

General Description

The WST3415 is the highest performance trench P-ch MOSFET with extreme high cell density, which provide excellent R_{DS(on)} and gate charge for most of the small power switching and load switch applications.

The WST3415 meet the RoHS and Green Product requirement, with full function reliability approved.

Features

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

Product Summary

| BVDSS | R _{DS(on)} | I _D |
|-------|---------------------|----------------|
| -20V | 44mΩ | -5.5A |

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- ESD:3KV

SOT-23-3L Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|--------------------------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | -20 | V |
| V _{GS} | Gate-Source Voltage | ±12 | V |
| I _D @T _C =25°C | Continuous Drain Current, V _{GS} @ -4.5V ¹ | -5.5 | A |
| I _D @T _C =70°C | Continuous Drain Current, V _{GS} @ -4.5V ¹ | -3.0 | A |
| I _{DM} | Pulsed Drain Current ² | -17 | A |
| P _D @T _A =25°C | Total Power Dissipation ³ | 1.0 | W |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R _{θJA} | Thermal Resistance Junction-Ambient ¹ | --- | 110 | °C/W |
| R _{θJC} | Thermal Resistance Junction-Case ¹ | --- | 70 | °C/W |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|--------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -20 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.016 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-4.5V, I _D =-3A | --- | 44 | 54 | mΩ |
| | | V _{GS} =-2.5V, I _D =-2A | --- | 53 | 62 | |
| | | V _{GS} =-1.8V, I _D =-1A | --- | 66 | 75 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -0.3 | -0.75 | -1.0 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 3.97 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-16V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =-16V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±8V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =-5V, I _D =-3A | --- | 14 | --- | S |
| Q _g | Total Gate Charge (-4.5V) | V _{DS} =-15V, V _{GS} =-4.5V, I _D =-3A | --- | 6.2 | 9 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 2.2 | 2.5 | |
| Q _{gd} | Gate-Drain Charge | | --- | 1.8 | 2.6 | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-10V, V _{GS} =-4.5V, R _G =3.3Ω, I _D =-3A | --- | 2.7 | 5.5 | ns |
| T _r | Rise Time | | --- | 8.4 | 15 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 38 | 78 | |
| T _f | Fall Time | | --- | 6 | 12 | |
| C _{iss} | Input Capacitance | V _{DS} =-15V, V _{GS} =0V, f=1MHz | --- | 575 | 810 | pF |
| C _{oss} | Output Capacitance | | --- | 98 | 135 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 75 | 110 | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I _S | Continuous Source Current ^{1,4} | V _G =V _D =0V, Force Current | --- | --- | -1 | A |
| I _{SM} | Pulsed Source Current ^{2,4} | | --- | --- | -17 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1 | V |
| t _{rr} | Reverse Recovery Time | I _F =-3A, dI/dt=100A/μs, T _J =25°C | --- | 28 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 25 | --- | nC |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper,t<10sec.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

