

DMP21D0UFD

20V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ Max	I_D max $T_A = 25^\circ C$ (Notes 4)
-20V	495m Ω @ $V_{GS} = -4.5V$	-1.14A
	730m Ω @ $V_{GS} = -2.5V$	-0.94A
	960m Ω @ $V_{GS} = -1.8V$	-0.85A
	1300m Ω @ $V_{GS} = -1.5V$	-0.75A

Description and Applications

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

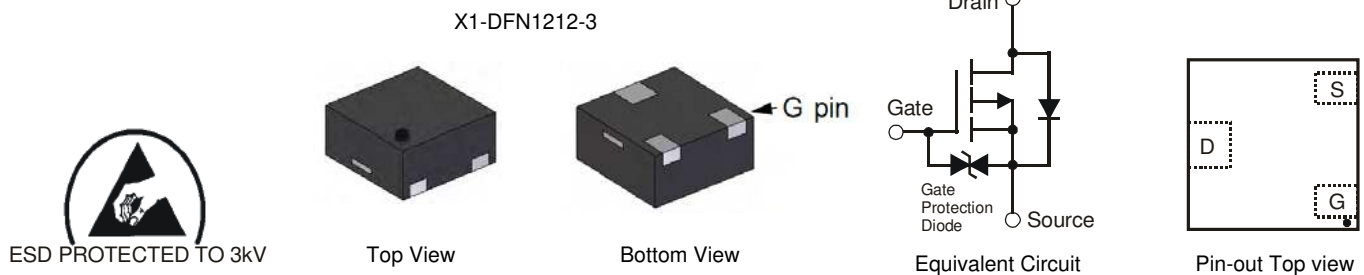
- Portable electronics

Features and Benefits

- Low Gate Threshold Voltage
- Fast Switching Speed
- **ESD Protected Gate 3KV**
- **Totally Lead-Free & Fully RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: X1-DFN1212-3
- 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
- Weight: 0.005 grams (approximate)

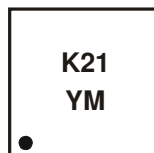


Ordering Information (Note 3)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMP21D0UFD-7	K21	7	8	3000

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

Marking Information



K21 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: Y = 2011)
M = Month (ex: 9 = September)

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

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 @ $T_A = 25^\circ\text{C}$ 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	$T_A = 25^\circ\text{C}$ (Note 4)	I_D	-1.14	A
		$T_A = 85^\circ\text{C}$ (Note 4)		-0.83	
		$T_A = 25^\circ\text{C}$ (Note 5)		-0.82	
Pulsed Drain Current (Note 6)			I_{DM}	-4.0	A

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 4)	P_D	930	mW
	(Note 5)		490	mW
Thermal Resistance, Junction to Ambient	(Note 4)	$R_{\theta JA}$	135	$^\circ\text{C}/\text{W}$
	(Note 5)		256	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
4. For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 5. Same as note 4, except the device is mounted on minimum recommended pad layout.
 6. Device mounted on minimum recommended pad layout test board, 10 μs pulse duty cycle = 1%.

