

General Description

The WSD4082DN33 is the highest performance trench Dual N- Channel MOSFET with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The WSD4082DN33 meet the RoHS and Green Product requirement 100% E_{AS} guaranteed with full function reliability approved.

Features

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

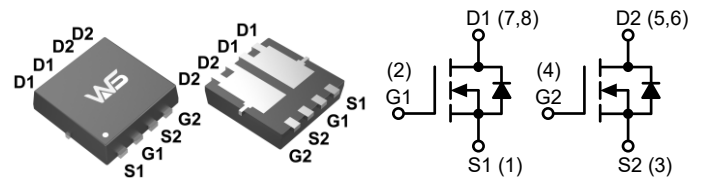
Product Summary

| BV_{DSS} | $R_{DS(ON)}$ | I_D |
|------------|--------------|-------|
| 40V | 18m Ω | 14A |

Applications

- POL Applications
- MB / VGA / Vcore
- Load Switch
- SMPS 2nd SR

DFN3X3-8L Pin Configuration



Absolute Maximum Ratings ($T_A=25^\circ\text{C}$, Unless Otherwise Noted)

| Symbol | Parameter | Rating | Units | |
|-----------|---|-------------------------|------------|------------------|
| V_{DS} | Drain-Source Voltage | 40 | V | |
| V_{GS} | Gate-Source Voltage | ± 20 | | |
| I_D | Drain Current (Continuous) ^{1,3} | $T_C=25^\circ\text{C}$ | 14 | A |
| | | $T_C=100^\circ\text{C}$ | 5.5 | |
| I_{DM} | Drain Current (Pulse) ² | 35 | | |
| P_D | Power Dissipation | $T_C=25^\circ\text{C}$ | 28 | W |
| E_{AS} | Single Pulse Avalanche Energy | | 29 | mJ |
| T_{STG} | Storage Temperature Range | | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | | -55 to 150 | |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|---|------|------|---------------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | --- | 62 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | --- | 8 | |

Electrical Characteristics ($T_A=25^\circ\text{C}$, Unless Otherwise Noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|------------------------------------|---|------|------|-----------|------------|
| Static | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 40 | --- | --- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=30V, V_{GS}=0V$ | --- | --- | 1.0 | μA |
| I_{GSS} | Gate Leakage Current | $V_{DS}=0V, V_{GS}=\pm 20V$ | --- | --- | ± 100 | nA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_{DS}=250\mu A$ | 1.0 | 1.4 | 2.5 | V |
| $R_{DS(on)}$ | Drain-Source On-state Resistance | $V_{GS}=10V, I_D=1A$ | --- | 18 | 25 | m Ω |
| | | $V_{GS}=4.5V, I_D=1A$ | --- | 25 | 35 | |
| g_{fs} | Forward Transconductance | $V_{DS}=5V, I_D=5A$ | --- | 14 | --- | S |
| Switching | | | | | | |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1.0\text{MHz}$ | --- | 3.0 | --- | Ω |
| Q_g | Total Gate Charge | $V_{GS}=10V, V_{DS}=15V, I_D=5A$ | --- | 5 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 1.5 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 3 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{GS}=10V, V_{DD}=15V, I_D=1A, R_G=6\Omega$ | --- | 9 | --- | ns |
| T_r | Rise Time | | --- | 3 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 35 | --- | |
| T_f | Fall Time | | --- | 2.5 | --- | |
| Dynamic | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0V, V_{DS}=15V, f=1.0\text{MHz}$ | --- | 580 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 77 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 60 | --- | |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Continuous Source Current | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | 8 | A |
| I_{SM} | Pulsed Source Current ³ | | --- | --- | 25 | |
| V_{SD} | Diode Forward Voltage | $I_{SD}=1A, V_{GS}=0V$ | --- | --- | 1.2 | V |

Note:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=16A, R_G=25, \text{Starting } T_J=25^\circ\text{C}$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

