

MJE4343 (NPN), MJE4353 (PNP)

High-Voltage - High Power Transistors

... designed for use in high power audio amplifier applications and high voltage switching regulator circuits.

Features

- High Collector-Emitter Sustaining Voltage –
NPN PNP
 $V_{CE(sus)} = 160 \text{ Vdc}$ – MJE4343 MJE4353
- High DC Current Gain – @ $I_C = 8.0 \text{ Adc}$ $h_{FE} = 35$ (Typ)
- Low Collector-Emitter Saturation Voltage –
 $V_{CE(sat)} = 2.0 \text{ Vdc (Max) @ } I_C = 8.0 \text{ Adc}$
- These are Pb-Free Devices

MAXIMUM RATINGS

| Rating | Symbol | Max | Unit |
|---|----------------|-------------|------------------|
| Collector-Emitter Voltage | V_{CEO} | 160 | Vdc |
| Collector-Base Voltage | V_{CB} | 160 | Vdc |
| Emitter-Base Voltage | V_{EB} | 7.0 | Vdc |
| Collector Current – Continuous Peak (Note 1) | I_C | 16 20 | Adc |
| Base Current – Continuous | I_B | 5.0 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | P_D | 125 | Watts |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.0 | $^\circ\text{C/W}$ |

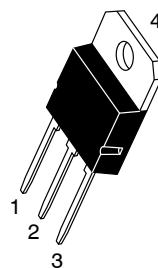
1. Pulse Test: Pulse Width $\leq 5.0 \mu\text{s}$, Duty Cycle $\geq 10\%$.



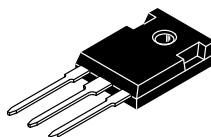
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**16 AMPS
POWER TRANSISTORS
COMPLEMENTARY
SILICON
160 VOLTS**



SOT-93
CASE 340D
STYLE 1



TO-247
CASE 340L
STYLE 3

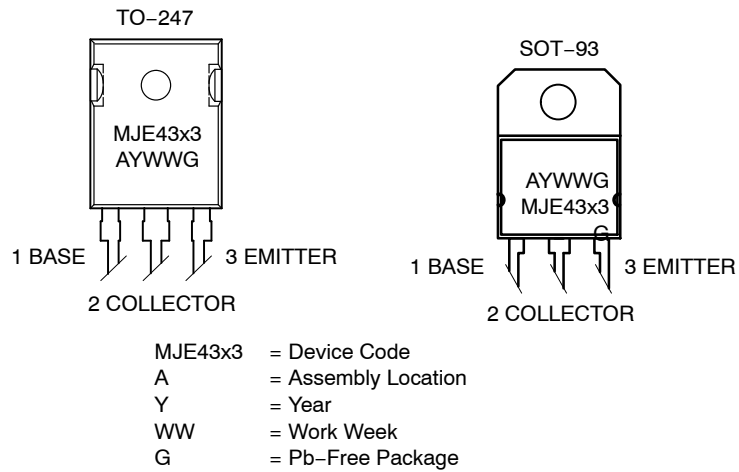
NOTE: Effective June 2012 this device will be available only in the TO-247 package. Reference FPCN# 16827.

ORDERING INFORMATION

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

MJE4343 (NPN), MJE4353 (PNP)

MARKING DIAGRAMS



ORDERING INFORMATION

| Device Order Number | Package Type | Shipping |
|---------------------|---------------------|-----------------|
| MJE4343G | SOT-93 (Pb-Free) | 30 Units / Rail |
| MJE4353G | SOT-93 (Pb-Free) | 30 Units / Rail |
| MJE4343G | TO-247 (Pb-Free) | 30 Units / Rail |
| MJE4353G | TO-247 (Pb-Free) | 30 Units / Rail |

