# WSD3028DN33

**N-Channel MOSFET**

## General Description

The WSD3028DN33 is the highest performance trench 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 WSD3028DN33 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

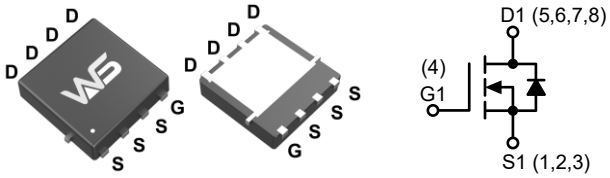
## Product Summery

| $BV_{DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 30V | 25mΩ | 19A |

## Applications

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

## DFN3X3-8L Pin Configuration




## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | |
| $I_D$@$T_C$=25°C | Continuous Drain Current, $V_{GS}$ @ 10V [1] | 25 | A |
| $I_D$@$T_C$=100°C | Continuous Drain Current, $V_{GS}$ @ 10V [1] | 18 | |
| $I_D$@$T_A$=25°C | Continuous Drain Current, $V_{GS}$ @ 10V [1] | 19 | |
| $I_D$@$T_A$=70°C | Continuous Drain Current, $V_{GS}$ @ 10V [1] | 15 | |
| $I_{DM}$ | Pulsed Drain Current [2] | 40 | |
| $E_{AS}$ | Single Pulse Avalanche Energy [3] | 21 | mJ |
| $I_{AS}$ | Avalanche Current | 15 | A |
| $P_D$@$T_C$=25°C | Power Dissipation [4] | 5 | W |
| $P_D$@$T_A$=25°C | Power Dissipation [4] | 2.5 | |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °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 [1] | --- | 50 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case [1] | --- | 4 | |

## Electrical Characteristics ($T_J$=25°C, Unless Otherwise Noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250μA | 30 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25°C, $I_D$=1mA | --- | 0.0232 | --- | V/°C |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance [2] | $V_{GS}$=10V , $I_D$=12A | --- | 22 | 25 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=8A | --- | 32 | 35 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$=250μA | 1.2 | 1.6 | 2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -6.08 | --- | mV/°C |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=25°C | --- | --- | 1.0 | μA |
| | | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=55°C | --- | --- | 5.0 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{DS}$=0V , $V_{GS}$=±20V | --- | --- | ±100 | nA |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=10V , $I_D$=6A | --- | 6.5 | --- | S |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f = 1.0MHz | --- | 2.5 | 3.3 | Ω |
| $Q_g$ | Total Gate Charge (4.5V) | $V_{DS}$=15V , $V_{GS}$=4.5V , $I_D$=6A | --- | 4.1 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 1 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 2.1 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=15V , $V_{GEN}$=10V , $R_G$=6Ω $I_D$=1A , $R_L$=15Ω | --- | 2 | --- | ns |
| $T_r$ | Rise Time | | --- | 4 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 15.8 | --- | |
| $T_f$ | Fall Time | | --- | 4 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , f = 1.0MHz | --- | 360 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 55 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 46 | --- | |

## Guaranteed Avalanche Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy [5] | $V_{DD}$=25V , L=0.1mH , $I_{AS}$=23A | 21 | --- | --- | mJ |

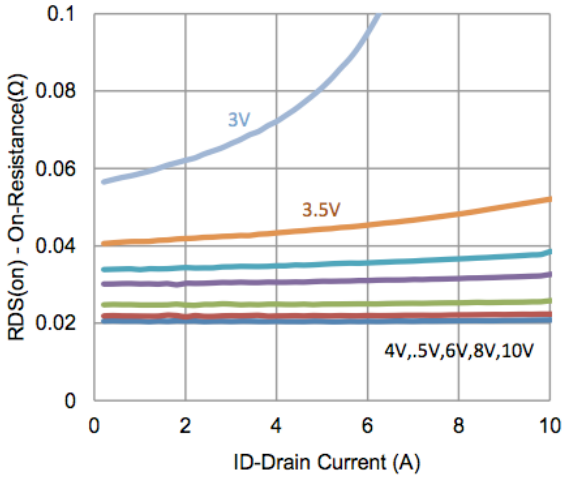
## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current [1,6] | $V_G$=$V_D$=0V , Force Current | --- | --- | 5 | A |
| $I_{SM}$ | Pulsed Source Curren [2,6] | | --- | --- | 22 | |
| $V_{SD}$ | Diode Forward Voltage [2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25°C | --- | --- | 1.0 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=20A, dI/dt=100A/μs,$T_J$=25°C | --- | 16.5 | --- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 10 | --- | nC |

