

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

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



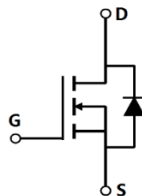

Key Performance Parameters

| Parameter | Value | Unit |
|--------------------------------|-------|------------|
| $V_{DS, min} @ T_{j(max)}$ | 650 | V |
| $I_D, pulse$ | 90 | A |
| $R_{DS(ON), max} @ V_{GS}=10V$ | 108 | m Ω |
| Q_g | 56.7 | nC |

Marking Information

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

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} | 600 | V |
| Gate-source voltage | V_{GS} | ± 30 | V |
| Continuous drain current ¹⁾ , $T_C=25^\circ\text{C}$ | I_D | 30 | A |
| Continuous drain current ¹⁾ , $T_C=100^\circ\text{C}$ | | 19 | |
| Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$ | $I_{D, pulse}$ | 90 | A |
| Continuous diode forward current ¹⁾ , $T_C=25^\circ\text{C}$ | I_S | 30 | A |
| Diode pulsed current ²⁾ , $T_C=25^\circ\text{C}$ | $I_{S, pulse}$ | 90 | A |
| Power dissipation ³⁾ , $T_C=25^\circ\text{C}$ | P_D | 219 | W |
| Single pulsed avalanche energy ⁵⁾ | E_{AS} | 1000 | mJ |
| MOSFET dv/dt ruggedness, $V_{DS}=0\dots 480\text{ V}$ | dv/dt | 50 | V/ns |
| Reverse diode dv/dt, $V_{DS}=0\dots 480\text{ V}$, $I_{SD}\leq I_D$ | dv/dt | 50 | V/ns |
| Operation and storage temperature | T_{stg}, T_j | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|--------------------|
| Thermal resistance, junction-case | $R_{\theta JC}$ | 0.57 | $^\circ\text{C/W}$ |
| Thermal resistance, junction-ambient ⁴⁾ | $R_{\theta JA}$ | 62 | $^\circ\text{C/W}$ |

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} | 600 | | | V | $V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$ |
| | | 650 | | | | $V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$, $T_j=150^\circ\text{C}$ |
| Gate threshold voltage | $V_{GS(th)}$ | 3.0 | | 4.5 | V | $V_{DS}=V_{GS}$, $I_D=1\text{ mA}$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | | 0.085 | 0.108 | Ω | $V_{GS}=10\text{ V}$, $I_D=15\text{ A}$ |
| | | | 0.20 | | | $V_{GS}=10\text{ V}$, $I_D=15\text{ A}$, $T_j=150^\circ\text{C}$ |
| Gate-source leakage current | I_{GSS} | | | 100 | nA | $V_{GS}=30\text{ V}$ |
| | | | | -100 | | $V_{GS}=-30\text{ V}$ |
| Drain-source leakage current | I_{DSS} | | | 10 | μA | $V_{DS}=600\text{ V}$, $V_{GS}=0\text{ V}$ |

Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|------------------------------|--------------|------|--------|------|------|---|
| Input capacitance | C_{iss} | | 2878.2 | | pF | $V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ KHz}$ |
| 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 | $V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=16\text{ A}$ |
| 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 | $V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=16\text{ A}$ |
| Gate-source charge | Q_{gs} | | 14.2 | | nC | |
| Gate-drain charge | Q_{gd} | | 27.2 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 7.0 | | V | |

