

SLD7N65SV / SLF7N65SV

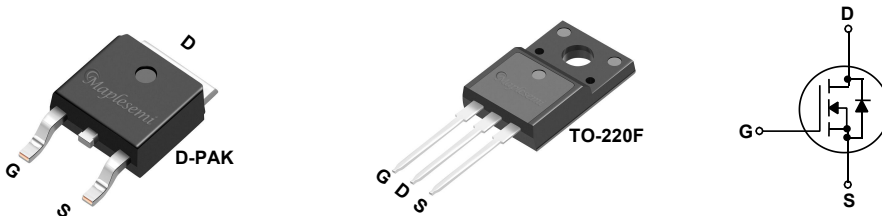
650V N-Channel MOSFET

General Description

This Power MOSFET is produced using Maple semi's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

Features

- 7A, 650V, $R_{DS(on)Max}=1.10\Omega@V_{GS} = 10V$
- Low gate charge (typical 26nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | SLD7N65SV | SLF7N65SV | Units |
|----------------|---|-------------|-----------|---------------------|
| V_{DSS} | Drain-Source Voltage | 650 | | V |
| I_D | Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$) | 7 | | A |
| | | - | | A |
| I_{DM} | Drain Current - Pulsed (Note 1) | 14 | | A |
| V_{GSS} | Gate-Source Voltage | ± 30 | | V |
| EAS | Single Pulsed Avalanche Energy (Note 2) | 602 | | mJ |
| I_{AR} | Avalanche Current (Note 1) | 7 | | A |
| E_{AR} | Repetitive Avalanche Energy (Note 1) | 141 | | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | 2.3 | | V/ns |
| P_D | Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C | 48 | 35 | W |
| | | - | - | W/ $^\circ\text{C}$ |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | | $^\circ\text{C}$ |
| T_L | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 300 | | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Max | | Units |
|-----------------|---|-----------|-----------|---------------------------|
| | | SLD7N65SV | SLF7N65SV | |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | - | 3.57 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 110 | 62.5 | $^\circ\text{C}/\text{W}$ |

Package Marking

| Part Number | Top Marking | Package | Packing Method | MOQ | QTY |
|-------------|-------------|---------|----------------|------|-------|
| SLD7N65SV | SLD7N65SV | T0-252 | Tape & Reel | 2500 | 25000 |
| SLF7N65SV | SLF7N65SV | T0-220F | Tube | 1000 | 5000 |

Electrical Characteristics

 $T_C = 25^\circ\text{C}$ unless otherwise noted

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

Off Characteristics

| | | | | | | |
|--------------------------------|---|---|-----|----|------|--------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 650 | -- | -- | V |
| $\Delta BV_{DSS} / \Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C | -- | - | -- | $V/^\circ\text{C}$ |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$ | -- | -- | 1 | μA |
| | | $V_{DS} = 520\text{ V}, T_C = 125^\circ\text{C}$ | -- | -- | 10 | μA |
| I_{GSSF} | Gate-Body Leakage Current, Forward | $V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$ | -- | -- | 100 | nA |
| I_{GSSR} | Gate-Body Leakage Current, Reverse | $V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$ | -- | -- | -100 | nA |

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|---|-----|-----|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 2.0 | -- | 4.0 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$ | -- | 1.1 | 1.35 | Ω |
| g_{FS} | Forward Transconductance | $V_{DS} = 40\text{ V}, I_D = 3.5\text{ A}$ (Note 4) | -- | - | -- | S |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|---|----|------|----|----|
| C_{ISS} | Input Capacitance | $V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$ | -- | 1130 | -- | pF |
| C_{OSS} | Output Capacitance | | -- | 86.8 | -- | pF |
| C_{RSS} | Reverse Transfer Capacitance | | -- | 4.08 | -- | pF |

Switching Characteristics

| | | | | | | |
|--------------|---------------------|--|----|------|----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 8\text{ A}, R_G = 25\text{ }\Omega$ (Note 4, 5) | -- | 12 | -- | ns |
| t_r | Turn-On Rise Time | | -- | 20 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 74 | -- | ns |
| t_f | Turn-Off Fall Time | | -- | 33 | -- | ns |
| Q_g | Total Gate Charge | $V_{DS} = 520\text{ V}, I_D = 8\text{ A}, V_{GS} = 10\text{ V}$ (Note 4, 5) | -- | 26 | -- | nC |
| Q_{GS} | Gate-Source Charge | | -- | 4.78 | -- | nC |
| Q_{GD} | Gate-Drain Charge | | -- | 5.82 | -- | nC |

