# CRMQBL4407A

## P-Channel -30V, 7.5mΩ Typ. Power MOSFET

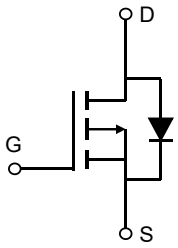
## Description

### Features

- -30V, -42A

  $R_{DS(ON)}$ Typ = 7.5mΩ @ $V_{GS}$ = -10V

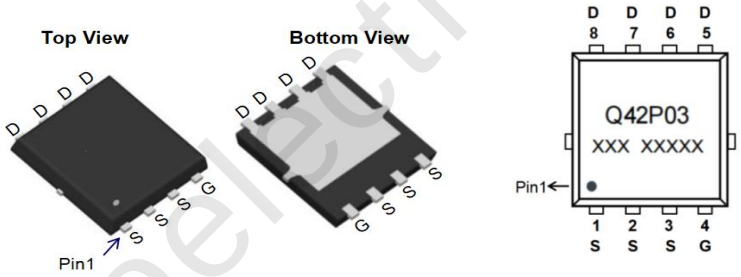
  $R_{DS(ON)}$ Typ = 13.5mΩ @ $V_{GS}$ = -4.5V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free
- 100% UIS TESTED!
- 100% ΔVds TESTED!




**Schematic Diagram**

### Application

- Load Switch
- PWM Application
- Power Management




**Marking and Pin Assignment**

### Package Marking and Ordering Information

| Device | Marking | Package | Outline | Reel Size | Reel (pcs) | Per Carton (pcs) |
|---|---|---|---|---|---|---|
| CRMQBL4407A | Q42P03 | PDFN3.3x3.3-8L | TAPING | 13" | 5000 | 50000 |

### Absolute Maximum Ratings (@ $T_J$ = 25°C unless otherwise specified)

| Symbol | Parameter | | Value | Units |
|---|---|---|---|---|
| $V_{DS}$ | Drain-to-Source Voltage | | -30 | V |
| $V_{GS}$ | Gate-to-Source Voltage | | ±20 | V |
| $I_D$ | Continuous Drain Current | $T_C$ = 25°C | -42 | A |
| | | $T_C$ = 100°C | -27 | A |
| $I_{DM}$ | Pulsed Drain Current [1] | | -168 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy [2] | | 121 | mJ |
| $P_D$ | Power Dissipation | $T_C$ = 25°C | 27 | W |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | | 4.62 | °C/W |
| $T_J$, $T_{STG}$ | Junction & Storage Temperature Range | | -55 to 150 | °C |

## Electrical Characteristics ($T_J$ = 25°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 | -30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = -30V, $V_{GS}$ = 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 | -1.7 | -2.5 | V |
| $R_{DS(ON)}$ | Static Drain-Source ON-Resistance(3) | $V_{GS}$ = -10V, $I_D$ = -30A | - | 7.5 | 9.8 | mΩ |
| | | $V_{GS}$ = -4.5V, $I_D$ = -15A | - | 13.5 | 17.5 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V, $V_{DS}$ = -15V, f = 1MHz | - | 1799 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 321 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 262 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{GS}$ = 0 to -10V, $V_{DS}$ = -15V, $I_D$ = -30A | - | 30 | - | nC |
| $Q_{gs}$ | Gate Source Charge | | - | 5 | - | nC |
| $Q_{gd}$ | Gate Drain("Miller") Charge | | - | 7.5 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On DelayTime | $V_{GS}$ = -10V, $V_{DD}$ = -15V, $I_D$= -30A, $R_{GEN}$ = 3Ω | - | 14.1 | - | ns |
| $t_r$ | Turn-On Rise Time | | - | 20 | - | ns |
| $t_{d(off)}$ | Turn-Off DelayTime | | - | 94 | - | ns |
| $t_f$ | Turn-Off Fall Time | | - | 65 | - | ns |
| **Drain-Source Diode Characteristics and Max Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | -42 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | -168 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$ = 0V, $I_S$ = -30A | - | - | -1.2 | V |
| trr | Body Diode Reverse Recovery Time | $I_F$=-30A,di/dt=-100A/μs | - | 19 | - | V |
| Qrr | Body Diode Reverse Recovery Charge | | - | 9 | - | V |

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. $E_{AS}$ condition: Starting $T_J$=25°C, $V_{DD}$=-25V, $V_G$=-10V, $R_G$=25ohm, L=0.5mH, $I_{AS}$=-22A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

