VANGUARD semiconductor

VSB012N06MS

60V/44A N-Channel Advanced Power MOSFET

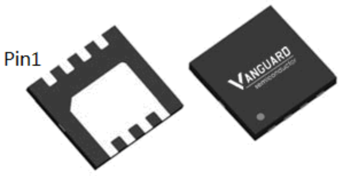
V_{DS}	60	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	9.5	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5V	11	mΩ
I_D	44	A

Features

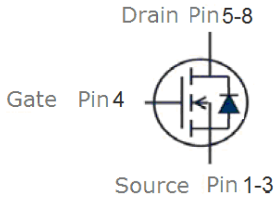
- N-Channel
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ V_{GS}=4.5 V
- Fast Switching
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant

Pb-Free RoHS HF Halogen-Free

TDFN3.3x3.3



Part ID	Package Type	Marking	Tape and reel information
VSB012N06MS	TDFN3.3x3.3	012N06M	5000pcs/Reel



Maximum ratings, at T_j=25 °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°C	44	A
I_D	Continuous drain current@V_{GS}=10V	T_C=25°C	44	A
		T_A=100°C	28	A
I_{DM}	Pulse drain current tested ①	T_C=25°C	160	A
EAS	Avalanche energy, single pulsed ②	I_D=20A	100	mJ
P_D	Maximum power dissipation	T_A=25°C	62	W
V_{GS}	Gate-Source voltage		±20	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	1.3	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	60	°C/W

Typical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ Tc = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	VDS=60V,VGS=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	VDS=60V,VGS=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.0	1.5	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	VGS=10V, ID=30A	--	9.5	12	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	VGS=4.5V, ID=10A	--	11	14	mΩ
Dynamic Electrical Characteristics @ T c= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	VDS=24V,VGS=0V, f=1MHz	--	1860	--	pF
C_{oss}	Output Capacitance		--	150	--	pF
C_{rss}	Reverse Transfer Capacitance		--	95	--	pF
Q_g	Total Gate Charge	VDS=30V,ID=10A, VGS=10V	--	26	--	nC
Q_{gs}	Gate-Source Charge		--	6.5	--	nC
Q_{gd}	Gate-Drain Charge		--	4.5	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	VDD=30V, ID=10A, RG=6.8Ω, VGS=10V	--	9	--	nS
t_r	Turn-on Rise Time		--	5	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	28	--	nS
t_f	Turn-Off Fall Time		--	4	--	nS
Source- Drain Diode Characteristics@ Tc = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	ISD=30A,VGS=0V	--	0.88	1.2	V
t_{rr}	Reverse Recovery Time	Tj=25℃,Isd=20A, VGS=0V di/dt=100A/μs	--	23	--	nS
Q_{rr}	Reverse Recovery Charge			52		nC

NOTE:

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

② Limited by TJmax, starting TJ = 25°C, L = 0.5mH,RG = 25Ω, IAS = 20A, VGS =10V. Part not recommended for use above this value

