

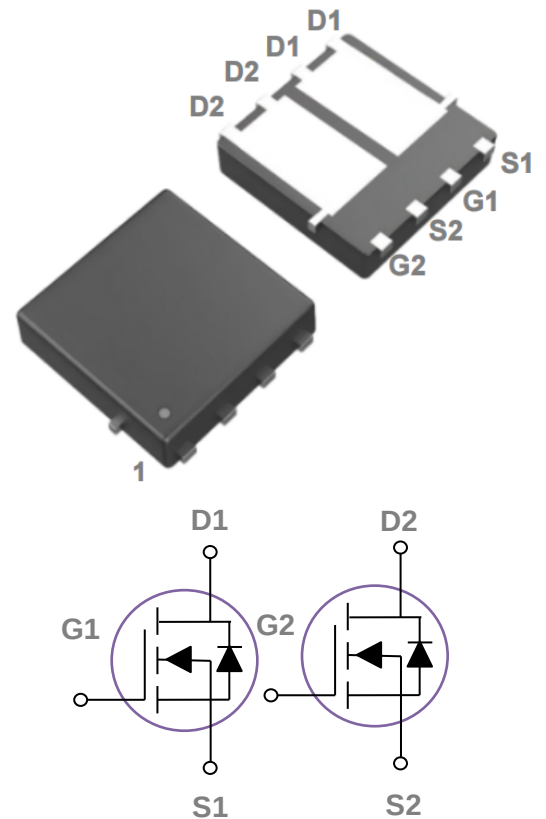
## Description:

This Dual N-Channel MOSFET uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge.

It can be used in a wide variety of applications.

## Features:

- 1)  $V_{DS}=40V, I_D=28A, R_{DS(on)} < 13m\Omega @ V_{GS}=10V$  ( Typ :  $10 m\Omega$  )
- 2) Improved dv/dt capability
- 3) Fast switching
- 4) 100% EAS Guaranteed
- 5) Green Device Available.



## Absolute Maximum Ratings: ( $T_C=25^\circ C$ unless otherwise noted)

| Symbol         | Parameter                                              | Ratings     | Units      |
|----------------|--------------------------------------------------------|-------------|------------|
| $V_{DS}$       | Drain-Source Voltage                                   | 40          | V          |
| $V_{GS}$       | Gate-Source Voltage                                    | $\pm 20$    | V          |
| $I_D$          | Continuous Drain Current-Continuous - $T_C=25^\circ C$ | 28          | A          |
|                | Continuous Drain Current- $T_C=100^\circ C$            | 21          |            |
| $I_{DM}$       | Drain Current – Pulsed <sup>2</sup>                    | 90          | A          |
| $E_{AS}$       | Single Pulse Avalanche Energy <sup>3</sup>             | 28          | mJ         |
| $P_D$          | Power Dissipation- $T_C=25^\circ C$                    | 35          | W          |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range       | -55 to +150 | $^\circ C$ |

### Thermal Characteristics:

| Symbol          | Parameter                                                        | Max | Units |
|-----------------|------------------------------------------------------------------|-----|-------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case (Steady State) <sup>1</sup> | 62  | °C/W  |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient <sup>1</sup>             | 4.1 |       |

### Package Marking and Ordering Information:

| Part NO.  | Marking | Package   |
|-----------|---------|-----------|
| DOZ28DN04 | 28DN04  | DFN3*3-8D |

