

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

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	40	V
Gate source voltage	V_{GS}	± 20	V
Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_D	130	A
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, pulse}$	390	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	130	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, Pulse}$	390	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	140	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	300	mJ
Operation and storage temperature	T_{stg} T_j	-55 to 175	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	R	1.07	$^{\circ}\text{C/W}$
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}	40			V	$V_{GS}=0\text{ V}$, $I_D=250\text{ A}$
Gate threshold voltage	$V_{GS(th)}$	1.3		2.5	V	$V_{DS}=V_{GS}$, $I_D=250\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		1.5	2.0		$V_{GS}=10\text{ V}$, $I_D=55\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		2.5	3.0		$V_{GS}=4.5\text{ V}$, $I_D=55\text{ A}$
Gate-source leakage current	I_{GSS}			100	nA	$V_{GS}=20\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		6587		pF	$V_{GS}=0\text{ V}$, $V_{DS}=20\text{ V}$, kHz
Output capacitance	C_{oss}		2537		pF	
Reverse transfer capacitance	C_{rss}		178		pF	
Turn-on delay time	$t_{d(on)}$		26.6		ns	$V_{GS}=10\text{ V}$, $V_{DS}=20\text{ V}$, R_G $I_D=20\text{ A}$
Rise time	t_r		9.3		ns	
Turn-off delay time	$t_{d(off)}$		96		ns	
Fall time	t_f		39.3		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		96.8		nC	$V_{GS}=10\text{ V}$, $V_{DS}=20\text{ V}$, $I_D=20\text{ A}$
Gate-source charge	Q_{gs}		14.5		nC	
Gate-drain charge	Q_{gd}		18.4		nC	
Gate plateau voltage	$V_{plateau}$		2.7		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=20\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		64.8		ns	$V_R=20\text{ V}$, $I_S=20\text{ A}$,
Reverse recovery charge	Q_{rr}		63.2		nC	
Peak reverse recovery current	I_{rrm}		2		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_{θ} 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) $V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $L=0.3\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

