



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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## Features

- $BV_{CEO} > 100V$
- $BV_{ECO} > 6V$
- $I_C = 2.5A$  Continuous Collector Current
- $I_{CM} = 3.5A$  Peak Collector Current
- $V_{CE(SAT)} < 100mV @ 1A$
- $R_{CE(SAT)} = 80m\Omega$  for a Low Equivalent On-Resistance
- Complementary PNP Type: NK-ZXTP25100CZ

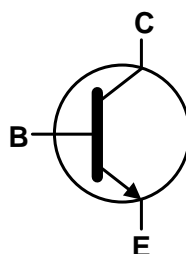
## Mechanical Data

- 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)

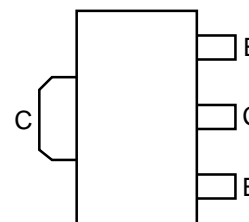
SOT89



Top View



Device Symbol



Top View  
Pin Out

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	180	V
Collector-Emitter Voltage (Forward Blocking)	V <sub>CEx</sub>	180	V
Collector-Emitter Voltage	V <sub>CE0</sub>	100	V
Emitter-Collector Voltage (Reverse Blocking)	V <sub>EC0</sub>	6	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	2.5	A
Peak Pulse Current	I <sub>CM</sub>	3.5	A
Base Current	I <sub>B</sub>	1	A

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

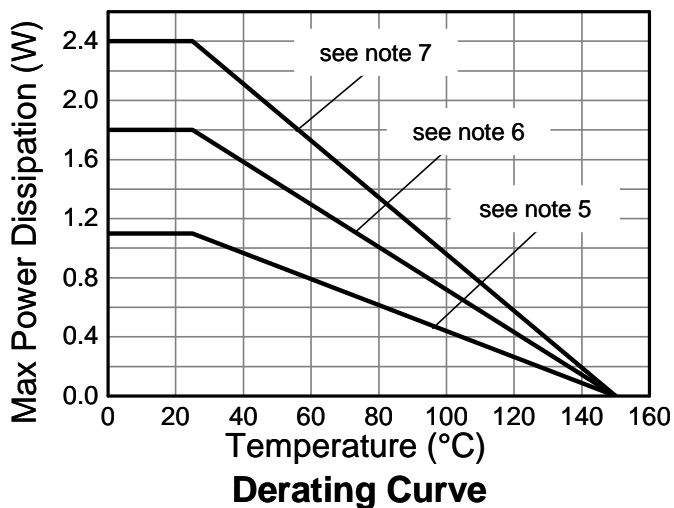
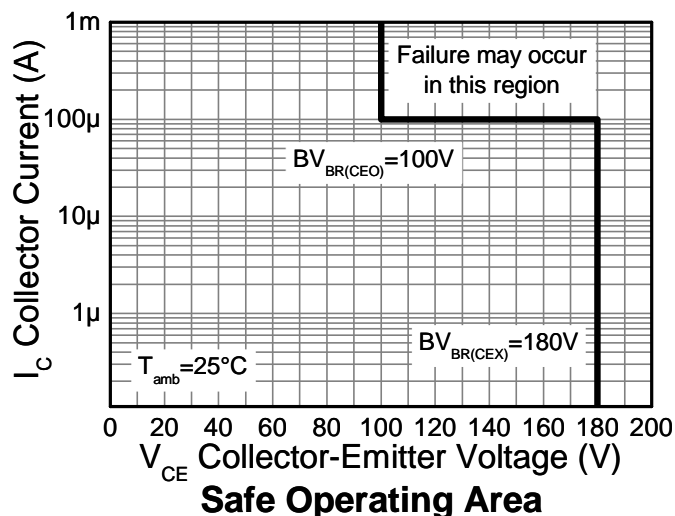
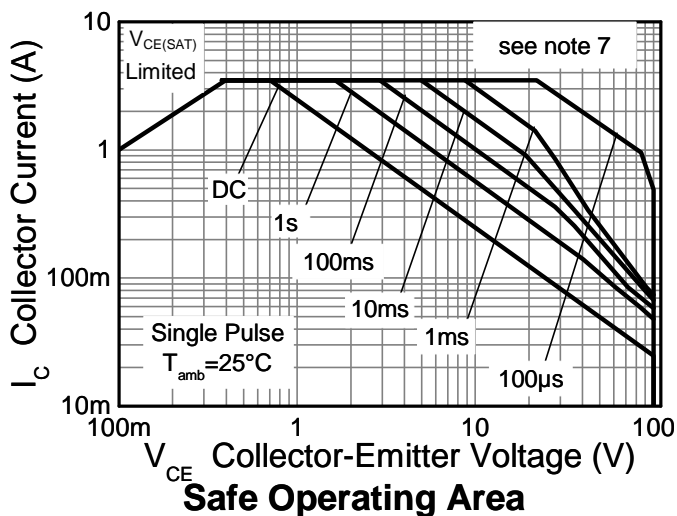
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.1	W mW/°C
		8.8	
		1.8	
		14.4	
		2.4	
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	19.2	°C/W
		4.46	
		35.7	
		117	
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	68	°C/W
		51	
		28	
		7.95	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	7.95	°C
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 10)

