

Features

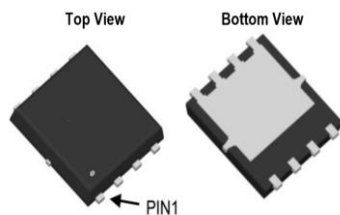
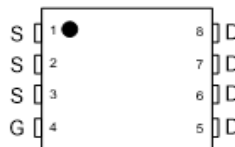
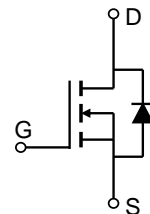
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- 100% UIS Tested
- 100% ΔV_{ds} Tested
- Halogen-free; RoHS-compliant

Applications

- Load Switch
- PWM Application
- Power Management

Product Summary

| Parameters | Value | Unit |
|-----------------------------------|-------|------|
| V_{DSS} | 40 | V |
| $V_{GS(th_Typ)}$ | 1.8 | V |
| $I_D (@ V_{GS}=10V)$ | 297 | A |
| $R_{DS(ON_Typ)} (@ V_{GS}=10V)$ | 0.8 | mΩ |
| $R_{DS(ON_Typ)} (@ V_{GS}=4.5V)$ | 1.2 | mΩ |


PDFN5x6-8L

Pin Assignment

Schematic Diagram
Ordering Information

| Device | Marking | MSL | Form | Package | Reel(pcs) | Per Carton (pcs) |
|---------------|---------|-----|-----------|------------|-----------|------------------|
| JMSL0401PG-13 | SL0401P | 1 | Tape&Reel | PDFN5x6-8L | 5000 | 50000 |

Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Value | Unit |
|----------------|---|---|------------------|
| V_{DS} | Drain-to-Source Voltage | 40 | V |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current | $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$ | A |
| I_{DM} | Pulsed Drain Current ⁽¹⁾ | Refer to Fig.4 | A |
| E_{AS} | Single Pulsed Avalanche Energy ⁽²⁾ | 706 | mJ |
| P_D | Power Dissipation | $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$ | W |
| T_J, T_{STG} | Junction & Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

