

RF TRANSISTORS

Type P - p- n-p N - n-p-n	Package	f _T , MHz	h _{FE} , min	G _{PS} , dB min	F, dB max	Maximum Rating			
						V _{CE} , V	I _C , mA	D _{tot} , mW	
MMBR5031	N	SOT-23	1000	25	17.4	2.5	10	20	300
2SA1778			1200		13	2.5	15	50	250
2SC3770			1200		15		20	30	250
2SC4269			1200		15	2.0	15	50	250
MMBR5179			1400	30	15.2	4.5	15	50	375
2SC3837K			1500	56		4.5	18	50	200
2SC3545			2000	50			15	50	150
2SC3771			2200		16	3.5	20	30	250
2SA1669			3000			2.0	15	50	250
2SC4364			3000		11	3.0	15	30	250
2SC4270			3000		12	3.0	15	50	250
2SC4365			3000		12	1.5	15	50	250
2SC3838K			3200	56		3.5	11	50	200
BFS17,BFS17A			3200	70	10	2.5	15	25	280
2SC3841			4000	40			12	30	200
BFR92A			4500	50	12	1.8	15	25	200
BFR93			4500	70	17	1.6	12	40	280
2SC4569			5000	40			12	60	150
BFR93P			5000	70	11	2.4	15	40	280
2SC3774			5000		14	2.2	12	70	250
BFR92P			5000	50	14	1.5	15	25	200
2SC3775			5000		14	1.5	12	100	250
BFR93A			5000	70	14	1.6	12	40	280
BFR92			5000	50	16	2.2	15	25	200
2SC4568			5500	40			12	30	150
2SC4857			6000		10	1.5	10	80	200
MMBR911			6000	30	11	2.9	12	60	330
2SC5106			6000	80	13		10	30	150
2SC5109			6000	80	13		10	60	150
2SC4092			6000	40	14	3.0	12	70	200
2SC3606			7000	30	12	1.1	12	80	150
2SC3356			7000	50	12	2.0	12	100	200
2SC4864			7000		13	1.1	8	70	200
2SC4093	7000	50	14	2.0	12	100	200		
MMBR941	8000	50	16	1.5	10	50	250		
MMBR571	8000	50	11.5	2.6	10	80	330		
BF569	P	SOT-23	750	25	13	6.0	-35	30	200
BFT92			4500	20	16	2.4	-15	25	200
BFT93			4500	20	16	2.4	-12	35	200
BFG67	N	SOT-143	6000	60	17	1.5	10	50	300
BFP67			6000	60	18	1.3	10	50	300
2SC4858			6000			1.5	10	80	200
2SC4862			6500			2.2	10	30	200
2SC4865			7000			1.1	10	70	200
			4000	20			15	100	700
BFP194	P	SOT-143	4500	20			-15	100	700
2SC3776	N	TO-92	3000		12	2.5	16	70	400
2SC3777			3500		12	3.0	16	70	400
2SC3778			5000		14	2.2	12	70	500
2SC3779			5000		14	1.5	12	100	600
2SC3355			6500	50	11	1.1	12	100	600

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Type P - p- n-p N - n-p-n	Package	f _T , MHz	h _{FE} ,	G _{PS} , dB	F, dB	Maximum Rating					
						min	min	max	V _{CE} ,	I _C ,	D _{tot} ,
									V	mA	mW
BFW92	N	SOT-37	2400	100	11	2.0	15	25	280		
BFW92A			2800	50	11	2.5	15	25	280		
BFR96S			3200	75	9	3.6	15	100	700		
BFR96			3200	75	13.5	3.6	15	75	700		
2SC2369			4500	40	13.0	3.0	15	70	250		
BFR90			4600	50	16	1.9	15	25	280		
BFR91			5000	50	15	1.9	12	35	300		
BFR90A			5500	100	15	1.8	15	25	280		
BFR91A			6000	80	12.5	1.6	12	35	300		
BFG65T			6500	100	10.5	1.7	10	50	300		
2SC3608			6500	30	13.6	2.0	15	80	250		
2SC3358			6500	50	13.6	2.0	15	100	250		
MRF571			8000	50	12	2.0	10	80	580		
BF970			P	SOT-37	750	25	13	6.0	-35	30	200
BFQ51					4500	20	16	2.4	-15	25	200
2SC2954	N	SOT-89	3000	30	13	4.0	18	150	2000		
BFQ18A			4000	25			18	150	1000		
2SC4673			4500			1.5	12	100	800		
2SC5347			4700			1.8	12	150	1300		
BFQ19S			5000		11.5	2.8	15	75	1000		
2SC4859			5500		10	1.5	10	80	800		
BFQ19			5500	25	11.5	3.3	15	100	1000		
2SC4536			5500	40		2.0	15	250	2000		
2SC4703			6000	50		3.5	12	150	1800		
2SC4866			6500		11	1.1	8	70	800		
2SC5229			6500			1.0	10	70	700		
2SC3357			6500	50	10	3.0	12	100	1200		
2SC5414			6700			1.1	12	100	400		
BFQ193			7000		17	1.2	12	80	600		
BFQ149			P	SOT-89	5000	20	12.0	3.75	-15	100	1000

