Prisemi®

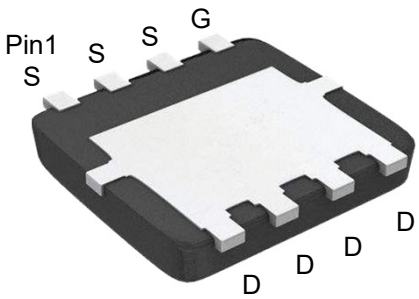
# PSM8PN04R5

## N-Channel MOSFET

## Description

The PSM8PN04R5 uses split gate trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for power management and high efficiency applications at high switching frequencies applications.

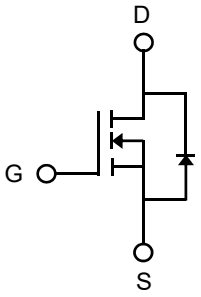
| MOSFET Product Summary | | |
|---|---|---|
| $V_{DS}$(V) | $R_{DS(on)}$(mΩ)(Typ) | $I_D$(A) |
| 40 | 3.9@ $V_{GS}$ = 10V | 64 |
| | 5.7@ $V_{GS}$ = 4.5V | |




**PDFN3333-8L**
**(Bottom View)**

## Feature

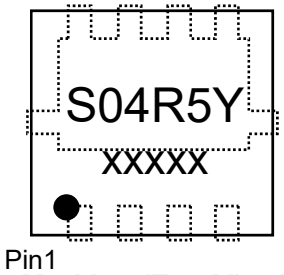
- Low $R_{DS(ON)}$ - Ensures On-State Losses are Minimized
- Excellent $Q_{gd}$ x $R_{DS(ON)}$ Product(FOM)
- Advanced Technology for DC-DC Converts
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% UIS (Avalanche) Rated
- Lead-Free Finish ; RoHS Compliant
- Halogen and Antimony Free. "Green" Device




**Circuit Diagram**

## Applications

- PWM applications
- Load switch
- Power management
- DC-DC Converters
- Wireless Chargers




**Marking (Top View)**

## Absolute maximum rating@25℃

| Rating | | Symbol | Value | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 40 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous[1)] | $T_C$=25℃ | $I_D$ | 64 | A |
| | $T_C$=100℃ | | 40 | |
| Pulsed Drain Current[2)] | | $I_{DM}$ | 213 | A |
| Total Power Dissipation[4)] | $T_C$=25℃ | $P_D$ | 32 | W |
| | $T_C$=100℃ | | 13 | |
| Avalanche Current @ L=0.1mH | | $I_{AS}$ | 27 | A |
| Avalanche Energy @ L=0.1mH | | $E_{AS}$ | 36 | mJ |
| Thermal Resistance , Junction-to-Case[4)] | | $R_{\theta JC}$ | 3.9 | ℃/W |
| Thermal Resistance Junction-to-Ambient[3)] | | $R_{\theta JA}$ | 63 | ℃/W |
| Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55~+150 | ℃ |

## Electrical characteristics per line@25℃ (unless otherwise specified)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V,$I_D$ = 250μA | | 40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 40V, $V_{GS}$ = 0V | $T_J$=25℃ | - | - | 1.0 | μA |
| | | | $T_J$=55℃ | - | - | 10 | |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±20V,$V_{DS}$ = 0V | | - | - | ±100 | nA |
| **On Characteristics[5)]** | | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$,$I_D$ = 250μA | | 1.2 | 1.7 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 10V,$I_D$ = 20A | | - | 3.9 | 4.7 | mΩ |
| | | $V_{GS}$ = 4.5V,$I_D$ = 15A | | - | 5.7 | 7.2 | |
| Forward Transconductance | $g_{fs}$ | $V_{DS}$ = 5 V,$I_D$ = 20A | | - | 25 | - | S |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0V,$I_S$ = 2A | | - | 0.7 | 1.2 | V |
| **Dynamic Characteristics[6)]** | | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$ = 20V,$V_{GS}$ = 0V, f = 1.0MHz | | - | 994 | - | pF |
| Output Capacitance | $C_{oss}$ | | | - | 602 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | - | 23 | - | |
| **Switching Characteristics[6)]** | | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}$ = 20V, $V_{GS}$ = 10V, $R_G$ = 3Ω, $I_D$ = 20A | | - | 1.3 | - | ns |
| Turn-on Rise Time | $t_r$ | | | - | 12 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | - | 17 | - | |
| Turn-Off Fall Time | $t_f$ | | | - | 12 | - | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 20V, $I_D$ = 20A, $V_{GS}$ = 0 to 10V, | | - | 14.3 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | | - | 3.1 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | | - | 1.8 | - | |
| Gate Resistance | $R_g$ | $V_{GS}$=0V,$V_{DS}$=0V,f=1MHz | | - | 4.1 | - | Ω |
| **Drain-Source Diode Characteristics[6)]** | | | | | | | |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$=20A, $d_i/d_t$=100A/μs | | - | 30 | - | ns |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | | - | 11 | - | nC |
| Diode Forward Current | $I_S$ | - | | - | - | 64 | A |

