

## N-Ch 100V Fast Switching MOSFETs

- ★ Super Low Gate Charge
- ★ Green Device Available
- ★ Excellent Cdv/dt effect decline
- ★ Advanced high cell density Trench technology

### Product Summary



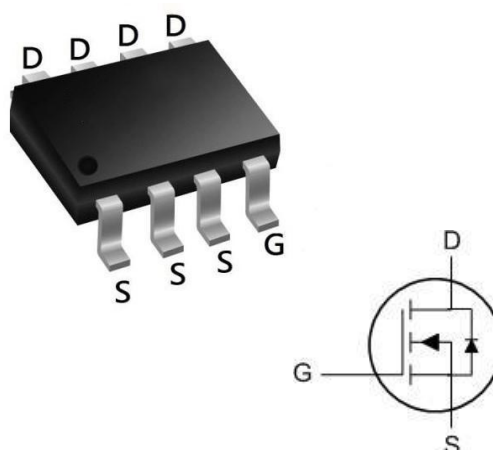
| BVDSS | RDSON | ID  |
|-------|-------|-----|
| 100V  | 88 mΩ | 10A |

### Description

The UD10N10S is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The UD10N10S meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### SOP8 Pin Configuration



### Absolute Maximum Ratings

| Symbol                 | Parameter                                             | Rating     | Units       |
|------------------------|-------------------------------------------------------|------------|-------------|
| $V_{DS}$               | Drain-Source Voltage                                  | 100        | V           |
| $V_{GS}$               | Gate-Source Voltage                                   | $\pm 20$   | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 10         | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 5          | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>                     | 10         | A           |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>            | 6.1        | mJ          |
| $P_D@T_A=25^{\circ}C$  | Total Power Dissipation <sup>3</sup>                  | 5          | W           |
| $T_{STG}$              | Storage Temperature Range                             | -55 to 150 | $^{\circ}C$ |
| $T_J$                  | Operating Junction Temperature Range                  | -55 to 150 | $^{\circ}C$ |

### Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit          |
|-----------------|--------------------------------------------------|------|------|---------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> | ---  | 125  | $^{\circ}C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 3.6  | $^{\circ}C/W$ |

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

| Symbol                                                 | Parameter                                                | Test Condition                                                                          | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                          |                                                                                         |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                           | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                              | 100  | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V,                                             | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                             | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                              | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                          |                                                                                         |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 1.0  | 1.5  | 2.5  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br>note3               | V <sub>GS</sub> =10V, I <sub>D</sub> =3A                                                | -    | 88   | 115  | mΩ    |
|                                                        |                                                          | V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A                                               | -    | 100  | 140  | mΩ    |
| Dynamic Characteristics                                |                                                          |                                                                                         |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                        | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                  | -    | 610  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                       |                                                                                         | -    | 40   | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                             |                                                                                         | -    | 25   | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                        | V <sub>DS</sub> =50V, I <sub>D</sub> =2A,<br>V <sub>GS</sub> =10V                       | -    | 12   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                       |                                                                                         | -    | 2.2  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                              |                                                                                         | -    | 2.5  | -    | nC    |
| Switching Characteristics                              |                                                          |                                                                                         |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                       | V <sub>DS</sub> =50V, I <sub>D</sub> =3A,<br>R <sub>G</sub> =1.8Ω, V <sub>GS</sub> =10V | -    | 7    | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                        |                                                                                         | -    | 5    | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                      |                                                                                         | -    | 16   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                       |                                                                                         | -    | 6    | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                          |                                                                                         |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current |                                                                                         | -    | -    | 3    | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                         | -    | -    | 12   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> =0V, I <sub>S</sub> =3A                                                 | -    | -    | 1.2  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                         | I <sub>F</sub> =3A, dI/dt=100A/μs                                                       | -    | 21   | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Charge                       |                                                                                         | -    | 21   | -    | nC    |

