

## Product Summary

BV <sub>DSS</sub>	BV <sub>DSS</sub> @T <sub>Jmax</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
115V	120V	90mΩ @ V <sub>GS</sub> = 10V	3.4A
		100mΩ @ V <sub>GS</sub> = 4.5V	2.3A

## Description

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, which makes it ideal for high-efficiency power management applications.

## Applications

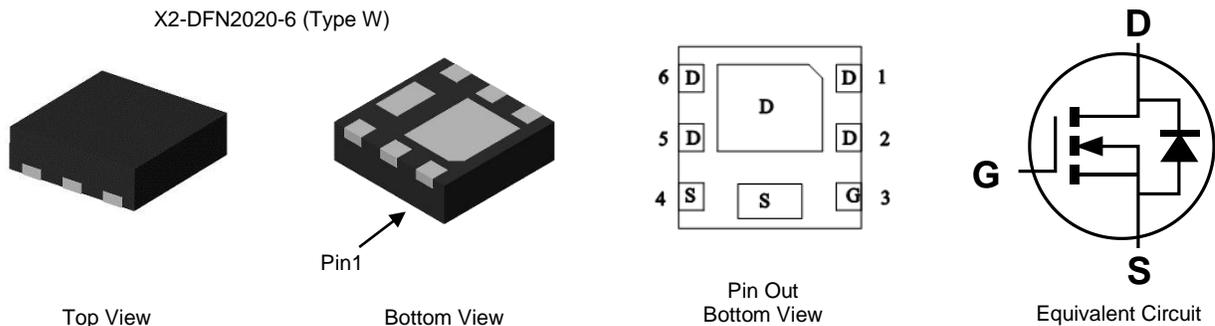
- DC-DC Primary Switch
- Load Switch

## Features and Benefits

- 0.4mm Profile—Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- 100% Unclamped Inductive Switching (UIS) Test in Production—Ensures More Reliable and Robust End Application
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## Mechanical Data

- Case: X2-DFN2020-6
- 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 (e4)
- Weight: 0.006 grams (Approximate)



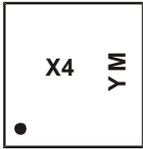
## Ordering Information (Note 4)

Part Number	Case	Quantity Per Reel
DMT12H090LFDF4-7	X2-DFN2020-6 (Type W)	3,000
DMT12H090LFDF4-13	X2-DFN2020-6 (Type W)	10,000

- 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

Site 1:

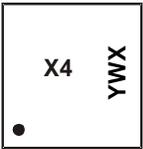


X4 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: 1 = 2021)  
 M = Month (ex: 9 = September)

Date Code Key

Year	2018	...	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	F	...	I	J	K	L	M	N	O	P	R	S
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

Site 2:



X4 = Product Type Marking Code  
 YWX = Date Code Marking  
 Y = Year (ex: 1 = 2021)  
 W = Week (ex: a = Week 27; z Represents Week 52 and 53)  
 X = Internal Code (ex: U = Monday)

Date Code Key

Year	2018	...	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	8	...	1	2	3	4	5	6	7	8	9	0
Week	1-26			27-52				53				
Code	A-Z			a-z				z				
Internal Code	Sun	Mon	Tue	Wed	Thu	Fri	Sat					
Code	T	U	V	W	X	Y	Z					

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	115	V
Gate-Source Voltage	V <sub>GSS</sub>	±12	V
Continuous Drain Current, V <sub>GS</sub> = 10V (Note 6)	I <sub>D</sub>	T <sub>A</sub> = +25°C	3.4
		T <sub>A</sub> = +70°C	2.7
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	15	A
Maximum Body Diode Continuous Current (Note 6)	I <sub>S</sub>	3.4	A
Pulsed Body Diode Continuous Current (10µs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	15	A
Avalanche Current, L = 0.3mH	I <sub>AS</sub>	2.3	A
Avalanche Energy, L = 0.3mH	E <sub>AS</sub>	0.79	mJ

