Complementary Silicon Plastic Power Transistors

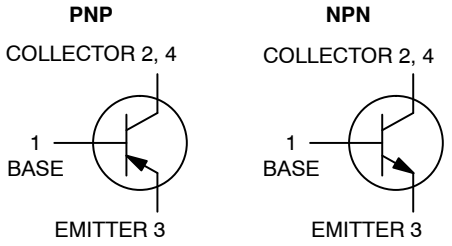
2N6107, 2N6109, 2N6111 (PNP), 2N6288, 2N6292 (NPN)

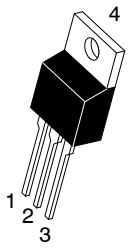
7 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 30 – 50 – 70 VOLTS, 40 WATTS

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

Features

- High DC Current Gain
- High Current Gain − Bandwidth Product
- TO−220 Compact Package
- These Devices are Pb−Free and are RoHS Compliant*





TO−220
CASE 221A
STYLE 1

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	I_C	7.0	Adc
Collector Current − Peak	I_{CM}	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

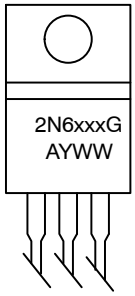
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. Indicates JEDEC Registered Data.

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	3.125	°C/W

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

MARKING DIAGRAM



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.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 4.

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 = 100 mAdc, I_B = 0)	$V_{CEO(sus)}$			Vdc
2N6111, 2N6288		30	–	
2N6109		50	–	
2N6107, 2N6292		70	–	
Collector Cutoff Current (V_{CE} = 20 Vdc, I_B = 0)	I_{CEO}			mAdc
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 (V_{CE} = 40 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	I_{CEX}			
2N6111, 2N6288		–	100	μAdc
(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 (I_C = 2.0 Adc, V_{CE} = 4.0 Vdc)	h_{FE}			–
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) (I_C = 500 mAdc, V_{CE} = 4.0 Vdc, f_{test} = 1.0 MHz)	f_T			MHz
2N6288, 2N6292		4.0	–	
2N6107, 2N6109, 2N6111		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	–	–

