2N6487, 2N6488, (NPN) 2N6490, 2N6491 (PNP)

Complementary Silicon Plastic Power Transistors

These devices are designed for use in general−purpose amplifier and switching applications.

Features

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

MAXIMUM RATINGS (Note 1)

Rating	Symbol	Value	Unit
Collector−Emitter Voltage 2N6487, 2N6490 2N6488, 2N6491	V_{CEO}	 60 80	Vdc
Collector−Base Voltage 2N6487, 2N6490 2N6488, 2N6491	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°C Derate above 25°C	P_D	75 0.6	W W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	1.8 0.014	W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	1.67	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	70	°C/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.

1. Indicates JEDEC Registered Data.

*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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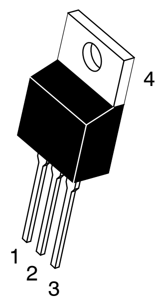
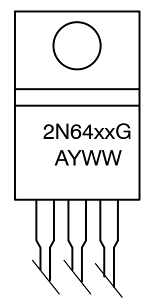
15 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 60−80 VOLTS, 75 WATTS

MARKING DIAGRAM



TO−220AB
CASE 221A
STYLE 1



2N64xx	=	Specific Device Code
xx	=	See Table on Page 5
G	=	Pb−Free Package
A	=	Assembly Location
Y	=	Year
WW	=	Work Week

ORDERING INFORMATION

See detailed ordering, marking, and shipping information in the package dimensions section on page 5 of this data sheet.

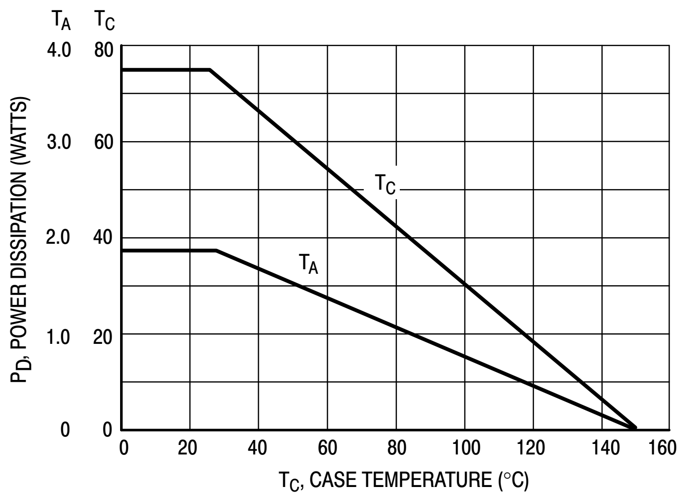


Figure 1. Power Derating

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted) (Note 2)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Sustaining Voltage (Note 3) (I_C = 200 mAdc, I_B = 0)	 2N6487, 2N6490 2N6488, 2N6491	$V_{CEO(sus)}$	 60 80	 – –	Vdc
Collector−Emitter Sustaining Voltage (Note) (I_C = 200 mAdc, V_{BE} = 1.5 Vdc)	 2N6487, 2N6490 2N6488, 2N6491	V_{CEX}	 70 90	 – –	Vdc
Collector Cutoff Current (V_{CE} = 30 Vdc, I_B = 0) (V_{CE} = 40 Vdc, I_B = 0)	 2N6487, 2N6490 2N6488, 2N6491	I_{CEO}	 – –	 1.0 1.0	mAdc
Collector Cutoff Current (V_{CE} = 65 Vdc, $V_{EB(off)}$ = 1.5 Vdc) (V_{CE} = 85 Vdc, $V_{EB(off)}$ = 1.5 Vdc) (V_{CE} = 60 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 150°C) (V_{CE} = 80 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 150°C)	 2N6487, 2N6490 2N6488, 2N6491 2N6487, 2N6490 2N6488, 2N6491	I_{CEX}	 – – – –	 500 500 5.0 5.0	μAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	1.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 4.0 Vdc) (I_C = 15 Adc, V_{CE} = 4.0 Vdc)		h_{FE}	 20 5.0	 150 –	–
Collector−Emitter Saturation Voltage (I_C = 5.0 Adc, I_B = 0.5 Adc) (I_C = 15 Adc, I_B = 5.0 Adc)		$V_{CE(sat)}$	 – –	 1.3 3.5	Vdc
Base−Emitter On Voltage (I_C = 5.0 Adc, V_{CE} = 4.0 Vdc) (I_C = 15 Adc, V_{CE} = 4.0 Vdc)		$V_{BE(on)}$	 – –	 1.3 3.5	Vdc
DYNAMIC CHARACTERISTICS					
Current−Gain − Bandwidth Product (Note 4) (I_C = 1.0 Adc, V_{CE} = 4.0 Vdc, f_{test} = 1.0 MHz)		f_T	5.0	–	MHz
Small−Signal Current Gain (I_C = 1.0 Adc, V_{CE} = 4.0 Vdc, f = 1.0 kHz)		h_{fe}	25	–	–

