

# 32.768kHz Crystal Oscillator



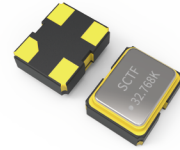
0CK / 1CK / 2CK / 3CK / 5CK / 7CK

## Feature

- Ultra Miniature Ceramic surface mount with Metal Lid
- CMOS compatible logic levels
- Tri-state function available
- Supply voltage : 1.8V, 2.5V, 3.3V
- RoHS Compliant / Pb Free

## Applications

- Real Time Clock Reference
- Internet of Things (IoT) devices
- Smart meters
- Audio, Video, Gaming products
- Portable Electronics



## Electrical Specifications

Item	Symb.	Min.	Typ.	Max.	Unit	Notes
Frequency Range	Freq.	32.768			kHz	
Operating Temperature	T <sub>use</sub>	-40	—	+85	°C	
		-40	—	+105	°C	
		-40	—	+125	°C	
Storage Temperature Range	T <sub>stg</sub>	-55	—	+155	°C	
Supply Voltage	V <sub>dd</sub>	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
		1.62	1.8	1.98	V	
Output Load(CMOS)	L <sub>CMOS</sub>	15			pF	
Current Consumption	I <sub>cc</sub>	—	—	90	μA	No load
Duty Cycle	SYM	45	—	55	%	50% V <sub>dd</sub> level, L <sub>CMOS</sub> ≤ 15pF
Output Voltage	V <sub>OH</sub>	0.9V <sub>dd</sub>	—	—	V	
	V <sub>OL</sub>	—	—	0.1V <sub>dd</sub>		
Enable Voltage High	V <sub>IH</sub>	0.7V <sub>dd</sub>	—	—	V	Output will be disable if OE is Logic"0" Output will be enable if OE is Logic"1" or open
Disable Voltage Low	V <sub>IL</sub>	—	—	0.3V <sub>dd</sub>		
Rise / Fall Time	T <sub>R</sub> / T <sub>F</sub>	—	—	25	nS	10% V <sub>dd</sub> to 90% V <sub>dd</sub> level
Start-up time	T <sub>str</sub>	—	—	5	mS	To 90% of Final Amplitude
Aging	f <sub>age</sub>	-3	—	+3	ppm	at 25°C ± 3°C. First Year

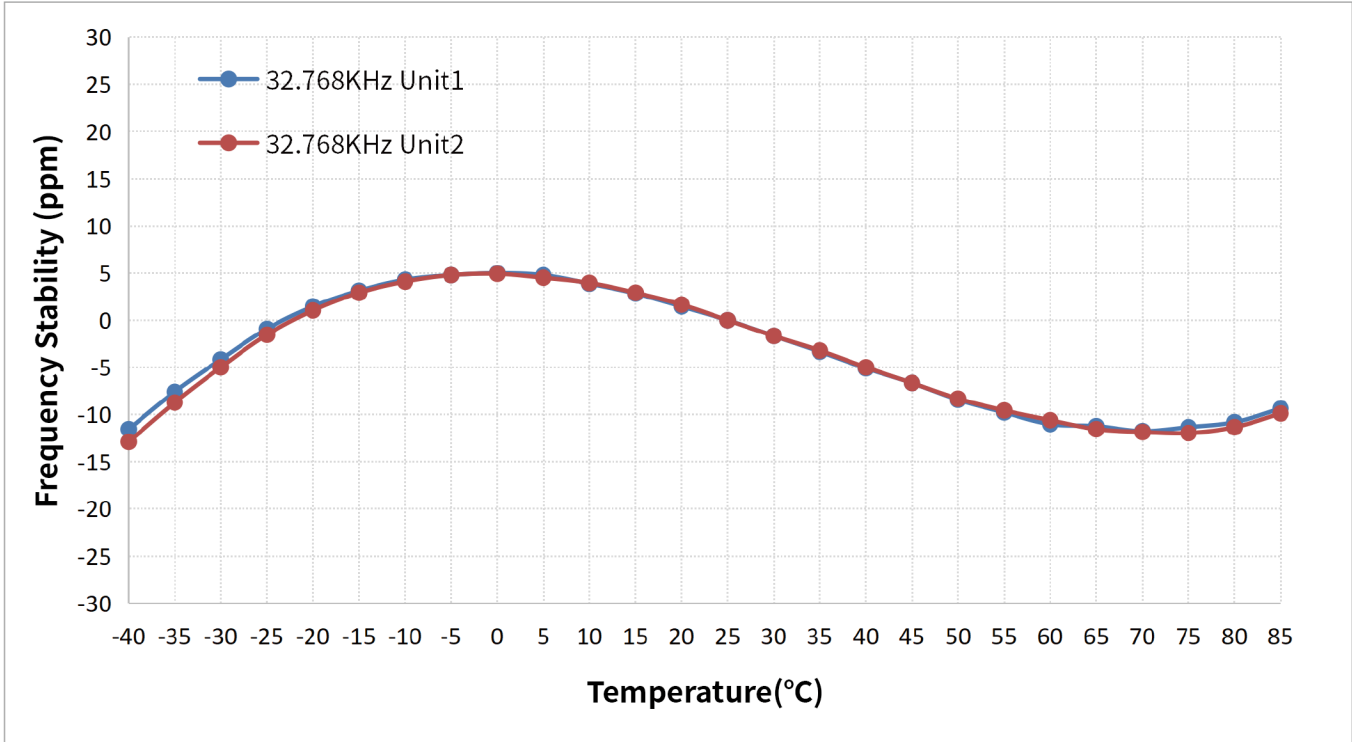
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## Electrical Specifications Cont.

