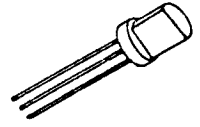
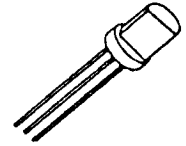


# SILICON SIGNAL TRANSISTORS GENERAL PURPOSE AMPLIFIERS TO-98 PACKAGE



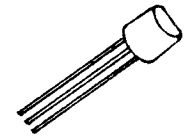
Device	Type	BV <sub>CEO</sub> @ 10mA (V)	h <sub>FE</sub>		V <sub>CE(SAT)</sub>		f <sub>T</sub> Typical (MHz)	C <sub>cb</sub> @ 10V, 1MHz Typical (Pf)	P <sub>T</sub> @ 25°C (mW)
			Min.-Max.	@ I <sub>C</sub> , V <sub>CE</sub> (V)	(V) Max.	@ I <sub>C</sub> , I <sub>B</sub>			
2N2711	NPN	18	30-90	2mA, 5	1.6	50mA, 3mA	120	7	360
2N2712	NPN	18	75-225	2mA, 5	1.6	50mA, 3mA	120	7	360
2N2713	NPN	18	30-90	2mA, 5	0.3	50mA, 3mA	120	5	360
2N2714	NPN	18	75-225	2mA, 5	0.3	50mA, 3mA	120	5	360
2N2923	NPN	25	90-180*	2mA, 10	1.6	50mA, 3mA	120	7	360
2N2924	NPN	25	150-300*	2mA, 10	1.6	50mA, 3mA	120	7	360
2N2925	NPN	25	235-470*	2mA, 10	1.6	50mA, 3mA	120	7	360
2N2926	NPN	18	35-470*	2mA, 10	1.6	50mA, 3mA	120	7	360
2N3390	NPN	25	400-800	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3391	NPN	25	250-500	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3391A	NPN	25	250-500	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3392	NPN	25	150-300	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3393	NPN	25	90-180	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3394	NPN	25	55-110	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3395	NPN	25	150-500	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3396	NPN	25	90-500	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3397	NPN	25	55-500	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3398	NPN	25	55-800	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3402	NPN	25	75-225	2mA, 5	0.3	50mA, 3mA	150	5	560
2N3403	NPN	25	180-540	2mA, 5	0.3	50mA, 3mA	150	5	560
2N3404	NPN	50	75-225	2mA, 5	0.3	50mA, 3mA	150	5	560
2N3405	NPN	50	180-540	2mA, 5	0.3	50mA, 3mA	150	5	560
2N3414	NPN	25	75-225	2mA, 5	0.3	50mA, 3mA	150	5	360
2N3415	NPN	25	180-540	2mA, 5	0.3	50mA, 3mA	150	5	360
2N3416	NPN	50	75-225	2mA, 5	0.3	50mA, 3mA	150	5	360
2N3417	NPN	50	180-540	2mA, 5	0.3	50mA, 3mA	150	5	360
2N3662	NPN	12	20-	8mA, 10	0.6	10mA, 1mA	1000	.9	200
2N3663	NPN	12	20-	8mA, 10	0.6	10mA, 1mA	1000	.9	200
2N3843	NPN	30	20-40	2mA, 5	0.2	10mA, 1mA	150	2	360
2N3843A	NPN	30	20-40	2mA, 5	0.2	10mA, 1mA	150	2	360
2N3844	NPN	30	35-70	2mA, 5	0.2	10mA, 1mA	150	2	360
2N3844A	NPN	30	35-70	2mA, 5	0.2	10mA, 1mA	150	2	360
2N3845	NPN	25	60-120	2mA, 5	0.2	10mA, 1mA	150	2	360
2N3845A	NPN	25	60-120	2mA, 5	0.2	10mA, 1mA	150	2	360
2N3854	NPN	36	35-70	2mA, 5	0.2	10mA, 1mA	200	1.7	360
2N3854A	NPN	36	35-70	2mA, 5	0.2	10mA, 1mA	200	1.7	360
2N3855	NPN	36	60-120	2mA, 5	0.2	10mA, 1mA	200	1.7	360
2N3855A	NPN	36	60-120	2mA, 5	0.2	10mA, 1mA	200	1.7	360
2N3856	NPN	36	100-200	2mA, 5	0.2	10mA, 1mA	200	1.7	360
2N3856A	NPN	36	100-200	2mA, 5	0.2	10mA, 1mA	200	1.7	360
2N3858	NPN	40	60-120	2mA, 5	0.125	10mA, 1mA	150	2	360
2N3858A	NPN	60	60-120	2mA, 5	0.125	10mA, 1mA	150	2	360
2N3859	NPN	40	100-200	2mA, 5	0.125	10mA, 1mA	150	2	360
2N3859A	NPN	60	100-200	2mA, 5	0.125	10mA, 1mA	150	2	360
2N3860	NPN	40	150-300	2mA, 5	0.125	10mA, 1mA	150	2	360
2N3877	NPN	70	20-	2mA, 5	0.125	10mA, 1.0mA	120	2	360
2N3877A	NPN	85	20-	2mA, 5	0.125	10mA, 1.0mA	120	2	360
2N3900	NPN	18	250-500	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3900A	NPN	18	250-500	2mA, 5	1.6	50mA, 3mA	120	7	360
2N3901	NPN	25	350-700	2mA, 5	1.6	50mA, 3mA	120	7	360

