

SLM150N06G

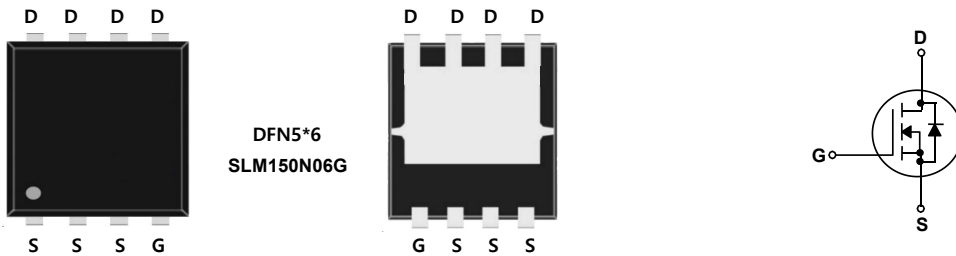
60V N-Channel MOSFET

General Description

This Power MOSFET is produced using Msemitek's advanced Shielding Gate MOSFET 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 low voltage applications such as DC/DC converters and high efficiency switching for power management in portable and battery operated products.

Features

- 150A, 60V, $R_{DS(on)Typ} = 1.8m\Omega @ V_{GS} = 10V$
- Very Low On-resistance $R_{DS(ON)}$
- 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 | SLM150N06G | Units |
|----------------|---|-------------|---------------------|
| V_{DSS} | Drain-Source Voltage | 60 | V |
| I_D | Drain Current - Continuous ($T_C = 25^\circ\text{C}$) | 150 | A |
| | | 98 | A |
| I_{DM} | Drain Current - Pulsed (Note 1) | 450 | A |
| V_{GSS} | Gate-Source Voltage | ± 20 | V |
| EAS | Single Pulsed Avalanche Energy (Note 2) | 552 | mJ |
| E_{AR} | Repetitive Avalanche Energy (Note 1) | 240 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | 4.5 | V/ns |
| P_D | Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C | 85 | W |
| | | 0.68 | 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 | $^\circ\text{C}$ |

* Drain current limited by maximum junction temperature.

Thermal Characteristics

| Symbol | Parameter | SLM150N06G | Units |
|-----------------|---|------------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 1.47 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 62.5 | $^\circ\text{C}/\text{W}$ |

Package Marking

| Part Number | Top Marking | Package | Packing Method | MOQ | QTY |
|-------------|-------------|---------|----------------|------|-------|
| SLM150N06G | SLM150N06G | DFN5*6 | Tape & Reel | 5000 | 25000 |

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 | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 60 | -- | -- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ | -- | -- | 1 | μA |
| | | $V_{DS} = 48\text{ V}, T_C = 150^\circ\text{C}$ | -- | -- | 10 | μA |
| I_{GSSF} | Gate-Body Leakage Current, Forward | $V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$ | -- | -- | 100 | nA |
| I_{GSSR} | Gate-Body Leakage Current, Reverse | $V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$ | -- | -- | -100 | nA |

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|---|-----|-----|-----|------------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 1.0 | -- | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}$ | -- | 1.8 | 2.2 | m Ω |

Dynamic Characteristics

| | | | | | | |
|------------|------------------------------|--|----|------|----|----|
| C_{iss} | Input Capacitance | $V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$ | -- | 5460 | -- | pF |
| C_{oss} | Output Capacitance | | -- | 2040 | -- | pF |
| C_{riss} | Reverse Transfer Capacitance | | -- | 5.5 | -- | pF |

Switching Characteristics

| | | | | | | |
|--------------|---------------------|--|----|-----|----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = 30\text{ V}, I_D = 60\text{ A},$ $R_G = 4.7\text{ }\Omega$ (Note 4, 5) | -- | 20 | -- | ns |
| t_r | Turn-On Rise Time | | -- | 127 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 95 | -- | ns |
| t_f | Turn-Off Fall Time | | -- | 25 | -- | ns |
| Q_g | Total Gate Charge | $V_{DS} = 30\text{ V}, I_D = 30\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 4, 5) | -- | 70 | -- | nC |
| Q_{gs} | Gate-Source Charge | | -- | 21 | -- | nC |
| Q_{gd} | Gate-Drain Charge | | -- | 33 | -- | nC |

