



features

- Low dielectric loss at high frequency (high Q)
- Narrow tolerance of capacitance
- Excellent temperature characteristics
- High reliability and no polarity by single layer ceramic substrate construction
- 0.10 - 1.3 pF available by 0.05 pF range (HFC1005 series)
- 0.10 - 1.20 pF available by 0.05 pF range (HFC1410, 1608, 1610, 1612 series)
- Marking: Brown body color with no marking
- Products with lead-free terminations meet EU RoHS requirements

dimensions and construction



| Size | Dimensions inches (mm) | | |
|-------------|-------------------------|------------------------|-------------------------|
| | L | W | t |
| 1005 | .039±.006 (1.0±0.15) | .02±.004 (0.5±0.1) | .02±.004 (0.5±0.1) |
| 1410 | .055±.006 (1.4±0.15) | .039±.004 (1.0±0.1) | .039±.004 (1.0±0.1) |
| 1608 | .063±.006 (1.6±0.15) | .031±.004 (0.8±0.1) | .028±.008 (0.7±0.2) |
| 1610 | .063±.006 (1.6±0.15) | .039±.004 (1.0±0.1) | .033±.01 (0.85±0.25) |
| 1612 | .063±.006 (1.6±0.15) | .047±.004 (1.2±0.1) | .043±.008 (1.1±0.2) |

capacitors

ordering information

| | | | | | | |
|------------|------------|--|--|----------------------|---|---|
| New Part # | HFC | 1608 | C | T | TD | R10 |
| | Type | Size | Material Code | Termination Material | Packaging | Nominal Capacitance |
| | | 1005: 1.0 x 0.5 mm 1410: 1.4 x 1.0 mm 1608: 1.6 x 0.8 mm 1610: 1.6 x 1.0 mm 1612: 1.6 x 1.2 mm | B C G H K N S T V W | T: Sn | TD: Paper tape (1005 only - 10,000 pieces/reel) TE: Embossed taping (1410, 1610, 1612 - 3,000 pieces/reel) (1608 - 4,000 pieces/reel) | 2 significant digits + zeros "R" indicates decimal point |

For further information on packaging, please refer to Appendix A.

characteristics of dielectric materials

HFC1005 Series

| Material Code | ϵ_r | τ_r (ppm/°C) |
|---------------|--------------|-------------------|
| T | 37.0±1.5 | 0±10 |
| N | 70.0±3.0 | 6±10 |
| K | 92.0±2.0 | 6±10 |
| V | 113.0±5.0 | 30±10 |
| H | 140.0±3.0 | 0±30 |
| G | 160.0±4.0 | 0±30 |
| S | 180.0±4.0 | 0±30 |

HFC1005 Series (continued)

| Material Code | ϵ_r | τ_r (ppm/°C) |
|---------------|--------------|-------------------|
| B | 200.0±5.0 | 0±30 |
| W | 260.0±5.0 | 0±60 |

HFC1410, 1608, 1610, 1612 Series

| Material Code | ϵ_r | τ_r (ppm/°C) |
|---------------|--------------|-------------------|
| C | 21.5±2.0 | 0±10 |
| T | 37.0±1.5 | 0±10 |
| N | 70.0±3.0 | 6±10 |
| V | 113.0±5.0 | 30±10 |

applications and ratings

| Part Designation | Capacitance (pF) | Tolerance Code (pF) | Material Code | Rated Voltage DC (V) | Operating Temperature Range |
|------------------|------------------|---------------------|---------------|----------------------|-----------------------------|
| HFC1005TTTDR10 | 0.10 | ±0.015 | T | 50 | -55°C to +125°C |
| HFC1005TTTDR15 | 0.15 | | | | |
| HFC1005NTTDR20 | 0.20 | ±0.030 | N | | |
| HFC1005NTTDR25 | 0.25 | | | | |
| HFC1005KTTDR30 | 0.30 | | K | | |
| HFC1005KTTDR35 | 0.35 | | | | |
| HFC1005VTTDR40 | 0.40 | | V | | |
| HFC1005VTTDR45 | 0.45 | | | | |
| HFC1005VTTDR50 | 0.50 | | | | |
| HFC1005VTTDR55 | 0.55 | | | | |
| HFC1005VTTDR60 | 0.60 | ±0.050 | H | | |
| HFC1005HTTDR65 | 0.65 | | | | |
| HFC1005HTTDR70 | 0.70 | | G | | |
| HFC1005HTTDR75 | 0.75 | | | | |
| HFC1005GTTDR80 | 0.80 | | | | |
| HFC1005GTTDR85 | 0.85 | | | | |
| HFC1005GTTDR90 | 0.90 | S | | | |
| HFC1005GTTDR95 | 0.95 | | | | |
| HFC1005STTD1R0 | 1.00 | | | | |
| HFC1005BTTD1R1 | 1.10 | B | | | |
| HFC1005WTTD1R2 | 1.20 | | | | |
| HFC1005WTTD1R3 | 1.30 | | | | |

