MJE15028, MJE15030 (NPN)
MJE15029, MJE15031 (PNP)

Complementary Silicon Plastic Power Transistors

These devices are designed for use as high−frequency drivers in audio amplifiers.

Features

- DC Current Gain Specified to 4.0 A
  h_{FE} = 40 (Min) @ I_C = 3.0 Adc
  = 20 (Min) @ I_C = 4.0 Adc
- Collector−Emitter Sustaining Voltage −
  $V_{CEO(sus)}$ = 120 Vdc (Min); MJE15028, MJE15029
  = 150 Vdc (Min); MJE15030, MJE15031
- High Current Gain − Bandwidth Product
  f_T = 30 MHz (Min) @ I_C = 500 mAdc
- TO−220AB Compact Package
- Pb−Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage MJE15028, MJE15029 MJE15030, MJE15031	V_{CEO}	 120 150	Vdc
Collector−Base Voltage MJE15028, MJE15029 MJE15030, MJE15031	V_{CB}	 120 150	Vdc
Emitter−Base Voltage	V_{EB}	5.0	Vdc
Collector Current − Continuous − Peak	I_C I_{CM}	8.0 16	Adc
Base Current	I_B	2.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	50 0.40	W W/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	2.0 0.016	W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	62.5	°C/W

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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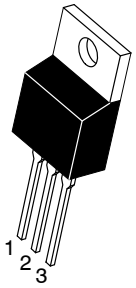
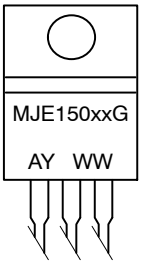
8 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 120−150 VOLTS, 50 WATTS



TO−220AB
CASE 221A−09
STYLE 1

MARKING DIAGRAM



MJE150xx = Device Code
x = 28, 29, 30, or 31
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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October, 2011 − Rev. 5
Publication Order Number:
MJE15028/D

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (Note 1) (I_C = 10 mAdc, I_B = 0) MJE15028, MJE15029 / MJE15030, MJE15031	$V_{CEO(sus)}$	120 / 150	– / –	Vdc
Collector Cutoff Current (V_{CE} = 120 Vdc, I_B = 0) MJE15028, MJE15029 / (V_{CE} = 150 Vdc, I_B = 0) MJE15030, MJE15031	I_{CEO}	– / –	0.1 / 0.1	mAdc
Collector Cutoff Current (V_{CB} = 120 Vdc, I_E = 0) MJE15028, MJE15029 / (V_{CB} = 150 Vdc, I_E = 0) MJE15030, MJE15031	I_{CBO}	– / –	10 / 10	μAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	–	10	μAdc
ON CHARACTERISTICS (Note 1)				
DC Current Gain (I_C = 0.1 Adc, V_{CE} = 2.0 Vdc)	h_{FE}	40	–	–
(I_C = 2.0 Adc, V_{CE} = 2.0 Vdc)		40	–	
(I_C = 3.0 Adc, V_{CE} = 2.0 Vdc)		40	–	
(I_C = 4.0 Adc, V_{CE} = 2.0 Vdc)		20	–	
DC Current Gain Linearity (V_{CE} From 2.0 V to 20 V, I_C From 0.1 A to 3 A) (NPN to PNP)	h_{FE}	**Typ** 2 3		
Collector−Emitter Saturation Voltage (I_C = 1.0 Adc, I_B = 0.1 Adc)	$V_{CE(sat)}$	–	0.5	Vdc
Base−Emitter On Voltage (I_C = 1.0 Adc, V_{CE} = 2.0 Vdc)	$V_{BE(on)}$	–	1.0	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain − Bandwidth Product (Note 2) (I_C = 500 mAdc, V_{CE} = 10 Vdc, f_{test} = 10 MHz)	f_T	30	–	MHz

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
2. $f_T = |h_{fe}| \bullet f_{test}$.

