

Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of Automotive Applications.

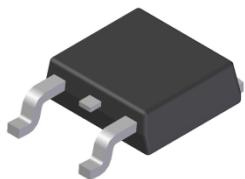
Features

- $BV_{CEO} > 100V$
- $I_C = 3A$ 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

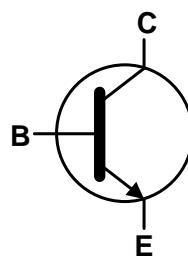
Mechanical Data

- Case: TO252 (DPAK)
- Case 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)

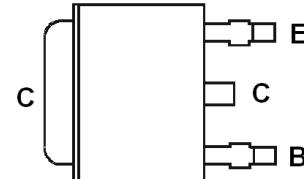
TO252 (DPAK)



Top View



Device Schematic



Pin Out Configuration
Top View

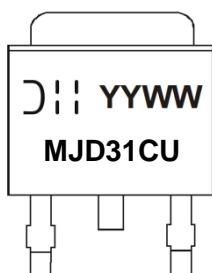
Ordering Information (Notes 4 & 5)

Part number	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MJD31CUQ-13	Automotive	MJD31CU	13	16	2,500

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product_compliance_definitions.html.
5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



MJD31CU = Product Type Marking Code
D11 = Manufacturers' Code Marking
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 17 = 2017)
WW = Week Code (01 to 53)

Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$, 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	15	W

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

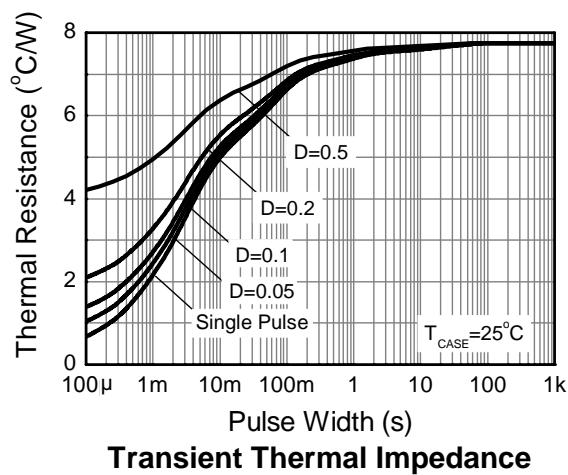
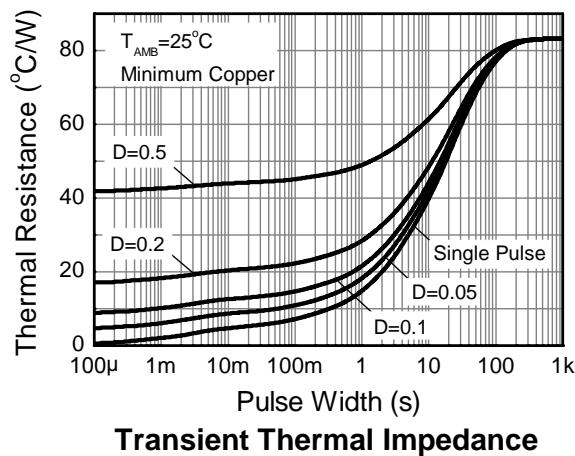
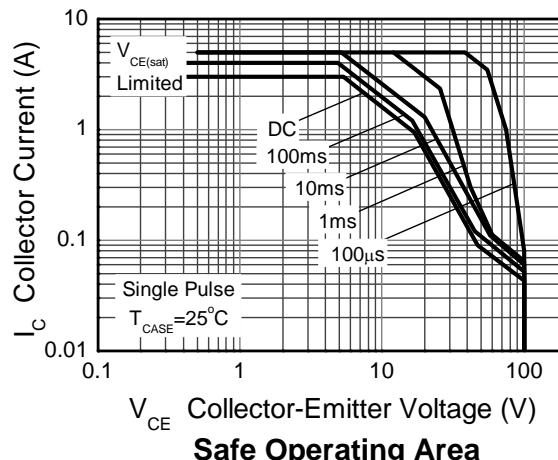
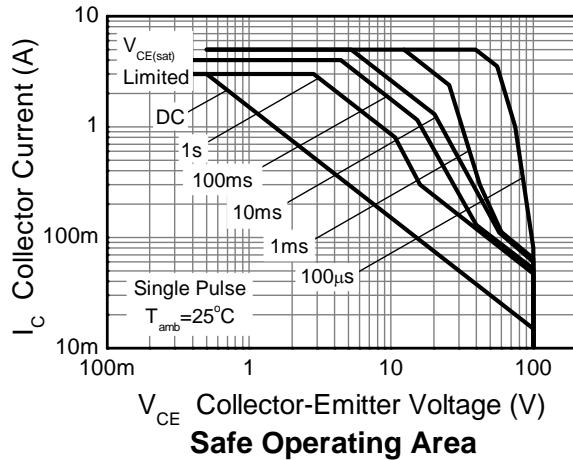
Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	3.9	W
		2.1	
		1.6	
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	32	°C/W
		59	
		80	
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	3.6	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 10)

