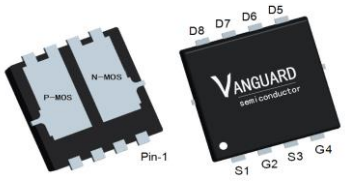
## Features

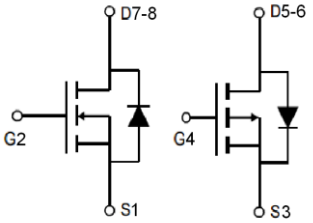
- N+P Channel
- Enhancement mode
- Very low on-resistance
- Fast Switching
- Pb-free lead plating; RoHS compliant

| | | | |
|---|---|---|---|
| $V_{DS}$ | 30 | -30 | V |
| $R_{DS(on),TYP}$@ $V_{GS}$=±10 V | 6.5 | 13 | mΩ |
| $R_{DS(on),TYP}$@ $V_{GS}$=±4.5V | 10 | 24 | mΩ |
| $I_D$ | 45 | -35 | A |

**PDFN5x6**




Pb-Free RoHS HF Halogen-Free




| Part ID | Package Type | Marking | Tape and reel information |
|---|---|---|---|
| VSP008C03MD | PDFN5x6 | 008C03MD | 3000pcs/Reel |

## Maximum ratings, at $T_A$ =25°C, unless otherwise specified

| Symbol | Parameter | | Rating | | Unit |
|---|---|---|---|---|---|
| | | | NMOS | PMOS | |
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage | | 30 | -30 | V |
| $I_S$ | Diode continuous forward current | $T_C$ =25°C | 45 | -35 | A |
| $I_D$ | Continuous drain current@VGS=±10V | $T_C$ =25°C | 45 | -35 | A |
| | | $T_C$ =100°C | 29 | -22 | A |
| $I_{DM}$ | Pulse drain current tested ① | $T_C$ =25°C | 180 | -140 | A |
| EAS | Avalanche energy, single pulsed ② | | 25 | 36 | mJ |
| $P_D$ | Maximum power dissipation | $T_C$ =25°C | 25 | 28 | W |
| VGS | Gate-Source voltage | | ±20 | ±20 | V |
| $T_{STG}$ $T_J$ | Storage and operating temperature range | | -55 to 150 | -55 to 150 | °C |

## Thermal Characteristics

| Symbol | Parameter | Typical | | Unit |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 5 | 4.5 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient | 50 | 50 | °C/W |

## N-Channel Electrical Characteristics

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 30 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current($T_A$=25℃) | $V_{DS}$=30V,$V_{GS}$=0V | -- | -- | 1 | μA |
| | Zero Gate Voltage Drain Current($T_A$=125℃) | $V_{DS}$=30V,$V_{GS}$=0V | -- | -- | 100 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.0 | 1.9 | 2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance ③ | $V_{GS}$=10V, $I_D$=20A | -- | 6.5 | 8 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=16A | -- | 10 | 12 | mΩ |
| **Dynamic Electrical Characteristics @ $T_J$= 25°C (unless otherwise stated)** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V,$V_{GS}$=0V, f=1MHz | -- | 1140 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 180 | -- | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 135 | -- | pF |
| $R_g$ | Gate Resistance | f=1MHz | -- | 2 | -- | Ω |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V,$I_D$=20A, $V_{GS}$=10V | -- | 22 | -- | nC |
| $Q_{gs}$ | Gate Source Charge | | -- | 4.7 | -- | nC |
| $Q_{gd}$ | Gate Drain Charge | | -- | 7 | -- | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn on Delay Time | $V_{DD}$=15V, $I_D$=20A, $R_G$=3Ω, $V_{GS}$=10V | -- | 8.5 | -- | nS |
| $t_r$ | Turn on Rise Time | | -- | 4 | -- | nS |
| $t_{d(off)}$ | Turn Off Delay Time | | - | 19 | -- | nS |
| $t_f$ | Turn Off Fall Time | | -- | 5.5 | -- | nS |
| **Source Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Forward on voltage | $I_{SD}$=15A,$V_{GS}$=0V | -- | 0.84 | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $T_j$=25℃,$I_{sd}$=20A, $V_{GS}$=0V di/dt=500A/μs | -- | 10.7 | -- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 15.5 | -- | nC |

NOTE:

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

② Limited by $T_{Jmax}$, starting $T_J$ = 25°C, L = 0.5mH,$R_G$ = 25Ω, $I_{AS}$ = 10A, $V_{GS}$ =10V. Part not recommended for use above this value

