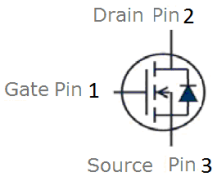
Features

- N-Channel，5V Logic Level Control
- Enhancement mode
- Fast Switching
- Very low on-resistance $R_{DS(on)}$ @ V_{GS}=4.5 V
- 100% Avalanche test
- Pb-free lead plating; RoHS compliant

V_{DS}	120	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	11.5	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5V	13	mΩ
I_D	63	A

TO-220AB



Part ID	Package Type	Marking	Tape and reel information
VST012N12MS	TO-220AB	012N12M	50pcs/Tube

Maximum ratings, at T_j=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		120	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	63	A
Mounted on Large Heat Sink				
I_D	Continuous Drain current@VGS=10V	T_C=25°C	63	A
		T_C=100°C	40	A
I_{DM}	Pulse Drain Current Tested ①	T_C=25°C	240	A
P_D	Maximum Power Dissipation	T_C=25°C	100	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		1.5	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		62	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed ②		56	mJ

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_C = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	120	--	--	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	1.3	2.0	2.6	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=20A	--	11.5	14	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=10A	--	13.0	16	mΩ
Dynamic Electrical Characteristics @ T_C= 25°C (unless otherwise stated)						
R_g	Gate Resistance	V_{DS}=30V,V_{GS}=0V, f=1MHz	--	1.8	--	Ω
C_{iss}	Input Capacitance		--	3910	--	pF
C_{oss}	Output Capacitance		--	305	--	pF
C_{rss}	Reverse Transfer Capacitance		--	230	--	pF
Q_g	Total Gate Charge	V_{DS}=60V,I_D=30A, V_{GS}=10V	--	54	--	nC
Q_{gs}	Gate-Source Charge		--	13	--	nC
Q_{gd}	Gate-Drain Charge		--	22	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=60V, I_D=20A, R_G=6.8Ω, V_{GS}=10V	--	24	--	nS
t_r	Turn-on Rise Time		--	85	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	55	--	nS
t_f	Turn-Off Fall Time		--	90	--	nS
Source- Drain Diode Characteristics@ T_C = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=20A,V_{GS}=0V	--	0.79	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=10A, V_{GS}=0V di/dt=100A/μs	--	50	--	nS
Q_{rr}	Reverse Recovery Charge			145		nC

NOTE:

① Repetitive rating; pulse width limited by max. junction temperature.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH,R_G = 25Ω, I_{AS} = 15A, V_{GS} =10V. Part not recommended for use above this value

③ Pulse width ≤ 300μs; duty cycle≤ 2%.

