40V PNP HIGH GAIN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89

Description

This bipolar junction transistor (BJT) is designed to meet the stringent requirements of automotive applications.

Features

- BV_{CEO} > -40V
- I_C = -5.5A High Continuous Current
- I_{CM} = -15A Peak Pulse Current
- $R_{CE(sat)}$ = 29mΩ for a low equivalent On-Resistance
- Low Saturation Voltage $V_{CE(sat)}$ < -60mV @ -1A
- h_{FE} Specified Up to -10A for High Current Gain Hold Up
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DIODES™ ZX5T3ZQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

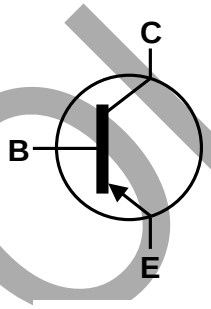
Mechanical Data

- 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)

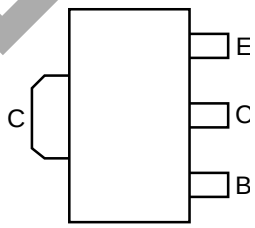
Applications

- Charging circuits
- DC-DC converters
- MOSFET and IGBT gate driving
- Power switches
- Motor control

Top View



Device Symbol



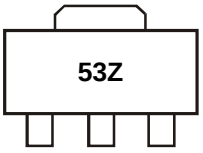
Top View
Pin Out

Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
ZX5T3ZQTA	SOT89	53Z	7	12	1,000	Reel
ZX5T3ZQTC	SOT89	53Z	13	12	4,000	Reel

Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
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



53Z = Product Type Marking Code

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

Characteristic	Symbol	Limit	Unit
Collector-Base Voltage	V_{CBO}	-50	V
Collector-Base Voltage	V_{CBS}	-50	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-7.5	V
Continuous Collector Current	I_C	-5.5	A
Peak Pulse Current	I_{CM}	-15	A

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

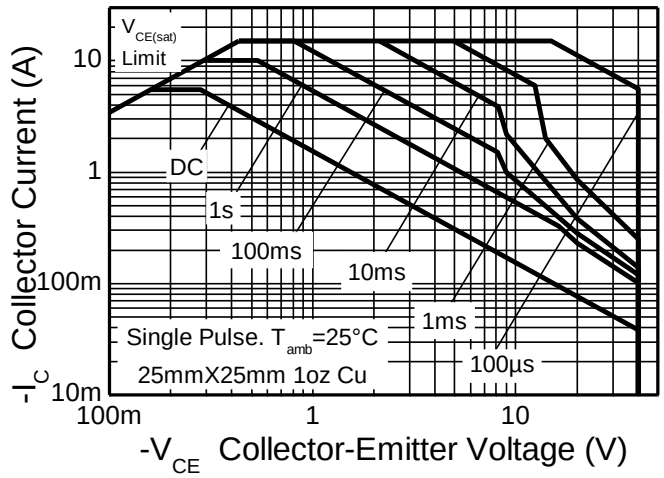
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.9	W
	(Note 6)		1.5	
	(Note 7)		2.1	
	(Note 8)		3.0	
Thermal Resistance, Junction to Ambient Air	(Note 5)	$R_{\theta JA}$	139	°C/W
	(Note 6)		83	
	(Note 7)		60	
	(Note 8)		42	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	2.81	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 10)

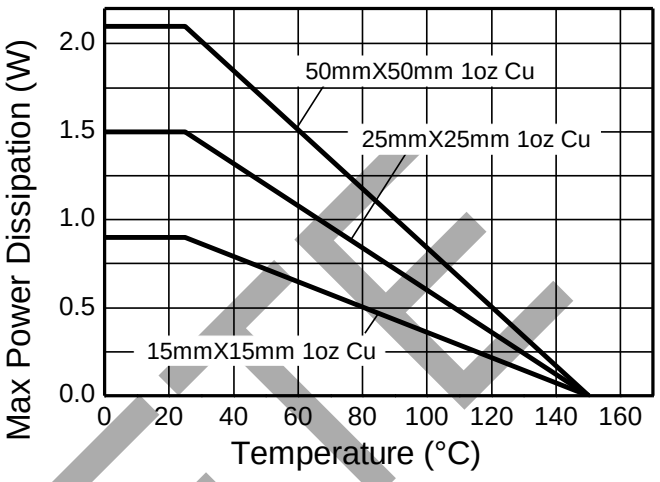
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 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 on 25mm x 25mm 1oz copper.
7. Same as note (5), except the device is mounted on 50mm x 50mm 1oz copper.
8. Same as note (5), except the device is mounted on 25mm x 25mm 1oz copper and measured at t<5secs.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