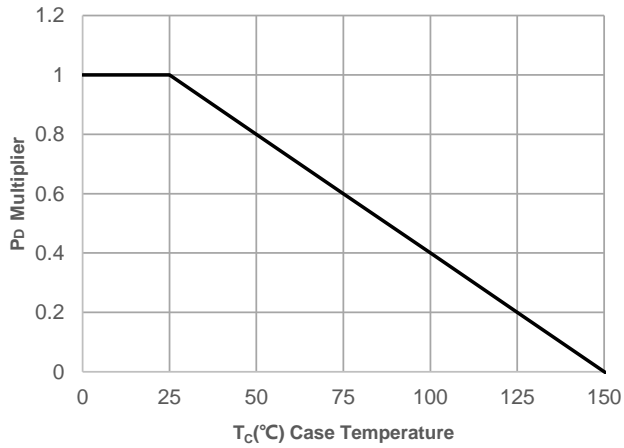
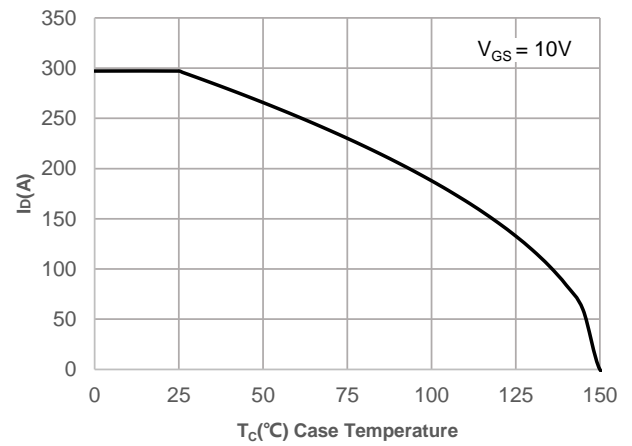
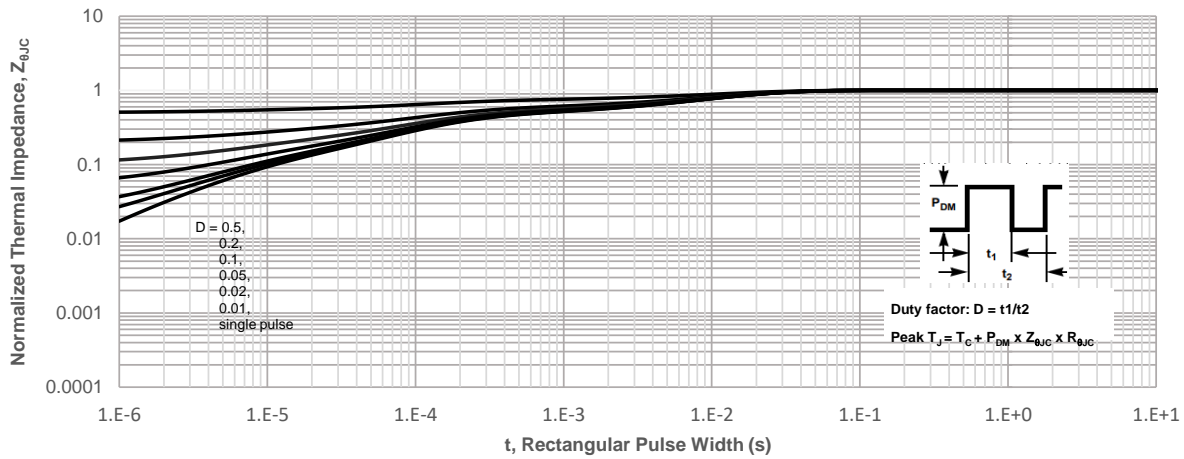
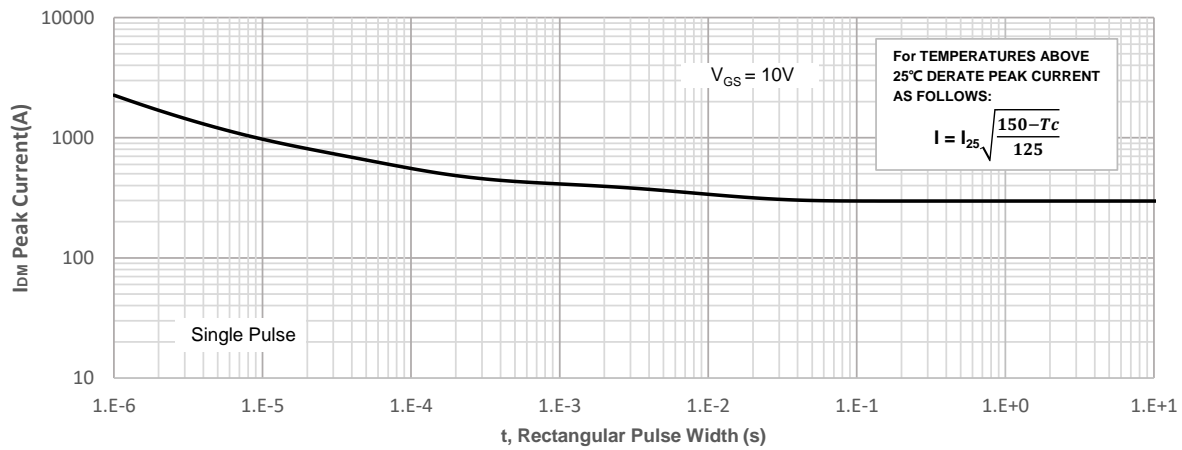
| Symbol | Parameter | Max | Unit |
|-----------------|--|-----|--------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient ⁽³⁾ | 40 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 0.8 | $^\circ\text{C/W}$ |