Typical Characteristics

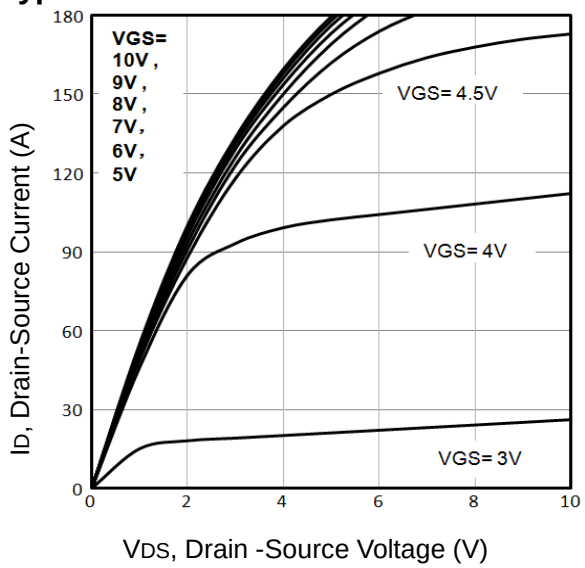


Fig1. Typical Output Characteristics

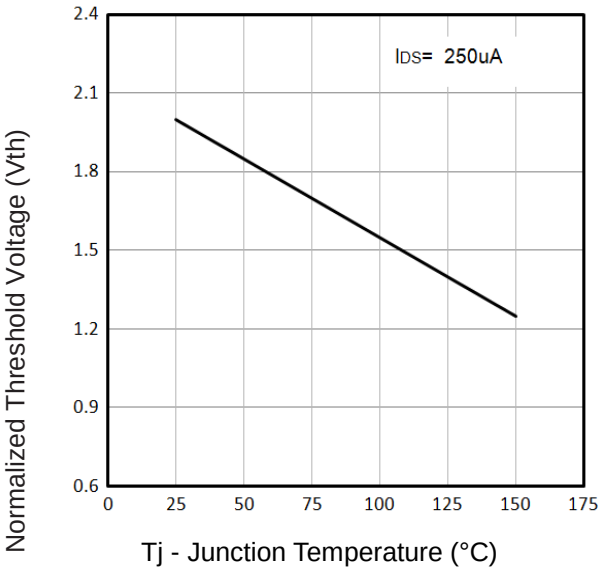


Fig2. Normalized Threshold Voltage Vs. Temperature

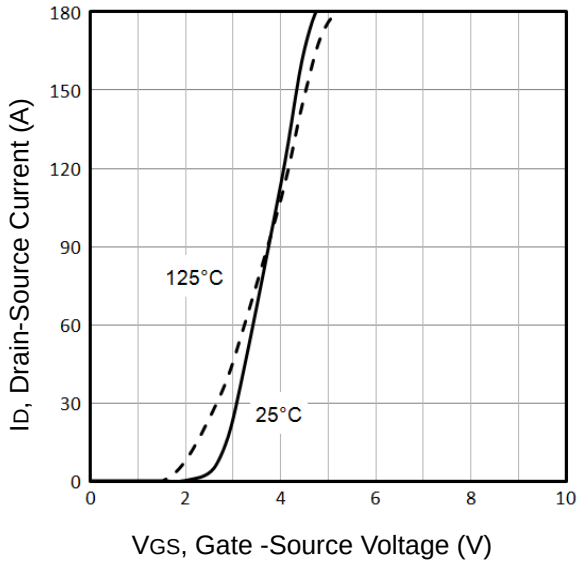


Fig3. Typical Transfer Characteristics

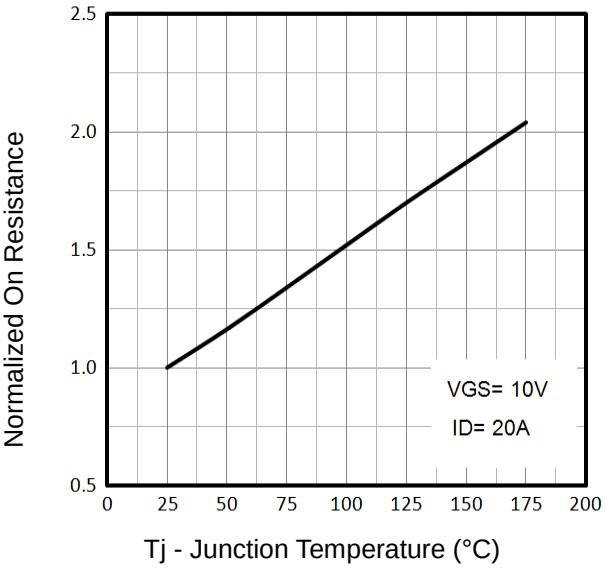


Fig4. Normalized On-Resistance Vs. Temperature

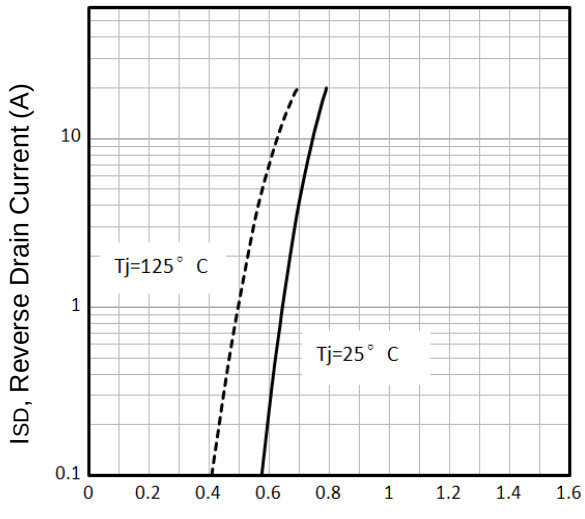


