





### Table of amendment

Version	Revision contents	Prepared by	Revised date
1.0	The first issued	<i>Amway</i>	2016.11.17
1.1	“Frequency Stability vs. Operating Temperature Range”, “Frequency Stability Over Any 15°C Of Ambient Temperature”, “Frequency Stability Over Ambient Temperature” and “Operable Temperature Range” changed	<i>Amway</i>	2017.02.14
1.2	Add “Shock” Conditions	<i>Amway</i>	2017.04.18
1.3	The “Retrace” Changed	<i>Amway</i>	2017.09.28
1.4	The “Warm Up Time” changed	<i>Amway</i>	2021.11.05
1.5	The “Operable Temperature Range” “ESD Level” changed	<i>Amway</i>	2021.11.25
1.6	The “Reflow Soldering Curve” “Package: Tape & Reel” changed	<i>Amway</i>	2023.02.22



## 1. Electrical Parameters

MODEL: O22S-1201-10.00MHz						
Item	Description	Parameters			Unit	Test Condition
		Min.	Typ.	Max.		
Output	Frequency	10.00			MHz	
	Output Waveform	LVCMOS				
	Output Low Voltage			0.4	V	$V_{cc}=3.3V, O_{load}=30pF$
	Output High Voltage	2.4			V	$V_{cc}=3.3V, O_{load}=30pF$
	Duty Cycle	45	50	55	%	@50%
	RF Output Current			4	mA	
	Rise/Fall Time (10%~90%)			5	ns	
	Load			30	pF	
	Start-up time			1.5	sec	@ -40°C ~ +85°C
	Alarm Output Current			1	mA	
	Oven alarm states and behavior:					
<ul style="list-style-type: none"> <li>“1”: Oven normal operation: heating system is working properly and oven has warmed up.</li> <li>“0”: Oven is not ok: heating system is not working properly or oven warming-up.</li> </ul>						
Frequency Stabilities	Initial Frequency Tolerance	-10		+10	$\times 10^{-6}$	Measurement referenced to frequency observed with $T_A=25^\circ C$ , $V_{cc}=3.3V$ , and after 15 minutes of operation.
	Frequency Stability vs. Operating Temperature Range	-3		+3	$\times 10^{-9}$	$T_A$ varied from $-40^\circ C \sim 85^\circ C$ , measurement referenced to frequency observed with $f_{ref}=(f_{max}+f_{min})/2$ , $V_{cc}=3.3V$ , $O_{load}=30pF$ , temperature variable more than $2^\circ C$ per minute, after 20 minute of operation, test time $\leq 2$ hours, ageing effects are excluded.
	Frequency Stability Over Any $15^\circ C$ Of Ambient Temperature	-0.5		+0.5	$\times 10^{-9}$	$T_A$ varied from $20^\circ C \sim 85^\circ C$ , measurement relative to the frequency at the start of the $15^\circ C$ window, temperature variable more than $0.5^\circ C$ per minute, after 2 days of operation.
		-0.8		+0.8	$\times 10^{-9}$	$T_A$ varied from $-40^\circ C \sim 20^\circ C$ , measurement relative to the frequency at the start of the $15^\circ C$ window, temperature variable more than $0.5^\circ C$ per minute, after 2 days of operation.