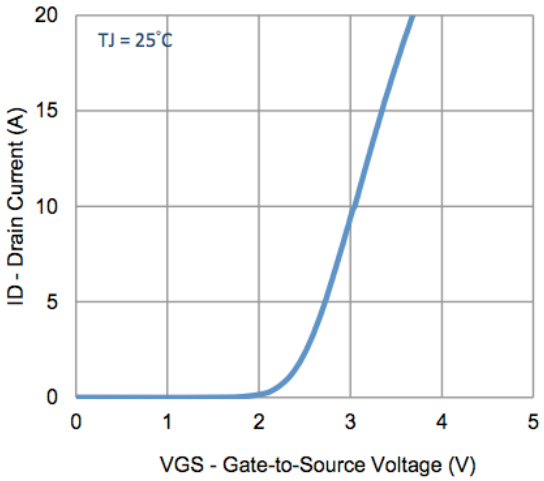
Note:

1. The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper, t<10sec.
2. The data tested by pulsed , pulse width ≤ 300μs , duty cycle ≤ 2%
3. The $E_{AS}$ data shows Max. rating . The test condition is $V_{DD}$=25V, $V_{GS}$=10V, L=0.1mH, $I_{AS}$=23A
4. The power dissipation is limited by 150°C junction temperature.
5. The Min. value is 100% $E_{AS}$ tested guarantee.
6. The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

