



Table of amendment

Version	Revision contents	Prepared by	Revised date
1.0	The first issued	<i>Amway</i>	2024.02.23
1.1	Revise “memory map” typo	<i>Amway</i>	2024.05.28
1.2	The “Package: Tape & Reel” changed	<i>Amway</i>	2025.01.06



1. Electrical Parameters

MODEL: O22S-1801-9.61MHz						
Item	Description	Parameters			Unit	Test Condition
		Min.	Typ.	Max.		
Output	Frequency	9.61			MHz	
	Output Waveform	LVTTTL				
	Output Low Voltage			0.4	V	V _{cc} =3.3V, Load =15pF
	Output High Voltage	2.4			V	V _{cc} =3.3V, Load =15pF
	Duty Cycle	45		55	%	Measurement at -40~85°C
	Spurious Suppression			-90	dBc	
	Rise/Fall Time			4	ns	10%~90%V _{CC}
	Load	13.5	15	16.5	pF	
	Start up time			1	s	90%V _{cc} to the correct frequency output time
Frequency Stabilities	Frequency Accuracy	-0.8		+0.8	× 10 ⁻⁶	Within 90 days after shipment and 15 minutes warm up time (before reflow), Measurement referenced to nominal frequency
		-0.9		+0.9	× 10 ⁻⁶	After 2 hours and 5 minutes warm up time (after reflow), Measurement referenced to the nominal frequency.
	Frequency Stability vs. Operating Temperature Range	-3		+3	× 10 ⁻⁹	TA varied from -40°C to 85°C, V _{cc} =3.3V, and Load = 15pF. Measurement referenced to frequency observed With TA = 25°C, V _{cc} =3.3V . Air condition
	Frequency Tolerance after Temperature compensated vs Operating Temperature Range	-0.3		+0.3	× 10 ⁻⁹	TA varied from -40°C to 85°C, V _{cc} =3.3V, and Load = 15pF. Measurement referenced to frequency observed With TA = 25°C, V _{cc} =3.3V . Air condition
	Temperature Accuracy			1	°C	TA varied from -40°C to 85°C, V _{cc} = 3.3V, and O _{Load} = 15 pF. Measurement TA.
	Frequency Stability vs. Supply Voltage	-1		+1	× 10 ⁻⁹	TA =25°C, V _{cc} varied from 3.135V to 3.465V and Load =15pF. Measurement referenced to frequency observed with TA = 25°C, V _{cc} =3.3V.
	Frequency Tolerance vs Load	-1		+1	× 10 ⁻⁹	10% Load Change Measurement referenced to frequency observed with TA = 25°C, V _{cc} =3.3V.
	Slope	-1		+1	× 10 ⁻⁹ /°C	-40°C~ 85°C



