

Features

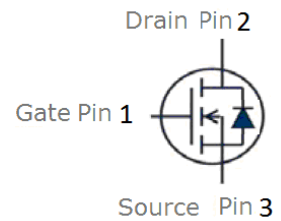
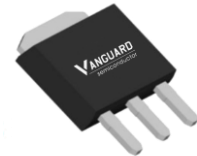
- N-Channel, 5V Logic Level Control
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5\text{ V}$
- Fast Switching and High efficiency
- 100% Avalanche test
- Pb-free lead plating; RoHS compliant



Part ID	Package Type	Marking	Tape and reel information
VS3610AI	TO-251SL	3610AI	75pcs/Tube

V_{DS}	30	V
$R_{DS(on),TYP} @ V_{GS}=10\text{ V}$	4.2	m Ω
$R_{DS(on),TYP} @ V_{GS}=4.5\text{ V}$	6	m Ω
I_D	85	A

TO-251



Maximum ratings, at $T_A = 25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	30	V
V_{GS}	Gate-Source voltage	± 20	V
I_S	Diode continuous forward current	$T_C = 25^\circ\text{C}$	85 A
I_D	Continuous drain current @ $V_{GS}=10\text{V}$	$T_C = 25^\circ\text{C}$	85 A
		$T_C = 100^\circ\text{C}$	60 A
I_{DM}	Pulse drain current tested ①	$T_C = 25^\circ\text{C}$	340 A
I_{DSM}	Continuous drain current @ $V_{GS}=10\text{V}$	$T_A = 25^\circ\text{C}$	13 A
		$T_A = 70^\circ\text{C}$	11 A
EAS	Avalanche energy, single pulsed ②	81	mJ
P_D	Maximum power dissipation	$T_C = 25^\circ\text{C}$	52 W
P_{DSM}	Maximum power dissipation ③	$T_A = 25^\circ\text{C}$	1.25 W
T_{STG}, T_J	Storage and Junction Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.9	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100	$^\circ\text{C/W}$



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	30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T _j =125°C)	V _{DS} =30V, 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	1.8	2.4	V
R _{DS(ON)}	Drain-Source On-State Resistance ④	V _{GS} =10V, I _D =20A	--	4.2	6	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance ④	V _{GS} =4.5V, I _D =16A	--	6	8	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	1560	1930	2300	pF
C _{oss}	Output Capacitance		200	310	420	pF
C _{rss}	Reverse Transfer Capacitance		170	260	350	pF
R _g	Gate Resistance	f=1MHz	--	0.85	--	Ω
Q _g	Total Gate Charge	V _{DS} =15V, I _D =20A, V _{GS} =10V	--	38	--	nC
Q _{gs}	Gate-Source Charge		--	5.1	--	nC
Q _{gd}	Gate-Drain Charge		--	12	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =15V, I _D =20A, R _G =3Ω, V _{GS} =10V	--	8.5	--	nS
t _r	Turn-on Rise Time		--	9	--	nS
t _{d(off)}	Turn-Off Delay Time		--	31	--	nS
t _f	Turn-Off Fall Time		--	9	--	nS
Source- Drain Diode Characteristics @ T_j = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =20A, V _{GS} =0V	--	0.8	1.2	V
t _{rr}	Reverse Recovery Time	T _j =25°C, I _{sd} =20A, V _{GS} =0V di/dt=500A/μs	--	16	--	nS
Q _{rr}	Reverse Recovery Charge		42	--	--	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} = 15A, V_{GS} = 10V. Part not recommended for use above this value
- ③ The power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150°C.
- ④ Pulse width ≤ 300μs; duty cycles ≤ 2%.