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:
6. 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.
 7. Same as note (6), except mounted on 25mm x 25mm 1oz copper.
 8. Same as note (6), except mounted on minimum recommended pad (MRP) layout.
 9. Thermal resistance from junction to solder-point (on the exposed collector pad).
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics



Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	120	—	—	V	$I_C = 20\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	100	—	—	V	$I_C = 30\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	7	—	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cut-off Current	I_{CBO}	—	—	1	μA	$V_{\text{CB}} = 100\text{V}$
Collector Cut-off Current	I_{CEO}	—	—	1	μA	$V_{\text{CE}} = 60\text{V}$
Collector Cut-off Current	I_{CES}	—	—	1	μA	$V_{\text{CE}} = 100\text{V}$
Emitter Cut-off Current	I_{EBO}	—	—	1	μA	$V_{\text{EB}} = 5\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{\text{CE}(\text{sat})}$	—	—	300	mV	$I_C = 1\text{A}, I_B = 100\text{mA}$
		—	—	500	mV	$I_C = 2\text{A}, I_B = 200\text{mA}$
		—	—	700	mV	$I_C = 3\text{A}, I_B = 375\text{mA}$
Base-Emitter Saturation Voltage (Note 11)	$V_{\text{BE}(\text{sat})}$	—	—	1.2	V	$I_C = 2\text{A}, I_B = 200\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{\text{BE}(\text{on})}$	—	—	950	mV	$I_C = 1\text{A}, V_{\text{CE}} = 2\text{V}$
		—	—	1.4	V	$I_C = 3\text{A}, V_{\text{CE}} = 4\text{V}$
DC Current Gain (Note 11)	h_{FE}	25 10	—	— 50	—	$V_{\text{CE}} = 4\text{V}, I_C = 1\text{A}$ $V_{\text{CE}} = 4\text{V}, I_C = 3\text{A}$
Current Signal Current Gain	H_{fe}	20	—	—	—	$V_{\text{CE}} = 10\text{V}, I_C = 0.5\text{A}, f = 1\text{kHz}$
Current Gain-Bandwidth Product	f_T	3.0	—	—	MHz	$I_C = 0.5\text{A}, V_{\text{CE}} = 10\text{V}, f = 1\text{MHz}$

Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

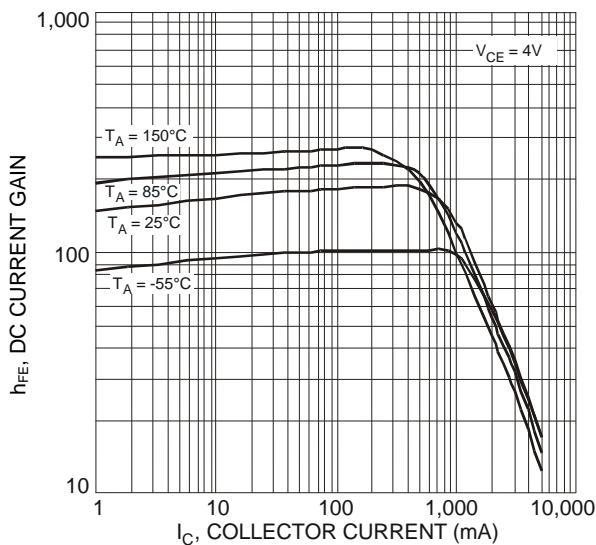


Figure 1 Typical DC Current Gain vs. Collector Current

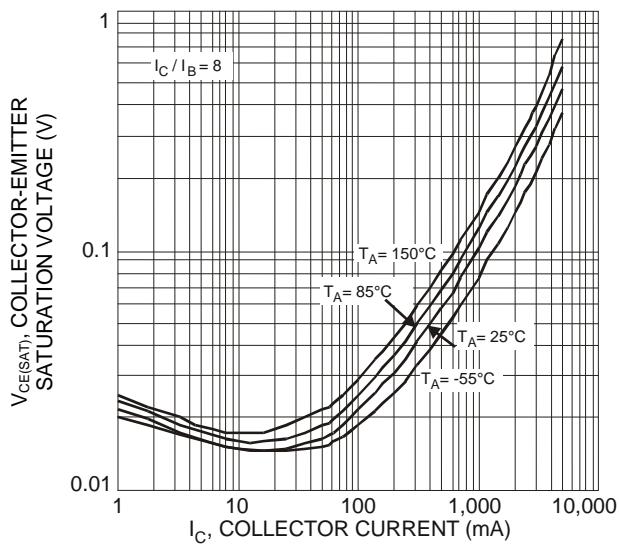


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

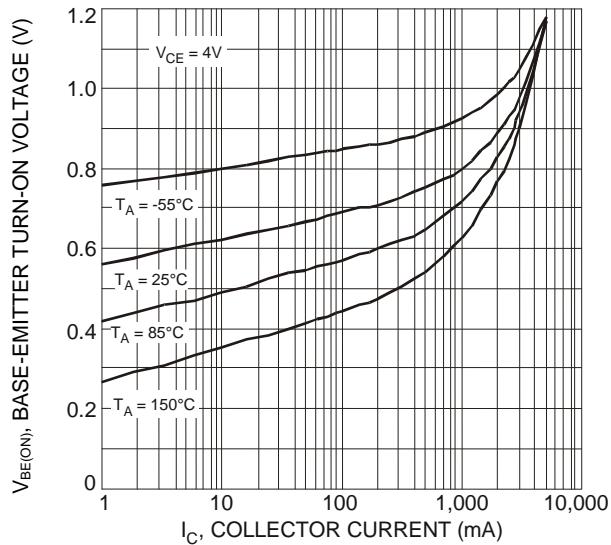


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

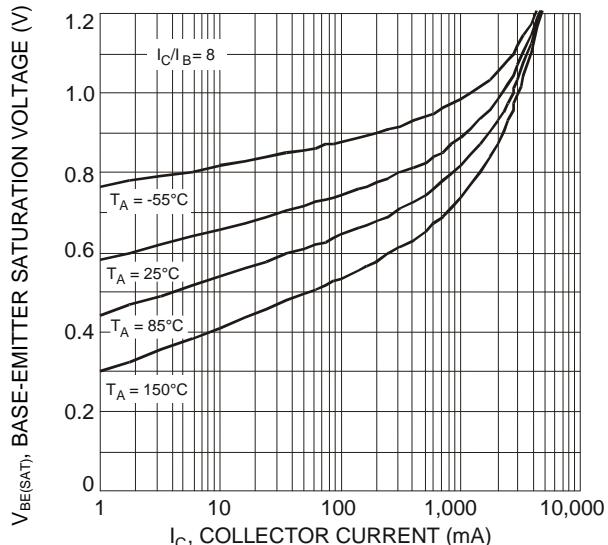


Figure 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

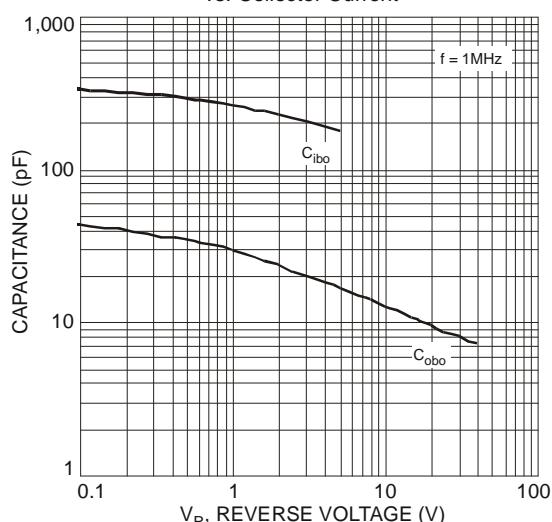
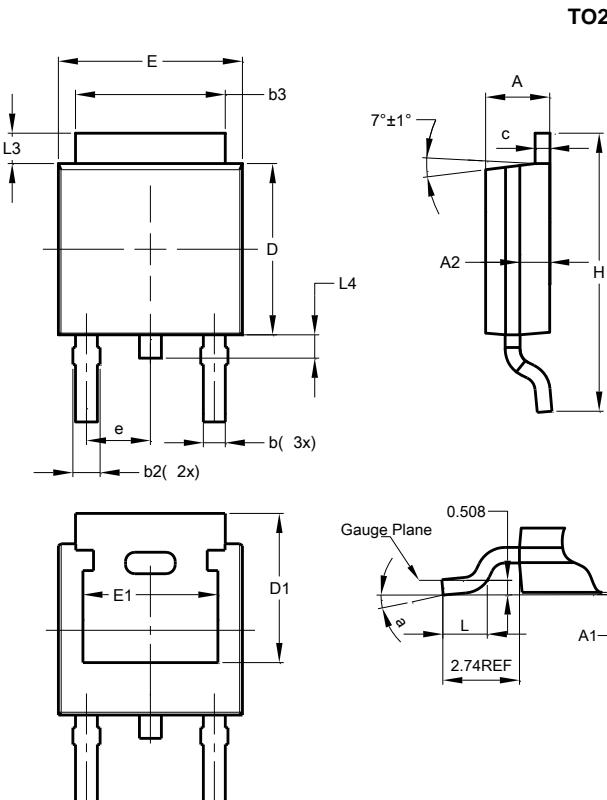


Figure 5 Typical Capacitance Characteristics

Package Outline Dimensions

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



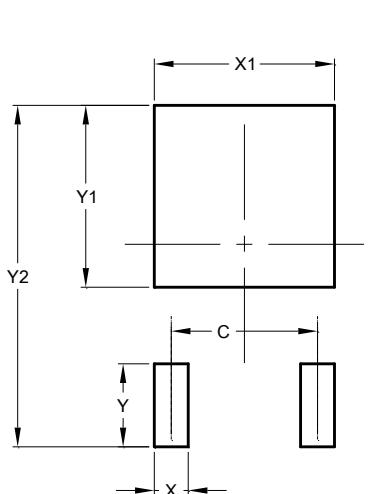
TO252 (DPAK)

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

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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