## Typical Performance Characteristics

Figure 1: Output Characteristics

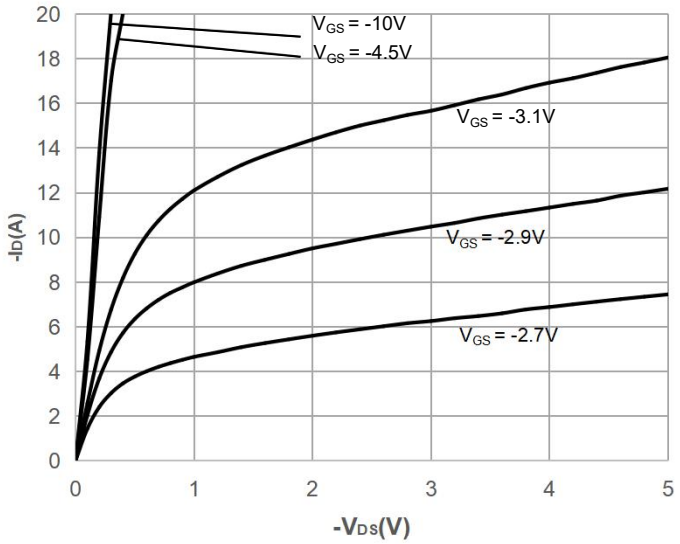



Figure 2: Typical Transfer Characteristics

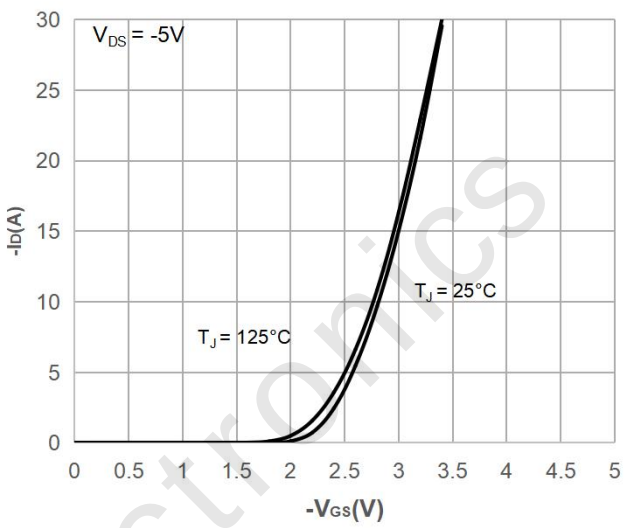



Figure 3: On-resistance vs. Drain Current

