

**40V COMPLEMENTARY MEDIUM POWER TRANSISTOR IN SOT26**

**Features**

- NPN + PNP Combination
- $BV_{CEO} > 40$  (-40)V
- $BV_{ECO} > 6$  (-3)V
- $I_{CM} = 9$  (-9)A Peak Pulse Current
- $V_{CE(sat)} < 60$  (-90)mV @ 1A
- $R_{CE(sat)} = 38$  (58)m $\Omega$
- **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**

**Description**

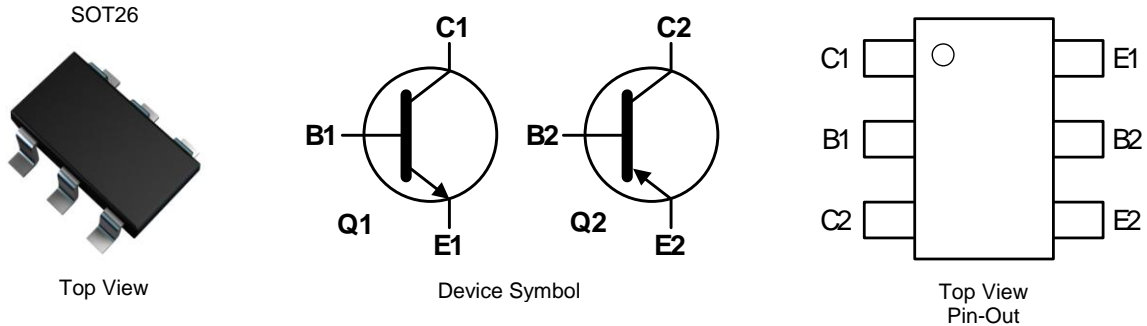
Advanced process capability is used to achieve this high performance device. Combining NPN and PNP transistors in the SOT26 package provides a compact solution for the intended applications.

**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 208③
- Weight: 0.015 grams (Approximate)

**Applications**

- MOSFET and IGBT Gate Driving
- Motor Drive

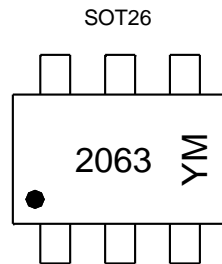


**Ordering Information** (Note 4)

| Product      | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|---------|--------------------|-----------------|-------------------|
| ZXTC2063E6TA | 2063    | 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. For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**



2063 = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: C = 2015)  
 M or  $\bar{M}$  = 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                               | Symbol           | Value | Unit |
|--|------------------|-------|------|
| Collector-Base Voltage                       | V <sub>CBO</sub> | 130   | V    |
| Collector-Emitter Voltage                    | V <sub>CEO</sub> | 40    | V    |
| Emitter-Collector Voltage (Reverse blocking) | V <sub>ECO</sub> | 6     | V    |
| Emitter-Base Voltage                         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current                 | I <sub>C</sub>   | 3.5   | A    |
| Peak Pulsed Collector Current                | I <sub>CM</sub>  | 9     | A    |
| Base Current                                 | I <sub>B</sub>   | 1     | A    |

**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> | -45   | V    |
| Collector-Emitter Voltage                    | V <sub>CEO</sub> | -40   | V    |
| Emitter-Collector Voltage (Reverse blocking) | V <sub>ECO</sub> | -3    | V    |
| Emitter-Base Voltage                         | V <sub>EBO</sub> | -7    | V    |
| Continuous Collector Current                 | I <sub>C</sub>   | -3    | A    |
| Peak Pulsed Collector Current                | I <sub>CM</sub>  | -9    | A    |
| Base Current                                 | I <sub>B</sub>   | -1    | A    |

