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# (ZTAC/ZTTC)
# SMD
# Ceramic Resonators

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# Product Introduction

## Introduction (ZTAC/ZTTC)

**Features :**

- High reliability chip resonator with high temperature withstanding ceramic case.
- Ultra-miniature size is suitable for compact equipment high mounting density.
- Low profile, Reflow solderable, Excellent solderability.

**Applications :**

- Car accessories.
- PDAs, PC peripherals.
- Camcorders, Digital cameras.

Token (ZTAC/ZTTC) series is the smallest surface mount ceramic resonators (Murata resonator CSAC/CSTC compatible). Previously, only higher cost quartz crystal resonators were considered for CAN bus application, due to tighter frequency tolerance requirements than for traditional automotive bus applications. Nowadays, Token utilizes the latest ceramic piezo technology freeing the design engineers from having to use these higher cost components and still achieve desired reliability and performance targets.


Token ZTAC and ZTTC series are the SMD ceramic resonators that meet the frequency tolerance ±0.5%, temperature tolerance ±0.3% ~ ±0.4%, and aging tolerance ±0.3%. The ZTAC and ZTTC covers the frequency range of 1.79 MHz to 50.00 MHz. ZTTC series features a built-in load capacitance. This feature eliminates any need for external loading capacitors and reduces component count, increases reliability and reduces size.

The ZTACE×MG (3.2 × 1.3 mm) with (Max.) profile 1.0 mm and ZTACW×MX (2.5 × 2.0 mm) with (Max.) profile 1.5 mm are the smallest resonators for their respective frequency ranges. All ZTAC and ZTTC series are surface mount devices (SMD) with operating temperature range is -20℃ to +80 ℃.

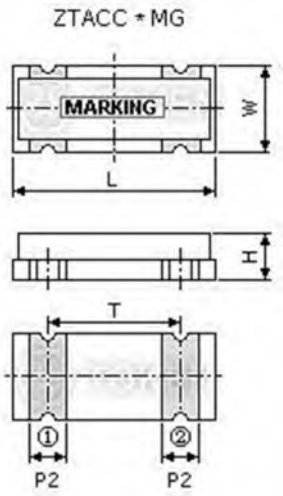
Tolerance is the main key characteristics to evaluate for a resonator. The total tolerance is the addition of the initial tolerance, temperature tolerance and aging tolerance. Tighter tolerances are possible through design advancements, material refinement and manufacturing techniques. Token's design and material improve the temperature and aging characteristics of the resonator. Token's manufacturing ability sort to tighter initial tolerances.

Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, contact us with your specific needs. For more information, please link to Token official website "Ceramic Resonators".

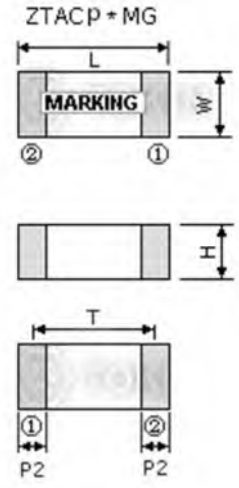
# ZTAC Dimensions

## Dimensions (ZTAC)

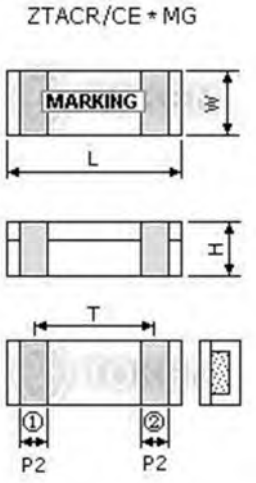
| Part Number | Dimensions (Unit: mm) | | | | |
|---|---|---|---|---|---|
| | L | W | H | P2 | T |
| ZTACC*MG | 7.4±0.2 | 3.4±0.2 | 1.8±0.2 | 1.2±0.2 | 5.0±0.3 |
| ZTACP*MG | 6.0±0.2 | 3.0±0.2 | 2.0 Max. | 1.2±0.2 | 5.0±0.3 |
| ZTACR*MG | 4.5±0.2 | 2.0±0.2 | 1.2 Max. | 0.8±0.2 | 3.0±0.2 |
| ZTACE*MG | 3.2±0.1 | 1.3±0.1 | 1.0 Max. | 0.4±0.1 | 2.4±0.1 |
| ZTACS*MT/MX | 4.7±0.2 | 4.1±0.2 | (1.2+A)±0.2 | 0.8±0.2 | 3.9±0.2 |
| ZTACV*MT/MX | 3.7±0.2 | 3.1±0.2 | (1.0+A)±0.2 | 0.7±0.2 | 3.0±0.2 |
| ZTACW*MX | 2.5±0.2 | 2.0±0.2 | 1.5 Max. | 0.4±0.2 | 2.0±0.2 |



