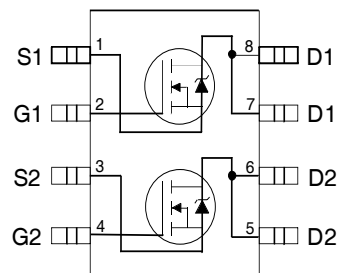


Features

- $V_{DS} (V) = 50V$
- $R_{DS(ON)} < 30m \Omega (V_{GS} = 10V)$
- $R_{DS(ON)} < 40 m \Omega (V_{GS} = 4.5V)$
- Advanced Process Technology
- Ultra Low On-Resistance
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching
- Lead-Free
-



Top View

Description

The SOP-8 has been modified through a customized leadframe for enhanced thermal characteristics and dual-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red. or wave soldering techniques Power dissipation of greater than 0.8W is possible in a typical pcB mount application.

Absolute Maximum Ratings

| | Parameter | Max. | Units |
|--------------------------|--|--------------|-------|
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 3.0 | A |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 2.3 | |
| I_{DM} | Pulsed Drain Current ① | 10 | |
| $P_D @ T_A = 25^\circ C$ | Power Dissipation | 2.0 | W |
| | Linear Derating Factor | 0.016 | W/°C |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| dv/dt | Peak Diode Recovery dv/dt ② | 4.5 | V/nS |
| T_J, T_{STG} | Junction and Storage Temperature Range | -55 to + 150 | °C |

Thermal Resistance Ratings

| | Parameter | Min. | Typ. | Max. | Units |
|-----------------|-------------------------------|------|------|------|-------|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient ④ | | | 62.5 | °C/W |

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

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------------------------|--------------------------------------|------|----------|-----------|---------------------|--|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 50 | | | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | | 0.049 | | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}, I_D = 1mA$ |
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance | | 21 32 | 30 40 | $m\Omega$ | $V_{GS} = 10V, I_D = 3.0A$ ③ $V_{GS} = 4.5V, I_D = 1.5A$ ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.0 | | 3.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| g_{fs} | Forward Transconductance | | 3.8 | | S | $V_{DS} = 15V, I_D = 3.0A$ ③ |
| I_{DSS} | Drain-to-Source Leakage Current | | | 2.0 25 | μA | $V_{DS} = 40V, V_{GS} = 0V$ $V_{DS} = 40V, V_{GS} = 0V, T_J = 55^\circ\text{C}$ |
| I_{GSS} | Gate-to-Source Forward Leakage | | | 100 | nA | $V_{GS} = 20V$ |
| | Gate-to-Source Reverse Leakage | | | -100 | nA | $V_{GS} = -20V$ |
| Q_g | Total Gate Charge | | 12 | 30 | nC | $I_D = 2.0A$ $V_{DS} = 25V$ $V_{GS} = 10V$ ③ |
| Q_{gs} | Gate-to-Source Charge | | 1.2 | | | |
| Q_{gd} | Gate-to-Drain ("Miller") Charge | | 3.5 | | | |
| $t_{d(on)}$ | Turn-On Delay Time | | 9.0 | 20 | ns | $V_{DD} = 25V$ $I_D = 1.0A$ $R_G = 6.0\Omega$ $R_D = 25\Omega$ ③ |
| t_r | Rise Time | | 8.0 | 20 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | | 45 | 70 | | |
| t_f | Fall Time | | 25 | 50 | | |
| L_D | Internal Drain Inductance | | 4.0 | | nH | Between lead, 6mm (0.25in.) from package and center of die contact |
| L_S | Internal Source Inductance | | 6.0 | | | |
| C_{iss} | Input Capacitance | | 290 | | pF | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0MHz$ |
| C_{oss} | Output Capacitance | | 140 | | | |
| C_{rss} | Reverse Transfer Capacitance | | 37 | | | |

Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|---|---|------|------|-------|---|
| I_S | Continuous Source Current (Body Diode) | | | 2.0 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| I_{SM} | Pulsed Source Current (Body Diode) ① | | | 12 | | |
| V_{SD} | Diode Forward Voltage | | | 1.2 | V | $T_J = 25^\circ\text{C}, I_S = 1.5A, V_{GS} = 0V$ ③ |
| t_{rr} | Reverse Recovery Time | | 70 | 100 | ns | $T_J = 25^\circ\text{C}, I_F = 1.5A$ |
| Q_{rr} | Reverse Recovery Charge | | 110 | 170 | nC | $di/dt = 100A/\mu s$ ③ |
| t_{on} | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$) | | | | |

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② $I_{SD} \leq 1.8A, di/dt \leq 90A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
- ③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ④ Surface mounted on FR-4 board, $t \leq 10sec$.