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

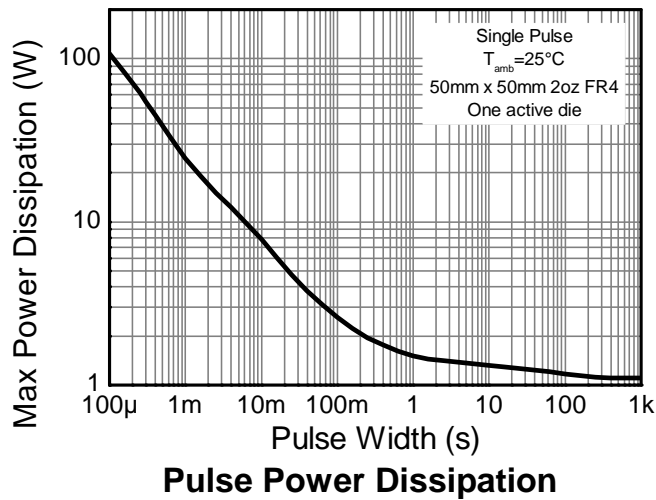
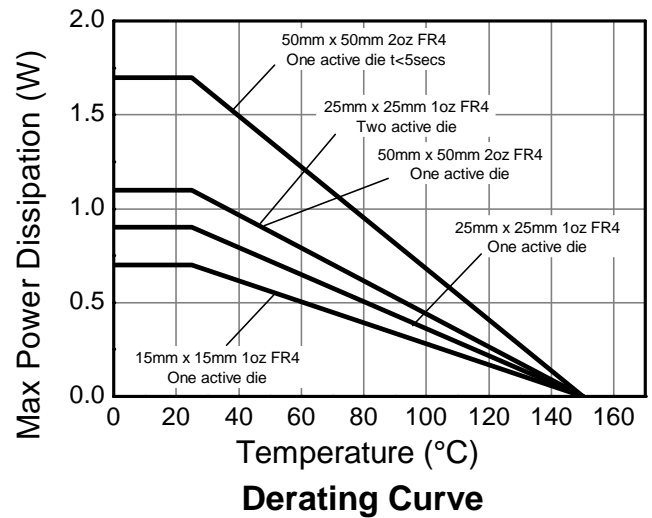
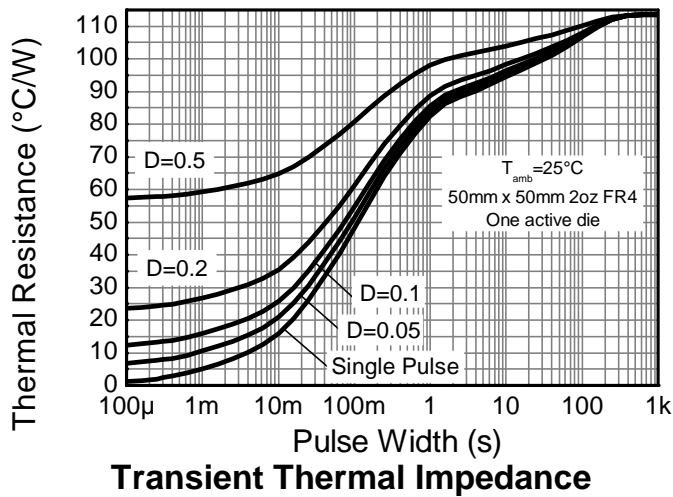
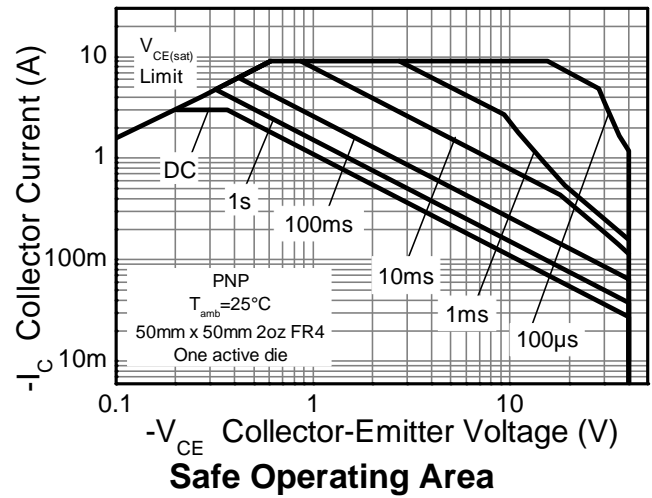
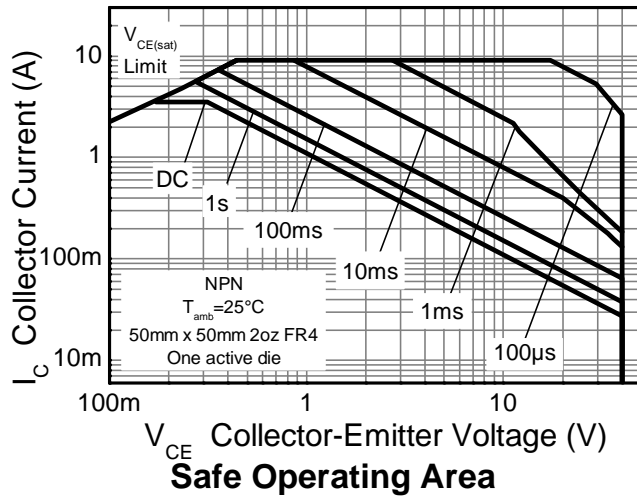
| Characteristic                              | Symbol                            | Value          | Unit |
|---|-----------------------------------|----------------|------|
| Power Dissipation<br>Linear Derating Factor | P <sub>D</sub>                    | (Notes 5 & 9)  | 0.7  |
|   |                                   | (Notes 6 & 9)  | 5.6  |
|   |                                   | (Notes 6 & 10) | 0.9  |
|   |                                   | (Notes 7 & 9)  | 7.2  |
|   |                                   | (Notes 8 & 9)  | 1.1  |
|   |                                   | (Notes 8 & 9)  | 8.8  |
| Thermal Resistance, Junction to Ambient     | R <sub>θJA</sub>                  | (Notes 5 & 9)  | 1.1  |
|   |                                   | (Notes 6 & 9)  | 8.8  |
|   |                                   | (Notes 6 & 10) | 1.1  |
|   |                                   | (Notes 7 & 9)  | 8.8  |
|   |                                   | (Notes 8 & 9)  | 1.7  |
| Thermal Resistance, Junction to Lead        | R <sub>θJL</sub>                  | 13.6           | °C/W |
| Operating and Storage Temperature Range     | T <sub>J</sub> , T <sub>STG</sub> | -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:
- 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.
  - Same as Note (5), except the device is surface mounted on 25mm x 25mm 1oz copper.
  - Same as Note (5), except the device is surface mounted on 50mm x 50mm 2oz copper.
  - Same as Note (7), except the device is measured at t < 5 seconds.
  - For device with one active die, both collectors attached to a common heatsink.
  - For device with two active dice running at equal power, split heatsink 50% to each collector.
  - Thermal resistance from junction to solder-point (at the end of the collector lead).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**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                       | $BV_{CBO}$    | 130              | 170                    | —                       | V    | $I_C = 100\mu\text{A}, I_E = 0$  |
| Collector-Emitter Breakdown Voltage (Note 13)          | $BV_{CEO}$    | 40               | 63                     | —                       | V    | $I_C = 10\text{mA}, I_B = 0$   |
| Emitter-Base Breakdown Voltage                         | $BV_{EBO}$    | 7                | 8.3                    | —                       | V    | $I_E = 100\mu\text{A}, I_C = 0$  |
| Emitter-Collector Breakdown Voltage (reverse blocking) | $BV_{ECX}$    | 6                | 7.4                    | —                       | V    | $I_E = 100\mu\text{A}, R_{BC} < 1\text{k}\Omega$ or<br>$0.25\text{V} > V_{BC} > -0.25\text{V}$   |
