



### COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

## **Product Summary**

Device	V <sub>(BR)DSS</sub>	$R_{DS(ON)} \qquad I_{D}$ $T_{A} = +25$	
Q1	40V	$15m\Omega$ @ $V_{GS} = 10V$	12.2A
Qi	40 V	$20m\Omega$ @ $V_{GS} = 4.5V$	10.6A
Q2	-40V	$29m\Omega$ @ $V_{GS} = -10V$	-8.8A
QZ	-40 V	$45 \text{m}\Omega$ @ $V_{GS} = -4.5 \text{V}$	-7.1A

## **Description**

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

### **Applications**

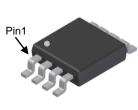
- DC-DC Converters
- Power Management Functions
- Backlighting

### **Features and Benefits**

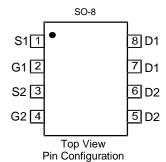
- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

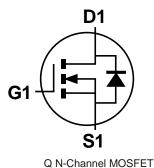
### **Mechanical Data**

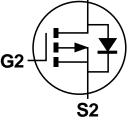
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 (23)
- Weight: 0.074 grams (Approximate)











Q2 P-Channel MOSFET

**D2** 

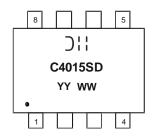
### **Ordering Information** (Note 4)

Part Number	Case	Packaging	
DMC4015SSD-13	SO-8	2,500/Tape & Reel	

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 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**



⊃¦¦ = Manufacturer's Marking
 C4015SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY or YY = Year (ex: 14 = 2014)
 WW = Week (01 - 53)



# **Maximum Ratings** (@ $T_A = +25^{\circ}C$ , unless otherwise specified.)

Characteristic	Symbol	Value_Q1	Value_Q2	Units			
Drain-Source Voltage	V <sub>DSS</sub>	40	-40	V			
Gate-Source Voltage			$V_{GSS}$	±20	±20	V	
Continuous Prois Current (Note C) V 40V	Steady State	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I <sub>D</sub>	8.6 6.8	-6.2 -4.9	А	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	t<10s	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I <sub>D</sub>	12.2 9.8	-8.8 -7.1	Α	
Maximum Body Diode Forward Current (Note 6)	Is	2.5	-2.2	А			
Pulsed Drain Current (10µs pulse, duty cycle = 1°	I <sub>DM</sub>	80	-50	Α			
Avalanche Current (Note 7) L = 0.1mH	I <sub>AS</sub>	27	-25	А			
Avalanche Energy (Note 7) L = 0.1mH	Eas	37	32	mJ			

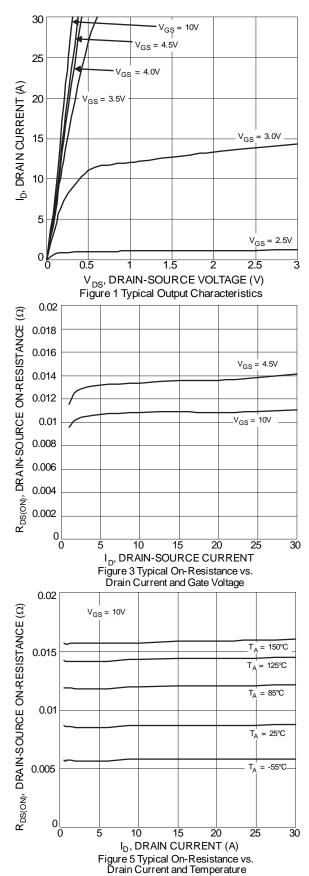
# Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

