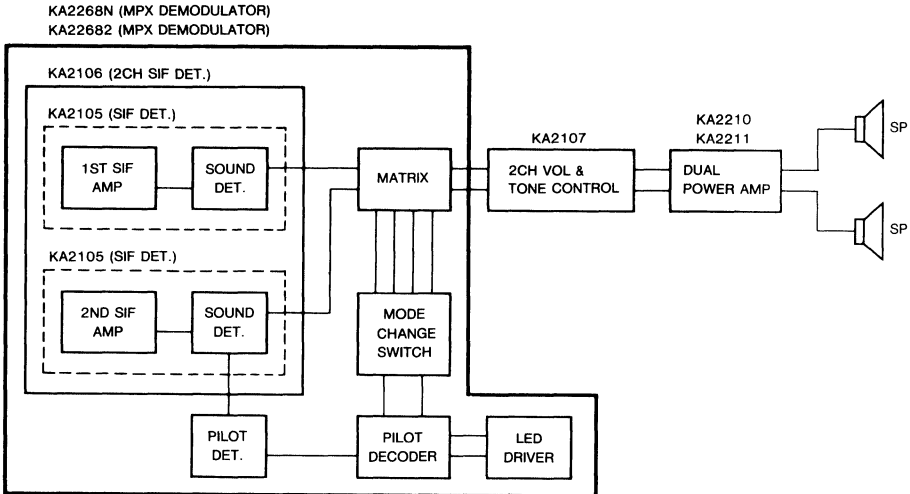
2.3.2 Color Monitor



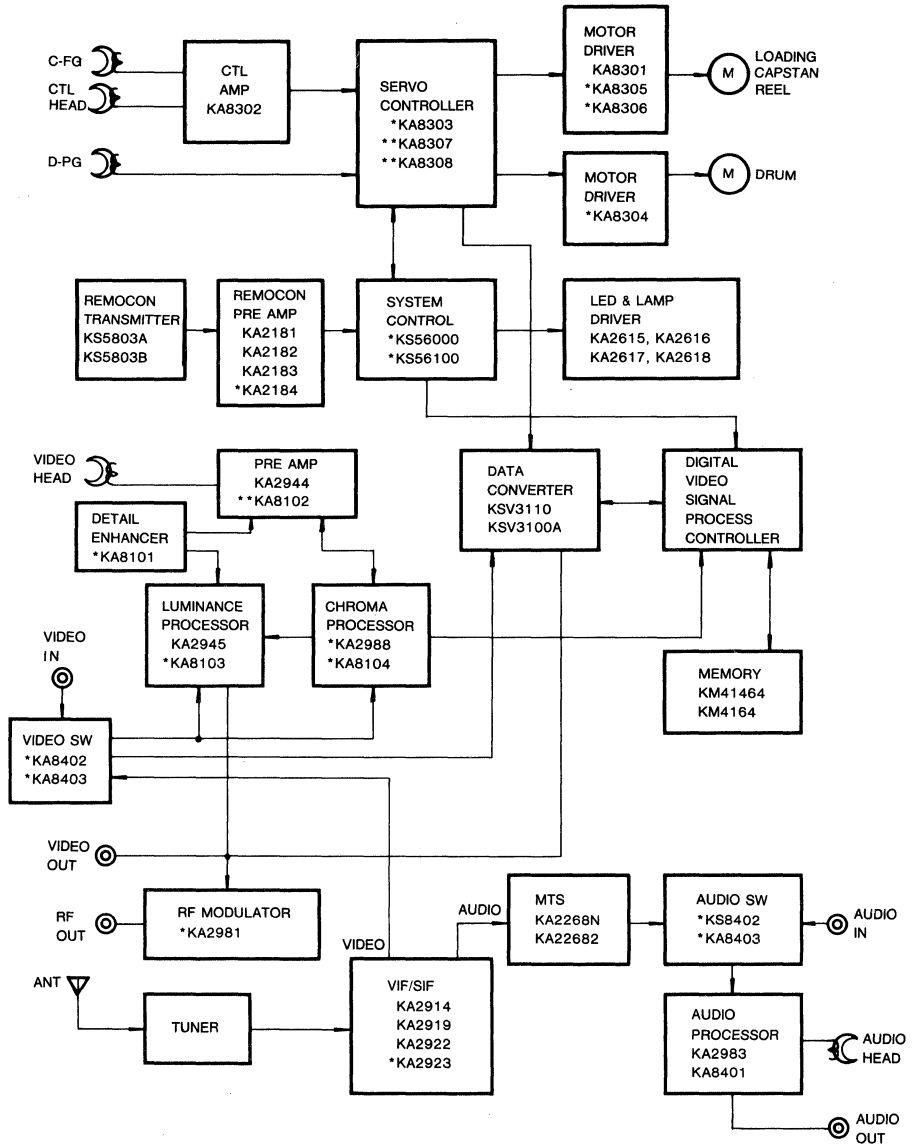
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2.4 Color Television Block Diagram



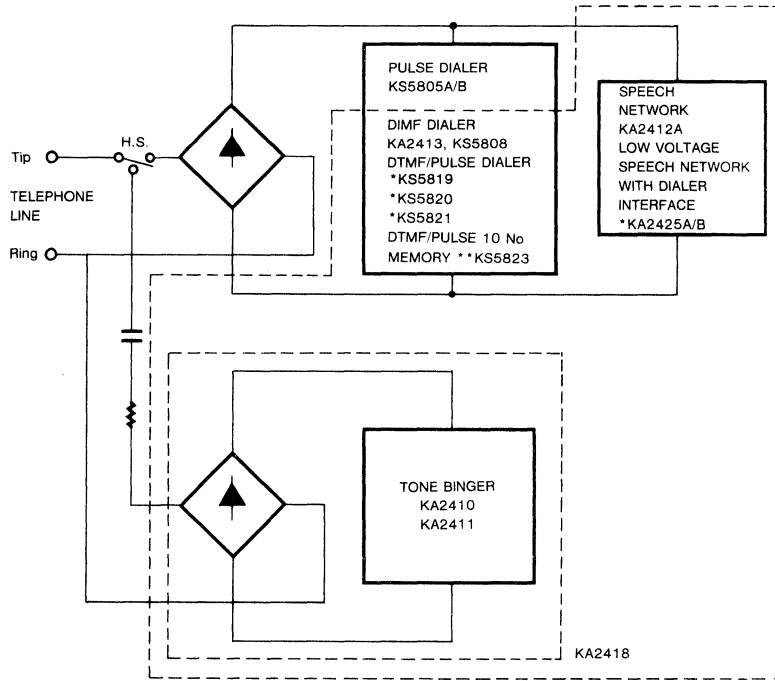


2.5 VTR Application



* New Product
 ** Under Development

3. TELECOMMUNICATION APPLICATION

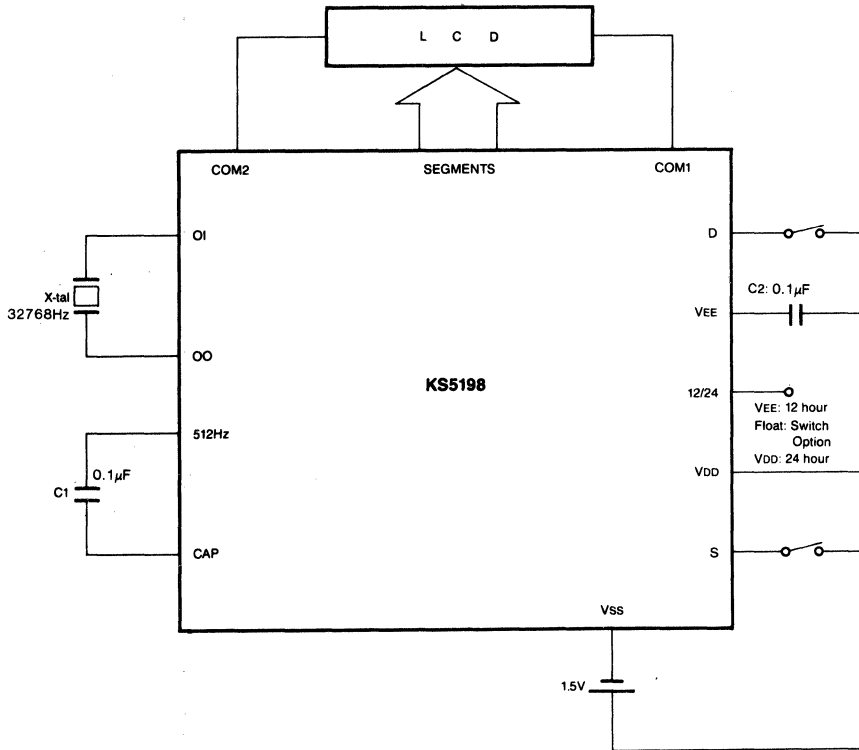


* NEW PRODUCT
 ** UNDER DEVELOPMENT

3

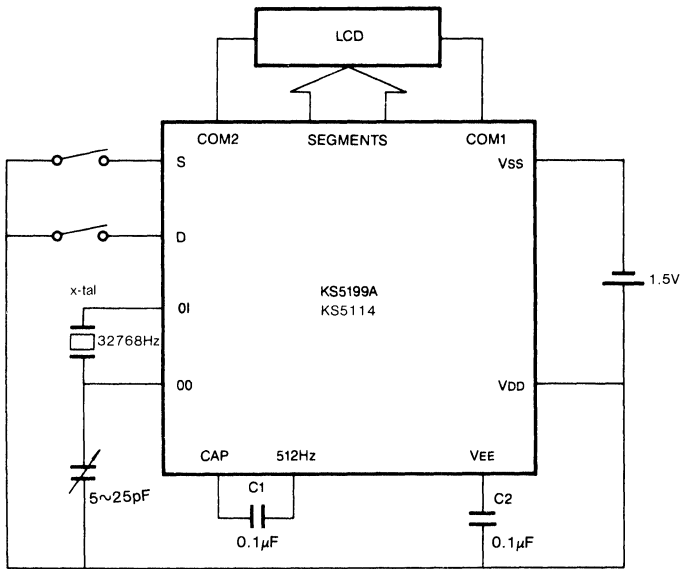
4. DIGITAL WATCH IC APPLICATION

4.1 KS 5198

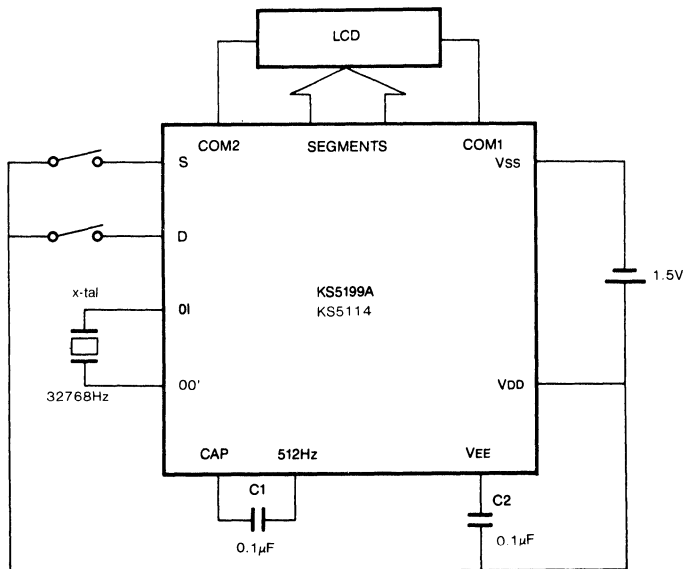


4.2 KS5199A, KS5114

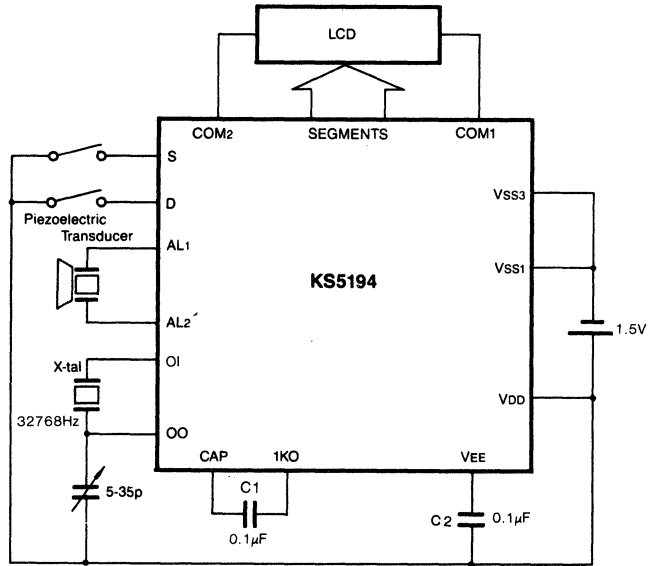
A. External Capacitor



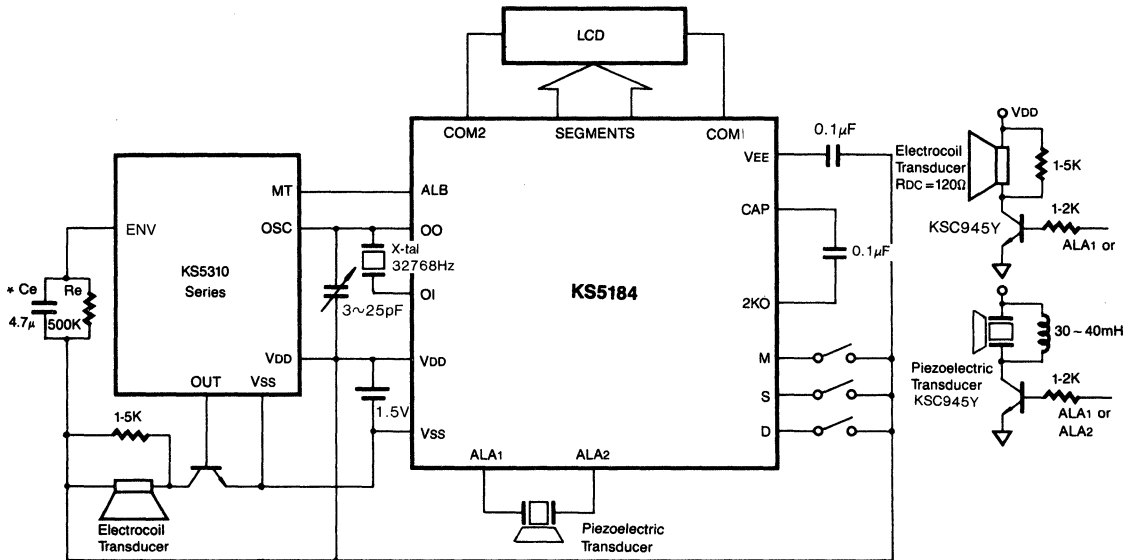
B. Internal Capacitor



4.3 KS5194

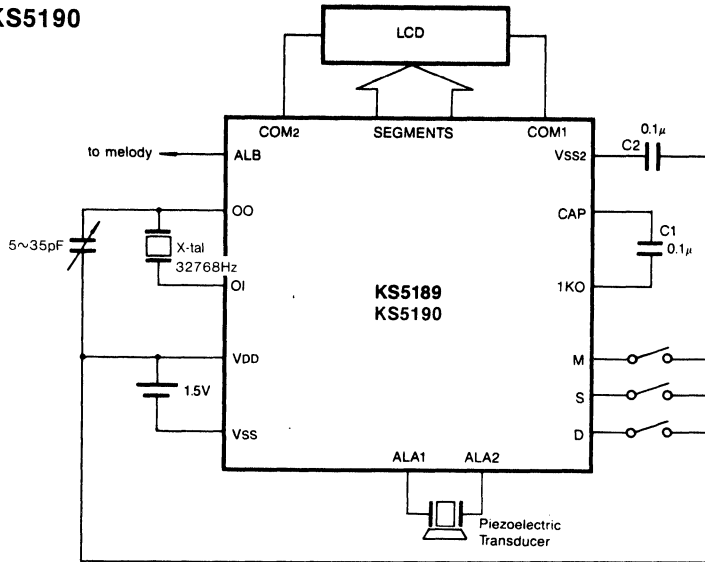


4.4 KS5184

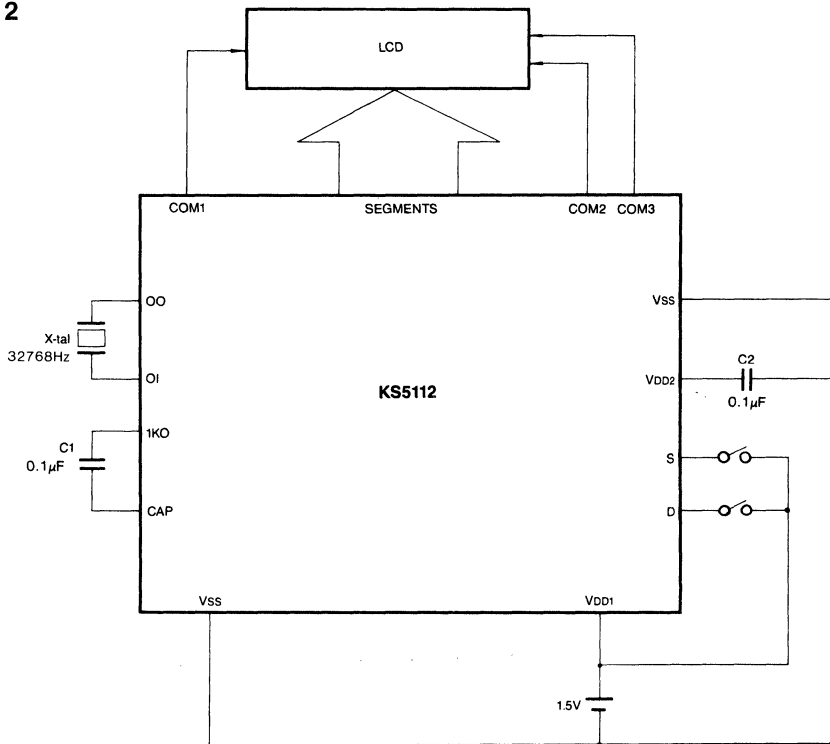


* Re and Ce are necessary only when employing envelope circuit with KS5310 Series. Otherwise, ENV pad must be connected to Vss.