| Emitter-Collector Breakdown Voltage (base open)        | $BV_{ECO}$    | 6                | 7.4                    | —                       | V    | $I_E = 100\mu\text{A}$   |
| Collector Cutoff Current                               | $I_{CBO}$     | —                | <1                     | 50                      | nA   | $V_{CB} = 100\text{V}$   |
| Collector Cutoff Current                               | $I_{EBO}$     | —                | <1                     | 50                      | nA   | $V_{CB} = 100\text{V}, T_A = +100^\circ\text{C}$   |
| Collector Cutoff Current                               | $I_{EBO}$     | —                | <1                     | 50                      | nA   | $V_{EB} = 5.6\text{V}$   |
| <b>ON CHARACTERISTICS (Note 13)</b>                    |               |                  |                        |                         |      |  |
| DC Current Gain  | $h_{FE}$      | 300<br>280<br>40 | 450<br>400<br>60       | 900                     | —    | $I_C = 10\text{mA}, V_{CE} = 2\text{V}$<br>$I_C = 1.0\text{A}, V_{CE} = 2\text{V}$<br>$I_C = 3.5\text{A}, V_{CE} = 2\text{V}$  |
| Collector-Emitter Saturation Voltage                   | $V_{CE(sat)}$ | —                | 50<br>85<br>150<br>135 | 60<br>110<br>220<br>195 | mV   | $I_C = 1.0\text{A}, I_B = 100\text{mA}$<br>$I_C = 1.0\text{A}, I_B = 20\text{mA}$<br>$I_C = 2.0\text{A}, I_B = 40\text{mA}$<br>$I_C = 3.5\text{A}, I_B = 350\text{mA}$ |
| Base-Emitter Saturation Voltage                        | $V_{BE(sat)}$ | —                | 960                    | 1,050                   | mV   | $I_C = 3.5\text{A}, I_B = 350\text{mA}$  |
| Base-Emitter Turn-On Voltage                           | $V_{BE(on)}$  | —                | 860                    | 950                     | mV   | $I_C = 3.5\text{A}, V_{CE} = 2\text{V}$  |
| <b>SMALL SIGNAL CHARACTERISTICS</b>                    |               |                  |                        |                         |      |  |
| Output Capacitance                                     | $C_{obo}$     | —                | 12                     | 20                      | pF   | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}$   |
| Current Gain-Bandwidth Product                         | $f_T$         | —                | 190                    | —                       | MHz  | $V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$  |
| Delay Time   | $t_d$         | —                | 64                     | —                       | ns   | $V_{CC} = 10\text{V}, I_C = 1\text{A}, I_{B1} = I_{B2} = 10\text{mA}$  |
| Rise Time  | $t_r$         | —                | 108                    | —                       | ns   |  |
| Storage Time   | $t_s$         | —                | 428                    | —                       | ns   |  |
| Fall Time  | $t_f$         | —                | 130                    | —                       | ns   |  |

