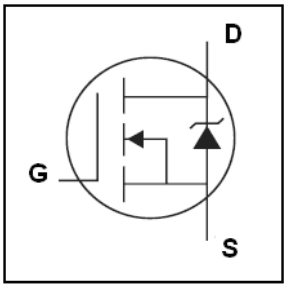
Features

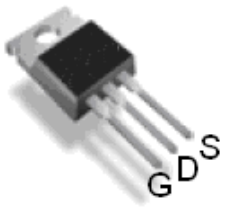
- ♦Low On-Resistance
- ♦Fast Switching
- ♦100% Avalanche Tested
- ♦Repetitive Avalanche Allowed up to Tjmax
- ♦Lead-Free, RoHS Compliant



V_{DSS}	100V
$R_{DS(on)}$	6.5mΩ
I_D	110A

Description

VS4410AT 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 Motor applications and a wide variety of other applications.



TO-220AB

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 (T_C=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage		±20	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		100	V
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Maxium Diode Continuous Forward Current	T_C=25°C	110	A
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested ①	T_C=25°C	370	A
I_D	Continuous Drain current@V_{GS}=10V	T_C=25°C	110	A
P_D	Maximum Power Dissipation	T_C=25°C	250	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.58	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		62.5	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed ②		900	mJ

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	100	110	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=100V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=100V,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	2	--	4	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=60A	--	6.5	8	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=50V,V_{GS}=0V, f=1MHz	--	6050	--	pF
C_{oss}	Output Capacitance		--	560	--	pF
C_{rss}	Reverse Transfer Capacitance		--	205	--	pF
Q_g	Total Gate Charge	V_{DS}=50V,I_D=75A, V_{GS}=10V	--	120	--	nC
Q_{gs}	Gate-Source Charge		--	26	--	nC
Q_{gd}	Gate-Drain Charge		--	30	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=60V, I_D=30A, R_G=2.8Ω, V_{GS}=10V	--	21	--	nS
t_r	Turn-on Rise Time		--	50	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	46	--	nS
t_f	Turn-Off Fall Time		--	60	--	nS
Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)						
I_{SD}	Source-drain current(Body Diode)	T_c=25℃	--	--	110	A
V_{SD}	Forward on voltage	I_{SD}=50A,V_{GS}=0V	--	0.86	1.3	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=75A, V_{GS}=0V di/dt=100A/μs	--	50	--	nS
Q_{rr}	Reverse Recovery Charge			105		nC

NOTE:

① Pulse width ≤ 300μs; duty cycle≤ 2%; pulse width limited by max. junction temperature.

②Limited by TJmax, starting T_J = 25°C, L = 0.5mH,RG = 25Ω, IAS =50A, VGS =10V.