2. Indicates JEDEC Registered Data.
3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
4. $f_T = |h_{fe}| \bullet f_{test}$

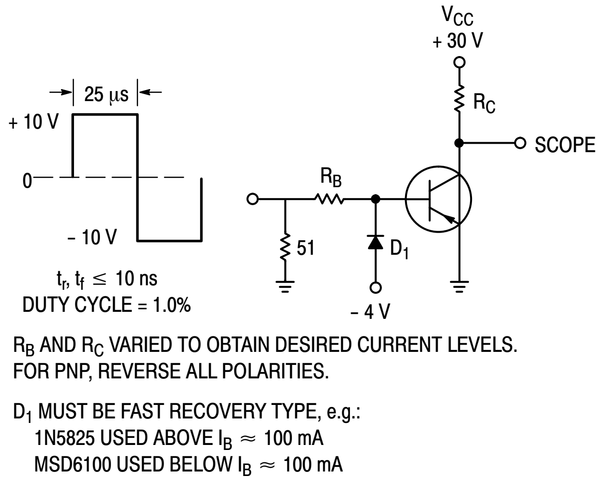


Figure 2. Switching Time Test Circuit

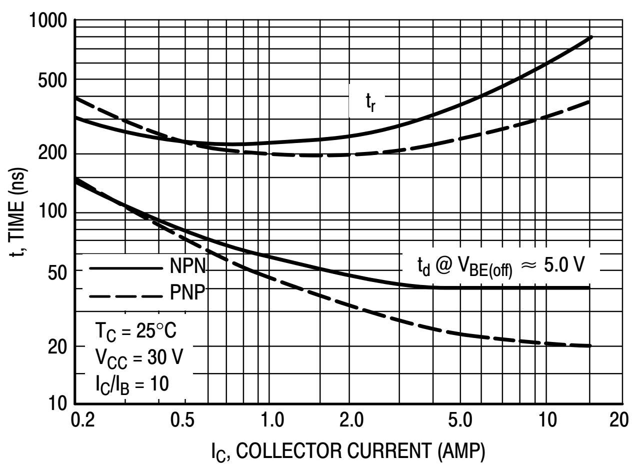


Figure 3. Turn−On Time

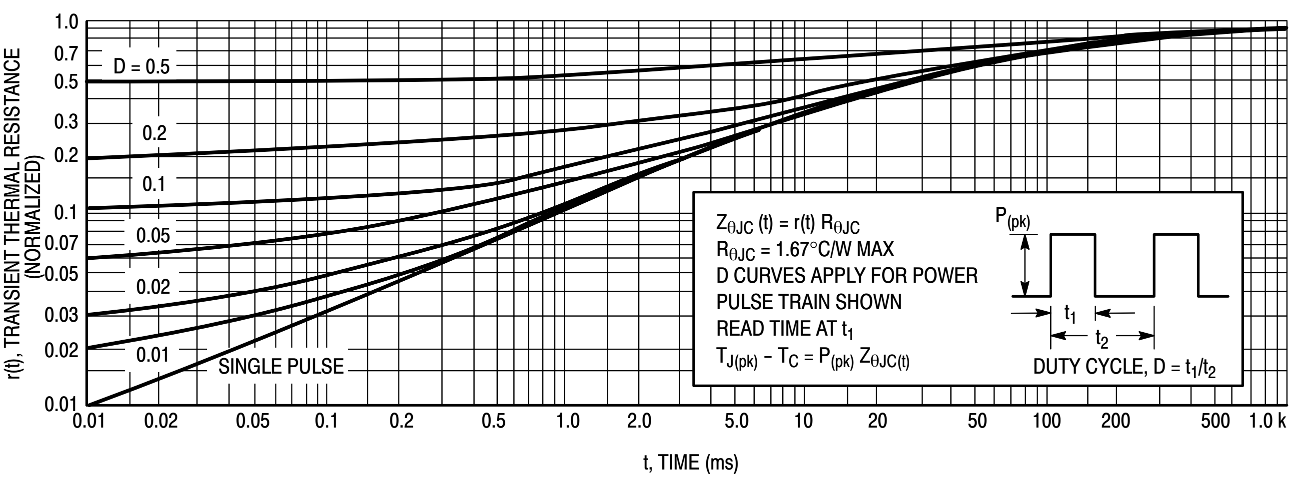


Figure 4. Thermal Response

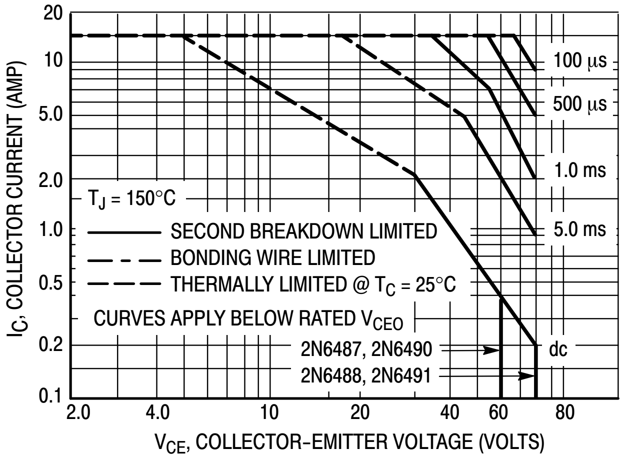


Figure 5. Active−Region Safe Operating Area

There are two limitations on the power handling ability of a transistors 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 $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ 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

