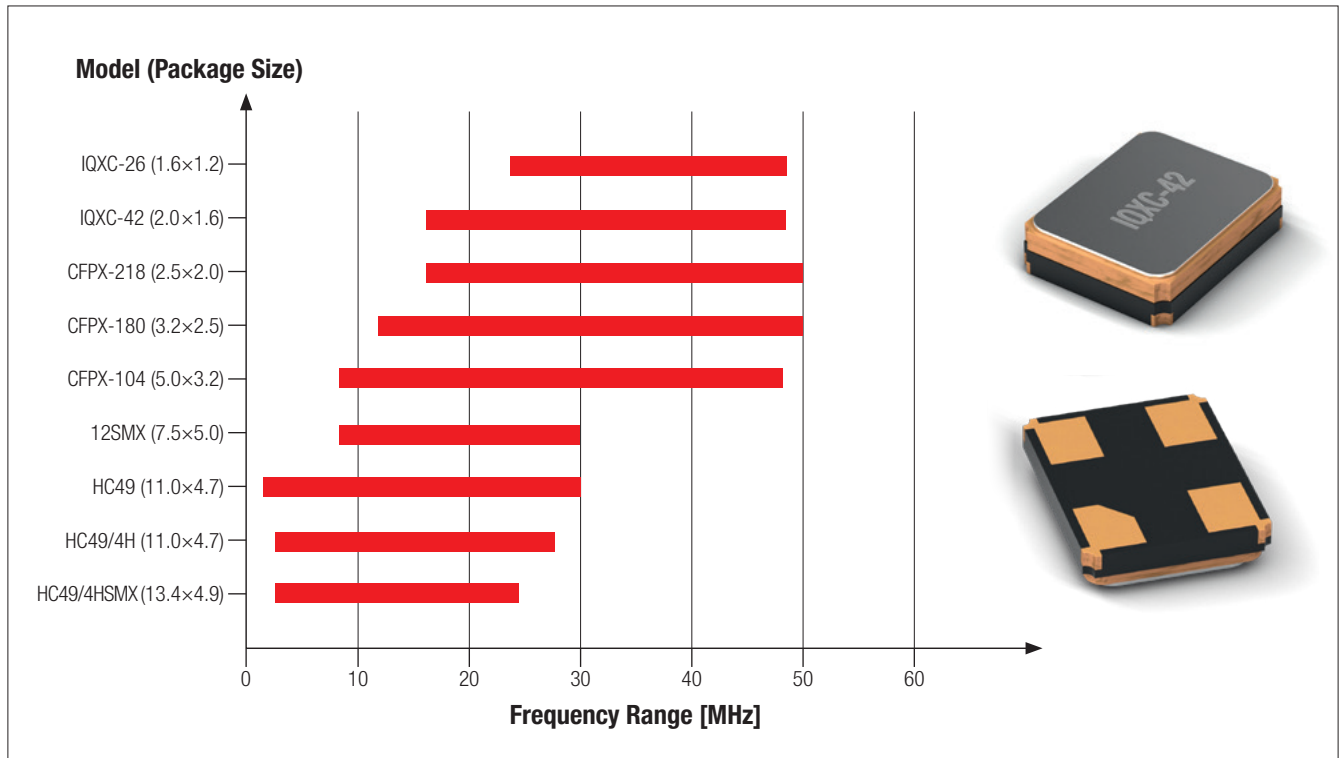


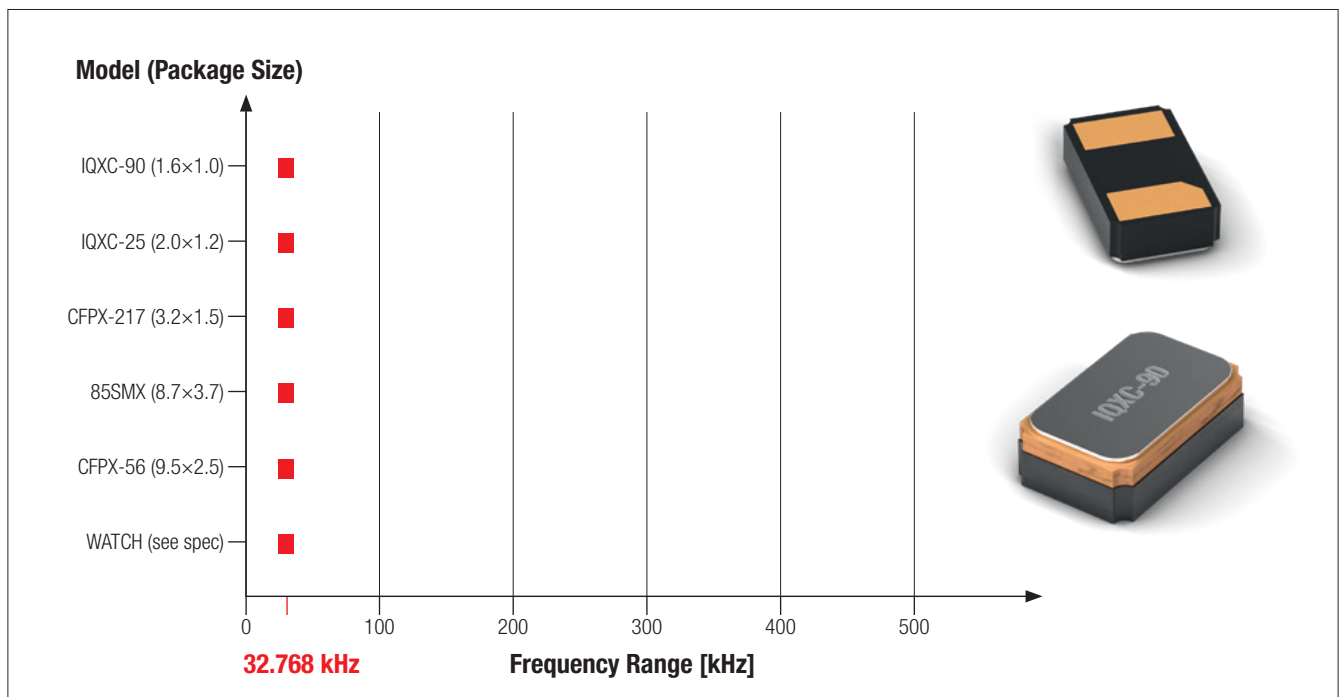
# Quartz Crystals

## Model vs. Frequency Range

### WE-XTAL (Crystal) vs. Frequency Range



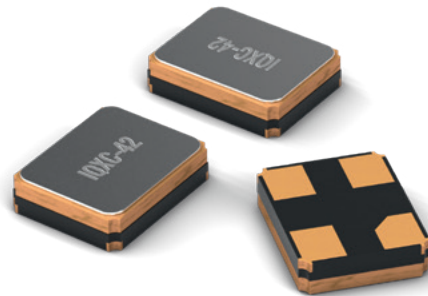
### WE-XTAL (Watch Crystal) vs. Frequency Range



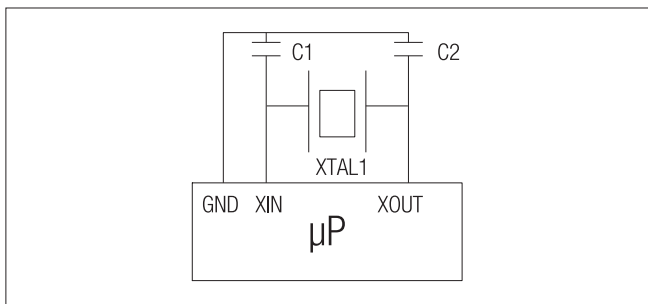
## Crystal Specification

- Frequency [kHz or MHz]
- Package size (model and dimensions)
- Tolerance [ppm] – The frequency accuracy at 25 °C
- Stability [ppm]\* – The frequency change over operating temperature range
- Operating temperature range [°C]\*
- Circuit load condition  $C_{Load}$  [pF]
  - For capacitive load ( $C_{Load}$ ) value the stray PCB capacitance and the IC pin capacitance should be considered.
  - Full CL value must match that of the crystal specification
  - $CL = (C1 * C2) / (C1 + C2) + C_{stray}$
  - $C_{stray} = \mu P \text{ pin stray} + \text{PCB Stray} \approx 3 \text{ pF to } 6 \text{ pF}$

\* Not relevant for watch crystal.



## Capacitive Load



## PCB Layout Design Considerations

