

**100V NPN HIGH VOLTAGE TRANSISTOR IN TO252**

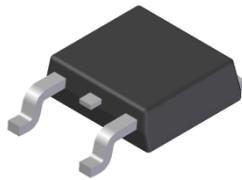
**Features**

- $BV_{CEO} > 100V$
- $I_C = 3A$  high Continuous Collector Current
- $I_{CM} = 5A$  Peak Pulse Current
- Ideal for Power Switching or Amplification Applications
- Complementary PNP Type: MJD32C
- **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**

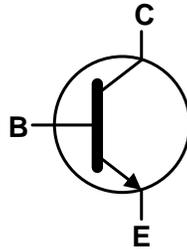
**Mechanical Data**

- 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 (3)
- Weight: 0.34 grams (Approximate)

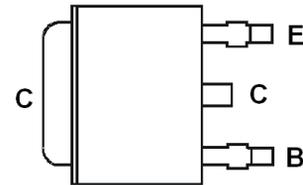
TO252 (DPAK)



Top View



Device Schematic



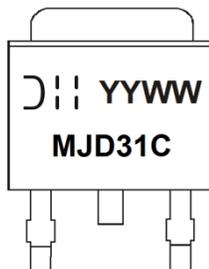
Pin Out Configuration  
Top View

**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MJD31C-13	AEC-Q101	MJD31C	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](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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



- MJD31C = Product Type Marking Code  
 DII = Manufacturers' code marking  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 16 = 2016)  
 WW = Week Code (01 – 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	100	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	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
Power Dissipation	P <sub>D</sub>	15	W

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

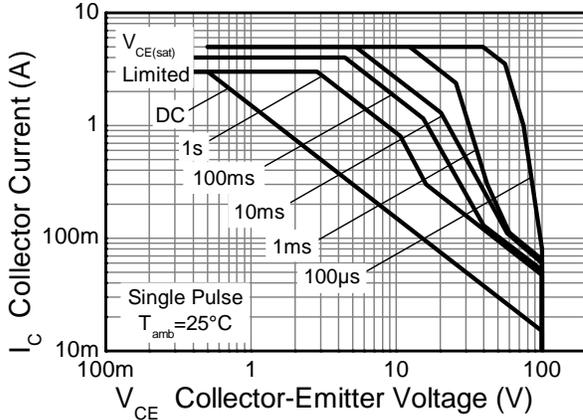
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	3.9
		(Note 6)	2.1
		(Note 7)	1.6
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 5)	32
		(Note 6)	59
		(Note 7)	80
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	8.4	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 9)

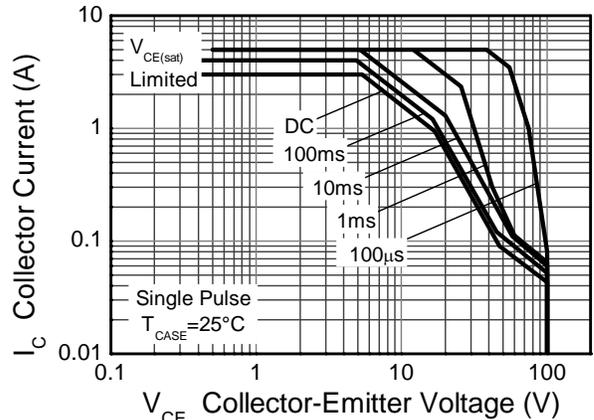
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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 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. Thermal resistance from junction to solder-point (on the exposed collector pad).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

