ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

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MJ13100		MJ16016	3-774
MJ13101		MJ16016	3-774
MJ13330	MJ13330		3-694
MJ13331	MJ13331		3-694
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MJ13333	MJ13333		3-700
MJ13334		MJ13335	3-700
MJ13335	MJ13335		3-700
MJ14000	MJ14000		3-706
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MJ15004	MJ15004		3-713
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MJ15027		MJ15025	3-723
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MJ16004	MJ16004		3-726
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MJ16014	MJ16014		3-774
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MJ2267		MJ15016	3-9
MJ2268		MJ2955	3-6
MJ2300		MJE270	3-874
MJ2305		MJE271	3-874
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Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
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MJ2841		2N5878	3-120
MJ2901		MJ15016	3-9
MJ2940		2N5875	3-120
MJ2955	MJ2955		3-6
MJ2955A	MJ2955A		3-9
MJ3000	MJ3000		3-530
MJ3001	MJ3001		3-530
MJ3029	MJ3029		3-532
MJ3030	2N6545		3-221
MJ3040	MJ3041		3-534
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MJ3042	MJ3042		3-534
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MJ3238	MJE15031		3-972
MJ3247	MJE15030		3-972
MJ3248	MJE15030		3-972
MJ400		2N3739	3-37
MJ4030	2N6285		3-172
MJ4031	2N6286		3-172
MJ4032	2N6287		3-172
MJ4033	2N6282		3-172
MJ4034	2N6283		3-172
MJ4035	2N6284		3-172
MJ410	MJ410		3-522
MJ411	MJ411		3-522
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MJ423	MJ423		3-524
MJ4237		MJ15012	3-716
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MJ424		2N6308	3-181
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MJ4380		MJE13004	3-944
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MJ4647	MJ4647		3-538
MJ480		2N3055	3-6
MJ481		2N3055	3-6
MJ490		2N3789	3-56
MJ491		2N3789	3-56
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MJ6503	MJ6503		3-540
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MJ702		MJ12002	3-637
MJ704		MJ12002	3-637
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 NPN	Device Type PNP	h_{FE} Min/Max	@ I_C Amp	Resistive Switching t_s µs Max	Resistive Switching t_f µs Max	Resistive Switching @ I_C Amp	f_T MHz Min	P_D (Case) Watts @ 25°C
6	375	BU326		30 typ	0.6	3.5	1**	2.5	6	90
	400	BU326A		30 typ	0.6	3.5	1**	2.5	6	90
7.5	80	2N3448		40/120	5	2	0.35	5	10	115
8	60	MJ1000##	MJ900##	1k min	3					90
		2N6055##	2N6053##	750/18k	4	1.5 typ	1.5 typ	4	4#	100
	80	MJ1001##	MJ901##	1k min	3					90
		2N6056##	2N6054##	750/18k	4	1.5 typ	1.5 typ	4	4#	100
	250	2N6306		15/75	3	1.6	0.4	3	5	125
	300	2N6307		15/75	3	1.6	0.4	3	5	125
	350	2N6308		12/60	3	1.6	0.4	5	5	125
	400	2N6545		7/35	5	4	1	5	6	125
			MJ6503	15 min	2	2	0.5	4		125
		MJ13080		8 min	5	1.5	0.5	5		150
	450	MJ16006		5 min	8	2.5	0.25	5		150
		MJ16008		7 min	8	2.2	0.25	5		150
		2N6835		10/30	5	2.5	0.25	5	10	150
	500	MJ16006A		5 min	8	3	0.4	5		150
	850*	MJ12021		5 min	8		0.1 typ	5		150
	1400*	MJ10011##		20 min	4		1	4		80
	1500*	MJ12005		5 min	5		1	5		100
9	400	BUX47		7 min	6	2	0.4	6		150
	450	BUX47A		7 min	5	2	0.4	5		150
10	40	2N6383##	2N6648##	1k/20k	5				20#	100
	60		2N3789	15 min	3	0.3 typ	0.4 typ	5	4	150
		2N3715	2N3791	30 min	3	0.3 typ	0.4 typ	5	4	150
		2N5877	2N5875	20/100	4	1	0.8	4	4	150
		2N6384##		1k/20k	5				20#	100
		MJ3000##	MJ2500##	1k min	5					150
	80	2N3714	2N3790	15 min	3	0.3 typ	0.4 typ	5	4	150
		2N3716	2N3792	30 min	3	0.3 typ	0.4 typ	5	4	150
		2N5878	2N5876	20/100	4	1	0.8	4	4	150
		2N6385##		1k/20k	5				20#	100
		MJ3001##	MJ2501##	1k min	5					150
	140	2N5634		15/60	5	0.9 typ	0.9 typ	5	1	150
		2N3442		20/70	4					117

* $V_{(BR)CEX}$, # $|h_{fe}|$ @ 1 MHz, ## Darlington

(continued)

JAN, JTX, JTXV Available

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

PNP
MJ2500, MJ2501
NPN
MJ3000, MJ3001

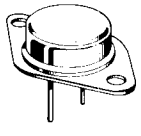
MEDIUM-POWER COMPLEMENTARY SILICON TRANSISTORS

. . . for use as output devices in complementary general purpose amplifier applications.