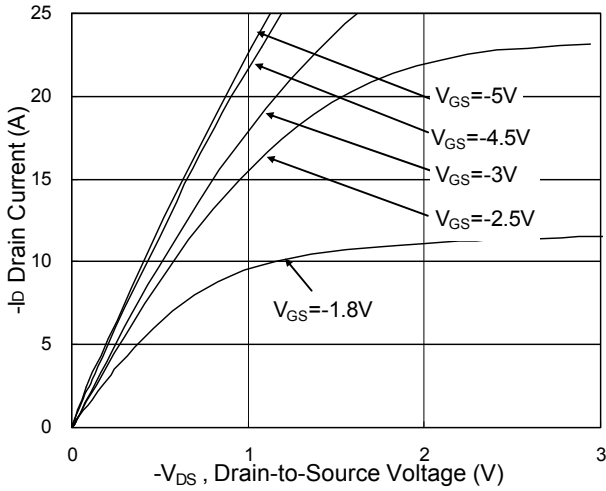


Fig.1 Typical Output Characteristics

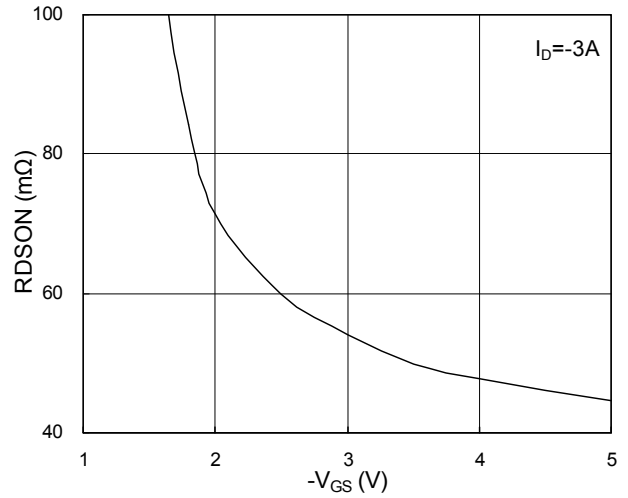


Fig.2 On-Resistance vs. G-S Voltage

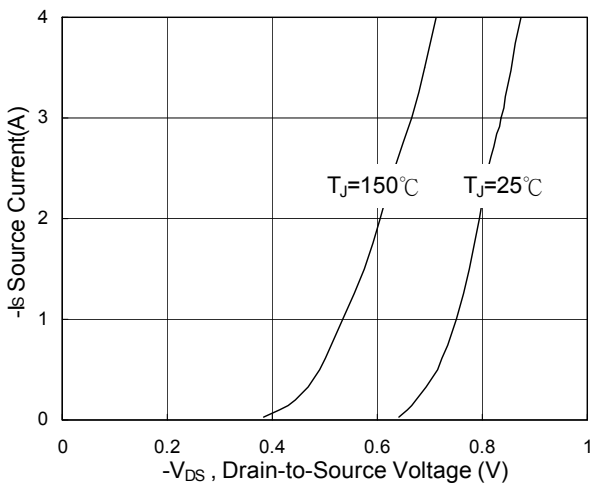


Fig.3 Forward Characteristics of Reverse

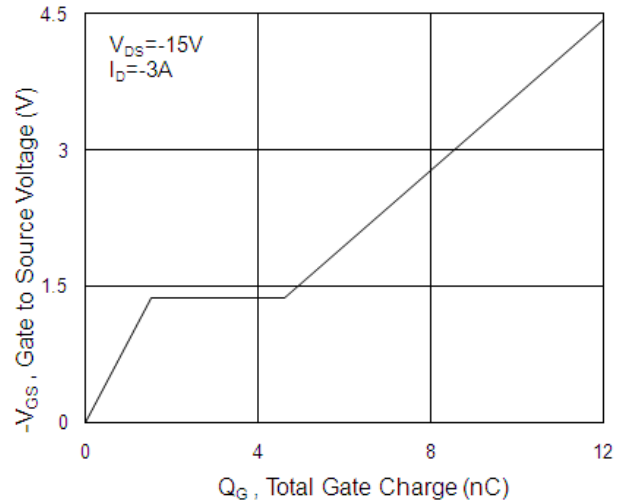


Fig.4 Gate-Charge Characteristics

