

## Features

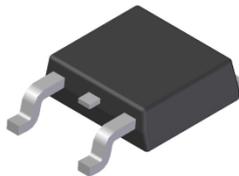
- $BV_{CEO} > 100V$
- $I_C = 3A$  Continuous Collector Current
- $I_{CM} = 5A$  Peak Pulse Current
- Ideal for Power Switching or Amplification Applications
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The MJD31CHQ is suitable for automotive 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/>

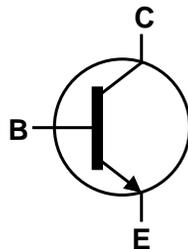
## Mechanical Data

- 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 ③
- Weight: 0.34 grams (Approximate)

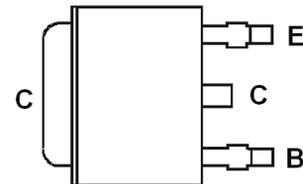
TO252 (DPAK)



Top View



Device Schematic



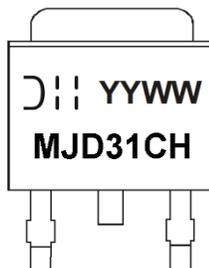
Pin Out Configuration  
Top View

## Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
MJD31CHQ-13	TO252 (DPAK)	MJD31CH	13	16	2500	Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  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



MJD31CH = Product Type Marking Code  
 ⌋⌋⌋ = Manufacturers' Code Marking  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 24 = 2024)  
 WW = Week Code (01 to 53)

### Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	120	V
Collector-Emitter Voltage	V <sub>CEO</sub>	100	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	3	A
Peak Pulse Collector Current	I <sub>CM</sub>	5	A
Continuous Base Current	I <sub>B</sub>	1	A

### Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

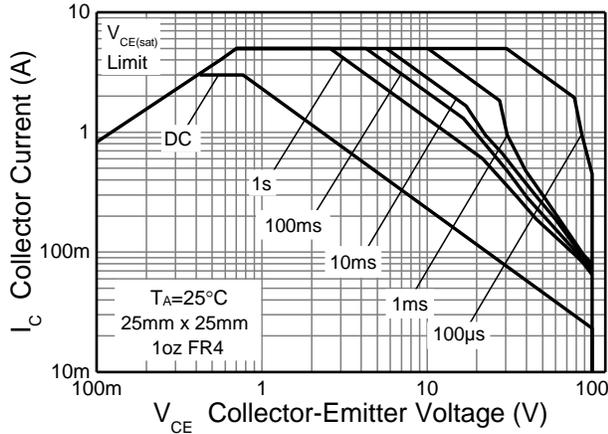
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	2.60
		(Note 6)	2.30
		(Note 7)	1.45
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 5)	48
		(Note 6)	54
		(Note 7)	86
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 8)

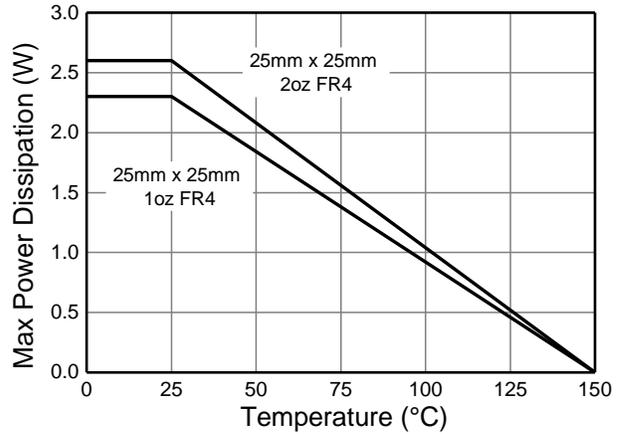
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the exposed collector pad on 25mm x 25mm 2oz copper that is on a single-sided 1.6mm FR4 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. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

