

## General Description

The MY7401 is the high cell density trench P-ch MOSFETs, which provide excellent  $R_{DS(on)}$  and gate charge for most of the synchronous buck converter applications. The MY7401 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

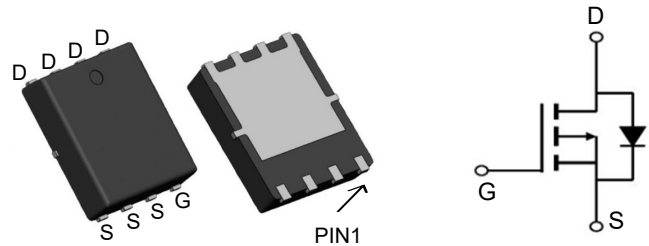


## Features

|                                     |     |           |
|-------------------------------------|-----|-----------|
| $V_{DSS}$                           | -30 | V         |
| $I_D$                               | -40 | A         |
| $R_{DS(ON)}$ (at $V_{GS} = -10V$ )  | 9.5 | $m\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS} = -4.5V$ ) | 14  | $m\Omega$ |

## Application

- Green Device Available
- Super Low Gate Charge
- Excellent  $CdV/dt$  effect decline
- Advanced high cell density Trench technology



## Package Marking and Ordering Information

| Product ID | Pack      | Marking | Qty(PCS) |
|------------|-----------|---------|----------|
| MY7401     | PDFN3*3-8 | MY7401  | 5000     |

## Absolute Maximum Ratings ( $T_c = 25^\circ\text{C}$ unless otherwise noted)

| Symbol                         | Parameter                                  | Rating     | Units            |
|--------------------------------|--------------------------------------------|------------|------------------|
| $V_{DS}$                       | Drain-Source Voltage                       | -30        | V                |
| $V_{GS}$                       | Gate-Source Voltage                        | $\pm 20$   | V                |
| $I_D @ T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | -40        | A                |
| $I_D @ T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | -25        | A                |
| $I_{DM}$                       | Pulsed Drain Current <sup>2</sup>          | -120       | A                |
| EAS                            | Single Pulse Avalanche Energy <sup>3</sup> | 105        | mJ               |
| $I_{AS}$                       | Avalanche Current                          | -50        | A                |
| $P_D @ T_A = 25^\circ\text{C}$ | Total Power Dissipation <sup>4</sup>       | 15         | W                |
| $T_{STG}$                      | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                          | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

## Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit               |
|-----------------|--------------------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> | ---  | 66   | $^\circ\text{C/W}$ |

**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

| Symbol                                                 | Parameter                                                | Test Condition                                                                                     | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                          |                                                                                                    |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                           | V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA                                                       | -30  | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V,                                                       | -    | -    | -1   | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                             | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                                        | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                          |                                                                                                    |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA                                         | -1.0 | -1.6 | -2.5 | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br>Note3               | V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A                                                      | -    | 9.5  | 12   | mΩ    |
|                                                        |                                                          | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A                                                      | -    | 14   | 18   |       |
| Dynamic Characteristics                                |                                                          |                                                                                                    |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                        | V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                           | -    | 1330 | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                       |                                                                                                    | -    | 183  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                             |                                                                                                    | -    | 156  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                        | V <sub>DS</sub> = -15V, I <sub>D</sub> = -<br>5A, V <sub>GS</sub> = -10V                           | -    | 22   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                       |                                                                                                    | -    | 1.0  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                              |                                                                                                    | -    | 1.8  | -    | nC    |
| Switching Characteristics                              |                                                          |                                                                                                    |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                       | V <sub>DD</sub> = -15V, I <sub>D</sub> = -10A,<br>V <sub>GS</sub> =-10V,<br>R <sub>GEN</sub> =2.5Ω | -    | 9    | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                        |                                                                                                    | -    | 13   | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                      |                                                                                                    | -    | 48   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                       |                                                                                                    | -    | 20   | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                          |                                                                                                    |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current |                                                                                                    | -    | -    | -40  | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                                    | -    | -    | -90  | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> =0V, I <sub>S</sub> = -15A                                                         | -    | -0.8 | -1.2 | V     |
| t <sub>rr</sub>                                        | Reverse Recovery Time                                    | T <sub>J</sub> =25℃,                                                                               | -    | 64   | -    | ns    |
| Q <sub>rr</sub>                                        | Reverse Recovery Charge                                  | V <sub>DD</sub> = -24V,I <sub>F</sub> =-2.8A,<br>dI/dt=-100A/μs                                    | -    | 25   | -    | nC    |