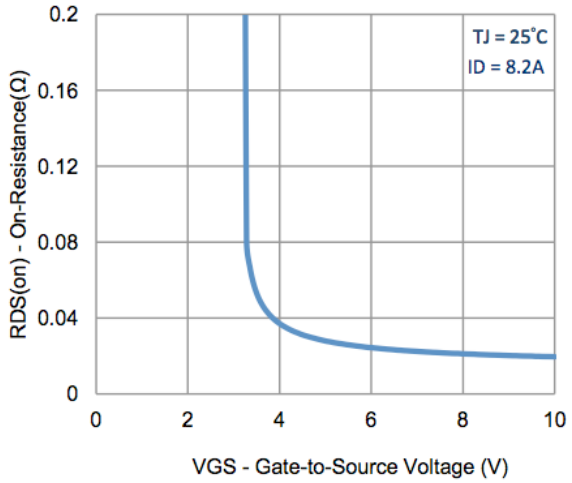
## Typical Characteristics



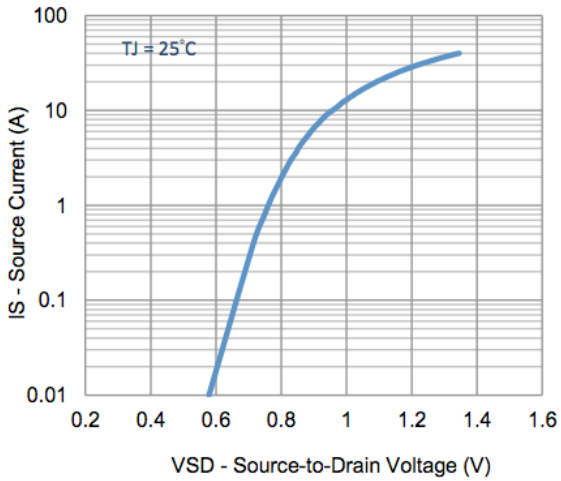

**1. On-Resistance vs. Drain Current**



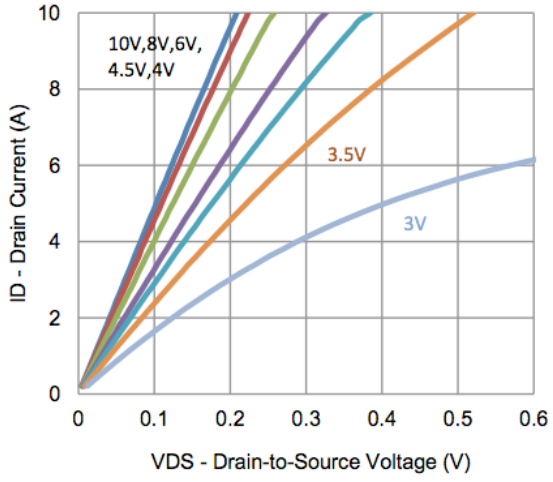

**2. Transfer Characteristics**



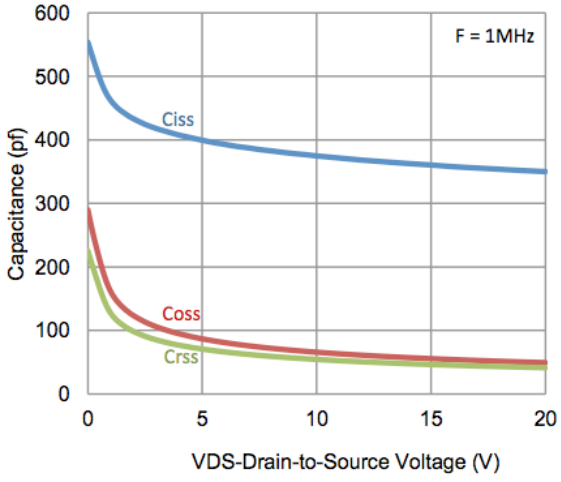

**3. On-Resistance vs. Gate-to-Source Voltage**




**4. Drain-to-Source Forward Voltage**

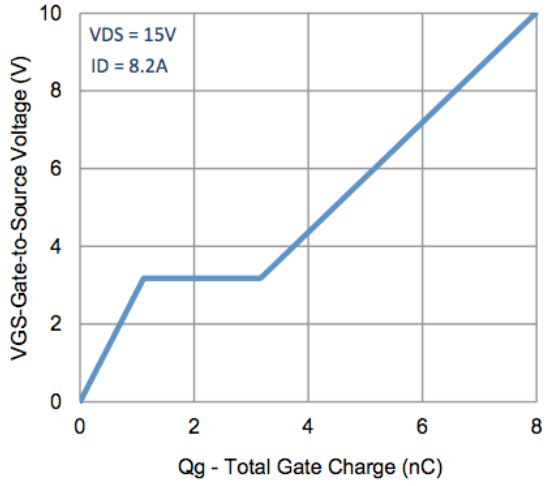



**5. Output Characteristics**

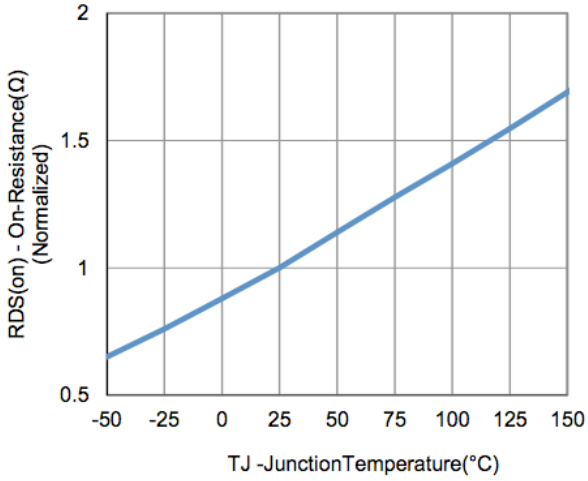



**6. Capacitance**

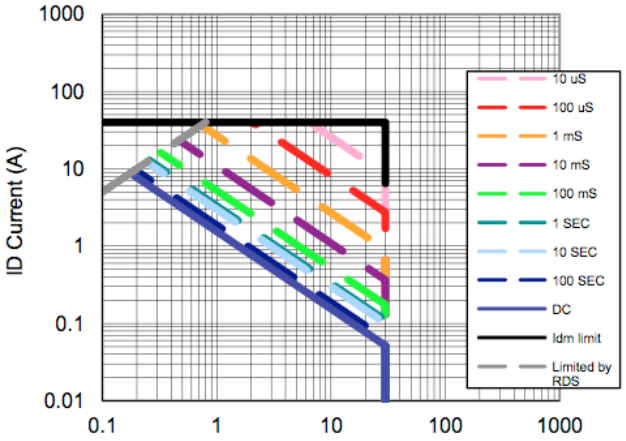
## Typical Characteristics (Cont.)