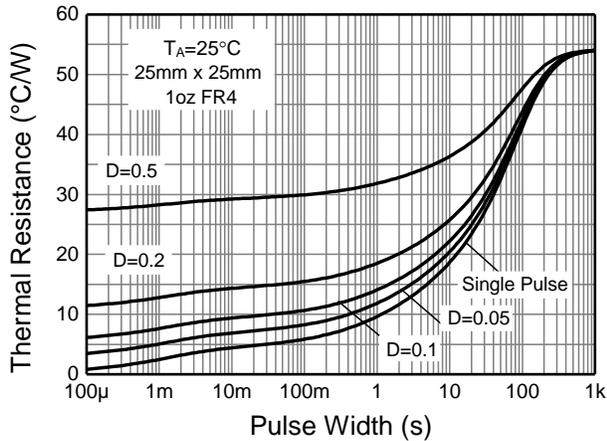
**Thermal Characteristics**



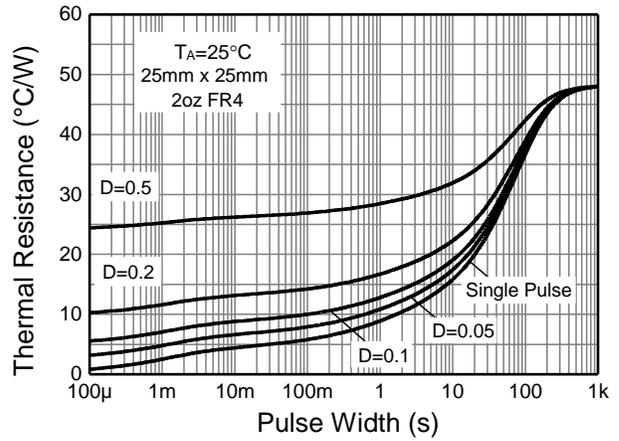
**Figure 1. Safe Operating Area**



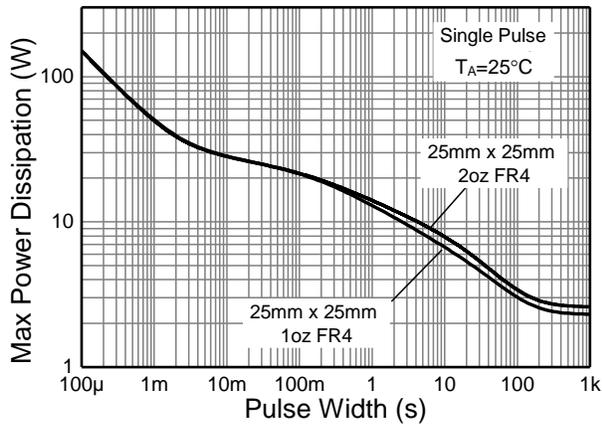
**Figure 2. Derating Curve**



**Figure 3. Transient Thermal Impedance**



**Figure 4. Transient Thermal Impedance**



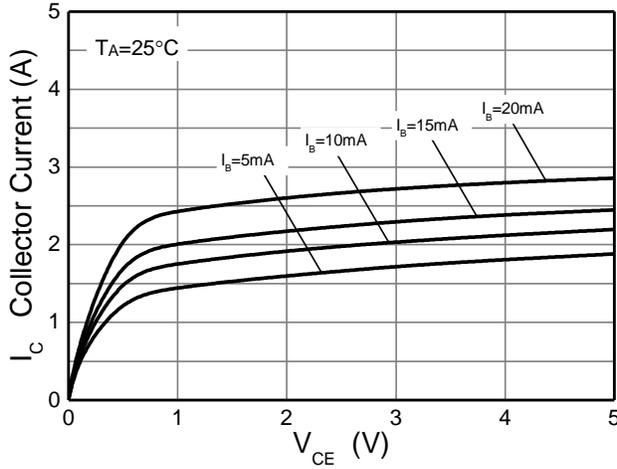
**Figure 5. Pulse Power Dissipation**

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

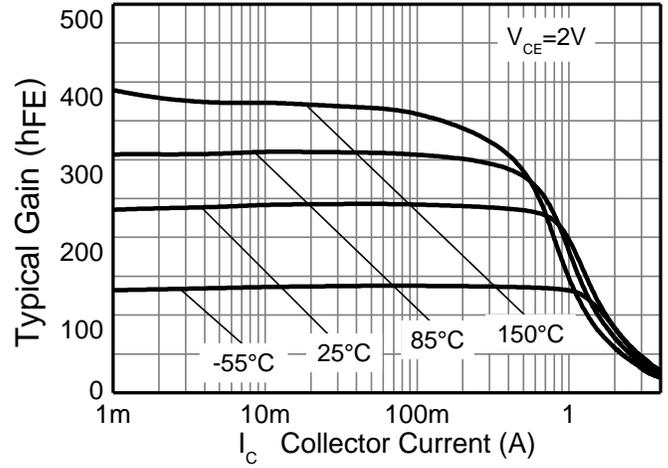
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	120	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	100	—	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	—	—	V	I <sub>E</sub> = 100μA
Collector Cut-Off Current	I <sub>CES</sub>	—	—	1	μA	V <sub>CE</sub> = 100V
Collector-Base Cut-Off Current	I <sub>CBO</sub>	—	—	100	nA	V <sub>CB</sub> = 100V
Emitter Cut-Off Current	I <sub>EBO</sub>	—	—	1	μA	V <sub>EB</sub> = 6V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	—	—	1.2	V	I <sub>C</sub> = 3A, I <sub>B</sub> = 375mA
