Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_A = +25°C
-20V	78mΩ @ V_{GS} = -8V	-3.4A
	100mΩ @ V_{GS} = -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

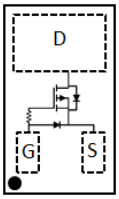
Features and Benefits

- Low Q_g & Q_{gd}
- 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 or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

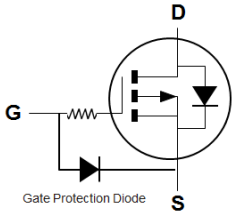
Mechanical Data

- 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 e4
- 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:
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

O = Product Type Marking Code
YW = Date Code Marking
Y or $\overline{Y}$ = Year (ex: 0 = 2020)
W or $\overline{W}$ = 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_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	-12	V
Continuous Drain Current (Note 5) V_{GS} = -8V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.4 -2.7	A
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.0 -2.4	A
Pulsed Drain Current (Note 6)			I_{DM}	-13	A
Human Body Model (HBM)			$V_{(ESD)}$	4	kV

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7)	P_D	0.81	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 7)	$R_{\theta JA}$	155.4	°C/W
Power Dissipation (Note 5)	P_D	1.4	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 5)	$R_{\theta JA}$	90.4	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

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 = -250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	-100	nA	V_{DS} = -16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	-50	nA	V_{GS} = -12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.7	-0.9	-1.2	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	64	78	mΩ	V_{GS} = -8V, I_D = -0.5A
		—	77	100		V_{GS} = -4.5V, I_D = -0.5A
		—	113	165		V_{GS} = -2.5V, I_D = -0.5A
		—	188	600		V_{GS} = -1.8V, I_D = -0.1A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -0.5A
Reverse Recovery Charge	Q_{RR}	—	1.3	—	nC	V_{DD} = -10V, I_F = -1A, di/dt = 100A/µs
Reverse Recovery Time	t_{RR}	—	7.7	—	ns	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	152	228	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	78	117		
Reverse Transfer Capacitance	C_{rss}	—	4.3	6.4		
Series Gate Resistance	R_G	—	21	31	Ω	f = 1MHz, V_{GS} = 0V, V_{DS} = 0V
Total Gate Charge	Q_g	—	1.1	1.6	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -0.5A
Gate-Source Charge	Q_{gs}	—	0.2	—		
Gate-Drain Charge	Q_{gd}	—	0.2	—		
Gate Charge at V_{TH}	$Q_{g(th)}$	—	3.6	—		
Turn-On Delay Time	$t_{D(ON)}$	—	4.1	6.1	ns	V_{DS} = -10V, V_{GS} = -4.5V, R_G = 2Ω, I_D = -0.5A
Turn-On Rise Time	t_R	—	5.6	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	9.5	14.2		
Turn-Off Fall Time	t_F	—	4.6	—		

