Product Summary

Device	BV_{DSS}	$R_{DS(ON)}$ max	I_D max T_A = +25°C
Q1	20V	0.99Ω @ V_{GS} = 4.5V	455mA
		1.2Ω @ V_{GS} = 2.5V	414mA
		1.8Ω @ V_{GS} = 1.8V	338mA
		2.4Ω @ V_{GS} = 1.5V	292mA
Q2	-20V	1.9Ω @ V_{GS} = -4.5V	-328mA
		2.4Ω @ V_{GS} = -2.5V	-292mA
		3.4Ω @ V_{GS} = -1.8V	-245mA
		5Ω @ V_{GS} = -1.5V	-202mA

Features and Benefits

- Low On-Resistance
- Very low Gate Threshold Voltage, 1.0V max
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package 0.8mm x 0.6mm
- **Totally Lead-Free & Fully RoHS compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

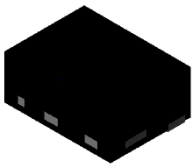
Description and Applications

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.

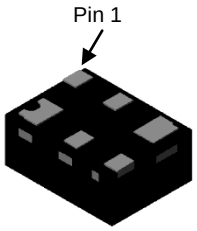
- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

Mechanical Data

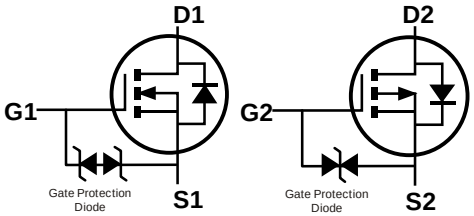
- Case: X2-DFN0806-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.027 grams (Approximate)



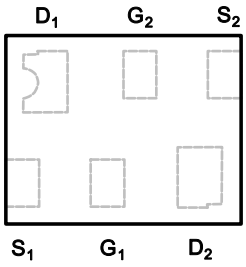
Top View



Bottom View



Device Symbol



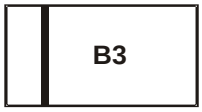
Pin Configuration
Top View

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC21D1UDA-7B	X2-DFN0806-6	10,000/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html 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



Top View

B3 = Product Type Marking Code

Maximum Ratings Q1 N-CHANNEL (@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 5)	Steady State	T_A = +25°C T_A = +70°C	I_D	455 365	mA
Pulsed Drain Current (Note 6)			I_{DM}	1500	mA

Maximum Ratings Q2 P-CHANNEL (@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 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-328 -262	mA
Pulsed Drain Current (Note 6)			I_{DM}	-1000	mA

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	300	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	419	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.

Electrical Characteristics Q1 N-CHANNEL (@T_A = +25°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 = 250µA
Zero Gate Voltage Drain Current @T_C = +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 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.4	0.75	1.0	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.5	0.99	Ω	V_{GS} = 4.5V, I_D = 100mA
		—	0.6	1.2		V_{GS} = 2.5V, I_D = 50mA
		—	0.8	1.8		V_{GS} = 1.8V, I_D = 20mA
		—	1.0	2.4		V_{GS} = 1.5V, I_D = 10mA
Diode Forward Voltage	V_{SD}	—	0.6	1.0	V	V_{GS} = 0V, I_S = 10mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	31	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	3.6	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.6	—	pF	
Gate Resistance	R_G	—	113	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge	Q_g	—	0.41	—	nC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250mA
Gate-Source Charge	Q_{gs}	—	0.06	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.05	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.5	—	ns	V_{DD} = 15V, V_{GS} = 4.5V, R_G = 2Ω, I_D = 200mA
Turn-On Rise Time	t_R	—	3.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	24	—	ns	
Turn-Off Fall Time	t_F	—	12	—	ns	

Electrical Characteristics Q2 P-CHANNEL (@T_A = +25°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 = -250µA
Zero Gate Voltage Drain Current @T_C = +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 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	-0.7	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.2	1.9	Ω	V_{GS} = -4.5V, I_D = -100mA
		—	1.6	2.4		V_{GS} = -2.5V, I_D = -50mA
		—	1.9	3.4		V_{GS} = -1.8V, I_D = -20mA
		—	2.4	5		V_{GS} = -1.5V, I_D = -10mA
Diode Forward Voltage	V_{SD}	—	-0.7	-1.1	V	V_{GS} = 0V, I_S = -10mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	28.5	—	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	3.9	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.4	—	pF	
Gate Resistance	R_G	—	398	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge	Q_g	—	0.4	—	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -250mA
Gate-Source Charge	Q_{gs}	—	0.07	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.07	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.2	—	ns	V_{DD} = -15V, V_{GS} = -4.5V, R_G = 2Ω, I_D = -200mA
Turn-On Rise Time	t_R	—	4.3	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	31	—	ns	
Turn-Off Fall Time	t_F	—	15.4	—	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

