



12V 175°C P-CHANNEL ENHANCEMENT MODE MOSFET POWERDI5060-8

Product Summary

BV _{DSS}	R _{DS(ON)}	I _D T _A = +25°C
-12V	$6m\Omega @ V_{GS} = -4.5V$	-80A
	$8m\Omega @ V_{GS} = -2.5V$	-70A

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Notebook Battery Power Management
- **DC-DC Converters**
- Load Switch

Features

- Rated to +175°C Ideal for High Ambient Temperature
- 100% Unclamped Inductive Switching Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low R_{DS(ON)} Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- 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 Finish Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.097 grams (Approximate)



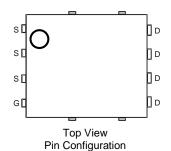




Bottom View



Internal Schematic



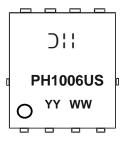
Ordering Information (Note 5)

F		
Part Number	Case	Packaging
DMPH1006UPSQ-13	PowerDI5060-8	2,500 / Tape & Reel

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



) | | = Manufacturer's Marking PH1006US = Product Type Marking Code YYWW = Date Code Marking YY = Year (ex: 16 = 2016) WW = Week (01 to 53)



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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	-12	V
Gate-Source Voltage		V_{GSS}	±8	V
Continuous Drain Current (Note 8) V _{GS} = -4.5V	$T_{C} = +25^{\circ}C$ $T_{C} = +100^{\circ}C$	I _D	-80 -60	А
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I _{DM}	-140	Α
Maximum Continuous Body Diode Forward Current (Note 7)		Is	-3.6	Α
Avalanche Current, L=0.1mH (Note 9)		I _{AS}	-18	Α
Avalanche Energy, L=0.1mH (Note 9)		E _{AS}	-17	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit		
Total Power Dissipation (Note 6)		PD	1.8	W	
The word Desistance I westign to Angliant (Note C)	Steady State		86	0000	
Thermal Resistance, Junction to Ambient (Note 6)	t<10s	$R_{\theta JA}$	74	°C/W	
Total Power Dissipation (Note 7)		P _D	3.2	W	
Thermal Desistance Junction to Ambient (Note 7)	Steady State		47	°C/W	
Thermal Resistance, Junction to Ambient (Note 7)	t<10s	$R_{\theta JA}$	40		
Thermal Resistance, Junction to Case (Note 8)		$R_{\theta JC}$	1.0		
Operating and Storage Temperature Range		T _{J,} T _{STG}	-55 to +175	°C	

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

h						
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 10)						
Drain-Source Breakdown Voltage	BV_{DSS}	-12	_	_	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	I _{DSS}	I	_	-1	μΑ	$V_{DS} = -12V, V_{GS} = 0V$
Gate-Source Leakage	I _{GSS}	l	_	±100	nA	$V_{GS} = \pm 8V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	V _{GS(TH)}	-0.4	_	-1	V	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$
Static Drain-Source On-Resistance		I	4	6	mΩ	$V_{GS} = -4.5V$, $I_{D} = -15A$
Static Diani-Source On-Resistance	R _{DS(ON)}		5	8	11122	$V_{GS} = -2.5V$, $I_{D} = -10A$
Diode Forward Voltage	V_{SD}	_	-0.7	-1.1	V	$V_{GS} = 0V, I_{S} = -1A$
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	Ciss		6,334	_		V _{DS} = -10V, V _{GS} = 0V f = 1MHz
Output Capacitance	Coss	l	1094	_	pF	
Reverse Transfer Capacitance	Crss		895	_		
Gate Resistance	R_g	_	3.5	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$
Total Gate Charge (V _{GS} = -8V)	Q_g	_	124	_		
Total Gate Charge (V _{GS} = -4.5V)	Qg	_	72	_	1 .0 /	
Gate-Source Charge	Q_{gs}	_	9	_	nC	$V_{DD} = -10V, I_D = -20A$
Gate-Drain Charge	Q_{gd}	_	17	_		
Turn-On Delay Time	t _{D(ON)}		11	_		
Turn-On Rise Time	t _R	-	21	_		$V_{GS} = -4.5V, V_{DD} = -10V,$ $R_g = 1\Omega, I_D = -10A$
Turn-Off Delay Time	t _{D(OFF)}	_	105	_	ns	
Turn-Off Fall Time	t _F	_	94	_		
Reverse Recovery Time	t _{RR}	_	27	_	ns	I _F = -10A, di/dt = -100A/μs
Reverse Recovery Charge	Q_{RR}	_	10	_	nC	I _F = -10A, di/dt = -100A/μs

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.

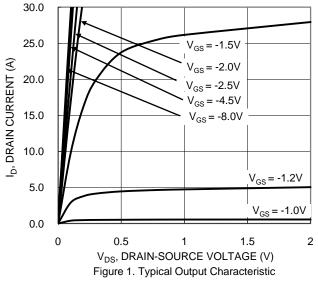
^{8.} Thermal resistance from junction to soldering point (on the exposed drain pad).

^{9.} I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.

^{10.} Short duration pulse test used to minimize self-heating effect.

^{11.} Guaranteed by design. Not subject to product testing.





