20V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)\ Max}$	I_D T_A = +25°C
-20V	88mΩ @ V_{GS} = -8V	-2.9A
	105mΩ @ V_{GS} = -4.5V	-1.8A

Features and Benefits

- Low Q_g & Q_{gd}
- Small Footprint
- Low Profile 0.30mm Height
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

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.

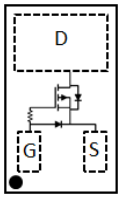
Mechanical Data

- Case: X2-DSN1006-3
- Terminal Connections: See Diagram Below
- Terminals: Finish – Matte Tin Annealed over Copper Pillar (e3)

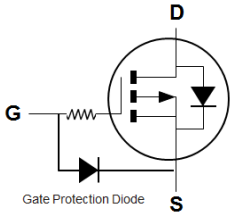
Applications

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

X2-DSN1006-3



Top View



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2088LCP3-7	X2-DSN1006-3	3000/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

B = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: F = 2018)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Code	B	C	D	E	F	G	H	I	J	K	L	M

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

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	-2.9 -2.4	A
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-1.8 -1.4	A
Pulsed Drain Current (Note 6)			I_{DM}	-15	A
Human Body Model (HBM)			$V_{(ESD)}$	4	kV

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7)	P_D	0.57	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 7)	$R_{\theta JA}$	217	°C/W
Power Dissipation (Note 5)	P_D	1.13	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 5)	$R_{\theta JA}$	110	°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	-1.0	-1.2	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	73	88	mΩ	V_{GS} = -8V, I_D = -0.5A
		—	90	105		V_{GS} = -4.5V, I_D = -0.5A
		—	143	174		V_{GS} = -2.5V, I_D = -0.5A
		—	266	750		V_{GS} = -1.8V, I_D = -0.1A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	3.4	—	S	V_{DS} = -10V, I_D = -0.5A
Diode Forward Voltage	V_{SD}	—	-0.75	-1.0	V	V_{GS} = 0V, I_S = -0.5A
Reverse Recovery Charge	Q_{RR}	—	1.0	—	nC	V_{DD} = -10V, I_F = -1A, di/dt = 100A/µs
Reverse Recovery Time	t_{RR}	—	5.7	—	ns	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	121	160	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	66	100		
Reverse Transfer Capacitance	C_{rss}	—	4.3	8		
Series Gate Resistance	R_G	9	18	36	Ω	f = 1MHz, V_{GS} = 0V, V_{DS} = 0V
Total Gate Charge	Q_g	—	1.1	1.5	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -0.5A
Gate-Source Charge	Q_{gs}	—	0.17	—		
Gate-Drain Charge	Q_{gd}	—	0.22	—		
Gate Charge at V_{TH}	$Q_{g(th)}$	—	0.12	—		
Turn-On Delay Time	$t_{D(ON)}$	—	6.3	12	ns	V_{DS} = -10V, V_{GS} = -4.5V, R_G = 2Ω, I_D = -0.5A
Turn-On Rise Time	t_R	—	2.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	17	34		
Turn-Off Fall Time	t_F	—	6	—		

Notes:
5. Device mounted on FR-4 material with 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm 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.

