60V NPN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89

Features

- BV_{CEO} > 60V
- I_C = 5A High Continuous Current
- R_{SAT} = 30mΩ for a Low Equivalent On-Resistance
- Low Saturation Voltage $V_{CE(SAT)}$ < 65mV @ I_C = 1A
- h_{FE} Specified Up to 10A for High Current Gain Hold Up
- Complementary PNP Type: ZXTP2012Z
- **Lead-Free Finish; 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

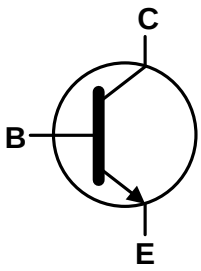
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.05 grams (Approximate)

Application

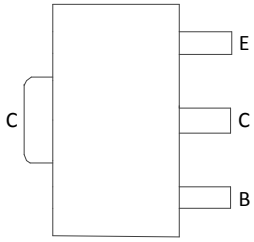
- Emergency Lighting Circuits
- Motor Driving (Including DC Fans)
- Backlight Inverters
- Power Switches
- Gate Driving MOSFETs and IGBTs

SOT89

Top View



Device Symbol



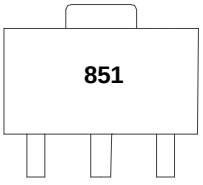
Top View
Pin Out

Ordering Information (Note 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXTN2010ZTA	AEC-Q101	851	7	12	1,000
ZXTN2010Z-13R	AEC-Q101	851	13	12	4,000
ZXTN2010ZQTA	Automotive	851	7	12	1,000

Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please 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



851 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	7	V
Base Current	I_B	2	A
Continuous Collector Current	I_C	5	A
Peak Pulse Current	I_{CM}	20	A

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

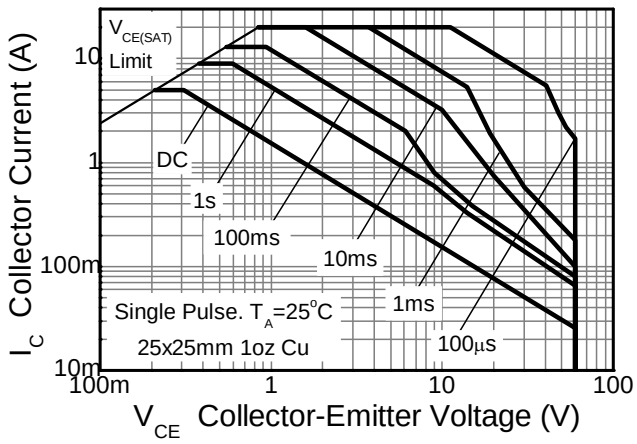
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6) Linear Derating Factor	P_D	1.5 12	W mW/°C
Power Dissipation (Note 7) Linear Derating Factor	P_D	2.1 16.8	W mW/°C
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	83	°C/W
Thermal Resistance, Junction to Ambient (Note 7)	$R_{\theta JA}$	60	°C/W
Thermal Resistance, Junction to Leads (Note 8)	$R_{\theta JL}$	3.23	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 9)

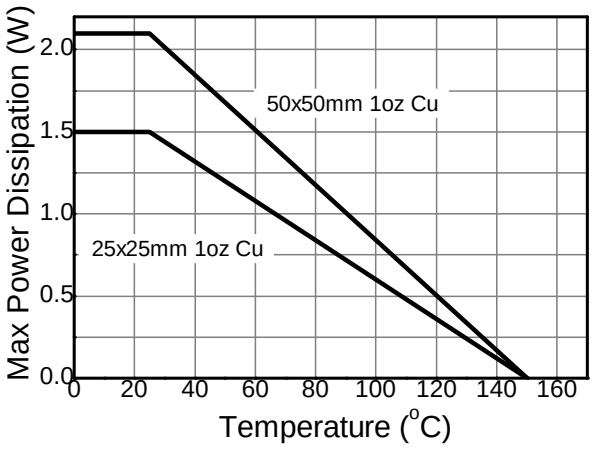
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	≥ 4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	≥ 400	V	C

