ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
MJF127	MJF127		3-1016
MJF15030	MJF15030		3-1026
MJF15031	MJF15031		3-1026
MJF2955	MJF2955		—
MJF3055	MJF3055		—
MJF47	MJF47		3-1007
MJF6107	MJF6107		3-1022
MJH10012	MJH10012		3-596
MJH11017	MJH11017		3-1034
MJH11018	MJH11018		3-1034
MJH11019	MJH11019		3-1034
MJH11020	MJH11020		3-1034
MJH11021	MJH11021		3-1034
MJH11022	MJH11022		3-1034
MJH12004	MJH12004		3-644
MJH12005	MJH12005		—
MJH13090	MJH13090		3-688
MJH13091		MJH16010	3-758
MJH16002	MJH16002		3-976
MJH16002A	MJH16002A		3-734
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MJH16008	MJH16008		3-742
MJH16010	MJH16010		3-758
MJH16010A	MJH16010A		3-766
MJH16012	MJH16012		3-758
MJH16018	MJH16018		3-782
MJH16032	MJH16032		3-984
MJH16034	MJH16034		3-984
MJH6282	MJH6282		3-1030
MJH6283	MJH6283		3-1030
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MPS-U01A	MPS-U01A		3-1040
MPS-U02	MPS-U02		3-1042
MPS-U03	MPS-U03		3-1044
MPS-U04	MPS-U04		3-1044
MPS-U05	MPS-U05		3-1048
MPS-U06	MPS-U06		3-1048
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MPS-U12		MPS-U45	3-1055
MPS-U31		MPS-U06	3-1048
MPS-U45	MPS-U45		3-1055
MPS-U47		MPS-U06	3-1048
MPS-U51	MPS-U51		3-1058
MPS-U51A	MPS-U51A		3-1058
MPS-U52	MPS-U52		3-1060
MPS-U55	MPS-U55		3-1062
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MPS-U57	MPS-U57		3-1064

Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
MPS-U60	MPS-U60		3-1066
MPS-U95	MPS-U95		3-1068
MPSU01	MPS-U01		3-1040
MPSU01A	MPS-U01A		3-1040
MPSU02	MPS-U02		3-1042
MPSU03	MPS-U03		3-1044
MPSU04	MPS-U04		3-1044
MPSU05	MPS-U05		3-1048
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MPSU45	MPS-U45		3-1055
MPSU51	MPS-U51		3-1058
MPSU51A	MPS-U51A		3-1058
MPSU52	MPS-U52		3-1060
MPSU55	MPS-U55		3-1062
MPSU56	MPS-U56		3-1062
MPSU57	MPS-U57		3-1064
MPSU60	MPS-U60		3-1066
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NSD103		2N4923	3-79
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NSD202		2N4919	3-75
NSD203		2N4919	3-75
NSD204		2N4919	3-75
NSD205		2N4919	3-75
NSD206		2N4919	3-75
NSD3439		MJE3439	3-908
NSD3440		MJE3440	3-908
NSDU01		MPS-U01	3-1040
NSDU01A		MPS-U01A	3-1040
NSDU05		MPS-U05	3-1048
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NSP2010		TIP42	3-1083
NSP2011		TIP42A	3-1083
NSP2021		TIP41A	3-1083

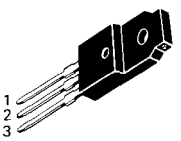
Consult Motorola if a direct replacement is necessary.

