

## Description

This bipolar junction transistor (BJT) is designed to meet the stringent requirements of automotive applications.

## Features

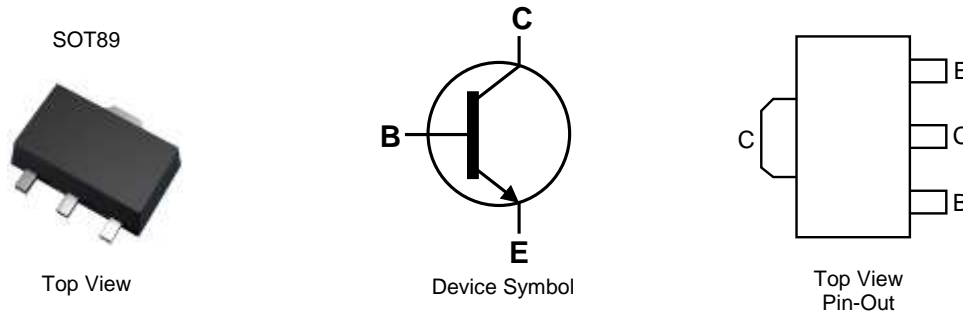
- $BV_{CEX} > 70V$
- $BV_{CEO} > 20V$
- $BV_{ECO} > 4.5V$
- $I_C = 7.5A$  High Continuous Current
- $V_{CE(SAT)} < 35mV @ 1A$
- Low Equivalent On-Resistance;  $R_{CE(sat)} = 21m\Omega$
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **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: Finish—Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208
- Weight: 0.05 grams (Approximate)

## Applications

- Emergency Lighting Circuits
- Motor Driving
- Camera Strobe
- Boost Converter
- CCFL Backlight Inverters
- MOSFET Gate Drivers
- LED Driving

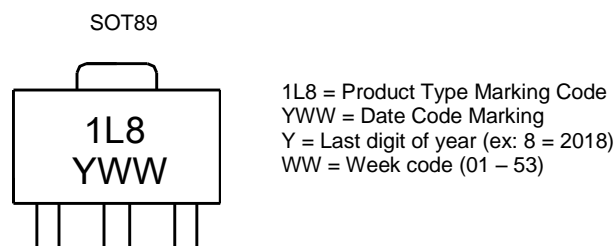


## Ordering Information (Notes 4 and 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXTN19020DZQTA	Automotive	1L8	7	12	1000

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
  5. For packaging details, see <http://www.diodes.com/products/packages.html>.

## Marking Information



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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	70	V
Collector-Emitter Voltage (Forward Blocking)	V <sub>CEX</sub>	70	V
Collector-Emitter Voltage	V <sub>CEO</sub>	20	V
Emitter-Collector Voltage (Reverse Blocking)	V <sub>ECX</sub>	6	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	7.5	A
Base Current	I <sub>B</sub>	1	A
Peak Pulse Current	I <sub>CM</sub>	20	A

