Absolute Maximum Ratings: NPN, 4401 Type (Q_1) (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	600	mA

Absolute Maximum Ratings: PNP, 4403 Type (Q_2) (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-5	V
Collector Current	I_C	-600	mA

Thermal Characteristics – Total Device (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5) Total Device	P_D	200	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +150	°C

Note: 5. For a device mounted on minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state.

Thermal Characteristics – Total Device

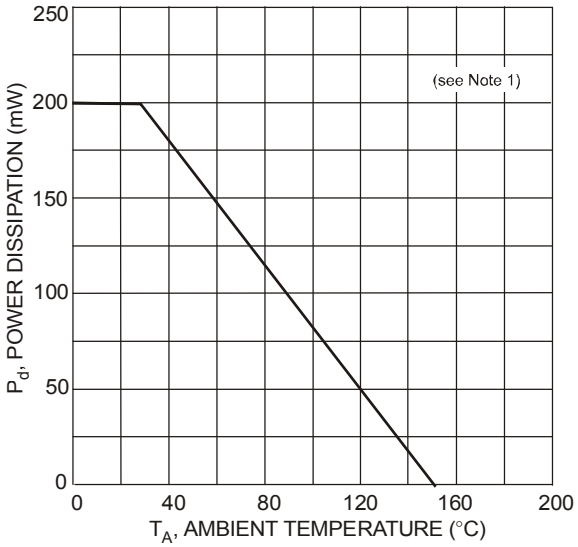


Fig. 1, Power Derating Curve (Total Device)

Electrical Characteristics, NPN 4401 Section (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)					
Collector-Base Breakdown Voltage	BV_{CBO}	60	—	V	I_C = 100μA, I_E = 0
Collector-Emitter Breakdown Voltage	BV_{CEO}	40	—	V	I_C = 1.0mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	6.0	—	V	I_E = 100 μA, I_C = 0
Collector Cutoff Current	I_{CEX}	—	100	nA	V_{CE} = 35V, $V_{EB(OFF)}$ = 0.4V
Base Cutoff Current	I_{BL}	—	100	nA	V_{CE} = 35V, $V_{EB(OFF)}$ = 0.4V
ON CHARACTERISTICS (Note 6)					
DC Current Gain	h_{FE}	20 40 80 100 40	— — — 300 —	—	I_C = 100μA, V_{CE} = 1.0V I_C = 1.0mA, V_{CE} = 1.0V I_C = 10mA, V_{CE} = 1.0V I_C = 150mA, V_{CE} = 1.0V I_C = 500mA, V_{CE} = 2.0V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.40 0.75	V	I_C = 150mA, I_B = 15mA I_C = 500mA, I_B = 50mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	0.75 —	0.95 1.2	V	I_C = 150mA, I_B = 15mA I_C = 500mA, I_B = 50mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{cb}	—	6.5	pF	V_{CB} = 5.0V, f = 1.0MHz, I_E = 0
Input Capacitance	C_{eb}	—	30	pF	V_{EB} = 0.5V, f = 1.0MHz, I_C = 0
Input Impedance	h_{ie}	1.0	15	kΩ	V_{CE} = 10V, I_C = 1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h_{re}	0.1	8.0	x 10^{-4}	
Small Signal Current Gain	h_{fe}	40	500	—	
Output Admittance	h_{oe}	1.0	30	μS	
Current Gain-Bandwidth Product	f_T	250	—	MHz	V_{CE} = 10V, I_C = 20mA, f = 100MHz
SWITCHING CHARACTERISTICS					
Delay Time	t_d	—	15	ns	V_{CC} = 30V, I_C = 150mA, $V_{BE(off)}$ = 2.0V, I_{B1} = 15mA
Rise Time	t_r	—	20	ns	
Storage Time	t_s	—	225	ns	V_{CC} = 30V, I_C = 150mA, I_{B1} = I_{B2} = 15mA
Fall Time	t_f	—	30	ns	