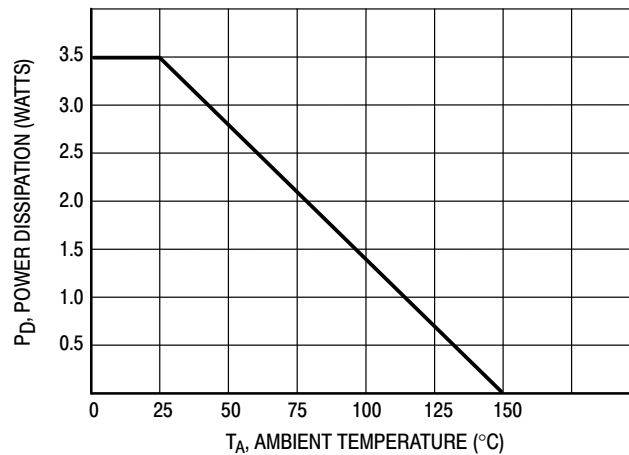


Figure 1. Power Derating
Reference: Ambient Temperature

MJE4343 (NPN), MJE4353 (PNP)

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

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

OFF CHARACTERISTICS

| | | | | |
|--|----------------|--------|------------|-----------------|
| Collector–Emitter Sustaining Voltage (Note 2) ($I_C = 200\text{ mAdc}$, $I_B = 0$) | $V_{CEO(sus)}$ | 160 | – | Vdc |
| Collector–Emitter Cutoff Current ($V_{CE} = 80\text{ Vdc}$, $I_B = 0$) | I_{CEO} | – | 750 | μAdc |
| Collector–Emitter Cutoff Current ($V_{CE} = \text{Rated } V_{CB}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = \text{Rated } V_{CB}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) | I_{CEX} | – – | 1.0 5.0 | mAdc |
| Collector–Base Cutoff Current ($V_{CB} = \text{Rated } V_{CB}$, $I_E = 0$) | I_{CBO} | – | 750 | μAdc |
| Emitter–Base Cutoff Current ($V_{BE} = 7.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | – | 1.0 | mAdc |

ON CHARACTERISTICS (Note 2)

| | | | | |
|--|---------------|-----------|----------------------|-----|
| DC Current Gain ($I_C = 8.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 16\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) | h_{FE} | 15 8.0 | 35 (Typ) 15 (Typ) | – |
| Collector–Emitter Saturation Voltage ($I_C = 8.0\text{ Adc}$, $I_B = 800\text{ mA}$) ($I_C = 16\text{ Adc}$, $I_B = 2.0\text{ Adc}$) | $V_{CE(sat)}$ | – – | 2.0 3.5 | Vdc |
| Base–Emitter Saturation Voltage ($I_C = 16\text{ Adc}$, $I_B = 2.0\text{ Adc}$) | $V_{BE(sat)}$ | – | 3.9 | Vdc |
| Base–Emitter On Voltage ($I_C = 16\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) | $V_{BE(on)}$ | – | 3.9 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | |
|--|----------|-----|-----|-----|
| Current–Gain – Bandwidth Product (Note 3) ($I_C = 1.0\text{ Adc}$, $V_{CE} = 20\text{ Vdc}$, $f_{test} = 0.5\text{ MHz}$) | f_T | 1.0 | – | MHz |
| Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 0.1\text{ MHz}$) | C_{ob} | – | 800 | pF |

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

3. $f_T = |h_{fe}| \cdot f_{test}$.

MJE4343 (NPN), MJE4353 (PNP)

