

## Description

### JMT Dual N-channel Enhancement Mode Power MOSFET

#### Features

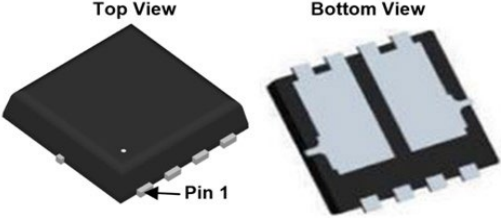
- 40V, 20A  
 $R_{DS(ON)} < 19.2m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 25.4m\Omega @ V_{GS} = 4.5V$
- Advanced Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free

#### Applications

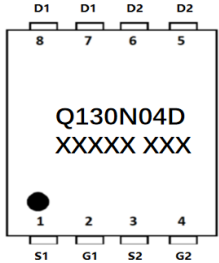
- Load Switch
- PWM Application
- Power Management



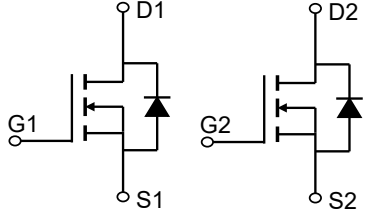
*100% UIS TESTED!*  
*100% ΔVds TESTED!*



PDFN3x3-8L-D



Marking and Pin Assignment



Schematic Diagram

### Package Marking and Ordering Information

| Device Marking | Device      | Outline | Package      | Reel Size | Reel(pcs) | Per Carton (pcs) |
|----------------|-------------|---------|--------------|-----------|-----------|------------------|
| Q130N04D       | JMTQ130N04D | TAPING  | PDFN3x3-8L-D | 13"       | 5000      | 50000            |

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

| Symbol          | Parameter  | Value               | Units |
|-----------------|--|---------------------|-------|
| $V_{DS}$        | Drain-to-Source Voltage                                | 40                  | V     |
| $V_{GS}$        | Gate-to-Source Voltage                                 | ±20                 | V     |
| $I_D$           | Continuous Drain Current                               | $T_C = 25^\circ C$  | 20    |
|                 |  | $T_C = 100^\circ C$ | 13    |
| $I_{DM}$        | Pulsed Drain Current <sup>(1)</sup>                    | 80                  | A     |
| $E_{AS}$        | Single Pulsed Avalanche Energy <sup>(2)</sup>          | 30                  | mJ    |
| $P_D$           | Power Dissipation                                      | $T_C = 25^\circ C$  | 50    |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient <sup>(3)</sup> | 61                  | °C/W  |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                   | 2.5                 |       |
| $T_J, T_{STG}$  | Junction & Storage Temperature Range                   | -55 to 150          | °C    |



