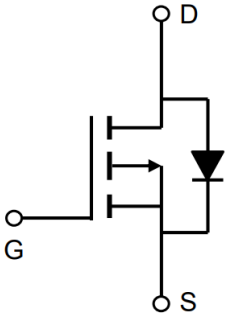
AP3P06AI

-60V P-Channel Enhancement Mode MOSFET

Description

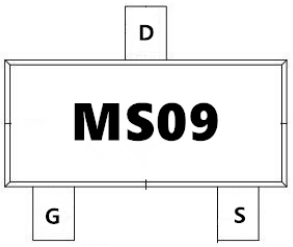
The AP3P06AI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS} = -60V I_D =-3 A

$R_{DS(ON)}$ < -180mΩ @ V_{GS}=-10V



Application

Battery protection

Load switch

Uninterruptible power supply

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP3P06AI	SOT-23	MS09	3000

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ -10V[1]	-3.3	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -10V[1]	-1.4	A
I_{DM}	Pulsed Drain Current[2]	-7	A
P_D@T_A=25℃	Total Power Dissipation[3]	1	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	125	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	80	℃/W

-60V P-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_C=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-60	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.021	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-1.5A	---	130	185	mΩ
		V_{GS}=-4.5V , I_D=-1A	---	158	200	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	---	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.08	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-48V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-1.5A	---	5.9	---	S
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-20V , V_{GS}=-4.5V , I_D=-1.5A	---	4.6	---	nC
Q_{gs}	Gate-Source Charge		---	1.4	---	
Q_{gd}	Gate-Drain Charge		---	1.62	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DS}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-1A	---	17.4	---	ns
T_r	Rise Time		---	5.4	---	
$T_{d(off)}$	Turn-Off Delay Time		---	37.2	---	
T_f	Fall Time		---	2.4	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	531	---	pF
C_{oss}	Output Capacitance		---	59	---	
C_{rss}	Reverse Transfer Capacitance		---	38	---	
I_S	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	-1.7	A
I_{SM}	Pulsed Source Current[2,4]		---	---	-7	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V

Note :
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The power dissipation is limited by 150℃ junction temperature
4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

