

FDS3672

N-Channel PowerTrench® MOSFET 100V, 7.5A, 22mΩ

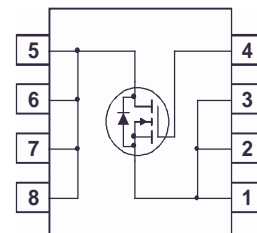
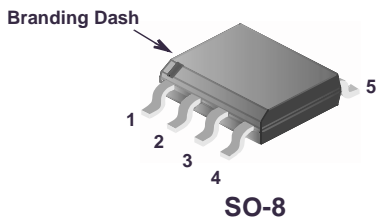
Features

- $r_{DS(ON)} = 19m\Omega$ (Typ.), $V_{GS} = 10V$, $I_D = 7.5A$
- $Q_g(tot) = 28nC$ (Typ.), $V_{GS} = 10V$
- Low Miller Charge
- Low Q_{RR} Body Diode
- Optimized efficiency at high frequencies
- UIS Capability (Single Pulse and Repetitive Pulse)

Applications

- DC/DC converters and Off-Line UPS
- Distributed Power Architectures and VRMs
- Primary Switch for 24V and 48V Systems
- High Voltage Synchronous Rectifier

Formerly developmental type 82763



MOSFET Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

| Symbol | Parameter | Ratings | Units |
|----------------|--|------------|----------------|
| V_{DSS} | Drain to Source Voltage | 100 | V |
| V_{GS} | Gate to Source Voltage | ± 20 | V |
| I_D | Drain Current | | |
| | Continuous ($T_A = 25^\circ C$, $V_{GS} = 10V$, $R_{\theta JA} = 50^\circ C/W$) | 7.5 | A |
| | Continuous ($T_A = 100^\circ C$, $V_{GS} = 10V$, $R_{\theta JA} = 50^\circ C/W$) | 4.8 | A |
| | Pulsed | Figure 4 | A |
| E_{AS} | Single Pulse Avalanche Energy (Note 1) | 416 | mJ |
| P_D | Power dissipation | 2.5 | W |
| | Derate above $25^\circ C$ | 20 | mW/ $^\circ C$ |
| T_J, T_{STG} | Operating and Storage Temperature | -55 to 150 | $^\circ C$ |

Thermal Characteristics

| | | | |
|-----------------|--|----|--------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient at 10 seconds (Note 3) | 50 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient at 1000 seconds (Note 3) | 85 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case (Note 2) | 25 | $^\circ C/W$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|---------|---------|-----------|------------|------------|
| FDS3672 | FDS3672 | SO-8 | 330mm | 12mm | 2500 units |

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

Off Characteristics

| | | | | | | |
|------------|-----------------------------------|---|-----|---|-----------|---------------|
| B_{VDSS} | Drain to Source Breakdown Voltage | $I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$ | 100 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 80\text{V}$ $V_{GS} = 0\text{V}$ | - | - | 1 | μA |
| | | $T_C = 150^\circ\text{C}$ | - | - | 250 | |
| I_{GSS} | Gate to Source Leakage Current | $V_{GS} = \pm 20\text{V}$ | - | - | ± 100 | nA |

On Characteristics

| | | | | | | |
|--------------|----------------------------------|--|---|-------|-------|----------|
| $V_{GS(TH)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$ | 2 | - | 4 | V |
| $r_{DS(ON)}$ | Drain to Source On Resistance | $I_D = 7.5\text{A}$, $V_{GS} = 10\text{V}$ | - | 0.019 | 0.023 | Ω |
| | | $I_D = 6.8\text{A}$, $V_{GS} = 6\text{V}$ | - | 0.023 | 0.028 | |
| | | $I_D = 7.5\text{A}$, $V_{GS} = 10\text{V}$, $T_C = 150^\circ\text{C}$ | - | 0.035 | 0.043 | |