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

## P-Channel Electrical Characteristics

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=-250μA | -30 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current($T_A$=25℃) | $V_{DS}$=-30V,$V_{GS}$=0V | -- | -- | -1 | μA |
| | Zero Gate Voltage Drain Current($T_A$=125℃) | $V_{DS}$=-30V,$V_{GS}$=0V | -- | -- | -100 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=-250μA | -1.0 | -1.9 | -2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance ③ | $V_{GS}$=-10V, $I_D$=-20A | -- | 13 | 16 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-16A | -- | 24 | 28 | mΩ |
| **Dynamic Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $C_{iss}$ | Input Capacitance | VDS=-15V,VGS=0V, f=1MHz | -- | 2605 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 300 | -- | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 230 | -- | pF |
| $R_g$ | Gate Resistance | f=1MHz | -- | 3.3 | -- | Ω |
| $Q_g$ | Total Gate Charge | VDS=-15V,ID=-20A, VGS=-10V | -- | 44 | -- | nC |
| $Q_{gs}$ | Gate Source Charge | | -- | 9 | -- | nC |
| $Q_{gd}$ | Gate Drain Charge | | -- | 10.6 | -- | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn on Delay Time | VDD=-15V, ID=-20A, RG=3Ω, VGS=-10V | -- | 11.4 | -- | ns |
| $t_r$ | Turn on Rise Time | | -- | 22 | -- | ns |
| $t_{d(off)}$ | Turn Off Delay Time | | - | 57 | -- | ns |
| $t_f$ | Turn Off Fall Time | | -- | 32 | -- | ns |
| **Source Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Forward on voltage | $I_{SD}$=-15A,$V_{GS}$=0V | -- | -0.9 | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $T_j$=25℃,Isd=-20A, VGS=0V di/dt=-500A/μs | -- | 27 | -- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 77 | -- | nC |

NOTE:

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

② Limited by $T_{Jmax}$, starting $T_J$ = 25°C, L = 0.5mH, $R_G$ = 25Ω, $I_{AS}$ = -12A, $V_{GS}$ =-10V. Part not recommended for use above this value

