# ZX5T953G

## 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
- $R_{SAT}$ = 60mΩ 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)**

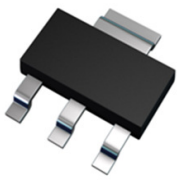
## Mechanical Data

- 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)

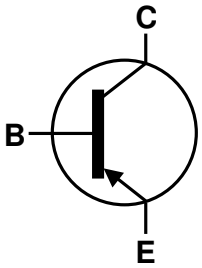
## Applications

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

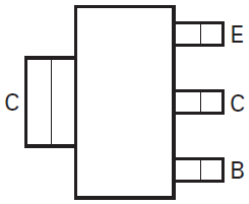
SOT223



Top View




Device Symbol




Top View
Pin-Out

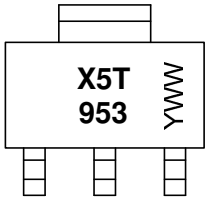
## Ordering Information (Notes 4 & 5)

| 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 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 $\overline{Y}$ = Last Digit of Year (ex: 5= 2015)
WW or $\overline{W}W$ = Week Code (01~53)


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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -140 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -100 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -7 | V |
| Continuous Collector Current | $I_C$ | -5 | A |
| Peak Pulse Current | $I_{CM}$ | -10 | A |

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

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation<br>Linear Derating Factor | (Note 6) | $P_D$ | 3.0<br>24 | W<br>mW / °C |
| | (Note 7) | | 1.6<br>12.8 | |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 42 | °C/W |
| | (Note 7) | $R_{\theta JA}$ | 78 | |
| Thermal Resistance Junction to Lead | (Note 8) | $R_{\theta JL}$ | 10.4 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

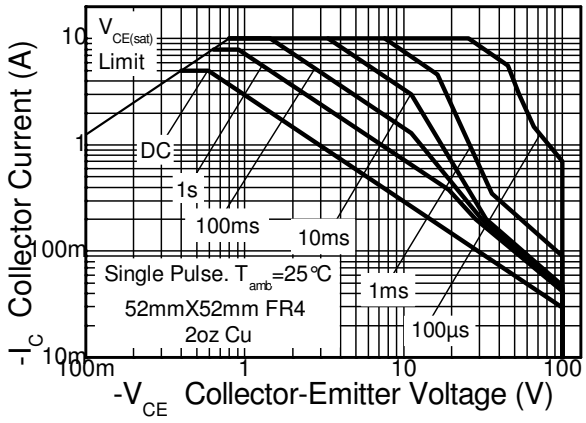
## ESD Ratings (Note 9)

| 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 |

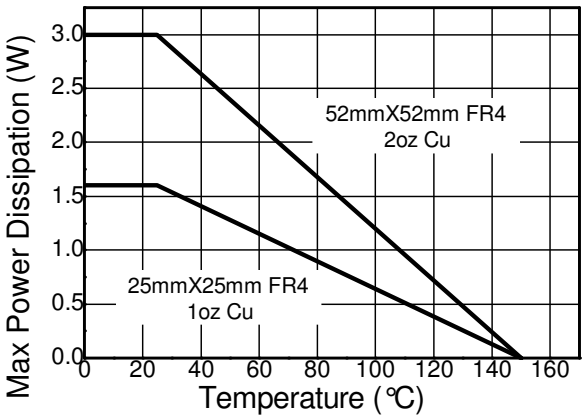
Notes:
6. For a device mounted with the collector lead on 52mm x 52mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
7. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
8. Thermal resistance from junction to solder-point (at the end of the collector lead).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.