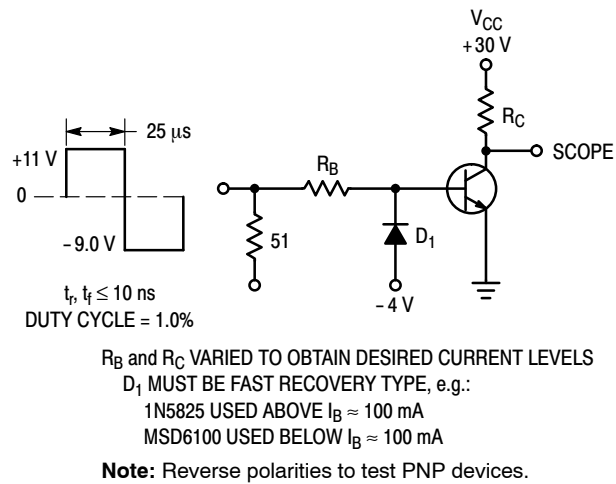


Figure 2. Switching Times Test Circuit

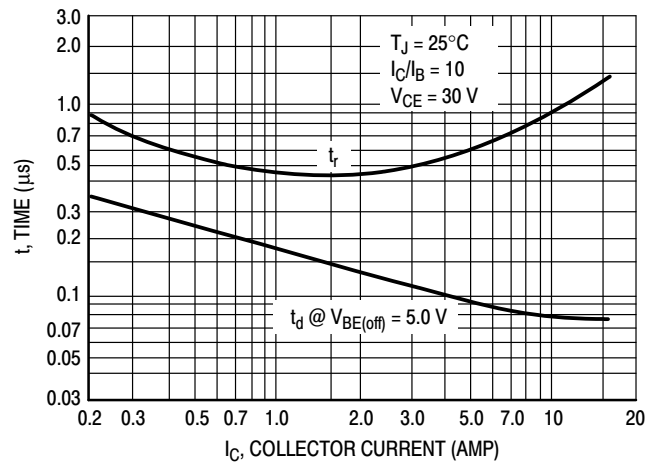


Figure 3. Typical Turn-On Time

TYPICAL CHARACTERISTICS

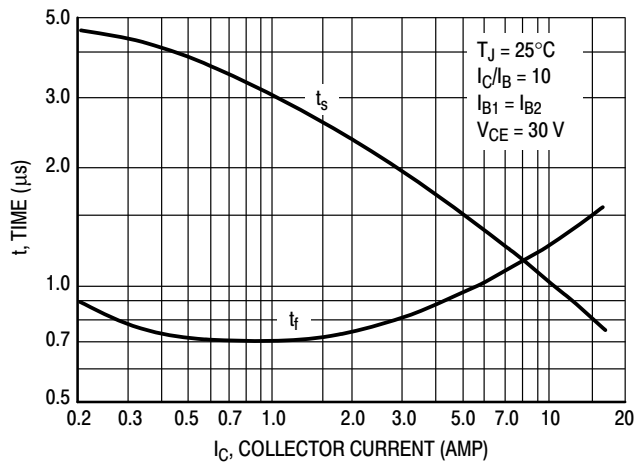


Figure 4. Turn-Off Time

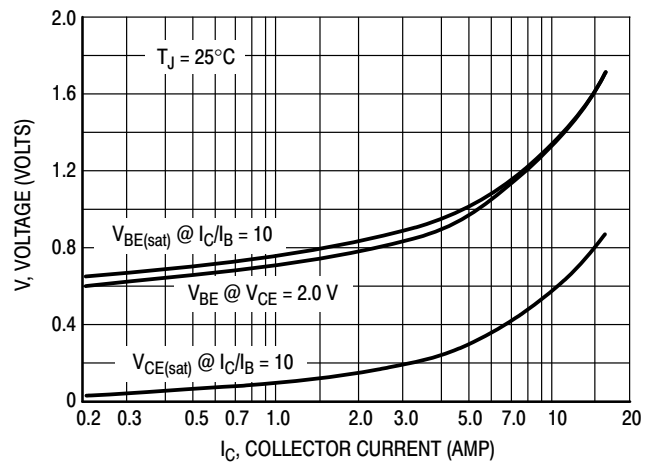


Figure 5. On Voltages

MJE4343 (NPN), MJE4353 (PNP)

