

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	$I_D$ $T_A = 25^\circ C$
-12V	32m $\Omega$ @ $V_{GS} = -4.5V$	-5.5A
	45m $\Omega$ @ $V_{GS} = -2.5V$	-4.5A
	75m $\Omega$ @ $V_{GS} = -1.8V$	-3.2A

## Description

This new generation MOSFET has been designed to minimize the on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

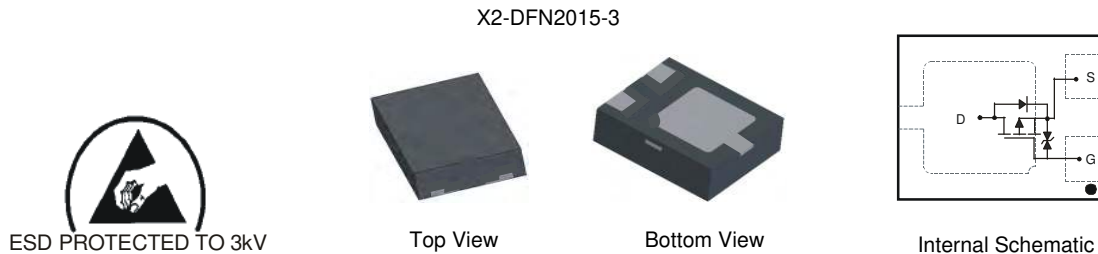
- DC-DC Converters
- Power management functions
- Analog Switch

## Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Up To 3kV**
- **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: X2-DFN2015-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e4)</sup>
- Weight: 0.008 grams (approximate)

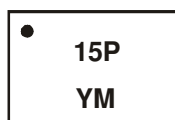


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1045UFY4-7	X2-DFN2015-3	3,000/Tape & Reel
DMP1045UFY4-13	X2-DFN2015-3	10,000/Tape & Reel

- 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



15P = Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: W = 2009)  
 M = Month (ex: 9 = September)

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		$V_{DSS}$	-12	V
Gate-Source Voltage		$V_{GSS}$	$\pm 8$	V
Continuous Drain Current $V_{GS} = -4.5\text{V}$ (Note 6)	Steady State	$I_D$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	A
	$t < 5\text{s}$		$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	A
Maximum Continuous Body Diode Forward Current (Note 6)		$I_S$	-2.2	A
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)		$I_{DM}$	-25	A

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	0.7	W
	$T_A = +70^\circ\text{C}$		0.4	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	193	$^\circ\text{C/W}$
	$t < 5\text{s}$		135	
Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	$P_D$	1.7	W
	$T_A = +70^\circ\text{C}$		1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	73	$^\circ\text{C/W}$
	$t < 5\text{s}$		52	
Thermal Resistance, Junction to Case (Notes 6)	Steady state	$R_{\theta JC}$	17	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-12	-	-	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	$I_{DSS}$	-	-	-1.0	$\mu\text{A}$	$V_{DS} = -12\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-0.3	-0.55	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	26	32	m $\Omega$	$V_{GS} = -4.5\text{V}, I_D = -4.0\text{A}$
			31	45		$V_{GS} = -2.5\text{V}, I_D = -3.5\text{A}$
			51	75		$V_{GS} = -1.8\text{V}, I_D = -2.7\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	-	12	-	S	$V_{DS} = -5\text{V}, I_D = -4\text{A}$
Diode Forward Voltage	$V_{SD}$	-	-0.6	-	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{ISS}$	-	1291	-	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{OSS}$	-	266	-	pF	
Reverse Transfer Capacitance	$C_{RSS}$	-	242	-	pF	
Gate Resistance	$R_g$	-	13	-	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
<b>SWITCHING CHARACTERISTICS (Note 8)</b>						
Total Gate Charge ( $V_{GS} = -8\text{V}$ )	$Q_g$	-	23.7	-	nC	$V_{DS} = -10\text{V}, I_D = -4\text{A}$
Total Gate Charge ( $V_{GS} = -4.5\text{V}$ )	$Q_g$	-	14.7	-	nC	
Gate-Source Charge	$Q_{gs}$	-	1.8	-	nC	
Gate-Drain Charge	$Q_{gd}$	-	4.6	-	nC	$V_{DS} = -10\text{V}, V_{GS} = -4.5\text{V},$ $R_L = 2.5\Omega, R_G = 3.0\Omega$
Turn-On Delay Time	$t_{D(on)}$	-	14	-	ns	
Turn-On Rise Time	$t_r$	-	22	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	74	-	ns	
Turn-Off Fall Time	$t_f$	-	75	-	ns	

