Complementary Silicon Plastic Power Transistors

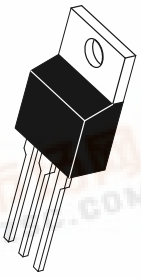
. . . designed for use as high–frequency drivers in audio amplifiers.

- DC Current Gain Specified to 5.0 Amperes
  h_{FE} = 50 (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

NPN
MJE15032*
PNP
MJE15033*

*Motorola Preferred Device

8.0 AMPERES
POWER TRANSISTORS
COMPLEMENTARY
SILICON
250 VOLTS
50 WATTS



CASE 221A–06
TO–220AB

MAXIMUM RATINGS

Rating	Symbol	MJE15032 MJE15033	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°C Derate above 25°C	P_D	50 0.40	Watts W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	2.0 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	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	°C/W

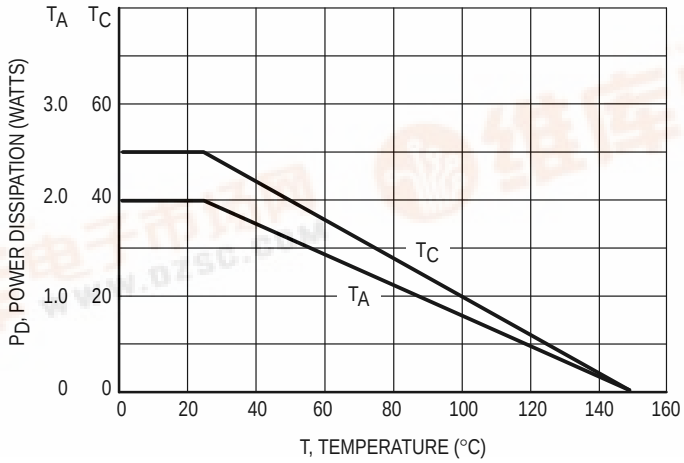


Figure 1. Power Derating

Preferred devices are Motorola recommended choices for future use and best overall value.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (1) (I_C = 10 mAdc, I_B = 0) MJE15032, MJE15033	$V_{CEO(sus)}$	250	—	Vdc
Collector Cutoff Current (V_{CB} = 150 Vdc, I_E = 0) MJE15032, MJE15033	I_{CBO}	—	10	μAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	—	10	μAdc
ON CHARACTERISTICS (1)				
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	50	—	—
(I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)		50	—	
(I_C = 2.0 Adc, V_{CE} = 5.0 Vdc)		10	—	
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} = 5.0 Vdc)	$V_{BE(on)}$	—	1.0	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain — Bandwidth Product (2) (I_C = 500 mAdc, V_{CE} = 10 Vdc, f_{test} = 1.0 MHz)	f_T	30	—	MHz

