

**25V NPN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89**
**Description**

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirement of Automotive Applications.

**Features**

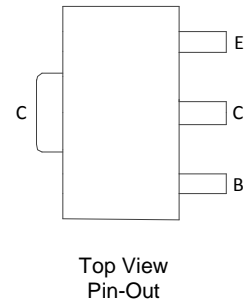
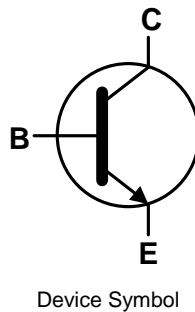
- $BV_{CEO} > 25V$
- $I_C = 5.5A$  High Continuous Current
- $I_{CM} = 20A$  Peak Pulse Current
- Very Low Saturation Voltages
- Extremely Low Equivalent On-Resistance;  $R_{CE(SAT)} = 25m\Omega$  at 6.5A
- Excellent  $h_{FE}$  Characteristics up to 20A
- **Totally Lead-Free & Fully RoHS Compliant (Notes 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 208③
- Weight: 0.05 grams (Approximate)

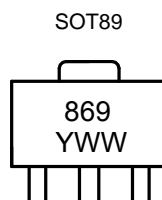
**Applications**

- Emergency Lighting Circuits
- Motor Driving (Including DC Fans)
- Solenoid, Relay and Actuator Drivers
- DC DC Modules
- Backlight Inverters


**Ordering Information (Note 5)**

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
ZXTN2005ZQTA	869	7	12	1,000

- 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, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

**Marking Information**


869 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y = Last Digit of Year (ex: 8 = 2018)  
 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>CBO</sub>	60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	25	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	5.5	A
Peak Pulse Current	I <sub>CM</sub>	20	A

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

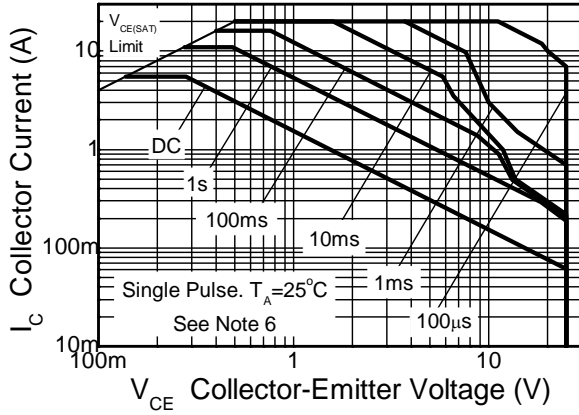
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.5	W mW/°C
		12	
		2.1	
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	16.8	°C/W
		83	
		60	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 8)

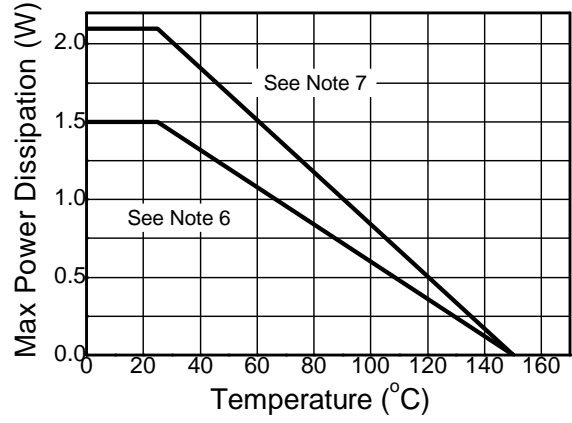
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted with the exposed collector pad on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR-4 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 50mm x 50mm 1oz copper.
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

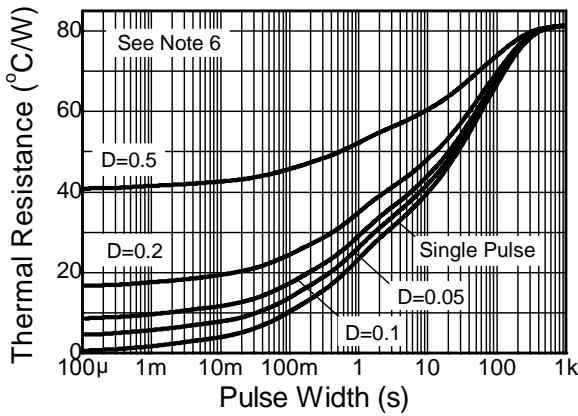
**Thermal Characteristics and Derating Information**



