

**EMI FILTERS**

**■ Chip Type EMI Filters**

Series (Pages)	Style	Equivalent circuit	Features	Applications
LC compound EMI Filter LCF20 Series (P42)			<ul style="list-style-type: none"> <li>• EMI chip filter with the circuit formation</li> <li>• The sharp damping characteristic ensures the noise control effect up to the radio frequency band.</li> <li>• Absence of specific direction permits easy handling.</li> </ul>	Noise control for computer, peripheral equipment, digital TV, digital VTR, mobile telephone, etc.
Chip type EMI Filter CNF10,CNH10 Series (P43)			<ul style="list-style-type: none"> <li>• Extremely small 3-terminal chip capacitor. (1.6×0.8)</li> <li>• Capacitance: 22pF~100,000pF</li> <li>• Rated current: 300mA,500mA,1A</li> </ul>	CNF, CNA series <ul style="list-style-type: none"> <li>• Automotive electronics</li> <li>• Computer &amp; peripherals</li> <li>• Digital TV</li> <li>• Mobile communications equipment</li> </ul>
Chip type EMI Filter CNF20,CNH20 Series (P44~P45)			<ul style="list-style-type: none"> <li>• Extremely small 3-terminal chip capacitor. (2×1.25)</li> <li>• Capacitance: 22pF~1μF</li> <li>• Rated current: 400mA~4A</li> </ul>	
Chip type EMI Filter CNF31,CNF31,CNH30 Series (P46)			<ul style="list-style-type: none"> <li>• 3-terminal monolithic chip type capacitor. (3.2×1.25,3.2×1.6)</li> <li>• Capacitance: 22pF~100,000pF</li> <li>• Rated current: 300mA(CNF),1A,2A(CNH)</li> </ul>	
Chip type EMI Filter CNF41, CNH41 Series (P47)			<ul style="list-style-type: none"> <li>• 3-terminal monolithic chip type capacitor. (4.5×1.6)</li> <li>• Capacitance: 22pF~220,000pF</li> <li>• Rated current: 300mA(CNF),2A(CNH)</li> </ul>	
Chip type EMI Filter CNX20, CNX41 Series (P48)			<ul style="list-style-type: none"> <li>• 3-terminal capacitor for DC power line</li> <li>• Large insertion loss in wide range</li> <li>• Capacitance: 0.47μF~1.5μF</li> <li>• Rated current: 2A~6 A</li> </ul>	
EMI chip filter array CNA30 Series (P49)			<ul style="list-style-type: none"> <li>• Array of 3-terminal monolithic chip type capacitor. (3.2×1.6)</li> <li>• Capacitance: 22pF~22,000pF</li> <li>• Rated current: 300mA</li> </ul>	CNH series  <ul style="list-style-type: none"> <li>• Noise control for DC power supply line of various digital appliances</li> </ul>
Chip type feed through capacitor CTH20, CTH30, CTH32 Series (P54)			<ul style="list-style-type: none"> <li>• The structure will hardly allow residual inductance, and the self resonant frequency extends to the microwave band. Ideal for high-frequency noise control.</li> <li>• Capacitance: 47~3,300pF</li> <li>• Rated current: 10A, 15A, 20A</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive car electronics, Base station for mobile telephone, Microwave transmission, test equipment, Medical apparatus, Industrial meter, SW Power supply, DC-DC Converter etc, DC power supply line and Signal line</li> </ul>
Chip type Ferrite bead inductor CFB, CFM, CFC,CFS Series (P56~P59)			<ul style="list-style-type: none"> <li>• Excellent solderability and high soldering heat resistance for either flow or reflow soldering.</li> <li>• Monolithic inorganic material construction for high reliability.</li> <li>• Closed magnetic circuit configuration avoids crosstalk and is suitable for high density PCBs.</li> </ul>	<ul style="list-style-type: none"> <li>• For digital AV equipment such as TV, VTR &amp; DVD</li> <li>• For telecommunication equipment such as Fax, Modem &amp; ISDN terminals</li> <li>• For computer equipment such as personal computers, and game console.</li> <li>• For noise control for other electronic equipment.</li> </ul>

EMI FILTERS

## CHIP TYPE LC COMPOUND EMI FILTERS [ LCF20 Series ]

The LCF20 Series are LC compound EMI filters with a monolithic structure, which are ideal for high-speed digital signal lines.

### ■ Features

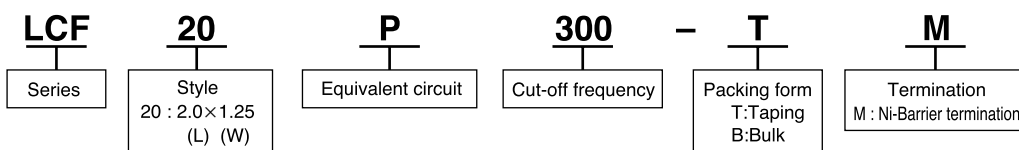
- LC compound EMI chip filter with a monolithic structure and  $\pi$  type circuit formation.
- The sharp damping characteristic ensures a large insertion loss characteristic up to the radio frequency band.
- Absence of specific direction permits easy handling.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

### ■ Applications

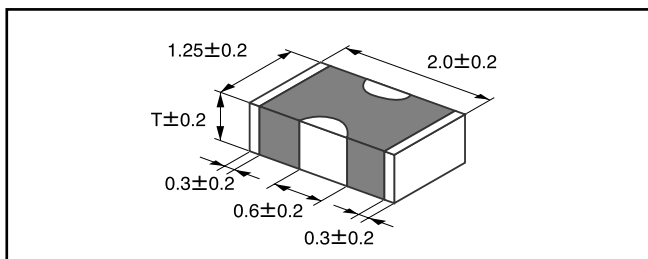
- Noise control for the digital video signal line in TV, DVD, VTR, and DSC
- Noise control for the signal line in personal computer, FAX, modem, and game equipment



