20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
20V	14 mΩ @ V_{GS} = 4.5V	9 A
	20 mΩ @ V_{GS} = 2.5V	7.5 A

Description

This new generation 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.

Applications

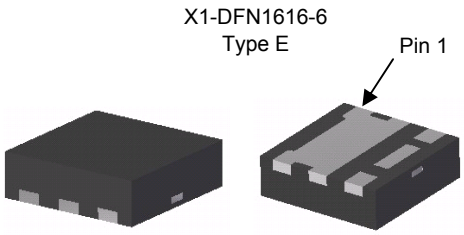
- Power management functions
- Load Switch

Features and Benefits

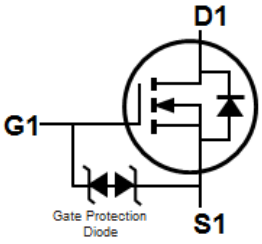
- Typical off board profile of 0.5mm - ideally suited for thin applications
- Low $R_{DS(ON)}$ – minimizes conduction losses
- PCB footprint of 2.56mm^2
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 standards for High Reliability**

Mechanical Data

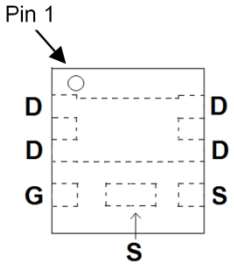
- Case: X1-DFN1616-6 Type E
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Lead Free Plating (NiPdAu Finish over Copper leadframe).
- Terminals: Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.04 grams (approximate)



Top View Bottom View



Device Symbol



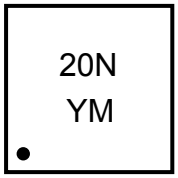
Top View Pin-Out

Ordering Information (Note 4)

Product	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN2020UFCL-7	7	8	3,000

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 http://www.diodes.com/products/packages.html.

Marking Information



20N = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: A = 2013)
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

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±10	V
Continuous Drain Current (Note 6) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	9 7.1	A
Pulsed Drain Current (Note 7)			I_{DM}	45	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	0.61	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 5)	$R_{\theta JA}$	205	°C/W
Power Dissipation (Note 6)	P_D	2.0	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 6)	$R_{\theta JA}$	62	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics N-CHANNEL – Q1 (@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}	—	—	1.0	µA	V_{DS} = 16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	10	µA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	0.4	—	0.9	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	10 12 14	14 20 26	mΩ	V_{GS} = 4.5V, I_D = 9A V_{GS} = 2.5V, I_D = 7.5A V_{GS} = 1.8V, I_D = 7A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1.6A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1788	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	162	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	150	—	pF	
Gate Resistance	R_g	—	1.36	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	21.5	—	nC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 3A
Gate-Source Charge	Q_{gs}	—	2.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.3	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	3.8	—	ns	V_{DD} = 10V, V_{GS} = 4.5V, I_D = 4A, R_G = 2Ω
Turn-On Rise Time	t_r	—	5.7	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	33	—	ns	
Turn-Off Fall Time	t_f	—	6.8	—	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 1inch square copper plate.
7. Repetitive rating, pulse width limited by junction temperature.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

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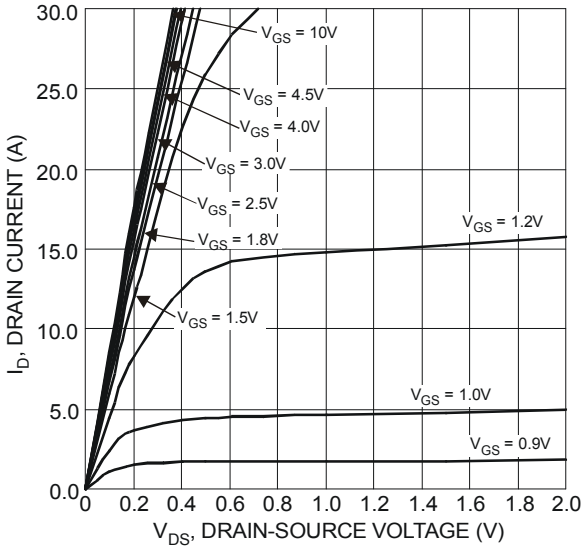

