

Features

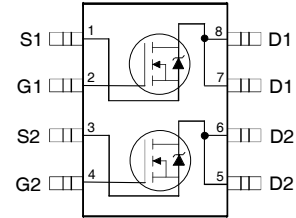
- $V_{DS} (V) = 60V$
- $I_D = 8A (V_{GS}=10V)$
- $R_{DS(ON)} < 23 m\Omega (V_{GS} = 10V)$

Applications

- Synchronous Rectifier MOSFET for Isolated DC-DC Converters
- Low Power Motor Drive Systems

Benefits

- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- 20V V_{GS} Max. Gate Rating



SOP-8

Absolute Maximum Ratings

| | Parameter | Max. | Units |
|--------------------------|--|--------------|---------------|
| V_{DS} | Drain-to-Source Voltage | 60 | V |
| V_{GS} | Gate-to-Source Voltage | ± 20 | |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 8.0 | A |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 6.4 | |
| I_{DM} | Pulsed Drain Current ① | 64 | |
| $P_D @ T_A = 25^\circ C$ | Power Dissipation ④ | 2.0 | W |
| $P_D @ T_A = 70^\circ C$ | Power Dissipation ④ | 1.28 | |
| | Linear Derating Factor | 0.016 | W/ $^\circ C$ |
| T_J | Operating Junction and | -55 to + 150 | $^\circ C$ |
| T_{STG} | Storage Temperature Range | | |

Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|-----------------|--------------------------|------|------|--------------|
| $R_{\theta JL}$ | Junction-to-Drain Lead ⑤ | | 20 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction-to-Ambient ④⑤ | | 62.5 | |

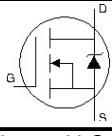
Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|------------------------------|--------------------------------------|------|-------|------|-------|--|
| BV_{DSS} | Drain-to-Source Breakdown Voltage | 60 | | | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | | 0.068 | | V/°C | Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | | 13.7 | 23 | mΩ | $V_{GS} = 10V, I_D = 8.0A$ ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | | | 2 | V | $V_{DS} = V_{GS}, I_D = 50\mu A$ |
| $\Delta V_{GS(th)}$ | Gate Threshold Voltage Coefficient | | -8.2 | | mV/°C | |
| I_{DSS} | Drain-to-Source Leakage Current | | | 20 | μA | $V_{DS} = 60V, V_{GS} = 0V$ |
| | | | | 250 | | $V_{DS} = 60V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| I_{GSS} | Gate-to-Source Forward Leakage | | | 100 | nA | $V_{GS} = 20V$ |
| | Gate-to-Source Reverse Leakage | | | -100 | | $V_{GS} = -20V$ |
| g_{fs} | Forward Transconductance | 18 | | | S | $V_{DS} = 25V, I_D = 6.4A$ |
| Q_g | Total Gate Charge | | 24 | 36 | nC | $V_{DS} = 30V$ $V_{GS} = 10V$ $I_D = 6.4A$ See Fig. 17 |
| Q_{gs1} | Pre-Vth Gate-to-Source Charge | | 3.8 | | | |
| Q_{gs2} | Post-Vth Gate-to-Source Charge | | 1.2 | | | |
| Q_{gd} | Gate-to-Drain Charge | | 7.2 | | | |
| Q_{godr} | Gate Charge Overdrive | | 11.8 | | | |
| Q_{sw} | Switch Charge ($Q_{gs2} + Q_{gd}$) | | 8.4 | | | |
| Q_{oss} | Output Charge | | 7.5 | | | |
| $t_{d(on)}$ | Turn-On Delay Time | | 5.1 | | ns | $V_{DD} = 30V, V_{GS} = 10V$ ③ $I_D = 6.4A$ $R_\theta = 1.8\Omega$ |
| t_r | Rise Time | | 5.9 | | | |
| $t_{d(off)}$ | Turn-Off Delay Time | | 17 | | | |
| t_f | Fall Time | | 6.7 | | | |
| C_{iss} | Input Capacitance | | 1330 | | pF | $V_{GS} = 0V$ $V_{DS} = 30V$ $f = 1.0\text{MHz}$ |
| C_{oss} | Output Capacitance | | 190 | | | |
| C_{rss} | Reverse Transfer Capacitance | | 92 | | | |

Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|----------|---------------------------------|------|------|-------|
| E_{AS} | Single Pulse Avalanche Energy ② | | 325 | mJ |
| I_{AR} | Avalanche Current ① | | 6.4 | A |

Diode Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|---|------|------|------|-------|--|
| I_S | Continuous Source Current (Body Diode) | | | 1.8 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) ① | | | 64 | | |
| V_{SD} | Diode Forward Voltage | | | 1.3 | V | $T_J = 25^\circ\text{C}, I_S = 6.4A, V_{GS} = 0V$ ③ |
| t_{rr} | Reverse Recovery Time | | 20 | 30 | ns | $T_J = 25^\circ\text{C}, I_F = 6.4A, V_{DD} = 30V$ |
| Q_{rr} | Reverse Recovery Charge | | 61 | 92 | nC | $di/dt = 300A/\mu s$ ③ |

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}, L = 16\text{mH}$
 $R_G = 25\Omega, I_{AS} = 6.4A$.
- ③ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board.
- ⑤ R_θ is measured at T_J approximately 90°C .

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

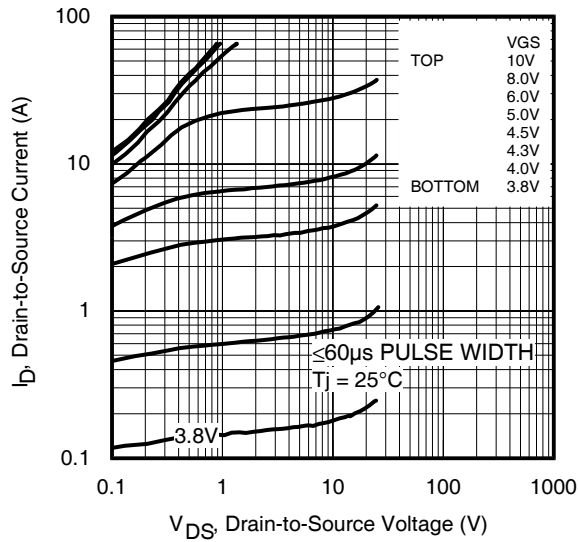


Fig 1. Typical Output Characteristics

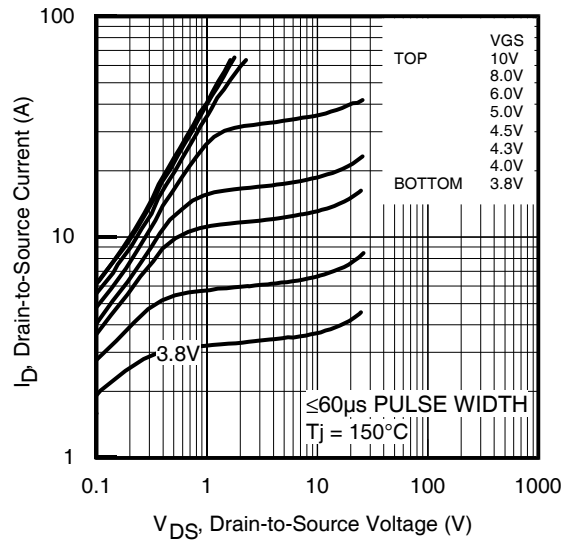


Fig 2. Typical Output Characteristics

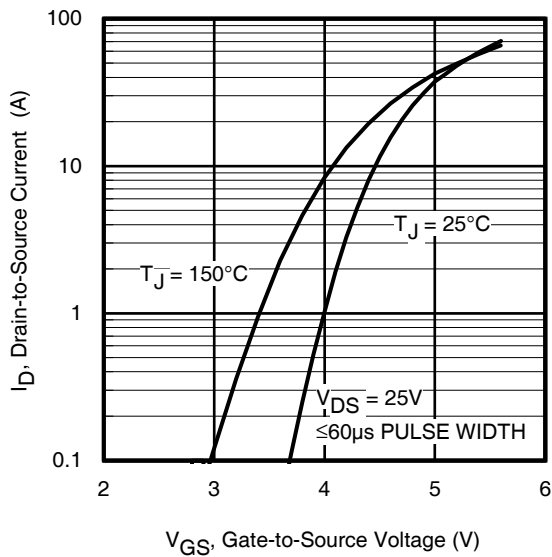


Fig 3. Typical Transfer Characteristics

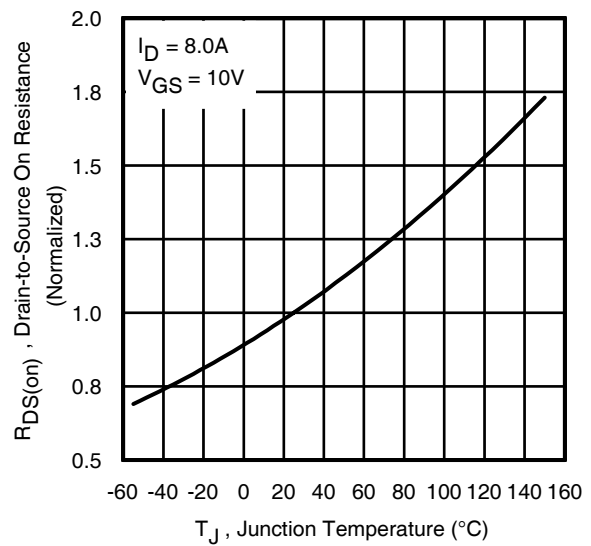


Fig 4. Normalized On-Resistance vs. Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