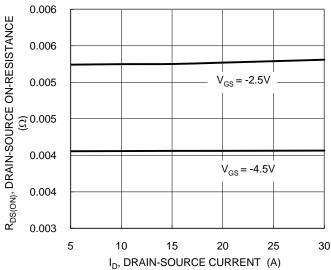


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

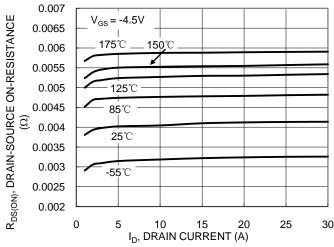
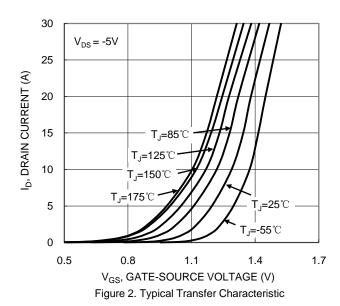
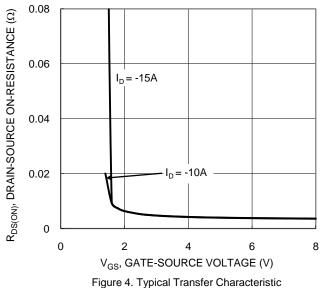


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





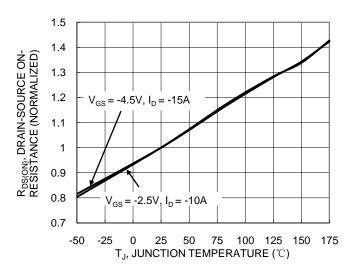


Figure 6. On-Resistance Variation with Temperature



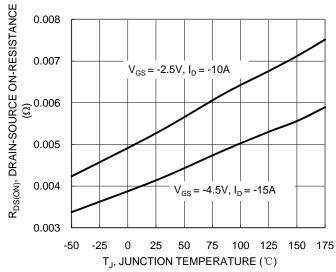


Figure 7. On-Resistance Variation with Temperature

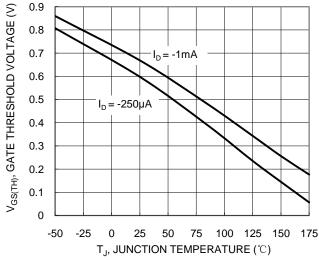
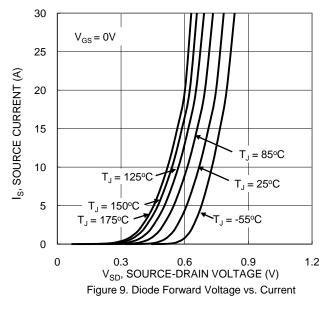
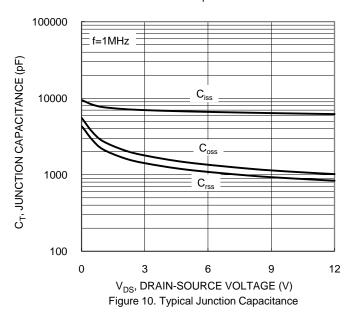
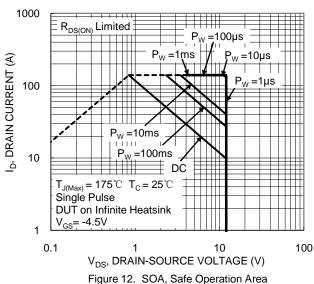


Figure 8. Gate Threshold Variation vs. Junction Temperature

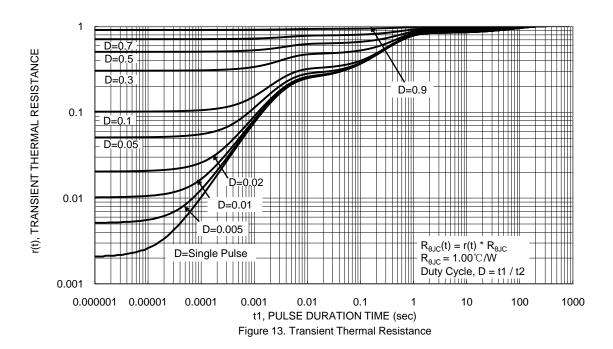


8 6 $V_{GS}(V)$ $V_{DS} = -10V, I_{D} = -20A$ 2 0 0 20 40 60 80 100 120 140 Qg (nC) Figure 11. Gate Charge







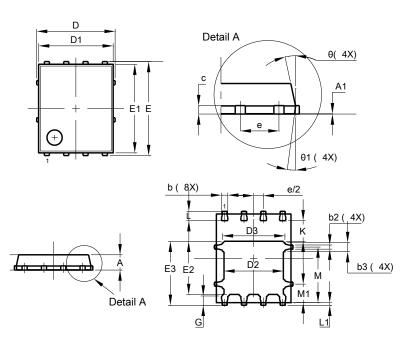




Package Outline Dimensions

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

PowerDI5060-8

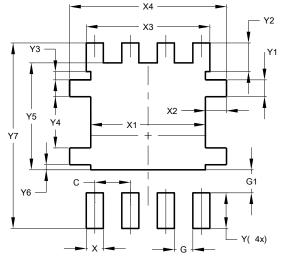


PowerDI5060-8					
Dim	Min	Max	Тур		
Α	0.90	1.10	1.00		
A1	0.00	0.05	-		
b	0.33	0.51	0.41		
b2	0.200	0.350	0.273		
b3	0.40	0.80	0.60		
С	0.230	0.330	0.277		
D		5.15 BSC			
D1	4.70	5.10	4.90		
D2	3.70	4.10	3.90		
D3	3.90	4.30	4.10		
E	6.15 BSC				
E1	5.60	6.00	5.80		
E2	3.28	3.68	3.48		
E3	3.99	4.39	4.19		
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		
M	3.235	4.035	3.635		
M1	1.00	1.40	1.21		
Θ	10°	12º	11º		
Θ1	6º	8°	7°		
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)			
С	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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