

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

## Complementary Silicon Plastic Power Transistors

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\*

### MAXIMUM RATINGS (Note 1)

| Rating   | Symbol         | Value          | Unit                     |
|--|----------------|----------------|--------------------------|
| Collector-Emitter Voltage<br>2N6111, 2N6288<br>2N6109<br>2N6107, 2N6292                  | $V_{CEO}$      | 30<br>50<br>70 | Vdc                      |
| Collector-Base Voltage<br>2N6111, 2N6288<br>2N6109<br>2N6107, 2N6292                     | $V_{CB}$       | 40<br>60<br>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<br>@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 40<br>0.32     | W<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                      | $T_J, T_{stg}$ | -65 to +150    | $^\circ\text{C}$         |

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

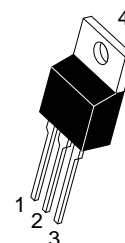
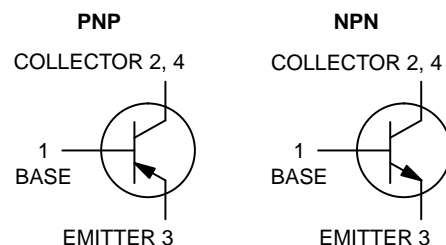
| Characteristics                      | Symbol          | Max   | Unit               |
|--------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3.125 | $^\circ\text{C/W}$ |



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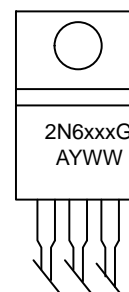
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## 7 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 30 – 50 – 70 VOLTS, 40 WATTS



TO-220  
CASE 221A  
STYLE 1

### 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.

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

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

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted) (Note 2)

| Characteristic   | Symbol         | Min                             | Max                                    | Unit                            |
|--|----------------|---------------------------------|--|---------------------------------|
| <b>OFF CHARACTERISTICS</b>   |                |                                 |  |                                 |
| Collector–Emitter Sustaining Voltage (Note 3)<br>( $I_C = 100\text{ mA}$ , $I_B = 0$ )<br>2N6111, 2N6288<br>2N6109<br>2N6107, 2N6292   | $V_{CEO(sus)}$ | 30<br>50<br>70                  | –<br>–<br>–                            | Vdc                             |
| Collector Cutoff Current<br>( $V_{CE} = 20\text{ Vdc}$ , $I_B = 0$ )<br>2N6111, 2N6288<br>( $V_{CE} = 40\text{ Vdc}$ , $I_B = 0$ )<br>2N6109<br>( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ )<br>2N6107, 2N6292   | $I_{CEO}$      | –<br>–<br>–                     | 1.0<br>1.0<br>1.0                      | mA                              |
| Collector Cutoff Current<br>( $V_{CE} = 40\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ )<br>2N6111, 2N6288<br>( $V_{CE} = 60\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ )<br>2N6109<br>( $V_{CE} = 80\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ )<br>2N6107, 2N6292<br>( $V_{CE} = 30\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )<br>2N6111, 2N6288<br>( $V_{CE} = 50\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )<br>2N6109<br>( $V_{CE} = 70\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )<br>2N6107, 2N6292 | $I_{CEX}$      | –<br>–<br>–<br>–<br>–<br>–<br>– | 100<br>100<br>100<br>2.0<br>2.0<br>2.0 | $\mu\text{A}$<br><br><br><br>mA |
| Emitter Cutoff Current<br>( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )  | $I_{EBO}$      | –                               | 1.0                                    | mA                              |
| <b>ON CHARACTERISTICS (Note 3)</b>   |                |                                 |  |                                 |
| DC Current Gain<br>( $I_C = 2.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )<br>2N6107, 2N6292<br>( $I_C = 2.5\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )<br>2N6109<br>( $I_C = 3.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )<br>2N6111, 2N6288<br>( $I_C = 7.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )<br>All Devices   | $h_{FE}$       | 30<br>30<br>30<br>2.3           | 150<br>150<br>150<br>–                 | –                               |
| Collector–Emitter Saturation Voltage<br>( $I_C = 7.0\text{ A}$ , $I_B = 3.0\text{ A}$ )  | $V_{CE(sat)}$  | –                               | 3.5                                    | Vdc                             |
| Base–Emitter On Voltage<br>( $I_C = 7.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )  | $V_{BE(on)}$   | –                               | 3.0                                    | Vdc                             |
| <b>DYNAMIC CHARACTERISTICS</b>   |                |                                 |  |                                 |
| Current Gain – Bandwidth Product (Note 4)<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )<br>2N6288, 2N6292<br>2N6107, 2N6109, 2N6111   | $f_T$          | 4.0<br>10                       | –<br>–                                 | MHz                             |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )  | $C_{ob}$       | –                               | 250                                    | pF                              |
| Small–Signal Current Gain<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f = 50\text{ kHz}$ )  | $h_{fe}$       | 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  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

