

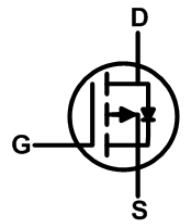
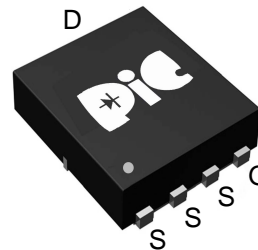
➤ General Description

This PAP31TY03Y 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

- Super Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

➤ DFN5X6A-EP1



➤ Application

- DC/DC Primary Side Switch
- Industrial Synchronous
- Rectification Load Switch
- DC/DC Converters

➤ Absolute Maximum Ratings

Parameter	Symbol	Rating		Units
		10s	Steady State	
Drain-Source Voltage	V_{DS}	-30		V
Gate-Source Voltage	V_{GS}	± 20		V
Continuous Drain Current, $V_{GS} @ -10V^1$	$I_D@T_C=25^\circ C$	-35		A
Continuous Drain Current, $V_{GS} @ -10V^1$	$I_D@T_C=100^\circ C$	-22		A
Continuous Drain Current, $V_{GS} @ -10V^1$	$I_D@T_A=25^\circ C$	-13.4	-8.5	A
Continuous Drain Current, $V_{GS} @ -10V^1$	$I_D@T_A=70^\circ C$	-10.7	-6.8	A
Pulsed Drain Current ²	I_{DM}	-95		A
Single Pulse Avalanche Energy ³	EAS	72.2		mJ
Avalanche Current	I_{AS}	-38		A
Total Power Dissipation ⁴	$P_D@T_C=25^\circ C$	34.7		W
Total Power Dissipation ⁴	$P_D@T_A=25^\circ C$	5	2	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	$R_{\theta JA}$	62		$^\circ C/W$
Thermal Resistance Junction-Ambient ¹ ($t \leq 10s$)	$R_{\theta JA}$	25		$^\circ C/W$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	3.6		$^\circ C/W$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-15A$	---	---	20	m Ω
		$V_{GS}=-4.5V, I_D=-10A$	---	---	32	
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}	$V_{DS}=-24V, V_{GS}=0V, T_J=25^\circ C$	---	---	-1	uA
		$V_{DS}=-24V, V_{GS}=0V, T_J=55^\circ C$	---	---	-5	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
Forward Transconductance	g_{fs}	$V_{DS}=-5V, I_D=-10A$	---	5	---	S
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	13	---	Ω
Total Gate Charge (-4.5V)	Q_g	$V_{DS}=-15V, V_{GS}=-4.5V, I_D=-15A$	---	12.5	---	nC
Gate-Source Charge	Q_{gs}		---	5.4	---	
Gate-Drain Charge	Q_{gd}		---	5	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-15A$	---	4.4	---	ns
Rise Time	T_r		---	11.2	---	
Turn-Off Delay Time	$T_{d(off)}$		---	34	---	
Fall Time	T_f		---	18	---	
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V, f=1MHz$	---	1345	---	pF
Output Capacitance	C_{oss}		---	194	---	
Reverse Transfer Capacitance	C_{rss}		---	158	---	

➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current ^{1,5}	I_S	$V_G=V_D=0V, \text{Force Current}$	---	---	-35	A
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V, I_S=-1A, T_J=25^\circ C$	---	---	-1.2	V
Reverse Recovery Time	t_{rr}	$I_F=-15A, dI/dt=100A/\mu s, T_J=25^\circ C$	---	12.4	---	nS
Reverse Recovery Charge	Q_{rr}		---	5	---	nC

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 $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-38A$

