VANGUARD semiconductor

VSP006N05MS

50V/70A N-Channel Advanced Power MOSFET

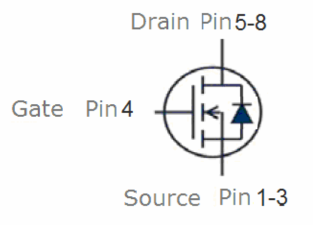
V_{DS}	50	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	5.5	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5V	7.5	mΩ
I_D	70	A

Features

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

Pb-Free RoHS HF Halogen-Free

PDFN5x6



Part ID	Package Type	Marking	Tape and reel information
VSP006N05MS	PDFN5x6	006N05M	3000pcs/reel

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

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage		±20	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		50	V
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	T_C =25°C	70	A
Mounted on Large Heat Sink				
I_D	Continuous Drain current@VGS=10V	T_C =25°C	70	A
		T_C =100°C	55	A
I_{DM}	Pulse Drain Current Tested ①	T_C =25°C	250	A
P_D	Maximum Power Dissipation	T_C =25°C	83	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		1.8	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		52.5	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed ②		60	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	50	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=40V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=40V,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	1.0	2.0	3.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=25A	--	5.5	6.5	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=10A	--	7.5	10.0	mΩ
Dynamic Electrical Characteristics @ T_C= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	--	1825	--	pF
C_{oss}	Output Capacitance		--	230	--	pF
C_{rss}	Reverse Transfer Capacitance		--	135	--	pF
Q_g	Total Gate Charge	V_{DS}=20V,I_D=10A, V_{GS}=10V	--	58	--	nC
Q_{gs}	Gate-Source Charge		--	12	--	nC
Q_{gd}	Gate-Drain Charge		--	10	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=30V, I_D=5A, R_G=6.8Ω, V_{GS}=10V	--	24	--	nS
t_r	Turn-on Rise Time		--	113	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	48	--	nS
t_f	Turn-Off Fall Time		--	105	--	nS
Source- Drain Diode Characteristics@ T_C = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=25A,V_{GS}=0V	--	0.84	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=10A, V_{GS}=0V di/dt=100A/μs	--	36	--	nS
Q_{rr}	Reverse Recovery Charge			41		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} = 20A, V_{GS} =10V. Part not recommended for use above this value

