

General Description

SFGMOS[®]

low

$R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics. The low V_{th} series is specially designed to use in synchronous rectification power systems with low driving voltage.

Features

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



Applications

- PD charger
- Motor driver
- Switching voltage regulator
- DC-DC convertor
- Switched mode power supply

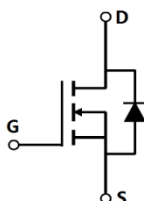
Key Performance Parameters

Parameter	Value	Unit
$V_{DS, min} @ T_{j(max)}$	100	V
$I_{D, pulse}$	120	A
$R_{DS(ON) max} @ V_{GS}=10V$	20	
Q_g	19.8	nC

Marking Information

Product Name	Package	Marking
SFG10R20DF	TO252	SFG10R20D

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}	100	V
Gate source voltage	V_{GS}	± 20	V
Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_D	40	A
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, pulse}$	120	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	40	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, Pulse}$	120	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	72	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	30	mJ
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	1.74	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient ⁴⁾	R	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}	100			V	$V_{GS}=0\text{ V}$, $I_D=250\text{ A}$
Gate threshold voltage	$V_{GS(th)}$	1.0		2.5	V	$V_{DS}=V_{GS}$, $I_D=250\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		17	20		$V_{GS}=10\text{ V}$, $I_D=8\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$			26		$V_{GS}=4.5\text{ V}$, $I_D=6\text{ A}$
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}					

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1191		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, 2 MHz
Output capacitance	C_{oss}		195		pF	
Reverse transfer capacitance	C_{rss}		4.1		pF	
Turn-on delay time	$t_{d(on)}$		17.8		ns	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $R_G=2.2\ \Omega$ - $I_D=10\text{ A}$
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	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $I_D=8\text{ A}$