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

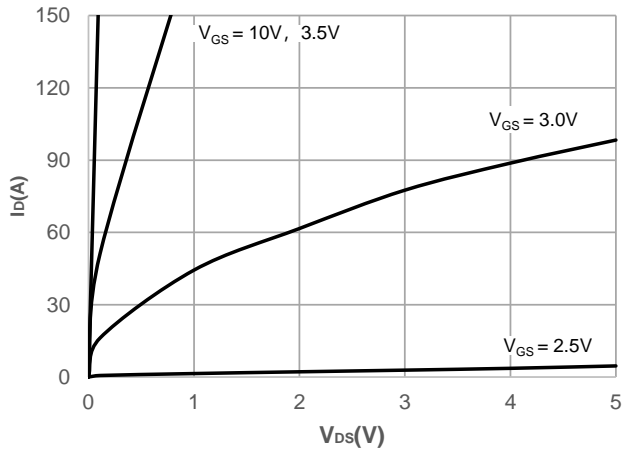
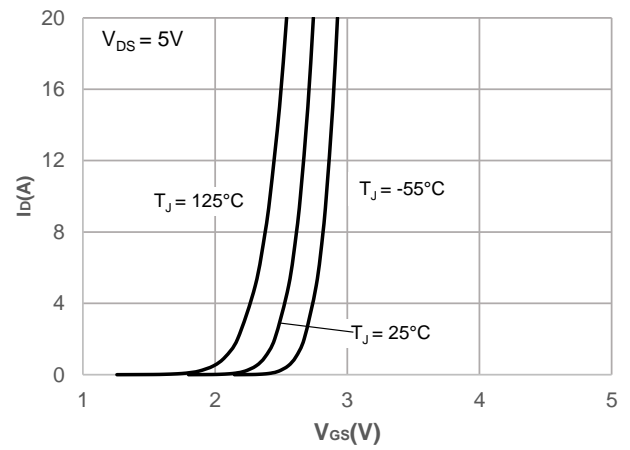
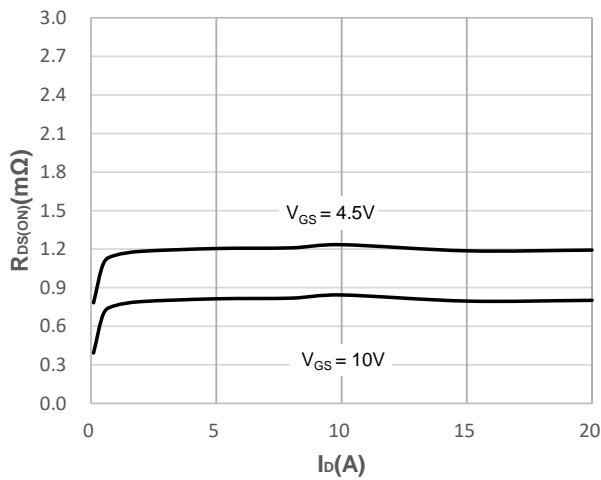
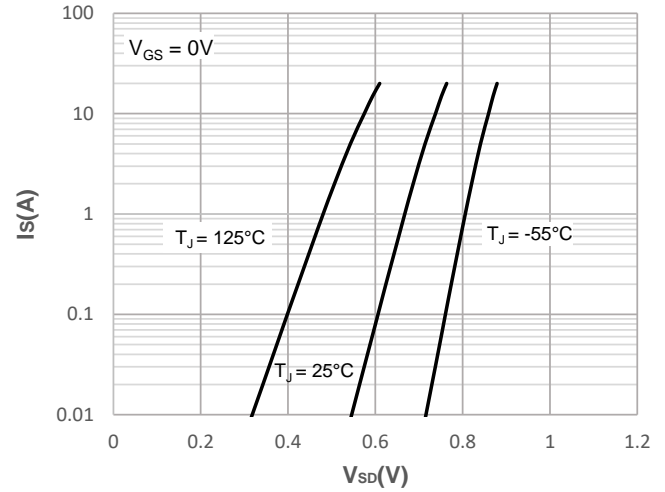
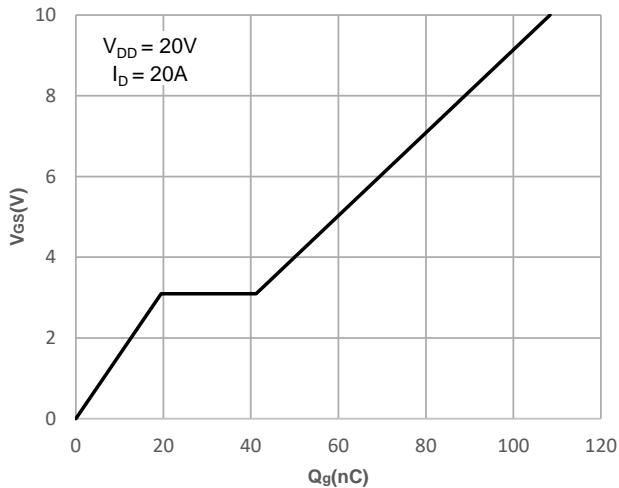
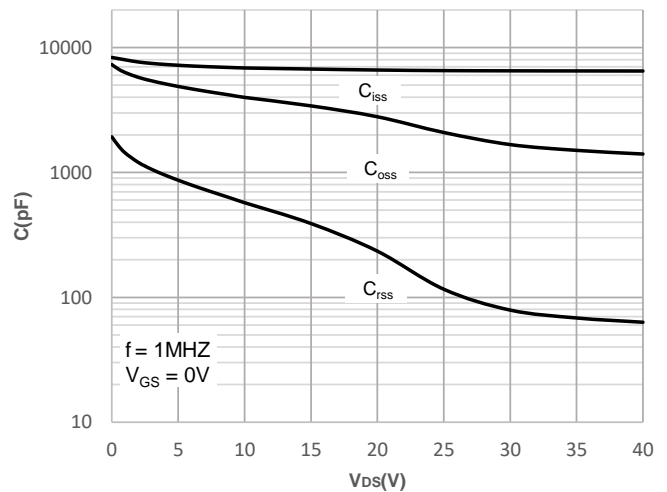
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------------------------|--|---|------|------|------|------|
| Off Characteristics | | | | | | |
| V _{(BR)DSS} | Drain-Source Breakdown Voltage | I _D = 250μA, V _{GS} = 0V | 40 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 32V, V _{GS} = 0V | - | - | 1.0 | μA |
| I _{GSS} | Gate-Body Leakage Current | V _{DS} = 0V, V _{GS} = ±20V | - | - | ±100 | nA |
| On Characteristics | | | | | | |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 250μA | 1.2 | 1.8 | 2.3 | V |
| R _{DS(ON)} | Static Drain-Source ON-Resistance ⁽⁴⁾ | V _{GS} = 10V, I _D = 20A | - | 0.8 | 1.1 | mΩ |
| | | V _{GS} = 4.5V, I _D = 15A | - | 1.2 | 1.7 | mΩ |
| Dynamic Characteristics | | | | | | |
| R _g | Gate Resistance | f = 1MHz | - | 0.9 | - | Ω |
| C _{iss} | Input Capacitance | V _{GS} = 0V, V _{DS} = 20V, f = 1MHz | 4720 | 6608 | 8920 | pF |