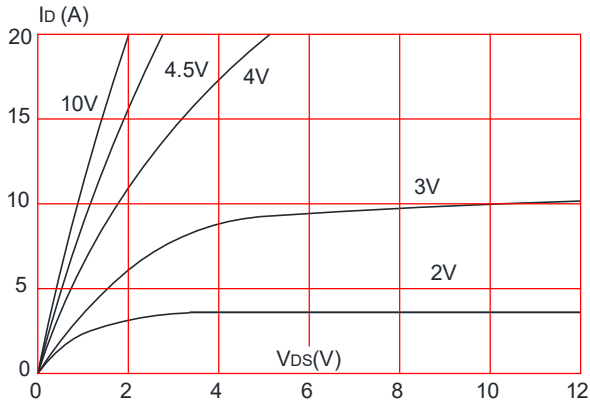
Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition :  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=4A$

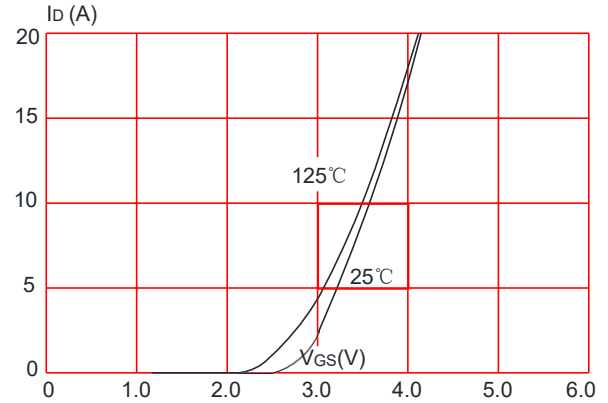
3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

### Typical Performance Characteristics

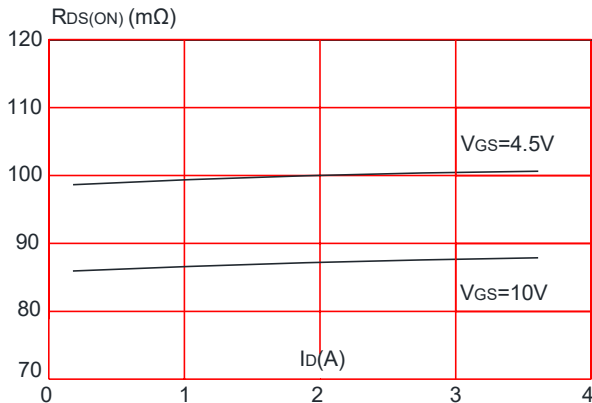
**Figure 1: Output Characteristics**



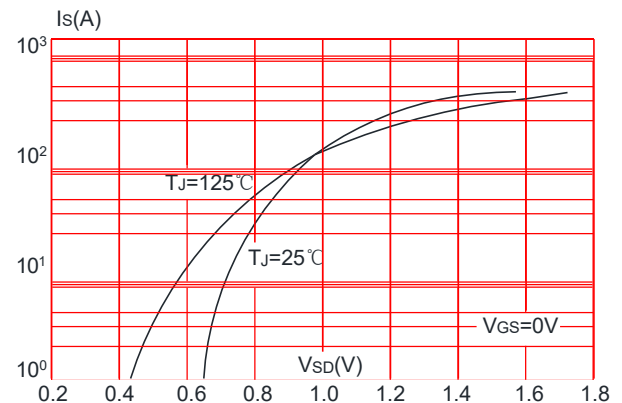
**Figure 2: Typical Transfer Characteristics**



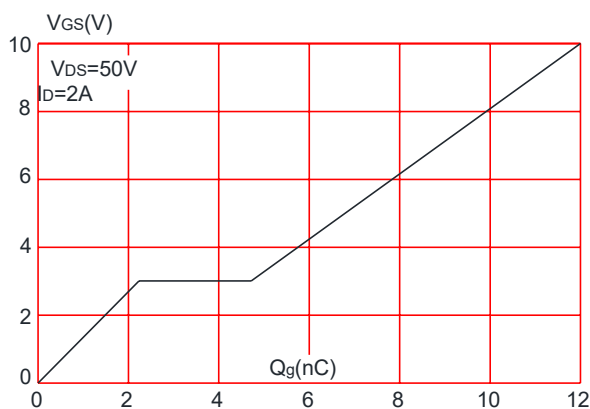
**Figure 3: On-resistance vs. Drain Current**



