

Features

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

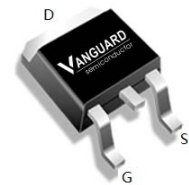


Halogen-Free

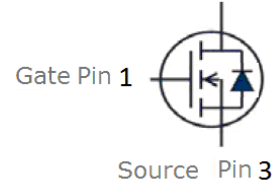
Part ID	Package Type	Marking	Tape and reel information
VS4610AD	TO-252	4610AD	2500pcs/Reel

V_{DS}	40	V
$R_{DS(on),TYP@ V_{GS}=10\text{ V}}$	6.6	mΩ
$R_{DS(on),TYP@ V_{GS}=4.5\text{ V}}$	10	mΩ
I_D	65	A

TO-252



Drain Pin 2



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

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	40	V
I_S	Diode continuous forward current	$T_C=25^\circ\text{C}$ 65	A
I_D	Continuous drain current@ $V_{GS}=10\text{V}$	$T_C=25^\circ\text{C}$ 65	A
		$T_C=100^\circ\text{C}$ 46	A
I_{DM}	Pulse drain current tested ①	$T_C=25^\circ\text{C}$ 260	A
EAS	Avalanche energy, single pulsed ②	39	mJ
P_D	Maximum power dissipation	$T_C=25^\circ\text{C}$ 51	W
V_{GS}	Gate-Source voltage	± 20	V
$T_{STG} T_J$	Storage and operating 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	40	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T _j =125°C)	V _{DS} =40V, 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	--	2.4	V
R _{DS(ON)}	Drain-Source On-State Resistance③	V _{GS} =10V, I _D =20A	--	6.6	8	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance③	V _{GS} =4.5V, I _D =16A	--	10	12	mΩ
Dynamic Electrical Characteristics @ T _j = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz	1600	2060	2500	pF
C _{oss}	Output Capacitance		120	175	230	pF
C _{rss}	Reverse Transfer Capacitance		90	130	180	pF
R _g	Gate Resistance	f=1MHz	--	0.4	--	Ω
Q _g	Total Gate Charge	V _{DS} =20V, I _D =20A, V _{GS} =10V	--	49.6	--	nC
Q _{gs}	Gate-Source Charge		--	8	--	nC
Q _{gd}	Gate-Drain Charge		--	16.4	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =20V, I _D =20A, R _G =3Ω, V _{GS} =10V	--	9.2	--	nS
t _r	Turn-on Rise Time		--	6.8	--	nS
t _{d(off)}	Turn-Off Delay Time		--	29.6	--	nS
t _f	Turn-Off Fall Time		--	7.2	--	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	--	36	--	nS
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs		48		nC

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{jmax} , starting $T_j = 25^{\circ}\text{C}$, $L = 0.5\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 11A$, $V_{GS} = 10V$. Part not recommended for use above this value
- ③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.



