



A Product Line of Diodes Incorporated

ZXTC2045E6

#### 30V COMPLEMENTARY MEDIUM POWER TRANSISTOR IN SOT26

#### **Features**

- NPN + PNP Combination
- BV<sub>CEO</sub> > 30 (-30)V
- BV<sub>CEV</sub> > 40 (-40)V
- I<sub>CM</sub> = 5 (-5)A Peak Pulse Current
- 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)

#### Description

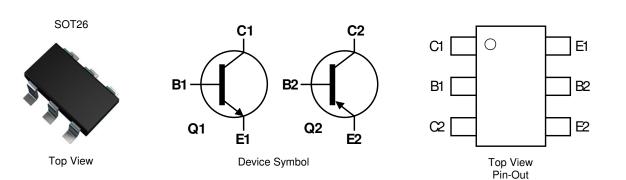
Advanced process capability is used to achieve this high performance device. Combining NPN and PNP transistors, the SOT26 package provides a compact solution for the intended applications.

#### **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 (3)
- Weight: 0.015 grams (Approximate)

## **Applications**

- MOSFET and IGBT Gate Driving
- Motor Drive



## Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC2045E6TA	AEC-Q101	2045	7	8	3,000
ZXTC2045E6QTA	Automotive	2045	7	8	3,000

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

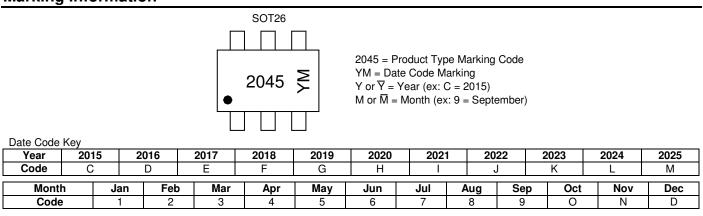
2. See http://www.diodes.com/ for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free. 3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and

<1000ppm antimony compounds.

4. Automotive products are AEC-Q101 qualified and PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.

5. For packaging details, go to our website at http://www.diodes.com

## **Marking Information**





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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	40	V
Collector-Emitter Voltage	V <sub>CEV</sub>	40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	30	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	Ιc	1.5	А
Peak Pulsed Collector Current	ICM	5	A
Base Current	Ι <sub>Β</sub>	1	А

#### Absolute Maximum Ratings – Q2 (PNP Transistor) (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-40	V
Collector-Emitter Voltage	V <sub>CEV</sub>	-40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-30	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	Ic	-1.5	A
Peak Pulsed Collector Current	I <sub>CM</sub>	-5	A
Base Current	IB	-1	A

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

Characteristic	Symbol	Value	Unit		
	(Notes 6 & 10)		0.7 5.6		
	(Notes 7 & 10)		0.9 7.2		
Power Dissipation Linear Derating Factor	(Notes 7 & 11)	P <sub>D</sub>	1.1 8.8	W mW/℃	
	(Notes 8 & 10)		1.1 8.8		
	(Notes 9 & 10)		1.7 13.6		
	(Notes 6 & 10)		179		
	(Notes 7 & 10)		139		
Thermal Resistance, Junction to Ambient	(Notes 7 & 11)	$R_{\theta JA}$	113	00.001	
	(Notes 8 & 10)		113	°C/W	
	(Notes 9 & 10)		73		
Thermal Resistance, Junction to Lead	(Note 12)	$R_{\theta JL}$	95.50		
Operating and Storage Temperature Range	TJ, TSTG	-55 to +150	°C		

#### ESD Ratings (Note 13)

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

Notes: 6. 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.

7. Same as Note 6, except the device is surface mounted on 25mm x 25mm 1oz copper.

8. Same as Note 6, except the device is surface mounted on 50mm x 50mm 2oz copper.

9. Same as Note 8, except the device is measured at t < 5 seconds.

10. For device with one active die, both collectors attached to a common heatsink.

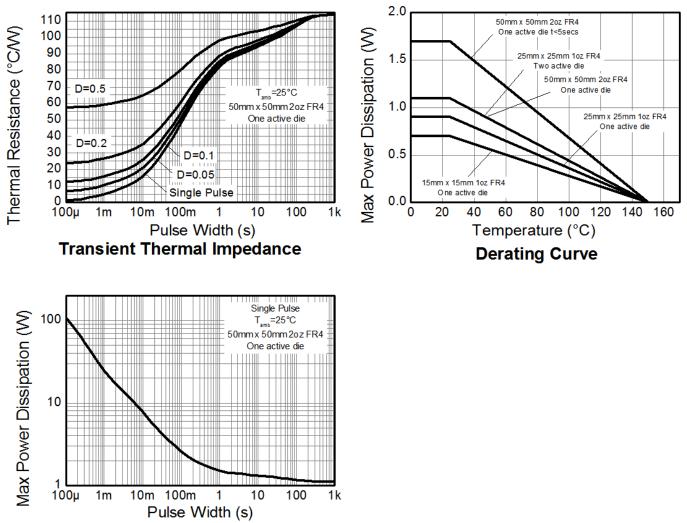
11. For device with two active die running at equal power, split heatsink 50% to each collector.