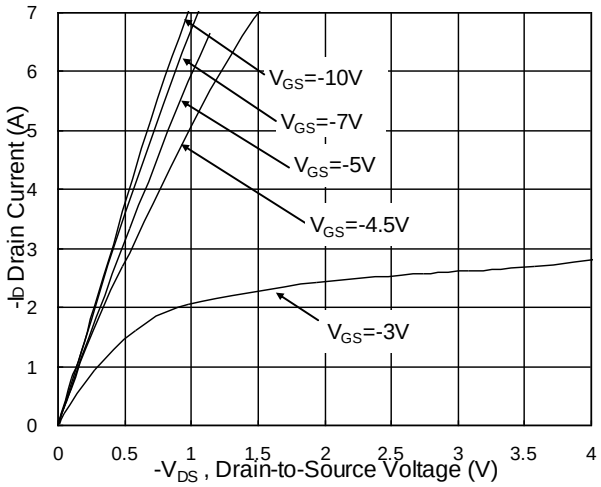


Fig.1 Typical Output Characteristics

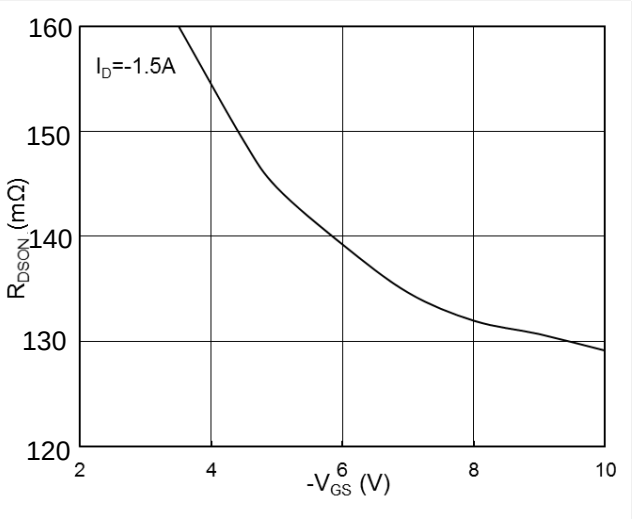


Fig.2 On-Resistance v.s Gate-Source

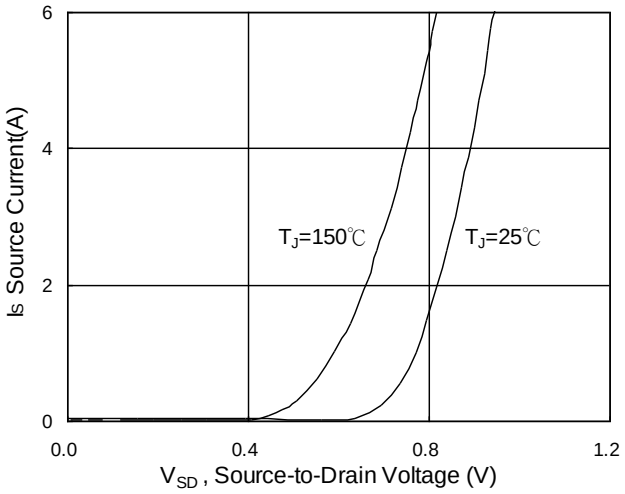


Fig.3 Forward Characteristics Of Reverse

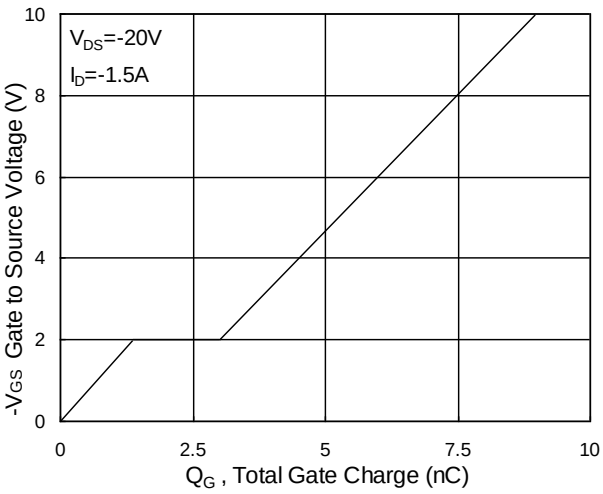


Fig.4 Gate-Charge Characteristics

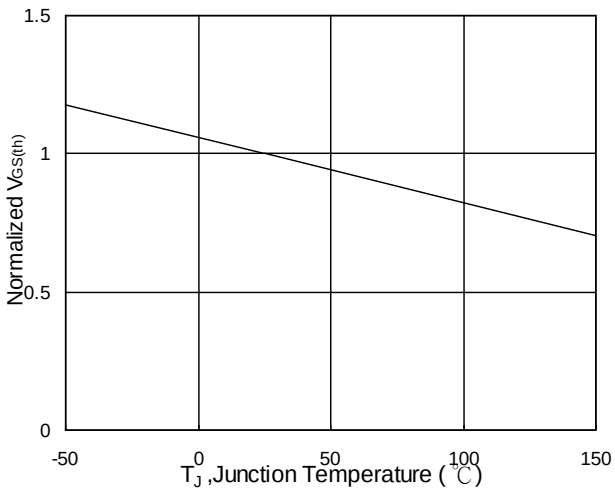