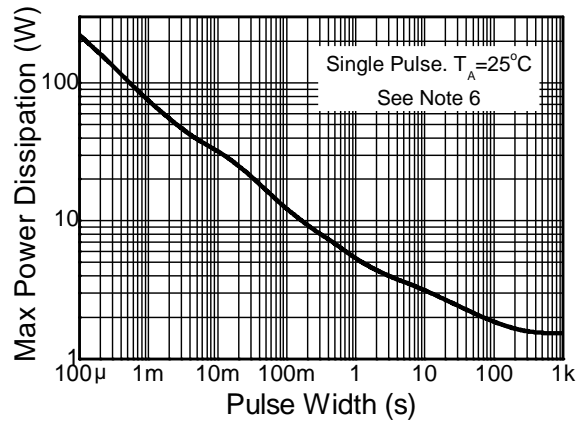
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



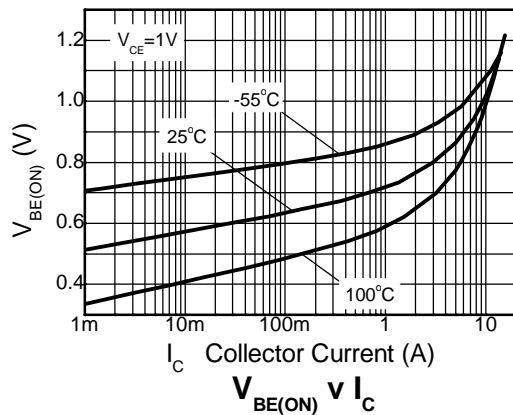
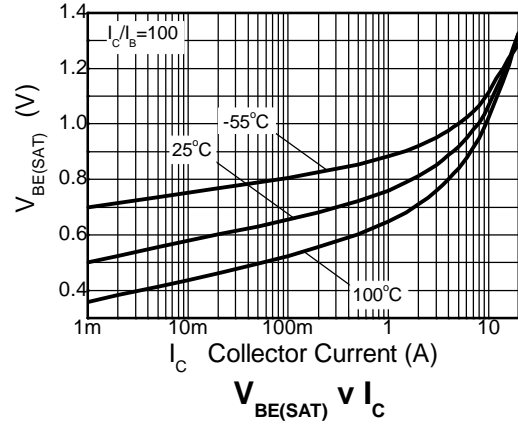
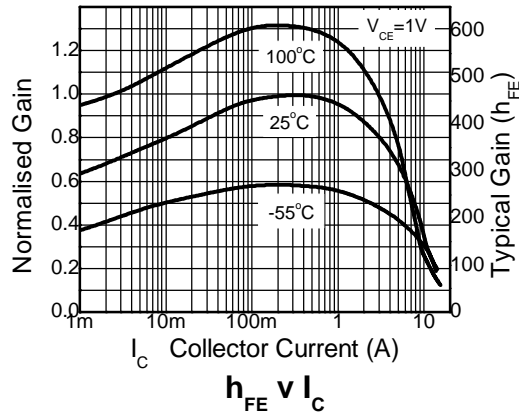
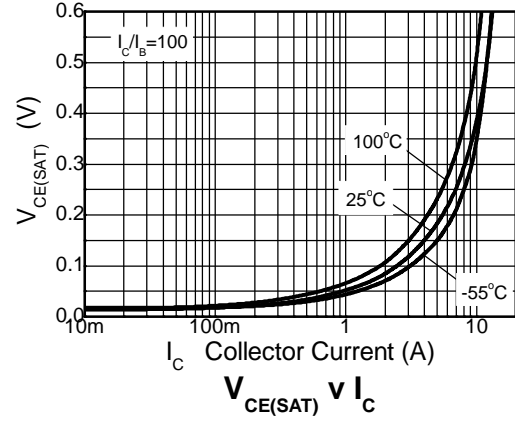
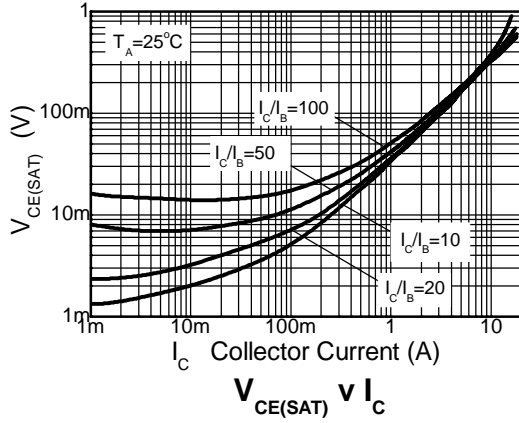
**Pulse Power Dissipation**

