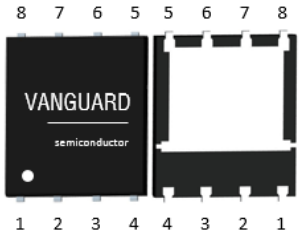
Features

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

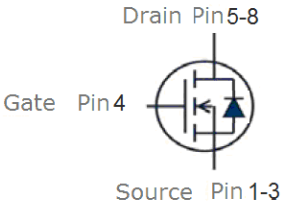
V_{DS}	40	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	4.5	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5 V	5.5	mΩ
I_D	80	A

PDFN5x6



Pb-Free RoHS Halogen-Free

Part ID	Package Type	Marking	Tape and reel information
VS4020AP	PDFN5x6	4020AP	3000PCS/Reel



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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		40	V
VGS	Gate-Source voltage		±20	V
I_S	Diode continuous forward current	T_C =25°C	80	A
I_D	Continuous drain current @VGS=10V	T_C =25°C	80	A
		T_C =100°C	50	A
I_{DM}	Pulse drain current tested ①	T_C =25°C	320	A
EAS	Avalanche energy, single pulsed ②		90	mJ
P_D	Maximum power dissipation	T_C =25°C	45	W
T_{STG}, T_J	Storage and operating temperature range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	30	°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	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℃)	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	1.7	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=20A	--	4.5	6	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=15A	--	5.5	7	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	3500	3915	4300	pF
C_{oss}	Output Capacitance		200	300	450	pF
C_{rss}	Reverse Transfer Capacitance		150	255	350	pF
R_g	Gate Resistance	f=1MHz	--	0.8	--	Ω
Q_g (10V)	Total Gate Charge	V_{DS}=20V,I_D=20A, V_{GS}=10V	50	63	80	nC
Q_g (4.5V)	Total Gate Charge		23	31	39	nC
Q_{gs}	Gate-Source Charge		7	13	20	nC
Q_{gd}	Gate-Drain Charge		7	11.5	17	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=20A, R_G=3Ω, V_{GS}=10V	--	11	--	ns
t_r	Turn-on Rise Time		--	8	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	54	--	ns
t_f	Turn-Off Fall Time		--	13.5	--	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℃,I_{sd}=20A, V_{GS}=0V di/dt=500A/μs	--	13	--	ns
Q_{rr}	Reverse Recovery Charge		--	21	--	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 Pulse width ≤ 300μs; duty cycle≤ 2%.

