



#### **40V N-CHANNEL 175°C MOSFET POWERDI**

#### **Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub> T <sub>C</sub> = +25°C
40V	4.0mΩ @ V <sub>GS</sub> = 10V	80A

#### **Description and Applications**

This MOSFET has been designed to meet the stringent requirements of Automotive applications. It is qualified to AECQ101, supported by a PPAP and is ideal for use in:

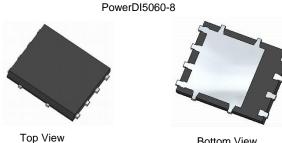
- **Engine Management Systems**
- **Body Control Electronics**
- **DC-DC Converters**

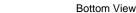
#### **Features**

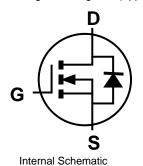
- Rated to +175°C Ideal for High Ambient Temperature **Environments**
- 100% Unclamped Inductive Switching Ensures More Reliable and Robust End Application
- Low R<sub>DS(ON)</sub> Minimises Power Losses
- Low Q<sub>g</sub> Minimises Switching Losses
- <1.1mm Package Profile Ideal for Thin Applications
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- **PPAP Capable (Note 4)**

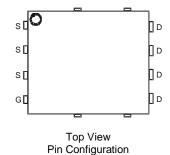
#### Mechanical Data

- Case: PowerDI5060-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.097 grams (Approximate)









## Ordering Information (Note 5)

Part Number	Case	Packaging
DMNH4005SPSQ-13	PowerDI5060-8	2,500 / Tape & Reel

Pin1

Notes:

- 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product\_compliance\_definitions.html.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

#### **Marking Information**



☐ H = Manufacturer's Marking H4005SS = Product Type Marking Code YYWW = Date Code Marking YY = Last Digit of Year (ex: 16 = 2016) WW = Week Code (01 to 53)

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# **Maximum Ratings** ( $@T_A = +25^{\circ}C$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit		
Drain-Source Voltage			V <sub>DSS</sub>	40	V
Gate-Source Voltage			$V_{GSS}$	20	V
Continuous Drain Current (Note 7) $V_{GS} = 10V$ Steady $T_C = +25^{\circ}C$ State $T_C = +100^{\circ}C$			I <sub>D</sub>	80 60	А
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	90	Α		
Maximum Continuous Body Diode Forward Current (Note 6)			Is	80	Α
Avalanche Current (Note 8) L=1mH			I <sub>AS</sub>	30	Α
Avalanche Energy (Note 8) L=1mH			E <sub>AS</sub>	445	mJ

## **Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)		$P_D$	1.6	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	ב	98	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	t<10s	$R_{\theta JA}$	54	
Total Power Dissipation (Note 7)		$P_D$	2.8	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	2	53	°C/W
Thermal Resistance, Junction to Ambient (Note 7)	t<10s	$R_{\theta JA}$	29	
Thermal Resistance, Junction to Case		$R_{ heta JC}$	0.9	
Operating and Storage Temperature Range		$T_{J_i}T_{STG}$	-55 to +175	°C

## Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

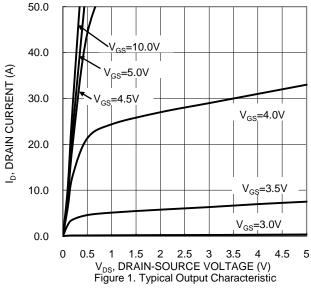
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 9)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	1	1	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	1	1	μΑ	$V_{DS} = 32V, V_{GS} = 0V$	
Gate-Source Leakage	IGSS	_	1	±100	nA	$V_{GS} = \pm 16V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 9)							
Gate Threshold Voltage	$V_{GS(TH)}$	1		3	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	_	3.2	4.0	mΩ	$V_{GS} = 10V, I_D = 20A$	
Diode Forward Voltage	$V_{SD}$	_	1	1.2	V	$V_{GS} = 0V, I_{S} = 1A$	
DYNAMIC CHARACTERISTICS (Note 10)							
Input Capacitance	C <sub>iss</sub>	_	2847	1		V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V f = 1.0MHz	
Output Capacitance	Coss	_	743	-	pF		
Reverse Transfer Capacitance	Crss	_	243	_			
Gate Resistance	$R_g$	_	2.0	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge (V <sub>GS</sub> = 10V)	Qg	_	48	1			
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Qg	_	23	_	nC	$V_{DD} = 20V, I_D = 20A$	
Gate-Source Charge	$Q_{gs}$	_	9.5	_	IIC	V <sub>DD</sub> = 20V, I <sub>D</sub> = 20A	
Gate-Drain Charge	$Q_{gd}$	_	11.5	_			
Turn-On Delay Time	t <sub>D(ON)</sub>	_	6.6	_			
Turn-On Rise Time	t <sub>R</sub>	_	12.1	_		$V_{DD} = 20V, V_{GS} = 10V,$ $R_g = 1\Omega, I_D = 20A$	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	_	18.3	_	ns		
Turn-Off Fall Time	t <sub>F</sub>	_	4.9	_			
Reverse Recovery Time	t <sub>RR</sub>	_	29	_	ns	1 454 4:/44 4004/	
Reverse Recovery Charge	$Q_{RR}$	_	24	_	nC	$I_F = 15A$ , di/dt = 100A/ $\mu$ s	

