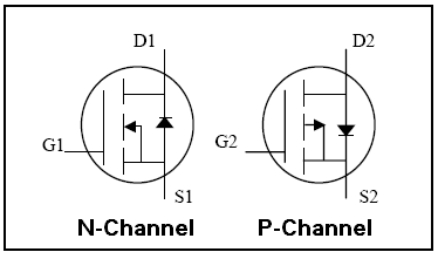
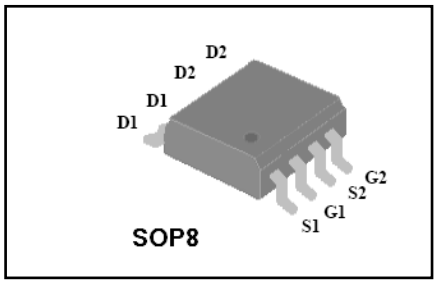
Features

- N-CH: 60V/8A,$R_{DS(ON)}$=35mΩ
- P-CH: -60V/-7.5A,$R_{DS(ON)}$=75mΩ
- Low On-Resistance
- 150°C Operating Temperature
- Fast Switching
- Lead-Free, Green Product

Pin Description





Description

VS4559AS 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.

Absolute Maximum Ratings

Symbol	Parameter		Rating		Unit
			NMOS	PMOS	
Common Ratings (T_C=25°C Unless Otherwise Noted)					
V_{GS}	Gate-Source Voltage		±60	±60	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		60	-60	V
T_J	Maximum Junction Temperature		175		°C
T_{STG}	Storage Temperature Range		-50 to 150		°C
I_S	Diode Continuous Forward Current①	T_C=25°C	8	-7.5	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested②	T_C=25°C	28	-27	A
I_D	Continuous Drain Current(VGS=-10V)	T_C=25°C	8	-7.5	A
		T_C=100°C	5.5	-5	
P_D	Maximum Power Dissipation	T_C=25°C	2		W
$R_{\theta JA}$	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	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current (Tc=25℃)	V_{DS}=48V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current (Tc=125℃)	V_{DS}=48V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.0	2.0	3.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=8A	--	35	50	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=4A	--	55	70	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=30V,V_{GS}=0V, f=1MHz	--	750	--	pF
C_{oss}	Output Capacitance		--	155	--	pF
C_{rss}	Reverse Transfer Capacitance		--	48	--	pF
Q_g	Total Gate Charge	V_{DS}=30V,I_D=4A, V_{GS}=4.5V	--	20	--	nC
Q_{gs}	GateSource Charge		--	11	--	nC
Q_{gd}	GateDrain Charge		--	8	--	nC
Switching Characteristics						
$t_{d(on)}$	Turnon Delay Time	V_{DD}=30V, I_D=6A, R_G=3.3Ω, V_{GS}=10V	--	15	--	nS
t_r	Turnon Rise Time		--	19	--	nS
$t_{d(off)}$	TurnOff Delay Time		-	30	--	nS
t_f	TurnOff Fall Time		--	13	--	nS
Source Drain Diode Characteristics						
I_{SD}	Sourcedrain current(Body Diode) ①	T_c=25℃	8	--	--	A
V_{SD}	Forward on voltage	T_j=25℃,I_{SD}=4A, V_{GS}=0V	--	0.82	1.2	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	-60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current (Tc=25℃)	V_{DS}=-48V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current (Tc=125℃)	V_{DS}=-48V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250μA	-1.0	-2.0	-3.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-6A	--	75	95	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-4A	--	95	110	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=-30V,V_{GS}=0V, f=1MHz	--	750	--	pF
C_{oss}	Output Capacitance		--	95	--	pF
C_{rss}	Reverse Transfer Capacitance		--	50	--	pF
Q_g	Total Gate Charge	V_{DS}=-30V,I_D=-6A, V_{GS}=-4.5V	--	19	--	nC
Q_{gs}	Gate-Source Charge		--	12	--	nC
Q_{gd}	Gate-Drain Charge		--	6	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-30V, I_D=-6A, R_G=3.3Ω, V_{GS}=-4.5V	--	8.5	--	nS
t_r	Turn-on Rise Time		--	14	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	21	--	nS
t_f	Turn-Off Fall Time		--	15	--	nS
Source- Drain Diode Characteristics						
I_{SD}	Source-drain current(Body Diode)	T_c=25℃	-7.8①	--		A
V_{SD}	Forward on voltage	T_j=25℃,I_{SD}=-4A V_{GS}=0V	--	-0.83	-1.2	V

Notes:

① Pulse test ; Pulse width≤300μs, duty cycle≤2%.

