

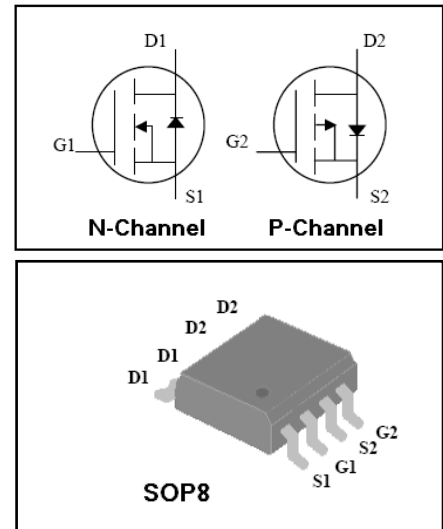
Features

- ◆ N-CH: 30V/6A, $R_{DS(ON)}=30m\Omega(Typ)@V_{GS}=4.5V$
- ◆ P-CH: -30V/-5.2A, $R_{DS(ON)}=45m\Omega(Typ)@V_{GS}=-4.5V$
- ◆ Low On-Resistance
- ◆ Low V_{th} Application
- ◆ Fast Switching
- ◆ 150°C Operating Temperature
- ◆ Lead-Free, Green Product

Description

VS4606AS designed by the trench processing techniques to achieve extremely low on-resistance. And fast switching speed and improved transfer effective . These features combine to make this design an extremely efficient and reliable device for variety of DC-DC applications.

Pin Description



Absolute Maximum Ratings

Symbol	Parameter		Rating		Unit
			NMOS	PMOS	
Common Ratings (T _c =25°C Unless Otherwise Noted)					
V _{GS}	Gate-Source Voltage		±30	±30	V
V _{(BR)DSS}	Drain-Source Breakdown Voltage		30	-30	V
T _J	Maximum Junction Temperature		175		°C
T _{STG}	Storage Temperature Range		-50 to 150		°C
I _S	Diode Continuous Forward Current ^①	T _C =25°C	6	-5.2	A
Mounted on Large Heat Sink					
I _{DM}	Pulse Drain Current Tested ^②	T _C =25°C	20	18	A
I _D	Continuous Drain Current(VGS=-10V)	T _C =25°C	6.0	-5.2	A
		T _C =100°C	3.6	-3.5	
P _D	Maximum Power Dissipation	T _C =25°C	2		W
R _{θJA}	Thermal Resistance Junction-Ambient		62.5		°C/W

N-Channel

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current (T _c =25°C)	V _{DS} =30V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current (T _c =125°C)	V _{DS} =30V,V _{GS} =0V	--	--	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±16V,V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =250μA	0.6	0.9	1.2	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =4A	--	30	40	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =3.3V, I _D =2A	--	32	60	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =15V,V _{GS} =0V, f=1MHz	--	420	--	pF
C _{oss}	Output Capacitance		--	60	--	pF
C _{rss}	Reverse Transfer Capacitance		--	35	--	pF
Q _g	Total Gate Charge	V _{DS} =15V,I _D =1A, V _{GS} =4.5V	--	11	--	nC
Q _{gs}	GateSource Charge		--	3.0	--	nC
Q _{gd}	GateDrain Charge		--	4.0	--	nC
Switching Characteristics						
t _{d(on)}	Turnon Delay Time	V _{DD} =15V, I _D =1A, R _G =3.3Ω, V _{GS} =4.5V	--	14	--	nS
t _r	Turnon Rise Time		--	16	--	nS
t _{d(off)}	TurnOff Delay Time		-	28	--	nS
t _f	TurnOff Fall Time		--	11	--	nS
Source Drain Diode Characteristics						
I _{SD}	Sourcedrain current(Body Diode) ^①	T _c =25°C	8	--	--	A
V _{SD}	Forward on voltage	T _J =25°C,I _{SD} =3A, V _{GS} =0V	--	0.7	1.3	V

Notes:

- ① Pulse test ; Pulse width≤300μs, duty cycle≤2%.
 ② Pulse width limited by maximum allowable junction temperature

