MJD5731

High Voltage PNP Silicon Power Transistors

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

Features

- PNP Complements to the MJD47 thru MJD50 Series
- Epoxy Meets UL 94 V−0 @ 0.125 in
- These Devices are Pb−Free and are RoHS Compliant

MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Collector−Emitter Voltage	V_{CEO}	350	Vdc
Emitter−Base Voltage	V_{EB}	5	Vdc
Collector Current − Continuous	I_C	1.0	Adc
Collector Current − Peak	I_{CM}	3.0	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
Unclamped Inductive Load Energy (See Figure 10)	E	20	mJ
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150	°C
ESD − Human Body Model	HBM	3B	V
ESD − Machine Model	MM	C	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

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	T_L	260	°C

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

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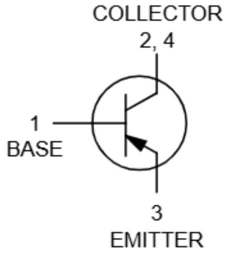
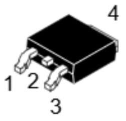
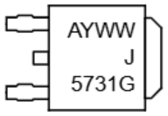
SILICON POWER TRANSISTORS 1.0 AMPERE 350 VOLTS, 15 WATTS





DPAK
CASE 369C
STYLE 1

MARKING DIAGRAM



A = Assembly Location
Y = Year
WW = Work Week
J5731 = Device Code
G = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping†
MJD5731T4G	DPAK (Pb−Free)	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.

August, 2013 − Rev. 5

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)	$V_{CEO(sus)}$	350	–	Vdc
Collector Cutoff Current (V_{CE} = 250 Vdc, I_B = 0)	I_{CEO}	–	0.1	mAdc
Collector Cutoff Current (V_{CE} = 350 Vdc, V_{BE} = 0)	I_{CES}	–	0.01	mAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	–	0.5	mAdc
ON CHARACTERISTICS (Note 3)				
DC Current Gain (I_C = 0.3 Adc, V_{CE} = 10 Vdc) (I_C = 1.0 Adc, V_{CE} = 10 Vdc)	h_{FE}	 30 10	 175 –	–
Collector−Emitter Saturation Voltage (I_C = 1.0 Adc, I_B = 0.2 Adc)	$V_{CE(sat)}$	–	1.0	Vdc
Base−Emitter On Voltage (I_C = 1.0 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 = 2.0 MHz)	f_T	10	–	MHz
Small−Signal Current Gain (I_C = 0.2 Adc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{fe}	25	–	–

