

100V, 90A, 7.4mΩ N-channel Power SGT MOSFET

JMSH1008PGQ

Features

- Ultra-low ON-resistance, R_{DS(ON)}
- Low Gate Charge
- 100% UIS Tested
- 100% ΔV_{ds} Tested
- Halogen-free; RoHS-compliant
- AEC-Q101 Qualified

Applications

- Load Switch
- PWM Application
- General Automotive Application

Product Summary

| Parameters | Value | Unit |
|---|-------|------|
| V _{DSS} | 100 | V |
| V _{GS(th)_Typ} | 3.1 | V |
| I _D (@V _{GS} =10V) | 90 | A |
| R _{DS(ON)_Typ} (@V _{GS} =10V) | 7.4 | mΩ |

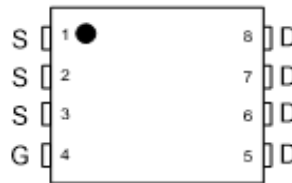
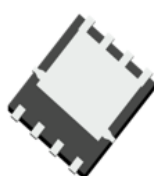


Top View

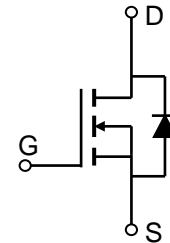


PDFN5X6-8L

Bottom View



Pin Assignment



Schematic Diagram

Ordering Information

| Device | Marking | MSL | Form | Package | Reel(pcs) | Per Carton (pcs) |
|----------------|----------|-----|-----------|------------|-----------|------------------|
| JMSH1008PGQ-13 | SH1008PQ | 1 | Tape&Reel | PDFN5x6-8L | 5000 | 50000 |

Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

| Symbol | Parameter | Value | Unit |
|-----------------------------------|---|------------------------|------|
| V _{DS} | Drain-to-Source Voltage | 100 | V |
| V _{GS} | Gate-to-Source Voltage | ±20 | V |
| I _D | Continuous Drain Current | T _C = 25°C | 90 |
| | | T _C = 100°C | 64 |
| I _{DM} | Pulsed Drain Current ⁽¹⁾ | Refer to Fig.4 | A |
| E _{AS} | Single Pulsed Avalanche Energy ⁽²⁾ | 265 | mJ |
| P _D | Power Dissipation | T _C = 25°C | 150 |
| | | T _C = 100°C | 75 |
| T _J , T _{STG} | Junction & Storage Temperature Range | -55 to 175 | °C |

Thermal Characteristics

| Symbol | Parameter | Max | Unit |
|------------------|--|-----|------|
| R _{θJA} | Thermal Resistance, Junction to Ambient ⁽³⁾ | 44 | °C/W |
| R _{θJC} | Thermal Resistance, Junction to Case | 1.0 | |

**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 | $I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$ | 100 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 80\text{V}$, $V_{GS} = 0\text{V}$ | - | - | 1.0 | μA |
| I_{GSS} | Gate-Body Leakage Current | $V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$ | - | - | ± 100 | nA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$ | 2.1 | 3.1 | 4.0 | V |
| $R_{DS(ON)}$ | Static Drain-Source ON-Resistance ⁽⁴⁾ | $V_{GS} = 10\text{V}$, $I_D = 20\text{A}$ | - | 7.4 | 9.6 | m Ω |
| Dynamic Characteristics | | | | | | |
| R_g | Gate Resistance | $f = 1\text{MHz}$ | - | 1.1 | - | Ω |
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}$, $V_{DS} = 50\text{V}$, $f = 1\text{MHz}$ | 1709 | 2393 | 3230 | pF |
| C_{oss} | Output Capacitance | | 305 | 426 | 576 | pF |
| C_{rss} | Reverse Transfer Capacitance | | 16 | 22 | 29 | pF |
| Q_g | Total Gate Charge | $V_{GS} = 0$ to 10V $V_{DS} = 50\text{V}$, $I_D = 20\text{A}$ | 28 | 39 | 53 | nC |
| Q_{gs} | Gate Source Charge | | - | 13 | 17 | nC |
| Q_{gd} | Gate Drain("Miller") Charge | | - | 10 | 13 | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-On DelayTime | $V_{GS} = 10\text{V}$, $V_{DD} = 50\text{V}$ $I_D = 20\text{A}$, $R_{GEN} = 3\Omega$ | - | 14 | - | ns |
| t_r | Turn-On Rise Time | | - | 22 | - | ns |
| $t_{d(off)}$ | Turn-Off DelayTime | | - | 27 | - | ns |
| t_f | Turn-Off Fall Time | | - | 10 | - | ns |
| Body Diode Characteristics | | | | | | |
| I_S | Maximum Continuous Body Diode Forward Current | | - | - | 90 | A |
| I_{SM} | Maximum Pulsed Body Diode Forward Current | | - | - | 360 | A |
| V_{SD} | Body Diode Forward Voltage | $V_{GS} = 0\text{V}$, $I_S = 20\text{A}$ | - | | 1.2 | V |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F = 15\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$ | 42 | 59 | 79 | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | | - | 126 | - | nC |

