

## Features

- N-Channel
- Enhancement mode
- Low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5\text{ V}$
- Fast Switching
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant

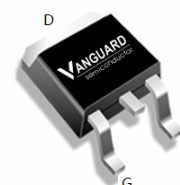


Halogen-Free

| Part ID     | Package Type | Marking | Tape and reel information |
|-------------|--------------|---------|---------------------------|
| VSD018N03MS | TO-252       | 018N03M | 2500pcs/reel              |

|                                         |    |           |
|-----------------------------------------|----|-----------|
| $V_{DS}$                                | 30 | V         |
| $R_{DS(on), Typ} @ V_{GS}=10\text{ V}$  | 16 | $m\Omega$ |
| $R_{DS(on), Typ} @ V_{GS}=4.5\text{ V}$ | 22 | $m\Omega$ |
| $I_D$                                   | 30 | A         |

TO-252



Drain Pin 2



Source Pin 3

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

| Symbol        | Parameter                                       | Rating                    | Unit               |
|---------------|-------------------------------------------------|---------------------------|--------------------|
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage                  | 30                        | V                  |
| $I_D$         | Continuous drain current @ $V_{GS}=10\text{ V}$ | $T_C=25^{\circ}\text{C}$  | 30                 |
|               |                                                 | $T_C=100^{\circ}\text{C}$ | 19                 |
| $I_{DM}$      | Pulse drain current tested ①                    | $T_C=25^{\circ}\text{C}$  | 100                |
| EAS           | Avalanche energy, single pulsed ②               | $L=0.1\text{ mH}$         | 11                 |
| $P_D$         | Maximum power dissipation                       | $T_C=25^{\circ}\text{C}$  | 42                 |
| $V_{GS}$      | Gate-Source voltage                             | $\pm 20$                  | V                  |
| $T_{STG}$     | Storage and operating temperature range         | -55 to 175                | $^{\circ}\text{C}$ |

## Thermal characteristics

| Symbol          | Parameter                           | Typical | Unit                 |
|-----------------|-------------------------------------|---------|----------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | 55      | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 3.5     | $^{\circ}\text{C/W}$ |

| 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                                                     | 30  | --   | --   | V    |
| I <sub>DSS</sub>                                                                     | Zero Gate Voltage Drain Current<br>(T <sub>c</sub> =25°C)  | V <sub>DS</sub> =24V,V <sub>GS</sub> =0V                                                      | --  | --   | 1    | μA   |
|                                                                                      | Zero Gate Voltage Drain Current<br>(T <sub>c</sub> =125°C) | V <sub>DS</sub> =24V,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 | 1.5  | 2.2  | V    |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance③                          | V <sub>GS</sub> =10V, I <sub>D</sub> =15A                                                     | --  | 16   | 18.5 | mΩ   |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance③                          | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                                    | --  | 22   | 25   | mΩ   |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance③                          | V <sub>GS</sub> =4.2V, I <sub>D</sub> =2A                                                     | --  | 23   | 28   | mΩ   |
| Dynamic Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated) |                                                            |                                                                                               |     |      |      |      |
| C <sub>iss</sub>                                                                     | Input Capacitance                                          | V <sub>DS</sub> =15V,V <sub>GS</sub> =0V,<br>f=1MHz                                           | --  | 445  | --   | pF   |
| C <sub>oss</sub>                                                                     | Output Capacitance                                         |                                                                                               | --  | 75   | --   | pF   |
| C <sub>rss</sub>                                                                     | Reverse Transfer Capacitance                               |                                                                                               | --  | 40   | --   | pF   |
| Q <sub>g</sub>                                                                       | Total Gate Charge                                          | V <sub>DS</sub> =10V,I <sub>D</sub> =10A,<br>V <sub>GS</sub> =10V                             | --  | 15   | --   | nC   |
| Q <sub>gs</sub>                                                                      | GateSource Charge                                          |                                                                                               | --  | 4.5  | --   | nC   |
| Q <sub>gd</sub>                                                                      | GateDrain Charge                                           |                                                                                               | --  | 5.0  | --   | nC   |
| Switching Characteristics                                                            |                                                            |                                                                                               |     |      |      |      |
| t <sub>d(on)</sub>                                                                   | Turnon Delay Time                                          | V <sub>DD</sub> =15V,<br>I <sub>D</sub> =6A,<br>R <sub>G</sub> =3.3Ω,<br>V <sub>GS</sub> =10V | --  | 6    | --   | nS   |
| t <sub>r</sub>                                                                       | Turnon Rise Time                                           |                                                                                               | --  | 14   | --   | nS   |
| t <sub>d(off)</sub>                                                                  | TurnOff Delay Time                                         |                                                                                               | -   | 21   | --   | nS   |
| t <sub>f</sub>                                                                       | TurnOff Fall Time                                          |                                                                                               | --  | 10   | --   | nS   |
| Source Drain Diode Characteristics                                                   |                                                            |                                                                                               |     |      |      |      |
| I <sub>SD</sub>                                                                      | Sourcedrain current(Body Diode)                            | T <sub>c</sub> =25°C                                                                          | 30  | --   | --   | A    |
| V <sub>SD</sub>                                                                      | Forward on voltage                                         | T <sub>J</sub> =25°C,I <sub>SD</sub> =15A,<br>V <sub>GS</sub> =0V                             | --  | 0.91 | 1.3  | V    |

