Features

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

V_{DS}	40	V
$R_{DS(on),Typ}$	2.4	mΩ
I_D	120	A

DPAK
(TO-252)

Description

VS40200AD designed by the trench processing techniques to achieve extremely low on-resistance. Additional features of this design are a 175°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 MOTO 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		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current	T_C=25°C	120	A
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested (Sillicon Limit)	T_C=25°C	480	A
I_D	Continuous Drain current@V_{GS}=10V (See Fig2)	T_C=25°C	120	A
P_D	Maximum Power Dissipation	T_C=25°C	85	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.78	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed ②		600	mJ

Static 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	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=32V,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	1.2	2.0	2.8	V
$R_{DS(ON)}$	Drain-Source On-State Resistance①	V_{GS}=10V, I_D=40A	--	2.4	3.0	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance①	V_{GS}=4.5V, I_D=40A	--	3.4	4.5	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	--	6050	--	pF
C_{oss}	Output Capacitance		--	780	--	pF
C_{rss}	Reverse Transfer Capacitance		--	565	--	pF
Q_g	Total Gate Charge	V_{DS}=20V,I_D=20A, V_{GS}=10V	--	130	--	nC
Q_{gs}	Gate-Source Charge		--	45	--	nC
Q_{gd}	Gate-Drain Charge		--	16	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=10A, R_G=6.8Ω, V_{GS}=10V	--	19	--	nS
t_r	Turn-on Rise Time		--	65	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	20	--	nS
t_f	Turn-Off Fall Time		--	26	--	nS
Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)						
I_{SD}	Source-drain current(Body Diode)	T_C=25℃	--	--	120	A
V_{SD}	Forward on voltage	I_{SD}=60A,V_{GS}=0V	--	--	1.3	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=30A, V_{GS}=0V di/dt=200A/μs	--	35	--	nS
Q_{rr}	Reverse Recovery Charge			38		nC

NOTE:

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

② Limited by Tjmax, starting TJ = 25°C, L = 0.5mH,RG = 25Ω, IAS = 45A, VGS =10V.

Part not recommended for use above this value

③ Repetitive rating; pulse width limited by max. junction temperature.

