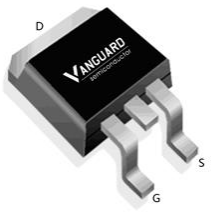
V_{DS}	45	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	1.8	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5 V	2.7	mΩ
I_D	200	A

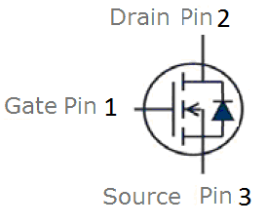
Features

- Enhancement mode
- Low on-resistance $R_{DS(on)}$ @ V_{GS}=4.5 V
- VitoMOS® Ⅱ Technology
- Fast Switching and High efficiency
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant

Pb-Free RoHS HF Halogen-Free

TO-263





Part ID	Package Type	Marking	Tape and reel information
VSM002NE4MS-G	TO-263	002NE4M	1000pcs/Reel

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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		45	V
VGS	Gate-Source voltage		±20	V
I_S	Diode continuous forward current	T_C=25°C	200	A
I_D	Continuous drain current @V_{GS}=10V	T_C=25°C	200	A
		T_C=100°C	140	A
I_{DM}	Pulse drain current tested ①	T_C=25°C	800	A
I_{DSM}	Continuous drain current @VGS=10V	T_A=25°C	26	A
		T_A=70°C	21	A
EAS	Avalanche energy, single pulsed ②		144	mJ
P_D	Maximum power dissipation	T_C=25°C	120	W
		T_C=100°C	60	W
P_{DSM}	Maximum power dissipation ③	T_A=25°C	2	W
		T_A=70°C	1.3	W
T_{STG}, T_J	Storage and Junction Temperature Range		-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.25	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	45	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=45V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T_j=125℃)	V_{DS}=45V,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	1.3	--	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=10V, I_D=40A	--	1.8	2.5	mΩ
		T_j=100℃	--	2.3	--	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=4.5V, I_D=20A		2.7	3.5	mΩ
Dynamic Electrical Characteristics @ T_j= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	2770	3260	3750	pF
C_{oss}	Output Capacitance		1075	1265	1455	pF
C_{rss}	Reverse Transfer Capacitance		25	35	45	pF
R_g	Gate Resistance	f=1MHz	--	1.2	--	Ω
Q_g (10V)	Total Gate Charge	V_{DS}=20V,I_D=40A, V_{GS}=10V	--	55	--	nC
Q_g (4.5V)	Total Gate Charge		--	28	--	nC
Q_{gs}	Gate-Source Charge		--	9.3	--	nC
Q_{gd}	Gate-Drain Charge		--	10.5	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=40A, R_G=3Ω, V_{GS}=10V	--	9.6	--	ns
t_r	Turn-on Rise Time		--	80	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	44	--	ns
t_f	Turn-Off Fall Time		--	62	--	ns
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=40A,V_{GS}=0V	--	0.8	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=40A, V_{GS}=0V di/dt=100A/μs	--	44	--	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 = 0.5mH, R_G = 25Ω, I_{AS} = 24A, V_{GS} =10V. Part not recommended for use above this value

③ The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 380μs; duty cycle≤ 2%.