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 50\text{V}$, $V_G = 10\text{V}$, $R_G = 25\text{ohm}$, $L = 3\text{mH}$, $I_{AS} = 13.3\text{A}$, $V_{DD} = 0\text{V}$ during time in avalanche.
 3. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 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

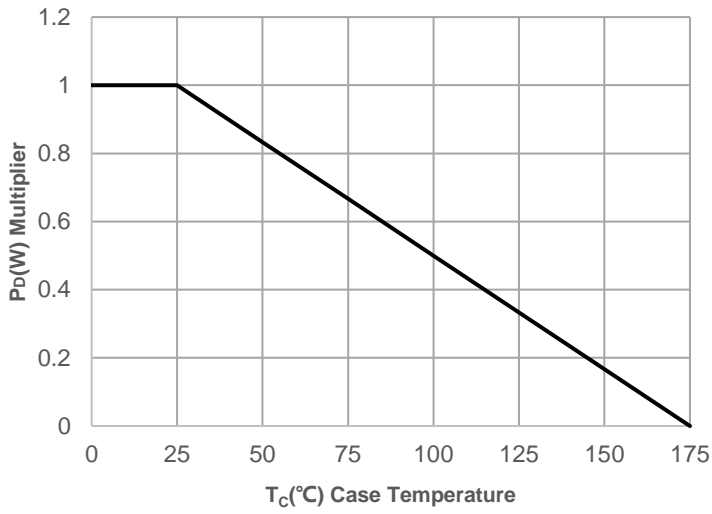


Figure 2: Current De-rating

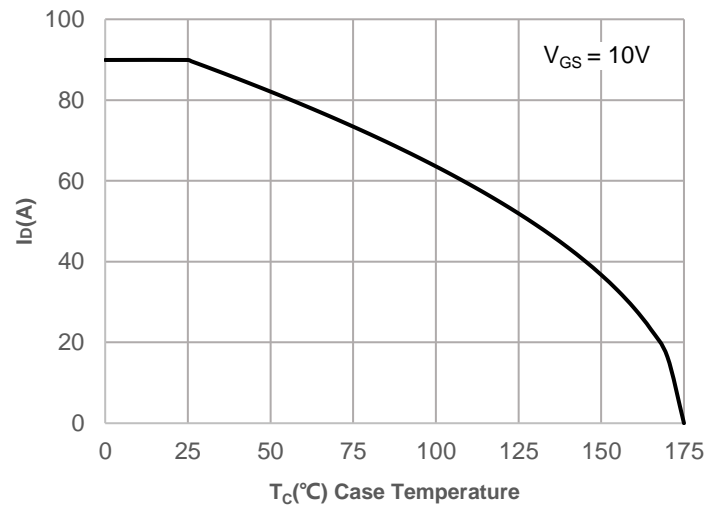


