

## Description

This bipolar junction transistor (BJT) is designed to meet the stringent requirements of automotive applications.

## Features

- $BV_{CEO} > -60V$
- $I_C = -6A$  Continuous Collector Current
- Low Saturation Voltage  $V_{CE(sat)} < -95mV @ -1A$
- $R_{CE(sat)} = 40m\Omega$  for a low Equivalent On-Resistance
- $h_{FE}$  Specified up to -10A for a High Current Gain Hold-Up
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The ZX5T1951GQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

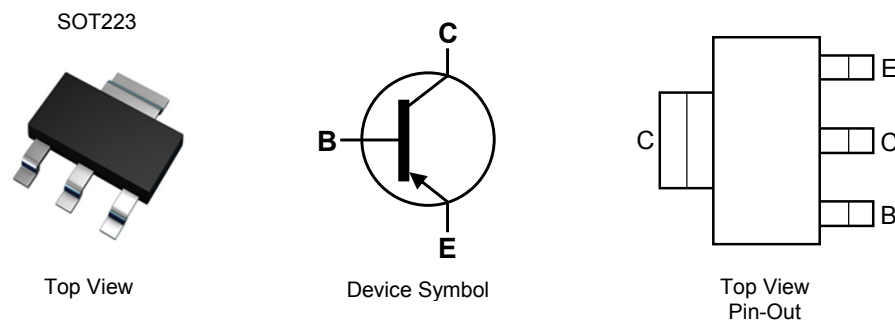
<https://www.diodes.com/quality/product-definitions/>

## 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 @3
- Weight: 0.112 grams (Approximate)

## Applications

- Motor Driving
- DC-DC Modules
- Backlight Inverters
- Actuator, Relay and Solenoid Drivers

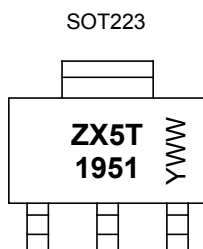


## Ordering Information (Note 4)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZX5T1951GQTA	ZX5T1951	7	12	1000

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  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 <http://www.diodes.com/products/packages.html>.

## Marking Information



ZX5T1951 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 0= 2020)  
 WW or  $\bar{W}W$  = Week Code (01~53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-90	V
Collector-Emitter Voltage	V <sub>CES</sub>	-90	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-60	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current (Note 5)	I <sub>C</sub>	-6	A
Peak Pulse Current	I <sub>CM</sub>	-15	A
Base Current	I <sub>B</sub>	-1	A

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

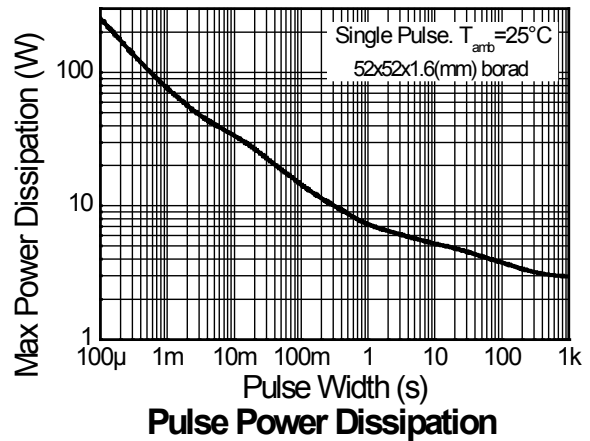
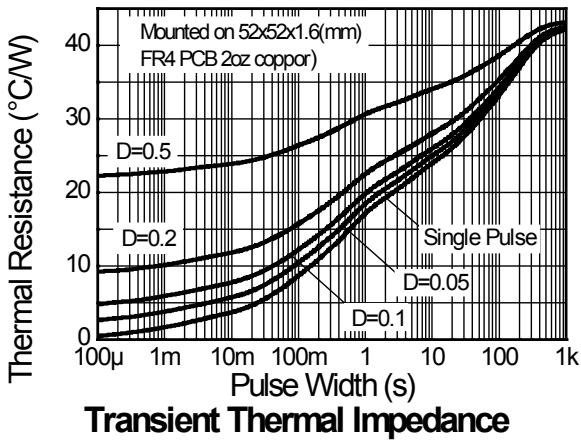
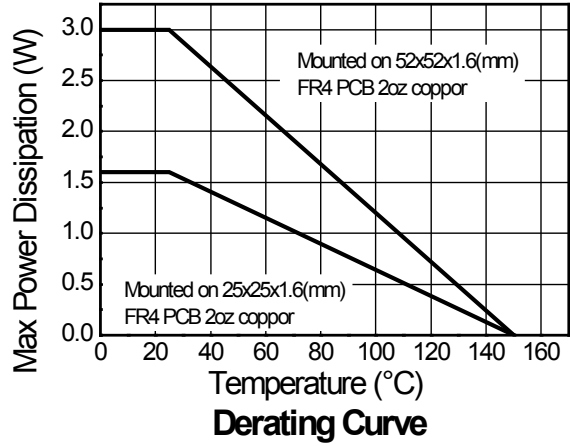
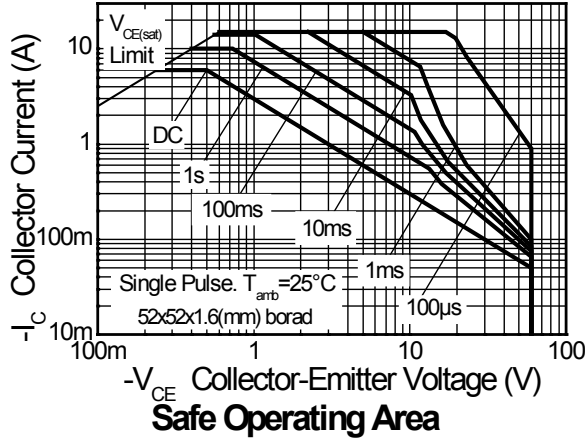
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	3.0	W
		24	
		1.6	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	12.8	°C/W
		42	
Thermal Resistance Junction to Lead	R <sub>θJL</sub>	78	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	12.3	
		-55 to +150	

