


60V NPN MEDIUM POWER TRANSISTOR IN SOT89

Features

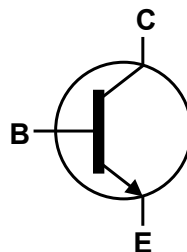
- $BV_{CEO} > 60V$
- $I_C = 1A$ Continuous Collector Current
- $I_{CM} = 2A$ Peak Pulse Current
- $R_{CE(sat)} = 195m\Omega$ for a Low Equivalent On-Resistance
- h_{FE} characterized up to 2A for high current gain hold up
- Complementary PNP Type: FCX591
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

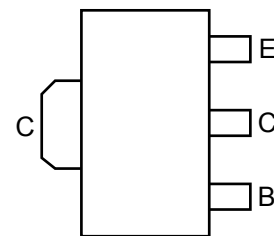
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 
- Weight: 0.055 grams (Approximate)



Top View



Equivalent Circuit



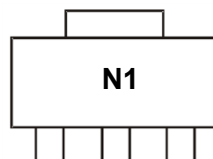
Top View
Pin-Out

Ordering Information (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX491TA	AEC-Q101	N1	7	12mm	1,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



N1= Product Type Marking Code

Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	80	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	1	A
Peak Pulse Current	I_{CM}	2	A

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

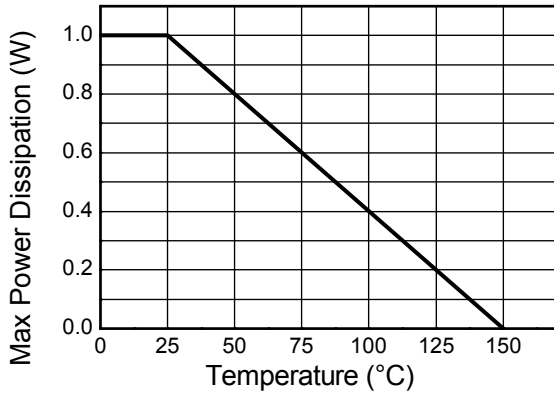
Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	(Note 5)	1
		(Note 6)	1.5
		(Note 7)	2.0
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	(Note 5)	125
		(Note 6)	83
		(Note 7)	60
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	22	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	16	
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +150	

ESD Ratings (Note 10)

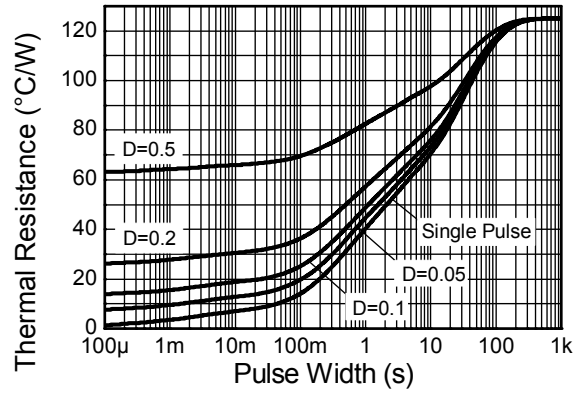
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
 7. Same as Note 5, 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. Thermal resistance from junction to the top of the case.
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

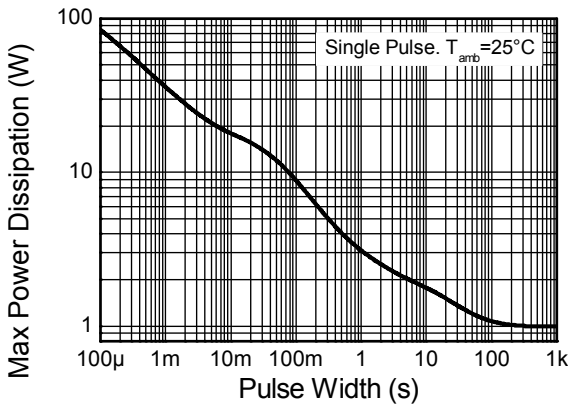
Thermal Characteristics and Derating Information



