

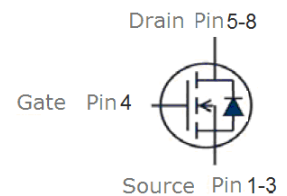
## Features

- N-Channel, 5V Logic Level Control
- Enhancement mode
- Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5\text{ V}$
- Fast Switching
- 100% Avalanche test
- Pb-free lead plating: RoHS compliant



| Part ID  | Package Type | Marking | Tape and reel information |
|----------|--------------|---------|---------------------------|
| VS3618AE | PDFN3333     | 3618AE  | 5000PCS/Reel              |

|  |    |            |
|--|----|------------|
| $V_{DS}$                               | 30 | V          |
| $R_{DS(on),TYP} @ V_{GS}=10\text{ V}$  | 6  | m $\Omega$ |
| $R_{DS(on),TYP} @ V_{GS}=4.5\text{ V}$ | 9  | m $\Omega$ |
| $I_D$                                  | 50 | A          |

**PDFN3333**


## Maximum ratings, at $T_A=25^\circ\text{C}$ , unless otherwise specified

| Symbol         | Parameter                                      | Rating                  | Unit             |
|----------------|--|-------------------------|------------------|
| $V_{(BR)DSS}$  | Drain-Source breakdown voltage                 | 30                      | V                |
| $V_{GS}$       | Gate-Source voltage                            | $\pm 20$                | V                |
| $I_S$          | Diode continuous forward current               | $T_C=25^\circ\text{C}$  | 50<br>A          |
| $I_D$          | Continuous drain current @ $V_{GS}=10\text{V}$ | $T_C=25^\circ\text{C}$  | 50<br>A          |
|                |  | $T_C=100^\circ\text{C}$ | 31<br>A          |
| $I_{DM}$       | Pulse drain current tested ①                   | $T_C=25^\circ\text{C}$  | 200<br>A         |
| $I_{DSM}$      | Continuous drain current @ $V_{GS}=10\text{V}$ | $T_A=25^\circ\text{C}$  | 17<br>A          |
|                |  | $T_A=70^\circ\text{C}$  | 14<br>A          |
| EAS            | Avalanche energy, single pulsed ②              | 25                      | mJ               |
| $P_D$          | Maximum power dissipation                      | $T_C=25^\circ\text{C}$  | 30<br>W          |
| $P_{DSM}$      | Maximum power dissipation ③                    | $T_A=25^\circ\text{C}$  | 3.6<br>W         |
| $T_{STG}, T_J$ | Storage and junction temperature range         | -55 to 150              | $^\circ\text{C}$ |

## Thermal Characteristics

| Symbol          | Parameter                               | Typical | Unit               |
|-----------------|---|---------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 4.1     | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 35      | $^\circ\text{C/W}$ |