Typical Characteristics

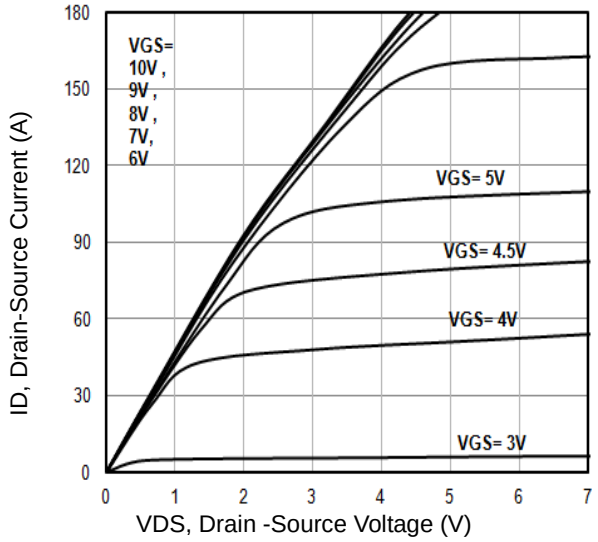


Fig1. Typical Output Characteristics

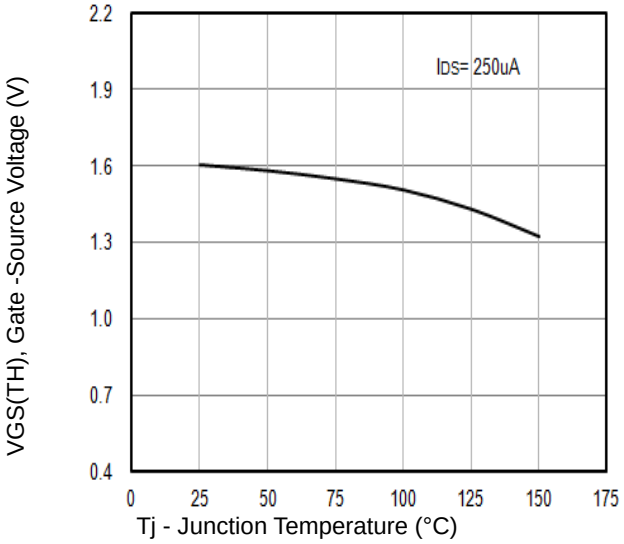


Fig2. $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

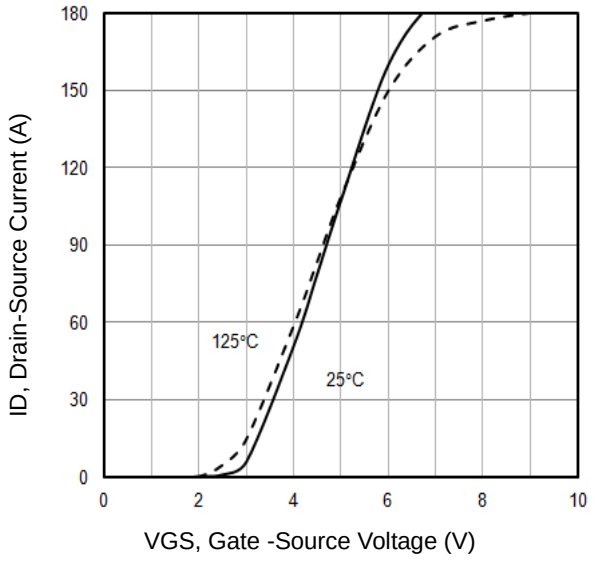


Fig3. Typical Transfer Characteristics

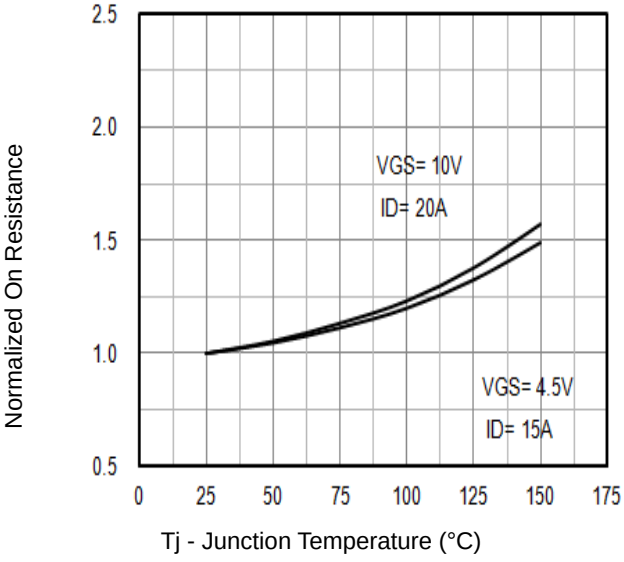


