



- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent  $CdV/dt$  effect decline
- ★ Advanced high cell density Trench technology

## Product Summary



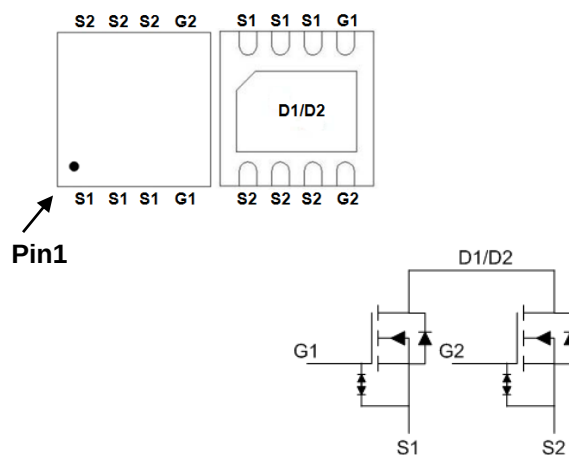
| BVDSS | RDSON | ID  |
|-------|-------|-----|
| 20V   | 5.8mΩ | 56A |

## General Description

The PWF2019 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent  $RDSON$  and gate charge for most of the small power switching and load switch applications.

The PWF2019 meet the RoHS and Green Product requirement with full function reliability approved.

## DFN3x3 Pin Configuration



## Absolute Maximum Ratings

| Symbol                | Parameter                                   | Rating     | Units      |
|-----------------------|---------------------------------------------|------------|------------|
| $V_{DS}$              | Drain-Source Voltage                        | 20         | V          |
| $V_{GS}$              | Gate-Source Voltage                         | $\pm 8$    | V          |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 4.5V^1$ | 56         | A          |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 4.5V^1$ | 35.6       | A          |
| $I_D@T_A=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 4.5V^1$ | 19         | A          |
| $I_D@T_A=70^\circ C$  | Continuous Drain Current, $V_{GS} @ 4.5V^1$ | 15         | A          |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>           | 100        | A          |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation <sup>1</sup>        | 31         | W          |
| $P_D@T_A=25^\circ C$  | Total Power Dissipation <sup>1</sup>        | 3.6        | W          |
| $T_{STG}$             | Storage Temperature Range                   | -55 to 150 | $^\circ C$ |
| $T_J$                 | Operating Junction Temperature Range        | -55 to 150 | $^\circ C$ |

## Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit         |
|-----------------|--------------------------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> | ---  | 35   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 4    | $^\circ C/W$ |



### N-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

| Symbol       | Parameter                                      | Conditions                                         | Min. | Typ. | Max.     | Unit       |
|--------------|------------------------------------------------|----------------------------------------------------|------|------|----------|------------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=250\mu A$                          | 20   | ---  | ---      | V          |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=4.5V, I_D=3A$                              | 3.5  | 4.3  | 5.8      | m $\Omega$ |
|              |                                                | $V_{GS}=3.9V, I_D=3A$                              | 3.7  | 4.5  | 6.5      |            |
|              |                                                | $V_{GS}=2.5V, I_D=3A$                              | 4    | 5    | 7        |            |
|              |                                                | $V_{GS}=1.8V, I_D=3A$                              | 5.6  | 7    | 12       |            |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=250\mu A$                      | 0.4  | ---  | 1.0      | V          |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=16V, V_{GS}=0V, T_J=25^\circ\text{C}$      | ---  | ---  | 1        | $\mu A$    |
|              |                                                | $V_{DS}=16V, V_{GS}=0V, T_J=55^\circ\text{C}$      | ---  | ---  | 5        |            |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 8V, V_{DS}=0V$                         | ---  | ---  | $\pm 10$ | $\mu A$    |
| $g_{fs}$     | Forward Transconductance                       | $V_{DS}=5V, I_D=3A$                                | ---  | 42   | ---      | S          |
| $Q_g$        | Total Gate Charge (4.5V)                       | $V_{DS}=10V, I_D=3A$                               | ---  | 38   | ---      | nC         |
|              | Total Gate Charge (3.9V)                       |                                                    | ---  | 33   | ---      |            |
| $Q_{gs}$     | Gate-Source Charge                             |                                                    | ---  | 4.5  | ---      |            |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                    | ---  | 12   | ---      |            |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=16V, V_{GS}=4.5V, R_G=6\Omega$<br>$I_D=3A$ | ---  | 22   | ---      | ns         |
| $T_r$        | Rise Time                                      |                                                    | ---  | 41   | ---      |            |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                    | ---  | 77   | ---      |            |
| $T_f$        | Fall Time                                      |                                                    | ---  | 21   | ---      |            |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=10V, V_{GS}=0V, f=1\text{MHz}$             | ---  | 3165 | ---      | pF         |
| $C_{oss}$    | Output Capacitance                             |                                                    | ---  | 380  | ---      |            |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                    | ---  | 325  | ---      |            |

