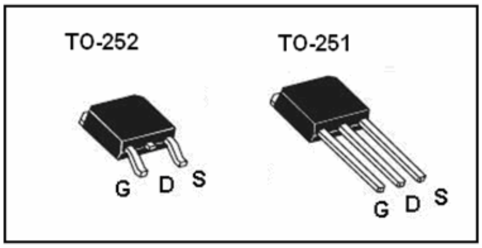
Features

- ♦ Low On-Resistance
- ♦ Fast Switching
- ♦ 100% Avalanche Tested
- ♦ Repetitive Avalanche Allowed up to Tjmax
- ♦ Hg-Free, RoHS Compliant

V_{DS}	40	V
$R_{DS(on),Typ}$	5.0	mΩ
I_D	80	A

Description

VS4080AI/AD designed by the trench processing techniques to achieve extremely low on-resistance. Additional features of this design are a 150°C junction operating temperature, fast switching speed and improved repetitive avalanche rating . These features combine to make this design an extremely efficient and reliable device for use in Motor applications and a wide variety of other applications.



Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only;and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (TA) is 25°C, unless otherwise specified.

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage		±20	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		40	V
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current ①	T_C =25°C	80	A
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested (Sillicon Limit) ①	T_C =25°C	240	A
I_D	Continuous Drain current@V_{GS}=10V	T_C =25°C	80	A
P_D	Maximum Power Dissipation	T_C =25°C	32	W
		T_C =75°C	20	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		2.0	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed ②		240	mJ

Typicle Electrical Characteristics

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	40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=32V,V_{GS}=0V	--	--	100	nA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=32V,V_{GS}=0V	--	--	10	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	1.6	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance①	V_{GS}=10V, I_D=20A	--	5.0	7.5	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance①	V_{GS}=4.5V, I_D=15A	--	6.0	8.5	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	--	1400	--	pF
C_{oss}	Output Capacitance		--	220	--	pF
C_{rss}	Reverse Transfer Capacitance		--	150	--	pF
Q_g	Total Gate Charge V_{GS}=10V	V_{DS}=20V,I_D=10A, V_{GS}=10V	--	37	--	nC
	V_{GS}=4.5V			26		nC
Q_{gs}	Gate-Source Charge		--	7	--	nC
Q_{gd}	Gate-Drain Charge		--	18	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=9A, R_G=6.8Ω, V_{GS}=10V	--	16	--	nS
t_r	Turn-on Rise Time		--	15	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	20	--	nS
t_f	Turn-Off Fall Time		--	12	--	nS
Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)						
I_{SD}	Source-drain current(Body Diode) ①	T_c=25℃	--	--	80	A
V_{SD}	Forward on voltage	I_{SD}=20A,V_{GS}=0V	--	--	1.3	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=20A, V_{GS}=0V di/dt=100A/μs	--	29	--	nS
Q_{rr}	Reverse Recovery Charge			16	--	nC

NOTE:

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

② Pulse width limited by max. junction temperature.

③Limited by T_{Jmax}, starting T_J = 25°C, L = 0.3mH,R_G = 25Ω, I_{AS} =40A, V_{GS} =10V. Part not recommended for use above this value

