

Product Summary

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

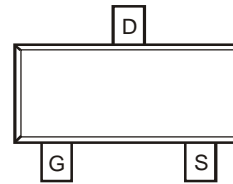
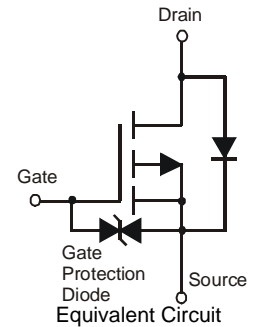
- Case: SC59
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram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



SC59



Top View

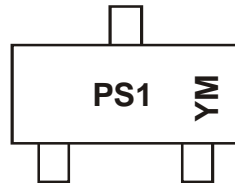

 Top View
Pin-Out


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 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_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|-------------------------------------|------------------|-------|------|
| Drain-Source Voltage | V _{DSS} | -20 | V |
| Gate-Source Voltage | V _{GSS} | ±12 | V |
| Drain Current (Note 5) Steady State | I _D | -0.7 | A |
| Pulsed Drain Current (Note 6) | I _{DM} | -2.8 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | P _D | 500 | mW |
| Thermal Resistance, Junction to Ambient | R _{θJA} | 250 | °C/W |
| 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 | Typ | Max | Unit | Test Condition |
|-------------------------------------|---------------------|------|--------------|--------------|------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -20 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -10 | μA | V _{DS} = -20V, V _{GS} = 0V |
| Gate-Body Leakage | I _{GSS} | — | — | ±10 | μA | V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -0.5 | — | -1.2 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 0.23 0.37 | 0.30 0.50 | Ω | V _{GS} = -4.5V, I _D = -0.4A V _{GS} = -2.5V, I _D = -0.4A |
| Forward Transfer Admittance | Y _{fs} | — | 1.5 | — | S | V _{DS} = -10V, I _D = -0.4A |
| Diode Forward Voltage (Note 7) | V _{SD} | — | -0.8 | -1.1 | V | V _{GS} = 0V, I _S = -0.7A |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{iss} | — | 178.5 | — | pF | V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 26.3 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 18.8 | — | pF | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | t _{D(ON)} | — | 10.4 | — | ns | V _{DD} = -10V, I _D = -0.4A, V _{GS} = -5.0V, R _{GEN} = 50Ω |
| Turn-Off Delay Time | t _{D(OFF)} | — | 175 | — | ns | |
| Turn-On Rise Time | t _r | — | 22.3 | — | ns | |
| Turn-Off Fall Time | t _f | — | 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.

