

30V N-Channel Enhancement Mode MOSFET

Description

The AP3400AI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 30V$ $I_D = 6.2A$

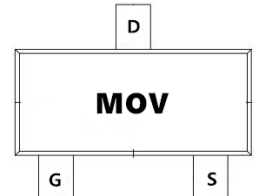
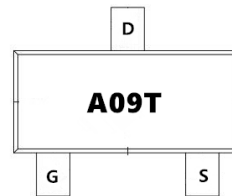
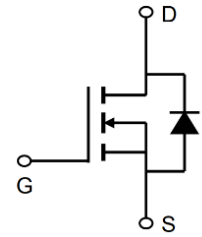
$R_{DS(ON)} < 28m\Omega$ @ $V_{GS}=10V$ (Type : 20m Ω)

Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP3400AI	SOT-23	A09T	3000
AP3400AI	SOT-23	MOV	3000

Absolute Maximum Ratings ($T_C=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^{\circ}C$	Continuous Drain Current	6.2	A
$I_D @ T_A = 70^{\circ}C$	Continuous Drain Current	4.9	A
IDM	Pulsed Drain Current ²	20	A
$P_D @ T_A = 25^{\circ}C$	Total Power Dissipation ³	1	W
TSTG	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	125	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ ($t \leq 10s$)	85	$^{\circ}C/W$

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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	33	---	V
$\Delta BVDSS/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	0.029	---	V/ $^{\circ}\text{C}$
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=5.8A$	---	20	28	m Ω
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=4.5V, I_D=5A$	---	24	32	m Ω
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=2.5V, I_D=4A$	---	31	55	m Ω
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	0.5	0.85	1.2	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-2.82	---	mV/ $^{\circ}\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=24V, V_{GS}=0V, T_J=55^{\circ}\text{C}$	---	---	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=5V, I_D=5A$	---	25	---	S
R _g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	1.5	---	Ω
Q _g	Total Gate Charge (4.5V)	$V_{DS}=15V, V_{GS}=4.5V, I_D=5.8A$	---	11.5	---	nC
Q _{gs}	Gate-Source Charge		---	1.6	---	
Q _{gd}	Gate-Drain Charge		---	2.9	---	
Td(on)	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=3\Omega$ $I_D=5A$	---	5	---	ns
T _r	Rise Time		---	47.	---	
Td(off)	Turn-Off Delay Time		---	26	---	
T _f	Fall Time		---	8	---	
C _{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1MHz$	---	860	---	pF
C _{oss}	Output Capacitance		---	84	---	
C _{rss}	Reverse Transfer Capacitance		---	70	---	
I _s	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	5.8	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	---	1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The power dissipation is limited by 150°C 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.

