

5.0A, 20V N-Channel Power MOSFET

GENERAL DESCRIPTION

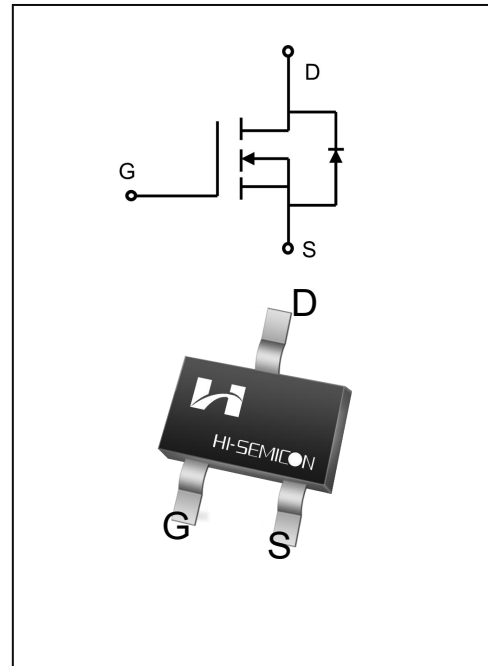
The Power MOSFET has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

Features

- ◆ $V_{DS}(V)=20V, I_D=5.0A$
- ◆ $R_{DS(ON)}$
 TYP: $19m\Omega @ V_{GS}=4.5V$
 TYP: $23m\Omega @ V_{GS}=2.5V$

Applications

- ◆ Battery protection
- ◆ Power management
- ◆ Load switch



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFS2312A	SOT-23	2312A	Pb Free	Reel

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current	I_D	$T_C = 25^{\circ}\text{C}$	A
		$T_C = 75^{\circ}\text{C}$	
Drain Current Pulsed(Note 1)	I_{DM}	15	A
Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C	P_D	1.25	W
Operation Junction Temperature Range	T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-55\sim+150$	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	TL	300	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _V DSS	V _{GS} =0V, I _D =250μA	20	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =20V, V _{GS} =0V	--	--	1	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =12V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =12V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	0.5	0.7	1.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =4.5V, I _D =3.0A	--	19	25	mΩ
		V _{GS} =2.5V, I _D =2.0A	--	23	30	mΩ
Dynamic Characteristics						
Input Capacitance	C _{iSS}	V _{DS} =10V V _{GS} =0V f=1.0MHZ	--	572	--	pF
Output Capacitance	C _{oSS}		--	85	--	
Reverse Transfer Capacitance	C _{rSS}		--	70	--	pF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V; V _{GS} =4.5V R _G =5.5Ω I _D =3.0A (Note 2.3)	--	9.5		nS
Turn-on Rise Time	t _r		--	33.6		
Turn-off Delay Time	t _{d(off)}		--	37.5		
Turn-off Fall Time	t _f		--	11.3		
Total Gate Charge	Q _g	V _{DS} =10V, I _D =3.0A V _{GS} =4.5V (Note 2.3)	--	10.9	--	nC
Gate-Source Charge	Q _{gs}		--	2.4	--	
Gate-Drain Charge	Q _{gd}		--	3.1	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	5.0	A
Pulsed Source Current	I_{SM}		--	--	15	
Diode Forward Voltage	V_{SD}	$I_S=5.0A, V_{GS}=0V$	--	0.9	1.2	V

NOTE:

1. Pulse width limited by maximum junction temperature
2. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
3. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1 Output Characteristics

