40V PNP HIGH GAIN LOW SATURATION MEDIUM POWER 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
- **Lead-Free Finish; 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

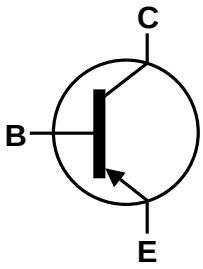
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.05 grams (Approximate)

Applications

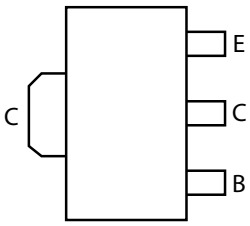
- Charging Circuits
- DC-DC Converters
- MOSFET and IGBT Gate Driving
- Power Switches
- Motor Control

SOT89

Top View



Device Symbol



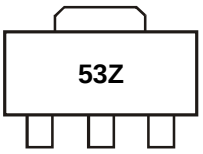
Top View
Pin Out

Ordering Information (Note 5)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZX5T3ZTA	AEC-Q101	53Z	7	12	1,000
ZX5T3ZQTA	Automotive	53Z	7	12	1,000
ZX5T3ZTC	AEC-Q101	53Z	13	12	4,000
ZX5T3ZQTC	Automotive	53Z	13	12	4,000

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
2. 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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
5. For packaging details, go to our website at http"//www.diodes.com/products/packages.html.

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.)

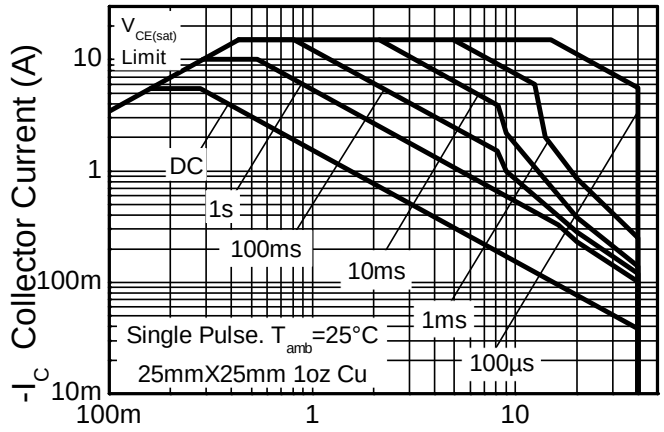
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	0.9	W
	(Note 7)		1.5	
	(Note 8)		2.1	
	(Note 9)		3.0	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	139	°C/W
	(Note 7)		83	
	(Note 8)		60	
	(Note 9)		42	
Thermal Resistance, Junction to Lead	(Note 10)	$R_{\theta JL}$	2.81	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 11)

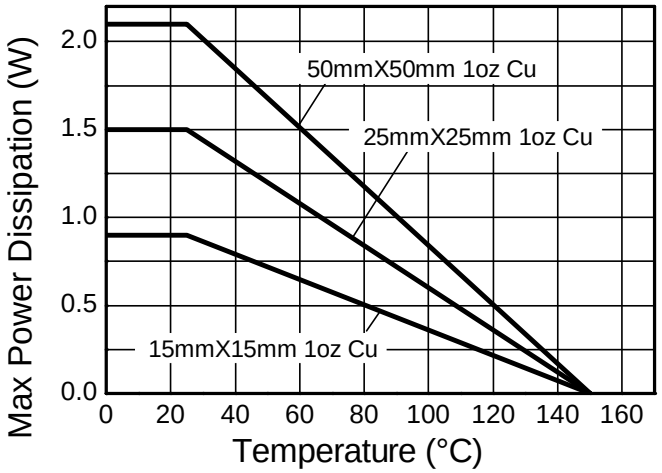
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	≥ 4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	≥ 400	V	C

Notes:
6. 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.
7. Same as note (6), except the device is mounted on 25mm x 25mm 1oz copper.
8. Same as note (6), except the device is mounted on 50mm x 50mm 1oz copper.
9. Same as note (6), except the device is mounted on 25mm x 25mm 1oz copper and measured at t<5secs.
10. Thermal resistance from junction to solder-point (on the exposed collector pad).
11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