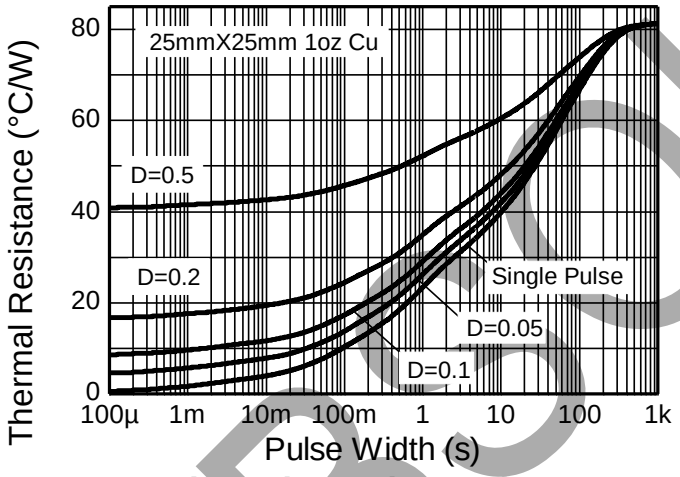
Thermal Characteristics and Derating Information



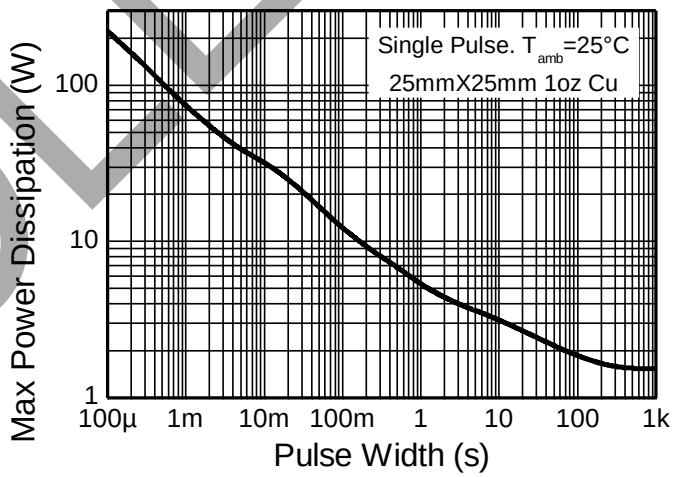
Safe Operating Area



Derating Curve



Transient Thermal Impedance



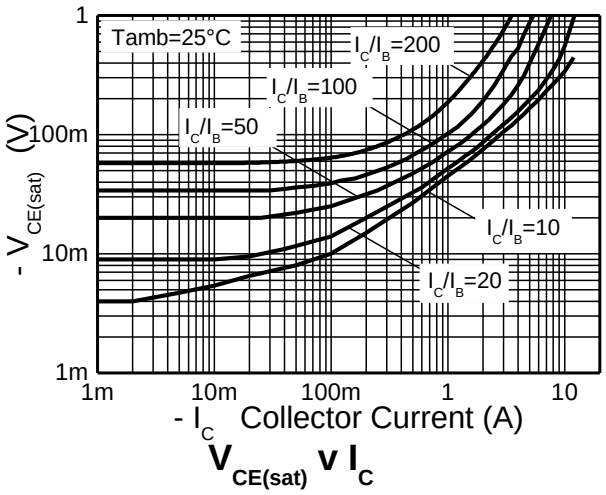
Pulse Power Dissipation

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

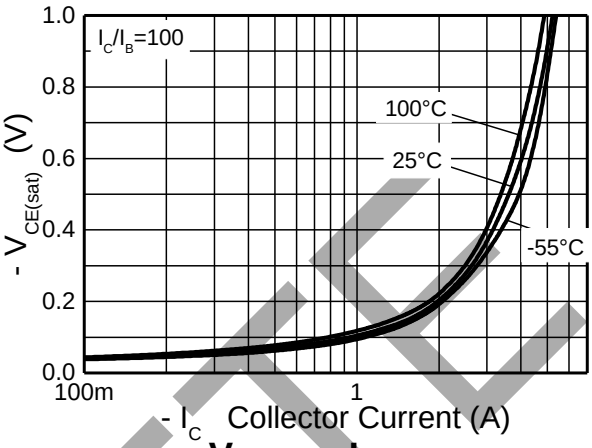
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-50	-90	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage	BV_{CES}	-50	-90	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	-40	-58	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7.5	-8.3	—	V	I_E = -100µA
Collector Cutoff Current	I_{CBO}	—	1	-20	nA	V_{CB} = -40V
Collector Cutoff Current	I_{CES}	—	1	-20	nA	V_{CE} = -32V
Emitter Cutoff Current	I_{EBO}	—	1	-20	nA	V_{EB} = -6V
DC Current Transfer Static Ratio (Note 11)	h_{FE}	200 200 170 110	390 350 290 175	— 550 — —	—	I_C = -10mA, V_{CE} = -2V I_C = -0.5A, V_{CE} = -2V I_C = -2A, V_{CE} = -2V I_C = -5.5A, V_{CE} = -2V
