

-30V, -50A, 8.1mΩ P-channel Power Trench MOSFET
JMTQ080P03A
Features

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

Applications

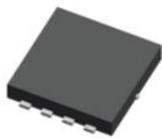
- Load Switch
- PWM Application
- Power Management

Product Summary

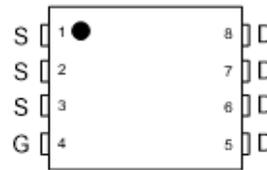
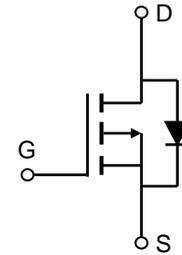
| Parameters | Value | Unit |
|----------------------------------|-------|------|
| V_{DSS} | -30 | V |
| $V_{GS(th)_Typ}$ | -1.5 | V |
| $I_D(@V_{GS}=-10V)$ | -50 | A |
| $R_{DS(ON)_Typ}(@V_{GS}=-10V)$ | 5.9 | mΩ |
| $R_{DS(ON)_Typ}(@V_{GS}=-4.5V)$ | 8.1 | mΩ |



Top View



Bottom View


Pin Assignment

Schematic Diagram
PDFN3X3-8L
Ordering Information

| Device | Marking | MSL | Form | Package | Reel(pcs) | Per Carton (pcs) |
|-------------|----------|-----|-----------|------------|-----------|------------------|
| JMTQ080P03A | Q080P03A | 1 | Tape&Reel | PDFN3x3-8L | 5000 | 50000 |

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

| Symbol | Parameter | Value | Unit |
|----------------|---|---------------------------|------------------|
| V_{DS} | Drain-to-Source Voltage | -30 | V |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current | $T_C = 25^\circ\text{C}$ | -50 |
| | | $T_C = 100^\circ\text{C}$ | -32 |
| I_{DM} | Pulsed Drain Current ⁽¹⁾ | Refer to Fig.4 | A |
| E_{AS} | Single Pulsed Avalanche Energy ⁽²⁾ | 133 | mJ |
| P_D | Power Dissipation | $T_C = 25^\circ\text{C}$ | 30 |
| | | $T_C = 100^\circ\text{C}$ | 12 |
| 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⁾ | 41 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 4.2 | |

**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 | $I_D = -250\mu\text{A}$, $V_{GS} = 0\text{V}$ | -30 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = -30\text{V}$, $V_{GS} = 0\text{V}$ | - | - | -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 | $V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$ | -1.1 | -1.5 | -2.0 | V |
| $R_{DS(ON)}$ | Static Drain-Source ON-Resistance ⁽⁴⁾ | $V_{GS} = -10\text{V}$, $I_D = -20\text{A}$ | - | 5.9 | 7.4 | m Ω |
| | | $V_{GS} = -4.5\text{V}$, $I_D = -10\text{A}$ | - | 8.1 | 10.1 | m Ω |
| Dynamic Characteristics | | | | | | |
| R_g | Gate Resistance | $f = 1\text{MHz}$ | - | 11.5 | - | Ω |
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}$, $V_{DS} = -15\text{V}$, $f = 1\text{MHz}$ | 2405 | 3366 | 4545 | pF |
| C_{oss} | Output Capacitance | | 336 | 471 | 635 | pF |
| C_{rss} | Reverse Transfer Capacitance | | 232 | 324 | 438 | pF |
| Q_g | Total Gate Charge | $V_{GS} = 0$ to -10V $V_{DS} = -15\text{V}$, $I_D = -10\text{A}$ | 42 | 59 | 80 | nC |
| Q_{gs} | Gate Source Charge | | - | 9.5 | - | nC |
| Q_{gd} | Gate Drain("Miller") Charge | | 10 | 14 | 19 | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-On DelayTime | $V_{GS} = -10\text{V}$, $V_{DD} = -15\text{V}$ $I_D = -10\text{A}$, $R_{GEN} = 2.7\Omega$ | - | 6.8 | - | ns |
| t_r | Turn-On Rise Time | | - | 5.7 | - | ns |
| $t_{d(off)}$ | Turn-Off DelayTime | | - | 112 | - | ns |
| t_f | Turn-Off Fall Time | | - | 78 | - | ns |
| Body Diode Characteristics | | | | | | |
| I_S | Maximum Continuous Body Diode Forward Current | | - | - | -50 | A |
| I_{SM} | Maximum Pulsed Body Diode Forward Current | | - | - | -202 | 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 | $I_F = -10\text{A}$, $di/dt = 100\text{A/us}$ | 15 | 21 | 29 | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | | - | 9.8 | - | nC |

