

**100V PNP MEDIUM POWER TRANSISTOR IN SOT223**

**Features**

- $BV_{CEO} > -100V$
- $I_C = -5A$  High Continuous Collector Current
- $I_{CM} = -10A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(sat)} < -90mV @ -1A$
- $R_{SAT} = 60m\Omega$  for a Low equivalent On-Resistance
- $h_{FE}$  Specified up to -10A for a High 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: SOT223
- 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: 0.112 grams (Approximate)

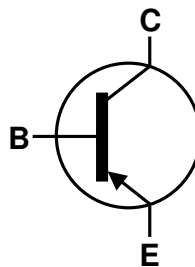
**Applications**

- Motor Driving
- Line Switching
- High Side Switches
- Subscriber Line Interface Cards (SLIC)

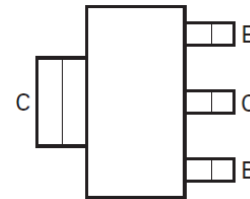
SOT223



Top View



Device Symbol



Top View  
Pin-Out

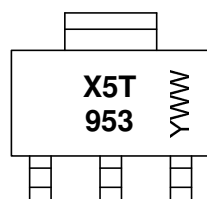
**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZX5T953GTA	AEC-Q101	X5T953	7	12	1,000
ZX5T953GQTA	Automotive	X5T953	7	12	1,000

- 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**

SOT223



X5T953 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 WW or  $\bar{W}W$  = Week Code (01~53)

### Maximum Ratings (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-140	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-100	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-5	A
Peak Pulse Current	I <sub>CM</sub>	-10	A

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

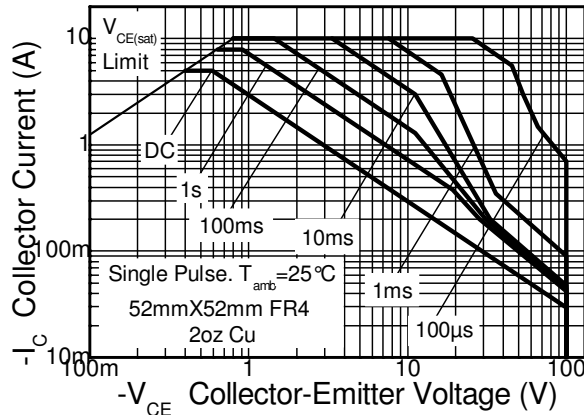
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	3.0	W
		24	
Linear Derating Factor		1.6	mW / °C
		12.8	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	42	°C/W
	R <sub>θJA</sub>	78	
Thermal Resistance Junction to Lead	R <sub>θJL</sub>	10.4	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 9)

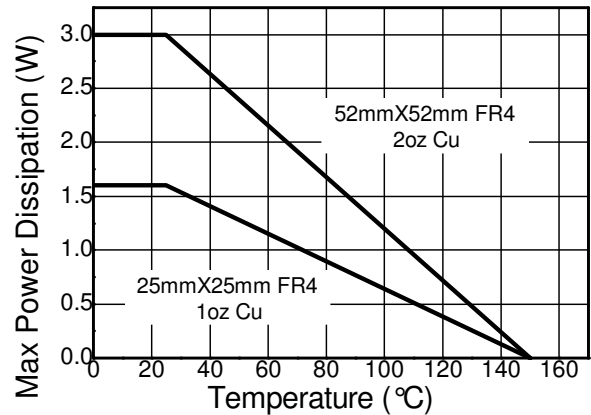
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted with the collector lead on 52mm x 52mm 2oz 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 5, except the device is mounted on 25mm x 25mm 1oz copper.
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

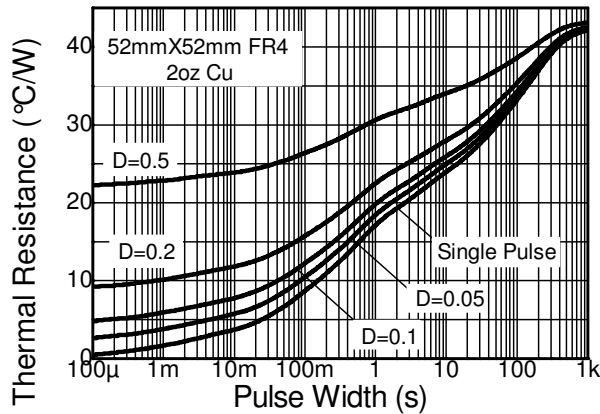
**Thermal Characteristics and Derating Information**



