PAP31TB01QB

P-Ch -30V Fast Switching MOSFET

V_{DS}=-30V, I_D=-4.5A, $RDS_{(ON)}$=52mΩ

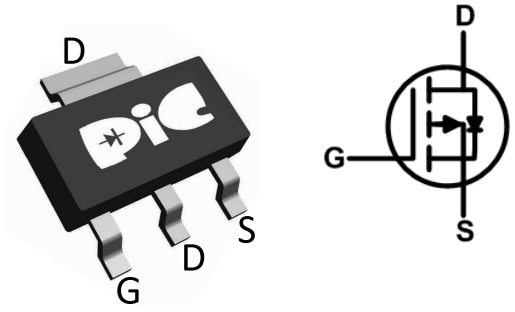
➢ General Description

This PAP31TB01QB 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

- ●Green Device Available
- ●Super Low Gate Charge
- ●Excellent CdV/dt effect decline
- ●Advanced high cell density Trench technology
- ●SOT-223 package design

➢ SOT-223



➢ Application

- ●Motor and Load Control
- ●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°C	-4.5	A
Continuous Drain Current, V_{GS} @ -10V[1]	I_D@T_A=70°C	-3.5	A
Pulsed Drain Current[2]	I_{DM}	-23	A
Total Power Dissipation[3]	P_D@T_A=25°C	1.5	W
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C
Thermal Resistance Junction-Ambient [1]	$R_{\theta JA}$	85	°C/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	48	°C/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	Δ BV_{DSS}/Δ T_J	Reference to 25°C , I_D=-1mA	---	-0.023	---	V/°C
Static Drain-Source On-Resistance2	$R_{DS(ON)}$	V_{GS}=-10V , I_D=-4A	---	42	52	mΩ
		V_{GS}=-4.5V , I_D=-3A	---	75	90	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	Δ $V_{GS(th)}$		---	4	---	mV/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-24V , V_{GS}=0V , T_J=25°C	---	---	-1	uA
		V_{DS}=-24V , V_{GS}=0V , T_J=55°C	---	---	-5	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Forward Transconductance	gfs	V_{DS}=-5V , I_D=-4A	---	11	---	S
Total Gate Charge (-4.5V)	Q_g	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-4A	---	6.4	9.0	nC
Gate-Source Charge	Q_{gs}		---	2.3	3.2	
Gate-Drain Charge	Q_{gd}		---	1.9	2.7	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-4A	---	2.8	5.6	ns
Rise Time	T_r		---	8.4	15.1	
Turn-Off Delay Time	$T_{d(off)}$		---	39	78.0	
Fall Time	T_f		---	6	12.0	
Input Capacitance	C_{iss}	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	583	816	pF
Output Capacitance	C_{oss}		---	100	140	
Reverse Transfer Capacitance	C_{rss}		---	80	112	

➢ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current1,4	I_S	V_G=V_D=0V , Force Current	---	---	-4.5	A
Pulsed Source Current2,4	I_{SM}		---	---	-23	A
Diode Forward Voltage2	V_{SD}	V_{GS}=0V , I_S=-1A , T_J=25°C	---	---	-1.2	V
Reverse Recovery Time	t_{rr}	I_F=-4A , dI/dt=100A/μs , T_J=25°C	---	7.8	---	nS
Reverse Recovery Charge	Q_{rr}		---	2.5	---	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