Typical Characteristics

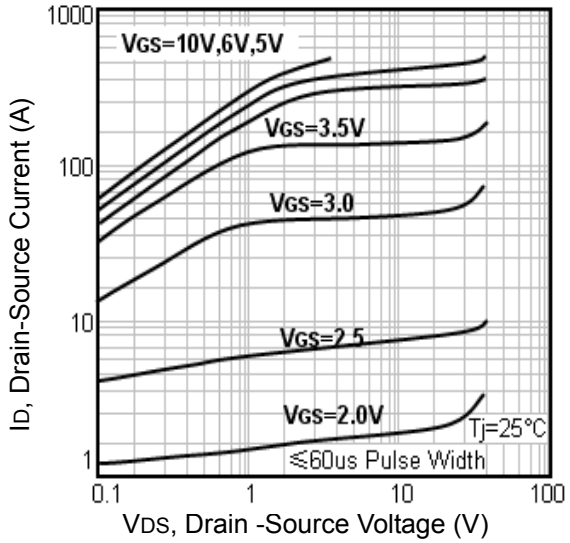


Fig1. Typical Output Characteristics

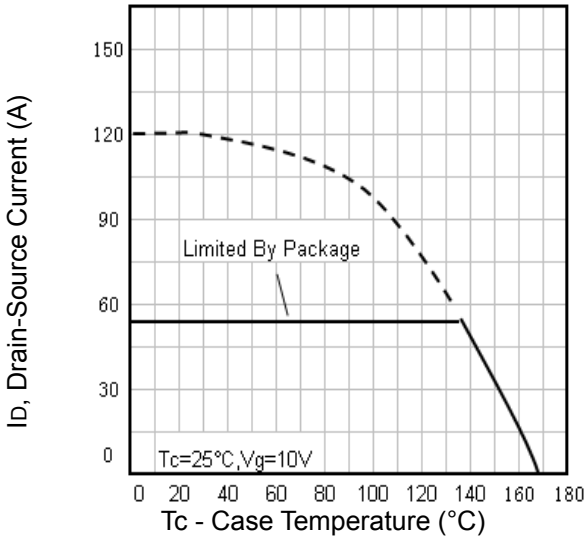


Fig2. Maximum Drain Current Vs.Case Temperature

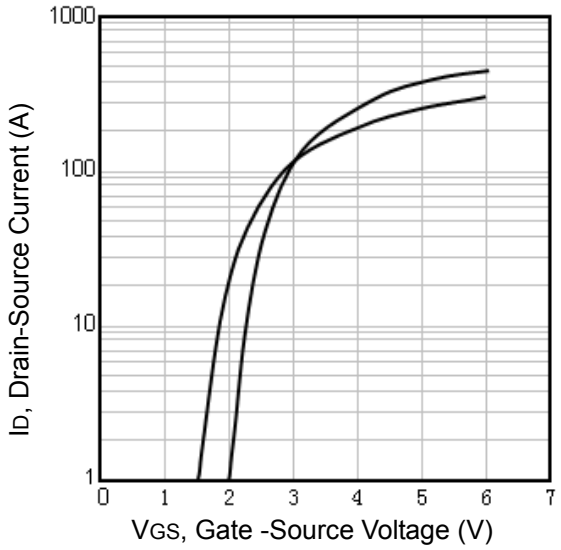


Fig3. Typical Transfer Characteristics

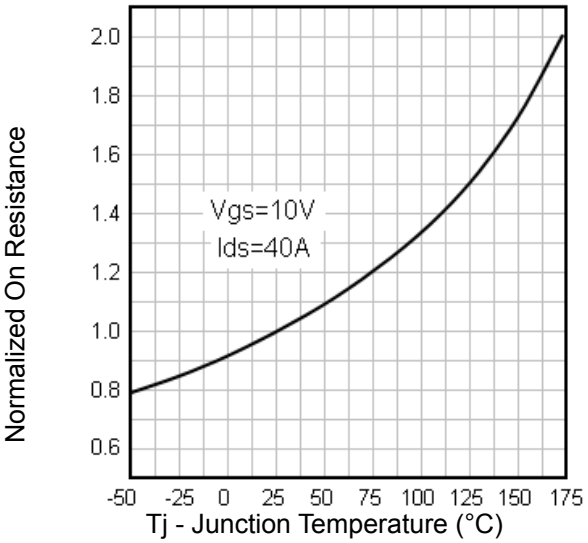


Fig4. Normalized On-Resistance Vs. Temperature

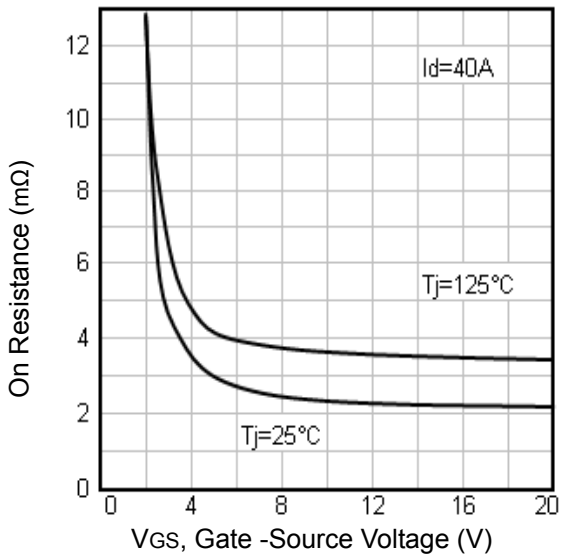


Fig5. On Resistance Vs. Gate -Source Voltage

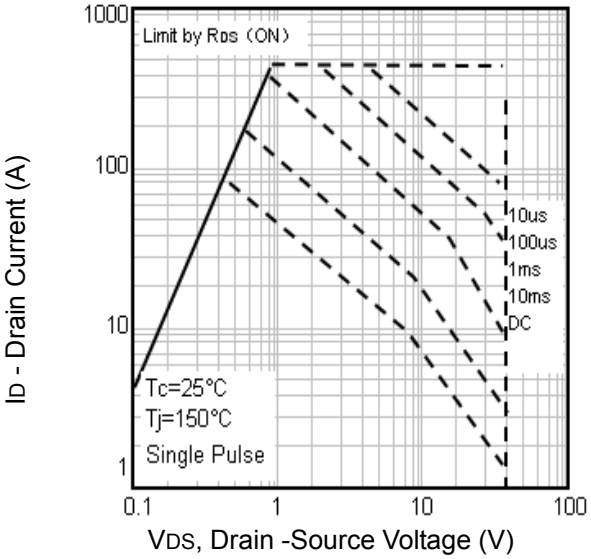


