

MJD47, MJD50

Preferred Device

High Voltage Power Transistors

DPAK For Surface Mount Applications

Designed for line operated audio output amplifier, SWITCHMODE™ power supply drivers and other switching applications.

Features

- Lead Formed for Surface Mount Applications in Plastic Sleeves (No Suffix)
- Electrically Similar to Popular TIP47, and TIP50
- 250 and 400 V (Min) – $V_{CEO(sus)}$
- 1 A Rated Collector Current
- Epoxy Meets UL 94 V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V
Machine Model, C > 400 V
- Pb-Free Packages are Available

MAXIMUM RATINGS

| Rating | Symbol | Max | Unit |
|---|----------------|----------------|--------------------------|
| Collector-Emitter Voltage MJD47 MJD50 | V_{CEO} | 250 400 | Vdc |
| Collector-Base Voltage MJD47 MJD50 | V_{CB} | 350 500 | Vdc |
| Emitter-Base Voltage | V_{EB} | 5 | Vdc |
| Collector Current – Continuous – Peak | I_C | 1 2 | Adc |
| Base Current | I_B | 0.6 | mAdc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 15 0.12 | W W/ $^\circ\text{C}$ |
| Total Power Dissipation (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.56 0.0125 | W W/ $^\circ\text{C}$ |
| 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 | $R_{\theta JC}$ | 8.33 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 80 | $^\circ\text{C}/\text{W}$ |
| Lead Temperature for Soldering Purpose | T_L | 260 | $^\circ\text{C}$ |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

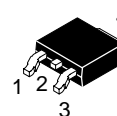
1. These ratings are applicable when surface mounted on the minimum pad sizes recommended.



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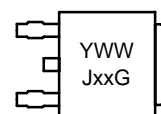
<http://onsemi.com>

**NPN SILICON POWER
TRANSISTORS
1 AMPERE
250, 400 VOLTS, 15 WATTS**



DPAK
CASE 369C
STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
Jxx = Device Code
xx = 47 or 50
G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

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

| Characteristic | Symbol | Min | Max | Unit | |
|---|----------------|---------------|------------|------------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector-Emitter Sustaining Voltage (Note 2) ($I_C = 30\text{ mAdc}$, $I_B = 0$) | MJD47 MJD50 | $V_{CE(sus)}$ | 250 400 | - - | Vdc |
| Collector Cutoff Current ($V_{CE} = 150\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 300\text{ Vdc}$, $I_B = 0$) | MJD47 MJD50 | I_{CEO} | - - | 0.2 0.2 | mAdc |
| Collector Cutoff Current ($V_{CE} = 350\text{ Vdc}$, $V_{BE} = 0$) ($V_{CE} = 500\text{ Vdc}$, $V_{BE} = 0$) | MJD47 MJD50 | I_{CES} | - - | 0.1 0.1 | mAdc |
| Emitter Cutoff Current ($V_{BE} = 5\text{ Vdc}$, $I_C = 0$) | | I_{EBO} | - | 1 | mAdc |
| ON CHARACTERISTICS (Note 2) | | | | | |
| DC Current Gain ($I_C = 0.3\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 1\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$) | | h_{FE} | 30 10 | 150 - | - |
| Collector-Emitter Saturation Voltage ($I_C = 1\text{ Adc}$, $I_B = 0.2\text{ Adc}$) | | $V_{CE(sat)}$ | - | 1 | Vdc |
| Base-Emitter On Voltage ($I_C = 1\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$) | | $V_{BE(on)}$ | - | 1.5 | Vdc |
| DYNAMIC CHARACTERISTICS | | | | | |
| Current Gain — Bandwidth Product ($I_C = 0.2\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$, $f = 2\text{ MHz}$) | | f_T | 10 | - | MHz |
| Small-Signal Current Gain ($I_C = 0.2\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$, $f = 1\text{ kHz}$) | | h_{fe} | 25 | - | - |