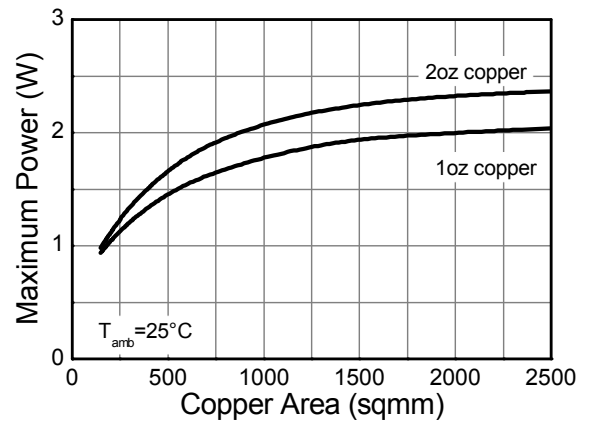
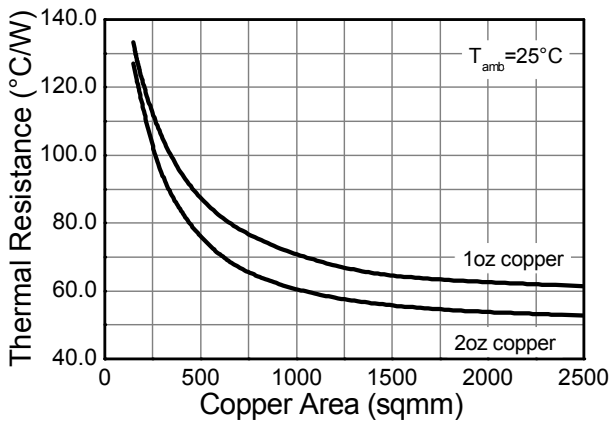
Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

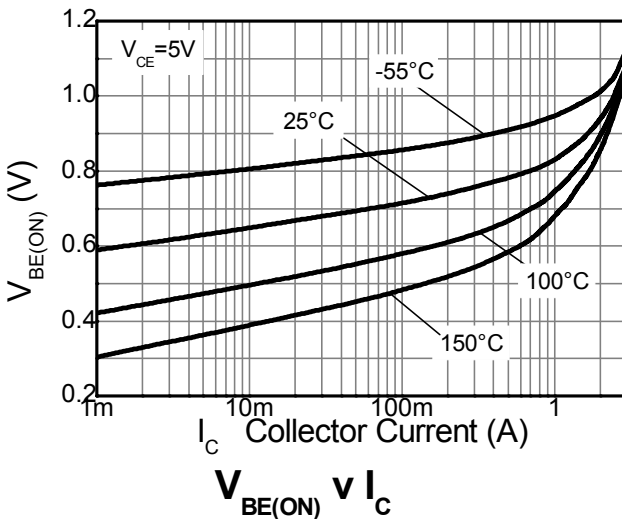
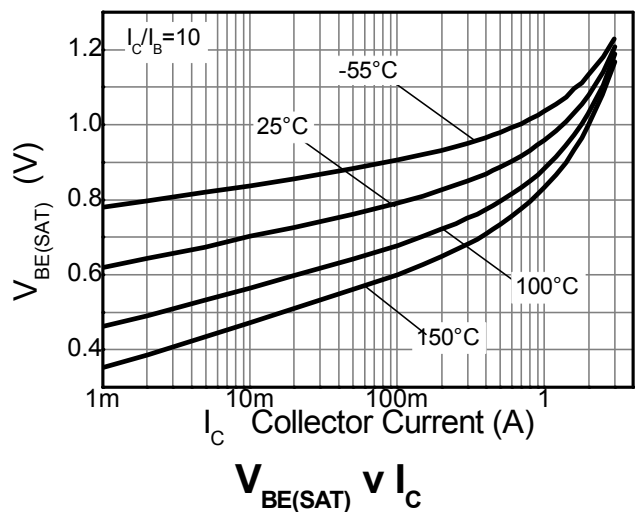
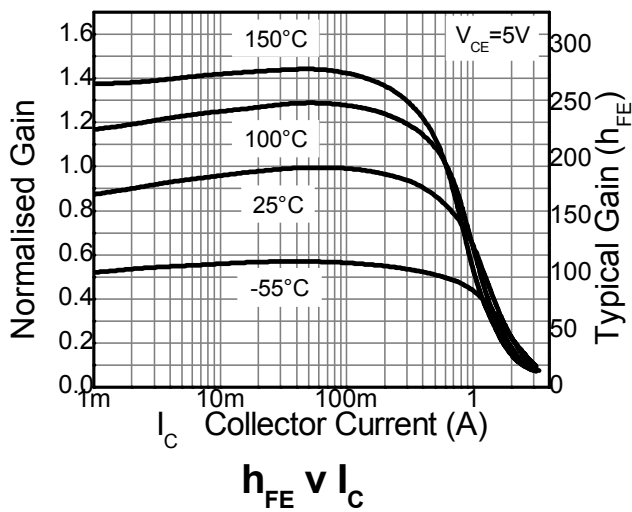
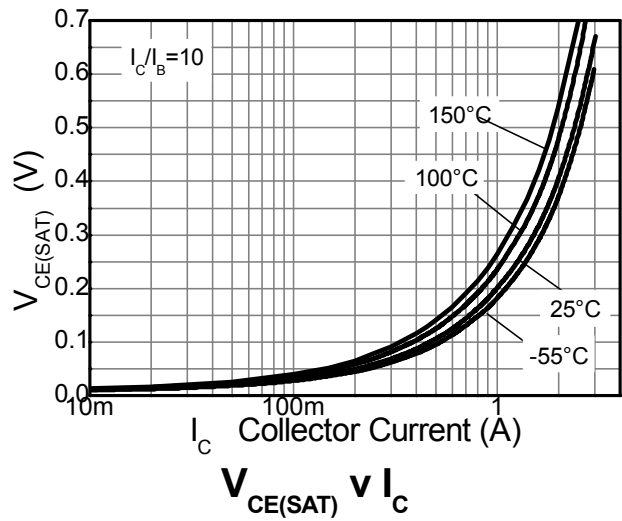
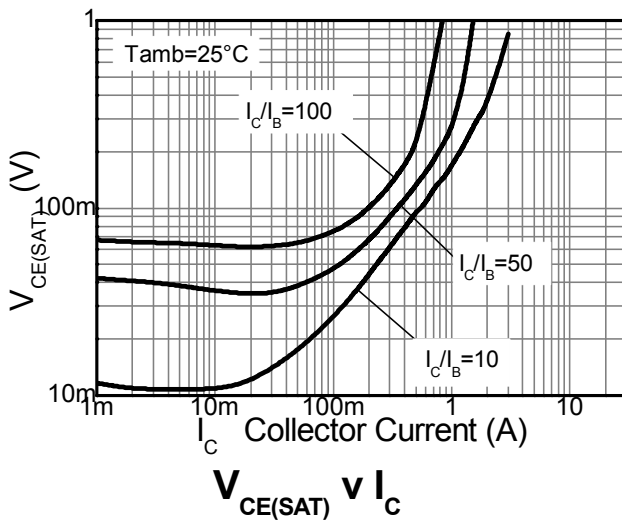