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

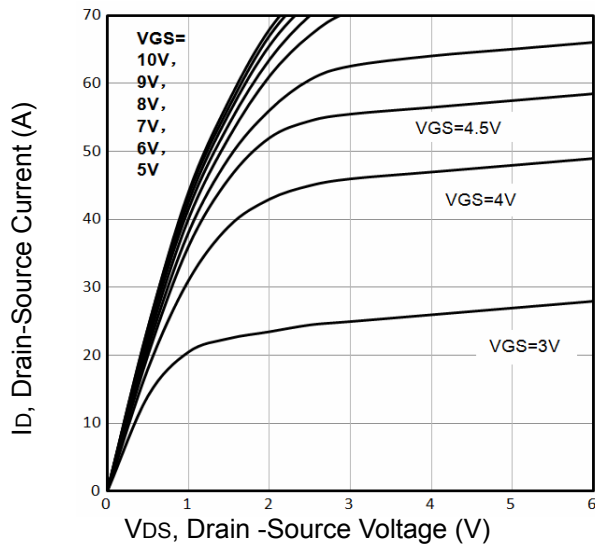
② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.1mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 15A, V<sub>GS</sub> = 10V. Part not recommended for use above this value

③ Pulse width ≤ 300μs; duty cycles 2%.

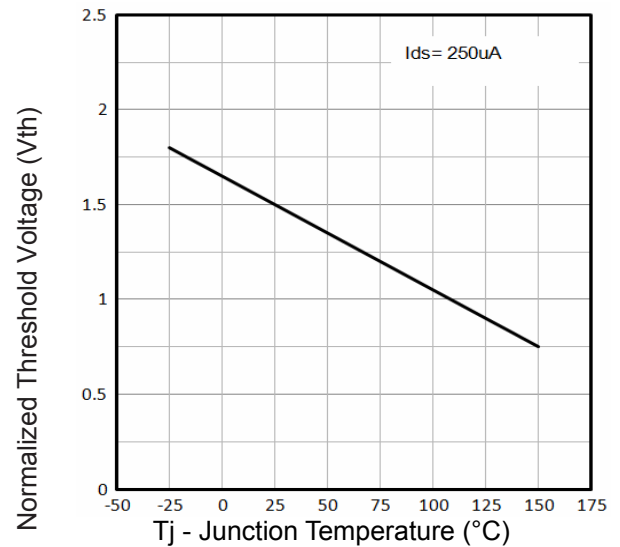
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A.1– Apr.8<sup>th</sup>, 2016

