

# *Hy-Q*

## *International*



*Ceramic Resonator & Filter  
Product Guide*

## Ceramic Resonators

A Ceramic Resonator is sometimes referred to as a dielectric resonator. They are commonly used for timing devices which create a clock signal. This type of signal oscillates between a high and low state using a piece of piezoelectric ceramic, connected to two or more electrodes. A resonator can have a built in capacitor to help save space on a printed circuit board.

When connected in an electronic oscillating circuit, a ceramic resonator will vibrate, generating an oscillating signal with a specific frequency. Like the similar crystal oscillator, they're used to generate a clock signal to control the timing in oscillating circuits.

The ceramic resonator utilizes a frequency within the electrical component but unlike the quartz crystal which has a frequency tolerance of 10~30 PPM , a ceramic resonator carries a 0.5% or 5,000 PPM frequency tolerance which is generally used in microprocessor applications where absolute stability is not important.

The properties and components of Ceramic Resonators make them particularly useful in a broad range of applications. They are mainly used as a source of a clock signal for microprocessors. Ceramic Resonators are ideal for applications where the precision of the frequency may not be so critical, such as microprocessors.

They're also commonly used in:

- Communications equipment
- Automotive electronics
- TVs
- Medical/healthcare equipment
- Telephones
- Toys
- Personal computing
- VCR
- Household appliances
- Radios



## Ceramic Filters

Ceramic filters are widely used in IF and RF band-pass filter applications for radio receivers and transmitters.

These RF & IF ceramic filters are low cost, generally easy to use and in many ways ideal for a host of applications where the performance and specification of a crystal filter is not needed.

RF & IF ceramic band-pass filters are manufactured from ceramics that exhibit the piezoelectric effect. These filters are available for lower frequencies, with centre frequencies typically being at 455kHz and frequencies of 10.7 MHz which is a standard IF for many FM broadcast receivers.

Having a lower Q level than quartz, the ceramic RF & IF filters have bandwidths that are typically measured between 0.05 and 20% of the operating frequency.

## Ceramic Discriminators

The discriminator functions to convert the change of the frequency into audio frequency, a unique system of detection only used for FM broadcasting. The detection of FM wave is made through the circuit in which the relation between the frequency and the output voltage is linear. FM wave detection methods as known as ratio detection, Foster-Seeley detection, quadrature detection, differential peak detection, etc.

### **FM Wave Detection Methods**

#### **Ratio Detection**

Ratio detection is the most popular method in use at present. The impedance characteristic of a ceramic resonator is designed into the circuit, then a coil as a detector is unnecessary. The fact is that adjustment is eliminated.

#### **Quadrature Detection**

This detection method was originally developed as a sound detector for TV sets, but recently it has become popular in the consumer market (FM tuners, car radios, etc.). The Quadrature Detection Method utilizes the phase characteristic.

An FM signal is supplied directly to one side of the multiplier's input with an IC to the other side of the multiplier's input an FM-IF signal, which is passed through the phase shifting circuit mainly composed of a tank circuit tuned to FM-IF, is applied. By taking advantage of the phase characteristic of the ceramic resonator as a discriminator, we can eliminate adjustment of the FM-IF circuit.

#### **Differential Peak Detection**

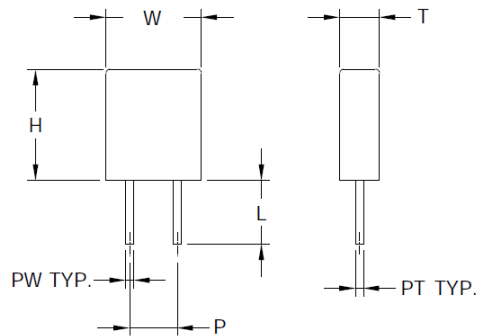
This detection method was developed by RCA as a sound detector for TV sets. The method has the following features.

- Can output at high levels.
- Can function with only 1 synchronous coil.

Non-linearities of synchronous characteristics compensate each other by applying rectified intermediate frequency voltage, as a result, linearity can be obtained.

