## Description

# JMT N And P-Channel Enhancement Mode MOSFET

### Features

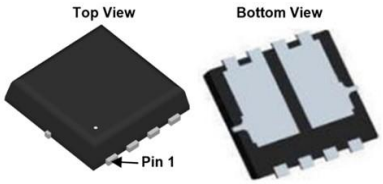
- N-Channel: 30V, 10A
  $R_{DS(ON)}$ < 18mΩ @ $V_{GS}$ = 10V
  $R_{DS(ON)}$ < 28mΩ @ $V_{GS}$ = 4.5V
- P-Channel: -30V, -8A
  $R_{DS(ON)}$ < 31mΩ @ $V_{GS}$ = -10V
  $R_{DS(ON)}$ < 49mΩ @ $V_{GS}$ = -4.5V
- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

### Application

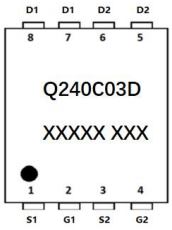
- Battery Protection
- Load Switch
- Power Management

RoHS

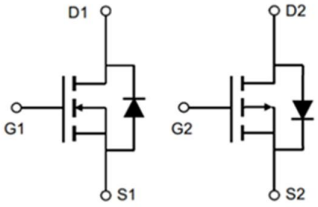
*100% UIS TESTED!*
*100% ΔVds TESTED!*




**PDFN3x3-8L-D**




**Marking and pin Assignment**




**Schematic Diagram**

## Package Marking and Ordering Information

| Device Marking | Device | OUTLINE | Device Package | Reel Size | Reel (PCS) | Per Carton (PCS) |
|---|---|---|---|---|---|---|
| Q240C03D | JMTQ240C03D | TAPING | PDFN3x3-8L-D | 13inch | 5000 | 50000 |

## Absolute Maximum Ratings ($T_C$=25℃ unless otherwise specified)

| Symbol | Parameter | | Max. N-Channel | Max. P-Channel | Units |
|---|---|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | | 30 | -30 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±20 | ±20 | V |
| $I_D$ | Continuous Drain Current | $T_C$ = 25℃ | 10 | -8 | A |
| | | $T_C$= 100℃ | 6.5 | -5.2 | A |
| $I_{DM}$ | Pulsed Drain Current note1 | | 40 | -32 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy note2 | | 11 | 23 | mJ |
| $P_D$ | Power Dissipation | $T_C$= 25℃ | 3.1 | 3.4 | W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | | 40 | 37 | ℃/W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | -55 to +150 | | ℃ |

## N-Channel Electrical Characteristics ($T_J$=25℃ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristic** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=30V, $V_{GS}$=0V | - | - | 1 | μA |
| $I_{GSS}$ | Gate to 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 | 1.0 | 1.5 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note2 | $V_{GS}$=10V, $I_D$=5A | - | 14 | 18 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=3A | - | 20 | 28 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V, f=1.0MHz | - | 490 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 79 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 61 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V, $I_D$=5A, $V_{GS}$=10V | - | 5.2 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 0.9 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 1.3 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=15V, $I_D$=3A, $V_{GS}$=10V, $R_{REN}$ =3Ω | - | 4.5 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 2.5 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 14.5 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 3.5 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 10 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 40 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$=10A | - | 0.8 | 1.2 | V |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : $T_J$=25℃, $V_{DD}$=15V, $V_G$=10V, L=0.5mH, Rg=25Ω, $I_{AS}$=6.5A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## P-Channel Electrical Characteristics ($T_J$=25℃ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristic** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$= -250μA | -30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$= -30V, $V_{GS}$=0V, | - | - | -1 | μA |
| $I_{GSS}$ | Gate to 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 | -1.0 | -1.6 | -2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note3 | $V_{GS}$= -10V, $I_D$= -7A | - | 24 | 31 | mΩ |
| | | $V_{GS}$= -4.5V, $I_D$= -4A | - | 35 | 49 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$= -15V, $V_{GS}$=0V, f=1.0MHz | - | 982 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 135 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 109 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$= -15V, $I_D$= -4A, $V_{GS}$= -10V | - | 10 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 2 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 2.7 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$= -15V, $I_D$= -7A, $V_{GS}$= -10V, $R_{GEN}$=2.5Ω | - | 11 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 19 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 45 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 26 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | -8 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | -32 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$= -8A | - | -0.8 | -1.2 | V |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : $T_J$=25℃, $V_{DD}$= -15V, $V_G$= -10V, L=0.5mH, Rg=25Ω, $I_{AS}$= -9.5A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Performance Characteristics-N