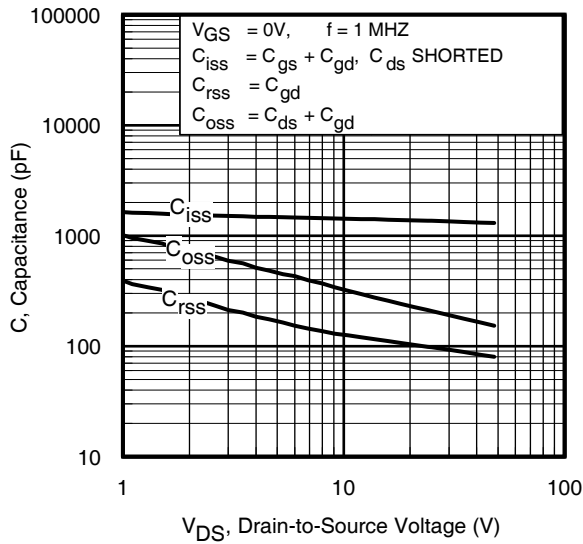


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

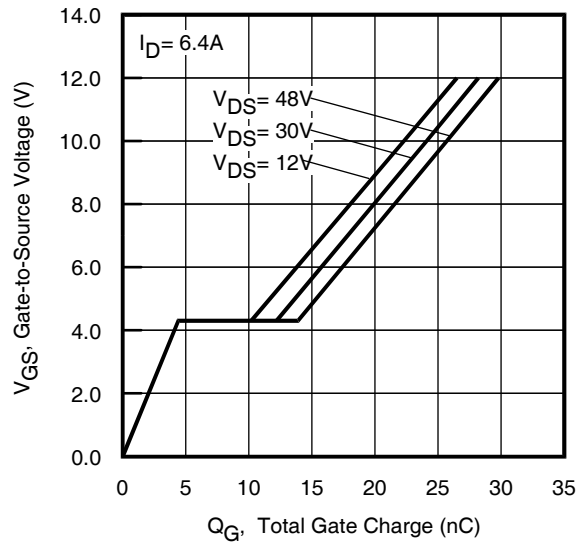


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

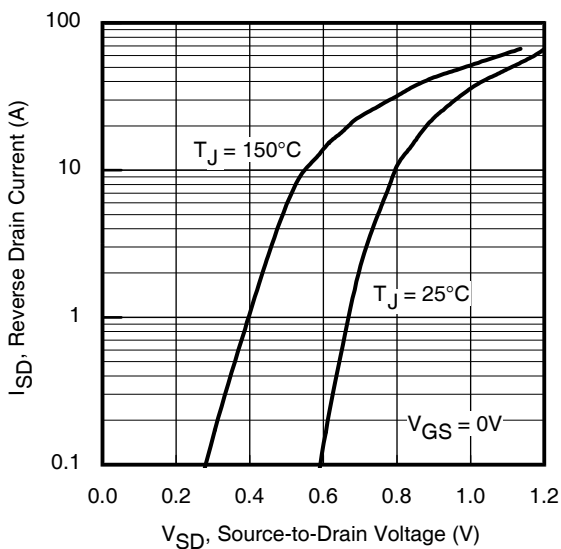


Fig 7. Typical Source-Drain Diode Forward Voltage

