

Enhancement Mode N-Channel Power MOSFET

Features

- ◆ Low $R_{DS(on)}$ & FOM
- ◆ Extremely low switching loss
- ◆ Excellent stability and uniformity
- ◆ Fast switching and soft recovery

Applications

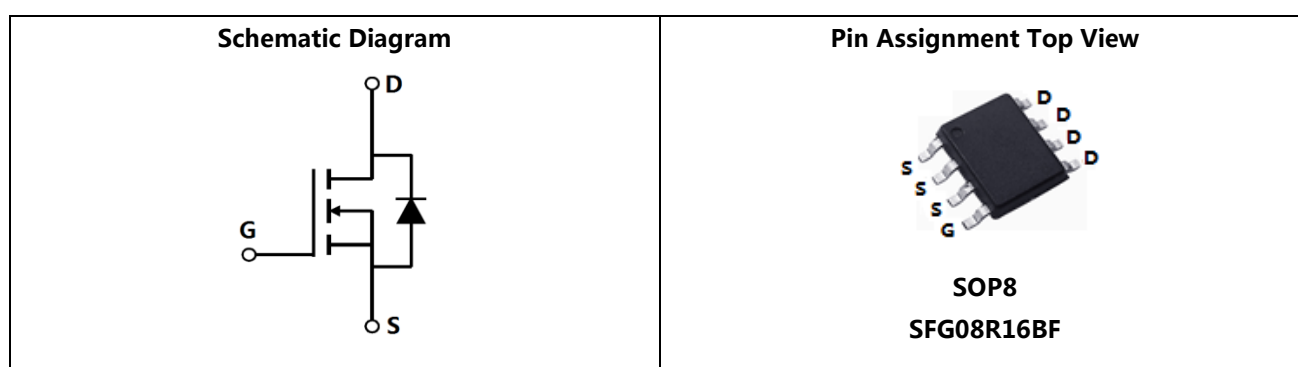
- ◆ Consumer electronic power supply
- ◆ Motor control
- ◆ Synchronous rectification
- ◆ Isolated DC/DC convertor
- ◆ Invertors

■ General Description

SFG08R16BF uses advanced SFGMOS™ technology to provide low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable to use in synchronous rectification applications.

| | |
|-----------------------------------|---------|
| ◆ $V_{DS, min}$ | 80 V |
| ◆ $I_{D, pulse}$ | 32 A |
| ◆ $R_{DS(ON), max @ V_{GS}=10 V}$ | 16 mΩ |
| ◆ Q_g | 22.5 nC |

■ Schematic and Package Information



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

| Parameter | Symbol | Value | Unit |
|--|----------------|------------|------|
| Drain source voltage | V_{DS} | 80 | V |
| Gate source voltage | V_{GS} | ±20 | V |
| Continuous drain current ¹⁾ , $T_C=25^{\circ}C$ | I_D | 8 | A |
| Pulsed drain current ²⁾ , $T_C=25^{\circ}C$ | $I_{D, pulse}$ | 32 | A |
| Power dissipation ³⁾ , $T_C=25^{\circ}C$ | P_D | 3.5 | W |
| Single pulsed avalanche energy ⁴⁾ | E_{AS} | 20 | mJ |
| Operation and storage temperature | T_{stg}, T_j | -55 to 150 | °C |

■ Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|-----------------------------|
| Thermal resistance, junction-case | $R_{\theta JC}$ | 35.7 | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance, junction-ambient ⁵⁾ | $R_{\theta JA}$ | 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} | 80 | | | 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 | $R_{DS(on)}$ | | 13.0 | 16.0 | m Ω | $V_{GS}=10\text{ V}, I_D=8\text{ A}$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | | 16.0 | 20.0 | m Ω | $V_{GS}=4.5\text{ V}, I_D=6\text{ A}$ |
| Gate-source leakage current | I_{GSS} | | | 100 | nA | $V_{GS}=20\text{ V}$ |
| | | | | -100 | | $V_{GS}=-20\text{ V}$ |
| Drain-source leakage current | I_{DSS} | | | 1 | μA | $V_{DS}=80\text{ V}, V_{GS}=0\text{ V}$ |

■ Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|------------------------------|--------------|------|--------|------|------|---|
| Input capacitance | C_{iss} | | 1432.2 | | pF | $V_{GS}=0\text{ V},$ $V_{DS}=50\text{ V},$ $f=100\text{ kHz}$ |
| Output capacitance | C_{oss} | | 343.6 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 9.1 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 18.9 | | ns | $V_{GS}=10\text{ V},$ $V_{DS}=50\text{ V},$ $R_G=2\ \Omega,$ $I_D=10\text{ A}$ |
| Rise time | t_r | | 4.6 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 38.1 | | ns | |
| Fall time | t_f | | 18.9 | | ns | |

■ Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|----------------------|----------------------|------|------|------|------|---|
| Total gate charge | Q_g | | 22.5 | | nC | $I_D=10\text{ A}$, $V_{DS}=50\text{ V}$, $V_{GS}=10\text{ V}$ |
| Gate-source charge | Q_{gs} | | 4.1 | | nC | |
| Gate-drain charge | Q_{gd} | | 5.4 | | nC | |
| Gate plateau voltage | V_{plateau} | | 3.1 | | V | |

■ Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|-------------------------------|-----------|------|------|------|------|---|
| Diode forward current | I_S | | | 40 | A | $V_{GS} < V_{th}$ |
| Pulsed source current | I_{SP} | | | 120 | | |
| Diode forward voltage | V_{SD} | | | 1.3 | V | $I_S=10\text{ A}$, $V_{GS}=0\text{ V}$ |
| Reverse recovery time | t_{rr} | | 53.0 | | ns | $I_S=10\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$ |
| Reverse recovery charge | Q_{rr} | | 91.1 | | nC | |
| Peak reverse recovery current | I_{rrm} | | 2.9 | | 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) $V_{DD}=50\text{ V}$, $R_G=50\ \Omega$, $L=0.3\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.
- 5) 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 $T_a=25\text{ }^\circ\text{C}$.

■ **Electrical Characteristics Diagrams**