Electrical Characteristics Diagrams

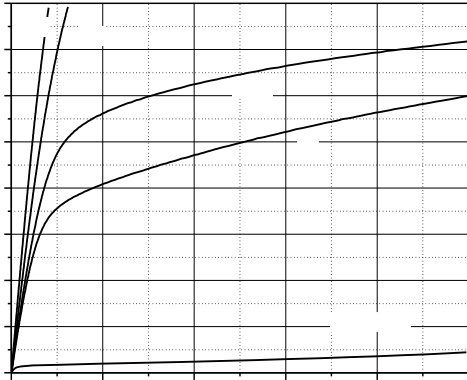


Figure 1. Typ. output characteristics

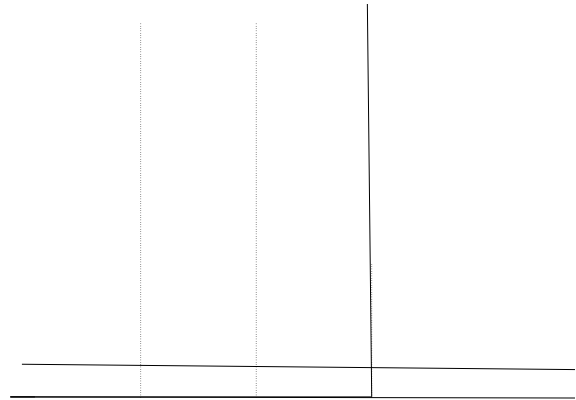


Figure 2. Typ. transfer characteristics

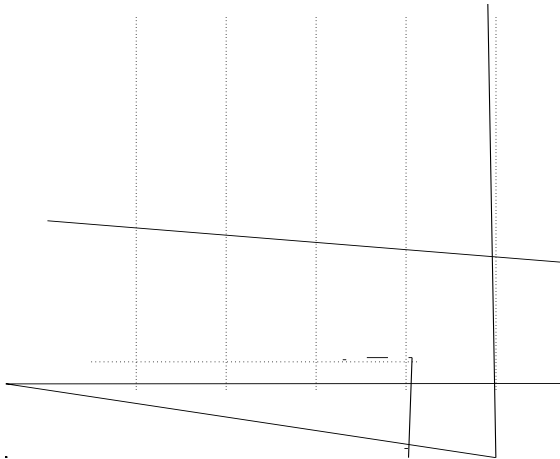


Figure 3. Typ. capacitances

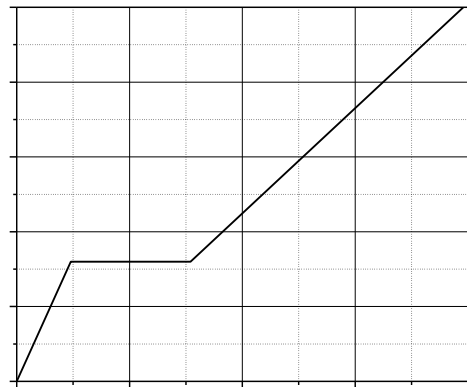


Figure 4. Typ. gate charge

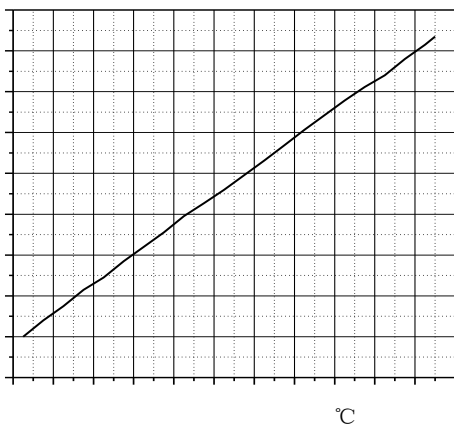