**Figure1:** Output Characteristics

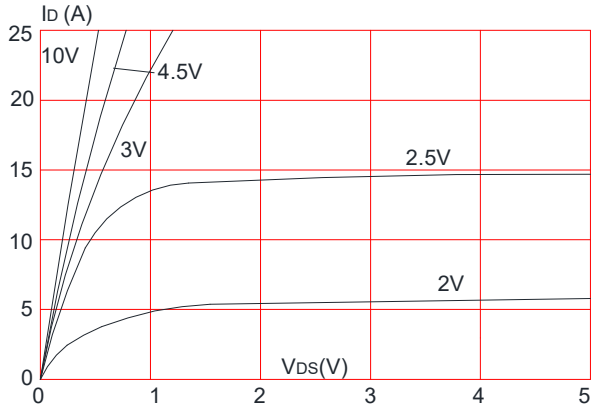



**Figure 2:** Typical Transfer Characteristics

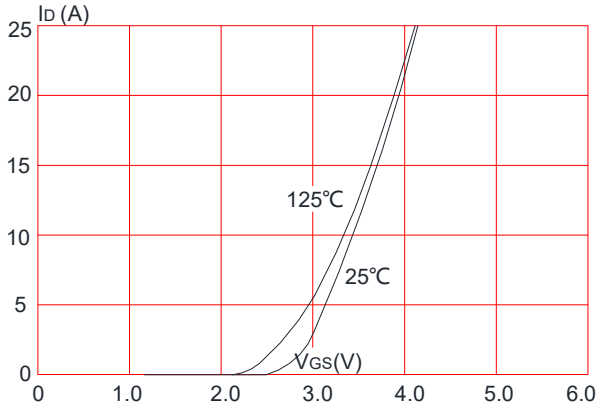



**Figure 3:**On-resistance vs. Drain Current

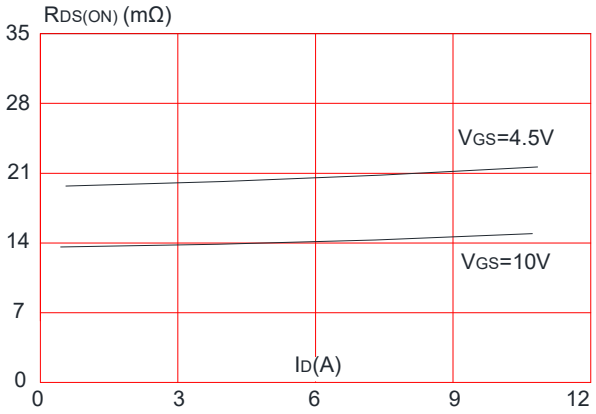



**Figure 4**: Body Diode Characteristics

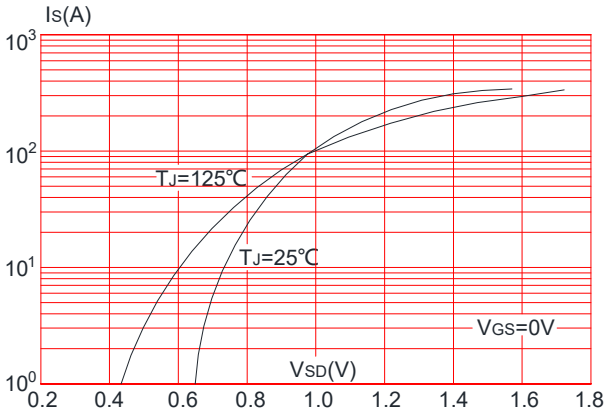



**Figure 5:** Gate Charge Characteristics

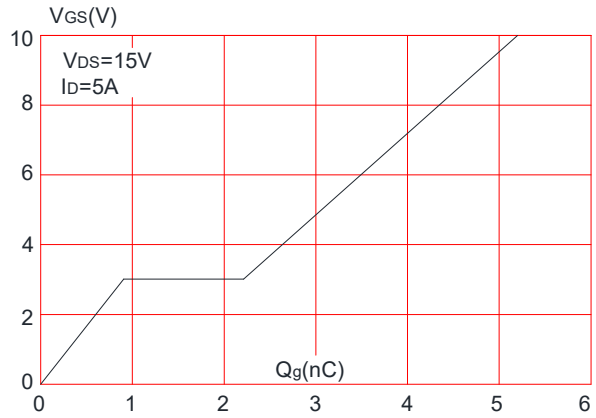



