

OSG60R099HSZF_Datasheet

Enhancement Mode N-Channel Power MOSFET

Features

- ◆ Ultra-fast and robust body diode
- ◆ Low $R_{DS(on)}$ & FOM
- ◆ Excellent low switching loss
- ◆ Excellent stability and uniformity
- ◆ Easy to drive

Applications

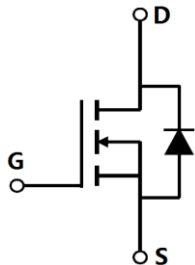

- ◆ PC power
- ◆ Server power supply
- ◆ Telecom
- ◆ Solar inverter
- ◆ Super charger for automobiles

■ General Description

OSG60R099HSZF use advanced GreenMOS™ technology to provide low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics. This device offers extremely fast and robust body diode, and is suitable for telecom and super charger applications.

| | |
|-----------------------------------|---------|
| ◆ $V_{DS, min@Tjmax}$ | 650 V |
| ◆ $I_{D, pulse}$ | 108 A |
| ◆ $R_{DS(ON), max @ V_{GS}=10 V}$ | 99 mΩ |
| ◆ Q_g | 66.8 nC |

■ Schematic and Package Information

| | |
|--|---|
| Schematic Diagram  | Pin Assignment-Top View  TO247 OSG60R099HSZF |
|--|---|

■ Absolute Maximum Ratings at $T_j=25^{\circ}C$ 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⁾ | I_D | 36 | A |
| Continuous drain current ¹⁾ $T_j=100^{\circ}C$ | | 22.8 | |
| Pulsed drain current ²⁾ | $I_{D, pulse}$ | 108 | A |
| Power dissipation ³⁾ | P_D | 278 | W |
| Single pulsed avalanche energy ⁵⁾ | E_{AS} | 1000 | mJ |
| MOSFET dv/dt ruggedness, $V_{DS}=0...480 V$ | dv/dt | 100 | V/ns |
| Reverse diode dv/dt, $V_{DS}=0...480 V, I_{SD} \leq I_D$ | dv/dt | 50 | V/ns |
| Operation and storage temperature | T_{stg}, T_j | -55 to 150 | $^{\circ}C$ |

■ Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|-----------------------------|
| Thermal resistance, junction-case | $R_{\theta JC}$ | 0.45 | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance, junction-ambient ⁴⁾ | $R_{\theta JA}$ | 62 | $^{\circ}\text{C}/\text{W}$ |

■ 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 | 740 | | | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$ $T_j=150^{\circ}\text{C}$ |
| Gate threshold voltage | $V_{GS(th)}$ | 3.2 | | 4.2 | V | $V_{DS}=V_{GS}, I_D=1\text{ mA}$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | | 0.082 | 0.099 | Ω | $V_{GS}=10\text{ V}, I_D=18\text{ A}$ |
| | | | 0.20 | | | $V_{GS}=10\text{ V}, I_D=18\text{ A},$ $T_j=150^{\circ}\text{C}$ |
| 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 | $V_{DS}=600\text{ V}, V_{GS}=0\text{ V}$ |
| Gate resistance | R_G | | 8.0 | | Ω | $f=1\text{ MHz}, \text{Open drain}$ |

■ Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|------------------------------|--------------|------|--------|------|------|--|
| Input capacitance | C_{iss} | | 3917.5 | | pF | $V_{GS}=0\text{ V},$ $V_{DS}=50\text{ V},$ $f=100\text{ kHz}$ |
| Output capacitance | C_{oss} | | 203.3 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 9.0 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 48.3 | | ns | $V_{GS}=10\text{ V},$ $V_{DS}=400\text{ V},$ $R_G=2\ \Omega,$ $I_D=20\text{ A}$ |
| Rise time | t_r | | 77.0 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 90.9 | | ns | |
| Fall time | t_f | | 4.6 | | ns | |

■ Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|----------------------|----------------------|------|------|------|------|--|
| Total gate charge | Q_g | | 66.8 | | nC | $I_D=20\text{ A}$, $V_{DS}=400\text{ V}$, $V_{GS}=10\text{ V}$ |
| Gate-source charge | Q_{gs} | | 16.6 | | nC | |
| Gate-drain charge | Q_{gd} | | 28.7 | | nC | |
| Gate plateau voltage | V_{plateau} | | 6.7 | | V | |

■ Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|-------------------------------|-----------|------|-------|------|---------------|---|
| Diode forward current | I_S | | | 36 | A | $V_{GS}<V_{th}$ |
| Pulsed source current | I_{SP} | | | 108 | | |
| Diode forward voltage | V_{SD} | | | 1.4 | V | $I_S=36\text{ A}$, $V_{GS}=0\text{ V}$ |
| Reverse recovery time | t_{rr} | | 146.5 | | ns | $I_S=20\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$ |
| Reverse recovery charge | Q_{rr} | | 1.0 | | μC | |
| Peak reverse recovery current | I_{rrm} | | 12.8 | | 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) $V_{DD}=100\text{ V}$, $R_G=50\text{ }\Omega$, $L=60\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

■ **Electrical Characteristics Diagrams**

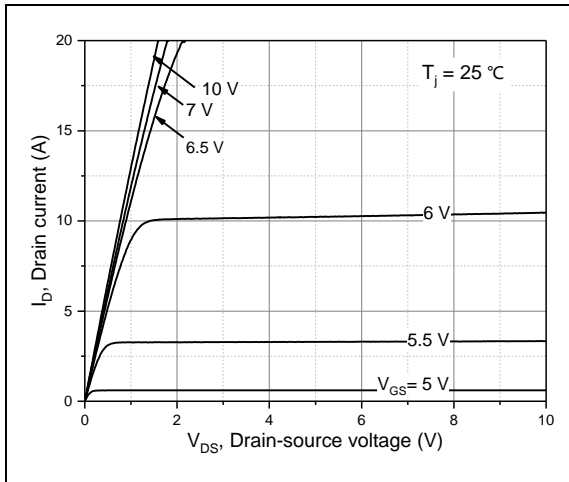


Figure 1, Typ. output characteristics

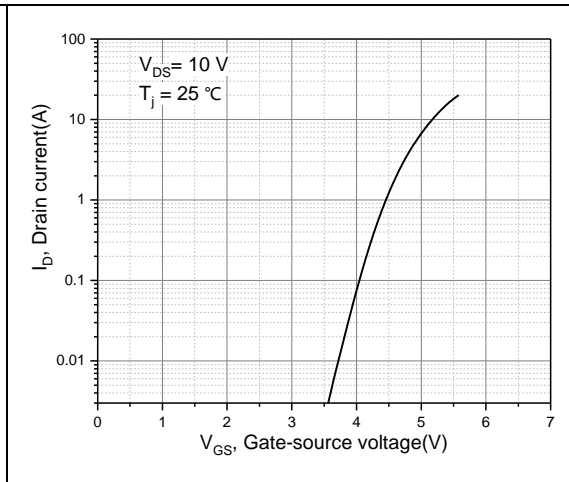


Figure 2, Typ. transfer characteristics

