

## General Description

This MOSFET uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a wide variety of applications.

## Features

- Low gate charge
- High power and current handling capability
- Lead free product is acquired

## Applications

- Load switch
- PWM applications
- Power management



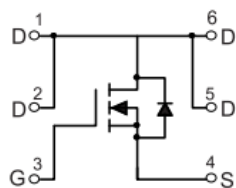
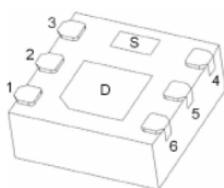
## Key Performance Parameters

| Parameter                      | Value | Unit       |
|--------------------------------|-------|------------|
| $V_{DS}$                       | 30    | V          |
| $R_{DS(ON), max} @ V_{GS}=10V$ | 10    | m $\Omega$ |

## Marking Information

| Product Name | Package   | Marking |
|--------------|-----------|---------|
| OSH03N10N2F  | DFN2X2-6L | 0310    |

## Package & Pin information



**Absolute Maximum Ratings** at  $T_j=25^{\circ}\text{C}$  unless otherwise noted

| Parameter                                    | Symbol         | Value      | Unit               |
|----------------------------------------------|----------------|------------|--------------------|
| Drain-source voltage                         | $V_{DS}$       | 30         | V                  |
| Gate-source voltage                          | $V_{GS}$       | $\pm 20$   | V                  |
| Continuous Drain Current                     | $I_D$          | 13         | A                  |
| Pulsed Drain Current <sup>1)</sup>           | $I_{D,pulse}$  | 55         | A                  |
| Power Dissipation                            | $P_D$          | 2.9        | W                  |
| Single pulsed avalanche energy <sup>2)</sup> | $E_{AS}$       | 57.6       | mJ                 |
| Operation and storage temperature            | $T_{stg}, T_j$ | -55 to 150 | $^{\circ}\text{C}$ |

**Thermal Characteristics**

| Parameter                            | Symbol          | Value | Unit                 |
|--------------------------------------|-----------------|-------|----------------------|
| Thermal resistance, junction-to-case | $R_{\theta JA}$ | 3.3   | $^{\circ}\text{C/W}$ |

**Electrical Characteristics** at  $T_j=25^{\circ}\text{C}$  unless otherwise specified

| Parameter                        | Symbol       | Min. | Typ. | Max. | Unit             | Test condition                                  |
|----------------------------------|--------------|------|------|------|------------------|-------------------------------------------------|
| Drain-source breakdown voltage   | $BV_{DSS}$   | 30   |      |      | V                | $V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$ |
| Gate threshold voltage           | $V_{GS(th)}$ | 1.0  |      | 2.0  | V                | $V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$     |
| Drain-source on-state resistance | $R_{DS(ON)}$ |      | 6.8  | 10   | $\text{m}\Omega$ | $V_{GS}=10\text{ V}, I_D=10\text{ A}$           |
| Drain-source on-state resistance | $R_{DS(ON)}$ |      | 11   | 15   | $\text{m}\Omega$ | $V_{GS}=4.5\text{ V}, I_D=8\text{ A}$           |
| Gate-source leakage current      | $I_{GSS}$    |      |      | 100  | nA               | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$         |
|                                  |              |      |      | -100 |                  | $V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$        |
| Drain-source leakage current     | $I_{DSS}$    |      |      | 1    | $\mu\text{A}$    | $V_{DS}=30\text{ V}, V_{GS}=0\text{ V}$         |