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

TYPICAL CHARACTERISTICS

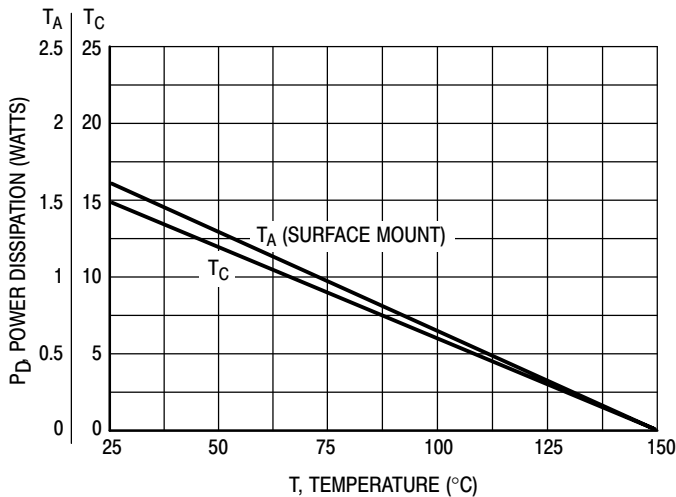


Figure 1. Power Derating

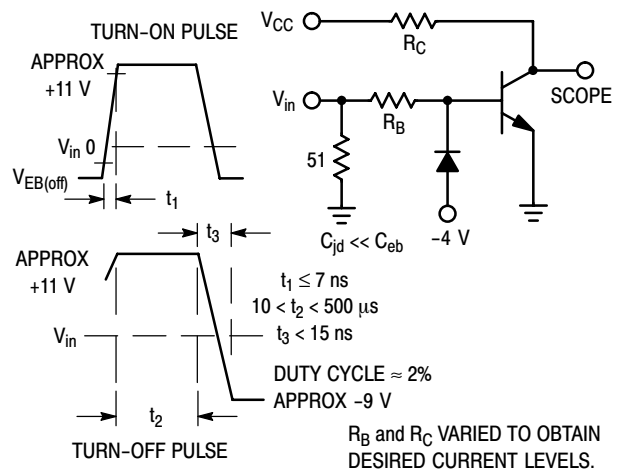


Figure 2. Switching Time Equivalent Circuit

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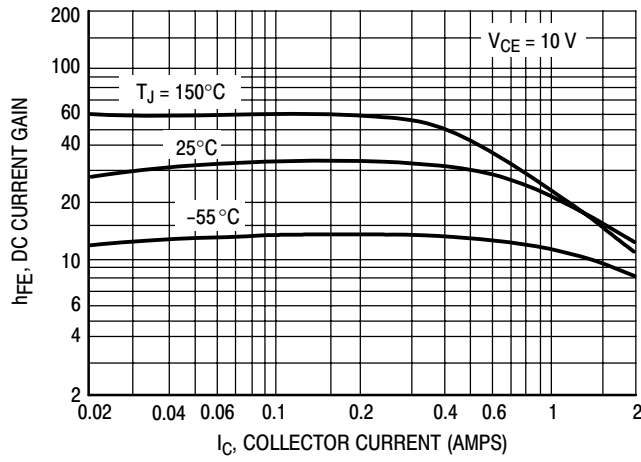