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

## N-Channel Typical Characteristics

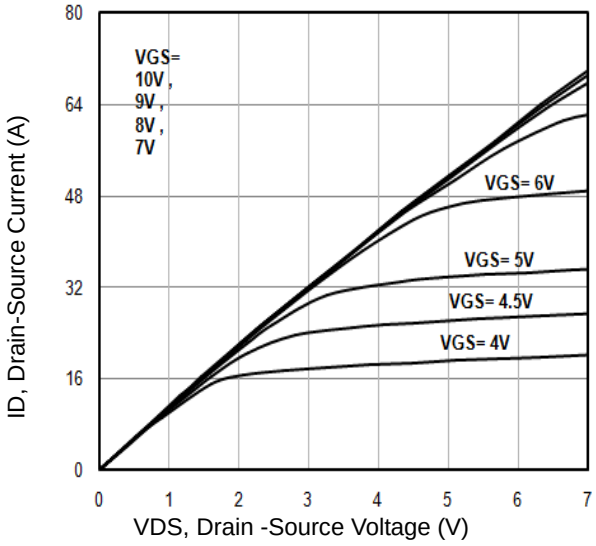



**Fig1**. Typical Output Characteristics

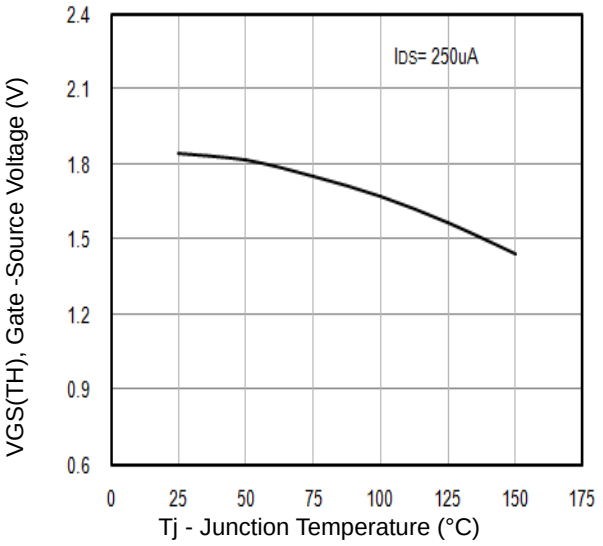



**Fig2.** $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

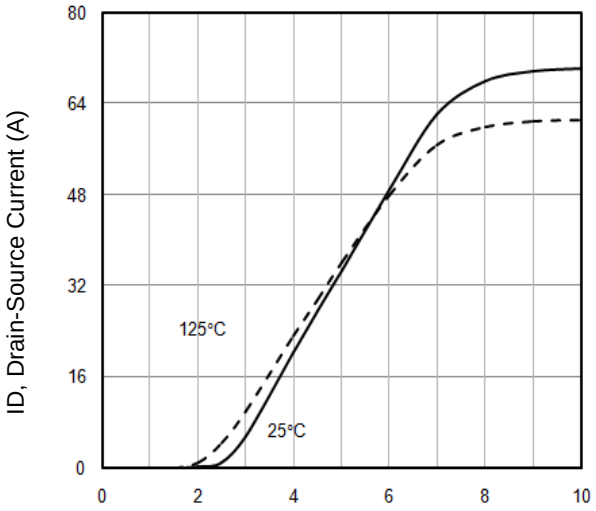



**Fig3**. Typical Transfer Characteristics

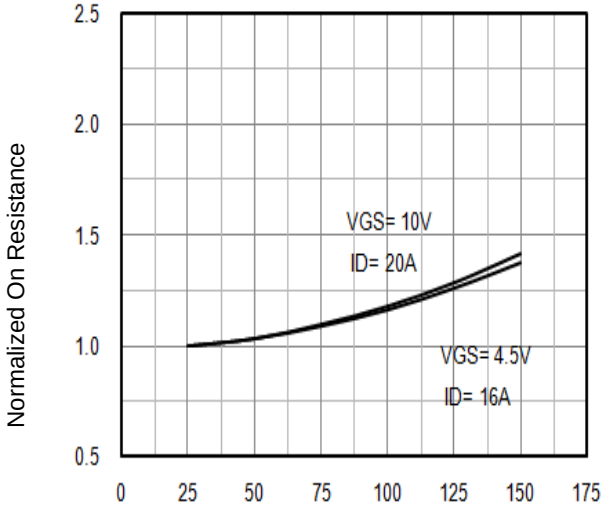



**Fig4**. Normalized On-Resistance Vs. Tj

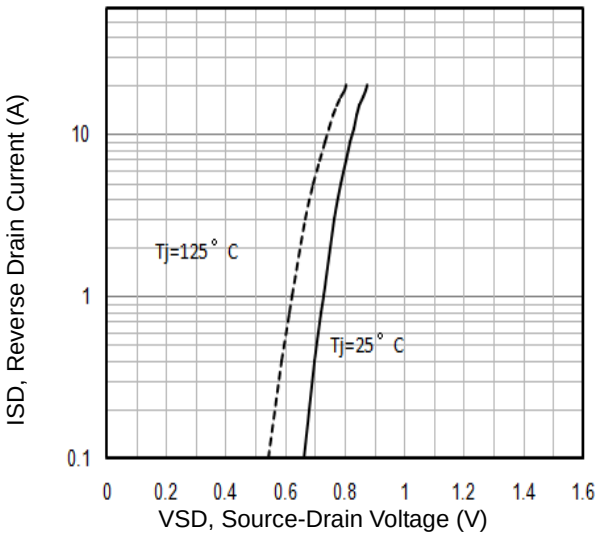