Fig6. Maximum Safe Operating Area

Typical Characteristics

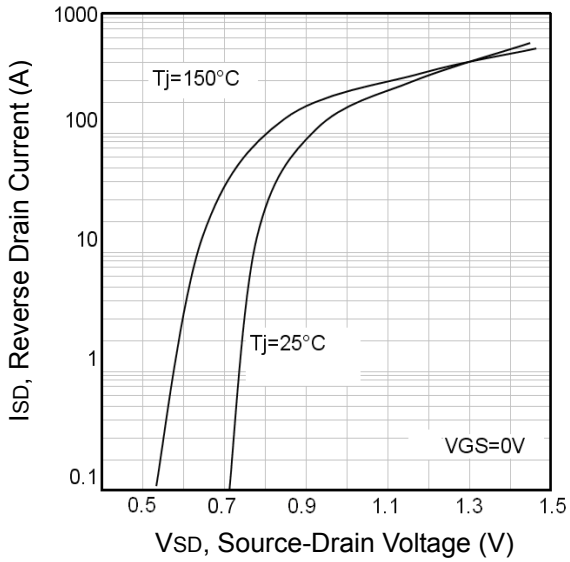


Fig7. Typical Source-Drain Diode Forward Voltage

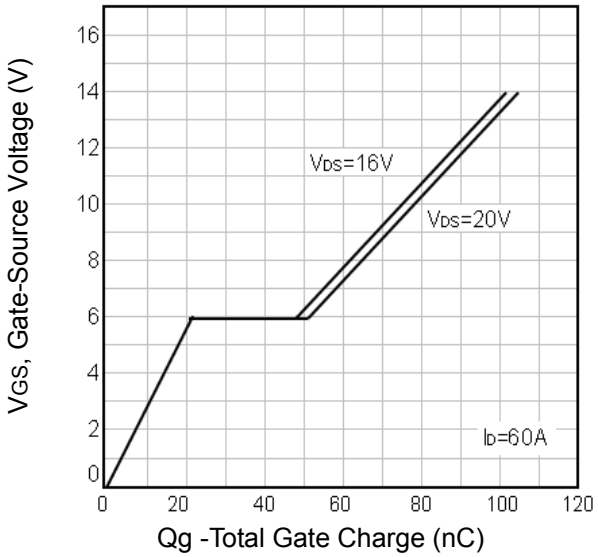


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

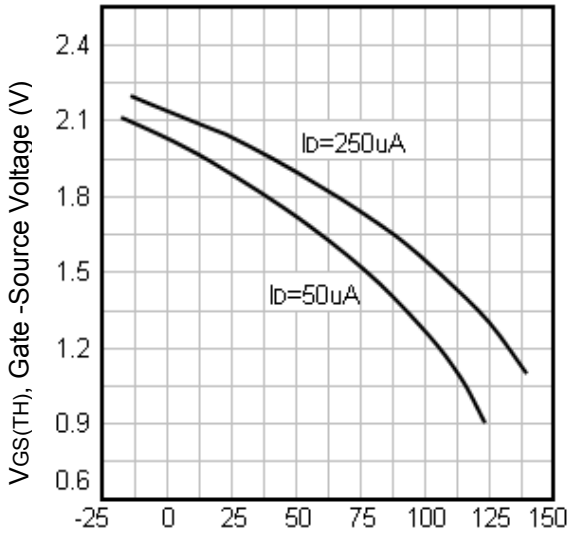


Fig9. Threshold Voltage Vs. Temperature

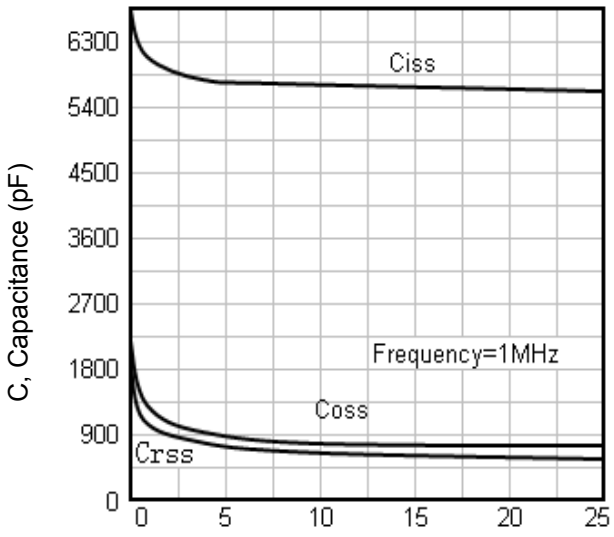


Fig10. Typical Capacitance Vs.Drain-Source Voltage

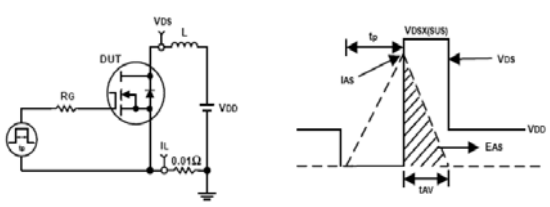


Fig11. Unclamped Inductive Test Circuit and waveforms