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
  - Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

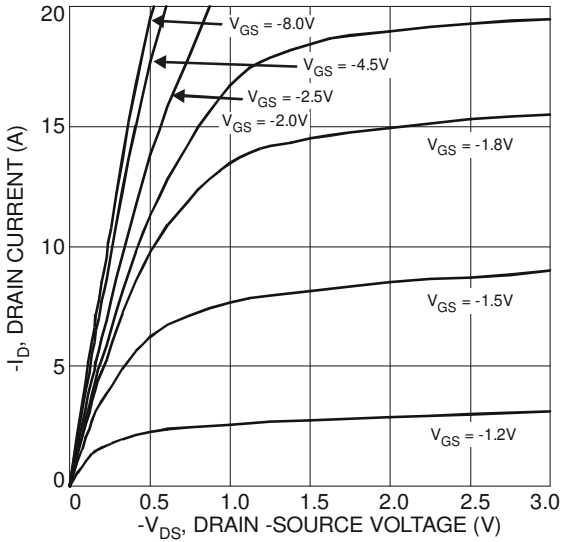


Fig. 1 Typical Output Characteristics

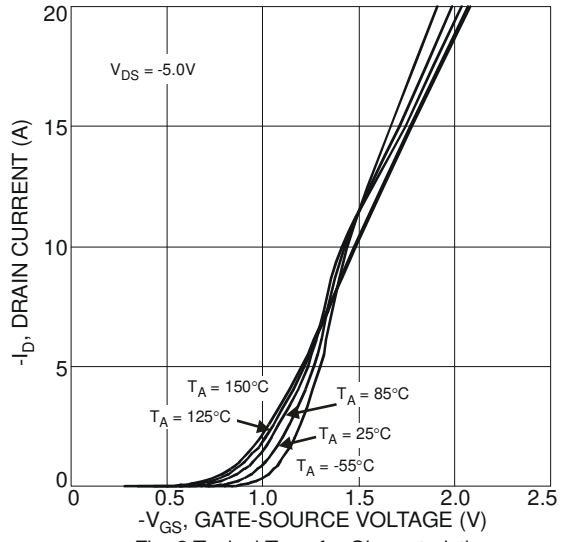


Fig. 2 Typical Transfer Characteristics

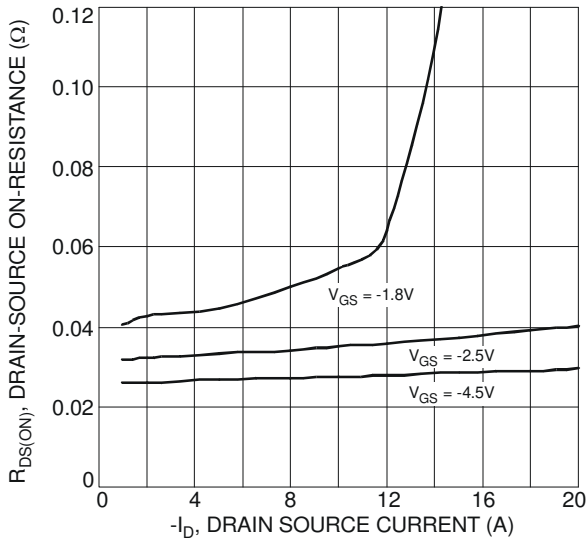


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

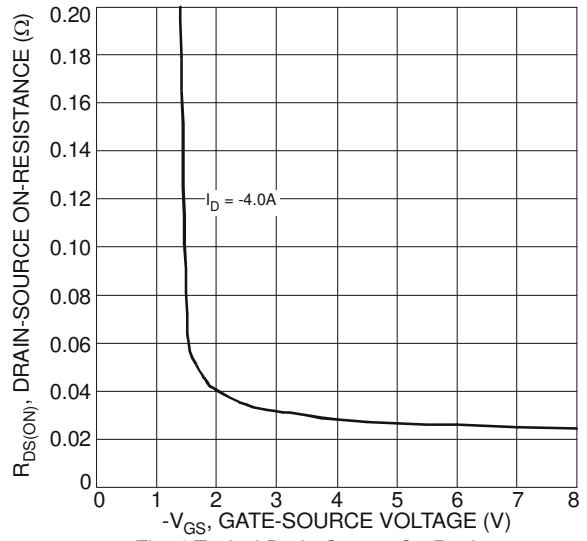