4.  $f_T = |h_{fe}| \cdot f_{test}$

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

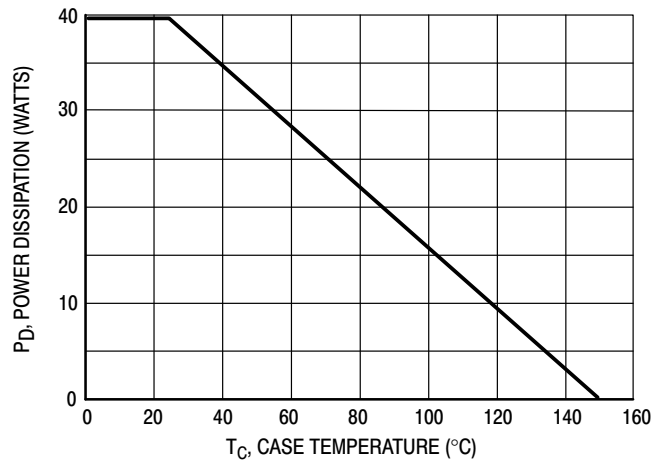


Figure 1. Power Derating

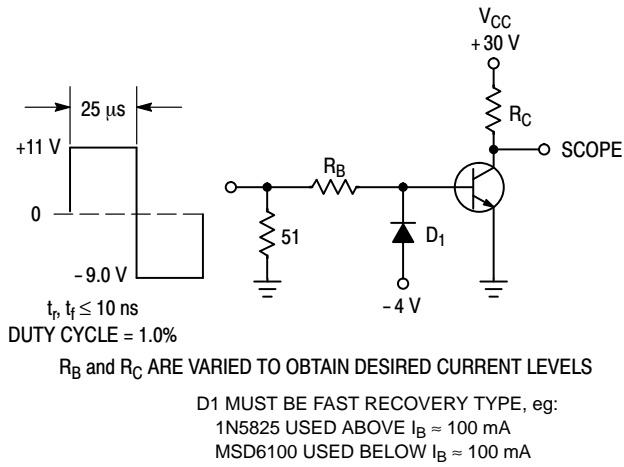


Figure 2. Switching Time Test Circuit

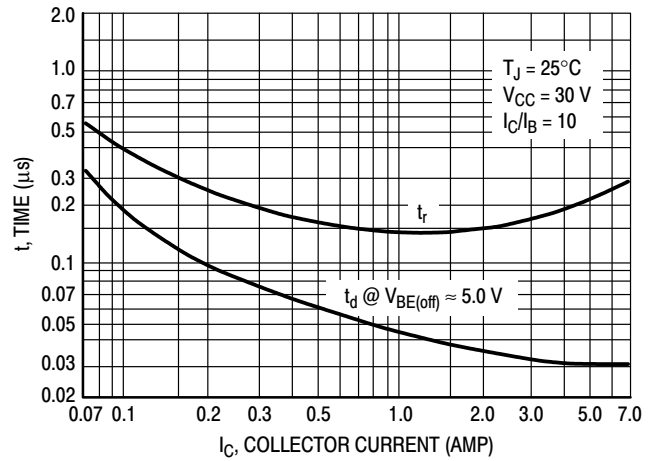


Figure 3. Turn-On Time

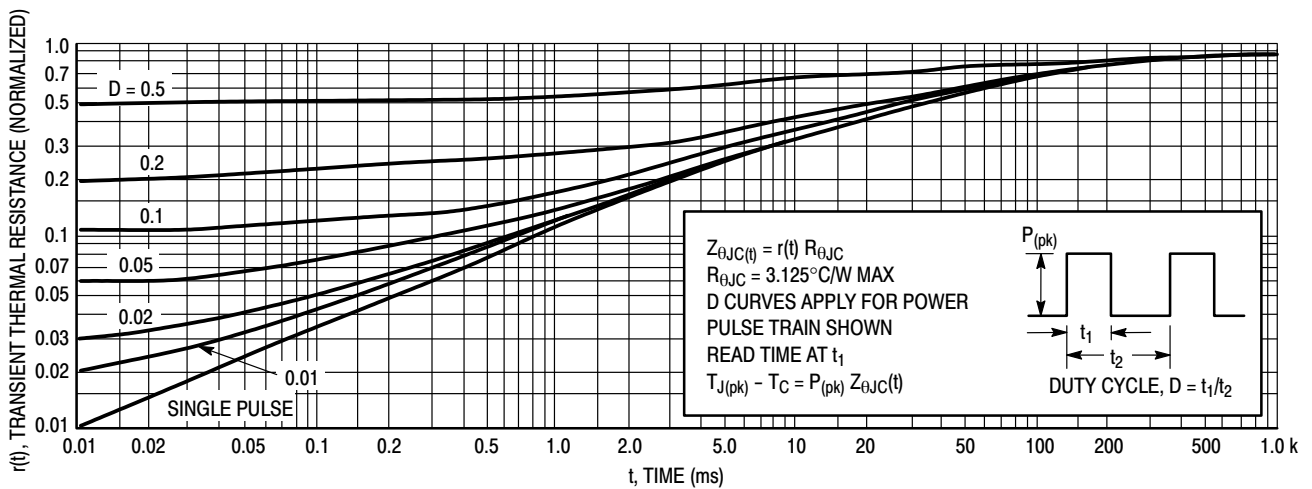


Figure 4. Thermal Response

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

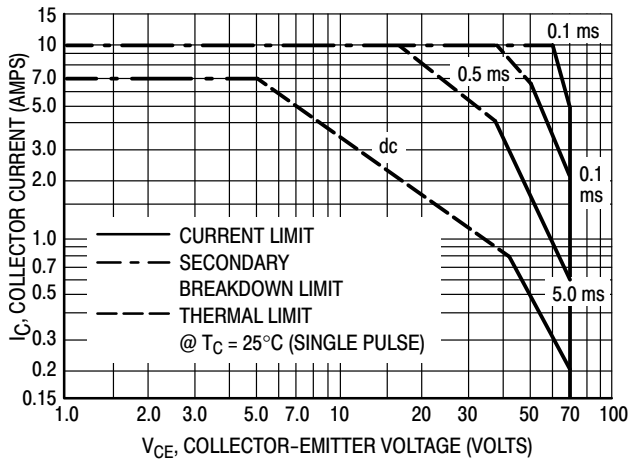


Figure 5. Active-Region Safe Operating Area

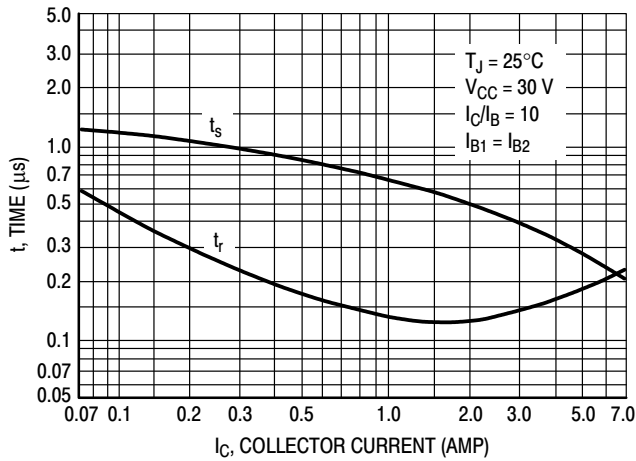


Figure 6. Turn-Off Time

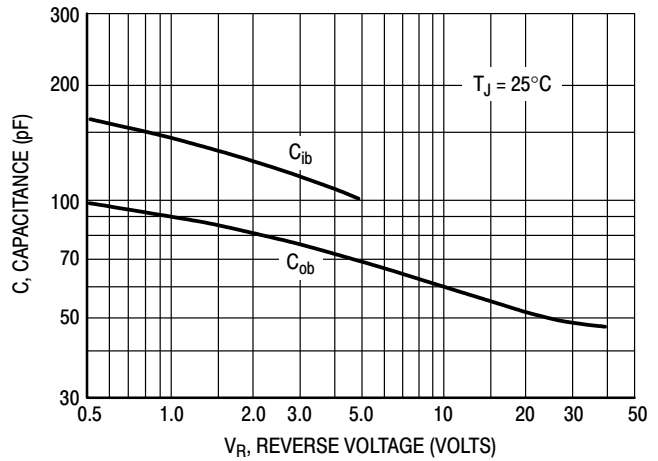
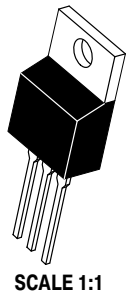


Figure 7. Capacitance

### ORDERING INFORMATION

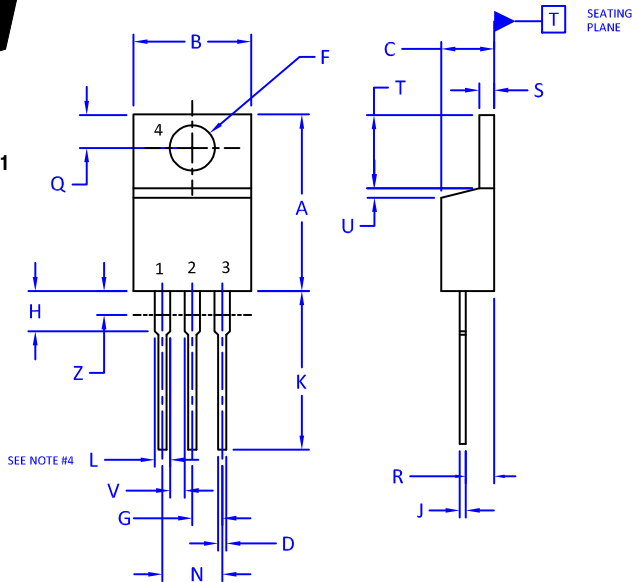
| Device  | Device Marking | Package             | Shipping        |
|---------|----------------|---------------------|-----------------|
| 2N6107G | 2N6107         | TO-220<br>(Pb-Free) | 50 Units / Rail |
