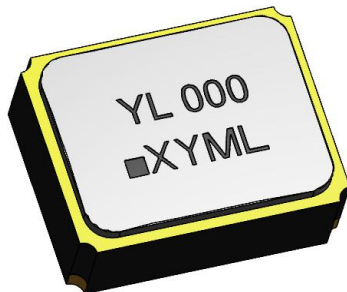




PRODUCT SPECIFICATION SHEET



Customer	-		
Customer P/N	-		
Product Type	Voltage Controlled Temperature Compensated Crystal Oscillator		
Part Number	2WG4000003	Version	S0
Part Description	SMD VC-TCXO 2.5 x 2.0		
Nominal Frequency	40.000000MHz		

Prepared	Li Xiang
Reviewed	Jin Zhe
Approved	Xing Yue
Date	2024-12-13

Customer's Approval & Date :

广东惠伦晶体科技股份有限公司

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Moisture Sensitivity Level 1

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ATTENTION

- [1] If you intend to use products on the controlling equipment that relate to medical, aeronautical, aerospace, military science, space and etc., please make sure to let us know your intentions in advance.
- [2] Ultrasonic related process may cause damage to crystal blank by resonance itself. If ultrasonic related process is used, we strongly recommend to assess the damage risk under related ultrasonic conditions before use in production.

1. History of Specification Revision

Ver.	Contents	Date	Reviser	Remark
S0	Initial release	2024-12-13	Li Xiang	

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2. Electrical Specifications

2.1 Operation conditions

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Nominal frequency	40.000000			MHz	-
2	Supply voltage (Vcc)	-	2.80	-	V	-
3	ESD	HBM \geq 2000V			-	JESD22-A114-B
4	MSL	Level 1			-	IPC/JEDEC J-STD-033C
5	Current consumption	-	-	2.0	mA	-
6	Operating temperature range	-30	-	+85	°C	-
7	Storage temperature range	-40	-	+90	°C	-

2.2 Output characteristics

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Output type	Clipped sine wave			-	Decoupling capacitor is required in external circuit
2	Standard output Load	10 K Ω //10 pF			-	-
3	Output level	0.8	-	-	V _{pp}	-
4	Duty cycle	40	50	60	%	Ground level
5	Start-up time vs. frequency	-	-	2.0	ms	Within ± 0.5 ppm
6	Start-up time vs. output level	-	-	2.0	ms	$\geq 90\%$ of Vpp

2.3 Frequency characteristics

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Nominal frequency	40.000000			MHz	-
2	Frequency tolerance after reflow	-1.5	-	+1.5	ppm	At 25 \pm 2°C after 2 times reflow, refer to nominal frequency at control voltage (VAFC) = 1.50 V DC
3	Frequency stability vs. temperature	-0.5	-	+0.5	ppm	Refer to frequency at 25°C within operating temperature range
4	Frequency stability vs. supply voltage	-0.2	-	+0.2	ppm	$\pm 5\%$ Vcc variation
5	Frequency stability vs. load variation	-0.1	-	+0.1	ppm	$\pm 10\%$ load variation
6	Frequency Aging	-1.0	-	+1.0	ppm/First year	-

2.4 Auto frequency control (AFC) characteristics

#	Parameters	Min.	Typ.	Max.	Unit	NOTE
1	AFC control voltage range (V _{AFC})	0.50	1.50	2.50	V	-
2	AFC frequency tuning range at Min. V _{AFC}	-15.0	-	-9.0	ppm	At V _{AFC} =1.50V, refer to V _{AFC} =0.50V
3	AFC frequency tuning range at Max. V _{AFC}	+9.0	-	+15.0	ppm	At V _{AFC} =1.50V, refer to V _{AFC} =2.50V

