

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.

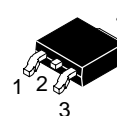
1. These ratings are applicable when surface mounted on the minimum pad sizes recommended.



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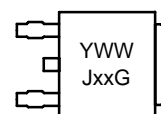
<http://onsemi.com>

**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

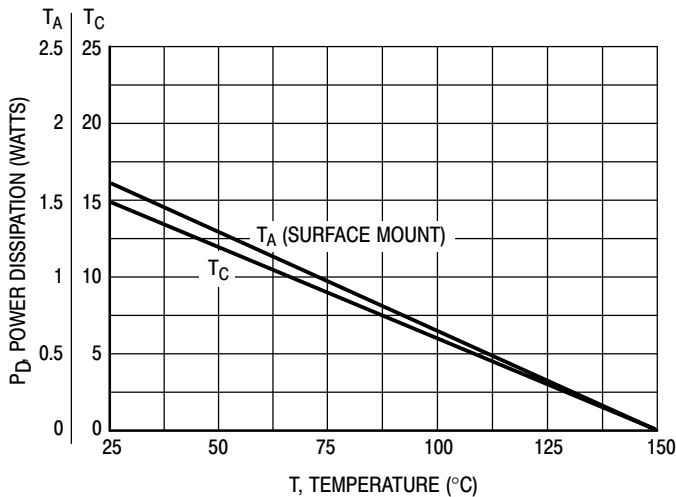


Figure 1. Power Derating

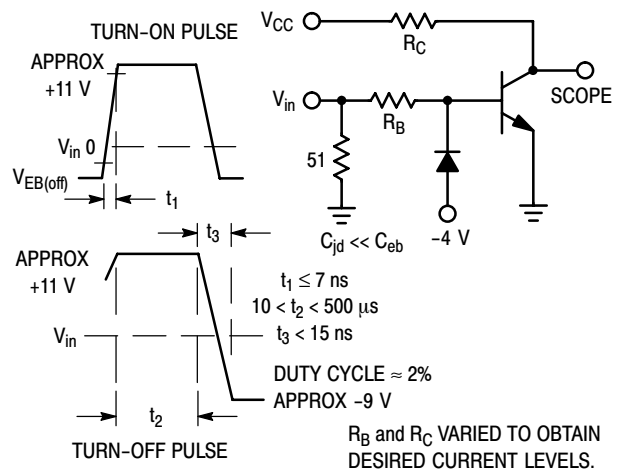


Figure 2. Switching Time Equivalent Circuit

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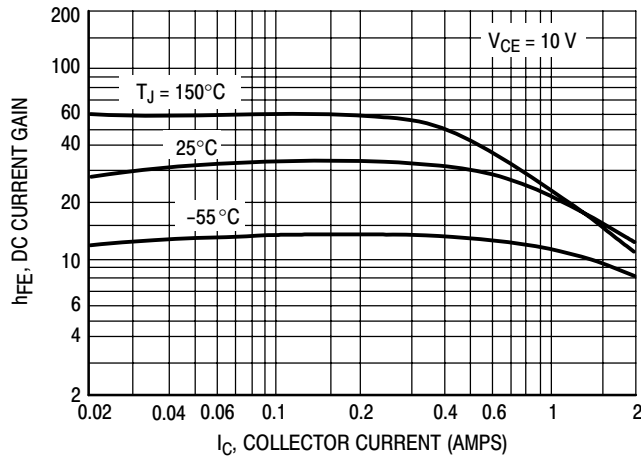


