

TIP29, A, B, C (NPN), TIP30, A, B, C (PNP)

Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications. Compact TO-220 package.

Features

- These Devices are Pb-Free and are RoHS Compliant*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|----------------|-----------------------|--------------------------|
| Collector – Emitter Voltage TIP29G, TIP30G TIP29AG, TIP30AG TIP29BG, TIP30BG TIP29CG, TIP30CG | V_{CEO} | 40 60 80 100 | Vdc |
| Collector – Base Voltage TIP29G, TIP30G TIP29AG, TIP30AG TIP29BG, TIP30BG TIP29CG, TIP30CG | V_{CB} | 40 60 80 100 | Vdc |
| Emitter – Base Voltage | V_{EB} | 5.0 | Vdc |
| Collector Current – Continuous | I_C | 1.0 | Adc |
| Collector Current – Peak | I_{CM} | 3.0 | Adc |
| Base Current | I_B | 0.4 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 30 0.24 | W W/ $^\circ\text{C}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 2.0 0.016 | W W/ $^\circ\text{C}$ |
| Unclamped Inductive Load Energy (Note 1) | E | 32 | mJ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

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. This rating based on testing with $L_C = 20\text{ mH}$, $R_{BE} = 100\ \Omega$, $V_{CC} = 10\text{ V}$, $I_C = 1.8\text{ A}$, P.R.F = 10 Hz

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 4.167 | $^\circ\text{C/W}$ |

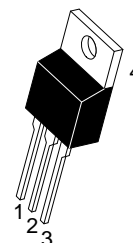
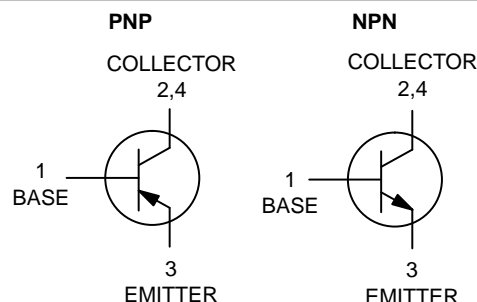
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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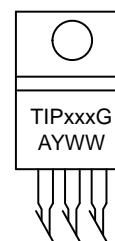
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1 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 40, 60, 80, 100 VOLTS, 80 WATTS



TO-220
CASE 221A
STYLE 1

MARKING DIAGRAM



TIPxxx = Device Code:
29, 29A, 29B, 29C
30, 30A, 30B, 30C
A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|---|-----------------------|-----------------------|--------------------------|------|
| Collector–Emitter Sustaining Voltage (I _C = 30 mAdc, I _B = 0) (Note 2) TIP29G, TIP30G TIP29AG, TIP30AG TIP29BG, TIP30BG TIP29CG, TIP30CG | V _{CEO(sus)} | 40 60 80 100 | – – – – | Vdc |
| Collector Cutoff Current (V _{CE} = 30 Vdc, I _B = 0) TIP29G, TIP29AG, TIP30G, TIP30AG (V _{CE} = 60 Vdc, I _B = 0) TIP29BG, TIP29CG, TIP30BG, TIP30CG | I _{CEO} | – – | 0.3 0.3 | mAdc |
| Collector Cutoff Current (V _{CE} = 40 Vdc, V _{EB} = 0) TIP29G, TIP30G (V _{CE} = 60 Vdc, V _{EB} = 0) TIP29AG, TIP30AG (V _{CE} = 80 Vdc, V _{EB} = 0) TIP29BG, TIP30BG (V _{CE} = 100 Vdc, V _{EB} = 0) TIP29CG, TIP30CG | I _{CES} | – – – – | 200 200 200 200 | μAdc |
| Emitter Cutoff Current (V _{BE} = 5.0 Vdc, I _C = 0) | I _{EBO} | – | 1.0 | mAdc |