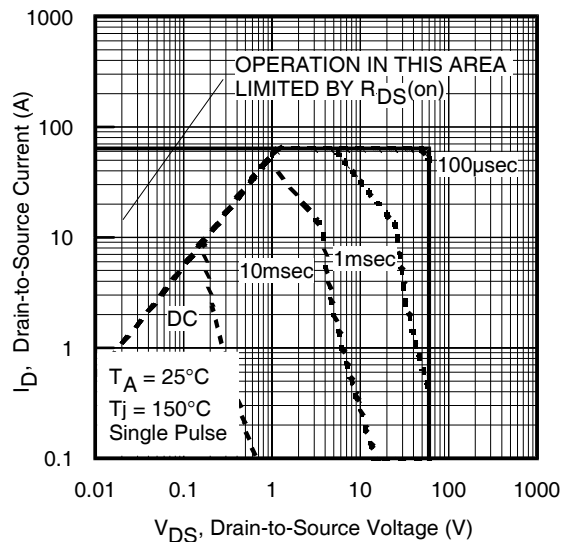


Fig 8. Maximum Safe Operating Area

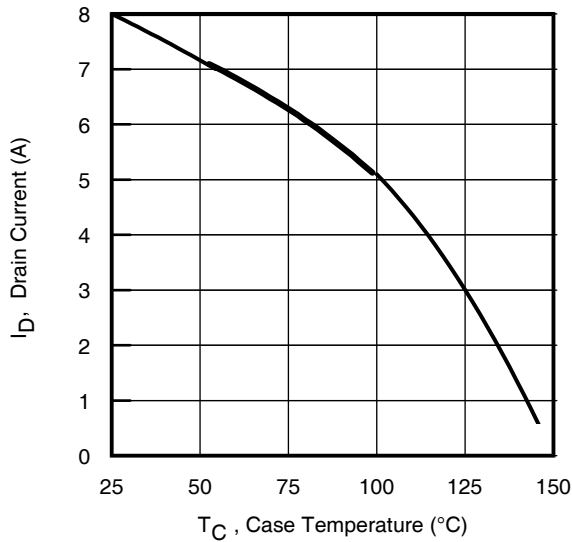


Fig 9. Maximum Drain Current vs. Case Temperature

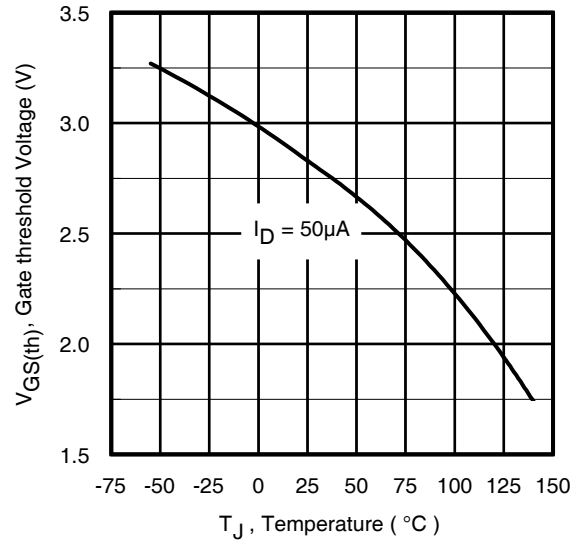


Fig 10. Threshold Voltage vs. Temperature

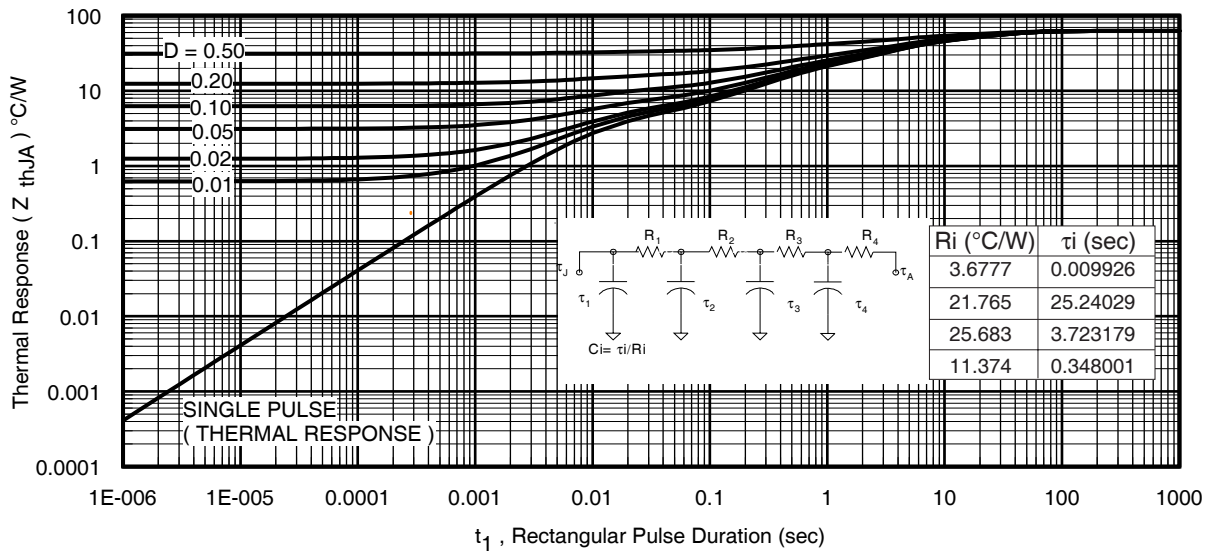


