# WSD3044DN56

**Dual N-Channel MOSFET**

## General Description

The WSD3044DN56 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 WSD3044DN56 meet the RoHS and Green Product requirement, 100% $E_{AS}$ guaranteed with full function reliability approved.

## Features

- 100% UIS Tested.
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

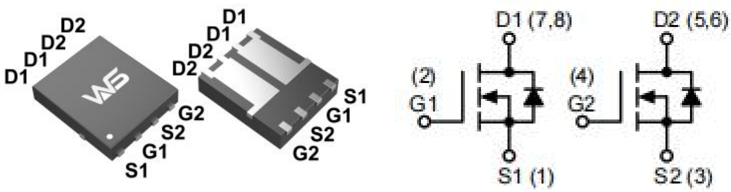
## Product Summery

| $BV_{DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 30V | 8.3mΩ | 30A |

## Applications

- Power Management for Industrial DC/DC Converters
- Ldeal for high-frequency switching and synchronous rectification

## DFN5*6-8L Pin Configuration




## Absolute Maximum Ratings ($T_A$=25°C, Unless Otherwise Noted)

| Symbol | Parameter | | Rating | Units |
|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | | ±20 | |
| $I_D$ [7] | Continuous Drain Current | $T_C$=25°C | 30 | A |
| | | $T_C$=100°C | 22 | |
| $I_{DM}$ [3] | Pulse Drain Current | | 50 | |
| $P_D$ [2] | Power Dissipation | $T_C$=25°C | 27 | W |
| $I_{AS}$ [3] | Single pulse Avalanche Current | | 35 | A |
| $E_{AS}$ [3] | Single pulse Avalanche Energy | L=0.5mH | 68 | mJ |
| $T_{STG}$ | Storage Temperature Range | | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | | -55 to 150 | |
| $R_{\theta JA}$ [1,4] | Thermal Resistance-Junction to Ambient | t≤10s | 30 | °C/W |
| | | Steady State | 60.5 | |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | | 5 | |

## 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 |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=10A | --- | 8.3 | 10 | mΩ |
| | | $T_J$=125°C | --- | 16 | --- | |
| | | $V_{GS}$=4.5V , $I_D$=10A | --- | 9.6 | 15 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$=250μA | 1.0 | 1.5 | 2.2 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=30V , $V_{GS}$=0V | --- | --- | 1.0 | μA |
| | | $T_J$=55°C | --- | --- | 5.0 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{DS}$=0V , $V_{GS}$=±10V | --- | --- | ±100 | nA |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=5V , $I_D$=10A | --- | 8 | --- | S |
| $R_G$ | Gate Resistance | $f$=1.0MHz | 1.0 | 2.0 | 3.0 | Ω |
| $Q_g$ | Total Gate Charge (10V) | $V_{DS}$=15V , $V_{GS}$=10V , $I_D$=10A | --- | 18 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 2 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 4.1 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=5V , $V_{GS}$=10V , $I_D$=10A<br>$R_L$=1Ω , $R_{GEN}$=3Ω | --- | 5 | --- | ns |
| $T_r$ | Rise Time | | --- | 2 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 17 | --- | |
| $T_f$ | Fall Time | | --- | 8 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , $f$=1.0MHz | --- | 1050 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 121 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 100 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $I_S$ [7] | Continuous Source Current | | --- | --- | 30 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=1A | --- | 0.7 | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=20A , di/dt=500A/μs | --- | 25 | --- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 31 | --- | nC |

Note:

1. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A$=25°C. The Power dissipation $P_{DSM}$ is based on $R_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
2. The power dissipation $P_D$ is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
3. Single pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
4. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
6. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.
7. The maximum current rating is package limited.
8. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A$=25°C.
9. The maximum current rating is silicon limited

