

# MJE15032 (NPN), MJE15033 (PNP)

## Complementary Silicon Plastic Power Transistors

Designed for use as high-frequency drivers in audio amplifiers.

### Features

- DC Current Gain Specified to 5.0 Amperes  
 $h_{FE} = 70$  (Min) @  $I_C = 0.5$  Adc  
 $= 10$  (Min) @  $I_C = 2.0$  Adc
- Collector-Emitter Sustaining Voltage –  
 $V_{CEO(sus)} = 250$  Vdc (Min) – MJE15032, MJE15033
- High Current Gain – Bandwidth Product  
 $f_T = 30$  MHz (Min) @  $I_C = 500$  mAdc
- TO-220AB Compact Package
- Epoxy Meets UL 94 V-0 @ 0.125 in
- ESD Ratings: Machine Model C  
 Human Body Model 3B
- Pb-Free Packages are Available\*

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	250	Vdc
Collector-Base Voltage	$V_{CB}$	250	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0	Vdc
Collector Current – Continuous – Peak	$I_C$	8.0 16	Adc
Base Current	$I_B$	2.0	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	50 0.40	W W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.0 0.016	W 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	$R_{\theta JC}$	2.5	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$

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.

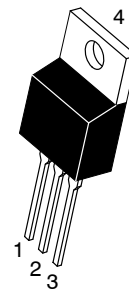


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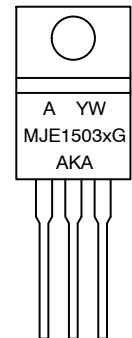
<http://onsemi.com>

## 8.0 AMPERES POWER TRANSISTORS COMPLEMENTARY SILICON 250 VOLTS, 50 WATTS

### MARKING DIAGRAM



TO-220  
CASE 221A  
STYLE 1



MJE1503x = Specific Device Code  
 x = 2 or 3  
 A = Assembly Location  
 Y = Year  
 W = Work Week  
 G = Pb-Free

### ORDERING INFORMATION

Device	Package	Shipping†
MJE15032	TO-220	50 Units/Rail
MJE15032G	TO-220 (Pb-Free)	50 Units/Rail
MJE15033	TO-220	50 Units/Rail
MJE15033G	TO-220 (Pb-Free)	50 Units/Rail

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (Note 1) ( $I_C = 10\text{ mA}$ , $I_B = 0$ )	$V_{CEO(sus)}$	250	–	Vdc
Collector Cutoff Current ( $V_{CB} = 250\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	10	$\mu\text{A}$
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	10	$\mu\text{A}$
<b>ON CHARACTERISTICS (Note 1)</b>				
DC Current Gain ( $I_C = 0.5\text{ A}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 2.0\text{ A}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	70 50 10	– – –	–
Collector–Emitter Saturation Voltage ( $I_C = 1.0\text{ A}$ , $I_B = 0.1\text{ A}$ )	$V_{CE(sat)}$	–	0.5	Vdc
Base–Emitter On Voltage ( $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$V_{BE(on)}$	–	1.0	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Current Gain – Bandwidth Product (Note 2) ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )	$f_T$	30	–	MHz

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .
2.  $f_T = |h_{fe}| \cdot f_{test}$ .