**Electrical Characteristics**

| Symbol  | Parameter   | Condition  | Min. | Typ. | Max. | Unit |
|---|---|--|------|------|------|------|
| <b>Static Electrical Characteristics @ T<sub>j</sub>=25°C (unless otherwise stated)</b>     |   |  |      |      |      |      |
| 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  | --   | --   | 0.1  | μA   |
|   | Zero Gate Voltage Drain Current (T <sub>j</sub> =125°C) | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V  | --   | --   | 100  | μA   |
| I <sub>GSS</sub>  | Gate-Body Leakage Current                               | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   | --   | --   | ±100 | nA   |
| V <sub>GS(TH)</sub>   | Gate Threshold Voltage                                  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                       | 1.0  | 1.8  | 2.5  | V    |
| R <sub>DS(ON)</sub>   | Drain-Source On-State Resistance ④                      | V <sub>GS</sub> =10V, I <sub>D</sub> =15A  | --   | 6    | 7    | mΩ   |
| R <sub>DS(ON)</sub>   | Drain-Source On-State Resistance ④                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A   | --   | 9    | 11   | mΩ   |
| <b>Dynamic Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>  |   |  |      |      |      |      |
| C <sub>iss</sub>  | Input Capacitance                                       | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f=1MHz   | --   | 1110 | --   | pF   |
| C <sub>oss</sub>  | Output Capacitance                                      |  | --   | 180  | --   | pF   |
| C <sub>rss</sub>  | Reverse Transfer Capacitance                            |  | --   | 130  | --   | pF   |
| R <sub>g</sub>  | Gate Resistance   | f=1MHz   | --   | 1.9  | --   | Ω    |
| Q <sub>g</sub>  | Total Gate Charge                                       | V <sub>DS</sub> =15V, I <sub>D</sub> =15A,<br>V <sub>GS</sub> =10V                             | --   | 23   | --   | nC   |
| Q <sub>gs</sub>   | Gate-Source Charge                                      |  | --   | 6.2  | --   | nC   |
| Q <sub>gd</sub>   | Gate-Drain Charge                                       |  | --   | 8.9  | --   | nC   |
| <b>Switching Characteristics</b>  |   |  |      |      |      |      |
| t <sub>d(on)</sub>  | Turn-on Delay Time                                      | V <sub>DD</sub> =15V,<br>I <sub>D</sub> =15A,<br>R <sub>G</sub> =6.8Ω,<br>V <sub>GS</sub> =10V | --   | 14   | --   | ns   |
| t <sub>r</sub>  | Turn-on Rise Time                                       |  | --   | 27   | --   | ns   |
| t <sub>d(off)</sub>   | Turn-Off Delay Time                                     |  | --   | 65   | --   | ns   |
| t <sub>f</sub>  | Turn-Off Fall Time                                      |  | --   | 19   | --   | ns   |
| <b>Source- Drain Diode Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b> |   |  |      |      |      |      |
| V <sub>SD</sub>   | Forward on voltage                                      | I <sub>SD</sub> =15A, V <sub>GS</sub> =0V  | --   | 0.84 | 1.2  | V    |
| t <sub>rr</sub>   | Reverse Recovery Time                                   | T <sub>j</sub> =25°C, I <sub>sd</sub> =15A,<br>V <sub>GS</sub> =0V                             | --   | 31   | --   | ns   |
| Q <sub>rr</sub>   | Reverse Recovery Charge                                 | di/dt=100A/μs  | --   | 95   | --   | nC   |

**NOTE:**

- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.5mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 10A, V<sub>GS</sub> = 10V. Part not recommended for use above this value
- ③ The power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C.
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