P-Channel

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =-250μA	-30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current (T _c =25°C)	V _{DS} =-30V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current (T _c =125°C)	V _{DS} =-30V,V _{GS} =0V	--	--	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±12V,V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =-250μA	-0.6	-0.9	-1.2	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-3A	--	45	65	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-3.3V, I _D =-2A	--	55	75	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =-15V,V _{GS} =0V, f=1MHz	--	500	--	pF
C _{oss}	Output Capacitance		--	80	--	pF
C _{rss}	Reverse Transfer Capacitance		--	65	--	pF
Q _g	Total Gate Charge	V _{DS} =-15V,I _D =-1A, V _{GS} =-4.5V	--	12	--	nC
Q _{gs}	Gate-Source Charge		--	4	--	nC
Q _{gd}	Gate-Drain Charge		--	6	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =-15V, I _D =-1A, R _G =3.3Ω, V _{GS} =-4.5V	--	8.2	--	nS
t _r	Turn-on Rise Time		--	7.3	--	nS
t _{d(off)}	Turn-Off Delay Time		--	33	--	nS
t _f	Turn-Off Fall Time		--	28	--	nS
Source- Drain Diode Characteristics						
I _{SD}	Source-drain current(Body Diode)	T _c =25°C	-5.8 ^①	--		A
V _{SD}	Forward on voltage	T _J =25°C,I _{SD} =-3A V _{GS} =0V	--	-0.75	-1.3	V

Notes:

- ① Pulse test ; Pulse width≤300μs, duty cycle≤2%.
- ② Pulse width limited by maximum allowable junction temperature.

