

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>A</sub> = +25°C
-20V	78mΩ @ V <sub>GS</sub> = -8V	-3.4A
	100mΩ @ V <sub>GS</sub> = -4.5V	-3.0A

## Description

This new generation MOSFET is designed to minimize the footprint in handheld and mobile application. It can be used to replace many small signals MOSFET with as really small footprint.

## Applications

- Battery Management
- Load Switch
- Battery Protection
- Handheld and Mobile Application

## Features and Benefits

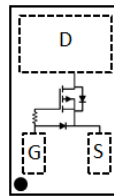
- Low Q<sub>g</sub> & Q<sub>gd</sub>
- Small Footprint
- Low Profile 0.20mm Height
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, 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

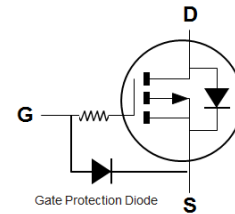
- Case: X4-DSN1006-3
- Terminal Connections: See Diagram Below
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu or NiAu Solderable per MIL-STD-202, Method 208
- Weight: 0.00029 grams (Approximate)



X4-DSN1006-3



Top View



Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2078LCA3-7	X4-DSN1006-3	10k/Tape & Reel

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



O = Product Type Marking Code  
 YW = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: 0 = 2020)  
 W or  $\bar{W}$  = Week (ex: a = week 27; z represents week 52 and 53)

### Date Code Key

Year	2017	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	7	...	0	1	2	3	4	5	6	7	8	9
Week	1-26			27-52						53		
Code	A-Z			a-z						z		

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	-20	V
Gate-Source Voltage			V <sub>GSS</sub>	-12	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = -8V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-3.4	A
		T <sub>A</sub> = +70°C		-2.7	
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-3.0	A
		T <sub>A</sub> = +70°C		-2.4	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	-13	A
Human Body Model (HBM)			V <sub>(ESD)</sub>	4	kV

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7)	P <sub>D</sub>	0.81	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 7)	R <sub>θJA</sub>	155.4	°C/W
Power Dissipation (Note 5)	P <sub>D</sub>	1.4	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	90.4	°C/W
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 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>BSS</sub>	—	—	-100	nA	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	-50	nA	V <sub>GS</sub> = -12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.7	-0.9	-1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	64	78	mΩ	V <sub>GS</sub> = -8V, I <sub>D</sub> = -0.5A
		—	77	100		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.5A
		—	113	165		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -0.5A
		—	188	600		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -0.1A
		—	—	—		—
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -0.5A
Reverse Recovery Charge	Q <sub>RR</sub>	—	1.3	—	nC	V <sub>DD</sub> = -10V, I <sub>F</sub> = -1A, di/dt = 100A/μs
Reverse Recovery Time	t <sub>RR</sub>	—	7.7	—	ns	
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	152	228	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	78	117		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	4.3	6.4		
Series Gate Resistance	R <sub>G</sub>	—	21	31	Ω	f = 1MHz, V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V
Total Gate Charge	Q <sub>g</sub>	—	1.1	1.6	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.5A
Gate-Source Charge	Q <sub>gs</sub>	—	0.2	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	0.2	—		
Gate Charge at V <sub>TH</sub>	Q <sub>g(th)</sub>	—	3.6	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.1	6.1	ns	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>G</sub> = 2Ω, I <sub>D</sub> = -0.5A
Turn-On Rise Time	t <sub>r</sub>	—	5.6	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	9.5	14.2		
Turn-Off Fall Time	t <sub>f</sub>	—	4.6	—		

- Notes:
- Device mounted on FR-4 material with 1inch<sup>2</sup> (6.45cm<sup>2</sup>), 2oz. (0.071mm thick) Cu.
  - Repetitive rating, pulse width limited by junction temperature.
  - Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