Drain-Source Diode Characteristics and Maximum Ratings

| | | | | | | |
|----------|---|---|----|-----|-----|---------------|
| I_S | Maximum Continuous Drain-Source Diode Forward Current | -- | -- | 7.5 | A | |
| I_{SM} | Maximum Pulsed Drain-Source Diode Forward Current | -- | -- | 14 | A | |
| V_{SD} | Drain-Source Diode Forward Voltage | $V_{GS} = 0\text{ V}, I_S = 7\text{ A}$ | -- | -- | 1.4 | V |
| t_{rr} | Reverse Recovery Time | $V_{GS} = 0\text{ V}, I_S = 7\text{ A},$ | -- | 506 | -- | ns |
| Q_{rr} | Reverse Recovery Charge | $di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4) | -- | 2.7 | -- | μC |

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 10\text{ mH}, I_{AS} = 7\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq I_D, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

N- Channel Typical Characteristics

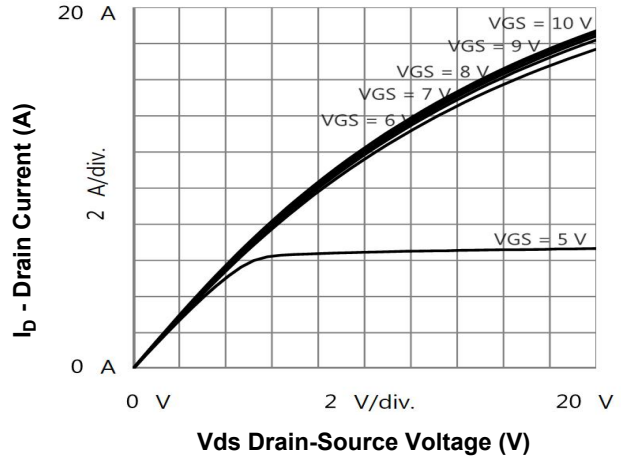


Figure 1. On-Region Characteristics

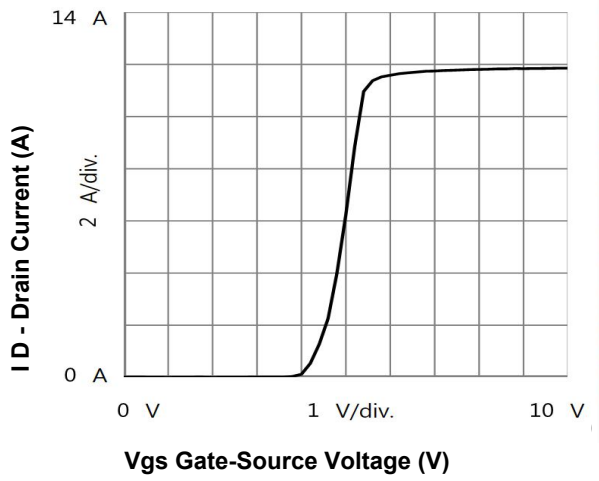


Figure 2. Transfer Characteristics

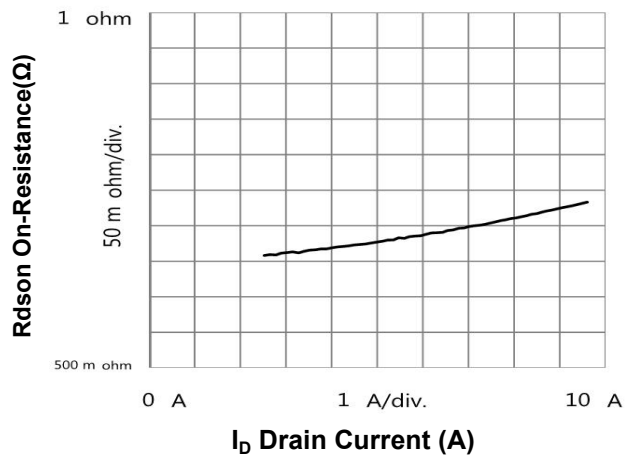


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

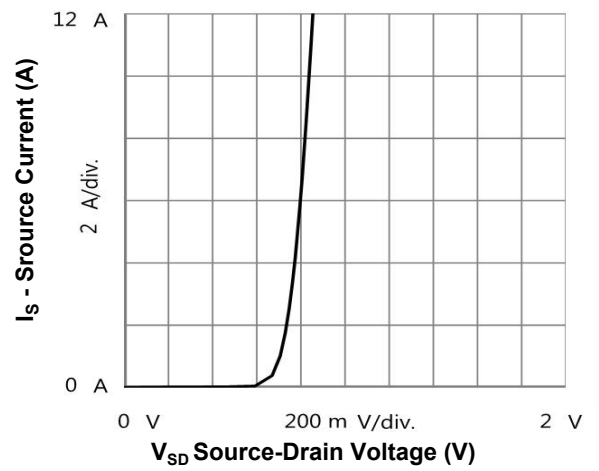


Figure 4. Source Current vs Source-Drain Voltage

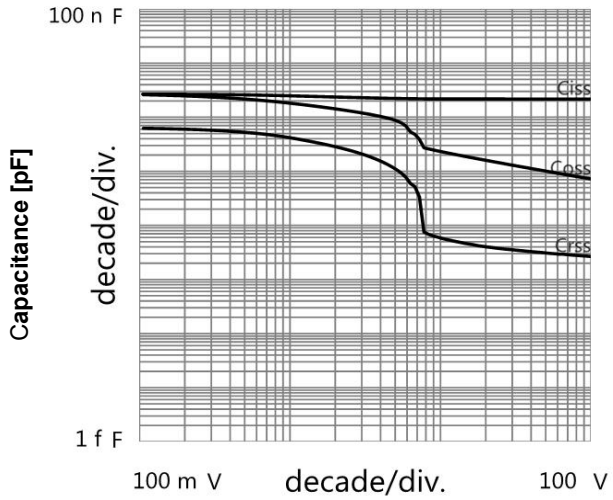


Figure 5. Capacitance Characteristics

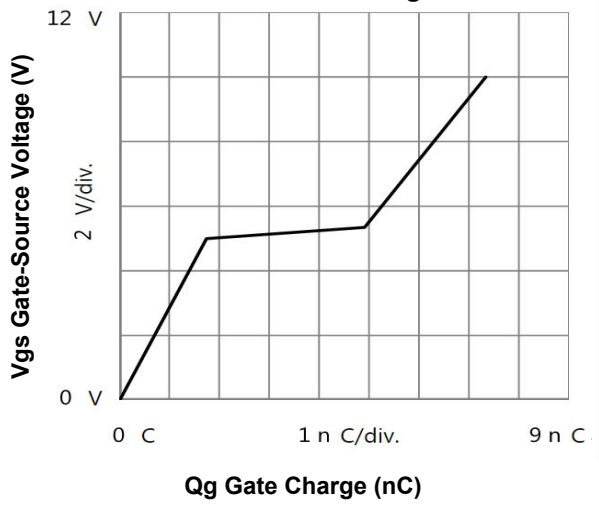


Figure 6. Gate Charge Characteristics

N- Channel Typical Characteristics (Continued)