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

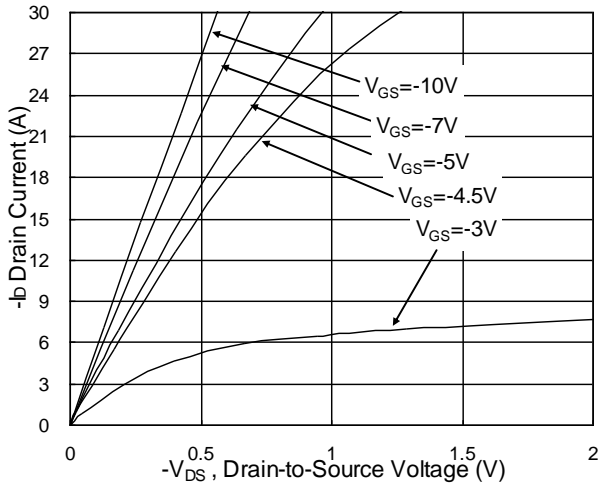


Fig.1 Typical Output Characteristics

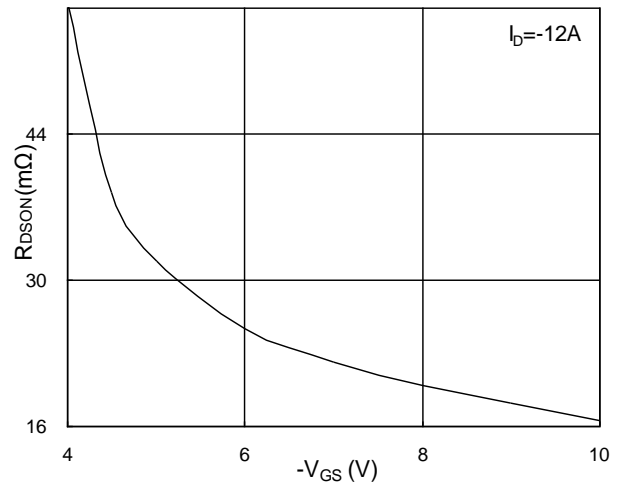


Fig.2 On-Resistance v.s Gate-Source

