

HIGH GAIN, LOW $V_{CE(SAT)}$ NPN BIPOLAR TRANSISTOR

Features

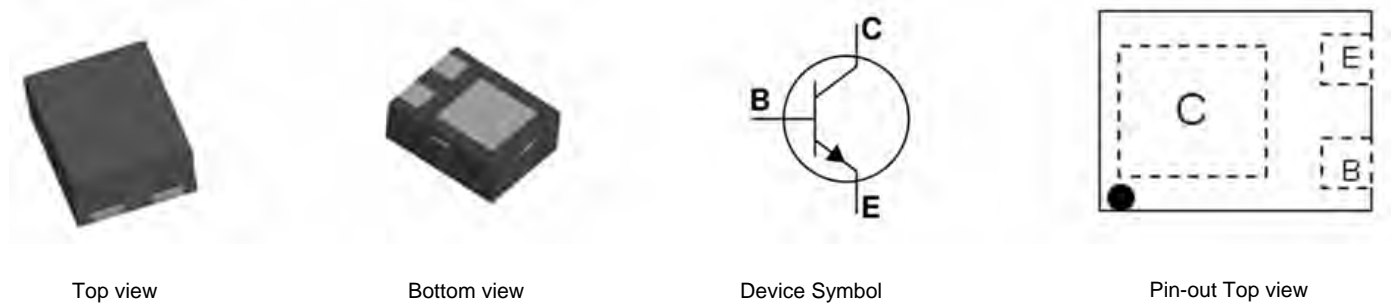
- High Gain Low V_{cesat} NPN transistor
- Very Low R_{cesat}
- High ICM capability
- 1.5A Continuous Current Rating
- Ultra-Small Surface mount Package
- **Qualified to AEC-Q101 Standards for High Reliability**
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)**
- **“Green” Device (Note 2)**
- **ESD rating: 400V-MM, 8KV-HBM**

Mechanical Data

- Case: DFN1411-3
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.003 grams (approximate)

Applications

- MOSFET and IGBT gate driving
- DC-DC conversion
- Interface between low voltage IC and Load
- LED driving

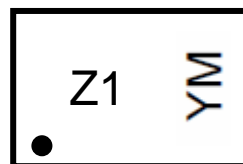


Ordering Information

Product	Status	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN26020DMFTA	Active	Z1	7	8	3000

Notes: 1. No purposefully added lead. Halogen and Antimony Free.
2. Diodes Inc's "Green" Policy can be found on our website at <http://www.diodes.com>

Marking Information



Z1 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: W = 2009)
M = Month (ex: 9 = September)

Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015
Code	W	X	Y	Z	A	B	C

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

Maximum Ratings

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	20	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current (Note 4)	I_C	1.5	A
Peak Pulse Current	I_{CM}	4	A
Base Current	I_B	0.5	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3)	P_D	1	W
Power Dissipation (Note 4)	P_D	380	mW
Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	125	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	330	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 3. Device mounted on FR-4 PCB with 1inch square pads.
4. Device mounted on FR-4 PCB with minimum recommended pad layout

