Travelling Merchant: A021

DATASHEET

Standard: **O22S-2103-10.00MHz**

P/N:

Plot			The Label
Drew	Audited	Approved	
Amway.wei	Tony · Wang	James. Liu	
Date: 2015.01.12			Stamp, please! Thanks!

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Table of amendment

Version	Revision contents	Prepared by	Revised date
1.0	The first issued	Amway	2015.01.12

1. Electrical Parameters

MODEL： O22S-2103-10.00MHz

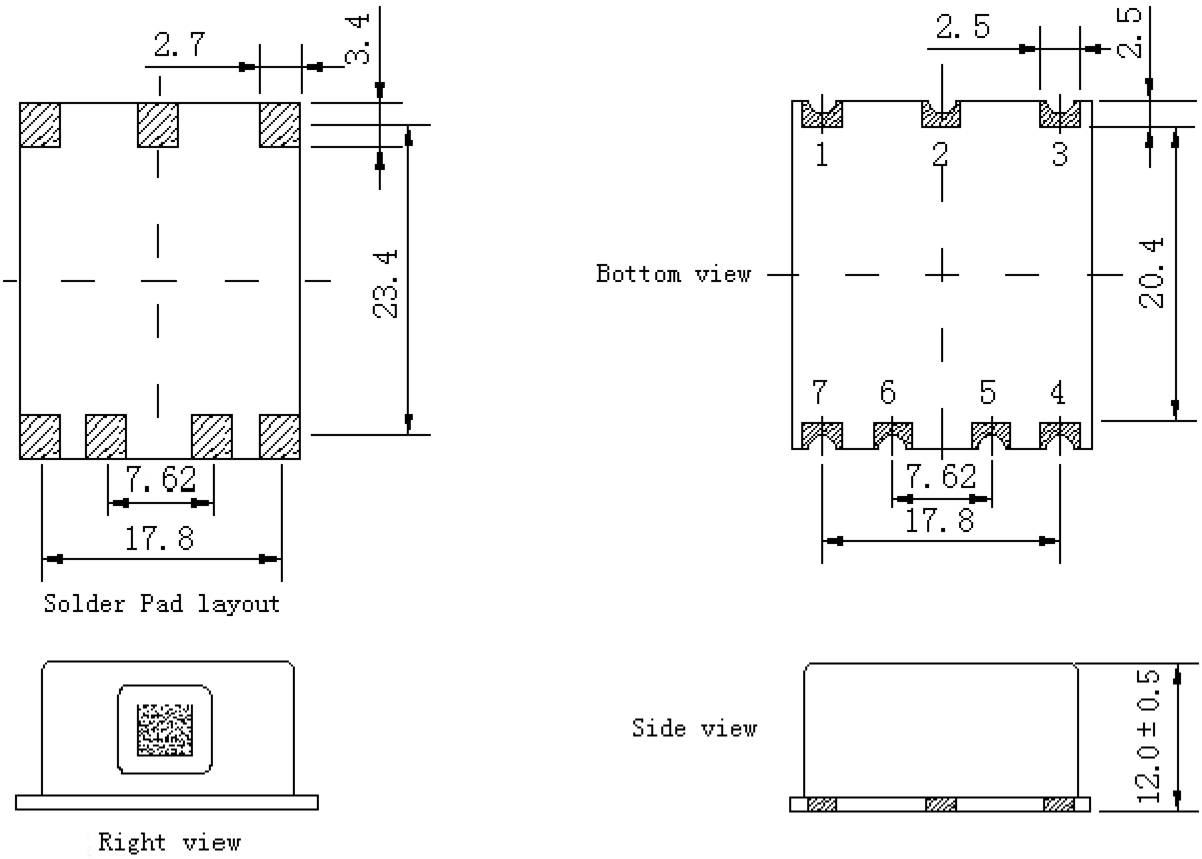
Item	Description	Parameters			Unit	Test Condition
		Min.	Typ.	Max.		
Output	Frequency		10.00		MHz	
	Output Waveform		LVTTL			
	Output Low Voltage			0.4	V	V_{cc}=5.0V, O_{load}=15pF
	Output High Voltage	2.4			V	V_{cc}=5.0V, O_{load}=15pF
	Duty Cycle	45	50	55	%	@50%
	Rise / Fall Time (10%~90%)		2	3	ns	@25℃
	Load		15		pF	
	Frequency Tolerance vs. Operating Temperature Range	-3		+3	$\times10^{-9}$	T_A varied from -5℃ to 85℃, measurement referenced to frequency observed with $f_{ref}=(f_{max}+f_{min})/2$ V_{cc}=5.0V, O_{load}=15pF, temperature variable speed less than 1℃per minute.
		-0.3		+0.3	$\times10^{-9}$	ΔT<5℃ within range -5℃ to 20℃ V_{cc}=5.0V, O_{load}=15pF, temperature variable speed less than 1℃per minute.
		-0.3		+0.3	$\times10^{-9}$	ΔT<5℃ within range 20℃ to 60℃ V_{cc}=5.0V, O_{load}=15pF, temperature variable speed less than 1℃per minute.
		-0.3		+0.3	$\times10^{-9}$	ΔT<5℃ within range 60℃ to 85℃ V_{cc}=5.0V, O_{load}=15pF, temperature variable speed less than 1℃per minute.
	Warm-up stability	-0.015		+0.015	$\times10^{-6}$	T_A in range -5℃ to 85℃,within 30 days power off, After 10 minutes of warm-up with reference to 24 hours value
	Frequency variation During Thermal Shock (up to 3 minutes duration)	-2		+2	$\times10^{-9}$	Ramp rate : 5℃/min up to 3 minutes duration, within entire operating temperature range.
	Initial Frequency Tolerance	-0.05		+0.05	$\times10^{-6}$	T_A=25℃, Vcc=5.0V, at shipment measurement referenced to 10MHz after 10 minutes of warm-up .
	Allan Deviation			0.03	$\times10^{-9}$	Temperature stability, no EMI\EMC or other interference，test after power for 24hours, 25℃; 1s, using PN9000 equipment.
				0.02	$\times10^{-9}$	Temperature stability, no EMI\EMC or other interference，test after power for 24hours, 25℃; 10s, using PN9000 equipment.

