## General Description

The GreenMOS® high voltage MOSFET utilizes charge balance technology to achieve outstanding low on-resistance and lower gate charge. It is engineered to minimize conduction loss, provide superior switching performance and robust avalanche capability.

The GreenMOS® Z series is integrated with fast recovery diode (FRD) to minimize reverse recovery time. It is suitable for resonant switching topologies to reach higher efficiency, higher reliability and smaller form factor.

## Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Ultra-fast and robust body diode

## Applications

GreenMOS®

RoHS compliant

- PC power
- Telecom power
- Server power
- EV Charger
- Motor driver

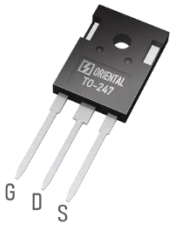
## Key Performance Parameters

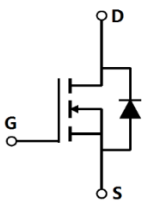
| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 600 | V |
| $I_{D,\ pulse}$ | 90 | A |
| $R_{DS(ON),\ max}$ @ $V_{GS}$=10V | 108 | mΩ |
| $Q_g$ | 56.7 | nC |

## Marking Information

| Product Name | Package | Marking |
|---|---|---|
| OSG60R108HSZF-F | TO247 | OSG60R108HSZ |

## Package & Pin Information



## Absolute Maximum Ratings at $T_j$=25°C unless otherwise noted

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 600 | V |
| Gate-source voltage | $V_{GS}$ | ±30 | V |
| Continuous drain current[1], $T_C$=25 °C | $I_D$ | 30 | A |
| Continuous drain current[1], $T_C$=100 °C | | 19 | |
| Pulsed drain current[2], $T_C$=25 °C | $I_{D,\ pulse}$ | 90 | A |
| Continuous diode forward current[1], $T_C$=25 °C | $I_S$ | 30 | A |
| Diode pulsed current[2], $T_C$=25 °C | $I_{S,\ pulse}$ | 90 | A |
| Power dissipation[3], $T_C$=25 °C | $P_D$ | 219 | W |
| Single pulsed avalanche energy[4] | $E_{AS}$ | 1000 | mJ |
| MOSFET dv/dt ruggedness, $V_{DS}$=0…480 V | dv/dt | 50 | V/ns |
| Reverse diode dv/dt, $V_{DS}$=0…480 V, $I_{SD}$≤$I_D$ | dv/dt | 50 | V/ns |
| Operation and storage temperature | $T_{stg}$, $T_j$ | -55 to 150 | °C |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal resistance, junction-case | $R_{\theta JC}$ | 0.57 | °C/W |
| Thermal resistance, junction-ambient | $R_{\theta JA}$ | 62 | °C/W |

## Electrical Characteristics at $T_j$=25°C unless otherwise specified

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $BV_{DSS}$ | 600 | | | V | $V_{GS}$=0 V, $I_D$=1 mA |
| Gate threshold voltage | $V_{GS(th)}$ | 3.0 | | 4.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=1 mA |
| Drain-source on-state resistance | $R_{DS(ON)}$ | | 0.085 | 0.108 | Ω | $V_{GS}$=10 V, $I_D$=15 A |
| | | | 0.20 | | | $V_{GS}$=10 V, $I_D$=15 A, $T_j$=150 °C |
| Gate-source leakage current | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=30 V |
| | | | | -100 | | $V_{GS}$=-30 V |
| Drain-source leakage current | $I_{DSS}$ | | | 10 | μA | $V_{DS}$=600 V, $V_{GS}$=0 V |

## Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | | 2878.2 | | pF | $V_{GS}$=0 V, $V_{DS}$=50 V, $f$=100 KHz |
| Output capacitance | $C_{oss}$ | | 226.7 | | pF | |
| Reverse transfer capacitance | $C_{rss}$ | | 8.3 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 56.8 | | ns | $V_{GS}$=10 V, $V_{DS}$=400 V, $R_G$=2 Ω, $I_D$=16 A |
| Rise time | $t_r$ | | 63.1 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 116.1 | | ns | |
| Fall time | $t_f$ | | 7.1 | | ns | |

## Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Total gate charge | $Q_g$ | | 56.7 | | nC | $V_{GS}$=10 V, $V_{DS}$=400 V, $I_D$=16 A |
| Gate-source charge | $Q_{gs}$ | | 14.2 | | nC | |
| Gate-drain charge | $Q_{gd}$ | | 27.2 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 7.0 | | V | |

## Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Diode forward voltage | $V_{SD}$ | | | 1.4 | V | $I_S$=30 A, $V_{GS}$=0 V |
| Reverse recovery time | $t_{rr}$ | | 131.5 | | ns | $I_S$=16 A, di/dt=100 A/μs |
| Reverse recovery charge | $Q_{rr}$ | | 0.8 | | uC | |
| Peak reverse recovery current | $I_{rrm}$ | | 11.0 | | A | |

**Note**

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) $V_{DD}$=100 V, $V_{GS}$=10 V, L=60 mH, starting $T_j$=25 °C.

## Electrical Characteristics Diagrams

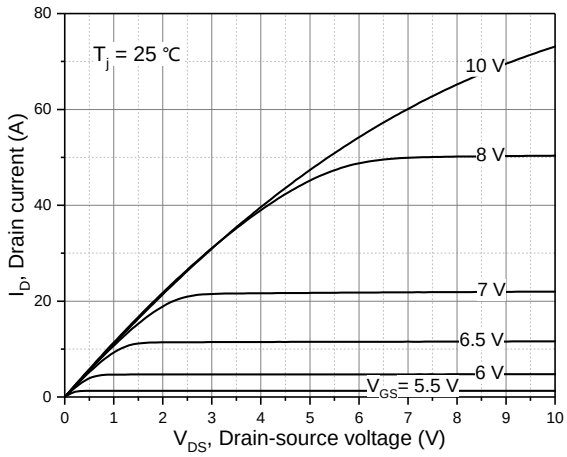



**Figure 1. Typ. output characteristics**

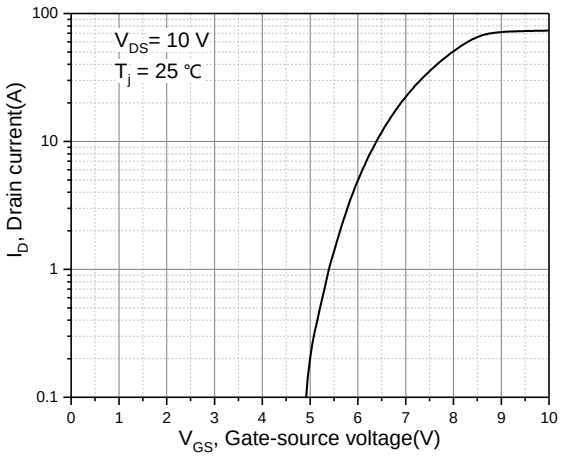



**Figure 2. Typ. transfer characteristics**

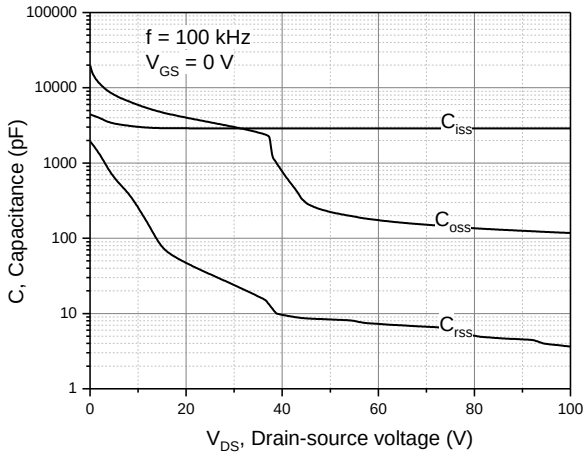



**Figure 3. Typ. capacitances**

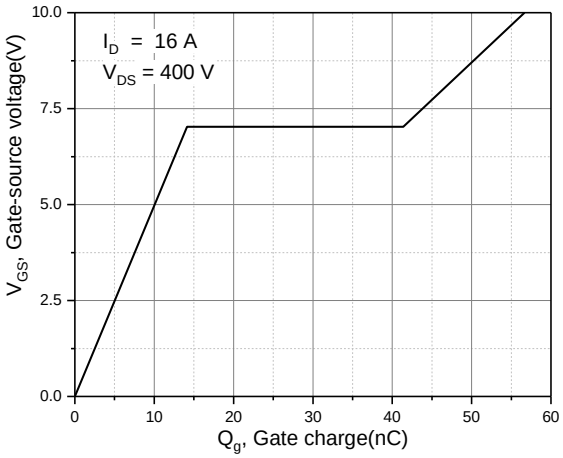



**Figure 4. Typ. gate charge**

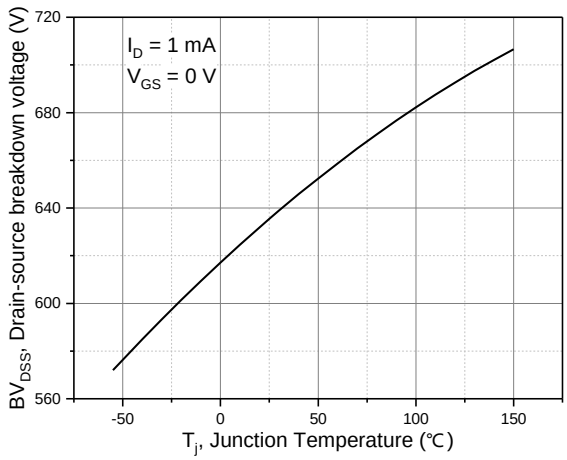



**Figure 5. Drain-source breakdown voltage**

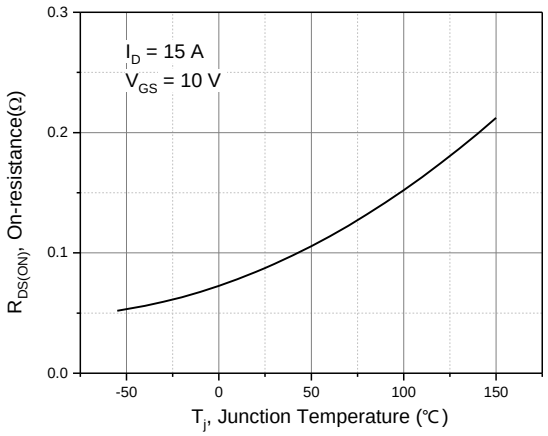



**Figure 6. Drain-source on-state resistance**

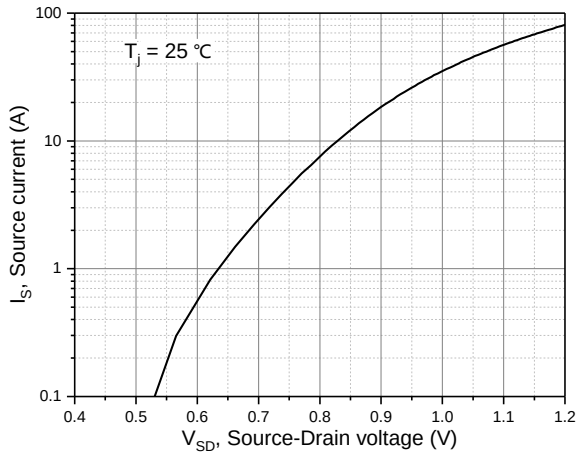



