FCX491

60V NPN MEDIUM POWER TRANSISTOR IN SOT89

Features

- BV_{CEO} > 60V
- I_C = 1A Continuous Collector Current
- I_{CM} = 2A Peak Pulse Current
- $R_{CE(sat)}$ = 195mΩ 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**
- **PPAP Capable (Note 4)**

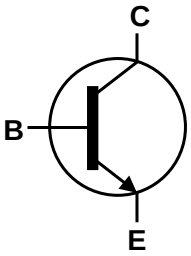
Mechanical Data

- 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: 0.055 grams (Approximate)

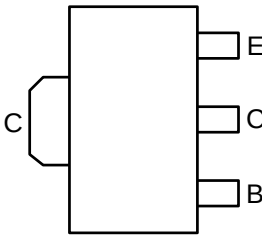
SOT89



Top View



Equivalent Circuit



Top View
Pin-Out

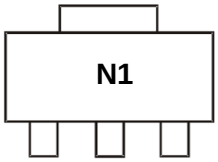
Ordering Information (Notes 4 and 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX491TA	AEC-Q101	N1	7	12mm	1,000
FCX491QTA	Automotive	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. 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 http://www.diodes.com/quality/product_compliance_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

SOT89



N1= Product Type Marking Code

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	1	W
	(Note 7)		1.5	
	(Note 8)		2.0	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	125	°C/W
	(Note 7)		83	
	(Note 8)		60	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	22	
Thermal Resistance, Junction to Case	(Note 10)	$R_{\theta JC}$	16	
Operating and Storage Temperature Range		T_J, T_{STG}	-65 to +150	°C

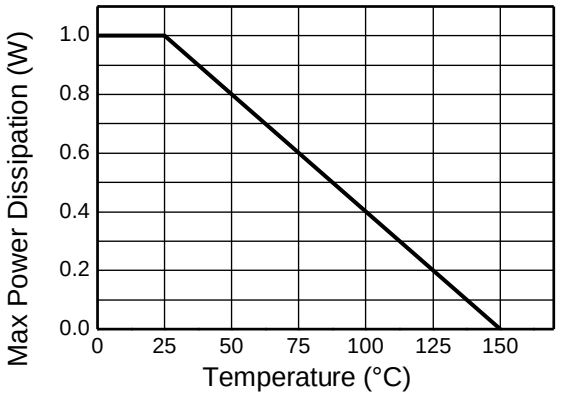
ESD Ratings (Note 11)

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

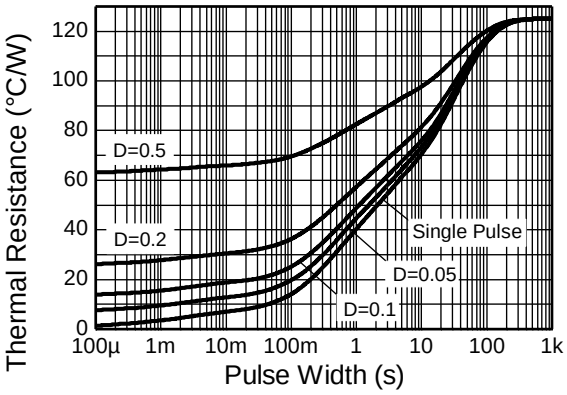
Notes:
6. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
7. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
8. Same as Note 5, except the device is mounted on 50mm x 50mm 1oz copper.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Thermal resistance from junction to the top of the case.
11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

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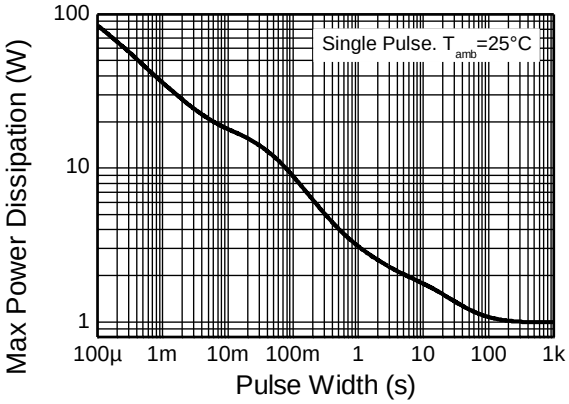
Thermal Characteristics and Derating Information



