40V PNP LOW SATURATION TRANSISTOR IN SOT89

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
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Mechanical Data

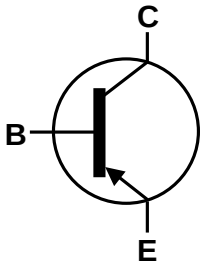
- Package: SOT89
- Package Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.05 grams (Approximate)

Applications

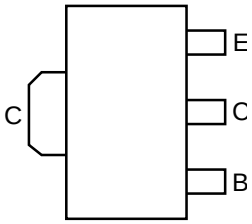
- Charging circuits
- DC-DC converters
- MOSFET and IGBT gate driving
- Power switches
- Motor controls

SOT89

Top View



Device Symbol



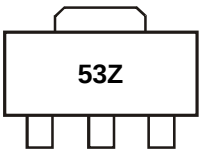
Top View
Pin Out

Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
ZX5T3ZTA	SOT89	53Z	7	12	1,000	Reel
ZX5T3ZTC	SOT89	53Z	13	12	4,000	Reel

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



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

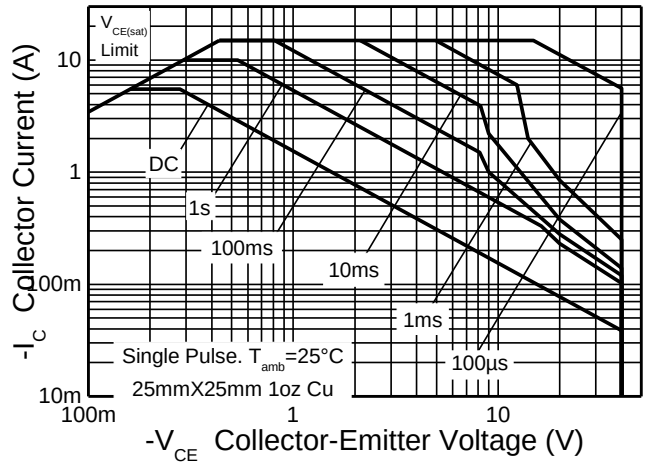


Figure 1. Safe Operating Area

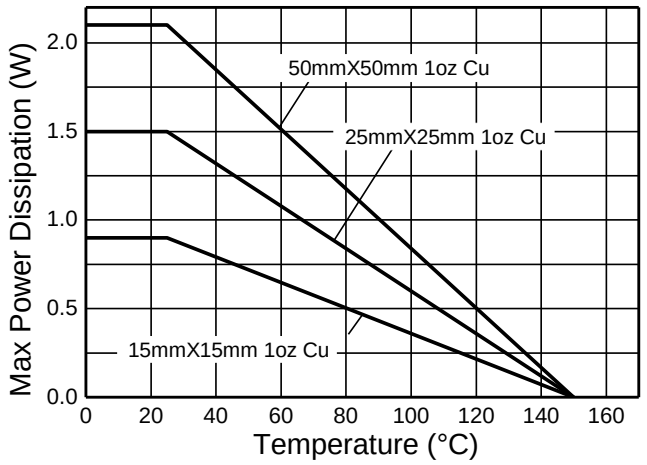


Figure 2. Derating Curve

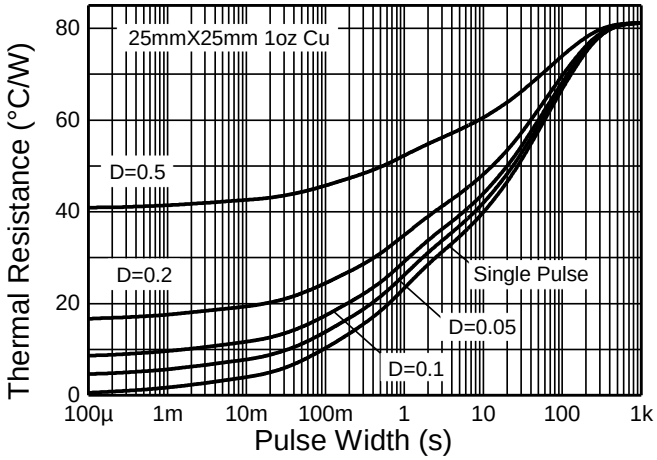


Figure 3. Transient Thermal Impedance

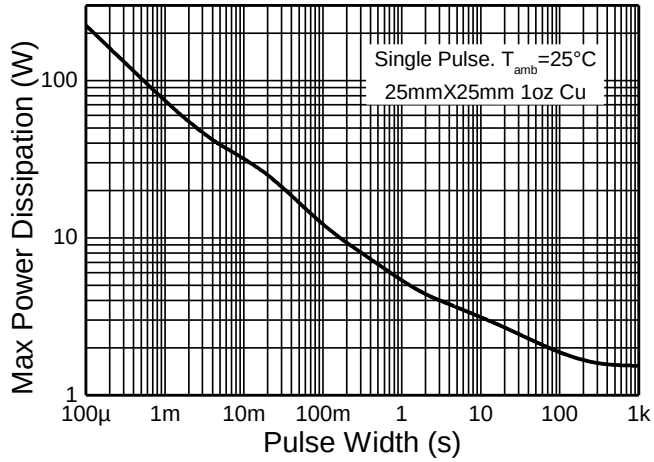


Figure 4. Pulse Power Dissipation

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	—	18	—	ns	I_C = -1A, V_{CC} = -10V I_{B1} = -I_{B2} = -100mA
	t_r		17			
	t_s		325			
	t_f		60			
Switching Times	t_d	—	55	—	ns	I_C = -2A, V_{CC} = -30V I_{B1} = -I_{B2} = -20mA
	t_r		107			
	t_s		264			
	t_f		103			