Typical Characteristics - N-CHANNEL

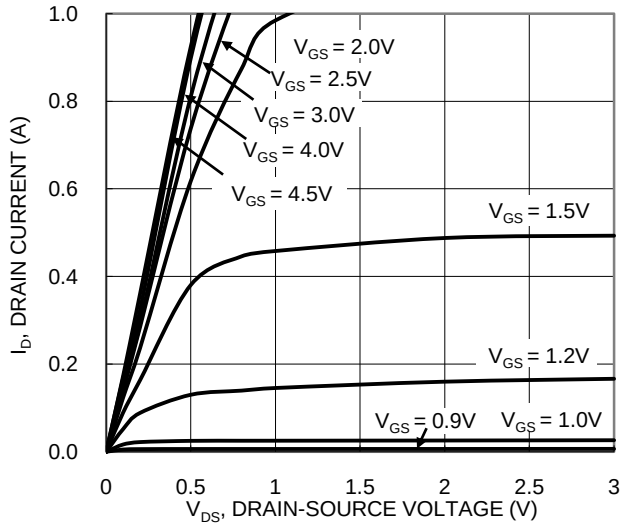


Figure 1. Typical Output Characteristic

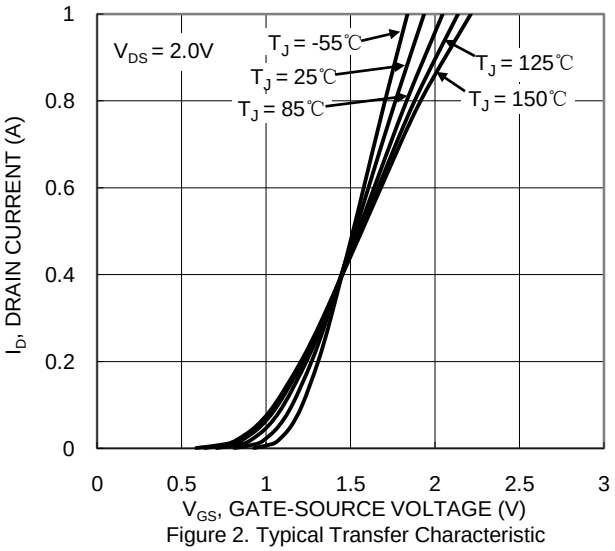


Figure 2. Typical Transfer Characteristic

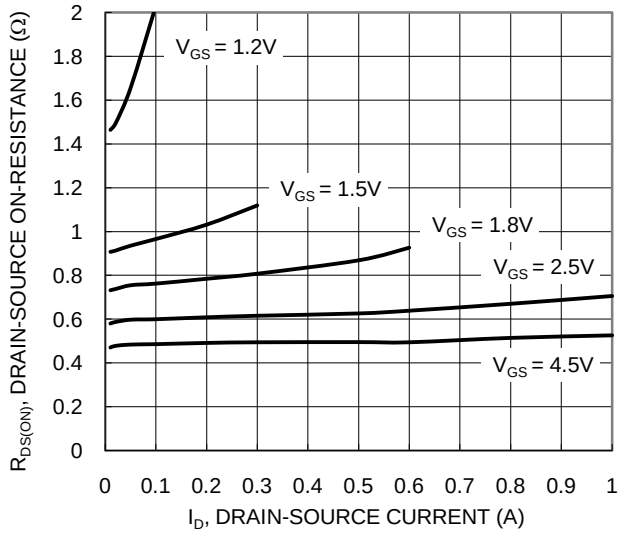


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

