



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

#### **Features**

- BV<sub>CEO</sub> > -60V
- I<sub>C</sub> = -5.5A Continuous Collector Current
- I<sub>CM</sub> = -15A Peak Pulse Current
- Low Saturation Voltage V<sub>CE(SAT)</sub> < -70mV Max @ -1A</li>
- R<sub>SAT</sub> = 39mΩ @ -5A for Low Equivalent On-Resistance
- hFE 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)

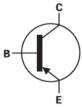
### **Applications**

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

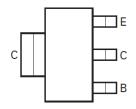
#### **SOT223**







**Device Schematic** 



Pin-Out Top View

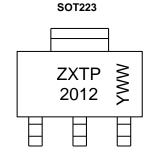
### Ordering Information (Note 4)

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 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  $\overline{Y}$  = Last Digit of Year (ex: 5= 2015) WW or  $\overline{W}W$  = 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>	-100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-60	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	Ic	-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	(Note 5)		3.0 24	W	
Linear Derating Factor	(Note 6)	P <sub>D</sub>	1.6 12.8	mW/°C	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	42		
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	78	°C/W	
Thermal Resistance, Junction to Lead	(Note 7)	$R_{ heta JL}$	8.8		
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C		

### ESD Ratings (Note 8)

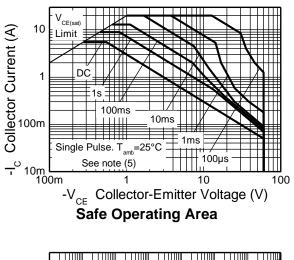
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	С

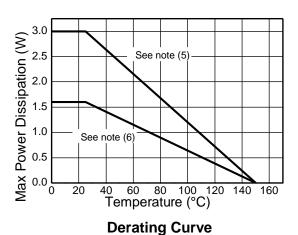
Notes:

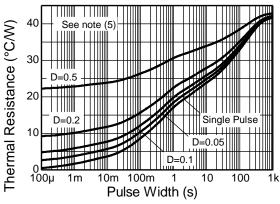
- 5. For a device mounted with the collector lead on 52mm x 52mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  6. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
  7. Thermal resistance from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

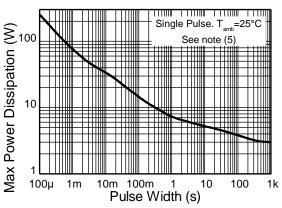


### **Thermal Characteristics and Derating Information**









**Transient Thermal Impedance** 

**Pulse Power Dissipation** 



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

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-100	-120	_	V	$I_{C} = -100 \mu A$
Collector-Emitter Breakdown Voltage	BV <sub>CER</sub>	-100	-120	_	V	$I_C = -1\mu A$ , $RB \le 1k\Omega$
Collector-Emitter Breakdown Voltage (Note 9)	$BV_{CEO}$	-60	-80	_	V	$I_C = -10mA$
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	-8.1		٧	$I_E = -100 \mu A$
Collector Cutoff Current	I <sub>CBO</sub>	_	< -1 —	-20 -0.5	nΑ μΑ	V <sub>CB</sub> = -80V V <sub>CB</sub> = -80V, T <sub>A</sub> = +100°C
Collector Cutoff Current	I <sub>CER</sub> R≤1kΩ	_	< -1 —	-20 -0.5	nΑ μΑ	$V_{CB} = -80V$ $V_{CB} = -80V$ , $T_A = +100^{\circ}C$
Emitter Cutoff Current	I <sub>EBO</sub>	_	< -1	-10	nA	$V_{EB} = -6V$
Collector-Emitter Saturation Voltage (Note 9)	VCE(SAT)	_	-15 -55 -90 -195	-25 -70 -120 -250	mV	$I_C = -0.1A$ , $I_B = -10mA$ $I_C = -1A$ , $I_B = -100mA$ $I_C = -2A$ , $I_B = -200mA$ $I_C = -5A$ , $I_B = -500mA$
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(SAT)</sub>	_	-1.03	-1.15	V	$I_C = -5A$ , $I_B = -500mA$
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(ON)</sub>	_	-0.92	-1.02	٧	$I_C = -5A$ , $V_{CE} = -1V$
DC Current Gain (Note 9)	h <sub>FE</sub>	100 100 45 10	250 200 90 25	300	l	$\begin{split} &I_{C} = -10 \text{mA}, \ V_{CE} = -1 \text{V} \\ &I_{C} = -2 \text{A}, \ V_{CE} = -1 \text{V} \\ &I_{C} = -5 \text{A}, \ V_{CE} = -1 \text{V} \\ &I_{C} = -10 \text{A}, \ V_{CE} = -1 \text{V} \end{split}$
Transition Frequency	f⊤	_	120	-	MHz	$V_{CE} = -10V, I_{C} = -100mA,$ 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>	_	39 370		ns	V <sub>CC</sub> = -10V, I <sub>C</sub> = -1A, I <sub>B1</sub> = -I <sub>B2</sub> = 100mA

