

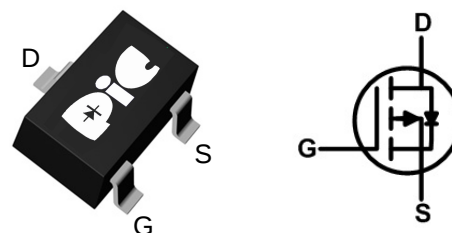
➤ General Description

This PAP2301NS P-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent $R_{ds(On)}$ performance and efficiency for power switching and load switching application., this device also comply with the RoHS and Green Product requirement with full function reliability approved.

➤ Feature

- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology
- SOT-23S package design

➤ SOT-23S



➤ Application

- Load Switch
- Portable instrument
- Small power switching

➤ Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current, $V_{GS} @ -4.5V^1$	$I_D@T_A=25^\circ C$	-3.3	A
Continuous Drain Current, $V_{GS} @ -4.5V^1$	$I_D@T_A=70^\circ C$	-2.6	A
Pulsed Drain Current ²	I_{DM}	-13	A
Total Power Dissipation ³	$P_D@T_A=25^\circ C$	1.4	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ C$
Thermal Resistance Junction-ambient ¹	$R_{\theta JA}$	125	$^\circ C/W$
Thermal Resistance Junction-ambient ¹ ($t \leq 10s$)	$R_{\theta JA}$	90	$^\circ C/W$

➤ Electrical Characteristics ($T_J=25^\circ C$ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V$, $I_D=-250\mu A$	-20	---	---	V
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	$V_{GS}=-4.5V$, $I_D=-3A$	---	76	100	$m\Omega$
		$V_{GS}=-2.5V$, $I_D=-2A$	---	110	135	
		$V_{GS}=-1.8V$, $I_D=-0.9A$	---	160	240	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=-250\mu A$	-0.45	-0.6	-1.0	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-16V$, $V_{GS}=0V$, $T_J=25^\circ C$	---	---	-1	μA
		$V_{DS}=-16V$, $V_{GS}=0V$, $T_J=55^\circ C$	---	---	-5	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 12V$, $V_{DS}=0V$	---	---	± 100	nA
Forward Transconductance	g_{fs}	$V_{DS}=-5V$, $I_D=-3A$	---	12.2	---	S
Total Gate Charge (-4.5V)	Q_g	$V_{DS}=-15V$, $V_{GS}=-4.5V$, $I_D=-3A$	---	10.1	---	nC
Gate-Source Charge	Q_{gs}		---	1.21	---	
Gate-Drain Charge	Q_{gd}		---	2.46	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=-10V$, $V_{GS}=-4.5V$, $R_G=3.3\Omega$ $I_D=-3A$	---	5.6	---	ns
Rise Time	T_r		---	32.2	---	
Turn-Off Delay Time	$T_{d(off)}$		---	45.6	---	
Fall Time	T_f		---	29.2	---	
Input Capacitance	C_{iss}	$V_{DS}=-15V$, $V_{GS}=0V$, $f=1MHz$	---	677	---	pF
Output Capacitance	C_{oss}		---	82	---	
Reverse Transfer Capacitance	C_{rss}		---	73	---	

➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current ^{1,4}	I_S	$V_G=V_D=0V$, Force Current	---	---	-3	A
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V$, $I_S=-1A$, $T_J=25^\circ C$	---	---	-1	V

Note :

1.Pulse width limited by maximum junction temperature.

2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

3.Ensure that the channel temperature does not exceed $150^\circ C$.