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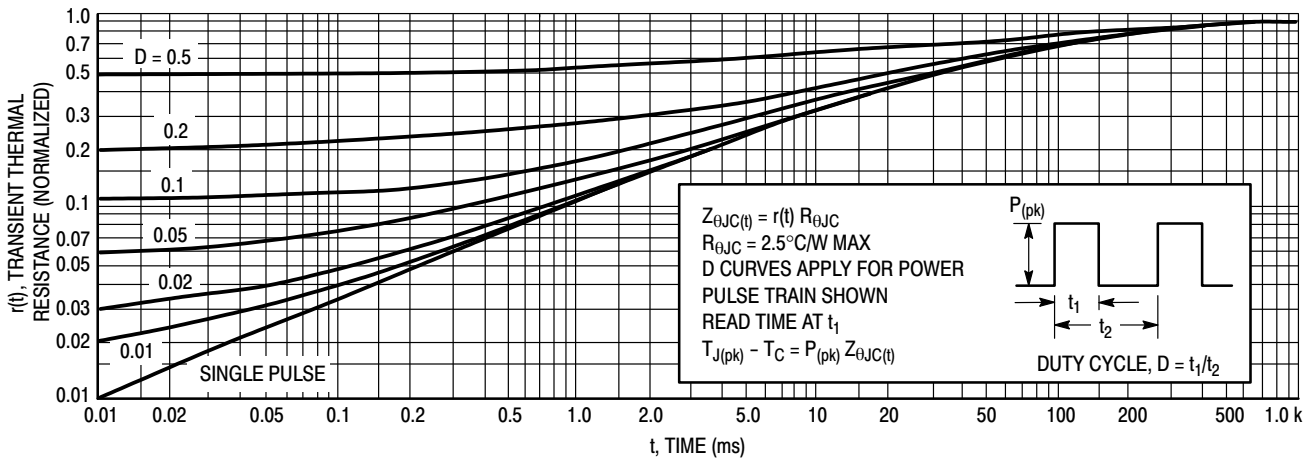


Figure 1. Thermal Response

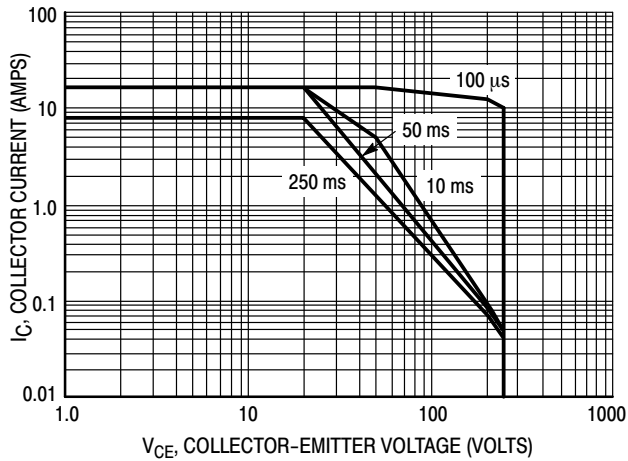


Figure 2. MJE15032 & MJE15033 Safe Operating Area

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 Figures 2 and 4 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  $T_{J(pk)} < 150^{\circ}\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 1. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

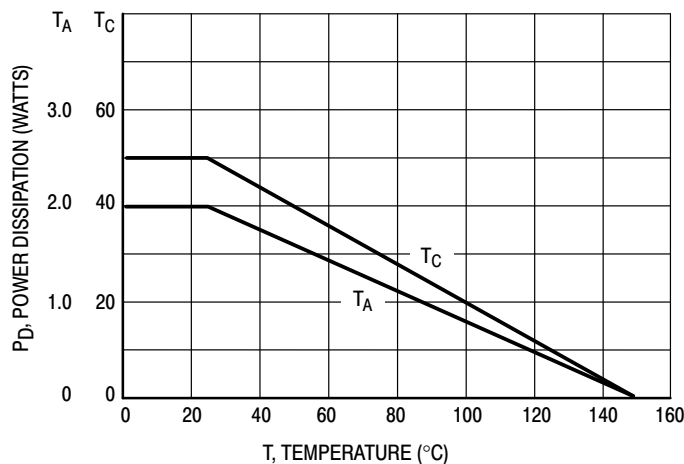
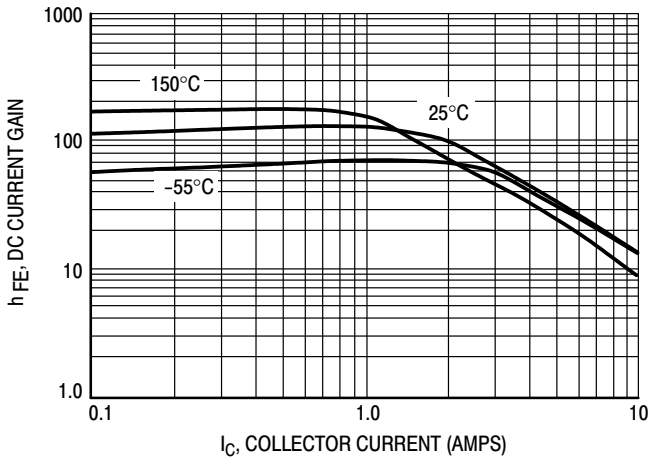