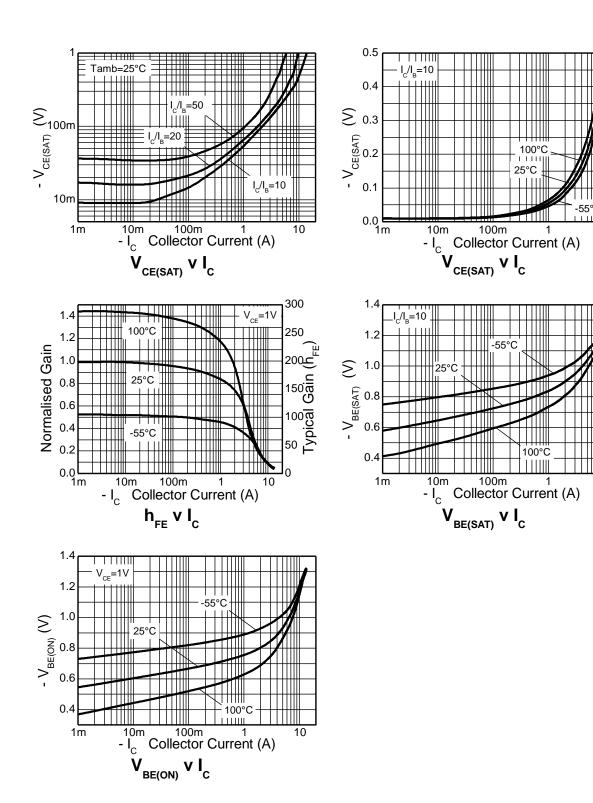
Note: 9. Measured under pulsed conditions. Pulse width  $\leq$  300 $\mu$ s. Duty cycle  $\leq$  2%.

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

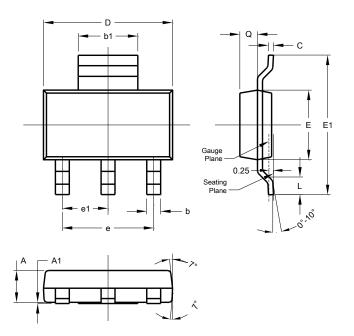




### **Package Outline Dimensions**

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

#### **SOT223**

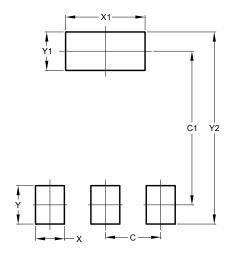


SOT223					
Dim	Min	Max	Тур		
Α	1.55	1.65	1.60		
A1	0.010	0.15	0.05		
b	0.60	0.80	0.70		
b1	2.90	3.10	3.00		
С	0.20	0.30	0.25		
D	6.45	6.55	6.50		
Е	3.45	3.55	3.50		
E1	6.90	7.10	7.00		
е	-	-	4.60		
e1	-	-	2.30		
L	0.85	1.05	0.95		
Q	0.84	0.94	0.89		
All Dimensions in mm					

# **Suggested Pad Layout**

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

#### **SOT223**



Dimensions	Value (in mm)
С	2.30
C1	6.40
Х	1.20
X1	3.30
Y	1.60
Y1	1.60
C2	8 00



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