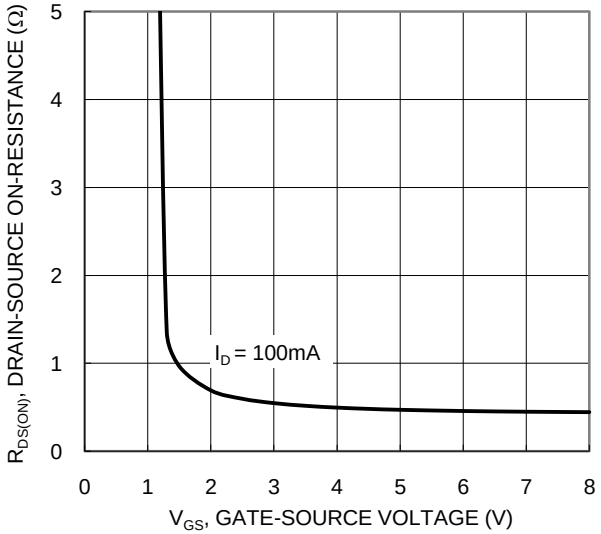


Figure 4. Typical Transfer Characteristic

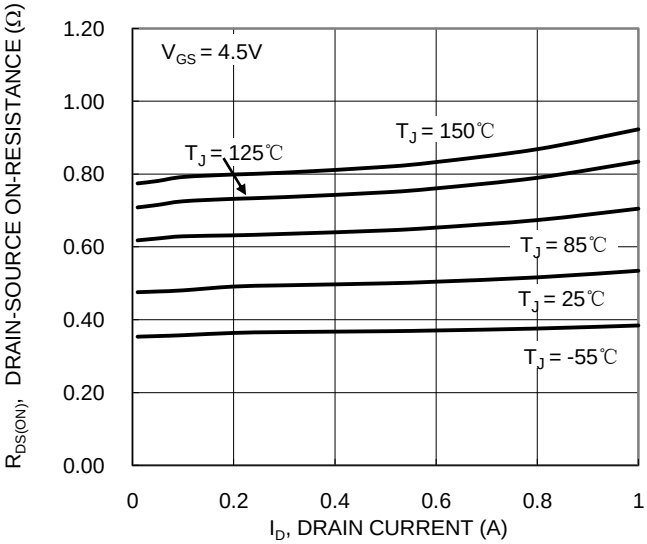


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

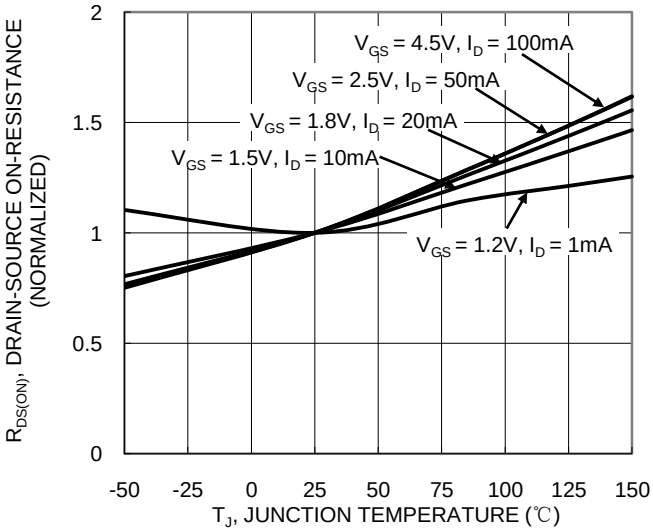


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - N-CHANNEL (Cont.)