4.5 KS5189, KS5190

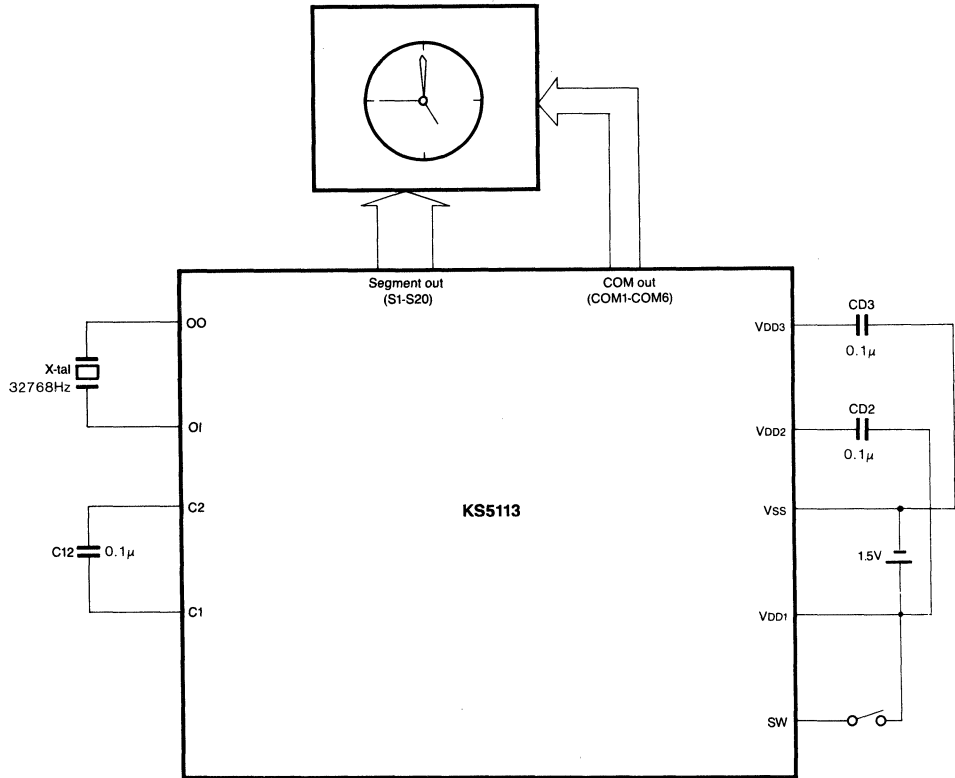


4.6 KS5112

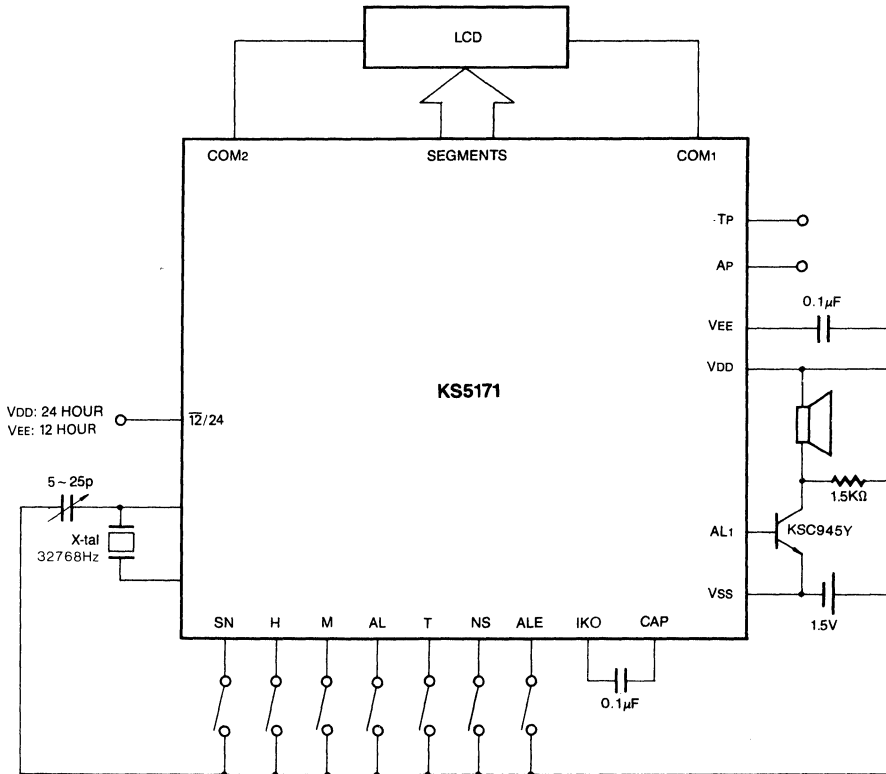


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4.7 KS5113



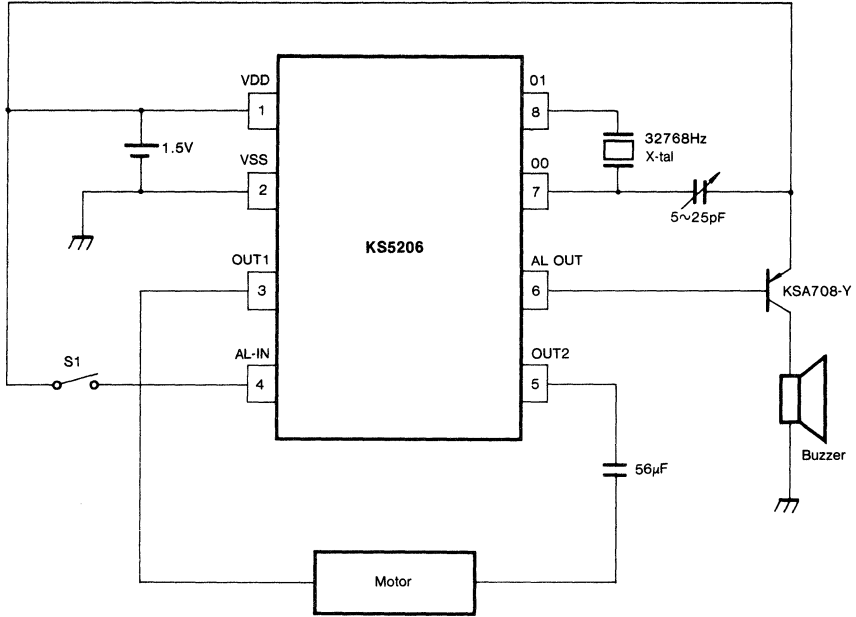
4.8 KS5171



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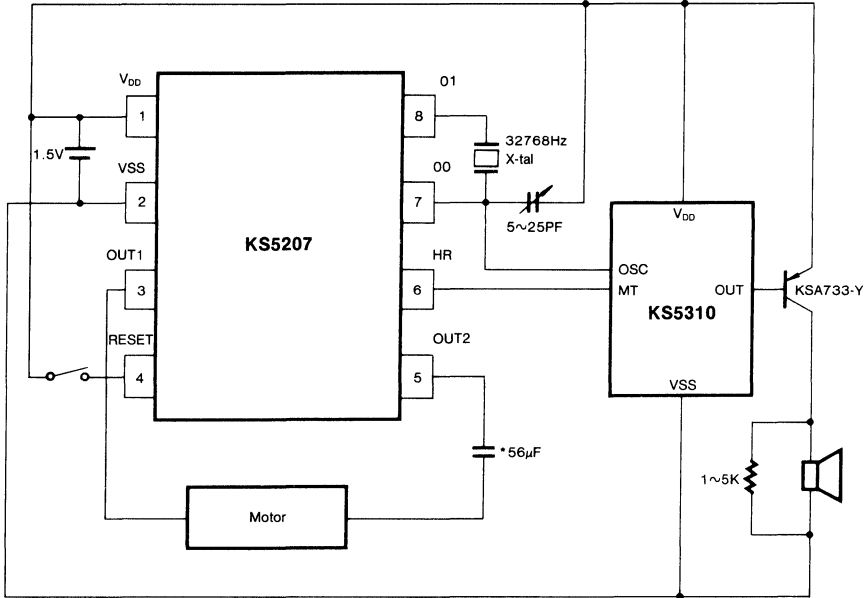
5. ANALOG CLOCK APPLICATION

5.1 KS5206



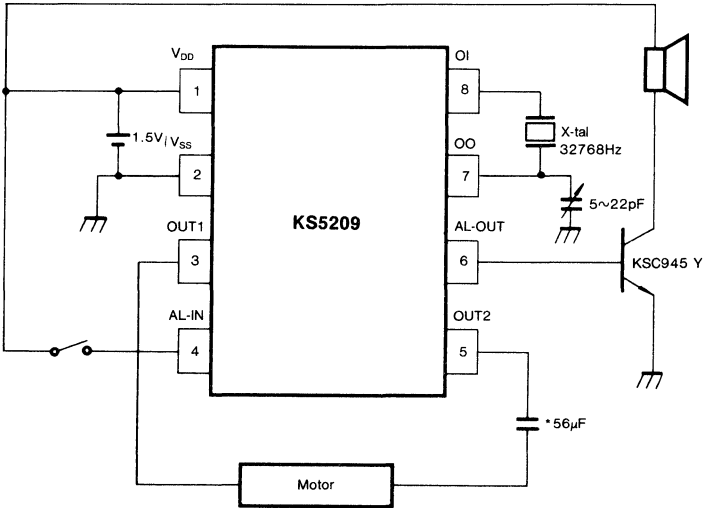
* No NEED CAPACITOR in KS5206E,F

5.2 KS5207



* NO NEED CAPACITOR IN KS5207E, F

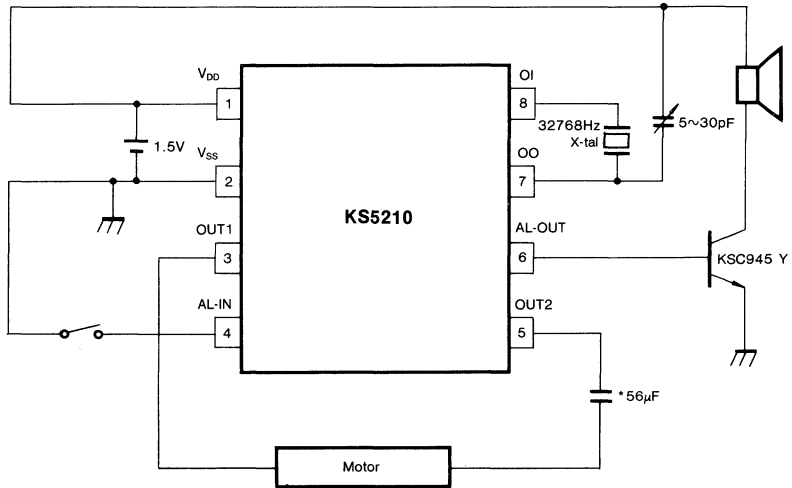
5.3 KS5209



* NO NEED CAPACITOR IN KS5210E, F

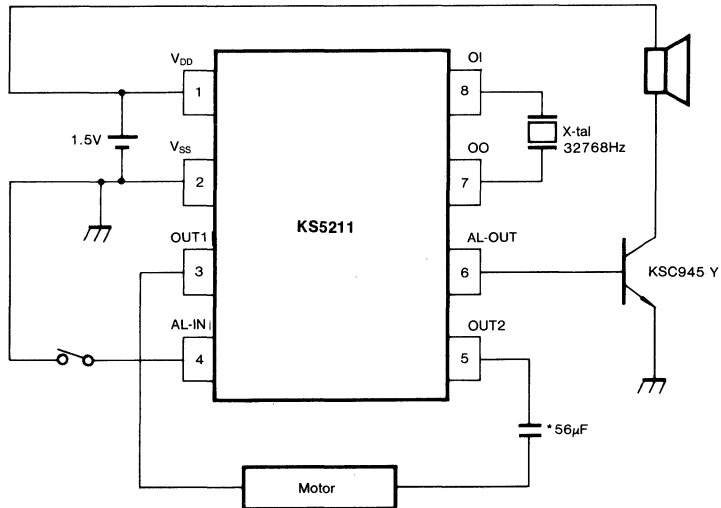
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5.4 KS5210



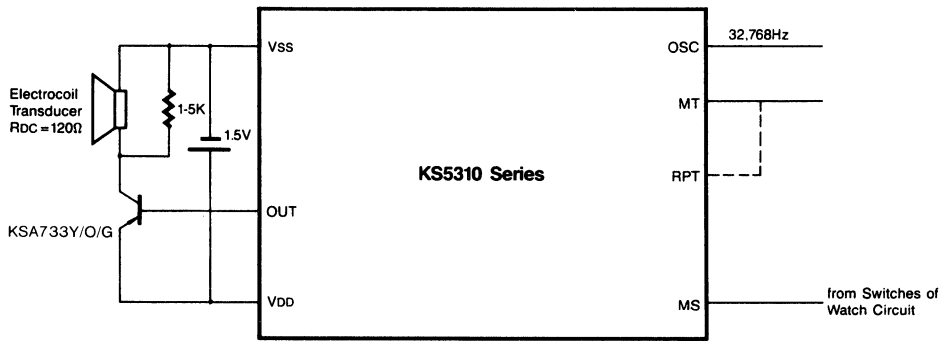
* NO NEED CAPACITOR IN KS5210E, F

5.5 KS5211



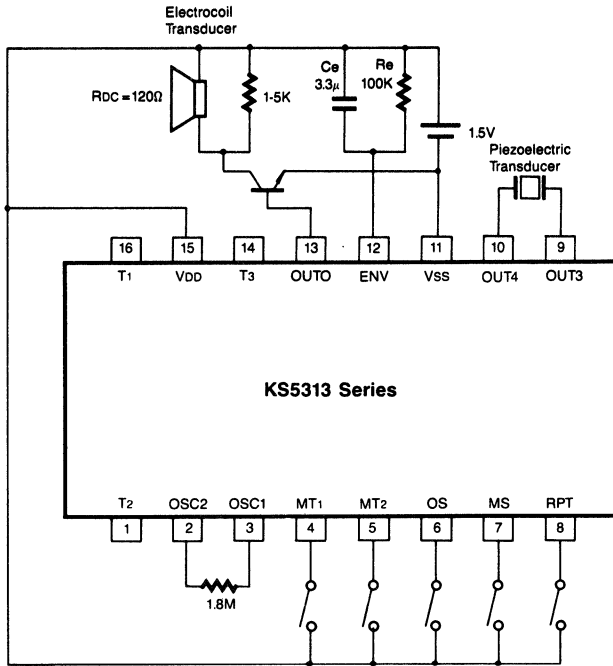
6. MELODY IC APPLICATION

6.1 KS5310 Series

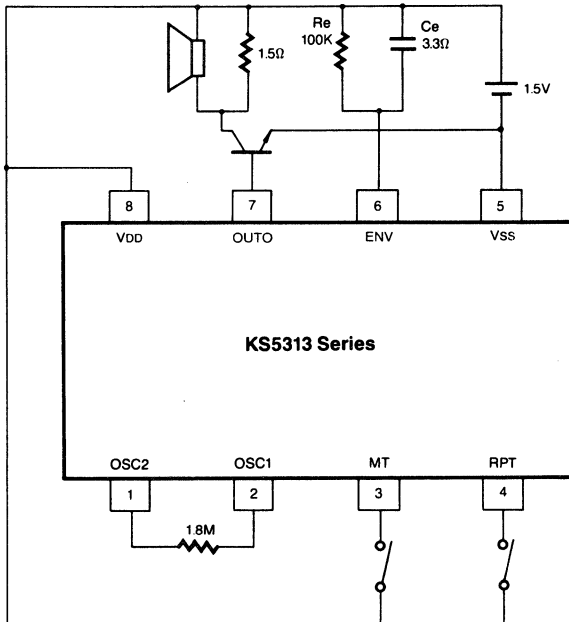


*Currently available types
KS5310A: Oh! Susanna

6.2 KS5313 Series

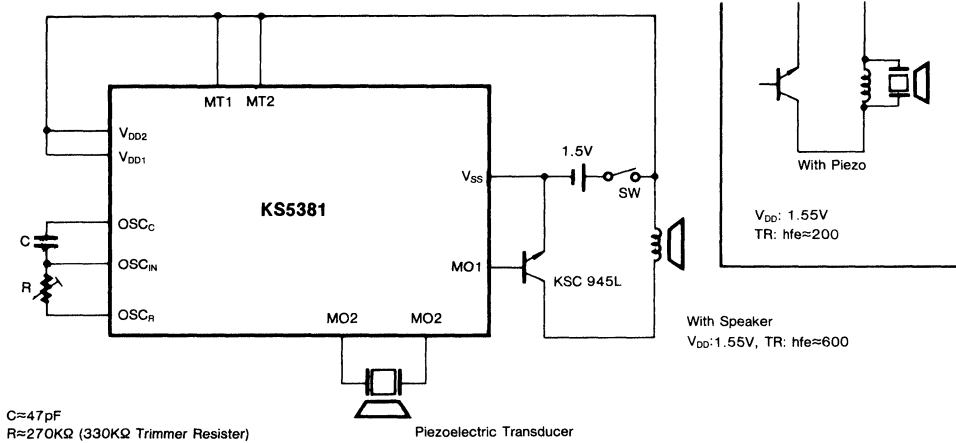


- * Currently available types
- KS5313N: MINUET (BACH)
 - KS5313P: Cuckoo's Waltz
 - KS5313Q: Home Sweet Home
 - KS5313R: Oh! Susanna
 - KS5313S: Big Ben
 - KS5313T: For Elise

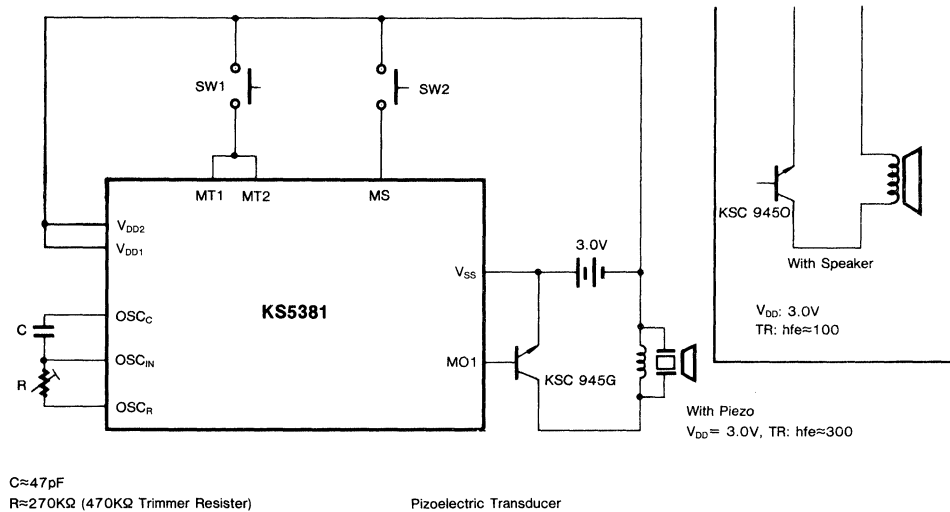


6.3 KS5381

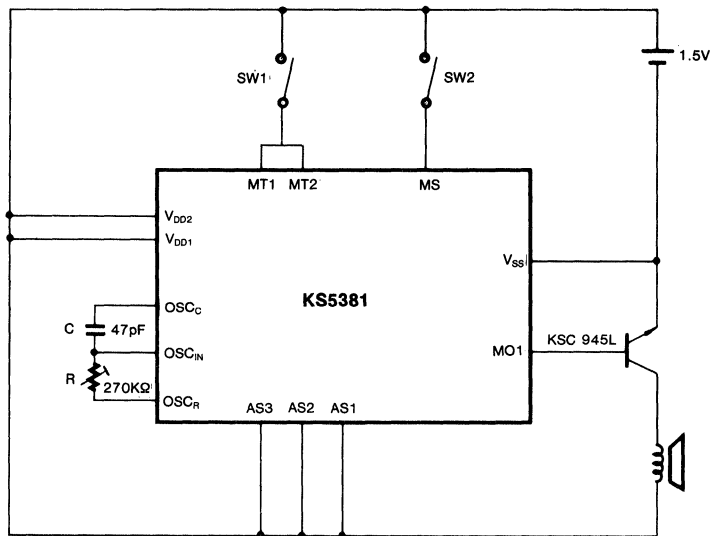
A. Repeat Mode



B. Switch Select Mode

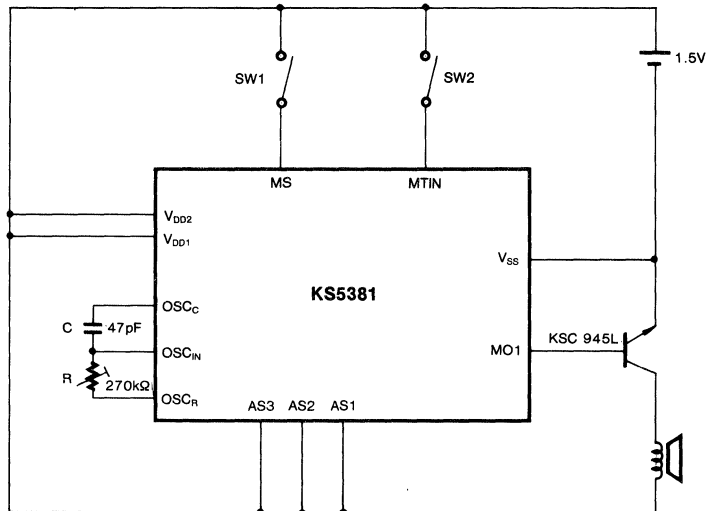


C. Application Select Mode



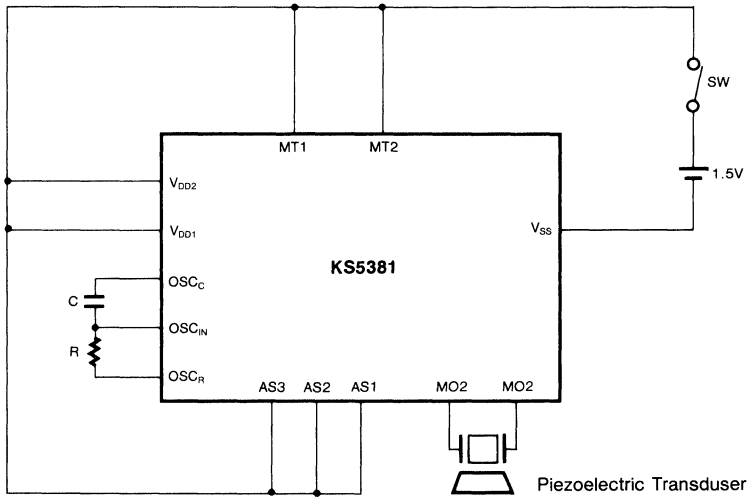
* Application Option for Melody Select (AS3=L, AS2=L, AS1=H)

D. Trigger Mode



* All melodies can be available by the combination of AS3, AS2, and AS1.

