

# MJD5731

Preferred Device

## High Voltage PNP Silicon Power Transistors

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

- 350 V (Min) -  $V_{CEO(sus)}$
- 1.0 A Rated Collector Current
- PNP Complements to the MJD47 thru MJD50 Series

### MAXIMUM RATINGS

Rating	Symbol	MJD5731	Unit
Collector-Emitter Voltage	$V_{CEO}$	350	Vdc
Emitter-Base Voltage	$V_{EB}$	5	Vdc
Collector Current- Continuous Peak	$I_C$	1.0 3.0	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 (1) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.56 0.0125	Watts W/ $^\circ\text{C}$
Unclamped Inductive Load Energy (See Figure )	E	20	mJ
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	$R_{\theta JC}$	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	$T_L$	260	$^\circ\text{C}$

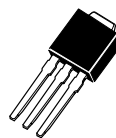
1. These ratings are applicable when surface mounted on the minimum pad size recommended.



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## SILICON POWER TRANSISTORS 1.0 A, 350 V 15 W

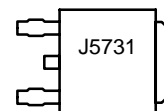
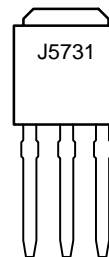


DPAK  
CASE 369



DPAK  
CASE 369A  
Style 1

### MARKING DIAGRAM



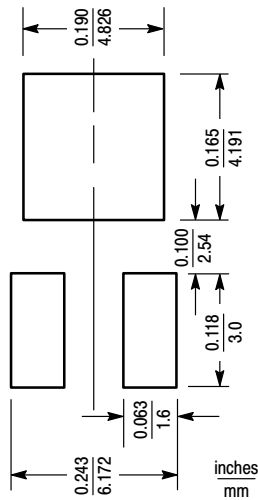
xx = Specific Device Code  
A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
MJD5731T4	DPAK	2500/ Tape & Reel

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

# MJD5731



## MINIMUM PAD SIZES RECOMMENDED FOR SURFACE MOUNTED APPLICATIONS

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Sustaining Voltage (Note 2) ( $I_C = 30 \text{ mAdc}$ , $I_B = 0$ )	$V_{CE(sus)}$	350	-	Vdc
Collector Cutoff Current ( $V_{CE} = 250 \text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	-	0.1	mAdc
Collector Cutoff Current ( $V_{CE} = 350 \text{ Vdc}$ , $V_{BE} = 0$ )	$I_{CES}$	-	0.01	mAdc
Emitter Cutoff Current ( $V_{BE} = 5.0 \text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	-	0.5	mAdc
<b>ON CHARACTERISTICS (Note 2)</b>				
DC Current Gain ( $I_C = 0.3 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ )	$h_{FE}$	30 10	175 -	-
Collector-Emitter Saturation Voltage ( $I_C = 1.0 \text{ Adc}$ , $I_B = 0.2 \text{ Adc}$ )	$V_{CE(sat)}$	-	1.0	Vdc
Base-Emitter On Voltage ( $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ )	$V_{BE(on)}$	-	1.5	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Current Gain - Bandwidth Product ( $I_C = 0.2 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 2.0 \text{ MHz}$ )	$f_T$	10	-	MHz
Small-Signal Current Gain ( $I_C = 0.2 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{fe}$	25	-	-

2. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

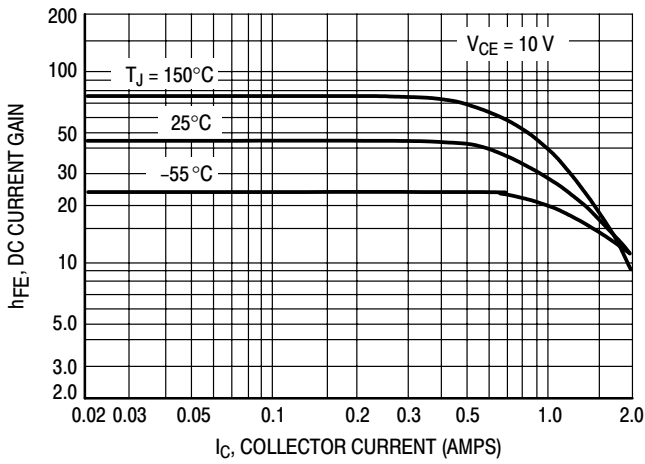


Figure 1. DC Current Gain

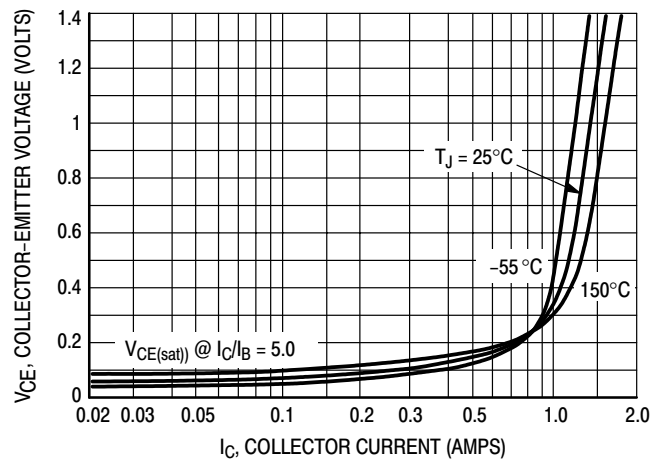


Figure 2. Collector-Emitter Saturation Voltage

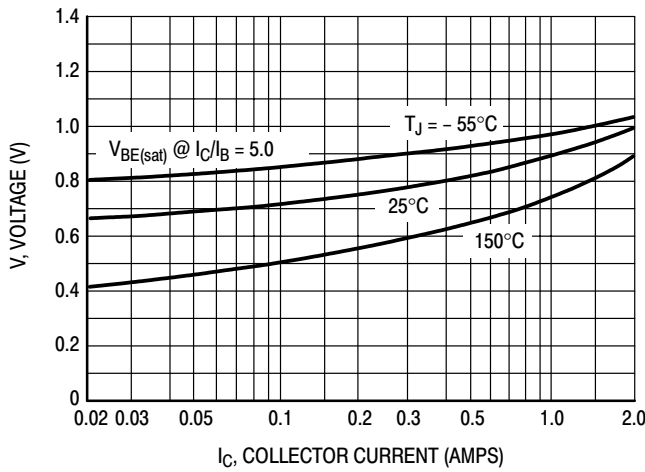


Figure 3. Base-Emitter Voltage

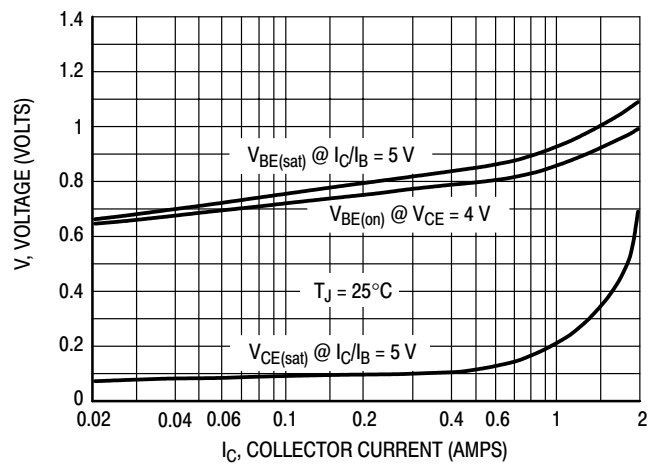


Figure 4. "On" Voltages

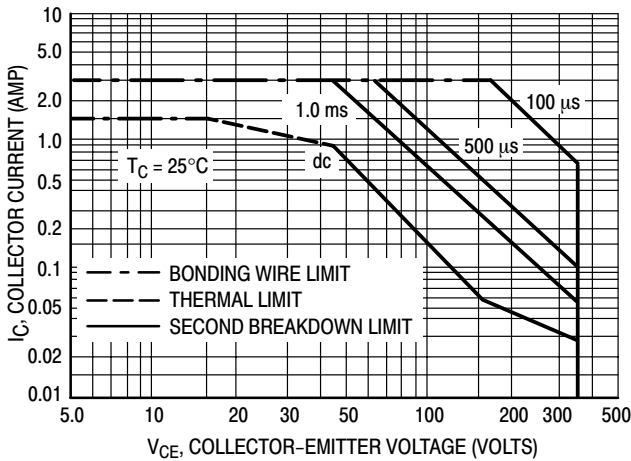


Figure 5. Forward Bias Safe Operating Area

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 5 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.

