

Ceramic Resonators

Lead type

3.45 to 40MHz

FCR(Built-in load capacity/External load capacity) series

Issue date: August 2007

- All specifications are subject to change without notice.
 - Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.
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Ceramic Resonators(Lead) FCR Series

Conformity to RoHS Directive

FEATURES

- The FCR series are small leaded ceramic resonators that used thickness shear mode or 3rd overtone thickness mode element of piezo ceramics with both 3.45 to 10.0MHz and 16.0 to 50.0MHz.
- The products with built-in capacitances have a dielectric element formed two capacities. This eliminates the external loading capacitors, thus simplifying circuit requirements.
- Optimization of the temperature characteristics of both the piezoelectric materials and dielectric materials has resulted in stable oscillating frequency.
- Ammo packing is available for various automatic insert machine (1500pieces/box). Short lead type and L-bend lead type are also available, please contact TDK.
- Setting or matching of oscillating circuit condition which correspond to new models IC, application IC or custom IC are available, please contact TDK.
- The products don't contain Lead at solder of internal joint and solder plating of lead wire. You can use both Pb free solder (Sn-3Ag-0.5Cu) and Sn-Pb eutectic solder on your production.

TEMPERATURE RANGES

| | |
|-------------------|--------------|
| Operating/Storage | -40 to +85°C |
|-------------------|--------------|

OSCILLATING FREQUENCY DRIFT OVER TEMPERATURE

 $\pm 0.3\%$ / -40 to +85°C (Standard)

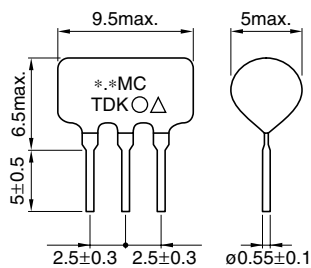
OSCILLATING FREQUENCY AGING

 $\pm 0.3\%$ / 10years (Standard)

SHAPES AND DIMENSIONS

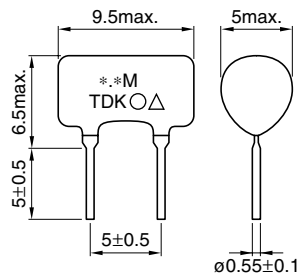
FCR**.*MC5

BUILT-IN LOADING TYPE



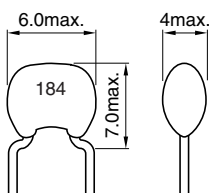
FCR**.*M5

EXTERNAL LOADING TYPE

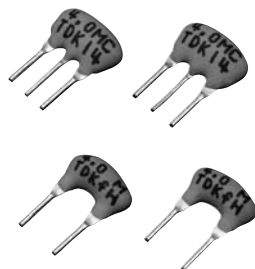


FCR**.*M6

EXTERNAL LOADING TYPE



Dimensions in mm



PRODUCT IDENTIFICATIONS

| | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|
| FCR | 4.0 | MC5 | □□ | □□ | □□ | □□ | □□ |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |

(1) Series name

| | |
|-----|--------------------------|
| FCR | Ceramic resonator (lead) |
|-----|--------------------------|

(2) Oscillating frequency

(3) Production type and dimensions

| Symbol | Oscillating frequency range | Loading capacitors |
|--------|-----------------------------|--------------------|
| M5 | 3.45 to 10.0 MHz | External |
| MC5 | 3.45 to 10.0 MHz | Internal |
| M6 | 16.0 to 50.0 MHz | External |

(4) Initial oscillating frequency tolerance

| | ±0.5% | ±0.5% | ±0.5% |
|--------|-------------|-------|-------|
| Non | ±0.5% | ±0.5% | ±0.5% |
| A | ±0.3% | ±0.3% | — |
| Others | Custom made | | |

(5) Oscillating frequency correlation

| | Non correlation for TDK Standard |
|--------|----------------------------------|
| Non | Non correlation for TDK Standard |
| F | Custom made |
| F1 | Custom made |
| F2 | Custom made |
| Others | Custom made |

(6) Loading capacitance

(7) Products thickness

| | Standard |
|--------|-------------|
| Non | Standard |
| N | Custom made |
| Others | Custom made |

(8) Packaging style and lead length

| Symbol | Packaging style | Lead length |
|--------|--|----------------|
| Non | Bulk (500pieces) | Standard (5mm) |
| M | Bulk (500pieces) | 3.1mm |
| M3 | Bulk (500pieces) | 3.0mm |
| T | Taping (Ammo pack 16mm height, 1500pieces) | — |
| T3 | Taping (Ammo pack 18mm height, 1500pieces) | — |
| Others | Custom made | |