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

Typical Characteristics

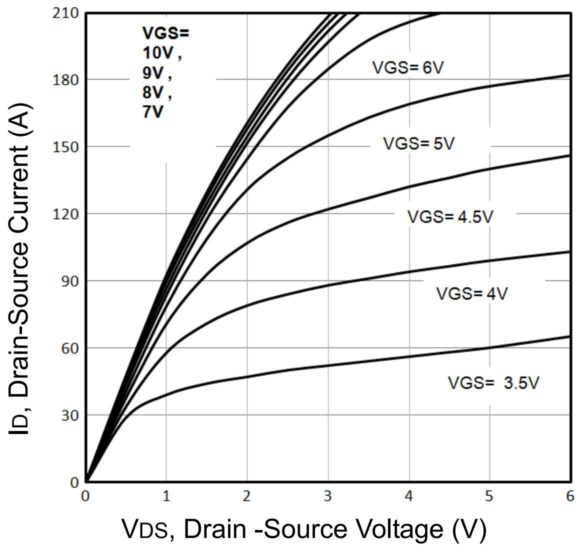


Fig1. Typical Output Characteristics

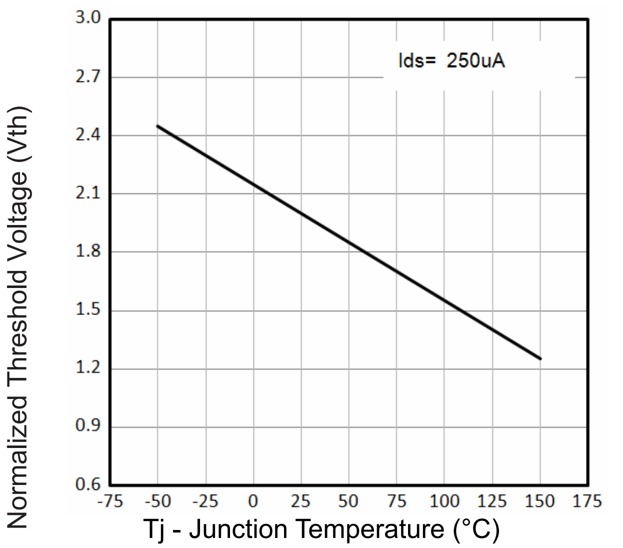


Fig2. Normalized Threshold Voltage Vs. Temperature

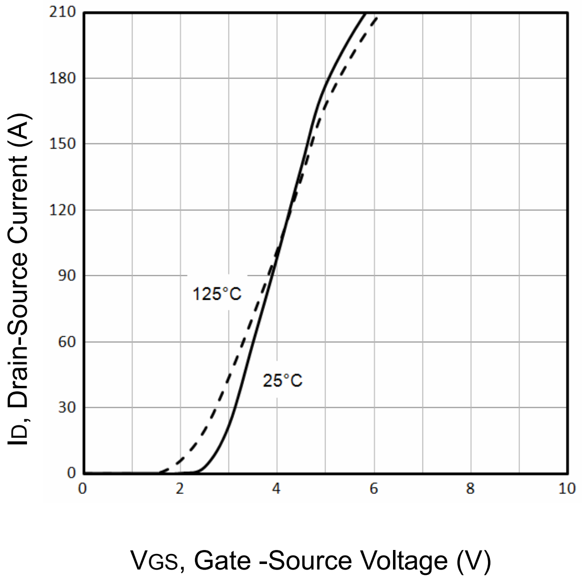


Fig3. Typical Transfer Characteristics

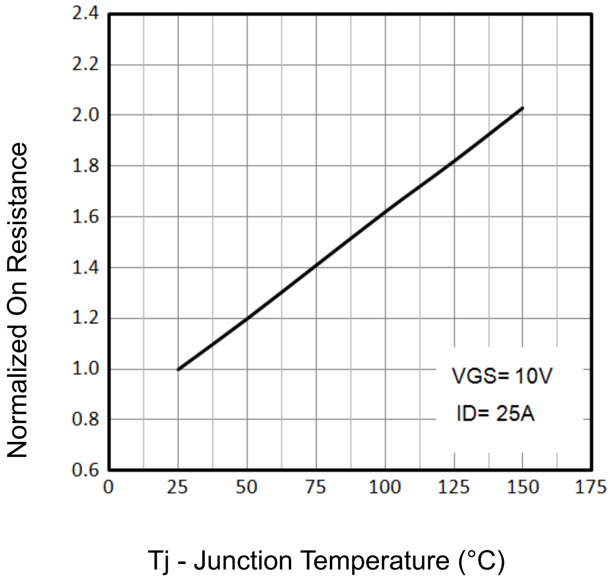


Fig4. Normalized On-Resistance Vs. Temperature

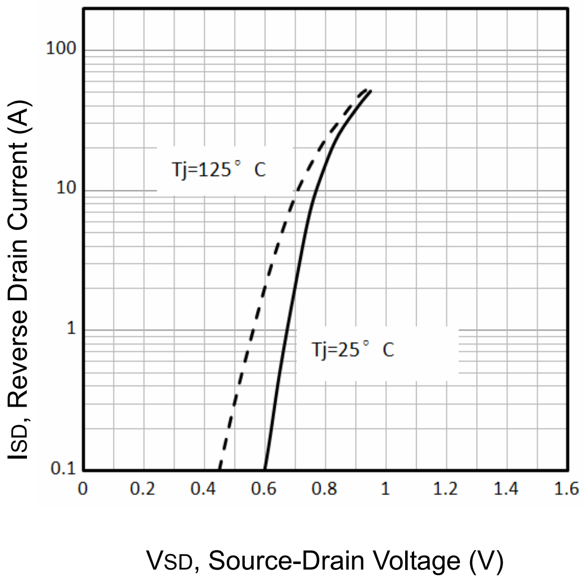