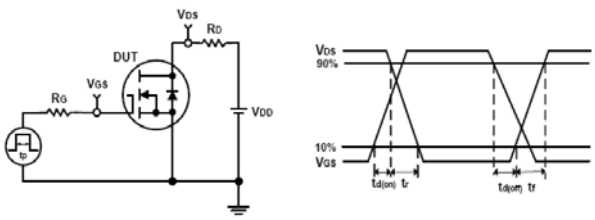
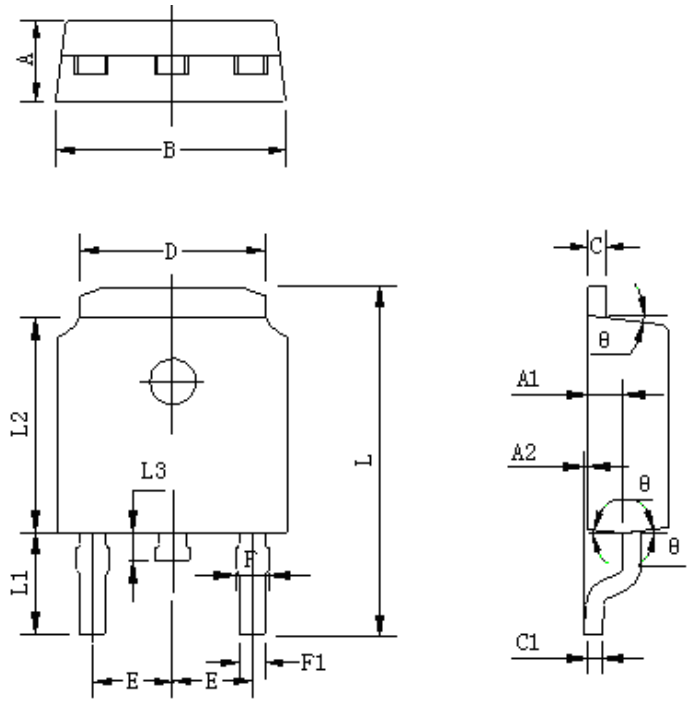


Fig12. Switching Time Test Circuit and waveforms

TO-252 Package Outline



TO-252 Dimensions (Unit:mm)

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

Marking

Logo
Product Name & Package Code
XXX：Product Lot Code
YWW：Year and week Code

Order Information

Product	Package	Packaging	Min Unit Quantity
VS40200AD	TO-252	2500PCS/Reel	5000PCS

Customer Service

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