

ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

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MJD127	MJD127		3-822	MJE1092	MJE1092		—
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MJD13003			3-854	MJE1100	MJE1100		—
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MJD148-1	MJD148-1		—	MJE1103	MJE1103		—
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MJD29	MJD31		3-797	MJE13003	MJE13003		3-938
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MJD30C	MJD32C		3-797	MJE15028	MJE15028		3-972
MJD30C1			3-797	MJE15029	MJE15029		3-972
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MJD32C			3-797	MJE1660	MJE1660		3-898
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MJD340	MJD340		3-840	MJE170	MJE170		3-862
MJD340-1			3-840	MJE171	MJE171		3-862
MJD350			3-840	MJE172	MJE172		3-862
MJD350-1			3-840	MJE180	MJE180		3-862
MJD41C			3-801	MJE181	MJE181		3-862
MJD41C1	MJD41C1		3-840	MJE182	MJE182		3-862
MJD42C			3-801	MJE200	MJE200		3-866
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MJD44E3			3-805	MJE2010			3-1083
MJD44E3-1			3-805	MJE2011			3-1083

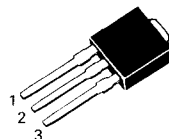
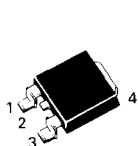
*Consult Motorola if a direct replacement is necessary.

TABLE 9 — PLASTIC CASE 152 (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
		NPN	PNP			t _s μs Max	t _f μs Max	@ I _C Amp		
2	60	MPS-U05	MPS-U55	60 min	0.25				50	10
	80	MPS-U06	MPS-U56	60 min	0.25				50	10
	100	MPS-U07	MPS-U57	30 min	0.25				50	10

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TABLE 10 — DPAK — SURFACE MOUNT POWER PACKAGE



- STYLE 1:
1. BASE
 2. COLLECTOR
 3. EMITTER
 4. COLLECTOR

CASE 369A-04

CASE 369-03

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
		NPN	PNP			t _s μs Typ	t _f μs Typ	@ I _C Amp		
0.5	300	MJD340	MJD350	30/240	0.05					15
1	250	MJD47		30/150	0.3	2	0.2	0.3	10	15
	400	MJD50		30/150	0.3	2	0.2	0.3	10	20
1.5	400	MJD13003		5/25	1	4 max	0.7 max	1	4	15
2	100	MJD112##	MJD117##	1000 min	2	1.7	1.3	2	25#	20
3	40	MJD31	MJD32	10 min	1	0.6	0.3	1	3	15
	100	MJD31C	MJD32C	10 min	1	0.6	0.3	1	3	15
4	45	MJD148		30 min	4				3	20
	80	MJD6039##	MJD6036##	1k/12k	2	1.7	1.2	2	25	20
5	25	MJD200	MJD210	45/180	2	0.15	0.04	2	65	12.5
6	100	MJD41C	MJD42C	15/75	3	0.4	0.15	3	3	20
8	80	MJD44H11	MJD45H11	40 min	4	0.5	0.14	5	50 typ	20
	100	MJD122##	MJD127##	1k/12k	4	1.5	2	4	4#	20
10	60	MJD3055	MJD2955	20/100	4	1.5	1.5	3	2	20
	80	MJD44E3##		1k min	5	2	0.5	10		20

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* Case 369-03 may be ordered by adding -1 suffix to part number.

Complementary Plastic Power Transistors

NPN/PNP Silicon DPAK For Surface Mount Applications

... designed for low voltage, low-power, high-gain audio amplifier applications.