Drain-Source Diode Characteristics and Maximum Ratings

| | | | | | | |
|----------|---|--|----|-----|-----|----|
| I_S | Maximum Continuous Drain-Source Diode Forward Current | -- | -- | 150 | A | |
| I_{SM} | Maximum Pulsed Drain-Source Diode Forward Current | -- | -- | 450 | A | |
| V_{SD} | Drain-Source Diode Forward Voltage | $V_{GS} = 0\text{ V}, I_S = 30\text{ A}$ | -- | -- | 1.4 | V |
| t_{rr} | Reverse Recovery Time | $V_{GS} = 0\text{ V}, I_S = 30\text{ A},$ | -- | 63 | -- | ns |
| Q_{rr} | Reverse Recovery Charge | $di_F / dt = 80\text{ A}/\mu\text{s}$ (Note 4) | -- | 59 | -- | nC |

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $V_{DD} = 30\text{ V}, R_G = 25\text{ }\Omega$, 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

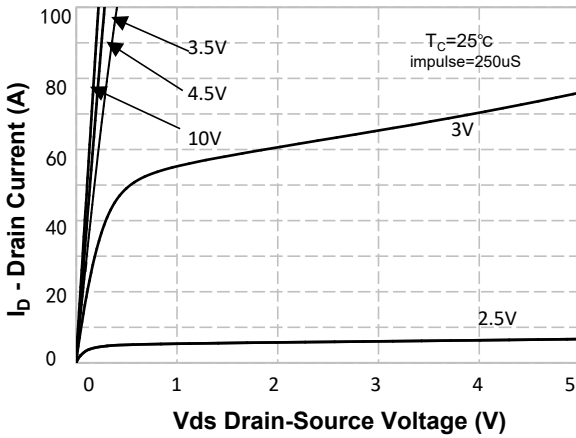


Figure 1. On-Region Characteristics

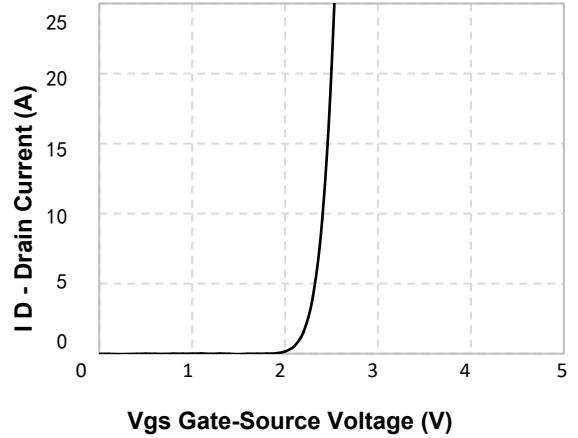


Figure 2. Transfer Characteristics

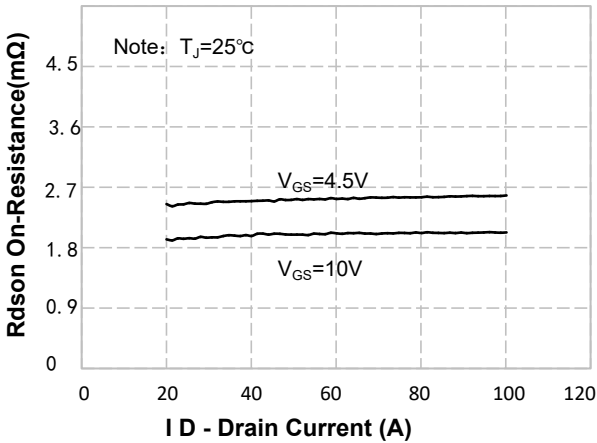


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

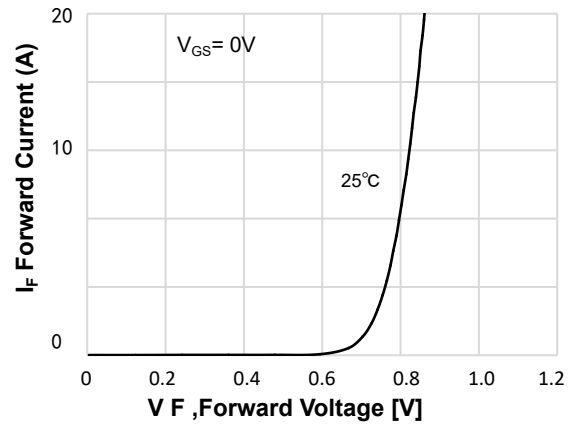


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

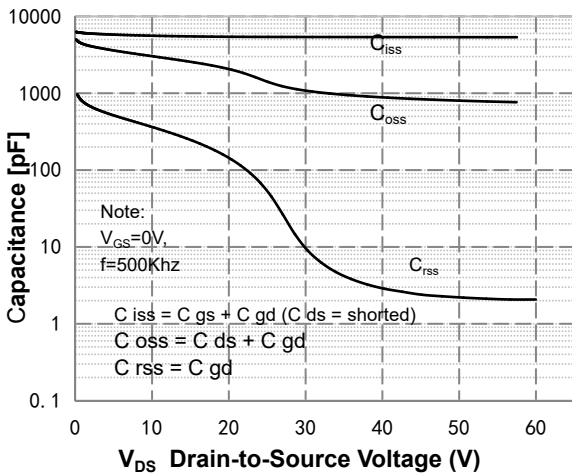


Figure 5. Capacitance Characteristics

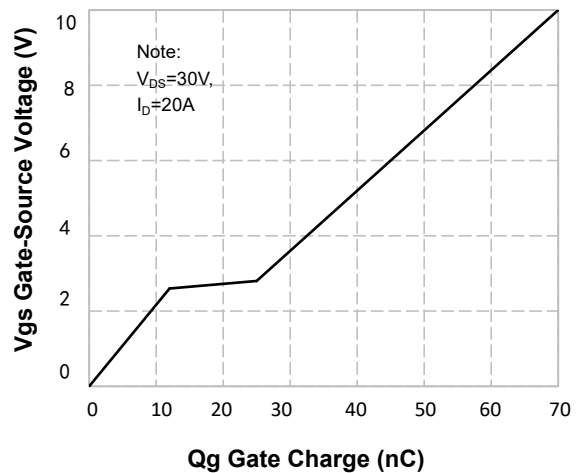


Figure 6. Gate Charge Characteristics

N- Channel Typical Characteristics (Continued)

