PAP31TK13K

P-Ch -30V Fast Switching MOSFET

V_{DS}=-30V, I_D=-5.0A, $RDS_{(ON)}$=40mΩ

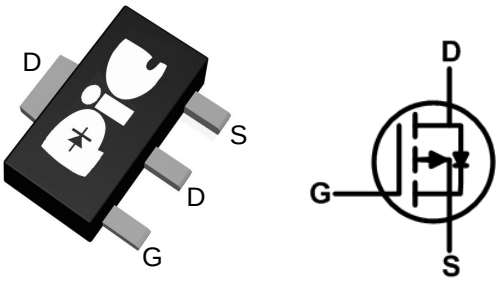
➢ General Description

This PAP31TK13K P-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent Rds(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

- ●Super high density cell design for extremely
- ●low RDS (ON)
- ●SOT-89-3L package design

➢ SOT-89-3L



➢ Application

- ●Power Management in White LED System
- ●Push Pull Converter
- ●LCD TV Inverter & AD/DC Inverter Systems.

➢ Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current, V_{GS} @ -10V[1]	I_D@T_A=25℃	-5	A
Continuous Drain Current, V_{GS} @ -10V[1]	I_D@T_A=70℃	-4	A
Pulsed Drain Current[2]	I_{DM}	-25	A
Total Power Dissipation[3]	P_D@T_A=25℃	1.5	W
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃
Thermal Resistance Junction-Ambient [1]	$R_{\theta JA}$	85	℃/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	24	℃/W

➢ Electrical Characteristics (T_J=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V , I_D=-250uA	-30	---	---	V
BV_{DSS} Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25℃ , I_D=-1mA	---	-0.016	---	V/℃
Static Drain-Source On-Resistance[2]	$R_{DS(ON)}$	V_{GS}=-10V , I_D=-5A	---	32	40	mΩ
		V_{GS}=-4.5V , I_D=-4A	---	50	62	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.5	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	-2.8	---	mV/℃
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-24V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-24V , V_{GS}=0V , T_J=55℃	---	---	-5	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Forward Transconductance	gfs	V_{DS}=-5V , I_D=-5A	---	13.7	---	S
Gate Resistance	R_g	V_{DS}=0V , V_{GS}=0V , f=1MHz		15	30	Ω
Total Gate Charge (-4.5V)	Q_g	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-5A	---	9.8	14	nC
Gate-Source Charge	Q_{gs}		---	3.6	5.1	
Gate-Drain Charge	Q_{gd}		---	3.2	4.5	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-5A	---	5.0	10	ns
Rise Time	T_r		---	27.2	49	
Turn-Off Delay Time	$T_{d(off)}$		---	41	82	
Fall Time	T_f		---	17.5	35	
Input Capacitance	C_{iss}	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1100	1540	pF
Output Capacitance	C_{oss}		---	150	210	
Reverse Transfer Capacitance	C_{rss}		---	125	175	

➢ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current[1,4]	I_S	V_G=V_D=0V , Force Current	---	---	-5	A
Pulsed Source Current[2,4]	I_{SM}		---	---	-25	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V
Reverse Recovery Time	t_{rr}	I_F=5A , dI/dt=100A/μs , T_J=25℃	---	6.2	---	nS
Reverse Recovery Charge	Q_{rr}		---	1.0	---	nC

Note :
1.Pulse width limited by maximum junction temperature.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.Ensure that the channel temperature does not exceed 150°C.
4.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

