

Features

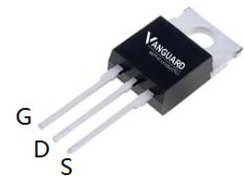
- N-Channel, 10V Logic Level Control
- Enhancement mode
- Very low on-resistance
- Fast Switching
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant



Part ID	Package Type	Marking	Tape and reel information
VST003N06HS	TO-220AB	003N06H	50pcs/Tube

V_{DS}	60	V
$R_{DS(on),TYP}@ V_{GS}=10V$	3.7	mΩ
I_D	140	A

TO-220AB



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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		60	V
I_S	Diode continuous forward current	$T_C=25^\circ\text{C}$	140	A
I_D	Continuous drain current@ $V_{GS}=10V$	$T_C=25^\circ\text{C}$	140	A
		$T_C=100^\circ\text{C}$	90	A
I_{DM}	Pulse drain current tested ①	$T_C=25^\circ\text{C}$	560	A
I_{AS}	Avalanche current	$L=0.5\text{mH}$	48	A
E_{AS}	Avalanche energy, single pulsed ②		100	mJ
P_D	Maximum power dissipation	$T_C=25^\circ\text{C}$	175	W
V_{GS}	Gate-Source voltage		± 20	V
$T_{STG} T_J$	Storage and operating temperature range		-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.85	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	48	$^\circ\text{C/W}$

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	60	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current(T _c =25°C)	V _{DS} =60V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T _c =125°C)	V _{DS} =60V,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	2.0	3.0	4.0	V
R _{DS(ON)}	Drain-Source On-State Resistance③	V _{GS} =10V, I _D =45A	--	3.7	4.5	mΩ
Dynamic Electrical Characteristics @ T _c = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =25V,V _{GS} =0V, f=1MHz	--	5220	--	pF
C _{oss}	Output Capacitance		--	570	--	pF
C _{rss}	Reverse Transfer Capacitance		--	380	--	pF
R _g	Gate Resistance	f=1MHz	--	1.8	--	Ω
Q _g	Total Gate Charge	V _{DS} =30V,I _D =20A, V _{GS} =10V	--	124	--	nC
Q _{gs}	Gate-Source Charge		--	11	--	nC
Q _{gd}	Gate-Drain Charge		--	14	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =30V, I _D =10A, R _G =3.5Ω, V _{GS} =10V	--	26	--	nS
t _r	Turn-on Rise Time		--	23	--	nS
t _{d(off)}	Turn-Off Delay Time		--	45	--	nS
t _f	Turn-Off Fall Time		--	12	--	nS
Source- Drain Diode Characteristics@ T _c = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =35A,V _{GS} =0V	--	0.83	1.2	V
t _{rr}	Reverse Recovery Time	T _j =25°C,I _{sd} =20A, di/dt=500A/μs	--	32	--	nS
Q _{rr}	Reverse Recovery Charge				141	

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} = 20A, V_{GS} = 10V. Part not recommended for use above this value
- ③ Pulse width ≤ 300μs; duty cycle ≤ 2%.

