

SMD TCXO/VCTCXO

ASTXR-12



ESD Sensitive



RoHS / RoHS II Compliant



2.5 x 2.0 x 0.9mm

Moisture Sensitivity Level (MSL) – 1

OVERVIEW:

Abrakon's ASTXR series of Temperature Compensated Crystal Oscillators are based on an Advanced-Analog Temperature Compensation Integrated Circuit, incorporated with Rakon's Precision TCXO processing techniques.

This composite enables exceptional frequency stability over temperature ($\leq \pm 0.50$ ppm over -40°C to $+85^{\circ}\text{C}$). Additionally, high-resolution screening algorithms are employed during the production verification process, ensuring that 100% of these devices are fully compliant to the stringent frequency stability specifications.

For Power Sensitive applications, the ASTXR series provides the ability to preserve consumed power by placing the device in shut-down mode; when not used. This series of devices are ideally suited for GPS and other mobile applications where performance, size, cost and power management are of critical importance

FEATURES:

- Excellent phase noise performance
- Low power consumption
- Miniature size: 2.5 x 2.0 x 0.9mm
- RoHS compliant
- Temperature stability choices are ± 0.5 ppm to ± 2.5 ppm depending on operating temperature range

APPLICATIONS:

- GPS
- Smartphone
- PND
- Communications
- Consumer electronics
- Wi-Fi
- WiMAX/W-LAN

STANDARD SPECIFICATIONS:

| Parameters | Minimum | Typical | Maximum | Units | Notes |
|---|------------------------------|---------|-----------|-------------------------|--|
| Frequency Range | 10 | | 52 | MHz | |
| Supply Voltage (Vdd) | 1.8 | | 3.3 | V | |
| Current Consumption (@Vdd max) | | | 2 | mA | See Note 2 |
| Operable Temperature Range | -40 | | +85 | $^{\circ}\text{C}$ | |
| Storage Temperature Range | -40 | | +85 | $^{\circ}\text{C}$ | |
| Initial Frequency Tolerance @ $+25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ at time of shipment | | | ± 1 | ppm | |
| Reflow Drift | | | ± 1 | ppm | After 2 consecutive reflows and 1hr recovery@ $+25^{\circ}\text{C}$ |
| Frequency Stability over Operating Temperature Range | ± 0.5 | | ± 2.5 | ppm | Ref. to $(F_{\text{MAX}} + F_{\text{MIN}})/2$. Vc is set to midpoint of control voltage range See Note 1 |
| Frequency Slope (tested to a minimum of 1 freq. reading every 2°C over operating temperature range) | 0.1 | | 1 | ppm/ $^{\circ}\text{C}$ | See Note 1 |
| Static Temperature Hysteresis (Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at $+25^{\circ}\text{C}$) | | | 0.6 | ppm | |
| Sensitivity vs. Supply Voltage Variations (Vdd $\pm 5\%$ @ $+25^{\circ}\text{C}$) | | | ± 0.1 | ppm | |
| Sensitivity vs. Load Variations ($\pm 10\%$ load change @ $+25^{\circ}\text{C}$) | | | ± 0.2 | ppm | See Note 2 |
| Long Term Stability (frequency drift over 1 year @ $+25^{\circ}\text{C}$) | | | ± 1 | ppm | |
| Output Type | DC Coupled Clipped Sine-wave | | | | See Note 3 |
| Output Voltage Level (@ minimum Vdd) | 0.8 | | | V | See Note 2 |
| Output Load Resistance | 9 | 10 | 11 | k Ω | |
| Output Load Capacitance | 9 | 10 | 11 | pF | |
| Startup Time (amplitude) | | | 0.5 | ms | Within 90% of specified output level |
| Startup Time (frequency) | | | 2 | ms | Within ± 0.5 ppm of steady state frequency |

