

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

**Features**

- $BV_{CEO} > -60V$
- $BV_{ECO} > -7V$
- $I_C = 5A$  High Continuous Current
- Low Saturation Voltage  $V_{CE(sat)} < -80mV @ 1A$
- $R_{CE(sat)} = 50m\Omega$
- Complementary PNP Type: ZXTN19060CG
- **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**

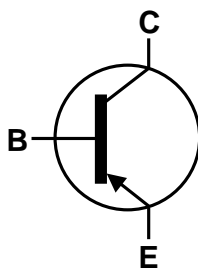
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.112 grams (Approximate)

**Applications**

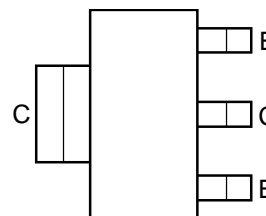
- Motor Drive
- High Side Driver



Top View



Device Symbol



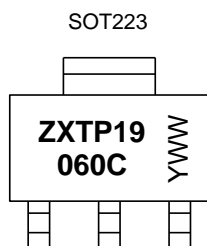
Top View  
Pin-Out

**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTP19060CGTA	AEC-Q101	ZXTP19060C	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**



ZXTP19060C = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 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>	-60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-60	V
Emitter-Collector Voltage (reverse blocking)	V <sub>ECX</sub>	-7	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-5	A
Base Current	I <sub>B</sub>	-1	A
Peak Pulse Current	I <sub>CM</sub>	-7	A

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

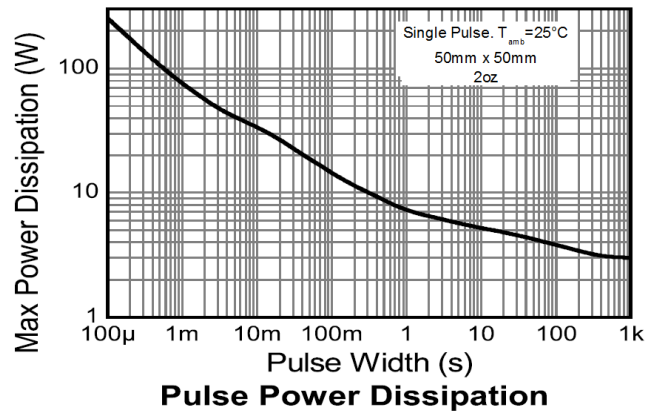
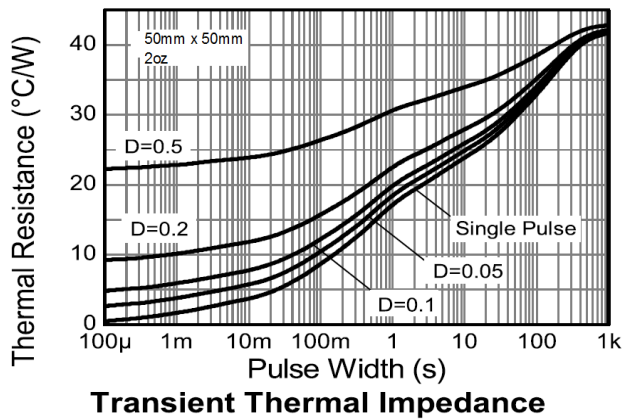
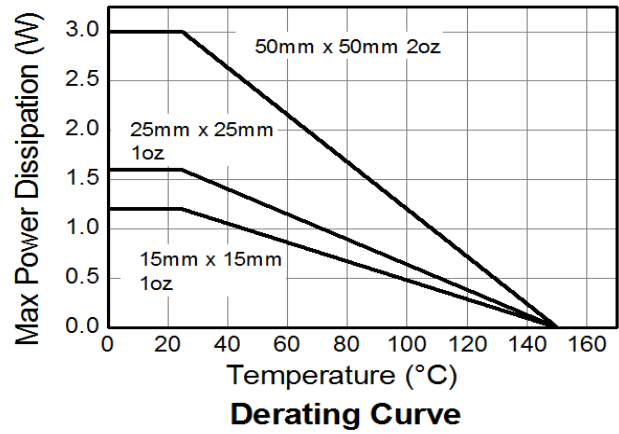
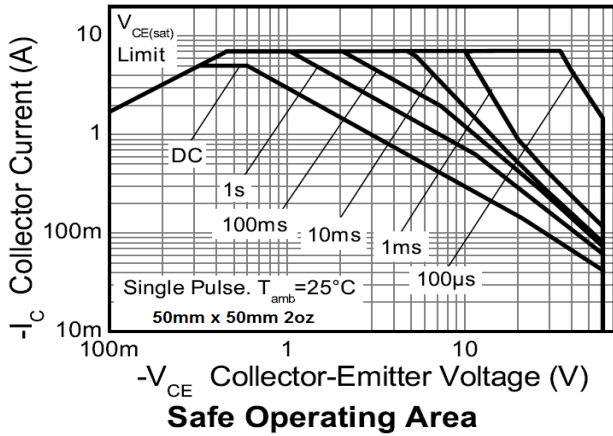
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.2	W mW/°C
		9.6	
		1.6	
		12.8	
		3	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	24	°C/W
		5.3	
		42	
		104	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	78	°C/W
		42	
		23.5	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 10)

