

ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

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MJ13100		MJ16016	3-774	MJ2841		2N5878	3-120
MJ13101		MJ16016	3-774	MJ2901		MJ15016	3-9
MJ13330	MJ13330		3-694	MJ2940		2N5875	3-120
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MJ13333	MJ13333		3-700	MJ3000	MJ3000		3-530
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MJ14001	MJ14001		3-706	MJ3040	MJ3041		3-534
MJ14002	MJ14002		3-706	MJ3041	MJ3041		3-534
MJ14003	MJ14003		3-706	MJ3042	MJ3042		3-534
MJ15001	MJ15001		3-710	MJ3055	2N3055		3-6
MJ15002	MJ15002		3-710	MJ3055A	2N3055A		3-9
MJ15003	MJ15003		3-713	MJ3237	MJE15031		3-972
MJ15004	MJ15004		3-713	MJ3238	MJE15031		3-972
MJ15011	MJ15011		3-716	MJ3247	MJE15030		3-972
MJ15012	MJ15012		3-716	MJ3248	MJE15030		3-972
MJ15015	MJ15015		3-9	MJ400		2N3739	3-37
MJ15016	MJ15016		3-9	MJ4030	2N6285		3-172
MJ15018	MJ15018		3-718	MJ4031	2N6286		3-172
MJ15019	MJ15019		3-718	MJ4032	2N6287		3-172
MJ15020	MJ15020		3-718	MJ4033	2N6282		3-172
MJ15021	MJ15021		3-718	MJ4034	2N6283		3-172
MJ15022	MJ15022		3-720	MJ4035	2N6284		3-172
MJ15023	MJ15023		3-723	MJ410	MJ410		3-522
MJ15024	MJ15024		3-720	MJ411	MJ411		3-522
MJ15025	MJ15025		3-723	MJ413	MJ413		3-524
MJ15026		MJ15024	3-720	MJ423	MJ423		3-524
MJ15027		MJ15025	3-723	MJ4237		MJ15012	3-716
MJ16002	MJ16002		3-726	MJ4238		MJ15012	3-716
MJ16002A	MJ16002A		3-734	MJ424		2N6308	3-181
MJ16004	MJ16004		3-726	MJ4247		MJ15011	3-716
MJ16006	MJ16006		3-742	MJ4248		MJ15011	3-716
MJ16006A	MJ16006A		3-750	MJ425		2N6545	3-221
MJ16008	MJ16008		3-742	MJ431	MJ431		3-524
MJ16010	MJ16010		3-758	MJ4360		MJE130C2	3-938
MJ16010A	MJ16010A		3-766	MJ4361		MJE130C3	3-938
MJ16012	MJ16012		3-758	MJ4380		MJE130C4	3-944
MJ16014	MJ16014		3-774	MJ4381		MJE130C5	3-944
MJ16016	MJ16016		3-774	MJ4400		MJE130C4	3-944
MJ16018	MJ16018		3-782	MJ4401		MJE130C5	3-944
MJ16020	MJ16020		—	MJ450		2N4398	3-68
MJ16022	MJ16022		—	MJ4502	MJ4502		3-536
MJ205		MJ12003	3-642	MJ4645	MJ4646		3-538
MJ2249		2N3766	3-44	MJ4646	MJ4646		3-538
MJ2250		2N3767	3-44	MJ4647	MJ4647		3-538
MJ2251		2N3738	3-37	MJ480		2N3055	3-6
MJ2252		2N3739	3-37	MJ481		2N3055	3-6
MJ2253		2N3740	3-41	MJ490		2N3789	3-56
MJ2254		2N3741	3-41	MJ491		2N3789	3-56
MJ2267		MJ15016	3-9	MJ6502	MJ6503		3-540
MJ2268		MJ2955	3-6	MJ6503	MJ6503		3-540
MJ2300		MJE270	3-874	MJ6700		2N6193	3-158
MJ2305		MJE271	3-874	MJ701		MJ12002	3-637
MJ2500	MJ2500		3-530	MJ702		MJ12002	3-637
MJ2501	MJ2501		3-530	MJ704		MJ12002	3-637
MJ2801		2N3055	3-6	MJ721		MJ12002	3-637

*Consult Motorola if a direct replacement is necessary.