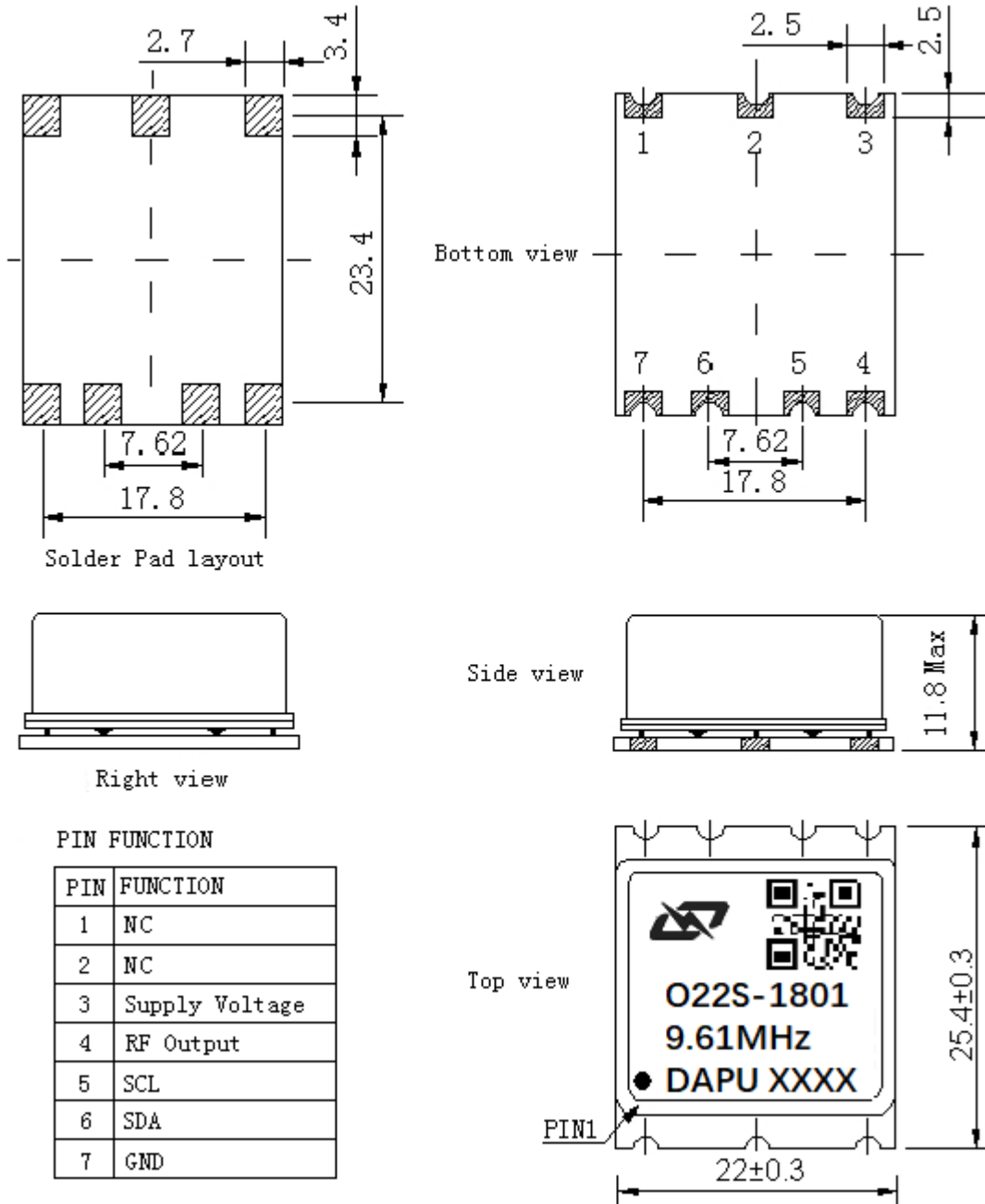
Frequency Stabilities	Short-Term Stability: Allan Variance (0°C ~75°C)			10	$\times 10^{-12}$	Temperature stability, no EMI\EMC or other interference , test after power for 1hour. 1s.
				15	$\times 10^{-12}$	Temperature stability, no EMI\EMC or other interference , test after power for 24hours. 10s.
				50	$\times 10^{-12}$	Temperature stability, no EMI\EMC or other interference , test after power for 72hours. 100s.
	Aging Tolerance per day	-0.5		+0.5	$\times 10^{-9}$	V _{cc} , TA constant Measurement referenced to frequency observed with TA=25°C, V _{cc} =3.3V. and after 30 days of operation
	Aging Tolerance per month	-12		+12	$\times 10^{-9}$	
	Aging Tolerance 1 Year	-0.08		+0.08	$\times 10^{-6}$	
Aging Tolerance 10 Years	-0.5		+0.5	$\times 10^{-6}$		
Power Supply	Supply Voltage	3.135	3.3	3.465	V	
	Steady Consumption			450	mA	@25°C
	Warm up current			1000	mA	When all temp range
	Warm Up Time			5	minute	
	Warm Up 1	-0.08		+0.08	$\times 10^{-6}$	After warm up 3 minutes. Measurement referenced to frequency observed with TA = 25°C, V _{cc} =3.3V. and after 24 hours of operation.
	Warm Up 2	-0.02		+0.02	$\times 10^{-6}$	After warm up 10 minutes. Measurement referenced to frequency observed with TA = 25°C, V _{cc} =3.3V. and after 24 hours of operation.
Phase Noise	Phase Noise			-80	dBc/Hz	1Hz
				-120		10Hz
				-140		100Hz
				-145		1KHz
				-150		10KHz
				-150		100KHz
				-150		1MHz