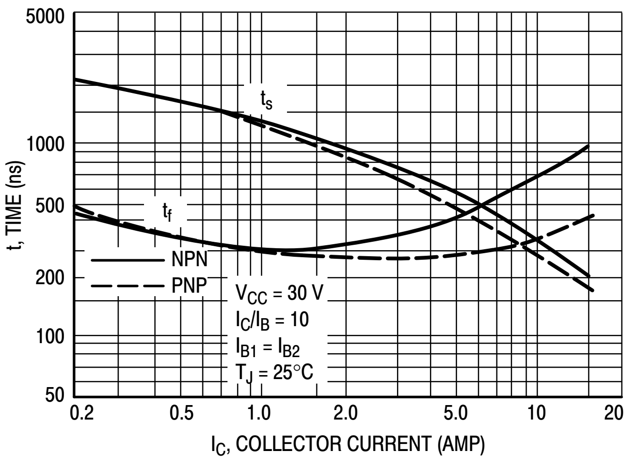


Figure 6. Turn−Off Time

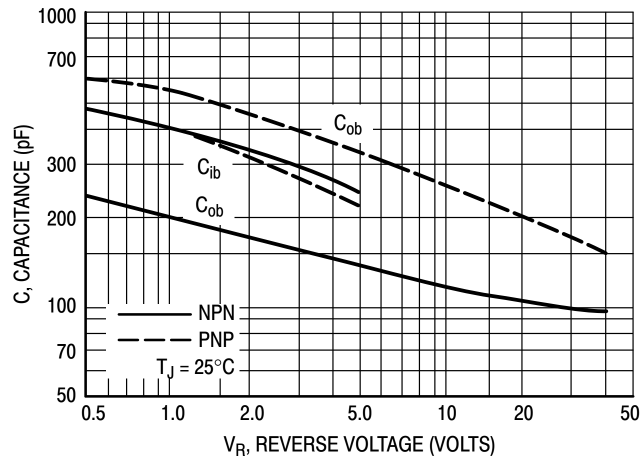


Figure 7. Capacitances

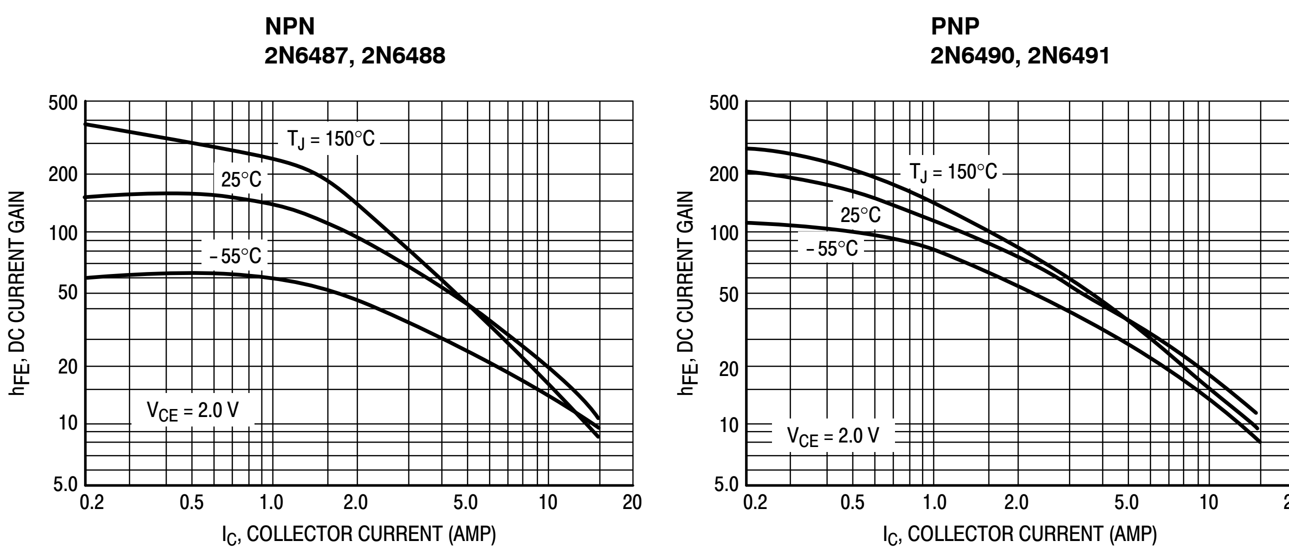


Figure 8. DC Current Gain

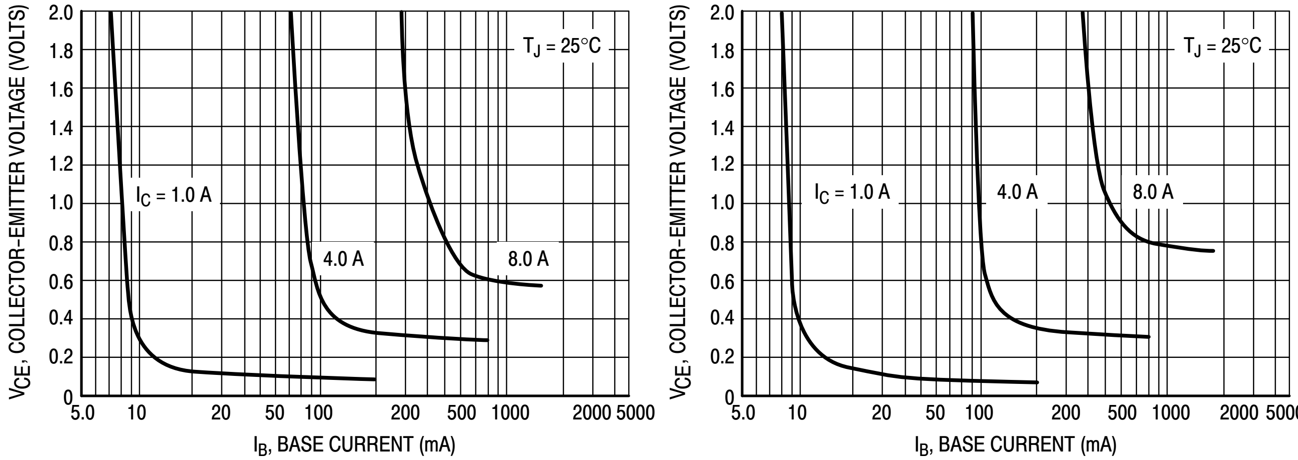


Figure 9. Collector Saturation Region

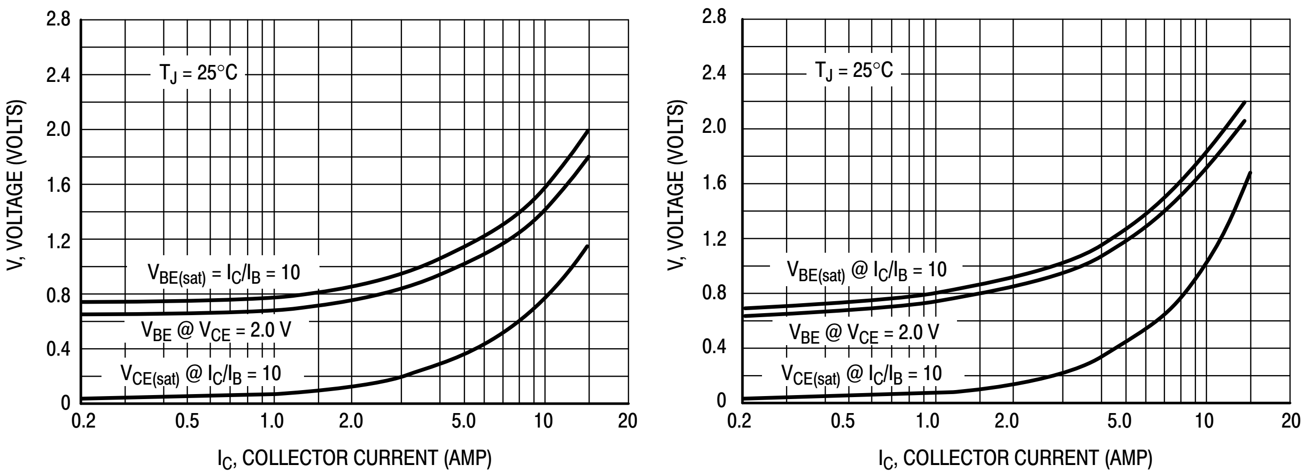