TABLE 1 — METAL TO-204, TO-204AE (continued)

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	Resistive Switching			f _T MHz Min	P _D (Case) Watts @ 25°C
						t _s μs Max	t _f μs Max	@ I _C Amp		
		NPN	PNP							
25	60	2N5885	2N5883	20/100	10	1	0.8	10	4	200
	80	2N5886	2N5884 2N6436	20/100 30/120	10 10	1 1	0.8 0.25	10 10	4 40	200 200
	100	2N6338	2N6437	30/120	10	1	0.25	10	40	200
	120	2N6339	2N6438	30/120	10	1	0.25	10	40	200
	125	BUV10 BUV10N		10 min 10 min	20 20	1.2 1.55	0.25 0.45	20 15	8 10	150 175
	140	2N6340		30/120	10	1	0.25	10	40	200
	150	2N6341		30/120	10	1	0.25	10	40	200
	500	BUT14##		15 min	16	2.8	0.8	16		175
28	400	BUT13##		20 min	20	2.6	0.8	18		175
30	40	2N3771 2N5301	2N4398	15/60 15/60	15 15				2 2	150 200
	60	2N5302 MJ11012##	2N4399 MJ11011##	15/60 1k min	15 20	2	1	10	2 4#	200 200
	90	BUX39 MJ11014##	MJ11013##	8 min 1k min	20 20	1	0.25	20	8 4#	120 200
	100	2N6328 MJ802	MJ4502	6/30 25/100	30 7.5				3 2	200 200
	120	MJ11016##	MJ11015##	1k min	20				4#	200
	325	BUV23●		8 min	16	1.8	0.4	16	8	250
	400	BUS98● BUX98		8 min	20	2.3 3	0.4 0.8	20 20		250 250
	450	BUS98A● BUX98A MJ16020● MJ16022●		8 min 5 min 7 min	16 30 30	2.3 3 1.8 1.5	0.4 0.8 0.2 0.15	16 16 20 20		250 250 250 250
40	160	BUV21N●		10 min	40	1	0.2	40	8	250
	200	BUV21●		10 min	25	1.8	0.4	25	8	150
	250	BUS52● BUV22●		15 min 10 min	40 20					350 250
	350	MJ10022●##		50/600	120	2.5	0.9	20		250
	400	MJ10023●##		50/600	10	2.5	0.9	20		250
	700	BUT35●##		15 min	24	4	1.2	24		250
50	60	2N5685● MJ11028●##	2N5683● MJ11029●##	15/60 400 min	25 50	0.5 typ	0.3 typ	25	2	300 300
	80	2N5686●	2N5684● 2N6377●	15/60 30/120	25 20	0.5 typ 0.8	0.3 typ 0.25	25 20	2 30	300 250
	90	MJ11030●##	MJ11031●##	400 min	50					300
	100	2N6274●	2N6378●	30/120	20	0.8	0.25	20	30	250
	120	2N6275● MJ11032●##	2N6379● MJ11033●##	30/120 400 min	20 50	0.8	0.25	20	30	250 300
	125	BUV20●		10 min	50	1.2	0.25	50	8	250
	150	2N6277●		30/120	20	0.8	0.25	20	30	250

● Modified TO-3 60 mil pins, # |h_{FE}| @ 1 MHz, ## Darlington

(continued)

JAN, JTX, JTXV Available

MJ4502

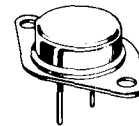
HIGH-POWER PNP SILICON TRANSISTOR

... for use as an output device in complementary audio amplifiers to 100-Watts music power per channel.

- High DC Current Gain — $h_{FE} = 25-100$ @ $I_C = 7.5$ A
- Excellent Safe Operating Area
- Complement to the NPN MJ802

**30 AMPERE
POWER TRANSISTOR**

**PNP SILICON
100 VOLTS
200 WATTS**



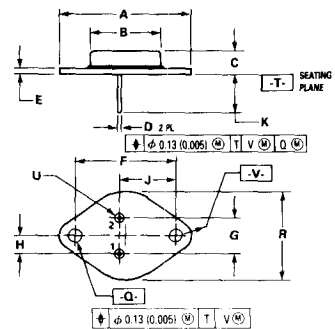
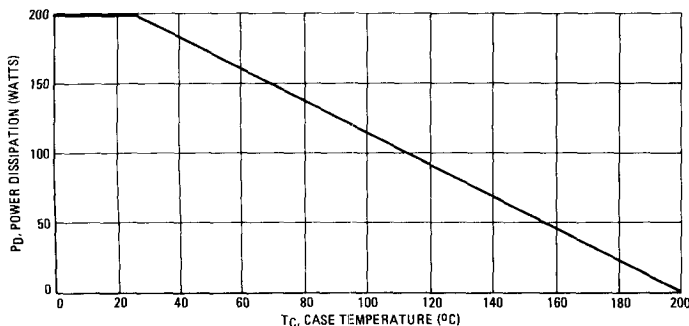
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE}	100	Vdc
Collector-Base Voltage	V_{CB}	100	Vdc
Collector-Emitter Voltage	V_{CEO}	90	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector Current	I_C	30	Adc
Base Current	I_B	7.5	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	200 1.14	Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.875	$^\circ\text{C/W}$