Note: 6. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

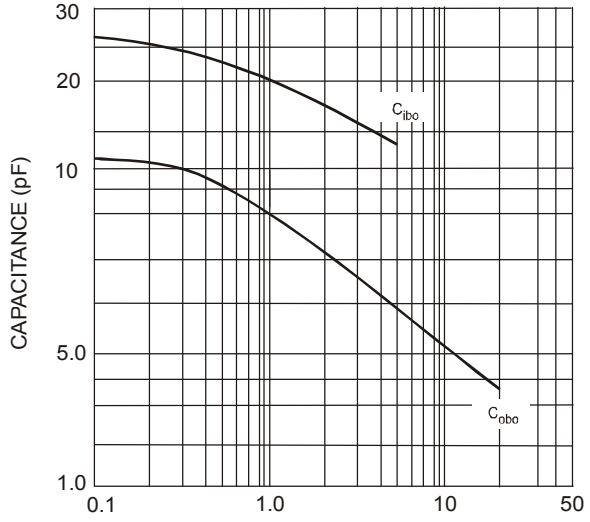


Fig. 1 Typical Capacitance (4401)

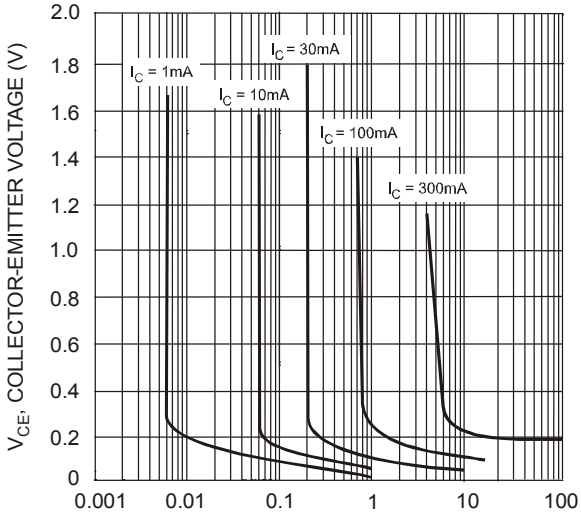


Fig. 2 Typical Collector Saturation Region (4401)

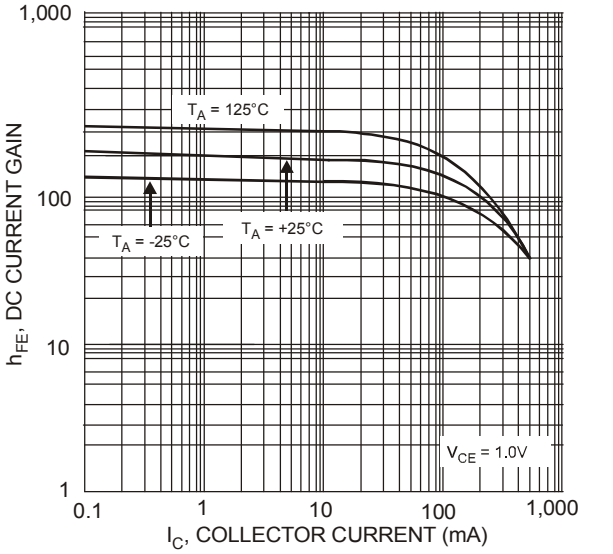


Fig. 3 Typical DC Current Gain vs. Collector Current (4401)

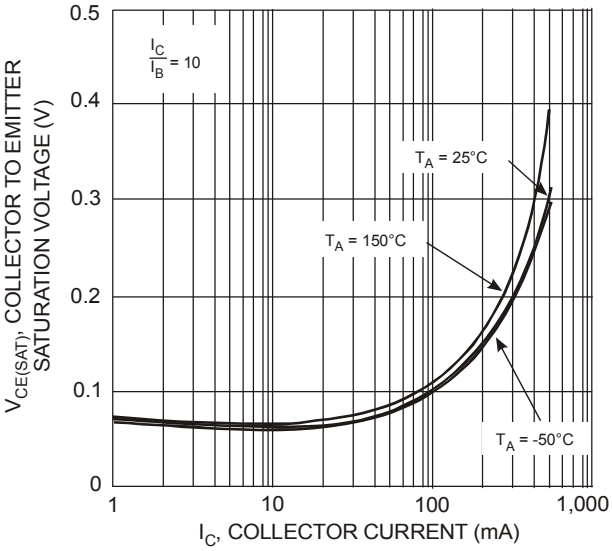


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current (4401)