➢ Typical Characteristics

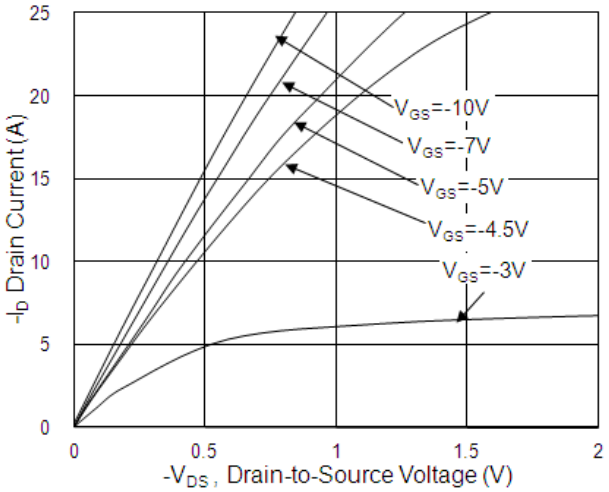


Fig.1 Typical Output Characteristics

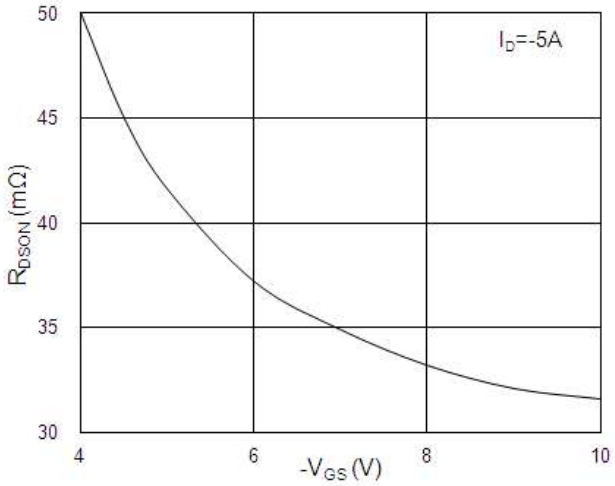


Fig.2 On-Resistance v.s Gate-Source

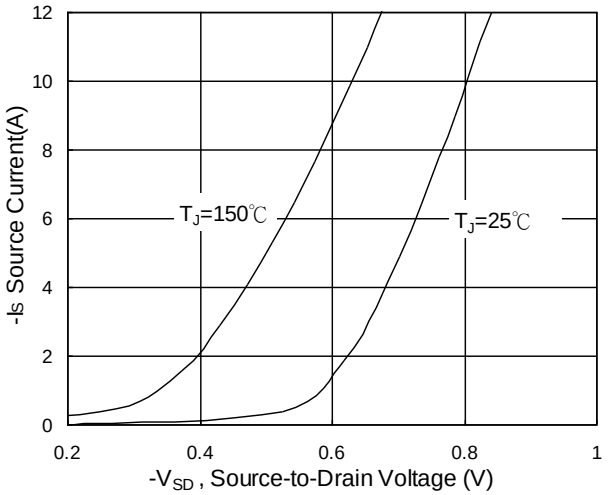


Fig.3 Forward Characteristics of Reverse

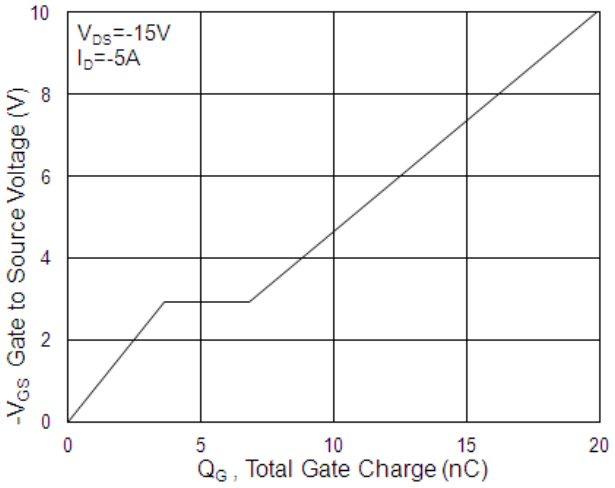


