

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max @ T _A = +25°C (Note 5)
-20V	495mΩ @ V _{GS} = -4.5V	-0.77A
	690mΩ @ V _{GS} = -2.5V	-0.67A
	960mΩ @ V _{GS} = -1.8V	-0.57A

Description and Applications

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

- Portable Electronics

Features and Benefits

- Footprint of Just 0.6mm²—13 Times Smaller Than SOT23
- Low Gate Threshold Voltage
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- ESD Protected Gate**
- Qualified to AEC-Q101 Standards for High Reliability**

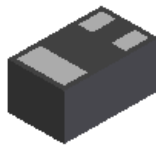
Mechanical Data

- Case: X1-DFN1006-3
- Case 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)

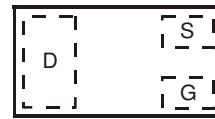
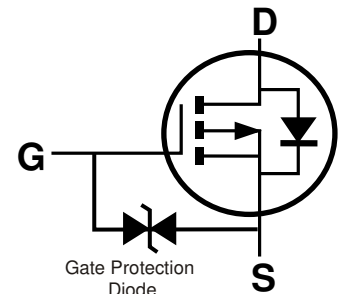


ESD PROTECTED

X1-DFN1006-3



Bottom View


 Top View
Internal Schematic




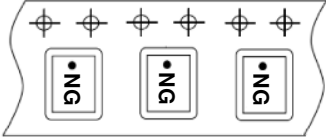
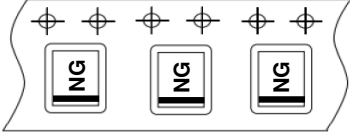

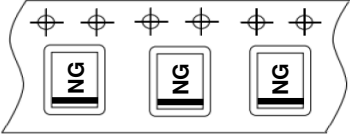
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP21D0UFB-7	X1-DFN1006-3	3,000/Tape & Reel
DMP21D0UFB-7B	X1-DFN1006-3	10,000/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, see <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

<p>DMP21D0UFB-7</p>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Top View Dot Denotes Drain Side</p> </div> <div style="text-align: center;"> <p>From date code 1527 (YYWW), this changes to:</p>  <p>Top View Bar Denotes Gate and Source Side</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;">   </div>
<p>DMP21D0UFB-7B</p>	<div style="text-align: center; margin-bottom: 20px;">  <p>Top View Bar Denotes Gate and Source Side</p> </div> <div style="text-align: center; margin-bottom: 20px;"> <p>NG = Part Marking Code</p> </div> <div style="text-align: center;">  </div>

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	Steady State V _{GS} =-4.5V	T _A = +25°C (Note 5)	-0.77	A
		T _A = +85°C (Note 5)	-0.55	
		T _A = +25°C (Note 6)	-1.17	
Pulsed Drain Current (Note 7)		I _{DM}	-5.0	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	0.43	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	293	°C/W
Power Dissipation (Note 6)	P _D	0.99	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	126	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Thermal Characteristics