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

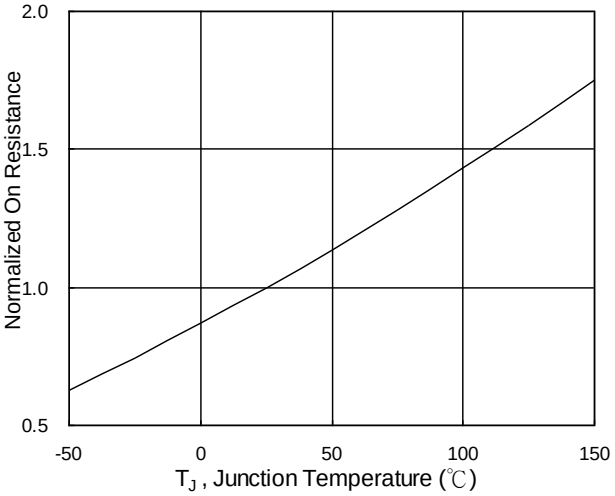


Fig.6 Normalized R_{DSON} v.s T_J

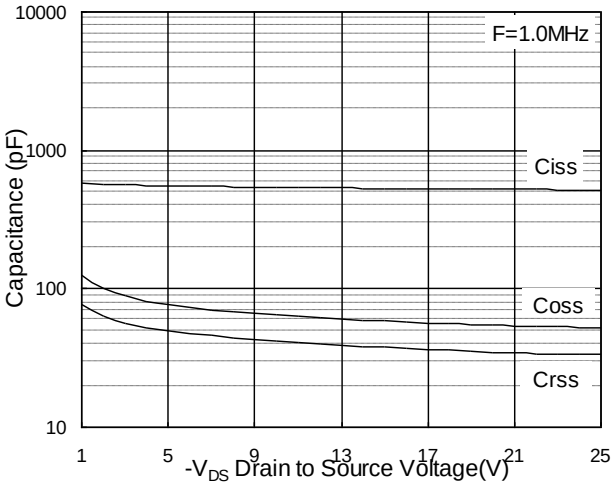


Fig.7 Capacitance

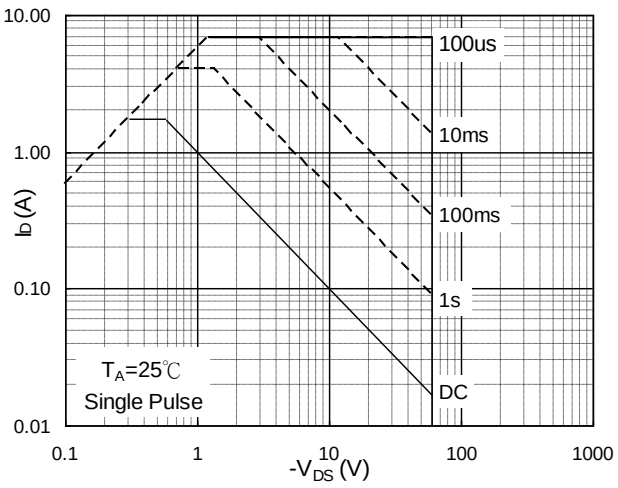


Fig.8 Safe Operating Area

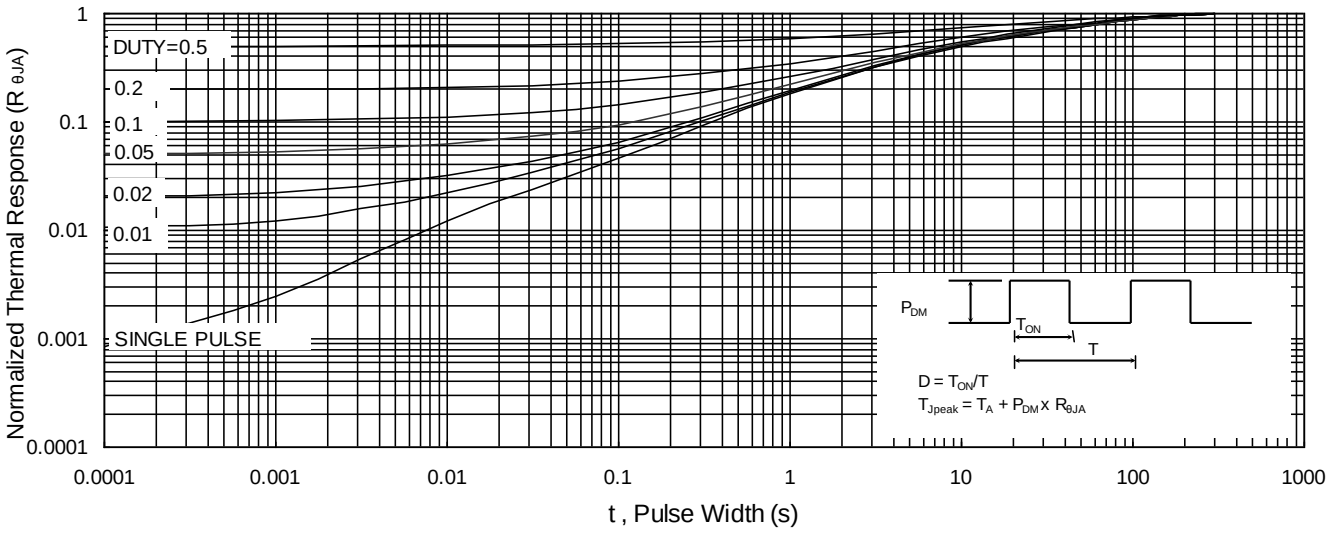


