20V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D Max T_A = +25°C
-20V	1.9Ω @ V_{GS} = -4.5V	-0.4A
	2.4Ω @ V_{GS} = -2.5V	-0.36A
	3.4Ω @ V_{GS} = -1.8V	-0.3A

Description and Applications

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

- Portable electronics

Features and Benefits

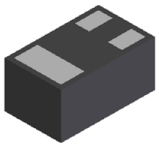
- Footprint of just 0.6mm^2 – 13 times smaller than SOT23
- 0.4mm Profile – Ideal for Low Profile Applications
- Low Gate Threshold Voltage
- Fast Switching Speed
- **ESD Protected**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DIODES™ DMP22D5UFB4Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Mechanical Data

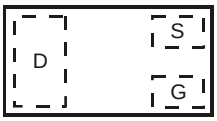
- Package: X2-DFN1006-3
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.001 grams (Approximate)

ESD Protected

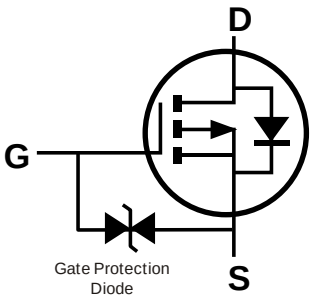
X2-DFN1006-3



Bottom View



Top View
Internal Schematic



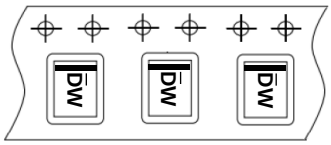
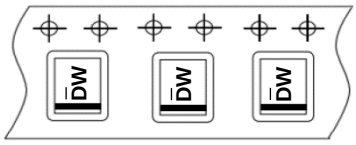
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Tape Pitch (mm)	Packing	
						Qty.	Carrier
DMP22D5UFB4Q-7R	X2-DFN1006-3	DW	7	8	4	3,000	Reel
DMP22D5UFB4Q-7B	X2-DFN1006-3	DW	7	8	2	10,000	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

DMP22D5UFB4Q-7R	 Top View Bar Denotes Gate and Source Side 	$\overline{DW}$ = Product Type Marking Code
DMP22D5UFB4Q-7B	 Top View Bar Denotes Gate and Source Side 	$\overline{DW}$ = Product Type Marking Code

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}	±8	V
Continuous Drain Current (Note 6)	Steady State	T_A = +25°C T_A = +70°C	I_D	-0.4 -0.32	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-0.4	A
Pulsed Drain Current (Note 7)			I_{DM}	-0.8	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	0.46	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	272.1	°C/W
Power Dissipation (Note 6)	P_D	1.18	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	106.2	°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}	—	—	-1	µA	V_{DS} = -16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	1.9	Ω	V_{GS} = -4.5V, I_D = -100mA
				2.4		V_{GS} = -2.5V, I_D = -50mA
				3.4		V_{GS} = -1.8V, I_D = -20mA
				5		V_{GS} = -1.5V, I_D = -10mA
Diode Forward Voltage	V_{SD}	—	—	-1.1	V	V_{GS} = 0V, I_S = -10mA
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	17	—	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	4.1	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.7	—	pF	
Total Gate Charge	Q_g	—	0.3	—	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -250mA
Gate-Source Charge	Q_{gs}	—	0.04	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	7.3	—	ns	V_{DD} = -15V, V_{GS} = -4.5V, R_G = 2Ω, I_D = -200mA
Turn-On Rise Time	t_R	—	20.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	185	—	ns	
Turn-Off Fall Time	t_F	—	97	—	ns	

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate.
7. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

