



#### P-CHANNEL ENHANCEMENT MODE MOSFET

## **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> Max	
(=)===	( )	T <sub>C</sub> = +25°C
40\/	$11m\Omega @ V_{GS} = -10V$	-35A
-40V	15mΩ @ $V_{GS}$ = -4.5V	-30A

## Description

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

## Applications

- DC-DC Converters
- Power Management Functions
- Backlighting

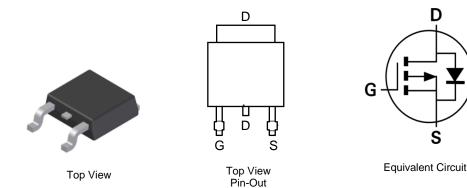
## Features and Benefits

- 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 (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 Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.33 grams (Approximate)

#### TO252 (DPAK)



### Ordering Information (Notes 4 & 5)

Part Number		Compliance	Case	Packaging	
DMP4015SK3Q-13 Automotive		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.					

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"

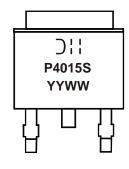
and Lead-free. 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

4. Automotive products are AEC-Q101 qualified and are PPAP capable. 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**



Dil = Manufacturer's Marking P4015S = Product Type Marking Code YYWW = Date Code Marking YY = Year (ex: 13 = 2013) WW = Week (01 - 53)

## Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units		
Drain-Source Voltage	V <sub>DSS</sub>	-40	V		
Gate-Source Voltage			V <sub>GSS</sub>	±25	V
Continuous Drain Current (Note 6) $V_{GS}$ = -10V	Steady State	T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	ID	-35 -27	А
Continuous Drain Current (Note 6) \/ 10\/	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	ID	-14 -11	A
Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V	t<10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	ID	-22 -18	А
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	-100	A
Maximum Body Diode Forward Current (Note 6)			ls	-5.5	A
Avalanche Current (Note 7)			I <sub>AS</sub>	-22	A
Avalanche Energy (Note 7)			E <sub>AS</sub>	242	mJ

## **Thermal Characteristics**

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	<b>D</b> -	3.5	W
	T <sub>A</sub> = +70°C	PD	2.2	
Thermal Desistance, Junction to Ambient (Note C)	Steady State	D	36	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	t<10s	R <sub>θJA</sub>	15	
Thermal Resistance, Junction to Case (Note 6)	Steady State	$R_{\theta JC}$	4.5	
Operating and Storage Temperature Range		TJ, TSTG	-55 to +150	°C

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate. 7. UIS in production with L = 0.1mH,  $T_J = +25^{\circ}C$ .



# Electrical Characteristics (@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>	-40	_		V	$V_{GS} = 0V, I_D = -250\mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>			-1	μA	$V_{DS} = -40V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	_		±100	nA	$V_{GS} = \pm 25 V$ , $V_{DS} = 0 V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.5	-2	-2.5	V	$V_{DS} = V_{GS}$ , $I_D = -250 \mu A$	
Static Drain-Source On-Resistance	Passa		7	11	mΩ	$V_{GS} = -10V, I_D = -9.8A$	
	R <sub>DS(ON)</sub>	_	9	15	11152	$V_{GS} = -4.5V, I_D = -9.8A$	
Forward Transfer Admittance	Y <sub>fs</sub>	_	26		S	$V_{DS} = -20V, I_{D} = -9.8A$	
Diode Forward Voltage	V <sub>SD</sub>		-0.7	-1	V	$V_{GS} = 0V, I_{S} = -1A$	
DYNAMIC CHARACTERISTICS (Note 9)							
Input Capacitance	C <sub>iss</sub>		4,234			$V_{DS} = -20V, V_{GS} = 0V$ f = 1MHz	
Output Capacitance	Coss		1,036		pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	_	526				
Gate Resistance	R <sub>G</sub>	_	7.77		Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$	
Total Gate Charge	Qg	_	47.5				
Gate-Source Charge	Q <sub>gs</sub>	_	14.2		nC	V <sub>DS</sub> = -20V, V <sub>GS</sub> = -5V I <sub>D</sub> = -9.8A	
Gate-Drain Charge	Q <sub>gd</sub>	_	13.5				
Turn-On Delay Time	t <sub>D(on)</sub>		13.2			V <sub>GS</sub> = -10V, V <sub>DD</sub> = -20V,	
Turn-On Rise Time	tr		10		nS		
Turn-Off Delay Time	t <sub>D(off)</sub>		302.7		115	$R_G = 6\Omega, I_D = -1A$	
Turn-Off Fall Time	t <sub>f</sub>	_	137.9				

