# 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 Adc
- Collector−Emitter Saturation Voltage −
  $V_{CE(sat)}$ = 1.1 Vdc (Max) @ $I_C$
  = 4.0 Adc
- 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 | $I_C$ | 1 5 | Adc |
| Base Current | $I_B$ | 7.0 | Adc |
| Total Power Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 90<br>0.72 | W<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | −65 to +150 | °C |

**THERMAL CHARACTERISTICS**

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

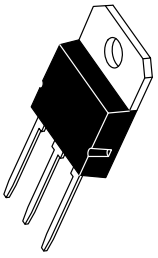
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

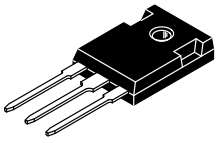
**ON Semiconductor®**

**http://onsemi.com**

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



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



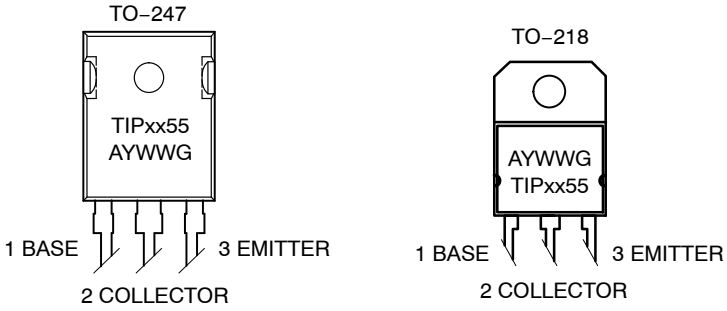
**TO−247**
**CASE 340L**
**STYLE 3**

**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.

## 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 |

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

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| Collector−Emitter Sustaining Voltage (Note 1)<br>($I_C$ = 30 mAdc, $I_B$ = 0) | $V_{CEO(sus)}$ | 60 | – | Vdc |
| Collector Cutoff Current<br>($V_{CE}$ = 70 Vdc, $R_{BE}$ = 100 Ohms) | $I_{CER}$ | – | 1.0 | mAdc |
| Collector Cutoff Current<br>($V_{CE}$ = 30 Vdc, $I_B$ = 0) | $I_{CEO}$ | – | 0.7 | mAdc |
| Collector Cutoff Current<br>($V_{CE}$ = 100 Vdc, $V_{BE(off)}$ = 1.5 Vdc) | $I_{CEV}$ | – | 5.0 | mAdc |
| Emitter Cutoff Current<br>($V_{BE}$ = 7.0 Vdc, $I_C$ = 0) | $I_{EBO}$ | – | 5.0 | mAdc |
| **ON CHARACTERISTICS** (Note 1) | | | | |
| DC Current Gain<br>($I_C$ = 4.0 Adc, $V_{CE}$ = 4.0 Vdc)<br>($I_C$ = 10 Adc, $V_{CE}$ = 4.0 Vdc) | $h_{FE}$ | <br>20<br>5.0 | <br>70<br>– | – |
| Collector−Emitter Saturation Voltage<br>($I_C$ = 4.0 Adc, $I_B$ = 400 mAdc)<br>($I_C$ = 10 Adc, $I_B$ = 3.3 Adc) | $V_{CE(sat)}$ | <br>–<br>– | <br>1.1<br>3.0 | Vdc |
| Base−Emitter On Voltage<br>($I_C$ = 4.0 Adc, $V_{CE}$ = 4.0 Vdc) | $V_{BE(on)}$ | – | 1.8 | Vdc |
| **SECOND BREAKDOWN** | | | | |
| Second Breakdown Collector Current with Base Forward Biased<br>($V_{CE}$ = 30 Vdc, t = 1.0 s; Nonrepetitive) | $I_{s/b}$ | 3.0 | – | Adc |
| **DYNAMIC CHARACTERISTICS** | | | | |
| Current Gain — Bandwidth Product<br>($I_C$ = 0.5 Adc, $V_{CE}$ = 10 Vdc, f = 1.0 MHz) | $f_T$ | 2.5 | – | MHz |
| Small−Signal Current Gain<br>($V_{CE}$ = 4.0 Vdc, $I_C$ = 1.0 Adc, f = 1.0 kHz) | $h_{fe}$ | 15 | – | kHz |