Figure 5. Drain-source breakdown voltage

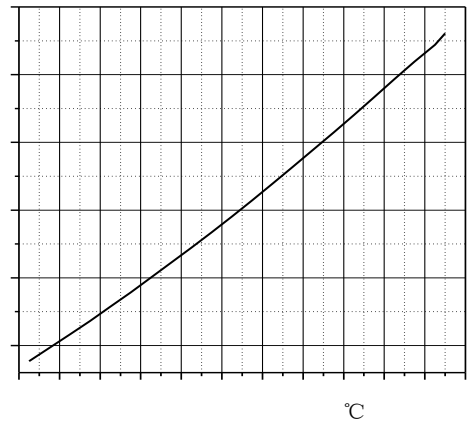


Figure 6. Drain-source on-state resistance

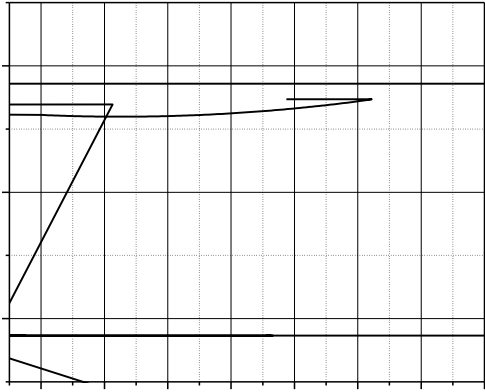


Figure 7. Drain-source on-state resistance

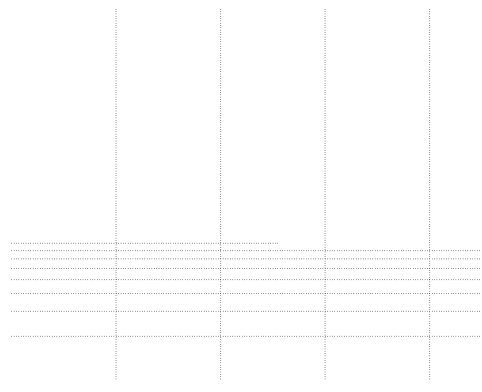


Figure 8. Forward characteristic of body diode

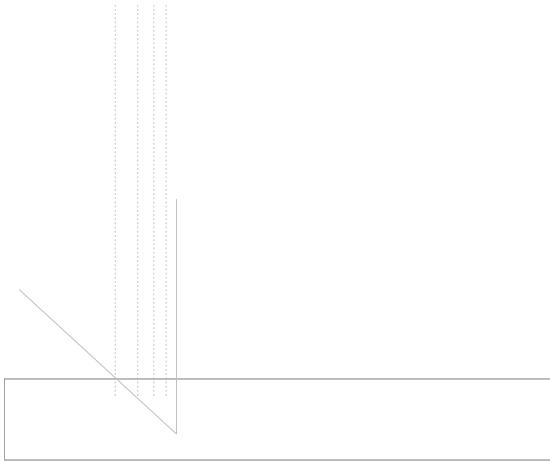


Figure 9. Safe operation area $T_C = 25^\circ\text{C}$