Figure 3: Normalized Maximum Transient Thermal Impedance

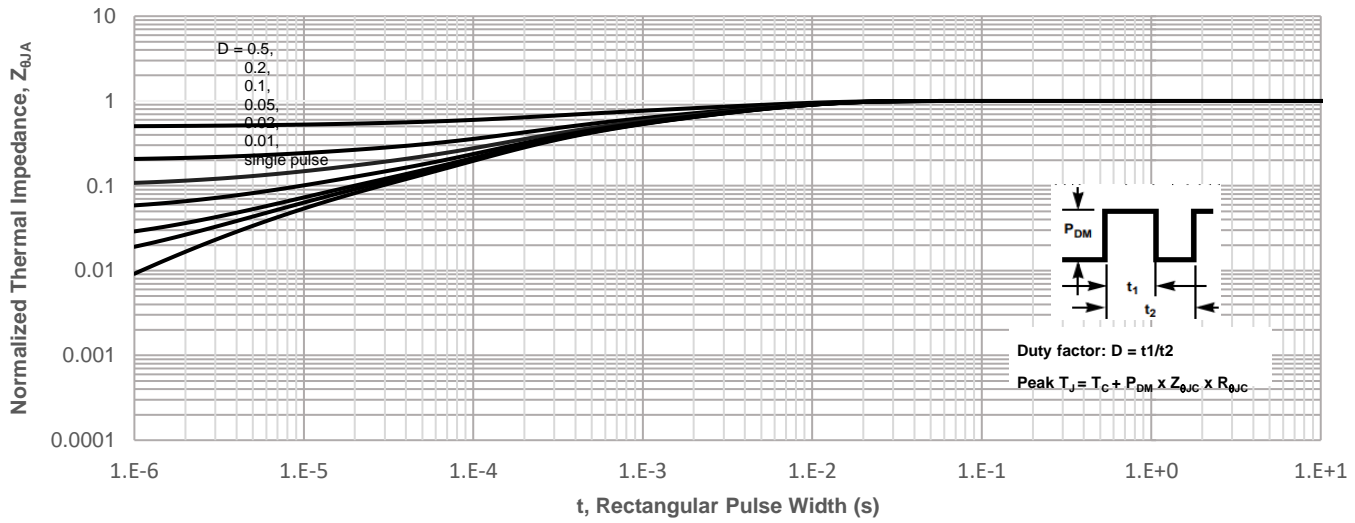
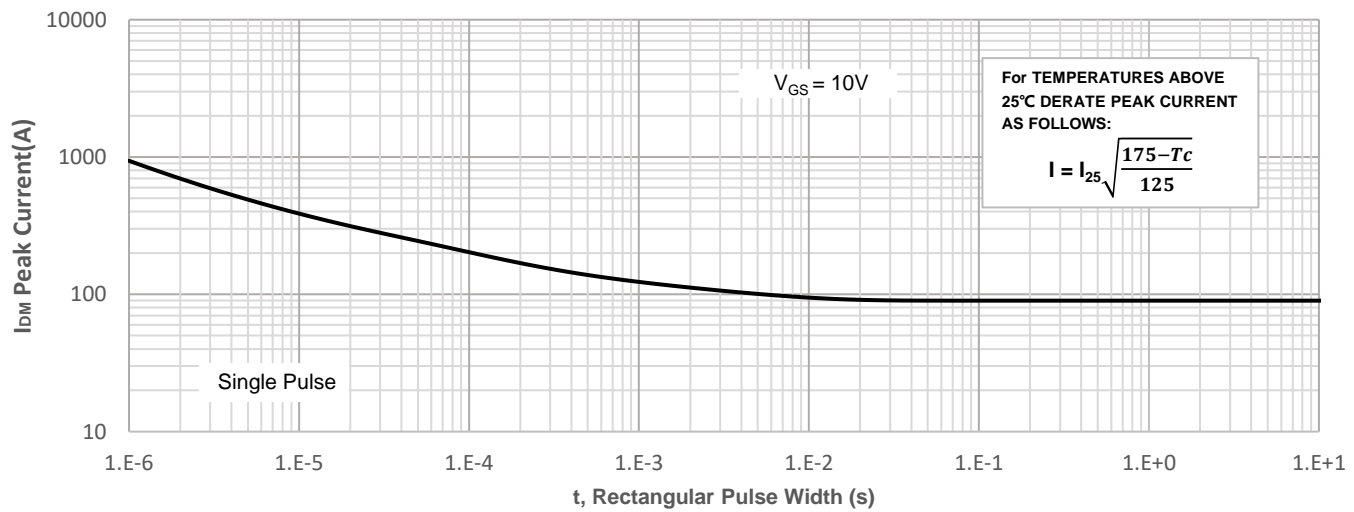
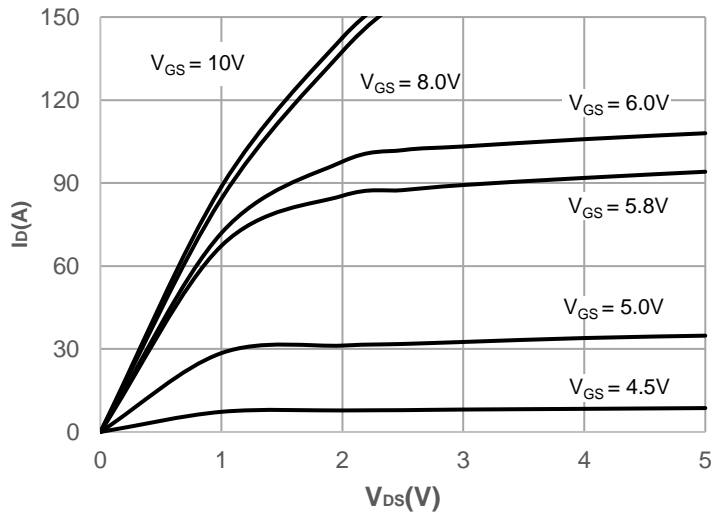