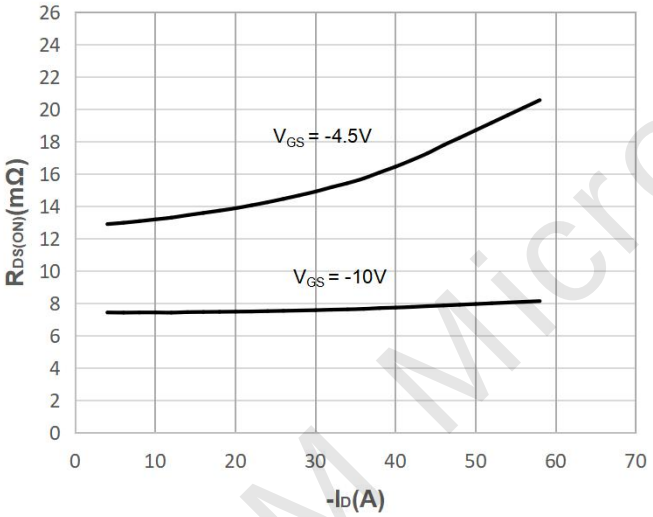



Figure 4: Body Diode Characteristics

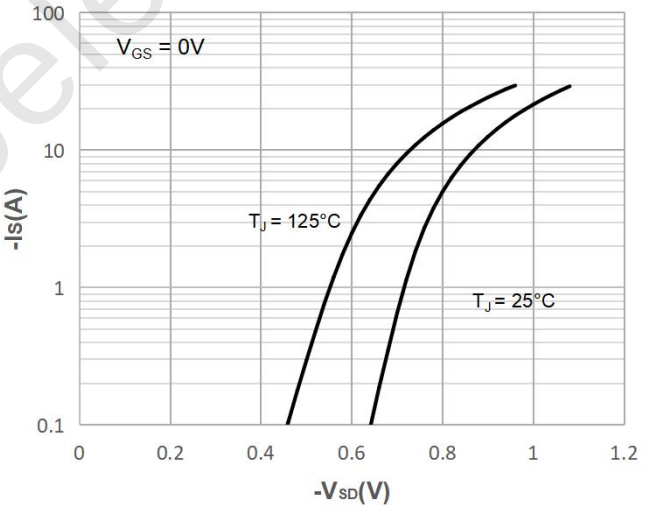



Figure 5: Gate Charge Characteristics

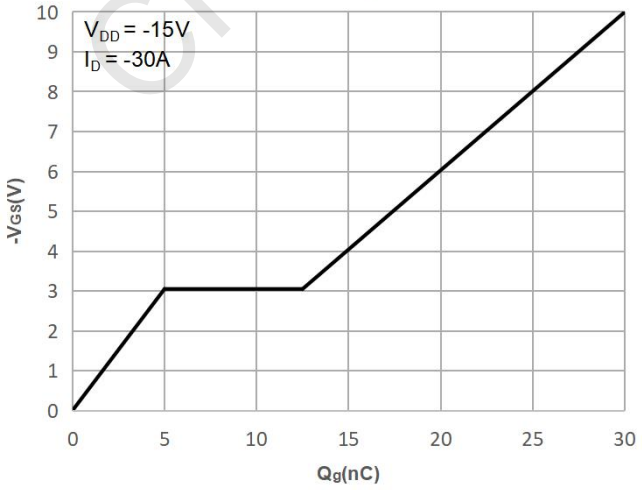
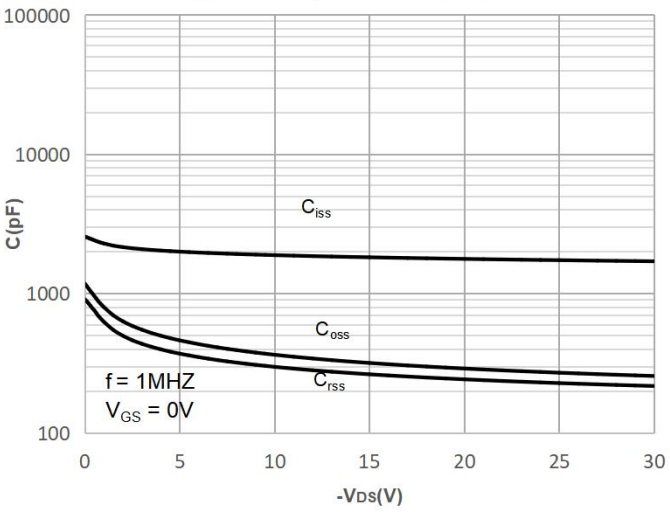



