


TYPE	MATERIAL	POLARITY	REPLACE- MENT	PAGE NUMBER	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub> @ 25°C	P <sub>h</sub> Point °C	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub> (volts)	h <sub>FE</sub>	Subscript	f <sub>T</sub> (Units)	Subscript			
												(min)	(max)						Units	Units	Units
2N3174	S	P	2N3790	7-147	HPA	75W	C	200	100	100	0	12	36	1.0A	0.75	1.0A	10	E	1.0M	T	
2N3175	S	P	MJ2267	7-202	HPA	85W	C	200	40	40	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3176	S	P	2N3789	7-147	HPA	85W	C	200	60	60	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3177	S	P	2N3790	7-147	HPA	85W	C	200	80	80	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3178	S	P	2N3790	7-147	HPA	85W	C	200	100	100	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3179	S	P	MJ2267	7-202	HPA	85W	C	200	40	40	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3180	S	P	2N3789	7-147	HPA	85W	C	200	60	60	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3181	S	P	2N3790	7-147	HPA	85W	C	200	80	80	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3182	S	P	2N3790	7-147	HPA	85W	C	200	100	100	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3183	S	P	2N3789	7-147	HPA	75W	C	200	40	40	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3184	S	P	2N3789	7-147	HPA	75W	C	200	60	60	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3185	S	P	2N3790	7-147	HPA	75W	C	200	80	80	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3186	S	P	2N3790	7-147	HPA	75W	C	200	100	100	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T	
2N3187	S	P	MJ2267	7-202	HPA	85W	C	200	40	40	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3188	S	P	2N3789	7-147	HPA	85W	C	200	60	60	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3189	S	P	2N3790	7-147	HPA	85W	C	200	80	80	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3190	S	P	2N3790	7-147	HPA	85W	C	200	100	100	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3191	S	P	2N3790	7-147	HPA	85W	C	200	40	40	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3192	S	P	2N3789	7-147	HPA	85W	C	200	60	60	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3193	S	P	2N3790	7-147	HPA	85W	C	200	80	80	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3194	S	P	2N3790	7-147	HPA	85W	C	200	100	100	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3195	S	P	2N3789	7-147	HPA	75W	C	200	60	60	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3196	S	P	2N3789	7-147	HPA	75W	C	200	80	80	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3197	S	P	2N3790	7-147	HPA	75W	C	200	100	100	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3198	S	P	2N3790	7-147	HPA	75W	C	200	100	100	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T	
2N3199	S	P	2N3790	7-147	HPA	40W	C	200	40	40	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T	
2N3200	S	P	2N3740	7-137	HPA	40W	C	200	60	60	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T	
2N3201	S	P	2N3741	7-137	HPA	40W	C	200	80	80	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T	
2N3202	S	P	2N3741	7-137	HPA	8.8W	C	200	40	40	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T	
2N3203	S	P	2N3740	7-137	HPA	8.8W	C	200	60	60	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T	
2N3204	S	P	2N3741	7-137	HPA	8.8W	C	200	80	80	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T	