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. Thermal resistance from junction to solder-point (on the exposed collector pad).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

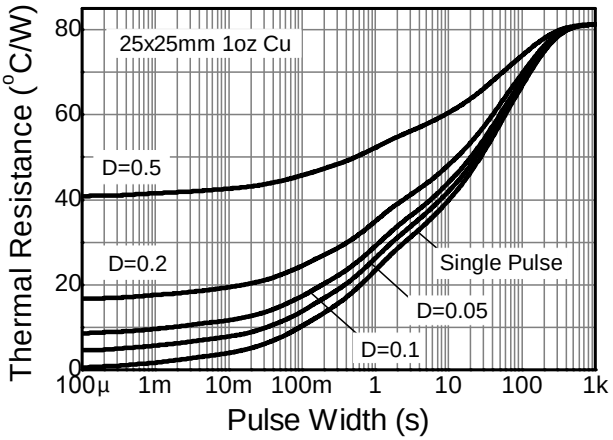
Thermal Characteristics and Derating Information



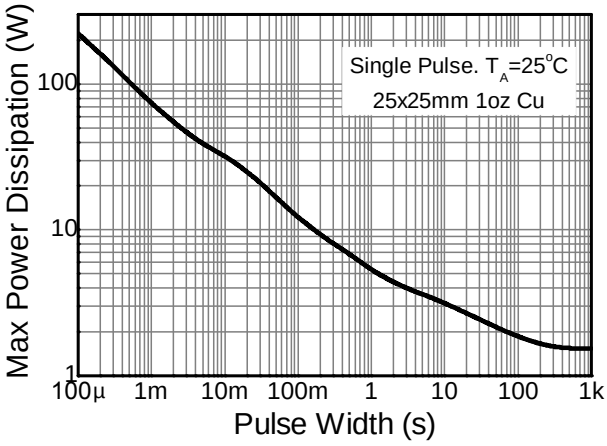
Safe Operating Area



Derating Curve



Transient Thermal Impedance



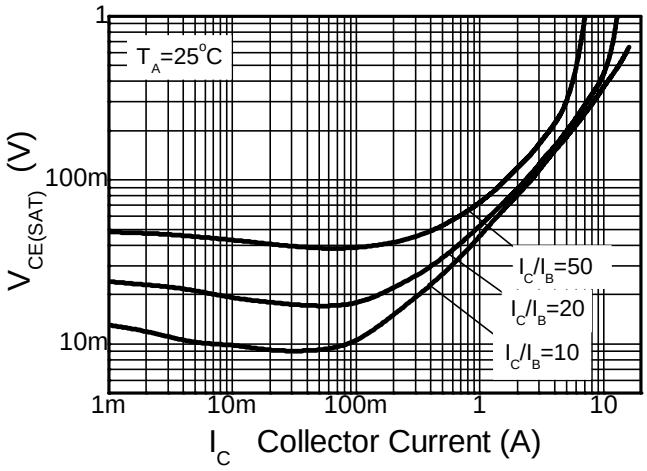
Pulse Power Dissipation

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

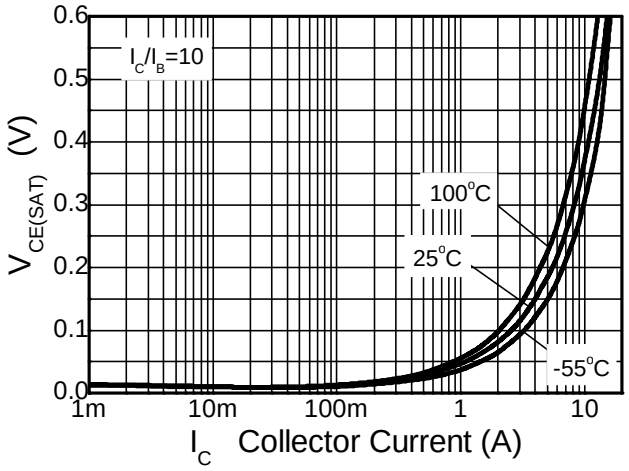
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	150	190	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CER}	150	190	—	V	I_C = 1µA, R_B ≤ 1kΩ
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	60	80	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.1	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	< 1	50 500	nA nA	V_{CB} = 120V V_{CB} = 120V, T_A = +100°C
Collector Cutoff Current	I_{CER} R ≤ 1kΩ	—	< 1	100 500	nA nA	V_{CB} = 120V V_{CB} = 120V, T_A = +100°C