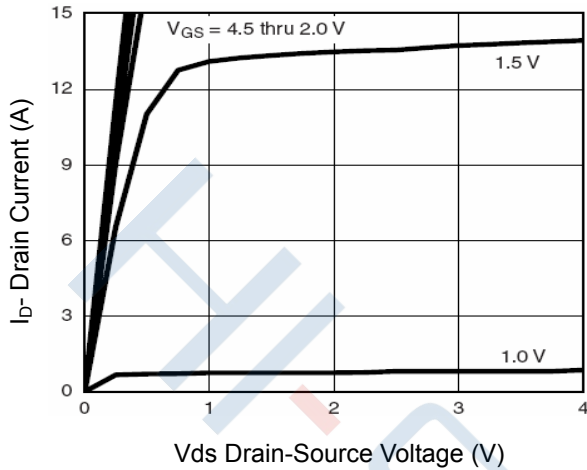


Figure 2 Transfer Characteristics

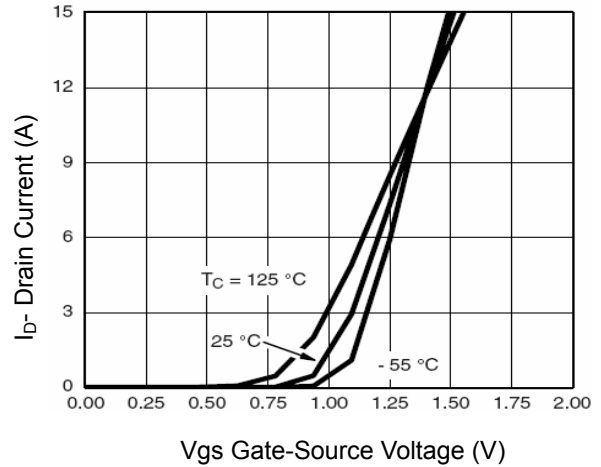


Figure 3 Drain-Source On-Resistance

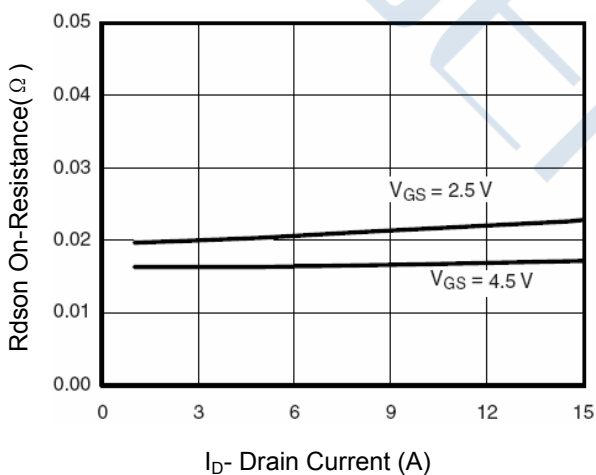


Figure 4 Source- Drain Diode Forward

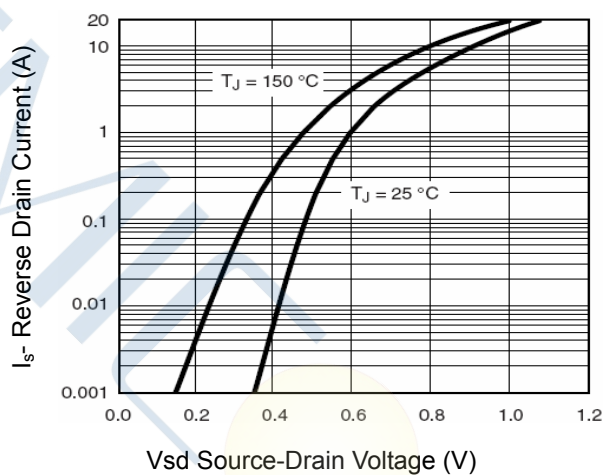