	Frequency Stability Over Ambient Temperature	-0.3		+0.3	$\times 10^{-9}$	$T_A$ varied from $80^\circ\text{C} \pm 5^\circ\text{C}$ , measurement relative to the frequency at $80^\circ\text{C}$ , temperature variable more than $0.5^\circ\text{C}$ per minute, after 2 days of operation.
	Frequency Stability vs. Supply Voltage	-0.1		+0.1	$\times 10^{-9}$	$V_{cc}$ varied from 3.27V to 3.33V, and $O_{Load}=30\text{pF}$ .
	Overall tolerance over 15 years lifetime from 1h post-reflow frequency	-0.5		+0.5	$\times 10^{-6}$	after warm-up time including all frequency drift effects
	Frequency stability over any 20 min period	-5		+5	$\times 10^{-9}$	@ $25^\circ\text{C}$ , after 20 minutes of operation
	Aging Tolerance Per Day	-0.05		+0.05	$\times 10^{-6}$	@ $25^\circ\text{C}$ , after 5 min
		-3		+3	$\times 10^{-9}$	@ $25^\circ\text{C}$ , after 24 hours
		-1		+1	$\times 10^{-9}$	@ $25^\circ\text{C}$ , after 7 days
		-0.2		+0.2	$\times 10^{-9}$	@ $25^\circ\text{C}$ , after 30 days
	Aging Tolerance 1 Month	-8		+8	$\times 10^{-9}$	@ $25^\circ\text{C}$ , after 7 days
		-5		+5	$\times 10^{-9}$	@ $25^\circ\text{C}$ , after 30 days
	Aging Tolerance 1 Years	-0.08		+0.08	$\times 10^{-6}$	@ $25^\circ\text{C}$ , after 7 days
		-0.06		+0.06	$\times 10^{-6}$	@ $25^\circ\text{C}$ , after 30 days
	G-sensitivity			3	$\times 10^{-9}/\text{G}$	
Warm Up Time	Frequency change during warm-up (after start-up time)	0.9	4	400	$\times 10^{-6}$	@ $-40^\circ\text{C} \sim +85^\circ\text{C}$ symmetric or asymmetric referred to 2h frequency ( $f_{2h}$ )
	Warm-up @ $-40^\circ\text{C}$		4	7	min	Oscillator frequency within $\pm 0.015 \times 10^{-6}$ , With reference to 2 hours value.
			3.7	5	min	Oscillator frequency within $\pm 0.15 \times 10^{-6}$ , With reference to 2 hours value.
	Warm-up @ $-10^\circ\text{C}$		3.3	6	min	Oscillator frequency within $\pm 0.015 \times 10^{-6}$ , With reference to 2 hours value.
			3	5	min	Oscillator frequency within $\pm 0.15 \times 10^{-6}$ , With reference to 2 hours value.
	Warm-up @ $+25^\circ\text{C}$		1.9	5	min	Oscillator frequency within $\pm 0.015 \times 10^{-6}$ , With reference to 2 hours value.
			1.6	4.25	min	Oscillator frequency within $\pm 0.15 \times 10^{-6}$ , With reference to 2 hours value.
	Warm-up @ $+55^\circ\text{C}$		1.4	4.5	min	Oscillator frequency within $\pm 0.015 \times 10^{-6}$ , With reference to 2 hours value.
			1	4	min	Oscillator frequency within $\pm 0.15 \times 10^{-6}$ , With reference to 2 hours value.



Retrace	Retrace Accuracy			±15	$\times 10^{-9}$	@ -40°C ~ +85°C, On 24h, Off 24h, On df after warm-up time
	Retrace time to $\leq \pm 5$ ppb			7	min	@ -40°C ~ +85°C, On 1h, Off 15 min
	Retrace time to $\leq \pm 50$ ppb			5	min	@ 25°C, on 24h, Off 1 week
	Retrace time to $\leq \pm 150$ ppb			45	s	@ -10°C ~ +85°C, Off 10s
Power Supply	Supply Voltage	3.27	3.3	3.33	V	
	Steady Consumption			400	mA	@25°C
					700	mA
Warm up current			1200	mA	@ -40°C ~ +85°C	
Phase Noise	Phase Noise @ -40 to 85°C			-70	dBc/Hz	1Hz
				-100		10Hz
				-125		100Hz
				-140		1KHz
				-145		10KHz
				-150		100KHz
Spurs And Harmonic	Accumulated Power Of Spurs And Harmonic Distortions @ -40 to 85°C			-90	dBc	$10 \text{ Hz} \leq f_{\text{Offset}} < 300 \text{ Hz}$
				-90		$300 \text{ Hz} \leq f_{\text{Offset}} \leq 10 \text{ kHz}$
				-40		$10 \text{ kHz} \leq f_{\text{Offset}}$



Environmental Conditions	Operating Temperature Range	-40		+85	°C	
	Operable Temperature Range	-45		+100	°C	
	Rate Of Temperature Variation			2	°C/min	
	Relative Humidity Range	5		95	%	
	Absolute Humidity Range	1		29	g/m <sup>3</sup>	
	Air pressure range	70		106	kPa	
	ESD Level	Human Body Model, class2: 2000V to 4000V; ANSI/ESDA/JEDEC JS-001-2010. Machine Model, class B: 200V to 400V; JEDEC JESD22-A115C.				
	Moisture Sensitivity Level	Level 2.				
	Vibration	Three-dimensional vibration, sinusoidal according to EN 300 019-2-4 Class 4M5 with amplitude modified by a gain of 10. <ul style="list-style-type: none"> <li>• Amplitude of displacement: 12mm (5-9Hz)</li> <li>• Amplitude of acceleration: 40 m/ s<sup>2</sup> (9-200Hz)</li> </ul>				
	Shock	Pretest sine sweep vibration testing of all axes based on IEC 60068-2-6 (test Fc), with the following parameter severities: <ul style="list-style-type: none"> <li>• Amplitude of displacement: ≥0.75mm (0.3-9Hz)</li> <li>• Frequency range: 0.3Hz to 50Hz</li> <li>• Amplitude of acceleration: ≥2 m/ s<sup>2</sup></li> </ul> or simulation of mechanical resonances for: <ul style="list-style-type: none"> <li>• Frequency range: 0.3Hz to 50Hz</li> </ul> Pretest result: <ul style="list-style-type: none"> <li>• Vibration testing/ simulation doesn't exhibit any resonance</li> </ul> Shock per EN 300 019-2-4 Class 4M5 with amplitude modified by a gain of 1.5. <ul style="list-style-type: none"> <li>• Amplitude of acceleration: 75 m/ s<sup>2</sup></li> </ul> Device shall be operating after the shock event. <ul style="list-style-type: none"> <li>• Frequency shift df/f ≤ 10 ppb</li> </ul>				
Full Package Storage	Relative humidity (%)	20% ~ 70%				
	Temperature (°C)	-10~35°C				



