



60V 175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C	
	10mΩ @ V _{GS} = 10V	59A	
60V	12.8mΩ @ V _{GS} = 4.5V	52A	

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:

- Power Management Functions
- DC-DC Converters
- Backlighting

Features

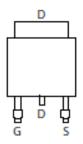
- Rated to +175°C ideal for high ambient temperature environments
- Low R_{DS(ON)} Ensures On State Losses Are Minimized
- Excellent Q_{gd x} R_{DS(ON)} Product (FOM)
- Advanced Technology for DC/DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Lead-Free 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

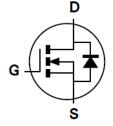
- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish Matte Tin Annealed over Copper Leadframe;
 Solderable per MIL-STD-202, Method 208 ³
- Weight: 0.33 grams (Approximate)







Pin Out Top View



Equivalent Circuit

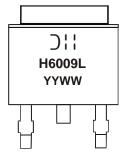
Ordering Information (Note 5)

Part Number	Case	Packaging			
DMTH6009LK3Q-13	TO252	2.500/Tape & Reel			

Notes:

- 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
- 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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
- $5.\ For\ packaging\ details,\ go\ to\ our\ website\ at\ http://www.diodes.com/products/packages.html.$

Marking Information



Old = Manufacturer's Marking
H6009L = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 15 = 2015)
WW = Week Code (01 to 53)



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

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V _{DSS}	60	V	
Gate-Source Voltage		V _{GSS}	±20	V
Continuous Drain Current (Note 6) V _{GS} = 10V	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I _D	14.2 11.9	А
Continuous Drain Current (Note 7) V _{GS} = 10V	$T_C = +25$ °C $T_C = +70$ °C	I _D	59 49	А
Maximum Continuous Body Diode Forward Current (Note 7)	Is	80	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	90	Α	
Avalanche Current, L=0.1mH	I _{AS}	20.3	А	
Avalanche Energy, L=0.1mH	E _{AS}	20.6	mJ	

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)		3.2	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{ heta JA}$	47	°C/W
Total Power Dissipation (Note 7)	P_{D}	60	W
Thermal Resistance, Junction to Case (Note 7)	$R_{ heta JC}$	2.5	°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 8)							
Drain-Source Breakdown Voltage	BV _{DSS}	60	-	-	V	$V_{GS} = 0V$, $I_D = 1mA$	
Zero Gate Voltage Drain Current	I _{DSS}	-	-	1	μΑ	$V_{DS} = 48V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}	-	-	±100	nA	$V_{GS} = \pm 16V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V _{GS(TH)}	0.7	1.4	2	٧	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
Static Drain-Source On-Resistance		-	8.3	10	mΩ	$V_{GS} = 10V, I_D = 13.5A$	
Static Drain-Source On-Resistance	R _{DS(ON)}	-	9.6	12.8	mΩ	$V_{GS} = 4.5V, I_D = 11.5A$	
Diode Forward Voltage	V _{SD}	-	0.9	1.2	V	$V_{GS} = 0V, I_S = 20A$	
DYNAMIC CHARACTERISTICS (Note 9)							
Input Capacitance	C _{iss}	-	1,925	-		V _{DS} = 30V, V _{GS} = 0V, f = 1MHz	
Output Capacitance	Coss	-	438	-	pF		
Reverse Transfer Capacitance	C _{rss}	-	41	-		I = IIVIDZ	
Gate Resistance	R_{g}	-	1.7	-	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge (V _{GS} = 4.5V)	Q_g	-	15.6	-			
Total Gate Charge (V _{GS} = 10V)	Qg	-	33.5	-	nC	V _{DS} = 30V, I _D = 13.5A	
Gate-Source Charge	Q _{gs}	-	4.7	-	iiC		
Gate-Drain Charge	Q_{gd}	-	5.3	-			
Turn-On Delay Time	t _{D(ON)}	-	4.5	-		$V_{DD} = 30V, V_{GS} = 10V,$ $R_G = 6\Omega, I_D = 13.5A$	
Turn-On Rise Time	t _R	-	8.6	-			
Turn-Off Delay Time	t _{D(OFF)}	-	35.9	-	ns		
Turn-Off Fall Time	t _F	-	15.7	-		!	
Body Diode Reverse Recovery Time	t _{RR}	-	18.2	-	ns	1 42 EA di/dt 400A/:	
Body Diode Reverse Recovery Charge	Q_{RR}	-	33.1	-	nC	$I_F = 13.5A$, di/dt = 400A/ μ s	

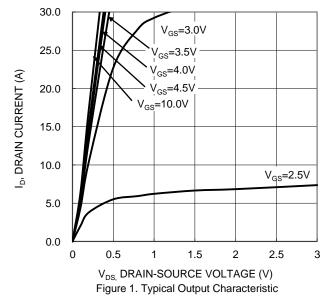
Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.

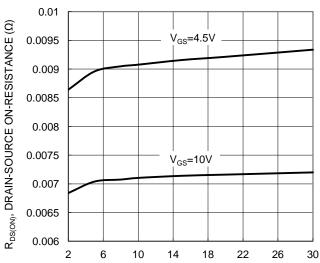
^{7.} Device mounted on infinite heat sink and measured by thermal couple attached on bottom heat sink of package.

^{8.} Short duration pulse test used to minimize self-heating effect.

^{9.} Guaranteed by design. Not subject to product testing.







