Customer Code: A037

DATASHEET

DAPU P/N: **O22S-3704-10.00MHz**

Customer P/N: _____

DAPU			Customer Approval
Drew	Audited	Approved	
Amway.wei	Tony · Wang	James.Liu	
Date: 2020.02.13			Stamp, please! Thanks!

Guangdong Dapu Telecom Technology Co.,Ltd

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Table of amendment

Version	Revision contents	Prepared by	Revised date
1.0	The first issued	Amway	2020.02.13

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1. Electrical Parameters

MODEL： O22S-3704-10.00MHz						
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, Load =15pF
	Output High Voltage	2.4			V	V_{cc}=3.3V, Load =15pF
	Duty Cycle	45	50	55	%	
	Spurious Suppression			-90	dBc	
	Rise/Fall Time			8	ns	
	Load		15		pF	
Frequency Stabilities	Initial Frequency Tolerance	-1.0		+1.0	$\times 10^{-6}$	After 2 hours and 5 minutes warm up time （after reflow), Measurement referenced to the frequency (before reflow）
	Frequency Stability vs. Operating Temperature Range	-5.0		+5.0	$\times 10^{-9}$	TA varied from-40 to 90℃,V_{cc}=3.3V, and Load = 15pF.Measurement referenced to frequency observed With TA = 25℃, V_{cc}=3.3V .
	Frequency Tolerance after Temperature Compensated vs Operating Temperature Range(at 3rd and 5th Polynomial)	-0.3		+0.3	$\times 10^{-9}$	TA varied from -40 to 90℃, V_{cc}=3.3V, and Load = 15 pF. Measurement referenced to frequency observed With TA = 25℃, V_{cc}=3.3V.
	Frequency Jump			0.05	$\times 10^{-9}$	Continuous testing for 48 hours, temperature Fluctuations< 3 ℃ ,one sampling/10s.
	Hysteresis			0.3	$\times 10^{-9}$	
	Frequency Stability vs. Supply Voltage	-0.5		+0.5	$\times 10^{-9}$	measurement referenced to frequency observed T_A=25℃, V_{cc} varied from 3.13V to 3.47V, and O_{Load}=15pF.
	Frequency Tolerance vs Load	-0.5		+0.5	$\times 10^{-9}$	5% load change measurement referenced to frequency observed with T_A=25 ℃ , V_{cc}=3.3V, and O_{Load}=15pF.

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	Aging Tolerance day	-0.6		+0.6	$\times 10^{-9}$	After 3 days
	Aging Slope Variation (/day)	-0.4		+0.4	$\times 10^{-9}$	
	Aging Tolerance 10 Years	-0.5		+0.5	$\times 10^{-6}$	
Power Supply	Supply Voltage	3.13	3.3	3.47	V	
	Steady Consumption			400	mA	@25℃
	Warm up current			1000	mA	
	Warm-Up Time			5	minutes	@25 ℃ within ±0.02 × 10^{-6} of final frequency with reference after 1 hours on.
				10	minutes	@25 ℃ within ±0.01 × 10^{-6} of final frequency with reference after 1 hours on.
Phase Noise	Phase Noise			-80	dBc/Hz	1Hz
				-120		10Hz
				-140		100Hz
				-145		1KHz
				-150		10KHz
				-150		100KHz
Environmental Conditions	Operating Temperature	-40		+90	℃	
	Storage Temperature	-55		+125	℃	
	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 3.				
	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 (℃)	-10~35℃				