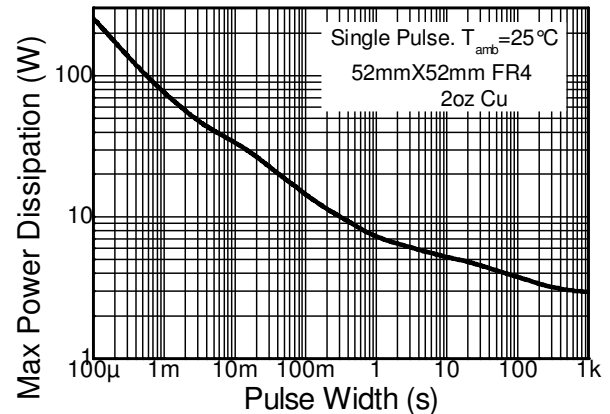
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



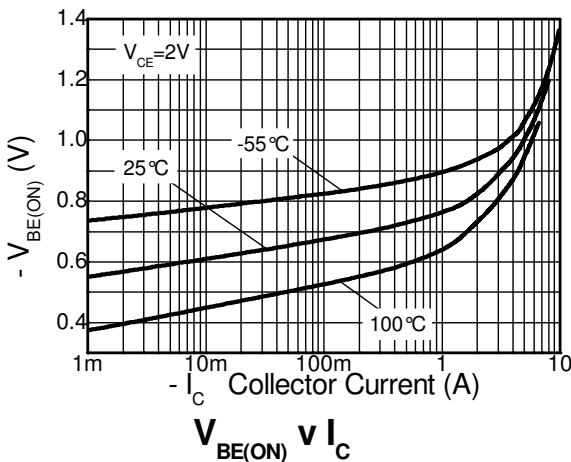
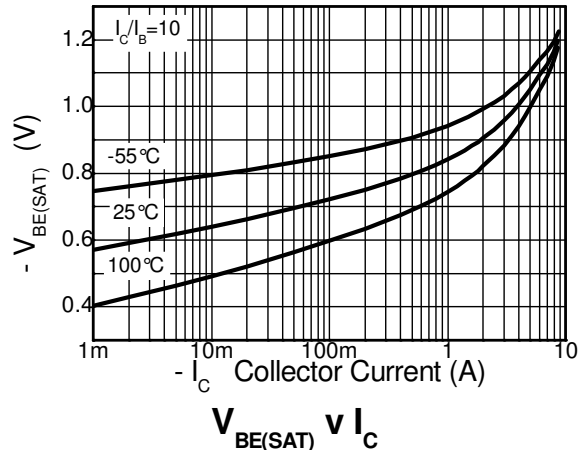
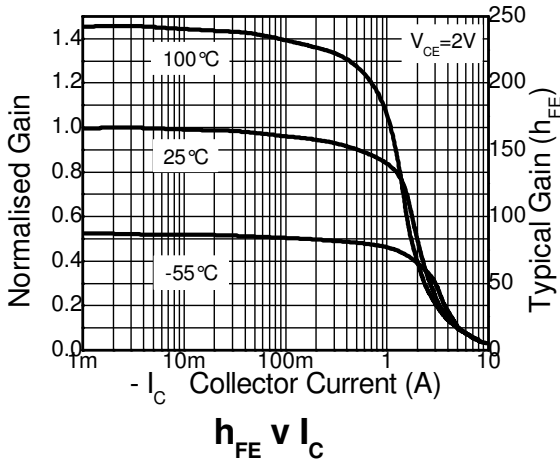
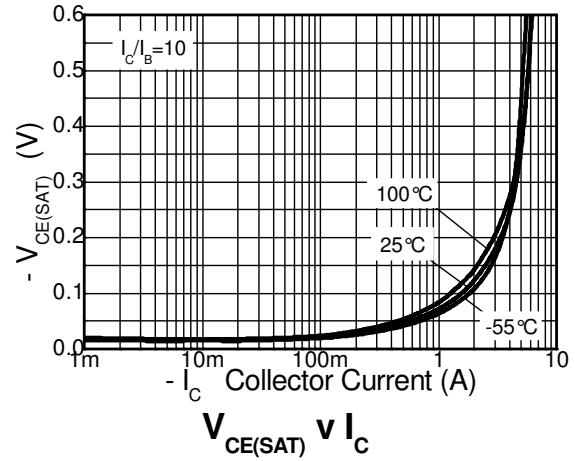
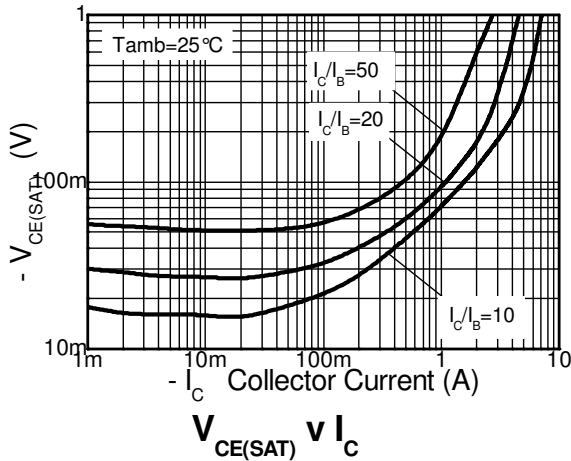
**Pulse Power Dissipation**