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J=25^\circ\text{C}$, $V_{DD}=-15\text{V}$, $V_{GS}=-10\text{V}$, $R_G=25\text{ohm}$, $L=0.5\text{mH}$, $I_{AS}=-23.1\text{A}$, $V_{DD}=0\text{V}$ 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

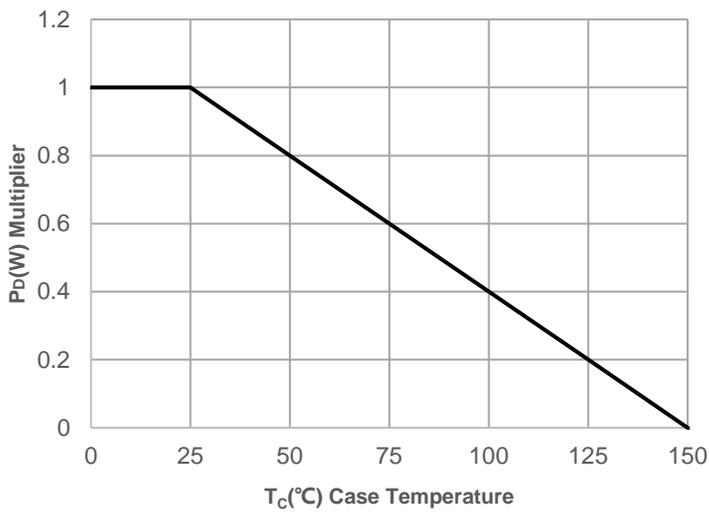


Figure 2: Current De-rating

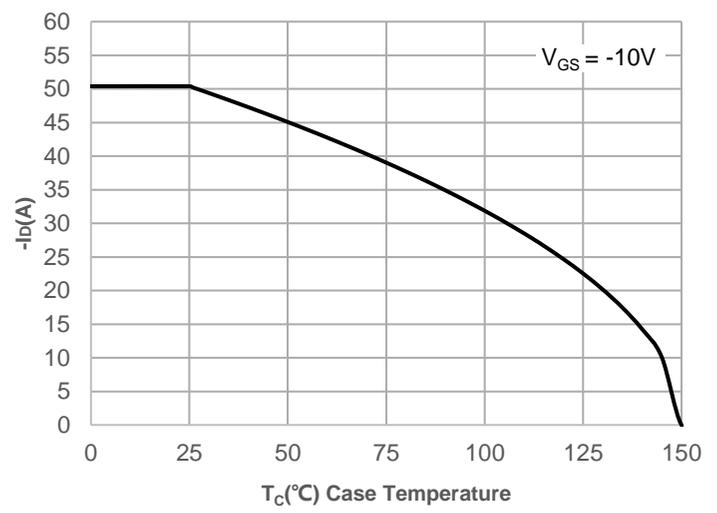