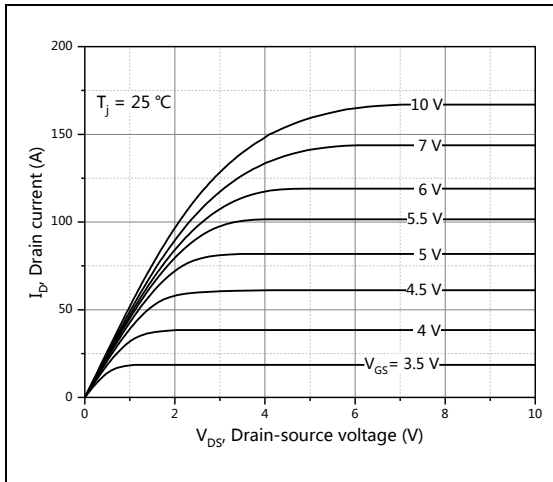


Figure 1, Typ. output characteristics

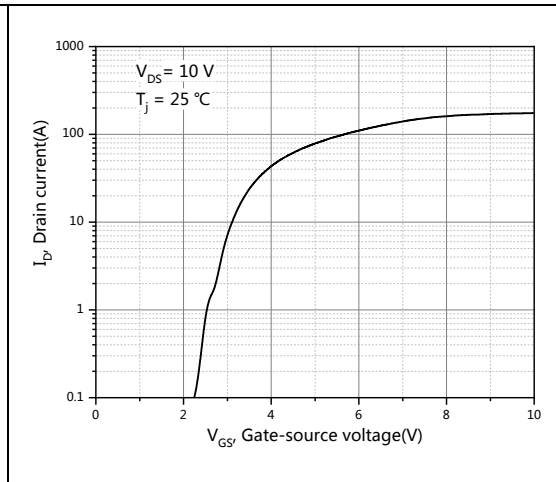


Figure 2, Typ. transfer characteristics

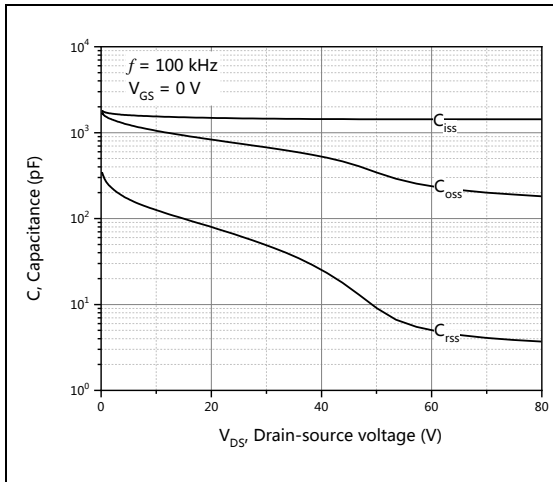


Figure 3, Typ. capacitances

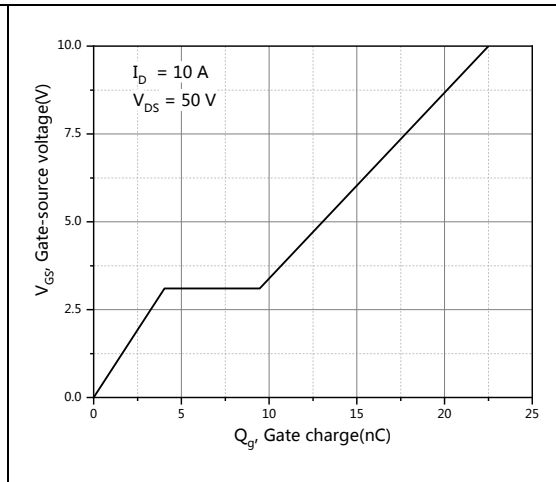


Figure 4, Typ. gate charge

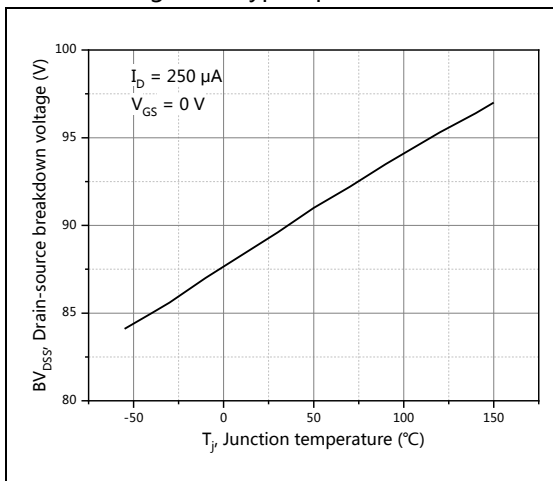


Figure 5, Drain-source breakdown voltage

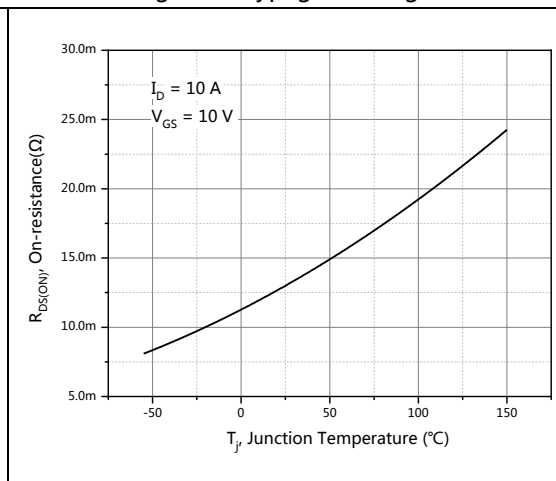


Figure 6, Drain-source on-state resistance

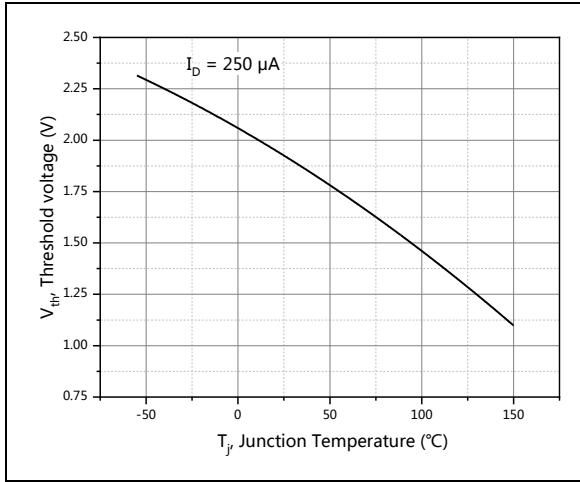


Figure 7, Threshold voltage

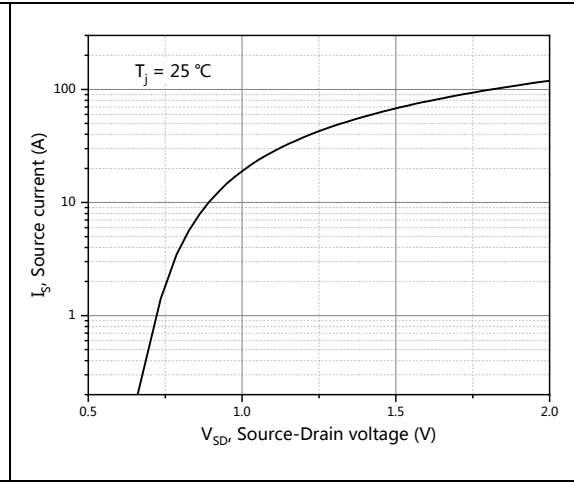