Environmental Conditions	Operable Temperature range	-40		+85	°C		
	Operating Temperature	-40		+85	°C		
	Storage Temperature	-55		+105	°C		
	Temperature Rate of Change			1	°C/min		
	Jitter			1.6	ps-rms	12KHz-5MHz	
	Air-tightness			1x10 ⁻⁹	Pa.cm ³ /s	Crystal cavity	
				1x10 ⁻⁵	Pa.cm ³ /s	Shell	
	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	Test Condition: 0.75mm ;acceleration:10g;10Hz~500Hz, one cycle per 30 min, test 2 hour. (3 times for each 3 directions X ,Y , Z), IEC 68-2-06 Test Fc.						
Shock	50g; 11ms; half sine wave (3 times for each 3 directions X ,Y , Z),IEC 68-2-27 Test Ea/Severity 50A.						
Full Package Storage	Relative Humidity (%)	20%~70%					
	Temperature (°C)	-10~35°C					



2. Mechanical Structure (mm)



Note1: Tolerance ± 0.20mm without mark

Note2: The first two xx representative: year
After two xx representative: week

Note3: Referential weight 10g

Note4: NC is not connect



3. I²C Devices Address

3.1. 2kbit I²C SERIAL EEPROM

Device name: FM24C02B

Device supplier: FUDAN MICRO

Device address: 1010 100

Memory map

Address	Size bytes	Parameter	Format	Value
0000h~0000h	1	EEPROM map version	unsigned byte	01h
0001h~0001h	1	HUAWEI Reserved		00h
0002h~0004h	3	Vendor ID(3 characters)	ASCII	DP
0005h~0024h	32	Vendor Product ID	ASCII	O22S-1801-9.61MHz
0025h~0028h	4	Nominal frequency in Hertz	32-bit unsigned integer	9610000
0029h~002Ch	4	Device serial number	32-bit unsigned integer	001
002Dh~0032h	6	Date code of manufacture	ASCII	“YYMMDD”
0033h~003Fh	13	HUAWEI Reserved		00h
0040h~0047h	8	A ₀	64-bit floating point	0.1334
0048h~004Fh	8	A ₁	64-bit floating point	-0.005225
0050h~0057h	8	A ₂	64-bit floating point	3.77E-05
0058h~005Fh	8	A ₃	64-bit floating point	-9.07E-07
0060h~0067h	8	A ₄	64-bit floating point	1.99E-08
0068h~006Fh	8	A ₅	64-bit floating point	-1.85E-10
0070h~0077h	8	B ₀	64-bit floating point	-101.583
0078h~007Fh	8	B ₁	64-bit floating point	0.740016
0080h~009Fh	32	HUAWEI Reserved		00h
00A0h~00CFh	48	Vendor Reserved		
00D0h~00D1h	2	Pmin	16-bit unsigned integer	10240
00D2h~00D3h	2	Pmax	16-bit unsigned integer	51200
00D4h~00FFh	44	Vendor Reserved		

Note: All numerical values are stored in little endian format

3.2. Analog-to-Digital Converter

Device name : SD150

Device supplier : SGMICRO

Device address : 1001000

Initialize the register address: 00000001

The initialization value: 01000010 10000011

Note: More detailed information see the datasheet provide by the SGMICRO.



4. Temperature measurement and compensation scheme

Temperature compensation formula:

$$A_5P^5 + A_4P^4 + A_3P^3 + A_2P^2 + A_1P + A_0 = \frac{f(P) - f(P_{ref})}{f(P_{ref})}$$

A_x : Temperature compensation parameters (see register list)

P : This parameter is read by ADC and is related to temperature.

$f(P)$: measured frequency.

P_{ref} : Parameter variables associated with the reference Temperature (25°C)

OCXO Ambient temperature calculation formula:

$$B_1P + B_0 = Ta[^\circ C]$$

5. Vibration condition

Random vibration and sinusoidal vibration

	Test conditions	Vibration parameter diagram
Random Vibration (outside)	5~10Hz:+12dB/oct,(0.000026g ² /Hz) 10~50Hz:0.04m ² /s ³ (0.000416 g ² /Hz) 50~100Hz:-12 dB/oct,(0.000026g ² /Hz) The total root mean square acceleration is 0.15Grms. 3 x 30min	Figure 3
Swept Sine (outside)	5-9Hz:1.2mm,9~200Hz:4m/s ² ,3 x 5sweep cycles,1oct/min.	Figure 4
Installation vibration of trackside equipment	10~600Hz: -1.5 dB/oct 600~2000Hz:0.001g ² /Hz	Figure C.4