Fig.9 Normalized Maximum Transient Thermal Impedance

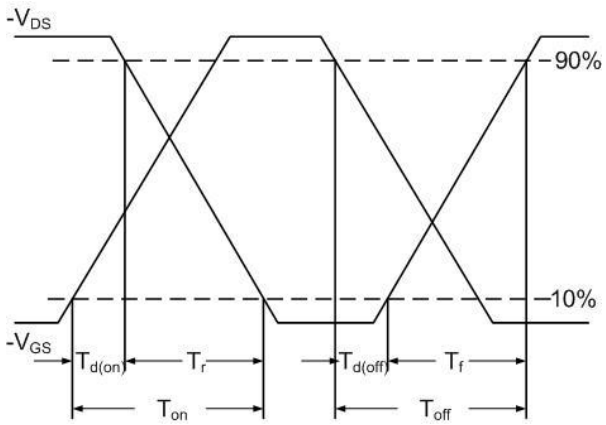


Fig.10 Switching time waveform

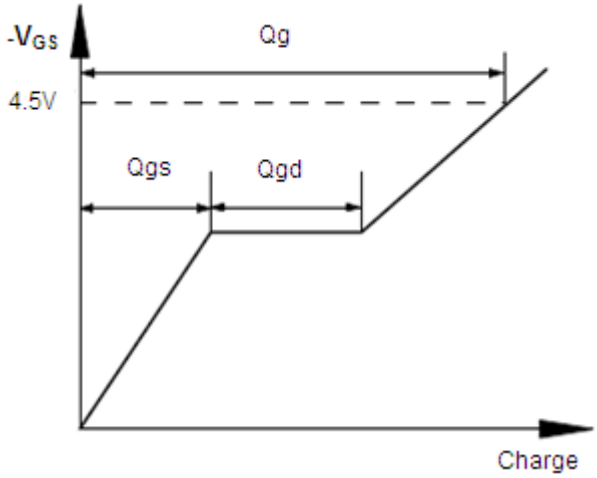


Fig.11 Gate Charge waveform

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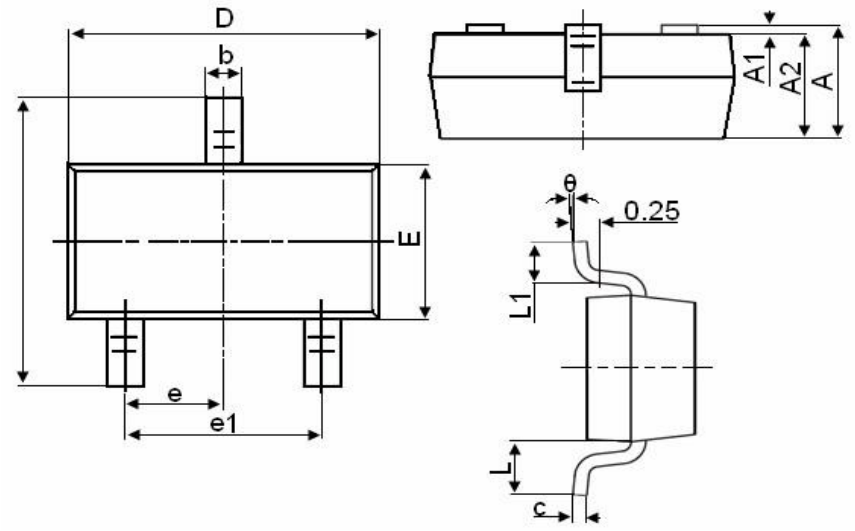
Package Mechanical Data-SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