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

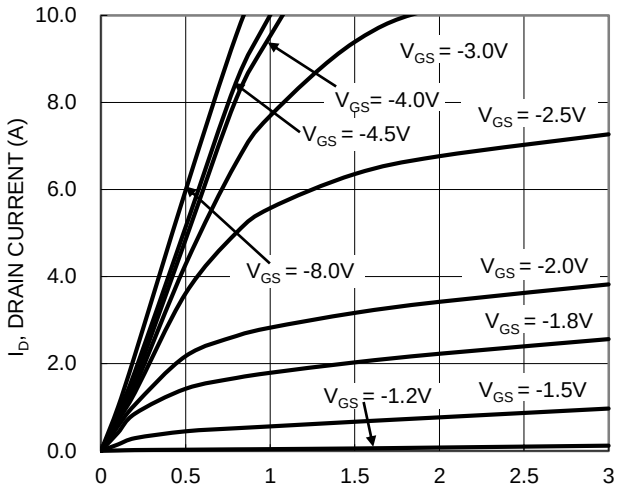


Figure 1. Typical Output Characteristic

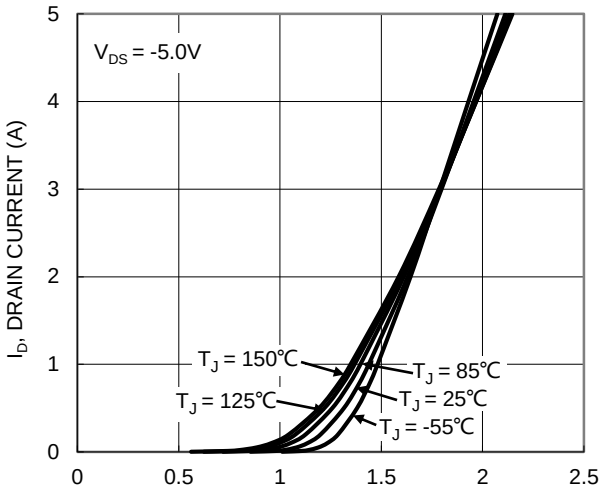


Figure 2. Typical Transfer Characteristic

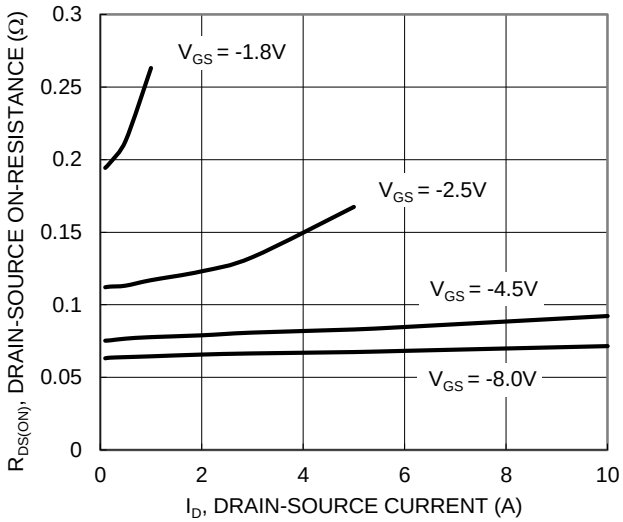


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

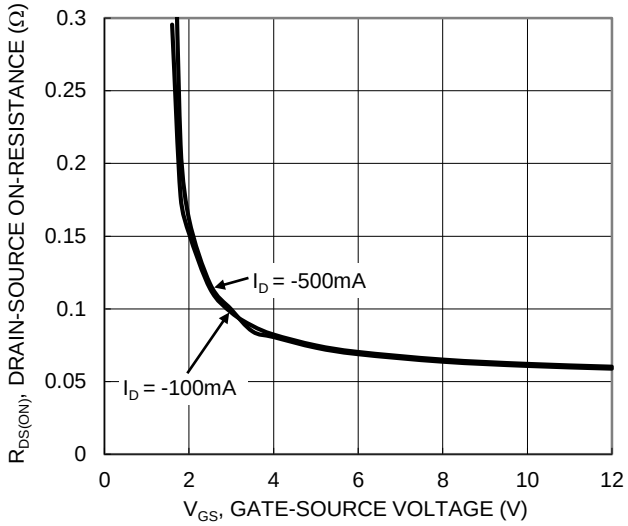


Figure 4. Typical Transfer Characteristic