Table 1: Frequency Stability VS. Temperature



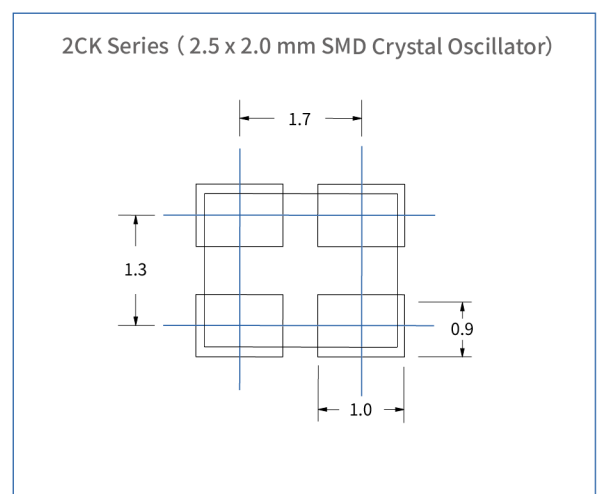
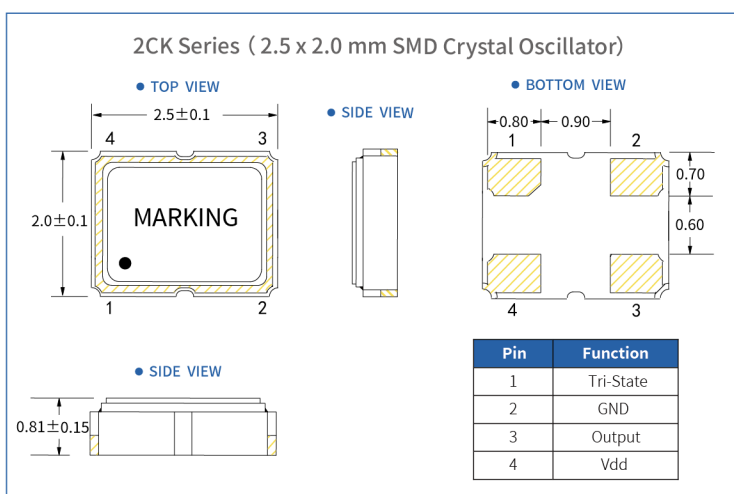
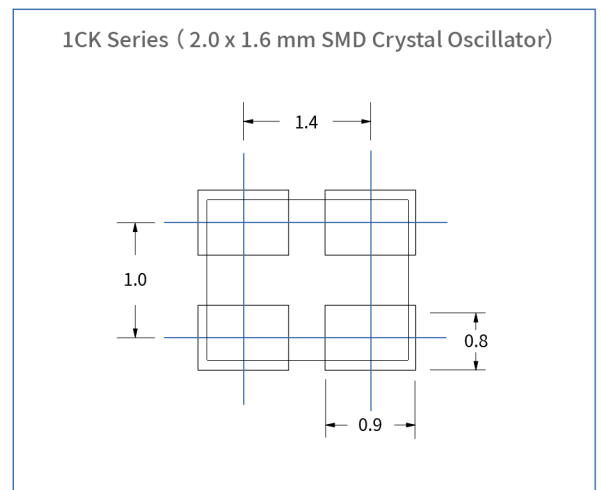
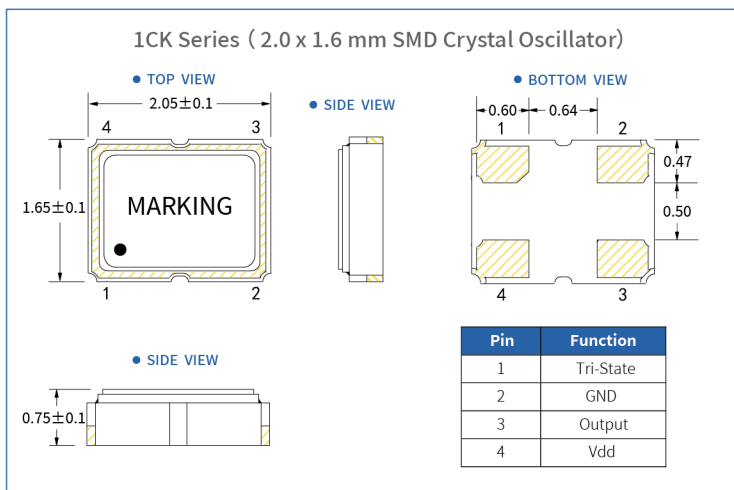
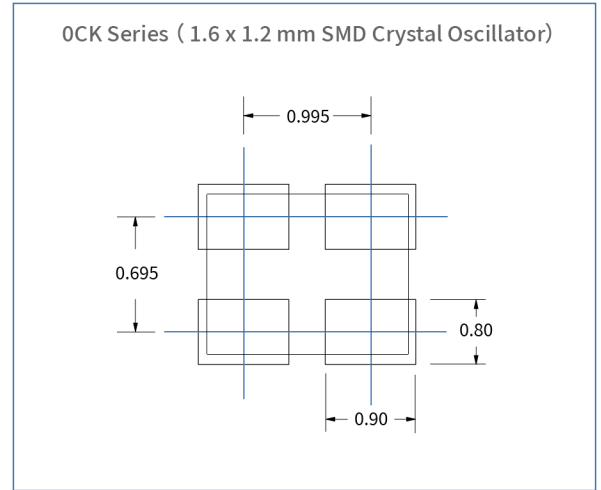
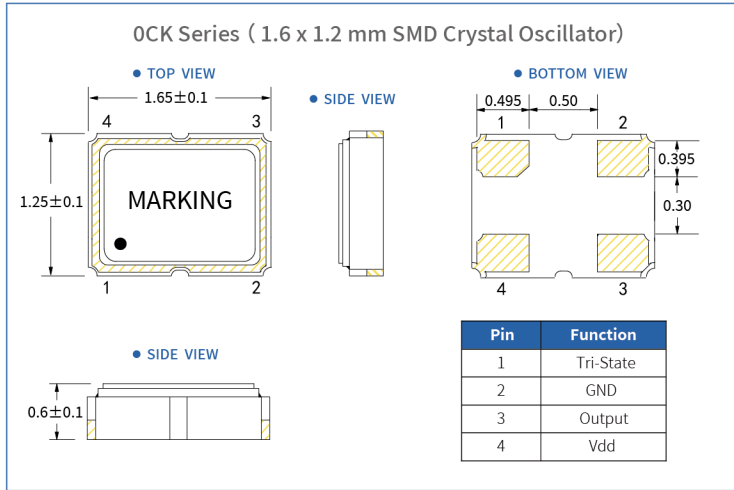
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## Dimensions (UNIT:mm)

