400V NPN HIGH VOLTAGE TRANSISTOR IN SOT89

Description

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

Features

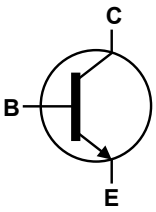
- BV_{CEO} > 400V
- I_C = 225mA Continuous Collector Current
- I_{CM} = 500mA Peak Pulse Current
- Excellent h_{FE} Characteristics up to 100mA
- Low saturation voltage $V_{CE(sat)}$ < 200mV @ 20mA
- Complementary PNP Type: FCX558Q
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- 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

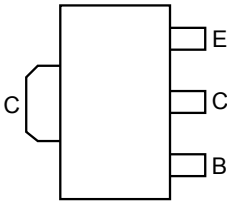
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.055 grams (Approximate)

SOT89

Top View



Equivalent Circuit



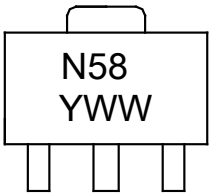
Top View
Pin-Out

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°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°C, unless otherwise specified.)

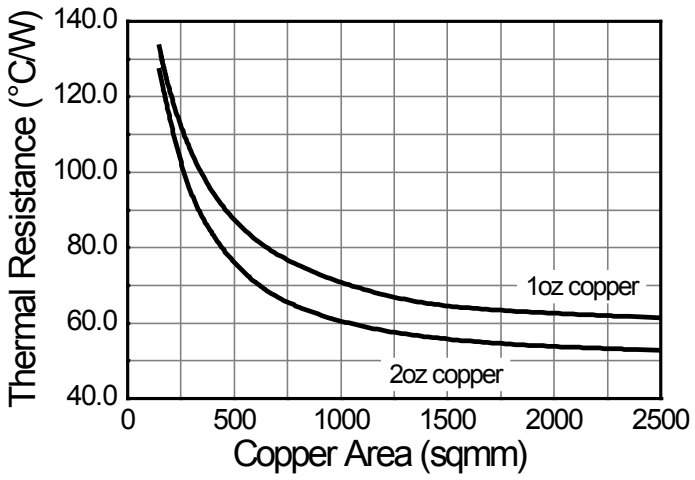
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.7	W
	(Note 6)		1	
	(Note 7)		1.5	
	(Note 8)		2	
Thermal Resistance, Junction to Ambient Air	(Note 5)	$R_{\theta JA}$	178	°C/W
	(Note 6)		125	
	(Note 7)		83	
	(Note 8)		60	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	22	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

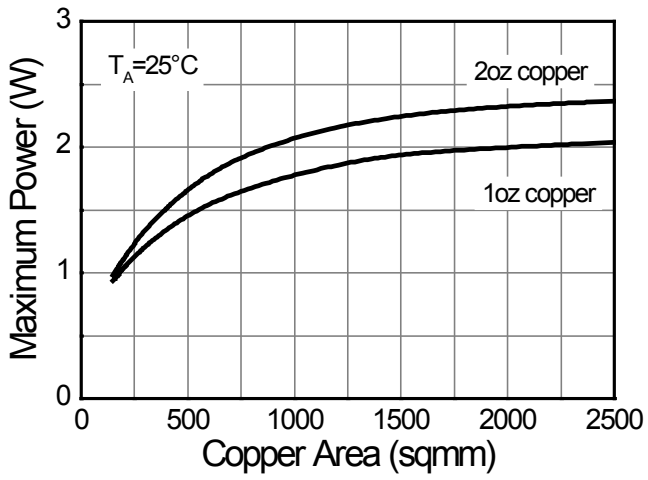
ESD Ratings (Note 10)

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

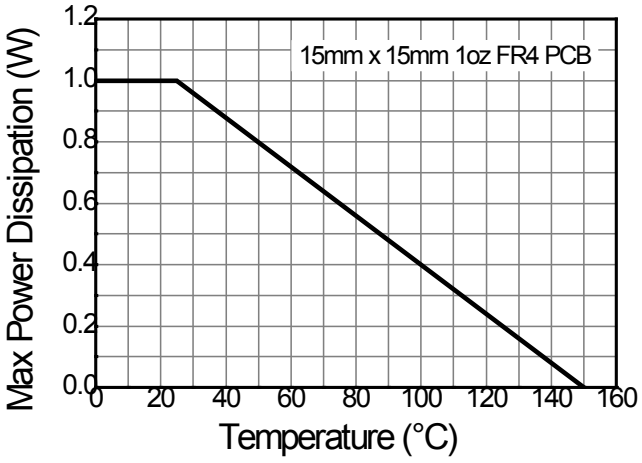
Notes:
5. For a device mounted with the exposed collector pad on minimum recommended pad layout (MRP) 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
6. Same as Note 5, except the device is mounted with the exposed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