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

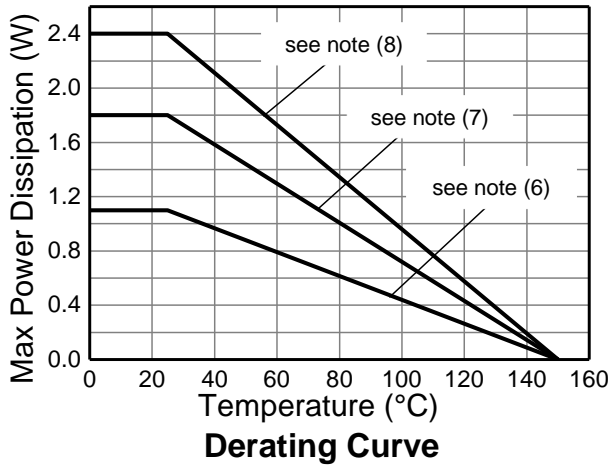
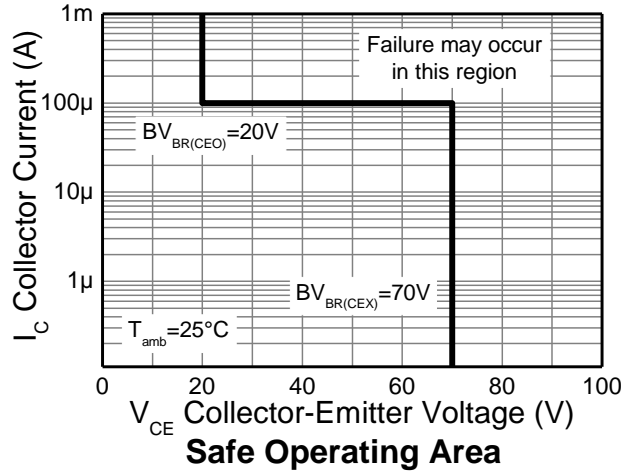
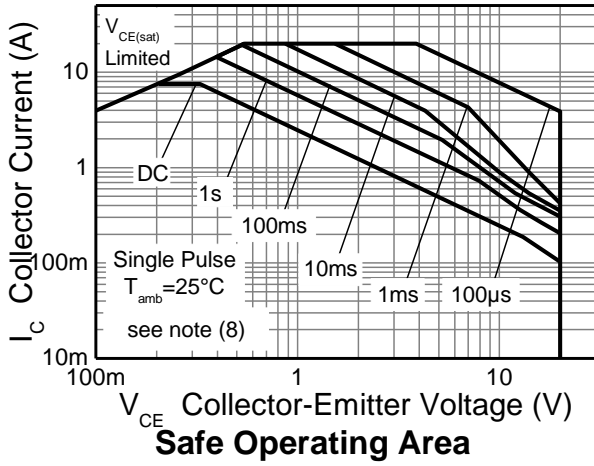
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.1	W mW/°C
		8.8	
		1.8	
		14.4	
		2.4	
		19.2	
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	4.46	°C/W
		35.7	
		27.8	
		222	
		117	
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	68	°C/W
		51	
		28	
		4.69	
Thermal Resistance, Junction to Case	R <sub>θJL</sub>	4.69	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 11)