Figure 3: Normalized Maximum Transient Thermal Impedance

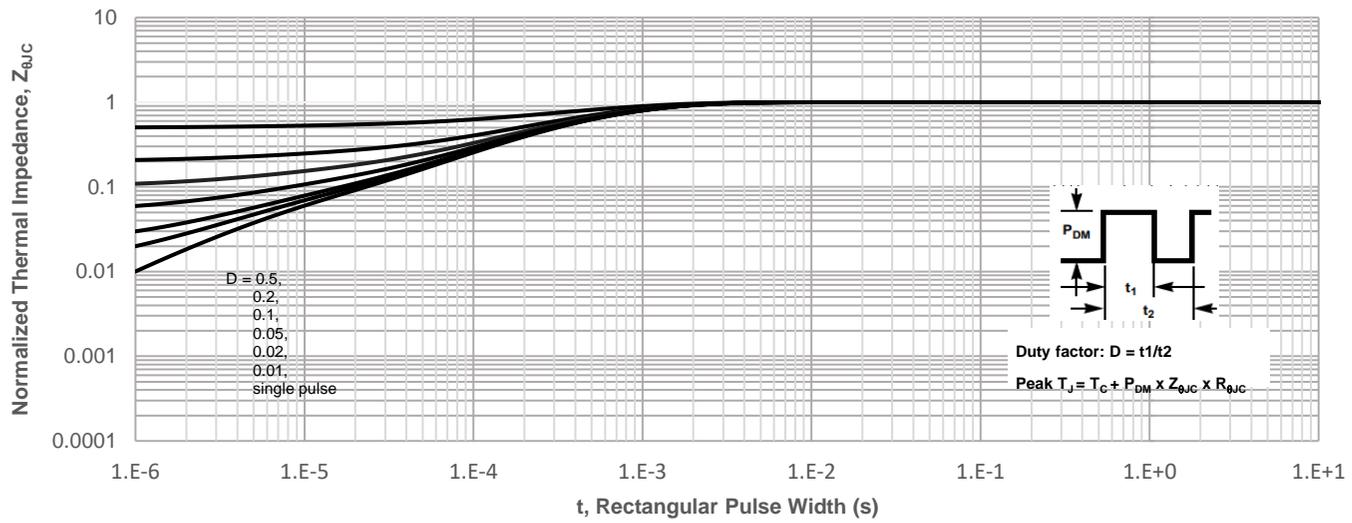
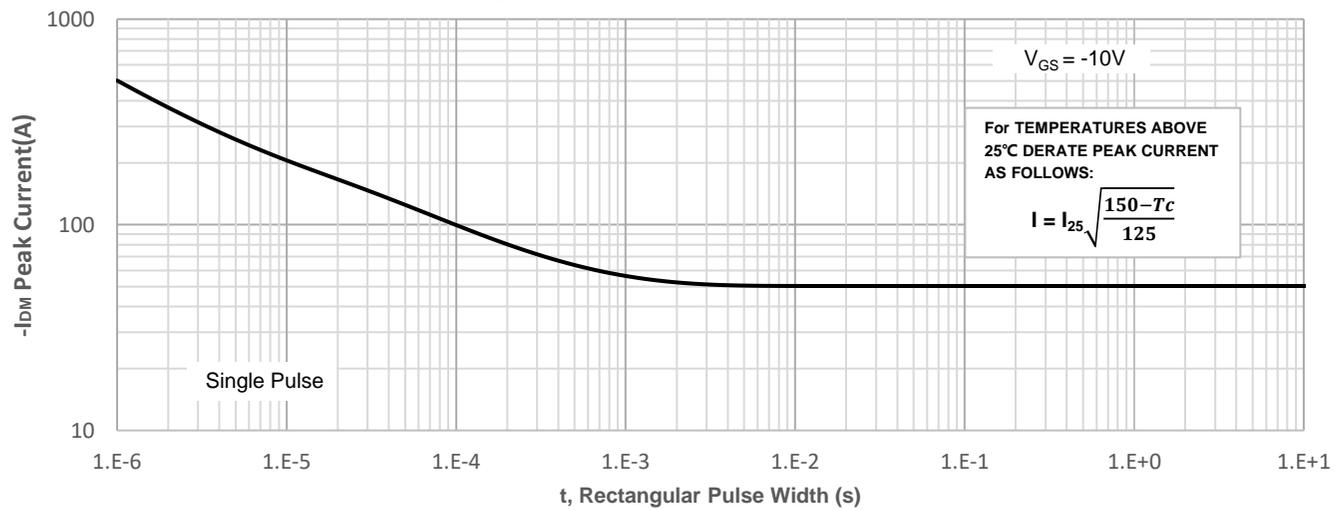
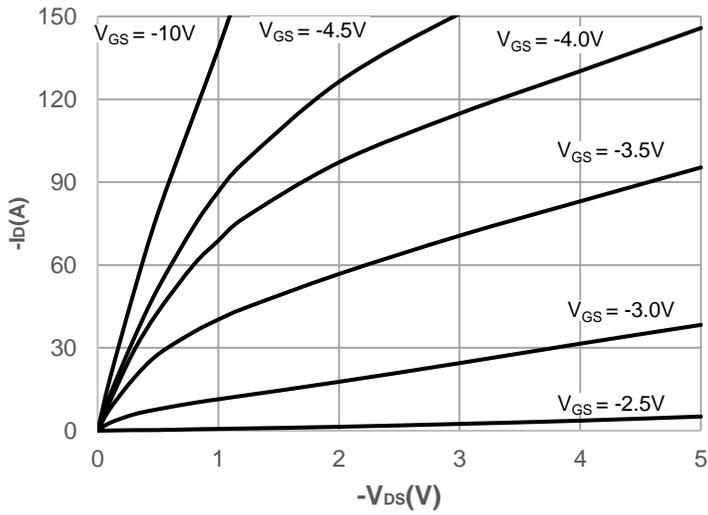
