

General Description

The WSD2012DN25 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 WSD2012DN25 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

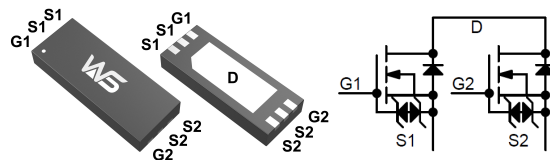
Product Summary

| BVDSS | RDSON | ID |
|-------|------------------------|-----|
| 20V | 9.5mΩ _(max) | 11A |

Applications

- Power management in portable and battery operated products
- DC-DC Power System
- ESD:2KV

DFN2X5 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 _A =25°C | Continuous Drain Current, V _{GS} @ 4.5V ¹ | 11 | A |
| I _D @T _A =70°C | Continuous Drain Current, V _{GS} @ 4.5V ¹ | 9 | A |
| I _{DM} | Pulsed Drain Current ² | 95 | A |
| P _D @T _A =25°C | Total Power Dissipation ³ | 1.7 | W |
| P _D @T _A =70°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 (Steady State) | --- | 75 | °C/W |
| R _{θJA} | Thermal Resistance Junction-ambient ¹ (t<10S) | --- | 40 | °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 | BVDSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.022 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =4.5V, I _D =5.5A | 5.0 | 7.0 | 9.5 | mΩ |
| | | V _{GS} =2.5V, I _D =5.5A | 6.8 | 9.0 | 13 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 0.3 | 0.65 | 1.0 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -2.32 | --- | 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} =±12V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =10A | --- | 65 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2500 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =10V, V _{GS} =4.5V, I _D =5.5A | 10 | 12.5 | 15 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 5.5 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 6.5 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =10V, V _{GS} =10V, R _G =1Ω, I _D =1A, RL=10Ω | --- | 1.1 | --- | μs |
| T _r | Rise Time | | --- | 2.6 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 7 | --- | |
| T _f | Fall Time | | --- | 7.4 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =10V, V _{GS} =0V, f=1MHz | 1000 | 1256 | 1511 | pF |
| C _{oss} | Output Capacitance | | 150 | 220 | 295 | |
| C _{rss} | Reverse Transfer Capacitance | | 100 | 168 | 238 | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current ^{1,4} | V _G =V _D =0V, Force Current | --- | --- | 3 | A |
| I _{SM} | Pulsed Source Current ^{2,4} | | --- | --- | 45 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | --- | 0.58 | 1.0 | V |
| t _{rr} | Reverse Recovery Time | I _F =10A, di/dt=500A/μs, T _J =25°C | --- | 11 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 15 | --- | 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