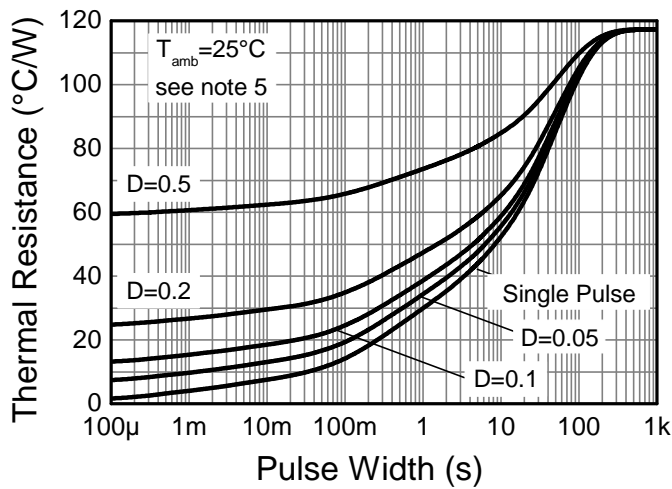
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
- For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 0.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
  - Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
  - Same as Note 7, except the device is measured at t<5 seconds.
  - Thermal resistance from junction to solder-point (on the exposed collector pad).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

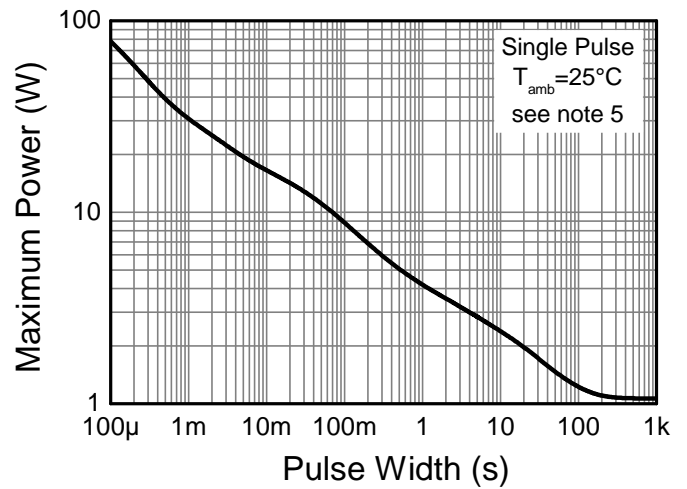
**Thermal Characteristics and Derating Information**