② Pulse width limited by maximum allowable junction temperature.

N-Channel Typical **Characteristics**

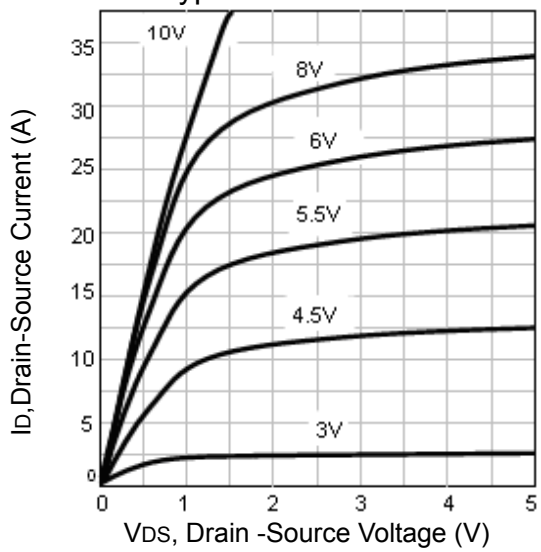


Fig1. Typical Output Characteristics

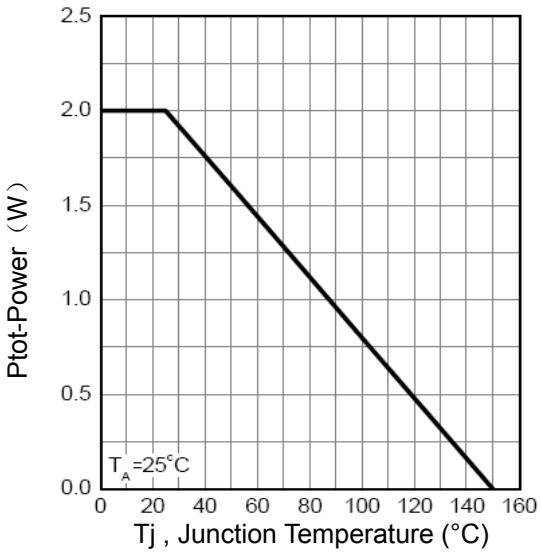


Fig2. Power Dissipation

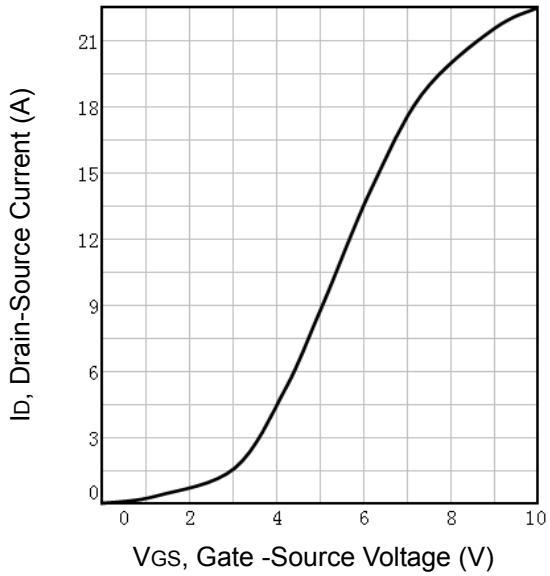


Fig3. Typical Transfer Characteristics

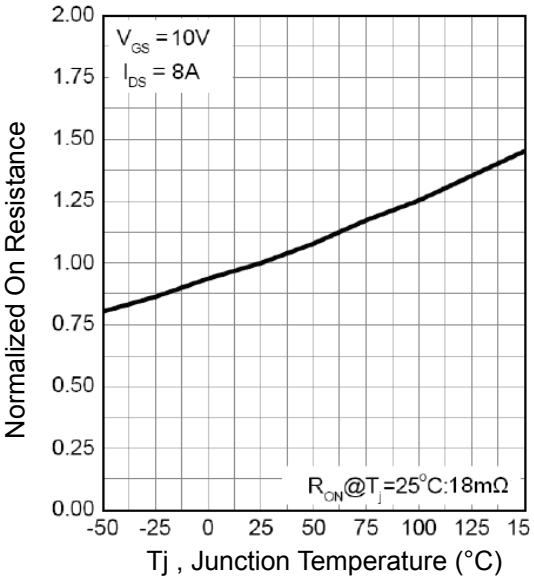