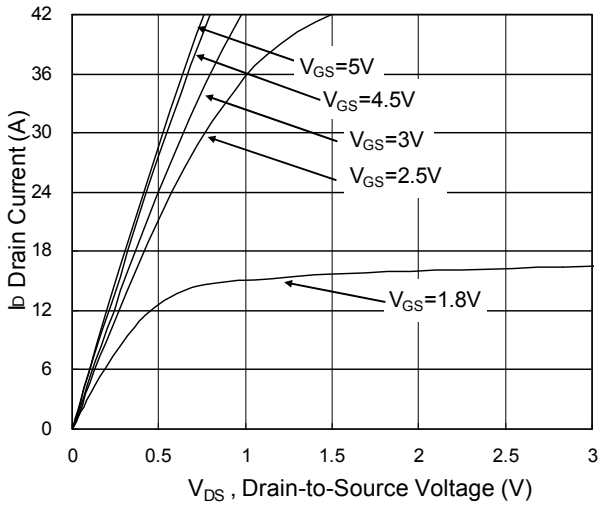


Fig.1 Typical Output Characteristics

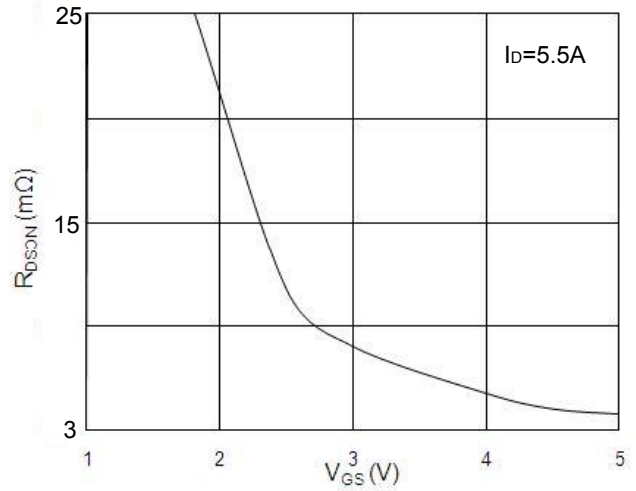


Fig.2 On-Resistance vs. Gate-Source

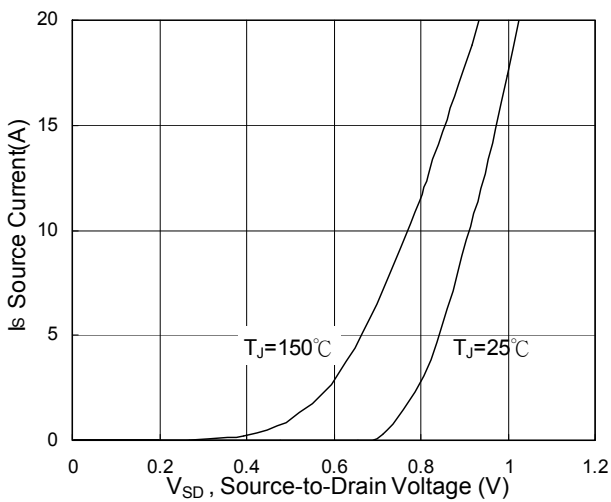


Fig.3 Forward Characteristics Of Reverse

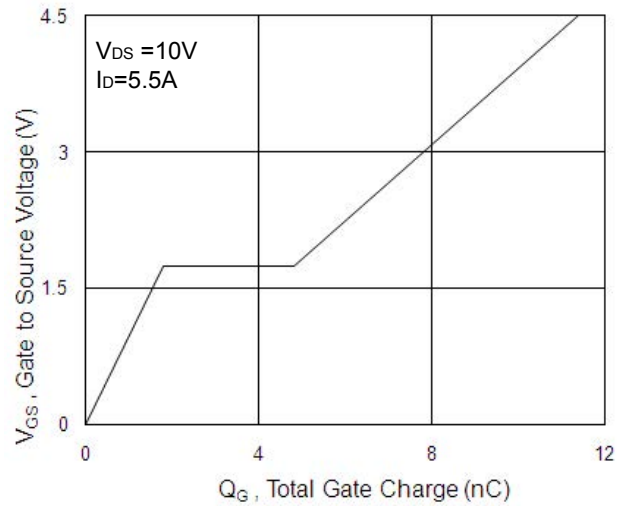


Fig.4 Gate-Charge Characteristics