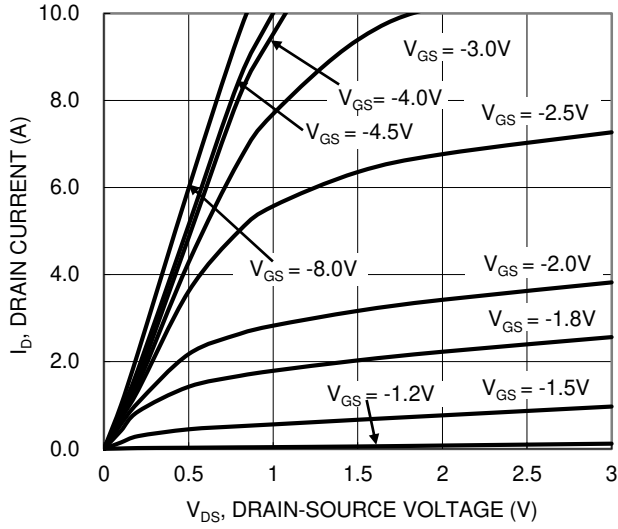


Figure 1. Typical Output Characteristic

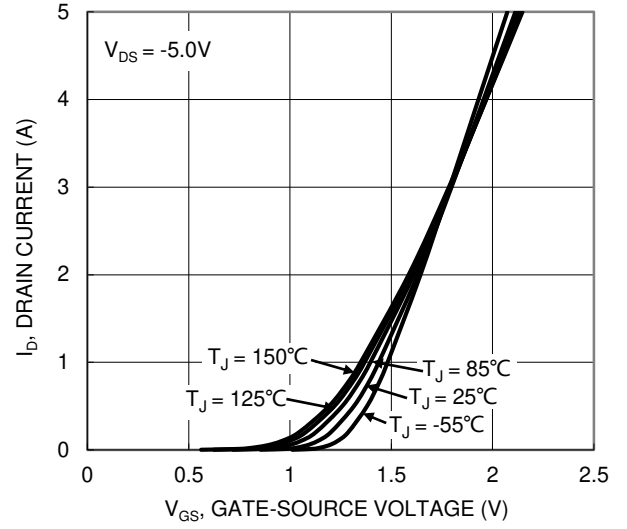


Figure 2. Typical Transfer Characteristic

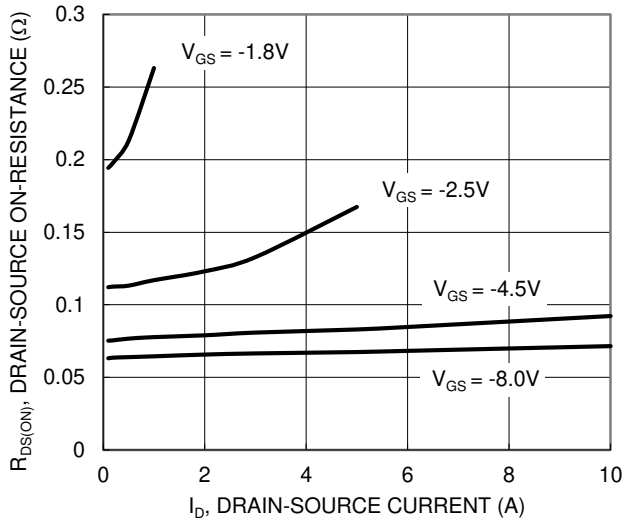


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

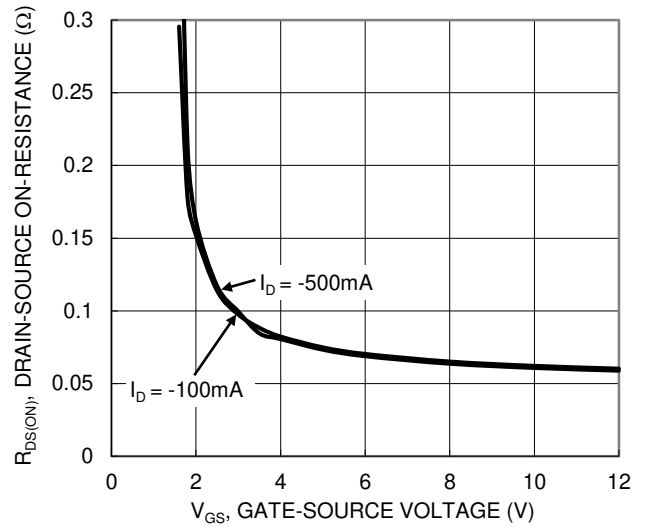


Figure 4. Typical Transfer Characteristic

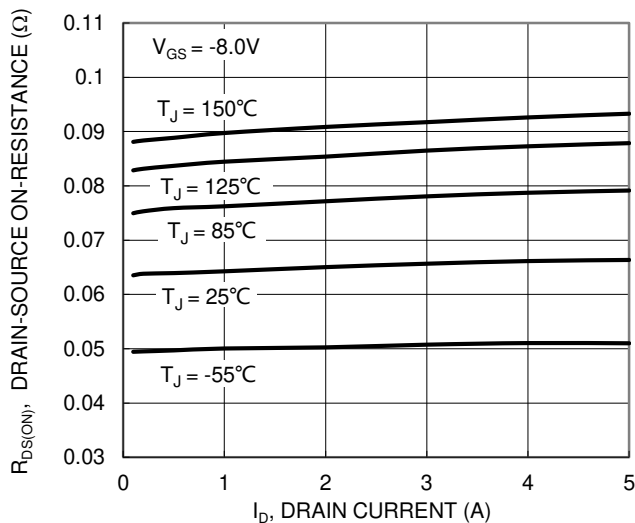


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