N-Channel Typical Characteristics

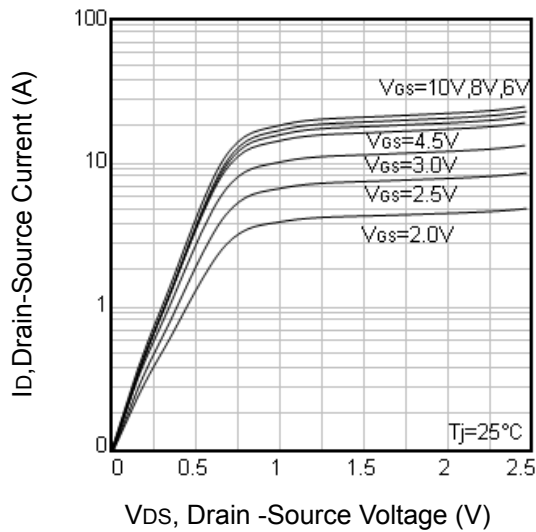


Fig1. Typical Output Characteristics

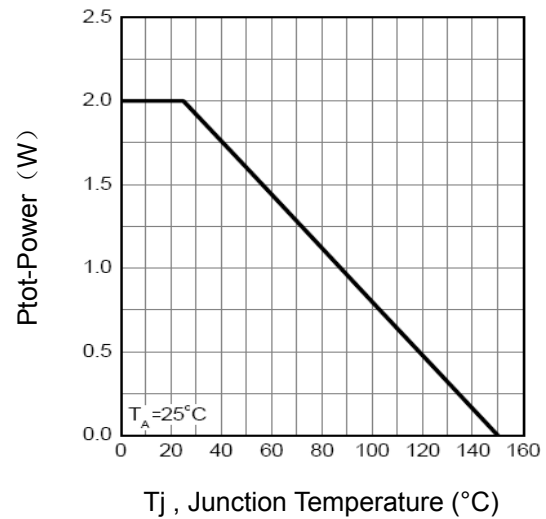


Fig2. Power Dissipation

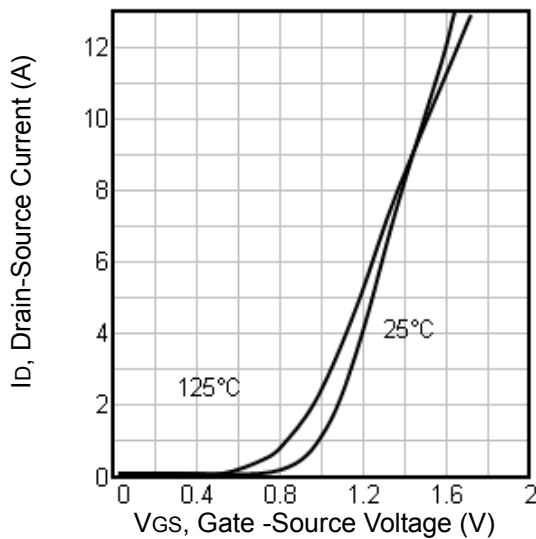


Fig3. Typical Transfer Characteristics

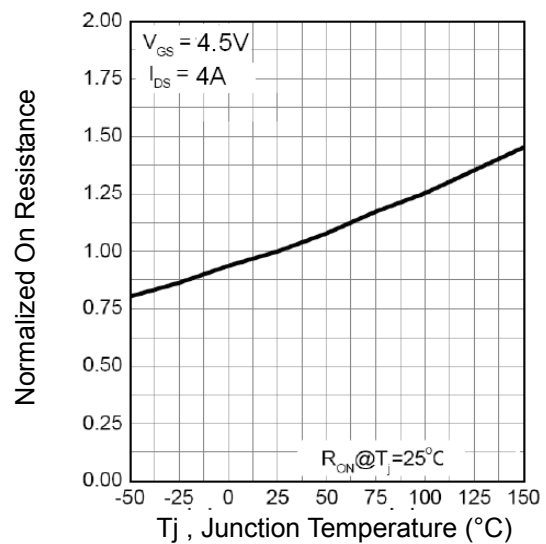


Fig4. Normalized On-Resistance Vs. Temperature

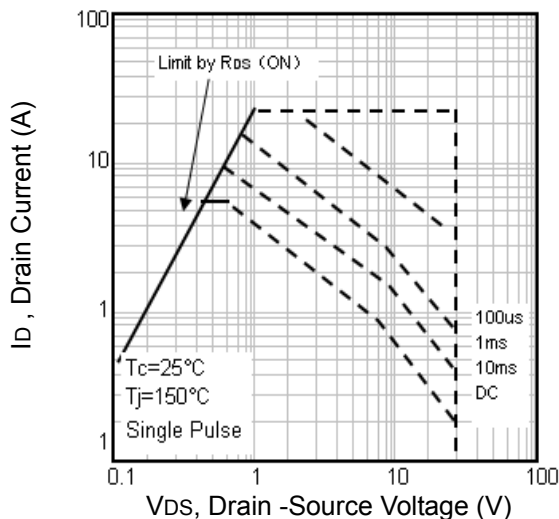


Fig5. Maximum Safe Operating Area

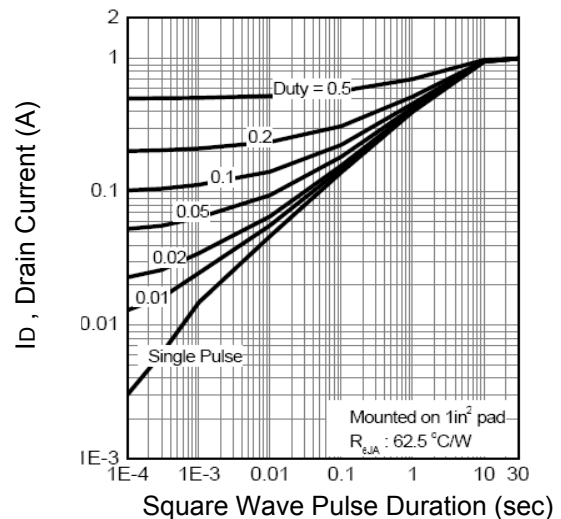


Fig6. Thermal Transient Impedance

N-Channel Typical Characteristics

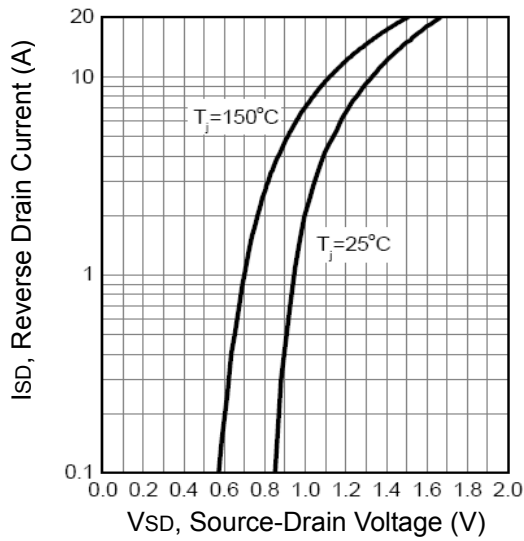