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

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

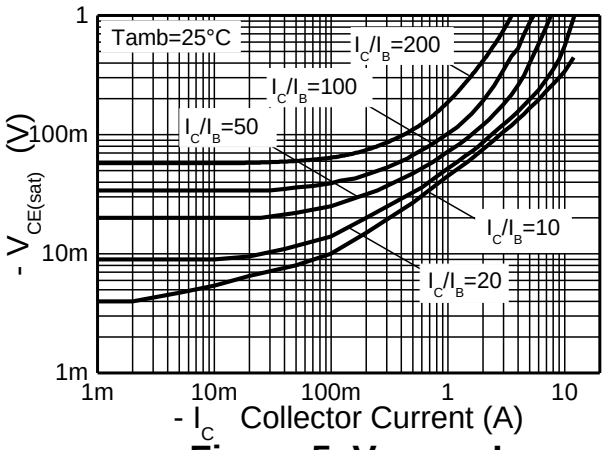


Figure 5. $V_{CE(sat)}$ v I_C

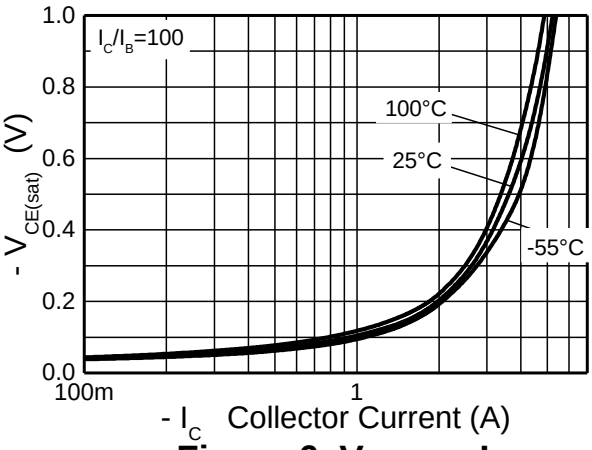


Figure 6. $V_{CE(sat)}$ v I_C

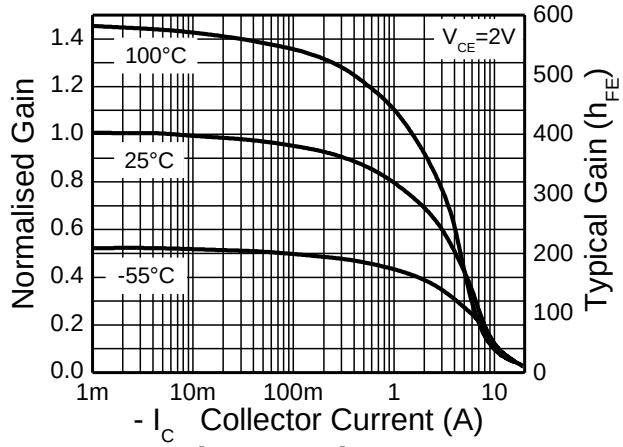


Figure 7. h_{FE} v I_C

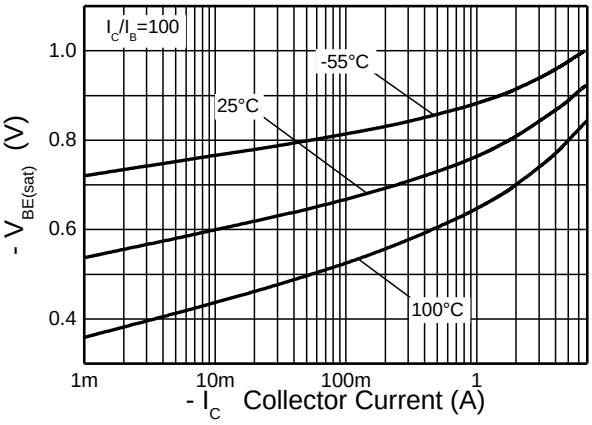