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Typical Characteristics

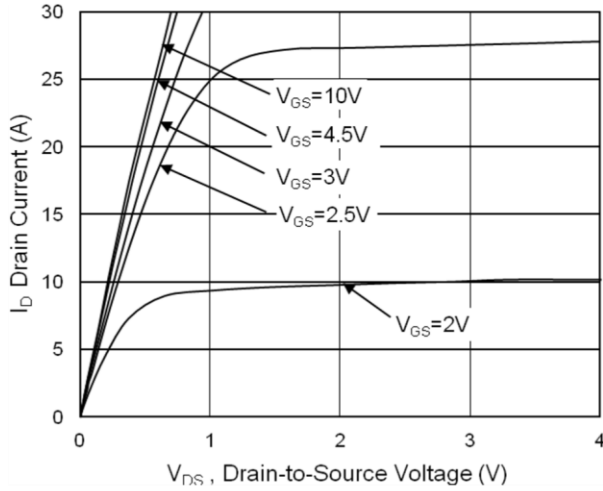


Fig.1 Typical Output Characteristics

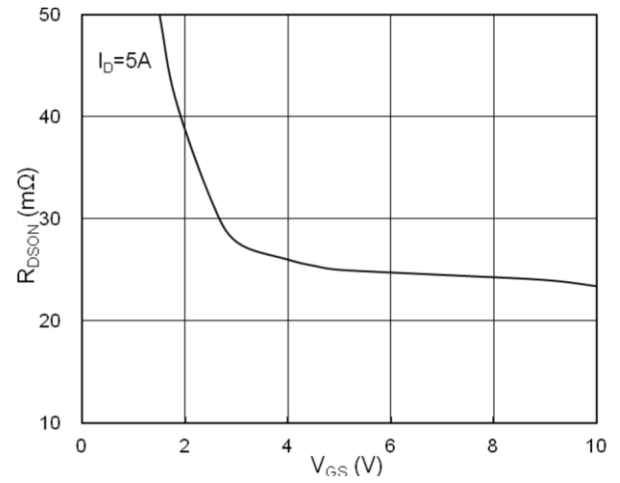


Fig.2 On-Resistance vs. Gate-Source

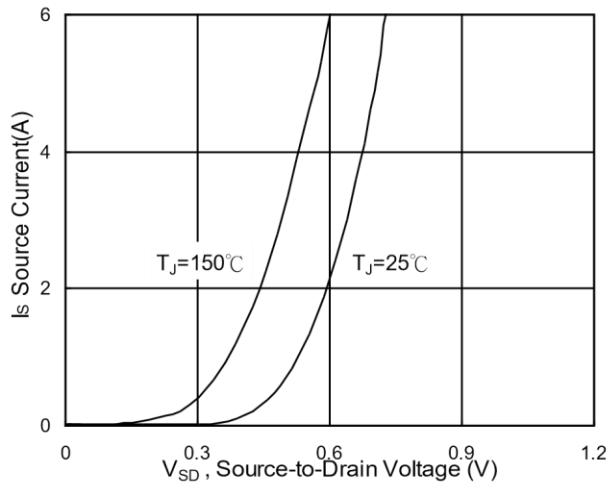


Fig.3 Forward Characteristics Of Reverse

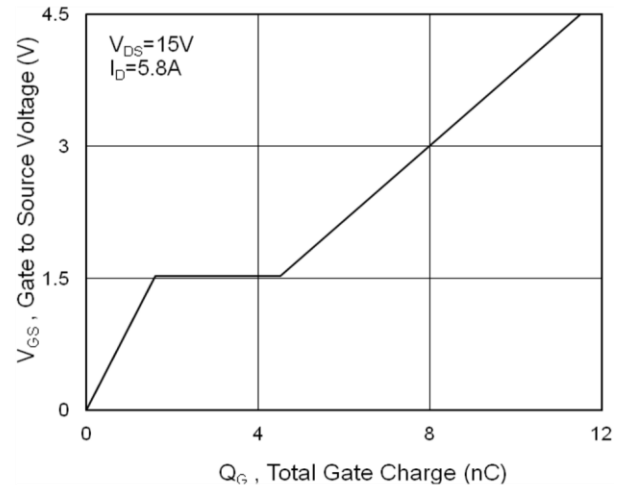