**Figure 6:** Capacitance Characteristics

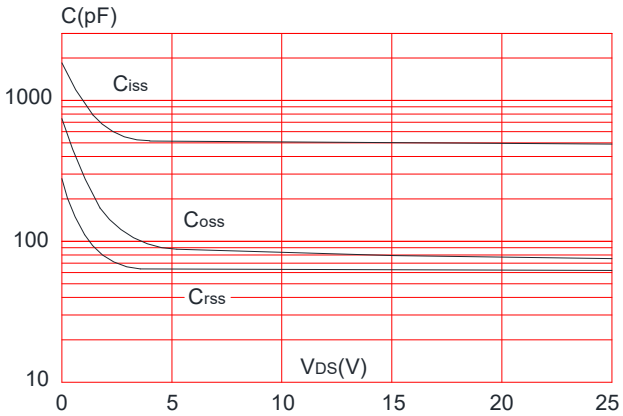


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

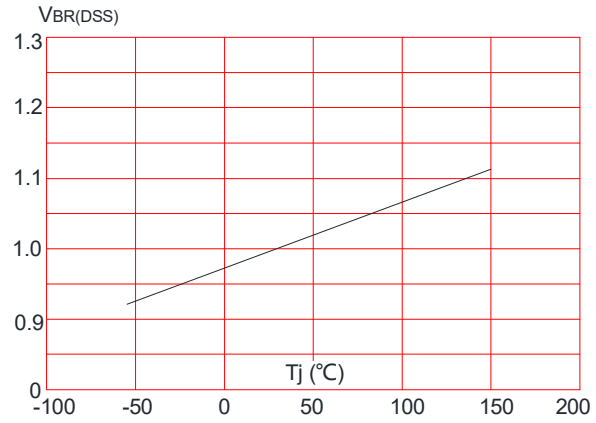



**Figure 8:** Normalized on Resistance vs. Junction Temperature

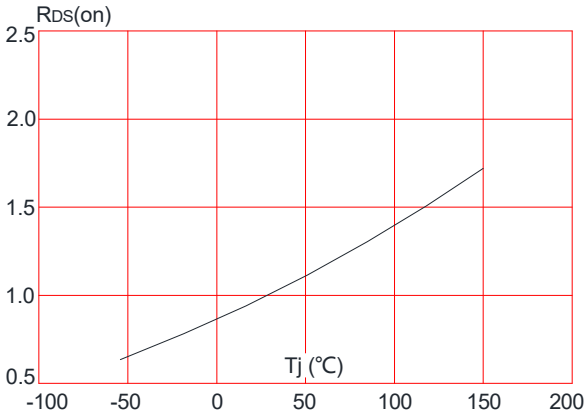



**Figure 9:** Maximum Safe Operating Area

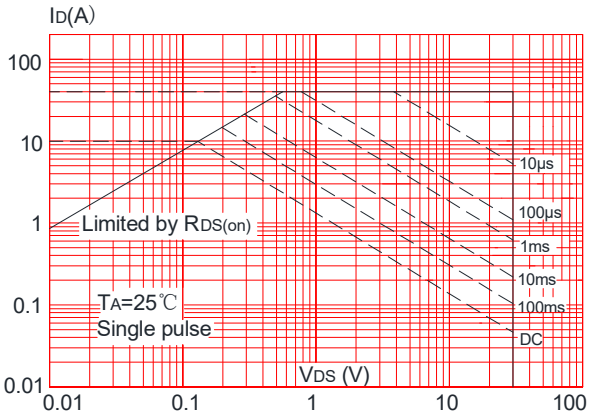



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

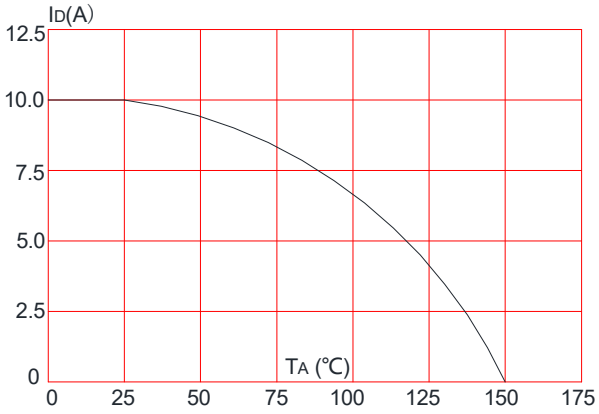
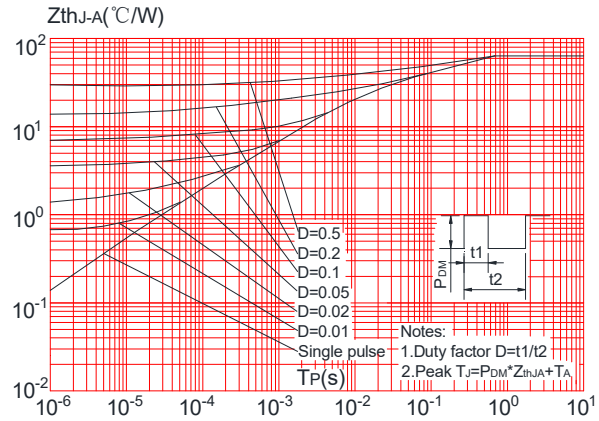



