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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 Ω
- **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**

Mechanical Data

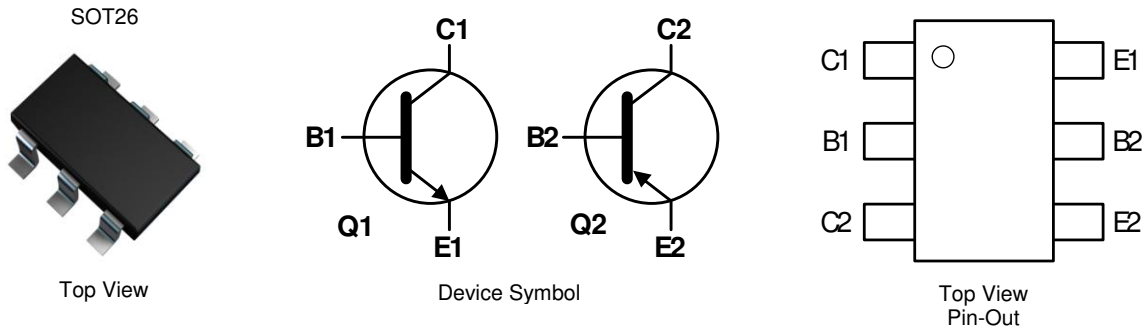
- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208③
- Weight: 0.015 grams (Approximate)

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.

Applications

- MOSFET and IGBT Gate Driving
- Motor Drive

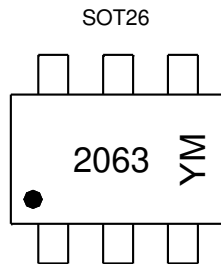


Ordering Information (Note 4)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	130	V
Collector-Emitter Voltage	V _{CEO}	40	V
Emitter-Collector Voltage (Reverse blocking)	V _{ECO}	6	V
Emitter-Base Voltage	V _{EBO}	7	V
Continuous Collector Current	I _C	3.5	A
Peak Pulsed Collector Current	I _{CM}	9	A
Base Current	I _B	1	A

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-45	V
Collector-Emitter Voltage	V _{CEO}	-40	V
Emitter-Collector Voltage (Reverse blocking)	V _{ECO}	-3	V
Emitter-Base Voltage	V _{EBO}	-7	V
Continuous Collector Current	I _C	-3	A
Peak Pulsed Collector Current	I _{CM}	-9	A
Base Current	I _B	-1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

