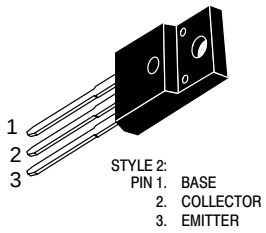
# Complementary Silicon Power Transistors

. . . specifically designed for general purpose amplifier and switching applications.

- Isolated Overmold Package (1500 Volts RMS Min)
- Electrically Similar to the Popular MJE3055T and MJE2955T
- Collector–Emitter Sustaining Voltage — $V_{CEO(sus)}$ 90 Volts
- 10 Amperes Rated Collector Current
- No Isolating Washers Required
- Reduced System Cost
- UL Recognized, File #E69369, to 3500 $V_{RMS}$ Isolation

**NPN**
**MJF3055**
**PNP**
**MJF2955**

**COMPLEMENTARY SILICON POWER TRANSISTORS**
**10 AMPERES**
**90 VOLTS**
**30 WATTS**




**CASE 221D–02**
**TO–220 TYPE**

**MAXIMUM RATINGS**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector–Emitter Sustaining Voltage | $V_{CEO(sus)}$ | 90 | Vdc |
| Collector–Emitter Breakdown Voltage | $V_{CES}$ | 90 | Vdc |
| Base–Emitter Voltage | $V_{EBO}$ | 5 | Vdc |
| Collector Current — Continuous | $I_C$ | 10 | Adc |
| Base Current — Continuous | $I_B$ | 6 | Adc |
| RMS Isolation Voltage (3) Test No. 1 Per Fig. 4<br>(for 1 sec, R.H. < 30%, Test No. 2 Per Fig. 5<br>$T_A$ = 25°C) Test No. 3 Per Fig. 6 | $V_{ISOL}$ | 4500<br>3500<br>1500 | $V_{RMS}$ |
| Total Power Dissipation @ $T_C$ = 25°C (2)<br>Derate above 25°C | $P_D$ | 30<br>0.25 | Watts<br>W/°C |
| Total Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 2<br>0.016 | Watts<br>W/°C |
| Operating and Storage Temperature Range | $T_J$, $T_{stg}$ | –55 to +150 | °C |

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance — Junction to Case (2) | $R_{\theta JC}$ | 4 | °C/W |
| Thermal Resistance — Junction to Ambient | $R_{\theta JA}$ | 62.5 | °C/W |
| Lead Temperature for Soldering Purposes | $T_L$ | 260 | °C |

(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle ≤ 10%.
(2) Measurement made with thermocouple contacting the bottom insulated surface (in a location beneath the die), the devices mounted on a heatsink with thermal grease and a mounting torque of ≥ 6 in. lbs.
(3) Proper strike and creepage distance must be provided.



April, 2002 – Rev. 3
Publication Order Number:
MJF3055/D

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

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS (1)** | | | | |
| Collector–Emitter Sustaining Voltage ($I_C$ = 200 mAdc, $I_B$ = 0) | $V_{CEO(sus)}$ | 90 | — | Vdc |
| Collector Cutoff Current ($V_{CE}$ = 90 Vdc, $V_{BE}$ = 0) | $I_{CES}$ | — | 1 | μAdc |
| Collector Cutoff Current ($V_{CE}$ = 90 Vdc, $I_E$ = 0) | $I_{CBO}$ | — | 1 | μAdc |
| Emitter–Base Leakage ($V_{EB}$ = 5 Vdc, $I_C$ = 0) | $I_{EBO}$ | — | 1 | μAdc |
| **ON CHARACTERISTICS (1)** | | | | |
| DC Current Gain ($I_{CE}$ = 4 Adc, $V_{CE}$ = 4 Vdc)<br>($I_{CE}$ = 10 Adc, $V_{CE}$ = 4 Vdc) | $h_{FE}$ | 20<br>5 | 100<br>— | — |
| Collector–Emitter Saturation Voltage<br>($I_C$ = 4 Adc, $I_B$ = 0.4 Adc)<br>($I_C$ = 10 Adc, $I_B$ = 3.3 Adc) | $V_{CE(sat)}$ | <br>—<br>— | <br>1<br>2.5 | Vdc |
| Base–Emitter On Voltage ($I_C$ = 4 Adc, $V_{BE}$ = 4 Vdc) | $V_{BE(on)}$ | — | 1.5 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | |
| Current–Gain–Bandwidth Product<br>($V_{CE}$ = 10 Vdc, $I_C$ = 0.5 Adc, $f_{test}$ = 500 kHz) | $f_T$ | 2 | — | MHz |

(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle ≤ 10%.

