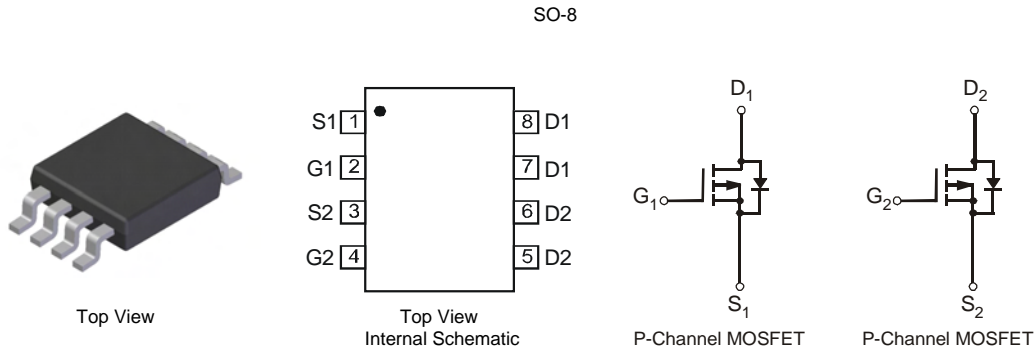


Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

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 Below
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.072 grams (approximate)



Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | | | Symbol | Value | Unit |
|---|--------------|--------------------------|-----------|----------|------|
| Drain-Source Voltage | | | V_{DSS} | -20 | V |
| Gate-Source Voltage | | | V_{GSS} | ± 12 | V |
| Continuous Drain Current (Note 3) $V_{GS} = -4.5\text{V}$ | Steady State | $T_A = 25^\circ\text{C}$ | I_D | -4.6 | A |
| | | $T_A = 85^\circ\text{C}$ | | -3 | A |
| Pulsed Drain Current (Note 4) | | | I_{DM} | -20 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|--------------------|
| Power Dissipation (Note 3) | P_D | 1.15 | W |
| Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 109 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

- Notes:
1. No purposefully added lead.
 2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
 3. Device mounted on FR-4 PCB, with minimum recommended pad layout.
 4. Repetitive rating, pulse width limited by junction temperature.

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-------|-------|-----------|------------|--|
| OFF CHARACTERISTICS (Note 5) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | -20 | - | - | V | $V_{GS} = 0V, I_D = -250\mu A$ |
| Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$ | I_{DSS} | - | - | -1.0 | μA | $V_{DS} = -16V, V_{GS} = 0V$ |
| Gate-Source Leakage | I_{GSS} | - | - | ± 100 | nA | $V_{GS} = \pm 12V, V_{DS} = 0V$ |
| ON CHARACTERISTICS (Note 5) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -0.45 | - | -1.1 | V | $V_{DS} = V_{GS}, I_D = -250\mu A$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | - | 55 | 75 | m Ω | $V_{GS} = -4.5V, I_D = -4.8A$ |
| | | - | 76 | 110 | | $V_{GS} = -2.5V, I_D = -1A$ |
| Forward Transfer Admittance | $ Y_{fs} $ | - | 10 | - | S | $V_{DS} = -9V, I_D = -3.4A$ |
| Diode Forward Voltage | V_{SD} | - | -0.8 | -1.2 | V | $V_{GS} = 0V, I_S = -2A$ |
| DYNAMIC CHARACTERISTICS (Note 6) | | | | | | |
| Input Capacitance | C_{iss} | - | 608.4 | - | pF | $V_{DS} = -6V, V_{GS} = 0V$ $f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | - | 81.5 | - | pF | |
| Reverse Transfer Capacitance | C_{rss} | - | 72.4 | - | pF | |
| Gate Resistance | R_g | - | 44.91 | - | Ω | $V_{DS} = 0V, V_{GS} = 0V, f = 1\text{MHz}$ |
| Total Gate Charge | Q_g | - | 6.5 | - | nC | $V_{DS} = -10V, V_{GS} = -4.5V,$ $I_D = -3.2A$ |
| Gate-Source Charge | Q_{gs} | - | 0.9 | - | nC | |
| Gate-Drain Charge | Q_{gd} | - | 1.5 | - | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 12.45 | - | ns | $V_{DS} = -10V, V_{GS} = -4.5V,$ $R_L = 10\Omega, R_G = 1\Omega, I_D = -1A$ |
| Turn-On Rise Time | t_r | - | 10.29 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 46.52 | - | ns | |
| Turn-Off Fall Time | t_f | - | 22.19 | - | ns | |

