

Complementary Silicon Power Plastic Transistors

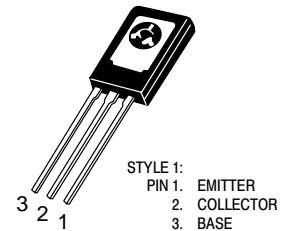
... designed for low power audio amplifier and low-current, high-speed switching applications.

- High Collector–Emitter Sustaining Voltage —
 $V_{CEO(sus)} = 100 \text{ Vdc (Min) — MJE243, MJE253}$
- High DC Current Gain @ $I_C = 200 \text{ mAdc}$
 $h_{FE} = 40\text{--}200$
 $= 40\text{--}120 \text{ — MJE243, MJE253}$
- Low Collector–Emitter Saturation Voltage —
 $V_{CE(sat)} = 0.3 \text{ Vdc (Max) @ } I_C = 500 \text{ mAdc}$
- High Current Gain Bandwidth Product —
 $f_T = 40 \text{ MHz (Min) @ } I_C = 100 \text{ mAdc}$
- Annular Construction for Low Leakages
 $I_{CBO} = 100 \text{ nAdc (Max) @ Rated } V_{CB}$

**NPN
MJE243*
PNP
MJE253***

*ON Semiconductor Preferred Device

**4 AMPERE
POWER TRANSISTORS
COMPLEMENTARY
SILICON
100 VOLTS
15 WATTS**



**CASE 77-09
TO-225AA**

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	100	Vdc
Collector–Base Voltage	V_{CB}	100	Vdc
Emitter–Base Voltage	V_{EB}	7.0	Vdc
Collector Current — Continuous Peak	I_C	4.0 8.0	Adc
Base Current	I_B	10	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	15 0.12	Watts W/ac
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate @ 25°C	P_D	1.5 0.012	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	θ_{JC}	8.34	°C/W
Thermal Resistance, Junction to Ambient	θ_{JA}	83.4	°C/W

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

MJE243 MJE253

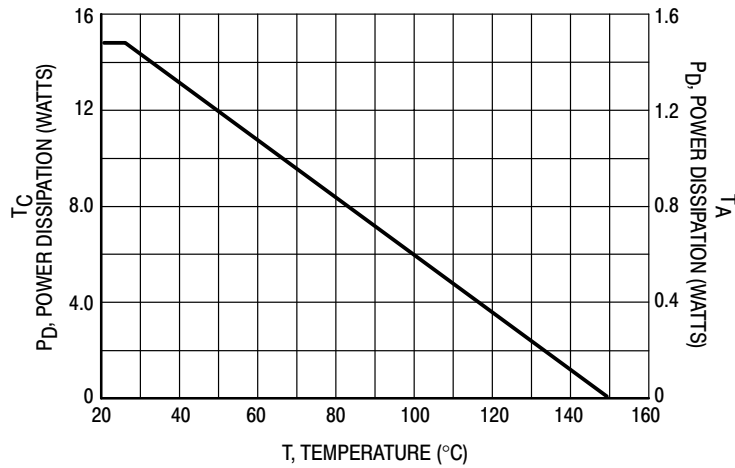


Figure 1. Power Derating

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage (I _C = 10 mA _{dc} , I _B = 0)	V _{CEO(sus)}	100	—	V _{dc}
Collector Cutoff Current (V _{CB} = 100 V _{dc} , I _E = 0) (V _{CE} = 100 V _{dc} , I _E = 0, T _C = 125°C)	I _{CBO}	—	0.1	μA _{dc}
Emitter Cutoff Current (V _{BE} = 7.0 V _{dc} , I _C = 0)	I _{EBO}	—	0.1	μA _{dc}