E. For Melody Card

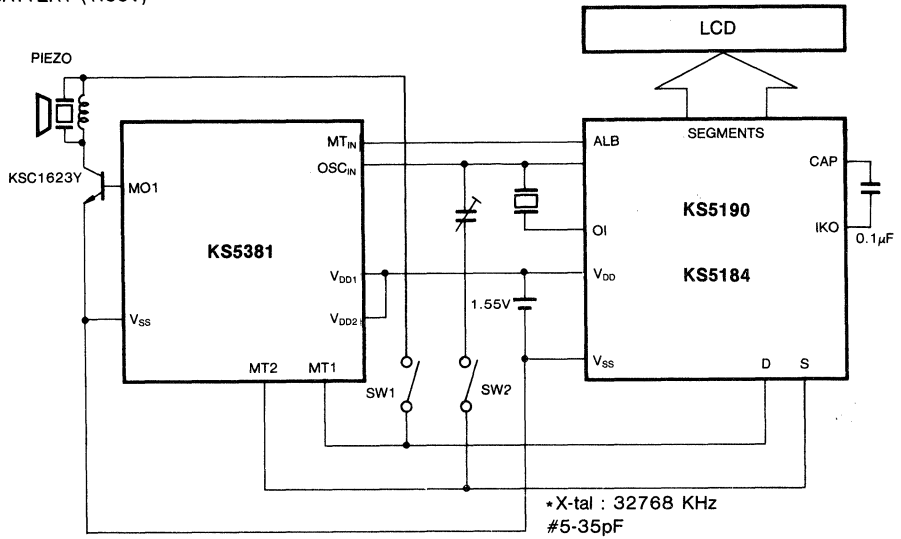


C : 47pF
R : 270kΩ

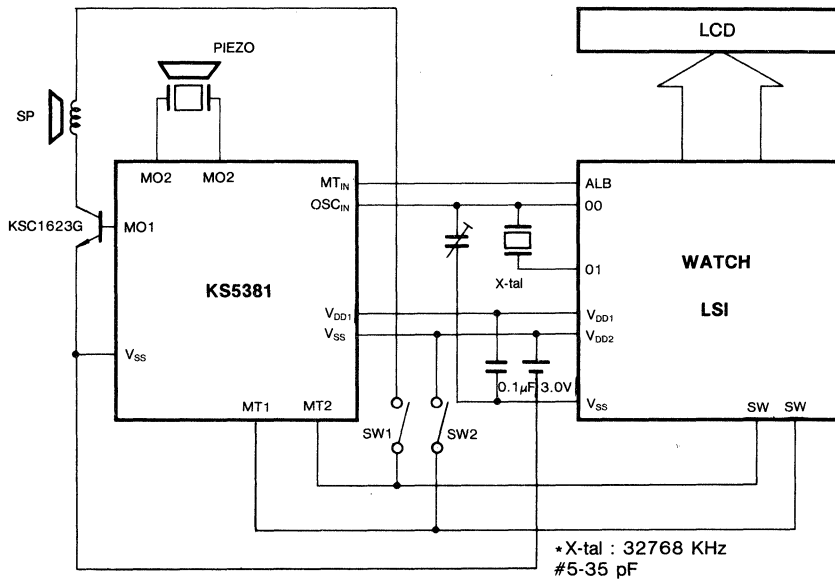
* Application Option for Melody Select (AS3, AS2, AS1)

F. Combination with Watch

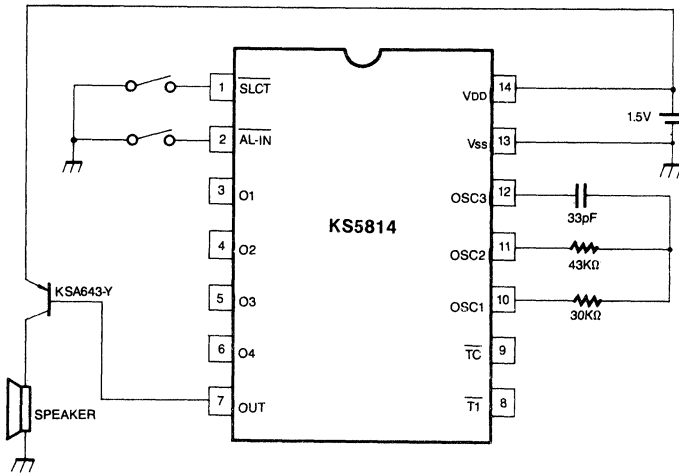
1) AgO BATTERY (1.55V)



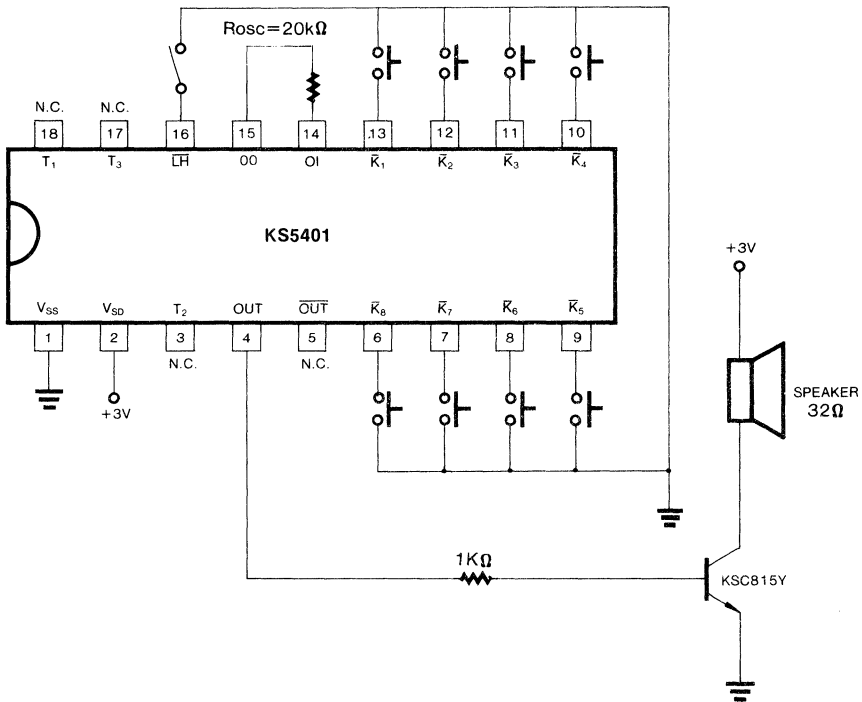
2) LITHIUM BATTERY (3.0V)