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

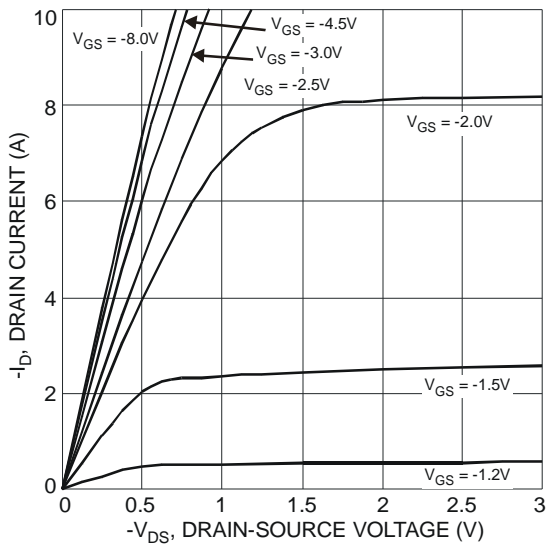


Fig. 1 Typical Output Characteristics

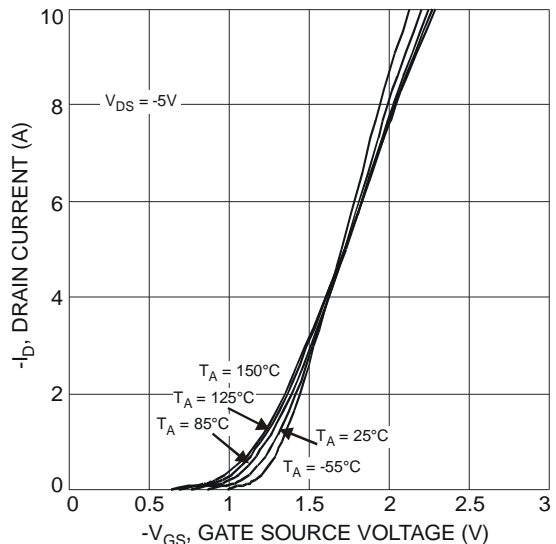


Fig. 2 Typical Transfer Characteristics

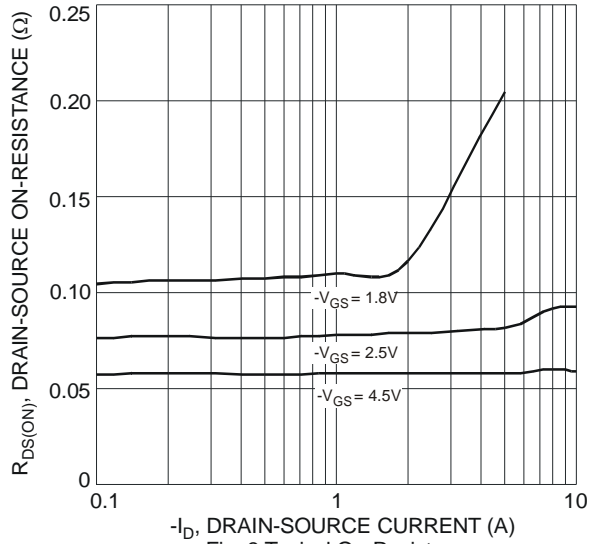


