

**20V COMPLEMENTARY MEDIUM POWER TRANSISTOR IN SOT26**

**Features**

- NPN + PNP combination
- $BV_{CEO} > 20$  (-20)V
- $BV_{EBO} > 7$  (-7)V
- Continuous Collector Current  $I_C = 4$  (-3.5)A
- $V_{CE(sat)} < 50$  (-65)mV @ 1A
- $R_{CE(sat)} = 35$  (54)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**

**Description**

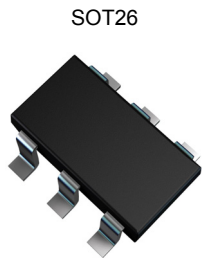
Advanced process capability has been used to achieve this high performance device. Combining NPN and PNP transistors in the SOT26 package provides a compact solution for the intended applications.

**Mechanical Data**

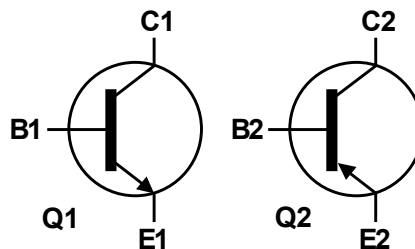
- Case: SOT26
- Case Material: molded plastic, "Green" molding compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.015 grams (approximate)

**Applications**

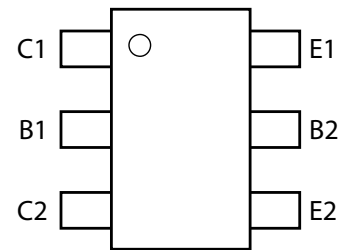
- MOSFET and IGBT gate driving
- Motor drive



Top View



Device Symbol



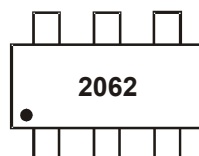
Top View Pin-Out

**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC2062E6TA	2062	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**



2062 = 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>	100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	20	V
Emitter-Collector Voltage (reverse blocking)	V <sub>ECO</sub>	5	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	4	A
Peak Pulsed Collector Current	I <sub>CM</sub>	10	A
Base Current	I <sub>B</sub>	1	A

