

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

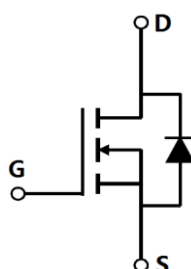
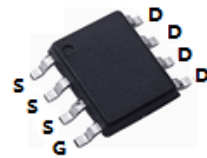
- ◆ Consumer electronic power supply
- ◆ Motor control
- ◆ Synchronous-rectification
- ◆ Isolated DC/DC convertor
- ◆ Invertors

■ General Description

SFG10R20BF 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.

◆ $V_{DS, min}$	100 V
◆ $I_D, pulse$	32 A
◆ $R_{DS(ON), max @ V_{GS}=10 V}$	20 mΩ
◆ Q_g	19.8 nC

■ Schematic and Package Information

Schematic Diagram 	Pin Assignment Top View  SOP8 SFG10R20BF
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■ Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	100	V
Gate source voltage	V_{GS}	±20	V
Continuous drain current ¹⁾	I_D	8	A
Pulsed drain current ²⁾	$I_{D, pulse}$	32	A
Power dissipation ³⁾	P_D	3.5	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	30	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 150	°C

■ Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	35.7	°C/W

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	100			V	$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	1.0		2.5	V	$V_{DS}=V_{GS}$, $I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		17	20	m Ω	$V_{GS}=10\text{ V}$, $I_D=8\text{ A}$
Drain-source on-state resistance	$R_{DS(on)}$			26	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	$V_{DS}=100\text{ V}$, $V_{GS}=0\text{ V}$

■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1190.6		pF	$V_{GS}=0\text{ V}$, $V_{DS}=100\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}		194.6		pF	
Reverse transfer capacitance	C_{rss}		3.3		pF	
Turn-on delay time	$t_{d(on)}$		17.8		ns	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $R_G=2.2\text{ }\Omega$, $I_D=10\text{ A}$
Rise time	t_r		3.9		ns	
Turn-off delay time	$t_{d(off)}$		33.5		ns	
Fall time	t_f		3.2		ns	

■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		19.8		nC	$I_D=8\text{ A}$, $V_{DS}=50\text{ V}$, $V_{GS}=10\text{ V}$
Gate-source charge	Q_{gs}		2.4		nC	
Gate-drain charge	Q_{gd}		5.3		nC	
Gate plateau voltage	V_{plateau}		3.2		V	

■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward current	I_S			8	A	$V_{GS}<V_{th}$
Pulsed source current	I_{SP}			32		
Diode forward voltage	V_{SD}			1.3	V	$I_S=8\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		50.2		ns	$I_S=8\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		95.1		nC	
Peak reverse recovery current	I_{rrm}		2.5		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) $V_{DD}=50\text{ V}$, $R_G=25\text{ }\Omega$, $L=0.3\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

