

# Complementary Silicon Power Transistors

## TIP3055 (NPN), TIP2955 (PNP)

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
- These are Pb–Free Devices\*

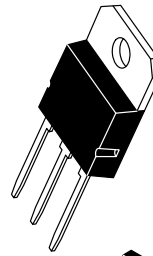
### MAXIMUM RATINGS

| Symbol         | Rating                                                                                | Value          | Unit      |
|----------------|---------------------------------------------------------------------------------------|----------------|-----------|
| $V_{CEO}$      | Collector – Emitter Voltage                                                           | 60             | Vdc       |
| $V_{CER}$      | Collector – Emitter Voltage                                                           | 70             | Vdc       |
| $V_{CB}$       | Collector – Base Voltage                                                              | 100            | Vdc       |
| $V_{EB}$       | Emitter – Base Voltage                                                                | 7.0            | Vdc       |
| $I_C$          | Collector Current – Continuous                                                        | 15             | Adc       |
| $I_B$          | Base Current                                                                          | 7.0            | Adc       |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | 90<br>0.72     | W<br>W/°C |
| $T_J, T_{stg}$ | Operating and Storage Junction<br>Temperature Range                                   | –65 to<br>+150 | °C        |

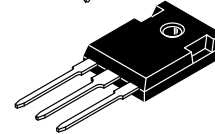
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS

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



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

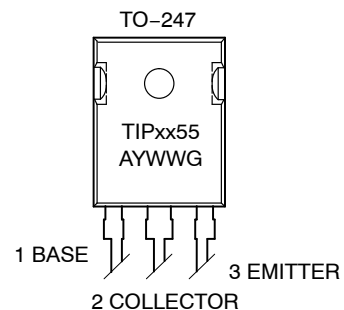
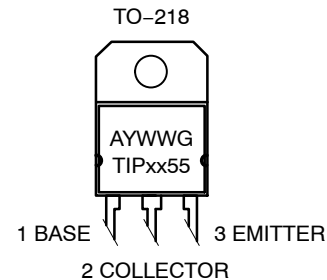


TO-247  
CASE 340L  
STYLE 3

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

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

### MARKING DIAGRAM



TIPxx55 = Device Code  
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 3 of this data sheet.

\*For additional information on our Pb–Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, [SOLDERM/D](#).

# TIP3055 (NPN), TIP2955 (PNP)

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

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

### OFF CHARACTERISTICS

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

### ON CHARACTERISTICS (Note 1)

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

### SECOND BREAKDOWN

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

### DYNAMIC CHARACTERISTICS

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

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

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

## TIP3055 (NPN), TIP2955 (PNP)

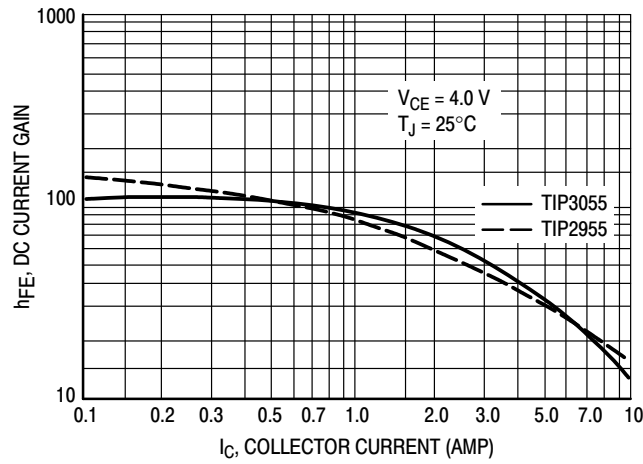


Figure 1. DC Current Gain

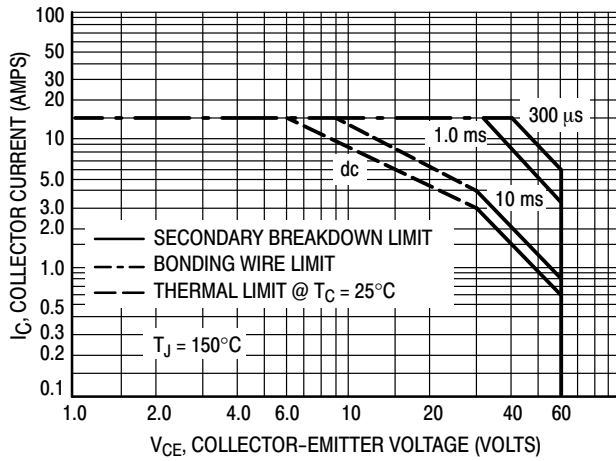


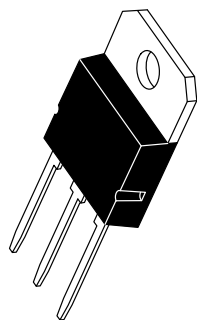
Figure 2. Maximum Rated Forward Bias Safe Operating Area

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.