6.4 KS5814

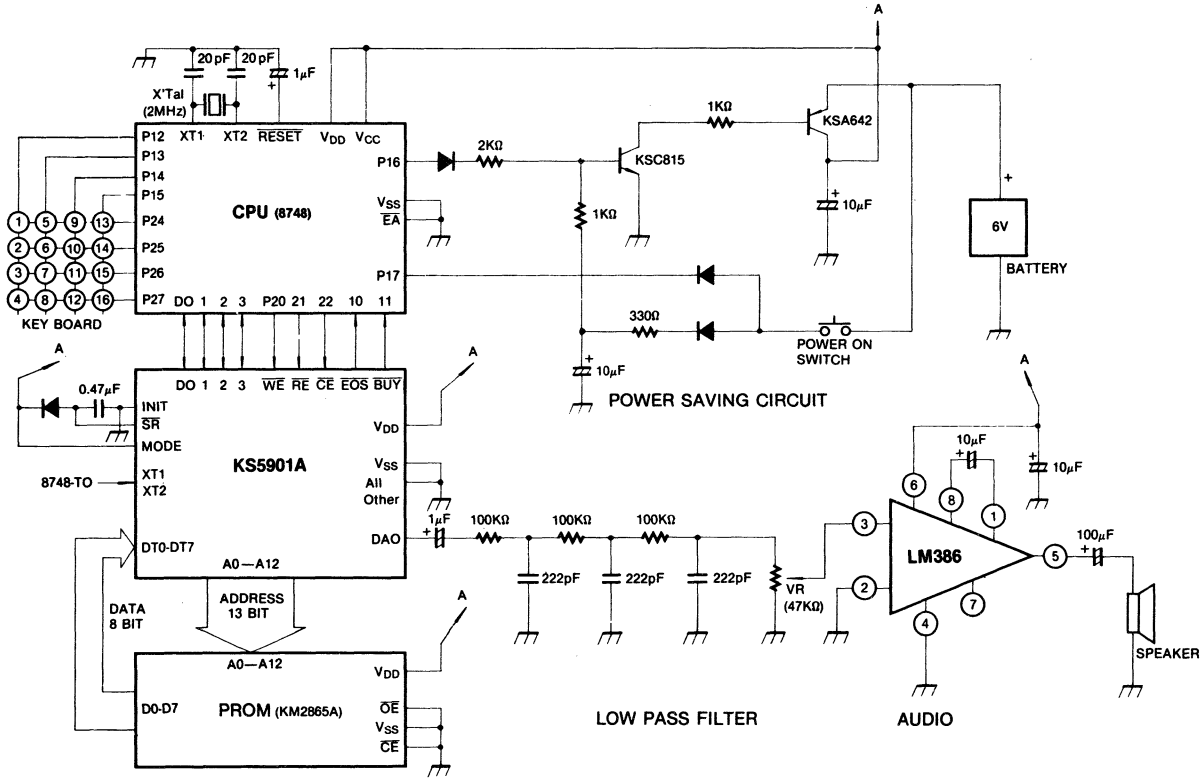


6.5 KS5401



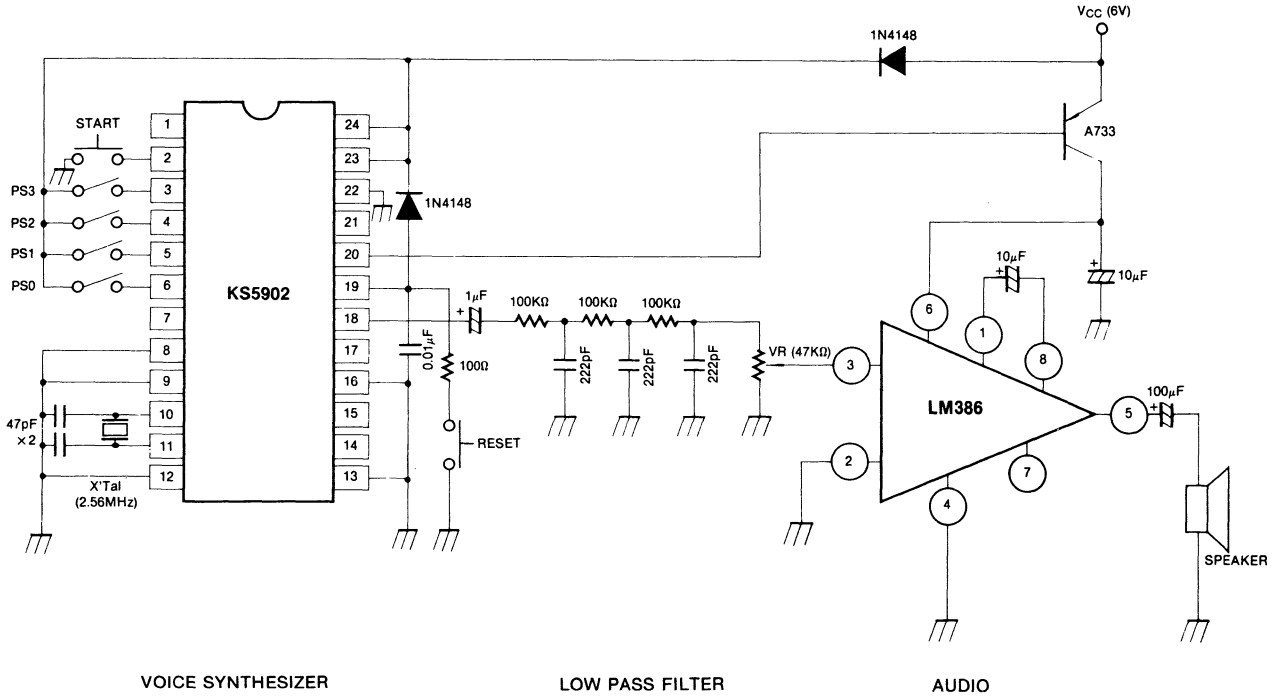
7. VOICE SYNTHESIS IC APPLICATION

7.1 KS5901A





7.2 KS5902



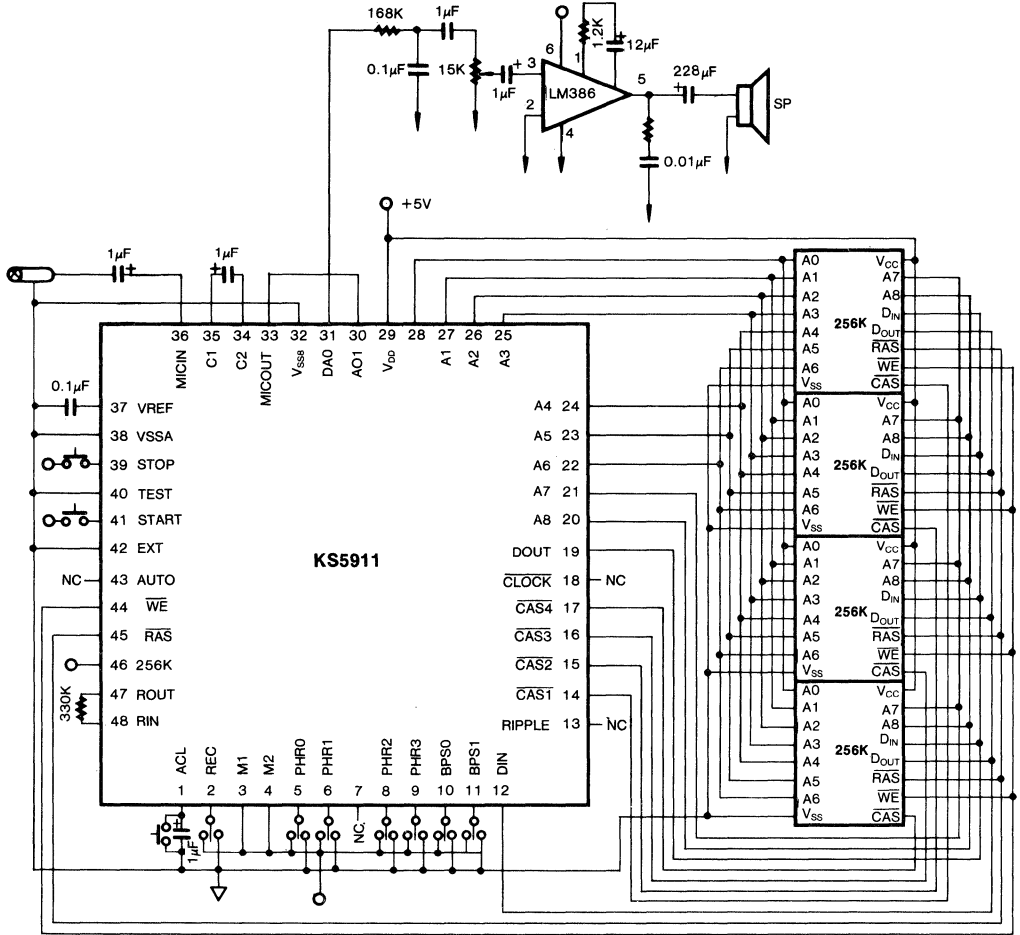
VOICE SYNTHESIZER

LOW PASS FILTER

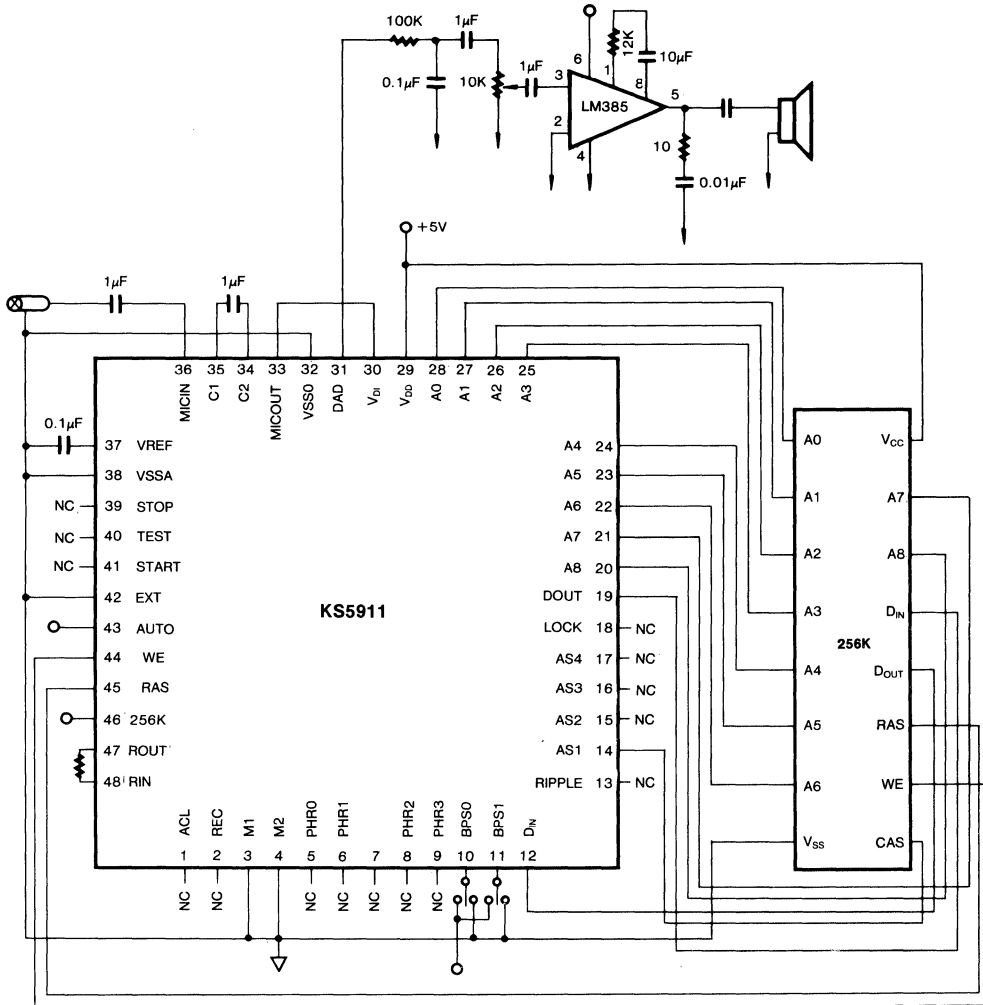
AUDIO

7.3 KS5911

A. Manual Operation Mode

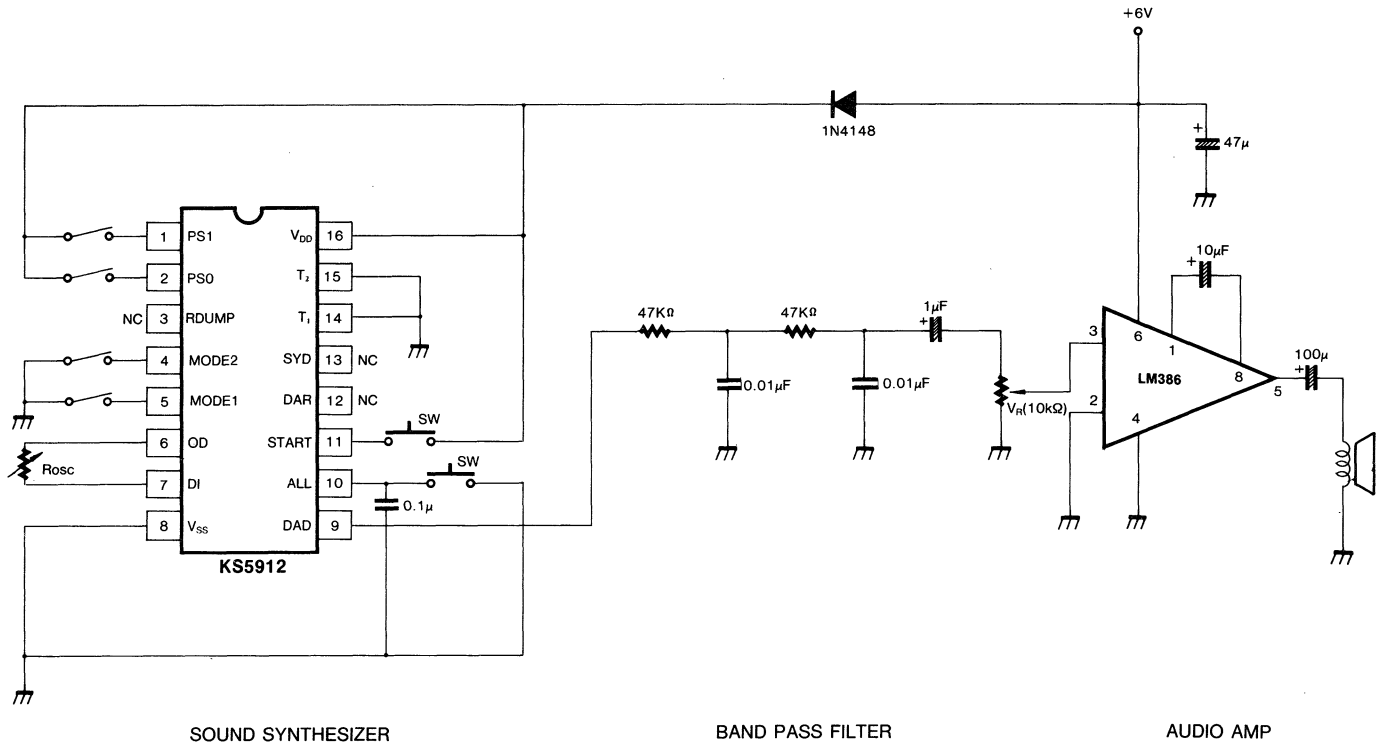


B. Auto Mode





7.4 KS5912



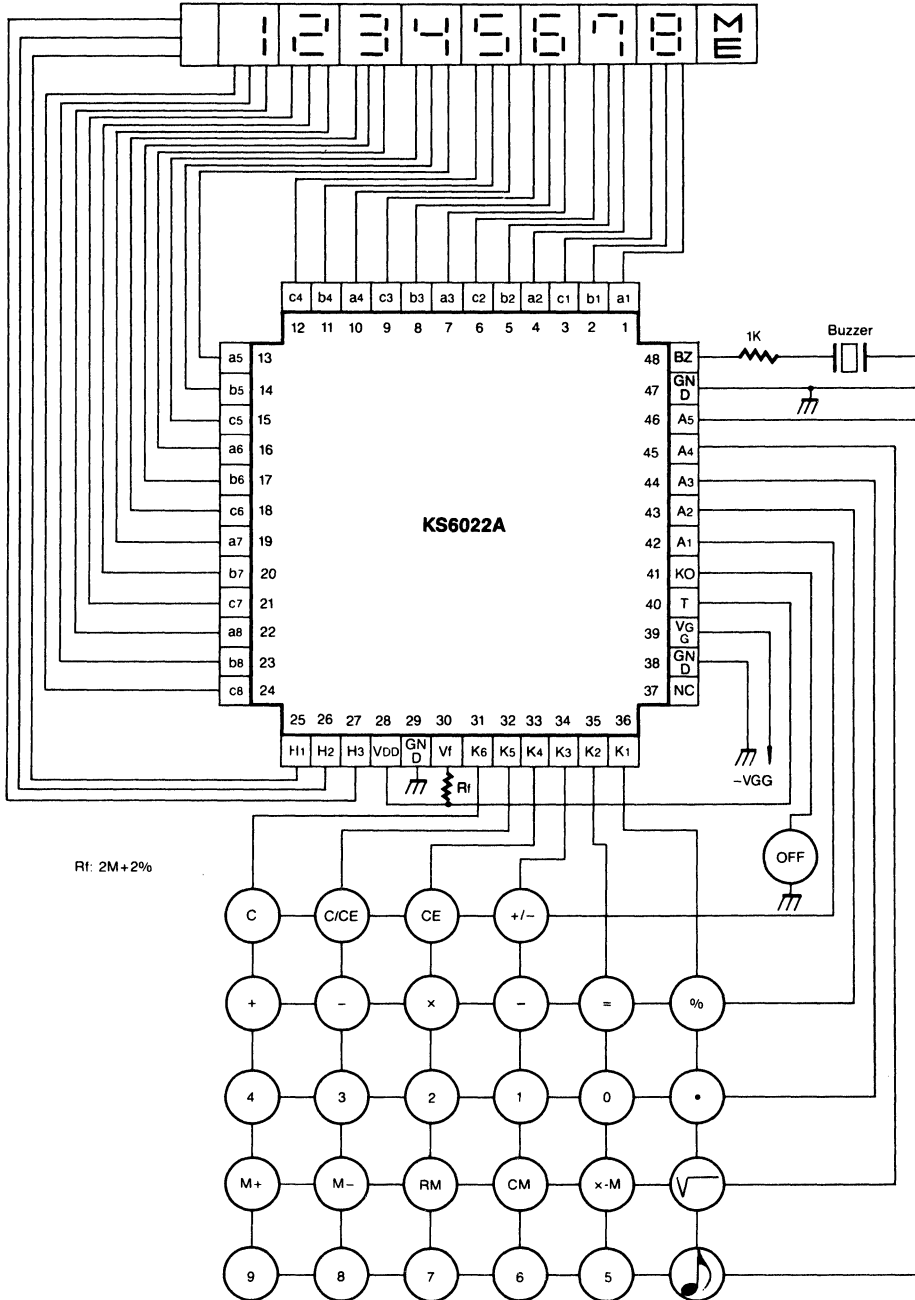
SOUND SYNTHESIZER

BAND PASS FILTER

AUDIO AMP

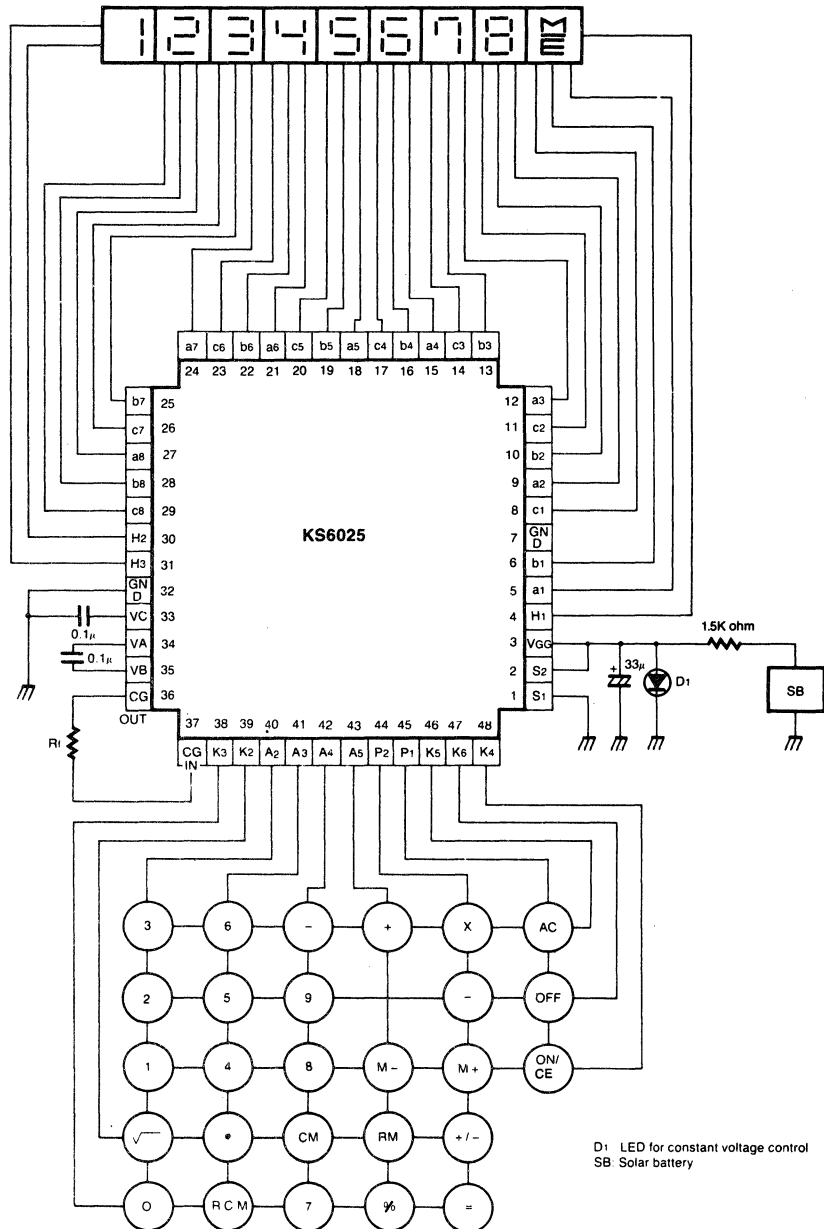
8. CALCULATOR APPLICATION

8.1 KS6022A

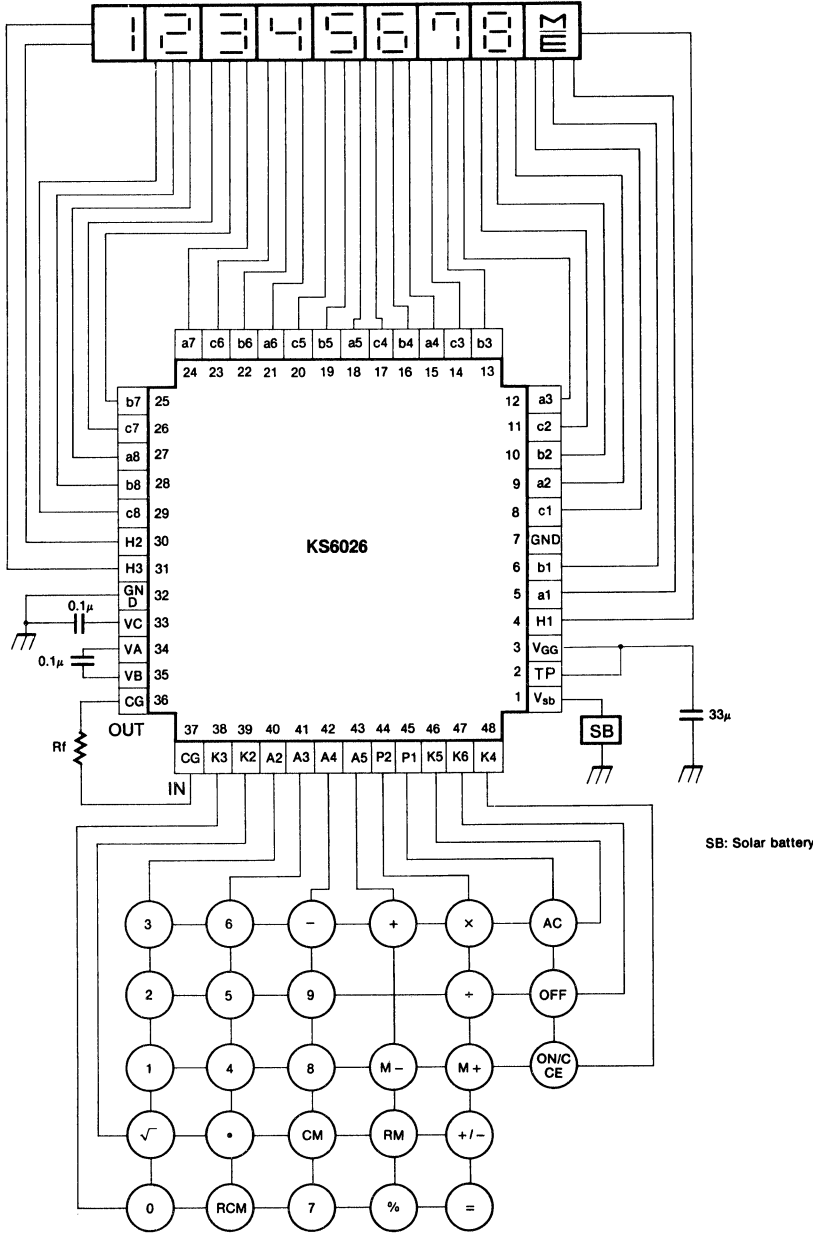


3

8.2 KS6025

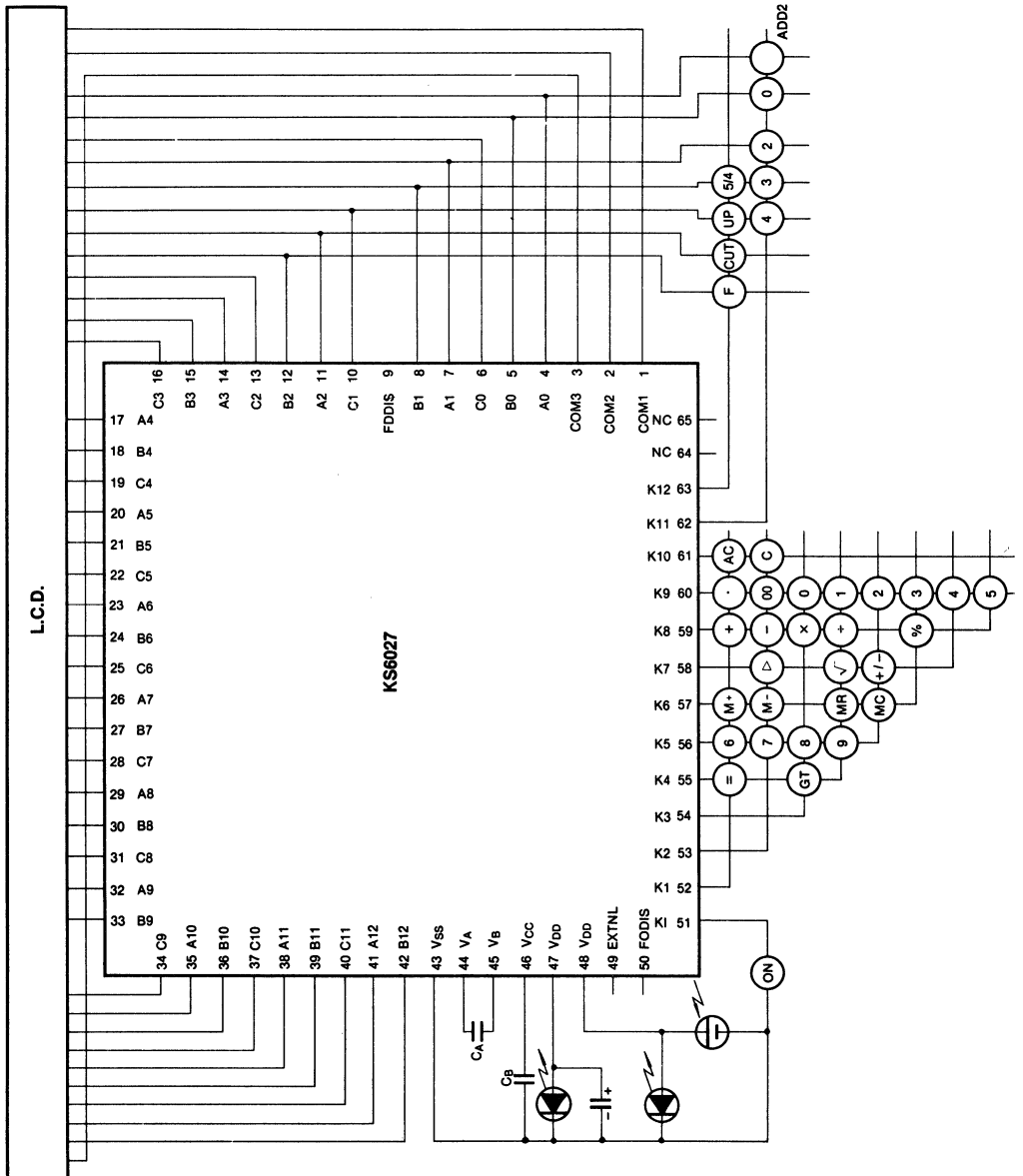


8.3 KS6026

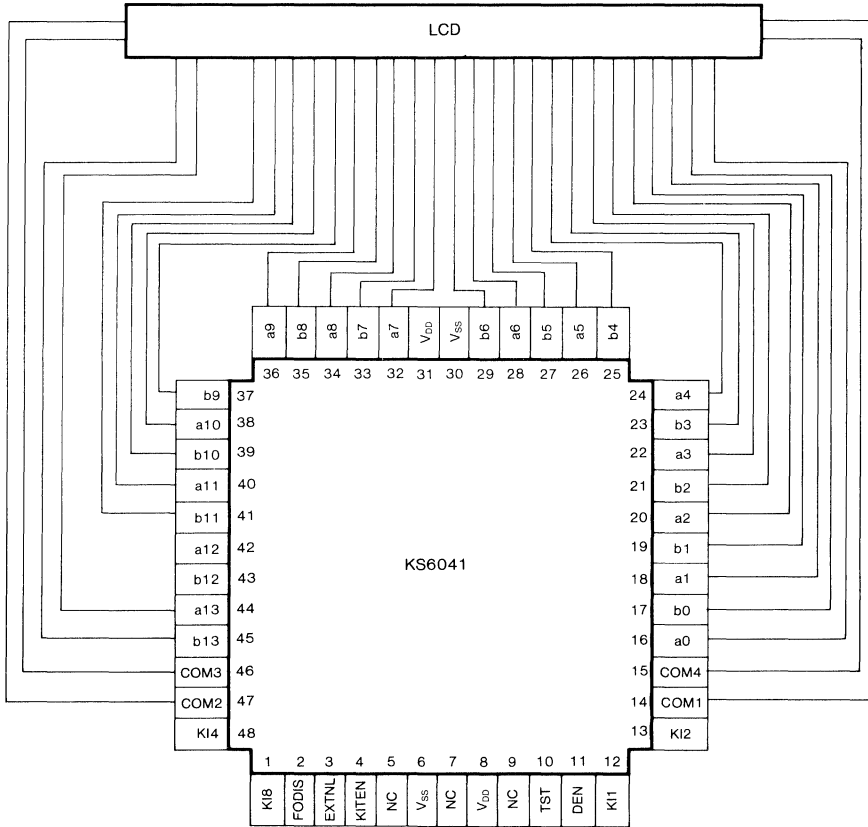


3

