

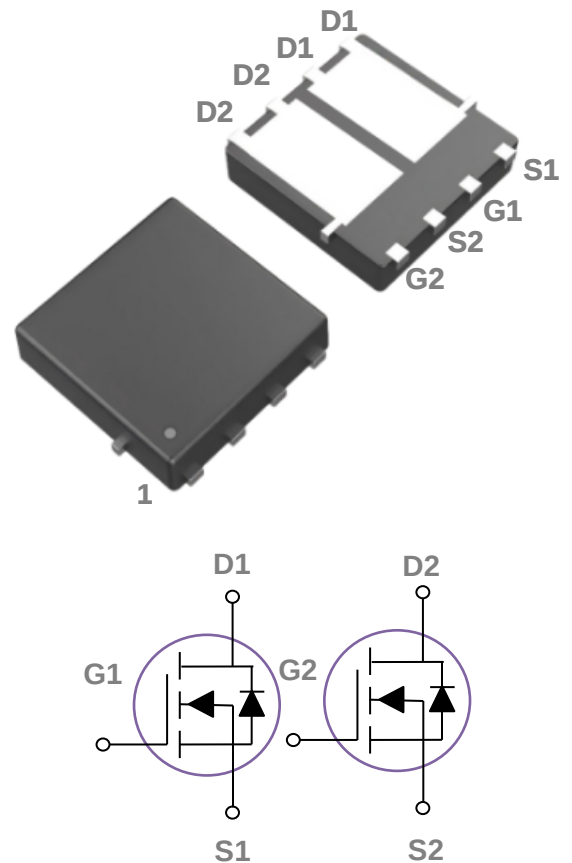
## Description:

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)  $V_{DS}=40V, I_D=20A, R_{DS(ON)} < 22m\Omega @ V_{GS}=10V$  ( Typ :  $17m\Omega$  )
- 2) Improved  $dv/dt$  capability
- 3) Fast switching
- 4) 100% EAS Guaranteed
- 5) Green Device Available.



## Absolute Maximum Ratings:

| 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- $T_C=25^\circ C$  | 20          | A          |
|                | Continuous Drain Current-Continuous- $T_C=100^\circ C$ | 12          |            |
| $I_{DM}$       | Drain Current – Pulsed <sup>note1</sup>                | 58          | A          |
| <b>EAS</b>     | Single Pulse Avalanche Energy <sup>note2</sup>         | 13          |            |
| $P_D$          | Power Dissipation - $T_C=25^\circ C$ <sup>4</sup>      | 15.6        | 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 | 8   | $^{\circ}\text{C}/\text{W}$ |

**Package Marking and Ordering Information:**

| Part NO.  | Marking | Package   |
|-----------|---------|-----------|
| DOZ20DN04 | 20DN04  | DFN3*3-8D |

