# P-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- **Lead Free By Design/RoHS Compliant (Note 2)**
- **ESD Protected Gate**
- **"Green" Device (Note 4)**
- **Qualified to AEC-Q101 Standards for High Reliability**

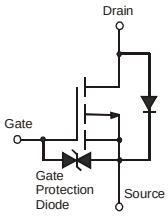
## Mechanical Data

- 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
- Terminal Connections: See Diagram
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.014 grams (approximate)

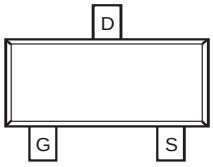


TOP VIEW

SC59



Equivalent Circuit



TOP VIEW

## 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 1) Steady State | $I_D$ | -0.7 | A |
| Pulsed Drain Current (Note 3) | $I_{DM}$ | -2.8 | A |

## Thermal Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Total Power Dissipation (Note 1) | $P_d$ | 500 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 250 | °C/W |
| Operating and Storage Temperature Range | $T_j$, $T_{STG}$ | -65 to +150 | °C |

## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 5)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -20 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250mA |
| 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 5)** | | | | | | |
| 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<br>0.37 | 0.30<br>0.50 | Ω | $V_{GS}$ = -4.5V, $I_D$ = -0.4A<br>$V_{GS}$ = -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 5) | $V_{SD}$ | — | -0.8 | -1.1 | V | $V_{GS}$ = 0V, $I_S$ = -0.7A |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 180 | — | pF | $V_{DS}$ = -10V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 120 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 50 | — | pF | |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 5 | — | ns | $V_{DD}$ = -10V, $I_D$ = -0.4A,<br>$V_{GS}$ = -5.0V, $R_{GEN}$ = 50Ω |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 55 | — | ns | |
| Turn-On Rise Time | $t_r$ | — | 20 | — | ns | |
| Turn-Off Fall Time | $t_f$ | — | 70 | — | ns | |

Notes:
1. Device mounted on FR-4 PCB.
2. No purposefully added lead.
3. Pulse width ≤10µS, Duty Cycle ≤1%.
4. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
5. Short duration pulse test used to minimize self-heating effect.