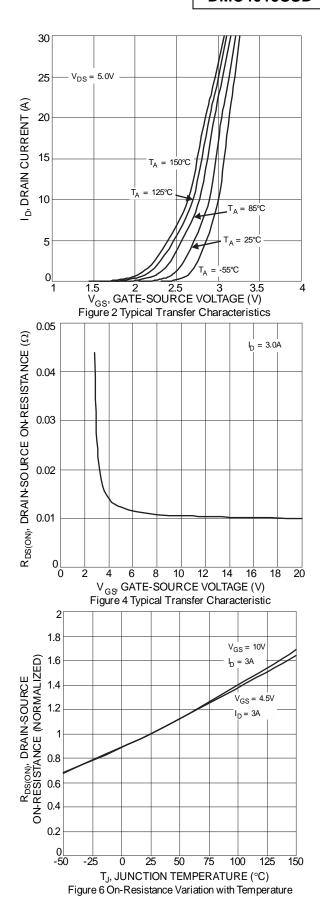
Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	D-	1.2	W
Total Fower Dissipation (Note 5)	T <sub>A</sub> = +70°C	$P_{D}$	0.9	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	р	106	°C/W
Thermal Nesistance, sunction to Ambient (Note 3)	t<10s	$R_{ heta JA}$	45	
Total Power Dissipation (Note 6)	$T_A = +25$ °C	$P_{D}$	1.7	W
Total Fower Dissipation (Note o)	$T_A = +70^{\circ}C$	FD	1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	р	76	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	t<10s	$R_{ heta JA}$	37	
Thermal Resistance, Junction to Case (Note 6)	$R_{ heta JC}$	12		
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

# Electrical Characteristics N-Channel Q1 (@T<sub>A</sub> = +25°C, unless otherwise specified.)

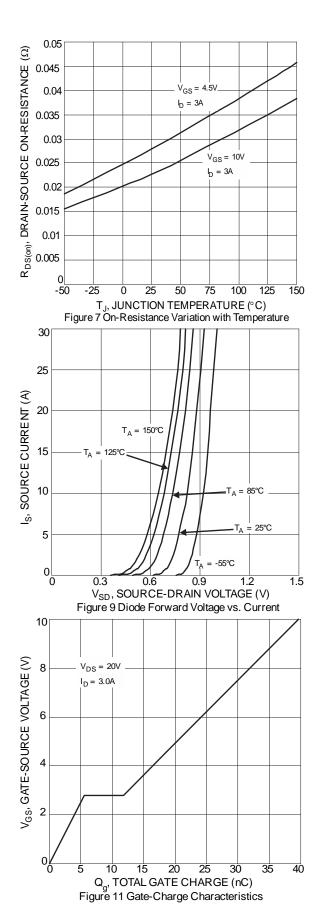
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	_	1	μA	$V_{DS} = 40V, V_{GS} = 0V$
Gate-Source Leakage	I <sub>GSS</sub>	_	_	±100	nA	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$
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	D	_	_	15	mΩ	$V_{GS} = 10V, I_D = 3A$
Static Diani-Source Off-Resistance	R <sub>DS(ON)</sub>	_	_	20	mt7	$V_{GS} = 4.5V, I_D = 3A$
Diode Forward Voltage	$V_{SD}$		0.7	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C <sub>iss</sub>		1810	_	pF	$V_{DS} = 20V, V_{GS} = 0V,$ f = 1.0MHz
Output Capacitance	Coss	_	135	_		
Reverse Transfer Capacitance	C <sub>rss</sub>	_	112	_		
Gate Resistance	R <sub>G</sub>	_	1.7	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Qg	_	19	_		V <sub>DS</sub> = 20V, I <sub>D</sub> = 3A
Total Gate Charge (V <sub>GS</sub> = 10V)	Qg		40	_	nC	
Gate-Source Charge	Q <sub>gs</sub>		5.5	_	nc nc	
Gate-Drain Charge	$Q_{gd}$		6.3	_		
Turn-On Delay Time	t <sub>D(on)</sub>		5.1	_		
Turn-On Rise Time	t <sub>r</sub>		5.7	_	nS	$V_{DD} = 20V, I_D = 3A$
Turn-Off Delay Time	t <sub>D(off)</sub>		23	_	no	$V_{GS} = 10V$ , $R_G = 3\Omega$ ,
Turn-Off Fall Time	t <sub>f</sub>		6.3	_		
Body Diode Reverse Recovery Time	t <sub>rr</sub>		12.2	_	nS	$I_S = 3A$ , $dI/dt = 100A/\mu s$
Body Diode Reverse Recovery Charge	Qrr		5.4	_	nC	$I_S = 3A$ , $dI/dt = 100A/\mu s$