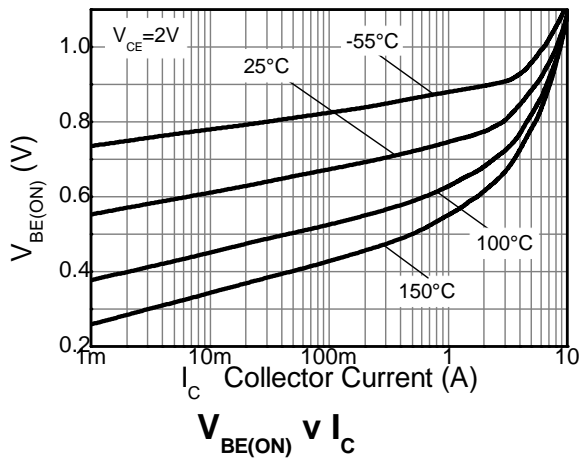
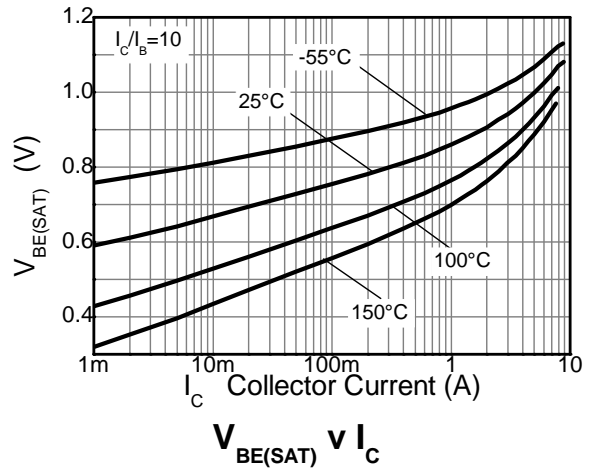
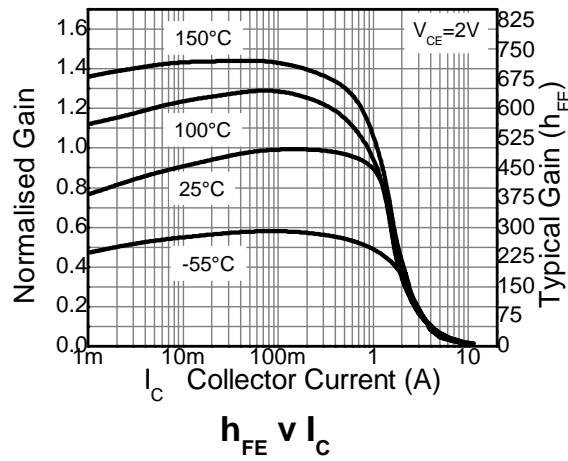
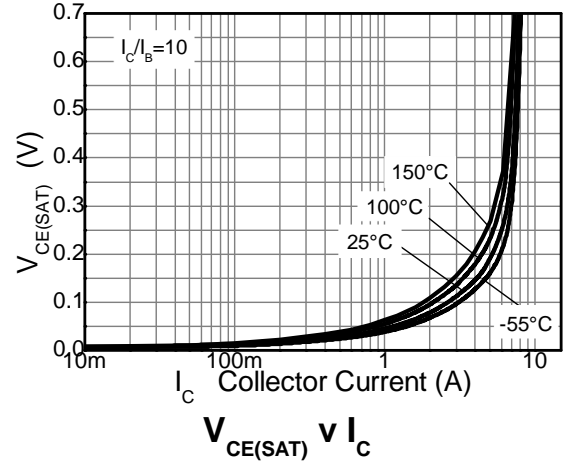
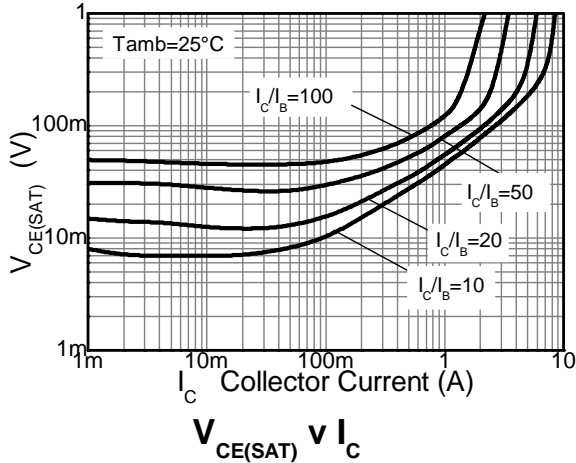
Note: 13. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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