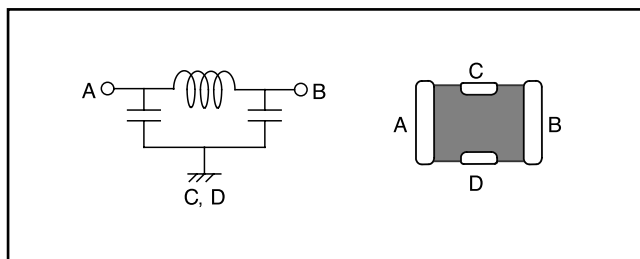
### ■ Part Number System



### ■ Dimensions



### ■ Equivalent circuit

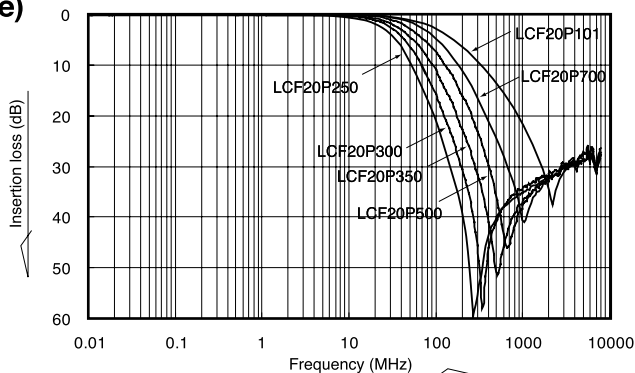


### ■ Part Number List · Specifications

Part number	Cut-off frequency	Rated current	Rated voltage	IR	T type
LCF20P250-□M	25 MHz	100mA DC	16V DC	10MΩmin.	1.0
LCF20P300-□M	30 MHz				
LCF20P350-□M	35 MHz				
LCF20P500-□M	50 MHz				0.8
LCF20P700-□M	70 MHz				
LCF20P101-□M	100 MHz				

□ : "T" stands for taping package and "B" stands for bulk package.

### ■ Insertion loss (Reference)



# CHIP TYPE EMI FILTERS [ CNF10 · CNH10 Series ]

The CNF10 · CNH10 series is an extremely small (1.6×0.8) 3-terminal chip capacitor. It is well suited for reducing EMI noise.

## ■ Features

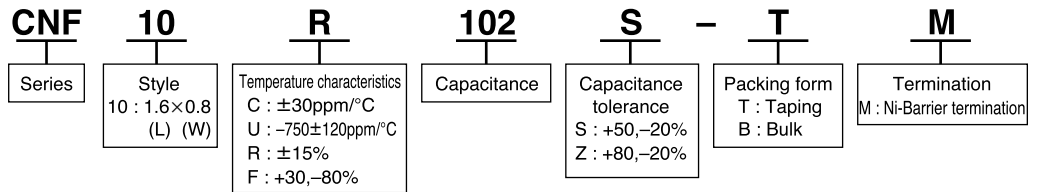
- Due to its small size and low residual inductance, it performs noise reduction at higher frequencies than conventional capacitors.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

## ■ Applications

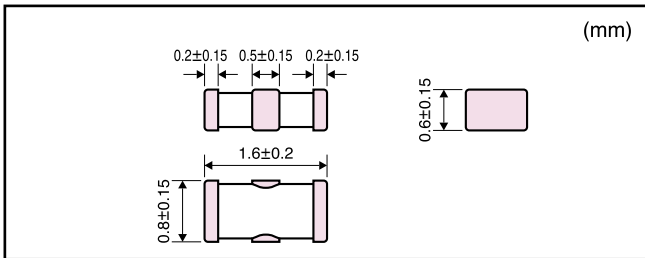
Noise reduction for computers, computer peripheral equipment, digital TV, digital VTR, cellular telephone, automotive electronics, etc.



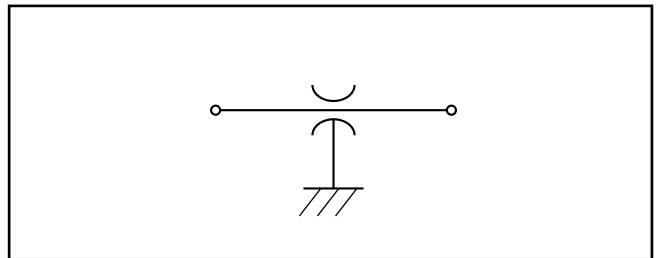
## ■ Part Number System



## ■ Dimensions



## ■ Equivalent circuit



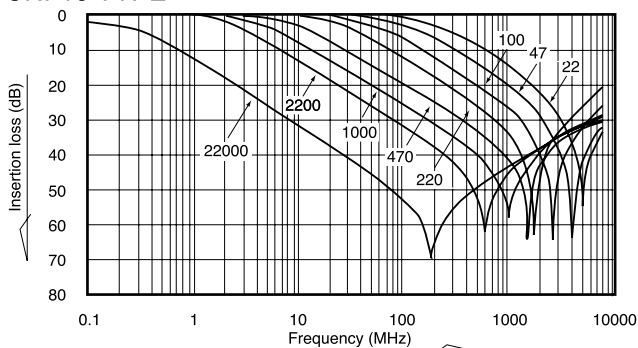
## ■ Part Number List · Specifications

Part number	Capacitance	Capacitance tolerance	Rated voltage	Rated current	IR	DC resistance	Temp. range
CNF10C220S-□M	22pF	+50, -20%	50V DC	0.3A DC	10,000MΩmin.	0.3 Ωmax.	-55~+125°C
CNF10C470S-□M	47pF						
CNF10C101S-□M	100pF						
CNF10U221S-□M	220pF						
CNF10R471S-□M	470pF						
CNF10R102S-□M	1,000pF						
CNF10R222S-□M	2,200pF	+80, -20%	25V DC	0.5A DC	1,000MΩmin.	0.15Ωmax.	-25~+ 85°C
CNF10R223S-□M	22,000pF						
CNH10F104Z-□M	100,000pF						

