

Plastic Medium-Power Silicon Transistors

... designed for general-purpose amplifier and low-speed switching applications.

- High DC Current Gain —
 $h_{FE} = 2500$ (Typ) @ $I_C = 4.0$ Adc
- Collector-Emitter Sustaining Voltage — @ 100 mAdc
 $V_{CE(sus)} = 60$ Vdc (Min) — 2N6387
 $= 80$ Vdc (Min) — 2N6388
- Low Collector-Emitter Saturation Voltage —
 $V_{CE(sat)} = 2.0$ Vdc (Max) @ $I_C = 5.0$ Adc — 2N6387, 2N6388
- Monolithic Construction with Built-In Base-Emitter Shunt Resistors
- TO-220AB Compact Package

*MAXIMUM RATINGS

Rating	Symbol	2N6387	2N6388	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	Vdc
Collector-Base Voltage	V_{CB}	60	80	Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current — Continuous Peak	I_C	10 15	10 15	Adc
Base Current	I_B	250		mAdc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	65 0.52		Watts W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	2.0 0.016		Watts W/ $^\circ\text{C}$
Operating and Storage Junction, Temperature Range	T_J, T_{stg}	-65 to +150		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.92	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

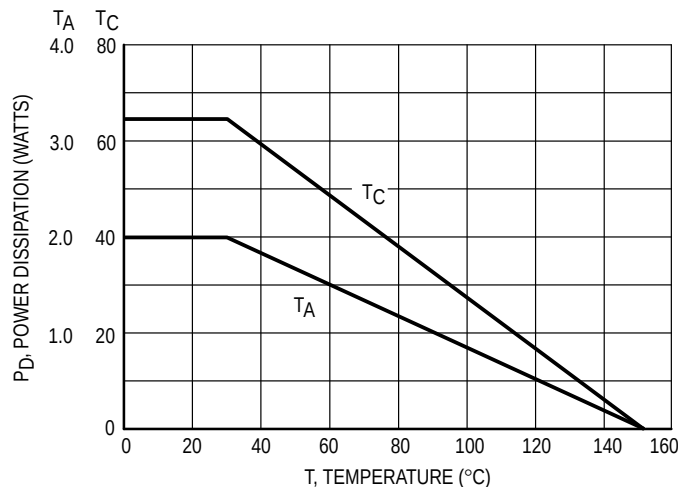


Figure 1. Power Derating

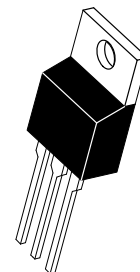
Preferred devices are Motorola recommended choices for future use and best overall value.

REV 7

2N6387
2N6388*

*Motorola Preferred Device

DARLINGTON
8 AND 10 AMPERE
NPN SILICON
POWER TRANSISTORS
60-80 VOLTS
65 WATTS



CASE 221A-06
TO-220AB



MOTOROLA

2N6387 2N6388

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (1) ($I_C = 200 \text{ mAdc}$, $I_B = 0$) 2N6387 2N6388	$V_{CEO(sus)}$	60 80	— —	Vdc
Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}$, $I_B = 0$) ($V_{CE} = 80 \text{ Vdc}$, $I_B = 0$) 2N6387 2N6388	I_{CEO}	— —	1.0 1.0	mAdc
Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}$, $V_{EB(off)} = 1.5 \text{ Vdc}$) ($V_{CE} = 80 \text{ Vdc}$, $V_{EB(off)} = 1.5 \text{ Vdc}$) ($V_{CE} = 60 \text{ Vdc}$, $V_{EB(off)} = 1.5 \text{ Vdc}$, $T_C = 125^\circ\text{C}$) ($V_{CE} = 80 \text{ Vdc}$, $V_{EB(off)} = 1.5 \text{ Vdc}$, $T_C = 125^\circ\text{C}$) 2N6387 2N6388 2N6387 2N6388	I_{CEX}	— — — —	300 300 3.0 3.0	μAdc mAdc
Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	5.0	mAdc

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) ($I_C = 1.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$)	2N6387, 2N6388 2N6387, 2N6388	h_{FE}	1000 100	20,000 —	—
Collector–Emitter Saturation Voltage ($I_C = 5.0 \text{ Adc}$, $I_B = 0.01 \text{ Adc}$) ($I_C = 10 \text{ Adc}$, $I_B = 0.1 \text{ Adc}$)	2N6387, 2N6388 2N6387, 2N6388	$V_{CE(sat)}$	— —	2.0 3.0	Vdc
Base–Emitter On Voltage ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) ($I_C = 10 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$)	2N6387, 2N6388 2N6387, 2N6388	$V_{BE(on)}$	— —	2.8 4.5	Vdc