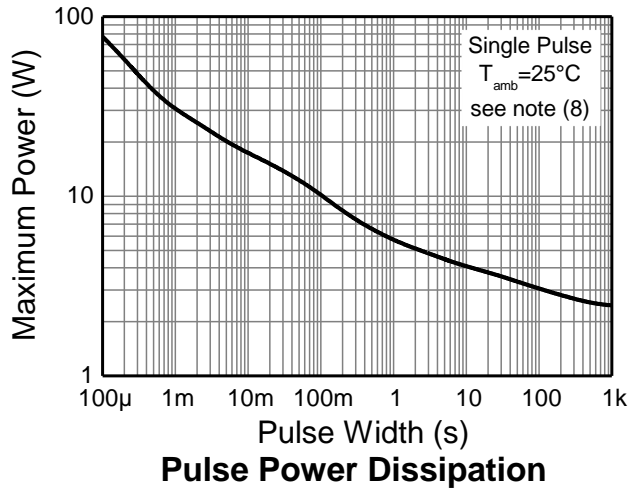
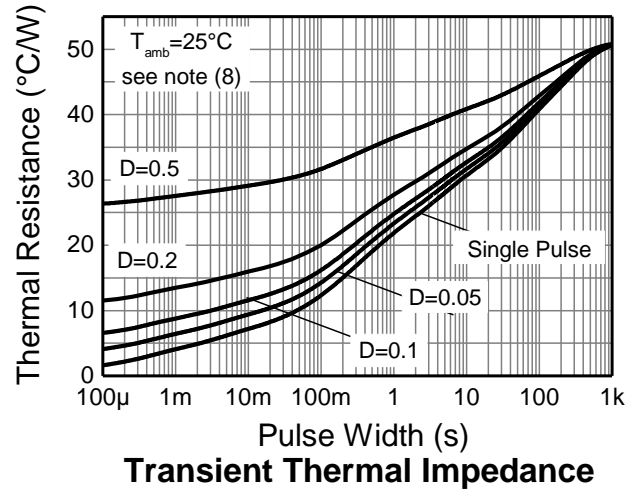
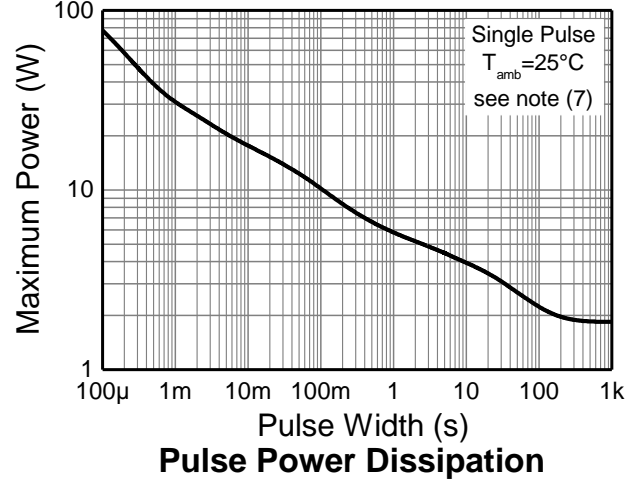
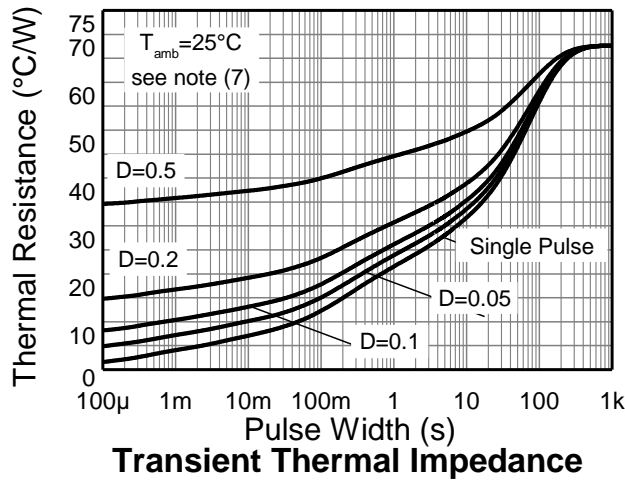
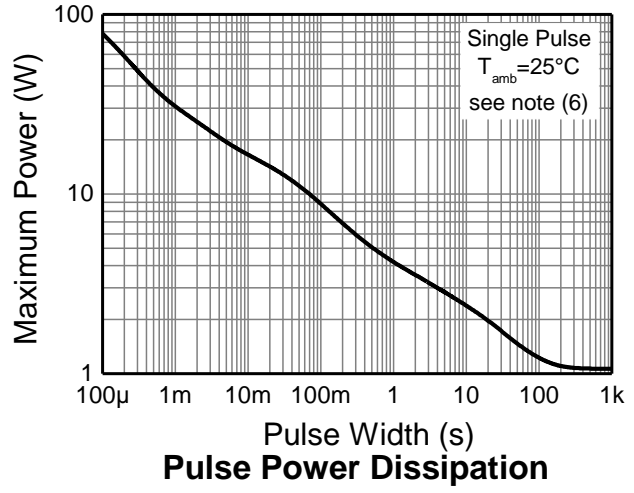
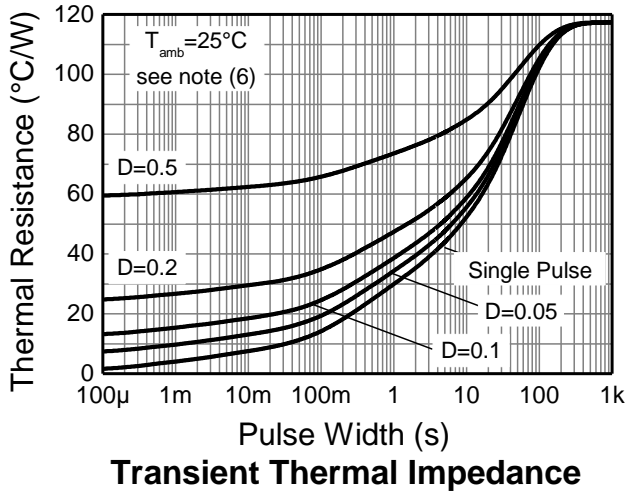
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge—Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge—Machine Model	ESD MM	400	V	C