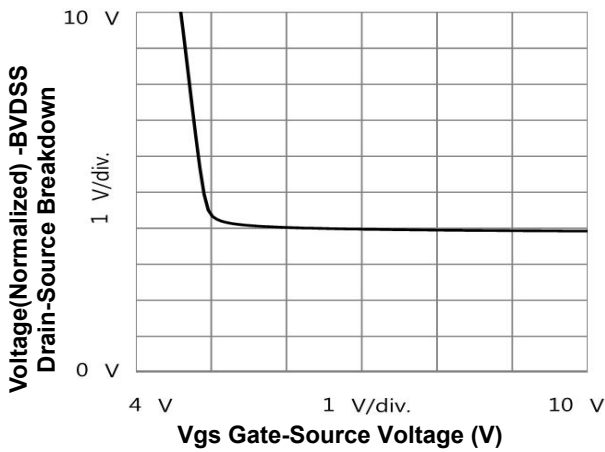


Figure 7. Breakdown Voltage Variation vs Gate-Source Voltage

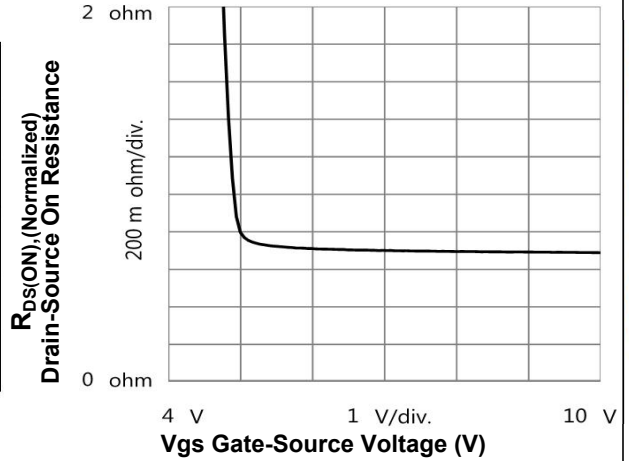


Figure 8. On-Resistance Variation vs Gate-Source Voltage

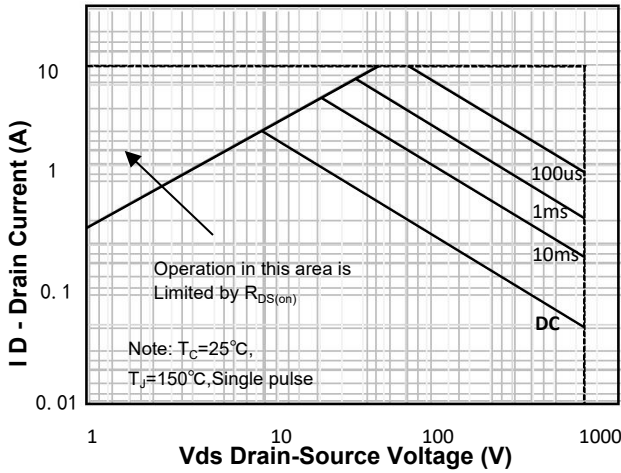
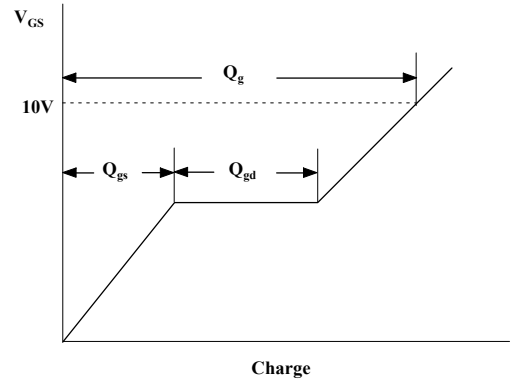
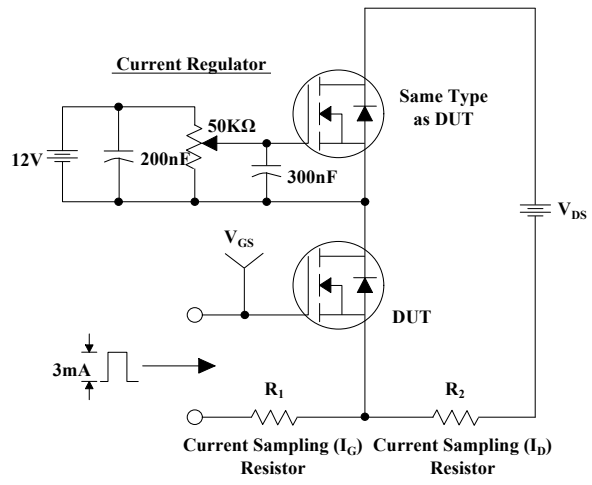
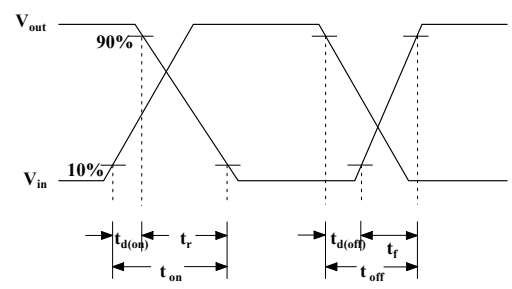
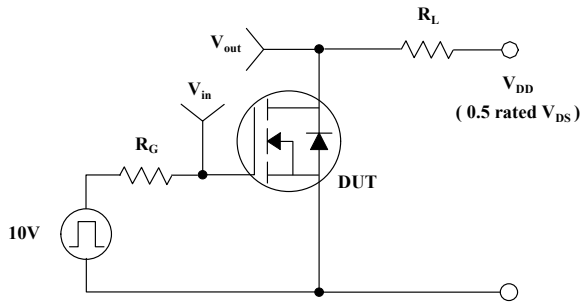