Typical Characteristics

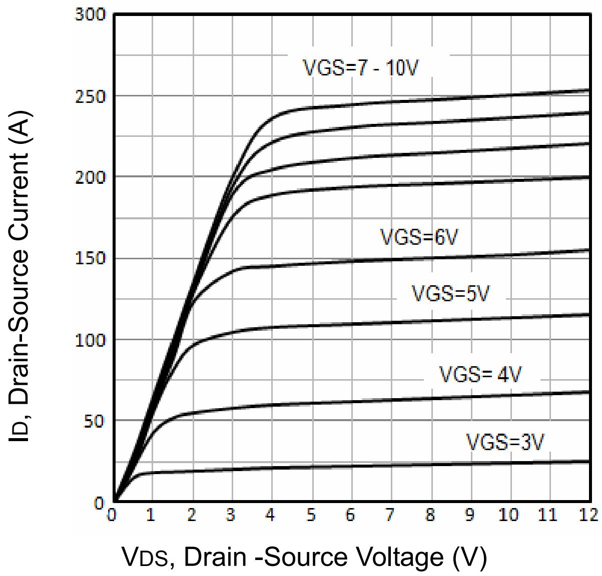


Fig1. Typical Output Characteristics

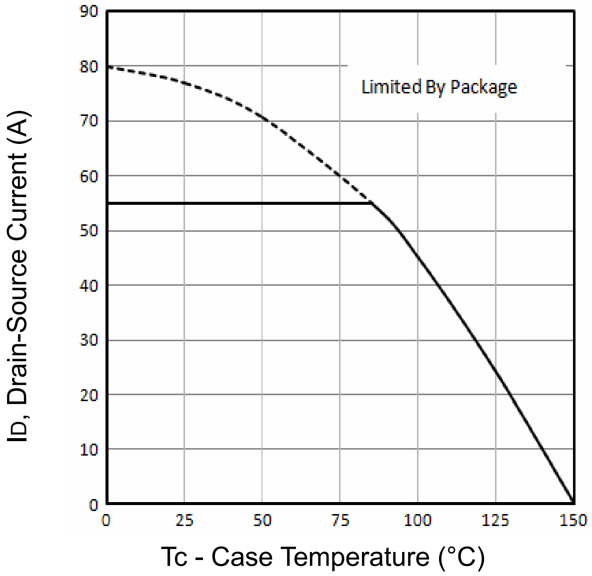


Fig2. Maximum Drain Current Vs.Case Temperature

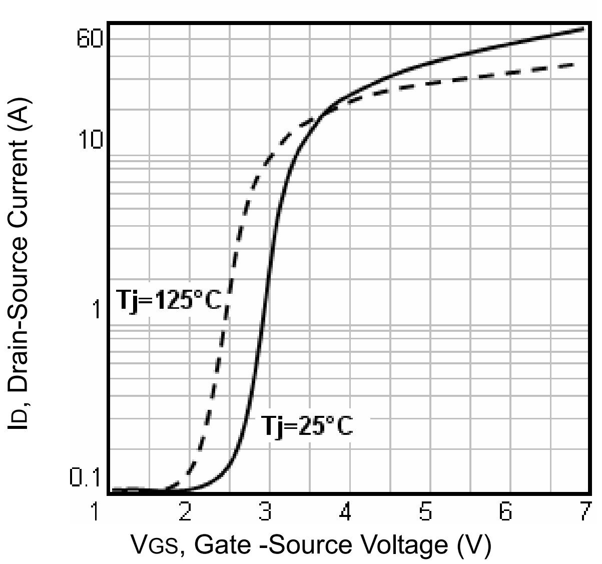


Fig3. Typical Transfer Characteristics

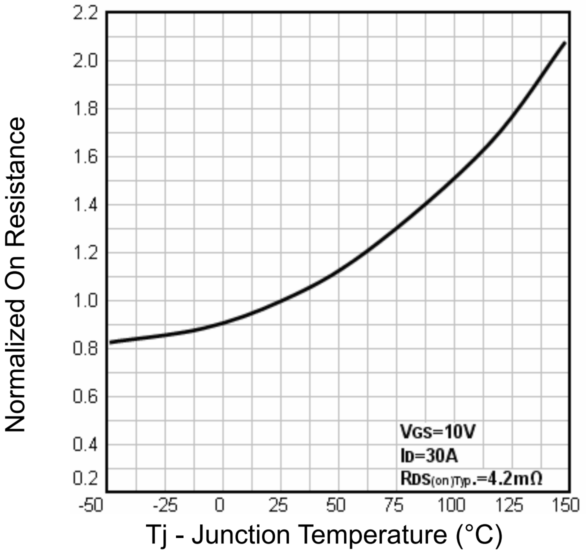


Fig4. Normalized On-Resistance Vs. Temperature

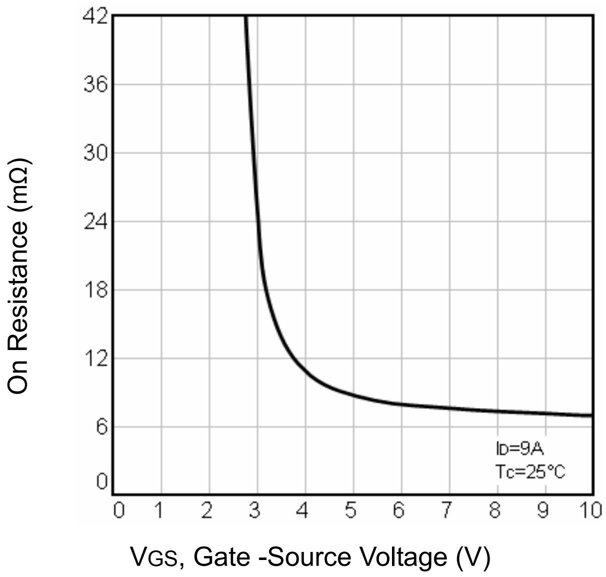


Fig5. On Resistance Vs. Gate -Source Voltage

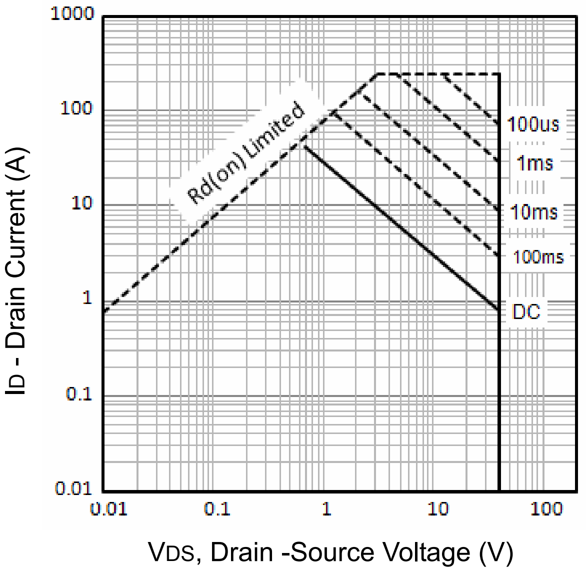


Fig6. Maximum Safe Operating Area