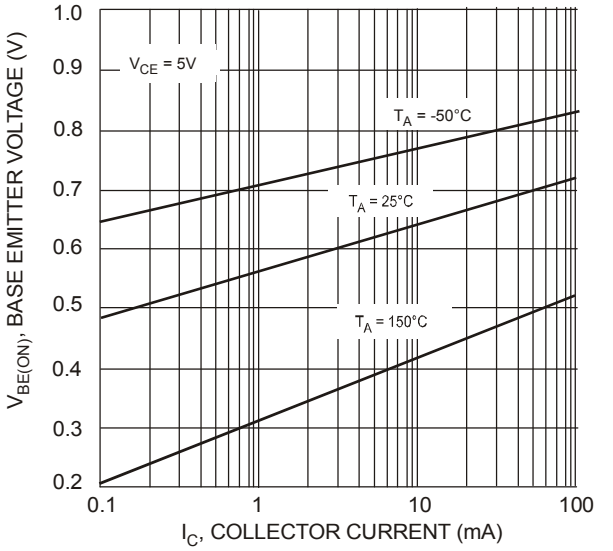


Fig. 5 Base Emitter Voltage vs. Collector Current (4401)

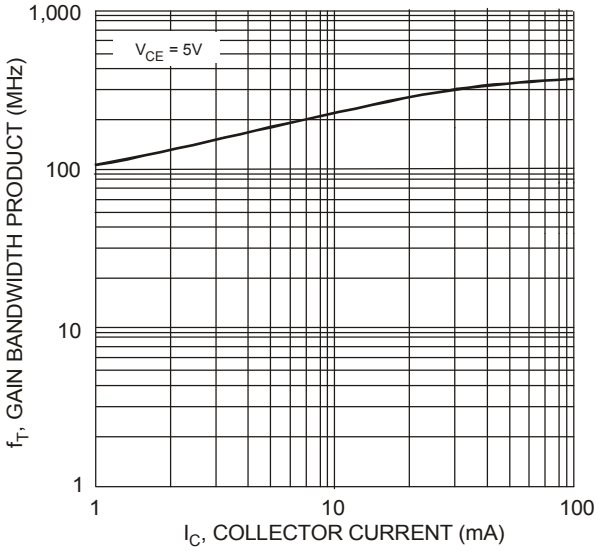


Fig. 6 Gain Bandwidth Product vs. Collector Current (4401)

Electrical Characteristics, PNP 4403 Section (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)					
Collector-Base Breakdown Voltage	BV_{CBO}	-40	—	V	I_C = -100µA, I_E = 0
Collector-Emitter Breakdown Voltage	BV_{CEO}	-40	—	V	I_C = -1.0mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	-5.0	—	V	I_E = -100µA, I_C = 0
Collector Cutoff Current	I_{CEX}	—	-100	nA	V_{CE} = -35V, $V_{EB(OFF)}$ = -0.4V
Base Cutoff Current	I_{BL}	—	-100	nA	V_{CE} = -35V, $V_{EB(OFF)}$ = -0.4V
ON CHARACTERISTICS (Note 6)					
DC Current Gain	h_{FE}	30 60 100 100 20	— — — 300 —	—	I_C = -100µA, V_{CE} = -1.0V I_C = -1.0mA, V_{CE} = -1.0V I_C = -10mA, V_{CE} = -1.0V I_C = -150mA, V_{CE} = -2.0V I_C = -500mA, V_{CE} = -2.0V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	-0.40 -0.75	V	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	-0.75 —	-0.95 -1.30	V	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{cb}	—	8.5	pF	V_{CB} = -10V, f = 1.0MHz, I_E = 0
Input Capacitance	C_{eb}	—	30	pF	V_{EB} = -0.5V, f = 1.0MHz, I_C = 0
Input Impedance	h_{ie}	1.5	15	kΩ	V_{CE} = -10V, I_C = -1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h_{re}	0.1	8.0	x 10^{-4}	
Small Signal Current Gain	h_{fe}	60	500	—	
Output Admittance	h_{oe}	1.0	100	µS	
Current Gain-Bandwidth Product	f_T	200	—	MHz	V_{CE} = -10V, I_C = -20mA, f = 100MHz
SWITCHING CHARACTERISTICS					
Delay Time	t_d	—	15	ns	V_{CC} = -30V, I_C = -150mA, $V_{BE(off)}$ = -2.0V, I_{B1} = -15mA
Rise Time	t_r	—	20	ns	
Storage Time	t_s	—	225	ns	V_{CC} = -30V, I_C = -150mA, I_{B1} = I_{B2} = -15mA
Fall Time	t_f	—	30	ns	