## Solder pad layout (UNIT:mm)



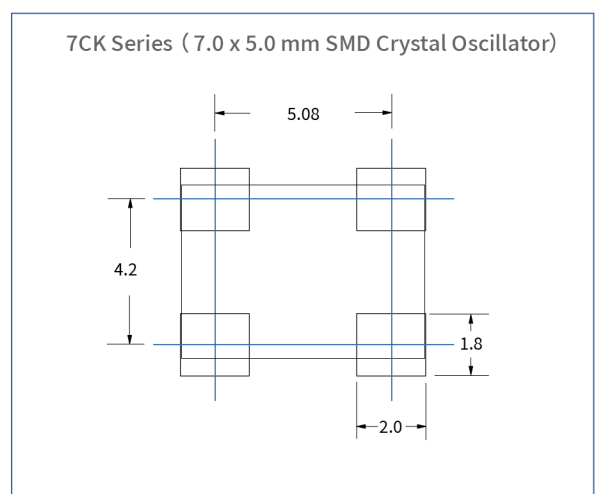
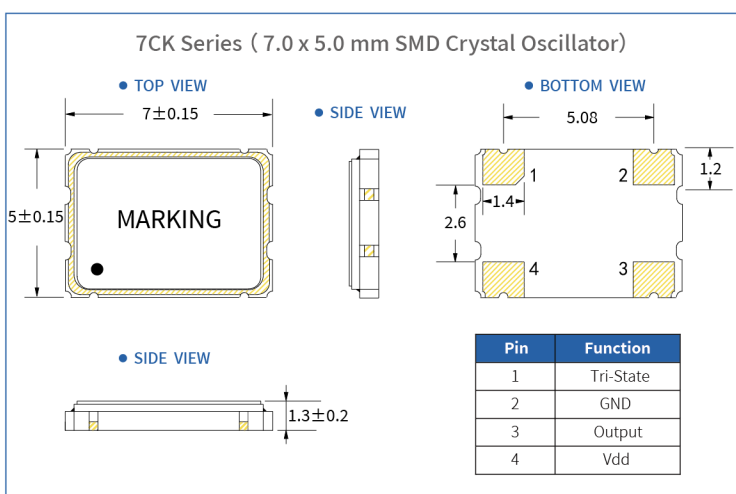
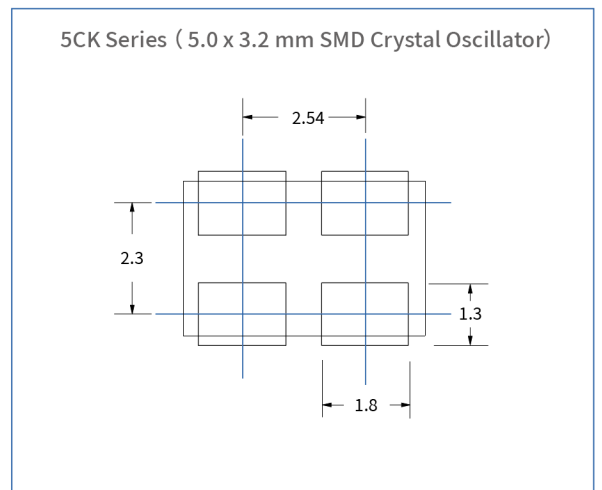
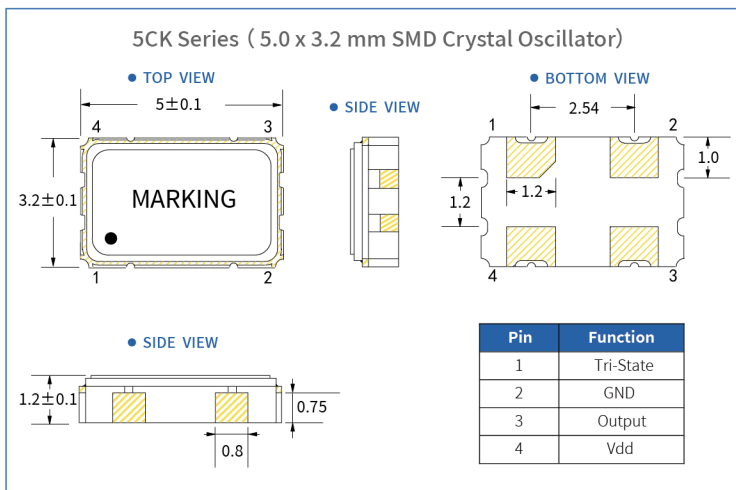