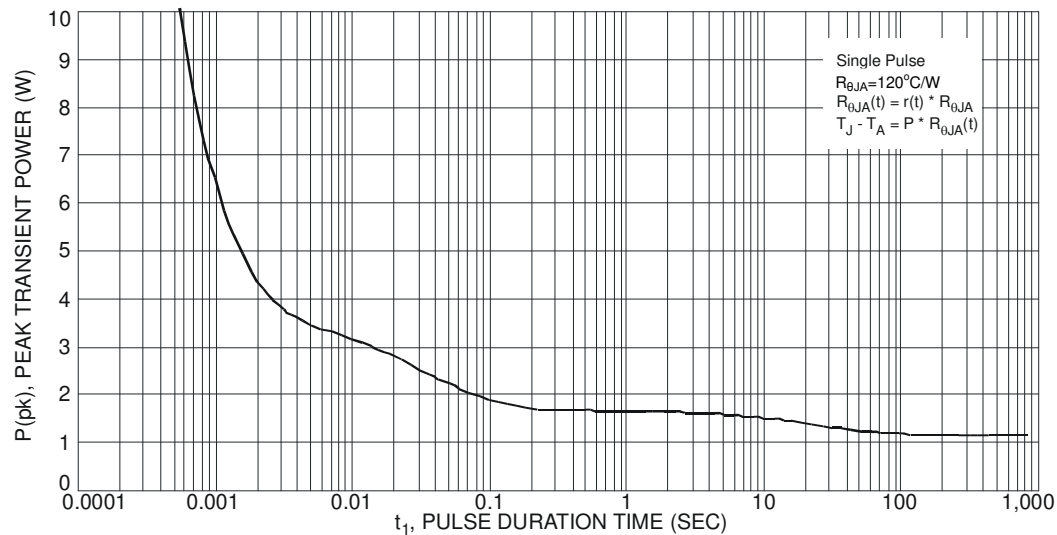


Fig. 1 Single Pulse Maximum Power Dissipation

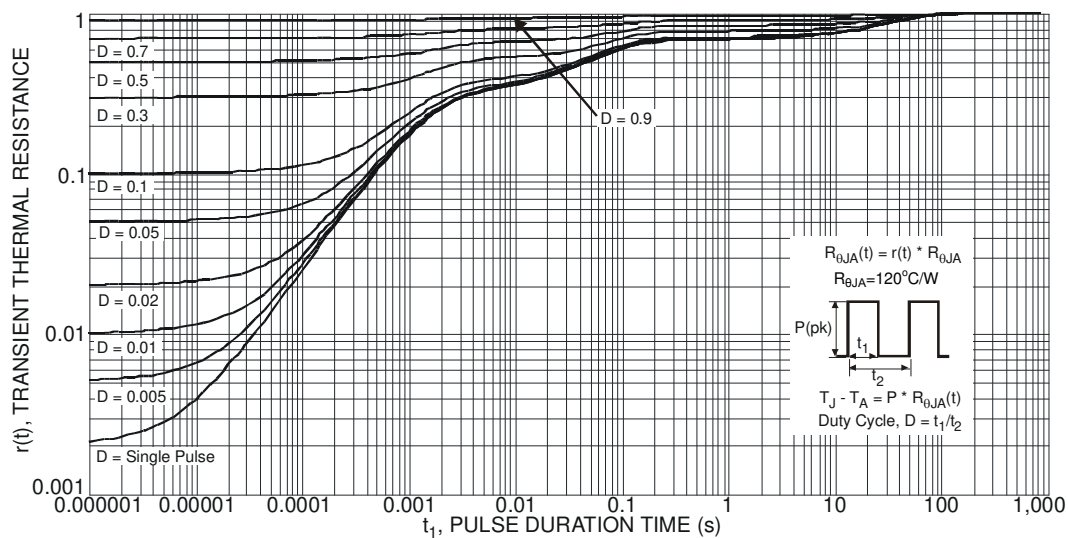


Fig. 2 Transient Thermal Response

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current, $T_J = +25^\circ\text{C}$	I_{DSS}	—	—	-1	μA	$V_{DS} = -20V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.5	-0.7	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	495	m Ω	$V_{GS} = -4.5V, I_D = -400mA$
		—	—	690		$V_{GS} = -2.5V, I_D = -300mA$
		—	—	960		$V_{GS} = -1.8V, I_D = -100mA$
Forward Transfer Admittance	$ Y_{fs} $	50	—	—	mS	$V_{DS} = -3V, I_D = -300mA$
Diode Forward Voltage	V_{SD}	—	—	-1.2	V	$V_{GS} = 0V, I_S = -300mA$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{ISS}	—	76.5	—	pF	$V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz$
Output Capacitance	C_{OSS}	—	13.7	—	pF	
Reverse Transfer Capacitance	C_{RSS}	—	10.7	—	pF	
Gate Resistance	R_g	—	195	—	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge	Q_g	—	1.5	—	nC	$V_{GS} = -8V, V_{DS} = -15V, I_D = -1A$
Total Gate Charge	Q_g	—	1.0	—	nC	$V_{GS} = -4.5V, V_{DS} = -15V, I_D = -1A$
Gate-Source Charge	Q_{gs}	—	0.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.3	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	7.1	—	ns	$V_{DS} = -10V, I_D = -1A$ $V_{GS} = -4.5V, R_G = 6\Omega$
Turn-On Rise Time	t_R	—	8.0	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	31.7	—	ns	
Turn-Off Fall Time	t_F	—	18.5	—	ns	