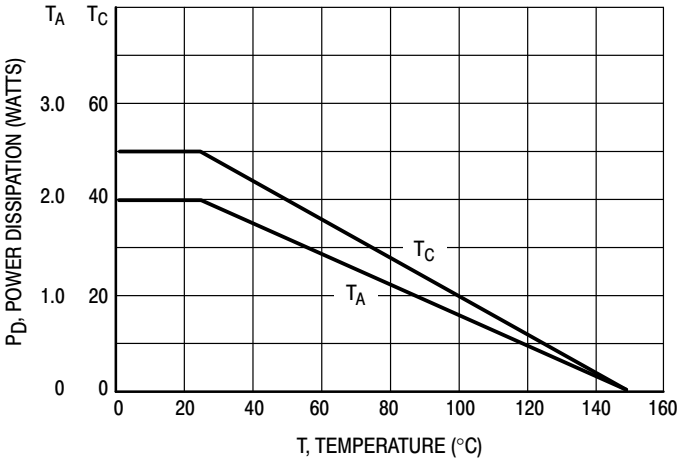


Figure 1. Power Derating

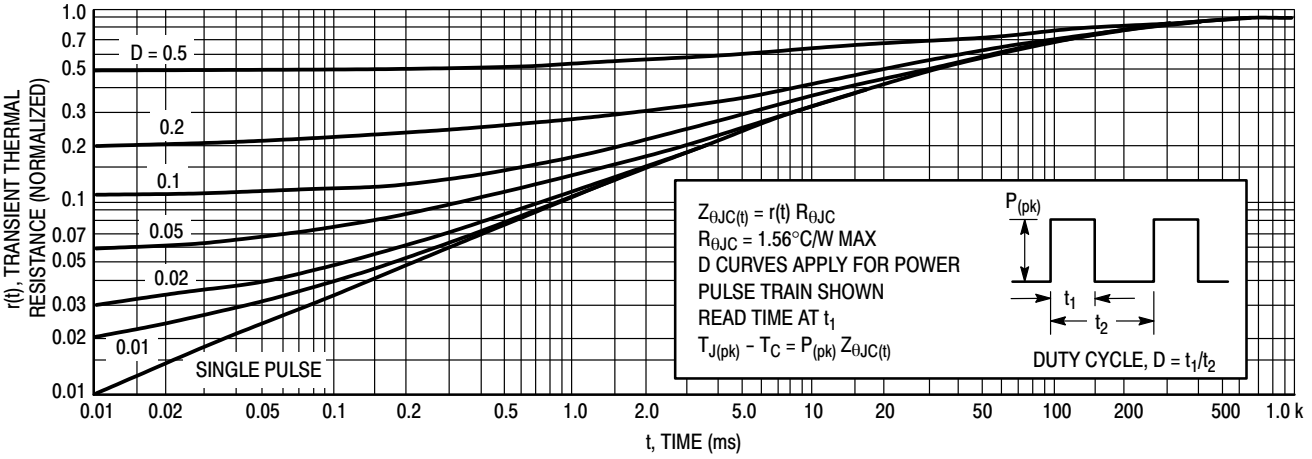


Figure 2. Thermal Response

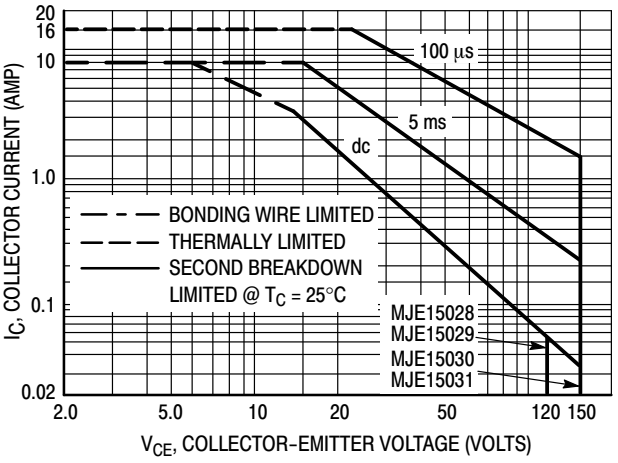


Figure 3. Forward Bias Safe Operating Area

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 then the curves indicate.

