



The latest comprehensive data to fully support these parts is readily available.

**LAB/STARTER KIT:  
PLEASE REFER TO  
PRODUCTION SECTION**

## TAPE & REEL SPECIFICATIONS

### MCH15

| Tape Code     | K      | L      |
|---------------|--------|--------|
| Tape Width    | 8mm    | 8mm    |
| Reel Diameter | 180mm  | 330mm  |
| Quantity      | 10,000 | 50,000 |

### MCH18, MCH21, MCH31

| Tape Code                 | K      | L      |
|---------------------------|--------|--------|
| Tape Width                | 8mm    | 8mm    |
| Reel Diameter             | 180mm  | 330mm  |
| Qty. Th ≤ 1.0mm           | 4,000  | 16,000 |
| Th = 1.25mm               | 3,000  | 12,000 |
| For plastic tape, change: | K to P | L to Q |

## CLASS II X7R MULTILAYER CERAMIC CAPACITORS

### MCH SERIES

- CLASS I, TEMPERATURE COMPENSATED: COG
- CLASS II, HIGH DIELECTRIC CONSTANT: X7R & Y5V. Z5U ALSO AVAILABLE

### MCH SERIES SPECIFICATIONS

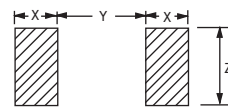
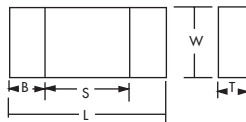
| Parameter                 | X7R                                                                                                                     | Test Conditions                                   |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Temperature range         | -55 +125°C                                                                                                              |                                                   |
| Temp. coefficients        | ≤ ±15%                                                                                                                  |                                                   |
| Dielectric loss tangent   | 2.5% Max                                                                                                                | 1KHz, 1vRMS                                       |
| tan δ                     | 0.1% Max                                                                                                                | 1MHz, 1vRMS                                       |
| Insulation resistance     | > 10,000MΩ or 500MΩ • μF*                                                                                               | After rated voltage applied for 60±5 sec          |
| Withstanding voltage      | No breakdown or mechanical damage                                                                                       | 2.5x r. v.                                        |
| End termination adherence | No peeling or sign of peeling shall be allowed on the end terminations                                                  | 510gF (5n), 30 sec<br>On alumina substrate        |
| Solderability             | 75% of the surface of both end terminations should be covered evenly with new solder, without any breaks on the surface | Solder temp: 235±5°C<br>Immersion time: 2±0.5 sec |
| Resistance to solder heat |                                                                                                                         | Solder temp 260±5°C                               |
| Appearance:               | No mechanical damage                                                                                                    | Immersion time 5±0.5s                             |
| Cap'n change rate:        | ≤ ±5.0%                                                                                                                 | Preheat: 150±10°C,<br>1-2 min                     |
| tan δ:                    | Satisfies initial specified value                                                                                       | Measure after 24±2 hrs                            |
| Insulation res'n:         | > 10,000MΩ or 500MΩ • μF*                                                                                               | No damage                                         |
| Withstand voltage:        |                                                                                                                         | Temp. 40±2°C                                      |
| Humidity resistance       |                                                                                                                         | RH: 90-95%                                        |
| Appearance:               | No mechanical damage                                                                                                    | Test time: 500 hrs                                |
| Cap'n change rate:        | ≤ ±10.0%                                                                                                                | Measured after 24 hrs                             |
| tan δ:                    | ≤ 5.0%                                                                                                                  |                                                   |
| Insulation res'n:         | > 1,000MΩ or 50MΩ • μF*                                                                                                 |                                                   |
| Life test                 |                                                                                                                         | Max, operating temp                               |
| Appearance:               | No mechanical damage                                                                                                    | 2x Rated voltage                                  |
| Cap'n change rate         | < ±10.0%                                                                                                                | Test time: 1000 hours                             |
| Insulation res'n:         | > 1,000MΩ or 50MΩ • μF*                                                                                                 | Measured after 24 hrs                             |

\*: whichever is smaller. †: whichever is larger.

