

# Introduction

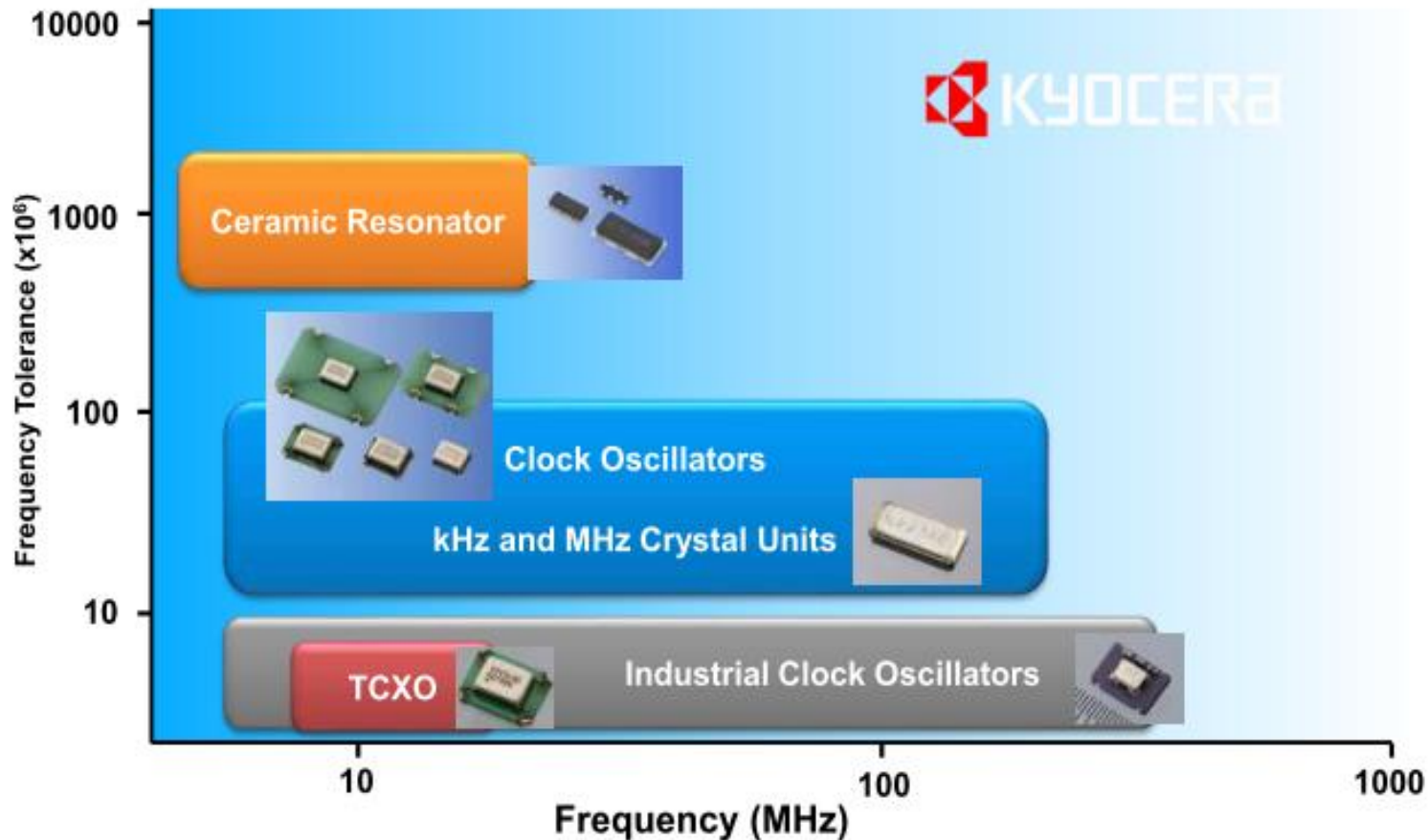
## Purpose

- Introduce AVX/Kyocera ceramic resonators.

## Objective

- Discuss advantage of ceramic resonators vs crystals.
- Discuss Features
- Part Numbers

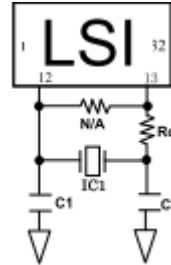
# AVX/KYOCERA - TOTAL TIMING DEVICE SOLUTIONS



- AVX Kyocera offers a wide variety of clock solutions.
- Specialising in cost effective to high specification devices.
- AVX caters for a wide range of timing devices for many applications.