DYNAMIC CHARACTERISTICS

Small-Signal Current Gain ($I_C = 1.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f_{\text{test}} = 1.0 \text{ MHz}$)	$ h_{fe} $	20	—	
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	200	pF
Small-Signal Current Gain ($I_C = 1.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	1000	—	—

* Indicates JEDEC Registered Data

(1) Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

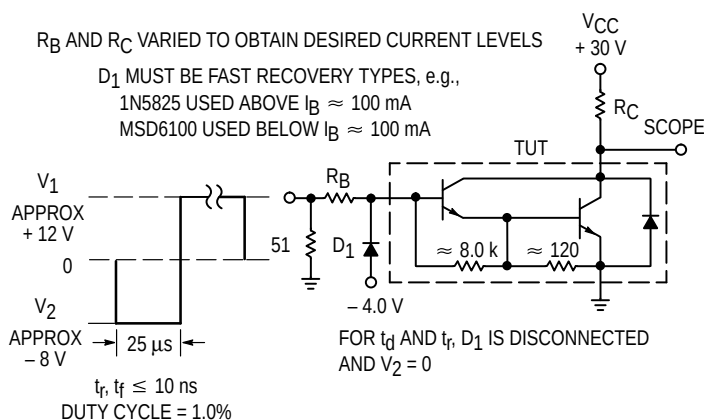


Figure 2. Switching Times Test Circuit

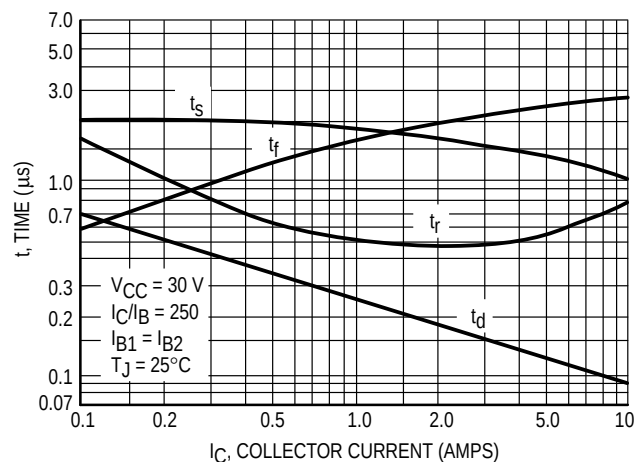