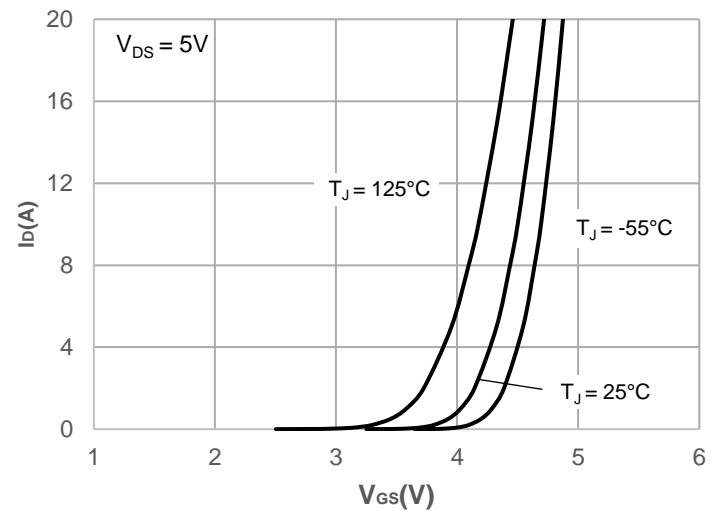
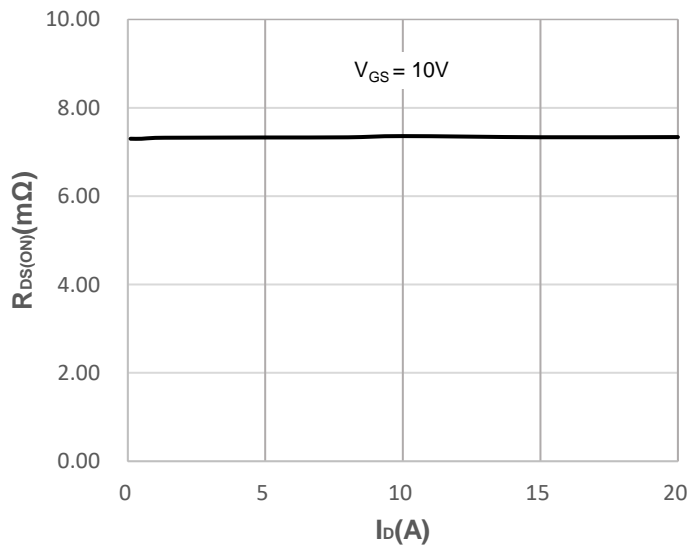
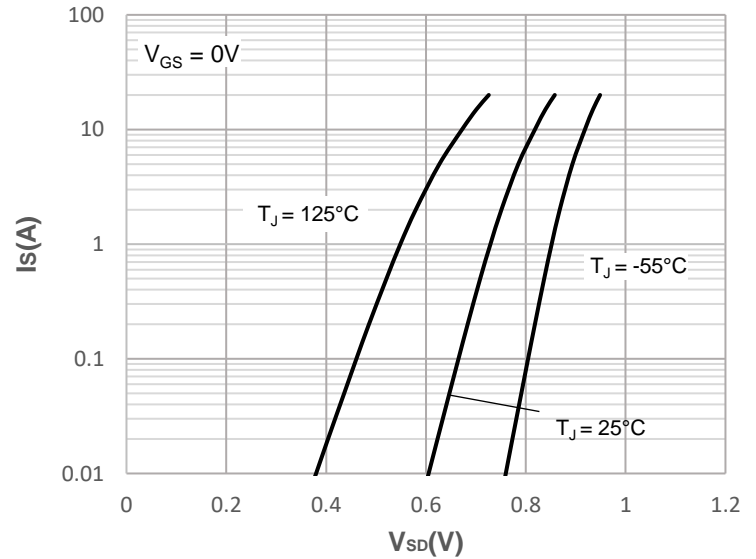
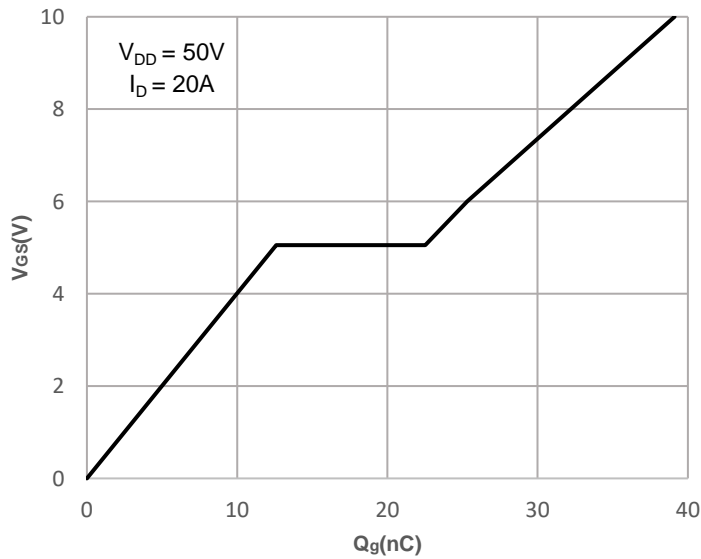
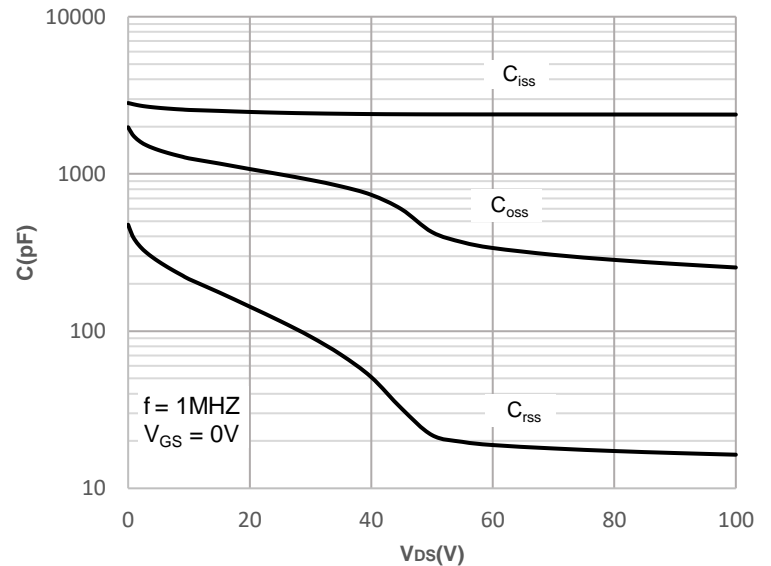