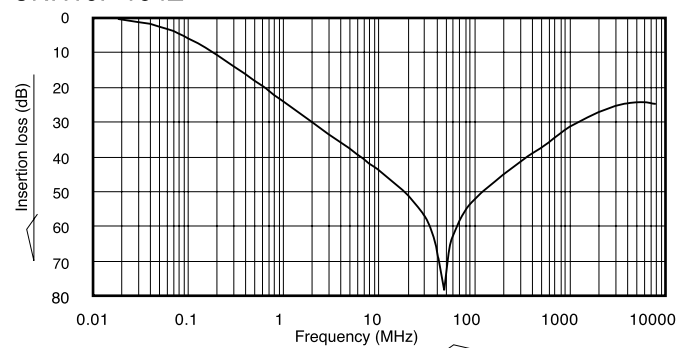
□ : "T" stands for taping package and "B" stands for bulk package.

## ■ Insertion loss (Reference)

CNF10 TYPE



CNH10F 104Z



## CHIP TYPE EMI FILTERS [ CNF20 Series ]

The CNF20 series is an extremely small (2.0×1.25) 3-terminal chip capacitor. It is well suited for reducing EMI noise.

### ■ Features

- Due to its small size and low residual inductance, it performs noise reduction at higher frequencies than conventional capacitors.
- An optimum constant can be selected according to the frequency from the 22-2,200 pF capacitance range.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

### ■ Applications

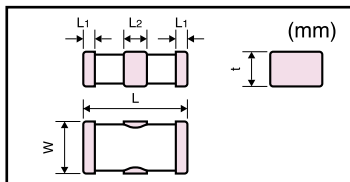
Noise reduction for computers, computer peripheral equipment, digital TV, digital VTR, cellular telephone, automotive electronics, etc.



### ■ Part Number System

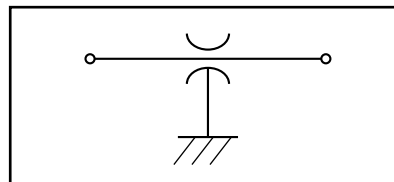
<b>CNF</b>	<b>20</b>	<b>R</b>	<b>102</b>	<b>S</b>	<b>-</b>	<b>T</b>	<b>M</b>
Series	Style 20 : 2.0×1.25 (L) (W)	Temperature characteristics C : ±30ppm/°C R : ±15%	Capacitance	Capacitance tolerance S : +50,-20%		Packing form T : Taping B : Bulk	Termination M : Ni-Barrier termination

### ■ Dimensions



Type	L	W	t	L1	L2
CNF20	2.0±0.2	1.25±0.2	0.8±0.2	0.3±0.2	0.6±0.2

### ■ Equivalent circuit

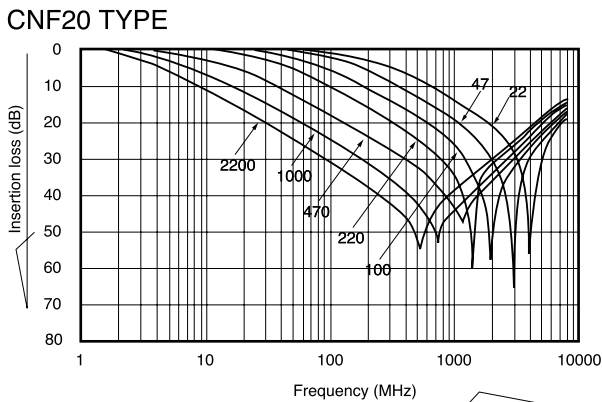


### ■ Part Number List · Specifications

Part number	Capacitance	Capacitance tolerance	Rated voltage	Rated current	IR	DC resistance	Temp. range
CNF20C220S-□M	22pF	+50, -20%	50V DC	0.4A DC	10,000MΩmin.	0.3 Ωmax.	-55~+125°C
CNF20C470S-□M	47pF						
CNF20C101S-□M	100pF						
CNF20C221S-□M	220pF						
CNF20R471S-□M	470pF						
CNF20R102S-□M	1,000pF						
CNF20R222S-□M	2,200pF						

□ : "T" stands for taping package and "B" stands for bulk package.

### ■ Insertion loss (Reference)



# CHIP TYPE EMI FILTERS [ CNH20 Series ]

The CNH20 series is an extremely small (2.0×1.25) 3-terminal chip capacitor. It is well suited for reducing EMI noise.

## ■ Features

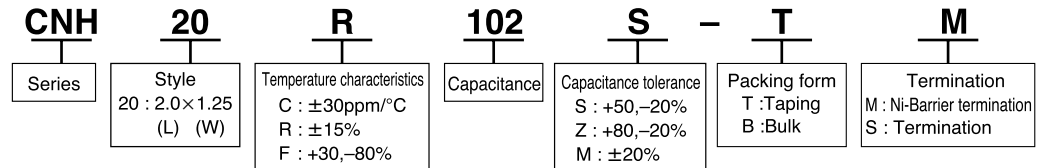
- Due to its small size and low residual inductance, it performs noise reduction at higher frequencies than conventional capacitors.
- The large current specification (~ 4A) is effective in protecting the DC power line from EMI.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

## ■ Applications

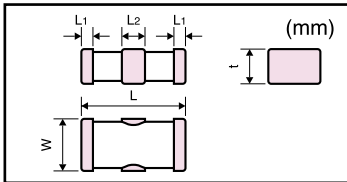
Noise reduction for computers, computer peripheral equipment, digital TV, digital VTR, cellular telephone, automotive electronics, etc.