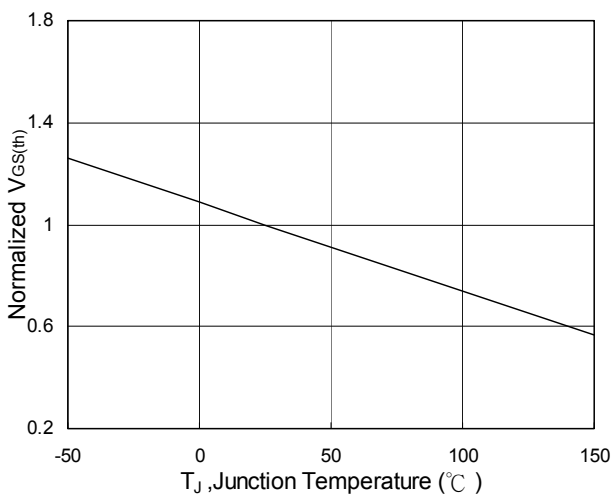


Fig.5 $V_{GS(th)}$ vs. T_J

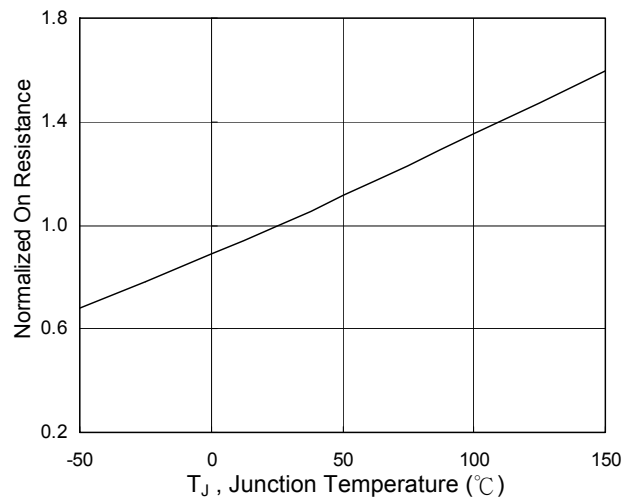


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

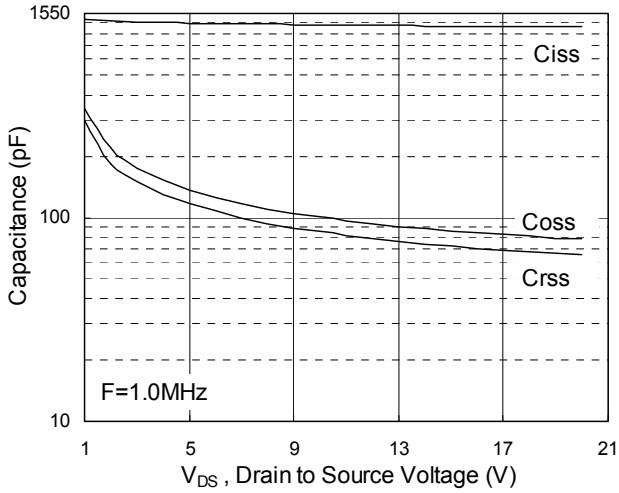


Fig.7 Capacitance

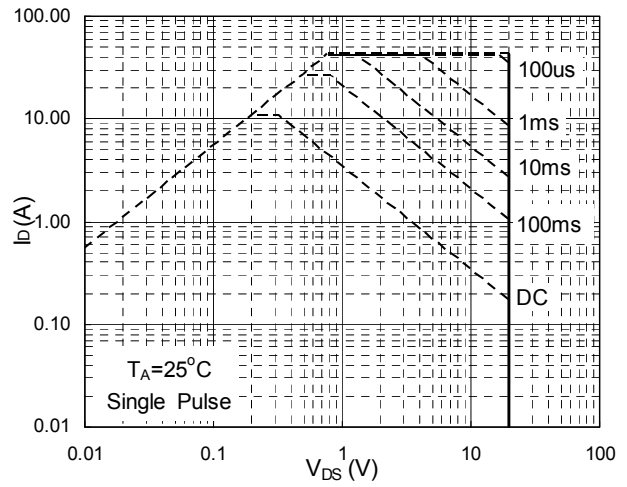


Fig.8 Safe Operating Area

