

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

**Features**

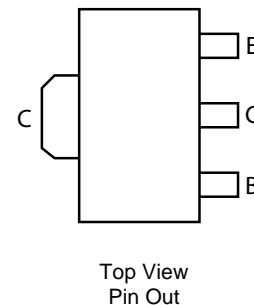
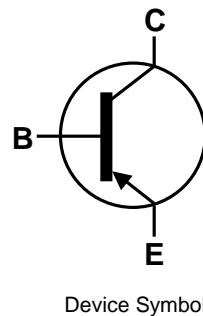
- $BV_{CEO} > -40V$
- $I_C = -5.5A$  High Continuous Current
- $I_{CM} = -15A$  Peak Pulse Current
- $R_{CE(SAT)} = 29m\Omega$  for a low equivalent On-Resistance
- Low Saturation Voltage  $V_{CE(SAT)} < -60mV @ -1A$
- $h_{FE}$  Specified Up to -10A for High Current Gain Hold Up
- **Lead-Free Finish; 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
- Weight: 0.05 grams (Approximate)

**Applications**

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

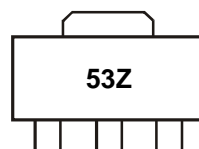


**Ordering Information** (Note 5)

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](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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Limit	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-50	V
Collector-Base Voltage	V <sub>CBS</sub>	-50	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-40	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7.5	V
Continuous Collector Current	I <sub>C</sub>	-5.5	A
Peak Pulse Current	I <sub>CM</sub>	-15	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

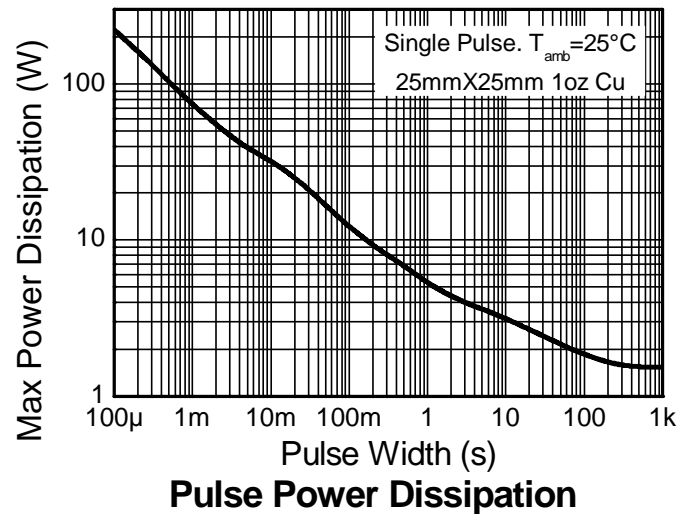
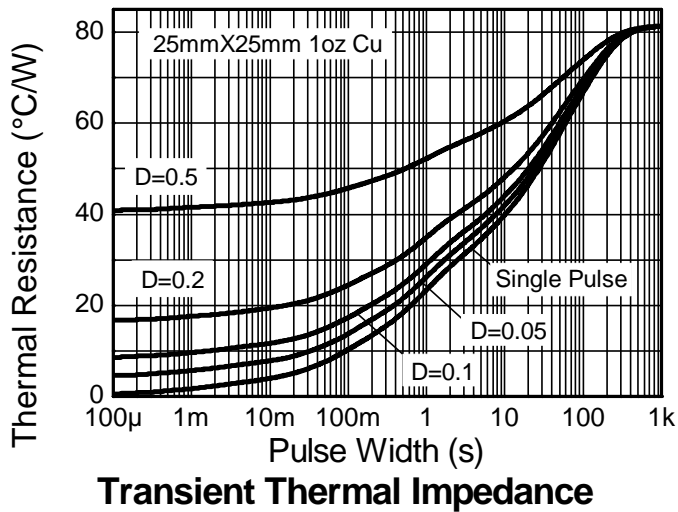
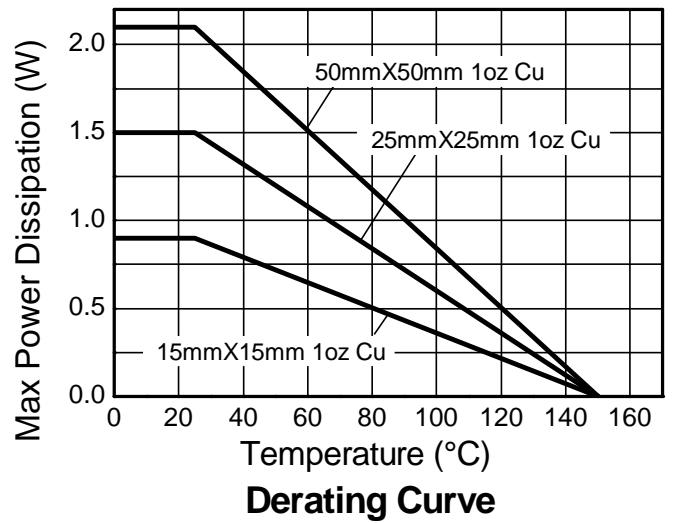
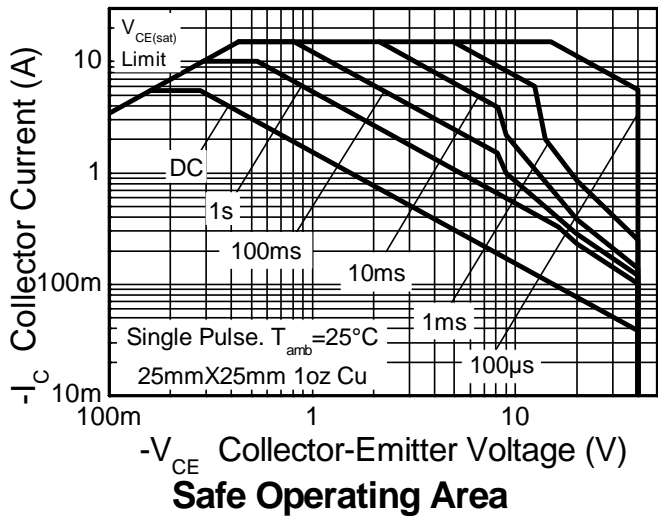
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	0.9	W
		1.5	
		2.1	
		3.0	
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	139	°C/W
		83	
		60	
		42	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	2.81	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-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**