Fig5. Typical Source-Drain Diode Forward Voltage

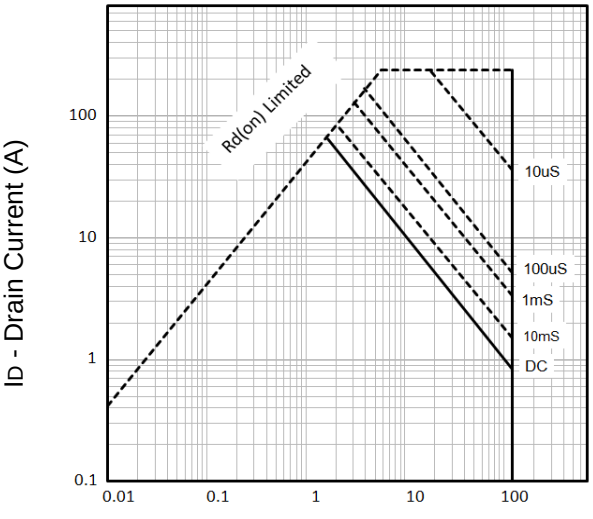


Fig6. Maximum Safe Operating Area

Typical Characteristics

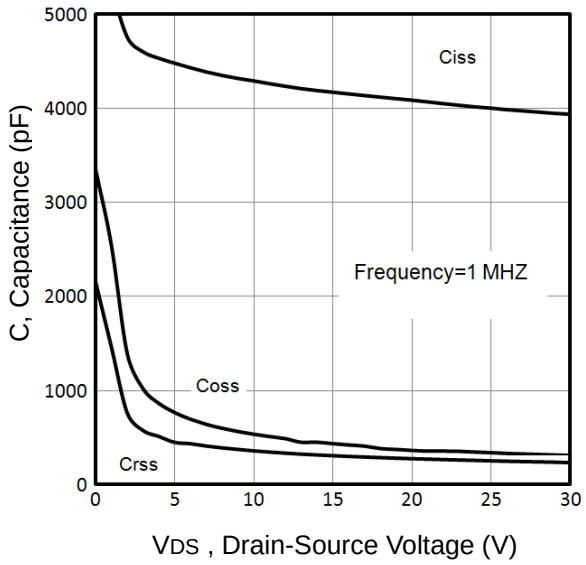


Fig7. Typical Capacitance Vs.Drain-Source

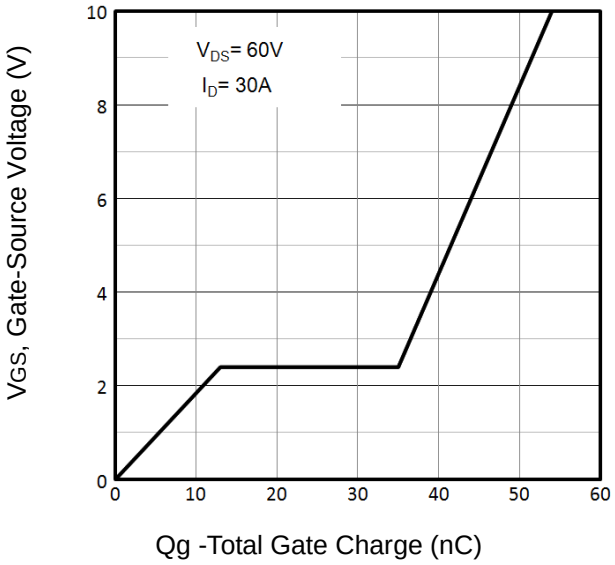


Fig8. Typical Gate Charge Vs.Gate-Source

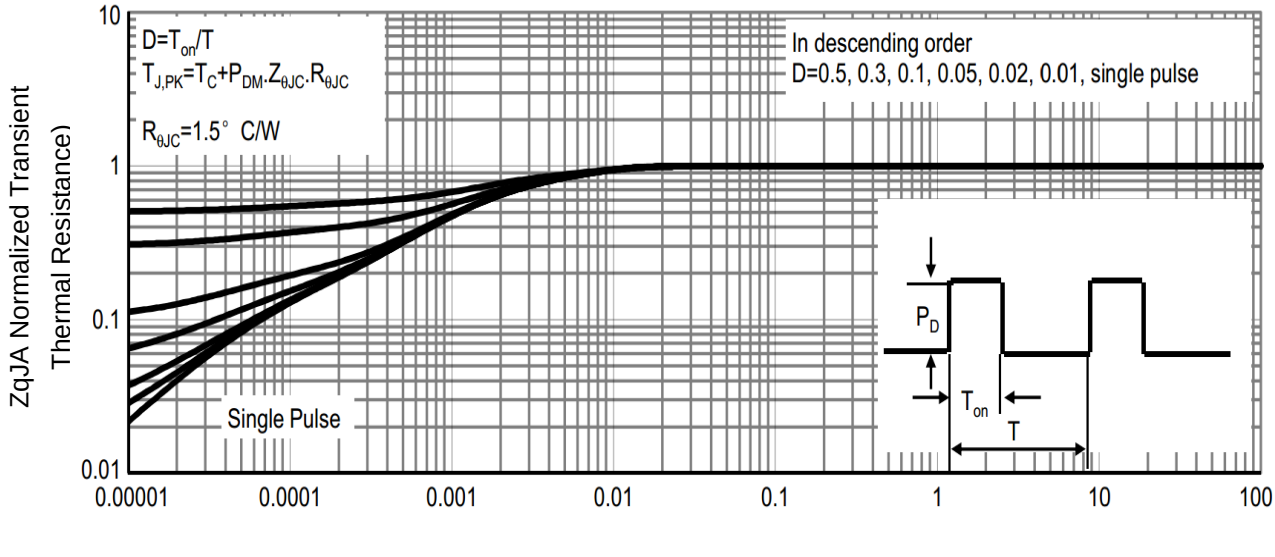