2N3205	S	P	2N3741	7-137	HPA	40W	C	200	40	40	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T	
2N3206	S	P	2N3740	7-137	HPA	40W	C	200	60	60	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T	
2N3207	S	P	2N3741	7-137	HPA	40W	C	200	100	100	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T	
2N3208	S	P	2N3740	7-137	HPA	8.8W	C	200	40	40	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T	
2N3209	S	P	MM2894	8-328	MSS	0.36W	A	200	20	20	0	30	120	30M	0.2	30M	10	E	400M	T	
2N3210	S	N		8-196	HSS	0.36W	A	200	40	15	0	30	120	10M	0.75	0.2A			300M	T	
2N3211	S	N		8-198	HSS	0.36W	A	200	40	15	0	50	150	10M	0.2	10M			350M	T	
2N3212	S	N			LPA	14W	C	110	100	80	0	30	90	3.0A	0.5	5.0A	3.0	E			
2N3213	G	P			LPA	14W	C	110	80	60	0	30	90	3.0A	0.5	5.0A	3.0	E			
2N3214	G	P			LPA	14W	C	110	60	40	0	30	90	3.0A	0.5	5.0A	3.0	E			
2N3215	G	P			LPA	14W	C	110	40	30	0	30	90	3.0A	0.5	5.0A	3.0	E			
2N3216	G	P			MSS	150M	A	100	20	10	0	60	100	200M	0.22	200M			10M	T	
2N3217	S	P			CHP	400M	A	200	15	10	0								1.0M	T	
2N3218	S	P			CHP	400M	A	200	25	20	0								1.0M	T	
2N3219	S	P			CHP	400M	A	200	40	35	0								1.0M	T	
2N3220	S	N			HFA	6.0W	C	175	100	80	0	20	60	1.0A	1.25	1.0A	20	E	10M	T	
2N3221	S	N			HPA	6.0W	C	175	100	80	0	40	120	1.0A	1.25	1.0A	40	E	10M	T	
2N3222	S	N			HPA	6.0W	C	175	80	60	0	20	60	1.0A	1.25	1.0A	20	E	10M	T	
2N3223	S	N			HPA	6.0W	C	175	80	60	0	40	120	1.0A	1.25	1.0A	40	E	10M	T	
2N3224	S	N	2N3498	8-232	VID	0.7W	A	200	100	100	0	20	60	50M			20	E	60M	T	
2N3225	S	P	2N3498	8-232	VID	0.7W	A	200	100	100	0	40	120	50M			40	E	80M	T	
2N3226	S	N			LPA	75W	C	200	35	35	0	20	50	2.0A	1.2	2.7A	20	E	30K	T	
2N3227	S	N		8-130	HSS	0.36W	A	200	40	20	0	100	300	10M	0.25	10M			500M	T	
2N3228	Thyristor, see Table on Page 1-154																				
2N3229	S	N			HPA	17.5W	C	200	105	60	0	5.0		2.5A	1.0	2.5A			150M	T	
2N3230	S	N			PHS	25W	C	200	80	60	0	2K	20K	2.0A	1.4	2.0A			40M	T	
2N3231	S	N			PHS	25W	C	200	100	80	0	2K	20K	2.0A	1.4	2.0A			40M	T	
2N3232	S	N			HPA	117W	C	200	80	60	0	18	55	3.0A	2.5	3.0A	10	E	1.0M	T	
2N3233	S	N		7-106	HPA	117W	C	200	110	100	0	18	55	3.0A	2.5	3.0A	10	E	1.0M	T	
2N3234	S	N			HPA	117W	C	200	160	160	0	18	55	3.0A	2.5	3.0A	10	E	1.0M	T	
2N3235	S	N		7-106	HPA	117W	C	200	65	55	0	20	70	4.0A	1.1	4.0A	10	E	1.0M	T	
2N3236	S	N			HPA	150W	C	200	90	90	0	17	60	5.0A	1.1	5.0A	10	E	1.0M	T	
2N3237	S	N			HPA	200W	C	200	90	75	0	12	36	10A	2.0	10A	10	E	1.0M	T	
2N3238	S	N			HPA	150W	C	200	80	80	0	8.5	25	10A	3.0	10A	10	E	1.0M	T	
2N3239	S	N			HPA	150W	C	200	80	80	0	8.5	25	10A	1.0	10A	10	E	1.0M	T	
2N3240	S	N			HPA	150W	C	200	160	160	0	8.5	25	10A	1.0	10A	10	E	1.0M	T	
2N3241	S	N			LNA	0.5W	A	175	30	25	0	50	300	10M			70	E	50M	T	
2N3241A	S	N			AFA	500M	A	175	30	25	0						175	E	100M	T	
2N3242	S	N			LNA	0.5W	A	175	30	25	0	75		10M			100	E	50M	T	
2N3242A	S	N			AFA	500M	A	175	40	40	0						200	E	100M	T	
2N3244	S	P		8-200	HSS	1.0W	A	200	40	40	0	50	150	0.5A	0.3	0.15A			175M	T	
2N3245	S	P		8-200	HSS	1.0W	A	200	50	50	0	30	90	0.5A	0.35	0.15A			150M	T	
2N3246	S	N			LNA	0.35W	A	200	60	45	0	200	600	10*	0.5	5.0M	200	E	60M	T	
2N3247	S	N			LNA	0.15W	A	150	60	45	0	200	600	10*	0.5	5.0M	200	E	60M	T	
2N3248	S	P		8-204	HSS	0.36W	A	200	15	12	0	50	150	0.1M	0.125	10M			250M	T	
2N3249	S	P		8-204	HSS	0.36W	A	200	15	12	0	100	300	0.1M	0.125	10M			300M	T	
2N3250	S	P		8-208	HSS	0.36W	A	200	50	40	0	50	150</								



