

ZXT2061E6

12V COMPLEMENTARY MEDIUM POWER TRANSISTOR IN SOT26

Features

- NPN + PNP Combination
- $BV_{CEO} > 12$ (-12)V
- $BV_{EBO} > 7$ (-7)V
- Continuous Collector Current $I_C = 5$ (-3.5)A
- $V_{CE(sat)} < 32$ (-70)mV @ 1A
- $R_{CE(sat)} = 25$ (45)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

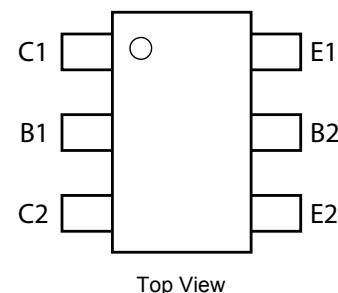
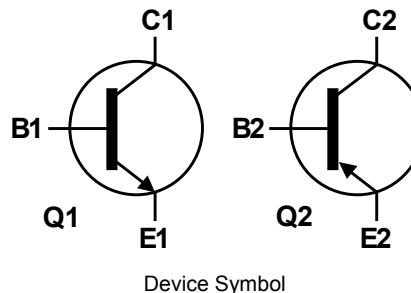
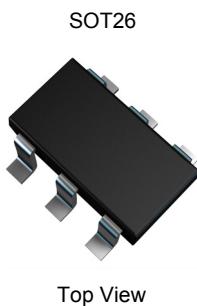
Advanced process capability has been used to achieve this high performance device. Combining NPN and PNP transistors in the SOT26 package provides a compact solution for the intended applications.

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 (E3)
- Weight: 0.015 grams (approximate)

Applications

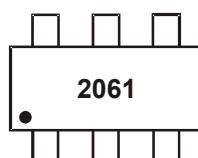
- MOSFET and IGBT Gate Driving
- Motor Drive

**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXT2061E6TA	2061	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

2061 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	12	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	5	A
Peak Pulsed Collector Current	I_{CM}	12	A
Base Current	I_B	1	A

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-12	V
Collector-Emitter Voltage	V_{CEO}	-12	V
Emitter-Base Voltage	V_{EBO}	-7	V
Continuous Collector Current	I_C	-3.5	A
Peak Pulsed Collector Current	I_{CM}	-10	A
Base Current	I_B	-1	A