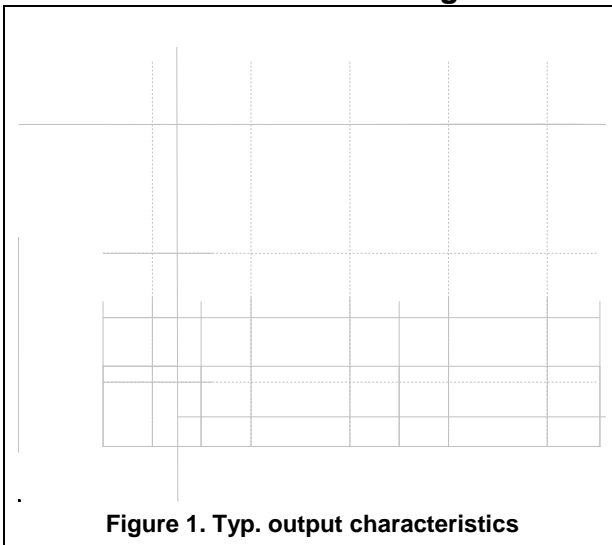


Figure 1. Typ. output characteristics

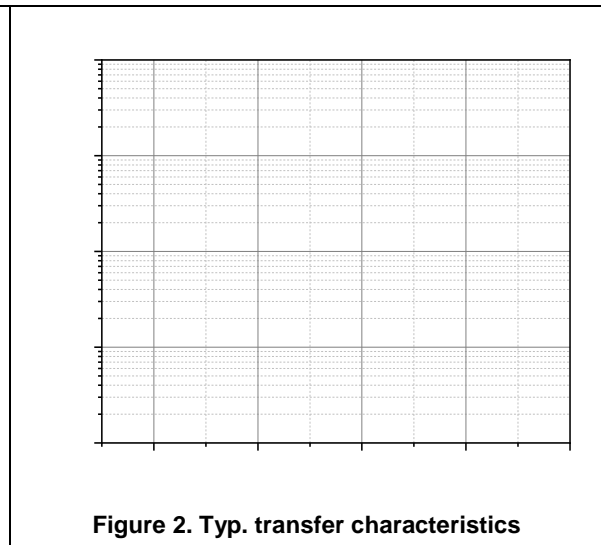


Figure 2. Typ. transfer characteristics

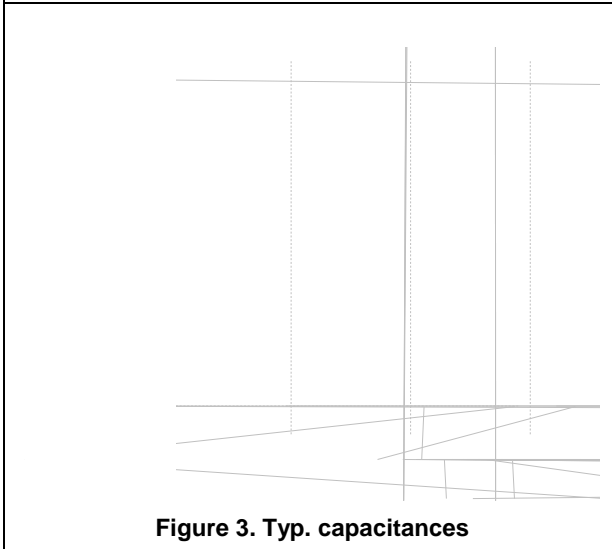


Figure 3. Typ. capacitances

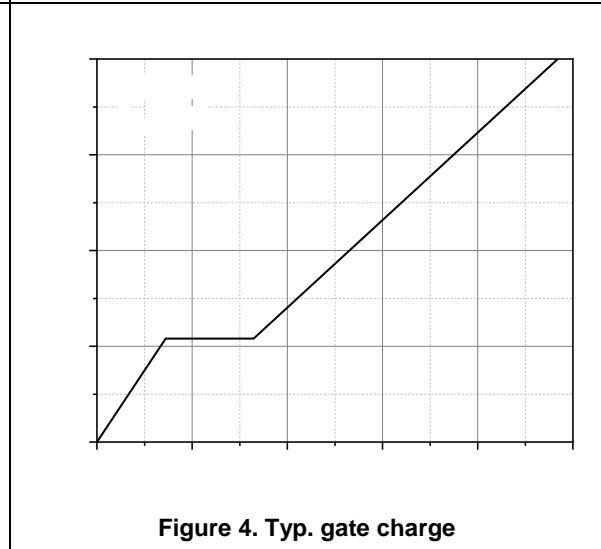


Figure 4. Typ. gate charge

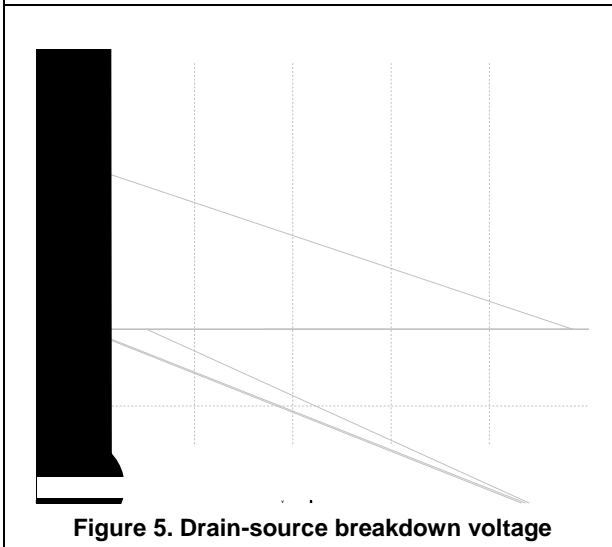


Figure 5. Drain-source breakdown voltage

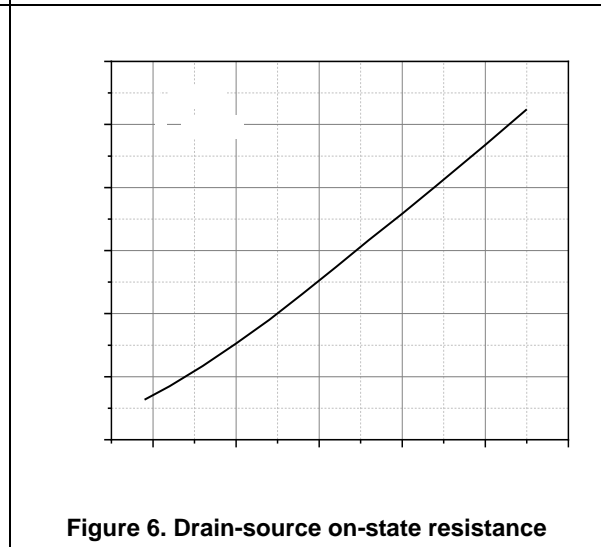


