



# High Voltage Power Transistors

## DPAK For Surface Mount Applications

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

- Lead Formed for Surface Mount Applications in Plastic Sleeves (No Suffix)
- Straight Lead Version in Plastic Sleeves ("–1" Suffix)
- Lead Formed Version in 16 mm Tape and Reel ("T4" Suffix)
- Electrically Similar to Popular TIP47, and TIP50
- 250 and 400 V (Min) —  $V_{CEO(sus)}$
- 1 A Rated Collector Current

### MAXIMUM RATINGS

Rating	Symbol	MJD47	MJD50	Unit
Collector–Emitter Voltage	$V_{CEO}$	250	400	Vdc
Collector–Base Voltage	$V_{CB}$	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		Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	15 0.12		Watts W/ $^\circ\text{C}$
Total Power Dissipation* @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.56 0.0125		Watts 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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient*	$R_{\theta JA}$	80	$^\circ\text{C/W}$
Lead Temperature for Soldering Purpose	$T_L$	260	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage (1) MJD47 ( $I_C = 30\text{ mAdc}, I_B = 0$ ) MJD50	$V_{CEO(sus)}$	250 400	— —	Vdc
Collector Cutoff Current ( $V_{CE} = 150\text{ Vdc}, I_B = 0$ ) MJD47 ( $V_{CE} = 300\text{ Vdc}, I_B = 0$ ) MJD50	$I_{CEO}$	— —	0.2 0.2	mAdc

\* When surface mounted on minimum pad sizes recommended.

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

(continued)

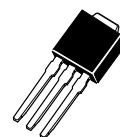
**MJD47\***  
**MJD50\***

\*Motorola Preferred Device

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

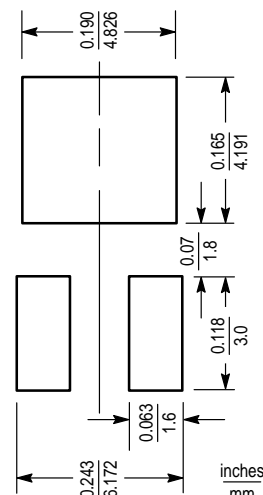


CASE 369A–13



CASE 369–07

### MINIMUM PAD SIZES RECOMMENDED FOR SURFACE MOUNTED APPLICATIONS



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

# MJD47 MJD50

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS — continued</b>				
Collector Cutoff Current ( $V_{CE} = 350\text{ Vdc}$ , $V_{BE} = 0$ ) ( $V_{CE} = 500\text{ Vdc}$ , $V_{BE} = 0$ )	$I_{CES}$	— —	0.1 0.1	mAdc
Emitter Cutoff Current ( $V_{BE} = 5\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	—	1	mAdc

## ON CHARACTERISTICS (1)

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	—	—

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

## TYPICAL CHARACTERISTICS

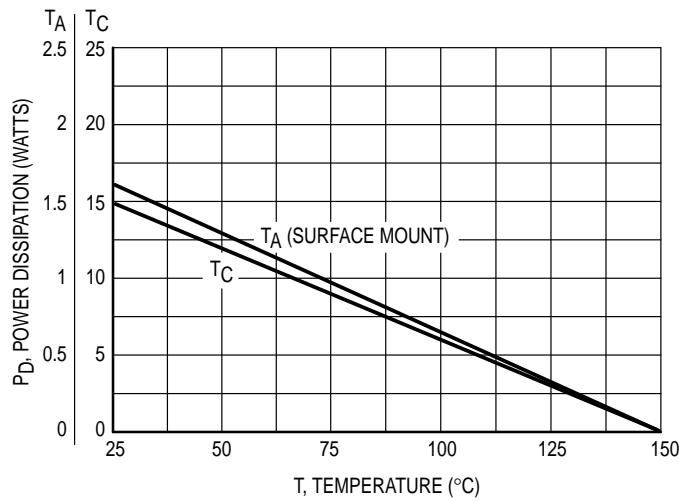


Figure 1. Power Derating

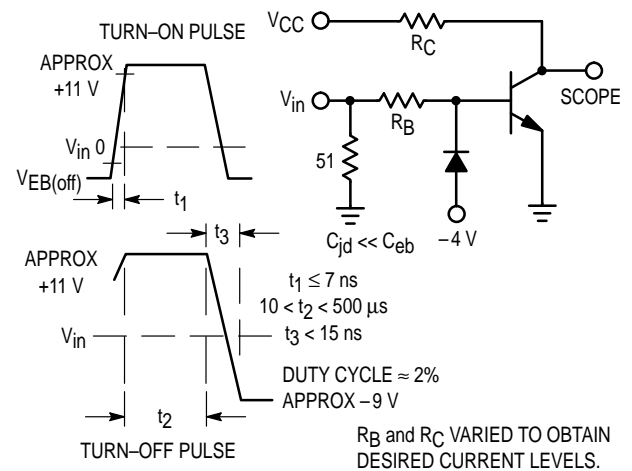


Figure 2. Switching Time Equivalent Circuit