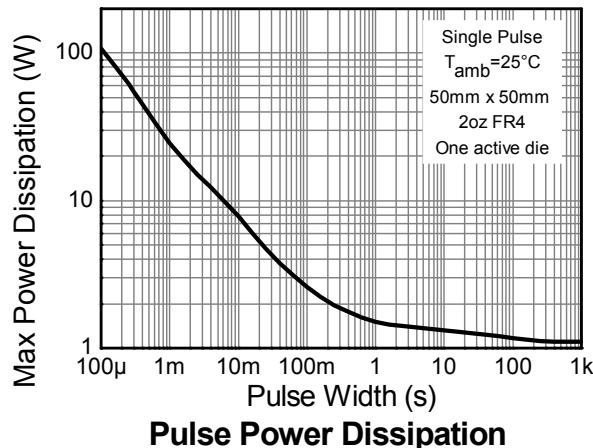
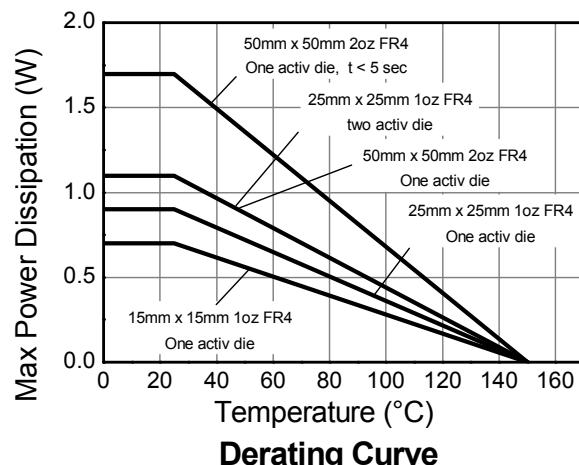
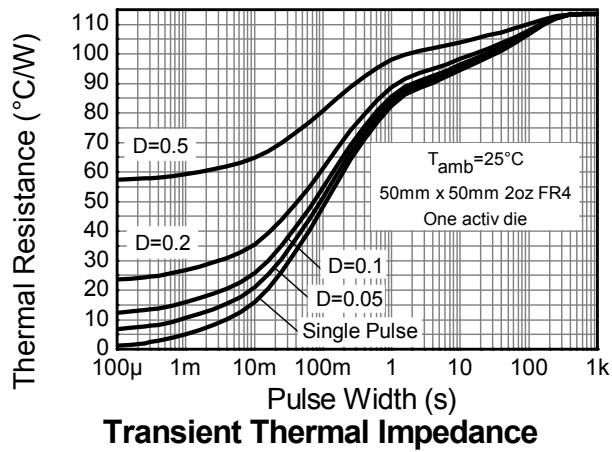
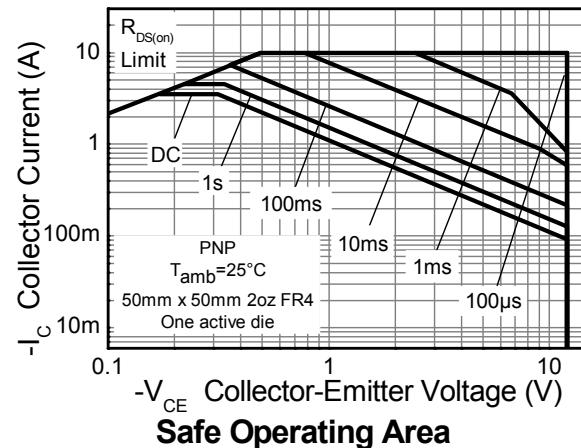
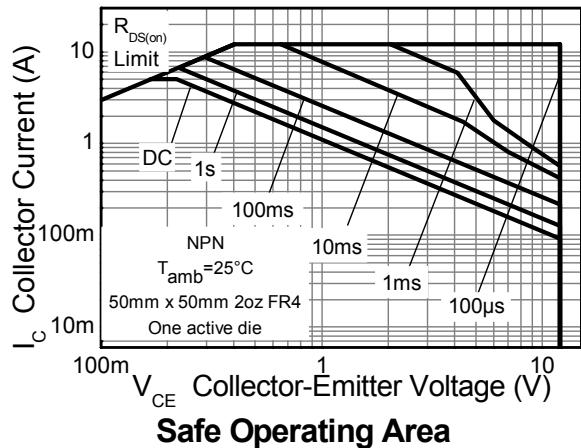
Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P_D	0.7	W mW/°C
		5.6	
		0.9	
		7.2	
		1.1	
		8.8	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	1.1	°C/W
		8.8	
		1.7	
		13.6	
		179	
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	139	°C/W
		113	
		113	
		73	
		87.58	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:

