



40V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D T _C = +25°C	
40V	4.5mΩ @ V _{GS} = 10V	95A	

Description and Applications

This MOSFET has been designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Engine Management Systems
- Body Control Electronics
- DCDC Converters

Features

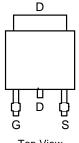
- Rated to +175°C Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching ensures more reliable and robust end application
- Low R_{DS(ON)} minimizes power losses
- Low Q_q minimizes switching losses
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

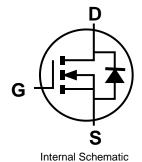
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound.
 UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish Matte Tin Annealed over Copper Leadframe.
 Solderable per MIL-STD-202, Method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







Top View Pin Out



Ordering Information (Note 4)

Part Number	Case	Packaging
DMTH4005SK3-13	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.
- 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. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



DII = Manufacturer's Marking
H4005S = 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°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 (Note 6)	$T_C = +25^{\circ}C$ (Note 9) $T_C = +100^{\circ}C$	Ι _D	95 73	А
Maximum Body Diode Forward Current (Note 6)	T _C = +25°C	Is	150	Α
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I _{DM}	150	Α	
Avalanche Current, L=0.1mH	I _{AS}	32.5	Α	
Avalanche Energy, L=0.1mH	E _{AS}	52.8	mJ	

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25$ °C	P_{D}	2.1	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{ heta JA}$	38	°C/W
Total Power Dissipation (Note 6)	T _C = +25°C	P _D	100	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	1.5	°C/W
Operating and Storage Temperature Range		T _{J,} T _{STG}	-55 to +175	°C

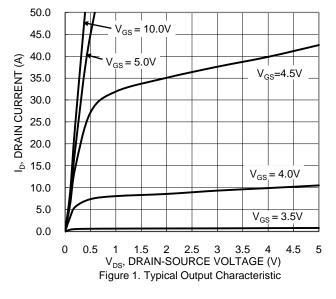
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV _{DSS}	40	_	_	V	$V_{GS} = 0V$, $I_D = 1mA$	
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 7)							
Gate Threshold Voltage	V _{GS(TH)}	2		4	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
Static Drain-Source On-Resistance	R _{DS(ON)}		3.6	4.5	mΩ	$V_{GS} = 10V, I_D = 50A$	
Diode Forward Voltage	V_{SD}		0.9	_	V	$V_{GS} = 0V, I_{S} = 50A$	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	Ciss		3062	_		.,	
Output Capacitance	Coss	_	902	_	pF	$V_{DS} = 20V$, $V_{GS} = 0V$, $f = 1MHz$	
Reverse Transfer Capacitance	Crss	_	179	_			
Gate Resistance	R_{G}		0.67	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge	Q_g		49.1	_		V 00V I 50A	
Gate-Source Charge	Q_{gs}		10.3	_	nC	$V_{DD} = 20V, I_D = 50A,$ $V_{GS} = 10V$	
Gate-Drain Charge	Q_{gd}		13	_		VGS - 10V	
Turn-On Delay Time	t _{D(ON)}		8.7	_			
Turn-On Rise Time	t _R	_	6.8	_	20	$V_{DD} = 20V, V_{GS} = 10V,$	
Turn-Off Delay Time	t _{D(OFF)}		18.6	_	ns	$I_D = 50A$, $R_G = 3\Omega$	
Turn-Off Fall Time	t _F	1	7.3	_			
Body Diode Reverse Recovery Time	t _{RR}		31.8	_	ns I 500 di/dt 4000///		
Body Diode Reverse Recovery Charge	Q_{RR}	_	26.5	_	nC	I _F = 50A, di/dt = 100A/μs	

Notes:

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





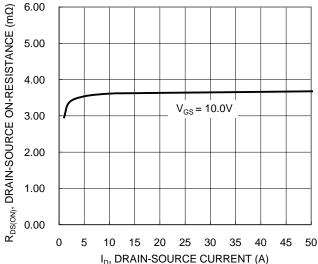


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

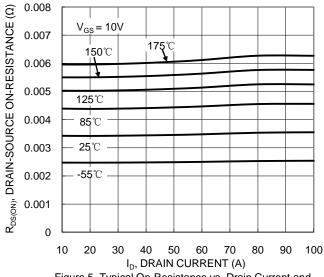
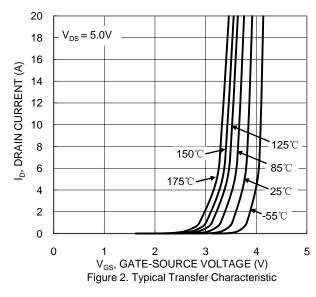
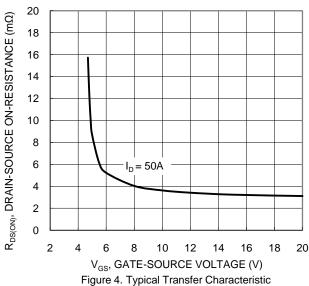