Thermal Characteristics and Derating Information

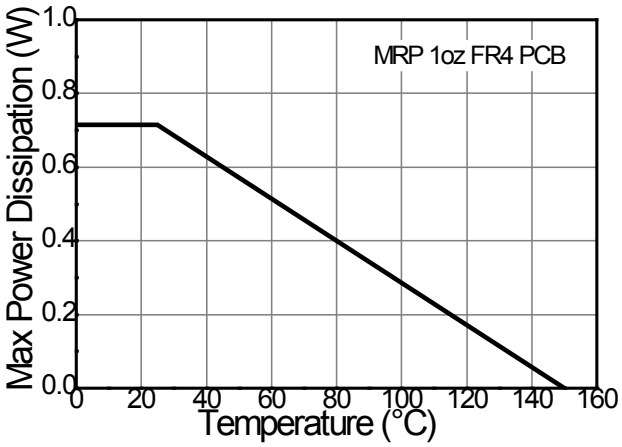




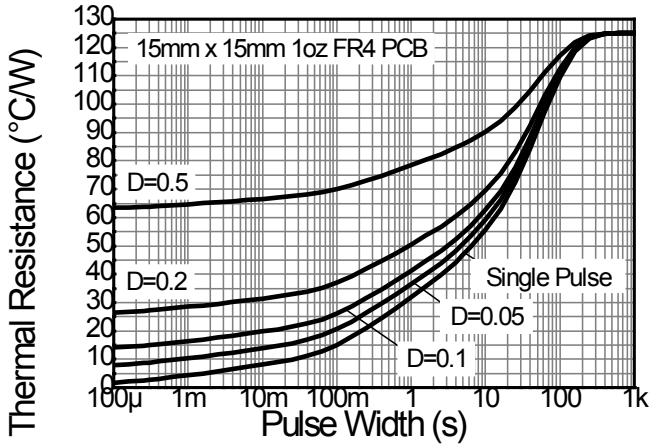
Thermal Characteristics and Derating Information (cont.)



