

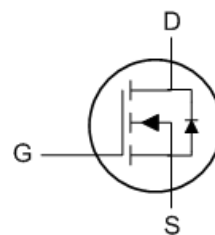
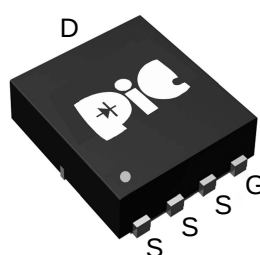
➤ General Description

This PAN40TY04Y N-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
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, V_{GS} @ 10V1	$I_D@T_C=25^\circ C$	46	A
Continuous Drain Current, V_{GS} @ 10V1	$I_D@T_C=100^\circ C$	28	A
Continuous Drain Current, V_{GS} @ 10V1	$I_D@T_A=25^\circ C$	10	A
Continuous Drain Current, V_{GS} @ 10V1	$I_D@T_A=70^\circ C$	8	A
Pulsed Drain Current2	I_{DM}	100	A
Single Pulse Avalanche Energy3	EAS	20	mJ
Avalanche Current	I_{AS}	20	A
Total Power Dissipation4	$P_D@T_C=25^\circ C$	46	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 (Steady State)1	$R_{\theta JA}$	62	$^\circ C/W$
Thermal Resistance Junction-Case1	$R_{\theta JC}$	2.7	$^\circ C/W$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V$, $I_D=250\mu A$	40	---	---	V
BVDSS Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ C$, $I_D=1mA$	---	0.034	---	$V/^\circ C$
Static Drain-Source On-Resistance ²	$R_{DS(ON)}$	$V_{GS}=10V$, $I_D=20A$	---	9.5	11.5	$m\Omega$
		$V_{GS}=4.5V$, $I_D=10A$	---	13.5	16.5	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.0	---	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	-5.64	---	$mV/^\circ C$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=32V$, $V_{GS}=0V$, $T_J=25^\circ C$	---	---	1	μA
		$V_{DS}=32V$, $V_{GS}=0V$, $T_J=55^\circ C$	---	---	5	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
Forward Transconductance	g_{fs}	$V_{DS}=5V$, $I_D=20A$	---	36	---	S
Gate Resistance	R_g	$V_{DS}=0V$, $V_{GS}=0V$, $f=1MHz$	---	2.1	---	Ω
Total Gate Charge (4.5V)	Q_g	$V_{DS}=20V$, $V_{GS}=4.5V$, $I_D=12A$	---	10.7	---	nC
Gate-Source Charge	Q_{gs}		---	3.3	---	
Gate-Drain Charge	Q_{gd}		---	4.2	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=12V$, $V_{GS}=10V$, $R_g=3.3$ $I_D=6A$	---	8.6	---	ns
Rise Time	T_r		---	3.4	---	
Turn-Off Delay Time	$T_{d(off)}$		---	25	---	
Fall Time	T_f		---	2.2	---	
Input Capacitance	C_{iss}	$V_{DS}=15V$, $V_{GS}=0V$, $f=1MHz$	---	1314	---	pF
Output Capacitance	C_{oss}		---	120	---	
Reverse Transfer Capacitance	C_{rss}		---	88	---	

➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current ^{1,5}	I_S	$V_G=V_D=0V$, Force Current	---	---	46	A
Pulsed Source Current ^{2,5}	I_{SM}		---	---	100	A
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ C$	---	---	1.2	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 $V_{DD}=25V$, $V_{GS}=10V$, $L=0.1mH$, $I_{AS}=20A$
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