## ■ Part Number System

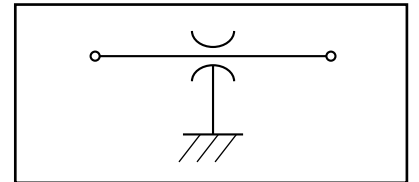


## ■ Dimensions



Type	L	W	t	L1	L2
CNH20	2.0±0.2	1.25±0.2	0.8±0.2 1.0±0.2	0.3±0.2	0.6±0.2

## ■ Equivalent circuit



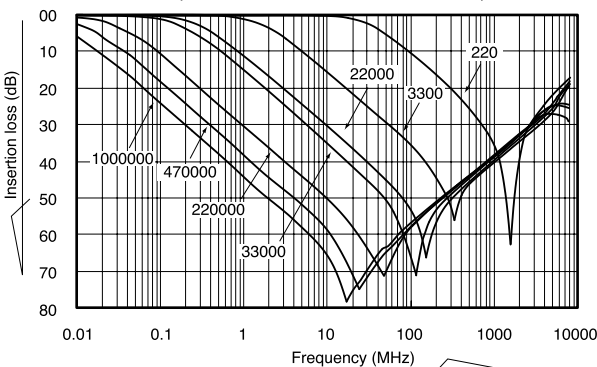
## ■ Part Number List · Specifications

Part number	Capacitance	Capacitance tolerance	Rated voltage	Rated current	IR	DC resistance	Temp. range
CNH20C221M-□M	220pF	±20%	100V DC	1A DC	10,000MΩmin.	0.08Ωmax.	-55~+125°C
*CNH20R332S-□M	3,300pF	+50, -20%	50V DC	2A DC		0.06Ωmax.	
CNH20R223S-□M	22,000pF			1A DC		0.08Ωmax.	
*CNH20R333S-□M	33,000pF	+80, -20%	25V DC	2A DC	1,000MΩmin.	0.06Ωmax.	-25~+85°C
CNH20F104Z-□M	100,000pF					0.05Ωmax.	
CNH20F224Z-□S	220,000pF	±20%	16V DC	3A DC	500MΩmin.	0.08Ωmax.	-55~+85°C
*CNH20R224M-□M	220,000pF					0.05Ωmax.	
*CNH20R474M-□M	470,000pF	+80, -20%	10V DC	4A DC		0.03Ωmax.	-25~+85°C
*CNH20F105Z-□S	1μF					0.04Ωmax.	
*CNH20R105M-□M	1μF	±20%				0.02Ωmax.	-55~+85°C

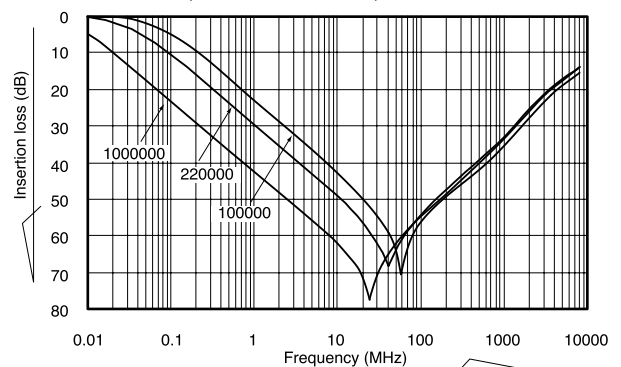
□ : "T" stands for taping package and "B" stands for bulk package. \* t=1.0mm

## ■ Insertion loss (Reference)

CNH20 TYPE (CG and R characteristics)



CNH20 TYPE (F characteristic)



# CHIP TYPE EMI FILTERS [ CNF31 · CNH31 · CNH30 Series ]

The CNF31 · CNH31 · CNH30 series is a 3-terminal EMI filter for SMT based on multilayer chip capacitor technology. The CNH series is suited for reducing EMI noise on DC power lines.

## ■ Features

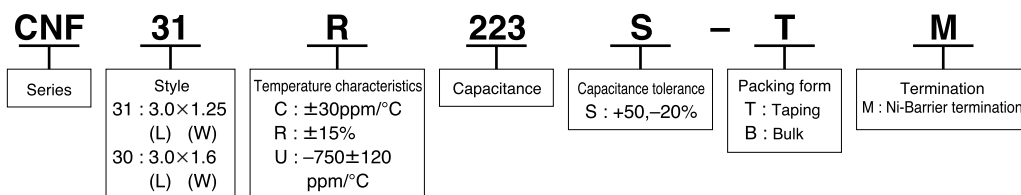
- Due to its small size and low residual inductance, noise reduction is possible at higher frequencies than conventional capacitors.
- High current rating (~2A), makes it well suited for reducing EMI noise on DC power lines.
- High capacitance (0.1μF max.) enables reduction of noise over a wide frequency range.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

## ■ Applications

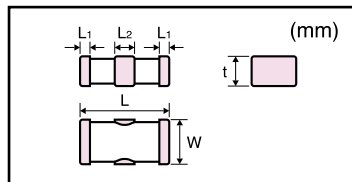
Noise reduction for signal lines and DC lines in computers, computer peripheral equipment, digital TV, digital VTR, cellular telephone, automotive electronics, printer, FAX, etc.



