

Complementary Silicon Plastic Power Transistors

... designed for use in general-purpose amplifier and switching applications.

- DC Current Gain Specified to 15 Amperes —
 $h_{FE} = 20-150 @ I_C = 5.0 \text{ Adc}$
 $= 5.0 \text{ (Min) } @ I_C = 15 \text{ Adc}$
- Collector-Emitter Sustaining Voltage —
 $V_{CEO(sus)} = 60 \text{ Vdc (Min) - 2N6487, 2N6490}$
 $= 80 \text{ Vdc (Min) - 2N6488, 2N6491}$
- High Current Gain — Bandwidth Product
 $f_T = 5.0 \text{ MHz (Min) } @ I_C = 1.0 \text{ Adc}$
- TO-220AB Compact Package

MAXIMUM RATINGS (1)

Rating	Symbol	2N6487 2N6490	2N6488 2N6491	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	Vdc
Collector-Base Voltage	V_{CB}	70	90	Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current — Continuous	I_C	15		Adc
Base Current	I_B	5.0		Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	75 0.6		Watts W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	1.8 0.014		Watts 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	$R_{\theta JC}$	1.67	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	70	$^\circ\text{C/W}$

(1) Indicates JEDEC Registered Data.

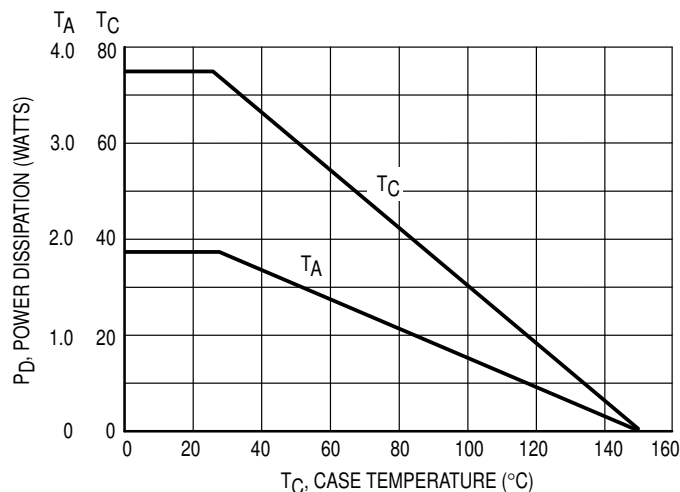


Figure 1. Power Derating

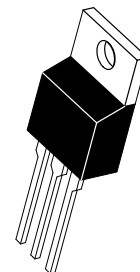
Preferred devices are Motorola recommended choices for future use and best overall value.

REV 7

NPN
2N6487
2N6488*
PNP
2N6490
2N6491*

*Motorola Preferred Device

15 AMPERE
COMPLEMENTARY
SILICON
POWER TRANSISTORS
60-80 VOLTS
75 WATTS



CASE 221A-06
TO-220AB

2N6487 2N6488 2N6490 2N6491

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (1) ($I_C = 200\text{ mAdc}$, $I_B = 0$)	$V_{CEO(sus)}$	60 80	—	Vdc
Collector–Emitter Sustaining Voltage (1) ($I_C = 200\text{ mAdc}$, $V_{BE} = 1.5\text{ Vdc}$)	V_{CEX}	70 90	— —	Vdc
Collector Cutoff Current ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 40\text{ Vdc}$, $I_B = 0$)	I_{CEO}	— —	1.0 1.0	mAdc
Collector Cutoff Current ($V_{CE} = 65\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 85\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 60\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) ($V_{CE} = 80\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$)	I_{CEX}	— — — —	500 500 5.0 5.0	μAdc
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	1.0	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 5.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 15\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$)	h_{FE}	20 5.0	150 —	—
Collector–Emitter Saturation Voltage ($I_C = 5.0\text{ Adc}$, $I_B = 0.5\text{ Adc}$) ($I_C = 15\text{ Adc}$, $I_B = 5.0\text{ Adc}$)	$V_{CE(sat)}$	— —	1.3 3.5	Vdc
Base–Emitter On Voltage ($I_C = 5.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 15\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$)	$V_{BE(on)}$	— —	1.3 3.5	Vdc