Typical Characteristics

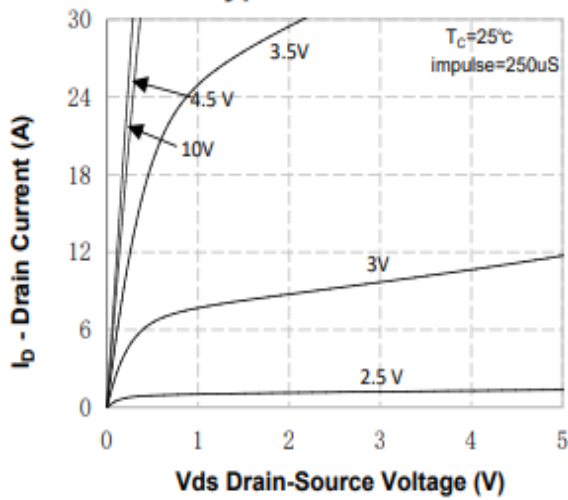


Figure 1. On-Region Characteristics

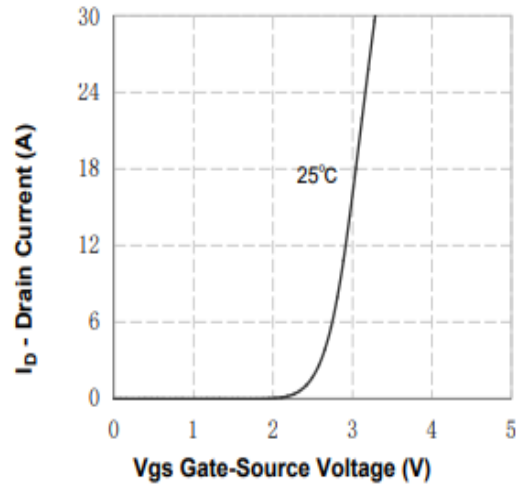


Figure 2. Transfer Characteristics

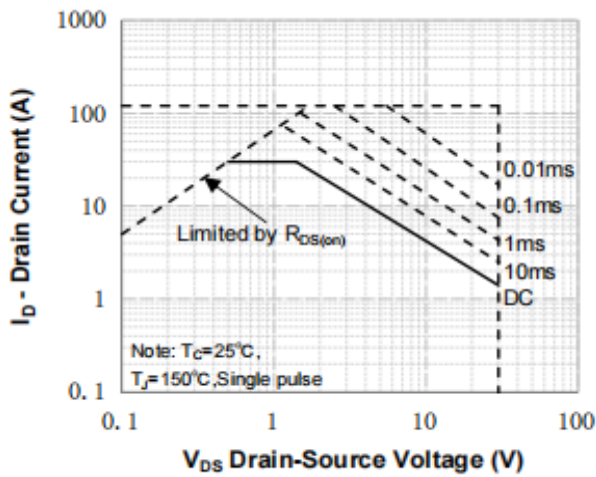


Figure 3. Maximum Safe Operating Area

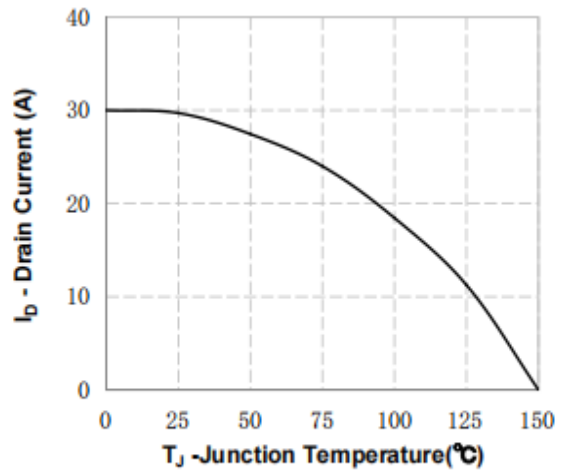


Figure 4. Maximum Continuous Drain Current vs Temperature

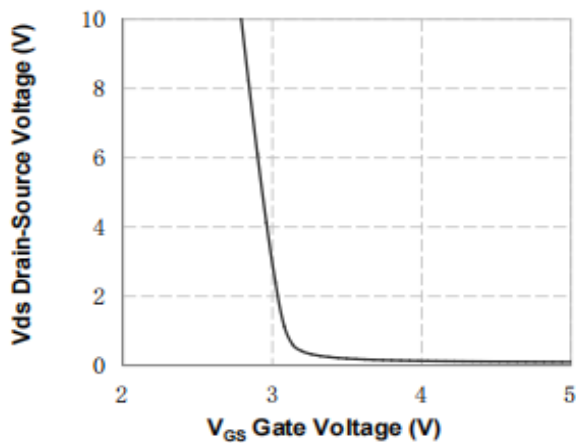


Figure 5. VDS Drain-Source Voltage vs Gate Voltage

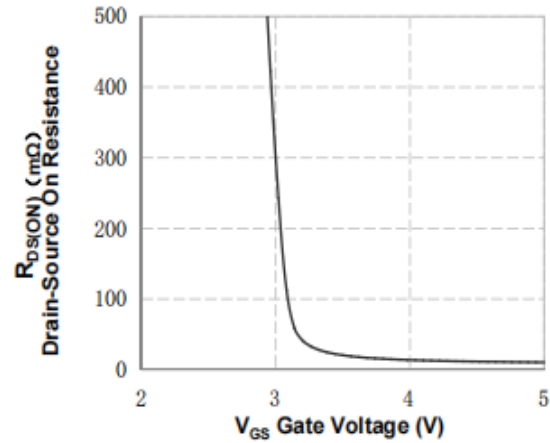


Figure 6. On-Resistance vs Gate Voltage

Typical Characteristics (Cont.)