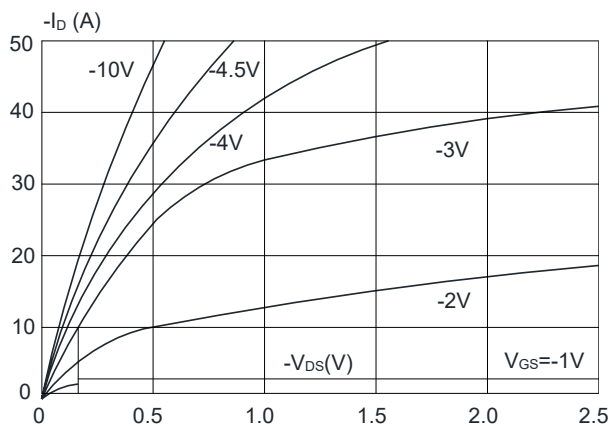
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition:  $T_J=25^\circ\text{C}$ ,  $V_{GS}=10V$ ,  $R_G=25\Omega$ ,  $L=0.5mH$ ,  $I_{AS}=-12.7A$

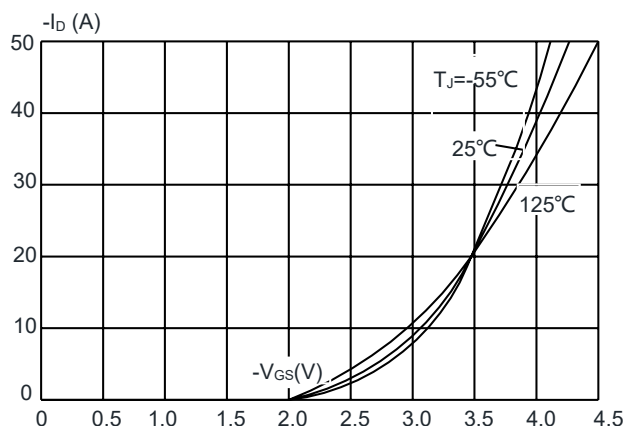
3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