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Revised: 07.06.14

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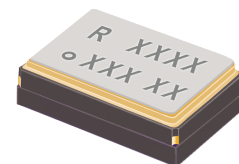
| Parameters | | Minimum | Typical | Maximum | Units | Notes |
|--------------------------------------|------------|---------|---------|---------|----------|--|
| Enable/Disable Function | | | | | | |
| Input Voltage High (VIH) | | 80%*Vdd | | Vdd | V | Normal operating Mode |
| Input Voltage Low (VIL) | | GND | | 20%*Vdd | V | Power Down Mode |
| Stand-by Current | | | <0.01 | 1 | µA | |
| Enable Time (amplitude) | | | | 0.5 | ms | Within 90% of specified output level |
| Enable Time (frequency) | | | | 2 | ms | Within ±0.5ppm of steady state frequency |
| Control Voltage Range (Vc) | Vdd ≤ 2.3V | 0.3 | | 1.5 | V | The nominal Vc value is midway between the min and max. Vc should not exceed Vdd+0.2V or GND |
| | Vdd > 2.3V | 0.4 | | 2.4 | V | |
| Frequency Tuning | | ±10 | | | ppm | Freq. shift from min to max of control voltages |
| Control Voltage Input Port Impedance | | | 500 | | kΩ | |
| Phase Noise @ 26MHz Carrier (@+25°C) | | | | | | |
| @ 1 | Hz offset | | -65 | | dBc / Hz | |
| @ 10 | Hz offset | | -93 | | dBc / Hz | |
| @ 100 | Hz offset | | -117 | | dBc / Hz | |
| @ 1,000 | Hz offset | | -137 | | dBc / Hz | |
| @ 10,000 | Hz offset | | -149 | | dBc / Hz | |
| @ 100,000 | Hz offset | | -151 | | dBc / Hz | |

Note:

- Parts should be shielded from drafts causing unexpected thermal gradients. Temperature changes due to ambient air currents on the oscillator can lead to short term frequency drift
- Specified for load stated in the Oscillator Output section at +25°C
- External AC-Coupling capacitor required. ≥ 1nF is recommended
- Frequency shift ≤ 1ppm after reliability test conditions (see section 7.0)

PART IDENTIFICATIONS:





2.5 x 2.0 x 0.9mm

Table of Available Configurations

| Abracon P/N | Freq. Stability Over Temperature (ppm) | Slope (ppm/°C) | Operating Temperature (°C) | Supply Voltage (V) | Enable/Disable | Temp. Sensor | Voltage Control |
|---------------------------|--|----------------|----------------------------|--------------------|----------------|--------------|-----------------|
| ASTXR-12-26.000MHz-508892 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | no | no | no |
| ASTXR-12-26.000MHz-512883 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | no | no | no |
| ASTXR-12-16.369MHz-508303 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 1 | no | no |
| ASTXR-12-16.369MHz-508314 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | Pin 2 | no | no |
| ASTXR-12-16.369MHz-511743 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 1 | no | no |
| ASTXR-12-16.369MHz-512543 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 2 | Pin 5 | no |
| ASTXR-12-19.200MHz-512544 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 2 | Pin 5 | no |
| ASTXR-12-26.000MHz-508139 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 1 | no | no |
| ASTXR-12-26.000MHz-508313 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 2 | no | no |
| ASTXR-12-26.000MHz-509161 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 2 | Pin 1 | no |
| ASTXR-12-26.000MHz-511741 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 1 | no | no |



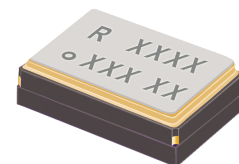


Table of Available Configurations (continued)