Dynamic Characteristics

| | | | | | | |
|--------------|----------------------------------|--|---|------|----|----|
| C_{ISS} | Input Capacitance | $V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$ | - | 2015 | - | pF |
| C_{OSS} | Output Capacitance | | - | 285 | - | pF |
| C_{RSS} | Reverse Transfer Capacitance | | - | 70 | - | pF |
| $Q_{g(TOT)}$ | Total Gate Charge at 10V | $V_{GS} = 0\text{V}$ to 10V | - | 28 | 37 | nC |
| $Q_{g(TH)}$ | Threshold Gate Charge | $V_{GS} = 0\text{V}$ to 2V | - | 4 | 6 | nC |
| Q_{gs} | Gate to Source Gate Charge | $V_{DD} = 50\text{V}$ $I_D = 7.5\text{A}$ $I_g = 1.0\text{mA}$ | - | 10 | - | nC |
| Q_{gs2} | Gate Charge Threshold to Plateau | | - | 6.8 | - | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | - | 6 | - | nC |

Switching Characteristics ($V_{GS} = 10\text{V}$)

| | | | | | | |
|--------------|---------------------|--|---|----|----|----|
| t_{ON} | Turn-On Time | $V_{DD} = 50\text{V}$, $I_D = 4\text{A}$ $V_{GS} = 10\text{V}$, $R_{GS} = 10\Omega$ | - | - | 51 | ns |
| $t_{d(ON)}$ | Turn-On Delay Time | | - | 14 | - | ns |
| t_r | Rise Time | | - | 20 | - | ns |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | - | 37 | - | ns |
| t_f | Fall Time | | - | 27 | - | ns |
| t_{OFF} | Turn-Off Time | | - | - | 96 | ns |

Drain-Source Diode Characteristics

| | | | | | | |
|----------|-------------------------------|---|---|---|------|----|
| V_{SD} | Source to Drain Diode Voltage | $I_{SD} = 7.5\text{A}$ | - | - | 1.25 | V |
| | | $I_{SD} = 4\text{A}$ | - | - | 1.0 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD} = 7.5\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | - | 55 | ns |
| Q_{RR} | Reverse Recovered Charge | $I_{SD} = 7.5\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | - | 90 | nC |

Notes:

1: Starting $T_j = 25^\circ\text{C}$, $L = 13\text{mH}$, $I_{AS} = 8\text{A}$.

2: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.