# Why ceramic?

Ceramic Resonator



**V.S.**

Quartz Crystal



+/-2500ppm at best	<b>Overall Tolerance</b>	<b>less than +/-200ppm</b>
<b>0.01 to 0.3 msec</b>	<b>Start up time</b>	0.1 to 3.0 msec
<b>Built-in</b>	<b>Capacitor</b>	External
<b>4.0x2.5mm for 4Mhz</b>	<b>Size</b>	8.0x4.5mm for 4MHz
<b>Better</b>	<b>Cost</b>	Good

# Three size options available...PRQC/PRQV is the main focus.



- **PRQC/PRQV series**
- Small size 3.2 x 1.3mm
- 8.00Mhz to 20.00Mhz



- **PBRC-MR/BRV-MR series**
- 4.5 x 2.0mm
- 4.00Mhz to 20.00Mhz

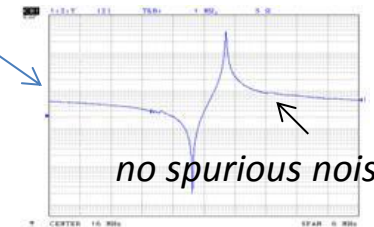
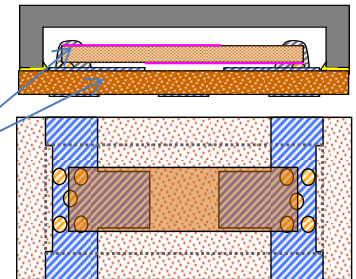


- **PBRC-HR/PBRV-HR series**
- 7.4 x 3.4mm
- 4.00Mhz to 20.00Mhz

## Focus product --PRQC/PRQV series--

### Features

- 1) Small size 3.2 x 1.3 mm
- 2) Built in capacitor
- 3) Robust & Cost competitive by simple structure  
*Single layer ceramic substrate*
- 4) Stable oscillation by  
*Fundamental oscillation mode*
- 5) Quick start up time  
*compared to Quartz*
- 6) Very tight tolerance product  
*TTL +/- 0.15 % will be available in H1 CY16*






# Frequency coverage

**Automotive/Industrial  
(PBRV-HR & MR / PRQV)**




**Consumer/industrial  
(PBRC-HR & MR / PRQC)**

Ceramic Resonators Line Up

	Frequency Range [MHz]					
	10	20	30	40	50	60
<b>PBRV-HR</b> 7.4X3.4X2.0 (mm)	2-20			Fundamental		
<b>PBRV-MR</b> 4.5X2.0X1.2 (mm)	4-20					
<b>PRQV</b> 3.2X1.3X1.0 (mm)	8-20					
<b>PRHV</b> 3.2X1.3X1.0 (mm)	8-16		Tightest tolerance TTL +/-0.15% @ 40 +105deg.C			

Available  
in CY16H1

Ceramic Resonators Line Up

	Frequency Range [MHz]					
	10	20	30	40	50	60
<b>PBRC-HR</b> 7.4x3.4x2.0 (mm)	2-20			Fundamental		
<b>PBRC-MR</b> 4.5x2.0x1.2 (mm)	4-20					
<b>PRQC</b> 3.2x1.3x1.0 (mm)	8-20					

# Product details

## Introduction of PBRC/V-HR series (2.00Mhz to 20.00Mhz)



### ■ Features

- 7.4 x 3.4mm
- Built-in load capacitance
- Stable oscillation by Fundamental mode
- Excellent solderability (Ni+Au termination)

### ■ Product Specifications

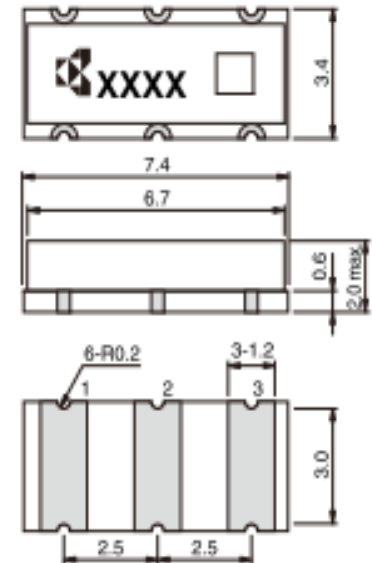
Parameters	Specifications
Frequency Range	2 to 20MHz
Frequency Tolerance (25°C)	+/- 0.1% , +/-0.5% or +/-0.7%
Resonant Impedance	50Ω max
Temperature Stability (-40 to 85°C )	+/- 0.1% or +/- 0.5%
Operating Temperature Range	-40 deg. C to +85/125/150 deg. C
Frequency Aging (10 Years)	+/- 0.1%
Dimensions	L : 7.4mm
	W : 3.4mm
	T : 2.0mm max

▪ Please inquire Kyocera about detailed individual product specifications.

