# UMW IRF7470TR

40V N-Channel MOSFET

## 1.Features

- $V_{DS\ (V)}$=40V
- $R_{DS(ON)}$<9mΩ($V_{GS}$=10V)
- $R_{DS(ON)}$<10mΩ($V_{GS}$=4.5V)

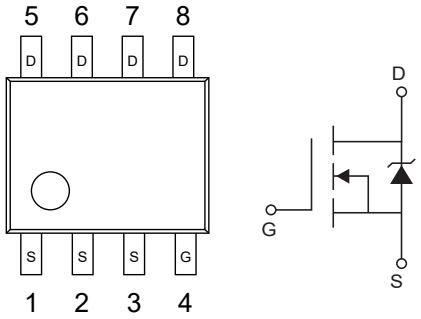
## 2.Applications

- High Frequency DC-DC Converters with Synchronous Rectification
- Lead-Free

## 3.Pinning information

| Pin | Symbol | Description |
|---|---|---|
| 1,2,3 | S | SOURCE |
| 4 | G | GATE |
| 5,6,7,8 | D | DRAIN |

**SOP-8**




## 4.Absolute Maximum Ratings $T_A$=25°C unless otherwise noted

| Parameter | | Symbol | Rating | Units |
|---|---|---|---|---|
| Drain- Source Voltage | | $V_{DS}$ | 40 | V |
| Gate-to-Source Voltage | | $V_{GS}$ | ±12 | A |
| Continuous Drain Current, $V_{GS}$=10V | $T_A$=25°C | $I_D$ | 10 | A |
| Continuous Drain Current, $V_{GS}$=10V | $T_A$=70°C | | 8.5 | A |
| Pulsed Drain Current ① | | $I_{DM}$ | 85 | W |
| Maximum Power Dissipation ③ | $T_A$=25°C | $P_D$ | 2.5 | W |
| Maximum Power Dissipation ③ | $T_A$=70°C | | 1.6 | mW/°C |
| Linear Derating Factor | | | 0.02 | V |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

## 6.Thermal Resistance Rating

| Parameter | Symbol | Typ | Max | Units |
|---|---|---|---|---|
| Junction-to-Drain Lead | $R_{\theta JL}$ | | 20 | °C/W |
| Junction-to-Ambient ④ | $R_{\theta JA}$ | | 50 | °C/W |

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting $T_J$=25°C, L=9.4mH, $R_G$=25Ω, $I_{AS}$=8A.

③ Pulse width ≤ 400μs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board.

## 7.Electrical Characteristics $T_J$=25°C

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 40 | | | V |
| Breakdown Voltage Temp. Coefficient | $\Delta V_{(BR)DSS}/\Delta T_J$ | $I_D$=1mA,Reference to 25°C | | 0.04 | | V/°C |
| Static Drain-to-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=10A ④ | | 9 | 13 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=8A ④ | | 10 | 15 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.8 | | 2 | V |
| Drain-to-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=32V, $V_{GS}$=0V | | | 20 | μA |
| | | $V_{DS}$=32V, $V_{GS}$=0V, $T_J$=125°C | | | 100 | μA |
| Gate-to-Source Forward Leakage | $I_{GSS}$ | $V_{GS}$=12V | | | 200 | nA |
| Gate-to-Source Reverse Leakage | | $V_{GS}$=-12V | | | -200 | nA |
| **Dynamic** | | | | | | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=20V, $I_D$=8A | 27 | | | S |
| Total Gate Charge | $Q_g$ | $I_D$=8A | | 29 | 44 | nC |
| Gate-to-Source Charge | $Q_{gs}$ | $V_{DS}$=20V | | 7.9 | 12 | nC |
| Gate-to-Drain ("Miller") Charge | $Q_{gd}$ | $V_{GS}$=4.5V ③ | | 8 | 12 | nC |
| Output Gate Charge | $Q_{oss}$ | $V_{GS}$=0V, $V_{DS}$=16V | | 23 | 35 | nC |
| Turn-On Delay Time | $t_{D(on)}$ | $V_{DD}$=20V | | 10 | | ns |
| Rise Time | $t_r$ | $I_D$=8A | | 1.9 | | ns |
| Turn-Off Delay Time | $t_{D(off)}$ | $R_G$=1.8Ω | | 21 | | ns |
| Fall Time | $t_f$ | $V_{GS}$=4.5V ③ | | 3.2 | | ns |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V | | 3430 | | pF |
| Output Capacitance | $C_{oss}$ | $V_{DS}$=20V | | 690 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | $f$=1.0MHz | | 41 | | pF |
| **Avalanche Characteristics** | | | | | | |
| Single Pulse Avalanche Energy ② | $E_{AS}$ | | | | 300 | mJ |
| Avalanche Current ① | $I_{AR}$ | | | | 8 | A |