TABLE 5 — PLASTIC TO-220 (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
10	60	D44H7	D45H7	20 min	4					50
		D44H8	D45H8	40 min	4					50
			D45H9	40 min	4					50
		MJE2801T		25/100	3					75
		MJE3055T	MJE2955T	20/70	4					75
		2N6387##	2N6667##	1k/20k	5				20#	65
		SE9300##	SE9400##	1k min	4				1#	70
	80	BDX33B##	BDX34B##	750 min	3				3	70
		BD809	BD810	15 min	4				1.5	90
		D44E3##		1000 min	5	2 typ	0.5 typ	10		50
			D45H12	40 min	4					50
		2N6388##	2N6668##	1k/20k	5				20#	65
		D44H10	D45H10	20 min	4	0.5 typ	0.14 typ	5	50 typ	50
		D44H11	D45H11	40 min	4	0.5 typ	0.14 typ	5	50 typ	50
		SE9301##	SE9401##	1k min	4				1#	70
	100	BDX33C##	BDX34C##	750 min	3				3	70
		SE9302##	SE9402##	1k min	4				1#	70
12	300	MJE13008		6/30	8	3	0.7	8	4	100
	400	MJE13009		6/30	8	3	0.7	8	4	100
15	30	D44VH1	D45VH1	20 min	4	0.7	0.09	8	50 typ	83
	40	2N6486	2N6489	20/150	5	0.6 typ	0.3 typ	5	5	75
	45	BDW39	BDW44	1 k min	5	1 typ	1.5 typ	5	4	85
		D44VH4	D45VH4	20 min	4	0.5	0.09	8	50 typ	83
	60	2N6487	2N6490	20/150	5	0.6 typ	0.3 typ	5	5	75
		BDW40	BDW45	1 k min	5	1 typ	1.5 typ	5	4	85
		D44VH7		20 min	4	0.5	0.09	8	50 typ	85
	80	2N6488	2N6491	20/150	5	0.6 typ	0.3 typ	5	5	75
		BDW41	BDW46	1 k min	5	1 typ	1.5 typ	5	4	85
		D44VH10	D45VH10	20 min	4	0.5	0.09	8	50 typ	83
	100	BDW42	BDW47	1 k min	5	1 typ	1.5 typ	5	4	85
	120	BDW43	BDW48	1 k min	5	1 typ	1.5 typ	5	4	85

$|h_{fe}|$ @ 1 MHz, ## Darlington

TABLE 6 — PLASTIC Full Pak (TO-220 Type)



CASE 221C-02

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
1	250	MJF47		30/150	0.3	2 typ	0.17 typ	0.3	10	28
5	100	MJF122##	MJF127##	2000 min	3	1.5 typ	1.5 typ	3	4#	28
8	80		MJF6107	30/90	2	0.5 typ	0.13 typ	2	4	35
	100	MJF102##	MJF107##	3000 min	3	1.5 typ	1.5 typ	3	4#	35
	150	MJF15030	MJF15031	40 min	3	1 typ	0.15 typ	3	30	35
10	60	MJF3055	MJF2955	20/100	4				2	40

$|h_{fe}|$ @ 1 MHz, ## Darlington

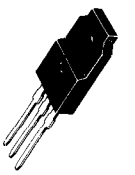
Full Pak
Power Transistor
For Isolated Package Applications

MJF6107

**PNP SILICON
POWER TRANSISTOR
7 AMPERES
70 VOLTS
34 WATTS**

Designed for general-purpose amplifier and switching applications, where the mounting surface of the device is required to be electrically isolated from the heatsink or chassis.

- Isolated Overmold Package (1500 Volts RMS Min.)
- Electrically Similar to the Popular 2N6107
- 70 $V_{CEO(sus)}$
- 7 A Rated Collector Current
- No Isolating Washers Required
- Reduced System Cost
- High Current Gain-Bandwidth Product
  f_T = 4 MHz (Min) @ I_C = 500 mAdc



**CASE 221C-02
TO-220 TYPE**

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	70	Vdc
Collector-Base Voltage	V_{CB}	80	Vdc
Emitter-Base Voltage	V_{EB}	5	Vdc
Isolation Voltage (RMS for 1 Min)	V_{ISOL}	1500	Vrms
Collector Current — Continuous — Peak	I_C	7 10	Adc
Base Current	I_B	3	Adc
Total Power Dissipation* @ T_C = 25°C Derate above 25°C	P_D	34 0.27	Watts W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	2 0.016	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case*	$R_{\theta JC}$	3.7	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Lead Temperature for Soldering Purpose	T_L	260	°C

*Measurement made with thermocouple contacting the bottom insulated mounting surface (in a location beneath the die), the device mounted on a heatsink with thermal grease and a mounting torque of ≥ 6 in. lbs.