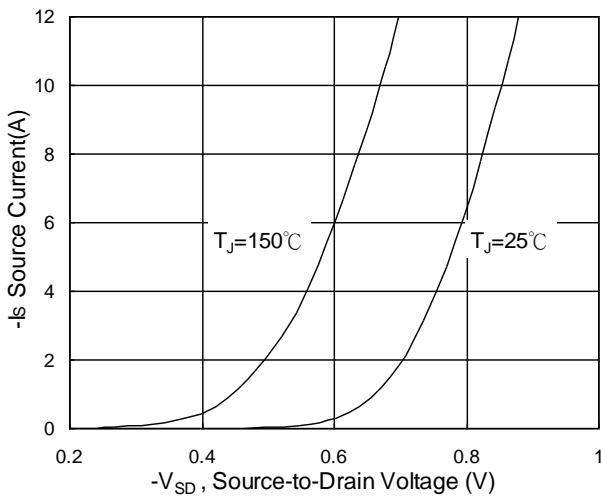


Fig.3 Forward Characteristics of Reverse

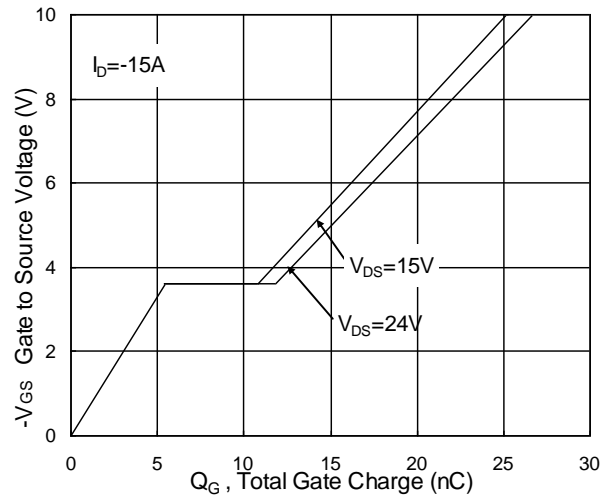


Fig.4 Gate-Charge Characteristics

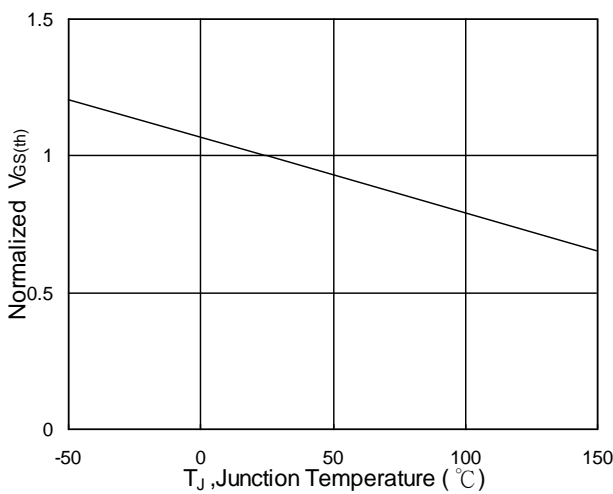


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

