

**60V NPN MEDIUM POWER LOW SATURATION TRANSISTOR IN SOT223**

**Features**

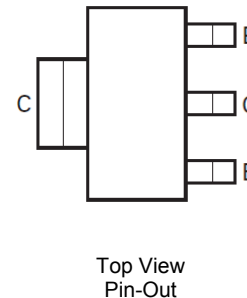
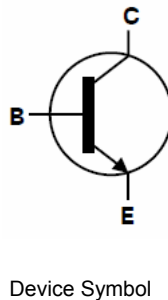
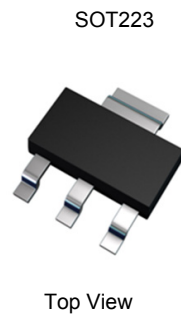
- $BV_{CEO} > 60V$
- $I_C = 6A$  high Continuous Collector Current
- $I_{CM} = 20A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(sat)} < -60mV @ -1A$
- $R_{SAT} = 35m\Omega$  for a low equivalent On-Resistance
- $h_{FE}$  specified up to 10A for a high gain hold up
- Complementary PNP Type: ZX5T951G
- **Lead-Free Finish; RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**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 **Ⓔ**
- Weight: 0.112 grams (approximate)

**Applications**

- Emergency lighting circuits
- MOSFET & IGBT gate drivers
- Solenoid, relay and actuator drivers
- DC Modules
- Motor control

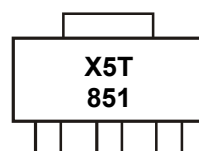


**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZX5T851GTA	X5T851	7	12	1,000
ZX5T851GTC	X5T851	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> 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>

**Marking Information**



X5T851 = Product Type Marking Code

### Maximum Ratings (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	150	V
Collector-Emitter Voltage	$V_{CEO}$	60	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	6	A
Peak Pulse Current	$I_{CM}$	20	A