**SILICON POWER TRANSISTOR SELECTOR GUIDE (continued)**

Type	$V_{CE0}$	$h_{FE}$ @ $I_C$		$V_{CE(sat)}$ @ $I_C$ & $I_B$		
NPN	Volts (Max)	Min/Max	Amp	Volts (Max)	Amp	Amp
PNP						

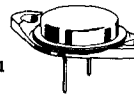
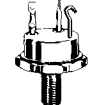
**3.0 AMP ( $T_{J(Max)} = 200^\circ C$ )**

 <p><b>Case 31</b> (TO-5) Solid Header</p>	$P_D = 6.0 W$ $f_T = 3.0 MHz$ $*f_T = 60 MHz$	2N3719*	40	25/180	1.0	0.75	1.0	0.1
		2N3720*	60	25/160	1.0	0.75	1.0	0.1
		2N3867*	40	40/200	1.5	0.75	1.5	0.15
		2N3868*	60	30/150	1.5	0.75	1.5	0.15
		2N4234	40	30/150	0.25	0.6	1.0	0.125
		2N4235	60	30/150	0.25	0.6	1.0	0.125
		2N4236	80	30/150	0.25	0.6	1.0	0.125
		2N4237	40	30/150	0.25	0.6	1.0	0.1
		2N4238	60	30/150	0.25	0.6	1.0	0.1
		2N4239	80	30/150	0.25	0.6	1.0	0.1

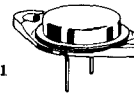
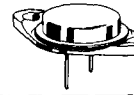

**4.0 AMP ( $T_{J(Max)} = 200^\circ C$ )**

 <p><b>Case 31</b> (TO-5)</p>	$P_D = 10 W$ $f_T = 4.0 MHz$	2N4877	60	20/100	4.0	1.0	4.0	0.4
		 <p><b>Case 80</b> (TO-66)</p>	$P_D = 20 W$ $f_T = 10 MHz$	2N3054*	60	25/100	0.5	1.0
2N3766	60			40/160	0.5	1.0	0.5	0.05
2N3767	80			40/160	0.5	1.0	0.5	0.05
$P_D = 25 W$ $*f_T = 1.0 MHz$ $f_T = 3.0 MHz$ $**f_T = 4.0 MHz$	2N3740		60	30/100	0.25	0.6	1.0	0.125
	2N3741		80	30/100	0.25	0.6	1.0	0.125
	2N4898		40	20/100	0.5	0.6	1.0	0.1
	2N4899		60	20/100	0.5	0.6	1.0	0.1
	2N4900		80	20/100	0.5	0.6	1.0	0.1
$P_D = 35 W$ $f_T = 1.0 MHz$	2N4910		40	20/100	0.5	0.6	1.0	0.1
	2N4911		60	20/100	0.5	0.6	1.0	0.1
	2N4912	80	20/100	0.5	0.6	1.0	0.1	
MJ4101**	40	25/100	1.5	1.0	1.5	0.15		
2N4231	40	25/100	1.5	0.7	1.5	0.15		
2N4232	60	25/100	1.5	0.7	1.5	0.15		
2N4233	80	25/100	1.5	0.7	1.5	0.15		