## Typical Characteristics

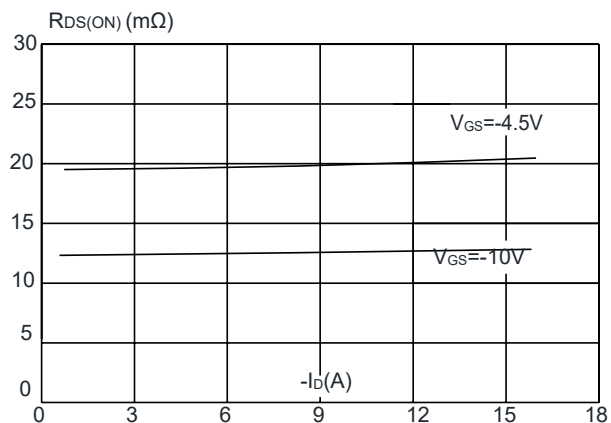
**Figure1:** Output Characteristics



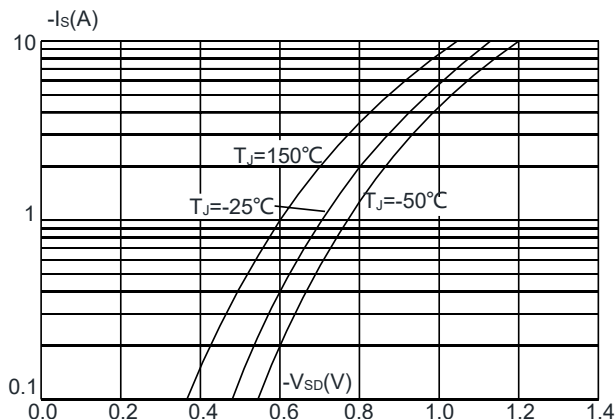
**Figure 2:** Typical Transfer Characteristics



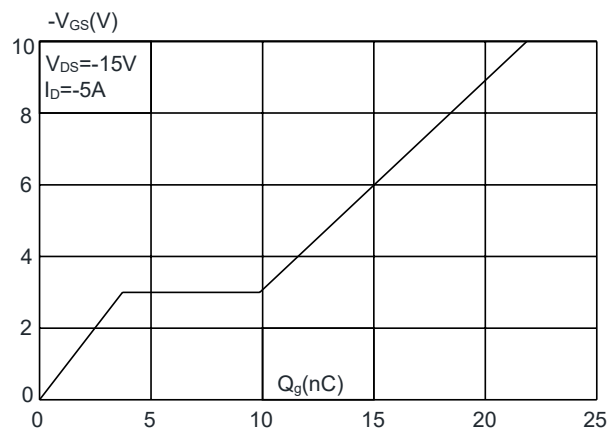
**Figure 3:** On-resistance vs. Drain Current



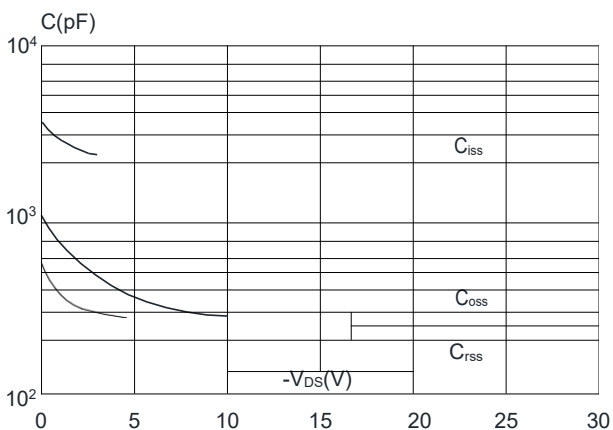
**Figure 4:** Body Diode Characteristics



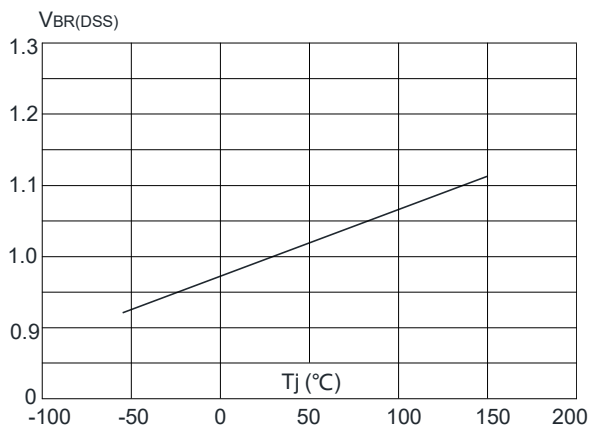
**Figure 5:** Gate Charge Characteristics