Typical Characteristics

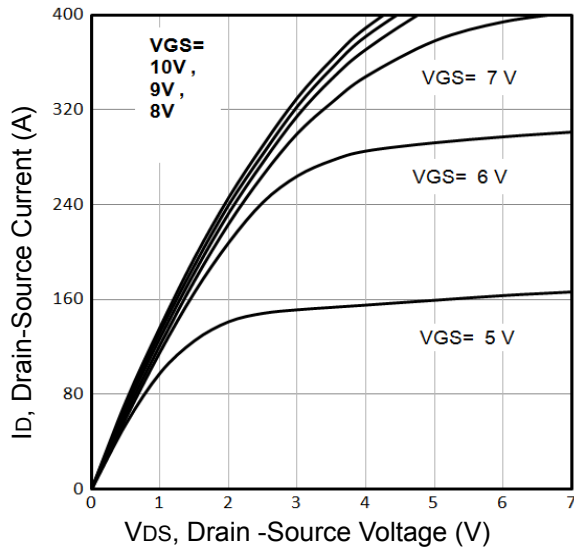


Fig1. Typical Output Characteristics

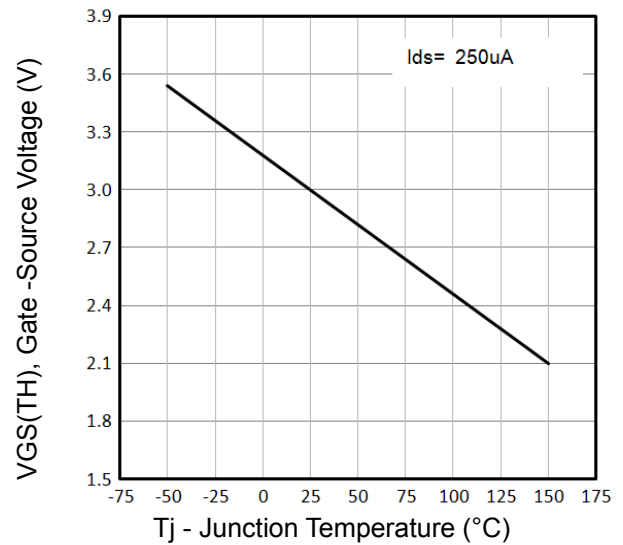


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

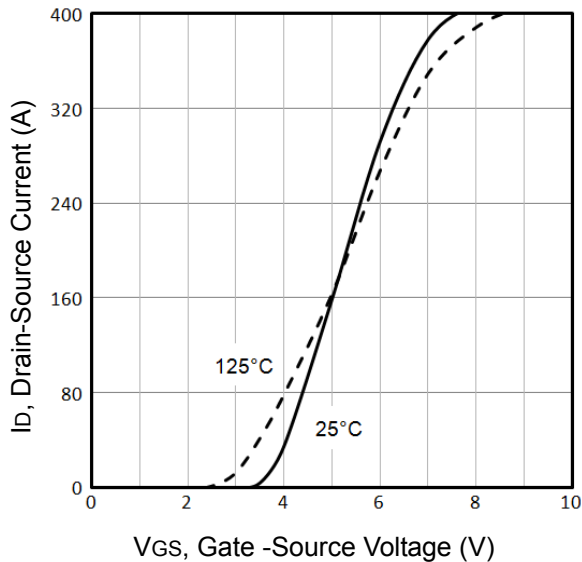


Fig3. Typical Transfer Characteristics

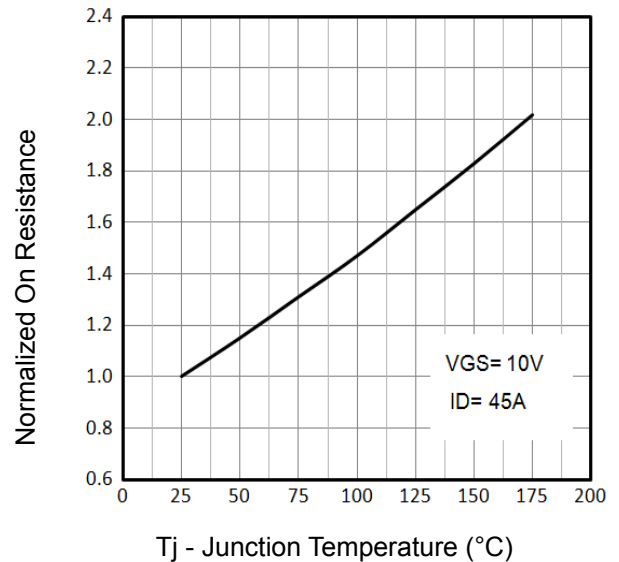


Fig4. Normalized On-Resistance Vs. T_j

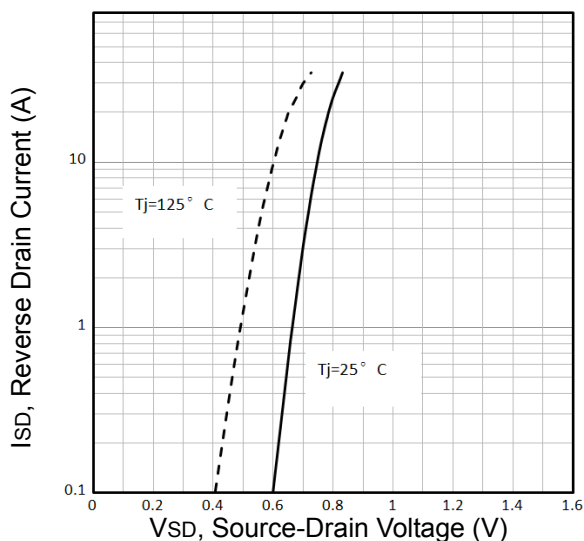


Fig5. Typical Source-Drain Diode Forward Voltage