ON CHARACTERISTICS

DC Current Gain (I _C = 200 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 1.0 A _{dc} , V _{CE} = 1.0 V _{dc})	h _{FE}	40 15	180 —	—
Collector–Emitter Saturation Voltage (I _C = 500 mA _{dc} , I _B = 50 mA _{dc}) (I _C = 1.0 A _{dc} , I _B = 100 mA _{dc})	V _{CE(sat)}	— —	0.3 0.6	V _{dc}
Base–Emitter Saturation Voltage (I _C = 2.0 A _{dc} , I _B = 200 mA _{dc})	V _{BE(sat)}	—	1.8	V _{dc}
Base–Emitter On Voltage (I _C = 500 mA _{dc} , V _{CE} = 1.0 V _{dc})	V _{BE(on)}	—	1.5	V _{dc}

DYNAMIC CHARACTERISTICS

Current–Gain — Bandwidth Product (I _C = 100 mA _{dc} , V _{CE} = 10 V _{dc} , f _{test} = 10 MHz)	f _T	40	—	MHz
Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f = 0.1 MHz)	C _{ob}	—	50	pF

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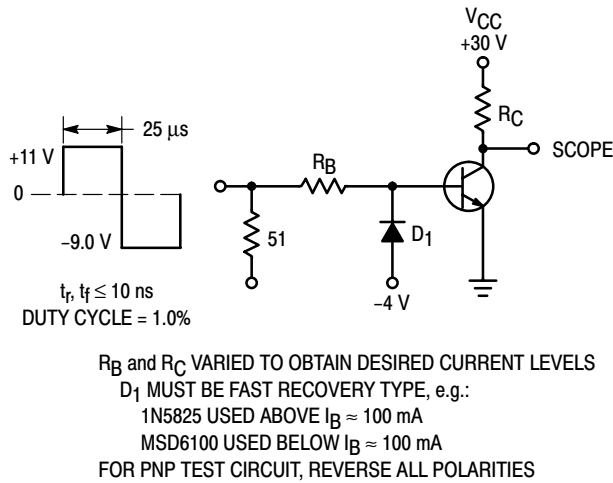