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

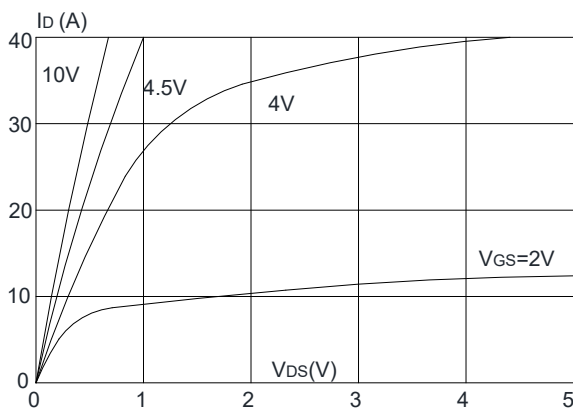
| Symbol                    | Parameter                        | Conditions                                                                                      | Min | Typ | Max   | Units |
|---------------------------|----------------------------------|-------------------------------------------------------------------------------------------------|-----|-----|-------|-------|
| Off Characteristics       |                                  |                                                                                                 |     |     |       |       |
| BV <sub>DSS</sub>         | Drain-Sourctce 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> =40V                                                       | --- | --- | 1.0   | 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 Resistance②      | V <sub>GS</sub> =10V, I <sub>D</sub> =8A                                                        | --- | 17  | 22    | m Ω   |
|                           |                                  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                                                       | --- | 25  | 35    |       |
| Dynamic Characteristics   |                                  |                                                                                                 |     |     |       |       |
| C <sub>iss</sub>          | Input Capacitance                | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1MHz                                               | --- | 523 | ---   | pF    |
| C <sub>oss</sub>          | Output Capacitance               |                                                                                                 | --- | 62  | ---   |       |
| C <sub>rss</sub>          | Reverse Transfer Capacitance     |                                                                                                 | --- | 53  | ---   |       |
| Switching Characteristics |                                  |                                                                                                 |     |     |       |       |
| t <sub>d(on)</sub>        | Turn-On Delay Time               | V <sub>DD</sub> =20V ,R <sub>L</sub> =2.5 Ω<br><br>V <sub>GS</sub> =10V , R <sub>REN</sub> =3 Ω | --- | 4   | ---   | ns    |
| t <sub>r</sub>            | Rise Time                        |                                                                                                 | --- | 3   | ---   | ns    |
| t <sub>d(off)</sub>       | Turn-Off Delay Time              |                                                                                                 | --- | 15  | ---   | ns    |
| t <sub>f</sub>            | Fall Time                        |                                                                                                 | --- | 2   | ---   | ns    |
| Q <sub>g</sub>            | Total Gate Charge                | V <sub>DS</sub> =20V , V <sub>GS</sub> =10V , I <sub>D</sub> =8A                                | --- | 12  | ---   | nC    |
| Q <sub>gs</sub>           | Gate-Source Charge               |                                                                                                 | --- | 3.2 | ---   | nC    |

|                                           |                                          |                                                               |     |     |     |    |
|-------------------------------------------|------------------------------------------|---------------------------------------------------------------|-----|-----|-----|----|
| <b>Q<sub>gd</sub></b>                     | Gate-Drain "Miller" Charge               |                                                               | --- | 3.1 | --- | nC |
| <b>Drain-Source Diode Characteristics</b> |                                          |                                                               |     |     |     |    |
| <b>I<sub>S</sub></b>                      | Continuous Source Current <sup>1,5</sup> | V <sub>G</sub> =V <sub>D</sub> =0V ,<br>Force Current         | --- | --- | 8   | A  |
| <b>I<sub>SM</sub></b>                     | Pulsed Source Current <sup>2,5</sup>     |                                                               | --- | --- | 32  | A  |
| <b>V<sub>SD</sub></b>                     | Forward on voltage <sup>②</sup>          | I <sub>SD</sub> =1A, T <sub>J</sub> =25℃, V <sub>GS</sub> =0V | --- | --- | 1.2 | V  |

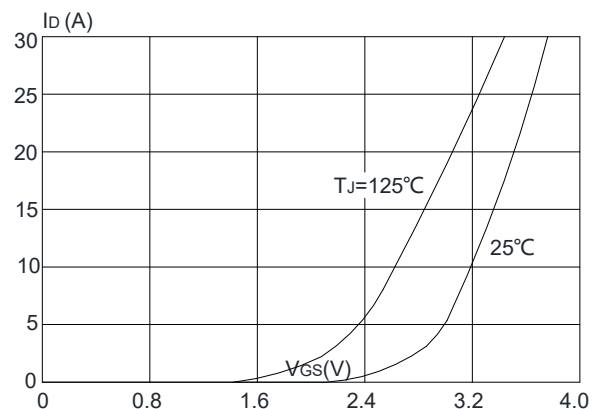
### Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition : T<sub>J</sub>=25℃, V<sub>DD</sub>=20V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω, I<sub>AS</sub>=7.2A  
T<sub>J</sub>=25℃, V<sub>DD</sub>=-20V, V<sub>G</sub>=-10V, L=0.5mH, R<sub>g</sub>=25Ω, I<sub>AS</sub>=-8.4A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