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	— — — 	-15 -44 -50 -120 -70 -125 -130 -162	-30 -60 -70 -165 -80 -175 -175 -185	mV	I_C = -0.1A, I_B = -10mA I_C = -1A, I_B = -100mA I_C = -1A, I_B = -50mA I_C = -1A, I_B = -10mA I_C = -2A, I_B = -200mA I_C = -2A, I_B = -40mA I_C = -3.5A, I_B = -175mA I_C = -5.5A, I_B = -550mA
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	—	-820 -1000	-900 -1075	mV	I_C = -2A, I_B = -40mA I_C = -5.5A, I_B = -550mA
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(om)}$	—	-778 -869	-850 -950	mV	I_C = -2A, V_{CE} = -2V I_C = -5.5A, V_{CE} = -2V
Transitional Frequency	f_T	—	152	—	MHz	I_C = -50mA, V_{CE} = -10V f = 100MHz
Output Capacitance	C_{obo}	—	53	—	pF	V_{CB} = -10V, f = 1MHz,
Switching Times	t_d t_r t_s t_f	—	18 17 325 60	—	nS	I_C = -1A, V_{CC} = -10V I_{B1} = -I_{B2} = -100mA
Switching Times	t_d t_r t_s t_f	—	55 107 264 103	—	nS	I_C = -2A, V_{CC} = -30V I_{B1} = -I_{B2} = -20mA

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

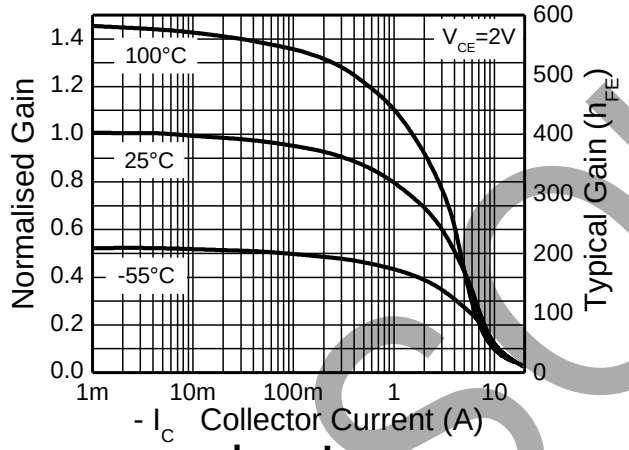
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