Figure 6: Capacitance Characteristics



## Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

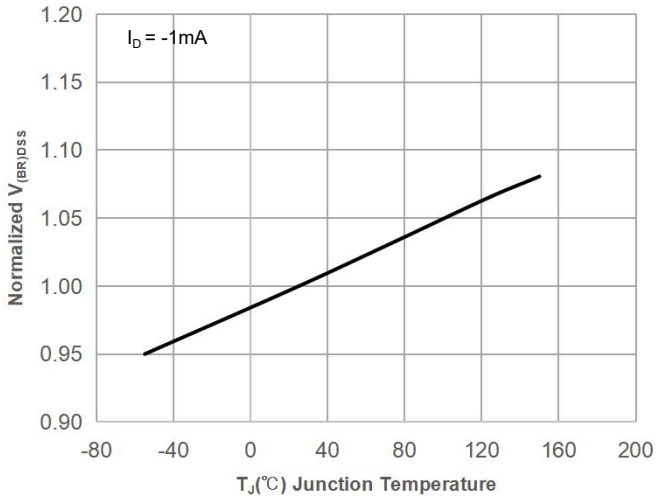



Figure 8: Normalized on Resistance vs. Junction Temperature

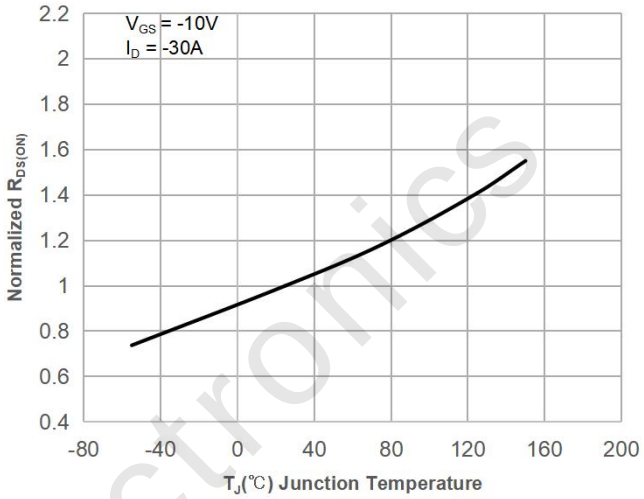



Figure 9: Maximum Safe Operating Area

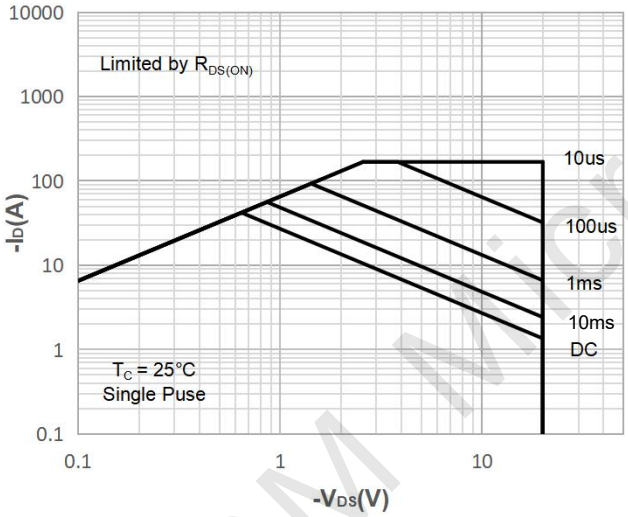



Figure 10: Maximum Continuous Drian Current vs. Case Temperature

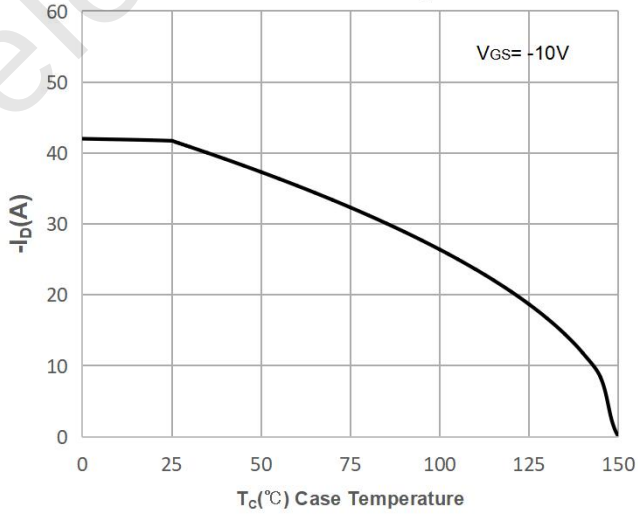



Figure 11: Normalized Maximum Transient Thermal Impedance

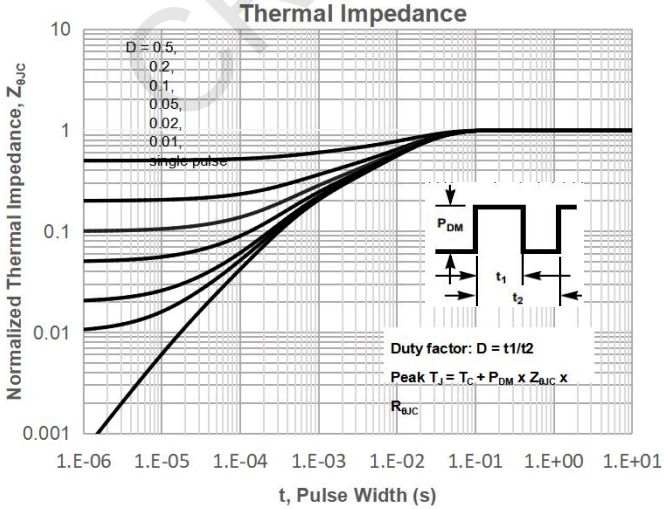
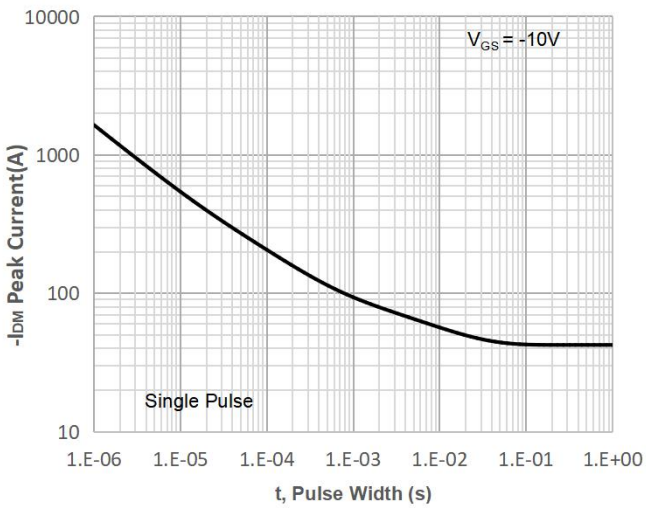