### ■ Applications

- Consumer
- Industrial
- Automotive etc

### ■ Dimensions



Standard Tol.: ±0.3

Termination: Ni+Au Flash Plating

1. 3 Input, Output (No polarity)

# Product details

## Introduction of PBRC/V-MR series (4.00MHz to 20.00MHz)



### ■ Features

- Small size (4.5 x 2.0mm)
- Built-in load capacitance
- Fundamental mode

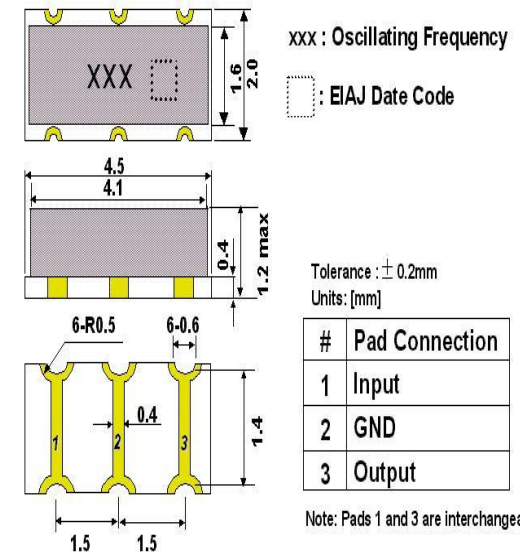
### ■ Applications

- Consumer
- Industrial
- Automotive etc

### ■ Product Specifications

Parameters	Specifications
Frequency Range	4 to 20MHz
Frequency Tolerance (25°C)	+/- 0.1% , +/-0.5% or +/-0.7%
Resonant Impedance	50Ω max
Temperature Stability (-40 to 85°C )	+/- 0.2% , +/-0.5% or +/-0.7%
Insulation Resistance	100MΩ min
Frequency Aging (10 Years)	+/- 0.1%
Dimensions	L : 4.5 ± 0.2mm
	W : 2.0 ± 0.2mm
	T : 1.2mm max

### ■ Dimensions



▪ Please inquire Kyocera about detailed individual product specifications.

# Product details

## Introduction of PRQC/V series (8.00MHz to 20.00MHz)



### ■ Features

- Small size (3.2 x 1.3mm)
- Built-in load capacitance
- Fundamental mode

### ■ Product Specifications

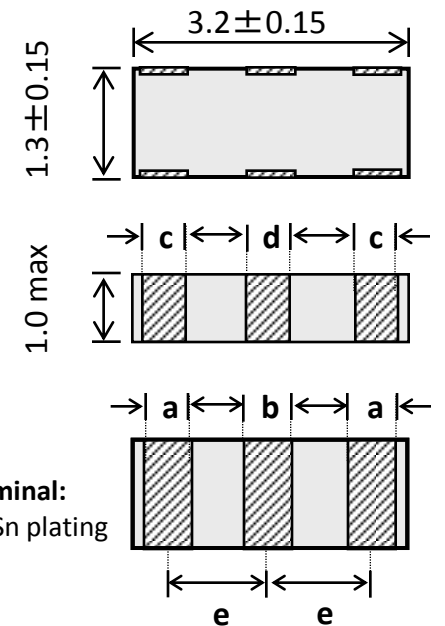
Parameters	Specifications
Frequency Range	8 to 20MHz
Frequency Tolerance (25°C)	+/- 0.15%, +/-0.5% or +/-0.7%
Resonant Impedance	60Ω max
Temperature Stability (-40 to 85°C )	+/- 0.25%, 0.50%
Insulation Resistance	100MΩ min
Frequency Aging (10 Years)	+/- 0.05%
Dimensions	L : 3.2 ± 0.15mm
	W : 1.3 ± 0.15mm
	T : 1.0mm max