MICROWAVE GAAS FET'S

TYPE	Alternative	f, GHz	Parameter, units				Conditions				Ratings	
			F,	G _S ,	G _M ,	P _{OUT} ,	f,	V _{DS} ,	I _{DS} ,	P,	V _{GD} ,	V _{DS} ,
			dB	dB	mS	mW	GHz	V	mA	mW	V	V
NE72089A	AN344A-2	1÷8	1	10	15		4	3	20	100	7	4.5
NE76184A	AN344A1-2	1÷8	0.7	10	30		4	3	20	100	7	5
FHC30LG/FA	AN344A3-2	1÷8	0.3	10	30		4	3	20	100	7	5
	AN326A-2	4÷18	4.5	3	8		17.4	2	8	30	5.5	2.5
CFY25-20	AN343A-2	4÷18	2	8.5	10		12	3	6	35	6	3.5
CFY25-17	AN343A1-2	4÷18	1.5	8.5	20		12	2	10	35	6	3.5
MGF4310	AN343A2-2	4÷18	1.1	8.5	20		12	2	10	35	6	3.5
MGF4415	AN343A3-2	4÷18	0.9	8.5	20		12	2	10	35	6	3.5
JS8830AS	AN330A-2	4÷25	6	3	5		25	2	6	30	6	3
NE673	AN330B-2	4÷25	3.5	6	5		17.4	2	10	30	6	3
JS830	AN330B1-2	4÷18	2	8	20		17.4	2	6	100	7	5
FRH01FH	AN330B2-2	4÷18	1.5	8	20		17.4	2	6	100	7	5
NE388-06	AN339A-2	1÷18	2.4		10		17.4	3	5	250	7	5.5
CFY-12	AN331A-2	1÷14	2.5	8	15	30	10	4	40	250	8	5
DXL2608A	AN605A-2	1÷8	3.5	5	30	75	8	4	30	450	8	6
NE463	AN328A-2	4÷12	4.5	9			8	4	8	50		6

SMALL SIGNAL & HIGHT VOLTAGE TRANSISTORS

Type P - p-n-p N - n-p-n	Package	f _T , MHz	h _{FE} ,	V _{CE(sat)} ,	V _{BE(sat)} ,	Maximum Rating				
			min	max	max	V _{CE} ,	I _C ,	D _{tot} ,		
						V	mA	mW		
KST1623L3÷L7	N	SOT-23	200	60	0.3	1.0	40	100	350	
SS9013D÷H			150	64			20	500	625	
SS9014A÷D			150	60			45	100	450	
SS8050B,C,D			100	85	0.6	1.2	25	1200	300	
SS8550B,C,D			100	85	0.6	1.2	-25	1200	300	
BF620	N	SOT-89	90	50	0.6	0.9	300	50	1000	
BF622			90	50	0.6	0.9	250	50	1000	
BFN16			90	40	0.4	0.9	250	200	1000	
BFN18			90	30	0.5	0.9	300	200	1000	
BST39			90	40	0.5	0.9	350	500	1000	
BST40			90	40	0.5	0.9	250	500	1000	
FCX657			90	50	0.5	0.9	300	500	1000	
SXTA42			90	40	0.5	0.9	300	500	1000	
SXTA43			90	40	0.5	0.9	200	500	1000	
MPS404			P	TO-92	5	20			-60	300
SS8550B,C,D	N	100	85		0.6	1.2	-25	1200	1000	
SS8050B,C,D		100	85		0.6	1.2	25	1200	1000	
MPSA42		50	40		0.5	0.9	300	500	625	
MPSA43		50	25		0.5	0.9	200	500	625	
MPSA44		90	50		0.75	0.75	400	300	625	
2N6515		100	50		1.0	0.9	250	500	800	
2N6516		100	45		1.0	0.9	300	500	800	
2N6517		100	30		1.0	0.9	350	500	800	
ZTX458		50	100		0.5		400	300	800	
ZTX658		50	50		0.5		400	500	800	
BF391		100	40		2.0	2.0	200	500	800	
BF392		100	40		2.0	2.0	250	500	800	
BF393		100	40		2.0	2.0	300	500	800	
BF420		80	50		0.5	0.75	300	500	800	
BF422		80	50		0.5	0.75	250	500	800	
BF844		90	50		0.75	0.75	400	300	800	
KSP42		90	40		0.5	0.9	300	500	800	
KSP43		90	40		0.5	0.9	200	500	800	
KSP44		90	50		0.5	0.75	400	300	800	
KSP45		90	50		0.5	0.75	350	300	800	
PBF259		90	25		1.0		300	500	800	
PBF259S		90	60		1.0		300	500	800	
PBF259RS		80	60		1.0		300	500	800	
KSC1506		100	40		2.0		300	100	800	
KSC2330		100	40		0.5	0.9	300	100	800	
KSC2340		100	30		0.5	0.9	350	100	800	
KSA1625		90	30		1.0	1.2	400	500	800	
SS9013D÷H			150		64			20	500	625
SS9014A÷D			150		60			45	100	450