**Fig5**. Typical Source-Drain Diode Forward Voltage

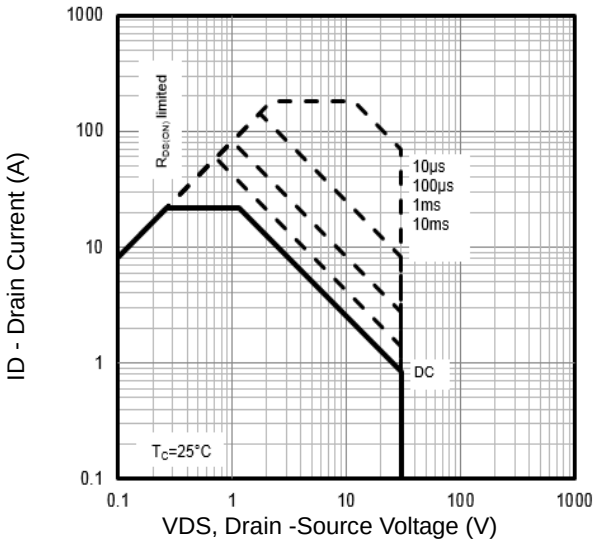



**Fig6**. Maximum Safe Operating Area

## N-Channel Typical Characteristics

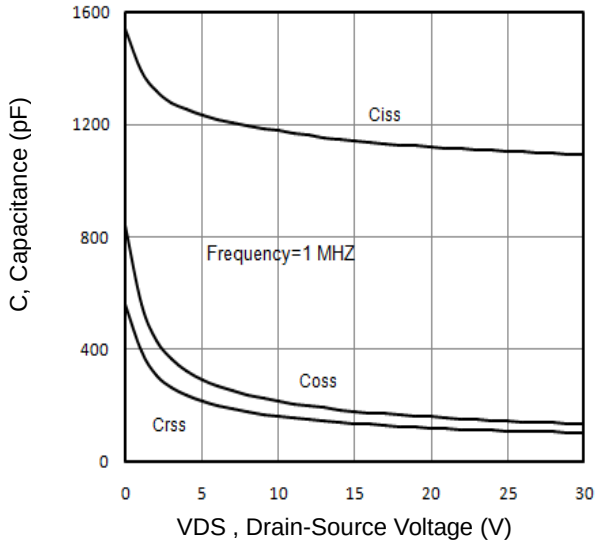



**Fig7**. Typical Capacitance Vs.Drain-Source Voltage

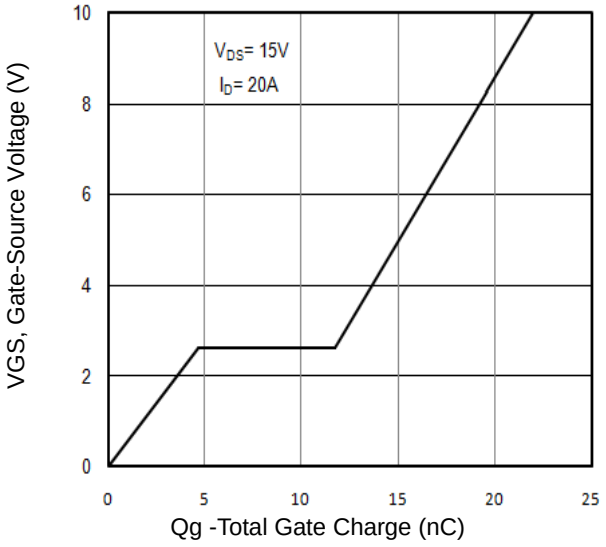



**Fig8**. Typical Gate Charge Vs.Gate-Source Voltage

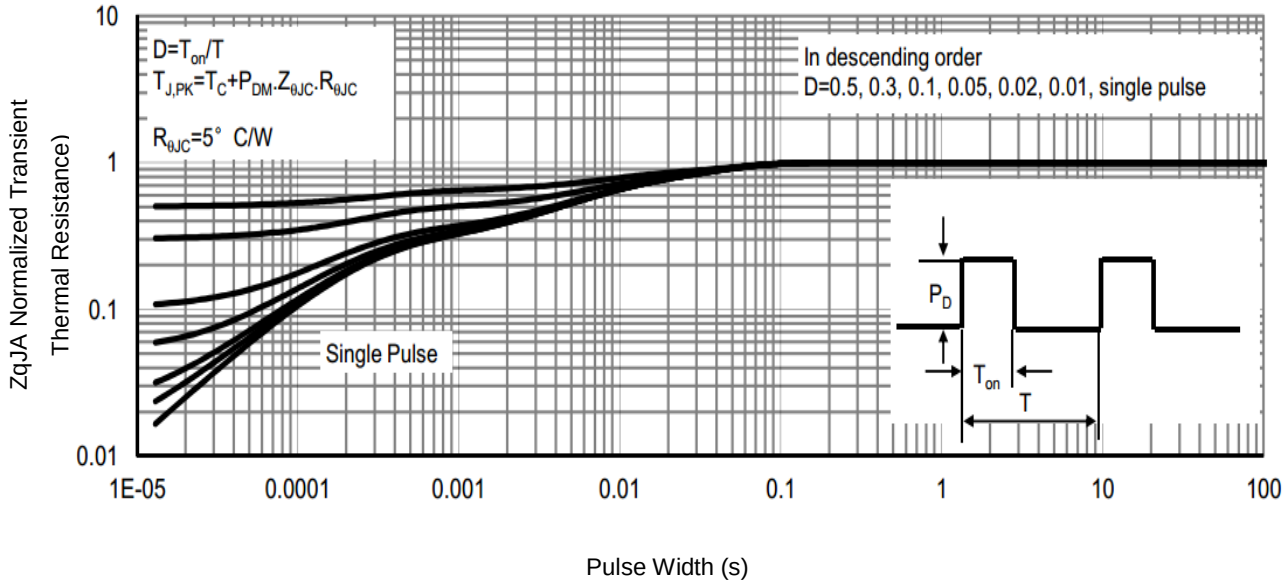



**Fig 9** .Normalized Maximum Transient Thermal Impedance

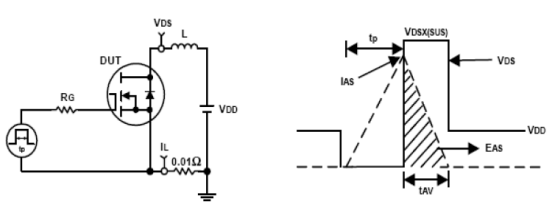