| C _{oss} | Output Capacitance | | 1995 | 2793 | 3770 | pF |
| C _{rss} | Reverse Transfer Capacitance | | 167 | 234 | 316 | pF |
| Q _g | Total Gate Charge | V _{GS} = 0 to 10V V _{DS} = 20V, I _D = 20A | 77 | 108 | 146 | nC |
| Q _{gs} | Gate Source Charge | | 14 | 19 | 26 | nC |
| Q _{gd} | Gate Drain("Miller") Charge | | 16 | 22 | 29 | nC |
| | | | | | | |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-On DelayTime | V _{GS} = 10V, V _{DD} = 20V I _D = 20A, R _{GEN} = 3Ω | - | 17 | - | ns |
| t _r | Turn-On Rise Time | | - | 33 | - | ns |
| t _{d(off)} | Turn-Off DelayTime | | - | 68 | - | ns |
| t _f | Turn-Off Fall Time | | - | 26 | - | ns |
| Body Diode Characteristics | | | | | | |
| I _S | Maximum Continuous Body Diode Forward Current | | - | - | 297 | A |
| I _{SM} | Maximum Pulsed Body Diode Forward Current | | - | - | 1188 | A |
| V _{SD} | Body Diode Forward Voltage | V _{GS} = 0V, I _S = 20A | - | | 1.2 | V |
| trr | Body Diode Reverse Recovery Time | I _F = 20A, di/dt = 100A/us | 45 | 63 | 85 | ns |
| Qrr | Body Diode Reverse Recovery Charge | | - | 93 | - | nC |

