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; $R_{CE(SAT)}$ = 25mΩ 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 208 e3
- Weight: 0.05 grams (Approximate)

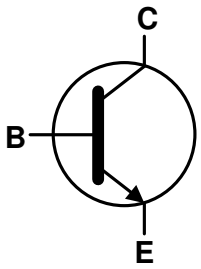
Applications

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

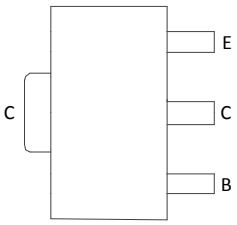
SOT89



Top View



Device Symbol



Top View
Pin-Out

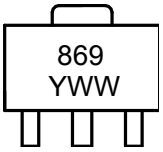
Ordering Information (Note 5)

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

SOT89



869 = Product Type Marking Code
YWW = Date Code Marking
Y = Last Digit of Year (ex: 8 = 2018)
WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	25	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	5.5	A
Peak Pulse Current	I_{CM}	20	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 6)	P_D	1.5 12	W mW/°C
	(Note 7)		2.1 16.8	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	83	°C/W
	(Note 7)		60	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

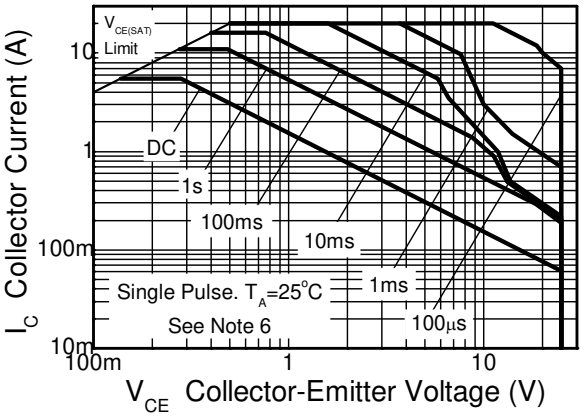
ESD Ratings (Note 8)

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

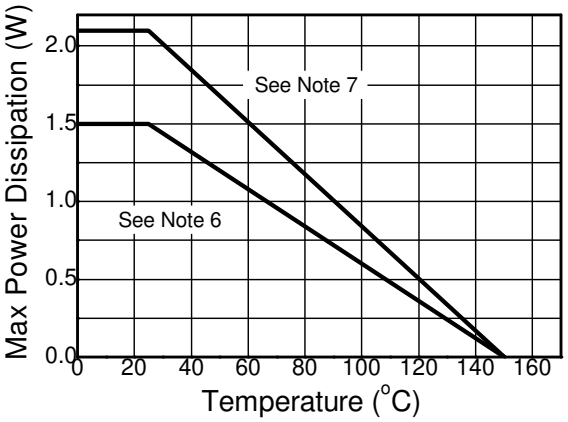
Notes:
6. For a device mounted with the exposed collector pad on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
7. Same as note (6), except the device is mounted on 50mm x 50mm 1oz copper.
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

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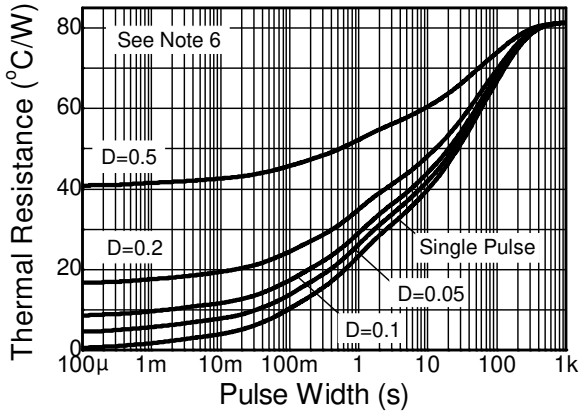
Thermal Characteristics and Derating Information



