ZXTC2061E6

12V COMPLEMENTARY MEDIUM POWER TRANSISTOR IN SOT26

Features

- NPN + PNP Combination
- BV_{CEO} > 12 (-12)V
- BV_{EBO} > 7 (-7)V
- Continuous Collector Current I_C = 5 (-3.5)A
- $V_{CE(sat)}$ < 32 (-70)mV @ 1A
- $R_{CE(sat)}$ = 25 (45)mΩ
- **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**

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)

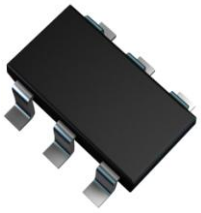
Description

Advanced process capability has been used to achieve this high performance device. Combining NPN and PNP transistors in the SOT26 package provides a compact solution for the intended applications.

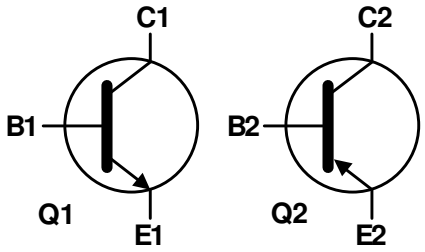
Applications

- MOSFET and IGBT Gate Driving
- Motor Drive

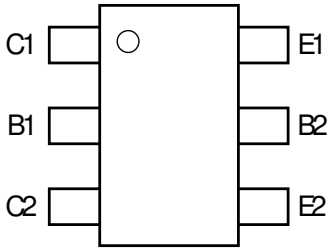
SOT26



Top View



Device Symbol



Top View
Pin-Out

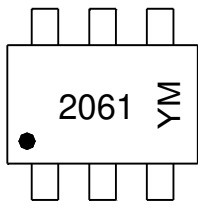
Ordering Information (Note 4)

Product	Complianace	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC2061E6TA	AEC-Q101	2061	7	8	3,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
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

SOT26



2061 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: C = 2015)
M or $\overline{M}$ = 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

Absolute Maximum Ratings – Q1 (NPN Transistor) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	12	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	5	A
Peak Pulsed Collector Current	I_{CM}	12	A
Base Current	I_B	1	A

Absolute Maximum Ratings – Q2 (PNP Transistor) (@T_A = +25°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
Continuous Collector Current	I_C	-3.5	A
Peak Pulsed Collector Current	I_{CM}	-10	A
Base Current	I_B	-1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

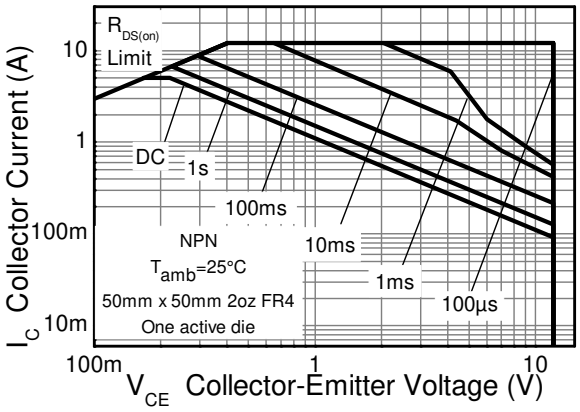
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Notes 5 & 9)	P_D	0.7 5.6	W mW/°C
	(Notes 6 & 9)		0.9 7.2	
	(Notes 6 & 10)		1.1 8.8	
	(Notes 7 & 9)		1.1 8.8	
	(Notes 8 & 9)		1.7 13.6	
Thermal Resistance, Junction to Ambient	(Notes 5 & 9)	$R_{\theta JA}$	179	°C/W
	(Notes 6 & 9)		139	
	(Notes 6 & 10)		113	
	(Notes 7 & 9)		113	
	(Notes 8 & 9)		73	
Thermal Resistance, Junction to Lead	(Note 11)	$R_{\theta JL}$	87.58	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 12)