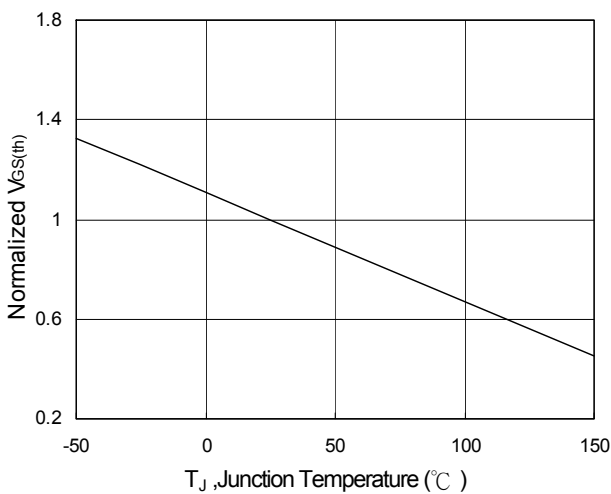


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

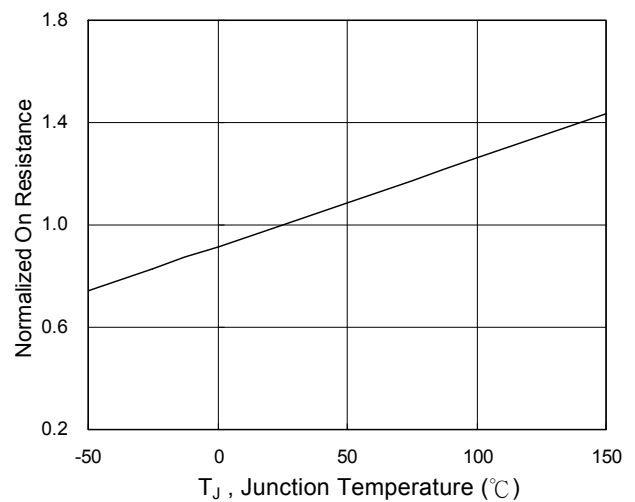


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

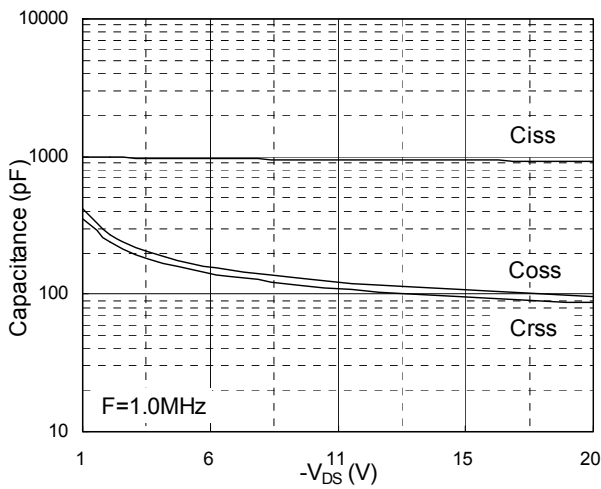


Fig.7 Capacitance

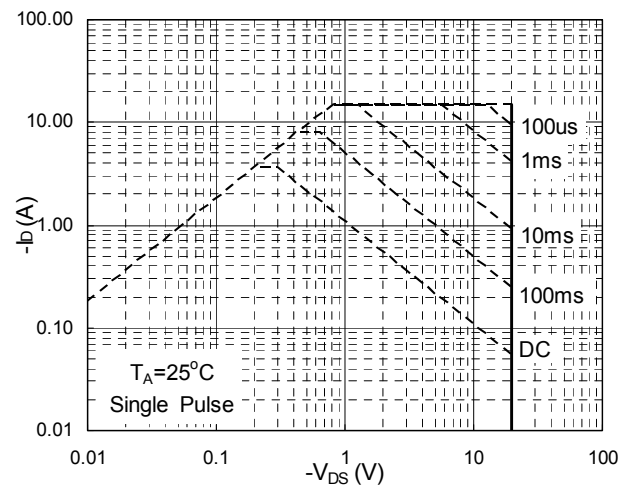