THYRISTORS IN PACKAGE ÔĪ-92

		$V_{\text{drm/rrm}}$, V		$I_{\text{drm/rrm}}$, μA	V_t , V	$\Delta V_{\text{drm/rrm}}$, V		D , mW	
		min	max	max	max	max		max	
	KP1125KN3A	7.5	9.5	150	3.5	1	250		
	KP1125KN3C	14	16						
	KP1125KN3B	19	23						
		V_s , V		I_s , μA	V_F , V	V_R , V	V_{rrm} , V	I_R , μA	D , mW
		min	max	max	max	min	min	max	max
ECG6404	KY124A	6	10	500	1.5		-30	0.1	300
2N4987		6	10	500	1.5		-30	0.1	300
2N4988		7.5	9	150	1.5		-30	0.1	300
2N4990		7	9	200	1.5		-30	0.1	300
	KY121A			120	1.7	12		20	250
	KY121C					18			
	KY121B					30			
	KY120A*	6	10	120	1.7		-1.5	20	250
	KY120C*	12	16						
	KY120B*	18	24						
ECG6403*	KY503A*	± 6	± 10	± 500	1.5			20	300
2N4991*		± 6	± 10	± 500	1.5			20	300
2N4992*		± 7.5	± 9	± 120	1.7			20	300
2N4993*		± 7.5	± 9	± 250	1.7			20	300
	KY503C*	± 12	± 16	± 120	1.7			20	250
	KY503B*	± 18	± 24						

SILICON EPITAXIAL PLANAR PNPN THYRISTORS (SCR'S) IN PACKAGE TO-92

TYPE	Maximum Rating							V_t , V	I_{qt} , i A	V_{qt} , V	dV/dt , V/ μs	dI/dt , A/ μs	t_{qt} , ns
	V_{drm} , V	V_{rrm} , V	$I_{\text{t(rms)}}$, A	$I_{\text{t(AV)}}$, A	$I_{\text{t(sm)}}$, A	V_{arm} , V	D , mW	max	max	max	min	min	max
MCR100xx*	200	6	0.8	0.5	7	6.0	500	1.93	0.12	0.8	25	30	200
	300												
P0102xx*	400												
	600												
	800												
2N5064*	200												
2N6565*	400												

SILICON TWO ANODES ZENER DIODE WITH COMMON CATHODE IN PACKAGE TO-92

TYPE	Alternative	V_{st} , V		I_{st} , mA		$\Delta V_{\text{st}}/^\circ\text{N}$, mV	D_d , mW
		min	max	min	max		max
DZS535-8	KC535A*	7	9	0.1	50	-2	600
DZS535-15	KC535C*	14	16		30	± 0.5	
DZS535-21	KC535B*	19	23		20	+2	
DZS535-30	KC535G*	28	32		15	+4	
DZS535-40	KC535D*	33	37		10	+4	

PROGRAMMABLE UNIJUNCTION TRANSISTORS (PUT) IN PACKAGE TO-92

TIPE	Maximum Rating					I_t , i A	I_{trm} , A	U_o , A	U_f , A	I_v , i eA
	V_{AC} , V	V_{GKF} , V	V_{GKR} , V	V_{GAR} , V	D , mW	max	max	min	max	min
2N6027*	± 40	40	-5	40	300	150	1	6	1.5	70
2N6028*										25

* Made also in SOT-23.