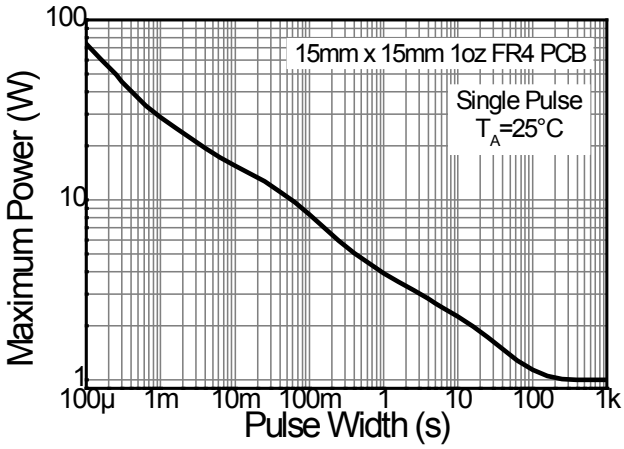
Derating Curve



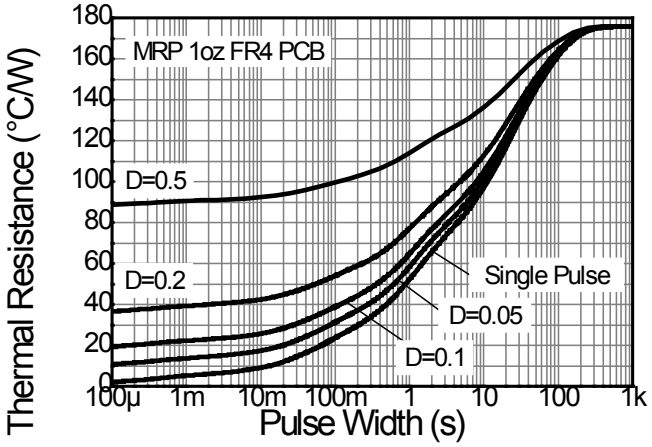
Derating Curve



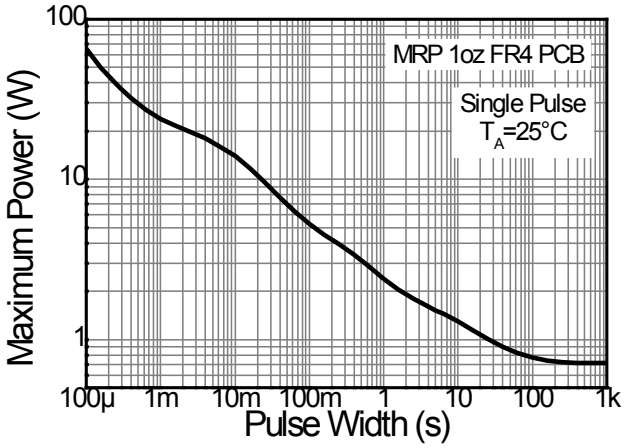
Transient Thermal Impedance



Pulse Power Dissipation



Transient Thermal Impedance



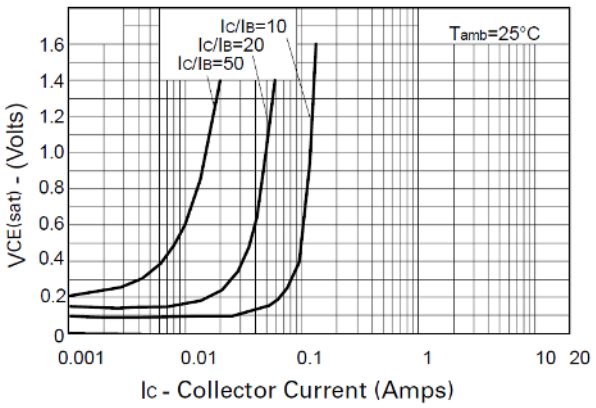
Pulse Power Dissipation

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

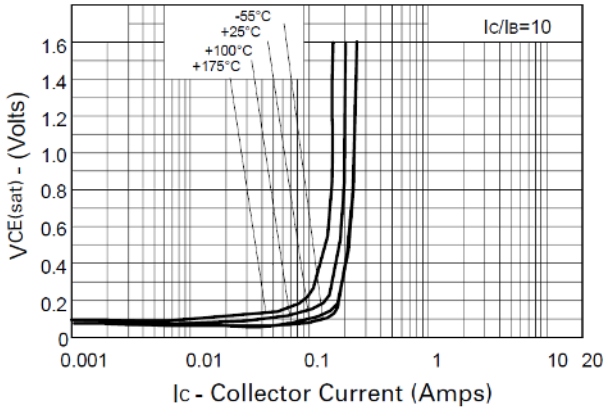
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	400	550	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage	BV_{CES}	400	550		V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	400	450	—	V	I_C = 1mA
Emitter-Base Breakdown Voltage	BV_{EBO}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

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%

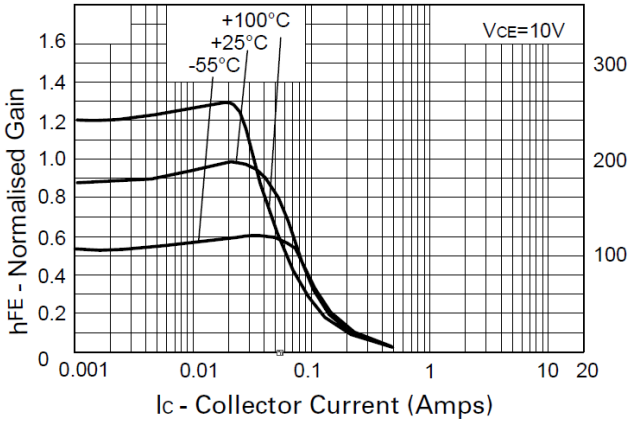
Typical Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)