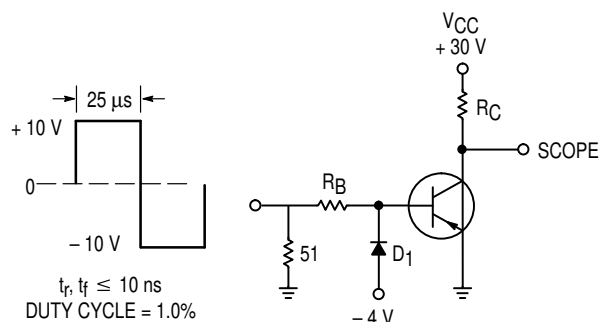
DYNAMIC CHARACTERISTICS

Current–Gain — Bandwidth Product (2) ($I_C = 1.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$, $f_{test} = 1.0\text{ MHz}$)	f_T	5.0	—	MHz
Small–Signal Current Gain ($I_C = 1.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$, $f = 1.0\text{ kHz}$)	h_{fe}	25	—	—

* Indicates JEDEC Registered Data.

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

(2) $f_T = |h_{fe}| \cdot f_{test}$.



R_B AND R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS.
FOR PNP, REVERSE ALL POLARITIES.

D_1 MUST BE FAST RECOVERY TYPE, e.g.:

1N5825 USED ABOVE $I_B \approx 100\text{ mA}$

MSD6100 USED BELOW $I_B \approx 100\text{ mA}$

Figure 2. Switching Time Test Circuit

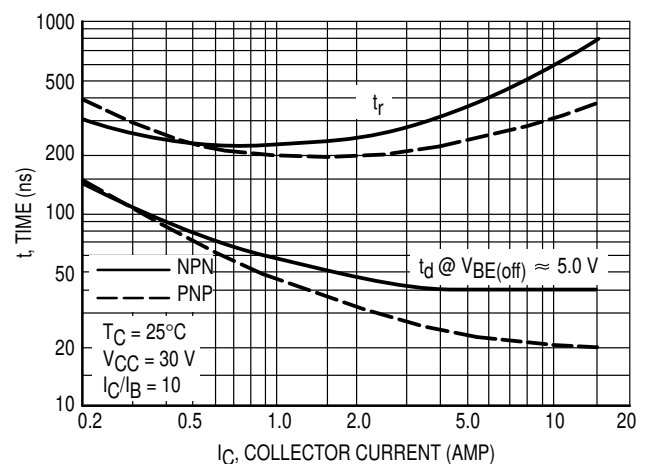


Figure 3. Turn–On Time

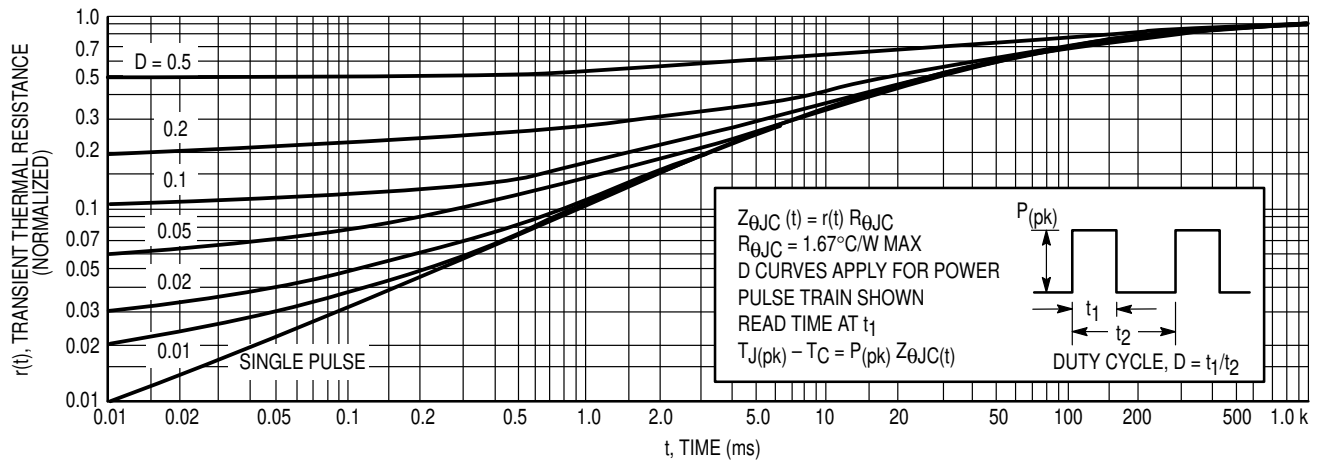


Figure 4. Thermal Response

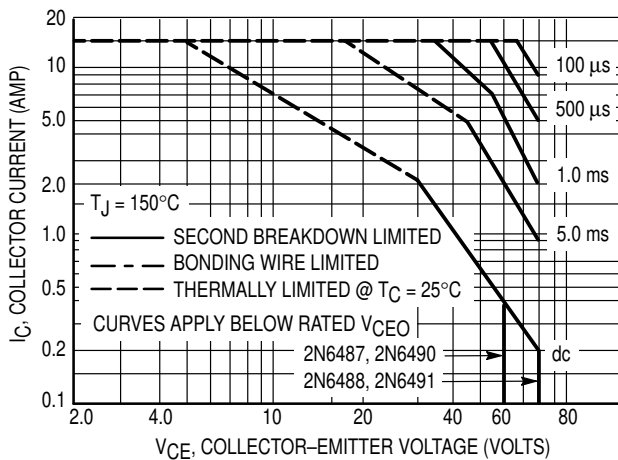


Figure 5. Active-Region Safe Operating Area