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

Typical Characteristics

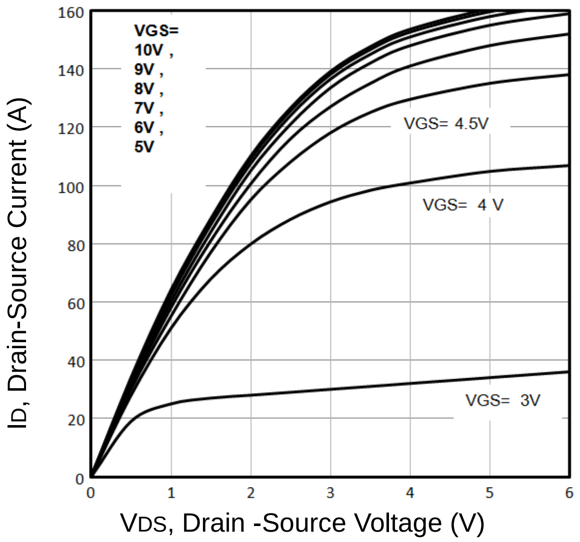


Fig1. Typical Output Characteristics

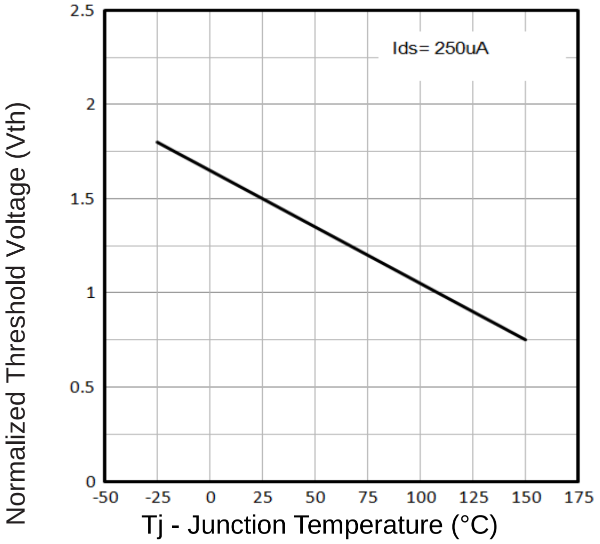


Fig2. Normalized Threshold Voltage Vs. Temperature

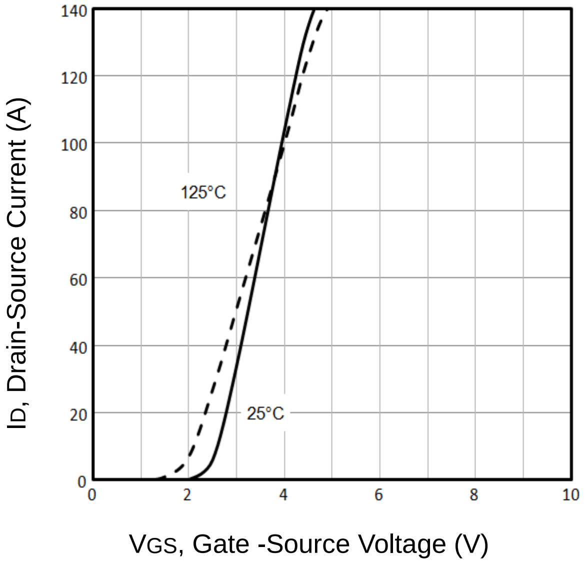


Fig3. Typical Transfer Characteristics

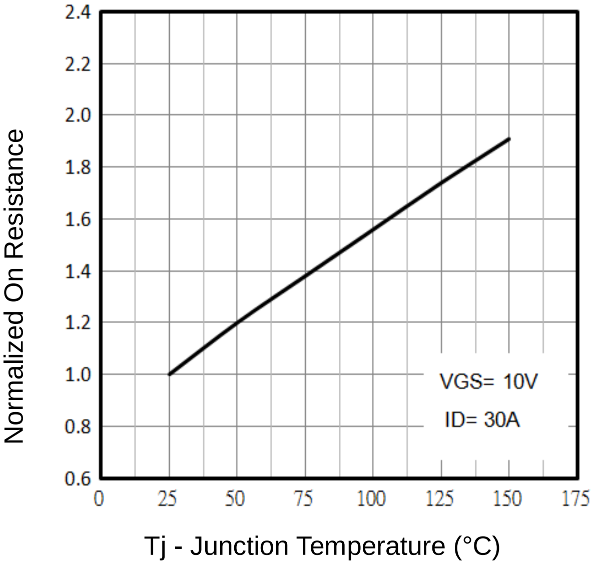


Fig4. Normalized On-Resistance Vs. Temperature

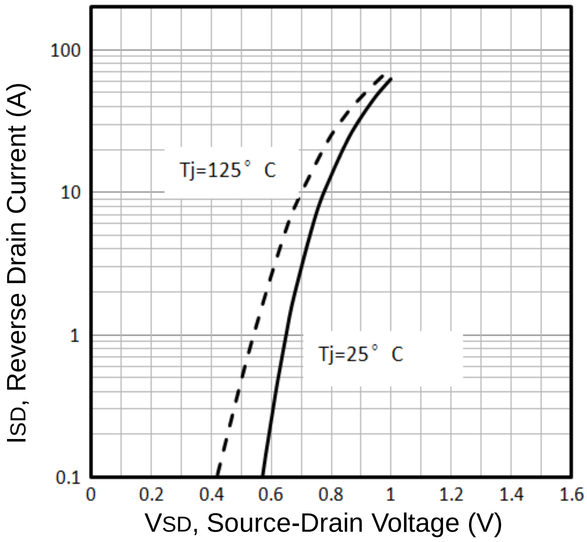