Full Pak is a trademark of Motorola Inc.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) (I_C = 100 mAdc, I_B = 0)	$V_{CEO(sus)}$	70	—	Vdc
Collector Cutoff Current (V_{CE} = 80 Vdc, I_B = 0)	I_{CES}	—	1	μAdc
Collector Cutoff Current (V_{CE} = 80 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	I_{CEX}	—	1	μAdc
Emitter Cutoff Current (V_{BE} = 5 Vdc, I_C = 0)	I_{EBO}	—	1	μAdc
ON CHARACTERISTICS (1)				
DC Current Gain (I_C = 2 Adc, V_{CE} = 4 Vdc) (I_C = 7 Adc, V_{CE} = 4 Vdc)	h_{FE}	30 5	90 —	—
Collector-Emitter Saturation Voltage (I_C = 7 Adc, I_B = 3 Adc)	$V_{CE(sat)}$	—	2	Vdc
Base-Emitter On Voltage (I_C = 7 Adc, V_{CE} = 4 Vdc)	$V_{BE(on)}$	—	2	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain-Bandwidth Product (2) (I_C = 500 mAdc, V_{CE} = 4 Vdc, f_{test} = 1 MHz)	f_T	4	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1 MHz)	C_{ob}	—	250	pF
Small-Signal Current Gain (I_C = 0.5 Adc, V_{CE} = 4 Vdc, f = 50 kHz)	h_{fe}	20	—	—

Notes: 1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. $f_T = |h_{fe}| \bullet f_{test}$