Test circuits and waveforms

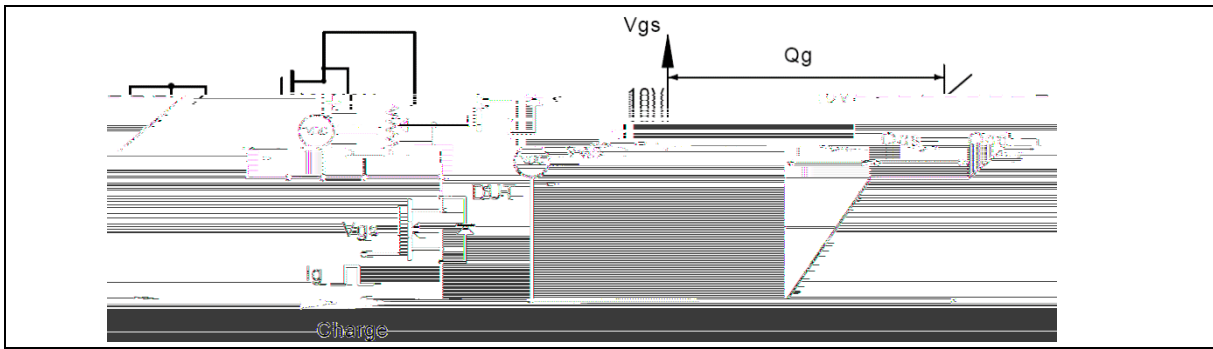


Figure 1. Gate charge test circuit & waveform

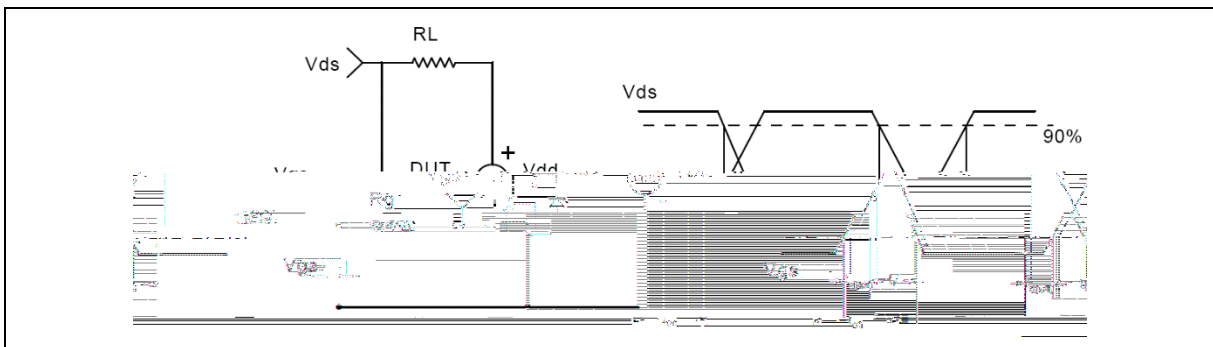


Figure 2. Switching time test circuit & waveforms

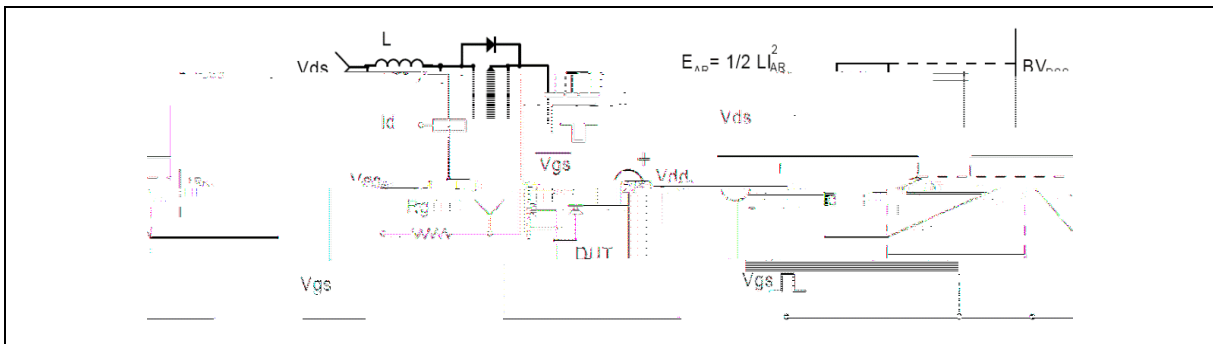


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

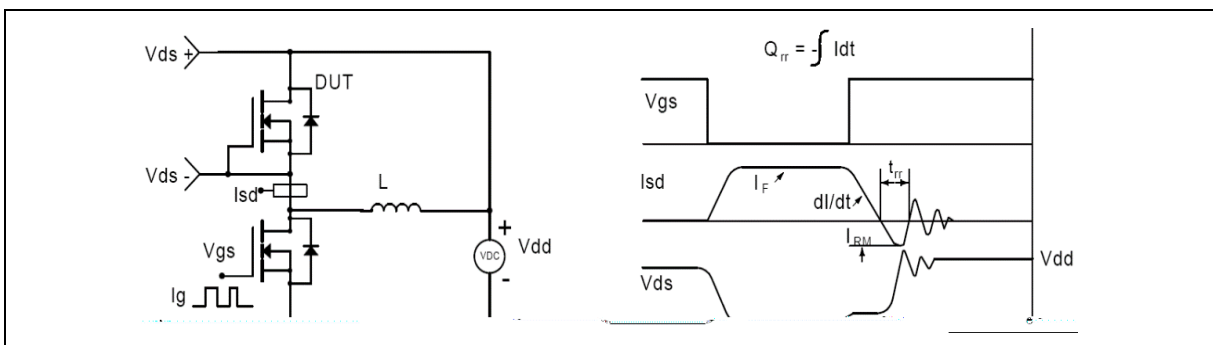
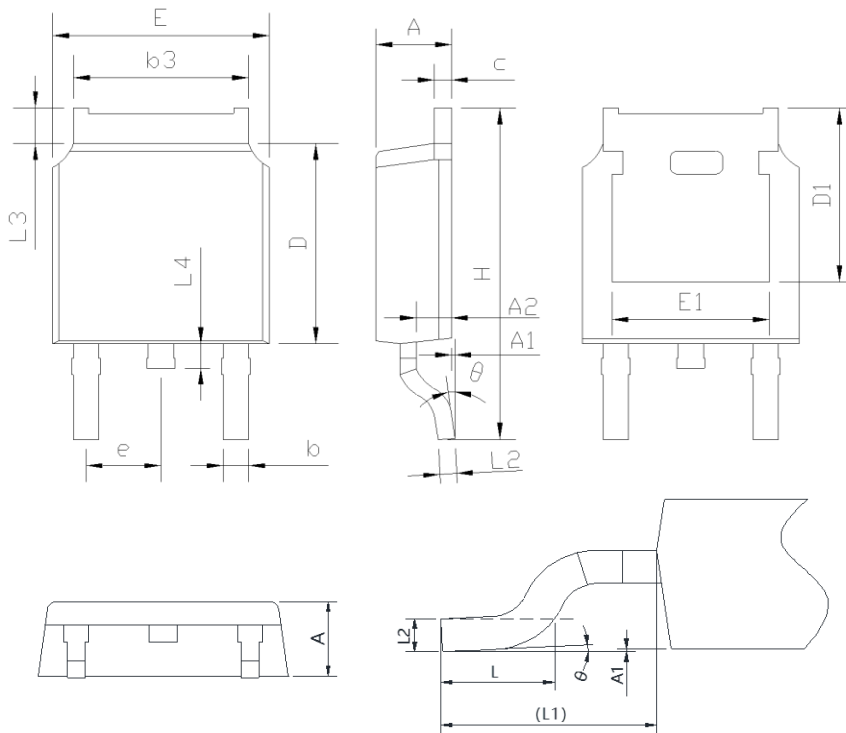