Fig.8 Safe Operating Area

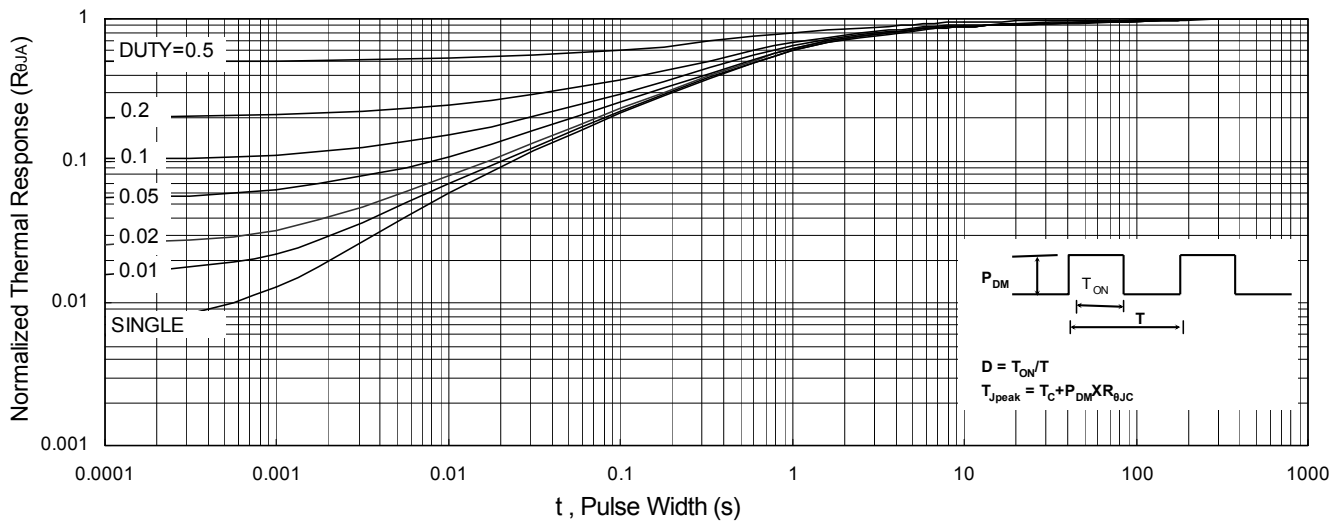


Fig.9 Normalized Maximum Transient Thermal Impedance

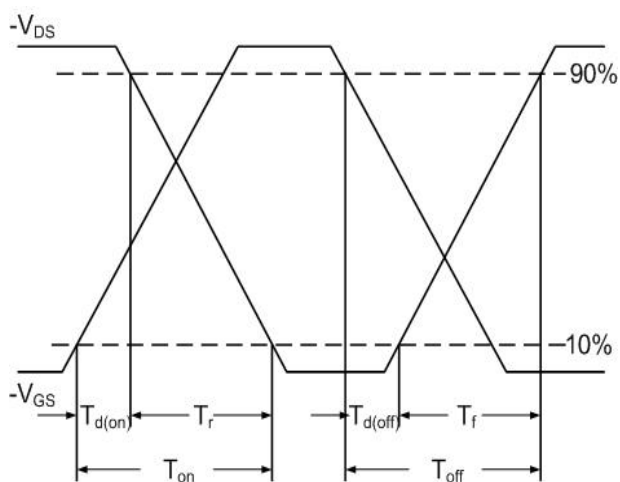


Fig.10 Switching Time Waveform

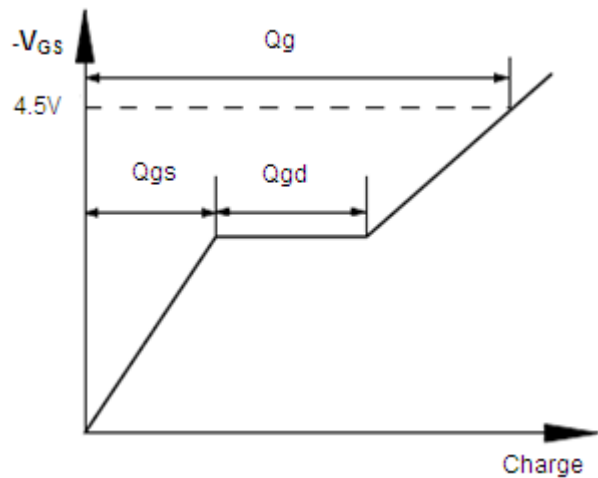


Fig.11 Gate Charge Waveform



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