Fig. 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

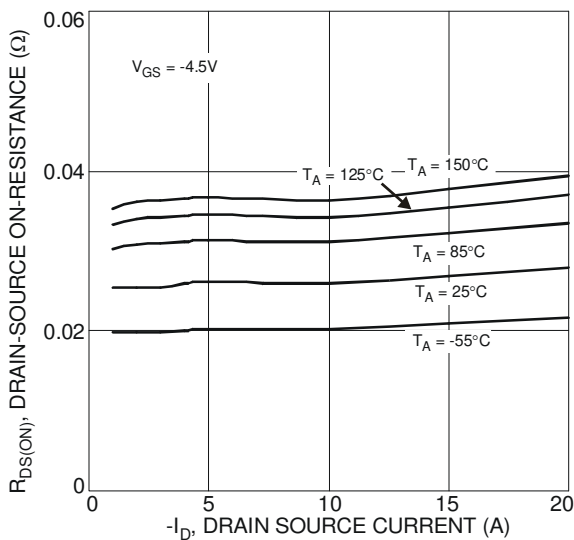


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

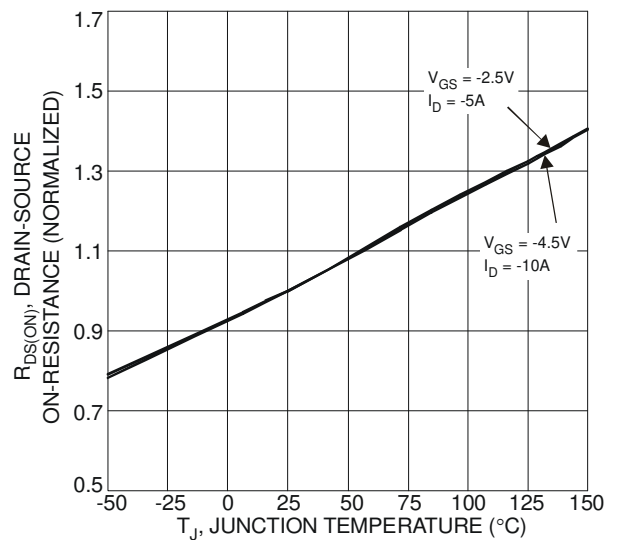


Fig. 6 On-Resistance Variation with Temperature

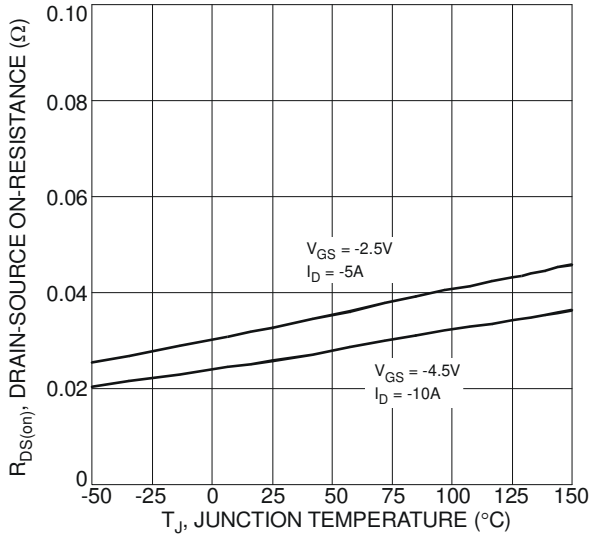


Fig. 7 On-Resistance Variation with Temperature

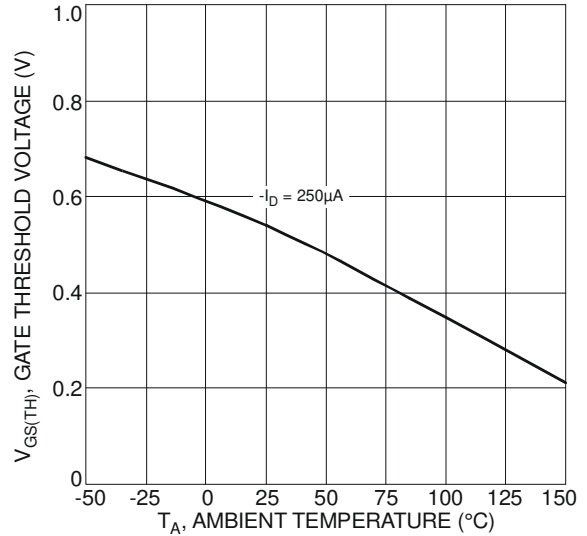


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

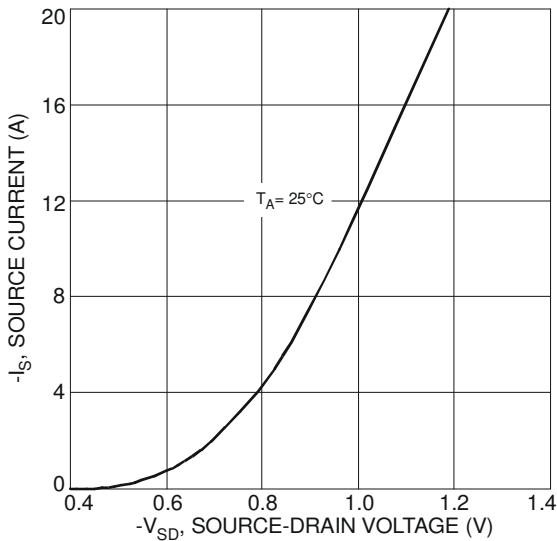