ON CHARACTERISTICS (Note 2)

| | | | | |
|---|----------------------|----------|---------|-----|
| DC Current Gain (I _C = 0.2 Adc, V _{CE} = 4.0 Vdc) (I _C = 1.0 Adc, V _{CE} = 4.0 Vdc) | h _{FE} | 40 15 | – 75 | – |
| Collector–Emitter Saturation Voltage (I _C = 1.0 Adc, I _B = 125 mAdc) | V _{CE(sat)} | – | 0.7 | Vdc |
| Base–Emitter On Voltage (I _C = 1.0 Adc, V _{CE} = 4.0 Vdc) | V _{BE(on)} | – | 1.3 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | |
|---|-----------------|-----|---|-----|
| Current–Gain – Bandwidth Product (Note 3) (I _C = 200 mAdc, V _{CE} = 10 Vdc, f _{test} = 1.0 MHz) | f _T | 3.0 | – | MHz |
| Small–Signal Current Gain (I _C = 0.2 Adc, V _{CE} = 10 Vdc, f = 1.0 kHz) | h _{fe} | 20 | – | – |

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

3. f_T = |h_{fe}| • f_{test}

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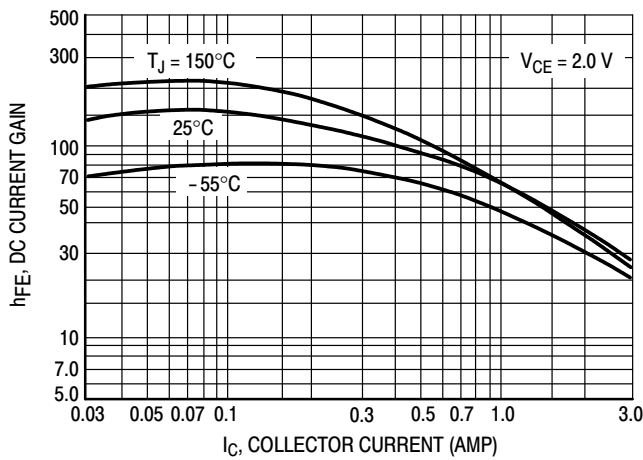