■ **Electrical Characteristics Diagrams**

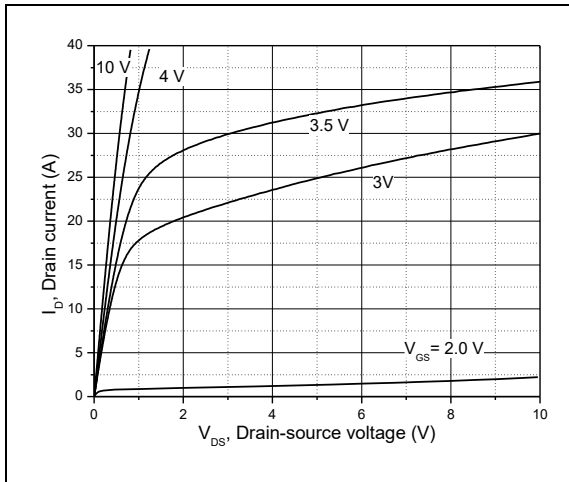


Figure 1, Typ. output characteristics

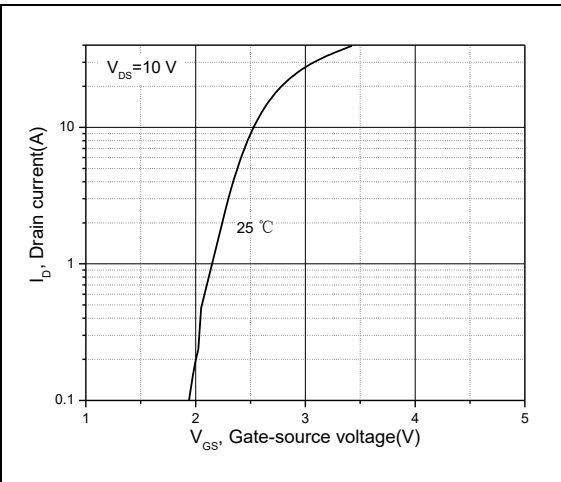


Figure 2, Typ. transfer characteristics

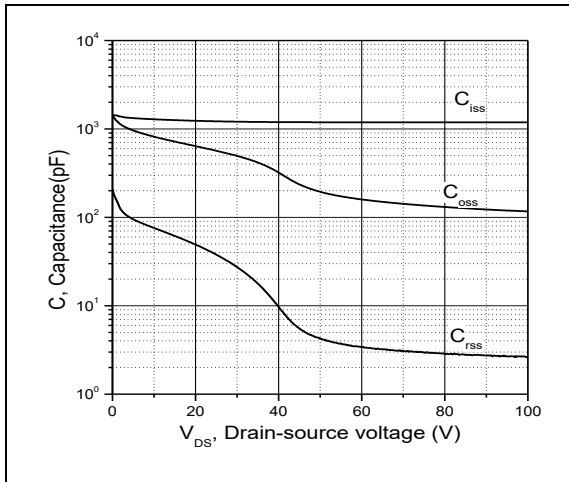


Figure 3, Typ. capacitances

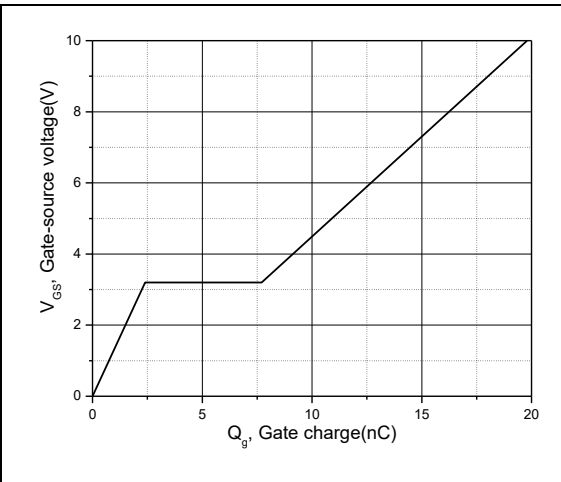


Figure 4, Typ. gate charge

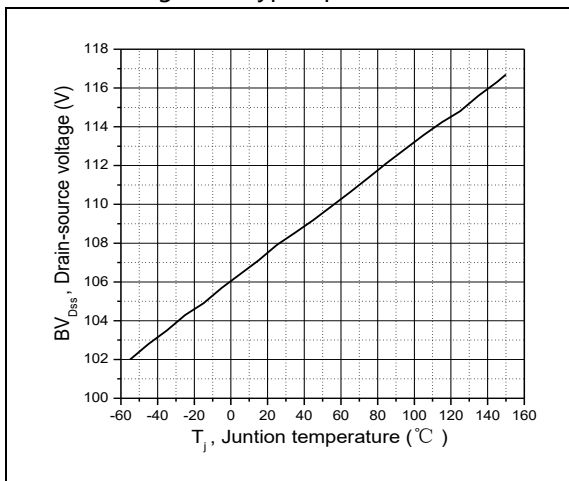


Figure 5, Drain-source breakdown voltage

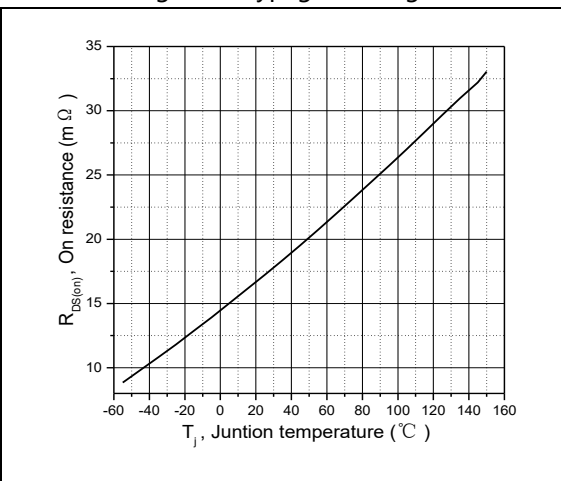