### Diode Characteristics

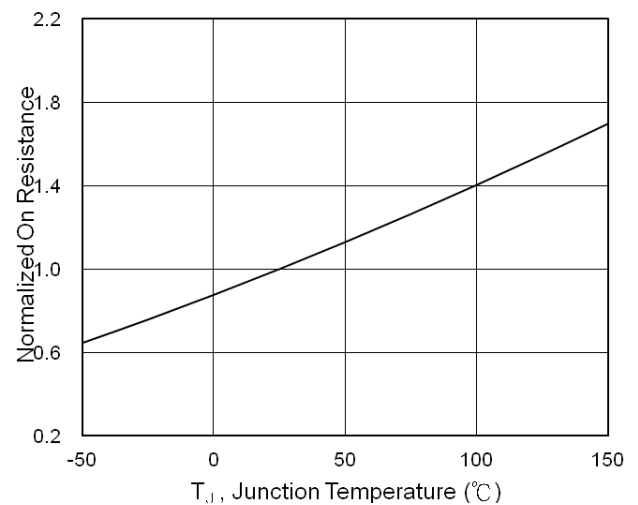
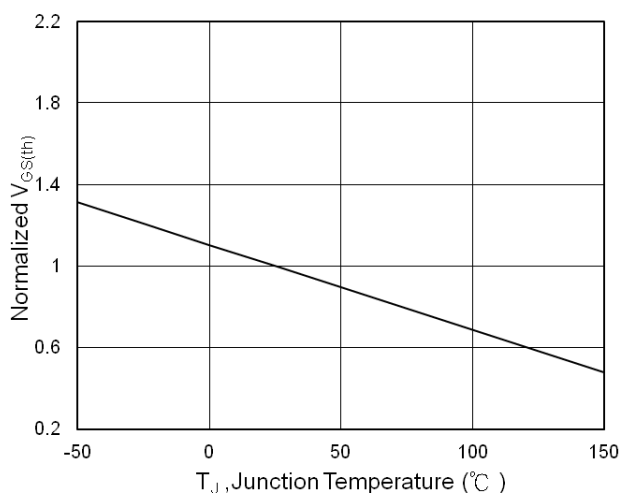
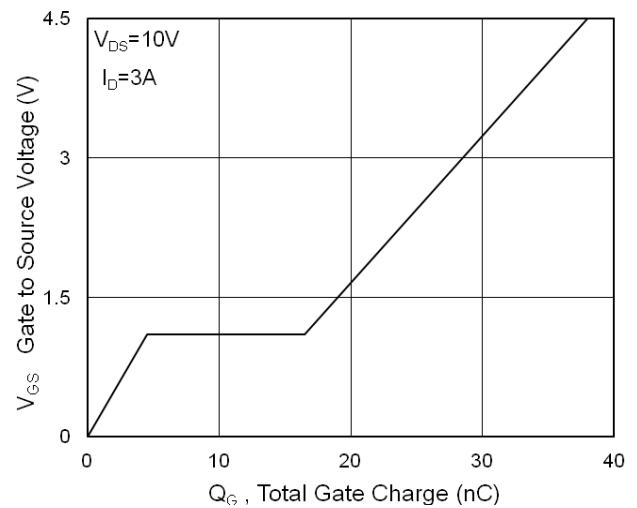
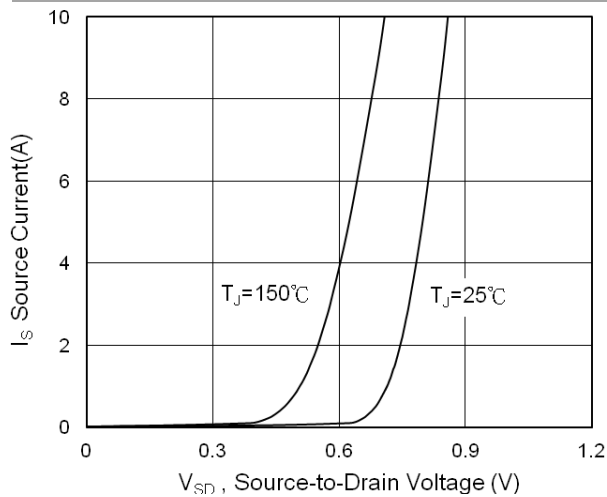
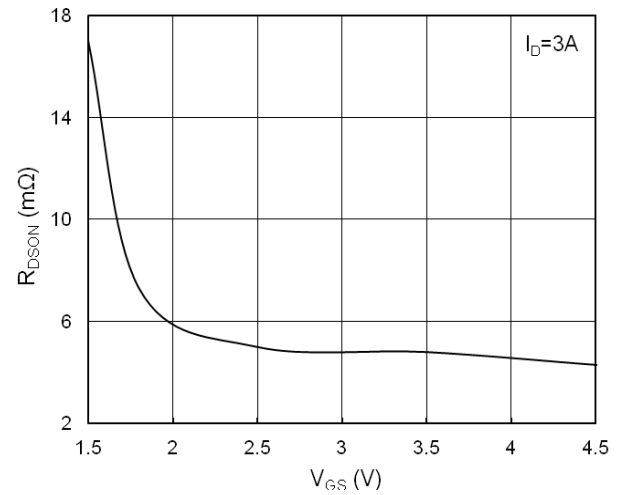
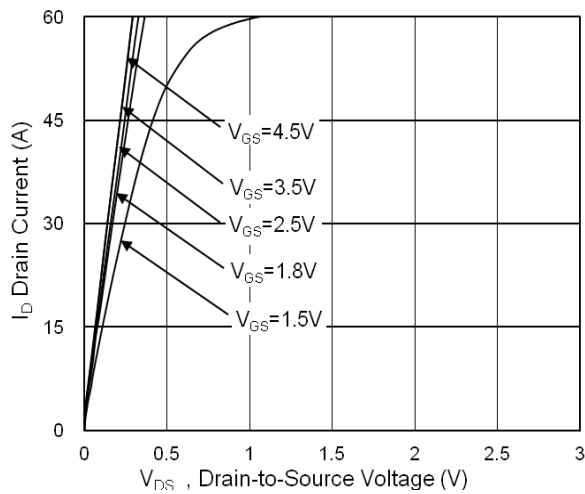
| Symbol   | Parameter                              | Conditions                                | Min. | Typ. | Max. | Unit |
|----------|----------------------------------------|-------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1</sup> | $V_G=V_D=0V$ , Force Current              | ---  | ---  | 30   | A    |
| $I_{SM}$ | Pulsed Source Current <sup>2</sup>     |                                           | ---  | ---  | 100  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>     | $V_{GS}=0V, I_S=3A, T_J=25^\circ\text{C}$ | ---  | ---  | 1.2  | V    |