Fig4. Normalized On-Resistance Vs. Temperature

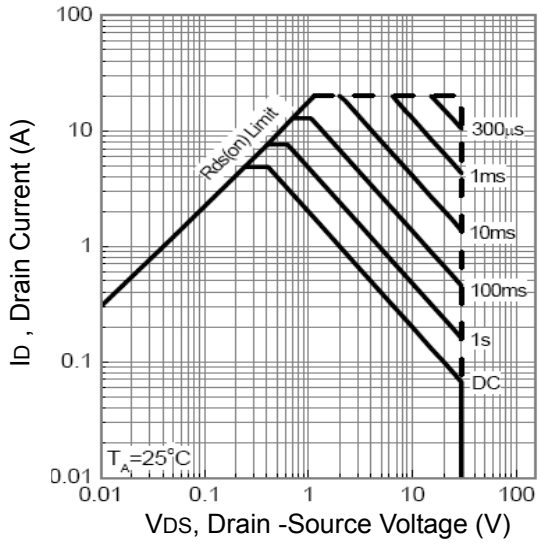


Fig5. Maximum Safe Operating Area

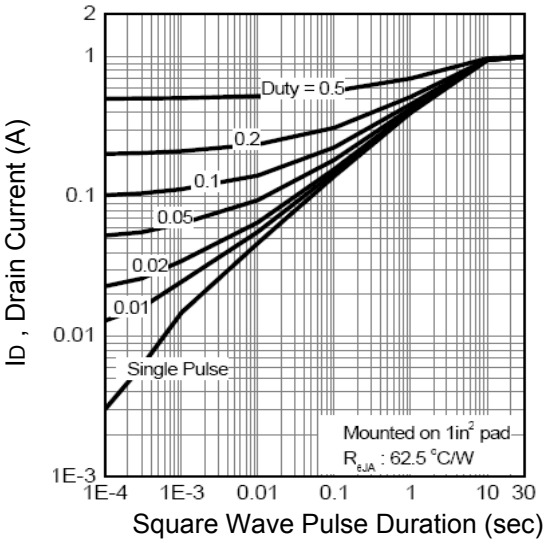


Fig6. Thermal Transient Impedance

N-Channel Typical **Characteristics**

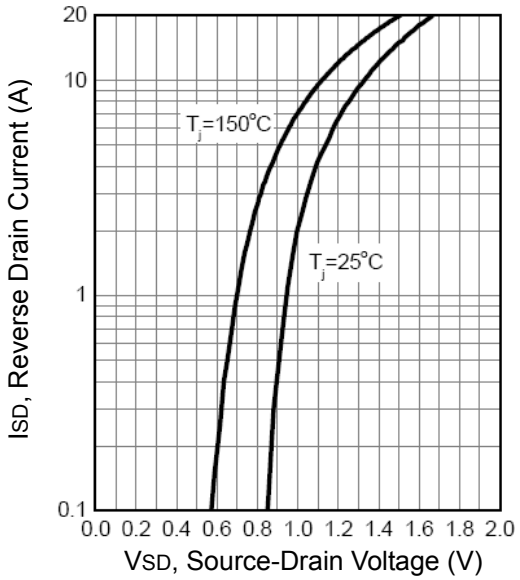


Fig7. Typical Source-Drain Diode Forward Voltage

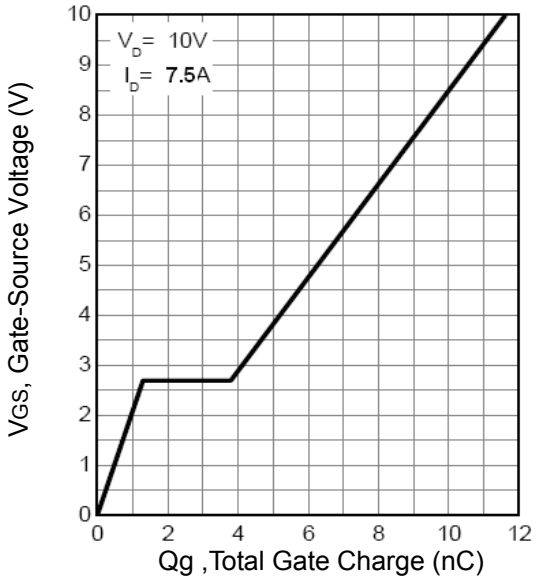


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

