PNP - 2N6107, 2N6109, 2N6111; NPN - 2N6288, 2N6292

Complementary Silicon Plastic Power Transistors

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

Features

- DC Current Gain Specified to 7.0 Amperes
  h_{FE} = 30−150 @ I_C
  = 3.0 Adc − 2N6111, 2N6288
  = 2.3 (Min) @ I_C = 7.0 Adc − All Devices
- Collector−Emitter Sustaining Voltage −
  $V_{CEO(sus)}$ = 30 Vdc (Min) − 2N6111, 2N6288
  = 50 Vdc (Min) − 2N6109
  = 70 Vdc (Min) − 2N6107, 2N6292
- High Current Gain − Bandwidth Product
  f_T = 4.0 MHz (Min) @ I_C = 500 mAdc − 2N6288, 90, 92
  = 10 MHz (Min) @ I_C = 500 mAdc − 2N6107, 09, 11
- TO−220AB Compact Package
- Pb−Free Packages are Available*

MAXIMUM RATINGS (Note 1)

Rating	Symbol	Value	Unit
Collector−Emitter Voltage 2N6111, 2N6288 2N6109 2N6107, 2N6292	V_{CEO}	 30 50 70	Vdc
Collector−Base Voltage 2N6111, 2N6288 2N6109 2N6107, 2N6292	V_{CB}	 40 60 80	Vdc
Emitter−Base Voltage	V_{EB}	5.0	Vdc
Collector Current − Continuous − Peak	I_C	7.0 10	Adc
Base Current	I_B	3.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	40 0.32	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	$R_{\theta JC}$	3.125	°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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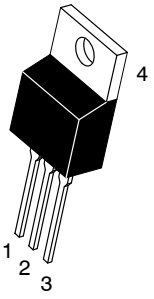
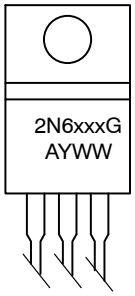
7 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 30 − 50 − 70 VOLTS, 40 WATTS

MARKING DIAGRAM



TO−220AB
CASE 221A
STYLE 1

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



2N6xxx = Specific Device Code
xxx = See Table on Page 4
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 4 of this data sheet.

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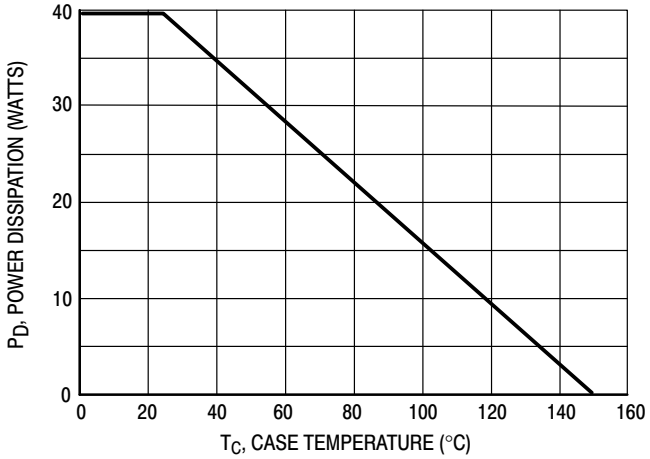


Figure 1. Power Derating

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Sustaining Voltage (Note 3)		$V_{CEO(sus)}$			Vdc
(I_C = 100 mAdc, I_B = 0)	2N6111, 2N6288		30	–	
	2N6109		50	–	
	2N6107, 2N6292		70	–	
Collector Cutoff Current		I_{CEO}			mAdc
(V_{CE} = 20 Vdc, I_B = 0)	2N6111, 2N6288		–	1.0	
(V_{CE} = 40 Vdc, I_B = 0)	2N6109		–	1.0	
(V_{CE} = 60 Vdc, I_B = 0)	2N6107, 2N6292		–	1.0	
Collector Cutoff Current		I_{CEX}			μAdc
(V_{CE} = 40 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	2N6111, 2N6288		–	100	
(V_{CE} = 60 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	2N6109		–	100	
(V_{CE} = 80 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	2N6107, 2N6292		–	100	
(V_{CE} = 30 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 150°C)	2N6111, 2N6288		–	2.0	mAdc
(V_{CE} = 50 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 150°C)	2N6109		–	2.0	
(V_{CE} = 70 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 150°C)	2N6107, 2N6292		–	2.0	
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	1.0	mAdc
ON CHARACTERISTICS (Note 3)					
DC Current Gain		h_{FE}			–
(I_C = 2.0 Adc, V_{CE} = 4.0 Vdc)	2N6107, 2N6292		30	150	
(I_C = 2.5 Adc, V_{CE} = 4.0 Vdc)	2N6109		30	150	
(I_C = 3.0 Adc, V_{CE} = 4.0 Vdc)	2N6111, 2N6288		30	150	
(I_C = 7.0 Adc, V_{CE} = 4.0 Vdc)	All Devices		2.3	–	
Collector–Emitter Saturation Voltage (I_C = 7.0 Adc, I_B = 3.0 Adc)		$V_{CE(sat)}$	–	3.5	Vdc
Base–Emitter On Voltage (I_C = 7.0 Adc, V_{CE} = 4.0 Vdc)		$V_{BE(on)}$	–	3.0	Vdc
DYNAMIC CHARACTERISTICS					
Current Gain — Bandwidth Product (Note 4)		f_T			MHz
(I_C = 500 mAdc, V_{CE} = 4.0 Vdc, f_{test} = 1.0 MHz)	2N6288, 92		4.0	–	
	2N6107, 09, 11		10	–	
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)		C_{ob}	–	250	pF
Small–Signal Current Gain (I_C = 0.5 Adc, V_{CE} = 4.0 Vdc, f = 50 kHz)		h_{fe}	20	–	–