▪ Please inquire Kyocera about detailed individual product specifications

### ■ Applications

- Consumer
- Industrial
- Automotive etc

### ■ Dimensions



▪ Terminal:  
Ni/Sn plating

Unit: mm

TYPE	Freq. / MHz	a	b	c	d	e
C	8.00~20.00	0.4	0.4	0.6	0.4	1.2



# Typical Part Numbers

Size	Freq (MHz)	Application	AVX Kyocera PN	Initial tolerance	Temp Tolerance	Aging	Operating temp range (°C)	Built-in Cap (pF)
7.2x3.0	4.00	Consumer/industrial	<a href="#">PBRC4.00HR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	30
7.2x3.0	4.19	Consumer/industrial	<a href="#">PBRC4.19HR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	30
7.2x3.0	4.91	Consumer/industrial	<a href="#">PBRC4.91HR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	30
7.2x3.0	8.00	Consumer/industrial	<a href="#">PBRC8.00HR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	30
4.5x2.0	4.00	Consumer/industrial	<a href="#">PBRC4.00MR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	15
4.5x2.0	8.00	Consumer/industrial	<a href="#">PBRC8.00MR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	15
4.5x2.0	12.00	Consumer/industrial	<a href="#">PBRC12.00MR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	15
4.5x2.0	16.00	Consumer/industrial	<a href="#">PBRC16.00MR50X000</a>	±0.5	±0.5	±0.3	-40 to 85	15
3.2x1.3	8.00	Consumer/industrial	<a href="#">PRQC8.00CR5010X000</a>	±0.5	±0.5	±0.1	-40 to 85	10
3.2x1.3	16.00	Consumer/industrial	<a href="#">PRQC16.00CR5010X000</a>	±0.5	±0.5	±0.1	-40 to 85	10
3.2x1.3	8.00	Consumer/industrial	<a href="#">PRQC8.00CR1010V00L</a>	±0.1	±0.02	±0.1	0 to 70	10
3.2x1.3	16.00	Consumer/industrial	<a href="#">PRQC16.00CR1010V00L</a>	±0.1	±0.02	±0.03	0 to 70	10
7.2x3.0	4.00	Automotive	<a href="#">PBRV4.00HR50Y000</a>	±0.5	±0.3	±0.3	-40to125	30
7.2x3.0	4.19	Automotive	<a href="#">PBRV4.19HR50Y000</a>	±0.5	±0.3	±0.3	-40to125	30
7.2x3.0	4.91	Automotive	<a href="#">PBRV4.91HR50Y000</a>	±0.5	±0.3	±0.3	-40to125	30
4.5x.20	8.00	Automotive	<a href="#">PBRV8.00MR50Y000</a>	±0.5	±0.3	±0.3	-40to125	15
4.5x.20	8.00	Automotive	<a href="#">PBRV8.00MR10Y000</a>	±0.1	±0.2	±0.05	-40to125	15
3.2x3.0	8.00	Automotive	<a href="#">PRQV8.00CR5010Y000</a>	±0.5	±0.5	±0.1	-40to125	10
3.2x3.0	10.00	Automotive	<a href="#">PRQV10.00CR5010Y000</a>	±0.5	±0.5	±0.1	-40to125	10
3.2x3.0	12.00	Automotive	<a href="#">PRQV12.00CR5010Y000</a>	±0.5	±0.5	±0.1	-40to125	10
3.2x3.0	16.00	Automotive	<a href="#">PRQV16.00CR5010Y000</a>	±0.5	±0.5	±0.1	-40to125	10
3.2x3.0	20.00	Automotive	<a href="#">PRQV20.00CR5010Y000</a>	±0.5	±0.5	±0.1	-40to125	10
3.2x3.0	8.00	Automotive	<a href="#">PRQV8.00CR1510Y00L</a>	±0.15	±0.1	±0.05	-40to125	10
3.2x3.0	16.00	Automotive	<a href="#">PRQV16.00CR1510Y00L</a>	±0.15	±0.1	±0.05	-40to125	10
3.2x3.0	20.00	Automotive	<a href="#">PRQV20.00CR1510Y00L</a>	±0.15	±0.1	±0.05	-40to125	10

# Summary

- Ceramic resonator is low cost solution.
- Small size benefit especially with 4MHz compared to crystals.
- Wide frequency range available.
- 3.2 x 1.3 mm smallest part is current focus product.