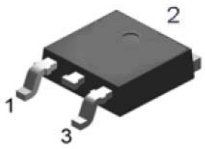
Features

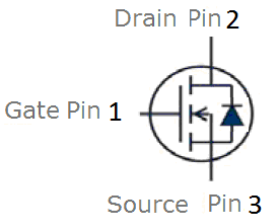
- N-Channel
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ V_{GS}=4.5 V
- Fast Switching
- High conversion efficiency
- Pb-free lead plating; RoHS compliant

Pb-Free RoHS HF Halogen-Free

V_{DS}	58	V
$R_{DS(on),TYP}$@ V_{GS}=4.5 V	15	mΩ
I_D	30	A

TO-252





Part ID	Package Type	Marking	Tape and reel information
VSD025NE5MS	TO-252	025NE5MS	2500pcs/reel

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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		58	V
I_S	Diode continuous forward current	T_C=25°C	30	A
I_D	Continuous drain current@V_{GS}=10V	T_C=25°C	30	A
		T_C=70°C	20.8	A
I_{DM}	Pulse drain current tested ①	T_C=25°C	120	A
EAS	Avalanche energy, single pulsed ②	I_D=30A	45	mJ
IAS	Avalanche energy, single pulsed ②		30	A
P_D	Maximum power dissipation	T_C=25°C	45	W
V_{GS}	Gate-Source voltage		±20	V
T_{STG} T_J	Storage and operating temperature range		-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.3	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	50	°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	58	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=48V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=48V,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	1.8	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=20A	--	14	18	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=10A	--	16	22	mΩ
Dynamic Electrical Characteristics @ T_C= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	--	2710	--	pF
C_{oss}	Output Capacitance		--	185	--	pF
C_{rss}	Reverse Transfer Capacitance		--	130	--	pF
Q_g	Total Gate Charge	V_{DS}=25V,I_D=4A, V_{GS}=10V	--	45	--	nC
Q_{gs}	Gate-Source Charge		--	4.3	--	nC
Q_{gd}	Gate-Drain Charge		--	11.5	--	nC
Rg	Gate Resistance	V_{GS}=0V, f=1MHz	--	4.0	--	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=25V, I_D=4A, R_G=6.8Ω, V_{GS}=10V	--	16	--	nS
t_r	Turn-on Rise Time		--	80	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	38	--	nS
t_f	Turn-Off Fall Time		--	73	--	nS
Source- Drain Diode Characteristics@ T_C = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=20A,V_{GS}=0V	--	0.86	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=4A, V_{GS}=0V di/dt=100A/μs	--	17	--	nS
Q_{rr}	Reverse Recovery Charge			10		nC

NOTE:

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

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.1mH,R_G = 25Ω, I_{AS} = 30A, V_{GS} =10V. Part not recommended for use above this value