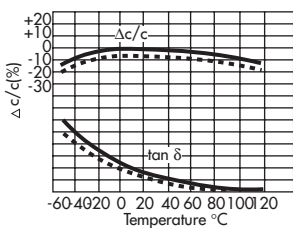
### DIMENSIONS & TYPICAL FOOTPRINT

| Size | Series | L        | W        | T max | B min | S min | X   | Y   | Z   |
|------|--------|----------|----------|-------|-------|-------|-----|-----|-----|
| 0402 | MCH15  | 1.0±0.05 | 0.5±0.05 |       | 0.1   | 0.3   | 0.4 | 0.5 | 0.6 |
| 0603 | MCH18  | 1.6±0.2  | 0.8±0.2  | SEE   | 0.15  | 0.4   | 0.7 | 0.8 | 0.8 |
| 0805 | MCH21  | 2.0±0.2  | 1.25±0.2 | PRICE | 0.2   | 0.6   | 1.0 | 1.0 | 1.3 |
| 1206 | MCH31  | 3.2±0.2  | 1.6±0.2  | TABLE | 0.2   | 1.0   | 1.0 | 2.0 | 1.6 |
| 1210 | MCH32  | 3.2±0.2  | 2.5±0.2  |       | 0.3   | 1.0   | 1.2 | 2.0 | 2.5 |

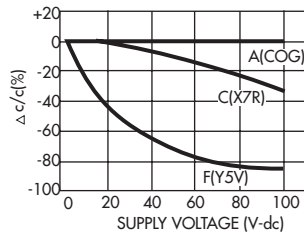
All dimensions in mm.



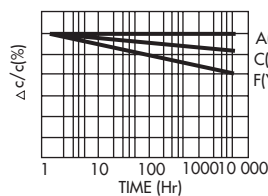
### TEMPERATURE CHARACTERISTICS



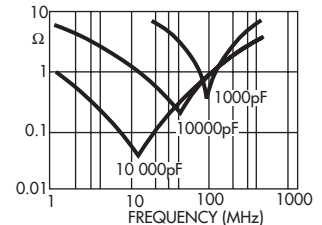
### DC BIAS CHARACTERISTICS



### AGEING CHARACTERISTICS



### IMPEDANCE VERSUS FREQUENCY



CLASS II X7R MULTILAYER CERAMIC CAPACITORS

MCH SERIES X7R DIELECTRIC, 50V, 10%

0402

| Part Number                 | Value | Th  | SQP  |
|-----------------------------|-------|-----|------|
| <b>100pF</b>                |       |     |      |
| MCH155C221K                 | 220pF | 0.5 | 0.02 |
| MCH155C271K                 | 270pF | 0.5 | 0.08 |
| MCH155C331K                 | 330pF | 0.5 | 0.08 |
| MCH155C391K                 | 390pF | 0.5 | 0.08 |
| MCH155C471K                 | 470pF | 0.5 | 0.02 |
| MCH155C561K                 | 560pF | 0.5 | 0.08 |
| MCH155C681K                 | 680pF | 0.5 | 0.08 |
| MCH155C821K                 | 820pF | 0.5 | 0.08 |
| <b>1nF</b>                  |       |     |      |
| MCH155C102K                 | 1.0nF | 0.5 | 0.02 |
| MCH155C122K                 | 1.2nF | 0.5 | 0.08 |
| MCH155C152K                 | 1.5nF | 0.5 | 0.08 |
| MCH155C182K                 | 1.8nF | 0.5 | 0.08 |
| MCH155C222K                 | 2.2nF | 0.5 | 0.08 |
| MCH155C272K                 | 2.7nF | 0.5 | 0.08 |
| MCH155C332K                 | 3.3nF | 0.5 | 0.04 |
| MCH155C392K                 | 3.9nF | 0.5 | 0.08 |
| For tape and reel, add 'K'. |       |     |      |

0603

| Part Number                 | Value | Th  | SQP  |
|-----------------------------|-------|-----|------|
| <b>100pF</b>                |       |     |      |
| MCH185C221K                 | 220pF | 0.8 | 0.01 |
| MCH185C271K                 | 270pF | 0.8 | 0.01 |
| MCH185C331K                 | 330pF | 0.8 | 0.01 |
| MCH185C391K                 | 390pF | 0.8 | 0.01 |
| MCH185C471K                 | 470pF | 0.8 | 0.01 |
| MCH185C561K                 | 560pF | 0.8 | 0.01 |
| MCH185C681K                 | 680pF | 0.8 | 0.01 |
| MCH185C821K                 | 820pF | 0.8 | 0.01 |
| <b>1nF</b>                  |       |     |      |
| MCH185C102K                 | 1.0nF | 0.8 | 0.01 |
| MCH185C122K                 | 1.2nF | 0.8 | 0.02 |
| MCH185C152K                 | 1.5nF | 0.8 | 0.01 |
| MCH185C182K                 | 1.8nF | 0.8 | 0.01 |
| MCH185C222K                 | 2.2nF | 0.8 | 0.01 |
| MCH185C272K                 | 2.7nF | 0.8 | 0.01 |
| MCH185C332K                 | 3.3nF | 0.8 | 0.01 |
| MCH185C392K                 | 3.9nF | 0.8 | 0.01 |
| MCH185C472K                 | 4.7nF | 0.8 | 0.01 |
| MCH185C562K                 | 5.6nF | 0.8 | 0.01 |
| MCH185C682K                 | 6.8nF | 0.8 | 0.01 |
| MCH185C822K                 | 8.2nF | 0.8 | 0.01 |
| <b>10nF</b>                 |       |     |      |
| MCH185C103K                 | 10nF  | 0.8 | 0.01 |
| For tape and reel, add 'K'. |       |     |      |

