Product Summary

BV_{DSS}	Max $R_{DS(ON)}$	I_D max T_A = +25°C (Note 6)
20V	195mΩ @ V_{GS} = 4.5V	2.11A
	260mΩ @ V_{GS} = 2.5V	1.83A
	380mΩ @ V_{GS} = 1.8V	1.51A
	520mΩ @ V_{GS} = 1.5V	1.29A

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Backlighting
- Power Management Functions
- DC-DC Converters

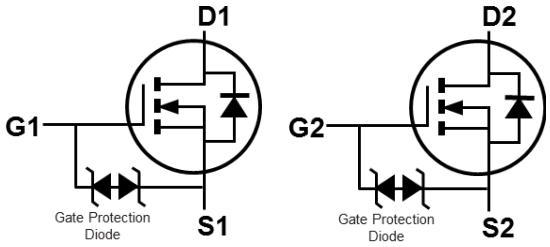
Features and Benefits

- Footprint of Just 1.3mm^2
- Ultra Low Profile Package — 0.4mm Profile
- On Resistance <200mΩ
- Low Gate Threshold Voltage
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMN2300UFL4Q is suitable for automotive applications requiring specific change control and is AEC-Q101 qualified, is PPAP capable, and is manufactured in IATF16949:2016 certified facilities.**

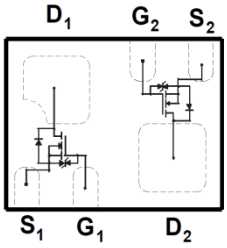
Mechanical Data

- Case: X2-DFN1310-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208e4

X2-DFN1310-6



Device Symbol



Top View
Pin-Out

Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DMN2300UFL4Q-7	23N	7	8	3000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

23N = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±8	V
Continuous Drain Current (Note 6)	Steady State	T_A = +25°C T_A = +85°C	I_D	2.11 1.19	A
Pulsed Drain Current (Note 7)			I_{DM}	6.0	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.53	W
	(Note 6)		1.39	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	238	°C/W
	(Note 6)		90	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.