Typical Characteristics

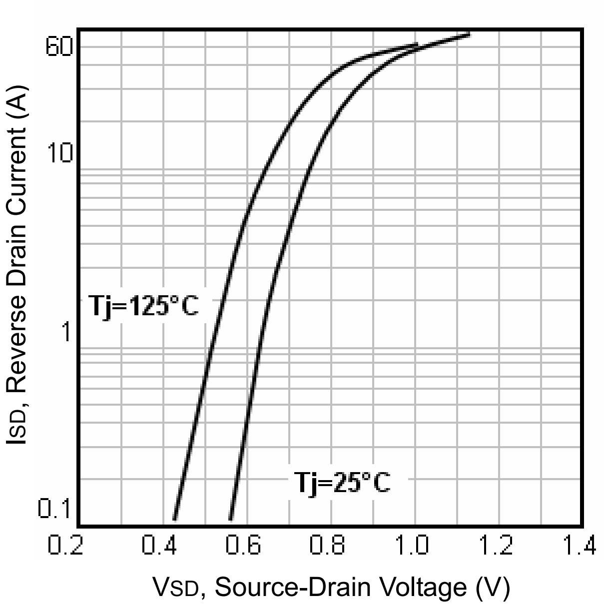


Fig7. Typical Source-Drain Diode Forward Voltage

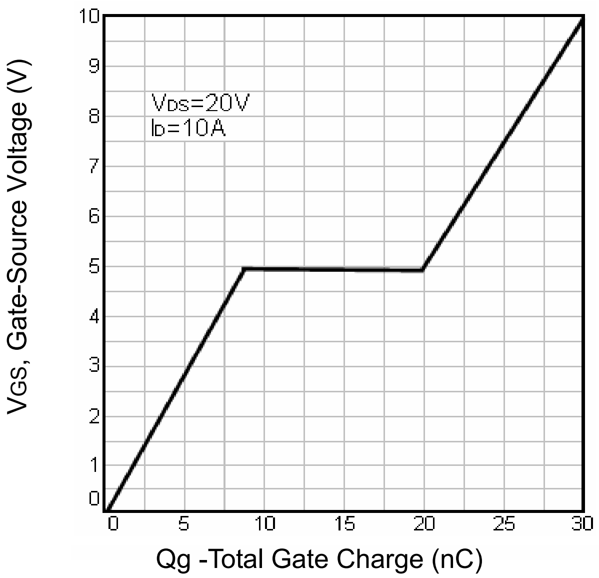


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

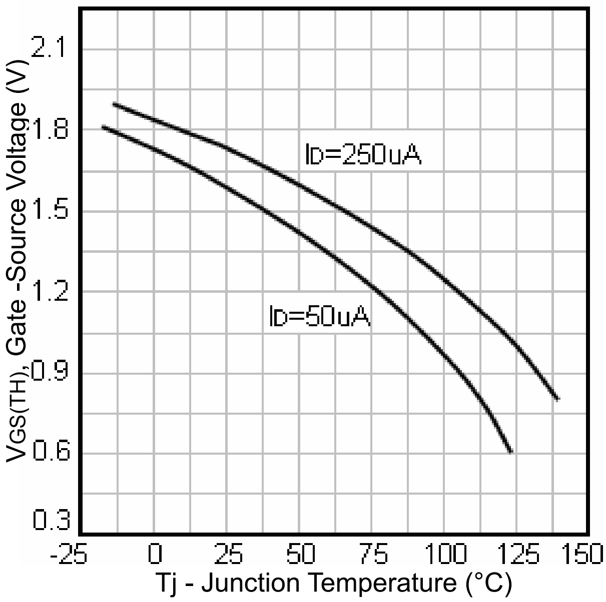


Fig9. Threshold Voltage Vs. Temperature

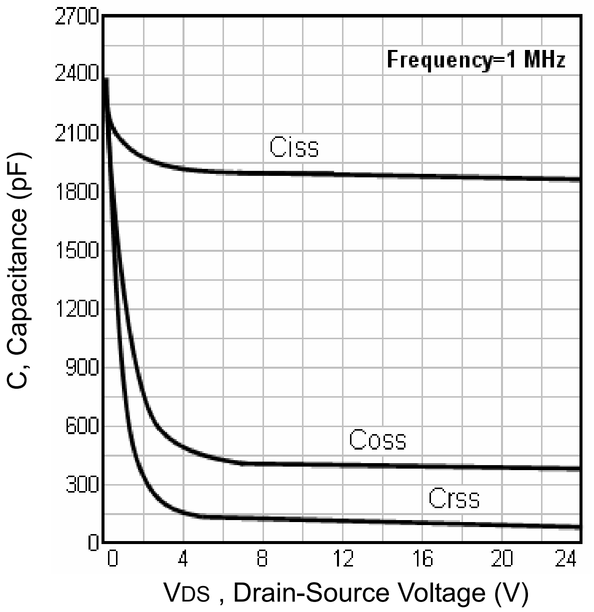


Fig10. Typical Capacitance Vs.Drain-Source Voltage

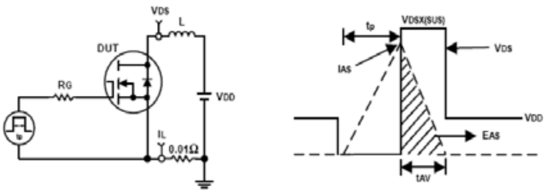


Fig11. Unclamped Inductive Test Circuit and waveforms

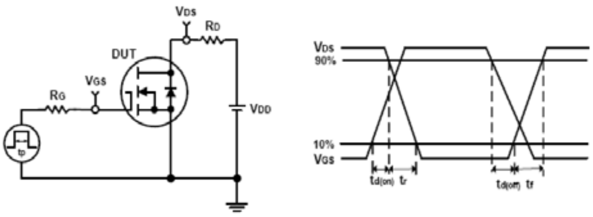