Fig4. Normalized On-Resistance Vs. Tj

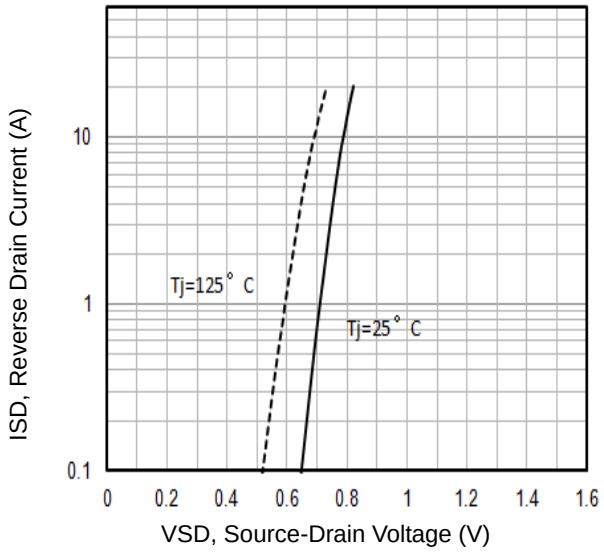


Fig5. Typical Source-Drain Diode Forward Voltage

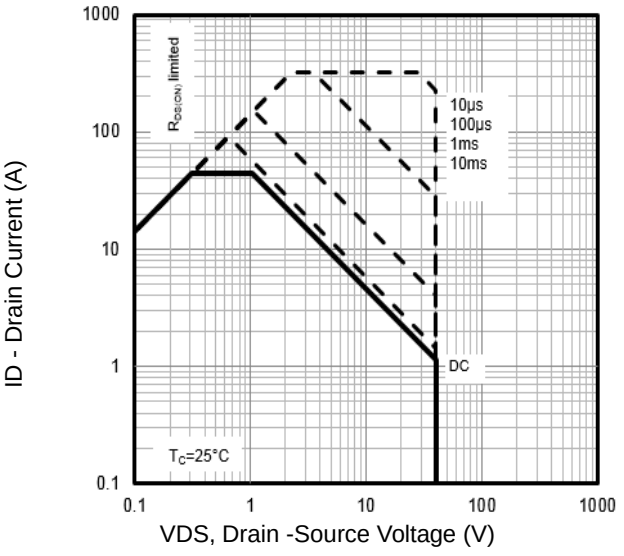


Fig6. Maximum Safe Operating Area

Typical Characteristics

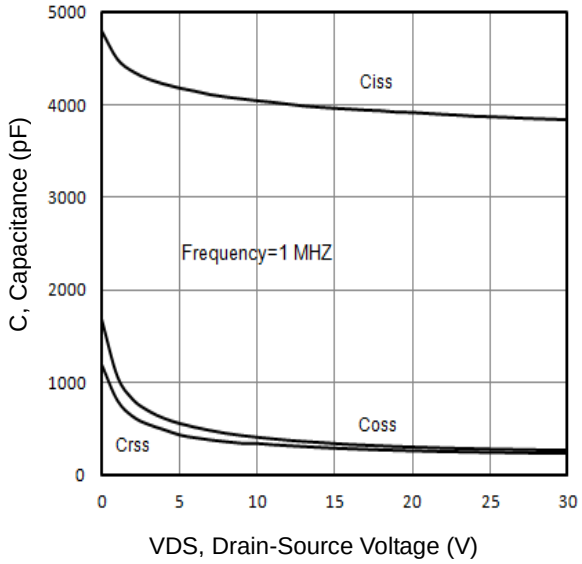


Fig7. Typical Capacitance Vs. Drain-Source Voltage

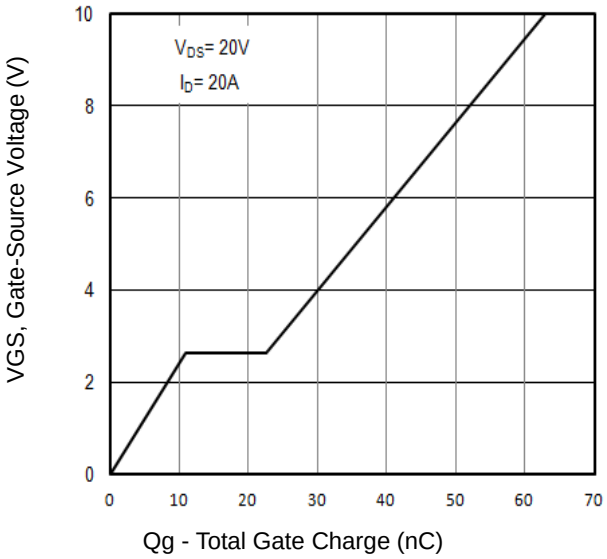