Typical Characteristics

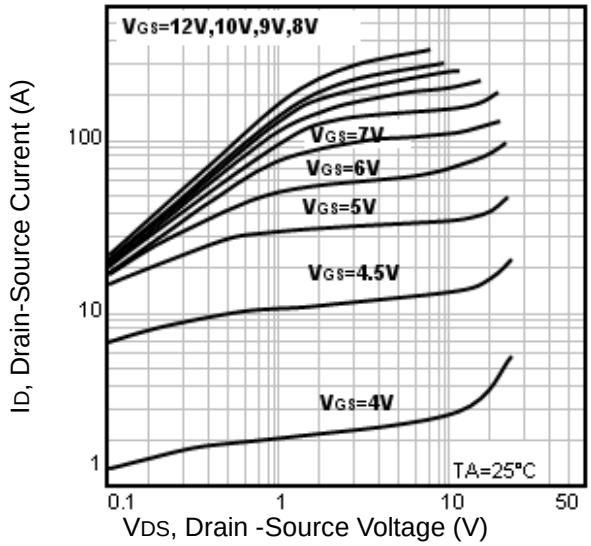


Fig1. Typical Output Characteristics

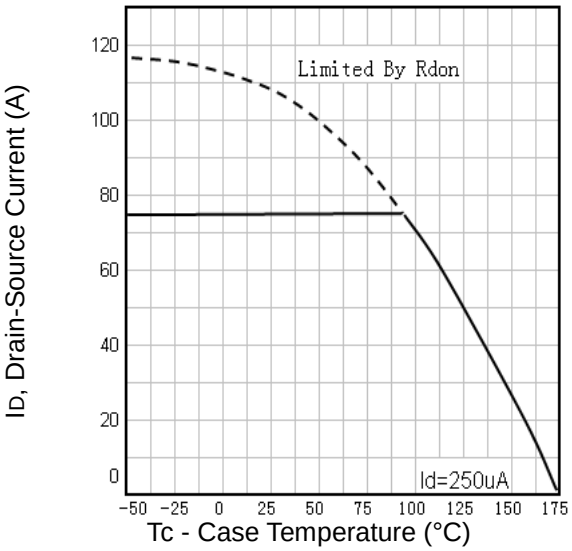


Fig2. Maximum Drain Current Vs.Case Temperature

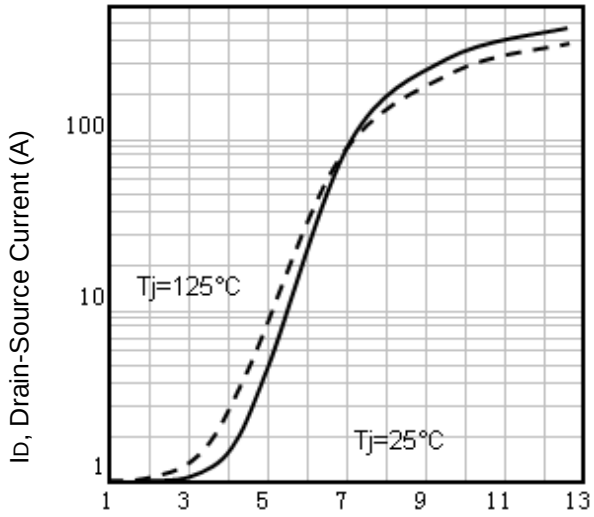


Fig3. Typical Transfer Characteristics

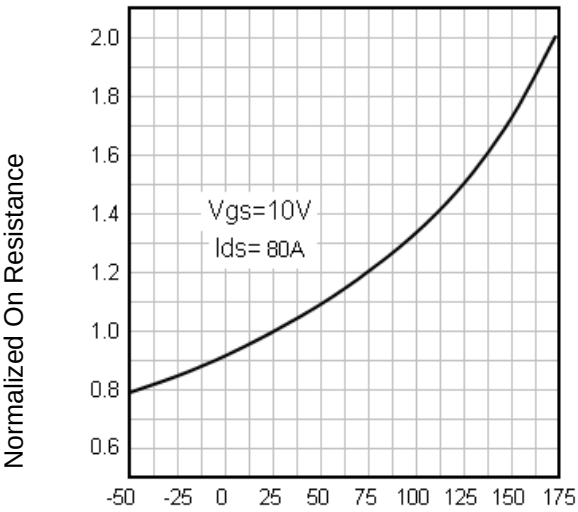


Fig4. Normalized On-Resistance Vs. Temperature

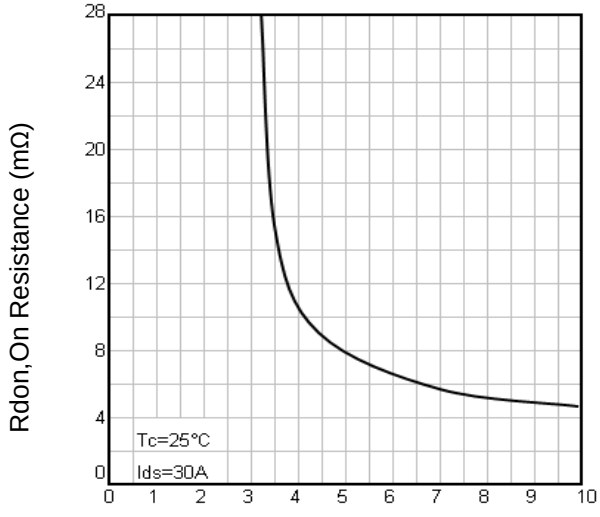


Fig5. Typical On-Resistance Vs. Gate -Source Voltage

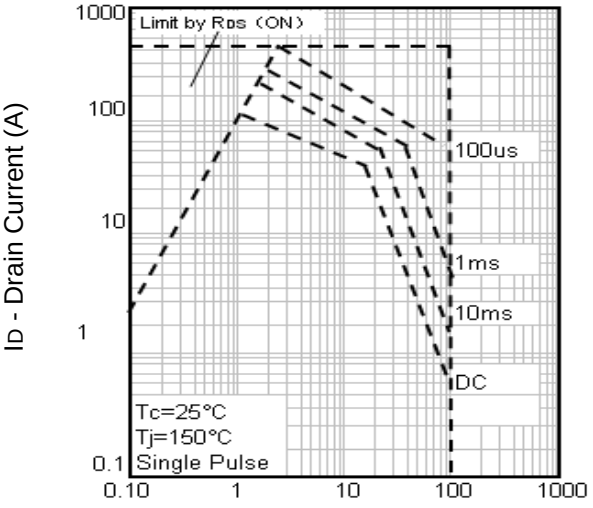


Fig6. Maximum Safe Operating Area

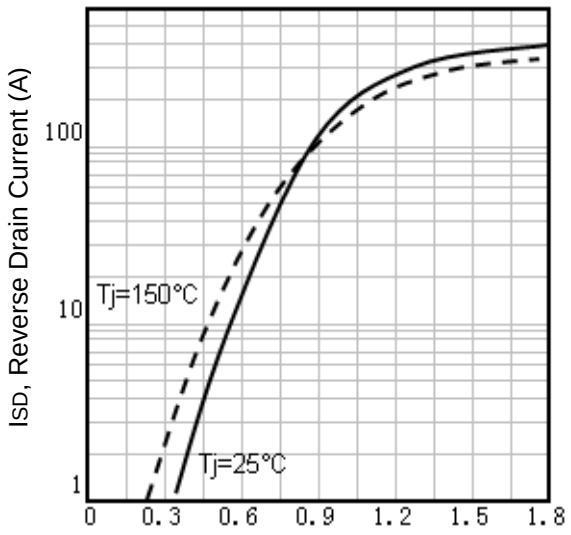