Fig.4 Gate-Charge Characteristics

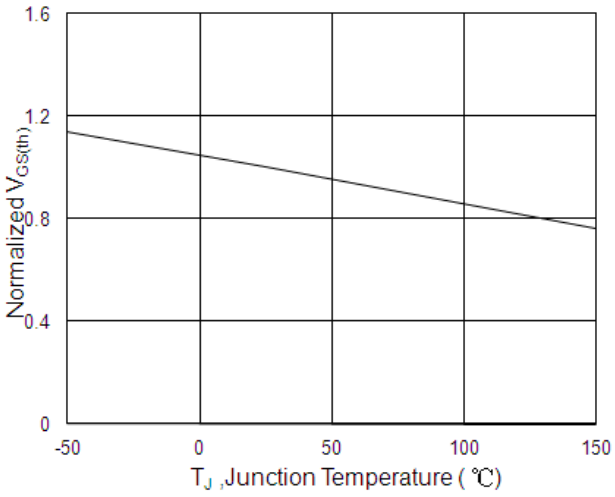


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

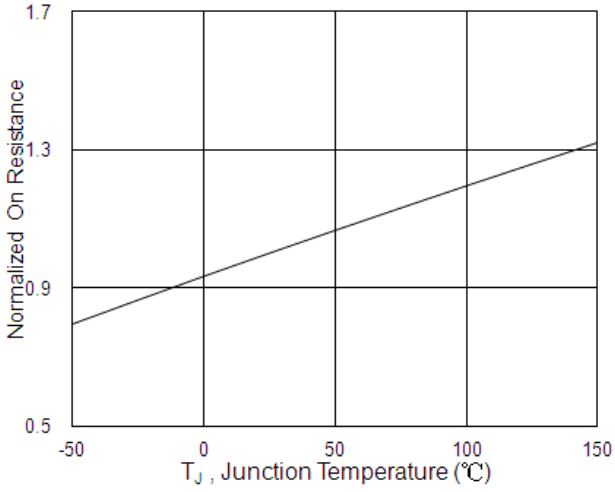


Fig.6 Normalized R_{DSON} vs. T_J

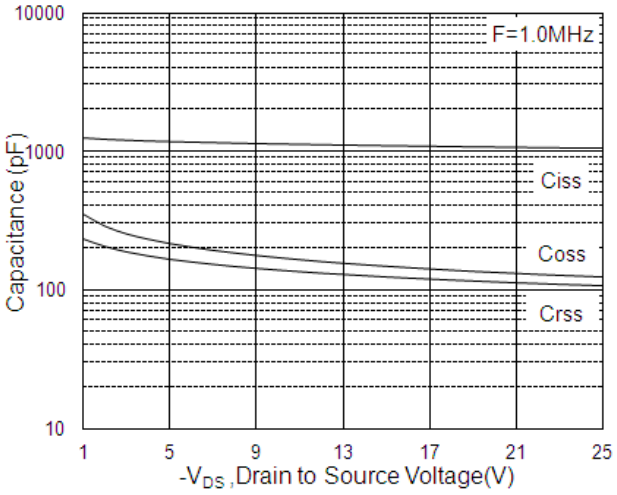


Fig.7 Capacitance