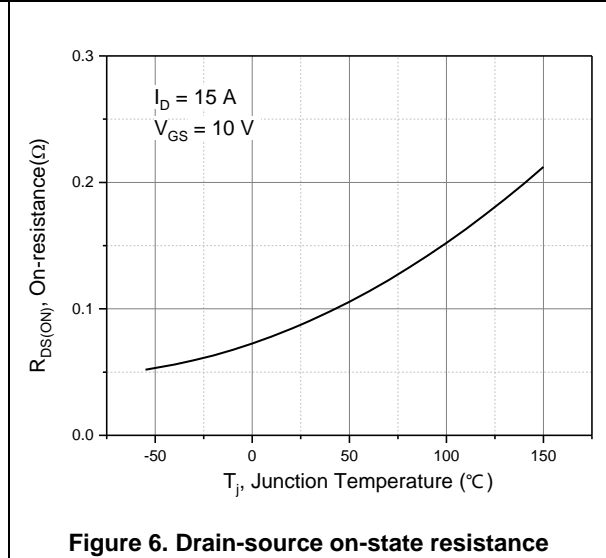
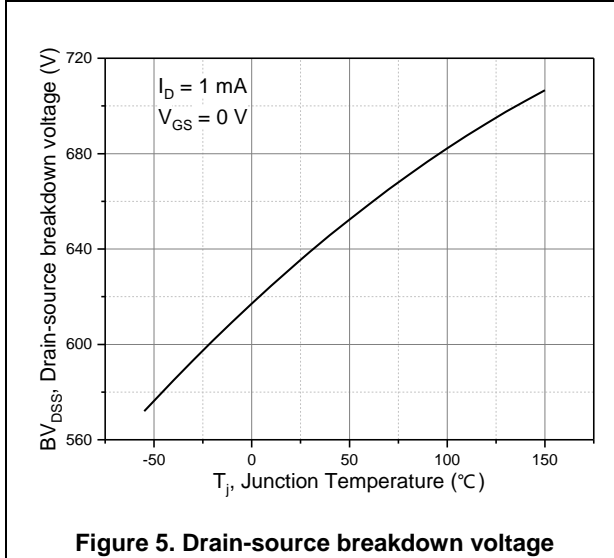
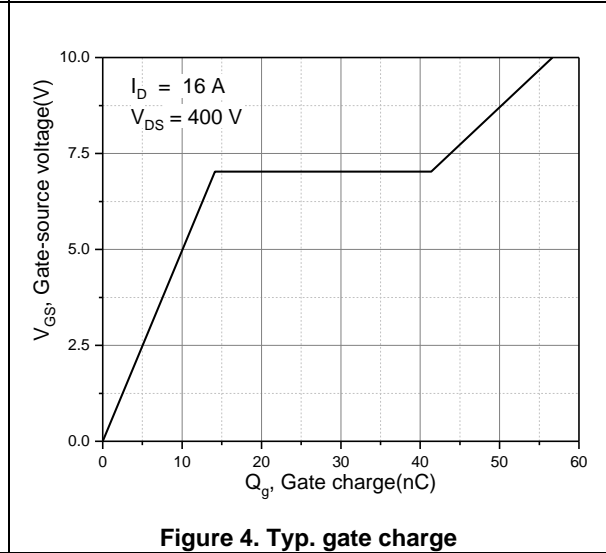
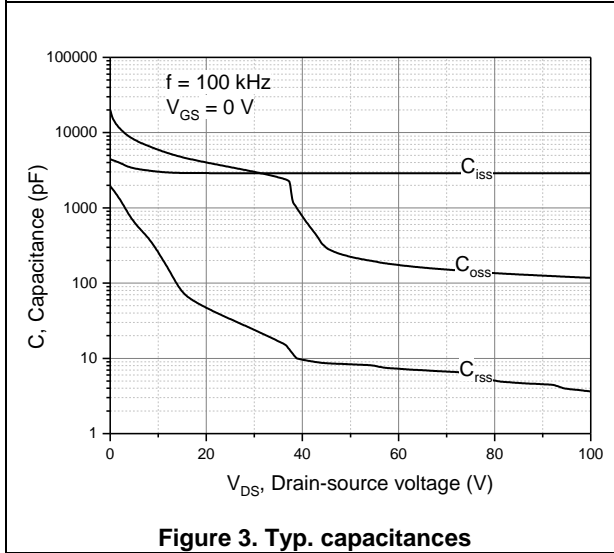
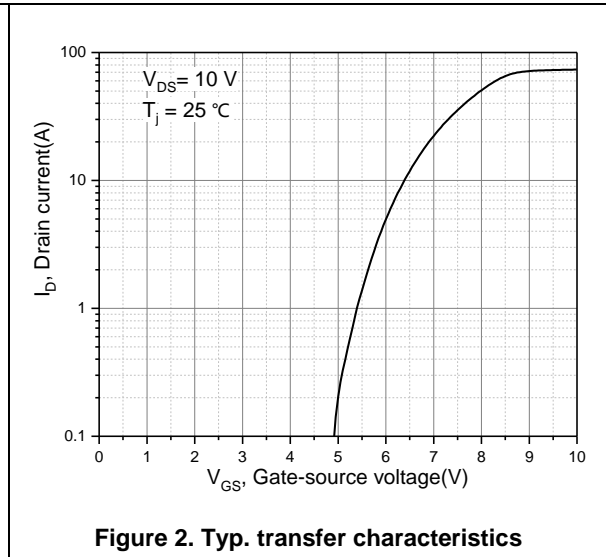
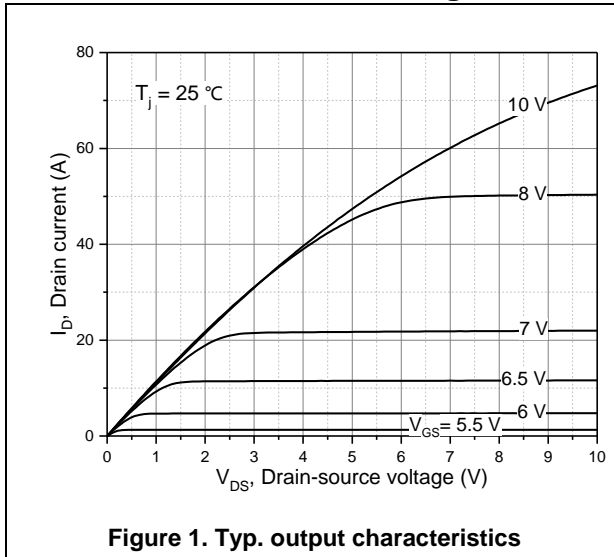
Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|-------------------------------|-----------|------|-------|------|---------------|---|
| Diode forward voltage | V_{SD} | | | 1.4 | V | $I_S=30\text{ A}$, $V_{GS}=0\text{ V}$ |
| Reverse recovery time | t_{rr} | | 131.5 | | ns | $I_S=16\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$ |
| Reverse recovery charge | Q_{rr} | | 0.8 | | μC | |
| 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) P_d is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^\circ\text{C}$.
- 5) $V_{DD}=100\text{ V}$, $V_{GS}=10\text{ V}$, $L=60\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams



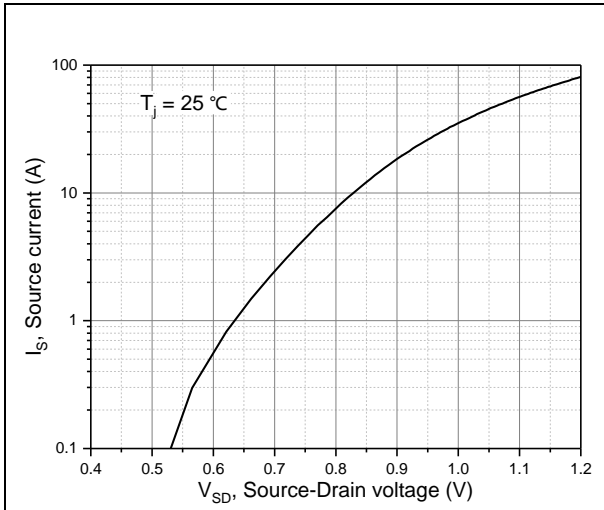


Figure 7. Forward characteristic of body diode

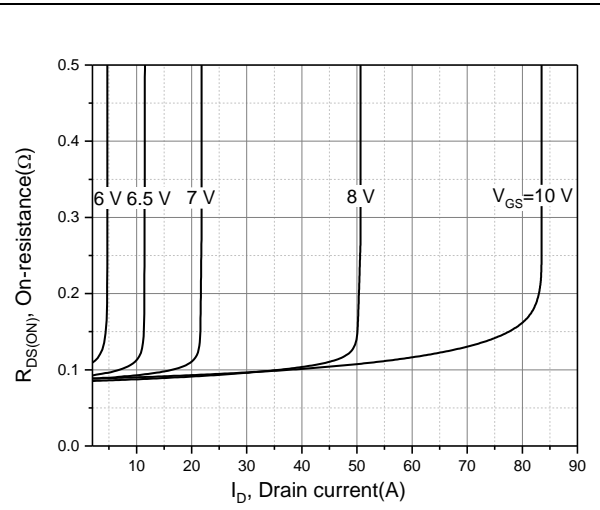


Figure 8. Drain-source on-state resistance

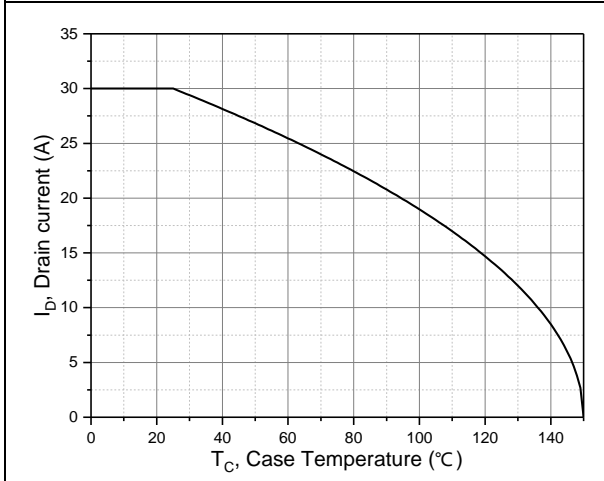


Figure 9. Drain current

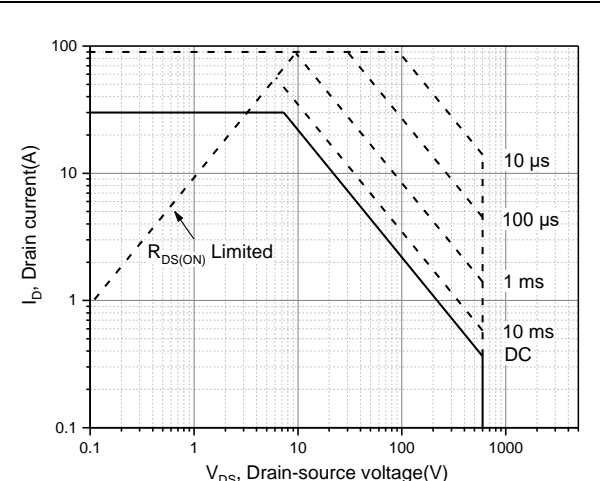


Figure 10. Safe operation area for T_C=25 °C

Test circuits and waveforms

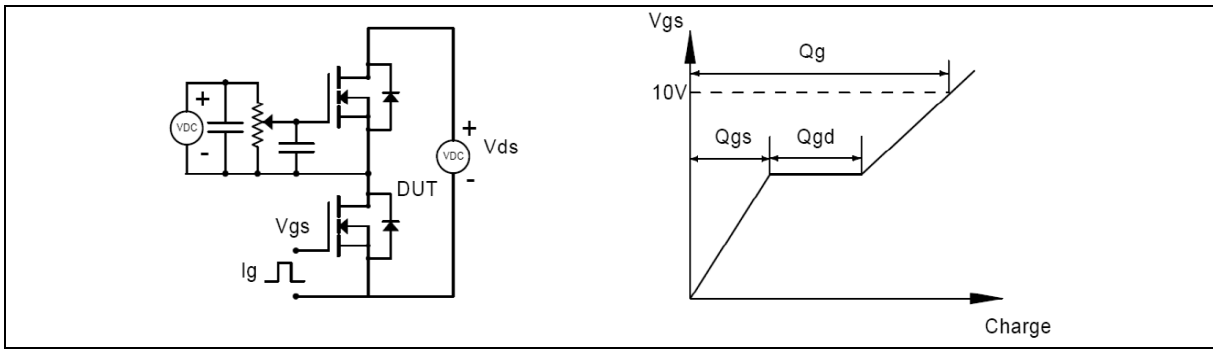


Figure 1. Gate charge test circuit & waveform

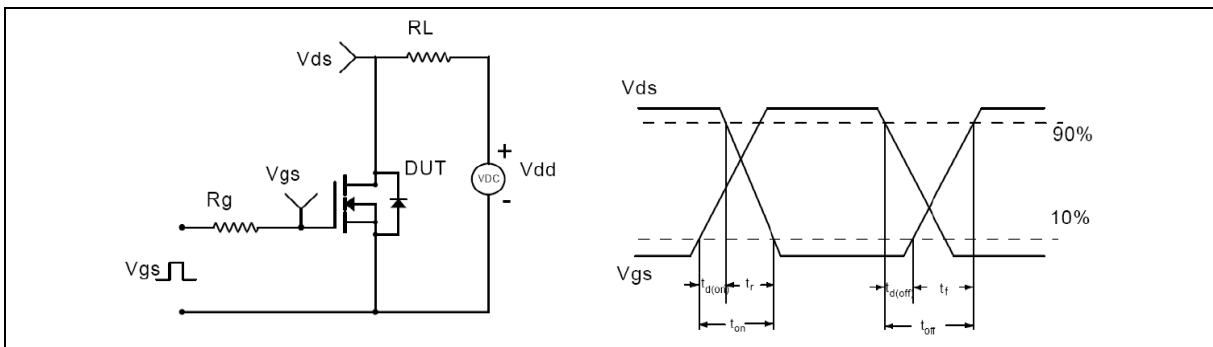