Figure 8, Forward characteristic of body diode

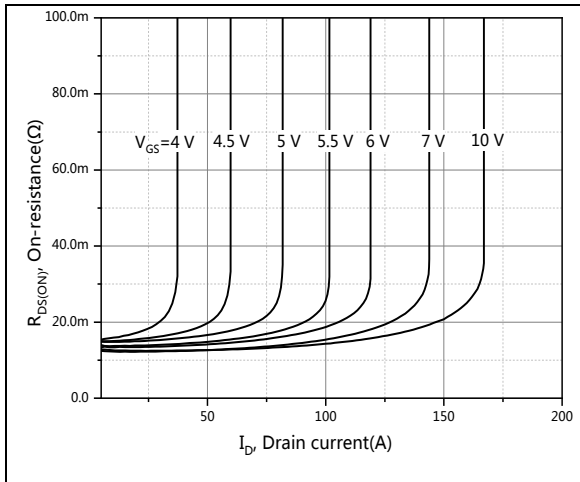


Figure 9, Drain-source on-state resistance

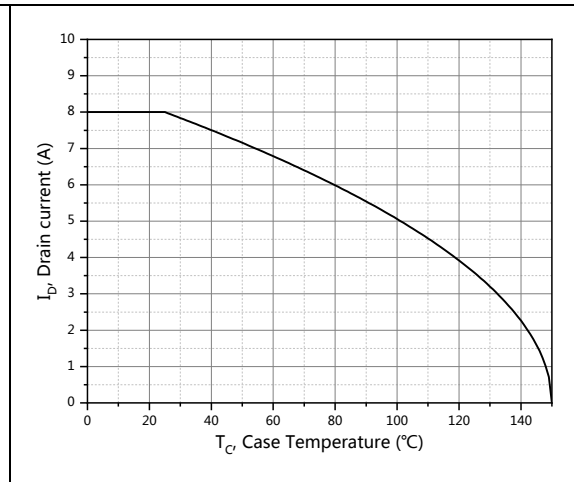


Figure 10, Drain current

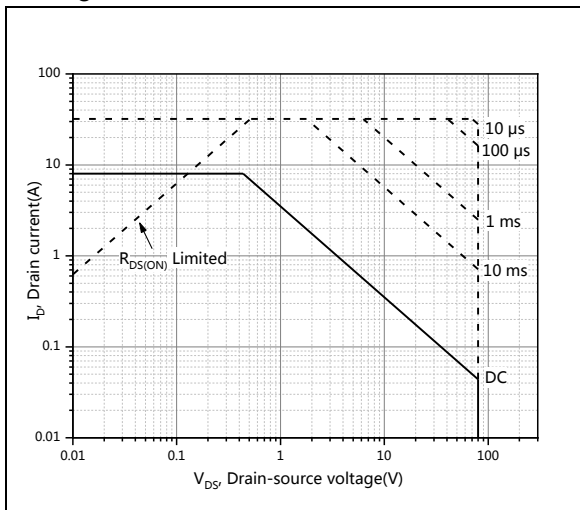


Figure 11, Safe operation area $T_c=25\text{ }^\circ\text{C}$

■ Test circuits and waveforms

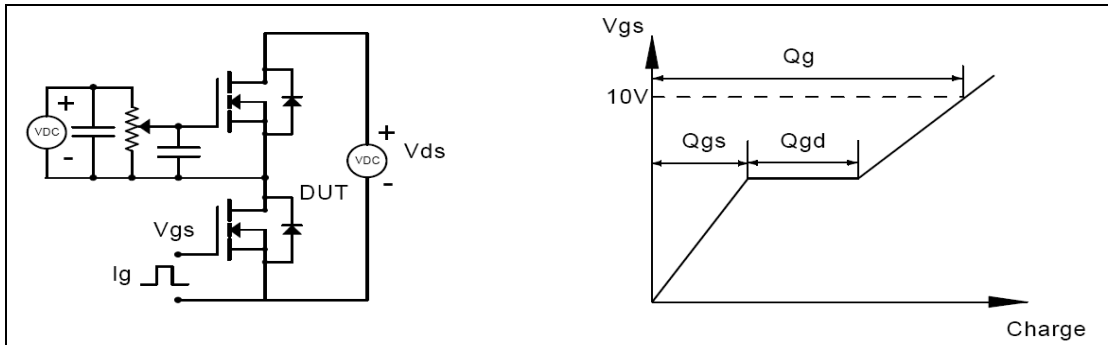


Figure 1, Gate charge test circuit & waveform

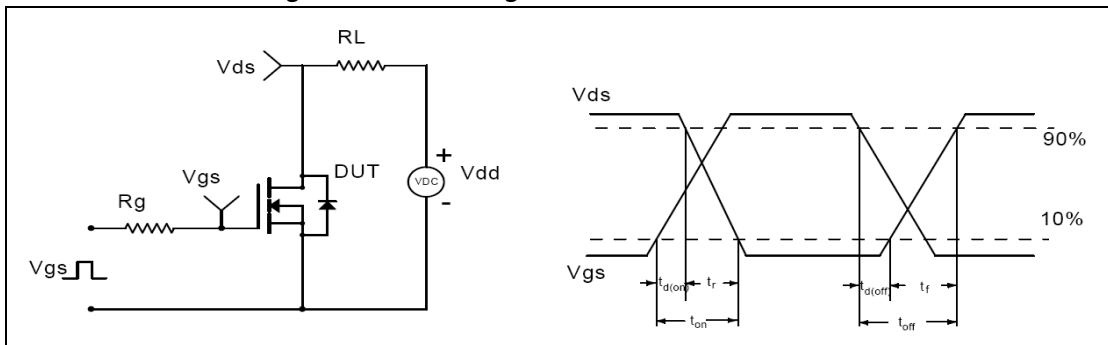


Figure 2, Switching time test circuit & waveforms

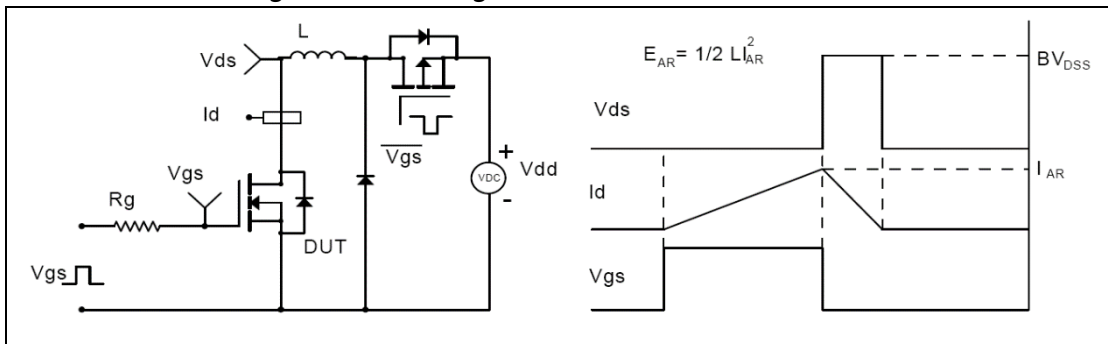


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