- Notes:
- For a device mounted with the exposed collector pad on 15mm × 15mm 1oz copper that is on a single-sided 0.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - Same as Note 6 except the device is mounted on 25mm × 25mm 1oz copper.
  - Same as Note 6 except the device is mounted on 50mm × 50mm 1oz copper.
  - As (9) above at 5 < 5 seconds.
  - Junction to case (collector tab). Typical.
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**



**Thermal Characteristics and Derating Information**

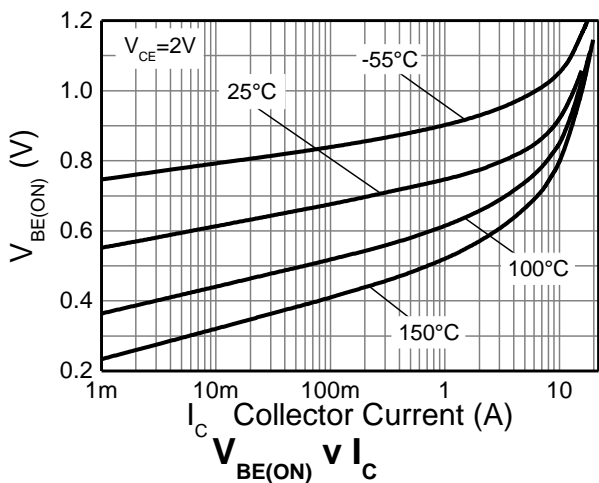
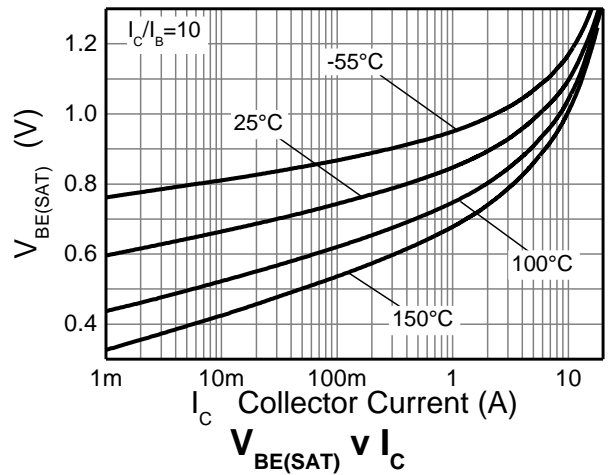
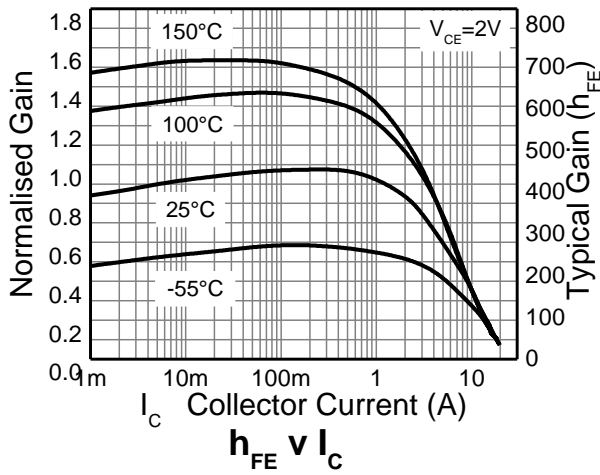
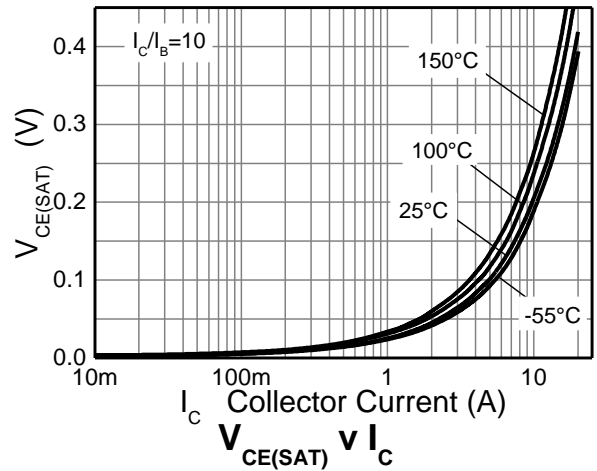
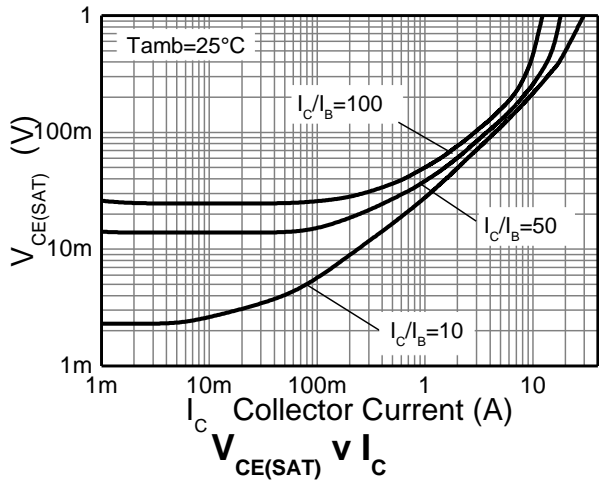