- Collector-Emitter Sustaining Voltage — $V_{CE(sus)} = 25 \text{ Vdc (Min) @ } I_C = 10 \text{ mAdc}$
- High DC Current Gain — $h_{FE} = 70 \text{ (Min) @ } I_C = 500 \text{ mAdc}$
 $= 45 \text{ (Min) @ } I_C = 2 \text{ Adc}$
 $= 10 \text{ (Min) @ } I_C = 5 \text{ Adc}$
- Lead Formed for Surface Mount Applications in Plastic Sleeves (No Suffix)
- Straight Lead Version in Plastic Sleeves ("1" Suffix)
- Lead Formed Version in 16 mm Tape and Reel ("RL" Suffix)
- Low Collector-Emitter Saturation Voltage —
 $V_{CE(sat)} = 0.3 \text{ Vdc (Max) @ } I_C = 500 \text{ mAdc}$
 $= 0.75 \text{ Vdc (Max) @ } I_C = 2 \text{ Adc}$
- High Current-Gain — Bandwidth Product — $f_T = 65 \text{ MHz (Min) @ } I_C = 100 \text{ mAdc}$
- Annular Construction for Low Leakage — $I_{CBO} = 100 \text{ nAdc @ Rated } V_{CB}$

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Base Voltage	V_{CB}	40	Vdc
Collector-Emitter Voltage	V_{CEO}	25	Vdc
Emitter-Base Voltage	V_{EB}	8	Vdc
Collector Current — Continuous Peak	I_C	5 10	Adc
Base Current	I_B	1	Adc
Total Device Dissipation (at $T_C = 25^\circ\text{C}$ Derate above 25°C)	P_D	12.5 0.1	Watts W/ $^\circ\text{C}$
Total Device Dissipation (at $T_A = 25^\circ\text{C}$ * Derate above 25°C)	P_D	1.4 0.011	Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	10	$^\circ\text{C/W}$
Junction to Ambient*	$R_{\theta JA}$	89.3	

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage (1) ($I_C = 10 \text{ mAdc}, I_B = 0$)	$V_{CE(sus)}$	25	—	Vdc
Collector Cutoff Current ($V_{CB} = 40 \text{ Vdc}, I_E = 0$) ($V_{CB} = 40 \text{ Vdc}, I_E = 0, T_J = 125^\circ\text{C}$)	I_{CBO}	— —	100 100	nAdc μAdc
Emitter Cutoff Current ($V_{BE} = 8 \text{ Vdc}, I_C = 0$)	I_{EBO}	—	100	nAdc

* When surface mounted on minimum pad sizes recommended.
 (1) Pulse Test: Pulse Width = 300 μs , Duty Cycle = 2%.

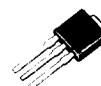
(continued)

NPN
MJD200
PNP
MJD210

SILICON
POWER TRANSISTORS
5 AMPERES
25 VOLTS
12.5 WATTS

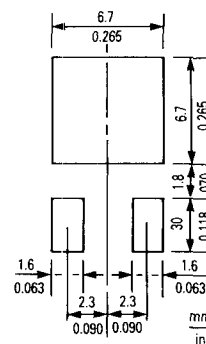


CASE 369A-04



CASE 369-03

MINIMUM PAD SIZES RECOMMENDED FOR SURFACE MOUNTED APPLICATIONS



3

ON CHARACTERISTICS

DYNAMIC CHARACTERISTICS

(1) Pulse Test: Pulse Width = $300\ \mu\text{s}$, Duty Cycle $\approx 2\%$.
 (2) $f_T = |h_{FE}| \cdot f_{\text{test}}$



MJD200 NPN, MJD210 PNP

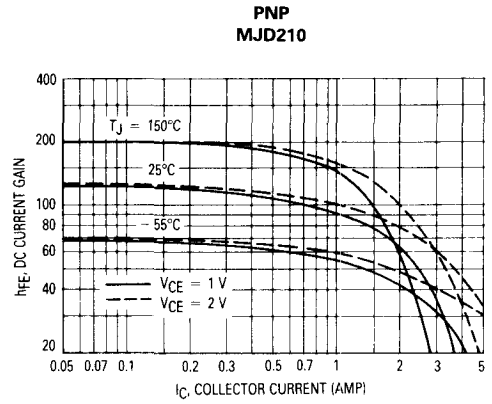
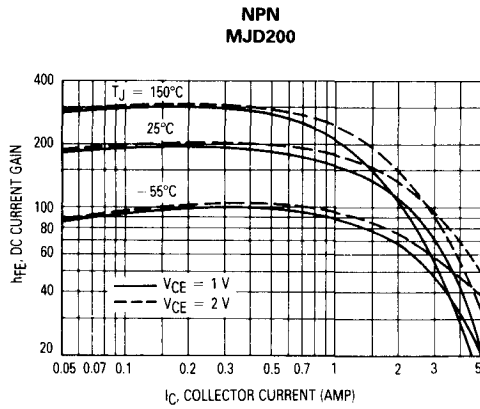


