

#### **400V PNP HIGH VOLTAGE TRANSISTOR IN SOT89**

#### **Description**

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

#### **Features**

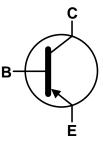
- BV<sub>CEO</sub> > -400V
- I<sub>C</sub> = -200mA High Continuous Current
- I<sub>CM</sub> = -500mA Peak Pulse Current
- Excellent hFE Characteristics up to -100mA
- Low Saturation Voltage V<sub>CE(sat)</sub> < -200mV @ -20mA</li>
- Complementary NPN Type: FCX458
- Totally Lead-Free & Fully RoHS Compliant (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**

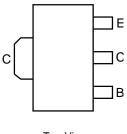
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound.
   UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.05 grams (Approximate)



Top View



Device Symbol



Top View Pin Out

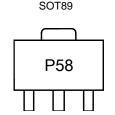
## Ordering Information (Notes 4 and 5)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FCX558QTA	Automotive	P58	7	12	1,000

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 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. Refer to 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**



P58 = Product Type Marking Code



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

Characteristic	Symbol	Limit	Unit
Collector-Base Voltage	$V_{CBO}$	-400	V
Collector-Emitter Voltage	$V_{\sf CEO}$	-400	V
Emitter-Base Voltage	$V_{EBO}$	-7	V
Continuous Collector Current	Ic	-200	mA
Peak Pulse Current	Ісм	-500	mA

# Thermal Characteristics (@TA = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit		
	(Note 6)		0.7		
Bower Discination	(Note 7)	Б	1.0	W	
Power Dissipation	(Note 8)	$P_D$	1.5		
	(Note 9)		2.0		
	(Note 6)		178		
Thermal Resistance, Junction to Ambient Air	(Note 7)	D	125	°C/W	
Thermal Resistance, Junction to Ambient Air	(Note 8)	$R_{ heta JA}$	83		
	(Note 9)		60	1	
Thermal Resistance, Junction to Lead (Note 10)		$R_{ heta JL}$	22		
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C		

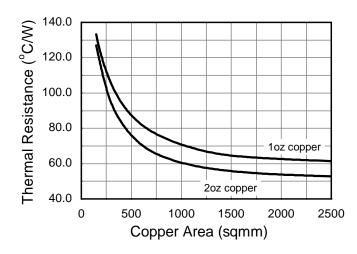
## ESD Ratings (Note 11)

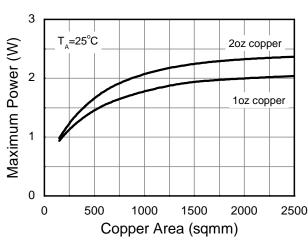
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	С

Notes:

- 6. For a device mounted with the exposed collector pad on minimum recommended pad layout (MRP) 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 6, except the device is mounted with the exposed collector pad on 15mm x 15mm 1oz copper.
- 8. Same as Note 6, except the device is mounted with the exposed collector pad on 25mm x 25mm 1oz copper.
- 9. Same as Note 6, except the device is mounted with the exposed collector pad on 50mm x 50mm 1oz copper.
- 10. Thermal resistance from junction to solder-point (on the exposed collector pad).
- 11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

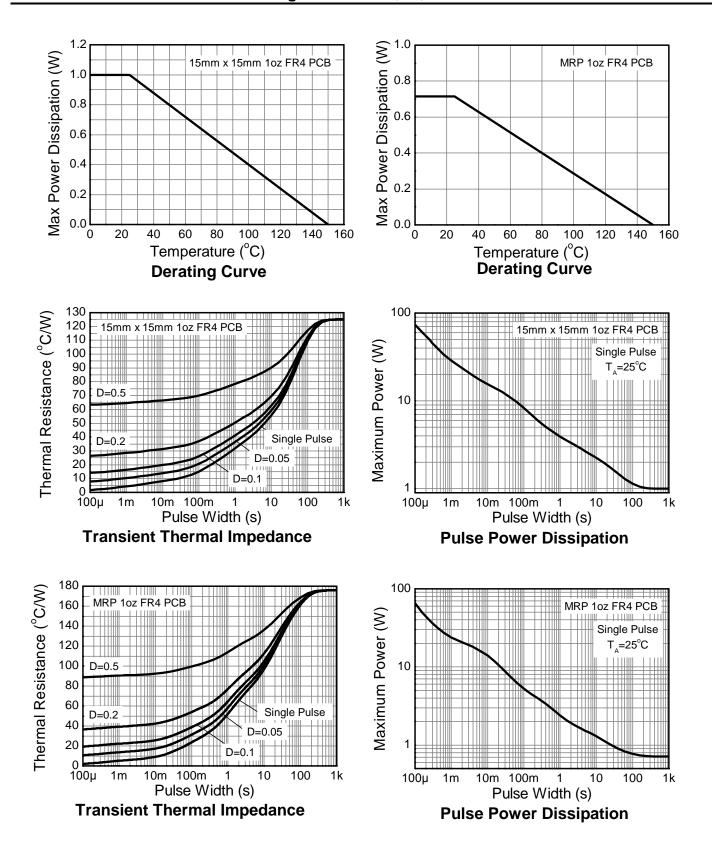
## **Thermal Characteristics and Derating Information**