Thermal Characteristics

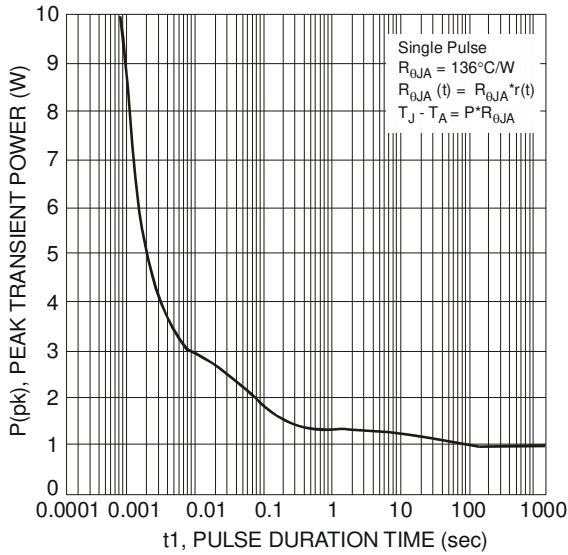


Fig. 1 Single Pulse Maximum Power Dissipation

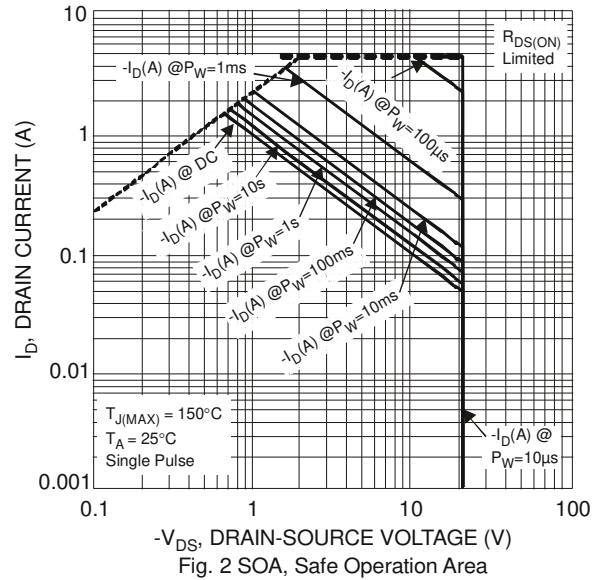


Fig. 2 SOA, Safe Operation Area

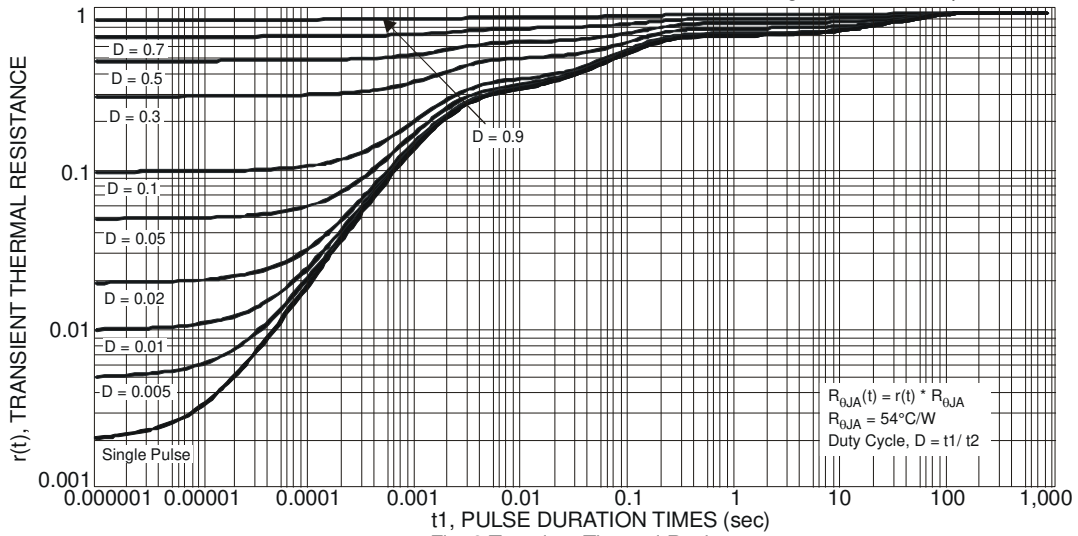


Fig. 3 Transient Thermal Resistance

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
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 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.45	-0.7	-1.2	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	-	495	m Ω	$V_{GS} = -4.5V, I_D = -800mA$
				730		$V_{GS} = -2.5V, I_D = -700mA$
				960		$V_{GS} = -1.8V, I_D = -100mA$
				1300		$V_{GS} = -1.5V, I_D = -100mA$
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						
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 (Note 8)	Q_g	-	1.5	-	nC	$V_{GS} = -8V, V_{DS} = -15V, I_D = -1A$
Total Gate Charge (Note 8)	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: 7. Short duration pulse test used to minimize self-heating effect.
8. Guarantee by design.