| Diode Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Continuous Source Current (Body Diode) | $I_S$ | MOSFET symbol showing the integral reverse p-n junction diode. | | | 2.3 | A |
| Pulsed Source Current (Body Diode) ① | $I_{SM}$ | | | | 85 | A |
| Diode Forward Voltage | $V_{SD}$ | $T_J$=25°C,$I_S$=8A,$V_{GS}$=0V ③ | | 0.8 | 1.3 | V |
| | | $T_J$=125°C,$I_S$=8A,$V_{GS}$=0V | | 0.65 | | V |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25°C,$I_F$=8A, $V_R$=20V | | 72 | 110 | ns |
| Reverse Recovery Charge | $Q_{rr}$ | dI/dt=100A/μs ③ | | 130 | 200 | nC |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=125°C,$I_F$=8A, $V_R$=20V | | 76 | 110 | ns |
| Reverse Recovery Charge | $Q_{rr}$ | dI/dt=100A/μs ③ | | 150 | 230 | nC |

## 8.1Typical Characterisitics

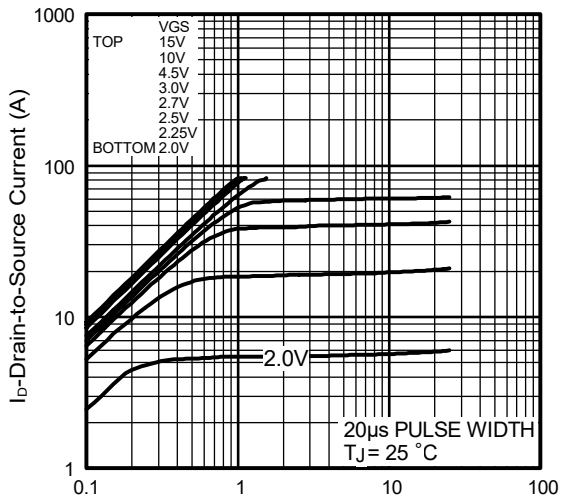



Fig 1. Typical Output Characteristics

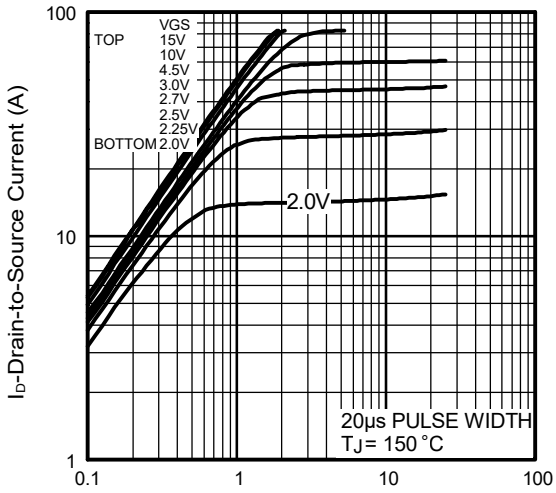



Fig 2. Typical Output Characteristics

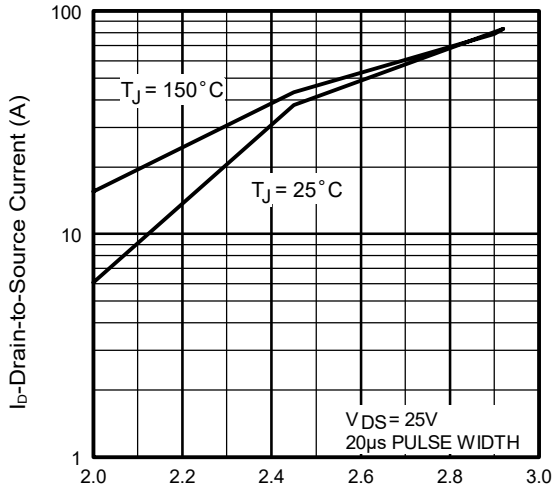



Fig 3. Typical Transfer Characteristics

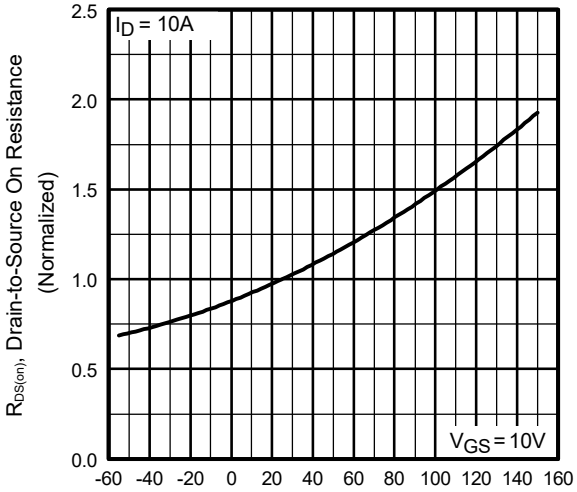



Fig 4. Nomalized On-ResistanceVs. Temperature

## 8.2Typical Characterisitics

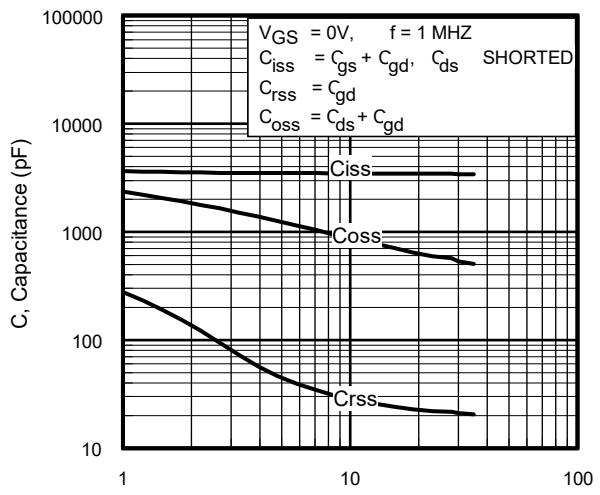



Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

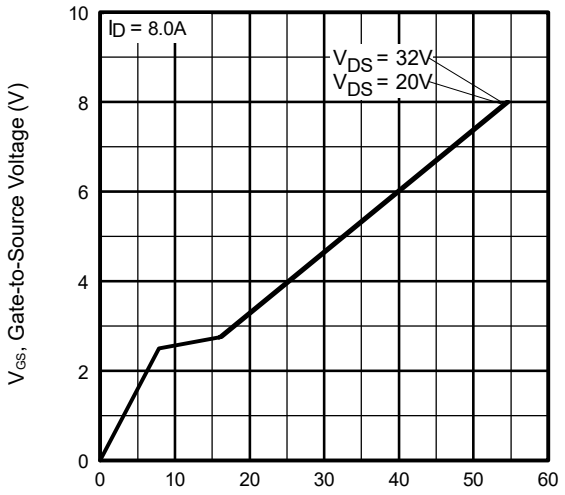



Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

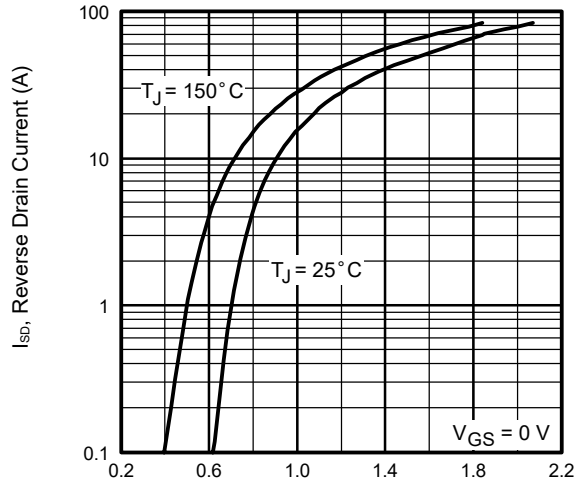



Fig 7. Typical Source-Drain Diode Forward Voltage

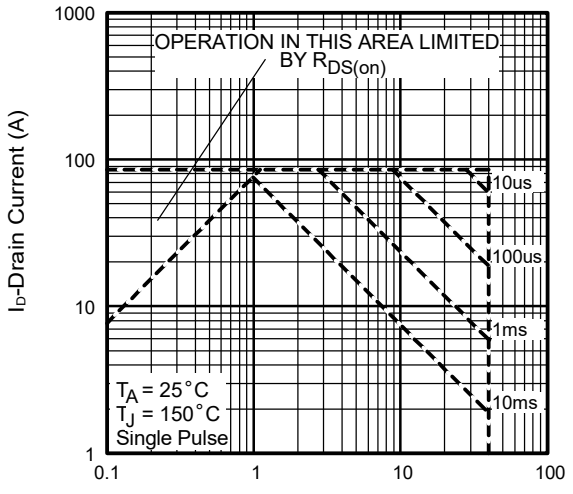



Fig 8. Maximum Safe Operating Area

## 8.3Typical Characterisitics

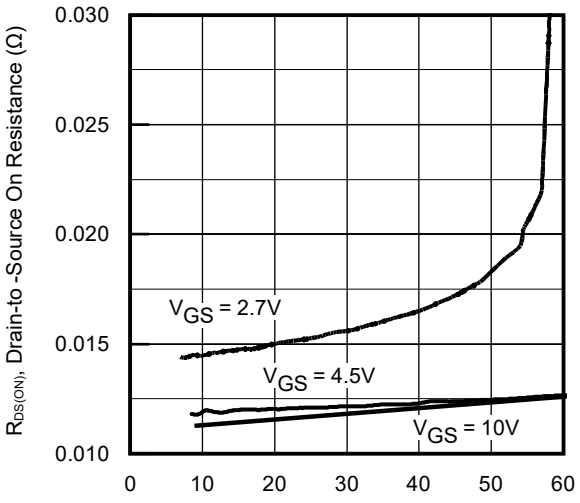



Fig 9. On-Resistance Vs. Drain Current

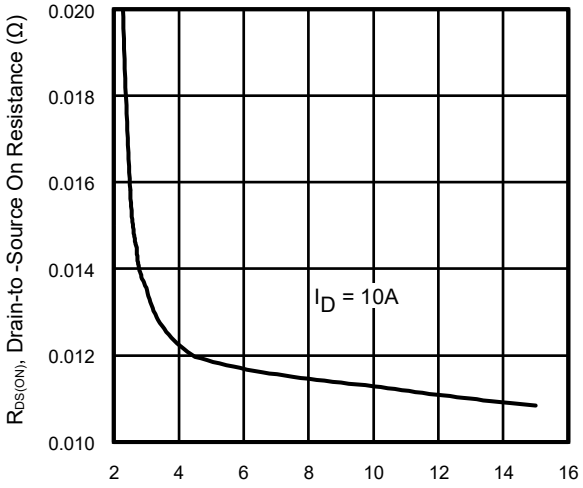



Fig 10. On-Resistance Vs. Drain Current

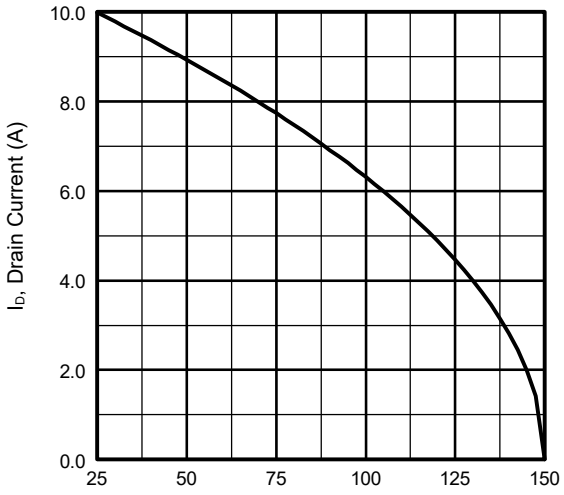



