

Features

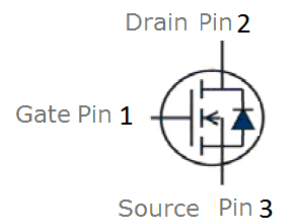
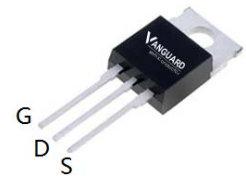
- N-Channel, 5V Logic Level Control
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5V$
- 100% Avalanche test
- Pb-free lead plating; RoHS compliant



Part ID	Package Type	Marking	Tape and reel information
VST010N10MS	TO-220AB	010N10M	50PCS/Tube

V_{DS}	100	V
$R_{DS(on),TYP} @ V_{GS}=10V$	8.6	mΩ
$R_{DS(on),TYP} @ V_{GS}=4.5V$	9.5	mΩ
I_D	105	A

TO-220AB



Maximum ratings, at $T_J=25^{\circ}C$, unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	100	V
I_S	Diode continuous forward current	$T_C=25^{\circ}C$ 105	A
I_D	Continuous drain current @ $V_{GS}=10V$	$T_C=25^{\circ}C$ 105	A
		$T_C=100^{\circ}C$ 69	A
I_{DM}	Pulse drain current tested ①	$T_C=25^{\circ}C$ 300	A
P_D	Maximum power dissipation	$T_C=25^{\circ}C$ 210	W
V_{GS}	Gate-Source voltage	±20	V
$T_{STG} T_J$	Storage and operating temperature range	-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.7	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	40	°C/W

Drain-Source Avalanche Ratings

EAS	Avalanche Energy, Single Pulsed ②	211	mJ
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Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ $T_j=25^{\circ}\text{C}$ (unless otherwise stated)						
$V_{(\text{BR})\text{DSS}}$	Drain-Source Breakdown Voltage	$V_{\text{GS}}=0\text{V}$ $I_{\text{D}}=250\mu\text{A}$	100	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{\text{DS}}=100\text{V}, V_{\text{GS}}=0\text{V}$	--	--	1	μA
	Zero Gate Voltage Drain Current($T_j=125^{\circ}\text{C}$)	$V_{\text{DS}}=100\text{V}, V_{\text{GS}}=0\text{V}$	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{\text{GS}}=\pm 20\text{V}, V_{\text{DS}}=0\text{V}$	--	--	± 100	nA
$V_{\text{GS}(\text{TH})}$	Gate Threshold Voltage	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=250\mu\text{A}$	1.0	2.0	3.0	V
$R_{\text{DS}(\text{ON})}$	Drain-Source On-State Resistance③	$V_{\text{GS}}=10\text{V}$, $I_{\text{D}}=30\text{A}$	--	8.6	10	m Ω
$R_{\text{DS}(\text{ON})}$	Drain-Source On-State Resistance③	$V_{\text{GS}}=4.5\text{V}$, $I_{\text{D}}=20\text{A}$	--	9.5	12	m Ω
Dynamic Electrical Characteristics @ $T_j=25^{\circ}\text{C}$ (unless otherwise stated)						
C_{iss}	Input Capacitance	$V_{\text{DS}}=30\text{V}, V_{\text{GS}}=0\text{V}$, $f=1\text{MHz}$	--	5290	--	pF
C_{oss}	Output Capacitance		--	340	--	pF
C_{rss}	Reverse Transfer Capacitance		--	295	--	pF
R_{g}	Gate Resistance	$f=1\text{MHz}$	--	1.6	--	Ω
Q_{g}	Total Gate Charge	$V_{\text{DS}}=50\text{V}, I_{\text{D}}=20\text{A}$, $V_{\text{GS}}=10\text{V}$	--	96	--	nC
Q_{gs}	Gate-Source Charge		--	22	--	nC
Q_{gd}	Gate-Drain Charge		--	25	--	nC
Switching Characteristics						
$t_{\text{d}(\text{on})}$	Turn-on Delay Time	$V_{\text{DD}}=40\text{V}$, $I_{\text{D}}=20\text{A}$, $R_{\text{G}}=6.8\Omega$, $V_{\text{GS}}=10\text{V}$	--	26	--	nS
t_{r}	Turn-on Rise Time		--	19	--	nS
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		--	51	--	nS
t_{f}	Turn-Off Fall Time		--	15	--	nS
Source- Drain Diode Characteristics@ $T_j=25^{\circ}\text{C}$ (unless otherwise stated)						
V_{SD}	Forward on voltage	$I_{\text{SD}}=30\text{A}, V_{\text{GS}}=0\text{V}$	--	0.83	1.2	V
t_{rr}	Reverse Recovery Time	$T_j=25^{\circ}\text{C}, I_{\text{SD}}=20\text{A}$, $V_{\text{GS}}=0\text{V}$	--	33	--	nS
Q_{rr}	Reverse Recovery Charge	$di/dt=500\text{A}/\mu\text{s}$		160		nC

