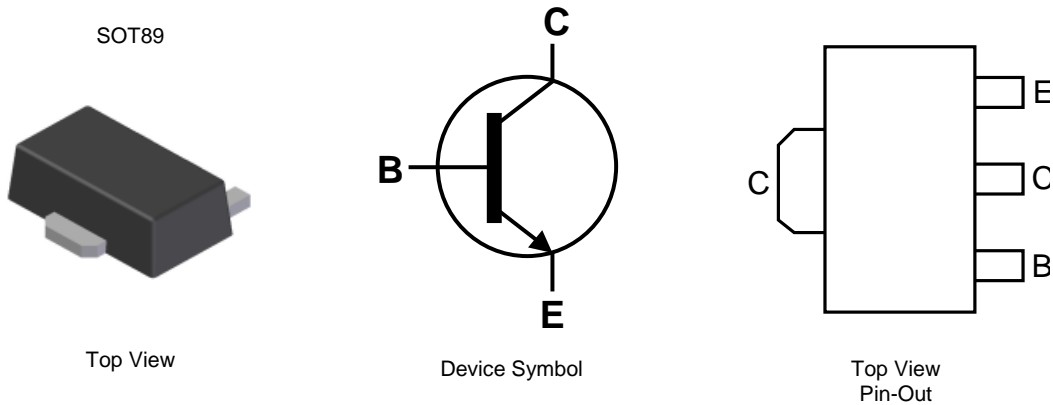


Features

- $BV_{CEO} > 350V$
- $I_C = 0.5A$ High Continuous Current
- $I_{CM} = 1A$ Peak Pulse Current
- High H_{FE} Hold Up
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.**
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Package: SOT89
- Package Material: Molded Plastic, "Green" Molding Compound
UL Flammability 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: 0.072 grams (Approximate)

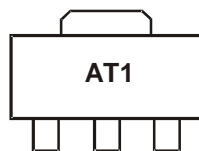


Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
BST39TA	SOT89	AT1	7	12	1,000	Reel
BST39-13R	SOT89	AT1	13	12	4,000	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



AT1 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	400	V
Collector-Emitter Voltage	V _{CEO}	350	V
Emitter-Base Voltage	V _{EBO}	7	V
Continuous Collector Current	I _C	500	mA
Peak Pulse Current	I _{CM}	1	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P _D	1	W
	(Note 6)		1.5	
	(Note 7)		2.0	
Thermal Resistance, Junction to Ambient Air	(Note 5)	R _{θJA}	125	°C/W
	(Note 6)		83	
	(Note 7)		60	
Thermal Resistance, Junction to Lead	(Note 8)	R _{θJL}	22	
Thermal Resistance, Junction to Case	(Note 9)	R _{θJC}	16	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	

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:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz 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 the device is mounted on 25mm x 25mm 1oz copper.
 7. Same as Note 5, except the device is mounted on 50mm x 50mm 1oz copper.
 8. Thermal resistance from junction to solder-point (on the exposed collector pad).
 9. Thermal resistance from junction to the top of the case.
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