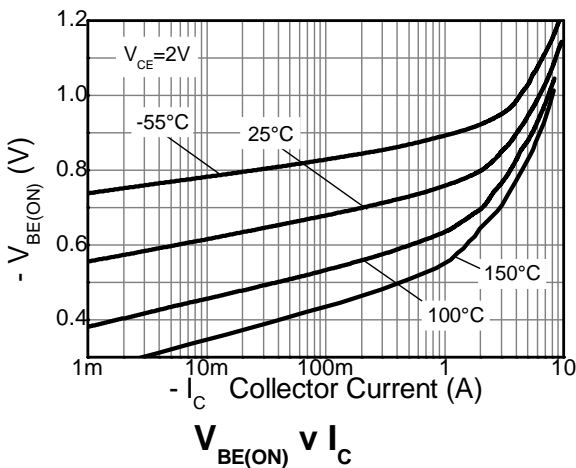
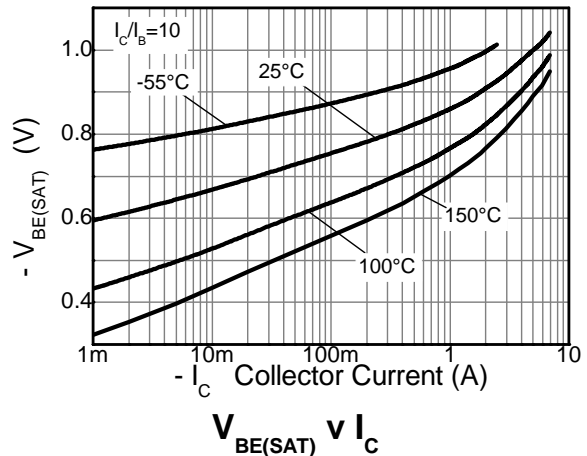
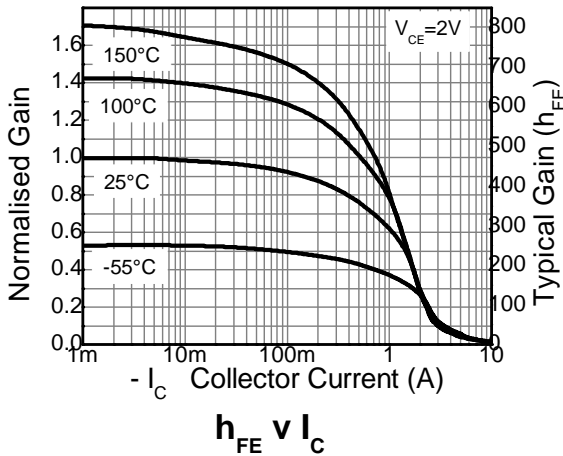
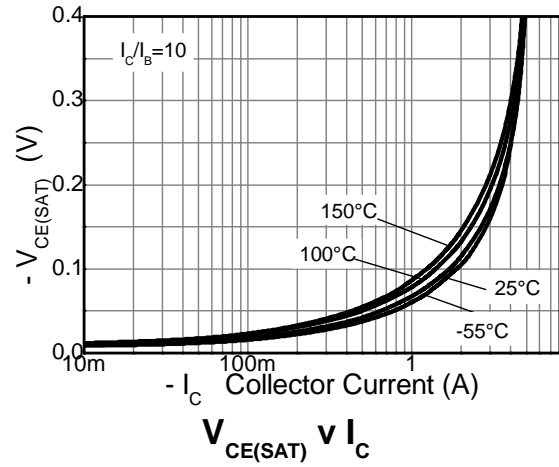
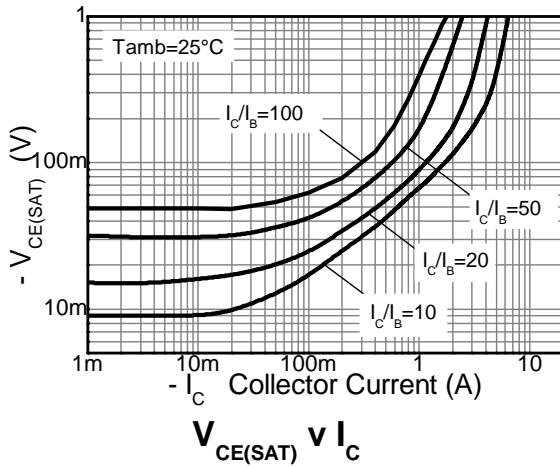
| Characteristic   | Symbol               | Min              | Typ                 | Max                 | Unit | Test Condition   |
|--|----------------------|------------------|---------------------|---------------------|------|--|
| <b>OFF CHARACTERISTICS</b>                             |                      |                  |                     |                     |      |  |
| Collector-Base Breakdown Voltage                       | BV <sub>CBO</sub>    | -45              | -80                 | —                   | V    | I <sub>C</sub> = -100μA, I <sub>E</sub> = 0  |
| Collector-Emitter Breakdown Voltage (Note 14)          | BV <sub>CEO</sub>    | -40              | -65                 | —                   | V    | I <sub>C</sub> = -10mA, I <sub>B</sub> = 0   |
| Emitter-Base Breakdown Voltage                         | BV <sub>EBO</sub>    | -7               | -8.3                | —                   | V    | I <sub>E</sub> = -100μA, I <sub>C</sub> = 0  |
| Emitter-Collector Breakdown Voltage (reverse blocking) | BV <sub>ECX</sub>    | -6               | -7.4                | —                   | V    | -I <sub>E</sub> = 100μA, R <sub>BC</sub> < 1kΩ or<br>0.25V < V <sub>BC</sub> < -0.25V  |
| Emitter-Collector Breakdown Voltage (base open)        | BV <sub>ECO</sub>    | -3               | -8.7                | —                   | V    | I <sub>E</sub> = -100μA  |
| Collector Cutoff Current                               | I <sub>CBO</sub>     | —                | <1                  | -50                 | nA   | V <sub>CB</sub> = -36V   |
| Collector Cutoff Current                               | I <sub>EBO</sub>     | —                | <1                  | -50                 | nA   | V <sub>CB</sub> = -36V, T <sub>A</sub> = +100°C  |
| Collector Cutoff Current                               | I <sub>EBO</sub>     | —                | <1                  | -50                 | nA   | V <sub>EB</sub> = -5.6V  |