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{jmax} , starting $T_j = 25^\circ\text{C}$, $L = 0.1\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 65A$, $V_{GS} = 10V$. Part not recommended for use above this value
- ③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

Typical Characteristics

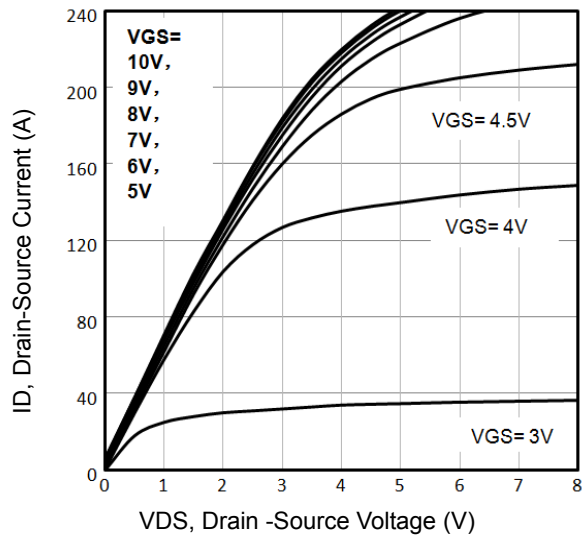


Fig1. Typical Output Characteristics

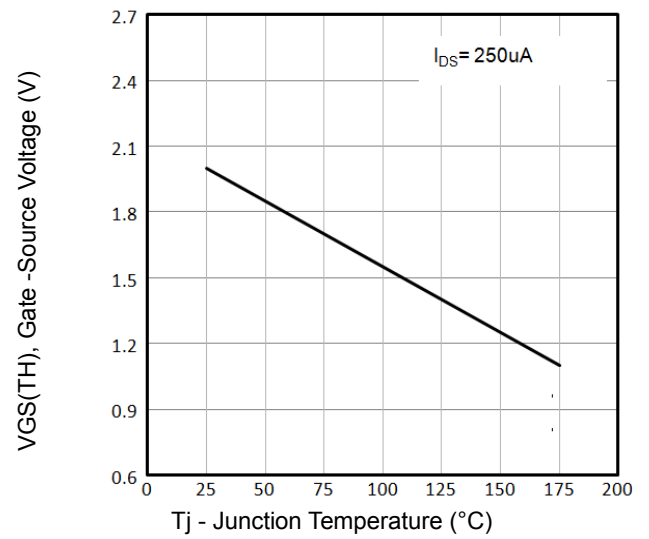


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

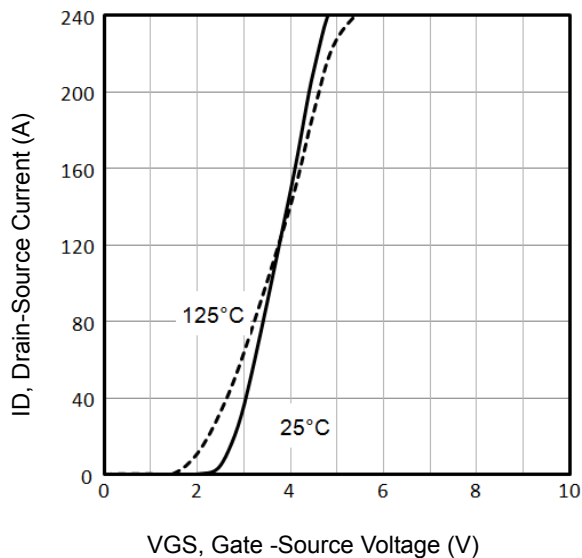


Fig3. Typical Transfer Characteristics