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = +25°C	0.9
		T <sub>A</sub> = +70°C	0.6
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	141	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = +25°C	1.6
		T <sub>A</sub> = +70°C	1.0
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	78	°C/W
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	15	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	115	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 10mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 92V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±9.6V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.6	—	2.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	—	90	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.5A
		—	—	100		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.0A
		—	—	300		V <sub>GS</sub> = 3.8V, I <sub>D</sub> = 1.0A
		—	—	350		V <sub>GS</sub> = 3V, I <sub>D</sub> = 0.5A
		—	—	—		—
Diode Forward Voltage	V <sub>SD</sub>	—	—	1.3	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 2.4A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	251	—	pF	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	80	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	3	—	pF	
Gate Resistance	R <sub>g</sub>	—	7	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	—	6	—	nC	V <sub>DS</sub> = 50V, I <sub>D</sub> = 4.5A, V <sub>GS</sub> = 10V
Gate-Source Charge	Q <sub>gs</sub>	—	0.3	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	2	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	2.2	—	ns	V <sub>DS</sub> = 50V, R <sub>L</sub> = 11Ω V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 3Ω
Turn-On Rise Time	t <sub>r</sub>	—	2.6	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	9.3	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	3.9	—	ns	
Reverse Recovery Time	t <sub>RR</sub>	—	83	—	ns	
Reverse Recovery Charge	Q <sub>RR</sub>	—	189	—	nC	I <sub>F</sub> = 4.5A, di/dt = 300A/µs

- Notes:
- Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PCB, 2oz copper, with 1inch square copper plate.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