Figure 6. Drain-source on-state resistance

Test circuits and waveforms

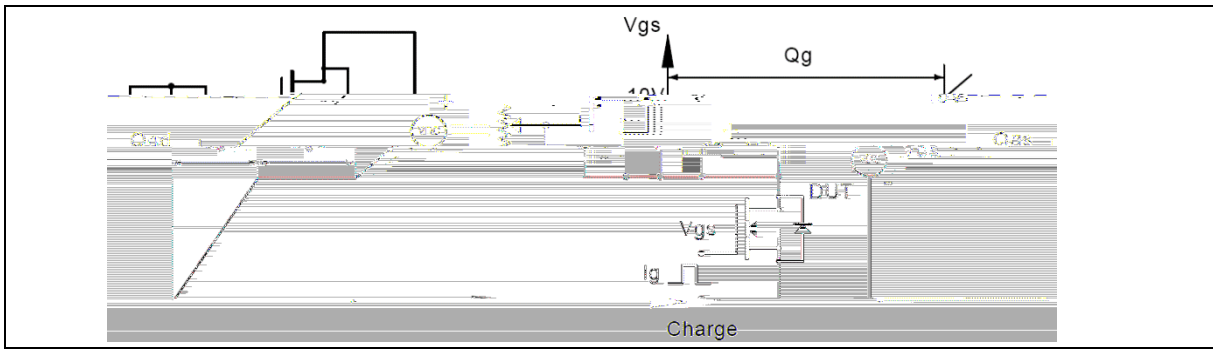


Figure 1. Gate charge test circuit & waveform

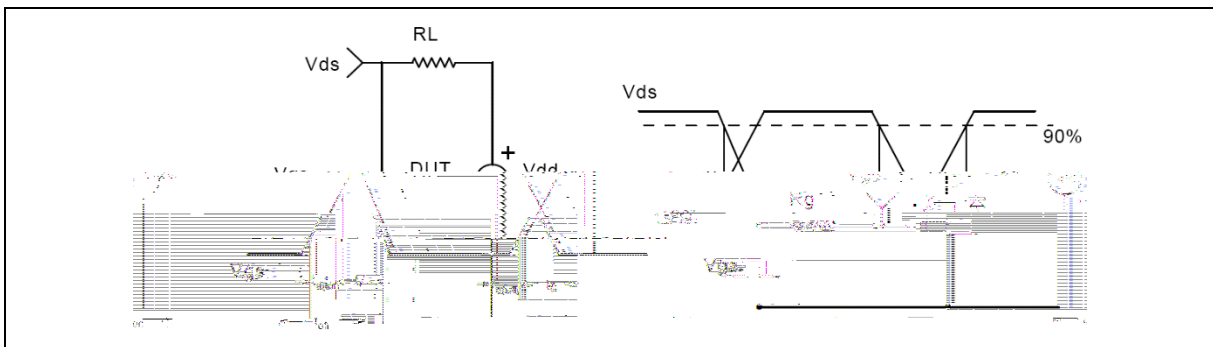


Figure 2. Switching time test circuit & waveforms

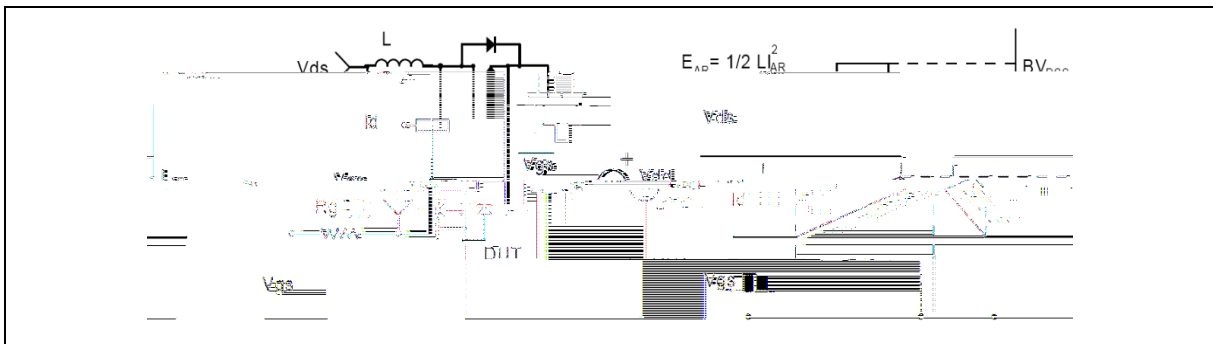


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

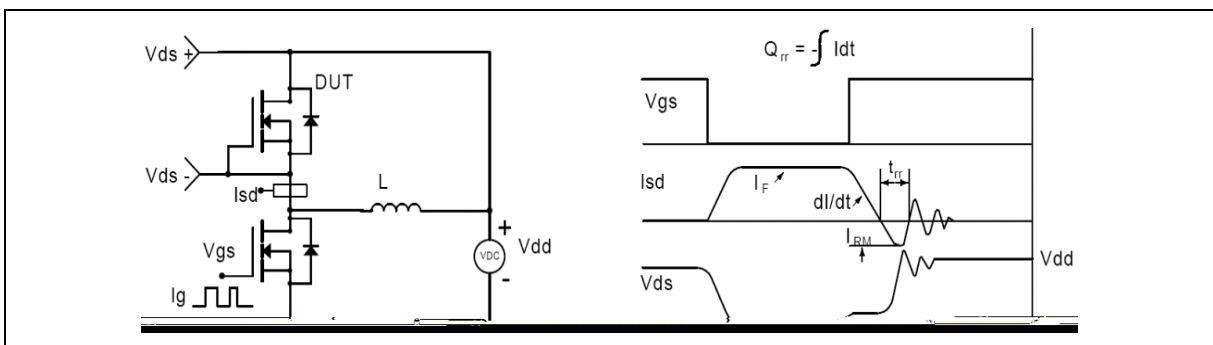


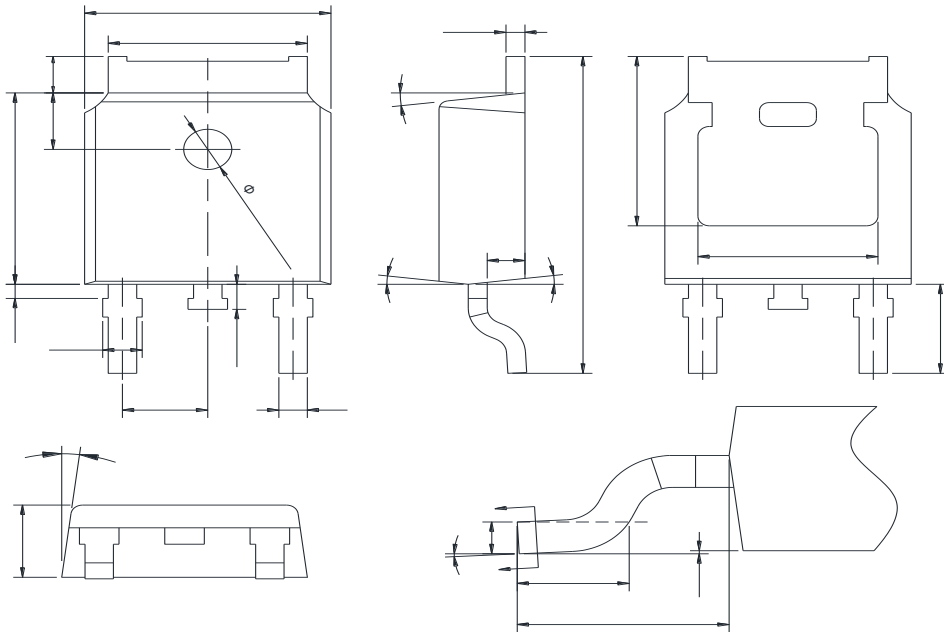
Figure 4. Diode reverse recovery test circuit & waveforms

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

reW* 0.4i

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	-	

Version 2: TO252-C package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO252-P	5000	2	10000	5	25000
TO252-C	5000	2	10000	5	25000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFS04R02DF	TO252	yes	yes	yes

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