

## Description

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

## Features

- $BV_{CEO} > 400V$
- $I_C = 225mA$  Continuous Collector Current
- $I_{CM} = 500mA$  Peak Pulse Current
- Excellent  $h_{FE}$  Characteristics up to 100mA
- Low saturation voltage  $V_{CE(sat)} < 200mV @ 20mA$
- Complementary PNP Type: FCX558Q
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **The FCX458Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

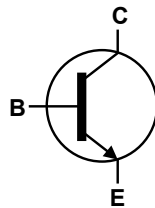
## Mechanical Data

- 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: 0.055 grams (Approximate)

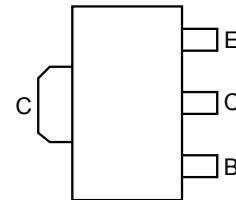
SOT89



Top View



Equivalent Circuit



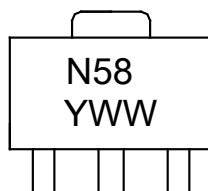
Top View  
Pin-Out

## Ordering Information (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX458QTA	Automotive	N58	7	12mm	1,000

- 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



N58 = Product Type Marking Code  
YWW - Date Code  
Y - Last digit of year (ex: 0 = 2020)  
WW - Week code (01~53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	400	V
Collector-Emitter Voltage	$V_{CEO}$	400	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	225	mA
Peak Pulse Current	$I_{CM}$	500	mA
Base Current	$I_B$	200	mA

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

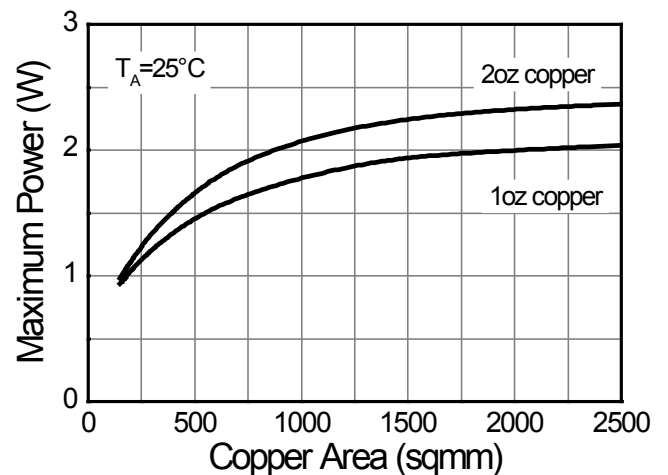
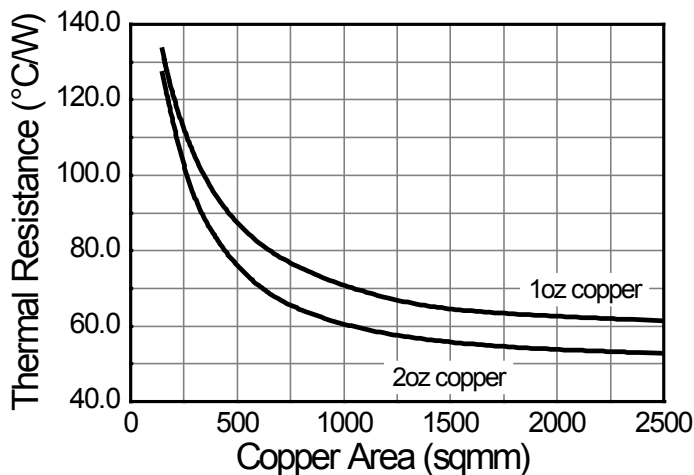
Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	0.7	W
		1	
		1.5	
		2	
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	178	$^\circ\text{C/W}$
		125	
		83	
		60	
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	22	$^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**ESD Ratings** (Note 10)