	Maximum total frequency jump	-0.2		+0.2	$\times 10^{-9}$	Test the frequency every 2s after the products are powered off for 72 hours. Take 10 frequency values and calculate the average value.
	Maximum daily ageing phase variation, based on mean ageing slope linear estimation over 48h(After 7 days of operation)	-20		+20	us	ΔT<5℃, measured during minimum of 48h of operation at compensation algorithm
	Daily Aging	-0.5		+0.5	$\times 10^{-9}$	Vcc, TA constant measurement referenced to frequency observed with TA=25℃, Vcc=5.0V, over 24 hours of operation, before shipment.
		-0.5		+0.5	$\times 10^{-9}$	Vcc, TA constant measurement referenced to frequency observed with TA=25℃, Vcc=5.0V, over 24 hours of operation, after 7 days of operation .
	Overall Stability	-0.5		+0.5	$\times 10^{-6}$	Inclusive of the following: operating temperature -5℃ to 85℃ 5.0V ±5% 15pF load ±5% 10 years aging reference to nominal frequency
Power Supply	Supply Voltage	4.9	5.0	5.1	V	
	Current Consumption			550	mA	T_A=-5℃
				240	mA	T_A=25℃
				80	mA	T_A=85℃
	Warm-up completion time			4	min	T_A=25℃, Oscillator frequency within ±0.015$\times 10^{-6}$, with reference to 24 hour value .
				10	min	TA in range -5℃ to 85℃, Oscillator frequency within ±0.015$\times 10^{-6}$, with reference to 24 hour value .
	Warm up current			600	mA	
	Ripple noise on power supply			10	mV	Peak to peak
	Inrush current on the 5V supply, at power up			3500	mA	For a 50µs max

Phase Noise	Phase Noise @25℃			-70	dBc/Hz	1Hz
				-100		10Hz
				-120		100Hz
				-130		1KHz
				-130		10KHz
				-130		1MHz
Environmental Conditions	Reference Air Velocity	1	2	3	m/s	
	Operable Temperature	-5		+85	℃	
	Storage Temperature	-40		+85	℃	
	ESD Level	Human Body Model, class2: 2000V to 4000V; ANSI/ESDA/JEDEC JS-001-2010.				
		Machine Model, class B: 200V to 400V; ANSI/ESDA/JEDEC JS-001-2010.				
	Moisture Sensitivity Level	Level 2 .				
Environmental Reliability (Operational Conditions)	Vibration(Sinusoidal)	1. Frequency range:5-9Hz（displacement：1,2mm） 2. Frequency range:9-200Hz（displacement：4m/s^2） 3. Duration:3×5 sweep cycles				
	Vibration(Random)	1. Frequency range:5-10Hz,10-50Hz,50-100Hz 2. ASD:0,04m^2/s^3 3. Duration:3 ×30 minutes				
	Shocks	1. Shock spectrum: half sine 2. Duration:11ms 3. Acceleration:50m/s^2 4. Directions of bumps:6 5. Duration:100 in each direction				
	Humidity	1. Temperature:30℃ 2. Humidity：93%RH 3. Duration：4d（96h）				
Environmental Reliability (Non Operational Conditions)	Random Vibration	1. Frequency range:5-20Hz,20-200Hz. 2. ASD:1 m^2/s^3 3. Duration:3 ×30 minutes				
	Shocks	1. Shock spectrum: half sine 2. Duration:6ms 3. Acceleration:180m/s2 4. Directions of bumps:6 5. Duration:100 in each direction				
	Free fall	1. Height:0.1m 2. Duration:1 fall on each face				