3: $R_{\theta JA}$ is measured with 1.0 in² copper on FR-4 board

Typical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

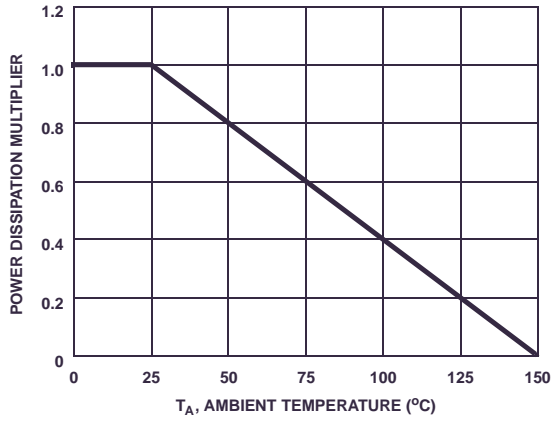


Figure 1. Normalized Power Dissipation vs Ambient Temperature

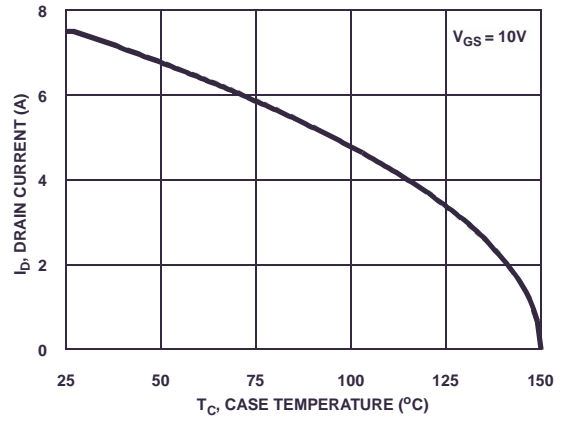


Figure 2. Maximum Continuous Drain Current vs Case Temperature

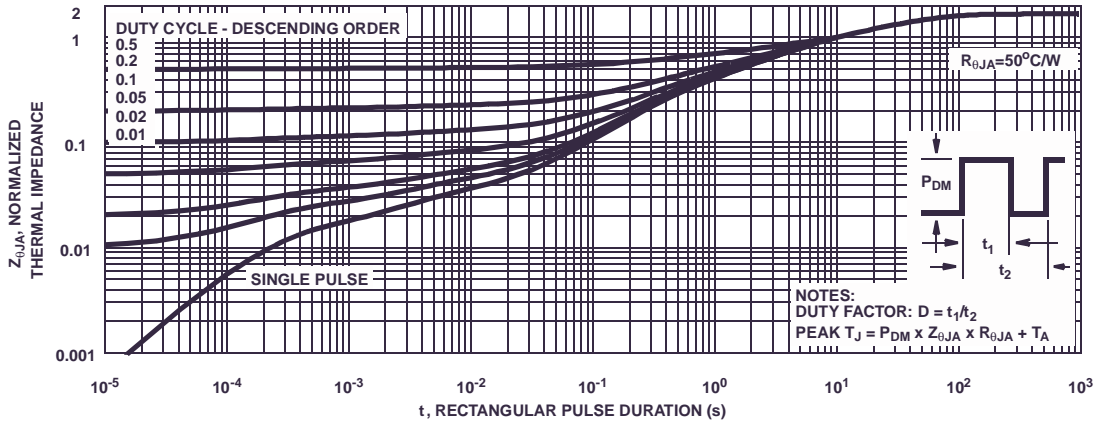


Figure 3. Normalized Maximum Transient Thermal Impedance

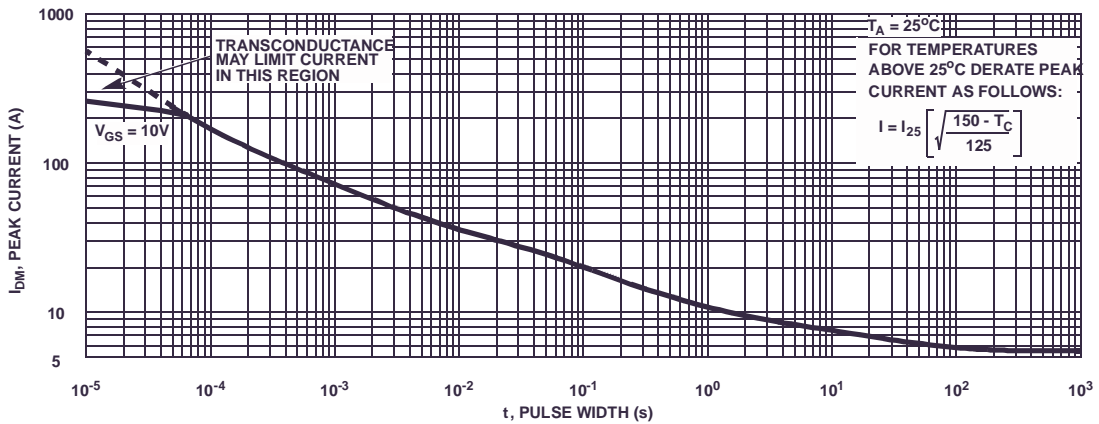


Figure 4. Peak Current Capability

Typical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

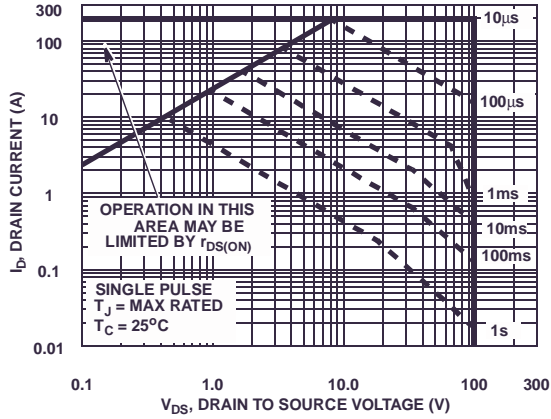
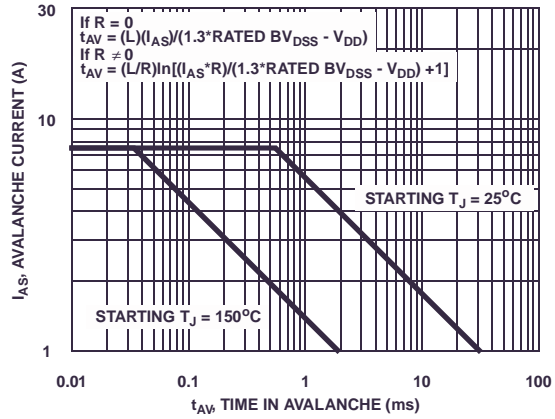


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515
Figure 6. Unclamped Inductive Switching Capability