Figure 5. DC Current Gain

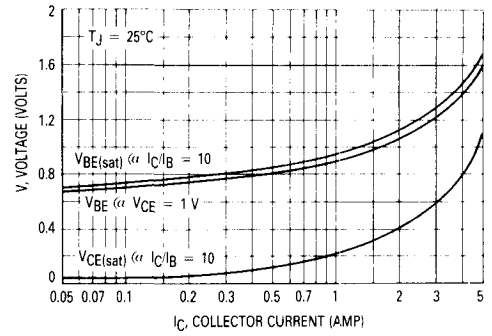
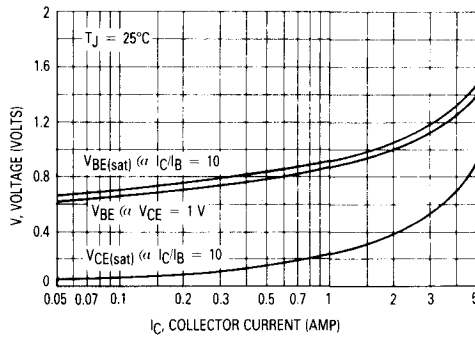


Figure 6. "On" Voltage

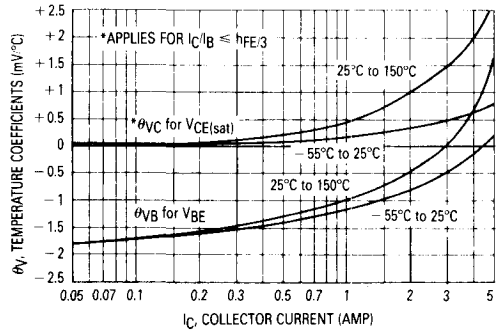
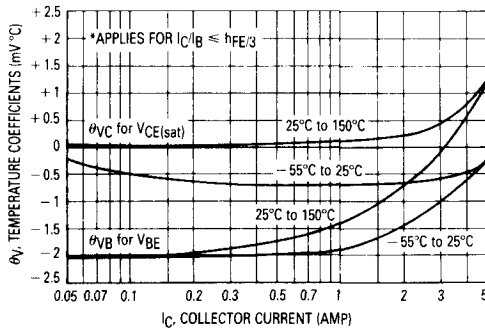