Typical Characteristics

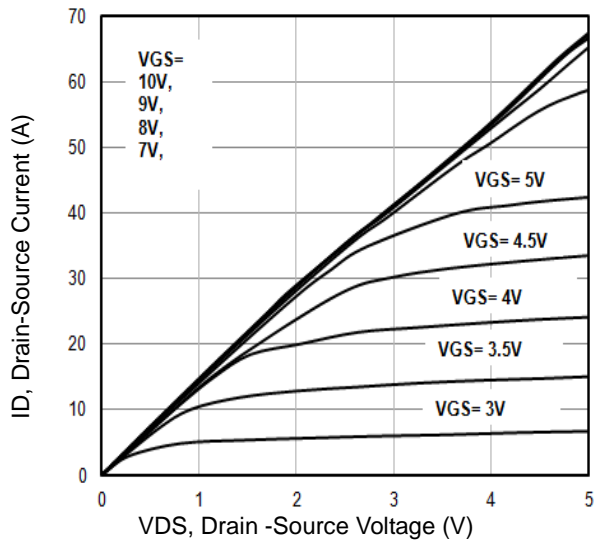


Fig1. Typical Output Characteristics

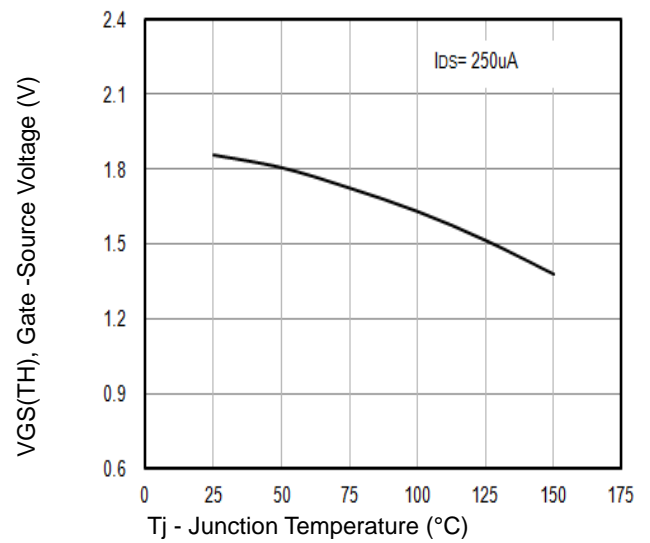


Fig2.  $V_{GS(TH)}$  Gate-Source Voltage Vs.  $T_j$

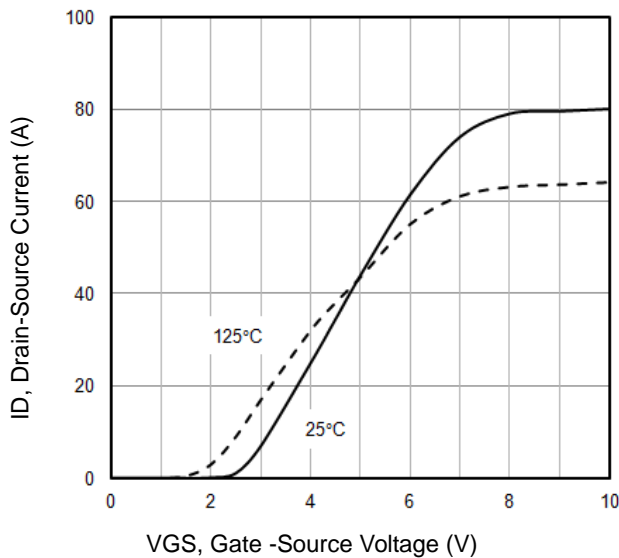


Fig3. Typical Transfer Characteristics

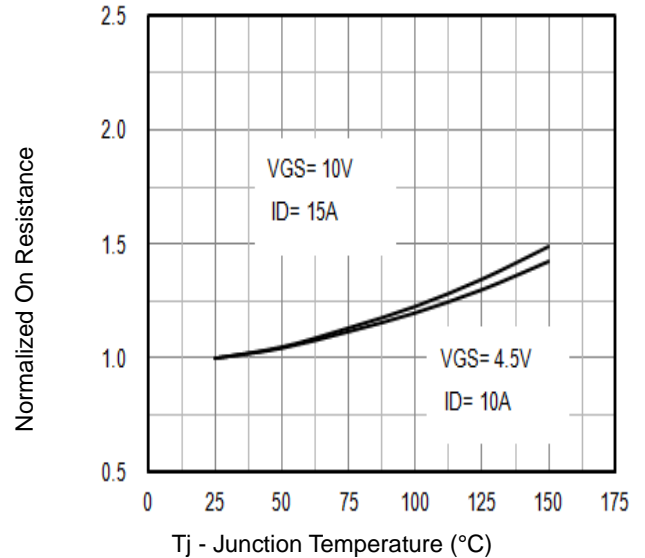


Fig4. Normalized On-Resistance Vs.  $T_j$

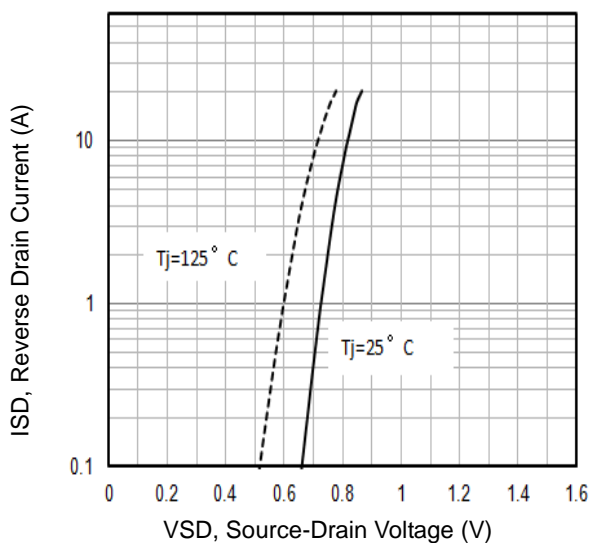