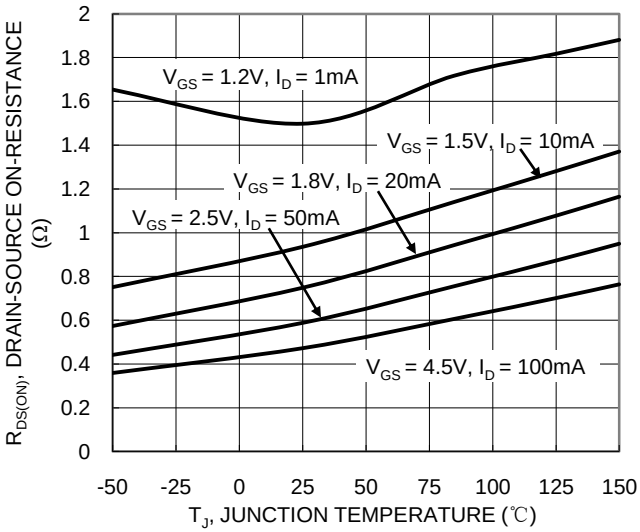


Figure 7. On-Resistance Variation with Temperature

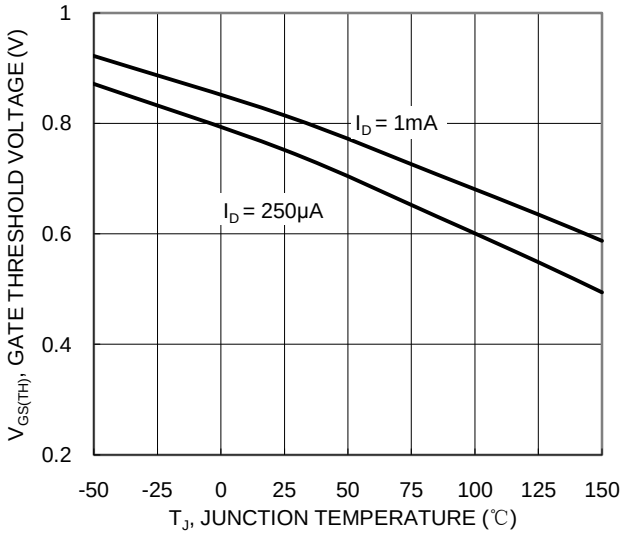


Figure 8. Gate Threshold Variation vs. Junction Temperature

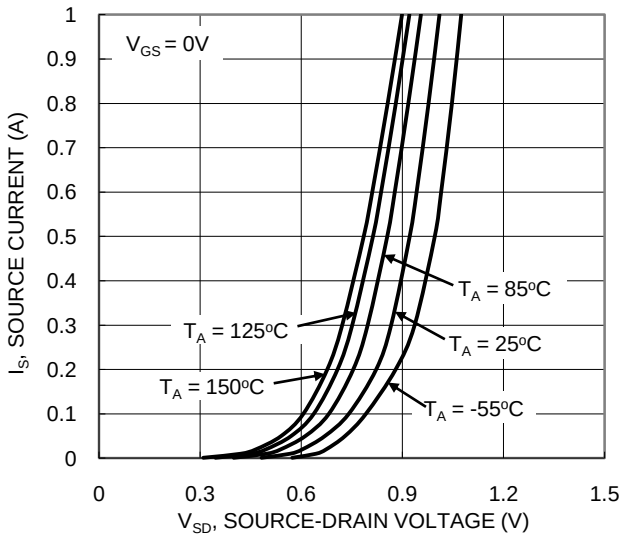


Figure 9. Diode Forward Voltage vs. Current

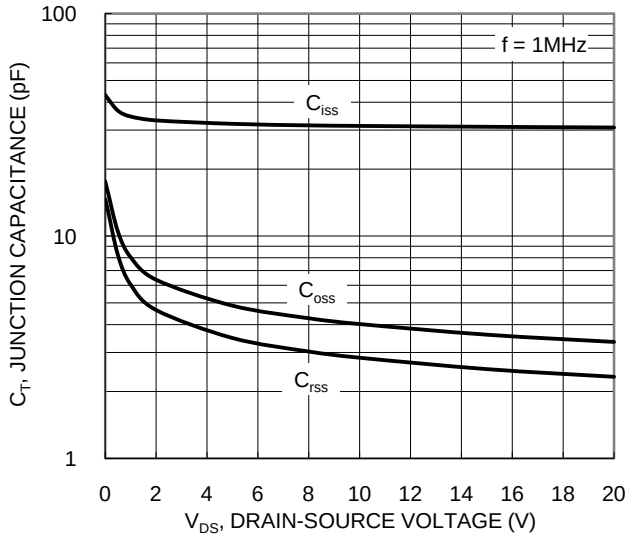


Figure 10. Typical Junction Capacitance

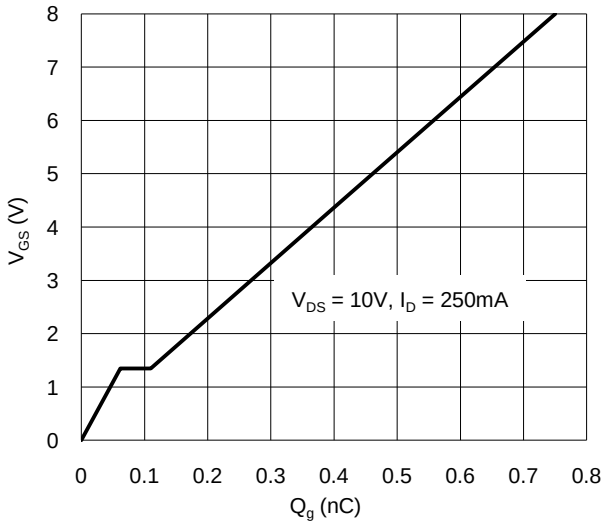
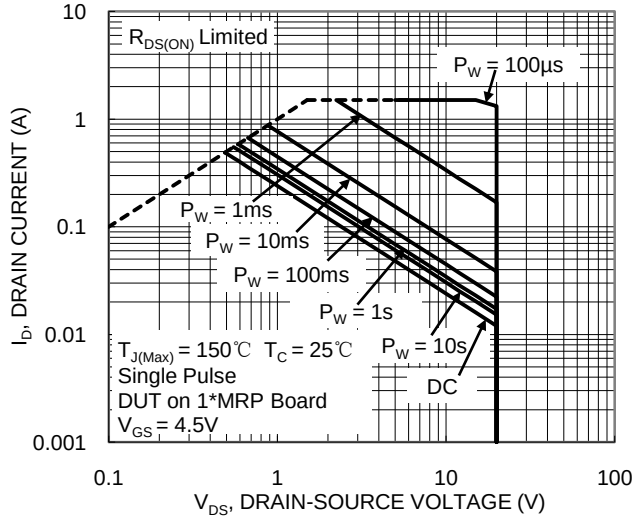