Figure 1 Typical Output Characteristics

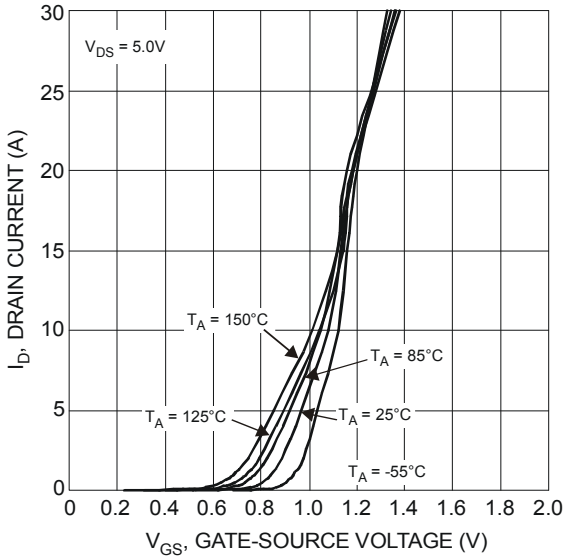

Figure 2 Typical Transfer Characteristics

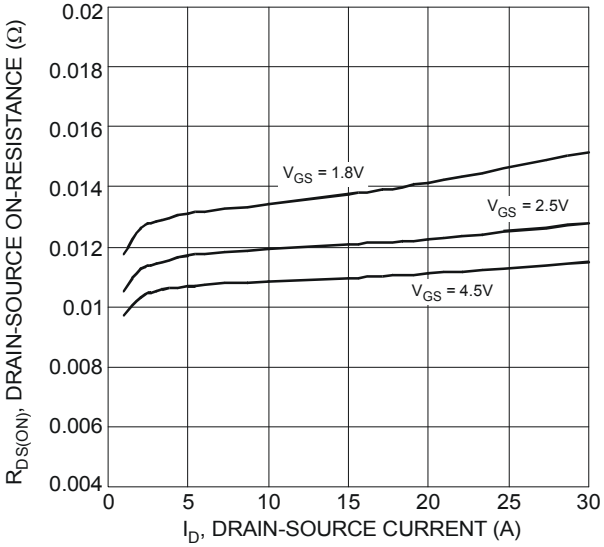

Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

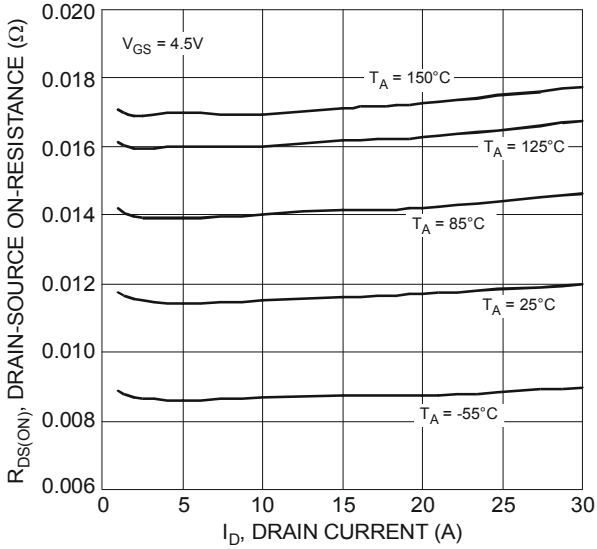

Figure 4 Typical On-Resistance vs. Drain Current and Temperature