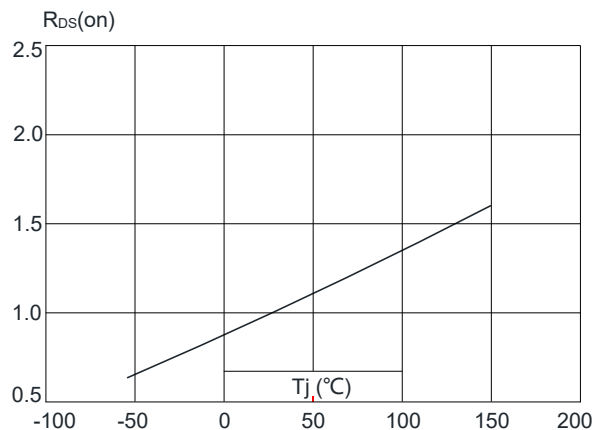
**Figure 6:** Capacitance Characteristics



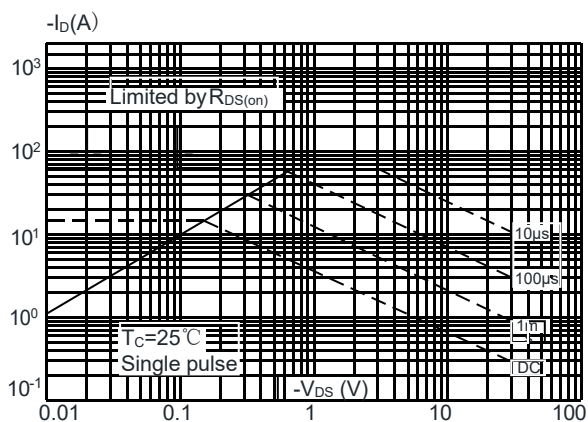
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



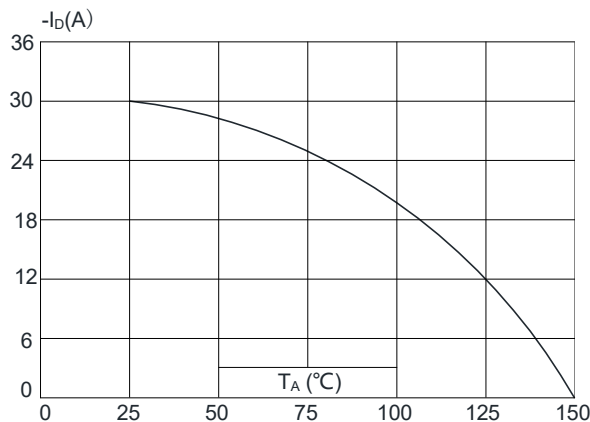
**Figure 8:** Normalized on Resistance vs. Junction Temperature



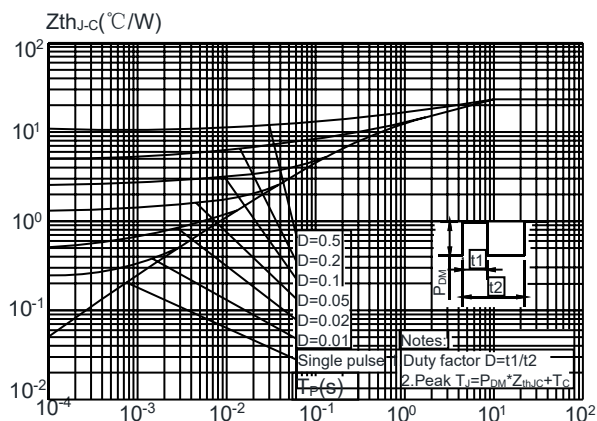
**Figure 9:** Maximum Safe Operating Area



