

## 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
- 100% UIS tested, 100% DVDS tested
- High power and current handling capability
- Lead free product is acquired

## Applications

- DC/DC converter
- Ideal for high-frequency switching and synchronous rectification



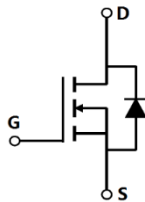
## Key Performance Parameters

| Parameter                      | Value | Unit       |
|--------------------------------|-------|------------|
| $V_{DS}$                       | 60    | V          |
| $R_{DS(ON), max} @ V_{GS}=10V$ | 11.5  | m $\Omega$ |

## Marking Information

| Product Name | Package          | Marking   |
|--------------|------------------|-----------|
| OSH06N12GF   | PDFN5 $\times$ 6 | OSH06N12G |

## Package & Pin information



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

| Parameter                                    | Symbol         | Value      | Unit               |
|----------------------------------------------|----------------|------------|--------------------|
| Drain-source voltage                         | $V_{DS}$       | 60         | V                  |
| Gate-source voltage                          | $V_{GS}$       | $\pm 20$   | V                  |
| Continuous Drain Current                     | $I_D$          | 48.5       | A                  |
| Pulsed Drain Current <sup>1)</sup>           | $I_{D,pulse}$  | 194        | A                  |
| Power Dissipation                            | $P_D$          | 57         | W                  |
| Single pulsed avalanche energy <sup>2)</sup> | $E_{AS}$       | 169        | 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 | $R_{\theta JC}$ | 2.2   | $^{\circ}\text{C/W}$ |

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

| Parameter                        | Symbol       | Min. | Typ. | Max. | Unit             | Test condition                            |
|----------------------------------|--------------|------|------|------|------------------|-------------------------------------------|
| Drain-source breakdown voltage   | $BV_{DSS}$   | 60   |      |      | V                | $V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$ |
| Gate threshold voltage           | $V_{GS(th)}$ | 1.0  |      | 2.5  | V                | $V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$     |
| Drain-source on-state resistance | $R_{DS(ON)}$ |      | 9.3  | 11.5 | $\text{m}\Omega$ | $V_{GS}=10\text{ V}, I_D=20\text{ A}$     |
| Drain-source on-state resistance | $R_{DS(ON)}$ |      | 11.6 | 14.5 | $\text{m}\Omega$ | $V_{GS}=4.5\text{ V}, I_D=15\text{ A}$    |
| 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    | $\mu\text{A}$    | $V_{DS}=60\text{ V}, V_{GS}=0\text{ V}$   |

### Dynamic Characteristics

| Parameter                    | Symbol       | Min. | Typ. | Max. | Unit     | Test condition                                                                                 |
|------------------------------|--------------|------|------|------|----------|------------------------------------------------------------------------------------------------|
| Input capacitance            | $C_{iss}$    |      | 2411 |      | pF       | $V_{GS}=0\text{ V}$ ,<br>$V_{DS}=30\text{ V}$ ,<br>$f=1.0\text{ MHz}$                          |
| Output capacitance           | $C_{oss}$    |      | 124  |      | pF       |                                                                                                |
| Reverse transfer capacitance | $C_{rss}$    |      | 116  |      | pF       |                                                                                                |
| Gate resistance              | $R_g$        |      | 1.4  |      | $\Omega$ | $V_{GS}=0\text{ V}$ ,<br>$V_{DS}=0\text{ V}$ ,<br>$f=1.0\text{ MHz}$                           |
| Turn-on Delay Time           | $t_{d(on)}$  |      | 4.3  |      | ns       | $V_{GS}=10\text{ V}$ ,<br>$V_{DS}=30\text{ V}$ ,<br>$R_L=1.5\ \Omega$ ,<br>$R_{GEN}=6\ \Omega$ |
| Turn-on Rise Time            | $t_r$        |      | 16   |      | ns       |                                                                                                |
| Turn-Off Delay Time          | $t_{d(off)}$ |      | 6.5  |      | ns       |                                                                                                |
| Turn-Off Fall Time           | $t_f$        |      | 24   |      | ns       |                                                                                                |

