



P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

V _{(BR)DSS}	R _{DS(ON)} Max	I _D Τ _C = +25°C
-40V	9.9 m $Ω @ V_{GS} = -10V$	-50A
- 4 0V	$14mΩ @ V_{GS} = -4.5V$	-45A

Description

This new generation MOSFET is 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.

Applications

- DC-DC Converters
- Power Management Functions
- Backlighting

Features and Benefits

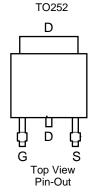
- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low On-Resistance
- Fast Switching Speed
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

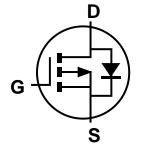
Mechanical Data

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



Top View





Equivalent Circuit

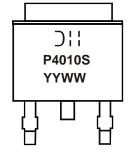
Ordering Information (Note 5)

Part Number	Case	Packaging
DMP4010SK3Q-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_compliance_definitions/.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



DII = Manufacturer's Marking
P4010S = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 15 = 2015)
WW = Week (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}	±25	V
Continuous Prain Current (Note 7) V 10V	Steady State	$T_C = +25$ °C $T_C = +70$ °C	I _D	-50 -40	А
Continuous Drain Current (Note 7), V _{GS} = -10V	Steady State	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I _D	-15 -12	А
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	-100	Α		
Maximum Body Diode Forward Current (Note 7)	I _S	-5.5	Α		
Avalanche Current, L = 1mH (Note 8)			I _{AS}	-22	Α
Avalanche Energy, L = 1mH (Note 8)			E _{AS}	260	mJ

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

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 6)		P_{D}	1.7	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	73	°C/W
Total Power Dissipation (Note 7)		P _D	3.3	W
Thermal Resistance, Junction to Ambient (Note 7) Steady State		R _{θJA}	38	°C/W
Thermal Resistance, Junction to Case	R _{0JC}	1.0	C/VV	
Operating and Storage Temperature Range		T_J,T_STG	-55 to +150	°C

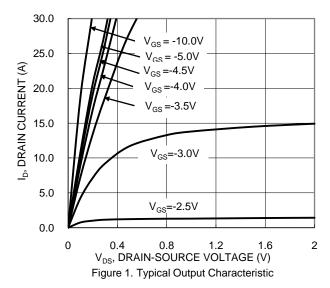
Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)

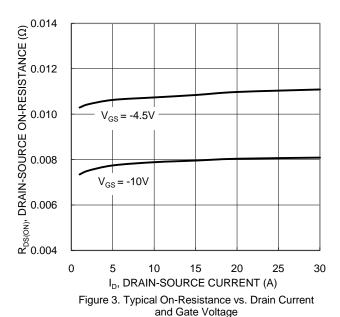
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 9)							
Drain-Source Breakdown Voltage	BV _{DSS}	-40	_	_	V	$V_{GS} = 0V, I_{D} = -250\mu A$	
Zero Gate Voltage Drain Current	I _{DSS}		_	-1	μΑ	$V_{DS} = -40V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}		_	±100	nA	$V_{GS} = \pm 25V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 9)							
Gate Threshold Voltage	V _{GS(TH)}	-1.5	-2	-2.5	V	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	
Static Drain-Source On-Resistance			7.5	9.9	mΩ	$V_{GS} = -10V, I_D = -9.8A$	
Static Drain-Source On-Resistance	R _{DS(ON)}		10.5	14	11122	$V_{GS} = -4.5V, I_D = -9.8A$	
Diode Forward Voltage	V_{SD}	_	-0.7	-1	V	$V_{GS} = 0V, I_{S} = -1A$	
DYNAMIC CHARACTERISTICS (Note 10)							
Input Capacitance	Ciss		4234	_		$V_{DS} = -20V$, $V_{GS} = 0V$ f = 1MHz	
Output Capacitance	Coss		1036	_	pF		
Reverse Transfer Capacitance	C _{rss}	_	526	_			
Gate Resistance	Rg		7.8	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge (V _{GS} = -4.5V)	Q_g	_	42.7	_			
Total Gate Charge (V _{GS} = -10V)	Qg	_	91	_	nC	$V_{DS} = -20V,$ $I_{D} = -9.8A$	
Gate-Source Charge	Qgs	_	14.2	_	IIC		
Gate-Drain Charge	Q_{gd}	_	13.5	_			
Turn-On Delay Time	t _{D(ON)}	_	13.2	_		$V_{GS} = -10V, V_{DD} = -20V,$ $R_{G} = 6\Omega, I_{D} = -1A$	
Turn-On Rise Time	t _R		10	_			
Turn-Off Delay Time	t _{D(OFF)}	_	303	_	ns		
Turn-Off Fall Time	t _F	_	138	_			
Reverse Recovery Time	t _{RR}	_	26	_	ns	$I_F = -9.8A$, $di/dt = -100A/\mu s$	
Reverse Recovery Charge	Q _{RR}	_	20	_	nC	$I_F = -9.8A$, $di/dt = -100A/\mu s$	

Notes:

- 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout. 7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
- 8. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
- 9. Short duration pulse test used to minimize self-heating effect.
- 10. Guaranteed by design. Not subject to product testing.







