BSR33

80V PNP MEDIUM POWER TRANSISTOR IN SOT89

Features

- BV_{CEO} > -80V
- I_C = -1A High Continuous Current
- Low saturation voltage $V_{CE(sat)}$ < -250mV @ -150mA
- Complementary type BSR43
- **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)**

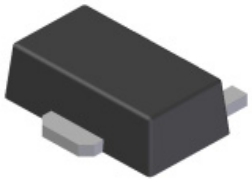
Mechanical Data

- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.052 grams (Approximate)

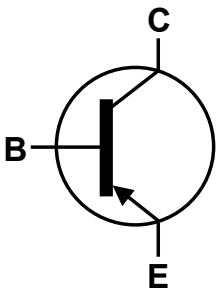
Application

- Load management functions
- Solenoid, relay and actuator drivers
- DC – DC modules

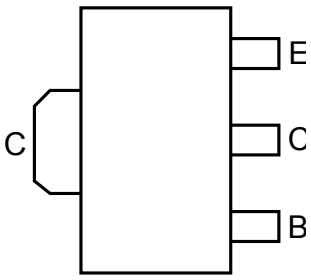
SOT89



Top View



Device Symbol



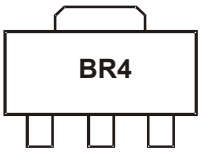
Top View
Pin-Out

Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
BSR33TA	AEC-Q101	BR4	7	12	1,000
BSR33QTA	Automotive	BR4	7	12	1,000

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-Q10x qualified and are PPAP capable. Automotive, AEC-Q10x and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



BR4 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-90	V
Collector-Emitter Voltage	V_{CEO}	-80	V
Emitter-Base Voltage	V_{EBO}	-5	V
Continuous Collector Current	I_C	-1	A
Peak Pulse Current	I_{CM}	-2	A
Peak Base Current	I_{BM}	-200	mA

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

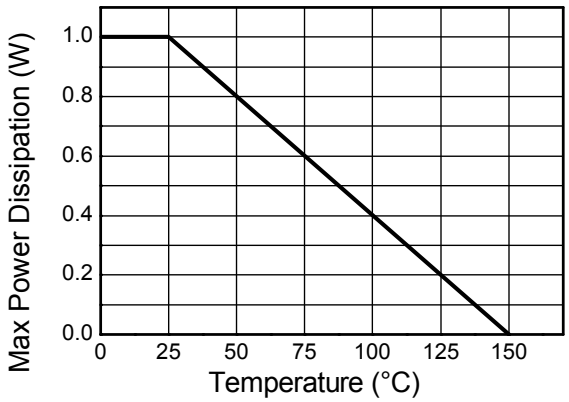
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	1	W
	(Note 7)		1.5	
	(Note 8)		2.1	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	125	°C/W
	(Note 7)		83	
	(Note 8)		60	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	13	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-65 to +150	°C

ESD Ratings (Note 10)

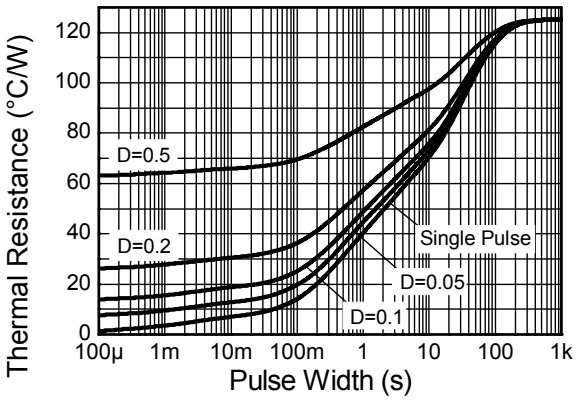
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
6. For a device mounted with the exposed collector pad on 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.
7. Same as note (6), except the device is mounted on 25mm x 25mm 1oz copper.
8. Same as note (6), except the device is mounted on 50mm x 50mm 1oz copper.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

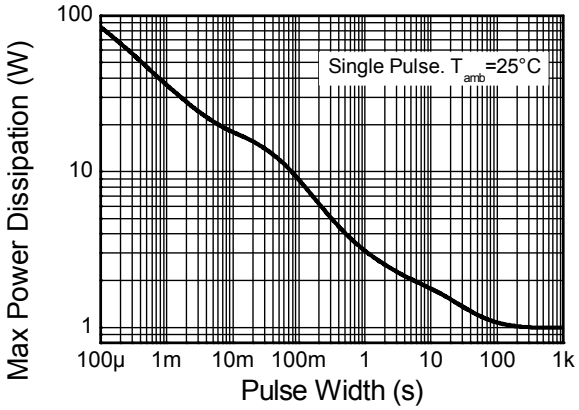
Thermal Characteristics and Derating Information