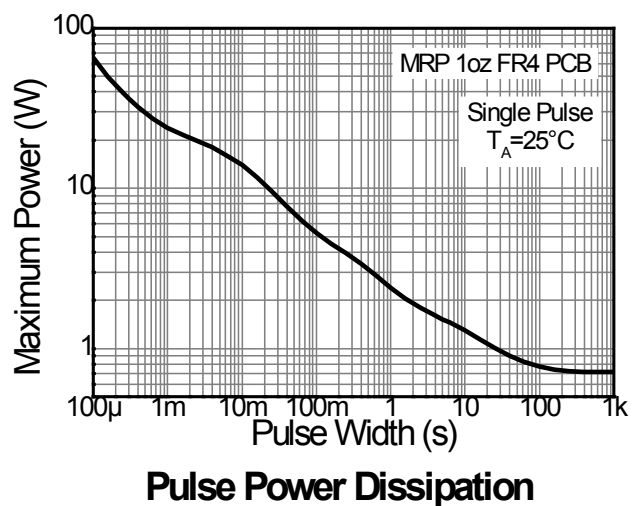
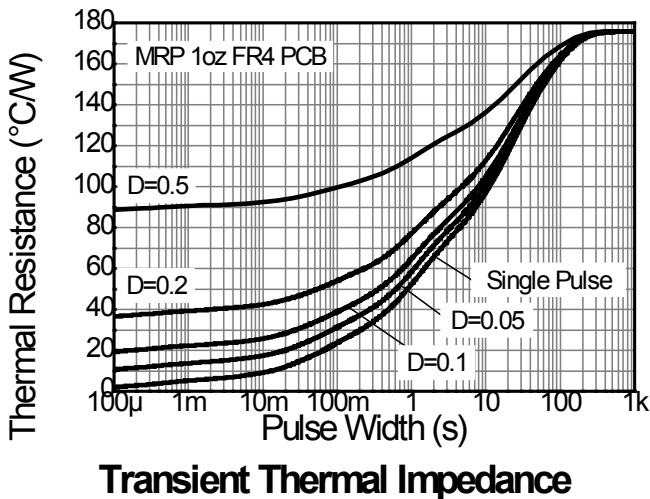
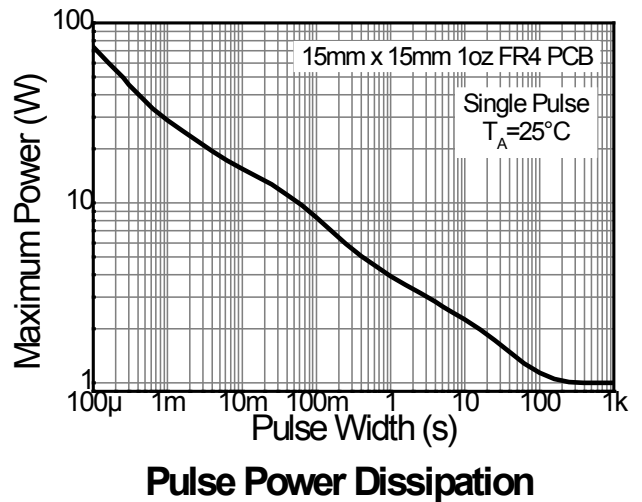
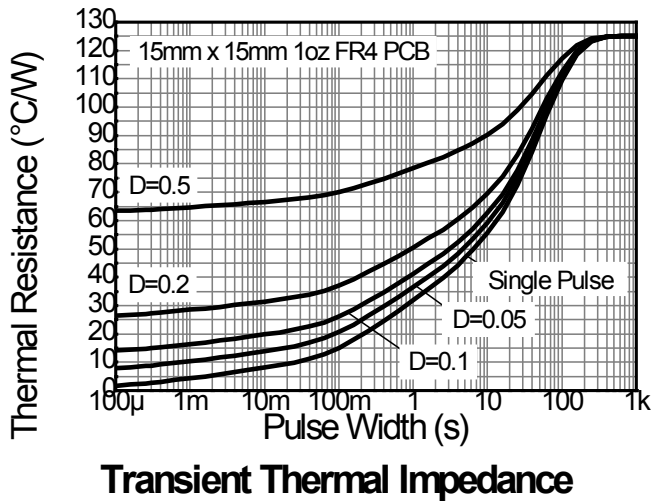
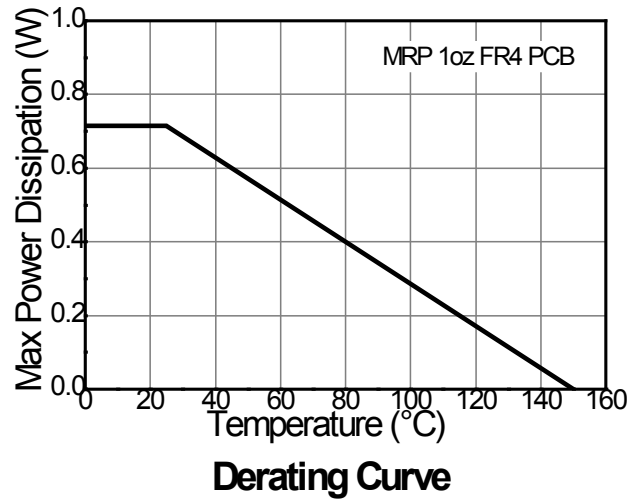
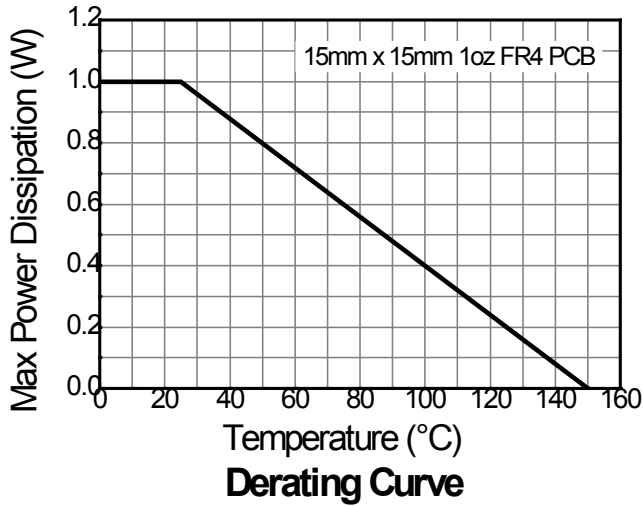
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
- 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.
  - Same as Note 5, except the device is mounted with the exposed collector pad on 15mm x 15mm 1oz copper.
  - Same as Note 5, except the device is mounted with the exposed collector pad on 25mm x 25mm 1oz copper.
  - Same as Note 5, except the device is mounted with the exposed collector pad on 50mm x 50mm 1oz copper.
  - Thermal resistance from junction to solder-point (on the exposed collector pad).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**