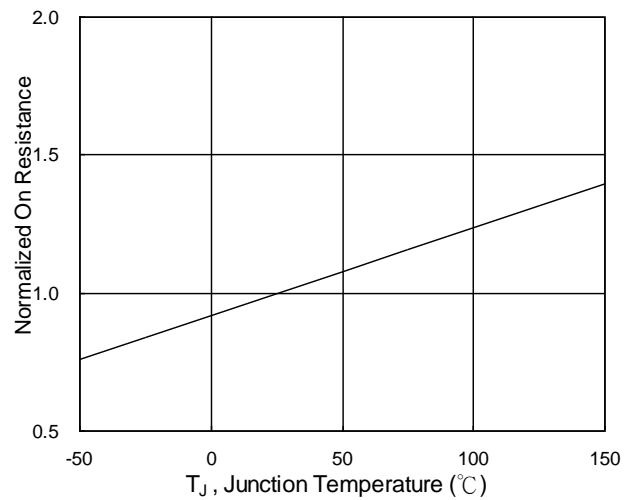


Fig.6 Normalized $R_{DS(ON)}$ v.s T_J

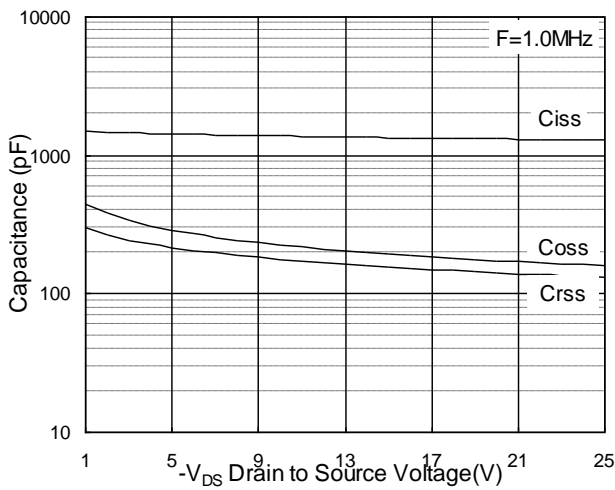


Fig.7 Capacitance

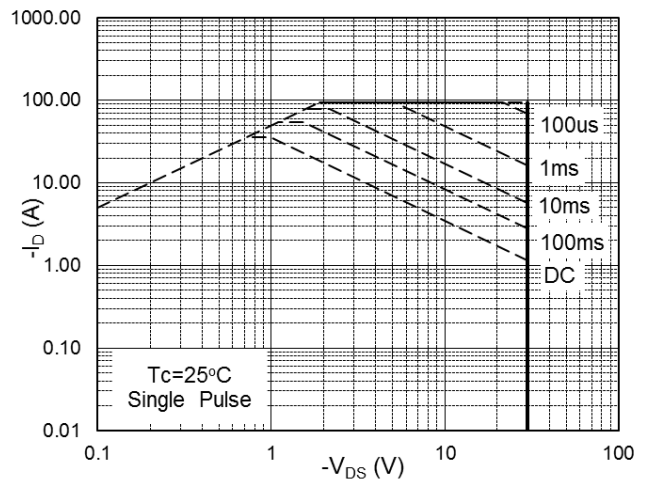


Fig.8 Safe Operating Area

