

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

**Features**

- $BV_{CEO} > -60V$
- $I_C = -5.5A$  Continuous Collector Current
- $I_{CM} = -15A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(SAT)} < -70mV$  Max @ -1A
- $R_{SAT} = 39m\Omega$  @ -5A for Low Equivalent On-Resistance
- $h_{FE}$  Specified up to -10A for 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**

**Mechanical Data**

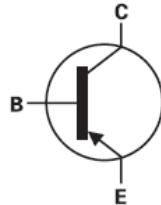
- Case: SOT223
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.112 grams (Approximate)

**Applications**

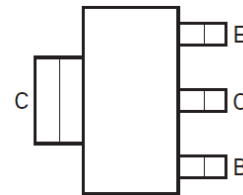
- DC-DC Converters
- MOSFET Gate Drivers
- Charging Circuits
- Power Switches
- Motor Control



Top View



Device Schematic



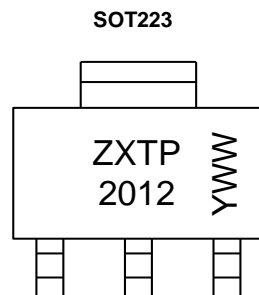
Pin-Out Top View

**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXTP2012GTA	AEC-Q101	ZXTP2012	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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



ZXTP 2012 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 WW or  $\bar{WW}$  = 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>	-100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-60	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	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.)

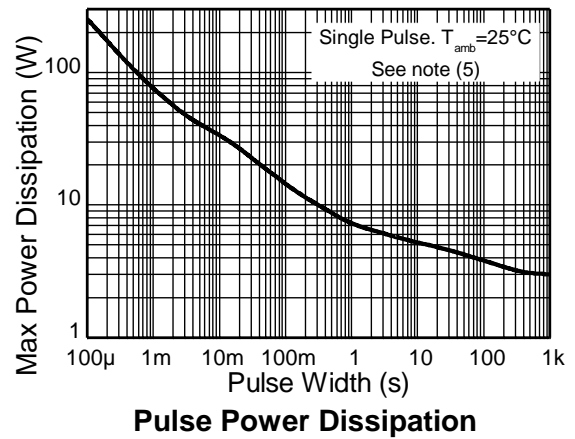
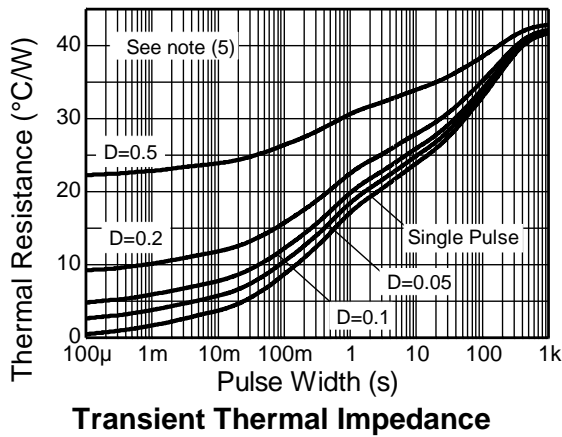
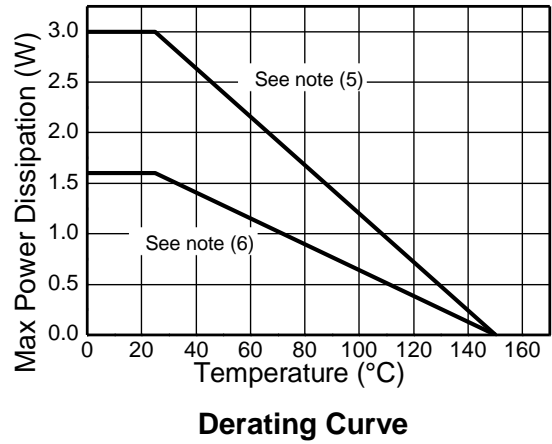
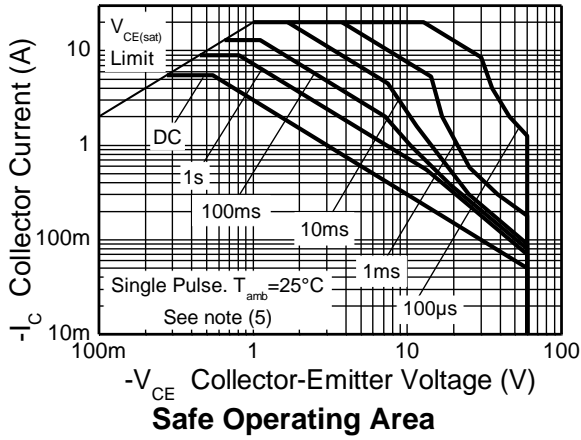
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	3.0	W
		24	
Linear Derating Factor		1.6	mW/°C
		12.8	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	42	°C/W
	R <sub>θJA</sub>	78	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	8.8	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°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	400	V	C