## ■ Part Number System

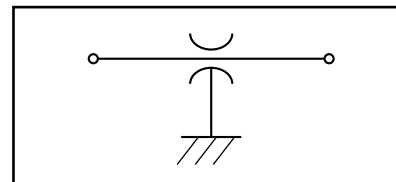


## ■ Dimensions



Type	L	W	t	L1	L2
CNF31 CNH31	3.2±0.2	1.25±0.2	0.7±0.2	0.4±0.3	1.1±0.3
CNH30		1.6±0.2			

## ■ Equivalent circuit



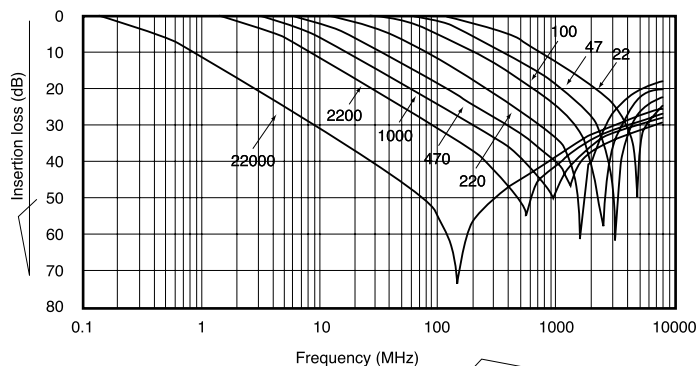
## ■ Part Number List · Specifications

Part number	Capacitance	Capacitance tolerance	Rated voltage	Rated current	IR	DC resistance	Temp. range				
CNF31C220S-□M	22pF	+50, -20%	50V DC	0.3A DC	10,000MΩmin.	0.3 Ωmax.	-55~+125°C				
CNF31C470S-□M	47pF										
CNF31C101S-□M	100pF										
CNF31C221S-□M	220pF										
CNF31R471S-□M	470pF										
CNF31R102S-□M	1,000pF										
CNF31R222S-□M	2,200pF		25V DC	2 A DC	1,000MΩmin.	0.05Ωmax.					
CNF31R223S-□M	22,000pF										
CNH31U332S-□M	3,300pF										
CNH31R223S-□M	22,000pF										
CNH31R473S-□M	47,000pF							50V DC	1 A DC	5,000MΩmin.	0.08Ωmax.
CNH30R104S-□M	100,000pF										

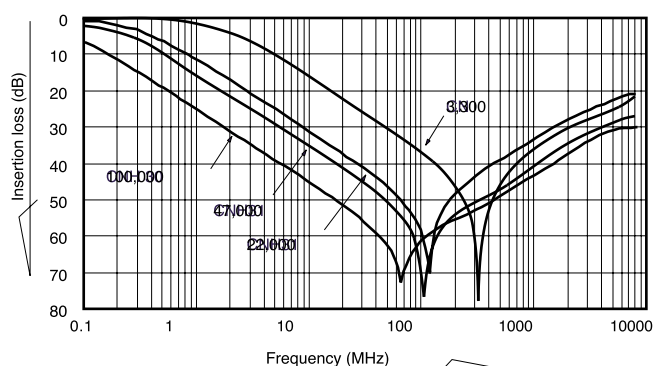
□ : "T" stands for taping package and "B" stands for bulk package.

## ■ Insertion loss (Reference)

### CNF31 TYPE



### CNH31, CNH30TYPE



## CHIP TYPE EMI FILTERS [ CNF41 · CNH41 Series ]

The CNF41 · CNH41 series is a 3-terminal EMI filter for SMT based on multilayer chip capacitor technology. This CNH series is for reducing EMI noise on DC power lines.

### ■ Features

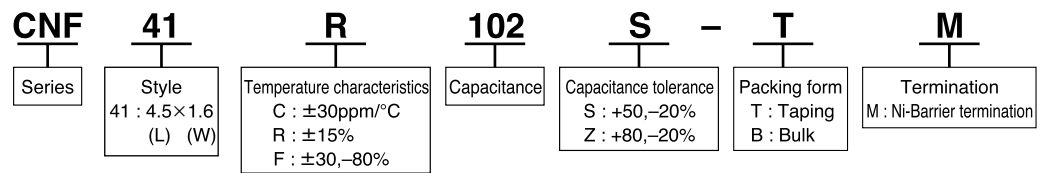
- Due to its small size and low residual inductance, it performs noise reduction at higher frequencies than conventional capacitors.
- High current rating (~2A) makes it well suited for reducing EMI noise on DC power lines.
- High capacitance (~0.22μF) enables reduction of noise over a wide frequency range.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

### ■ Applications

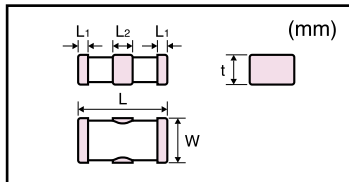
Noise reduction for signal lines and DC lines in computers, computer peripheral equipment, digital TV, digital VTR, cellular telephone, automotive electronics, printer, FAX, etc.



### ■ Part Number System

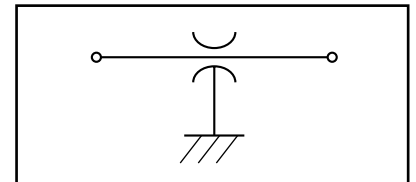


### ■ Dimensions



Type	L	W	t	L1	L2
CNF41 CNH41	4.5±0.3	1.6±0.3	1.0±0.3	0.5±0.3	1.4±0.3

### ■ Equivalent circuit



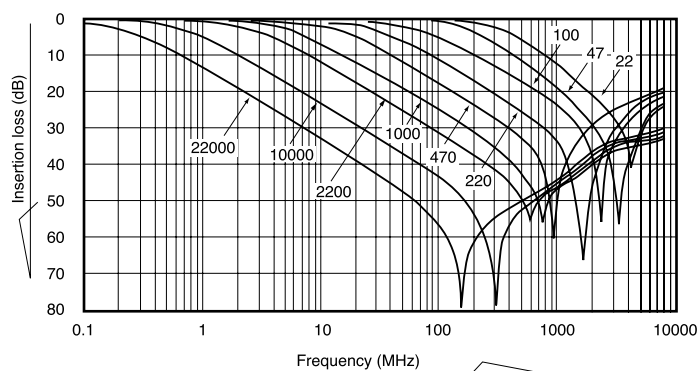
### ■ Part Number List · Specifications

Part number	Capacitance	Capacitance tolerance	Rated voltage	Rated current	IR	DC resistance	Temp. range
CNF41C220S-□M	22pF	+50, -20%	100V DC	0.3A DC	10,000MΩmin.	0.3 Ωmax.	-55~+125°C
CNF41C470S-□M	47pF						
CNF41C101S-□M	100pF						
CNF41C221S-□M	220pF						
CNF41C471S-□M	470pF						
CNF41R102S-□M	1,000pF						
CNF41R222S-□M	2,200pF						
CNF41R103S-□M	10,000pF						
CNF41R223S-□M	22,000pF						
CNH41F224Z-□M	220,000pF	+80, -20%	50V DC	2 A DC	1,000MΩmin.	0.04Ωmax.	-25~+ 85°C