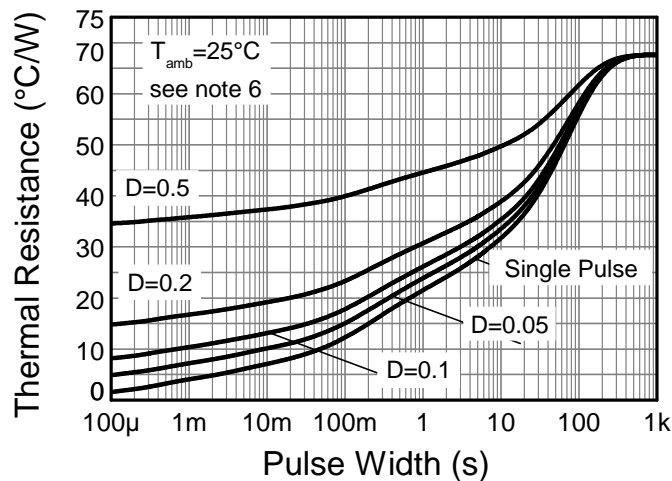
**Thermal Characteristics and Derating Information**



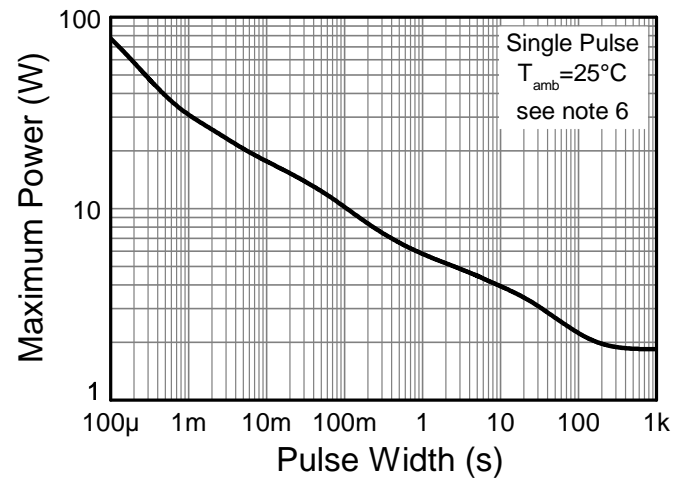
**Transient Thermal Impedance**



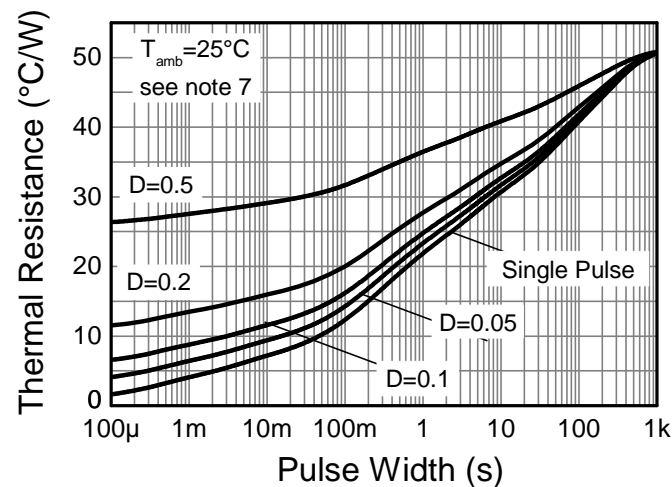
**Pulse Power Dissipation**



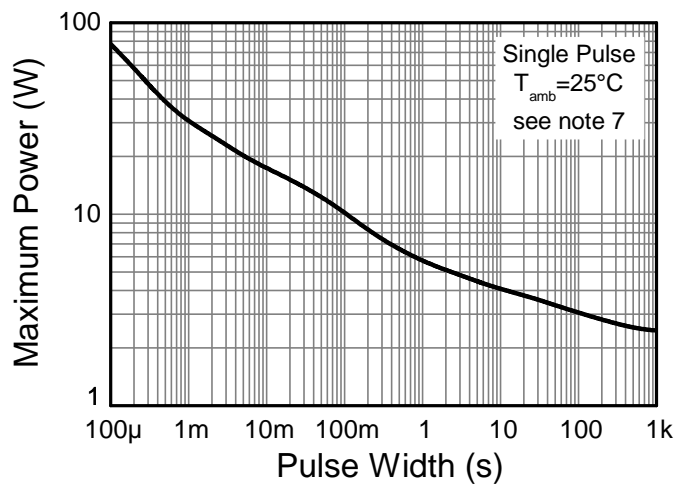
**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Transient Thermal Impedance**