LIGHT-EMITTING DIODES

TYPE	Alternative	Light colour	Wave length, nm	Luminous intensity, mcd	Forward current, mA	Colour of bulb	
				min			
Dia 3 mm							
TLHR4400	KUND24A(C,B)-K	red	655	1 ÷ 4	10	coloured diffused	
TLHG4400	KUND24A(C,B)-L	green	565	1 ÷ 4			
TLHY4400	KUND24A(C,B)-J	yellow	590	1 ÷ 4			
LO 3360-J	KUND24A(C,B)-Ð	orange	610	1 ÷ 4			
L-1154 IT	KUND24G(D,E,J,I,K,L,M,H)-K	red	655	30 ÷ 1000	20	colourless clear	
L-1154 GT	KUND24G(D,E,J,I,K,L)-L	green	565	30 ÷ 300			
L-1154 YT	KUND24G(D,E,J,I,K,L)-J	yellow	590	30 ÷ 300			
	KUND24G(D,E,J,I,K,L)-Ð	orange	610	30 ÷ 300			
Dia 3 mm low current							
TLLR4401	KUND24A1(C1,B1)-K	red	655	1 ÷ 5	2.0	coloured diffused	
Dia 5 mm							
TLUR 5400	AL307CM(KM,LM)	red	655	0.9 ÷ 6	10	coloured diffused	
TLHR 5401	AL307BM(GM,HM)	green	565	0.4 ÷ 6	20		
TLHY 5401	AL307DM(EM, JM)	yellow	590	0.4 ÷ 6	10		
	AL307TM(PM,MM)	orange	610	0.4 ÷ 6			
HLMP-3300	KUND21A(C,B)-K	red	655	1 ÷ 8	10	coloured diffused	
	KUND21A1(C1,B1)-K	red	655	12 ÷ 20	20		
HLMP-3507	KUND21A(C,B)-L	green	565	1 ÷ 8	10		
	KUND21A1(C1,B1)-L	green	565	12 ÷ 20	20		
HLMP-3400	KUND21A(C,B)-J	yellow	590	1 ÷ 8	10		
	KUND21A1(C1,B1)-J	yellow	590	12 ÷ 20	20		
	KUND21A(C,B)-P	orange	610	1 ÷ 8	10		
	KUND21A(C,B)-Ð	orange	610	1 ÷ 8	10		
HLMP-3750	KUND21G(D,E,J,I,K,L,M,H,O)-K	red	655	50 ÷ 2000	20	colourless clear	
HLMP-3950	KUND21G(D,E,J,I)-L	green	565	50 ÷ 300			
HLMP-3850	KUND21G(D,E,J,I)-J	yellow	590	50 ÷ 300			
	KUND21G(D,E)-P	orange	610	50 ÷ 150			
Dia 5 mm, Integrated Resistors							
	A-307A(C)-K	red	655	5 ÷ 30	6V 9V 12V	coloured diffused	
	A-307A(C)-L	green	565	5 ÷ 30			
	A-307A(C)-J	yellow	590	5 ÷ 30			
	A-307A(C)-P	orange	610	5 ÷ 30			
	A-307B(G,D)-K	red	655	50 ÷ 150		clear	
	A-307B(G)-L	green	565	50 ÷ 80			
	A-307B-J	yellow	590	50			
HLMP-3601	A-21A(C)-K	red	655	5 ÷ 30		coloured diffused	
	A-21A(C)-L	green	565	5 ÷ 30			
L-53YD-12V	A-21A(C)-J	yellow	590	5 ÷ 30			
	A-21A(C)-P	orange	610	5 ÷ 30			
	A-21B(G,D,E,J)-K	red	655	50 ÷ 250		clear	
	A-21B(G)-L	green	565	50 ÷ 80			
	A-21B(G)-J	yellow	590	50 ÷ 80			
Rectangular 2.5 x 5 mm							
TLSH5100	KUND28A(C,B,G,D)-K	red	655	0.4 ÷ 6		10	coloured diffused
TLSG5100	KUND28A(C,B,G,D)-L	green	565	0.4 ÷ 6	20		
TLSY5100	KUND28A(C,B,G,D)-J	yellow	590	0.4 ÷ 6			
L-113EDT	KUND28A(C,B)-P	orange	610	0.4 ÷ 2			
Dia 10mm							
L-813ID	KUND35A(C,B,G,D,E)-K	red	655	1 ÷ 20	20	coloured diffused	
L-813GD	KUND35A(C,B,G,D,E)-L	green	565	1 ÷ 20			
L-813YD	KUND35A(C,B,G,D,E)-J	yellow	590	1 ÷ 20			
L-813ED	KUND35A(C,B,G)-P	orange	610	1 ÷ 10			