Figure 5 Capacitance vs Vds

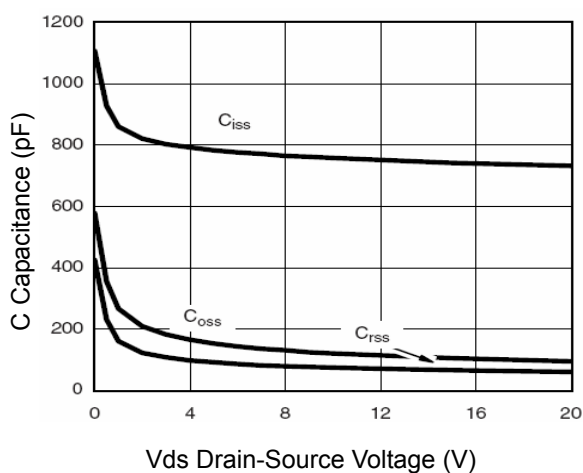


Figure 6 Gate Charge

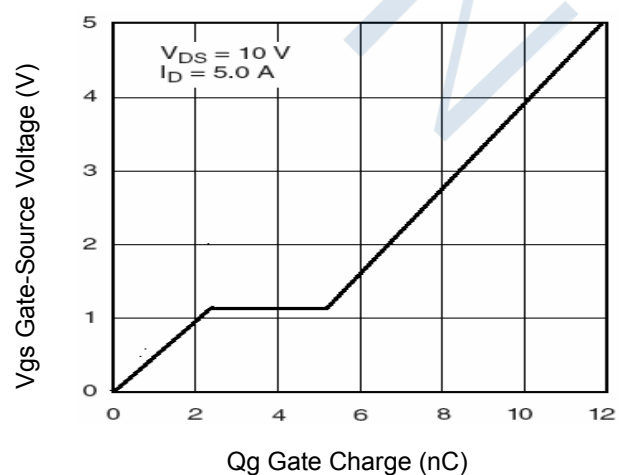


Figure 7 Power Dissipation

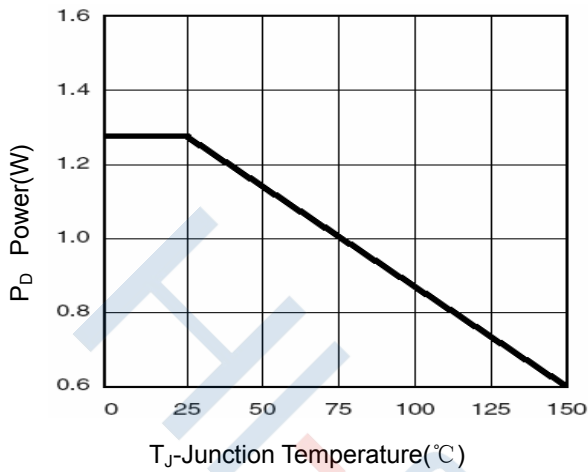


Figure 8 Drain Current