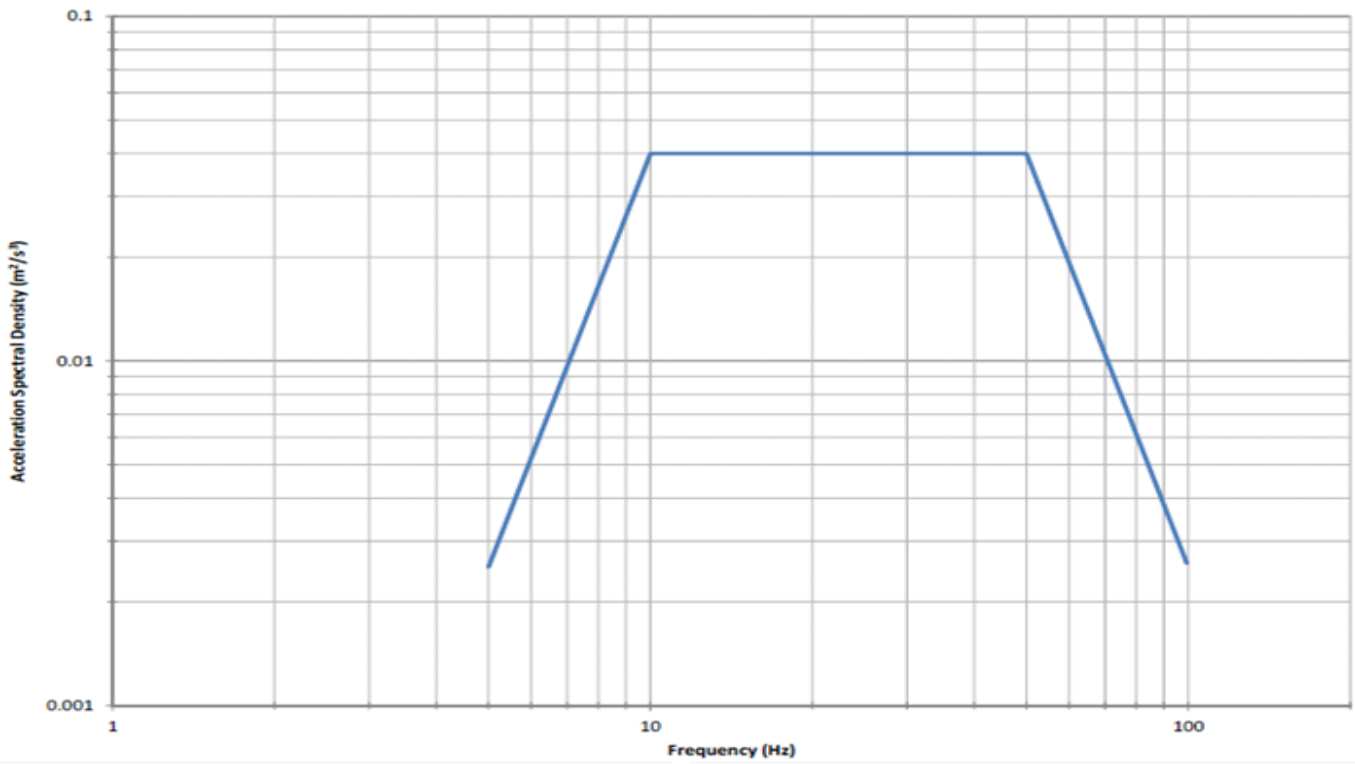


Figure 3

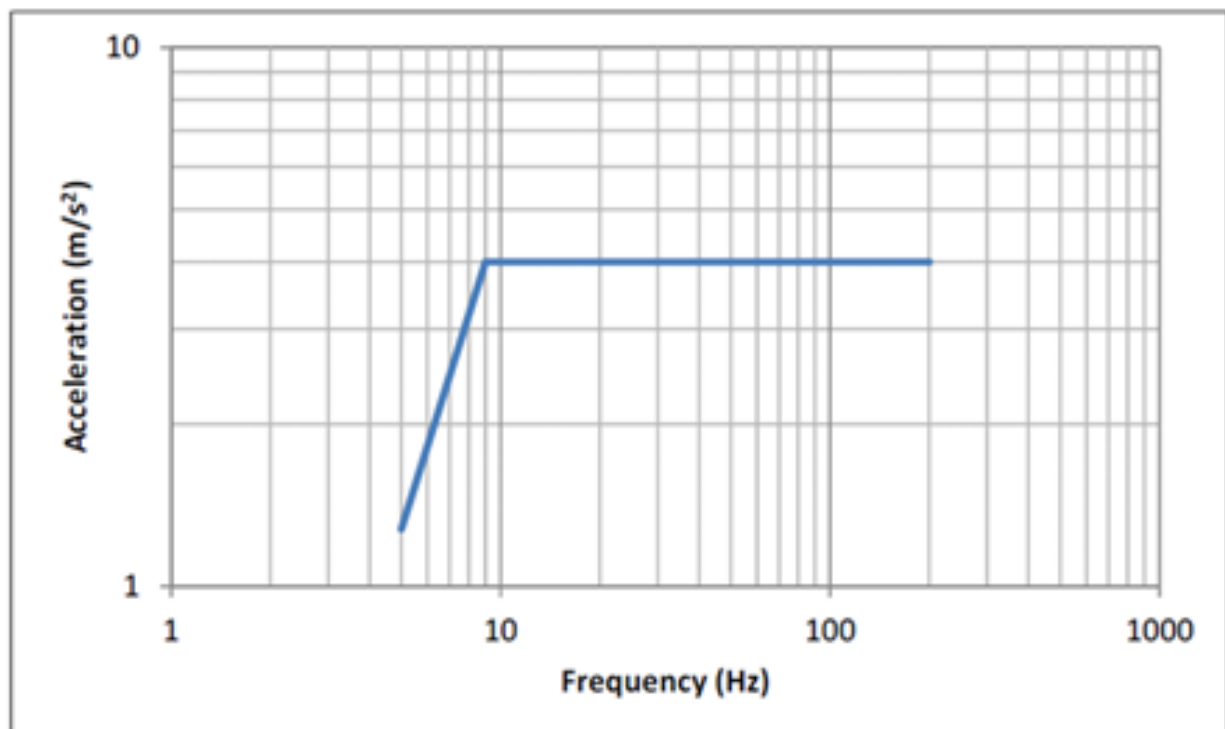


Figure 4

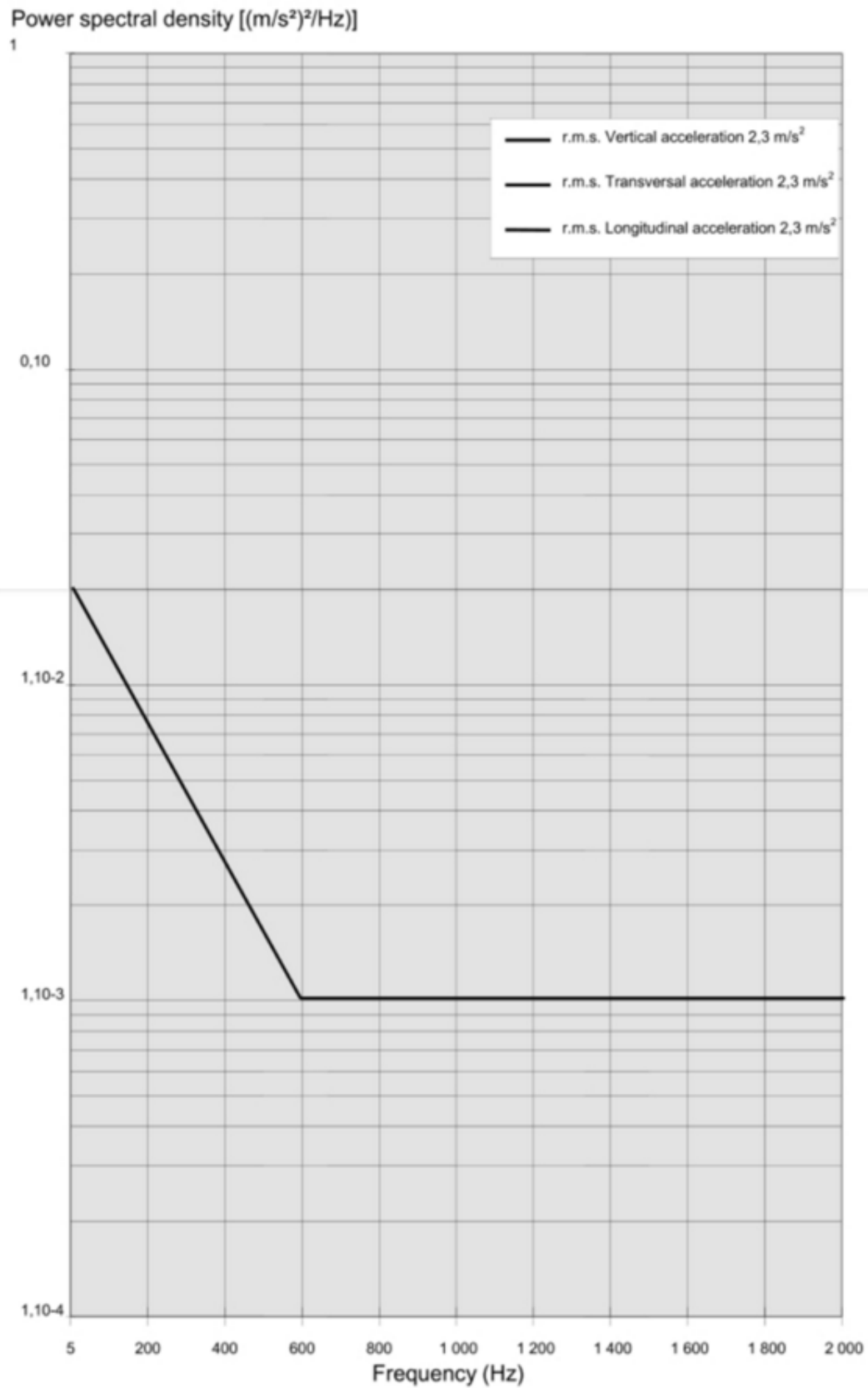