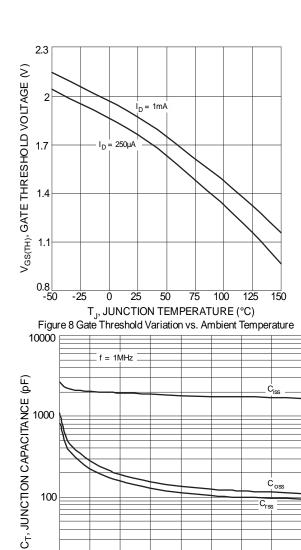












5 10 15 25 30 35 20  $V_{\rm DS}$ , DRAIN-SOURCE VOLTAGE (V) Figure 10 Typical Junction Capacitance

100

10

Coss

40

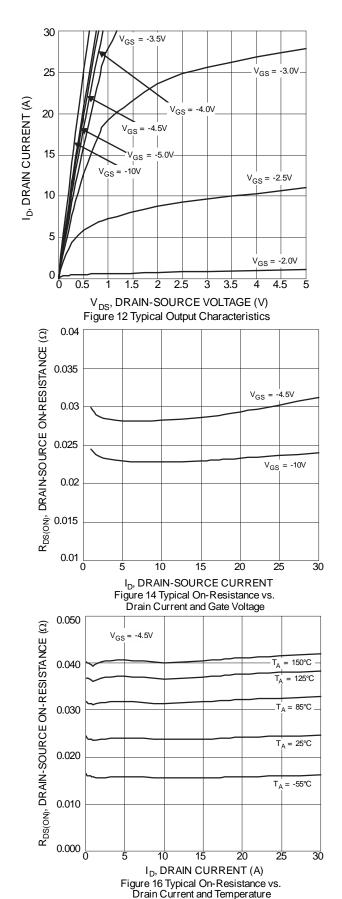


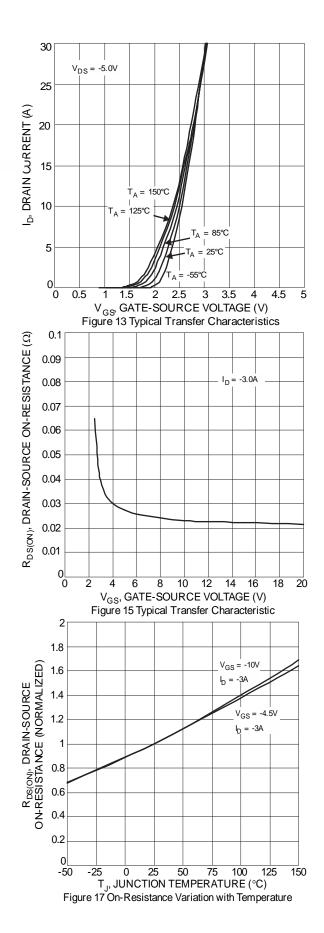
# Electrical Characteristics P-Channel Q2 (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1	_	-3	V	$V_{DS} = V_{GS}$ , $I_D = -250\mu A$	
Static Drain-Source On-Resistance	ם	_	_	29	mΩ	$V_{GS} = -10V, I_D = -3A$	
Static Dialii-Source Off-Resistance	R <sub>DS(ON)</sub>	_	_	45	11122	$V_{GS} = -4.5V, I_D = -3A$	
Diode Forward Voltage	$V_{SD}$	_	-0.7	-1.2	V	$V_{GS} = 0V, I_{S} = -1A$	
DYNAMIC CHARACTERISTICS (Note 9)							
Input Capacitance	Ciss		1626	_		V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V, f = 1.0MHz	
Output Capacitance	Coss	_	135	_	pF		
Reverse Transfer Capacitance	Crss	_	107	_			
Gate Resistance	$R_{G}$	_	11	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Qg	_	17	_			
Total Gate Charge (V <sub>GS</sub> = -10V)	Qg	_	34	_	nC	$V_{DS} = -20V, I_{D} = -3A$	
Gate-Source Charge	Qgs	_	3.7	_	IIC		
Gate-Drain Charge	$Q_{gd}$		6.0	_			
Turn-On Delay Time	t <sub>D(on)</sub>		3.9	_			
Turn-On Rise Time	t <sub>r</sub>	_	2.8	_	nS	$V_{DD} = -20V, R_L = 1.6\Omega$ $V_{GS} = -10V, R_G = 3\Omega, I_D = -3A$	
Turn-Off Delay Time	t <sub>D(off)</sub>		83	_	113		
Turn-Off Fall Time	t <sub>f</sub>	_	30	_			
Body Diode Reverse Recovery Time	t <sub>rr</sub>		17.3	_	nS	$I_S = -3A$ , $dI/dt = 100A/\mu s$	
Body Diode Reverse Recovery Charge	$Q_{rr}$	_	7.2		nC	$I_S = -3A$ , $dI/dt = 100A/\mu s$	