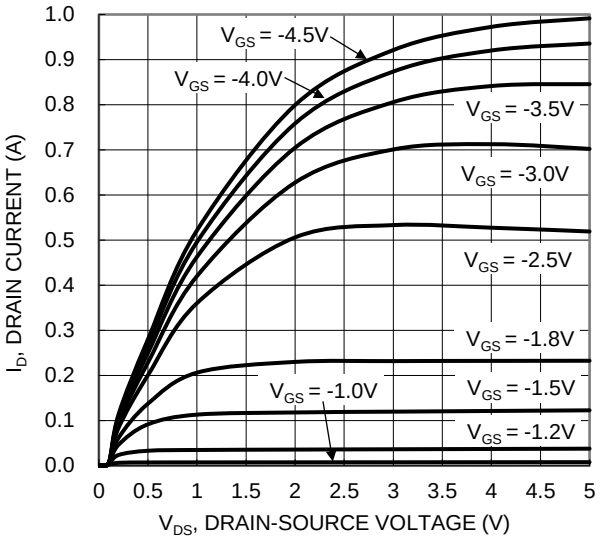


Figure 1. Typical Output Characteristic

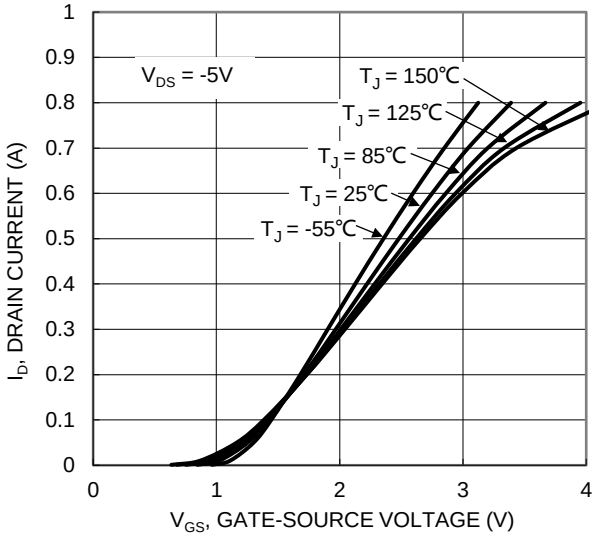


Figure 2. Typical Transfer Characteristic

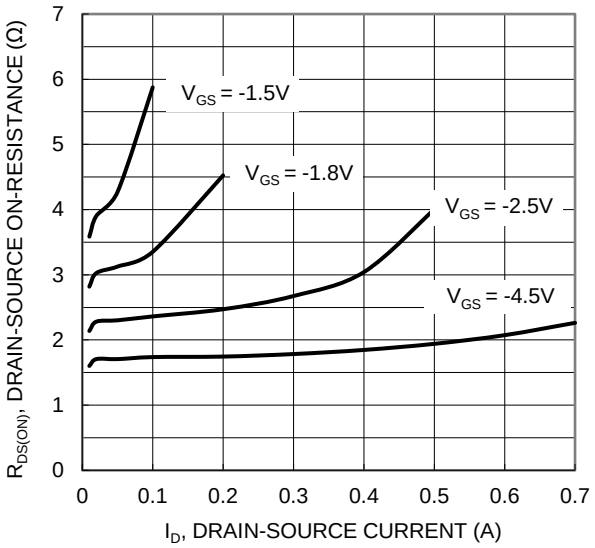


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

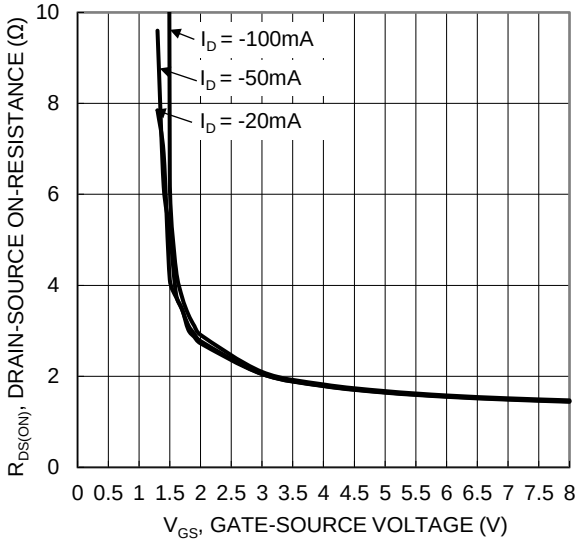


Figure 4. Typical Transfer Characteristic

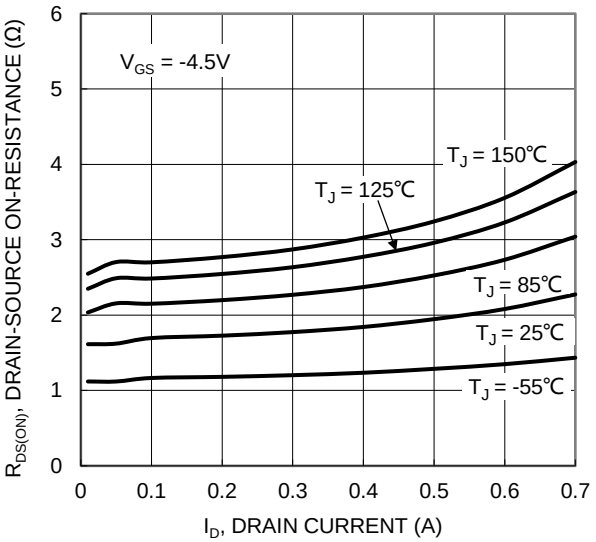


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