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## Test Circuit-N

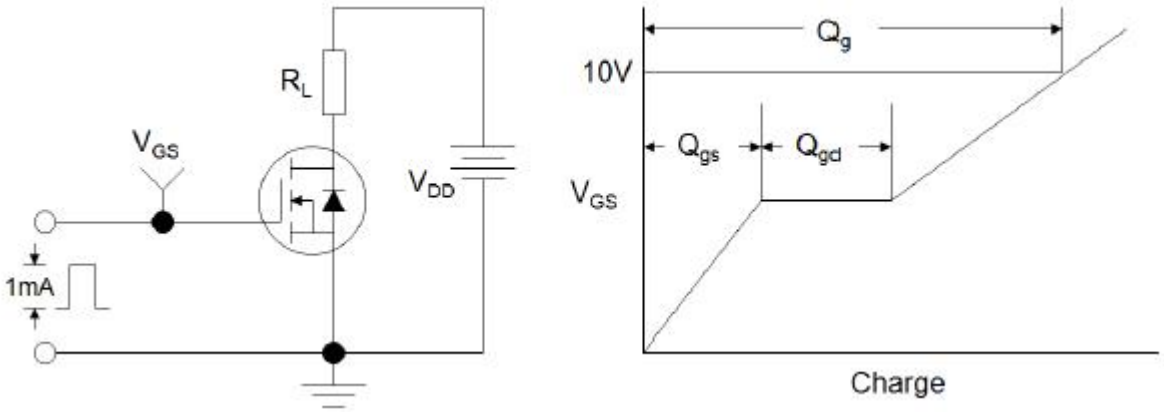



**Figure1:Gate Charge Test Circuit & Waveform**

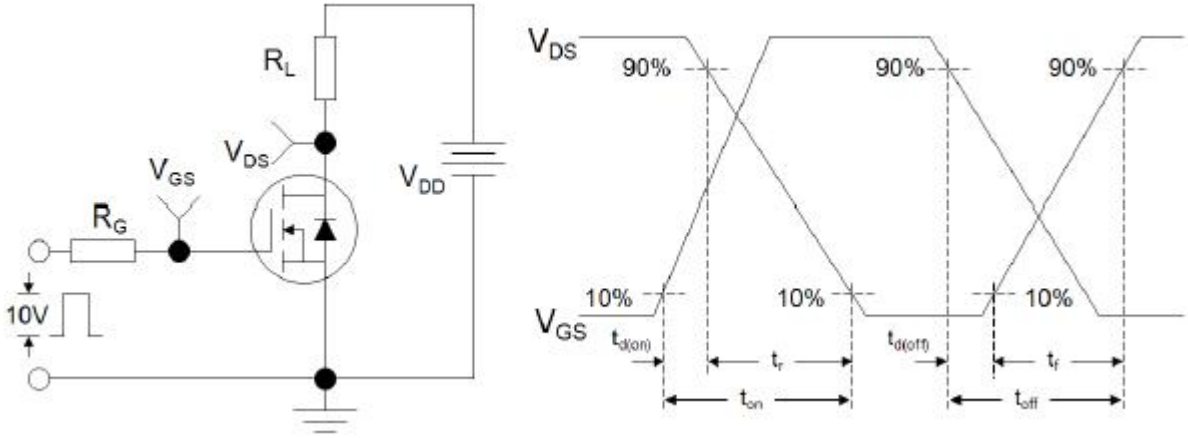



**Figure 2: Resistive Switching Test Circuit & Waveforms**

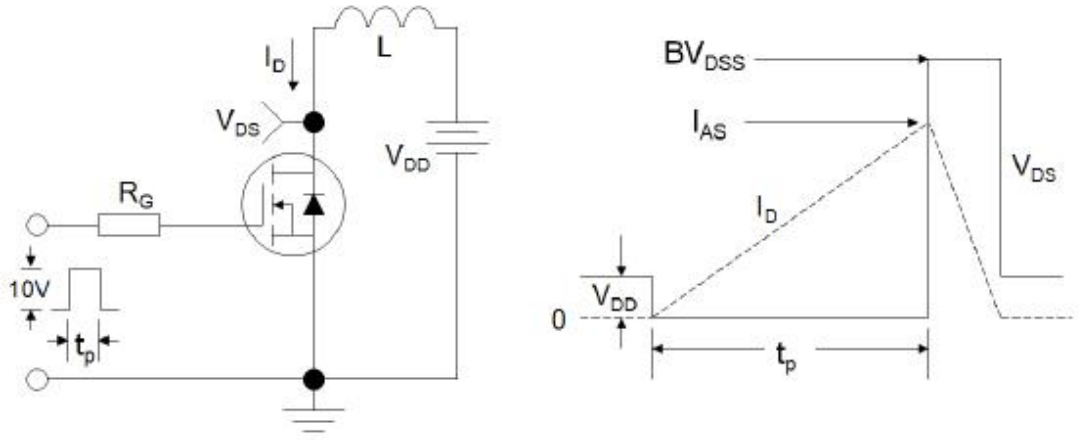



**Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms**

## Typical Performance Characteristics-P

**Figure1:** Output Characteristics

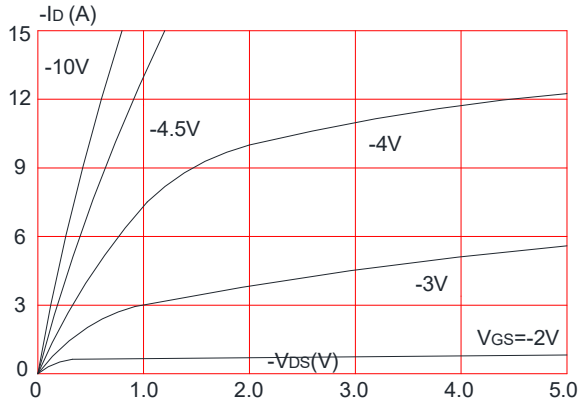