12. Thermal resistance from junction to solder-point (at the end of the collector lead).

13. Refer to JEDEC specification JESD22-A114 and JESD22-A115.



# Thermal Characteristics and Derating Information



**Pulse Power Dissipation** 



#### Electrical Characteristics - Q1 (NPN Transistor) (@TA = +25 °C, unless otherwise specified.) Characteristic Symbol Min Max Unit **Test Condition** Тур OFF CHARACTERISTICS BV<sub>CBO</sub> $I_{C} = 100 \mu A, I_{E} = 0$ Collector-Base Breakdown Voltage 40 ٧ -Collector-Emitter Breakdown Voltage 40 ٧ BV<sub>CEV</sub> - $I_C = 1 \mu A, \ 0.25 V > V_{BE} > 1.0 V$ Collector-Emitter Breakdown Voltage (Note 14) 30 ٧ $\mathsf{BV}_{\mathsf{CEO}}$ - $I_C = 10mA, I_B = 0$ — Emitter-Base Breakdown Voltage **BV**<sub>EBO</sub> 7 8.3 \_\_\_\_ ٧ $I_E = 100 \mu A, I_C = 0$ Collector Cut-Off Current Ісво \_\_\_\_ <1 20 nA $V_{CB} = 32V$ $V_{CE}=16V,\ R\leq 1k\Omega$ Collector Cut-Off Current 20 ICES/R <1 nA Emitter Cut-Off Current <1 20 nA $V_{EB} = 6V$ **I**EBO **ON CHARACTERISTICS** (Note 14) DC Current Gain 180 300 500 $I_C = 100mA, V_{CE} = 2V$ h<sub>FE</sub> Collector-Emitter Saturation Voltage V<sub>CE(sat)</sub> 375 mV $I_{C} = 750 \text{mA}, I_{B} = 15 \text{mA}$ Base-Emitter Saturation Voltage 1,200 mV $I_{C} = 750 \text{mA}, I_{B} = 15 \text{mA}$ V<sub>BE(sat)</sub> \_\_\_\_ SMALL SIGNAL CHARACTERISTICS Output Capacitance $C_{\text{obo}}$ 9 20 pF $V_{CB} = 10V, f = 1.0MHz$ Current Gain-Bandwidth Product fT 265 MHz $V_{CE} = 10V, I_C = 50mA, f = 100MHz$ Delay Time td 10 ns **Rise Time** tr 12 \_\_\_\_ ns $V_{CC} = 10V, I_{C} = 1A$ Storage Time 185 ns $I_{B1} = -I_{B2} = 50 \text{mA}$ ts \_\_\_\_ Fall Time 45 tf \_ \_\_\_\_ ns

#### Electrical Characteristics – Q2 (PNP Transistor) (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

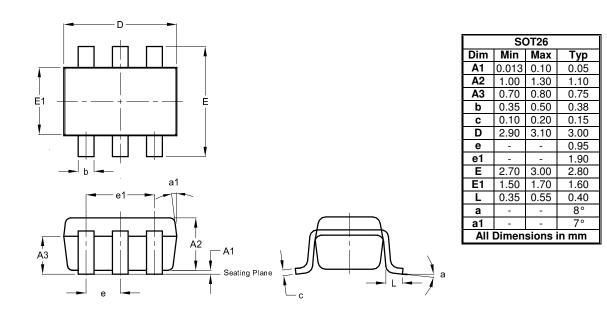
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-40	-		V	$I_{\rm C} = -100\mu A, I_{\rm E} = 0$
Collector-Emitter Breakdown Voltage	BVCEV	-40	-		V	$I_{C} = -1\mu A$ , 0.25V < $V_{BE}$ < 1.0V
Collector-Emitter Breakdown Voltage (Note 14)	BV <sub>CEO</sub>	-30	-	_	V	$I_{\rm C} = -10 {\rm mA}, I_{\rm B} = 0$
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	-8.3	_	V	$I_{\rm E} = -100 \mu A, I_{\rm C} = 0$
Collector Cut-Off Current	I <sub>CBO</sub>	_	<-1	-20	nA	V <sub>CB</sub> = -32V
Collector Cut-Off Current	I <sub>CES/R</sub>	_	<-1	-20	nA	V <sub>CE</sub> = -16V, R ≤ 1kΩ
Emitter Cut-Off Current	I <sub>EBO</sub>	_	<-1	-20	nA	$V_{EB} = -6V$
ON CHARACTERISTICS (Note 14)						
DC Current Gain	h <sub>FE</sub>	180	300	500	_	I <sub>C</sub> = -100mA, V <sub>CE</sub> = -2V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	_	_	-375	mV	I <sub>C</sub> = -750mA, I <sub>B</sub> = -15mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	_	_	-1,200	mV	I <sub>C</sub> = -750mA, I <sub>B</sub> = -15mA
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	Cobo		9	20	pF	V <sub>CB</sub> = -10V, f = 1.0MHz
Current Gain-Bandwidth Product	fт	_	195	_	MHz	V <sub>CE</sub> = -10V, I <sub>C</sub> = -50mA, f = 100MHz
Delay Time	t <sub>d</sub>	_	16	_	ns	
Rise Time	tr	_	11	_	ns	V <sub>CC</sub> = -10V, I <sub>C</sub> = -1A
Storage Time	ts	_	220		ns	$I_{B1} = -I_{B2} = -50 \text{mA}$
Fall Time	t <sub>f</sub>		31	_	ns	

Note: 14. Measured under pulsed conditions. Pulse width  $\leq$  300µs. Duty cycle  $\leq$  2%.



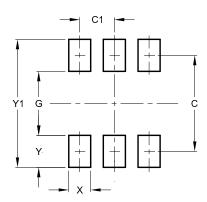
#### **Package Outline Dimensions**

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



#### **Suggested Pad Layout**

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



Dimensions	Value (in mm)
С	2.40
C1	0.95
G	1.60
Х	0.55
Ŷ	0.80
Y1	3.20



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