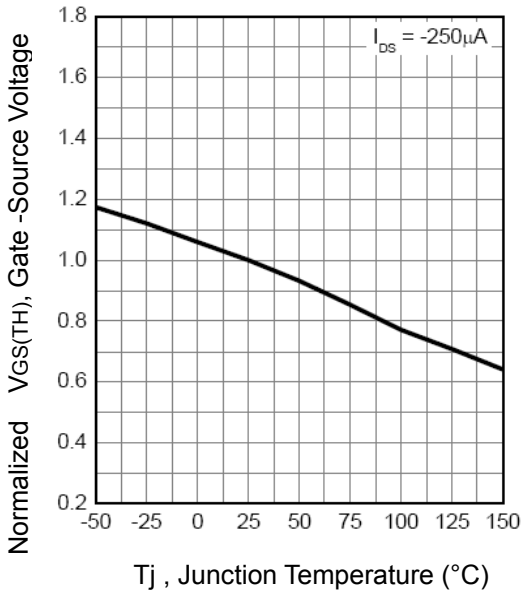


Fig9. Threshold Voltage Vs. Temperature

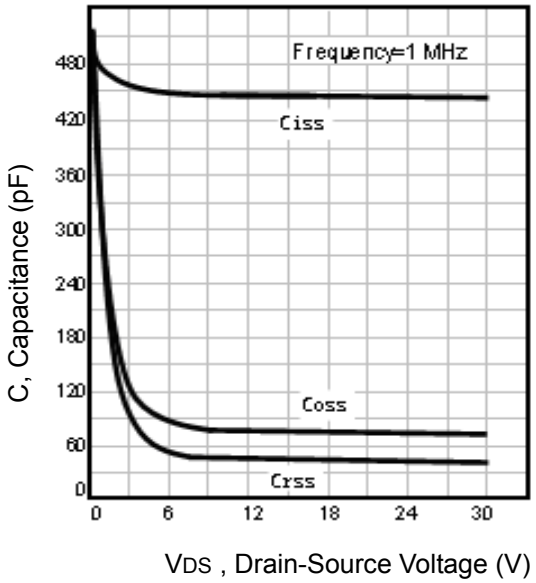


Fig10. Typical Capacitance Vs.Drain-Source Voltage

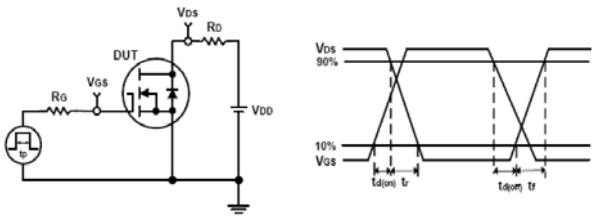


Fig11. Switching Time Test Circuit and waveforms

P-Channel Typical **Characteristics**

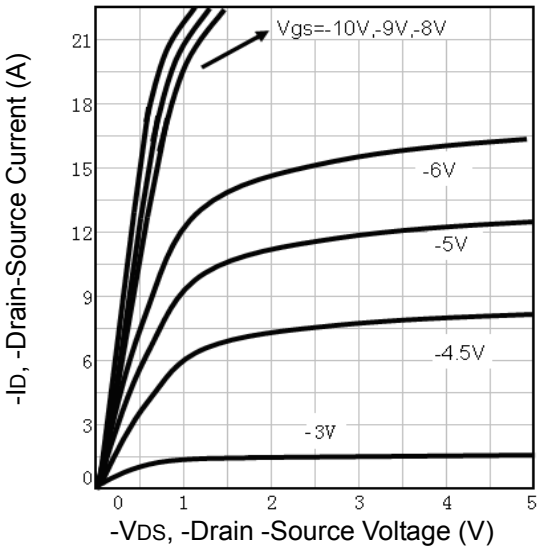


Fig1. Typical Output Characteristics