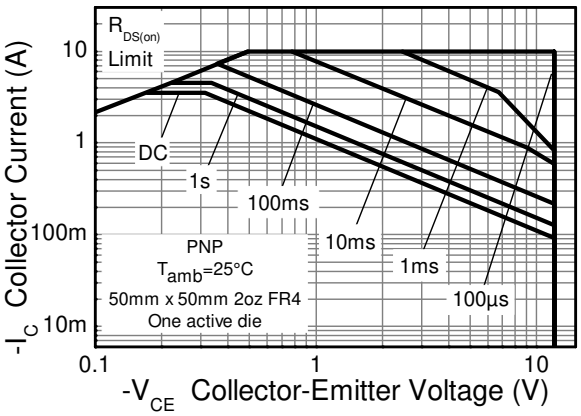
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device surface mounted on 15mm x 15mm FR4 PCB with high coverage of single sided 1oz 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 1oz copper.
7. Same as Note 5, except the device is surface mounted on 50mm x 50mm 2oz copper.
8. Same as Note 7, except the device is measured at t < 5 seconds.
9. For device with one active die, both collectors attached to a common heatsink.
10. For device with two active dice running at equal power, split heatsink 50% to each collector.
11. Thermal resistance from junction to solder-point (at the end of the collector lead).
12. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

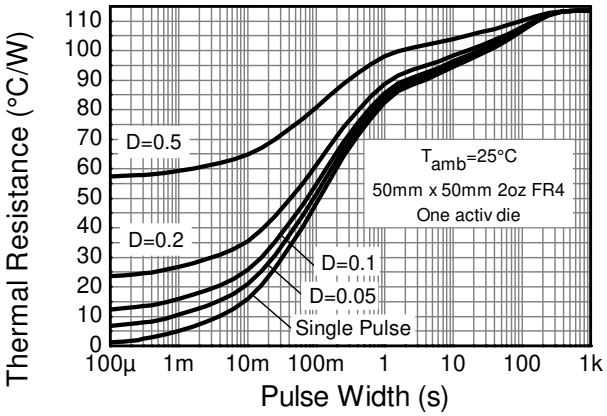
Thermal Characteristics and Derating Information



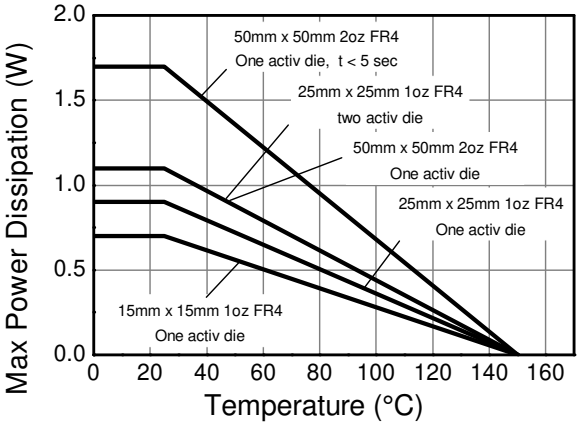
Safe Operating Area



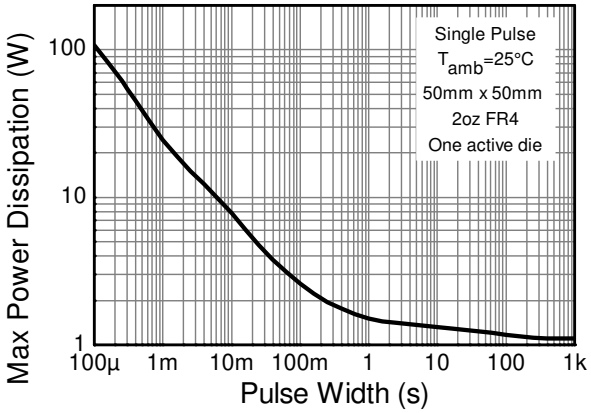
Safe Operating Area



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

Electrical Characteristics – Q1 (NPN Transistor) (@T_A = +25°C, unless otherwise specified.)