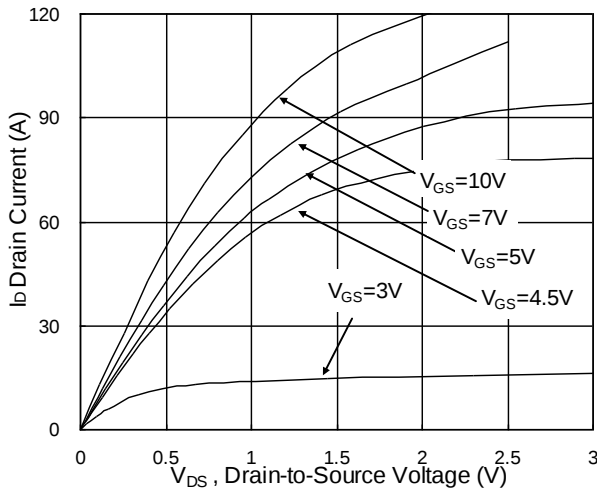


Fig.1 Typical Output Characteristics

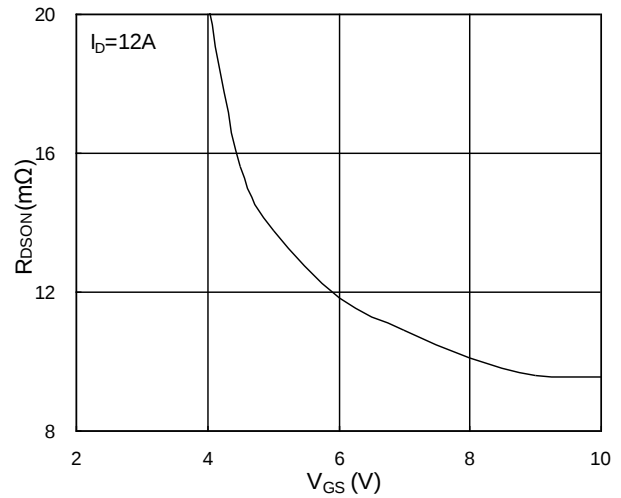


Fig.2 On-Resistance vs. G-S Voltage

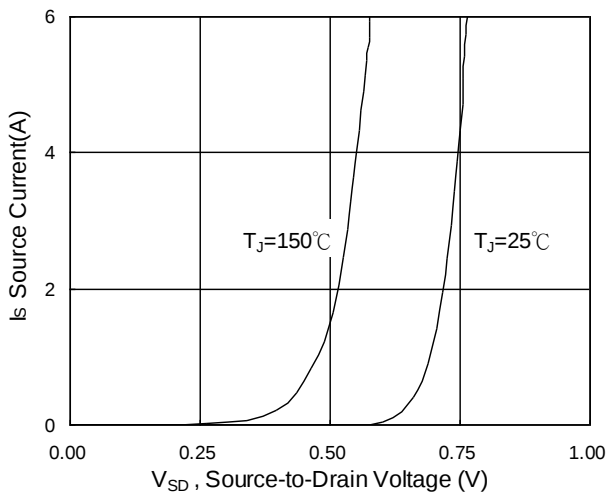


Fig.3 Forward Characteristics of Reverse

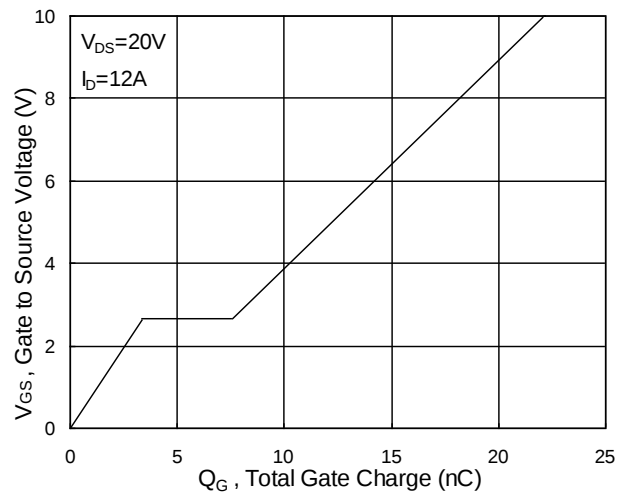