**Fig10.** Unclamped Inductive Test Circuit and waveforms

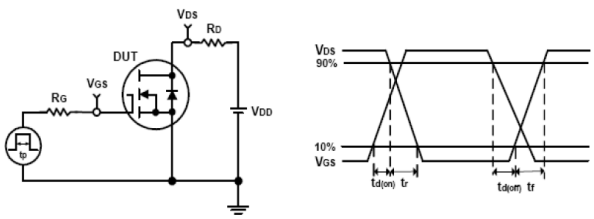



**Fig11**. Switching Time Test Circuit and waveforms

## P-Channel Typical Characteristics

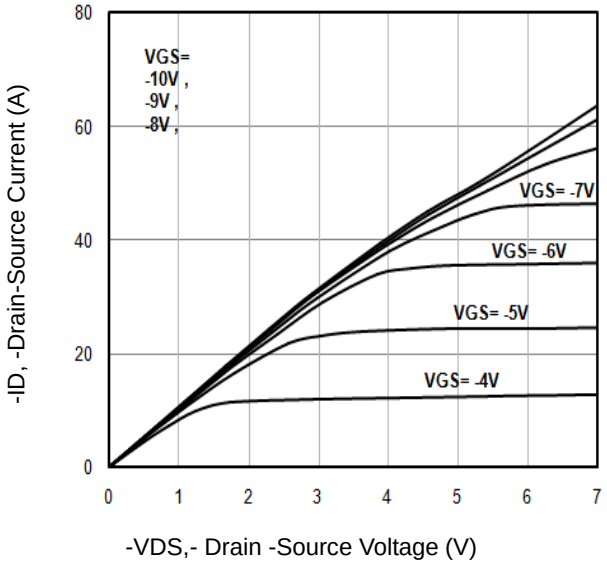



**Fig1.** Typical Output Characteristics

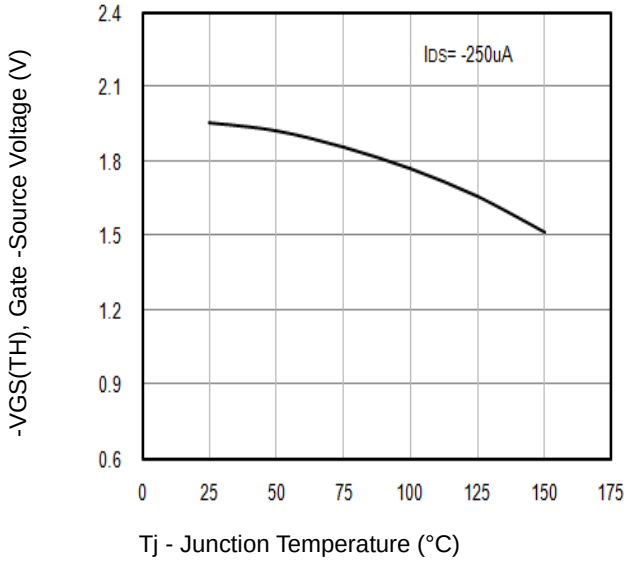



**Fig2. -**$V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

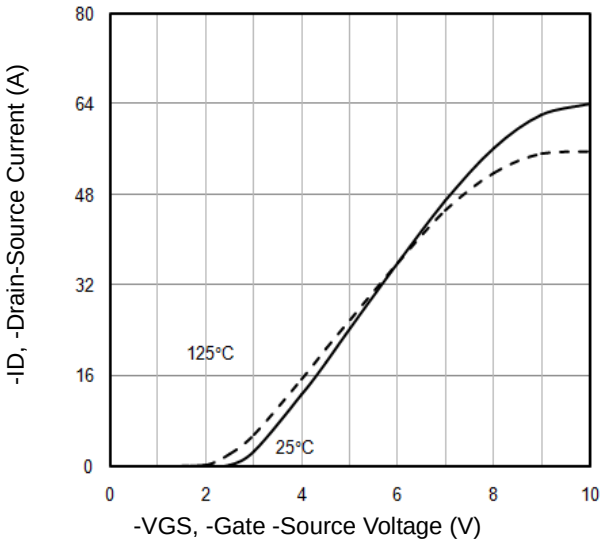



**Fig3**. Typical Transfer Characteristics

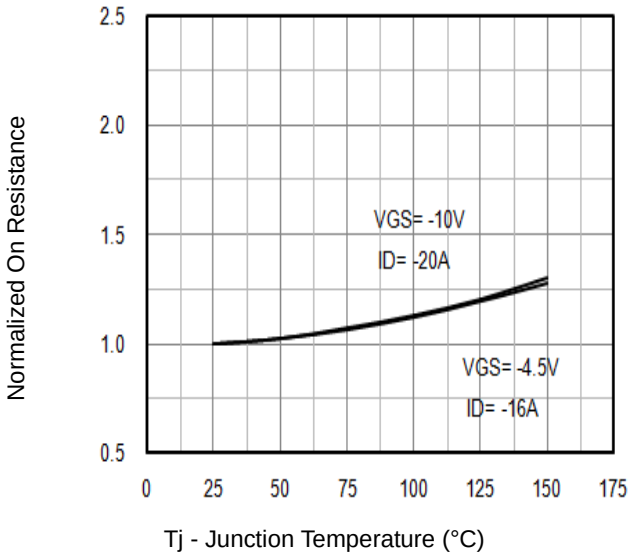