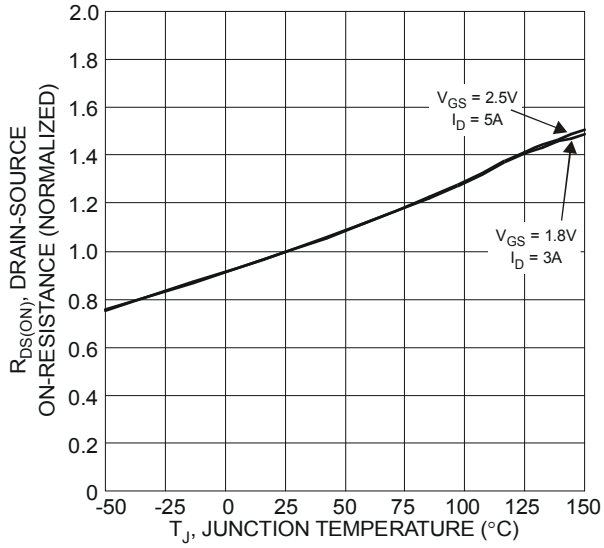

Figure 5 On-Resistance Variation with Temperature

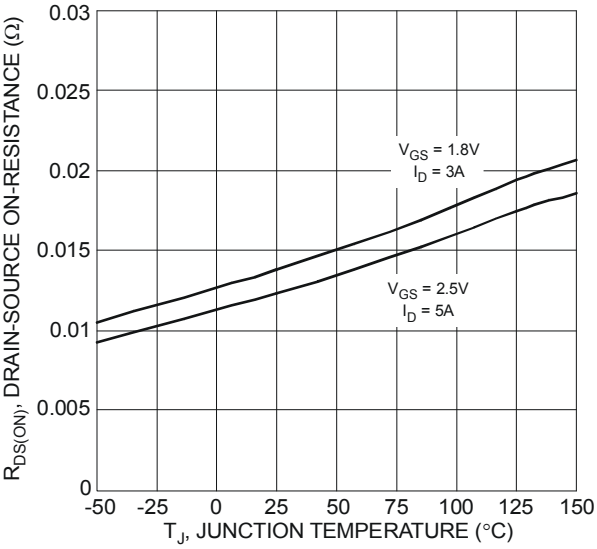

Figure 6 On-Resistance Variation with Temperature

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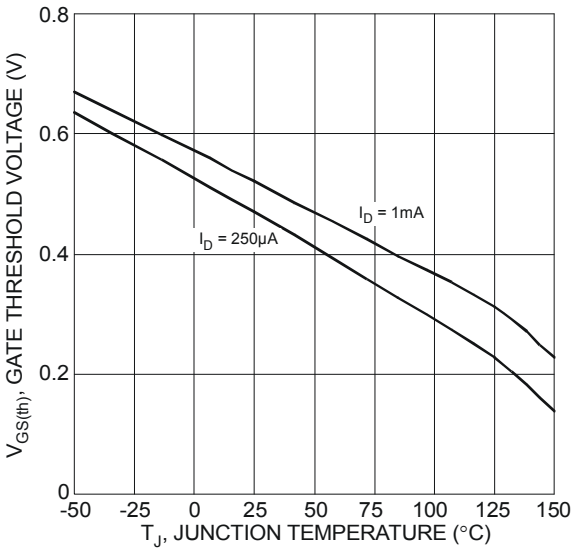