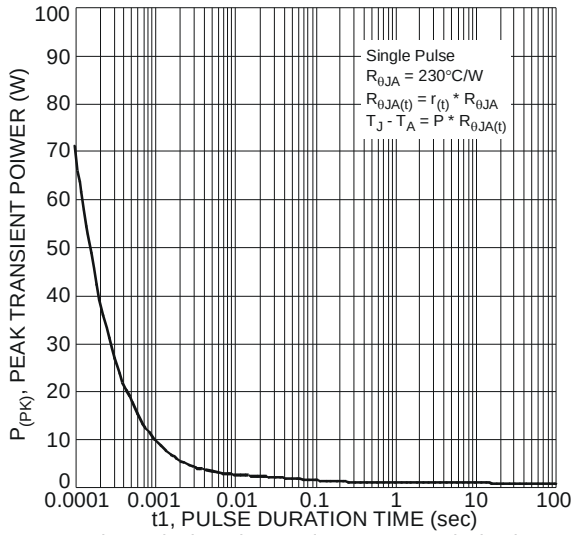


Fig. 1 Single Pulse Maximum Power Dissipation

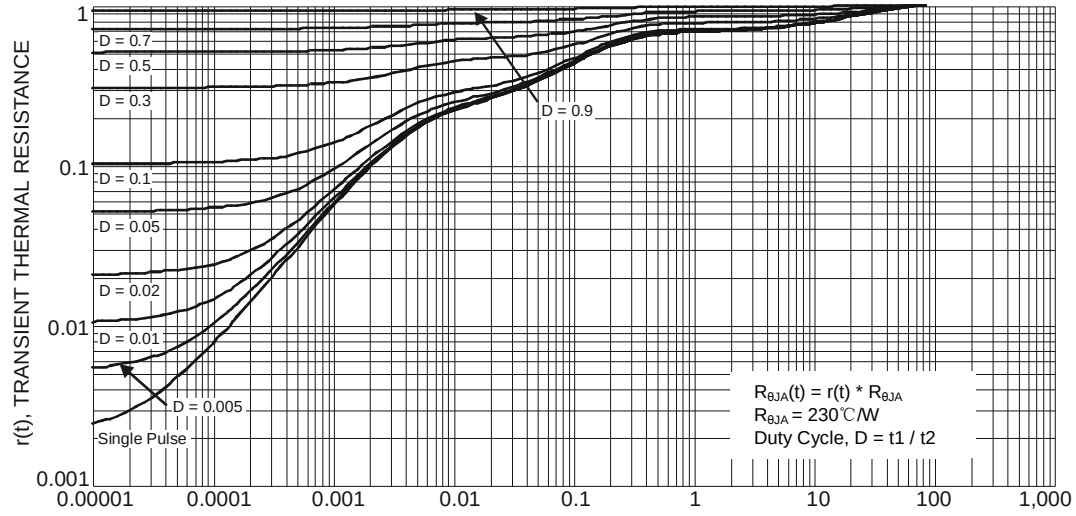


Fig. 2 Transient Thermal Resistance

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	V_{GS} = 0V, I_D = 10μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1	μA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	10	μA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.45	—	0.95	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	151	195	mΩ	V_{GS} = 4.5V, I_D = 300mA
		—	190	260		V_{GS} = 2.5V, I_D = 250mA
		—	247	380		V_{GS} = 1.8V, I_D = 100mA
		—	316	520		V_{GS} = 1.5V, I_D = 50mA
Forward Transfer Admittance	$\|Y_{fs}\|$	40	—	—	mS	V_{DS} = 3V, I_D = 30mA
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 300mA
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	—	67.6	135.2	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	9.7	19.4	pF	
Reverse Transfer Capacitance	C_{rss}	—	7.5	15	pF	
Gate Resistance	R_g	—	70	140	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	1.6	3.2	nC	V_{GS} = 4.5V, V_{DS} = 15V, I_D = 1A
Gate-Source Charge	Q_{gs}	—	0.2	0.4	nC	
Gate-Drain Charge	Q_{gd}	—	0.2	0.4	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	10	ns	V_{DS} = 10V, I_D = 1A, V_{GS} = 10V, R_G = 6Ω
Turn-On Rise Time	t_R	—	2.8	10	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	38	60	ns	
Turn-Off Fall Time	t_F	—	13	25	ns	

Note: 8. Short duration pulse test used to minimize self-heating effect.