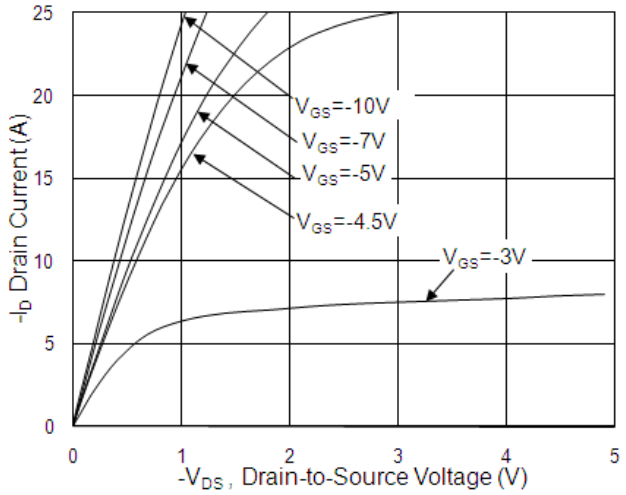


Fig.1 Typical Output Characteristics

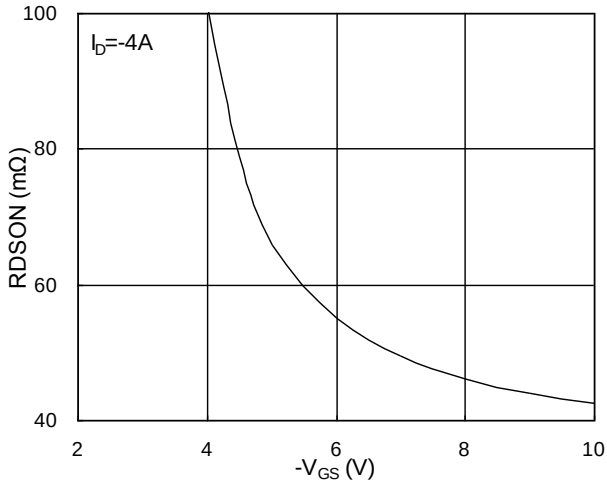


Fig.2 On-Resistance v.s Gate-Source

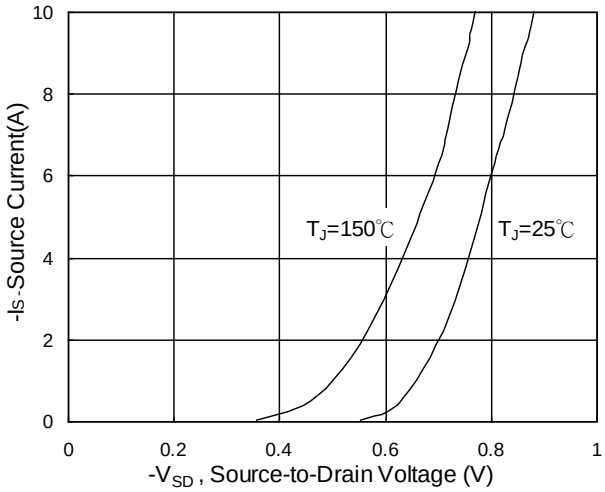