### Electrical Characteristics: ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

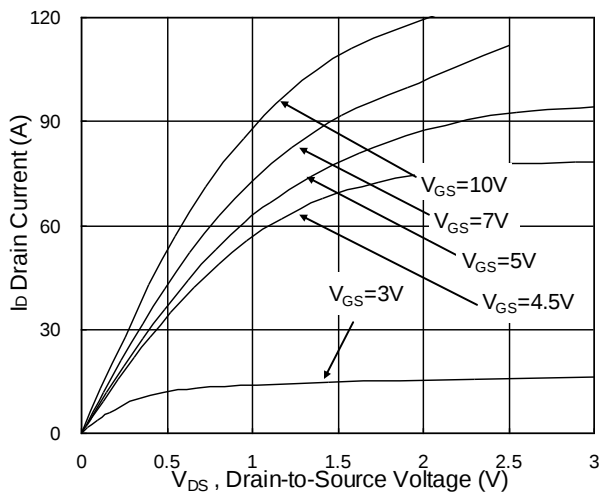
| Symbol                    | Parameter                               | Conditions                                                                                  | Min | Typ  | Max   | Units |
|---------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------|-----|------|-------|-------|
| Off Characteristics       |                                         |                                                                                             |     |      |       |       |
| BV <sub>DSS</sub>         | Drain-Sourtce Breakdown Voltage         | V <sub>GS</sub> =0V, I <sub>D</sub> =250 μ A                                                | 40  | ---  | ---   | V     |
| I <sub>DSS</sub>          | Drain-Source Leakage Current            | V <sub>GS</sub> =0V, V <sub>DS</sub> =32V, T <sub>J</sub> =25℃                              | --- | ---  | 1     | μ A   |
|                           |                                         | V <sub>GS</sub> =0V, V <sub>DS</sub> =32V, T <sub>J</sub> =55℃                              | --- | ---  | 5     | μ A   |
| I <sub>GSS</sub>          | Gate-Source Leakage Current             | V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0A                                                 | --- | ---  | ± 100 | nA    |
| On Characteristics        |                                         |                                                                                             |     |      |       |       |
| V <sub>GS(th)</sub>       | GATE-Source Threshold Voltage           | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 μ A                                  | 1   | 1.5  | 2.5   | V     |
| R <sub>DS(ON)</sub>       | Drain-Source On Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                                   | --- | 10   | 13    | m Ω   |
|                           |                                         | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                                  | --- | 13   | 20    |       |
| G <sub>FS</sub>           | Forward Transconductance                | V <sub>DS</sub> =5V, I <sub>D</sub> =20A                                                    | --- | 36   | ---   | S     |
| R <sub>g</sub>            | Gate Resistance                         | V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz                                          | --- | 2.1  | 4.2   | Ω     |
| Dynamic Characteristics   |                                         |                                                                                             |     |      |       |       |
| C <sub>iss</sub>          | Input Capacitance                       | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                           | --- | 1300 | ---   | pF    |
| C <sub>OSS</sub>          | Output Capacitance                      |                                                                                             | --- | 118  | ---   |       |
| C <sub>rss</sub>          | Reverse Transfer Capacitance            |                                                                                             | --- | 85   | ---   |       |
| Switching Characteristics |                                         |                                                                                             |     |      |       |       |
| t <sub>d(on)</sub>        | Turn-On Delay Time                      | V <sub>DD</sub> =12V , V <sub>GS</sub> =10V ,<br>R <sub>G</sub> =3.3 Ω , I <sub>D</sub> =6A | --- | 8.6  | ---   | ns    |
| t <sub>r</sub>            | Rise Time                               |                                                                                             | --- | 3.4  | ---   | ns    |

|                                    |                                                 |                                                                                            |     |      |     |    |
|------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------|-----|------|-----|----|
| <b>t<sub>d(off)</sub></b>          | Turn-Off Delay Time                             | V <sub>DD</sub> =12V , V <sub>GS</sub> =10V ,<br>R <sub>G</sub> =3.3 Ω ,I <sub>D</sub> =6A | --- | 25   | --- | ns |
| <b>t<sub>f</sub></b>               | Fall Time                                       |                                                                                            | --- | 2.2  | --- | ns |
| <b>Q<sub>g</sub></b>               | Total Gate Charge                               | V <sub>DS</sub> =20V , V <sub>GS</sub> =4.5V ,<br>I <sub>D</sub> =12A                      | --- | 10.7 | --- | nC |
| <b>Q<sub>gs</sub></b>              | Gate-Source Charge                              |                                                                                            | --- | 3.3  | --- | nC |
| <b>Q<sub>gd</sub></b>              | Gate-Drain Charge                               |                                                                                            | --- | 4.2  | --- | nC |
| Drain-Source Diode Characteristics |                                                 |                                                                                            |     |      |     |    |
| <b>V<sub>SD</sub></b>              | Source-Drain Diode Forward Voltage <sup>2</sup> | V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25 °C                           | --- | ---  | 1.2 | V  |
| <b>I<sub>S</sub></b>               | Continuous Source Current <sup>1,5</sup>        | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current                                         | --- | ---  | 42  | A  |
| <b>I<sub>SM</sub></b>              | Pulsed Source Current <sup>2,5</sup>            |                                                                                            | --- | ---  | 100 | A  |