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

Typical Characteristics

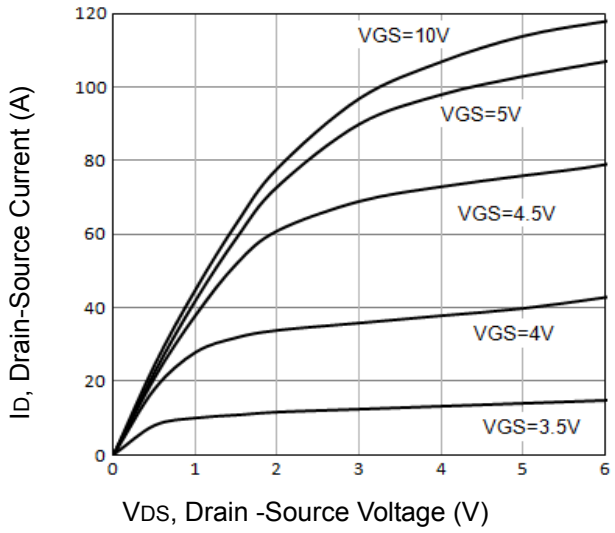


Fig1. Typical Output Characteristics

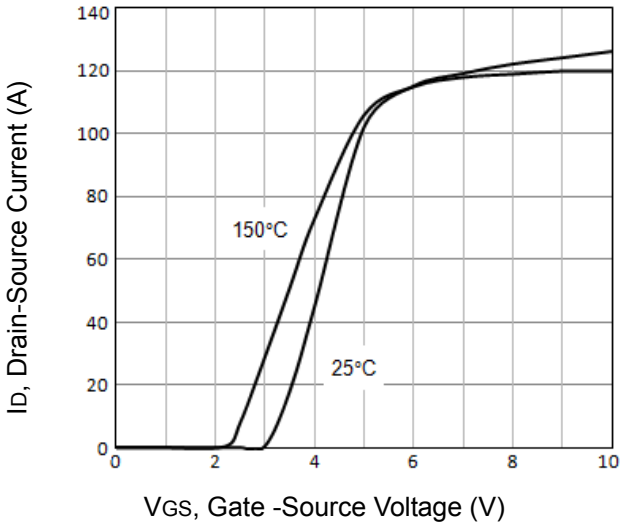


Fig2. Typical Transfer Characteristics

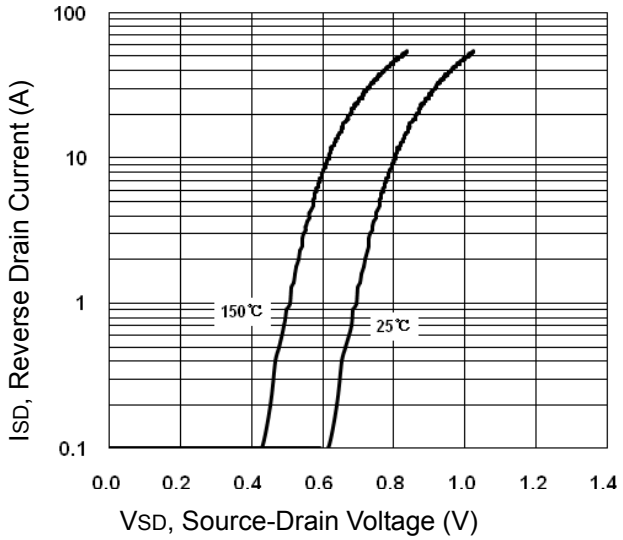


Fig3. Typical Source-Drain Diode Forward

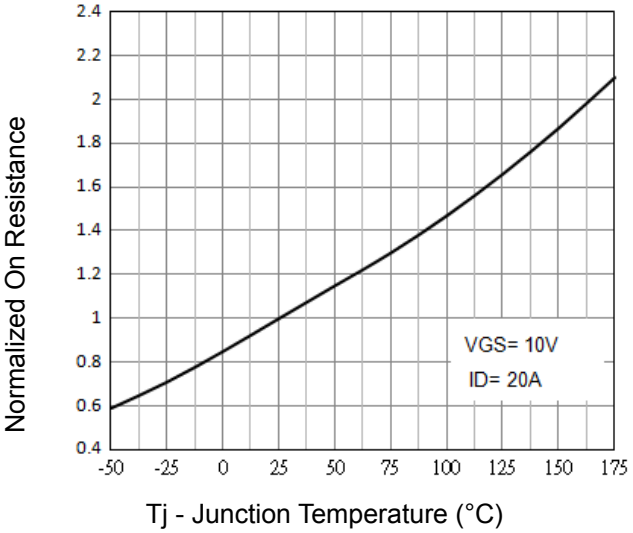


Fig4. Normalized On-Resistance Vs. Temperature

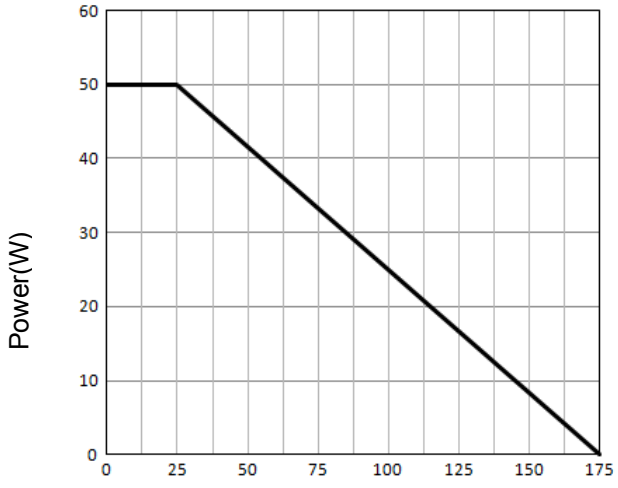


Fig5. Power Dissipation

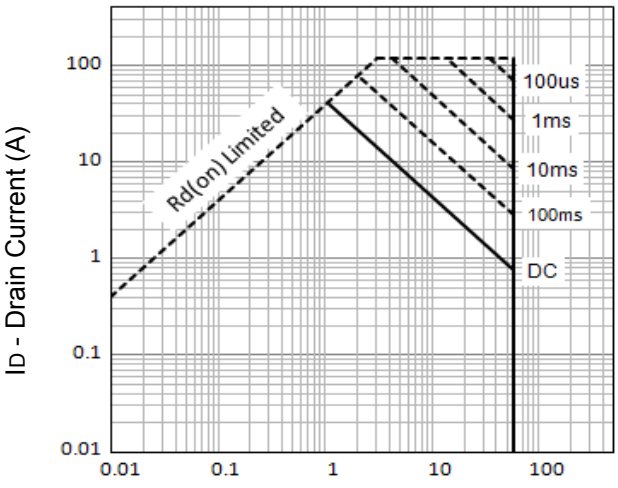