# MJD5731

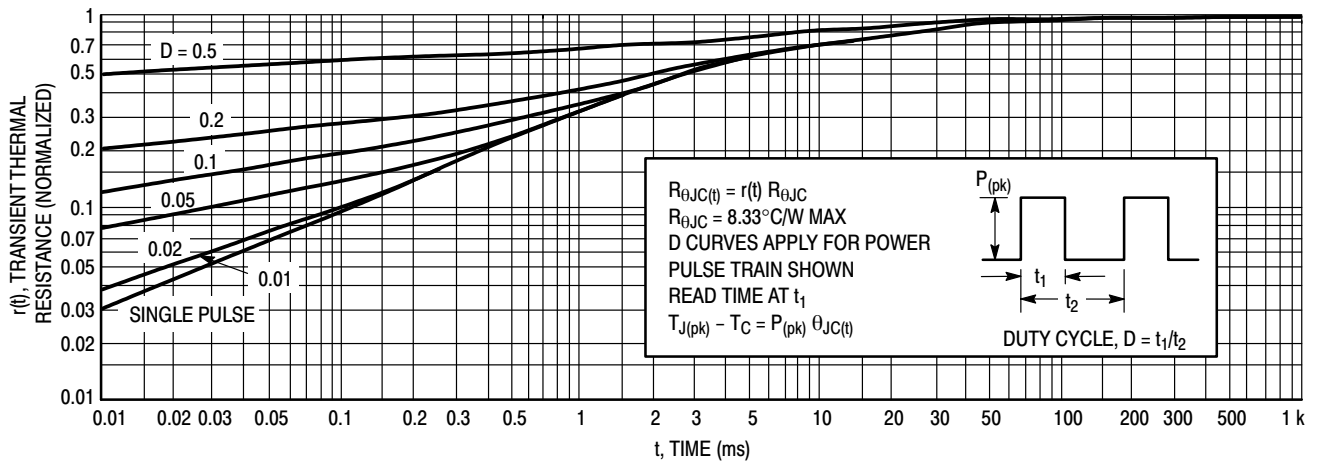


Figure 6. Thermal Response

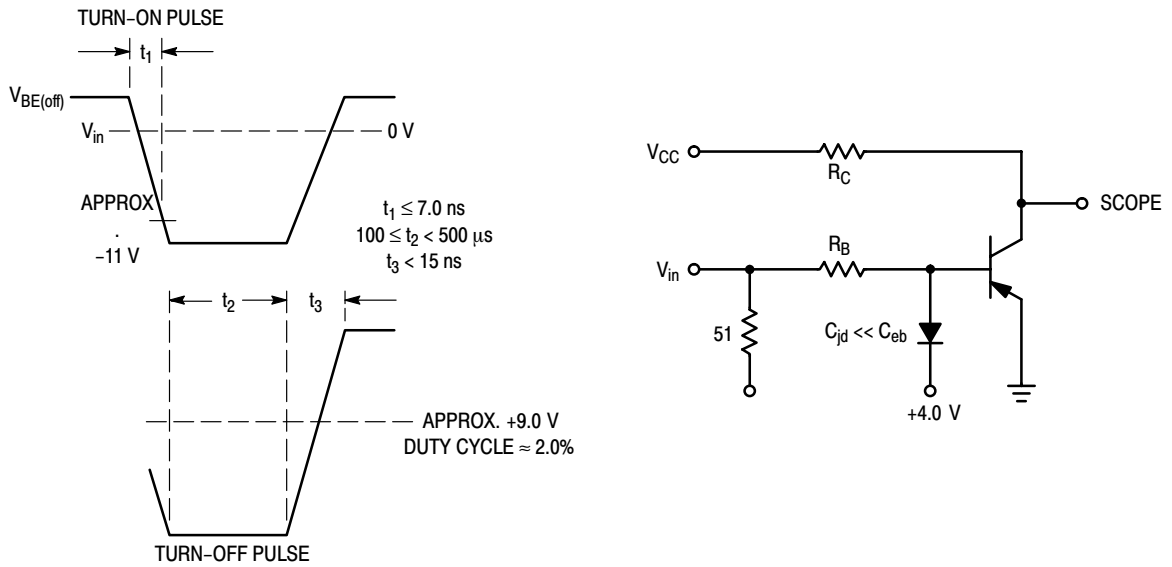


Figure 7. Switching Time Equivalent Circuit