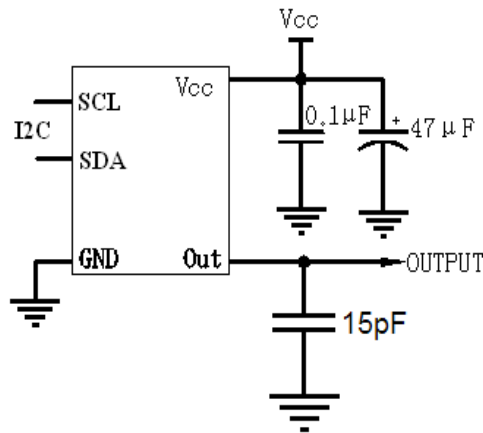


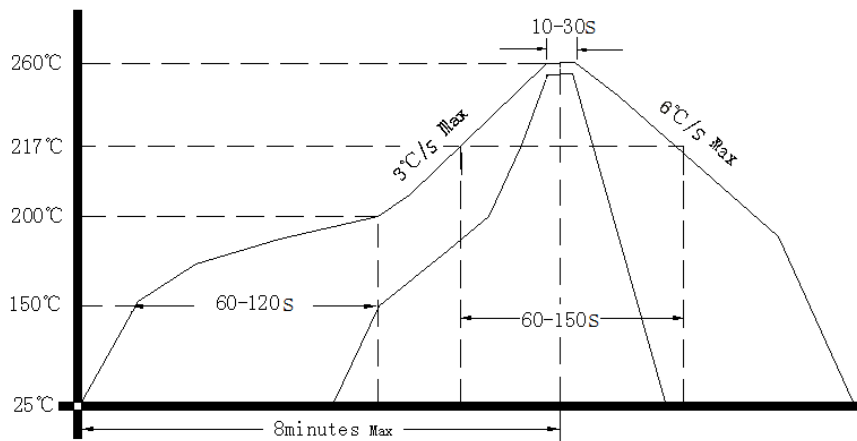
Figure C.4



6. Test Circuit



7. Reflow Soldering Curve (RoHS)



Note: Passing through reflow upside down is not supported

8. Package: Tape & Reel (mm)