LIGHT-EMITTING DIODES

Type	Alternative	Light colour	Wave length, nm	Luminous intensity, mcd	Forward current, mA	Colour of Bulb
				min		
Dia 10mm						
L-813SRC-B	KUND35A1(C1,B1,G1,D1,E1,J1,I1)-K	red	655	50 ÷ 1000	20	colourless clear
	KUND35A1(C1,B1,G1,D1,E1)-L	green	565	50 ÷ 300		
	KUND35A1(C1,B1,G1,D1,E1)-J	yellow	590	50 ÷ 300		
	KUND35A1(C1,B1,G1,D1,E1)-P	orange	610	50 ÷ 300		
Dia 10 mm, Integrated Resistors						
	A-35A(C)-K	red	655	5 ÷ 30	6V 9V 12V	coloured diffused
	A-35A(C)-L	green	565	5 ÷ 30		
	A-35A(C)-J	yellow	590	5 ÷ 30		
	A-35A(C)-P	orange	610	5 ÷ 30		
	A-35B(G)-K	red	655	50 ÷ 80		clear
	A-35B(G)-L	green	565	50 ÷ 80		
	A-35B(G)-J	yellow	590	50 ÷ 80		
	A-35B(G)-P	orange	610	50 ÷ 80		
Dia 5 mm, Bi-color						
TLUV5300	KUND18A(C,B,G,D,E)-M	red/green	655/565	1/1 ÷ 15/15	20	colourless diffused
Rectangular 2.5 x 5 mm, Bi-color						
L-409EGW	KUND29A(C,B,G)-M	red/green	655/565	0.4/0.4 ÷ 4/4	10	colourless diffused
Dia 10 mm, Bi-color						
L-819EGW	KUND26A(C,B,G,D,E)-M	red/green	655/565	1/1 ÷ 15/15	20	colourless diffused
Dia 5 mm, Bi-color + Bi-polar						
L-517EGW	KUND45A(C,B)-M	red/ green	655/565	1/1 ÷ 5/5	10	colourless diffused
L-517EYW	KUND45A3(C3,B3)-M	red/ yellow	655/590	1/1 ÷ 5/5		
Rectangular 2.5 x 5 mm, Bi-color + Bi-polar						
L-117EGW	KUND45A1(C1,B1)-M	red/ green	655/565	1/1 ÷ 5/5	10	colourless diffused
L-117EYW	KUND45A4(C4,B4)-M	red/ yellow	655/590	1/1 ÷ 5/5		
Rectangular 2.6 x 7 mm, Bi-color + Bi-polar						
	KUND45A2(C2,B2)-M	red/ green	655/565	1/1 ÷ 5/5	10	colourless diffused
	KUND45A5(C5,B5)-M	red/ yellow	655/590	1/1 ÷ 5/5		
SOD-123						
LS S269-BO	KUND30A91-K	red	655	0.4	5	clear
LG S269-BO	KUND30A91-L	green	565	0.4		
LY S269-BO	KUND30A91-J	Yellow	590	0.4		
SOT-23						
LS S260-DO	KUND30A9-K	red	655	0.4	5	clear
LG S260-DO	KUND30A9-L	green	565	0.4		
LY S260-DO	KUND30A9-J	Yellow	590	0.4		

PHOTODIODES

Type	Alternative	Static current radiant sensitivity, nA/Lx	Dark current, nA	Flat angle of viewing, degree	Spectral sensitivity range, nm	Dimension of package, mm
		min	max			
SFH 2030F	KDF115A	30	1	10	840 ÷ 900	∅ 5
	KDF115A3	30	100	125		5.5 X 9
	KDF115A5	90	100	85		10 X 12 with lens