4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

P-Ch -20V Fast Switching MOSFET
 $V_{DS}=-20V$, $I_D=-3.3A$, $R_{DS(on)}=100m\Omega$

➤ Typical Characteristics

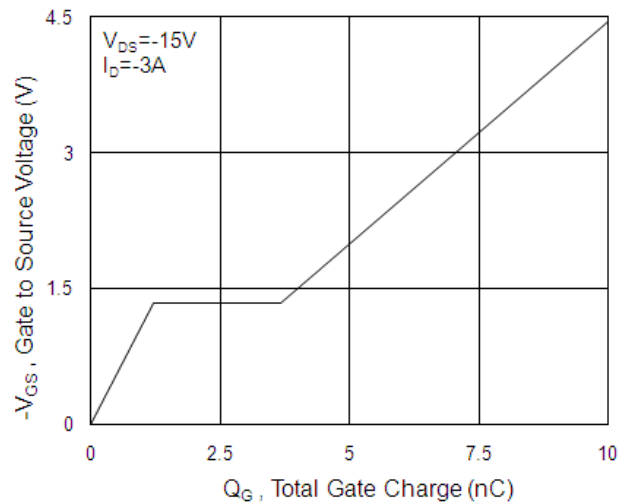
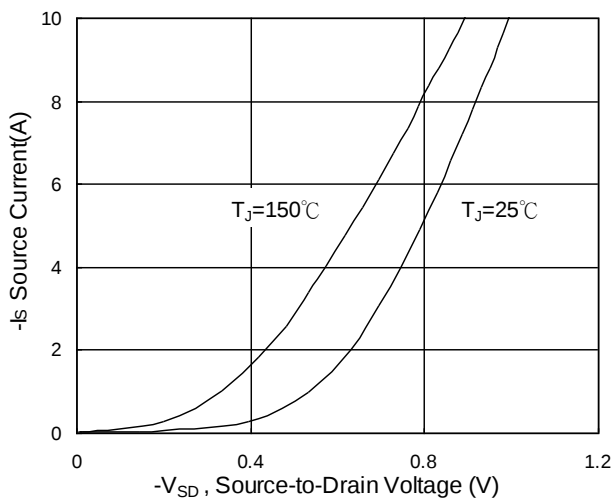
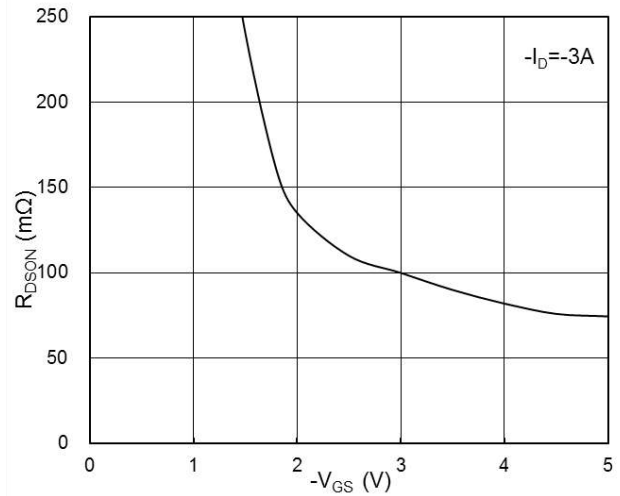
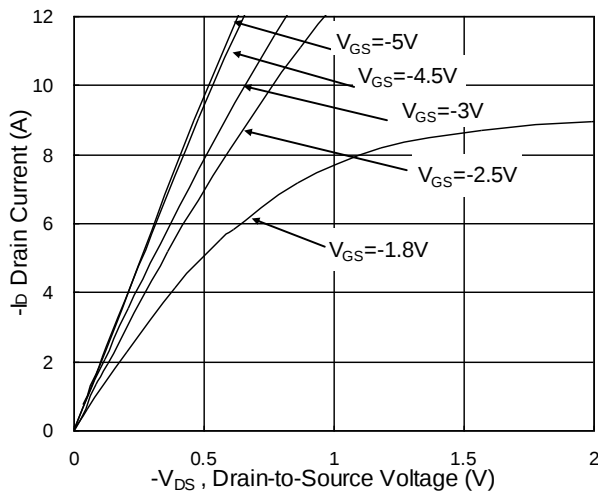
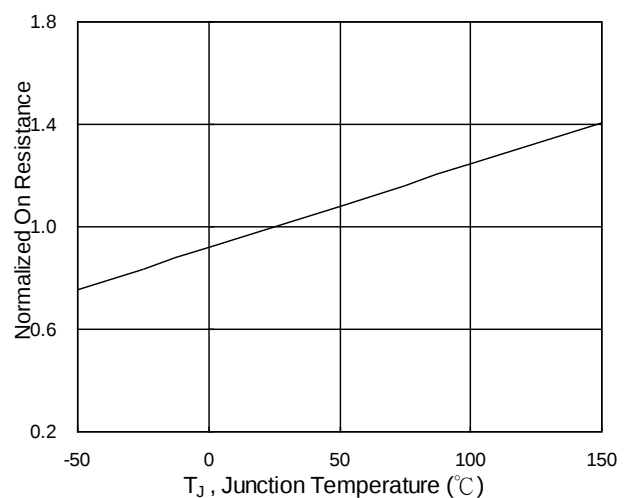
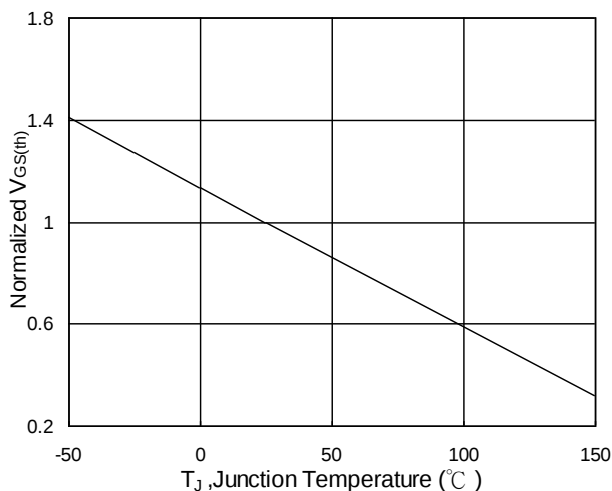