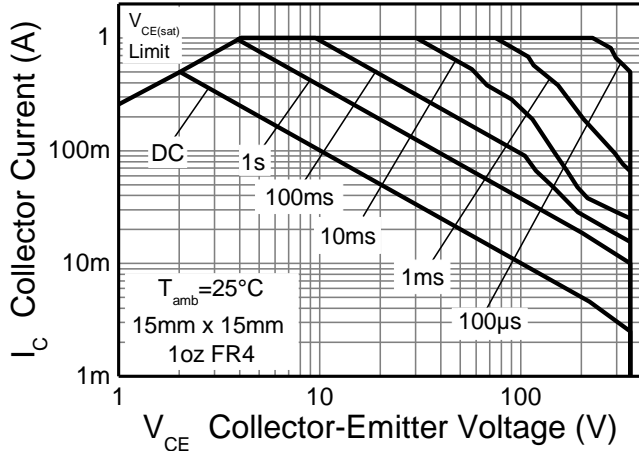


Figure 1. Safe Operating Area

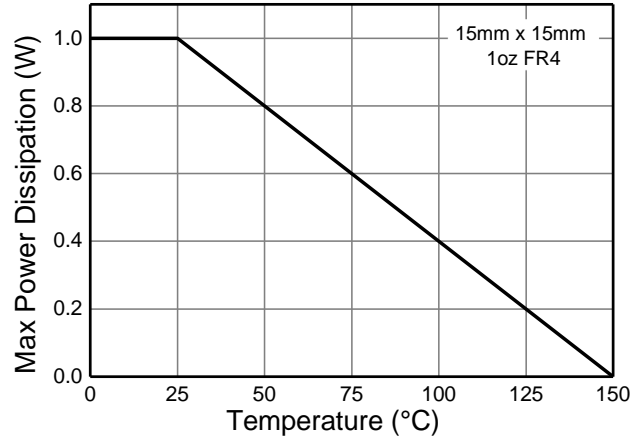


Figure 2. Derating Curve

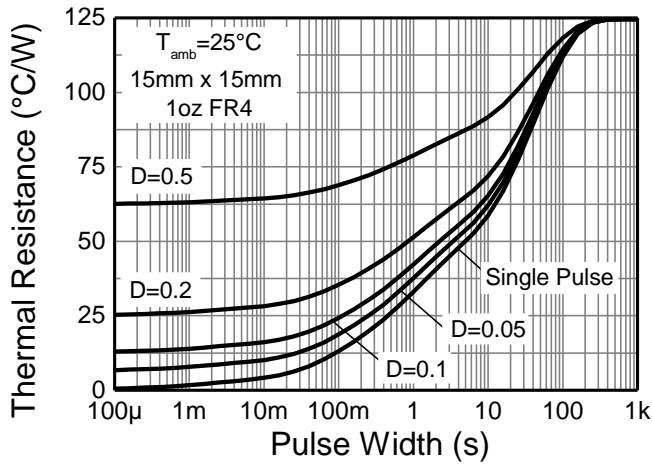


Figure 3. Transient Thermal Impedance

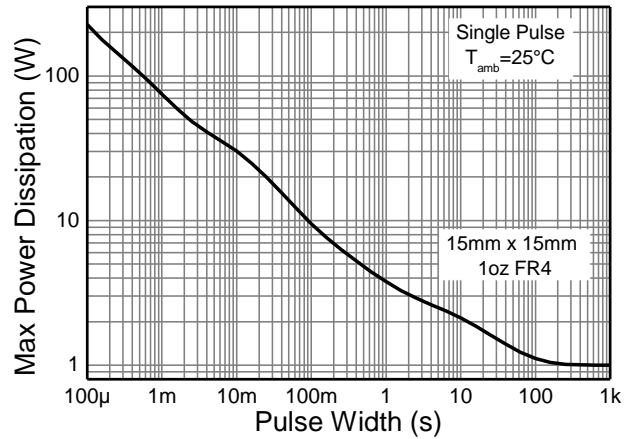


Figure 4. Pulse Power Dissipation

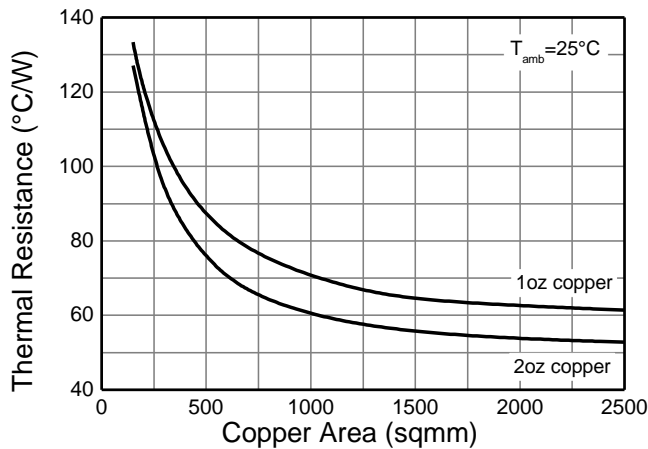


Figure 5. $R_{\theta JA}$ vs. Copper Area

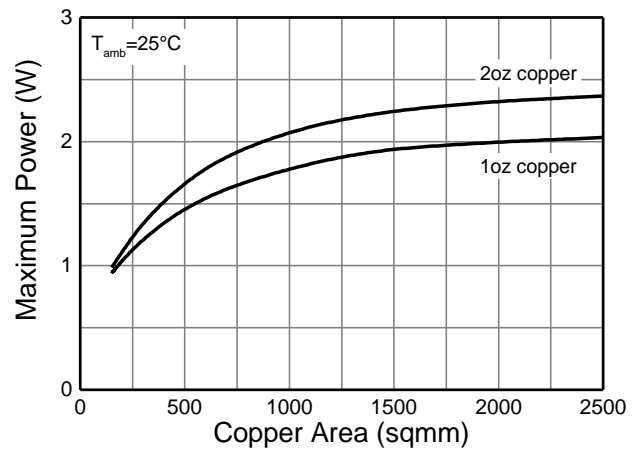


Figure 6. Power Dissipation vs. Copper Area

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV _{CB0}	400	—	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 11)	BV _{CEO}	350	—	—	V	I _C = 1mA
Emitter-Base Breakdown Voltage	BV _{EBO}	7	—	—	V	I _E = 100μA
Collector Cutoff Current	I _{CB0}	—	—	20	nA	V _{CB} = 300V
DC Current transfer Static Ratio (Note 11)	h _{FE}	40	—	—	—	I _C = 20mA, V _{CE} = 10V
Collector-Emitter Saturation Voltage (Note 11)	V _{CE(sat)}	—	—	0.5	V	I _C = 50mA, I _B = 4mA
Base-Emitter Saturation Voltage (Note 11)	V _{BE(sat)}	—	—	1.3	V	I _C = 50mA, I _B = 4mA
Transitional Frequency (Note 11)	f _T	70	—	—	MHz	I _C = 10mA, V _{CE} = 10V, f = 5MHz
Output Capacitance	C _{obo}	—	—	2	pF	V _{CB} = 10V, f = 1MHz, I _E = 0
Input Capacitance	C _{ibo}	—	—	20	pF	V _{EB} = 10V, f = 1MHz, I _C = 0

