

General Description

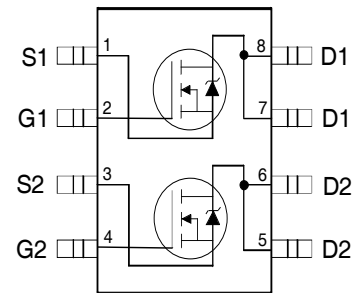
The IRF7311TR is the highest performance trench 2N-ch MOSFETs with extreme high cell density, which provide excellent R_{DS(on)} and gate charge for most of the small power switching and load switch applications. They meet the RoHS and Product requirement with full function reliability approved.

General Features

V_{DS} = 30V I_D = 9A

R_{DS(on)} < 13mΩ @ V_{GS}=10 V

R_{DS(on)} < 18mΩ @ V_{GS}=4.5V



SOP-8

Application

- Battery protection
- Load switch
- Uninterruptible power supply

Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---------------------------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | 30 | V |
| V _{GS} | Gate-Source Voltage | ±20 | V |
| I _D @T _C =25°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 9 | A |
| I _D @T _C =100°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 8.2 | A |
| I _D @T _A =25°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 6.5 | A |
| I _D @T _A =70°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 5.6 | A |
| I _{DM} | Pulsed Drain Current ² | 30 | A |
| EAS | Single Pulse Avalanche Energy ³ | 15 | mJ |
| I _{AS} | Avalanche Current | 22 | A |
| P _D @T _C =25°C | Total Power Dissipation ⁴ | 1.6 | W |
| P _D @T _A =70°C | Total Power Dissipation ⁴ | 1.0 | W |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |
| R _{θJA} | Thermal Resistance Junction-Ambient ¹ | 75 | °C/W |
| R _{θJC} | Thermal Resistance Junction-Case ¹ | 4.8 | °C/W |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|-------|----------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 30 | | | V |
| ΔBV _{DSS} /ΔT _J | BVDSS Temperature Coefficient | Reference to 25 °C, I _D =1mA | | 0.023 | | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =15A V _{GS} =4.5V, I _D =10A | | | 13 18 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.0 | | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | | -5.08 | | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =24V, V _{GS} =0V, T _J =25°C V _{DS} =24V, V _{GS} =0V, T _J =55°C | | | 1 5 | uA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | | | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =15A | | 32 | | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | | 1.7 | | Ω |
| Q _g | Total Gate Charge (4.5V) | | | 5.3 | | nC |
| Q _{gs} | Gate-Source Charge | V _{DS} =15V, V _{GS} =4.5V, I _D =12A | | 0.78 | | |
| Q _{gd} | Gate-Drain Charge | | | 2.2 | | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V, V _{GS} =10V, R _G =1.5Ω I _D =20A | | 6.4 | | ns |
| T _r | Rise Time | | | 39 | | |
| T _{d(off)} | Turn-Off Delay Time | | | 21 | | |
| T _f | Fall Time | | | 4.7 | | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | | 580 | | pF |
| C _{oss} | Output Capacitance | | | 97 | | |
| C _{rss} | Reverse Transfer Capacitance | | | 39 | | |
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | | | 37 | A |
| I _{SM} | Pulsed Source Current ^{2,5} | | | | 75 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | | | 1 | V |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3 .The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=22A
- 4.The power dissipation is limited by 175°C junction temperature
- 5 .The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