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	70	100	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Forwarding Block)	BV <sub>CEX</sub>	70	100	—	V	I <sub>C</sub> = 100μA, R <sub>BE</sub> ≤ 1kΩ or -1V < V <sub>BE</sub> < 0.25V
Collector-Emitter Breakdown Voltage (Notes 12)	BV <sub>CEO</sub>	20	30	—	V	I <sub>C</sub> = 10mA
Emitter-Collector Breakdown Voltage (Reverse Blocking)	BV <sub>ECX</sub>	6	8.4	—	V	I <sub>E</sub> = 100μA, R <sub>BC</sub> ≤ 1kΩ or 0.25V < V <sub>BC</sub> < -0.25V
Emitter-Collector Breakdown Voltage (Reverse Blocking)	BV <sub>ECO</sub>	4.5	5.7	—	V	I <sub>E</sub> = 100μA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.4	—	V	I <sub>E</sub> = 100μA
Collector-Base Cutoff Current	I <sub>CBO</sub>	—	<1	50 0.5	nA μA	V <sub>CB</sub> = 70V V <sub>CB</sub> = 70V, T <sub>amb</sub> = 100°C
Collector-Emitter Cutoff Current	I <sub>CEX</sub>	—	—	100	nA	V <sub>CE</sub> = 70V, R <sub>BE</sub> ≤ 1kΩ or -1V < V <sub>BE</sub> < 0.25V
Emitter Cutoff Current	I <sub>EBO</sub>	—	<1	50	nA	V <sub>EB</sub> = 5.6V
DC current transfer Static ratio (Notes 12)	h <sub>FE</sub>	300 260 150 50 —	450 390 210 75 35	900 — — — —	—	I <sub>C</sub> = 100mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V I <sub>C</sub> = 7.5A, V <sub>CE</sub> = 2V I <sub>C</sub> = 15A, V <sub>CE</sub> = 2V I <sub>C</sub> = 20A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Notes 12)	V <sub>CE(sat)</sub>	— — — — — —	26 50 75 60 83 155	32 70 100 80 105 200	mV	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA I <sub>C</sub> = 2A, I <sub>B</sub> = 20mA I <sub>C</sub> = 2A, I <sub>B</sub> = 40mA I <sub>C</sub> = 4A, I <sub>B</sub> = 400mA I <sub>C</sub> = 7.5A, I <sub>B</sub> = 375mA
Base-Emitter Saturation Voltage (Notes 12)	V <sub>BE(sat)</sub>	—	1000	1100	mV	I <sub>C</sub> = 7.5A, I <sub>B</sub> = 375mA
Base-Emitter Turn-on Voltage (Notes 12)	V <sub>BE(on)</sub>	—	870	1000	mV	I <sub>C</sub> = 7.5A, V <sub>CE</sub> = 2V
Transitional Frequency	f <sub>T</sub>	—	160	—	MHz	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V, f = 100MHz
Input Capacitance	C <sub>ibo</sub>	—	297	400	pF	V <sub>EB</sub> = 0.5V, f = 1MHz,
Output Capacitance	C <sub>obo</sub>	—	32.6	40	pF	V <sub>CB</sub> = 10V, f = 1MHz,
Switching Time	t <sub>d</sub>	—	129	—	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A, I <sub>B1</sub> = -I <sub>B2</sub> = 10mA
	t <sub>r</sub>	—	96	—	ns	
	t <sub>s</sub>	—	398	—	ns	
	t <sub>f</sub>	—	90	—	ns	