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

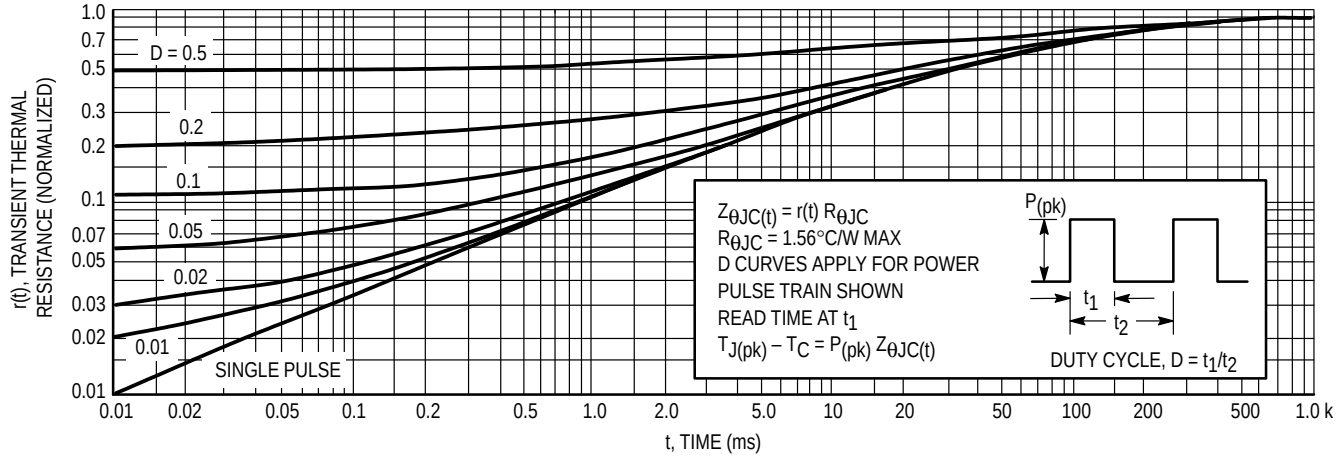


Figure 2. Thermal Response

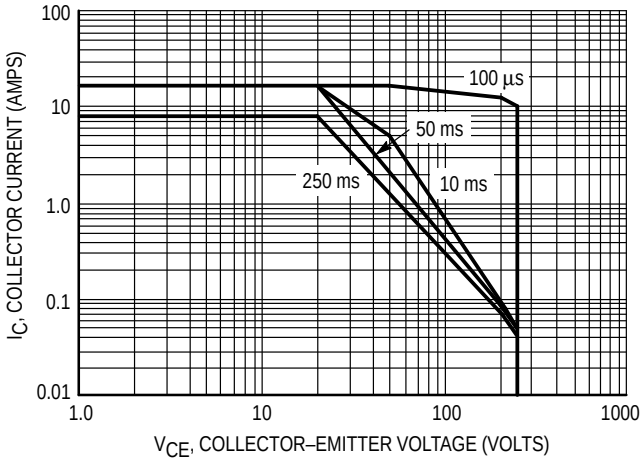


Figure 3. MJE15032 & MJE15033 Safe Operating Area

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 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.