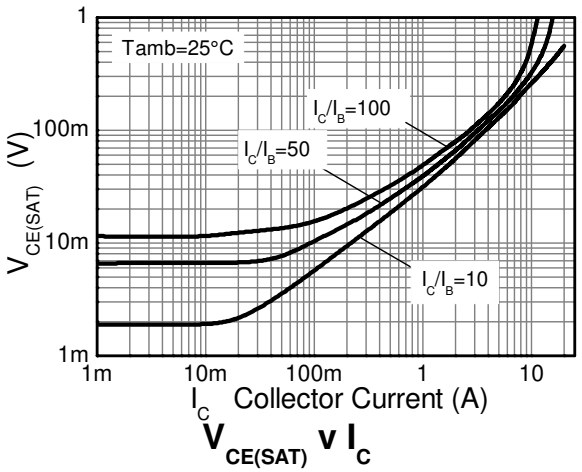
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	20	40	—	V	I_C = 100µA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 13)	BV_{CEO}	12	17	—	V	I_C = 10mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.4	—	V	I_E = 100µA, I_C = 0
Collector Cut-Off Current	I_{CBO}	—	<1	50 0.5	nA µA	V_{CB} = 20V V_{CB} = 20V, T_A = +100°C
Collector Cut-Off Current	I_{EBO}	—	<1	50	nA	V_{EB} = 5.6V
ON CHARACTERISTICS (Note 13)						
DC Current Gain	h_{FE}	500 480 260	800 750 390	1,500	—	I_C = 10mA, V_{CE} = 2V I_C = 1.0A, V_{CE} = 2V I_C = 5A, V_{CE} = 2V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	32 50 65 145	40 60 80 180	mV	I_C = 1.0A, I_B = 100mA I_C = 1.0A, I_B = 10mA I_C = 2.0A, I_B = 40mA I_C = 5A, I_B = 100mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	920	1,000	mV	I_C = 5A, I_B = 100mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	810	900	mV	I_C = 5A, V_{CE} = 2V
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	26	35	pF	V_{CB} = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f_T	—	260	—	MHz	V_{CE} = 10V, I_C = 50mA, f = 100MHz
Delay Time	t_d	—	71	—	ns	V_{CC} = 10V, I_C = 1A, I_{B1} = -I_{B2} = 10mA
Rise Time	t_r	—	70	—	ns	
Storage Time	t_s	—	233	—	ns	
Fall Time	t_f	—	72	—	ns	

Electrical Characteristics – Q2 (PNP Transistor) (@T_A = +25°C, unless otherwise specified.)

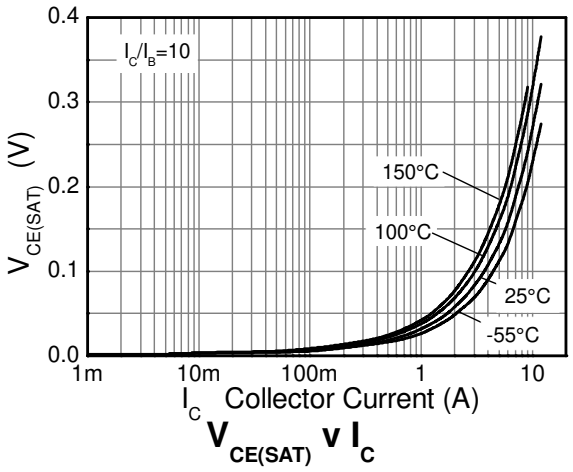
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	-12	-35	—	V	I_C = -100µA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 13)	BV_{CEO}	-12	-25	—	V	I_C = -10mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.4	—	V	I_E = -100µA, I_C = 0
Collector Cut-Off Current	I_{CBO}	— —	< -1	-50 -0.5	nA µA	V_{CB} = -12V V_{CB} = -12V, T_A = +100°C
Collector Cut-Off Current	I_{EBO}	—	< -1	-50	nA	V_{EB} = -5.6V
ON CHARACTERISTICS (Note 13)						
DC Current Gain	h_{FE}	500 290 75	800 450 100	1500 — —	—	I_C = -10mA, V_{CE} = -2V I_C = -1.0A, V_{CE} = -2V I_C = -3.5A, V_{CE} = -2V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	— — — —	-55 -170 -220 -150	-70 -265 -360 -200	mV	I_C = -1.0A, I_B = -100mA I_C = -1.0A, I_B = -10mA I_C = -2.0A, I_B = -40mA I_C = -3.5A, I_B = -350mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	-955	-1,050	mV	I_C = -3.5A, I_B = -350mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	-830	-900	mV	I_C = -3.5A, V_{CE} = -2V
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	17	25	pF	V_{CB} = -10V, f = 1.0MHz
Current Gain-Bandwidth Product	f_T	—	310	—	MHz	V_{CE} = -10V, I_C = -50mA, f = 100MHz
Delay Time	t_d	—	41	—	ns	V_{CC} = -10V, I_C = -1A, I_{B1} = -I_{B2} = -10mA
Rise Time	t_r	—	62	—	ns	
Storage Time	t_s	—	179	—	ns	
Fall Time	t_f	—	65	—	ns	

Note: 13. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

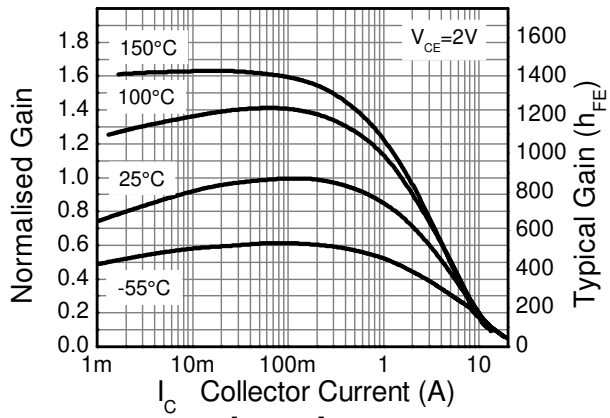
Typical Electrical Characteristics – Q1 (NPN Transistor) (@T_A = +25°C, unless otherwise specified.)