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(sat)</sub>	—	—	1.35	V	I <sub>C</sub> = 3A, I <sub>B</sub> = 375mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(on)</sub>	—	—	1.8	V	I <sub>C</sub> = 3A, V <sub>CE</sub> = 4V
DC Current Gain (Note 9)	h <sub>FE</sub>	120 100 25 10	— — — —	— — — —	—	V <sub>CE</sub> = 60V, I <sub>C</sub> = 20mA V <sub>CE</sub> = 4V, I <sub>C</sub> = 0.5A V <sub>CE</sub> = 4V, I <sub>C</sub> = 1A V <sub>CE</sub> = 4V, I <sub>C</sub> = 3A
Small-Signal Current Gain	h <sub>fe</sub>	20	—	—	—	V <sub>CE</sub> = 10V, I <sub>C</sub> = 0.5A, f = 1kHz
Current Gain-Bandwidth Product	f <sub>T</sub>	3	—	—	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 0.5A, f = 100MHz
Output Capacitance	C <sub>obo</sub>	—	15	—	pF	V <sub>CB</sub> = 10V, f = 1MHz
Input Capacitance	C <sub>ibo</sub>	—	310	—	pF	V <sub>EB</sub> = 0.5V, f = 1MHz
Delay Time	t <sub>d</sub>	—	30	—	ns	I <sub>C</sub> = 0.5A, V <sub>CC</sub> = 10V, I <sub>B1</sub> = -I <sub>B2</sub> = 50mA
Rise Time	t <sub>r</sub>	—	20	—	ns	
Storage Time	t <sub>s</sub>	—	430	—	ns	
Fall Time	t <sub>f</sub>	—	80	—	ns	

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

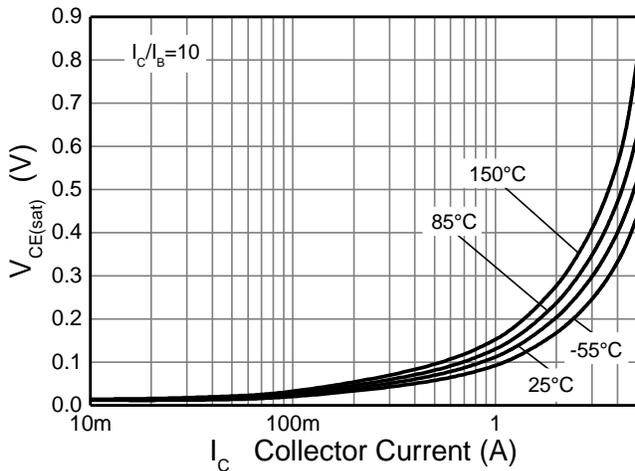
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



