

40V COMPLEMENTARY MEDIUM POWER TRANSISTOR IN SOT26

Features & Benefits

- NPN – PNP combination
- $BV_{CEO} > 40$ (-40)V
- $BV_{ECO} > 6$ (-3)V
- $I_{CM} = 3.5$ (-3)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**

Description

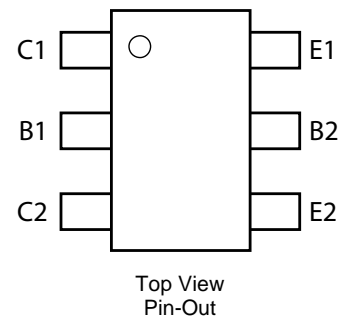
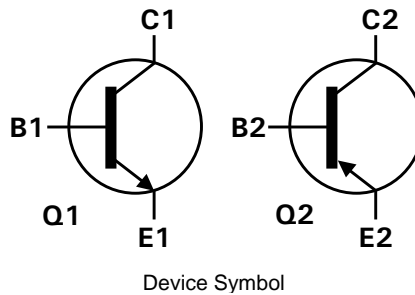
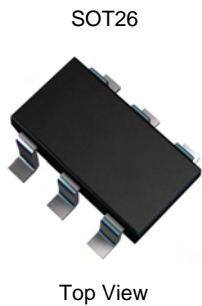
Advanced process capability has been used to achieve this high performance device. Combining NPN and PNP transistors in the SOT26 package provides a compact solution for the intended applications.

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: Solderable per MIL-STD-202, Method 208
- Lead Free Plating: Matte Tin Finish annealed over Copper leadframe (E3)
- Weight: 0.015 grams (approximate)

Applications

- MOSFET and IGBT gate driving
- Motor drive

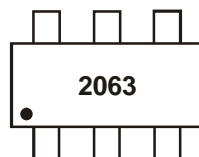


Ordering Information (Note 4)

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

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	
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

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

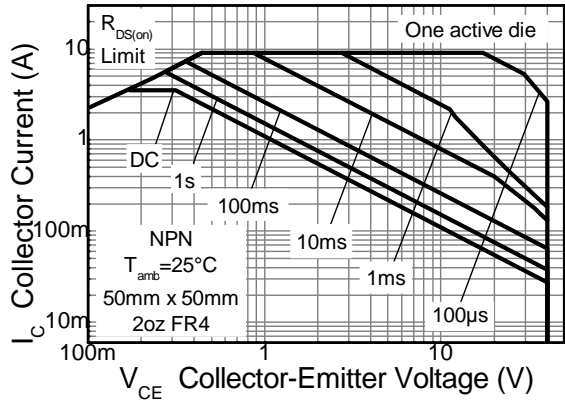
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-45	V
Collector-Emitter Voltage	V _{CEO}	-40	V
Emitter-Base Voltage	V _{EBO}	-3	V
Continuous Collector Current	I _C	-3	mA
Peak Pulsed Collector Current	I _{CM}	-9	A
Base Current	I _B	-1	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

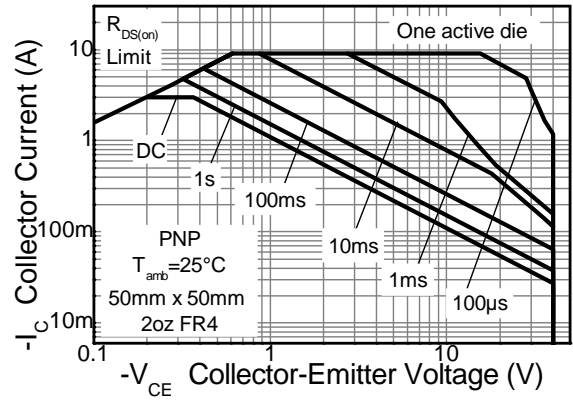
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P _D	(Notes 5 & 10)	0.7
		(Notes 6 & 10)	5.6
		(Notes 6 & 11)	0.9
		(Notes 7 & 10)	7.2
		(Notes 8 & 10)	1.1
		(Notes 8 & 10)	8.8
Thermal Resistance, Junction to Ambient	R _{θJA}	(Notes 5 & 10)	179
		(Notes 6 & 10)	139
		(Notes 6 & 11)	113
		(Notes 7 & 10)	113
Thermal Resistance, Junction to Lead	R _{θJL}	73	
Thermal Resistance, Junction to Lead	R _{θJL}	87.58	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

- Notes:
- For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 - For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 - For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
 - As above measured at t<5 seconds.
 - Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.
 - For device with one active die, both collectors attached to a common sink.
 - For device with two active dice running at equal power, split sink 50% to each collector.
 - Thermal resistance from junction to solder-point (at the end of the collector lead).