Figure 1. DC Current Gain

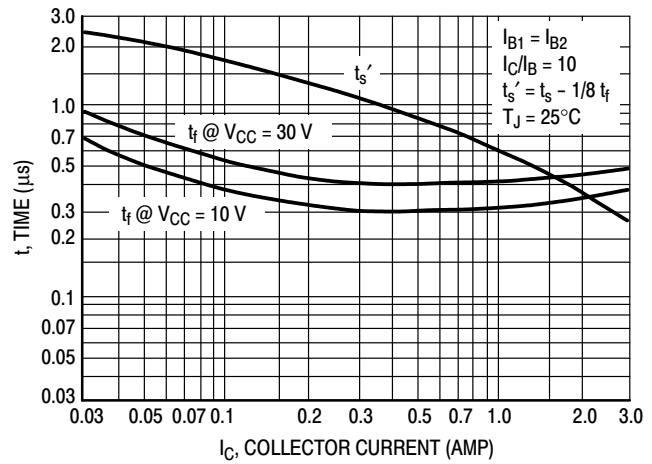


Figure 2. Turn-Off Time

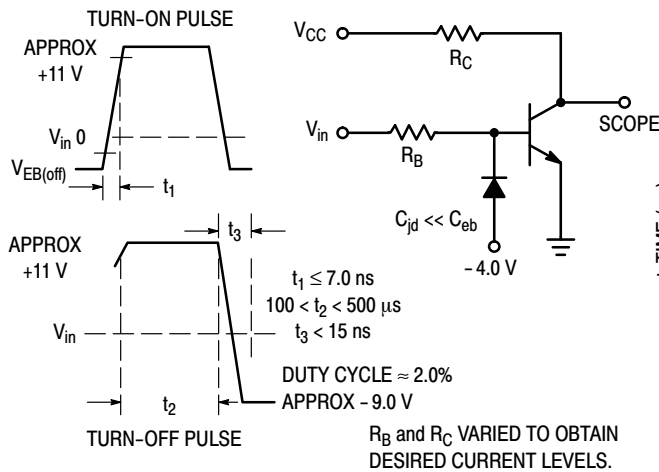


Figure 3. Switching Time Equivalent Circuit

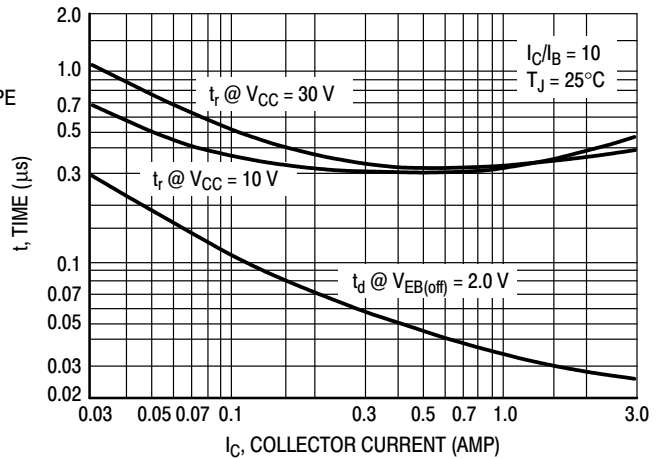


Figure 4. Turn-On Time

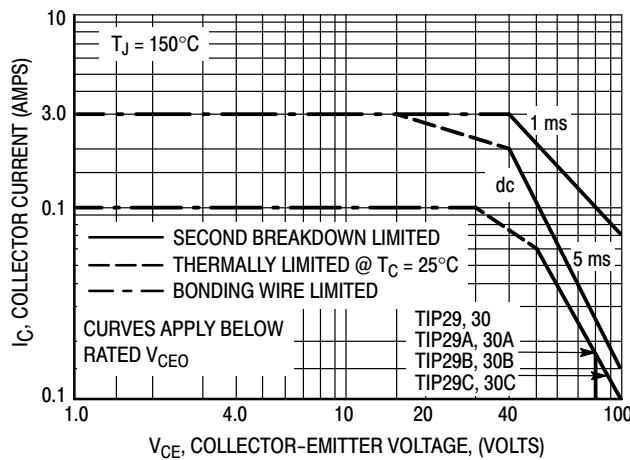


Figure 5. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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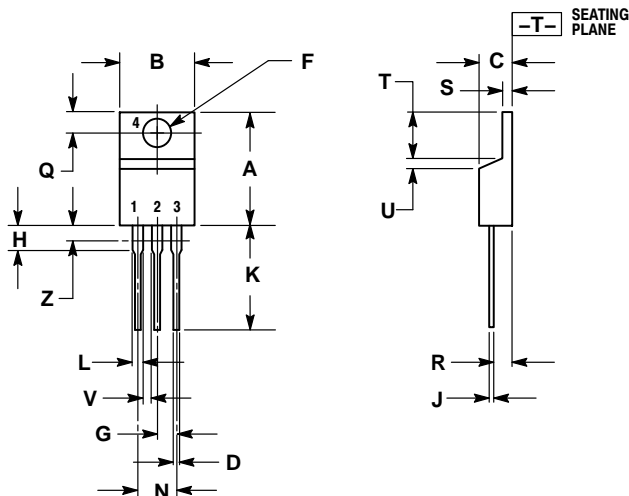
ORDERING INFORMATION

| Device | Package | Shipping |
|---------|---------------------|-----------------|
| TIP29G | TO-220 (Pb-Free) | 50 Units / Rail |
| TIP29AG | TO-220 (Pb-Free) | 50 Units / Rail |
| TIP29BG | TO-220 (Pb-Free) | 50 Units / Rail |
| TIP29CG | TO-220 (Pb-Free) | 50 Units / Rail |
| TIP30G | TO-220 (Pb-Free) | 50 Units / Rail |
| TIP30AG | TO-220 (Pb-Free) | 50 Units / Rail |
| TIP30BG | TO-220 (Pb-Free) | 50 Units / Rail |
| TIP30CG | TO-220 (Pb-Free) | 50 Units / Rail |

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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.

| 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 | 0.036 | 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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