Typical Characteristics

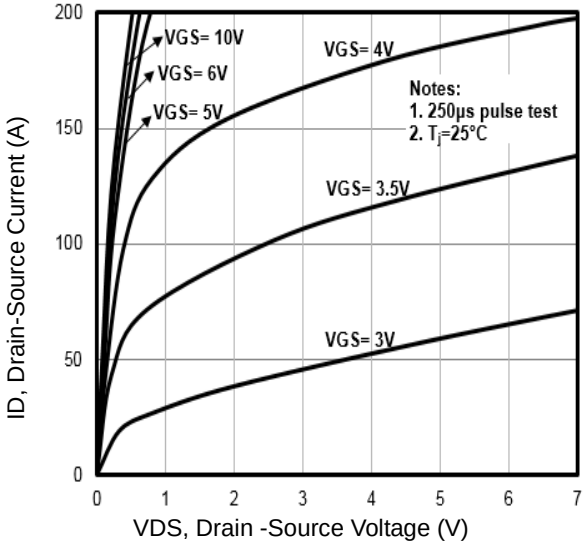


Fig1. Typical Output Characteristics

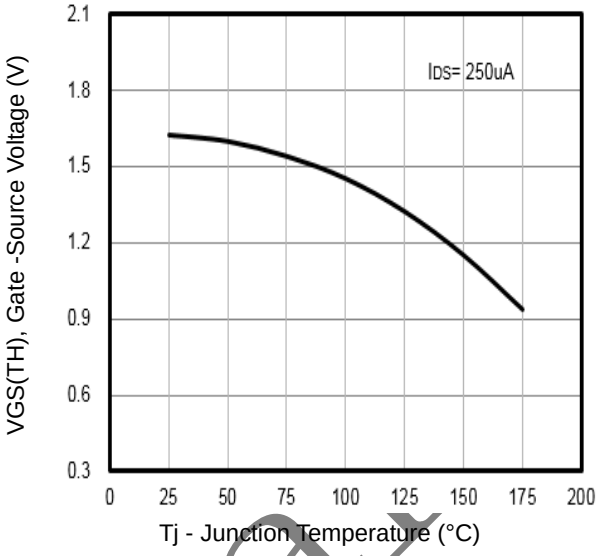


Fig2. $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

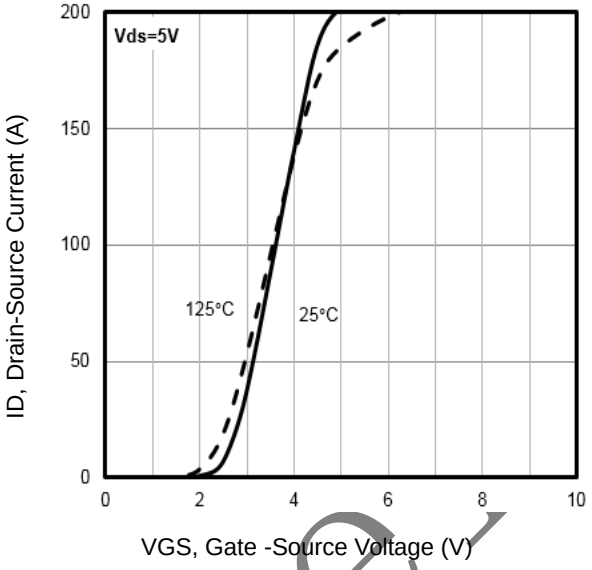


Fig3. Typical Transfer Characteristics

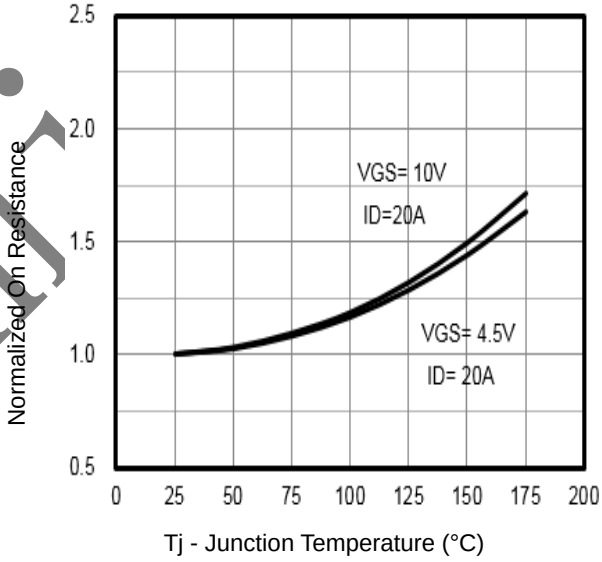