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

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

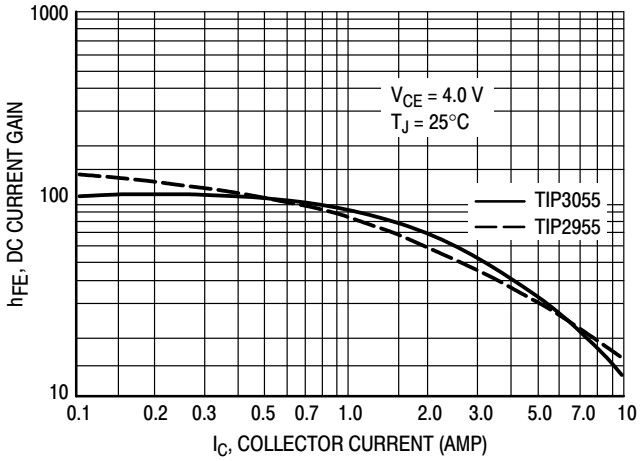



**Figure 1. DC Current Gain**

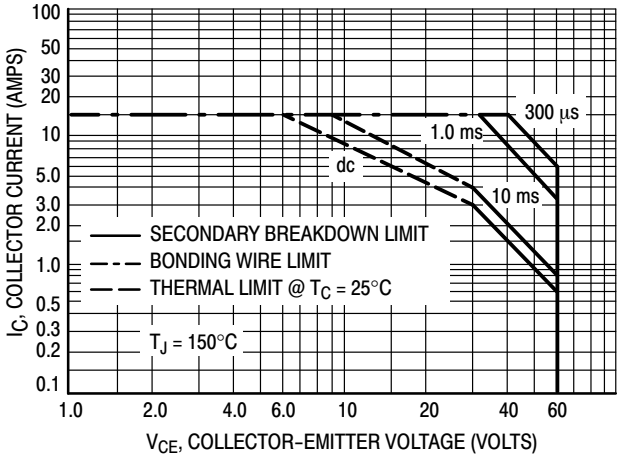



**Figure 2. Maximum Rated Forward Bias Safe Operating Area**

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.

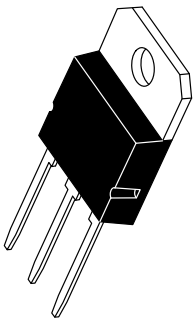
The data of Figure 2 is based on $T_C$ = 25°C; $T_{J(pk)}$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% but must be derated for temperature.

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

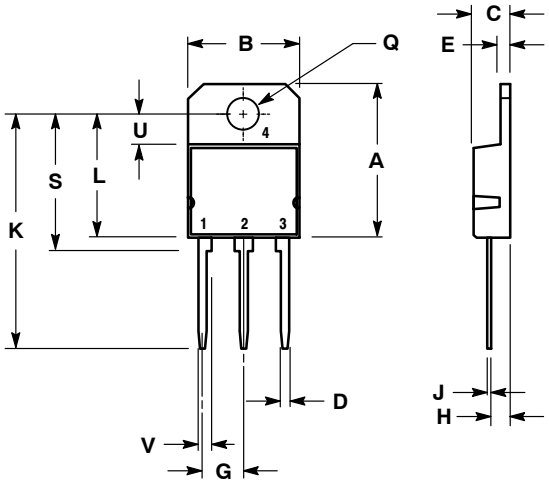
ON Semiconductor®

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

**DATE 01/03/2002**



**SCALE 1:1**



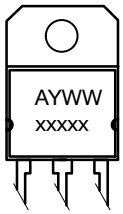

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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.