## Through Hole Ceramic Resonators

### ZTB Series



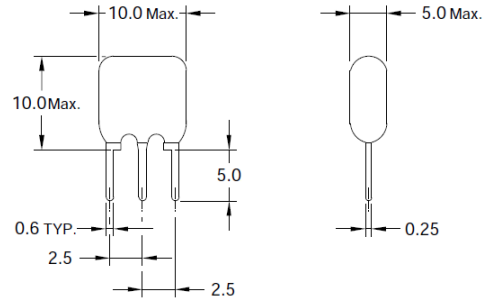
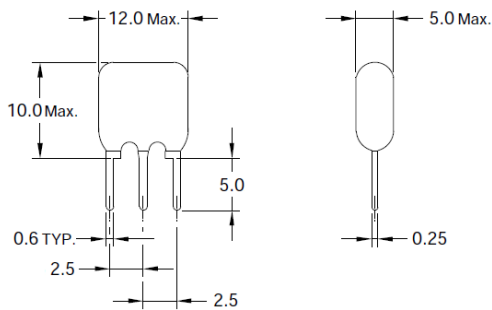
FREQUENCY RANGES
190 kHz to 249 kHz
250 kHz to 374 kHz
375 kHz to 429 kHz
430 kHz to 449 kHz
450 kHz to 509 kHz
510 kHz to 699 kHz
700 kHz to 999 kHz
1.0 MHz to 1.25 MHz

Eight different size vs. frequency options  
Please see the product data sheet on our website.

### ZTT Series

2.0 ~ 2.44 MHz

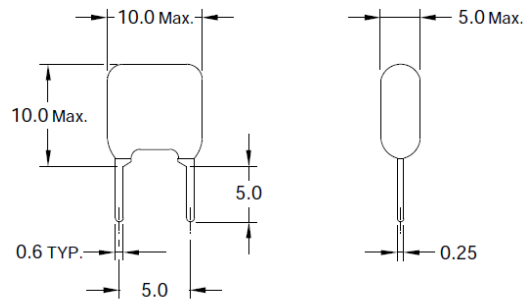
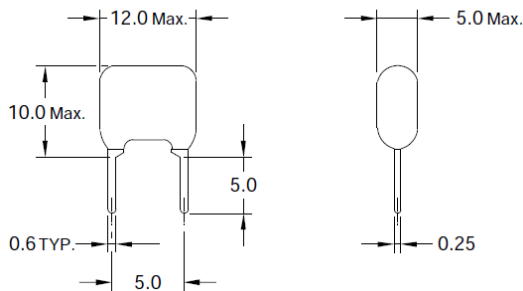
5.0 ~ 40.0 MHz