Fig5. Typical Source-Drain Diode Forward Voltage

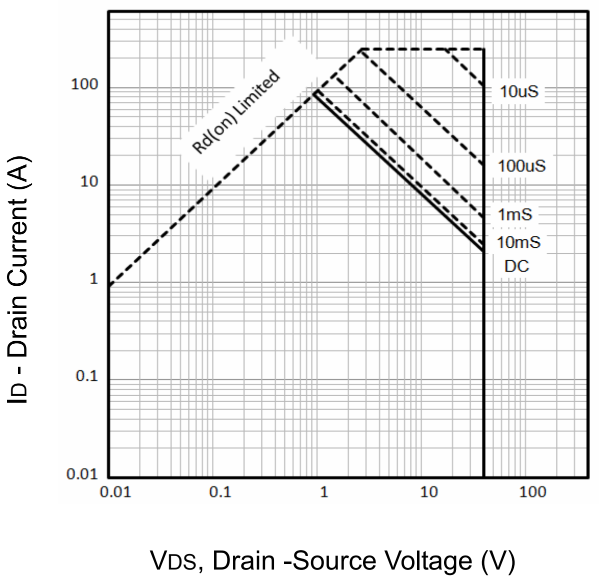


Fig6. Maximum Safe Operating Area

Typical Characteristics

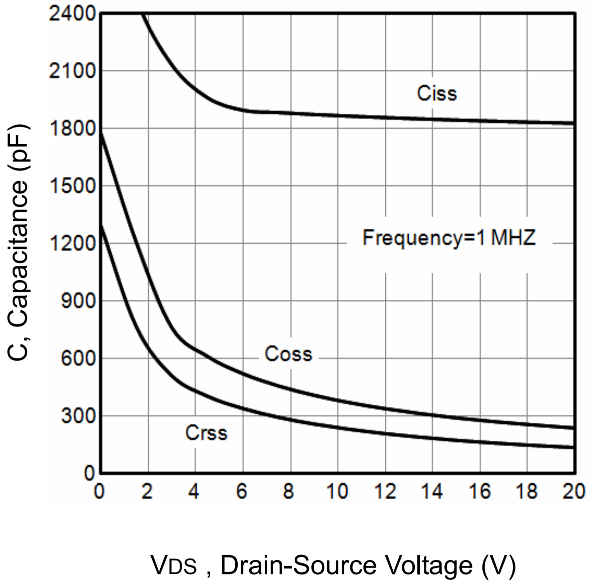


Fig7. Typical Capacitance Vs.Drain-Source Voltage

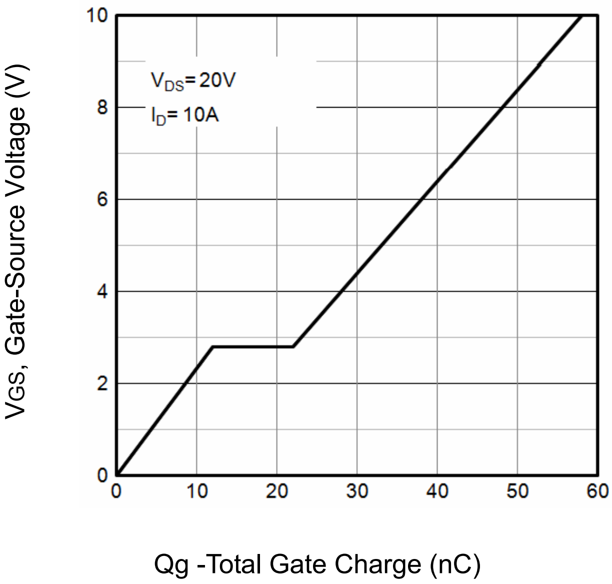


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

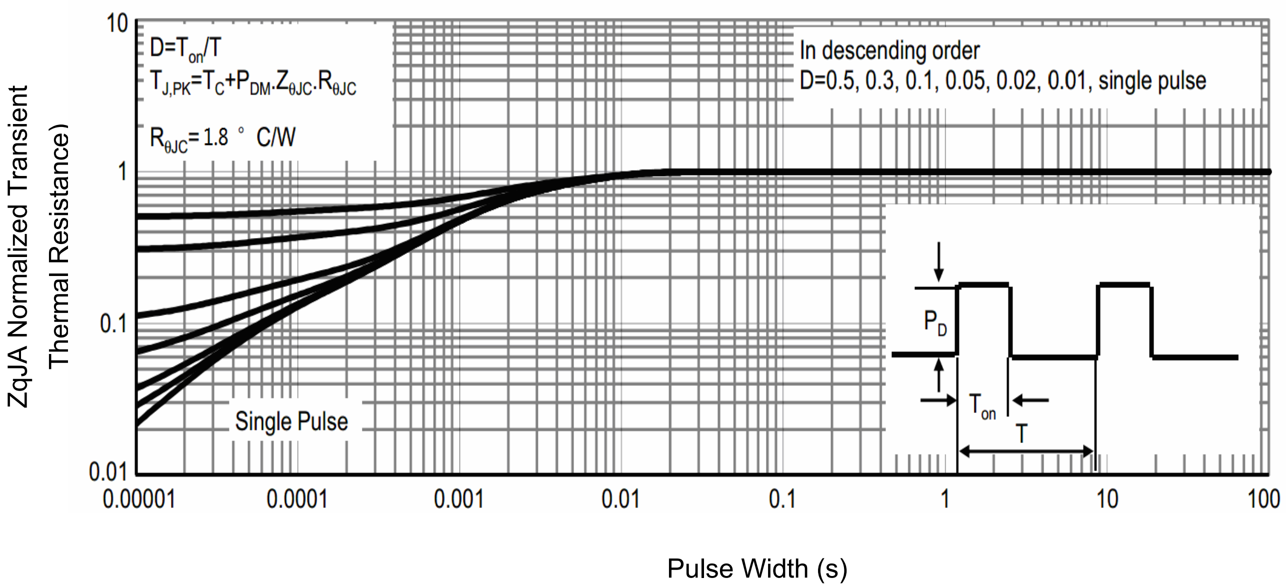


Fig9. Normalized Maximum Transient Thermal Impedance (Note H)