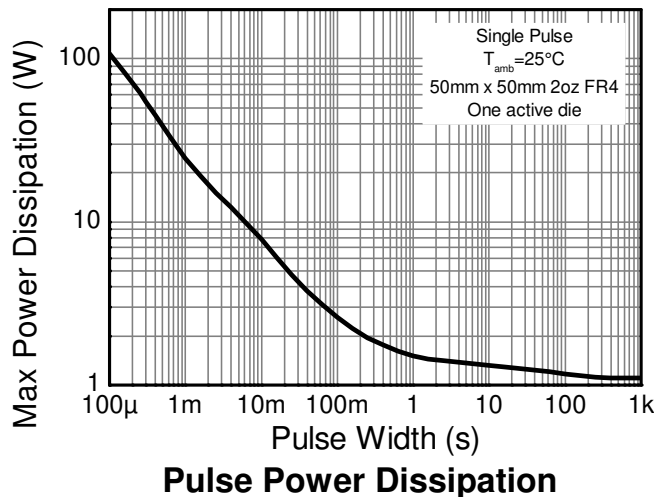
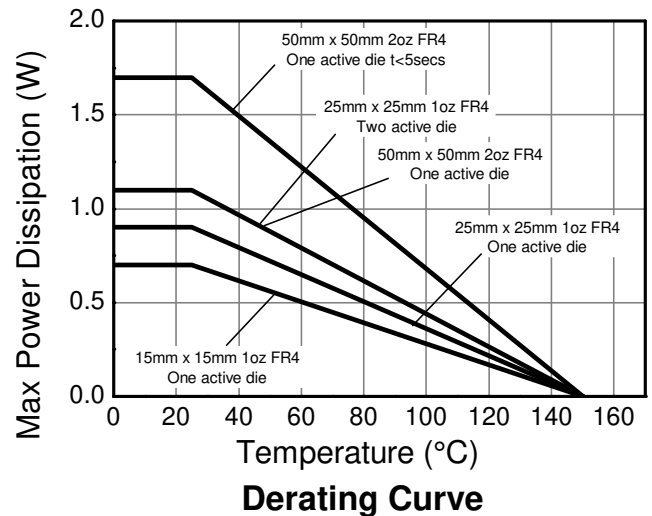
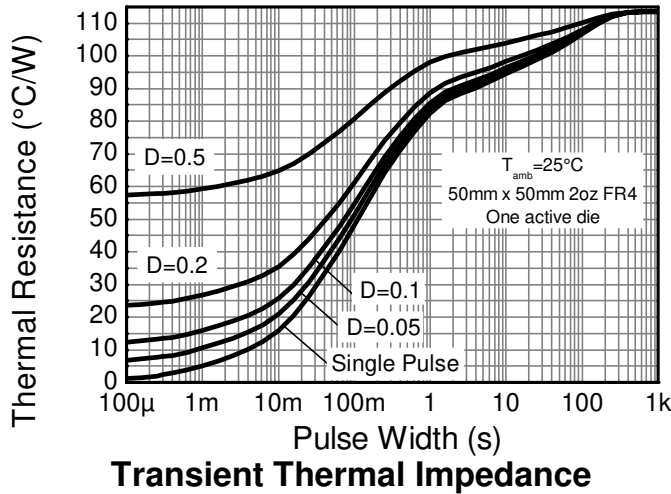
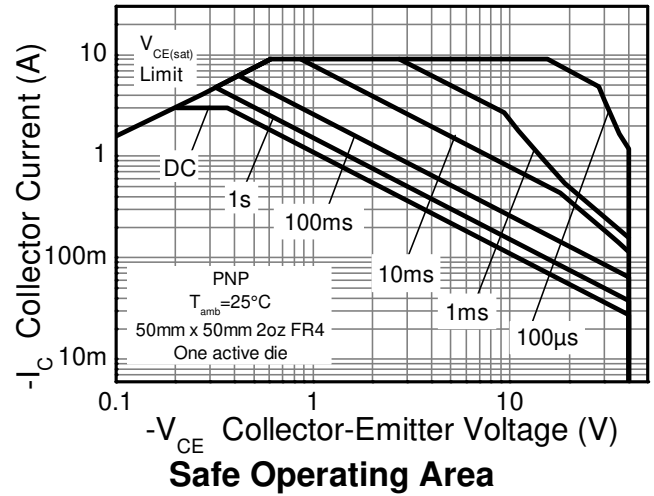
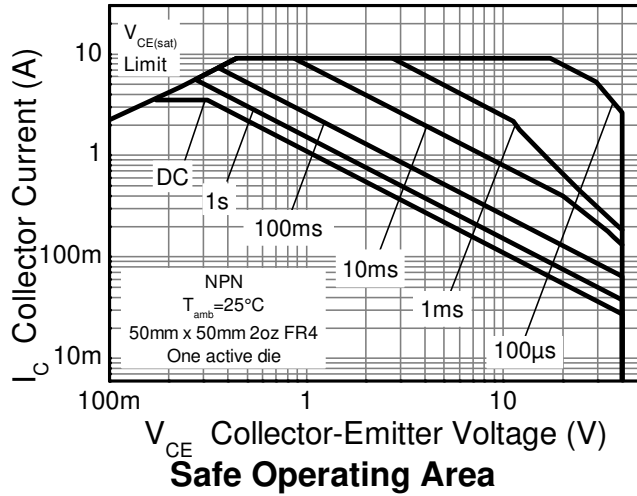
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P _D	(Notes 5 & 9)	0.7
		(Notes 6 & 9)	5.6
		(Notes 6 & 10)	0.9
		(Notes 7 & 9)	7.2
		(Notes 8 & 9)	1.1
		(Notes 8 & 9)	8.8
Thermal Resistance, Junction to Ambient	R _{θJA}	(Notes 5 & 9)	1.1
		(Notes 6 & 9)	8.8
		(Notes 6 & 10)	1.1
		(Notes 7 & 9)	8.8
		(Notes 8 & 9)	1.7
Thermal Resistance, Junction to Lead	R _{θJL}	13.6	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-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
OFF CHARACTERISTICS						
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 $0.25\text{V} > V_{BC} > -0.25\text{V}$
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 20	nA μA	$V_{CB} = 100\text{V}$ $V_{CB} = 100\text{V}, T_A = +100^\circ\text{C}$
Collector Cutoff Current	I_{EBO}	—	<1	50	nA	$V_{EB} = 5.6\text{V}$
ON CHARACTERISTICS (Note 13)						
DC Current Gain	h_{FE}	300 280 40	450 400 60	900	—	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$ $I_C = 1.0\text{A}, V_{CE} = 2\text{V}$ $I_C = 3.5\text{A}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	50 85 150 135	60 110 220 195	mV	$I_C = 1.0\text{A}, I_B = 100\text{mA}$ $I_C = 1.0\text{A}, I_B = 20\text{mA}$ $I_C = 2.0\text{A}, I_B = 40\text{mA}$ $I_C = 3.5\text{A}, I_B = 350\text{mA}$
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	$I_C = 3.5\text{A}, V_{CE} = 2\text{V}$
SMALL SIGNAL CHARACTERISTICS						
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	