**5.0 AMP ( $T_{J(Max)} = 200^\circ C$ )**

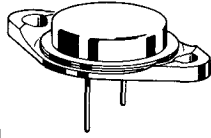
 <p><b>Case 11</b> (TO-3)</p>	$P_D = 87.5 W$ $f_T = 4.0 MHz$	2N4901	40	20/80	1.0	0.4	1.0	0.1
		2N4902	60	20/80	1.0	0.4	1.0	0.1
		2N4903	80	20/80	1.0	0.4	1.0	0.1
		2N4904	40	25/100	2.5	1.0	2.5	0.25
		2N4905	60	25/100	2.5	1.0	2.5	0.25
		2N4906	80	25/100	2.5	1.0	2.5	0.25
		2N4913	40	25/100	2.5	1.0	2.5	0.25
		2N4914	60	25/100	2.5	1.0	2.5	0.25
		2N4915	80	25/100	2.5	1.0	2.5	0.25
		2N5067	40	20/80	1.0	0.4	1.0	0.1
2N5068	60	20/80	1.0	0.4	1.0	0.1		
2N5069	80	20/80	1.0	0.4	1.0	0.1		
 <p><b>Case 9</b> (TO-61)</p>	$P_D = 117 W$ $f_T = 10 MHz$	2N1724	80	20/90	2.0	1.0	2.0	0.2
		2N1725	80	50/150	2.0	1.0	2.0	0.2

**7.5 AMP ( $T_{J(Max)} = 200^\circ C$ )**

 <p><b>Case 11</b> (TO-3)</p>	$P_D = 115 W$ $f_T = 10 MHz$	2N3445	60	20/60	3.0	1.5	3.0	0.3
		2N3446	80	20/60	3.0	1.5	3.0	0.3
		2N3447	60	40/120	5.0	1.5	5.0	0.5
		2N3448	80	40/120	5.0	1.5	5.0	0.5
 <p><b>Case 1</b> (TO-3)</p>	$P_D = 117 W$ $f_T = 1.0 MHz$	2N3232	60	15/75	3.0	2.5	3.0	0.2
 <p><b>Case 9</b> (TO-61)</p>	$P_D = 117 W$ $f_T = 10 MHz$	2N3487	60	20/60	3.0	1.2	3.0	0.3
		2N3488	80	20/60	3.0	1.2	3.0	0.3
		2N3489	100	15/45	3.0	1.2	3.0	0.3
		2N3490	60	40/120	5.0	1.0	3.0	0.3
		2N3491	80	40/120	5.0	1.0	3.0	0.3
		2N3492	100	30/90	5.0	1.0	3.0	0.3

**2N3232 (SILICON)**  
**2N3235**

**$V_{CE0} = 55-60\text{ V}$**   
 **$I_C = 7.5-10\text{ A}$**   
 **$P_D = 117\text{ W}$**



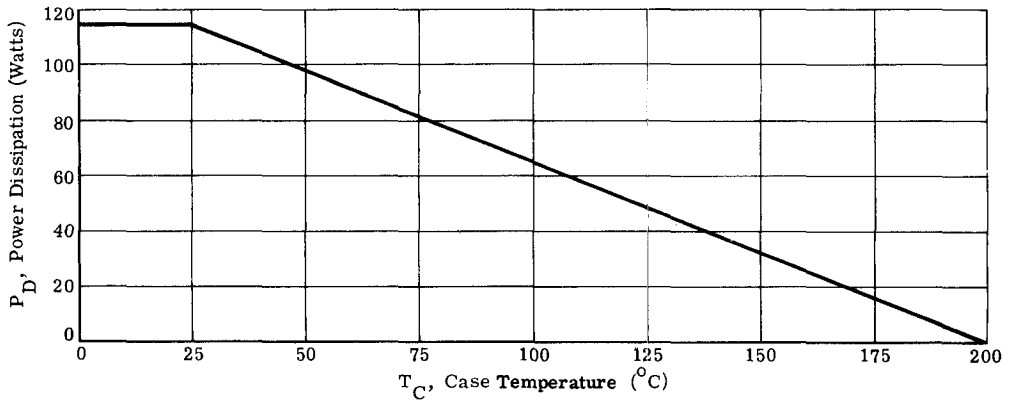
NPN silicon power transistors designed for switching and amplifier applications.