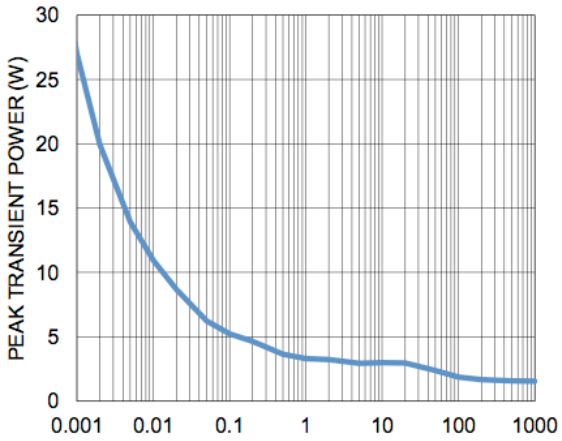

**7. Gate Charge**



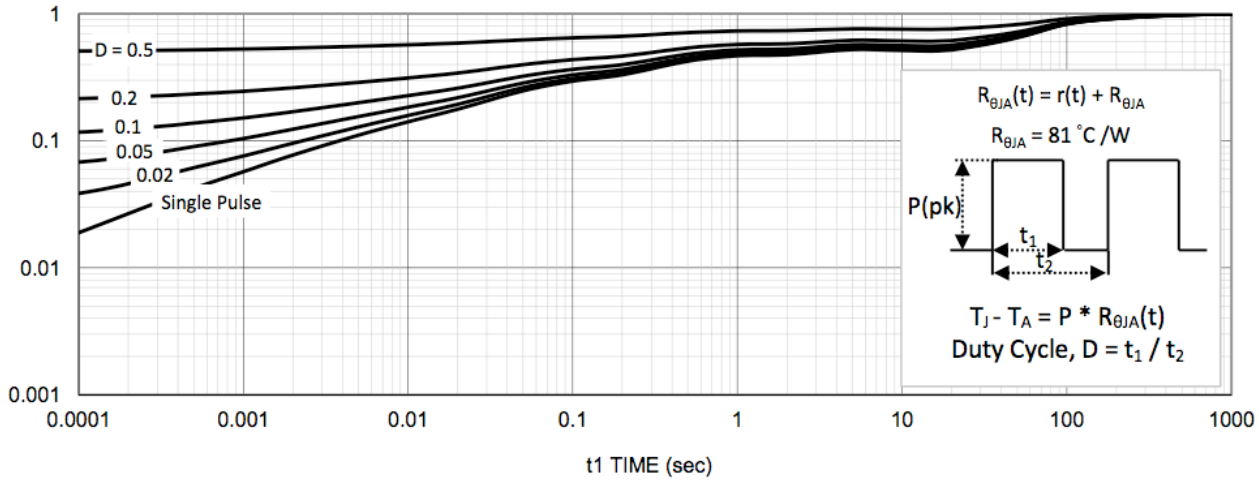

**8. Normalized On-Resistance Vs Junction Temperature**




**9. Safe Operating Area**

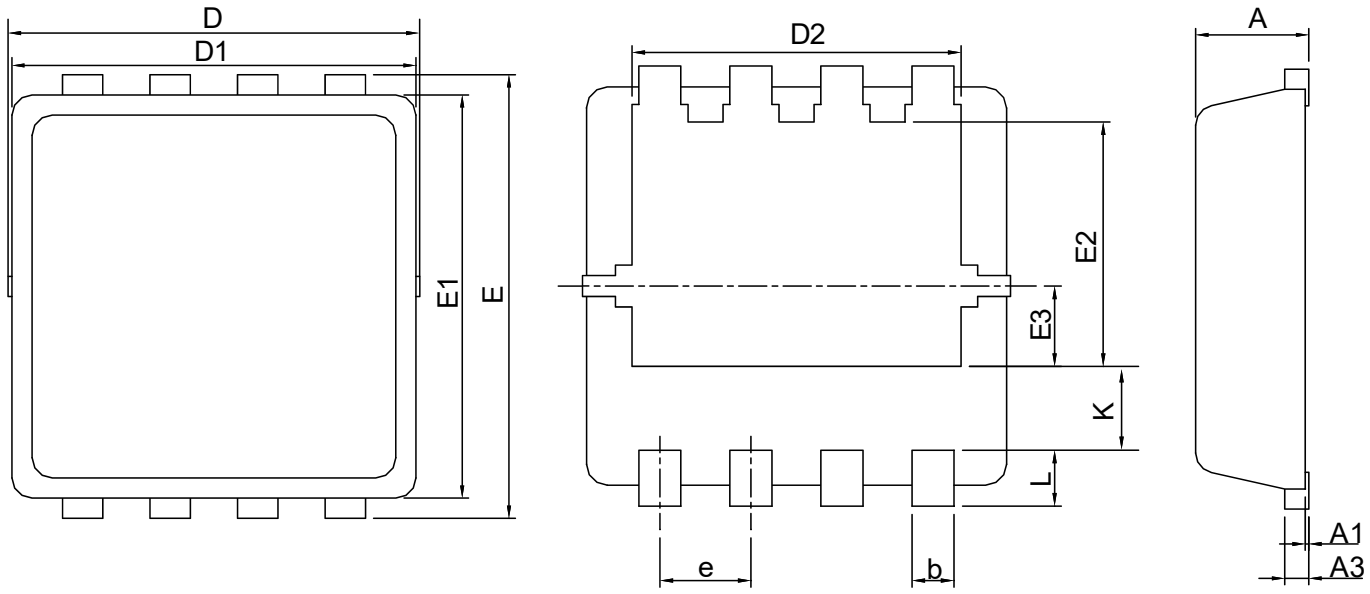



**10. Single Pulse Maximum Power Dissipation**



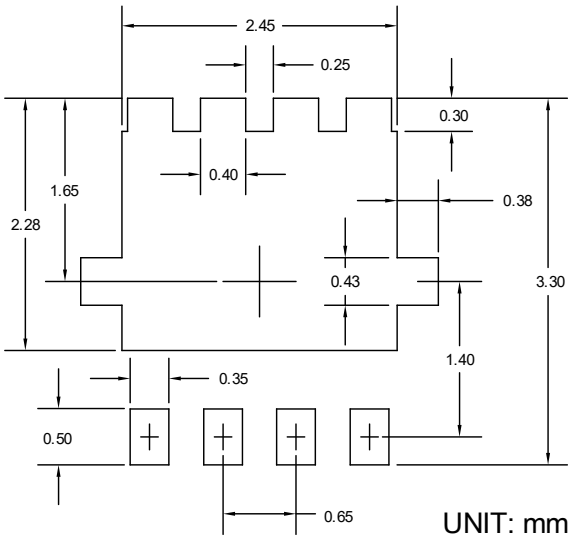

**11. Normalized Thermal Transient Junction to Ambient**

## Packaging information




| SYMBOL | DFN3X3-8L | | | |
|---|---|---|---|---|
| | MILLIMETERS | | INCHES | |
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.80 | 1.00 | 0.031 | 0.039 |
| A1 | 0.00 | 0.05 | 0.000 | 0.002 |
| A3 | 0.10 | 0.25 | 0.004 | 0.010 |
| b | 0.24 | 0.35 | 0.009 | 0.014 |
| D | 2.90 | 3.30 | 0.114 | 0.130 |
| D1 | 2.90 | 3.10 | 0.114 | 0.122 |
| D2 | 2.25 | 2.45 | 0.089 | 0.096 |
| E | 3.10 | 3.30 | 0.122 | 0.130 |
| E1 | 2.90 | 3.10 | 0.114 | 0.122 |
| E2 | 1.65 | 1.85 | 0.065 | 0.073 |
| E3 | 0.56 | 0.58 | 0.022 | 0.023 |
| e | 0.65 BSC | | 0.026 BSC | |
| K | 0.475 | 0.775 | 0.019 | 0.031 |
| L | 0.30 | 0.50 | 0.012 | 0.020 |

**RECOMMENDED LAND PATTERN**



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