

ZXTD6717E6

## COMPLEMENTARY 15V NPN &amp; 12V PNP LOW SATURATION TRANSISTORS IN SOT26

## Features and Benefits

- Pd = 1.1W in SOT26 Package
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

## NPN Transistor

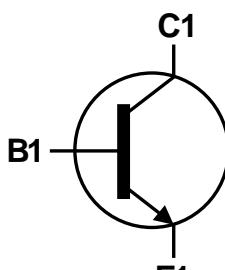
- BV<sub>CEO</sub> > 15V
- I<sub>C</sub> = 1.5A Continuous Collector Current
- Low Saturation Voltage (100mV max @ 1A)
- R<sub>SAT</sub> = 135mΩ @ 1.5A for a Low Equivalent On-Resistance

## PNP Transistor

- BV<sub>CEO</sub> > -12V
- I<sub>C</sub> = -1.25A Continuous Collector Current
- Low Saturation Voltage (-140mV max @ -1A)
- R<sub>SAT</sub> = 150mΩ @ 1.2A for a Low Equivalent On-Resistance



Top View



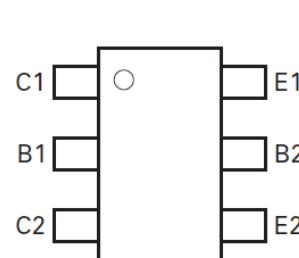
NPN Transistor

## Mechanical Data

- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.015 grams (Approximate)

## Applications

- Efficient Driving Functions including Motors, Lamps, Relays and Solenoids
- High Output Current Switches


Top View  
Pin-Out

Device Symbol

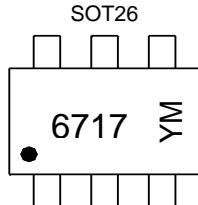
## Ordering Information (Notes 4 &amp; 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTD6717E6TA	AEC-Q101	6717	7	8	3,000
ZXTD6717E6QTA	Automotive	6717	7	8	3,000

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
- For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



6717 = Product Type Marking Code

YM = Date Code Marking

Y or Ȳ = Year (ex: C = 2015)

M or M̄ = Month (ex: 9 = September)

## Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Code	C	D	E	F	G	H	I	J	K	L	M

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

ZXTD6717E6

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	15	V
Collector-Emitter Voltage	$V_{CEO}$	15	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Peak Pulse Current	$I_{CM}$	5	A
Continuous Collector Current	$I_C$	1.5	A
Base Current	$I_B$	200	mA

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	-12	V
Collector-Emitter Voltage	$V_{CEO}$	-12	V
Emitter-Base Voltage	$V_{EBO}$	-7	V
Peak Pulse Current	$I_{CM}$	-3	A
Continuous Collector Current	$I_C$	-1.25	A
Base Current	$I_B$	-200	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 6)	1.1	W mW/°C
		8.8	
Thermal Resistance, Junction to Ambient	(Note 6)	1.7	°C/W
		13.6	
Thermal Resistance, Junction to Lead	(Note 8)	125	
		45	
Operating and Storage Temperature Range	$R_{\theta JL}$	95	
	$T_J, T_{STG}$	-55 to +150	°C

**ESD Ratings** (Note 9)

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:

6. For a device mounted with the collector lead on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state. Two active dice running at equal power with heatsink split 50% to each collector.
7. Same as Note 6, except the device is measured at  $t < 5$  seconds.
8. Thermal resistance from junction to solder-point (at the end of the collector lead).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