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

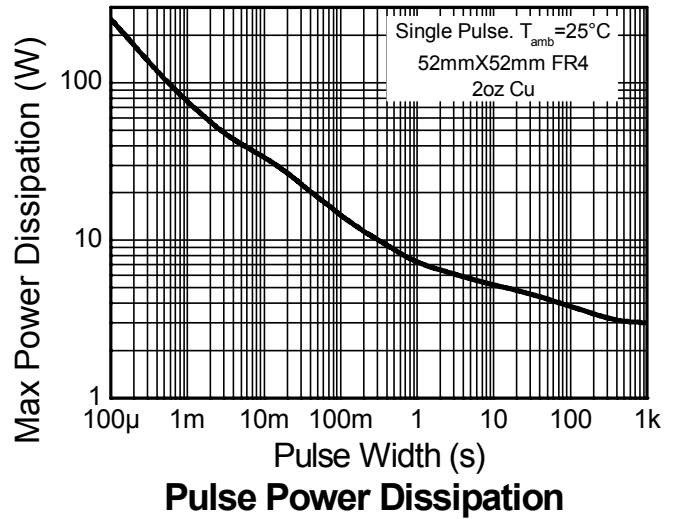
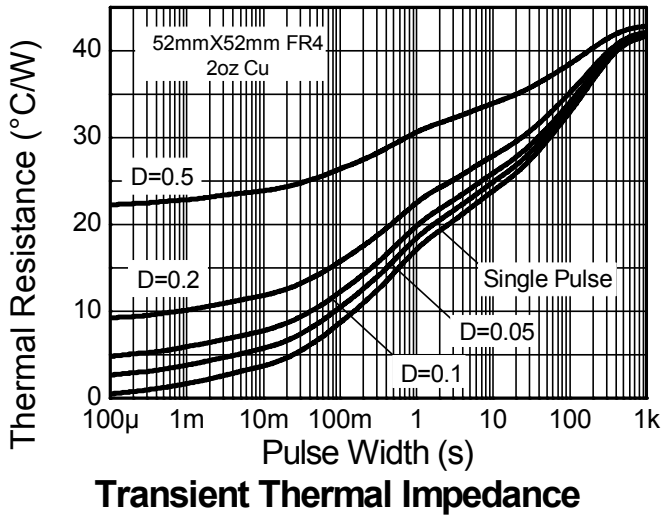
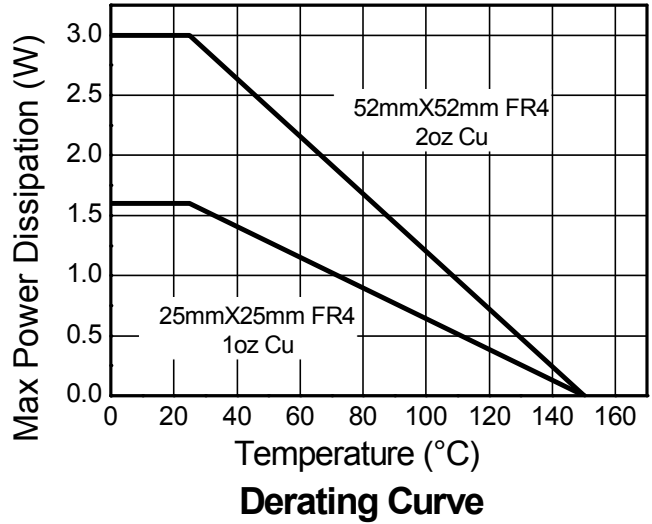
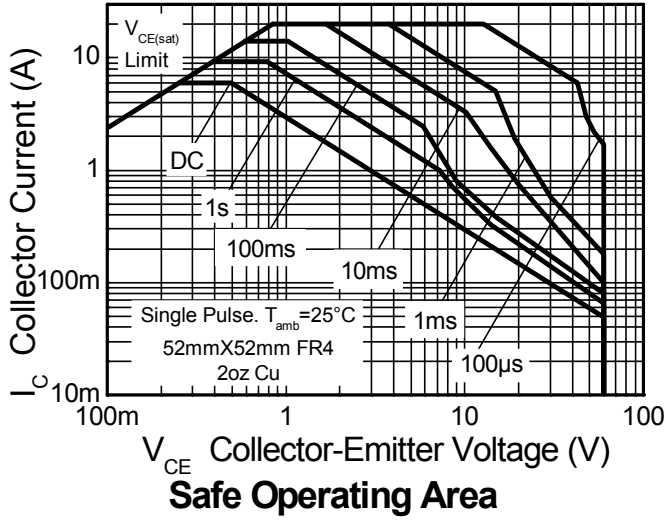
Characteristic	Symbol	Value	Unit
Power Dissipation Linear derating factor	$P_D$	3.0	W
		24	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	1.6	$\text{mW}/^\circ\text{C}$
		12.8	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	42	$^\circ\text{C}/\text{W}$
		78	
Thermal Resistance Junction to Lead	$R_{\theta JL}$	10.48	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

### ESD Ratings (Note 8)

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

- Notes:
5. For a device surface mounted on 52mm x 52mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  6. Same as note (5), except the device is surface mounted on 25mm x 25mm with 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 and Derating Information**