Figure 9. Maximum Safe Operating Area

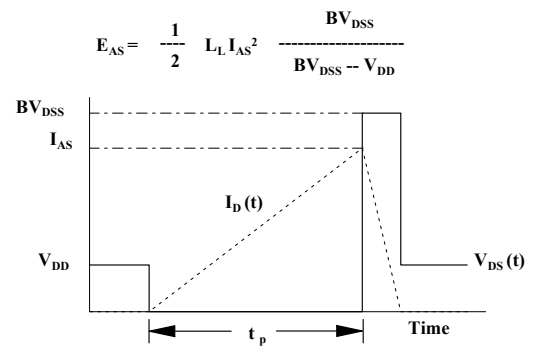
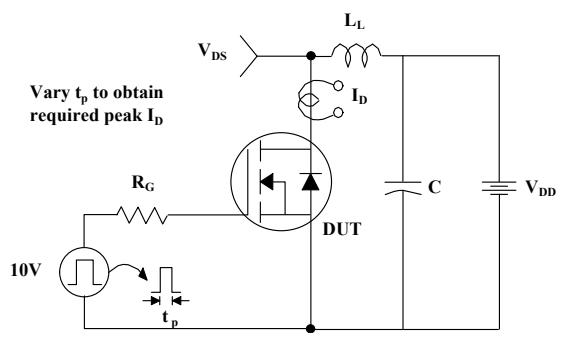
Gate Charge Test Circuit & Waveform



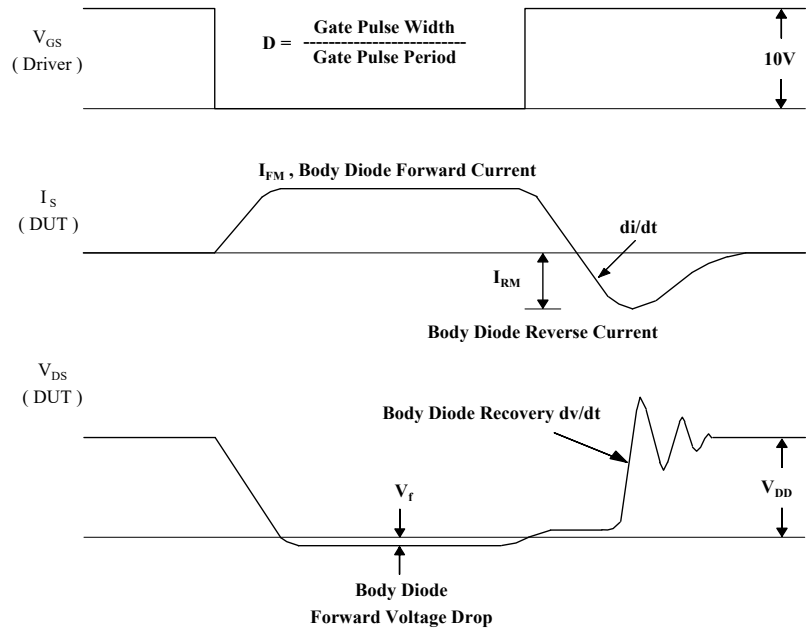
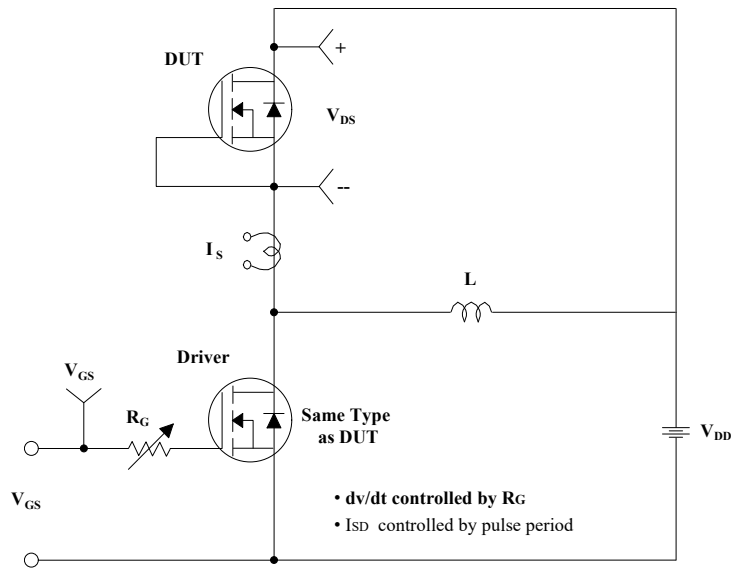
Resistive Switching Test Circuit & Waveforms



