



40V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

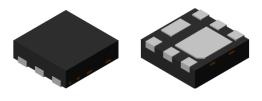
BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
40)/	11.5 m Ω @ V _{GS} = 10 V	11.6A
40V	$18m\Omega @ V_{GS} = 4.5V$	9.3A

Description

This new generation MOSFET is 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:

- Power Management Functions
- DC-DC Converters
- Backlighting

U-DFN2020-6 (SWP) (Type F)



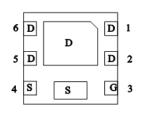
Top View Bottom View

Features

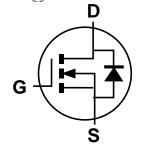
- Rated to +175°C Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching, Test in Production Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} Ensures On State Losses Are Minimized
- 0.6mm Profile Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- 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
- An Automotive-Compliant Part is Available Under Separate Datasheet (<u>DMTH4008LFDFWQ</u>)

Mechanical Data

- Case: U-DFN2020-6 (SWP) (Type F)
- 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 (23)
- Weight: 0.007 grams (Approximate)



Pin Out Bottom View



Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Quantity Per Reel
DMTH4008LFDFW-7	U-DFN2020-6 (SWP) (Type F)	3,000
DMTH4008LFDFW-13	U-DFN2020-6 (SWP) (Type F)	10,000

lotes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.

- 2. See https://www.diodes.com/quality/lead-free/ 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



8W = Product Type Marking Code YM = Date Code Marking Y = Year (ex: F = 2018) M = Month (ex: 9 = September)

Date Code Key

Year	201	7	2018	201	9	2020	202	1	2022	2023	3	2024
Code	Е		F	G		Н			J	K		L
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 (@ $T_A = +25^{\circ}C$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage	V_{GSS}	±20	V	
Continuous Drain Current (Note 7) V _{GS} = 10V	D	11.6 8.2	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I _{DM}	80	Α
Continuous Source-Drain Diode Current (Note 7)	Is	2.55	Α	
Pulsed Source-Drain Diode Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	80	Α	
Avalanche Current, L = 0.3mH (Note 8)	I _{AS}	14.7	А	
Avalanche Energy, L = 0.3mH (Note 8)	E _{AS}	32.4	mJ	

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^{\circ}C$	P_{D}	0.99	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	153	°C/W
Total Power Dissipation (Note 6)	$T_A = +25^{\circ}C$	P _D	2.35	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	64.5	°C/W
Thermal Resistance, Junction to Case (Note 7)	T _C = +25°C	R ₀ JC	14.8	°C/W
Operating and Storage Temperature Range		T _{J,} T _{STG}	-55 to +175	°C

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

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition		
OFF CHARACTERISTICS (Note 9)								
Drain-Source Breakdown Voltage	BV _{DSS}	40		_	V	$V_{GS} = 0V, I_D = 250\mu A$		
Zero Gate Voltage Drain Current	I _{DSS}	_	_	1	μΑ	$V_{DS} = 32V, V_{GS} = 0V$		
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$		
ON CHARACTERISTICS (Note 9)								
Gate Threshold Voltage	V _{GS(TH)}	1	1.7	3	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$		
Static Drain-Source On-Resistance	Б		9.1	11.5	m0	$V_{GS} = 10V, I_D = 10A$		
Static Drain-Source On-Resistance	R _{DS(ON)}	_	12.9	18	mΩ	$V_{GS} = 4.5V, I_D = 8.5A$		
Diode Forward Voltage	V_{SD}	_	0.8	1.0	V	$V_{GS} = 0V, I_{S} = 10A$		
DYNAMIC CHARACTERISTICS (Note 10)								
Input Capacitance	C _{iss}	_	1030	_		$V_{DS} = 20V, V_{GS} = 0V,$		
Output Capacitance	Coss	_	324	_	pF			
Reverse Transfer Capacitance	C _{rss}	_	27	_		f = 1MHz		
Gate Resistance	Rg	_	1.82	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$		
Total Gate Charge (V _{GS} = 4.5V)	Qg	_	6.8	_				
Total Gate Charge (V _{GS} = 10V)	Qg	_	14.2	_	nC	V 20V I 40A		
Gate-Source Charge	Q _{gs}	_	2.0	_	IIC	$V_{DD} = 20V, I_D = 10A$		
Gate-Drain Charge	Q _{gd}	_	2.7	_				
Turn-On Delay Time	t _{D(ON)}	_	3.1	_				
Turn-On Rise Time	t _R	_	3.1	_		$V_{DD} = 20V, V_{GS} = 10V,$		
Turn-Off Delay Time	t _{D(OFF)}	_	14.2	_	ns	$R_g = 6\Omega$, $I_D = 10A$		
Turn-Off Fall Time	t _F	_	5.8	_		-		
Reverse Recovery Time	t _{RR}	_	19.6	_	ns	1 100 11/11 1000/		
Reverse Recovery Charge	Q _{RR}	_	8.2	_	nC	I _F = 10A, di/dt = 100A/μs		

Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

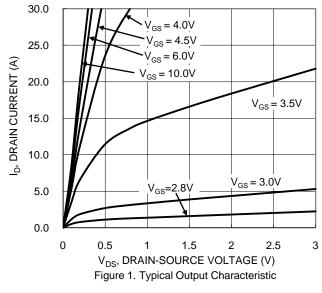
^{7.} Thermal resistance from junction to soldering point (on the exposed drain pad). 8. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J =+ 25°C.

^{9.} Short duration pulse test used to minimize self-heating effect.

^{10.} Guaranteed by design. Not subject to product testing.







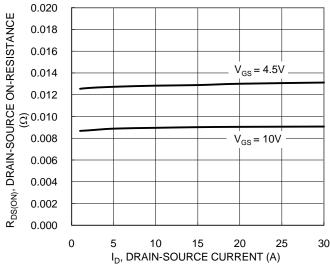


Figure 3. Typical On-Resistance vs. Drain Current and

Gate Voltage

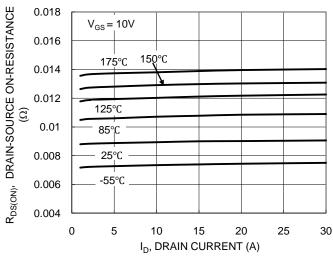
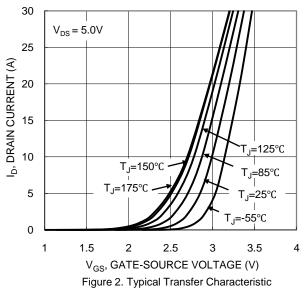
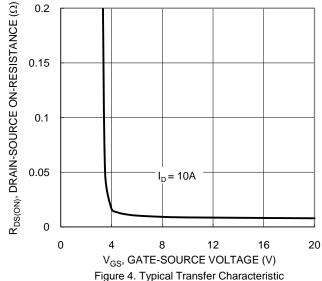


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





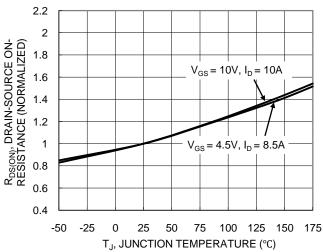


Figure 6. On-Resistance Variation with Temperature





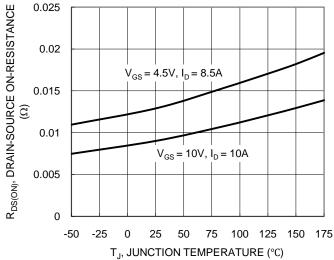
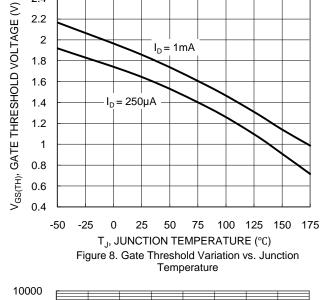