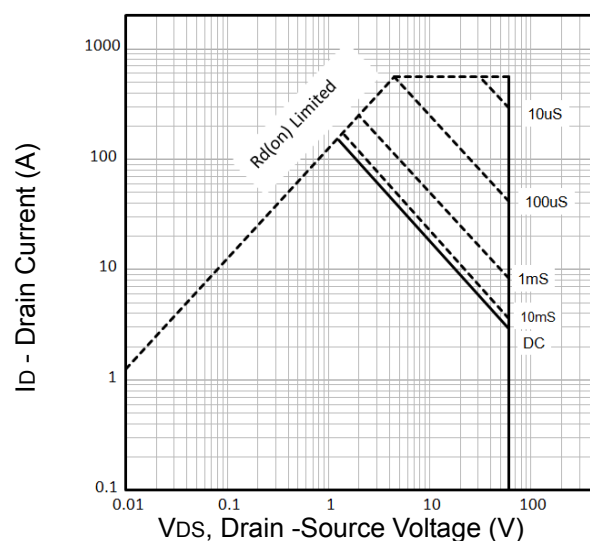


Fig6. Maximum Safe Operating Area

Typical Characteristics

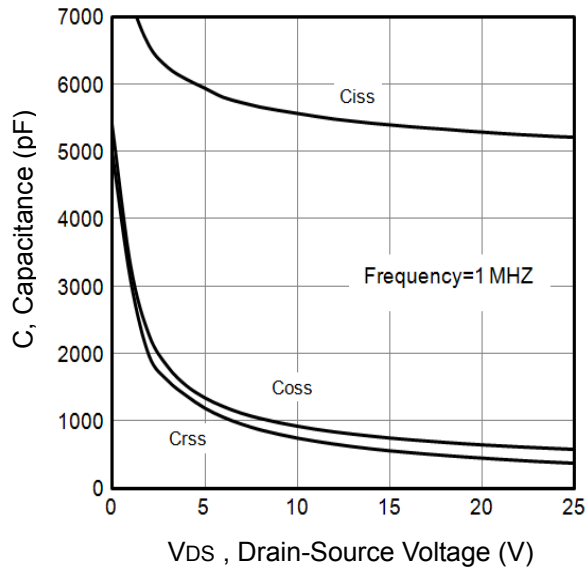


Fig7. Typical Capacitance Vs. Drain-Source Voltage

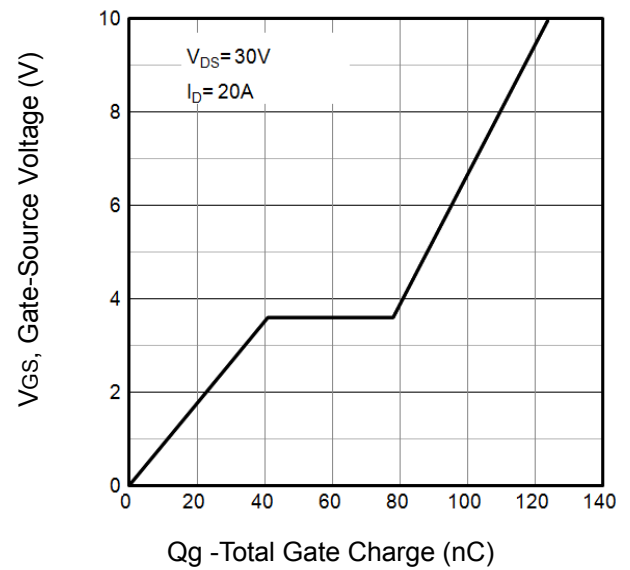


Fig8. Typical Gate Charge Vs. Gate-Source

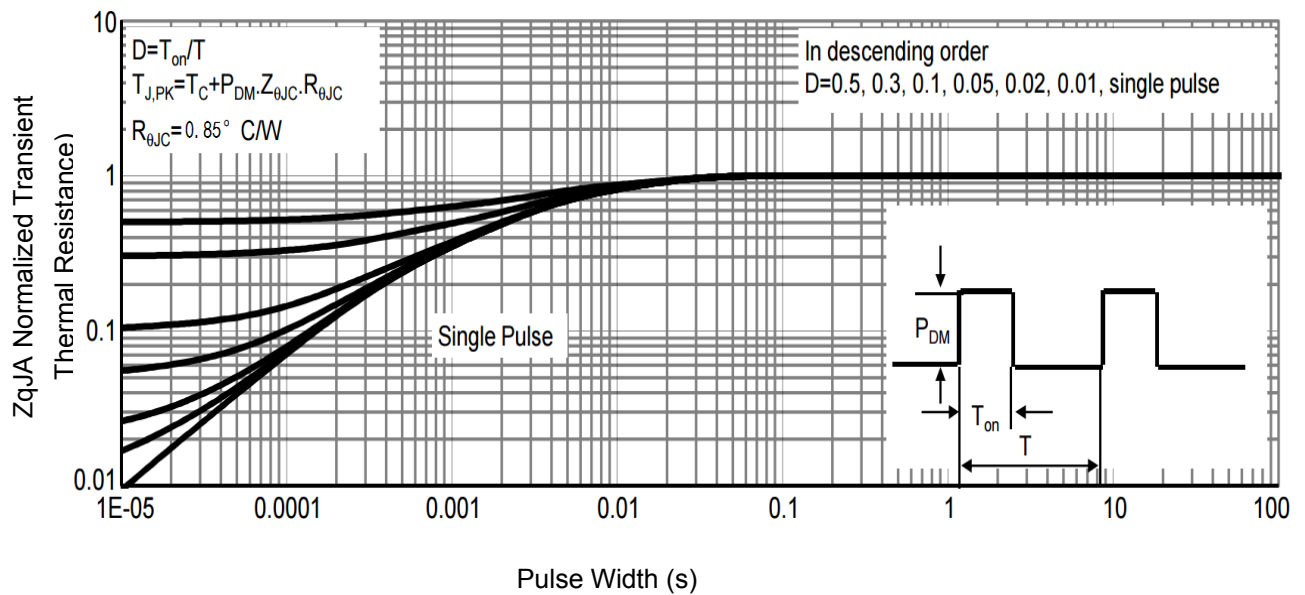


Fig9 . Normalized Maximum Transient Thermal Impedance

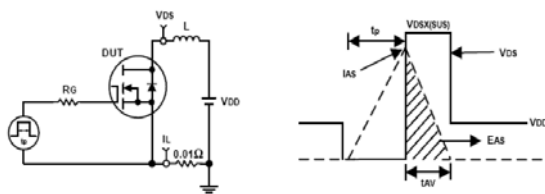