Notes:
1. Pulse width limited by maximum junction temperature.
2. Pulse test : Pulse width ≤ 100μs, duty cycle ≤ 2%.
3. Device mounted on 1 inch FR4 PCB with 2oz.Copper.
4. Device mounted on infinite heatsink.
5. Measured under pulsed conditions. Pulse width ≤ 300μs, duty cycle ≤ 2%.
6. Guaranteed by design, not subject to production.

## Typical Characteristics

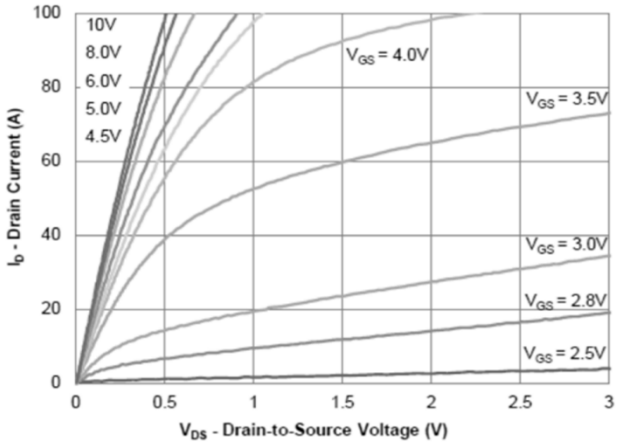



Figure 1: Output Characteristics

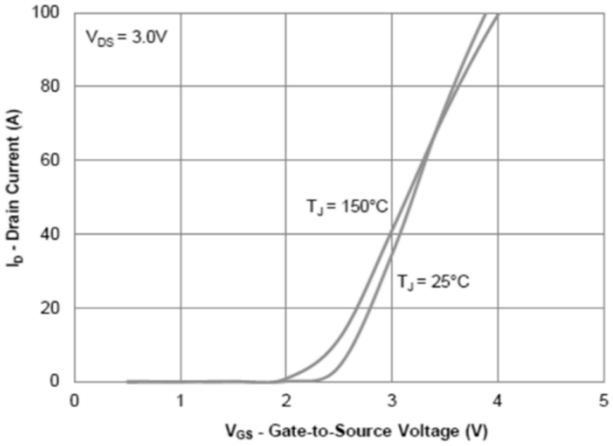



Figure 2: Transfer Characteristics

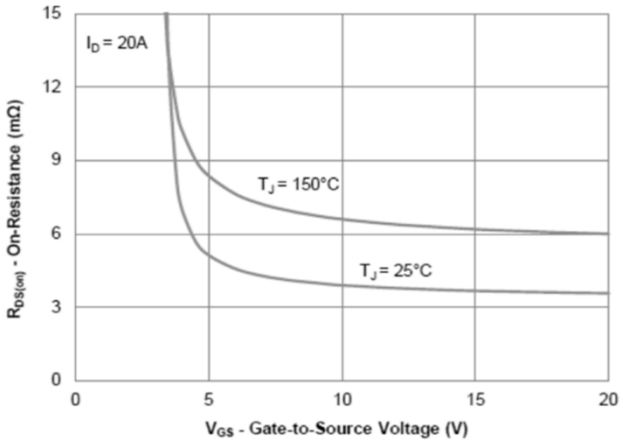



Figure 3: On-Resistance vs. Gate-Source Voltage

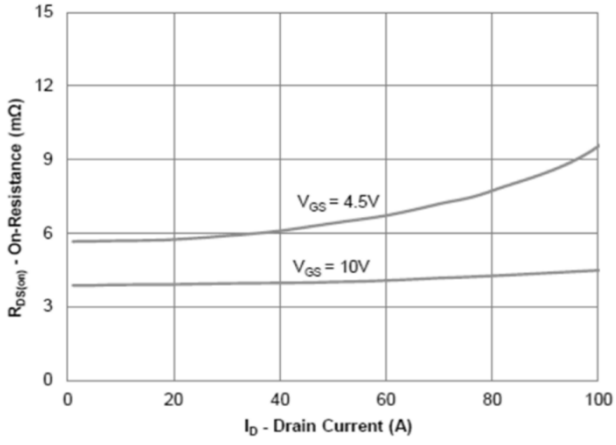