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

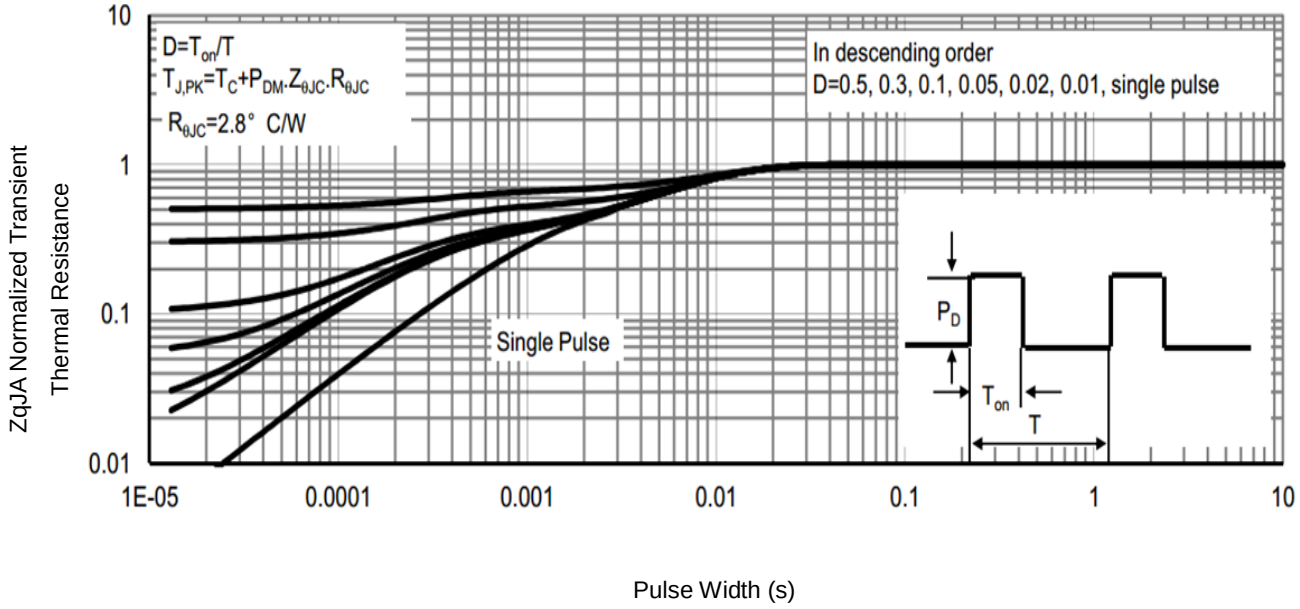


Fig9. Normalized Maximum Transient Thermal Impedance

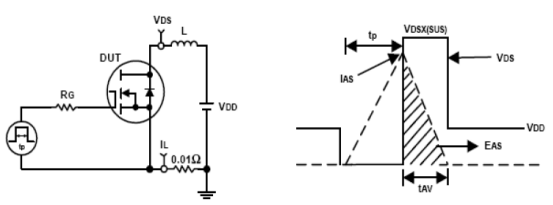


Fig10. Unclamped Inductive Test Circuit and waveforms

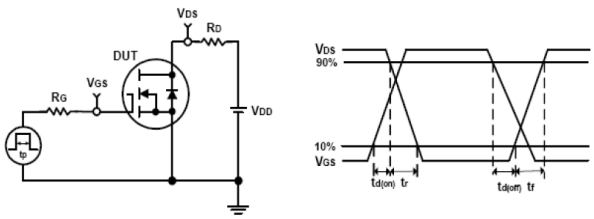
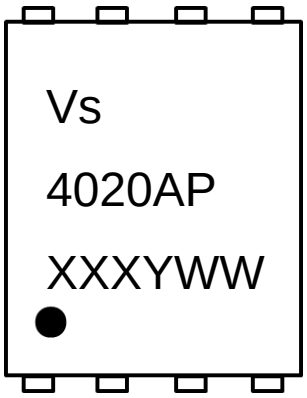