IR-DIODES

Type	Alternative	Wave-length, nm	Emissionpower @ $I_F=100\text{mA}$, mW,		Half angle, degree	Colour of bulb
			min	typ		
Dia 3mm						
SFH409-1	AL164A(C,B)3	920 ÷ 940	5(10,15)		40	dark clear
	AL171A(C,B)3	810 ÷ 820				
	AL172A(C,B)3	850 ÷ 870				
Dia 5mm						
SFH415-S	AL164A(C,B)	920 ÷ 940	5(10,15)		15	dark clear
	AL171A(C,B)	810 ÷ 820				
	AL172A(C,B)	850 ÷ 870				
	AL164A(C,B)1	920 ÷ 940	5(10,15)		8	
	AL171A(C,B)1	810 ÷ 820				
	AL172A(C,B)1	850 ÷ 870				
	AL164A(C,B)2	920 ÷ 940	5(10,15)		40	
	AL171A(C,B)2	810 ÷ 820				
	AL172A(C,B)2	850 ÷ 870				
SOD-123						
	AL164A91	920 ÷ 940	2.5		110	clear
SOT-23						
	AL164A9	920 ÷ 940	2.5		110	clear

DIODES IN PACKAGE SOT-23

Type	Alternative					Maximum Rating		
		\bar{N}_T , pF	V_F , V	I_R , nA	r_F , W	V_R , V	I_F , mA	I_{FM} , mA
		max	max	max	max			
BAT18	KD409A9	1.0	1.2	100	0.7	35	100	500
MMBV3401LT1	KD409C9	1.0	1.0	10	0.7			

DIODES IN PACKAGE SOD-123

Type	Alternative					Maximum Rating		
		\bar{N}_T , pF	V_F , V	I_R , nA	r_F , W	V_R , V	I_F , mA	I_{FM} , mA
		max	max	max	max			
BA582	KD409A91	1.1	1.0	20	1.0	35	100	500

ZENER VOLTAGE REGULATOR DIODES IN PACKAGE SOT-23

($V_F=0.9V_{MAX}$ at $I_F=10\text{mA}$)

TYPE	Zener voltage			Zener impedance	Max reverse leakage current		Zener voltage		Zener impedance	Zener voltage		Zener impedance	C, pF
	V_{Z1} , V			Z_{ZT1} , Ω	I_R	at V_R	V_{Z2} , V	Z_{ZT2} , Ω	V_{Z3} , V	Z_{ZT3} , Ω	at $V_R=0$		
	at $I_{ZT1}=5\text{mA}$			max	mA	V	at $I_{ZT2}=1\text{mA}$		at $I_{ZT3}=20\text{mA}$		f=1MHz		
	min	typ	max				min	max	max	min	max	max	max
BZX84C5V1	4.8	5.1	5.4	60	2	2	4.2	5.3	480	5	5.9	15	225
BZX84C5V6	5.2	5.6	6	40	1	2	4.8	6	400	5.2	6.3	10	200
BZX84C6V2	5.8	6.2	6.6	10	3	4	5.6	6.6	150	5.8	6.8	6	185
BZX84C6V8	6.4	6.8	7.2	15	2	4	6.3	7.2	80	6.4	7.4	6	155

VARICAPS IN PACKAGE SOT-23

TYPE	Alternative	C_d , pF		r_s , Ω	Q_a ,	I_R , nA	C_{d1}/C_{d2}	
		min	max	typ	min	max	min	max
BBY31	KB156A9	1.6	2.0	1.2		10	8.3(typ)	
BBY40	KB157A9	4.3	6.0	0.7			5.0	7.0
BBY42	KB158A9	2.4	3.0	1.0			12.0	16.0

VARICAPS IN PACKAGE SOD-123

TYPE	Alternative	C _{d1} , pF		r _s , Ω	Q _a ,	I _R , nA	C _{d1} /C _{d2}	
		min	max	typ	min	max	min	max
BB515	KB156A91	1.85	2.3	0.5	450	10	8.0	9.8
	KB156C91	2.3	2.5			20	8.0	
	KB156B91	2.4	2.8				7.5	
BB619	KB157A91	2.4	2.9	0.7	300	10	12.5	15.0
	KB157C91	2.6	3.0			50	12.0	
	KB157B91	2.8	3.3				12.0	
BB620	KB158A91	2.9	3.4	1.3	100	20	19.5	25.0
	KB158C91	3.2	3.6		110	50	19.0	
	KB158B91	3.5	3.8		120	18.0		

**IC VOLTAGE REGULATOR 78L05, 78L08, 78L12 - POSITIVE VOLTAGE
79L05, 79L12 - NEGATIVE VOLTAGE IN PACKAGE ÔÏ-92/SOT-89/SO-8**