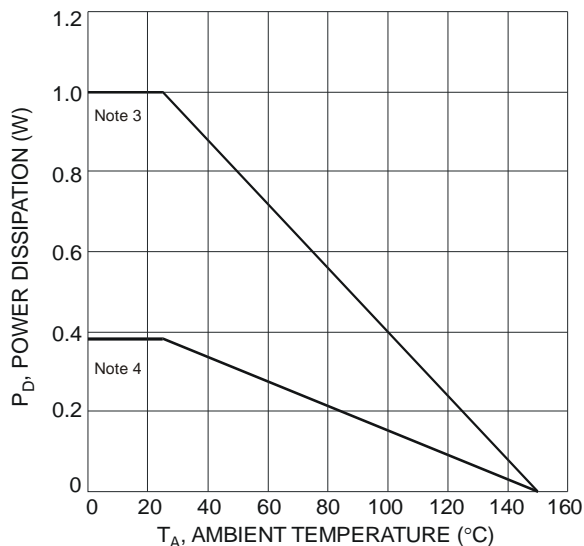


Fig. 1 Power Dissipation vs. Ambient Temperature

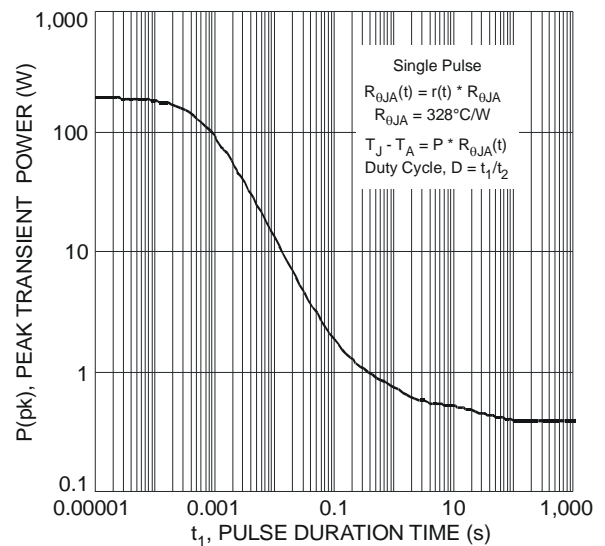


Fig. 2 Single Pulse Maximum Power Dissipation

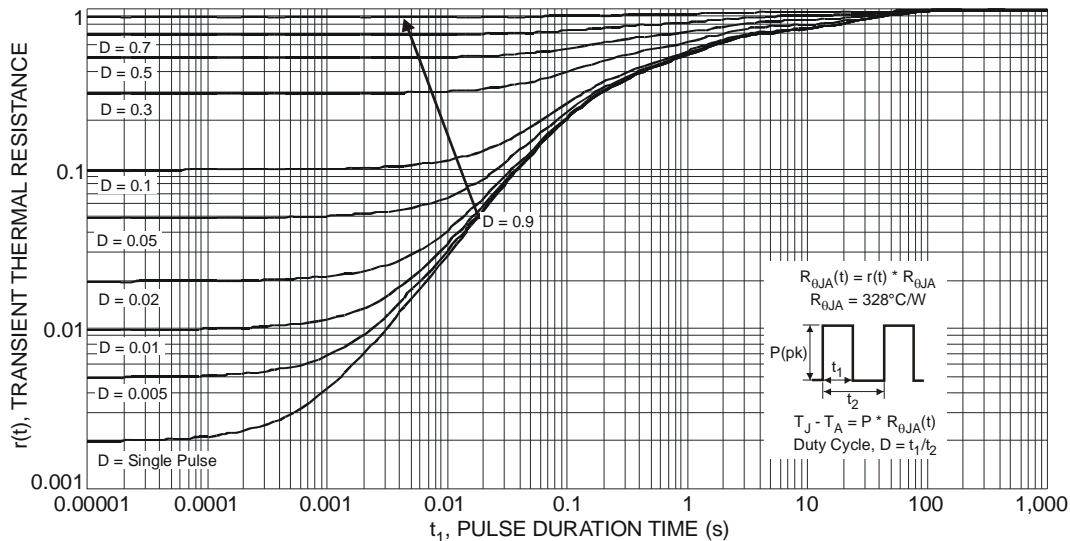


Fig. 3 Transient Thermal Response

Electrical Characteristics (at $T_A = 25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	20	—	—	V	$I_C = 100\mu\text{A}, I_E = 0\text{A}$
Collector-Emitter Breakdown Voltage (Note 5)	$V_{(BR)CEO}$	20	—	—	V	$I_C = 10\text{mA}, I_B = 0\text{A}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7	—	—	V	$I_E = 100\mu\text{A}, I_C = 0\text{A}$
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5	—	—	V	$I_E = 100\mu\text{A}, I_B = 0\text{A}$
Collector Cutoff Current	I_{cbo}	—	—	100 0.5	nA μA	$V_{CB} = 20\text{V}, I_E = 0\text{A}$ $V_{CB} = 20\text{V}, I_E = 0, T_A = 125^\circ\text{C}$
Emitter Cutoff Current	I_{ces}	—	—	100	nA	$V_{CE} = 20\text{V}, V_{BE} = 0\text{V}$
Base Cutoff Current	I_{ebo}	—	—	100	nA	$V_{BE} = 5.6\text{V}, I_C = 0\text{A}$
DC Current Gain (Note 5)	h_{FE}	300	—	1000	—	$V_{CE} = 2\text{V}, I_C = 100\text{mA}$
		290	—	—		$V_{CE} = 2\text{V}, I_C = 0.5\text{A}$
		270	—	—		$V_{CE} = 2\text{V}, I_C = 1\text{A}$
