Customer Code : A037

# DATASHEET

DAPU P/N: **O22S-3702-10.00MHz**

Customer P/N:

| DAPU | | | Customer Approval |
|---|---|---|---|
| Drew | Audited | Approved | |
| Amway.wei | Tony · Wang | James.Liu | |
| Date: 2019.10.10 | | | Stamp, please! Thanks! |

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# Table of amendment

| Version | Revision contents | Prepared by | Revised date |
|---|---|---|---|
| 1.0 | The first issued | Amway | 2019.09.10 |
| 1.1 | The “Mechanical Structure” “Memory map” changed | Amway | 2019.10.10 |
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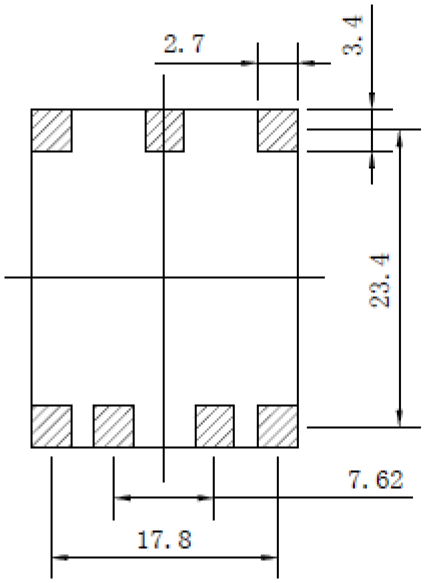
# 1. Electrical Parameters

**MODEL： O22S-3702-10.00MHz**

| 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 | $\times10^{-6}$ | After 2 hours and 5 minutes warm up time （after reflow), Measurement referenced to the frequency (before reflow） |
| | Frequency Stability vs. Operating Temperature Range | -3.0 | | +3.0 | $\times10^{-9}$ | TA varied from-40 to 85℃,$V_{cc}$=3.3V, and Load = 15pF.<br>Measurement referenced to frequency observed With TA = 25℃, $V_{cc}$=3.3V . |
| | Frequency Jump | | | 0.05 | $\times10^{-9}$ | |
| | Hysteresis | | | 0.3 | $\times10^{-9}$ | |
| | Frequency Stability vs. Supply Voltage | -0.5 | | +0.5 | $\times10^{-9}$ | 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 | $\times10^{-9}$ | 5% load change measurement referenced to frequency observed with $T_A$=25 ℃ , $V_{cc}$=3.3V, and $O_{Load}$=15pF. |

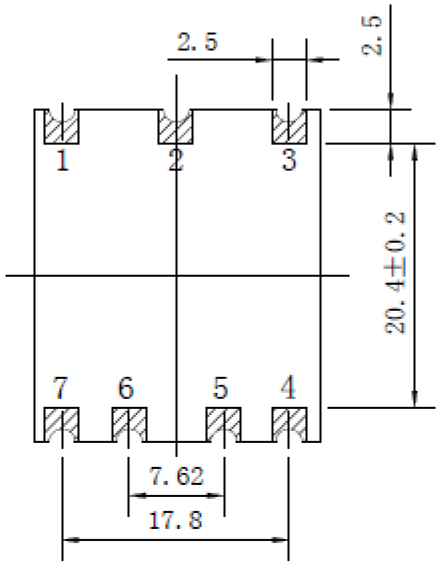
| | | | | | | |
|---|---|---|---|---|---|---|
| | Aging Tolerance day | -0.6 | | +0.6 | $\times10^{-9}$ | After 3 days |
| | Aging Slope Variation (/day) | -0.4 | | +0.4 | $\times10^{-9}$ | |
| | Aging Tolerance 10 Years | -0.5 | | +0.5 | $\times10^{-6}$ | |
| Power Supply | Supply Voltage | 3.13 | 3.3 | 3.47 | V | |
| | Steady Consumption | | | 400 | mA | @25℃ |
| | Warm up current | | | 1000 | mA | |
| | Warm-Up Time | | | 5 | minutes | @25 ℃ within ±0.02 $\times 10^{-6}$ of final frequency with reference after 1 hours on. |
| | | | | 10 | minutes | @25 ℃ within ±0.01 $\times 10^{-6}$ 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 | | +85 | ℃ | |
| | 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℃ | | | | |

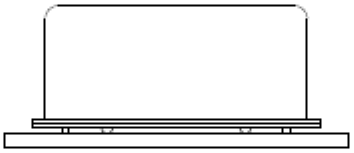
## 2. Mechanical Structure (mm)