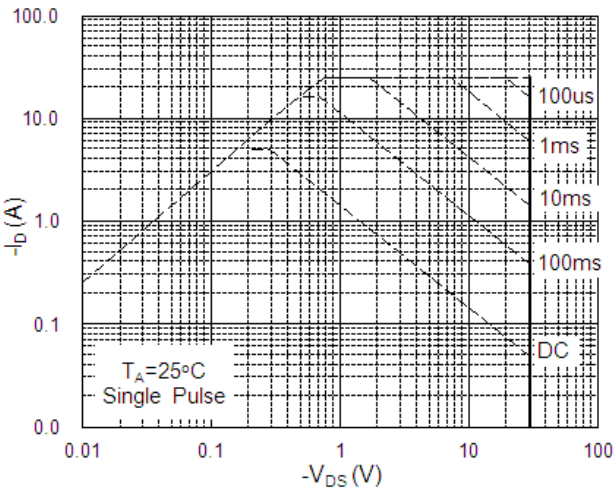


Fig.8 Safe Operating Area

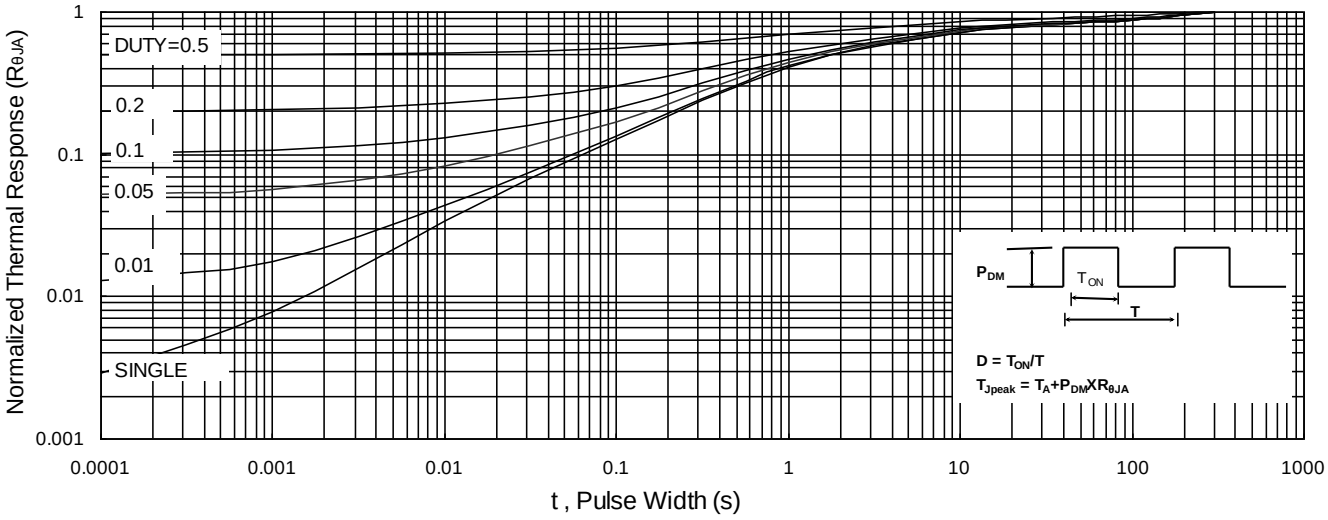


Fig.9 Normalized Maximum Transient Thermal Impedance

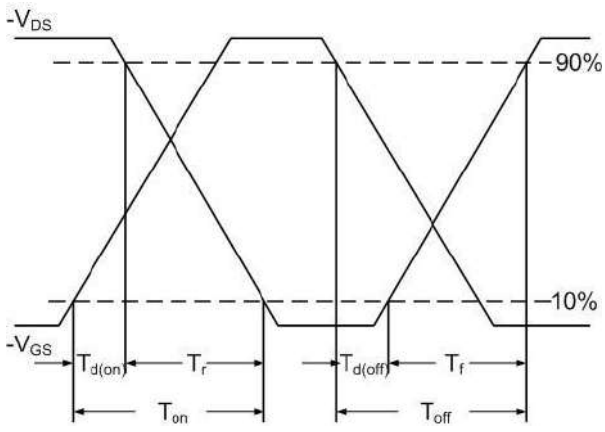


Fig.10 Switching Time Waveform

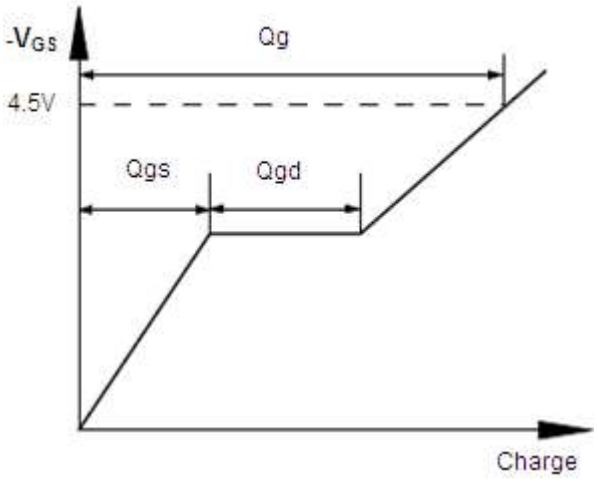
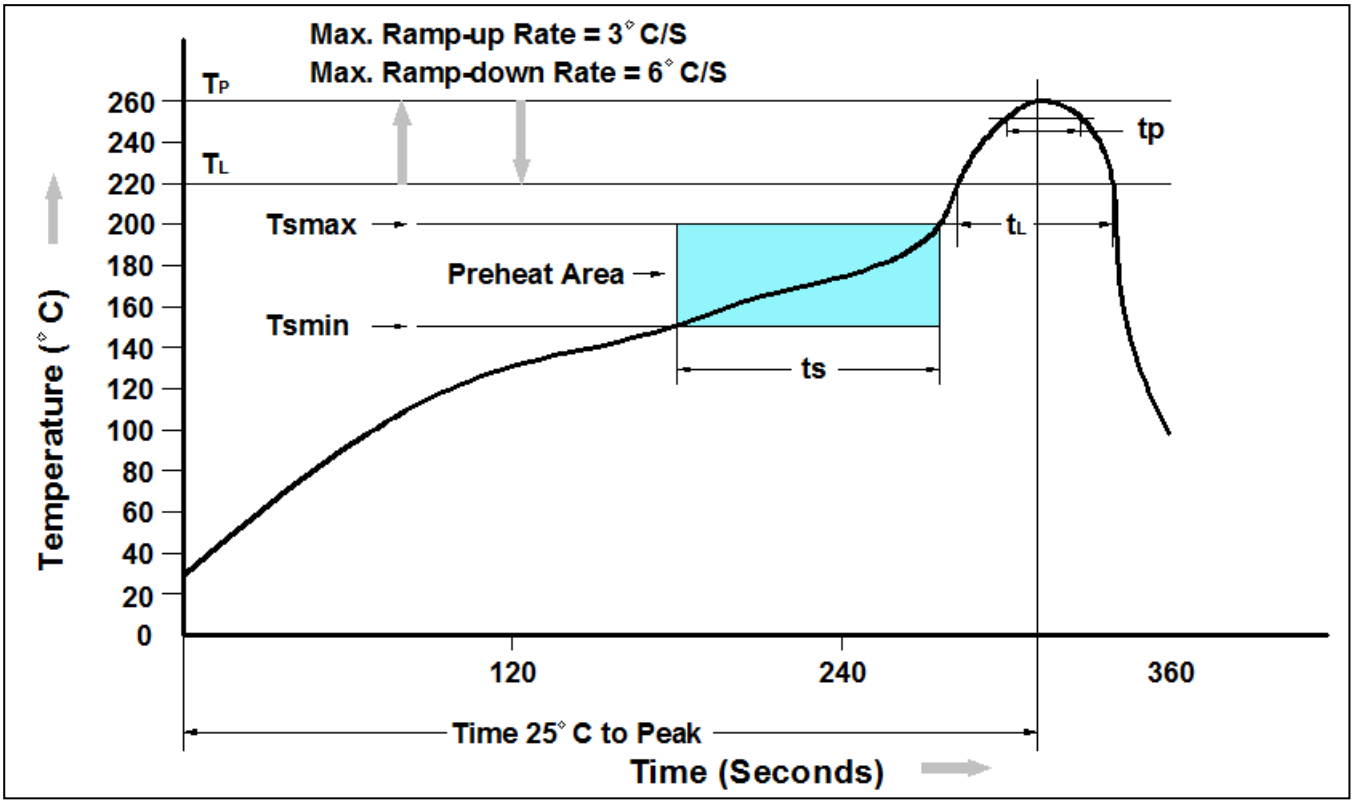


