100V NPN MEDIUM POWER TRANSISTOR IN TO252

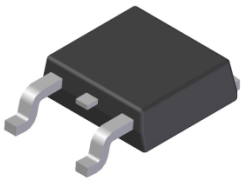
Features

- BV_{CEO} > 100V
- I_C = 3A high Continuous Collector Current
- I_{CM} = 5A Peak Pulse Current
- Ideal for Power Switching or Amplification Applications
- Complementary PNP Type: MJD32CUQ
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The MJD31CUQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

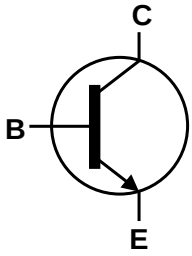
Mechanical Data

- Package: TO252
- Package Material: Molded Plastic, "Green" Molding Compound UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.34 grams (Approximate)

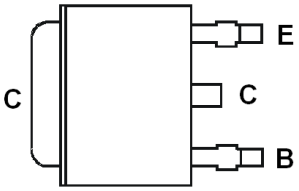
TO252 (DPAK)



Top View



Device Schematic



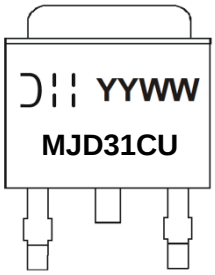
Pin Out Configuration
Top View

Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Quantity	Carrier
MJD31CUQ-13	TO252 (DPAK)	MJD31CU	13	16	2,500	Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



MJD31CU = Product Type Marking Code
= Manufacturers' Code Marking
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 23 = 2023)
WW = Week Code (01 to 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	120	V
Collector-Emitter Voltage	V_{CEO}	100	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	3	A
Peak Pulse Collector Current	I_{CM}	5	A
Continuous Base Current	I_B	1	A
Power Dissipation	P_D	16	W

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

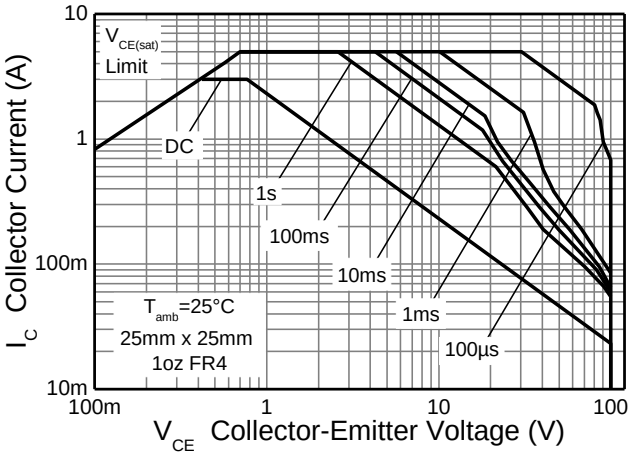
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	2.60	W
	(Note 6)		2.30	
	(Note 7)		1.45	
Thermal Resistance, Junction to Ambient Air	(Note 5)	$R_{\theta JA}$	48	°C/W
	(Note 6)		54	
	(Note 7)		86	
Thermal Resistance, Junction to Leads	(Note 8)	$R_{\theta JL}$	7.8	
Thermal Resistance, Junction to Case	(Note 7)	$R_{\theta JC}$	7.3	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 9)

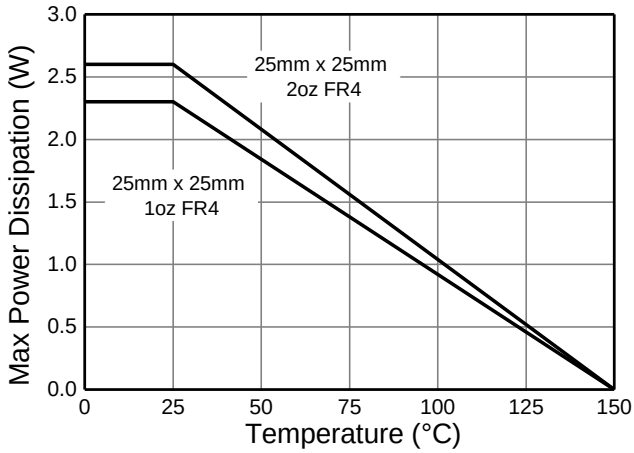
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device mounted with the exposed collector pad on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
6. Same as note (5), except mounted on 25mm x 25mm 1oz copper.
7. Same as note (5), except mounted on minimum recommended pad (MRP) layout.
8. Thermal resistance from junction to solder-point (on the exposed collector pad).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