Typical Characteristics

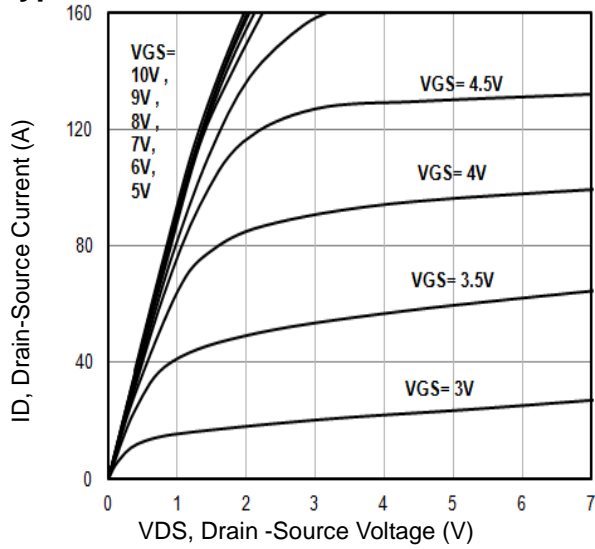


Fig1. Typical Output Characteristics

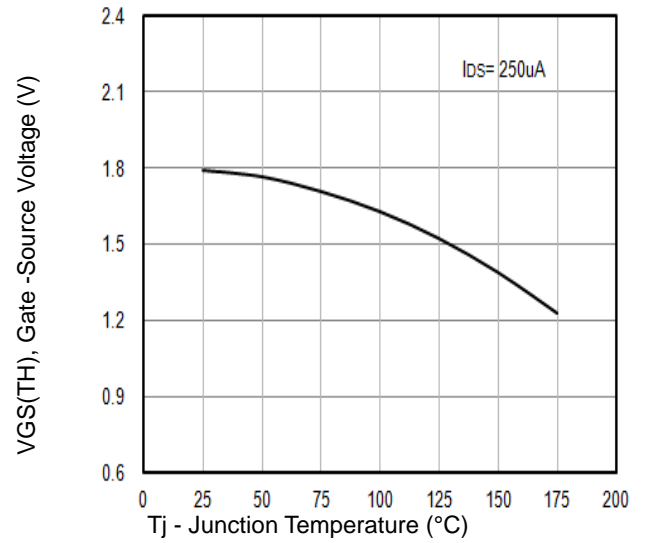


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

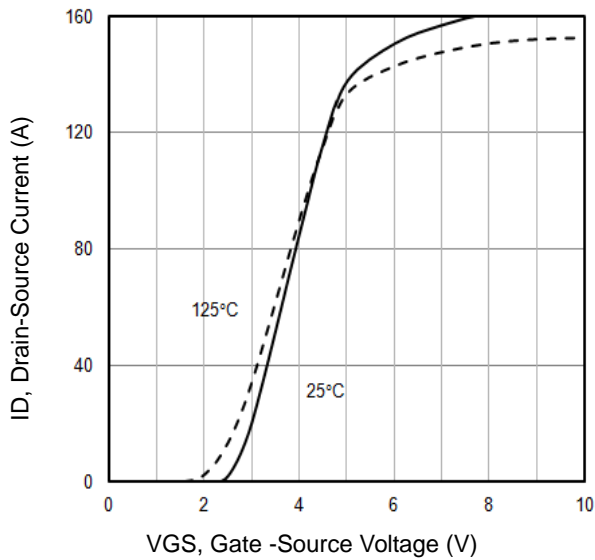


Fig3. Typical Transfer Characteristics

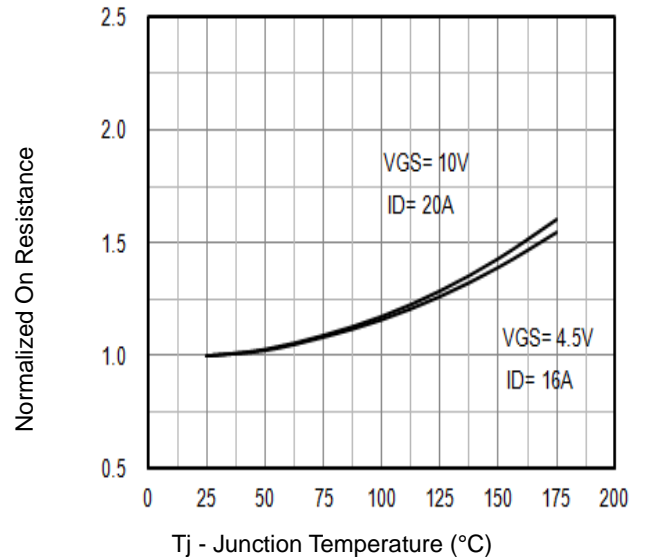