Fig.11 Gate Charge Waveform

➢ Recommand IR Reflow Soldering Thermal Profile

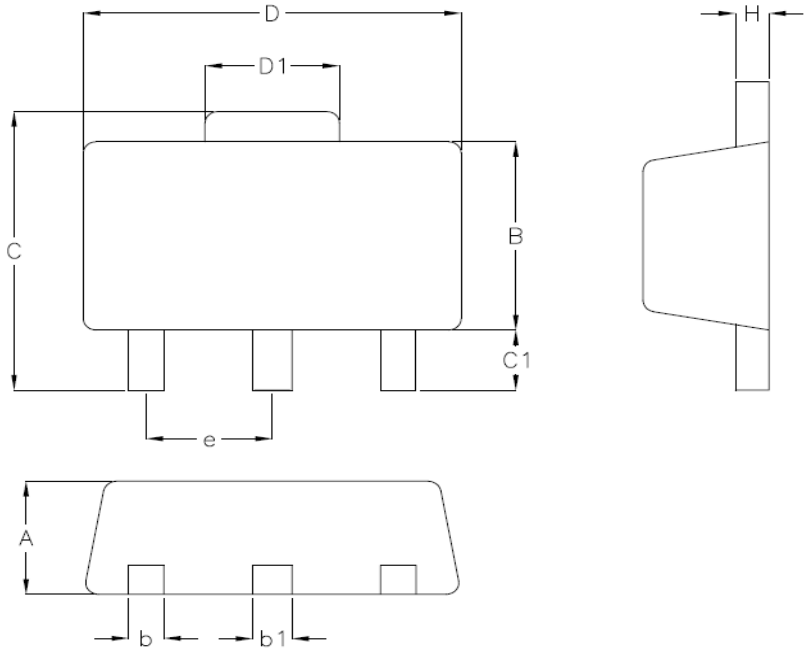


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Average Ramp-up Rate (tL to tP)	3°C/second max.
Liquidous Temperature (TL)	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (tP) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

➢ Ordering Information

Part Number	Description	Quantity
PAP31TK13K	SOT-89-3L Reel	1000 pcs

➢ Package Information (SOT-89-3L)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.397	1.600	0.055	0.063
b	0.420	0.540	0.017	0.021
b1	0.420	0.540	0.017	0.021
B	2.388	2.591	0.094	0.102
C	3.937	4.242	0.155	0.167
C1	0.787	1.194	0.031	0.047
D	4.394	4.597	0.173	0.181
D1	1.397	1.753	0.055	0.069
e	1.448	1.549	0.057	0.061
H	0.350	0.44	0.014	0.017

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