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV _{CBO}	80	—	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 11)	BV _{CEO}	60	—	—	V	I _C = 10mA
Emitter-Base Breakdown Voltage	BV _{EBO}	7	8.1	—	V	I _E = 100μA
Collector-Base Cutoff Current	I _{CBO}	—	<1	100	nA	V _{CB} = 60V
Collector Cutoff Current	I _{CES}	—	<1	100	nA	V _{CES} = 60V
Emitter Cutoff Current	I _{EBO}	—	<1	100	nA	V _{EB} = 5.6V
Collector-Emitter Saturation Voltage (Note 11)	V _{CE(sat)}	—	100 160	250 500	mV	I _C = 500mA, I _B = 50mA I _C = 1A, I _B = 100mA
Base-Emitter Saturation Voltage (Note 11)	V _{BE(sat)}	—	965	1100	mV	I _C = 1A, I _B = 100mA
Base-Emitter Turn-On Voltage (Note 11)	V _{BE(on)}	—	830	1000	mV	I _C = 1A, V _{CE} = 5V
DC Current Gain (Note 11)	h _{FE}	100 100 80 30	140 150 120 40	300	—	I _C = 1mA, V _{CE} = 5V I _C = 500mA, V _{CE} = 5V I _C = 1A, V _{CE} = 50V I _C = 2A, V _{CE} = 5V
Transitional Frequency	f _T	150	—	—	MHz	I _C = 50mA, V _{CE} = 10V f = 100MHz
Output capacitance	C _{obo}	—	—	10	pF	V _{CB} = 10V, f = 1MHz
Turn-On Time	t _{on}	—	49	—	ns	V _{CC} = 10V, I _{CC} = 0.5A I _{B1} = - I _{B2} = 25mA
Delay Time	t _d	—	18	—	ns	
Rise Time	t _r	—	31	—	ns	
Turn-Off Time	t _{off}	—	476	—	ns	
Storage Time	t _s	—	414	—	ns	
Fall Time	t _f	—	62	—	ns	

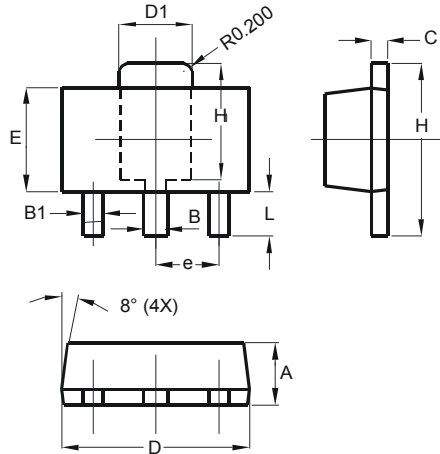
Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

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



Package Outline Dimensions

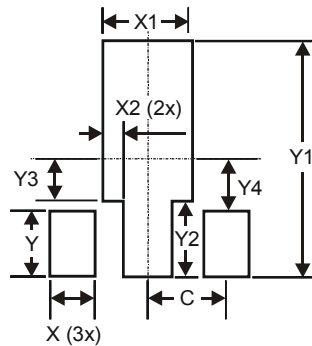
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
All Dimensions in mm		

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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