### Dynamic Characteristics

| Parameter                    | Symbol       | Min. | Typ. | Max. | Unit     | Test condition                                                                                             |
|------------------------------|--------------|------|------|------|----------|------------------------------------------------------------------------------------------------------------|
| Input capacitance            | $C_{iss}$    |      | 1062 |      | pF       | $V_{GS}=0\text{ V}$ ,<br>$V_{DS}=15\text{ V}$ ,<br>$f=1.0\text{ MHz}$                                      |
| Output capacitance           | $C_{oss}$    |      | 130  |      | pF       |                                                                                                            |
| Reverse transfer capacitance | $C_{rss}$    |      | 114  |      | pF       |                                                                                                            |
| Gate resistance              | $R_g$        |      | 1.53 |      | $\Omega$ | $V_{GS}=0\text{ V}$ ,<br>$V_{DS}=0\text{ V}$ ,<br>$f=1.0\text{ MHz}$                                       |
| Turn-on Delay Time           | $t_{d(on)}$  |      | 6.4  |      | ns       | $V_{GS}=10\text{ V}$ ,<br>$V_{DS}=15\text{ V}$ ,<br>$R_L=1.5\text{ }\Omega$ ,<br>$R_{GEN}=6\text{ }\Omega$ |
| Turn-on Rise Time            | $t_r$        |      | 346  |      | ns       |                                                                                                            |
| Turn-Off Delay Time          | $t_{d(off)}$ |      | 19.4 |      | ns       |                                                                                                            |
| Turn-Off Fall Time           | $t_f$        |      | 9.8  |      | ns       |                                                                                                            |

### Gate Charge Characteristics

| Parameter          | Symbol   | Min. | Typ. | Max. | Unit | Test condition                                                        |
|--------------------|----------|------|------|------|------|-----------------------------------------------------------------------|
| Total Gate Charge  | $Q_g$    |      | 21.2 |      | nC   | $V_{GS}=10\text{ V}$ ,<br>$V_{DS}=15\text{ V}$ ,<br>$I_D=20\text{ A}$ |
| Gate-Source Charge | $Q_{gs}$ |      | 2.32 |      | nC   |                                                                       |
| Gate-Drain Charge  | $Q_{gd}$ |      | 4.24 |      | nC   |                                                                       |

### Body Diode Characteristics

| Parameter                           | Symbol   | Min. | Typ. | Max. | Unit | Test condition                             |
|-------------------------------------|----------|------|------|------|------|--------------------------------------------|
| Source drain current (Body Diode)   | $I_{SD}$ |      |      | 13   | A    | $T_A=25^\circ\text{C}$                     |
| Diode forward voltage <sup>3)</sup> | $V_{SD}$ |      |      | 1.2  | V    | $I_S=13\text{ A}$ ,<br>$V_{GS}=0\text{ V}$ |

- Note:**
- 1) Pulse width limited by maximum allowable junction temperature.
  - 2) EAS condition:  $T_J=25^\circ\text{C}$ ,  $V_{DD}=40\text{ V}$ ,  $V_G=10\text{ V}$ ,  $R_g=25\text{ }\Omega$ ,  $L=0.5\text{ mH}$ .
  - 3) Repetitive Rating: Pulse width limited by maximum junction temperature.