| <b>ON CHARACTERISTICS (Note 14)</b>                    |                      |                  |                     |                     |      |  |
| DC Current Gain  | h <sub>FE</sub>      | 300<br>200<br>20 | 450<br>280<br>50    | 900<br>—<br>—       | —    | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V<br>I <sub>C</sub> = -1.0A, V <sub>CE</sub> = -2V<br>I <sub>C</sub> = -3.0A, V <sub>CE</sub> = -2V      |
| Collector-Emitter Saturation Voltage                   | V <sub>CE(sat)</sub> | —<br>—<br>—      | -70<br>-195<br>-175 | -90<br>-290<br>-260 | mV   | I <sub>C</sub> = -1.0A, I <sub>B</sub> = -100mA<br>I <sub>C</sub> = -1.0A, I <sub>B</sub> = -20mA<br>I <sub>C</sub> = -3.0A, I <sub>B</sub> = -300mA |
| Base-Emitter Saturation Voltage                        | V <sub>BE(sat)</sub> | —                | -935                | -1,000              | mV   | I <sub>C</sub> = -3.0A, I <sub>B</sub> = -300mA  |
| Base-Emitter Turn-On Voltage                           | V <sub>BE(on)</sub>  | —                | -855                | -950                | mV   | I <sub>C</sub> = -3.0A, V <sub>CE</sub> = -2V  |
| <b>SMALL SIGNAL CHARACTERISTICS</b>                    |                      |                  |                     |                     |      |  |
| Output Capacitance                                     | C <sub>obo</sub>     | —                | 17                  | 25                  | pF   | V <sub>CB</sub> = -10V, f = 1.0MHz   |
| Current Gain-Bandwidth Product                         | f <sub>T</sub>       | —                | 270                 | —                   | MHz  | V <sub>CE</sub> = -10V, I <sub>C</sub> = -50mA, f = 100MHz   |
| Delay Time   | t <sub>d</sub>       | —                | 57                  | —                   | ns   | V <sub>CC</sub> = -10V, I <sub>C</sub> = -1A, I <sub>B1</sub> = I <sub>B2</sub> = -10mA  |
| Rise Time  | t <sub>r</sub>       | —                | 69                  | —                   | ns   |  |
| Storage Time   | t <sub>s</sub>       | —                | 154                 | —                   | ns   |  |
| Fall Time  | t <sub>f</sub>       | —                | 60                  | —                   | ns   |  |