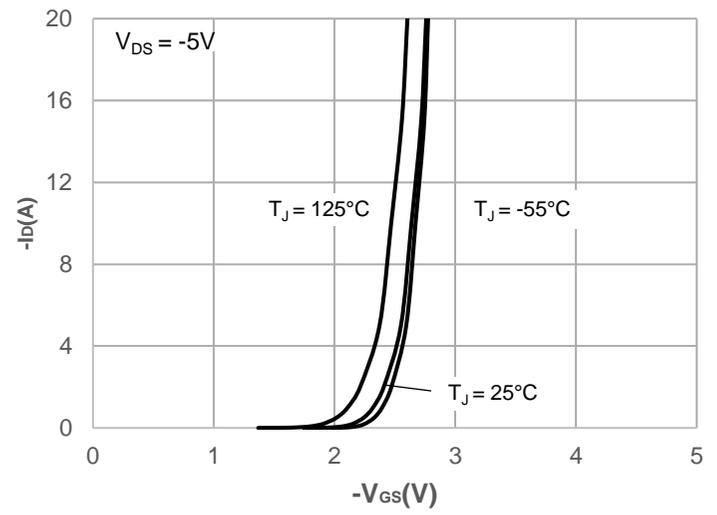
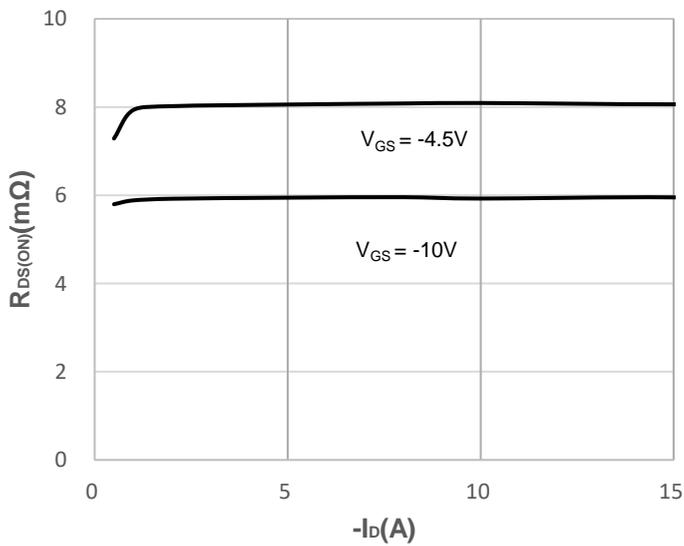
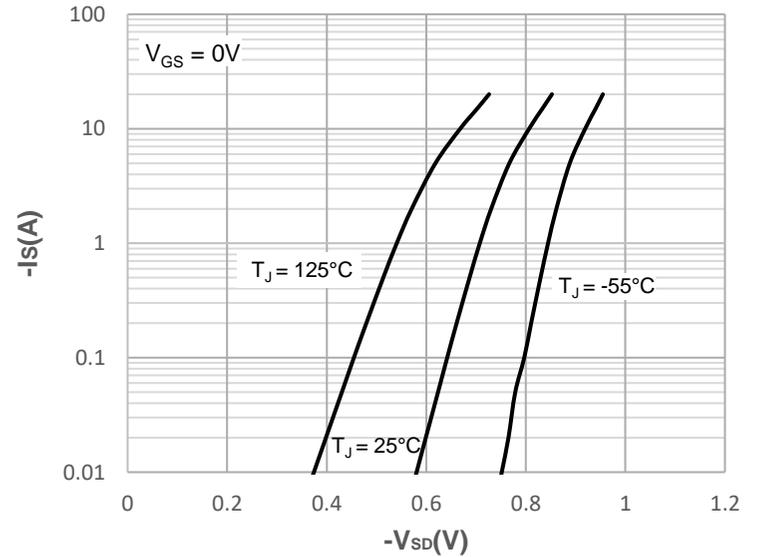
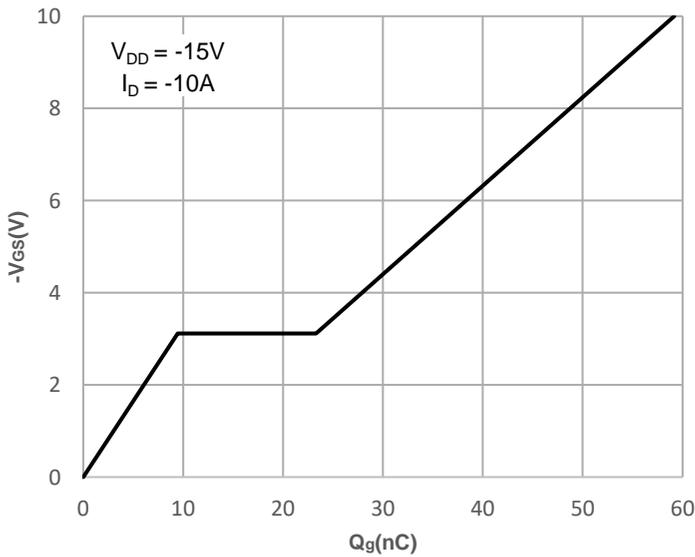
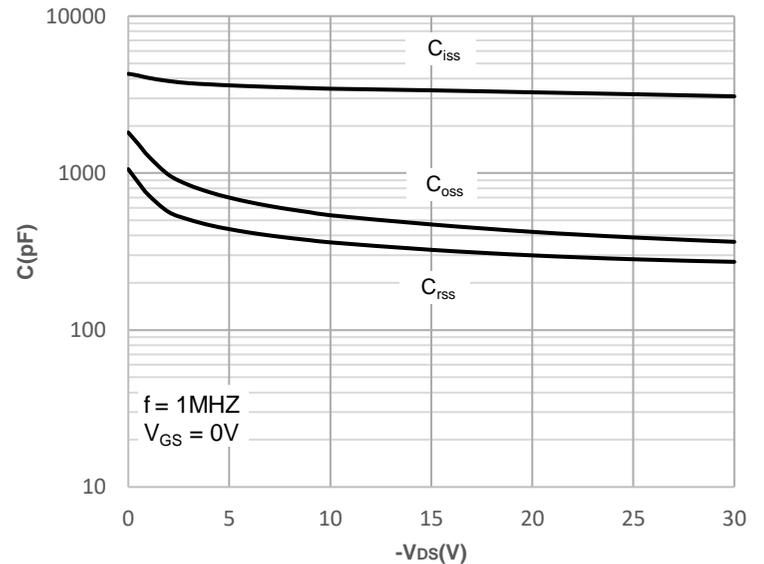