**Figure 2:** Typical Transfer Characteristics

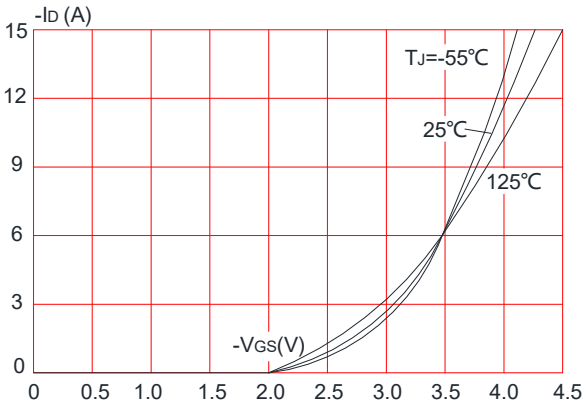



**Figure 3:**On-resistance vs. Drain Current

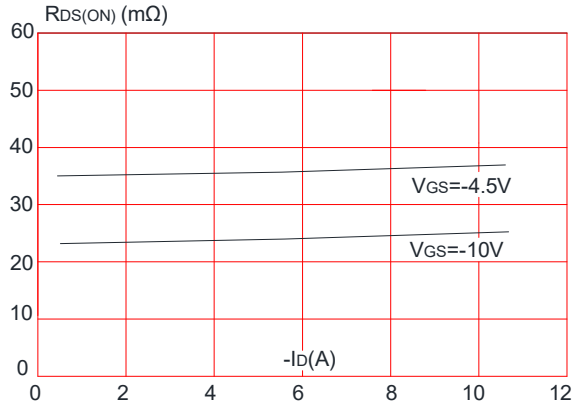



**Figure 4**: Body Diode Characteristics

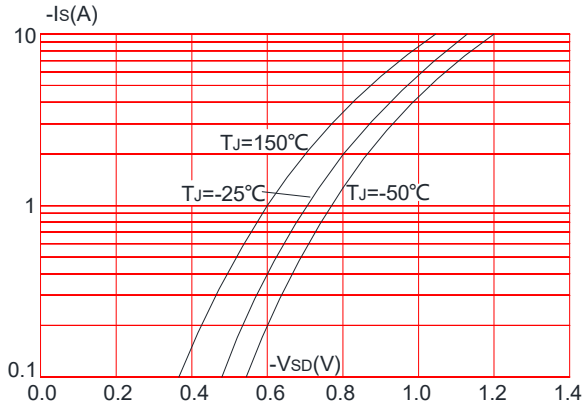



**Figure 5:** Gate Charge Characteristics

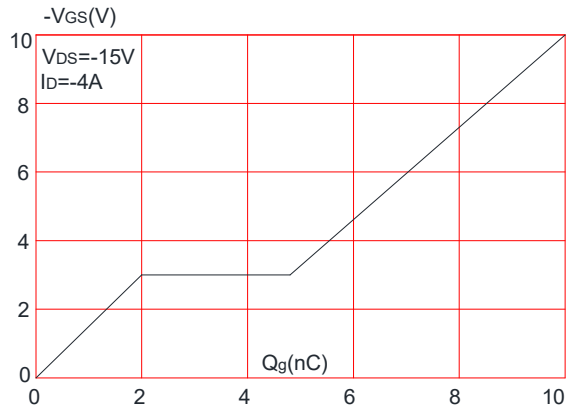



**Figure 6:** Capacitance Characteristics

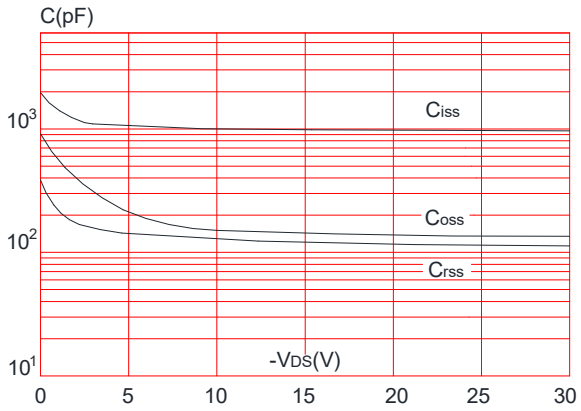