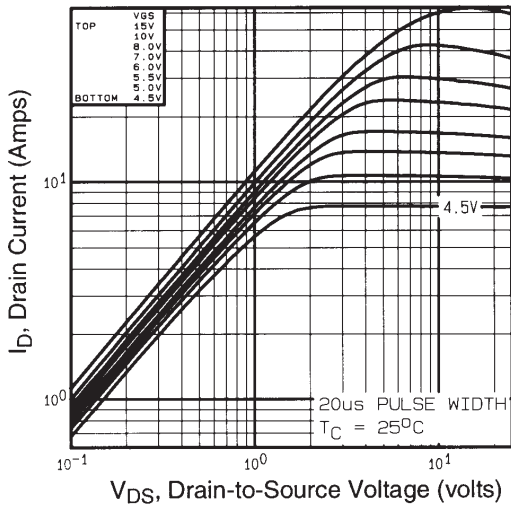


Fig 1. Typical Output Characteristics,

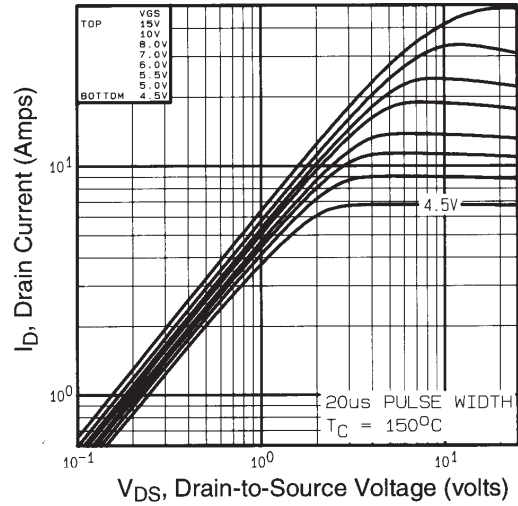


Fig 2. Typical Output Characteristics,

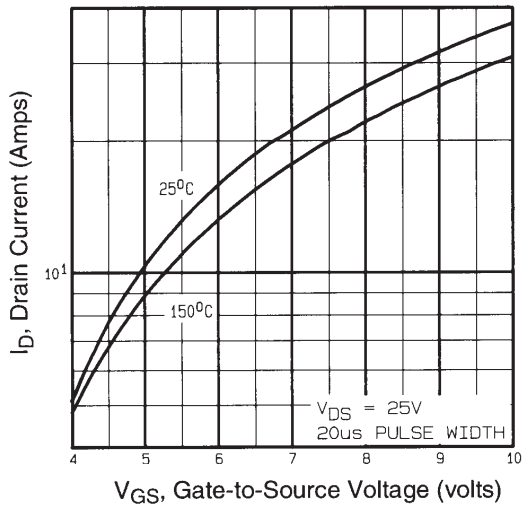


Fig 3. Typical Transfer Characteristics

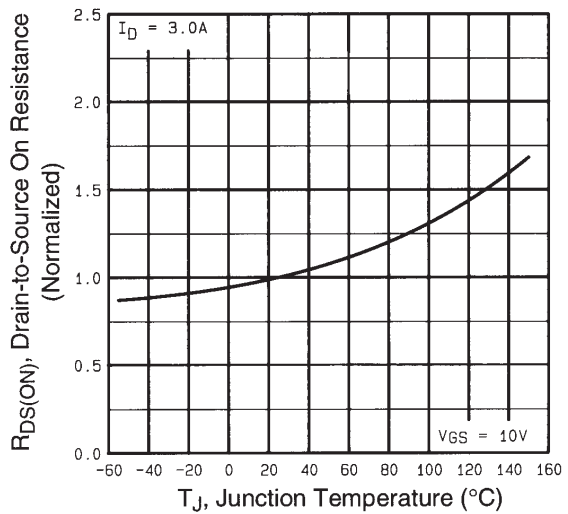


Fig 4. Normalized On-Resistance Vs. Temperature

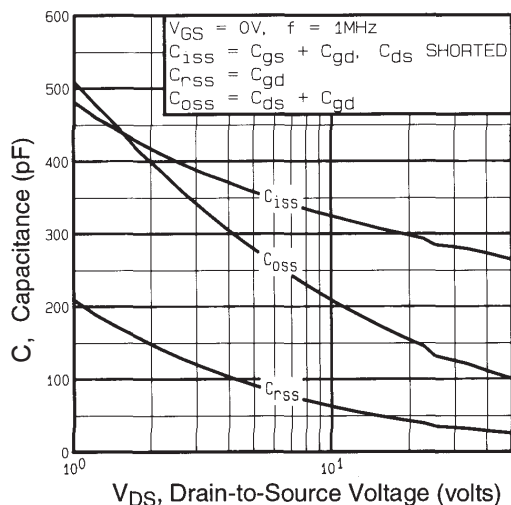