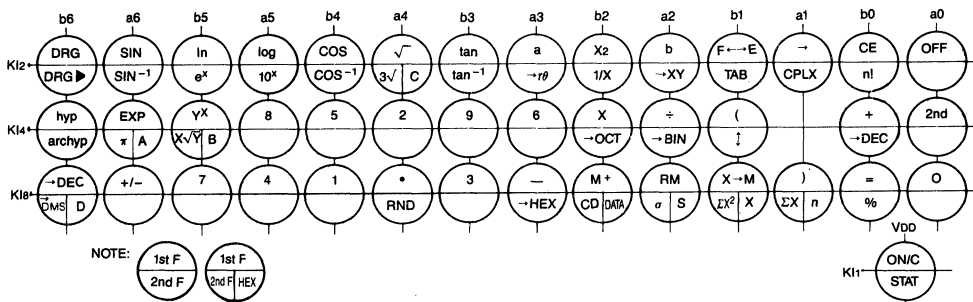
8.4 KS6027



8.5 KS6041



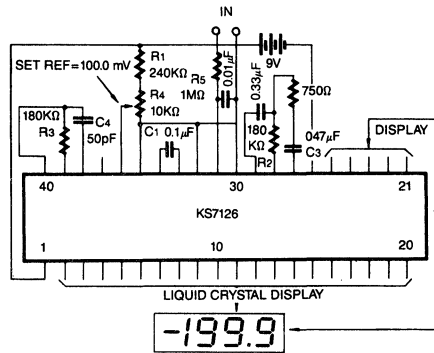
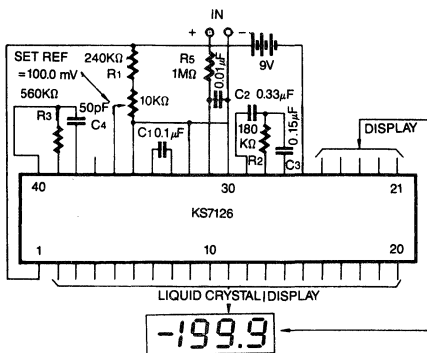
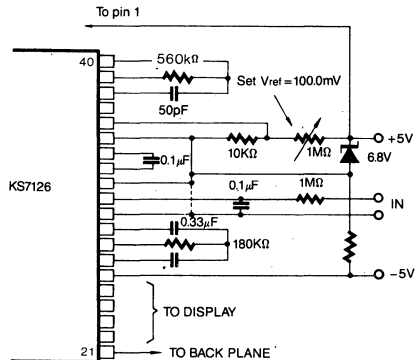
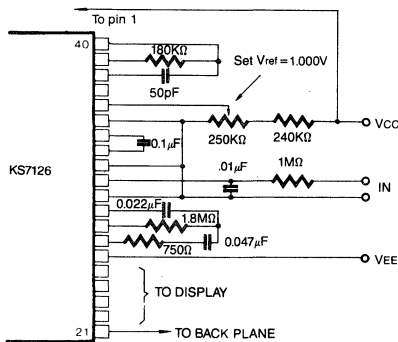
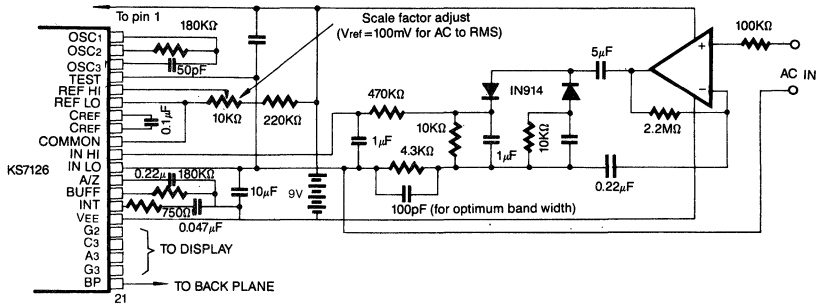
Key connection



3

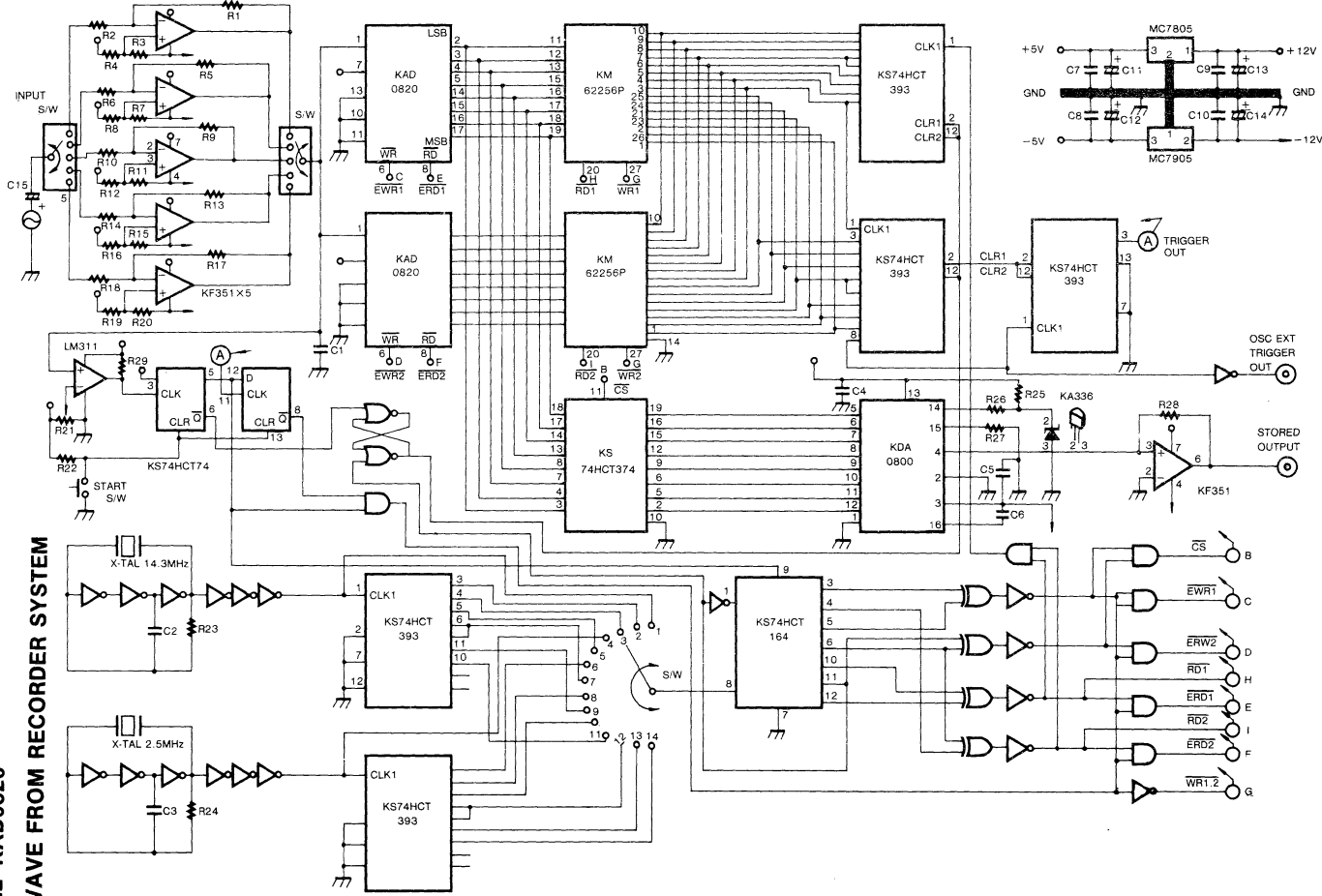
9. DATA CONVERTER IC APPLICATION

9.1 KS7126

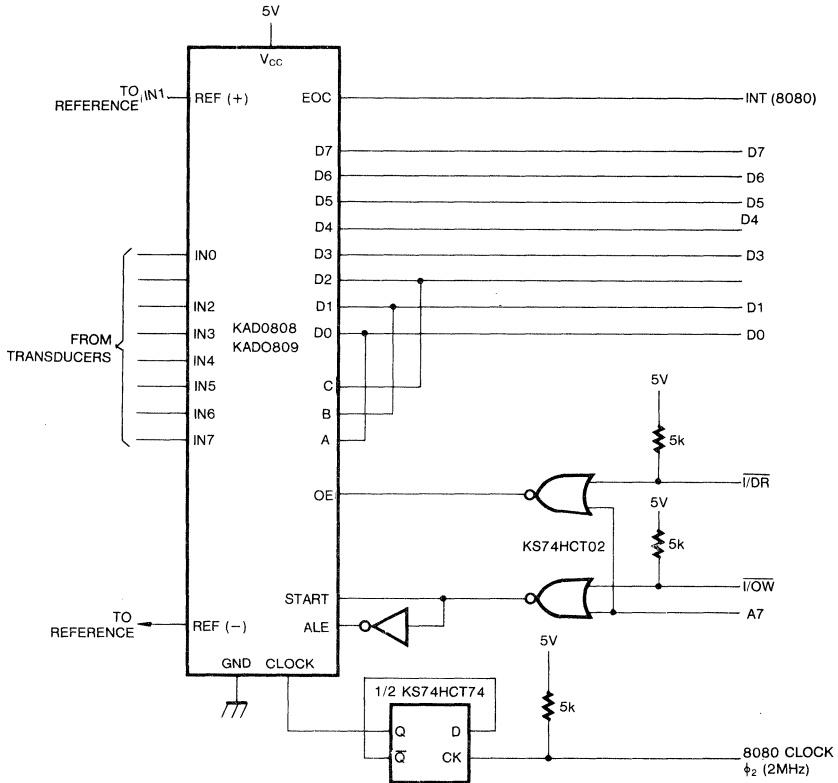


9.2 KAD0820

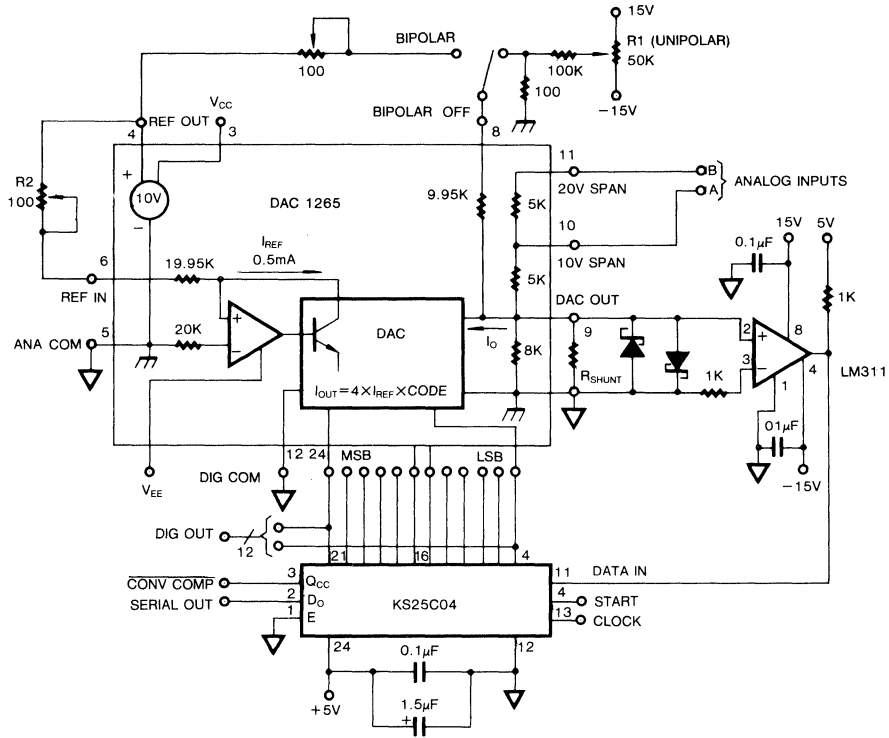
WAVE FROM RECORDER SYSTEM



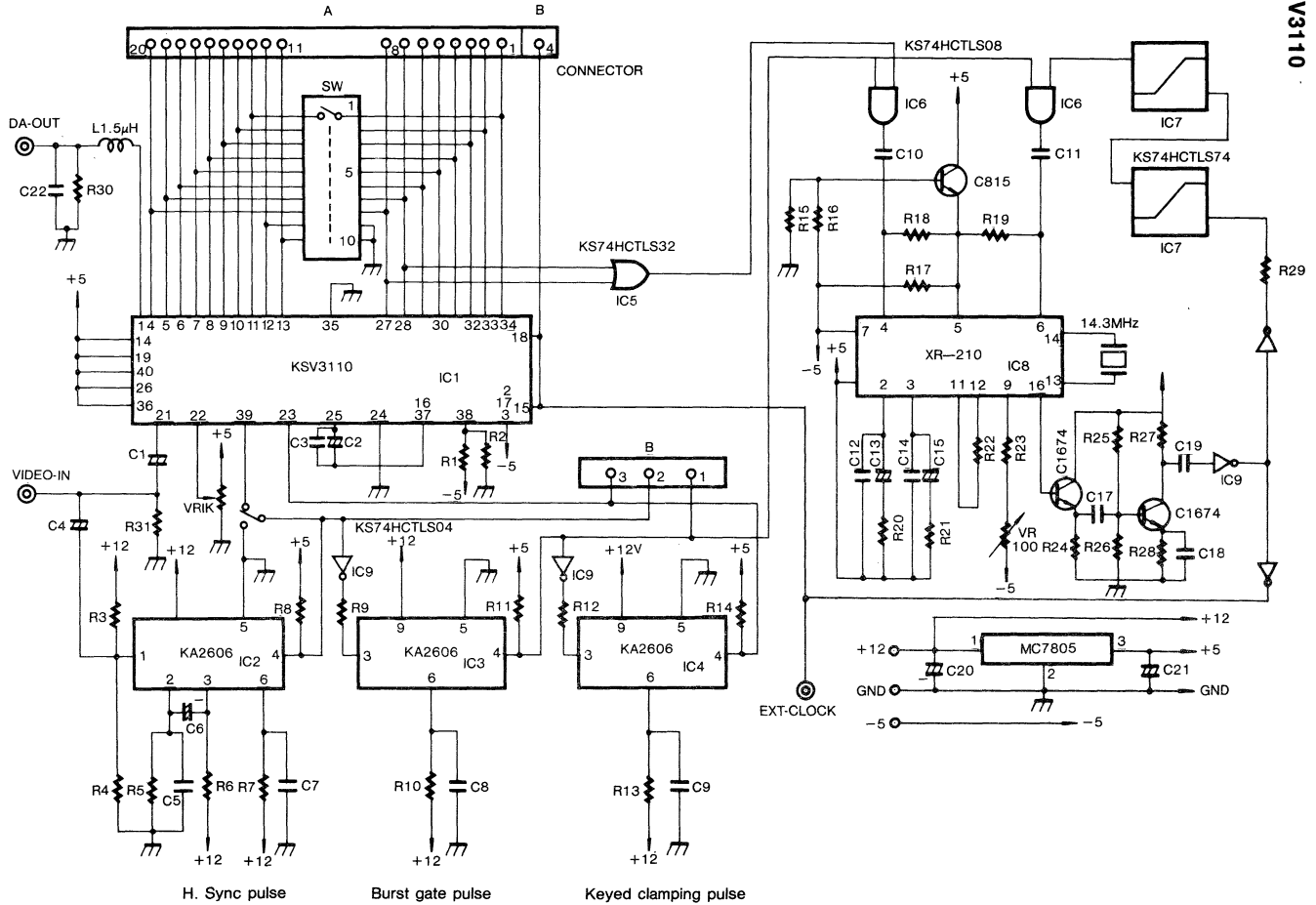
9.3 KAD0808, KAD0809



9.4 KS25C04



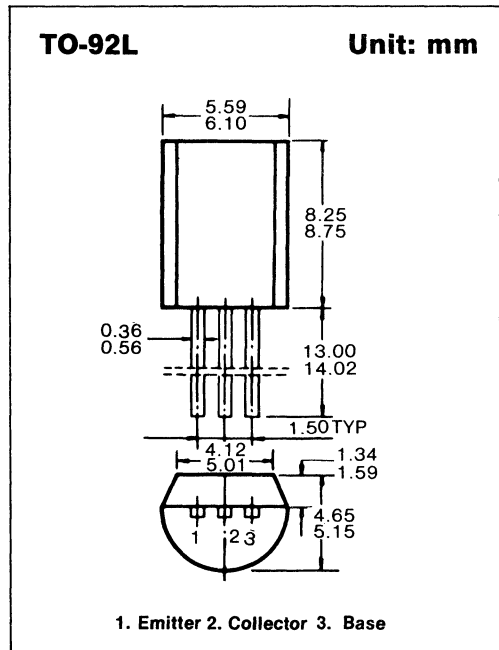
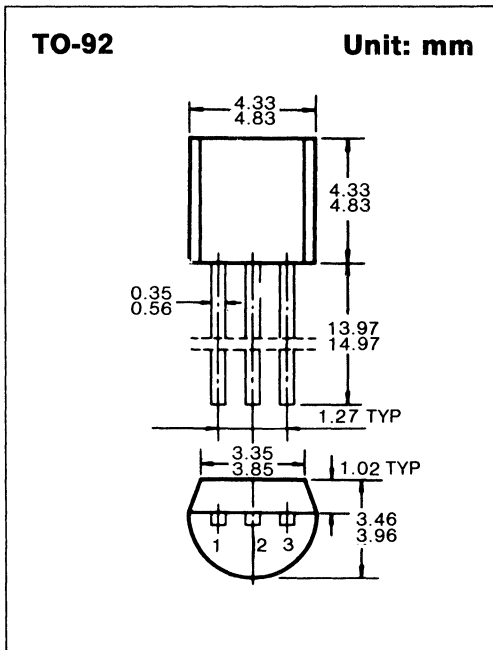
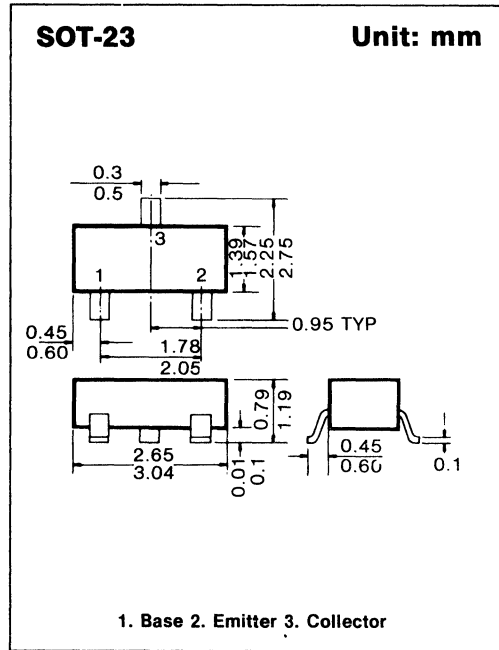
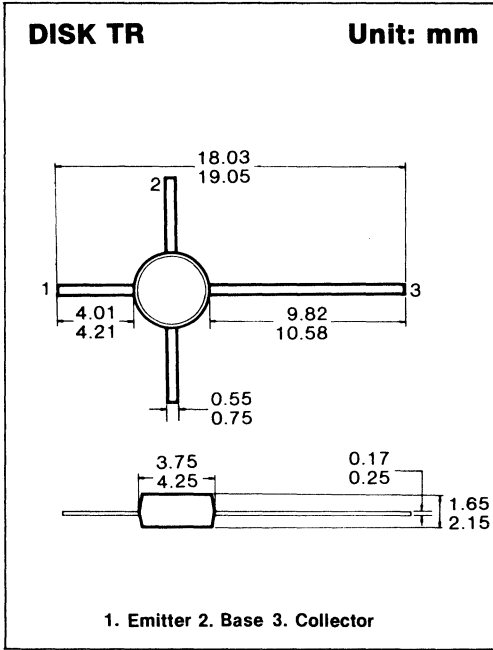
3