Fig.3 Forward Characteristics Of Reverse

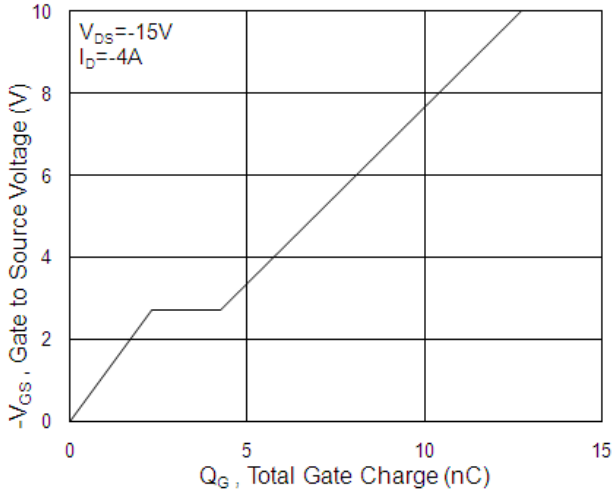


Fig.4 Gate Charge Characteristics

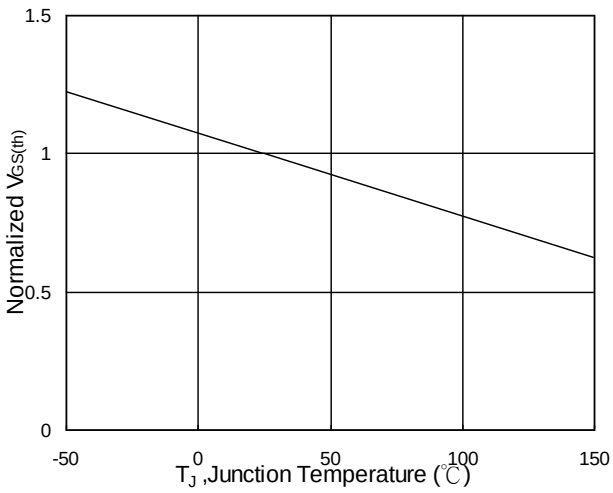


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

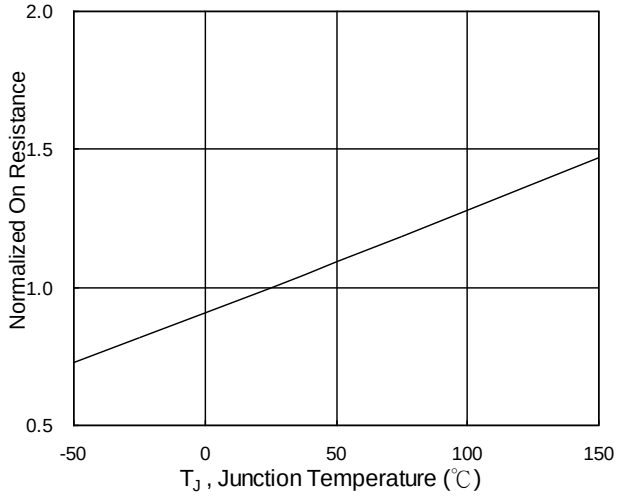