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

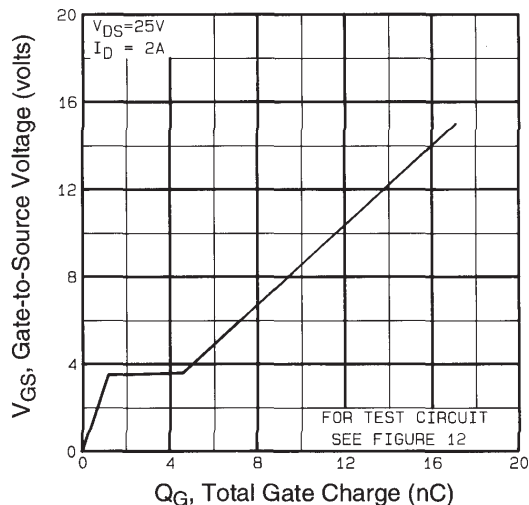


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

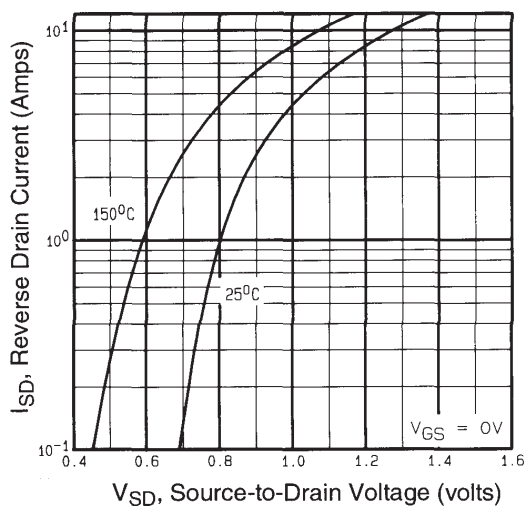


Fig 7. Typical Source-Drain Diode Forward Voltage

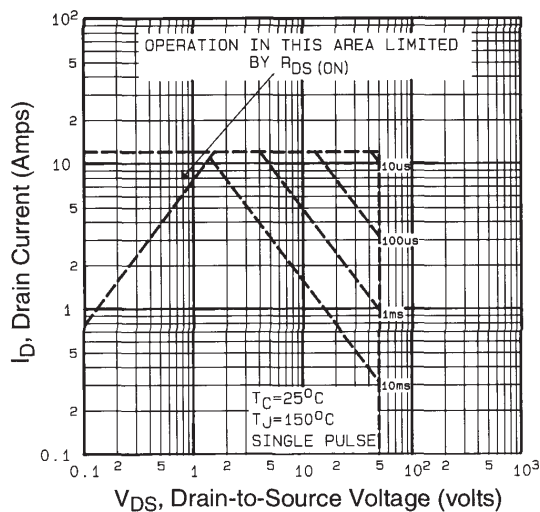


Fig 8. Maximum Safe Operating Area

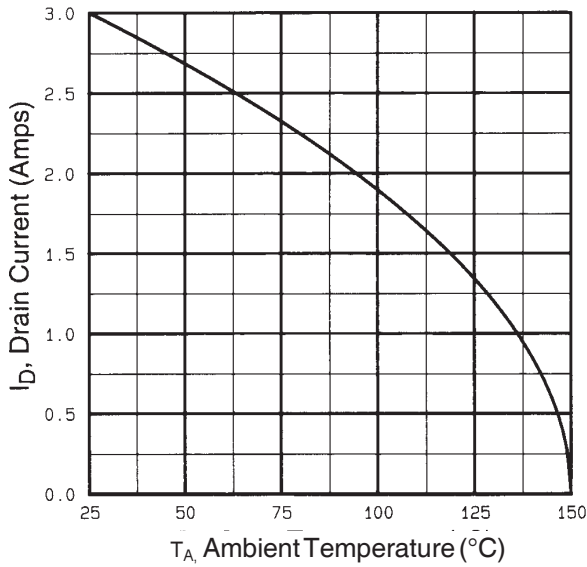