Fig10. Unclamped Inductive Test Circuit and waveforms

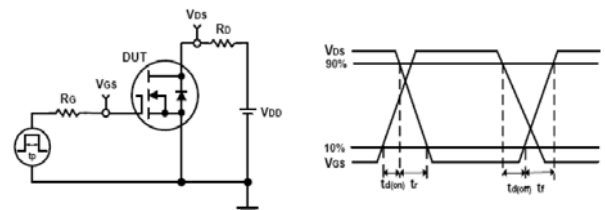
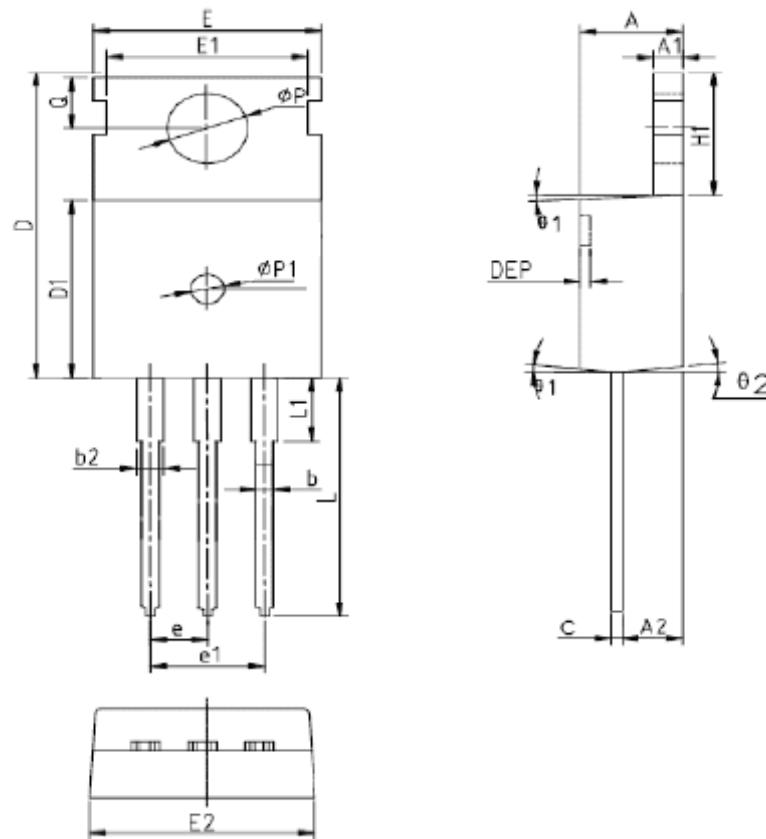


Fig11. Switching Time Test Circuit and waveforms

TO-220AB Package Outline



SYMBOL	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	$\phi p1$	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	ϕp	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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