Figure 4. Diode reverse recovery test circuit & waveforms

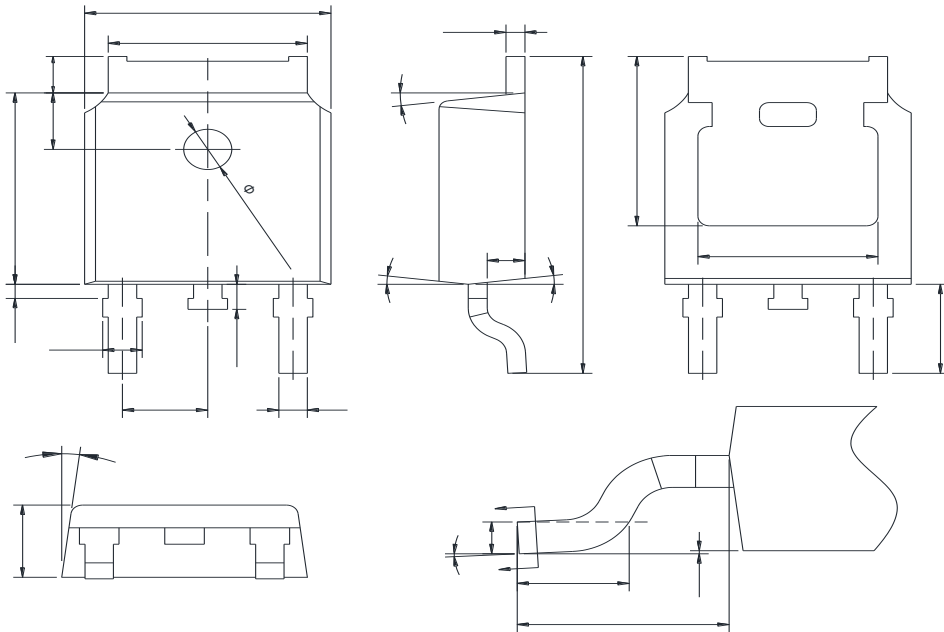
Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30 REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286 BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90 REF		
L2	0.51 BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
	0	-	

Version 1: TO252-P package outline dimension

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.38
A1	0.00	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b1	0.71	0.76	0.81
b2	0.72	-	0.90
b3	5.13	5.33	5.46
c	0.47	-	0.60
c1	0.46	0.51	0.56
c2	0.47	-	0.60
D	6.00	6.10	6.20
D1	5.25	-	-
E	6.50	6.60	6.70
E1	4.70	-	-
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	0.15	-	0.75
L6	1.80 REF		
	0	-	
2			

Version 2: TO252-J package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO252-P	2500	2	5000	5	25000
TO252-J	2500	2	5000	5	25000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFG10R20DF	TO252	yes	yes	yes

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