### Gate Charge Characteristics

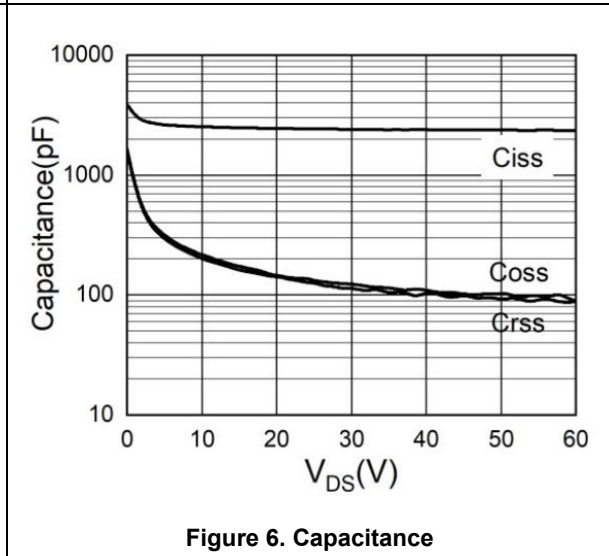
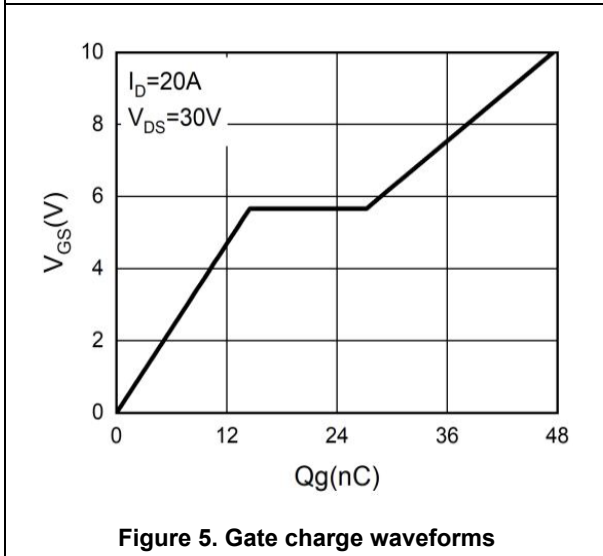
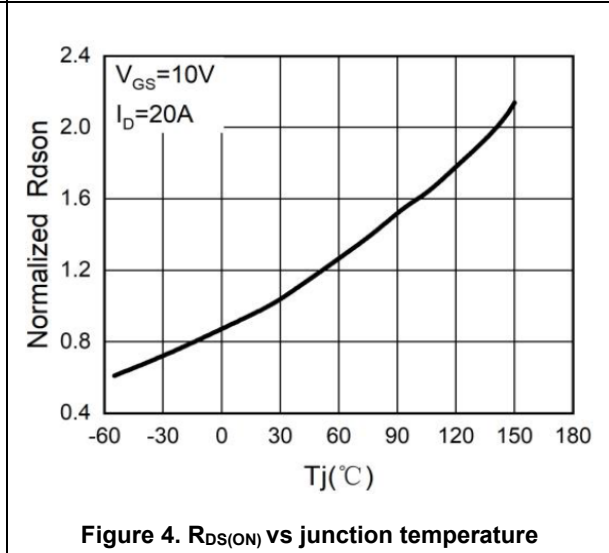
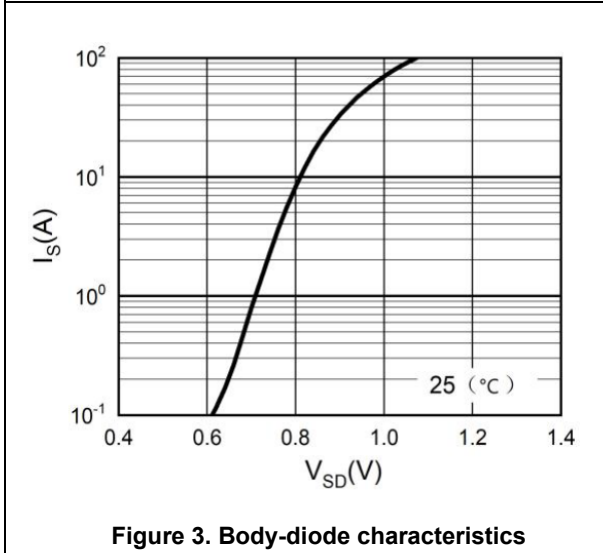
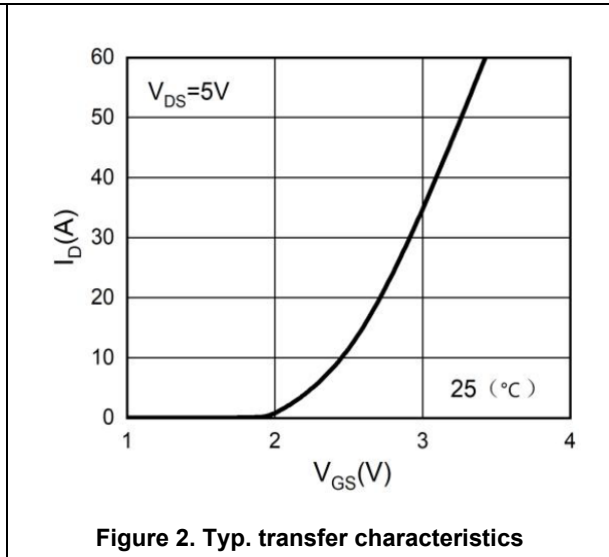
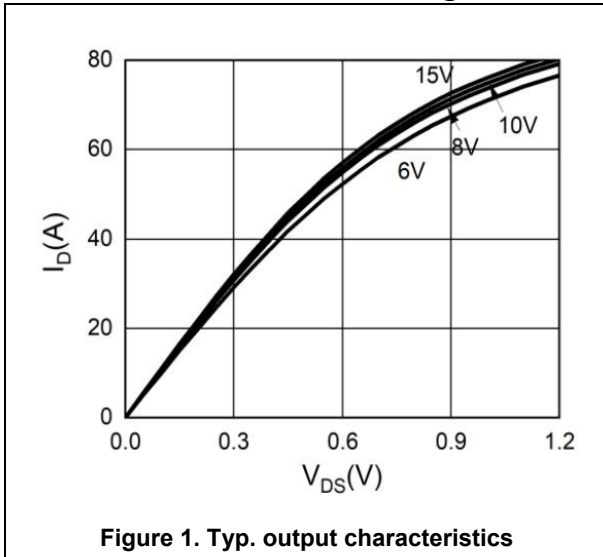
| Parameter          | Symbol   | Min. | Typ. | Max. | Unit | Test condition                                                        |
|--------------------|----------|------|------|------|------|-----------------------------------------------------------------------|
| Total Gate Charge  | $Q_g$    |      | 47.5 |      | nC   | $V_{GS}=10\text{ V}$ ,<br>$V_{DS}=30\text{ V}$ ,<br>$I_D=20\text{ A}$ |
| Gate-Source Charge | $Q_{gs}$ |      | 14.5 |      | nC   |                                                                       |
| Gate-Drain Charge  | $Q_{gd}$ |      | 12.7 |      | nC   |                                                                       |