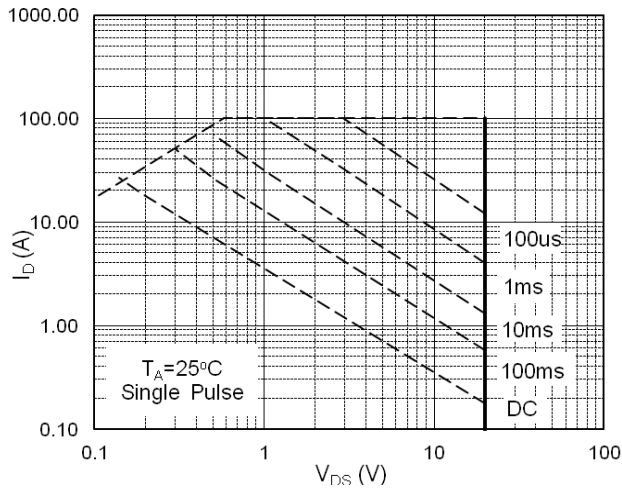
Note :

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper,  $t \leq 10s$ .

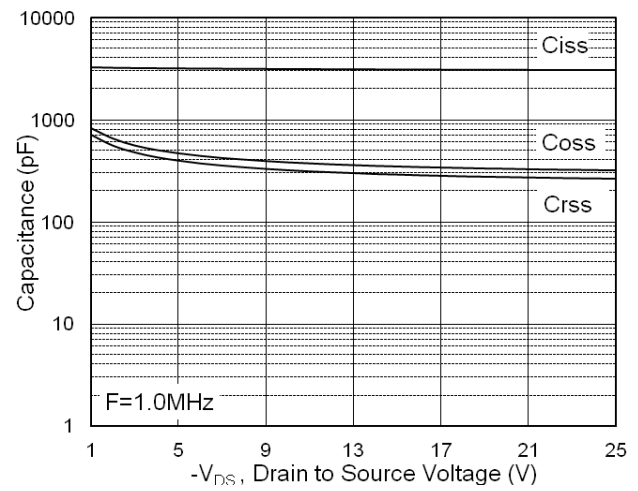
2. The data tested by pulsed, pulse width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$