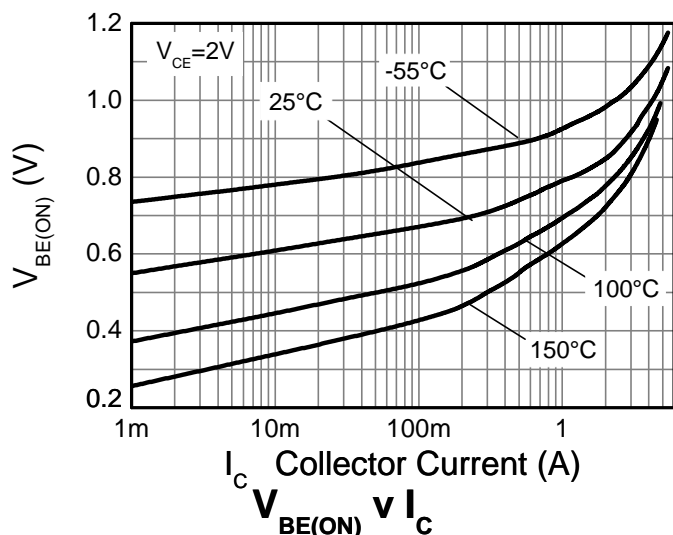
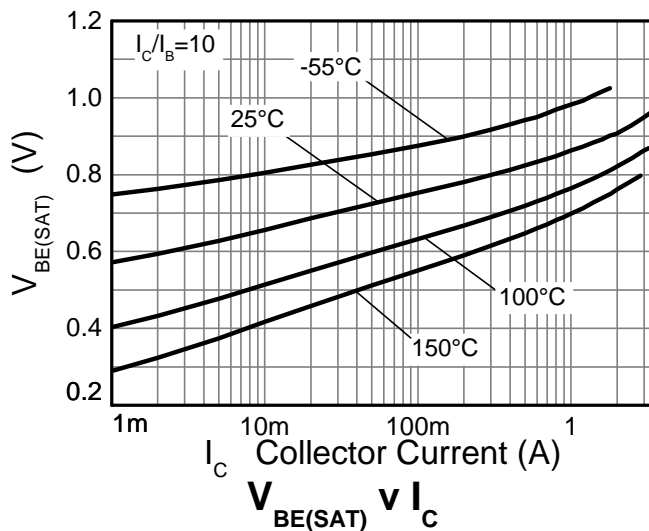
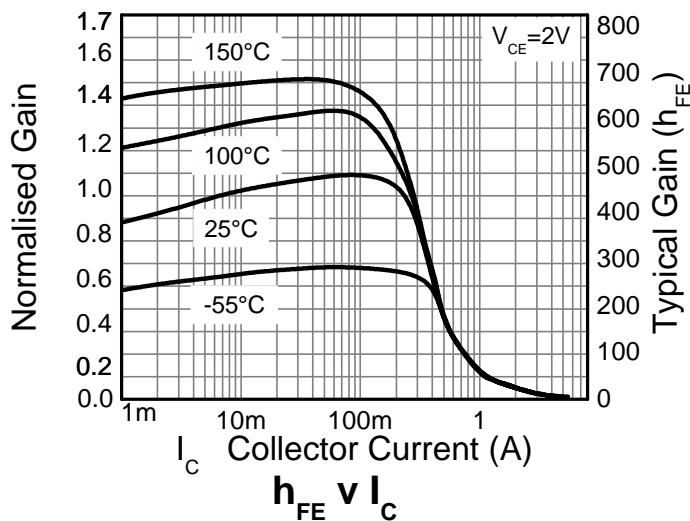
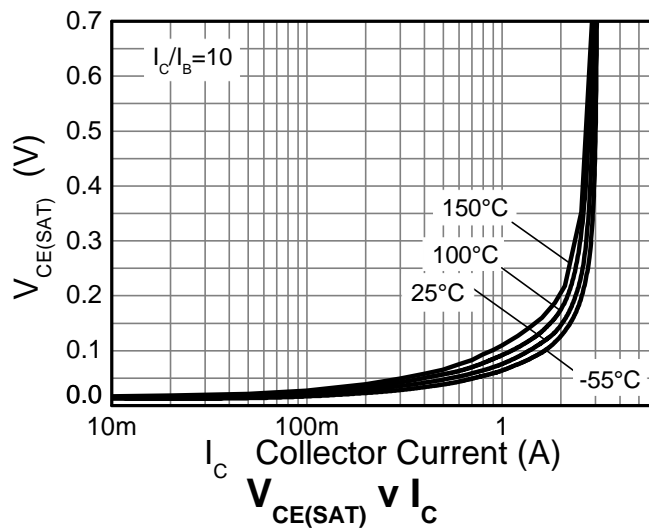
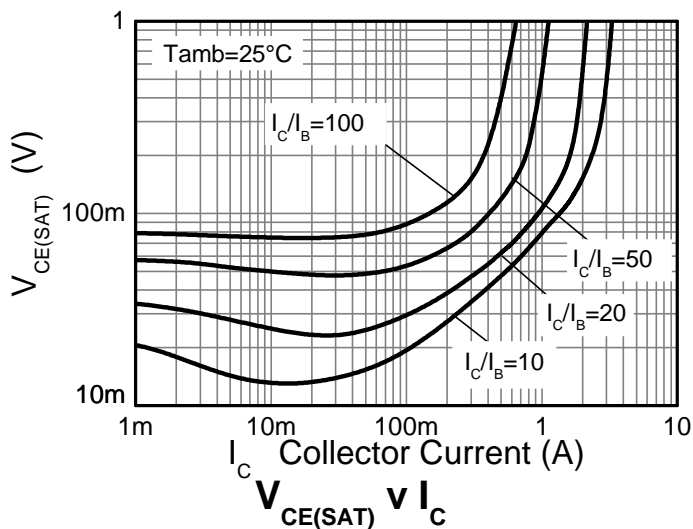
**Pulse Power Dissipation**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	180	220	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Forward Blocking)	$BV_{CEX}$	180	220	—	V	$I_C = 100\mu\text{A}$ , $R_{BE} < 1\text{k}\Omega$ or $-1\text{V} > V_{BE} > 0.25\text{V}$
Collector-Emitter Breakdown Voltage (Note 11)	$BV_{CEO}$	100	130	—	V	$I_C = 10\text{mA}$
Emitter-Collector Breakdown Voltage (Reverse Blocking)	$BV_{ECX}$	6	8.2	—	V	$I_E = 100\mu\text{A}$ , $R_{BC} < 1\text{k}\Omega$ or $0.25\text{V} > V_{BC} > -0.25\text{V}$
Emitter-Collector Breakdown Voltage (Reverse Blocking)	$BV_{ECO}$	6	8.7	—	V	$I_E = 100\mu\text{A}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.3	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	$I_{CBO}$	—	<1	50 0.5	nA $\mu\text{A}$	$V_{CB} = 180\text{V}$ $V_{CB} = 180\text{V}$ , $T_A = +100^\circ\text{C}$
Collector-Emitter Cutoff Current	$I_{CEX}$	—	—	100	nA	$V_{CE} = 100\text{V}$ , $R_{BE} < 1\text{k}\Omega$ or $1\text{V} < V_{BE} < 0.25\text{V}$