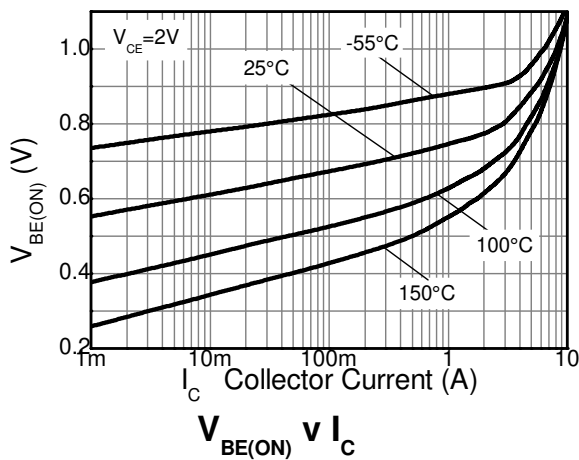
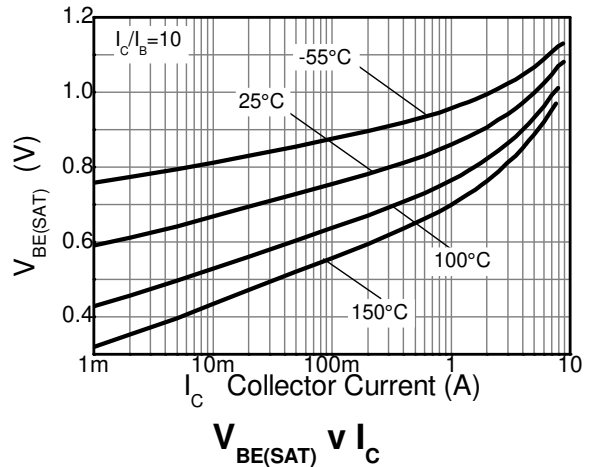
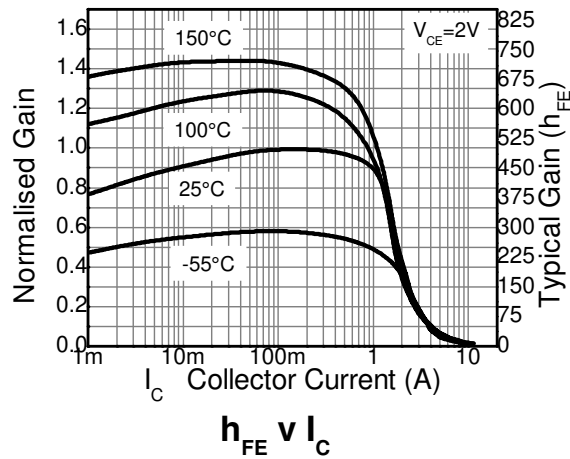
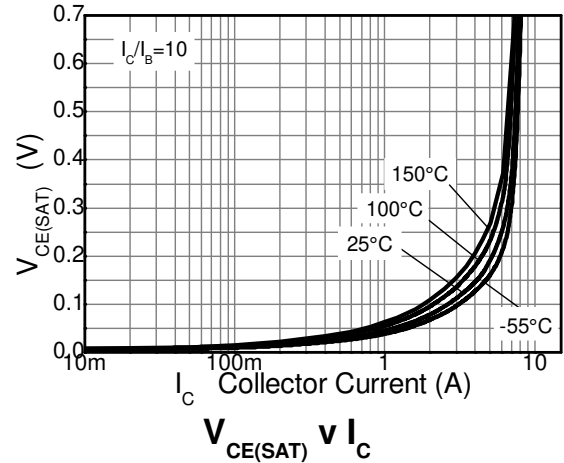
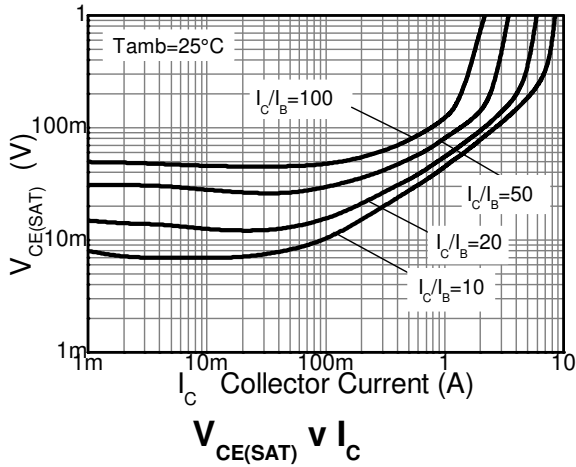
Note: 13. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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