Figure 2. Switching Time Test Circuit

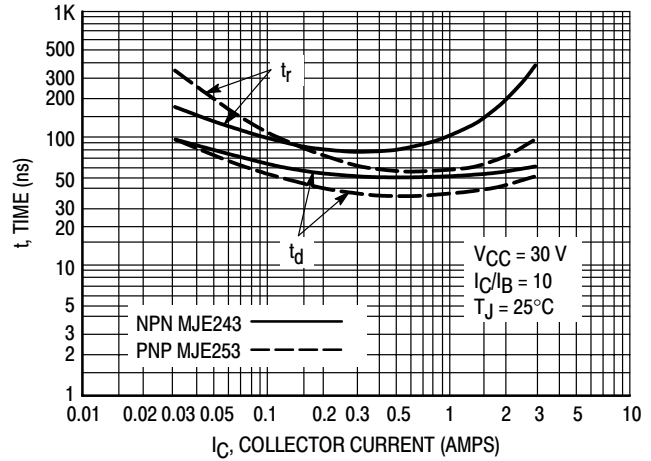


Figure 3. Turn-On Time

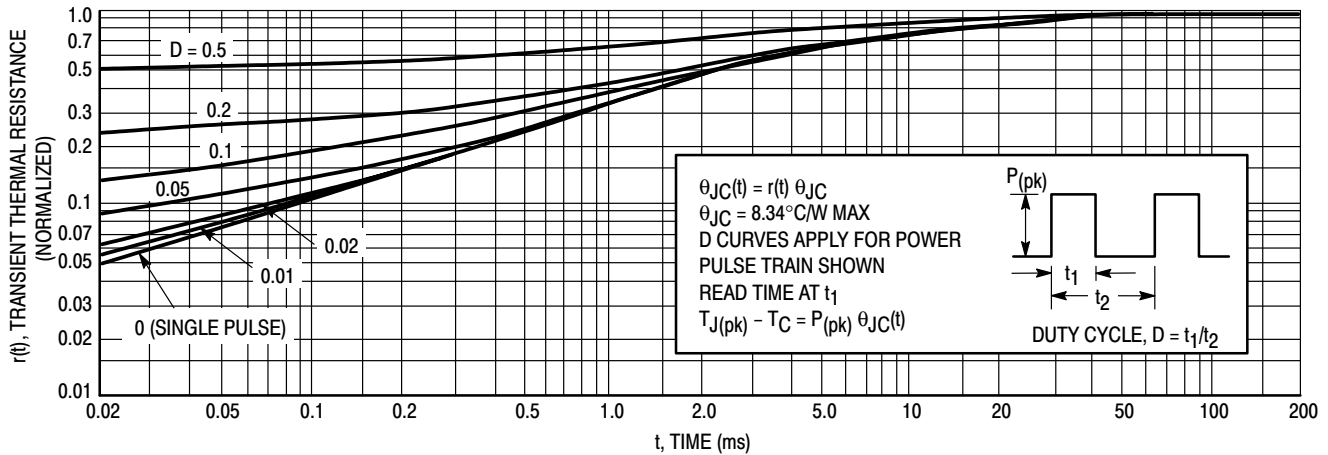


Figure 4. Thermal Response

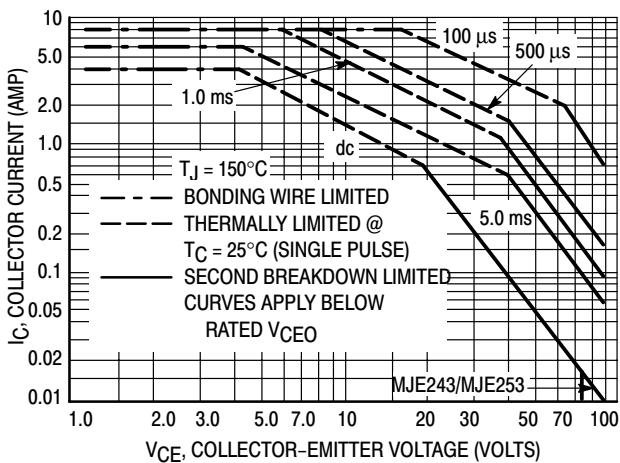


Figure 5. Active Region Safe Operating Area

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 $T_{J(pk)} = 150^\circ\text{C}$; 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 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.

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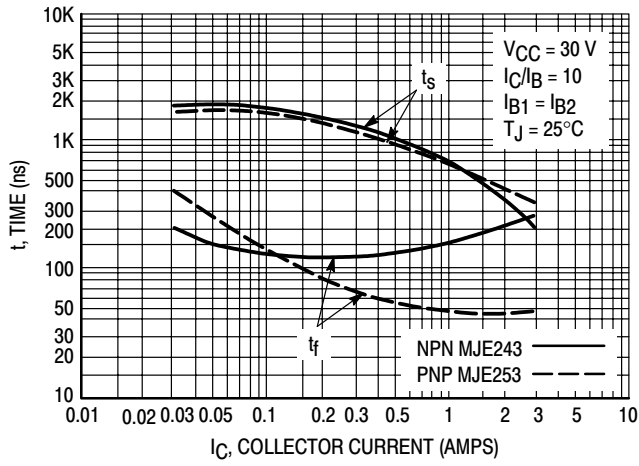