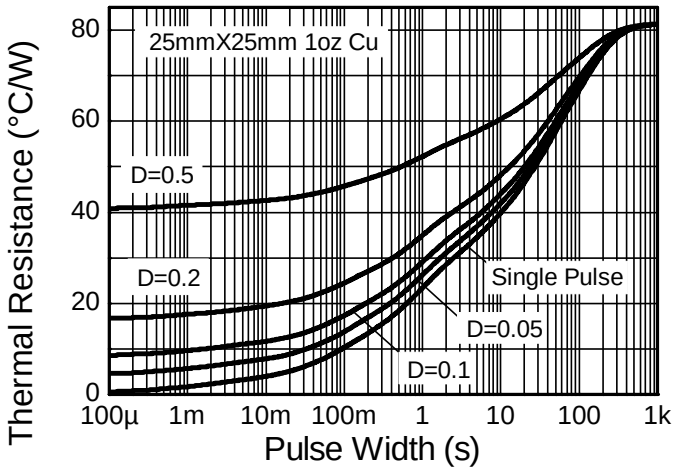
Thermal Characteristics and Derating Information



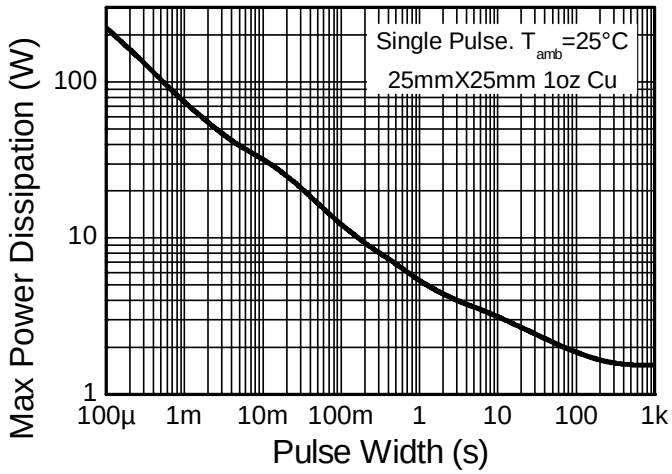
Safe Operating Area



Derating Curve



Transient Thermal Impedance



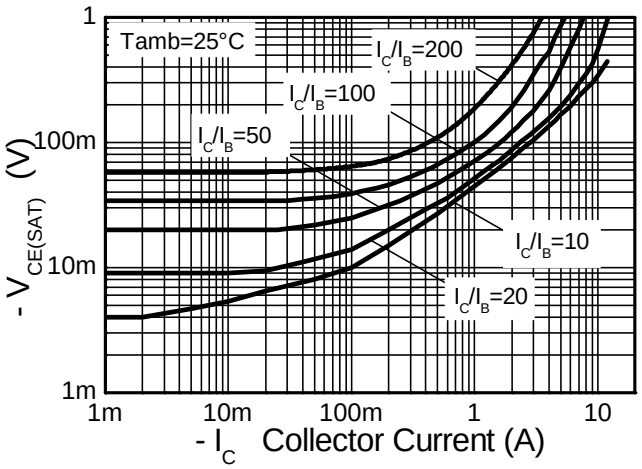
Pulse Power Dissipation

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

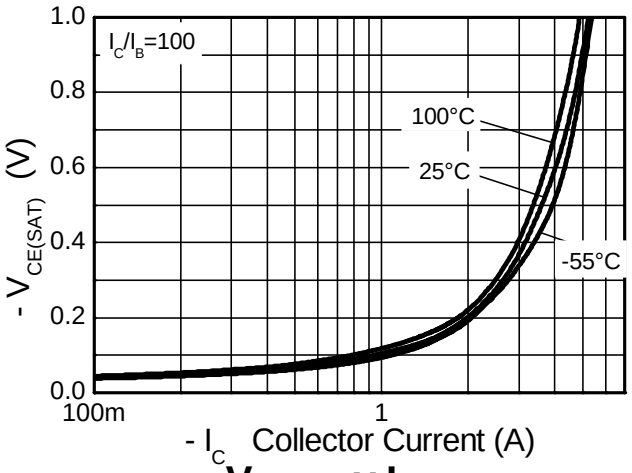
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-50	-90	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage	BV_{CES}	-50	-90	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 12)	BV_{CEO}	-40	-58	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	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 12)	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 12)	$V_{CE(SAT)}$	— — —	-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 12)	$V_{BE(SAT)}$	—	-820 -1000	-900 -1075	V	I_C = -2A, I_B = -40mA I_C = -5.5A, I_B = -550mA
Base-Emitter Turn-On Voltage (Note 12)	$V_{BE(ON)}$	—	-778 -869	-850 -950	V	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: 12. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