Figure 4: Peak Current Capacity



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

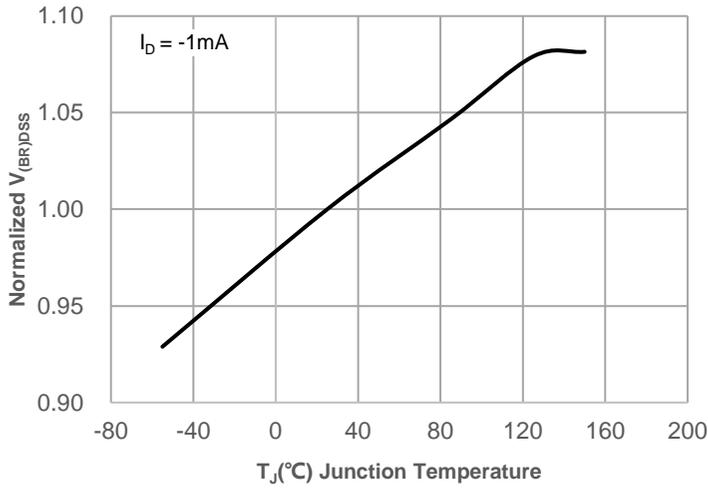


Figure 12: Normalized on Resistance vs. Junction Temperature

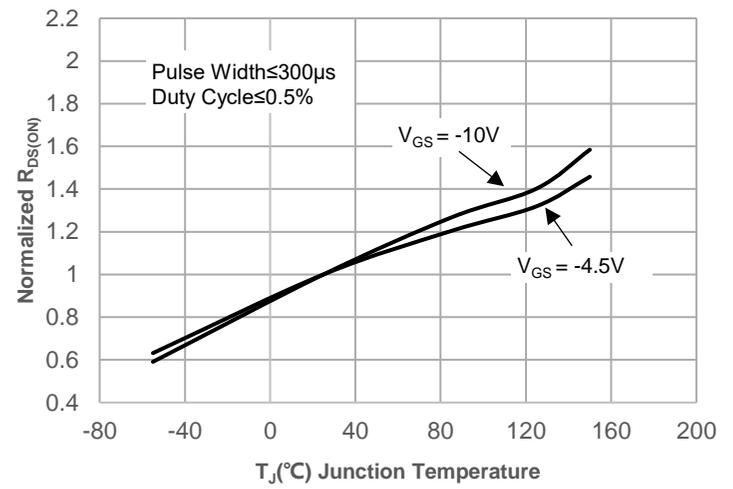


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

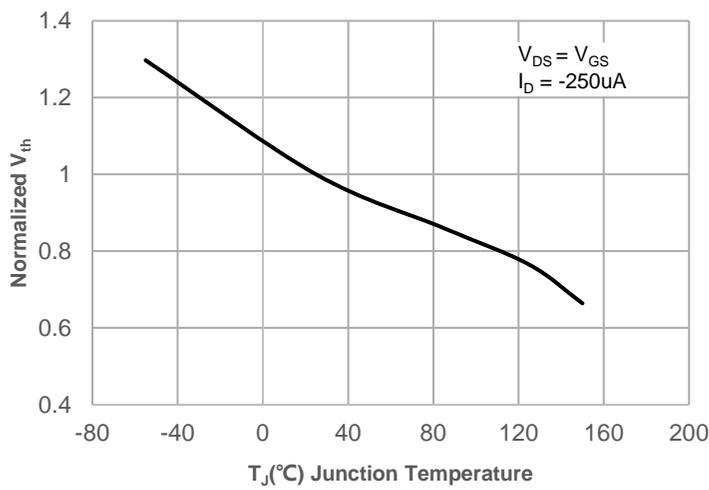


Figure 14: R_DS(ON) vs. V_GS

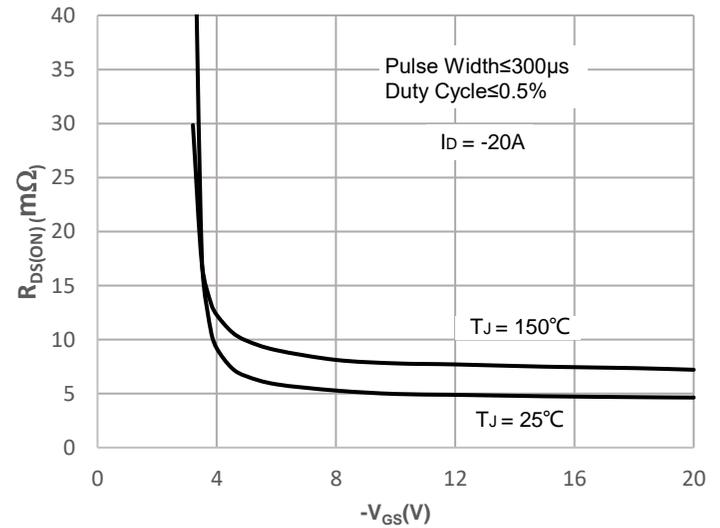
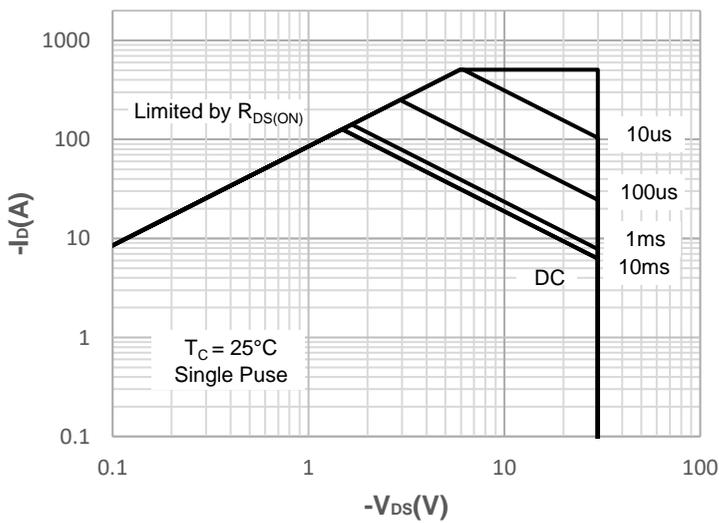


