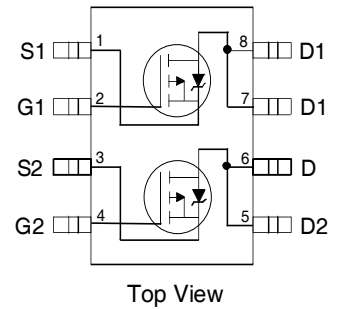


Features

- $V_{DS} (V) = -30V$
- $R_{DS(ON)} < 58m\Omega$ ($V_{GS} = -10V$)
- $R_{DS(ON)} < 98m\Omega$ ($V_{GS} = -4.5V$)
- Generation V Technology
- Ultra Low On-Resistance
- Surface Mount
- Fully Avalanche Rated
- Lead-Free



Description

The SOP-8 has been modified through a customized eadrame for enhanced thermacharacterstics and multiple 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 desianed forn vapor phase, infra red, or wave soldering techniques

Absolute Maximum Ratings ($T_A = 25^\circ C$ Unless Otherwise Noted)

| | Symbol | Maximum | Units |
|--|----------------|--------------------|------------|
| Drain-Source Voltage | V_{DS} | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current ^⑤ | I_D | $T_A = 25^\circ C$ | -4.9 |
| | | $T_A = 70^\circ C$ | -3.9 |
| Pulsed Drain Current | I_{DM} | -30 | A |
| Continuous Source Current (Diode Conduction) | I_S | -2.5 | |
| Maximum Power Dissipation ^⑤ | P_D | $T_A = 25^\circ C$ | 2.0 |
| | | $T_A = 70^\circ C$ | 1.3 |
| Single Pulse Avalanche Energy | E_{AS} | 140 | mJ |
| Avalanche Current | I_{AR} | -2.8 | A |
| Repetitive Avalanche Energy | E_{AR} | 0.20 | mJ |
| Peak Diode Recovery dv/dt ^③ | dv/dt | -5.0 | V/ ns |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to + 150 | $^\circ C$ |

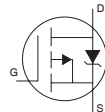
Thermal Resistance Ratings

| Parameter | Symbol | Limit | Units |
|--|-----------------|-------|--------------|
| Maximum Junction-to-Ambient ^⑤ | $R_{\theta JA}$ | 62.5 | $^\circ C/W$ |

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 | -30 | | | V | $V_{GS} = 0V, I_D = -250\mu A$ |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | | 0.022 | | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}, I_D = -1\text{mA}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | | 42 77 | 60 100 | $m\Omega$ | $V_{GS} = -10V, I_D = -4.9A$ ④ $V_{GS} = -4.5V, I_D = -3.6A$ ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | -1.0 | | | V | $V_{DS} = V_{GS}, I_D = -250\mu A$ |
| g_{fs} | Forward Transconductance | | 7.7 | | S | $V_{DS} = -15V, I_D = -4.9A$ |
| I_{DSS} | Drain-to-Source Leakage Current | | | -1.0 -25 | μA | $V_{DS} = -24V, V_{GS} = 0V$ $V_{DS} = -24V, V_{GS} = 0V, T_J = 55^\circ\text{C}$ |
| 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 | | 23 | 34 | nC | $I_D = -4.9A$ |
| Q_{gs} | Gate-to-Source Charge | | 3.8 | 5.7 | nC | $V_{DS} = -15V$ |
| Q_{gd} | Gate-to-Drain ("Miller") Charge | | 5.9 | 8.9 | nC | $V_{GS} = -10V$, See Fig. 10 ④ |
| $t_{d(on)}$ | Turn-On Delay Time | | 13 | 19 | ns | $V_{DD} = -15V$ |
| t_r | Rise Time | | 13 | 20 | ns | $I_D = -1.0A$ |
| $t_{d(off)}$ | Turn-Off Delay Time | | 34 | 51 | ns | $R_G = 6.0\Omega$ |
| t_f | Fall Time | | 32 | 48 | ns | $R_D = 15\Omega$ ④ |
| C_{iss} | Input Capacitance | | 710 | | pF | $V_{GS} = 0V$ |
| C_{oss} | Output Capacitance | | 380 | | pF | $V_{DS} = -25V$ |
| C_{rss} | Reverse Transfer Capacitance | | 180 | | pF | $f = 1.0\text{MHz}$, See Fig. 5 |

Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|---|-------|------|------|-------|--|
| I_S | Continuous Source Current (Body Diode) | | | -2.5 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) ① | | | -30 | | |
| V_{SD} | Diode Forward Voltage | -0.78 | -1.0 | | V | $T_J = 25^\circ\text{C}, I_S = -1.7A, V_{GS} = 0V$ ③ |
| t_{rr} | Reverse Recovery Time | | 44 | 66 | ns | $T_J = 25^\circ\text{C}, I_F = -1.7A$ |
| Q_{rr} | Reverse Recovery Charge | | 42 | 63 | nC | $di/dt = 100A/\mu s$ ③ |

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② Starting $T_J = 25^\circ\text{C}$, $L = 35\text{mH}$
 $R_G = 25\Omega, I_{AS} = -2.8A$.
- ③ $I_{SD} \leq -2.8A, di/dt \leq 150A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ⑤ Surface mounted on FR-4 board, $t \leq 10\text{sec}$.

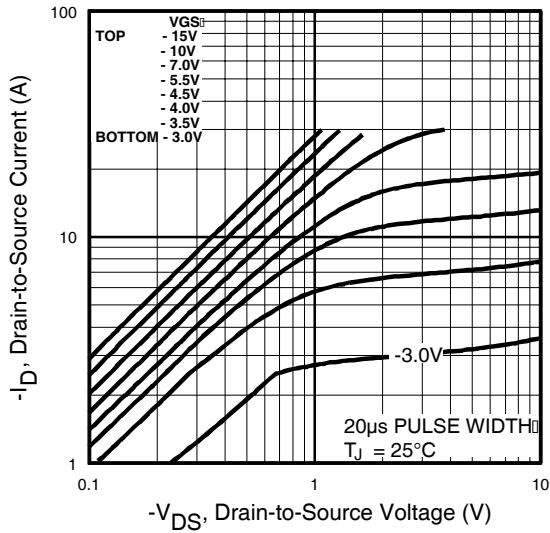


Fig 1. Typical Output Characteristics

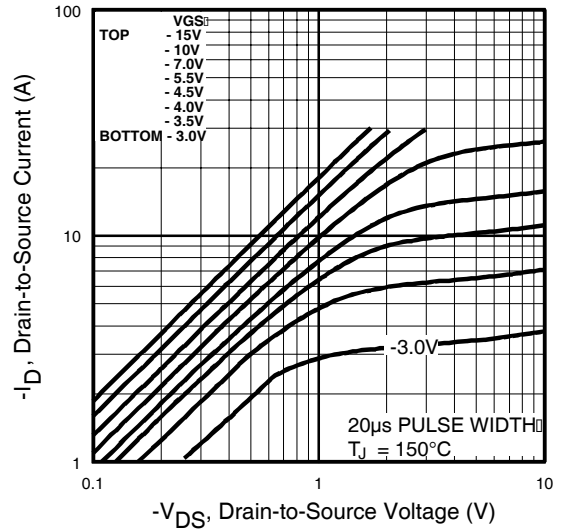


Fig 2. Typical Output Characteristics

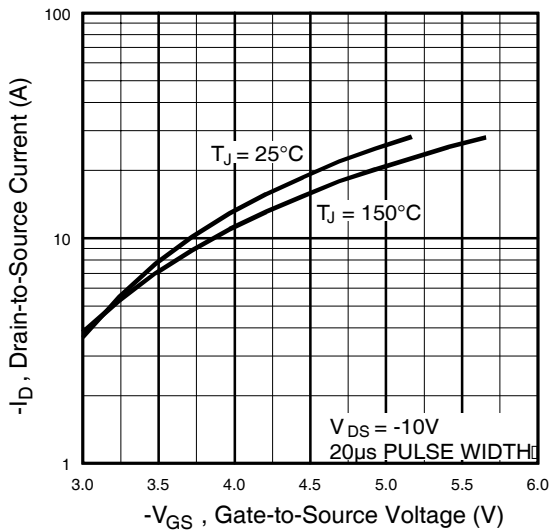