Typical Characteristics

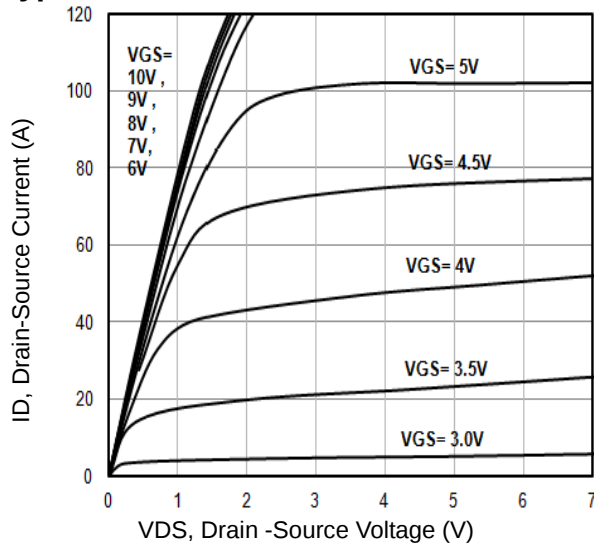


Fig1. Typical Output Characteristics

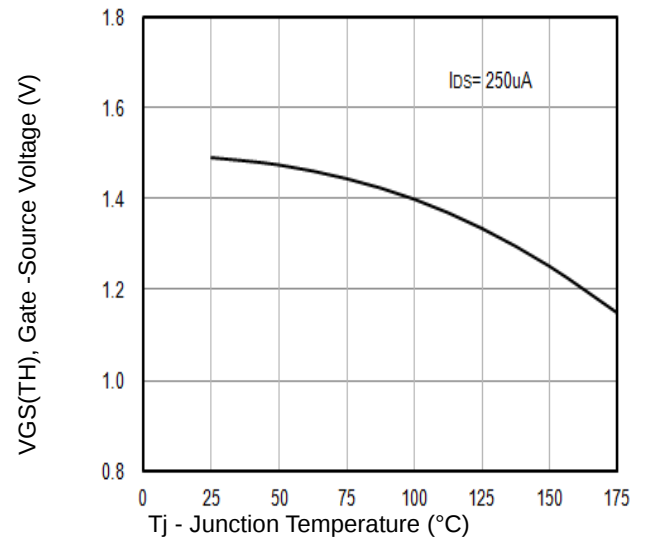


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

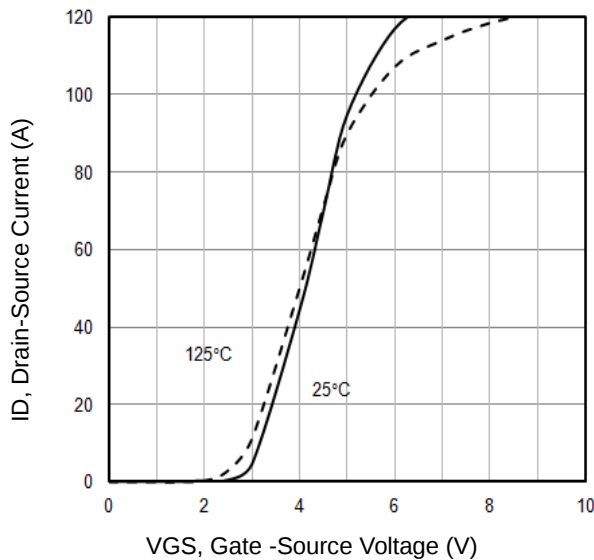


Fig3. Typical Transfer Characteristics

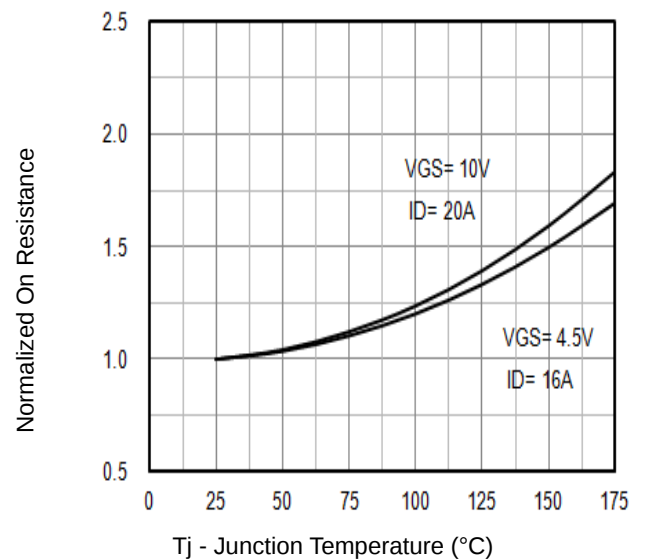


Fig4. Normalized On-Resistance Vs. T_j

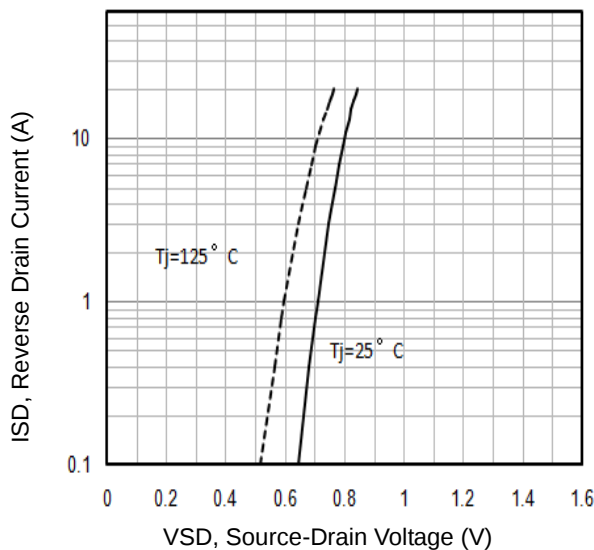


Fig5. Typical Source-Drain Diode Forward Voltage