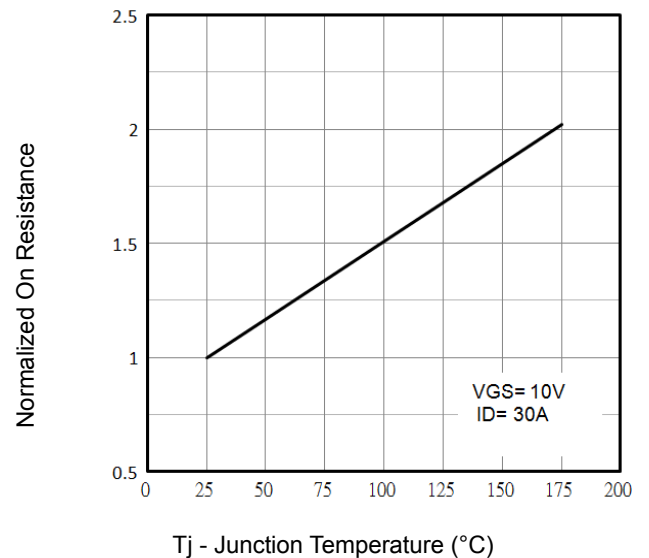


Fig4. Normalized On-Resistance Vs. T_j

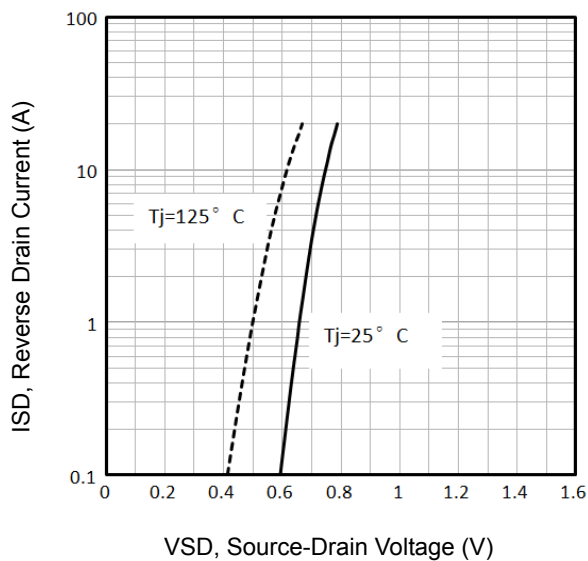


Fig5. Typical Source-Drain Diode Forward Voltage

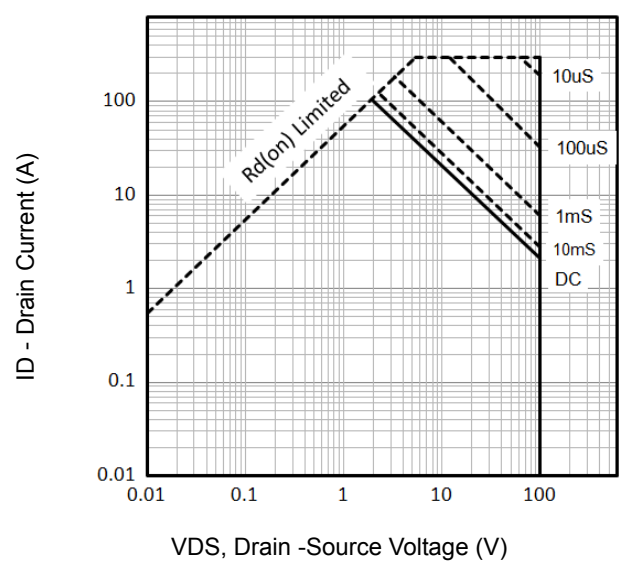


Fig6. Maximum Safe Operating Area

Typical Characteristics

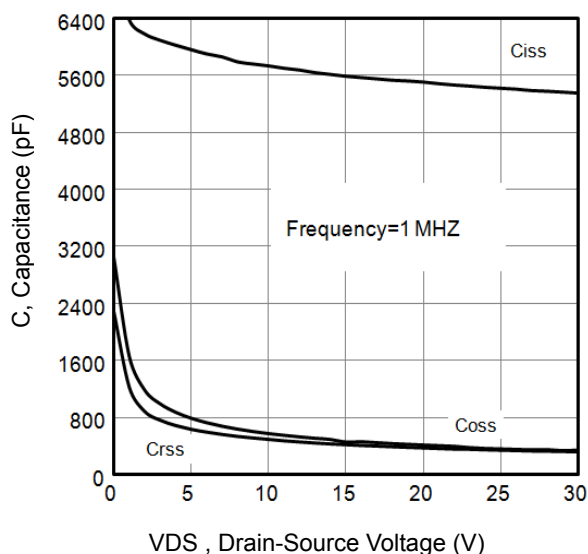


Fig7. Typical Capacitance Vs.Drain-Source Voltage

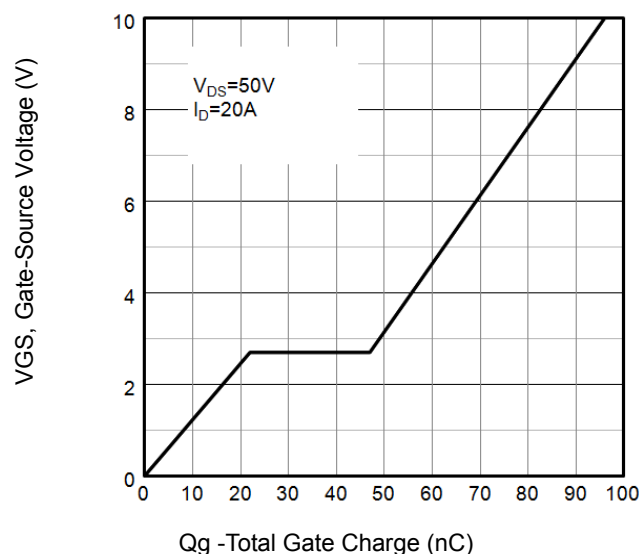


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

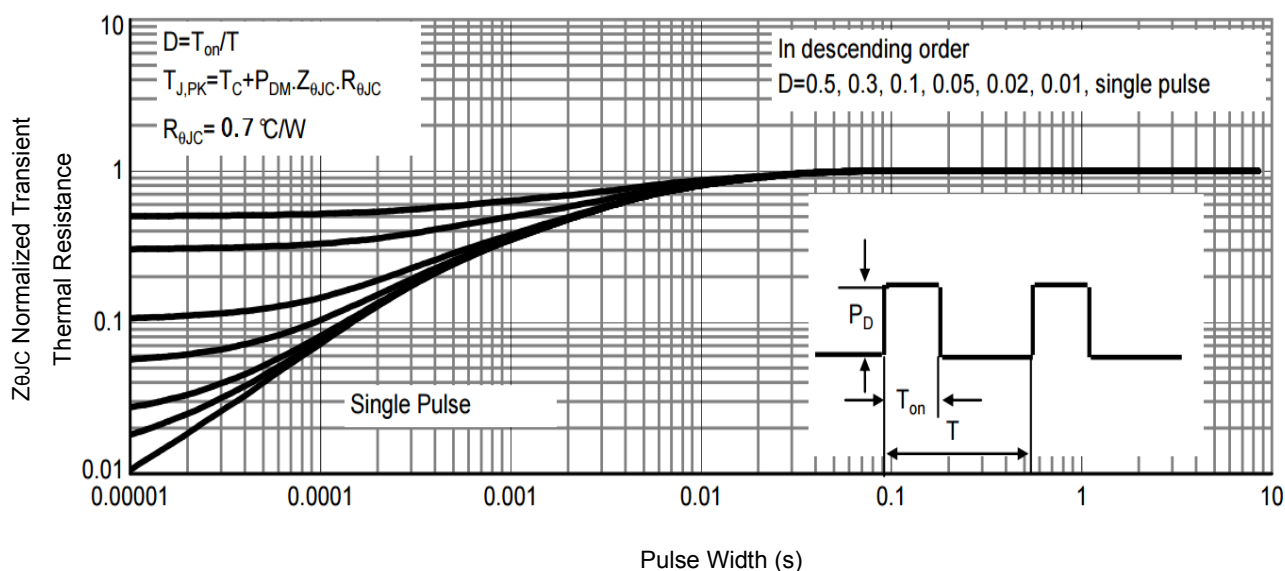


Fig9. Normalized Maximum Transient Thermal Impedance

