

# TIP3055 (NPN), TIP2955 (PNP)

## Complementary Silicon Power Transistors

Designed for general-purpose switching and amplifier applications.

### Features

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

### 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                                            | $I_C$          | 15             | A <sub>dc</sub>    |
| Base Current                                                              | $I_B$          | 7.0            | A <sub>dc</sub>    |
| Total Power Dissipation @ $T_C = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$          | 90<br>0.72     | W<br>W/ $^\circ C$ |
| Operating and Storage Junction<br>Temperature Range                       | $T_J, T_{stg}$ | –65 to<br>+150 | $^\circ C$         |

### THERMAL CHARACTERISTICS

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

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.

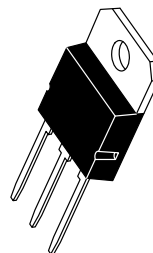
\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



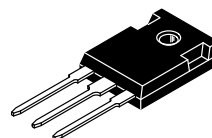
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**15 AMPERE  
POWER TRANSISTORS  
COMPLEMENTARY SILICON  
60 VOLTS, 90 WATTS**



SOT-93 (TO-218)  
CASE 340D  
STYLE 1



TO-247  
CASE 340L  
STYLE 3

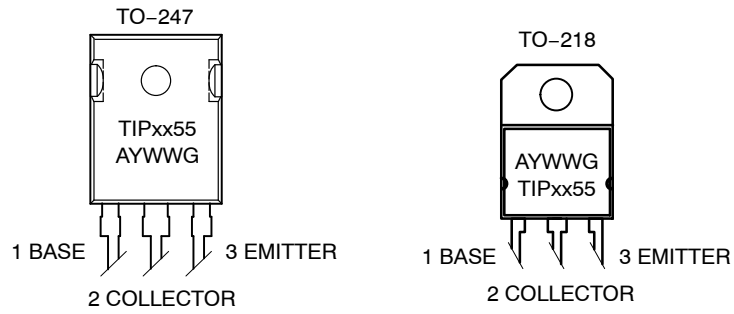
**NOTE:** Effective June 2012 this device will be available only in the TO-247 package. Reference FPCN# 16827.

### ORDERING INFORMATION

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

# TIP3055 (NPN), TIP2955 (PNP)

## MARKING DIAGRAMS



TIPxx55 = Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

## ORDERING INFORMATION

| Device   | Package                      | Shipping        |
|----------|------------------------------|-----------------|
| TIP3055G | SOT-93 (TO-218)<br>(Pb-Free) | 30 Units / Rail |
| TIP2955G | SOT-93 (TO-218)<br>(Pb-Free) | 30 Units / Rail |
| TIP3055G | TO-247<br>(Pb-Free)          | 30 Units / Rail |
| TIP2955G | TO-247<br>(Pb-Free)          | 30 Units / Rail |