**Figure 7. Forward characteristic of body diode**

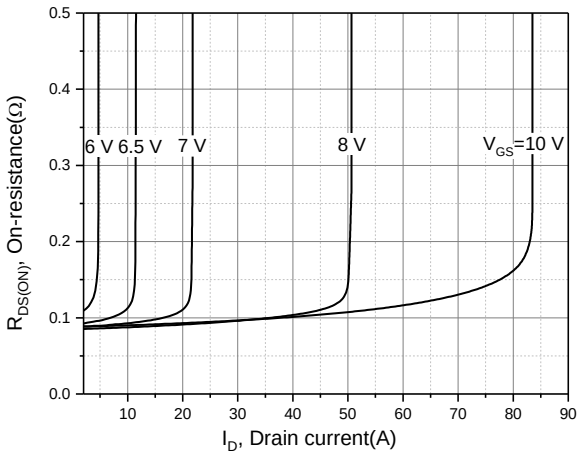



**Figure 8. Drain-source on-state resistance**

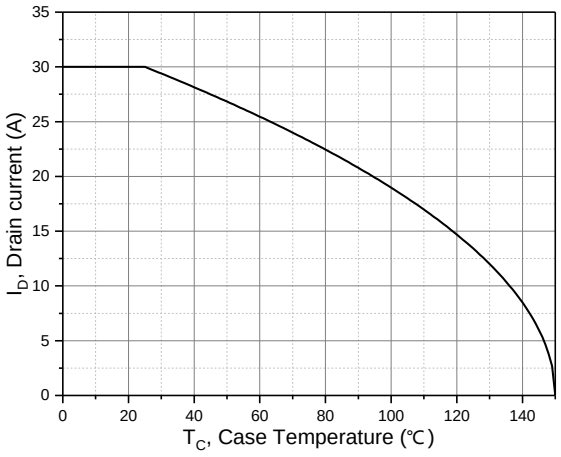



**Figure 9. Drain current**

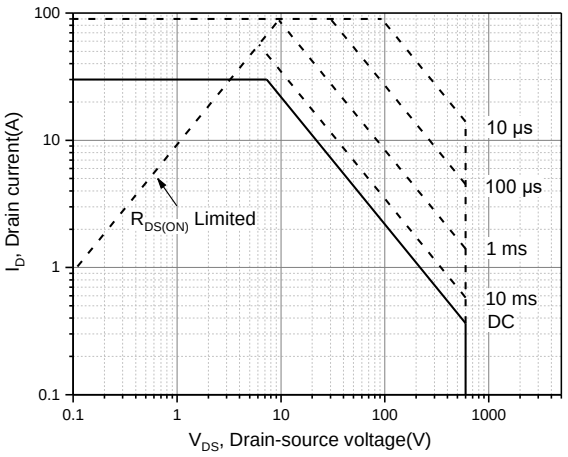



**Figure 10. Safe operation area for $T_C$=25 °C**

## Test circuits and waveforms

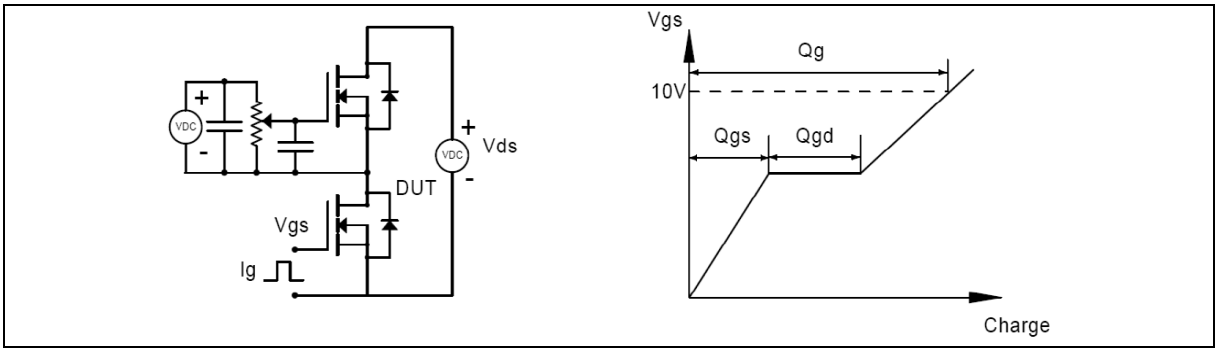



**Figure 1. Gate charge test circuit & waveform**

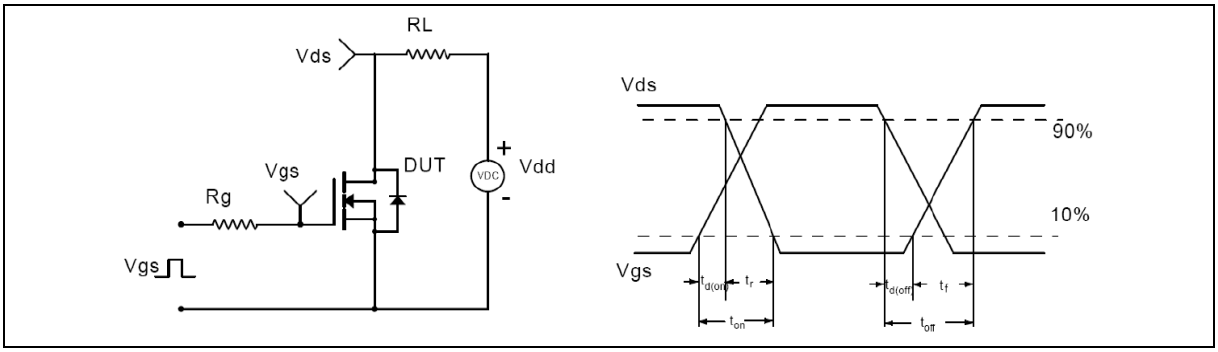



**Figure 2. Switching time test circuit & waveforms**

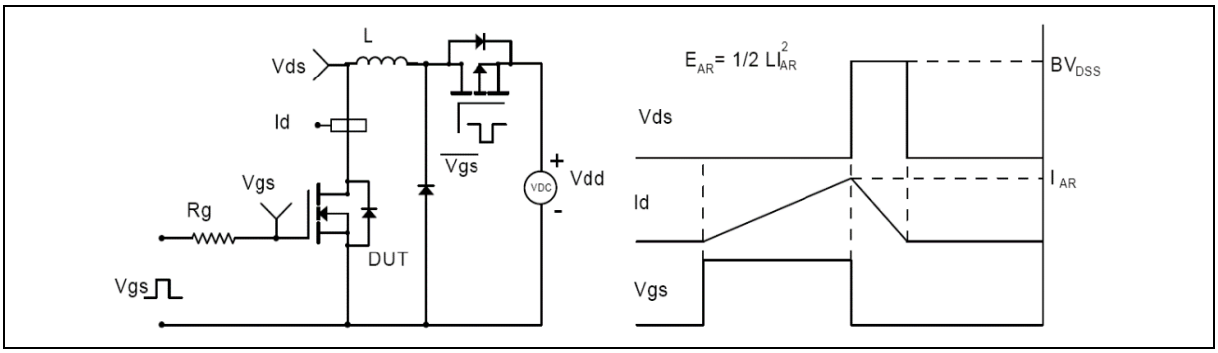



**Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms**

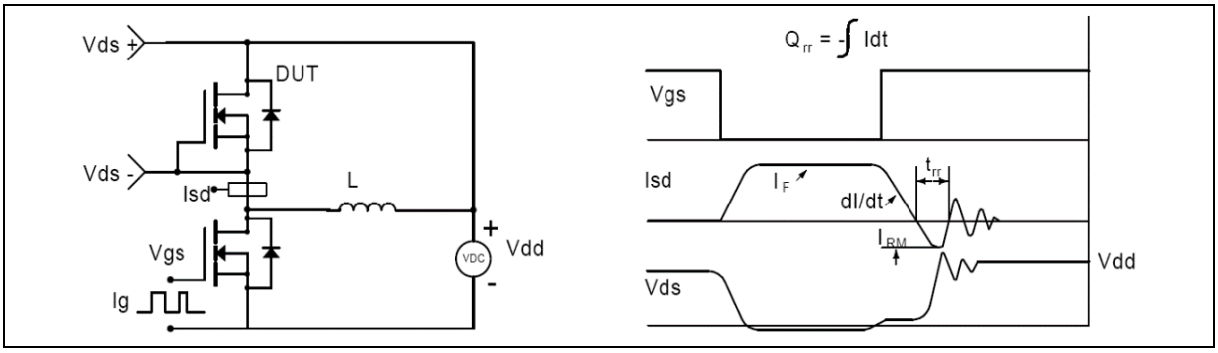
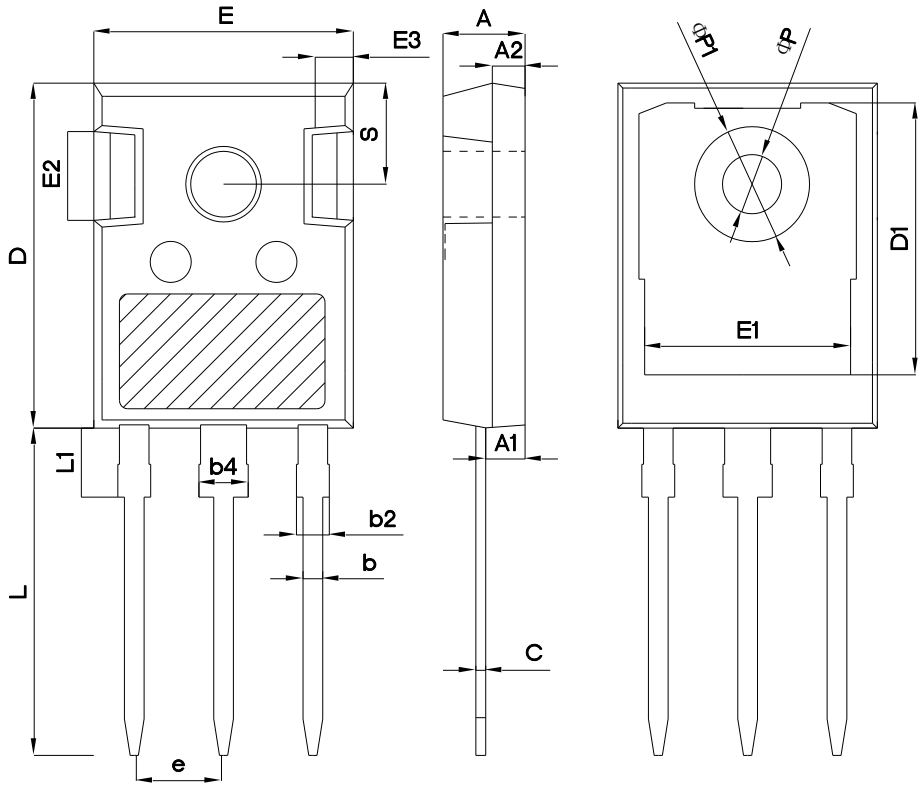