Figure 3. DC Current Gain

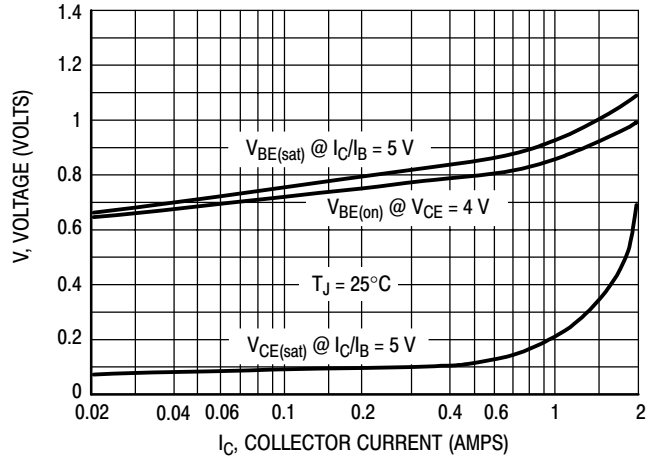


Figure 4. "On" Voltages

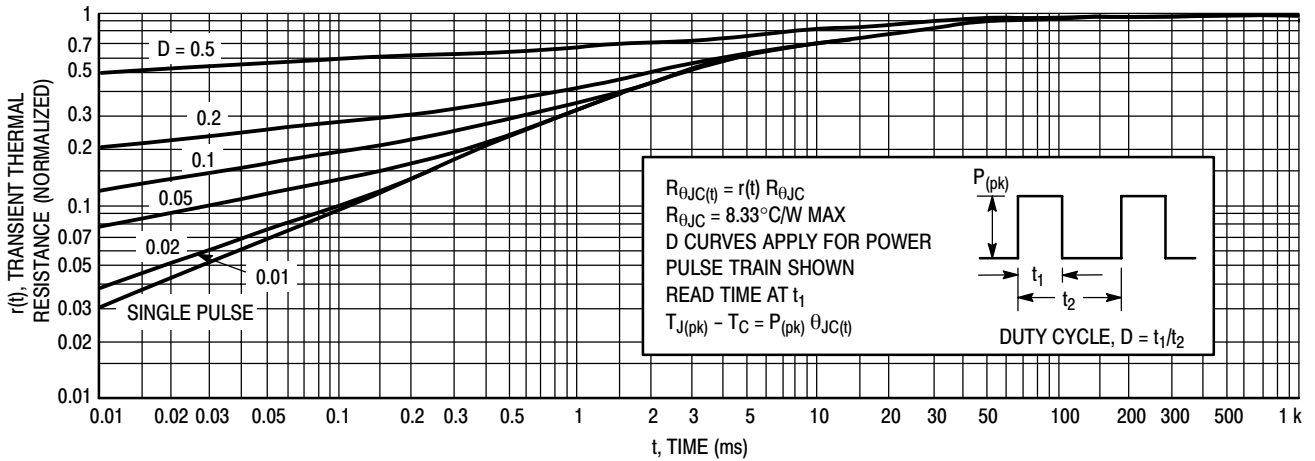


Figure 5. Thermal Response

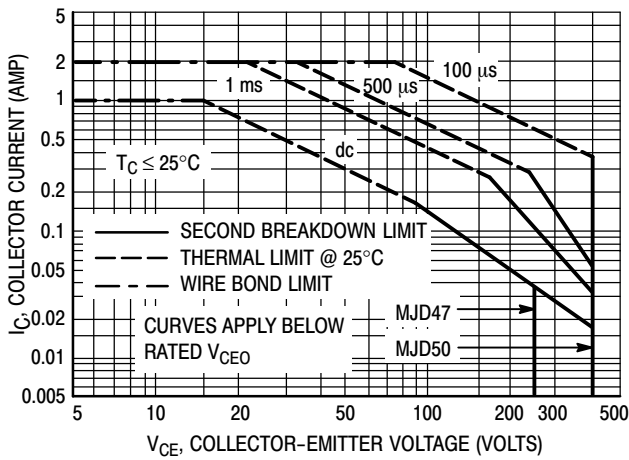


Figure 6. Active Region Safe Operating Area

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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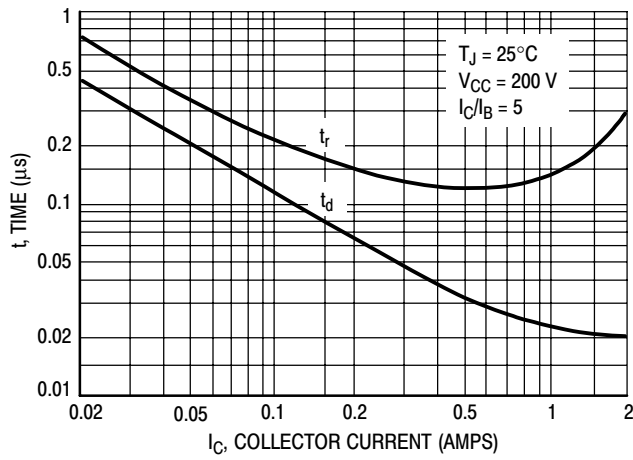


Figure 7. Turn-On Time

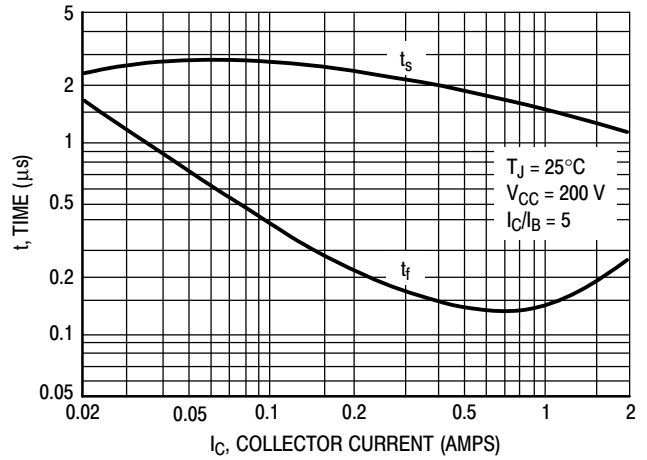


Figure 8. Turn-Off Time

ORDERING INFORMATION