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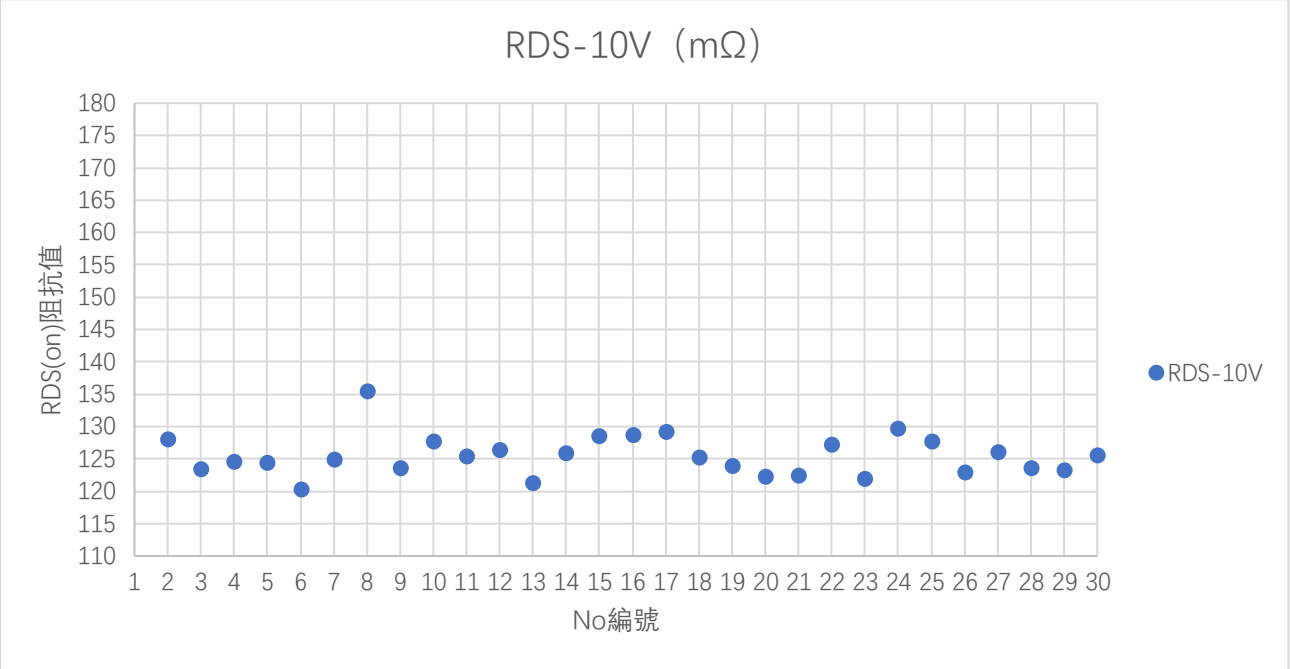