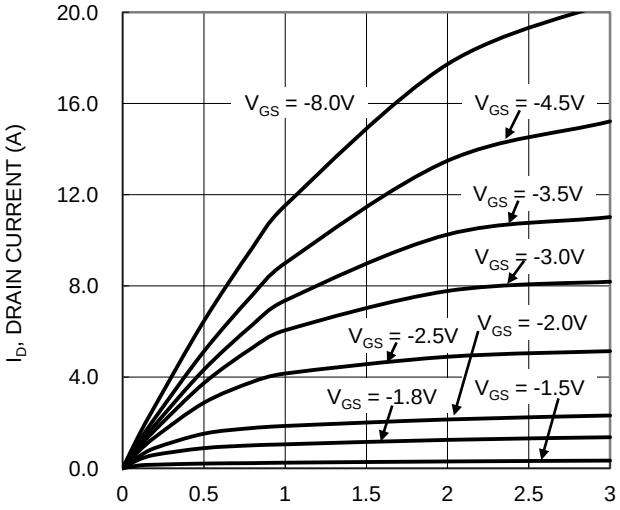


Figure 1. Typical Output Characteristic

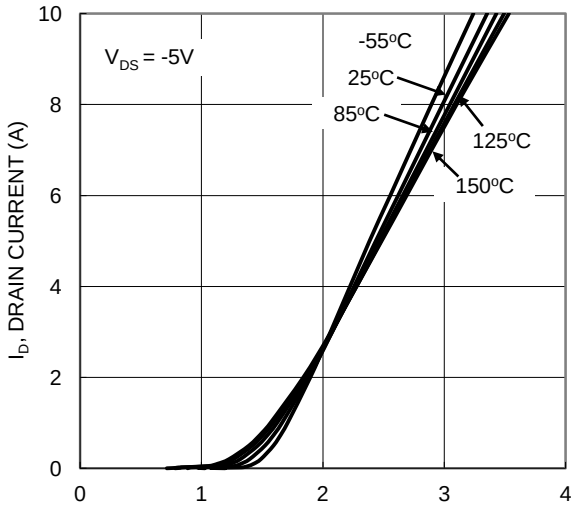


Figure 2. Typical Transfer Characteristic

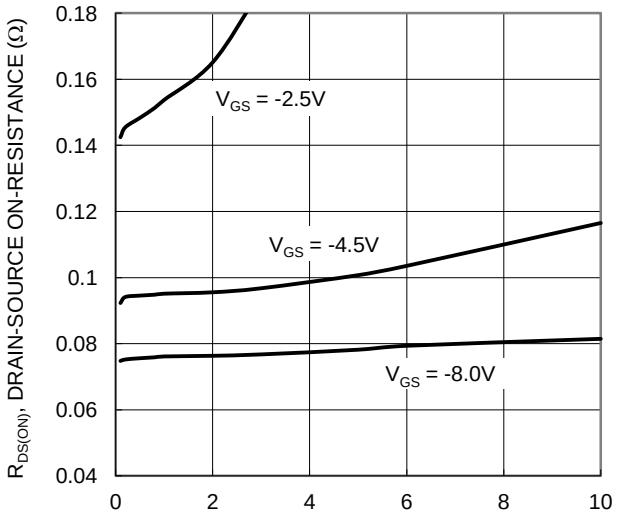


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

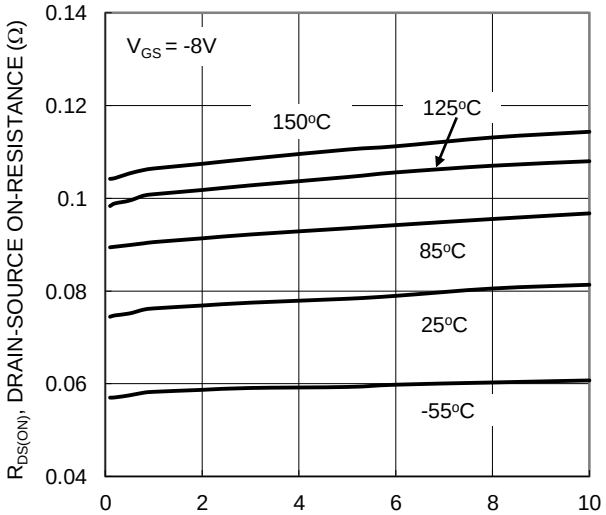


Figure 4. Typical On-Resistance vs. Drain Current and Junction Temperature

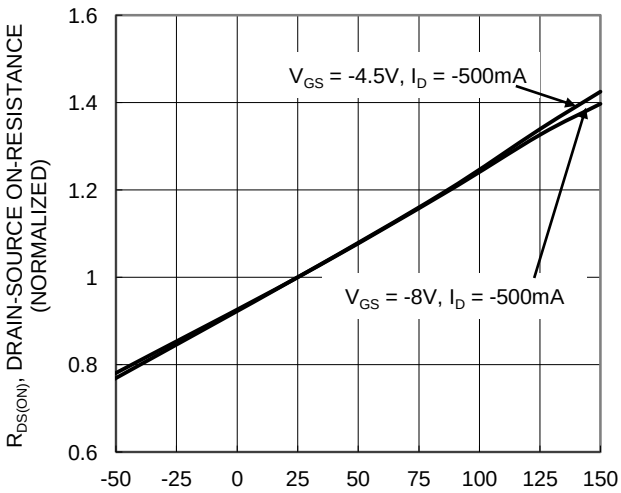