Figure 4: Peak Current Capacity



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

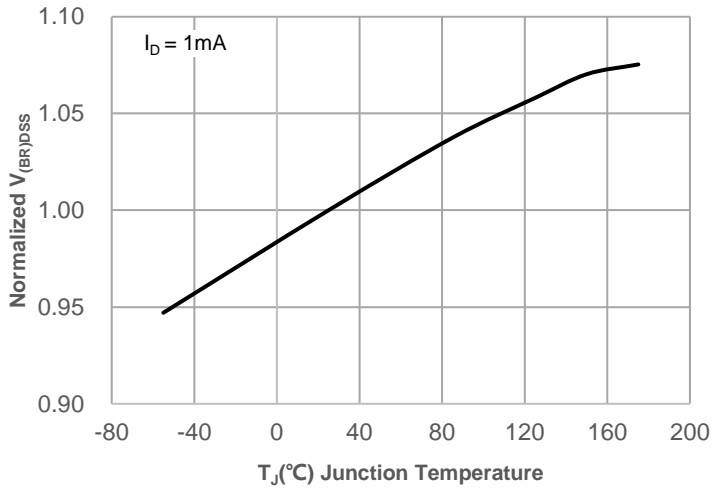


Figure 12: Normalized on Resistance vs. Junction Temperature

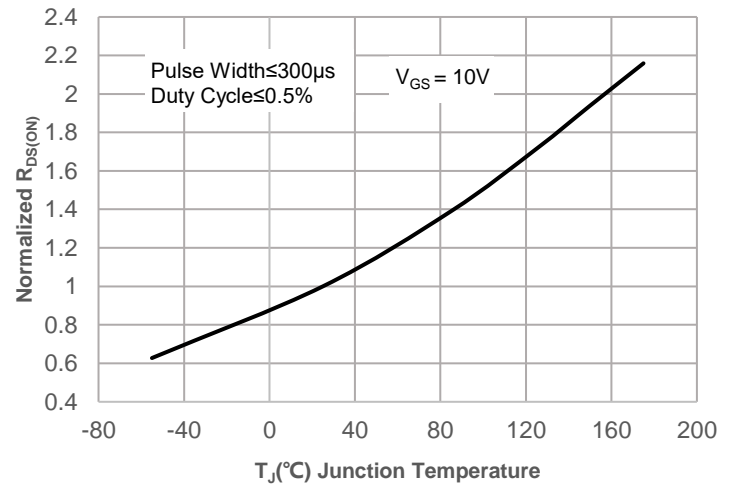


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

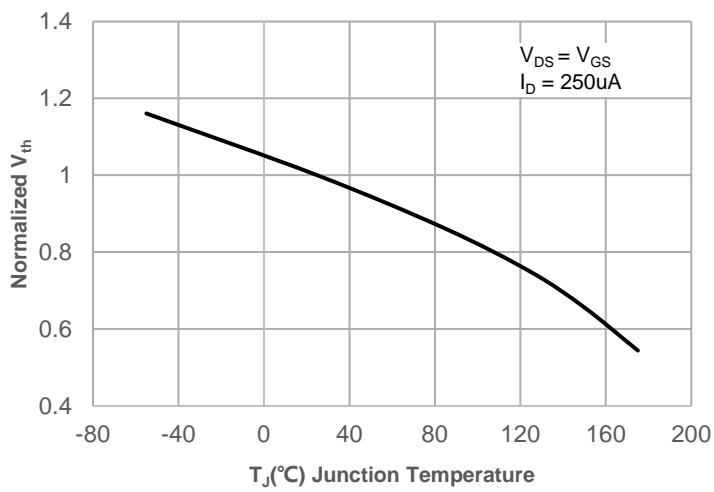


Figure 14: R_DS(on) vs. V_GS

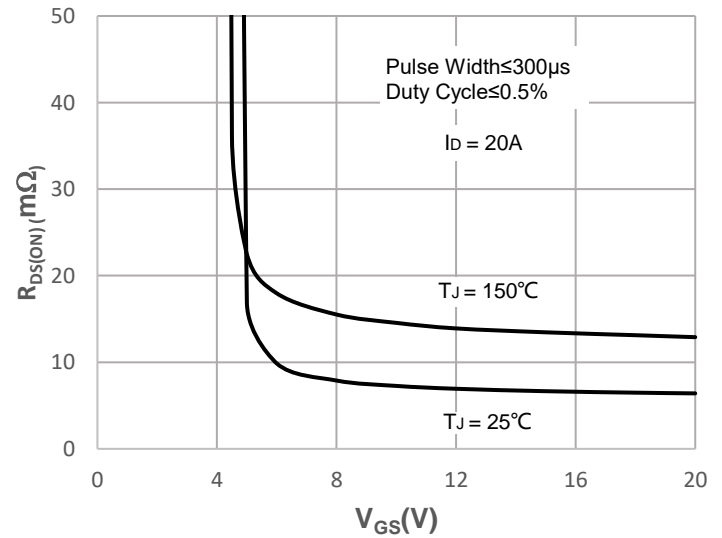
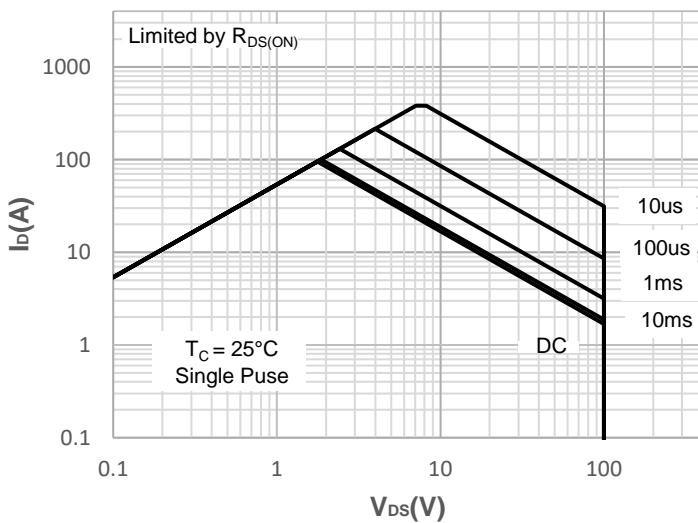