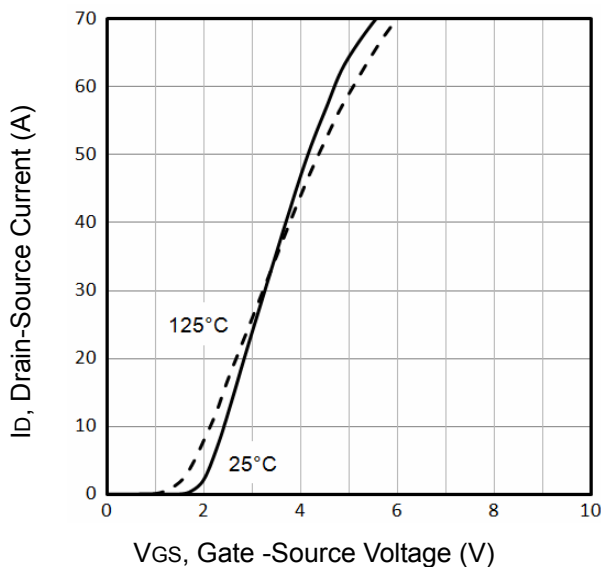
## Typical Characteristics



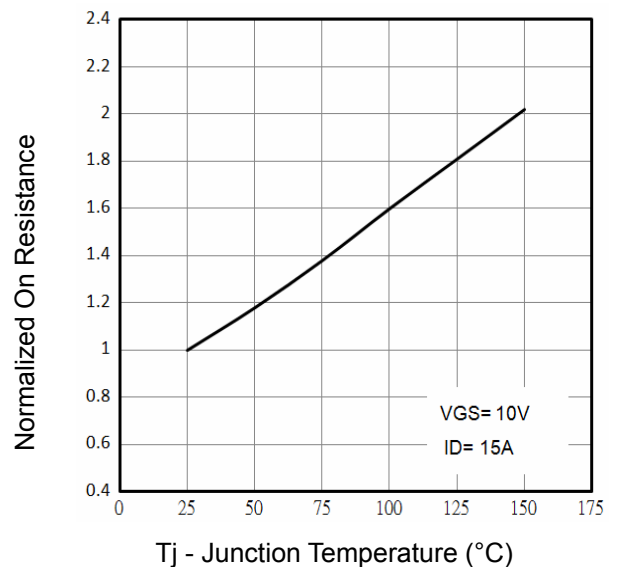
**Fig1.** Typical Output Characteristics



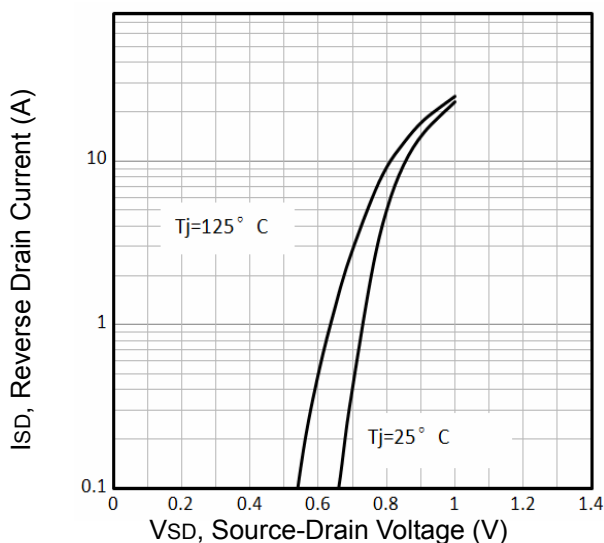
**Fig2.** Normalized Threshold Voltage Vs. Temperature



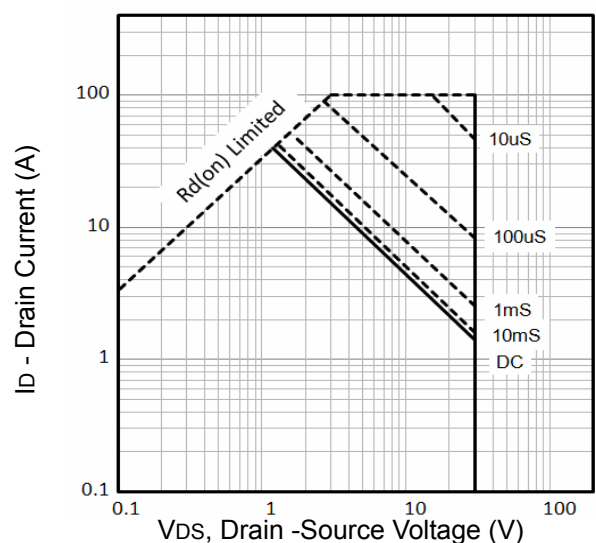
**Fig3.** Typical Transfer Characteristics