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

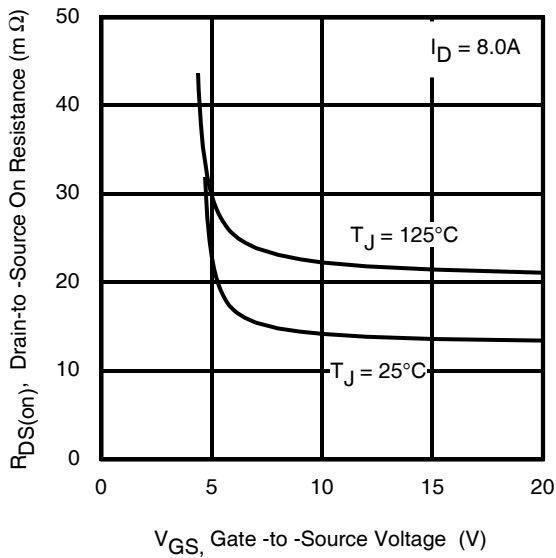


Fig 12. On-Resistance vs. Gate Voltage

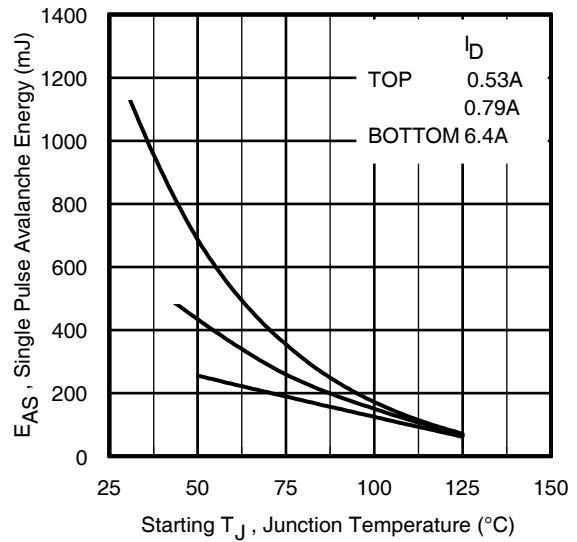


Fig 13. Maximum Avalanche Energy vs. Drain Current

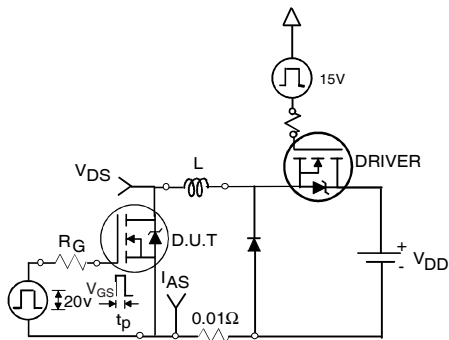


Fig 14a. Unclamped Inductive Test Circuit