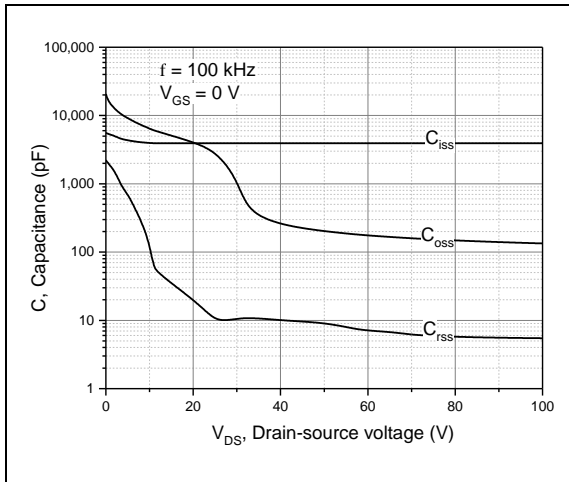


Figure 3, Typ. capacitances

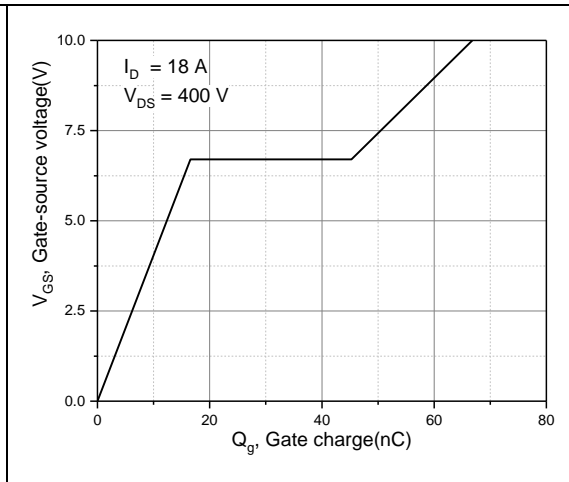


Figure 4, Typ. gate charge

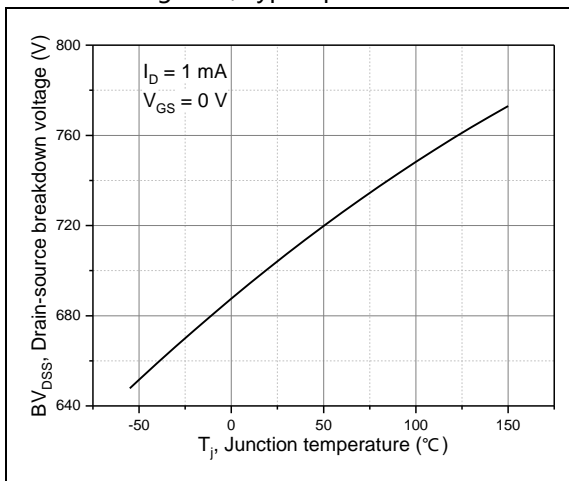


Figure 5, Drain-source breakdown voltage

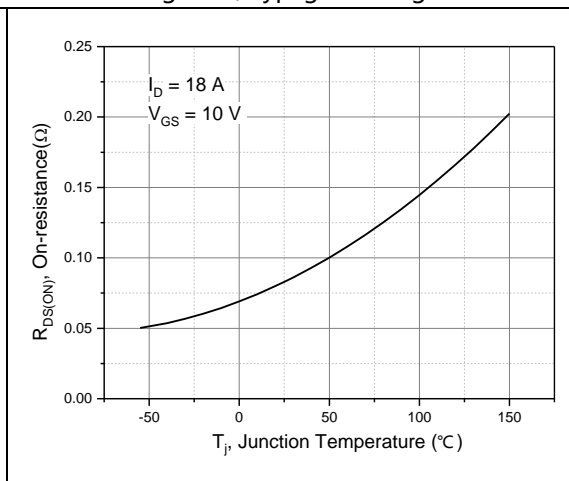


Figure 6, Drain-source on-state resistance

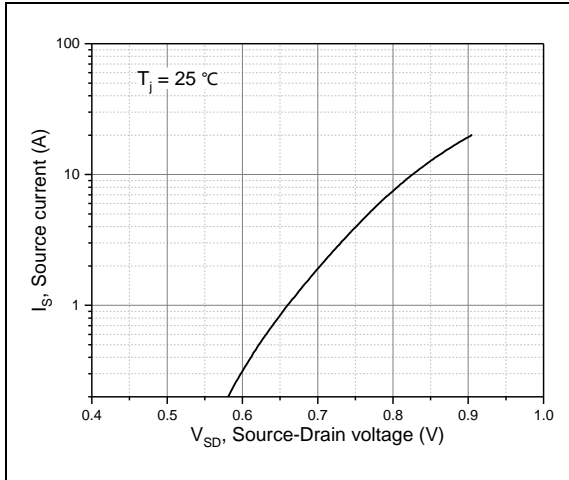


Figure 7, Forward characteristic of body diode

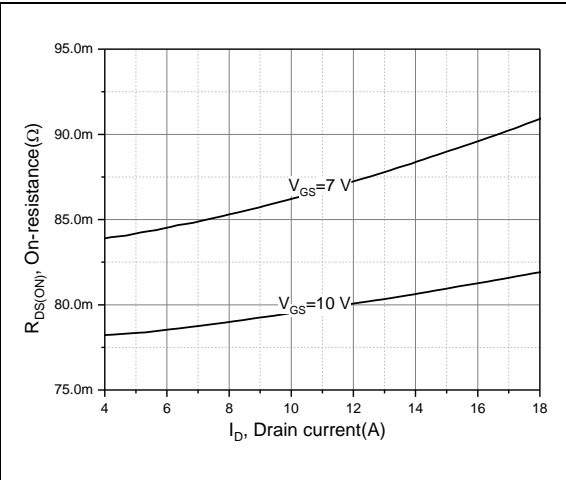


Figure 8, Drain-source on-state resistance