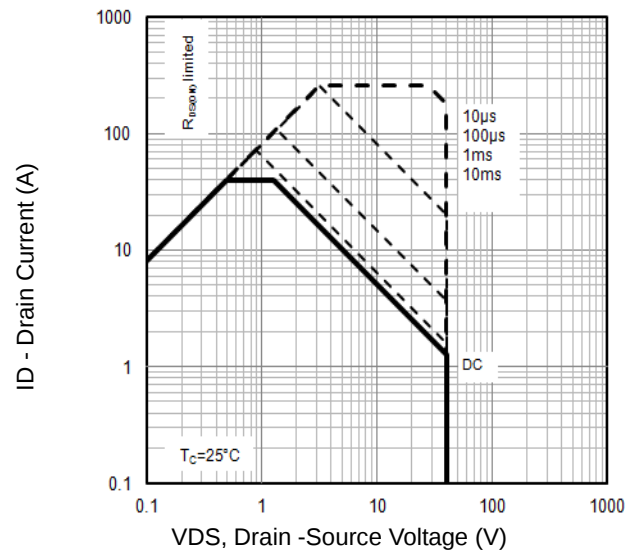


Fig6. Maximum Safe Operating Area

Typical Characteristics

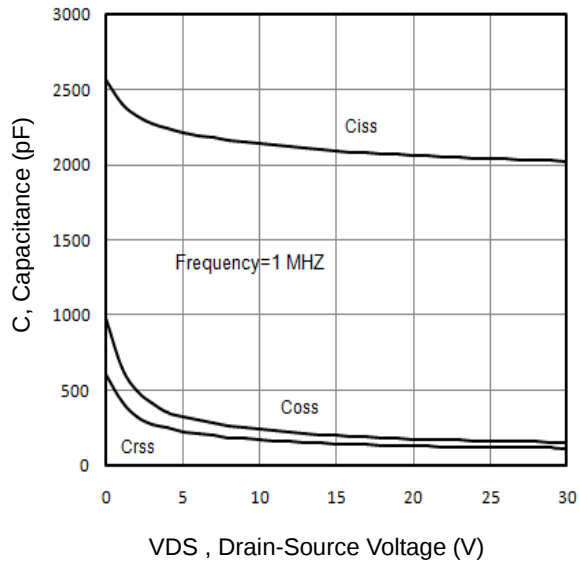


Fig7. Typical Capacitance Vs. Drain-Source Voltage

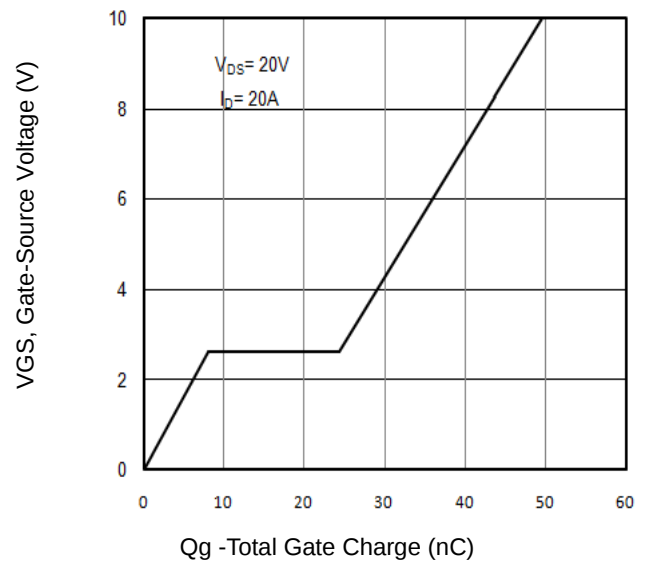


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

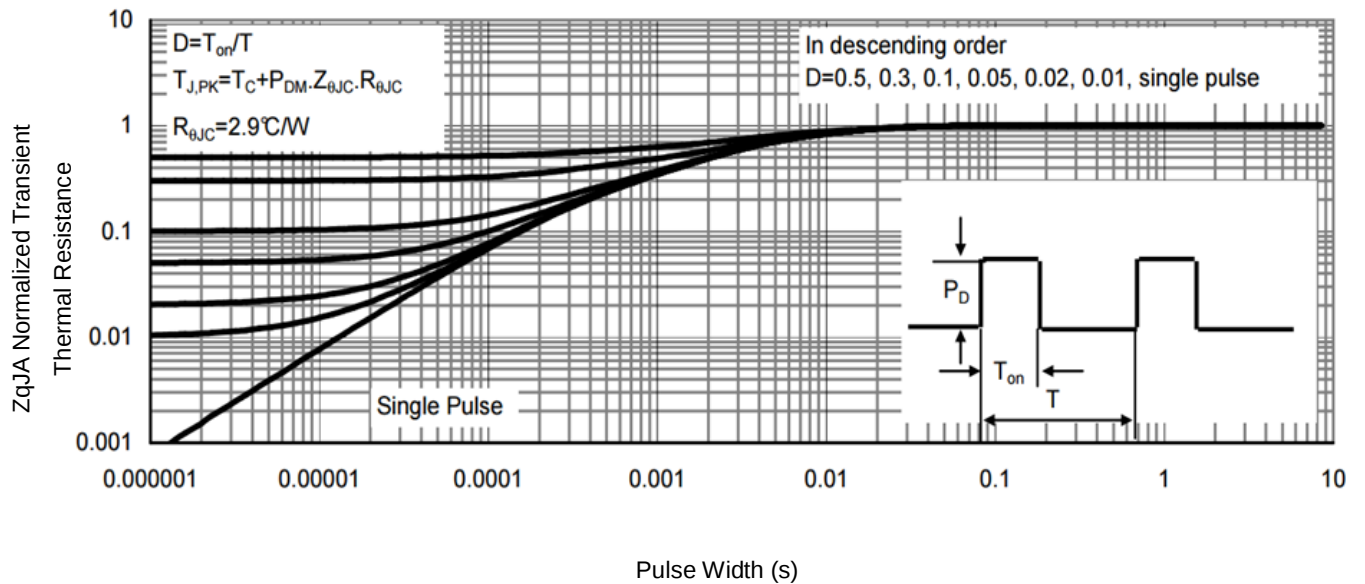


Fig9. Normalized Maximum Transient Thermal Impedance

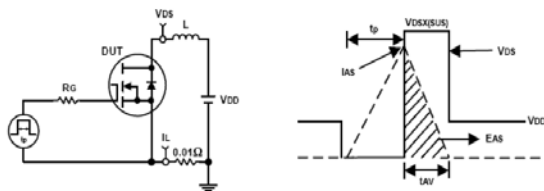


