

TXC Corporation Product Introduction

Purpose

- To introduce TXC's TCXO (Temperature-Compensated Crystal Oscillator).

Objectives

- Crystal Oscillator Categories
- What is a TCXO
- Package Type
- Main Features
- Manufacturing Flow
- TXC Core Competence

Content

- 7 pages

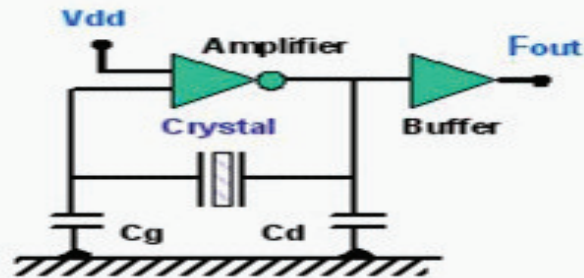
Learning Time

- 10 minutes

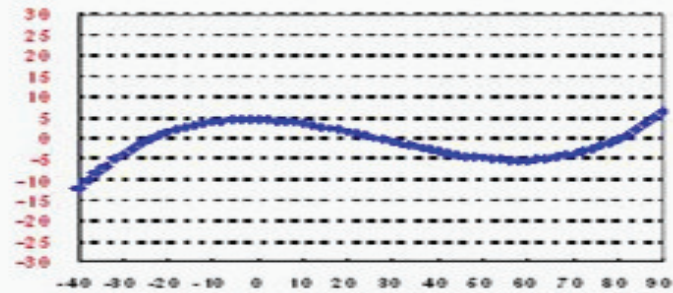


Crystal Oscillator Categories

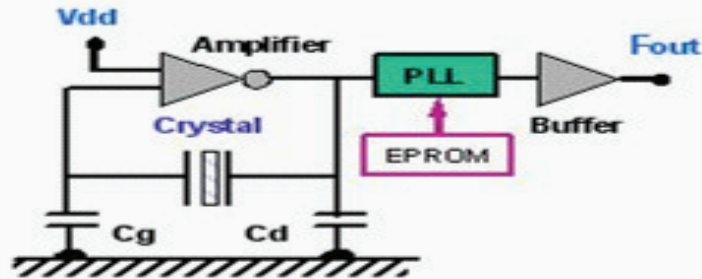
Simple Package Crystal Oscillator



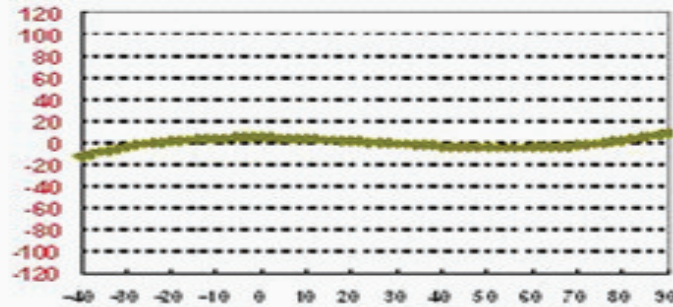
Frequency Stability



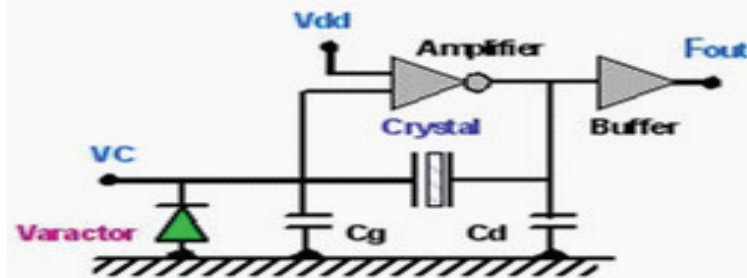