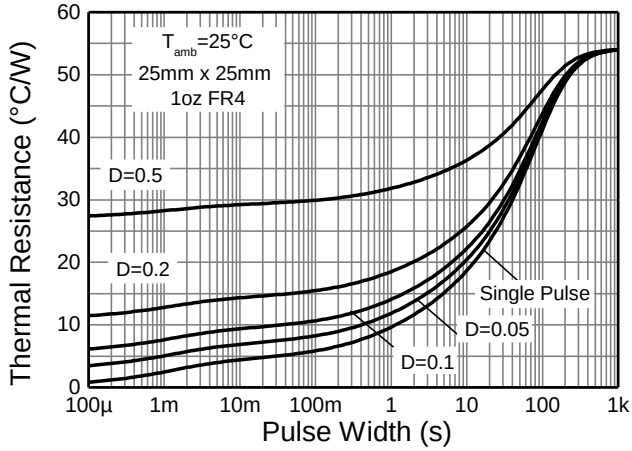
Thermal Characteristics



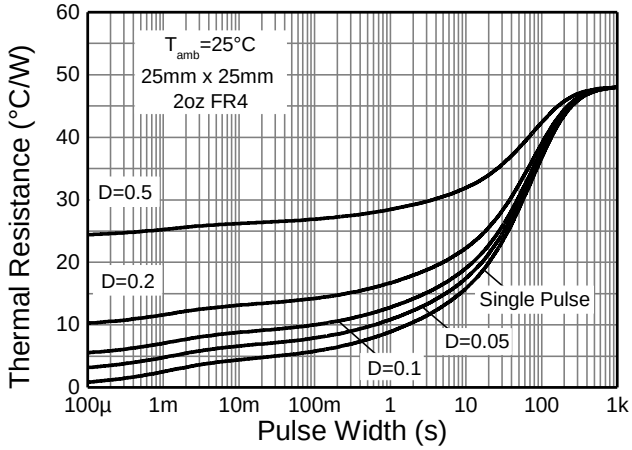
Safe Operating Area



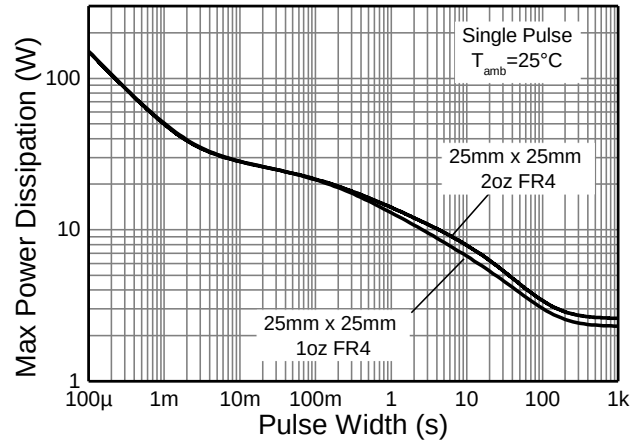
Derating Curve



Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	120	–	–	V	I_C = 20μA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	100	–	–	V	I_C = 30mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	–	–	V	I_E = 100μA
Collector-Base Cut-off Current	I_{CBO}	–	–	1	μA	V_{CB} = 100V
Collector Cut-off Current	I_{CEO}	–	–	1	μA	V_{CE} = 60V
Collector Cut-off Current	I_{CES}	–	–	1	μA	V_{CE} = 100V
Emitter Cut-off Current	I_{EBO}	–	–	1	μA	V_{EB} = 5V
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	–	–	300	mV	I_C = 1A, I_B = 100mA
		–	–	500	mV	I_C = 2A, I_B = 200mA
		–	–	700	mV	I_C = 3A, I_B = 375mA
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	–	–	1.2	V	I_C = 2A, I_B = 200mA
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	–	–	950	mV	I_C = 1A, V_{CE} = 2V
		–	–	1.4	V	I_C = 3A, V_{CE} = 4V
DC Current Gain (Note 10)	h_{FE}	25 10	–	– 50	–	V_{CE} = 4V, I_C = 1A V_{CE} = 4V, I_C = 3A
Current Signal Current Gain	H_{fe}	20	–	–	–	V_{CE} = 10V, I_C = 0.5A, f = 1kHz
Current Gain-Bandwidth Product	f_T	3	–	–	MHz	I_C = 0.5A, V_{CE} = 10V, f = 1MHz

