DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
20V	45mΩ @ V_{GS} = 4.5V	4.5A
	55mΩ @ V_{GS} = 2.5V	4.1A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **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**

Description

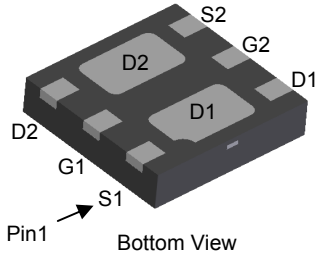
This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Mechanical Data

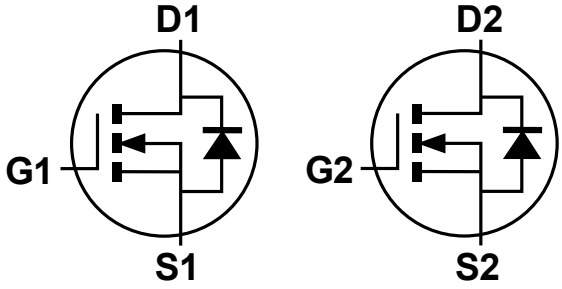
- Case: U-DFN2020-6 Type B
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0065 grams (approximate)

Applications

- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors



Bottom View



Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2050LFDB -7	DFN2020-6 Type B	3,000/Tape & Reel
DMN2050LFDB -13	DFN2020-6 Type B	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 http://www.diodes.com/products/packages.html

Marking Information

M5 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: A = 2013)
M = Month (ex: 9 = September)

Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015
Code	W	X	Y	Z	A	B	C

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°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	3.3 2.6	A
Continuous Drain Current (Note 6) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	4.5 3.6	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	1	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	25	A
Avalanche Current (Note 7) L = 0.1mH			I_{AR}	9	A
Repetitive Avalanche Energy (Note 7) L = 0.1mH			E_{AR}	4.5	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.73	W
	T_A = +70°C		0.46	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	173	°C/W
	t<10s		110	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.42	W
	T_A = +70°C		0.90	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	89	°C/W
	t<10s		57	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	18	
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}	–	–	1.0	µA	V_{DS} = 16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	–	–	±100	nA	V_{GS} = ±12V, 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	$R_{DS\ (ON)}$	–	28	45	mΩ	V_{GS} = 4.5V, I_D = 5.0A
		–	36	55		V_{GS} = 2.5V, I_D = 4.2A
Forward Transfer Admittance	$\|Y_{fs}\|$	–	9	–	S	V_{DS} = 5V, I_D = 5A
Diode Forward Voltage	V_{SD}	–	0.75	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	–	389	–	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	–	72	–	pF	
Reverse Transfer Capacitance	C_{rss}	–	63	–	pF	
Gate Resistance	R_g	–	2.1	–	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	–	5.7	–	nC	V_{DS} = 15V, I_D = 5.8A
Total Gate Charge (V_{GS} = 10V)	Q_g	–	12	–	nC	
Gate-Source Charge	Q_{gs}	–	0.7	–	nC	
Gate-Drain Charge	Q_{gd}	–	1.5	–	nC	
Turn-On Delay Time	$t_{D(on)}$	–	5	–	ns	V_{DS} = 10V, V_{GS} = 4.5V, R_G = 6Ω, I_{DS} = 1A
Turn-On Rise Time	t_r	–	8	–	ns	
Turn-Off Delay Time	$t_{D(off)}$	–	25	–	ns	
Turn-Off Fall Time	t_f	–	8	–	ns	
Reverse Recovery Time	t_{rr}	–	8.5	–	ns	I_F = 5A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{rr}	–	2.1	–	nC	

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. I_{AR} and E_{AR} rating are based on low frequency and duty cycles to keep T_J = +25°C
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

