



#### 60V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET

## **Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> T <sub>C</sub> = +25°C
60V	5.6mΩ @ V <sub>GS</sub> = 10V	90A

## **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
- DCDC 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> minimizes power losses
- Low Q<sub>q</sub> minimizes switching losses
- 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)

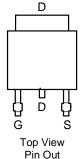
#### **Mechanical Data**

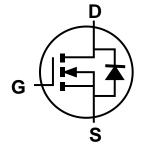
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish Matte Tin Annealed over Copper Leadframe.
   Solderable per MIL-STD-202,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





Top View





Internal Schematic

#### Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH6005LK3Q-13	TO252 (DPAK)	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**



= Manufacturer's Marking
H6005L = 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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units		
Drain-Source Voltage	$V_{DSS}$	60	V		
Gate-Source Voltage	$V_{GSS}$	±20	V		
Continuous Drain Current (Note 7)	T <sub>C</sub> = +25°C (Note 10)	٦	90	А	
, ,	$T_{\rm C} = +100^{\circ}{\rm C}$	2	70		
Maximum Body Diode Forward Current (Note 7)	Is	90	Α		
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I <sub>DM</sub>	150	Α		
Avalanche Current, L=1mH	I <sub>AS</sub>	14.8	Α		
Avalanche Energy, L=1mH	Eas	98	mJ		

## **Thermal Characteristics**

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	$T_A = +25^{\circ}C$	$P_{D}$	2.1	W
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\theta JA}$	38	°C/W
Total Power Dissipation (Note 7)	T <sub>C</sub> = +25°C	P <sub>D</sub>	100	W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	1.5	°C/W
Operating and Storage Temperature Range		T <sub>J,</sub> T <sub>STG</sub>	-55 to +175	°C

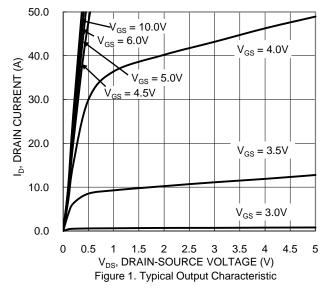
# **Electrical Character**istics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

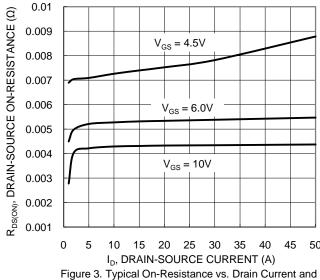
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 8)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	_		V	$V_{GS} = 0V$ , $I_D = 1mA$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	_	1	μΑ	$V_{DS} = 48V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	_	3	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
			4.5	5.6		$V_{GS} = 10V, I_D = 50A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>		5.6	7.2	mΩ	$V_{GS} = 6V, I_D = 20A$	
	, ,	_	7.9	10	•	$V_{GS} = 4.5V, I_D = 12.5A$	
Diode Forward Voltage	$V_{SD}$		_	1.2	V	$V_{GS} = 0V, I_{S} = 20A$	
DYNAMIC CHARACTERISTICS (Note 9)							
Input Capacitance	C <sub>iss</sub>		2962	_		.,	
Output Capacitance	Coss		965.2	_	pF	$V_{DS} = 30V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Reverse Transfer Capacitance	Crss		59.8	_			
Gate Resistance	$R_{G}$	_	0.66	_	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge (V <sub>GS</sub> = 10V)	Qg		47.1	_			
Total Gate Charge (V <sub>GS</sub> = 4.5V)	$Q_g$	_	23.1	_	nC	V 20V I 50A	
Gate-Source Charge	$Q_{gs}$	_	10.2	_	IIC	$V_{DD} = 30V, I_{D} = 50A$	
Gate-Drain Charge	$Q_{gd}$	_	12.5	_			
Turn-On Delay Time	t <sub>D(ON)</sub>	_	8.3	_			
Turn-On Rise Time	t <sub>R</sub>	_	9.4	_	ns	$V_{DD} = 30V, V_{GS} = 10V,$	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	_	22		ns	$I_D = 30A, R_G = 3.3\Omega$	
Turn-Off Fall Time	t <sub>F</sub>	_	8.9				
Body Diode Reverse Recovery Time	t <sub>RR</sub>		40.4	_	ns	I 204_di/dt = 1004/up	
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	_	49.7		nC		

Notes:

- 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
- 7. Thermal resistance from junction to soldering point (on the exposed drain pad).8. Short duration pulse test used to minimize self-heating effect.
- 8. Short duration pulse test used to minimize self-heating effect9. Guaranteed by design. Not subject to production testing.
- 10. Package limited.