5. 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.
6. Same as note (5), except the device is surface mounted on 25mm x 25mm 1oz copper.
7. Same as note (5), except the device is surface mounted on 50mm x 50mm 2oz copper.
8. Same as note (7), except the device is measured at $t < 5$ seconds.
9. For device with one active die, both collectors attached to a common heatsink.
10. For device with two active dice running at equal power, split heatsink 50% to each collector.
11. 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°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV _{CBO}	20	40	—	V	I _C = 100µA, I _E = 0
Collector-Emitter Breakdown Voltage (Note 12)	BV _{CEO}	12	17	—	V	I _C = 10mA, I _B = 0
Emitter-Base Breakdown Voltage	BV _{EBO}	7	8.4	—	V	I _E = 100µA, I _C = 0
Collector Cutoff Current	I _{CBO}	—	<1	50 0.5	nA µA	V _{CB} = 20V V _{CB} = 20V, T _A = +100°C
Collector Cutoff Current	I _{EBO}	—	<1	50	nA	V _{EB} = 5.6V
ON CHARACTERISTICS (Note 12)						
DC Current Gain	h _{FE}	500 480 260	800 750 390	1500	—	I _C = 10mA, V _{CE} = 2V I _C = 1.0A, V _{CE} = 2V I _C = 5A, V _{CE} = 2V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	32 50 65 145	40 60 80 180	mV	I _C = 1.0A, I _B = 100mA I _C = 1.0A, I _B = 10mA I _C = 2.0A, I _B = 40mA I _C = 5A, I _B = 100mA
Base-Emitter Saturation Voltage	V _{BE(sat)}	—	920	1000	mV	I _C = 5A, I _B = 100mA
Base-Emitter Turn-On Voltage	V _{BE(on)}	—	810	900	mV	I _C = 5A, V _{CE} = 2V
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C _{obo}	—	26	35	pF	V _{CB} = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f _T	—	260	—	MHz	V _{CE} = 10V, I _C = 50mA, f = 100MHz
Delay Time	t _d	—	71	—	ns	V _{CC} = 10V, I _C = 1A, I _{B1} = -I _{B2} = 10mA
Rise Time	t _r	—	70	—	ns	
Storage Time	t _s	—	233	—	ns	
Fall Time	t _f	—	72	—	ns	