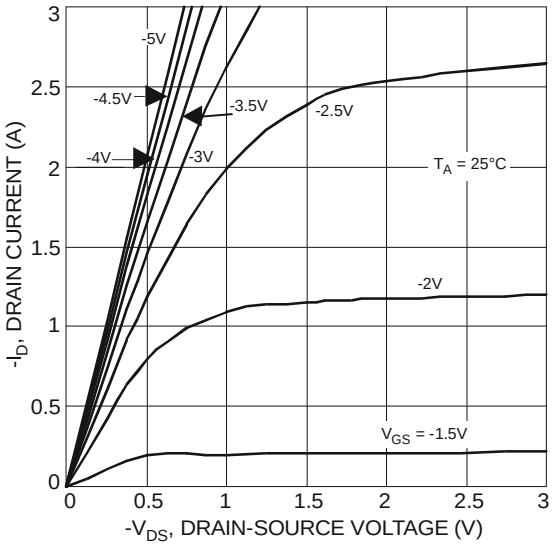



Fig. 1 Typical Output Characteristics

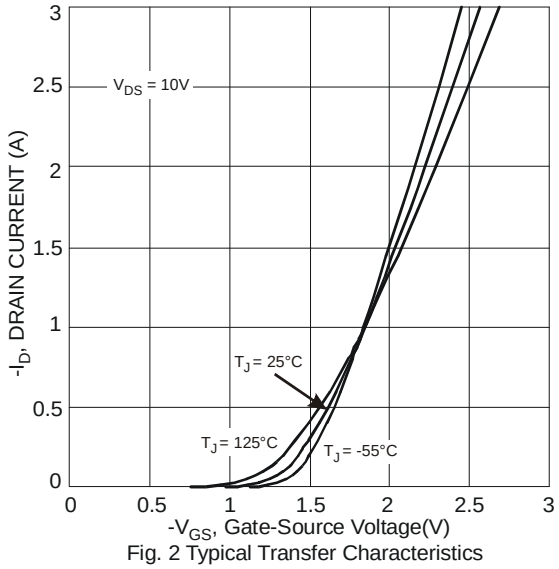



Fig. 2 Typical Transfer Characteristics

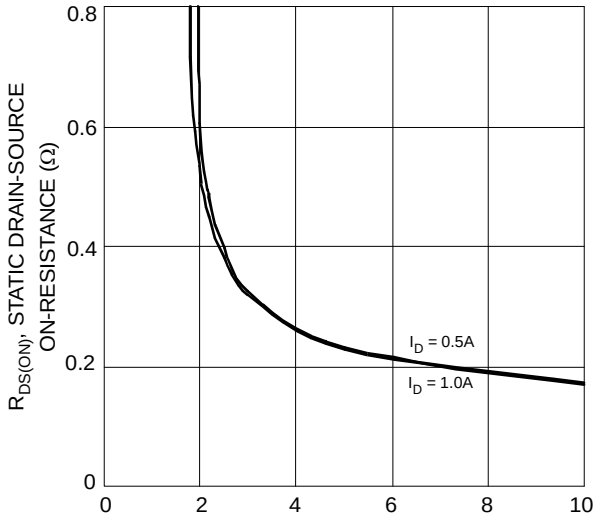



Fig. 3 On-Resistance vs. Gate Voltage

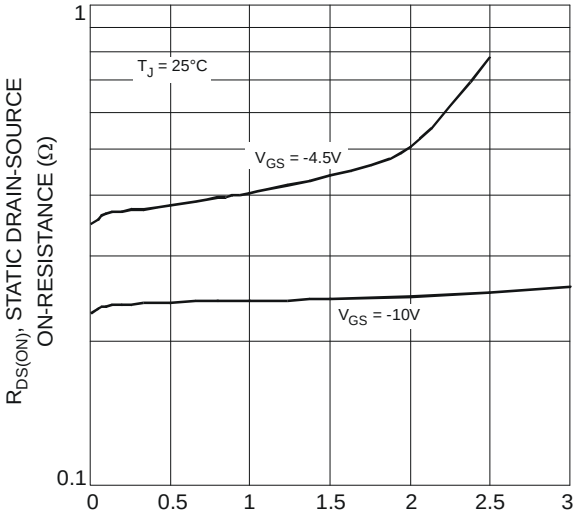



Fig. 4 On-Resistance vs. Drain Current

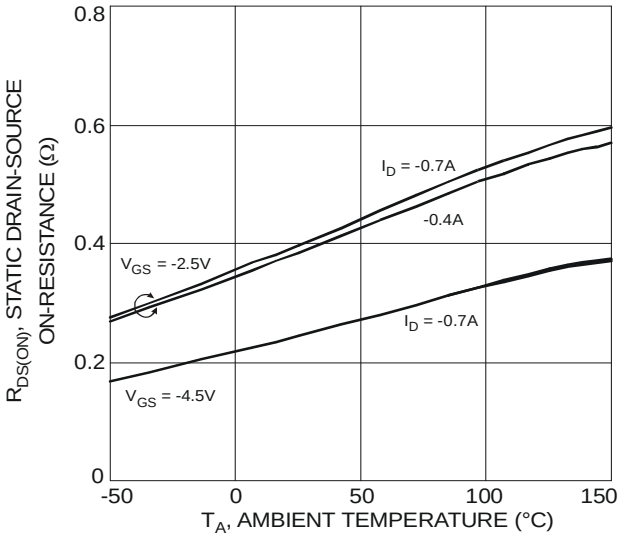



Fig. 5 On-Resistance Variation with Temperature

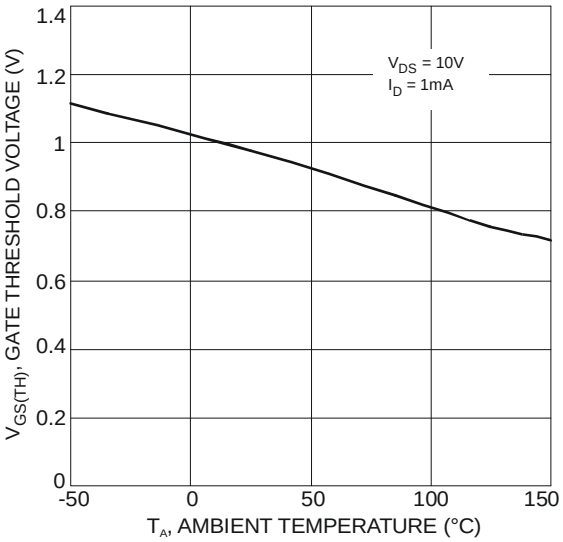



Fig. 6 Gate Threshold Voltage vs. Temperature

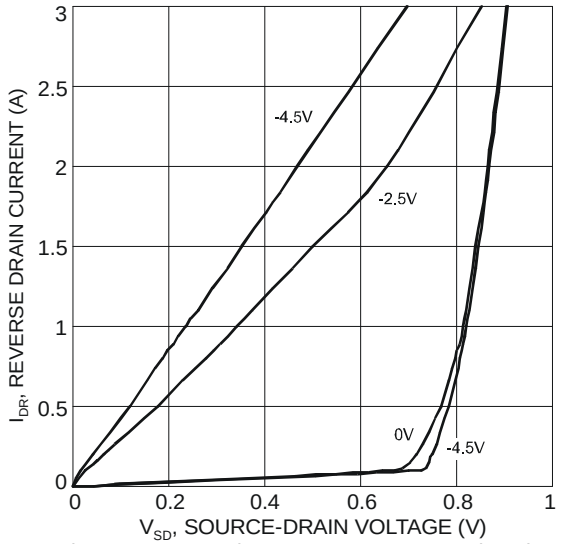



Fig. 7 Reverse Drain Current vs. Source-Drain Voltage

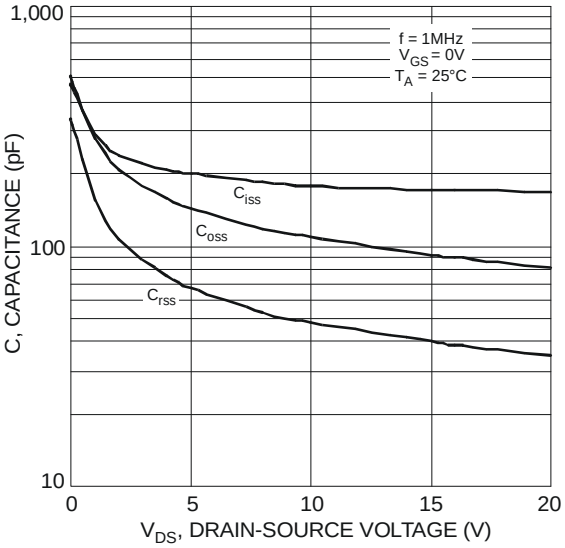


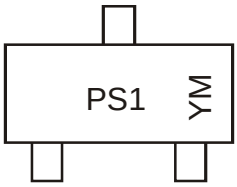

Fig. 8 Typical Total Capacitance

## Ordering Information (Note 6)

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

Notes: 6. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