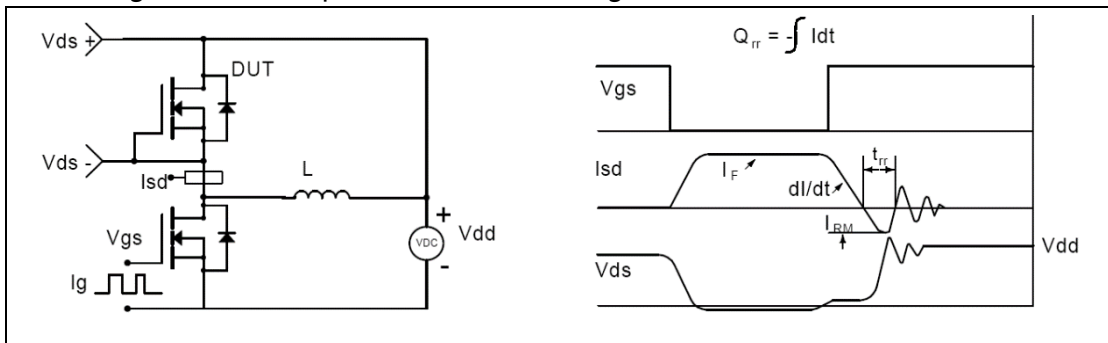
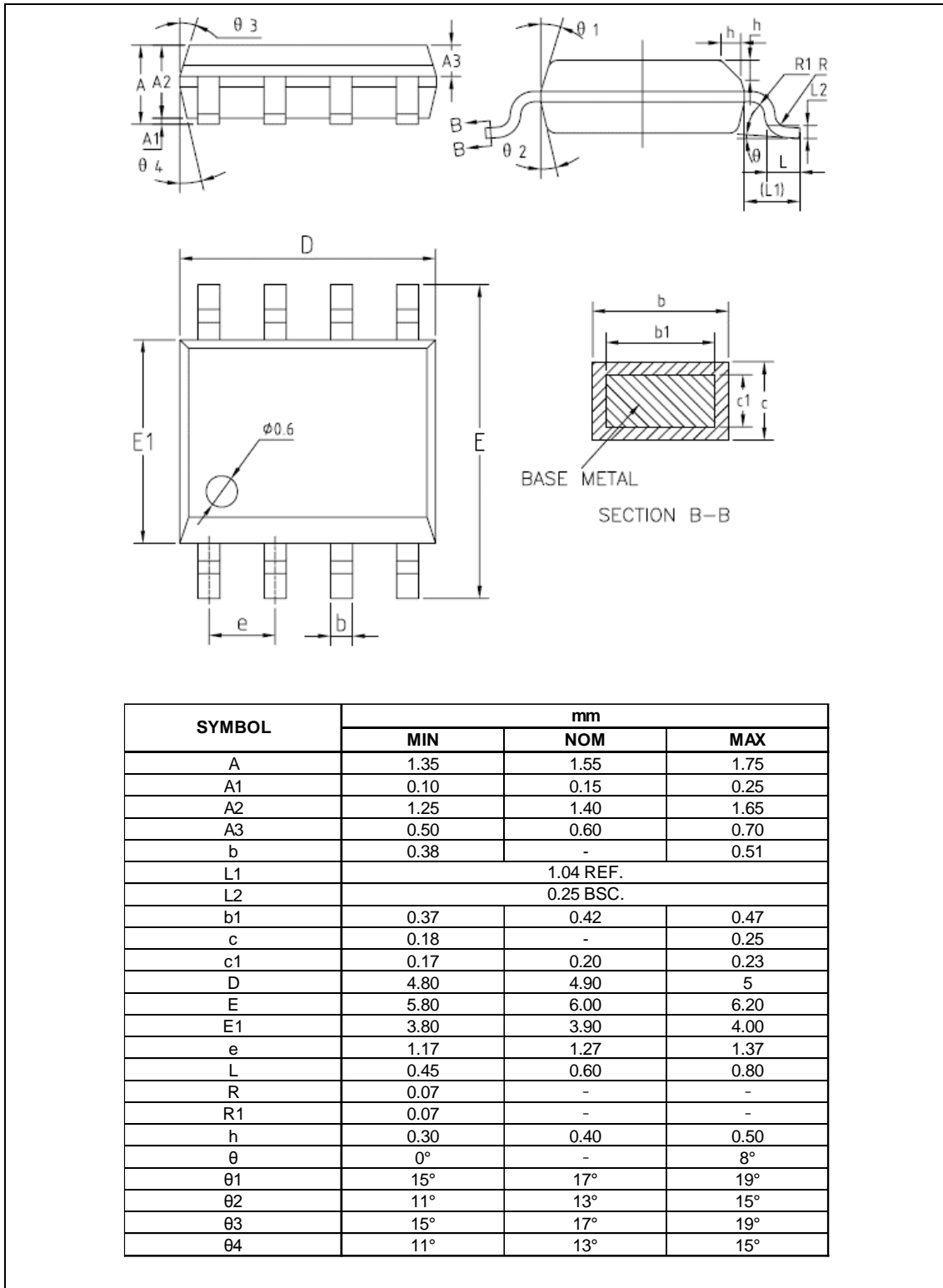


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

Figure1, TO252 package outline dimension



■ Ordering Information

| Package | Units/Reel | Reels/Inner Box | Units/Inner Box | Inner Box/Carton Box | Units/Carton Box |
|---------|------------|-----------------|-----------------|----------------------|------------------|
| SOP8 | 2500 | 2 | 5000 | 8 | 50000 |

■ Product Information

| Product | Package | Pb Free | RoHS | Halogen Free |
|------------|---------|---------|------|--------------|
| SFG08R16BF | SOP8 | yes | yes | yes |