MJD47, NJVMJD47T4G, MJD50, NJVMJD50T4G

High Voltage Power Transistors

DPAK for Surface Mount Applications

Designed for line operated audio output amplifier, switchmode 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
- Epoxy Meets UL 94 V−0 @ 0.125 in
- NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant

MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Collector−Emitter Voltage MJD47, NJVMJD47T4G MJD50, NJVMJD50T4G	V_{CEO}	 250 400	Vdc
Collector−Base Voltage MJD47, NJVMJD47T4G MJD50, NJVMJD50T4G	V_{CB}	 350 500	Vdc
Emitter−Base Voltage	V_{EB}	5	Vdc
Collector Current − Continuous	I_C	1	Adc
Collector Current − Peak	I_{CM}	2	Adc
Base Current	I_B	0.6	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 15 0.12	 W W/°C
Total Power Dissipation (Note 1) @ T_A = 25°C Derate above 25°C	P_D	 1.56 0.0125	 W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C
ESD − Human Body Model	HBM	3B	V
ESD − Machine Model	MM	C	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

ON Semiconductor®

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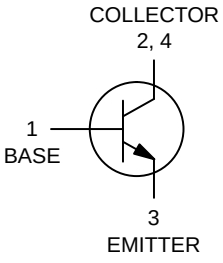
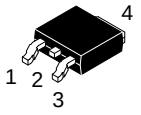
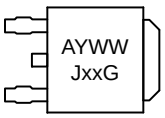
NPN SILICON POWER TRANSISTORS
1 AMPERE
250, 400 VOLTS, 15 WATTS





DPAK
CASE 369C
STYLE 1

MARKING DIAGRAM



A = Assembly Location
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 5 of this data sheet.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction−to−Case	$R_{\theta JC}$	8.33	°C/W
Thermal Resistance Junction−to−Ambient (Note 2)	$R_{\theta JA}$	80	°C/W
Lead Temperature for Soldering Purpose	T_L	260	°C

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

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (Note 3) (I_C = 30 mAdc, I_B = 0) MJD47, NJVMJD47T4G MJD50, NJVMJD50T4G	$V_{CEO(sus)}$	 250 400	 − −	Vdc
Collector Cutoff Current (V_{CE} = 150 Vdc, I_B = 0) MJD47, NJVMJD47T4G (V_{CE} = 300 Vdc, I_B = 0) MJD50, NJVMJD50T4G	I_{CEO}	 − −	 0.2 0.2	mAdc
Collector Cutoff Current (V_{CE} = 350 Vdc, V_{BE} = 0) MJD47, NJVMJD47T4G (V_{CE} = 500 Vdc, V_{BE} = 0) MJD50, NJVMJD50T4G	I_{CES}	 − −	 0.1 0.1	mAdc
Emitter Cutoff Current (V_{BE} = 5 Vdc, I_C = 0)	I_{EBO}	 −	 1	mAdc
ON CHARACTERISTICS (Note 3)				
DC Current Gain (I_C = 0.3 Adc, V_{CE} = 10 Vdc) (I_C = 1 Adc, V_{CE} = 10 Vdc)	h_{FE}	 30 10	 150 −	−
Collector−Emitter Saturation Voltage (I_C = 1 Adc, I_B = 0.2 Adc)	$V_{CE(sat)}$	 −	 1	Vdc
Base−Emitter On Voltage (I_C = 1 Adc, V_{CE} = 10 Vdc)	$V_{BE(on)}$	 −	 1.5	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain − Bandwidth Product (I_C = 0.2 Adc, V_{CE} = 10 Vdc, f = 2 MHz)	f_T	 10	 −	MHz
Small−Signal Current Gain (I_C = 0.2 Adc, V_{CE} = 10 Vdc, f = 1 kHz)	h_{fe}	 25	 −	−