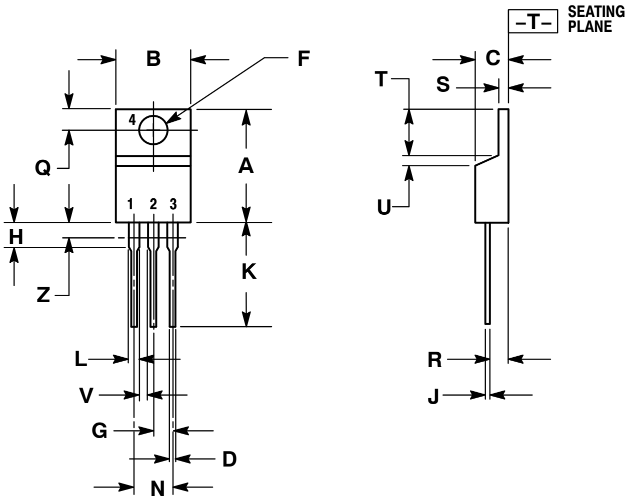
Figure 10. "On" Voltages

ORDERING INFORMATION

Device	Device Marking	Package	Shipping
2N6487	2N6487	TO−220AB	50 Units / Rail
2N6487G		TO−220AB (Pb−Free)	
2N6488	2N6488	TO−220AB	50 Units / Rail
2N6488G		TO−220AB (Pb−Free)	
2N6490	2N6490	TO−220AB	50 Units / Rail
2N6490G		TO−220AB (Pb−Free)	
2N6491	2N6491	TO−220AB	50 Units / Rail
2N6491G		TO−220AB (Pb−Free)	

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.

	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	0.036	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:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

PUBLICATION ORDERING INFORMATION

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