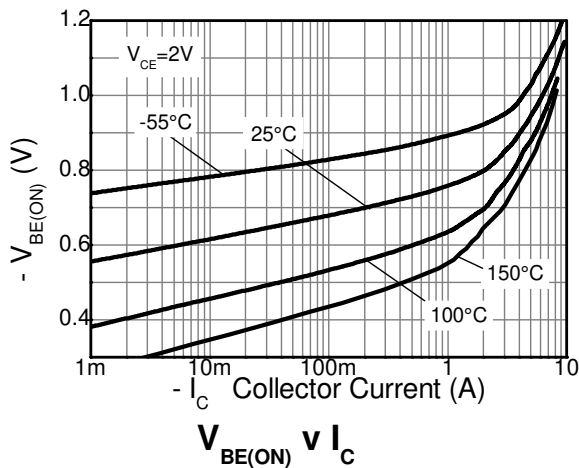
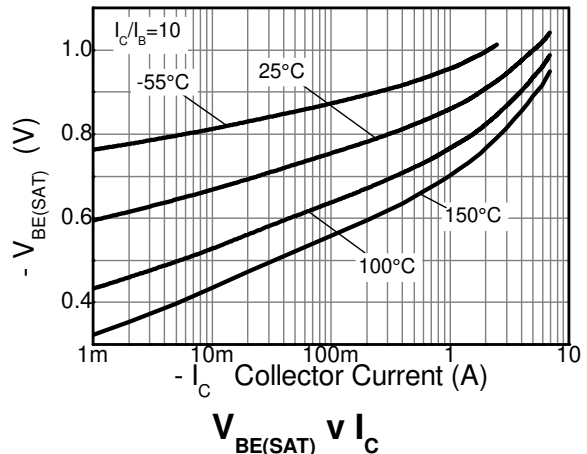
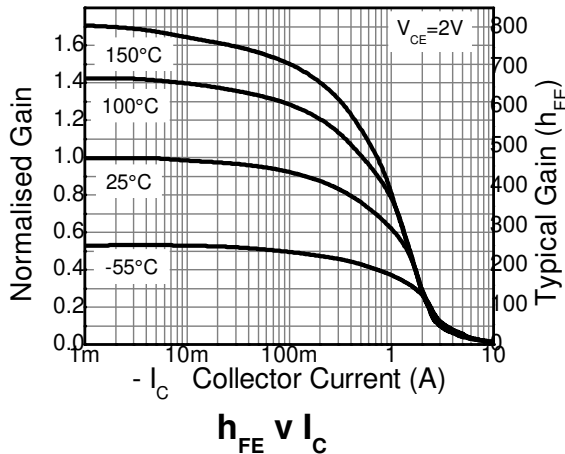
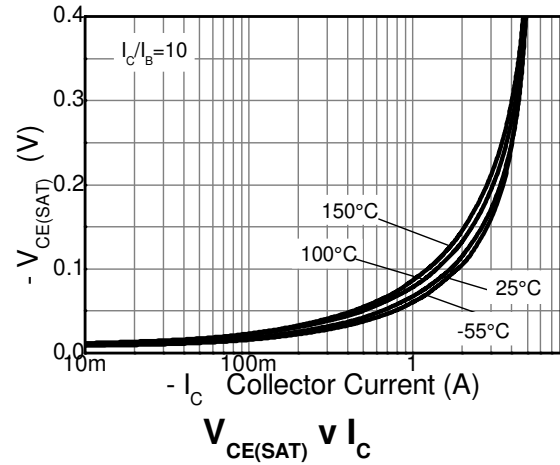
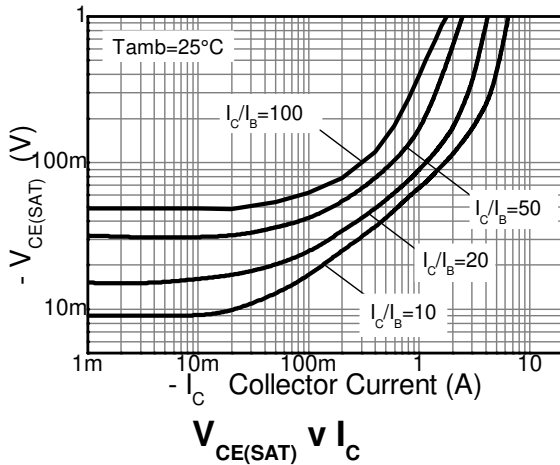
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV _{CBO}	-45	-80	—	V	I _C = -100μA, I _E = 0
Collector-Emitter Breakdown Voltage (Note 14)	BV _{CEO}	-40	-65	—	V	I _C = -10mA, I _B = 0
Emitter-Base Breakdown Voltage	BV _{EBO}	-7	-8.3	—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