Fig.6 Normalized R_{DSON} v.s T_J

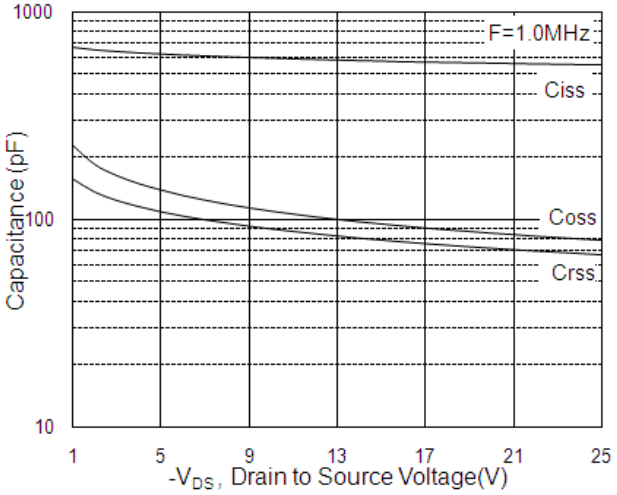


Fig.7 Capacitance

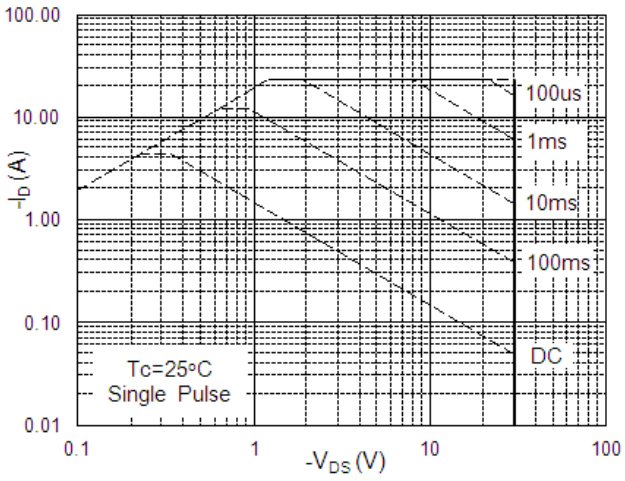


Fig.8 Safe Operating Area

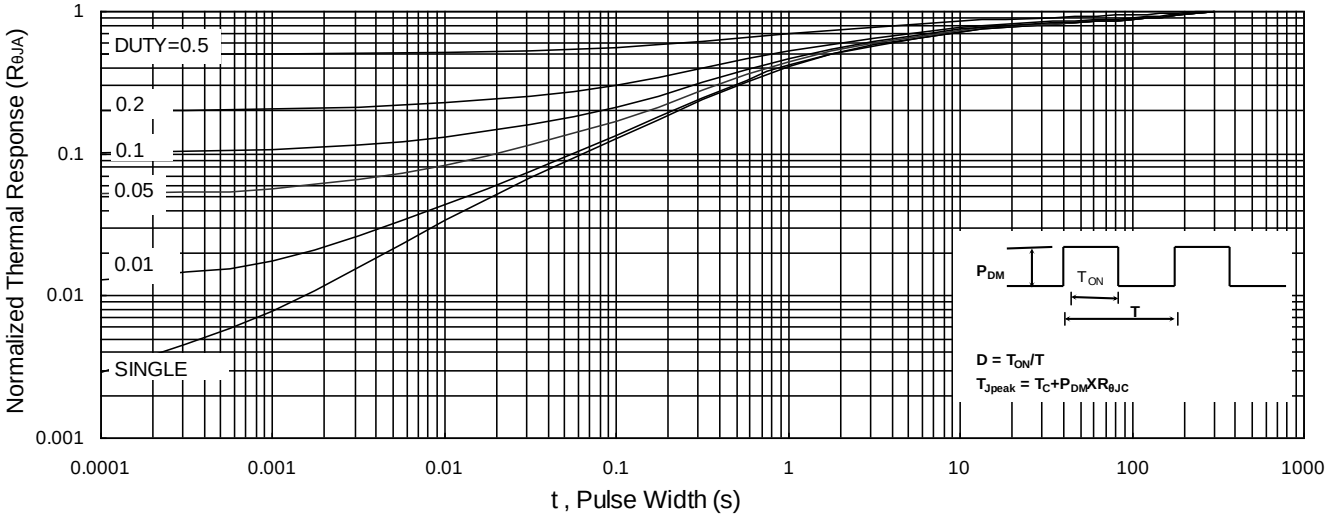