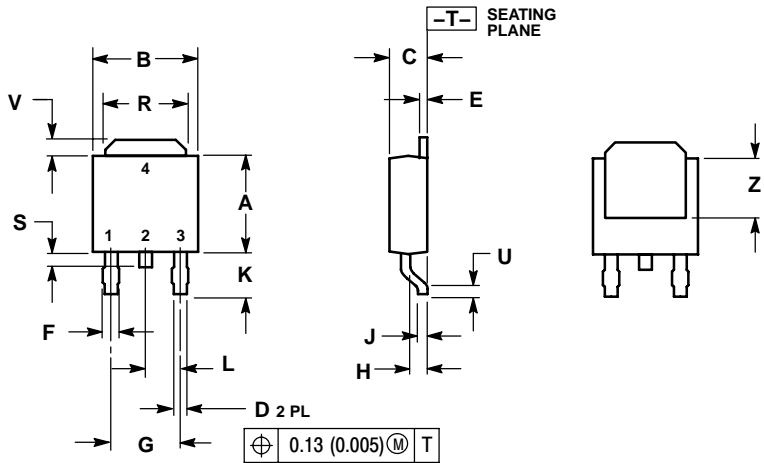
Device	Package	Shipping†
MJD47	369C	75 Units / Rail
MJD47G	369C (Pb-Free)	
MJD47T4	369C	2500 / Tape & Reel
MJD47T4G	369C (Pb-Free)	
MJD50	369C	75 Units / Rail
MJD50G	369C (Pb-Free)	
MJD50T4	369C	2500 / Tape & Reel
MJD50T4G	369C (Pb-Free)	

†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

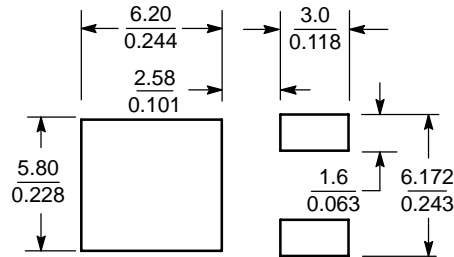


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

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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