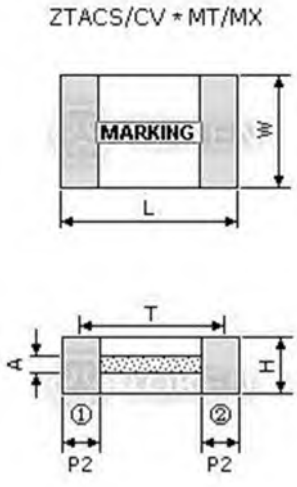

MHz (ZTACC*MG) Dimensions



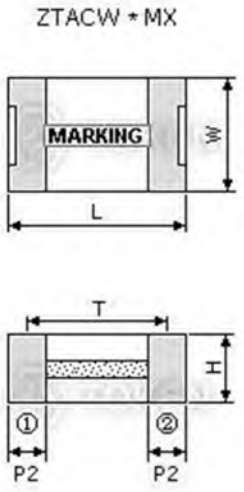

MHz (ZTACP*MG) Dimensions




MHz (ZTACR/CE*MG) Dimensions




MHz (ZTACS/CV*MT/MX) Dimensions




MHz (ZTACS/CV*MT/MX) Dimensions

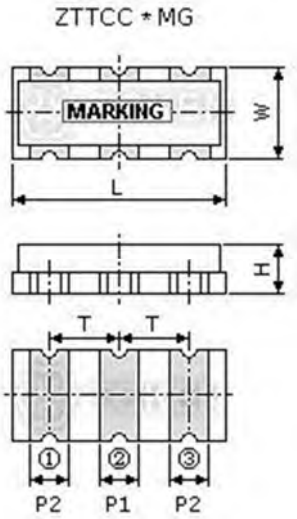
① Input ② Output

- Note: A stands for thickness of the ceramic element, which varies with the frequency. The range of the thickness is 0.1 to 0.7mm.

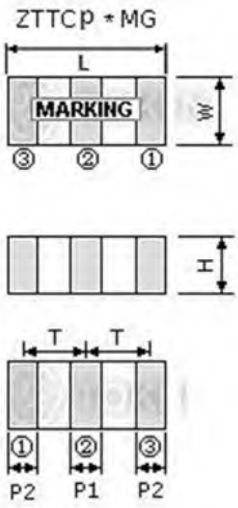
# ZTTC Dimensions

## Dimensions (ZTTC)

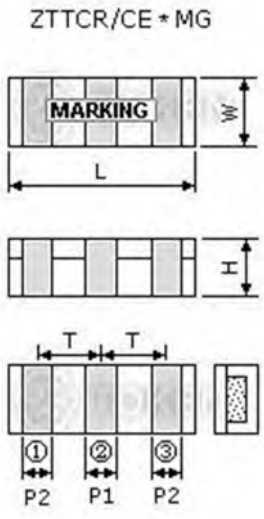
| Part Number | Dimensions (Unit: mm) | | | | | |
|---|---|---|---|---|---|---|
| | L | W | H | P1 | P2 | T |
| ZTTCC*MG | 7.4±0.2 | 3.4±0.2 | 1.8±0.2 | 1.2±0.2 | 1.2±0.2 | 2.5±0.3 |
| ZTTCP*MG | 6.0±0.2 | 3.0±0.2 | 2.0 Max. | 1.2±0.2 | 1.2±0.2 | 2.5±0.3 |
| ZTTCR*MG | 4.5±0.2 | 2.0±0.2 | 1.2 Max. | 0.8±0.2 | 0.8±0.2 | 1.5±0.2 |
| ZTTCE*MG | 3.2±0.1 | 1.3±0.1 | 1.0 Max. | 0.4±0.1 | 0.4±0.1 | 1.2±0.1 |
| ZTTCS*MT/MX | 4.7±0.2 | 4.1±0.2 | (1.2+A)±0.2 | 1.0±0.2 | 0.8±0.2 | 1.95±0.2 |
| ZTTCV*MT/MX | 3.7±0.2 | 3.1±0.2 | (1.0+A)±0.2 | 0.9±0.2 | 0.7±0.2 | 1.5±0.2 |
| ZTTCW*MX | 2.5±0.2 | 2.0±0.2 | 1.5 Max. | 0.5±0.2 | 0.4±0.2 | 1.0±0.2 |