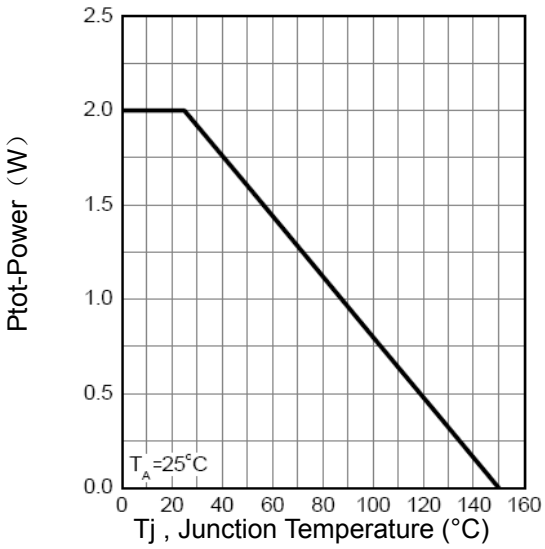


Fig2. Power Dissipation

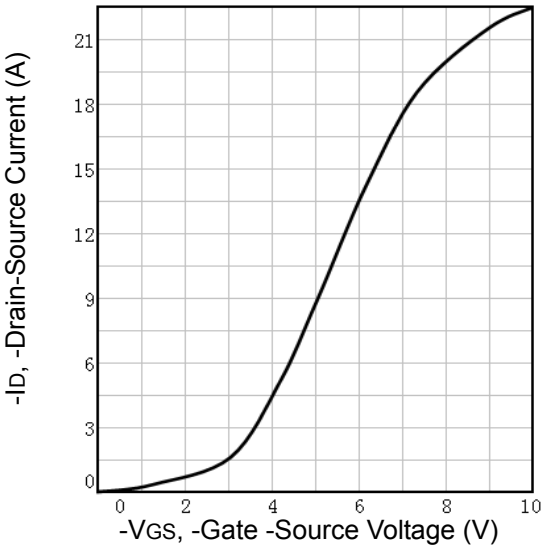


Fig3. Typical Transfer Characteristics

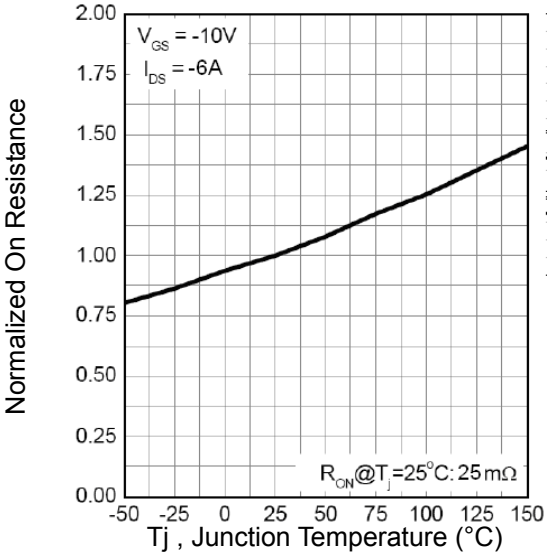


Fig4. Normalized On-Resistance Vs. Temperature

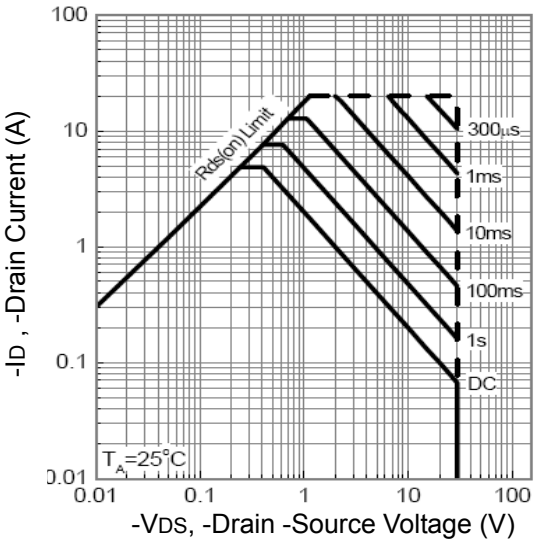


Fig5. Maximum Safe Operating Area

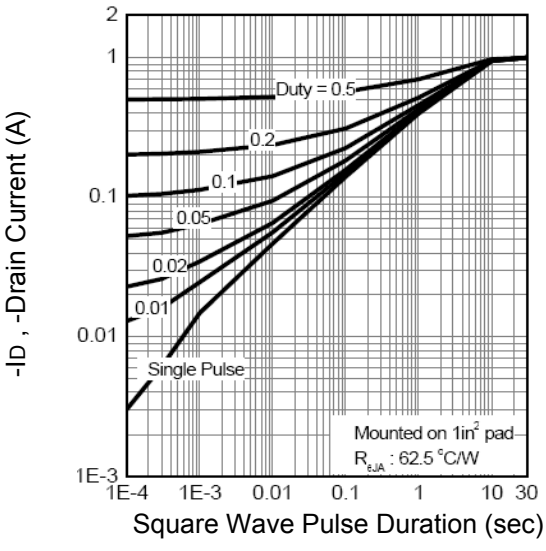


Fig6. Thermal Transient Impedance