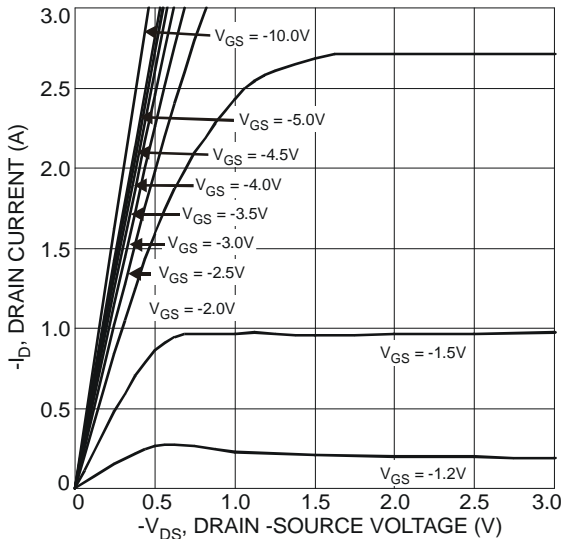


Figure 1 Typical Output Characteristics

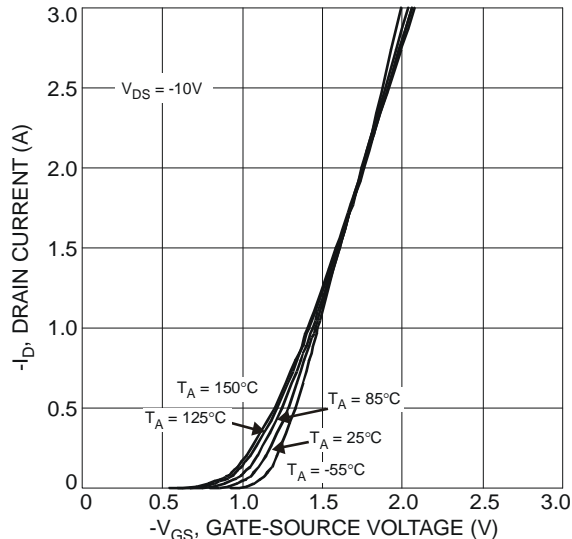


Figure 2 Typical Transfer Characteristics

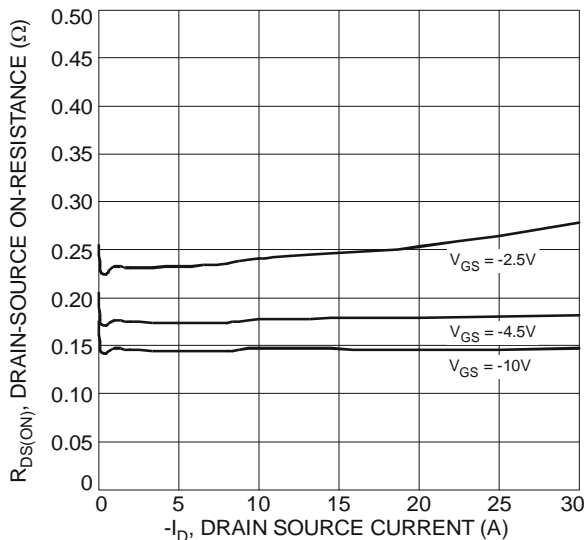


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

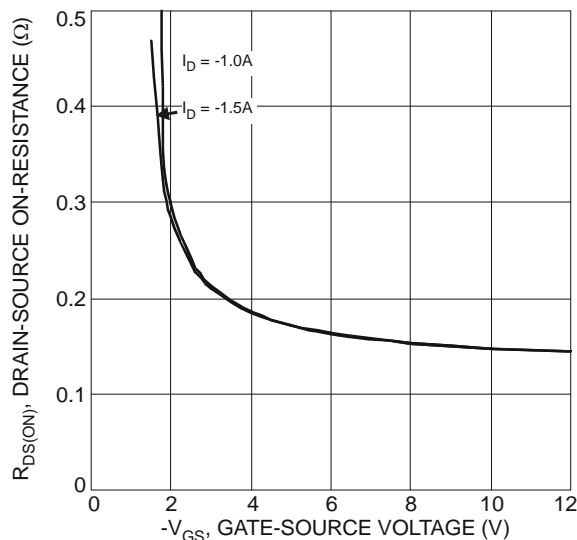


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

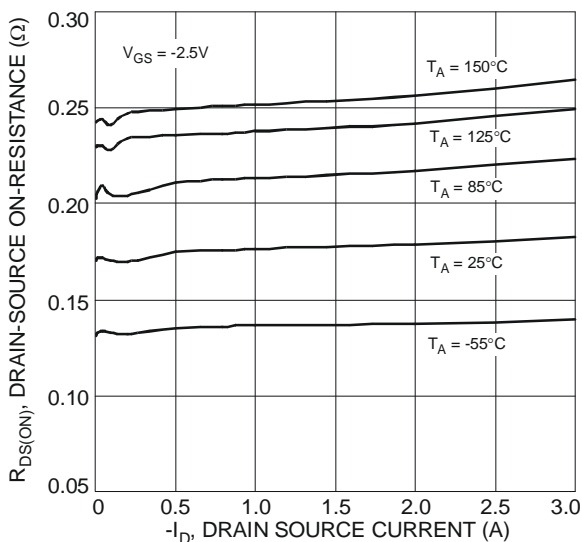


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

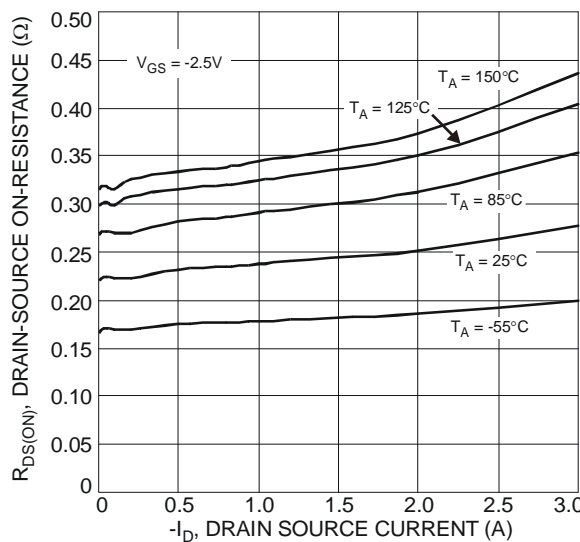


Figure 6 Typical On-Resistance vs. Drain Current and Temperature

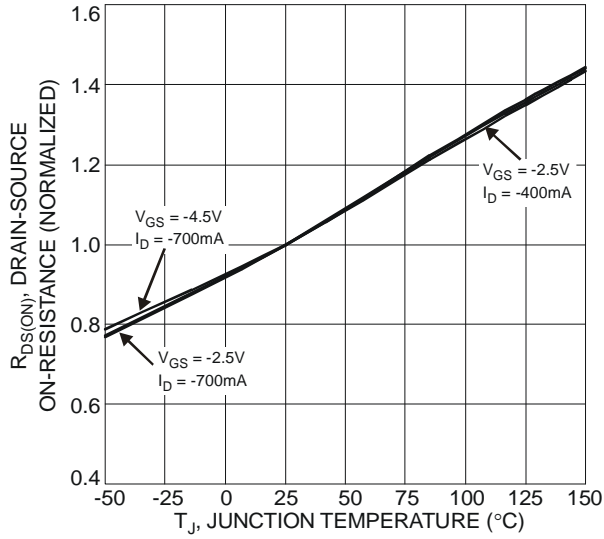