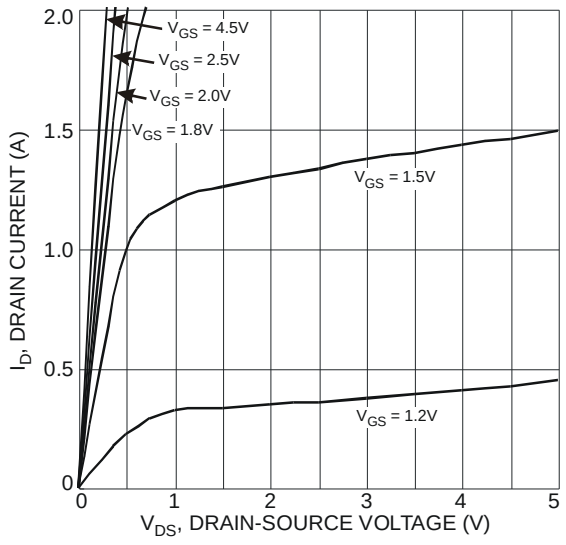


Fig. 3 Typical Output Characteristic

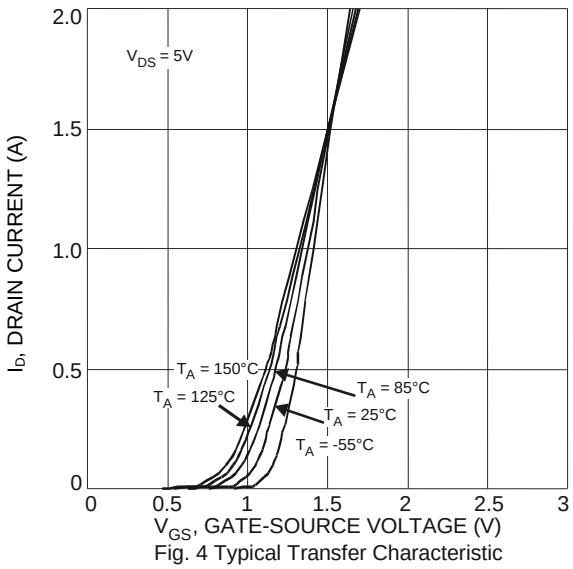


Fig. 4 Typical Transfer Characteristic

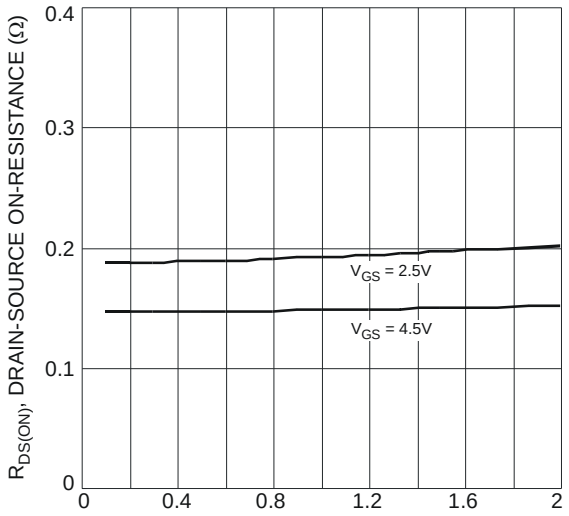


Fig. 5 Typical On-Resistance
vs. Drain Current and Gate Voltage

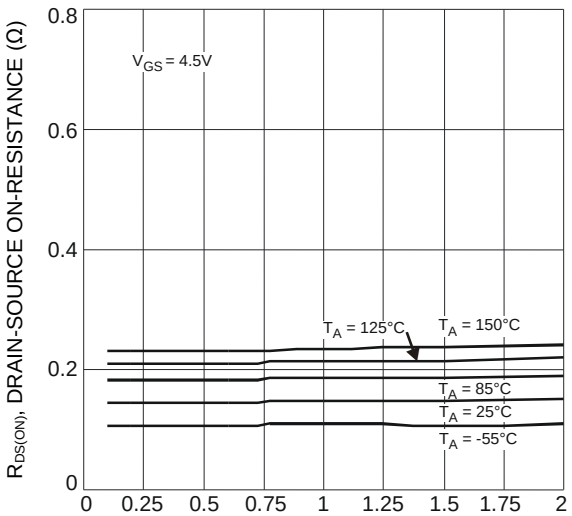


Fig. 6 Typical On-Resistance
vs. Drain Current and Temperature

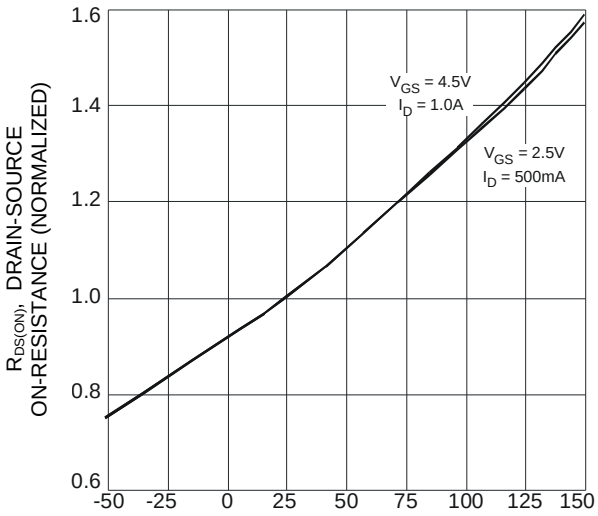


Fig. 7 On-Resistance Variation with Temperature

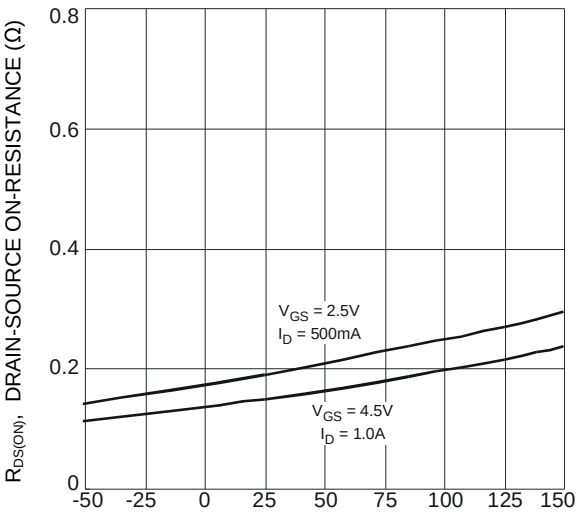


Fig. 8 On-Resistance Variation with Temperature