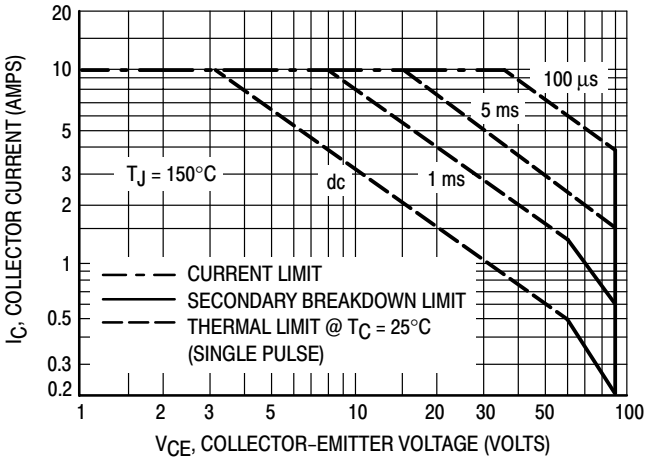



**Figure 1. Maximum Forward Bias Safe Operating Area**

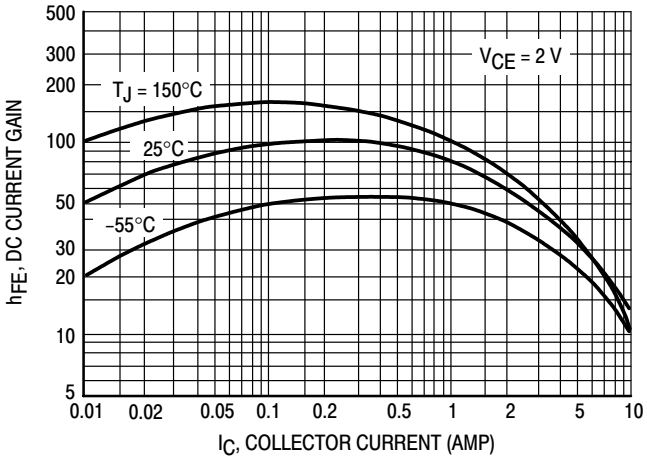



**Figure 2. DC Current Gain**

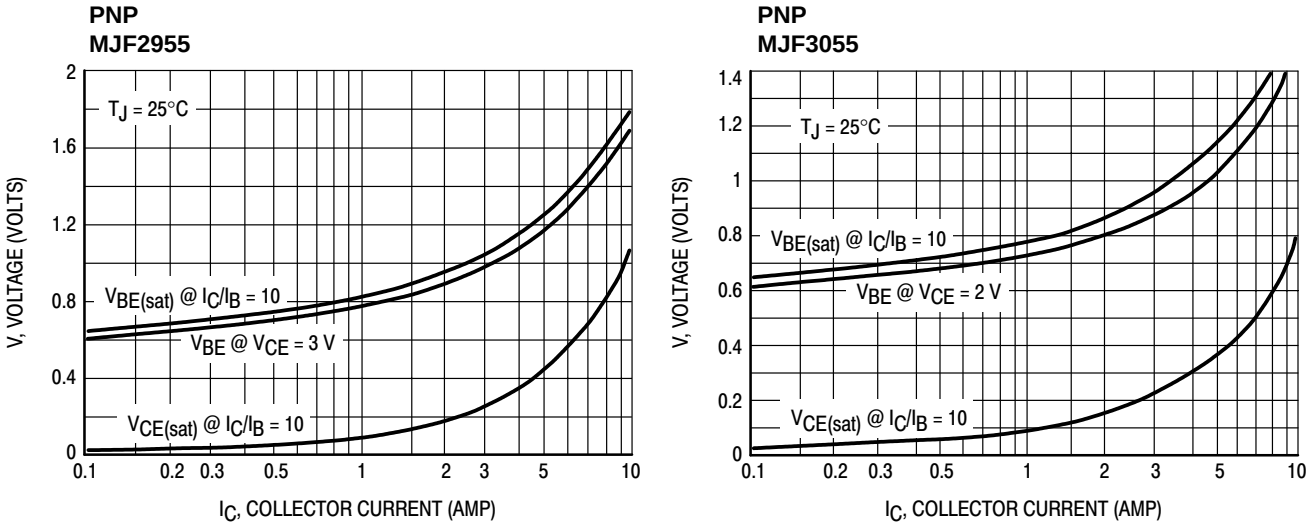



**Figure 3. “On” Voltages**

## TEST CONDITIONS FOR ISOLATION TESTS*

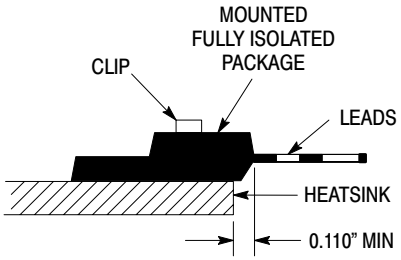



**Figure 4. Clip Mounting Position for Isolation Test Number 1**

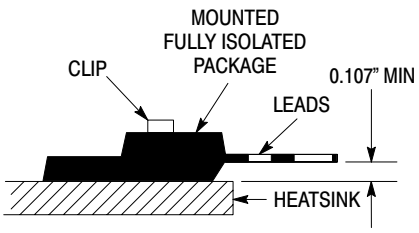



**Figure 5. Clip Mounting Position for Isolation Test Number 2**

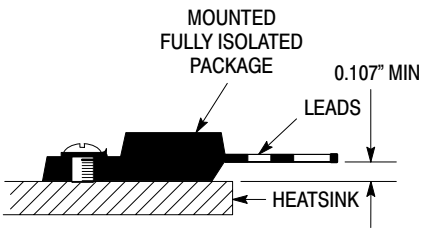



**Figure 6. Screw Mounting Position for Isolation Test Number 3**

*Measurement made between leads and heatsink with all leads shorted together

## MOUNTING INFORMATION

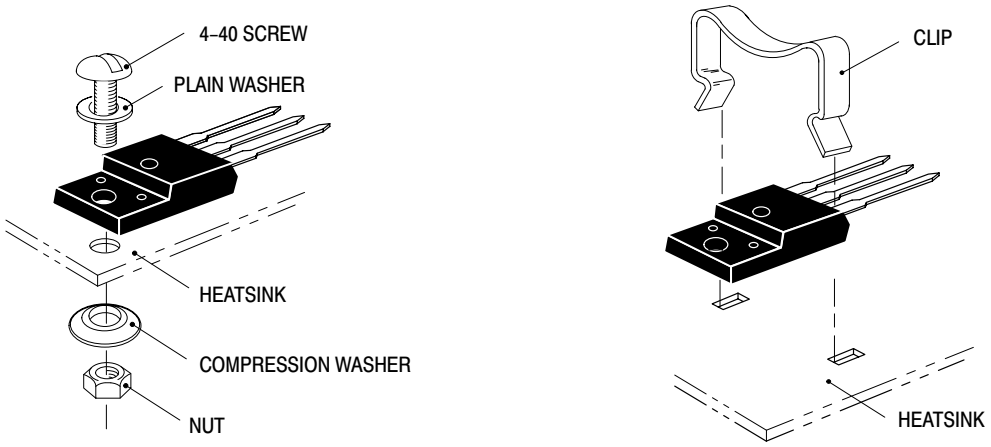



**Figure 7. Typical Mounting Techniques***

Laboratory tests on a limited number of samples indicate, when using the screw and compression washer mounting technique, a screw torque of 6 to 8 in · lbs is sufficient to provide maximum power dissipation capability. The compression washer helps to maintain a constant pressure on the package over time and during large temperature excursions.

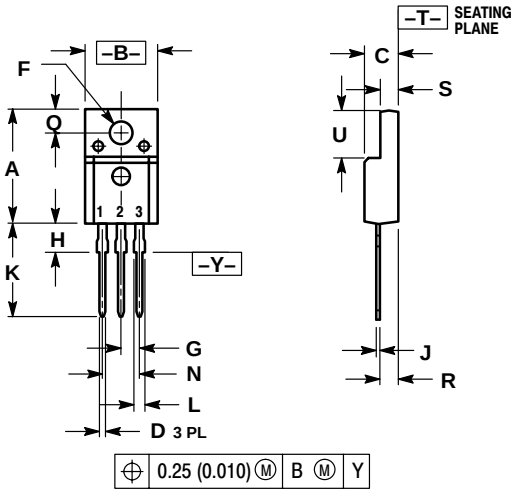
Destructive laboratory tests show that using a hex head 4–40 screw, without washers, and applying a torque in excess of 20 in · lbs will cause the plastic to crack around the mounting hole, resulting in a loss of isolation capability.

Additional tests on slotted 4–40 screws indicate that the screw slot fails between 15 to 20 in · lbs without adversely affecting the package. However, in order to positively ensure the package integrity of the fully isolated device, ON Semiconductor does not recommend exceeding 10 in · lbs of mounting torque under any mounting conditions.