## Electrical Characteristics (T<sub>J</sub> = 25°C unless otherwise specified)

| Symbol  | Parameter  | Conditions  | Min. | Typ. | Max. | Unit |
|---|--|---|------|------|------|------|
| <b>Off Characteristics</b>                                |  |   |      |      |      |      |
| V <sub>(BR)DSS</sub>                                      | Drain-Source Breakdown Voltage                           | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V  | 40   | -    | -    | V    |
| I <sub>DSS</sub>  | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V   | -    | -    | 1.0  | μA   |
| I <sub>GSS</sub>  | Gate-Body Leakage Current                                | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V  | -    | -    | ±100 | nA   |
| <b>On Characteristics</b>                                 |  |   |      |      |      |      |
| V <sub>GS(th)</sub>                                       | Gate Threshold Voltage                                   | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                  | 1.3  | 2    | 2.3  | V    |
| R <sub>DS(ON)</sub>                                       | Static Drain-Source ON-Resistance <sup>(4)</sup>         | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A   | -    | 14.8 | 19.2 | mΩ   |
|   |  | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A  | -    | 19.5 | 25.4 | mΩ   |
| <b>Dynamic Characteristics</b>                            |  |   |      |      |      |      |
| C <sub>iss</sub>  | Input Capacitance  | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 20V,<br>f = 1MHz                                    | -    | 1342 | -    | pF   |
| C <sub>oss</sub>  | Output Capacitance                                       |   | -    | 87   | -    | pF   |
| C <sub>rss</sub>  | Reverse Transfer Capacitance                             |   | -    | 72   | -    | pF   |
| Q <sub>g</sub>  | Total Gate Charge  | V <sub>GS</sub> = 0 to 10V<br>V <sub>DS</sub> = 20V, I <sub>D</sub> = 10A                   | -    | 26   | -    | nC   |
| Q <sub>gs</sub>   | Gate Source Charge                                       |   | -    | 6    | -    | nC   |
| Q <sub>gd</sub>   | Gate Drain("Miller") Charge                              |   | -    | 5    | -    | nC   |
| <b>Switching Characteristics</b>                          |  |   |      |      |      |      |
| t <sub>d(on)</sub>  | Turn-On DelayTime  | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 20V<br>I <sub>D</sub> = 10A, R <sub>GEN</sub> = 3Ω | -    | 7    | -    | ns   |
| t <sub>r</sub>  | Turn-On Rise Time  |   | -    | 11   | -    | ns   |
| t <sub>d(off)</sub>                                       | Turn-Off DelayTime                                       |   | -    | 26   | -    | ns   |
| t <sub>f</sub>  | Turn-Off Fall Time                                       |   | -    | 5    | -    | ns   |
| <b>Drain-Source Diode Characteristics and Max Ratings</b> |  |   |      |      |      |      |
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current |   | -    | -    | 20   | A    |
| I <sub>SM</sub>   | Maximum Pulsed Drain to Source Diode Forward Current     |   | -    | -    | 80   | A    |
| V <sub>SD</sub>   | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A  | -    | -    | 1.2  | V    |
| t <sub>rr</sub>   | Body Diode Reverse Recovery Time                         | I <sub>F</sub> = 10A, di/dt = 100A/us   | -    | 10   | -    | ns   |
| Q <sub>rr</sub>   | Body Diode Reverse Recovery Charge                       |   | -    | 6    | -    | nC   |

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2. E<sub>AS</sub> condition: Starting T<sub>J</sub>=25°C, V<sub>DD</sub>=20V, V<sub>G</sub>=10V, R<sub>G</sub>=25ohm, L=0.5mH, I<sub>AS</sub>=11A
  3. R<sub>θJA</sub> is measured with the device mounted on a 1inch<sup>2</sup> pad of 2oz copper FR4 PCB
  4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