### Typical Characteristics

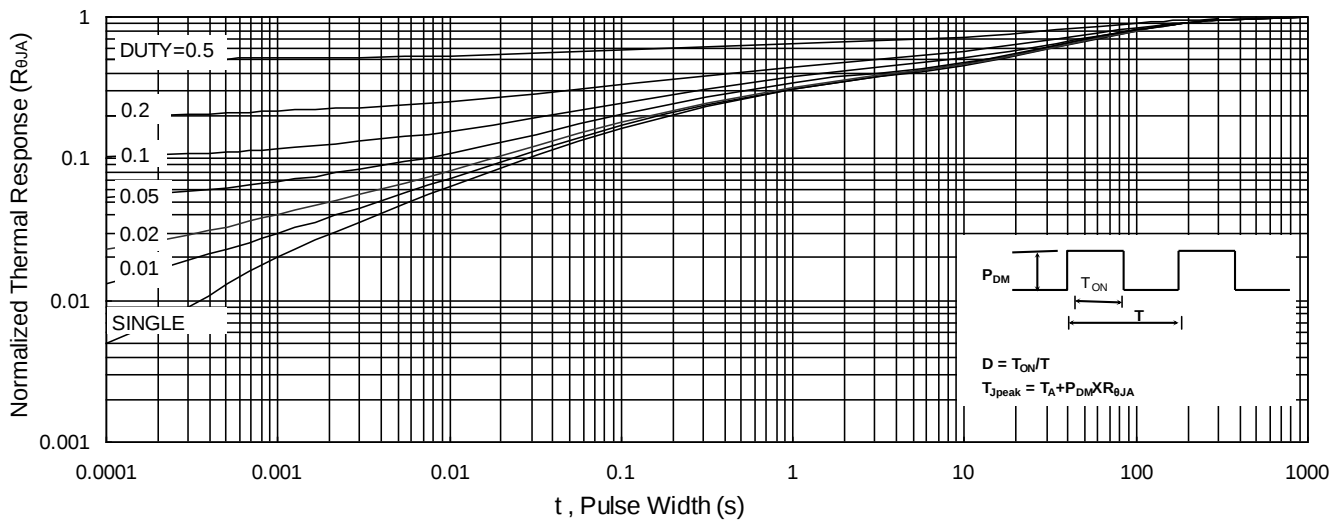




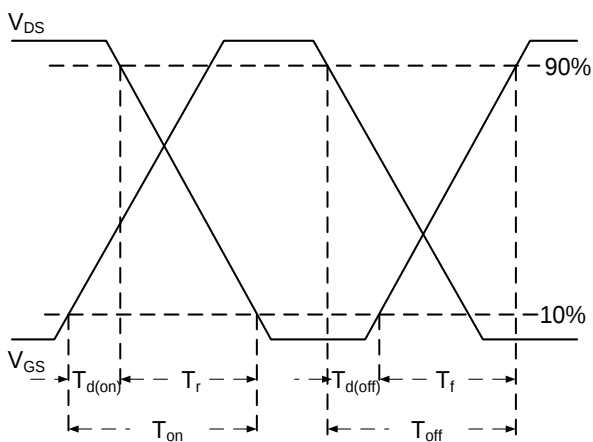
**Fig.7 Safe Operating Area**



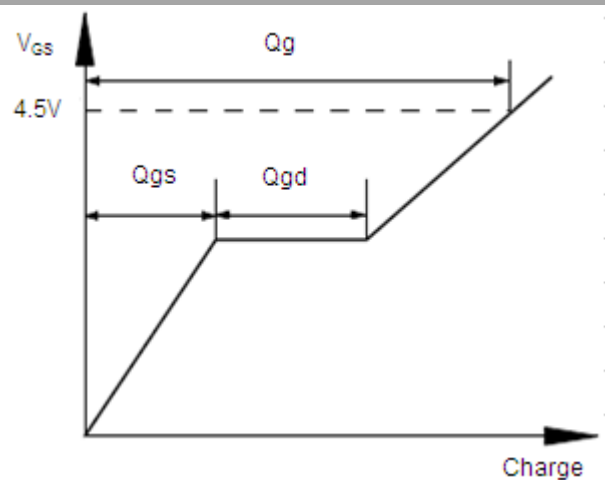
**Fig.8 Capacitance**



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