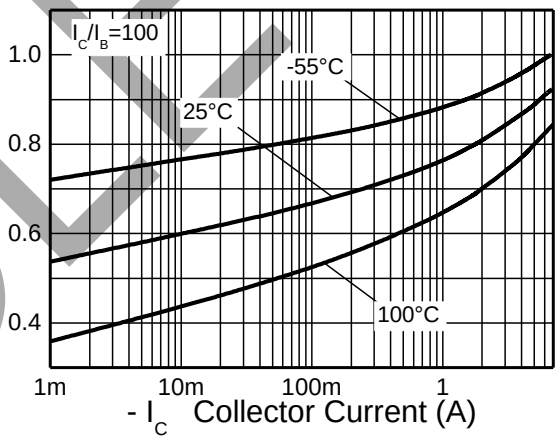
$V_{CE(sat)}$ v I_C



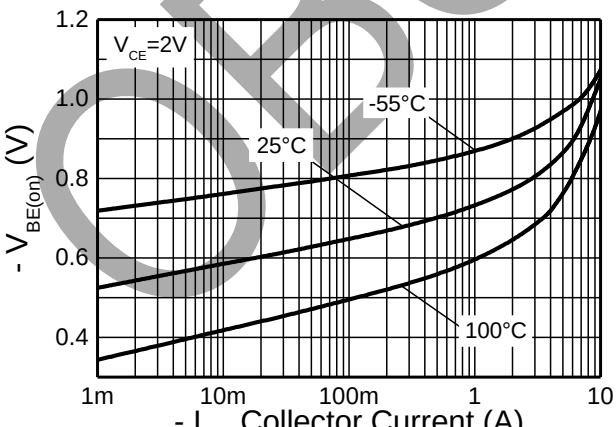
$V_{CE(sat)}$ v I_C



h_{FE} v I_C



$V_{BE(sat)}$ v I_C

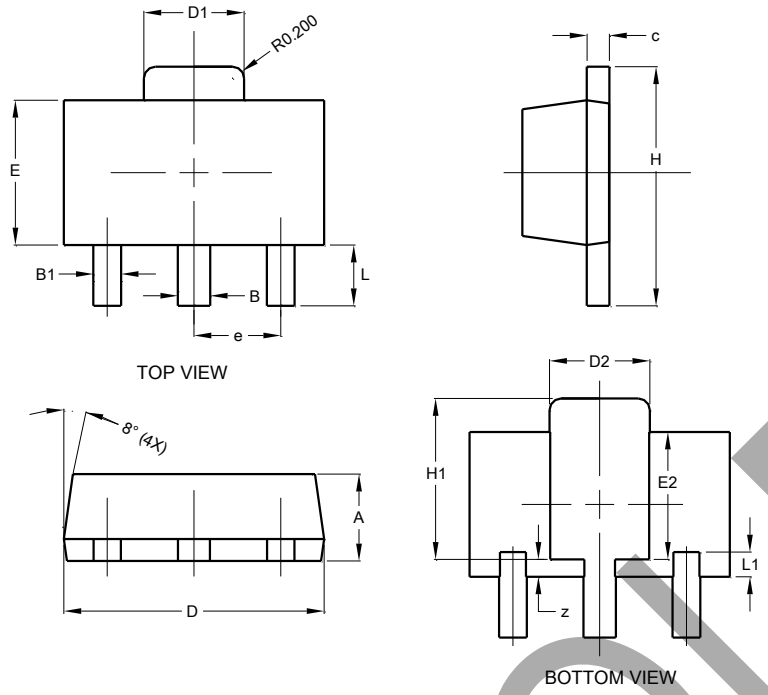


$V_{BE(on)}$ v I_C

Package Outline Dimensions

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

SOT89

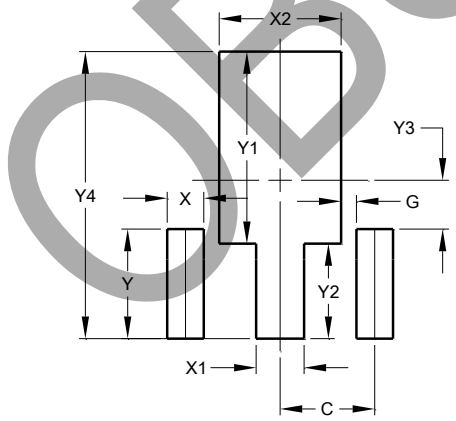


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions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