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

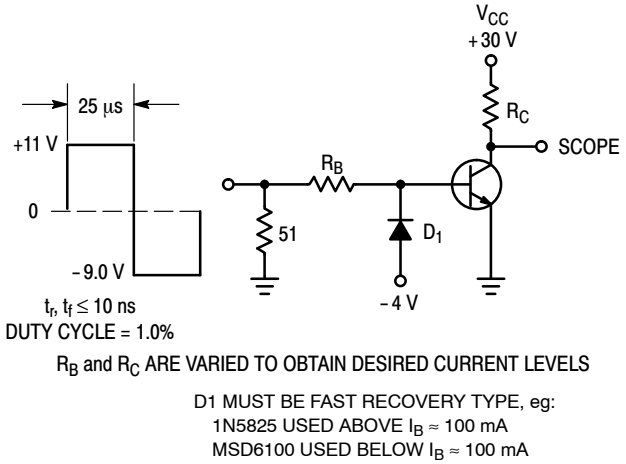


Figure 2. Switching Time Test Circuit

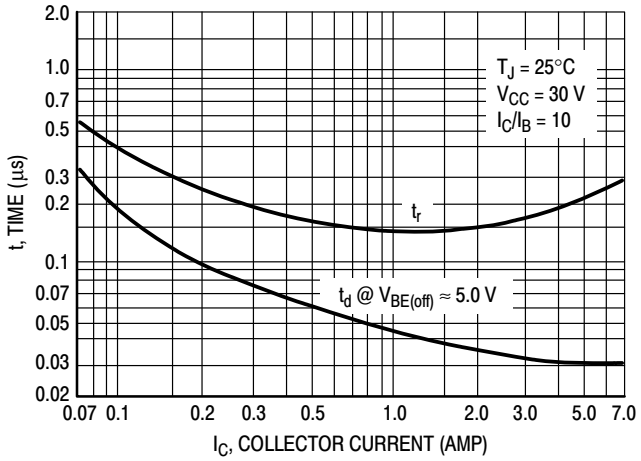


Figure 3. Turn−On Time

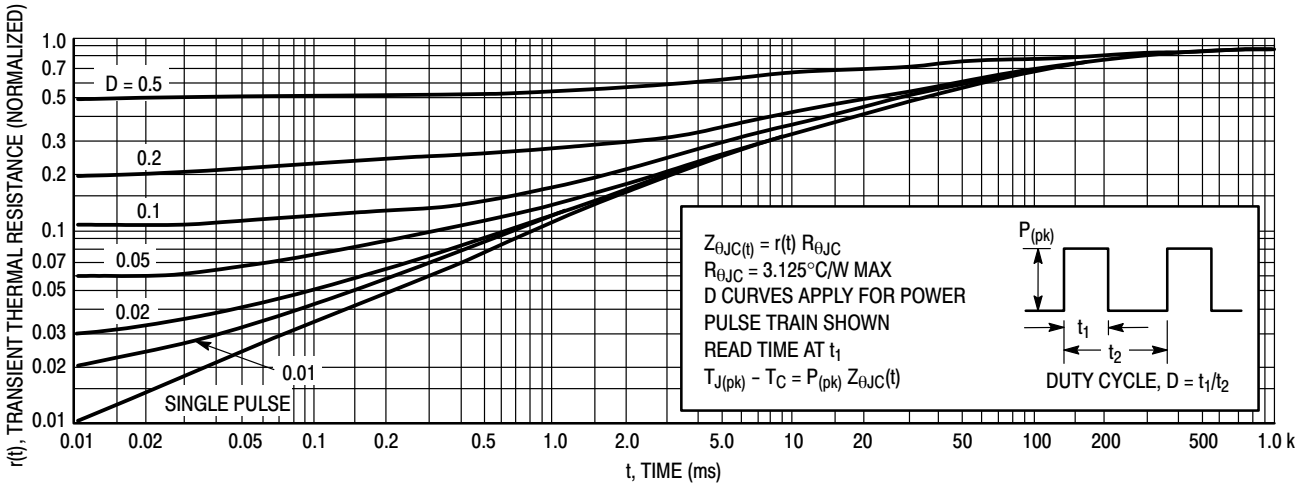


Figure 4. Thermal Response

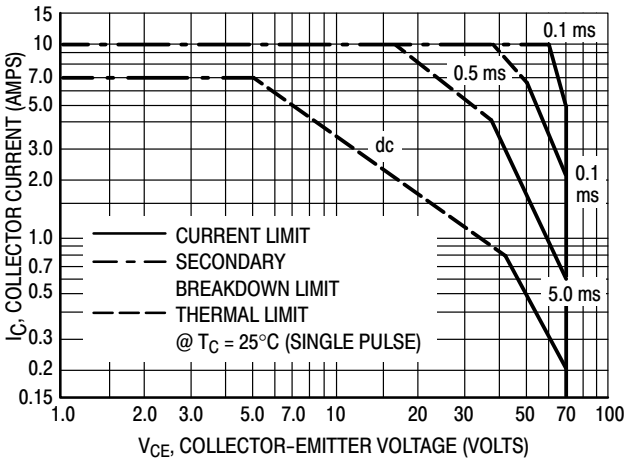


Figure 5. Active−Region Safe Operating Area

There are two limitations on the power handling ability of a 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°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.

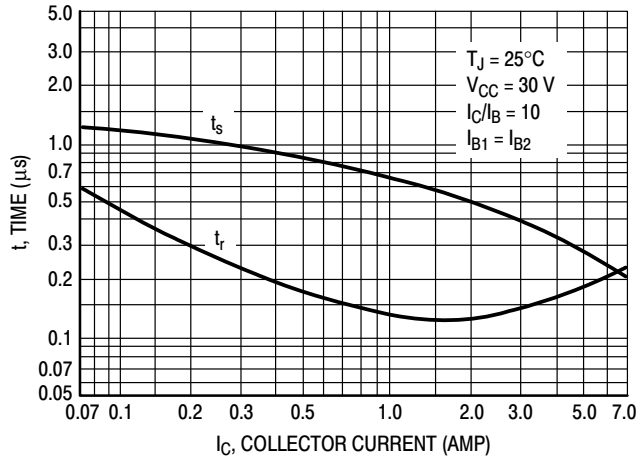


Figure 6. Turn−Off Time