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

TYPICAL CHARACTERISTICS

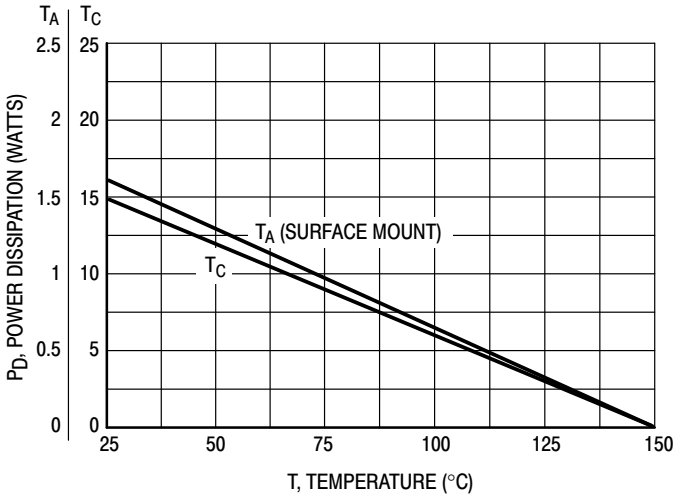


Figure 1. Power Derating

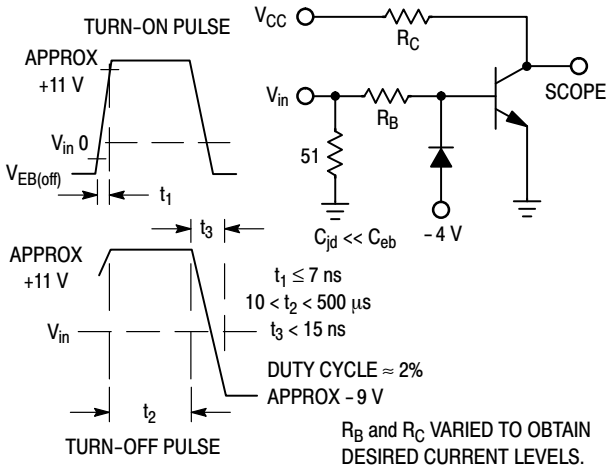


Figure 2. Switching Time Equivalent Circuit

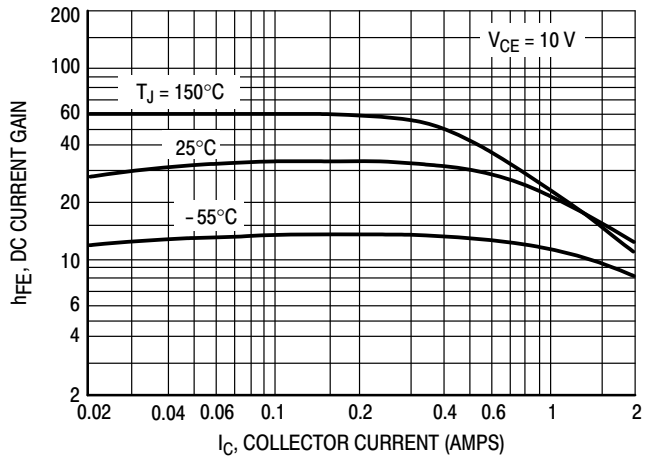


Figure 3. DC Current Gain

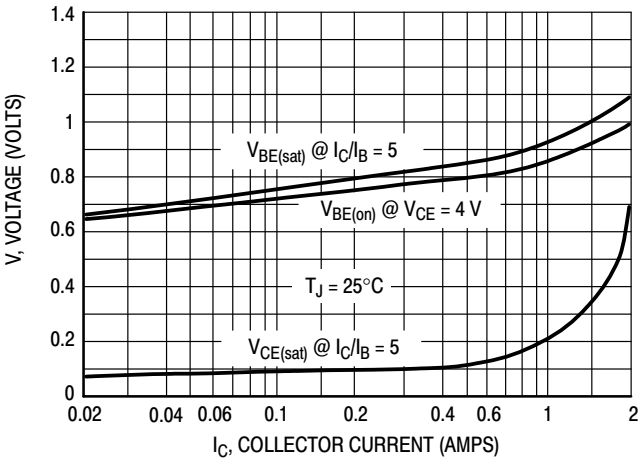