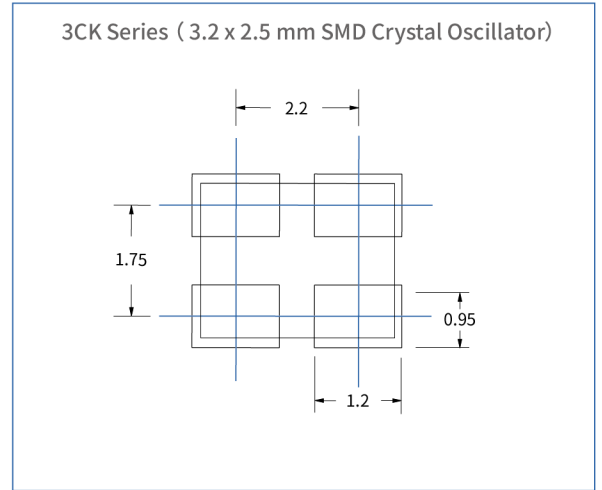
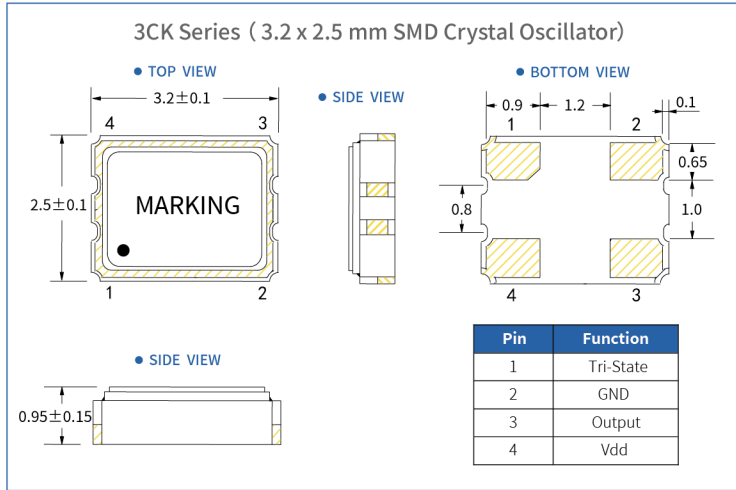
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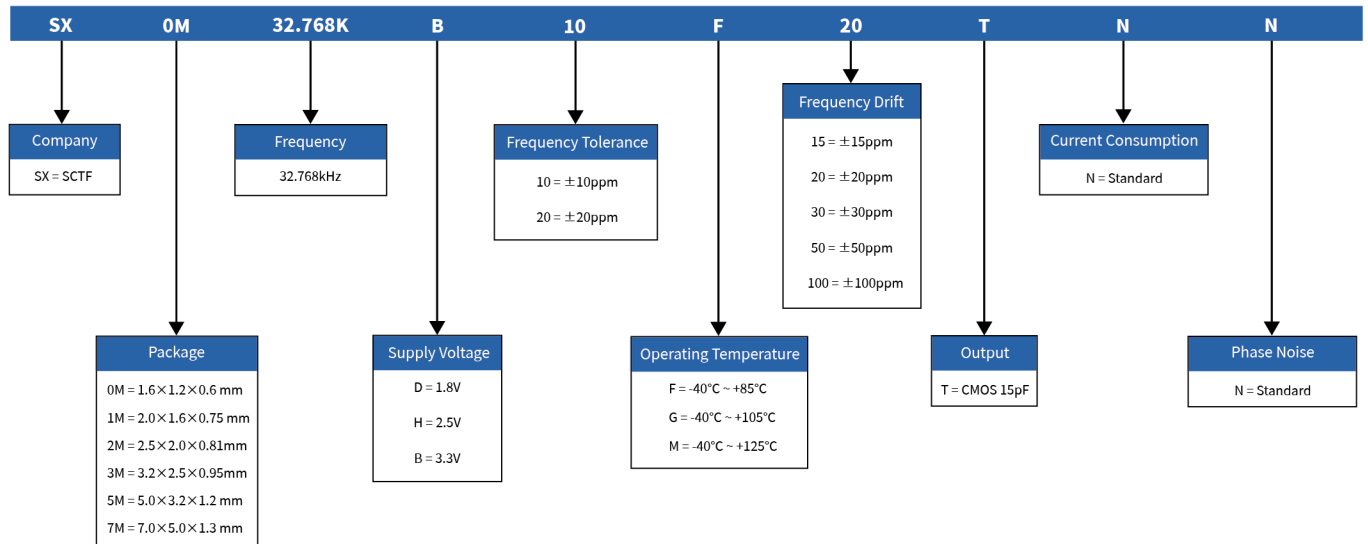