Programmable Crystal Oscillators



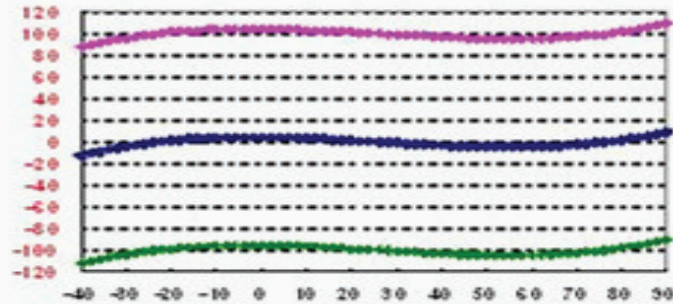
Frequency Stability



Voltage Controlled Crystal Oscillator



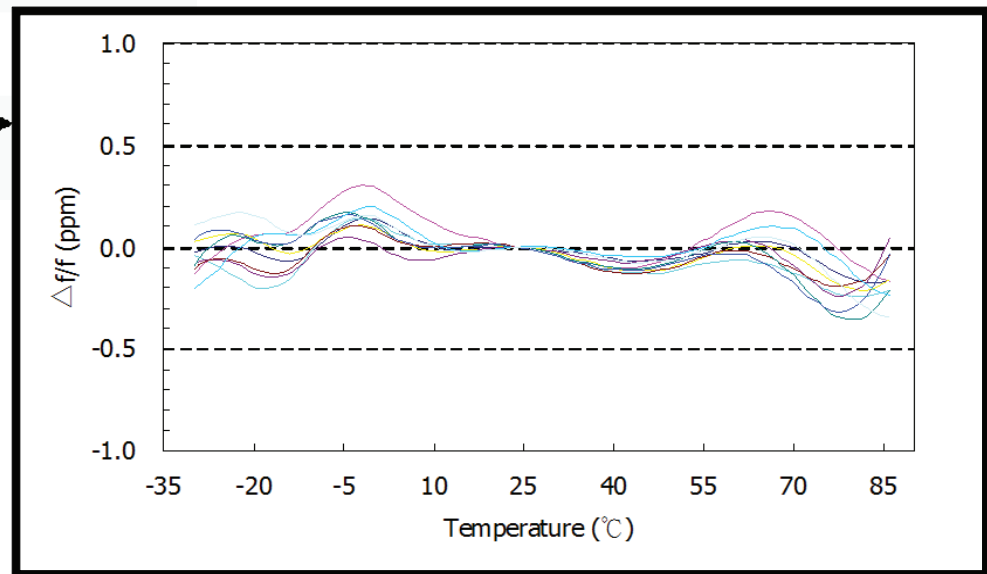
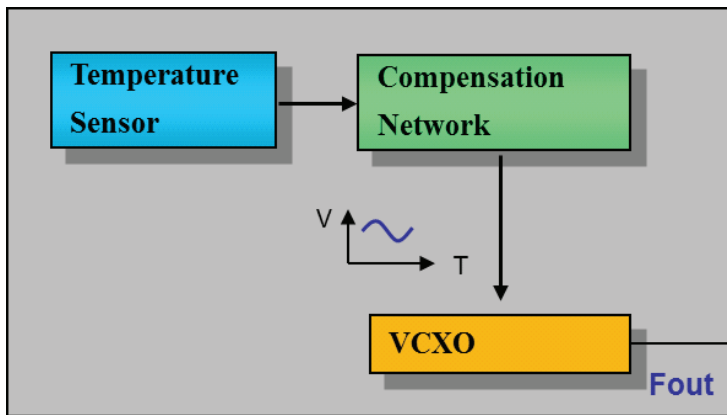
Frequency Stability



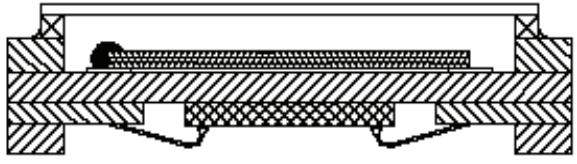
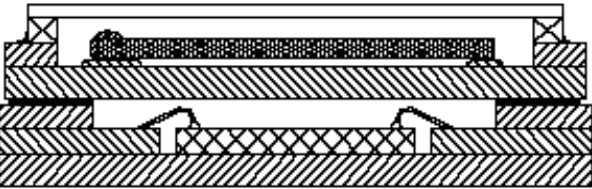
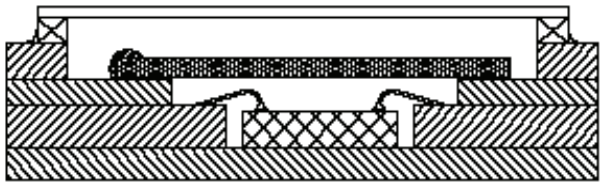
By incorporating the crystal resonator with an oscillation circuit, one can get different kind of clock crystal oscillators (XOs). For example, Simple Package Crystal Oscillator (SPXO), Voltage-Controlled Crystal Oscillator (VCXO) and so on.