Figure 4. "On" Voltages

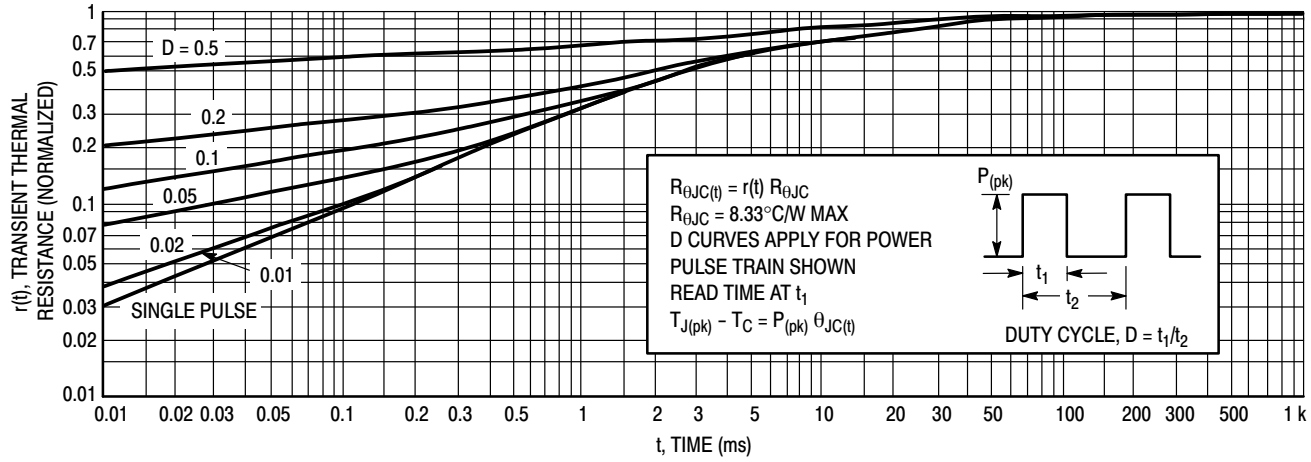


Figure 5. Thermal Response

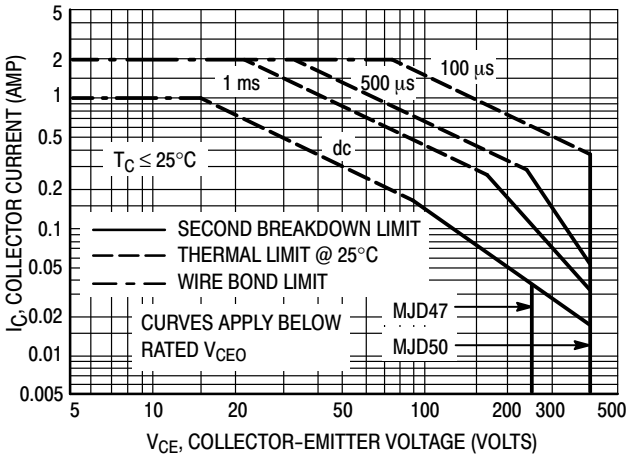


Figure 6. Active Region Safe Operating Area

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 $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \le 150°C$. $T_{J(pk)}$ 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.