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-140	-160	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$BV_{CER}$	-140	-160	-	V	$I_C = -1\mu\text{A}$ , $R_B \leq 1\text{k}\Omega$
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	-100	-115	-	V	$I_C = -1\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-8.1	-	V	$I_E = -100\mu\text{A}$
Collector-Base Cut-Off Current	$I_{CBO}$	-	<1	-20	nA	$V_{CB} = -100\text{V}$
				-0.5	$\mu\text{A}$	$V_{CB} = -100\text{V}$ , $T_A = +100^\circ\text{C}$
Collector-Emitter Cut-Off Current	$I_{CER}$ $R \leq 1\text{k}\Omega$	-	<1	-20	nA	$V_{CB} = -100\text{V}$
				-0.5	$\mu\text{A}$	$V_{CB} = -100\text{V}$ , $T_A = +100^\circ\text{C}$
Emitter Cut-Off Current	$I_{EBO}$	-	<1	-10	nA	$V_{EB} = -6\text{V}$
Static Forward Current Transfer Ratio (Note 10)	$h_{FE}$	100	250	-	-	$I_C = -10\text{mA}$ , $V_{CE} = -1\text{V}$
		100	200	300		$I_C = -1\text{A}$ , $V_{CE} = -1\text{V}$
		25	50	-		$I_C = -3\text{A}$ , $V_{CE} = -1\text{V}$
		15	30	-		$I_C = -4\text{A}$ , $V_{CE} = -1\text{V}$
		-	5	-		$I_C = -10\text{A}$ , $V_{CE} = -1\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	-	-20	-30	mV	$I_C = -100\text{mA}$ , $I_B = -10\text{mA}$
		-	-70	-90		$I_C = -1\text{A}$ , $I_B = -100\text{mA}$
		-	-120	-150		$I_C = -2\text{A}$ , $I_B = -200\text{mA}$
		-	-240	-340		$I_C = -4\text{A}$ , $I_B = -400\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	-	-985	-1100	mV	$I_C = -4\text{A}$ , $I_B = -400\text{mA}$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	-	-920	-1050	mV	$I_C = -4\text{A}$ , $V_{CE} = -2\text{V}$
Output Capacitance (Note 10)	$C_{obo}$	-	42	-	pF	$V_{CB} = -10\text{V}$ , $f = 1\text{MHz}$
Transition Frequency	$f_T$	-	125	-	MHz	$V_{CE} = -10\text{V}$ , $I_C = -100\text{mA}$ $f = 50\text{MHz}$
Switching Time	$t_{on}$	-	42	-	ns	$V_{CC} = -10\text{V}$ , $I_C = -1\text{A}$ $I_{B1} = I_{B2} = -100\text{mA}$
	$t_{off}$	-	540	-		

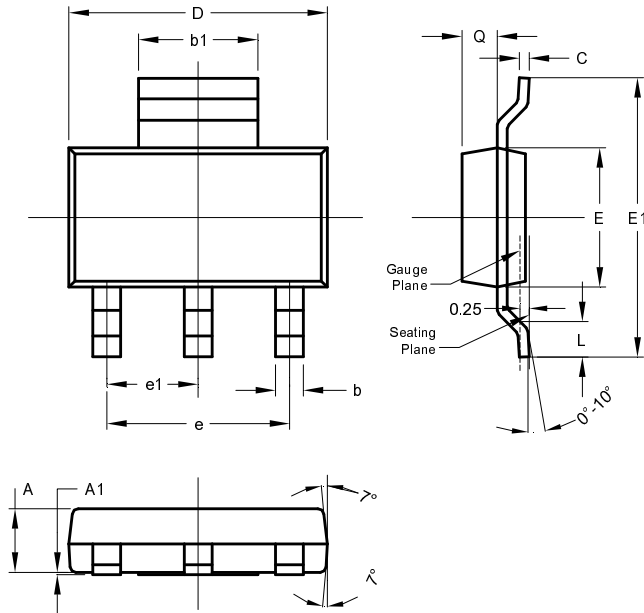
Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



## Package Outline Dimensions

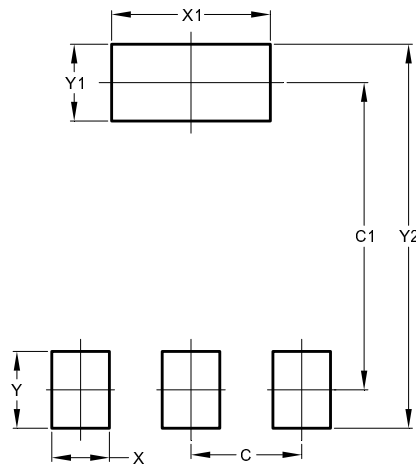
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
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)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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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