

General Description

The WSP4410 is the highest performance trench N-Ch MOSFET with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The WSP4410 meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

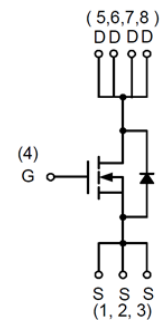
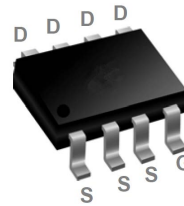
Product Summary

| BVDSS | RDSON | ID |
|-------|-------|-----|
| 30V | 4mΩ | 20A |

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

SOP-8 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|----------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_c=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 20 | A |
| $I_D@T_c=70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 15.8 | A |
| I_{DM} | Pulsed Drain Current ² | 80 | A |
| EAS | Single Pulse Avalanche Energy ³ | 31 | mJ |
| I_{AS} | Avalanche Current | 25 | A |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation ⁴ | 4.2 | 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 ¹ | --- | 65 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 25 | $^\circ C/W$ |

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 | 30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.028 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =20A | --- | 4.0 | 5.5 | mΩ |
| | | V _{GS} =4.5V, I _D =14A | --- | 6.0 | 6.8 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.3 | 1.8 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -6.16 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =24V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =24V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =12A | --- | 18 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.4 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V, V _{GS} =4.5V, I _D =20A | --- | 12.9 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 4.22 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 7.3 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V, V _{GS} =10V, R _G =6Ω I _D =10A, R _L =15Ω | --- | 14 | 26 | ns |
| T _r | Rise Time | | --- | 10 | 19 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 44 | 80 | |
| T _f | Fall Time | | --- | 12 | 23 | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 1700 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 265 | --- | |
| C _{riss} | Reverse Transfer Capacitance | | --- | 165 | --- | |

Guaranteed Avalanche Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------|--|---|------|------|------|------|
| EAS | Single Pulse Avalanche Energy ⁵ | V _{DD} =25V, L=0.1mH, I _{AS} =25A | 28 | --- | --- | mJ |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current ^{1,6} | V _G =V _D =0V, Force Current | --- | --- | 20 | A |
| I _{SM} | Pulsed Source Current ^{2,6} | | --- | --- | 80 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =5A, T _J =25°C | --- | --- | 1.1 | V |
| t _{rr} | Reverse Recovery Time | I _F =20A, dI/dt=100A/μs, T _J =25°C | --- | 10 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 3 | --- | nC |

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, t<10sec.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=25A
- The power dissipation is limited by 150°C junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Characteristics