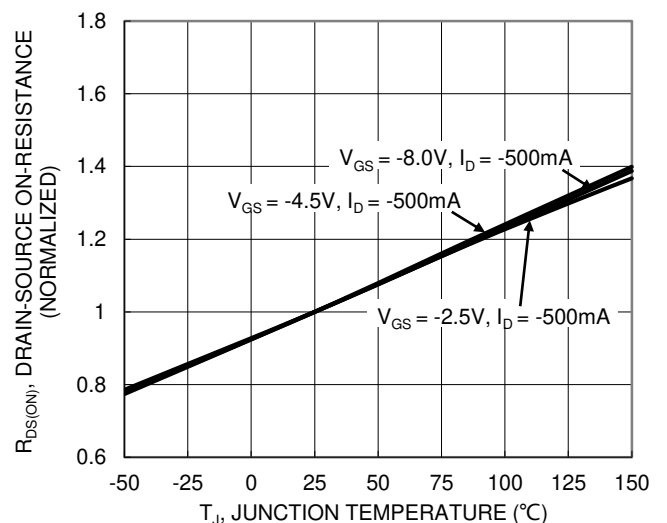


Figure 6. On-Resistance Variation with Junction Temperature

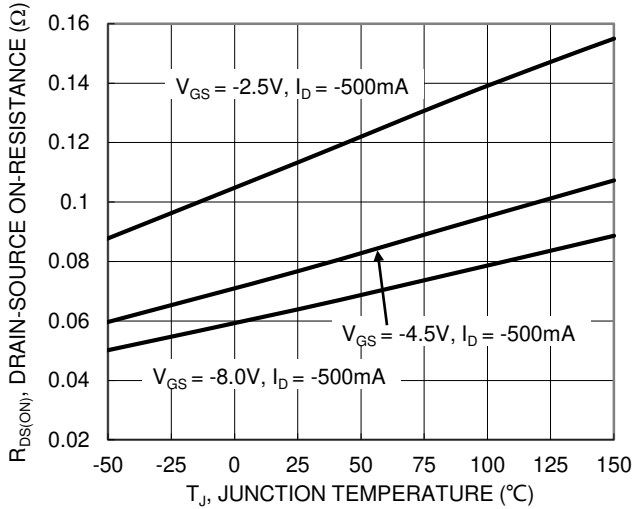


Figure 7. On-Resistance Variation with Junction Temperature

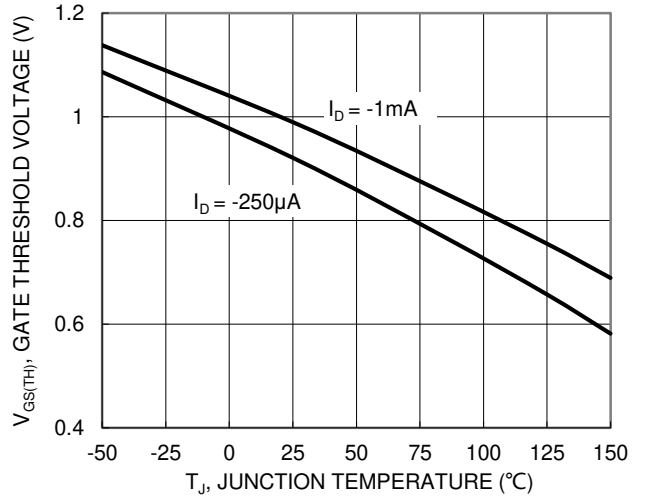


Figure 8. Gate Threshold Variation vs. Junction Temperature

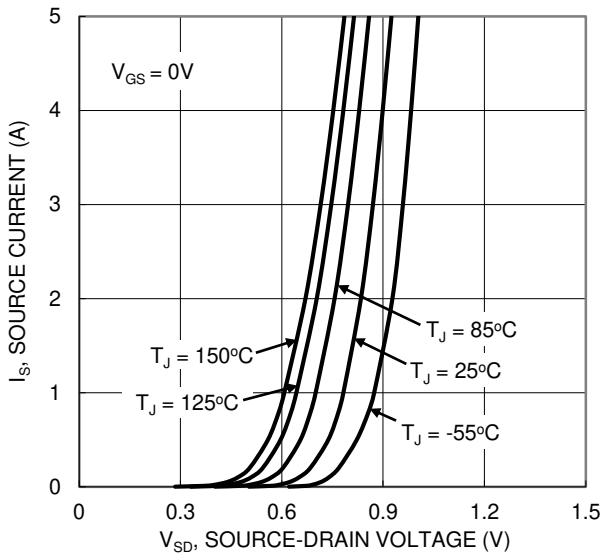


Figure 9. Diode Forward Voltage vs. Current