Figure 2. Switching time test circuit & waveforms



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

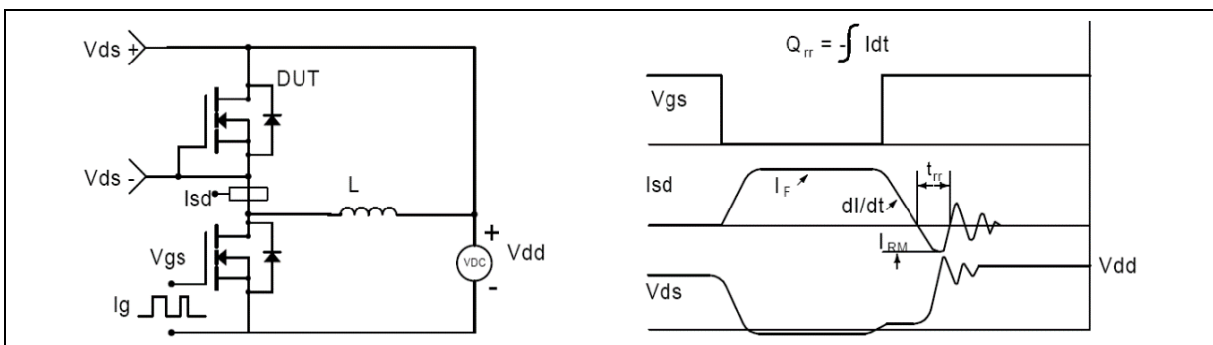
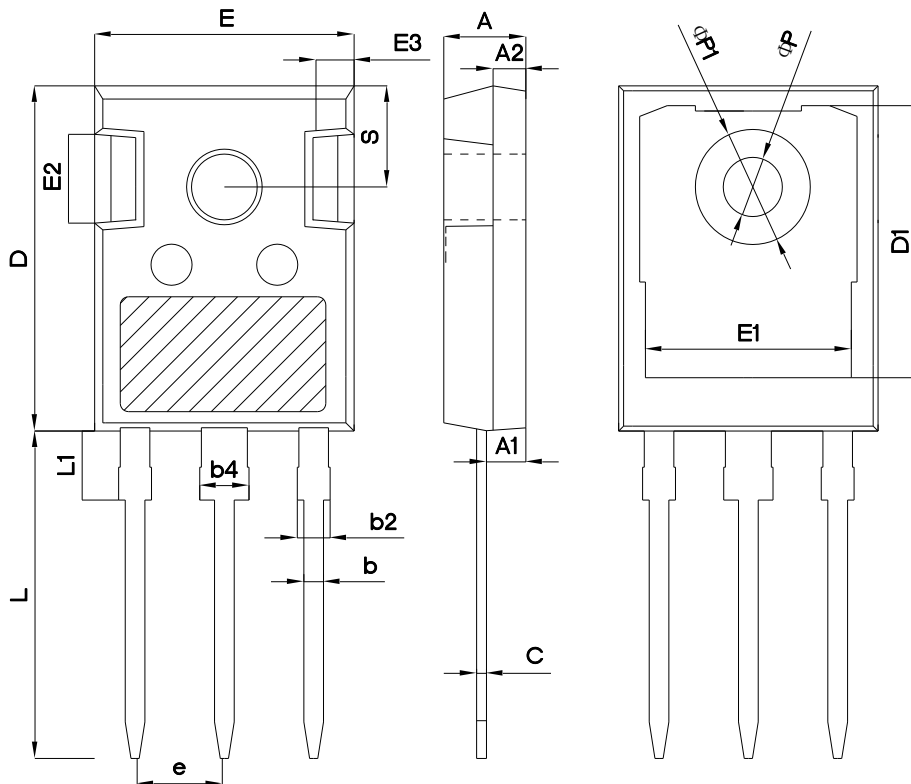


Figure 4. Diode reverse recovery test circuit & waveforms

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-C outline dimension

Ordering Information

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

Product Information

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

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