

TECHNICAL TERMS

The following technical terms are generally used for crystal units:

Crystal wafer (blank) : A piece of quartz crystal cut as specified in terms of shape, dimensions and orientation.

Electrode : Conductive thin film vacuum-evaporated onto a crystal wafer to allow AC voltage to be applied.

Holder : A case housing a crystal wafer, electrode and support to prevent them from being influenced mechanically and environmentally by outside conditions, and also having terminals permitting the electrical connection of the electrode to an outside circuit.

Crystal unit : Mounted crystal wafer provided with electrodes and housed in a holder.

Overtone order : A number assigned from sequentially increasing integers for successively occurring overtone frequencies with the fundamental wave oscillation of 1 in a specified oscillation mode. An overtone frequency in a slide or extension mode can approximate the value obtained by multiplying the fundamental wave frequency by an integer.

Series resonance frequency : Lower frequency of the two given when the electrical impedance of a crystal unit becomes resistant near its resonance point.

Load capacitance : Effective series capacitance measured from the terminals of a crystal unit to the oscillation circuit and determined as a condition when of using a crystal unit in an oscillation circuit. Operating fre-

quency is determined by the electrical characteristics of a crystal unit and the load capacitance. (Refer to the characteristics of frequency VS. load capacitance and the recommendable oscillation circuits.)

Nominal frequency : Nominal value expressed in terms of frequency.

Series resonance : Condition of resonance in the case of limitless load capacitance.

Frequency tolerance : Deviation from the nominal frequency expressed as a ratio to nominal frequency.

Equivalent series resistance : Equivalent resistance for series resonance frequency.

Load Resonance Resistance : Resistance for the lower frequency of the two given when the electrical impedance becomes resistant near the resonance point of a circuit, with the load capacitance connected to a crystal unit in series.

Operating temperature range : Temperature range within which crystal units operate under specified conditions.

Drive level : Electric-power or current level under the specified conditions of a crystal unit.

Main mode and spurious : Main mode indicates the most prominent resonance frequency and spurious indicates other resonance frequencies when there are some resonance frequencies near the nominal frequency.

INTERNAL STRUCTURE OF A CRYSTAL UNIT

A crystal wafer mechanically vibrates at several modes as shown in Table 1. To pick up desired vibration energy effectively, system supporting the crystal wafer is very important. Fig. 1 shows a typical example of internal con-

struction for a thickness-shear mode crystal unit at the minimum displace point of mechanical vibration on the wafer. Furthermore, the holder is hermetically sealed to prevent deterioration of the crystal unit's performance.

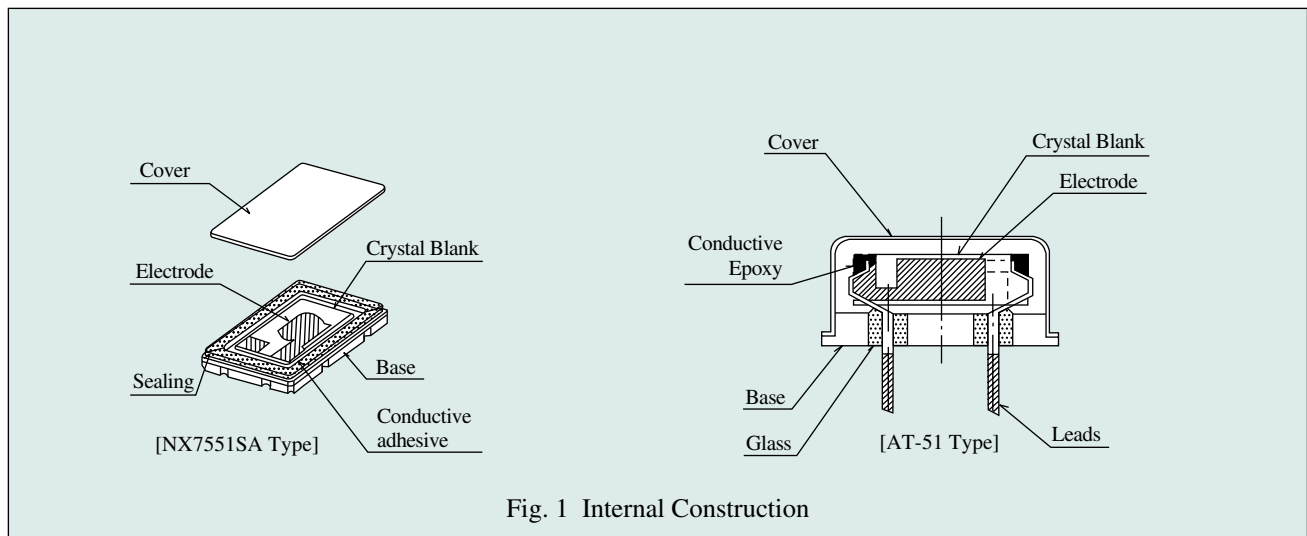


Fig. 1 Internal Construction