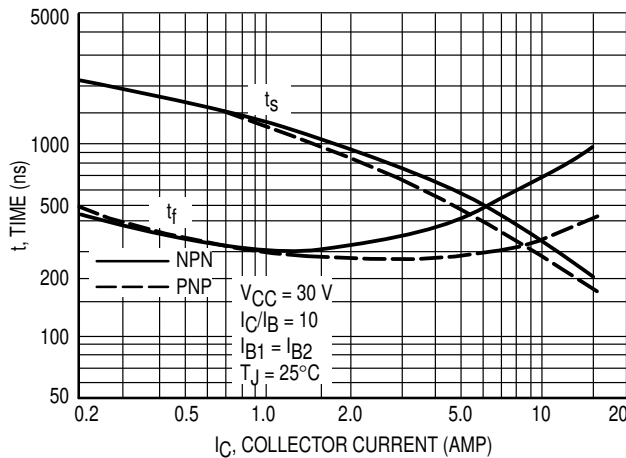


Figure 6. Turn-Off Time

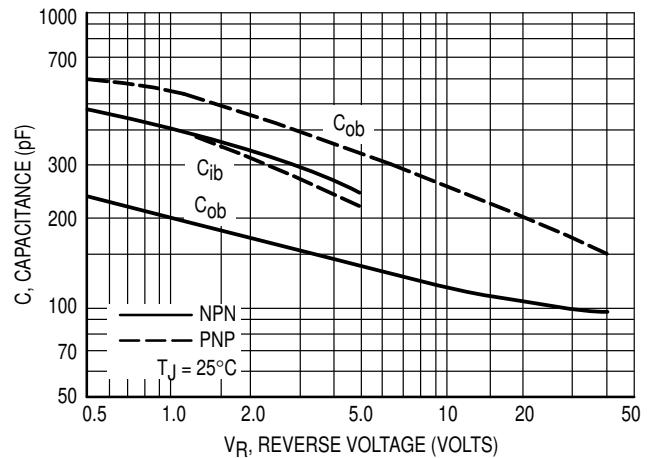


Figure 7. Capacitances

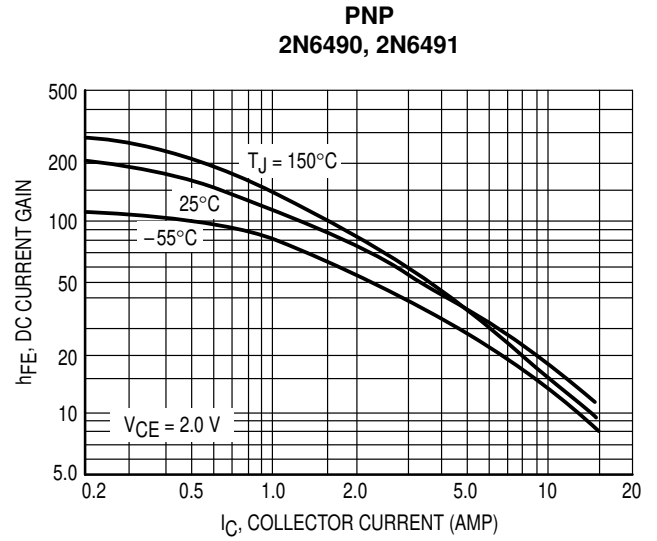
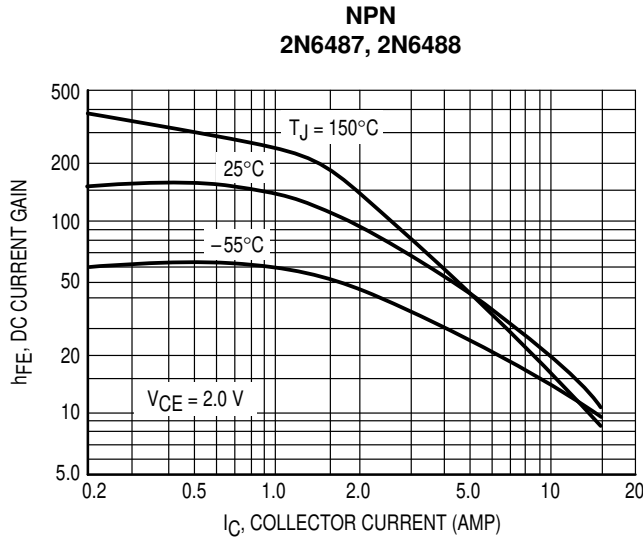


Figure 8. DC Current Gain

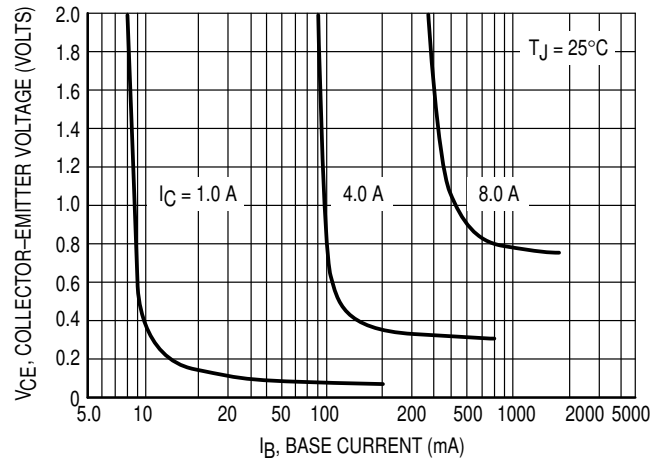
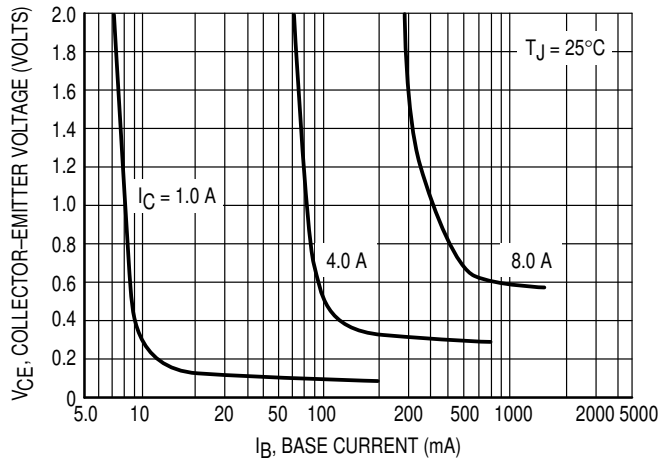