Fig.4 Gate-Charge Characteristics

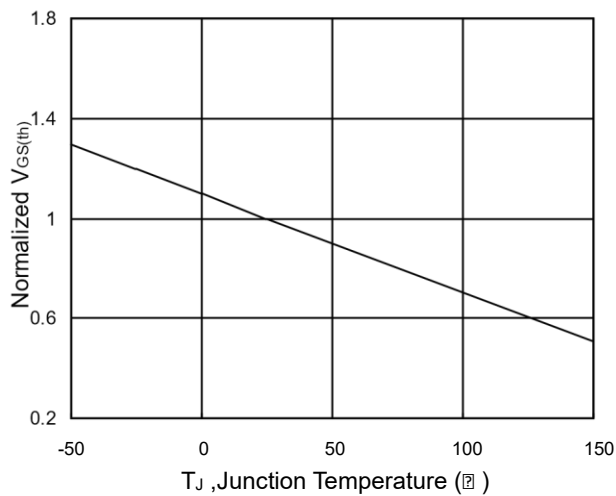


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

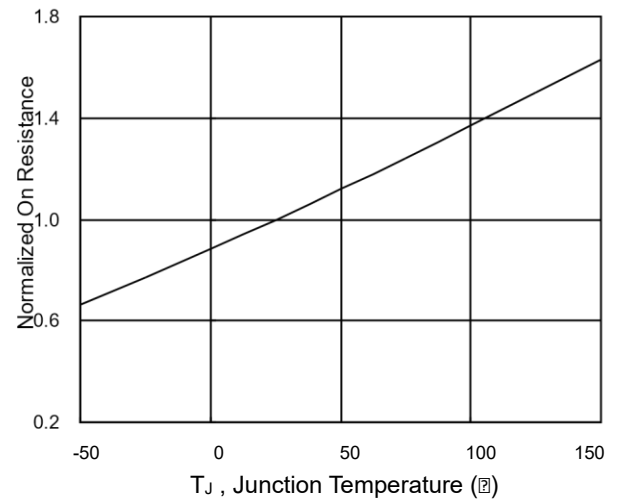


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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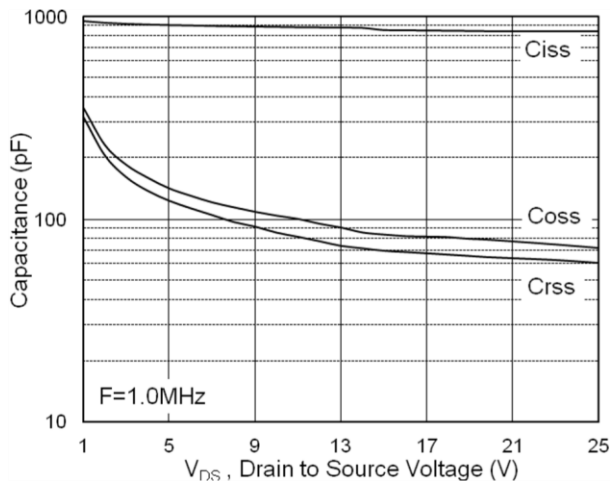