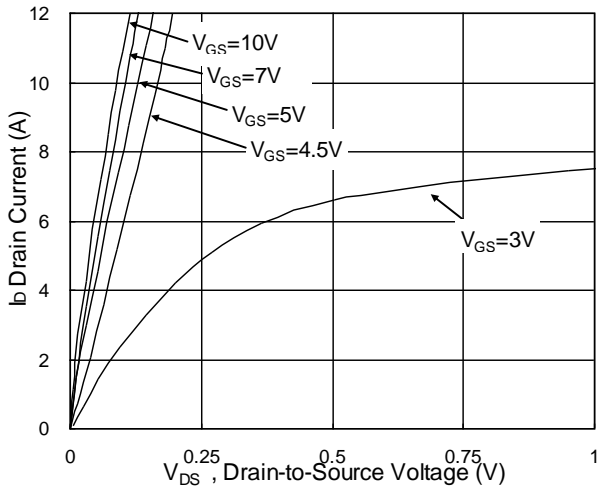


Fig.1 Typical Output Characteristics

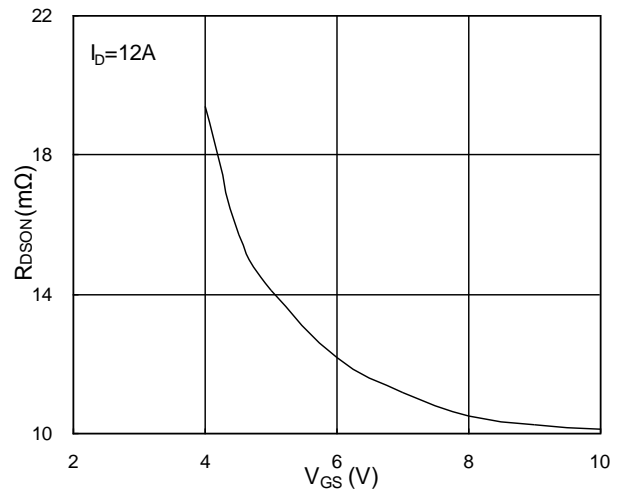


Fig.2 On-Resistance vs. G-S Voltage

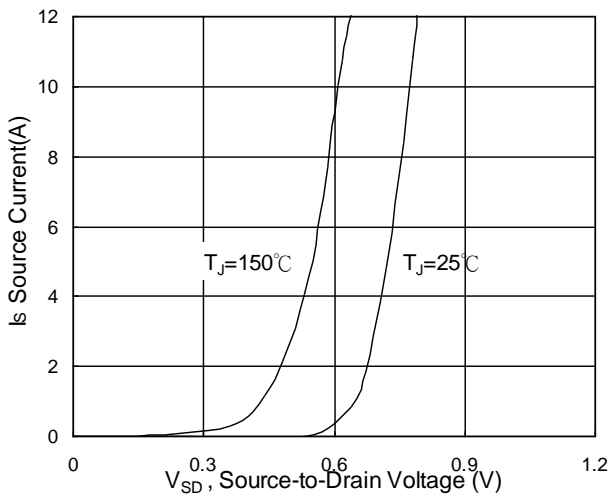


Fig.3 Forward Characteristics of Reverse

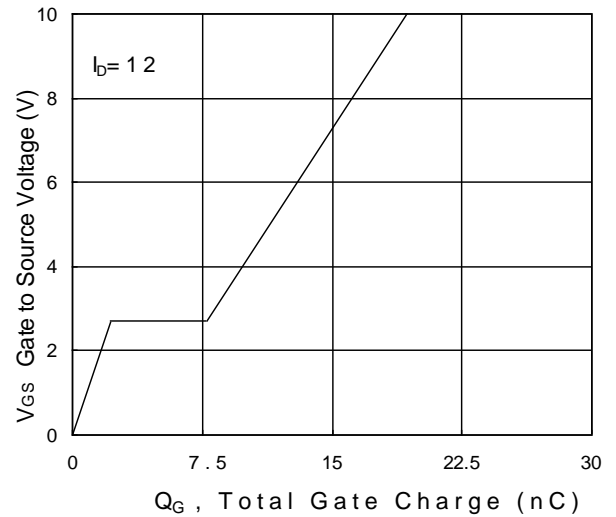