Figure 12: Peak Current Capacity



## Test Circuit

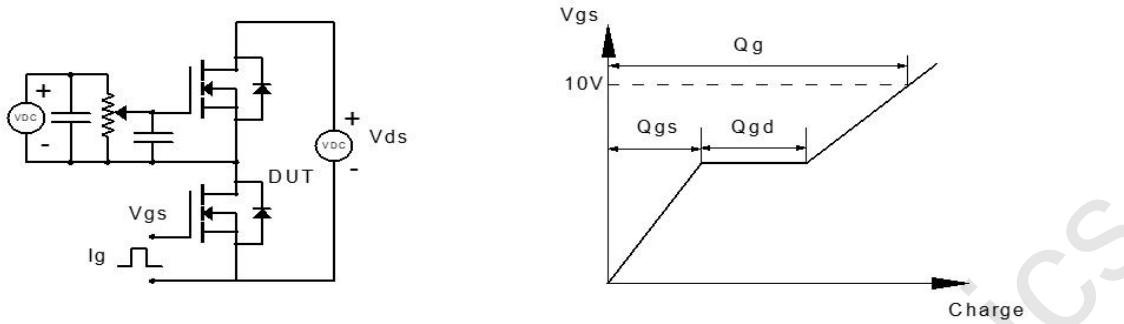



**Figure 1: Gate Charge Test Circuit & Waveform**

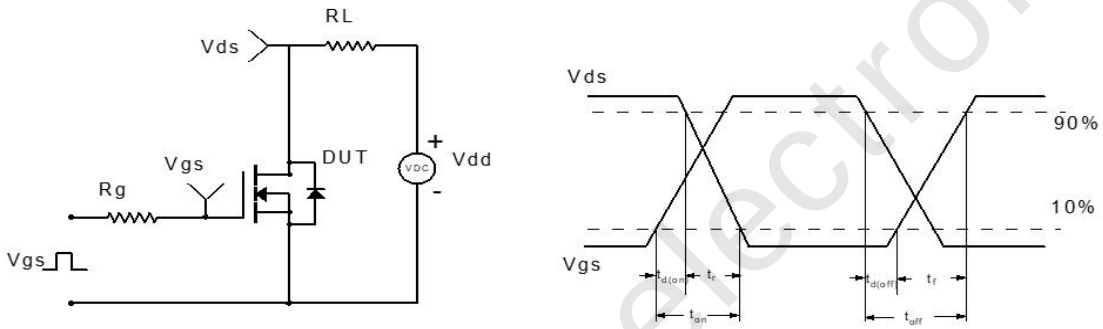



**Figure 2: Resistive Switching Test Circuit & Waveform**

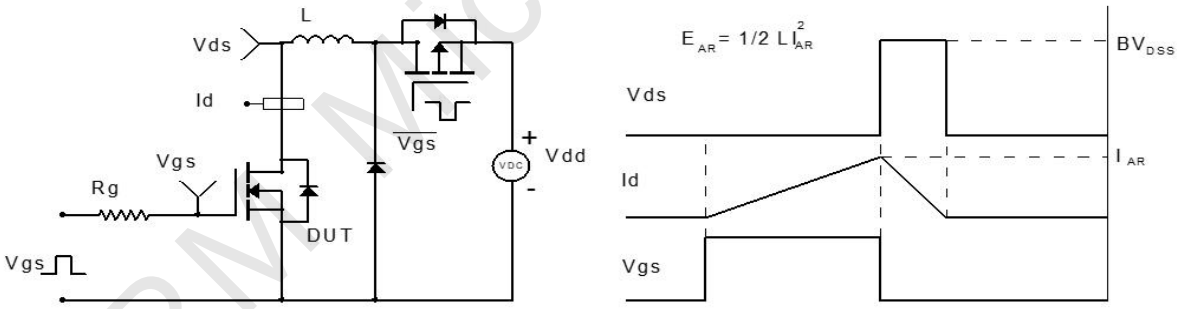



**Figure 3: Unclamped Inductive Switching Test Circuit& Waveform**

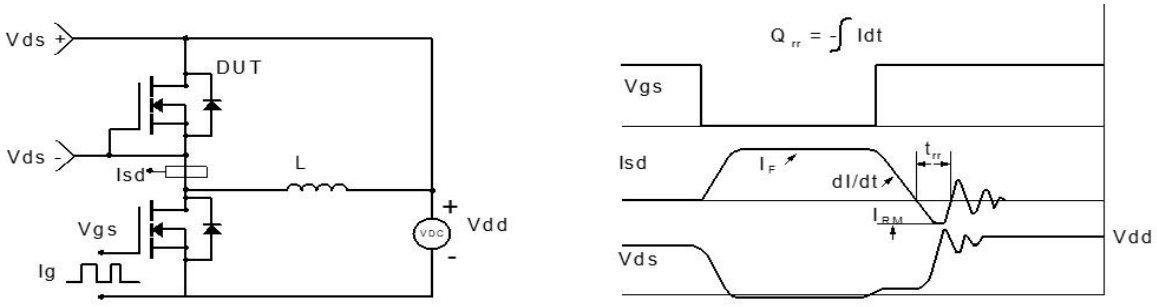
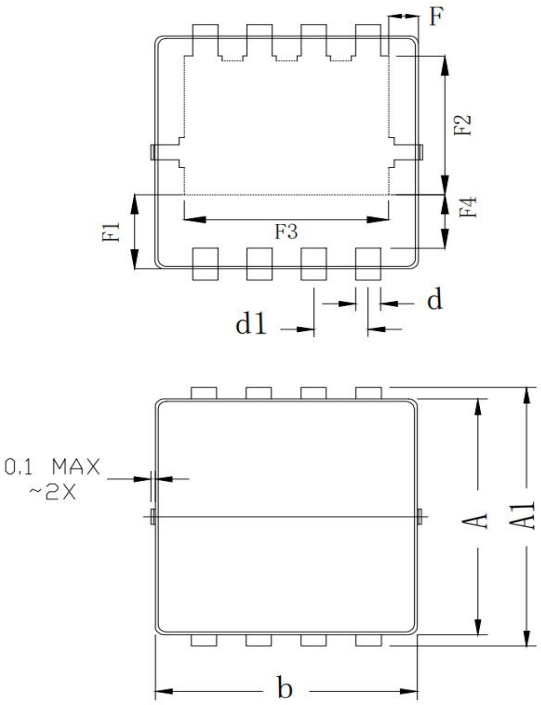
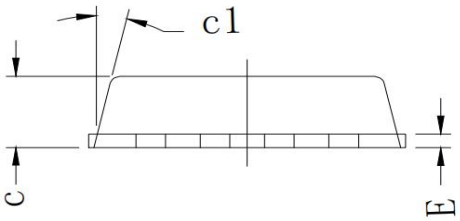



**Figure 4: Diode Recovery Test Circuit & Waveform**

## Package Mechanical Data(PDFN3.3x3.3-8L)




| COMMON DIMENSION (MM) | | | |
|---|---|---|---|
| PKG | PDFN 3.3×3.3-8L | | |
| SYMBOL | MIN | TYP | MAX |
| A | 3.070 | 3.100 | 3.130 |
| A1 | 3.300 | 3.400 | 3.500 |
| b | 3.070 | 3.100 | 3.130 |
| c | 0.770 | 0.800 | 0.830 |
| c1 | - | 13° | - |
| d | 0.275 | 0.300 | 0.325 |
| d1 | 0.625 | 0.650 | 0.675 |
| E | 0.144 | 0.152 | 0.160 |
| F | 0.300 | 0.325 | 0.350 |
| F1 | 0.960 | 0.985 | 1.010 |
| F2 | 1.775 | 1.800 | 1.825 |
| F3 | 2.425 | 2.450 | 2.475 |
| F4 | 0.660 | 0.685 | 0.710 |

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