

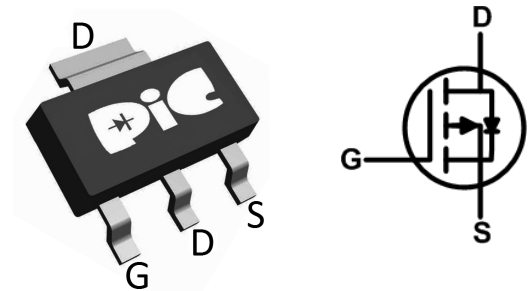
### ➤ General Description

This PAP61TB15QB 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-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	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current, $-V_{GS}$ @ $-10V^1$	$I_D@T_C=25^\circ C$	-18	A
Continuous Drain Current, $-V_{GS}$ @ $-10V^1$	$I_D@T_C=100^\circ C$	-14	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	-50	A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	101.5	mJ
Avalanche Current	$I_{AS}$	45	A
Total Power Dissipation <sup>4</sup>	$P_D@T_C=25^\circ C$	17.8	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 <sup>1</sup>	$R_{\theta JA}$	60	$^\circ C/W$
Thermal Resistance Junction-Case <sup>1</sup>	$R_{\theta JC}$	7	$^\circ C/W$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-60	---	---	V
Static Drain-Source On-Resistance <sup>2</sup>	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-5A$	---	---	28	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4A$	---	---	35	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	---	-2.5	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-48V, V_{GS}=0V, T_J=25^\circ C$	---	---	1	uA
		$V_{DS}=-48V, V_{GS}=0V, T_J=55^\circ C$	---	---	5	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
Gate Resistance	$R_g$	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	7	---	$\Omega$
Total Gate Charge (-4.5V)	$Q_g$	$V_{DS}=-20V, V_{GS}=-4.5V, I_D=-5A$	---	25	---	nC
Gate-Source Charge	$Q_{gs}$		---	6.7	---	
Gate-Drain Charge	$Q_{gd}$		---	5.5	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-1A$	---	38	---	ns
Rise Time	$T_r$		---	23.6	---	
Turn-Off Delay Time	$T_{d(off)}$		---	100	---	
Fall Time	$T_f$		---	6.8	---	
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, f=1MHz$	---	3635	---	pF
Output Capacitance	$C_{oss}$		---	224	---	
Reverse Transfer Capacitance	$C_{rss}$		---	141	---	

### ➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current <sup>1,5</sup>	$I_S$	$V_G=V_D=0V, \text{Force Current}$	---	---	-2	A
Diode Forward Voltage <sup>2</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-1A, T_J=25^\circ C$	---	---	-1	V

Note :

1.Pulse width limited by maximum junction temperature.

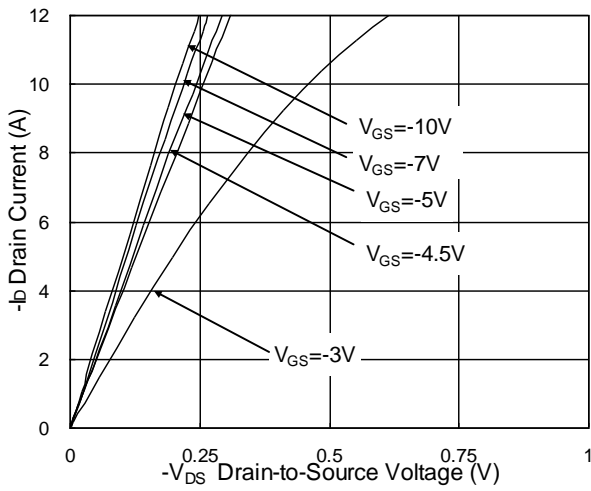
2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$

3.The EAS data shows Max. rating . The test condition is  $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-45A$

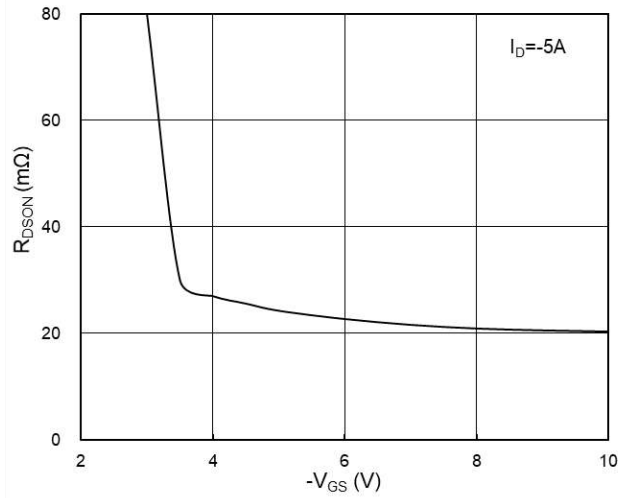
4.Ensure that the channel temperature does not exceed  $150^\circ C$ .