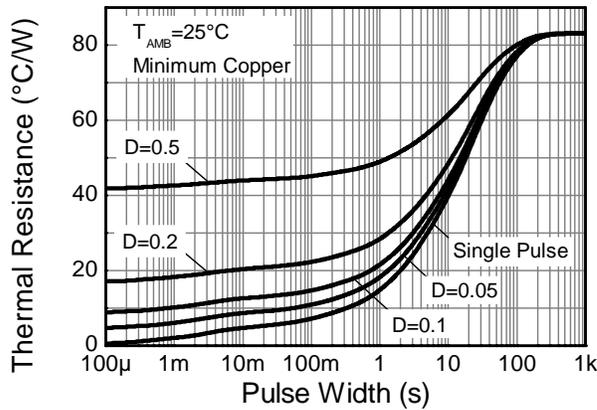
**Thermal Characteristics**



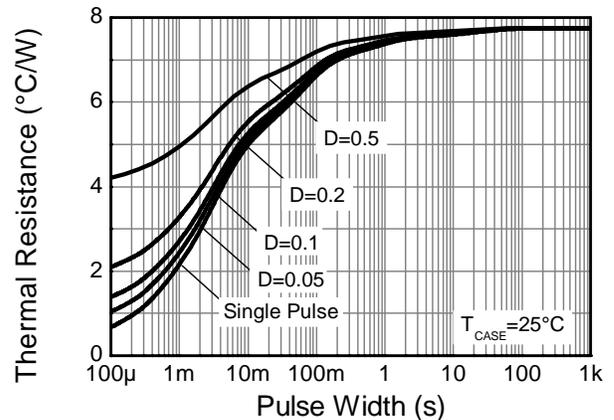
**Safe Operating Area**



**Safe Operating Area**



**Transient Thermal Impedance**



**Transient Thermal Impedance**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	100	—	—	V	$I_C = 30\text{mA}$ , $I_B = 0$
Collector Cut-off Current	$I_{CEO}$	—	—	1	$\mu\text{A}$	$V_{CB} = 60\text{V}$ , $I_B = 0$
Collector Cut-off Current	$I_{CES}$	—	—	1	$\mu\text{A}$	$V_{CE} = 100\text{V}$ , $V_{EB} = 0$
Emitter Cut-off Current	$I_{EBO}$	—	—	1	$\mu\text{A}$	$V_{EB} = 5\text{V}$ , $I_C = 0$
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	—	—	1.2	V	$I_C = 3.0\text{A}$ , $I_B = 375\text{mA}$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	—	—	1.8	V	$I_C = 3\text{A}$ , $V_{CE} = 4\text{V}$
DC Current Gain (Note 10)	$h_{FE}$	25 10	—	— 50	—	$V_{CE} = 4\text{V}$ , $I_C = 1\text{A}$ $V_{CE} = 4\text{V}$ , $I_C = 3\text{A}$
Current Signal Current Gain	$H_{fe}$	20	—	—	—	$V_{CE} = 10\text{V}$ , $I_C = 0.5\text{A}$ , $f = 1\text{KHz}$
Current Gain-Bandwidth Product	$f_T$	3.0	—	—	MHz	$I_C = 500\text{mA}$ , $V_{CE} = 10\text{V}$ , $f = 1\text{MHz}$

Note: 10. 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.)