2. Electrical Specifications (Cont.)

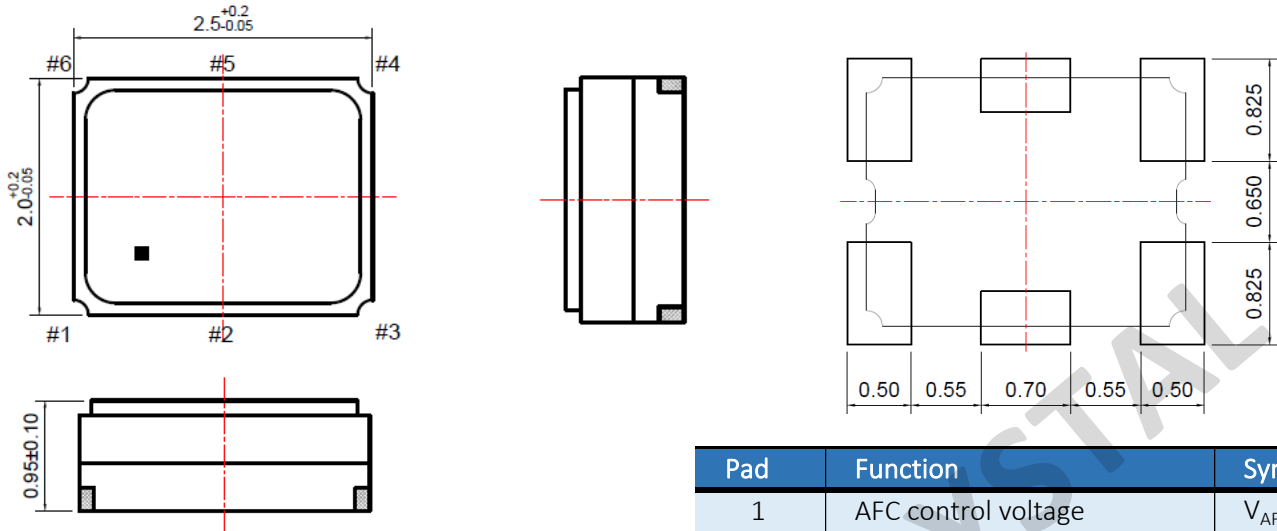
2.5 Phase noise characteristics

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Phase noise at 1kHz offset	-	-130	-	dBc/Hz	At 25±2°C

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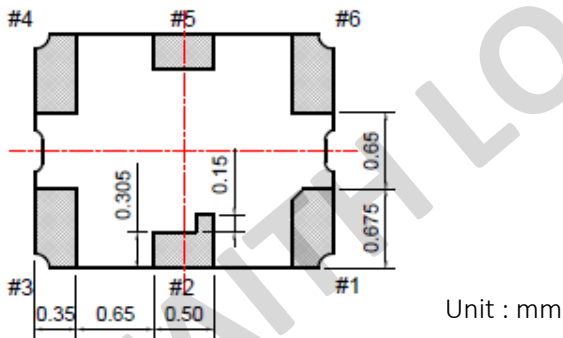
3. Product Design