The data of Figures 3 and 4 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 $T_{J(pk)}$ < 150°C. $T_{J(pk)}$ may be calculated from the data in Figure 2. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

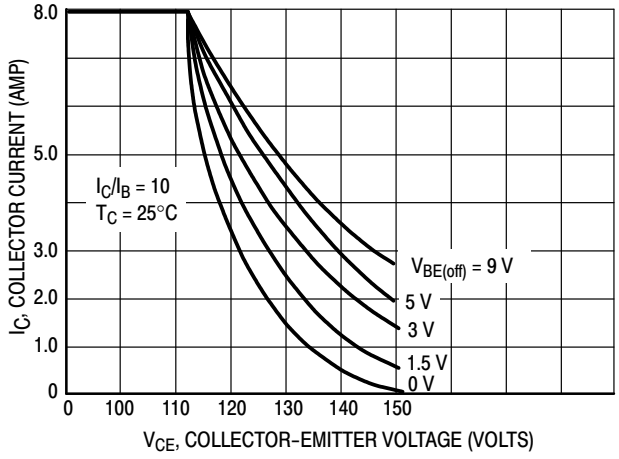


Figure 4. Reverse−Bias Switching Safe Operating Area

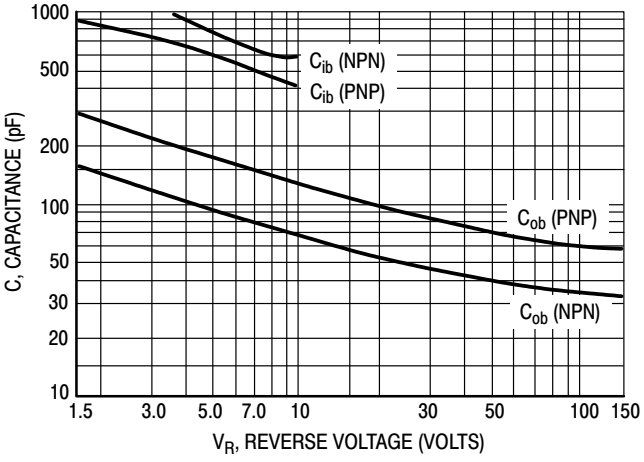