P-Channel Typical **Characteristics**

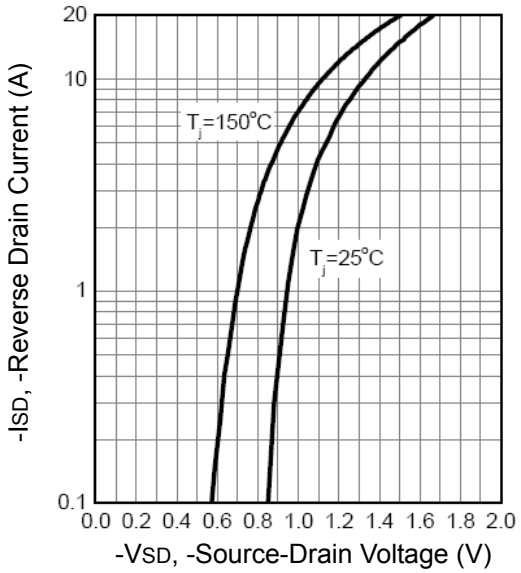


Fig7. Typical Source-Drain Diode Forward Voltage

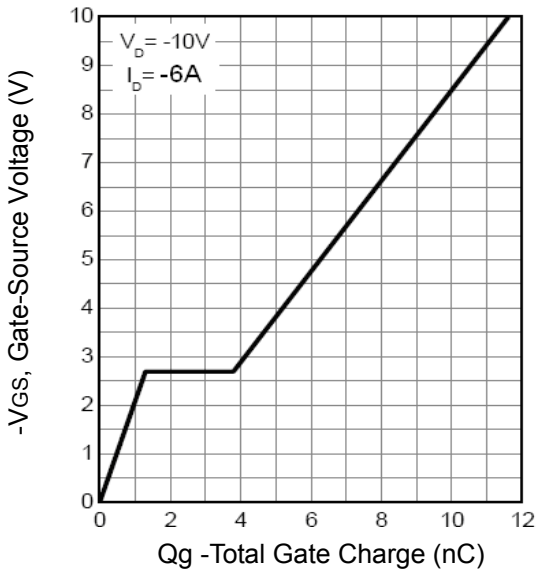


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

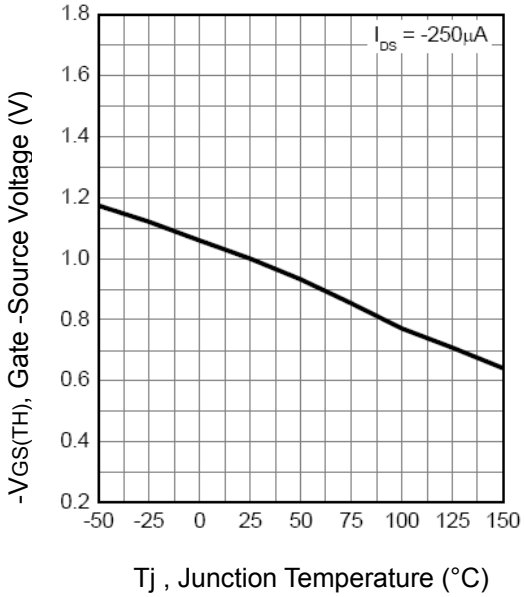


Fig9. Threshold Voltage Vs. Temperature

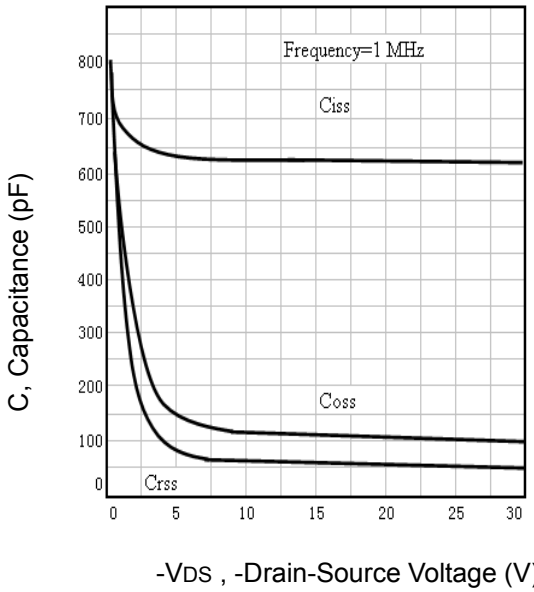


Fig10. Typical Capacitance Vs.Drain-Source Voltage