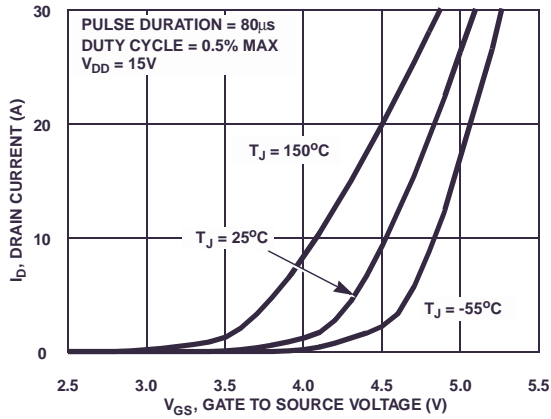


Figure 7. Transfer Characteristics

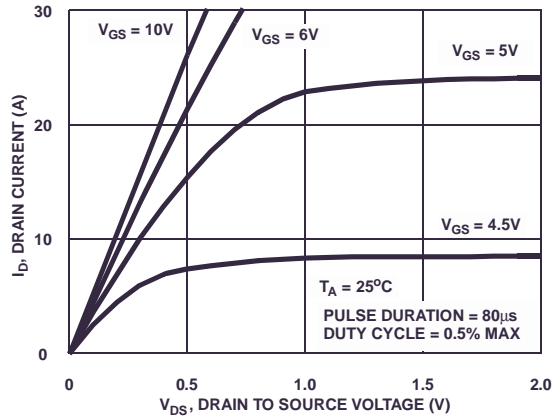


Figure 8. Saturation Characteristics

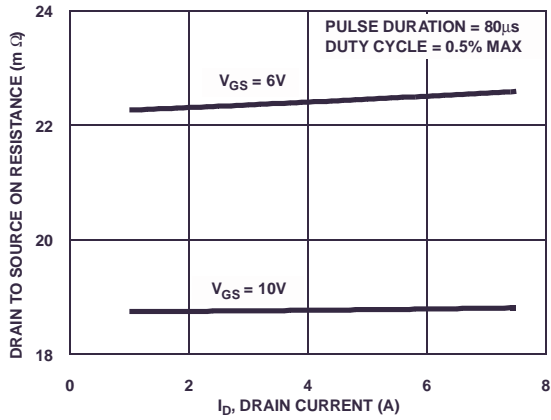


Figure 9. Drain to Source On Resistance vs Drain Current

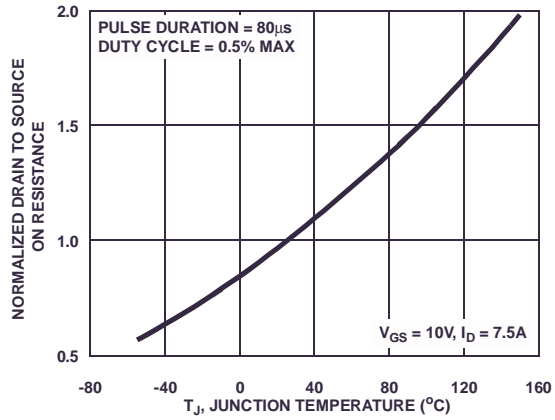


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

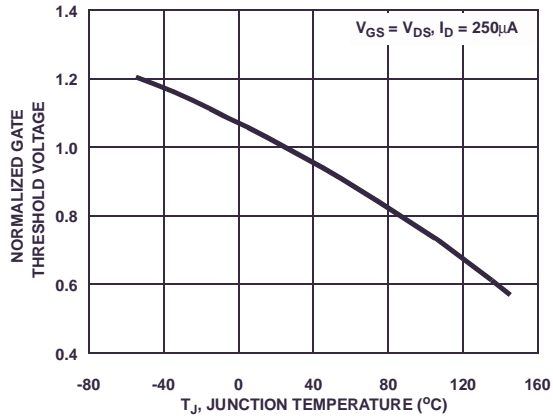


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