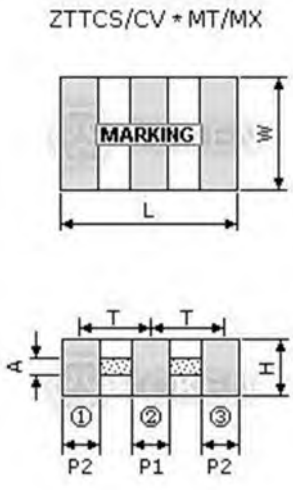

MHz (ZTTCC*MG) Dimensions



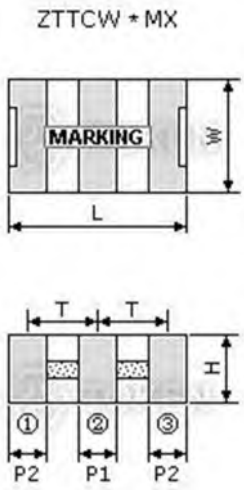

MHz (ZTTCP*MG) Dimensions




MHz (ZTTCR/CE*MG) Dimensions




MHz (ZTTCS/CV*MT/MX) Dimensions




MHz (ZTTCS/CV*MT/MX) Dimensions

① Input ② Ground ③ Output

- **Note: A stands for thickness of the ceramic element, which varies with the frequency. The range of the thickness is 0.1 to 0.7mm.**

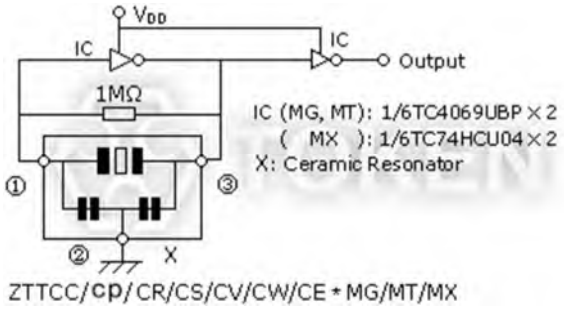
# Technical Characteristics

## Technical Characteristics (ZTAC/ZTTC)

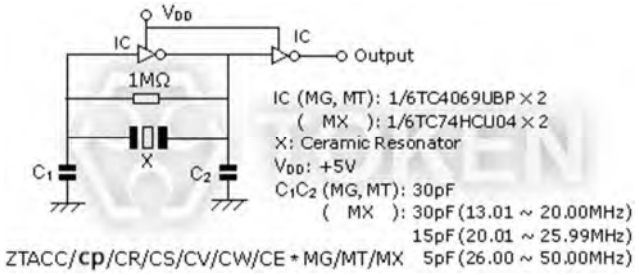
| Part Number | Frequency Range (MHz) | Frequency Accuracy (%) | Stability in Temperature (-20℃ ~ +80℃) (%) | Aging for Ten Years (%) |
|---|---|---|---|---|
| **ZTACC*MG / ZTTCC*MG** | 1.79 ~ 8.00 | ± 0.5 | ± 0.3 | ± 0.3 |
| **ZTACP*MG / ZTTCP*MG** | 2.00 ~ 12.00 | ± 0.5 | ± 0.3 | ± 0.3 |
| **ZTACR*MG / ZTTCR*MG** | 4.00 ~ 8.00 | ± 0.5 | ± 0.3 | ± 0.3 |
| **ZTACS*MT / ZTTCS*MT** | 6.00 ~ 13.00 | ± 0.5 | ± 0.4 | ± 0.3 |
| **ZTACV*MT / ZTTCV*MT** | 8.00 ~ 13.00 | ± 0.5 | ± 0.4 | ± 0.3 |
| **ZTACE*MG / ZTTCE*MG** | 8.00 ~ 13.00 | ± 0.5 | ± 0.4 | ± 0.3 |
| **ZTACS*MX / ZTTCS*MX** | 13.01 ~ 50.00 | ± 0.5 | ± 0.3 | ± 0.3 |
| **ZTACV*MX / ZTTCV*MX** | 16.00 ~ 50.00 | ± 0.5 | ± 0.3 | ± 0.3 |
| **ZTACW*MX / ZTTCW*MX** | 20.00 ~ 45.00 | ± 0.5 | ± 0.3 | ± 0.3 |