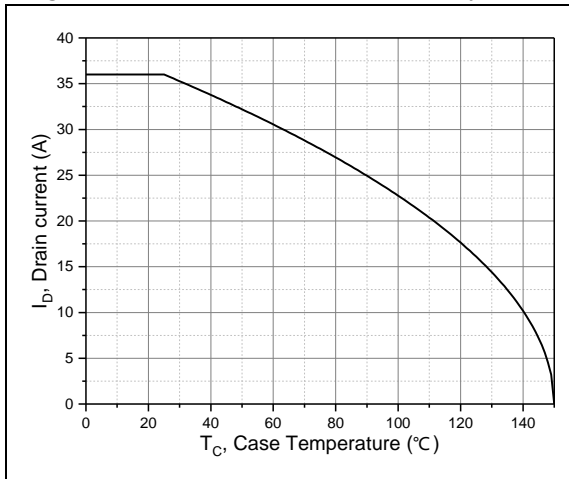


Figure 9, Drain current

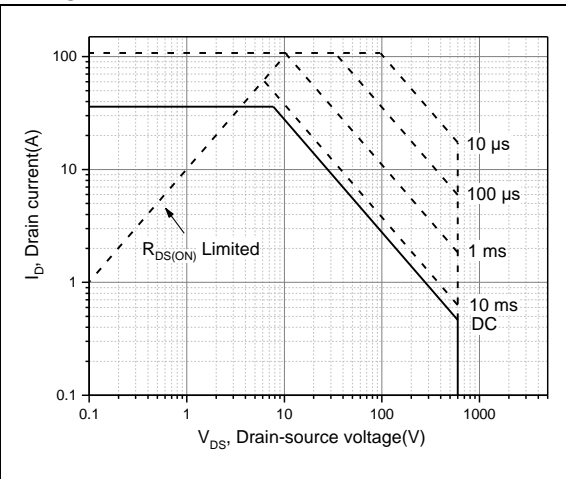


Figure 10, Safe operation area $T_C = 25\text{ }^\circ\text{C}$

■ Test circuits and waveforms

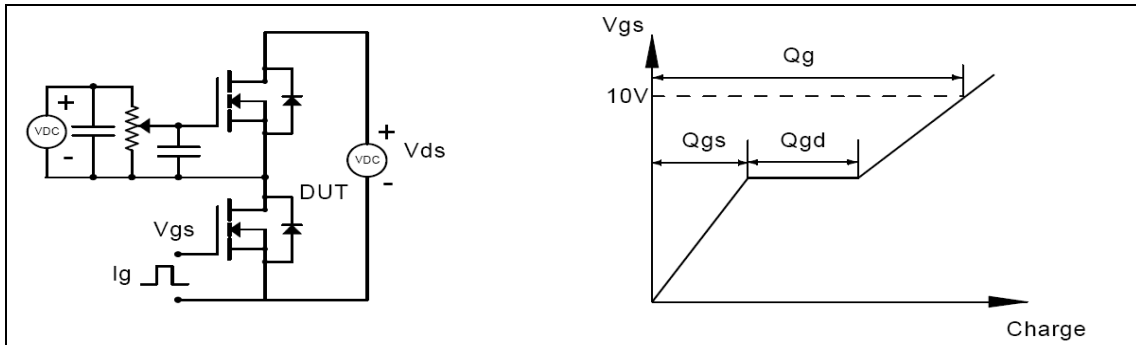


Figure 1, Gate charge test circuit & waveform

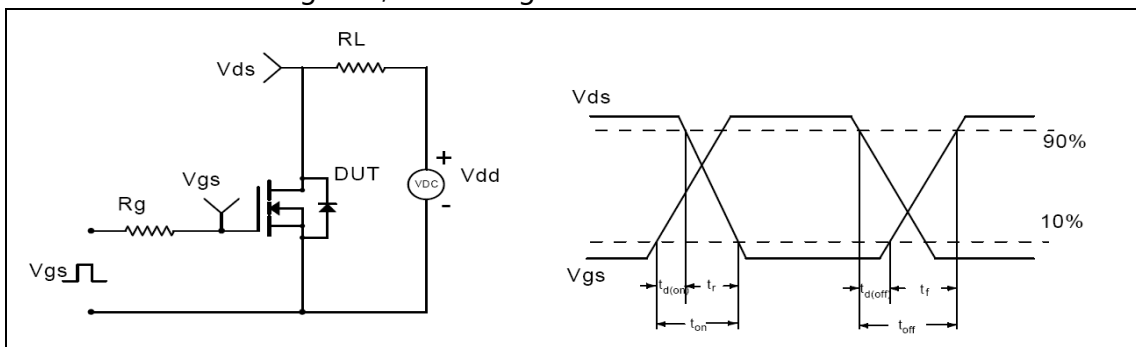


Figure 2, Switching time test circuit & waveforms

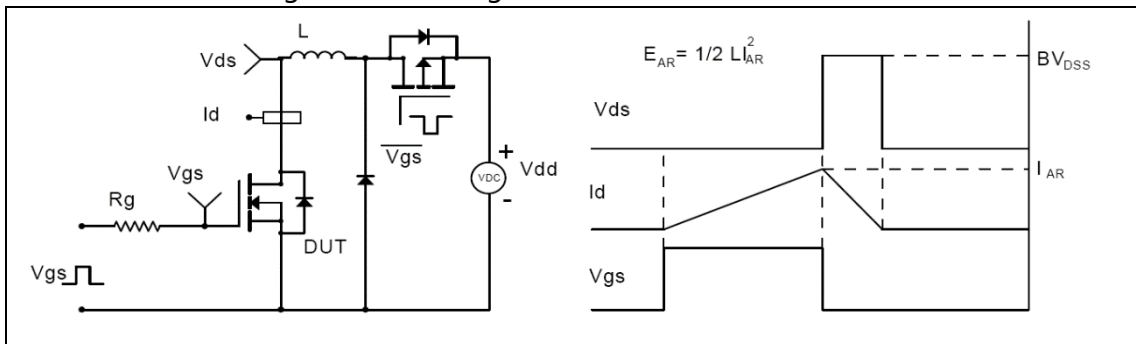