Figure 15: Maximum Safe Operating Area



Test Circuit

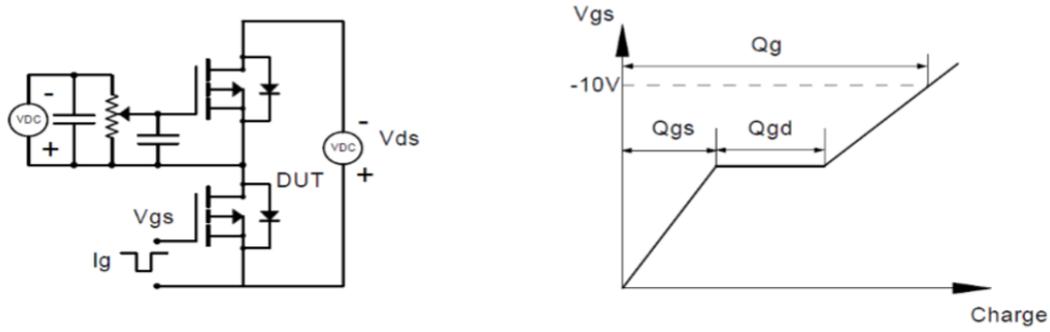


Figure 1: Gate Charge Test Circuit & Waveform

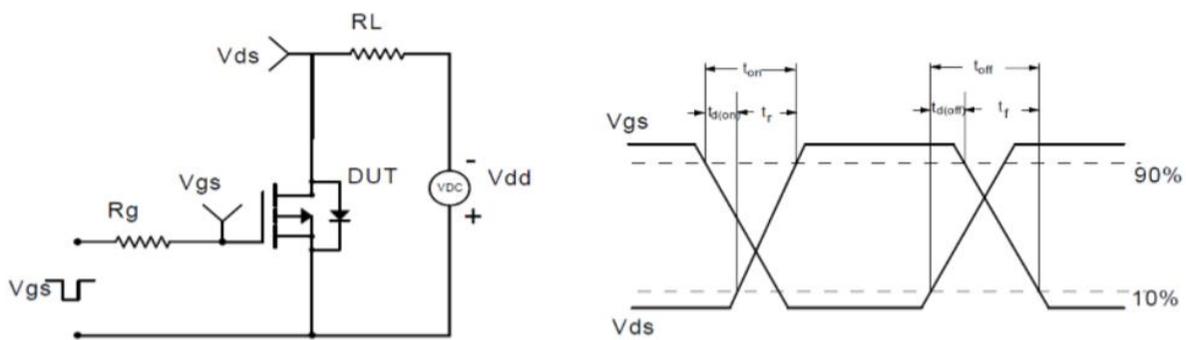


Figure 2: Resistive Switching Test Circuit & Waveform

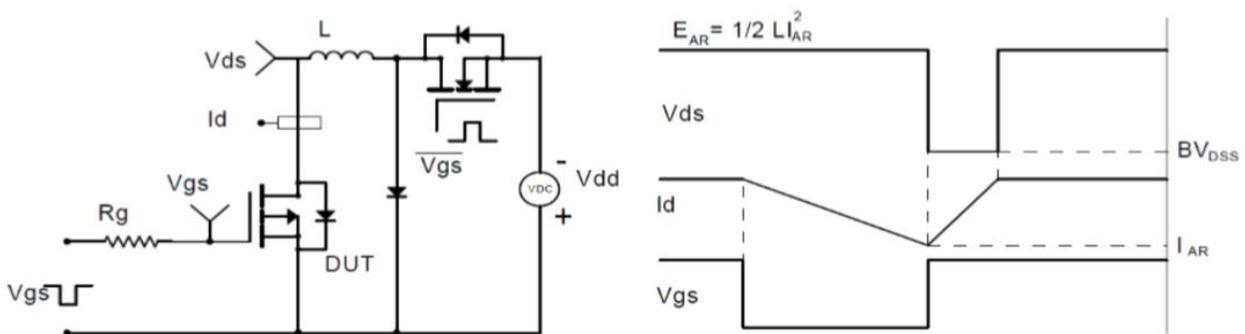


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

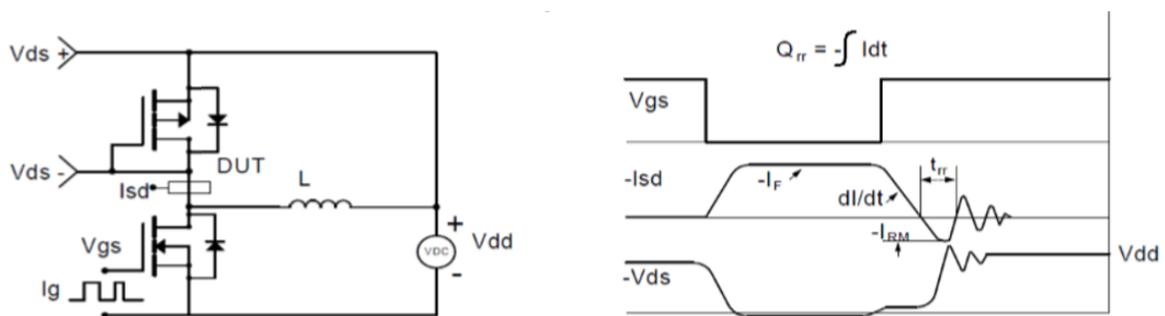
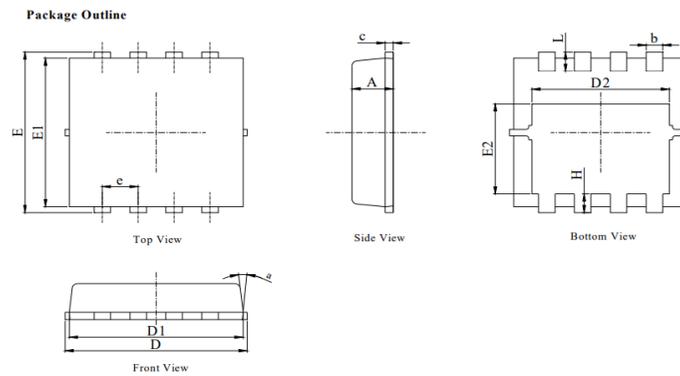


Figure 4: Diode Recovery Test Circuit & Waveform

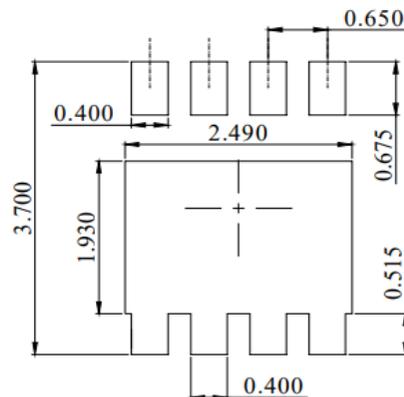


Package Mechanical Data(PDFN3x3-8L)


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,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 | 0.70 | 0.75 | 0.80 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.10 | 0.20 | 0.25 |
| D | 3.00 | 3.15 | 3.25 |
| D1 | 2.95 | 3.05 | 3.15 |
| D2 | 2.39 | 2.49 | 2.59 |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 2.95 | 3.05 | 3.15 |
| E2 | 1.70 | 1.80 | 1.90 |
| e | 0.65 BSC | | |
| H | 0.30 | 0.40 | 0.50 |
| L | 0.25 | 0.40 | 0.50 |
| a | --- | --- | 15° |

Recommended Soldering Footprint


DIMENSIONS:MILLIMETERS

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