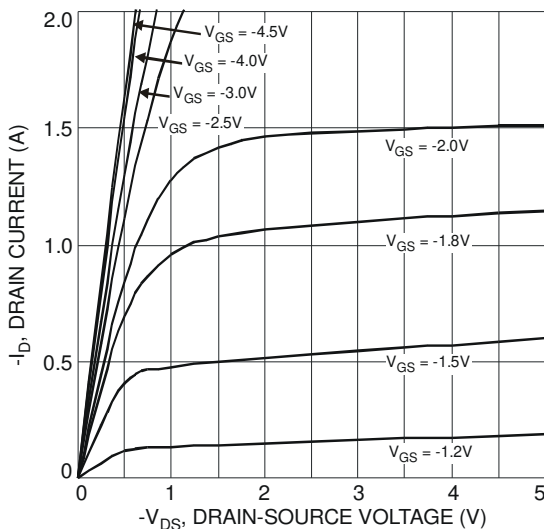


Fig. 4 Typical Output Characteristic

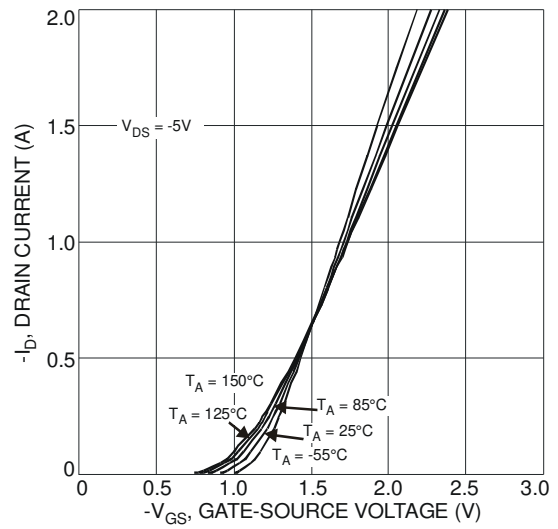


Fig. 5 Typical Transfer Characteristic

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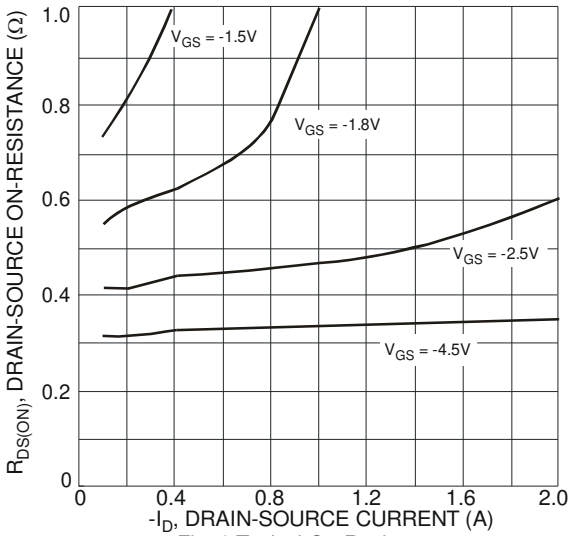