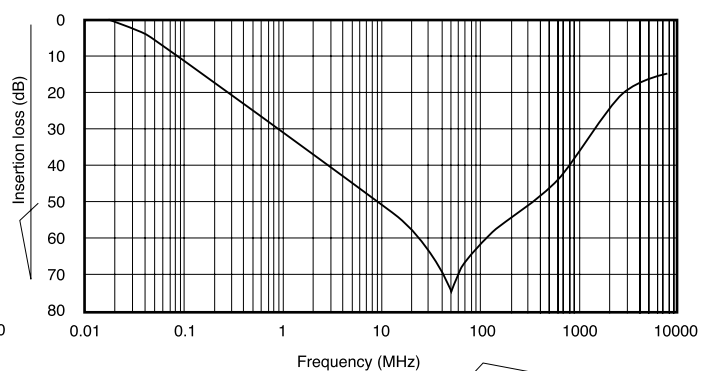
□ : "T" stands for taping package and "B" stands for bulk package.

### ■ Insertion loss (Reference)

#### CNF41 TYPE



#### CNH41F224Z





## CHIP TYPE EMI FILTERS [ CNX20 · CNX41 Series ]

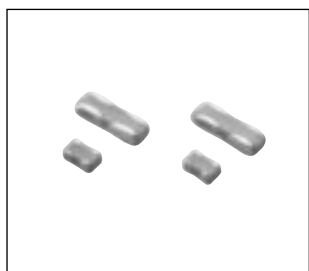
The CNX20 · CNX41 series is a 3-terminal SMT EMI filter based on multilayer chip capacitor technology. This CNH series is for reducing EMI noise on DC power lines.

### ■ Features

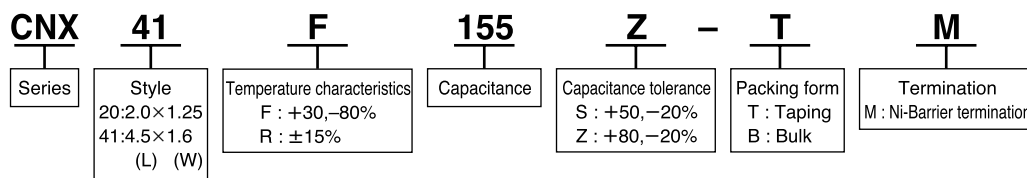
- Due to its small size and low residual inductance, it performs noise reduction at higher frequencies than conventional capacitors.
- High current rating (~6A) makes it well suited for reducing EMI noise on DC power lines.
- High capacitance (~1.5μF) enables reduction of noise over a wide frequency range.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

### ■ Applications

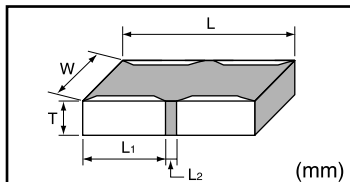
Noise reduction for DC lines in computers, computer peripheral equipment, digital TV, digital VTR, cellular telephone, automotive electronics, printer, FAX, etc.



### ■ Part Number System

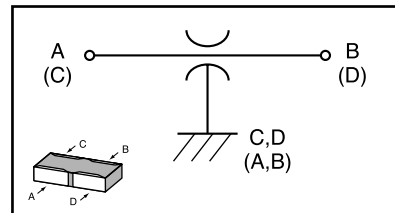


### ■ Dimensions



Type	L	W	t	L1	L2
CNX20	2.0±0.1	1.25±0.1	1.0±0.1	0.8±0.1	0.4±0.1
CNX41	4.5±0.15	1.6±0.15	1.0±0.15	2.0 <sup>+0.1</sup> <sub>-0.2</sub>	0.4 <sup>+0.2</sup> <sub>-0.1</sub>

### ■ Equivalent circuit



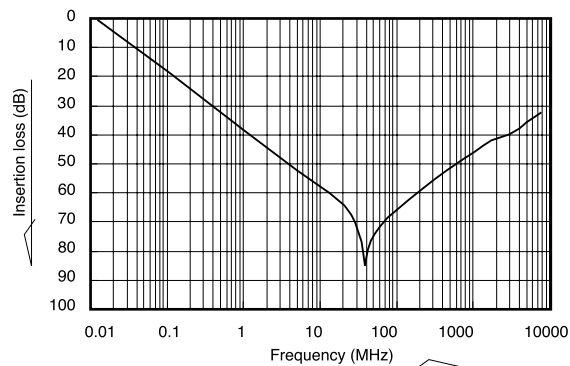
### ■ Part Number List · Specifications

Part number	Capacitance	Capacitance tolerance	Rated voltage	Rated current	IR	DC resistance	Temp. range
CNX20F474Z-□M	0.47μF	+80,-20%	25V DC	2A DC	1,000MΩmin.	0.05 Ωmax.	-25~+ 85°C
CNX41R184S-□M	0.18μF	+50,-20%	50V DC	3A DC		0.04 Ωmax.	-55~+125°C
CNX41R474S-□M	0.47μF		25V DC	4A DC	500MΩmin.	0.025Ωmax.	-25~+ 85°C
CNX41F105Z-□M	1.0 μF	50V DC				0.015Ωmax.	
CNX41F155Z-□M	1.5 μF	+80,-20%	25V DC	6A DC			