Figure 7. Temperature Coefficients

MJD200 NPN, MJD210 PNP

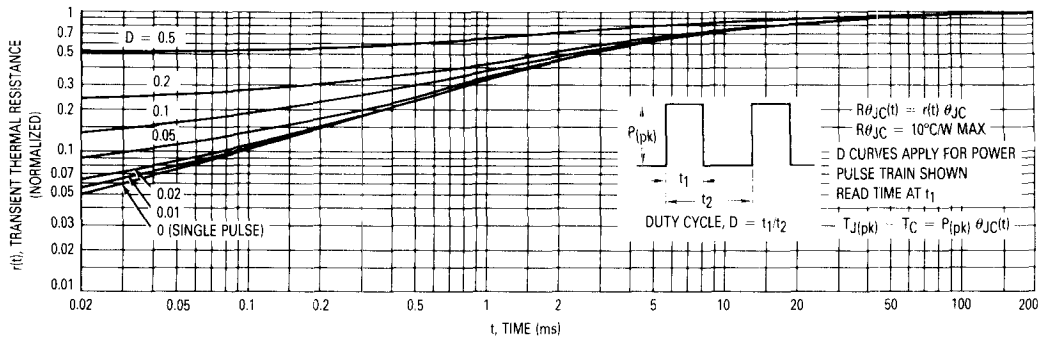


Figure 8. Thermal Response

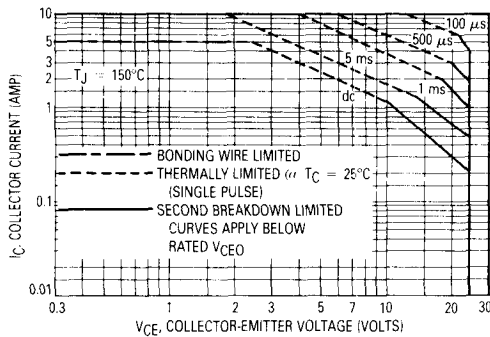


Figure 9. Active Region Safe Operating Area

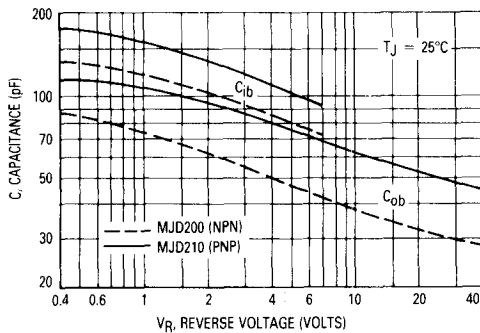


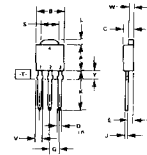
Figure 10. Capacitance

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

The data of Figure 9 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 8. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

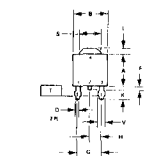
OUTLINE DIMENSIONS

CASE 369-03



DIMENSIONS			
DIM	MIN	MAX	INCHES
A	0.37	0.72	0.015
B	0.35	0.72	0.015
C	0.35	0.72	0.015
D	0.35	0.72	0.015
E	0.35	0.72	0.015
F	0.35	0.72	0.015
G	0.35	0.72	0.015
H	0.35	0.72	0.015
I	0.35	0.72	0.015
J	0.35	0.72	0.015
K	0.35	0.72	0.015
L	0.35	0.72	0.015
M	0.35	0.72	0.015
N	0.35	0.72	0.015
O	0.35	0.72	0.015
P	0.35	0.72	0.015
Q	0.35	0.72	0.015
R	0.35	0.72	0.015
S	0.35	0.72	0.015
T	0.35	0.72	0.015
U	0.35	0.72	0.015
V	0.35	0.72	0.015
W	0.35	0.72	0.015
X	0.35	0.72	0.015
Y	0.35	0.72	0.015
Z	0.35	0.72	0.015

CASE 369A-04



DIMENSIONS			
DIM	MIN	MAX	INCHES
A	0.37	0.72	0.015
B	0.35	0.72	0.015
C	0.35	0.72	0.015
D	0.35	0.72	0.015
E	0.35	0.72	0.015
F	0.35	0.72	0.015
G	0.35	0.72	0.015
H	0.35	0.72	0.015
I	0.35	0.72	0.015
J	0.35	0.72	0.015
K	0.35	0.72	0.015
L	0.35	0.72	0.015
M	0.35	0.72	0.015
N	0.35	0.72	0.015
O	0.35	0.72	0.015
P	0.35	0.72	0.015
Q	0.35	0.72	0.015
R	0.35	0.72	0.015
S	0.35	0.72	0.015
T	0.35	0.72	0.015
U	0.35	0.72	0.015
V	0.35	0.72	0.015
W	0.35	0.72	0.015
X	0.35	0.72	0.015
Y	0.35	0.72	0.015
Z	0.35	0.72	0.015

Case 369-03 may be ordered by adding a "-1" suffix to the device title (i.e. MJD200-1)