What is a TCXO?

The output signal from a temperature sensor is used to generate a correction voltage via a compensation network. The correction voltage is applied to the varactor in the VCXO. The capacitance variations compensate for the crystal's frequency vs. temperature characteristics.



Package Type

Package Structure	Features
<p data-bbox="331 349 499 389">a. H Type</p> 	<ul data-bbox="961 321 1774 625" style="list-style-type: none"> • <i>The thermal paths of both quartz and IC are the same, easy to get sync and precise compensated frequency.</i> • <i>Strong package structure to resist the thermal during SMT process.</i> • <i>Easy to achieve smaller size than 2016</i>
<p data-bbox="331 682 598 722">b. Double Type</p> 	<ul data-bbox="961 657 1753 909" style="list-style-type: none"> • <i>The thermal paths of both quartz and IC are quite different, hard to get sync and precise compensated frequency.</i> • <i>Poor package structure, high risk to separate after heating process.</i>
<p data-bbox="331 1023 651 1063">c. All-in-One Type</p> 	<ul data-bbox="961 990 1774 1291" style="list-style-type: none"> • <i>The thermal paths of both quartz and IC are not different, easy to get sync and precise compensated frequency.</i> • <i>Strong package structure to resist the thermal during SMT process.</i> • <i>Hard to achieve smaller size than 2016.</i>

There are 3 major package structure types in the TCXO world. They are a. H Type, b. Double Type, c. All-in-One Type. TXC uses H Type for all its 3.2mmx2.5mm, 2.5mmx2.0mm, 2.0mmx1.6mm TCXO products.

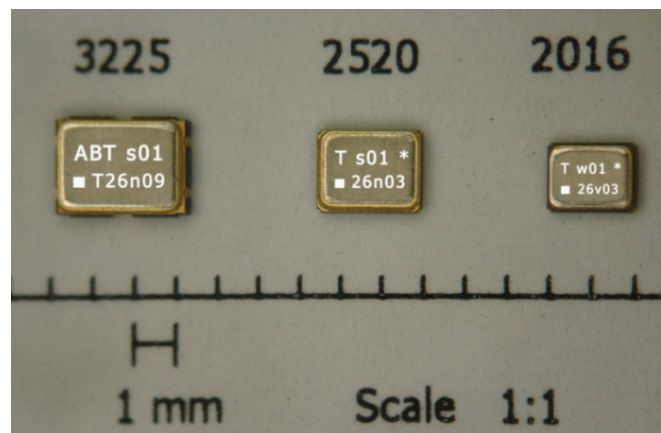
Main Features

	<i>Freq.</i>	<i>Freq Stability vs. Temp</i>	<i>Voltage</i>	<i>OTR</i>	<i>Output</i>	<i>PKG (mm)</i>
TCXO	13~52MHz	$\pm 0.5\text{ppm}$ $\pm 2.0\text{ppm}$	1.8~3.3V	-30°C~85°C	Clipped Sine Wave	3.2*2.5
						2.5*2.0
						2.0*1.6