Fig.9 Normalized Maximum Transient Thermal Impedance

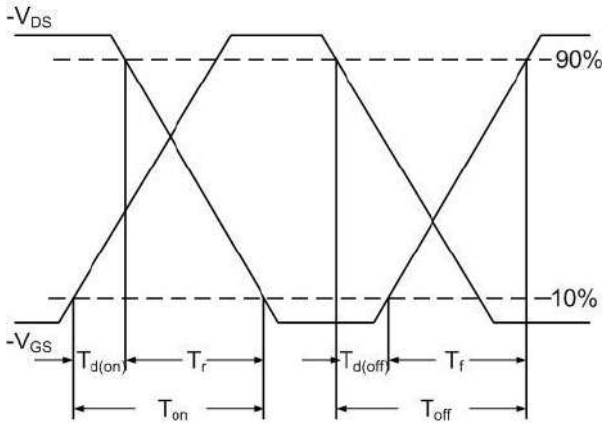


Fig.10 Switching Time Waveform

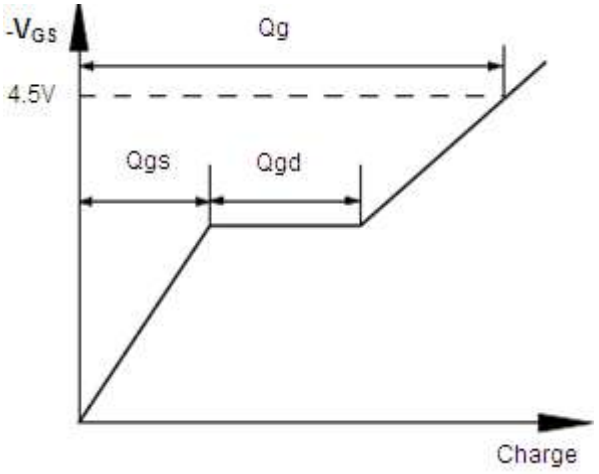
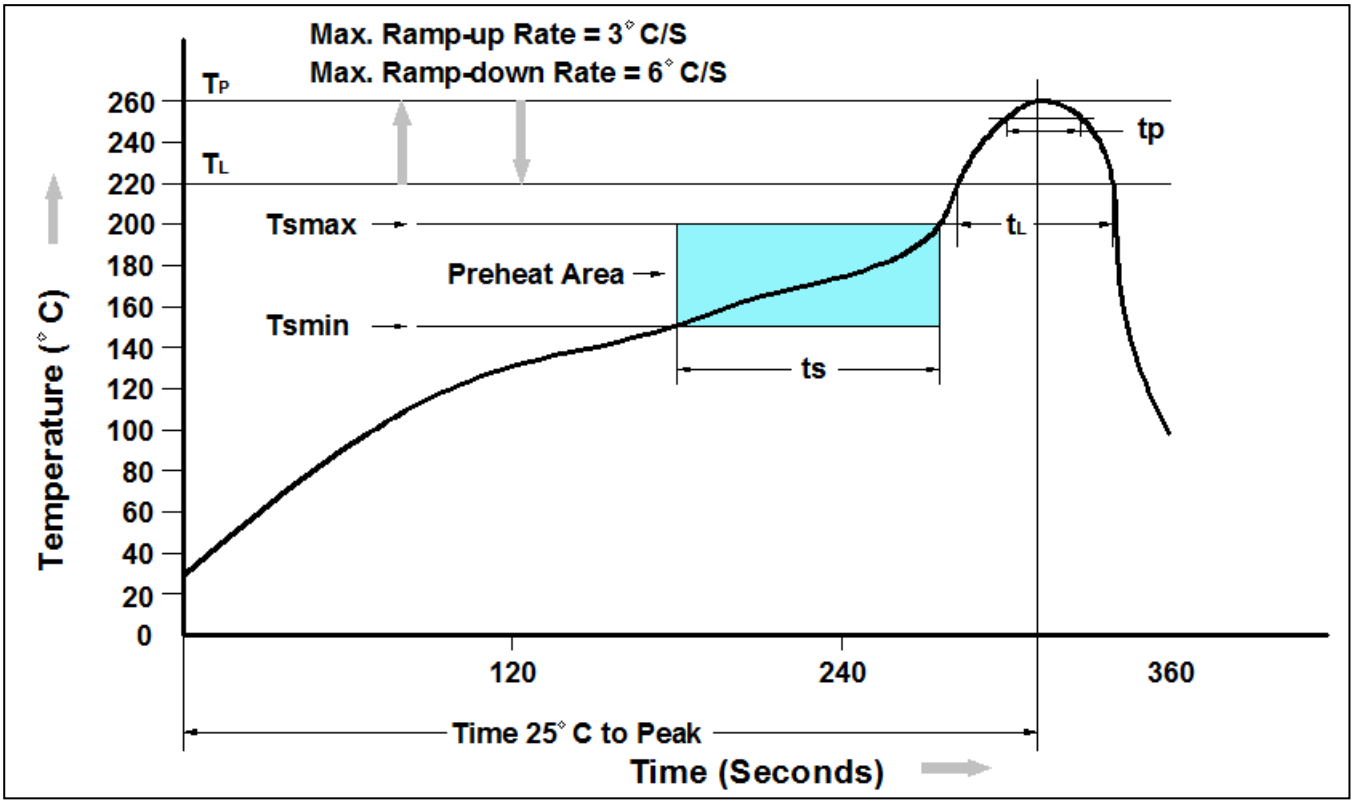