Figure 5. On-Resistance Variation with Junction Temperature

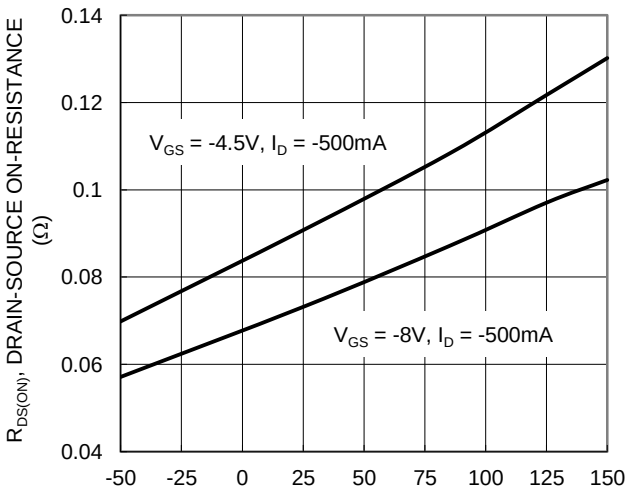


Figure 6. On-Resistance Variation with Junction Temperature

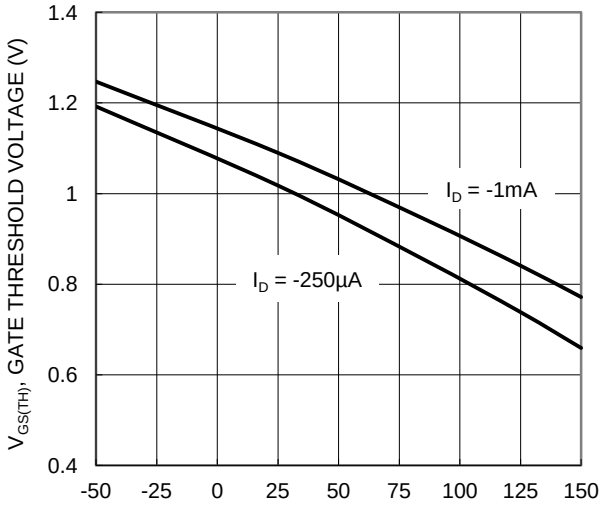


Figure 7. Gate Thershold Variation vs. Junction Temperature

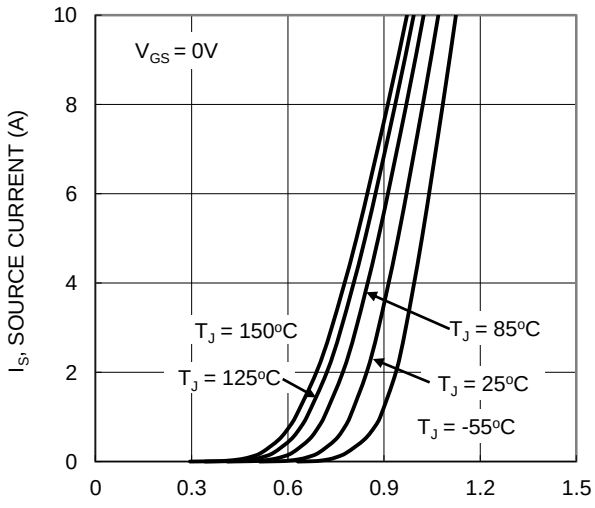


Figure 8. Diode Forward Voltage vs. Current

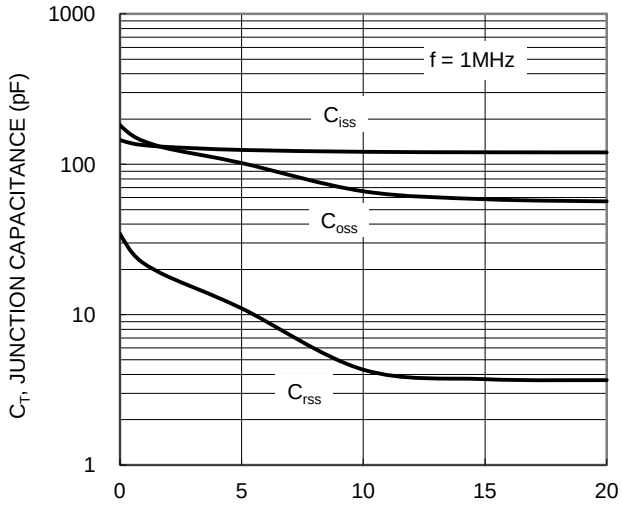


Figure 9. Typical Junction Capacitance