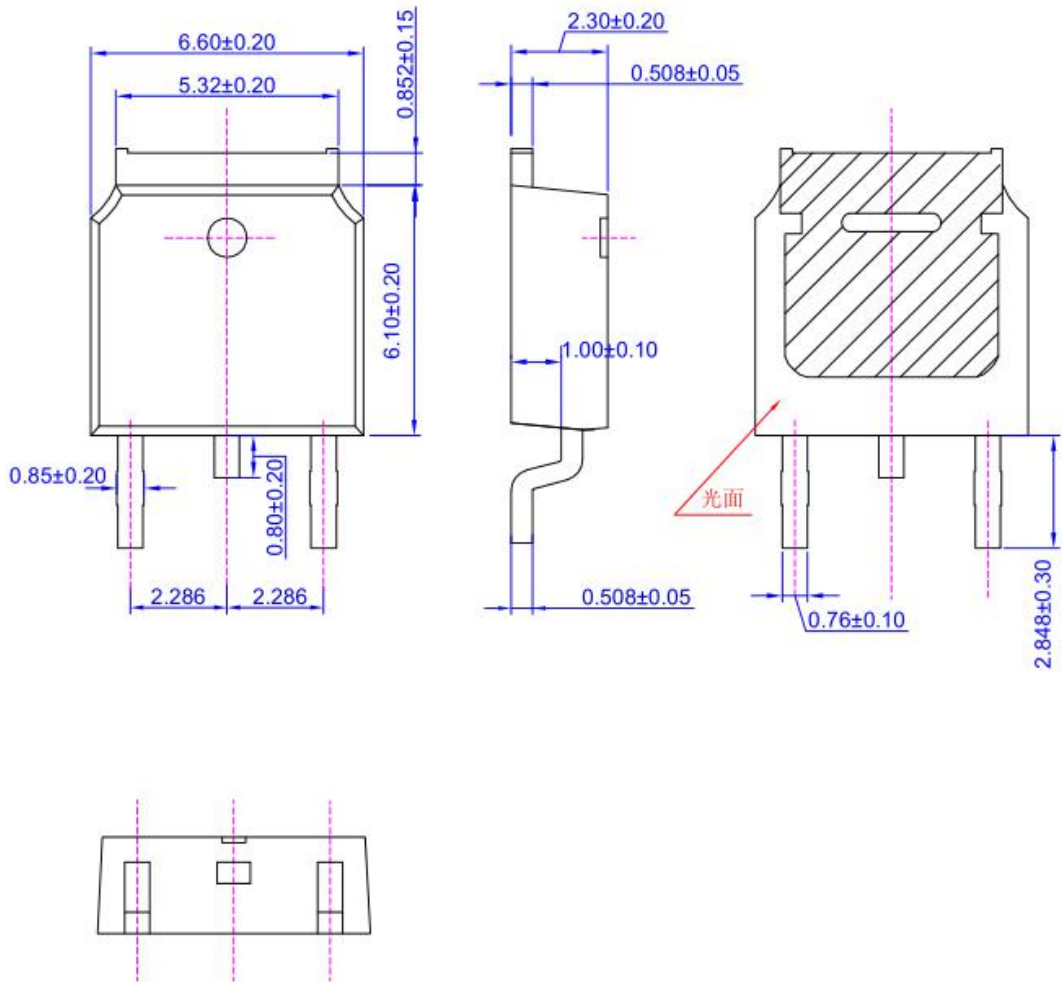
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



