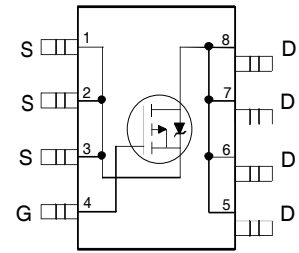


Description

The SOP-8 has been modified through a customized leadframe for enhanced thermal characteristics 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 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.



Top View

Features

- Generation V Technology
- Ultra Low On-Resistance
- P-Channel Mosfet
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching
- Lead-Free

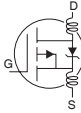
Absolute Maximum Ratings

| | Parameter | Max. | Units |
|--------------------------------|--|--------------|-------|
| $I_D @ T_A = 25^\circ\text{C}$ | 10 Sec. Pulsed Drain Current, $V_{GS} @ -10\text{V}$ | -6.7 | A |
| $I_D @ T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ -10\text{V}$ | -5.8 | |
| $I_D @ T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ -10\text{V}$ | -3.7 | |
| I_{DM} | Pulsed Drain Current ① | -23 | |
| $P_D @ T_A = 25^\circ\text{C}$ | Power Dissipation | 2.5 | W |
| | Linear Derating Factor | 0.02 | W/°C |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| dv/dt | Peak Diode Recovery dv/dt ② | -5.0 | V/ns |
| T_J, T_{STG} | Junction and Storage Temperature Range | -55 to + 150 | °C |

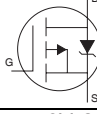
Thermal Resistance Ratings

| | Parameter | Typ. | Max. | Units |
|-----------------|-------------------------------|------|------|-------|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient ④ | --- | 50 | °C/W |

Electrical Characteristics @ T_J = 25°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 = -250μA |
| ΔV _{(BR)DSS/ΔT_J} | Breakdown Voltage Temp. Coefficient | — | -0.020 | — | V/°C | Reference to 25°C, I _D = -1mA |
| R _{DS(ON)} | Static Drain-to-Source On-Resistance | — | — | 45 | Ω | V _{GS} = -10V, I _D = -2.8A ③ |
| | | — | — | 70 | | V _{GS} = -4.5V, I _D = -2.4A ③ |
| V _{GS(th)} | Gate Threshold Voltage | -1.0 | — | — | V | V _{DS} = V _{GS} , I _D = -250μA |
| g _{fs} | Forward Transconductance | 3.1 | — | — | S | V _{DS} = -15V, I _D = -2.8A |
| I _{DSS} | Drain-to-Source Leakage Current | — | — | -1.0 | μA | V _{DS} = -24V, V _{GS} = 0V |
| | | — | — | -25 | | V _{DS} = -24V, V _{GS} = 0V, T _J = 125°C |
| I _{GSS} | Gate-to-Source Forward Leakage | — | — | -100 | nA | V _{GS} = -20V |
| | Gate-to-Source Reverse Leakage | — | — | 100 | | V _{GS} = 20V |
| Q _g | Total Gate Charge | — | — | 59 | nC | I _D = -2.8A |
| Q _{gs} | Gate-to-Source Charge | — | — | 5.7 | | V _{DS} = -2.4V |
| Q _{gd} | Gate-to-Drain ("Miller") Charge | — | — | 21 | | V _{GS} = -10V, See Fig. 6 and 12 ③ |
| t _{d(on)} | Turn-On Delay Time | — | 16 | — | ns | V _{DD} = -15V |
| t _r | Rise Time | — | 33 | — | | I _D = -2.8A |
| t _{d(off)} | Turn-Off Delay Time | — | 45 | — | | R _G = 6.0Ω |
| t _f | Fall Time | — | 47 | — | | R _D = 5.3Ω, See Fig. 10 ③ |
| L _D | Internal Drain Inductance | — | 2.5 | — | nH | Between lead tip and center of die contact  |
| L _S | Internal Source Inductance | — | 4.0 | — | | |
| C _{iss} | Input Capacitance | — | 1100 | — | pF | V _{GS} = 0V |
| C _{oss} | Output Capacitance | — | 490 | — | | V _{DS} = -25V |
| C _{rss} | Reverse Transfer Capacitance | — | 220 | — | | f = 1.0MHz, See Fig. 5 |

Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|-----------------|--|--|------|------|-------|--|
| I _S | Continuous Source Current (Body Diode) | — | — | -3.1 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I _{SM} | Pulsed Source Current (Body Diode) ① | — | — | -23 | | |
| V _{SD} | Diode Forward Voltage | — | — | -1.0 | V | T _J = 25°C, I _S = -2.0A, V _{GS} = 0V ② |
| t _{rr} | Reverse Recovery Time | — | 42 | 63 | ns | T _J = 25°C, I _F = -2.8A |
| Q _{rr} | Reverse Recovery Charge | — | 64 | 96 | nC | di/dt = 100A/μs 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. (See fig. 11)
- ② I_{SD} ≤ -2.8A, di/dt ≤ 90A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 150°C
- ③ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ④ Surface mounted on FR-4 board, t ≤ 10sec.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

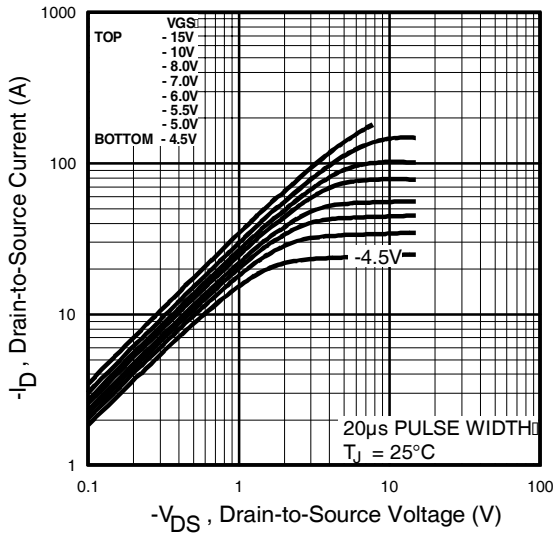


Fig 1. Typical Output Characteristics

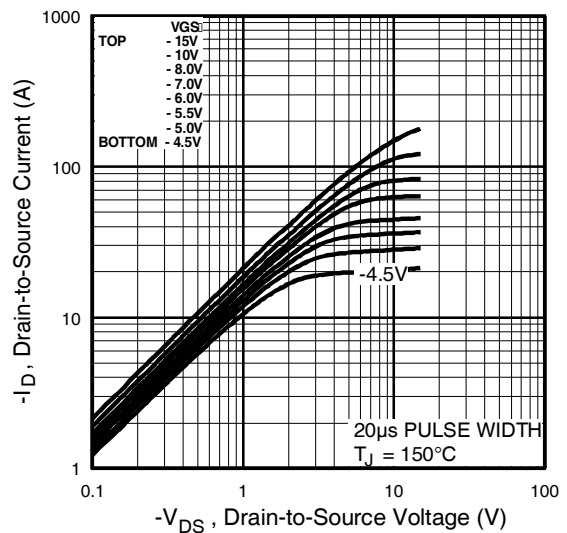


Fig 2. Typical Output Characteristics

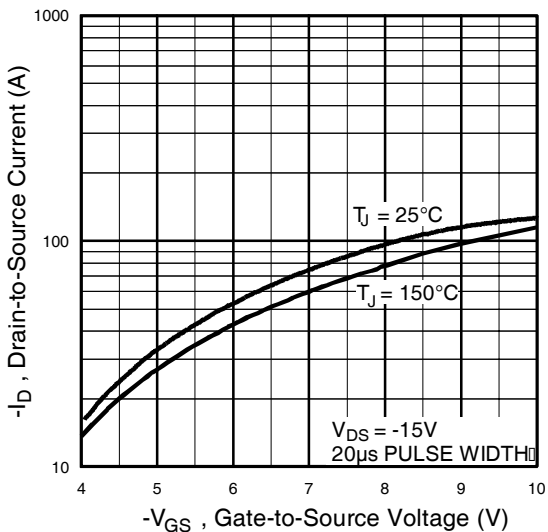


Fig 3. Typical Transfer Characteristics

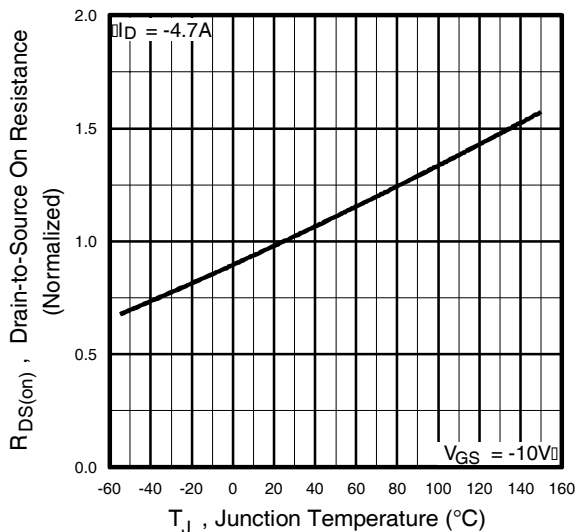


Fig 4. Normalized On-Resistance Vs. Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