## Typical Performance Characteristics

Figure 1: Output Characteristics

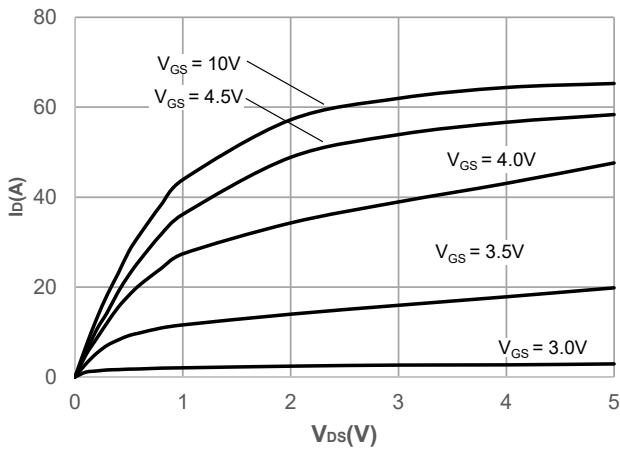


Figure 2: Typical Transfer Characteristics

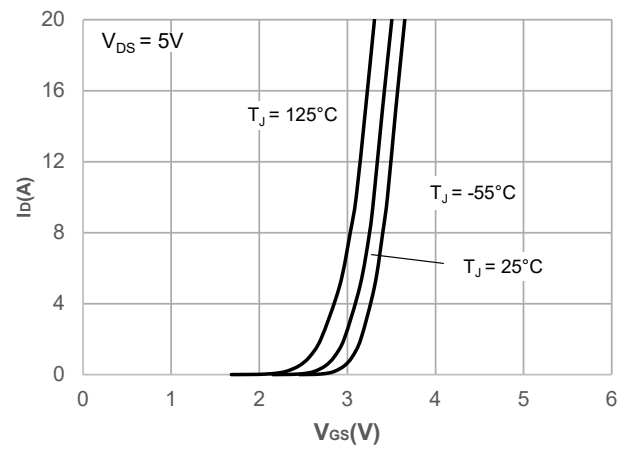


Figure 3: On-resistance vs. Drain Current

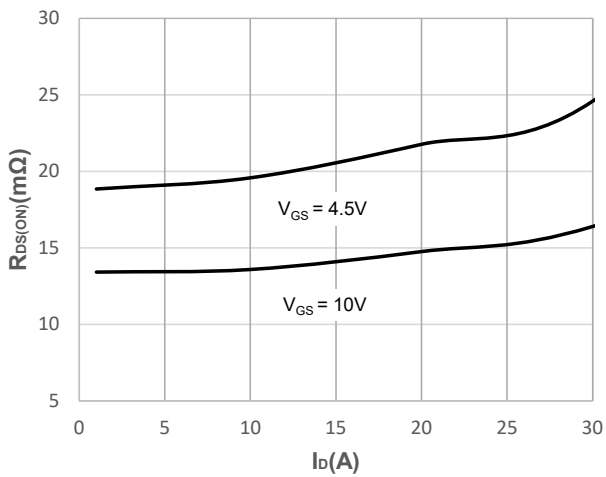


Figure 4: Body Diode Characteristics

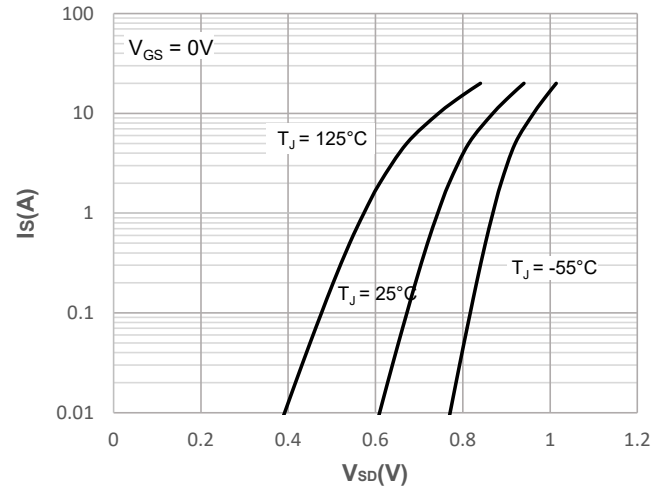


Figure 5: Gate Charge Characteristics

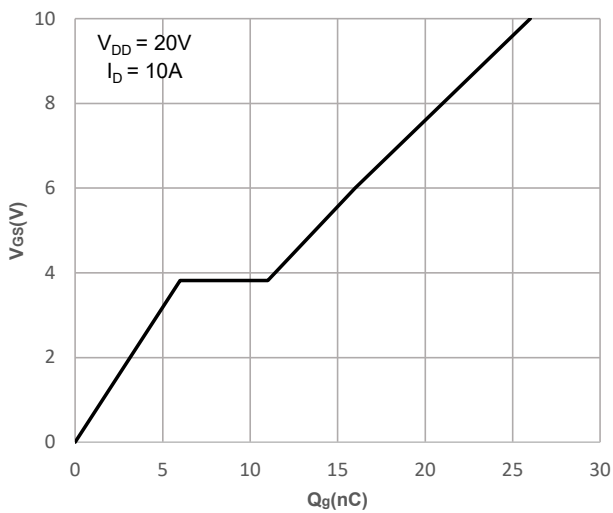
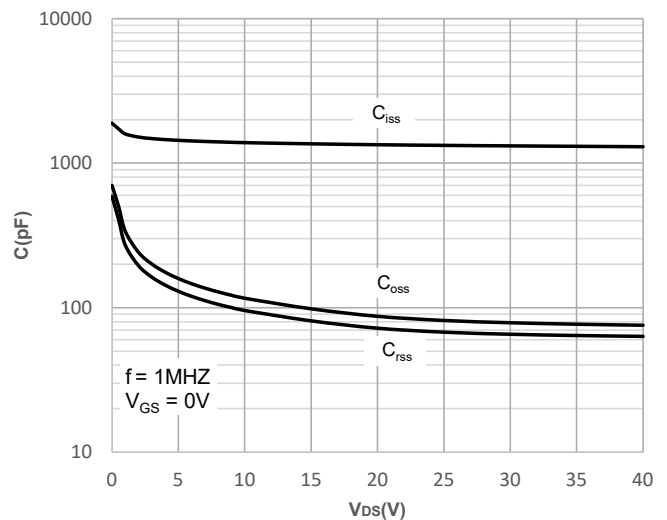