Fig5. Typical Source-Drain Diode Forward Voltage

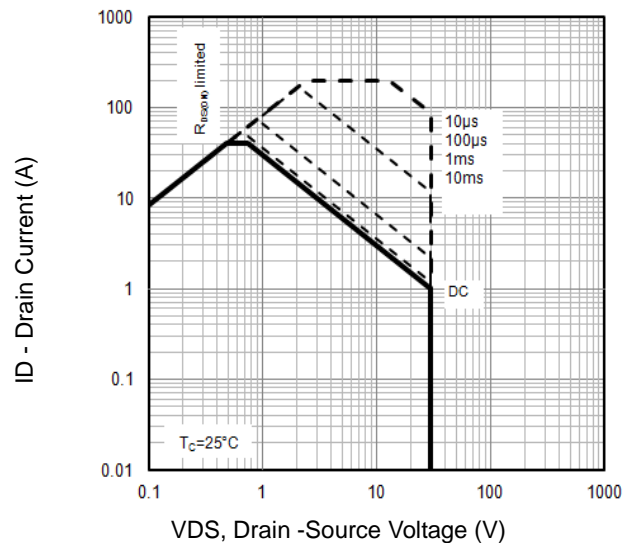


Fig6. Maximum Safe Operating Area

Typical Characteristics

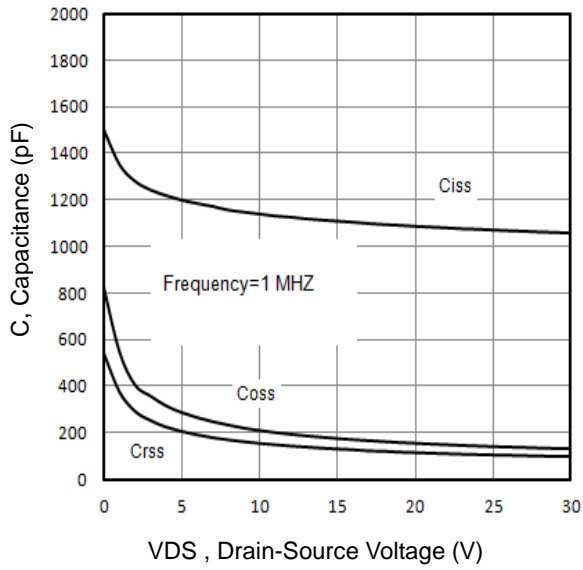


Fig7. Typical Capacitance Vs.Drain-Source Voltage

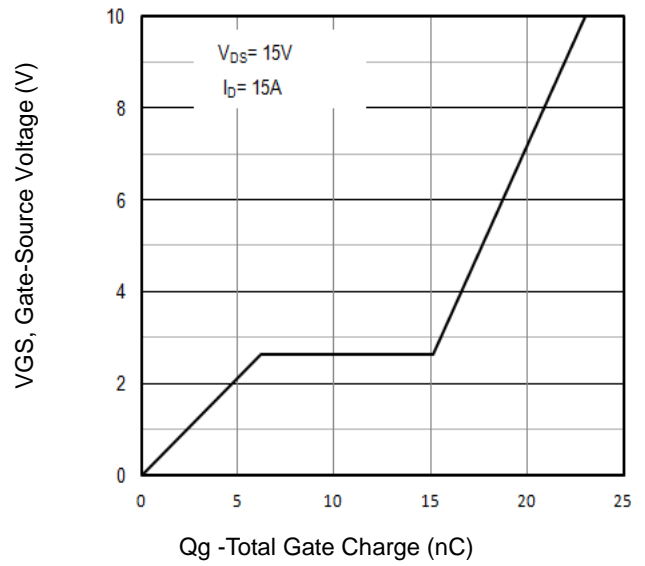


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

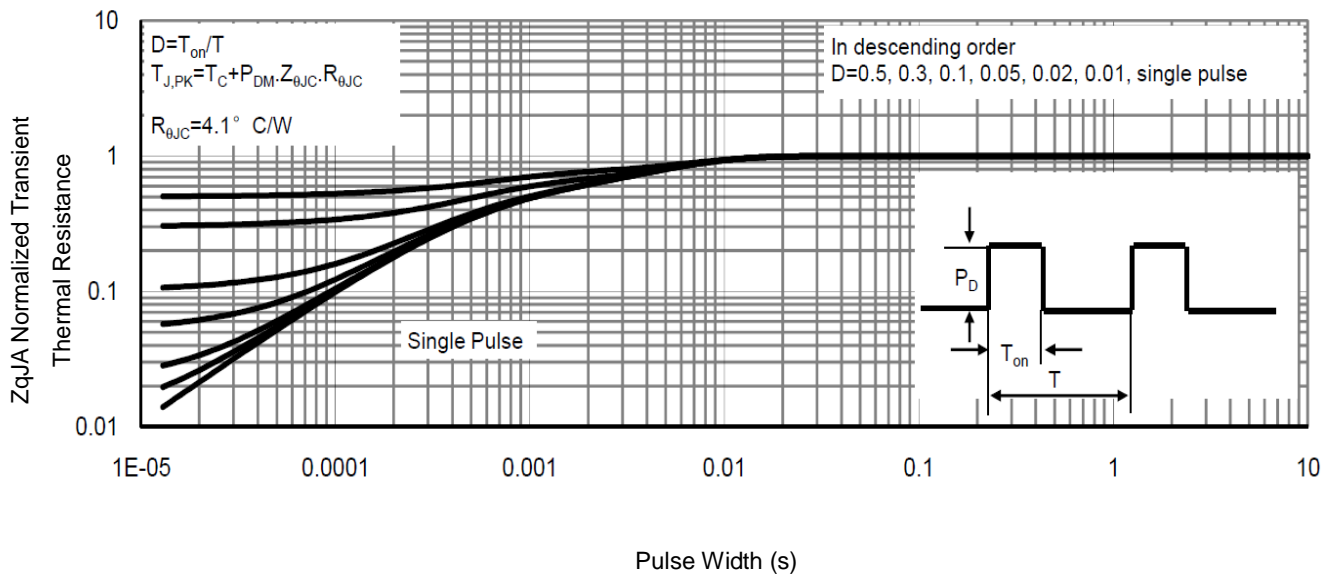