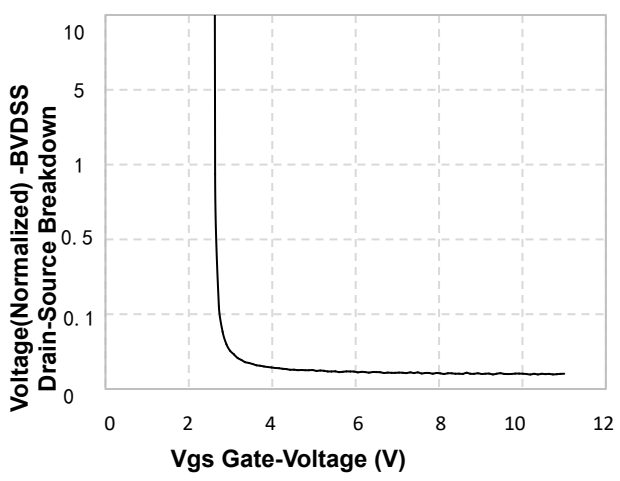


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

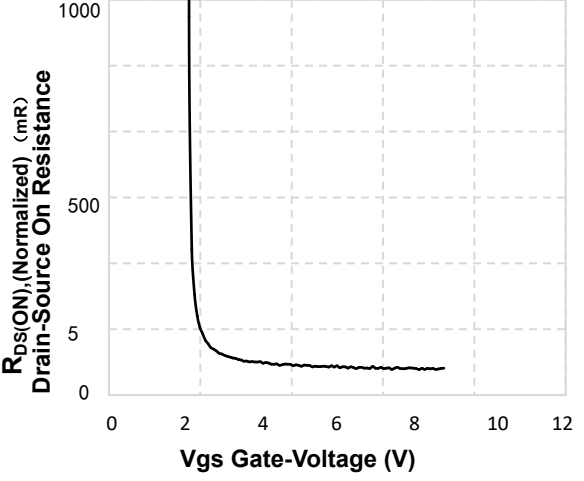


Figure 8. On-Resistance Variation vs Gate Voltage

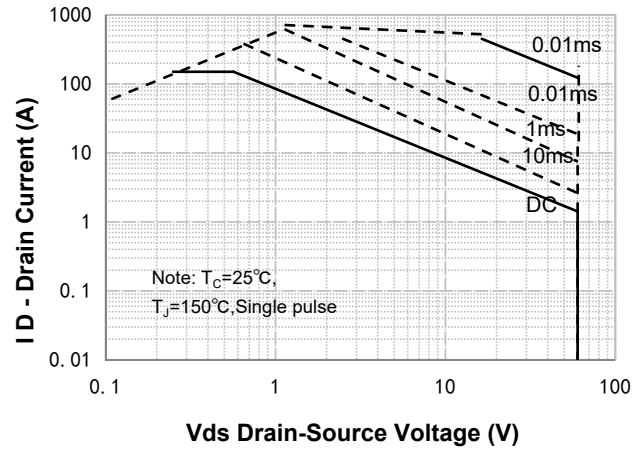


Figure 9. Maximum Safe Operating Area