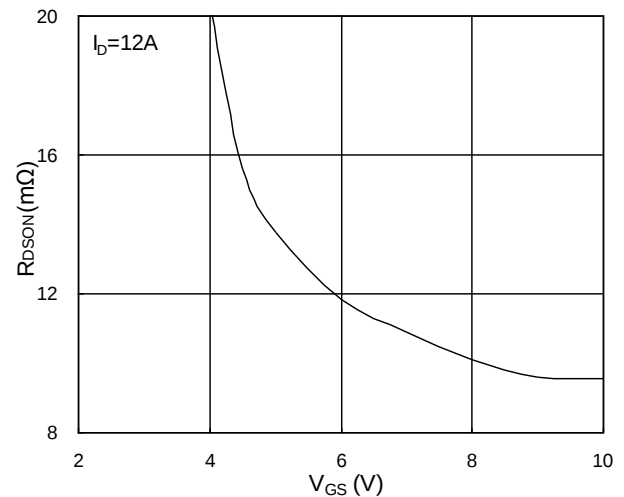
## Notes:

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=25A$
4. The power dissipation is limited by 150 $^\circ C$  junction temperature
5. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

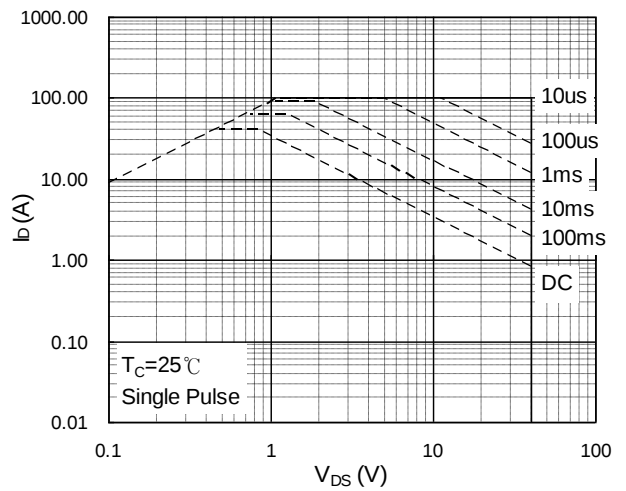