Figure 4: On-Resistance vs. Gate-Source Voltage

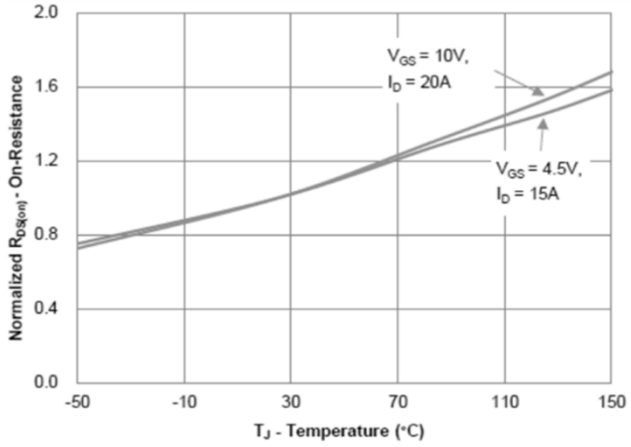



Figure 5: On-Resistance vs. Junction Temperature

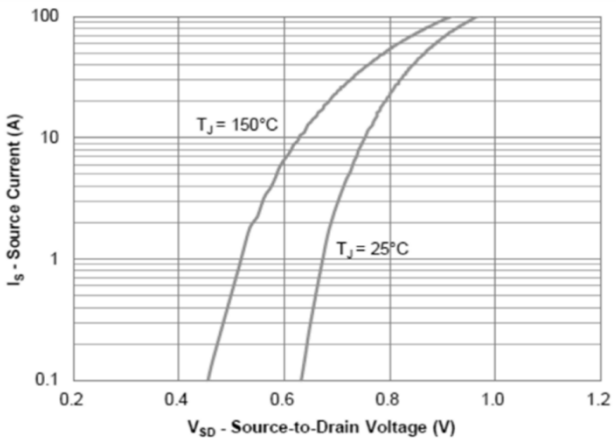



Figure 6: Source-Drain Diode Forward Voltage

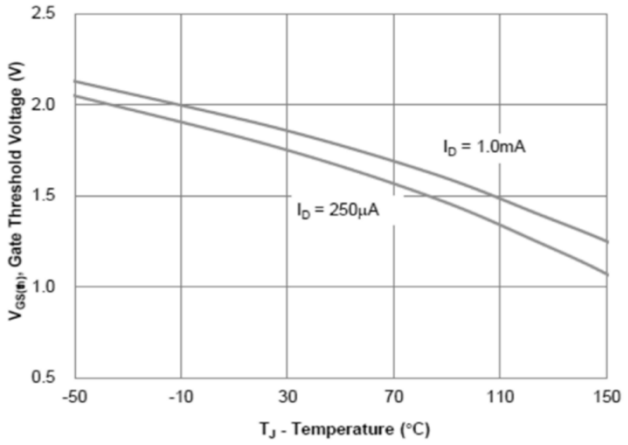



Figure 7: Gate Threshold Variation vs. Junction Temperature

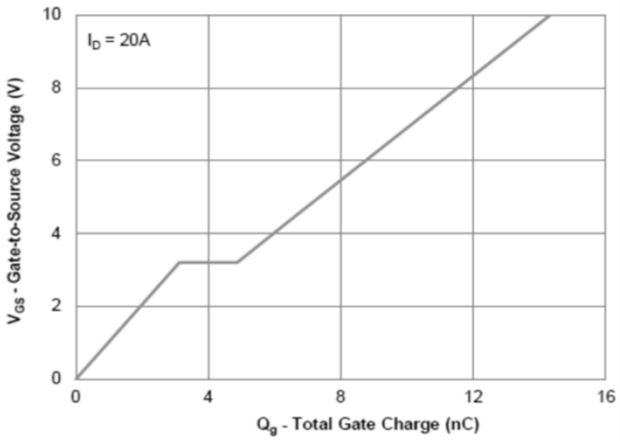