TXC Proprietary Info November 2011

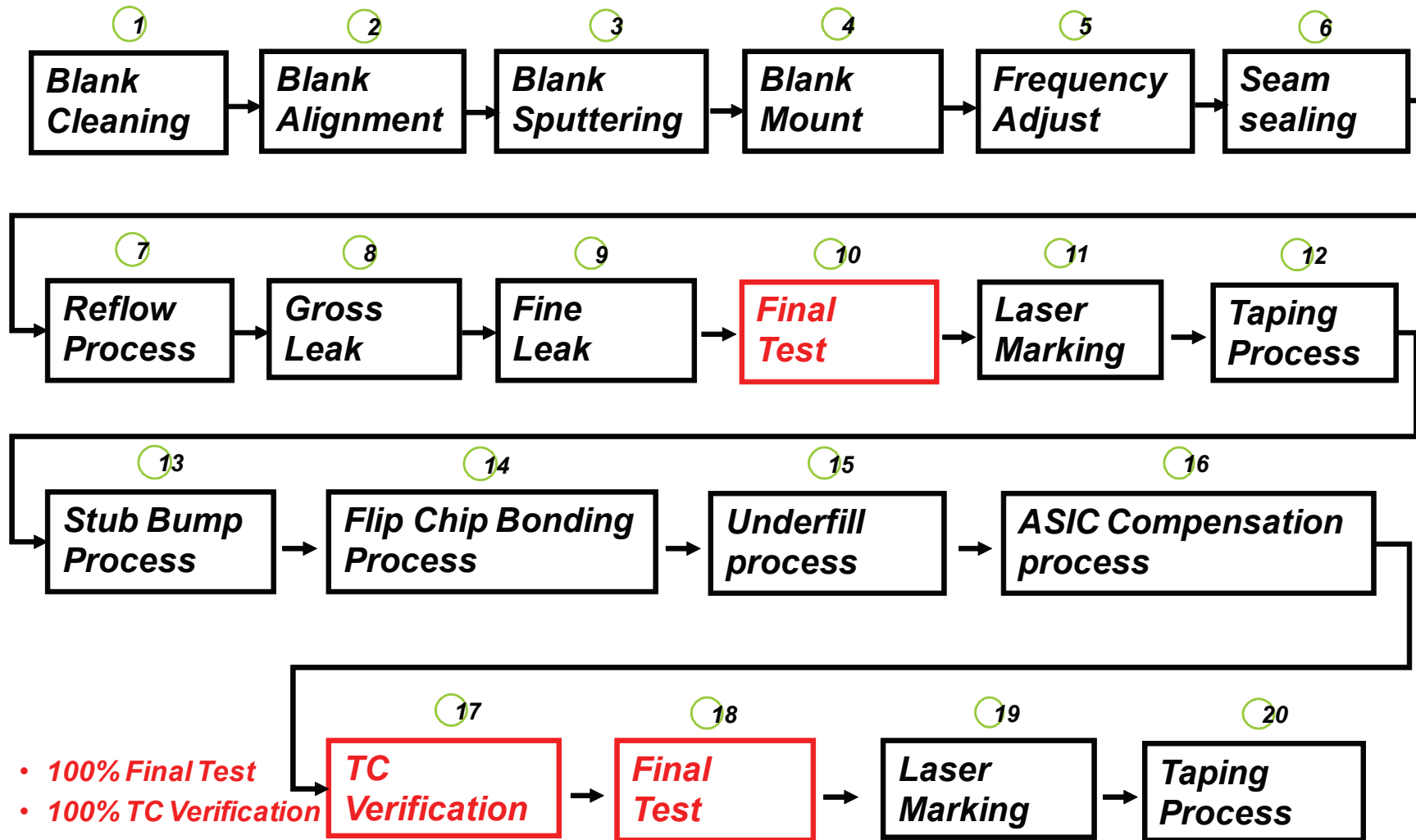
Additional features:

- AFC (Auto Frequency Control) function is available in all package sizes



How to choose the right TCXO? The 1st step is to decide the “size”, then select the nominal frequency, the stability over temperature, and the desired supply voltage.

Manufacturing Flow



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Steps 1 to 12 are the "Crystal" assembly process. There is a total 12 stations from quartz blank cleaning to taping. Step 10 is the "Final Test" station which is the 1st 100% test process to confirm the crystal specification compliance. Steps 13 to 20 are the "TCXO" assembly process. There is a total of 8 stations from IC stub bump to taping. Step 17 is the "TC Verification" station which is the 2nd 100% test process to confirm frequency over temperature compliance. Step 18 is the 3rd 100% test process to confirm all TCXO specification compliance.

TXC Core Competence

- **Technology**

In-House Design, Simulation, and Processing Capabilities

- **Quality**

Assurance on Design and Production

- **Service**

Global Sales, Marketing and FAE Support

- **Cost Efficiency**

Economy of Scale Production in both Taiwan and China Factories

- **Time to Market**

Leader in Crystal & Oscillator Miniaturization

- **Flexibility**

Agile Sampling Capability and Quick Ramp Up to Volume