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

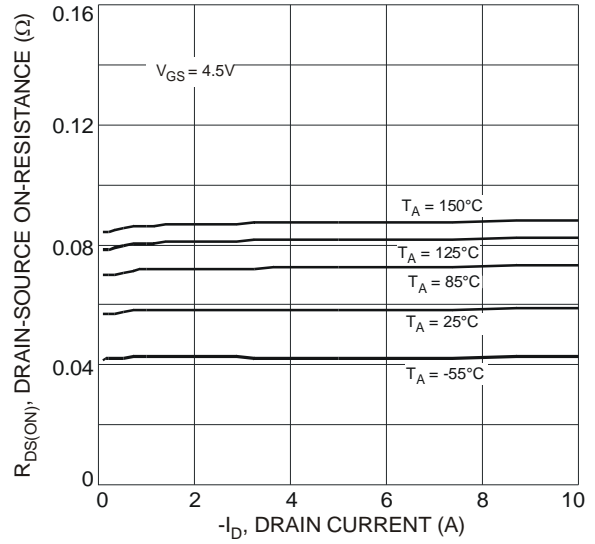


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

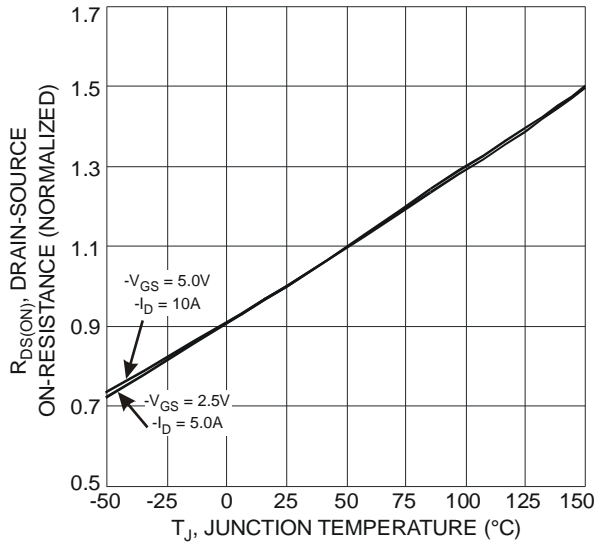


Fig. 5 On-Resistance Variation with Temperature

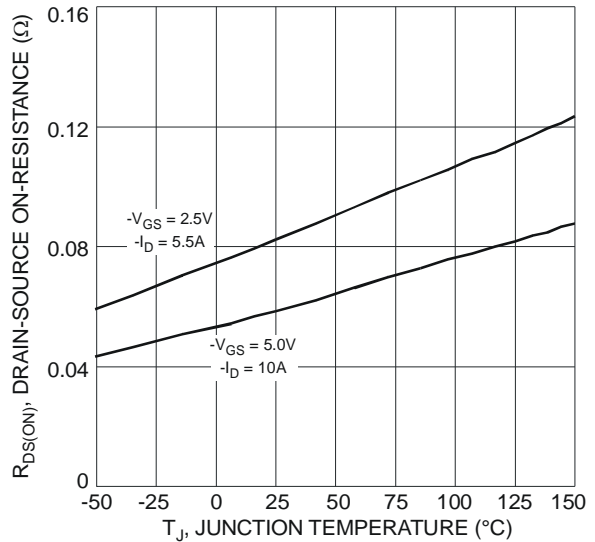


Fig. 6 On-Resistance Variation with Temperature