Fig.4 Gate-Charge Characteristics

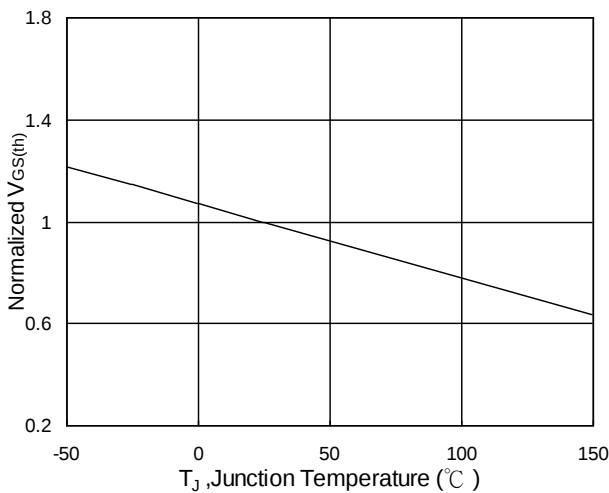


Fig.5 $V_{GS(th)}$ vs. T_J

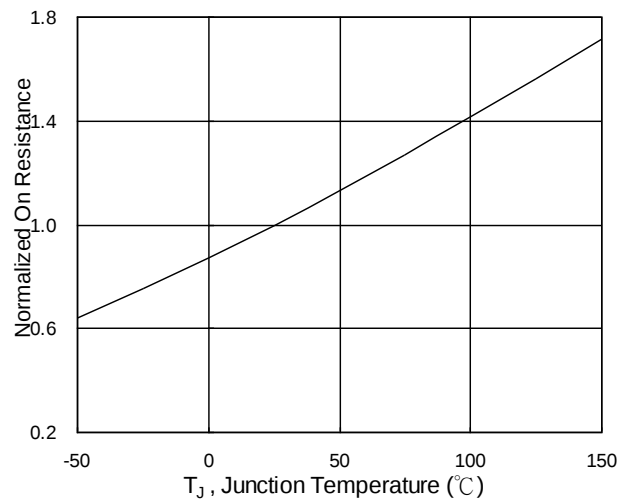


Fig.6 Normalized $R_{DS(ON)}$ vs. T_J

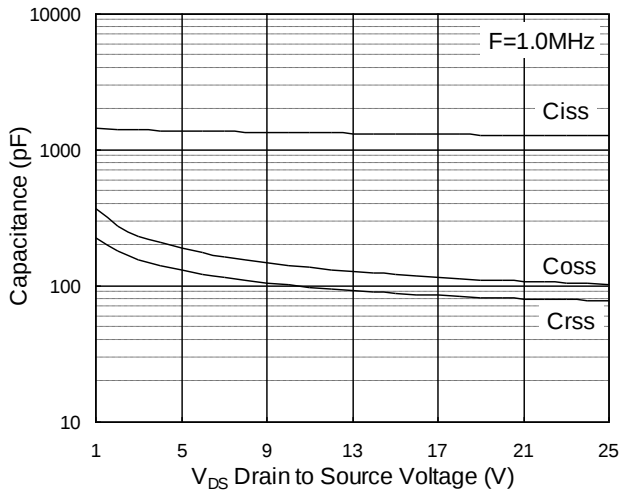


Fig.7 Capacitance

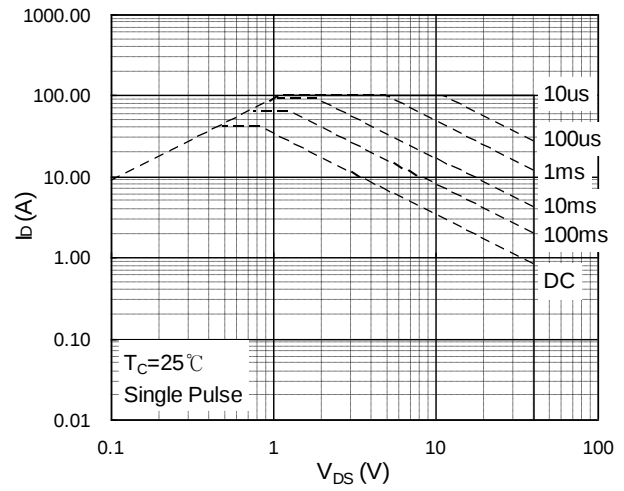