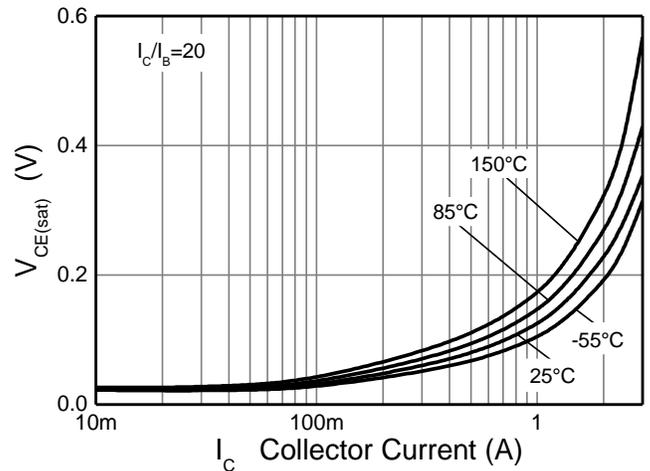
**Figure 6.  $I_C$  v  $V_{CE}$**



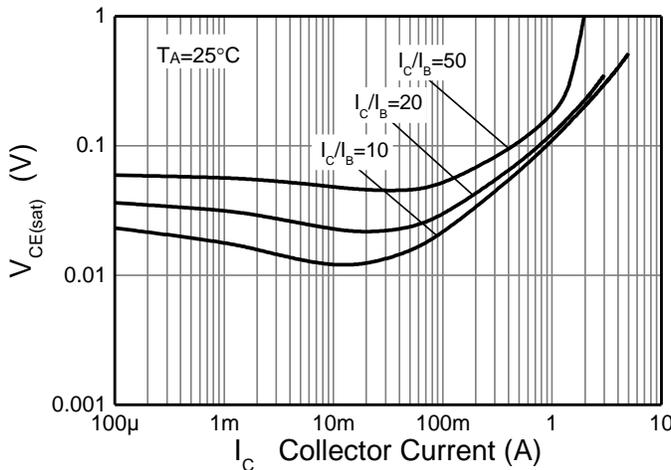
**Figure 7.  $h_{FE}$  v  $I_C$**



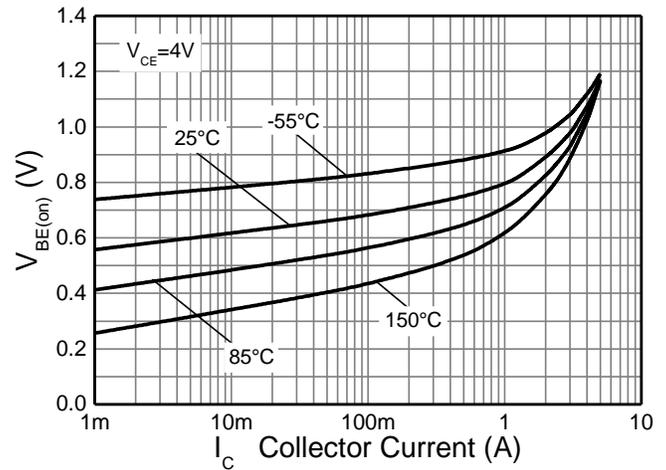
**Figure 8.  $V_{CE(sat)}$  v  $I_C$**



**Figure 9.  $V_{CE(sat)}$  v  $I_C$**

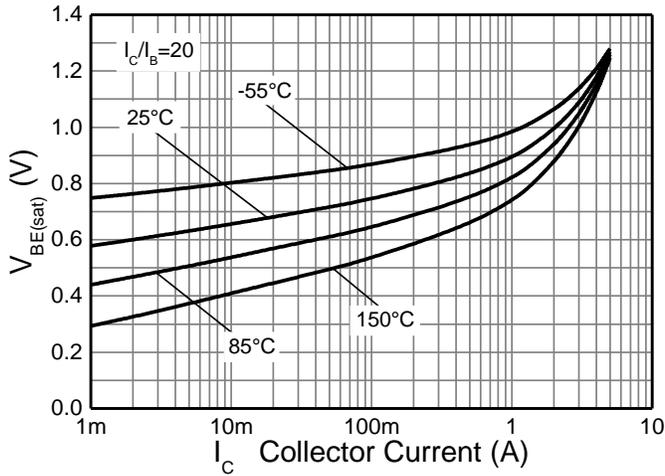


**Figure 10.  $V_{CE(sat)}$  v  $I_C$**



**Figure 11.  $V_{BE(on)}$  v  $I_C$**

**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.) (continued)

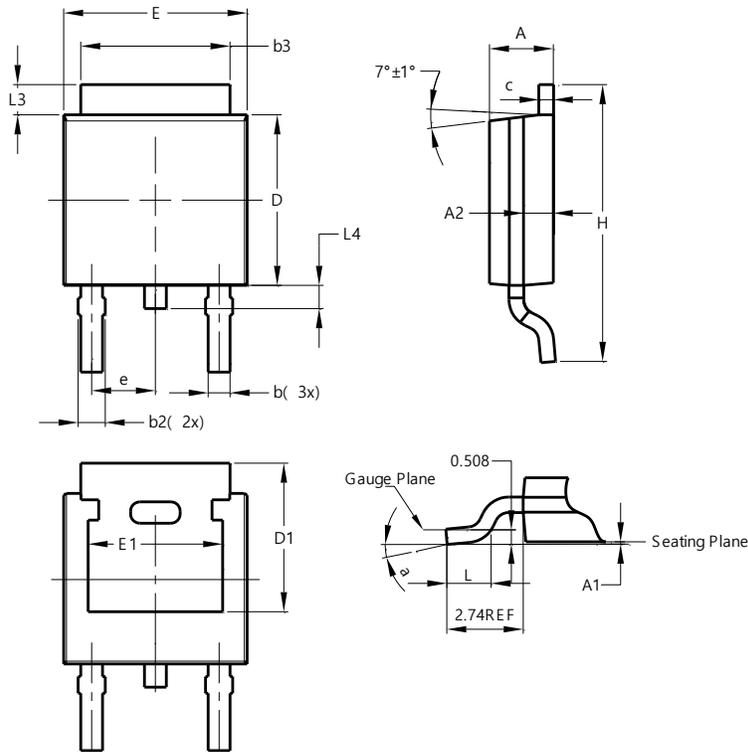


**Figure 12.  $V_{BE(sat)}$  v  $I_C$**

## Package Outline Dimensions

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

### TO252 (DPAK)

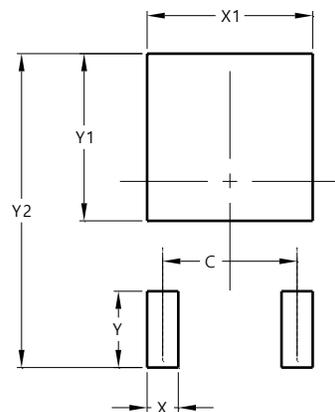


TO252 (DPAK)			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.50	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	--	--
e	2.286 BSC		
E	6.45	6.70	6.58
E1	4.32	--	--
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	--
<b>All Dimensions in mm</b>			

## 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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