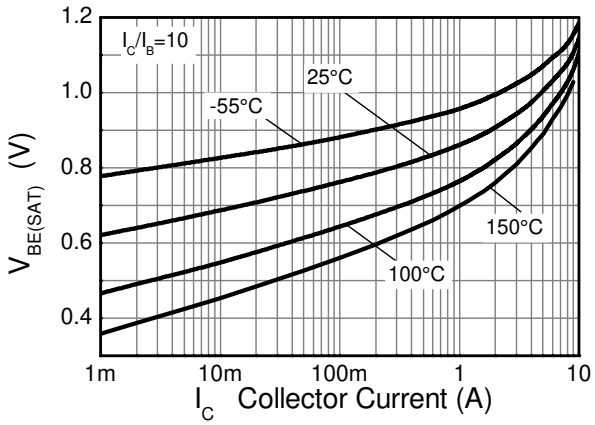
$V_{CE(SAT)}$ v I_C



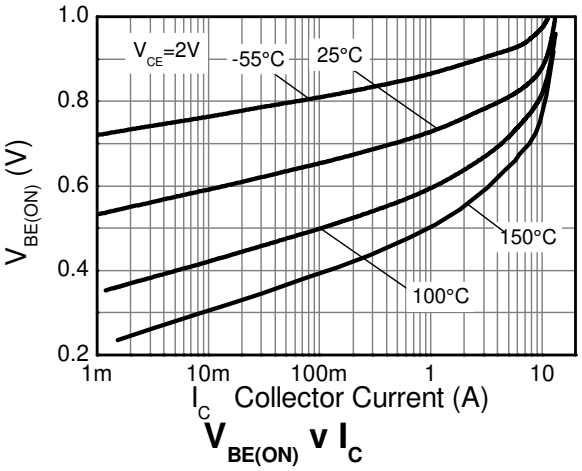
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C

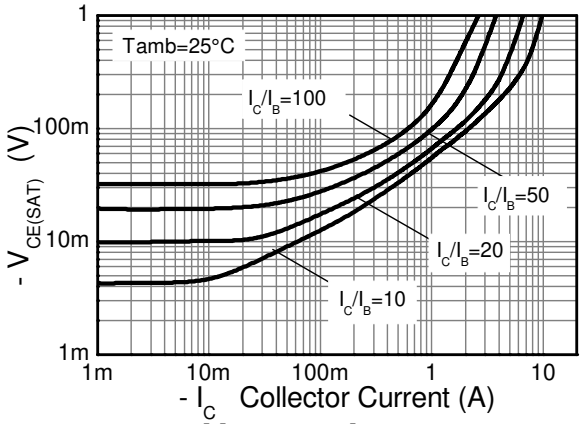


$V_{BE(SAT)}$ v I_C

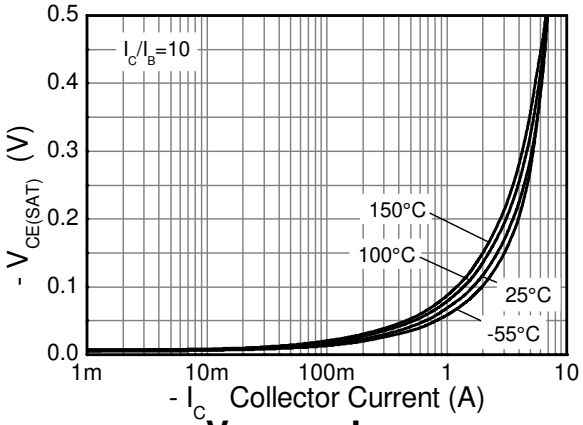


$V_{BE(ON)}$ v I_C

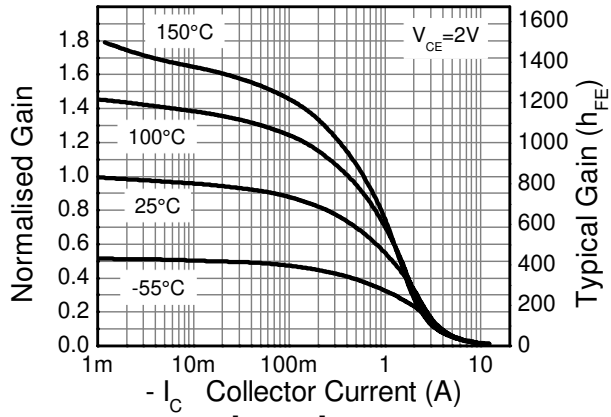
Typical Electrical Characteristics – Q2 (PNP Transistor) (@T_A = +25°C, unless otherwise specified.)