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

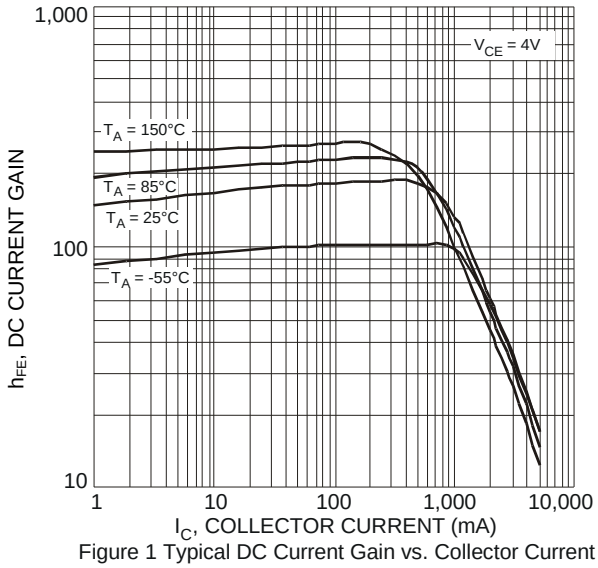


Figure 1 Typical DC Current Gain vs. Collector Current

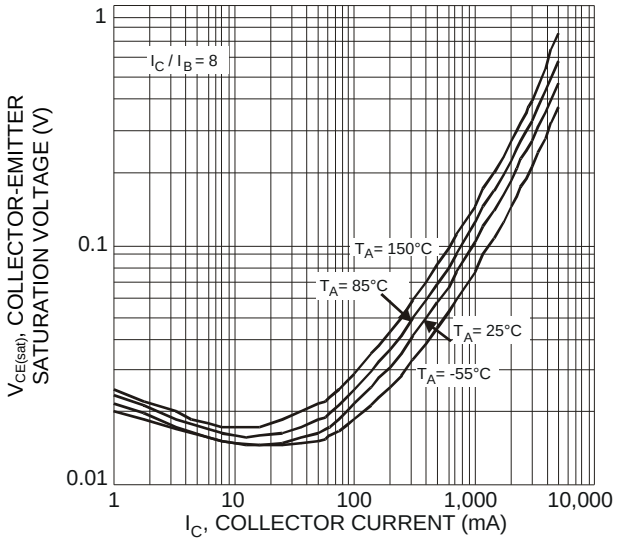


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

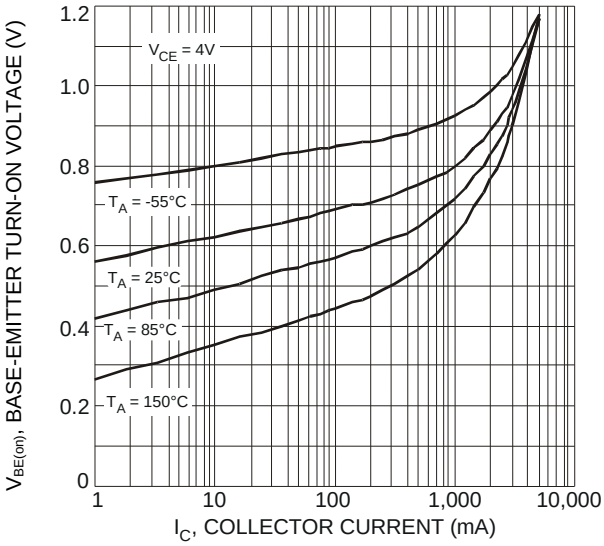


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

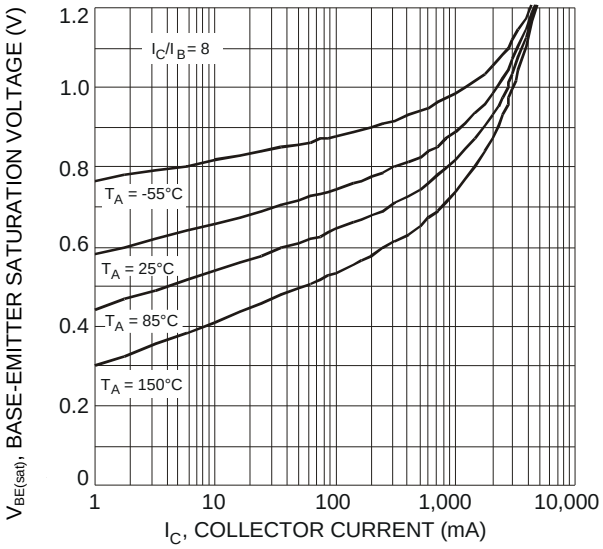


Figure 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