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## Options and Part Identification



## List of available part numbers

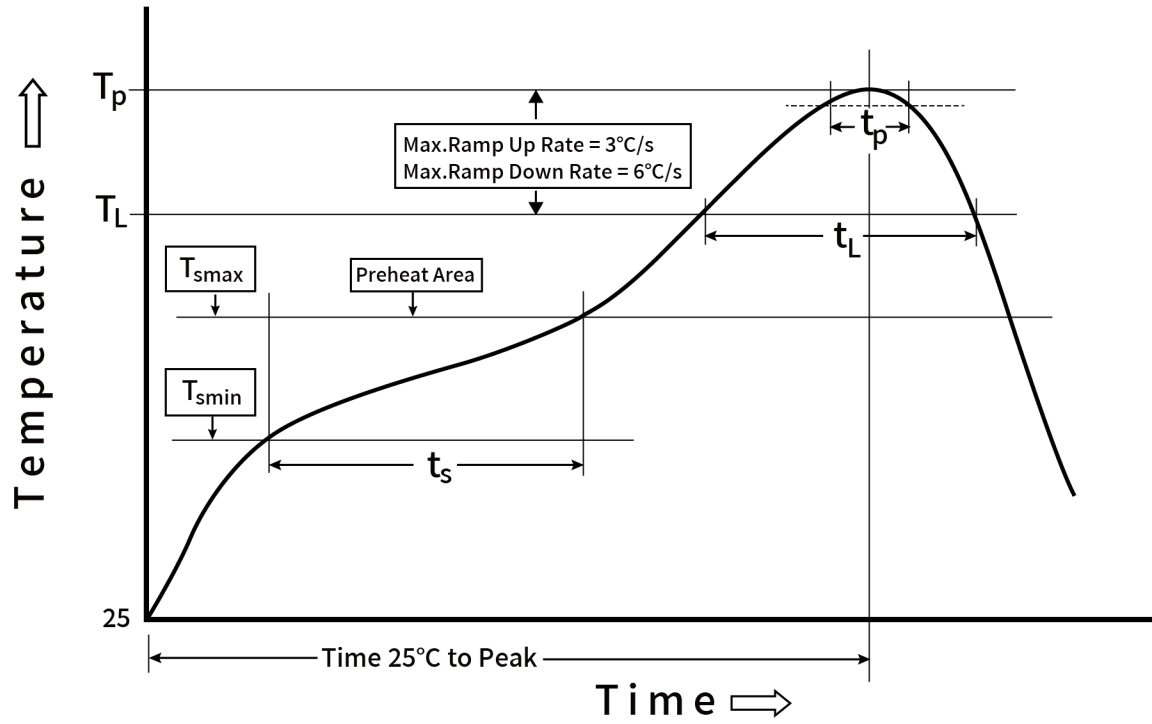
Part NO#			
SX0M32.768KB10F20TNN	SX1M32.768KB10F20TNN	SX2M32.768KB10F20TNN	SX3M32.768KB10F20TNN
SX5M32.768KB10F20TNN	SX7M32.768KB10F20TNN		