- Notes:
5. 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 steady-state.
  6. Same as Note 5, except the device is mounted on 25mm x 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 and Derating Information**

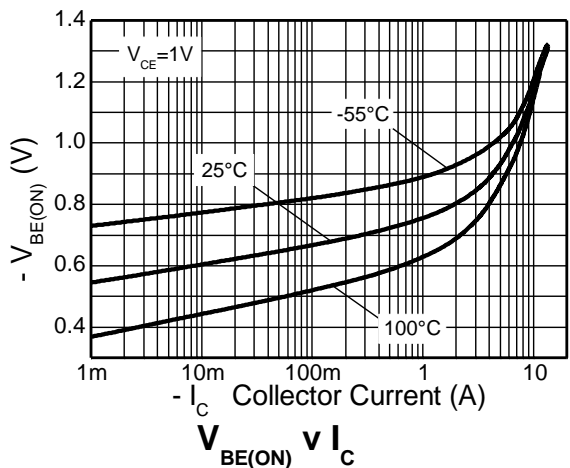
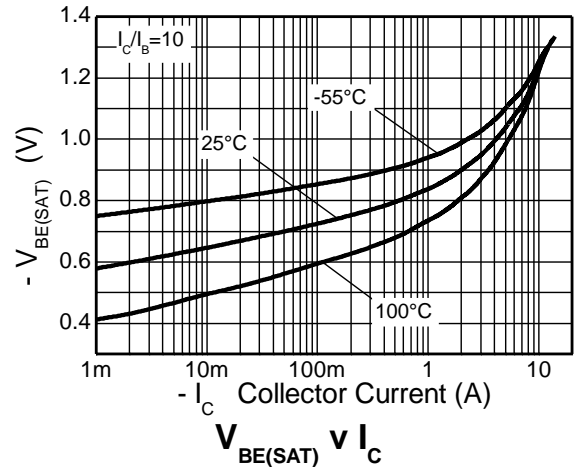
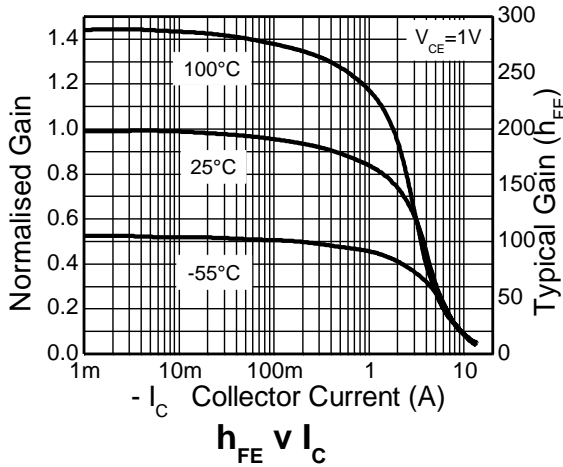
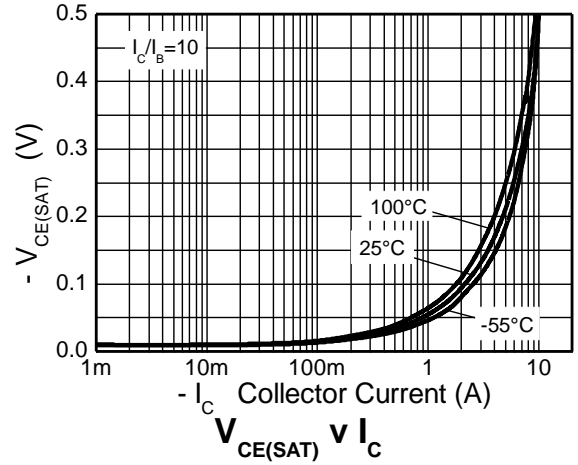
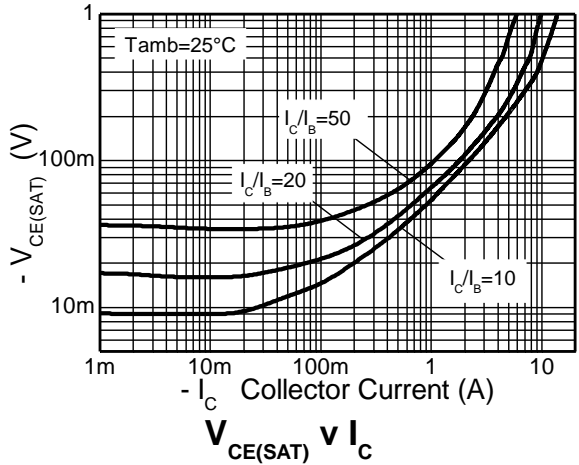


### Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	-100	-120	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage	BV <sub>CER</sub>	-100	-120	—	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 Cutoff Current	I <sub>CB0</sub>	—	< -1	-20	nA	V <sub>CB</sub> = -80V
		—	—	-0.5	μA	V <sub>CB</sub> = -80V, T <sub>A</sub> = +100°C
Collector Cutoff Current	I <sub>CER</sub> R <sub>B</sub> ≤ 1kΩ	—	< -1	-20	nA	V <sub>CB</sub> = -80V
		—	—	-0.5	μA	V <sub>CB</sub> = -80V, T <sub>A</sub> = +100°C
Emitter Cutoff Current	I <sub>EBO</sub>	—	< -1	-10	nA	V <sub>EB</sub> = -6V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(SAT)</sub>	—	-15 -55 -90 -195	-25 -70 -120 -250	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> = -2A, I <sub>B</sub> = -200mA I <sub>C</sub> = -5A, I <sub>B</sub> = -500mA
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(SAT)</sub>	—	-1.03	-1.15	V	I <sub>C</sub> = -5A, I <sub>B</sub> = -500mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(ON)</sub>	—	-0.92	-1.02	V	I <sub>C</sub> = -5A, V <sub>CE</sub> = -1V
DC Current Gain (Note 9)	h <sub>FE</sub>	100 100 45 10	250 200 90 25	300	—	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -1V I <sub>C</sub> = -2A, V <sub>CE</sub> = -1V I <sub>C</sub> = -5A, V <sub>CE</sub> = -1V I <sub>C</sub> = -10A, V <sub>CE</sub> = -1V
Transition Frequency	f <sub>T</sub>	—	120	—	MHz	V <sub>CE</sub> = -10V, I <sub>C</sub> = -100mA, f = 50MHz
Output Capacitance (Note 9)	C <sub>OBO</sub>	—	48	—	pF	V <sub>CB</sub> = -10V, f = 1MHz
Switching Times	t <sub>ON</sub>	—	39	—	ns	V <sub>CC</sub> = -10V, I <sub>C</sub> = -1A, I <sub>B1</sub> = -I <sub>B2</sub> = 100mA
	t <sub>OFF</sub>	—	370	—		

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

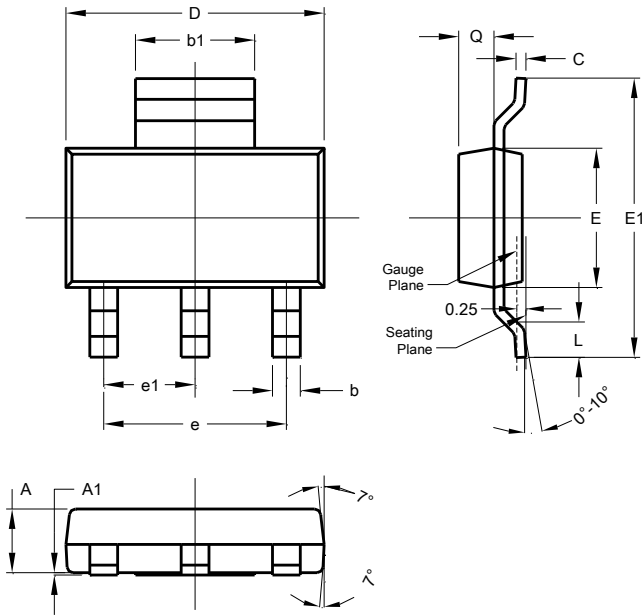
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



**Package Outline Dimensions**

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

**SOT223**

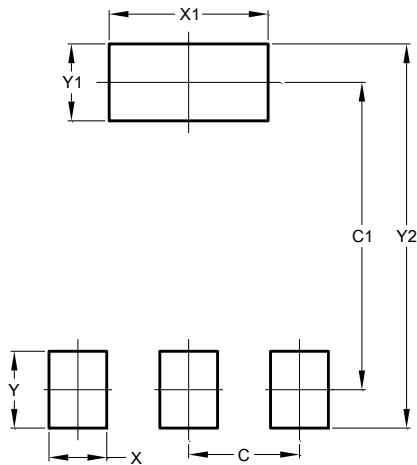


SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> 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
C2	8.00

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