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

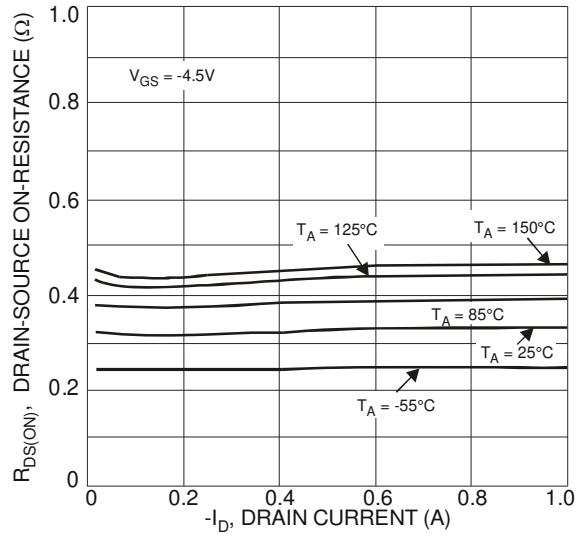


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

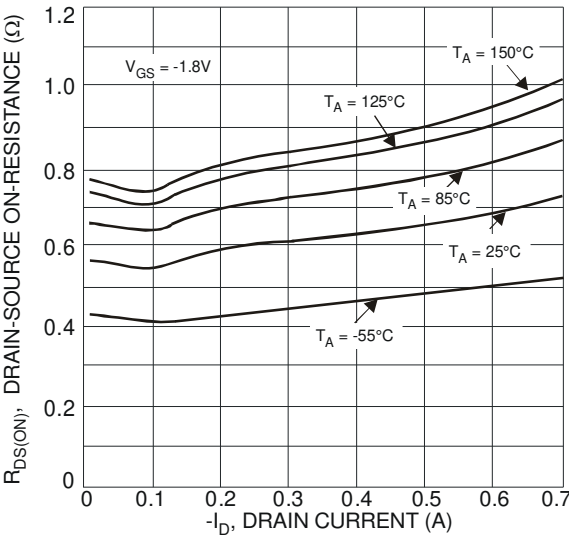


Fig. 8 Typical On-Resistance vs. Drain Current and Temperature

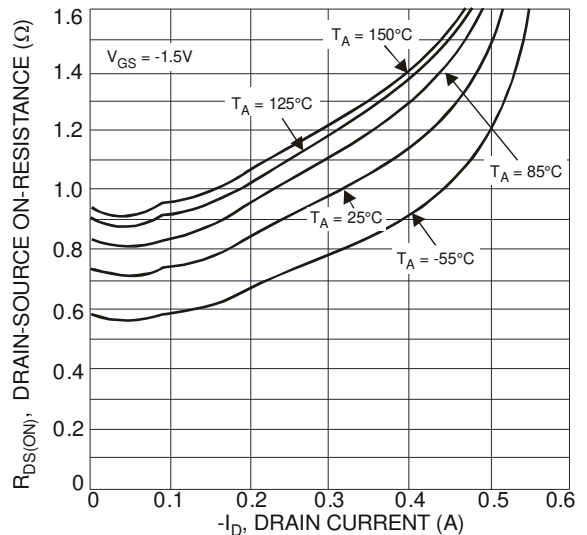


Fig. 9 Typical On-Resistance vs. Drain Current and Temperature

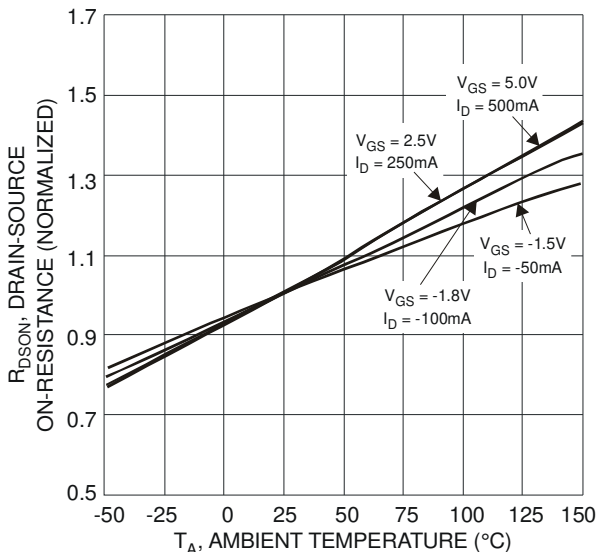


Fig. 10 On-Resistance Variation with Temperature

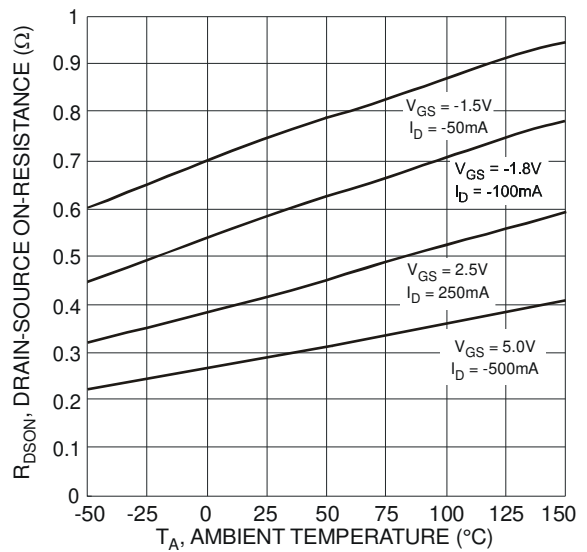


Fig. 11 On-Resistance Variation with Temperature

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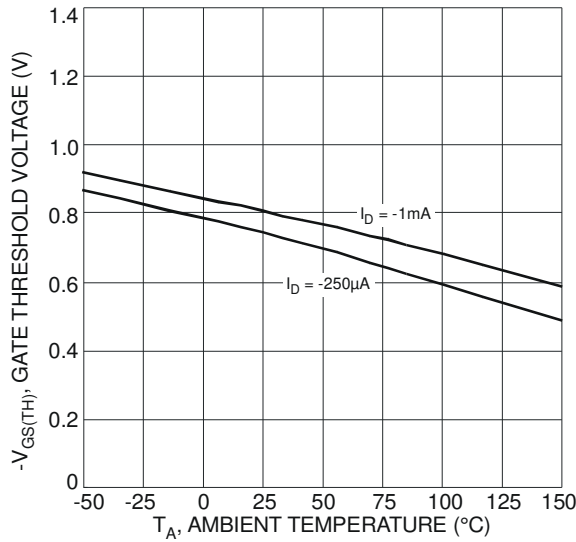