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

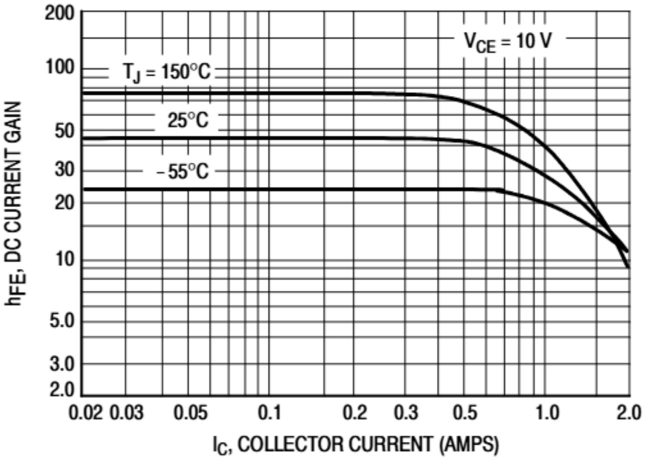


Figure 1. DC Current Gain

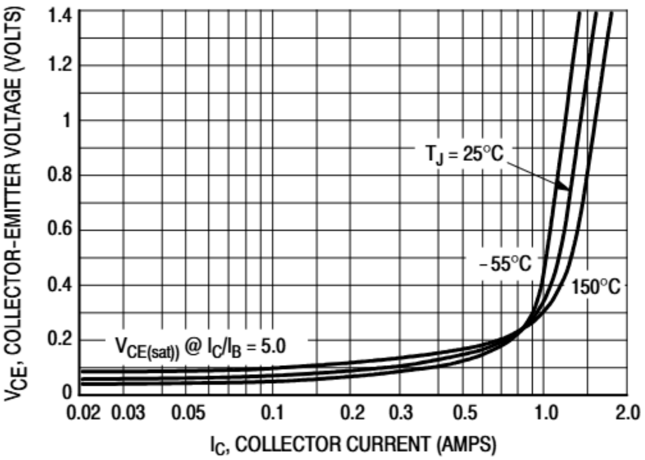


Figure 2. Collector−Emitter Saturation Voltage

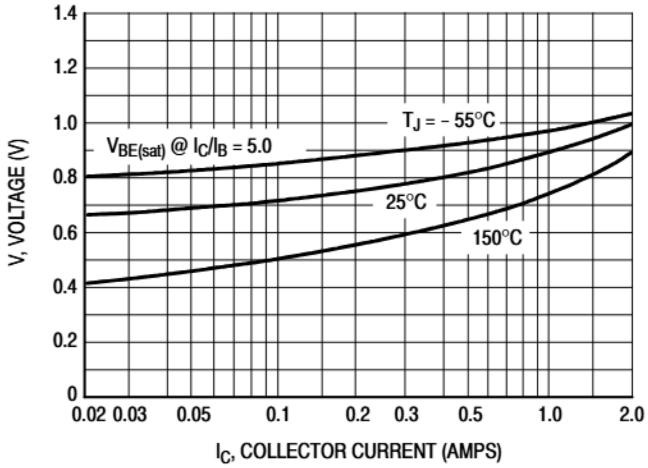


Figure 3. Base−Emitter Voltage

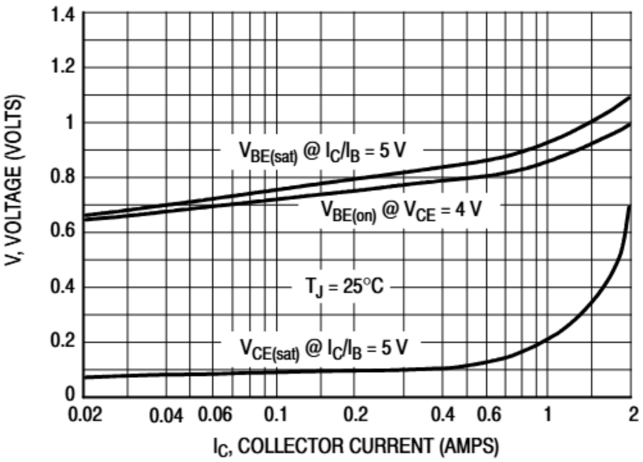


Figure 4. “On” Voltages

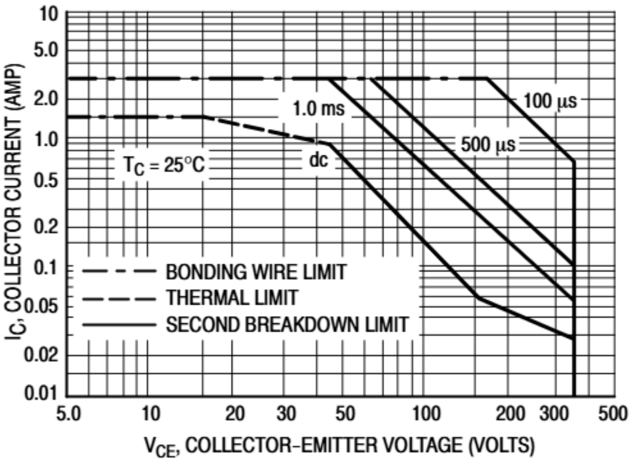


Figure 5. Forward Bias Safe Operating Area

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