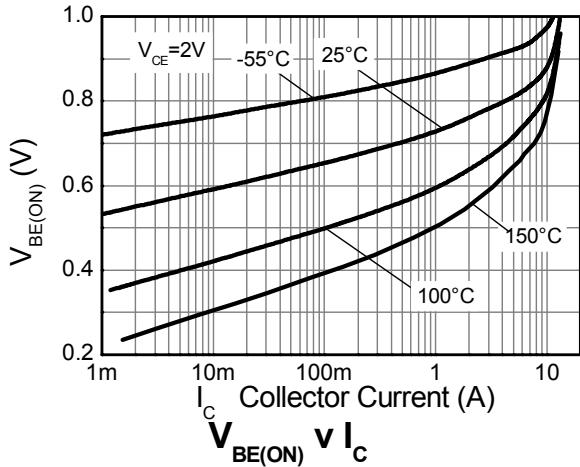
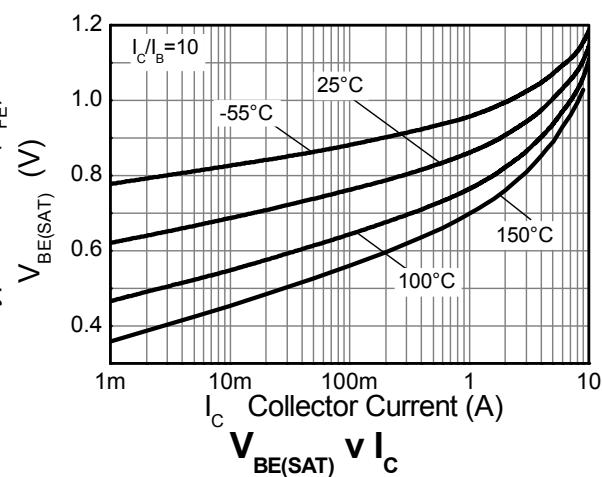
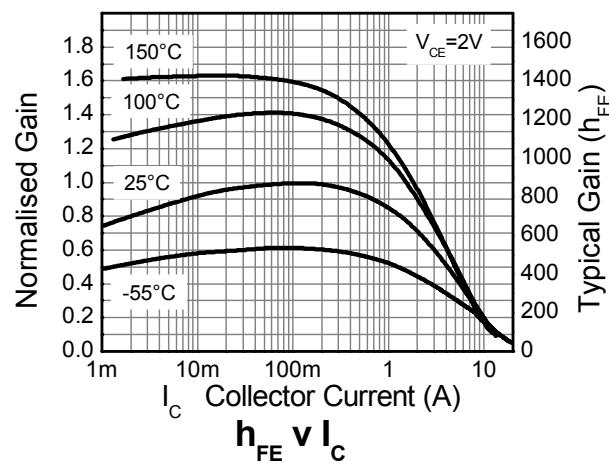
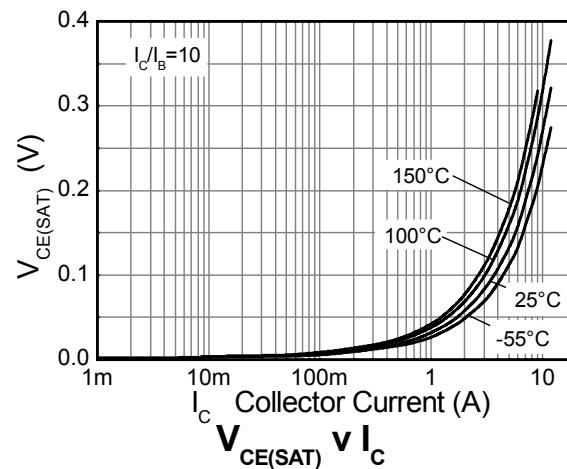
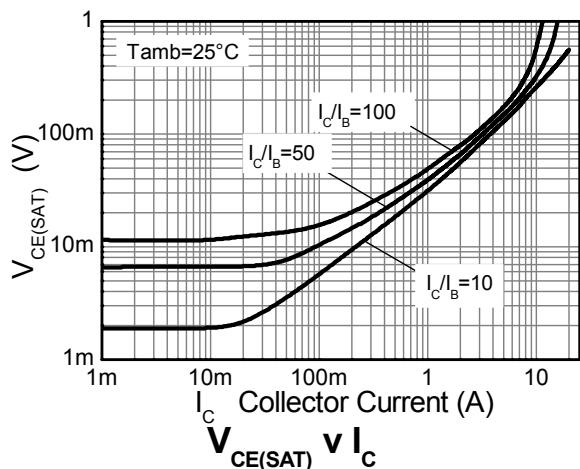
Notes: 12. Measured under pulsed conditions. Pulse width \leq 300µs. Duty cycle \leq 2%.