Gate Voltage

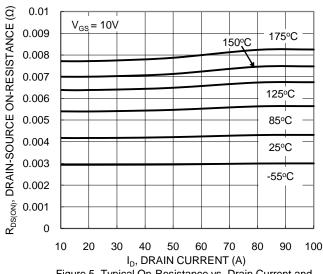
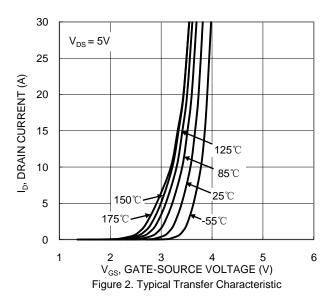
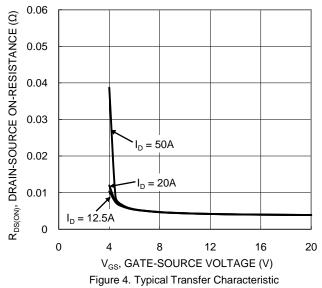


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature





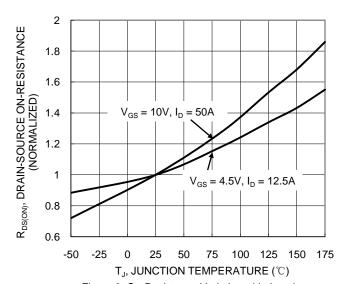


Figure 6. On-Resistance Variation with Junction Temperature





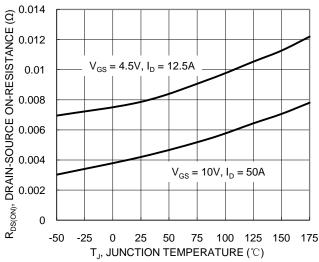
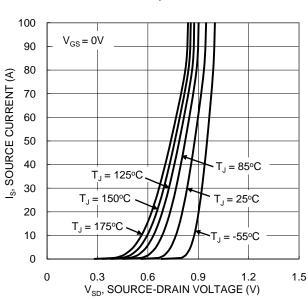
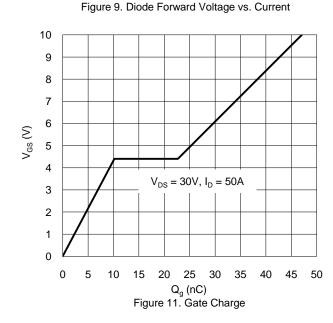


Figure 7. On-Resistance Variation with Junction Temperature





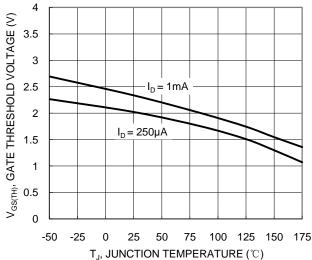
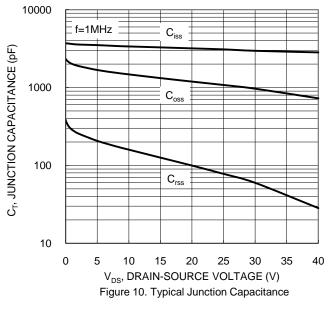
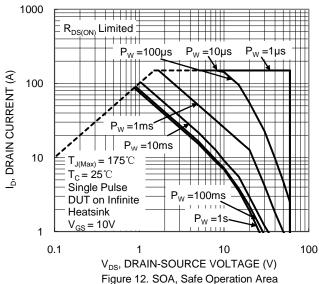


Figure 8. Gate Threshold Variation vs. Junction Temperature







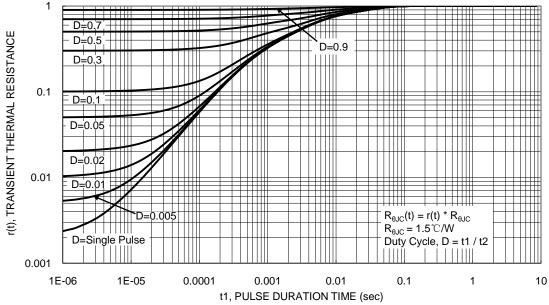


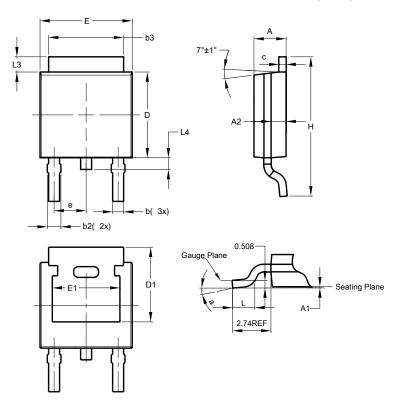
Figure 13. Transient Thermal Resistance



## **Package Outline Dimensions**

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

#### **TO252 (DPAK)**

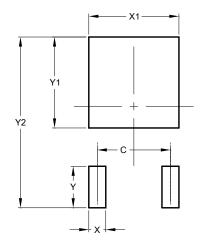


TO252 (DPAK)					
Dim	Min	Max	Тур		
Α	2.19	2.39	2.29		
<b>A1</b>	0.00	0.13	0.08		
A2	0.97	1.17	1.07		
q	0.64	0.88	0.783		
b2	0.76	1.14	0.95		
b3	5.21	5.46	5.33		
С	0.45	0.58	0.531		
D	6.00	6.20	6.10		
D1	5.21	-	-		
е	-	-	2.286		
Е	6.45	6.70	6.58		
E1	4.32	-	-		
H	9.40	10.41	9.91		
L	1.40	1.78	1.59		
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 http://www.diodes.com/package-outlines.html 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		
Y2	10.700		



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