Fig 3. Typical Transfer Characteristics

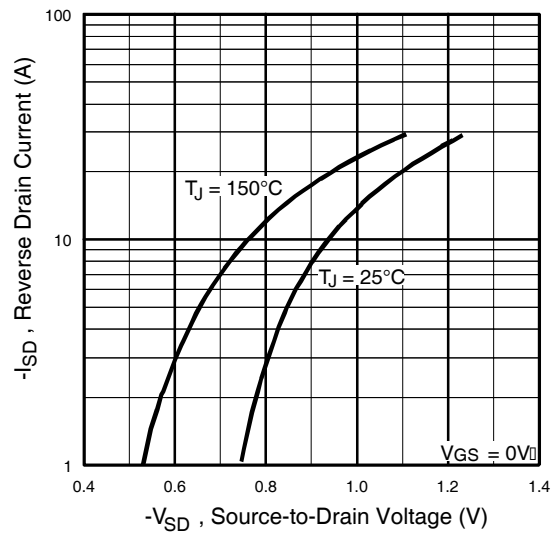


Fig 4. Typical Source-Drain Diode Forward Voltage

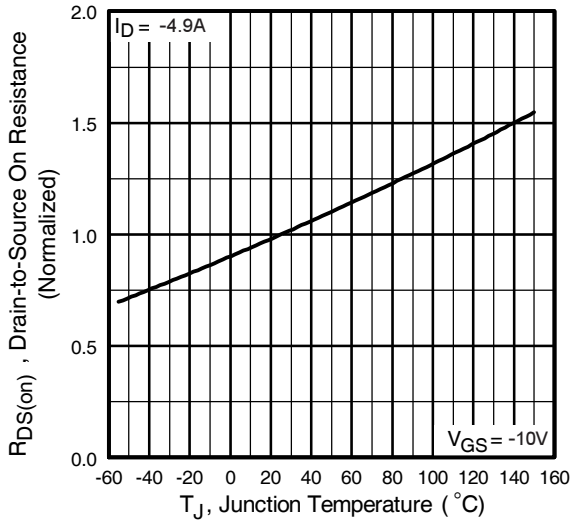


Fig 5. Normalized On-Resistance Vs. Temperature

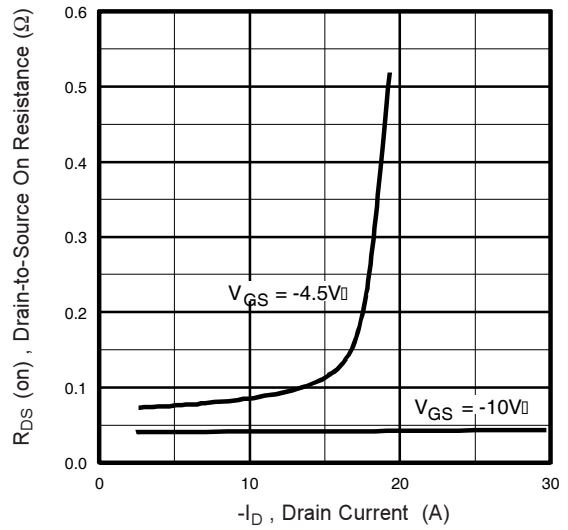


Fig 6. Typical On-Resistance Vs. Drain Current

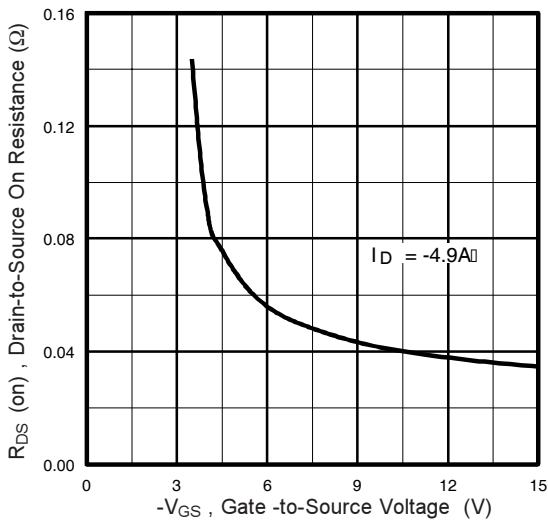


Fig 7. Typical On-Resistance Vs. Gate Voltage

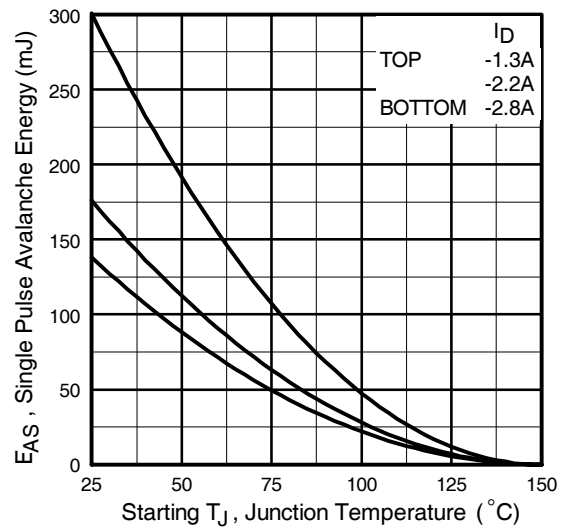


Fig 8. Maximum Avalanche Energy Vs. Drain Current