Figure 8: Gate Charge Characteristics

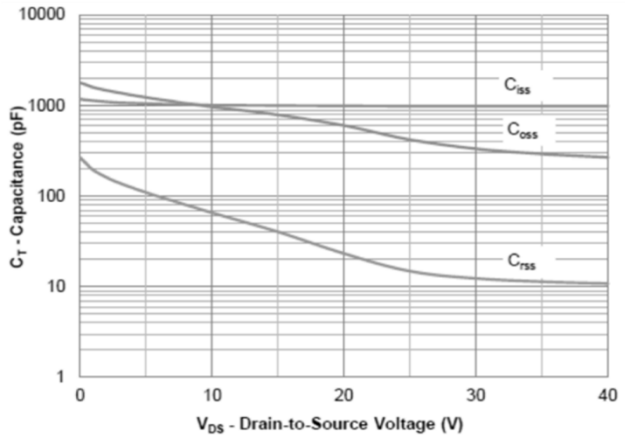



Figure 9: Capacitance Characteristics

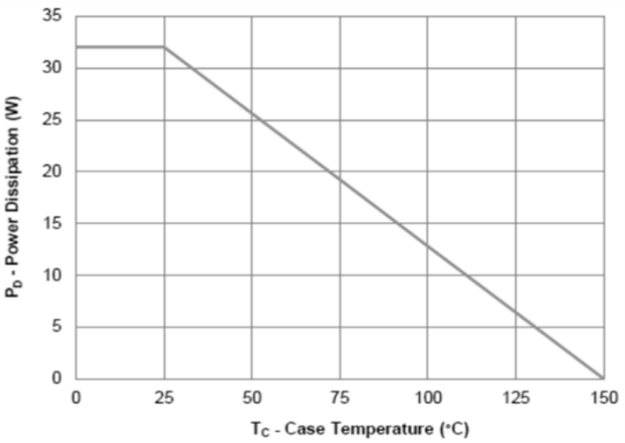



Figure 10: Power Derating

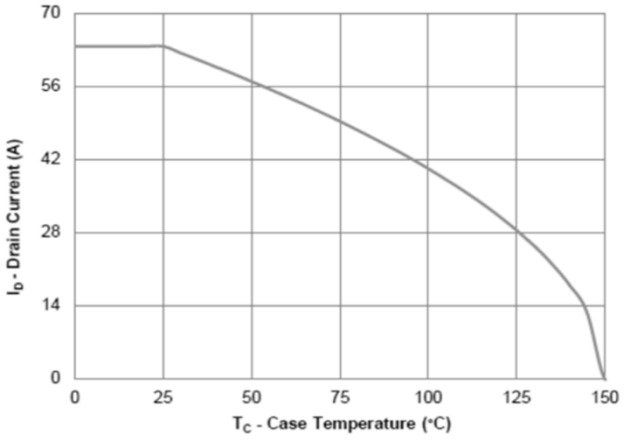



Figure 11: Current Derating

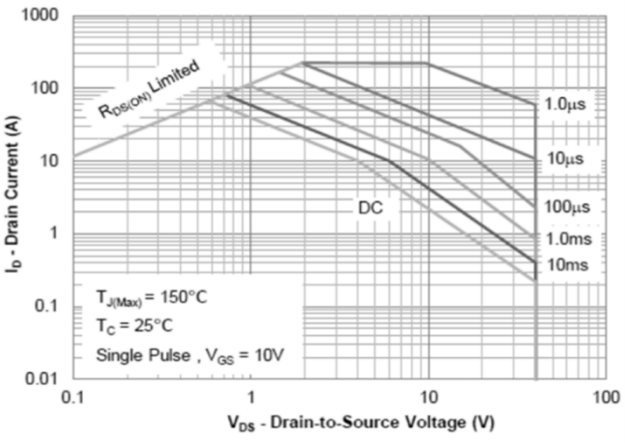