Emitter Cutoff Current	$I_{EBO}$	—	<1	50	nA	$V_{EB} = 5.6\text{V}$
DC Current Transfer Static Ratio (Note 11)	$h_{FE}$	300 120 40 —	450 170 60 20	900 — — —	—	$I_C = 10\text{mA}$ , $V_{CE} = 2\text{V}$ $I_C = 0.5\text{A}$ , $V_{CE} = 2\text{V}$ $I_C = 1\text{A}$ , $V_{CE} = 2\text{V}$ $I_C = 2.5\text{A}$ , $V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(SAT)}$	—	120 80 220	170 100 345	mV	$I_C = 0.5\text{A}$ , $I_B = 10\text{mA}$ $I_C = 1\text{A}$ , $I_B = 100\text{mA}$ $I_C = 2.5\text{A}$ , $I_B = 250\text{mA}$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(SAT)}$	—	935	1000	mV	$I_C = 2.5\text{A}$ , $I_B = 250\text{mA}$
Base-Emitter Turn-on Voltage (Note 11)	$V_{BE(ON)}$	—	890	950	mV	$I_C = 2.5\text{A}$ , $V_{CE} = 2\text{V}$
Transitional Frequency	$f_T$	—	175	—	MHz	$I_E = 50\text{mA}$ , $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Input Capacitance	$C_{IBO}$	—	154	250	pF	$V_{EB} = 0.5\text{V}$ , $f = 1\text{MHz}$
Output Capacitance	$C_{OBO}$	—	8.7	15	pF	$V_{CB} = 10\text{V}$ , $f = 1\text{MHz}$
Delay Time	$t_D$	—	16.4	—	ns	$I_C = 500\text{mA}$ , $V_{CC} = 10\text{V}$ , $I_{B1} = -I_{B2} = 50\text{mA}$
Rise Time	$t_R$	—	115	—	ns	
Storage Time	$t_S$	—	763	—	ns	
Fall Time	$t_F$	—	158	—	ns	