**Fig4**. Normalized On-Resistance Vs. Tj

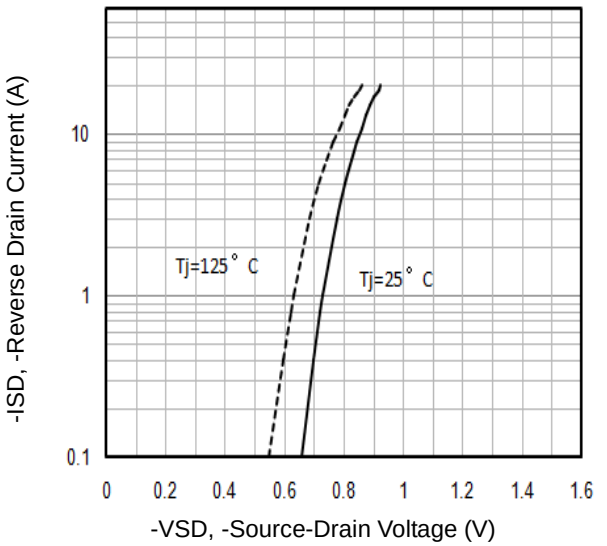



**Fig5**. Typical Source-Drain Diode Forward Voltage

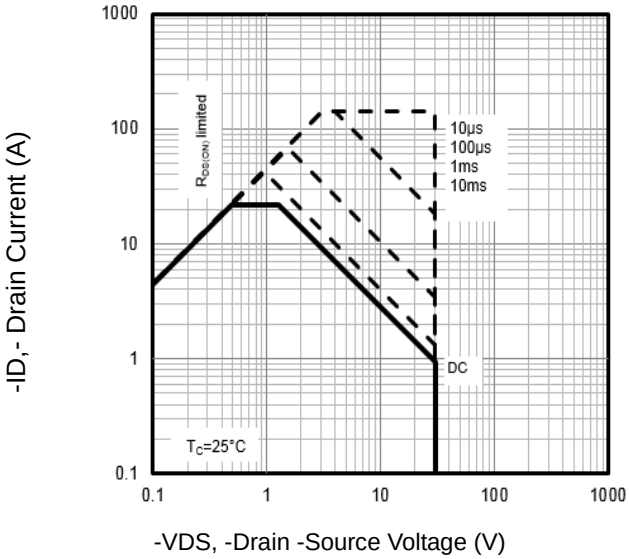



**Fig6**. Maximum Safe Operating Area

## P-Channel Typical Characteristics

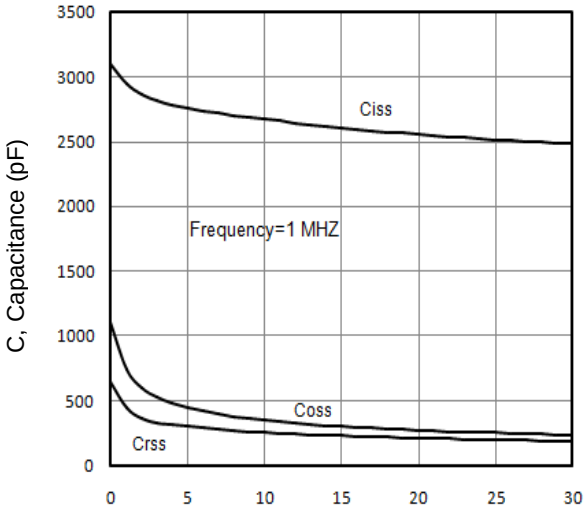



**Fig7**. Typical Capacitance Vs.Drain-Source Voltage

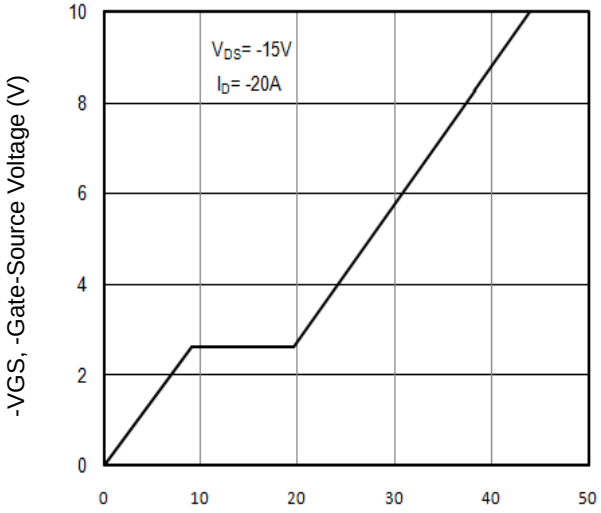



**Fig8**. Typical Gate Charge Vs.Gate-Source Voltage

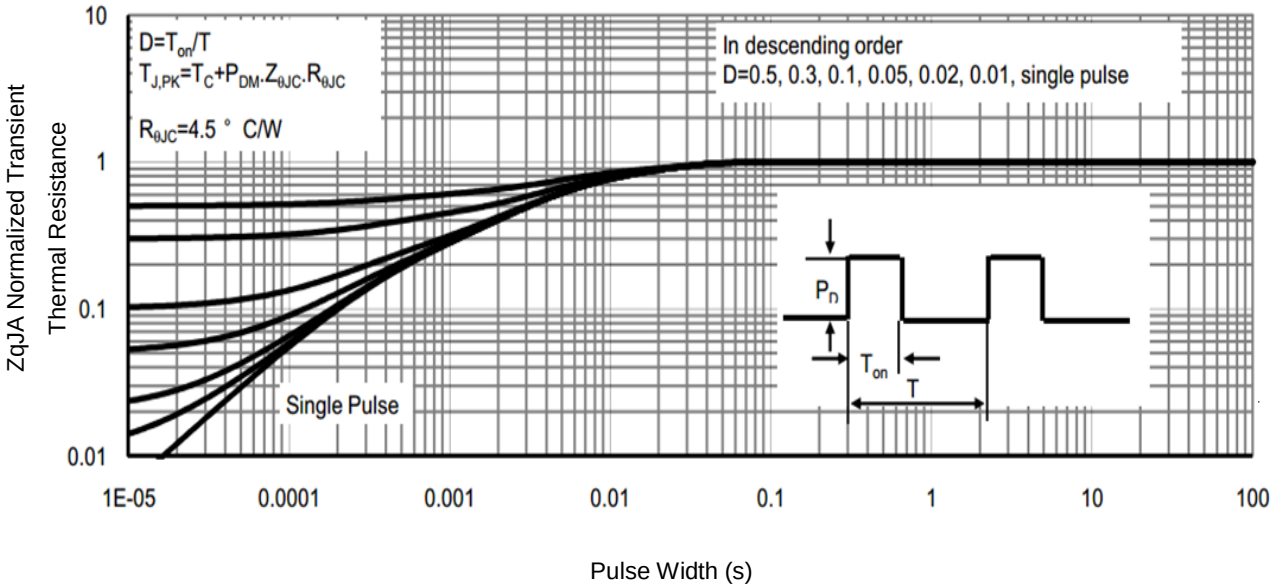



