



40V 175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
40V	7.3mΩ @ V _{GS} = 10V	70A
	9.8mΩ @ V _{GS} = 4.5V	44A

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:

- Engine Management Systems
- Body Control Electronics
- DC/DC Converter

Features

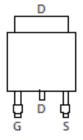
- Rated to +175°C Ideal for High Ambient Temperature Environments
- High Conversion Efficiency
- Low R_{DS(ON)} Minimizes On State Losses
- Low Input Capacitance
- · Fast Switching Speed
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

Mechanical Data

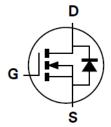
- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.33 grams (Approximate)



Top View



Pin Out Top View



Equivalent Circuit

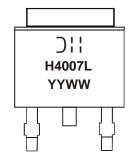
Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH4007LK3Q-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. 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



O!! = Manufacturer's Marking
H4007L = 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}	40	V	
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, V _{GS} = 10V (Note 6)	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	ΙD	16.8 13.9	А
Continuous Drain Current, V _{GS} = 10V (Note 7)	$T_C = +25^{\circ}C$ $T_C = +100^{\circ}C$	Ι _D	70 51	А
Maximum Continuous Body Diode Forward Current (Note 7)	Is	50	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	160	Α	
Avalanche Current, L = 0.1mH	I _{AS}	20	Α	
Avalanche Energy, L = 0.1mH	E _{AS}	20	mJ	

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P _D	2.6	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	47	°C/W
Total Power Dissipation (Note 7)	P _D	59	W
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	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.)

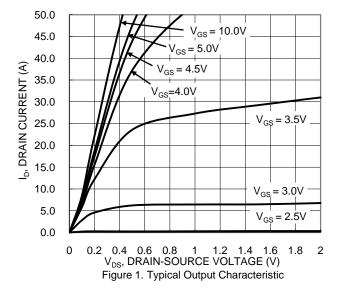
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 8)							
Drain-Source Breakdown Voltage	BV _{DSS}	40	1	-	٧	$V_{GS} = 0V$, $I_D = 1mA$	
Zero Gate Voltage Drain Current	I _{DSS}	-	-	1	μΑ	$V_{DS} = 32V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}	-	-	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V _{GS(TH)}	1	-	3	V	$V_{DS} = V_{GS}, I_D = 250 \mu A$	
Static Drain-Source On-Resistance		-	5.5	7.3	mΩ	$V_{GS} = 10V, I_D = 20A$	
Static Drain-Source On-Resistance	R _{DS(ON)}	-	8.6	9.8		$V_{GS} = 4.5V, I_D = 20A$	
Diode Forward Voltage	V_{SD}	-	-	1.2	V	$V_{GS} = 0V, I_{S} = 20A$	
DYNAMIC CHARACTERISTICS (Note 9)							
Input Capacitance	C _{iss}	-	1895	-		$V_{DS} = 30V$, $V_{GS} = 0V$, $f = 1MHz$	
Output Capacitance	Coss	-	485	-	pF		
Reverse Transfer Capacitance	C _{rss}	-	20.9	-			
Gate Resistance	R_{g}	0.1	0.62	1.8	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge (V _{GS} = 4.5V)	Qg	-	12.4	-			
Total Gate Charge (V _{GS} = 10V)	Qq	-	29.1	-	0	N/ 001/ 1 00A	
Gate-Source Charge	Q _{gs}	-	5.9	-	nC	$V_{DS} = 30V, I_{D} = 20A$	
Gate-Drain Charge	Q _{qd}	-	3.5	-			
Turn-On Delay Time	t _{D(ON)}	-	5.4	-		$V_{DD} = 30V, V_{GS} = 10V,$ $I_{D} = 20A, R_{G} = 3\Omega$	
Turn-On Rise Time	t _R	-	4.5	-			
Turn-Off Delay Time	t _{D(OFF)}	-	16.2	-	ns		
Turn-Off Fall Time	t _F	-	3.5	-			
Body Diode Reverse Recovery Time	t _{RR}	-	30.6	-	ns , and we continue		
Body Diode Reverse Recovery Charge	Q _{RR}	-	28.1	-	nC	$I_F = 20A$, di/dt = 100A/ μ s	

6. 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. Short duration pulse test used to minimize self-heating effect.

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





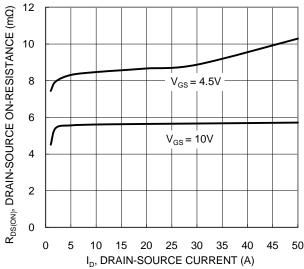


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

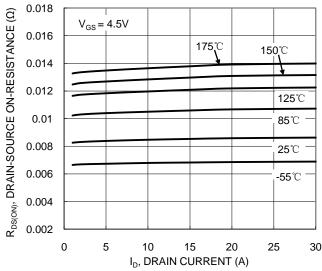
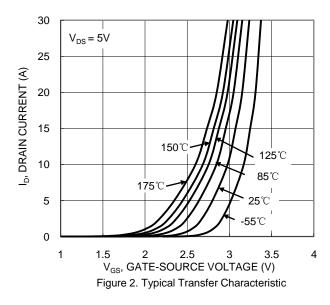
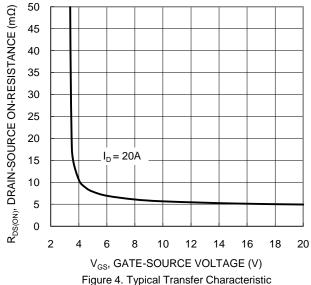