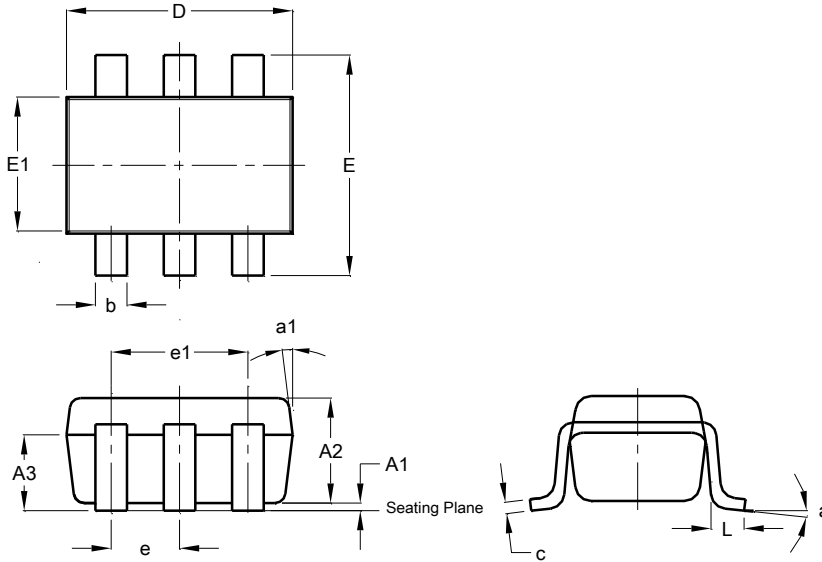
Typical Electrical Characteristics – Q2 (PNP Transistor) (@T_A = +25°C, unless otherwise specified.)



Package Outline Dimensions

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

SOT26

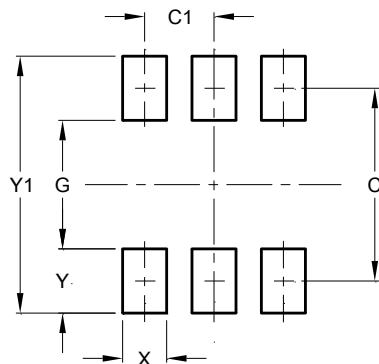


SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

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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