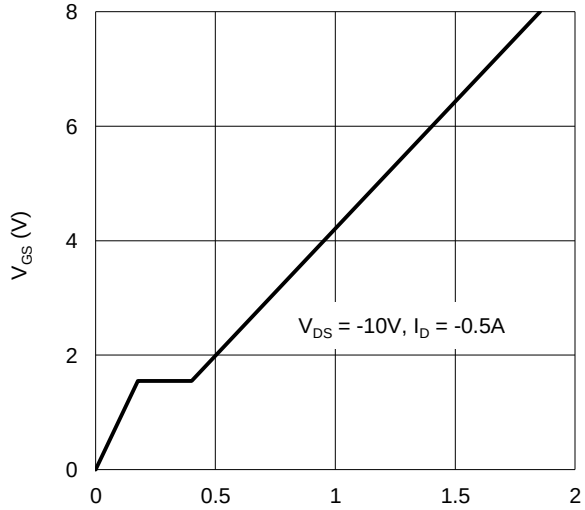


Figure 10. Gate Charge

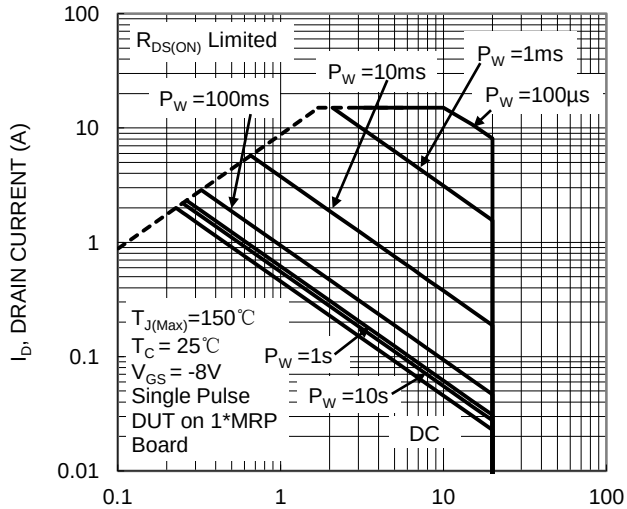


Figure 11. SOA, Safe Operation Area

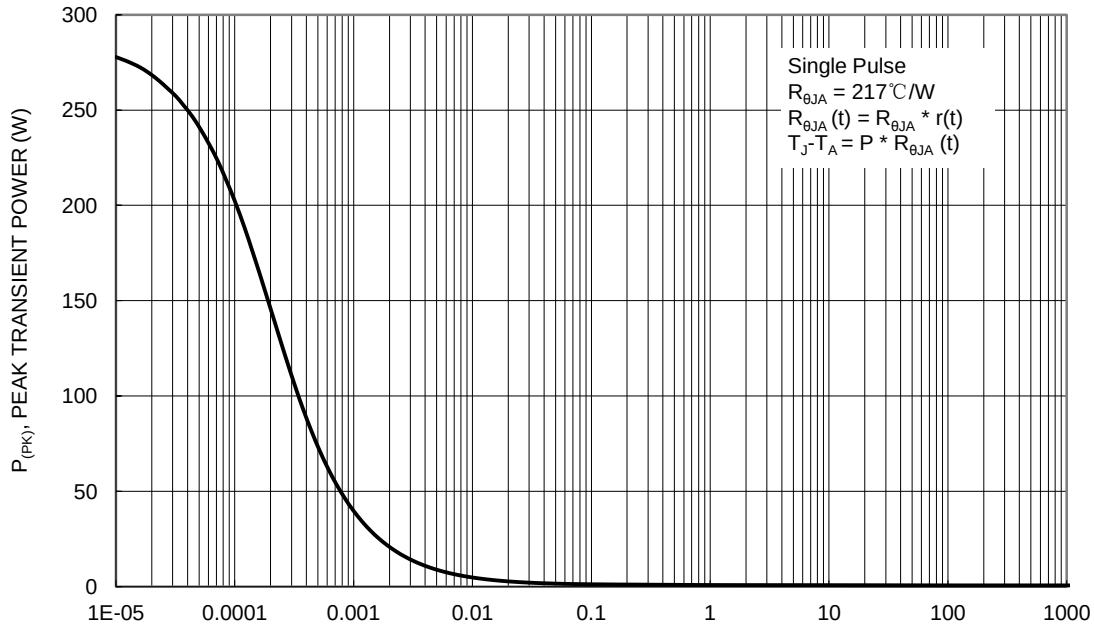


Figure 12. Single Pulse Maximum Power Dissipation

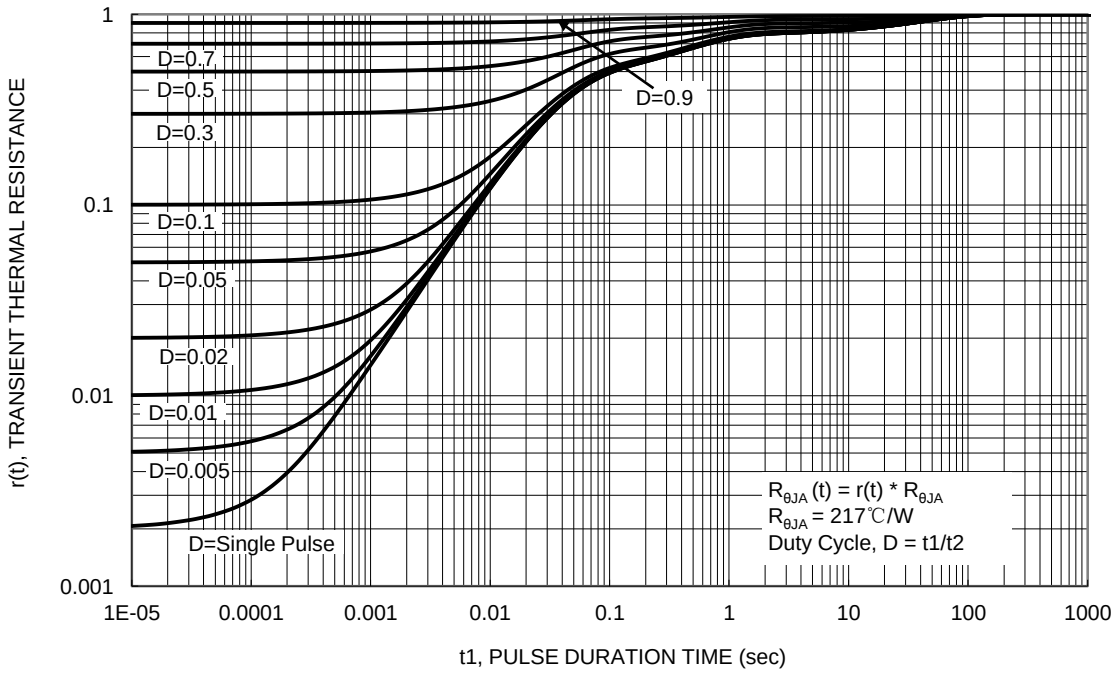
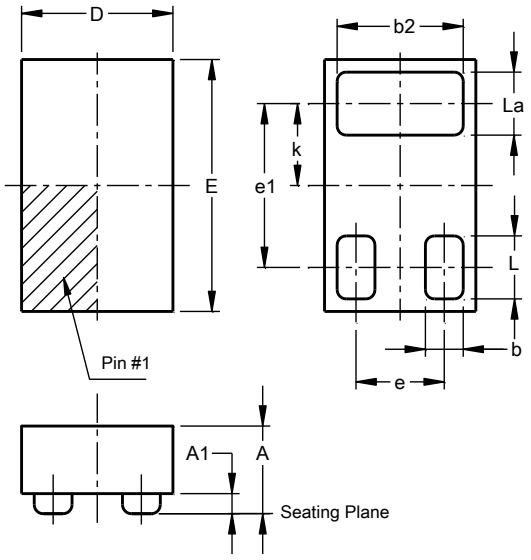


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X2-DSN1006-3

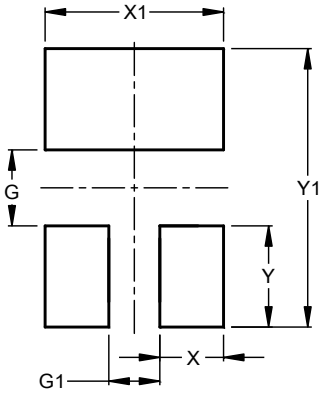


X2-DSN1006-3			
Dim	**Min**	**Max**	**Typ**
A	--	0.348	0.32
A1	--	--	0.08
b	0.14	0.16	0.15
b2	0.49	0.51	0.50
D	0.56	0.64	0.60
E	0.96	1.04	1.00
e	--	--	0.35
e1	--	--	0.65
k	--	--	0.325
L	0.21	0.29	0.25
La	0.21	0.29	0.25
All Dimensions in mm			

Suggested Pad Layout

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

X2-DSN1006-3



Dimensions	Value (in mm)
G	0.30
G1	0.20
X	0.25
X1	0.70
Y	0.40
Y1	1.10

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