Figure 3. Power Derating

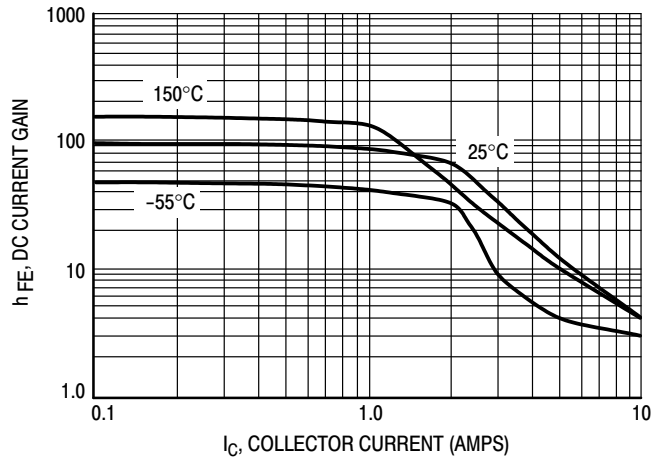
# MJE15032 (NPN), MJE15033 (PNP)

**NPN – MJE15032**

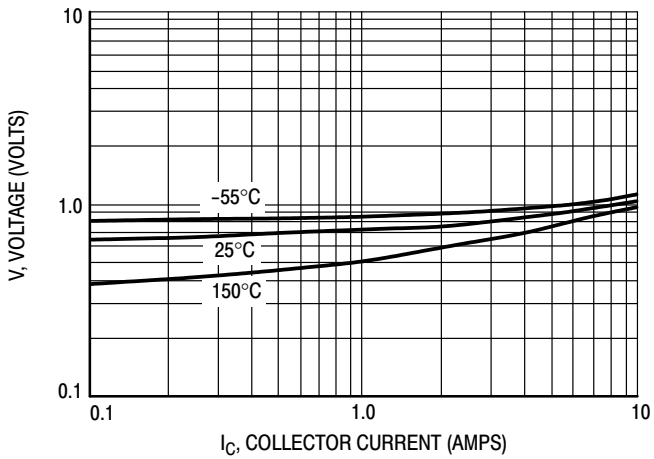


**Figure 4. NPN – MJE15032**  
 **$V_{CE} = 5\text{ V}$  DC Current Gain**

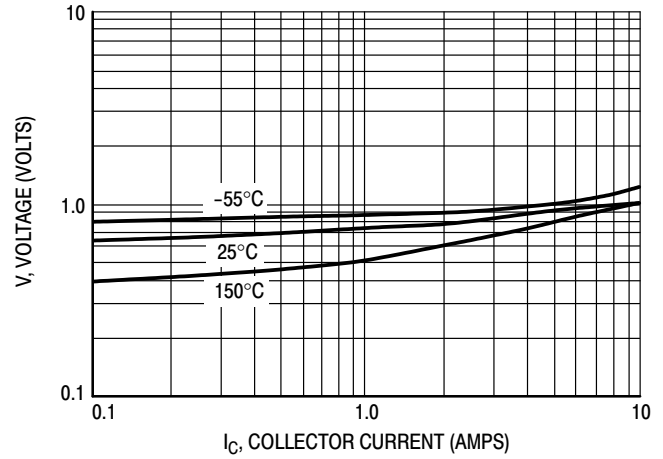
**PNP – MJE15033**



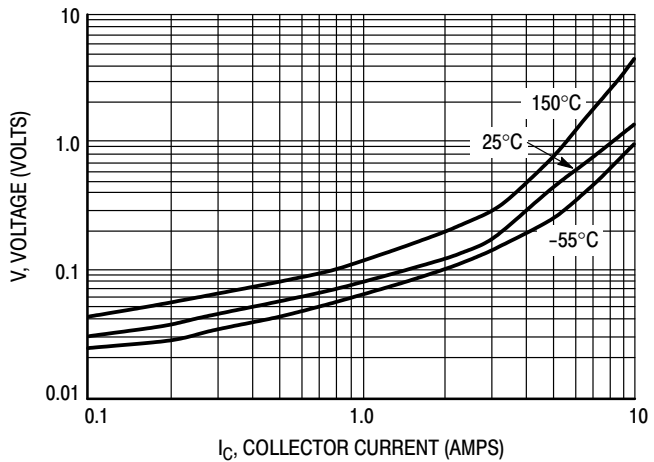
**Figure 5. PNP – MJE15033**  
 **$V_{CE} = 5\text{ V}$  DC Current Gain**



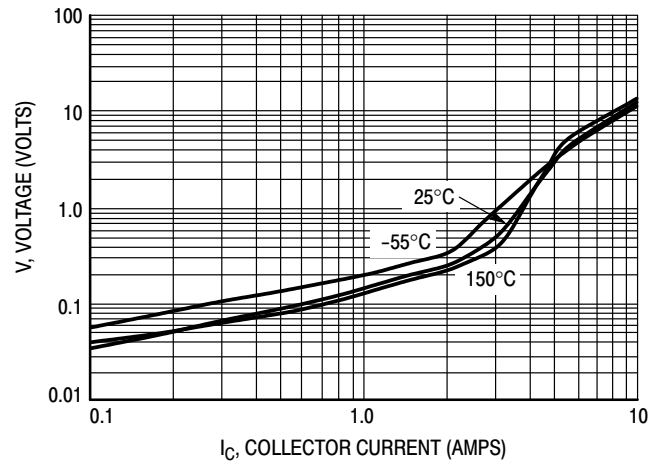
