

# MJD148

## NPN Silicon Power Transistor

### DPAK For Surface Mount Applications

Designed for general purpose amplifier and low speed switching applications.

- High Gain – 50 Min @  $I_C = 2.0$  A
- Low Saturation Voltage – 0.5 V @  $I_C = 2.0$  A
- High Current Gain – Bandwidth Product –  $f_T = 3.0$  MHz Min @  $I_C = 250$  mAdc
- Epoxy Meets UL 94 V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B; >8000 V  
Machine Model, C; >400 V

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	45	Vdc
Collector-Base Voltage	$V_{CB}$	45	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0	Vdc
Collector Current – Continuous Peak	$I_C$	4.0 7.0	Adc
Base Current	$I_B$	50	mAdc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	20 0.16	W W/ $^\circ\text{C}$
Total Power Dissipation (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.75 0.014	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	6.25	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	71.4	$^\circ\text{C/W}$

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.

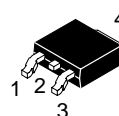


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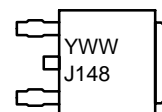
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**4.0 Amps  
45 Volts  
20 Watts  
POWER TRANSISTOR**

#### MARKING DIAGRAM



DPAK  
CASE 369C  
STYLE 1



J148 = Device Code  
Y = Year  
WW = Work Week

#### ORDERING INFORMATION

Device	Package	Shipping†
MJD148T4	DPAK	2500/Tape & Reel

†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.

# MJD148

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

Characteristic	Test Conditions	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage (Note 2)	$I_C = 100\text{ mAdc}$ , $I_B = 0$	$V_{CEO(sus)}$	45	–	Vdc
Collector Cutoff Current	$V_{CB} = 45\text{ Vdc}$ , $I_E = 0$	$I_{CBO}$	–	20	$\mu\text{Adc}$
Emitter Cutoff Current	$V_{BE} = 5\text{ Vdc}$ , $I_C = 0$	$I_{EBO}$	–	1	mAdc

### ON CHARACTERISTICS

DC Current Gain (Note 2)	$I_C = 10\text{ mAdc}$ , $V_{CE} = 5\text{ Vdc}$ $I_C = 0.5\text{ Adc}$ , $V_{CE} = 1\text{ Vdc}$ $I_C = 2\text{ Adc}$ , $V_{CE} = 1\text{ Vdc}$ $I_C = 3\text{ Adc}$ , $V_{CE} = 1\text{ Vdc}$	$h_{FE}$	40 85 50 30	– 375 – –	–
Collector–Emitter Saturation Voltage (Note 2)	$I_C = 2\text{ Adc}$ , $I_B = 0.2\text{ Adc}$	$V_{CE(sat)}$	–	0.5	Vdc
Base–Emitter On Voltage (Note 2)	$I_C = 2\text{ Adc}$ , $V_{CE} = 1\text{ Vdc}$	$V_{BE(on)}$	–	1.1	Vdc

### DYNAMIC CHARACTERISTICS

Current–Gain–Bandwidth Product	$I_C = 250\text{ mAdc}$ , $V_{CE} = 1\text{ Vdc}$ , $f = 1\text{ MHz}$	$f_T$	3	–	MHz
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2. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