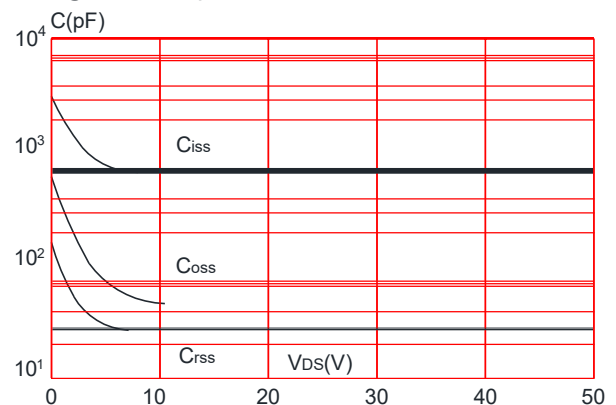
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

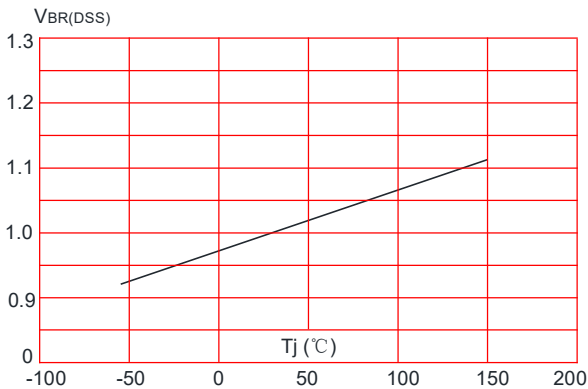


**Figure 6: Capacitance Characteristics**

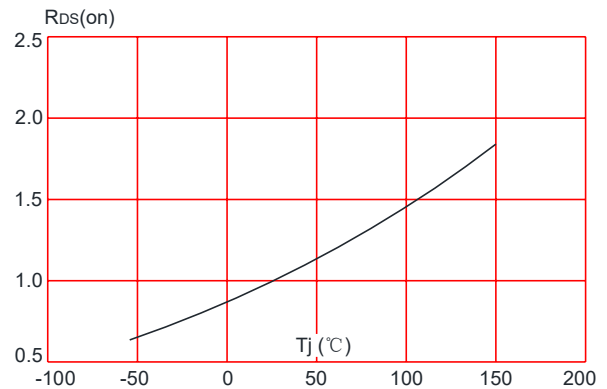


## N-Ch 100V Fast Switching MOSFETs

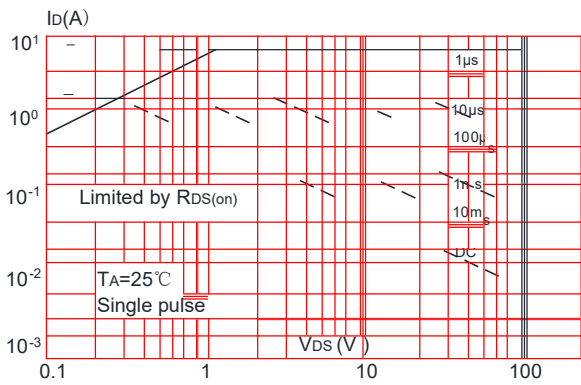
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



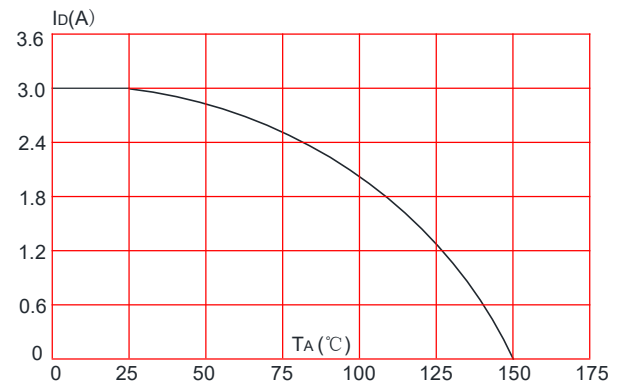
**Figure 8:** Normalized on Resistance vs. Junction Temperature