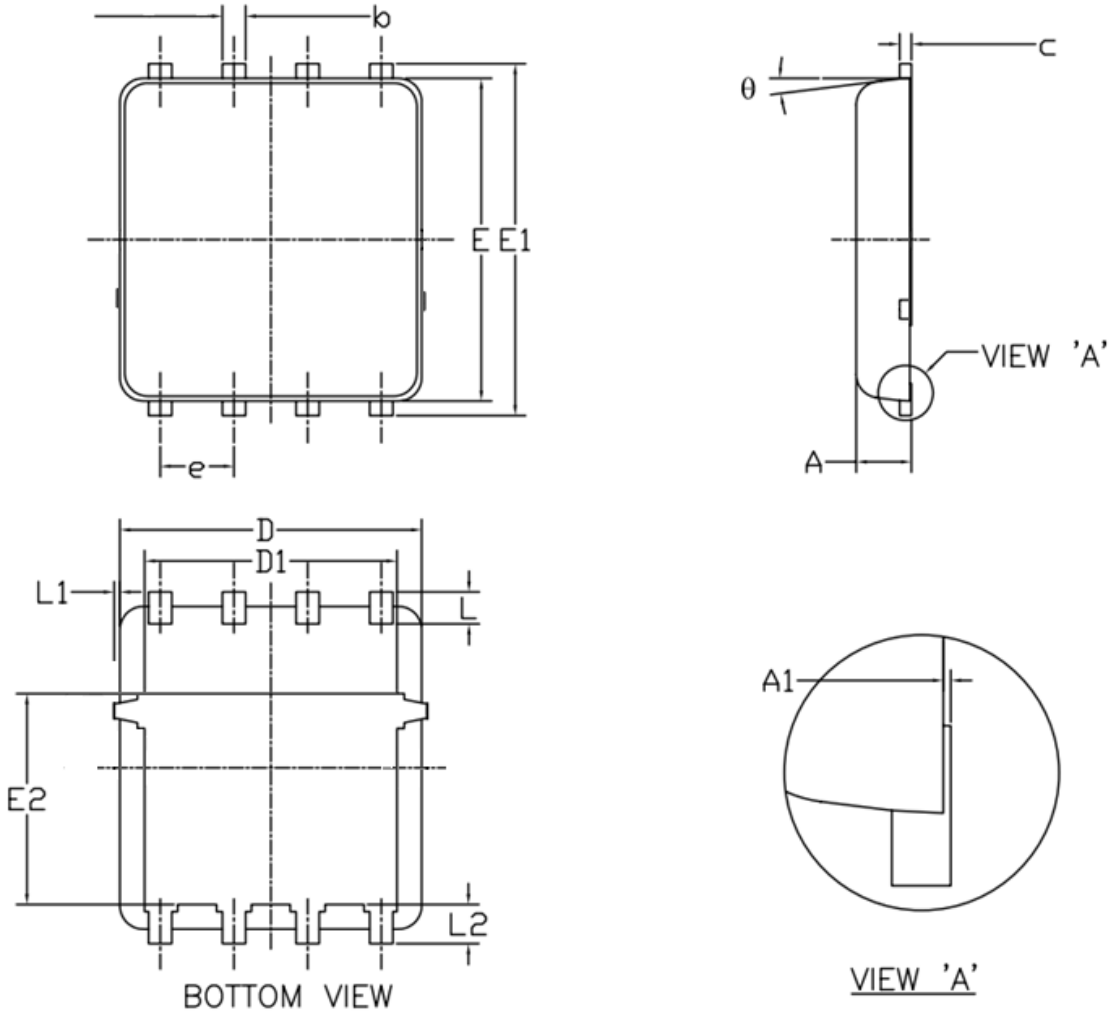
Fig11. Switching Time Test Circuit and waveforms

Marking Information



1st line： Vanguard Code（Vs）
2nd line： Part Number（4020AP）
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)

PDFN5x6 Package Outline Data



Symbol	DIMENSIONS (unit : mm)		
	Min	Typ	Max
A	0.90	1.00	1.20
A1	0.00	--	0.05
b	0.30	0.40	0.51
c	0.20	0.25	0.33
D	4.80	4.90	5.40
D1	3.61	4.00	4.25
E	5.65	5.80	6.06
E1	5.90	6.10	6.35
E2	3.38	3.58	3.92
e	1.27 BSC		
L	0.51	0.61	0.71
L1	--	--	0.15
L2	0.41	0.51	0.61
θ	0°	--	12°

Notes:

1. Refer to JEDEC MO-240 variation AA.
2. Dimensions "D" and "E" do NOT include mold flash protrusions or gate burrs.
3. Dimensions "D" and "E" include interterminal flash or protrusion. Interterminal flash or protrusion shall not exceed 0.25mm per side.

Customer Service

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