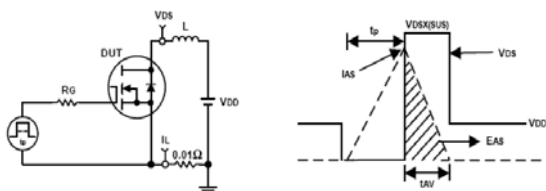


Fig10. Unclamped Inductive Test Circuit and waveforms

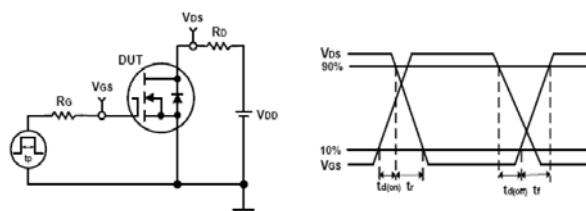
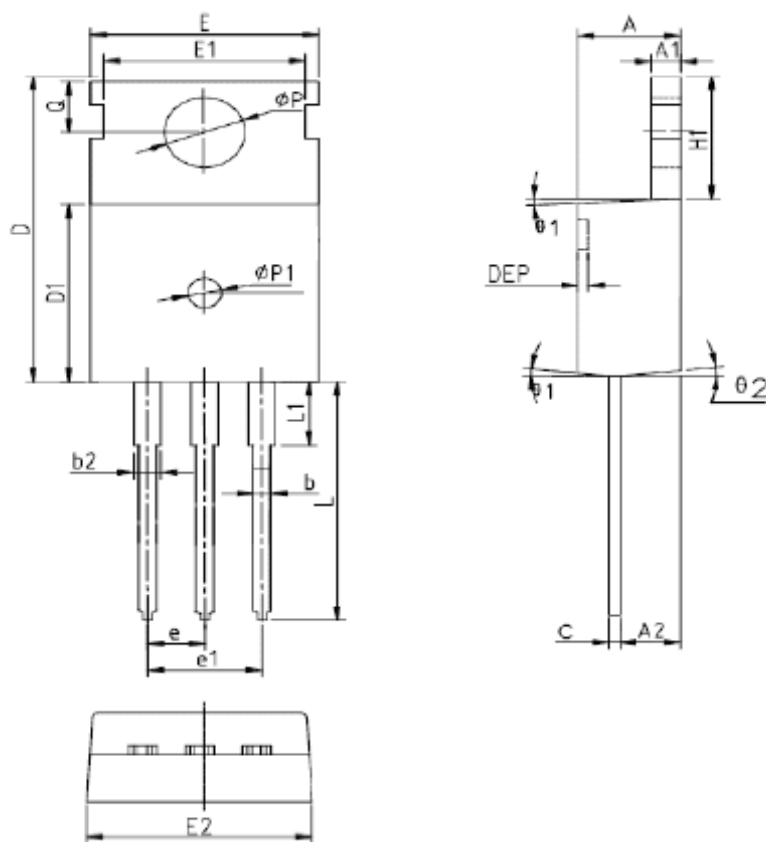


Fig11. Switching Time Test Circuit and waveforms

TO-220AB Package Outline Data



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185	$\theta p1$	1.40	1.50	1.60	0.055	0.059	0.063
A1	1.27	1.30	1.33	0.050	0.051	0.052	e	2.54BSC			0.1BSC		
A2	2.35	2.40	2.50	0.093	0.094	0.098	e1	5.08BSC			0.2BSC		
b	0.77	-	0.90	0.030	-	0.035	H1	6.40	6.50	6.60	0.252	0.256	0.260
b2	1.23	-	1.36	0.048	-	0.054	L	12.75	-	13.17	0.502	-	0.519
C	0.48	0.50	0.52	0.019	0.020	0.021	L1	-	-	3.95	-	-	0.156
D	15.40	15.60	15.80	0.606	0.614	0.622	L2	2.50REF.			0.098REF.		
D1	9.00	9.10	9.20	0.354	0.358	0.362	θp	3.57	3.60	3.63	0.141	0.142	0.143
DEP	0.05	0.10	0.20	0.002	0.004	0.008	Q	2.73	2.80	2.87	0.107	0.110	0.113
E	9.70	9.90	10.10	0.382	0.389	0.398	$\theta 1$	5°	7°	9°	5°	7°	9°
E1	-	8.70	-	-	0.343	-	$\theta 2$	1°	3°	5°	1°	3°	5°
E2	9.80	10.00	10.20	0.386	0.394	0.401							

Customer Service

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