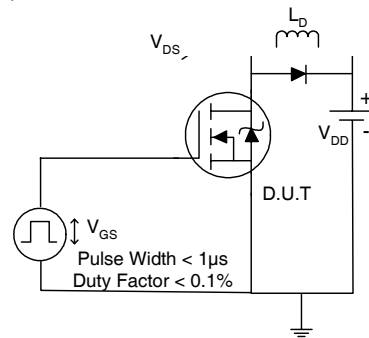


Fig 15a. Switching Time Test Circuit

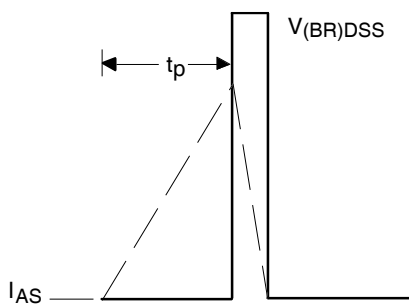


Fig 14b. Unclamped Inductive Waveforms

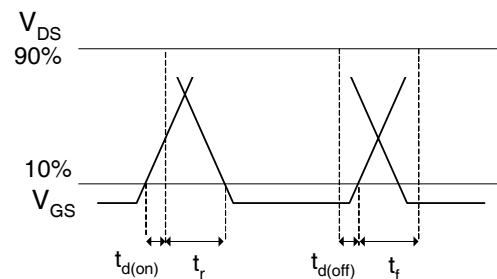


Fig 15b. Switching Time Waveforms

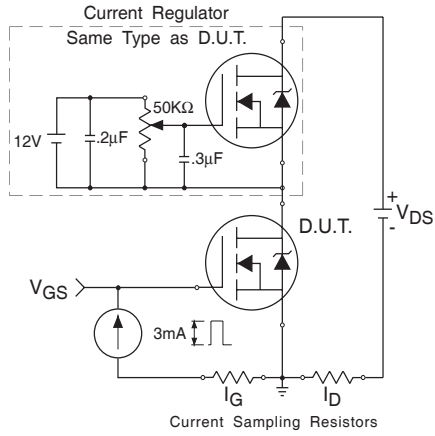