Figure 12: Safe Operating Area

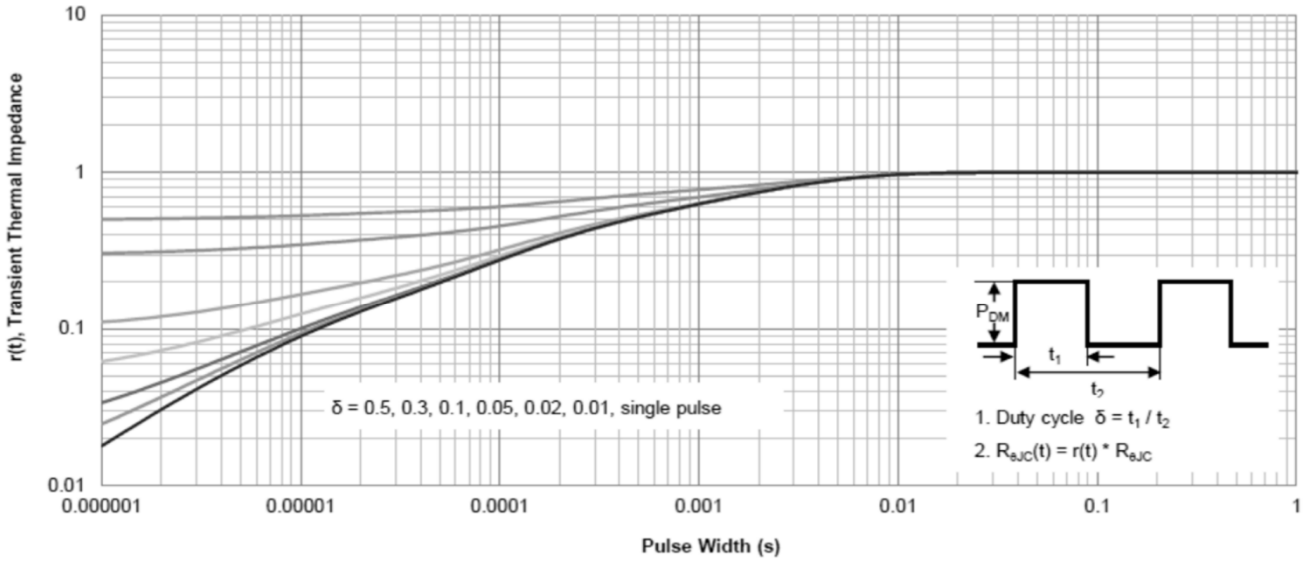
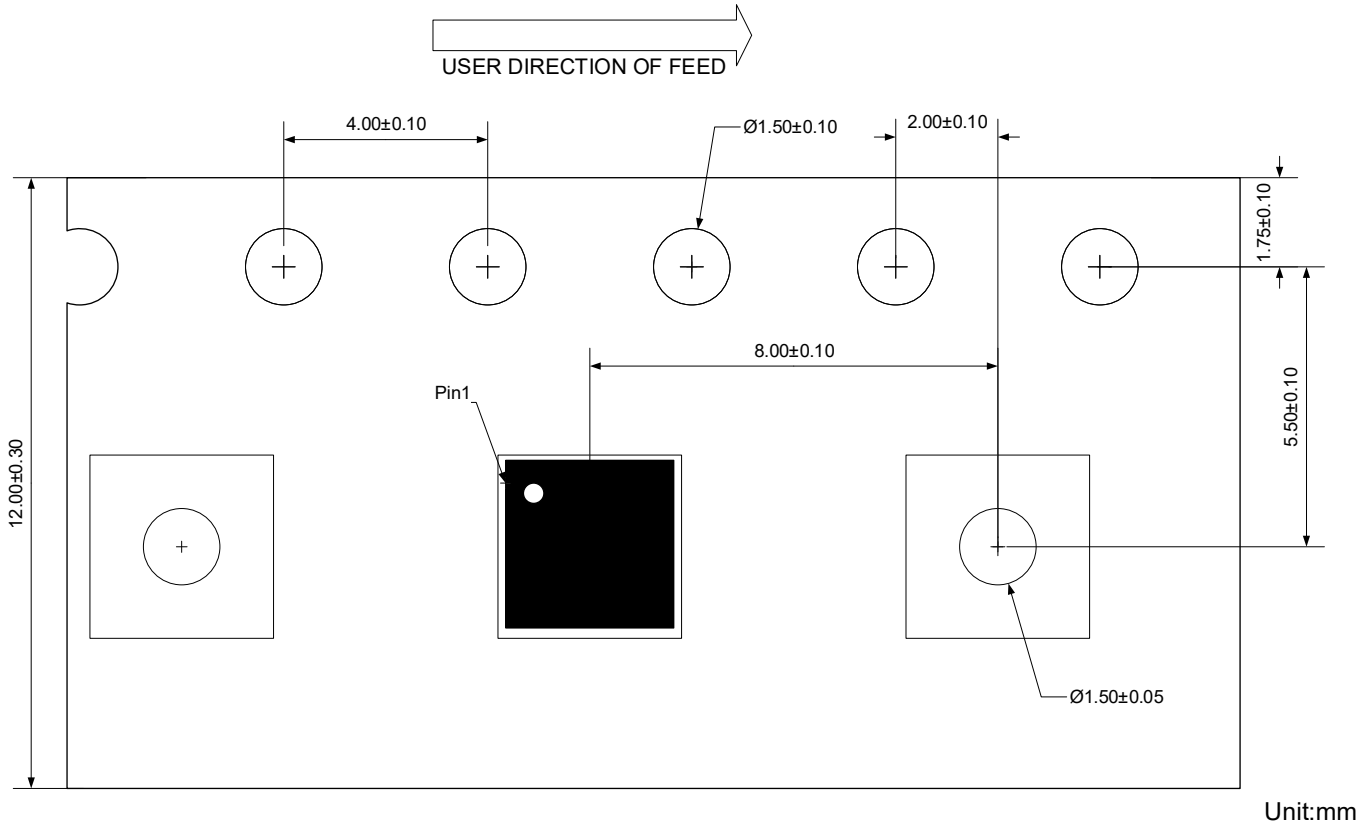



Figure 13: Normalized Maximum Transient Thermal Impedance

## Ordering Information

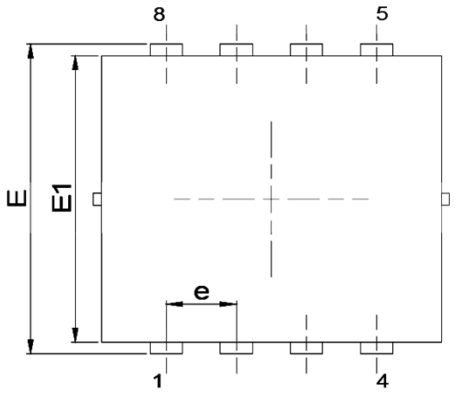
| Device | Package | Reel | Shipping |
|---|---|---|---|
| PSM8PN04R5 | PDFN3333-8L | 13" | 5000 / Tape & Reel |

