

## Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of automotive applications.

## Features

- $BV_{CEO} > -40V$
- Maximum Continuous Current  $I_C = -1A$
- Low Saturation Voltage  $V_{CE(SAT)} < -500mV @ -1A$
- Complementary NPN type: FCX491AQ
- **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

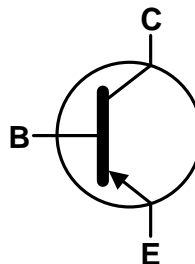
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.05 grams (Approximate)

## Application

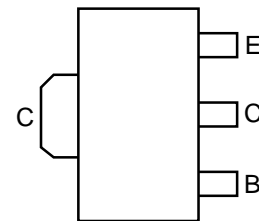
- Power MOSFET & IGBT Gate Driving
- Low Loss Power Switching



Top View



Device Symbol



Top View  
Pin Out

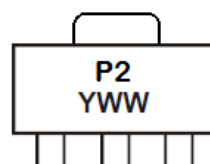
## Ordering Information (Note 5)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FCX591AQTA	P2	7	12	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](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. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

SOT89



P2 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y = Last Digit of Year (ex: 6 = 2016)  
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-40	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-1	A
Peak Pulse Current	I <sub>CM</sub>	-2	A
Peak Base Current	I <sub>B</sub>	-200	mA

### Thermal Characteristics

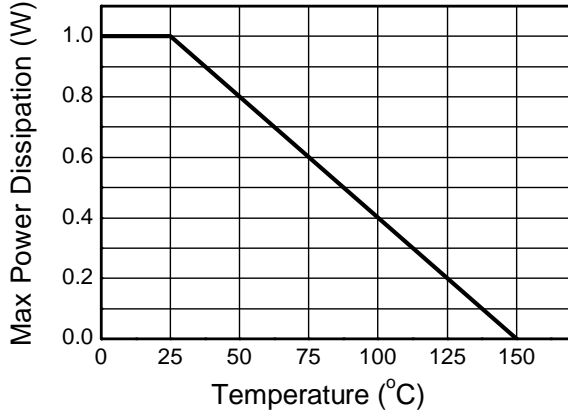
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	1	W
Thermal Resistance, Junction to Ambient Air (Note 6)	R <sub>θJA</sub>	125	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R <sub>θJL</sub>	10.01	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

### ESD Ratings (Note 8)

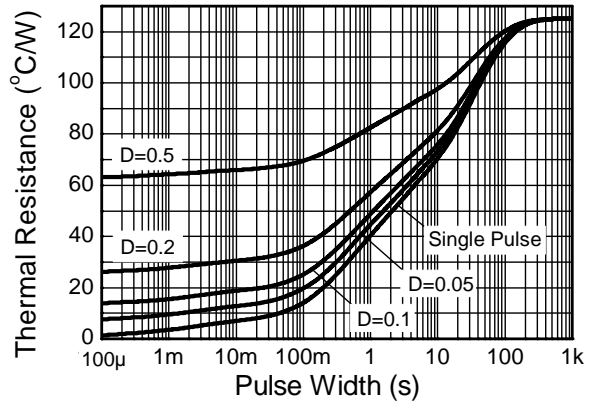
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	8,000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device surface mounted on 15mm X 15mm FR-4 PCB with high coverage of single sided 1 oz copper, in still air conditions; device measured when operating in steady state condition.
  7. Thermal resistance from junction to solder-point (on the exposed collector pad).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

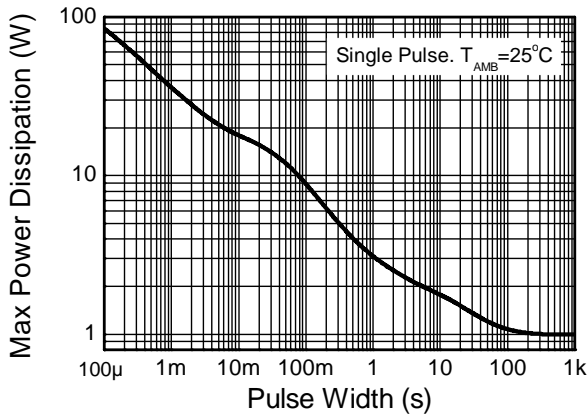
**Thermal Characteristics and Derating Information**