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

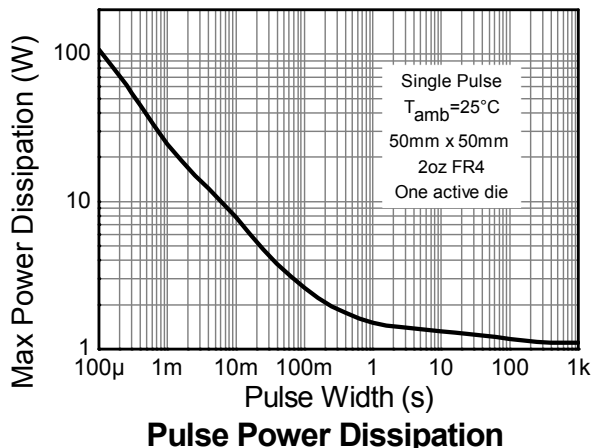
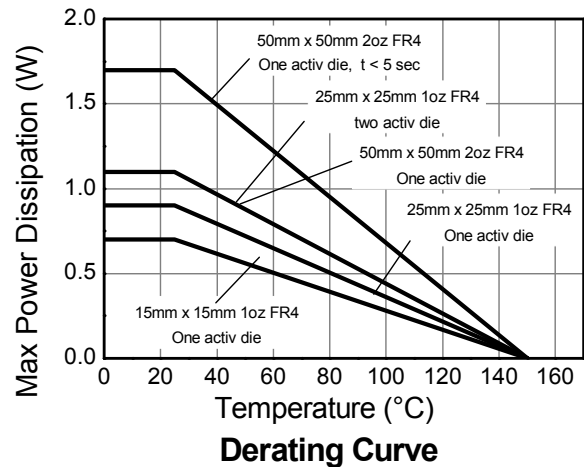
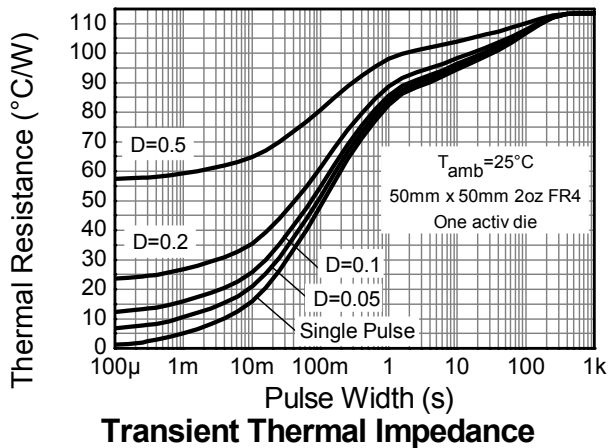
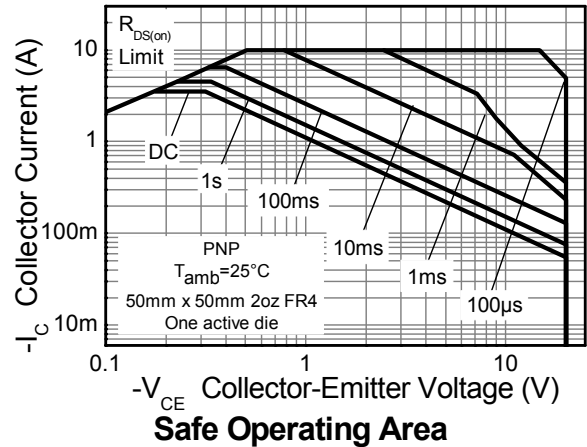
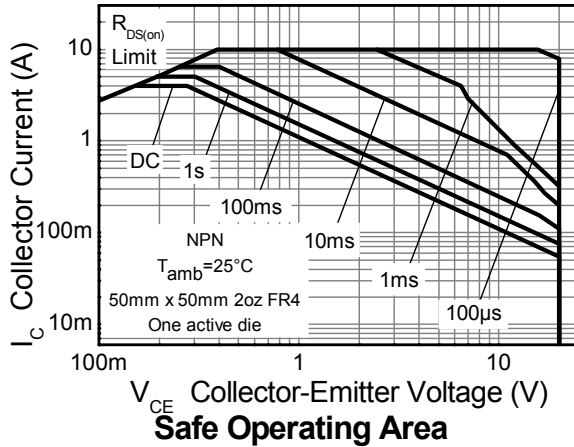
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-25	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-20	V
Emitter-Collector Voltage (reverse blocking)	V <sub>ECO</sub>	-4	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-3.5	A
Peak Pulsed Collector Current	I <sub>CM</sub>	-10	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>	0.7	W mW/°C
		5.6	
		0.9	
		7.2	
		1.1	
		8.8	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	1.1	°C/W
		8.8	
		1.7	
		13.6	
		179	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	139	°C/W
		113	
		113	
		73	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	87.58	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°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).

**Thermal Characteristics and Derating Information**



**Electrical Characteristics – Q1 (NPN 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>CB0</sub>	100	140	—	V	I <sub>C</sub> = 100μA, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage (Note 12)	BV <sub>CEO</sub>	20	35	—	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 (base open)	BV <sub>ECO</sub>	5	6	—	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CB0</sub>	—	<1	50 0.5	nA μA	V <sub>CB</sub> = 100V V <sub>CB</sub> = 100V, 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 12)</b>						
DC Current Gain	h <sub>FE</sub>	300 280 140 —	450 420 210 15	900 — — —	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V I <sub>C</sub> = 15A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	—	40 60 95 140	50 75 115 190	mV	I <sub>C</sub> = 1.0A, I <sub>B</sub> = 100mA I <sub>C</sub> = 1.0A, I <sub>B</sub> = 20mA I <sub>C</sub> = 2.0A, I <sub>B</sub> = 40mA I <sub>C</sub> = 4A, I <sub>B</sub> = 200mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	—	940	1050	mV	I <sub>C</sub> = 4A, I <sub>B</sub> = 200mA
Base-Emitter Turn-On Voltage	V <sub>BE(on)</sub>	—	810	900	mV	I <sub>C</sub> = 4A, 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>	—	215	—	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 50mA, f = 100MHz
Delay Time	t <sub>d</sub>	—	68	—	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>	—	72	—	ns	
Storage Time	t <sub>s</sub>	—	361	—	ns	
Fall Time	t <sub>f</sub>	—	64	—	ns	