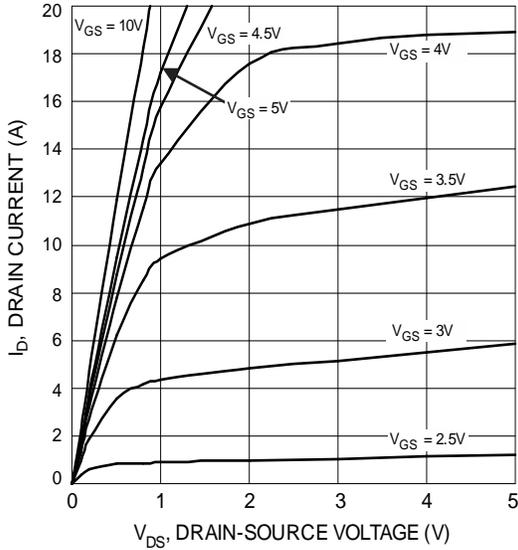


Figure 1 Typical Output Characteristic

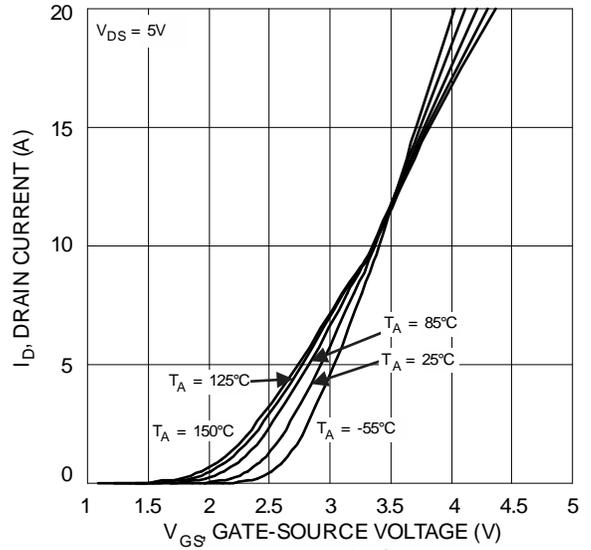


Figure 2 Typical Transfer Characteristics

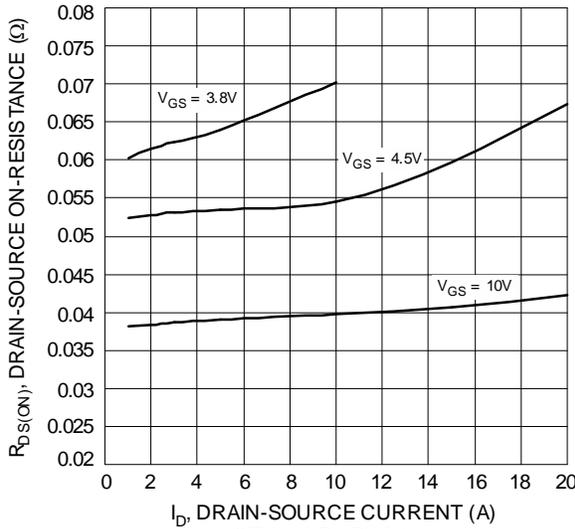


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

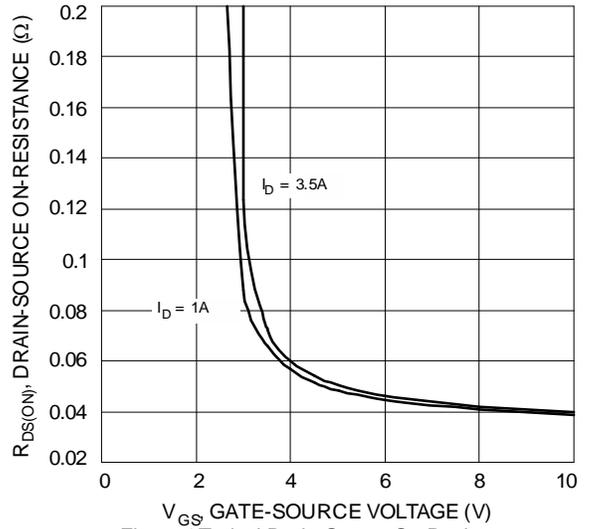


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