Fig 11. On-Resistance Vs. Drain Current

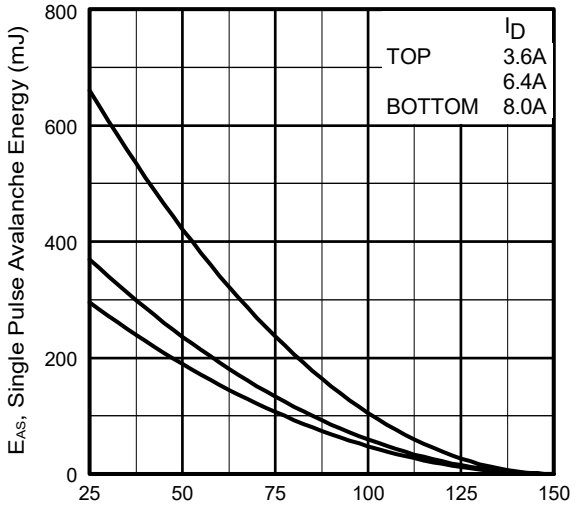



Fig 12. Maximum Avalanche Energy Vs. Drain Current

## 8.4Typical Characterisitics

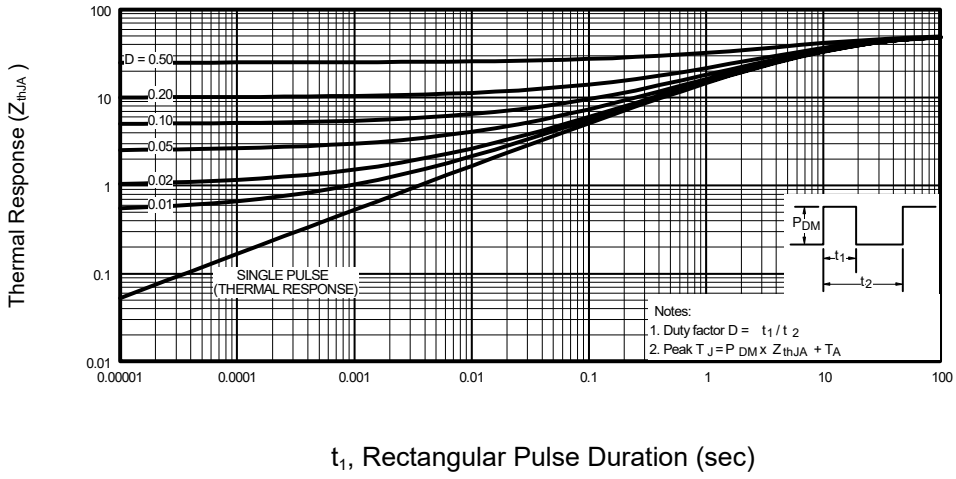



Fig 13. Maximum Effective Transient Themal Impedance, Junction-to-Ambient

## 8.5Typical Characterisitics

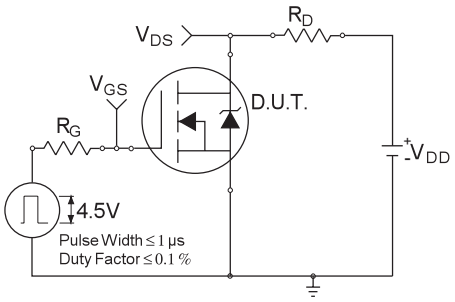



Fig 14a. Switching Time Test Circuit

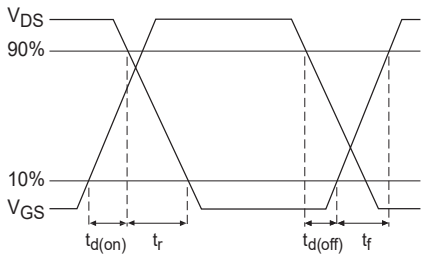
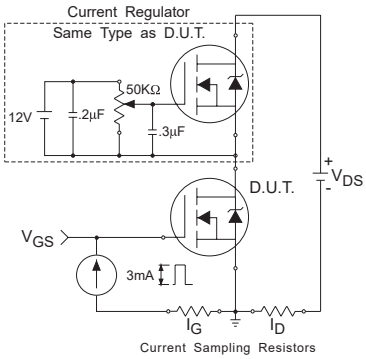



Fig 14b. Switching Time Waveforms



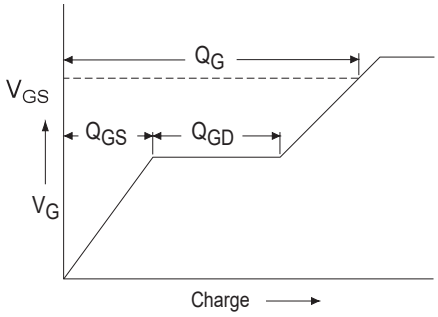
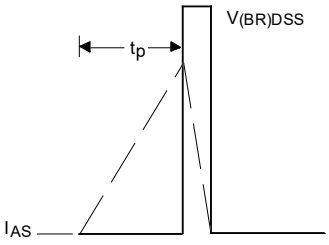