| Abracon P/N | Freq. Stability Over Temperature (ppm) | Slope (ppm/°C) | Operating Temperature (°C) | Supply Voltage (V) | Enable/Disable | Temp. Sensor | Voltage Control |
|---------------------------|--|----------------|----------------------------|--------------------|----------------|--------------|-----------------|
| ASTXR-12-26.000MHz-512545 | ± 0.5 | ± 0.1 | -40 to +85 | 1.8 V | Pin 2 | Pin 5 | no |
| ASTXR-12-19.200MHz-508072 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | no | no | no |
| ASTXR-12-19.200MHz-508207 | ± 0.5 | ± 0.1 | -30 to +85 | 2.85 V | no | no | no |
| ASTXR-12-19.200MHz-512242 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | no | no | no |
| ASTXR-12-19.200MHz-508221 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | no | no | yes |
| ASTXR-12-19.200MHz-508220 | ± 0.5 | ± 0.1 | -30 to +85 | 2.85 V | no | no | yes |
| ASTXR-12-19.200MHz-503461 | ± 0.5 | ± 0.1 | -30 to +85 | 2.85 V | no | no | yes |
| ASTXR-12-19.200MHz-512222 | ± 0.5 | ± 0.1 | -30 to +85 | 2.85 V | no | no | yes |
| ASTXR-12-19.200MHz-512240 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | no | no | yes |
| ASTXR-12-19.200MHz-511890 | ± 0.5 | ± 0.1 | -30 to +85 | 2.85 V | no | no | no |
| ASTXR-12-26.000MHz-504670 | ± 0.5 | ± 0.1 | -30 to +85 | 3.0 V | no | no | no |
| ASTXR-12-26.000MHz-511911 | ± 0.5 | ± 0.1 | -30 to +85 | 1.88 V | Pin 1 | no | no |
| ASTXR-12-26.000MHz-503820 | ± 0.5 | ± 0.1 | -30 to +85 | 1.9 V | Pin 2 | no | no |
| ASTXR-12-16.369MHz-505160 | ± 0.5 | ± 0.1 | -30 to +85 | 2.85 V | no | no | no |
| ASTXR-12-16.369MHz-506439 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | Pin 2 | no | no |
| ASTXR-12-26.000MHz-513028 | ± 0.5 | ± 0.1 | -30 to +85 | 1.8 V | no | no | yes |



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REFERENCE DESIGN INFORMATION:

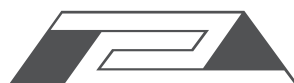
| Abrakon P/N | Equivalent Rakon P/N | Recommended Alternative | Chipset | Reference Design Chipset P/N |
|---------------------------|----------------------|-------------------------|----------|--|
| ASTXR-12-26.000MHz-508892 | 508892 | 512883 | Broadcom | BCM2075, BCM2076, BCM4750, BCM4751, BCM47511, BCM4752, BCM47521, BCM4760 |
| ASTXR-12-26.000MHz-512883 | 512883 | | Broadcom | BCM2075, BCM2076, BCM4750, BCM4751, BCM47511, BCM4752, BCM47521, BCM4760 |
| ASTXR-12-16.369MHz-508303 | 508303 | 511743 | CSR | SirfStar 3 (SS3), SirfStar 4 (SS4), SirfStar 5 (SS5) |
| ASTXR-12-16.369MHz-508314 | 508314 | 511743 | CSR | SirfStar 3 (SS3), SirfStar 4 (SS4), SirfStar 5 (SS5) |
| ASTXR-12-16.369MHz-511743 | 511743 | | CSR | SirfStar 3 (SS3), SirfStar 4 (SS4), SirfStar 5 (SS5) |
| ASTXR-12-16.369MHz-512543 | 512543 | | CSR | SirfStar 5 (SS5) |
| ASTXR-12-19.200MHz-512544 | 512544 | | CSR | SirfStar 5 (SS5) |
| ASTXR-12-26.000MHz-508139 | 508139 | 511741 | CSR | SirfStar 3 (SS3), SirfStar 4 (SS4), SirfStar 5 (SS5) |
| ASTXR-12-26.000MHz-508313 | 508313 | 511741 | CSR | SirfStar 3 (SS3), SirfStar 4 (SS4), SirfStar 5 (SS5) |
| ASTXR-12-26.000MHz-509161 | 509161 | 512545 | CSR | SirfStar 5 (SS5) |
| ASTXR-12-26.000MHz-511741 | 511741 | | CSR | SirfStar 3 (SS3), SirfStar 4 (SS4), SirfStar 5 (SS5) |
| ASTXR-12-26.000MHz-512545 | 512545 | | CSR | SirfStar 5 (SS5) |
| ASTXR-12-19.200MHz-508072 | 508072 | 512242 | Qualcomm | APQ Family, APQ8064 |
| ASTXR-12-19.200MHz-508207 | 508207 | 511890 | Qualcomm | APQ Family, APQ8064 |
| ASTXR-12-19.200MHz-512242 | 512242 | | Qualcomm | APQ Family, APQ8064 |