3.1 Package dimensions and pad functions

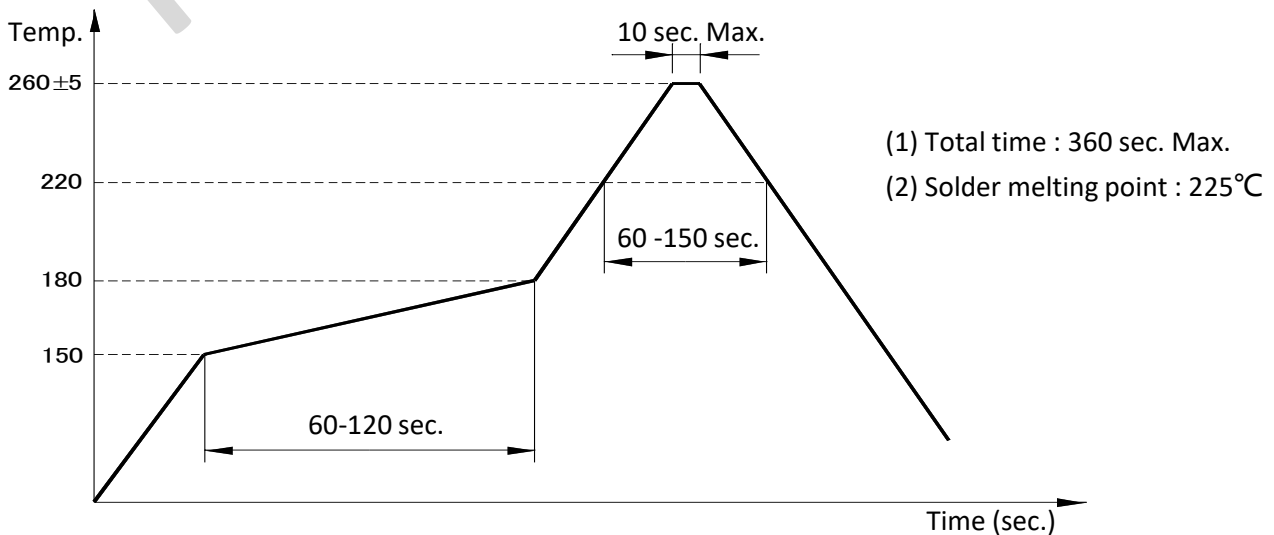


Pad	Function	Symbol
1	AFC control voltage	V_{AFC}
2	Ground	GND
3	Output	OUT
4	Supply voltage	V_{DD}

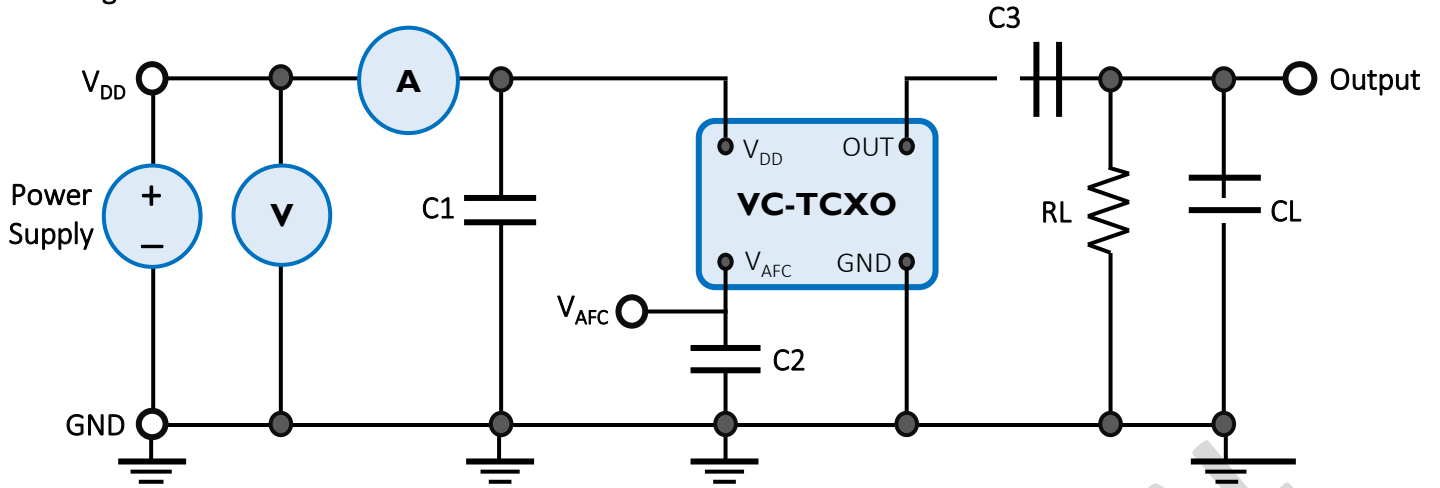
3.2 Recommended land pattern



3.3 Recommended reflow profile



4. Testing Circuit



External Components:

Parts	Function	Recommended
C1	AC noise bypass for V_{DD}	10nF
C2	AC noise bypass for V_{AF}	1nF
C3	DC block for output	10nF
RL	Load resistance	10K Ω
CL	Load capacitance	10pF