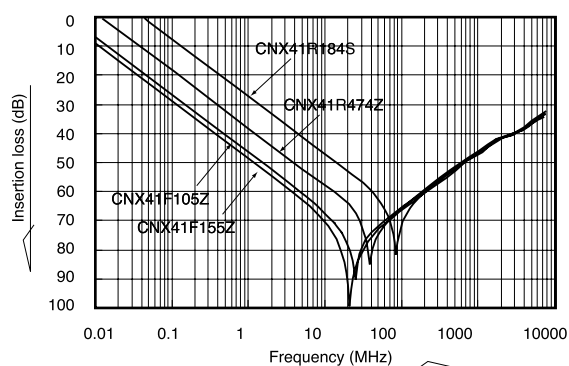
: Tはテーピング包装、Bはバルク包装

### ■ Insertion loss (Reference)

CNX20 F474Z



CNX41 TYPE





# CHIP TYPE EMI FILTER ARRAYS [ CNA30 Series ]

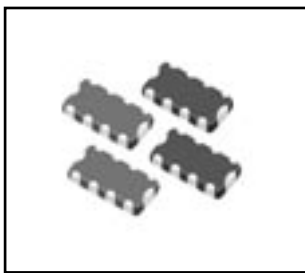
The EMI chip filter in the CNA30 Series is a compound type EMI filter with four built-in 3-terminal capacitors on one chip of 3216 size.

## Features

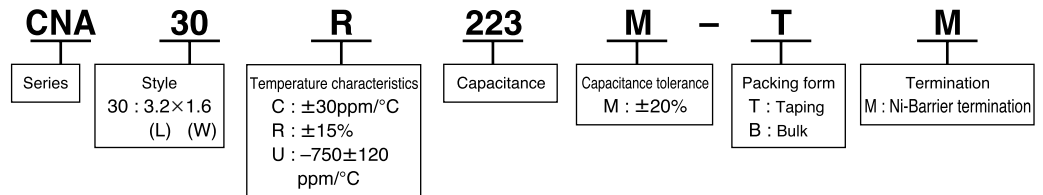
- The structure minimizes the residual inductance, and the self resonant frequency is high, ensuring large insertion loss in the wide band.
- The common gland electrode built in a chip ensures complete grounding of all lines at the gland on both ends. The filter is designed to control cross talk.
- An optimum constant can be selected from the capacity range of 22-22,000 pF to best suit the frequency.
- Nickel and tin plated barrier terminations offer good solderability and resistance to soldering heat.

## Applications

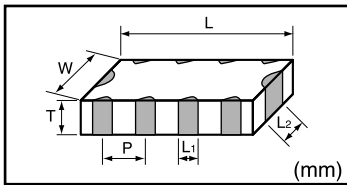
Noise reduction for DC lines in computers, computer peripheral equipment, digital TV, digital VTR, cellular telephone, automotive electronics, printer, FAX, etc.



## Part Number System

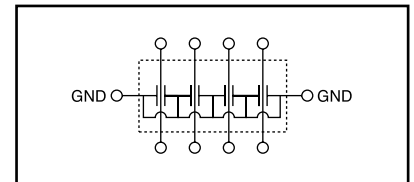


## Dimensions



Type	L	W	t	L1	L2	P
CNA30	3.2±0.2	1.6±0.2	0.7±0.2	0.4±0.2	0.8±0.2	0.8±0.1

## Equivalent circuit

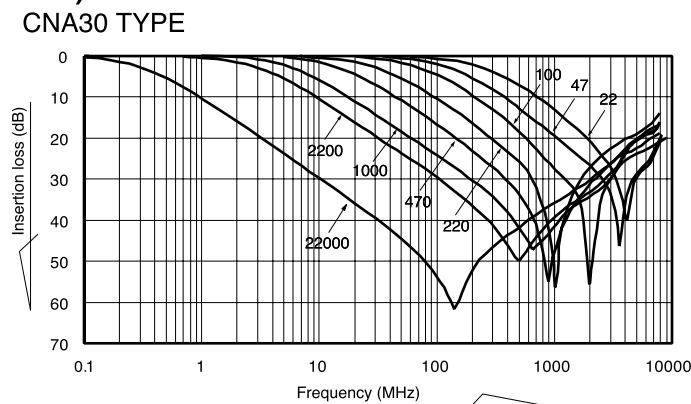


## Part Number List · Specifications

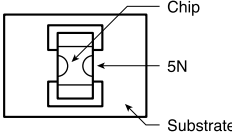
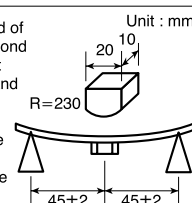
Part number	Capacitance	Capacitance tolerance	Rated voltage	Rated current	IR	DC resistance	Temp. range
CNA30C220M-□M	22pF	±20%	50V DC	0.3A DC	10,000MΩmin.	0.3Ωmax.	-55~+125°C
CNA30C470M-□M	47pF						
CNA30C101M-□M	100pF						
CNA30C221M-□M	220pF						
CNA30U471M-□M	470pF		25V DC				
CNA30R102M-□M	1,000pF						
CNA30R222M-□M	2,200pF						
CNA30R223M-□M	22,000pF						

□ : "T" stands for taping package and "B" stands for bulk package.