Fig10. Unclamped Inductive Test Circuit and waveforms

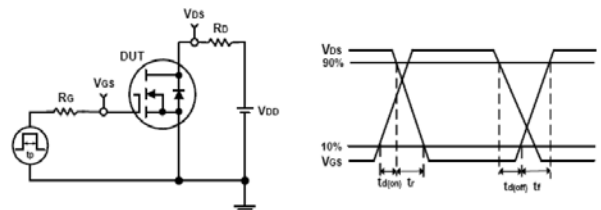
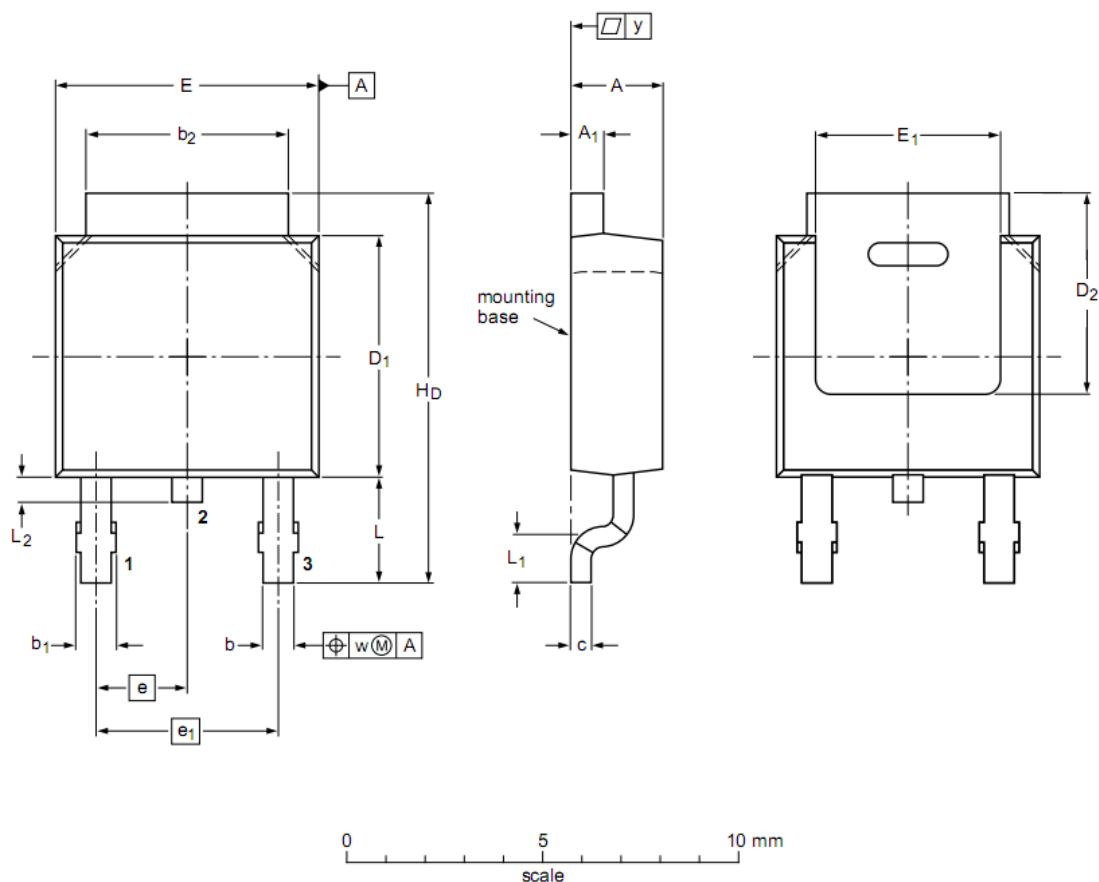


Fig11. Switching Time Test Circuit and waveforms

TO-252 Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	2.20	2.30	2.38
A ₁	0.46	0.50	0.63
b	0.64	0.76	0.89
b ₁	0.77	0.85	1.14
b ₂	5.00	5.33	5.46
c	0.458	0.508	0.558
D ₁	5.98	6.10	6.223
D ₂	5.21	--	--
E	6.40	6.60	6.731
E ₁	4.40	--	--
e	2.286 BSC		
e ₁	--	4.57	--
H _D	9.40	10.00	10.40
L	2.743 REF		
L ₁	1.40	1.52	1.77
L ₂	0.50	0.80	1.01
w	--	0.20	--
y	--	--	0.20

Notes:

1. Refer to JEDEC TO-252 variation AA
2. Dimension "E" does NOT include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.1524mm per side.
3. Dimension "D₁" does NOT include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.1524mm per end.

Customer Service

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