## 2. Phase Stability In Holdover

Profile 1: Ramp with 0.5°C/min to max or min temperature at the beginning, constant for rest of time.

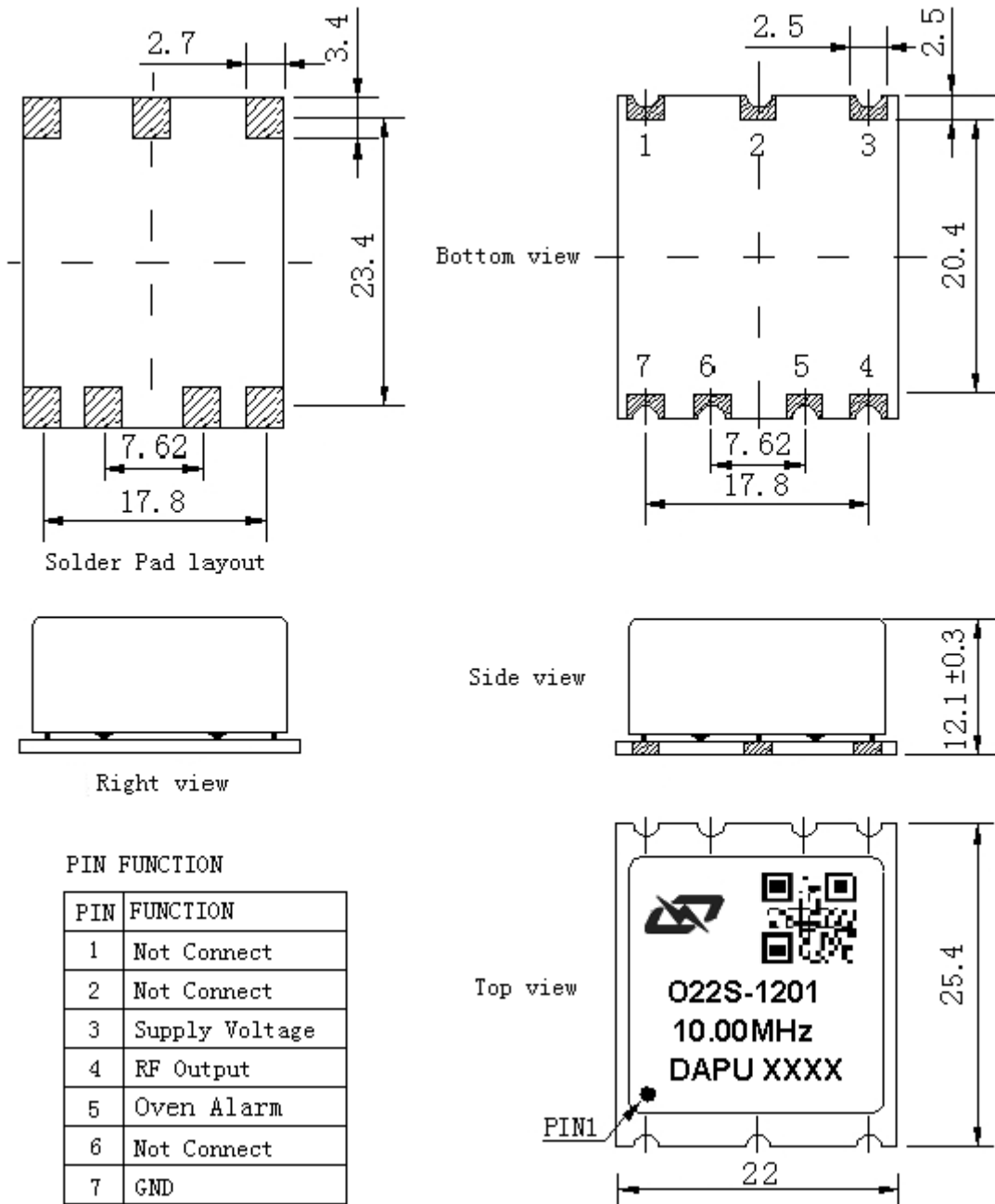
Profile 2: Continuous temperature cycling with 0.5°C/min between min and max temperatures.