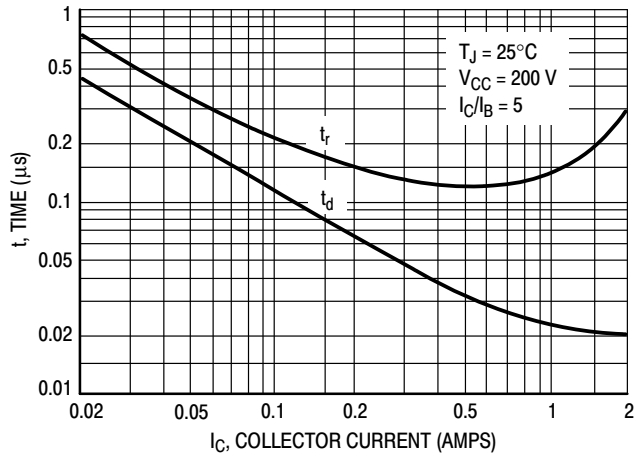


Figure 7. Turn−On Time

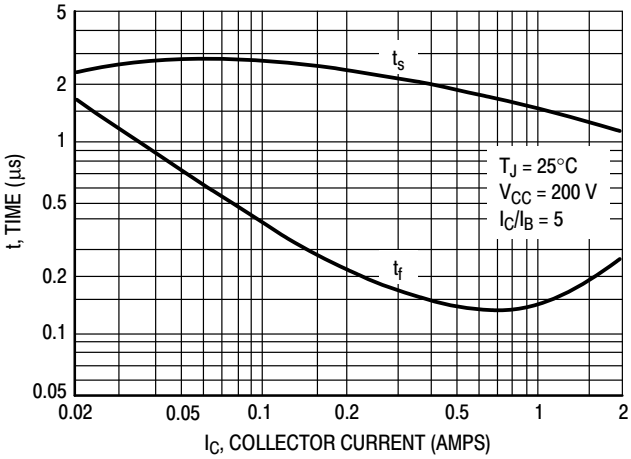


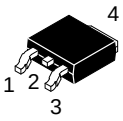
Figure 8. Turn-Off Time

ORDERING INFORMATION

Device	Package	Shipping†
MJD47G	369C (Pb−Free)	75 Units / Rail
MJD47T4G	369C (Pb−Free)	2,500 / Tape & Reel
NJVMJD47T4G*	369C (Pb−Free)	2,500 / Tape & Reel
MJD50G	369C (Pb−Free)	75 Units / Rail
MJD50T4G	369C (Pb−Free)	2,500 / Tape & Reel
NJVMJD50T4G*	369C (Pb−Free)	2,500 / Tape & Reel

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

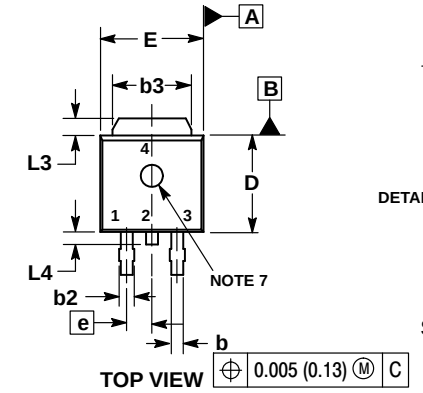
*NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.



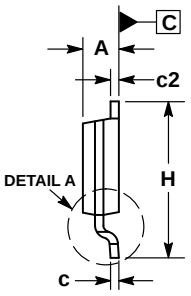
SCALE 1:1

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE F

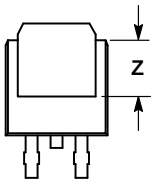
DATE 21 JUL 2015



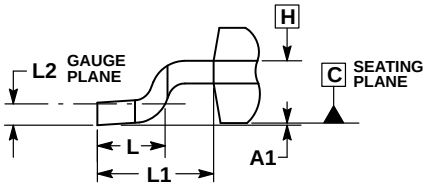
TOP VIEW



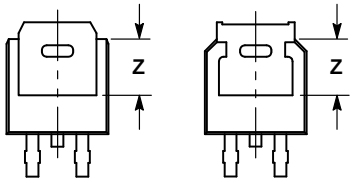
SIDE VIEW



BOTTOM VIEW



DETAIL A
ROTATED 90° CW



BOTTOM VIEW
ALTERNATE CONSTRUCTIONS

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114 REF		2.90 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

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

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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

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

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

STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

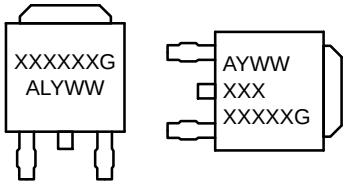
STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 8:
PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

GENERIC MARKING DIAGRAM*

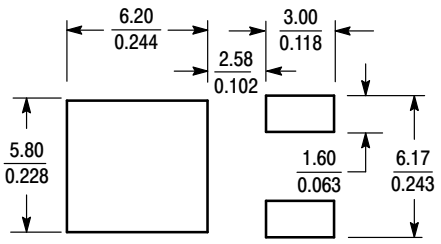


IC **Discrete**

XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking.

SOLDERING FOOTPRINT*



SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

ISSUE	REVISION	DATE
O	RELEASED FOR PRODUCTION. REQ. BY L. GAN	24 SEP 2001
A	ADDED STYLE 8. REQ. BY S. ALLEN.	06 AUG 2008
B	ADDED STYLE 9. REQ. BY D. WARNER.	16 JAN 2009
C	ADDED STYLE 10. REQ. BY S. ALLEN.	09 JUN 2009
D	RELABELED DRAWING TO JEDEC STANDARDS. ADDED SIDE VIEW DETAIL A. CORRECTED MARKING INFORMATION. REQ. BY D. TRUHITTE.	29 JUN 2010
E	ADDED ALTERNATE CONSTRUCTION BOTTOM VIEW. MODIFIED DIMENSIONS b2 AND L1. CORRECTED MARKING DIAGRAM FOR DISCRETE. REQ. BY I. CAMBALIZA.	06 FEB 2014
F	ADDED SECOND ALTERNATE CONSTRUCTION BOTTOM VIEW. REQ. BY K. MUSTAFA.	21 JUL 2015

PUBLICATION ORDERING INFORMATION

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