Fig4. Normalized On-Resistance Vs. T_j

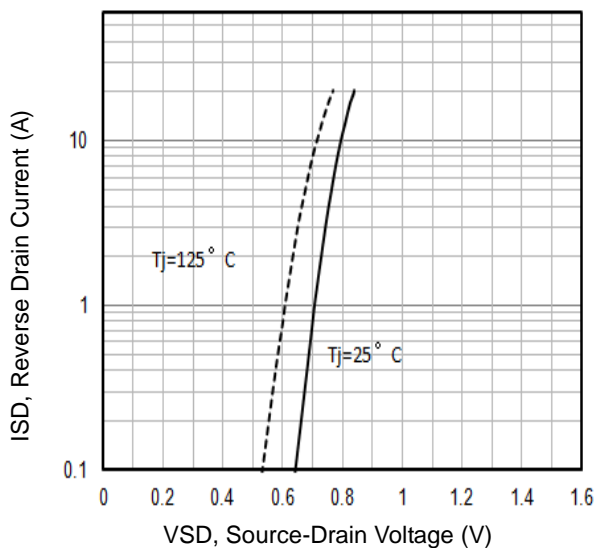


Fig5. Typical Source-Drain Diode Forward Voltage

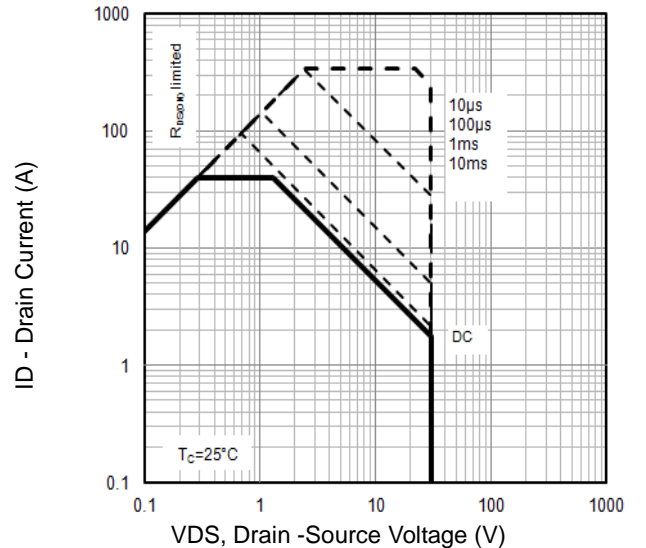


Fig6. Maximum Safe Operating Area

Typical Characteristics

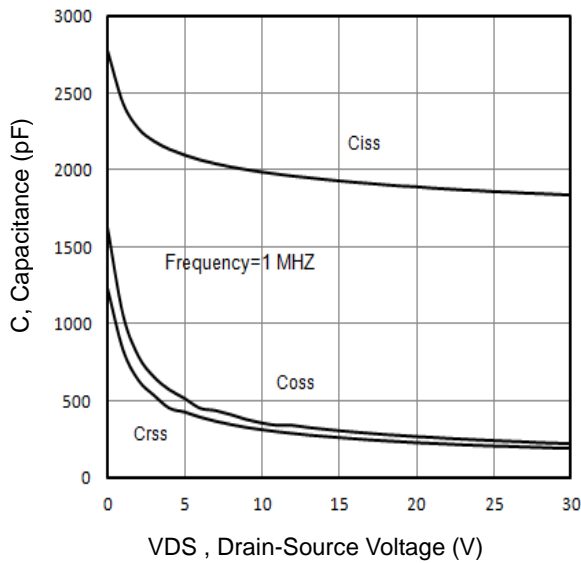


Fig7. Typical Capacitance Vs.Drain-Source Voltage

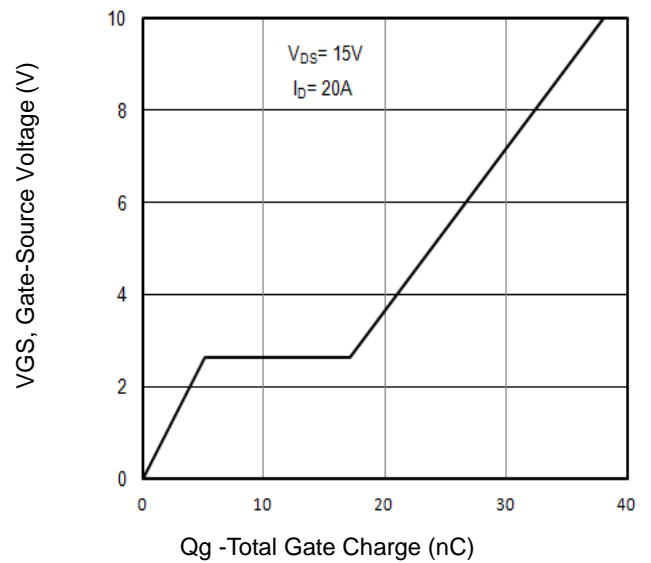