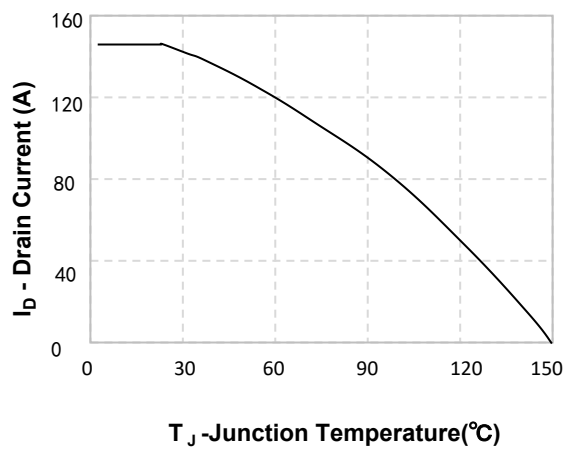


Figure 10. Maximum Continuous Drain Current vs Temperature

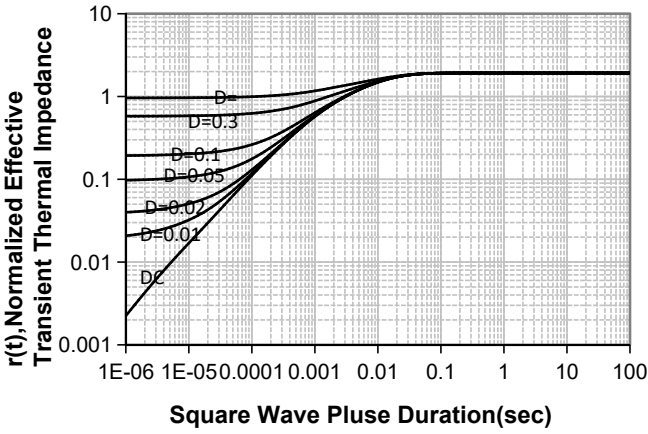
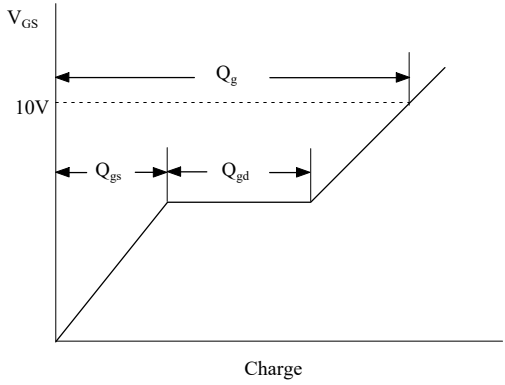
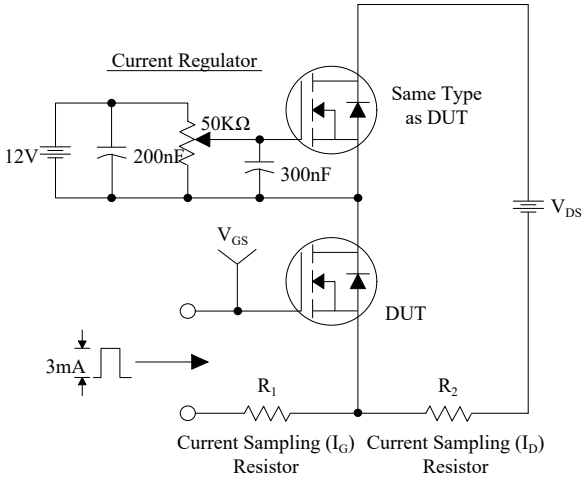
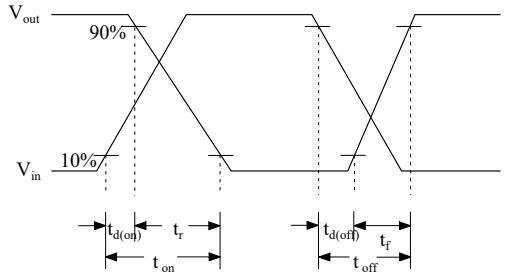
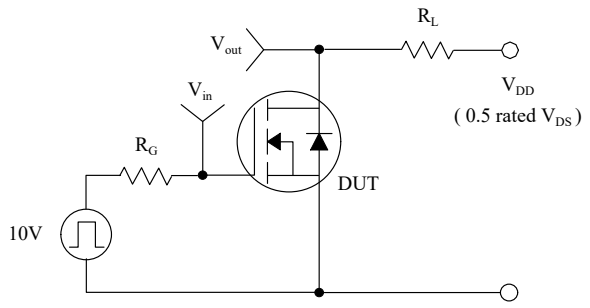