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

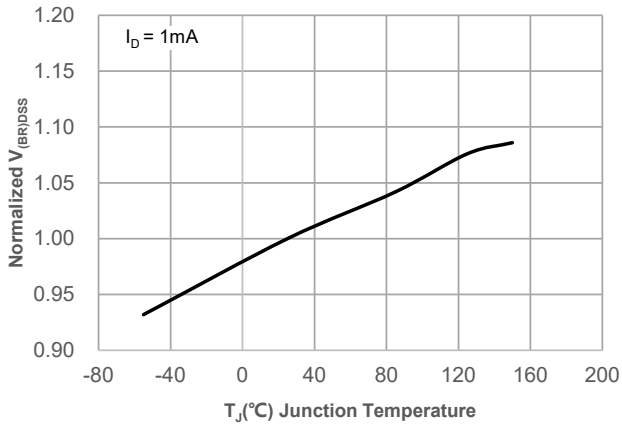


Figure 8: Normalized on Resistance vs. Junction Temperature

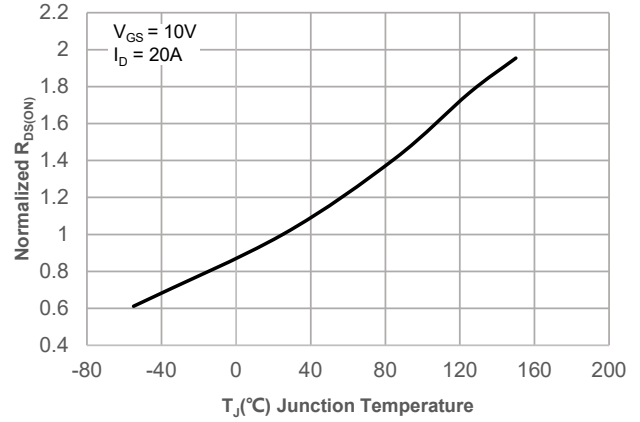


Figure 9: Maximum Safe Operating Area

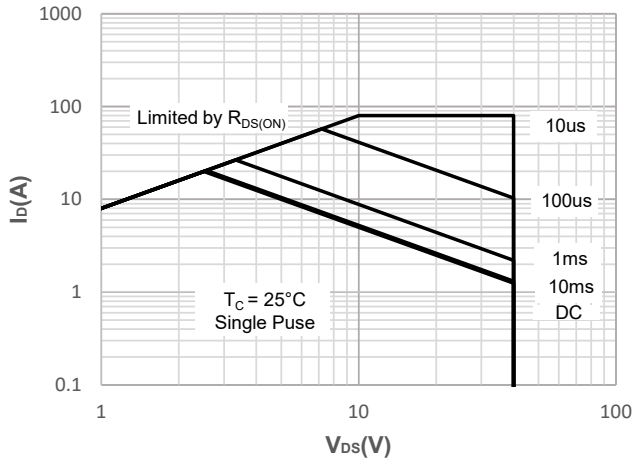


Figure 10: Maximum Continuous Driant Current vs. Case Temperature