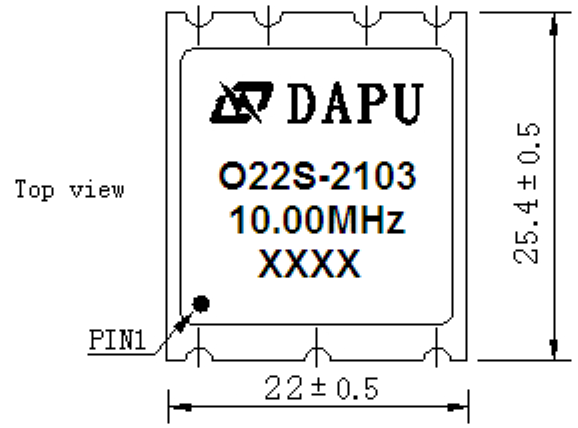
Environmental Reliability (Air temperature)	Low	1. low Temp:-25℃； 2. Duration: 72h
	High	1. low Temp:70℃； 2. Duration: 72h
	air/air Change	1. Temp Change:-25℃～30℃ 2. Cycle:5
	Humidity	1. Temperature:30℃ 2. Humidity：93%RH 3. Duration：4d（96h）
	Humidity(Condensation)	1. Temperature:30℃ 2. Humidity：90-100%RH 3. Duration：2Cycle
Full Package Storage	Relative humidity (%)	20%～70%
	Temperature (℃)	-10~35℃

2. Mechanical Structure(mm)



PIN FUNCTION

PIN	NOTATION	FUNCTION
1,2	NC	Not Connect
3	VCC	Supply Voltage
4	OUTPUT	RF Output
5	SCL	Serial Clock Input
6	SDA	Serial Data Input/Output
7	GND	GND



Note1: Tolerance ±0.2mm without mark

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

Note3: Referential Weight 12 g

Note4: NC is not connect

Note5: Material composition :
Pad/terminals：Cu （Surface plating: Ni 3-6um，Au 0.1～0.5um）
Base: High-TG FR4
Cover：Stainless steel

3. I^{2}C Devices Address

3.1.1 8K I^{2}C SERIAL EEPROM

Device name : AT24C08C

Device supplier : Atmel

Device address : 1010100~1010111

3.1.2 EEPROM for inventory and data storage

Address	Total number of bytes	Usage
0x000 – 0x05F	96	Inventory record
0x060 – 0x07F	32	Reserved future inventory format extension
0x080 – 0x1FF	384	Reserved for temperature correction record
0x0200 – 0x2FF	256	Reserved for aging correction record
0x0300 – 0x3FF	256	Frequency tolerance

3.1.3 Inventory record in EEPROM

The inventory record inside the EEPROM will be in the following format. This is a 96 byte format.

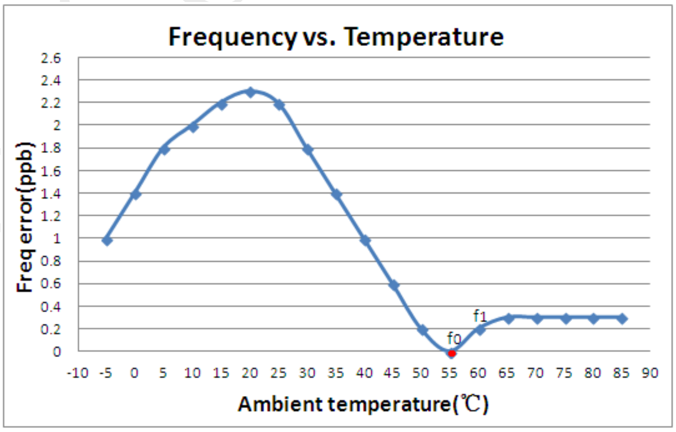
Identification Fields	D#	# of bytes	Values (in Hex)
Header	D0	1	80
Function Code: ******	D1-D11	11	5 ASCII bytes to show "******" See note 1 for unused position filling
Serial Number: "$Y_1Y_0F_1F_0M_1M_0N_5N_4N_3N_2N_1N_0$" Y_1Y_0=year,F1F0=factory code, M_1M_0=month $N_5N_4N_3N_2N_1N_0$=unit number	D12-D24	13	Variable Note 1,2, 4
Doc Number	D25-D36	12	9 ASCII bytes to show "DD/******" See note 1 for unused position filling
Doc Issue No. "$I_1.I_0$" (e.g. 1.5)	D37-D41	5	Note 1,6
Version "$SS_2:S_1S_0$ " (eg. S4:00)	D42-D47	6	Note 1,4
Supplier's Part Number : numbering scheme (12-digit)	D48-D62	15	12 ASCII bytes See note 1 for unused position filling See note 5 for value
Supplier Specific Information (If applicable)	D63-D73	11	Note 1
Specific information per function code	D74-D80	7	Note 1, 3
Supplier Code (Supplier's company name in capital letter)	D81-D94	14	"DAPU" See note 1 for unused position filling
End of File	D95	1	04

The inventory record inside the EEPROM will be in the following format. This is a 256 byte format.