## Thermal Characteristics and Derating Information (cont.)





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

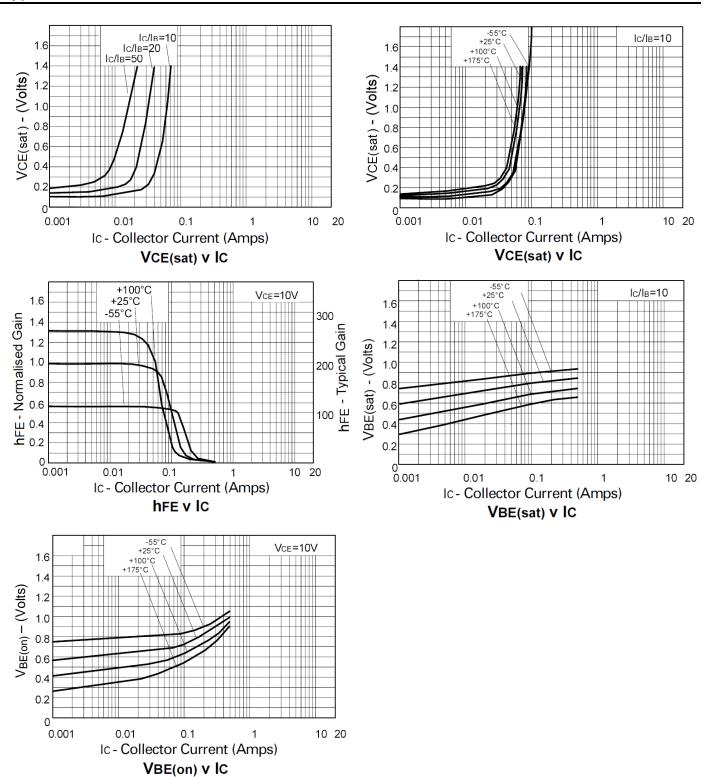
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-400	-	-	V	$I_{C} = -100 \mu A$
Collector-Emitter Breakdown Voltage (Note 12)	BV <sub>CEO</sub>	-400	-	-	V	$I_C = -1mA$
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	-	-	V	I <sub>E</sub> = -100μA
Collector Cutoff Current	I <sub>CBO</sub>	=	<1	-100	nA	V <sub>CB</sub> = -320V
Emitter Cutoff Current	I <sub>EBO</sub>	=	<1	-100	nA	$V_{EB} = -5V$
Emitter Cutoff Current	I <sub>CES</sub>	-	<1	-100	nA	V <sub>CES</sub> = -320V
DC Current Transfer Static Ratio (Note 12)	h <sub>FE</sub>	100 100 15		300 -	-	I <sub>C</sub> = -1mA, V <sub>CE</sub> = -10V I <sub>C</sub> = -50mA, V <sub>CE</sub> = -10V I <sub>C</sub> = -100mA, V <sub>CE</sub> = -10V
Collector-Emitter Saturation Voltage (Note 12)	V <sub>CE(sat)</sub>		- -	-0.2 -0.5	V	$I_C = -20\text{mA}, I_B = -2\text{mA}$ $I_C = -50\text{mA}, I_B = -6\text{mA}$
Base-Emitter Saturation Voltage (Note 12)	V <sub>BE(sat)</sub>	-	-	-0.9	V	$I_C = -50 \text{mA}, I_B = -5 \text{mA}$
Base-Emitter Turn-on Voltage (Note 12)	V <sub>BE(on)</sub>	=	-	-0.9	V	$I_C = -50 \text{mA}, V_{CE} = -10 \text{V}$
Transitional Frequency	f⊤	50	-	-	MHz	$I_E = -10 \text{mA}, V_{CE} = -20 \text{V}$ f = 20MHz
Output Capacitance	$C_{obo}$	-	-	5	pF	V <sub>CB</sub> = -20V, f = 1MHz
Switching Time	t <sub>on</sub>	_	95 1600	-	ns	$I_C = -50 \text{mA}, V_C = -100 \text{V}$ $I_{B1} = -5 \text{mA}, I_{B2} = 10 \text{mA}$

Note:

12. Measured under pulsed conditions. Pulse width  $\leq$  300 $\mu$ s. Duty cycle  $\leq$  2%.



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

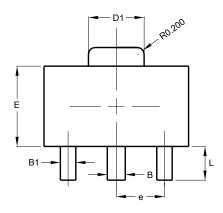


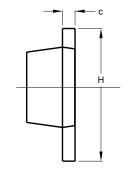


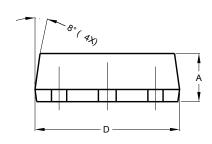
# **Package Outline Dimensions**

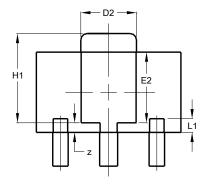
Please see http://www.diodes.com/package-outlines.html for the latest version.

#### SOT89







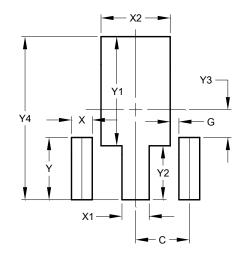


SOT89					
Dim	Min	Max	Тур		
Α	1.40	1.60	1.50		
В	0.50	0.62	0.56		
B1	0.42	0.54	0.48		
C	0.35	0.43	0.38		
D	4.40	4.60	4.50		
D1	1.62	1.83	1.733		
D2	1.61	1.81	1.71		
Е	2.40	2.60	2.50		
E2	2.05	2.35	2.20		
е	1	1	1.50		
Н	3.95	4.25	4.10		
H1	2.63	2.93	2.78		
L	0.90	1.20	1.05		
L1	0.327	0.527	0.427		
z	0.20	0.40	0.30		
All	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)
С	1.500
G	0.244
Х	0.580
X1	0.760
X2	1.933
Υ	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.



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