Fig.11 Gate Charge Waveform

➢ Recommand IR Reflow Soldering Thermal Profile

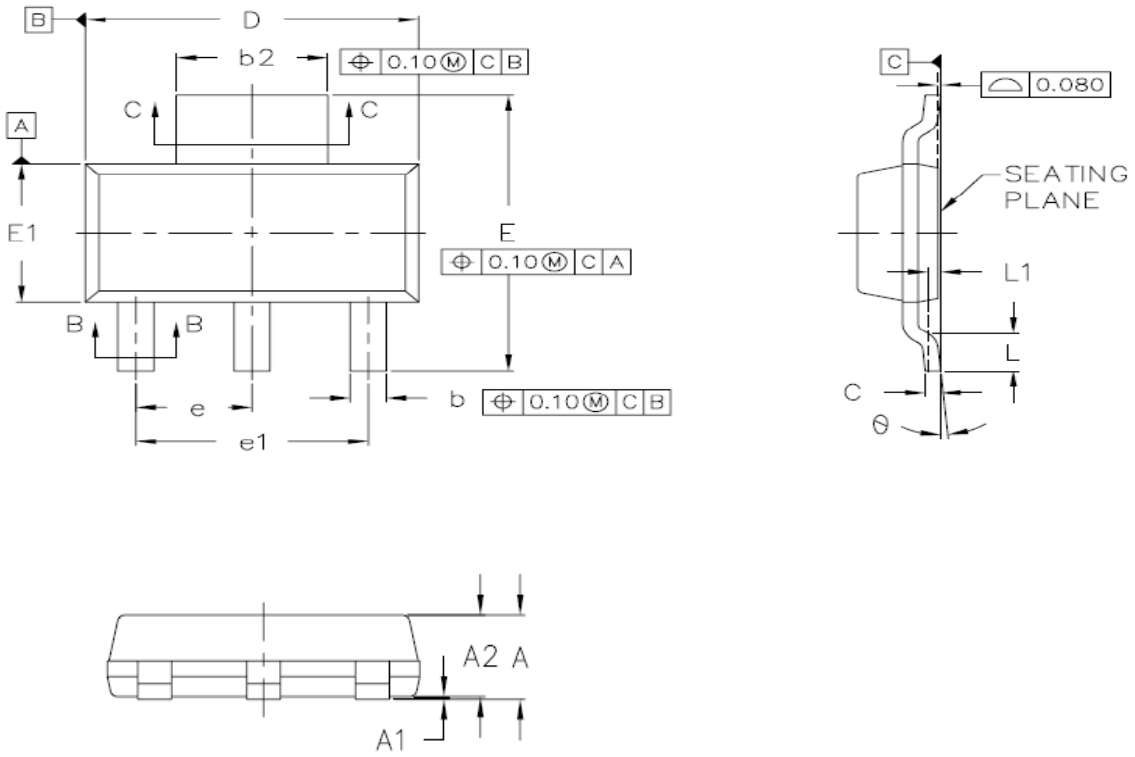


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Average Ramp-up Rate (tL to tP)	3°C/second max.
Liquidous Temperature (TL)	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds
Peak Temperature	260°C +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
PAP31TB01QB	SOT-223 Reel	3000 pcs

➢ Package Information (SOT-223)



SYMBOLS	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	——	1.80	——	0.071
A1	0.02	0.10	0.001	0.004
A2	1.50	1.70	0.059	0.067
b	0.66	0.84	0.026	0.033
b1	0.60	0.79	0.024	0.031
b2	2.90	3.10	0.114	0.122
b3	2.84	3.05	0.112	0.120
c	0.23	0.35	0.009	0.014
c1	0.23	0.33	0.009	0.013
D	6.30	6.70	0.248	0.264
E	6.70	7.30	0.264	0.287
E1	3.30	3.70	0.130	0.146
e	2.30 BSC.		0.091 BSC.	
e1	4.60 BSC.		0.182 BSC.	
L	0.81	——	0.032	——
L1	0.25 BSC.		0.010 BSC.	
θ	0°	10°	0°	10°

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