## SILICON SIGNAL LOW NOISE AMPLIFIERS TO-98 PACKAGE



Device	Type	BV <sub>CEO</sub> (V)	h <sub>FE</sub>		NF (db)	Conditions
			Min.-Max.	@ I <sub>C</sub> , V <sub>CE</sub> (V)		
2N3391A	NPN	25	250-500	2mA, 5	5.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 10Hz to 15.7KHz
2N3844	NPN	30	35-70	2mA, 5	10.2	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1mA, R <sub>s</sub> = 20, BW = 100KHz, f = 2MHz
2N3844A	NPN	30	35-70	2mA, 5	8.5	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1mA, R <sub>s</sub> = 20, BW = 100KHz, f = 2MHz
2N3845	NPN	30	60-120	2mA, 5	10.2	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1mA, R <sub>s</sub> = 20, BW = 100KHz, f = 2MHz
2N3845A	NPN	30	60-120	2mA, 5	8.5	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1mA, R <sub>s</sub> = 20, BW = 100KHz, f = 2MHz
2N3900A	NPN	18	250-500	2mA, 5	5.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 10Hz to 15.7KHz
2N3901	NPN	18	350-700	2mA, 5	5.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 10Hz to 15.7KHz
2N5232A	NPN	50	250-500	2mA, 5	5.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 10Hz to 15.7KHz
2N5249A	NPN	50	400-800	2mA, 5	3.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 10Hz to 15.7KHz
2N5306A	NPN	25	7K-70K	2mA, 5	5.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 600μA, R <sub>s</sub> = 160K, BW = 15.7KHz, f = 10Hz to 10KHz
2N5308A	NPN	40	7K-70K	2mA, 5	5.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 600μA, R <sub>s</sub> = 160K, BW = 15.7KHz, f = 10Hz to 10KHz
2N5309	NPN	50	60-120	10μA, 5	4.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 20μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 1KHz
2N5310	NPN	50	100-300	10μA, 5	3.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 20μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 1KHz
2N5311	NPN	50	250-500	10μA, 5	3.0	V <sub>CE</sub> = 5V, I <sub>C</sub> = 20μA, R <sub>s</sub> = 5K, BW = 15.7KHz, f = 1KHz

## SILICON SIGNAL LOW NOISE AMPLIFIERS TO-92 PACKAGE

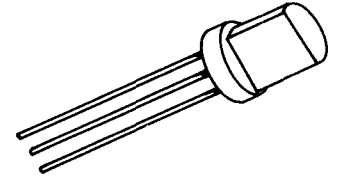


Device	Type	BV <sub>CEO</sub> (V)	h <sub>FE</sub>		NF (db)	Conditions
			Min.-Max.	@ I <sub>C</sub> , V <sub>CE</sub> (V)		
GES5827A	NPN	40	250-500	2mA, 5	5	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>g</sub> = 5K, BW = 15.7KHz
GES5828A	NPN	40	400-800	2mA, 5	5	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>g</sub> = 5K, BW = 15.7KHz
GES6000	NPN	25	100-300	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6001	PNP	25	100-300	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6004	NPN	40	100-300	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6005	PNP	40	100-300	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6010	NPN	40	100-300	10mA, 1	5	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6011	PNP	40	100-300	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6014	NPN	60	100-300	10mA, 1	5	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6015	PNP	60	100-300	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES929	NPN	50	60-120	10μA, 5	4	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10μA, R <sub>s</sub> = 10K, BW = 15.7KHz, f = 10Hz to 10KHz
GES930	NPN	50	100-300	10μA, 5	3	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10μA, R <sub>s</sub> = 10K, BW = 15.7KHz, f = 10Hz to 10KHz
GES5306A	NPN	25	7K-70K	2mA, 5	5	V <sub>CE</sub> = 5V, I <sub>C</sub> = 600μA, R <sub>g</sub> = 160K, BW = 15.7KHz, f = 10Hz to 10KHz
GES5308A	NPN	10	7K-70K	2mA, 5	5	V <sub>CE</sub> = 5V, I <sub>C</sub> = 600μA, R <sub>g</sub> = 160K, BW = 15.7KHz, f = 10Hz to 10KHz
D38S1-4	NPN	30	400-3K	100μA, 5	Typ 1.3	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>g</sub> = 100K, F = 1KHz
D38S7	NPN	45	400-2K	100μA, 5	Typ 1.3	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>g</sub> = 100K, F = 1KHz
D38S8-10	NPN	60	250-1.2K	100μA, 5	Typ 1.3	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>g</sub> = 100K, F = 1KHz
D38W8-10	NPN	80	150-1.2K	100μA, 5	2	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>g</sub> = 10K, BW = 15.7KHz, f = 10Hz to 10KHz
D38W13-14	NPN	100	150-800	100μA, 5	2	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100μA, R <sub>g</sub> = 10K, BW = 15.7KHz, f = 10Hz to 10KHz
GES6012	NPN	40	200-500	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6013	PNP	40	200-500	10mA, 1	2	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6016	NPN	60	200-500	10mA, 1	3	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz
GES6017	PNP	60	200-500	10mA, 1	2	V <sub>CE</sub> = 5V, I <sub>E</sub> = 100μA, R <sub>s</sub> = 5K, BW = 15.7KHz