NPN — MJE15032

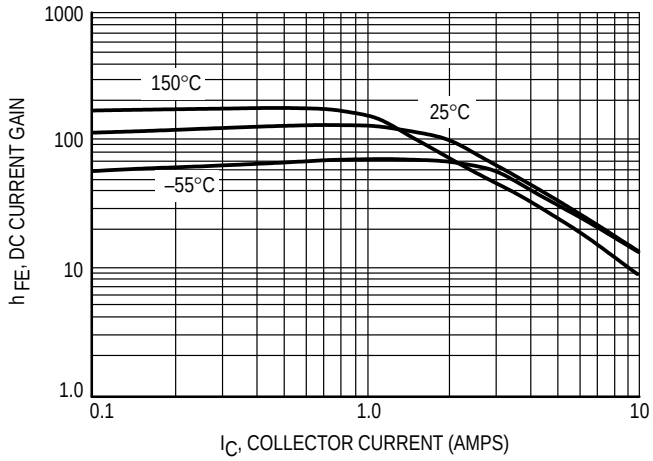


Figure 4. NPN — MJE15032 V_{CE} = 5 V DC Current Gain

PNP — MJE15033

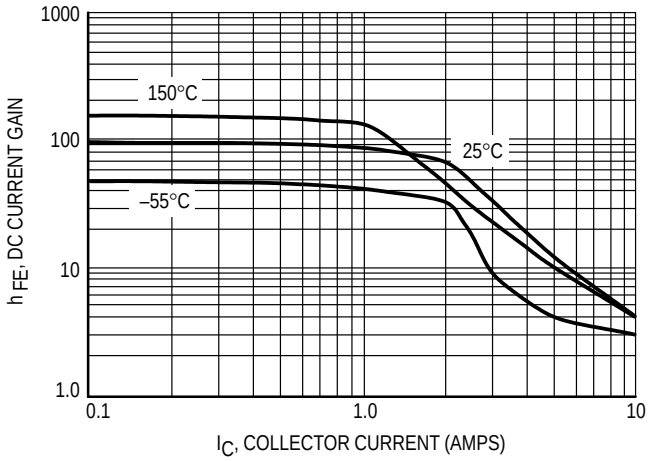


Figure 5. PNP — MJE15033 V_{CE} = 5 V DC Current Gain

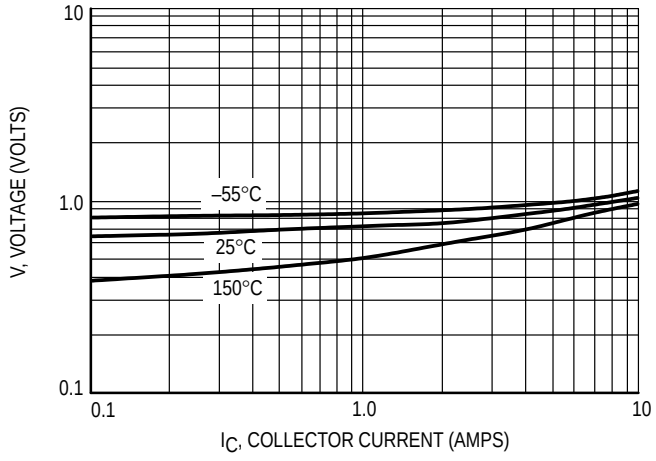


Figure 6. NPN — MJE15032 V_{CE} = 5 V $V_{BE(on)}$ Curve

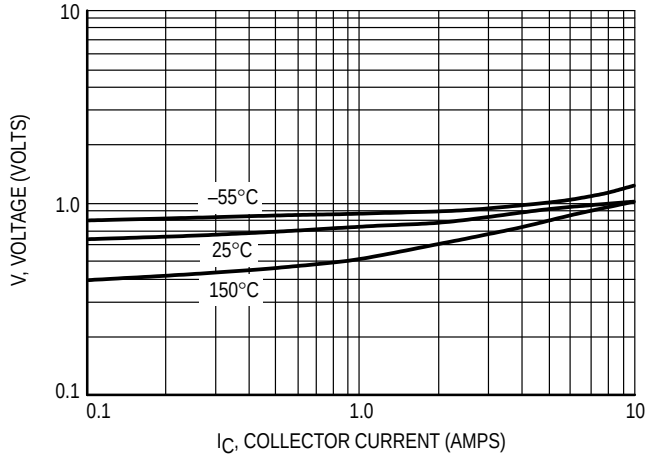


Figure 7. PNP — MJE15033 V_{CE} = 5 V $V_{BE(on)}$ Curve

NPN — MJE15032

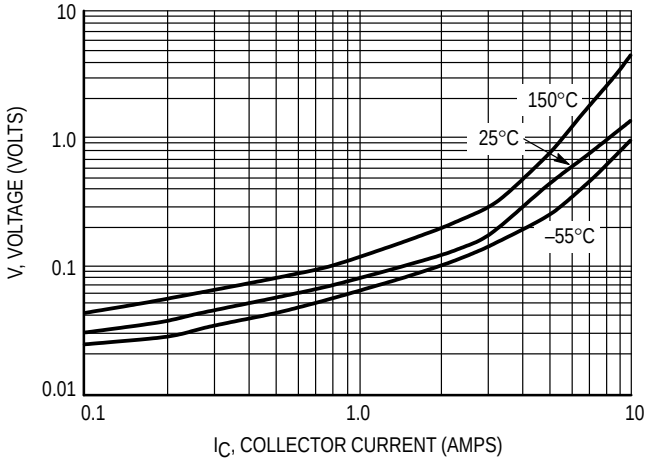


Figure 8. NPN — MJE15032
$V_{CE(sat)}$ I_C/I_B = 10

PNP — MJE15033

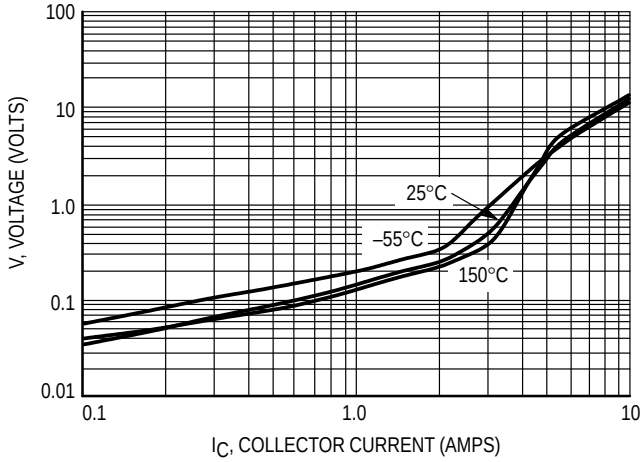


Figure 9. PNP — MJE15033
$V_{CE(sat)}$ I_C/I_B = 10

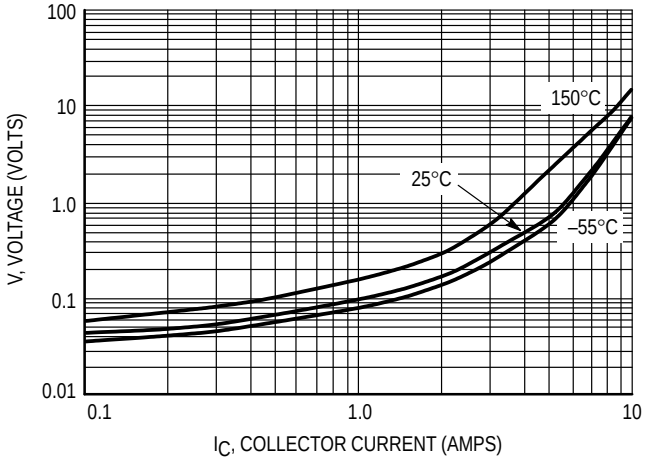