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 15mm x 15mm 1oz 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 6, except the device is mounted on 25mm x 25mm 1oz copper.
  7. Same as Note 6, except the device is mounted on 50mm x 50mm 2oz copper.
  8. Same as Note 8 measured at t<5 seconds.
  9. Thermal resistance from junction to solder-point (at the end of the collector lead).
  10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

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

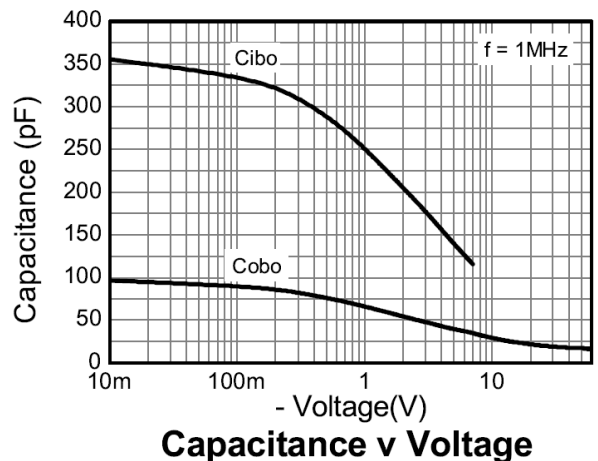
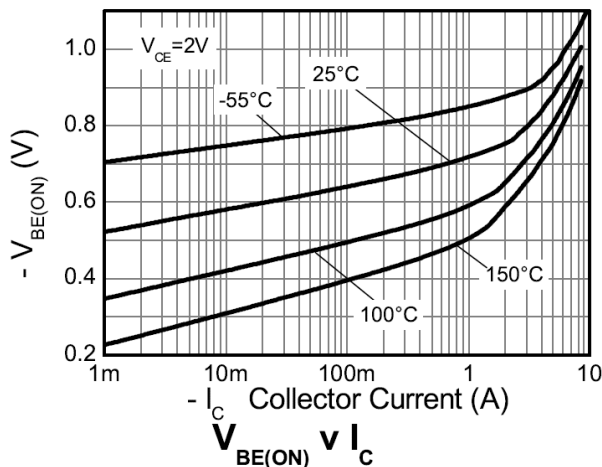
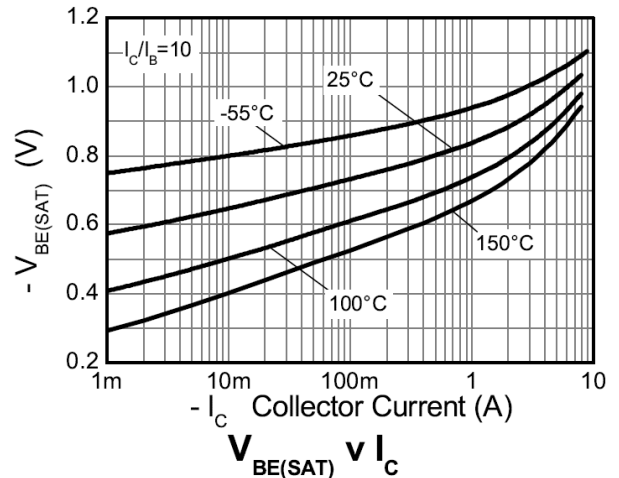
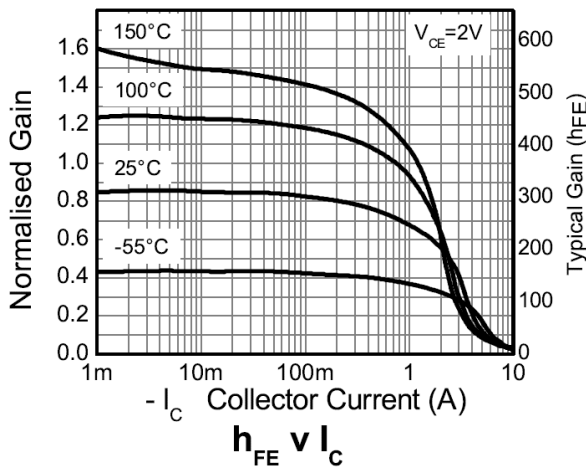
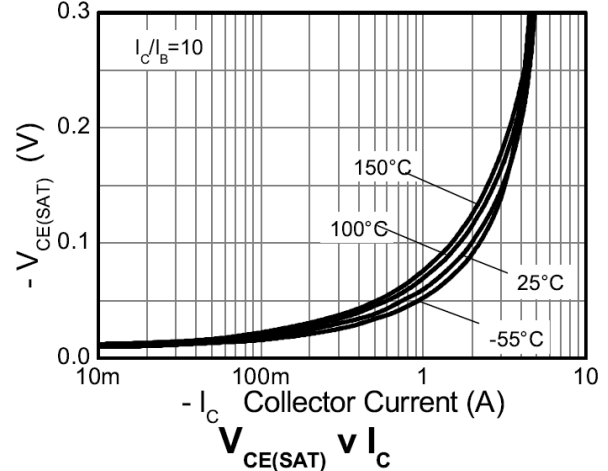
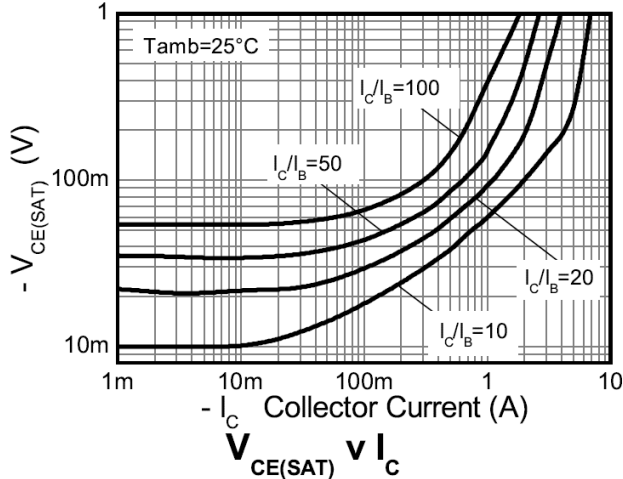