Figure 15: Maximum Safe Operating Area



Test Circuit

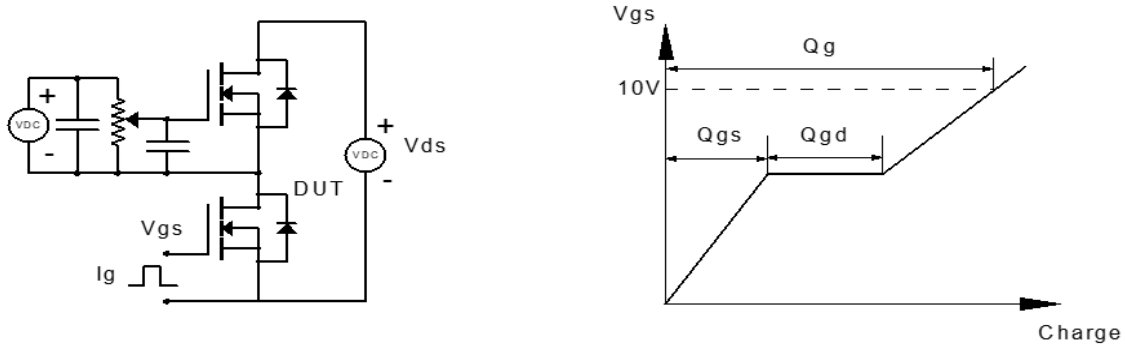


Figure 1: Gate Charge Test Circuit & Waveform

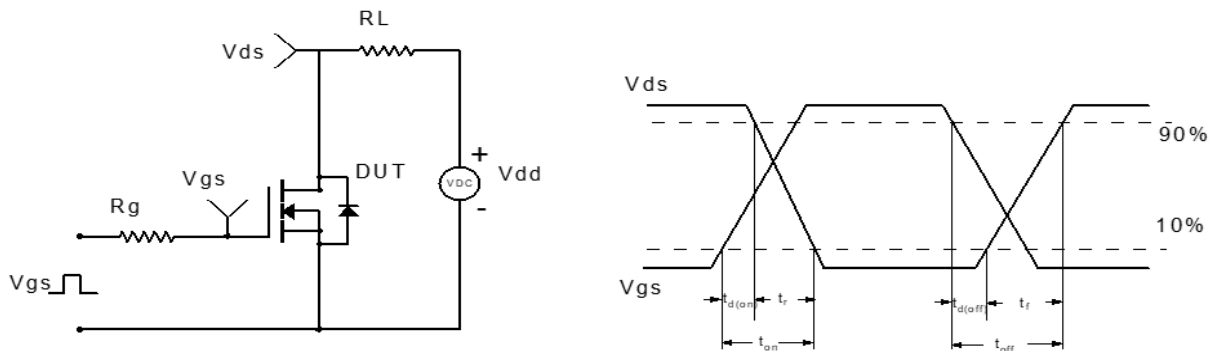


Figure 2: Resistive Switching Test Circuit & Waveform

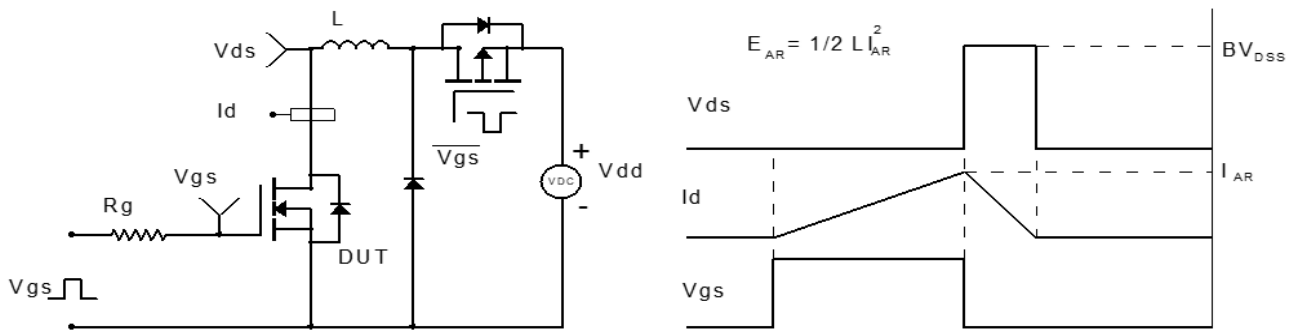


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