DC CURRENT GAIN

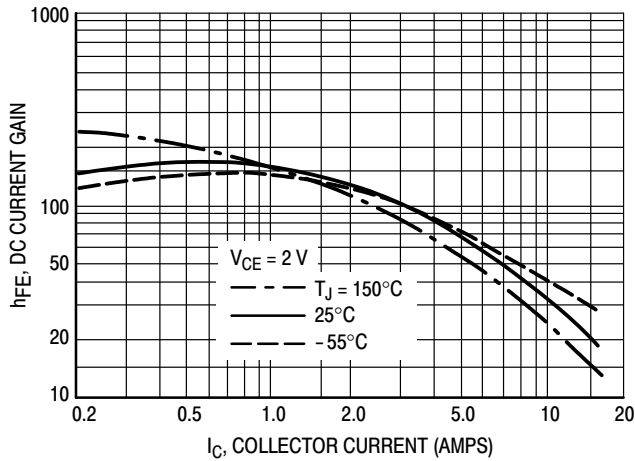


Figure 6. MJE4340 Series (NPN)

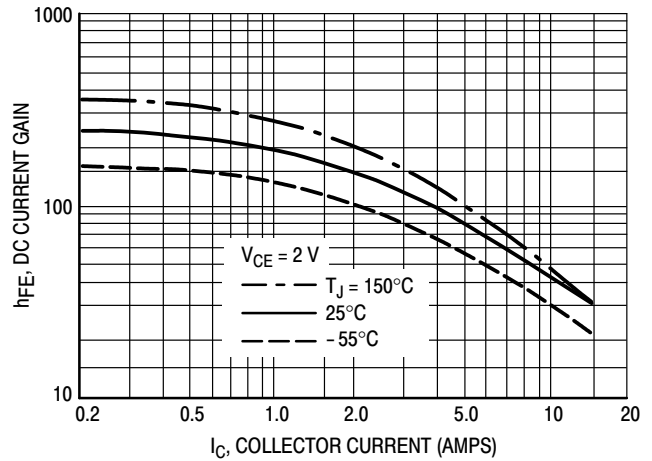


Figure 7. MJE4350 Series (PNP)