Fig.4 Gate-charge Characteristics

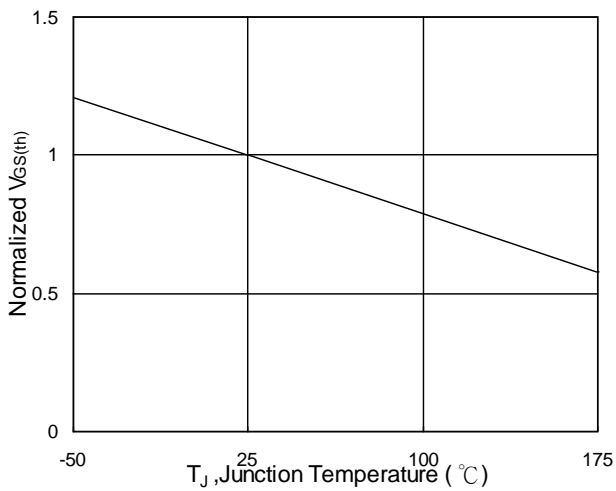


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

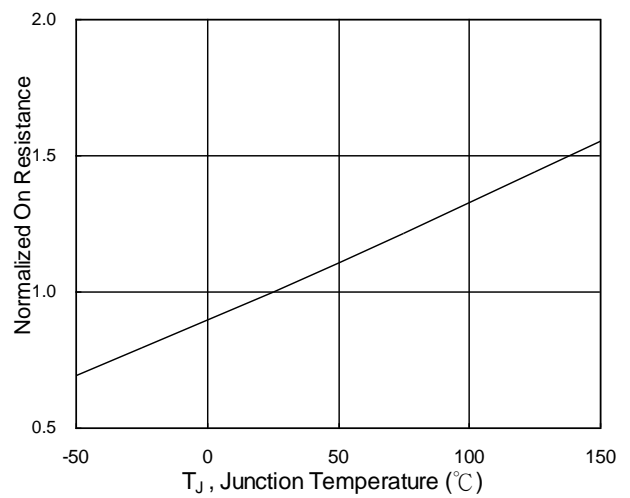


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

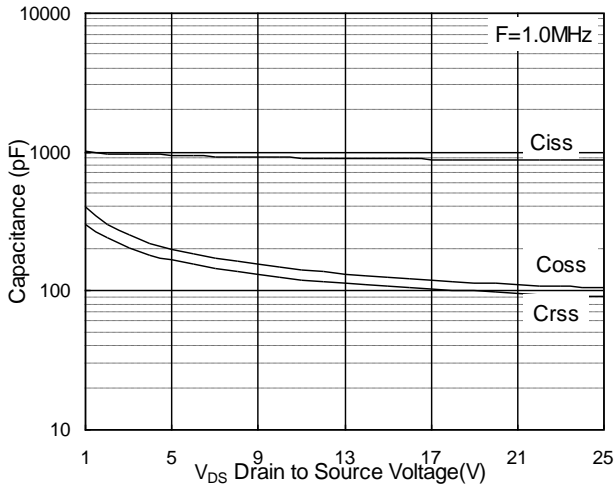