TYPICAL CHARACTERISTICS

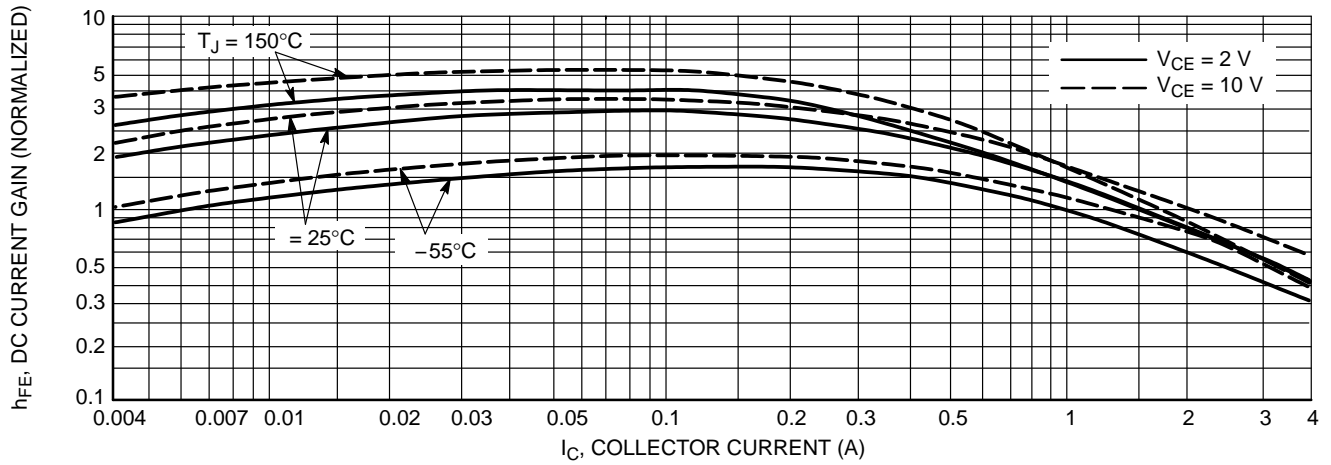


Figure 1. DC Current Gain

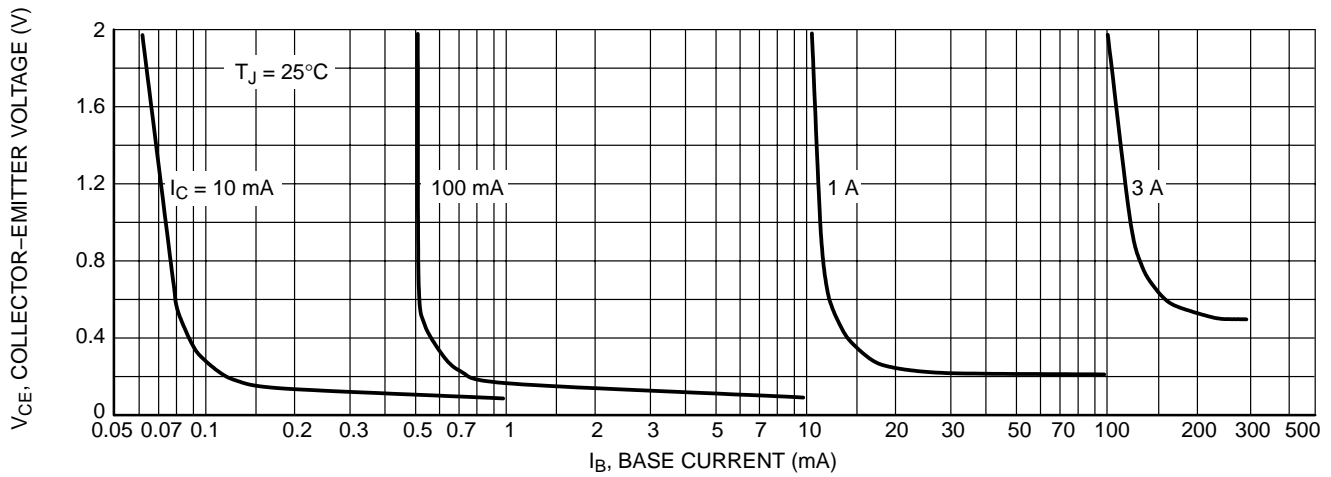


Figure 2. Collector Saturation Region

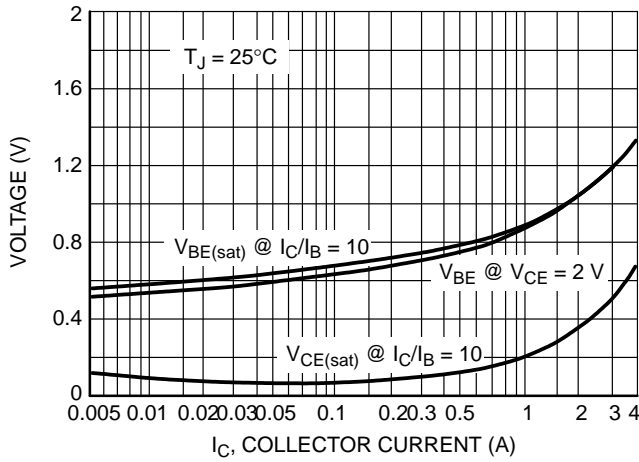


Figure 3. "On" Voltages

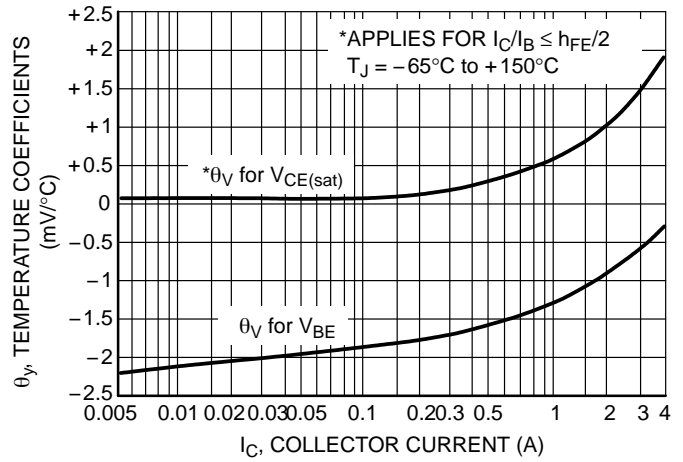


Figure 4. Temperature Coefficients

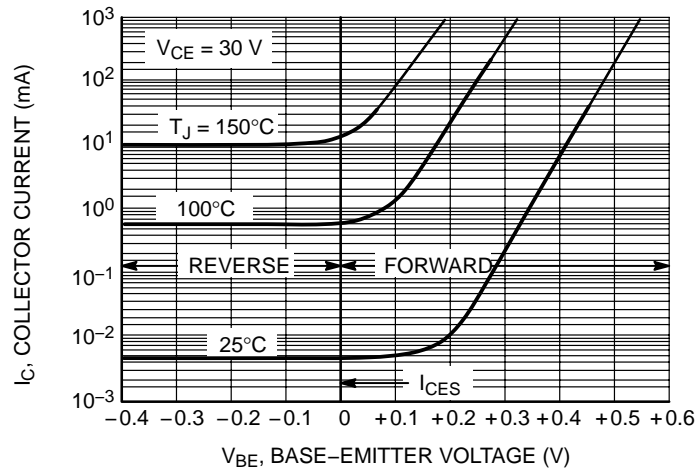


Figure 5. Collector Cut-Off Region