## Typical Characteristics

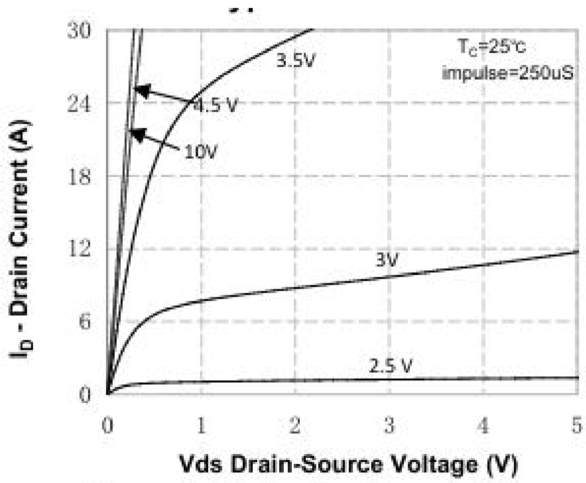



Figure 1. On-Region Characteristics

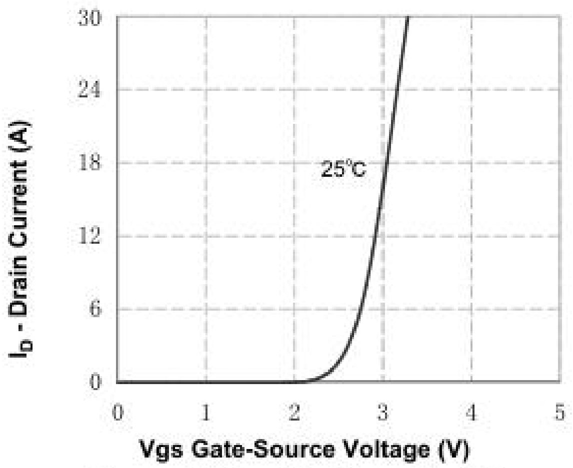



Figure 2. Transfer Characteristics

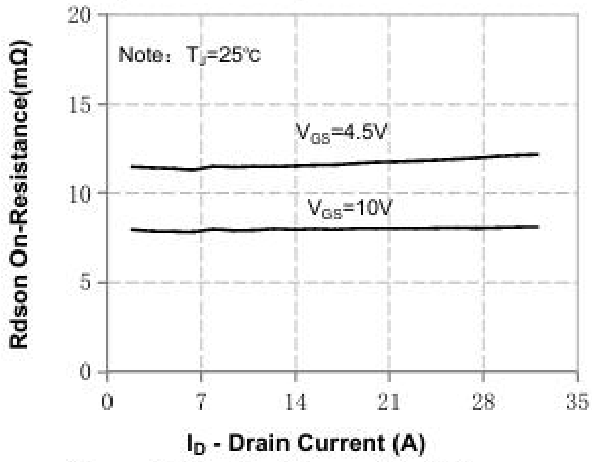



Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

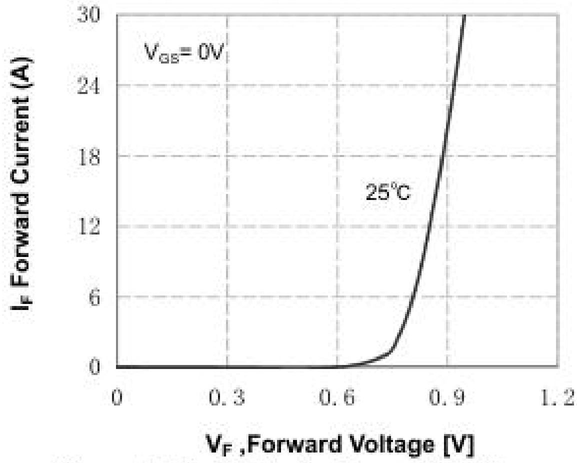



Figure 4. Body Diode Forward Voltage Variation vs Source Current

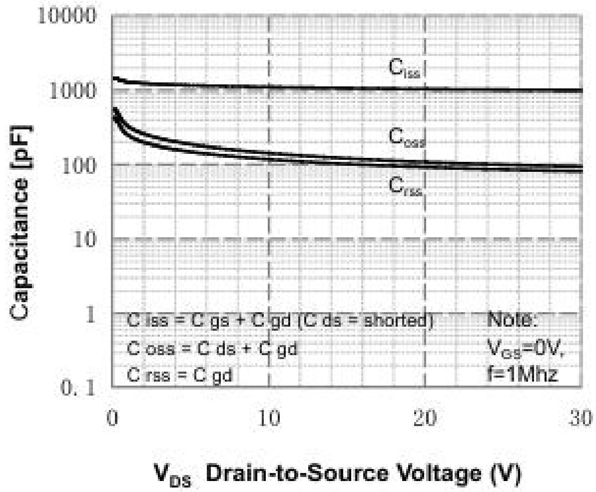



Figure 5. Capacitance Characteristics

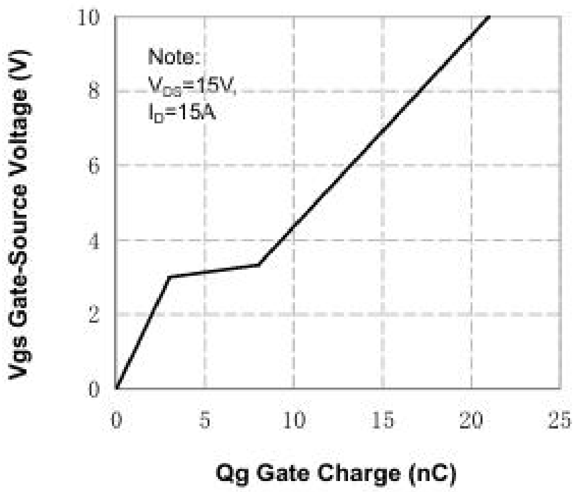



Figure 6. Gate Charge Characteristics