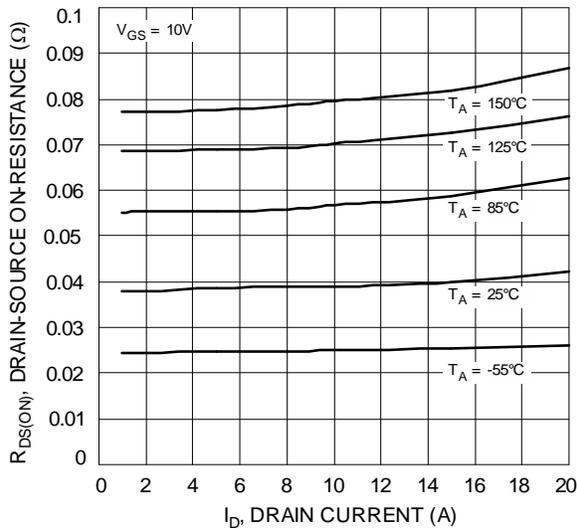


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

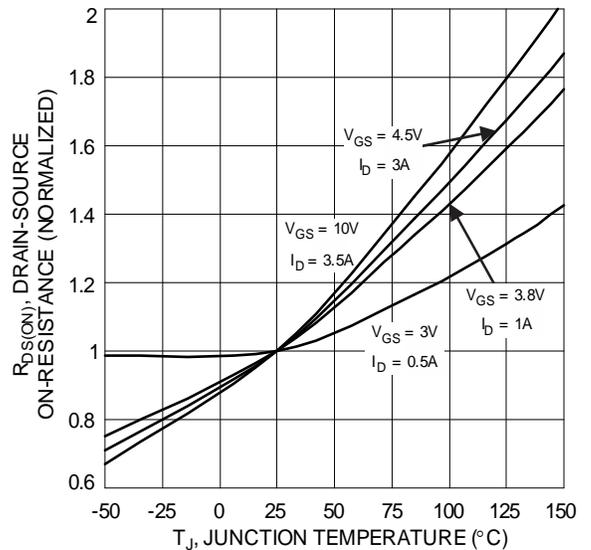


Figure 6 On-Resistance Variation with Temperature

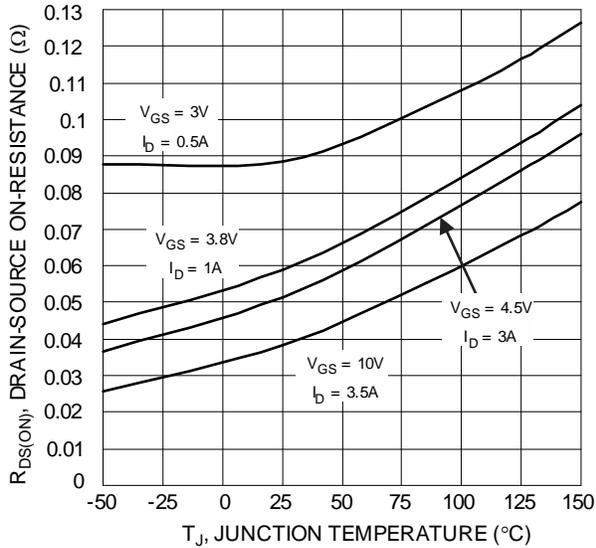


Figure 7 On-Resistance Variation with Temperature

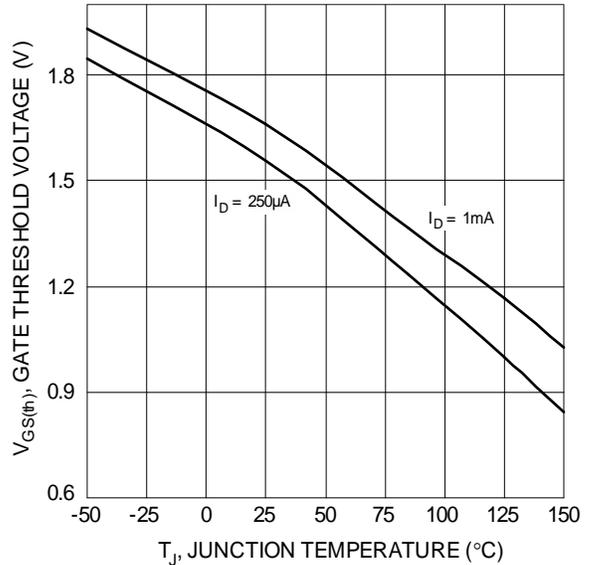