		200	—	—		$V_{CE} = 2\text{V}, I_C = 2\text{A}$
Collector-Emitter Saturation Voltage (Note 5)	$V_{CE(SAT)}$	—	—	45	mV	$I_C = 100\text{mA}, I_B = 1\text{mA}$
		—	—	70	mV	$I_C = 500\text{mA}, I_B = 25\text{mA}$
		—	—	125	mV	$I_C = 1\text{A}, I_B = 50\text{mA}$
		—	—	225	mV	$I_C = 1.5\text{A}, I_B = 30\text{mA}$
		—	—	225	mV	$I_C = 2\text{A}, I_B = 100\text{mA}$
Equivalent On-Resistance	$R_{CE(SAT)}$	—	90	—	m Ω	$I_C = 1\text{A}, I_B = 50\text{mA}$
Base-Emitter Turn-On Voltage	$V_{BE(ON)}$	—	—	1.2	V	$V_{CE} = 2\text{V}, I_C = 2\text{A}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.1	V	$I_C = 2\text{A}, I_B = 100\text{mA}$
Output Capacitance (Note 5)	C_{obo}	—	—	20	pF	$V_{CB} = 10\text{V}, f = 1.0\text{MHz}$
Input Capacitance (Note 5)	C_{ibo}	—	—	150	pF	$V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	f_T	—	260	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Turn-On Time	t_{on}	—	60	—	ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$ $I_{B2} = -I_{B1} = 50\text{mA}$
Delay Time	t_d	—	20	—	ns	
Rise Time	t_r	—	40	—	ns	
Turn-Off Time	t_{off}	—	225	—	ns	
Storage Time	t_s	—	205	—	ns	
Fall Time	t_f	—	20	—	ns	

Notes: 5. Short duration pulse test used to minimize self-heating effect.