### ZTA Series

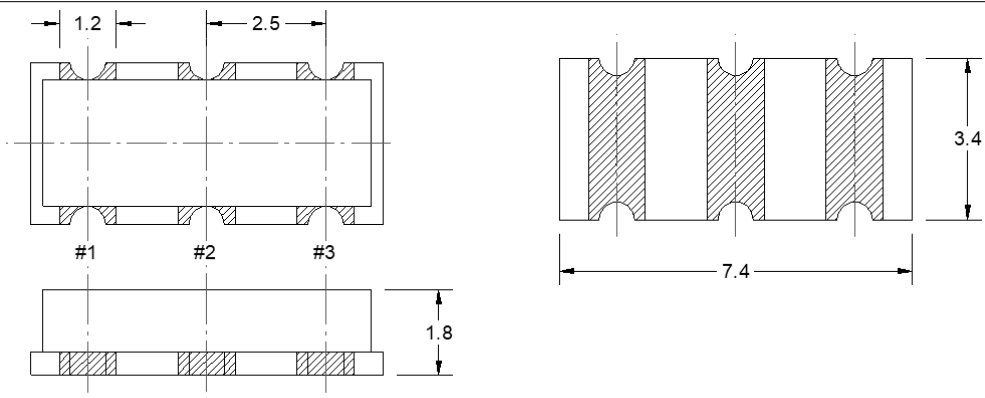
2 ~ 2.44 MHz

5.0 ~ 40.0 MHz

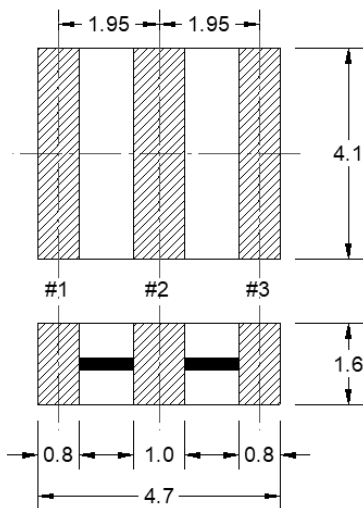


## Surface Mount Ceramic Resonators

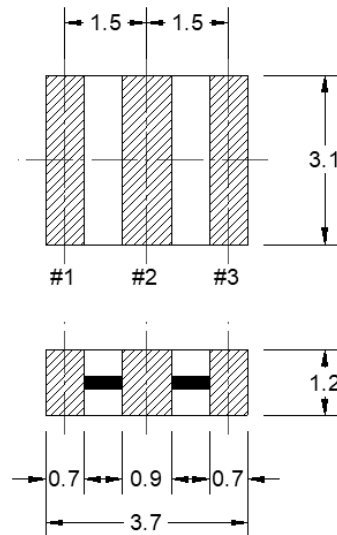
### ZTTCC



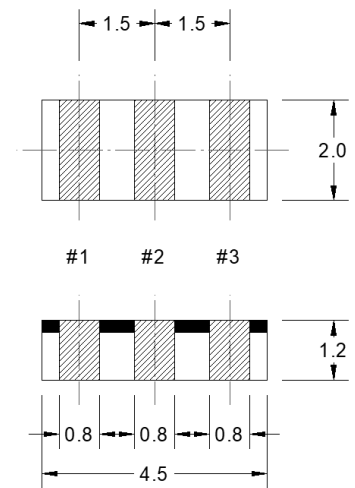
### ZTTCS



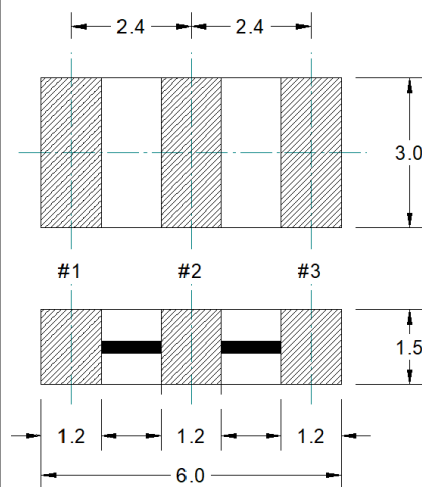
### ZTTCV



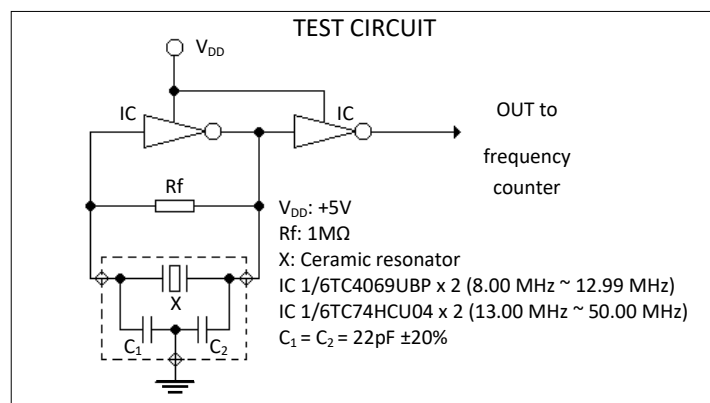
### ZTTCR



### ZTTCP

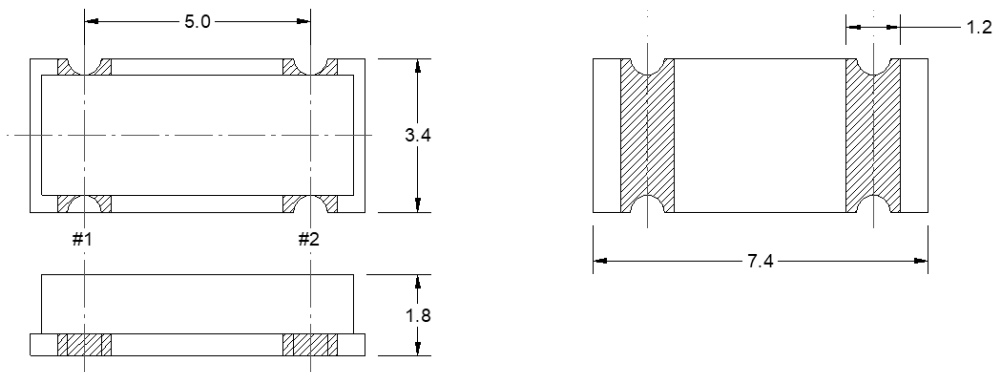


