



DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

V _{(BR)DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
001/	45mΩ @ V _{GS} = 4.5V	4.5A
20V	55mΩ @ V _{GS} = 2.5V	4.1A

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.

Applications

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

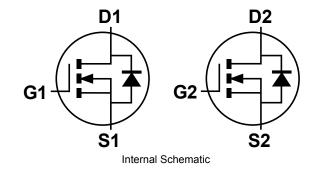
D2 G2 D1 D1 Pin1 Bottom View

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

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)



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	9	2010		2011	20	12	2013		2014	2	2015
Code	W		X		Υ	7	Z	Α		В		С
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	0	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 $T_A = +25^{\circ}C$ State $T_A = +70^{\circ}C$		l _D	3.3 2.6	Α
Continuous Drain Current (Note 6) $V_{GS} = 4.5V$ Steady $T_A = +25^{\circ}C$ State $T_A = +70^{\circ}C$		Ι _D	4.5 3.6	А
Maximum Continuous Body Diode Forward Current	(Note 6)	I _S	1	Α
Pulsed Drain Current (10µs pulse, duty cycle = 1%))	I _{DM}	25	Α
Avalanche Current (Note 7) L = 0.1mH		I _{AR}	9	Α
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	Pn	0.73	W	
Total Fower Dissipation (Note 3)	T _A = +70°C	r _D	0.46		
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	В	173	°C/W	
Thermal Resistance, sunction to Ambient (Note 5)	t<10s	$R_{ hetaJA}$	110		
Total Power Dissipation (Note 6)	$T_A = +25^{\circ}C$	D	1.42	W	
Total Fower Dissipation (Note 6)	T _A = +70°C	P _D	0.90	v v	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	В	89		
Thermal Resistance, Junction to Ambient (Note o)	t<10s	$R_{ hetaJA}$	57	°C/W	
Thermal Resistance, Junction to Case (Note 6)	$R_{ heta JC}$	18			
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C	

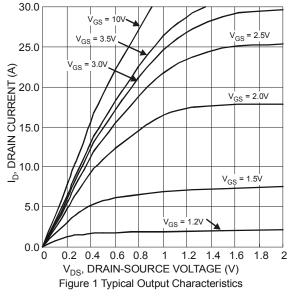
Electrical Characteristics (@T_A = ±25°C, unless otherwise specified.)

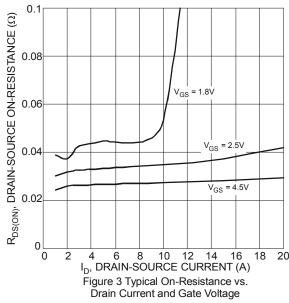
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 8)							
Drain-Source Breakdown Voltage	BV _{DSS}	20	-	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	-	_	1.0	μΑ	V _{DS} = 16V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 12V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)						•	
Gate Threshold Voltage	$V_{GS(th)}$	0.4	_	1.0	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
Static Drain-Source On-Resistance		ı	28	45	mΩ	$V_{GS} = 4.5V$, $I_D = 5.0A$	
Static Drain-Source On-Resistance	R _{DS (ON)}	-	36	55	11177	$V_{GS} = 2.5V$, $I_D = 4.2A$	
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}	ı	389	-	рF	1/ 401/11/ 01/	
Output Capacitance	Coss	-	72	_	pF	$V_{DS} = 10V, V_{GS} = 0V,$ - f = 1.0MHz	
Reverse Transfer Capacitance	C _{rss}	-	63	_	pF	1 - 1.0WH2	
Gate Resistance	Rg	-	2.1	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge (V _{GS} = 4.5V)	Q_g	-	5.7	_	nC		
Total Gate Charge (V _{GS} = 10V)	Qg	_	12	_	nC		
Gate-Source Charge	Q_{gs}	-	0.7	_	nC	V_{DS} = 15V, I_D = 5.8A	
Gate-Drain Charge	Q_{gd}	-	1.5	_	nC		
Turn-On Delay Time	t _{D(on)}	-	5	_	ns		
Turn-On Rise Time	t _r	_	8	_	ns	V _{DS} = 10V, V _{GS} = 4.5V,	
Turn-Off Delay Time	t _{D(off)}	_	25	_	ns	$R_G = 6\Omega$, $I_{DS} = 1A$	
Turn-Off Fall Time	t _f	_	8	_	ns		
Reverse Recovery Time	t _{rr}	-	8.5	_	ns	L 54 45/45 400A/c-	
Reverse Recovery Charge	Qrr	_	2.1	_	nC	$I_F = 5A$, di/dt = 100A/ μ s	