Fig5. Typical Source-Drain Diode Forward Voltage

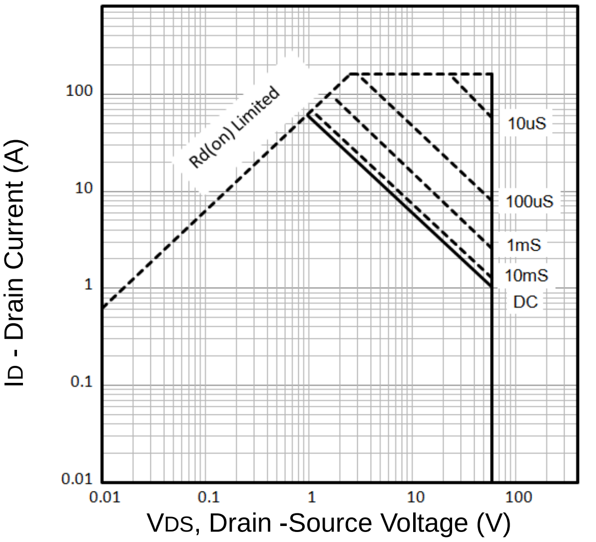


Fig6. Maximum Safe Operating Area

Typical Characteristics

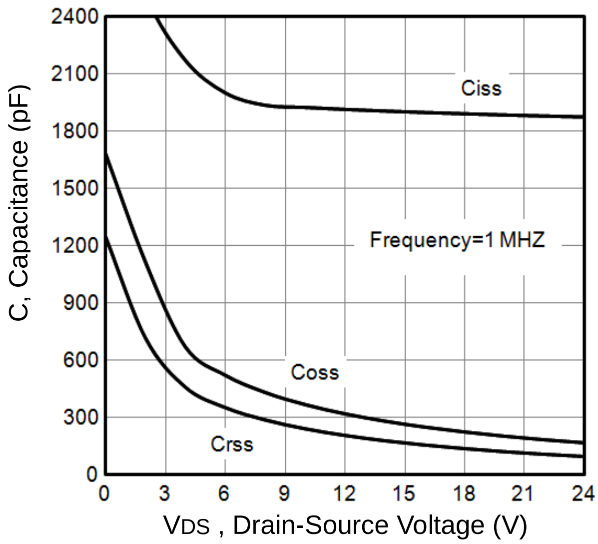


Fig7. Typical Capacitance Vs.Drain-Source Voltage

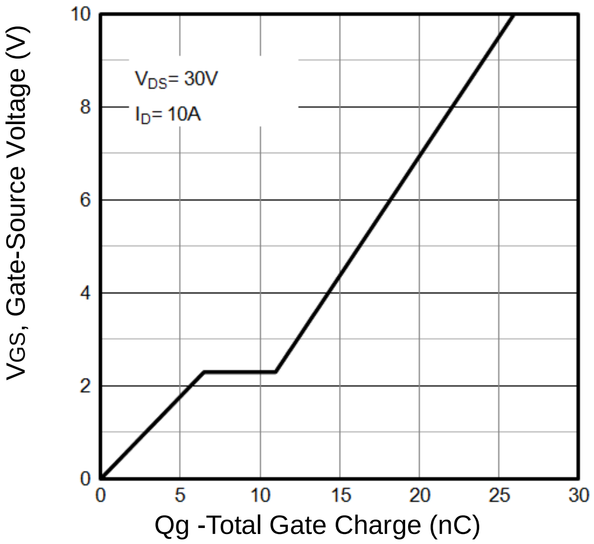


Fig8. Typical Gate Charge Vs.Gate-Source

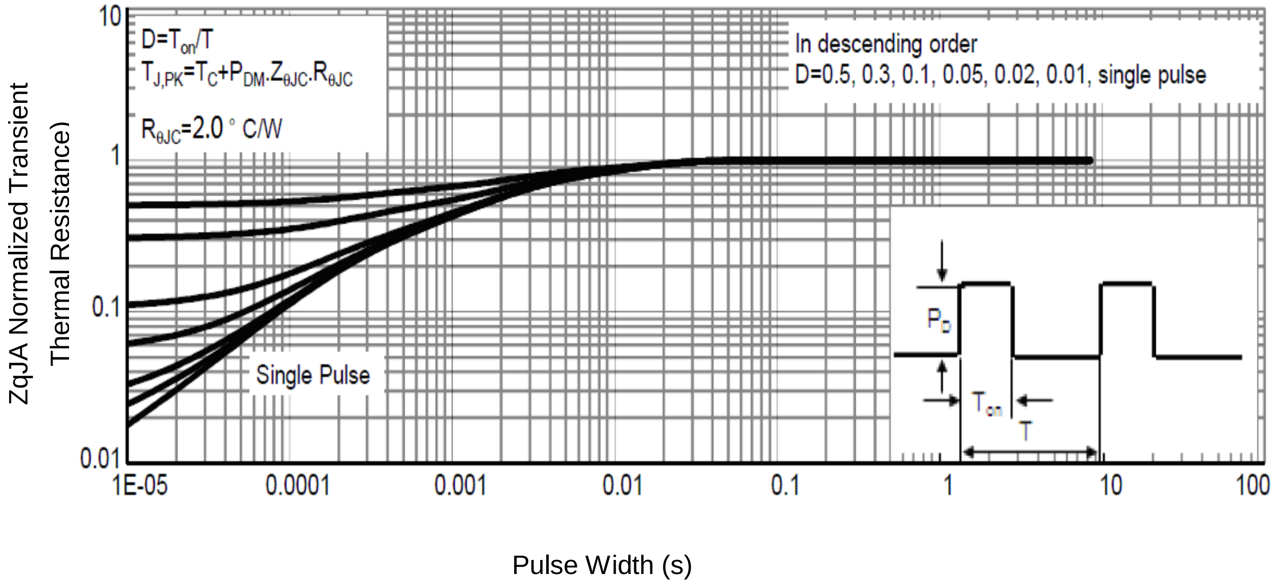


Fig 9 . Normalized Maximum Transient Thermal Impedance

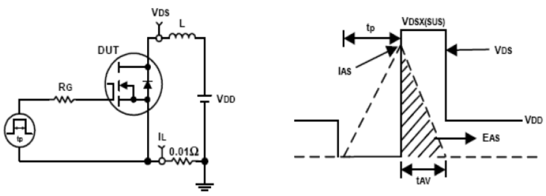