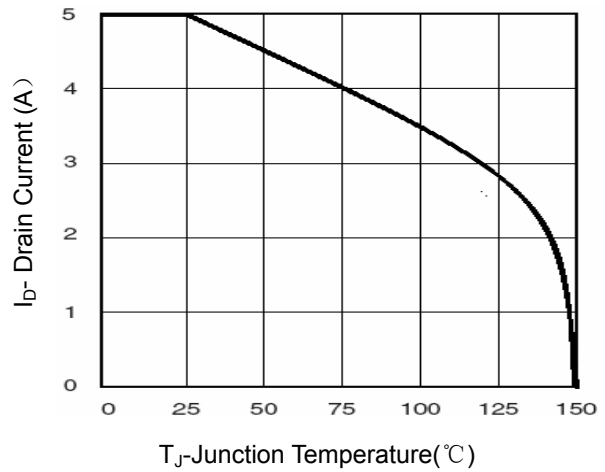


Figure 9 Rdson vs Vgs

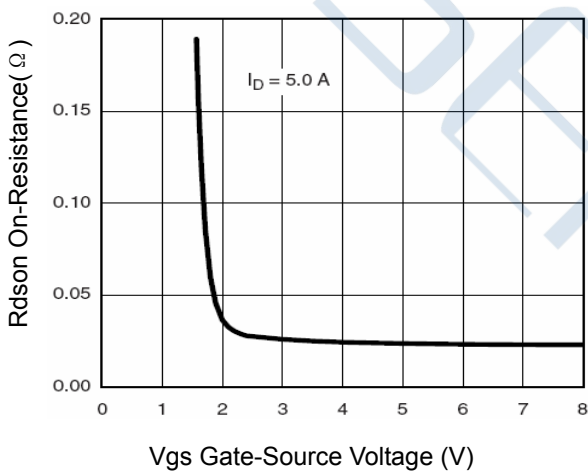


Figure 10 Drain-Source On-Resistance

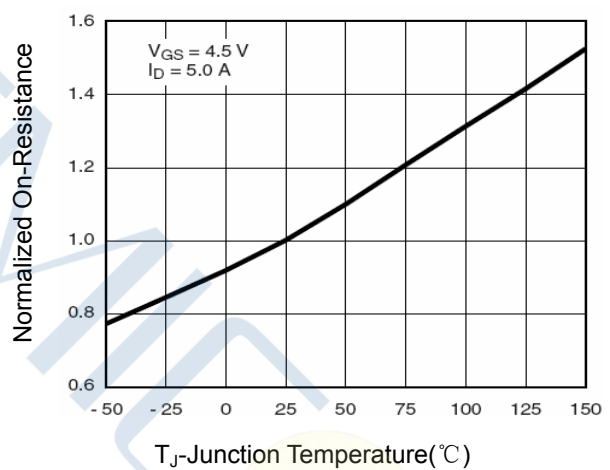
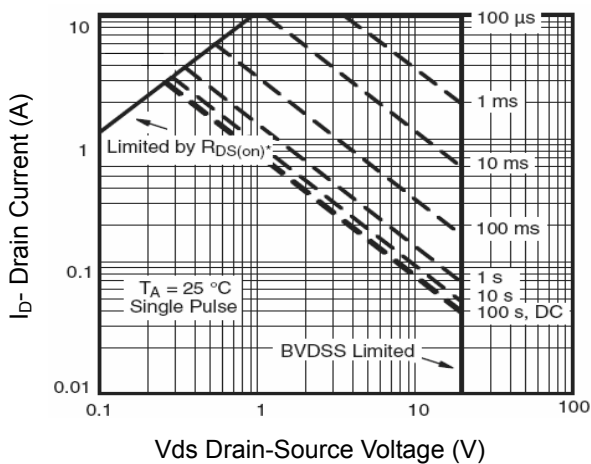
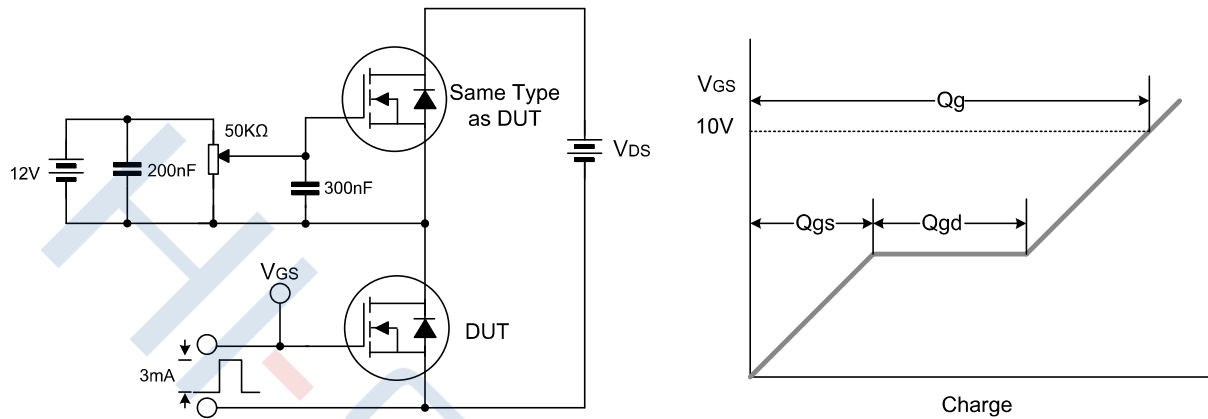