Fig4. Normalized On-Resistance Vs. Temperature

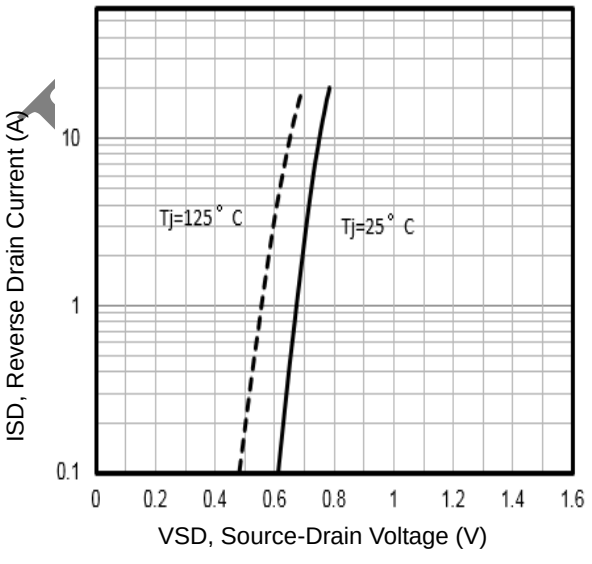


Fig5. Typical Source-Drain Diode Forward Voltage

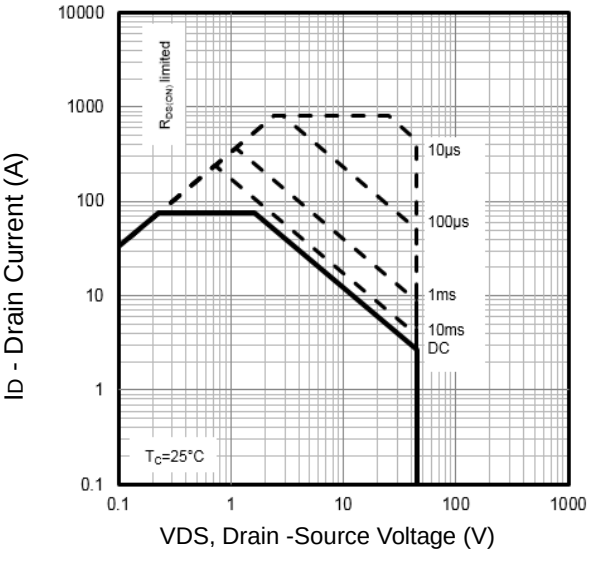


Fig6. Maximum Safe Operating Area

Typical Characteristics

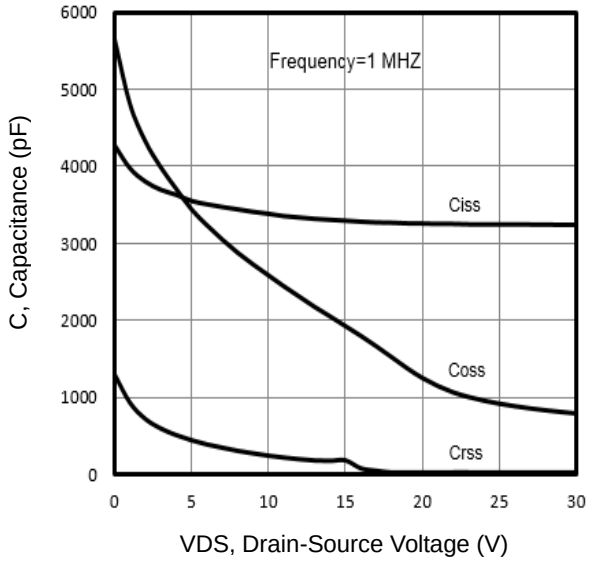


Fig7. Typical Capacitance Vs. Drain-Source Voltage

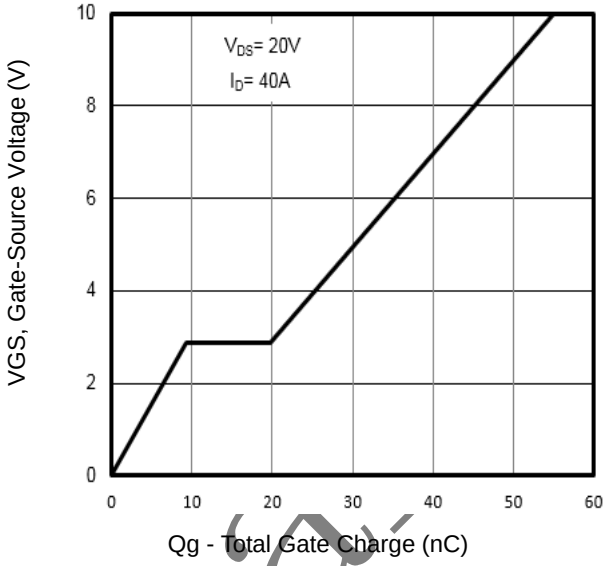


