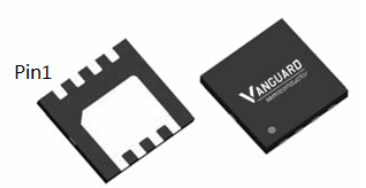
Features

- N-Channel，3.3V Logic Level Control
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ V_{GS}=3.3V
- Fast Switching
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant

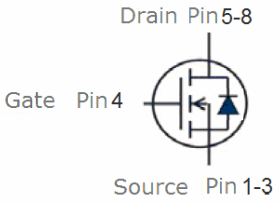
Pb-Free RoHS HF Halogen-Free

V_{DS}	30	V
$R_{DS(on),TYP}$@ V_{GS}=5V	4.5	mΩ
$R_{DS(on),TYP}$@ V_{GS}=3.3V	5.2	mΩ
I_D	65	A

TDFN3.3x3.3 .



Part ID	Package Type	Marking	Tape and reel information
VSB004N03LS	TDFN3.3x3.3	004N03L	5000pcs/Reel



Maximum ratings, at T_j=25 °C, unless otherwise specified

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		30	V
I_S	Diode continuous forward current	T_C=25°C	65	A
I_D	Continuous drain current@V_{GS}=10V	T_C=25°C	65	A
		T_A=100°C	41.5	A
I_{DM}	Pulse drain current tested ①	T_C=25°C	260	A
EAS	Avalanche energy, single pulsed ②	I_D=15A	33.75	mJ
P_D	Maximum power dissipation	T_A=25°C	31	W
V_{GS}	Gate-Source voltage		±12	V
T_{STG} T_J	Storage and operating temperature range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	4	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	50	°C/W

Typical Characteristics

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	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=24V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=24V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	0.6	1.0	1.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=5V, I_D=20A	--	4.5	6	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=3.3V, I_D=15A	--	5.2	7	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=2.5V, I_D=8A	--	6.5	8	mΩ
Dynamic Electrical Characteristics @ T_C= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V, f=1MHz	--	3510	--	pF
C_{oss}	Output Capacitance		--	490	--	pF
C_{rss}	Reverse Transfer Capacitance		--	440	--	pF
Q_g	Total Gate Charge	V_{DS}=15V,I_D=10A, V_{GS}=4.5V	--	18.8	--	nC
Q_{gs}	Gate-Source Charge		--	5.6	--	nC
Q_{gd}	Gate-Drain Charge		--	4.6	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=15V, I_D=10A, R_G=6.8Ω, V_{GS}=5V	--	33	--	nS
t_r	Turn-on Rise Time		--	15	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	6.5	--	nS
t_f	Turn-Off Fall Time		--	5	--	nS
Source- Drain Diode Characteristics@ T_C = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=20A,V_{GS}=0V	--	0.80	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=20A, V_{GS}=0V di/dt=100A/μs	--	19	--	nS
Q_{rr}	Reverse Recovery Charge			37		nC

NOTE:

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

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.3mH,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