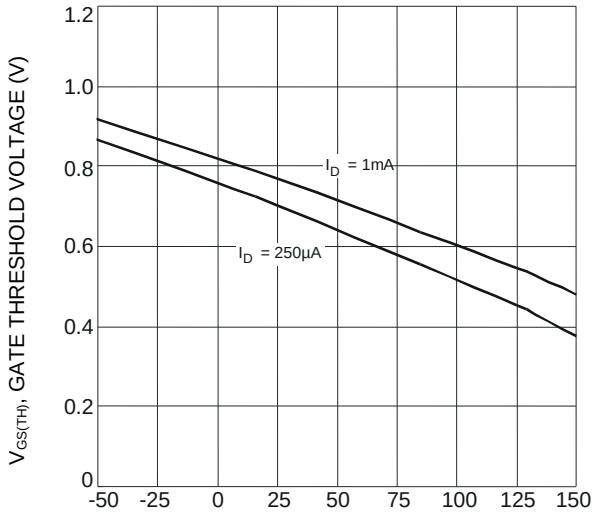


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

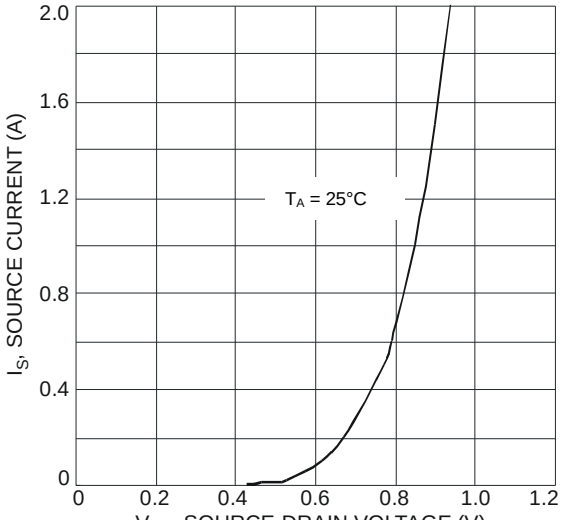


Fig. 10 Diode Forward Voltage vs. Current

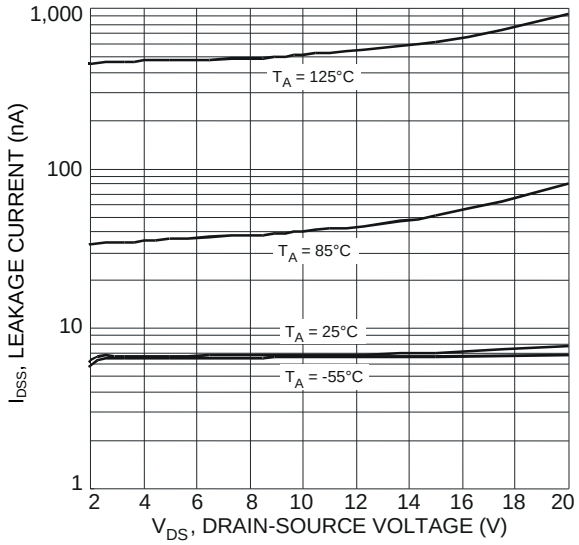


Fig. 11 Typical Leakage Current vs. Drain-Source Voltage

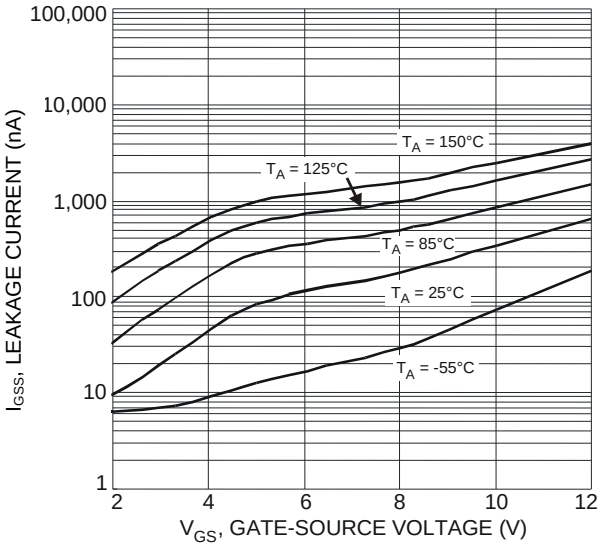


Fig.12 Leakage Current vs. Gate-Source Voltage

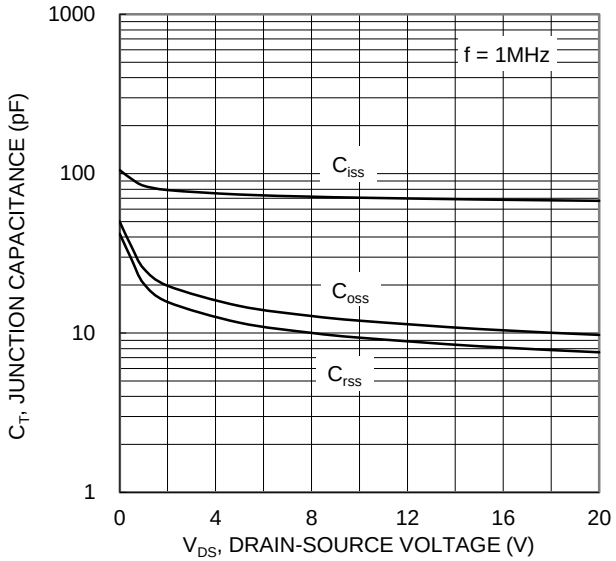


Fig. 13 Typical Junction Capacitance

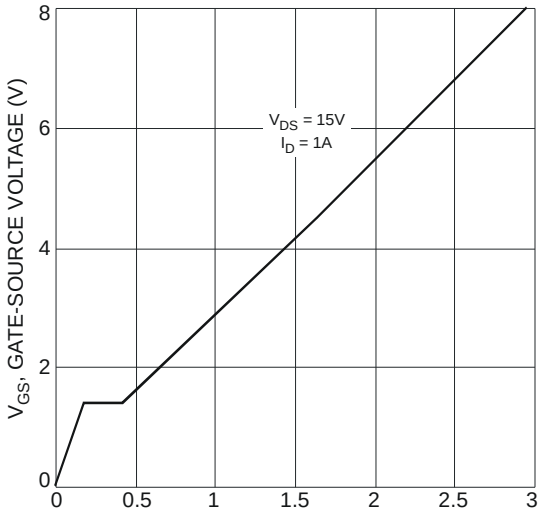
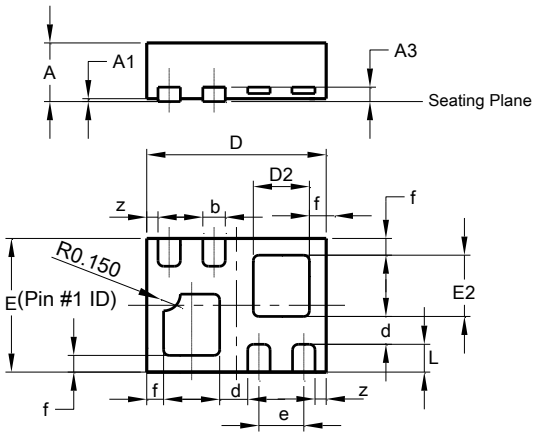


Fig. 14 Gate-Charge Characteristics

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

X2-DFN1310-6

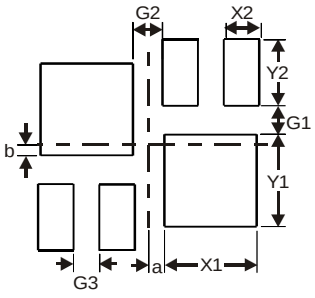


X2-DFN1310-6			
Dim	**Min**	**Max**	**Typ**
A	-	0.40	-
A1	0	0.05	0.02
A3	-	-	0.13
b	0.10	0.20	0.15
D	1.25	1.38	1.30
d	-	-	0.25
D2	0.30	0.50	0.40
E	0.95	1.075	1.00
e	-	-	0.35
E2	0.30	0.50	0.40
f	-	-	0.10
L	0.20	0.30	0.25
Z	-	-	0.05
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

X2-DFN1310-6



Dimensions	Value (in mm)
G1	0.16
G2	0.17
G3	0.15
X1	0.52
X2	0.20
Y1	0.52
Y2	0.375
a	0.09
b	0.06

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