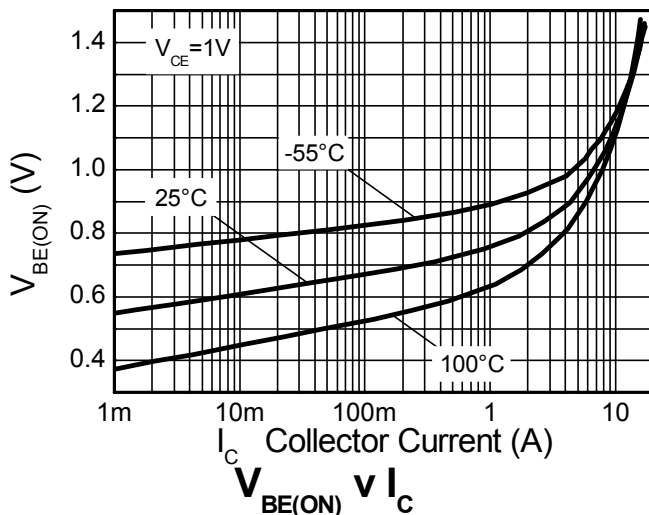
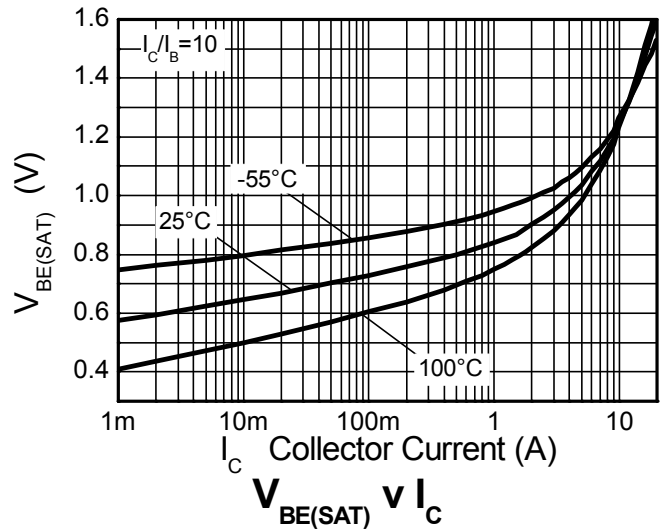
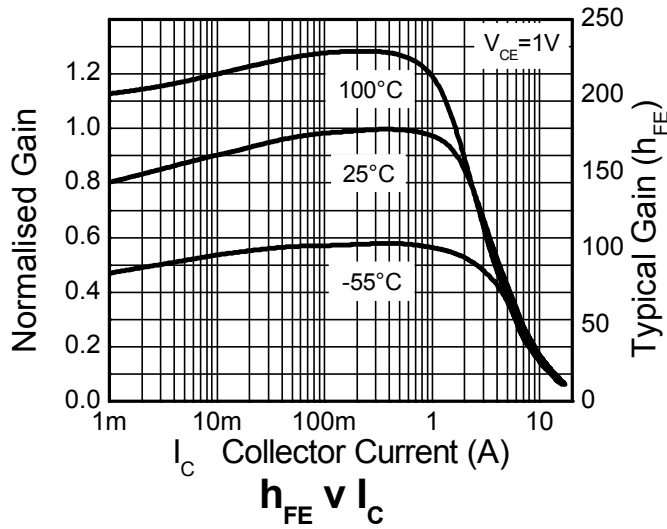
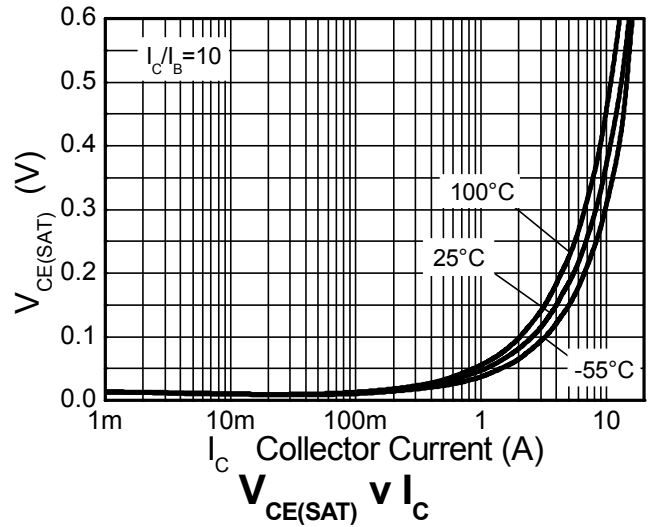
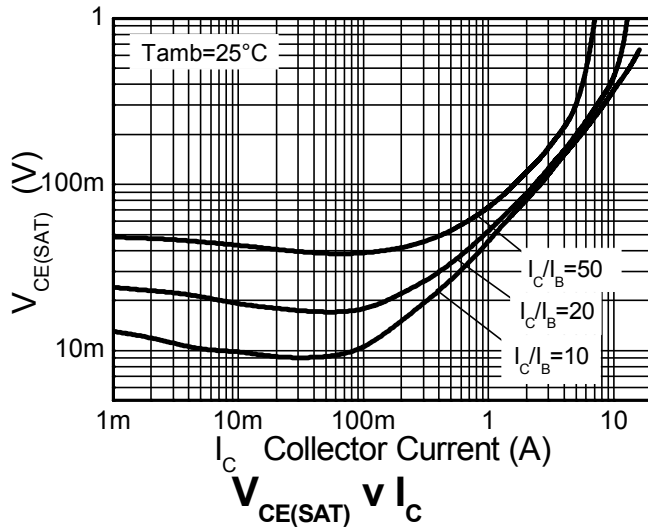