Figure 11. Gate Charge



Fiugre 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

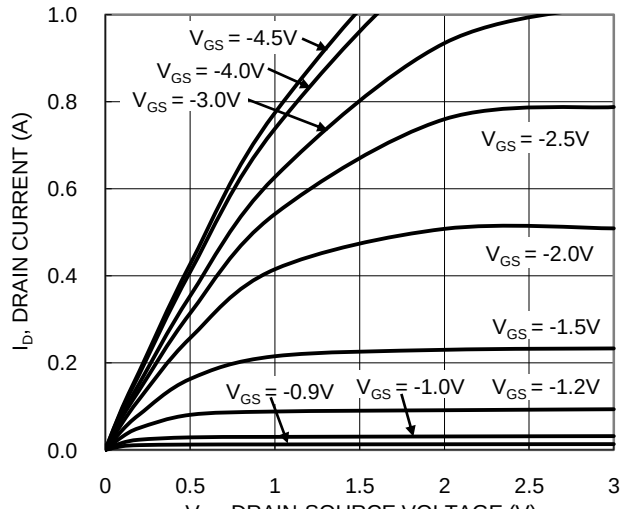


Figure 13. Typical Output Characteristic

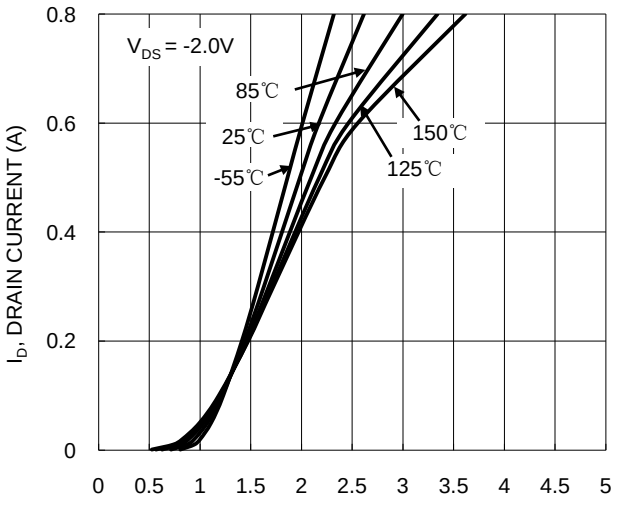


Figure 14. Typical Transfer Characteristic

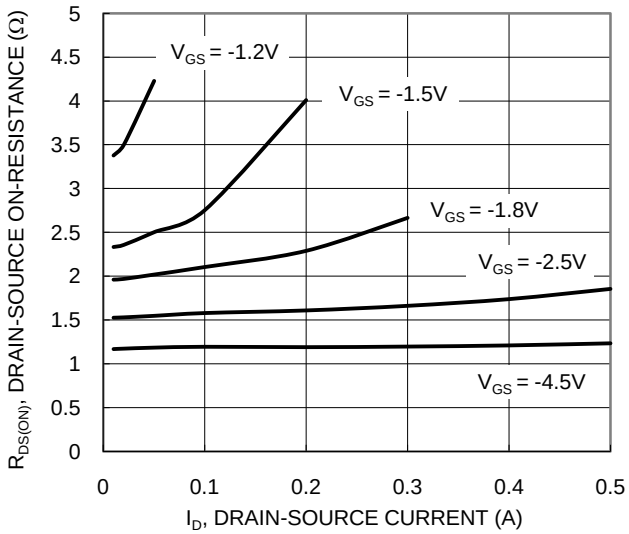


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