Fig 15a&b. Basic Gate Charge Test Circuit and Waveform



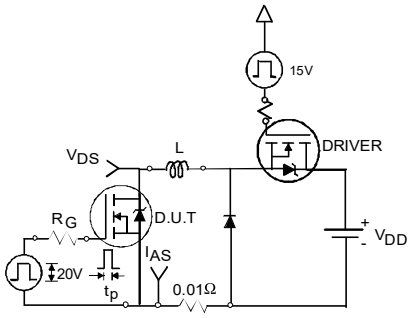
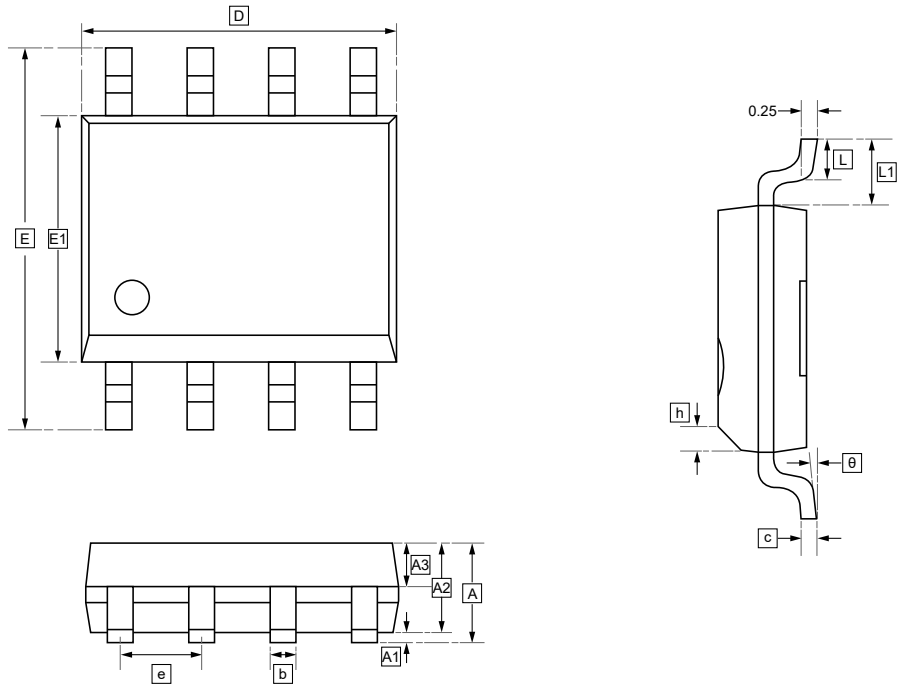




Fig 16a&b. Unclamped Inductive Test circuitand Waveforms

## 9.SOP-8 Package Outline Dimensions

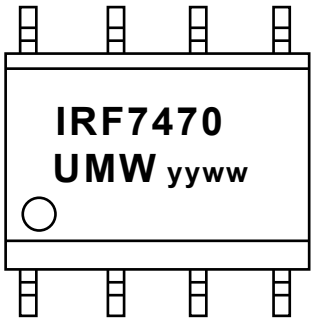



**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | A1 | A2 | A3 | b | c | D | E | E1 | e | h | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | - | 0.05 | 1.30 | 0.60 | 0.39 | 0.20 | 4.70 | 5.80 | 3.80 | 1.24 | 0.30 | 0.50 |
| **Max** | 1.75 | 0.20 | 1.50 | 0.70 | 0.47 | 0.24 | 5.10 | 6.20 | 4.00 | 1.30 | 0.50 | 0.80 |

| Symbol | L1 | θ |
|---|---|---|
| **Min** | 1.00 | 0° |
| **Max** | 1.10 | 8° |

## 10.Ordering information




yy: Year Code
ww: Week Code

| Order Code | Package | Base QTY | Delivery Mode |
|---|---|---|---|
| UMW IRF7470TR | SOP-8 | 3000 | Tape and reel |

## 11.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.