Figure 6, Drain-source on-state resistance

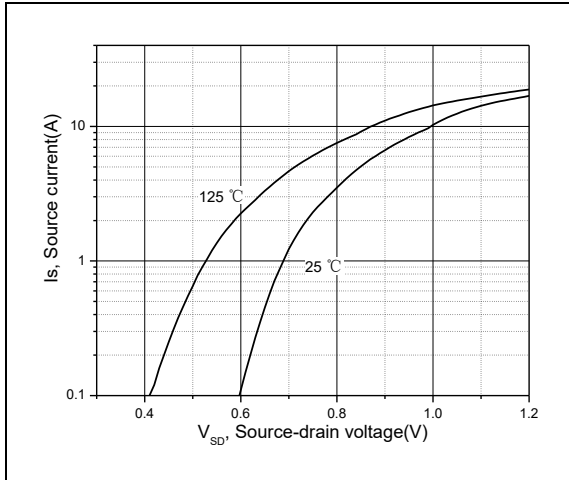


Figure 7, Forward characteristic of body diode

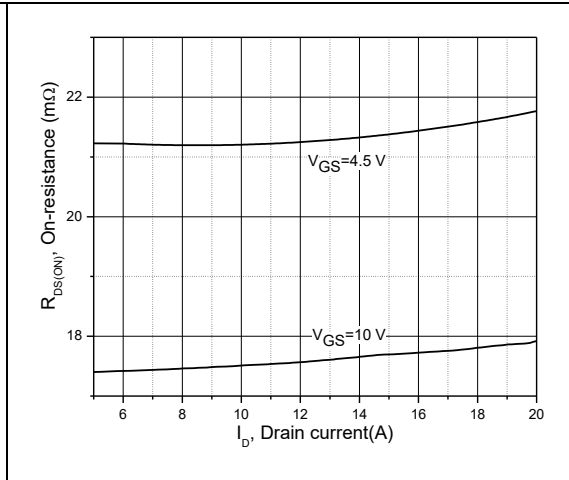


Figure 8, Drain-source on-state resistance

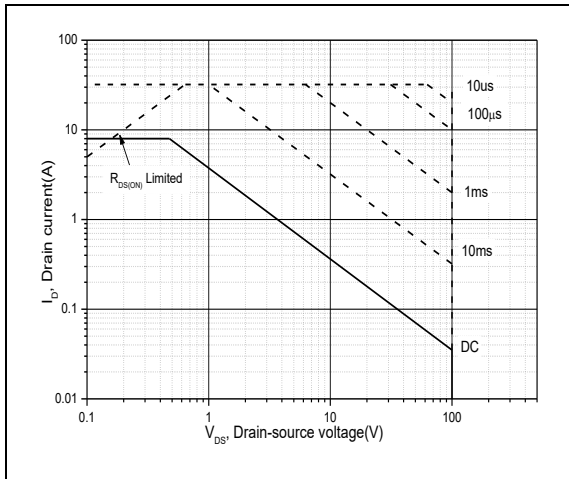


Figure 9, Safe operation area $T_C=25\text{ }^\circ\text{C}$

■ Test circuits and waveforms

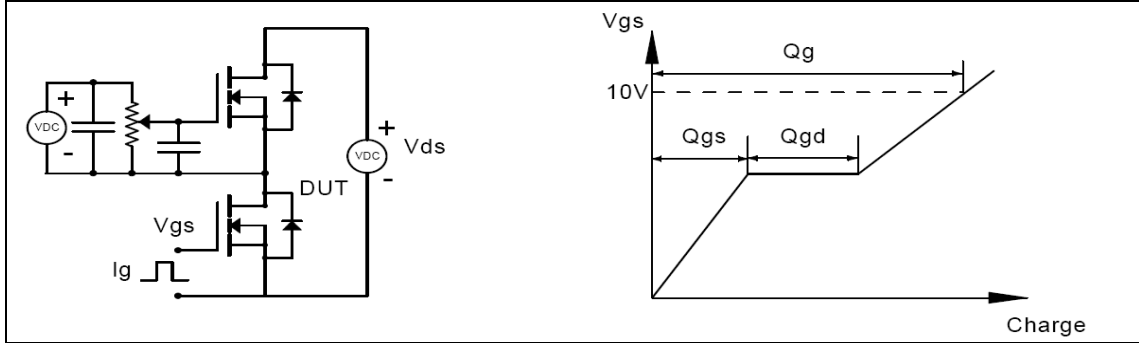


Figure 1, Gate charge test circuit & waveform