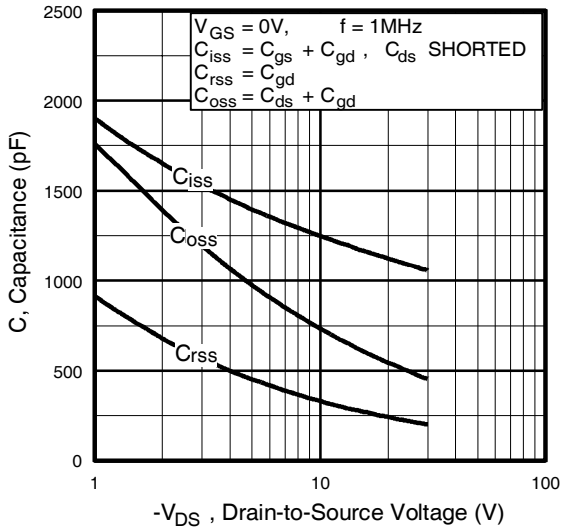


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

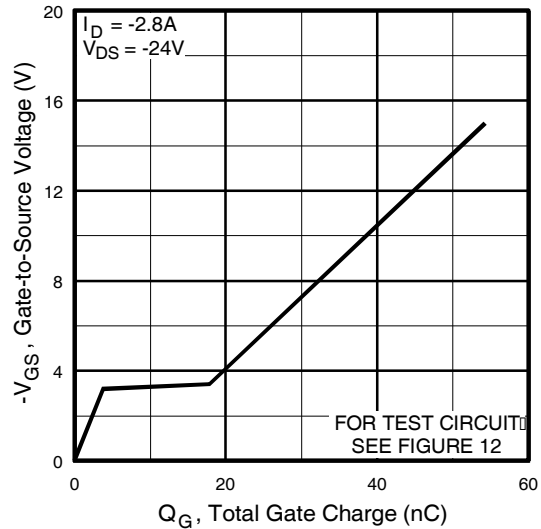


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

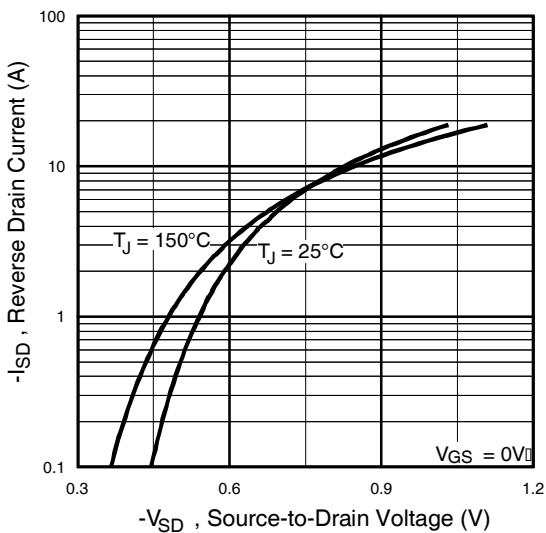


Fig 7. Typical Source-Drain Diode Forward Voltage

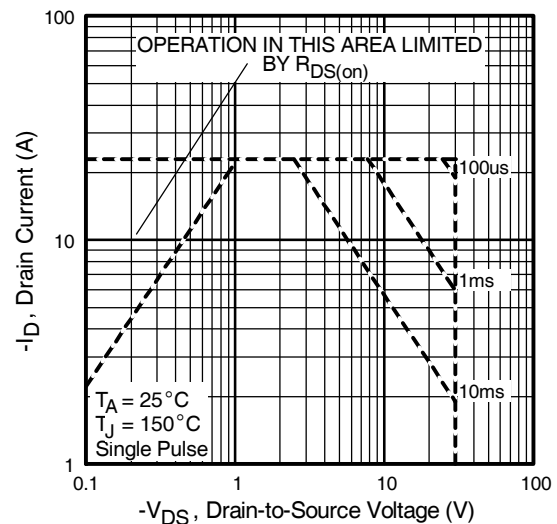