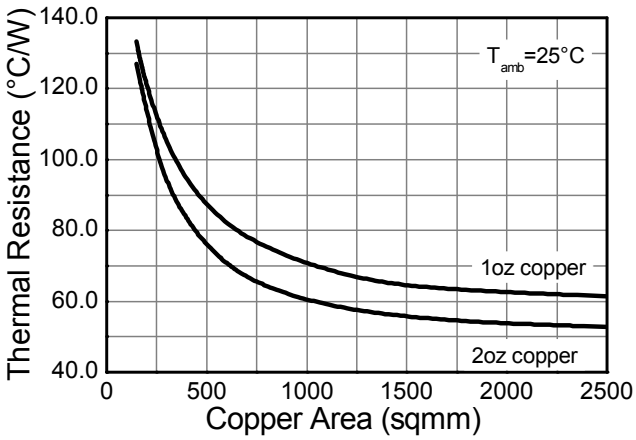
Derating Curve

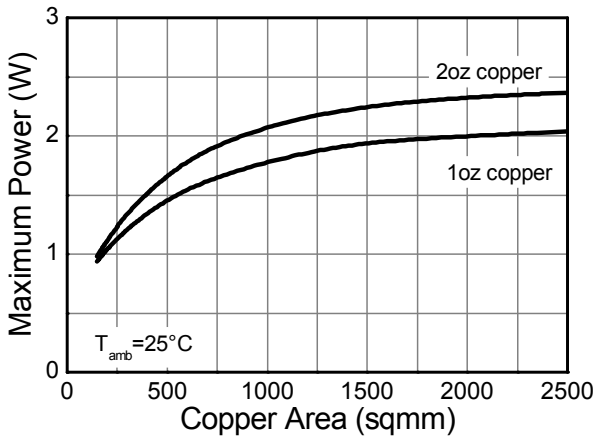


Transient Thermal Impedance



Pulse Power Dissipation



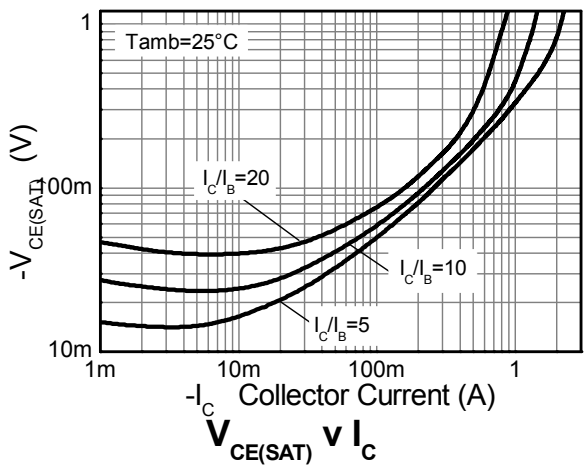


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

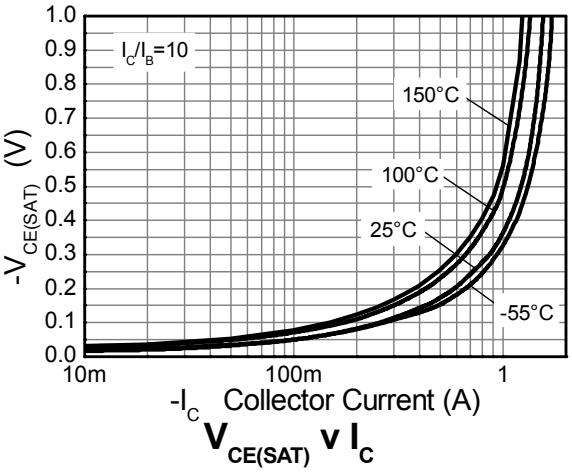
Characteristic	Symbol	Min	Typ.	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-90	–	–	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	-80	–	–	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-5	–	–	V	I_E = -100µA
Collector Cutoff Current	I_{CBO}	–	–	-100 -50	nA µA	V_{CB} = -60V V_{CB} = -60V, T_J = +150°C
DC current transfer Static ratio (Note 11)	h_{FE}	30 100 50	– – –	– 300 –	–	I_C = -100µA, V_{CE} = -5V I_C = -100mA, V_{CE} = -5V I_C = -500mA, V_{CE} = -5V
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	– –	– –	-0.25 -0.5	V	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	–	–	-1.0 -1.2	V	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA
Transitional Frequency	f_T	100	–	–	MHz	I_C = -50mA, V_{CE} = -10V f = 35MHz
Output capacitance	C_{obo}	–	–	20	pF	V_{CB} = -10V, f = 1MHz
Input Capacitance	C_{ibo}	–	–	120	pF	V_{CB} = -0.5V, f = 1MHZ
Turn-On Time	T_{on}	–	–	500	ns	V_{CC} =-20V, I_C = -100mA
Turn-Off Time	T_{off}	–	–	650	ns	I_{B1} =I_{B2} = -5mA