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

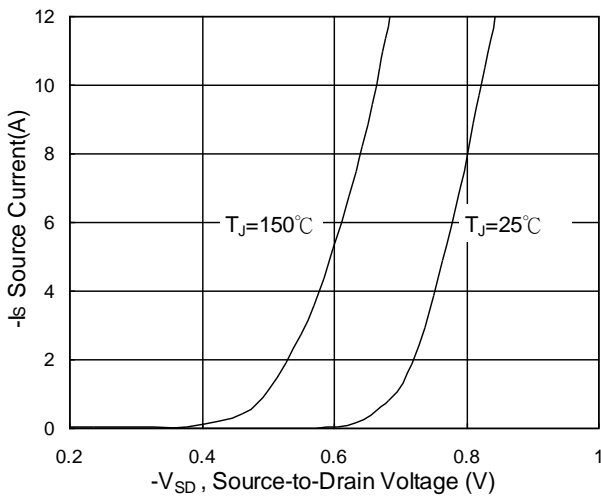
## ➤ Typical Characteristics



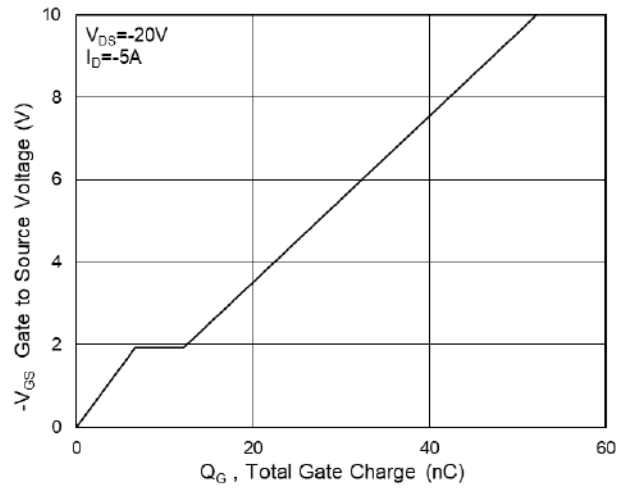
**Fig.1 Typical Output Characteristics**



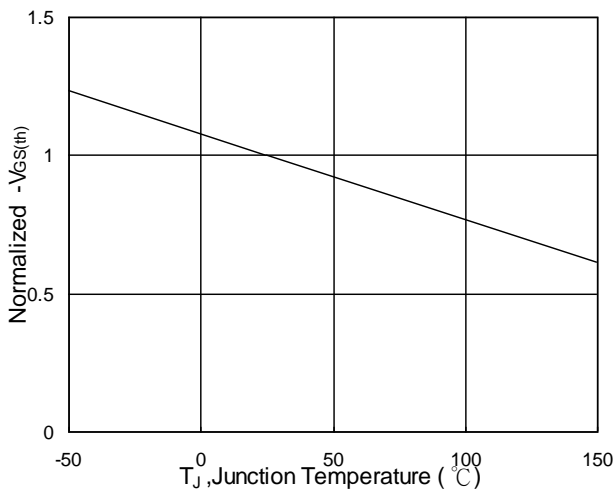
**Fig.2 On-Resistance vs G-S Voltage**



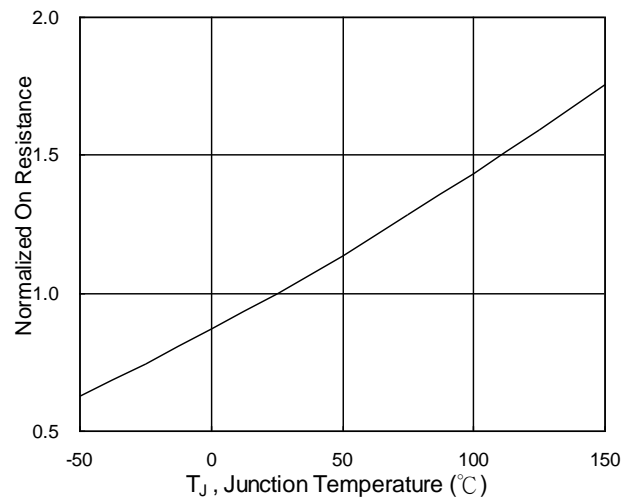
**Fig.3 Source Drain Forward Characteristics**