Phase stability	Ambient temperature	Condition
6 sigma (99.99966%) all clauses	See below	After 7 days of continuous operation/ ageing Supply voltage stability $\pm 0.1\%$ , load 15pF
$\leq \pm 5 \mu\text{sec}$ over 4 h	+80°C $\pm 5^\circ\text{C}$ +80°C $\pm 5^\circ\text{C}$	Profile 1 Profile 2
$\leq \pm 10 \mu\text{sec}$ over 8 h	+80°C $\pm 3.5^\circ\text{C}$ +80°C $\pm 5^\circ\text{C}$	Profile 1 Profile 2

Phase stability	Ambient temperature	Condition
4 sigma (99.38%) all clauses	See below	After 30 days of continuous operation/ ageing Supply voltage stability $\pm 0.1\%$ , load 15pF
$\leq \pm 10 \mu\text{sec}$ over 12 h	+80°C $\pm 4^\circ\text{C}$ +80°C $\pm 5^\circ\text{C}$	Profile 1 Profile 2
$\leq \pm 10 \mu\text{sec}$ over 24 h	+80°C $\pm 0.5^\circ\text{C}$ +80°C $\pm 5^\circ\text{C}$	Profile 1 Profile 2
$\leq \pm 1.5 \mu\text{sec}$ over 4 h	+80°C $\pm 2^\circ\text{C}$ +80°C $\pm 5^\circ\text{C}$	Profile 1 Profile 2
$\leq \pm 1.5 \mu\text{sec}$ over 8 h	+80°C $\pm 0.5^\circ\text{C}$ +80°C $\pm 5^\circ\text{C}$	Profile 1 Profile 2



### 3. Mechanical Structure (mm)

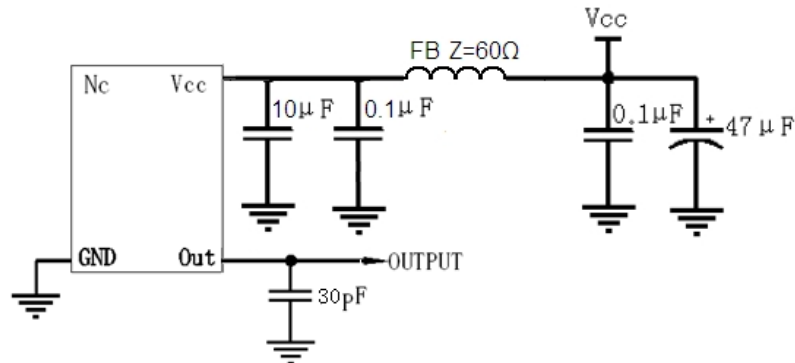


- Note1:** Tolerance  $\pm 0.2\text{mm}$  without mark
- Note2:** The first two xx representative: week  
After two xx representative: year
- Note3:** Referential weight  $<30\text{g}$
- Note4:** NC is not connect

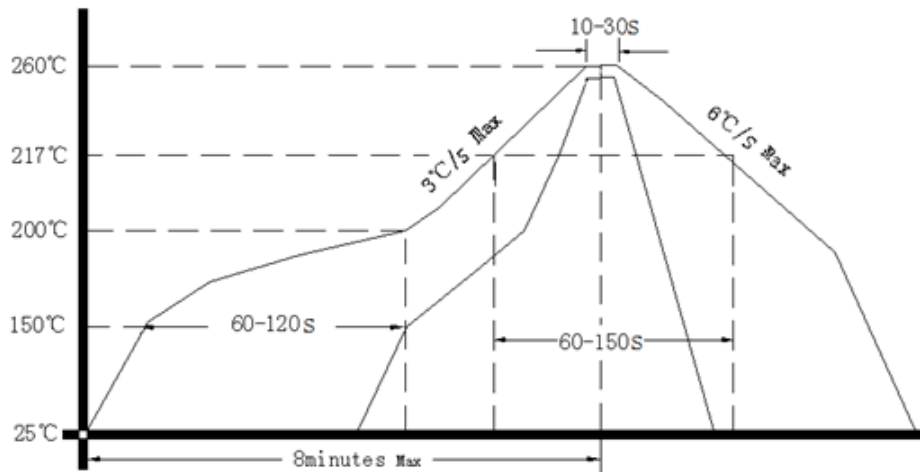




## 4. Test Circuit



## 5. Reflow Soldering Curve (RoHS)



Note: Passing through reflow upside down is not supported

## 6. Package: Tape & Reel (mm)