**ESD Ratings** (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

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

**Thermal Characteristics**

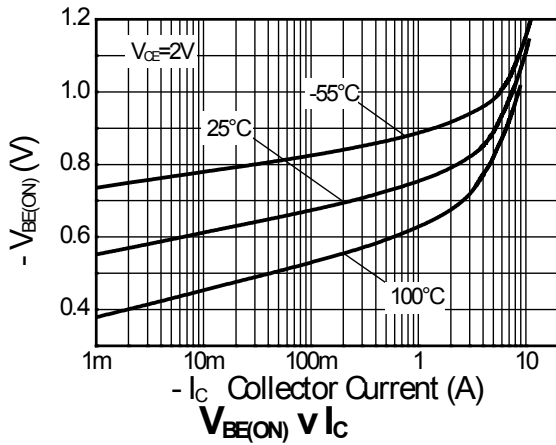
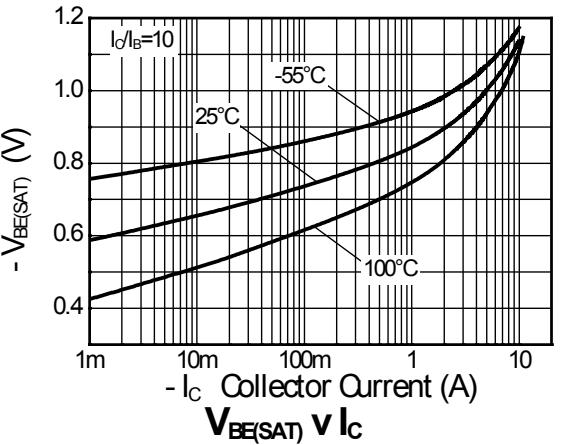
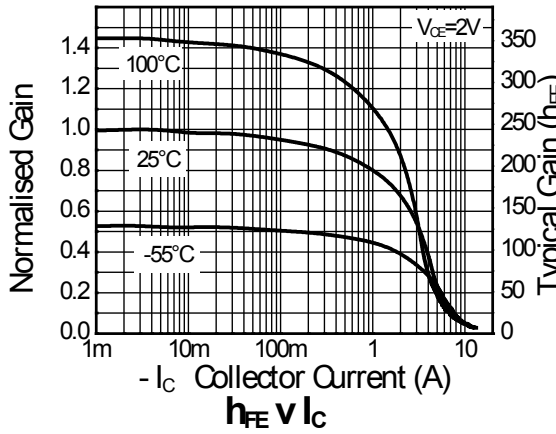
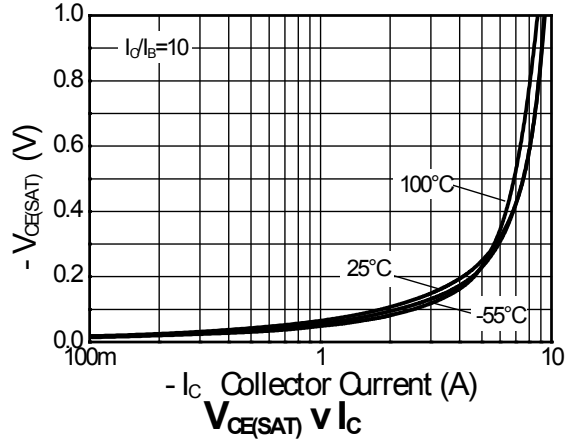
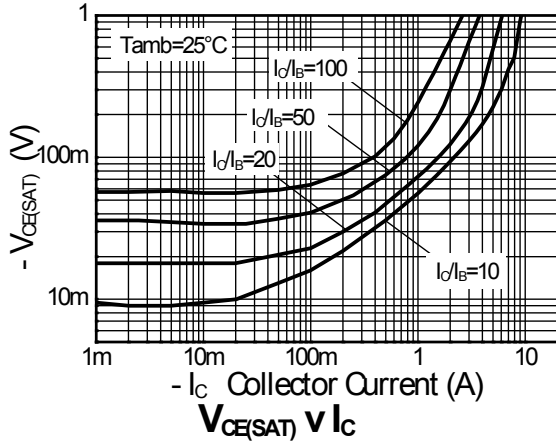