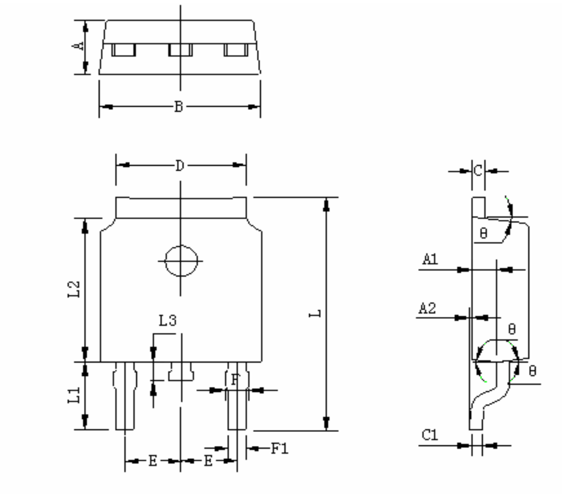


Fig12. Switching Time Test Circuit and waveforms

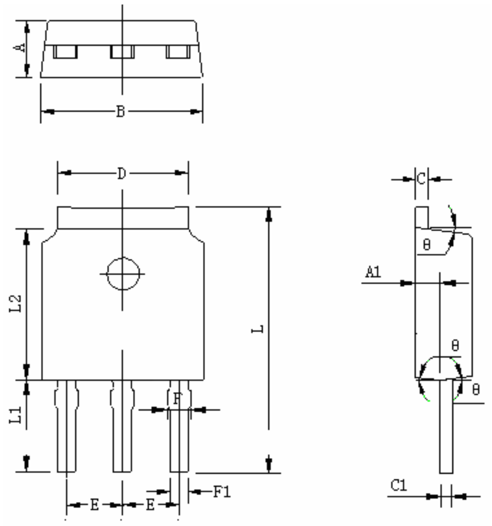
TO-252 Mechanical Data



TO-252 Dimensions (Unit:mm)

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	2.25	2.3	2.35	F	0.075	0.085	0.095
A1	0.96	1.01	1.06	F1	0.660	0.76	0.860
A2	0.05	0.1	0.15	L	9.80	9.825	10.40
B	6.05	6.6	6.65	L1	2.9REF		
C	0.46	0.508	0.580	L2	6.05	6.1	6.15
C1	0.508	0.508	0.508	L3	0.79	0.8	0.81
D	5.31	5.32	5.33	θ	7°	7°	7°
E	2.186	2.286	2.386				

TO-251 (Long Pin)Mechanical Data



TO-251 Dimensions (Unit:mm)

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	2.20	2.30	2.40	F	0.074	0.084	0.094
A1	0.91	1.01	1.11	F1	0.660	0.760	0.860
B	6.05	6.60	6.70	L	16.20	16.50	16.80
C	0.46	0.508	0.580	L1	9.40	9.50	9.60
C1	0.46	0.508	0.508	L2	6.00	6.10	6.20
D	5.10	5.32	5.46	θ	7°	7°	7°
E	2.186	2.286	2.386				

Order Information

Product	Marking	Package	Packaging	Min Unit Quantity
VS4080AD	VS4080AD	TO-252	2500/Reel	5000
VS4080AI	VS4080AI	TO-251	72/Tube	4680

Customer Service

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