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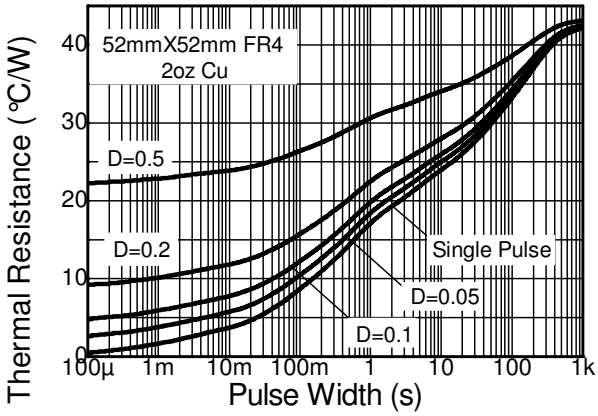
## Thermal Characteristics and Derating Information



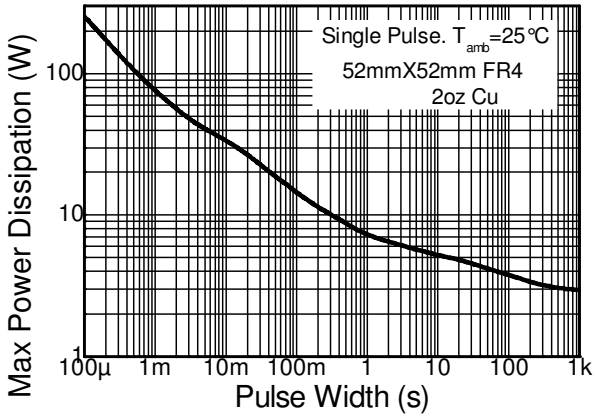

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**




**Pulse Power Dissipation**


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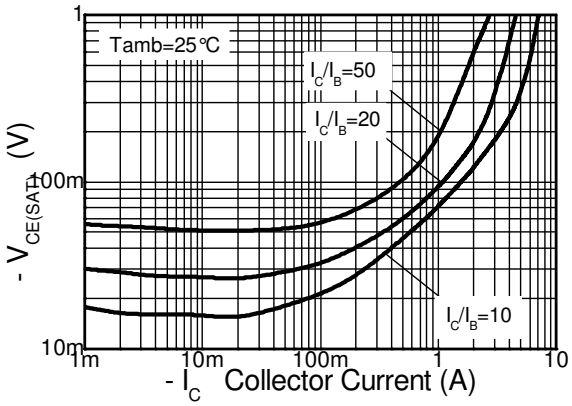
## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

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

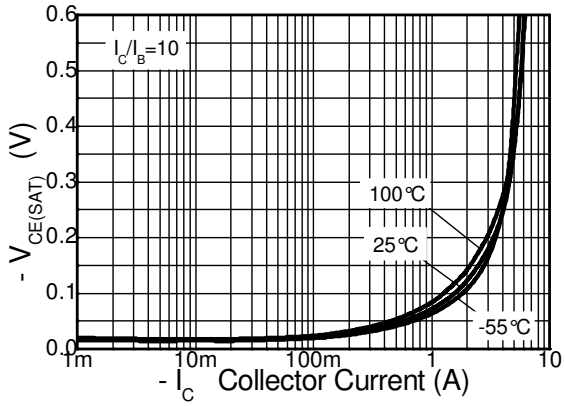
Note: 10. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.


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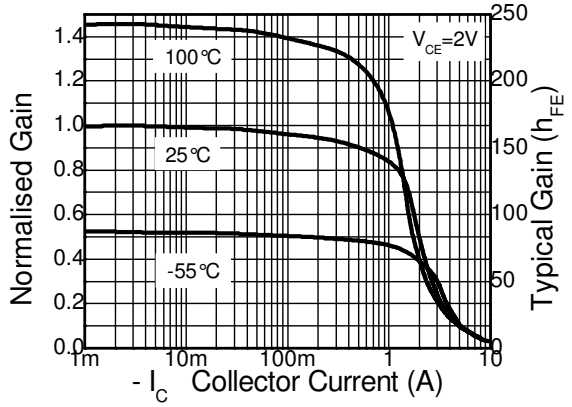
## Typical Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)