## Load With Information

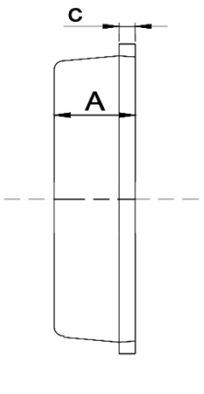



Unit:mm

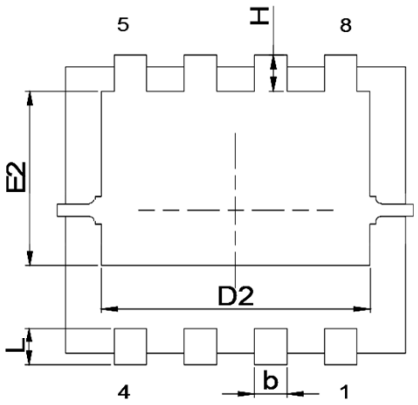
## Product Dimension (PDFN3333-8L)



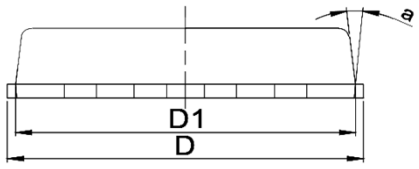
Top View



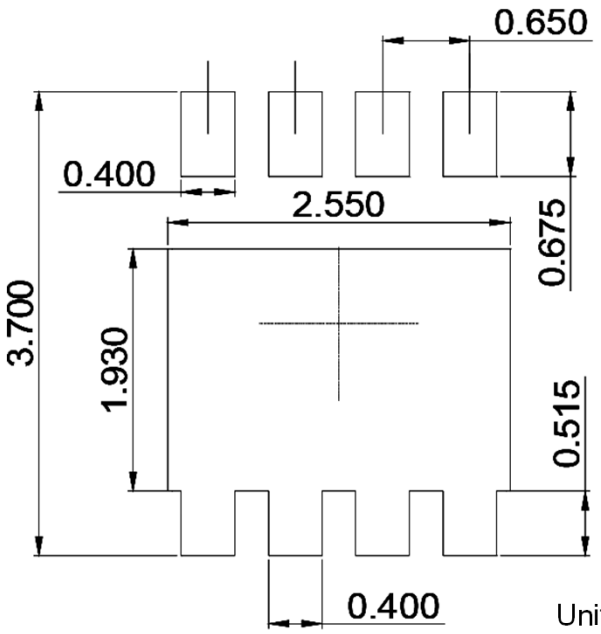
Side View



Bottom View



Front View



Unit: mm

Suggested PCB Layout

| Dim | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.70 | 0.90 | 0.028 | 0.035 |
| b | 0.20 | 0.40 | 0.008 | 0.016 |
| c | 0.10 | 0.20 | 0.004 | 0.008 |
| D | 3.20 | 3.40 | 0.126 | 0.134 |
| D1 | 3.05 | 3.25 | 0.120 | 0.128 |
| D2 | 2.35 | 2.69 | 0.093 | 0.106 |
| E | 3.20 | 3.45 | 0.126 | 0.136 |
| E1 | 2.85 | 3.15 | 0.112 | 0.124 |
| E2 | 1.65 | 1.90 | 0.065 | 0.075 |
| e | 0.65 BSC. | | 0.026 BSC. | |
| H | 0.25 | 0.60 | 0.010 | 0.024 |
| L | 0.25 | 0.50 | 0.010 | 0.020 |
| a | - | 15° | - | 15° |

**IMPORTANT NOTICE**

Prisemi® and Prisemi® are registered trademarks of **Prisemi Electronics Co., Ltd** (Prisemi**),** Prisemi reserves the right to make changes without further notice to any products herein. Prisemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Prisemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. “Typical” parameters which may be provided in Prisemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typicals” must be validated for each customer application by customer’s technical experts. Prisemi does not convey any license under its patent rights nor the rights of others. The products listed in this document are designed to be used with ordinary electronic equipment or devices, Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

Website: http://www.prisemi.com
For additional information, please contact your local Sales Representative.