**Fig4.** Normalized On-Resistance Vs. Temperature

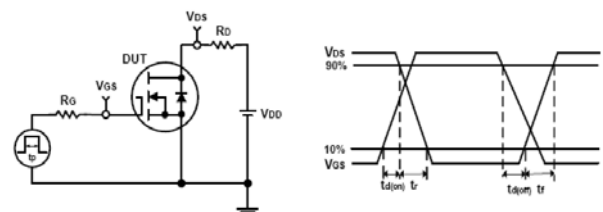
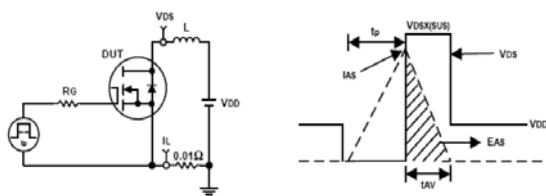
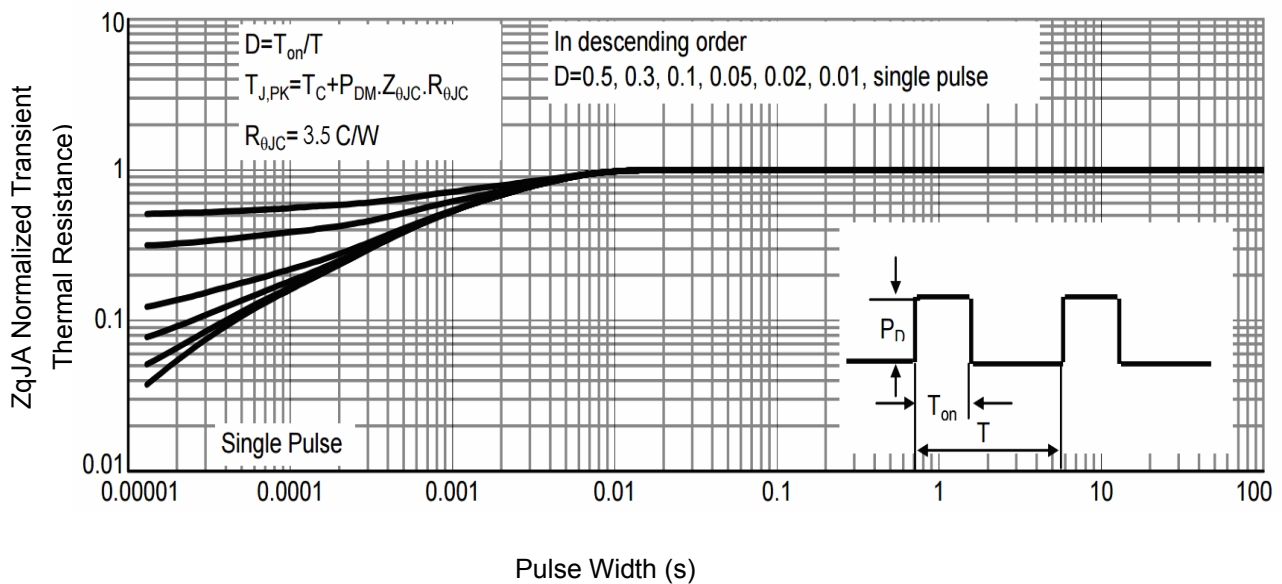
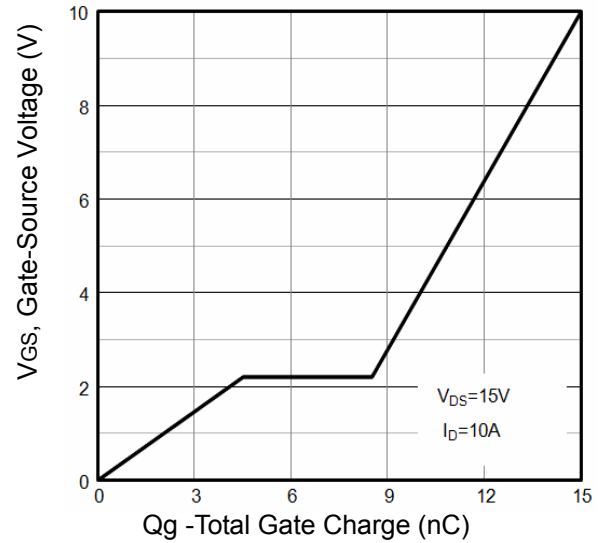
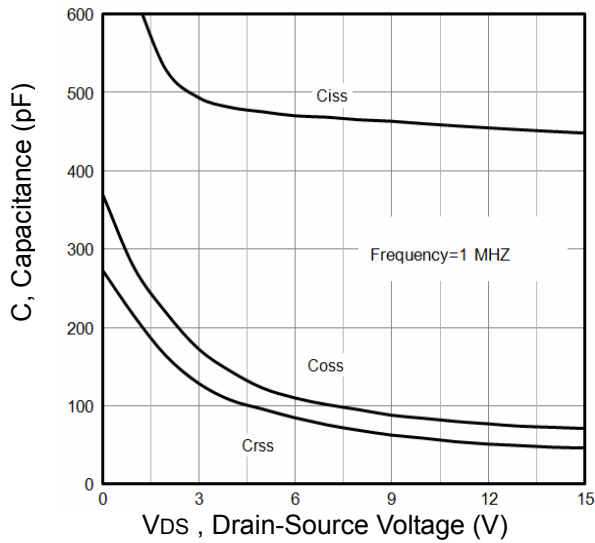