### ORDERING INFORMATION

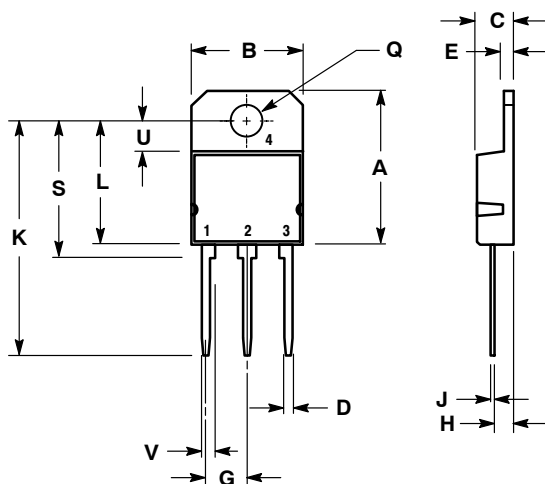
| Device   | Package                      | Shipping        |
|----------|------------------------------|-----------------|
| TIP3055G | SOT-93 (TO-218)<br>(Pb-Free) | 30 Units / Rail |
| TIP2955G | SOT-93 (TO-218)<br>(Pb-Free) | 30 Units / Rail |
| TIP3055G | TO-247<br>(Pb-Free)          | 30 Units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



SCALE 1:1

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

DATE 03 JAN 2002



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

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

- 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     |       |

GENERIC  
MARKING DIAGRAM\*

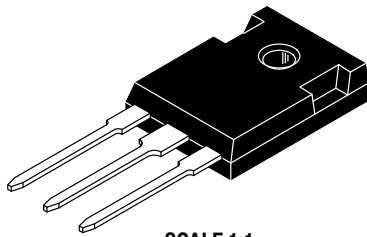


A = Assembly Location  
Y = Year  
WW = Work Week  
XXXXX = Device Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                  |                 |                                                                                                                                                                                     |
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| DESCRIPTION:     | SOT-93 (TO-218) | PAGE 1 OF 1                                                                                                                                                                         |

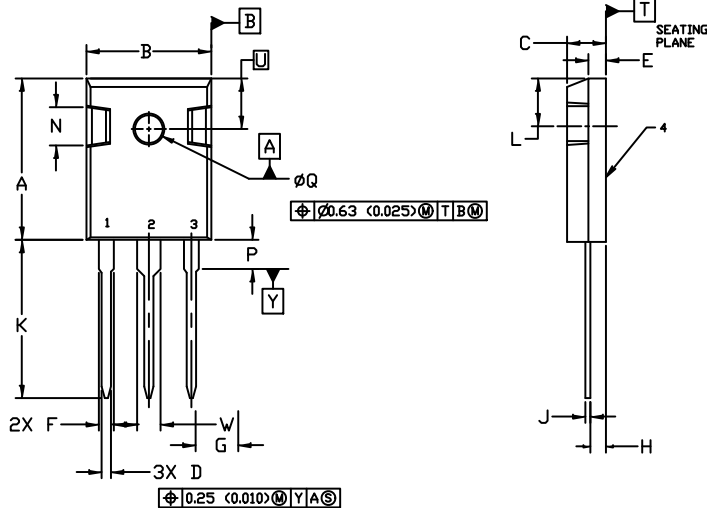
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**TO-247**  
**CASE 340L**  
**ISSUE G**

DATE 06 OCT 2021

SCALE 1:1

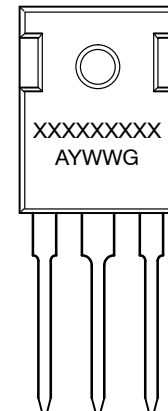


**NOTES:**

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

|     | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
| DIM | 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 |

**GENERIC**  
**MARKING DIAGRAM\***



|                                                               |                                                                                           |                                                                       |                                                                       |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| STYLE 1:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN  | STYLE 2:<br>PIN 1. ANODE<br>2. CATHODE (S)<br>3. ANODE 2<br>4. CATHODE (S)                | STYLE 3:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | STYLE 4:<br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR |
| STYLE 5:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE<br>4. ANODE | STYLE 6:<br>PIN 1. MAIN TERMINAL 1<br>2. MAIN TERMINAL 2<br>3. GATE<br>4. MAIN TERMINAL 2 |                                                                       |                                                                       |

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

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

|                         |                    |                                                                                                                                                                                  |
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