40V PNP MEDIUM POWER TRANSISTOR IN SOT89

Features

- BV_{CEO} > -40V
- Maximum Continuous Current I_C = -1A
- Low Saturation Voltage $V_{CE(sat)}$ < -500mV @ -1A
- Complementary NPN Type: FCX491A
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**
- **An automotive-compliant part is available under separate datasheet (FCX591AQ)**

Mechanical Data

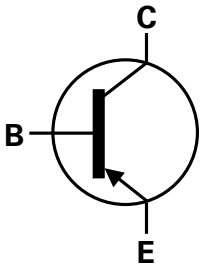
- Package: SOT89
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.05 grams (Approximate)

Application

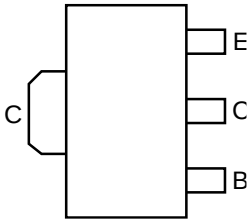
- Power MOSFET & IGBT gate driving
- Low loss power switching

SOT89

Top View



Device Symbol



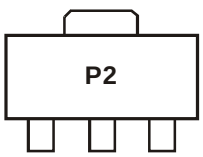
Top View
Pin Out

Ordering Information (Note 4)

Part Number	Status	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
						Qty.	Carrier
FCX591ATA	Released	SOT89	P2	7	12	1,000	Reel
FCX591A-13R	NRND (Use FCX591ATA)	SOT89	P2	13	12	4,000	Reel

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. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



P2 = Product Type Marking Code

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

Characteristic	Symbol	Limit	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-7	V
Continuous Collector Current	I_C	-1	A
Peak Pulse Current	I_{CM}	-2	A
Peak Base Current	I_B	-200	mA

Thermal Characteristics

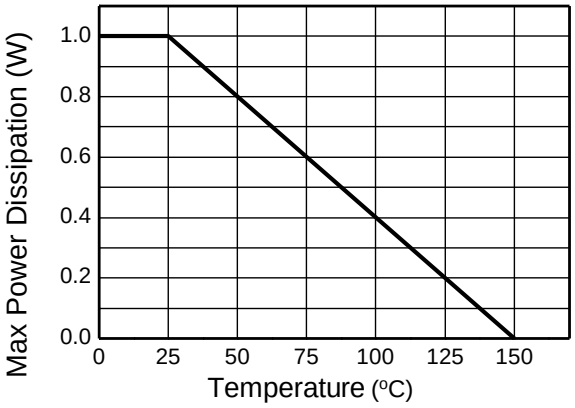
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	1	W
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	125	°C/W
Thermal Resistance, Junction to Leads (Note 6)	$R_{\theta JL}$	10.01	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +150	°C

ESD Ratings (Note 7)

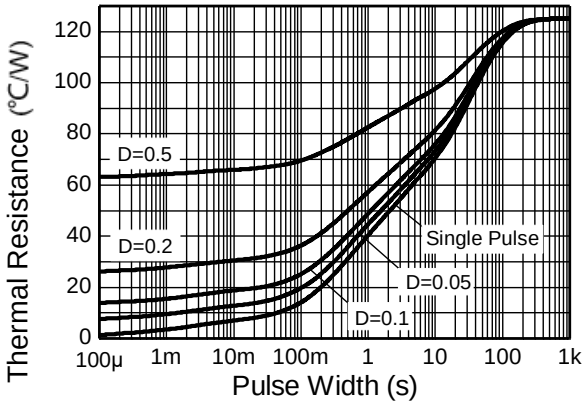
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device surface mounted on 15mm X 15mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; device measured when operating in steady state condition.
6. Thermal resistance from junction to solder-point (on the exposed collector pad).
7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

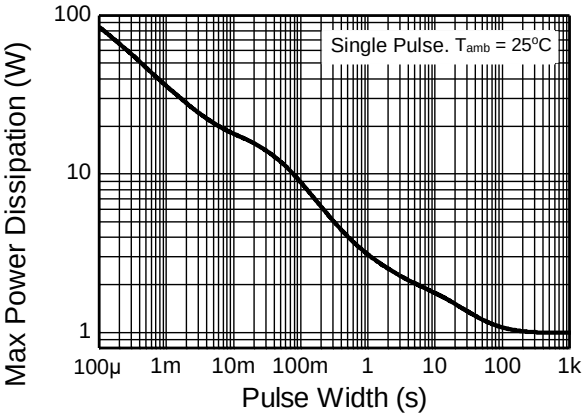
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



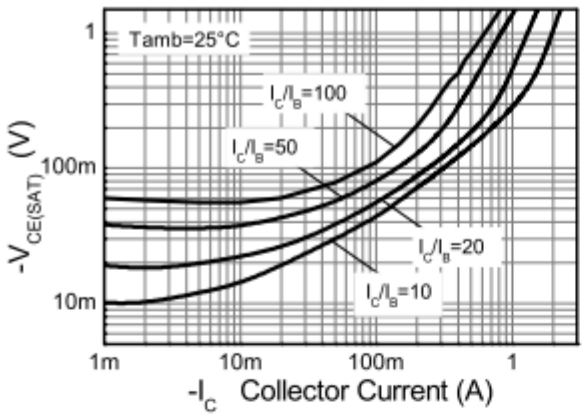
Pulse Power Dissipation

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

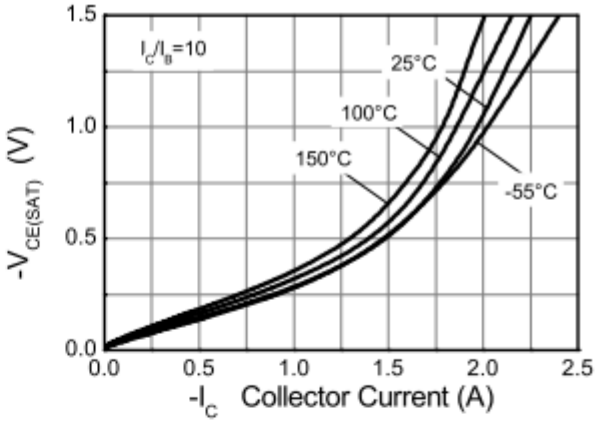
Characteristic	Symbol	Min	Typ.	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-40	—	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 8)	BV_{CEO}	-40	—	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	—	—	V	I_E = -100µA
Collector Cutoff Current	I_{CBO}	—	—	-100	nA	V_{CB} = -30V
Emitter Cutoff Current	I_{EBO}	—	—	-100	nA	V_{EB} = -4V
Emitter Cutoff Current	I_{CES}	—	—	-100	nA	V_{CES} = -30V
DC Current Transfer Static Ratio (Note 8)	h_{FE}	300 300 250 160 30	— — — — —	— 800 — — —	—	I_C = -1mA, V_{CE} = -5V I_C = -100mA, V_{CE} = -5V I_C = -500mA, V_{CE} = -5V I_C = -1A, V_{CE} = -5V I_C = -2A, V_{CE} = -5V
Collector-Emitter Saturation Voltage (Note 8)	$V_{CE(sat)}$	— —	— —	-0.2 -0.35 -0.5	V	I_C = -100mA, I_B = -1mA I_C = -500mA, I_B = -20mA I_C = -1A, I_B = -100mA
Base-Emitter Saturation Voltage (Note 8)	$V_{BE(sat)}$	—	—	-1.1	V	I_C = -1A, I_B = -50mA
Base-Emitter Turn-On Voltage (Note 8)	$V_{BE(on)}$	—	—	-1.0	V	I_C = -1A, V_{CE} = -5V
Transitional Frequency	f_T	150	—	—	MHz	I_E = -50mA, V_{CE} = -10V f = 100MHz
Output Capacitance	C_{obo}	—	—	10	pF	V_{CB} = -10V, f = 1MHz

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

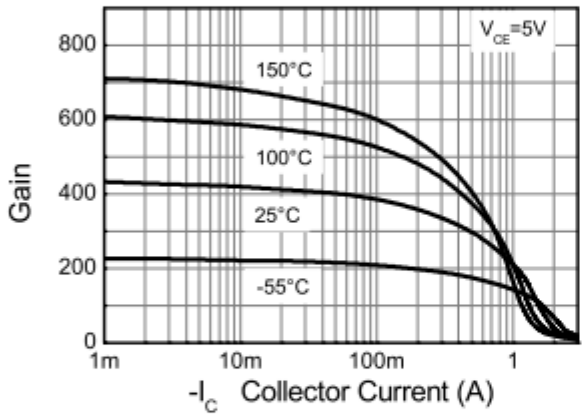
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



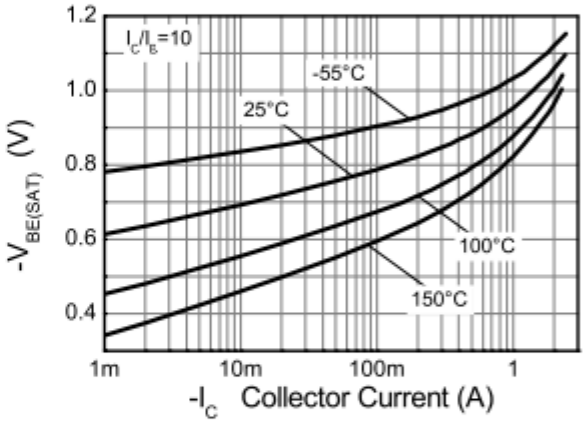
$V_{CE(SAT)}$ v I_C



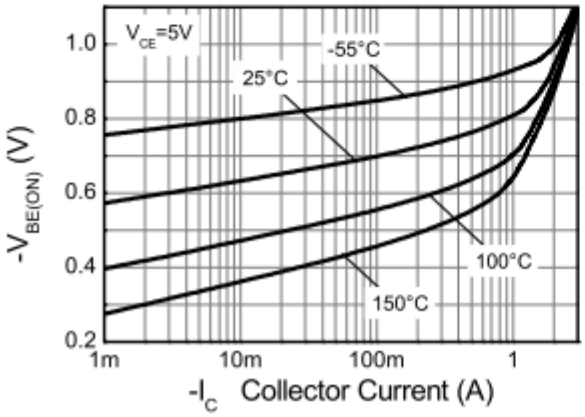
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C

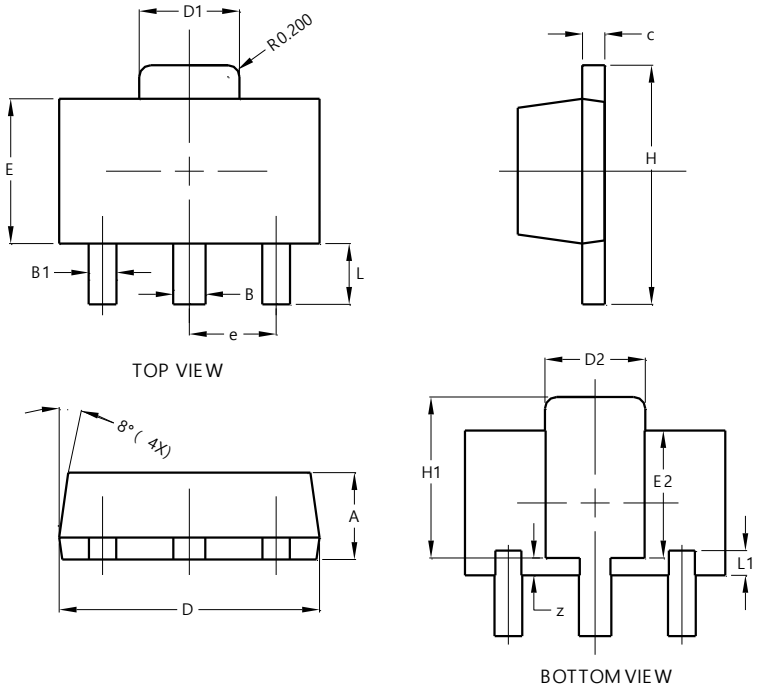


$V_{BE(ON)}$ v I_C

Package Outline Dimensions

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

SOT89

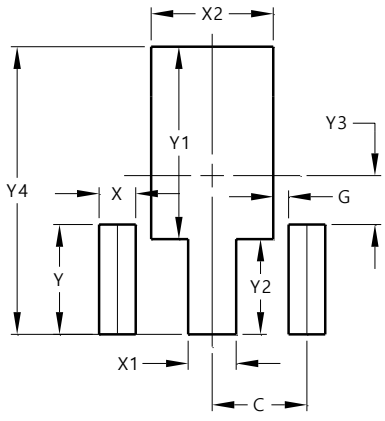


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions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