Emitter Cutoff Current	I_{EBO}	—	< 1	10	nA	V_{EB} = 6V
DC Current Transfer Static Ratio (Note 10)	h_{FE}	100	200	—	—	I_C = 10mA, V_{CE} = 1V
		100	200	300		I_C = 2A, V_{CE} = 1V
		55	105	—		I_C = 5A, V_{CE} = 1V
		20	40	—		I_C = 10A, V_{CE} = 1V
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(SAT)}$	—	17	30	mV	I_C = 100mA, I_B = 5mA
		—	35	55		I_C = 1A, I_B = 100mA
		—	40	65		I_C = 1A, I_B = 50mA
		—	90	125		I_C = 2A, I_B = 50mA
		—	170	230		I_C = 6A, I_B = 300mA
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(SAT)}$	—	970	1100	mV	I_C = 6A, I_B = 300mA
Base-Emitter Turn-on Voltage (Note 10)	$V_{BE(ON)}$	—	910	1050	mV	I_C = 6A, V_{CE} = 1V
Transitional Frequency	f_T	—	130	—	MHz	I_C = 100mA, V_{CE} = 10V, f = 50MHz
Output Capacitance	C_{OBO}	—	31	—	pF	V_{CB} = 10V, f = 1MHz,
Switching Time	t_{ON}	—	42	—	ns	V_{CC} = 10V, I_C = 1A
	t_{OFF}		760			I_{B1} = -I_{B2} = 100mA

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

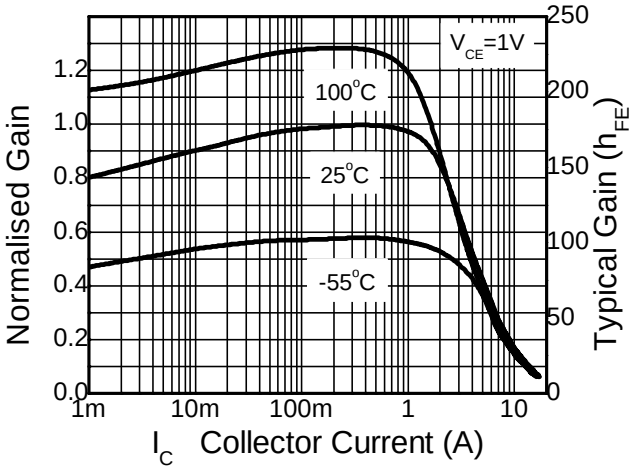
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