# Test Circuit for MOS IC

## Test Circuit for MOS IC (ZTAC/ZTTC)




MHz (ZTAC) Test Circuit for MOS IC




MHz (ZTTC) Test Circuit for MOS IC

## (ZTAC/ZTTC) Resonator Application - Oscillation Circuit for MOS IC

**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.

**Bias resistor (Rb optional):**
A Bias Resistor can be utilized in the resonator oscillation circuit to change the bias point when a reduction in IC gain is required, or to suppress unstable oscillation. This may be especially considered when a 3 stage buffered IC, or TTL IC, is used.

**Damping Resistor (Rd optional):**
Abnormal harmonic oscillation can be suppressed using a dampening resistor. The dampening resistor and load capacitors work together as a low-pass filter to reduce gain in the MHz range of oscillation.

**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. Token Engineers can help with the circuit design if needed.

## (ZTAC/ZTTC) Resonator Optimization - IC Evaluations

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.

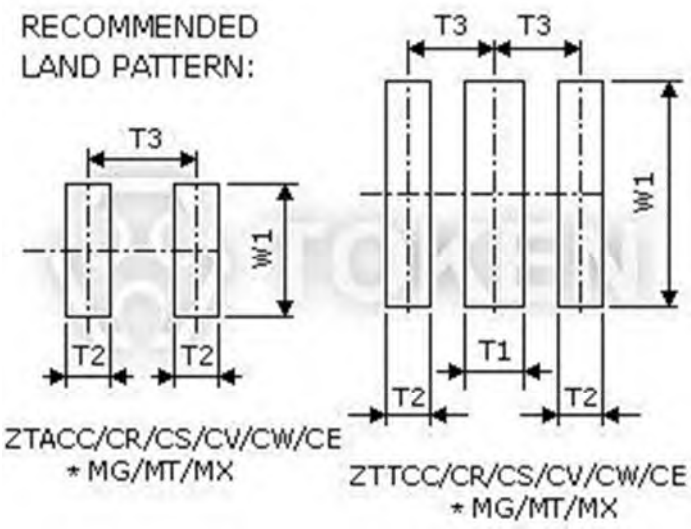
In addition, frequency correlation is measured to meet the tight initial frequency tolerance required. For the tight tolerance resonators the IC evaluation must be completed on the final circuit board layout. The final circuit boards provide the most accurate measurement of the frequency correlation.

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.

# Recommended Land Pattern

## Recommended Land Pattern (ZTAC/ZTTC)

| Part Number | Dimensions (Unit: mm) | | | |
|---|---|---|---|---|
| | T1 | T2 | T3 | W1 |
| ZTACC*MG | | 1.7±0.3 | 5.0±0.3 | 4.0±0.3 |
| ZTACR*MG | | 0.8±0.2 | 3.0±0.2 | 2.6±0.2 |
| ZTACS*MT/MX | | 0.8±0.2 | 3.9±0.2 | 5.0±0.2 |
| ZTACV*MT/MX | | 0.7±0.2 | 3.0±0.2 | 4.1±0.2 |
| ZTACW*MX | | 0.5±0.2 | 2.0±0.2 | 2.6±0.2 |
| ZTTCC*MG | 1.5±0.3 | 1.7±0.3 | 2.5±0.3 | 4.0±0.3 |
| ZTTCR*MG | 0.8±0.2 | 0.8±0.2 | 1.5±0.2 | 2.6±0.2 |
| ZTTCS*MT/MX | 1.3±0.2 | 0.8±0.2 | 1.95±0.2 | 5.0±0.2 |
| ZTTCV*MT/MX | 1.0±0.2 | 0.7±0.2 | 1.5±0.2 | 4.1±0.2 |
| ZTTCW*MX | 0.5±0.2 | 0.5±0.2 | 1.0±0.2 | 2.6±0.2 |




**MHz (ZTAC/ZTTC) Recommended Land Pattern**

# Order Codes

## Order Codes (ZTAC/ZTTC)

| ZTACC5.00MG | TR |
|---|---|
| Part Number | Package |
| | TR: Taping Reel |

# General Information

## Token Cuts Resonator Size and Cost

Token'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.

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