Figure 9. Collector Saturation Region

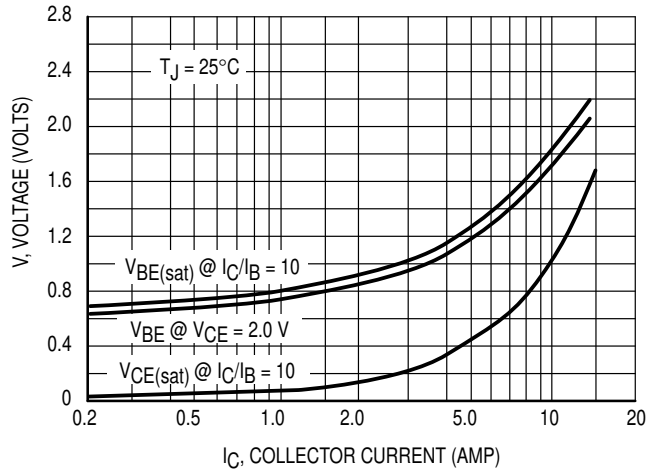
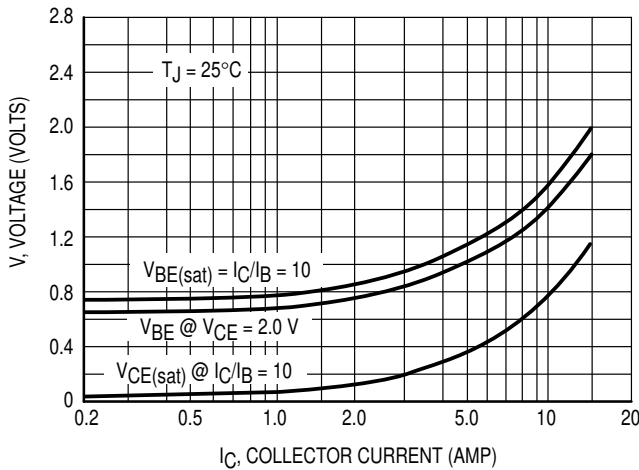
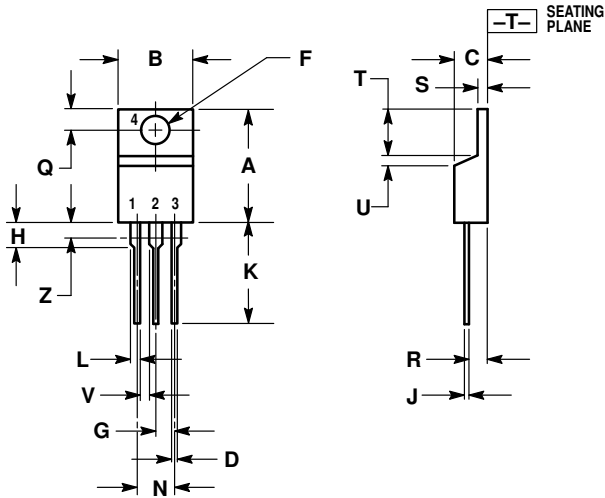


Figure 10. "On" Voltages

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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