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

3/10/07

applications and ratings (continued)

| Part Designation | Capacitance (pF) | Tolerance Code (pF) | Material Code | Rated Voltage DC (V) | Operating Temperature Range | | | | |
|------------------|------------------|---------------------|---------------|----------------------|-----------------------------|--------|---|----|-----------------|
| HFC1410VTTE1R1 | 1.10 | ±0.075 | V | 50 | -55°C to +125°C | | | | |
| HFC1410VTTE1R2 | 1.20 | | | | | | | | |
| HFC1410VTTE1R3 | 1.30 | | | | | | | | |
| HFC1608CTTER10 | 0.10 | ±0.015 | C | 50 | -55°C to +125°C | | | | |
| HFC1608TTTER15 | 0.15 | | T | | | | | | |
| HFC1608NTTER20 | 0.20 | ±0.030 | N | 50 | -55°C to +125°C | | | | |
| HFC1608NTTER25 | 0.25 | | | | | | | | |
| HFC1608NTTER30 | 0.30 | | | | | | | | |
| HFC1608NTTER35 | 0.35 | | | | | | | | |
| HFC1608VTTER40 | 0.40 | | | | | | | | |
| HFC1608VTTER45 | 0.45 | | V | | | | | | |
| HFC1608VTTER50 | 0.50 | | | | | | | | |
| HFC1608VTTER55 | 0.55 | | | | | | | | |
| HFC1610VTTER60 | 0.60 | | | | | ±0.030 | V | 50 | -55°C to +125°C |
| HFC1610VTTER65 | 0.65 | | | | | | | | |
| HFC1610VTTER70 | 0.70 | | | | | | | | |
| HFC1610VTTER75 | 0.75 | ±0.050 | V | 50 | -55°C to +125°C | | | | |
| HFC1610VTTER80 | 0.80 | | | | | | | | |
| HFC1610VTTER85 | 0.85 | | | | | | | | |
| HFC1610VTTER90 | 0.90 | | | | | | | | |
| HFC1612VTTER95 | 0.95 | | | | | ±0.050 | V | 50 | -55°C to +125°C |
| HFC1612VTTE1R0 | 1.00 | | | | | | | | |

capacitors

environmental applications

HFC1410, 1608, 1610, 1612 Series Type: HFC1612VT1R0R05M50 (1.0 PF)

Self Resonant Frequency (SRF) vs. Capacitance Value



Q vs. Frequency



ESR vs. Frequency



environmental applications (continued)

Electrical Characteristics

| Parameter | Requirement | Test Method |
|-----------------------|---|--|
| Capacitance | Within the specified tolerance of parts | Frequency: 1 MHz Voltage: 1 Vrms Instrument: YHP4278A |
| Q Value | 100 or more | Frequency: 1 MHz Voltage: 1 Vrms Instrument: YHP4278A |
| Insulation Resistance | 10,000 MΩ or more | Test Voltage: Rated voltage Electrification Time: 60 seconds ± 5 seconds |
| Breakdown Voltage | No breakdown | Test Voltage: 300% of the rated voltage Electrification Time: 1 second to 5 seconds Limit Surge Current: 50 mA or less |

Mechanical Characteristics

| Parameter | Requirement | Test Method |
|------------------------|---|--|
| Adhesion of Electrodes | No mechanical damage | A static load of 5N (0.5 kgf) shall be applied in the direction of the arrow as follows  |
| Core Body Strength | No mechanical damage | A static load of 5N (0.5 kgf) using a R 0.5 pressure rod shall be applied on the core of the component and held for 10 seconds |
| Substrate Bending Test | Visual Examination: No mechanical damage Capacitance: Within ±2.0% or ±0.02 pF whichever is more Q value: 100 or more Insulation Resistance: 10,000 MΩ or more | Solder a specimen to the substrate and bend it (Displacement: 2mm)  |

environmental applications (continued)

Endurance Characteristics

| Parameter | Requirement | Test Method |
|--------------------------------------|---|--|
| Solderability | A new coating of solder shall cover a minimum of 95% of the surface being immersed | Flux: 25 wt% colophony Solder: H60A (silver 3%) Preheating: 150°C for 1 minute Soldering Temperature: 230°C ± 5°C Soldering Temperature: 215°C ± 5°C (HFC1005) Immersion Time: 3 seconds ± 1 second |
| Resistance to Solder Heat | Visual Examination: No mechanical damage Capacitance: Within ±2.0% or ±0.02 pF whichever is more Q value: 100 or more Insulation Resistance: 10,000 MΩ or more | Flux: 25 wt% colophony Solder: H60A (silver 3%) Soldering Temperature: 270°C ± 5°C Immersion Time: 10 seconds ± 1 second |
| Resistance to Humidity (Load Test) | | Temperature: 60°C ± 2°C Relative Humidity: 95% RH Test Voltage: Rated voltage Test Hours: 1000 -0/+48 hours |
| Resistance to Humidity (Unload Test) | | Temperature: 85°C ± 2°C Relative Humidity: 85% RH Test Hours: 1000 -0/+48 hours |
| Resistance to High Temperature | | Temperature: 125°C ± 2°C Test Voltage: Rated voltage Test Hours: 1000 -0/+48 hours |
| Resistance to Low Heat | | Temperature: -55°C ± 2°C Test Hours: 1000 -0/+48 hours |
| Temperature Cycle | | Temperature: -55°C for 30 min., 125°C for 30 min. Hours for 1 Cycle: 2 hours Temperature Cycle: 50 cycles or more |
| Vibration | | Frequency of Vibration: 10 to 100 Hz Sweeping: 10→100→10 Hz, 5 minutes, 5.0 G This motion shall be applied for a period of 2 hours in each of 3 mutually perpendicular axis |
| Shock | | Half of sine wave (100 G) shall be applied for a period of 5 msec. in each of 3 mutually perpendicular axis |

The specimen shall be subjected to standard atmospheric condition for 24 hours after which measurement shall be made.