Fig10. Unclamped Inductive Test Circuit and waveforms

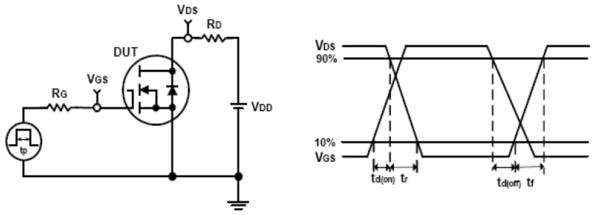
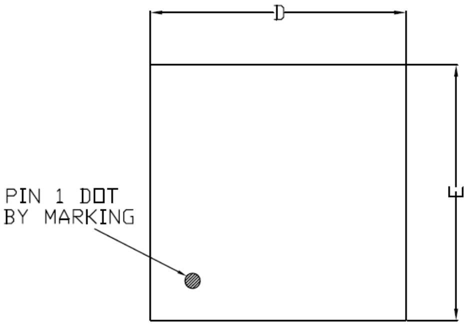
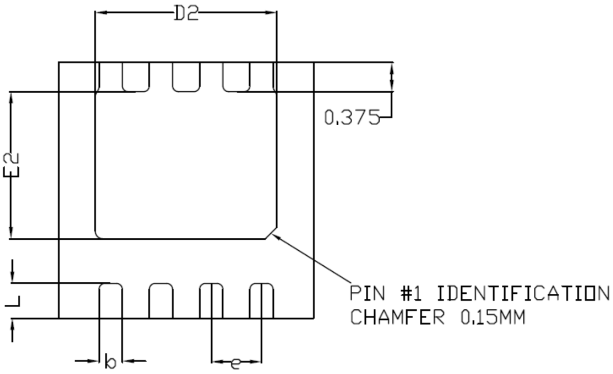


Fig11. Switching Time Test Circuit and waveforms

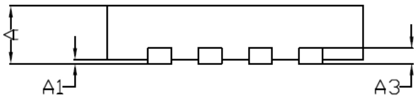
TDFN3.3x3.3 Package Outline Data



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Lead finish : NiPdAu

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		

Customer Service

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