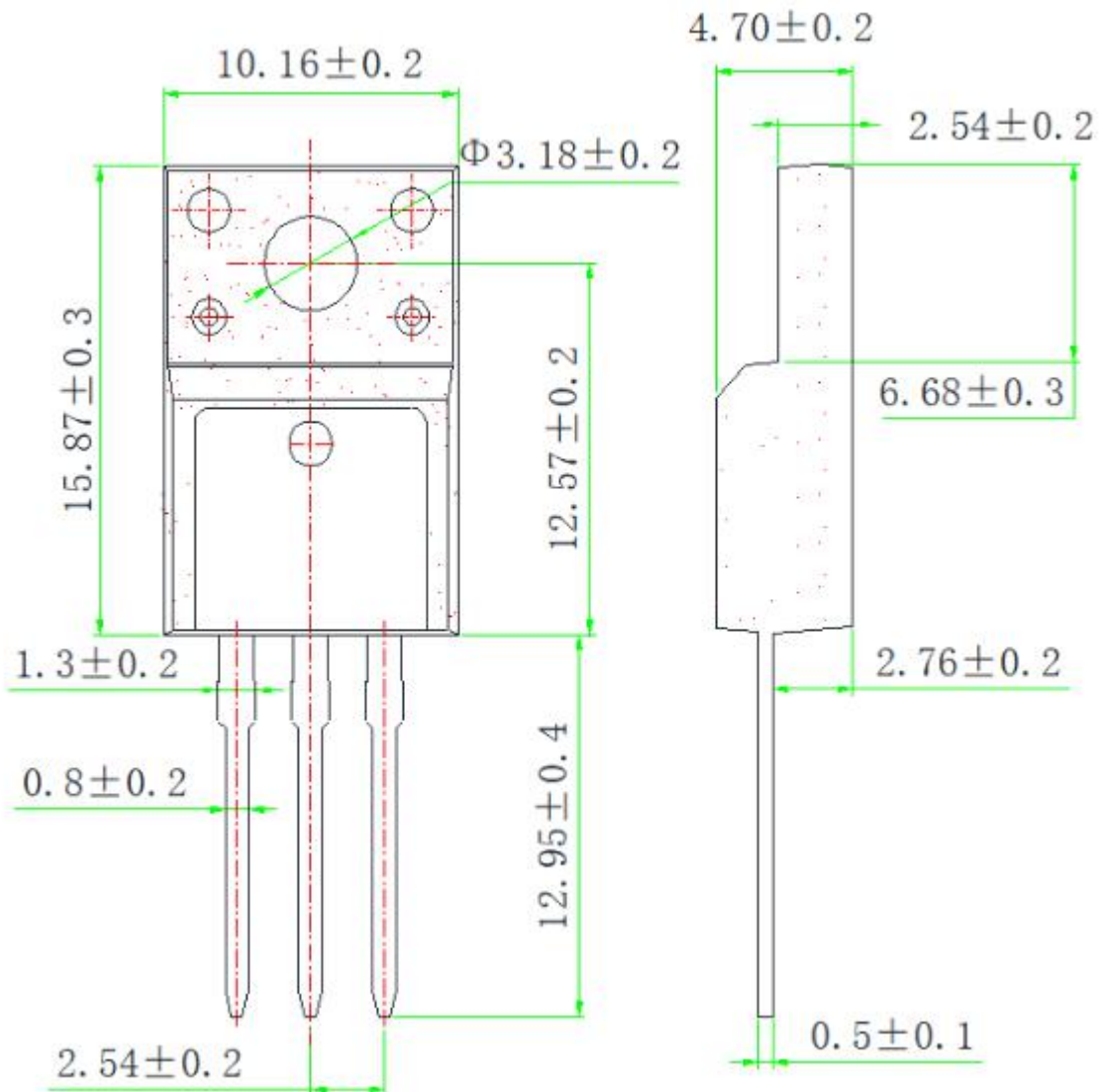
TO-252 OUTLINE



NOTE:

- 1.The plastic package is not marked as smooth surface $R_a=0.1$; Subglossy surface $R_a=0.8$
- 2.Undeclared tolerance ± 0.25 , Unmarked fillet $R_{max}=0.25$

TO-220F OUTLINE



NOTE:

1 The plastic package is not marked as smooth surface $R_a=0.1$; Subglossy surface $R_a=0.8$

2. Undeclared tolerance ± 0.25 , Unmarked fillet $R_{max}=0.25$

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