

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
-20V	0.3Ω @ $V_{GS} = -4.5V$	-0.9A
	0.5Ω @ $V_{GS} = -2.5V$	-0.7A

## Description

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

## Applications

- DC-DC Converters
- Power management functions

## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

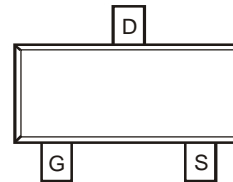
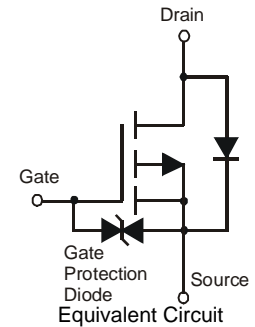
- Case: SC59
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Terminal Connections: See Diagram
- Weight: 0.014 grams (approximate)



SC59



Top View

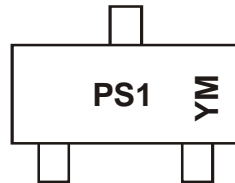

 Top View  
Pin-Out


## Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMP2012SN-7	Standard	SC59	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](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



PS1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: T = 2006  
 M = Month ex: 9 = September

### Date Code Key

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Code	T	U	V	W	X	Y	Z	A	B	C	D	E	F
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Code	1	2	3	4	5	6	7	8	9	O	N	D	

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-20	V
Gate-Source Voltage	V <sub>GSS</sub>	±12	V
Drain Current (Note 5) Steady State	I <sub>D</sub>	-0.7	A
Pulsed Drain Current (Note 6)	I <sub>DM</sub>	-2.8	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	500	mW
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	250	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-10	μA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Body Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.5	—	-1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	0.23 0.37	0.30 0.50	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.4A V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -0.4A
Forward Transfer Admittance	Y <sub>fs</sub>	—	1.5	—	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.4A
Diode Forward Voltage (Note 7)	V <sub>SD</sub>	—	-0.8	-1.1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -0.7A
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>iss</sub>	—	178.5	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	26.3	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	18.8	—	pF	
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	—	10.4	—	ns	V <sub>DD</sub> = -10V, I <sub>D</sub> = -0.4A, V <sub>GS</sub> = -5.0V, R <sub>GEN</sub> = 50Ω
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	175	—	ns	
Turn-On Rise Time	t <sub>r</sub>	—	22.3	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	64	—	ns	

- Notes:
5. Device mounted on FR-4 PCB.
  6. Pulse width ≤10μS, Duty Cycle ≤1%.
  7. Short duration pulse test used to minimize self-heating effect.