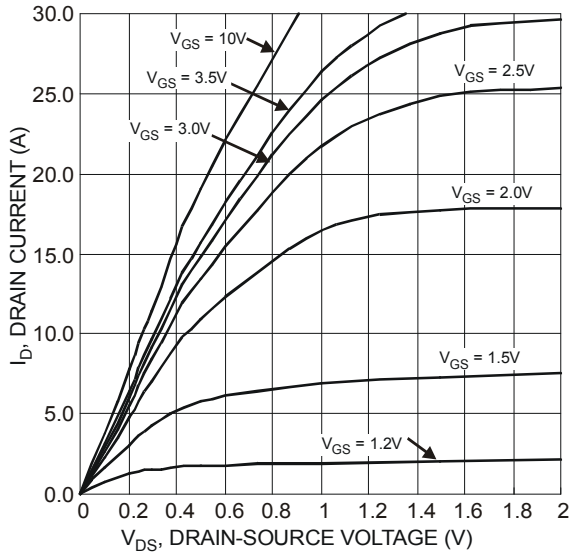


Figure 1 Typical Output Characteristics

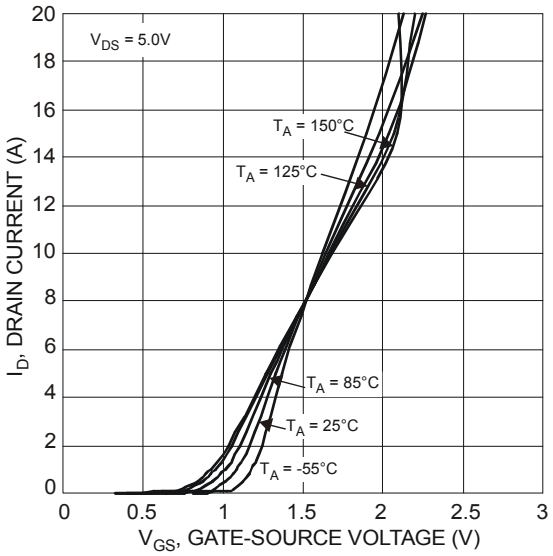


Figure 2 Typical Transfer Characteristics

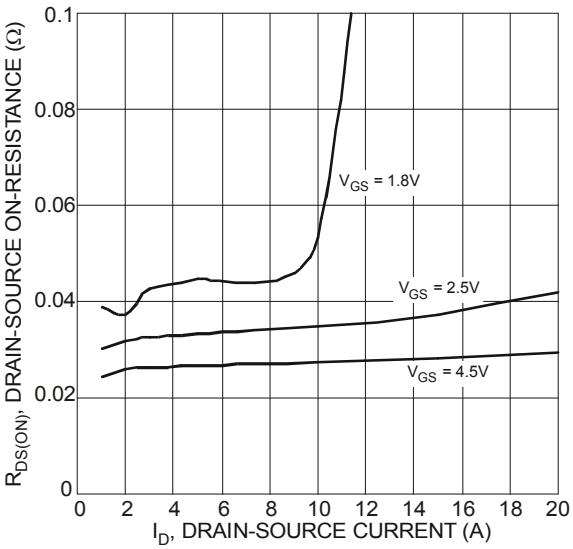


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

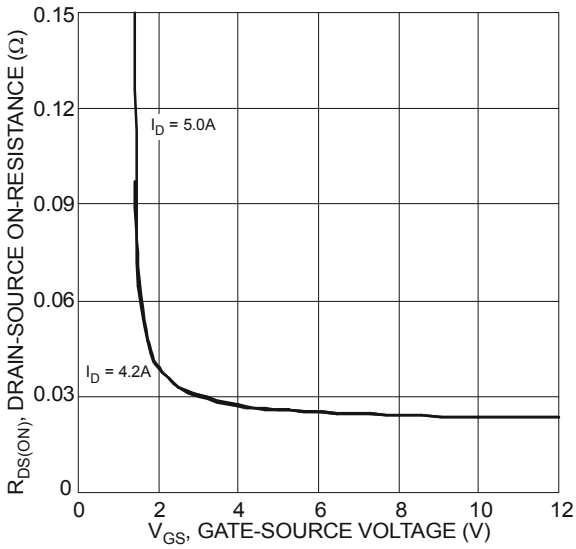


Figure 4 Typical Transfer Characteristics

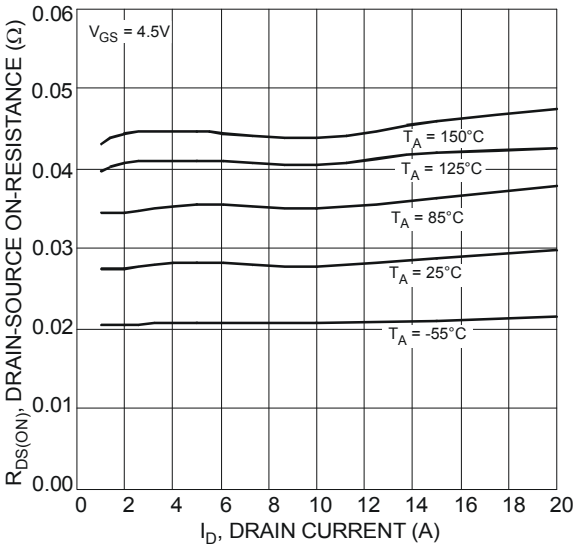


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

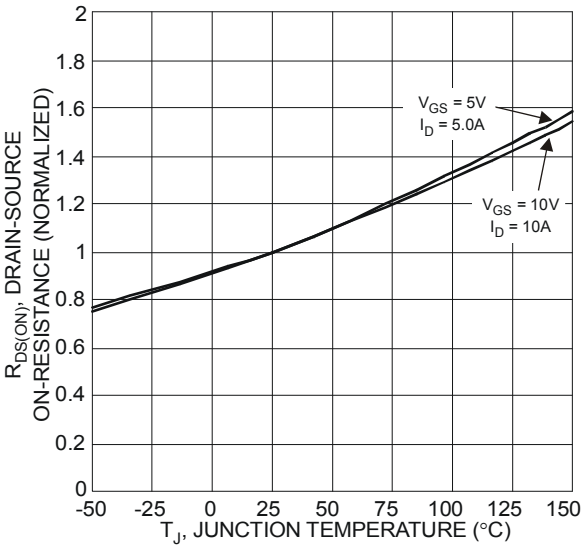


Figure 6 On-Resistance Variation with Temperature