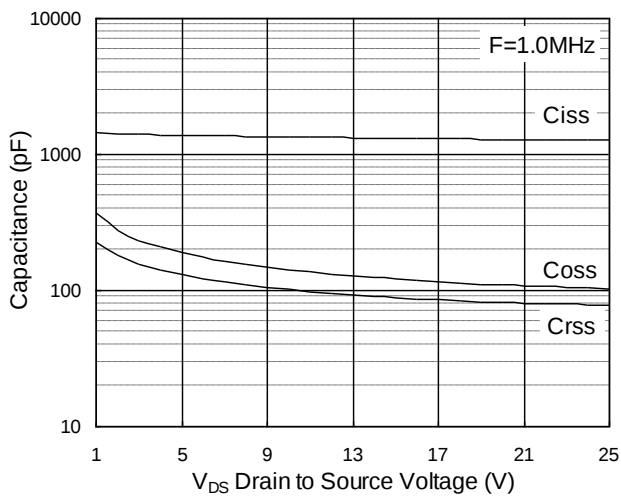
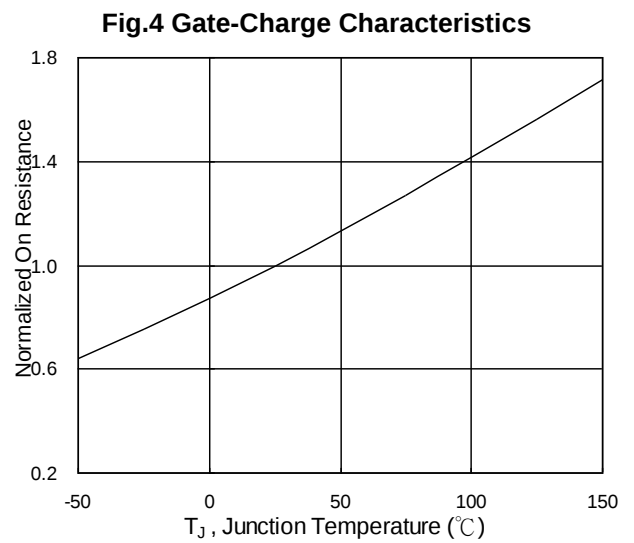
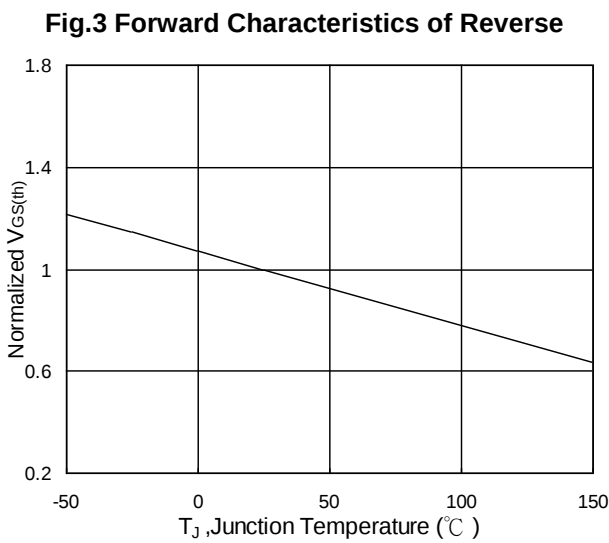
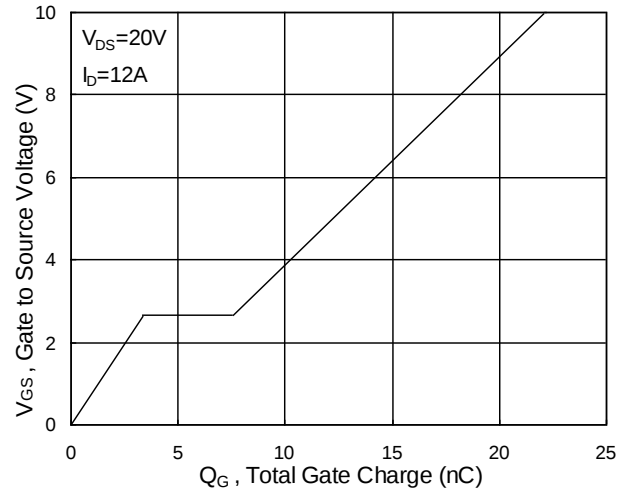
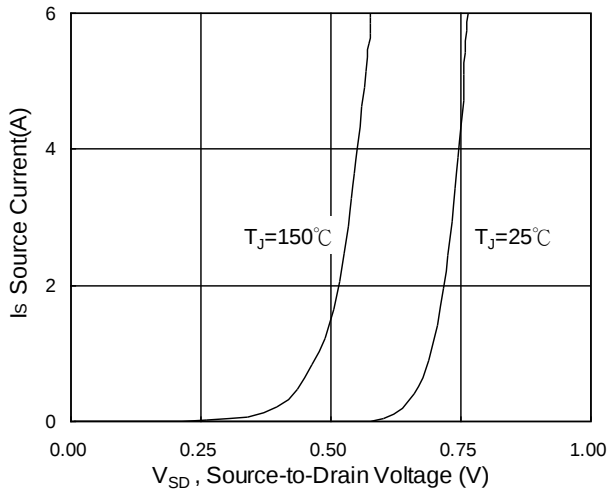
## Typical Characteristics: ( $T_C=25^\circ C$ unless otherwise noted)