Fig 8. Maximum Safe Operating Area

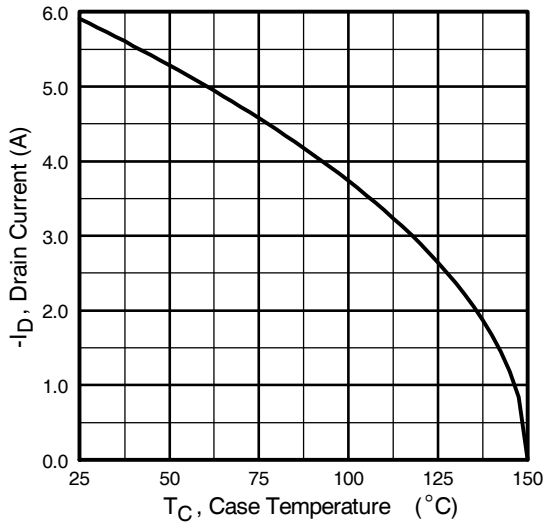


Fig 9. Maximum Drain Current Vs. Ambient Temperature

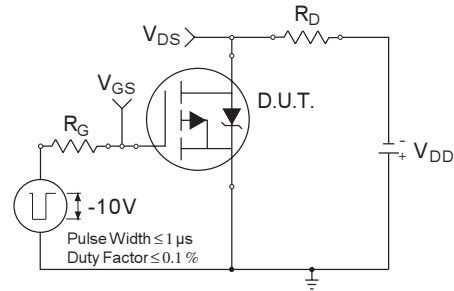


Fig 10a. Switching Time Test Circuit

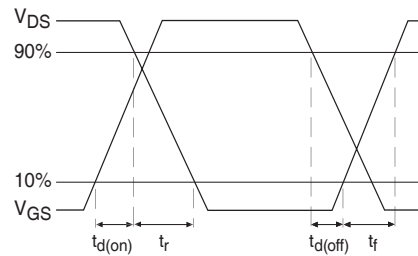
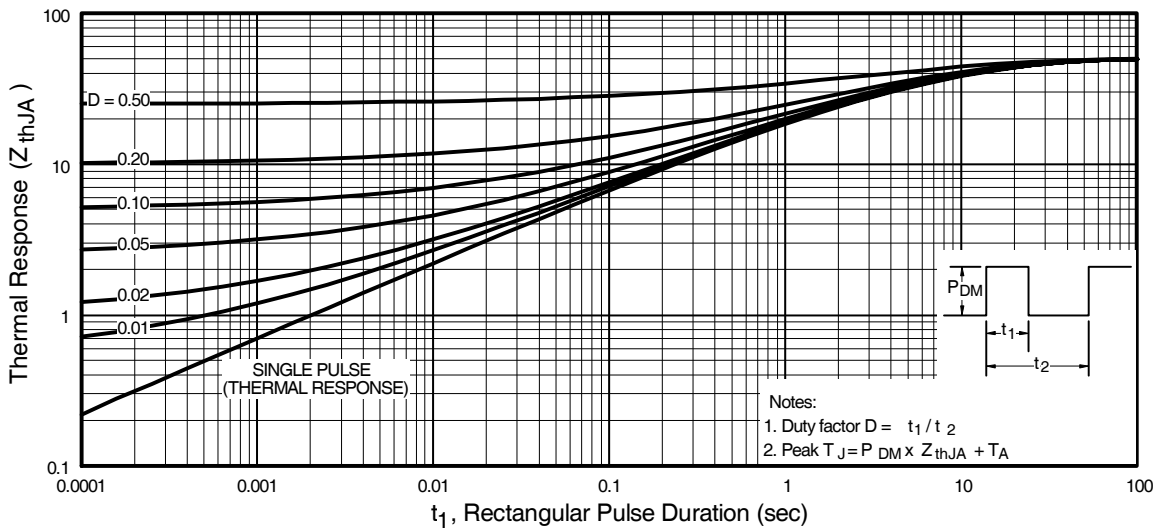


