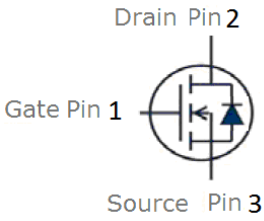
Features

- 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

V_{DS}	30	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	9	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5V	12	mΩ
I_D	60	A

TO-251



Part ID	Package Type	Marking	Tape and reel information
VSI012N03MS	TO-251	012N03M	75pcs/Tube

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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		30	V
I_S	Diode continuous forward current	T_C=25°C	60	A
I_D	Continuous drain current@V_{GS}=10V	T_C=25°C	60	A
		T_C=100°C	38	A
I_{DM}	Pulse drain current tested ①	T_C=25°C	150	A
EAS	Avalanche energy, single pulsed ②		48	mJ
IAS	Avalanche current max		30	A
P_D	Maximum power dissipation	T_C=25°C	50	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	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	45	°C/W

Typical Characteristics

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	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=30V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=30V_{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	0.8	1.5	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=30A	--	9	12	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=10A	--	12	16	mΩ
Dynamic Electrical Characteristics @ T_C= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V, f=1MHz	--	980	--	pF
C_{oss}	Output Capacitance		--	160	--	pF
C_{rss}	Reverse Transfer Capacitance		--	115	--	pF
Q_g	Total Gate Charge	V_{DS}=15V,I_D=20A, V_{GS}=10V	--	18	--	nC
Q_{gs}	Gate-Source Charge		--	4.5	--	nC
Q_{gd}	Gate-Drain Charge		--	5.5	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=15V, I_D=10A, R_G=6.8Ω, V_{GS}=10V	--	7	--	nS
t_r	Turn-on Rise Time		--	14	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	22	--	nS
t_f	Turn-Off Fall Time		--	8	--	nS
Source- Drain Diode Characteristics@ T_C = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=2A,V_{GS}=0V	--	0.74	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=10A, V_{GS}=0V di/dt=100A/μs	--	21	--	nS
Q_{rr}	Reverse Recovery Charge			11		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} = 18A, V_{GS} =10V. Part not recommended for use above this value

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

Typical Characteristics

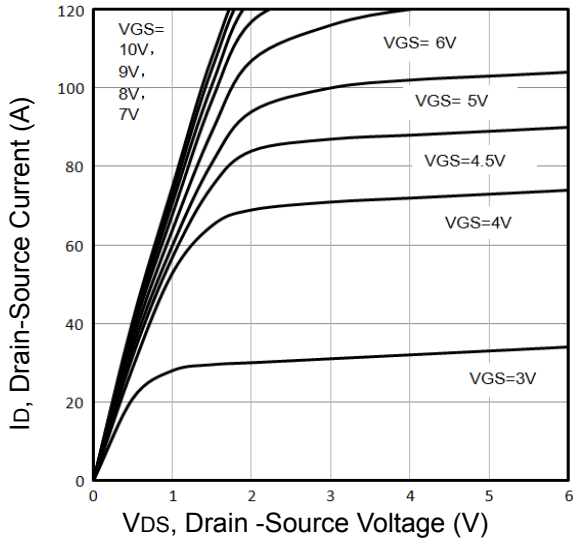


Fig1. Typical Output Characteristics

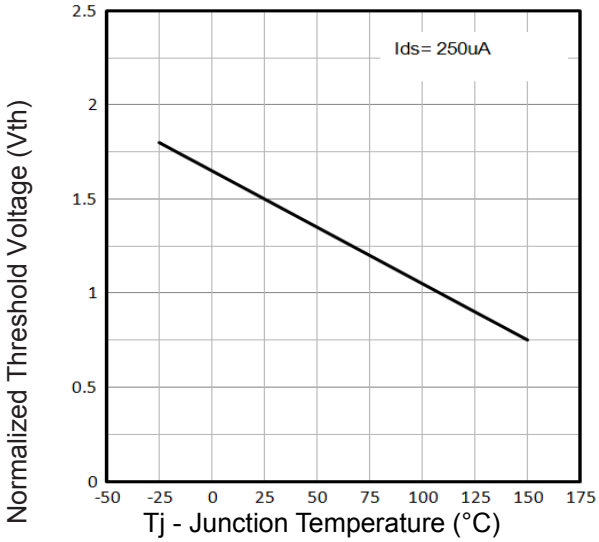


Fig2. Normalized Threshold Voltage Vs. Temperature

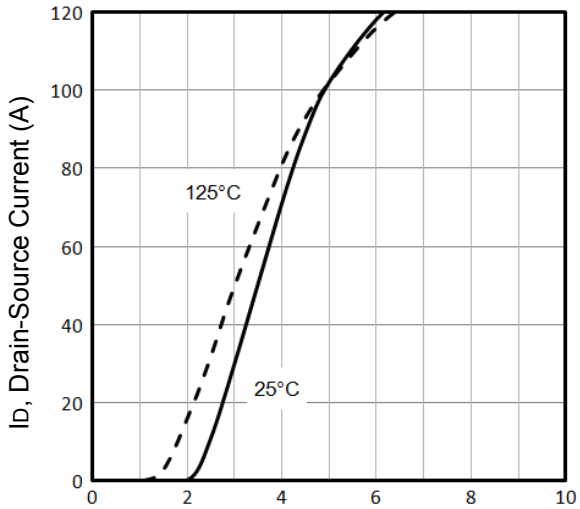


Fig3. Typical Transfer Characteristics

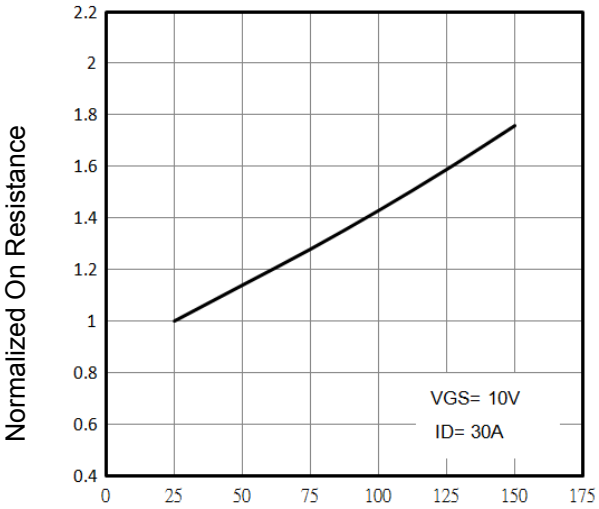


Fig4. Normalized On-Resistance Vs. Temperature

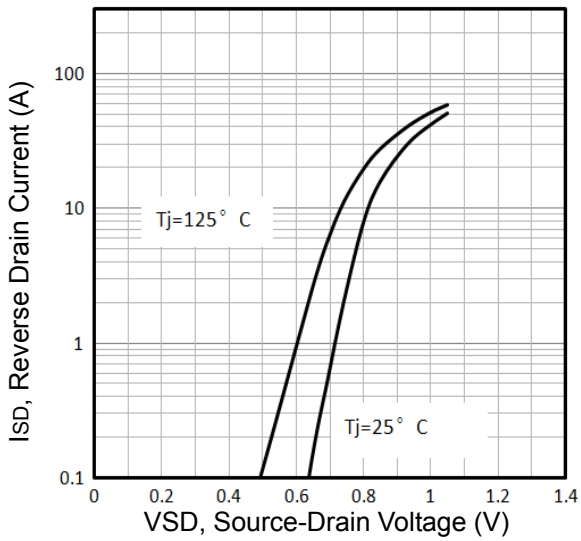


Fig5. Typical Source-Drain Diode Forward Voltage

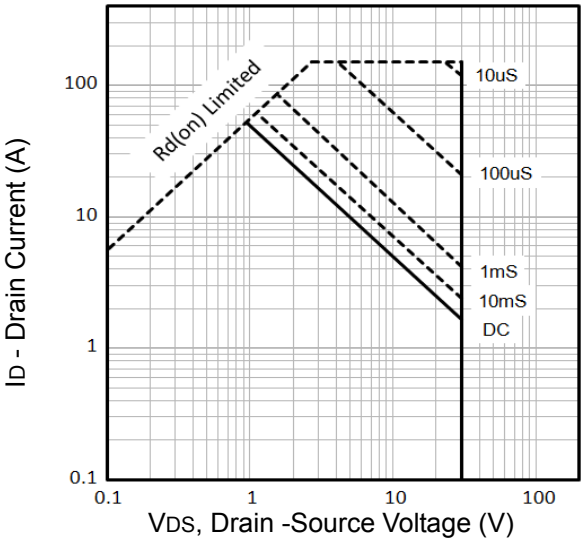


Fig6. Maximum Safe Operating Area

Typical Characteristics

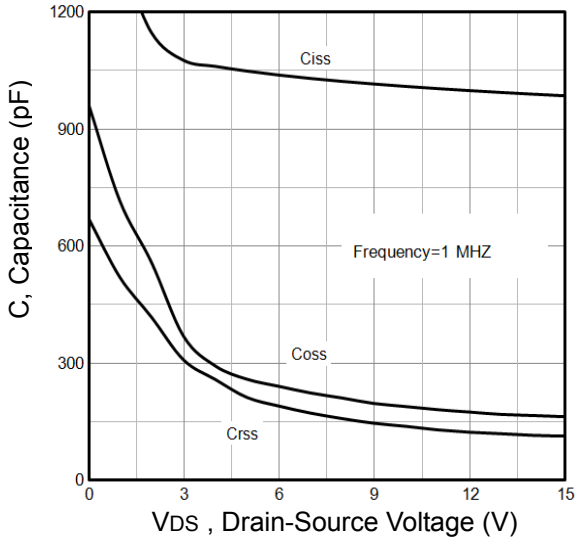


Fig7. Typical Capacitance Vs.Drain-Source Voltage

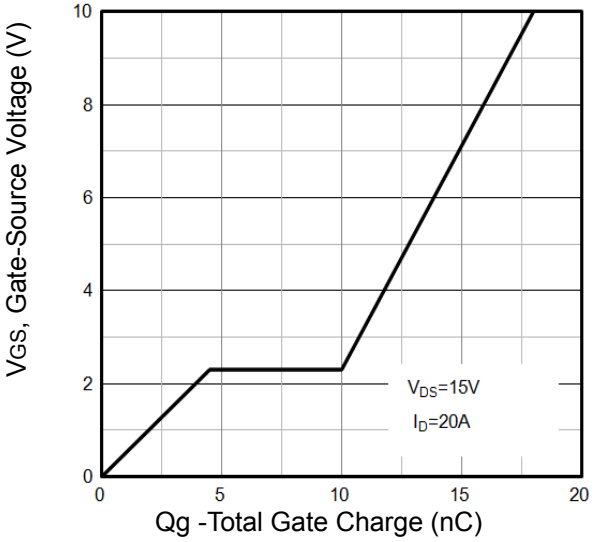


Fig8. Typical Gate Charge Vs.Gate-Source

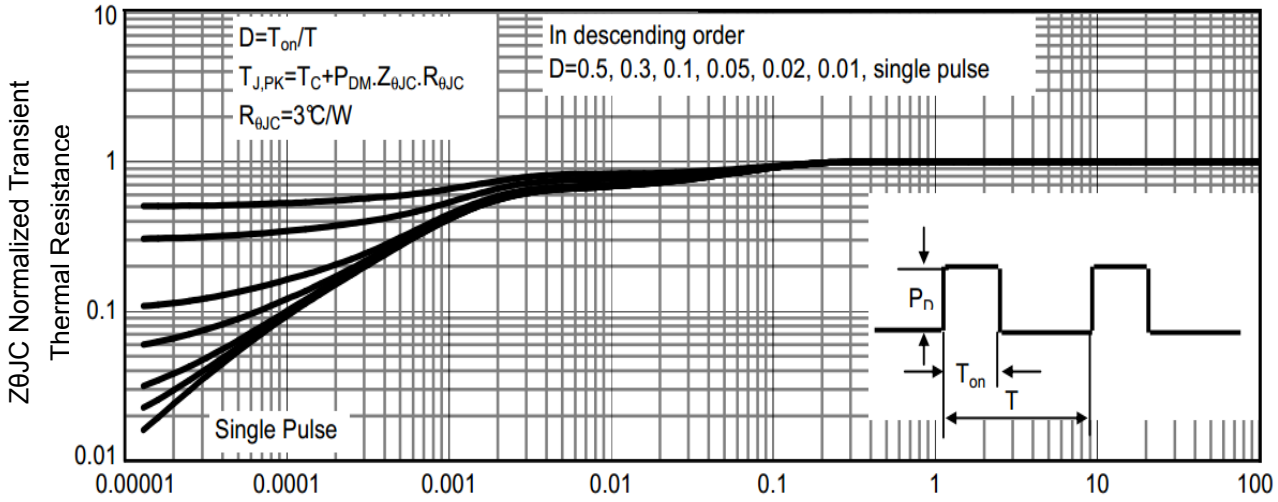


Fig 9 .Normalized Maximum Transient Thermal Impedance

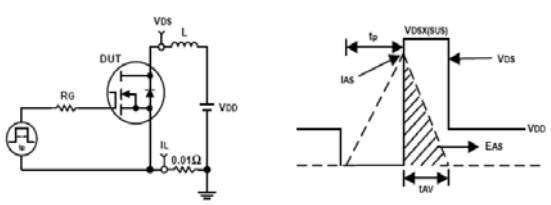


Fig10. Unclamped Inductive Test Circuit and waveforms

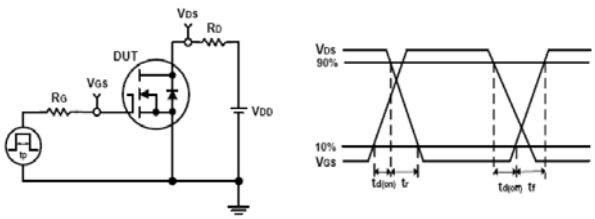
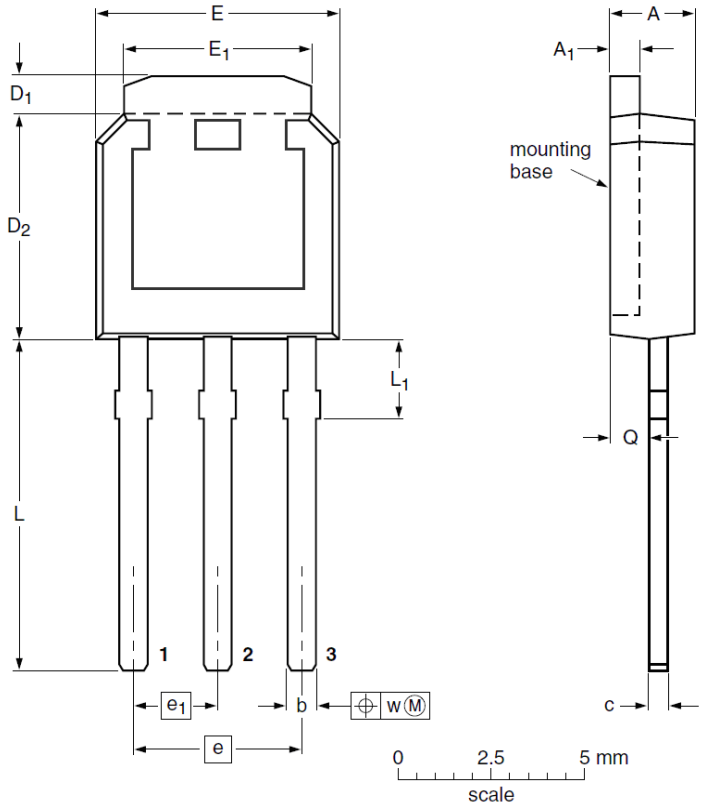


Fig11. Switching Time Test Circuit and waveforms

TO-251 Package Outline



DIMENSIONS (unit : mm)

Label	Min	Typ	Max	Label	Min	Typ	Max
A	2.22	2.30	2.38	**A_1**	0.46	0.55	0.93
b	0.71	0.78	0.89	**c**	0.46	0.51	0.56
D_1	0.96	1.02	1.10	**D_2**	5.98	6.05	6.22
E	6.47	6.60	6.73	**E_1**	5.20	5.33	5.55
e	--	4.57	--	**e_1**	--	2.28	--
L	9.20	9.38	9.60	**L_1**	--	2.70	--
Q	1.00	1.05	1.10	**w**	--	0.30	--

Customer Service

Sales and Service:
sales@vgsemi.com

Vanguard Semiconductor CO., LTD
TEL: (86-755) -26902410
FAX: (86-755) -26907027
WEB: **www.vgsemi.com**