### Body Diode Characteristics

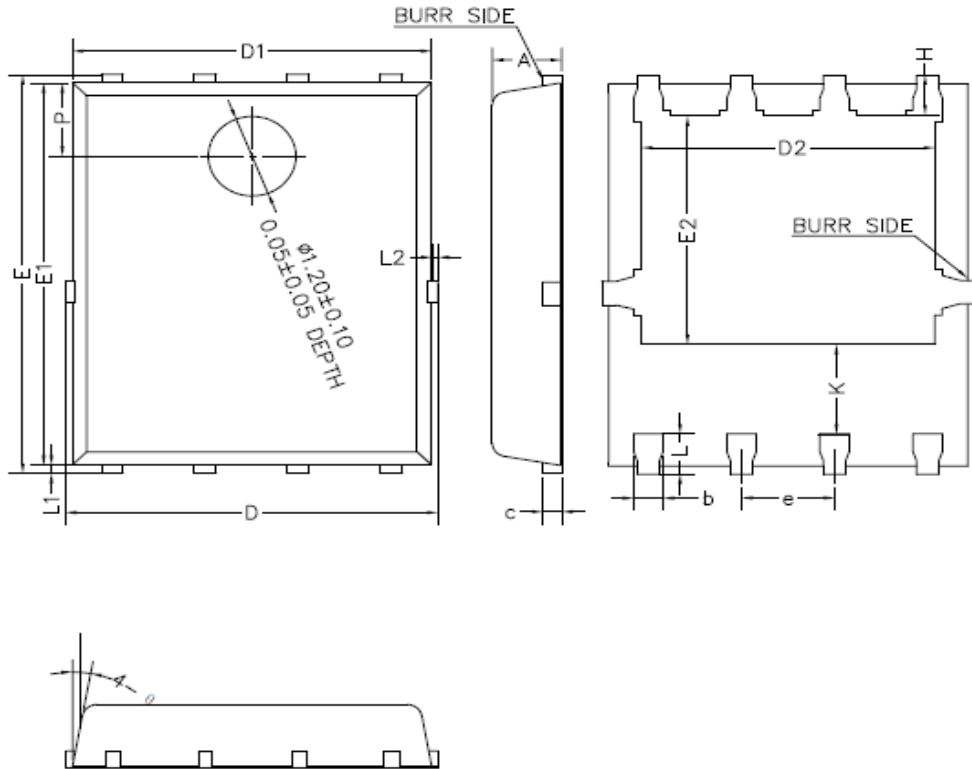
| Parameter                           | Symbol   | Min. | Typ. | Max. | Unit | Test condition                                 |
|-------------------------------------|----------|------|------|------|------|------------------------------------------------|
| Source drain current (Body Diode)   | $I_{SD}$ |      |      | 48.5 | A    | $T_A=25^\circ\text{C}$                         |
| Diode forward voltage <sup>3)</sup> | $V_{SD}$ |      |      | 0.99 | V    | $I_S=20\text{ A}$ ,<br>$V_{GS}=0\text{ V}$     |
| Reverse Recovery Time               | $t_{rr}$ |      | 24   |      | ns   | $I_F=20\text{ A}$ ,<br>$di/dt=100\text{ A/us}$ |
| Reverse Recovery Charge             | $Q_{rr}$ |      | 9.3  |      | nC   |                                                |

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

**Electrical Characteristics Diagrams**



**Package Information**



| Symbol   | mm    |       |       |
|----------|-------|-------|-------|
|          | Min.  | Typ.  | Max.  |
| A        | 1.000 | 1.100 | 1.200 |
| b        | 0.35  | 0.40  | 0.45  |
| c        | 0.21  | 0.25  | 0.34  |
| D        | -     | -     | 5.100 |
| D1       | 4.900 | 4.950 | 5.000 |
| D2       | 3.910 | 4.010 | 4.110 |
| e        | 1.17  | 1.27  | 1.37  |
| E        | 5.900 | 6.000 | 6.100 |
| E1       | 5.700 | 5.750 | 5.800 |
| E2       | 3.340 | 3.440 | 3.540 |
| H        | 0.510 | 0.610 | 0.710 |
| K        | 1.100 | -     | -     |
| L        | 0.510 | 0.610 | 0.710 |
| L1       | 0.060 | 0.130 | 0.200 |
| L2       | -     | -     | 0.150 |
| P        | 1.00  | 1.10  | 1.20  |
| $\theta$ | 8°    | 10°   | 12°   |

Version: PDFN5×6-G package outline dimension

**Ordering Information**

| Package Type | Units/ Reel | Reels/ Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|--------------|-------------|------------------|------------------|-------------------------|-------------------|
| PDFN5×6-G    | 5000        | 2                | 10000            | 6                       | 60000             |

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