Figure 11. Transient Thermal Response Curve

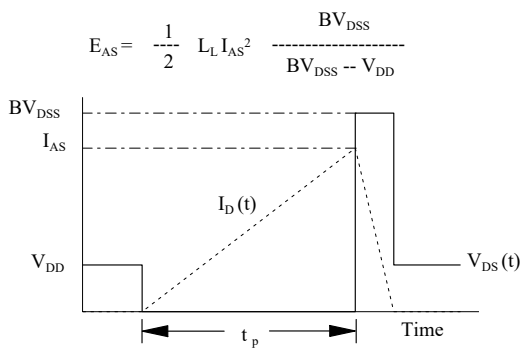
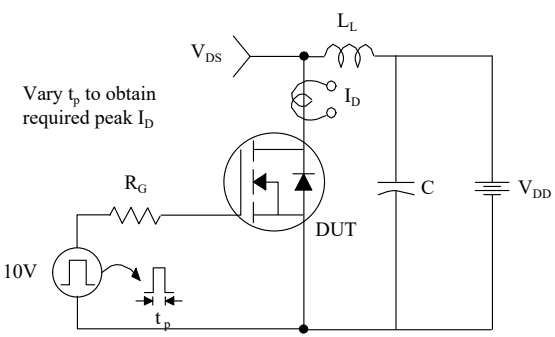
Gate Charge Test Circuit & Waveform



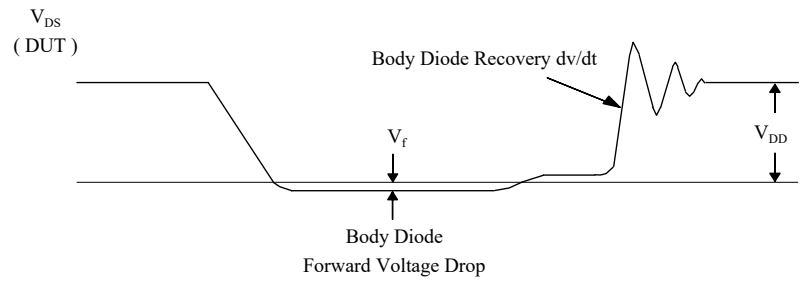
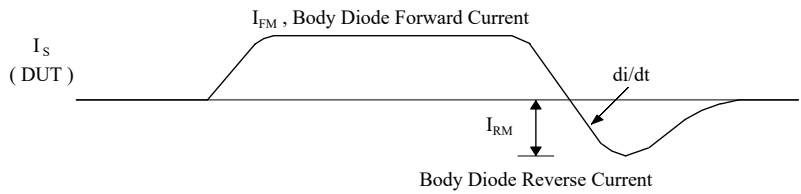
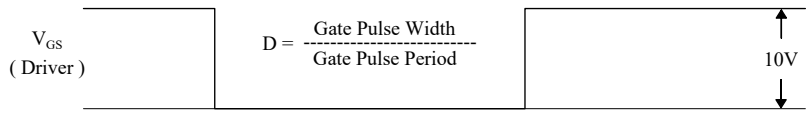
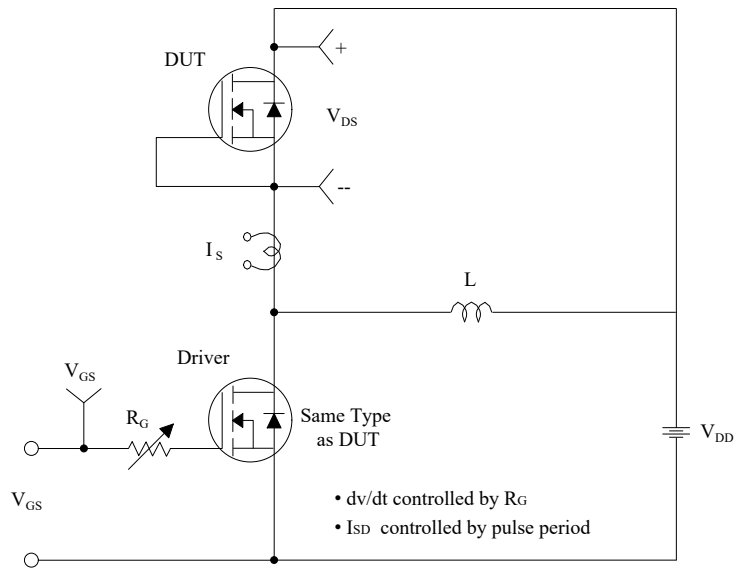
Resistive Switching Test Circuit & Waveforms