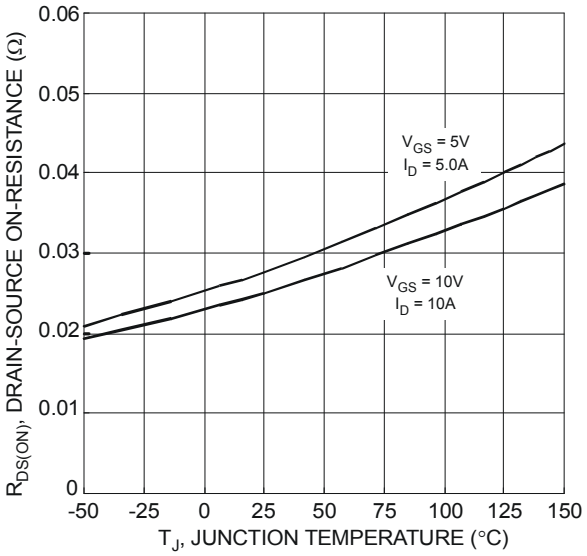


Figure 7 On-Resistance Variation with Temperature

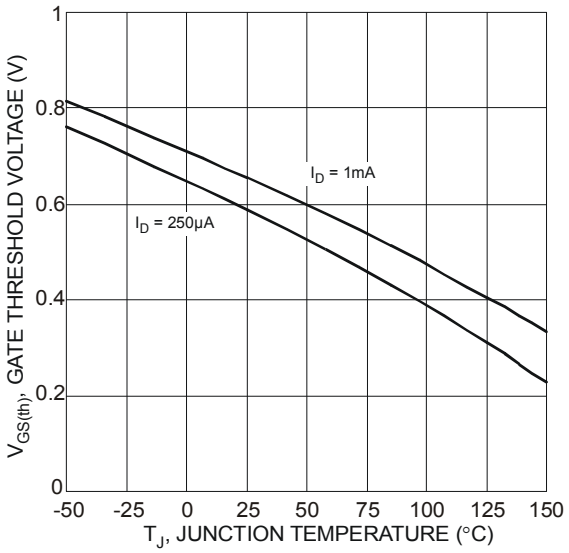


Figure 8 Gate Threshold Variation vs. Ambient Temperature

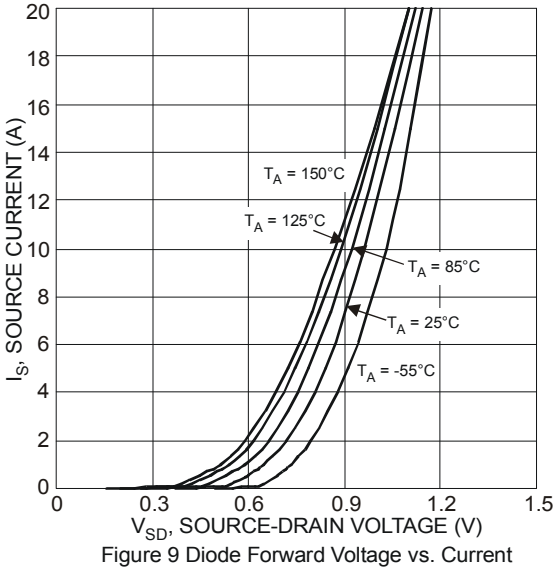


Figure 9 Diode Forward Voltage vs. Current

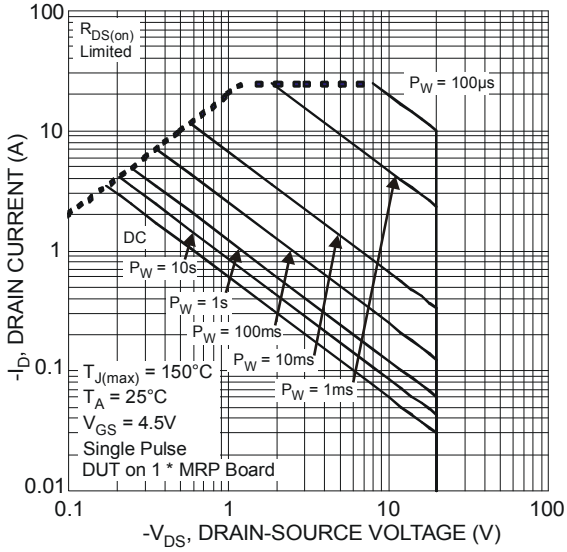


Figure 10 SOA, Safe Operation Area

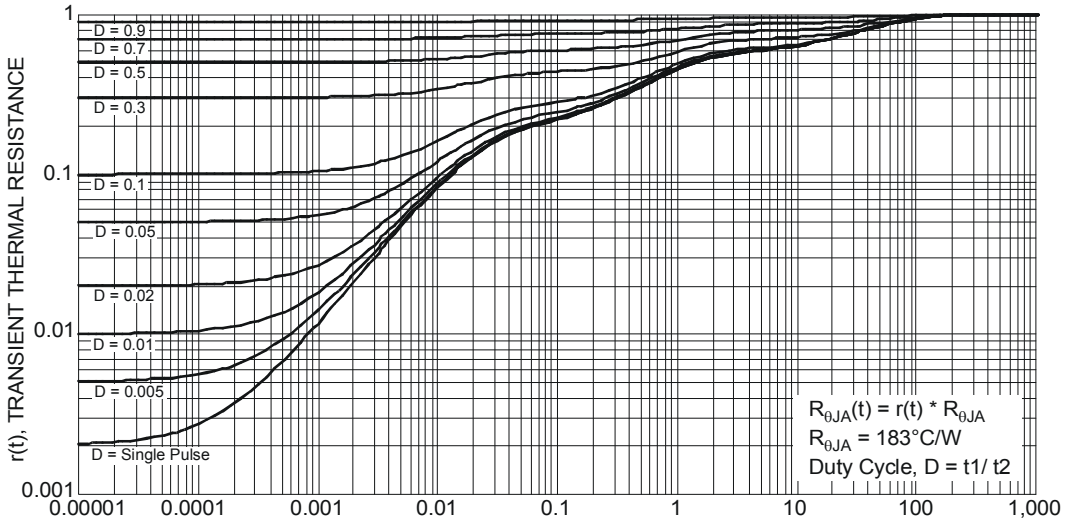
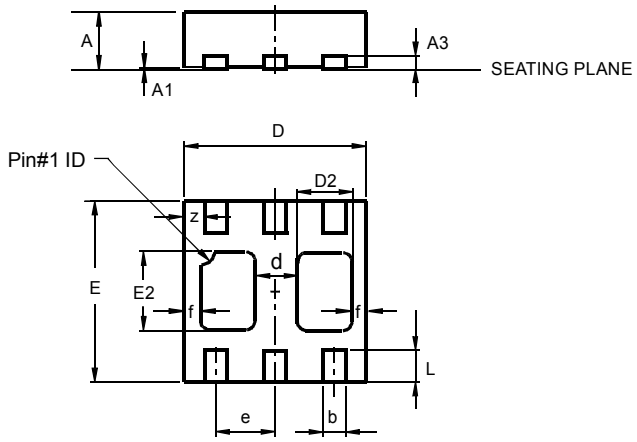


Figure 11 Transient Thermal Resistance

Package Outline Dimensions

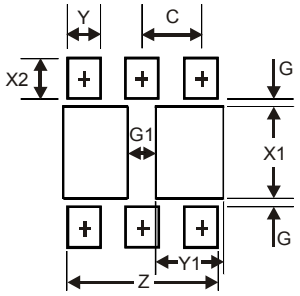
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



DFN2020-6 Type B			
Dim	**Min**	**Max**	**Typ**
A	0.545	0.605	0.575
A1	0	0.05	0.02
A3	—	—	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
d	—	—	0.45
D2	0.50	0.70	0.60
e	—	—	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
f	—	—	0.15
L	0.25	0.35	0.30
z	—	—	0.225
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
Z	1.67
G	0.20
G1	0.40
X1	1.0
X2	0.45
Y	0.37
Y1	0.70
C	0.65

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