

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

**Features**

- NPN + PNP combination
- $BV_{CEO} > 30$  (-30)V
- $BV_{CEV} > 40$  (-40)V
- $I_{CM} = 5$  (-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**

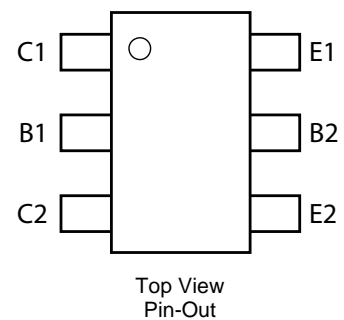
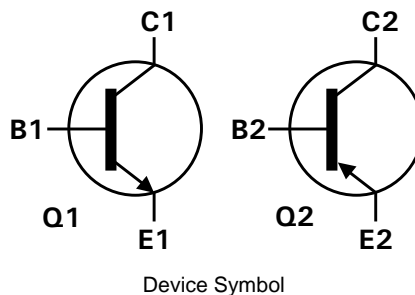
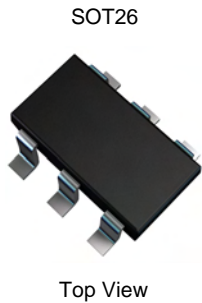
Advanced process capability has been used to achieve this high performance device. Combining NPN and PNP transistors in the SOT26 package provides a compact solution for the intended applications.

**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**

- MOSFET and IGBT gate driving
- Motor drive

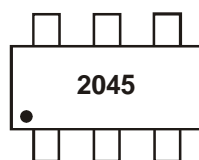


**Ordering Information** (Notes 4 & 5)

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**



2045 = Product Type Marking Code

**Maximum Ratings – Q1 (NPN 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	I <sub>C</sub>	1.5	A
Peak Pulsed Collector Current	I <sub>CM</sub>	5	A
Base Current	I <sub>B</sub>	1	A

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

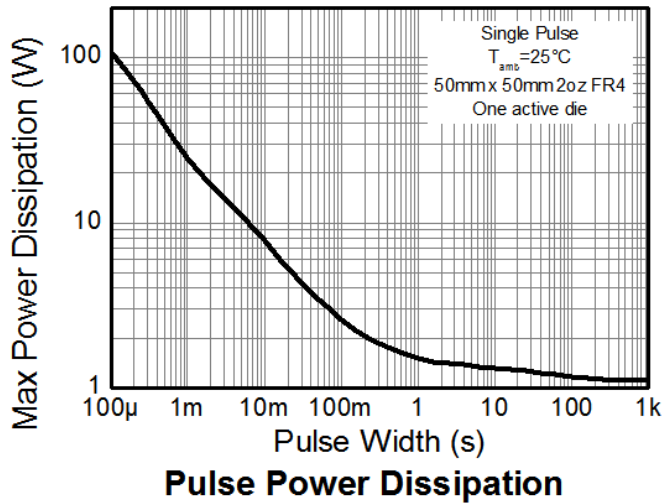
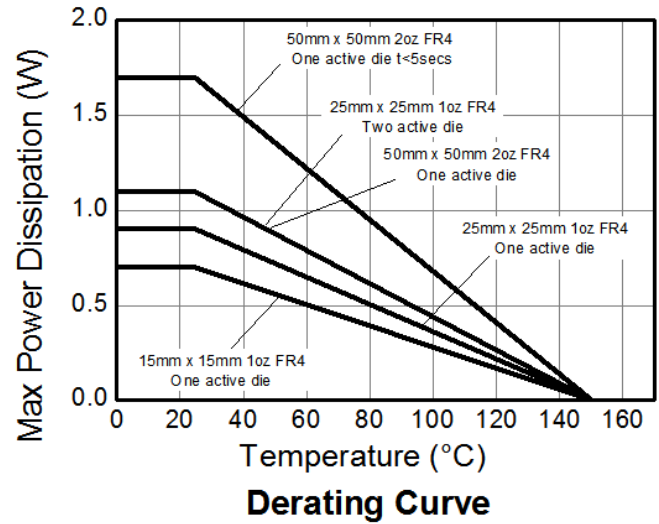
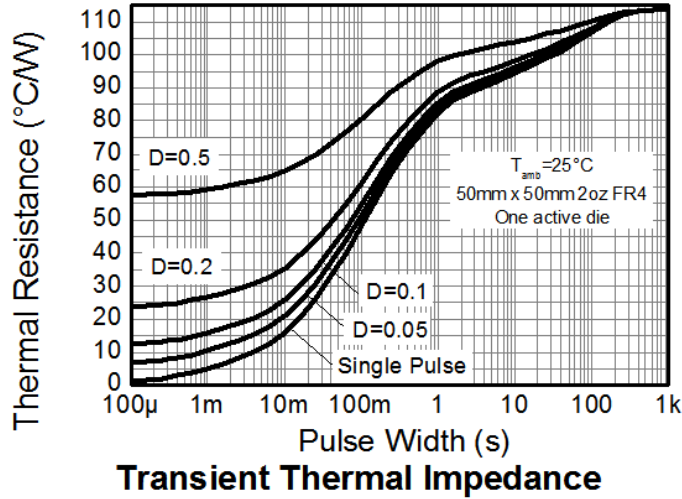
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-40	V
Collector-Emitter Voltage	V <sub>CEV</sub>	-40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-30	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-1.5	A
Peak Pulsed Collector Current	I <sub>CM</sub>	-5	A
Base Current	I <sub>B</sub>	-1	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>	(Notes 6 & 10)	0.7
		(Notes 7 & 10)	5.6
		(Notes 7 & 11)	0.9
		(Notes 8 & 10)	7.2
		(Notes 9 & 10)	1.1
		(Notes 9 & 10)	8.8
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Notes 6 & 10)	179
		(Notes 7 & 10)	139
		(Notes 7 & 11)	113
		(Notes 8 & 10)	113
		(Notes 9 & 10)	73
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	95.50	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- 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 dice 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).