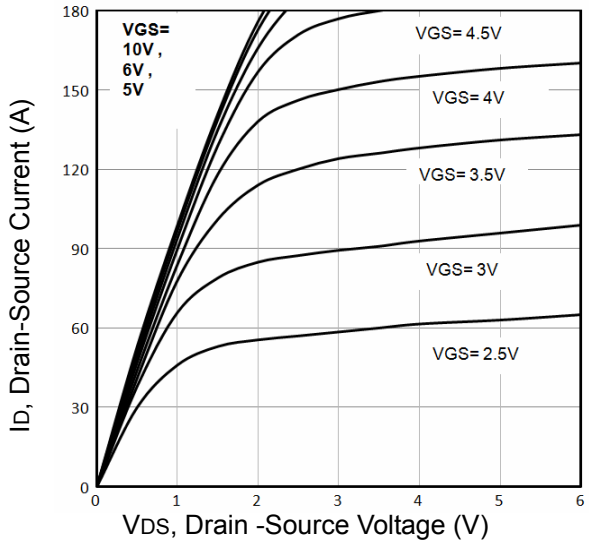


Fig1. Typical Output Characteristics

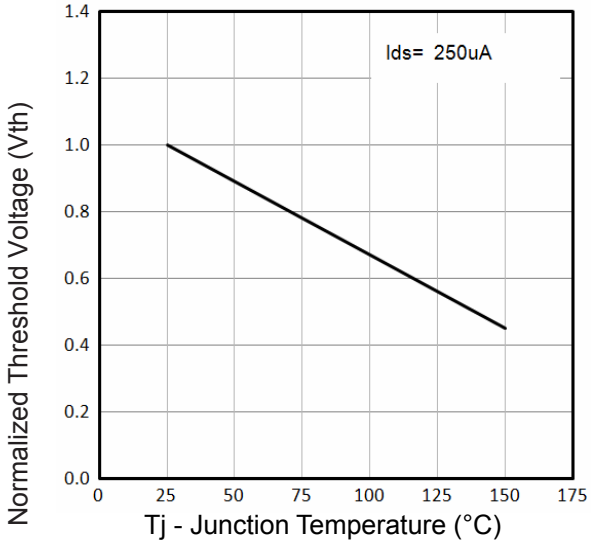


Fig2. Normalized Threshold Voltage Vs. Temperature

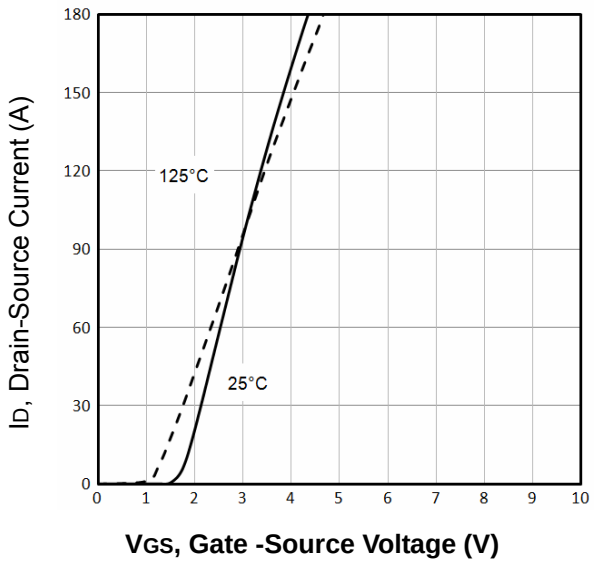


Fig3. Typical Transfer Characteristics

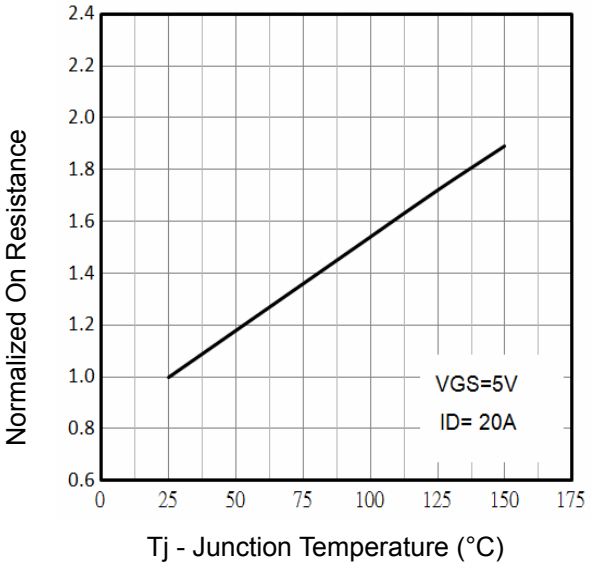


Fig4. Normalized On-Resistance Vs. Temperature

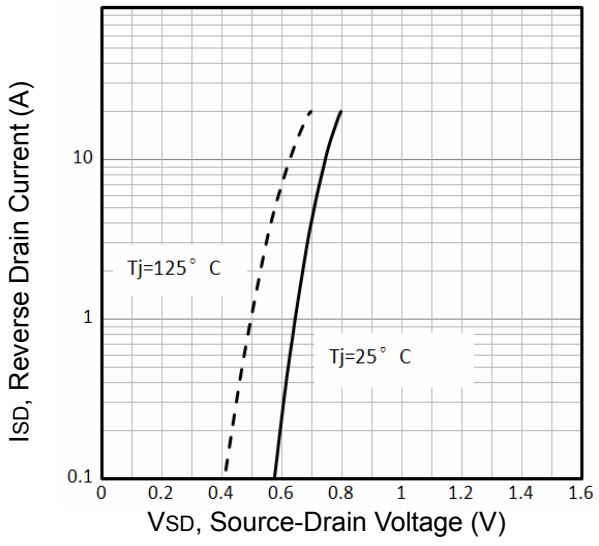


Fig5. Typical Source-Drain Diode Forward Voltage