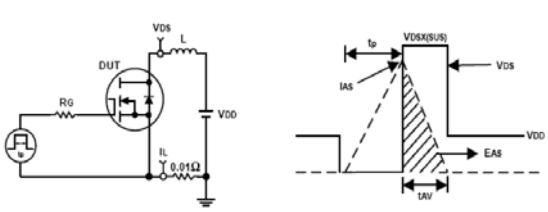


Fig10. Unclamped Inductive Test Circuit and waveforms

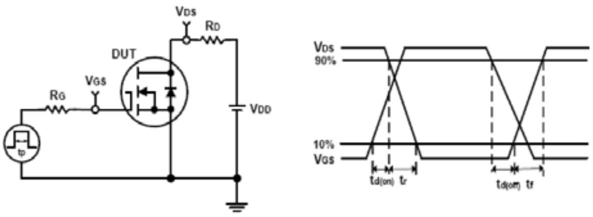
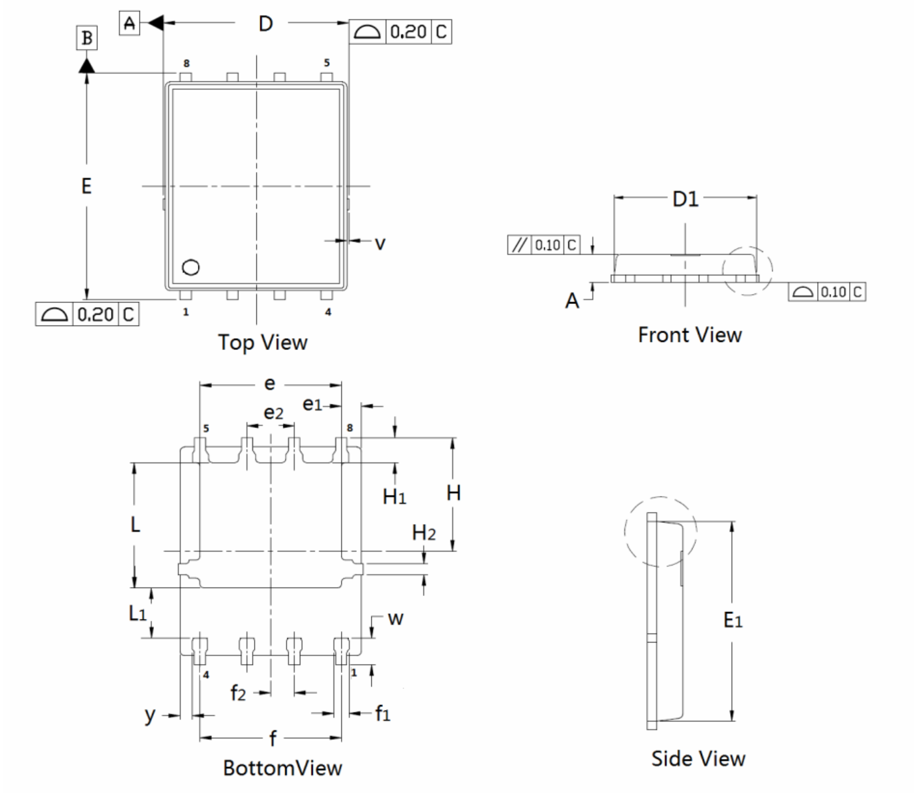


Fig11. Switching Time Test Circuit and waveforms

PDFN5×6 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.02	1.10	**D**	4.90	4.98	5.10
D_1	4.80	4.89	5.00	**E**	6.00	6.11	6.20
E_1	5.65	5.74	5.85	**e**	3.72	3.80	3.92
e_1	--	0.54	--	**e_2**	--	1.27	--
f	--	3.82	--	**f_1**	0.31	0.37	0.51
f_2	--	0.64	--	**H**	--	3.15	--
H_1	0.59	0.63	0.79	**H_2**	0.26	0.28	0.32
L	3.38	3.45	3.58	**L_1**	--	1.39	--
v	--	0.13	--	**w**	0.64	0.68	0.84
y	--	0.34	--		--		--

Customer Service

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