Figure 5. Capacitances

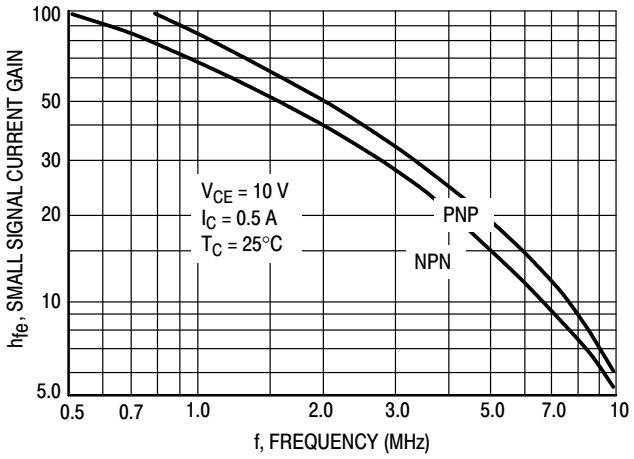


Figure 6. Small−Signal Current Gain

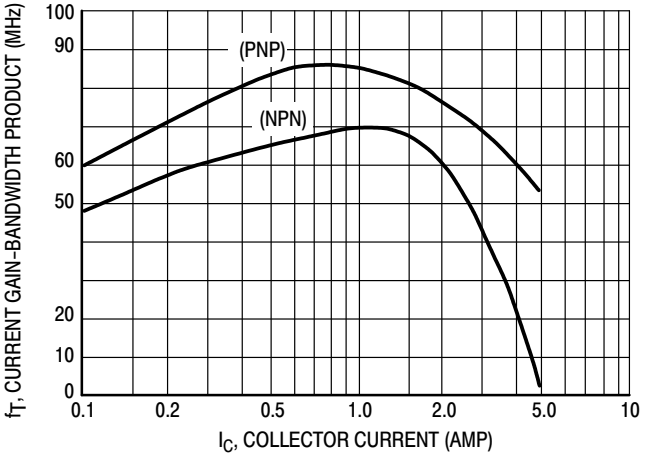
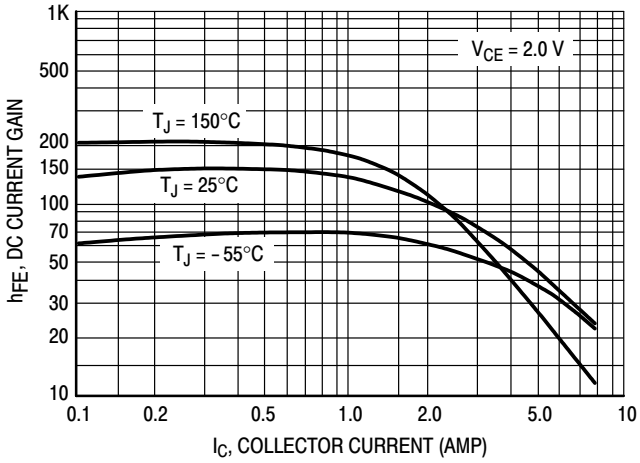


Figure 7. Current Gain−Bandwidth Product

NPN — MJE15028 MJE15030



PNP — MJE15029 MJE15031

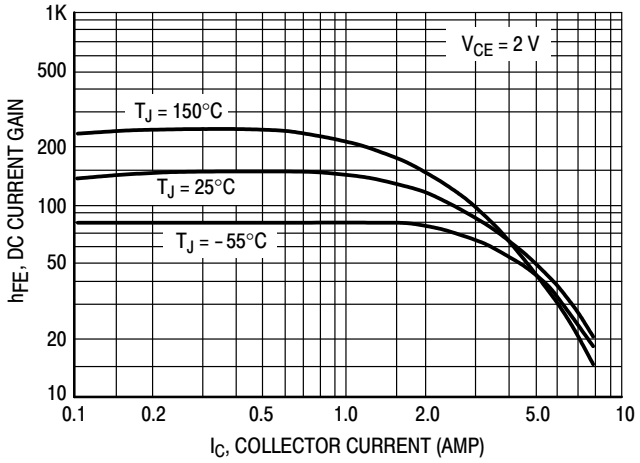
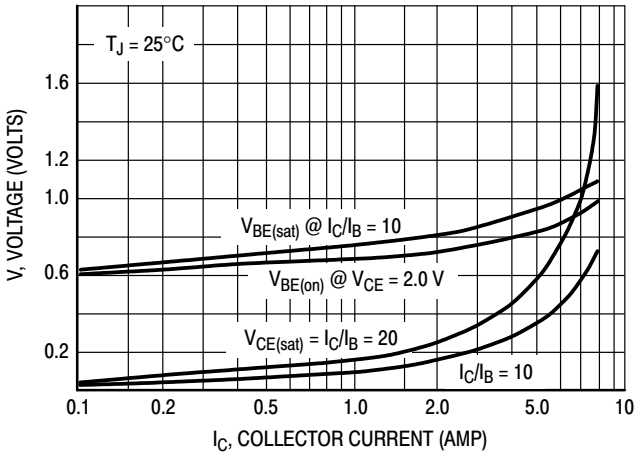