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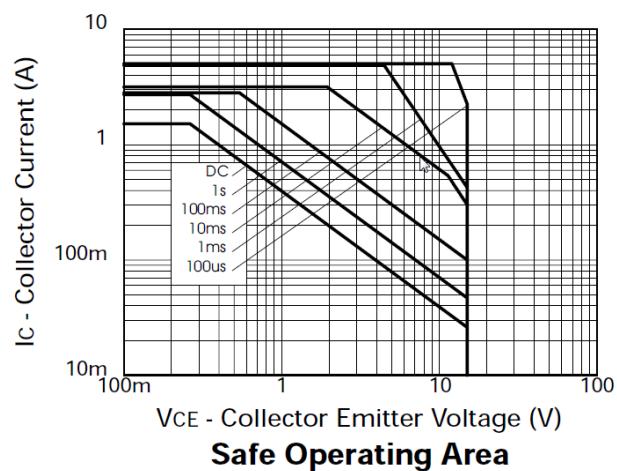
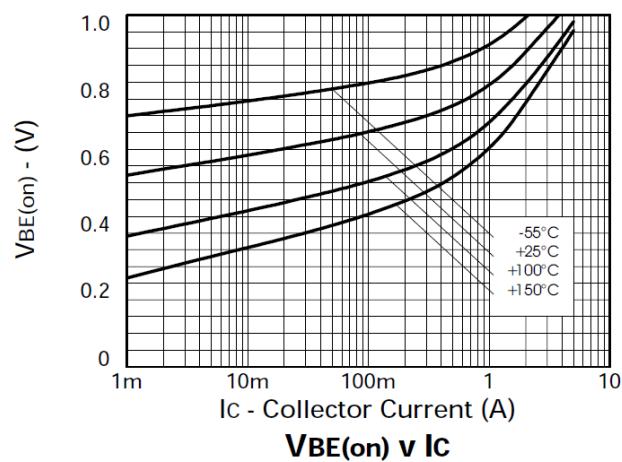
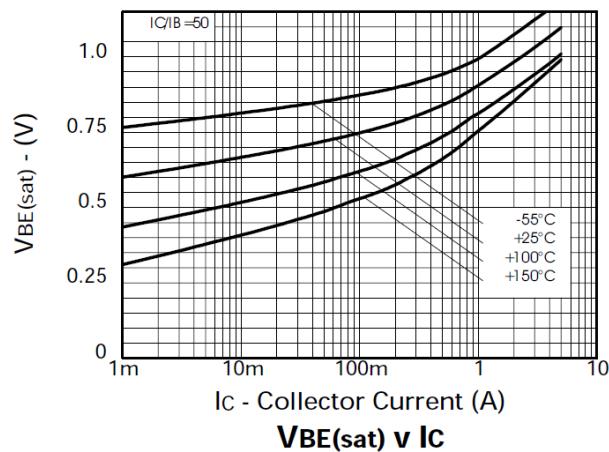
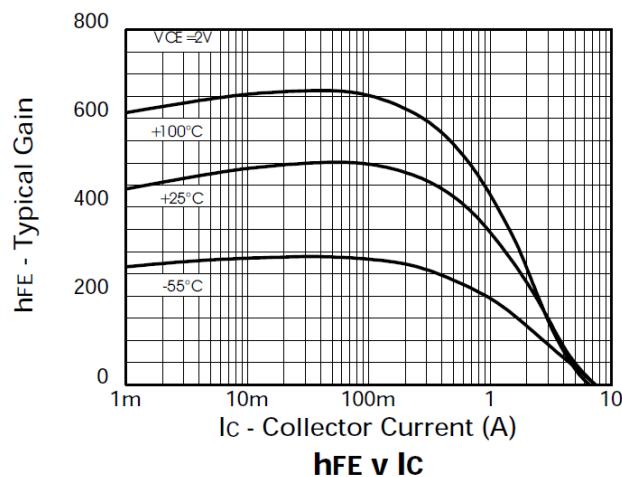
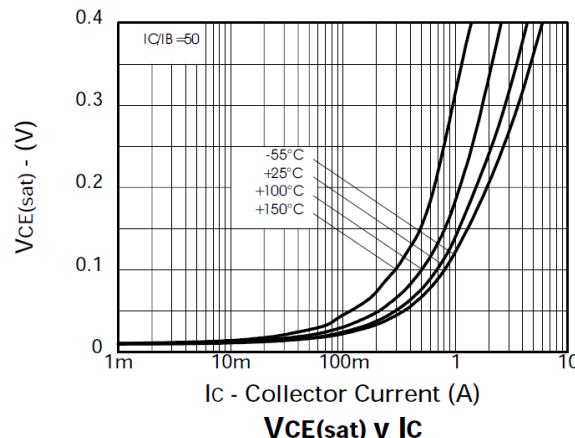
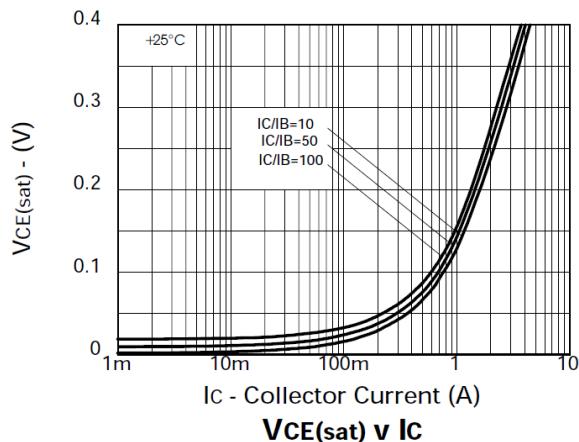
**NPN - Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	15	—	—	V	$I_C = 100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 10)	$\text{BV}_{\text{CEO}}$	15	—	—	V	$I_C = 10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	7	—	—	V	$I_E = 100\mu\text{A}, I_C = 0$
Collector Cut-Off Current	$I_{\text{CBO}}$	—	<1	10	nA	$V_{\text{CB}} = 10\text{V}$
Emitter Cut-Off Current	$I_{\text{EBO}}$	—	<1	10	nA	$V_{\text{EB}} = 5.6$
Emitter Cut-Off Current	$I_{\text{CES}}$	—	<1	10	nA	$V_{\text{CE}} = 10\text{V}$
<b>ON CHARACTERISTICS</b> (Note 10)						
DC Current Gain	$h_{\text{FE}}$	200	420	—	—	$I_C = 10\text{mA}, V_{\text{CE}} = 2\text{V}$
		300	450	—	—	$I_C = 100\text{mA}, V_{\text{CE}} = 2\text{V}$
		250	390	—	—	$I_C = 500\text{mA}, V_{\text{CE}} = 2\text{V}$
		200	300	—	—	$I_C = 1\text{A}, V_{\text{CE}} = 2\text{V}$