- 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 thermal vias to bottom layer 1inch square copper plate.
 - Device mounted on minimum recommended pad layout test board, 10 μs pulse duty cycle = 1%.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

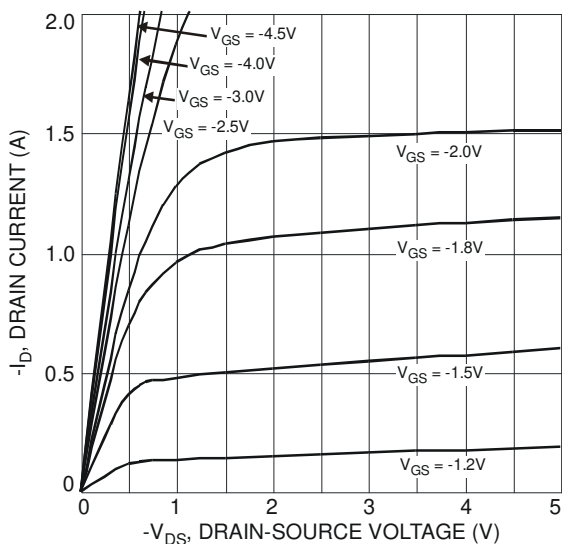
Typical Characteristics


Fig. 3 Typical Output Characteristic

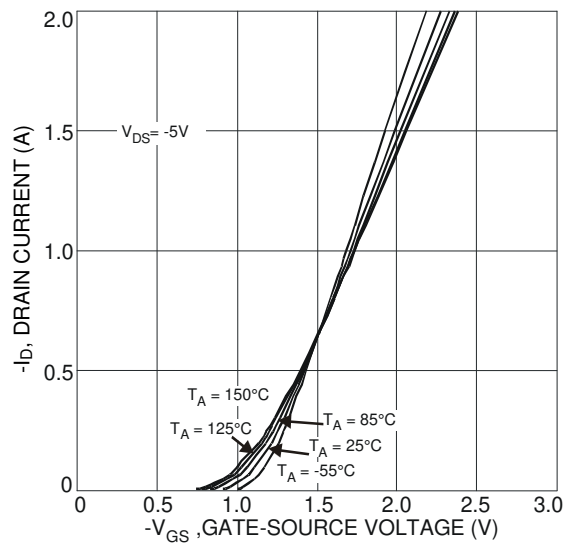


Fig. 4 Typical Transfer Characteristic

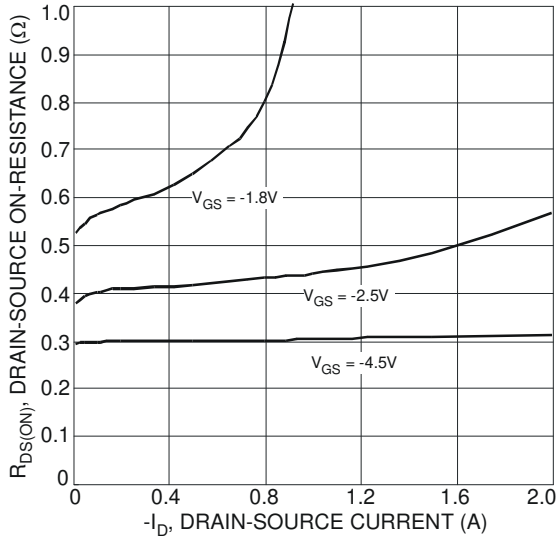