PACKAGE DIMENSIONS 4

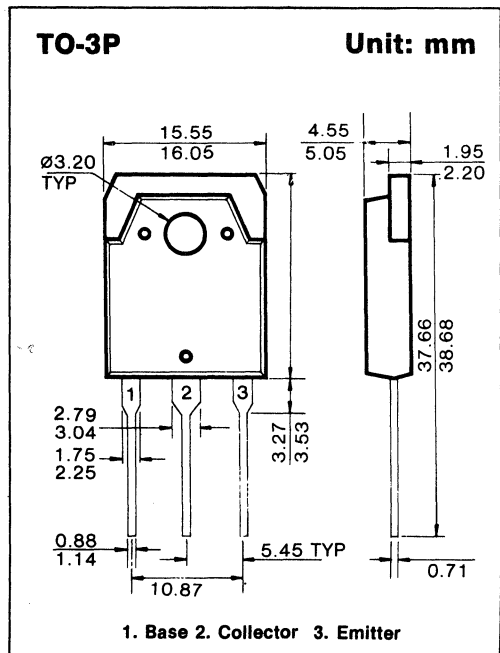
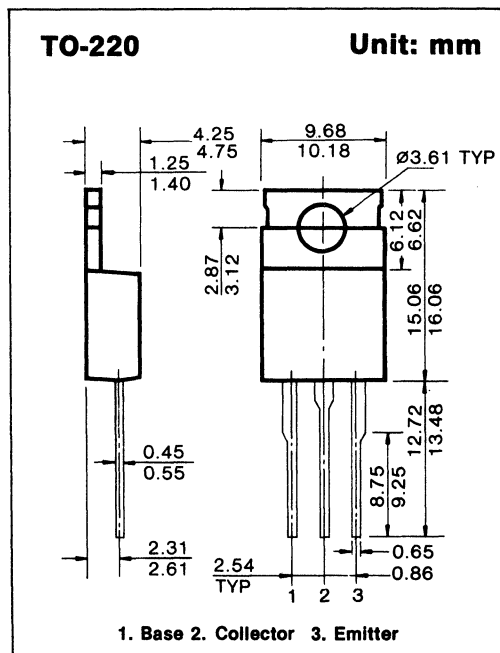
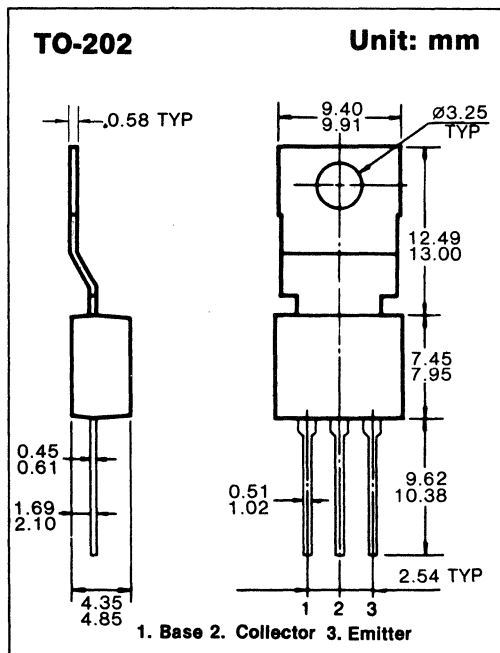
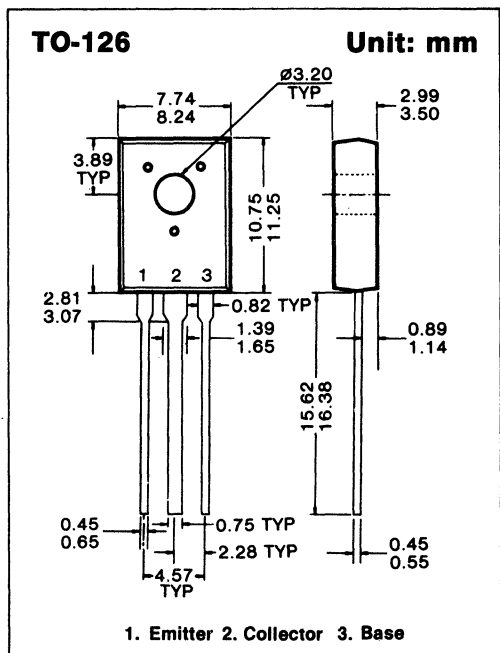


PACKAGE DIMENSIONS

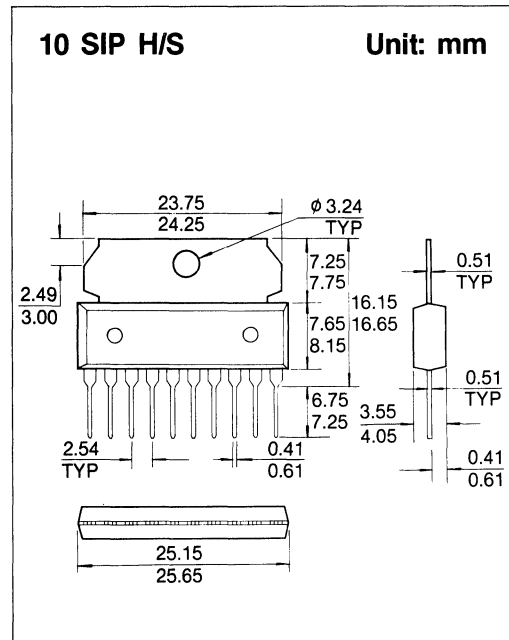
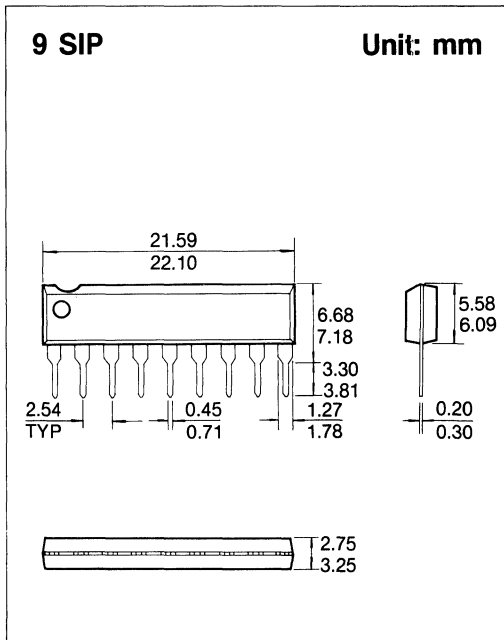
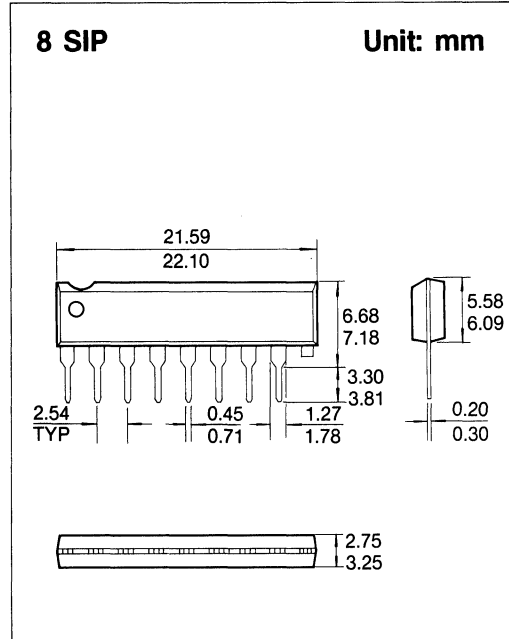
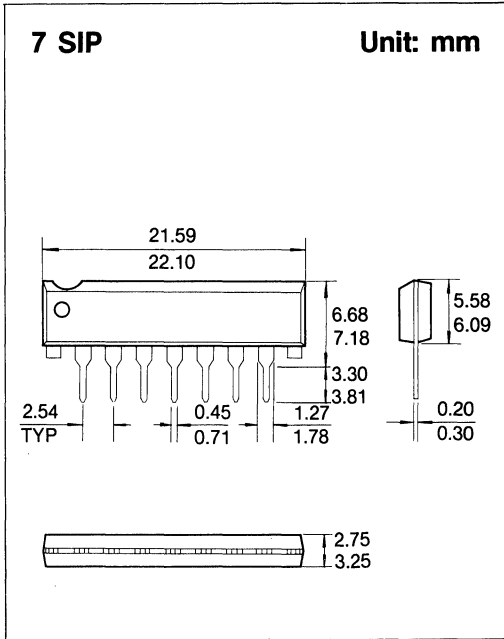


4

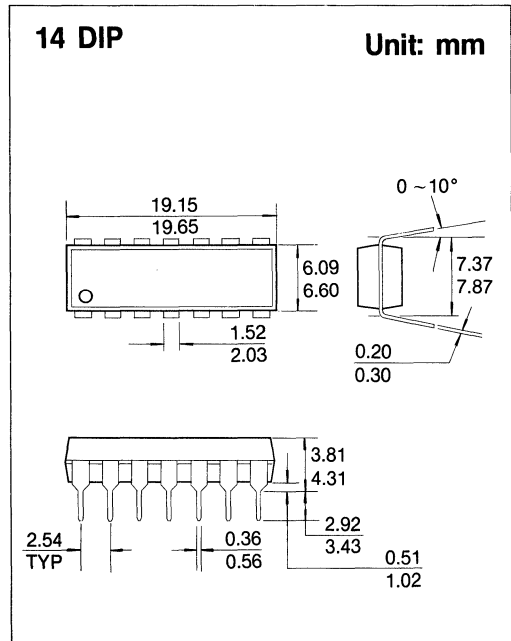
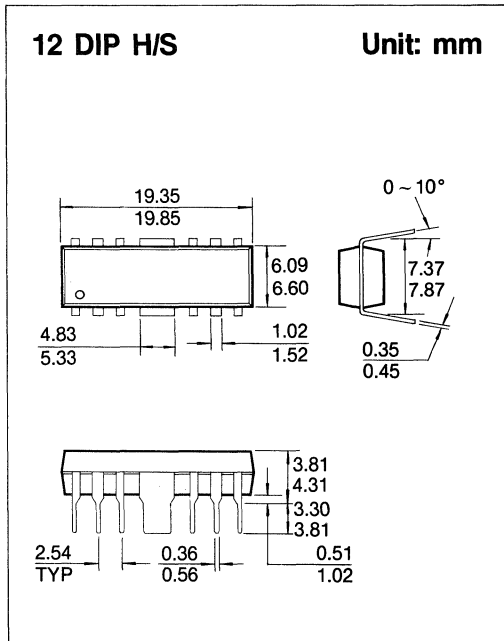
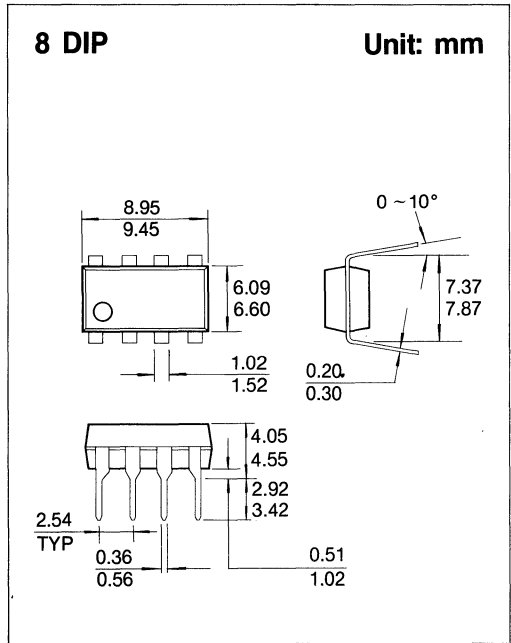
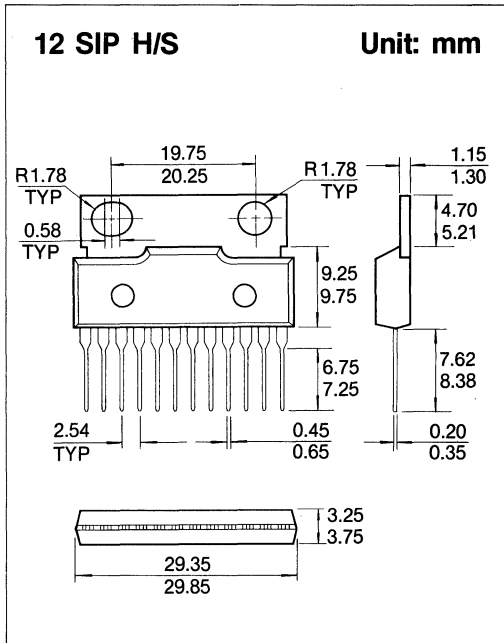
PACKAGE DIMENSIONS



PACKAGE DIMENSIONS



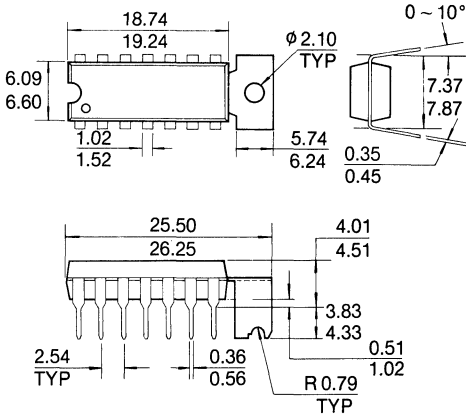
PACKAGE DIMENSIONS



PACKAGE DIMENSIONS

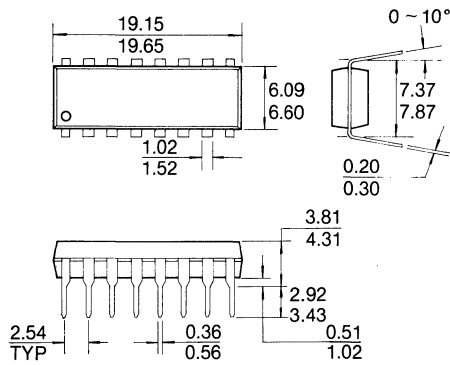
14 DIP H/S

Unit: mm



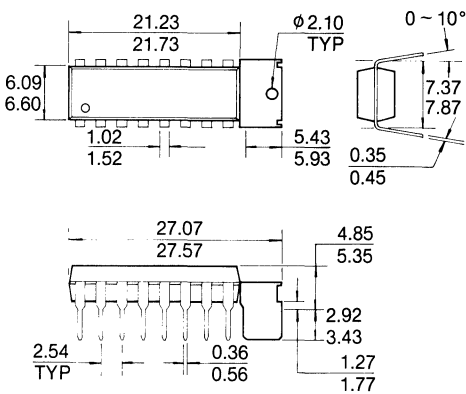
16 DIP

Unit: mm



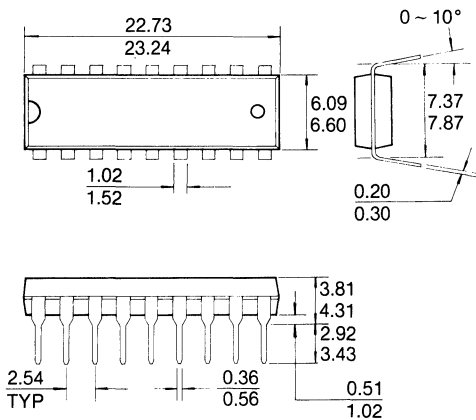
16 DIP H/S

Unit: mm



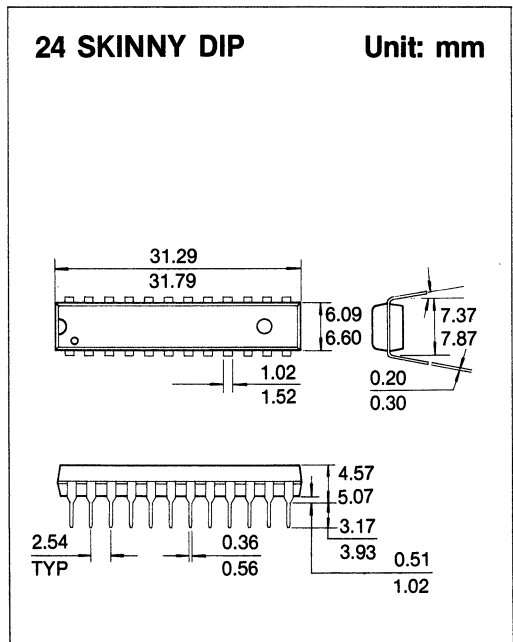
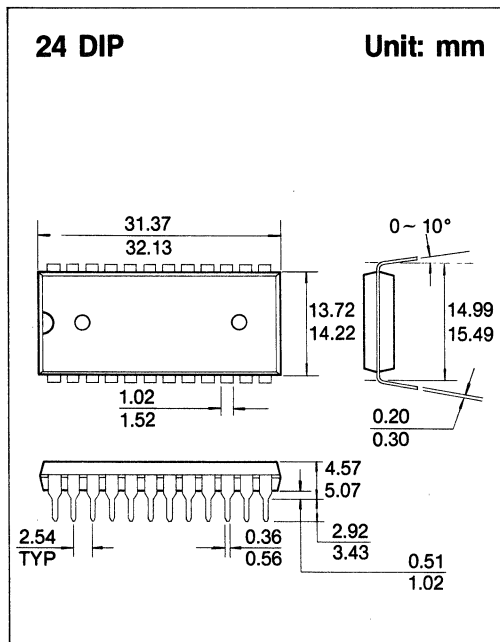
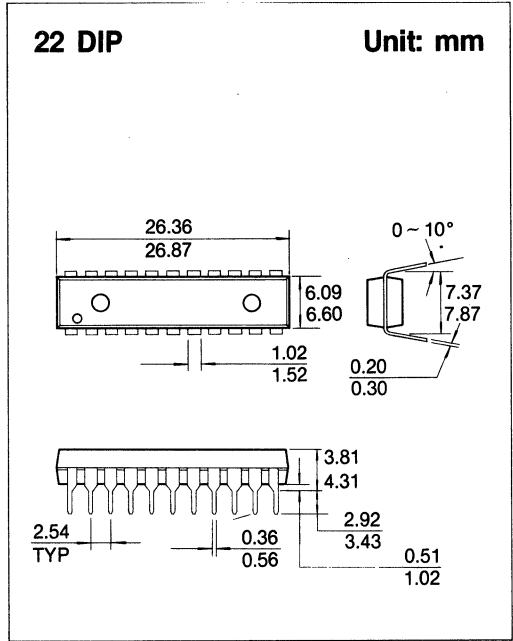
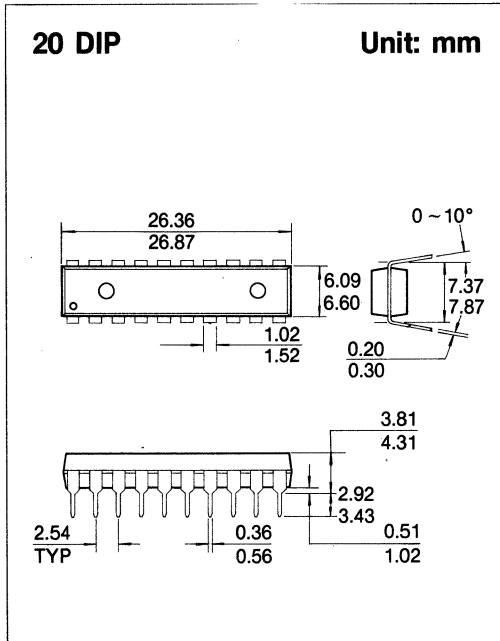
18 DIP