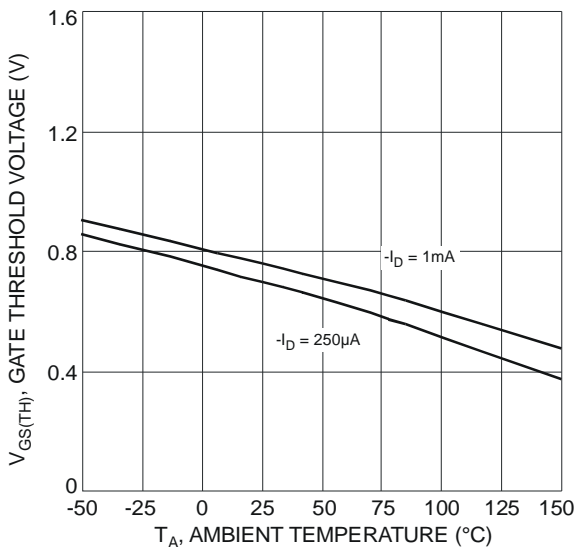


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

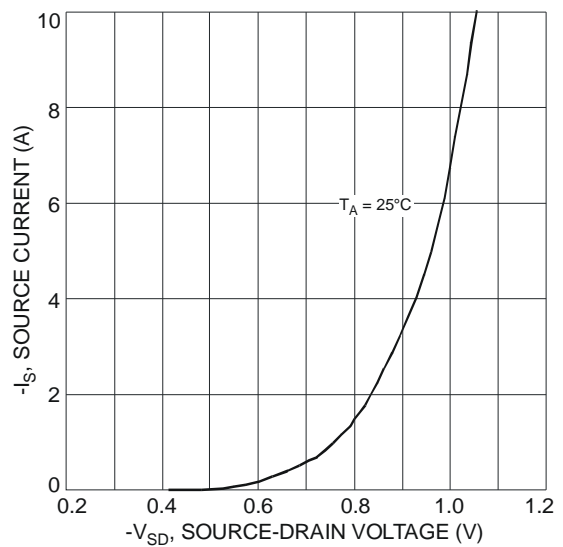
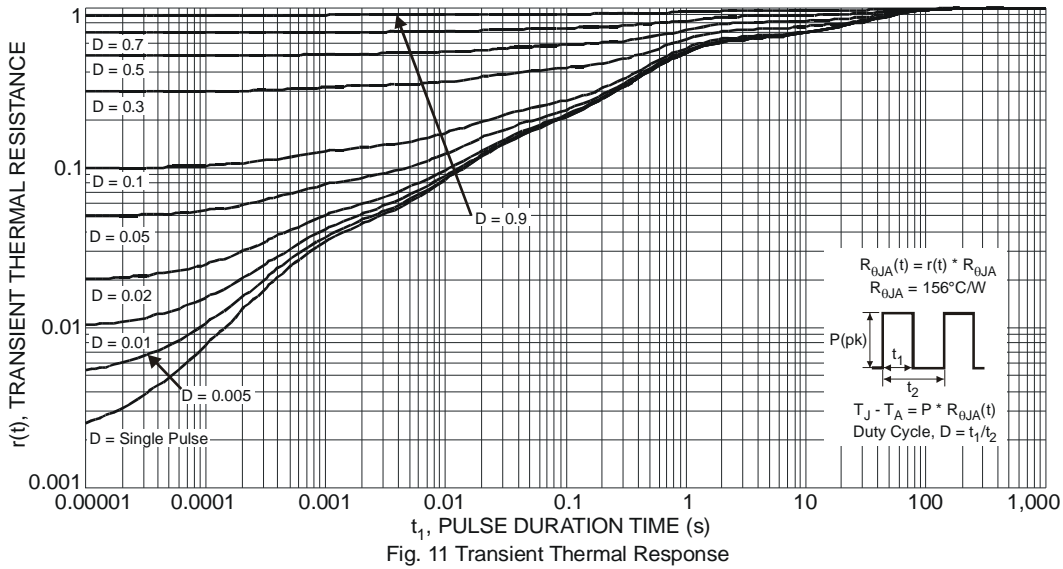
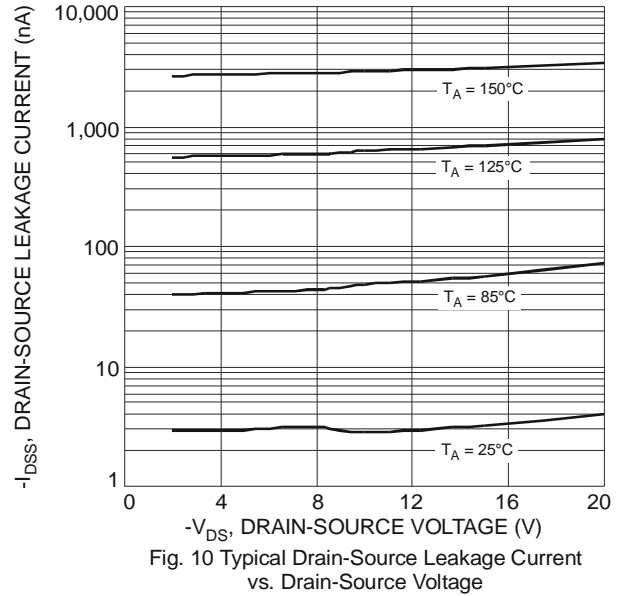
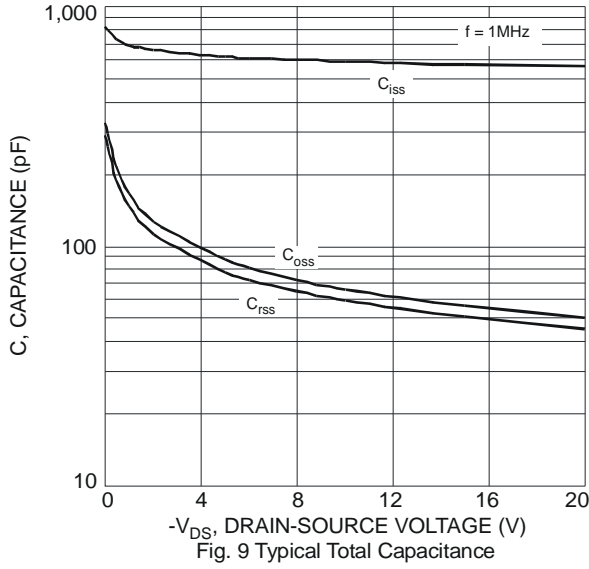