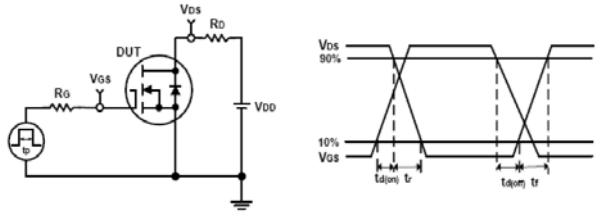
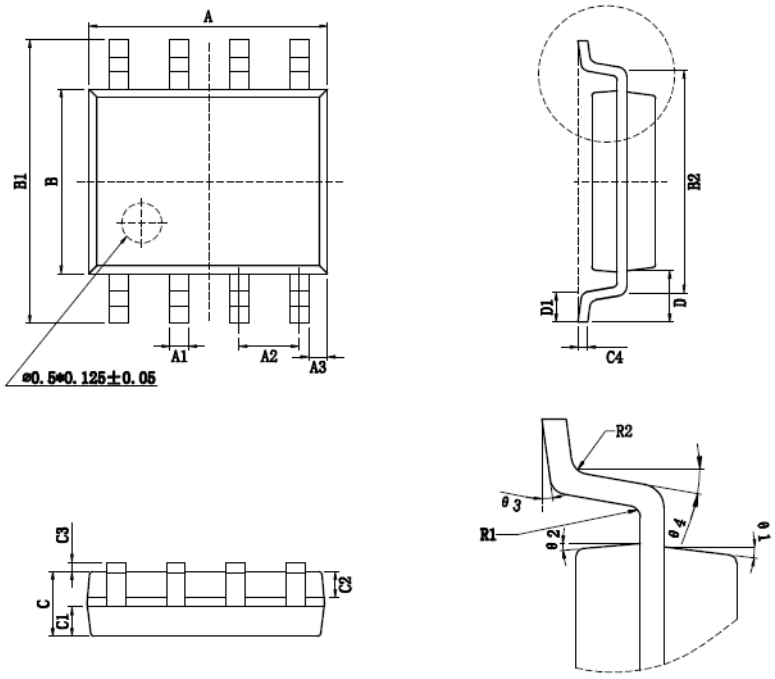


Fig11. Switching Time Test Circuit and waveforms

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.		
Θ1	17°Typ.		
Θ2	13°Typ.		
Θ3	0°~ 8°Typ.		
Θ4	4°~ 12°Typ.		

Order Information

Product	Marking	Package	Packaging	Min Unit Quantity
VS4559MS	VS4559MS	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