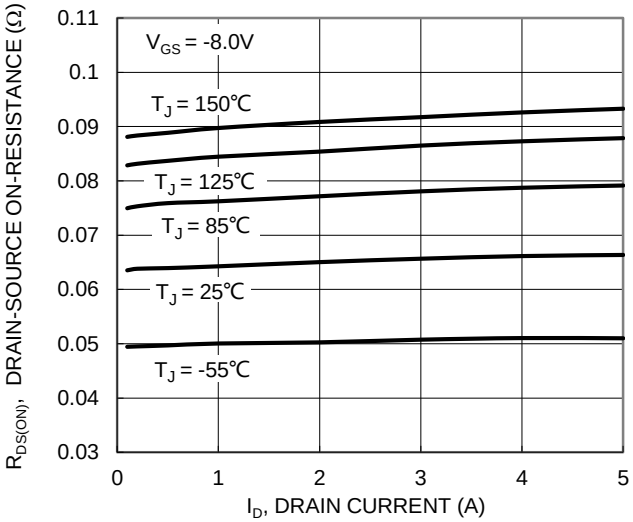


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

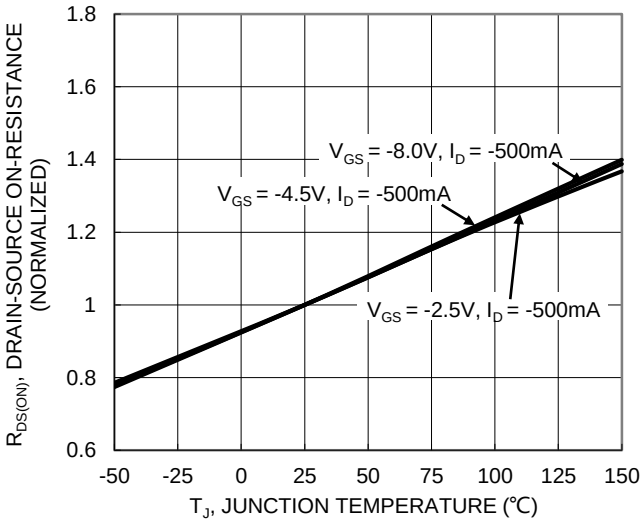


Figure 6. On-Resistance Variation with Junction Temperature

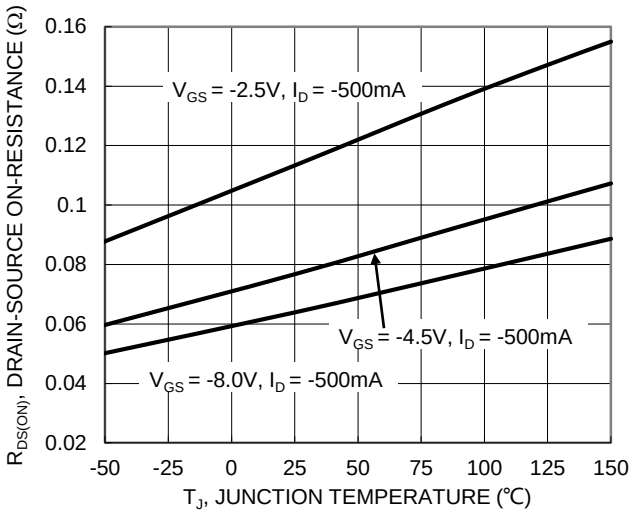


Figure 7. On-Resistance Variation with Junction Temperature

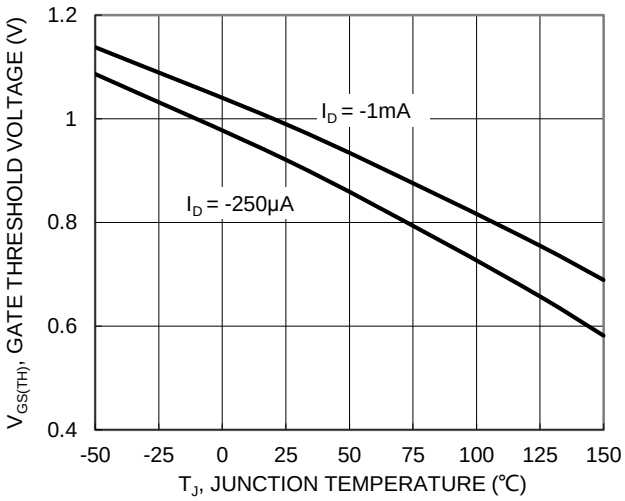


Figure 8. Gate Threshold Variation vs. Junction Temperature