Figure 6. Turn-Off Time

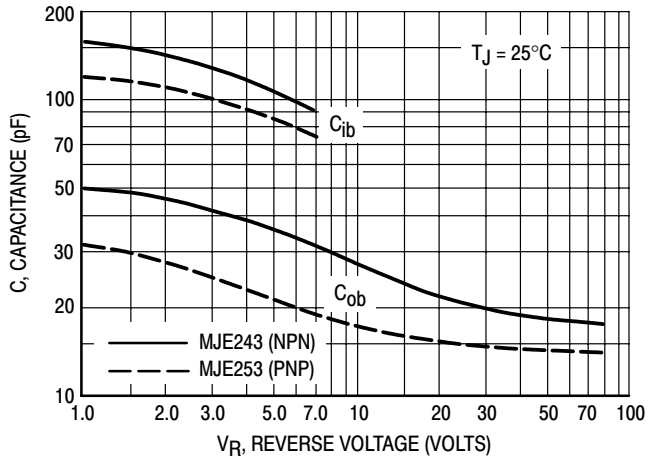


Figure 7. Capacitance

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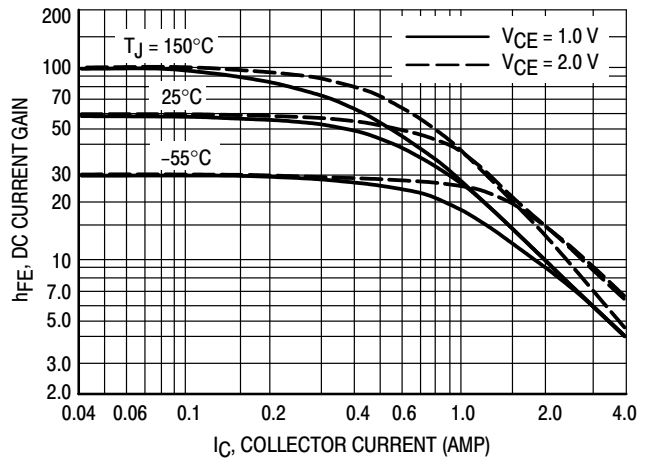
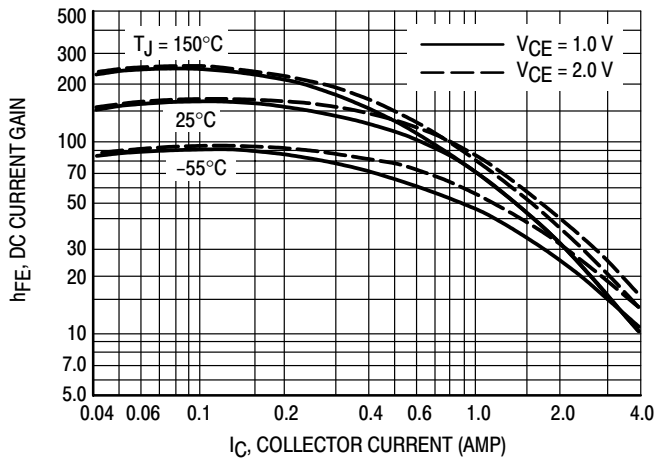


Figure 8. DC Current Gain

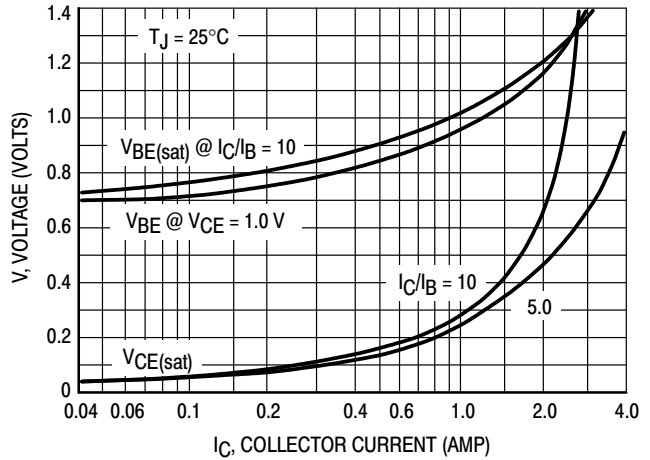
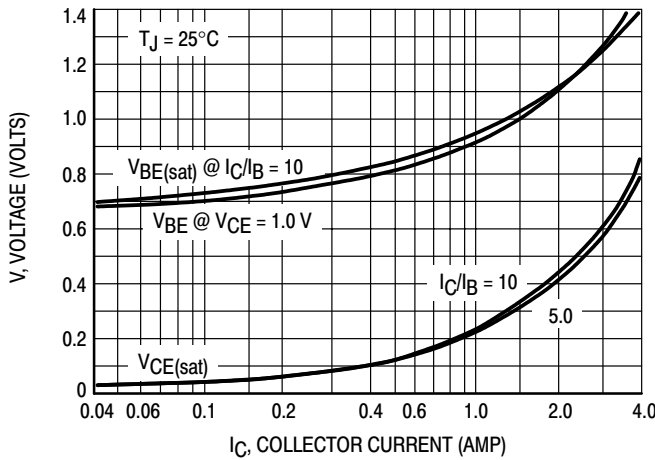