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	150	190	–	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage	BV <sub>CER</sub>	150	190	–	V	I <sub>C</sub> = -1μA, R <sub>B</sub> ≤ 1kΩ
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	60	80	–	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.1	–	V	I <sub>E</sub> = 100μA
Collector Cut-off Current	I <sub>CBO</sub>	–	<1	20	nA	V <sub>CB</sub> = 120V
		–	–	0.5	μA	V <sub>CB</sub> = 120V, T <sub>A</sub> = +100°C
Collector Cut-off Current	I <sub>CER</sub>	–	<1	20	nA	V <sub>CB</sub> = 120V
	R <sub>B</sub> ≤ 1kΩ	–	–	0.5	μA	V <sub>CB</sub> = 120V, T <sub>A</sub> = +100°C
Emitter Cut-off Current	I <sub>EBO</sub>	–	<1	10	nA	V <sub>EB</sub> = 6V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	–	20	30	mV	I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA
		–	45	60		I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
		–	50	70		I <sub>C</sub> = 1A, I <sub>B</sub> = 50mA
		–	100	135		I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA
		–	210	260		I <sub>C</sub> = 6A, I <sub>B</sub> = 300mA
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(sat)</sub>	–	1000	1100	mV	I <sub>C</sub> = 6A, I <sub>B</sub> = 300mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(on)</sub>	–	940	1050	mV	I <sub>C</sub> = 6A, V <sub>CE</sub> = 1V
DC Current Gain (Note 9)	h <sub>FE</sub>	100	200	–	–	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 1V
		100	200	300		I <sub>C</sub> = 2A, V <sub>CE</sub> = 1V
		55	105	–		I <sub>C</sub> = 5A, V <sub>CE</sub> = 1V
		20	40	–		I <sub>C</sub> = 10A, V <sub>CE</sub> = 1V
Output Capacitance	C <sub>obo</sub>	–	31	–	pF	V <sub>CB</sub> = 10V, f = 1MHz
Current Gain-Bandwidth Product	f <sub>T</sub>	–	130	–	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100mA, f = 100MHz
Switching Times	t <sub>on</sub>	–	42	–	ns	I <sub>C</sub> = 1A, V <sub>CC</sub> = 10V, I <sub>B1</sub> = -I <sub>B2</sub> = 100mA
	t <sub>off</sub>	–	760	–		

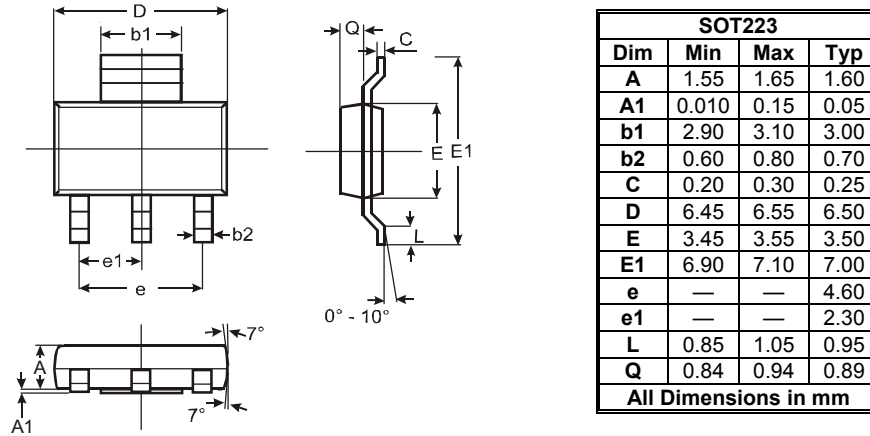
Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

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



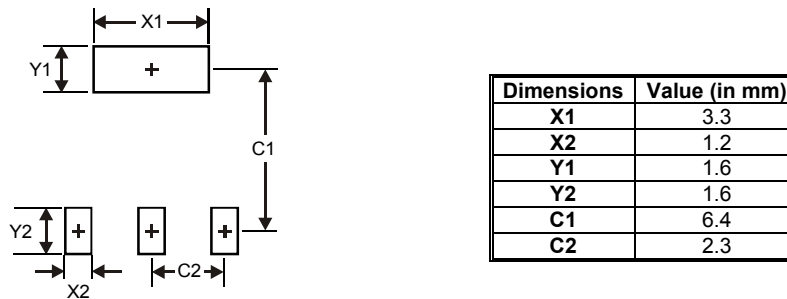
## Package Outline Dimensions

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



## Suggested Pad Layout

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



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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

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