Unit: mm

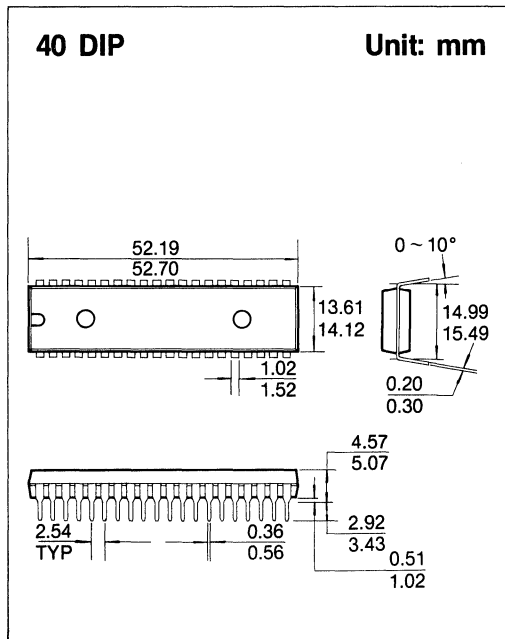
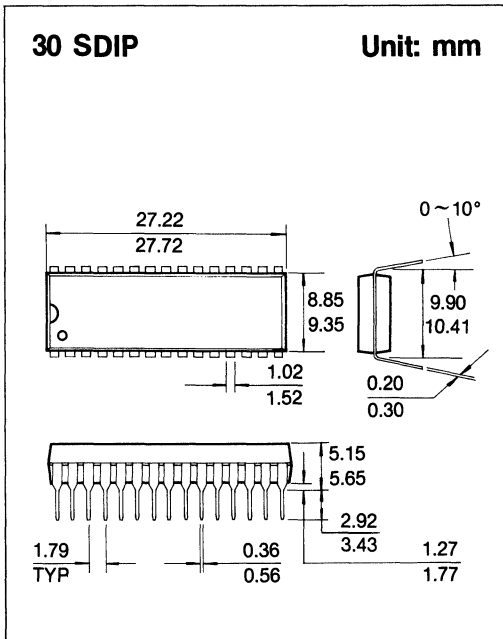
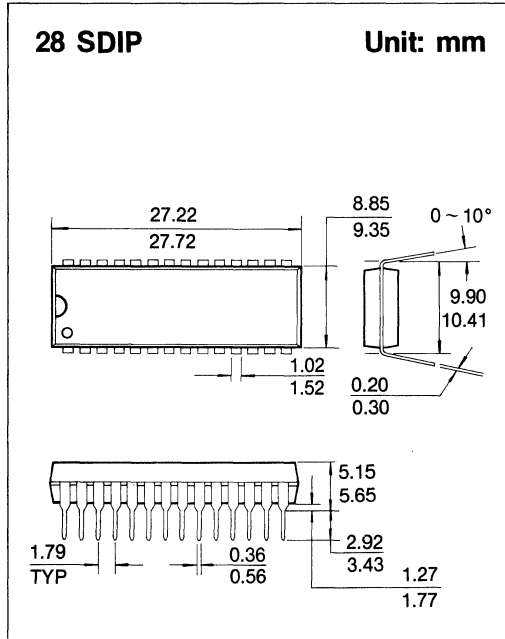
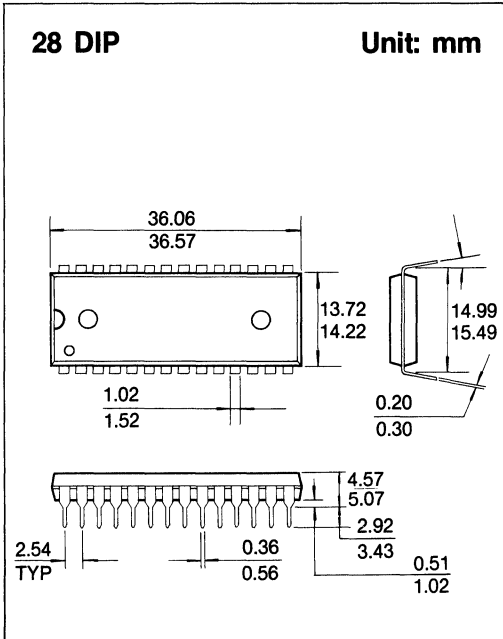


4

PACKAGE DIMENSIONS



PACKAGE DIMENSIONS

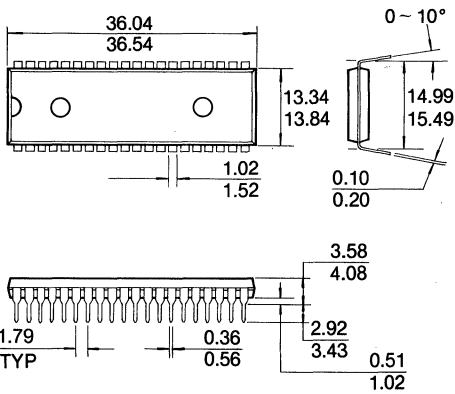


4

PACKAGE DIMENSIONS

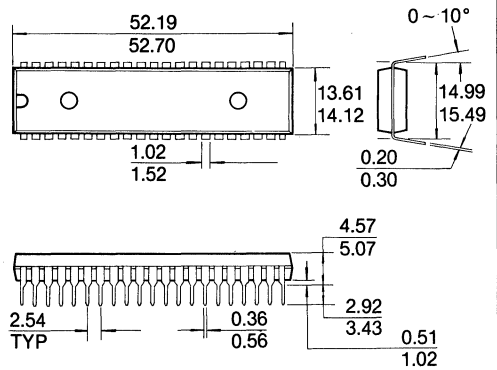
40 SDIP

Unit: mm



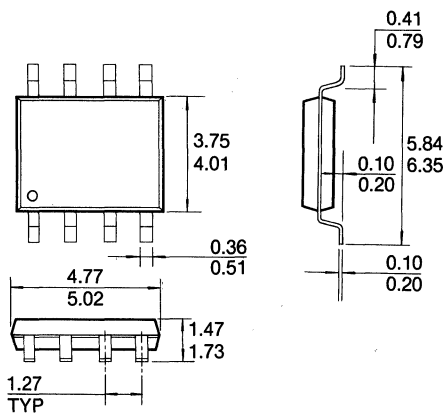
42 DIP

Unit: mm



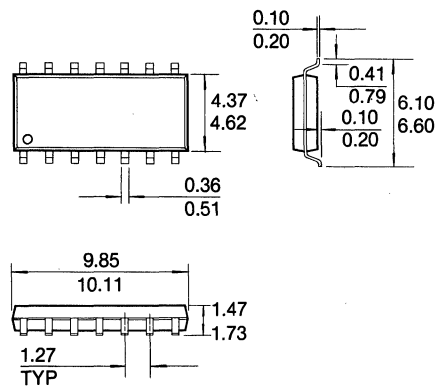
8 SOP

Unit: mm



14 SOP

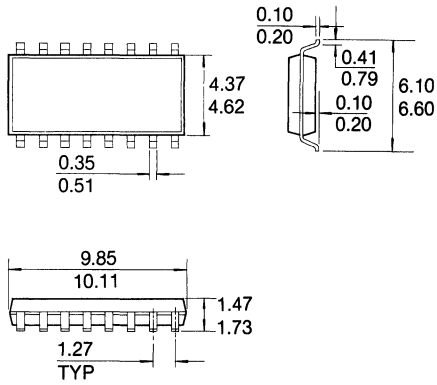
Unit: mm



PACKAGE DIMENSIONS

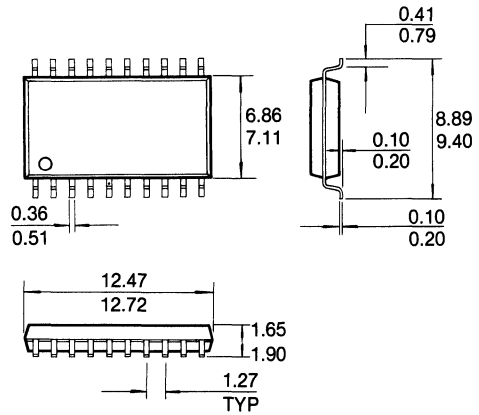
16 SOP

Unit: mm



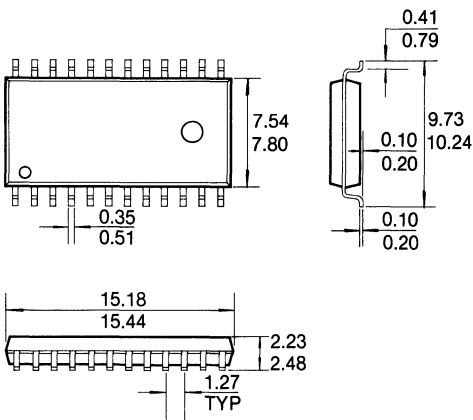
20 SOP

Unit: mm



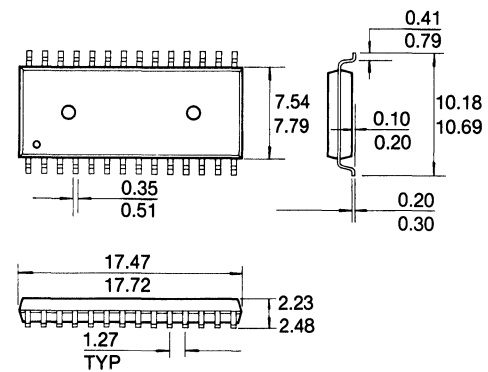
24 SOP

Unit: mm



28 SOP

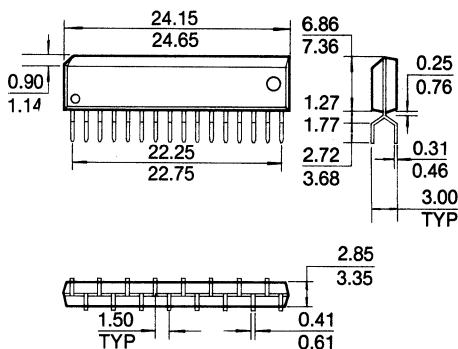
Unit: mm



PACKAGE DIMENSIONS

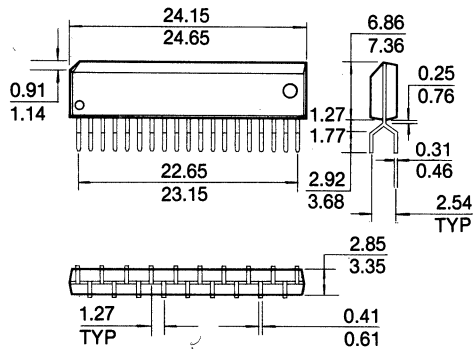
16 ZIP

Unit: mm



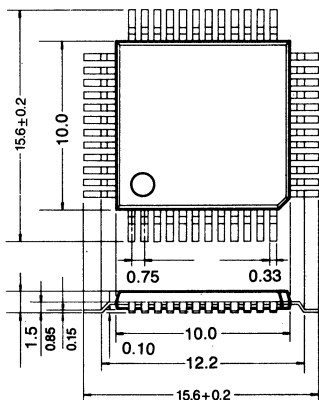
19 ZIP

Unit: mm



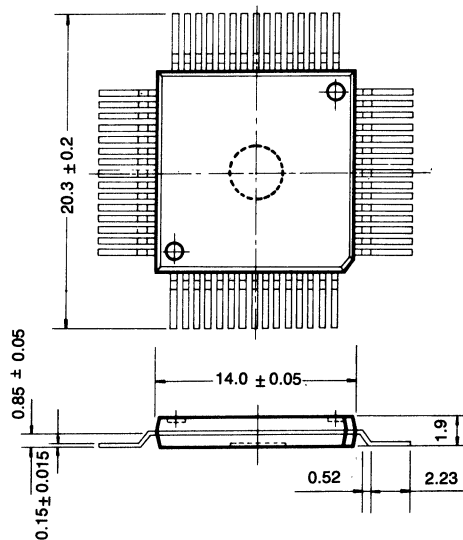
48 FQP

Unit: mm



60 FQP

Unit: mm

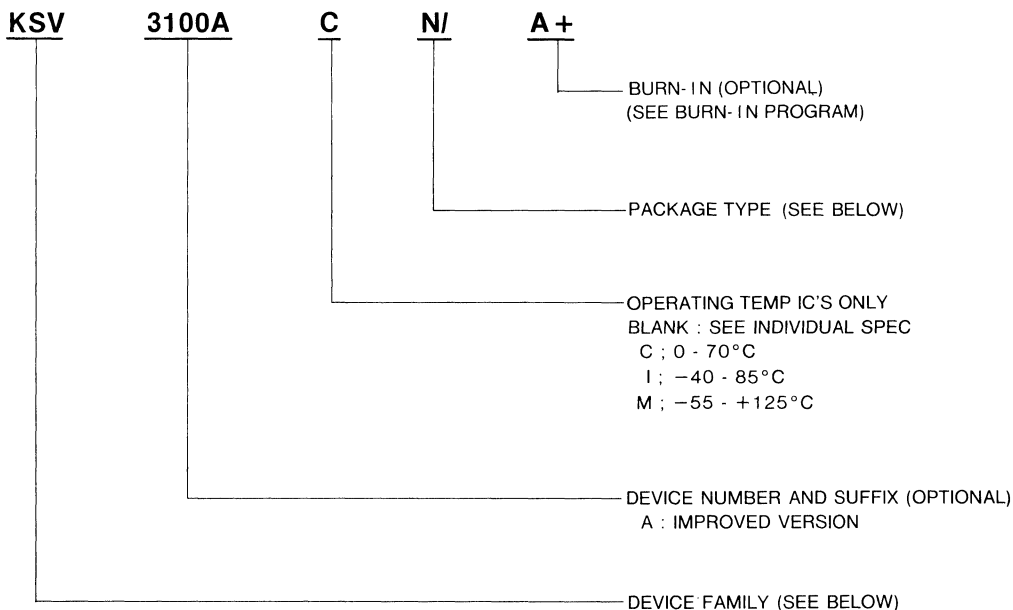




ORDERING INFORMATION 5



ORDERING INFORMATION



5

DEVICE FAMILY

TRANSISTOR / FET

- DKS DALINGTON TR
- IRF MOS POWER
- IRFA MOS POWER, TO-126
- IRFP MOS POWER, TO-3P
- KSA PNP TR
- KSB PNP TR
- KSC NPN TR
- KSD NPN TR
- MMBT TR, SOT-23
- MMBTA TR, SOT-23
- MMBTH TR, SOT-23
- MPS TR, SOT-23
- MPSA TR, TO-92
- MPSH TR, TO-92
- PN TR, TO-92
- SSH MOS POWER, TO-3P
- SSM MOS POWER, TO-3
- SSP MOS POWER, TO-220
- TIP BIPOLAR TR
- 2N TR

INTEGRATED CIRCUIT

- KA LINEAR IC
- KG GATE ARRAY
- KS CMOS IC
- KT TELECOM
- LM NATIONAL
- MC MOTOROLA
- NE SIGNETICS
- SA LINEAR ARRAY
- SD H.L AND LINERA ARRAY
- KSV A/D-D/A CONVERTER
- KAD A/D CONVERTER
- KDA D/A CONVERTER

PACKAGE TYPE

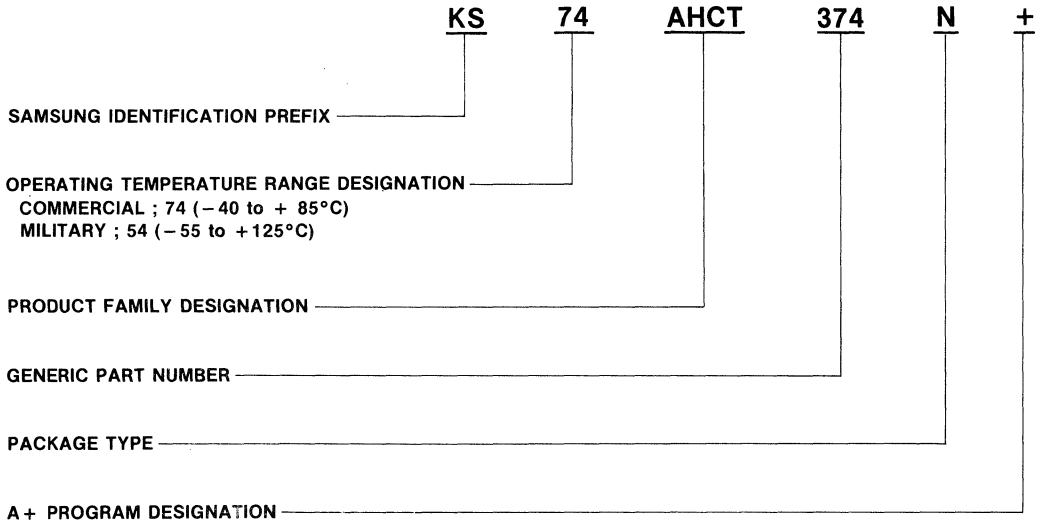
IC'S ONLY

- D SOP
- DT D-PACK
- J CERAMIC
- K TO-3P
- L LCCC
- N PLASTIC
- PL PLCC
- R TO-126
- T TO-220
- Z TO-92
- V TO-9; L
- W ZIP
- S SIP
- G BARE CHIP
- E SSM

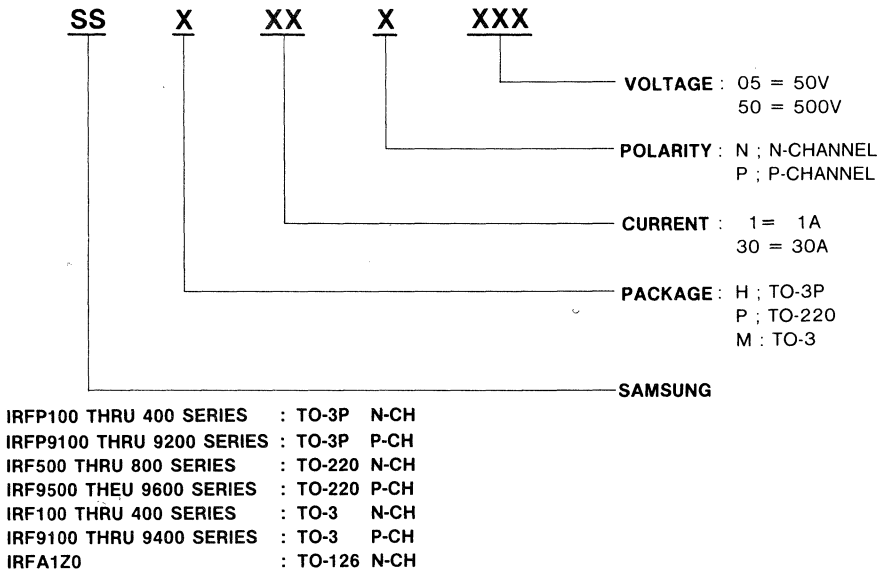
• NOTE: Direct-Replacement parts for products initiated by other manufacturers