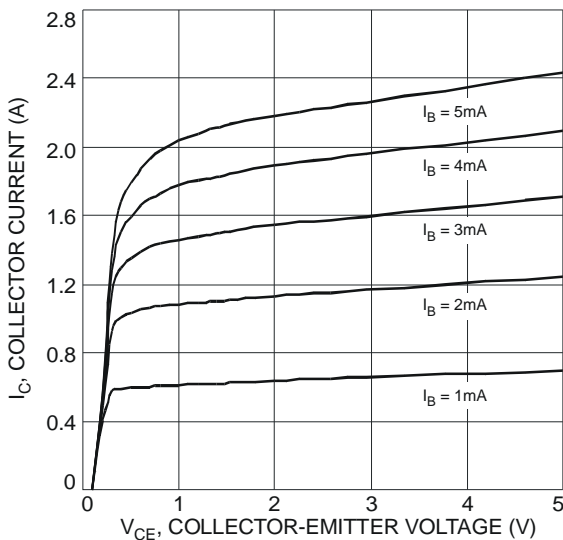


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

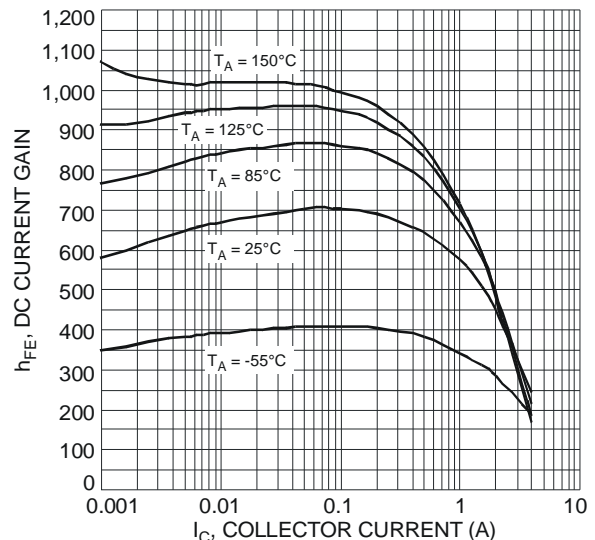


Fig. 5 Typical DC Current Gain vs. Collector Current

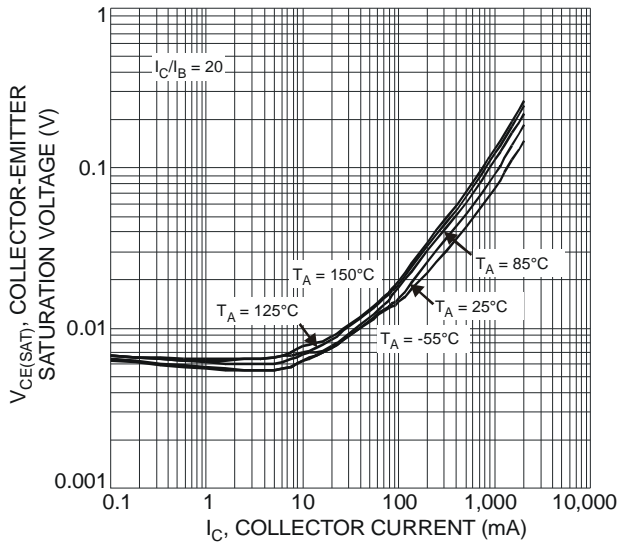


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

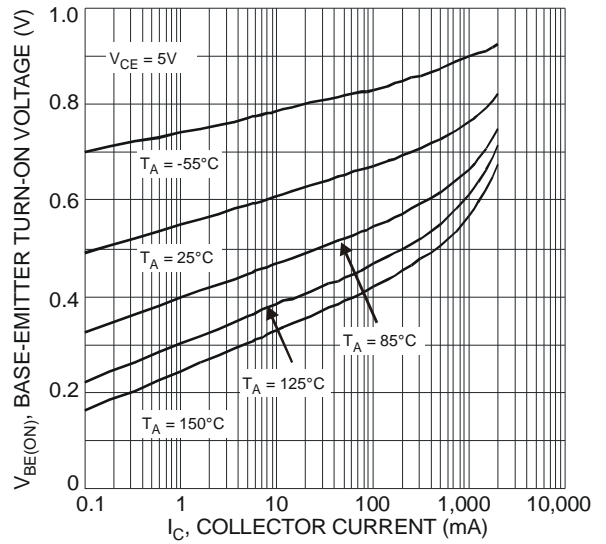


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

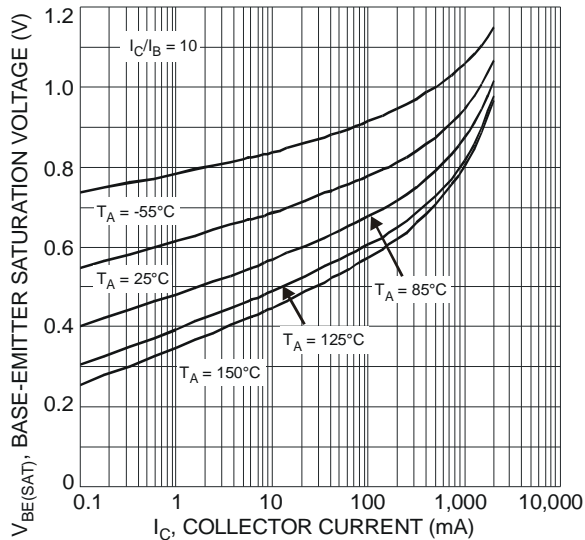


Fig. 8 Typical Base-Emitter Saturation Voltage vs. Collector Current

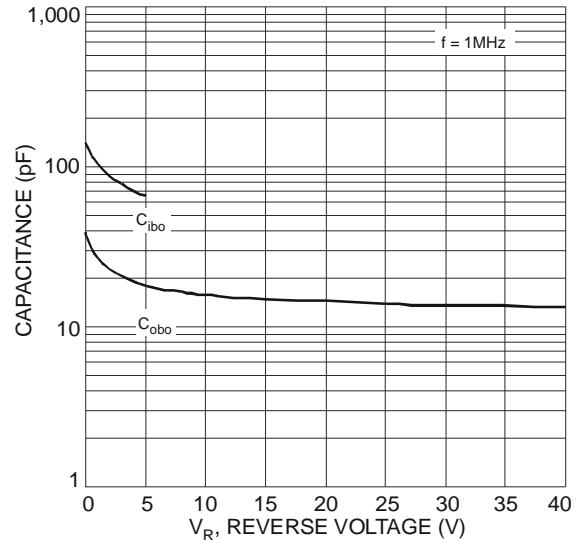


Fig. 9 Typical Capacitance Characteristics

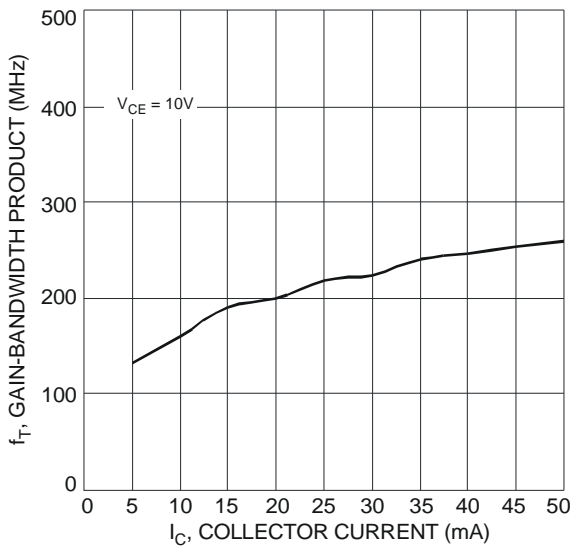