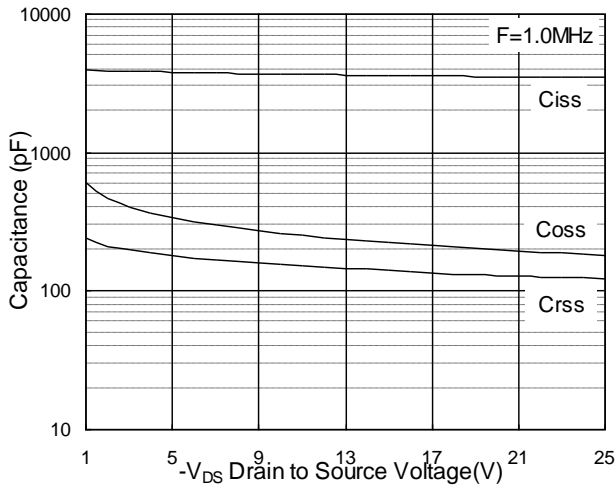
**Fig.4 Gate-Charge Characteristics**



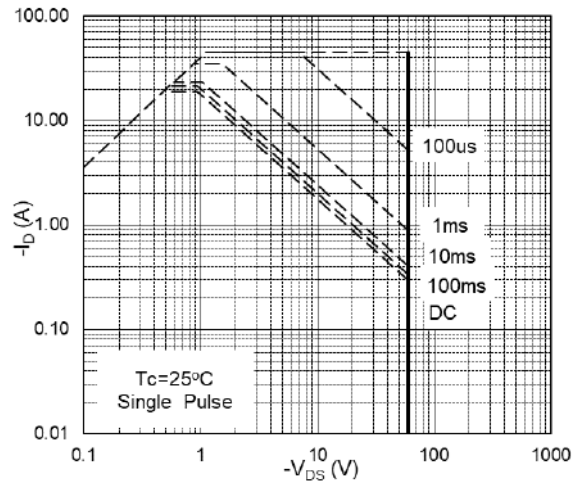
**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**



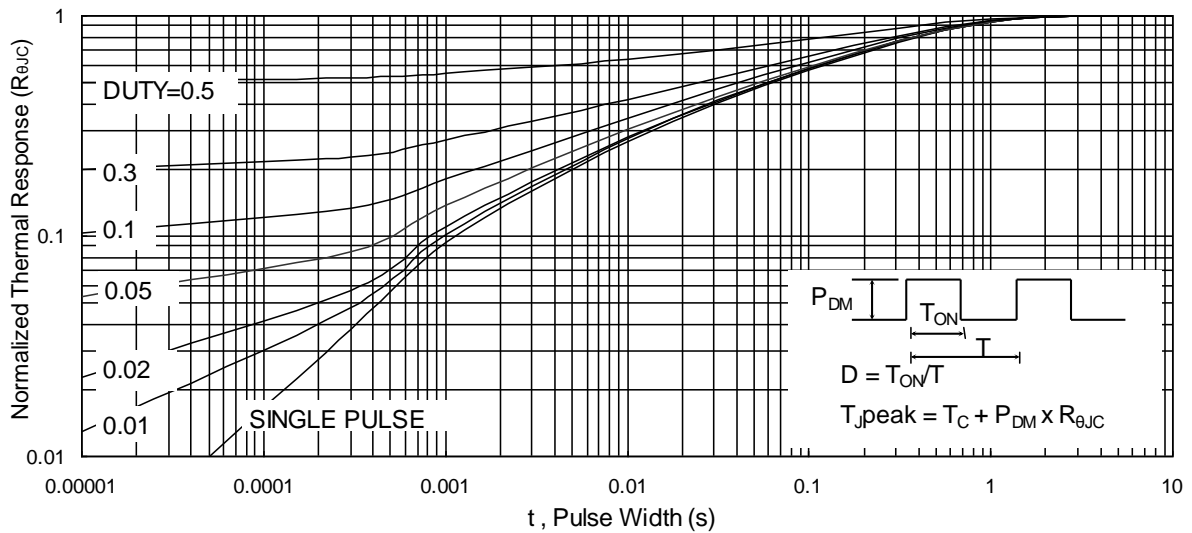
**Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$**