Fig.7 Capacitance

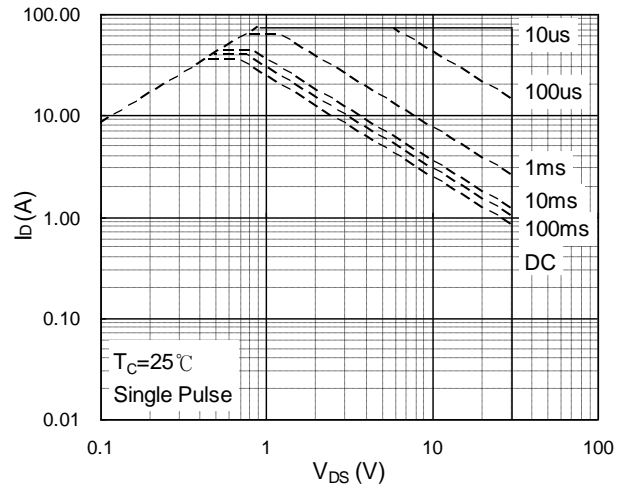


Fig.8 Safe Operating Area

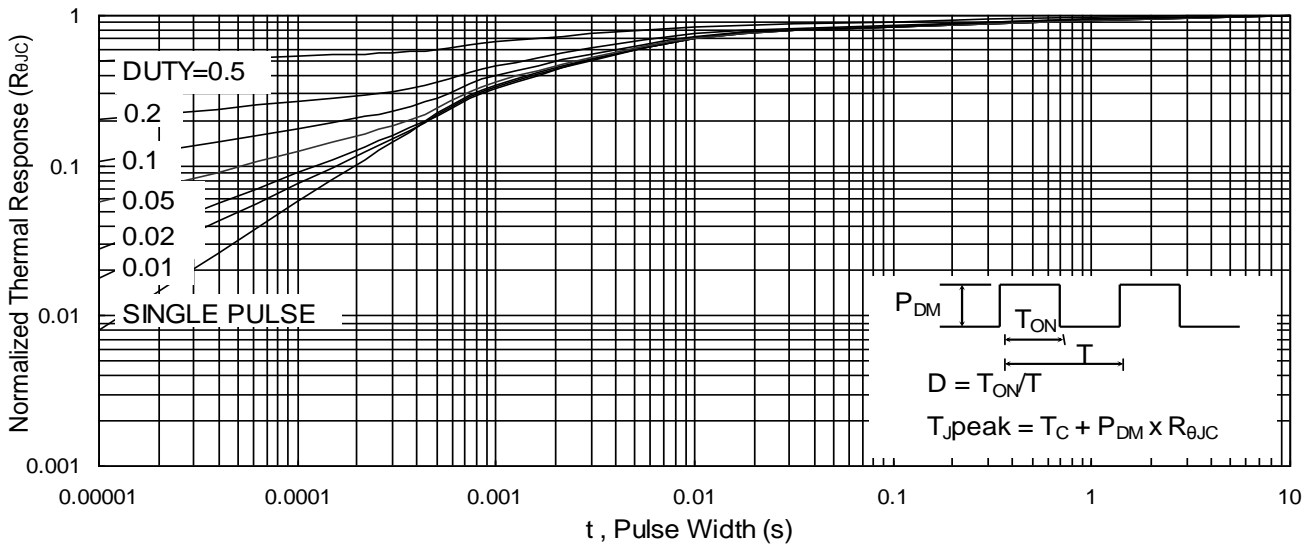


Fig.9 Normalized Maximum Transient Thermal Impedance

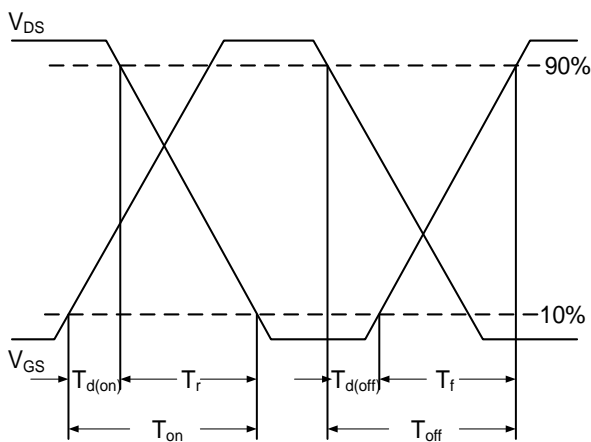


Fig.10 Switching Time Waveform

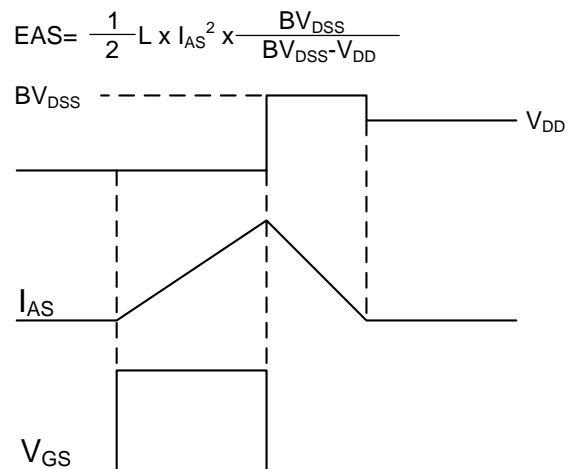