**Figure 6. NPN – MJE15032**  
 **$V_{CE} = 5\text{ V}$   $V_{BE(on)}$  Curve**



**Figure 7. PNP – MJE15033**  
 **$V_{CE} = 5\text{ V}$   $V_{BE(on)}$  Curve**



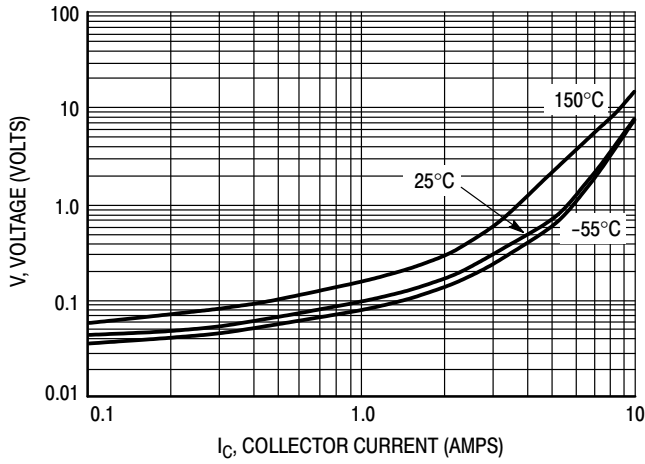
**Figure 8. NPN – MJE15032**  
 **$V_{CE(sat)}$   $I_C/I_B = 10$**



**Figure 9. PNP – MJE15033**  
 **$V_{CE(sat)}$   $I_C/I_B = 10$**

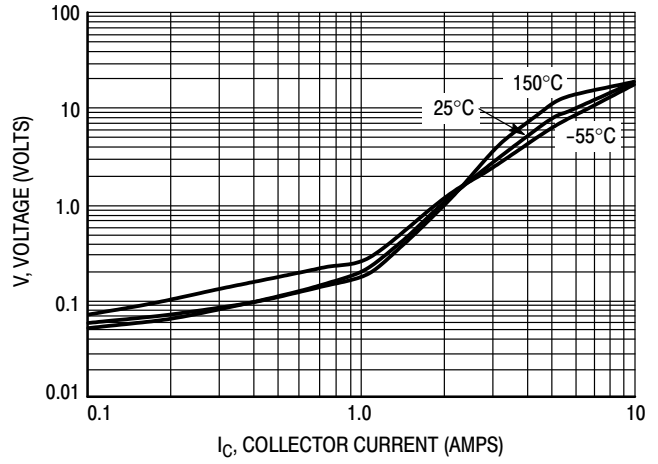
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**NPN – MJE15032**