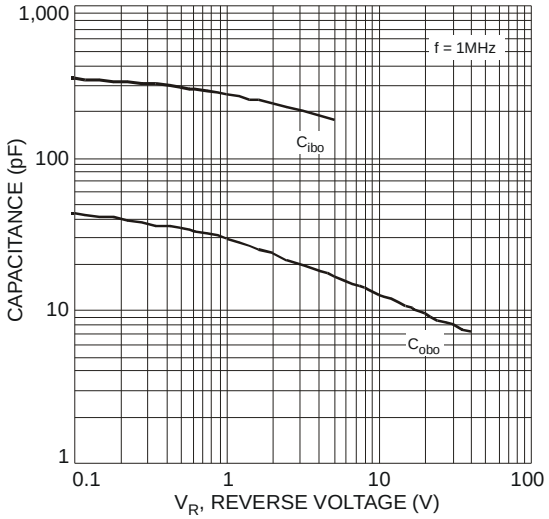
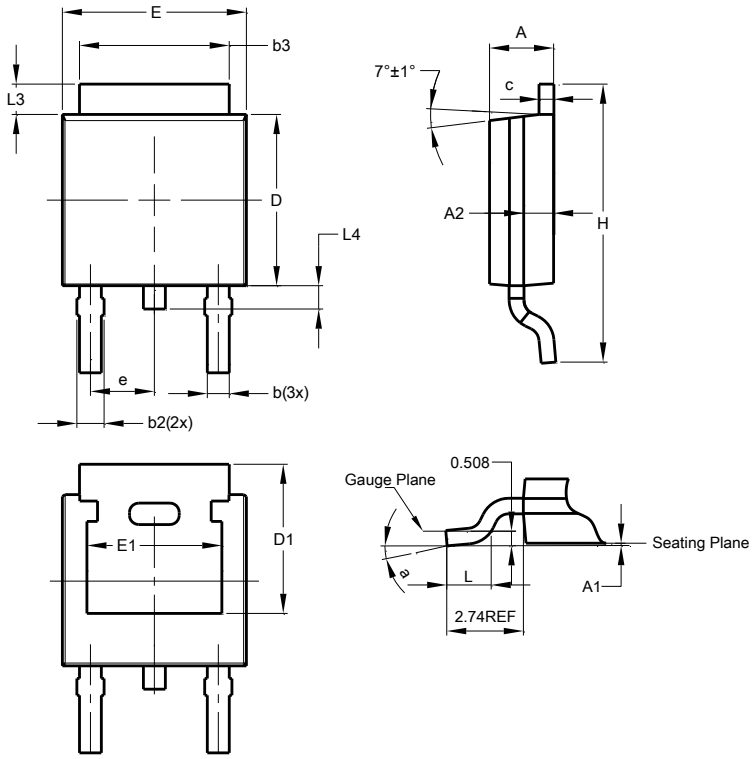


Figure 5 Typical Capacitance Characteristics

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

TO252 (DPAK)

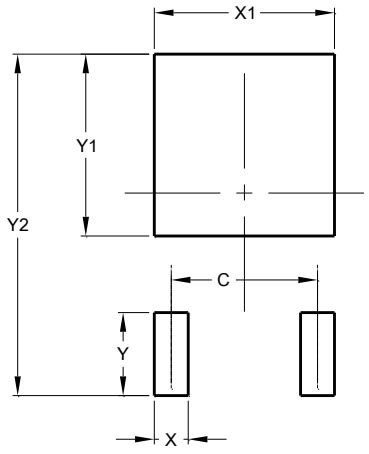


TO252 (DPAK)			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

TO252 (DPAK)



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

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