Fig7. Typical Source-Drain Diode Forward Voltage

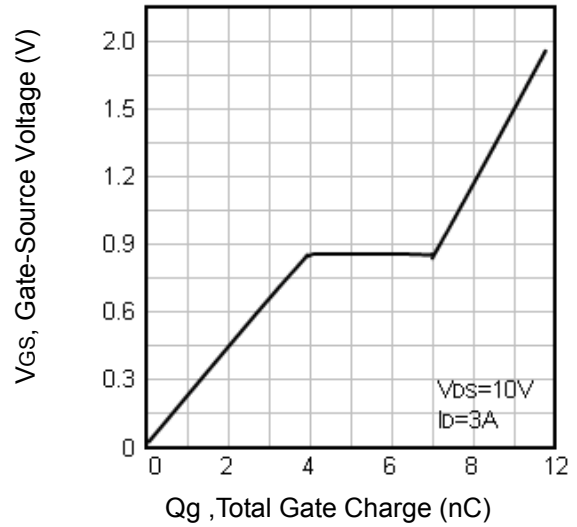


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

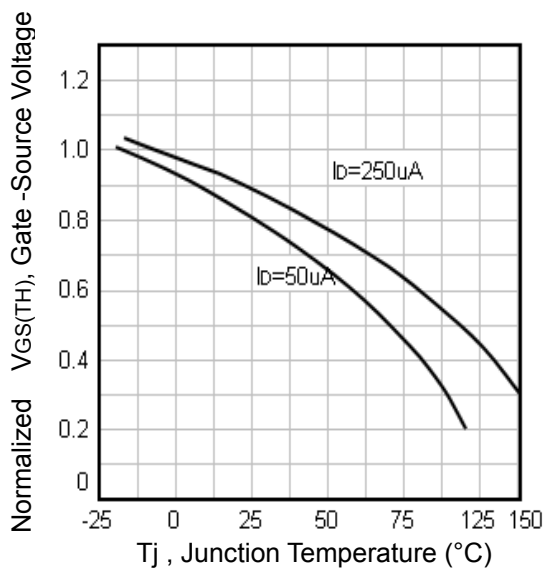


Fig9. Threshold Voltage Vs. Temperature

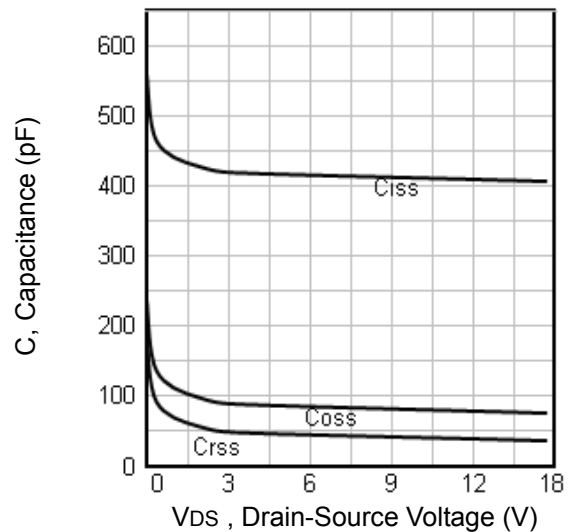


Fig10. Typical Capacitance Vs. Drain-Source Voltage

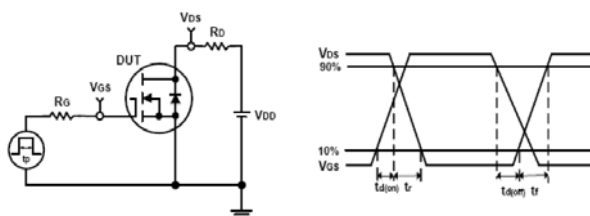


Fig11. Switching Time Test Circuit and waveforms

P-Channel Typical Characteristics

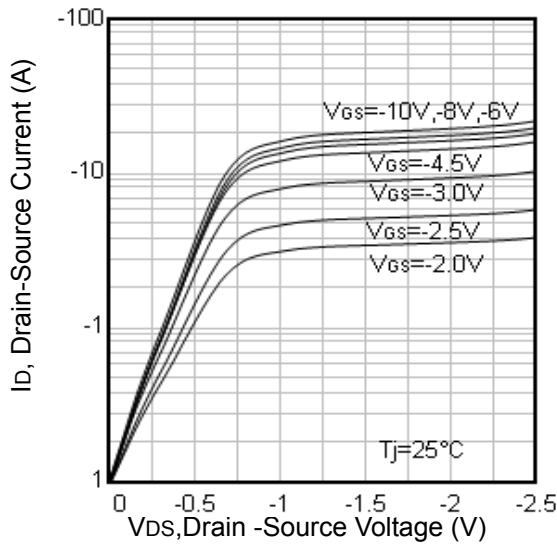


Fig1. Typical Output Characteristics

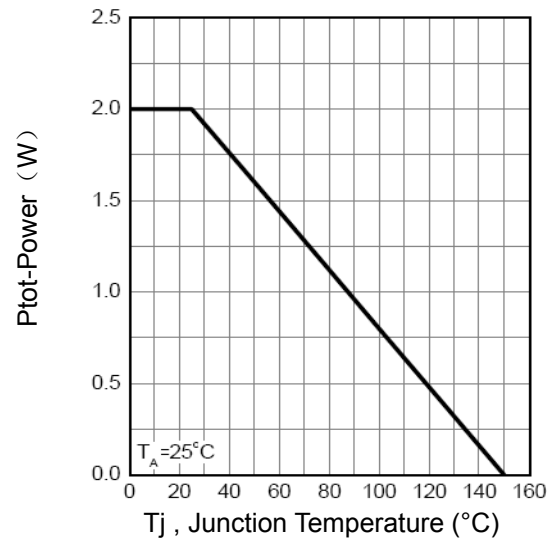