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

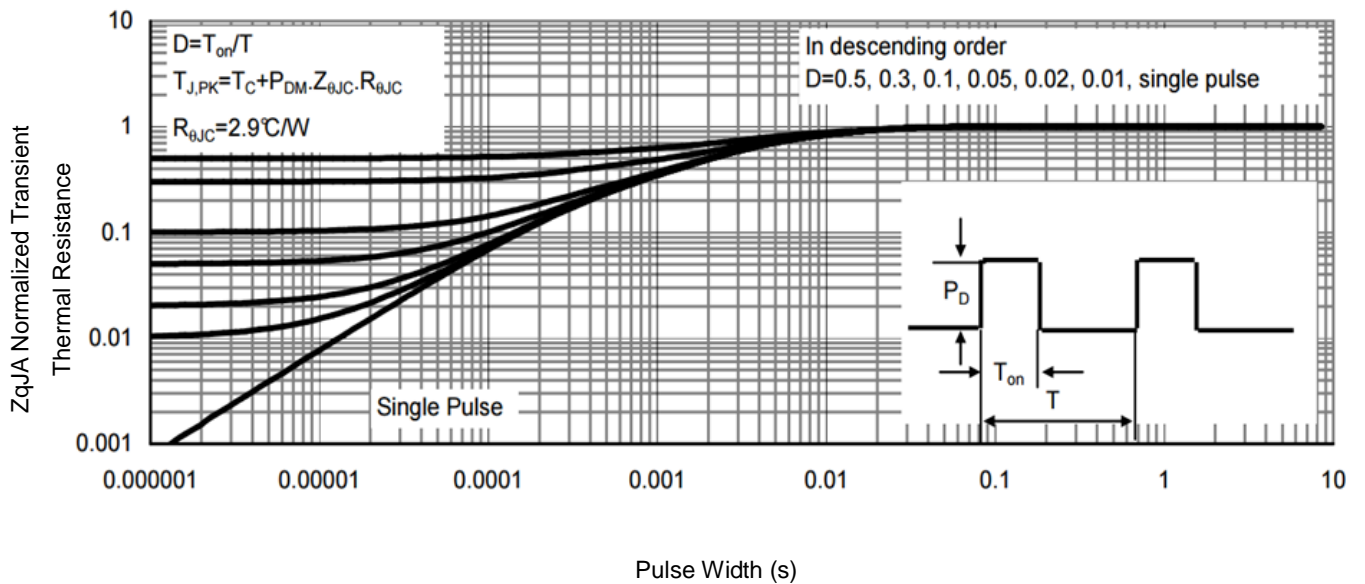


Fig9. Normalized Maximum Transient Thermal Impedance

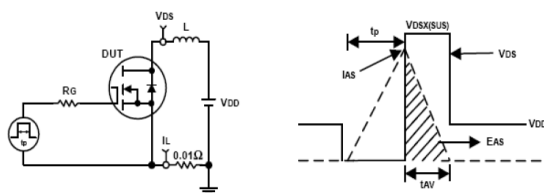


Fig10. Unclamped Inductive Test Circuit and waveforms

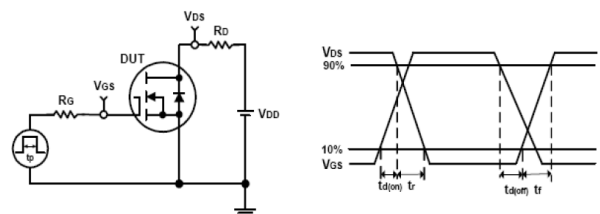
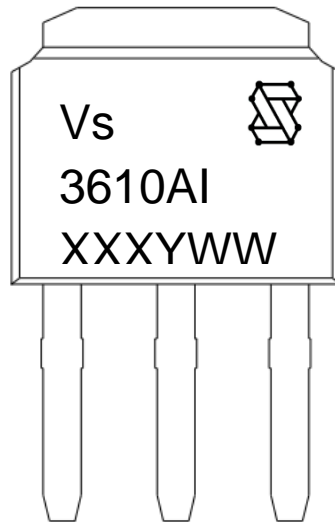