Note: 6. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%

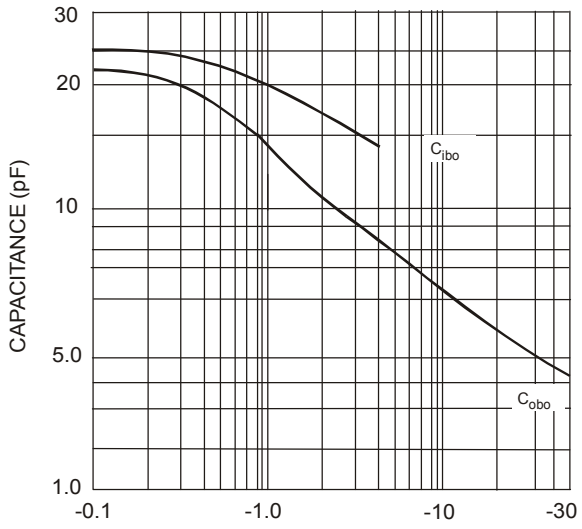


Fig. 7 Typical Capacitance (4403)

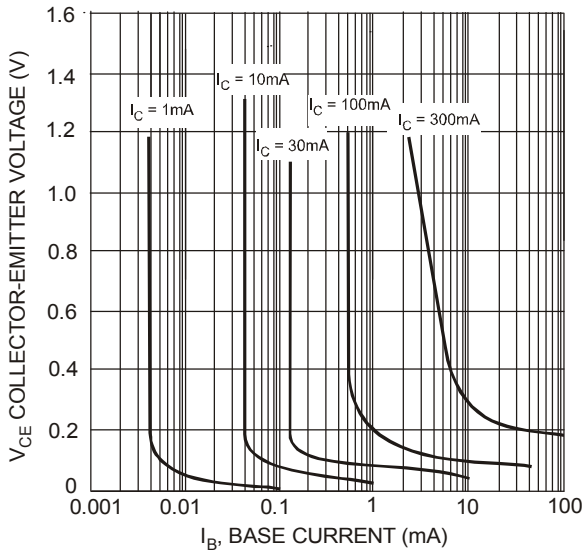


Fig. 8 Typical Collector Saturation Region (4403)

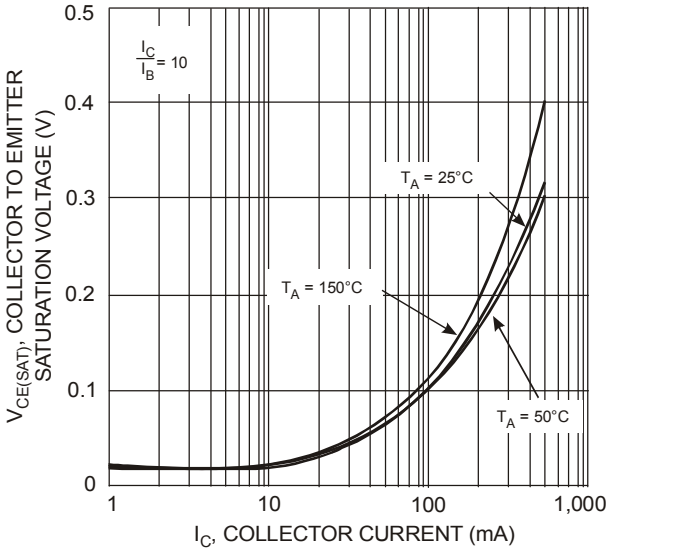


Fig. 9 Collector Emitter Saturation Voltage vs. Collector Current (4403)