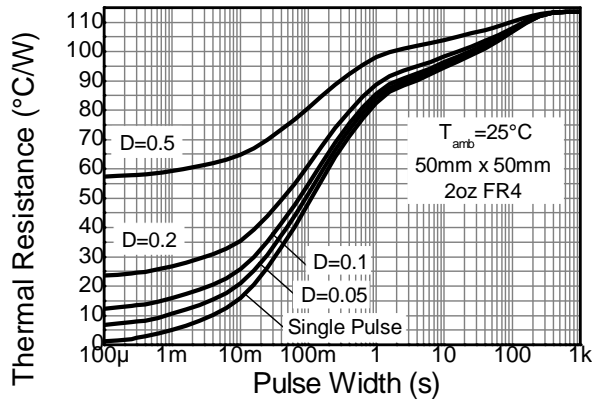
Thermal Characteristics



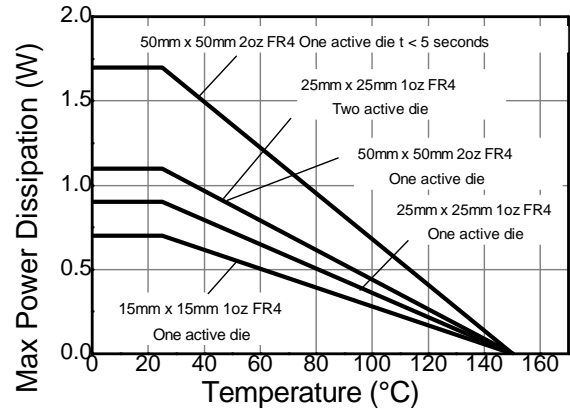
Safe Operating Area



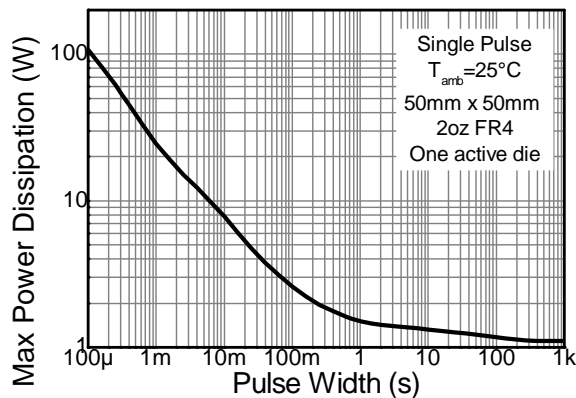
Safe Operating Area



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

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	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	$V_{EB} = 5.6\text{V}$
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	1050	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	

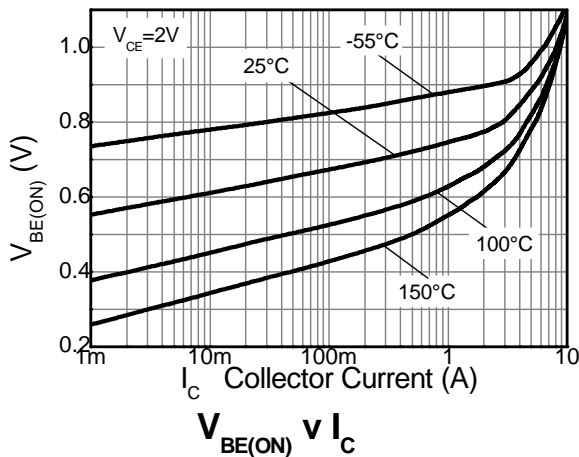
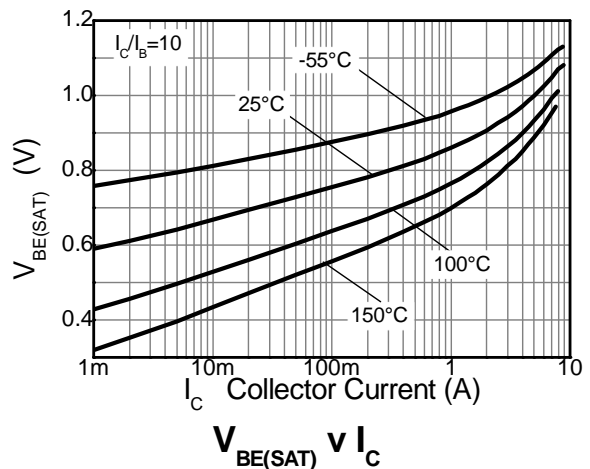
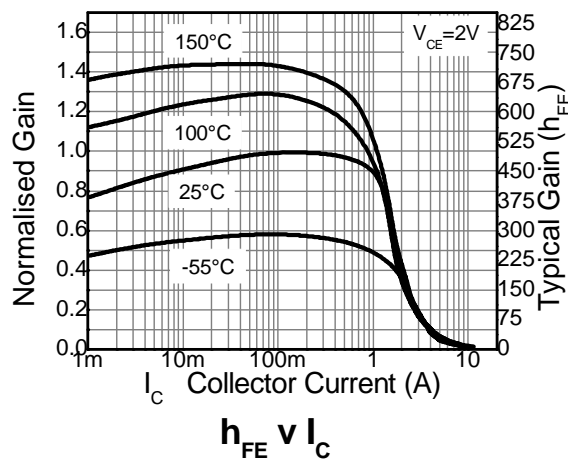
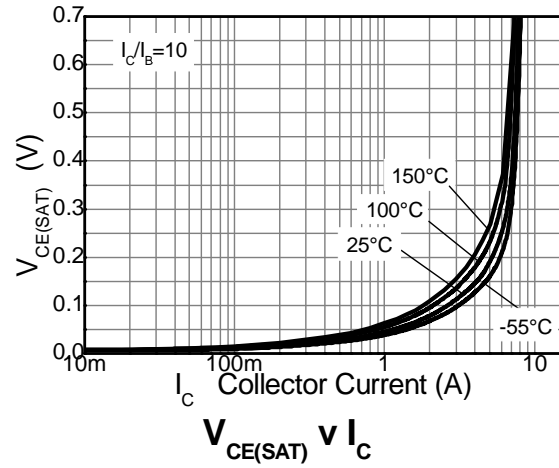
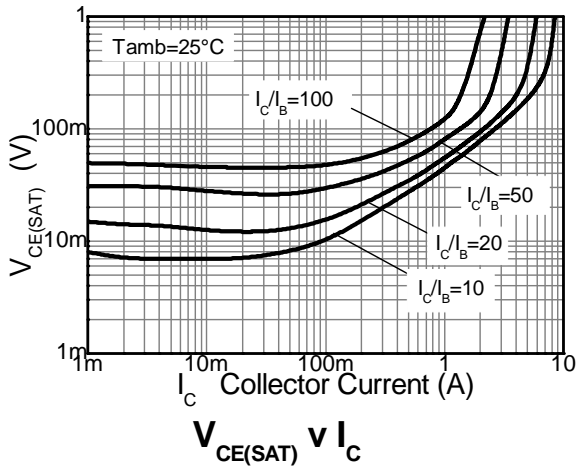
Notes: 13. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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