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

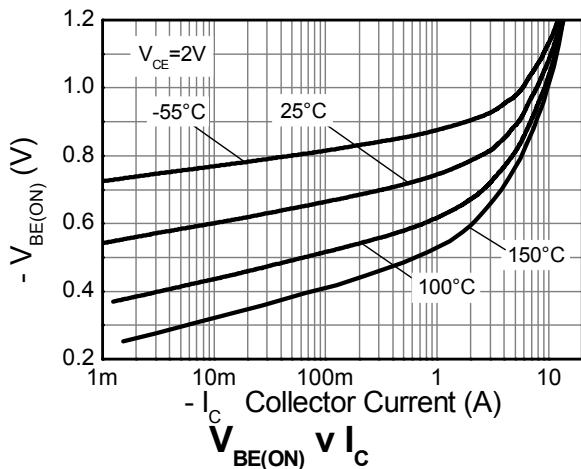
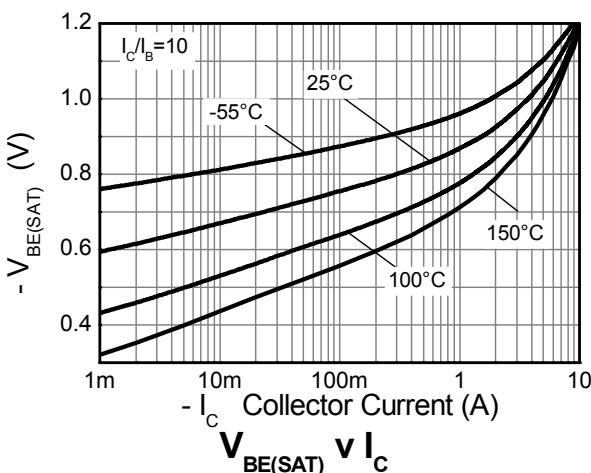
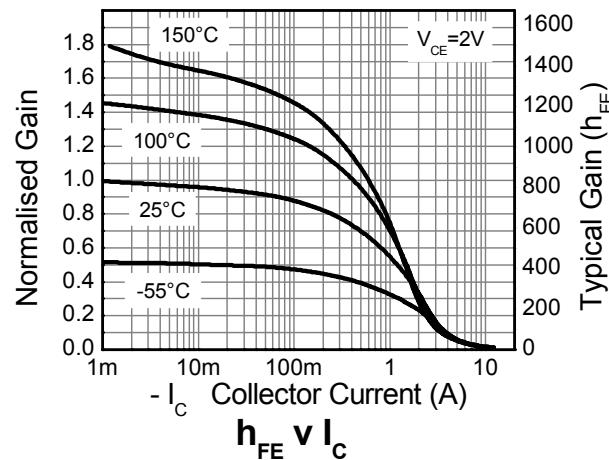
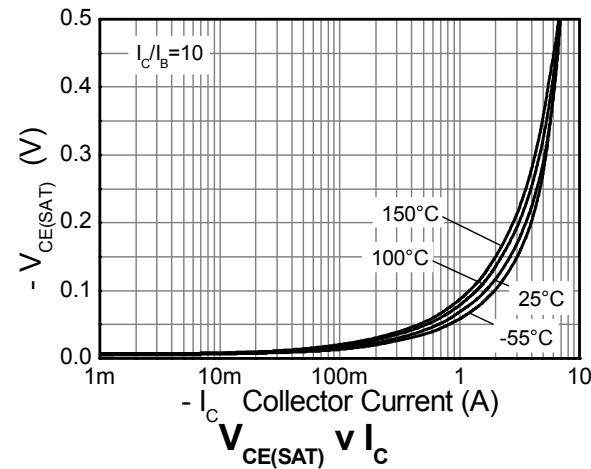
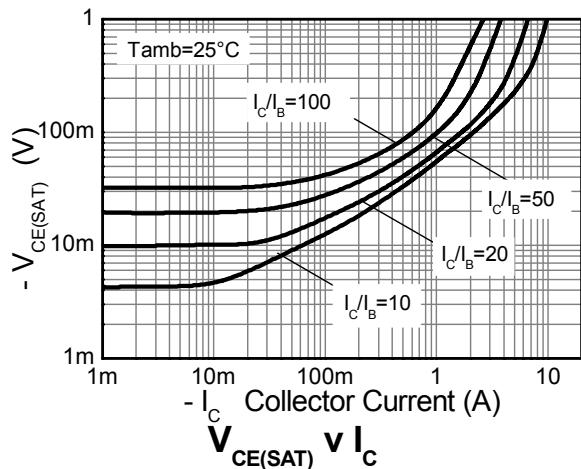
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	-12	-35	—	V	$I_C = -100\mu\text{A}$, $I_E = 0$
Collector-Emitter Breakdown Voltage (Note 12)	BV_{CEO}	-12	-25	—	V	$I_C = -10\text{mA}$, $I_B = 0$
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.4	—	V	$I_E = -100\mu\text{A}$, $I_C = 0$
Collector Cutoff Current	I_{CBO}	—	< -1	-50 -0.5	nA μA	$V_{\text{CB}} = -12\text{V}$ $V_{\text{CB}} = -12\text{V}$, $T_A = +100^\circ\text{C}$
Collector Cutoff Current	I_{EBO}	—	< -1	-50	nA	$V_{\text{EB}} = -5.6\text{V}$
ON CHARACTERISTICS (Note 12)						
DC Current Gain	h_{FE}	500 290 75	800 450 100	1500	—	$I_C = -10\text{mA}$, $V_{\text{CE}} = -2\text{V}$ $I_C = -1.0\text{A}$, $V_{\text{CE}} = -2\text{V}$ $I_C = -3.5\text{A}$, $V_{\text{CE}} = -2\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{sat})}$	— — — —	-55 -170 -220 -150	-70 -265 -360 -200	mV	$I_C = -1.0\text{A}$, $I_B = -100\text{mA}$ $I_C = -1.0\text{A}$, $I_B = -10\text{mA}$ $I_C = -2.0\text{A}$, $I_B = -40\text{mA}$ $I_C = -3.5\text{A}$, $I_B = -350\text{mA}$
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{sat})}$	—	-955	-1050	mV	$I_C = -3.5\text{A}$, $I_B = -350\text{mA}$
Base-Emitter Turn-On Voltage	$V_{\text{BE}(\text{on})}$	—	-830	-900	mV	$I_C = -3.5\text{A}$, $V_{\text{CE}} = -2\text{V}$
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	17	25	pF	$V_{\text{CB}} = -10\text{V}$, $f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	f_T	—	310	—	MHz	$V_{\text{CE}} = -10\text{V}$, $I_C = -50\text{mA}$, $f = 100\text{MHz}$
Delay Time	t_d	—	41	—	ns	$V_{\text{CC}} = -10\text{V}$, $I_C = -1\text{A}$, $I_{B1} = -I_{B2} = -10\text{mA}$
Rise Time	t_r	—	62	—	ns	
Storage Time	t_s	—	179	—	ns	
Fall Time	t_f	—	65	—	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_A = +25°C, unless otherwise specified.)