Fig6. Maximum Safe Operating Area

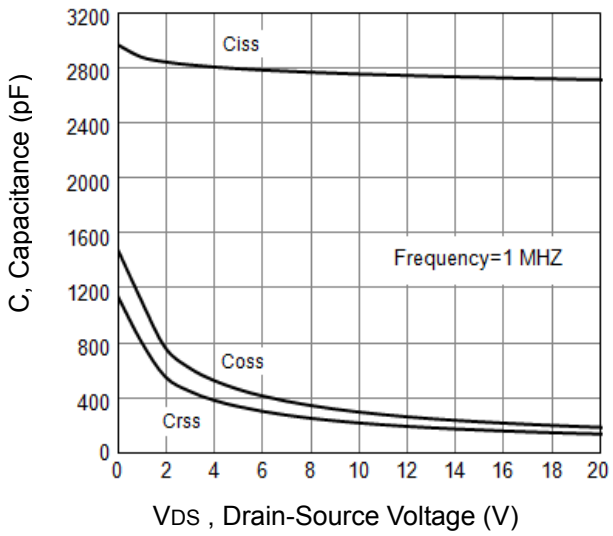


Fig7. Typical Capacitance Vs.Drain-Source Voltage

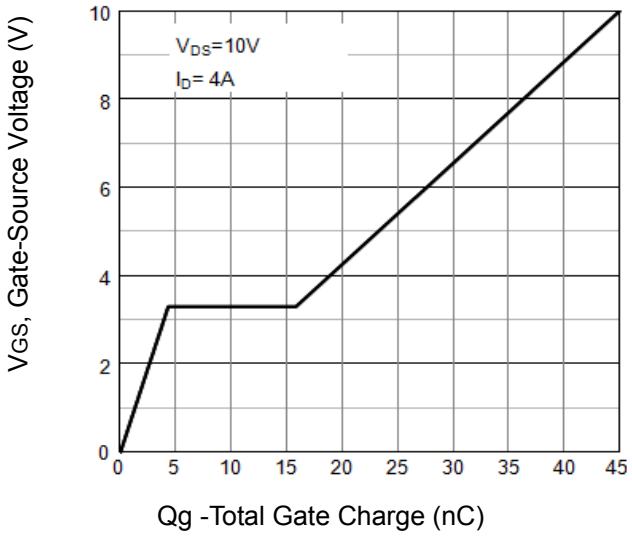


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

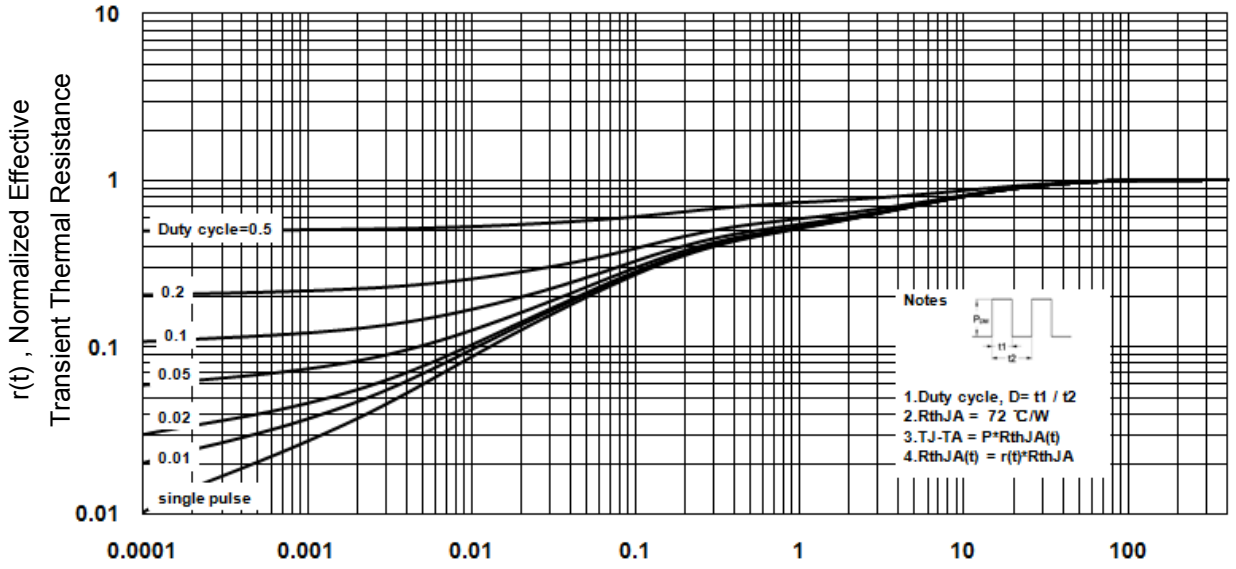


Fig9. **T1 ,Transient Thermal Response Curve**

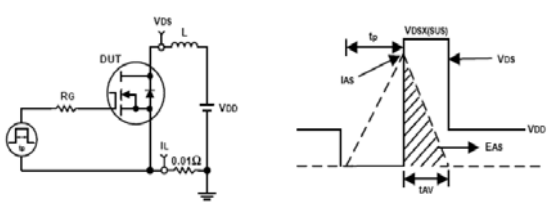


Fig10. Unclamped Inductive Test Circuit and waveforms

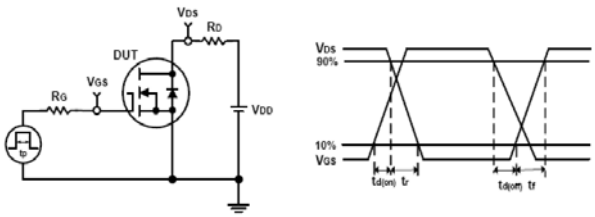
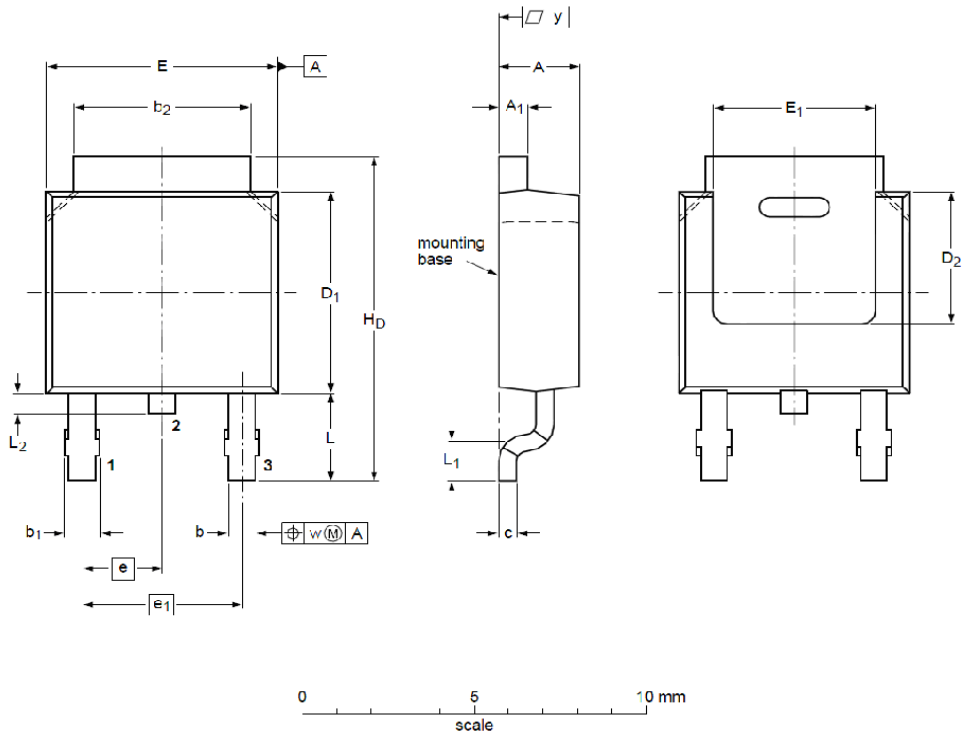


Fig11. Switching Time Test Circuit and waveforms

TO-252 Package Outline



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.22	2.30	2.38	**A_1**	0.46	0.58	0.93
b	0.71	0.79	0.89	**b_1**	0.90	0.98	1.10
b_2	5.00	5.30	5.46	**c**	0.20	0.40	0.56
D_1	5.98	6.05	6.22	**D_2**	--	4.00	--
E	6.47	6.60	6.73	**E_1**	5.10	5.28	5.45
e	--	2.28	--	**e_1**	--	4.57	--
H_D	9.60	10.08	10.40	**L**	2.75	2.95	3.05
L_1	--	0.50	--	**L_2**	0.80	0.90	1.10
w	--	0.20	--	**y**	0.20	--	--

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