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ELECTRICAL CHARACTERISTICS

| Part No. | Oscillating frequency Fosc (MHz) | Resonant impedance Ro(Ω) | Initial Fosc tolerance* (%) | Capacitance CL1/CL2 (pF) |
|--|----------------------------------|-----------------------------------|-----------------------------|--------------------------|
| FCR**.*MC5 type(Built-in loading type) | | | | |
| FCR3.45MC5 | 3.45 | 20 | ± 0.5 | 30/30 |
| FCR3.52MC5 | 3.52 | 20 | ± 0.5 | 30/30 |
| FCR3.58MC5 | 3.58 | 20 | $\pm 0.5/0.3$ | 30/30 |
| FCR3.64MC5 | 3.64 | 20 | ± 0.5 | 30/30 |
| FCR3.84MC5 | 3.84 | 20 | ± 0.5 | 30/30 |
| FCR4.0MC5 | 4.00 | 20 | $\pm 0.5/0.3$ | 30/30 |
| FCR4.19MC5 | 4.19 | 20 | $\pm 0.5/0.3$ | 30/30 |
| FCR5.0MC5 | 5.00 | 20 | $\pm 0.5/0.3$ | 30/30 |
| FCR6.0MC5 | 6.00 | 20 | $\pm 0.5/0.3$ | 30/30 |
| FCR8.0MC5 | 8.00 | 30 | $\pm 0.5/0.3$ | 20/20 |
| FCR8.38MC5 | 8.38 | 30 | $\pm 0.5/0.3$ | 20/20 |
| FCR10.0MC5 | 10.00 | 30 | $\pm 0.5/0.3$ | 20/20 |
| FCR**.*M5 type(External loading type) | | | | |
| FCR3.45M5 | 3.45 | 20 | ± 0.5 | |
| FCR3.52M5 | 3.52 | 20 | ± 0.5 | |
| FCR3.58M5 | 3.58 | 20 | $\pm 0.5/0.3$ | |
| FCR3.64M5 | 3.64 | 20 | ± 0.5 | |
| FCR3.84M5 | 3.84 | 20 | ± 0.5 | |
| FCR4.0M5 | 4.00 | 20 | $\pm 0.5/0.3$ | |
| FCR4.19M5 | 4.19 | 20 | $\pm 0.5/0.3$ | |
| FCR5.0M5 | 5.00 | 20 | $\pm 0.5/0.3$ | |
| FCR6.0M5 | 6.00 | 20 | $\pm 0.5/0.3$ | |
| FCR8.0M5 | 8.00 | 30 | $\pm 0.5/0.3$ | |
| FCR8.38M5 | 8.38 | 30 | $\pm 0.5/0.3$ | |
| FCR10.0M5 | 10.00 | 30 | $\pm 0.5/0.3$ | |
| FCR**.*M6 type(External loading type) | | | | |
| FCR16.0M6 | 16.00 | 40 | ± 0.5 | |
| FCR18.0M6 | 18.00 | 40 | ± 0.5 | |
| FCR18.43M6 | 18.43 | 40 | ± 0.5 | |
| FCR24.0M6 | 24.00 | 40 | ± 0.5 | |
| FCR25.0M6 | 25.00 | 40 | ± 0.5 | |
| FCR33.86M6 | 33.86 | 40 | ± 0.5 | |
| FCR40.0M6 | 40.00 | 40 | ± 0.5 | |

* $\pm 0.5\%$ is standard.

• These values are typical. Application frequency are also available. Please contact TDK.

RELIABILITY AND TEST CONDITIONS

The following test items are satisfied.

- (1) Oscillating frequency change: within $\pm 0.25\%$
- (2) Resonant resistance change: within $\pm 10\Omega$
- (3) Appearance, serious abnormalities not to exist.

| Test items | Test conditions |
|--|---|
| Low temperature storage characteristics | Temperature: $-40\pm 3^\circ\text{C}$ Time: 1000h |
| High temperature storage characteristics | Temperature: $+85\pm 2^\circ\text{C}$ Time: 1000h |
| Humidity resistance | Humidity: 90 to 95(%)RH Temperature: $60\pm 2^\circ\text{C}$ Time: 100h |
| Thermal shock | -40°C (30min), 85°C (30min) x 100 cycles |
| Soldering heat resistance | Solder temperature: peak 260°C , 10s flow |
| Drop | Drop 3 times onto the concrete from a height of 1m |
| Vibration | Frequency: $10 \leftrightarrow 55 \leftrightarrow 10\text{Hz/min}$ Amplitude: 1.5mm X, Y and Z directions for 2h each |

SOLDERABILITY

The lead wires are adopted Pb free plating wire to apply Pb free soldering. You can also use current Sn-Pb eutectic solder.

| Test conditions | Test result |
|--|---|
| With Rosin-ethanol 25% by weight, dip in Sn-Pb eutectic solder bath at $230\pm 5^\circ\text{C}$ for $3\pm 0.5\text{sec.}$ or Pb free solder(Sn-3Ag-0.5Cu) bath at $245\pm 2^\circ\text{C}$ for $3\pm 0.2\text{sec.}$ | 95% minimum of surface should be covered by new solder. |

RECOMMENDED SOLDERING CONDITIONS

This is the fit product for flow soldering.

FLOW SOLDERING CONDITION

| | |
|----------------------------|--------------------------|
| Heat-resistant temperature | $260\pm 5^\circ\text{C}$ |
| Heat-resistant time | $10\pm 1\text{sec.}$ |
| Number of times | 1time |

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