Fig.7 Capacitance

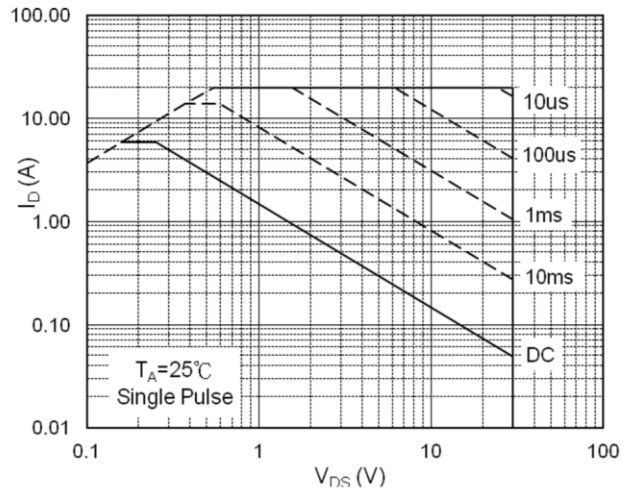


Fig.8 Safe Operating Area

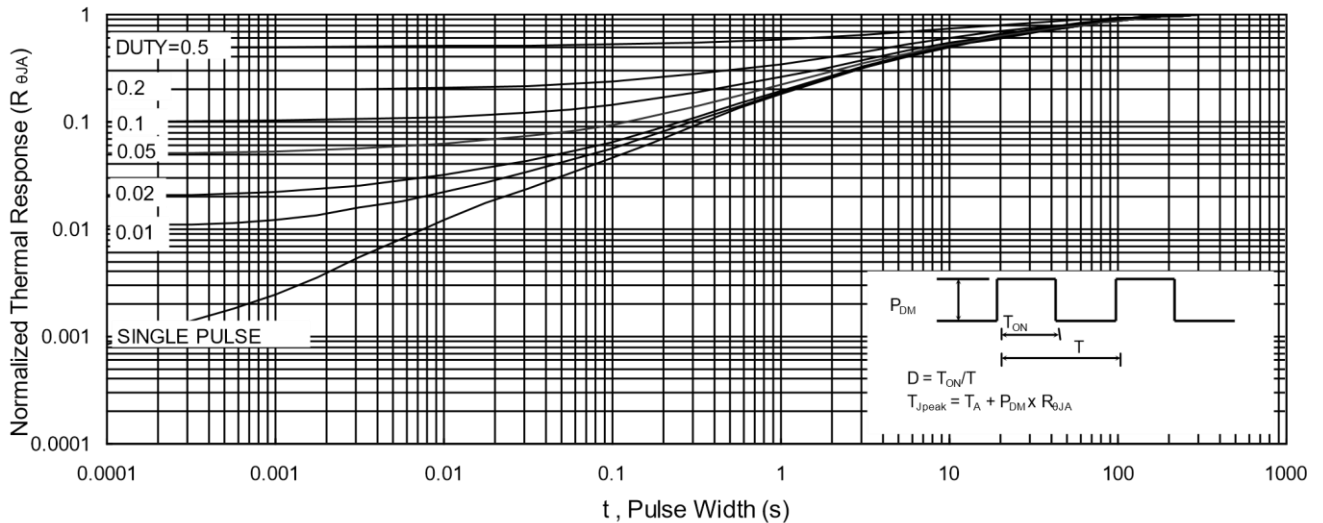


Fig.9 Normalized Maximum Transient Thermal Impedance

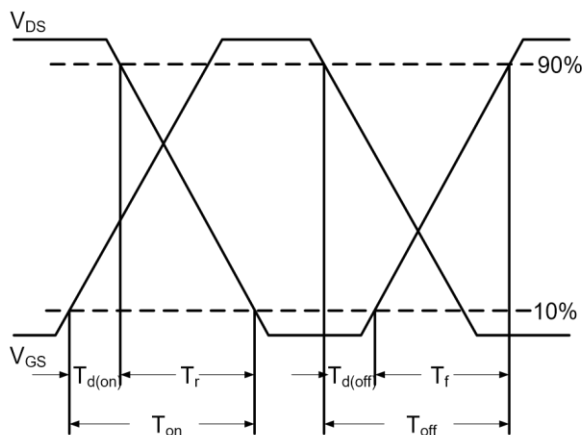


Fig.10 Switching Time Waveform

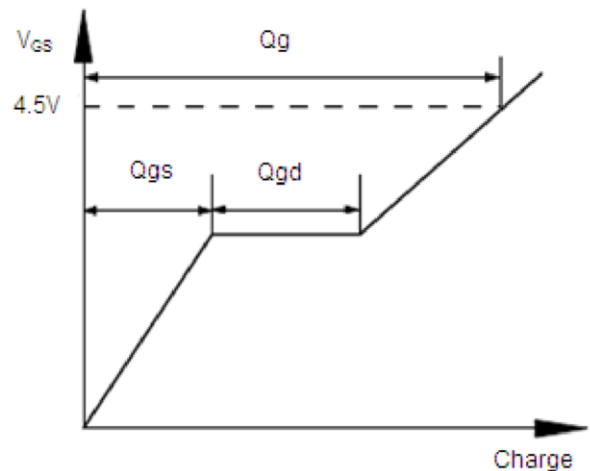
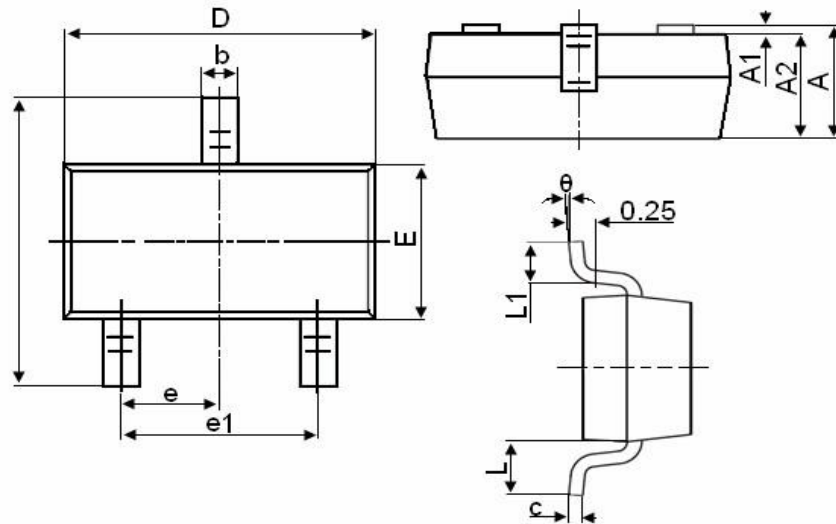