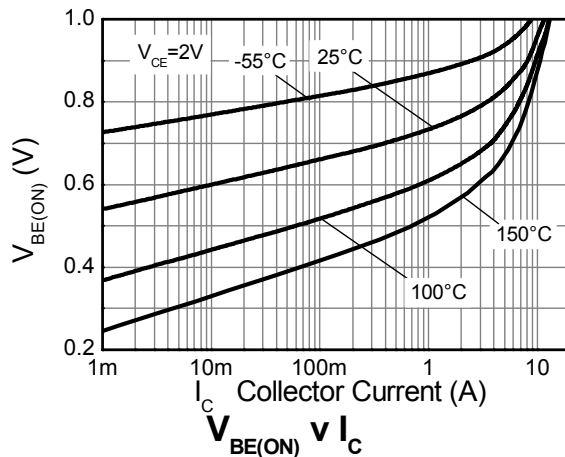
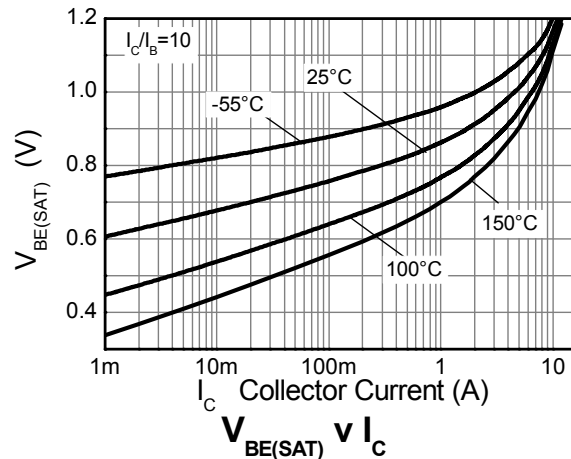
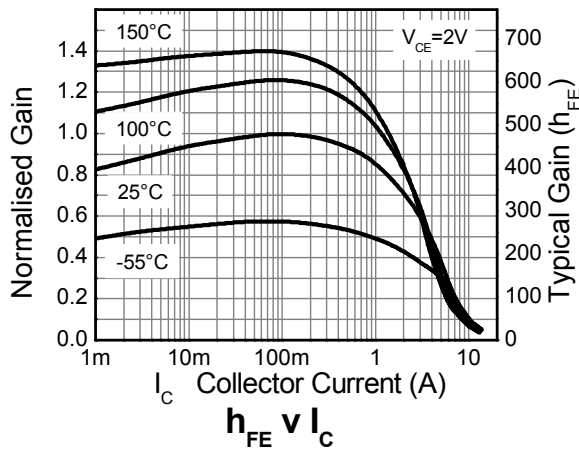
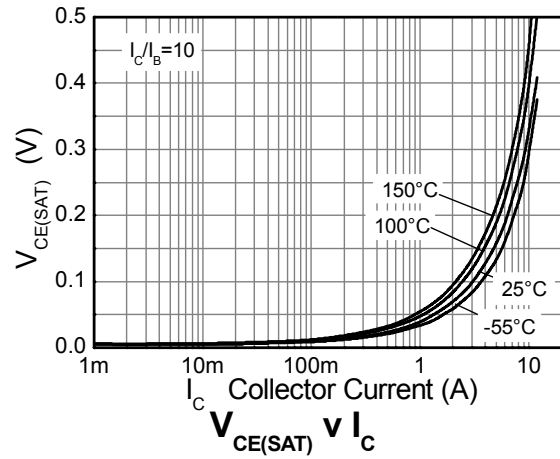
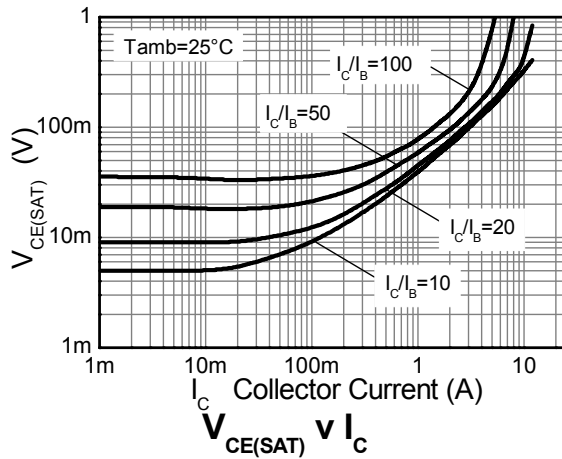
Notes: 12. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