Figure 8 Gate Threshold Variation vs. Junction Temperature

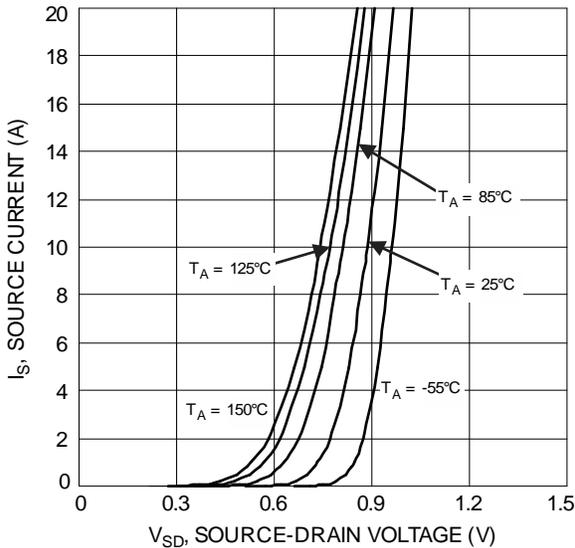


Figure 9 Diode Forward Voltage vs. Current

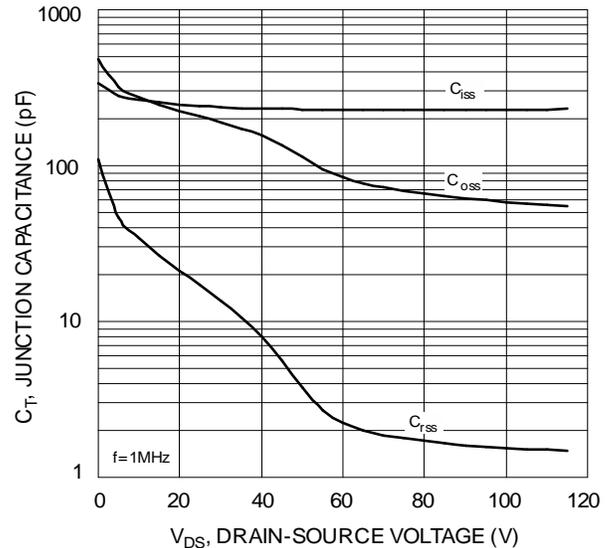


Figure 10 Typical Junction Capacitance

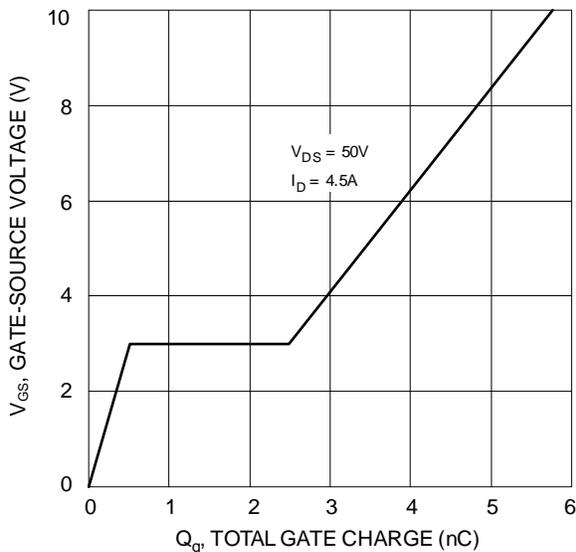


Figure 11 Gate Charge

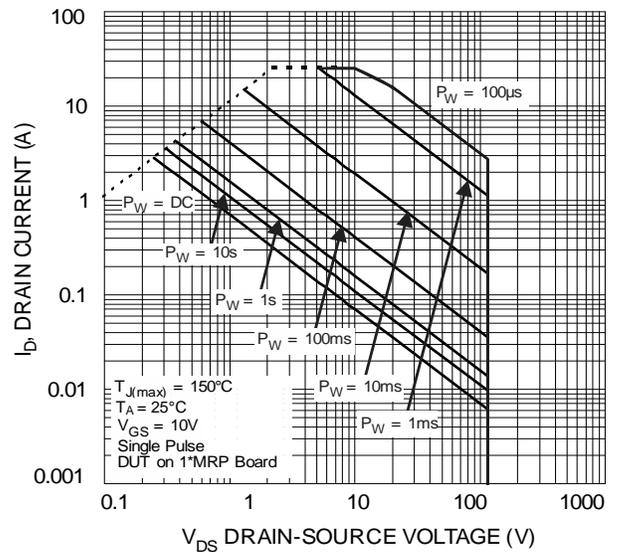
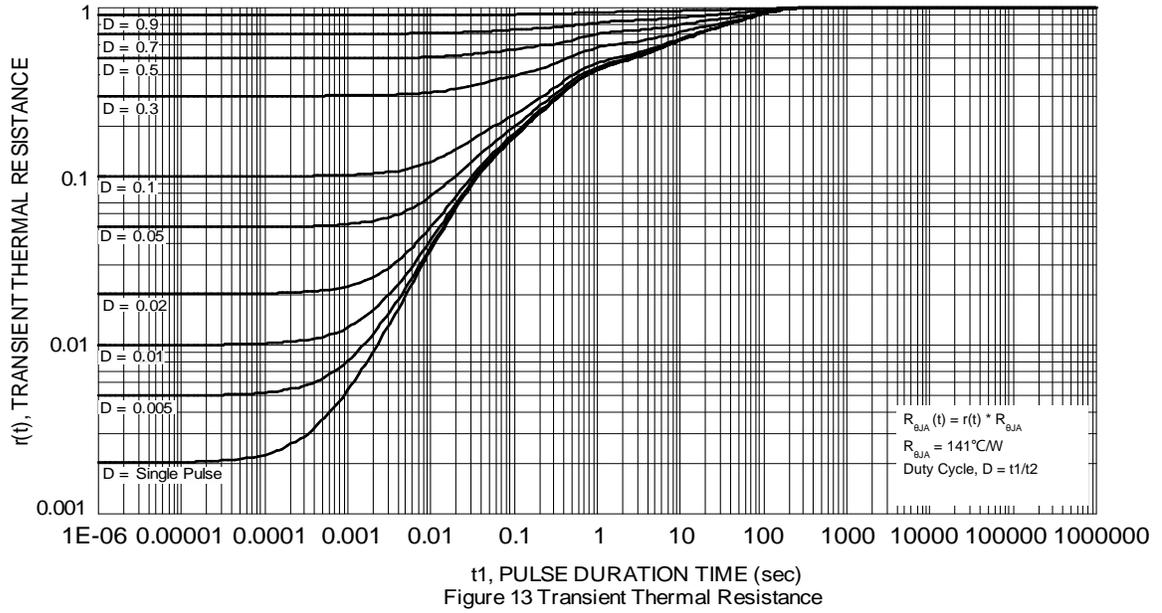