**Fig9**. Normalized Maximum Transient Thermal Impedance

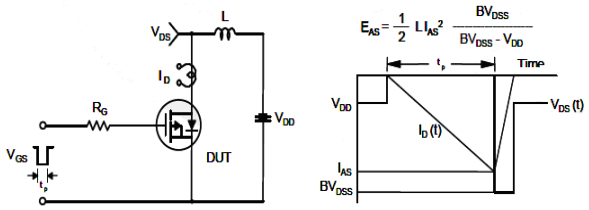



**Fig10**. Unclamped Inductive Test Circuit and Waveforms

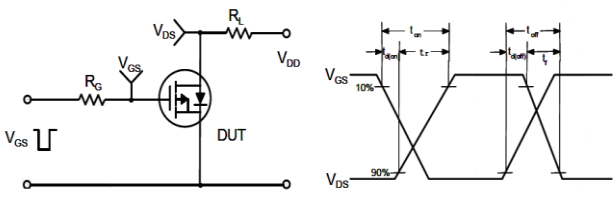
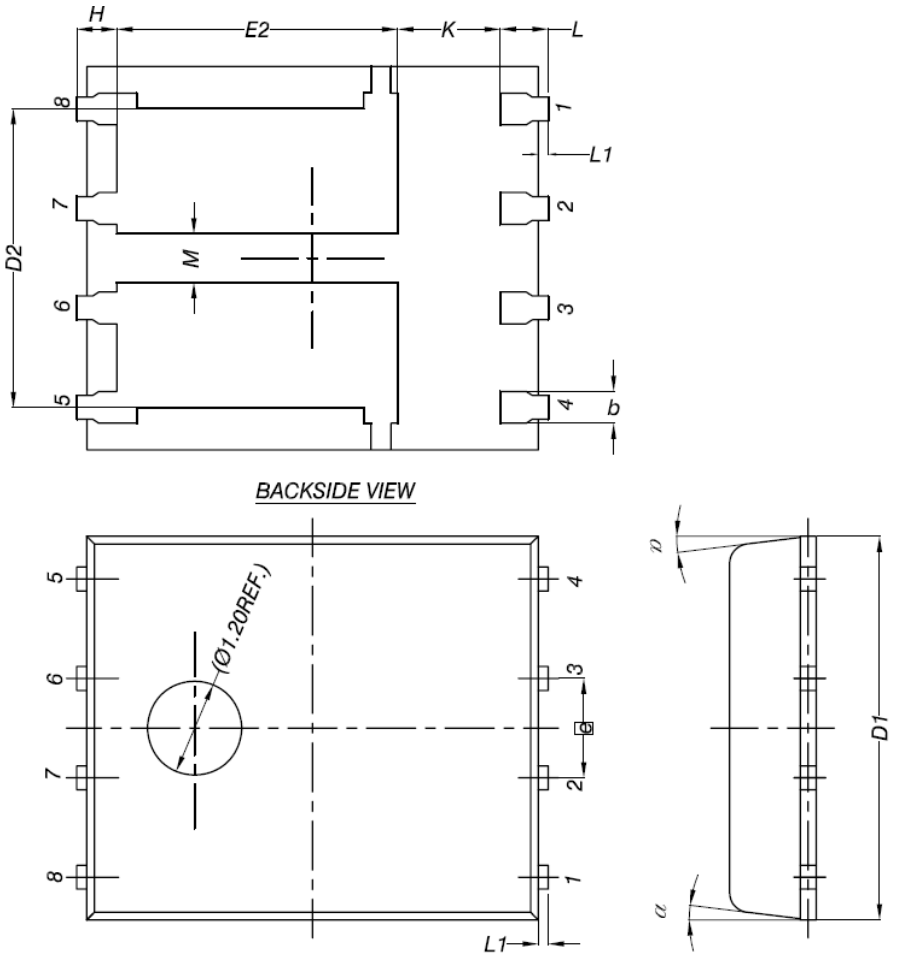



**Fig11**. Switching Time Test Circuit and waveforms

## PDFN5x6 Package Outline Data




**DIMENSIONS** ( unit : mm )

| Symbol | Min | Typ | Max | Symbol | Min | Typ | Max |
|---|---|---|---|---|---|---|---|
| **A** | 0.90 | 1.00 | 1.10 | **e** | | 1.27 BSC | |
| **b** | 0.33 | 0.41 | 0.51 | **H** | 0.41 | 0.51 | 0.61 |
| **C** | 0.20 | 0.25 | 0.30 | **K** | 1.10 | -- | -- |
| **D1** | 4.80 | 4.90 | 5.00 | **L** | 0.51 | 0.61 | 0.71 |
| **D2** | 3.61 | 3.81 | 3.96 | **L1** | 0.06 | 0.13 | 0.20 |
| **E** | 5.90 | 6.00 | 6.10 | **M** | 0.50 | -- | -- |
| **E1** | 5.70 | 5.75 | 5.80 | **α** | 0° | -- | 12° |
| **E2** | 3.38 | 3.58 | 3.78 | | | | |

## Customer Service

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**WEB:** **www.vgsemi.com**