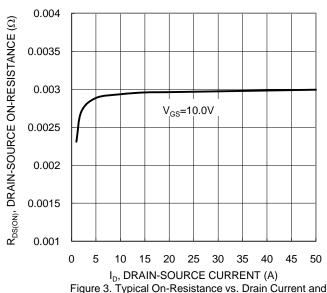
Notes:

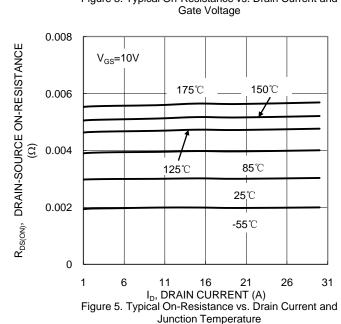
- 6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
- 7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
- 8.  $I_{AS}$  and  $E_{AS}$  ratings are based on low frequency and duty cycles to keep  $T_J$  = +25°C.
- 9. Short duration pulse test used to minimize self-heating effect.
- 10. Guaranteed by design. Not subject to product testing.

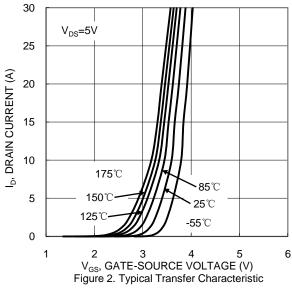
## DMNH4005SPSQ

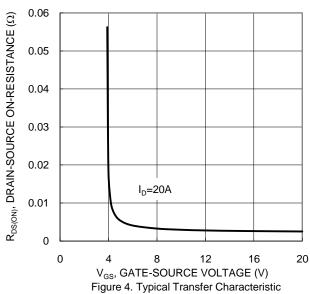












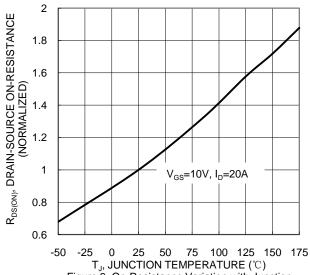


Figure 6. On-Resistance Variation with Junction Temperature

#### DMNH4005SPSQ

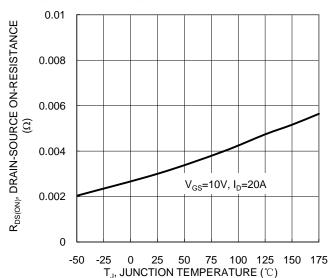
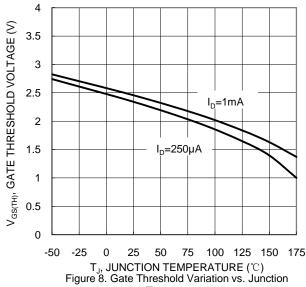
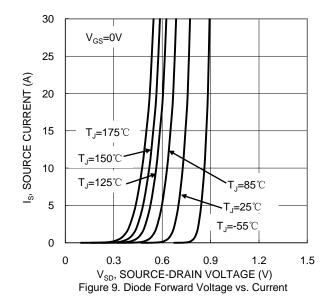
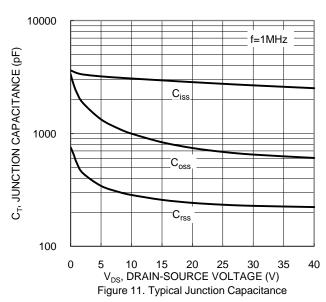


