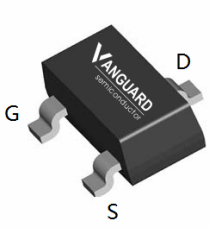
Features

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

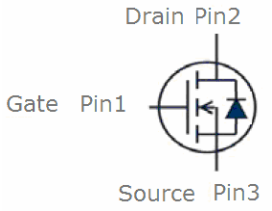
V_{DS}	60	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	38	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5 V	45	mΩ
I_D	6	A

SOT23-3L



Pb-Free RoHS HF Halogen-Free

Part ID	Package Type	Marking	Tape and reel information
VSL045N06MS	SOT23-3L	006	3000pcs/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	6	A
I_D	Continuous drain current@V_{GS}=10V	T_C=25°C	6	A
		T_C=100°C	3.8	A
I_{DM}	Pulse drain current tested ①	T_C=25°C	24	A
P_D	Maximum power dissipation	T_C=25°C	1.25	W
V_{GS}	Gate-Source voltage		±20	V
T_{STG}	Storage temperature range		-55 to 175	°C
T_J	Maximum Junction Temperature		150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	30	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	100	°C/W

Typical 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	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=60V,V_{GS}=0V	--	0.01	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=60V,V_{GS}=0V	--	5	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	1.6	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=6A	--	38	45	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=4A	--	45	50	mΩ
Dynamic Electrical Characteristics @ T_J= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=30V,V_{GS}=0V, f=1MHz	--	465	--	pF
C_{oss}	Output Capacitance		--	55	--	pF
C_{rss}	Reverse Transfer Capacitance		--	25	--	pF
Q_g	Total Gate Charge	V_{DS}=30V,I_D=5A, V_{GS}=10V	--	9.5	--	nC
Q_{gs}	Gate-Source Charge		--	1.8	--	nC
Q_{gd}	Gate-Drain Charge		--	2.2	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=30V, I_D=1A, R_G=6.8Ω, V_{GS}=10V	--	5.8	--	nS
t_r	Turn-on Rise Time		--	2.8	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	16	--	nS
t_f	Turn-Off Fall Time		--	2.2	--	nS
Source- Drain Diode Characteristics@ T_J= 25°C (unless otherwise stated)						
I_{SD}	Source-drain current(Body Diode)	T_C=25℃	--	--	6	A
V_{SD}	Forward on voltage	I_{SD}=2A,V_{GS}=0V	--	0.76	1.3	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=5A, V_{GS}=0V di/dt=100A/μs	--	26	--	nS
Q_{rr}	Reverse Recovery Charge			29		nC

NOTE:

①Pulse width ≤ 300μs; duty cycle≤ 2%.

Typical Characteristics

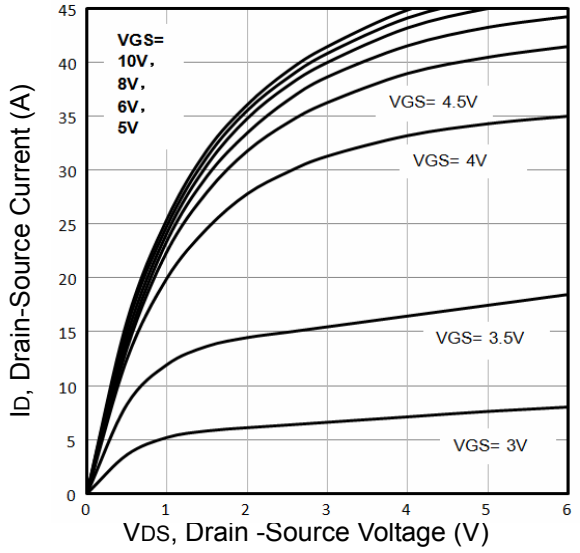


Fig1. Typical Output Characteristics

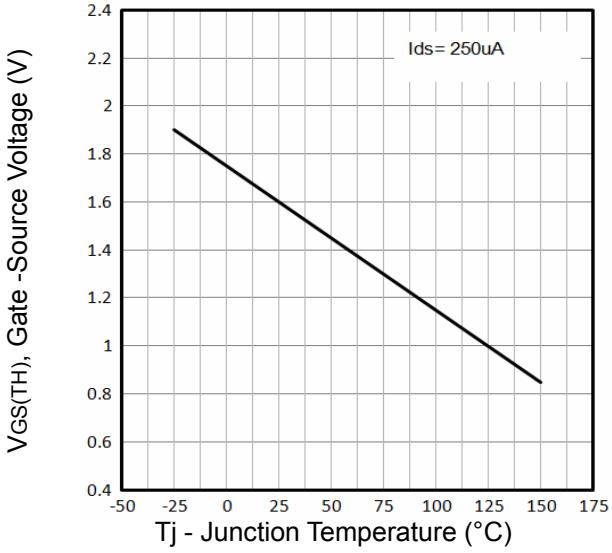


Fig2. Threshold Voltage Vs. Temperature

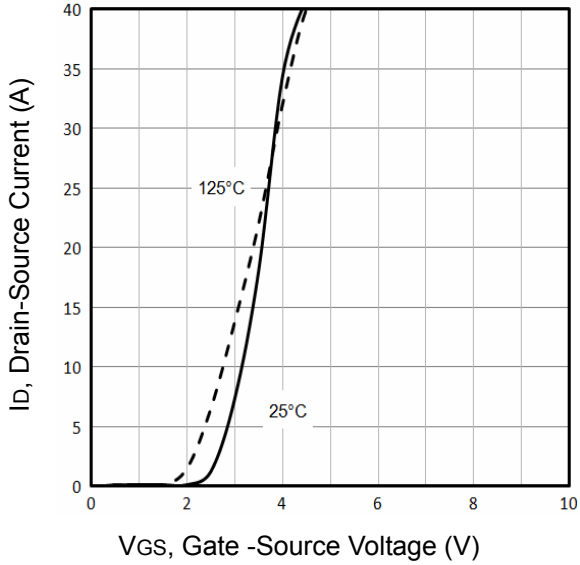


Fig3. Typical Transfer Characteristics

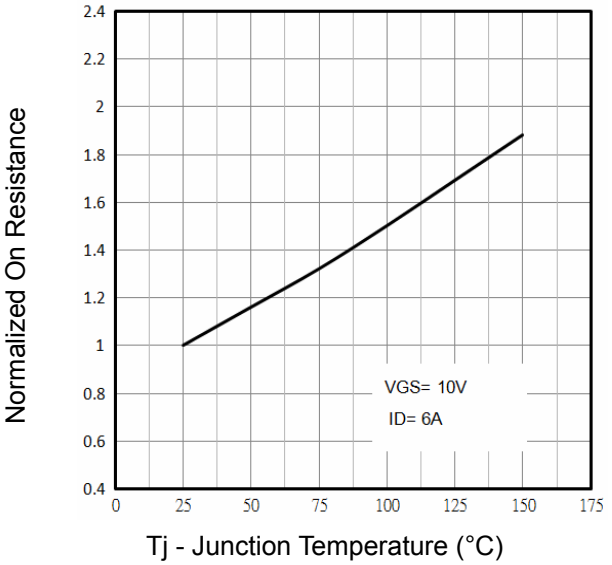


Fig4. Normalized On-Resistance Vs. Temperature

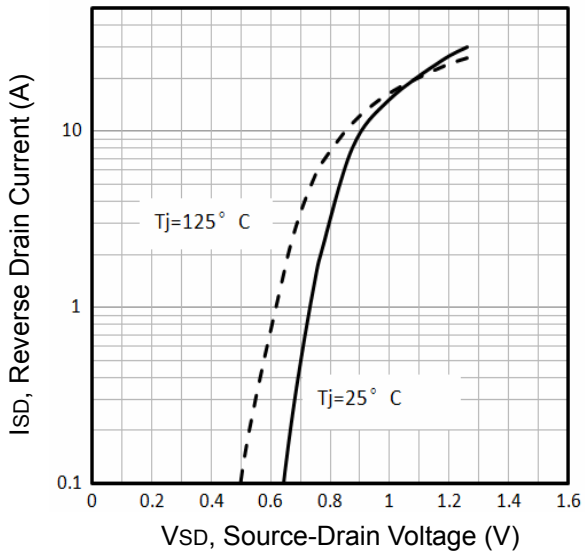


Fig5. Typical Source-Drain Diode Forward Voltage

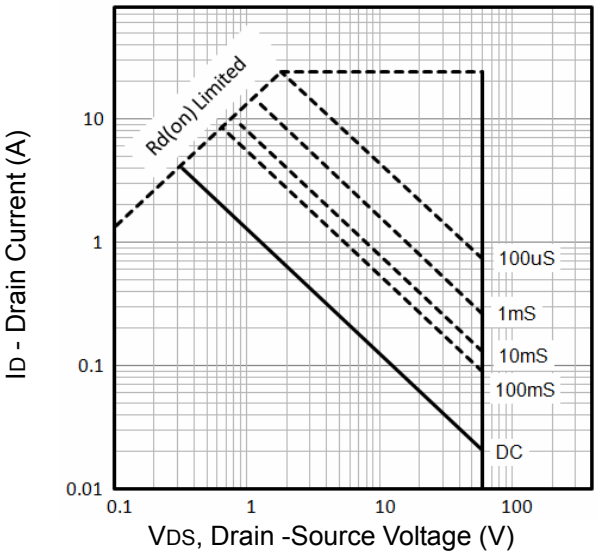


Fig6. Maximum Safe Operating Area

Typical Characteristics

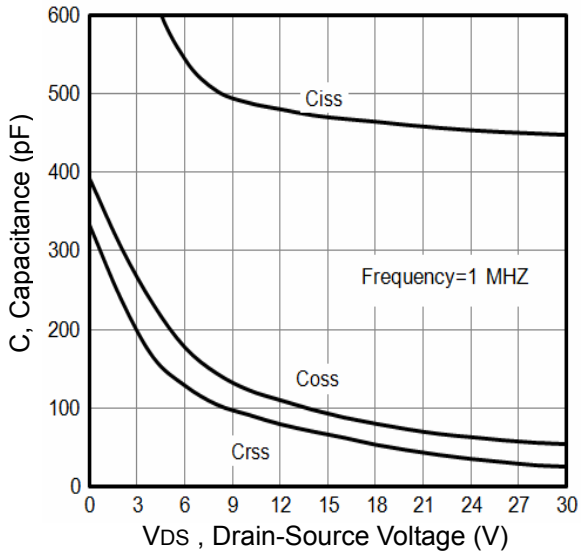


Fig7. Typical Capacitance Vs.Drain-Source Voltage

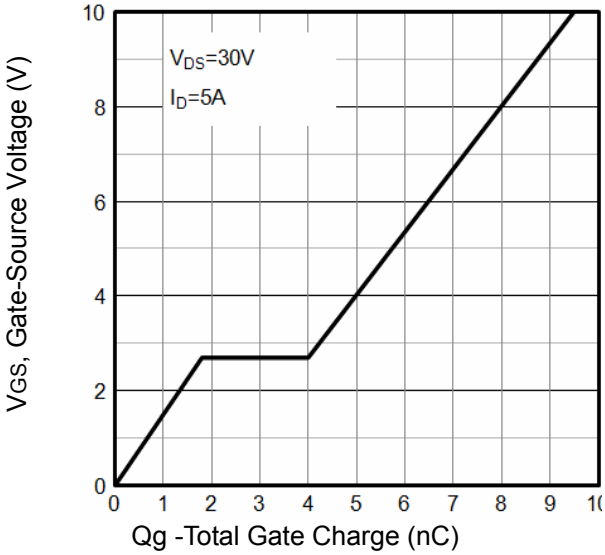
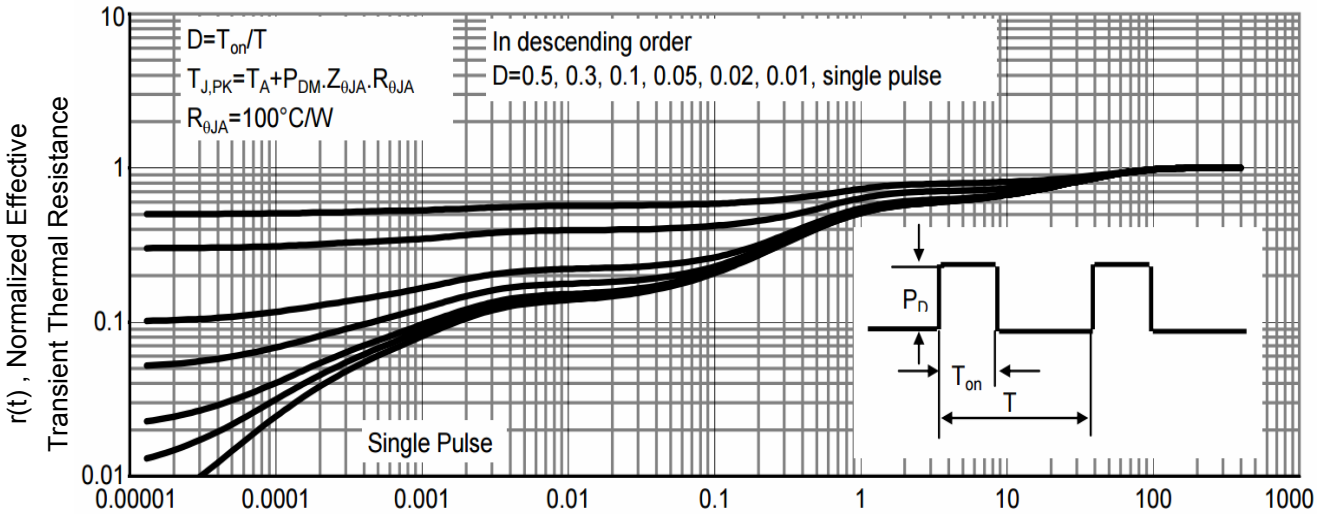


Fig8. Typical Gate Charge Vs.Gate-Source Voltage



T1, Square Wave Pulse Duration(sec)

Fig9. T1 ,Transient Thermal Response Curve

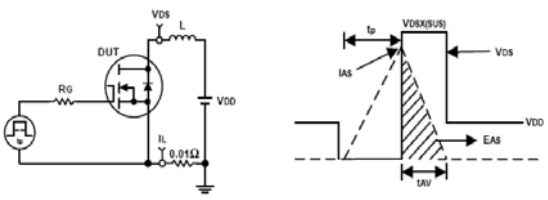


Fig10. Unclamped Inductive Test Circuit and waveforms

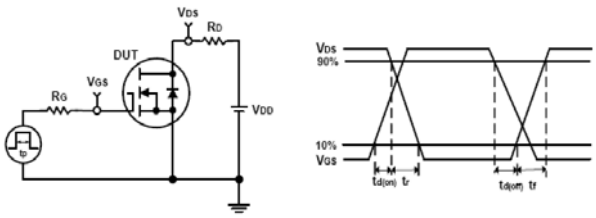
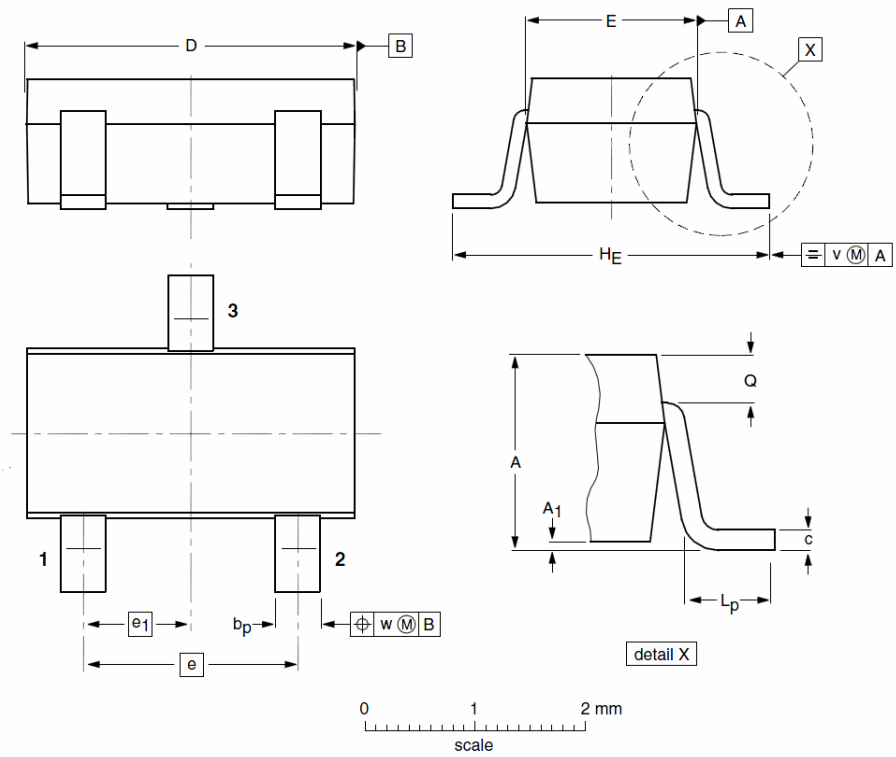


Fig11. Switching Time Test Circuit and waveforms

SOT23-3L Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	1.00	1.17	1.30	**A_1**	0.01	0.05	0.10
b_p	0.35	0.39	0.50	**c**	0.10	0.20	0.26
D	2.70	2.98	3.10	**E**	1.30	1.58	1.70
e	--	1.90	--	**e_1**	--	0.95	--
H_E	2.50	2.78	3.00	**L_p**	0.20	0.32	0.60
Q	0.23	0.27	0.33	**v**	--	0.20	--
w	--	0.20	--				

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