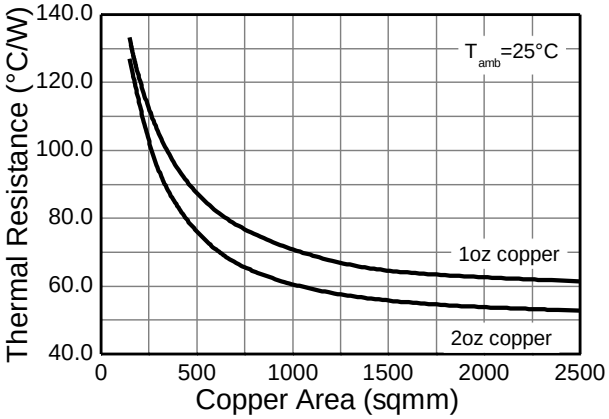
Derating Curve

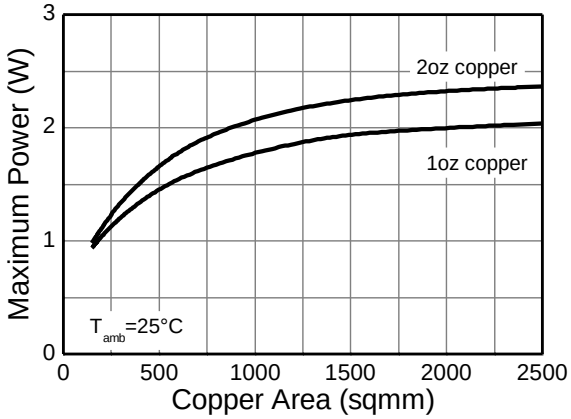


Transient Thermal Impedance



Pulse Power Dissipation





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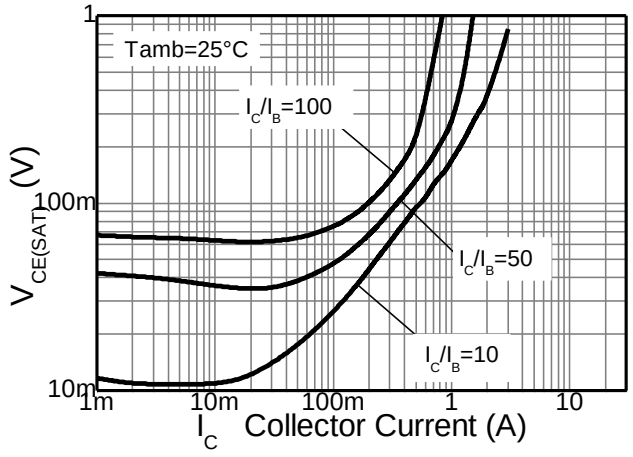
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	80	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 12)	BV_{CEO}	60	—	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.1	—	V	I_E = 100µA
Collector-Base Cut-Off Current	I_{CBO}	—	<1	100	nA	V_{CB} = 60V
Collector Cut-Off Current	I_{CES}	—	<1	100	nA	V_{CES} = 60V
Emitter Cut-Off Current	I_{EBO}	—	<1	100	nA	V_{EB} = 5.6V
Collector-Emitter Saturation Voltage (Note 12)	$V_{CE(sat)}$	— —	100 160	250 500	mV	I_C = 500mA, I_B = 50mA I_C = 1A, I_B = 100mA
Base-Emitter Saturation Voltage (Note 12)	$V_{BE(sat)}$	—	965	1100	mV	I_C = 1A, I_B = 100mA
Base-Emitter Turn-On Voltage (Note 12)	$V_{BE(on)}$	—	830	1000	mV	I_C = 1A, V_{CE} = 5V
DC Current Gain (Note 12)	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	

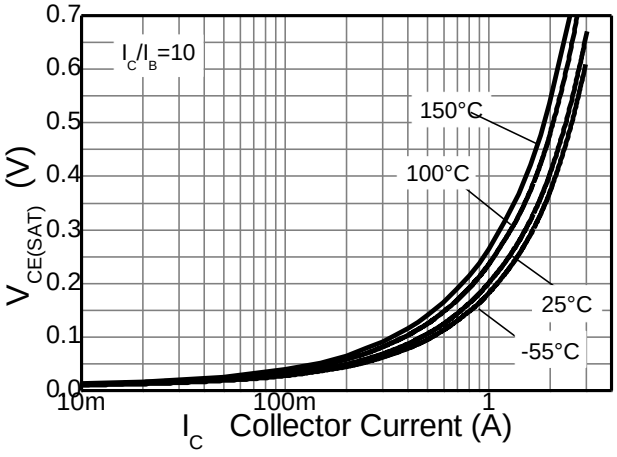
Note: 12. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%

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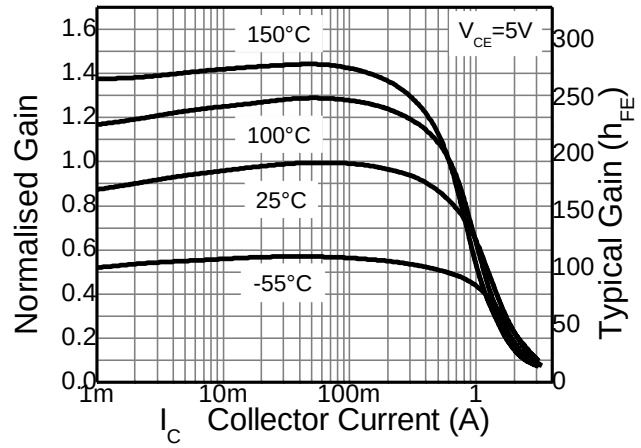
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