Fig. 8 Diode Forward Voltage vs. Current

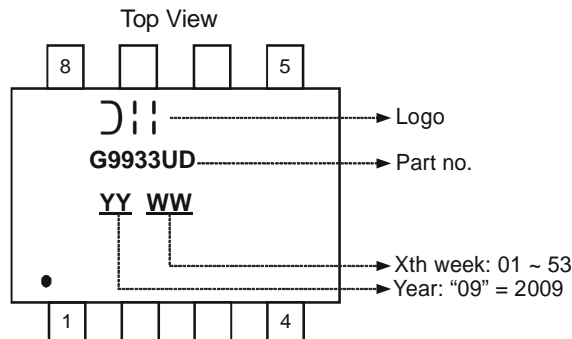


Ordering Information (Note 7)

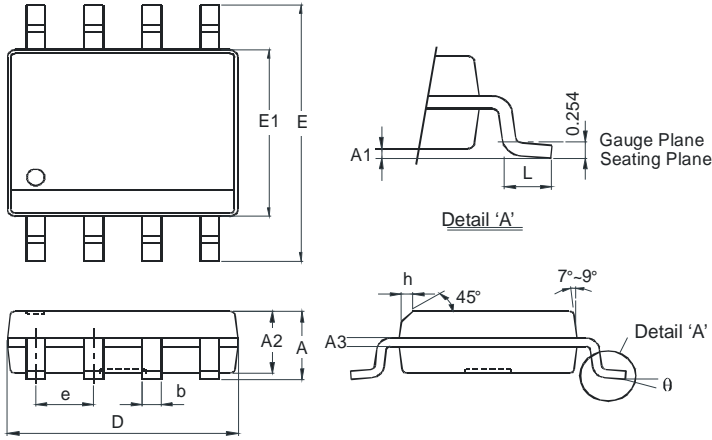
| Part Number | Case | Packaging |
|---------------|------|--------------------|
| DMG9933USD-13 | SO-8 | 2500 / Tape & Reel |

Notes: 7. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information

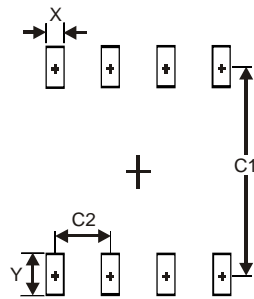


Package Outline Dimensions



| SO-8 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | - | 1.75 |
| A1 | 0.10 | 0.20 |
| A2 | 1.30 | 1.50 |
| A3 | 0.15 | 0.25 |
| b | 0.3 | 0.5 |
| D | 4.85 | 4.95 |
| E | 5.90 | 6.10 |
| E1 | 3.85 | 3.95 |
| e | 1.27 Typ | |
| h | - | 0.35 |
| L | 0.62 | 0.82 |
| θ | 0° | 8° |
| All Dimensions in mm | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| X | 0.60 |
| Y | 1.55 |
| C1 | 5.4 |
| C2 | 1.27 |

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