# Silicon Transistors



The General Electric 2N3900 and 2N3900A are NPN silicon planar passivated devices intended for low noise preamplifier applications. The planar passivated construction assures excellent device stability and life. These high performance, high value transistors are made possible by utilizing advanced manufacturing techniques.



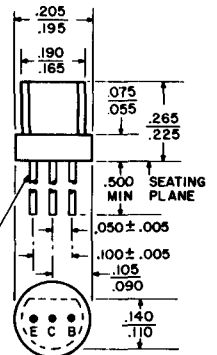
## absolute maximum ratings (25°C) unless otherwise specified

<b>Voltages</b>			
Collector to Emitter	$V_{CE0}$	18	V
Emitter to Base	$V_{EBO}$	5	V
Collector to Base	$V_{CBO}$	18	V
<b>Current</b>			
Collector (Steady State) <sup>(1)</sup>	$I_C$	100	mA
<b>Dissipation</b>			
Total Power (Free Air @ 25°C) <sup>(2)</sup>	$P_T$	360	mW
Total Power (Free Air @ 55°C) <sup>(2)</sup>	$P_T$	260	mW
<b>Temperature</b>			
Storage	$T_{str}$	-55 to +125	°C
Operating	$T_J$	+100	°C
Lead Soldering, $\frac{1}{16}$ " $\pm$ $\frac{1}{32}$ " from case for 10 seconds max.	$T_L$	+260	°C

NOTE 1: Lead diameter is controlled in the zone between .070 and .250 from the seating plane. Between .250 and end of lead a max. of .021 is held.

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3 LEADS  
.017  $^{+0.002}$   
-.001  
(NOTE 1)



<sup>(1)</sup> Determined from power limitations due to saturation voltage at this current.

<sup>(2)</sup> Derate 3.6 mW/°C increase in ambient temperature above 25°C.

## electrical characteristics (25°C) unless otherwise specified

		Min.	Typ.	Max.
<b>Collector Cutoff Current</b> ( $V_{CB} = 18V$ ) ( $V_{CB} = 18V, T_A = 100^\circ C$ )	$I_{CBO}$			.1 $\mu A$
	$I_{CBO}$			10 $\mu A$
<b>Emitter Cutoff Current</b> ( $V_{EB} = 5V$ )	$I_{EBO}$			.1 $\mu A$
<b>Forward Current Transfer Ratio</b> ( $V_{CE} = 4.5V, I_C = 2 mA$ )	$h_{FE}$	250		500
<b>SMALL SIGNAL CHARACTERISTICS</b>				
<b>Forward Current Transfer Ratio</b> ( $V_{CE} = 10V, I_C = 100 \mu A, f = 1 kHz$ )	$h_{fe}$	170 <sup>(3)</sup>	200	
<b>Input Impedance</b> ( $V_{CE} = 10V, I_C = 2 mA, f = 1 kHz$ )	$h_{ib}$		15	ohms
<b>Output Capacitance</b> ( $V_{CB} = 10V, I_E = 0, f = 1 MHz$ )	$C_{cbo}$	2.0	7	12 pF
<b>Gain Bandwidth Product</b> ( $I_C = 4 mA, V_{CB} = 5 V$ )	$f_t$		160	MHz
<b>NOISE</b>				
(wide band—15 cps to 10 kHz, Equivalent Noise Bandwidth = 15.7 kHz)				
<b>Noise Figure</b> ( $I_C = 100 \mu A, V_{CE} = 4.5V, R_k = 5000 ohms$ )	NF		1.9	5 <sup>(4)</sup> dB

<sup>(3)</sup> Typically a minimum of 95% of the distribution is above this value.

<sup>(4)</sup> Type 2N3900A only.

# TYPICAL CURVES 2N3900 AND 2N3900A