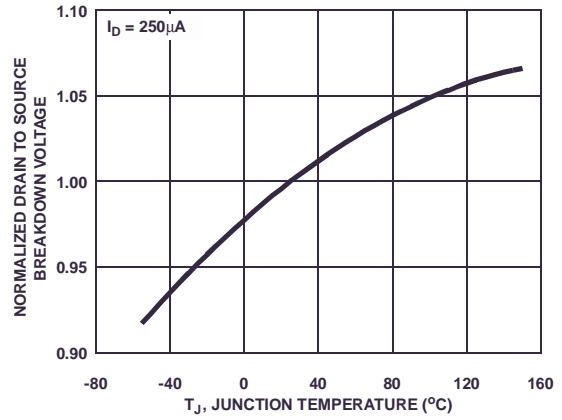


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

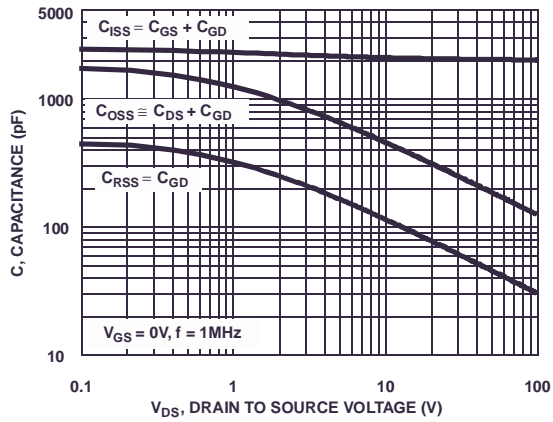


Figure 13. Capacitance vs Drain to Source Voltage

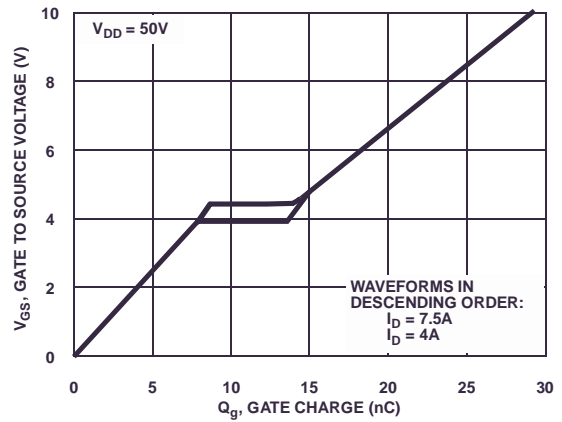


Figure 14. Gate Charge Waveforms for Constant Gate Currents

Test Circuits and Waveforms

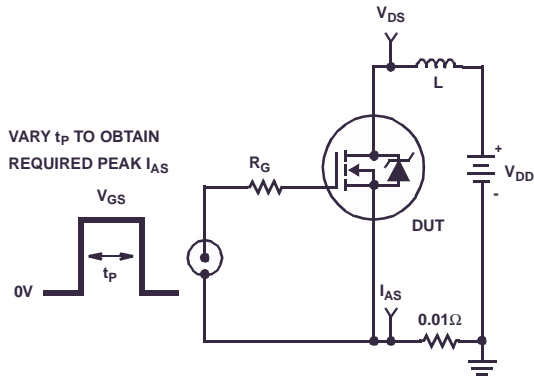


Figure 15. Unclamped Energy Test Circuit

