

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

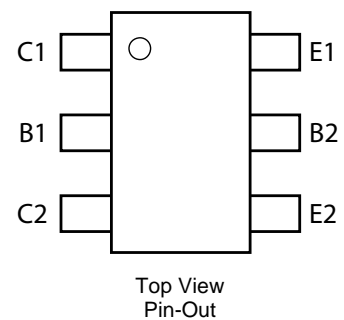
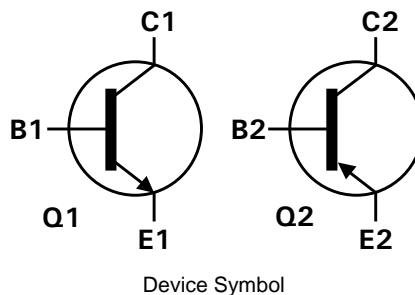
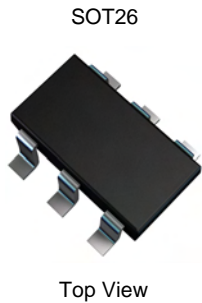
Advanced process capability has been used to achieve this high performance device. Combining NPN and PNP transistors in the SOT26 package provides a compact solution for the intended applications.

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

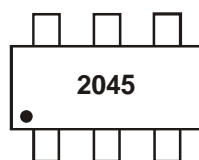


Ordering Information (Notes 4 & 5)

| 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_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|-------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 40 | V |
| Collector-Emitter Voltage | V _{CEV} | 40 | V |
| Collector-Emitter Voltage | V _{CEO} | 30 | V |
| Emitter-Base Voltage | V _{EBO} | 7 | V |
| Continuous Collector Current | I _C | 1.5 | A |
| Peak Pulsed Collector Current | I _{CM} | 5 | A |
| Base Current | I _B | 1 | A |

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

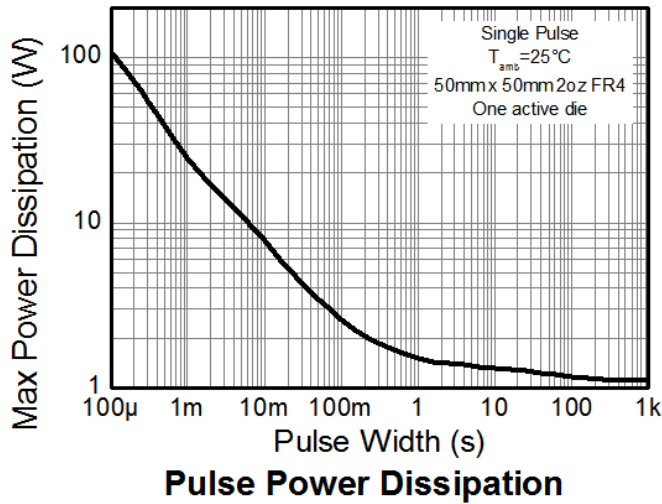
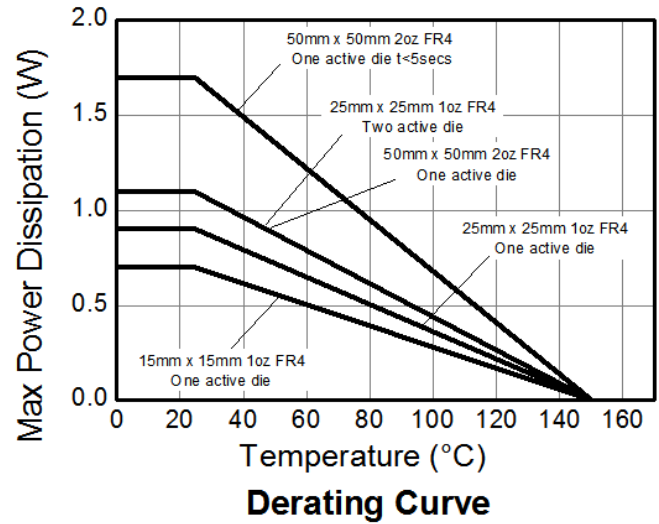
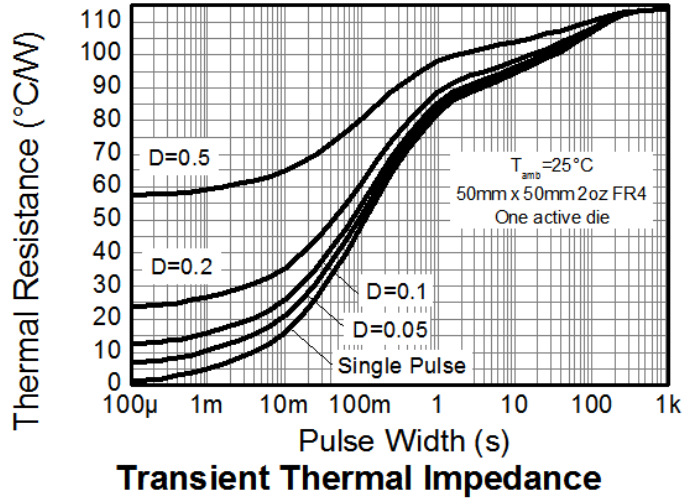
| Characteristic | Symbol | Value | Unit |
|-------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | -40 | V |
| Collector-Emitter Voltage | V _{CEV} | -40 | V |
| Collector-Emitter Voltage | V _{CEO} | -30 | V |
| Emitter-Base Voltage | V _{EBO} | -7 | V |
| Continuous Collector Current | I _C | -1.5 | A |
| Peak Pulsed Collector Current | I _{CM} | -5 | 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 | P _D | (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 _{θJA} | (Notes 6 & 10) | 1.1 |
| | | (Notes 7 & 10) | 8.8 |
| | | (Notes 7 & 11) | 1.1 |
| | | (Notes 8 & 10) | 8.8 |
| | | (Notes 9 & 10) | 1.7 |
| Thermal Resistance, Junction to Lead | R _{θJL} | 13.6 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -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 |
|---|---------------|-----|-----|------|------|---|
| OFF CHARACTERISTICS | | | | | | |
| 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 | $V_{EB} = 6V$ |
| ON CHARACTERISTICS (Note 13) | | | | | | |
| 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 | $I_C = 750\text{mA}$, $I_B = 15\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| 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 | |

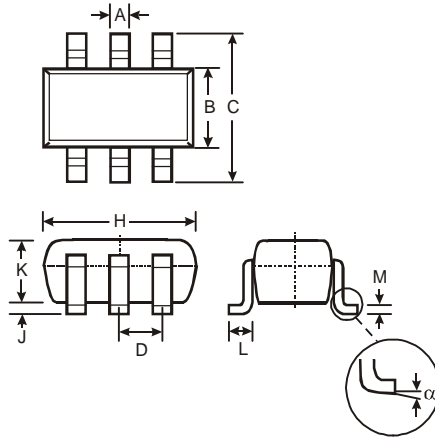
Electrical Characteristics – Q2 (PNP Transistor) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------|-----|------|-------|------|--|
| OFF CHARACTERISTICS | | | | | | |
| 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 | $V_{EB} = -6V$ |
| ON CHARACTERISTICS (Note 13) | | | | | | |
| 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 | $I_C = -750\text{mA}$, $I_B = -15\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| 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

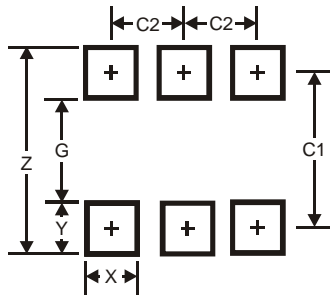
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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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