0805

| Part Number                                                | Value | Th   | SQP  |
|------------------------------------------------------------|-------|------|------|
| <b>100pF</b>                                               |       |      |      |
| MCH215C221K                                                | 220pF | 0.6  | 0.01 |
| MCH215C271K                                                | 270pF | 0.6  | 0.01 |
| MCH215C331K                                                | 330pF | 0.6  | 0.01 |
| MCH215C391K                                                | 390pF | 0.6  | 0.01 |
| MCH215C471K                                                | 470pF | 0.6  | 0.01 |
| MCH215C561K                                                | 560pF | 0.6  | 0.01 |
| MCH215C681K                                                | 680pF | 0.6  | 0.01 |
| MCH215C821K                                                | 820pF | 0.6  | 0.01 |
| <b>1nF</b>                                                 |       |      |      |
| MCH215C102K                                                | 1.0nF | 0.6  | 0.01 |
| MCH215C122K                                                | 1.2nF | 0.6  | 0.02 |
| MCH215C152K                                                | 1.5nF | 0.6  | 0.02 |
| MCH215C182K                                                | 1.8nF | 0.6  | 0.02 |
| MCH215C222K                                                | 2.2nF | 0.6  | 0.02 |
| MCH215C272K                                                | 2.7nF | 0.6  | 0.02 |
| MCH215C332K                                                | 3.3nF | 0.6  | 0.02 |
| MCH215C392K                                                | 3.9nF | 0.6  | 0.02 |
| MCH215C472K                                                | 4.7nF | 0.6  | 0.02 |
| MCH215C562K                                                | 5.6nF | 0.6  | 0.02 |
| MCH215C682K                                                | 6.8nF | 0.6  | 0.02 |
| MCH215C822K                                                | 8.2nF | 0.6  | 0.02 |
| <b>10nF</b>                                                |       |      |      |
| MCH215C103K                                                | 10nF  | 0.6  | 0.02 |
| MCH215C123K                                                | 12nF  | 0.6  | 0.02 |
| MCH215C153K                                                | 15nF  | 0.6  | 0.02 |
| MCH215C183K                                                | 18nF  | 0.6  | 0.02 |
| MCH215C223K                                                | 22nF  | 0.6  | 0.02 |
| MCH215C273K                                                | 27nF  | 0.85 | 0.03 |
| MCH215C333K                                                | 33nF  | 0.85 | 0.03 |
| MCH215C393K                                                | 39nF  | 0.85 | 0.03 |
| MCH215C473K                                                | 47nF  | 1.25 | 0.03 |
| MCH215C563K                                                | 56nF  | 1.25 | 0.03 |
| MCH215C683K                                                | 68nF  | 1.25 | 0.04 |
| For tape and reel, add 'K'. (Th 1.0mm)<br>'P' (Th 1.25mm). |       |      |      |