➤ REFERENCE DESIGN INFORMATION CONTD:

| Abrakon P/N | Equivalent Rakon P/N | Recommended Alternative | Chipset | Reference Design Chipset P/N |
|---------------------------|----------------------|-------------------------|----------|--|
| ASTXR-12-19.200MHz-508221 | 508221 | 512240 | Qualcomm | MDM Family, MDM6xxx, MDM7xxx, MDM8xxx, MDM6085, MDM6270, MDM6200, MDM6600, MDM8200A, MDM8220, MDM8215, MDM8229 |
| ASTXR-12-19.200MHz-508220 | 508220 | 512222 | Qualcomm | MDM Family, MDM6xxx, MDM7xxx, MDM8xxx, MDM6085, MDM6270, MDM6200, MDM6600, MDM8200A, MDM8220, MDM8215, MDM8230 |
| ASTXR-12-19.200MHz-503461 | 503461 | 512222 | Qualcomm | MDM Family, MDM6xxx, MDM7xxx, MDM8xxx, MDM6085, MDM6270, MDM6200, MDM6600, MDM8200A, MDM8220, MDM8215, MDM8231 |
| ASTXR-12-19.200MHz-512222 | 512222 | | Qualcomm | MDM Family, MDM6xxx, MDM7xxx, MDM8xxx, MDM6085, MDM6270, MDM6200, MDM6600, MDM8200A, MDM8220, MDM8215, MDM8225 |
| ASTXR-12-19.200MHz-512240 | 512240 | | Qualcomm | MDM Family, MDM6xxx, MDM7xxx, MDM8xxx, MDM6085, MDM6270, MDM6200, MDM6600, MDM8200A, MDM8220, MDM8215, MDM8226 |
| ASTXR-12-19.200MHz-511890 | 511890 | | Qualcomm | APQ Family, APQ8064 |
| ASTXR-12-26.000MHz-504670 | 504670 | 511911 | uBlox | u-blox 6 (UBX-M6000, UBX-M6010), u-blox 7 (UBX-M7020), u-blox 8 (UBX-M8030) |
| ASTXR-12-26.000MHz-511911 | 511911 | | uBlox | u-blox 6 (UBX-M6000, UBX-M6010), u-blox 7 (UBX-M7020), u-blox 8 (UBX-M8030) |
| ASTXR-12-26.000MHz-503820 | 503820 | 511911 | uBlox | u-blox 6 (UBX-M6000, UBX-M6010), u-blox 7 (UBX-M7020), u-blox 8 (UBX-M8030) |
| ASTXR-12-16.369MHz-505160 | 505160 | 511743 | | |
| ASTXR-12-16.369MHz-506439 | 506439 | 511743 | | |
| ASTXR-12-26.000MHz-513028 | 513028 | | | |



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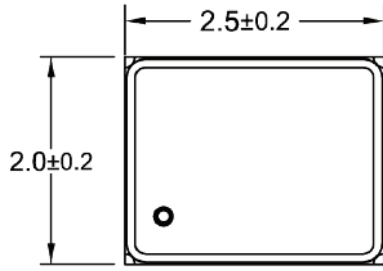


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2.5 x 2.0 x 0.9mm

OUTLINE DIMENSION:



TOP VIEW

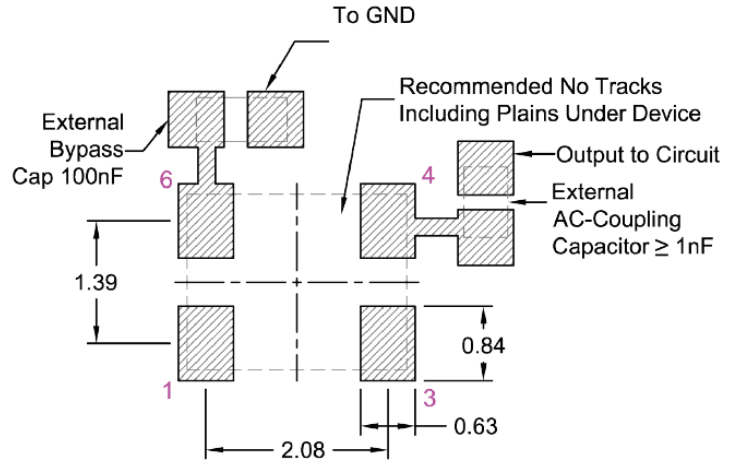


FRONT VIEW



BOTTOM VIEW

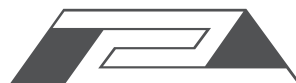
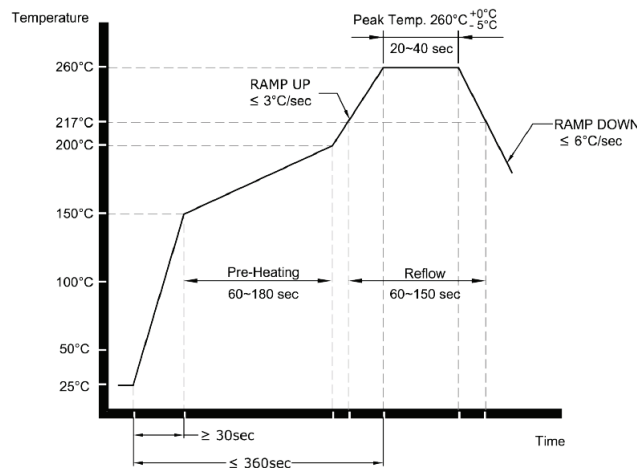
Recommended Land Pattern



| Pin | Function |
|-----|--------------------------|
| 1 | NC/GND Enable/Disable Vc |
| 2 | NC/GND |
| 3 | GND |
| 4 | Output |
| 5 | NC/GND |
| 6 | Vdd |

Dimensions: mm

REFLOW PROFILE:

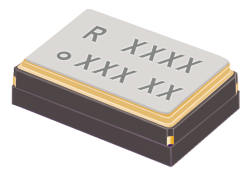


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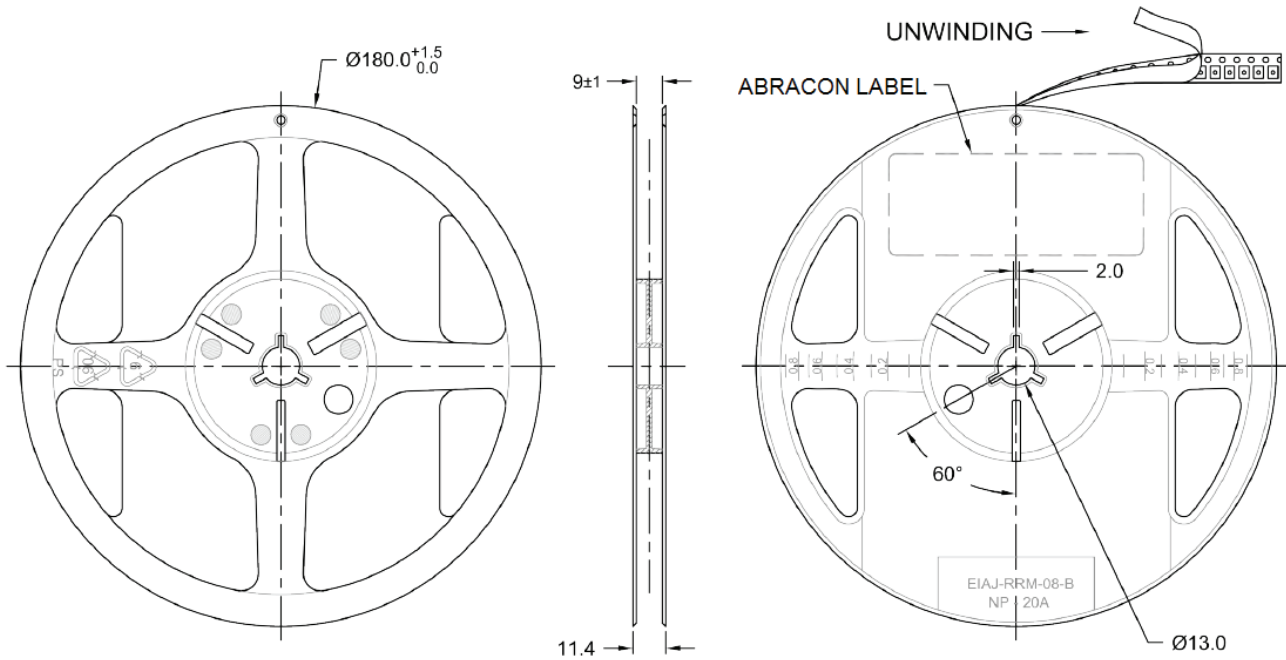
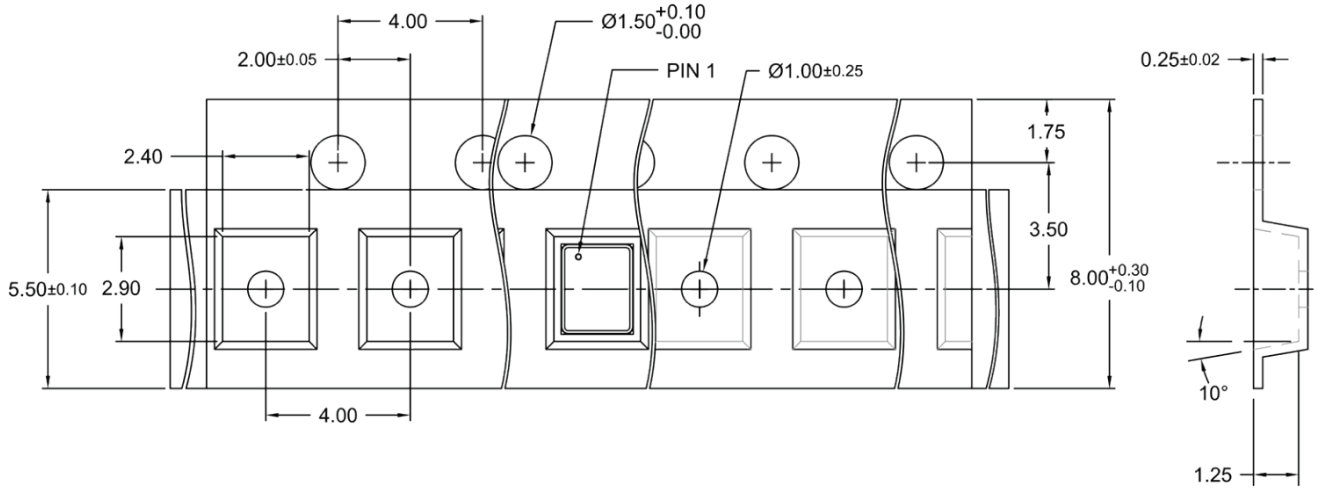
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2.5 x 2.0 x 0.9mm

TAPE & REEL:

3000pcs/reel



Dimensions: mm

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