Fig. 5 Typical On-Resistance vs. Drain Current and Gate Voltage

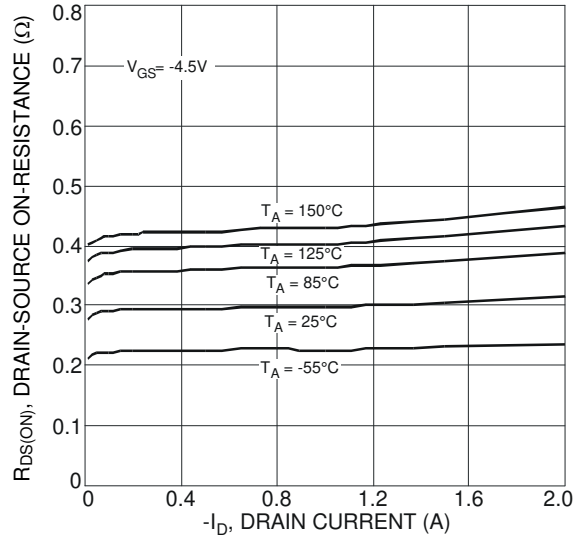


Fig. 6 Typical On-Resistance vs. Drain Current and Temperature

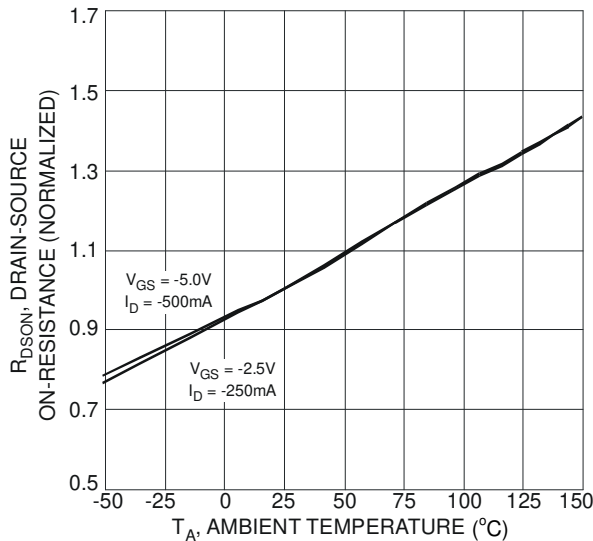


Fig. 7 On-Resistance Variation with Temperature

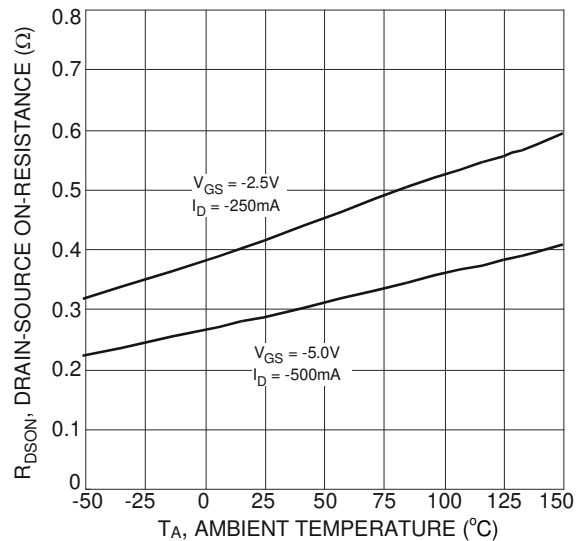


Fig. 8 On-Resistance Variation with Temperature

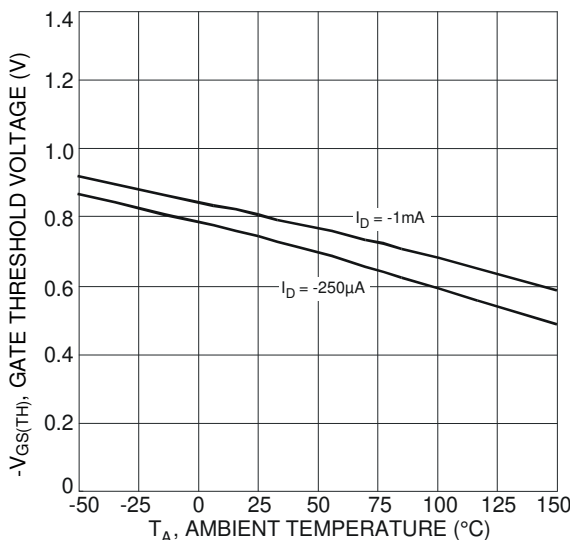


Fig. 9 Gate Threshold Variation vs. Ambient Temperature

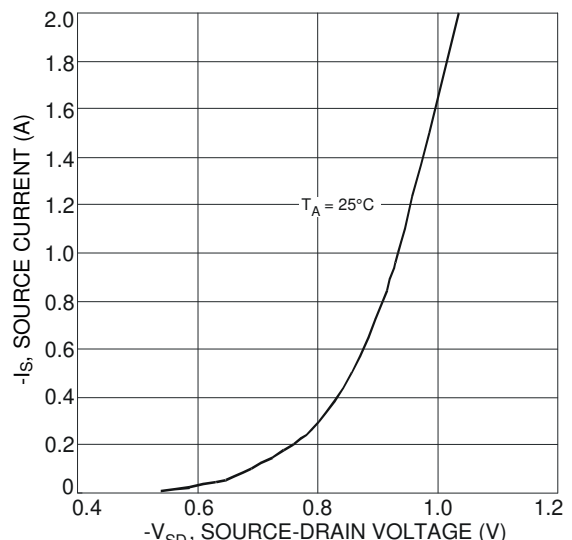