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-60	-110	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 11)	$BV_{CEO}$	-60	-90	-	V	$I_C = -10\text{mA}$
Emitter-Collector Breakdown Voltage (reverse blocking)	$BV_{ECX}$	-7	-8.4	-	V	$I_C = -100\mu\text{A}$ , $R_{BC} < 1\text{k}\Omega$ or $0.25\text{V} < V_{BC} > -0.25\text{V}$
Emitter-Collector Breakdown Voltage (reverse blocking)	$BV_{ECO}$	-7	-8.8	-	V	$I_E = -100\mu\text{A}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-8.4	-	V	$I_E = -100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$	-	< 1	-50	nA	$V_{CB} = -60\text{V}$
		-	-	-0.5	$\mu\text{A}$	$V_{CB} = -60\text{V}$ , $T_A = +100^\circ\text{C}$
Emitter Cut-Off Current	$I_{EBO}$	-	< 1	-50	nA	$V_{EB} = -5.6\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	-	-62	-80	mV	$I_C = -1\text{A}$ , $I_B = -100\text{mA}$
		-	-145	-205	mV	$I_C = -1\text{A}$ , $I_B = -20\text{mA}$
		-	-500	-750	mV	$I_C = -2\text{A}$ , $I_B = -40\text{mA}$
		-	-105	-165	mV	$I_C = -2\text{A}$ , $I_B = -200\text{mA}$
		-	-145	-200	mV	$I_C = -3\text{A}$ , $I_B = -300\text{mA}$
		-	-300	-500	mV	$I_C = -5\text{A}$ , $I_B = -500\text{mA}$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	-	-975	-1050	mV	$I_C = -5\text{A}$ , $I_B = -500\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	-	-890	-1000	mV	$I_C = -5\text{A}$ , $V_{CE} = -2\text{V}$
DC Current Gain (Note 11)	$h_{FE}$	200	330	500	-	$I_C = -100\text{mA}$ , $V_{CE} = -2\text{V}$
		160	260	-	-	$I_C = -1\text{A}$ , $V_{CE} = -2\text{V}$
		20	40	-	-	$I_C = -5\text{A}$ , $V_{CE} = -2\text{V}$
Current Gain-Bandwidth Product (Note 11)	$f_T$	-	180	-	MHz	$V_{CE} = -10\text{V}$ , $I_C = -50\text{mA}$ , $f = 50\text{MHz}$
Input Capacitance (Note 11)	$C_{ibo}$	-	280	400	pF	$V_{EB} = -0.5\text{V}$ , $f = 1\text{MHz}$
Output Capacitance (Note 11)	$C_{obo}$	-	29.5	40	pF	$V_{CB} = -10\text{V}$ , $f = 1\text{MHz}$
Delay Time	$t_d$	-	24.3	-	ns	$I_C = -500\text{mA}$ , $V_{CC} = -10\text{V}$ , $I_{B1} = -I_{B2} = -50\text{mA}$
Rise Time	$t_r$	-	13.2	-	ns	
Storage Time	$t_s$	-	456	-	ns	
Fall Time	$t_f$	-	68.2	-	ns	

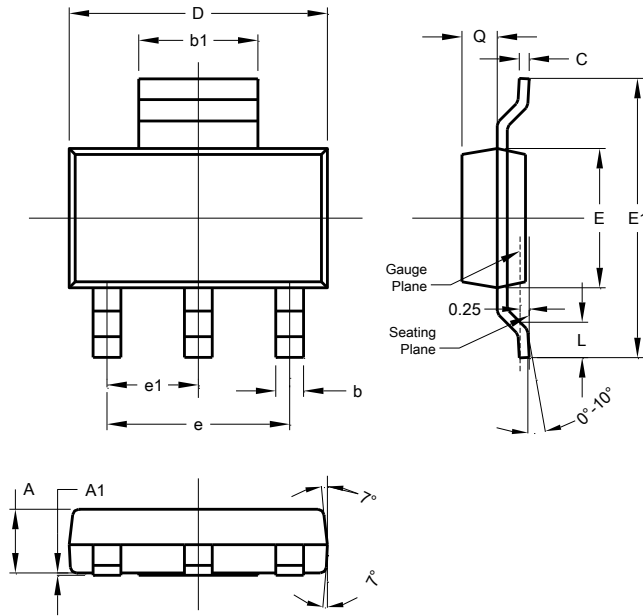
Note: 11. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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



## Package Outline Dimensions

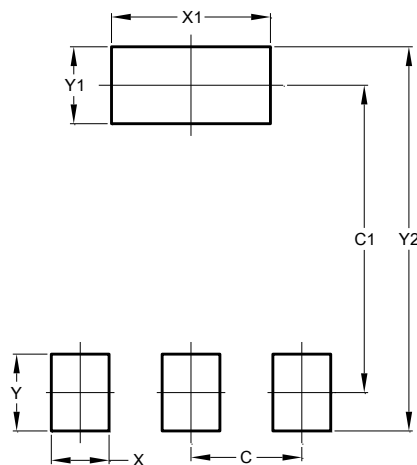
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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

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