

## Features

- P-Channel
- Very low on-resistance  $R_{DS(on)}$  @  $V_{GS} = -3.3V$
- Fast Switching
- Repetitive Avalanche Allowed up to  $T_{jmax}$
- 100% Avalanche test
- Pb-free lead plating; RoHS compliant

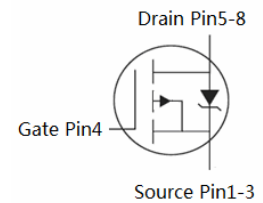
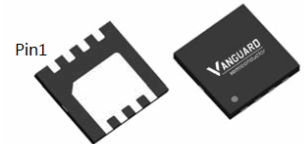


Halogen-Free

| Part ID     | Package Type | Marking | Tape and reel information |
|-------------|--------------|---------|---------------------------|
| VSB006P02LS | TDFN3.3x3.3  | 006P02L | 5000pcs/reel              |

|                                   |     |    |
|-----------------------------------|-----|----|
| $V_{DS}$                          | -20 | V  |
| $R_{DS(on),TYP} @ V_{GS} = -5V$   | 6.5 | mΩ |
| $R_{DS(on),TYP} @ V_{GS} = -3.3V$ | 7.5 | mΩ |
| $I_D$                             | -50 | A  |

**TDFN3.3x3.3**



**Maximum ratings, at  $T_j = 25^\circ C$ , unless otherwise specified**

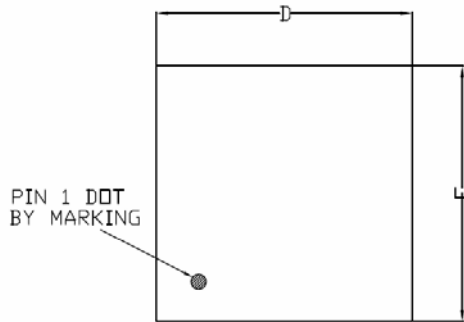
| Symbol                                          | Parameter                                       |                       | Rating     | Unit |
|-------------------------------------------------|-------------------------------------------------|-----------------------|------------|------|
| Common Ratings (Tc=25°C Unless Otherwise Noted) |                                                 |                       |            |      |
| V <sub>GS</sub>                                 | Gate-Source Voltage                             |                       | ±8         | V    |
| V <sub>(BR)DSS</sub>                            | Drain-Source Breakdown Voltage                  |                       | -20        | V    |
| T <sub>J</sub>                                  | Maximum Junction Temperature                    |                       | 150        | °C   |
| T <sub>STG</sub>                                | Storage Temperature Range①                      |                       | -55 to 175 | °C   |
| I <sub>S</sub>                                  | Diode Continuous Forward Current                | T <sub>C</sub> =25°C  | -50        | A    |
| EAS                                             | Avalanche energy, single pulsed ③               | L=0.3mH               | 60         | mJ   |
| Mounted on Large Heat Sink                      |                                                 |                       |            |      |
| I <sub>D</sub>                                  | Continuous Drain current @V <sub>GS</sub> =-10V | T <sub>C</sub> =25°C  | -50        | A    |
|                                                 |                                                 | T <sub>C</sub> =100°C | -32        | A    |
| I <sub>DM</sub>                                 | Pulse Drain Current Tested ②                    | T <sub>C</sub> =25°C  | -200       | A    |
| P <sub>D</sub>                                  | Maximum Power Dissipation                       | T <sub>C</sub> =25°C  | 78         | W    |
| R <sub>θJC</sub>                                | Thermal Resistance-Junction to Case             |                       | 45         | °C/W |
| R <sub>θJA</sub>                                | Thermal Resistance Junction-Ambient             |                       | 1.6        | °C/W |