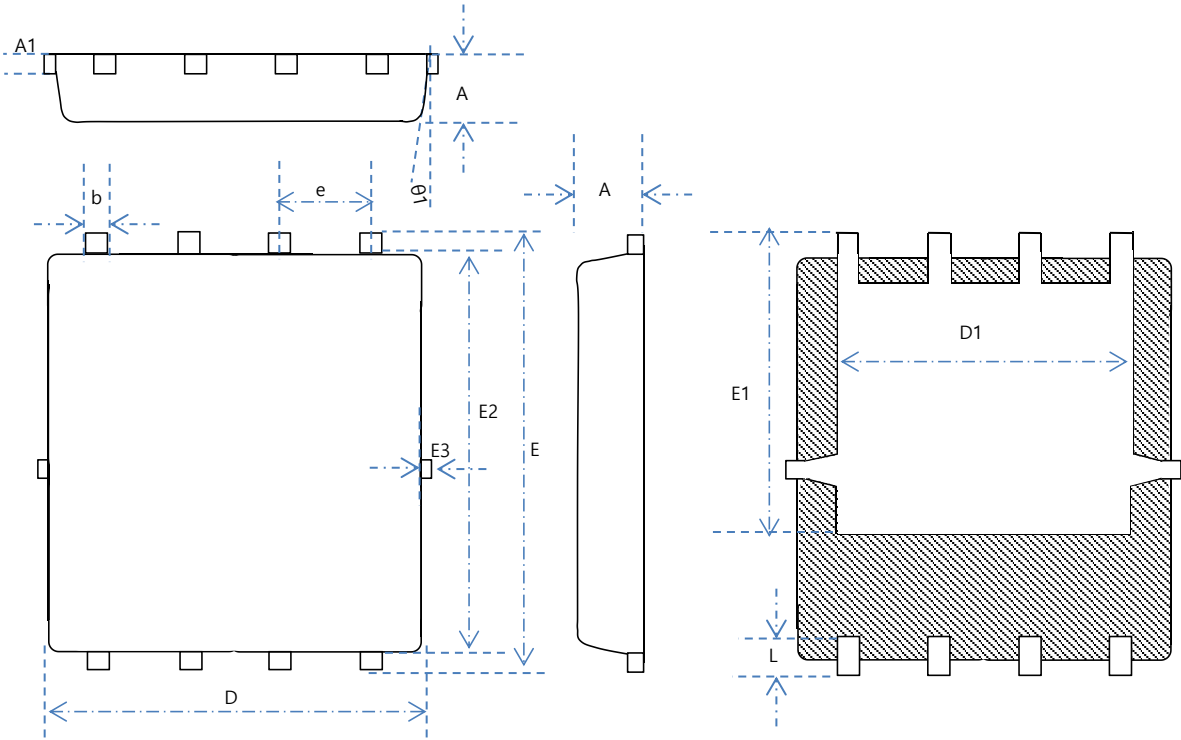
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



DFN 5*6 OUTLINE



| SYMBO L | Mechanical Dimensions/mm | | | SYMBOL | Mechanical Dimensions/mm | | |
|------------|--------------------------|------|------|--------|--------------------------|------|------|
| | MIN | NOM | MAX | | MIN | NOM | MAX |
| A | 0.85 | 0.95 | 1.05 | D | 4.90 | 5.20 | 5.35 |
| A1 | 0.254 REF | | | e | 1.270 TYPE | | |
| b | - | 0.30 | - | D1 | 3.90 | 4.0 | 4.10 |
| E | 5.85 | 6.05 | 6.25 | L | 0.54 | 0.64 | 0.74 |
| E1 | 3.90 | 4.10 | 4.30 | | | | |
| E2 | 5.45 | 5.55 | 5.65 | theta | 8° | 10° | 12° |
| E3 | - | - | 0.15 | | | | |

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