Fig. 10 Typical Gain-Bandwidth Product vs. Collector Current

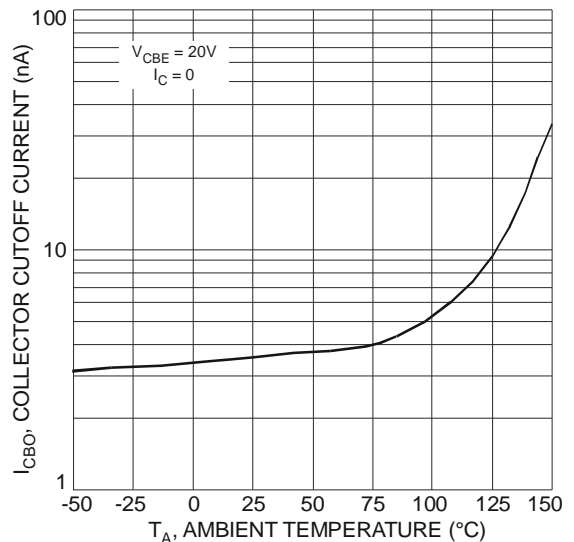
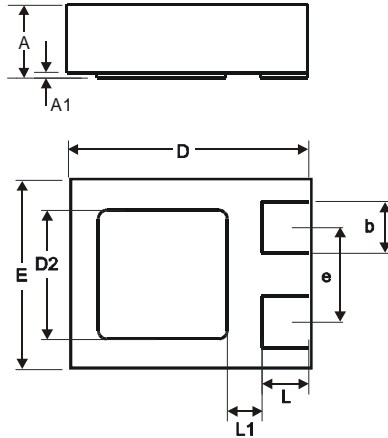


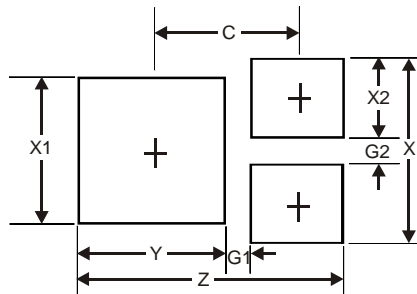
Fig. 11 Collector Cutoff Current vs. Ambient Temperature

Package Outline Dimensions



DFN1411-3			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0	0.05	0.02
b	0.25	0.35	0.30
D	1.35	1.475	1.40
D2	0.65	0.85	0.75
E	1.05	1.18	1.10
e	—	—	0.55
L	0.225	0.325	0.275
L1	—	—	0.20
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	1.38
G1	0.15
G2	0.15
X	0.95
X1	0.75
X2	0.40
Y	0.75
C	0.76

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 © 2009, Diodes Incorporated

www.diodes.com