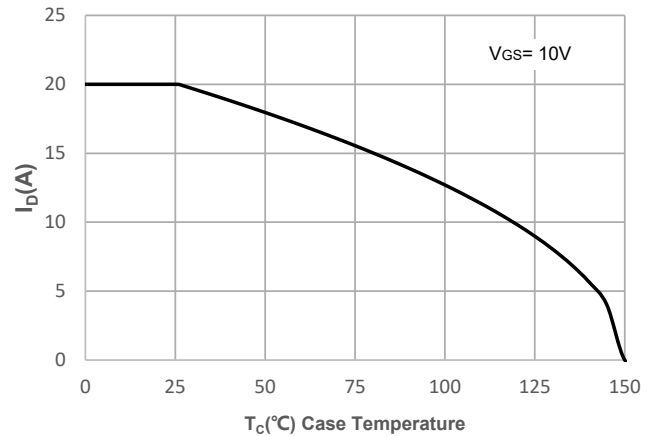


Figure 11: Normalized Maximum Transient Thermal Impedance

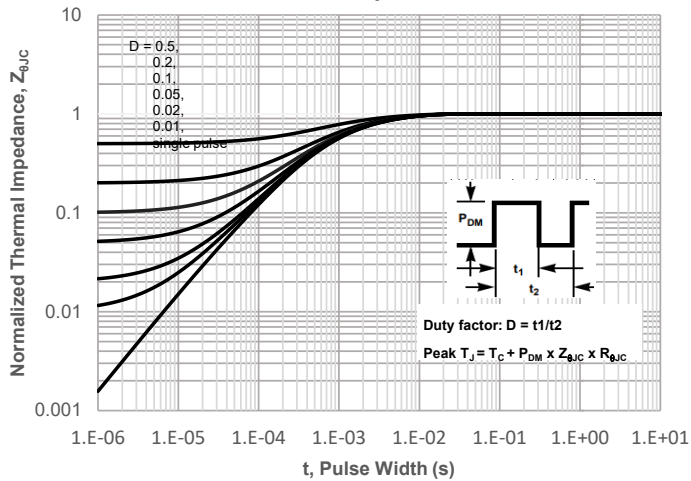
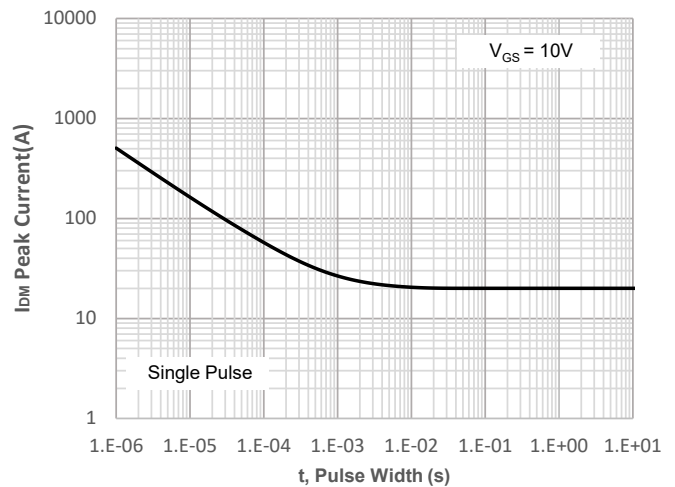


Figure 12: Peak Current Capacity



## Test Circuit

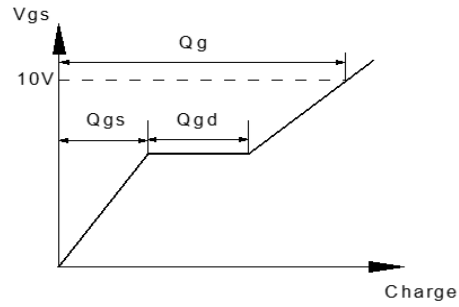
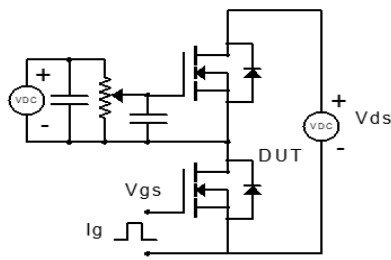