**Thermal Characteristics and Derating Information (cont.)**

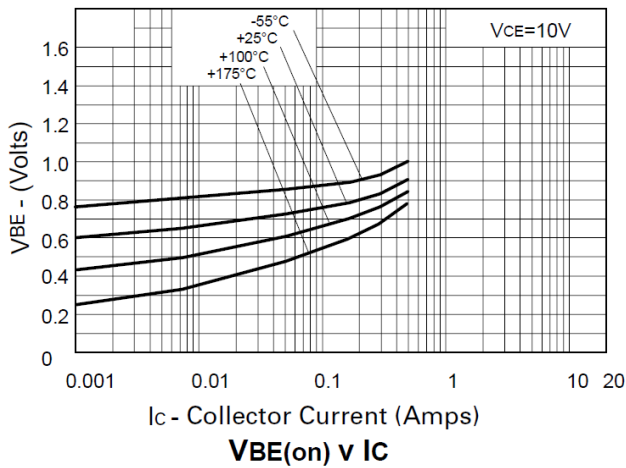
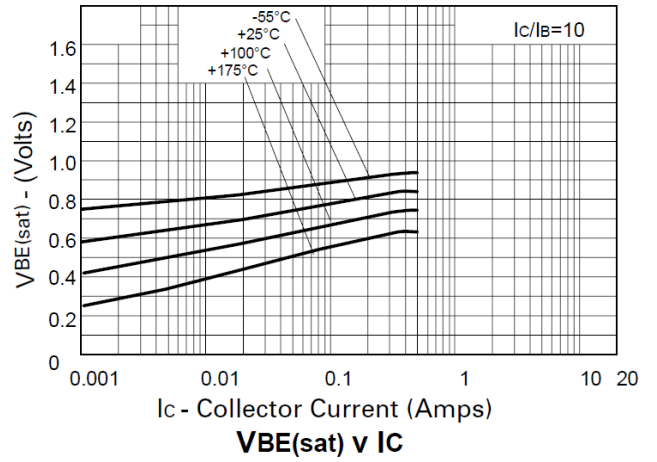
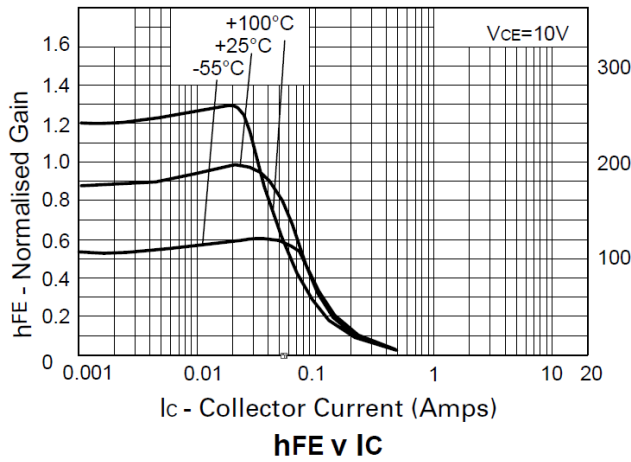
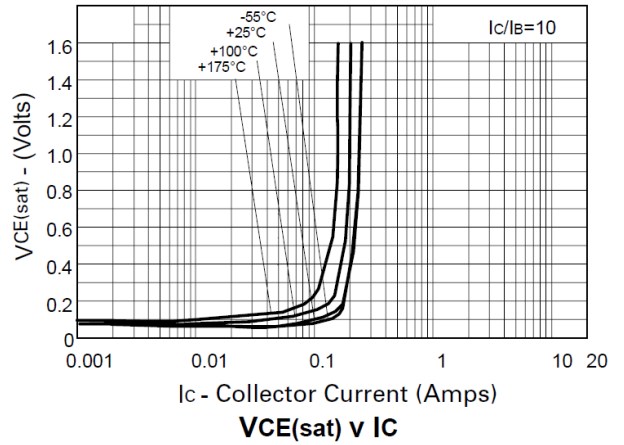
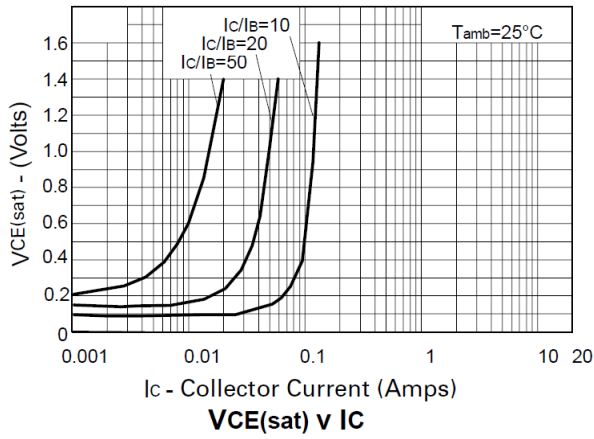


**Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	400	550	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$BV_{CES}$	400	550	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 11)	$BV_{CEO}$	400	450	—	V	$I_C = 1\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.1	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	$I_{CBO}$	—	<1	100	nA	$V_{CB} = 320\text{V}$
Collector Cutoff Current	$I_{CES}$	—	<1	100	nA	$V_{CES} = 320\text{V}$
Emitter Cutoff Current	$I_{EBO}$	—	<1	20	nA	$V_{EB} = 6\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	—	—	200 500	mV	$I_C = 20\text{mA}, I_B = 2\text{mA}$ $I_C = 50\text{mA}, I_B = 6\text{mA}$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	—	—	900	mV	$I_C = 50\text{mA}, I_B = 5\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	—	—	900	mV	$I_C = 50\text{mA}, V_{CE} = 10\text{V}$
DC Current Gain (Note 11)	$h_{FE}$	100 100 15	—	300	—	$I_C = 1\text{mA}, V_{CE} = 10\text{V}$ $I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $I_C = 100\text{mA}, V_{CE} = 10\text{V}$
Transitional Frequency	$f_T$	50	—	—	MHz	$I_C = 10\text{mA}, V_{CE} = 20\text{V},$ $f = 20\text{MHz}$
Output Capacitance	$C_{obo}$	—	—	5	pF	$V_{CB} = 20\text{V}, f = 1\text{MHz}$
Turn-On Time	$t_{on}$	—	135	—	ns	$I_C = 50\text{mA}, V_{CE} = 100\text{V},$
Turn-Off Time	$t_{off}$	—	2260	—	ns	$I_{B1} = 5\text{mA}, I_{B2} = -10\text{mA}$

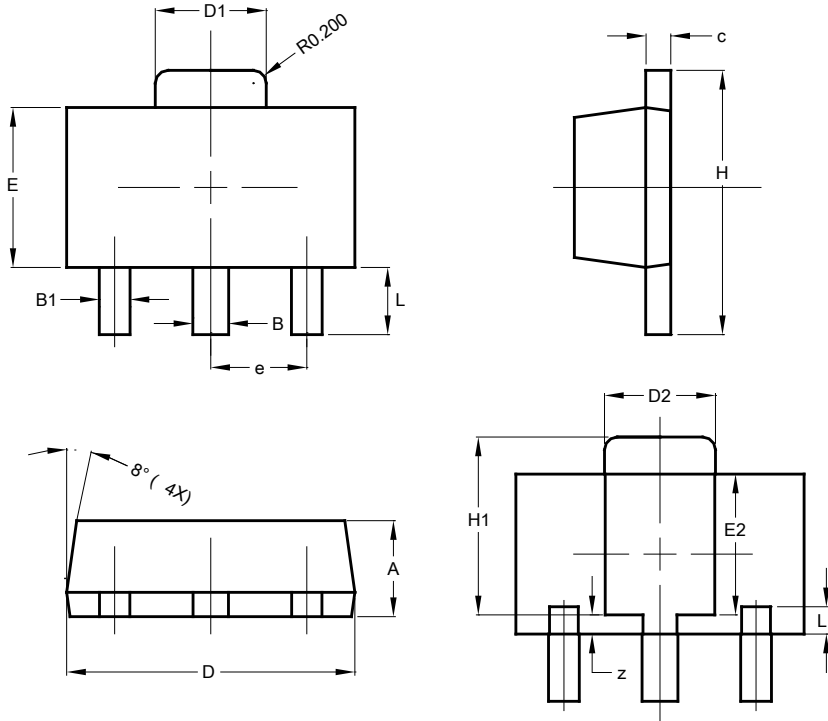
Note: 11. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$

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



## Package Outline Dimensions

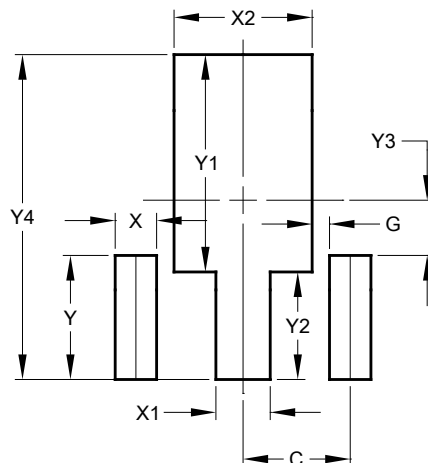
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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
All Dimensions in mm			

## 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

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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