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

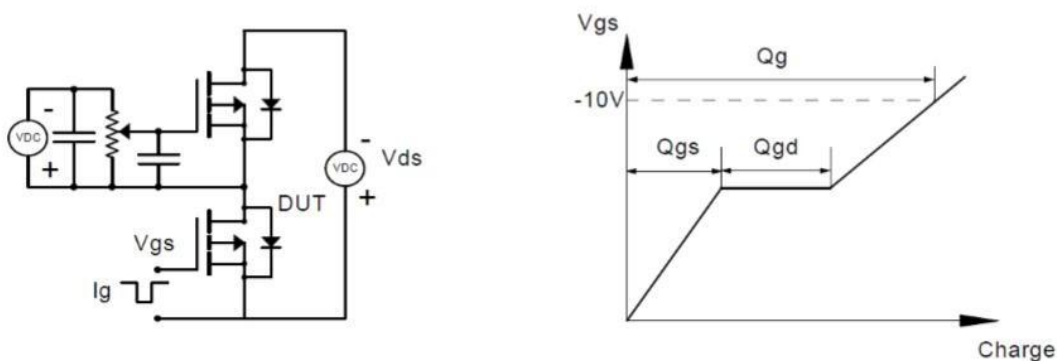


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

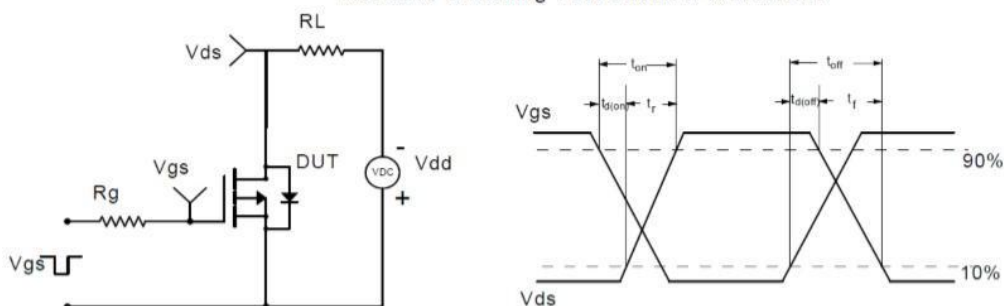


## Test Circuit

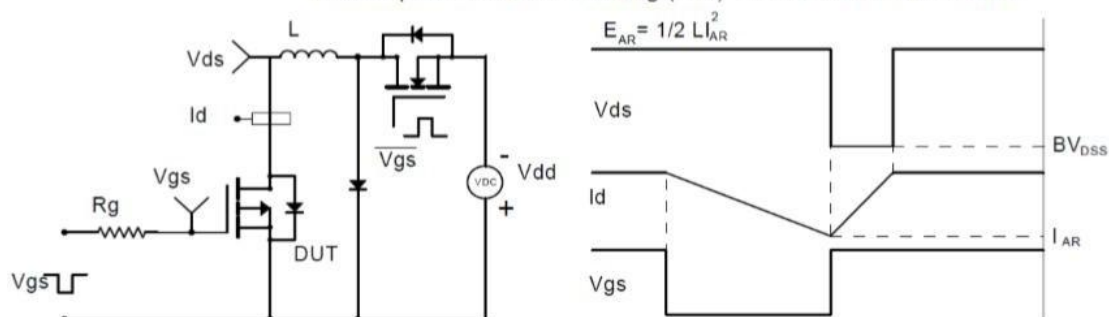
Gate Charge Test Circuit & Waveform



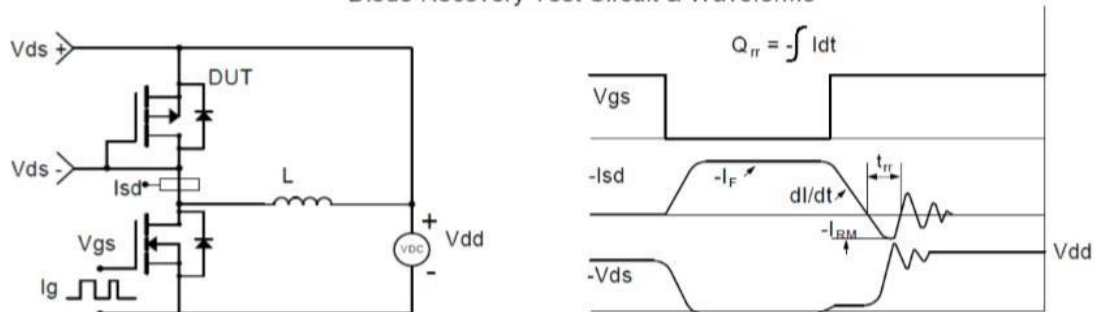
Resistive Switching Test Circuit & Waveforms