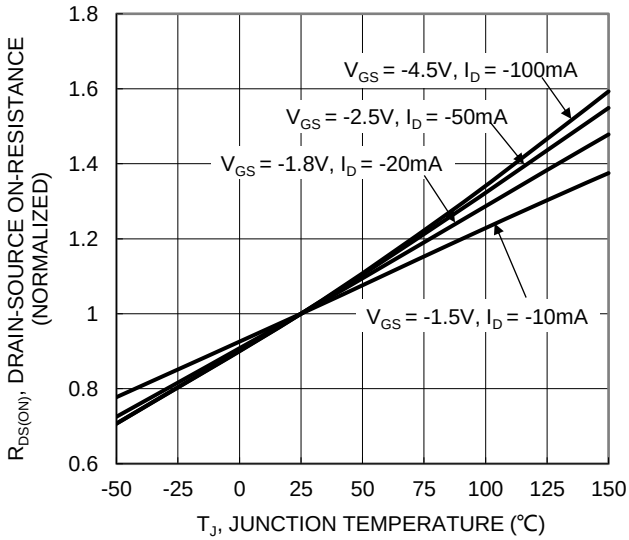


Figure 6. On-Resistance Variation with Temperature

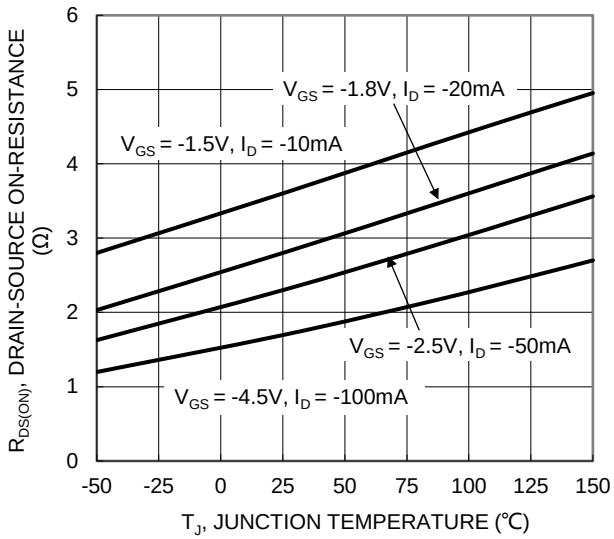


Figure 7. On-Resistance Variation with Temperature

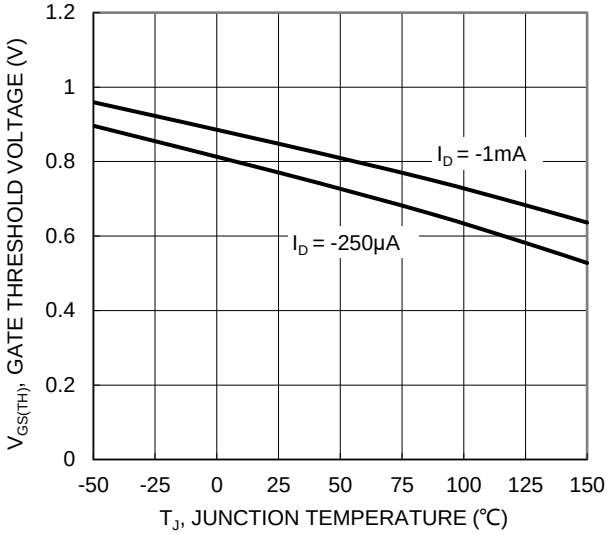


Figure 8. Gate Threshold Variation vs. Junction Temperature

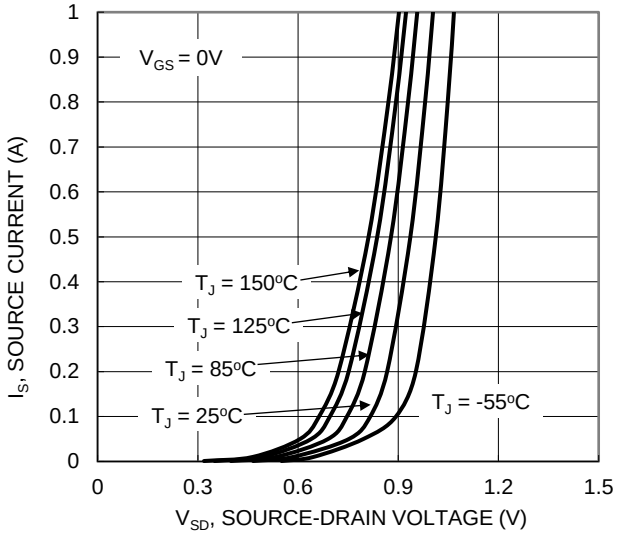


Figure 9. Diode Forward Voltage vs. Current

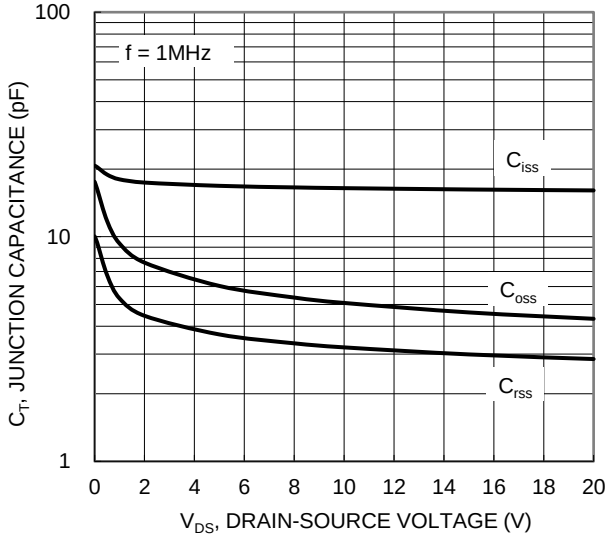