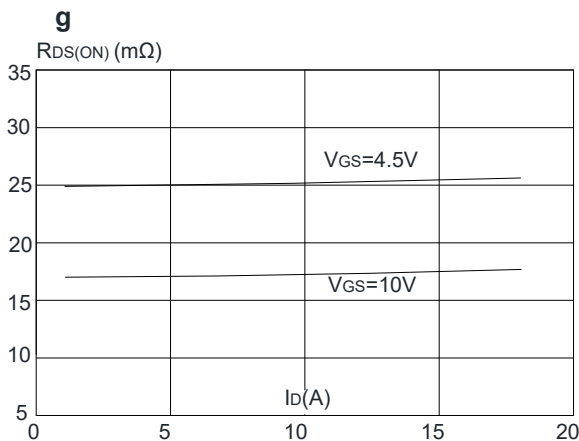
### Typical Characteristics: (T<sub>C</sub>=25℃ unless otherwise noted)



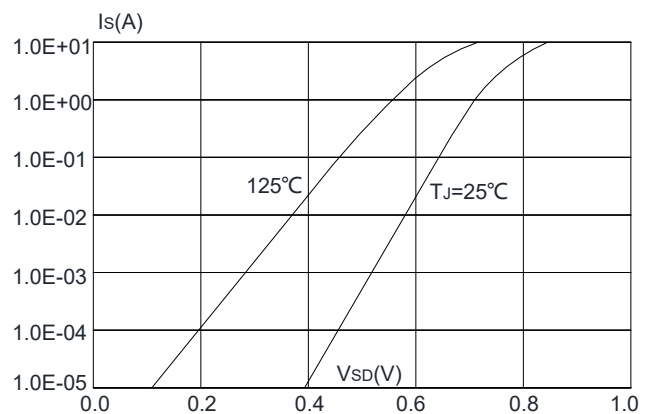
**Figure1:** Output Characteristics



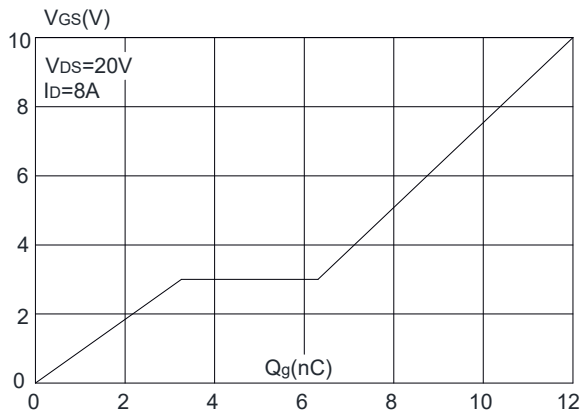
**Figure 2:** Typical Transfer Characteristics



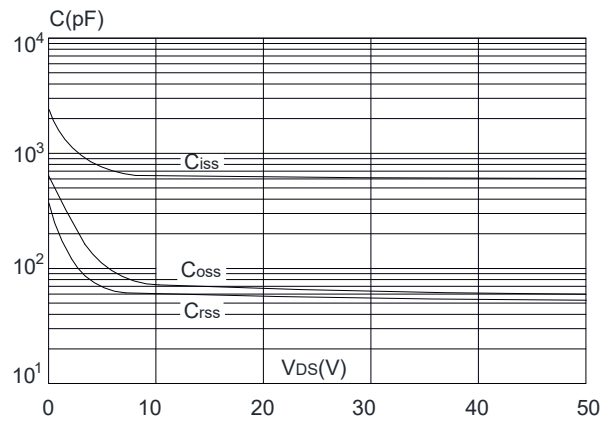
**Figure 3:** On-resistance vs. Drain Current



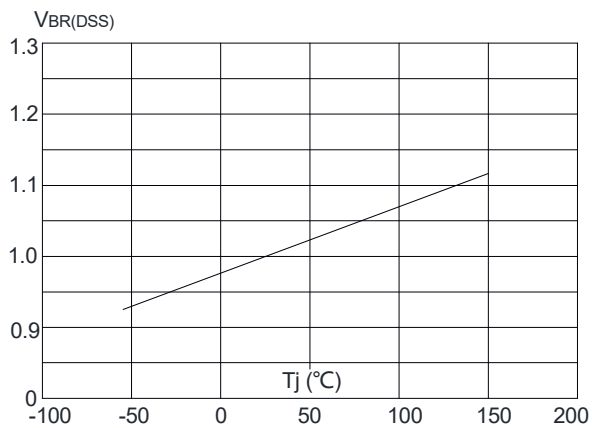
**Figure 4:** Body Diode Characteristics