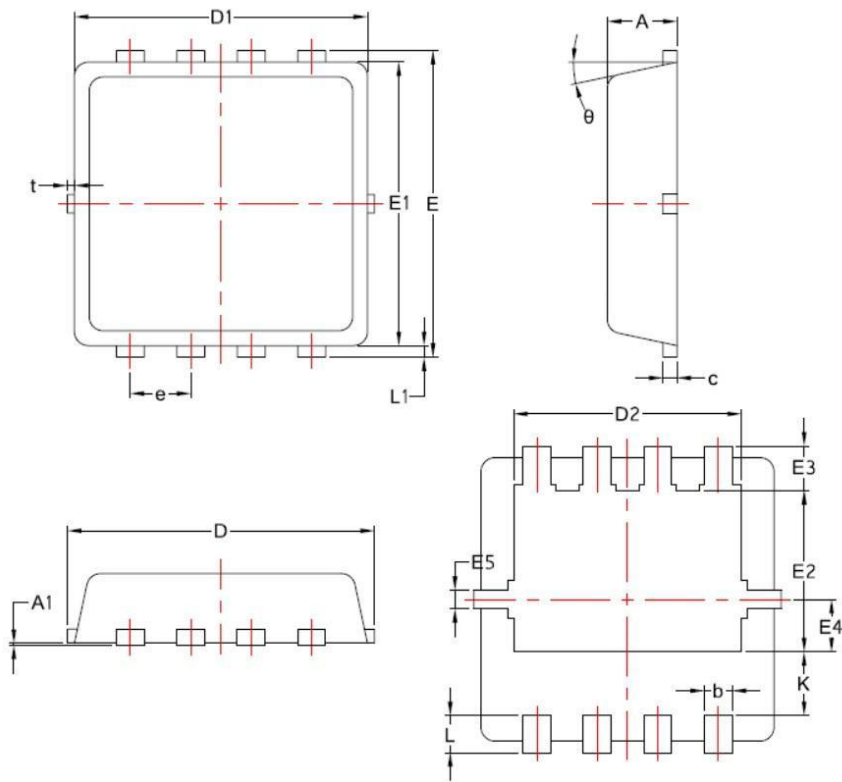
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data-PDFN3.3X3.3-8L Singl



| S<br>Y<br>M<br>B<br>O<br>L | COMMON |       |      |
|----------------------------|--------|-------|------|
|                            | MM     |       |      |
|                            | MIN    | NOM   | MAX  |
| A                          | 0.70   | 0.75  | 0.85 |
| A1                         | /      | /     | 0.05 |
| b                          | 0.20   | 0.30  | 0.40 |
| c                          | 0.10   | 0.152 | 0.25 |
| D                          | 3.15   | 3.30  | 3.45 |
| D1                         | 3.00   | 3.15  | 3.25 |
| D2                         | 2.29   | 2.45  | 2.65 |
| E                          | 3.15   | 3.30  | 3.45 |
| E1                         | 2.90   | 3.05  | 3.20 |
| E2                         | 1.54   | 1.74  | 1.94 |
| E3                         | 0.28   | 0.48  | 0.65 |
| E4                         | 0.37   | 0.57  | 0.77 |
| E5                         | 0.10   | 0.20  | 0.30 |
| e                          | 0.60   | 0.65  | 0.70 |
| K                          | 0.59   | 0.69  | 0.89 |
| L                          | 0.30   | 0.40  | 0.50 |
| L1                         | 0.06   | 0.125 | 0.20 |
| t                          | 0      | 0.075 | 0.13 |
| θ                          | 10°    | 12°   | 14°  |