| Symbol                                                                               | Parameter                                 | Condition                                                                                          | Min. | Typ.  | Max. | Unit |
|--------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------|------|-------|------|------|
| Static Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated)  |                                           |                                                                                                    |      |       |      |      |
| V <sub>(BR)DSS</sub>                                                                 | Drain-Source Breakdown Voltage            | V <sub>GS</sub> =0V I <sub>D</sub> =-250μA                                                         | -20  | --    | --   | V    |
| I <sub>DSS</sub>                                                                     | Zero Gate Voltage Drain Current(Tc=25°C)  | V <sub>DS</sub> =-16V,V <sub>GS</sub> =0V                                                          | --   | --    | -1   | μA   |
|                                                                                      | Zero Gate Voltage Drain Current(Tc=125°C) | V <sub>DS</sub> =-16V,V <sub>GS</sub> =0V                                                          | --   | --    | -100 | μA   |
| I <sub>GSS</sub>                                                                     | Gate-Body Leakage Current                 | V <sub>GS</sub> =±8V,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                                           | -0.5 | -0.8  | -1.2 | V    |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance ②        | V <sub>GS</sub> =-5V, I <sub>D</sub> =-20A                                                         | --   | 6.5   | 8.0  | mΩ   |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance ②        | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A                                                       | --   | 7.0   | 8.5  | mΩ   |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance ②        | V <sub>GS</sub> =-3.3V, I <sub>D</sub> =-10A                                                       | --   | 7.5   | 9.0  | mΩ   |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance ②        | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-6A                                                        | --   | 9.0   | 12.0 | mΩ   |
| Dynamic Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated) |                                           |                                                                                                    |      |       |      |      |
| C <sub>iss</sub>                                                                     | Input Capacitance                         | V <sub>DS</sub> =-10V,V <sub>GS</sub> =0V,<br>f=1MHz                                               | --   | 4130  | --   | pF   |
| C <sub>oss</sub>                                                                     | Output Capacitance                        |                                                                                                    | --   | 620   | --   | pF   |
| C <sub>rss</sub>                                                                     | Reverse Transfer Capacitance              |                                                                                                    | --   | 515   | --   | pF   |
| Q <sub>g</sub>                                                                       | Total Gate Charge                         | V <sub>DS</sub> =-10V,I <sub>D</sub> =-10A,<br>V <sub>GS</sub> =-4.5V                              | --   | 55    | --   | nC   |
| Q <sub>gs</sub>                                                                      | Gate-Source Charge                        |                                                                                                    | --   | 10    | --   | nC   |
| Q <sub>gd</sub>                                                                      | Gate-Drain Charge                         |                                                                                                    | --   | 13    | --   | nC   |
| Switching Characteristics                                                            |                                           |                                                                                                    |      |       |      |      |
| t <sub>d(on)</sub>                                                                   | Turn-on Delay Time                        | V <sub>DD</sub> =-10V,<br>I <sub>D</sub> =-10A,<br>R <sub>G</sub> =6.8Ω,<br>V <sub>GS</sub> =-4.5V | --   | 15    | --   | nS   |
| t <sub>r</sub>                                                                       | Turn-on Rise Time                         |                                                                                                    | --   | 38    | --   | nS   |
| t <sub>d(off)</sub>                                                                  | Turn-Off Delay Time                       |                                                                                                    | --   | 205   | --   | nS   |
| t <sub>f</sub>                                                                       | Turn-Off Fall Time                        |                                                                                                    | --   | 85    | --   | nS   |
| Source- Drain Diode Characteristics@ T <sub>J</sub> = 25°C (unless otherwise stated) |                                           |                                                                                                    |      |       |      |      |
| V <sub>SD</sub>                                                                      | Forward on voltage                        | I <sub>SD</sub> =-20A,V <sub>GS</sub> =0V                                                          | --   | -0.84 | -1.3 | V    |
| t <sub>rr</sub>                                                                      | Reverse Recovery Time                     | T <sub>J</sub> =25°C,I <sub>sd</sub> =-20A,<br>V <sub>GS</sub> =0V                                 | --   | 52    | --   | nS   |
| Q <sub>rr</sub>                                                                      | Reverse Recovery Charge                   | di/dt=-100A/μs                                                                                     |      | 340   |      | nC   |

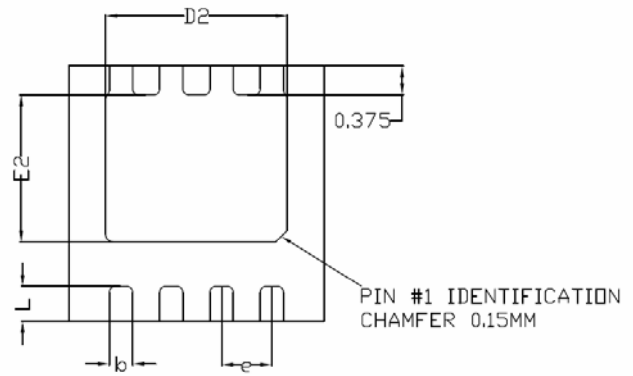
**NOTE:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width ≤ 300μs; duty cycles ≤ 2%.
- ③ Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.3mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 20A, V<sub>GS</sub> = 10V. Part not recommended for use above this value

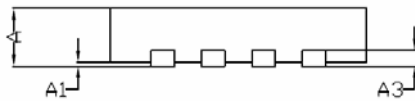
**TDFN3.3x3.3 Package Outline Data**



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Lead finish : NiPdAu

**DIMENSIONS ( unit : mm )**

| Symbol | Min      | Typ  | Max  | Symbol | Min      | Typ  | Max  |
|--------|----------|------|------|--------|----------|------|------|
| A      | 0.70     | 0.75 | 0.80 | A1     | 0.00     | --   | 0.05 |
| A3     | 0.20 REF |      |      | D      | 3.25     | 3.30 | 3.35 |
| E      | 3.25     | 3.30 | 3.35 | D2     | 2.30     | 2.35 | 2.40 |
| E2     | 1.85     | 1.90 | 1.95 | b      | 0.25     | 0.30 | 0.35 |
| L      | 0.35     | 0.45 | 0.55 | e      | 0.65 BSC |      |      |
|        |          |      |      |        |          |      |      |

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