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-90	-120	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$BV_{CES}$	-90	-120	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	$BV_{CEO}$	-60	-80	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-8	—	V	$I_E = -100\mu\text{A}$
Collector-Base Cut-Off Current	$I_{CBO}$	—	-1	-50	nA	$V_{CB} = -72\text{V}$
Collector-Emitter Cut-Off Current	$I_{CES}$	—	-1	-50	nA	$V_{CB} = -72\text{V}$
Emitter Cutoff Current	$I_{EBO}$	—	-1	-10	nA	$V_{EB} = -6\text{V}$
Static Forward Current Transfer Ratio (Note 9)	$h_{FE}$	100	240	—	—	$I_C = -10\text{mA}, V_{CE} = -2\text{V}$
		100	180	300		$I_C = -2\text{A}, V_{CE} = -2\text{V}$
		40	70	—		$I_C = -5\text{A}, V_{CE} = -2\text{V}$
		5	14	—		$I_C = -10\text{A}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(sat)}$	—	-16	-30	mV	$I_C = -100\text{mA}, I_B = -10\text{mA}$
		—	-55	-95		$I_C = -1\text{A}, I_B = -100\text{mA}$
		—	-85	-130		$I_C = -2\text{A}, I_B = -200\text{mA}$
		—	-200	-260		$I_C = -5\text{A}, I_B = -500\text{mA}$
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(sat)}$	—	-1	-1.15	V	$I_C = -5\text{A}, I_B = -500\text{mA}$
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(on)}$	—	-0.89	-1.0	V	$I_C = -5\text{A}, V_{CE} = -2\text{V}$
Output Capacitance (Note 9)	$C_{obo}$	—	33	70	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$
Transition Frequency	$f_T$	—	120	—	MHz	$V_{CE} = -10\text{V}, I_C = -100\text{mA}$ $f = 50\text{MHz}$
Switching Time	$t_{on}$	—	33	80	ns	$V_{CC} = -10\text{V}, I_C = -2\text{A}$ $I_{B1} = -I_{B2} = -200\text{mA}$
	$t_{off}$	—	215	300		

Note: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

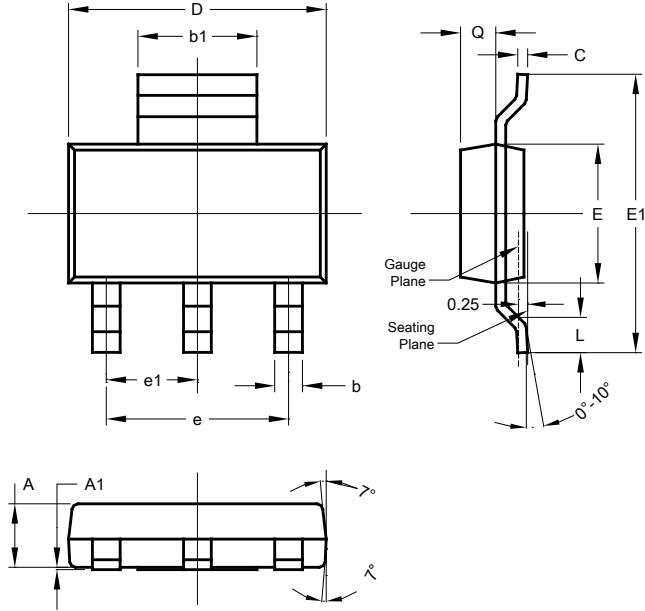
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



**Package Outline Dimensions**

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

**SOT223**

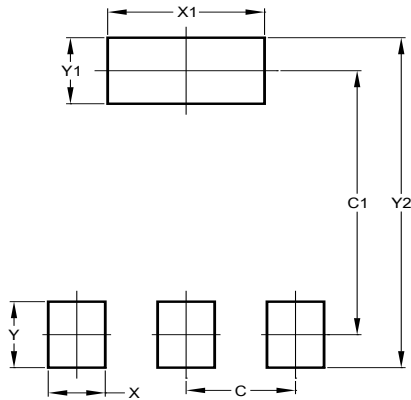


SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

**Suggested Pad Layout**

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

**SOT223**



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

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