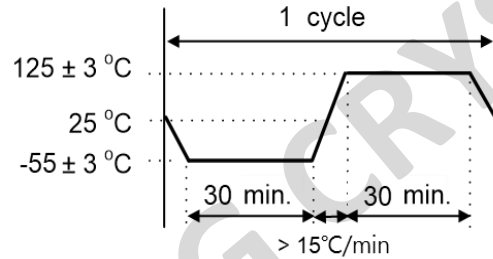
5. Reliability

5.1 Mechanical endurance

#	Item	Test Condition	Reference
1	Mechanical shock	Acceleration : 100 g Duration : 6.0 ms half sine shock pulse Test cycles : 3 times for all 3 directions	JESD47F_JEDEC B
2	Vibration	Acceleration : 20 g Duration : 4 hours/each direction Frequency range : 10 ~ 55 Hz and 55 ~ 2,000 Hz Amplitude : 0.75 mm (for 10 ~ 55 Hz) Direction : X, Y, Z, 3 directions	JESD47F_JEDEC B
3	Gross leak	Standard Sample For Automatic Gross Leak Detector. Test Pressure: 2kg /cm ²	MIL-STD-883E
4	Fine leak	Helium bombing 4.5 kgf / cm ² for 2 hours	MIL-STD-883E

5. Reliability (Cont.)

5.2 Environmental endurance

#	Item	Test Condition	Reference
1	High temperature storage	Temperature : $+125^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Duration : 1,000 hours	JESD47F_JEDEC B
2	Low temperature storage	Temperature : $-40^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Duration : 1,000 hours	JESD47F_JEDEC B
3	High temperature & humidity	Temperature : $85^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Humidity : RH 85% Duration : 1,000 hours	JESD47F_JEDEC B
4	Thermal shock (air to air)	Total 500 cycles of the following temperature cycle 	JESD47F_JEDEC B
5	Highly accelerated stress test (un-bias)	Temperature : $130^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Humidity : RH 85% Pressure : 2 atms Duration : 96 hours	JESD47F_JEDEC B
6	Aging	Temperature : $105^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Duration : 1,000 hours Voltage input by specification	JESD47F_JEDEC B