Figure 3. Switching Times

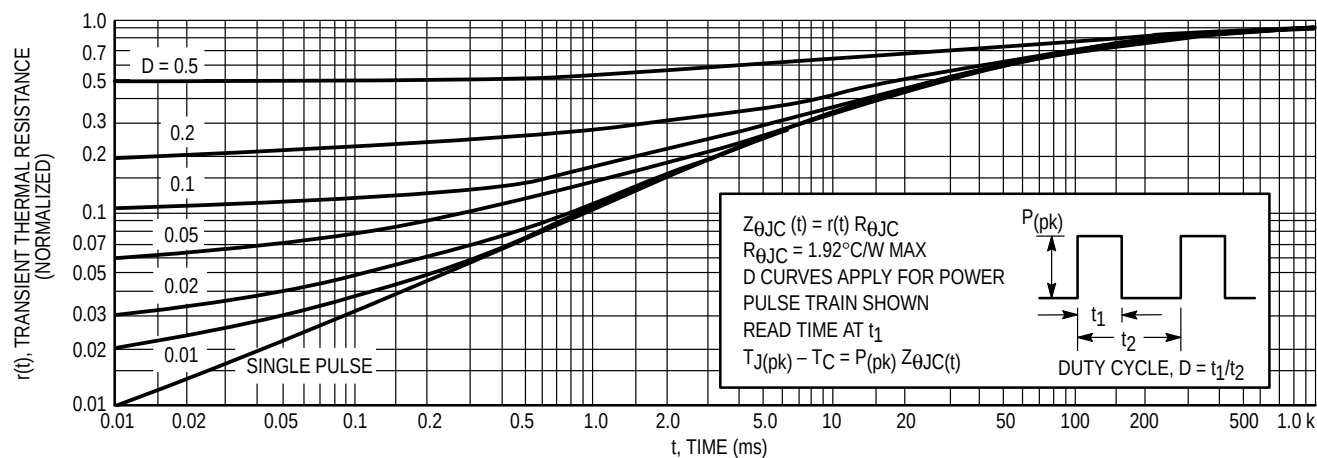


Figure 4. Thermal Response

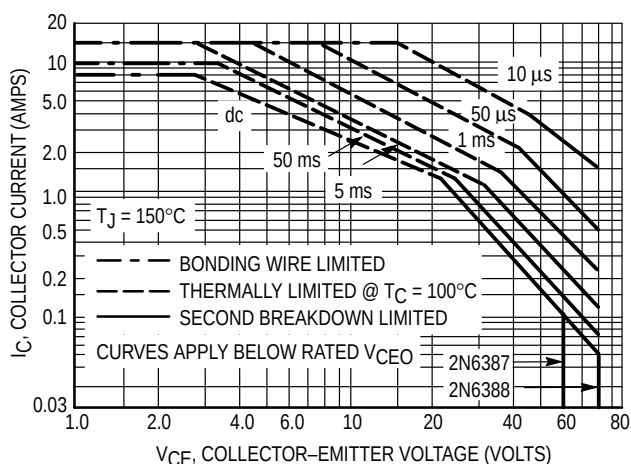


Figure 5. Active-Region Safe Operating Area

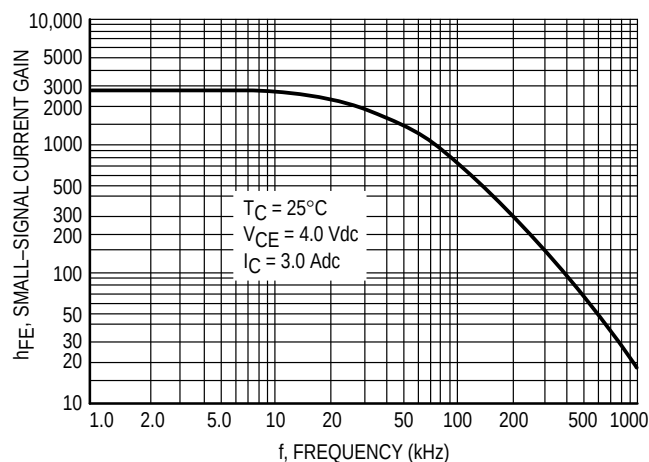


Figure 6. Small-Signal Current Gain

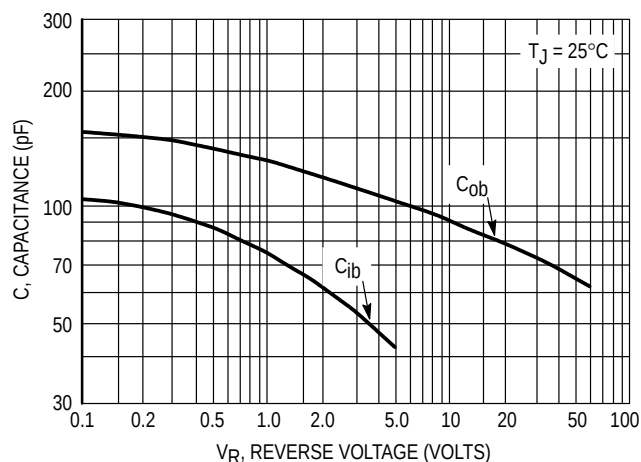


Figure 7. Capacitance

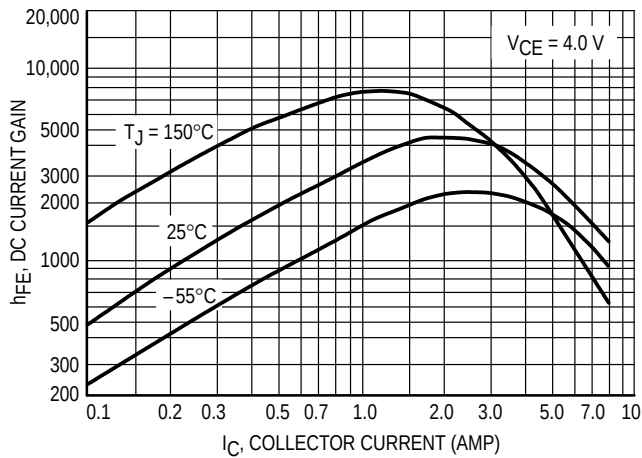


Figure 8. DC Current Gain

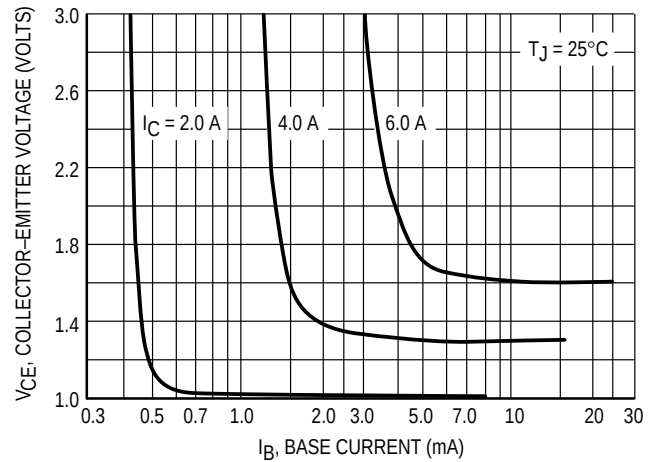


Figure 9. Collector Saturation Region

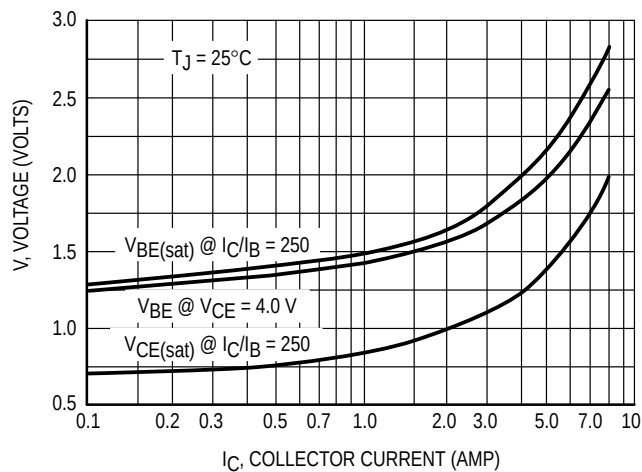