Fig7. Typical Source-Drain Diode Forward Voltage

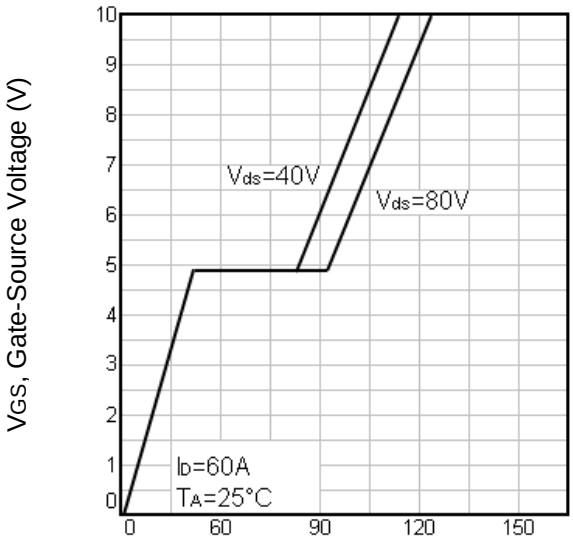


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

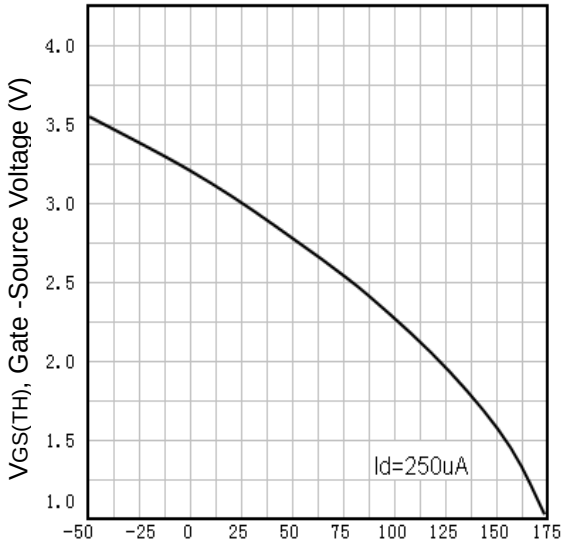


Fig9. Threshold Voltage Vs. Temperature

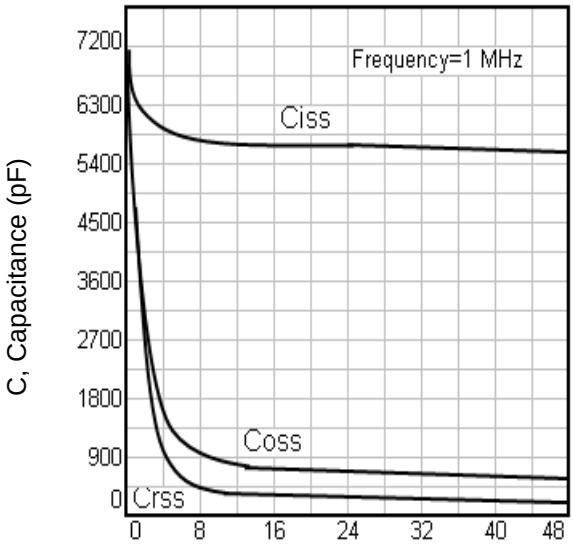


Fig10. Typical Capacitance Vs.Drain-Source Voltage

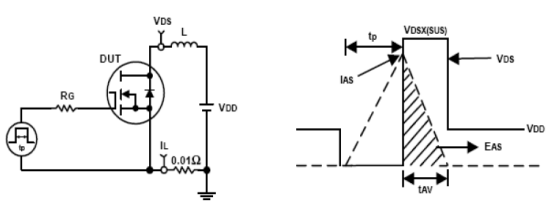


Fig11. Unclamped Inductive Test Circuit and waveforms

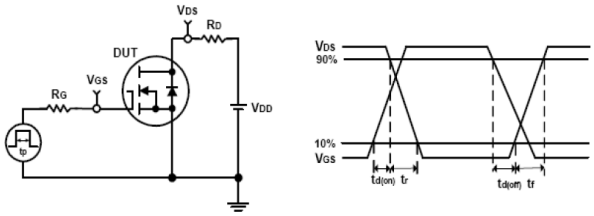
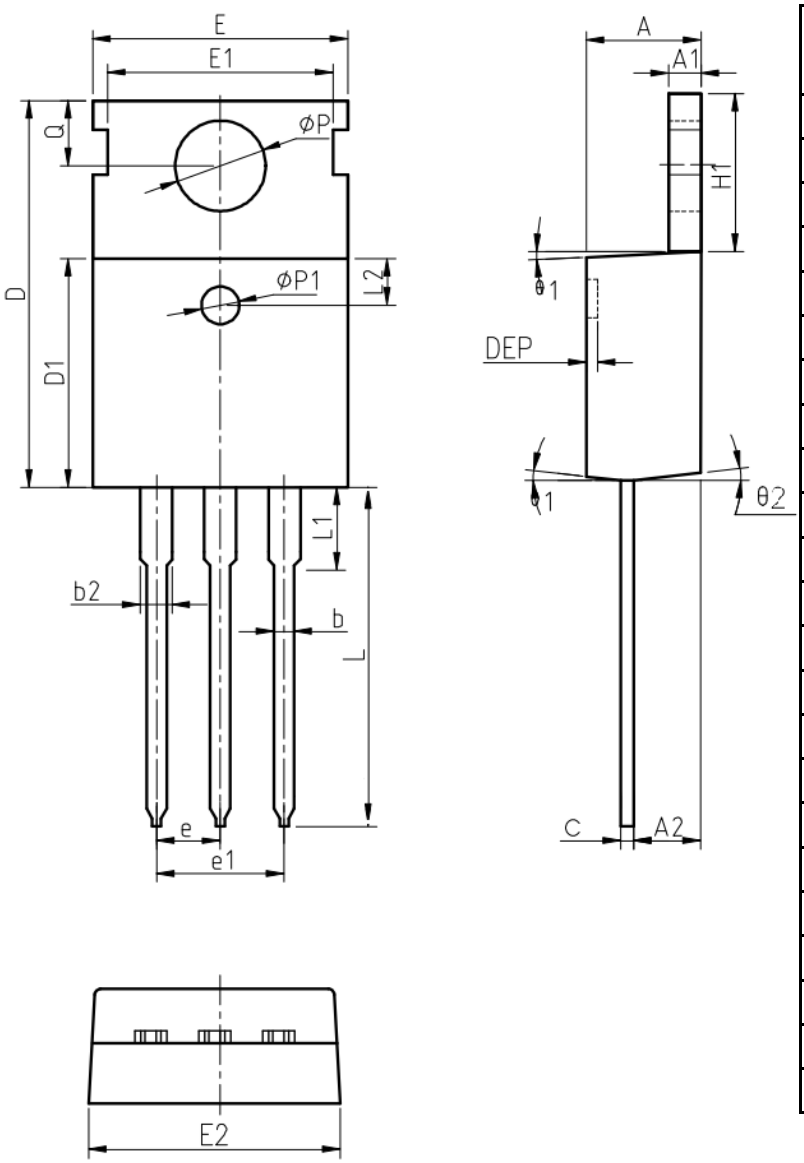


Fig12. Switching Time Test Circuit and waveforms

TO-220AB Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.30	4.52	4.70
A1	1.15	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	1.00
b2	1.17	1.32	1.50
c	0.45	0.50	0.61
D	15.30	15.65	15.90
D1	9.00	9.20	9.40
DEP	0.05	0.10	0.25
E	9.66	9.90	10.28
E1	-	8.70	-
E2	9.80	10.00	10.20
ΦP1	1.40	1.50	1.60
e	2.54 BSC		
e1	5.08 BSC		
H1	6.40	6.50	6.80
L	12.70	-	14.27
L1	-	-	3.95
L2	2.40	2.50	2.60
ΦP	3.53	3.60	3.70
Q	2.70	2.80	2.90
θ1	5 °	7 °	9 °
θ2	1 °	3 °	5 °

Notes:

1. Refer to JEDEC TO-220 variation AB
2. Dimension "D" and "E" do NOT include mold flash. Mold flash shall not exceed 0.127mm per side.

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