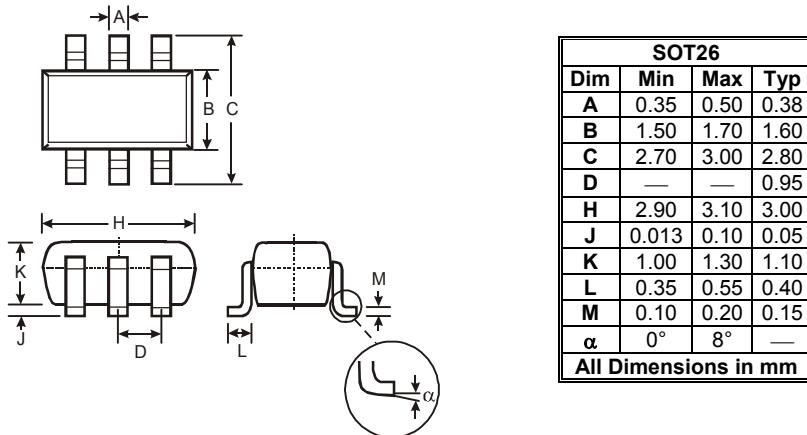
Typical Electrical Characteristics – Q2 (PNP Transistor) (@T_A = +25°C, unless otherwise specified.)



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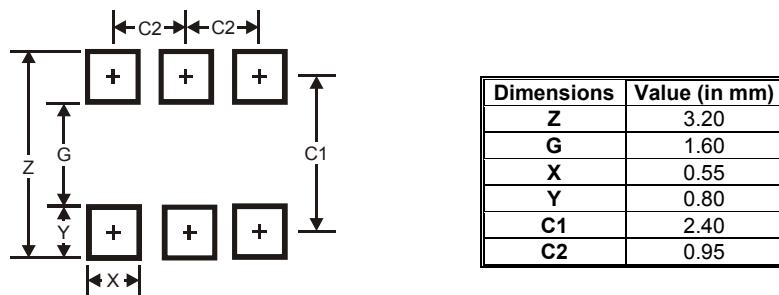
Package Outline Dimensions

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



Suggested Pad Layout

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



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