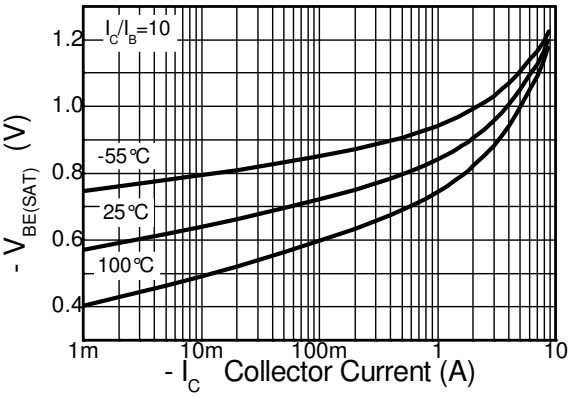

**$V_{CE(SAT)}$ v $I_C$**



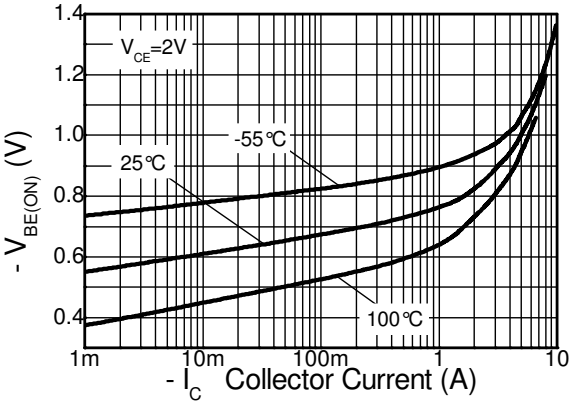

**$V_{CE(SAT)}$ v $I_C$**




**$h_{FE}$ v $I_C$**




**$V_{BE(SAT)}$ v $I_C$**

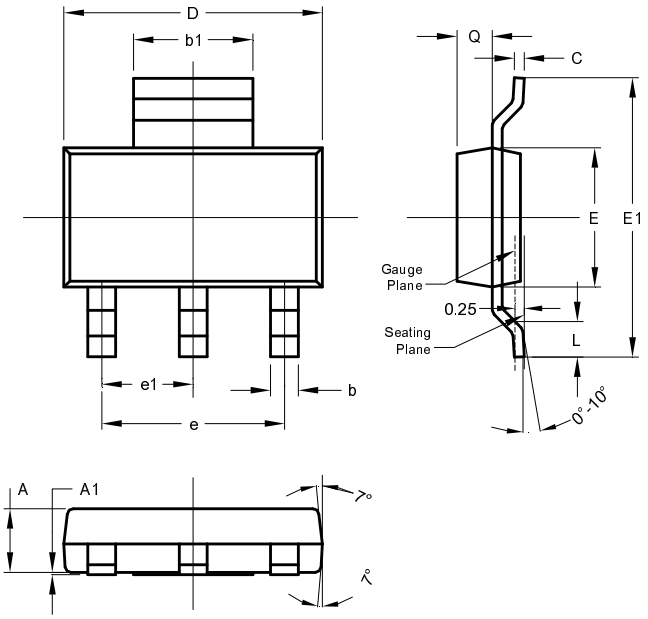



**$V_{BE(ON)}$ v $I_C$**


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## Package Outline Dimensions

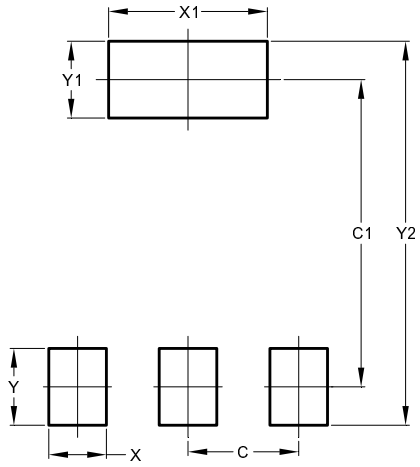
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.




| 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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