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

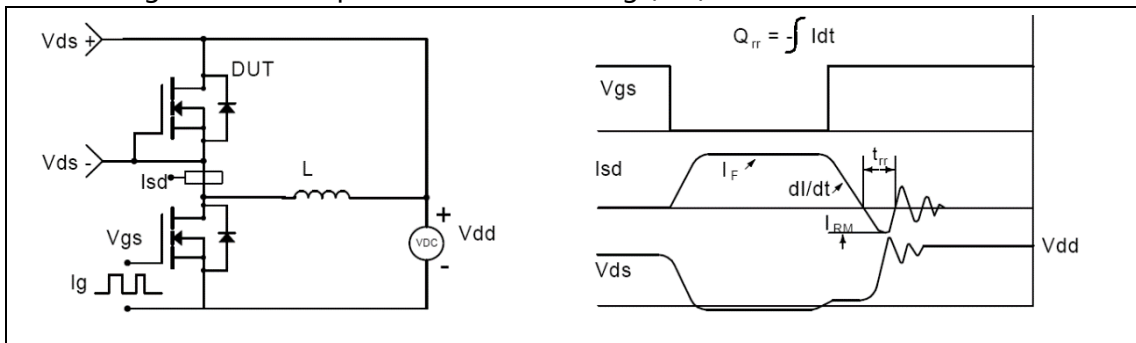
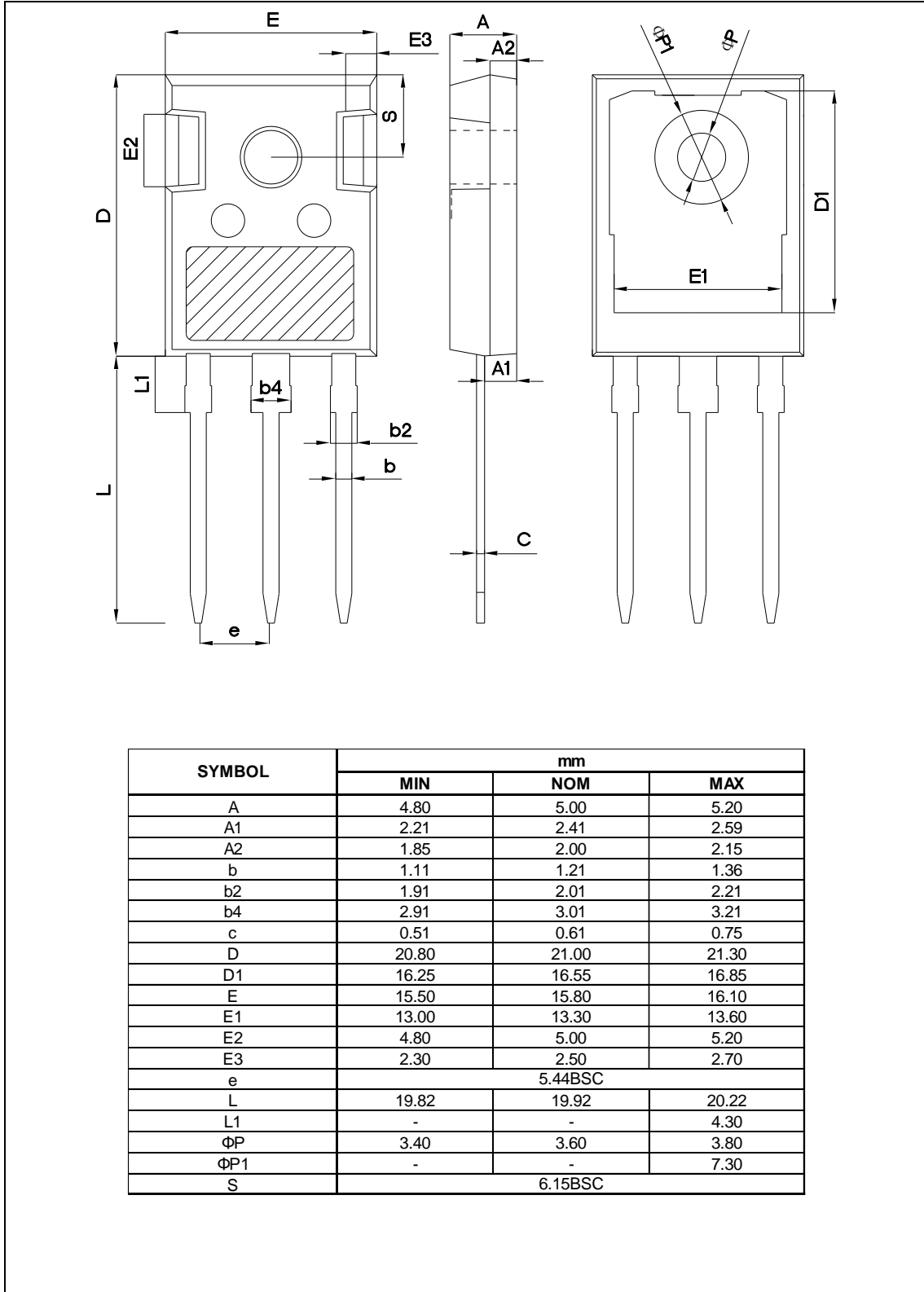


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

Figure1, TO247 package outline dimension



■ Ordering Information

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

■ Product Information

| Product | Package | Pb Free | RoHS | Halogen Free |
|---------------|---------|---------|------|--------------|
| OSG60R099HSZF | TO247 | yes | yes | yes |