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

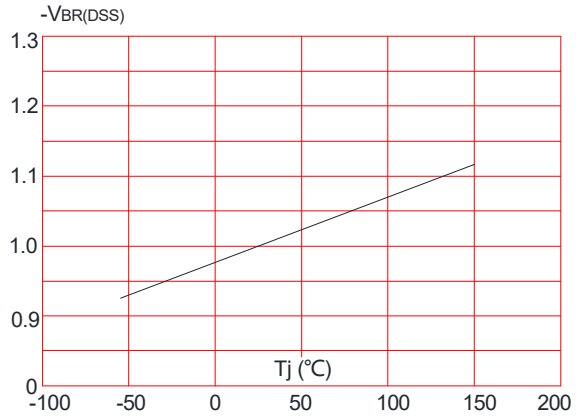



**Figure 8:** Normalized on Resistance vs. Junction Temperature

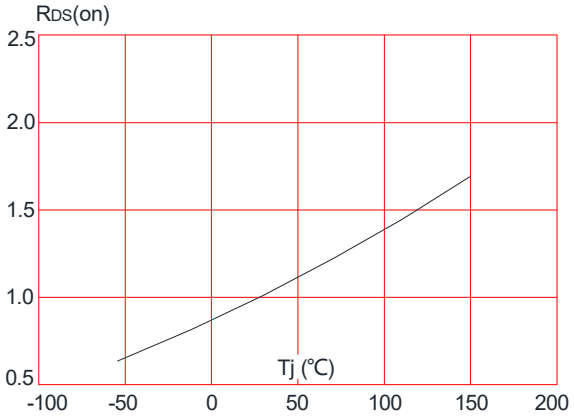



**Figure 9:** Maximum Safe Operating Area

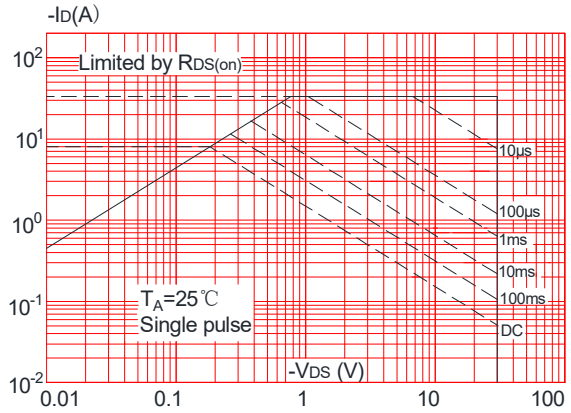



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

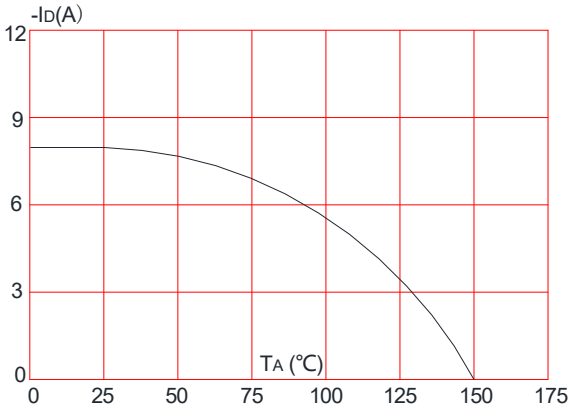
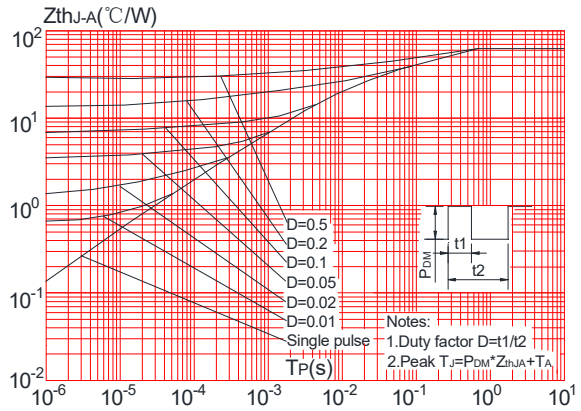
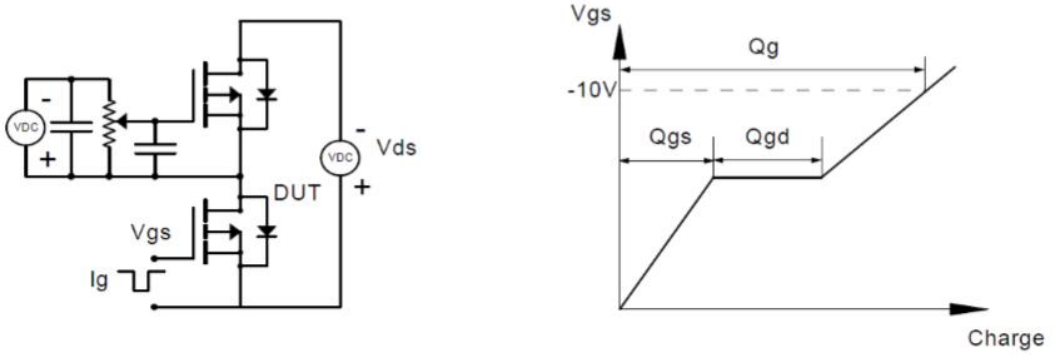