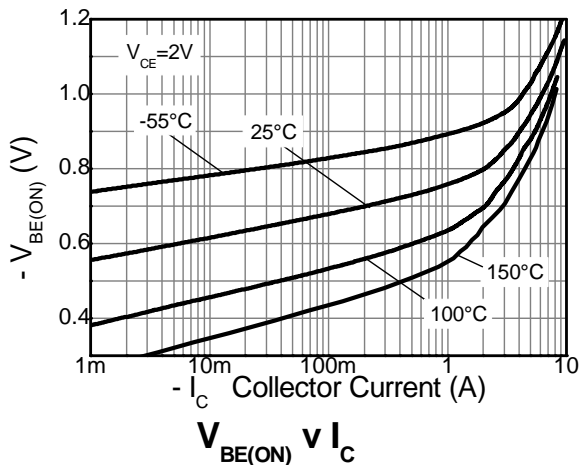
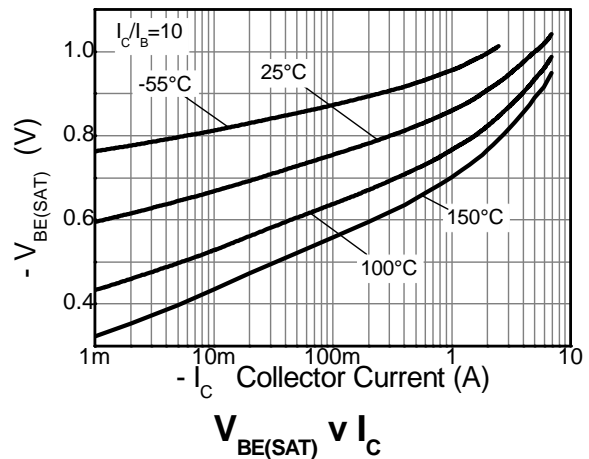
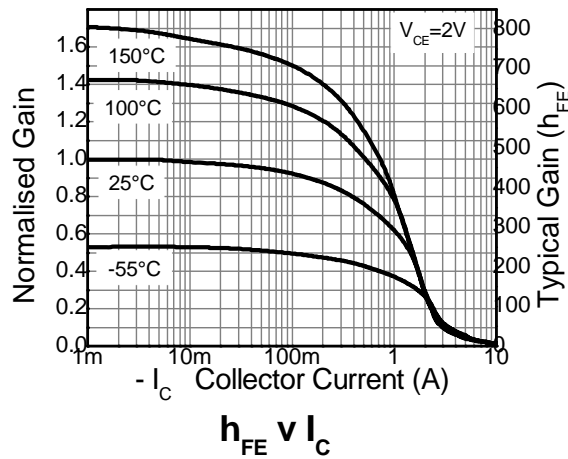
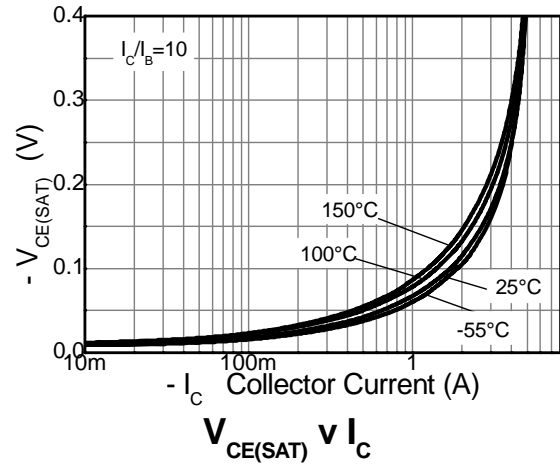
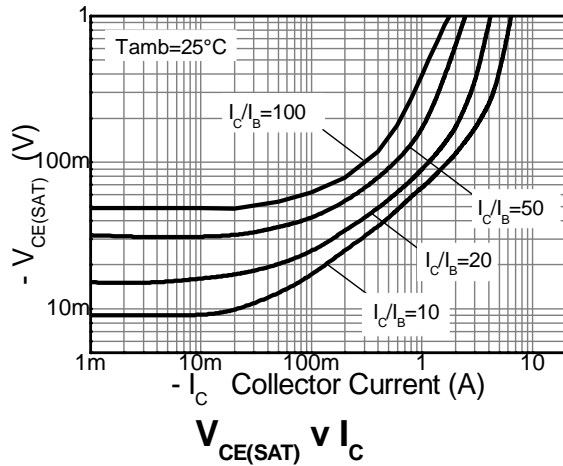
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	-45	-80	—	V	$I_C = -100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 14)	BV_{CEO}	-40	-65	—	V	$I_C = -10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	BV_{EBO}	-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}	-3	-8.7	—	V	$I_E = -100\mu\text{A}$
Collector Cutoff Current	I_{CBO}	—	<1	-50	nA	$V_{CB} = -36\text{V}$
Collector Cutoff Current	I_{EBO}	—	<1	-50	nA	$V_{EB} = -5.6\text{V}$
ON CHARACTERISTICS (Note 14)						
DC Current Gain	h_{FE}	300 200 20	450 280 50	900 — —	—	$I_C = -10\text{mA}, V_{CE} = -2\text{V}$ $I_C = -1.0\text{A}, V_{CE} = -2\text{V}$ $I_C = -3.0\text{A}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	-70 -195 -175	-90 -290 -260	mV	$I_C = -1.0\text{A}, I_B = -100\text{mA}$ $I_C = -1.0\text{A}, I_B = -20\text{mA}$ $I_C = -3.0\text{A}, I_B = -300\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	-935	-1000	mV	$I_C = -3.0\text{A}, I_B = -300\text{mA}$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	-855	-950	mV	$I_C = -3.0\text{A}, V_{CE} = -2\text{V}$
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	17	25	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	f_T	—	270	—	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
Delay Time	t_d	—	57	—	ns	$V_{CC} = -10\text{V}, I_C = -1\text{A}, I_{B1} = I_{B2} = -10\text{mA}$
Rise Time	t_r	—	69	—	ns	
Storage Time	t_s	—	154	—	ns	
Fall Time	t_f	—	60	—	ns	

Notes: 14. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

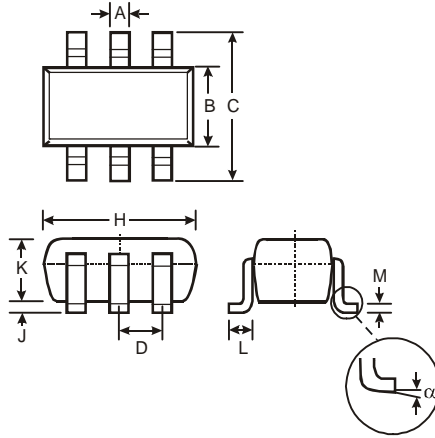
Typical Electrical Characteristics – Q1 (NPN Transistor)



Typical Electrical Characteristics – Q2 (PNP Transistor)

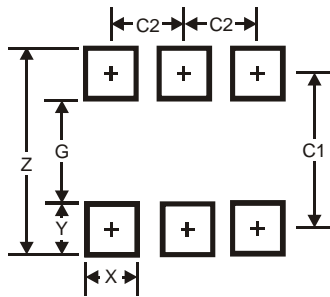


Package Outline Dimensions



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



Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2012, Diodes Incorporated

www.diodes.com