**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>	60	120	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage	BV <sub>CER</sub>	60	120	—	V	I <sub>C</sub> = 1μA, R <sub>B</sub> ≤ 1kΩ
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	25	35	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.1	—	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	—	20 0.5	nA μA	V <sub>CB</sub> = 50V V <sub>CB</sub> = 50V, T <sub>A</sub> = +100°C
Collector Cutoff Current	I <sub>CER</sub> R ≤ 1kΩ	—	—	20 0.5	nA μA	V <sub>CB</sub> = 50V V <sub>CB</sub> = 50V, T <sub>A</sub> = +100°C
Emitter Cutoff Current	I <sub>EBO</sub>	—	—	10	nA	V <sub>EB</sub> = 5.6V
DC Current Transfer Static Ratio (Note 9)	h <sub>FE</sub>	300 300 200 40	400 450 275 55	—	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 1V I <sub>C</sub> = 1A, V <sub>CE</sub> = 1V I <sub>C</sub> = 7A, V <sub>CE</sub> = 1V I <sub>C</sub> = 20A, V <sub>CE</sub> = 1V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(SAT)</sub>	—	25 30 45 105 160	35 45 70 130 200	mV	I <sub>C</sub> = 500mA, I <sub>B</sub> = 10mA 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> = 10mA I <sub>C</sub> = 6.5A, I <sub>B</sub> = 150mA
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(SAT)</sub>	—	950	1050	mV	I <sub>C</sub> = 6.5A, I <sub>B</sub> = 150mA
Base-Emitter Turn-on Voltage (Note 9)	V <sub>BE(ON)</sub>	—	860	960	mV	I <sub>C</sub> = 6.5A, V <sub>CE</sub> = 1V
Transitional Frequency	f <sub>T</sub>	—	150	—	MHz	I <sub>C</sub> = 100mA, V <sub>CE</sub> = 10V, f = 50MHz
Output Capacitance	C <sub>OBO</sub>	—	48	—	pF	V <sub>CB</sub> = 10V, f = 1MHz
Switching Time	t <sub>ON</sub>	—	33	—	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A, I <sub>B1</sub> = -I <sub>B2</sub> = 100mA
	t <sub>OFF</sub>	—	464	—		

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

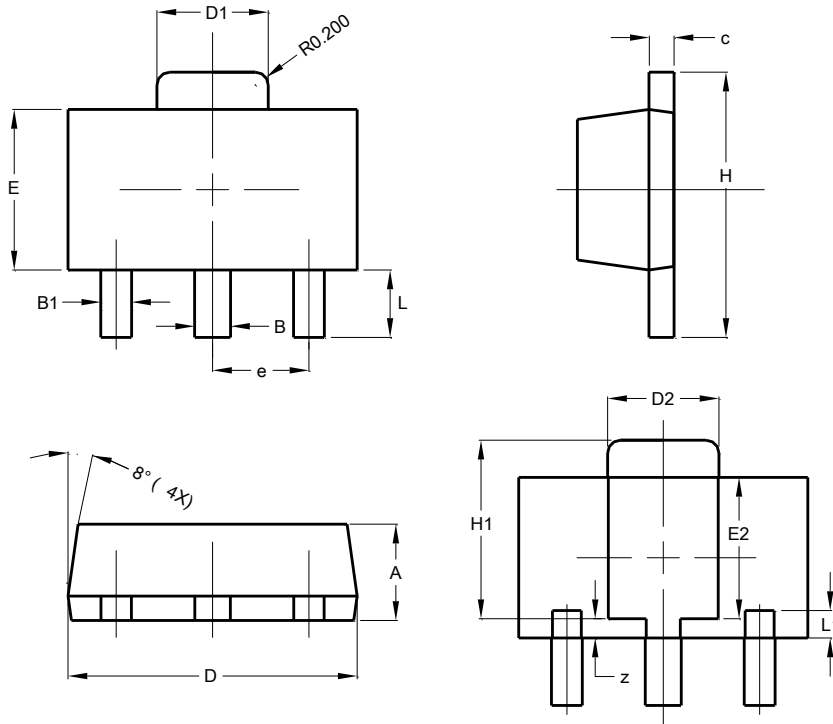
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



**Package Outline Dimensions**

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

SOT89

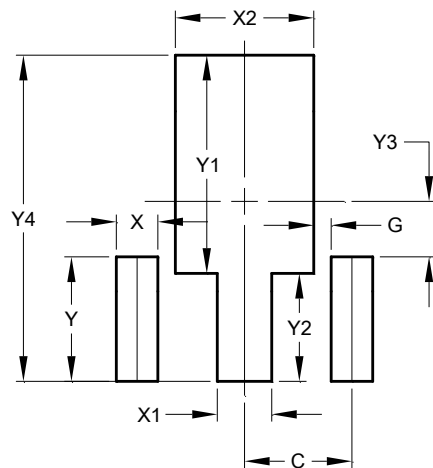


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in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