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

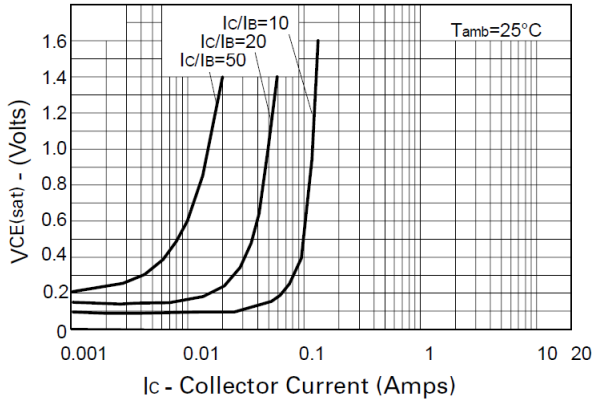


Figure 7. $V_{CE(sat)}$ vs. I_C

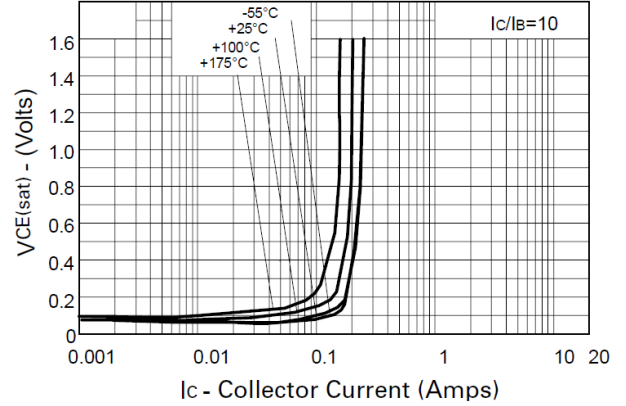


Figure 8. $V_{CE(sat)}$ vs. I_C

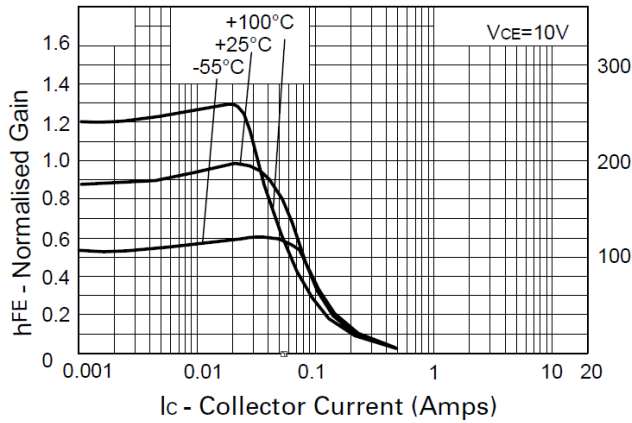


Figure 9. h_{FE} vs. I_C

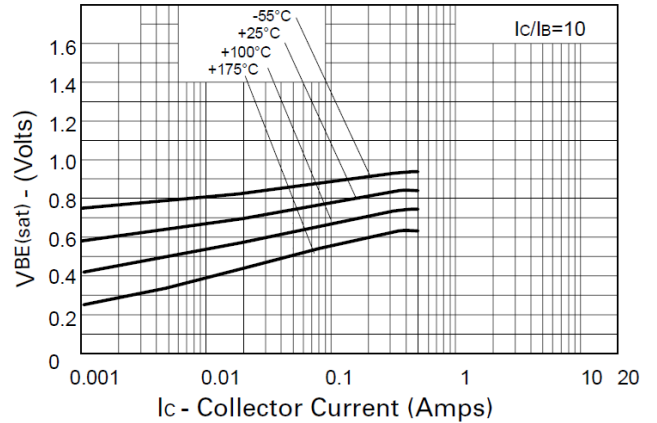


Figure 10. $V_{BE(sat)}$ vs. I_C

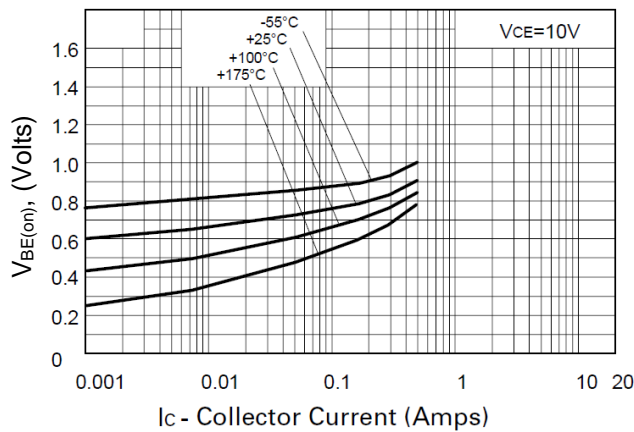
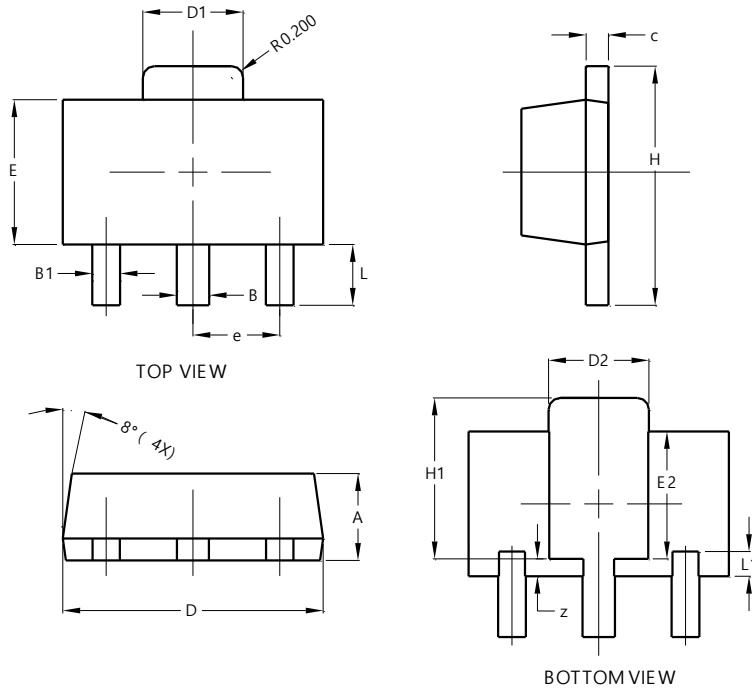


Figure 11. $V_{BE(on)}$ vs. I_C

Package Outline Dimensions

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

SOT89

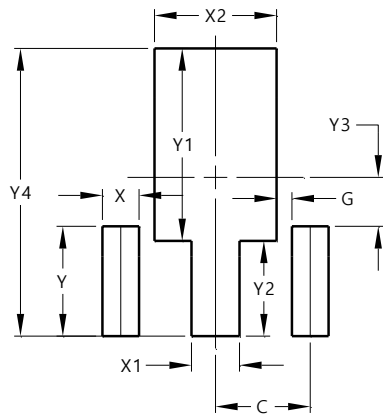


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

Suggested Pad Layout

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

SOT89



Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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