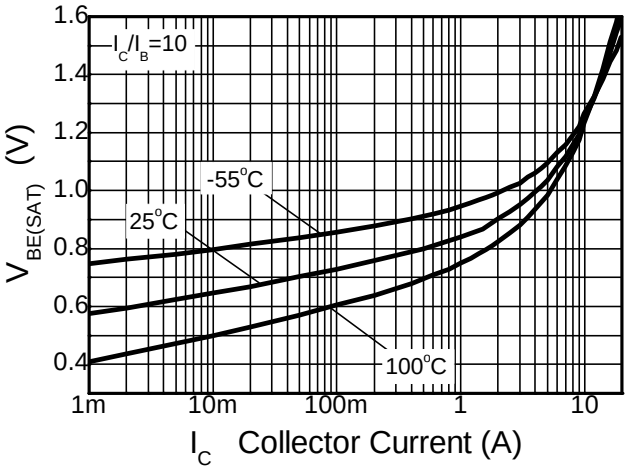
$V_{CE(SAT)}$ v I_C



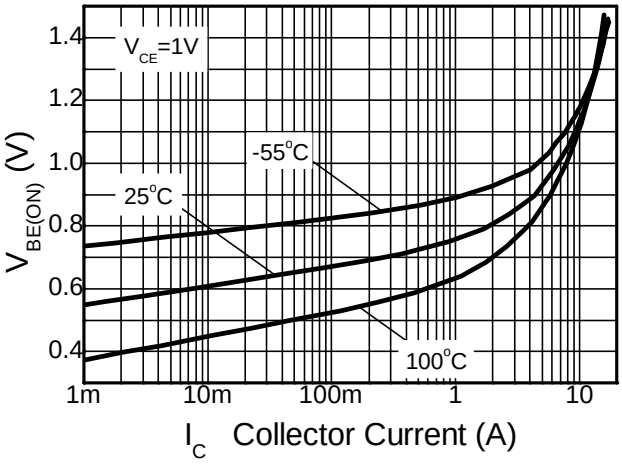
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C

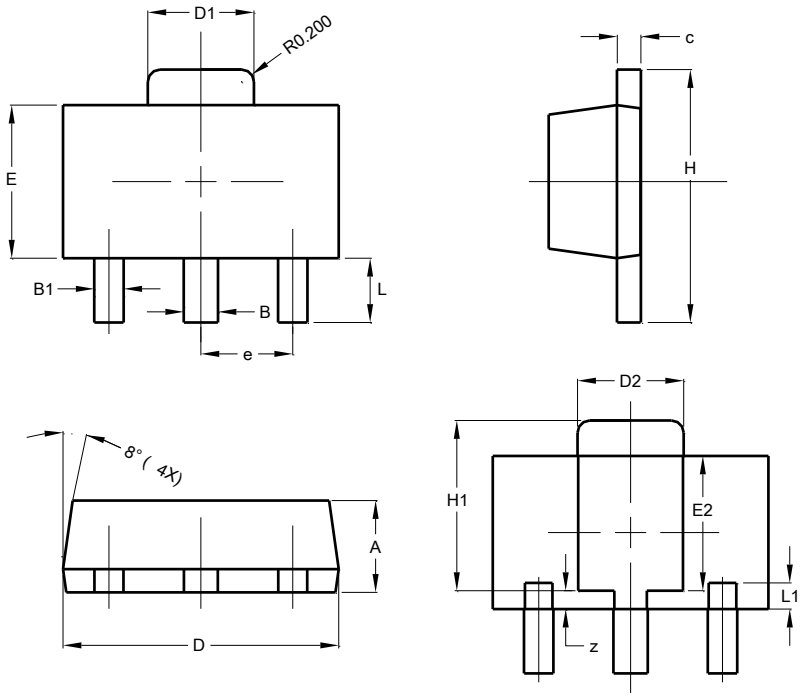


$V_{BE(ON)}$ v I_C

Package Outline Dimensions

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

SOT89

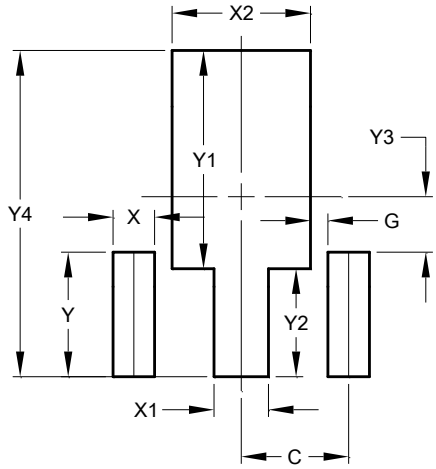


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions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