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

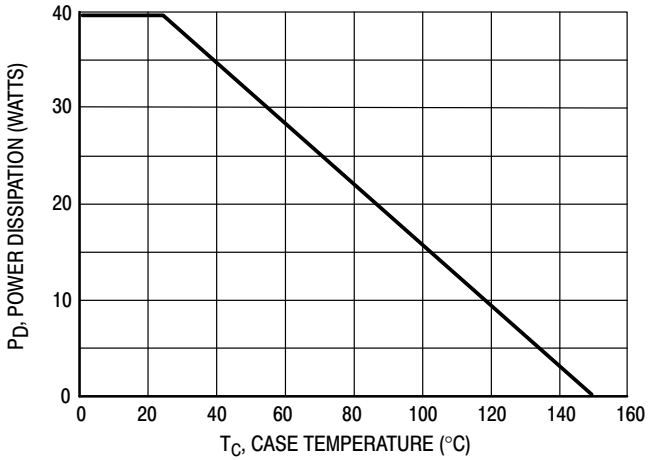


Figure 1. Power Derating

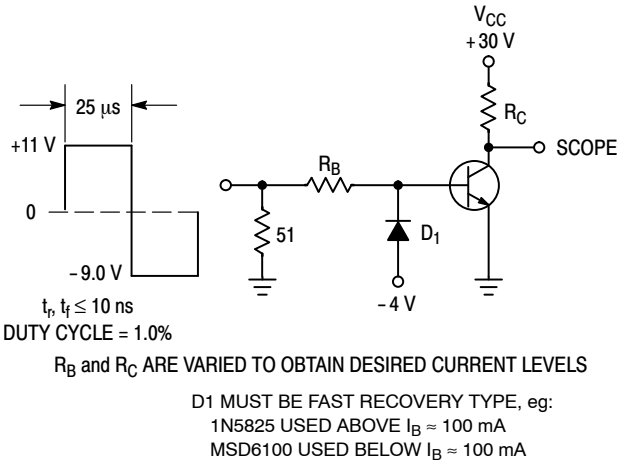


Figure 2. Switching Time Test Circuit

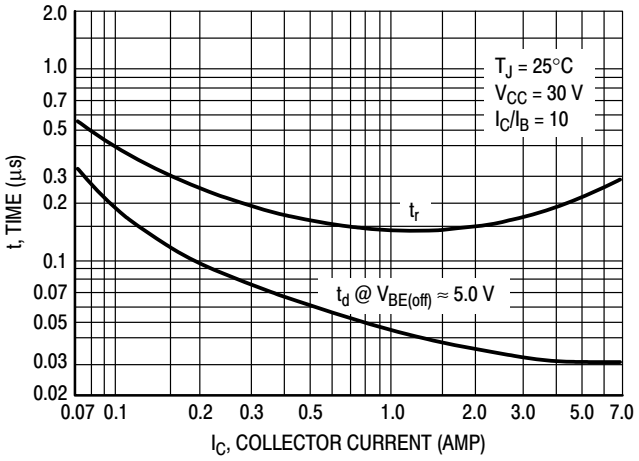


Figure 3. Turn−On Time

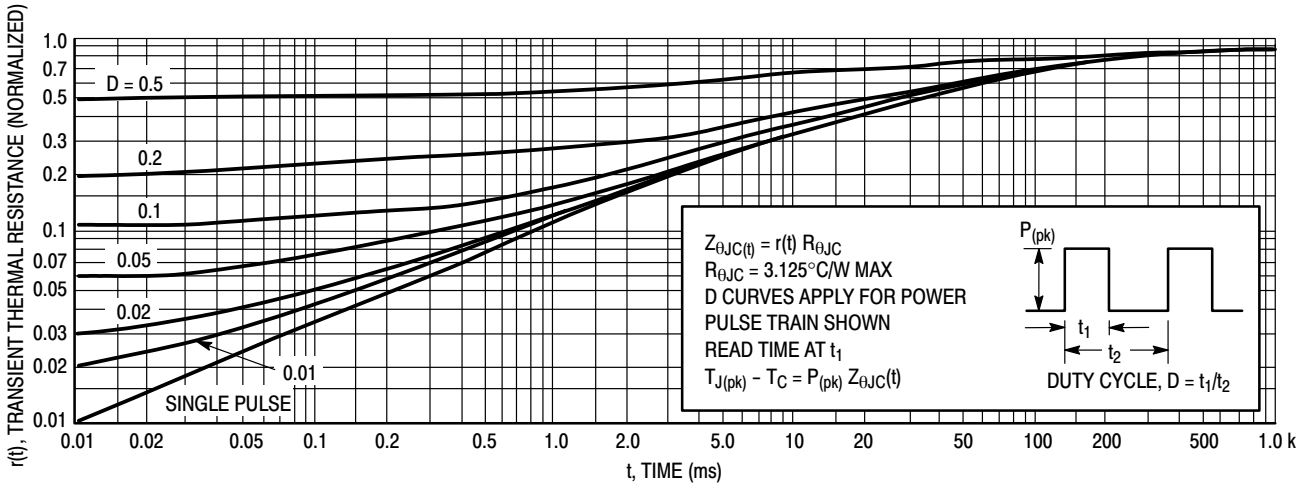


Figure 4. Thermal Response

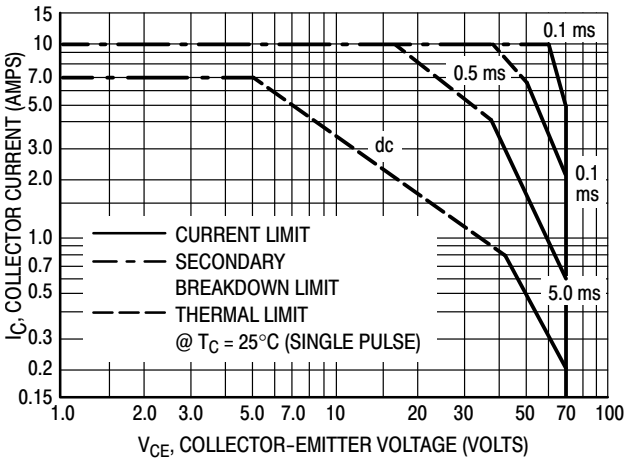


Figure 5. Active−Region Safe Operating Area

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 $T_{J(pk)} \le 150°C$. $T_{J(pk)}$ 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.

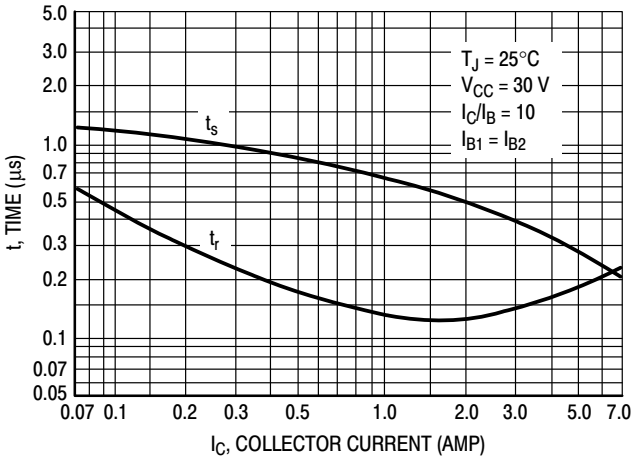


Figure 6. Turn−Off Time

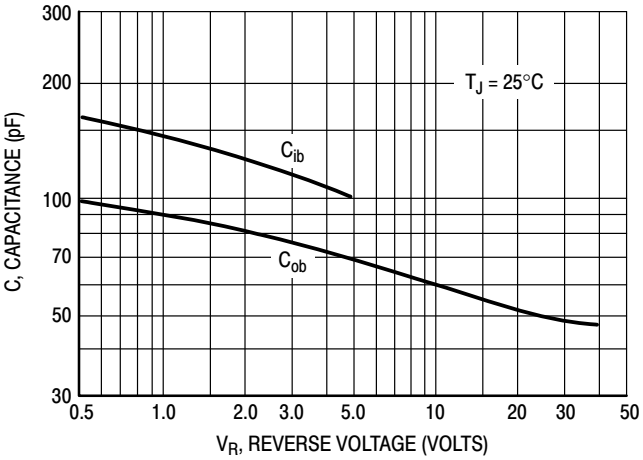


Figure 7. Capacitance

ORDERING INFORMATION

Device	Device Marking	Package	Shipping
2N6292G	2N6292	TO−220 (Pb−Free)	50 Units / Rail

DISCONTINUED (Note 5)

2N6107G	2N6107	TO−220 (Pb−Free)	50 Units / Rail
2N6109G	2N6109	TO−220 (Pb−Free)	50 Units / Rail
2N6111G	2N6111	TO−220 (Pb−Free)	50 Units / Rail
2N6288G	2N6288	TO−220 (Pb−Free)	50 Units / Rail

5. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
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