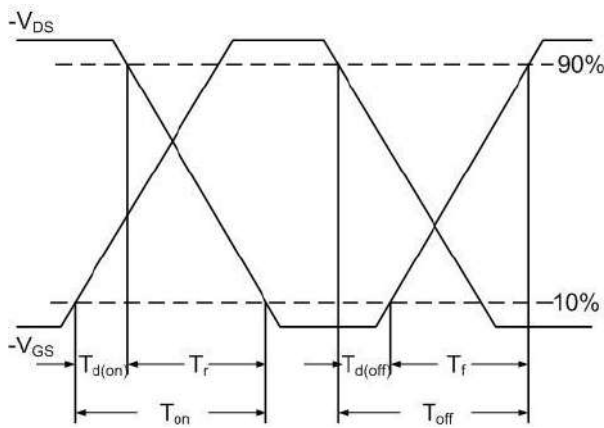
**Fig.7 Capacitance**



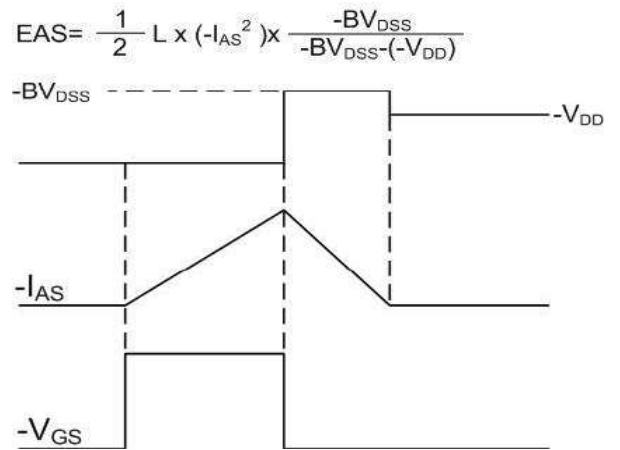
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