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





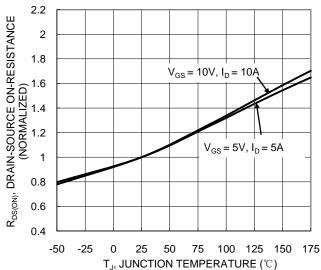


Figure 6. On-Resistance Variation with Temperature





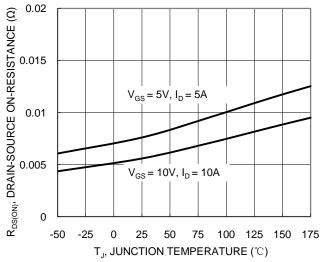
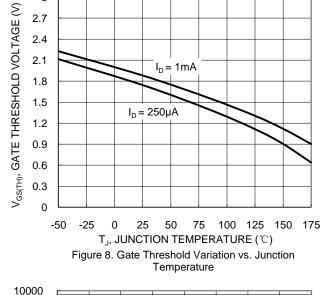
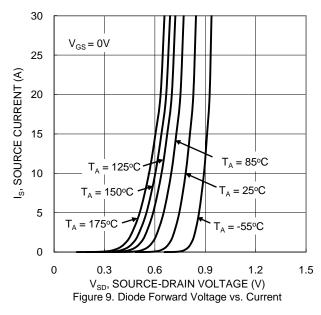
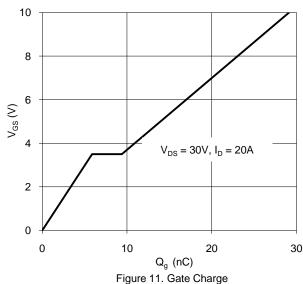


Figure 7. On-Resistance Variation with Temperature

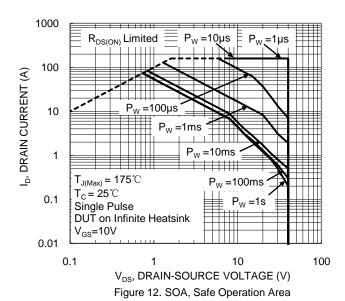


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f=1MHz C_T, JUNCTION CAPACITANCE (pF) C_{iss} 1000 100 C_{rss} 10 0 5 10 15 20 25 30 35 40 V_{DS}, DRAIN-SOURCE VOLTAGE (V) Figure 10. Typical Junction Capacitance





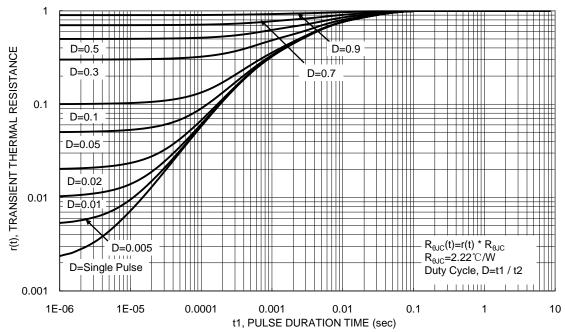


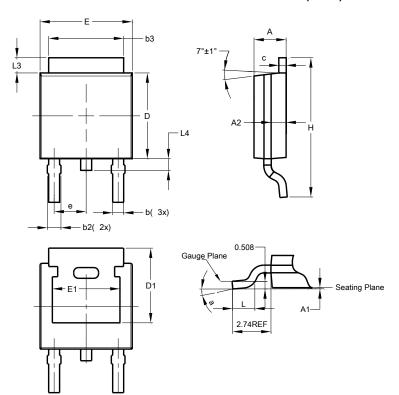
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

TO252 (DPAK)

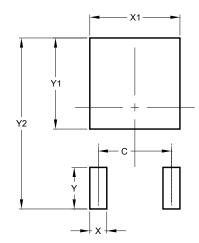


TO252 (DPAK)					
Dim	Min	Max	Тур		
Α	2.19	2.39	2.29		
A 1	0.00	0.13	0.08		
A2	0.97	1.17	1.07		
q	0.64	0.88	0.783		
b2	0.76	1.14	0.95		
b3	5.21	5.46	5.33		
С	0.45	0.58	0.531		
D	6.00	6.20	6.10		
D1	5.21	-	-		
е	-	-	2.286		
Е	6.45	6.70	6.58		
E1	4.32	-	-		
H	9.40	10.41	9.91		
٦	1.40	1.78	1.59		
L3	0.88	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.

TO252 (DPAK)



Dimensions	Value (in mm)		
С	4.572		
Х	1.060		
X1	5.632		
Y	2.600		
Y1	5.700		
V2	10.700		



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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