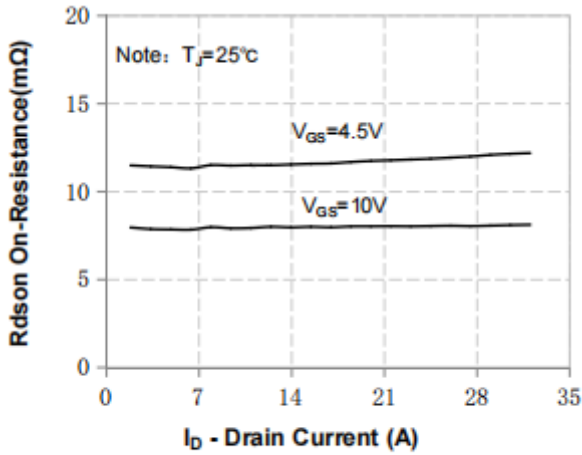


Figure 7. On-Resistance Variation vs Drain Current and Gate Voltage

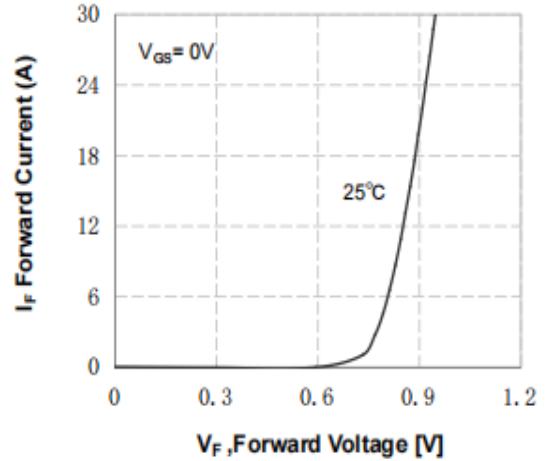


Figure 8. Body Diode Forward Voltage Variation vs Source Current

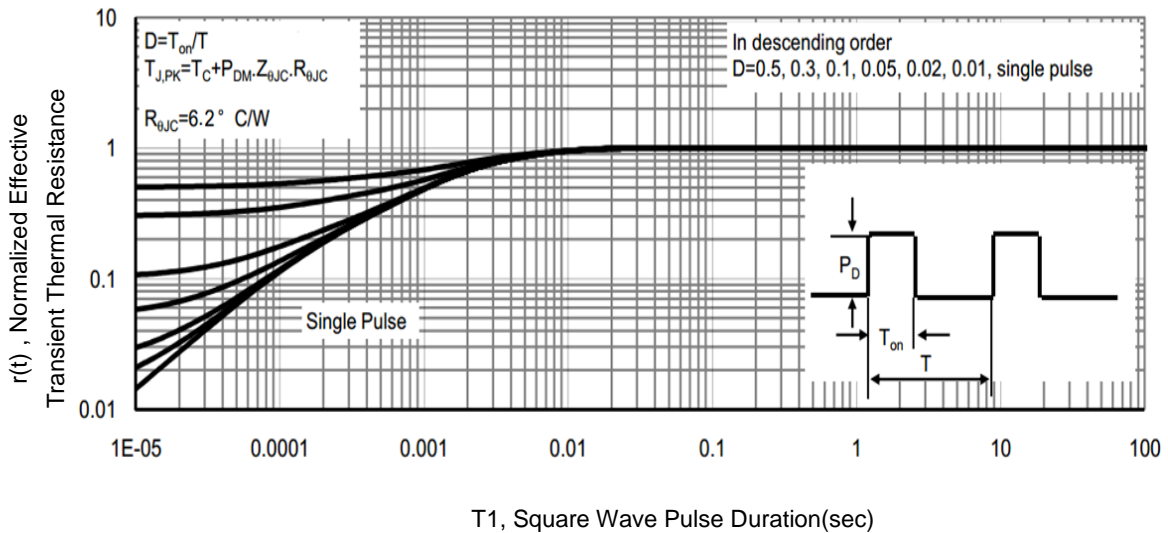


Fig9. T1, Transient Thermal Response Curve

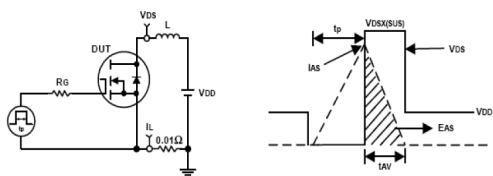


Fig10. Unclamped Inductive Test Circuit and waveforms

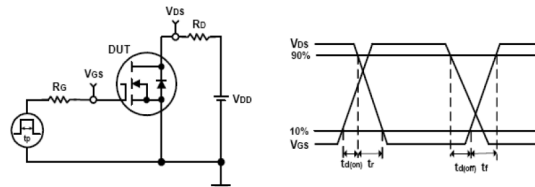
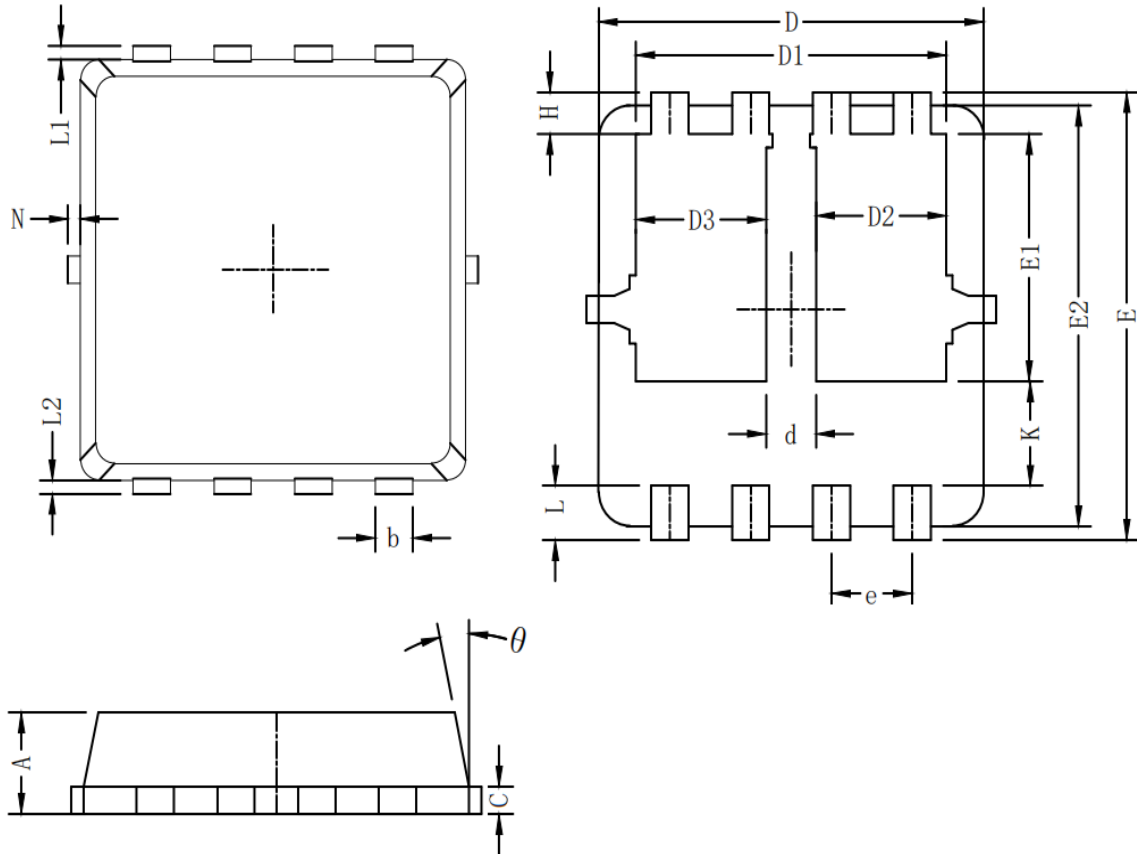


Fig11. Switching Time Test Circuit and waveforms

Packaging information


| Symbol | Dim in mm | | |
|----------|-----------|------|------|
| | min | typ | max |
| A | 0.6 | 0.75 | 0.9 |
| b | 0.2 | 0.3 | 0.4 |
| C | 0.15 | 0.2 | 0.25 |
| D | 3 | 3.1 | 3.2 |
| D1 | 2.3 | 2.45 | 2.6 |
| D2/D3 | 0.8 | 1 | 1.2 |
| E | 3.15 | 3.3 | 3.45 |
| E1 | 1.43 | 1.73 | 1.93 |
| E2 | 2.9 | 3.05 | 3.2 |
| e | 0.65BSC | | |
| H | 0.2 | 0.35 | 0.5 |
| K | 0.57 | 0.77 | 0.87 |
| L | 0.3 | 0.4 | 0.5 |
| L1/L2 | 0.1REF | | |
| θ | 8° | 10° | 13° |
| N | 0 | | 0.15 |
| d | 0.3 | 0.4 | 0.5 |

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