Figure 10. NPN — MJE15032
$V_{CE(sat)}$ I_C/I_B = 20

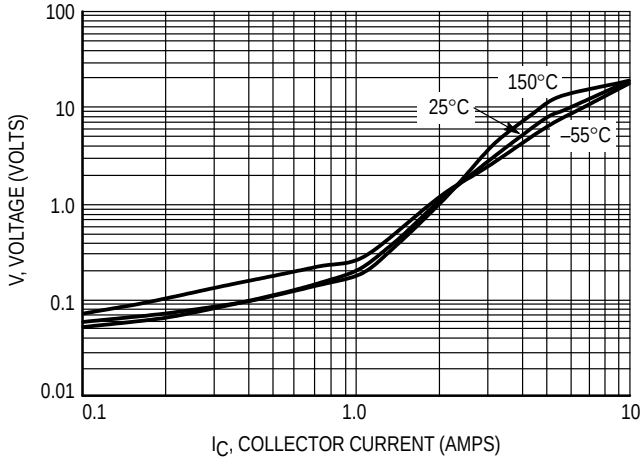


Figure 11. PNP — MJE15033
$V_{CE(sat)}$ I_C/I_B = 20

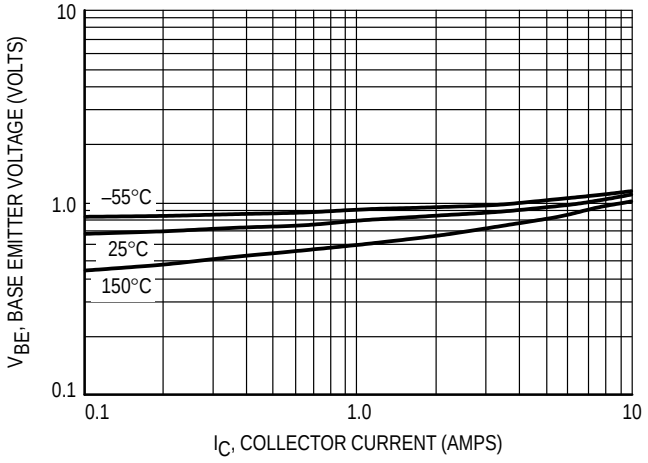


Figure 12. NPN — MJE15032
$V_{BE(sat)}$ I_C/I_B = 10

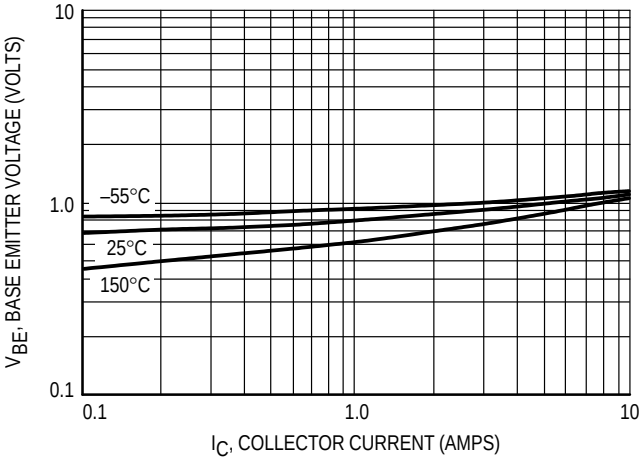
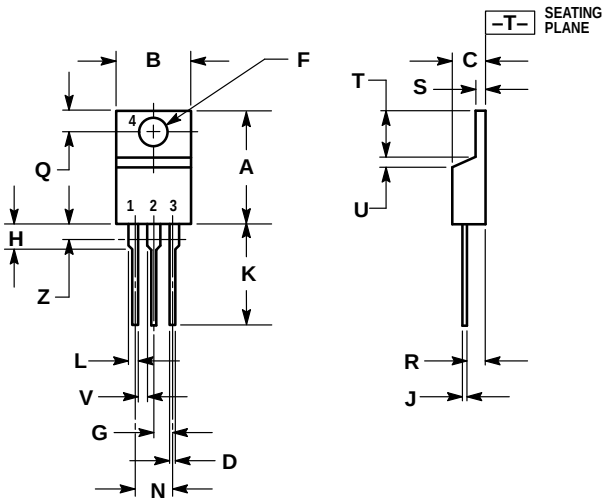


Figure 13. PNP — MJE15033
$V_{BE(sat)}$ I_C/I_B = 10

PACKAGE DIMENSIONS



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	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	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

CASE 221A–06
TO–220AB
ISSUE Y

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