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

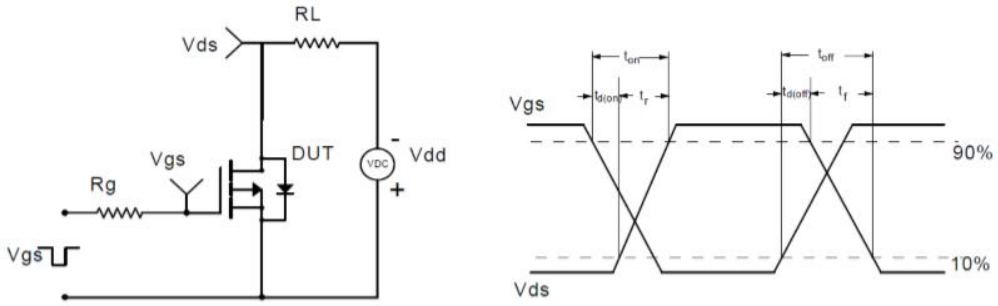


## Test Circuit-P

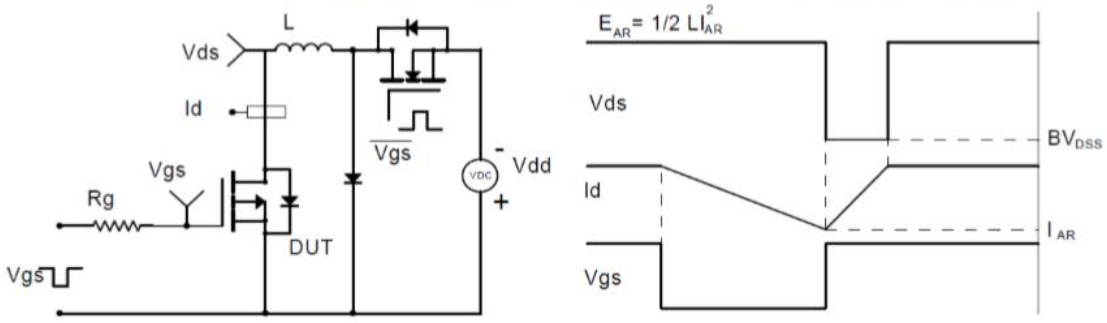
Gate Charge Test Circuit & Waveform



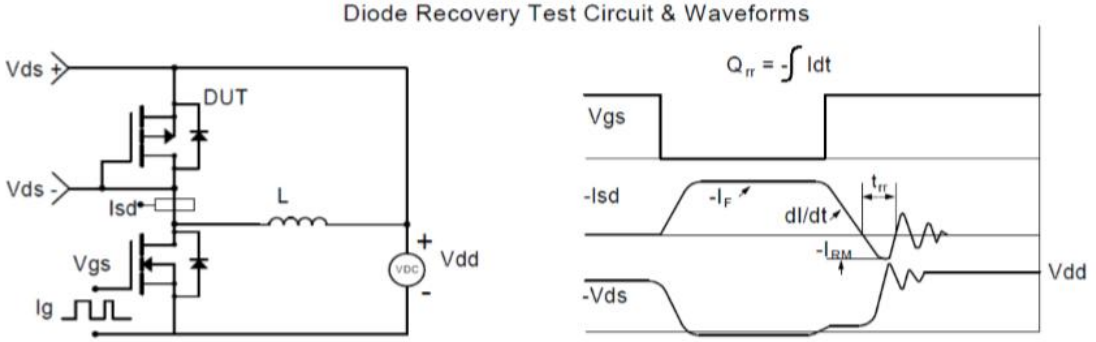

Resistive Switching Test Circuit & Waveforms



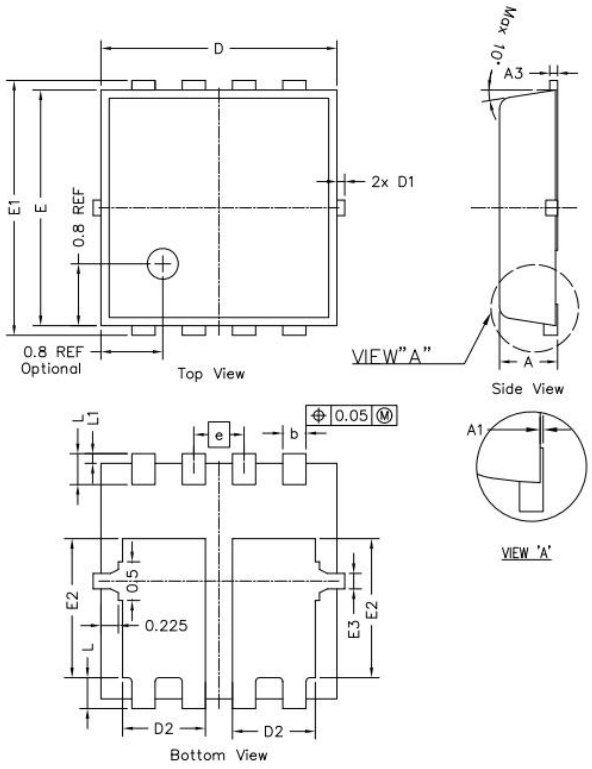

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms



## Package Mechanical Data-PDFN3x3-8L-D




| SYMBOLS | DIMENSION IN MM | | | DIMENSION IN INCHES | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.700 | 0.750 | 0.800 | 0.028 | 0.030 | 0.031 |
| A1 | --- | --- | 0.050 | ---- | ---- | 0.002 |
| A3 | 0.144 | 0.152 | 0.202 | 0.006 | 0.006 | 0.008 |
| b | 0.250 | 0.300 | 0.350 | 0.010 | 0.012 | 0.014 |
| e | | 0.65 BSC | | | 0.026 BSC | |
| D | 2.950 | 3.050 | 3.150 | 0.116 | 0.120 | 0.124 |
| E | 2.950 | 3.050 | 3.150 | 0.116 | 0.120 | 0.124 |
| D1 | --- | --- | 0.125 | ---- | ---- | 0.005 |
| E1 | 3.200 | 3.300 | 3.400 | 0.126 | 0.130 | 0.134 |
| D2 | 0.970 | 1.070 | 1.170 | 0.038 | 0.042 | 0.046 |
| E2 | 1.700 | 1.800 | 1.900 | 0.067 | 0.071 | 0.075 |
| E3 | 0.150 | 0.200 | 0.250 | 0.006 | 0.008 | 0.010 |
| L | 0.300 | 0.400 | 0.500 | 0.012 | 0.016 | 0.020 |
| L1 | 0.075 | 0.125 | 0.175 | 0.003 | 0.005 | 0.007 |