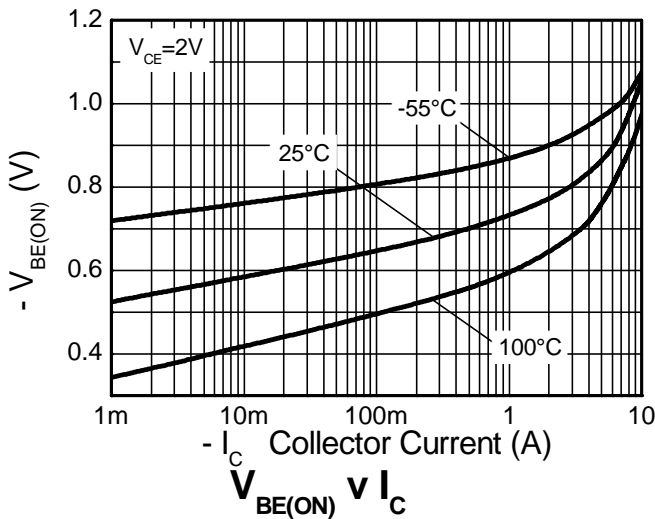
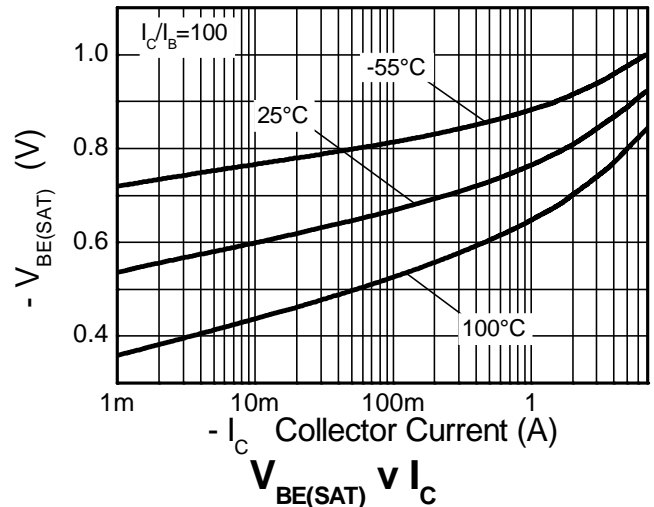
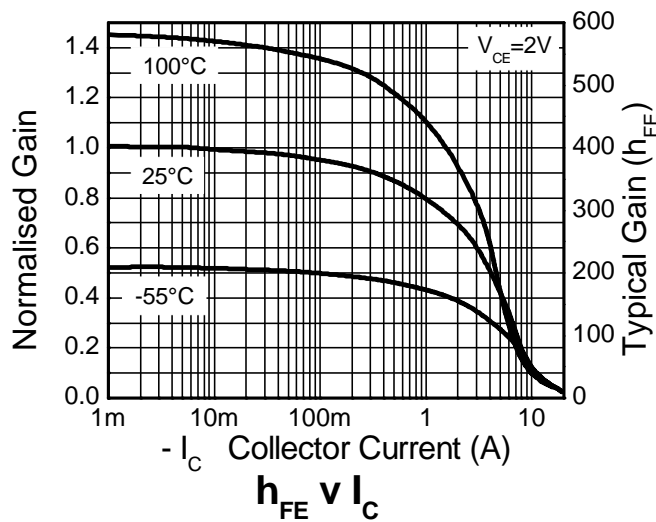
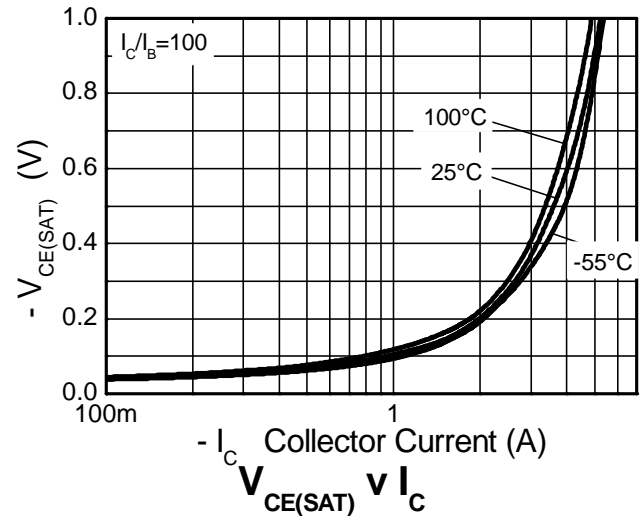
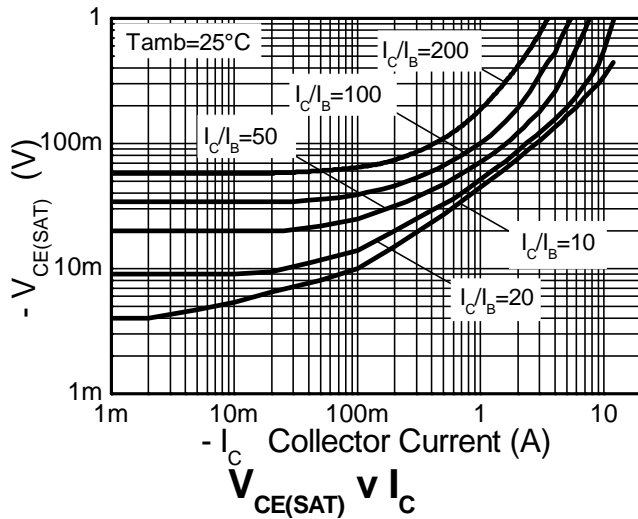