Fig 9. Maximum Drain Current Vs. Ambient Temperature

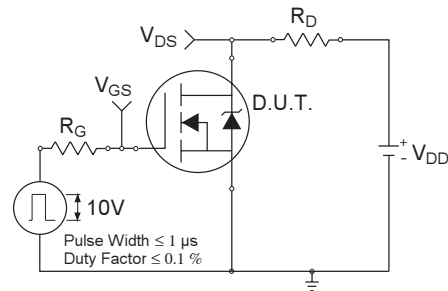


Fig 10a. Switching Time Test Circuit

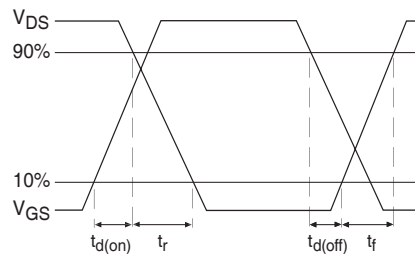


Fig 10b. Switching Time Waveforms

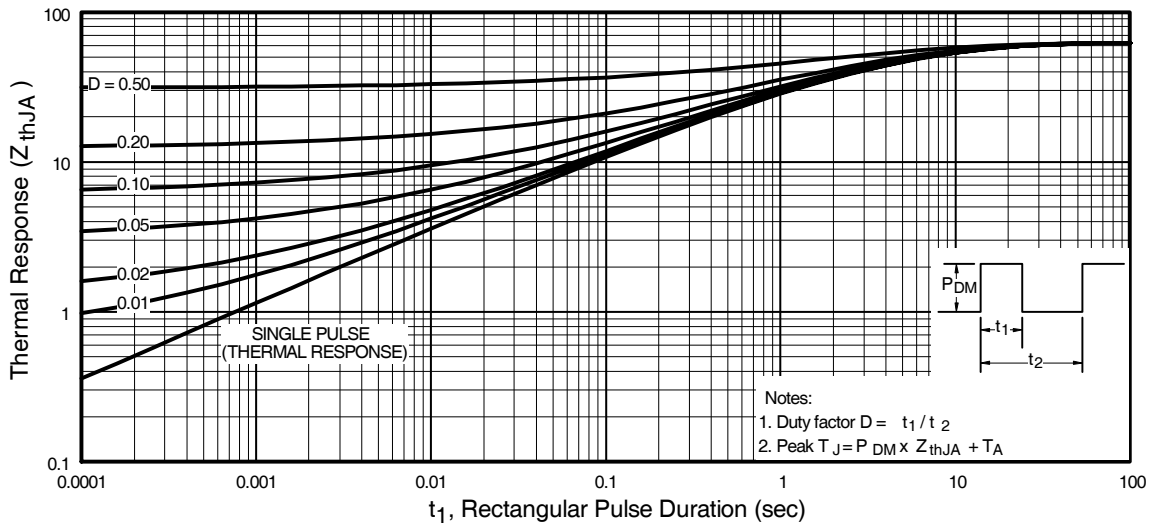


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

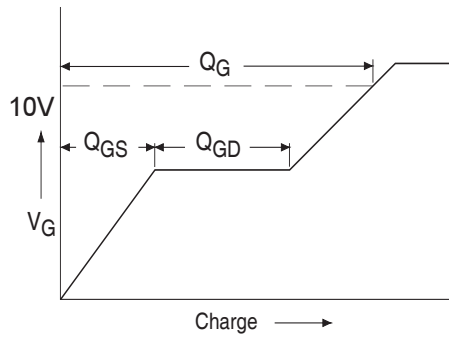


Fig 12a. Basic Gate Charge Waveform