Fig2. Power Dissipation

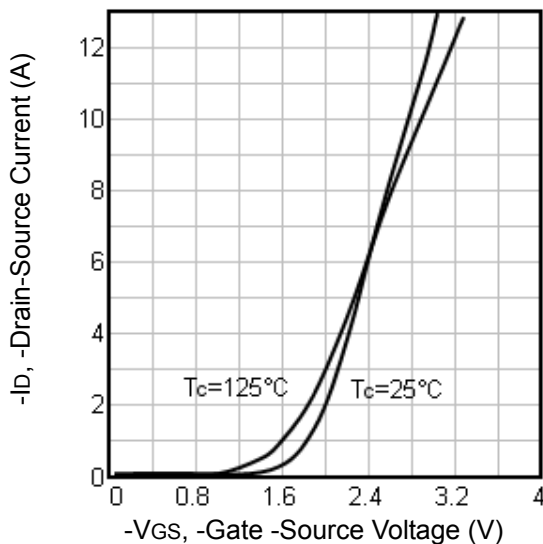


Fig3. Typical Transfer Characteristics

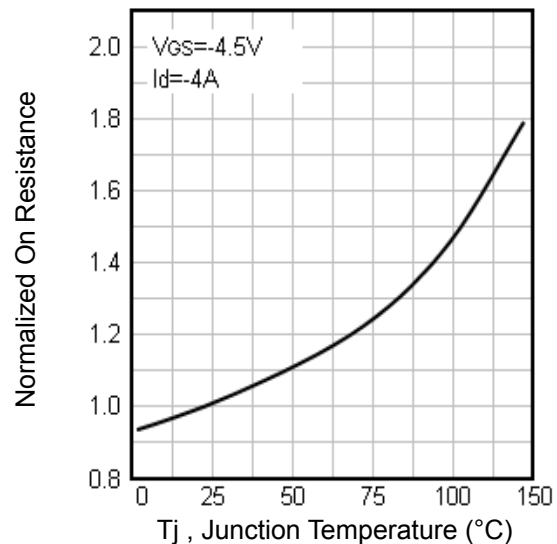


Fig4. Normalized On-Resistance Vs. Temperature

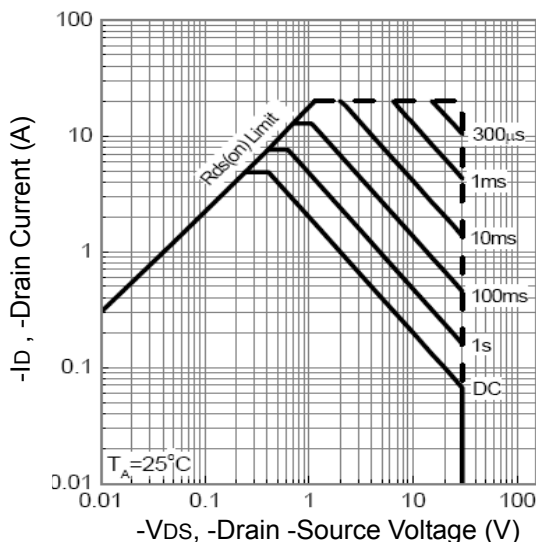


Fig5. Maximum Safe Operating Area

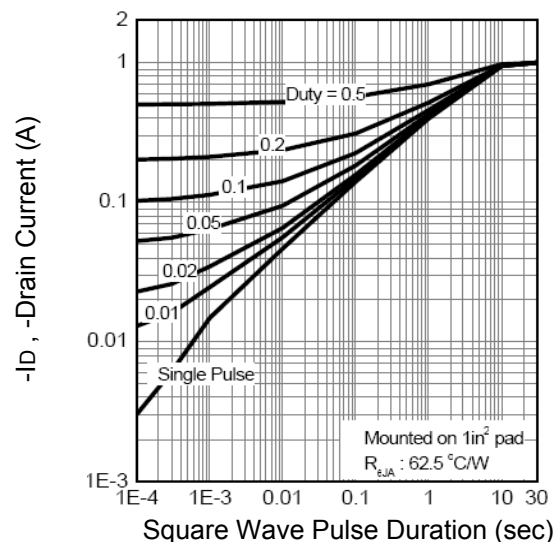


Fig6. Thermal Transient Impedance

P-Channel Typical Characteristics

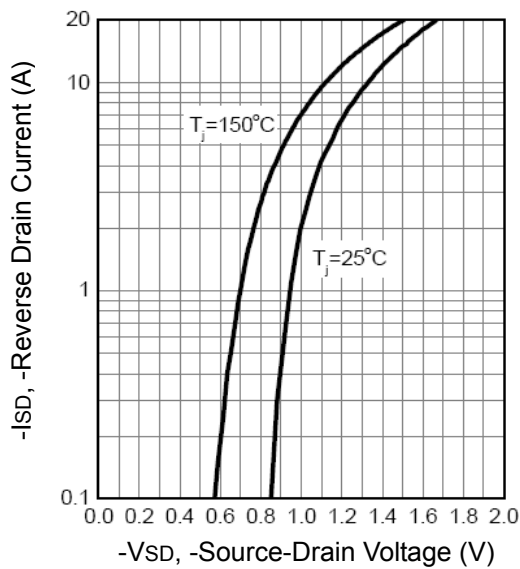


Fig7. Typical Source-Drain Diode Forward Voltage

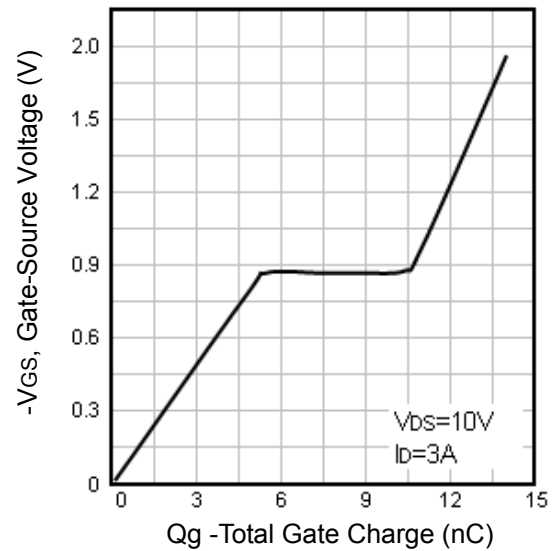


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