Figure 8. $V_{BE(sat)}$ v I_C

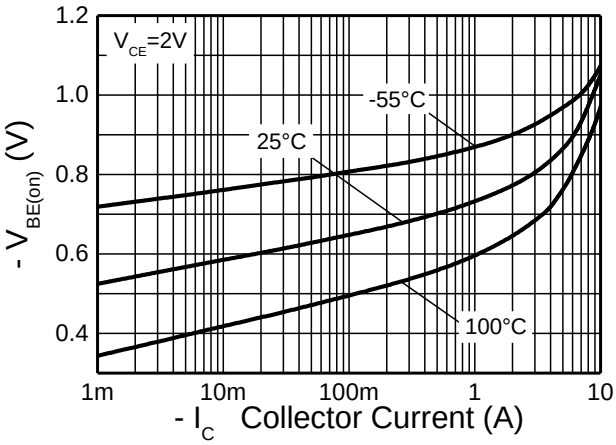
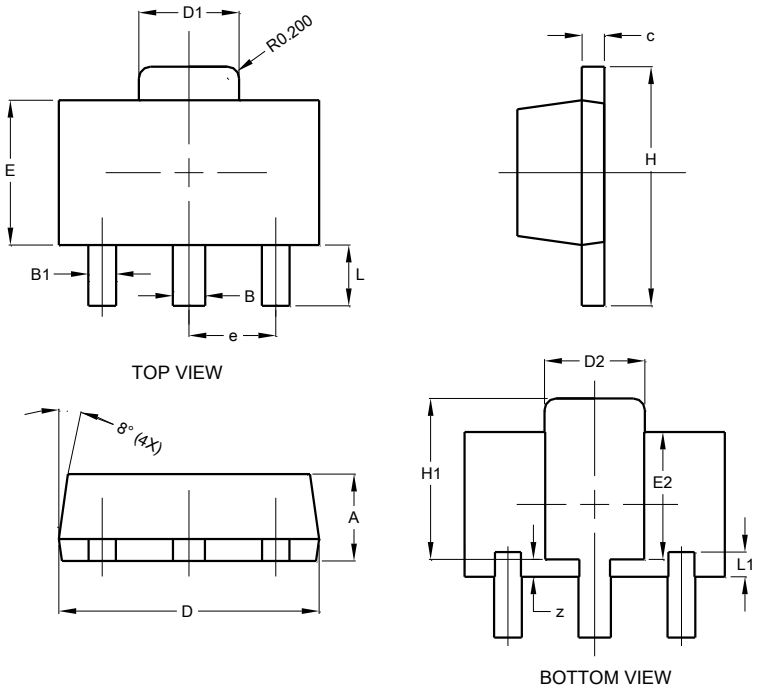


Figure 9. $V_{BE(on)}$ v I_C

Package Outline Dimensions

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

SOT89

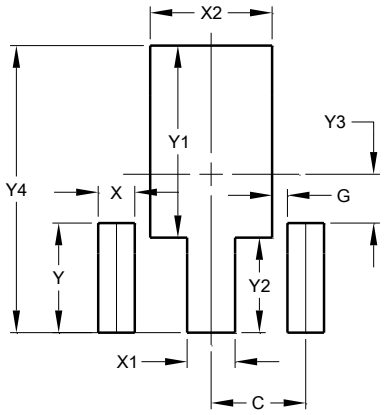


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions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