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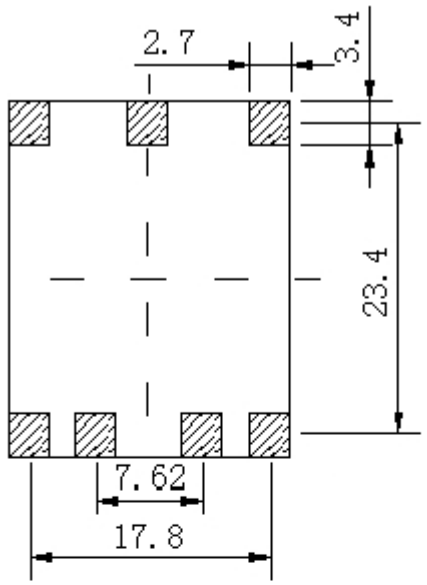
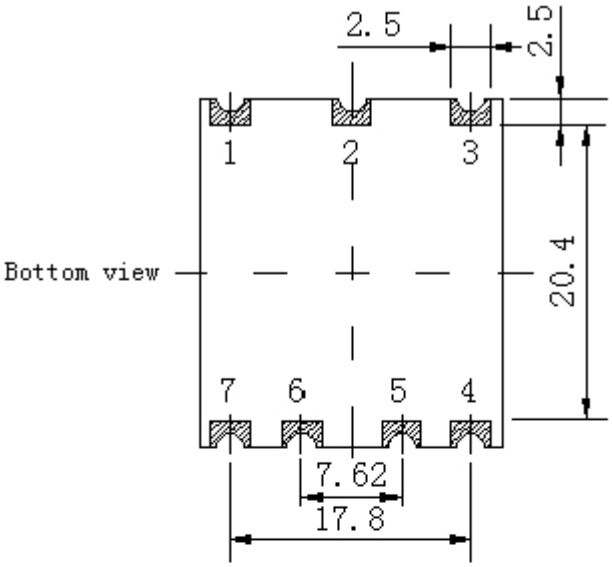
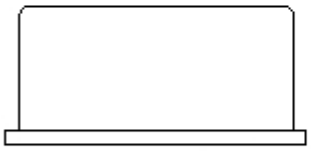
2. Mechanical Structure (mm)

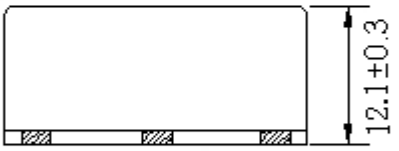


Solder Pad layout



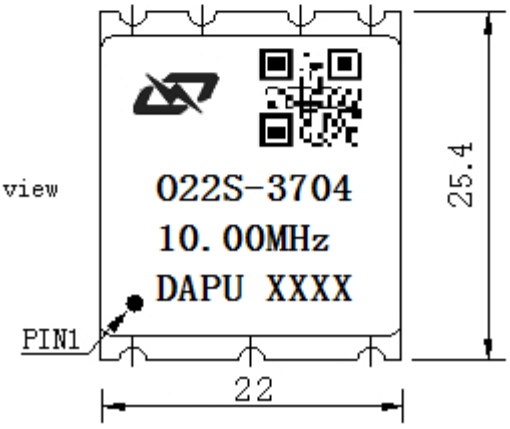


Right view



PIN FUNCTION

PIN	FUNCTION
1	NC
2	Reset
3	Supply Voltage
4	RF Output
5	SCL
6	SDA
7	GND



Note1: Tolerance ±0.20mm without mark

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

Note3: Referential weight 10g

Note4: NC is not connect

Note5: The PIN2 function is: Input by low level voltage, the OCXO internal MCU will reset (reset MCU only).

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3. I²C Devices Address

Device name: **PIC16F1704**
Device supplier: MICROCHIP
Device address: 1110 000

Memory map

Address	Size bytes	Parameter	Format	Value
0000h~0004h	5	Vendor ID	ASCII	DP
0005h~0024h	32	Vendor Product ID	ASCII	O22S-3704-10.00MHz
0025h~0028h	4	Nominal frequency in Hertz	32-bit unsigned integer	10000000
0029h~002Ch	4	Device serial number	32-bit unsigned integer	001
002Dh~0032h	6	Date code of manufacture	ASCII	"YYMMDD"
0033h~003dh	11	PxxxxxxYYWW P:Vedor code, xxxxxx: OCXO serial number(Insert a null marker at the end when a digit is left.) YY : Production Year, ex)19 => 2019 WW : Production Week, ex) 45, 45weeks	ASCII	"PxxxxxxYYWW"
003Eh~003Fh	2	SAMSUNG Reserved		00h
0040h~0047h	8	A_0	64-bit floating point	1.33E-01
0048h~004Fh	8	A_1	64-bit floating point	-5.23E-03
0050h~0057h	8	A_2	64-bit floating point	3.77E-05
0058h~005Fh	8	A_3	64-bit floating point	-9.08E-07
0060h~0067h	8	A_4	64-bit floating point	1.99E-10
0068h~006Fh	8	A_5	64-bit floating point	-1.85E-12
0070h~0077h	8	B_0	64-bit floating point	-1.02E+02
0078h~007Fh	8	B_1	64-bit floating point	7.40E-01
0080h~0087h	8	C_0	64-bit floating point	7.40E-01
0088h~008Fh	8	C_1	64-bit floating point	-5.23E-03
0090h~0097h	8	C_2	64-bit floating point	3.77E-05
0098h~009Fh	8	C_3	64-bit floating point	-9.08E-07