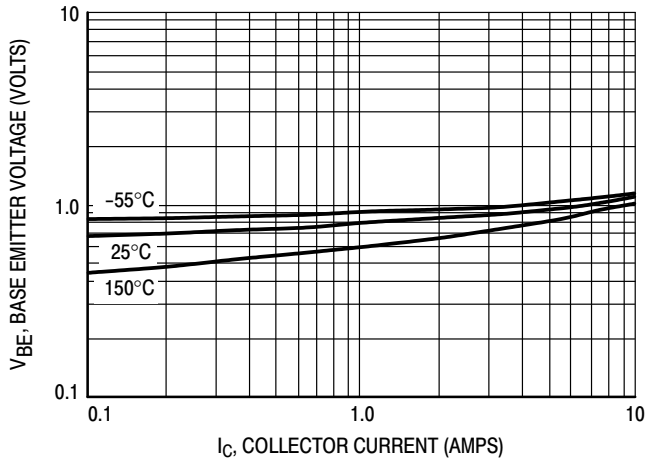


**Figure 10. NPN – MJE15032**  
 $V_{CE(sat)} I_C/I_B = 20$

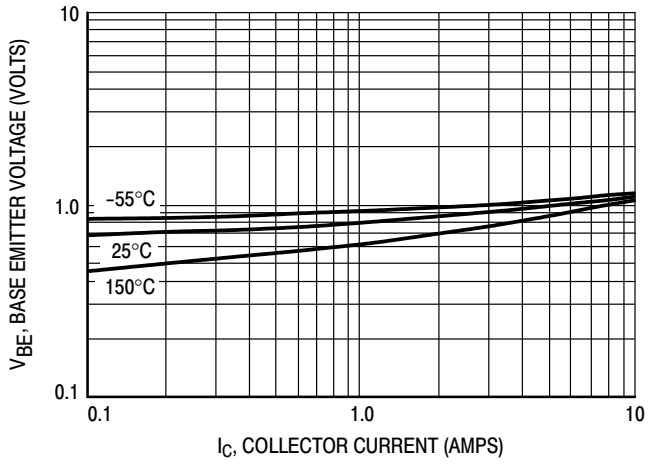
**PNP – MJE15033**



**Figure 11. PNP – MJE15033**  
 $V_{CE(sat)} I_C/I_B = 20$



**Figure 12. NPN – MJE15032**  
 $V_{BE(sat)} I_C/I_B = 10$

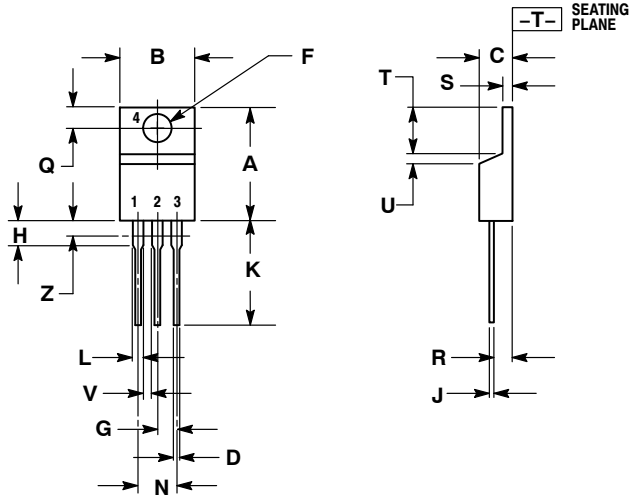


**Figure 13. PNP – MJE15033**  
 $V_{BE(sat)} I_C/I_B = 10$

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## 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.

DIM	INCHES		MILLIMETERS	
	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:

1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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