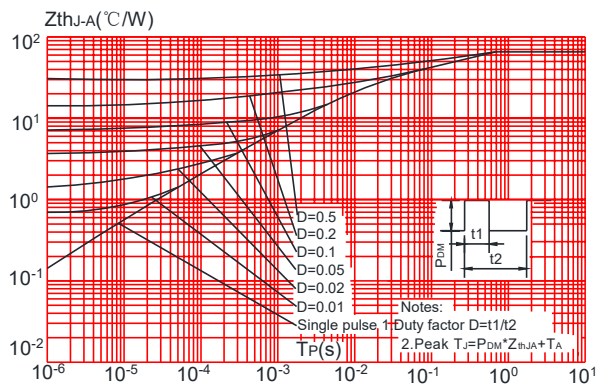
**Figure 9:** Maximum Safe Operating Area



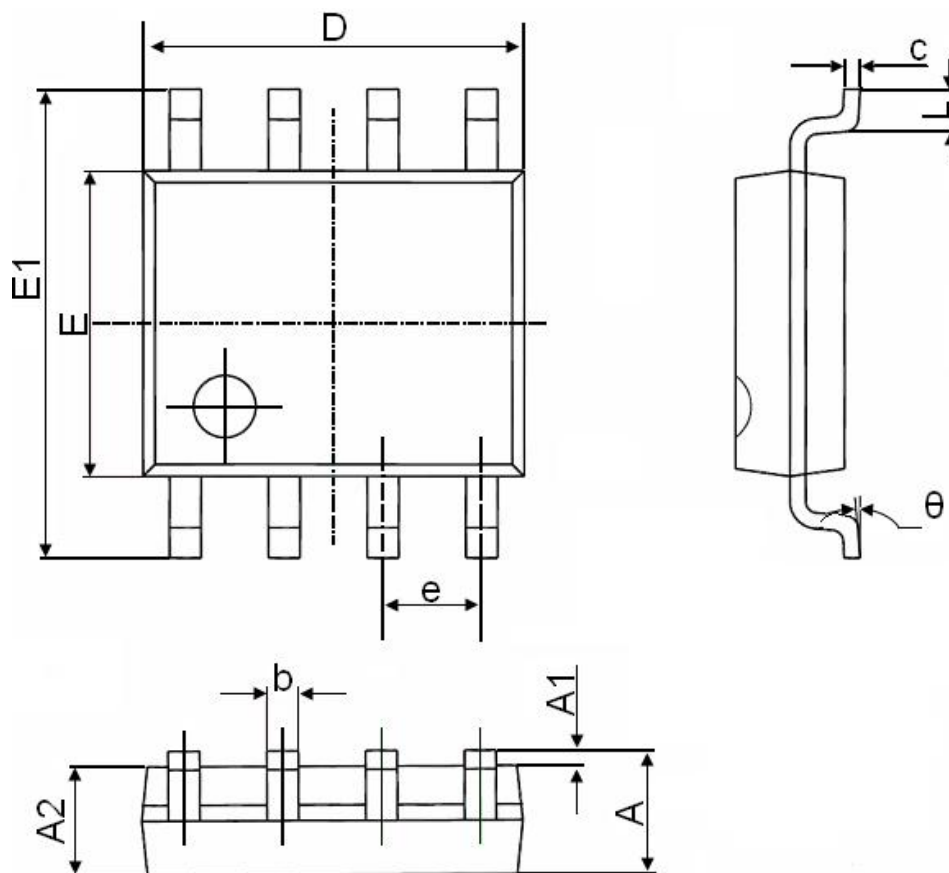
**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



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



### SOP-8 Package Information



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min.                      | Max.  | Min.                 | Max.  |
| A        | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1       | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2       | 1.350                     | 1.550 | 0.053                | 0.061 |
| b        | 0.330                     | 0.510 | 0.013                | 0.020 |
| c        | 0.170                     | 0.250 | 0.006                | 0.010 |
| D        | 4.700                     | 5.100 | 0.185                | 0.200 |
| E        | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1       | 5.800                     | 6.200 | 0.228                | 0.244 |
| e        | 1.270(BSC)                |       | 0.050(BSC)           |       |
| L        | 0.400                     | 1.270 | 0.016                | 0.050 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |