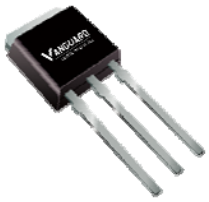
V_{DS}	60	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	7.5	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5 V	12.5	mΩ
I_D	60	A

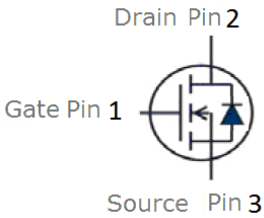
Features

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

Pb-Free RoHS HF Halogen-Free

TO-251





Part ID	Package Type	Marking	Tape and reel information
VS6610GI	TO-251	6610GI	75pcs/Tube

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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		60	V
VGS	Gate-Source voltage		±20	V
I_S	Diode continuous forward current	T_C =25°C	60	A
I_D	Continuous drain current @VGS=10V	T_C =25°C	60	A
		T_C =100°C	42	A
I_{DM}	Pulse drain current tested ①	T_C =25°C	240	A
I_{DSM}	Continuous drain current @VGS=10V	T_A=25°C	9	A
		T_A=70°C	7	A
EAS	Avalanche energy, single pulsed ②		25	mJ
P_D	Maximum power dissipation	T_C =25°C	52	W
		T_C =100°C	26	W
P_{DSM}	Maximum power dissipation ③	T_A=25°C	1.25	W
		T_A=70°C	0.8	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	2.9	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100	°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	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T_j =125℃)	V_{DS}=60V,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	1.5	1.8	2.4	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=10V, I_D=20A	--	7.5	10	mΩ
		T_j =100℃	--	10	--	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=4.5V, I_D=20A	--	12.5	17	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=30V,V_{GS}=0V, f=1MHz	970	1140	1310	pF
C_{oss}	Output Capacitance		550	645	740	pF
C_{rss}	Reverse Transfer Capacitance		--	20	30	pF
R_g	Gate Resistance	f=1MHz	--	0.9	--	Ω
Q_g (10V)	Total Gate Charge	V_{DS}=30V,I_D=20A, V_{GS}=10V	--	20	--	nC
Q_g (4.5V)	Total Gate Charge		--	10	--	nC
Q_{gs}	Gate-Source Charge		--	4	--	nC
Q_{gd}	Gate-Drain Charge		--	3.9	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=30V, I_D=20A, R_G=3Ω, V_{GS}=10V	--	8.4	--	ns
t_r	Turn-on Rise Time		--	34	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	19	--	ns
t_f	Turn-Off Fall Time		--	5.6	--	ns
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=20A,V_{GS}=0V	--	0.9	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=20A, V_{GS}=0V di/dt=100A/μs	--	26	--	ns
Q_{rr}	Reverse Recovery Charge		--	14	--	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} = 10A, 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

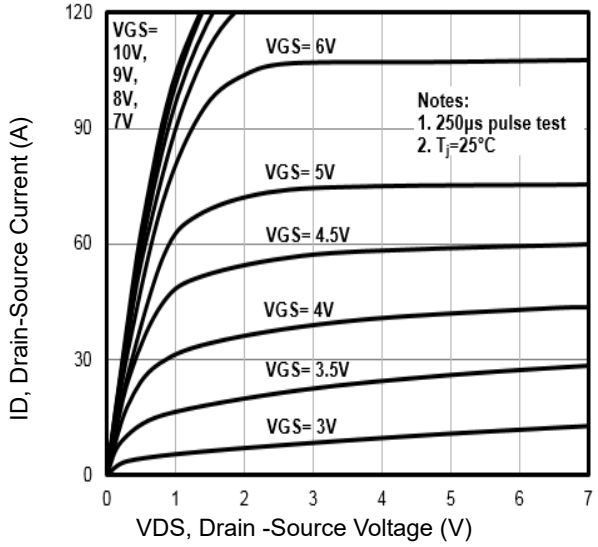


Fig1. Typical Output Characteristics

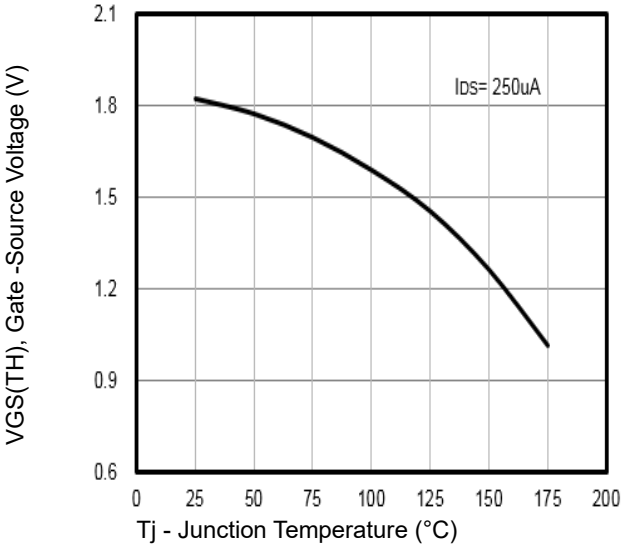


Fig2. $V_{GS(TH)}$ Gate -Source Voltage Vs.Tj

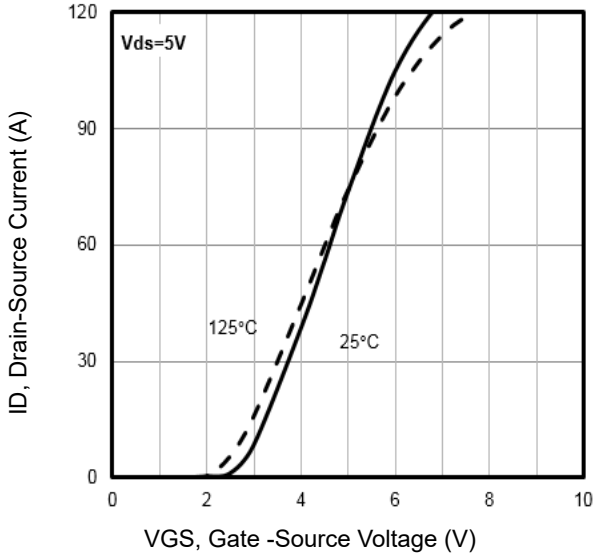


Fig3. Typical Transfer Characteristics

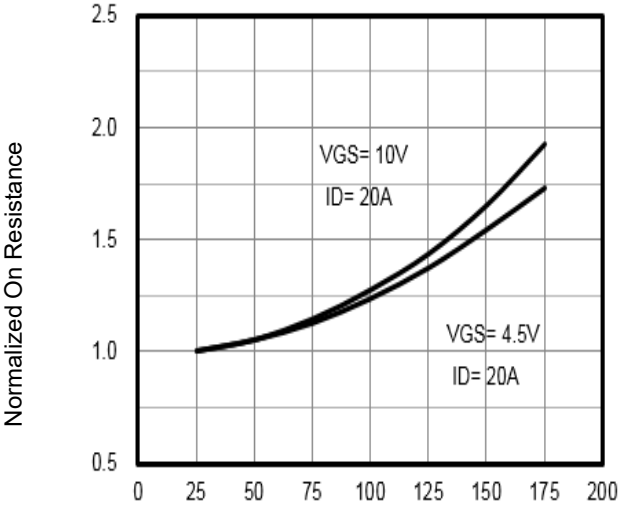


Fig4. Normalized On-Resistance Vs. Tj

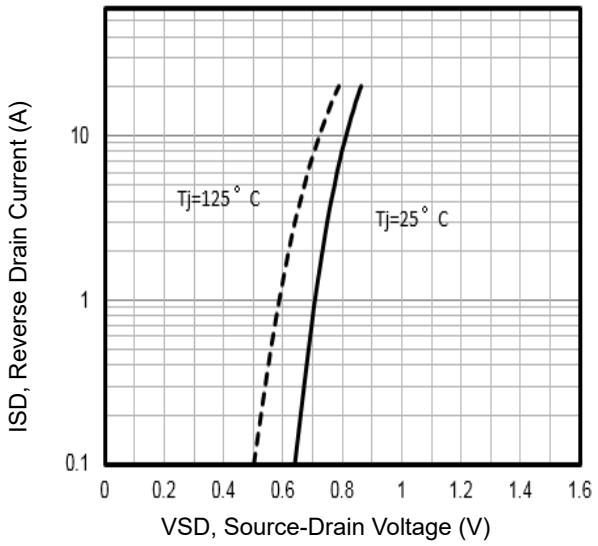


Fig5. Typical Source-Drain Diode Forward Voltage

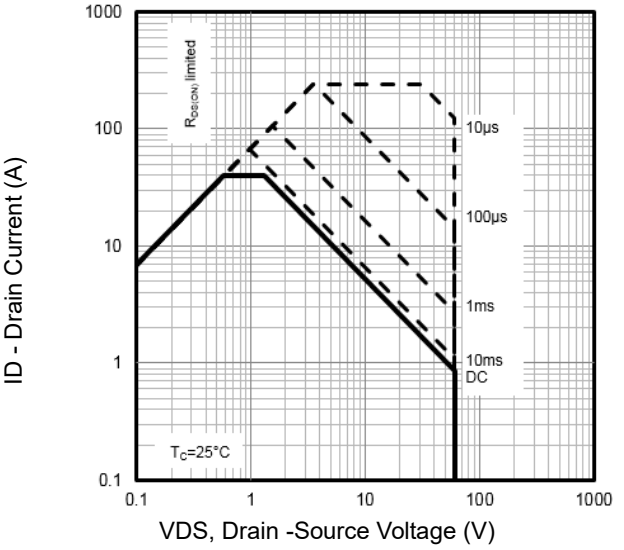


Fig6. Maximum Safe Operating Area

Typical Characteristics

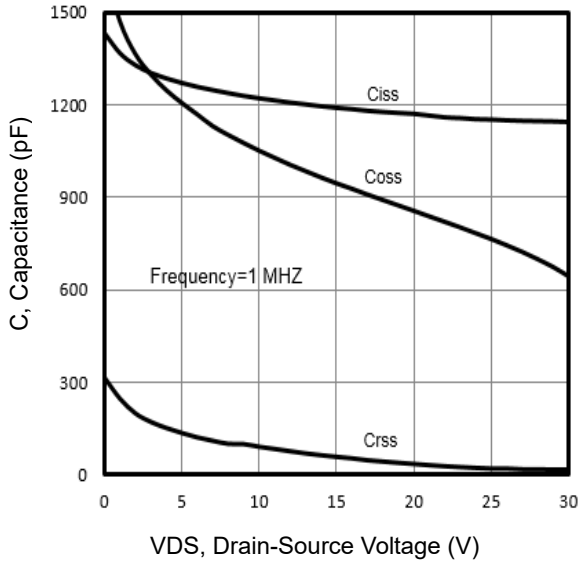


Fig7. Typical Capacitance Vs. Drain-Source Voltage

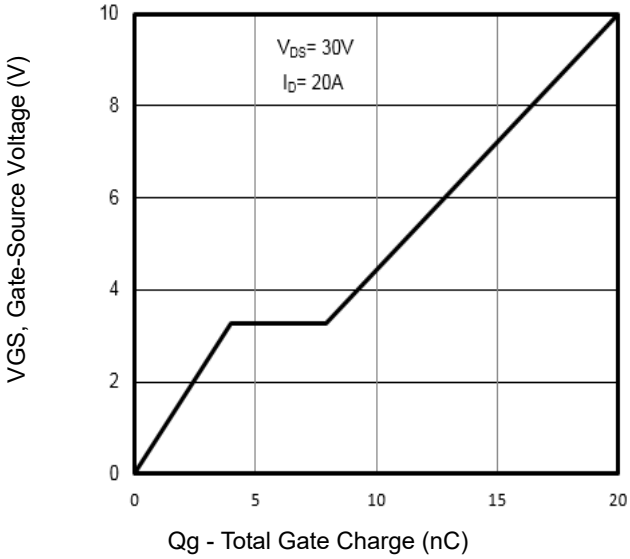


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

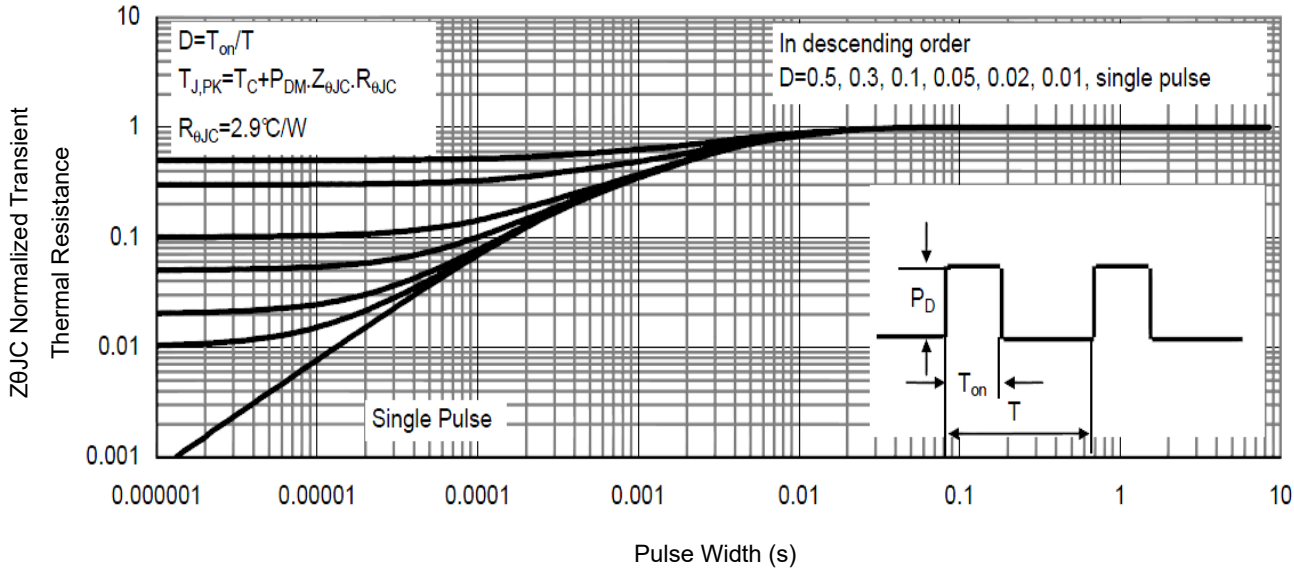


Fig9. Normalized Maximum Transient Thermal Impedance

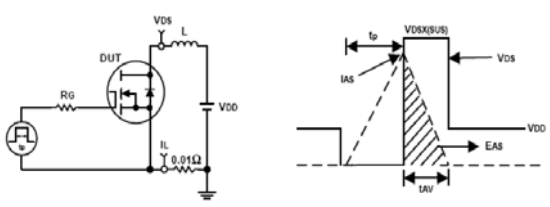


Fig10. Unclamped Inductive Test Circuit and waveforms

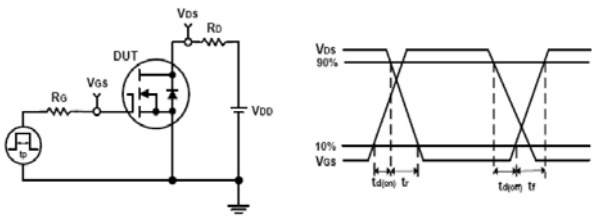
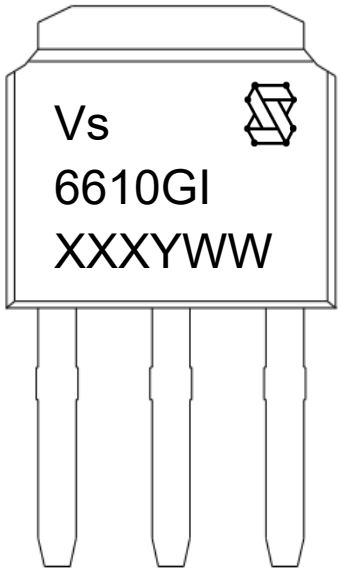


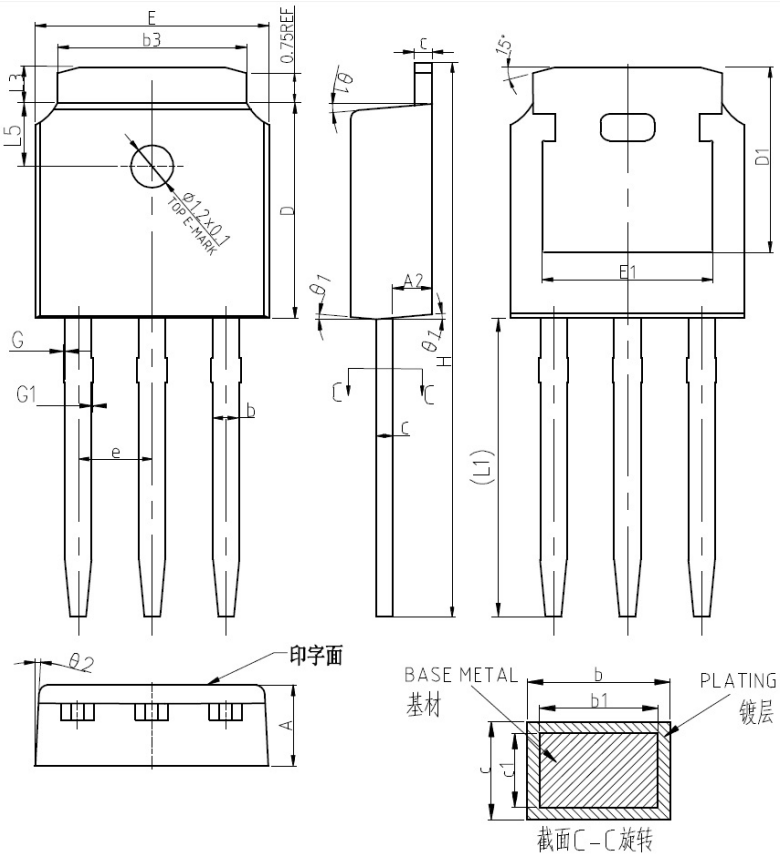
Fig11. Switching Time Test Circuit and waveforms

Marking Information



1st line: Vanguard Code（Vs）， Vanguard Logo
2nd line: Part Number（6610GI）
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-251 Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	2.20	2.30	2.38
A2	0.97	1.07	1.17
b	0.72	0.78	0.85
b1	0.71	0.76	0.81
b3	5.23	5.33	5.46
c	0.47	0.53	0.58
c1	0.46	0.51	0.56
D	6.00	6.10	6.20
D1	5.30 REF		
E	6.50	6.60	6.70
E1	4.70	4.83	4.92
e	2.286 BSC		
G	0.00	0.04	0.10
G1	0.00	0.04	0.10
H	16.22	16.52	16.82
L1	9.20	9.40	9.60
L3	0.90	1.02	1.25
L5	1.70	1.80	1.90
θ1	5°	7°	9°
θ2	5°	7°	9°

Notes:

1. Refer to JEDEC TO-251 variation AA
2. Dimension "D" and "E" do NOT include mold flash. Mold flash shall not exceed 0.127mm per side.

Customer Service

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