Note: 12. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.

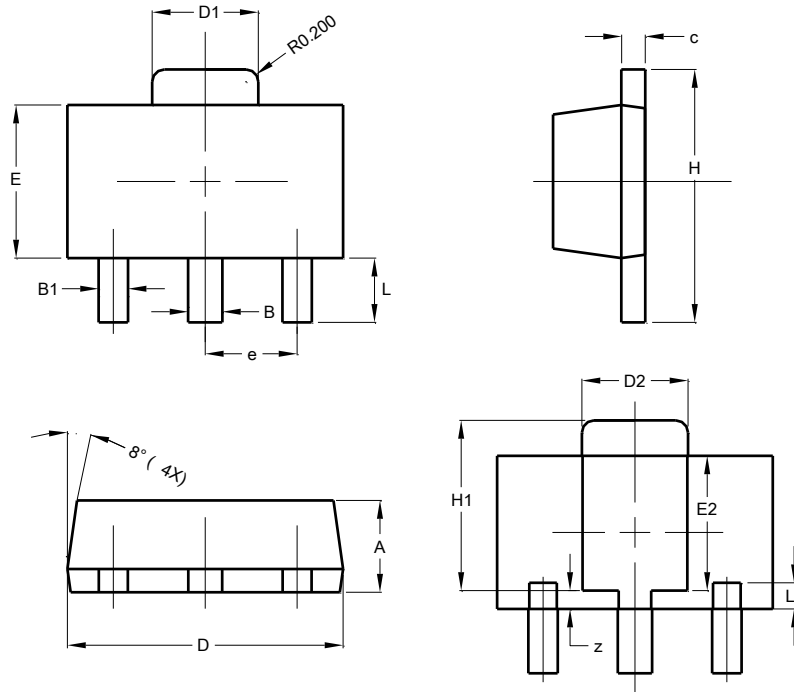
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



**Package Outline Dimensions**

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

**SOT89**

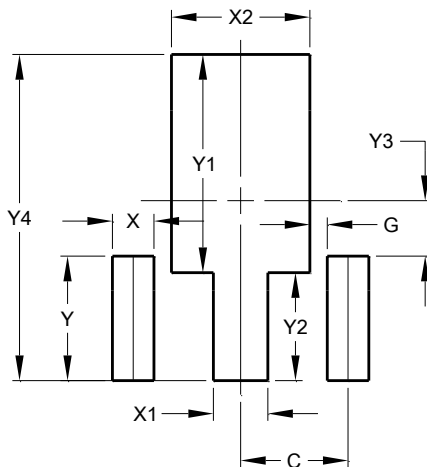


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in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