Figure 3. DC Current Gain

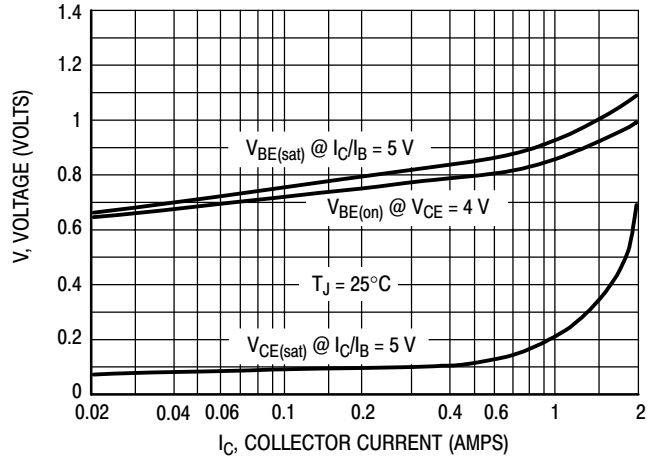


Figure 4. "On" Voltages

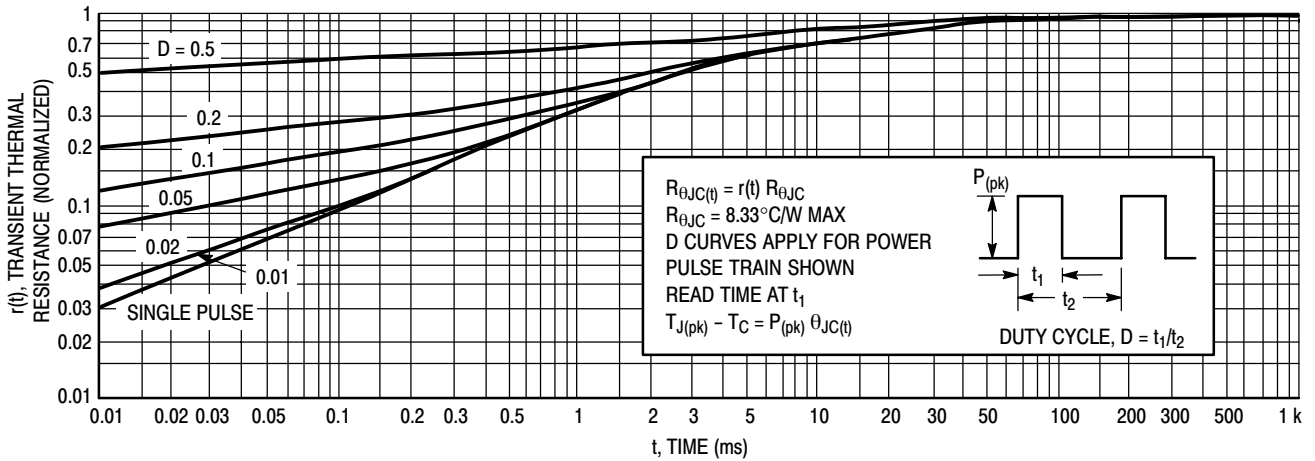


Figure 5. Thermal Response

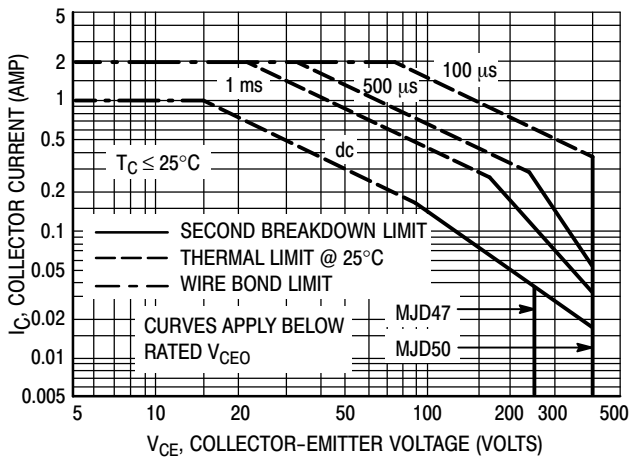


Figure 6. Active Region Safe Operating Area

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 6 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 5. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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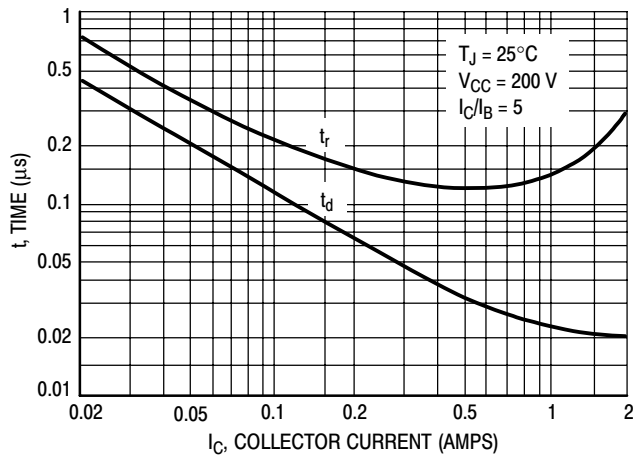