Fig.11 Gate Charge Waveform

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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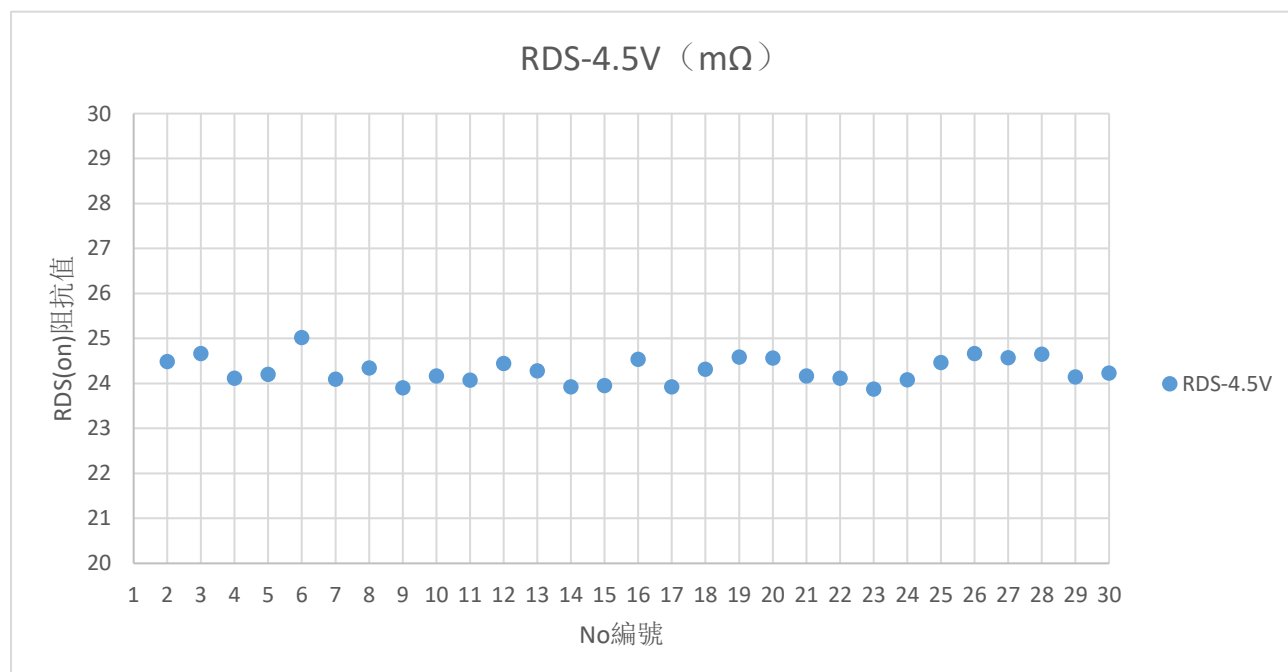
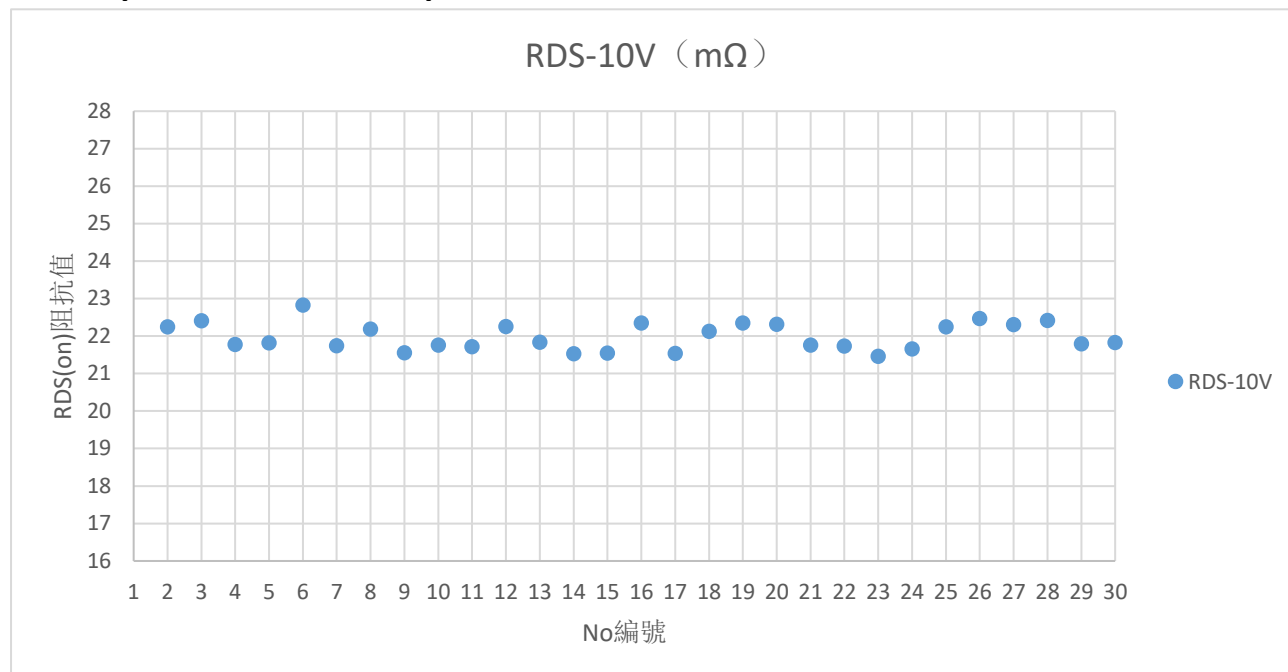
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Edition	Date	Change
Rve3.0	2019/4/10	Initial release
Rve3.1	2020/3/25	Reduce RDS(on)

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Test Report For 30PCS (30pcs 典型測試報告)



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