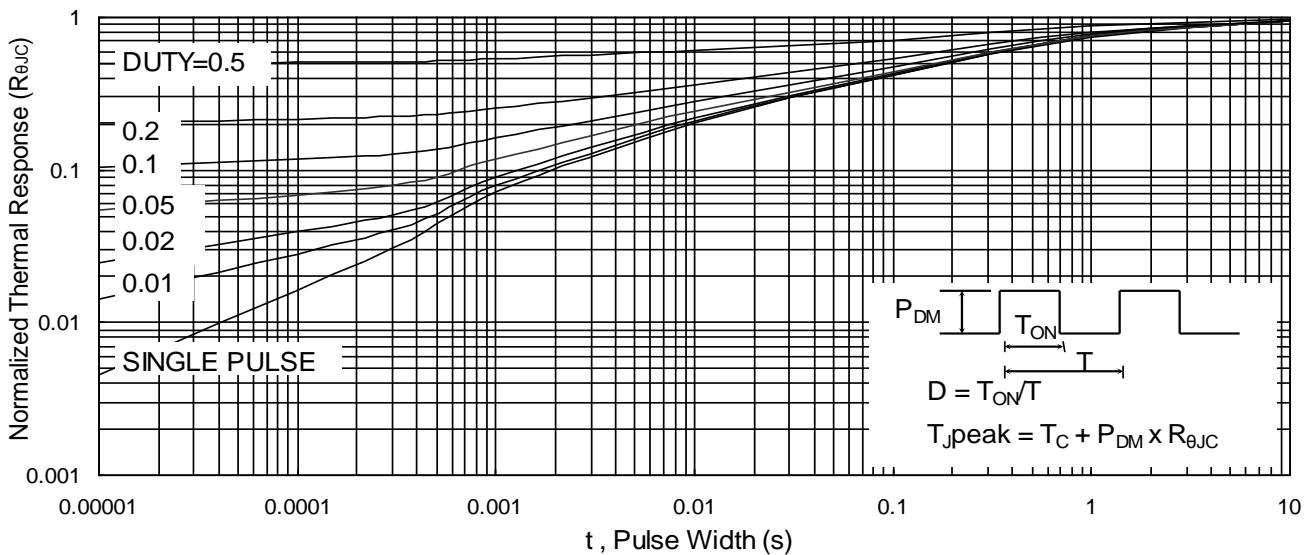


Fig.9 Normalized Maximum Transient Thermal Impedance

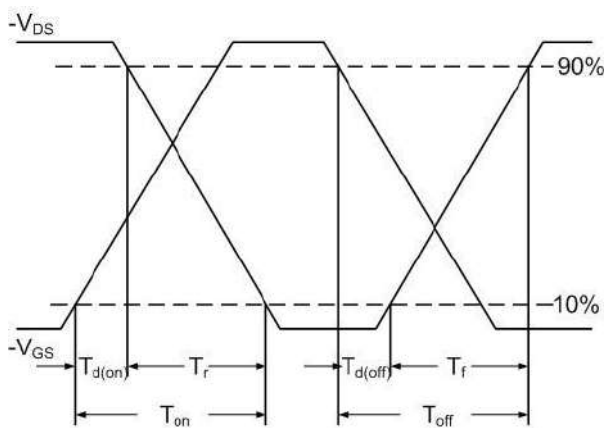


Fig.10 Switching Time Waveform

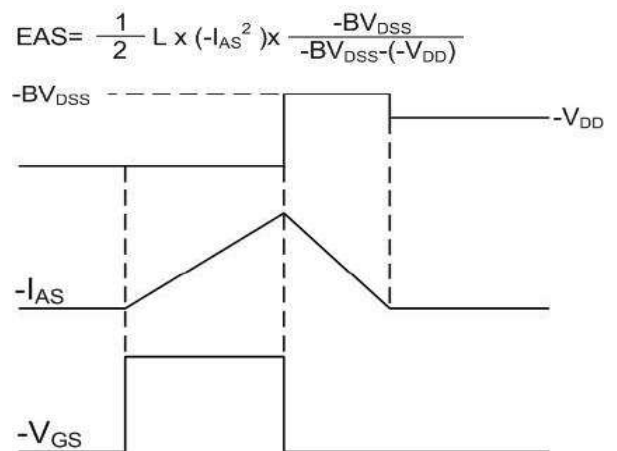
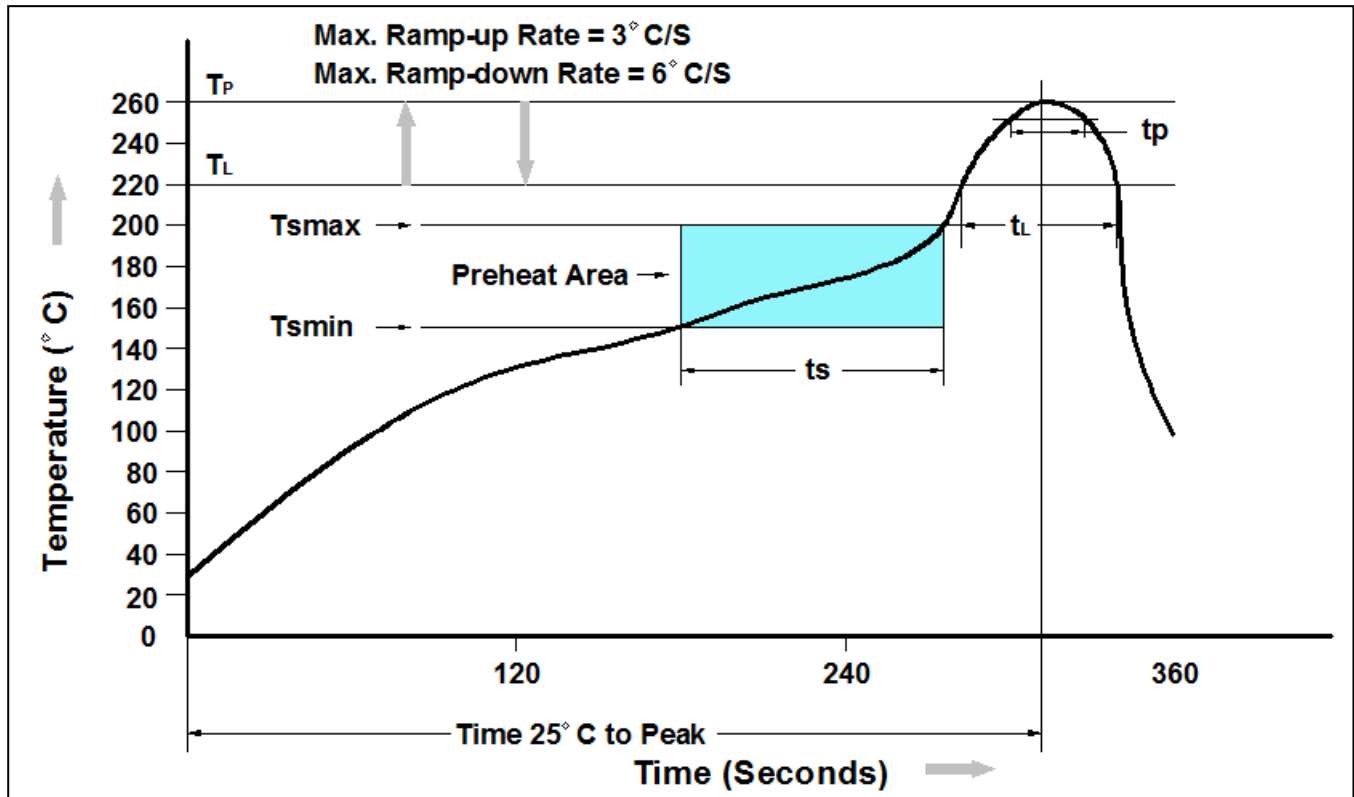


