

# TIP3055 (NPN), TIP2955 (PNP)

## Complementary Silicon Power Transistors

Designed for general-purpose switching and amplifier applications.

### Features

- DC Current Gain –  
 $h_{FE} = 20-70 @ I_C$   
 $= 4.0 \text{ Adc}$
- Collector–Emitter Saturation Voltage –  
 $V_{CE(sat)} = 1.1 \text{ Vdc (Max) @ } I_C$   
 $= 4.0 \text{ Adc}$
- Excellent Safe Operating Area
- Pb–Free Packages are Available\*

### MAXIMUM RATINGS

| Rating  | Symbol         | Value          | Unit                     |
|---|----------------|----------------|--------------------------|
| Collector – Emitter Voltage   | $V_{CEO}$      | 60             | Vdc                      |
| Collector – Emitter Voltage   | $V_{CER}$      | 70             | Vdc                      |
| Collector – Base Voltage  | $V_{CB}$       | 100            | Vdc                      |
| Emitter – Base Voltage  | $V_{EB}$       | 7.0            | Vdc                      |
| Collector Current – Continuous  | $I_C$          | 1.5            | Adc                      |
| Base Current  | $I_B$          | 7.0            | Adc                      |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 90<br>0.72     | W<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                   | $T_J, T_{stg}$ | –65 to<br>+150 | $^\circ\text{C}$         |

### THERMAL CHARACTERISTICS

| Characteristic                          | Symbol          | Max  | Unit               |
|---|-----------------|------|--------------------|
| Thermal Resistance, Junction–to–Case    | $R_{\theta JC}$ | 1.39 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction–to–Ambient | $R_{\theta JA}$ | 35.7 | $^\circ\text{C/W}$ |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

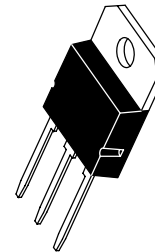
\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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**15 AMPERE  
POWER TRANSISTORS  
COMPLEMENTARY SILICON  
60 VOLTS, 90 WATTS**



**SOT–93 (TO–218)  
CASE 340D  
STYLE 1**

### MARKING DIAGRAM



A = Assembly Location  
 Y = Year  
 WW = Work Week  
 TIPxx55 = Device Code  
 xx = 30 or 29  
 G = Pb–Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# TIP3055 (NPN), TIP2955 (PNP)

## ORDERING INFORMATION

| Device   | Package                      | Shipping        |
|----------|------------------------------|-----------------|
| TIP3055  | SOT-93 (TO-218)              | 30 Units / Rail |
| TIP3055G | SOT-93 (TO-218)<br>(Pb-Free) | 30 Units / Rail |
| TIP2955  | SOT-93 (TO-218)              | 30 Units / Rail |
| TIP2955G | SOT-93 (TO-218)<br>(Pb-Free) | 30 Units / Rail |

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

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

### OFF CHARACTERISTICS

|  |               |    |     |     |
|--|---------------|----|-----|-----|
| Collector-Emitter Sustaining Voltage (Note 1)<br>( $I_C = 30\text{ mA}$ , $I_B = 0$ )      | $V_{CE(sus)}$ | 60 | –   | Vdc |
| Collector Cutoff Current<br>( $V_{CE} = 70\text{ Vdc}$ , $R_{BE} = 100\text{ Ohms}$ )      | $I_{CER}$     | –  | 1.0 | mA  |
| Collector Cutoff Current<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ )                       | $I_{CEO}$     | –  | 0.7 | mA  |
| Collector Cutoff Current<br>( $V_{CE} = 100\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ ) | $I_{CEV}$     | –  | 5.0 | mA  |
| Emitter Cutoff Current<br>( $V_{BE} = 7.0\text{ Vdc}$ , $I_C = 0$ )                        | $I_{EBO}$     | –  | 5.0 | mA  |

### ON CHARACTERISTICS (Note 1)

|  |               |           |            |     |
|--|---------------|-----------|------------|-----|
| DC Current Gain<br>( $I_C = 4.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )<br>( $I_C = 10\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )             | $h_{FE}$      | 20<br>5.0 | 70<br>–    | –   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 4.0\text{ A}$ , $I_B = 400\text{ mA}$ )<br>( $I_C = 10\text{ A}$ , $I_B = 3.3\text{ A}$ ) | $V_{CE(sat)}$ | –<br>–    | 1.1<br>3.0 | Vdc |
| Base-Emitter On Voltage<br>( $I_C = 4.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )  | $V_{BE(on)}$  | –         | 1.8        | Vdc |

### SECOND BREAKDOWN

|   |           |     |   |   |
|---|-----------|-----|---|---|
| Second Breakdown Collector Current with Base Forward Biased<br>( $V_{CE} = 30\text{ Vdc}$ , $t = 1.0\text{ s}$ ; Nonrepetitive) | $I_{s/b}$ | 3.0 | – | A |
|---|-----------|-----|---|---|