Figure 8. DC Current Gain

NPN



PNP

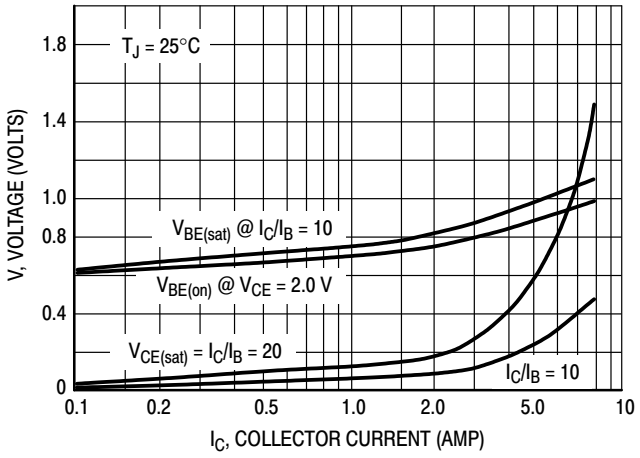


Figure 9. “On” Voltage

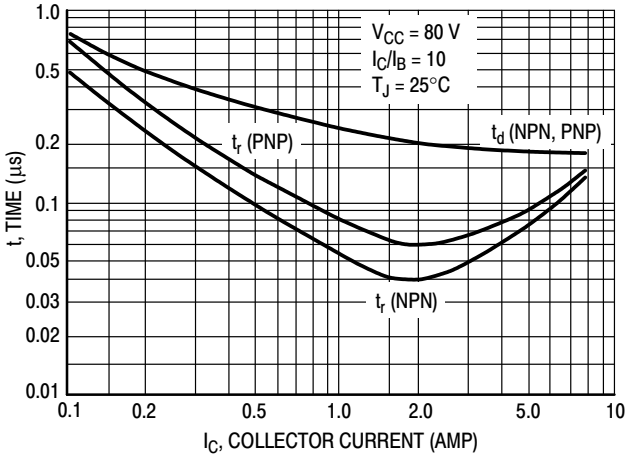


Figure 10. Turn−On Times

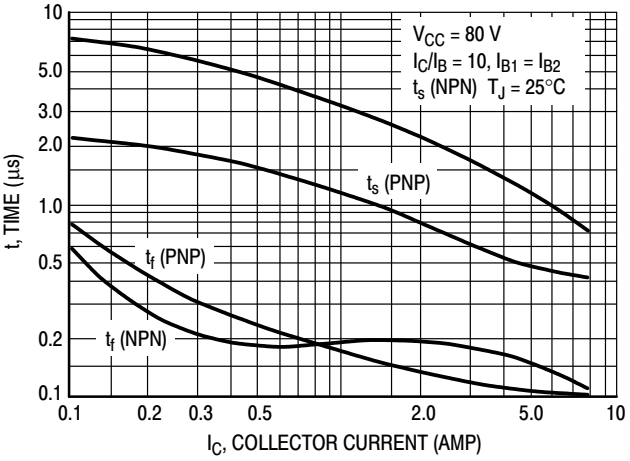


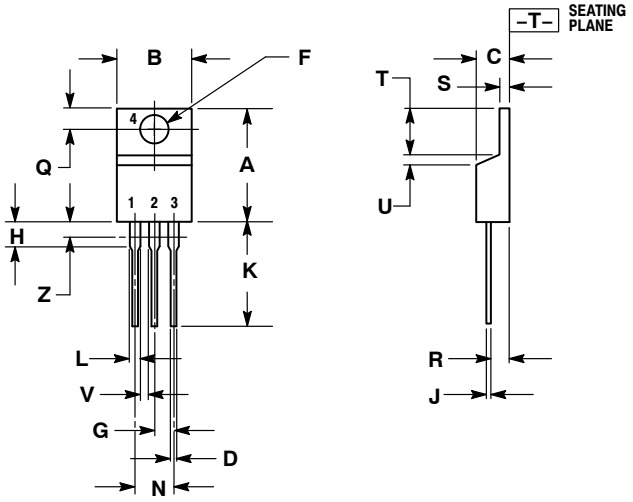
Figure 11. Turn−Off Times

ORDERING INFORMATION

Device	Package	Shipping
MJE15028	TO−220	50 Units / Rail
MJE15028G	TO−220 (Pb−Free)	50 Units / Rail
MJE15029	TO−220	50 Units / Rail
MJE15029G	TO−220 (Pb−Free)	50 Units / Rail
MJE15030	TO−220	50 Units / Rail
MJE15030G	TO−220 (Pb−Free)	50 Units / Rail
MJE15031	TO−220	50 Units / Rail
MJE15031G	TO−220 (Pb−Free)	50 Units / Rail

PACKAGE DIMENSIONS

TO−220
CASE 221A−09
ISSUE AG



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

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

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