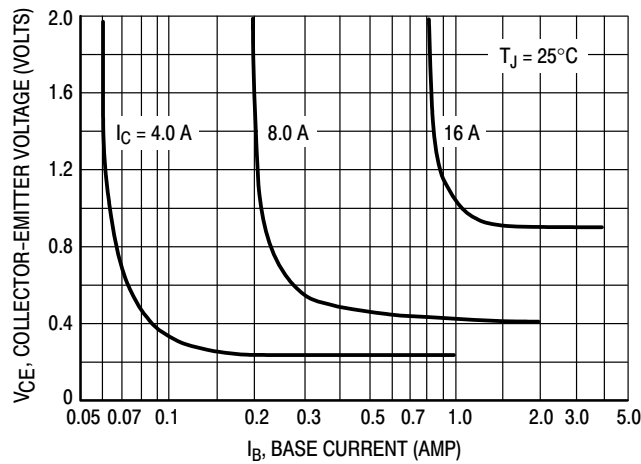


Figure 8. Collector Saturation Region

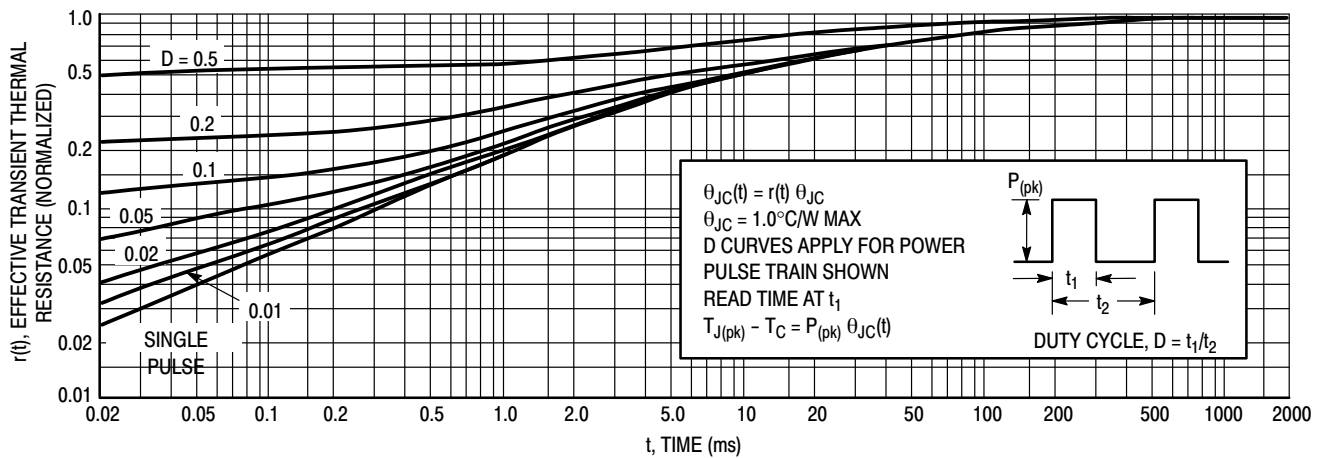


Figure 9. Thermal Response

MJE4343 (NPN), MJE4353 (PNP)

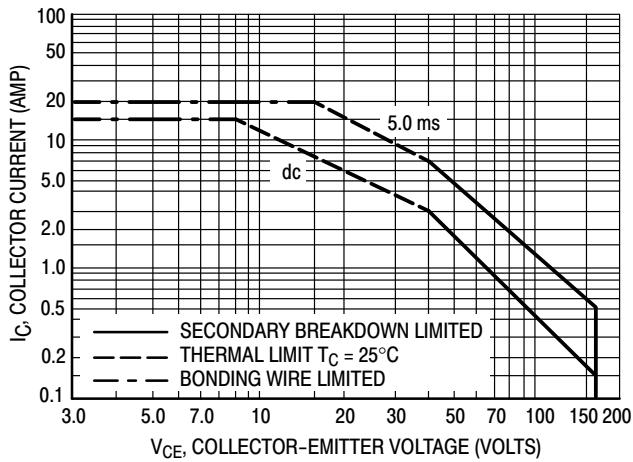


Figure 10. Maximum Forward Bias Safe Operating Area

REVERSE BIAS

For inductive loads, high voltage and high current must be sustained simultaneously during turn-off, in most cases, with the base to emitter junction reverse biased. Under these conditions the collector voltage must be held to a safe level at or below a specific value of collector current. This can be accomplished by several means such as active clamping, RC snubbing, load line shaping, etc. The safe level for these devices is specified as Reverse Bias Safe Operating Area and represents the voltage-current conditions during reverse biased turn-off. This rating is verified under clamped conditions so that the device is never subjected to an avalanche mode. Figure 11 gives RBSOA characteristics.

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 10 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 when $T_C \geq 25^\circ\text{C}$. Second breakdown limitations do not derate the same as thermal limitations. Allowable current at the voltages shown on Figure 10 may be found at any case temperature by using the appropriate curve on Figure 9.