Fig.8 Safe Operating Area

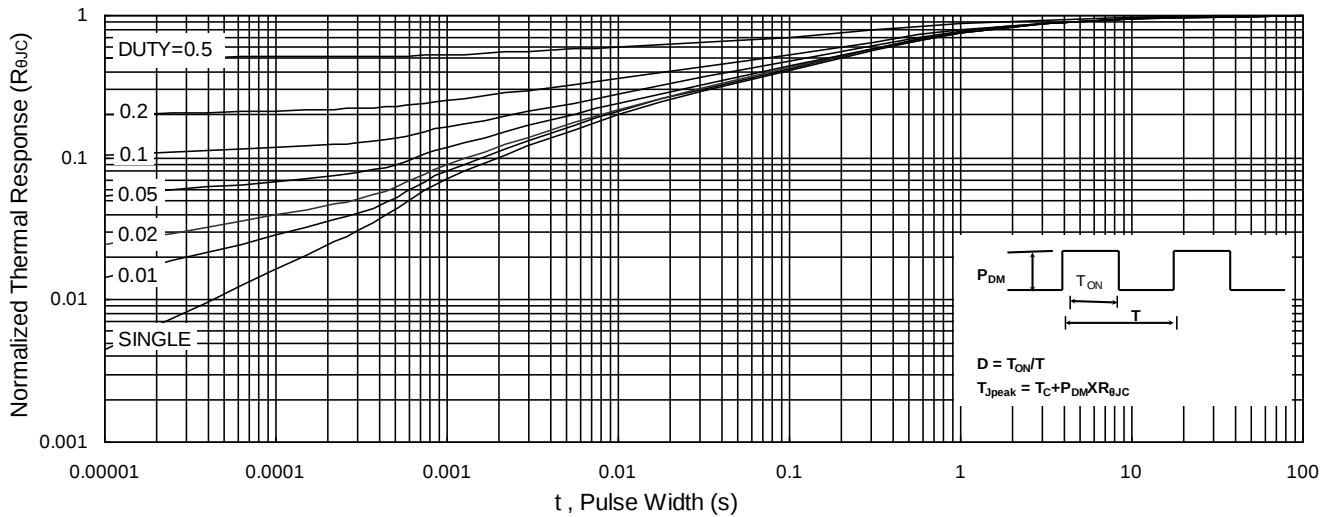


Fig.9 Normalized Maximum Transient Thermal Impedance

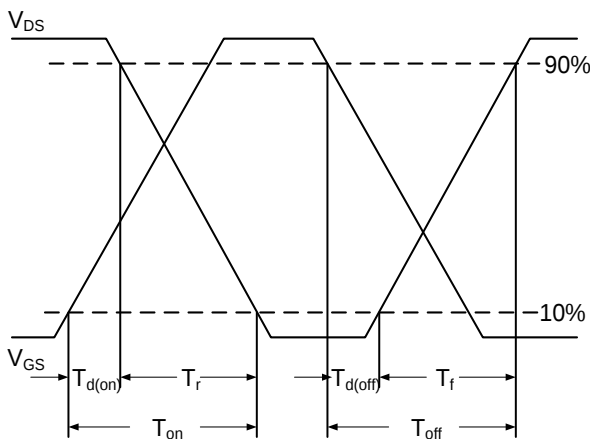


Fig.10 Switching Time Waveform

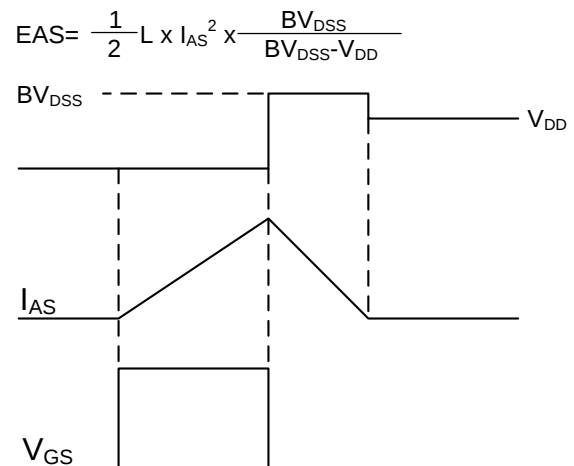
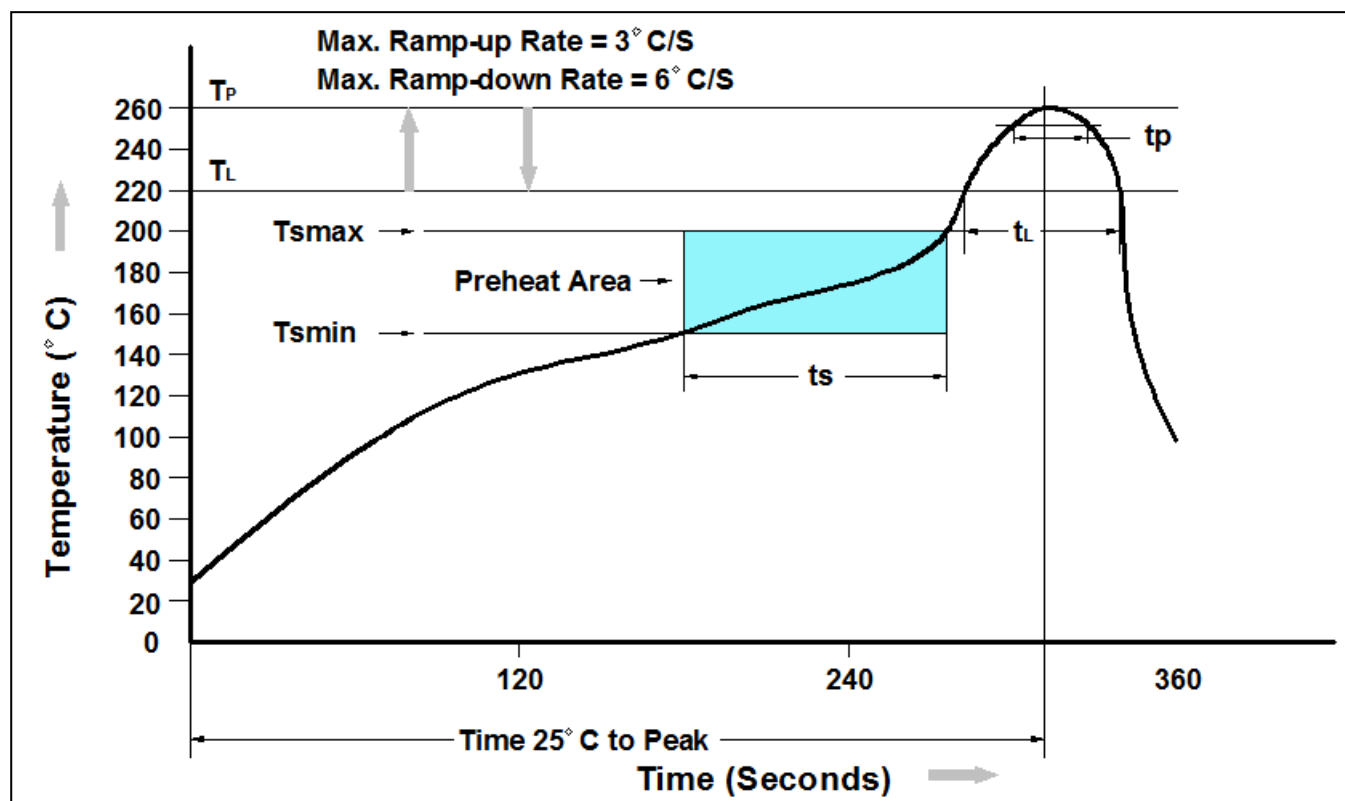