Pad Connections
#1 – Input
#2 – Ground
#3 – Output

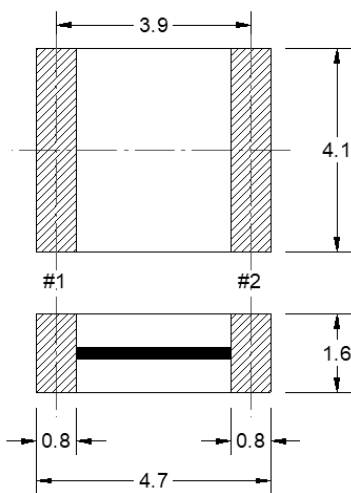


## Surface Mount Ceramic Resonators

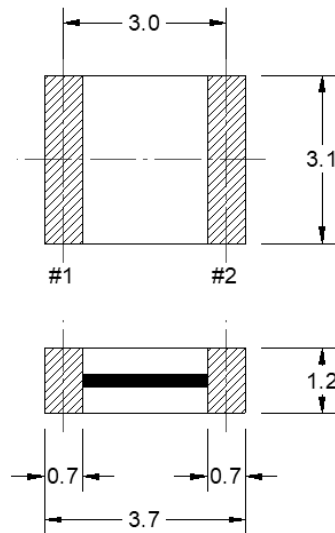
### ZTACC



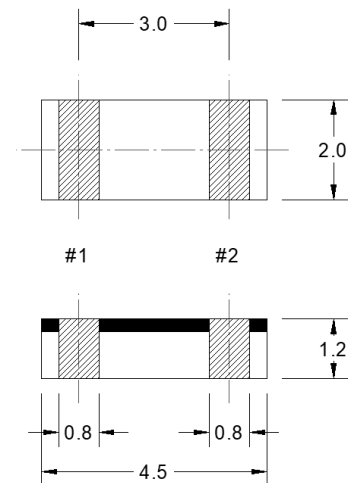
### ZTACS



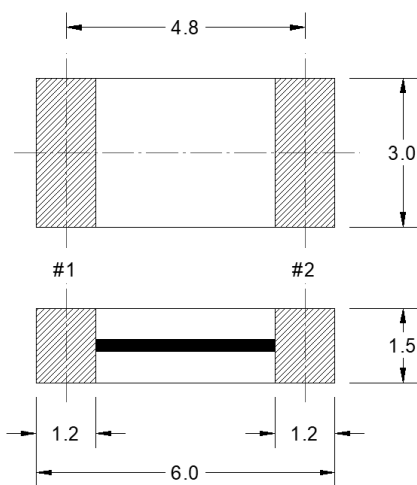
### ZTACV



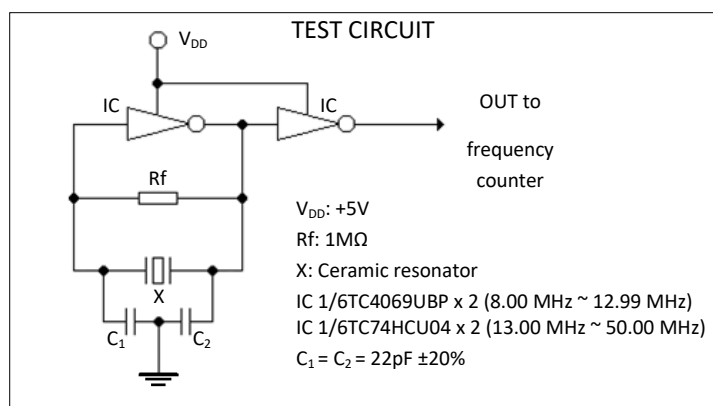
### ZTACR



### ZTACP



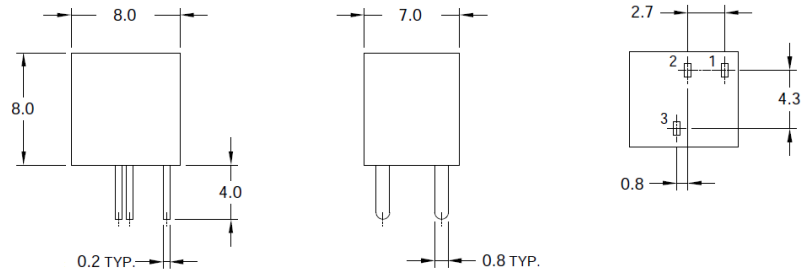