**Fig5.** Typical Source-Drain Diode Forward Voltage

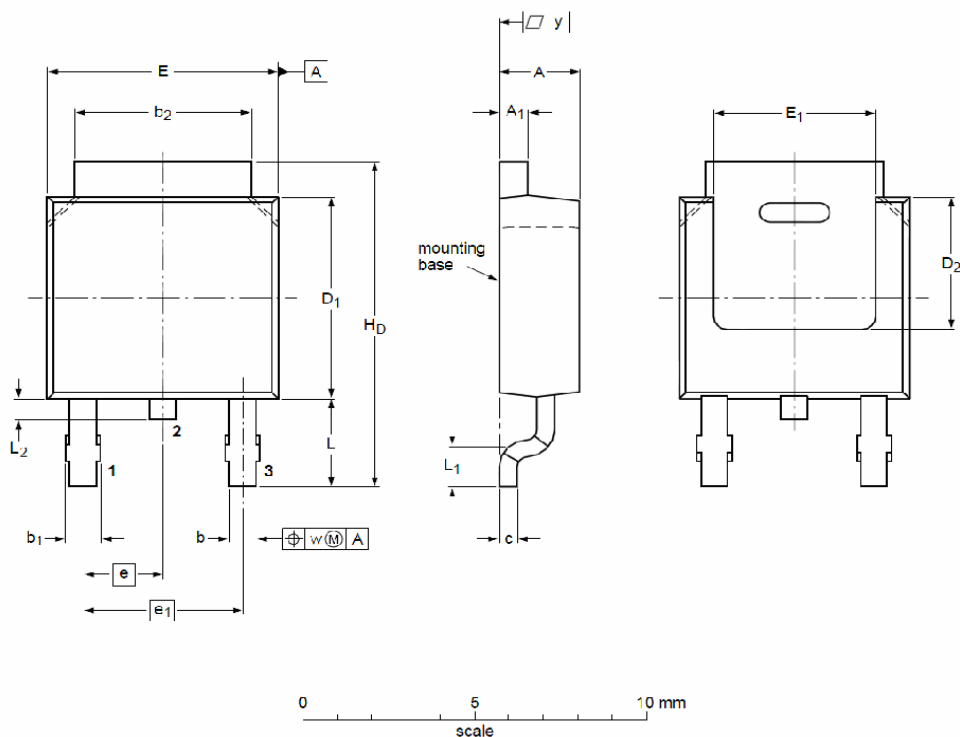


**Fig6.** Maximum Safe Operating Area

## Typical Characteristics



## TO-252 Package Outline



**DIMENSIONS** ( unit : mm )

| Symbol         | Min  | Typ   | Max   | Symbol         | Min  | Typ  | Max  |
|----------------|------|-------|-------|----------------|------|------|------|
| A              | 2.22 | 2.30  | 2.38  | A <sub>1</sub> | 0.46 | 0.58 | 0.93 |
| b              | 0.71 | 0.79  | 0.89  | b <sub>1</sub> | 0.90 | 0.98 | 1.10 |
| b <sub>2</sub> | 5.00 | 5.30  | 5.46  | c              | 0.20 | 0.40 | 0.56 |
| D <sub>1</sub> | 5.98 | 6.05  | 6.22  | D <sub>2</sub> | --   | 4.00 | --   |
| E              | 6.47 | 6.60  | 6.73  | E <sub>1</sub> | 5.10 | 5.28 | 5.45 |
| e              | --   | 2.28  | --    | e <sub>1</sub> | --   | 4.57 | --   |
| H <sub>D</sub> | 9.60 | 10.08 | 10.40 | L              | 2.75 | 2.95 | 3.05 |
| L <sub>1</sub> | --   | 0.50  | --    | L <sub>2</sub> | 0.80 | 0.90 | 1.10 |
| w              | --   | 0.20  | --    | y              | 0.20 | --   | --   |

## Customer Service

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