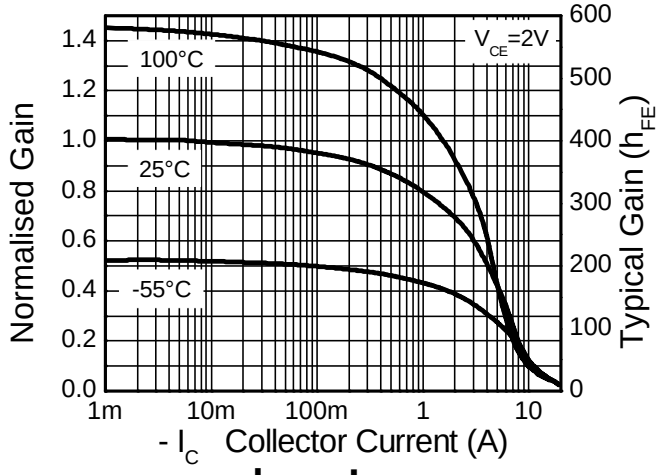
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



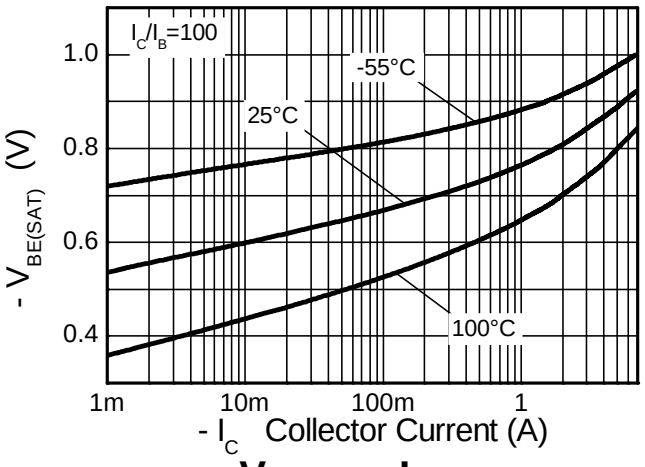
$V_{CE(SAT)}$ v I_C



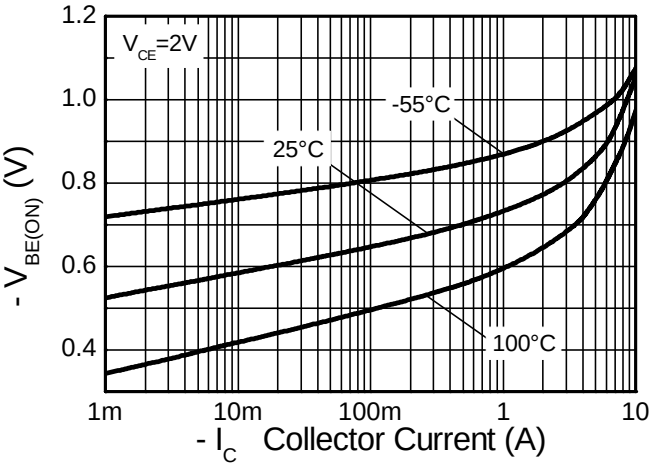
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



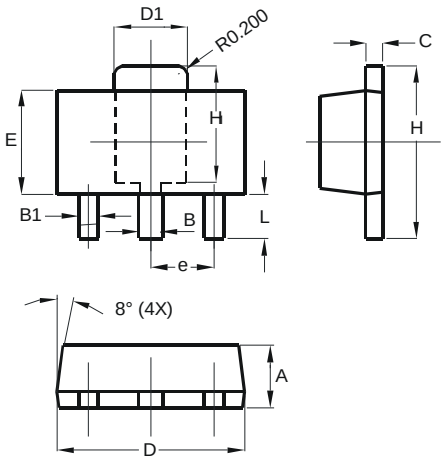
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

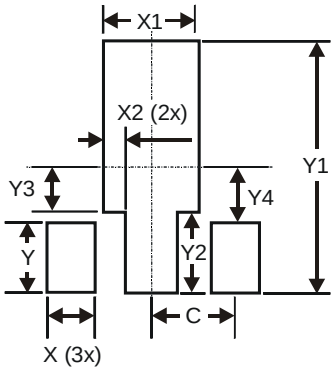
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT89		
Dim	**Min**	**Max**
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
All Dimensions in mm		

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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