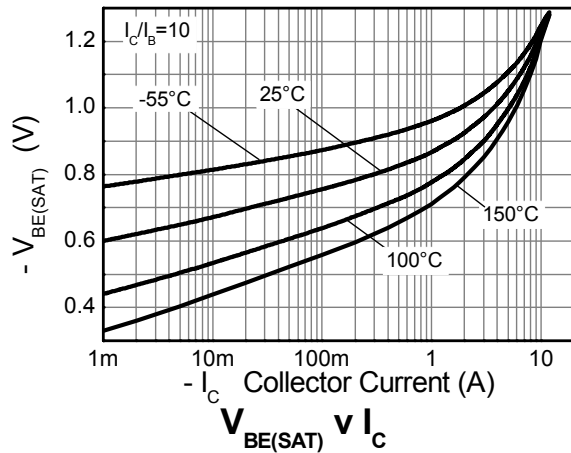
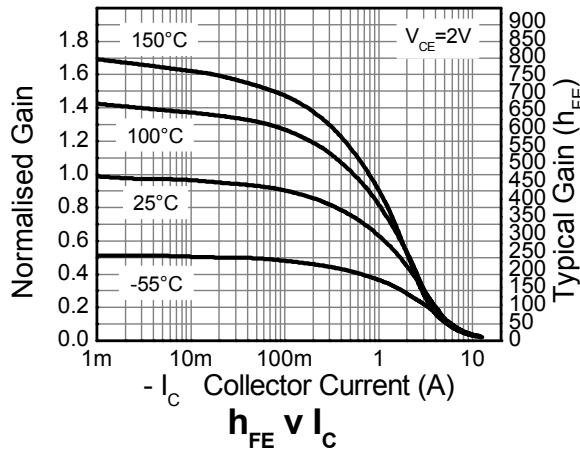
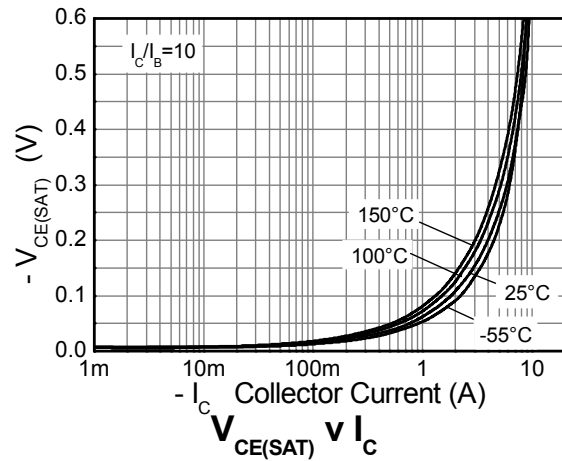
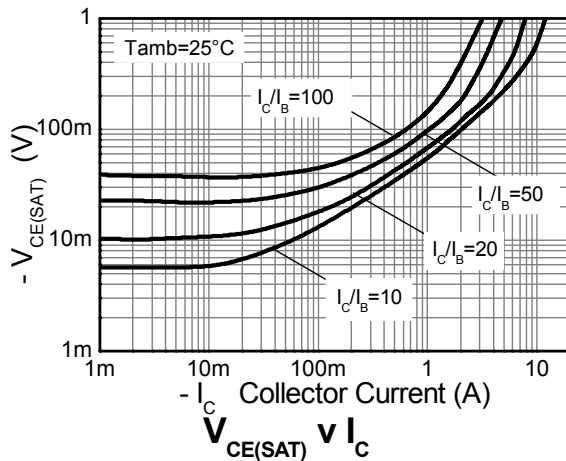
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	-25	-55	—	V	$I_C = -100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 12)	$BV_{CEO}$	-20	-45	—	V	$I_C = -10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-8.3	—	V	$I_E = -100\mu\text{A}, I_C = 0$
Collector Cutoff Current	$I_{CBO}$	—	< -1	-50	nA	$V_{CB} = -25\text{V}$
Collector Cutoff Current	$I_{EBO}$	—	< -1	-50	nA	$V_{CB} = -25\text{V}, T_A = +100^\circ\text{C}$
Collector Cutoff Current	$I_{EBO}$	—	< -1	-50	nA	$V_{EB} = -5.6\text{V}$
<b>ON CHARACTERISTICS (Note 12)</b>						
DC Current Gain	$h_{FE}$	300 170 65 —	450 300 100 15	900 — — —	—	$I_C = -10\text{mA}, V_{CE} = -2\text{V}$ $I_C = -1.0\text{A}, V_{CE} = -2\text{V}$ $I_C = -3.5\text{A}, V_{CE} = -2\text{V}$ $I_C = -10\text{A}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	-55 -100 -185 -190	-65 -135 -280 -250	mV	$I_C = -1.0\text{A}, I_B = -100\text{mA}$ $I_C = -1.0\text{A}, I_B = -20\text{mA}$ $I_C = -2.0\text{A}, I_B = -40\text{mA}$ $I_C = -3.5\text{A}, I_B = -175\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	-925	-1000	mV	$I_C = -3.5\text{A}, I_B = -175\text{mA}$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	-835	-900	mV	$I_C = -3.5\text{A}, V_{CE} = -2\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{obo}$	—	21	30	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	—	290	—	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
Delay Time	$t_d$	—	56	—	ns	$V_{CC} = -10\text{V}, I_C = -1\text{A},$ $I_{B1} = -I_{B2} = -10\text{mA}$
Rise Time	$t_r$	—	68	—	ns	
Storage Time	$t_s$	—	158	—	ns	
Fall Time	$t_f$	—	59	—	ns	