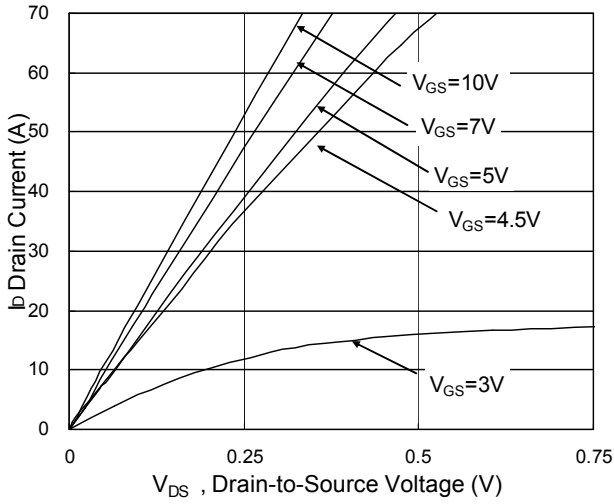


Fig.1 Typical Output Characteristics

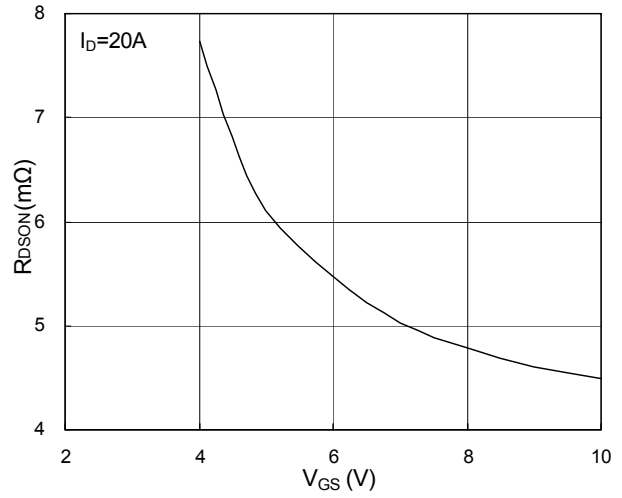


Fig.2 On-Resistance vs. Gate-Source

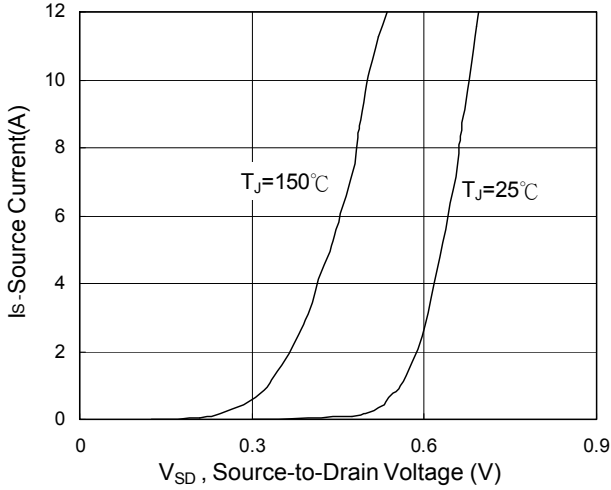


Fig.3 Forward Characteristics of Reverse

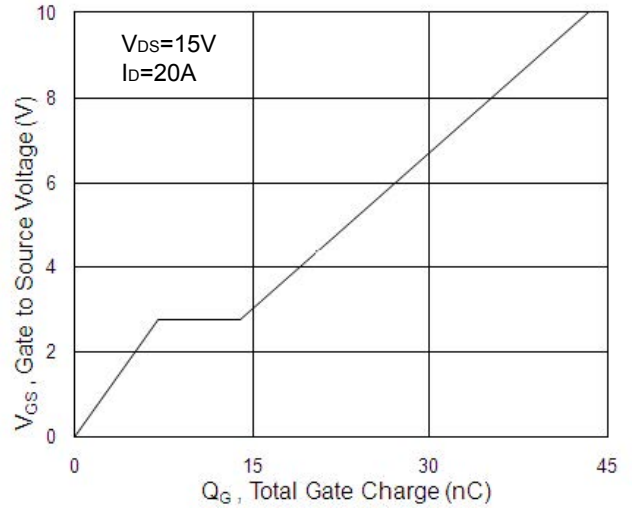


Fig.4 Gate-Charge Characteristics

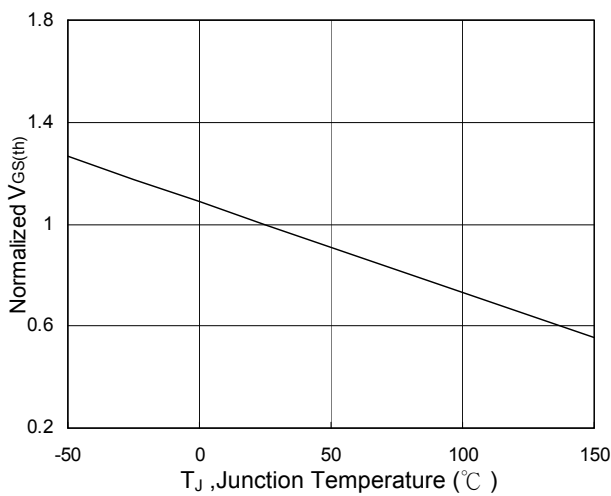


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

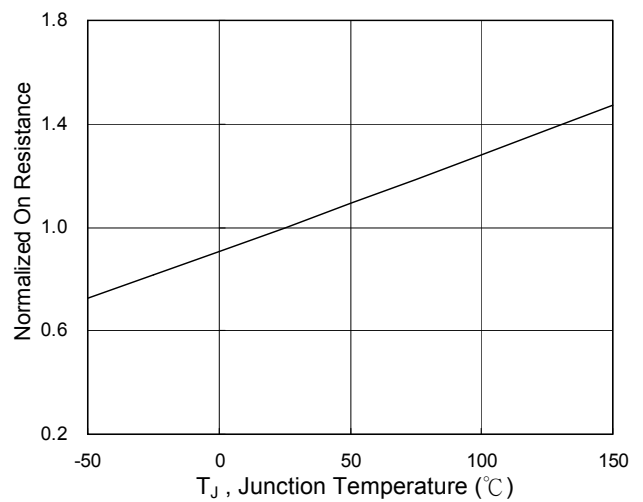