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

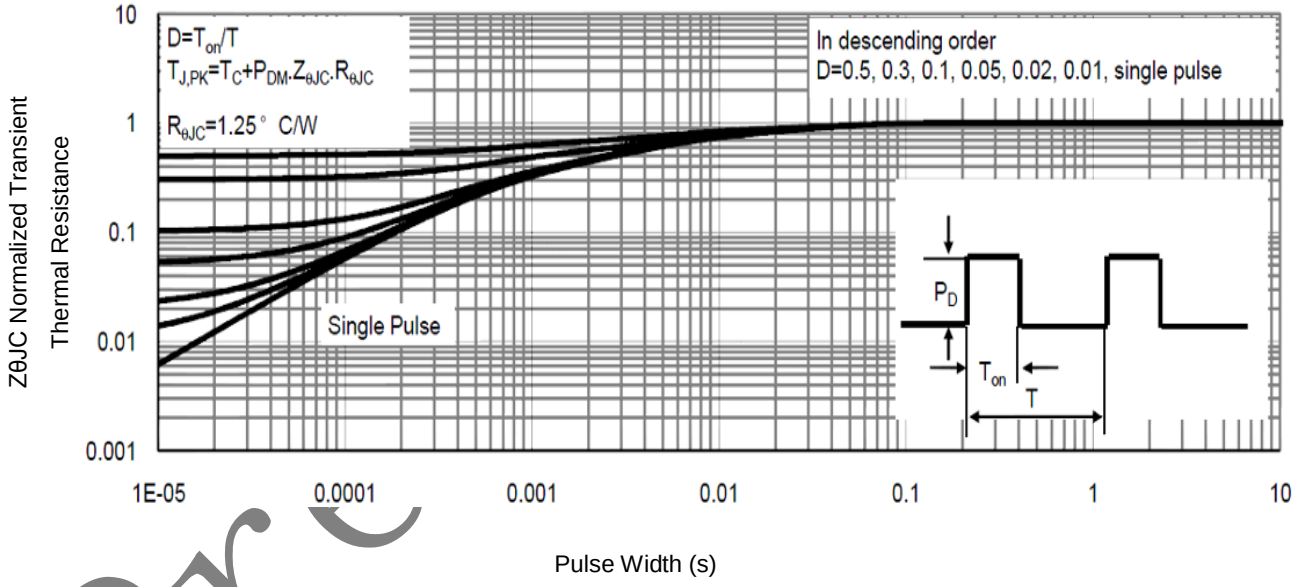


Fig9. Normalized Maximum Transient Thermal Impedance

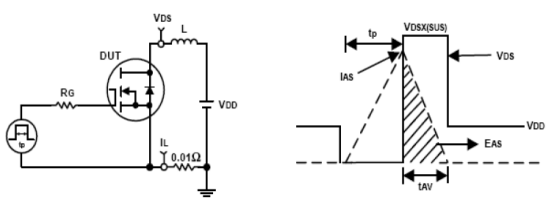


Fig10. Unclamped Inductive Test Circuit and waveforms

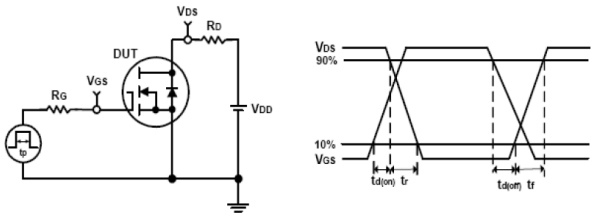
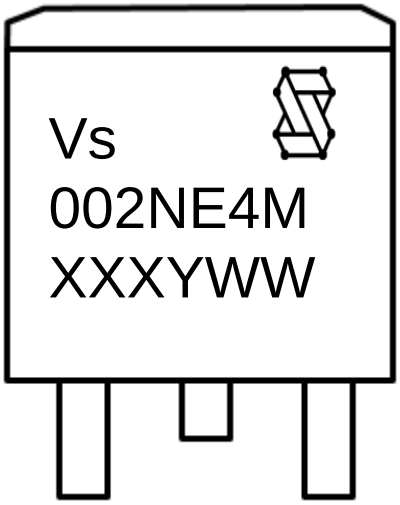