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

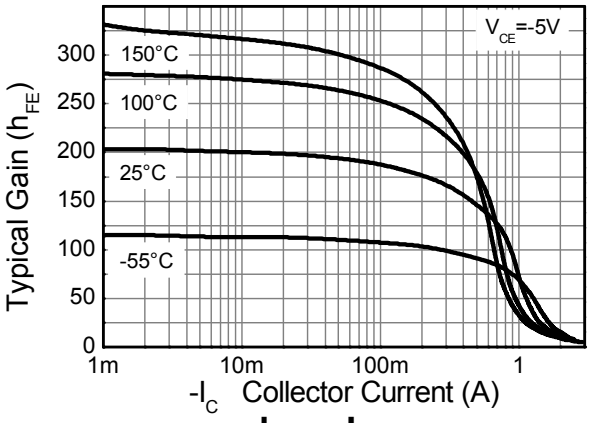
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



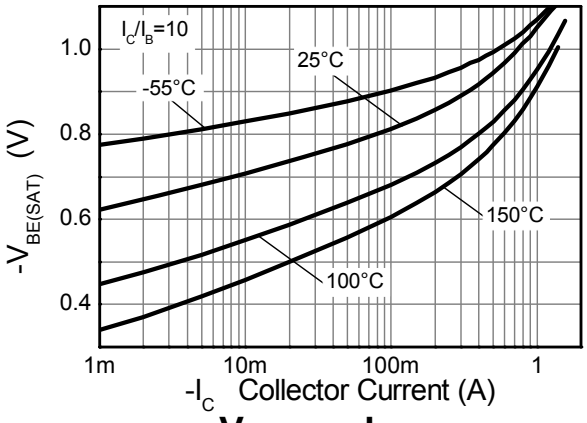
$V_{CE(SAT)}$ v I_C



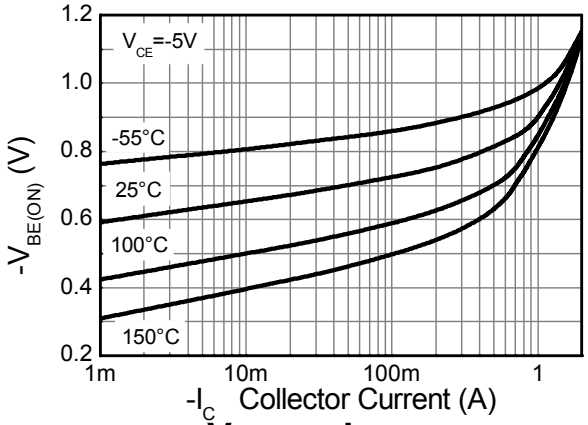
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



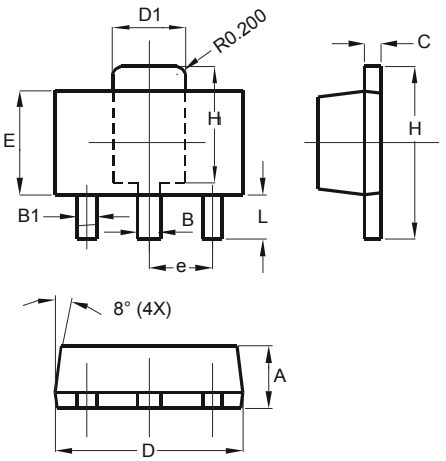
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

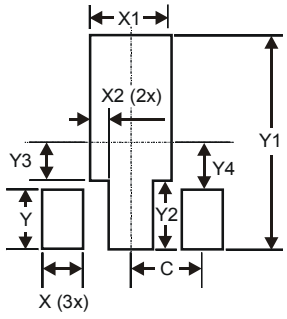
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT89		
Dim	**Min**	**Max**
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
All Dimensions in mm		

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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