Figure 7 Gate Threshold Variation vs. Ambient Temperature

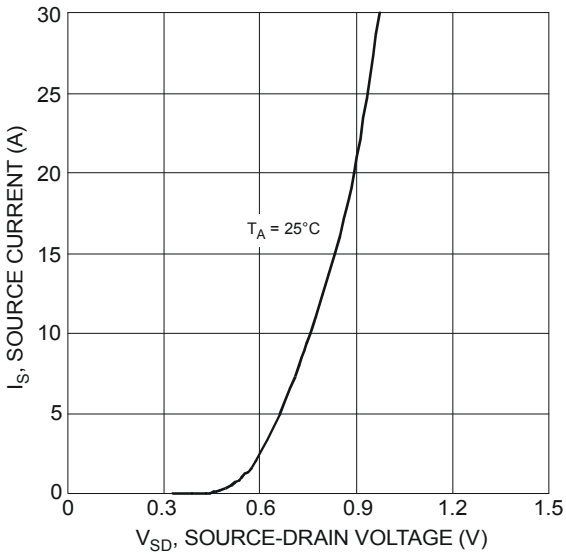

Figure 8 Diode Forward Voltage vs. Current

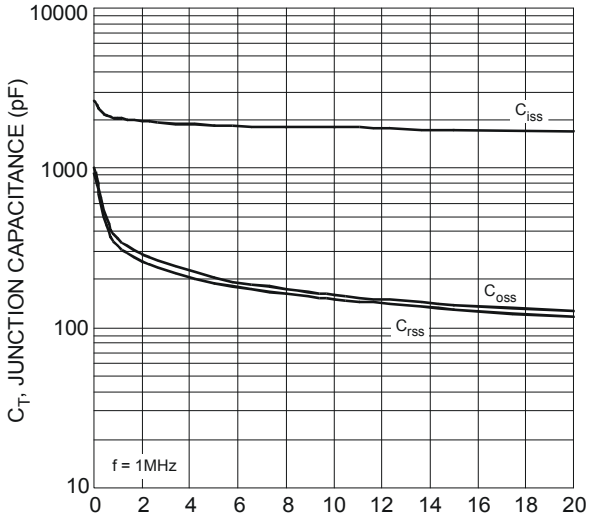

Figure 9 Typical Junction Capacitance

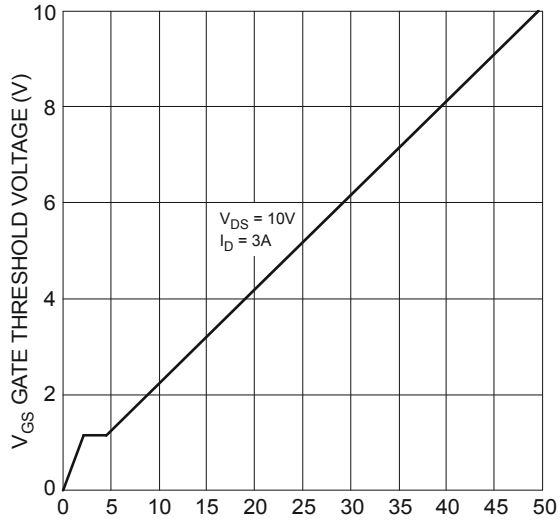

Figure 10 Gate Charge

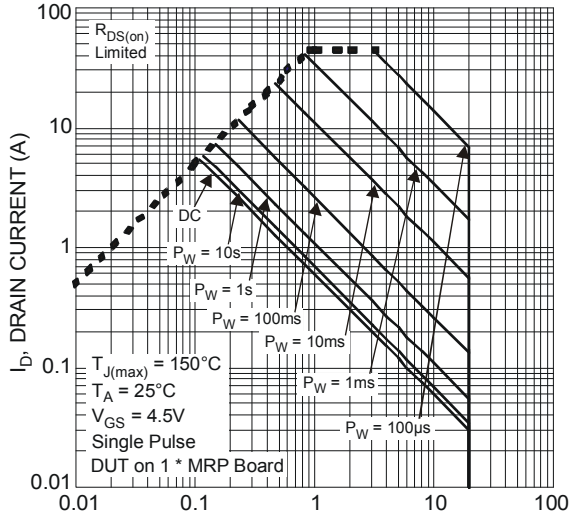

Figure 11 SOA, Safe Operation Area

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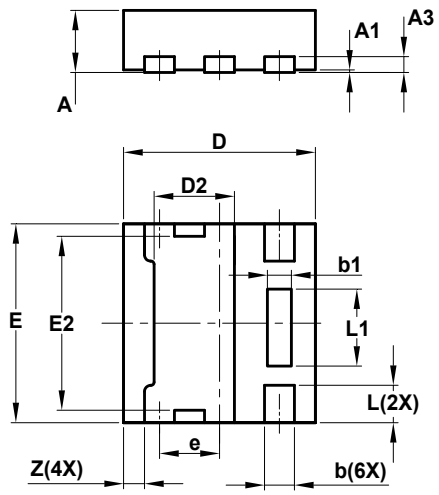
Package Outline Dimensions

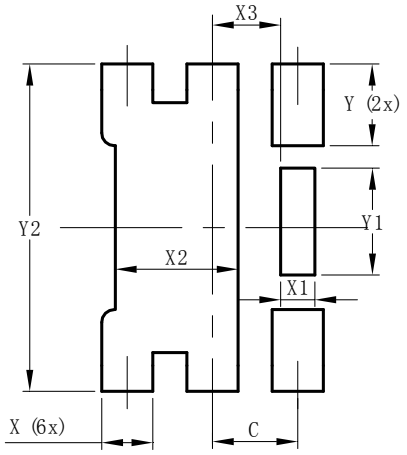
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



X1-DFN1616-6 Type E			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0	0.05	0.02
A3	—	—	0.13
b	0.20	0.30	0.25
b1	0.10	0.30	0.20
D	1.55	1.65	1.60
D2	0.57	0.77	0.67
E	1.55	1.65	1.60
E2	1.30	1.50	1.40
e	—	—	0.50
L	0.25	0.35	0.30
L1	0.52	0.72	0.62
Z	—	—	0.175
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for latest version.



Dimensions	Value (in mm)
C	0.500
X	0.300
X1	0.200
X2	0.720
X3	0.400
Y	0.475
Y1	0.620
Y2	1.900

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