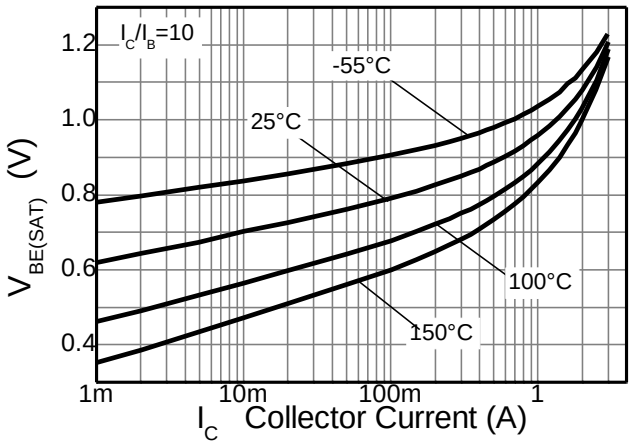
$V_{CE(SAT)}$ v I_C



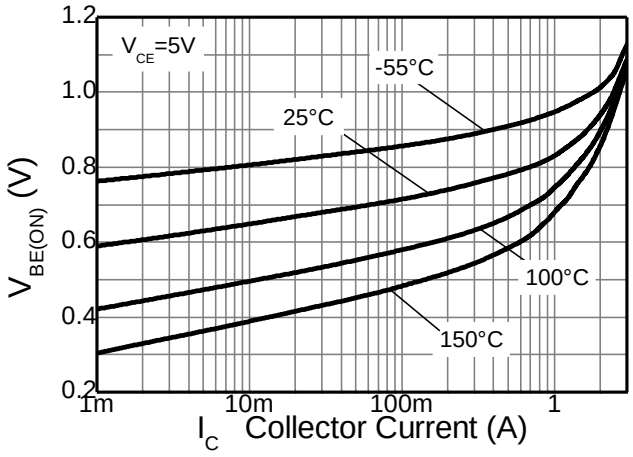
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C

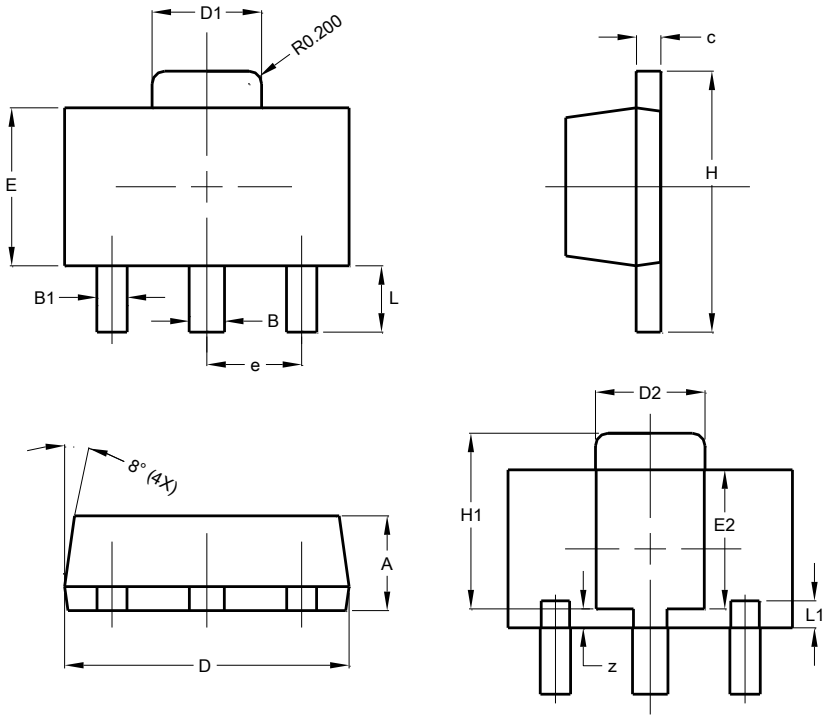


$V_{BE(ON)}$ v I_C

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Package Outline Dimensions

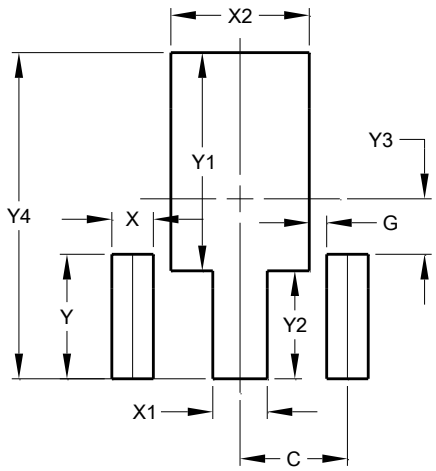
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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



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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