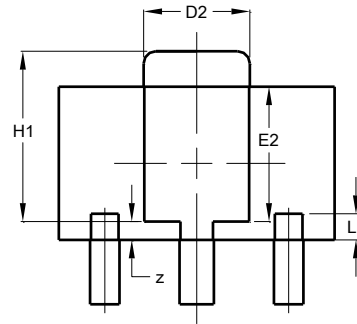
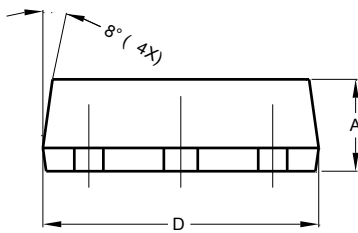
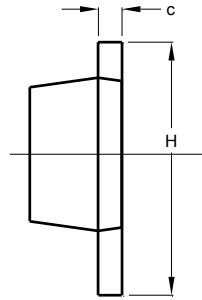
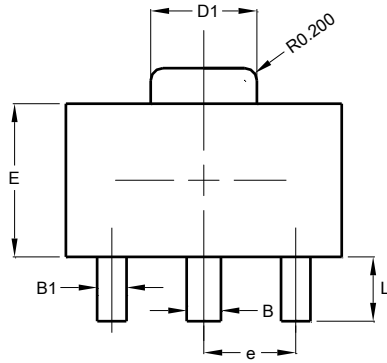
 Note: 11. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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



### Package Outline Dimensions

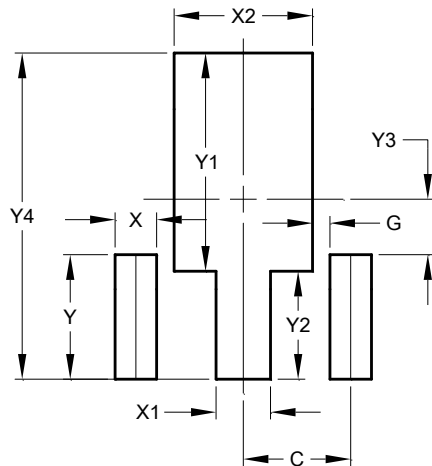
SOT89



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

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

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.