Fig.11 Unclamped Inductive Switching Waveform

➤ Recommad IR Reflow Soldering Thermal Profile

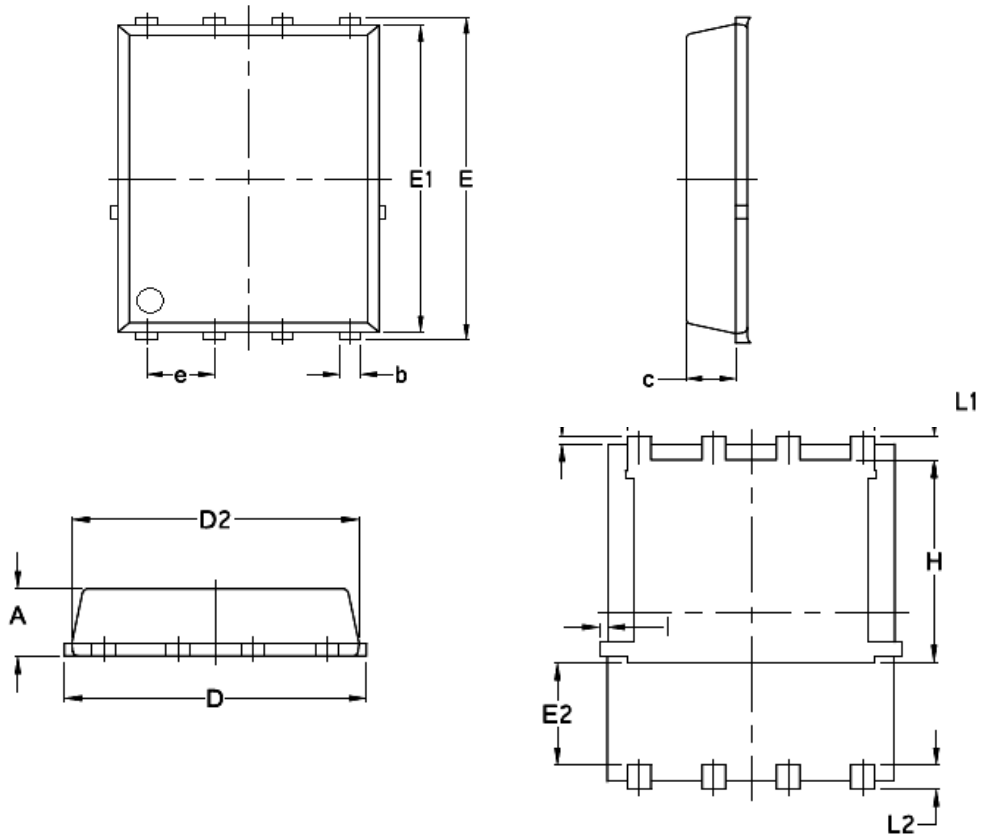


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	150°C
Temperature Max. (T _{smax})	200°C
Time (t _s) from (T _{smin} to T _{smax})	60-120 seconds
Average Ramp-up Rate (t _L to t _P)	3°C/second max.
Liquidous Temperature (T _L)	217°C
Time (t _L) Maintained Above (T _L)	60 – 150 seconds
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
PAP31TY03Y	DFN5X6A-EP1 Reel	3000 pcs

➤ Package Information (DFN5X6A-EP1)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.970	0.0324	0.0382
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
I	---	0.18	---	0.0070
E	5.90	6.15	0.2323	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.10	---	0.0433	---
e	1.27 BSC		0.05 BSC	
H	3.30	3.78	0.1299	0.1488
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.61	0.0150	0.0240
L2	0.38	0.71	0.0150	0.0279

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