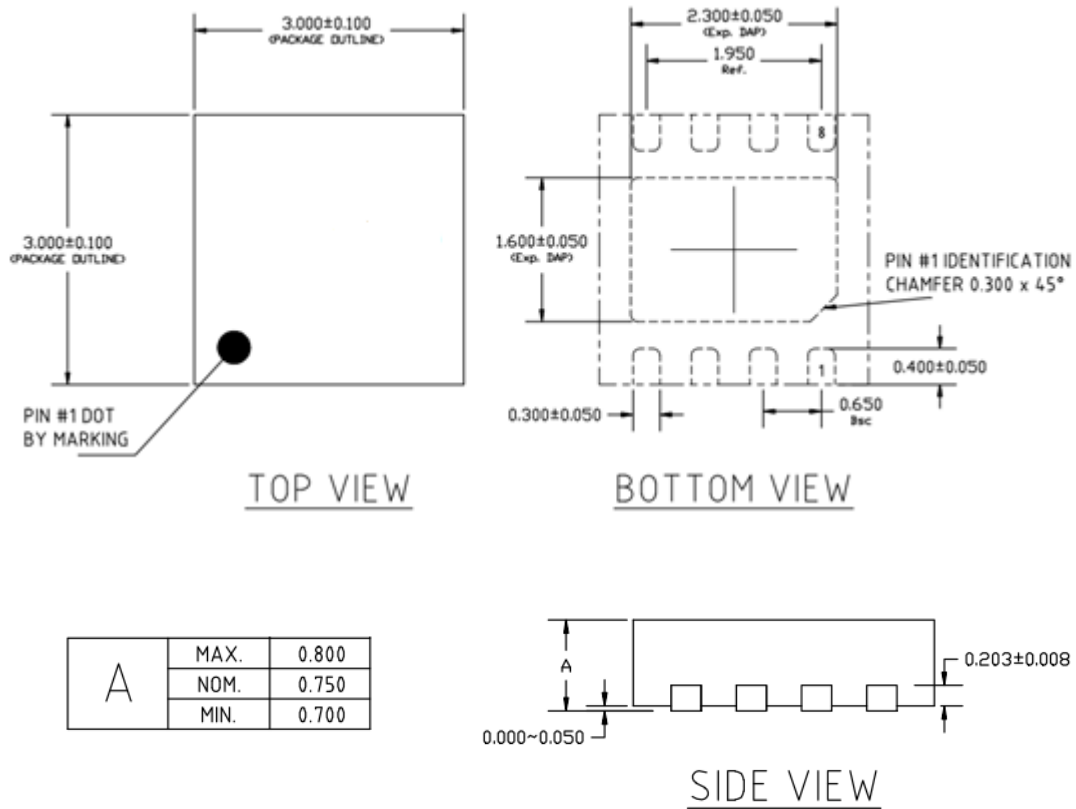


**Fig.10 Switching Time Waveform**

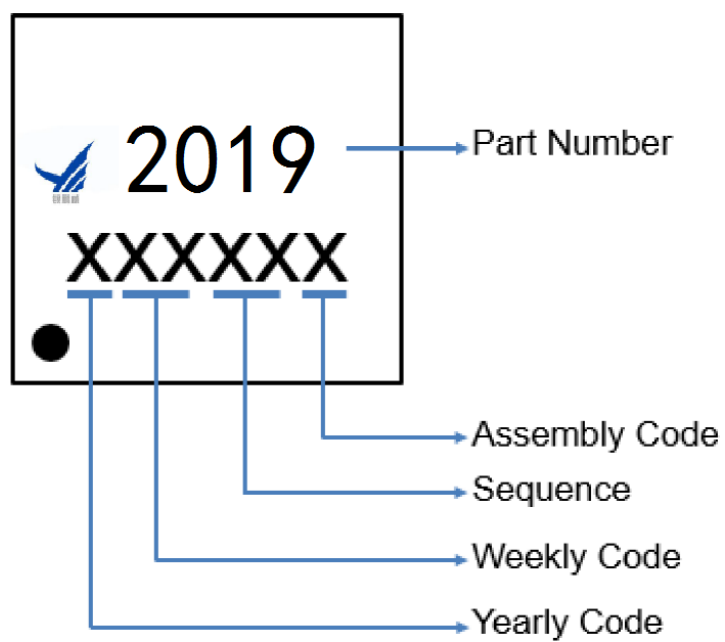


**Fig.11 Gate Charge Waveform**

## DFN3x3 Package Outline Dimensions



### Marking Instruction



## DFN3x3 Tape and Reel Data