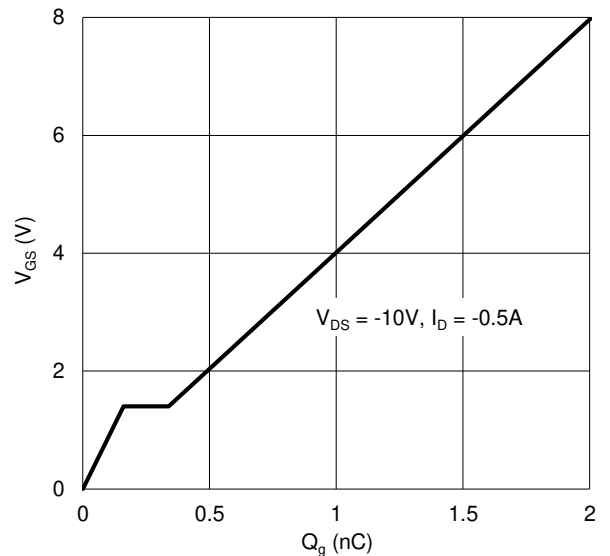


Figure 10. Gate Charge

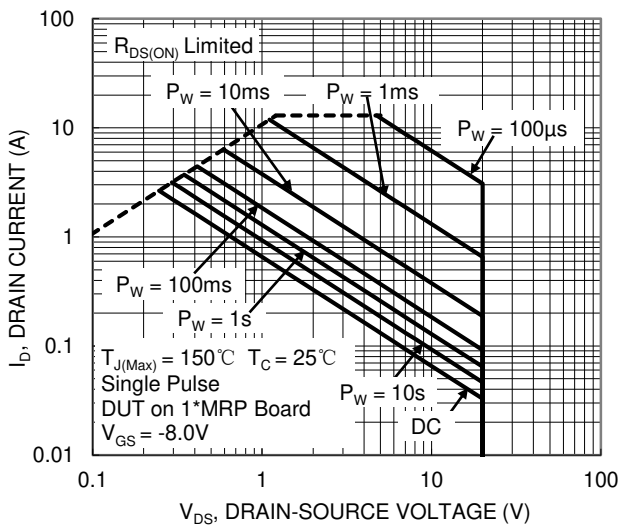


Figure 11. SOA, Safe Operation Area

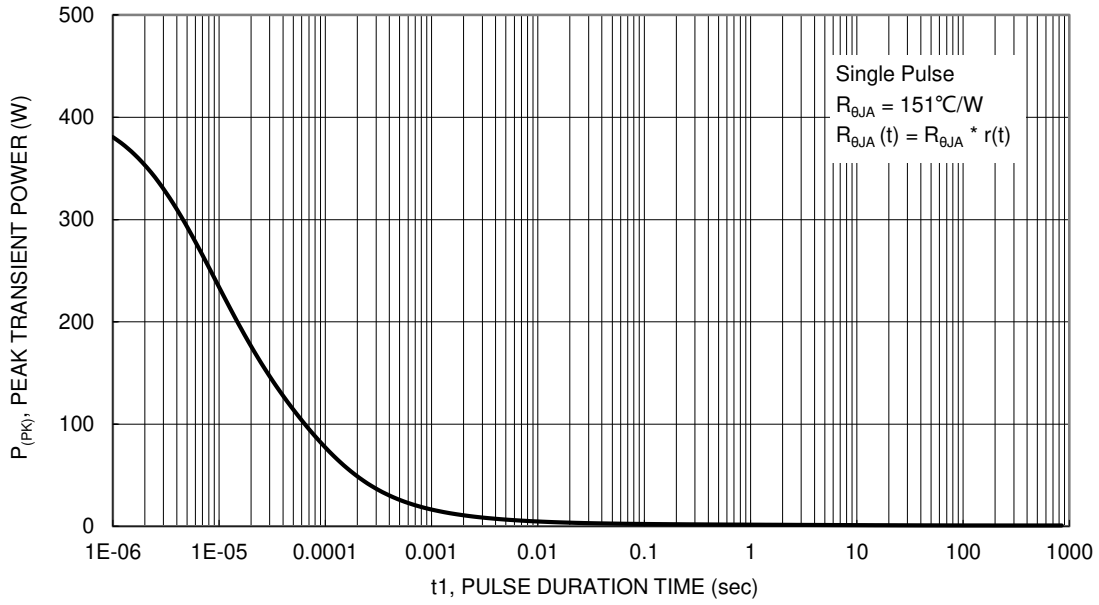


Figure 12. Single Pulse Maximum Power Dissipation

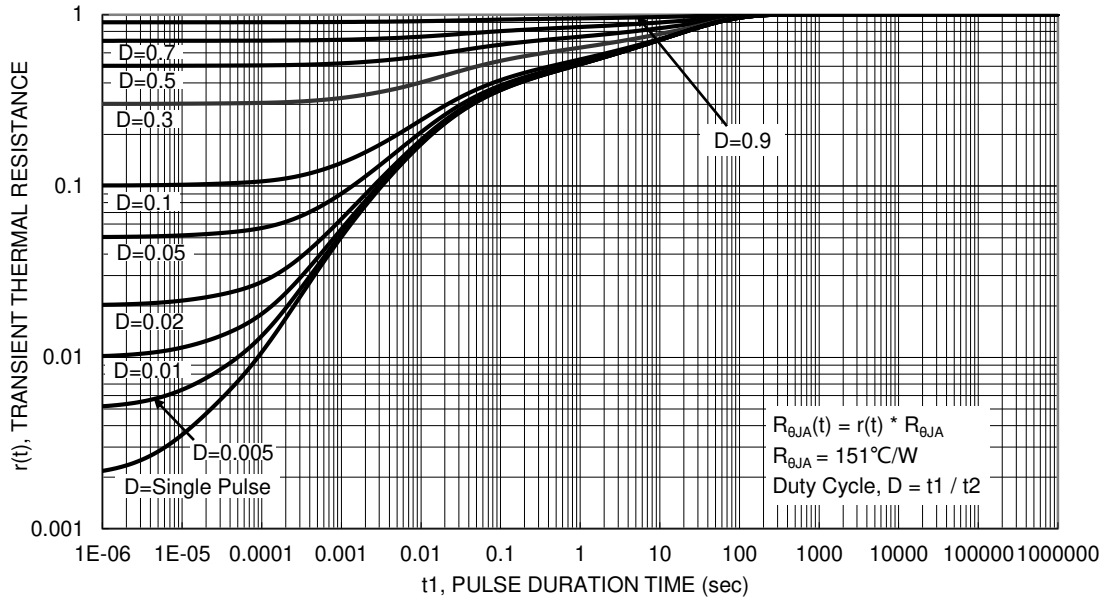
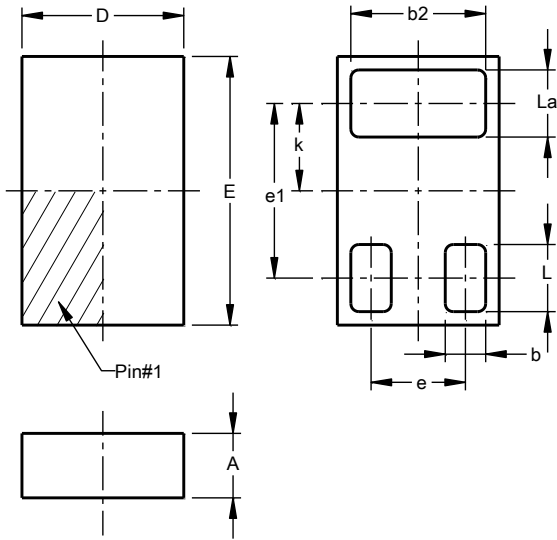


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

X4-DSN1006-3

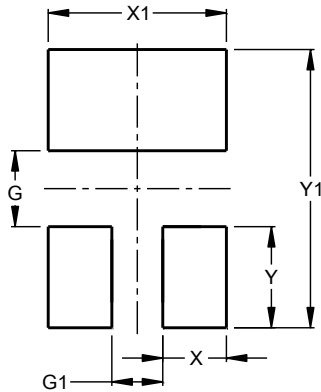


X4-DSN1006-3			
Dim	Min	Max	Typ
A	0.18	0.22	0.20
b	0.14	0.16	0.15
b2	0.49	0.51	0.50
D	0.56	0.64	0.60
E	0.96	1.04	1.00
e	--	--	0.35
e1	--	--	0.65
k	--	--	0.325
L	0.24	0.26	0.25
La	0.24	0.26	0.25
All Dimensions in mm			

**Suggested Pad Layout**

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

X4-DSN1006-3



Dimensions	Value (in mm)
G	0.40
G1	0.20
X	0.15
X1	0.50
Y	0.25
Y1	0.90

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