## Marking Information



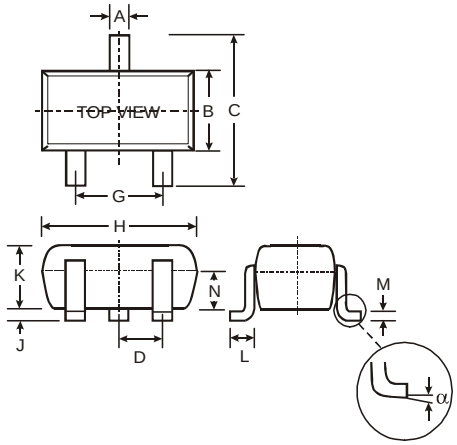

PS1 = Product Type Marking Code
YM = Date Code Marking
Y = Year ex: T = 2006
M = Month ex: 9 = September

Date Code Key

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| Code | T | U | V | W | X | Y | Z |

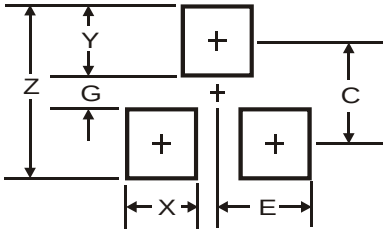
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

## Package Outline Dimensions




| SC59 | | |
|---|---|---|
| Dim | Min | Max |
| A | 0.35 | 0.50 |
| B | 1.50 | 1.70 |
| C | 2.70 | 3.00 |
| D | 0.95 | |
| G | 1.90 | |
| H | 2.90 | 3.10 |
| J | 0.013 | 0.10 |
| K | 1.00 | 1.30 |
| L | 0.35 | 0.55 |
| M | 0.10 | 0.20 |
| N | 0.70 | 0.80 |
| α | 0° | 8° |
| All Dimensions in mm | | |

## Suggested Pad Layout




| Dimensions | Value (in mm) |
|---|---|
| Z | 4.0 |
| G | 1.2 |
| X | 0.9 |
| Y | 1.4 |
| C | 2.6 |
| E | 0.95 |