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

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



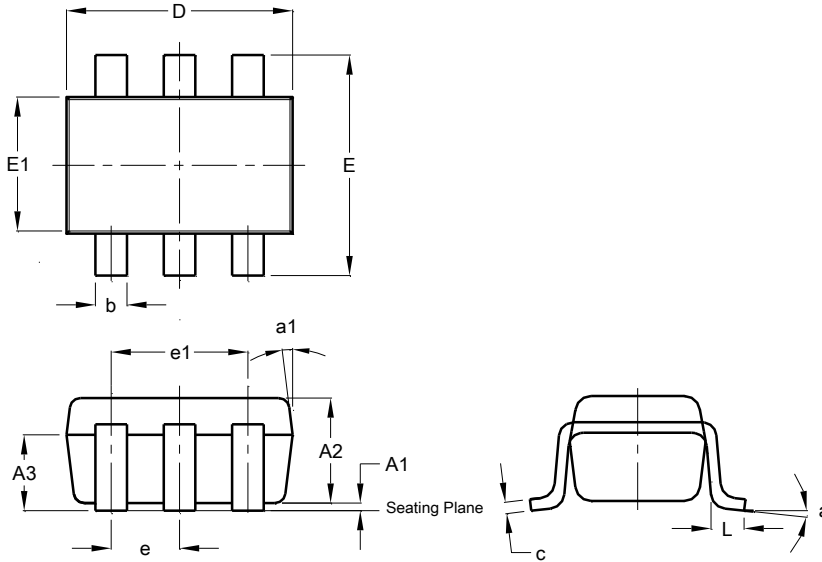
**Typical Electrical Characteristics – Q2 (PNP Transistor)** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



**Package Outline Dimensions**

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

**SOT26**

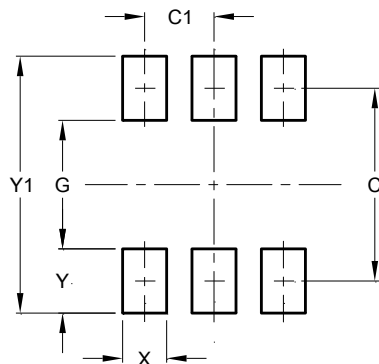


| SOT26                |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A1                   | 0.013 | 0.10 | 0.05 |
| A2                   | 1.00  | 1.30 | 1.10 |
| A3                   | 0.70  | 0.80 | 0.75 |
| b                    | 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.

**SOT26**



| 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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