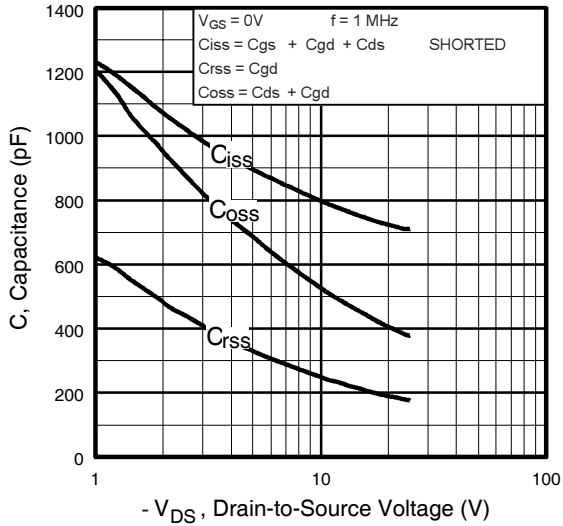


Fig 9. Typical Capacitance Vs. Drain-to-Source Voltage

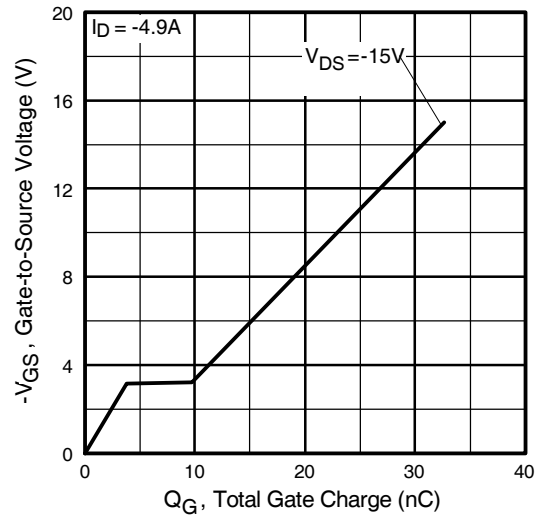


Fig 10. Typical Gate Charge Vs. Gate-to-Source Voltage

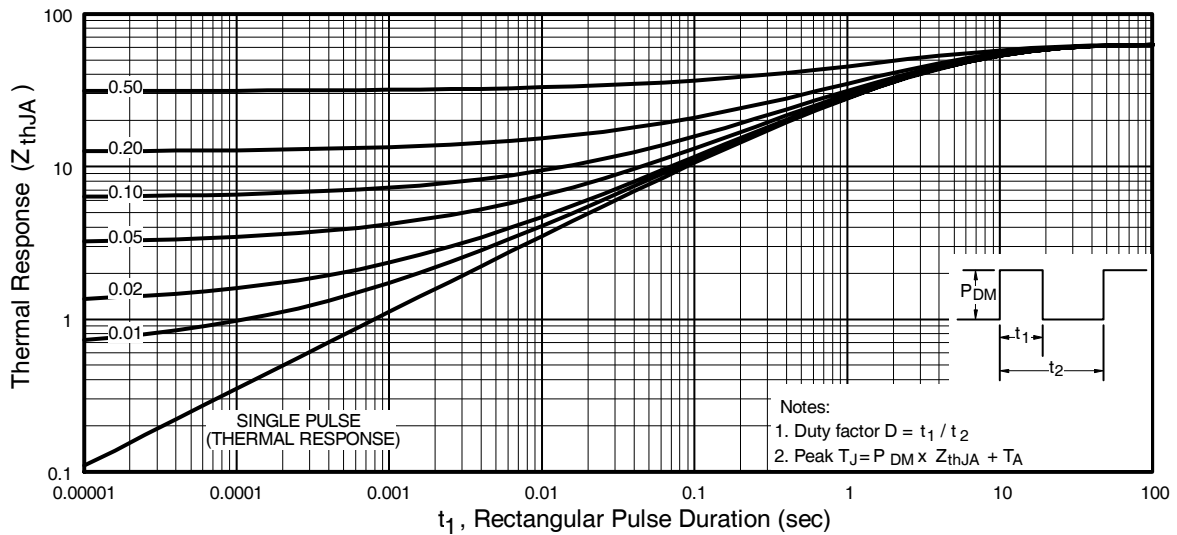
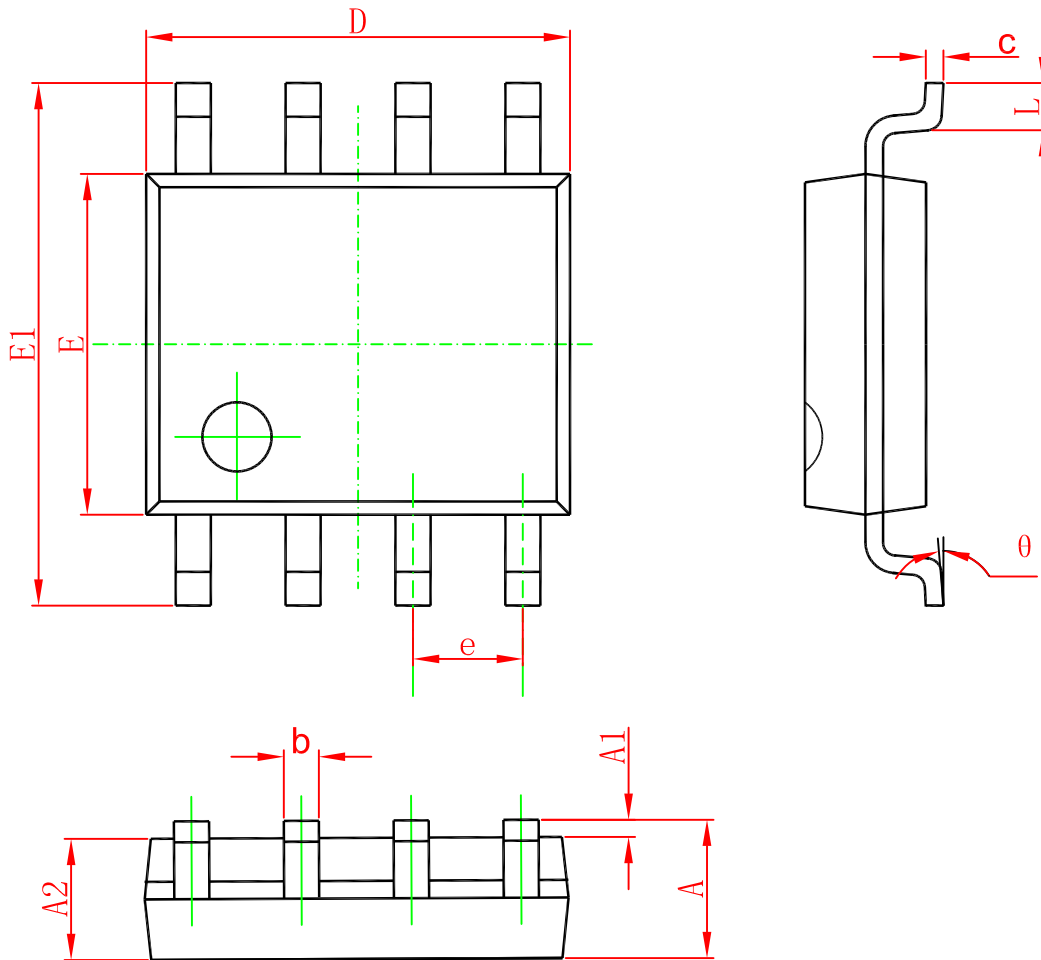


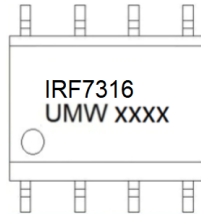
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

SOP-8



| 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 IRF7316TR | SOP-8 | 3000 | Tape and reel |