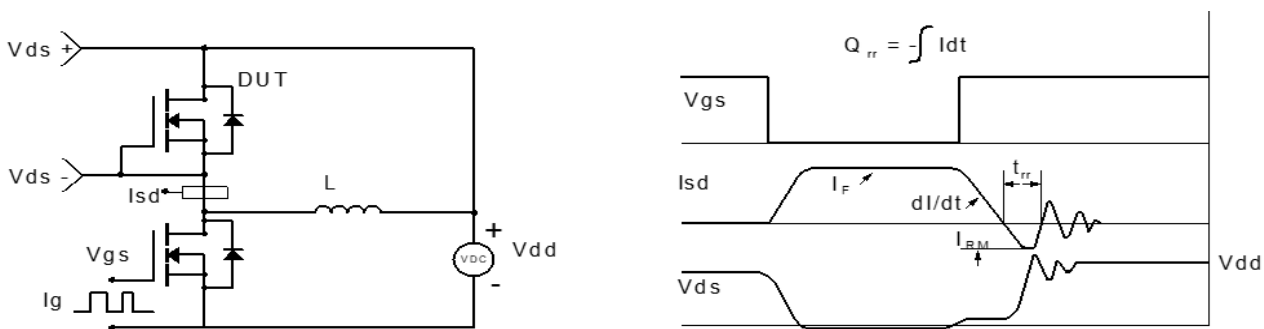
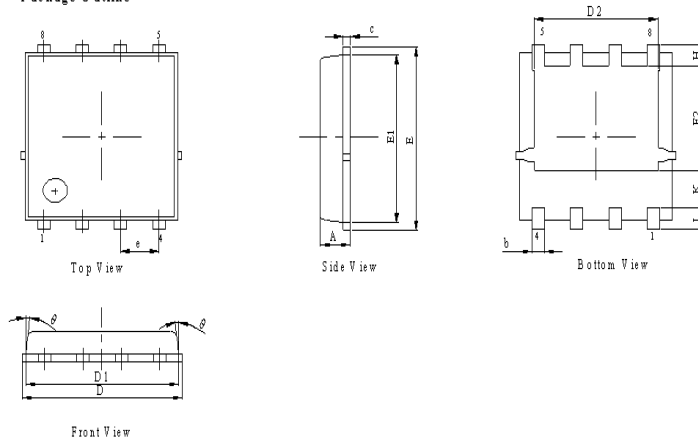


Figure 4: Diode Recovery Test Circuit & Waveform



Package Mechanical Data(PDFN5X6-8L)

Package Outline

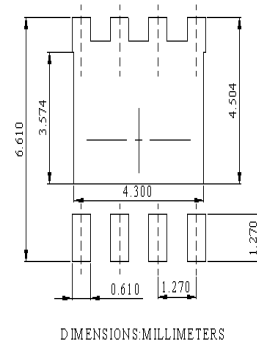


NOTES:

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



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