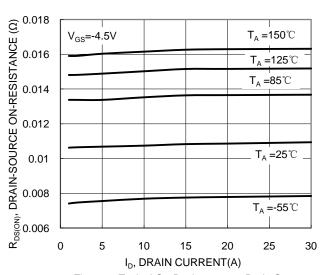
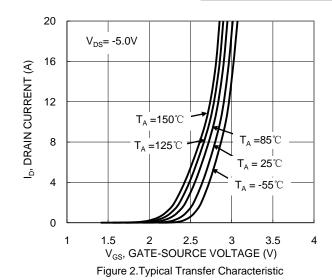
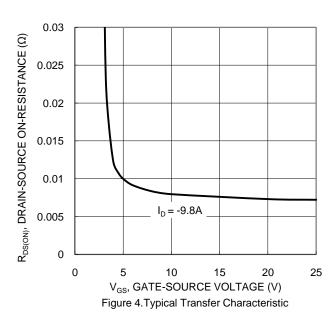


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





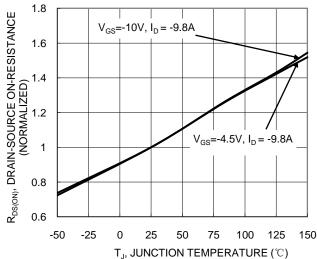
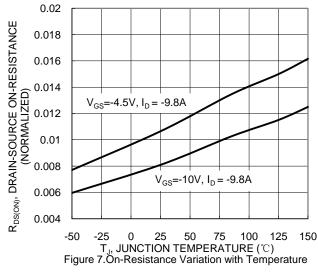
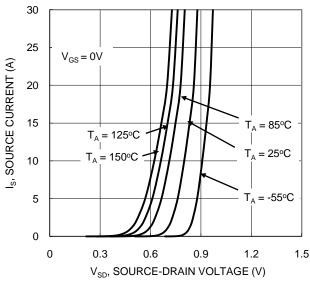
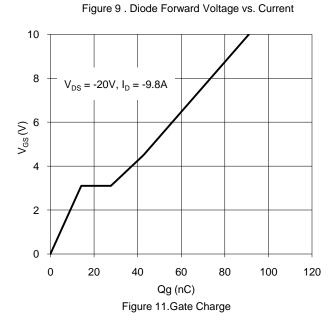


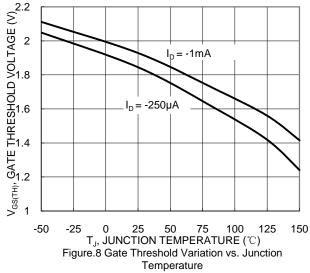
Figure 6.On-Resistance Variation with Temperature











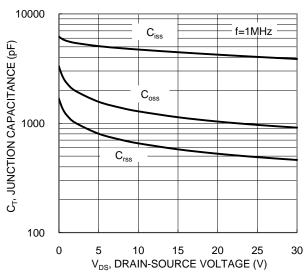
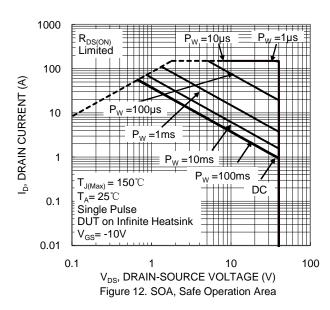


Figure 10. Typical Junction Capacitance





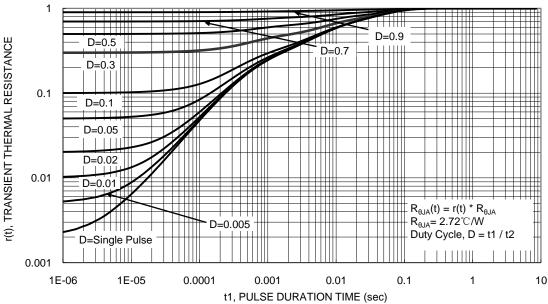


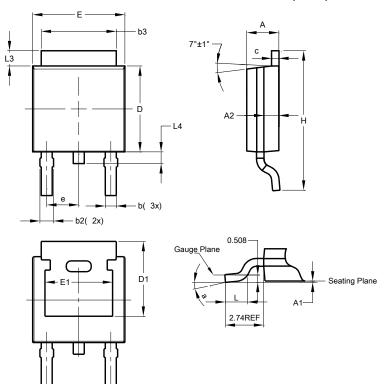
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

TO252 (DPAK)

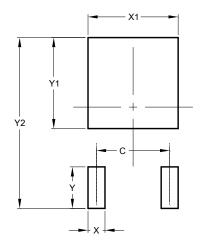


TO252 (DPAK)					
Dim	Min	Max	Тур		
Α	2.19	2.39	2.29		
A1	0.00	0.13	0.08		
A2	0.97	1.17	1.07		
b	0.64	0.88	0.783		
b2	0.76	1.14	0.95		
b3	5.21	5.46	5.33		
С	0.45	0.58	0.531		
D	6.00	6.20	6.10		
D1	5.21	-	-		
е	-	-	2.286		
Е	6.45	6.70	6.58		
E1	4.32	-	-		
Н	9.40	10.41	9.91		
L	1.40	1.78	1.59		
L3	0.88	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.

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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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