Figure 7 On-Resistance Variation with Temperature

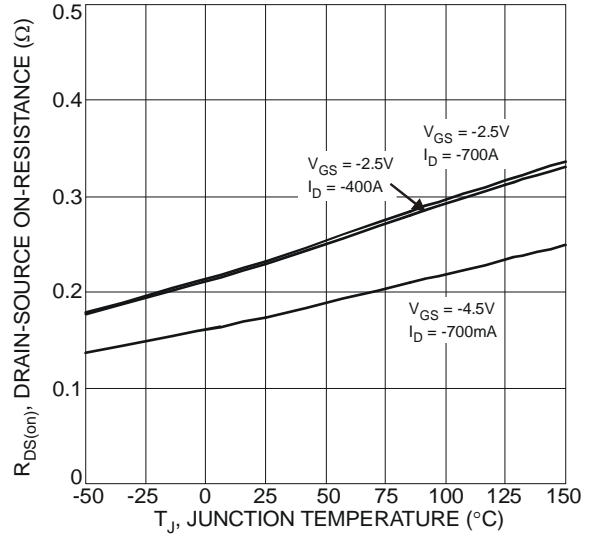


Figure 8 On-Resistance Variation with Temperature

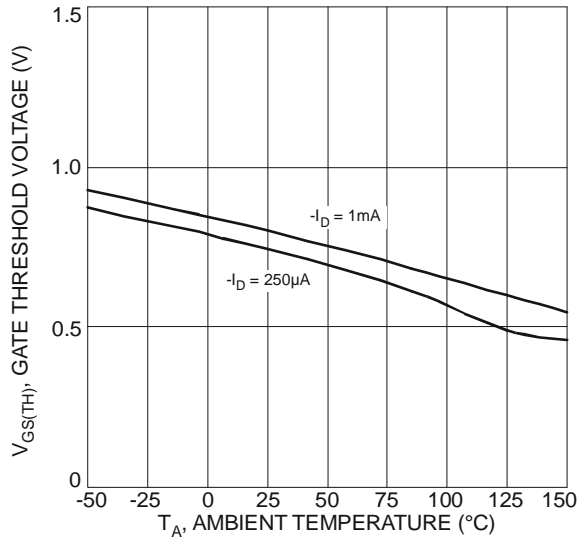


Figure 9 Gate Threshold Variation vs. Ambient Temperature

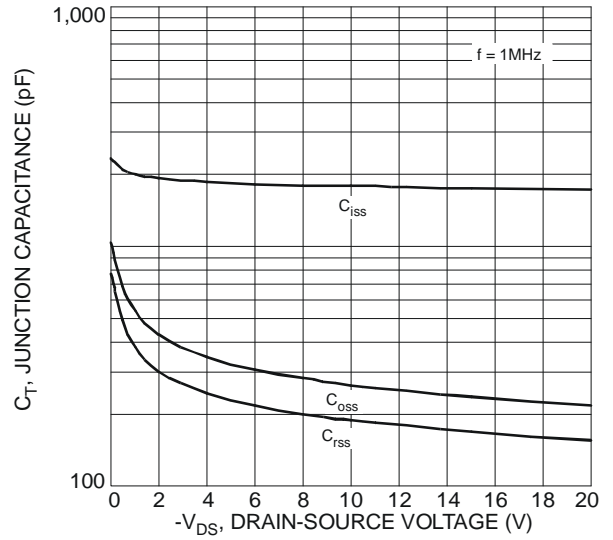
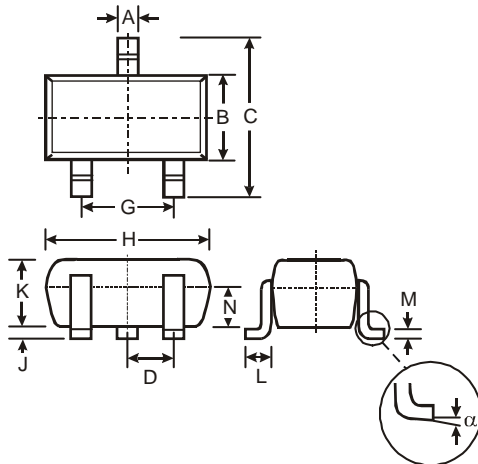


Figure 10 Typical Junction Capacitance

Package Outline Dimensions

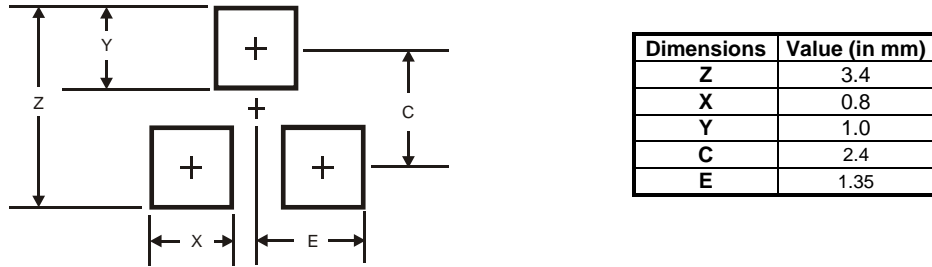
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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.



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