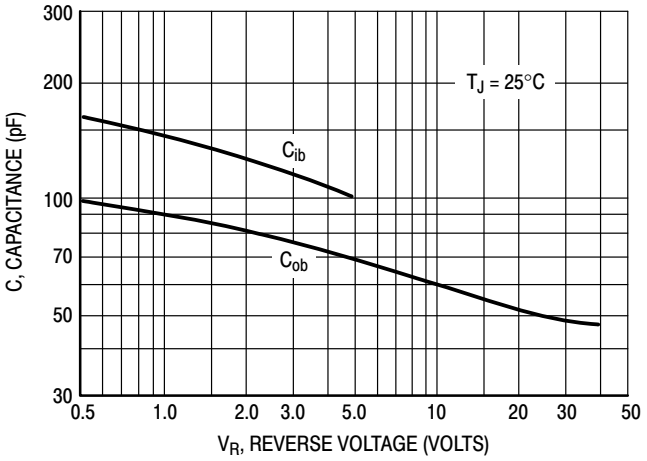


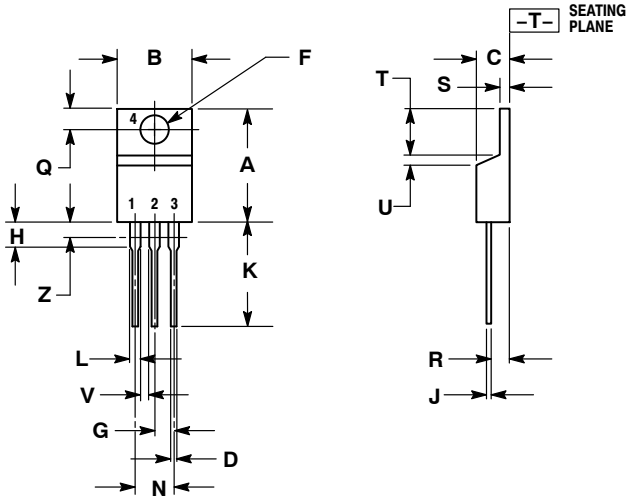
Figure 7. Capacitance

ORDERING INFORMATION

Device	Device Marking	Package	Shipping
2N6107	2N6107	TO−220AB	50 Units / Rail
2N6107G		TO−220AB (Pb−Free)	
2N6109	2N6109	TO−220AB	50 Units / Rail
2N6109G		TO−220AB (Pb−Free)	
2N6111	2N6111	TO−220AB	50 Units / Rail
2N6111G		TO−220AB (Pb−Free)	
2N6288	2N6288	TO−220AB	50 Units / Rail
2N6288G		TO−220AB (Pb−Free)	
2N6292	2N6292	TO−220AB	50 Units / Rail
2N6292G		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

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