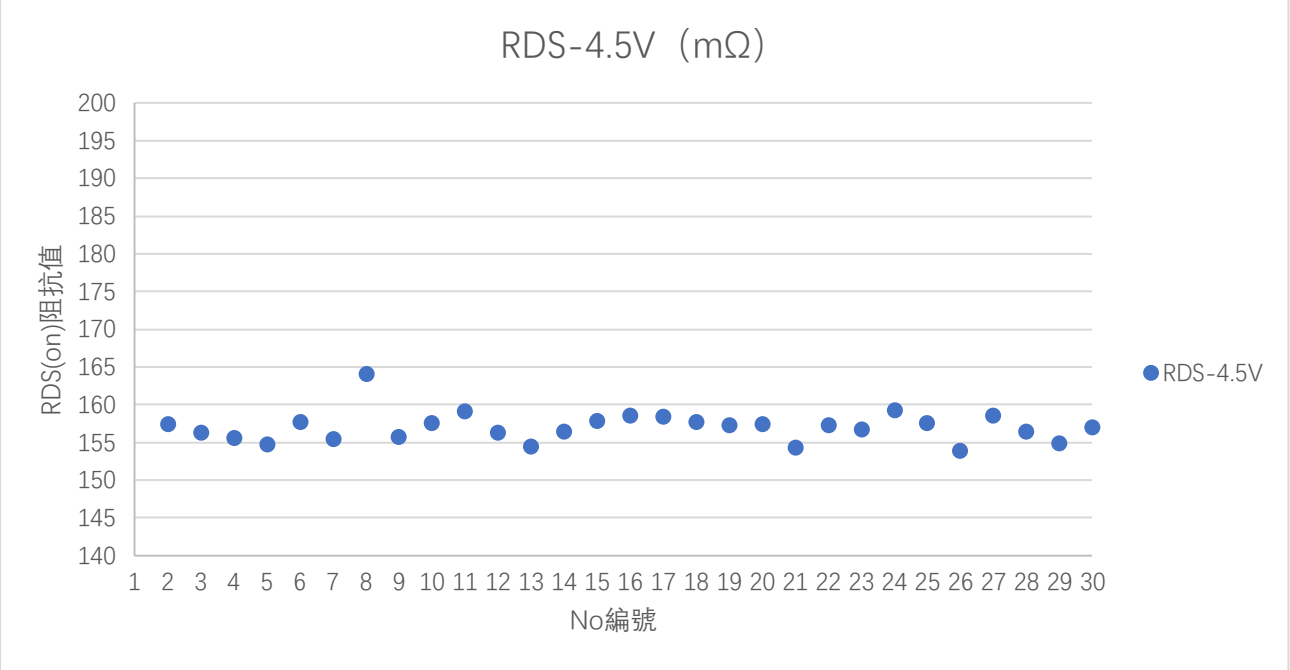
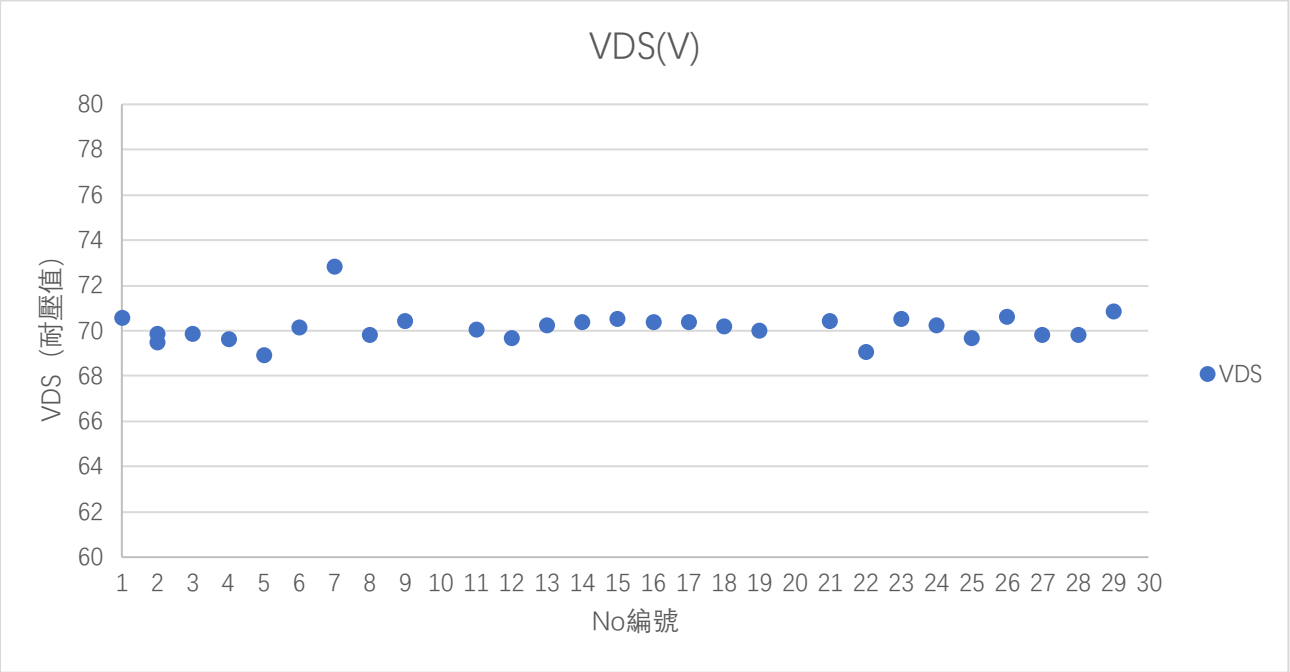
-60V P-Channel Enhancement Mode MOSFET