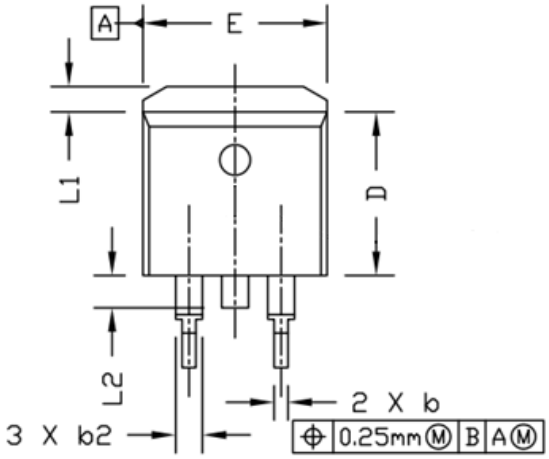
Fig11. Switching Time Test Circuit and waveforms

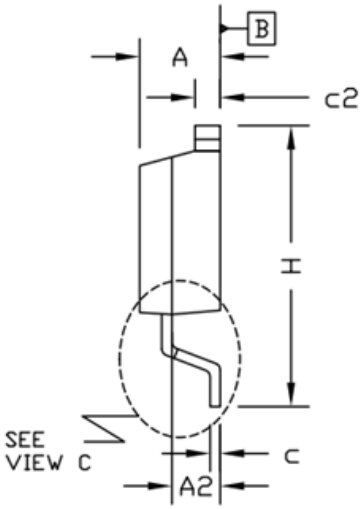
Marking Information

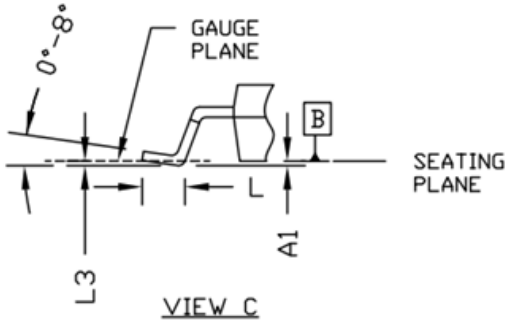


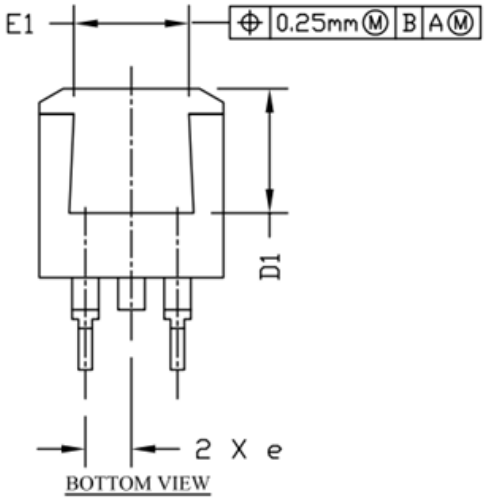
1st line: Vanguard Code（Vs）， Vanguard Logo
2nd line: Part Number（002NE4M）
3rd line: Date code （XXXYWW）
XXX: Wafer Lot Number Code , code changed with Lot Number
Y: Year Code，(e.g. E=2017, F=2018, G=2019, H=2020, etc)
WW: Week Code (01 to 53)

TO-263 Package Outline Data









Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.400	4.570	4.700
A1	0.000	0.100	0.200
A2	2.300	2.400	2.500
b	0.700	0.800	0.900
b2	1.200	1.270	1.360
c	0.381	0.500	0.737
c2	1.220	1.300	1.350
D	8.600	9.200	9.300
D1	6.860		
e	2.540 BSC		
E	9.780	9.880	10.260
E1	6.225		
H	14.700	15.100	15.500
L	2.000	2.550	2.750
L1	1.000	1.200	1.400
L2	1.300	1.600	1.700
L3	0.255 BSC		

Notes:

1. Refer to JEDEC TO-263 variation AB
2. Dimension "D" & "E" do NOT include mold flash, mold flash shall not exceed 0.127mm per side.

Customer Service

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