Fig9. Normalized Maximum Transient Thermal Impedance

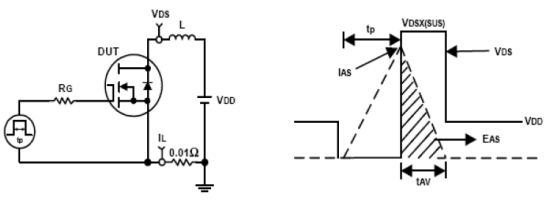


Fig10. Unclamped Inductive Test Circuit and waveforms

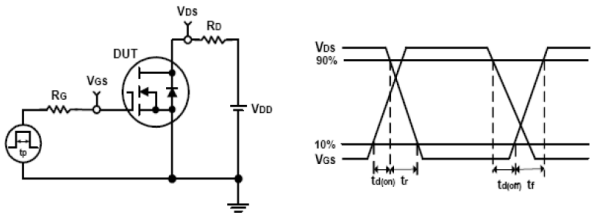
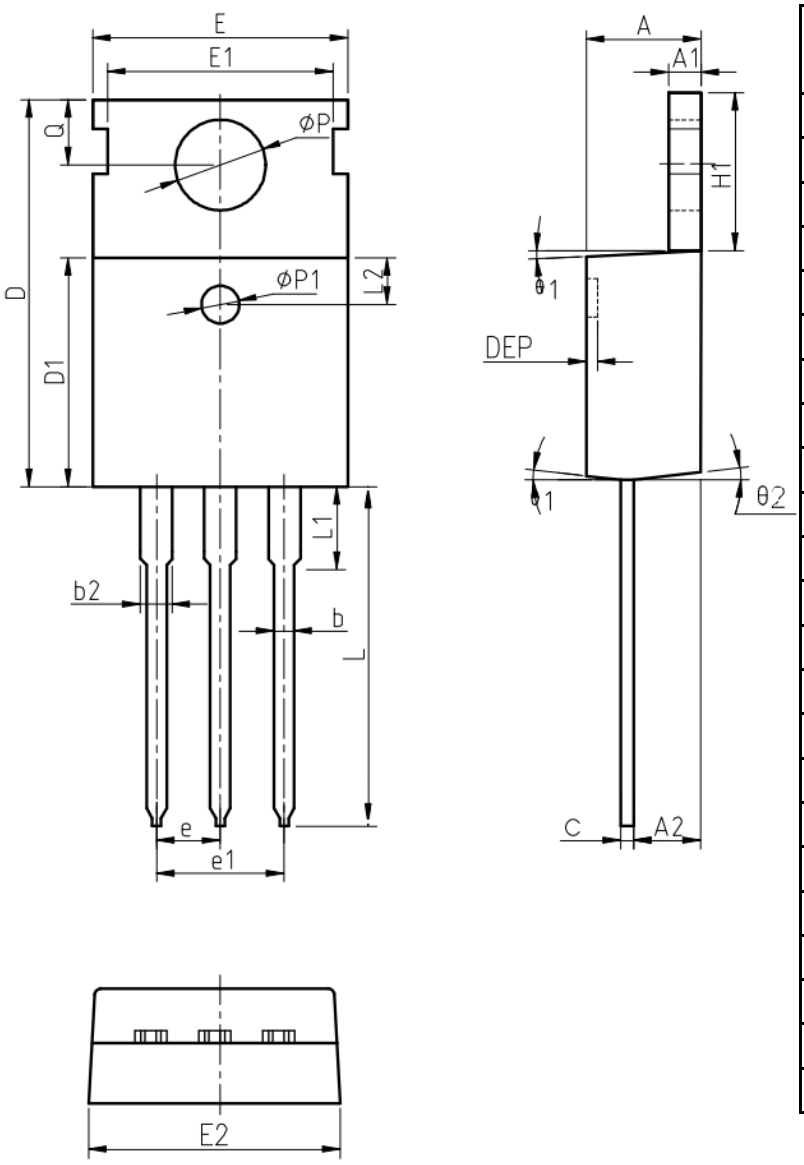


Fig11. Switching Time Test Circuit and waveforms

TO-220AB Package Outline



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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