6. Marking and Packing

6.1 Marking definition

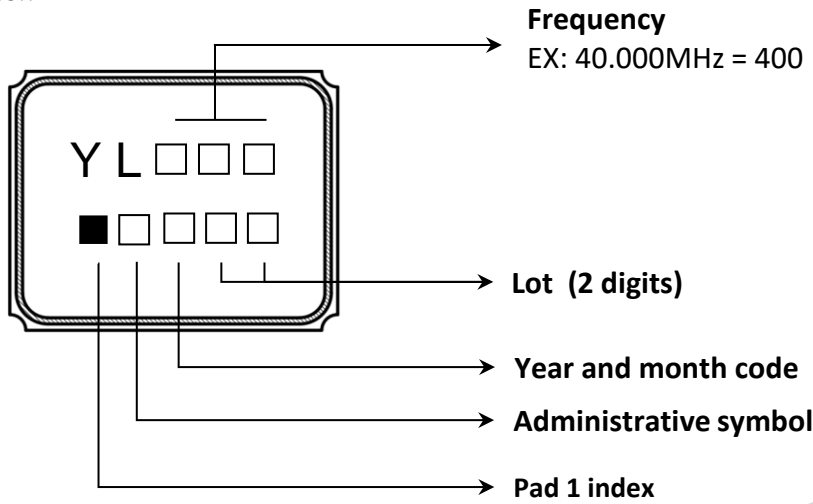
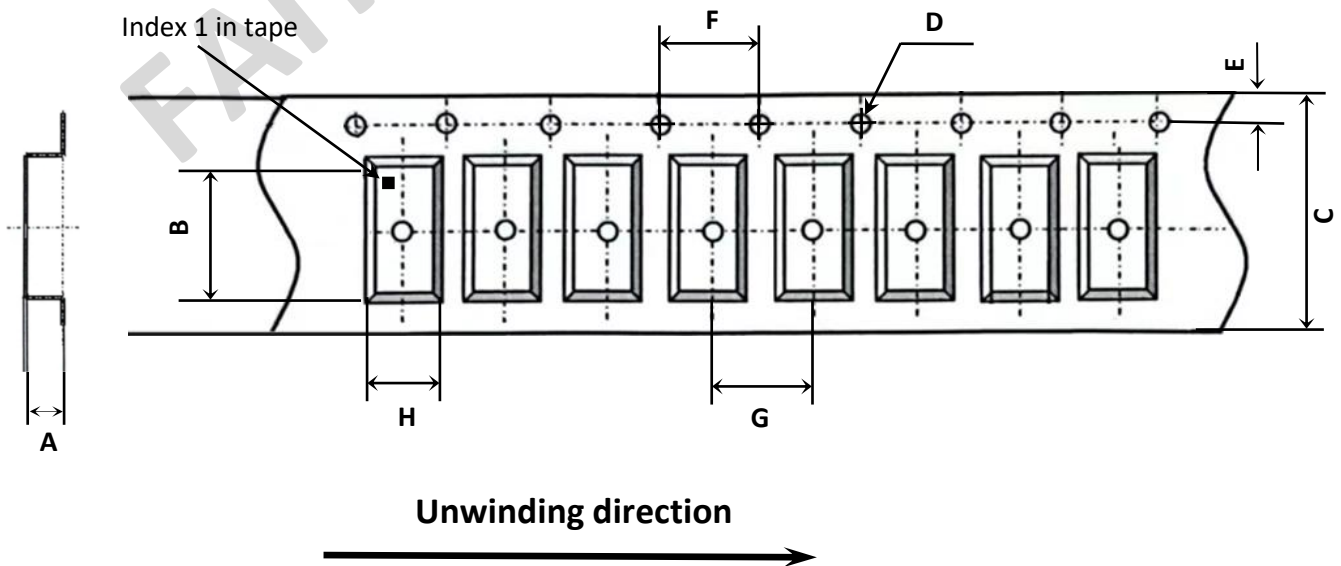


Table of Year and Month code

Year \ Month		Month											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	2025	A	B	C	D	E	F	G	H	J	K	L	M
2022	2026	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	2027	a	b	c	d	e	f	g	h	j	k	l	m
2024	2028	n	p	q	r	s	t	u	v	w	x	y	z