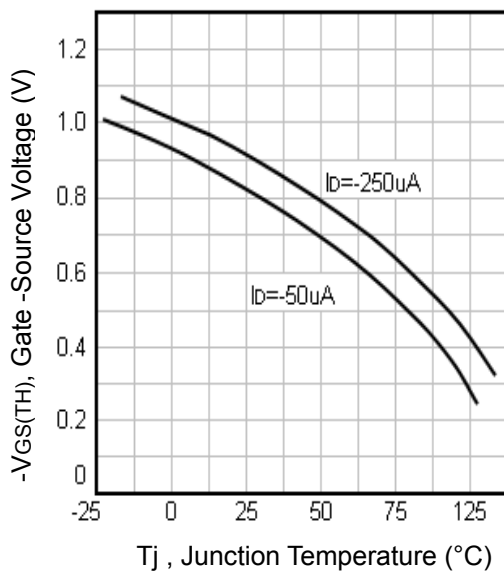


Fig9. Threshold Voltage Vs. Temperature

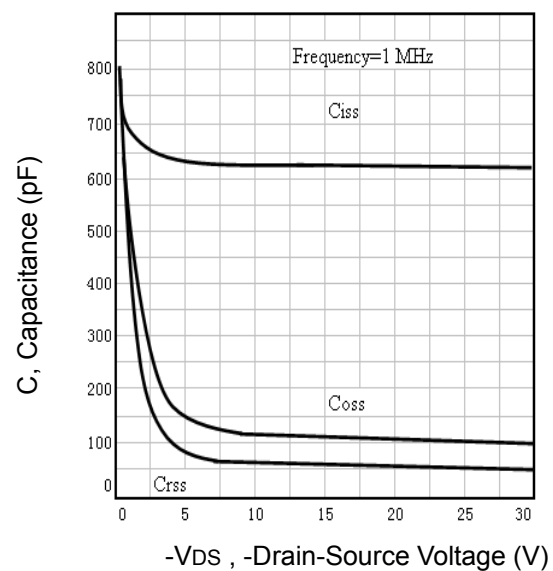


Fig10. Typical Capacitance Vs. Drain-Source Voltage

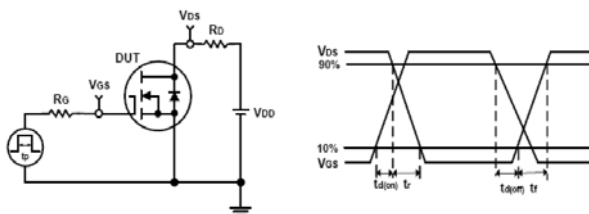
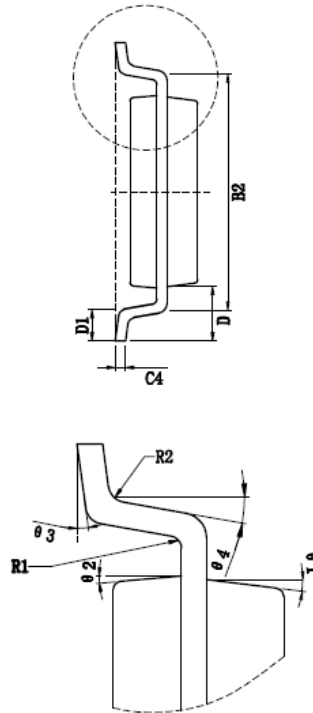
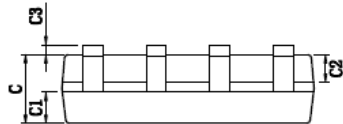
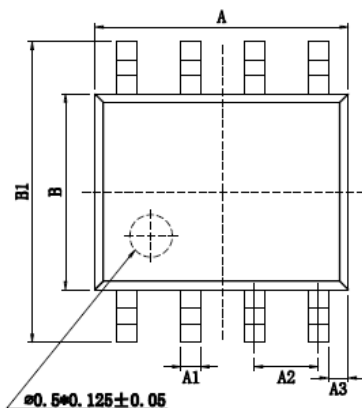


Fig11. Switching Time Test Circuit and waveforms

SOP8 Mechanical Data



Symbol	Dimensions In Millimeters		
	Min	Nom	Max
A	4.800	4.900	5.000
A1	0.356	0.406	0.456
A2	1.270Typ.		
A3	0.345Typ.		
B	3.800	3.900	4.000
B1	5.800	6.000	6.200
B2	5.00Typ.		
C	1.300	1.400	1.500
C1	0.550	0.600	0.650
C2	0.550	0.600	0.650
C3	0.050	--	0.200
C4	0.203Typ.		
D	1.050Typ.		
D1	0.400	0.500	0.600
R1	0.200Typ.		
R2	0.200Typ.		
$\theta 1$	17°Typ.		
$\theta 2$	13°Typ.		
$\theta 3$	0°~ 8°Typ.		
$\theta 4$	4°~ 12°Typ.		

Order Information

Product	Marking	Package	Packaging	Min Unit Quantity
VS4606AS	VS4606AS	SOP8	3000/Reel	6000

Customer Service

Sales and Service:

Sales@vgsemi.com

Shen Zhen Vangaurd Semiconductor CO., LTD

TEL: (86-755) -26902410

FAX: (86-755) -26907027

WEB: www.vgsemi.com