- High DC Current Gain – h_{FE} = 4000 (Typ) @ I_C = 5.0 Adc
- Monolithic Construction with Built-In Base-Emitter Shunt Resistors

10 AMPERE DARLINGTON POWER TRANSISTORS COMPLEMENTARY SILICON

60–80 VOLTS
150 WATTS

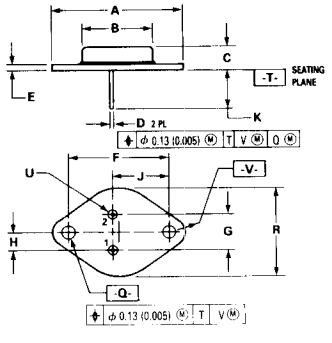


MAXIMUM RATINGS

Rating	Symbol	MJ2500 MJ3000	MJ2501 MJ3001	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	Vdc
Collector-Base Voltage	V_{CB}	60	80	Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current	I_C	10		Adc
Base Current	I_B	0.2		Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	150 0.857		Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	1.17	°C/W



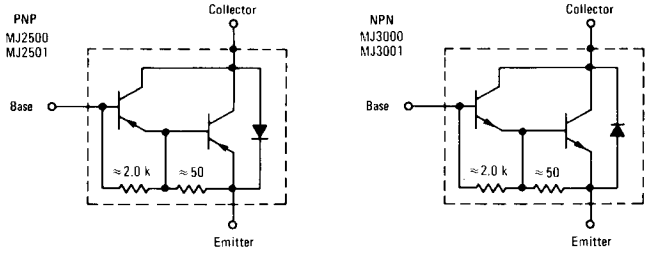
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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)

FIGURE 1 – DARLINGTON CIRCUIT SCHEMATIC



3

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage(1) (I_C = 100 mAdc, I_B = 0)	MJ2500, MJ3000	$V_{(BR)CEO}$	60	–	Vdc
	MJ2501, MJ3001		80	–	
Collector-Emitter Leakage Current		I_{CER}			mAdc
(V_{EB} = 60 Vdc, R_{BE} = 1.0 k ohm)	MJ2500, MJ3000		–	1.0	
(V_{EB} = 80 Vdc, R_{BE} = 1.0 k ohm)	MJ2501, MJ3001		–	1.0	
(V_{EB} = 60 Vdc, R_{BE} = 1.0 k ohm, T_C = 150°C)	MJ2500, MJ3000		–	5.0	
(V_{EB} = 80 Vdc, R_{BE} = 1.0 k ohm, T_C = 150°C)	MJ2501, MJ3001		–	5.0	
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	2.0	mAdc
Collector-Emitter Leakage Current		I_{CEO}			mAdc
(V_{CE} = 30 Vdc, I_B = 0)	MJ2500, MJ3000		–	1.0	
(V_{CE} = 40 Vdc, I_B = 0)	MJ2501, MJ3001		–	1.0	
ON CHARACTERISTICS (1)					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 3.0 Vdc)		h_{FE}	1000	–	–
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 5.0 Adc, I_B = 20 mAdc)			–	2.0	
(I_C = 10 Adc, I_B = 50 mAdc)			–	4.0	
Base-Emitter Voltage (I_C = 5.0 Adc, V_{CE} = 3.0 Vdc)		V_{BE}	–	3.0	Vdc

(1)Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

FIGURE 2 – DC CURRENT GAIN

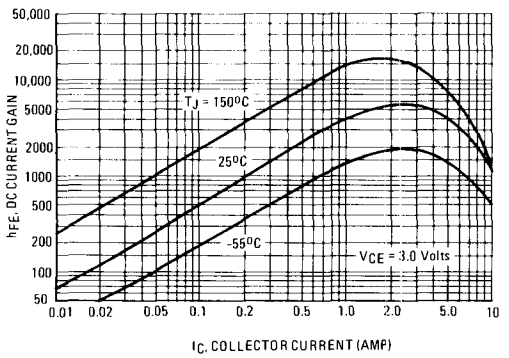


FIGURE 3 – SMALL-SIGNAL CURRENT GAIN

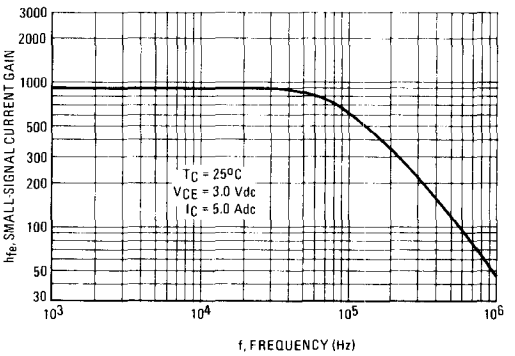


FIGURE 4 – "ON" VOLTAGES

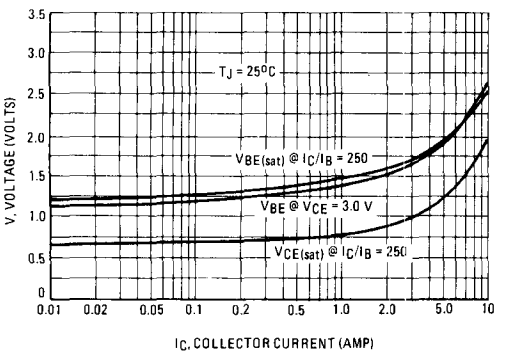
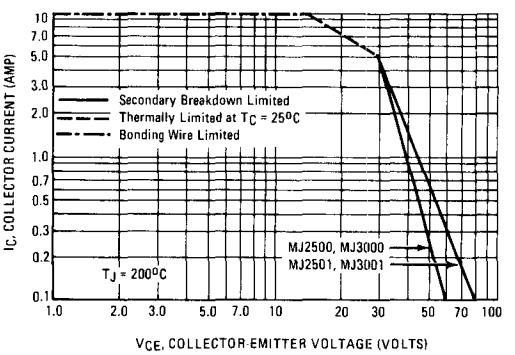


FIGURE 5 – DC SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor: junction temperature and secondary breakdown. Safe operating area curves indicate I_C–V_{CE} limits of the transistor that must be observed for reliable operation; e.g., the transistor must not be subjected to greater dissipation than the curves indicate.

At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.