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

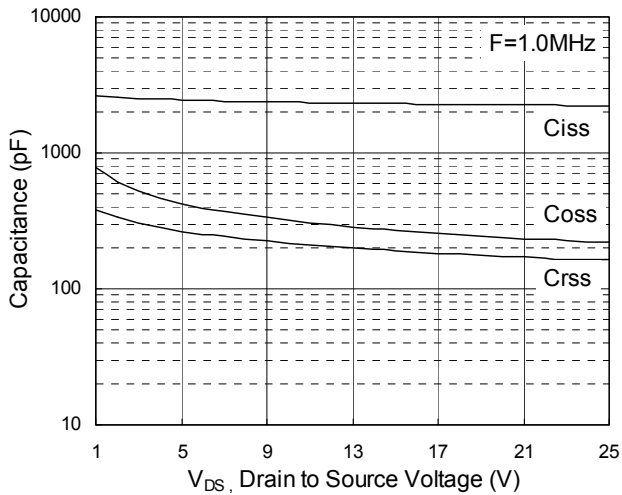


Fig.7 Capacitance

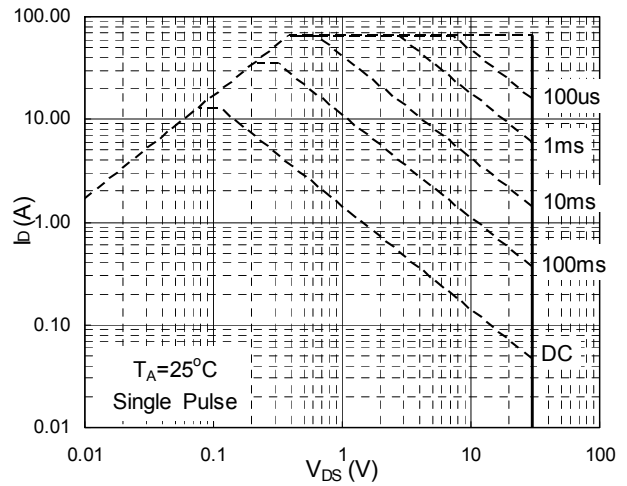


Fig.8 Safe Operating Area

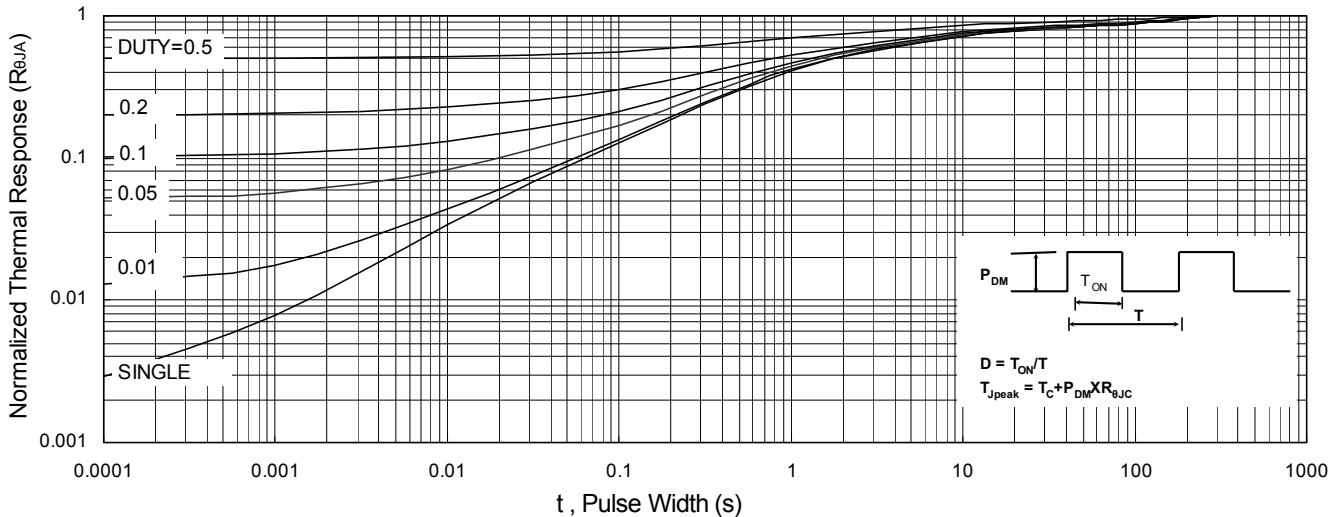


Fig.9 Normalized Maximum Transient Thermal Impedance

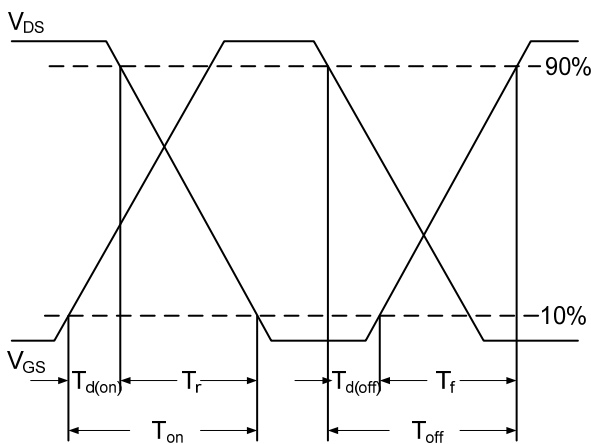


Fig.10 Switching Time Waveform

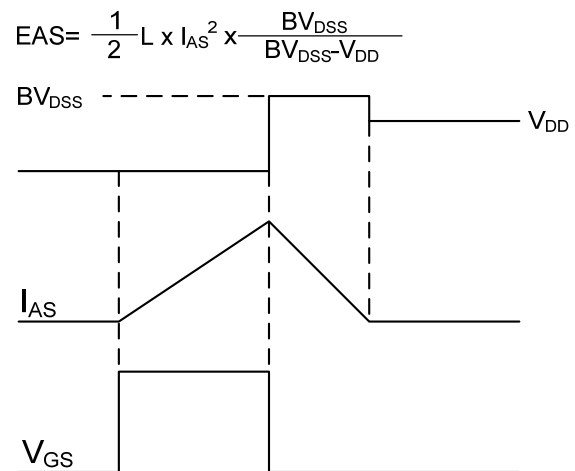


Fig.11 Unclamped Inductive Switching Waveform



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