Figure 10. "On" Voltages

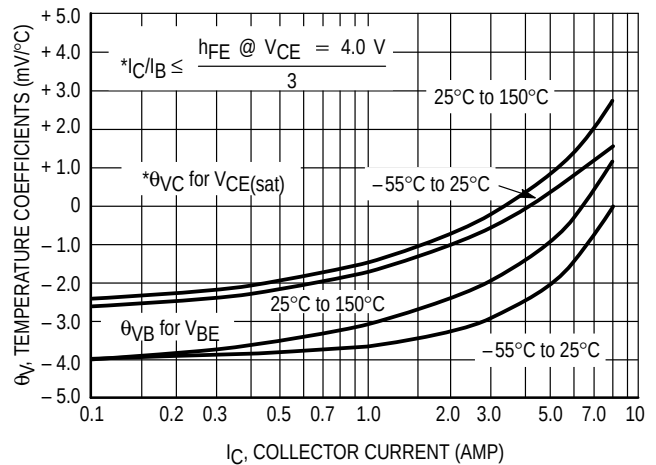


Figure 11. Temperature Coefficients

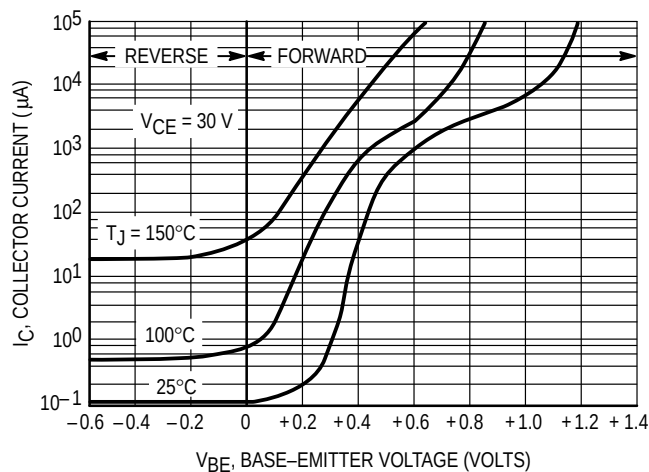


Figure 12. Collector Cut-Off Region

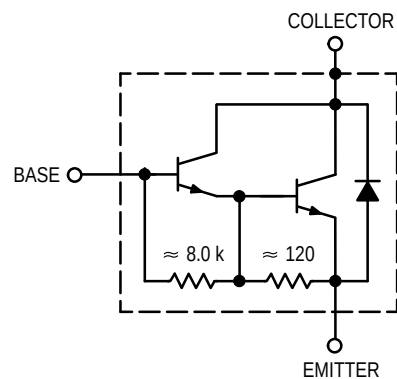
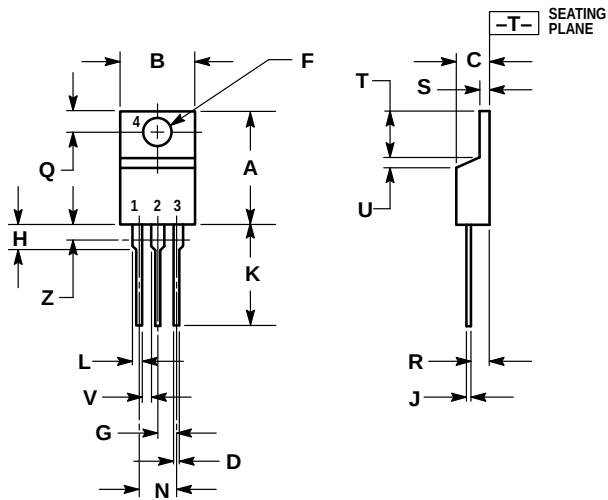


Figure 13. Darlington Schematic

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.

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	0.035	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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