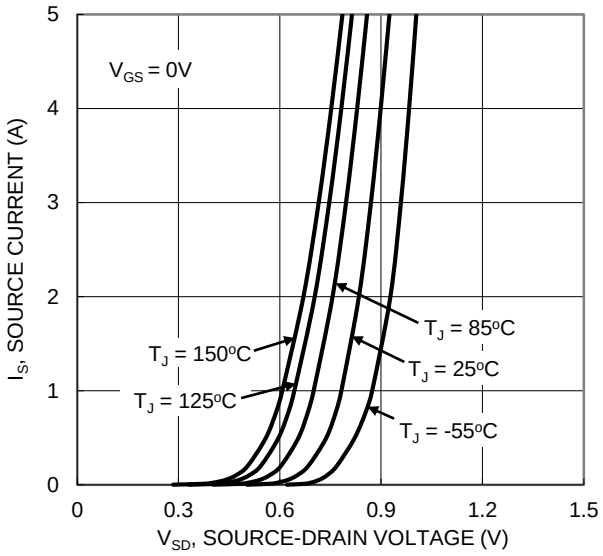


Figure 9. Diode Forward Voltage vs. Current

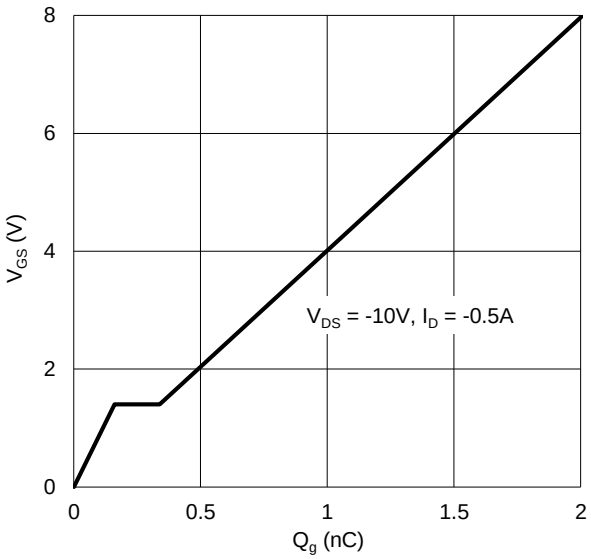


Figure 10. Gate Charge

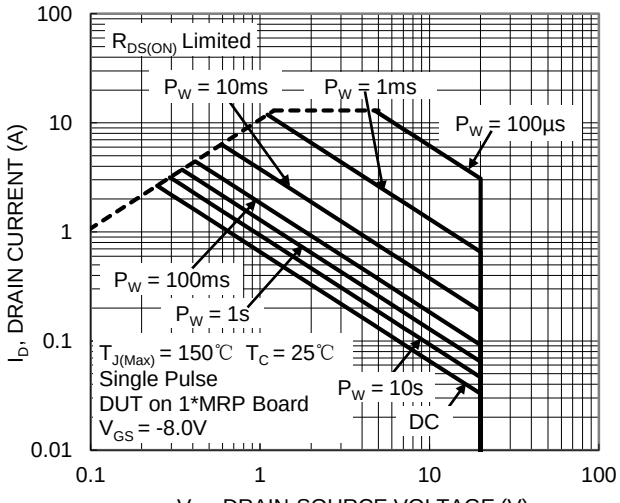


Figure 11. SOA, Safe Operation Area

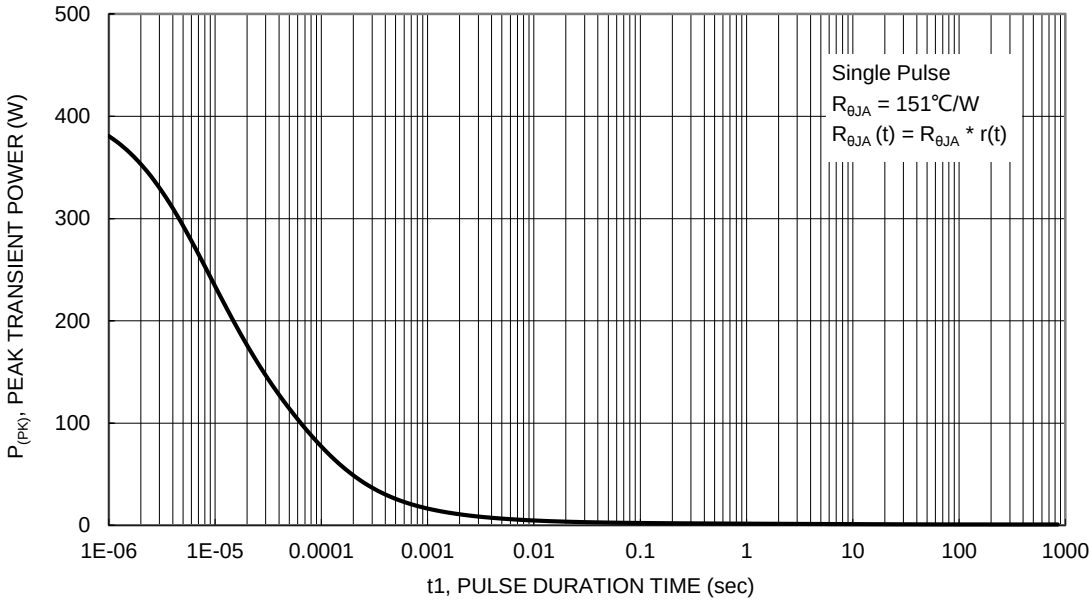


Figure 12. Single Pulse Maximum Power Dissipation

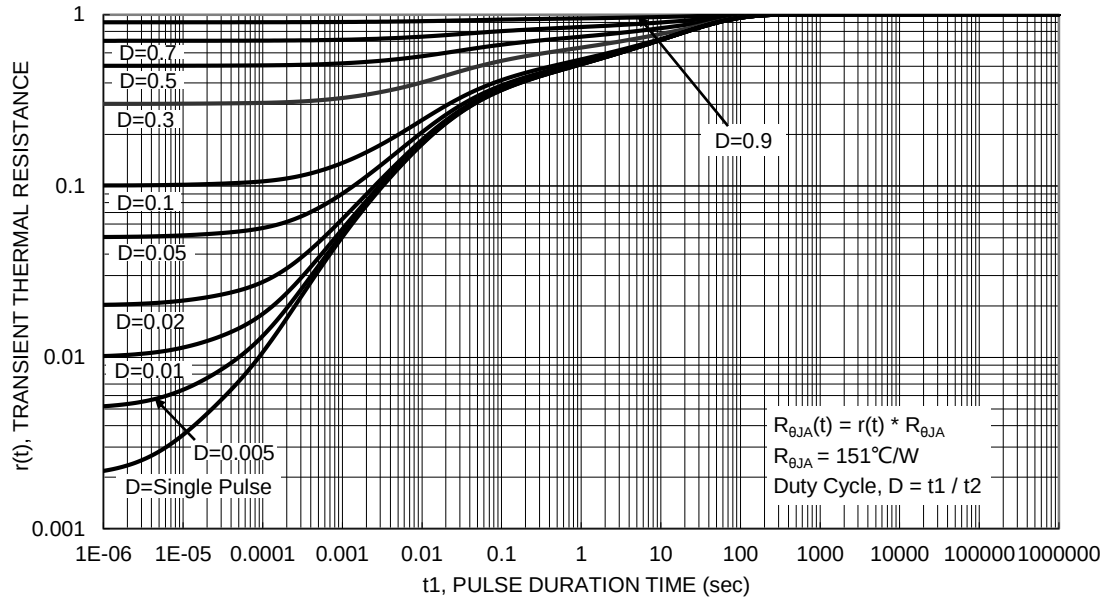
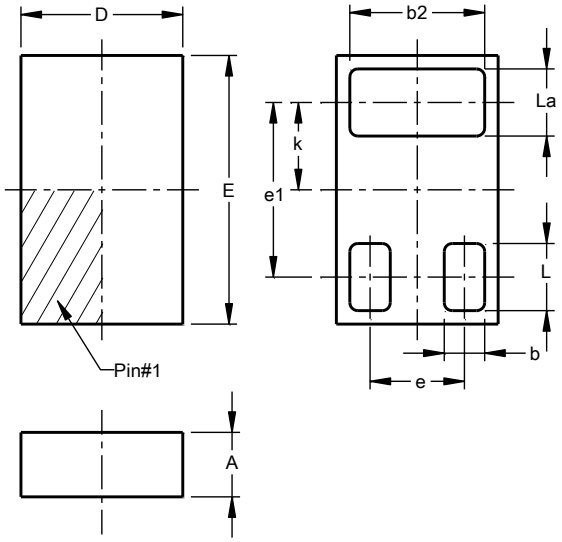


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X4-DSN1006-3

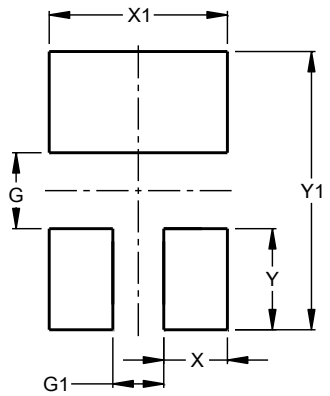


X4-DSN1006-3			
Dim	**Min**	**Max**	**Typ**
A	0.18	0.22	0.20
b	0.14	0.16	0.15
b2	0.49	0.51	0.50
D	0.56	0.64	0.60
E	0.96	1.04	1.00
e	--	--	0.35
e1	--	--	0.65
k	--	--	0.325
L	0.24	0.26	0.25
La	0.24	0.26	0.25
All Dimensions in mm			

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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