| 2N6109G | 2N6109         | TO-220<br>(Pb-Free) | 50 Units / Rail |
| 2N6111G | 2N6111         | TO-220<br>(Pb-Free) | 50 Units / Rail |
| 2N6288G | 2N6288         | TO-220<br>(Pb-Free) | 50 Units / Rail |
| 2N6292G | 2N6292         | TO-220<br>(Pb-Free) | 50 Units / Rail |

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



## TO-220 CASE 221A ISSUE AK

DATE 13 JAN 2022



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN.   | MAX.  | MIN.        | MAX.  |
| A   | 0.570  | 0.620 | 14.48       | 15.75 |
| B   | 0.380  | 0.415 | 9.66        | 10.53 |
| C   | 0.160  | 0.190 | 4.07        | 4.83  |
| D   | 0.025  | 0.038 | 0.64        | 0.96  |
| F   | 0.142  | 0.161 | 3.60        | 4.09  |
| G   | 0.095  | 0.105 | 2.42        | 2.66  |
| H   | 0.110  | 0.161 | 2.80        | 4.10  |
| J   | 0.014  | 0.024 | 0.36        | 0.61  |
| 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        | 1.41  |
| 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

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

STYLE 3:  
PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE

STYLE 4:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. MAIN TERMINAL 2

STYLE 5:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

STYLE 6:  
PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

STYLE 7:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. ANODE

STYLE 8:  
PIN 1. CATHODE  
2. ANODE  
3. EXTERNAL TRIP/DELAY  
4. ANODE

STYLE 9:  
PIN 1. GATE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

STYLE 10:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN  
4. SOURCE

STYLE 11:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE  
4. SOURCE

STYLE 12:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. NOT CONNECTED

|                  |             |   |
|------------------|-------------|---|
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|                  |             | PAGE 1 OF 1   |

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