ORDERING INFORMATION

HIGH PERFORMANCE CMOS LOGIC ICs

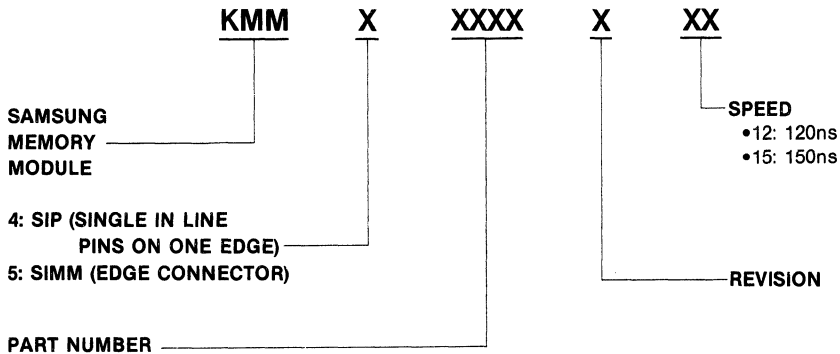
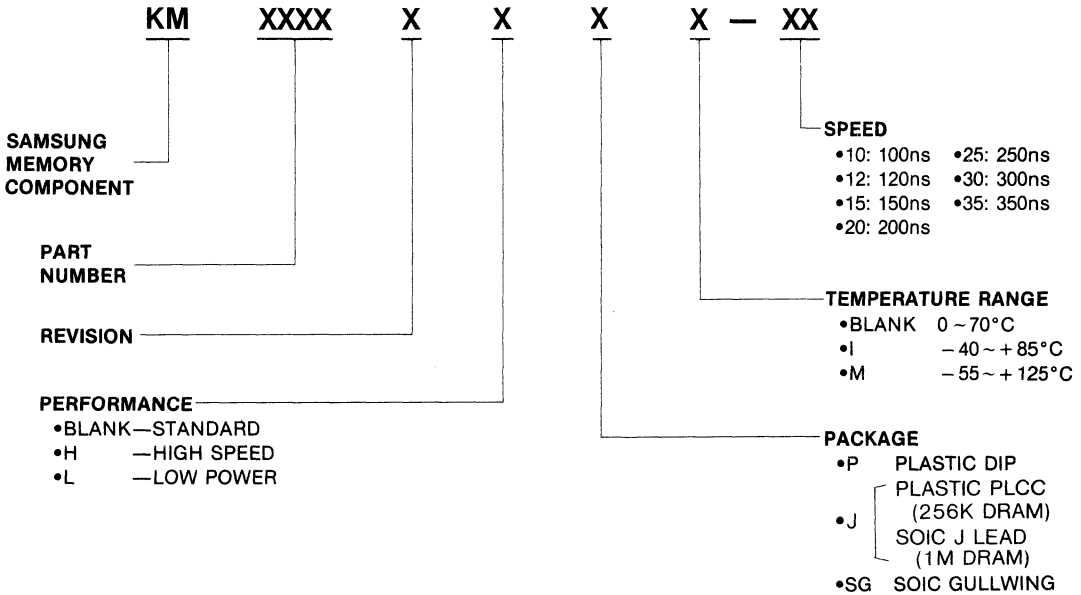


POWER MOSFETS



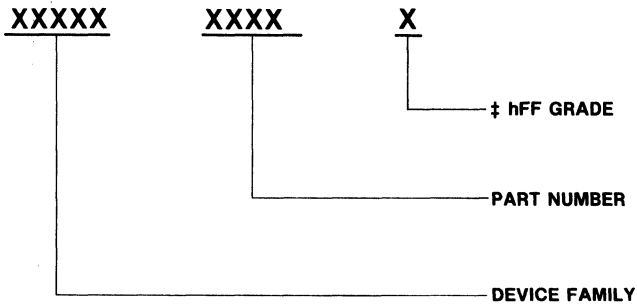
ORDERING INFORMATION

MEMORY DEVICES



ORDERING INFORMATION

BIPOLAR TRANSISTOR



‡ hFE GRADE SEE INDIVIDUAL SPEC.

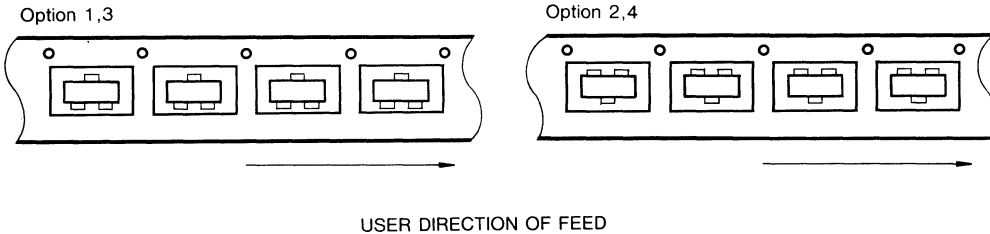
ORDERING INFORMATION

SOT-23 TAPE AND REEL SPECIFICATION

Samsung's tape and reel fully meets EIA standard RS481 (8mm Type) all parts will automatically be shipped in tape and reel unless customer specifies otherwise.

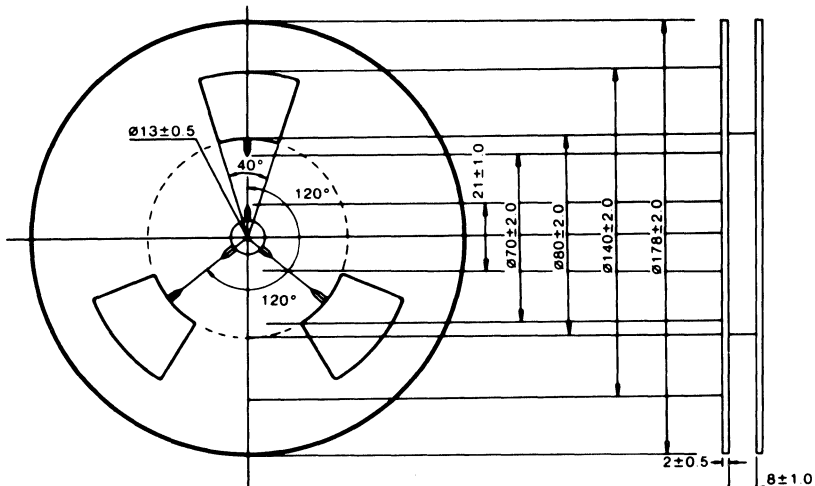
4 Options are available according to the suffix added to the device number.

DEVICE SUFFIX	OPTION	Q'TY PER REEL	MINIMUM ORDER
T1 or T2	1,2	3000	1 REEL
T3 or T4	3,4	10000	1 REEL



CARRIER TAPE REELS

Unit: mm



5

ORDERING INFORMATION

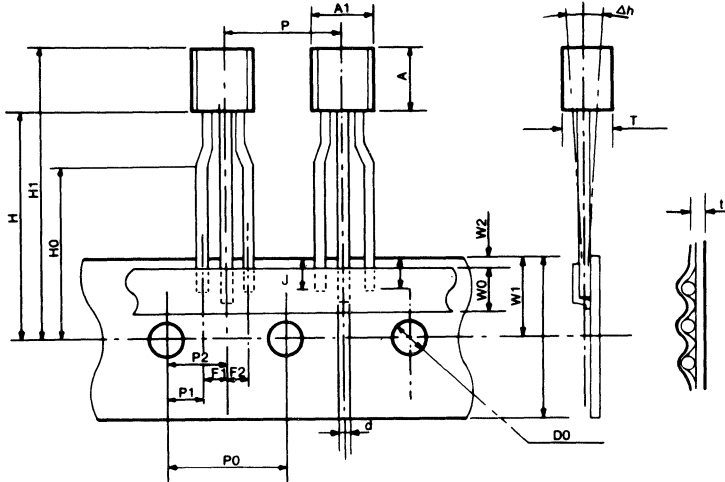
TO-92 ORDERING INFORMATION

AMMO PACK and BULK TYPE are available.

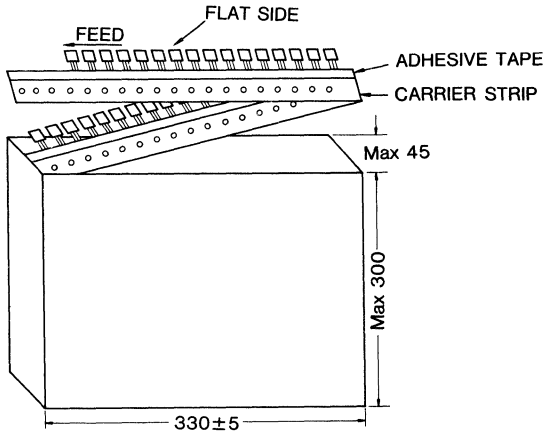
The device will automatically be shipped in bulk type unless "AMMO PACK" is indicated

AMMO PACK

TO-92 TAPING SPECIFICATION



P	12.7±0.5	H ₀	16±0.5
P ₀	12.7±0.2	F	5 ^{+0.1} _{-0.1}
P ₁	3.85±0.5	F ₁ , F ₂	±0.3
P ₂	6.35±0.5	D ₀	4±0.2
W	18 ^{+0.3} _{-0.3}	t	0.65±0.2
W ₀	6±0.5	Δh	C±1
W ₁	9±0.5	d	0.46
W ₂	Max. 0.5	T	3.56
H	Max. 21	L ₁	Min. 2.5
H ₁	Max. 27		



FLAT SIDE OF TRANSISTOR and ADHESIVE TAPE VISIBLE

1 AMMO PACK contains 2000 pcs Transistors.

SAMSUNG's AMMO PACK is equivalent to styles A,B,C,D of reel pack depending on which box-flat is opened and which end of the box the devices are fed from.

Minimum Order Quantity is 1 AMMO PACK.
Increment is 1 AMMO PACK

BULK TYPE

Minimum Order Quantity is 2000 pcs.
Increment is 1000pcs.

ORDERING INFORMATION

SAMSUNG'S A+ Program

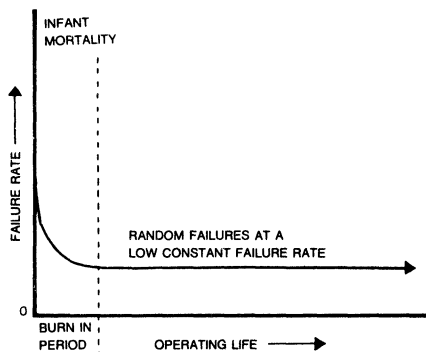
The Samsung A+ Program has been designed to offer the customer an alternative to standard off-the-shelf plastic encapsulated CMOS circuits. The A+ Program will significantly reduce incoming inspection requirements as well as early device failures (infant mortality). These results are achieved by a tightened AQL inspection plan and a burn-in of each unit for 160+8, -0 hours at 125°C or equivalent conditions established from a time/temperature regression curve.

The AQL Plan. Acceptable Quality Levels (AQL) are a measure of the quality of outgoing CMOS circuits. These levels are established by the manufacturer to show the process percent defective being produced and to ensure that the customer is receiving material that meets his requirements. The Samsung A+ Program has tightened these AQL levels to a point at which incoming inspection by the customer is no longer a necessity. A+ product quality is monitored significantly more closely than standard product; those lots which fall the AQL level are 100% reworked before resubmission to the AQL gate.

The Reliability Plan. Reliability is the statistical probability that a product will give satisfactory performance for a specified period of time when used under specified conditions. A typical rate curve is shown below:

Reliability theory assumes that devices fail according to the above curve. When a group of devices is manufactured a small portion of the units will be inherently weaker than the average. These weak units will probably fail during the first few hours of operation—hence the term "infant mortality." If the units are burned-in however, thereby allowing the weak units to fail, there is a much lower probability that those finally put into system use will fail.

The SAMSUNG A+ Flow. In order to achieve an extremely high quality unit and reduce infant mortality failures the following flow has been established:



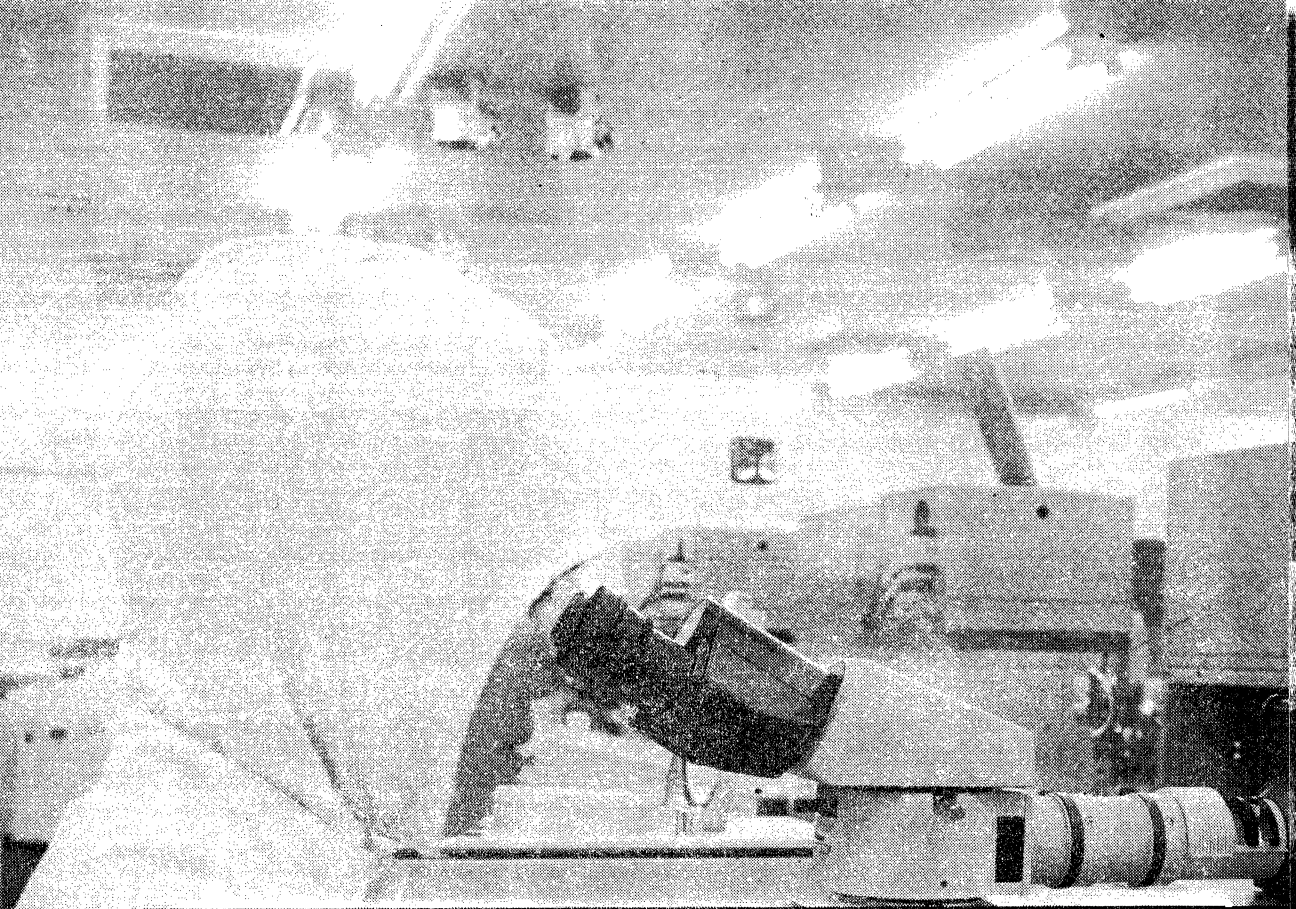
Process Flow

	DESCRIPTION
	WAFAER FABRICATION CMOS PROCESS CV PLOTS OXIDE AND NITRIDE THICKNESS MEASUREMENTS OPTICAL INSPECTIONS SEM ANALYSIS
	ENCAPSULATION NITTO HC10 TYPE 2 EPOXY MOLDING COMPOUND ULTRA PURE FOR CMOS APPLICATIONS
	POST MOLD BAKE 6 HOURS AT 175 DEG. C. CURES PLASTIC STRESSES ALL WIRE BONDS AND DIE
	O/S FUNCTIONAL ELECTRICAL 100% TESTING OPENS/SHORTS AND INTERMITTENTS REMOVE
	HIGH TEMPERATURE BURN-IN 160 HOURS AT 125 DEG. C. OR EQUIVALENT CONDITIONS ESTABLISHED FROM A TIME/ TEMPERATURE REGRESSION CURVE. 0.96 eV
	FULL FUNCTIONAL AND PARAMETRIC ELECTRICAL TESTING 100% ELECTRICAL TESTING AC, DC 88 DEG. C.
	THERMAL SHOCK MONITOR -65 DEG. C. TO + 125 DEG. C. LIQUID TO LIQUID 5 CYCLES- SAMPLES SELECTED AT RANDOM
	TIGHT AQL SAMPLING PLAN ELECTRICAL-0.05% AQL AT 88 DEG. C. MECHANICAL-0.01% AQL CRITICAL & MAJOR
	SHIP UNITS

5

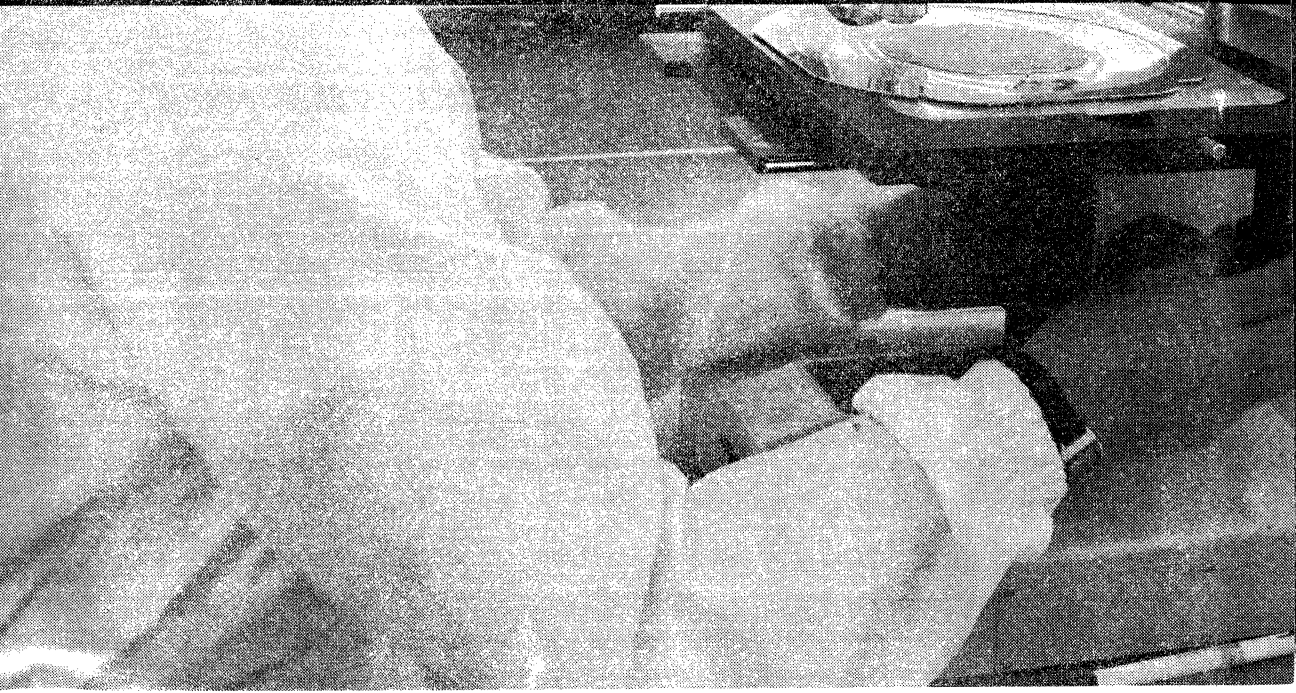
NOTES

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6



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PRINTED IN KOREA
MAY, 1988