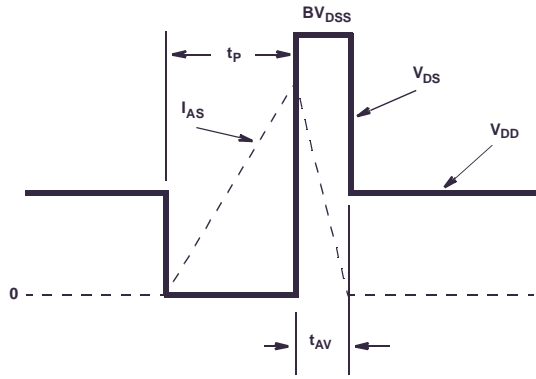


Figure 16. Unclamped Energy Waveforms

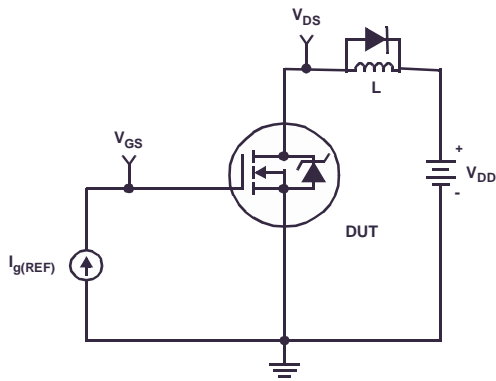


Figure 17. Gate Charge Test Circuit

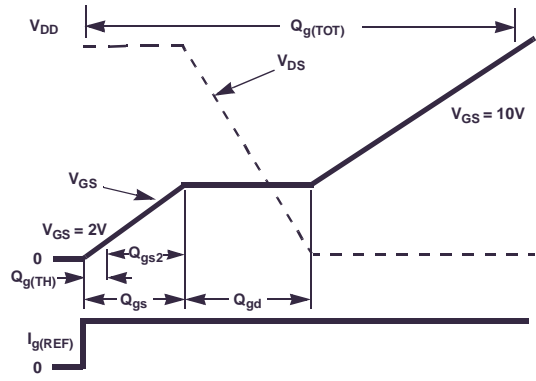


Figure 18. Gate Charge Waveforms

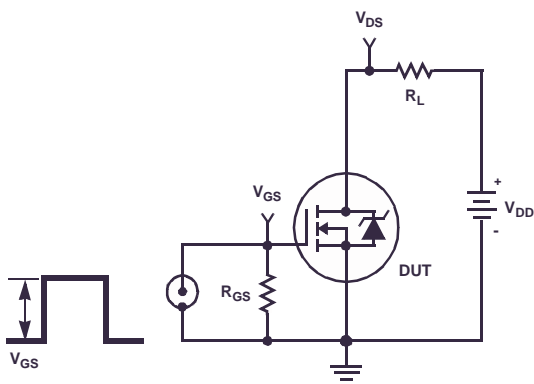


Figure 19. Switching Time Test Circuit

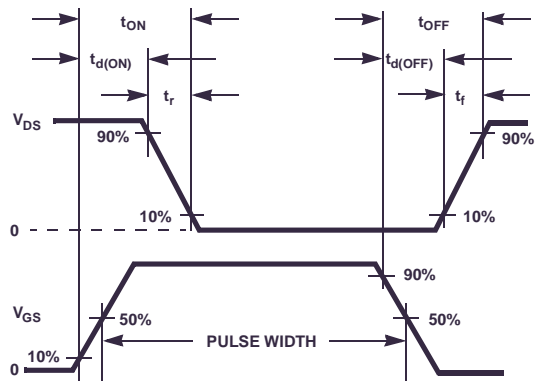





Figure 20. Switching Time Waveforms



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