Figure 7. On-Resistance Variation with Temperature



2.4

100

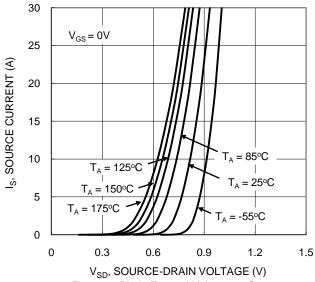
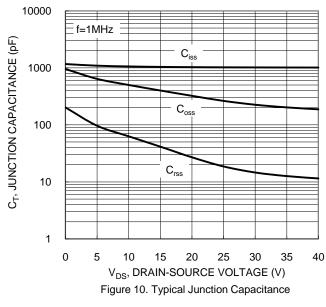
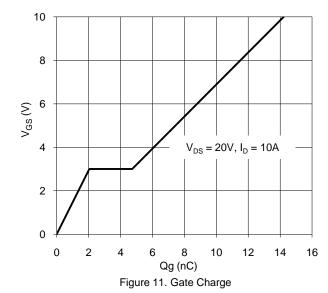
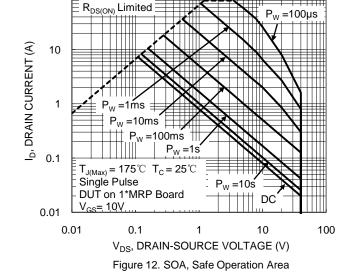


Figure 9. Diode Forward Voltage vs. Current









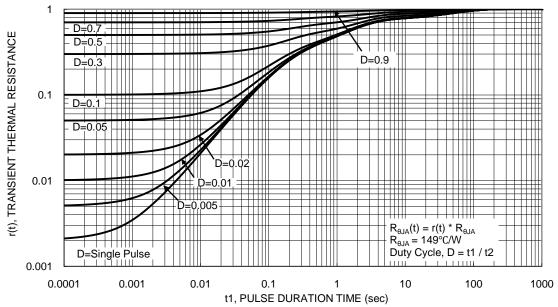


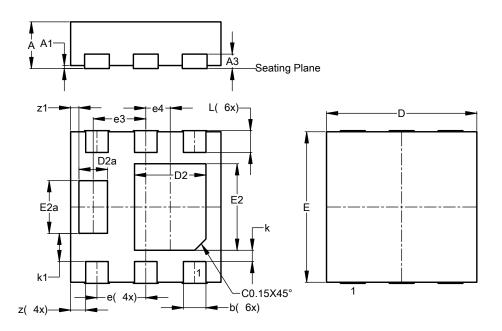
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

U-DFN2020-6 (SWP) (Type F)

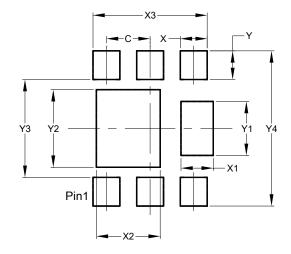


U-DFN2020-6 (SWP) (Type F)						
Dim	Min	Max	Тур			
Α	0.59	0.65	0.62			
A1	0.00	0.05	0.03			
A3	-	-	0.192			
b	0.28	0.38	0.33			
D	1.95	2.05	2.00			
D2	0.87	1.07	0.97			
D2a	0.35		0.40 2.00			
E	1.95					
E2	1.07	1.27	1.17			
E2a	0.67	0.77	0.72			
e		0.65 B	SC			
е3		0.70 B	SC			
e4	C).325 B	SC			
k			0.15			
k1			0.375			
L	0.225	0.355	0.305			
Z			0.20			
z 1			0.11			
All Dimensions in mm						

Suggested Pad Layout

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

U-DFN2020-6 (SWP) (Type F)



Dimensions	Value (in mm)
С	0.650
X	0.400
X1	0.480
X2	0.950
Х3	1.700
Y	0.425
Y1	0.800
Y2	1.150
Y3	1.450
Y4	2.300



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