**Thermal Characteristics and Derating Information**



**Electrical Characteristics – Q1 (NPN Transistor)** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	40	-	—	V	$I_C = 100\mu\text{A}$ , $I_E = 0$
Collector-Emitter Breakdown Voltage	$BV_{CEV}$	40	-	—	V	$I_C = 1\mu\text{A}$ , $0.25V > V_{BE} > 1.0V$
Collector-Emitter Breakdown Voltage (Note 13)	$BV_{CEO}$	30	-	—	V	$I_C = 10\text{mA}$ , $I_B = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.3	—	V	$I_E = 100\mu\text{A}$ , $I_C = 0$
Collector Cutoff Current	$I_{CBO}$	—	<1	20	nA	$V_{CB} = 32V$
Collector Cutoff Current	$I_{CES/R}$	—	<1	20	nA	$V_{CE} = 16V$ , $R \leq 1k\Omega$
Emitter Cutoff Current	$I_{EBO}$	—	<1	20	nA	$V_{EB} = 6V$
<b>ON CHARACTERISTICS (Note 13)</b>						
DC Current Gain	$h_{FE}$	180	300	500	—	$I_C = 100\text{mA}$ , $V_{CE} = 2V$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	375	mV	$I_C = 750\text{mA}$ , $I_B = 15\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	1200	mV	$I_C = 750\text{mA}$ , $I_B = 15\text{mA}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{obo}$	—	9	20	pF	$V_{CB} = 10V$ , $f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	—	265	—	MHz	$V_{CE} = 10V$ , $I_C = 50\text{mA}$ , $f = 100\text{MHz}$
Delay Time	$t_d$	—	10	—	ns	$V_{CC} = 10V$ , $I_C = 1A$ $I_{B1} = -I_{B2} = 50\text{mA}$
Rise Time	$t_r$	—	12	—	ns	
Storage Time	$t_s$	—	185	—	ns	
Fall Time	$t_f$	—	45	—	ns	

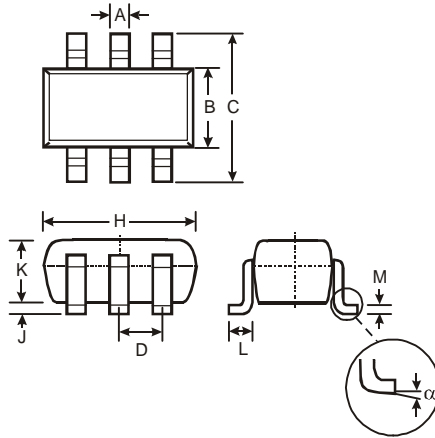
**Electrical Characteristics – Q2 (PNP Transistor)** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	-40	-	—	V	$I_C = -100\mu\text{A}$ , $I_E = 0$
Collector-Emitter Breakdown Voltage	$BV_{CEV}$	-40	-	—	V	$I_C = -1\mu\text{A}$ , $0.25V < V_{BE} < 1.0V$
Collector-Emitter Breakdown Voltage (Note 13)	$BV_{CEO}$	-30	-	—	V	$I_C = -10\text{mA}$ , $I_B = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-8.3	—	V	$I_E = -100\mu\text{A}$ , $I_C = 0$
Collector Cutoff Current	$I_{CBO}$	—	<-1	-20	nA	$V_{CB} = -32V$
Collector Cutoff Current	$I_{CES/R}$	—	<-1	-20	nA	$V_{CE} = -16V$ , $R \leq 1k\Omega$
Emitter Cutoff Current	$I_{EBO}$	—	<-1	-20	nA	$V_{EB} = -6V$
<b>ON CHARACTERISTICS (Note 13)</b>						
DC Current Gain	$h_{FE}$	180	300	500	—	$I_C = -100\text{mA}$ , $V_{CE} = -2V$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	-375	mV	$I_C = -750\text{mA}$ , $I_B = -15\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	-1200	mV	$I_C = -750\text{mA}$ , $I_B = -15\text{mA}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{obo}$	—	9	20	pF	$V_{CB} = -10V$ , $f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	—	195	—	MHz	$V_{CE} = -10V$ , $I_C = -50\text{mA}$ , $f = 100\text{MHz}$
Delay Time	$t_d$	—	16	—	ns	$V_{CC} = -10V$ , $I_C = -1A$ $I_{B1} = -I_{B2} = -50\text{mA}$
Rise Time	$t_r$	—	11	—	ns	
Storage Time	$t_s$	—	220	—	ns	
Fall Time	$t_f$	—	31	—	ns	

Notes: 13. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

## Package Outline Dimensions

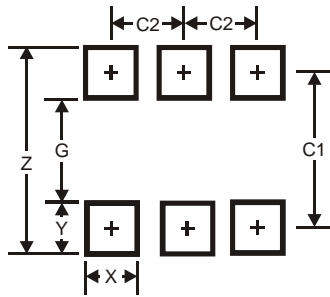
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT26			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
α	0°	8°	—
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)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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