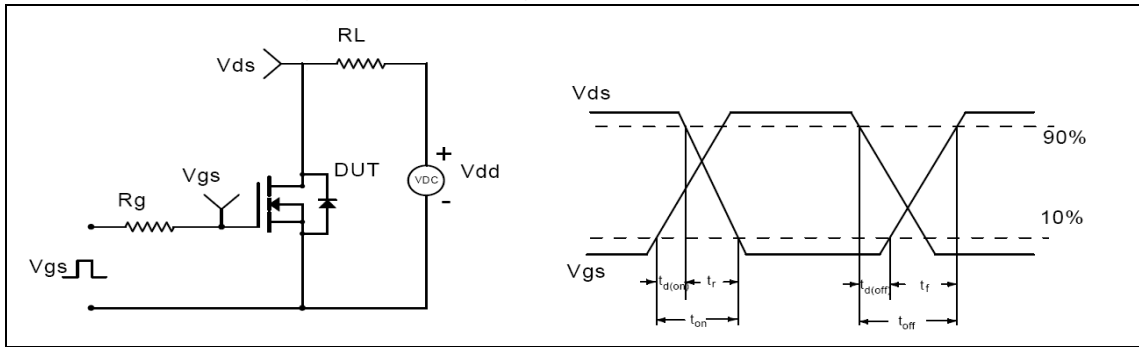


Figure 2, Switching time test circuit & waveforms

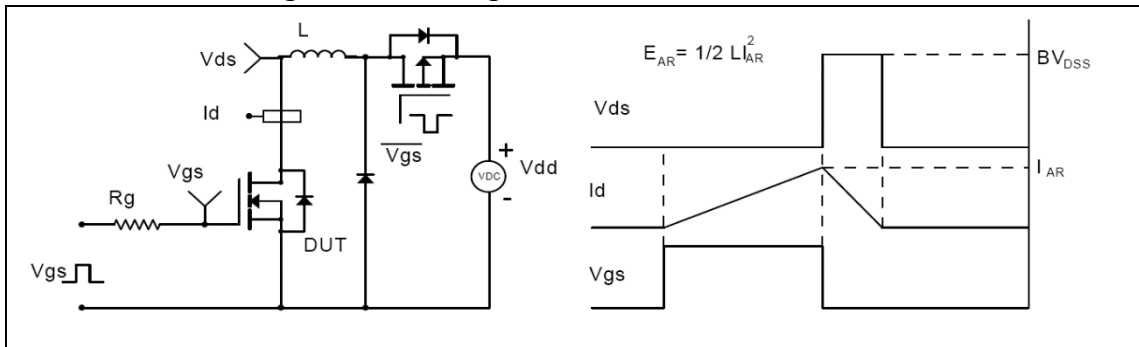


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

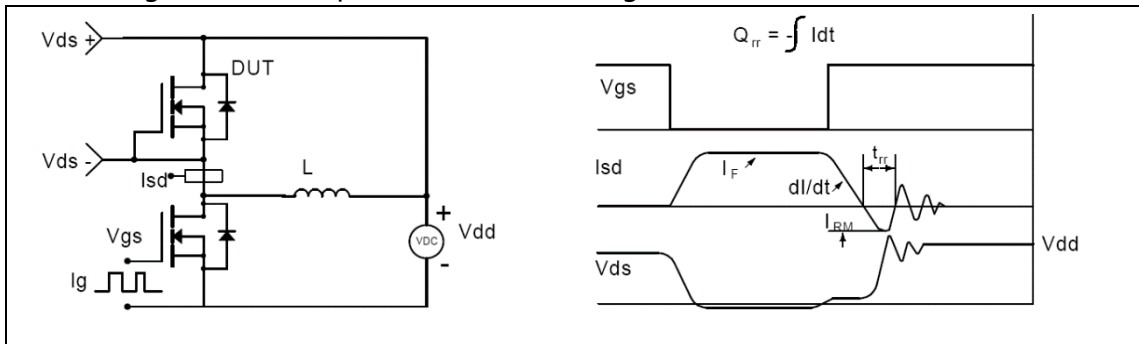
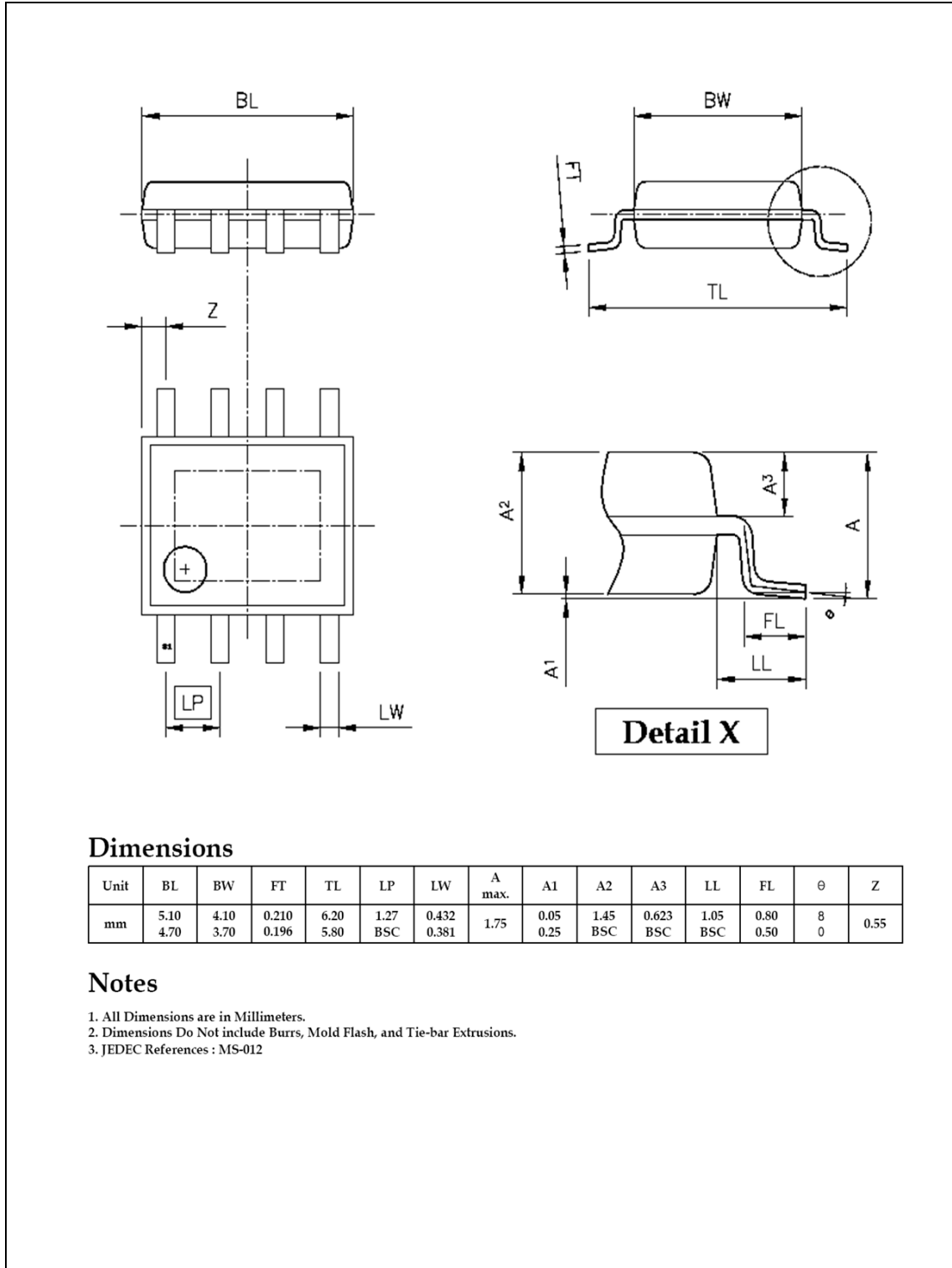


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

Figure1, SOP8 package outline dimension


Dimensions

Unit	BL	BW	FT	TL	LP	LW	A max.	A1	A2	A3	LL	FL	θ	Z
mm	5.10 4.70	4.10 3.70	0.210 0.196	6.20 5.80	1.27 BSC	0.432 0.381	1.75	0.05 0.25	1.45 BSC	0.623 BSC	1.05 BSC	0.80 0.50	8 0	0.55

Notes

1. All Dimensions are in Millimeters.
2. Dimensions Do Not include Burrs, Mold Flash, and Tie-bar Extrusions.
3. JEDEC References : MS-012

■ Ordering Information

Package	Units/Tape	Tapes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
SOP8	2500	2	5000	8	40000

■ Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFG10R20BF	SOP8	yes	yes	yes