00A0h~00BFh	32	SAMSUNG Reserved		00h
00C0h~00EFh	48	Vendor Reserved		
00F0h~00F1h	2	OCXO Temperature 10-bit ADC Value	16-bit unsigned integer	528
00F2h~00FFh	14	Vendor Reserved		

Note1：All numerical values are stored in little endian format

Note 2: SDA, SCL, Reset Input low voltage is $0.3V_{cc}$ Max, Input high voltage is $0.7V_{cc}$ Min.

Note 3: MCU and I2C reset do not affect the output quality and waveform of crystal oscillator signal.

Note4: I2C Clock Speed: 100kbit/s Max.

ADC bit map:

BIT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10 bit ADC	0x000 - 0x3FF										0	0	0	0	0	0

4. Temperature measurement and compensation scheme

Temperature compensation formula(five functions)：

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

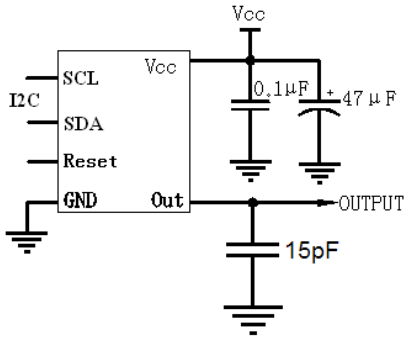
Temperature compensation formula(three functions)：

$$C_3P^3 + C_2P^2 + C_1P + C_0 = \frac{f(P) - f(P_{ref})}{f(P_{ref})}$$

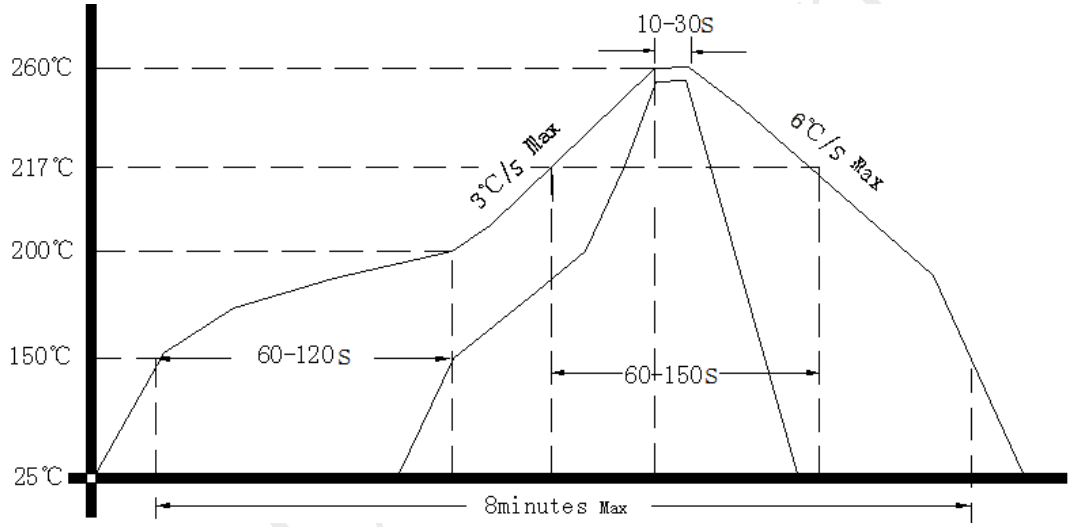
A_x: Temperature compensation parameters (see register list)
C_x: Temperature compensation parameters (see register list)
P: This parameter is read by ADC and is related to temperature.
f(P): measured frequency.
P_{ref}: Parameter variables associated with the reference Temperature (25℃)
OCXO Ambient temperature calculation formula：

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

5. Test Circuit



6. Reflow Soldering Curve (RoHS)



Note: passing through reflow upside down is not supported

7. Package: Tape & Reel (mm)