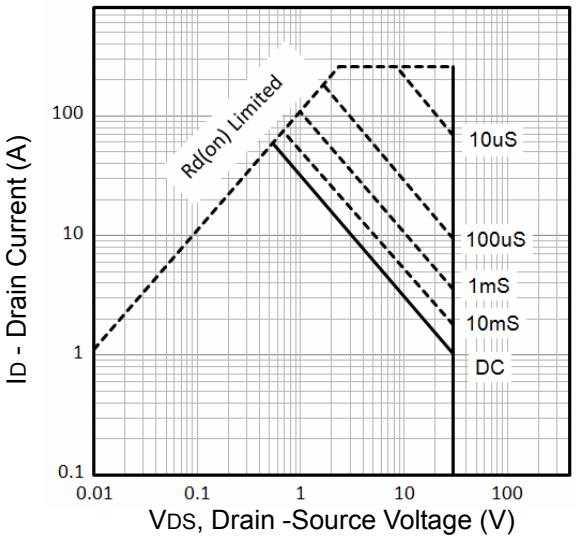


Fig6. Maximum Safe Operating Area

Typical Characteristics

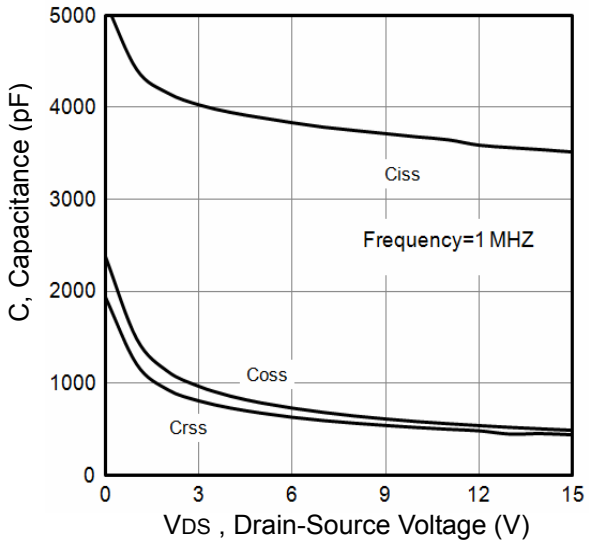


Fig7. Typical Capacitance Vs.Drain-Source Voltage

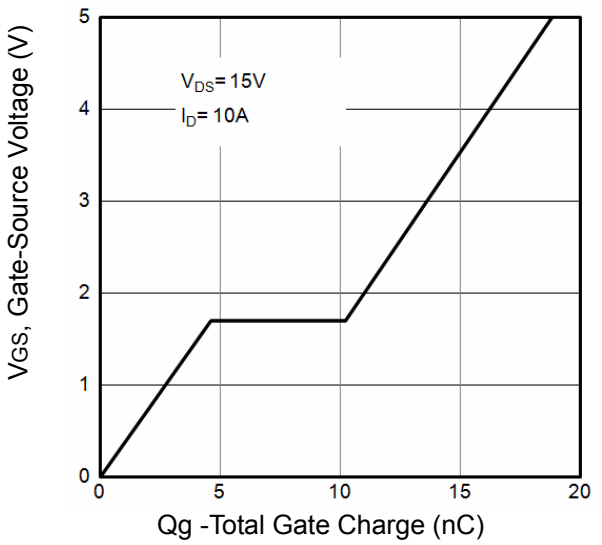


Fig8. Typical Gate Charge Vs.Gate-Source

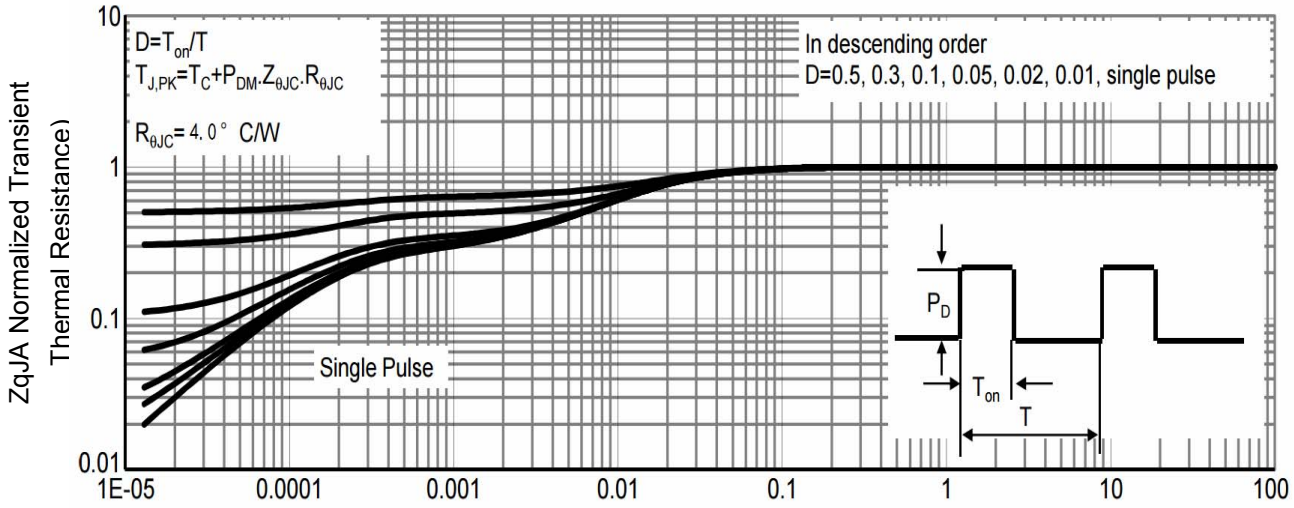


Fig9. Normalized Maximum Transient Thermal Impedance

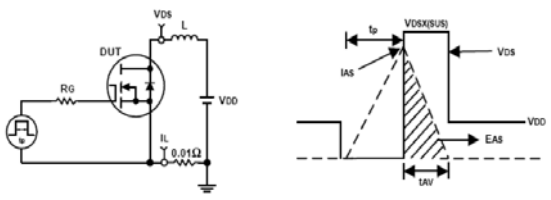


Fig10. Unclamped Inductive Test Circuit and waveforms