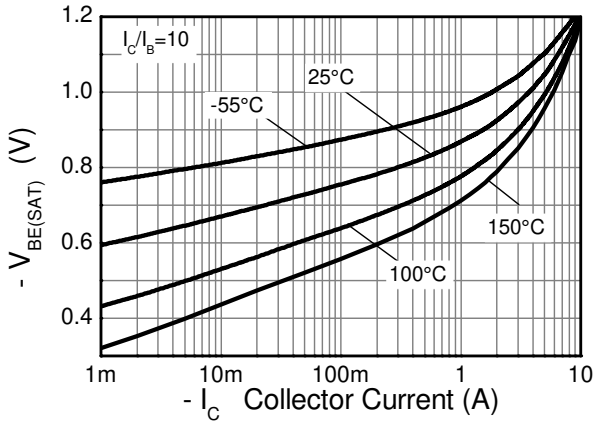
$V_{CE(SAT)}$ v I_C



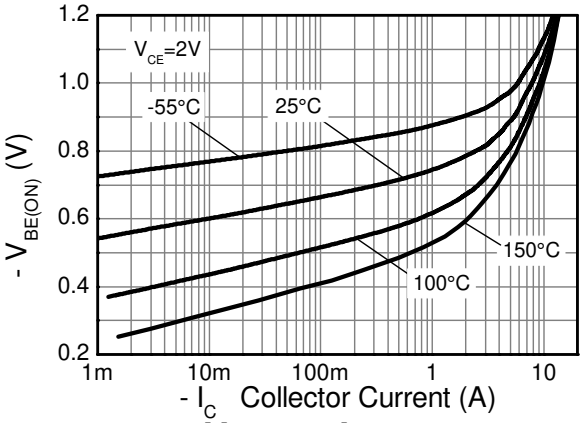
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



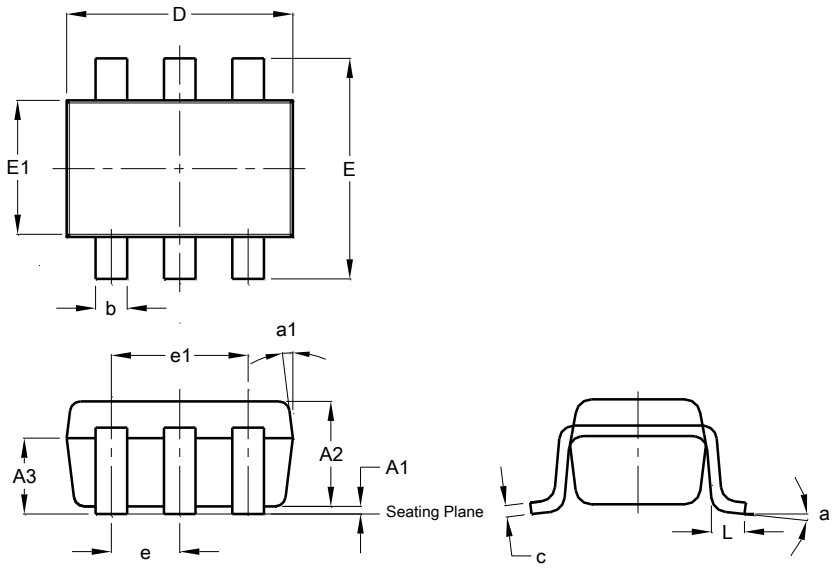
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

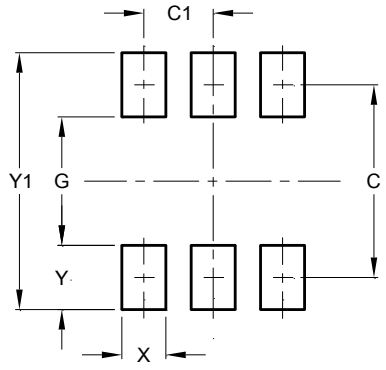
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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