FIGURE 1 — POWER-TEMPERATURE DERATING CURVE



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	6.35	8.25	0.250	0.325
D	0.97	1.09	0.038	0.043
E	1.40	1.77	0.055	0.070
F	30.15 BSC	—	1.187 BSC	—
G	10.92 BSC	—	0.430 BSC	—
H	5.46 BSC	—	0.215 BSC	—
J	16.89 BSC	—	0.665 BSC	—
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	—	26.67	—	1.050
U	4.83	5.33	0.190	0.210
V	3.84	4.19	0.151	0.165

STYLE 1:
PIN 1. BASE
2. EMITTER
CASE COLLECTOR

**CASE 1-06
TO-204AA
(TO-3)**

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage ⁽¹⁾ ($I_C = 200\text{ mA dc}$, $R_{BE} = 100\text{ Ohms}$)	$V_{(BR)CER}$	100	—	Vdc
Collector-Emitter Sustaining Voltage ⁽¹⁾ ($I_C > 200\text{ mA dc}$)	$V_{CEO(sus)}$	90	—	Vdc
Collector-Base Cutoff Current ($V_{CB} = 100\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 100\text{ Vdc}$, $I_E = 0$, $T_C = 150^\circ\text{C}$)	I_{CBO}	—	1.0 5.0	mA dc
Emitter-Base Cutoff Current ($V_{BE} = 4.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	1.0	mA dc
ON CHARACTERISTICS ⁽¹⁾				
DC Current Gain ($I_C = 7.5\text{ A dc}$, $V_{CE} = 2.0\text{ Vdc}$)	h_{FE}	25	100	—
Base-Emitter "On" Voltage ($I_C = 7.5\text{ A dc}$, $V_{CE} = 2.0\text{ Vdc}$)	$V_{BE(on)}$	—	1.3	Vdc
Collector-Emitter Saturation Voltage ($I_C = 7.5\text{ A dc}$, $I_B = 0.75\text{ A dc}$)	$V_{CE(sat)}$	—	0.8	Vdc
Base-Emitter Saturation Voltage ($I_C = 7.5\text{ A dc}$, $I_B = 0.75\text{ A dc}$)	$V_{BE(sat)}$	—	1.3	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain - Bandwidth Product ($I_C = 1.0\text{ A dc}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ MHz}$)	f_T	2.0	—	MHz

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

FIGURE 2 — DC CURRENT GAIN

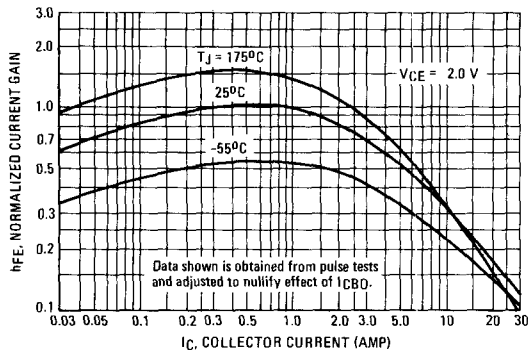


FIGURE 3 — "ON" VOLTAGES

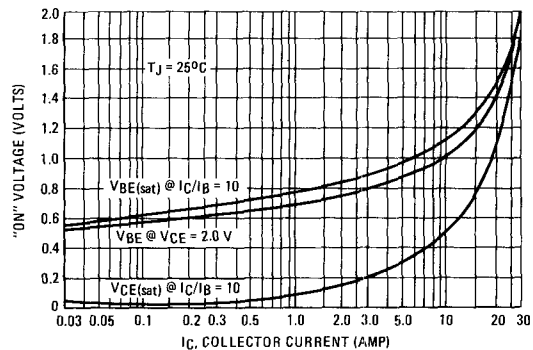
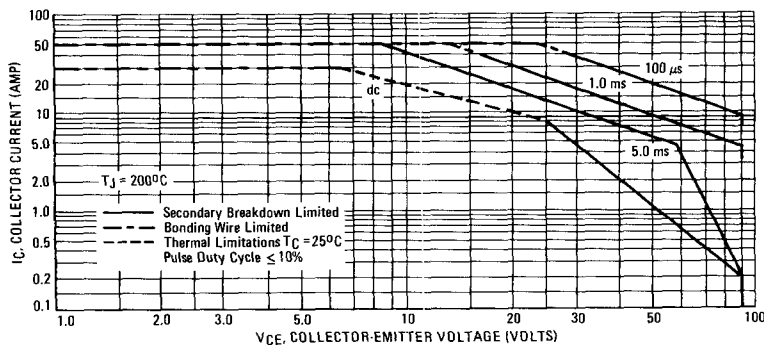


FIGURE 4 — ACTIVE REGION SAFE OPERATING AREA



The Safe Operating Area Curves indicate $I_C - V_{CE}$ limits below which the device will not enter secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a catastrophic failure. To insure operation below the maximum T_J , power-temperature derating must be observed for both steady state and pulse power conditions.