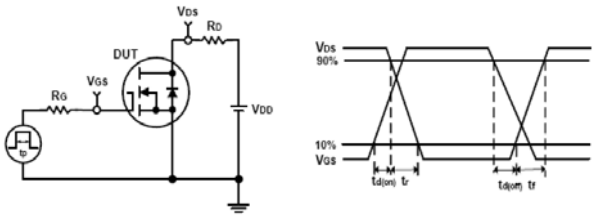
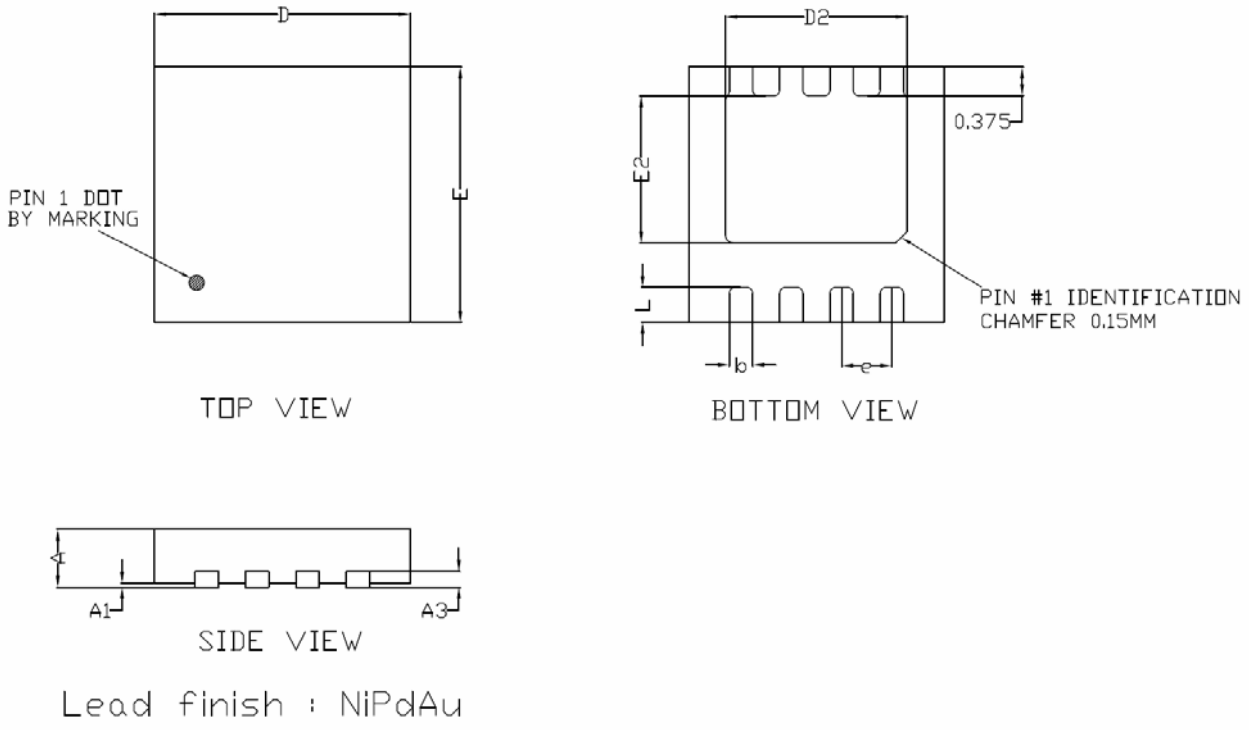


Fig11. Switching Time Test Circuit and waveforms

TDFN3.3x3.3 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.75	0.80	**A1**	0.00	--	0.05
A3	0.20 REF			**D**	3.25	3.30	3.35
E	3.25	3.30	3.35	**D2**	2.30	2.35	2.40
E2	1.85	1.90	1.95	**b**	0.25	0.30	0.35
L	0.35	0.45	0.55	**e**	0.65 BSC		

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