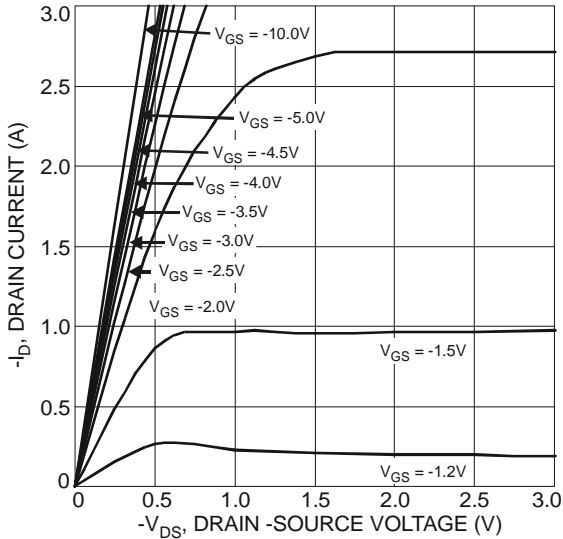


Figure 1 Typical Output Characteristics

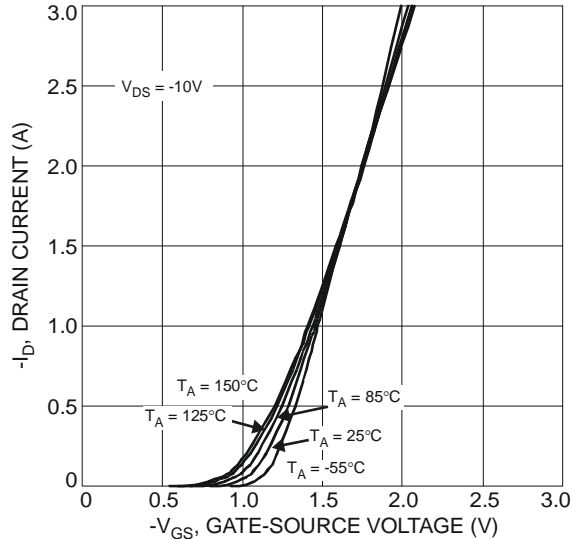


Figure 2 Typical Transfer Characteristics

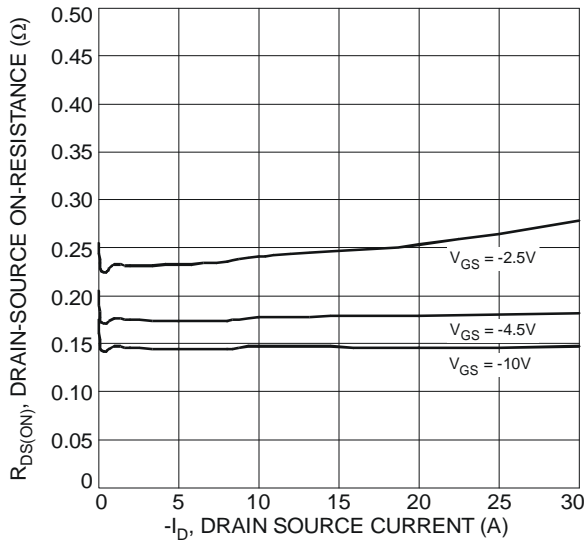


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

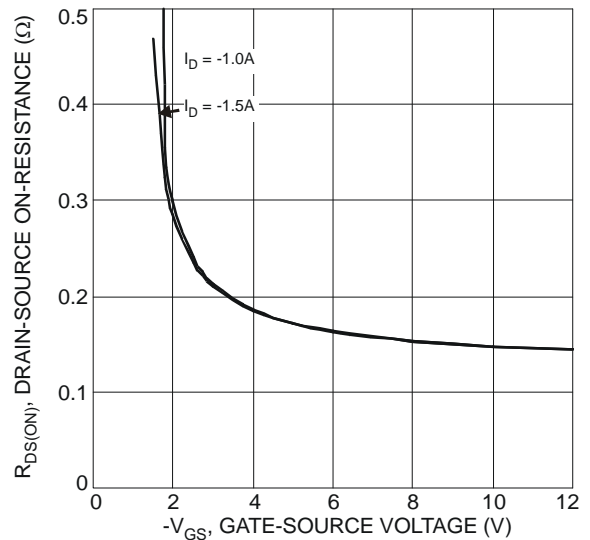


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

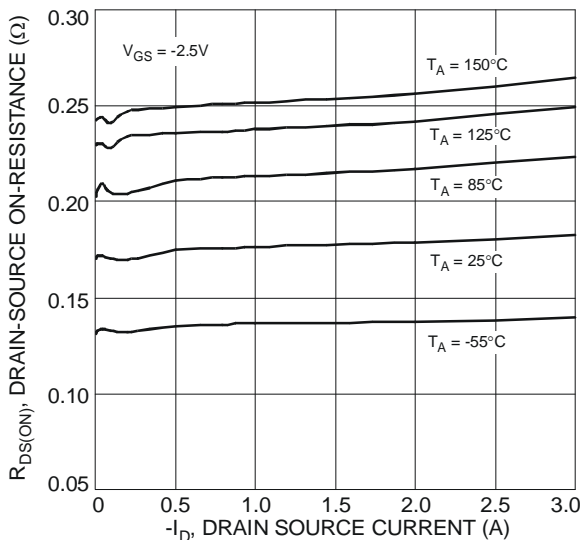


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

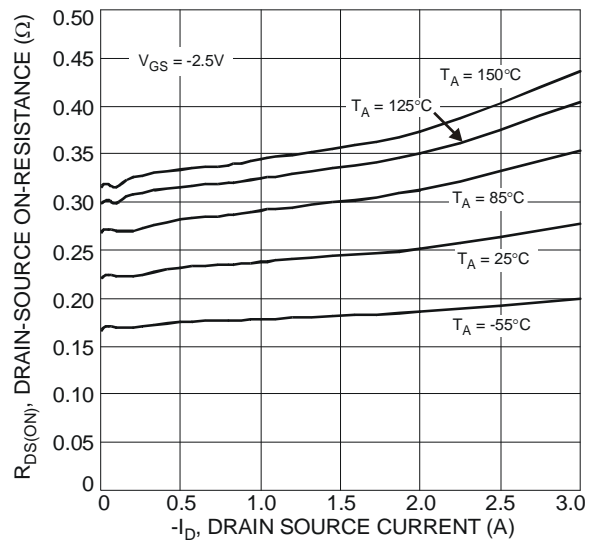


Figure 6 Typical On-Resistance vs. Drain Current and Temperature

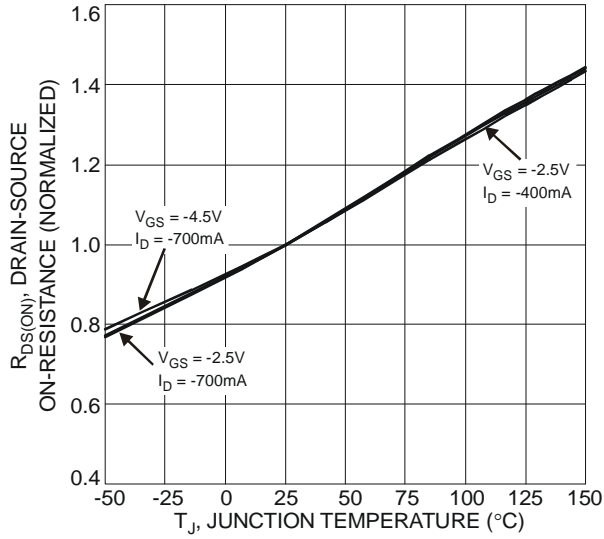


Figure 7 On-Resistance Variation with Temperature