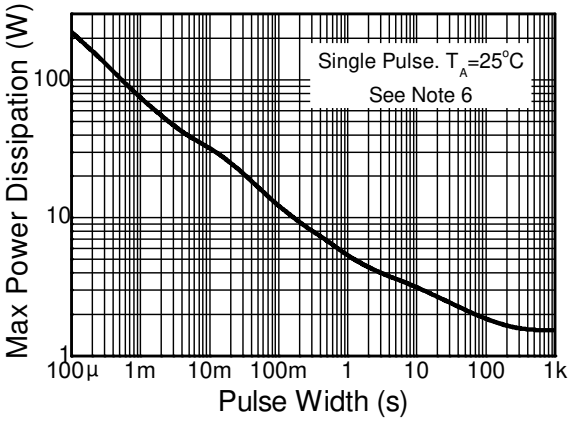
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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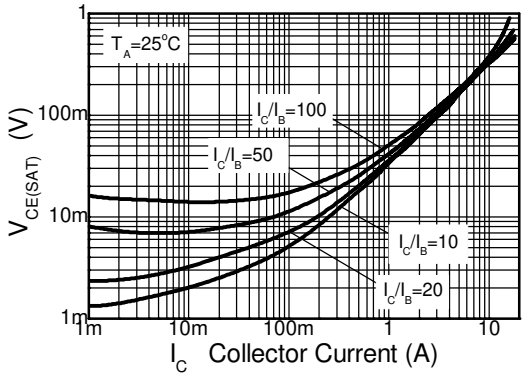
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	60	120	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage	BV_{CER}	60	120	—	V	I_C = 1µA, R_B ≤ 1kΩ
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	25	35	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.1	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	—	20 0.5	nA µA	V_{CB} = 50V V_{CB} = 50V, T_A = +100°C
Collector Cutoff Current	I_{CER} R ≤ 1kΩ	—	—	20 0.5	nA µA	V_{CB} = 50V V_{CB} = 50V, T_A = +100°C
Emitter Cutoff Current	I_{EBO}	—	—	10	nA	V_{EB} = 5.6V
DC Current Transfer Static Ratio (Note 9)	h_{FE}	300 300 200 40	400 450 275 55	—	—	I_C = 10mA, V_{CE} = 1V I_C = 1A, V_{CE} = 1V I_C = 7A, V_{CE} = 1V I_C = 20A, V_{CE} = 1V
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(SAT)}$	—	25 30 45 105 160	35 45 70 130 200	mV	I_C = 500mA, I_B = 10mA I_C = 1A, I_B = 100mA I_C = 1A, I_B = 10mA I_C = 2A, I_B = 10mA I_C = 6.5A, I_B = 150mA
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(SAT)}$	—	950	1050	mV	I_C = 6.5A, I_B = 150mA
Base-Emitter Turn-on Voltage (Note 9)	$V_{BE(ON)}$	—	860	960	mV	I_C = 6.5A, V_{CE} = 1V
Transitional Frequency	f_T	—	150	—	MHz	I_C = 100mA, V_{CE} = 10V, f = 50MHz
Output Capacitance	C_{OBO}	—	48	—	pF	V_{CB} = 10V, f = 1MHz
Switching Time	t_{ON}	—	33	—	ns	V_{CC} = 10V, I_C = 1A, I_{B1} = -I_{B2} = 100mA
	t_{OFF}		464			

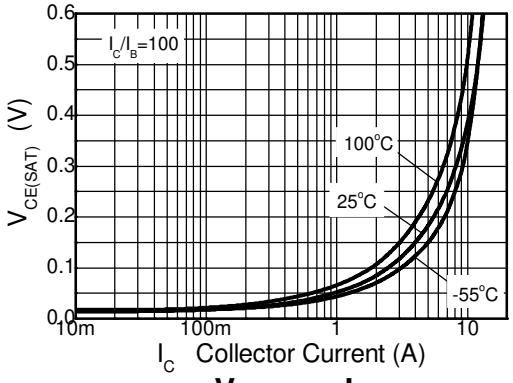
Note 9: Measured under pulsed conditions. Pulse width = 300µs. Duty cycle ≤ 2%.

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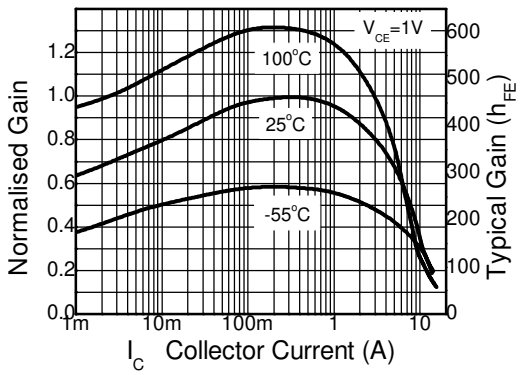
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