		75	150	—	—	$I_C = 3\text{A}, V_{\text{CE}} = 2\text{V}$
		30	75	—	—	$I_C = 5\text{A}, V_{\text{CE}} = 2\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{sat})}$	—	16.5	20	mV	$I_C = 100\text{mA}, I_B = 10\text{mA}$
			40	55	mV	$I_C = 250\text{mA}, I_B = 10\text{mA}$
			75	100	mV	$I_C = 500\text{mA}, I_B = 10\text{mA}$
			150	200	mV	$I_C = 1\text{A}, I_B = 10\text{mA}$
			205	245	mV	$I_C = 1.5\text{A}, I_B = 20\text{mA}$
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{sat})}$	—	0.93	1.10	V	$I_C = 1.5\text{A}, I_B = 20\text{mA}$
Base-Emitter Turn-On Voltage	$V_{\text{BE}(\text{on})}$	—	0.865	1.10	V	$I_C = 1.5\text{A}, V_{\text{CE}} = 2\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{\text{obo}}$	—	15	—	pF	$V_{\text{CB}} = 10\text{V}, f = 1.0\text{MHz}$
Current Gain Bandwidth Product	$f_T$	—	180	—	MHz	$I_C = 50\text{mA}, V_{\text{CE}} = 10\text{V}$ $f = 100\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	$t_{\text{on}}$	—	50	—	ns	$I_C = 1\text{A}, V_{\text{CC}} = 10\text{V}$
Turn-Off Time	$t_{\text{off}}$	—	250	—	ns	$I_{B1} = -I_{B2} = 100\text{mA}$

Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**ZXTD6717E6**

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



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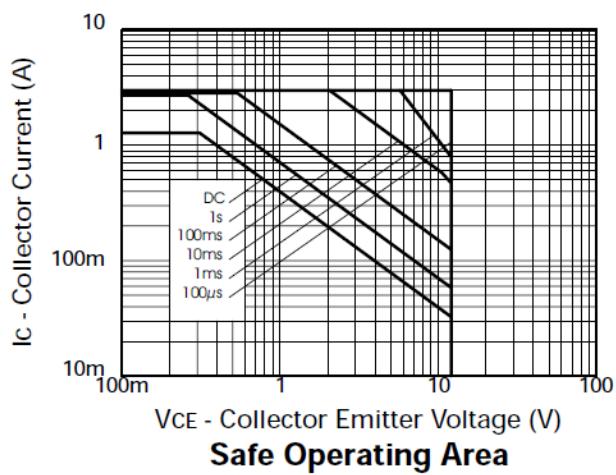
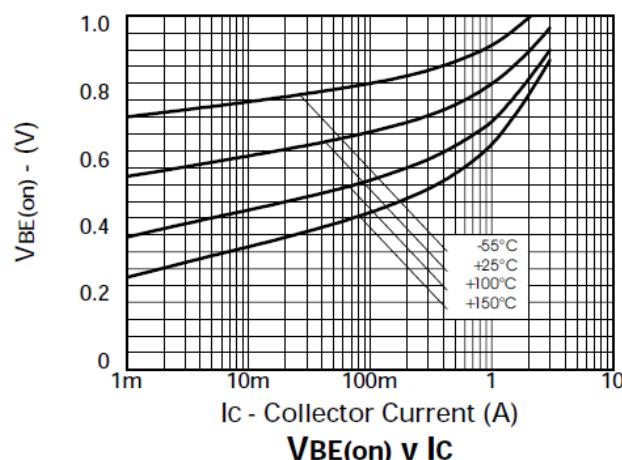
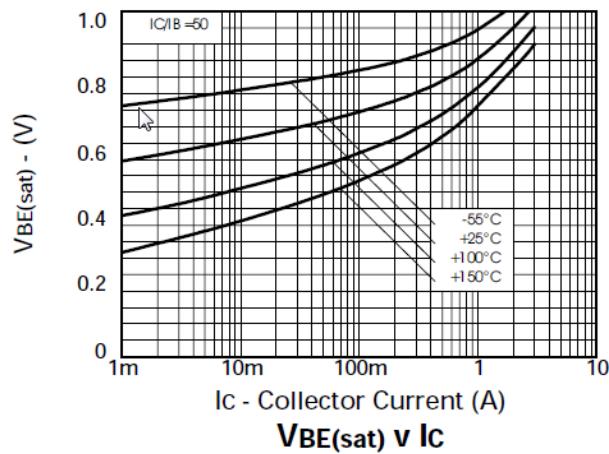
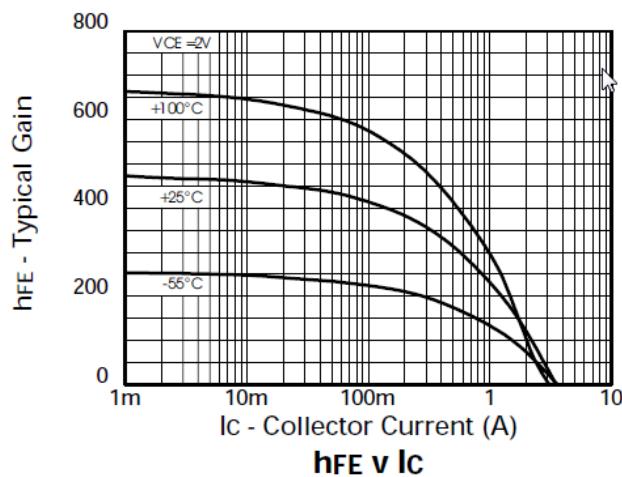
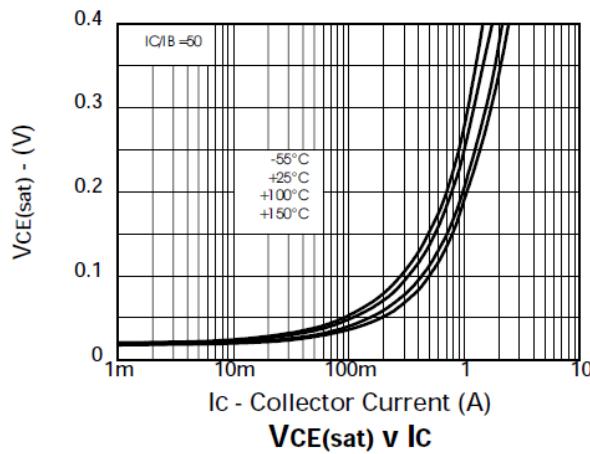
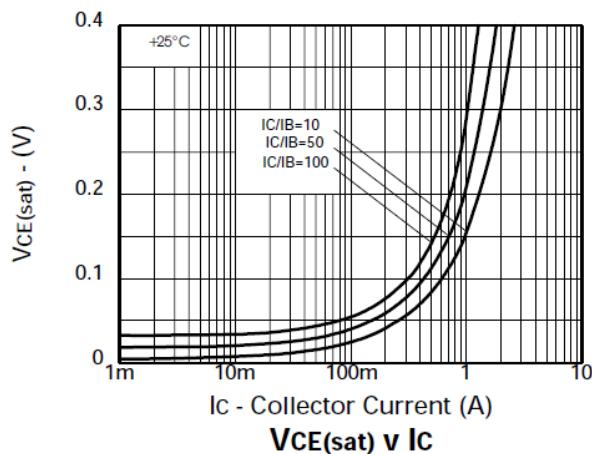
**PNP - Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