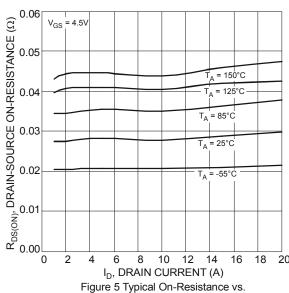
Notes:

- 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.

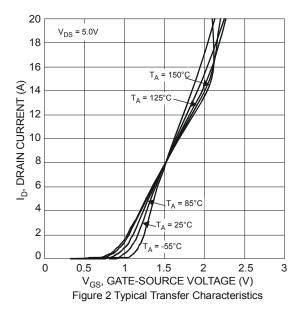


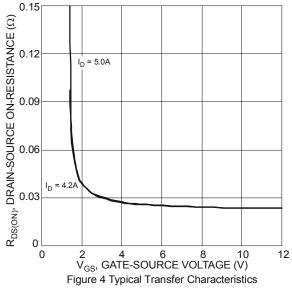






Drain Current and Temperature





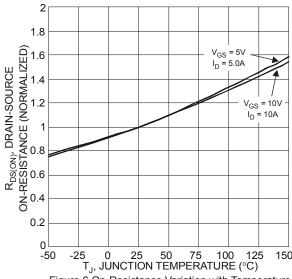
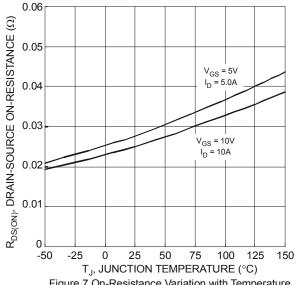


Figure 6 On-Resistance Variation with Temperature







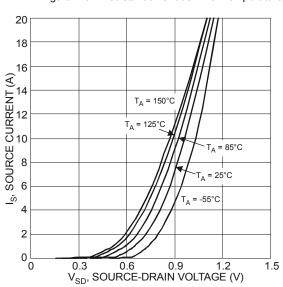
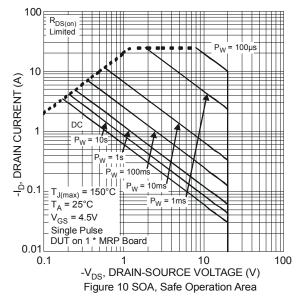


Figure 9 Diode Forward Voltage vs. Current

V_{GS(th)}, GATE THRESHOLD VOLTAGE (V) $I_D = 1mA$ 0.6 $I_{D} = 250 \mu A$ 0.4 -50 25 50 75 100 125 T_J, JUNCTION TEMPERATURE (°C)

Figure 8 Gate Threshold Variation vs. Ambient Temperature



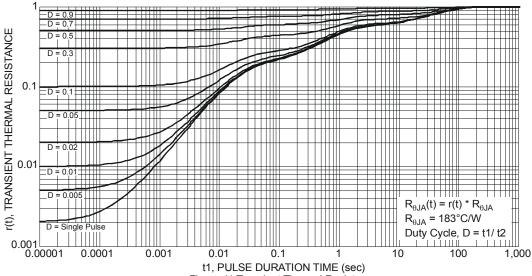
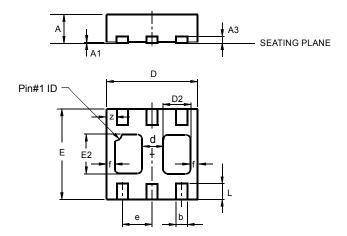


Figure 11 Transient Thermal Resistance



Package Outline Dimensions

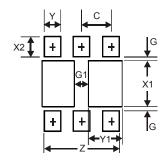
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



DFN2020-6 Type B								
Dim	Min	Max	Тур					
Α	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					
е		_	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
Υ	0.37
Y1	0.70
С	0.65



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