Fig 10b. Switching Time Waveforms



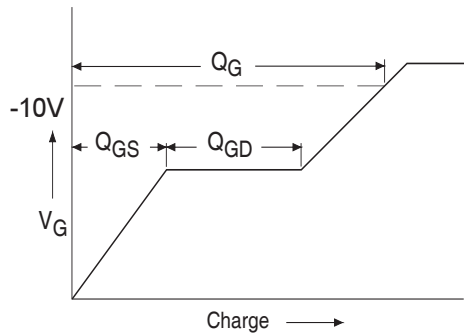


Fig 12a. Basic Gate Charge Waveform

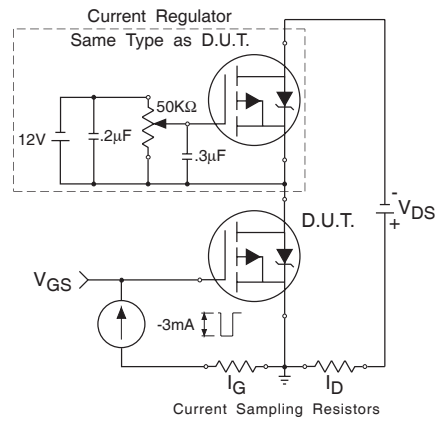
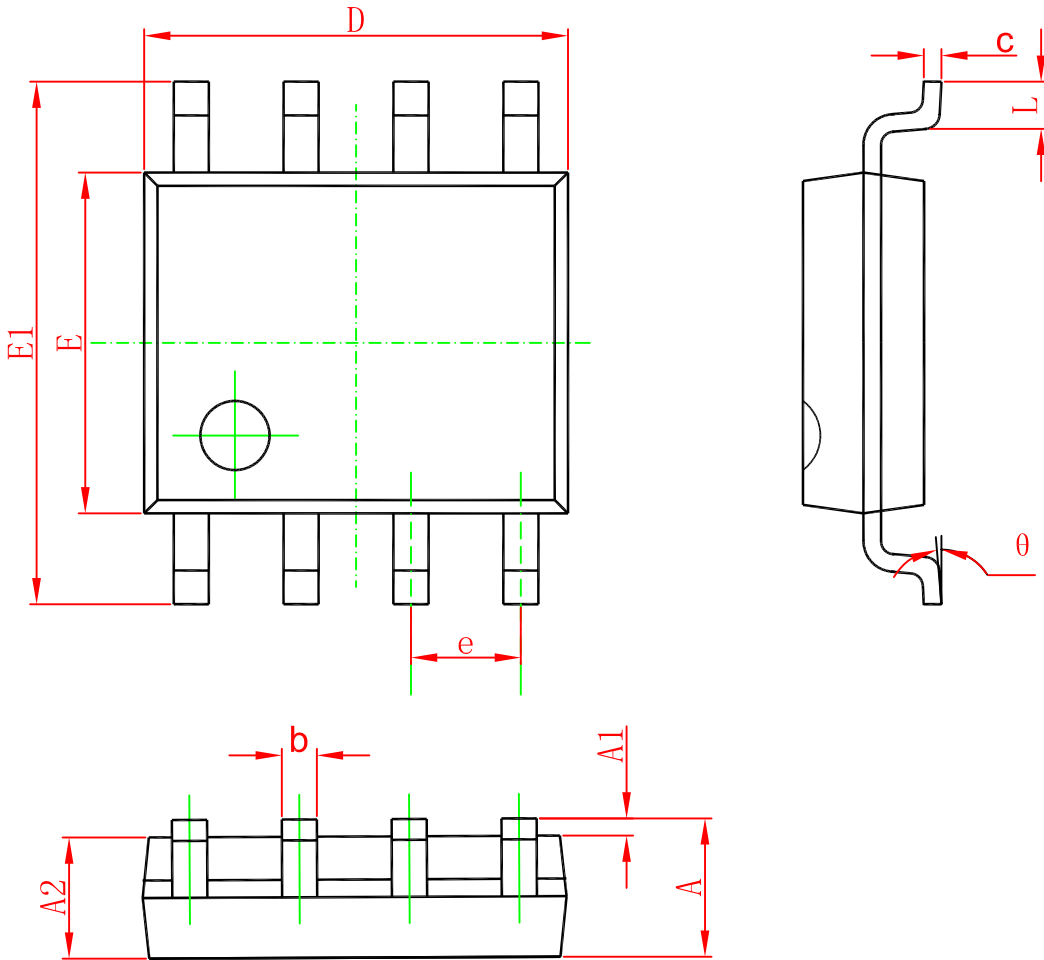


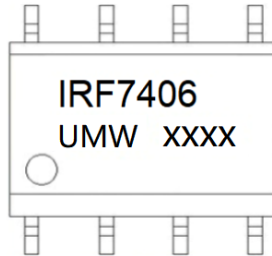
Fig 12b. Gate Charge Test Circuit

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 IRF7406TR | SOP-8 | 3000 | Tape and reel |