I_D, DRAIN-SOURCE CURRENT (A) Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

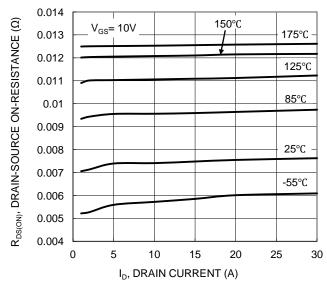
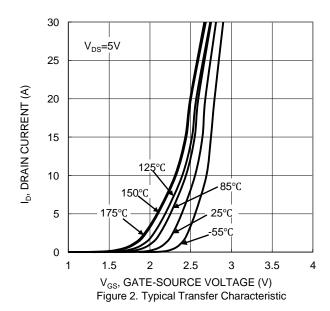
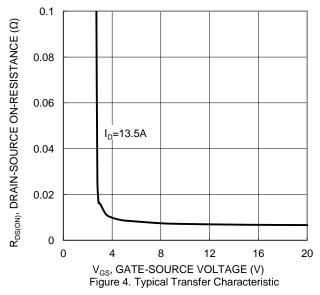


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature





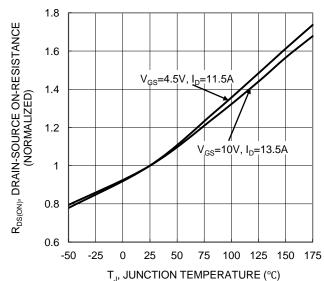
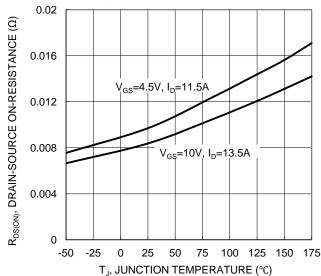
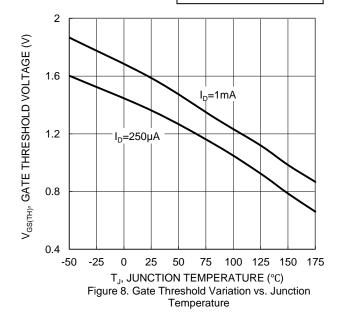


Figure 6. On-Resistance Variation with Junction
Temperature



DMTH6009LK3Q





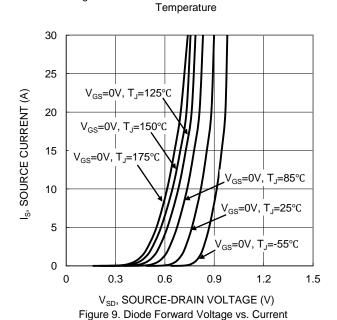
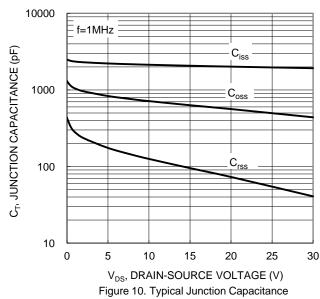


Figure 7. On-Resistance Variation with Junction



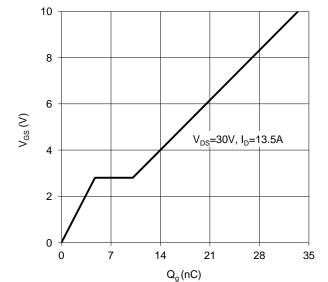
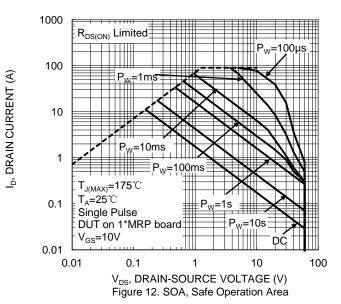


Figure 11. Gate Charge





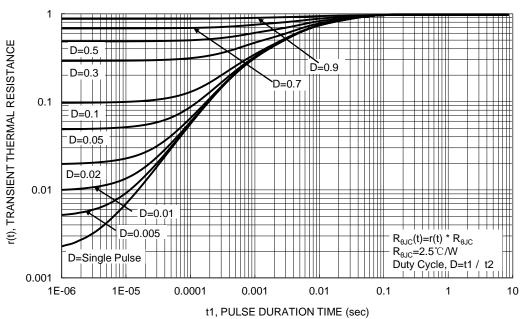
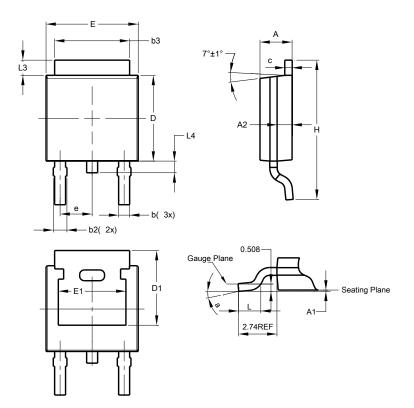


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

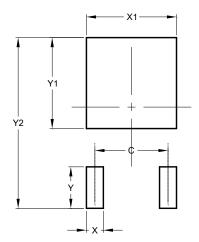


TO252 (DPAK)						
Dim	Min	Max	Тур			
Α	2.19	2.39	2.29			
A 1	0.00	0.13	0.08			
A2	0.97	1.17	1.07			
b	0.64	0.88	0.783			
b2	0.76	1.14	0.95			
b3	5.21	5.46	5.33			
С	0.45	0.58	0.531			
D	6.00	6.20	6.10			
D1	5.21	-	-			
е	-	-	2.286			
Е	6.45	6.70	6.58			
E1	4.32	-	-			
Н	9.40	10.41	9.91			
L	1.40	1.78	1.59			
L3	0.88	1.27	1.08			
L4	0.64	1.02	0.83			
а	0°	10°	-			
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)			
С	4.572			
Х	1.060			
X1	5.632			
Y	2.600			
Y1	5.700			
Y2	10.700			

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