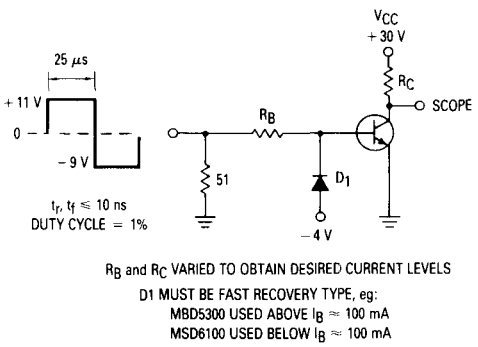


Figure 1. Switching Time Test Circuit

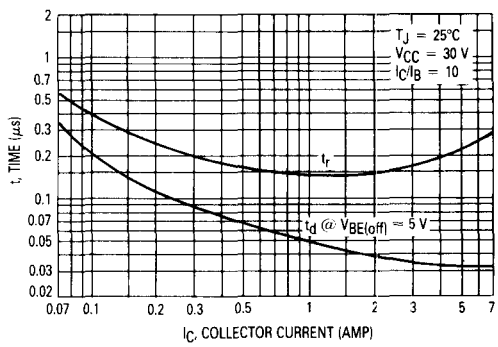


Figure 2. Turn-On Time

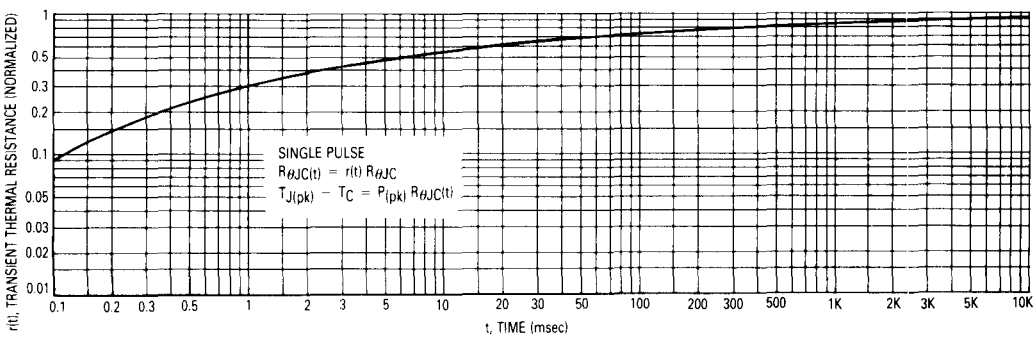


Figure 3. Thermal Response

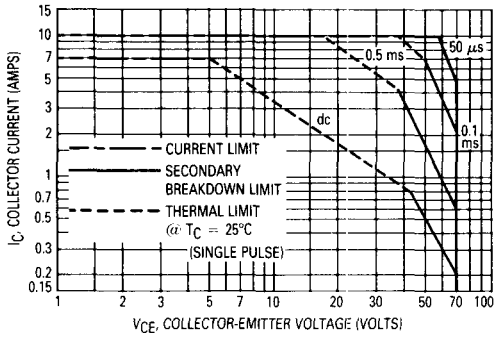


Figure 4. Active-Region Safe Operating Area

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 5 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