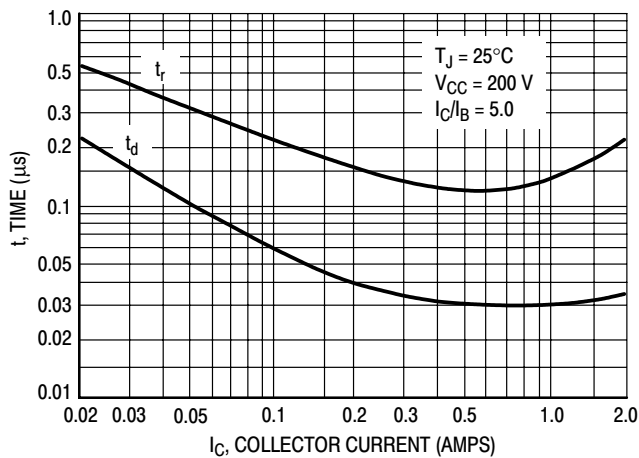


Figure 8. Turn-On Resistive Switching Times

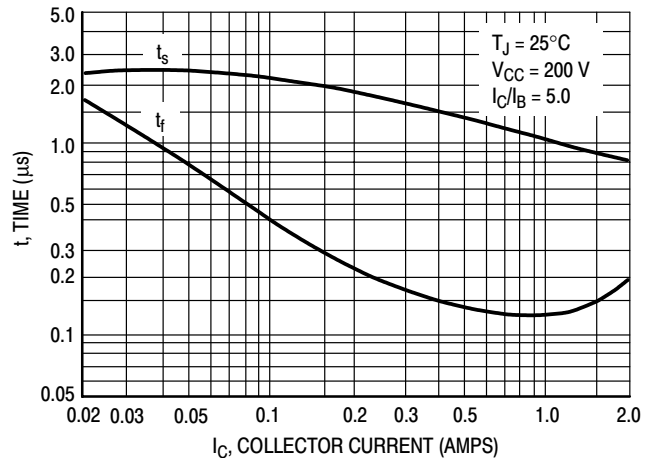
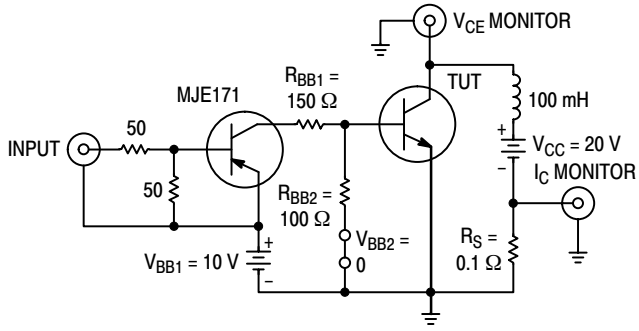