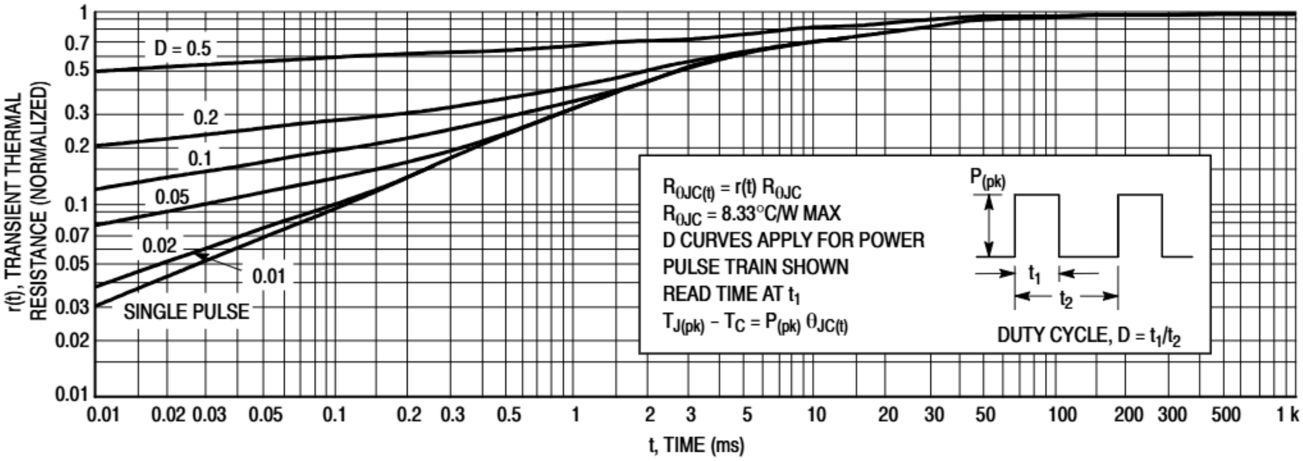


Figure 6. Thermal Response

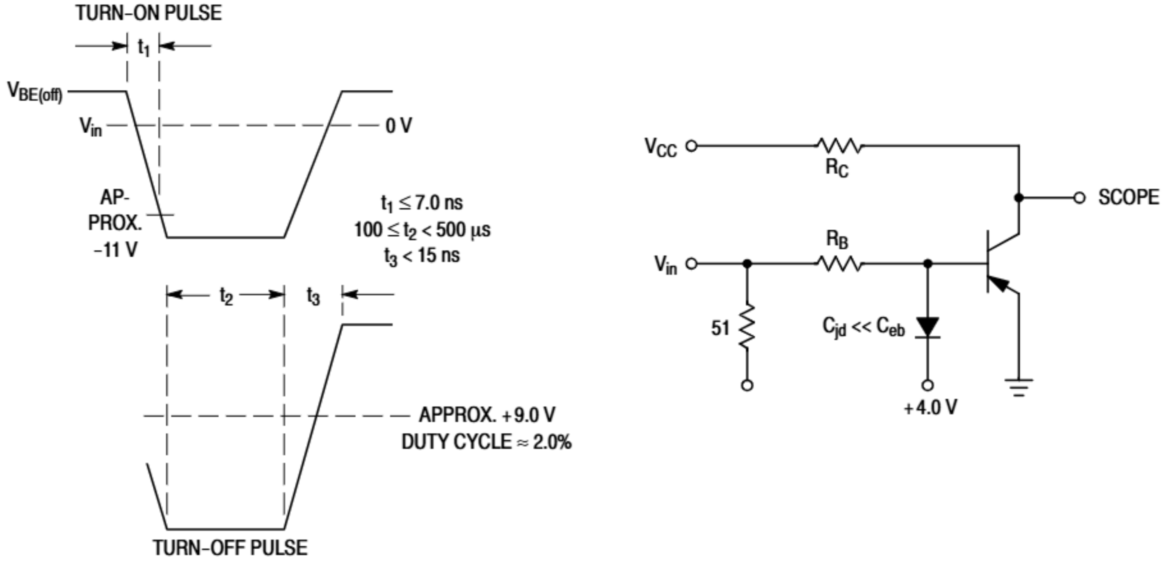


Figure 7. Switching Time Equivalent Circuit

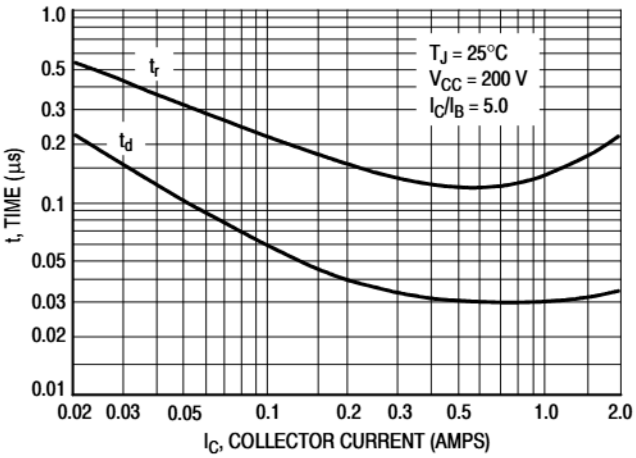


Figure 8. Turn−On Resistive Switching Times

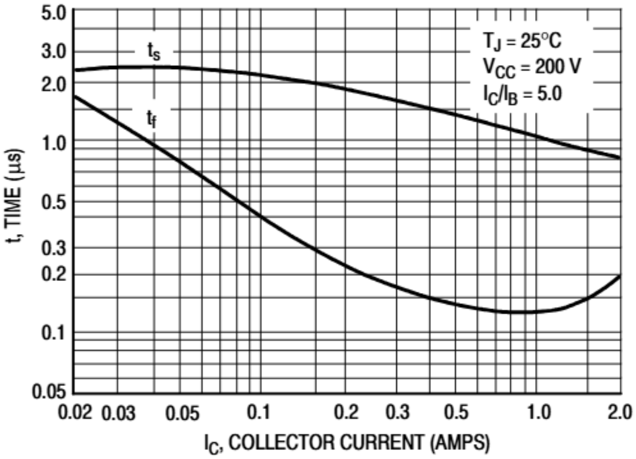
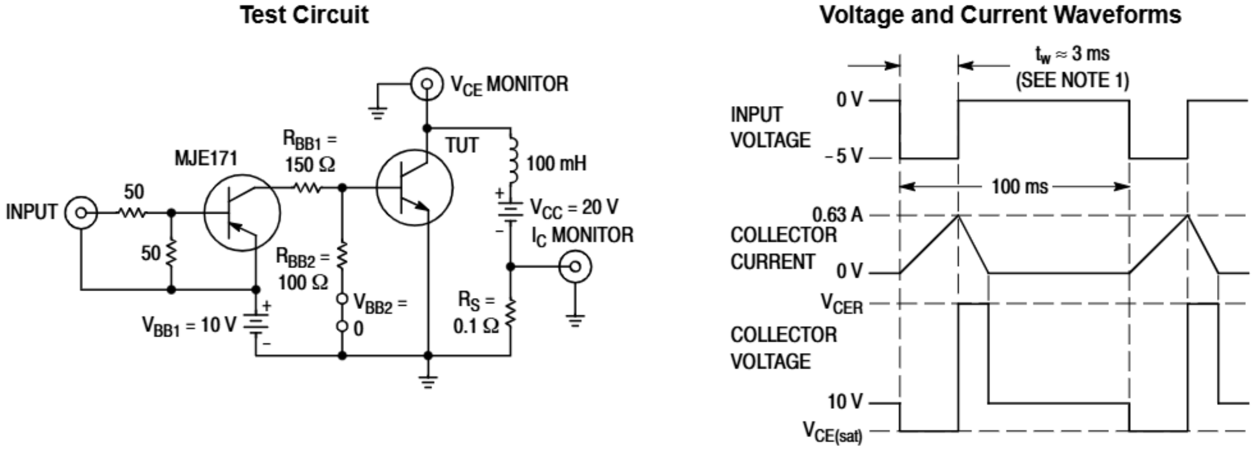


Figure 9. Resistive Turn−Off Switching Times

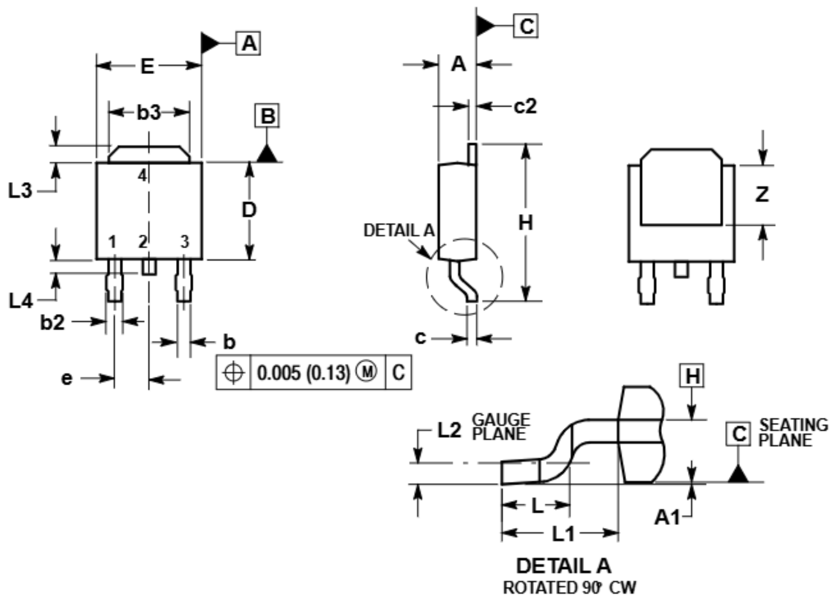

Test Circuit

Voltage and Current Waveforms

Figure 10. Inductive Load Switching

PACKAGE DIMENSIONS

DPAK
CASE 369C
ISSUE D

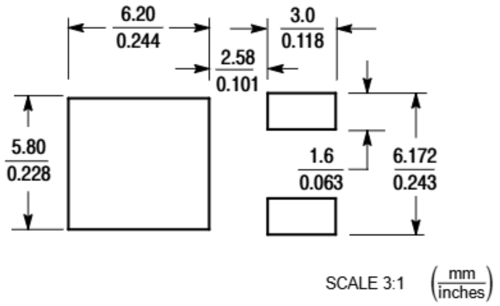


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES 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.

	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	0.030	0.045	0.76	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	0.108 REF		2.74 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

SOLDERING FOOTPRINT*



*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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