6.2 Packing (EIA-481-2)

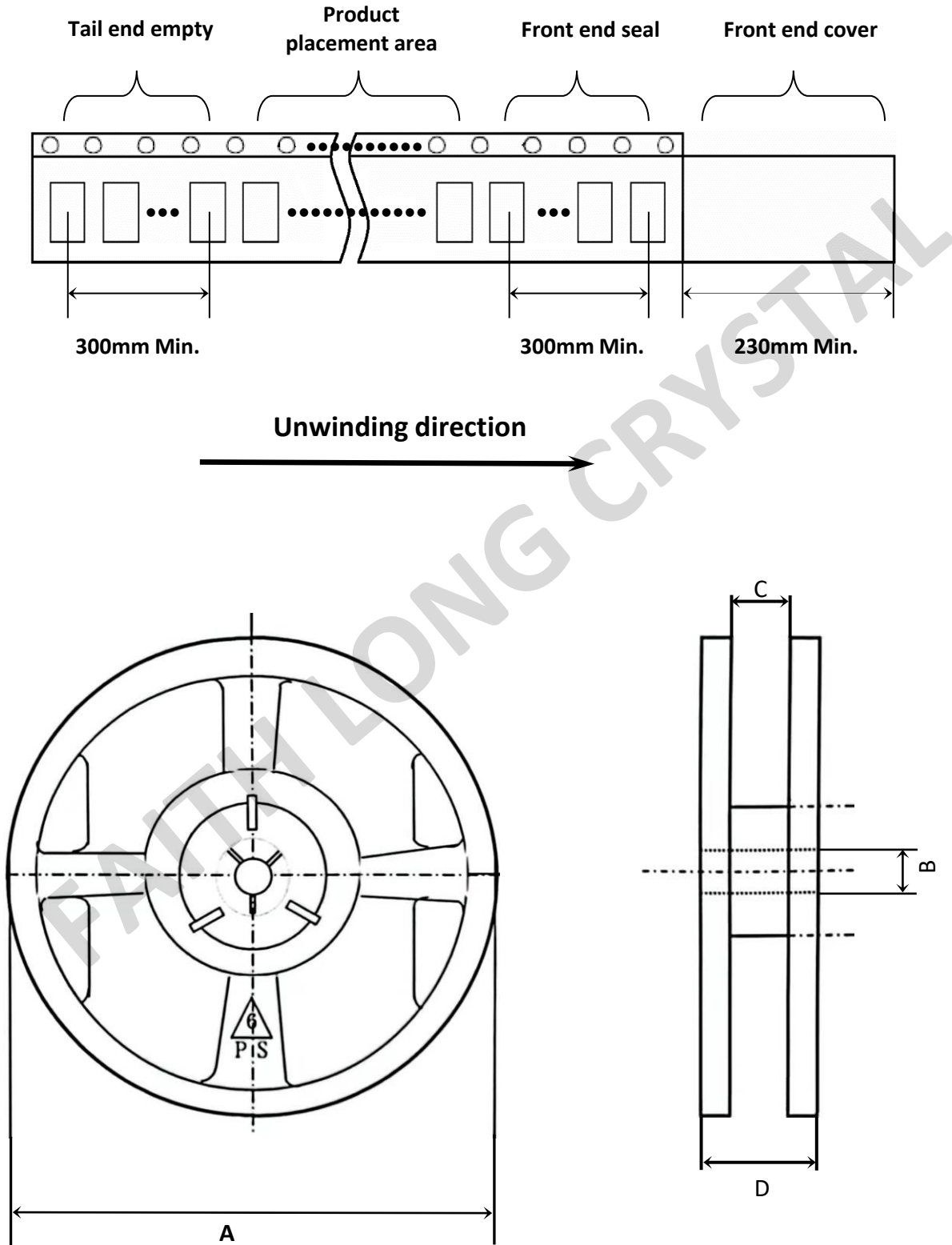
8mm-4mm, 3,000pcs/reel, $\Phi 178$



Tape dimension (Unit : mm)							
A	B	C	D	E	F	G	H
1.45±0.1	2.70±0.1	8.0±0.3	1.55±0.05	1.75±0.1	4.00±0.2	4.00±0.1	2.25±0.1

6. Marking and Packing (Cont.)

6.2 Packing (EIA-481-2) (Cont.)



3,000 pcs/reel

Reel dimension (Unit : mm)			
A	B	C	D
178±2.0	13.2±0.5	9.0±0.5	11.5±1.4



6. Marking and Packing (Cont.)

6.3 SMD product packing standard

Out-going packing instruction

Reel packing	Inner packing	Carton
Name: reel Standard: diameter 18cm Material: plastics	Name: bubble wrap Standard: 430×330×20mm Material: HDPE Quantity: 15 reels	Name: carton Standard: 400×400×280mm Material: AB corrugated paper Quantity: 4 bags
		
		

The label instruction

Label drawing	Mark	Name of article	Items	Size	Printing
	L1	Bar Code Label (Chintz Paper)	1.Part No. 2.Lot No. 3.Q'ty 4.Freq	70x50mm	White
	L2	Bar Code Label (Chintz Paper)	1.Part No. 2.Date Code 3.Q'ty 4.Freq	70x50mm	White

Remark: The above instruction of label drawing is used for template and may vary with different product specifications .
If customer has specified requirements for labels packaging, please provide the operation procedure.

Product storage conditions:

- [1] Temperature: 15 to 35°C.
- [2] Humidity: 30 to 70% RH.
- [3] Time: within 6 months after delivery.
- [4] Please store the products in a dry, clean, well-ventilated area and avoid direct sunlight exposure, heat, and vibration.