**CASE 11**  
 (TO-3)

**MAXIMUM RATINGS**

Rating	Symbol	2N3232	2N3235	Units
Collector-Base Voltage	$V_{CB}$	60	55	Vdc
Collector-Emitter Voltage	$V_{CEO}$	60	55	Vdc
Emitter-Base Voltage	$V_{EB}$	6	7	Vdc
Collector Current (Continuous)	$I_C$	7.5	10	Adc
Base Current (Continuous)	$I_B$	3	7	Adc
Power Dissipation	$P_D$	117	117	Watts
Thermal Resistance, Junction to Case	$\theta_{JC}$	1.5	1.5	$^{\circ}\text{C}/\text{W}$
Junction Operating Temperature Range	$T_J$	-65 $^{\circ}\text{C}$ to +200 $^{\circ}\text{C}$		$^{\circ}\text{C}$

**FIGURE 1 — POWER-TEMPERATURE DERATING CURVE**



**Power Transistors**

**2N3232, 2N3235** (continued)

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit	
Emitter-Base Cutoff Current ( $V_{EB} = 6.0$ Vdc)	2N3232	$I_{EBO}$	-	1.0	mAdc	
	( $V_{EB} = 7.0$ Vdc)		2N3235	-		5.0
Collector-Emitter Cutoff Current ( $V_{CE} = 60$ Vdc, $V_{BE} = -1.5$ Vdc)	2N3232	$I_{CEX}$	-	1.0	mAdc	
	2N3235		-	-	5.0	
	( $V_{CE} = 30$ Vdc, $V_{BE} = -1.5$ Vdc, $T_C = 150^\circ\text{C}$ )		2N3232	-	-	1.0
	2N3235		-	5.0		
Collector-Emitter Sustaining Voltage* ( $I_C = 100$ mAdc, $I_B = 0$ )	2N3232	$V_{CEO(sus)}^*$	60	-	Vdc	
	2N3235		55	-		
Collector Current ( $V_{CE} = 60$ Vdc, $I_B = 0$ )	2N3232	$I_{CEO}$	-	10	mAdc	
	( $V_{CE} = 55$ Vdc, $I_B = 0$ )		2N3235	-		10
DC Current Gain* ( $I_C = 1.5$ Adc, $V_{CE} = 10$ Vdc)	2N3232	$h_{FE}$	15	-	-	
	( $I_C = 3.0$ Adc, $V_{CE} = 10$ Vdc)		2N3235	15		75
	( $I_C = 2$ Adc, $V_{CE} = 4$ Vdc)		2N3232	20		-
	( $I_C = 4$ Adc, $V_{CE} = 4$ Vdc)		2N3235	20		70
Collector-Emitter Saturation Voltage ( $I_C = 3.0$ Adc, $I_B = 0.2$ Adc)	2N3232	$V_{CE(sat)}$	-	2.5	Vdc	
	( $I_C = 4.0$ Adc, $I_B = 0.4$ Adc)		2N3235	-		1.1
Base-Emitter Voltage* ( $I_C = 3.0$ Adc, $V_{CE} = 10$ Vdc)	2N3232	$V_{BE}$	-	3.5	Vdc	
	( $I_C = 4.0$ Adc, $V_{CE} = 4$ Vdc)		2N3235	-		1.8
Small Signal Current Gain ( $V_{CE} = 10$ Vdc, $I_C = 3.0$ Adc, $f = 1.0$ MHz)	2N3232	$h_{fe}$	1.0	-	-	
	( $V_{CE} = 4$ Vdc, $I_C = 4.0$ Adc, $f = 1.0$ MHz)		2N3235	1.0		-

\*Use sweep test to prevent overheating.