Figure 1: Gate Charge Test Circuit & Waveform

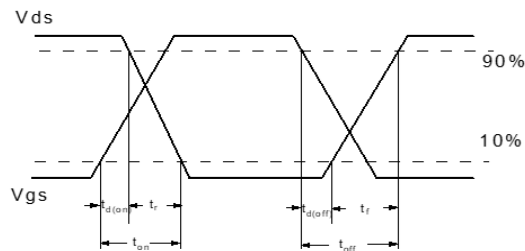
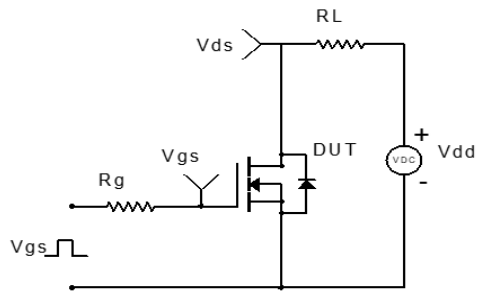


Figure 2: Resistive Switching Test Circuit & Waveform

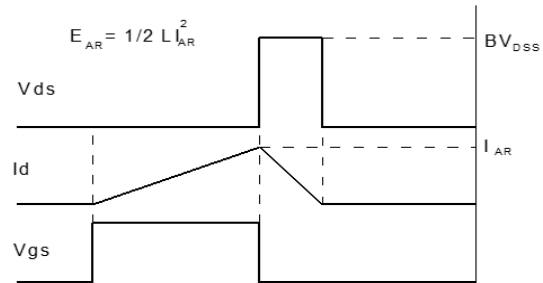
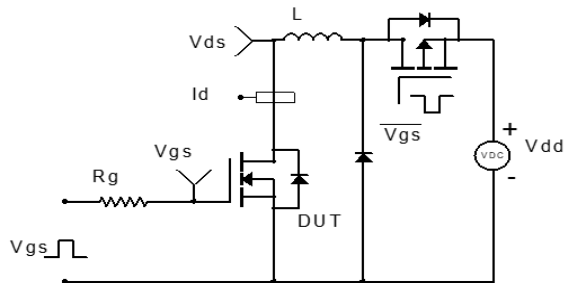


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

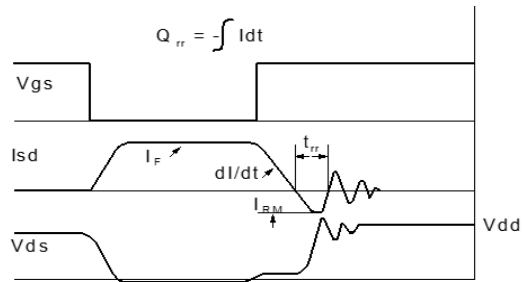
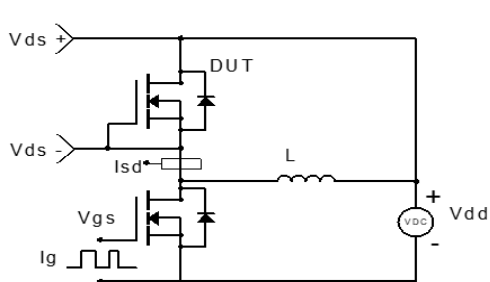
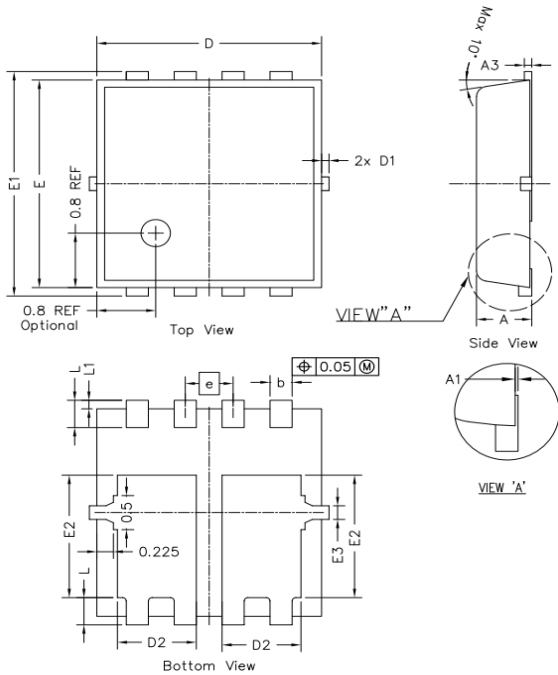


Figure 4: Diode Recovery Test Circuit & Waveform



## Package Mechanical Data(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 |

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