Figure 9. "On" Voltages

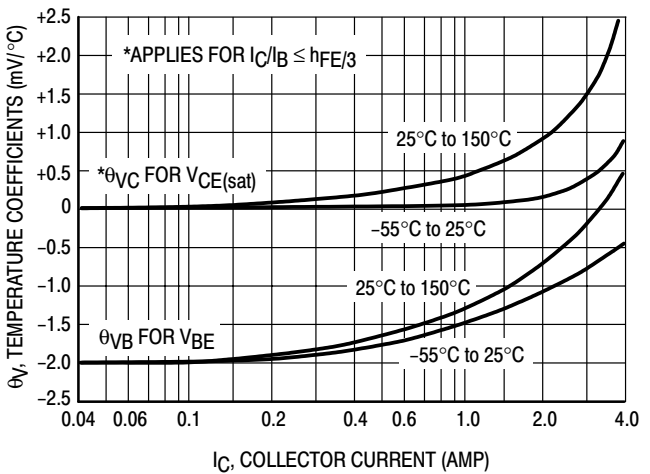
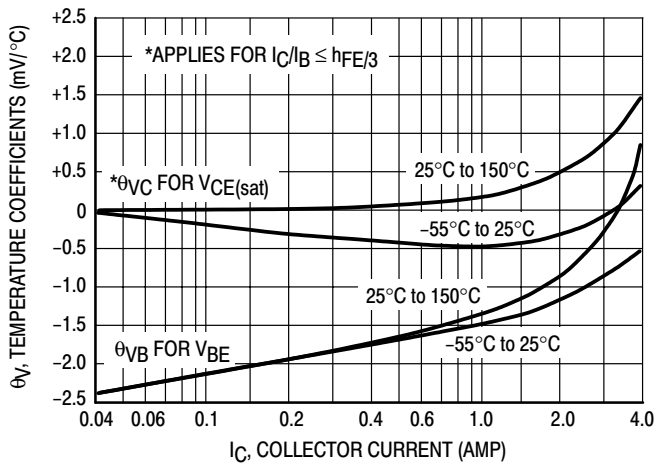
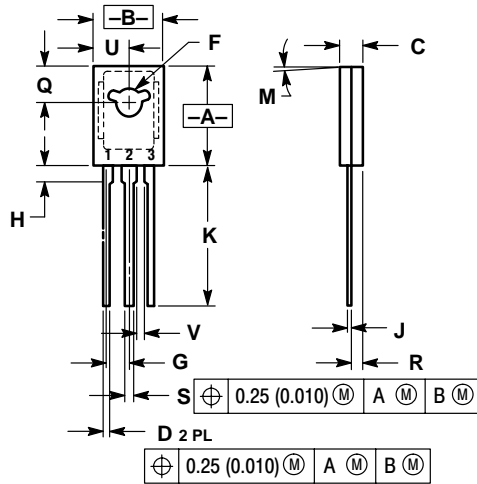


Figure 10. Temperature Coefficients

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PACKAGE DIMENSIONS

TO-225AA
CASE 77-09
ISSUE W



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.425	0.435	10.80	11.04
B	0.295	0.305	7.50	7.74
C	0.095	0.105	2.42	2.66
D	0.020	0.026	0.51	0.66
F	0.115	0.130	2.93	3.30
G	0.094 BSC		2.39 BSC	
H	0.050	0.095	1.27	2.41
J	0.015	0.025	0.39	0.63
K	0.575	0.655	14.61	16.63
M	5° TYP		5° TYP	
Q	0.148	0.158	3.76	4.01
R	0.045	0.065	1.15	1.65
S	0.025	0.035	0.64	0.88
U	0.145	0.155	3.69	3.93
V	0.040	---	1.02	---

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

Notes

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