Fig.11 Unclamped Inductive Switching Waveform

➤ Recommend IR Reflow Soldering Thermal Profile

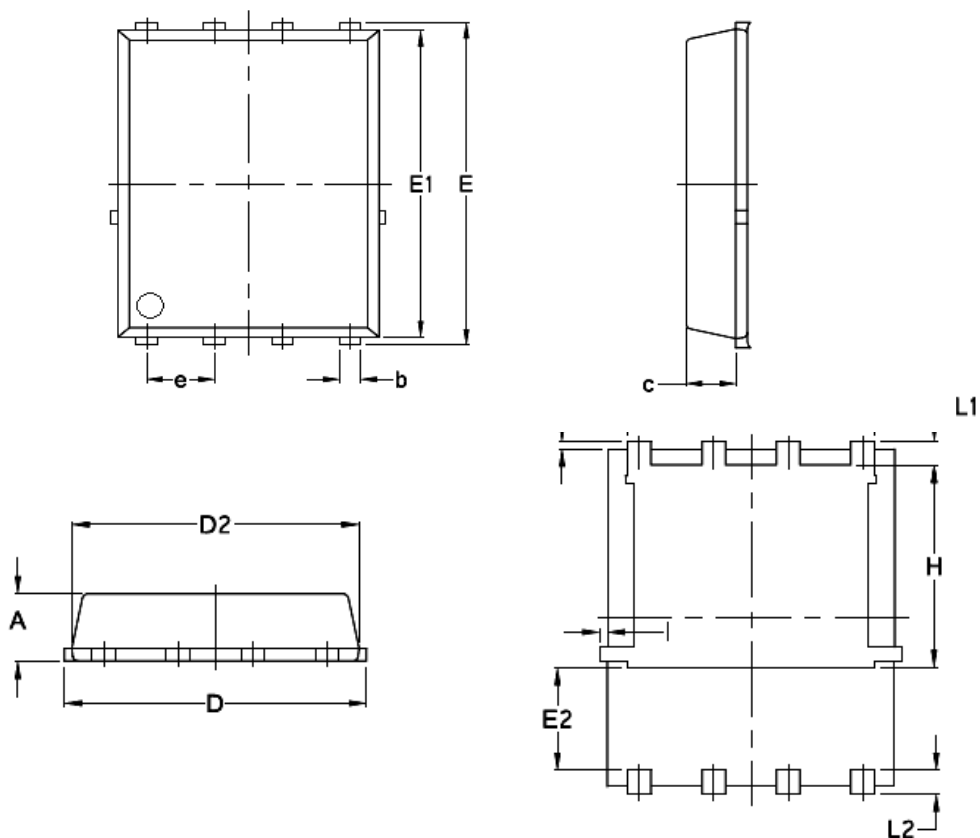


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T_{Smin})	150°C
Temperature Max. (T_{Smax})	200°C
Time (t_S) from (T_{Smin} to T_{Smax})	60-120 seconds
Average Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak 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
PAN40TY04Y	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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