Fig. 10 Diode Forward Voltage vs. Current

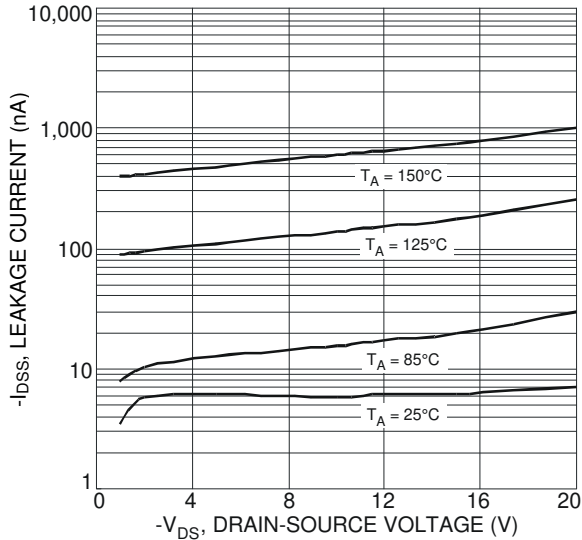


Fig. 11 Typical Leakage Current vs. Drain-Source Voltage

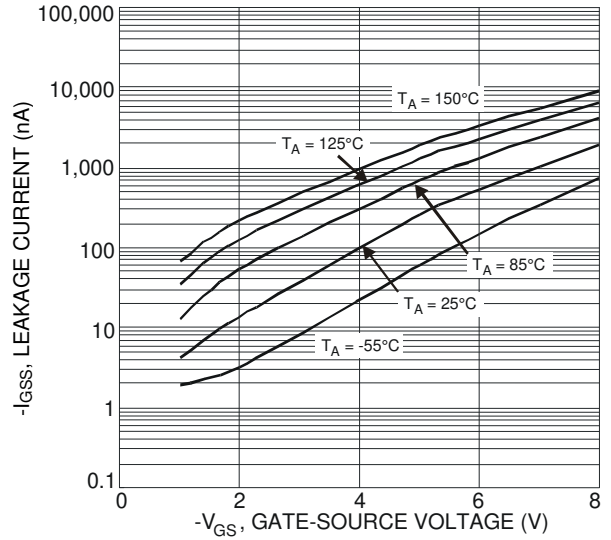


Fig. 12 Leakage Current vs. Gate-Source Voltage

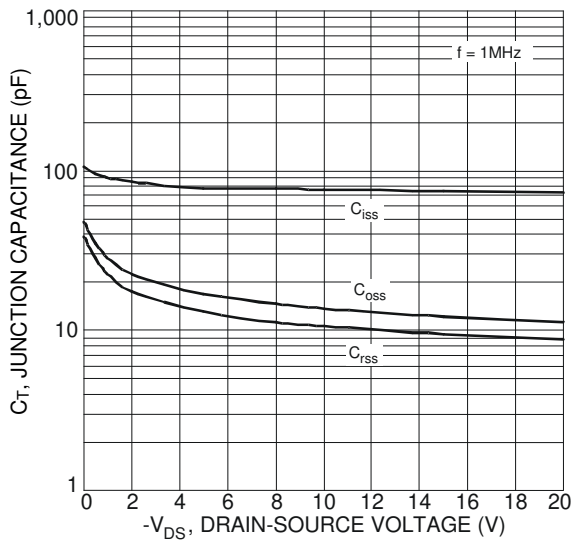


Fig. 13 Typical Junction Capacitance

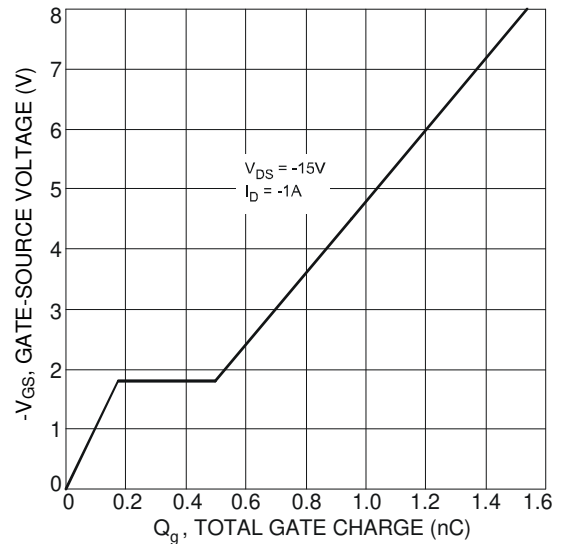


Fig. 14 Gate-Charge Characteristics

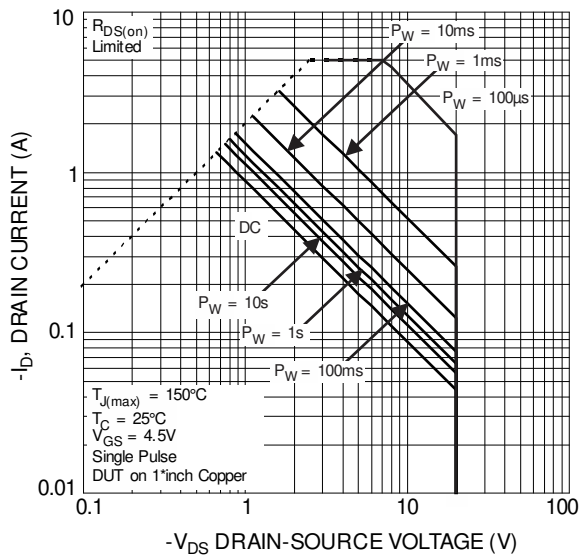
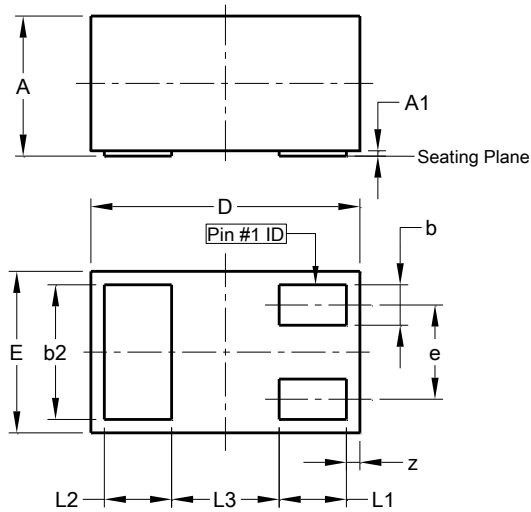


Figure 15 SOA, Safe Operation Area

Package Outline Dimensions

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

X1-DFN1006-3

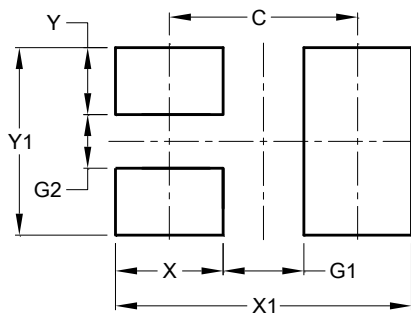


X1-DFN1006-3			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.075	1.00
E	0.55	0.675	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

Suggested Pad Layout

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

X1-DFN1006-3



Dimensions	Value (in mm)
C	0.70
G1	0.30
G2	0.20
X	0.40
X1	1.10
Y	0.25
Y1	0.70

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