Fig.3 Source Drain Forward Characteristics

Fig.4 Gate-Charge Characteristics



P-Ch -20V Fast Switching MOSFET
 $V_{DS}=-20V$, $I_D=-3.3A$, $R_{DS(ON)}=100m\Omega$

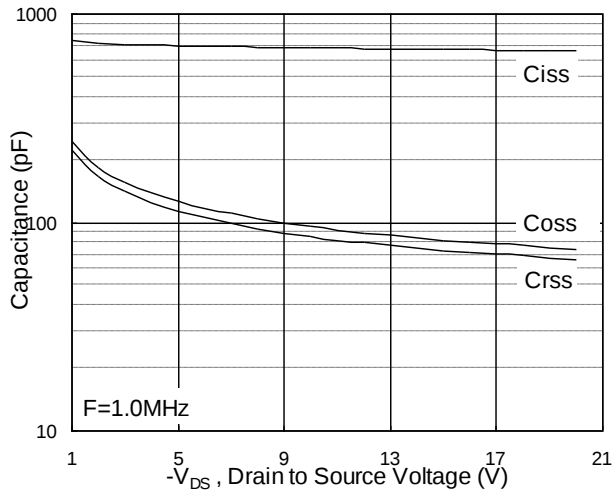


Fig.7 Capacitance

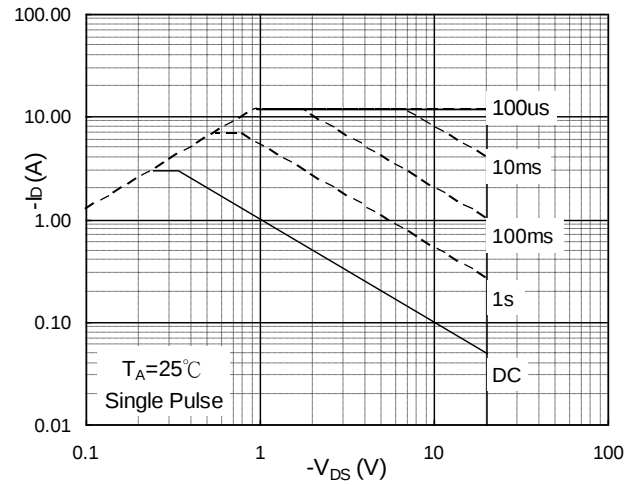


Fig.8 Safe Operating Area

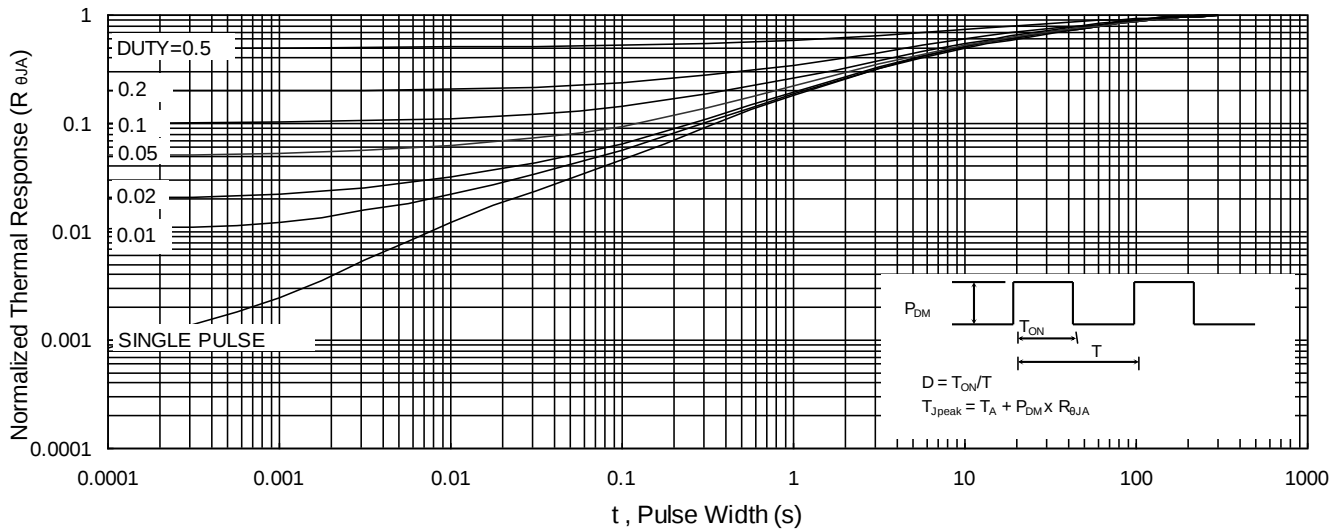


Fig.9 Normalized Maximum Transient Thermal Impedance

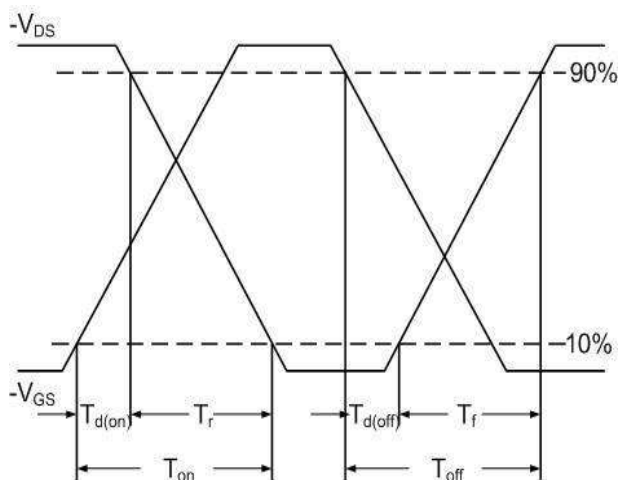


Fig.10 Switching Time Waveform

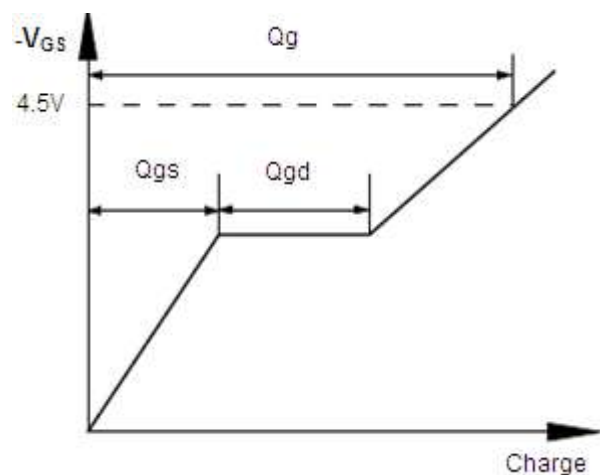


Fig.11 Gate Charge Waveform

➤ Recommand IR Reflow Soldering Thermal Profile

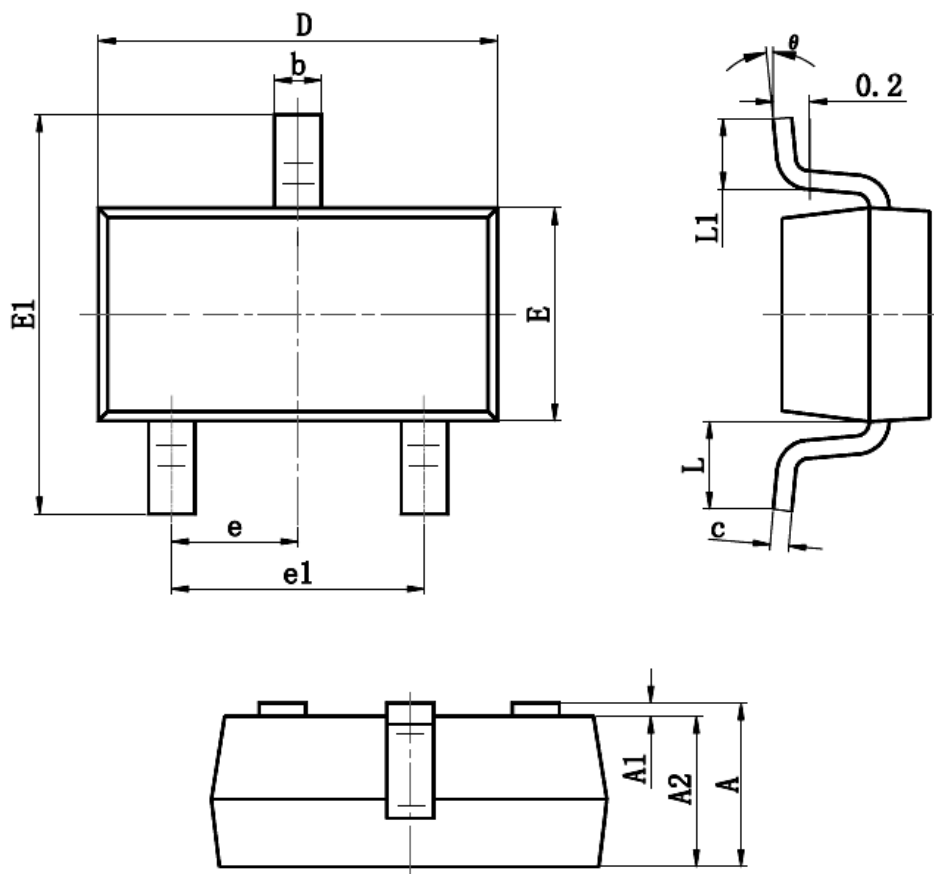


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	150°C
Temperature Max. (T_{smax})	200°C
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds
Average Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (t_P) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (T_P to T_L)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

➤ Ordering Information

Part Number	Description	Quantity
PAP2301NS	SOT-23S Reel	3000 pcs

➤ Package Information (SOT-23S)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.100	0.035	0.039
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	6°

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