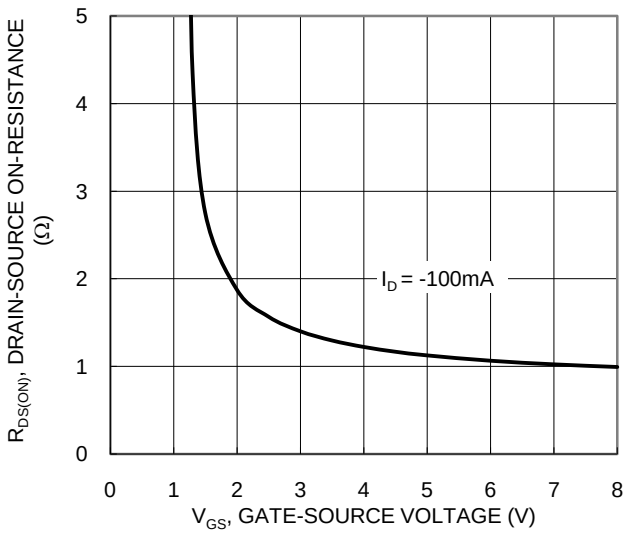


Figure 16. Typical Transfer Characteristic

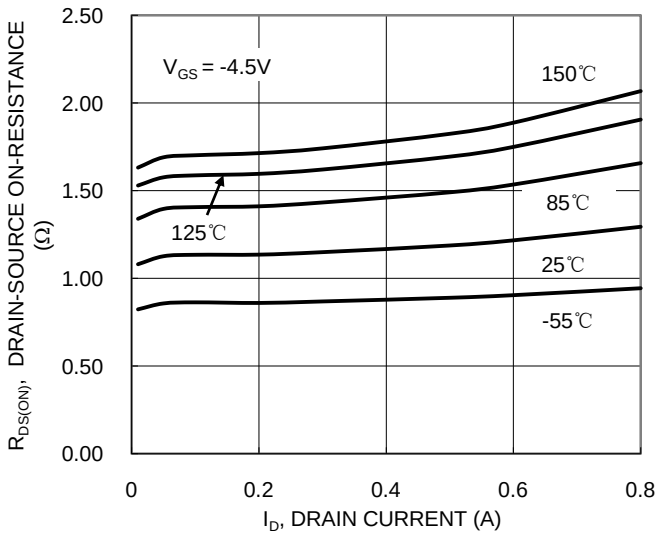


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

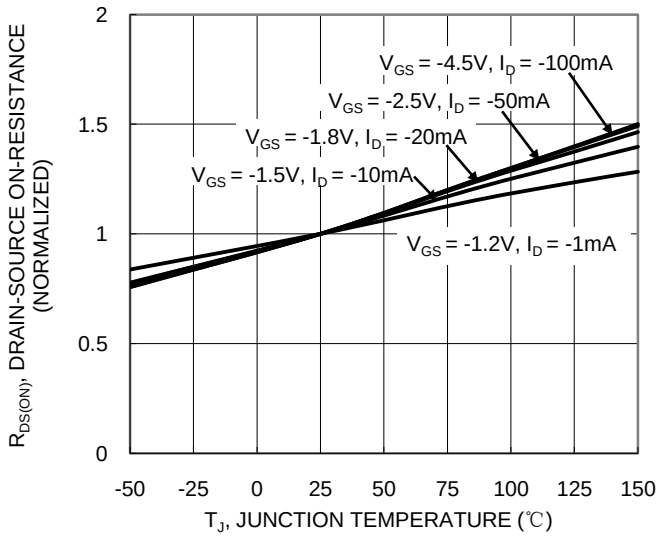


Figure 18. On-Resistance Variation with Temperature

Typical Characteristics - P-CHANNEL (Cont.)