** For more information about mounting power semiconductors see Application Note AN1040.

## PACKAGE DIMENSIONS

### CASE 221D–02
### TO–220 TYPE
### ISSUE D




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

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.621 | 0.629 | 15.78 | 15.97 |
| B | 0.394 | 0.402 | 10.01 | 10.21 |
| C | 0.181 | 0.189 | 4.60 | 4.80 |
| D | 0.026 | 0.034 | 0.67 | 0.86 |
| F | 0.121 | 0.129 | 3.08 | 3.27 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.123 | 0.129 | 3.13 | 3.27 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.14 | 1.52 |
| N | 0.200 BSC | | 5.08 BSC | |
| Q | 0.126 | 0.134 | 3.21 | 3.40 |
| R | 0.107 | 0.111 | 2.72 | 2.81 |
| S | 0.096 | 0.104 | 2.44 | 2.64 |
| U | 0.259 | 0.267 | 6.58 | 6.78 |

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

# Notes

# Notes

## PUBLICATION ORDERING INFORMATION

**Literature Fulfillment**:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
**Phone**: 303–675–2175 or 800–344–3860 Toll Free USA/Canada
**Fax**: 303–675–2176 or 800–344–3867 Toll Free USA/Canada
**Email**: ONlit@hibbertco.com

**N. American Technical Support**: 800–282–9855 Toll Free USA/Canada

**JAPAN**: ON Semiconductor, Japan Customer Focus Center
4–32–1 Nishi–Gotanda, Shinagawa–ku, Tokyo, Japan 141–0031
**Phone**: 81–3–5740–2700
**Email**: r14525@onsemi.com

**ON Semiconductor Website**: http://onsemi.com

For additional information, please contact your local
Sales Representative.