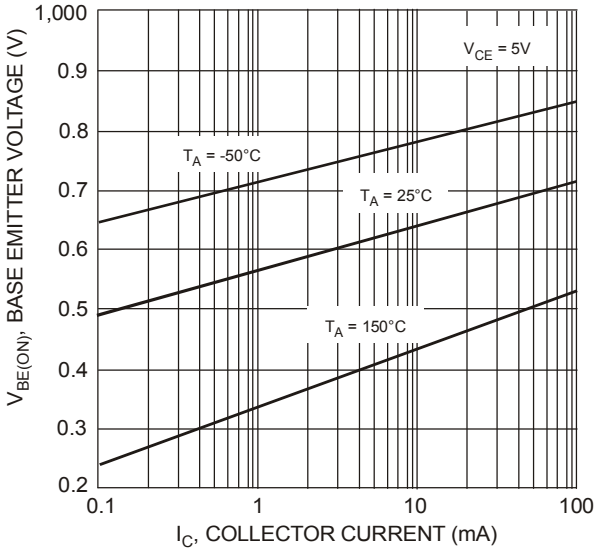


Fig. 10 Base-Emitter Voltage vs. Collector Current (4403)

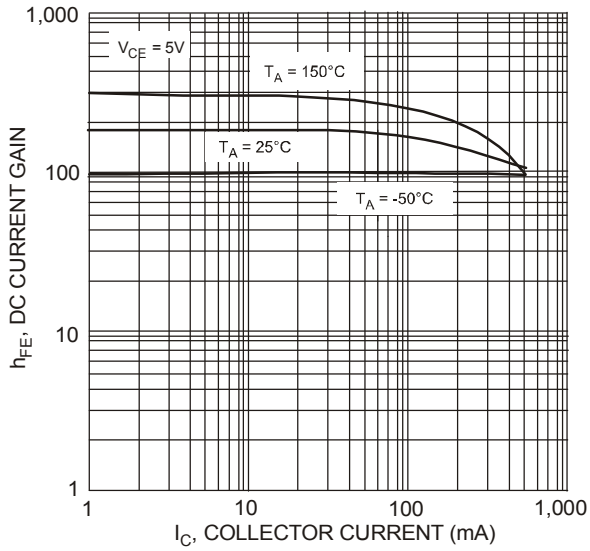


Fig. 11 DC Current Gain vs. Collector Current (4403)

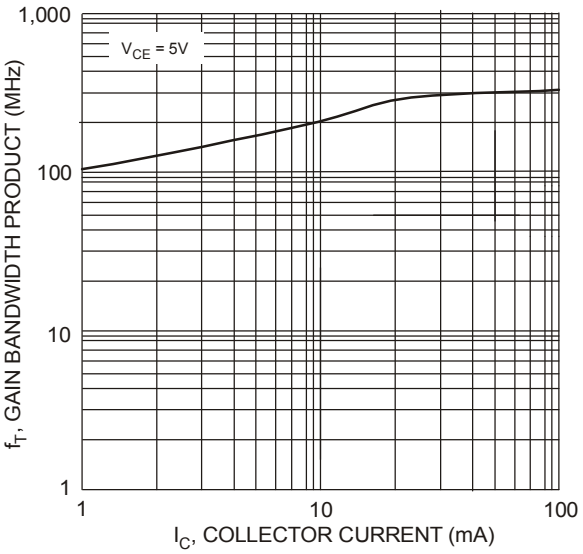
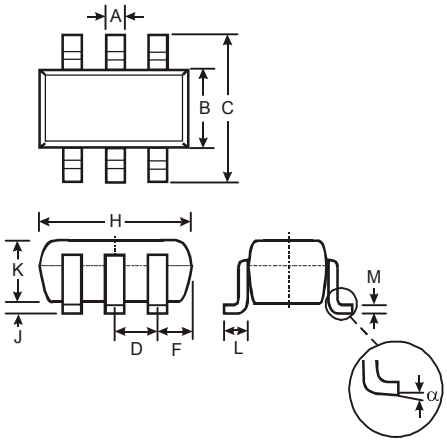


Fig. 12 Gain Bandwidth Product vs. Collector Current (4403)

Package Outline Dimensions

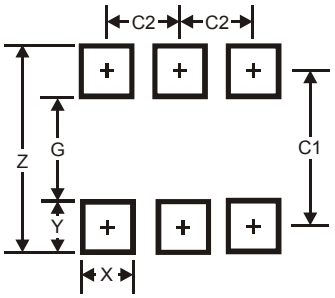
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT363			
Dim	**Min**	**Max**	**Typ**
A	0.10	0.30	0.25
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.65 Typ		
F	0.40	0.45	0.425
H	1.80	2.20	2.15
J	0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.22	0.11
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	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

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.

www.diodes.com