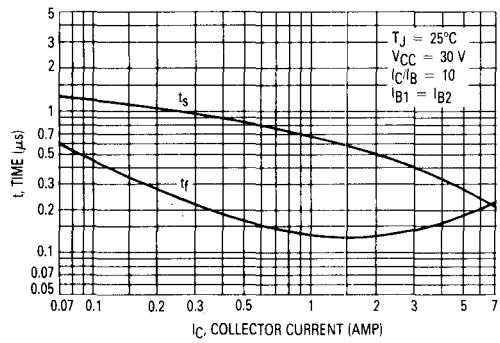


Figure 5. Turn-Off Time

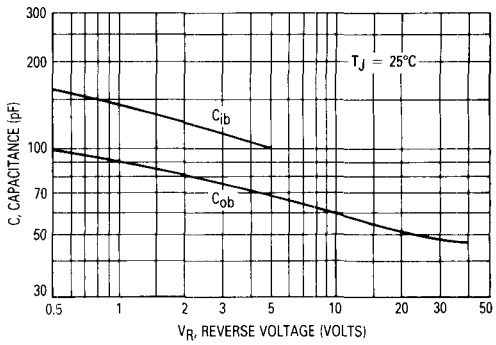


Figure 6. Capacitance

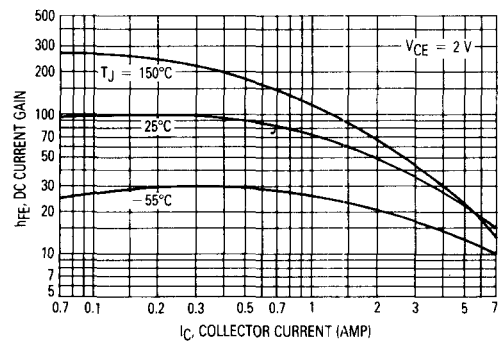


Figure 7. DC Current Gain

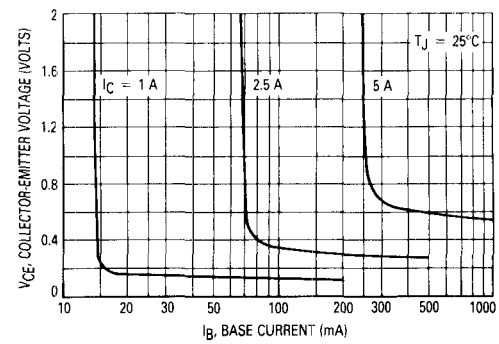


Figure 8. Collector Saturation Region

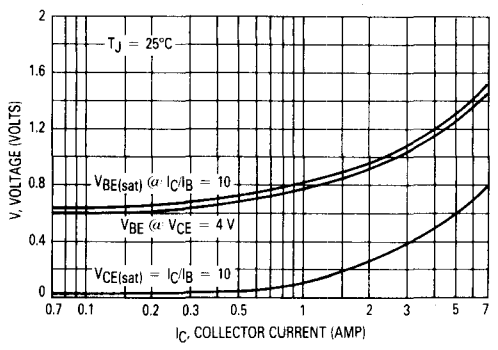


Figure 9. "On" Voltages

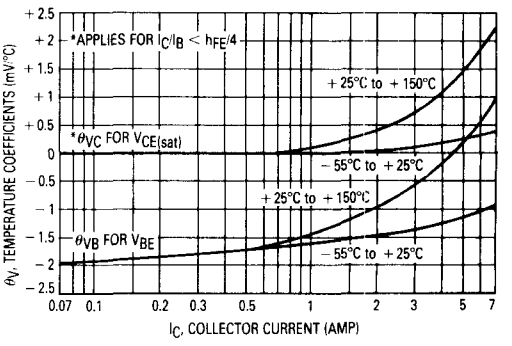


Figure 10. Temperature Coefficients

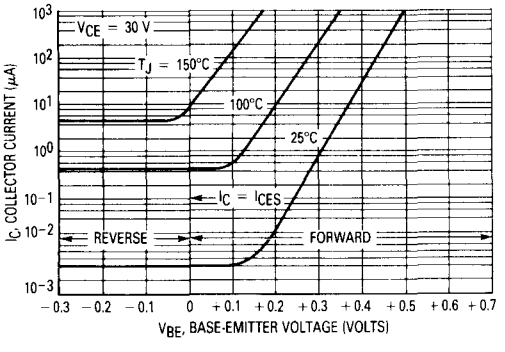


Figure 11. Collector Cut-Off Region

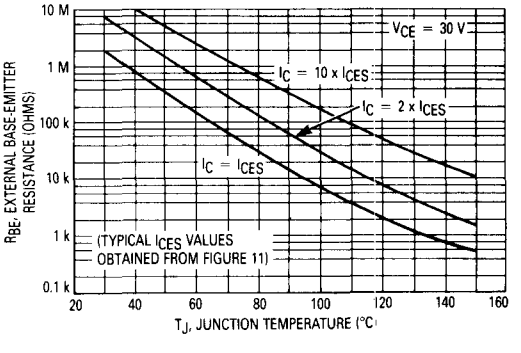
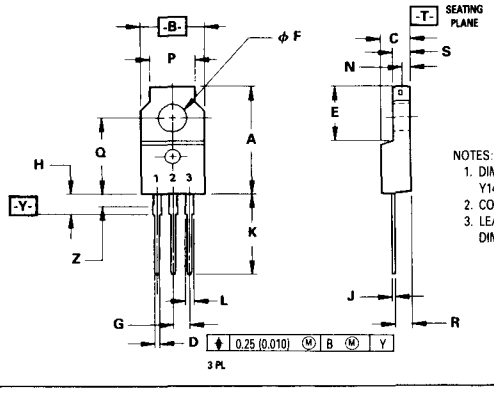


Figure 12. Effects of Base-Emitter Resistance

OUTLINE DIMENSIONS



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

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. LEAD DIMENSION UNCONTROLLED WITHIN DIMENSION "Z".

CASE 221C-02
TO-220 TYPE

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	17.28	17.78	0.680	0.700
B	9.86	10.36	0.388	0.408
C	4.45	4.95	0.175	0.195
D	0.64	1.01	0.025	0.040
E	8.64	9.01	0.340	0.355
F	3.56	3.81	0.140	0.150
G	2.54 BSC		0.100 BSC	
H	2.80	3.93	0.110	0.155
J	0.46	0.71	0.018	0.028
K	12.70	13.97	0.500	0.550
L	1.15	1.77	0.045	0.070
N	1.25	—	0.049	—
P	6.86	7.36	0.270	0.290
Q	12.20	12.70	0.480	0.500
R	2.29	3.04	0.090	0.120
S	2.67	2.92	0.105	0.115
Z	1.78	2.28	0.070	0.090

3