Fig. 12 Gate Threshold Variation vs. Ambient Temperature

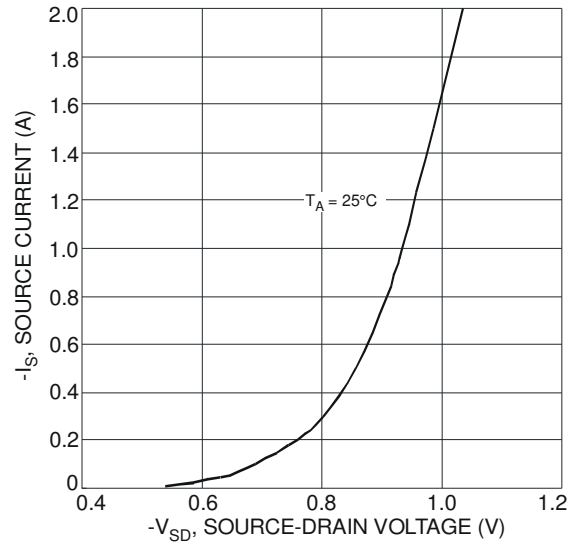


Fig. 13 Diode Forward Voltage vs. Current

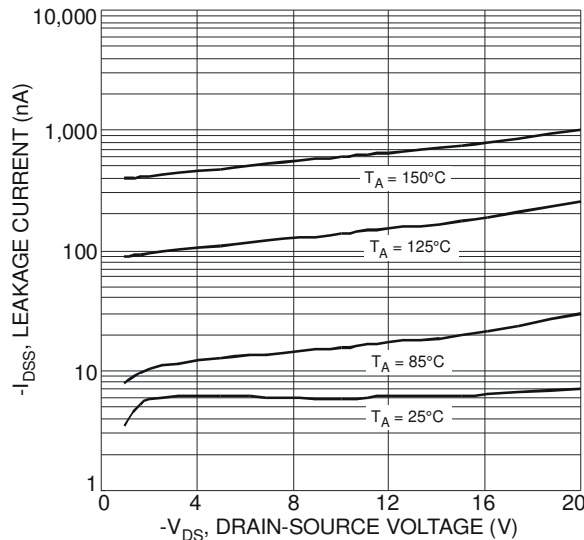


Fig. 14 Typical Leakage Current vs. Drain-Source Voltage

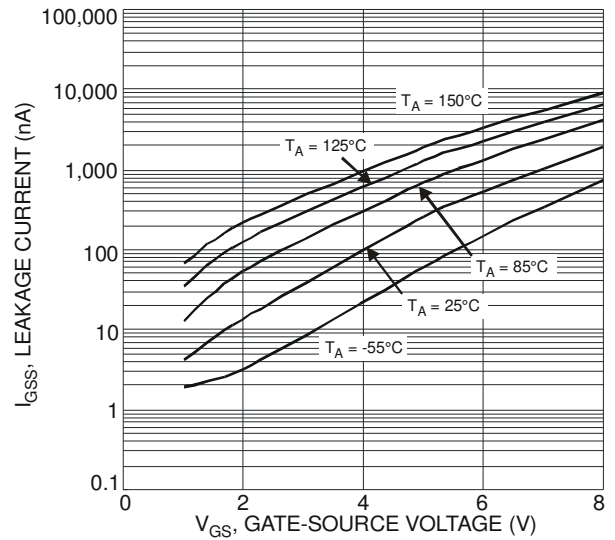


Fig. 15 Leakage Current vs. Gate-Source Voltage

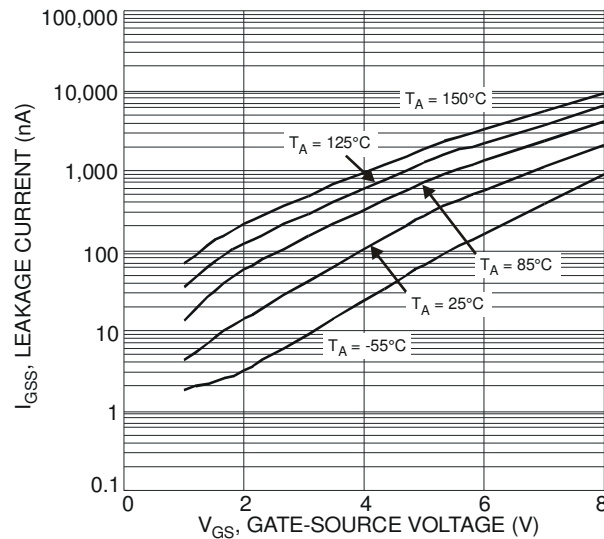


Fig. 16 Leakage Current vs. Gate-Source Voltage

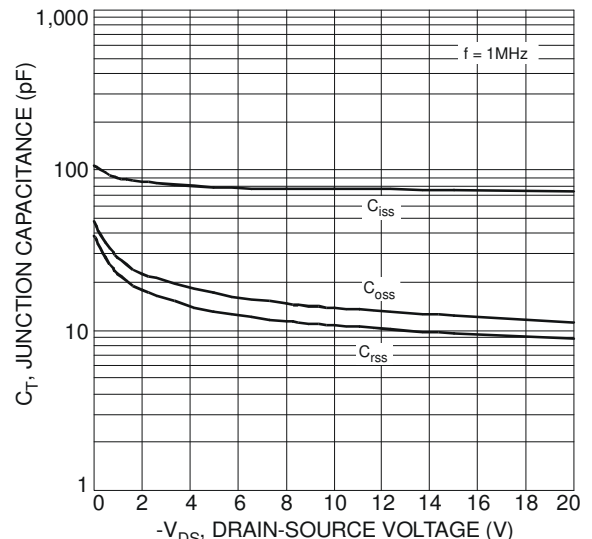


Fig. 17 Typical Junction Capacitance