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## Reflow Profile

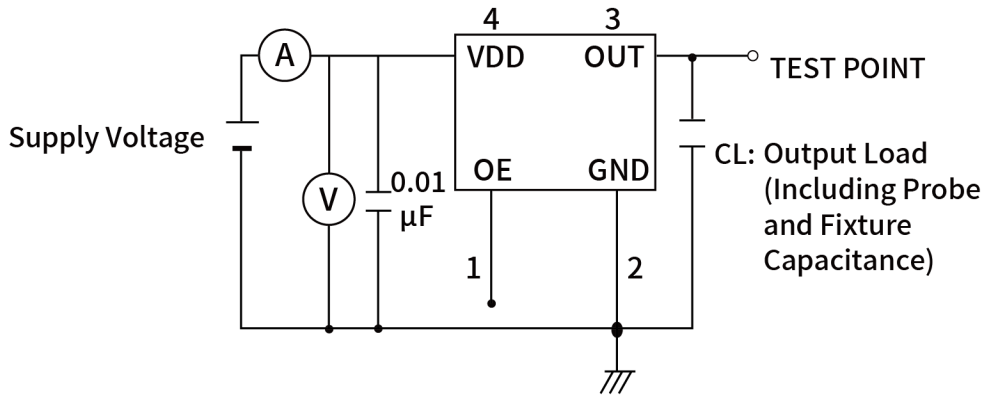


Profile Feature	Sn - Pb Eutectic Assembly	Preheat / Soak
Preheat / Soak <ul style="list-style-type: none"> <li>● Temperature Min ( T<sub>s</sub> min )</li> <li>● Temperature Max ( T<sub>s</sub> max )</li> <li>● Time ( T<sub>s</sub> min to T<sub>s</sub> max )</li> </ul>	100°C 150°C 60-120 seconds	150°C 200°C 60-120 seconds
Ramp - up rate ( T <sub>L</sub> to T <sub>p</sub> )	3°C/ second max.	3°C/ second max.
Time maintained above <ul style="list-style-type: none"> <li>● Liquidous temperature ( T<sub>L</sub> )</li> <li>● Time ( t<sub>L</sub> ) maintained above T<sub>L</sub></li> </ul>	183°C 60-150 seconds	217°C 60-150 seconds
Peak package body temperature ( T <sub>p</sub> )	235°C	260°C
Time within 5° C of the specified classification temperature ( T <sub>p</sub> )	20 seconds	30 seconds
Ramp - down rate ( T <sub>p</sub> to T <sub>L</sub> )	6°C/ second max.	6°C/ second max.
Time 25° C to peak temperature	6 minutes max.	8 minutes max.
<b>Suggest reflow times</b>	<b>2 Times max.</b>	

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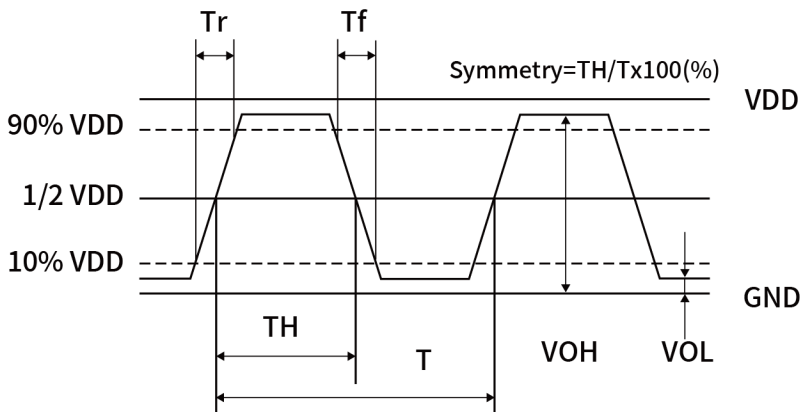
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## Testing Circuit



Notes: PIN 1 connected to Vdd or floating, the product is working properly; connected to GND, stops working.