Figure 11 Safe Operation Area

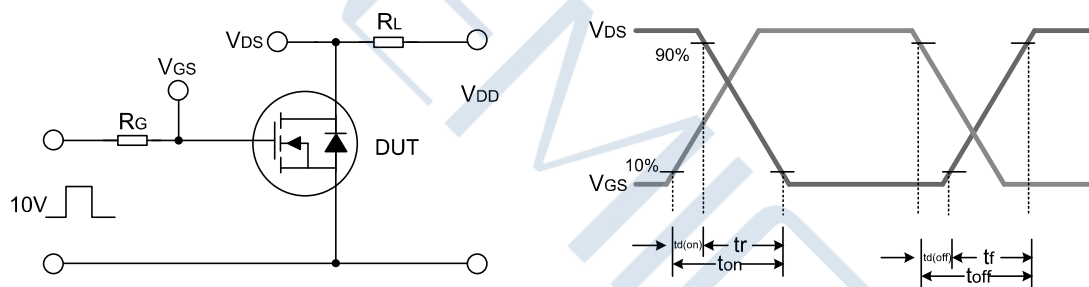


Test Circuit

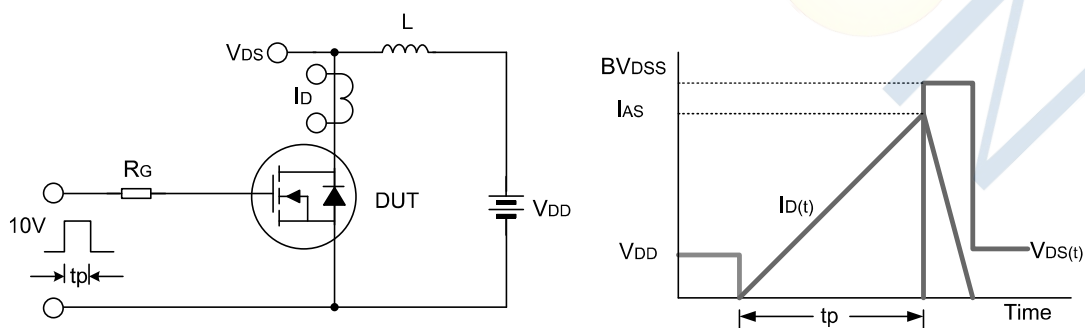
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

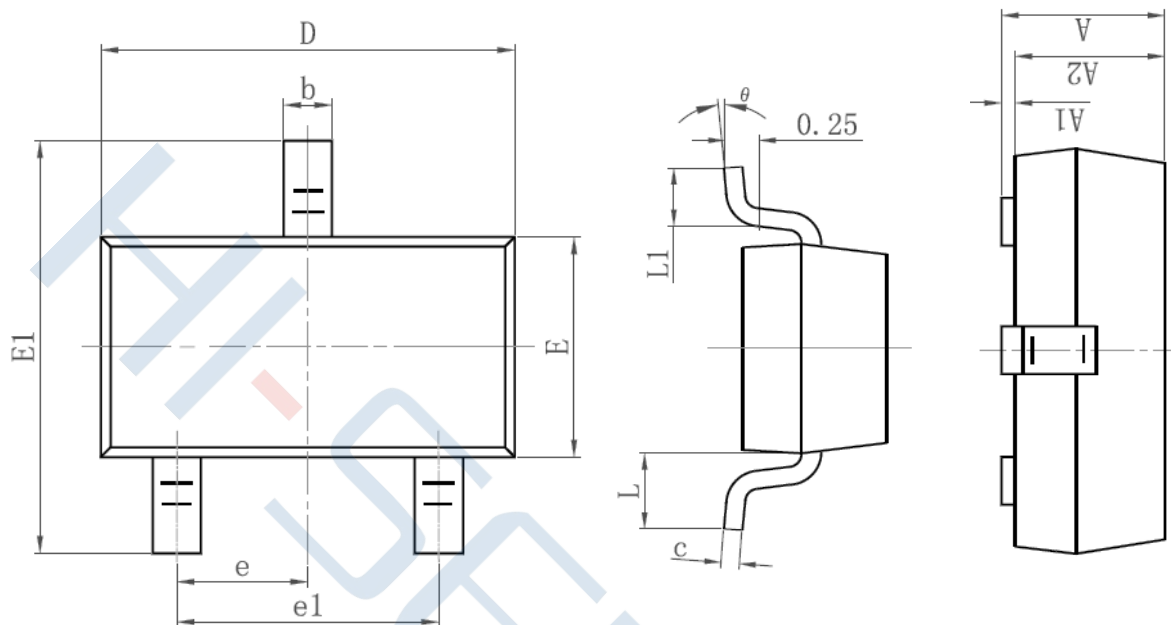


Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of SOT-23

Unit:mm



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

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