Figure 10. Typical Junction Capacitance

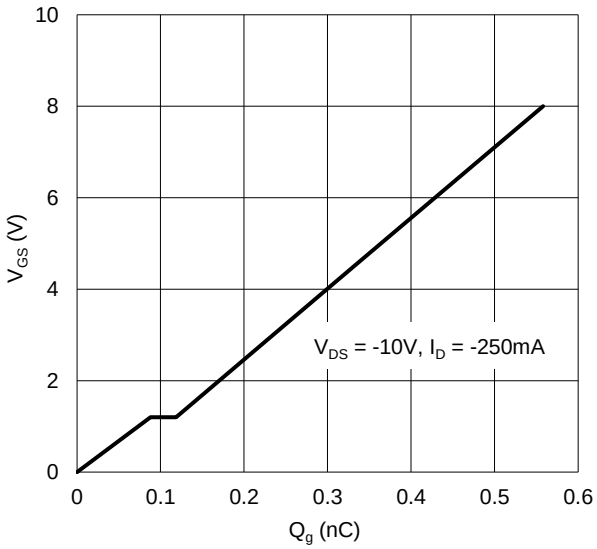


Figure 11. Gate Charge

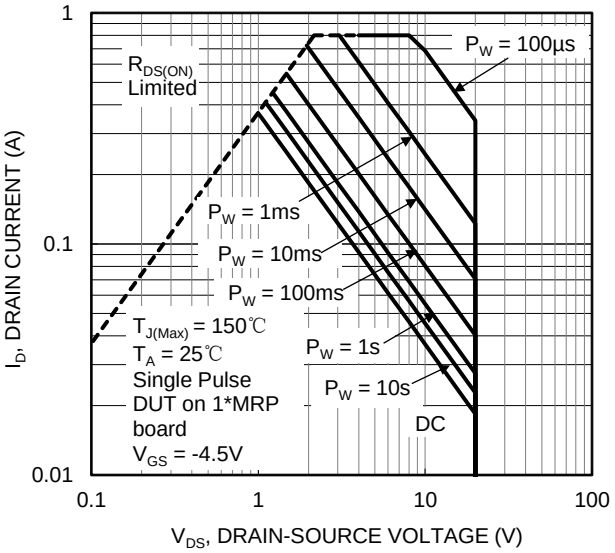


Figure 12. SOA, Safe Operation Area

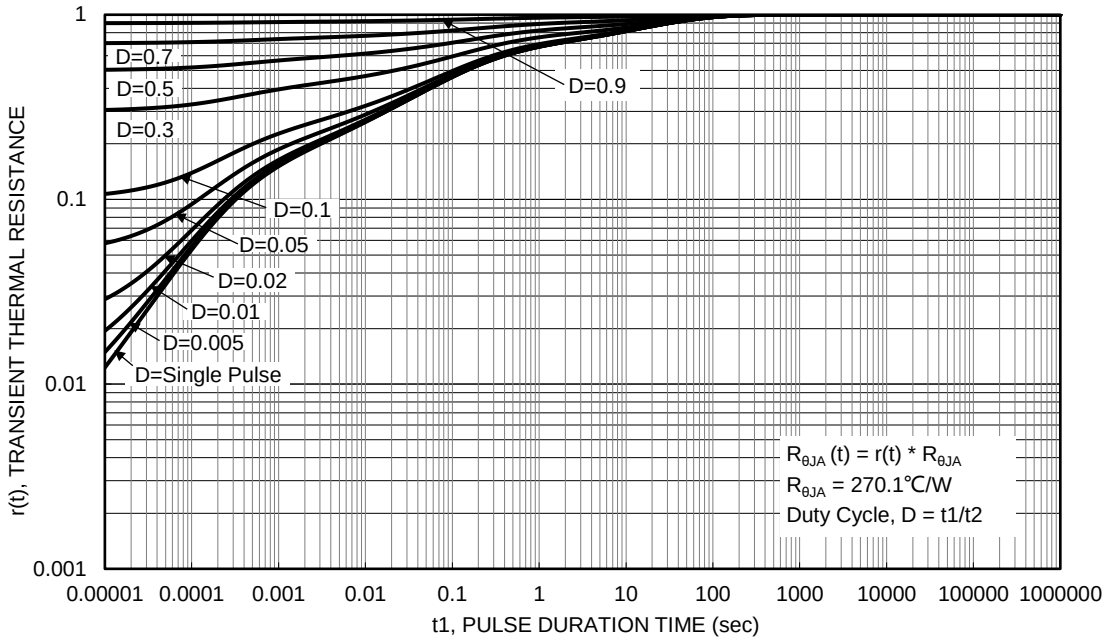
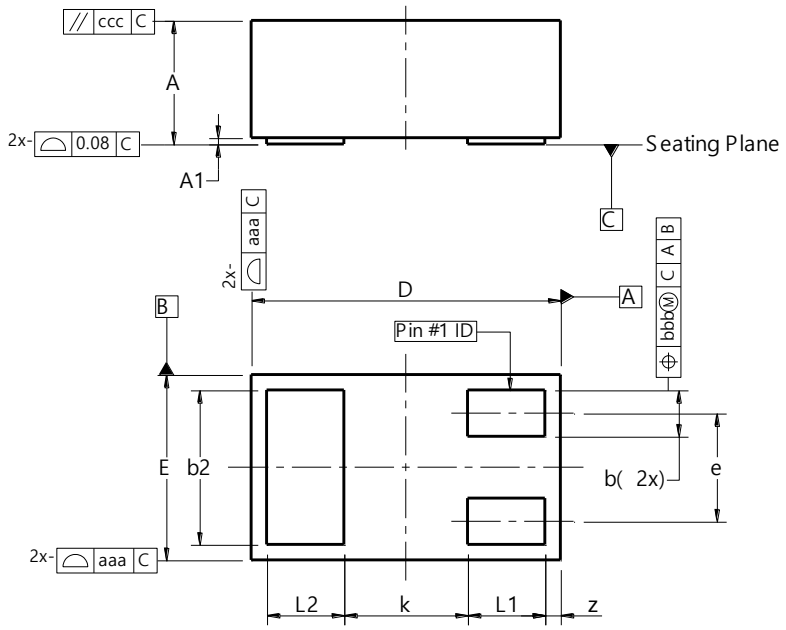


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X2-DFN1006-3

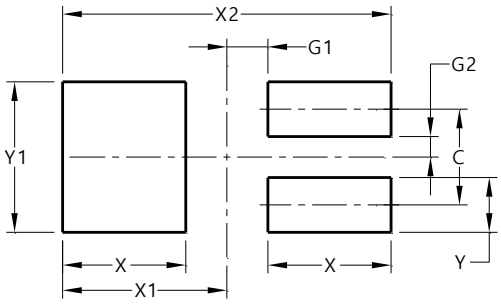


X2-DFN1006-3			
Dim	**Min**	**Max**	**Typ**
A	—	0.40	—
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.05	1.00
E	0.55	0.65	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
k	-	-	0.40
z	0.02	0.08	0.05
aaa	0.15		
bbb	0.05		
ccc	0.05		
All Dimensions in mm			

Suggested Pad Layout

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

X2-DFN1006-3



Dimensions	Value (in mm)
C	0.350
G1	0.150
G2	0.075
X	0.450
X1	0.600
X2	1.200
Y	0.200
Y1	0.550

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