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# DIRECT

## Electronics Tech.

### (ZTB)

# Ceramic Resonators

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**▶ Product Introduction**

**Direct KHz Ceramic Resonators (ZTB) is Murata resonator CSB compatible.**

**Features :**

- Oscillating circuits requiring no adjustment can be designed by utilizing these resonators in conjunction with transistors or appropriate ICs.
- The ZTB series is stable over a wide temperature range and with respect to long-term aging.
- Miniature and lightweight, standardized for use in low profile devices.
- Highly reliable design with excellent environmental resistance.
- The ZTB series comprises fixed, tuned, solid-state devices.
- Operation Temperature (-20°C ~ +80°C).

**Applications :**

- Square-wave and sine-wave oscillators.
- Clock generator for microprocessors.
- Remote control systems.

Direct KHz Ceramic Resonators (ZTB) is Murata resonator CSB compatible. The (ZTB) series ceramic resonators owe their development to Direct's expert technologies and the application of mass production techniques typically utilized in the manufacture of piezoelectric ceramic components. Because of their consistent high quality and high mechanical Q, the (ZTB) series are ideally suited to remote control unit and microprocessor applications.

Direct Resonators KHz (ZTB) series is designed to provide the engineer with a rugged, relatively low frequency device in the frequency range of 190 kHz to 1,250 kHz. Initial frequency tolerance is  $\pm 0.5\%$  which compares very favorably to the nominal  $\pm 2\% \sim \pm 3\%$  requirements of one chip microprocessors. Stability and Aging Tolerance are tight to  $\pm 0.3\%$ .

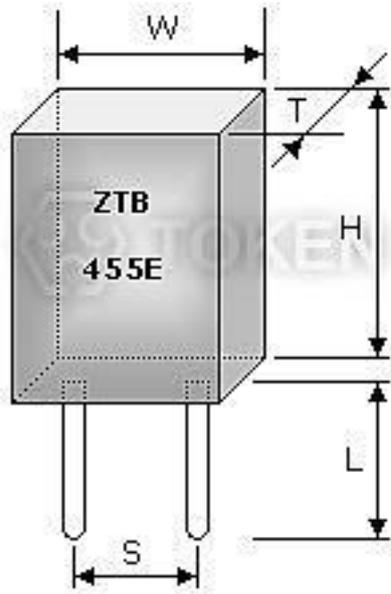
The (ZTB) series conform to the RoHS directive. Direct will also produce devices outside these specifications to meet customer requirements, with comprehensive application engineering and design support available for customers worldwide. Contact us with your specific needs. For more information, please link to Direct official website "[Ceramic Resonators](#)".



**► Dimensions**

**Dimensions (Unit: mm; Tolerance: ±0.3mm) (ZTB)**

Frequency Range (kHz)	W width	T thickness	H height	S lead space	L lead length
190~249	13.5	3.6	14.7	10.0	8.0
250~374	11.0	3.6	12.2	7.7	7.0
375~429	7.9	3.6	9.3	5.0	7.2
430~699	7.0	3.5	9.0	5.0	4.0(6.0)
700~1250	5.1	2.2	6.3	2.5	4.0



**KHz (ZTB) Series Dimensions**



## ► Technical Characteristics

### Technical Characteristics (ZTB)

Part Number	Frequency Accuracy (at 25°C)	Resonant Impedance (Ω)	Stability in Temperature (-20°C ~+80°C)(%)	Aging For 10 Years (%)	Load Capacitance (pF)	
					C1	C2
ZTB82 ~ ZTB189 *	±2kHz	≤20	±0.3	±0.3	/	/
ZTB190D ~ ZTB249D	±1kHz	≤20	±0.3	±0.3	330	470
ZTB250D ~ ZTB374D	±1kHz	≤20	±0.3	±0.3	220	470
ZTB375P ~ ZTB429P	±2kHz	≤20	±0.3	±0.3	120	470
ZTB430E ~ ZTB509E	±2kHz	≤20	±0.3	±0.3	100	100
ZTB510P ~ ZTB699P	±2kHz	≤30	±0.3	±0.3	100	100
ZTB700J ~ ZTB999J	±0.5%	≤70	±0.3	±0.3	100	100
ZTB1000J ~ ZTB1250J	±0.5%	≤100	±0.3	±0.3	100	100

● \* Note: ZTB82 ~ ZTB189 series is new products of custom design.