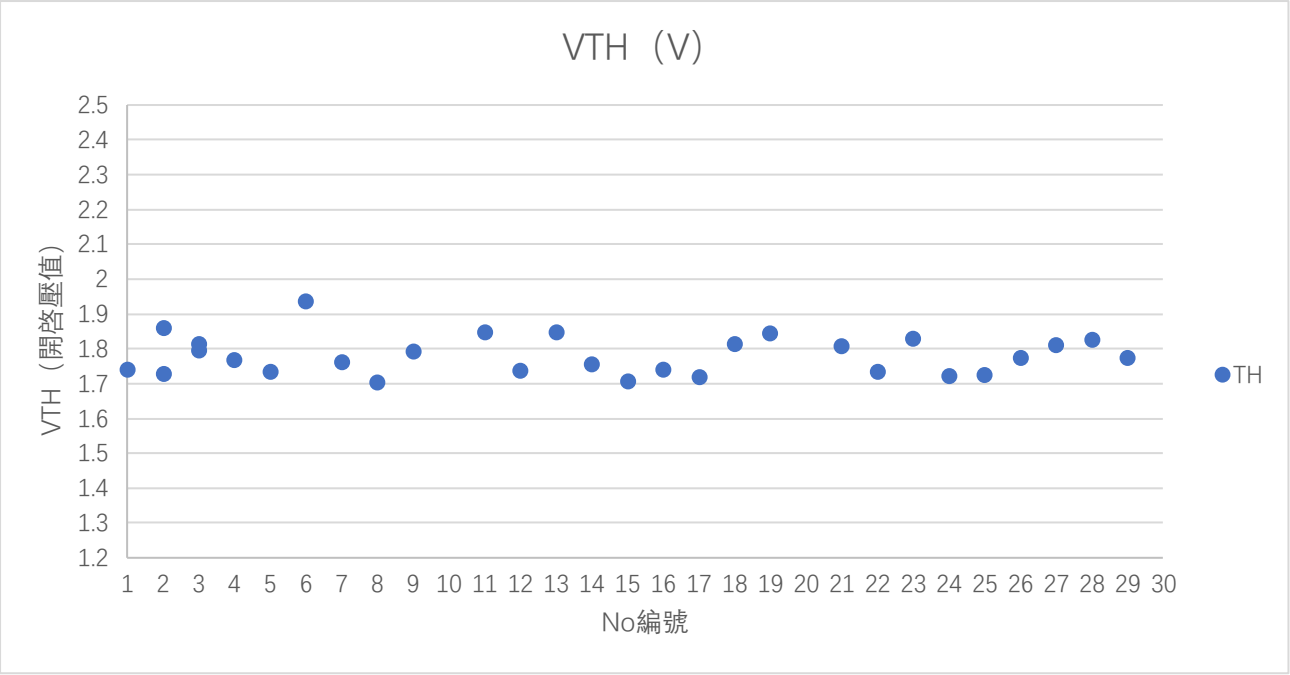
Edition	Date	Change
Rve3.7	2019/4/10	Initial release
Rve3.9	2020/3/25	Reduce RDS(on)

Test Report For 30PCS（30pcs 典型測試報告）






VDS(V)
VDS（耐壓值）
80
78
76
74
72
70
68
66
64
62
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
No編號
VDS


VTH（V）
VTH（開啓壓值）
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
No編號
TH