Identification Fields	D#	# of bytes	Values (in Hex)
Frequency drift value	0x0300 – 0x3FF	256	Note 7,8,9

Notes

1. The I/D values are in ASCII representation except where explicitly noted. Unused positions in a field are filled with the ASCII space character (20h). A null character (00h) is in the last byte of each field, except header and End-of-file. The end-of-file ASCII character (04h) indicates end of inventory data.
2. The variable values will be provided by or agreed to by SCN contact for use here.
3. This field is reserved for future use
4. F1F0 is defined by Supplier to identify different factory of the Supplier to manufacture the part.
SS2:S1S0 is defined by Supplier to differentiate different version of the part.
Every Hardware or software modification must be identified by a new value.
5. This part number is specific to each supplier, and must clearly identify the product.
Different values must be used before and after qualification.
6. The Doc Issue in inventory is the version used by supplier to design product.
7. Address 0x0300 indicates temperature sensor value 55℃, address 0x0301 indicates temperature sensor value 55.2℃. In this way, increment address when temperature increases every 0.2℃. Therefore, address 0x03FF indicates 106.2℃.
8. Storage of frequency drift: Testing OCXO frequency in environmental temperature range -5℃~+85℃ sloop:2℃/1min, take the minimum frequency value f0 as reference point. Variation(frequency drift at other temperature points relate to f0) divide by 0.05ppb, the results are stored to the addresses, frequency drift value is defined as integer. That is:
Frequency drift=((fn-fo)/10,000,000)/0.00,005. For example, when temperature of OCXO is risen from -5℃~+85℃, frequency variation plot is as figure below. Find the minimum frequency value f0. Difference between f1 and f0 is 0.2ppb, so store 4 into the related temperature sensor address.



9. Compensation of frequency drift method：
   a. Read the feedback value from internal temperature sensor and finding the corresponding address, then look up the table of the adjacent addresses.
   b. Using linear interpolation (or parabolic) methods calculate the correct frequency drift.
   c. Calculate crystal drift compensation value by using the frequency drift, through a digital or analog low-pass filter to compensate for output.

3.2. DIGITAL THERMOMETER AND THERMOSTAT

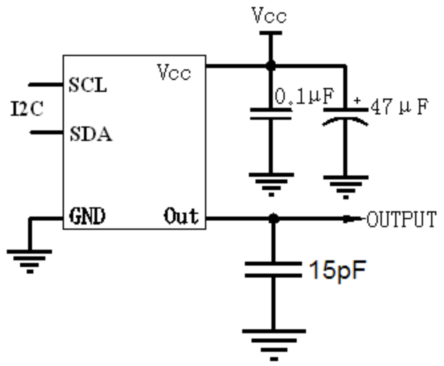
Device name: MCP9804

Device supplier: Microchip

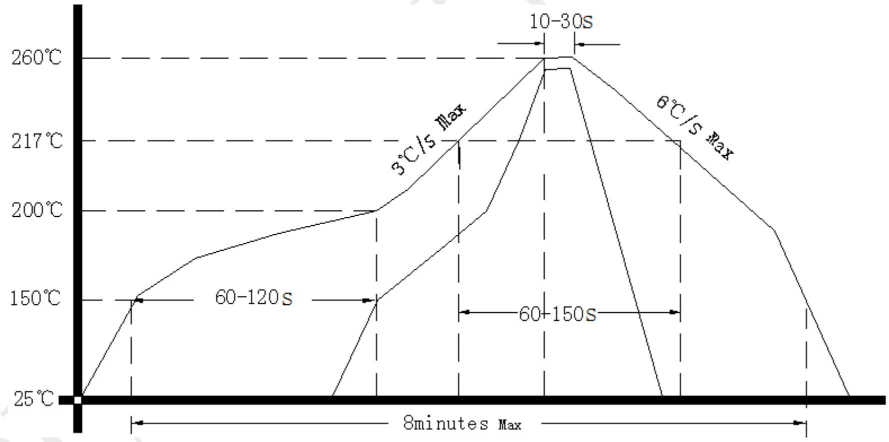
Device address: 0011111

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

4. Test Circuit



5. Reflow Soldering Curve (RoHS)



6. Package(mm)