Pad Connections	
#1	Input
#2	Output



## Through Hole Ceramic Filters

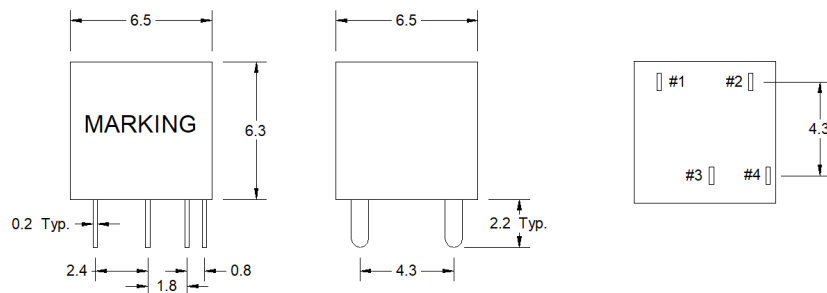
LTU 450 2

LTU 455 2



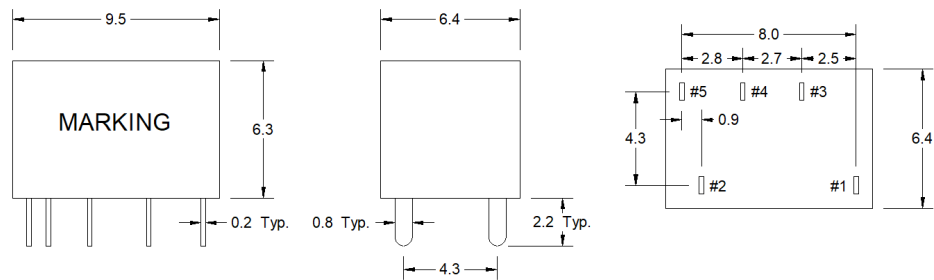
LTM 450-U

LTM 455-U



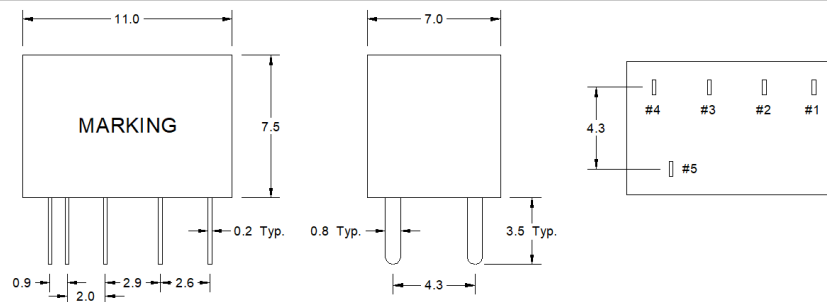
LTM 450-W

LTM 455-W



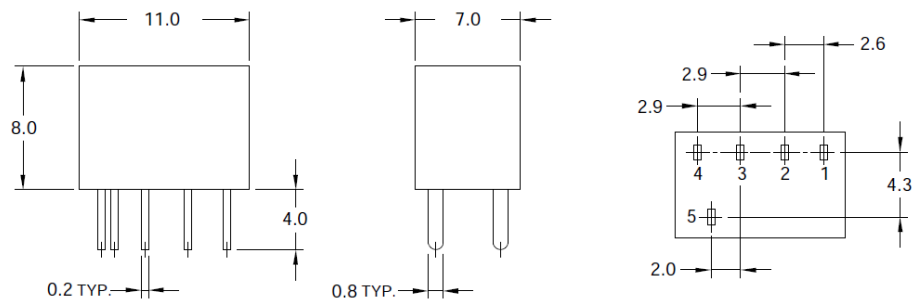
LTS 450-W

LTS 455-W

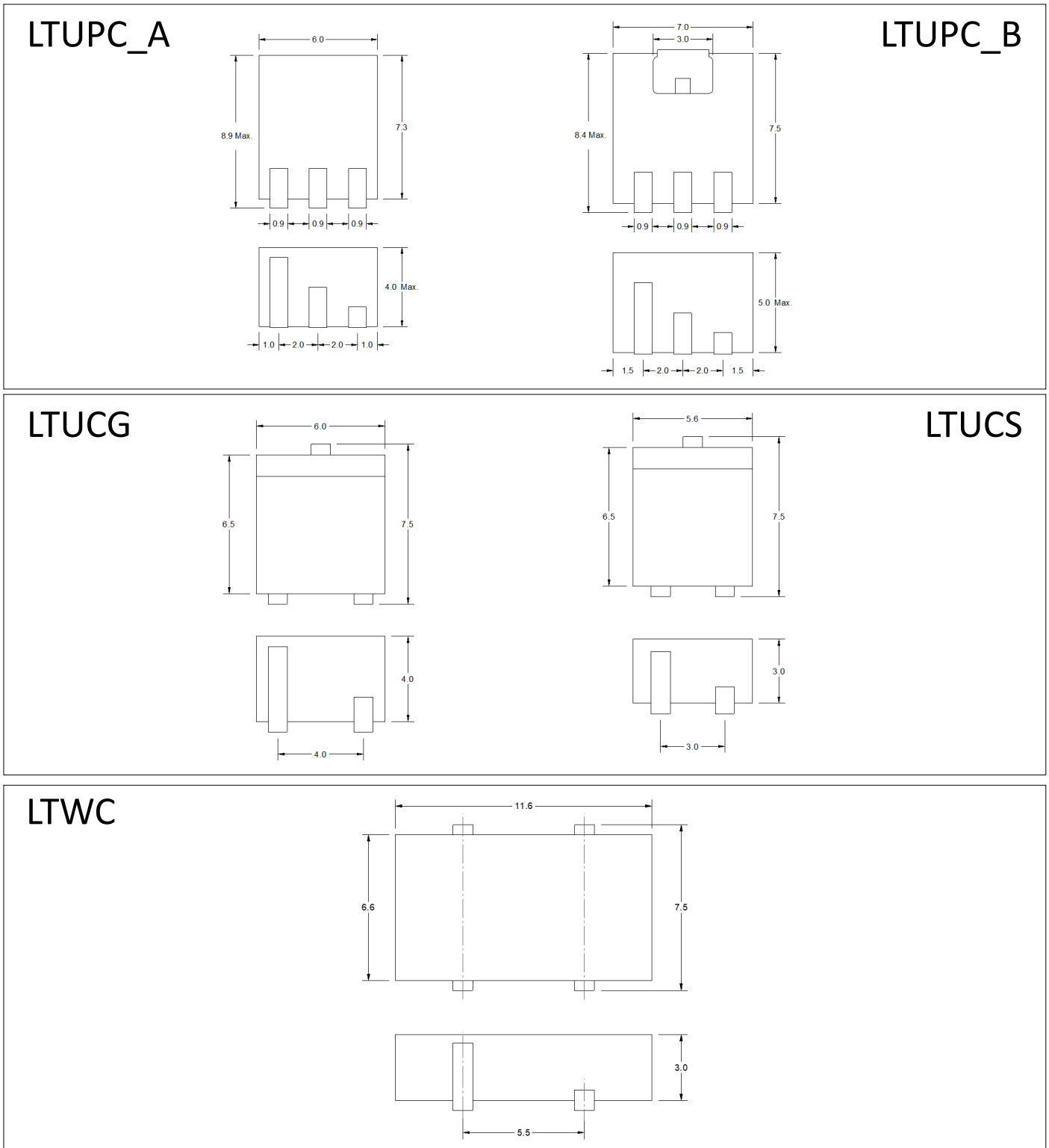


LTW33 450

LTW33 455