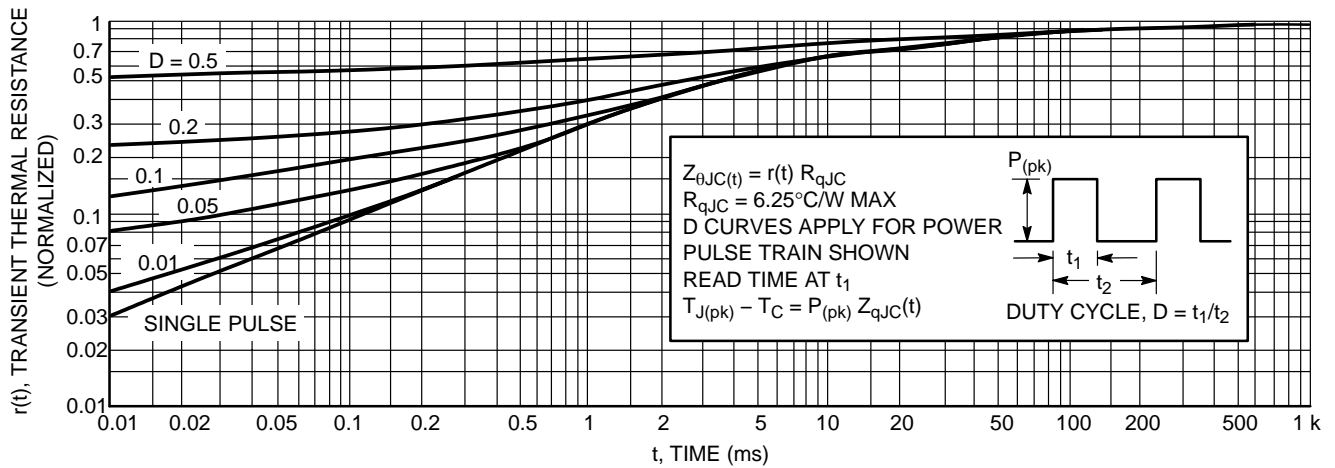


Figure 6. Thermal Response

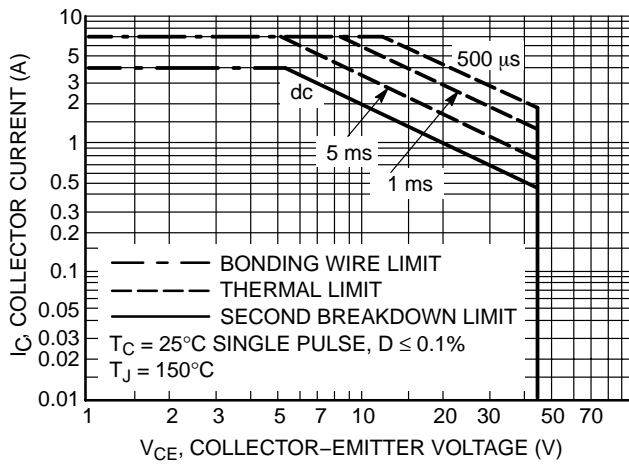


Figure 7. Maximum Rated Forward Bias

#### FORWARD BIAS SAFE OPERATING AREA INFORMATION

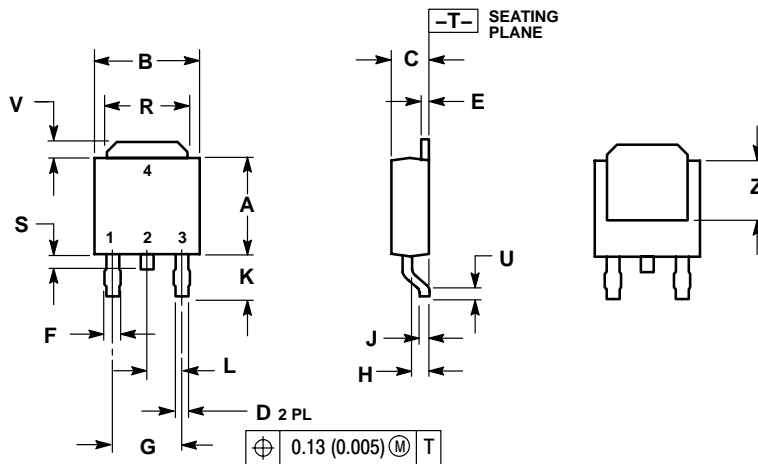
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 7 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 6. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

# MJD148

## PACKAGE DIMENSIONS

### DPAK (SINGLE GAUGE) CASE 369C-01 ISSUE O



#### NOTES:

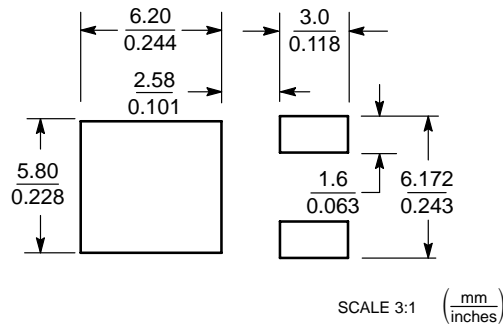
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.


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
- COLLECTOR
- EMITTER
- COLLECTOR

## SOLDERING FOOTPRINT



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