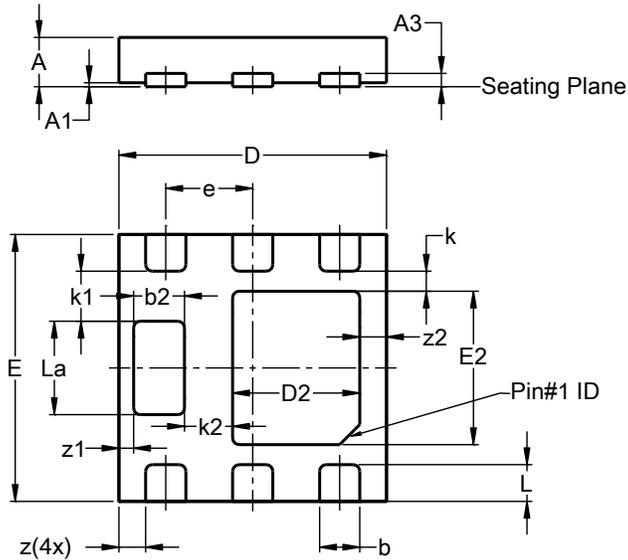
Figure 12 SOA, Safe Operation Area



## Package Outline Dimensions

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

X2-DFN2020-6 (Type W)

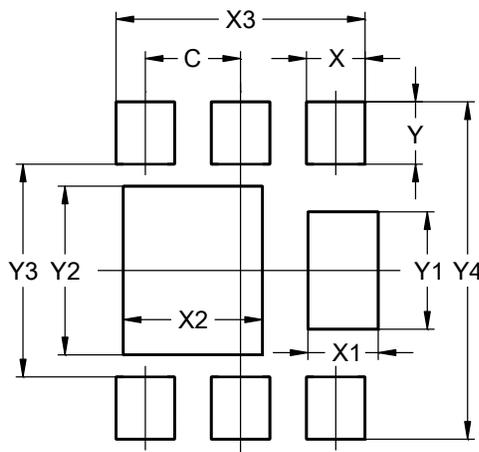


X2-DFN2020-6 Type W			
Dim	Min	Max	Typ
A	0.34	0.40	0.37
A1	0.00	0.05	0.02
A3	—	—	0.100
b	0.25	0.35	0.30
b2	0.33	0.43	0.38
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
e	—	—	0.65
k	—	—	0.15
k1	—	—	0.375
k2	—	—	0.36
L	0.225	0.325	0.275
La	0.65	0.75	0.70
z	—	—	0.20
z1	—	—	0.11
z2	—	—	0.20
All Dimensions in mm			

## Suggested Pad Layout

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

X2-DFN2020-6 (Type W)



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	0.480
X2	0.950
X3	1.700
Y	0.425
Y1	0.800
Y2	1.150
Y3	1.450
Y4	2.300

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