1206

| Part Number                                                | Value | Th   | SQP  |
|------------------------------------------------------------|-------|------|------|
| <b>100pF</b>                                               |       |      |      |
| MCH315C221K                                                | 220pF | 0.6  | 0.01 |
| MCH315C271K                                                | 270pF | 0.6  | 0.01 |
| MCH315C331K                                                | 330pF | 0.6  | 0.01 |
| MCH315C391K                                                | 390pF | 0.6  | 0.01 |
| MCH315C471K                                                | 470pF | 0.6  | 0.01 |
| MCH315C561K                                                | 560pF | 0.6  | 0.01 |
| MCH315C681K                                                | 680pF | 0.6  | 0.01 |
| MCH315C821K                                                | 820pF | 0.6  | 0.01 |
| <b>1nF</b>                                                 |       |      |      |
| MCH315C102K                                                | 1.0nF | 0.6  | 0.01 |
| MCH315C122K                                                | 1.2nF | 0.6  | 0.01 |
| MCH315C152K                                                | 1.5nF | 0.6  | 0.01 |
| MCH315C182K                                                | 1.8nF | 0.6  | 0.01 |
| MCH315C222K                                                | 2.2nF | 0.6  | 0.01 |
| MCH315C272K                                                | 2.7nF | 0.6  | 0.01 |
| MCH315C332K                                                | 3.3nF | 0.6  | 0.01 |
| MCH315C392K                                                | 3.9nF | 0.6  | 0.01 |
| MCH315C472K                                                | 4.7nF | 0.6  | 0.01 |
| MCH315C562K                                                | 5.6nF | 0.6  | 0.01 |
| MCH315C682K                                                | 6.8nF | 0.6  | 0.01 |
| MCH315C822K                                                | 8.2nF | 0.6  | 0.01 |
| <b>10nF</b>                                                |       |      |      |
| MCH315C103K                                                | 10nF  | 0.6  | 0.01 |
| MCH315C123K                                                | 12nF  | 0.6  | 0.01 |
| MCH315C153K                                                | 15nF  | 0.6  | 0.01 |
| MCH315C183K                                                | 18nF  | 0.6  | 0.01 |
| MCH315C223K                                                | 22nF  | 0.6  | 0.01 |
| MCH315C273K                                                | 27nF  | 0.6  | 0.02 |
| MCH315C333K                                                | 33nF  | 0.85 | 0.02 |
| MCH315C393K                                                | 39nF  | 0.85 | 0.02 |
| MCH315C473K                                                | 47nF  | 0.85 | 0.02 |
| MCH315C563K                                                | 56nF  | 0.85 | 0.02 |
| MCH315C683K                                                | 68nF  | 0.85 | 0.02 |
| MCH315C823K                                                | 82nF  | 0.85 | 0.03 |
| <b>100nF</b>                                               |       |      |      |
| MCH315C104K                                                | 100nF | 0.85 | 0.02 |
| MCH315C124K                                                | 120nF | 1.25 | 0.04 |
| For tape and reel, add 'K'. (Th 1.0mm)<br>'P' (Th 1.25mm). |       |      |      |

MCH SERIES X7R DIELECTRIC, 25V, 10%

0402

| Part Number                                                  | Value   | Th  | SQP  |
|--------------------------------------------------------------|---------|-----|------|
| <b>1nF</b>                                                   |         |     |      |
| MCH152C472K                                                  | 4.7nF   | 0.5 | 0.02 |
| MCH152C562K                                                  | 5.6nF   | 0.5 | 0.02 |
| MCH152C682K                                                  | 6.8nF   | 0.5 | 0.03 |
| MCH153C822K                                                  | *>8.2nF | 0.5 | 0.10 |
| <b>10nF</b>                                                  |         |     |      |
| MCH153C103K                                                  | *>10nF  | 0.5 | 0.10 |
| For tape and reel, add 'K'.<br>*: Only available at 16 volts |         |     |      |

0603

| Part Number                                                  | Value   | Th  | SQP  |
|--------------------------------------------------------------|---------|-----|------|
| <b>10nF</b>                                                  |         |     |      |
| MCH182C123K                                                  | 12nF    | 0.8 | 0.04 |
| MCH182C153K                                                  | 15nF    | 0.8 | 0.04 |
| MCH182C183K                                                  | 18nF    | 0.8 | 0.04 |
| MCH182C223K                                                  | 22nF    | 0.8 | 0.02 |
| MCH182C273K                                                  | 27nF    | 0.8 | 0.06 |
| MCH182C333K                                                  | 33nF    | 0.8 | 0.04 |
| MCH183C393K                                                  | *>39nF  | 0.8 | 0.06 |
| MCH183C473K                                                  | *>47nF  | 0.8 | 0.04 |
| MCH183C563K                                                  | *>56nF  | 0.8 | 0.06 |
| MCH183C683K                                                  | *>68nF  | 0.8 | 0.06 |
| MCH183C823K                                                  | *>82nF  | 0.8 | 0.06 |
| <b>100nF</b>                                                 |         |     |      |
| MCH183C104K                                                  | *>100nF | 0.8 | 0.06 |
| For tape and reel, add 'K'.<br>*: Only available at 16 volts |         |     |      |