**Figure 4. Diode reverse recovery test circuit & waveforms**

## Package Information




| Symbol | mm | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | 4.80 | 5.00 | 5.20 |
| A1 | 2.21 | 2.41 | 2.59 |
| A2 | 1.85 | 2.00 | 2.15 |
| b | 1.11 | 1.21 | 1.36 |
| b2 | 1.91 | 2.01 | 2.21 |
| b4 | 2.91 | 3.01 | 3.21 |
| c | 0.51 | 0.61 | 0.75 |
| D | 20.80 | 21.00 | 21.30 |
| D1 | 16.25 | 16.55 | 16.85 |
| E | 15.50 | 15.80 | 16.10 |
| E1 | 13.00 | 13.30 | 13.60 |
| E2 | 4.80 | 5.00 | 5.20 |
| E3 | 2.30 | 2.50 | 2.70 |
| e | 5.44BSC | | |
| L | 19.82 | 19.92 | 20.22 |
| L1 | - | - | 4.30 |
| ΦP | 3.40 | 3.60 | 3.80 |
| ΦP1 | - | - | 7.30 |
| S | 6.15BSC | | |

Version 1: TO247-P outline dimension

## Ordering Information

| Package Type | Units/ Tube | Tubes/ Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|---|---|---|---|---|---|
| TO247-P | 30 | 11 | 330 | 6 | 1980 |

## Product Information

| Product | Package | Pb Free | RoHS | Halogen Free |
|---|---|---|---|---|
| OSG60R108HSZF-F | TO247 | yes | yes | yes |

## Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Oriental Semiconductor hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

For further information on technology, delivery terms and conditions and prices, please contact the Oriental Semiconductor sales representatives (www.orientalsemi.com).



ORIENTAL SEMICONDUCTOR

*A Power Semiconductor Innovator*