Type	Output voltage, V at 1mA ≤ I ₀ ≤ 40mA	Bias current, mA	Bias current change, mA	Input regulation, mV	Output regulation, mV at 1mA ≤ I ₀ ≤ 100mA
		max	max	max	max
78L05 79L05	4.75 ÷ 5.25 (7V ≤ V _I ≤ 20V)	6	1.5 (8V ≤ V _I ≤ 20V)	150 (7V ≤ V _I ≤ 20V)	60
78L08	7.7 ÷ 8.3 (10.5V ≤ V _I ≤ 23V)	6	1.5 (11V ≤ V _I ≤ 23V)	175 (10.5 V ≤ V _I ≤ 23V)	80
78L09	8.55 ÷ 9.45 (11.5V ≤ V _I ≤ 24V)	6	1.5 (11V ≤ V _I ≤ 23V)	175 (11.5 V ≤ V _I ≤ 24V)	90
78L12 79L12	11.4 ÷ 12.6 (14,5V ≤ V _I ≤ 27V)	6	1.5 (16V ≤ V _I ≤ 27V)	250 (14.5 V ≤ V _I ≤ 27V)	100

LOW DROPOUT VOLTAGE REGULATORS IN PACKAGE TO-92/SOT-89

Type	Input voltage, V	Output voltage, V, 100µA < I _L < 100mA		Ground current, mA	Line regulation, %	Load regulation, %, 100µA < I _L < 100mA	Dropout voltage, mV
		min	max				
LP2950AC-3.3	-0.3 to +30	3.254	3.346	0.12 I _L =0.1mA	0.4 4.3V < V _{IN} < 30V	0.3 V _{IN} =4.3V	100 I _L =100µA
				12 I _L =100mA			500 I _L =100mA
LP2950C-3.3	-0.3 to +30	3.221	3.379	0.12 I _L =0.1mA	0.4 4.3V < V _{IN} < 30V	0.3 V _{IN} =4.3V	100 I _L =100µA
				12 I _L =100mA			500 I _L =100mA
LP2950AC-5.0	-0.3 to +30	4.925	5.075	0.12 I _L =0.1mA	0.4 6V < V _{IN} < 30V	0.3 V _{IN} =6.0V	100 I _L =100µA
				12 I _L =100mA			500 I _L =100mA
LP2950C-5.0	-0.3 to +30	4.88	5.12	0.12 I _L =0.1mA	0.4 6V < V _{IN} < 30V	0.3 V _{IN} =6.0V	100 I _L =100µA
				12 I _L =100mA			500 I _L =100mA

LOW DROPOUT VOLTAGE REGULATORS IN PACKAGE DIP-8/SO-8

Type	Input voltage, V	Output voltage, V, 100µA < I _L < 100mA		Ground current, mA	Line regulation, %, 6V < V _{IN} < 30V	Load regulation, %, 100µA < I _L < 100mA	Reference voltage, V	
		min	max				min	max
LP2951C-5.0	-0.3 to +30	4.88	5.12	0.12 I _L =0.1mA	0.4	0.3	1.21	1.26
				12 I _L =100mA				

IC THREE TERMINAL ADJUSTABLE SHUNT REGULATOR IN PACKAGE TO-92/SOT-89/SO-8/DIP-8

Type	Maximum ratings			V_{ref}			$\Delta V_{ref}/\Delta V_{KA}$		I_{OFF}
	V_{KA} , V	I_K , mA	I_{ref} , mA	V			min	max	max
				min	typ	max			
TL431AC	37	-100 ÷ 150	-0.05 ÷ 10	2.47	2.495	2.52	-1.4	-2.7	1
TL431C				2.44	2.495	2.55			

IC OPERATIONAL AMPLIFIER

Type	Alternative	Package	Input current, nA	0-bias voltage, mV	Difference of input current, nA	Voltage gain	Maximum output voltage, V	Supply voltage, V	Consumption current, mA
			max	max	max				
LM324	KP1401YD2A	DIP-14 / SO-14	- 100	3	30	25000	±11.6	±16	1.2
	KP1401YD2C		- 250	7	50			+32	
LM358	KP1040YD1A	DIP-8 / SO-8	- 100	3	30	25000	±11.6	±16	1.2
	KP1040YD1N		- 250	7	50			+32	

IC COMPARATORS

Type	Alternative	Package	Input current, nA	0-bias voltage, mV	Difference of input current, nA	Voltage gain	Maximum output voltage, V	Supply voltage, V	Consumption current, mA
			max	max	max				
LM339	KP1401CA1A	DIP-14 / SO-14	- 250	2	50	50000	33	3 ÷ 36	2
	KP1401CA1C			5				±1.5 ÷ ±18	
LM393	KP1401CA3A	DIP-8 / SO-8	- 250	2	50	50000	33	3 ÷ 36	1
	KP1401CA3C			5				±1.5 ÷ ±18	