## Waveform Conditions



Waveform measurement system should have a min. bandwidth of 5 times the frequency being tested.

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## Reliability Specification

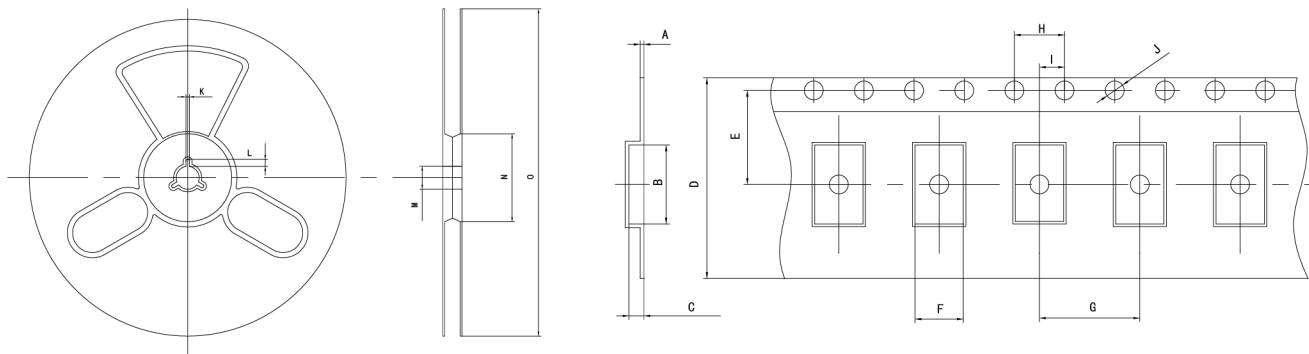
NO.	Item	Conditions	Basis of Verdict
1	Drop	High:100cm;Thickness:3cm;3 times.	$\Delta FL \leq \pm 5 \text{ppm}$
2	Vibration	Frequency:10~500HZ speed:11min/cycle Amplitude:1.5mm(10~55Hz) acceleration rate:200m/s <sup>2</sup> (55~500Hz) Direction:X,Y,Z	$\Delta FL \leq \pm 5 \text{ppm}$
3	Low Temperature Storage	Temp:-40°C±2°C;Times:96h	$\Delta FL \leq \pm 5 \text{ppm}$
4	High Temperature Storage	Temp:125°C±2°C;Times:96h	$\Delta FL \leq \pm 5 \text{ppm}$
5	High Temp.&Humidity	Temp:80°C±2°C; Humidity:85%±5%;Times:1000h	$\Delta FL \leq \pm 5 \text{ppm}$
6	Thermal Shock	-40°C±2°C (30min) ↔ 85°C±2°C (30min) ; For 100 cycles	$\Delta FL \leq \pm 5 \text{ppm}$
7	Resistance to Soldering Heat	Keep 150 °C ± 5 °C 120s and then rose to 265 °C ± 5 °C for 10s,warming and holding time is less than the 200s, placed at room temperature 1 ~ 2h after test	$\Delta FL \leq \pm 5 \text{ppm}$
8	Aging	Temp:85°C;Times:30days	$\Delta FL \leq \pm 5 \text{ppm}$
9	Soldering Test	Dipping in solder bath at 245deg.C ± 5deg.C for 3±0.5 sec.	Soldering tin rate greater than 95%