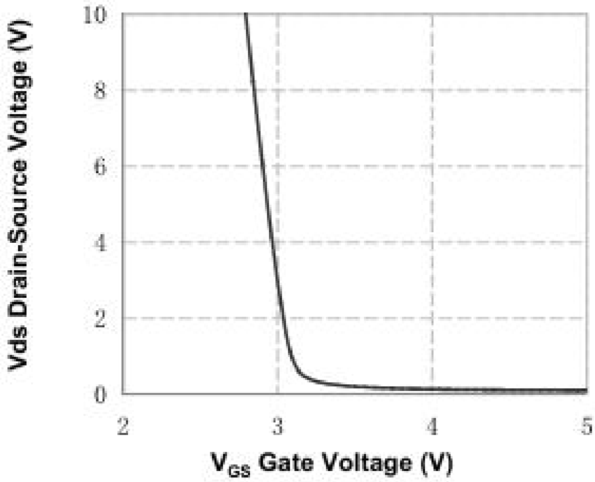



Figure 7. Vds Drain-Source Voltage vs Gate Voltage

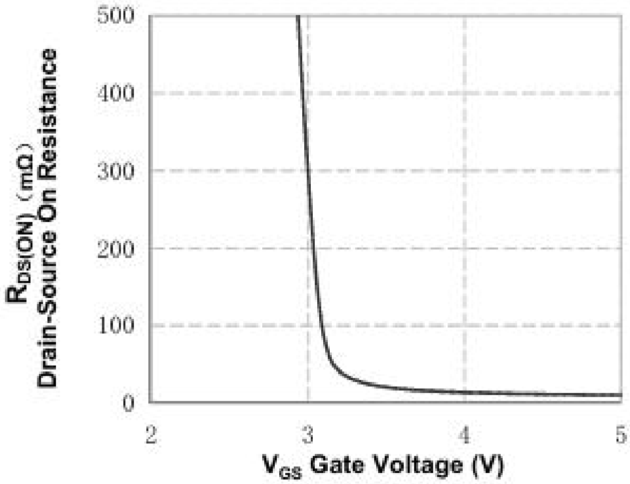



Figure 8. On-Resistance vs Gate Voltage

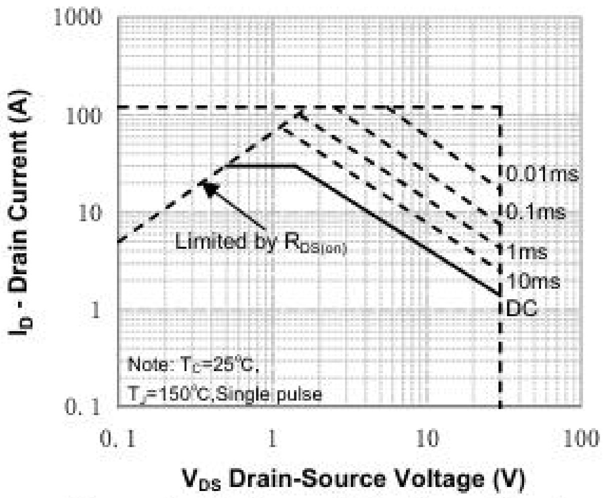



Figure 9. Maximum Safe Operating Area

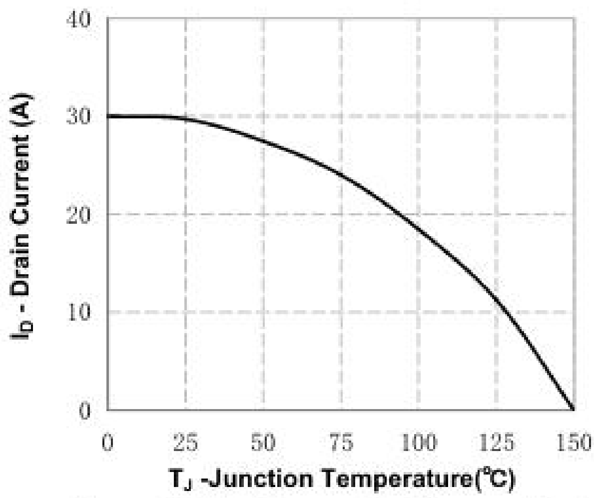



Figure 10. Maximum Continuous Drain Current vs Temperature

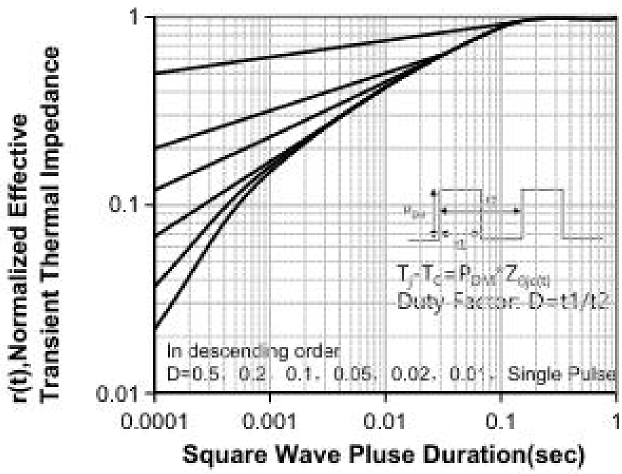
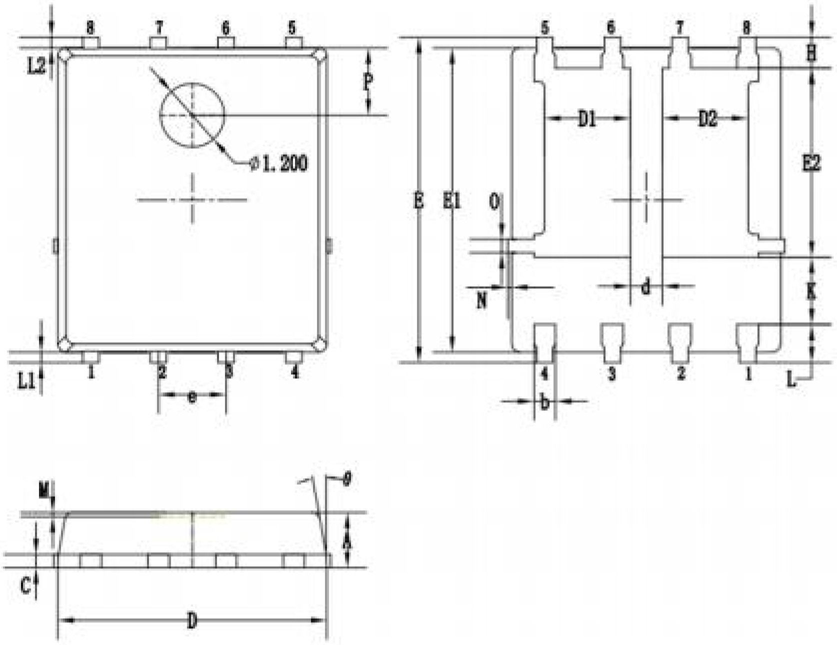



Figure 11. Transient Thermal Response Curve

## Packaging information




| SYMBOLS | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.05 | 1.20 |
| b | 0.35 | 0.40 | 0.50 |
| C | 0.20 | 0.25 | 0.35 |
| D | 4.90 | 5.05 | 5.20 |
| D1/D2 | 1.51 | 1.61 | 1.71 |
| d | 0.50 | 0.60 | 0.70 |
| E | 6.00 | 6.15 | 6.30 |
| E1 | 5.60 | 5.75 | 5.90 |
| E2 | 3.47 | 3.57 | 3.67 |
| e | 1.27 BSC. | | |
| H | 0.48 | 0.58 | 0.68 |
| K | 1.17 | 1.27 | 1.37 |
| L | 0.64 | 0.74 | 0.84 |
| L1/L2 | 0.20 REF. | | |
| θ | 8° | 10° | 12° |
| M | 0.08 REF. | | |
| N | 0 | - | 0.15 |
| O | 0.25 REF. | | |
| P | 1.28 REF. | | |

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