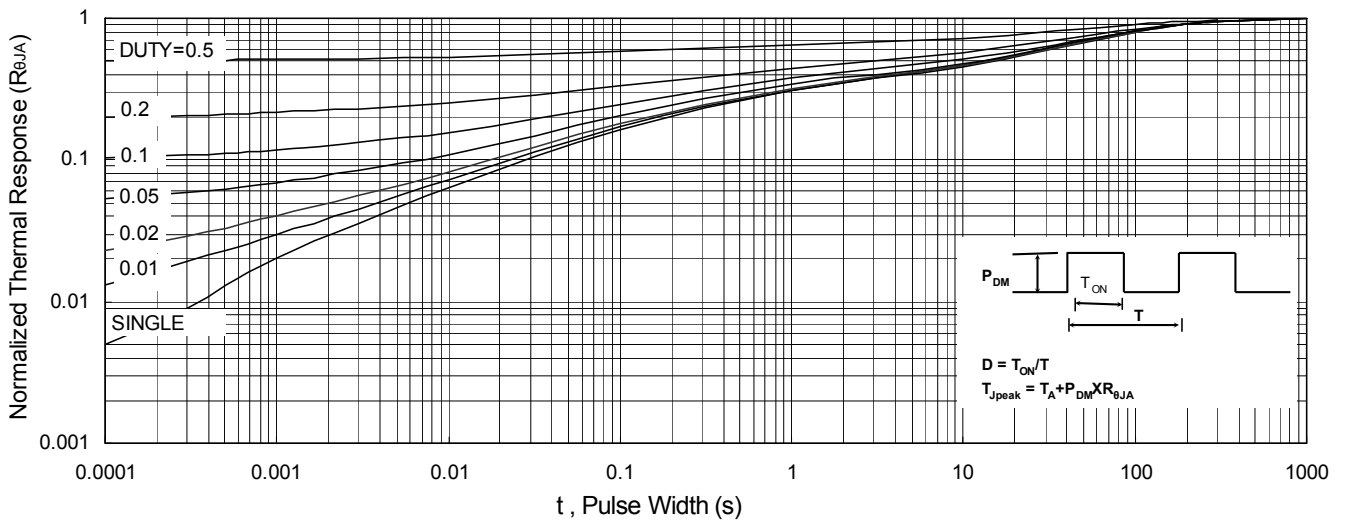


Fig.9 Normalized Maximum Transient Thermal Impedance

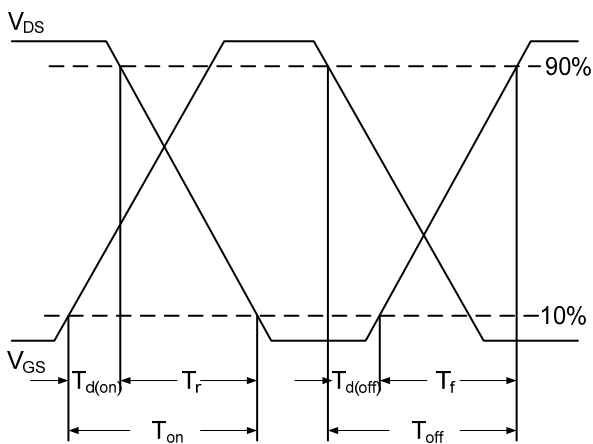


Fig.10 Switching Time Waveform

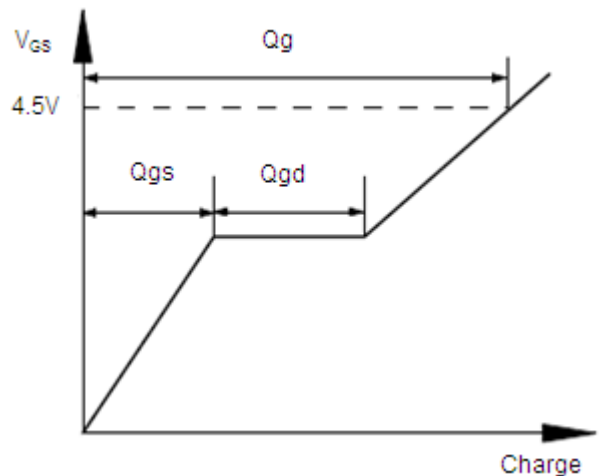


Fig.11 Gate Charge Waveform



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