0805

| Part Number                                                  | Value  | Th   | SQP  |
|--------------------------------------------------------------|--------|------|------|
| <b>10nF</b>                                                  |        |      |      |
| MCH212C563K                                                  | 56nF   | 0.85 | 0.03 |
| MCH212C683K                                                  | 68nF   | 0.85 | 0.03 |
| MCH212C823K                                                  | 82nF   | 1.25 | 0.04 |
| <b>100nF</b>                                                 |        |      |      |
| MCH212C104K                                                  | 100nF  | 1.25 | 0.03 |
| MCH212C124K                                                  | 120nF  | 1.25 | 0.04 |
| MCH212C154K                                                  | 150nF  | 1.25 | 0.04 |
| MCH213C184K                                                  | *180nF | 1.25 | 0.04 |
| MCH213C224K                                                  | *220nF | 1.25 | 0.04 |
| For tape and reel, add 'P'.<br>*: Only available at 16 volts |        |      |      |

1206

| Part Number                                                  | Value  | Th   | SQP  |
|--------------------------------------------------------------|--------|------|------|
| <b>100nF</b>                                                 |        |      |      |
| MCH312C154K                                                  | 150nF  | 1.15 | 0.04 |
| MCH312C184K                                                  | 180nF  | 1.15 | 0.04 |
| MCH312C224K                                                  | 220nF  | 1.15 | 0.04 |
| MCH312C274K                                                  | 270nF  | 1.15 | 0.04 |
| MCH312C334K                                                  | 330nF  | 1.15 | 0.05 |
| MCH313C394K                                                  | *390nF | 1.15 | 0.05 |
| MCH313C474K                                                  | *470nF | 1.15 | 0.07 |
| For tape and reel, add 'P'.<br>*: Only available at 16 volts |        |      |      |

MLC CAPACITOR PART NUMBER CROSS REFERENCE

|                           |        | Chipsize |        |        |        |        | Dielectric |     |     |     |           | Voltage |     |       | Terminations |      | Packaging |          |         |             |  |
|---------------------------|--------|----------|--------|--------|--------|--------|------------|-----|-----|-----|-----------|---------|-----|-------|--------------|------|-----------|----------|---------|-------------|--|
| Manufacturer              | 0402   | 0603     | 0805   | 1206   | 1210   | 1812   | NPO        | X7R | Z5U | Y5V | Value Tol | 16      | 25  | 50/63 | 100          | 200  | Pd Ag     | Ni. Bar. | Bulk    | Tape & Reel |  |
| Rohm                      | MCH15  | MCH18    | MCH21  | MCH31  |        | -      | A          | C   | E   | F   |           | 3       | 2   | 5     | -            | -    | -         | MCH      | No Code | P or K      |  |
| TDK                       | CC0402 | CC0603   | CC0805 | CC1206 | CC1210 | CC1812 | NPO        | X7R | Z5U | Y5V |           | C       | E   | H     | -            | -    | -         | CC       | No Code | T & R       |  |
| Goldstar                  | -      | -        | GMC21  | GMC31  | -      | -      | CG         | X7R | -   | Y5V |           | -       | 25  | 50    | 100          | -    | P         | N        | B       | T           |  |
| Murata                    | -      | -        | GR40   | GR42-6 | GR42-2 | GR43-2 | CG         | X7R | Z5U | Y5V | Refer to  | -       | 25V | 50V   | 100V         | 200V | GR        | GRM      | PB      | PT          |  |
| AVX/Kyocera               | -      | -        | 0805   | 1206   | 1210   | 1812   | A          | C   | E   | -   | EIA       | -       | -   | 5     | 1            | 6    | 1         | 3        | No Code | TR          |  |
| Philips                   | -      | -        | 0805   | 1206   | 1210   | 1812   | CJ         | 2B  | -   | 2F  | Code      | -       | -   | 9     | -            | -    | A         | B        | A       | B           |  |
| Syfer                     | -      | -        | 0805   | 1206   | 1210   | 1812   | C          | X   | Z   | -   |           | 016     | 025 | 050   | 100          | 200  | F         | J        | No Code | T           |  |
| Vitramon                  | -      | -        | VJ0805 | VJ1206 | VJ1210 | VJ1812 | A          | Y   | U   | -   |           | -       | -   | A     | B            | -    | F         | X        | No Code | T           |  |
| Part Number Position Code |        | A        |        |        |        |        | B          |     | C   |     | D         | E       |     |       | F            |      |           | G        |         |             |  |