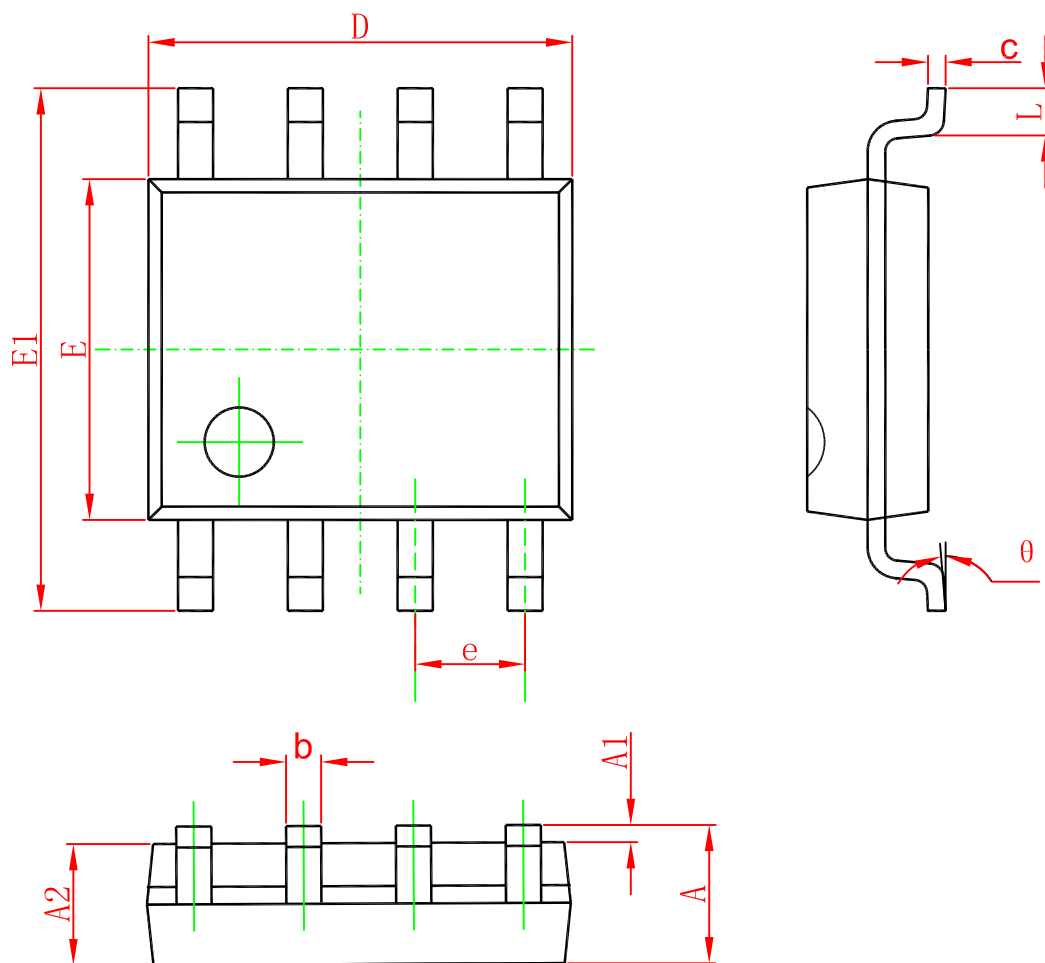


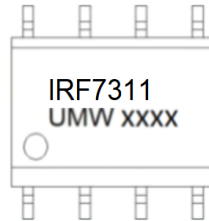
Fig.11 Unclamped Inductive Waveform

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| 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 IRF7311TR | SOP-8 | 3000 | Tape and reel |