Notes: 12. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**Typical Electrical Characteristics – Q1 (NPN Transistor) (@T<sub>A</sub> = +25°C, unless otherwise specified.)**

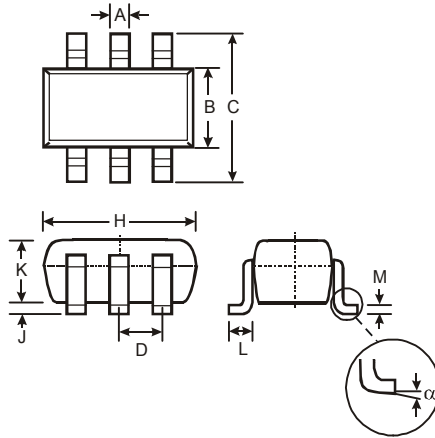


**Typical Electrical Characteristics – Q2 (PNP Transistor) (@T<sub>A</sub> = +25°C, unless otherwise specified.)**



## Package Outline Dimensions

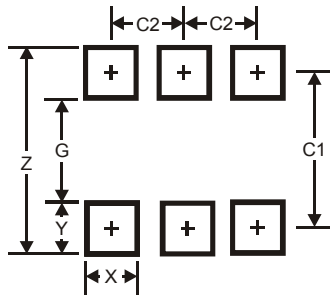
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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