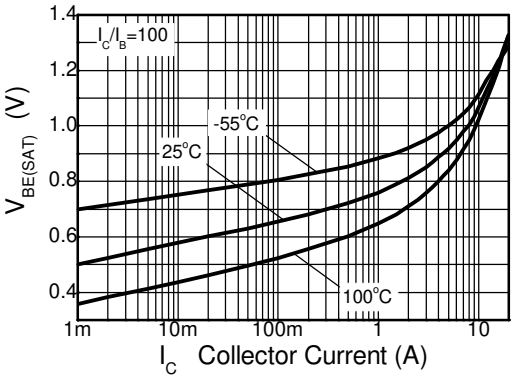
$V_{CE(SAT)}$ v I_C



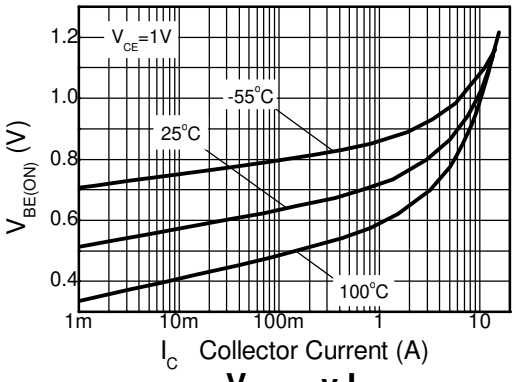
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C



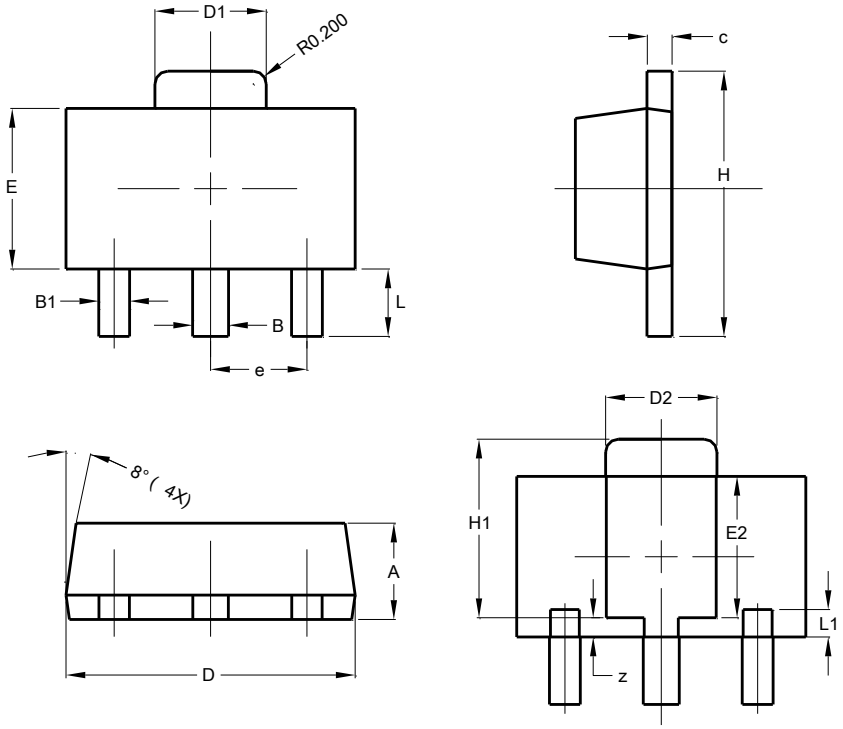
$V_{BE(ON)}$ v I_C

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Package Outline Dimensions

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

SOT89

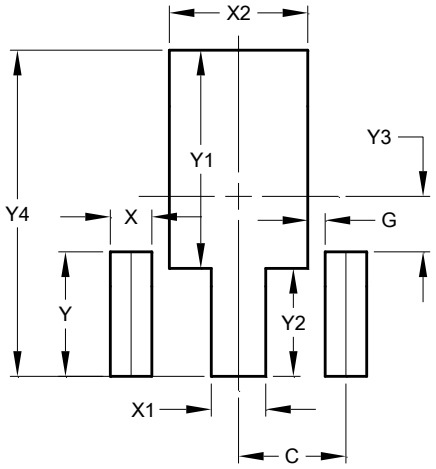


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions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