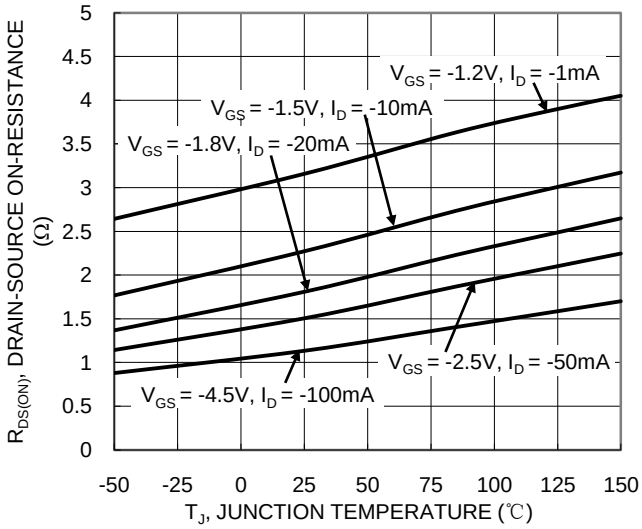


Figure 19. On-Resistance Variation with Temperature

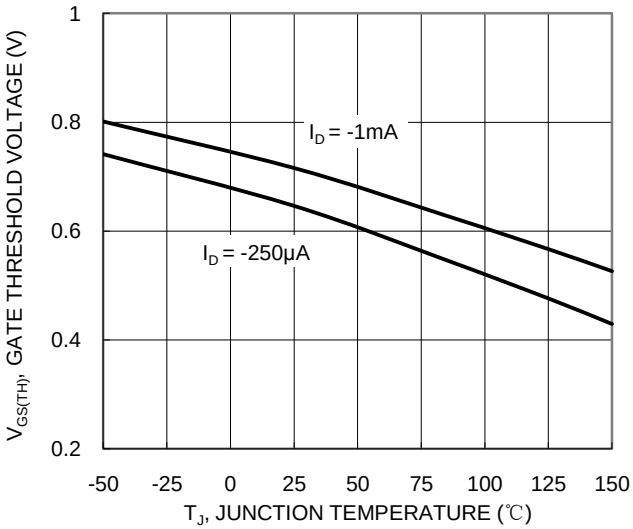


Figure 20. Gate Threshold Variation vs. Junction Temperature

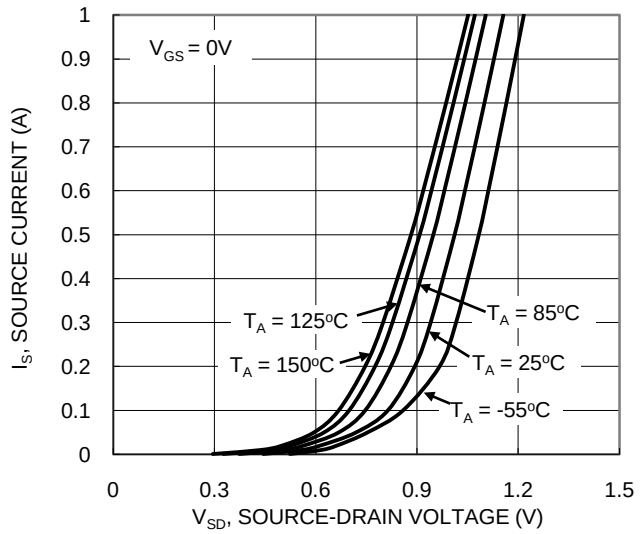


Figure 21. Diode Forward Voltage vs. Current

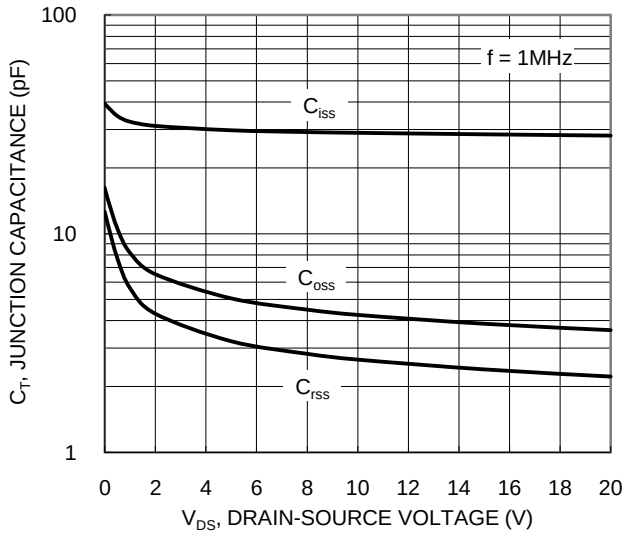


Figure 22. Typical Junction Capacitance

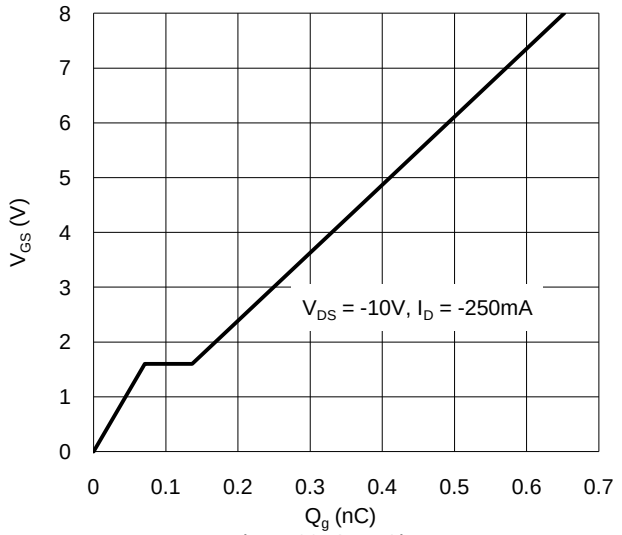


Figure 23. Gate Charge

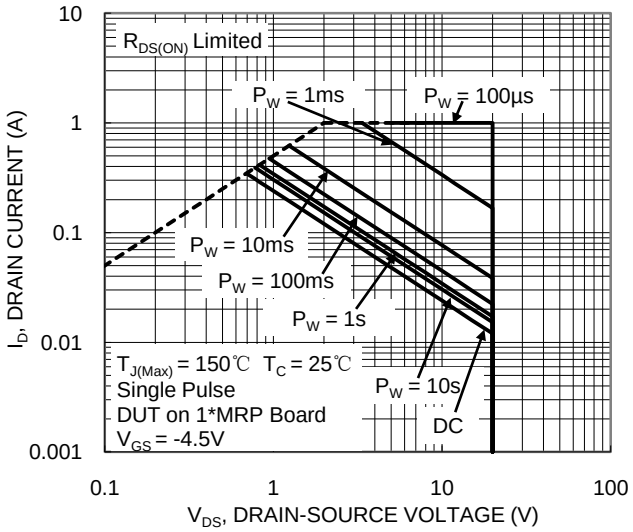


Figure 24. SOA, Safe Operation Area

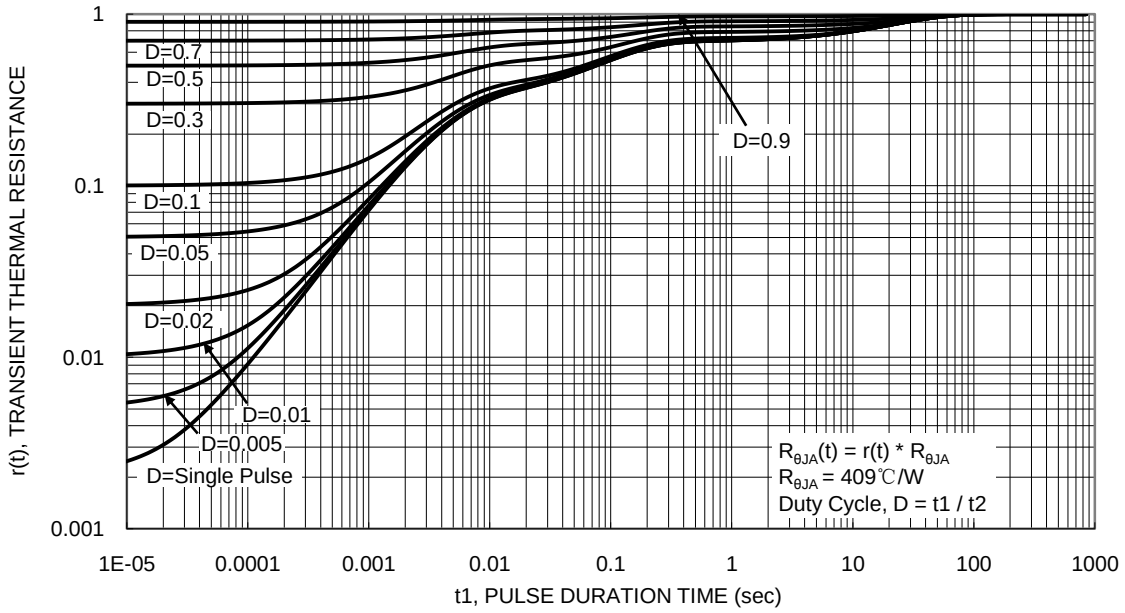
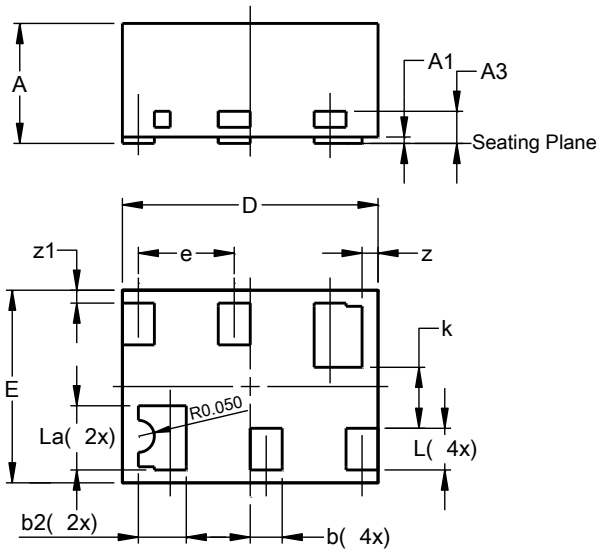


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

X2-DFN0806-6

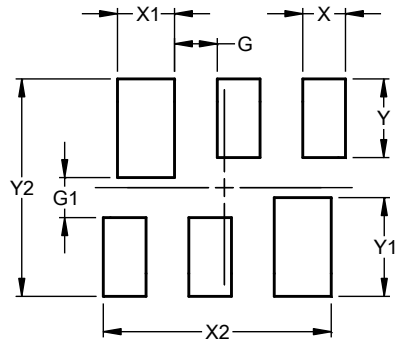


X2-DFN0806-6			
Dim	**Min**	**Max**	**Typ**
A	--	0.40	0.36
A1	0.00	0.03	0.02
A3	--	--	0.10
b	0.07	0.15	0.10
b2	0.10	0.20	0.15
D	0.75	0.85	0.80
E	0.55	0.65	0.60
e	--	--	0.30
k	--	--	0.19
L	0.10	0.18	0.13
La	0.17	0.25	0.20
z	--	--	0.05
z1	--	--	0.04
All Dimensions in mm			

Suggested Pad Layout

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

X2-DFN0806-6



Dimensions	Value (in mm)
G	0.150
G1	0.140
X	0.150
X1	0.200
X2	0.800
Y	0.275
Y1	0.345
Y2	0.760

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A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

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