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-50	-90	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage	BV <sub>CES</sub>	-50	-90	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 12)	BV <sub>CEO</sub>	-40	-58	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7.5	-8.3	—	V	I <sub>E</sub> = -100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	<1	-20	nA	V <sub>CB</sub> = -40V
Collector Cutoff Current	I <sub>CES</sub>	—	<1	-20	nA	V <sub>CE</sub> = -32V
Emitter Cutoff Current	I <sub>EBO</sub>	—	<1	-20	nA	V <sub>EB</sub> = -6V
DC Current Transfer Static Ratio (Note 12)	h <sub>FE</sub>	200 200 170 110	390 350 290 175	— 550 — —	—	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V I <sub>C</sub> = -0.5A, V <sub>CE</sub> = -2V I <sub>C</sub> = -2A, V <sub>CE</sub> = -2V I <sub>C</sub> = -5.5A, V <sub>CE</sub> = -2V
Collector-Emitter Saturation Voltage (Note 12)	V <sub>CE(SAT)</sub>	— — —	-15 -44 -50 -120 -70 -125 -130 -162	-30 -60 -70 -165 -80 -175 -175 -185	mV	I <sub>C</sub> = -0.1A, I <sub>B</sub> = -10mA I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA I <sub>C</sub> = -1A, I <sub>B</sub> = -50mA I <sub>C</sub> = -1A, I <sub>B</sub> = -10mA I <sub>C</sub> = -2A, I <sub>B</sub> = -200mA I <sub>C</sub> = -2A, I <sub>B</sub> = -40mA I <sub>C</sub> = -3.5A, I <sub>B</sub> = -175mA I <sub>C</sub> = -5.5A, I <sub>B</sub> = -550mA
Base-Emitter Saturation Voltage (Note 12)	V <sub>BE(SAT)</sub>	—	-820 -1000	-900 -1075	V	I <sub>C</sub> = -2A, I <sub>B</sub> = -40mA I <sub>C</sub> = -5.5A, I <sub>B</sub> = -550mA
Base-Emitter Turn-On Voltage (Note 12)	V <sub>BE(ON)</sub>	—	-778 -869	-850 -950	V	I <sub>C</sub> = -2A, V <sub>CE</sub> = -2V I <sub>C</sub> = -5.5A, V <sub>CE</sub> = -2V
Transitional Frequency	f <sub>T</sub>	—	152	—	MHz	I <sub>C</sub> = -50mA, V <sub>CE</sub> = -10V f = 100MHz
Output Capacitance	C <sub>obo</sub>	—	53	—	pF	V <sub>CB</sub> = -10V, f = 1MHz,
Switching Times	t <sub>d</sub>	—	18	—	nS	I <sub>C</sub> = -1A, V <sub>CC</sub> = -10V I <sub>B1</sub> = -I <sub>B2</sub> = -100mA
	t <sub>r</sub>		17			
	t <sub>s</sub>		325			
	t <sub>f</sub>		60			
Switching Times	t <sub>d</sub>	—	55	—	nS	I <sub>C</sub> = -2A, V <sub>CC</sub> = -30V I <sub>B1</sub> = -I <sub>B2</sub> = -20mA
	t <sub>r</sub>		107			
	t <sub>s</sub>		264			
	t <sub>f</sub>		103			

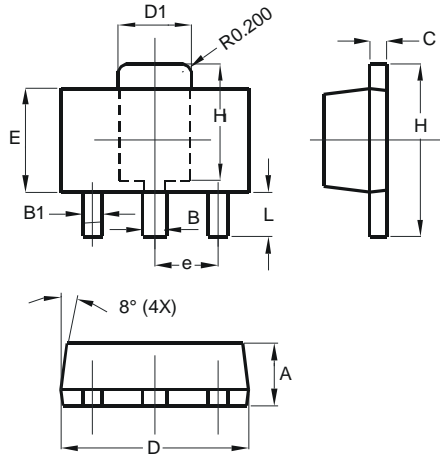
Note: 12. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



## Package Outline Dimensions

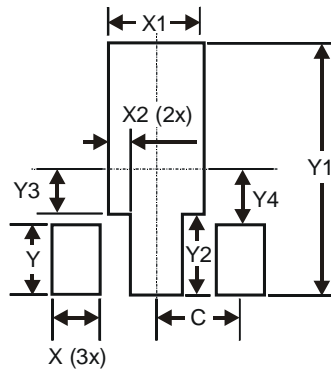
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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