8. Short duration pulse test used to minimize self-heating effect.9. Guaranteed by design. Not subject to production testing. Notes:





T<sub>A</sub> = 25°C

5

4 4.5

T<sub>A</sub> = 150°C

T<sub>A</sub> = 25°C

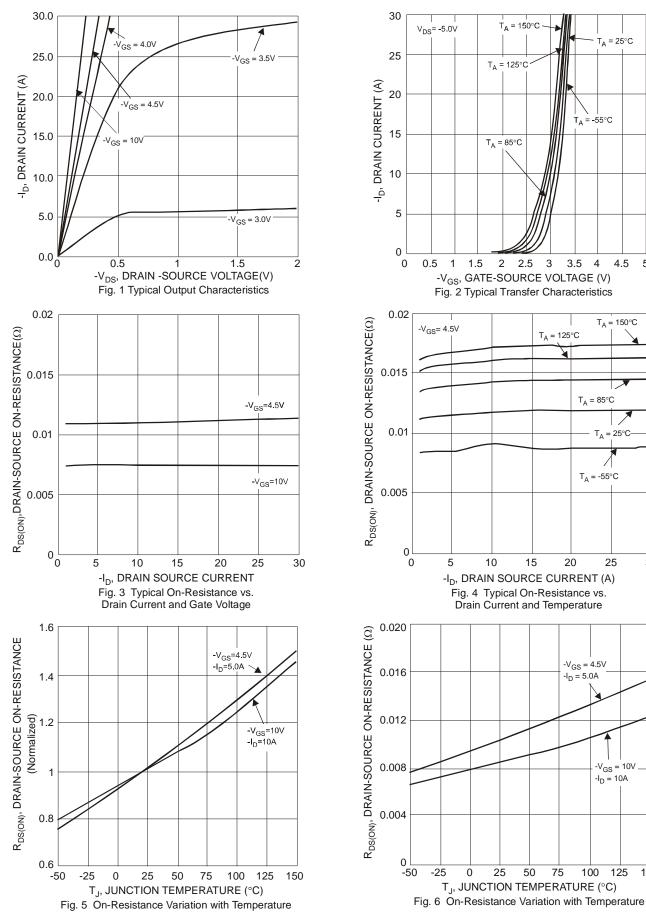
25

-V<sub>GS</sub> = 10V

125

-I<sub>D</sub> = 10A

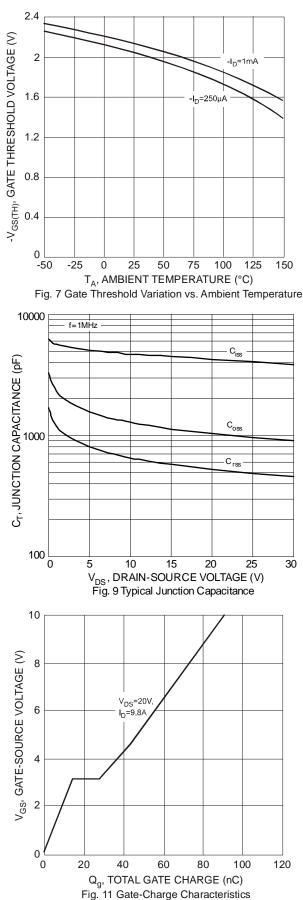
30

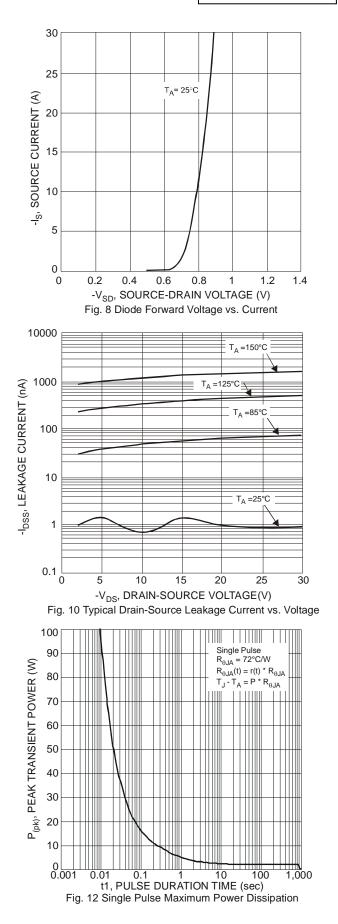


150

## DMP4015SK3Q

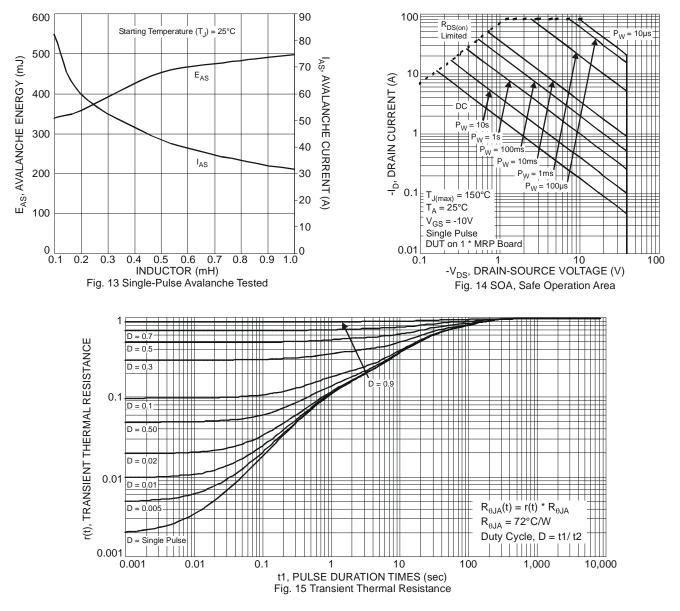








## DMP4015SK3Q

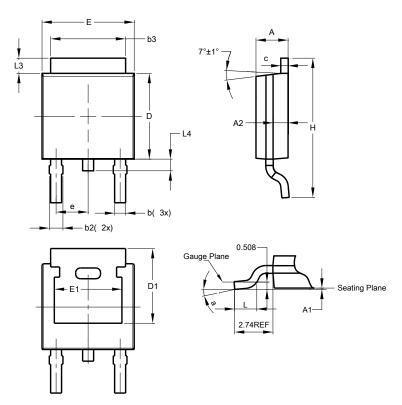




## **Package Outline Dimensions**

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

TO252 (DPAK)

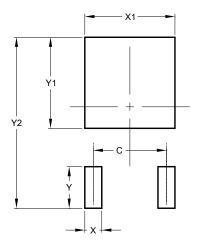


TO252 (DPAK)					
Dim	Min	Max	Тур		
Α	2.19	2.39	2.29		
A1	0.00	0.13	0.08		
A2	0.97	1.17	1.07		
p	0.64	0.88	0.783		
b2	0.76	1.14	0.95		
b3	5.21	5.46	5.33		
С	0.45	0.58	0.531		
D	6.00	6.20	6.10		
D1	5.21	_	_		
е	_	_	2.286		
Е	6.45	6.70	6.58		
E1	4.32				
Η	9.40	10.41 9.9			
L	1.40	1.78	1.59		
L3	0.88	1.27	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



#### IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

#### LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

- A. Life support devices or systems are devices or systems which:
  - 1. are intended to implant into the body, or
  - 2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.
- B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2015, Diodes Incorporated

www.diodes.com