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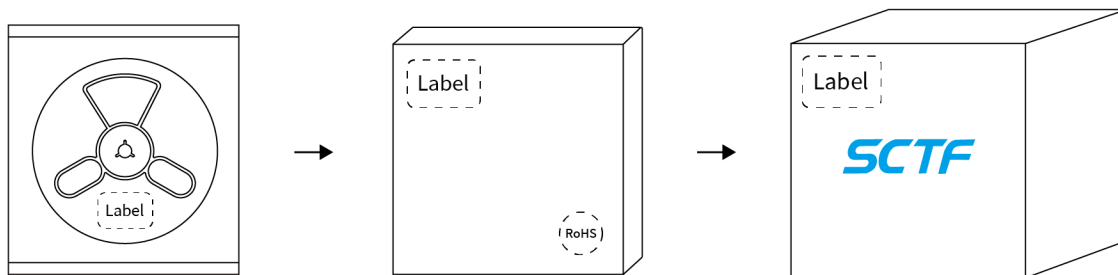
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## Taping Specifications



Series	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0CK	0.25±0.05	1.8±0.1	0.7±0.1	8.0±0.1	3.5±0.1	1.9±0.1	4.0±0.1	4.0±0.1	2.0±0.1	φ1.5±0.1	2.0±0.2	4.0±1.0	φ13±0.5	φ60±1	φ180±1
1CK	0.25±0.05	2.3±0.1	1.0±0.1	8.0±0.1	3.5±0.1	1.9±0.1	4.0±0.1	4.0±0.1	2.0±0.1	φ1.5±0.1	2.0±0.2	4.0±1.0	φ13±0.5	φ60±1	φ180±1
2CK	0.25±0.05	3.5±0.1	1.4±0.1	8.0±0.1	3.5±0.1	2.70±0.1	4.0±0.1	4.0±0.1	2.0±0.1	φ1.5±0.1	2.0±0.2	4.0±1.0	φ13±0.5	φ60±1	φ180±1
3CK	0.25±0.05	3.5±0.1	1.4±0.1	8.0±0.1	3.5±0.1	2.70±0.1	4.0±0.1	4.0±0.1	2.0±0.1	φ1.5±0.1	2.0±0.2	4.0±1.0	φ13±0.5	φ60±1	φ180±1
5CK	0.3±0.05	5.5±0.1	1.25±0.1	12±0.1	5.5±0.1	3.6±0.1	8.0±0.1	4.0±0.1	2.0±0.1	φ1.5±0.1	2.0±0.2	4.0±1.0	φ13±0.5	φ60±1	φ180±1
7CK	0.3±0.05	7.6±0.1	2.0±0.1	16±0.3	7.5±0.1	5.4±0.1	8.0±0.1	4.0±0.1	2.0±0.1	φ1.5±0.1	2.0±0.2	4.0±1.0	φ13±0.5	φ60±1	φ180±1

## Packaging specifications



■ 1 reel/box

■ 10 box/carton

Series	Packaging
0CK	3,000 pcs/reel
1CK	3,000 pcs/reel
2CK	3,000 pcs/reel
3CK	3,000 pcs/reel
5CK	1,000 pcs/reel
7CK	1,000 pcs/reel