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





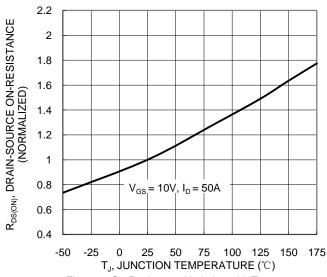


Figure 6. On-Resistance Variation with Temperature





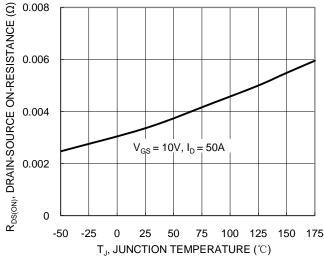


Figure 7. On-Resistance Variation with Temperature

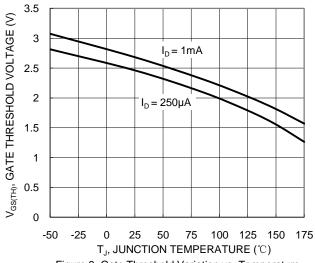
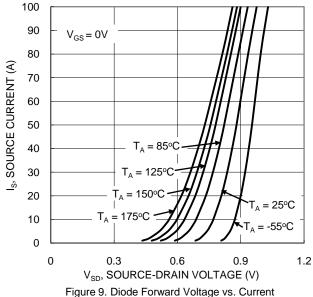
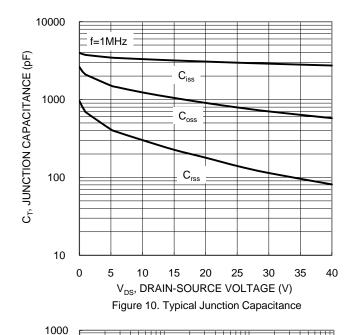


Figure 8. Gate Threshold Variation vs. Temperature





 $R_{DS(ON)}$ Limited

 $T_{J(Max)} = 175$ °C $T_C = 25$ °C

DUT on Infinite Heatsink

Single Pulse

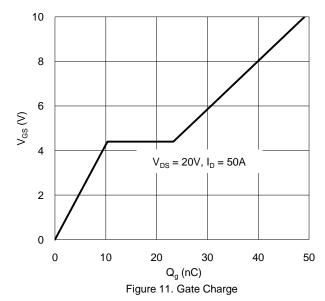
V_{GS}= 10V

100

10

0.1

ID, DRAIN CURRENT (A)



0.1 10 V_{DS} , DRAIN-SOURCE VOLTAGE (V) Figure 12. SOA, Safe Operation Area

100



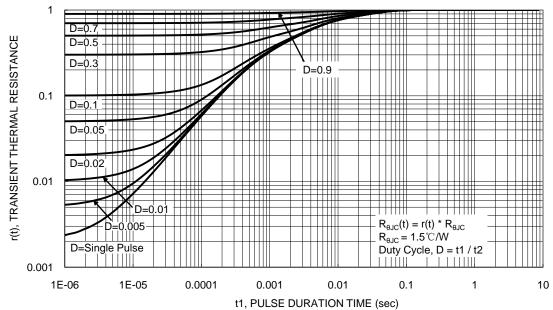
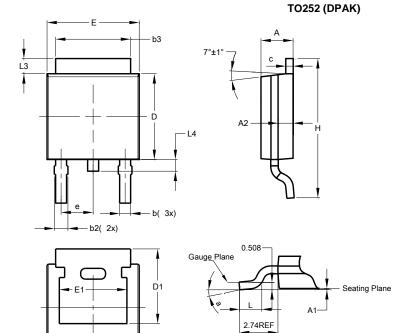


Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

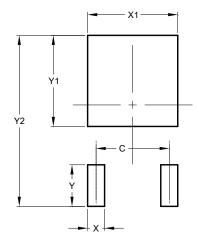


TO252 (DPAK)					
Dim	Min	Max	Тур		
Α	2.19	2.39	2.29		
A 1	0.00	0.13	0.08		
A2	0.97	1.17	1.07		
b	0.64	0.88	0.783		
b2	0.76	1.14	0.95		
b3	5.21	5.46	5.33		
С	0.45	0.58	0.531		
D	6.00	6.20	6.10		
D1	5.21	-	-		
е	-	-	2.286		
Е	6.45	6.70	6.58		
E1	4.32	-	-		
Н	9.40	10.41	9.91		
٦	1.40	1.78	1.59		
L3	0.88	1.27	1.08		
L4	0.64	1.02	0.83		
а	0°	10°	-		
All Dimensions in mm					

Suggested Pad Layout

Please see 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
Υ	2.600
Y1	5.700
Y2	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