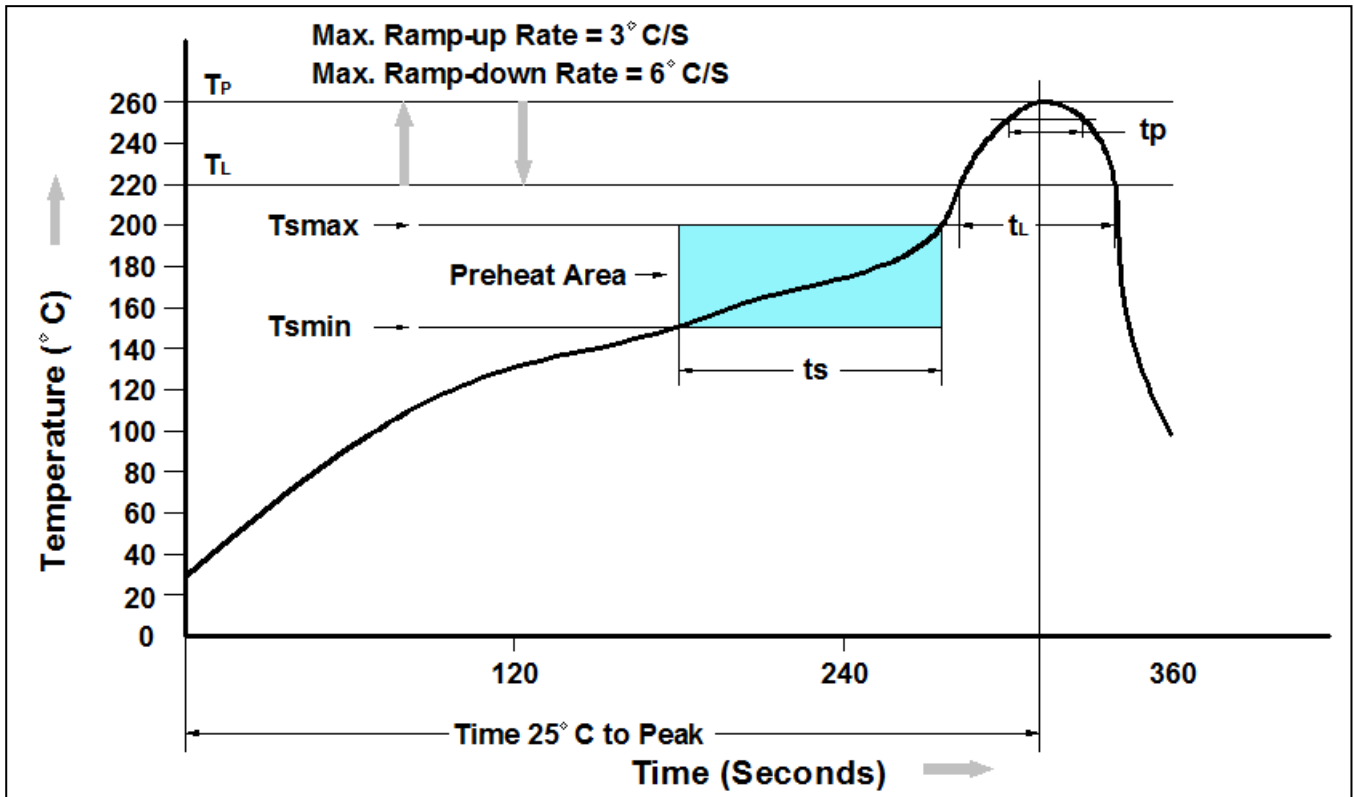


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Waveform**

## ➤ Recommend IR Reflow Soldering Thermal Profile

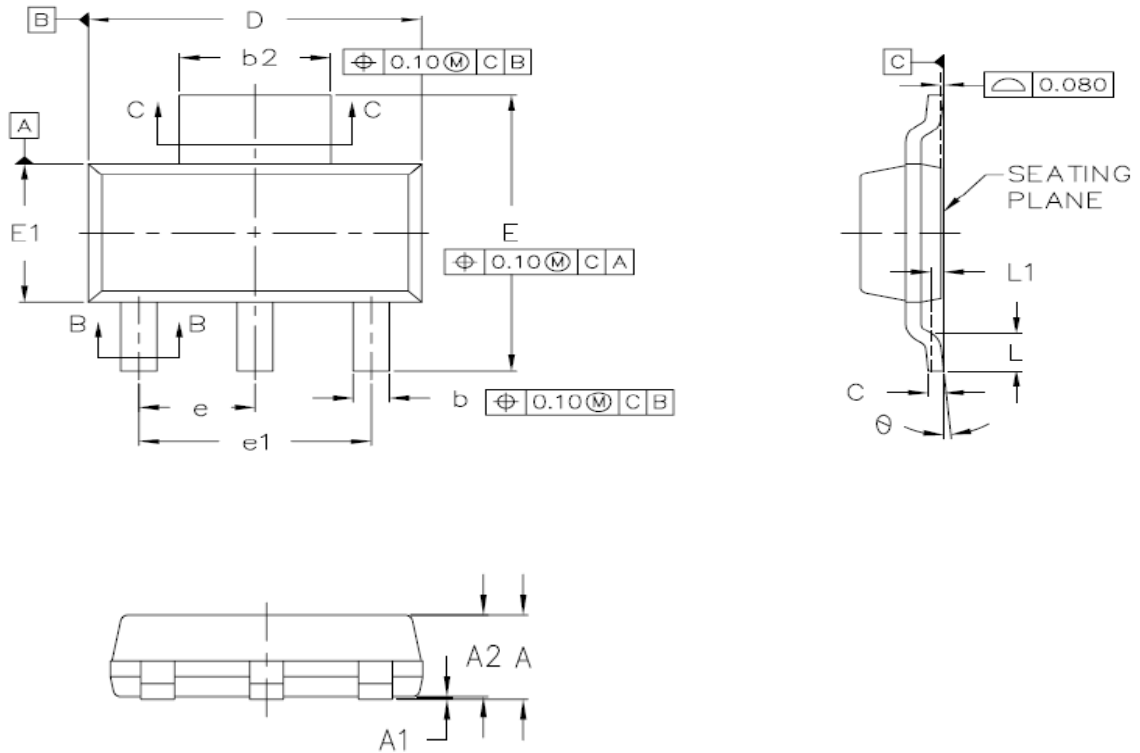


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150°C
Temperature Max. (T <sub>smax</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds
Average Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

## ➤ Ordering Information

Part Number	Description	Quantity
PAP61TB15QB	SOT-223 Reel	3000 pcs

➤ Package Information ( SOT-223 )



DIMENSIONS	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.	
$\theta$	0°	10°	0°	10°

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