## Electrical Characteristics Diagrams

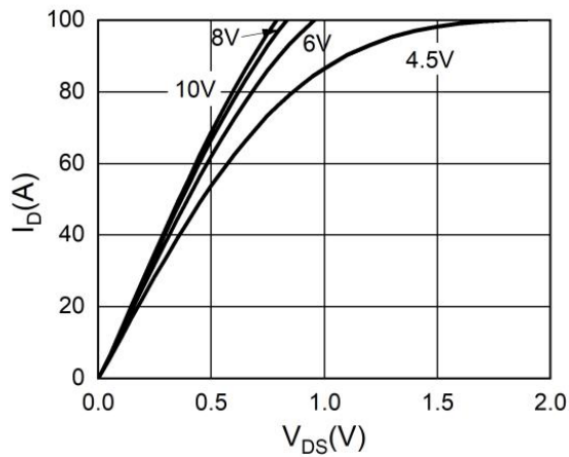


Figure 1. Typ. output characteristics

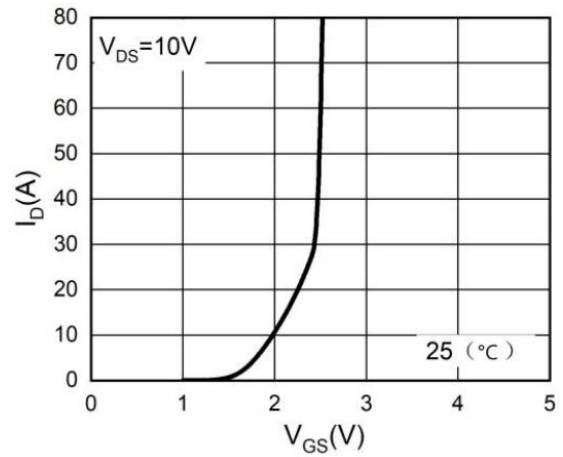


Figure 2. Typ. transfer characteristics

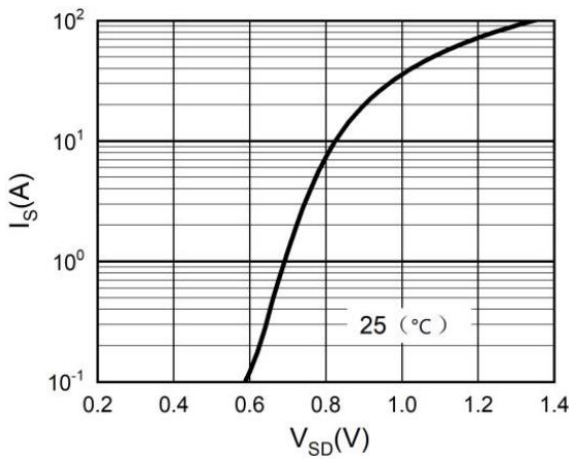


Figure 3. Body-diode characteristics

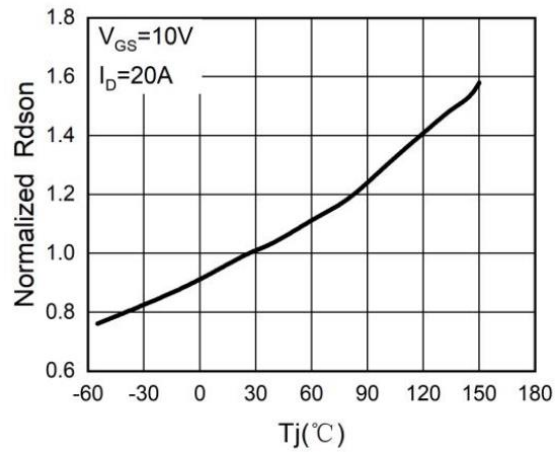


Figure 4.  $R_{DS(ON)}$  vs junction temperature

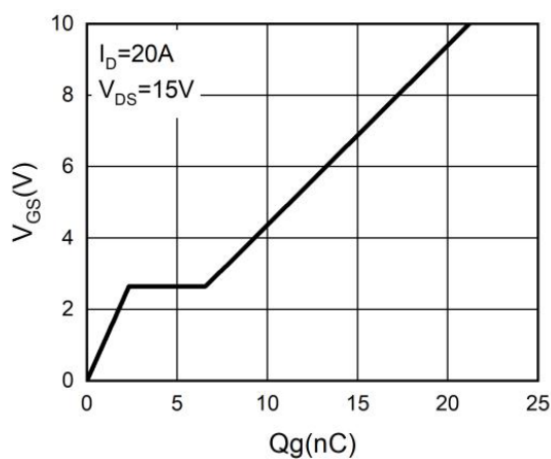


Figure 5. Gate Charge Waveforms

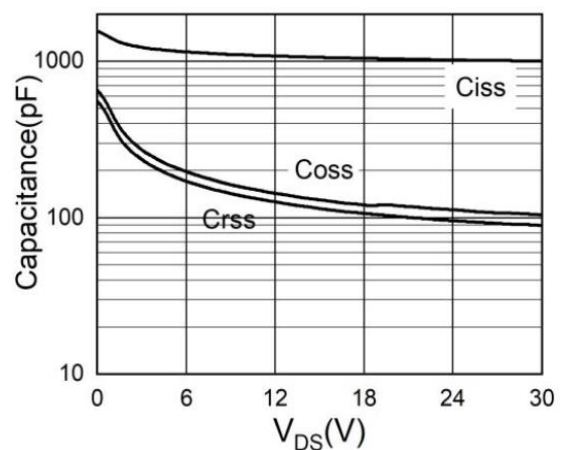
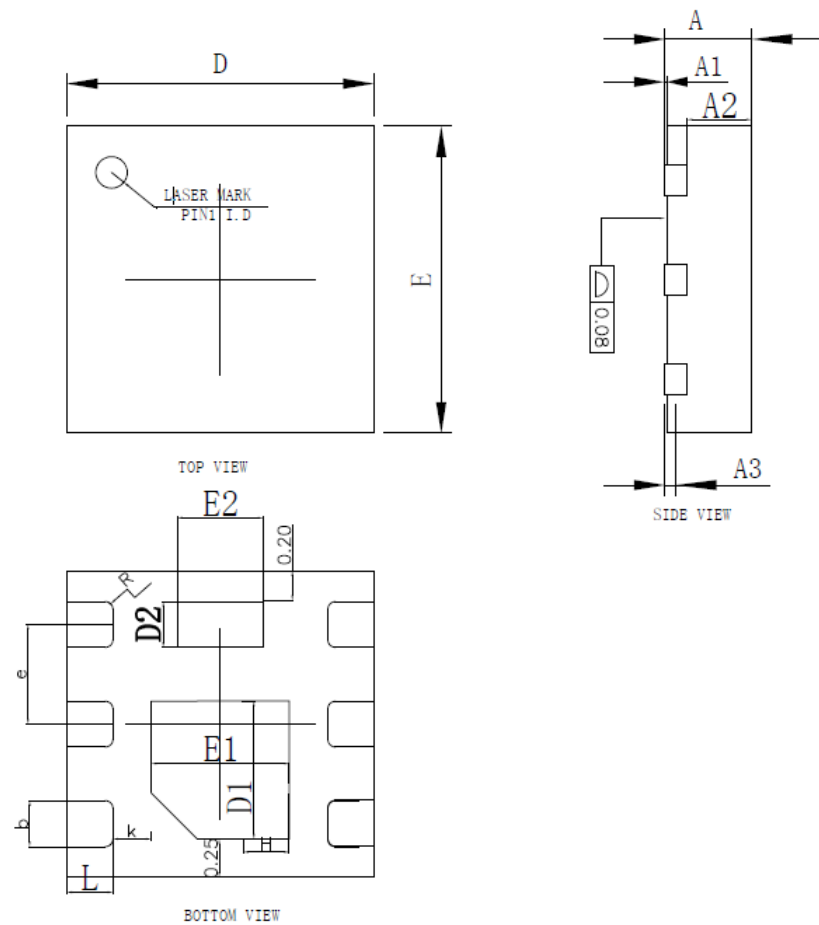


Figure 6. Capacitance

## Package Information



| Symbol | mm       |       |       |
|--------|----------|-------|-------|
|        | Min.     | Typ.  | Max.  |
| A      | 0.50     | 0.55  | 0.60  |
| A1     | 0.00     | 0.02  | 0.05  |
| A2     | 0.34     | 0.398 | 0.456 |
| A3     | 0.152REF |       |       |
| b      | 0.25     | 0.30  | 0.35  |
| D      | 1.90     | 2.00  | 2.10  |
| E      | 1.90     | 2.00  | 2.10  |
| D1     | 0.80     | 0.90  | 1.00  |
| E1     | 0.80     | 0.90  | 1.00  |
| D2     | 0.25     | 0.30  | 0.35  |
| E2     | 0.46     | 0.56  | 0.66  |
| H      | 0.3REF   |       |       |
| K      | 0.25REF  |       |       |
| L      | 0.25     | 0.30  | 0.35  |
| e      | 0.65BSC  |       |       |
| R      | 0.05     |       |       |

Version : DFN2X2-G package outline dimension

**Ordering Information**

| Package Type | Units/ Reel | Reels/ Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|--------------|-------------|------------------|------------------|-------------------------|-------------------|
| DFN2X2-G     | 5000        | 10               | 50000            | 4                       | 200000            |

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