**Derating Curve**



**Transient Thermal Impedance**



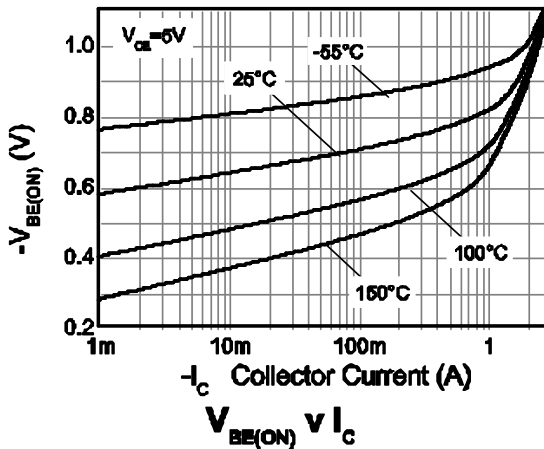
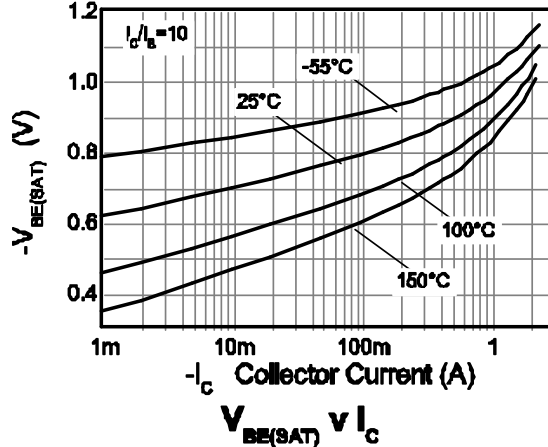
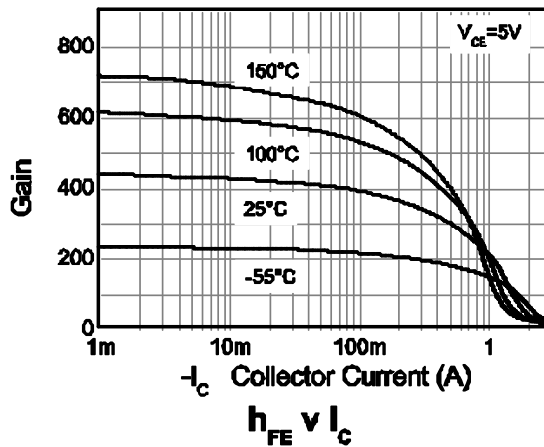
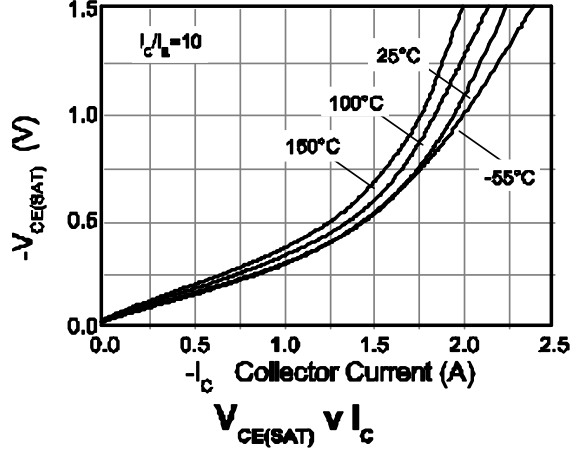
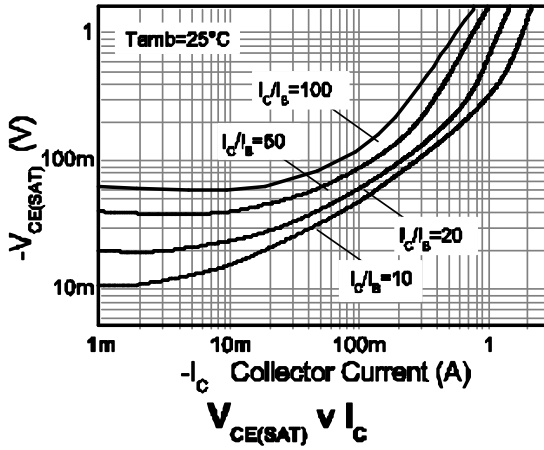
**Pulse Power Dissipation**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-40	-	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	$BV_{CEO}$	-40	-	-	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-	-	V	$I_E = -100\mu\text{A}$
Collector Base Cutoff Current	$I_{CBO}$	-	-	-100	nA	$V_{CB} = -30\text{V}$
Emitter Base Cutoff Current	$I_{EBO}$	-	-	-100	nA	$V_{EB} = -4\text{V}$
Collector Cutoff Current	$I_{CES}$	-	-	-100	nA	$V_{CES} = -30\text{V}$
DC Current Transfer Static Ratio (Note 9)	$h_{FE}$	300	-	-	-	$I_C = -1\text{mA}, V_{CE} = -5\text{V}$
		300	-	800		$I_C = -100\text{mA}, V_{CE} = -5\text{V}$
		250	-	-		$I_C = -500\text{mA}, V_{CE} = -5\text{V}$
		160	-	-		$I_C = -1\text{A}, V_{CE} = -5\text{V}$
		30	-	-		$I_C = -2\text{A}, V_{CE} = -5\text{V}$
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(SAT)}$	-	-	-0.2	V	$I_C = -100\text{mA}, I_B = -1\text{mA}$
		-	-	-0.35		$I_C = -500\text{mA}, I_B = -20\text{mA}$
		-	-	-0.5		$I_C = -1\text{A}, I_B = -100\text{mA}$
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(SAT)}$	-	-	-1.1	V	$I_C = -1\text{A}, I_B = -50\text{mA}$
Base-Emitter Turn-on Voltage (Note 9)	$V_{BE(ON)}$	-	-	-1.0	V	$I_C = -1\text{A}, V_{CE} = -5\text{V}$
Transitional Frequency	$f_T$	150	-	-	MHz	$I_E = -50\text{mA}, V_{CE} = -10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	$C_{obo}$	-	-	10	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$

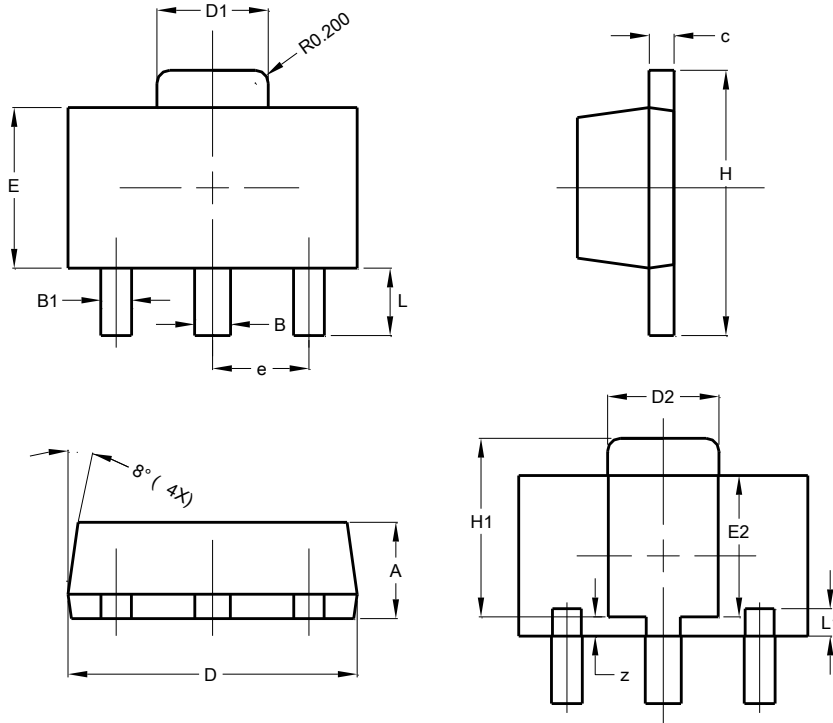
Notes: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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



**Package Outline Dimensions**

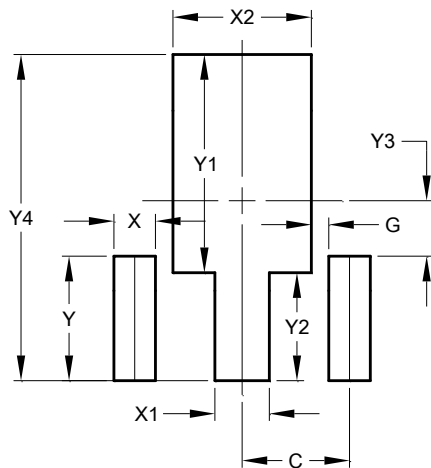
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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
<b>All Dimensions in mm</b>			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> 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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