Solder Pad layout

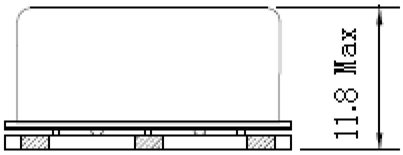
Bottom view





Right view

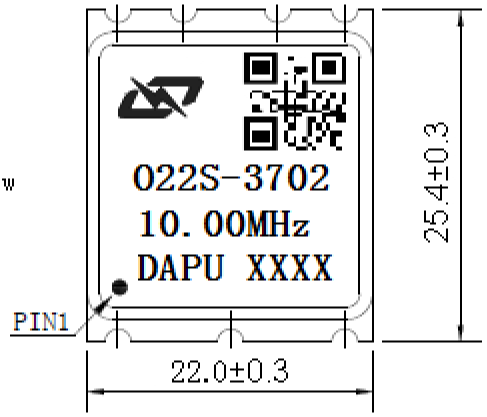
Side view



PIN FUNCTION

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

Top view



**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

# 3. I$^2$C Devices Address

## 3.1. 2kbit I$^2$C SERIAL EEPROM

Device name : AT24C02
Device supplier : Atmel
Device address : 1010 100

**Memory map**

| Address | Size bytes | Parameter | Format | Value |
|---|---|---|---|---|
| 0000h~0000h | 1 | EEPROM map version | unsigned byte | 01h |
| 0001h~0001h | 1 | SAMSUNG Reserved | | 00h |
| 0002h~0004h | 3 | Vendor ID(3 characters) | ASCII | DP |
| 0005h~0024h | 32 | Vendor Product ID | ASCII | O22S-3702-10.00MHz |
| 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~003Fh | 13 | SAMSUNG 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 | SAMSUNG Reserved | | 00h |
| 00A0h~00FFh | 96 | Vendor Reserved | | |

Note：All numerical values are stored in little endian format

## 3.2. Analog-to-Digital Converter

Device name : ADC081C027
Device supplier : TI
Device address : 1010 000
Initialize the register address：0000 0010
The initialization value：0010 0000
Note: More detailed information see the datasheet provide by the TI.

## 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.**

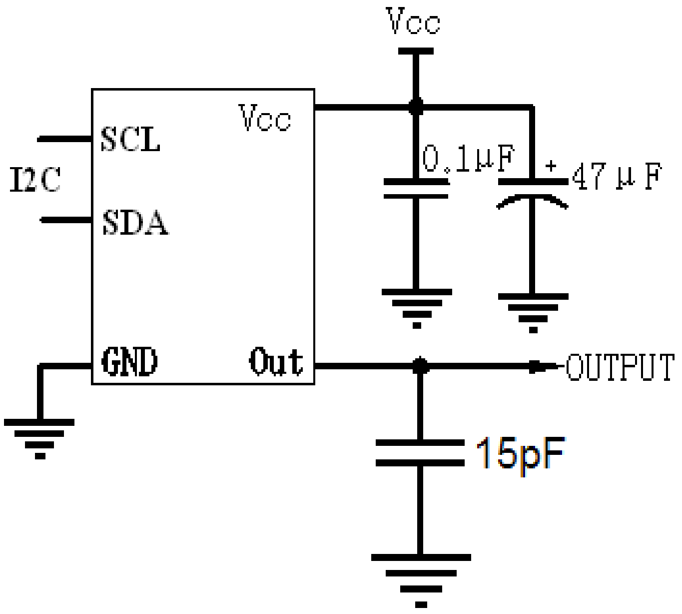
**f(P): measured frequency.**

**$P_{ref}$: Parameter variables associated with the reference Temperature (25℃)**

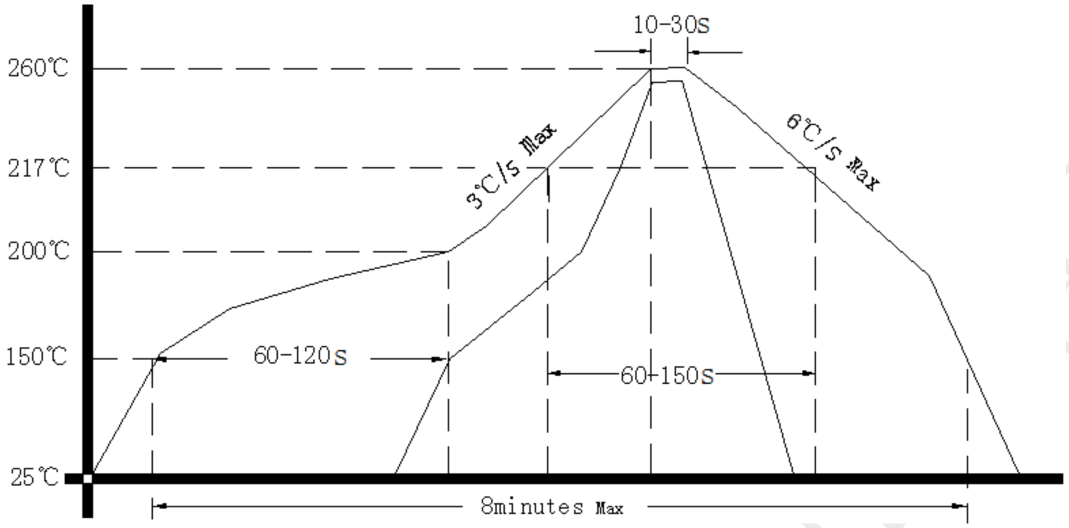
**OCXO Ambient temperature calculation formula：**

$$B_1P + B_0 = Ta[°C]$$

## 5. Test Circuit



## 6. Reflow Soldering Curve (RoHS)



Note: passing through reflow upside down is not supported

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