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Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	-12	—	—	V	$I_C = -100\mu\text{A}$ , $I_E = 0$
Collector-Emitter Breakdown Voltage (Note 11)	$\text{BV}_{\text{CEO}}$	-12	—	—	V	$I_C = -10\text{mA}$ , $I_B = 0$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	-7	—	—	V	$I_E = -100\mu\text{A}$ , $I_C = 0$
Collector Cut-Off Current	$I_{\text{CBO}}$	—	<-1	-10	nA	$V_{\text{CB}} = -10\text{V}$
Emitter Cut-Off Current	$I_{\text{EBO}}$	—	<-1	-10	nA	$V_{\text{EB}} = -5.6\text{V}$
Emitter Cut-Off Current	$I_{\text{CES}}$	—	<-1	-10	nA	$V_{\text{CE}} = -10\text{V}$
<b>ON CHARACTERISTICS</b> (Note 11)						
DC Current Gain	$\text{h}_{\text{FE}}$	300	490	—	—	$I_C = -10\text{mA}$ , $V_{\text{CE}} = -2\text{V}$
		300	450	—	—	$I_C = -100\text{mA}$ , $V_{\text{CE}} = -2\text{V}$
		200	340	—	—	$I_C = -500\text{mA}$ , $V_{\text{CE}} = -2\text{V}$
		125	250	—	—	$I_C = -1.25\text{A}$ , $V_{\text{CE}} = -2\text{V}$
		75	140	—	—	$I_C = -2\text{A}$ , $V_{\text{CE}} = -2\text{V}$
		30	80	—	—	$I_C = -3\text{A}$ , $V_{\text{CE}} = -2\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{sat})}$	—	-25	-40	mV	$I_C = -100\text{mA}$ , $I_B = -10\text{mA}$
		—	-55	-100	mV	$I_C = -250\text{mA}$ , $I_B = -10\text{mA}$
		—	-110	-175	mV	$I_C = -500\text{mA}$ , $I_B = -10\text{mA}$
		—	-160	-215	mV	$I_C = -1\text{A}$ , $I_B = -50\text{mA}$
		—	-185	-240	mV	$I_C = -1.25\text{A}$ , $I_B = -100\text{mA}$
		—	—	—	—	—
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{sat})}$	—	-0.99	-1.10	V	$I_C = -1.25\text{A}$ , $I_B = -100\text{mA}$
Base-Emitter Turn-On Voltage	$V_{\text{BE}(\text{on})}$	—	-0.85	-1.0	V	$I_C = -1.25\text{A}$ , $V_{\text{CE}} = -2\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{\text{obo}}$	—	15	—	pF	$V_{\text{CB}} = -10\text{V}$ , $f = 1.0\text{MHz}$
Current Gain Bandwidth Product	$f_T$	—	220	—	MHz	$I_C = -50\text{mA}$ , $V_{\text{CE}} = -10\text{V}$ $f = 100\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	$t_{\text{on}}$	—	50	—	ns	$I_C = -1\text{A}$ , $V_{\text{CC}} = -10\text{V}$
Turn-Off Time	$t_{\text{off}}$	—	135	—	ns	$I_{B1} = -I_{B2} = -100\text{mA}$

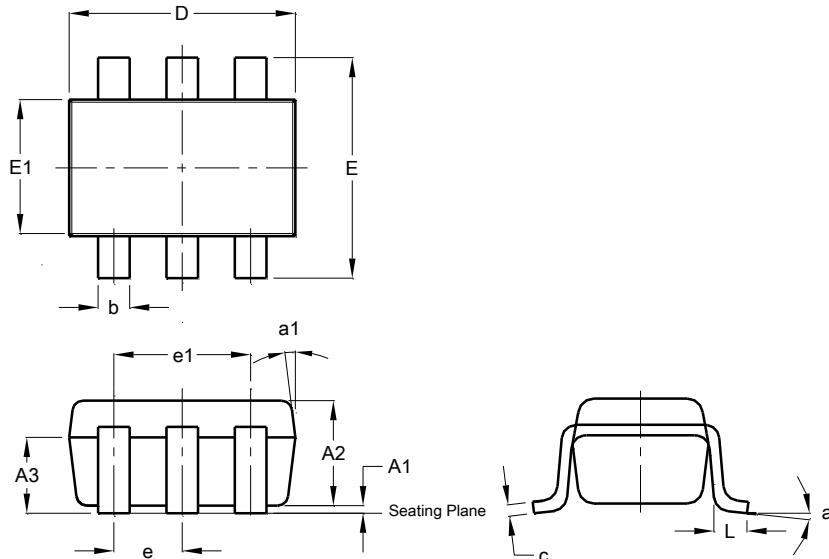
Note: 11. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**PNP - 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 the latest version.

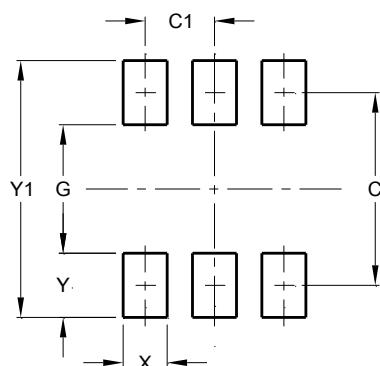


SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°

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	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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