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

### MARKING DIAGRAM




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

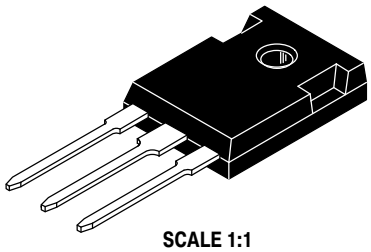
| | | | |
|---|---|---|---|
| **DOCUMENT NUMBER:** | **98ASB42643B** | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. | |
| **DESCRIPTION:** | **SOT−93** | | **PAGE 1 OF 1** |

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

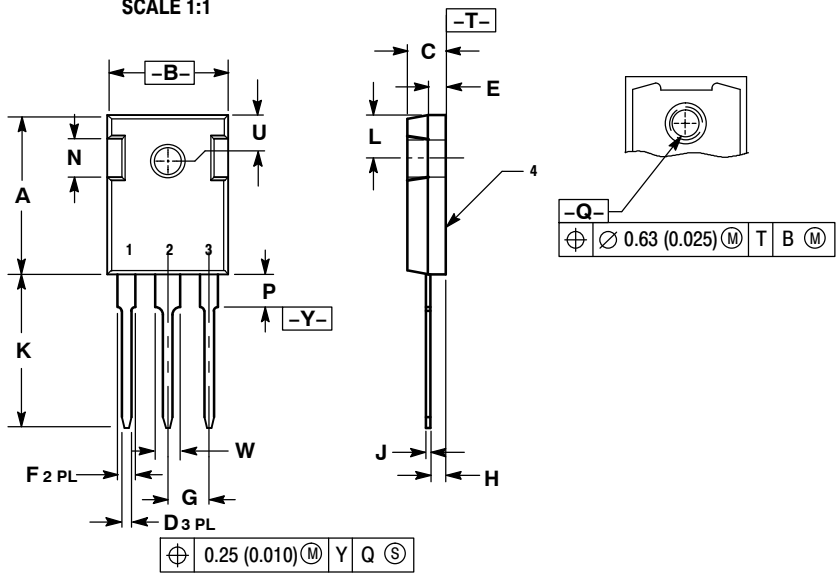
ON Semiconductor®

**TO−247**
CASE 340L−02
ISSUE F

DATE 26 OCT 2011



SCALE 1:1




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

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 20.32 | 21.08 | 0.800 | 8.30 |
| 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 1:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 2:
PIN 1. ANODE
2. CATHODE (S)
3. ANODE 2
4. CATHODES (S)

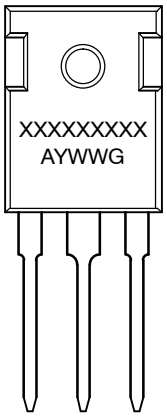
STYLE 3:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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

STYLE 5:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 6:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

### GENERIC MARKING DIAGRAM*




XXXXX = 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.

| | | |
|---|---|---|
| DOCUMENT NUMBER: | 98ASB15080C | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red. |
| STATUS: | ON SEMICONDUCTOR STANDARD | |
| NEW STANDARD: | | |
| DESCRIPTION: | TO−247 | PAGE 1 OF 2 |

| ISSUE | REVISION | DATE |
|---|---|---|
| D | CHANGE OF OWNERSHIP FROM MOTOROLA TO ON SEMICONDUCTOR. DIM A WAS 20.80–21.46/0.819–0.845. DIM K WAS 19.81–20.32/0.780–0.800. UPDATED STYLE 1, ADDED STYLES 2, 3, & 4. REQ. BY L. HAYES. | 25 AUG 2000 |
| E | DIM E MINIMUM WAS 2.20/0.087. DIM K MINIMUM WAS 20.06/0.790. ADDED GENERIC MARKING DIAGRAM. REQ. BY S. ALLEN. | 26 FEB 2010 |
| F | ADDED STYLES 5 AND 6. REQ. BY J. PEREZ. | 26 OCT 2011 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

## PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT**:
**Email Requests to:** orderlit@onsemi.com

**onsemi Website:** www.onsemi.com

**TECHNICAL SUPPORT**
**North American Technical Support:**
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

**Europe, Middle East and Africa Technical Support:**
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

◊