Figure 9. Resistive Turn-Off Switching Times

Test Circuit



Voltage and Current Waveforms

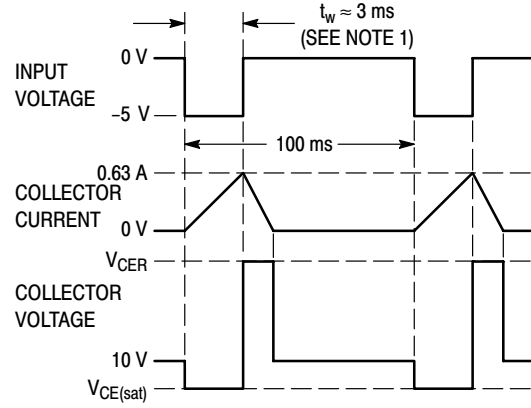
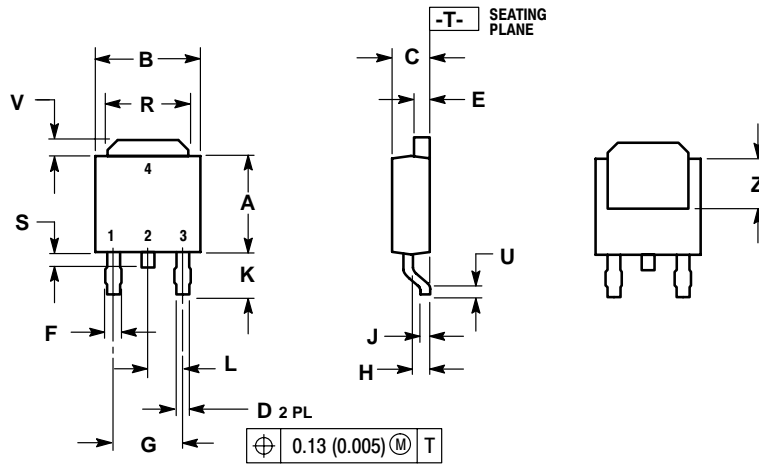


Figure 10. Inductive Load Switching

# MJD5731

## PACKAGE DIMENSIONS

DPAK  
CASE 395A-13  
ISSUE AB



NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
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	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	---	0.51	---
V	0.030	0.050	0.77	1.27
Z	0.138	---	3.51	---

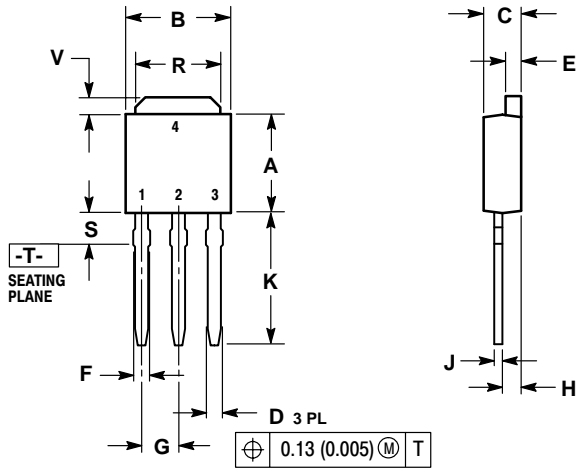
STYLE 1:

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

# MJD5731

## PACKAGE DIMENSIONS

DPAK  
CASE 395-07  
ISSUE M




NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.175	0.215	4.45	5.46
S	0.050	0.090	1.27	2.28
V	0.030	0.050	0.77	1.27

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