## ▶ Test Circuit for MOS IC

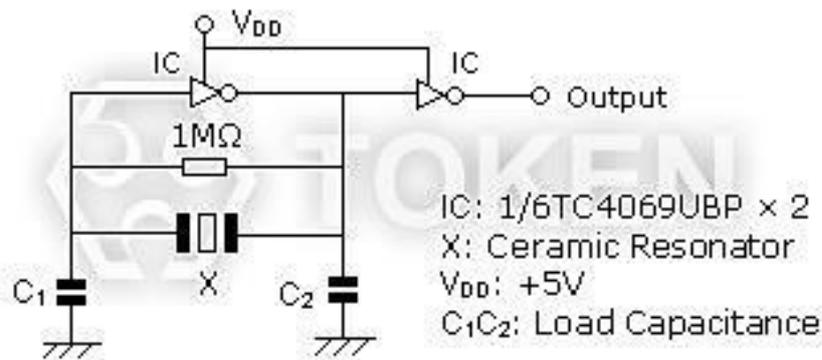
### Resonator Selection - Test Circuit for MOS IC (ZTB)

#### Loading Capacitor (C1 & C2):

The stability of the oscillation circuit is mainly determined by the C1 & C2 values. If the load capacitance is too small, unstable oscillation will occur because of oscillation waveform distortion. If too high, a stop in oscillation can be expected. When comparing the same IC, oscillation circuits with lower frequencies require higher capacitance. Direct Engineers can help with the circuit design if needed.

#### Feedback Resistor (R = 1MΩ):

A Feedback Resistor is used to determine the oscillation circuit bias. The feedback resistance will contribute to instability if it is too large by reducing feedback. Conversely, if it is too small, increases in current will be realized thereby reducing gain. Recent developments in IC design allows for the integration of the feedback resistor in many cases.



KHz (ZTB) Test Circuit for MOS IC

### Resonator Optimum - IC Evaluations (ZTB)

Due to the properties of resonators, IC matching must be studied and performed to satisfy oscillation conditions.

Tolerance is determined by the design of the resonator. However stability and correlation is determined by the IC evaluation. The microcontroller is evaluated with the resonators to determine the best possible circuit conditions to achieve stability and stable oscillation.

In addition, frequency correlation is measured to meet the tight initial frequency tolerance required. For the tight tolerance resonators the IC evaluation must be completed on the final circuit board layout. The final circuit boards provide the most accurate measurement of the frequency correlation.

This measurement will account for the effects of stray capacitance on the oscillation frequency. Once the correlation is determined the frequency of the resonator is adjusted to compensate for the correlation.



## Order Codes

### Order Codes (ZTB)

ZTB455E	P	
Part Number	Package	
	P	Bulk
	TR	Taping Reel

## General Information

### Direct Cuts Resonator Size and Cost

Direct's Resonators are made of high stability piezoelectric ceramics that function as a mechanical resonator. This device has been developed to function as a reference signal generator. The frequency is primarily adjusted by the size and thickness of the ceramic element. With the advance of the IC technology, various equipment may be controlled by a single LSI (Large-Scale Integration) integrated circuit, such as the one-chip microprocessor.

Resonator can be used as the timing element in most microprocessor based equipment. In the future, more and more applications will use **ceramic resonator** because of its high stability non-adjustment performance, miniature size and cost savings.

Typical applications include TVs, VCRs, remote controls and toys, voice synthesizers, automotive electronic devices, copiers, telephones, cameras, communication equipment.

Direct offers a full range of industry standard through hole and surface mount resonators both with and without internal capacitors. For standard Operating Temperatures (-20°C to 80°C), and for Automotive applications (-40°C to +125°C), with a wide range of frequencies and frequency stability options. Additionally, Direct Application Engineering and Design capabilities allow for custom design and characterization requirements that meet the demands of most applications.