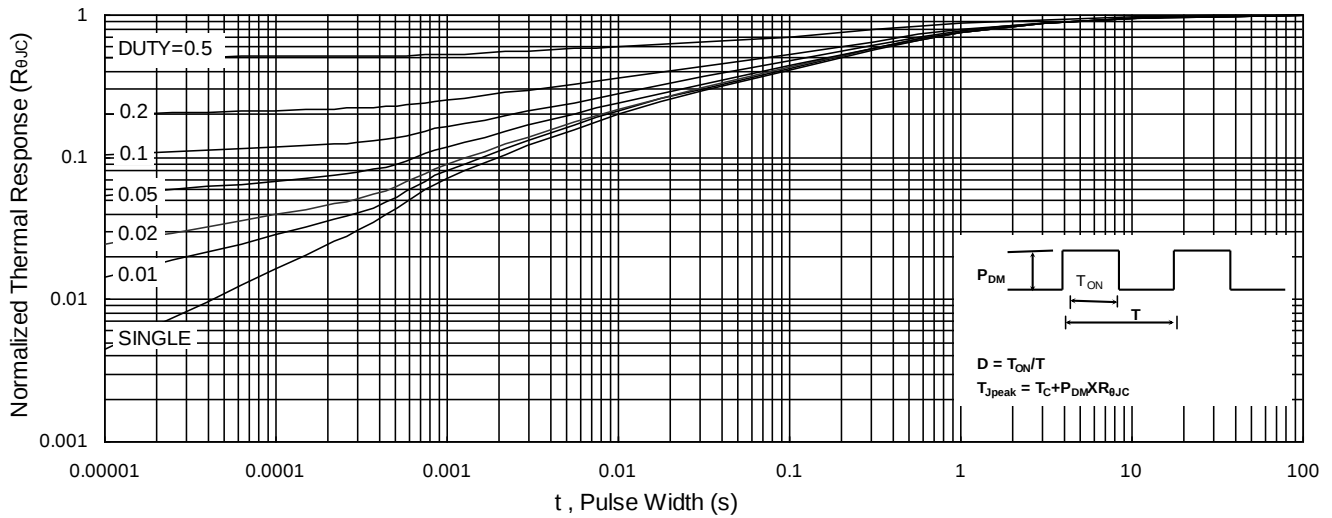


**Fig.1 Typical Output Characteristics**

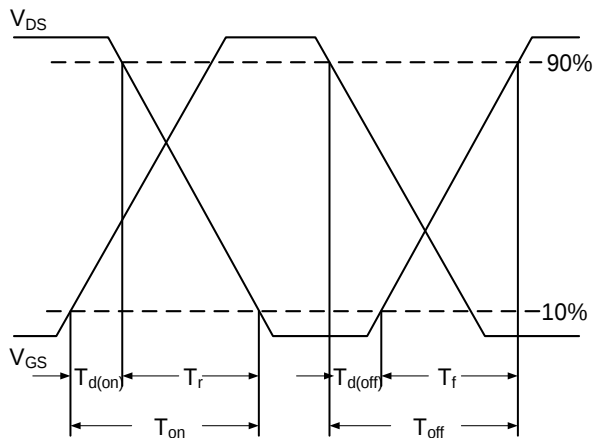


**Fig.2 On-Resistance vs. G-S Voltage**

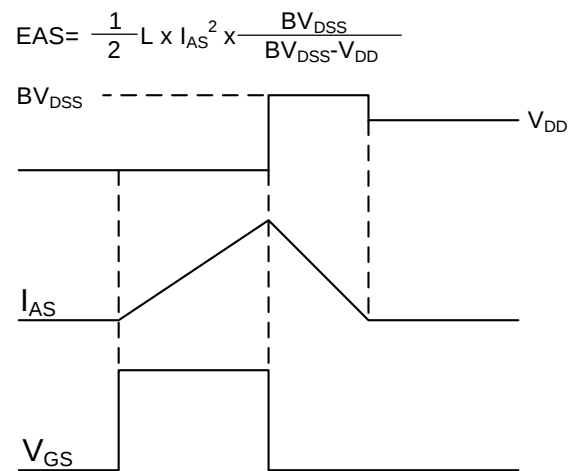




**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**