Figure 7. Turn-On Time

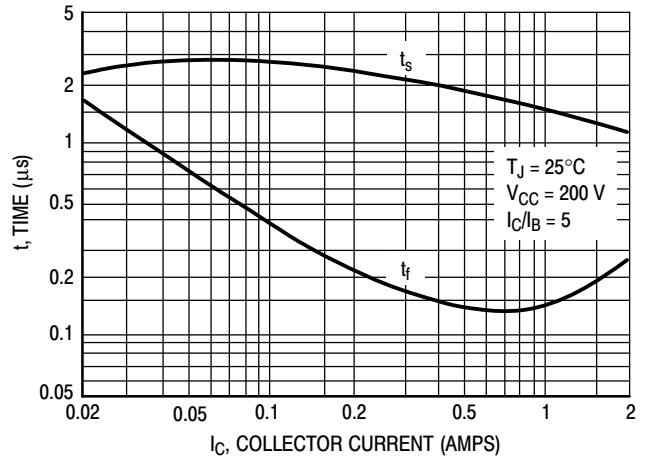


Figure 8. Turn-Off Time

ORDERING INFORMATION

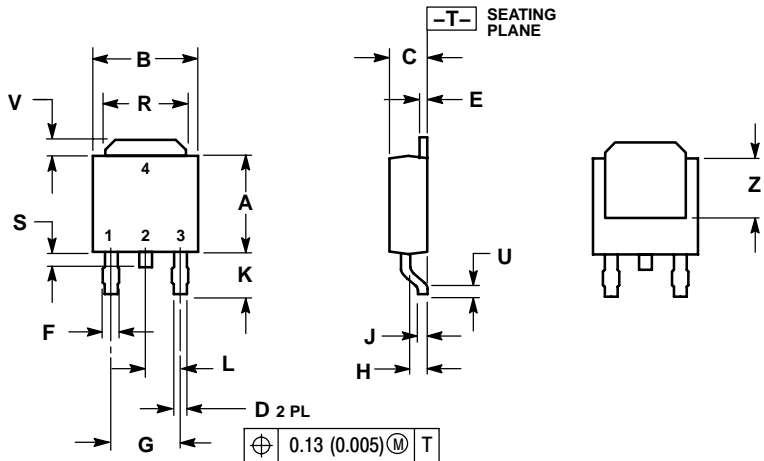
| Device | Package | Shipping† |
|----------|-------------------|--------------------|
| MJD47 | 369C | 75 Units / Rail |
| MJD47G | 369C (Pb-Free) | |
| MJD47T4 | 369C | 2500 / Tape & Reel |
| MJD47T4G | 369C (Pb-Free) | |
| MJD50 | 369C | 75 Units / Rail |
| MJD50G | 369C (Pb-Free) | |
| MJD50T4 | 369C | 2500 / Tape & Reel |
| MJD50T4G | 369C (Pb-Free) | |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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PACKAGE DIMENSIONS

DPAK CASE 369C ISSUE O

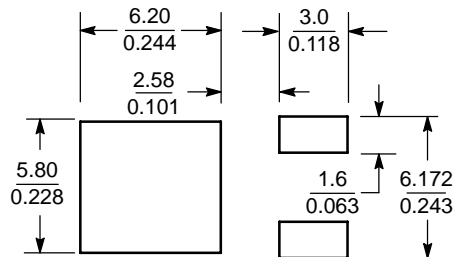


- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.235 | 0.245 | 5.97 | 6.22 |
| B | 0.250 | 0.265 | 6.35 | 6.73 |
| C | 0.086 | 0.094 | 2.19 | 2.38 |
| D | 0.027 | 0.035 | 0.69 | 0.88 |
| E | 0.018 | 0.023 | 0.46 | 0.58 |
| F | 0.037 | 0.045 | 0.94 | 1.14 |
| G | 0.180 BSC | | 4.58 BSC | |
| H | 0.034 | 0.040 | 0.87 | 1.01 |
| J | 0.018 | 0.023 | 0.46 | 0.58 |
| K | 0.102 | 0.114 | 2.60 | 2.89 |
| L | 0.090 BSC | | 2.29 BSC | |
| R | 0.180 | 0.215 | 4.57 | 5.45 |
| S | 0.025 | 0.040 | 0.63 | 1.01 |
| U | 0.020 | --- | 0.51 | --- |
| V | 0.035 | 0.050 | 0.89 | 1.27 |
| Z | 0.155 | --- | 3.93 | --- |

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

SOLDERING FOOTPRINT*



SCALE 3:1 (mm / inches)

*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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