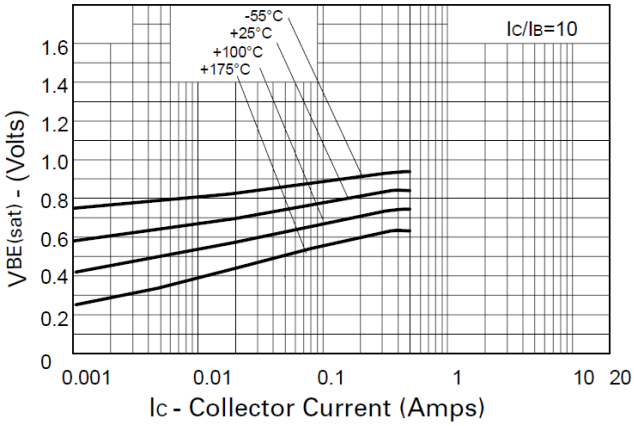
VCE(sat) v IC



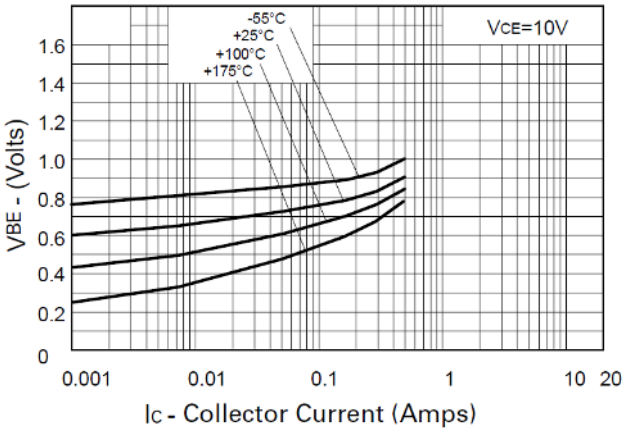
VCE(sat) v IC



hFE v IC



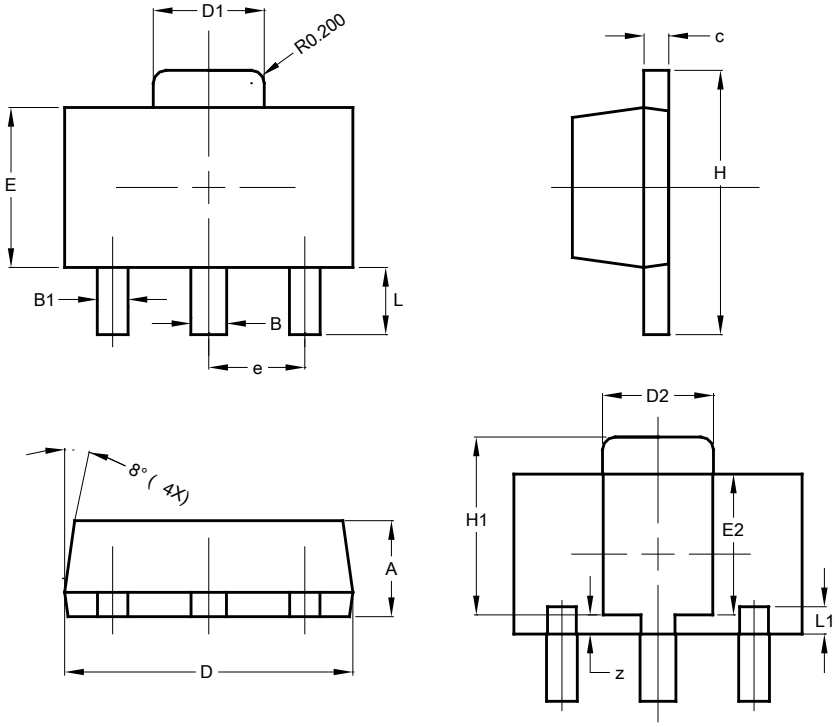
VBE(sat) v IC



VBE(on) v IC

Package Outline Dimensions

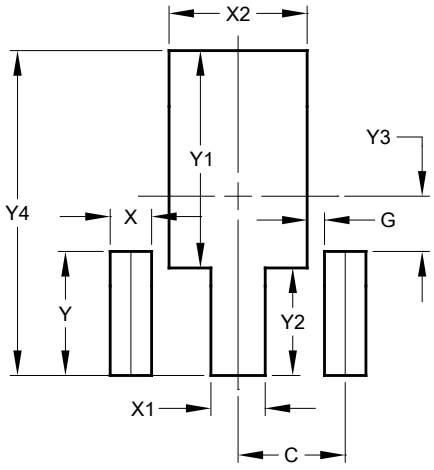
Please see http://www.diodes.com/package-outlines.html for the latest version.



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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