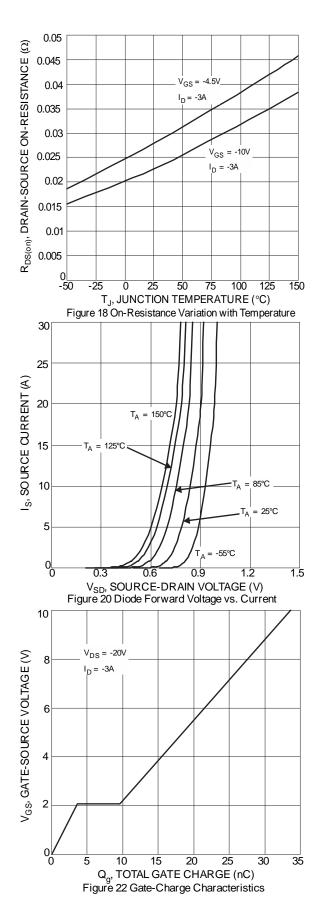
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
   Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
   IAS and EAS rating are based on low frequency and duty cycles to keep TJ = +25°C.
   Short duration pulse test used to minimize self-heating effect.
   Guaranteed by design. Not subject to product testing.

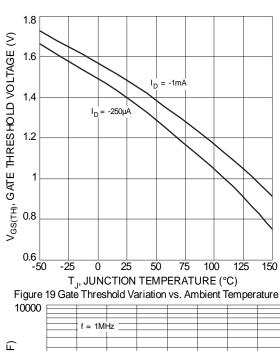








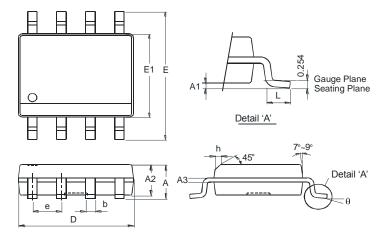






# **Package Outline Dimensions**

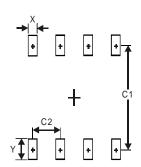
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SO-8						
Dim	Min	Max				
Α	-	1.75				
<b>A</b> 1	0.10	0.20				
A2	1.30	1.50				
A3	0.15	0.25				
b	0.3	0.5				
D	4.85	4.95				
Е	5.90	6.10				
E1	3.85	3.95				
е	<b>e</b> 1.27 Typ					
h	-	0.35				
L	0.62	0.82				
θ	0°	8°				
All Dimensions in mm						

# **Suggested Pad Layout**

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
Х	0.60
Y	1.55
C1	5.4
C2	1.27



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многоканальный

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