Fig9. Normalized Maximum Transient Thermal Impedance

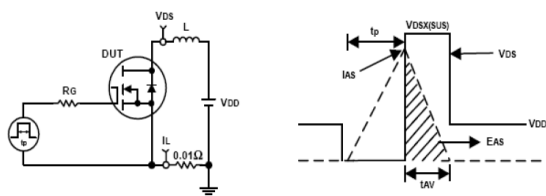


Fig10. Unclamped Inductive Test Circuit and waveforms

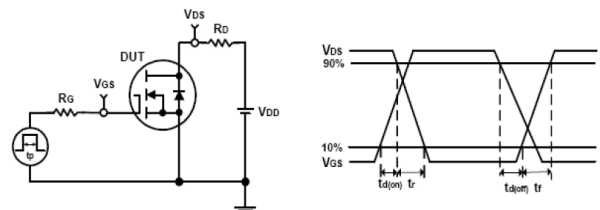
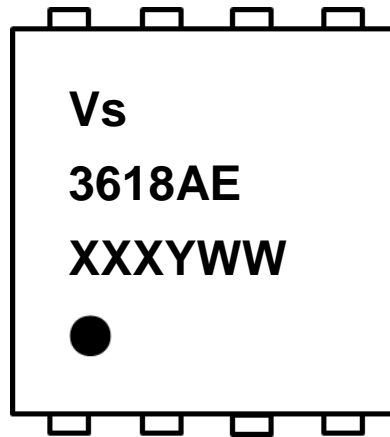


Fig11. Switching Time Test Circuit and waveforms

## Marking Information



1<sup>st</sup> line: Vanguard Code (Vs)

2<sup>nd</sup> line: Part Number (3618AE)