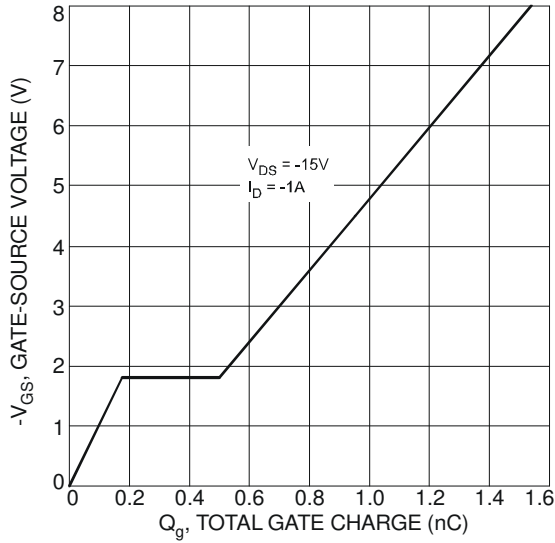
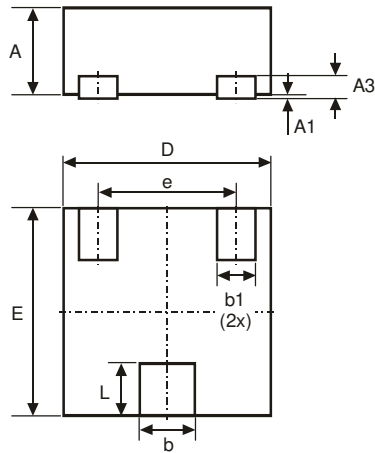


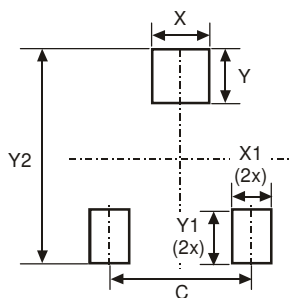
Fig. 18 Gate-Charge Characteristics

Package Outline Dimensions



X1-DFN1212-3			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0	0.05	0.02
A3	-	-	0.13
b	0.27	0.37	0.32
b1	0.17	0.27	0.22
D	1.15	1.25	1.20
E	1.15	1.25	1.20
e	-	-	0.80
L	0.25	0.35	0.30
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.80
X	0.42
X1	0.32
Y	0.50
Y1	0.50
Y2	1.50

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