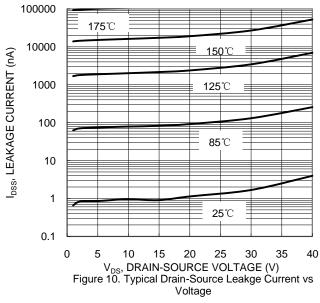
Figure 7. On-Resistance Variation with Junction Temperature

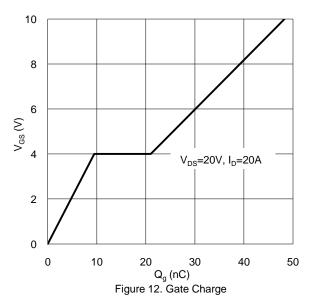




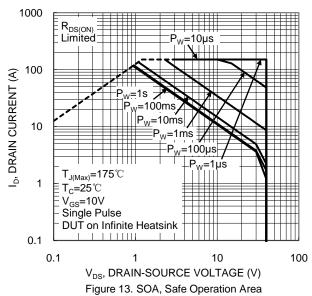












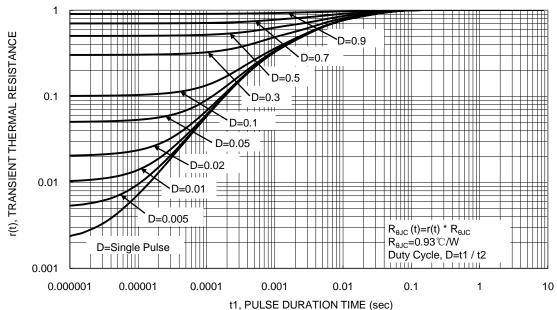


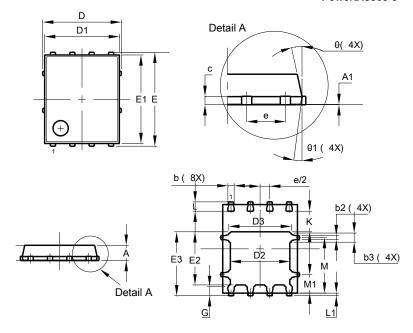
Figure 14. Transient Thermal Resistance



#### **Package Outline Dimensions**

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

#### PowerDI5060-8

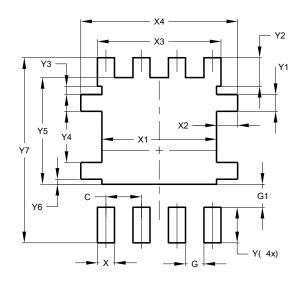


PowerDI5060-8					
Dim	Min	Max	Тур		
Α	0.90	1.10	1.00		
A1	0.00	0.05	-		
b	0.33	0.51	0.41		
b2	0.200	0.350	0.273		
b3	0.40	0.80	0.60		
C	0.230	0.330	0.277		
D	,	5.15 BSC			
D1	4.70	5.10	4.90		
D2	3.70	4.10	3.90		
D3	3.90	4.30	4.10		
Е	6.15 BSC				
E1	5.60	6.00	5.80		
E2	3.28	3.68	3.48		
E3	3.99	4.39	4.19		
е		1.27 BSC			
G	0.51	0.71	0.61		
K	0.51	-	-		
L	0.51	0.71	0.61		
L1	0.100	0.200	0.175		
М	3.235	4.035	3.635		
M1	1.00	1.40	1.21		
Θ	10°	12º	11º		
Θ1	6°	80	7º		
All Dimensions in mm					

## **Suggested Pad Layout**

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

#### PowerDI5060-8



Dimensions	value (in mm)	
C	1.270	
G	0.660	
G1	0.820	
Х	0.610	
X1	4.100	
X2	0.755	
Х3	4.420	
X4	5.610	
Υ	1.270	
Y1	0.600	
Y2	1.020	
Y3	0.295	
Y4	1.825	
Y5	3.810	
Y6	0.180	
Y7	6.610	



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многоканальный

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#### Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru\_6 moschip.ru 4 moschip.ru 9