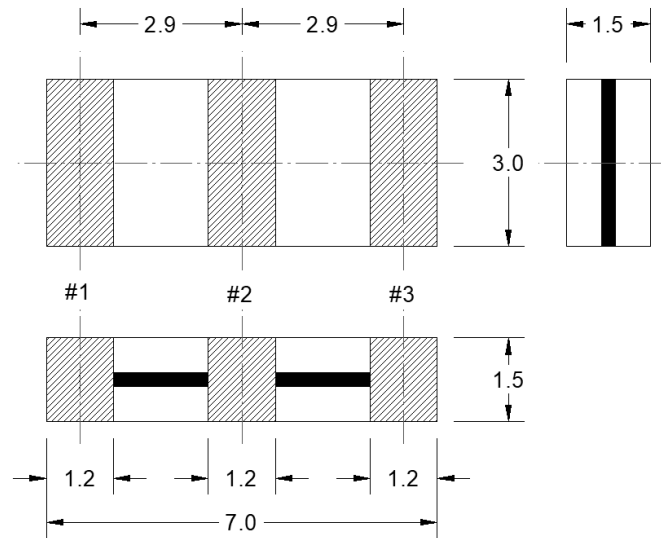
## Surface Mount Ceramic Filters



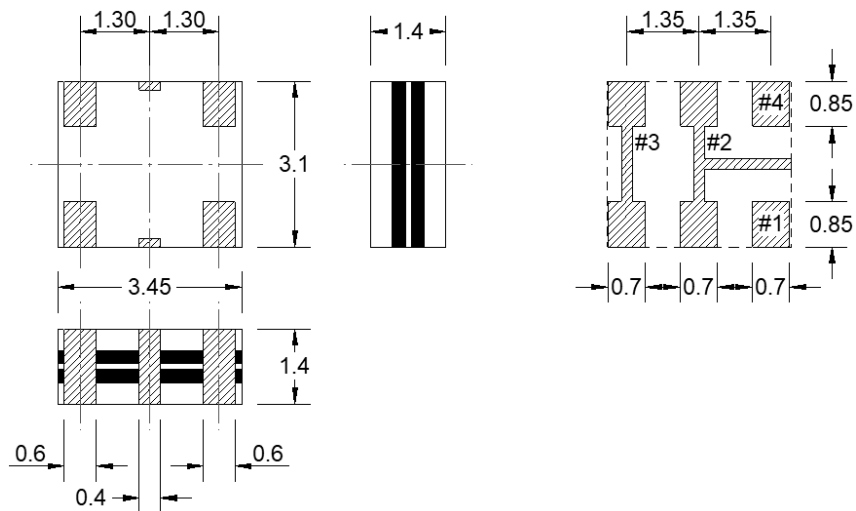


## Surface Mount Ceramic Filters

### LTCV10.7



### LTCS10.7





# Worldwide manufacturer and distribution of Quartz Crystals, Crystal Filters, Crystal Oscillators, and Ceramic Devices

Hy-Q International is dedicated to the production of frequency management and control systems. The parent company was formed in Australia in 1969 by a group of crystal engineers determined to build a company where excellence of product and reliability of delivery were the prime considerations. This has been, and remains, the cornerstone of the Group policy and took Hy-Q from a single company with twenty five employees in 1969 to employing over 400 people on five continents.



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