Fig11. Switching Time Test Circuit and waveforms



Marking Information



1st line: Vanguard Code (Vs), Vanguard Logo

2nd line: Part Number (3610AI)

3rd line: Date code (XXXYWW)

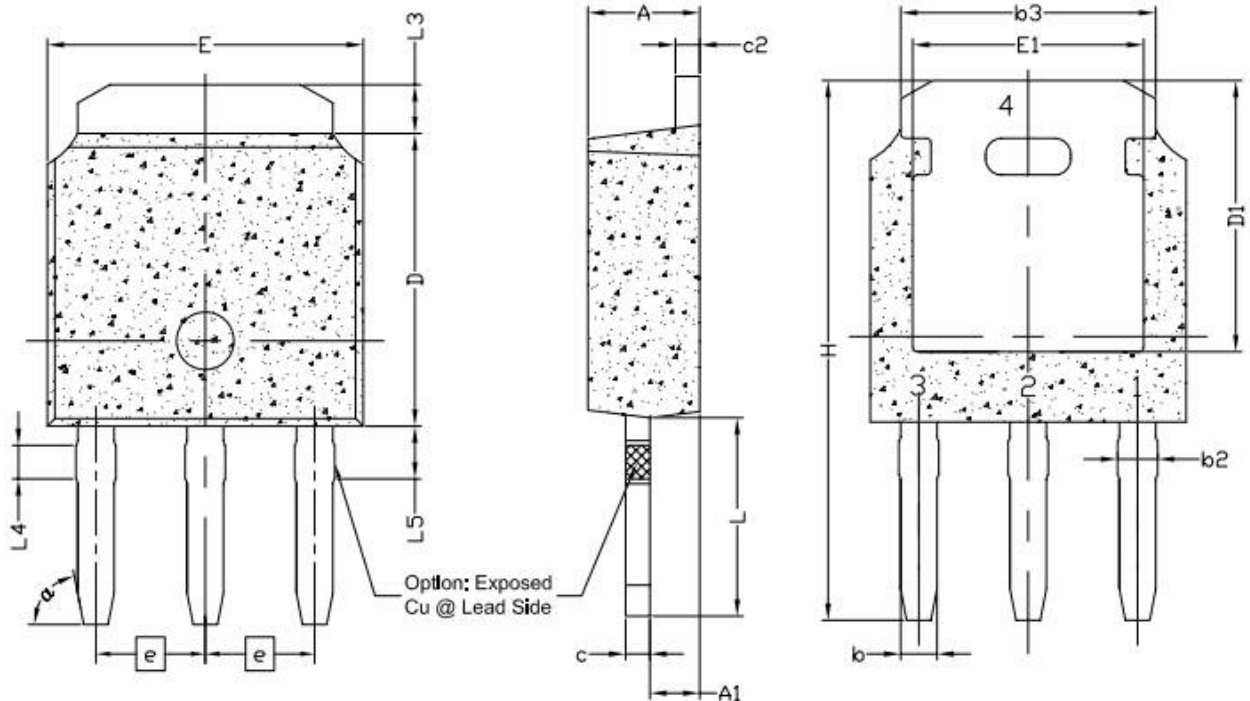
XXX: Wafer Lot Number

Y: Year Code, e.g. E means 2017

WW: Week Code



TO-251SL Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	2.20	2.30	2.39
A1	0.89	1.04	1.15
b	0.64	0.76	0.89
b2	0.77	0.84	1.14
b3	5.21	5.34	5.46
c	0.46	0.50	0.60
c2	0.46	0.50	0.60
D	5.98	6.10	6.223
D1	5.10	--	--
E	6.40	6.60	6.731
E1	4.40	--	--
e	2.286 BSC		
H	11.05	11.25	11.45
L	3.98	4.13	4.35
L3	0.89	--	1.27
L4	0.698 REF		
L5	0.972	1.099	1.226
α	79° REF		

Notes:

1. Dimension "D" and "E" do NOT include mold flash, protrusion or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 0.1mm per side.

Customer Service

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