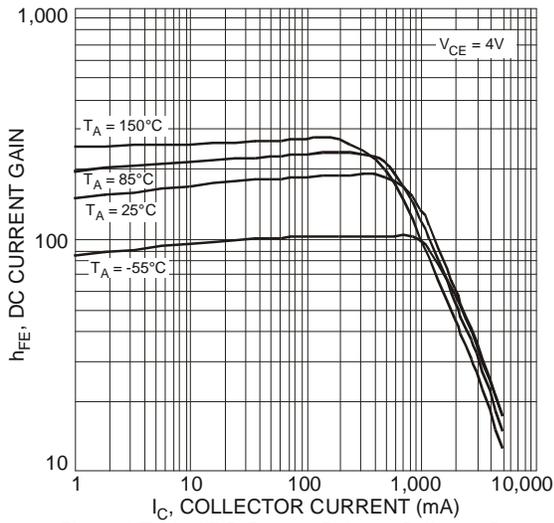


Figure 1 Typical DC Current Gain vs. Collector Current

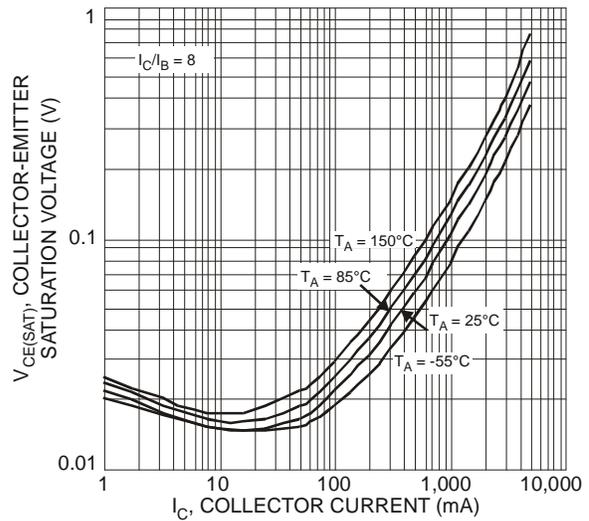


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

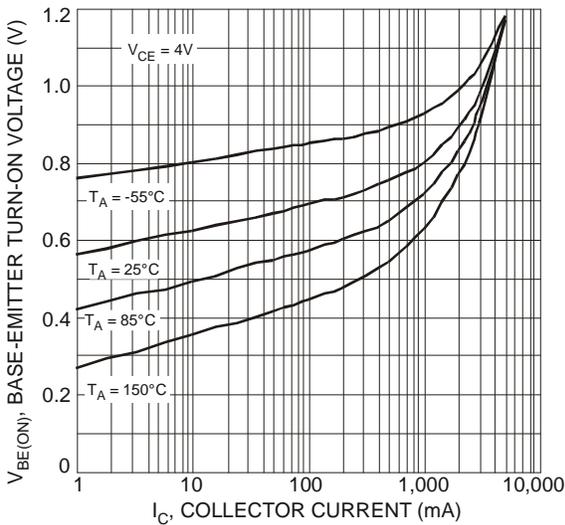


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

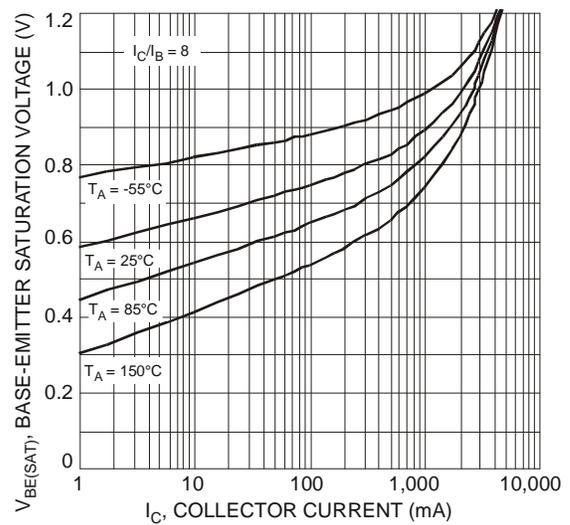


Figure 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

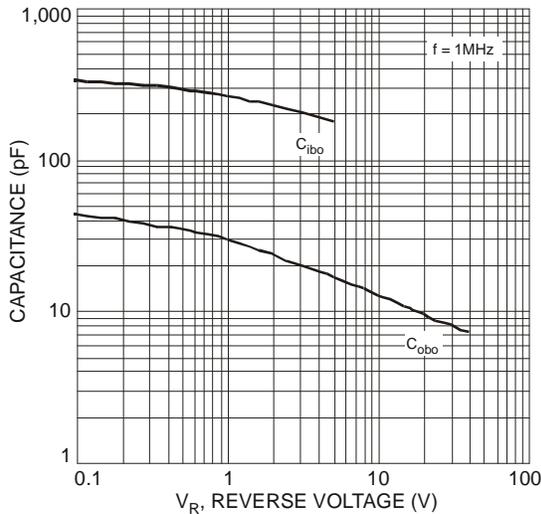
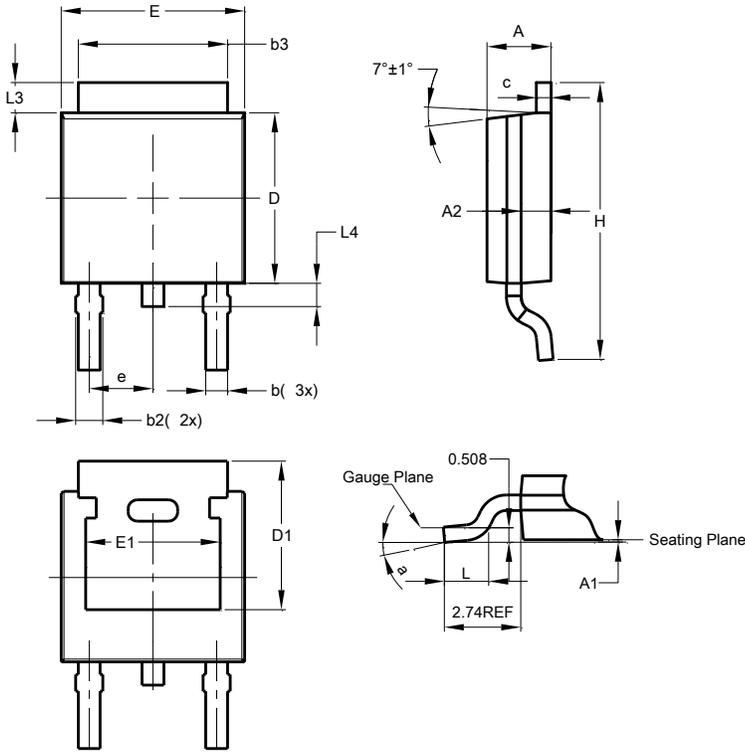


Figure 5 Typical Capacitance Characteristics

## Package Outline Dimensions

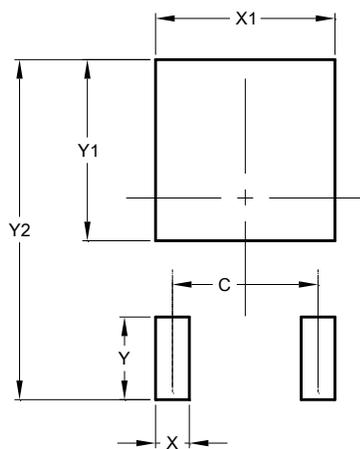
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



TO252 (DPAK)			
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.



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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