## TIP3055 (NPN), TIP2955 (PNP)

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

#### ON CHARACTERISTICS (Note 1)

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

#### DYNAMIC CHARACTERISTICS

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

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

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

## TIP3055 (NPN), TIP2955 (PNP)

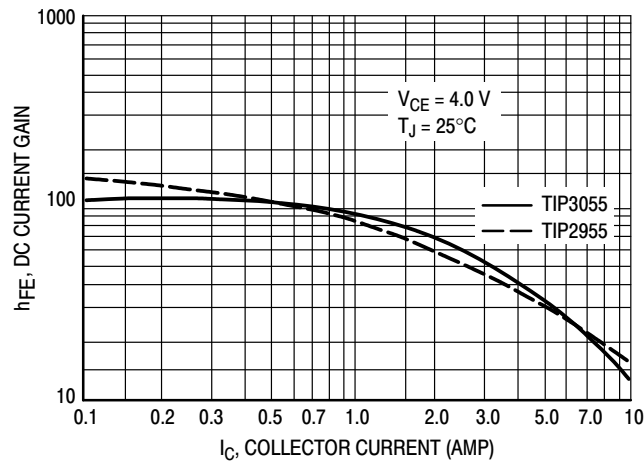


Figure 1. DC Current Gain

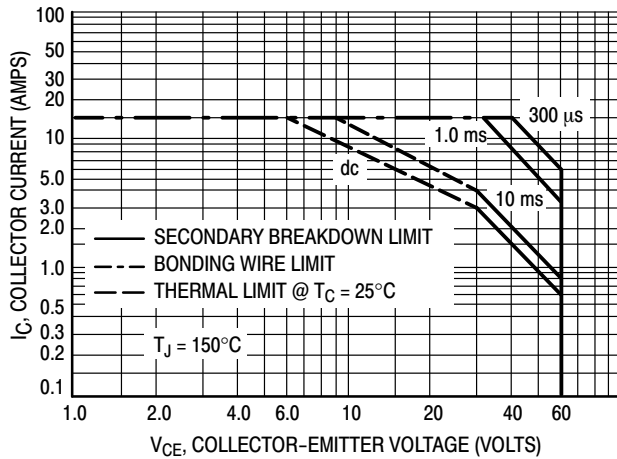


Figure 2. Maximum Rated Forward Bias Safe Operating Area

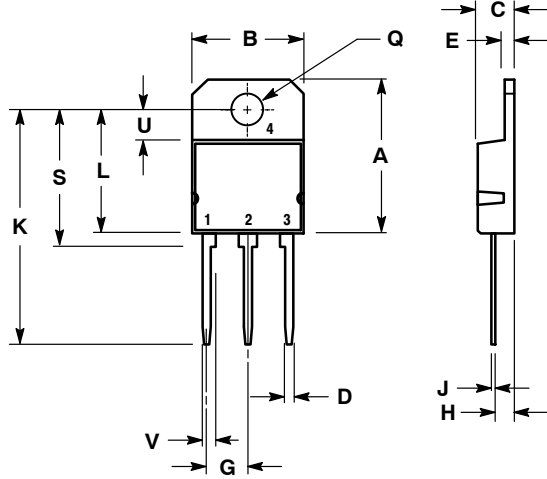
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater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

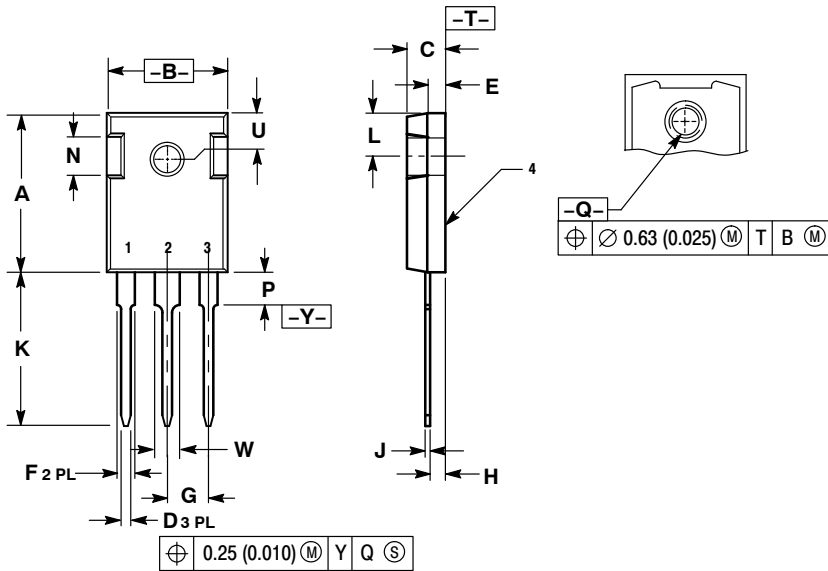


NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: MILLIMETER.

| 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

### TO-247 CASE 340L-02 ISSUE F



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

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 20.32       | 21.08 | 0.800     | 0.830 |
| B   | 15.75       | 16.26 | 0.620     | 0.640 |
| C   | 4.70        | 5.30  | 0.185     | 0.209 |
| D   | 1.00        | 1.40  | 0.040     | 0.055 |
| E   | 1.90        | 2.60  | 0.075     | 0.102 |
| F   | 1.65        | 2.13  | 0.065     | 0.084 |
| G   | 5.45 BSC    |       | 0.215 BSC |       |
| H   | 1.50        | 2.49  | 0.059     | 0.098 |
| J   | 0.40        | 0.80  | 0.016     | 0.031 |
| K   | 19.81       | 20.83 | 0.780     | 0.820 |
| L   | 5.40        | 6.20  | 0.212     | 0.244 |
| N   | 4.32        | 5.49  | 0.170     | 0.216 |
| P   | ---         | 4.50  | ---       | 0.177 |
| Q   | 3.55        | 3.65  | 0.140     | 0.144 |
| U   | 6.15 BSC    |       | 0.242 BSC |       |
| W   | 2.87        | 3.12  | 0.113     | 0.123 |

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

## TIP3055 (NPN), TIP2955 (PNP)

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