Fig. 9 Diode Forward Voltage vs. Current

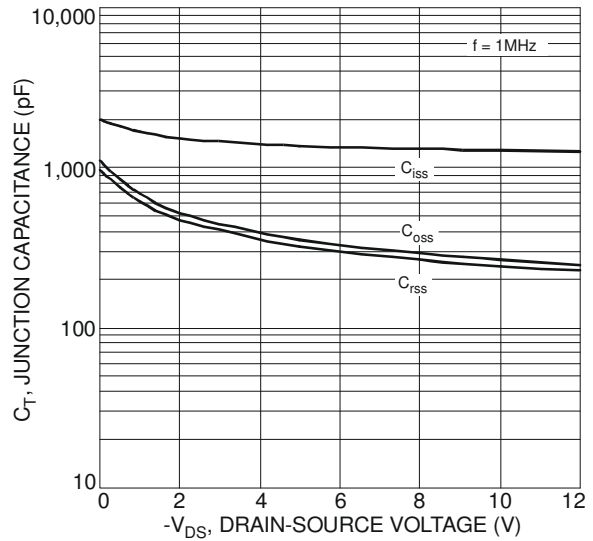


Fig. 10 Typical Junction Capacitance

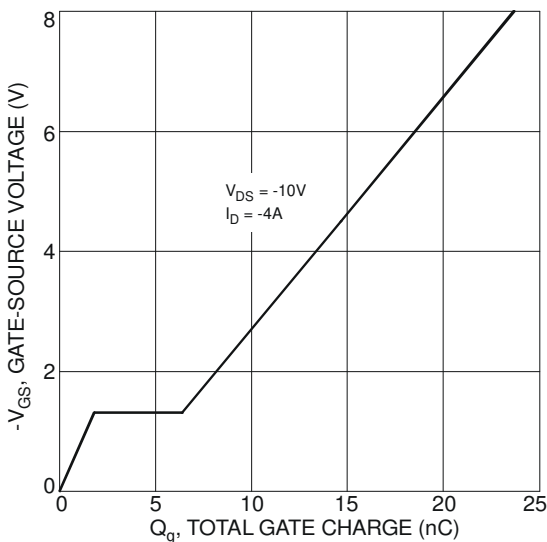


Fig. 11 Gate-Charge Characteristics

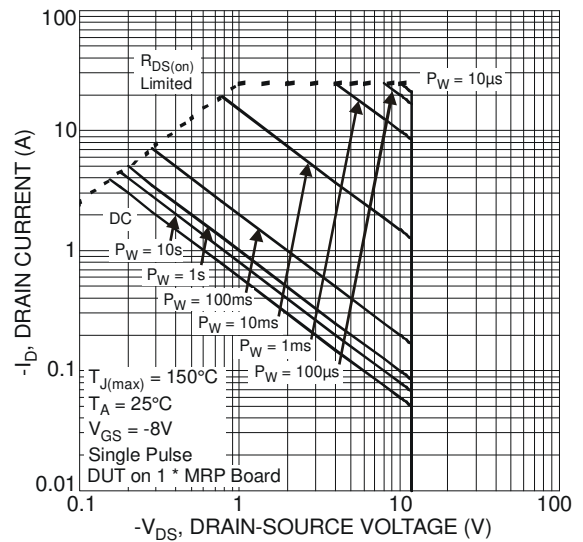
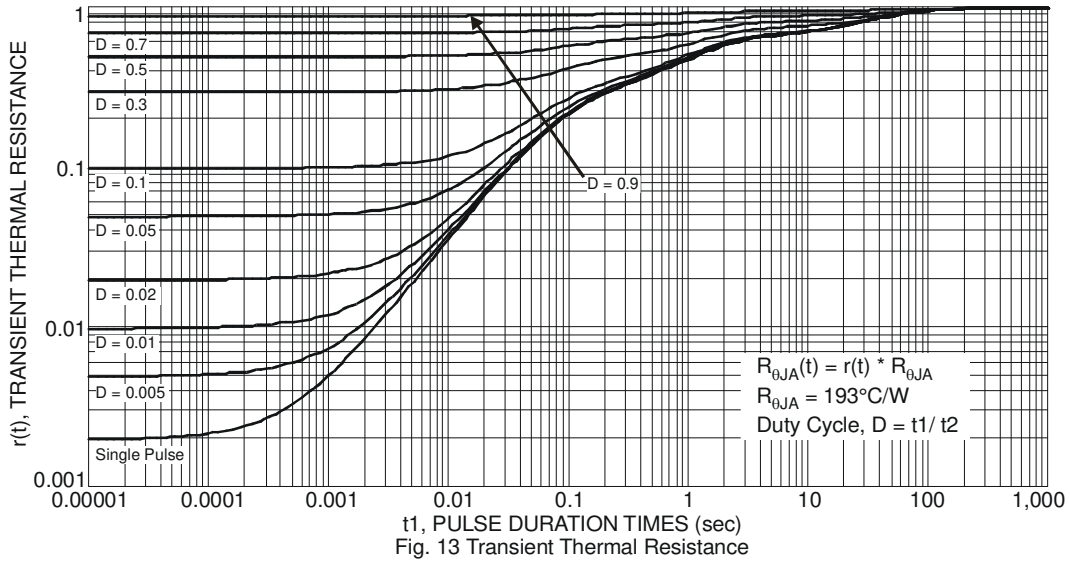
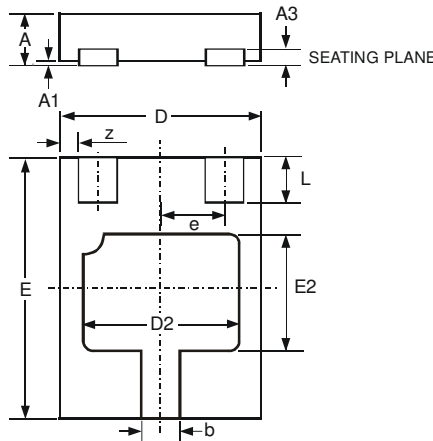


Fig. 12 SOA, Safe Operation Area



**Package Outline Dimensions**

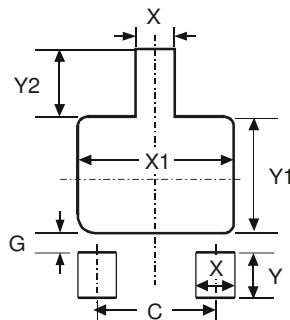
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



X2-DFN2015-3			
Dim	Min	Max	Typ
A	-	0.40	-
A1	0	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.45	1.575	1.50
D2	1.00	1.20	1.10
e	-	-	0.50
E	1.95	2.075	2.00
E2	0.70	0.90	0.80
L	0.25	0.35	0.30
z	-	-	0.125
<b>All Dimensions in mm</b>			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	1.00
G	0.15
X	0.31
X1	1.30
Y	0.50
Y1	1.00
Y2	0.65

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