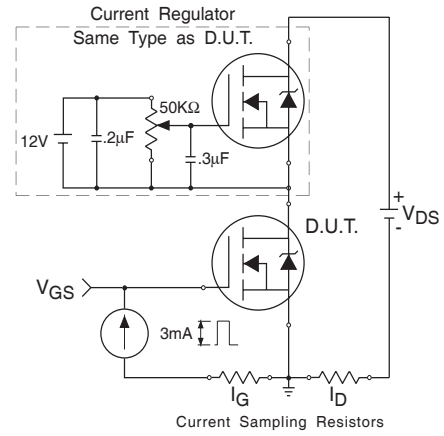
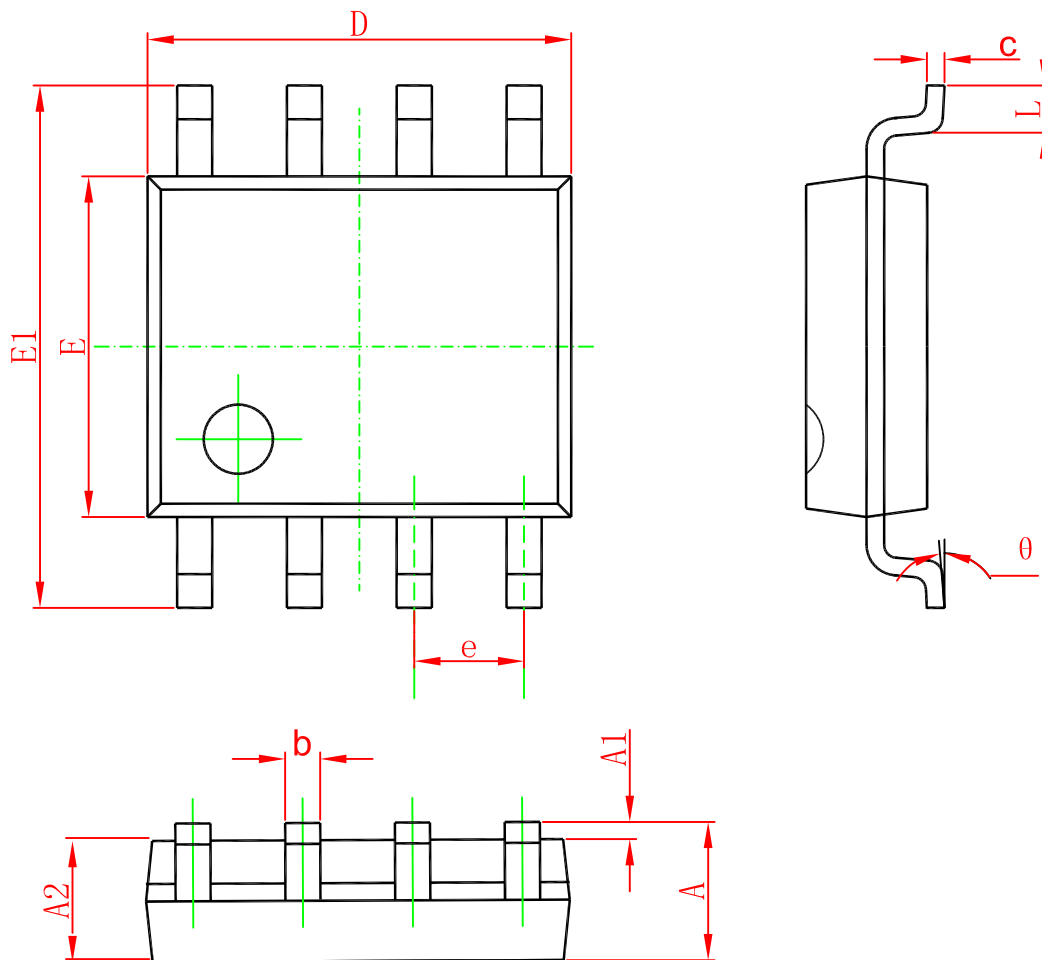
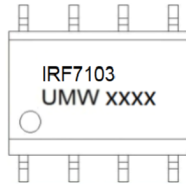


Fig 12b. Gate Charge Test Circuit



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

Marking



Ordering information

| Order code | Package | Baseqty | Deliverymode |
|---------------|---------|---------|---------------|
| UMW IRF7103TR | SOP-8 | 3000 | Tape and reel |