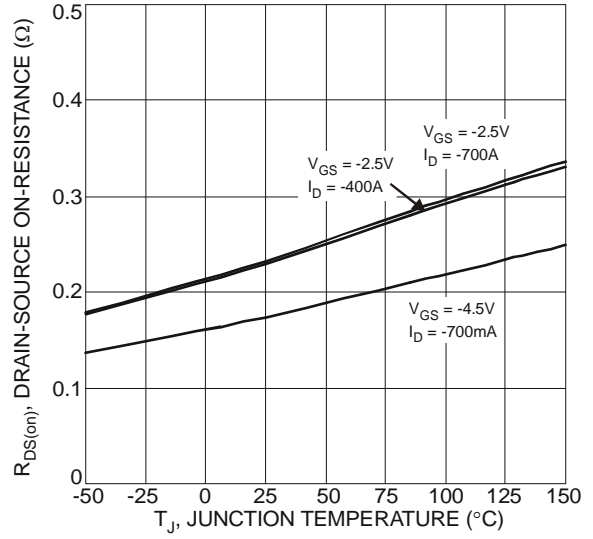


Figure 8 On-Resistance Variation with Temperature

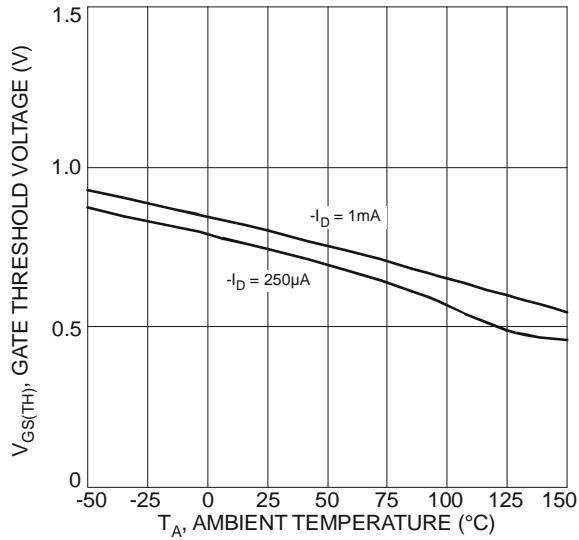


Figure 9 Gate Threshold Variation vs. Ambient Temperature

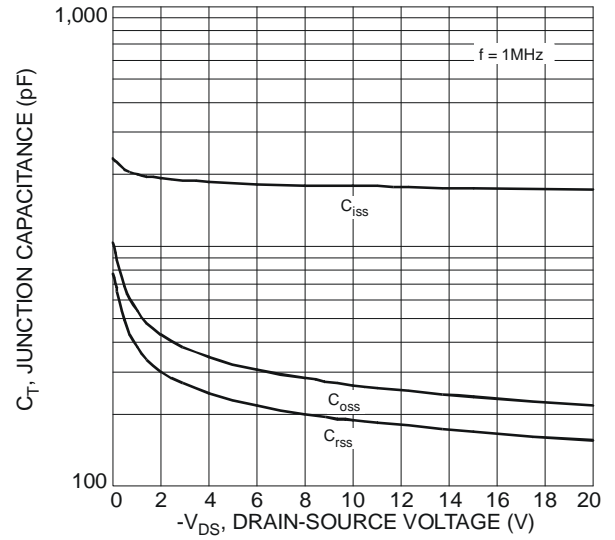
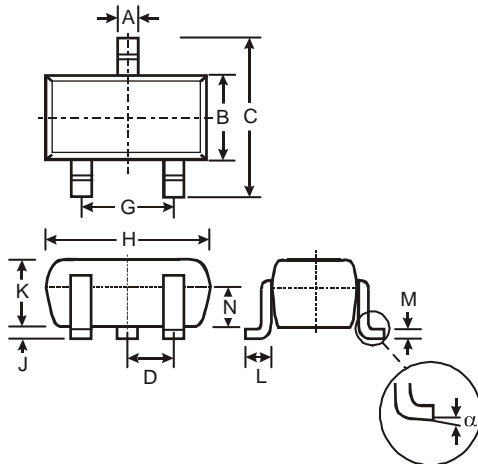


Figure 10 Typical Junction Capacitance

## Package Outline Dimensions

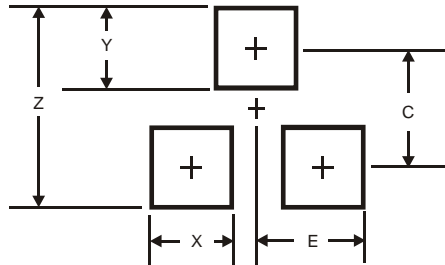
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SC59			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	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)
Z	3.4
X	0.8
Y	1.0
C	2.4
E	1.35

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