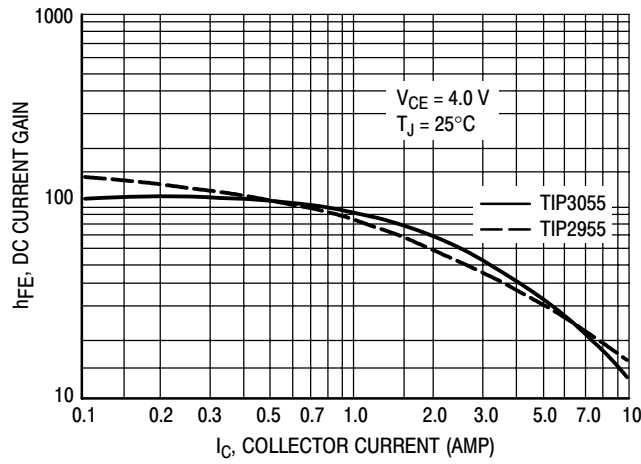
### DYNAMIC CHARACTERISTICS

|  |          |     |   |     |
|--|----------|-----|---|-----|
| Current Gain — Bandwidth Product<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ MHz}$ ) | $f_T$    | 2.5 | – | MHz |
| Small-Signal Current Gain<br>( $V_{CE} = 4.0\text{ Vdc}$ , $I_C = 1.0\text{ A}$ , $f = 1.0\text{ kHz}$ )       | $h_{fe}$ | 15  | – | kHz |

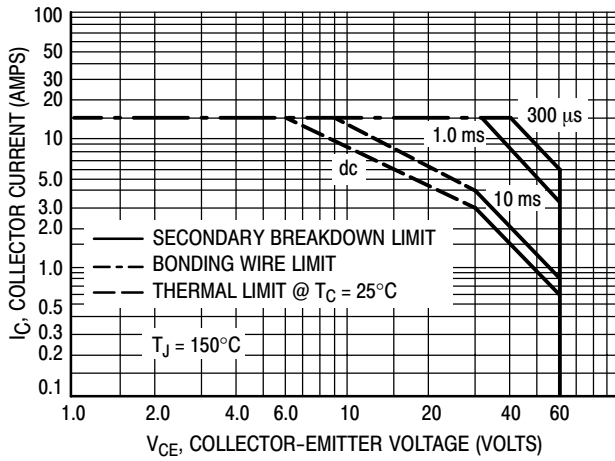
1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

NOTE: For additional design curves, refer to electrical characteristics curves of 2N3055.

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**Figure 1. DC Current Gain**



**Figure 2. Maximum Rated Forward Bias Safe Operating Area**

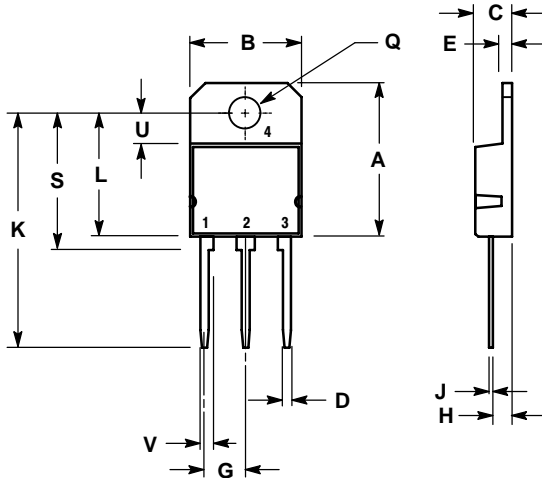
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater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

The data of Figure 2 is based on  $T_C = 25^\circ\text{C}$ ;  $T_{J(pk)}$  is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% but must be derated for temperature.

# TIP3055 (NPN), TIP2955 (PNP)

## PACKAGE DIMENSIONS

SOT-93 (TO-218)  
CASE 340D-02  
ISSUE E



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | ---         | 20.35 | ---       | 0.801 |
| B   | 14.70       | 15.20 | 0.579     | 0.598 |
| C   | 4.70        | 4.90  | 0.185     | 0.193 |
| D   | 1.10        | 1.30  | 0.043     | 0.051 |
| E   | 1.17        | 1.37  | 0.046     | 0.054 |
| G   | 5.40        | 5.55  | 0.213     | 0.219 |
| H   | 2.00        | 3.00  | 0.079     | 0.118 |
| J   | 0.50        | 0.78  | 0.020     | 0.031 |
| K   | 31.00 REF   |       | 1.220 REF |       |
| L   | ---         | 16.20 | ---       | 0.638 |
| Q   | 4.00        | 4.10  | 0.158     | 0.161 |
| S   | 17.80       | 18.20 | 0.701     | 0.717 |
| U   | 4.00 REF    |       | 0.157 REF |       |
| V   | 1.75 REF    |       | 0.069     |       |

### STYLE 1:

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

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