Fig 17a. Gate Charge Test Circuit

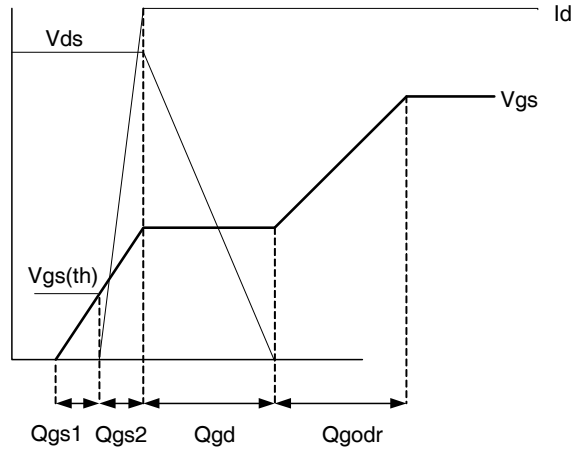
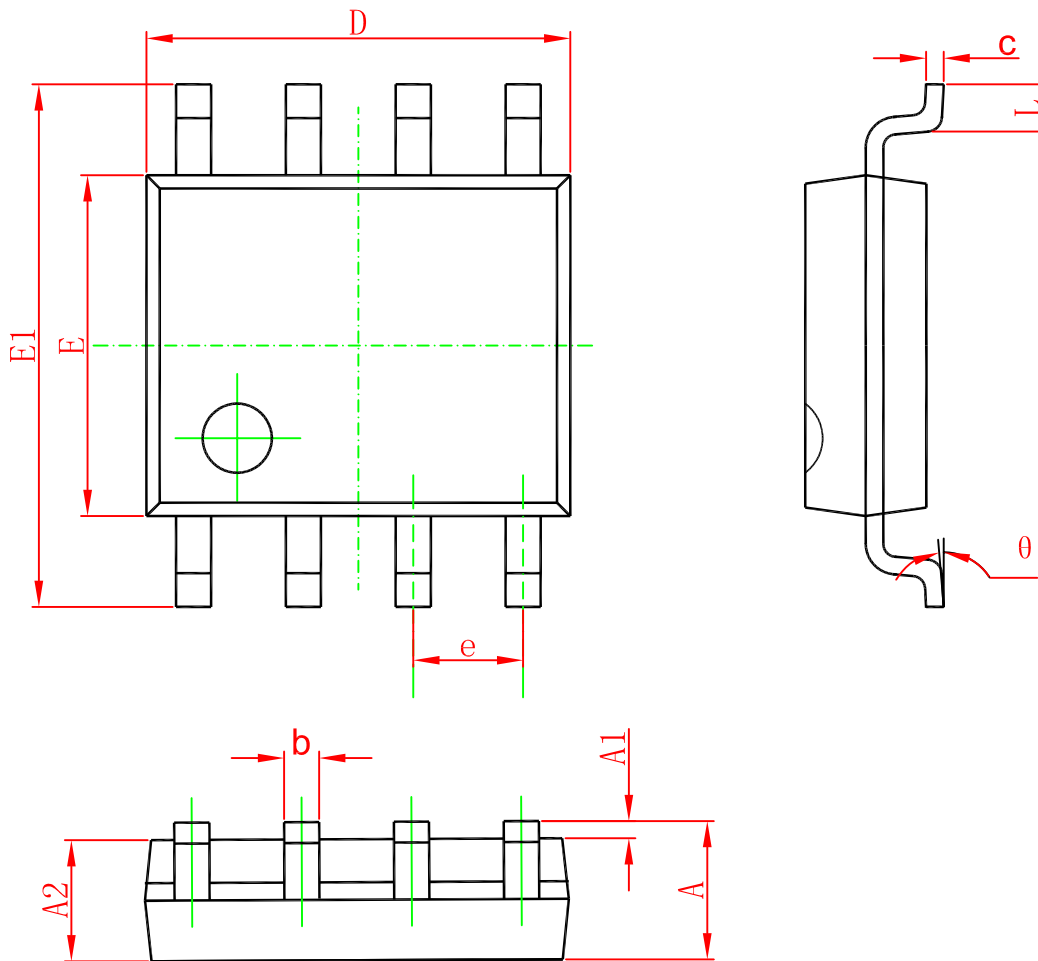


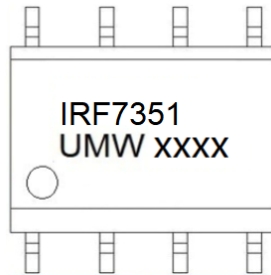
Fig 17b. Gate Charge Waveform

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 IRF7351TR | SOP-8 | 3000 | Tape and reel |