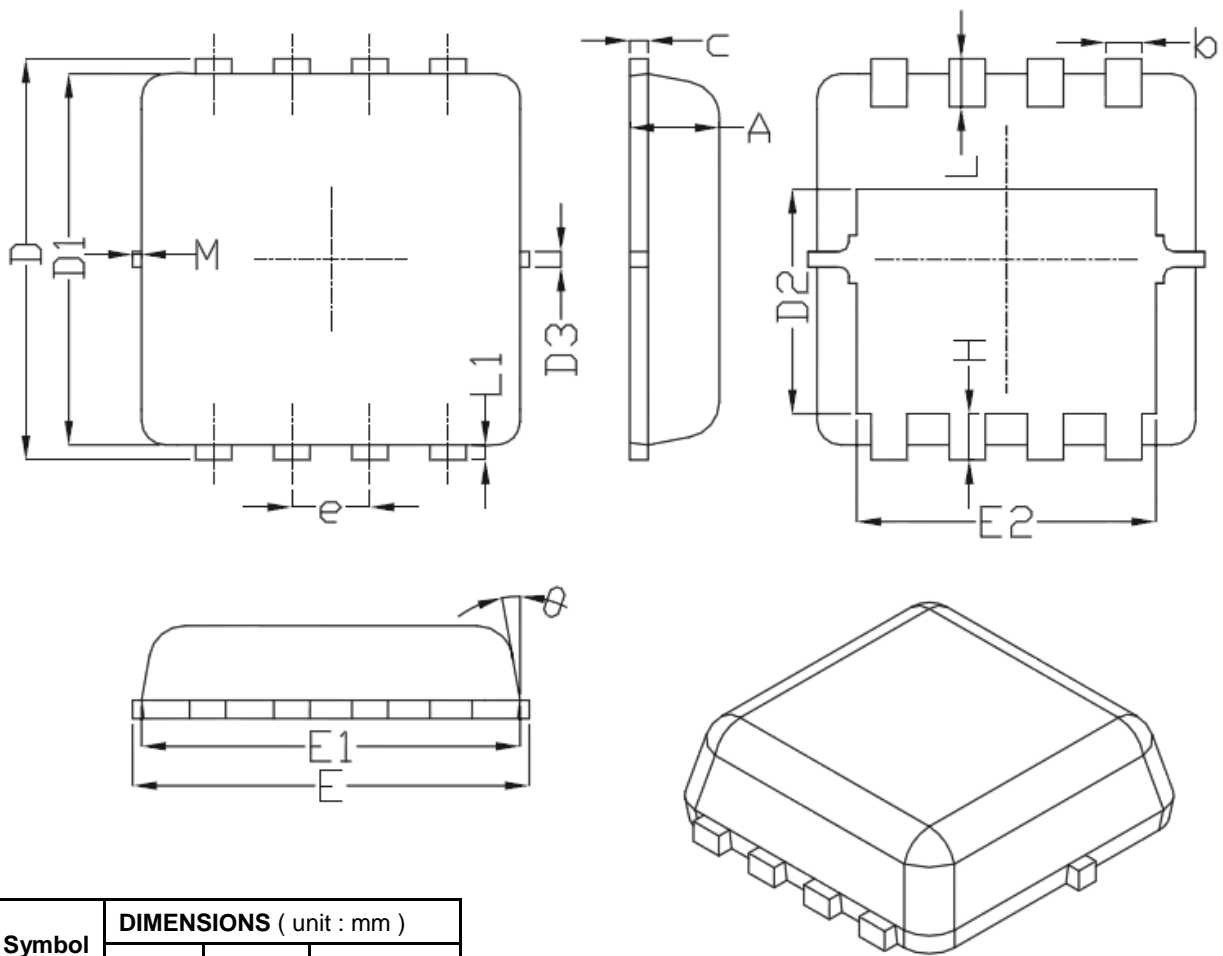
3<sup>rd</sup> line: Date code (XXXYWW)

XXX: Wafer Lot Number

Y: Year Code, e.g. E means 2017

WW: Week Code

PDFN3333 Package Outline Data



| Symbol          | DIMENSIONS ( unit : mm ) |      |      |
|-----------------|--------------------------|------|------|
|                 | Min                      | Typ  | Max  |
| A               | 0.7                      | 0.75 | 0.8  |
| b               | 0.25                     | 0.3  | 0.35 |
| C               | 0.1                      | 0.15 | 0.25 |
| D               | 3.25                     | 3.35 | 3.45 |
| D1              | 3                        | 3.1  | 3.2  |
| D2              | 1.78                     | 1.88 | 1.98 |
| D3              | --                       | 0.13 | --   |
| E               | 3.2                      | 3.3  | 3.4  |
| E1              | 3                        | 3.15 | 3.2  |
| E2              | 2.39                     | 2.49 | 2.59 |
| e               | 0.65 BSC                 |      |      |
| H               | 0.3                      | 0.39 | 0.5  |
| L               | 0.3                      | 0.4  | 0.5  |
| L1              | --                       | 0.13 | --   |
| θ               | --                       | 10°  | 12°  |
| M               | *                        | *    | 0.15 |
| * Not specified |                          |      |      |

Notes:

1. Follow JEDEC MO-240 variation CA.
2. Dimensions "D1" and "E1" do NOT include mold flash protrusions or gate burrs.
3. Dimensions "D1" and "E1" include interterminal flash or protrusion. Interterminal flash or protrusion shall not exceed 0.25mm per side.

Customer Service

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