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 15\text{V}$, $V_{GS} = 10\text{V}$, $R_G = 25\Omega$, $L = 3\text{mH}$, $I_{AS} = 21.7\text{A}$, $V_{DD} = 0\text{V}$ during time in avalanche.
 3. $R_{\theta JA}$ is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB.
 4. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

Typical Performance Characteristics

Figure 1: Power De-rating

Figure 2: Current De-rating

Figure 3: Normalized Maximum Transient Thermal Impedance

Figure 4: Peak Current Capacity


Typical Performance Characteristics

Figure 5: Output Characteristics

Figure 6: Typical Transfer Characteristics

Figure 7: On-resistance vs. Drain Current

Figure 8: Body Diode Characteristics

Figure 9: Gate Charge Characteristics

Figure 10: Capacitance Characteristics


Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

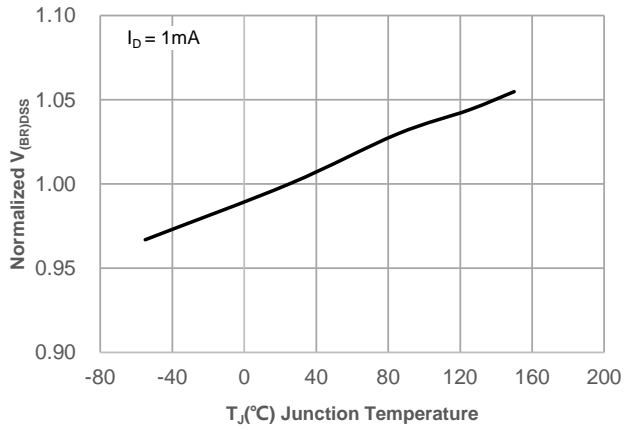


Figure 12: Normalized on Resistance vs. Junction Temperature

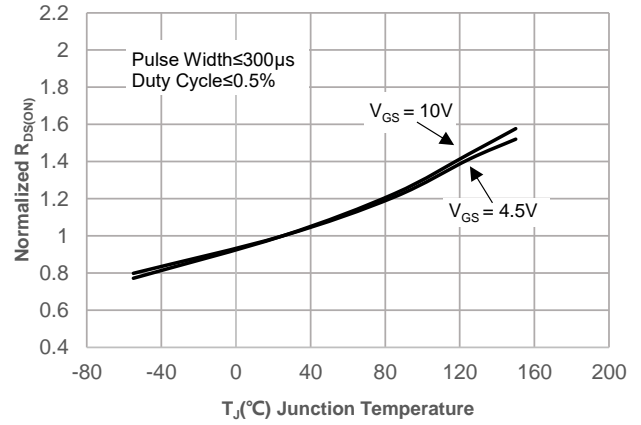


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

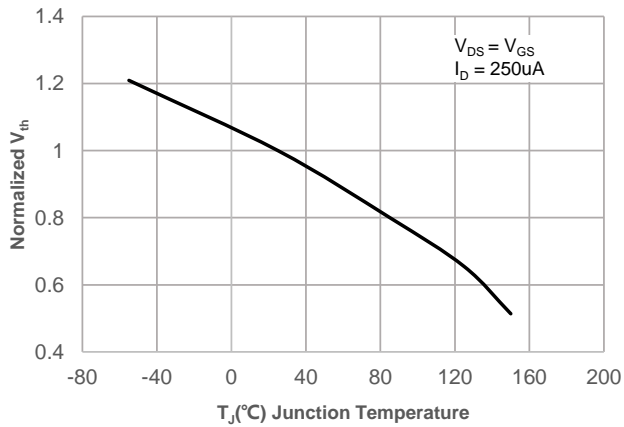


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

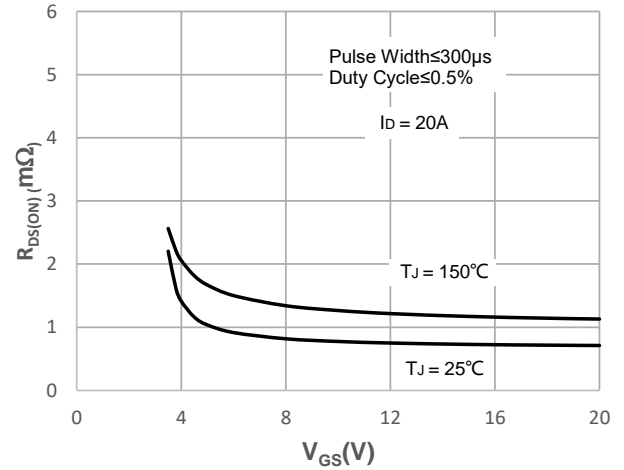
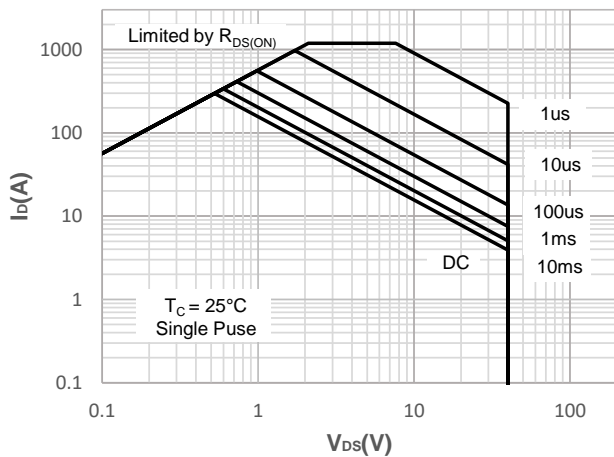


Figure 15: Maximum Safe Operating Area



Test Circuit

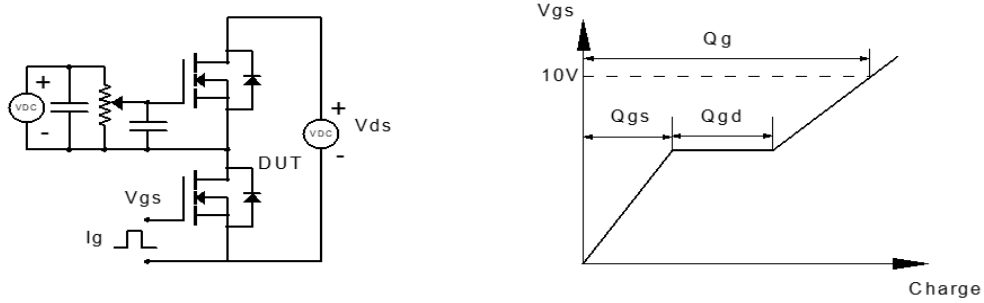


Figure 1: Gate Charge Test Circuit & Waveform

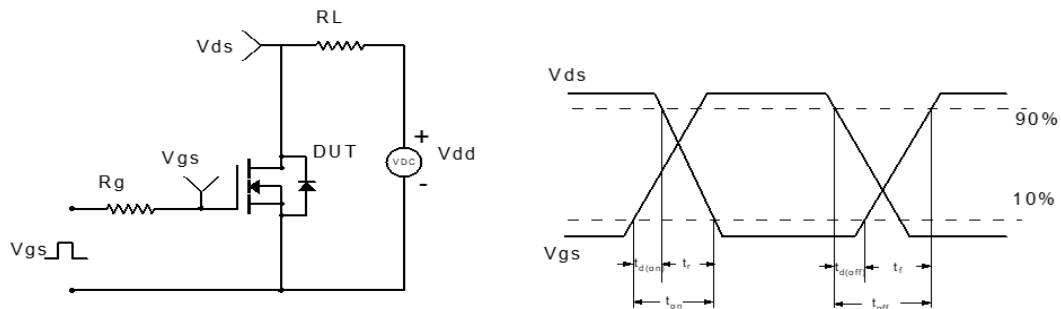


Figure 2: Resistive Switching Test Circuit & Waveform

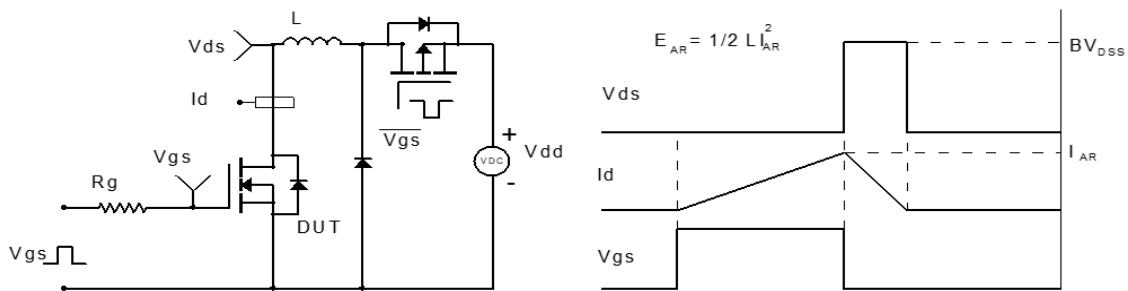


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

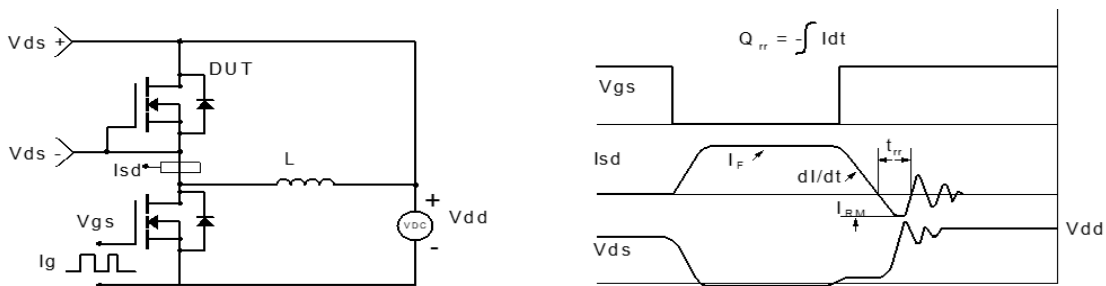
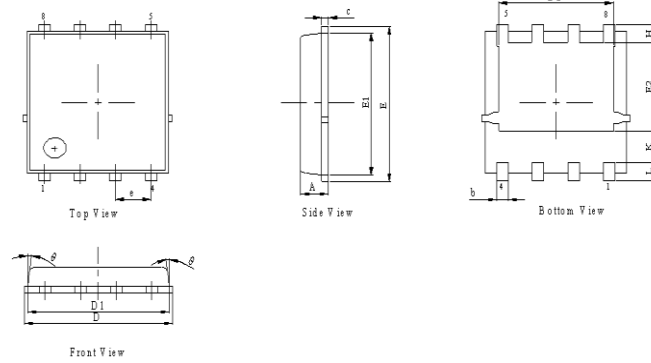


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(PDFN5x6-8L)

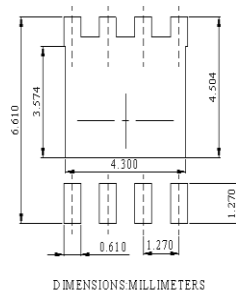
Package Outline



- NOTES:
1. Dimension and tolerance per ASME Y 14.5M, 1994.
 2. All dimensions in millimeter (angle in degree).
 3. Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.

| DIM. | MILLIMETER | | |
|------|------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.9 | 1 | 1.15 |
| b | 0.31 | 0.41 | 0.51 |
| C | 0.24 | 0.32 | 0.4 |
| D | 5 | 5.2 | 5.4 |
| D1 | 4.95 | 5.05 | 5.15 |
| D2 | 4 | 4.1 | 4.2 |
| E | 6.05 | 6.15 | 6.25 |
| E1 | 5.5 | 5.6 | 5.7 |
| E2 | 3.42 | 3.53 | 3.63 |
| e | 1.27BSC | | |
| H | 0.6 | 0.7 | 0.8 |
| L | 0.5 | 0.7 | 0.8 |
| K | 1.23 REF | | |
| O | | | 10 |

Recommended Soldering Footprint



DIMENSIONS: MILLIMETERS

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