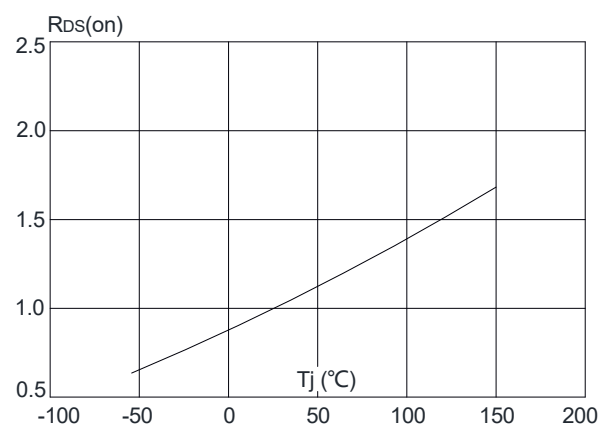
**Figure 5:** Gate Charge Characteristics



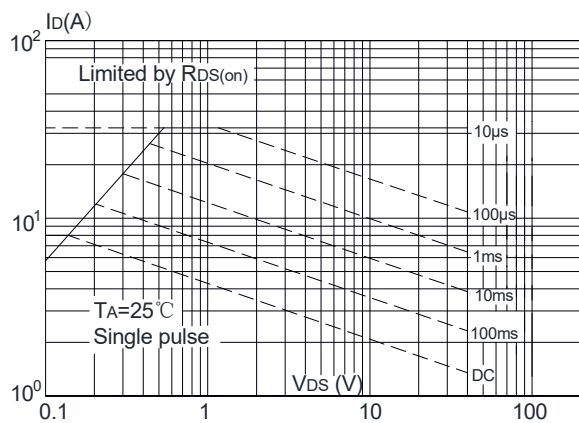
**Figure 6:** Capacitance Characteristics



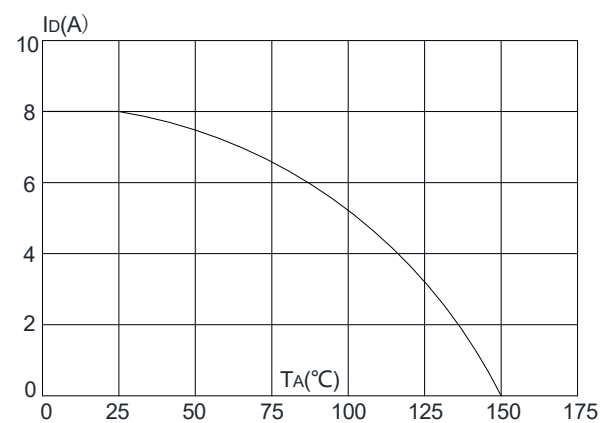
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



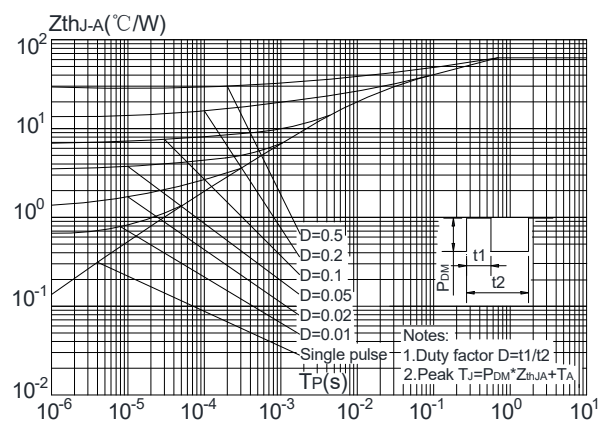
**Figure 8:** Normalized on Resistance vs. Junction Temperature



**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



**Figure.11:** Maximum Effective  
Transient Thermal Impedance, Junction-to-Ambient