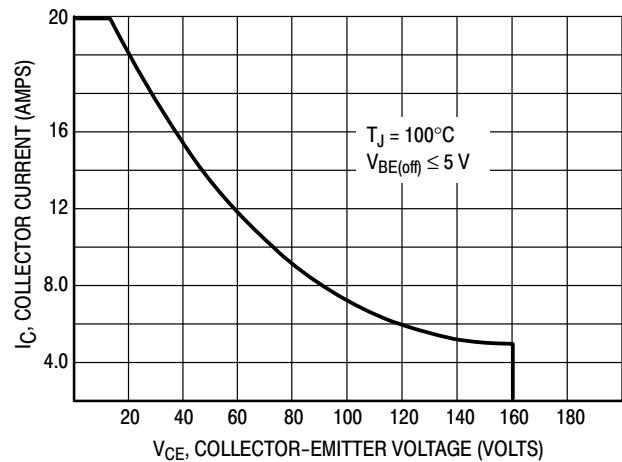


Figure 11. Maximum Reverse Bias Safe Operating Area

MECHANICAL CASE OUTLINE

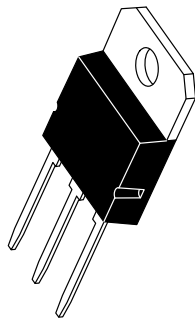
PACKAGE DIMENSIONS

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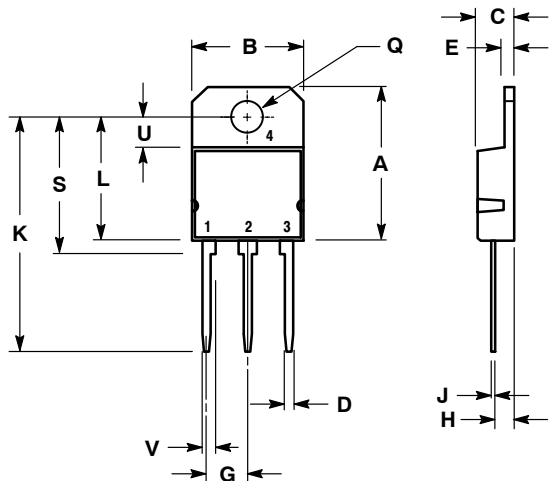


SOT-93 (TO-218) CASE 340D-02 ISSUE E

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.

| 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 | |

MARKING DIAGRAM

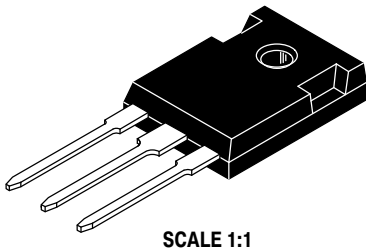


A = Assembly Location
Y = Year
WW = Work Week
xxxxx = Device Code

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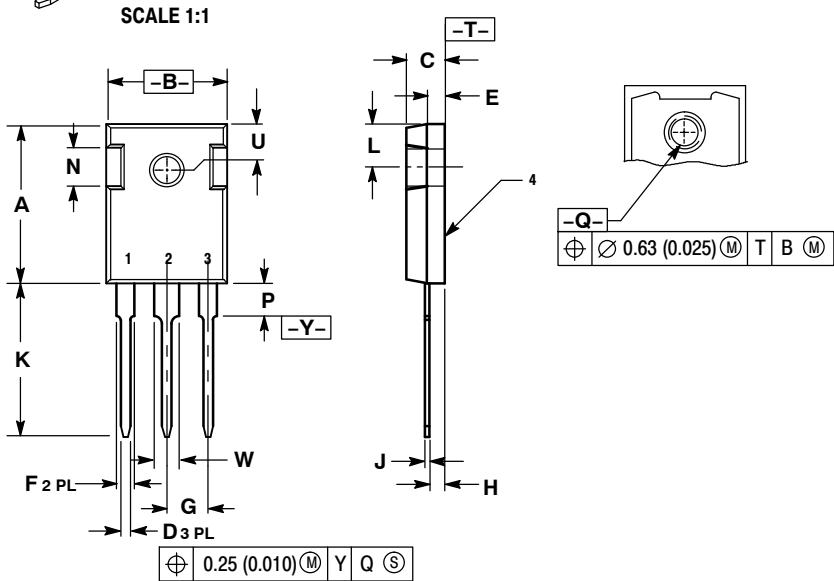
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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



TO-247
CASE 340L-02
ISSUE F

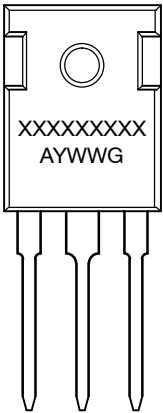
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NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| 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 |

GENERIC MARKING DIAGRAM*



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.

- 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

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| | | PAGE 1 OF 2 |

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