IC TONE RINGER IN PACKAGE DIP-8/SO-8

Type	Output voltage high, V	Operating supply voltage, V	Sustaining voltage, V		High frequency 1, Hz		High frequency 2, Hz		Low frequency, Hz	
	min	max	min	max	min	max	min	max	min	max
KA2410 KA2411	17	29	9.7	12.0	450	450	550	680	8.0	11.0

IC TONE RINGER WITH BRIDGE DIODE IN PACKAGE DIP-8/SO-8

Type	Supply voltage, V	Activation voltage, V		Sustaining voltage, V		Output frequency 1, Hz	Output frequency 2, Hz	Sweep frequency, Hz
	max	min	min	min	max	typ	typ	typ
KA2418	26	12.2	13.0	8.0	8.8	2300	1700	10

LED ELECTRONIC CLOCK, COLOUR LED-SCREEN THE LED – INFORMATION SYSTEMS

A small power consumption is achieved by application of light-emitting diodes of enhanced contrast and luminous brightness. A high quality of the product provides a reliable performance of the clock.

When applying our product you acquire the additional working comfort and improve the interior of your office.

LED ELECTRONIC CLOCK indicates hours, minutes, seconds.

The product differs from the units of similar application by the following features:

- multicolour indication; signalling melody for each half an hour;
- run of current time within 30 days without power supply;
- regulation of melody volume.

COLOUR LED-SCREEN is designed for representation of graphic and text information in static and dynamic modes, and is composed of some modules.

- A frame construction of the screen makes it rigid. It is possible to fabricate different versions of the screen for indoors and outdoors applications.
- Dimensions of the screen, versions for climatic conditions, its fastening and other requirements of a customer are co-ordinated on concluding an agreement for delivery of the screen.

MAIN TECHNICAL DATA

		LED-Clock	LED-Screen (for 1 module)
1.	Supply voltage	220 V/ 50 Hz	220 V/50 Hz
2.	Power consumption	20 W	not over 20 W
3.	Dimensions	350x350x50 mm	200x200x40 mm (16x16 LEDs)
4.	Colours of representation	red, green, yellow, black	red, green, yellow, black

INFORMATION SYSTEMS are designed for representation of text information on purpose to advertise firms, goods, information for clients. **Systems** operating as running line, are controlled by IR-remote (communication cable) keyboard or personal computer through interface RS 232. A size of characters and strong contrast make possible to read information at a large distance over a wide illumination range.

	-14K(L)1	-15LK1	-16K(L)1	-16LK1	-16K2
Total number of text characters	6000	6000	6000	6000	6000
Size of character, mm	30x45	40x65	50x85	50x85	50x85
Dimensions, mm	460x90x50	600x106x60	940x132x72	940x132x72	1440x132x72
Mass, kg	1.5	3	5	5	7.5
Power consumption, W	20	25	30	35	35
Colour	red (green)	threecolour	red (green)	threecolour	red (green)
Communication range on IR-rays, m	10	10	10	10	10
Supply, V	220 AC/ 12 DC	220 AC	220 AC	220 AC	220 AC

NEW ELECTRONIC COMPONENTS

	Name	Parameter	Value
1.	Thermal resistor thin-film	R_{nom} , Ohm	1.000 \pm 10.000
		Deviation, %	0.1, 0.2, 0.3
		Temperature, °C	from – 60 °C to + 150 °C
		Substate	polycor, ceramics
2.	Microcircuit of low-noise amplifier for hearing aids	Chip (mount on the carrier by requirements of customer)	
3.	Microcircuit for controlling a brushless motor	For surface mount in SO28 package	

PRODUCTS

	Name	Conditions	Value
1.	System of electronic ignition for motor facilities, motor cultivators boat motors, fuel saws. Applied for uninterrupted function of spark plugs in conditions.	Relative humidity	100 % at T _{AMB} + 25 °C
		Temperature, °C	from – 45 °C to + 100 °C
2.	Hearing Aid electronic	Amplification	- 50 ± 5 dB at 1600 Hz
		Level of sound pressure	120 ± 5 dB
		Increasing frequencies	200 ÷ 4000 Hz
		Nominal voltage of supply: battery accumulator	1.4 V 1.2 V
3.	Infra red device for orientation	Viewing on horizontal	30 °
		Viewing on vertical	90 °
		Temperature	from – 40 °C to + 40 °C
		Distance of operation	not less 2.5 m