## Insertion loss (Reference)



**PERFORMANCE AND TEST METHOD**

Item	Performance				Testing method and conditions (In accordance with JIS C5101-1)															
	CG, UJ	R	F																	
Dissipation Factor	2.5% or less *1)			5% or less *1)	CG : 1MHz UJ, R, F : 1kHz Measurement voltage : 0.5~2Vrms															
Withstanding voltage	No insulation breakdown and no failure.				Application time is 1~5seconds. CG, UJ : 300% of rated voltage R, F : 250% of rated voltage															
Insulation resistance	No less than 10,000MΩ or 500MΩ · μF, whichever is smaller.				Rated voltage is applied for 1 minute.															
Adhesion strength of termination	 <p>No peeling-off or exfoliation shall be manifest or recognizable in its incipient stages.</p>				Solder a specimen on the testing jig shown on the left and apply a force of 5N (0.51kgf) in the direction indicated by arrow.															
Vibration resistance	Visual	No remarkable damage			Vibration frequency : 10~55Hz Full amplitude : 1.5mm, 10~55~10Hz 1min. XYZ direction 2hrs for each total 6hrs.															
	Capacitance	Within specified tolerance																		
	Dissipation factor	Initial standard values must be satisfied.																		
Resistance to soldering heat	Visual	No remarkable damage			Solder : H60A or H63A (JIS Z 3282) Soldering temperature : 270±5°C Immersion time : 10±1sec. Preheat : 80~100°C (1~2min.) and 170~200°C (1~min.) Immersion into solder should be carried out continuously after preheating.															
	Capacitance	No more than ±2.5% or ±0.25pF, whichever is larger.	Within ±7.5%	Within ±20%																
	Dissipation factor	Initial standard values be satisfied.																		
	Insulation resistance	Initial standard values be satisfied.																		
	Withstanding voltage	No damage or insulation breakdown.																		
Solderability	Termination surface should be covered with new solder to over 75%.				Solder : H60A or H63 (JIS Z 3282A) Soldering temperature : 230±5°C Immersion time : 2±1sec.															
Temperature cycling	Visual	No remarkable damage			<table border="1"> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> <tr> <td>1</td> <td>Lower limit temp.*</td> <td>30min.</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>3min.</td> </tr> <tr> <td>3</td> <td>Upper limit temp.*</td> <td>30min.</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>3min.</td> </tr> </table> <p>These four temperatures in the above order completes one cycle. The cycle is repeated 25 times.</p>	Step	Temperature	Time	1	Lower limit temp.*	30min.	2	Room temp.	3min.	3	Upper limit temp.*	30min.	4	Room temp.	3min.
	Step	Temperature	Time																	
	1	Lower limit temp.*	30min.																	
	2	Room temp.	3min.																	
	3	Upper limit temp.*	30min.																	
4	Room temp.	3min.																		
Capacitance	No more than ±2.5% or ±0.25pF, whichever is larger.	Within ±7.5%	Within ±20%																	
Dissipation factor	Initial standard values must be satisfied.																			
Insulation resistance	Initial standard values must be satisfied.																			
Withstanding voltage	No damage or insulation breakdown.																			
Humidity load test	Visual	No remarkable damage			Test temp : 40±2°C Relative humidity : 90~95% Testing time : 1000 +48, -0 100% of rated voltage is applied															
	Capacitance	No more than ±5% or ±0.5pF, whichever is larger.	Within ±12.5%	Within ±30%																
	Dissipation factor	Less than 5% *1)		Less than 7.5% *1)																
Life test at high temperature load	Visual	No remarkable damage			Test temp : Upper limit temp.±3°C Testing time : 1000 +48, -0 200% of rated voltage is applied.															
	Capacitance	No more than ±3% or ±0.3pF, whichever is larger	Within ±12.5%	Within ±30%																
	Dissipation factor	Less than 4% *1)		Less than 7.5% *1)																
	Insulation resistance	No less than 10,000MΩ or 500MΩ · μF, whichever is smaller.																		
Flexion	Visual	No mechanical damage			<p>Add load at a speed of about 1mm per second until flexion amount reaches 1mm *2), and keep the condition for 5 minutes. Have a capacitance meter connected to both ends of sample during a test.</p> 															
	Capacitance	No more than ±5% or ±0.5pF, whichever is larger.	Within ±12.5%	Within ±30%																

\*1) Dielectric dissipation factor

Type name	Temperature characteristics	Rated voltage	Initial	Moistureproof load	High-temperature load
CNH20R224M-□M	R	16V	5% max.	7.5% max.	7.5% max.
CNH20R474M-□M					
CNH20R105M-□M					
CNH20F224Z-□S	F	16V	9% max.	12.5% max.	12.5% max.
CNH20F105Z-□S					

\*2) Deflection

Type name	Temperature characteristics	Rated voltage	Initial
CNH20F224Z-□S	F	16V	2mm
CNH20F105Z-□S			

EMI FILTERS

# HANDLING PRECAUTIONS

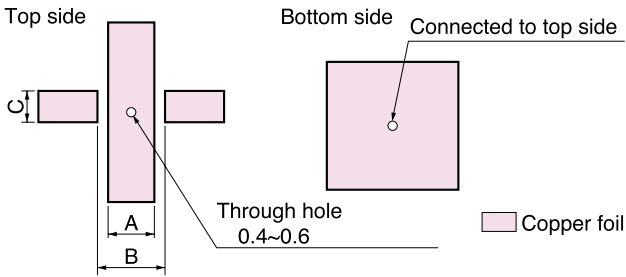
## Soldering

### 1. Basic design

Recommended board pattern.

#### [LCF · CNF · CNH series]

Reflow soldering

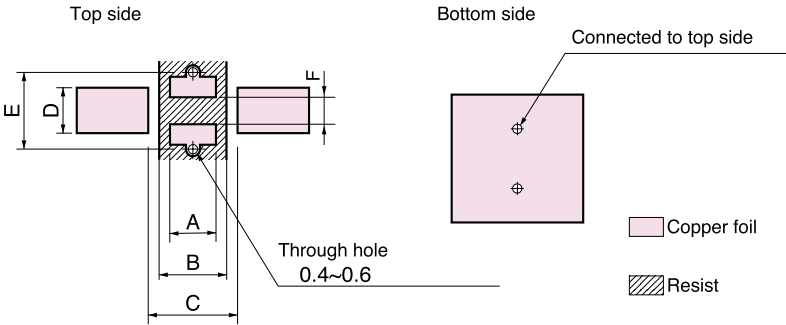


Unit : mm

Type	CNF10 CNH10	LCF20 CNF20 CNH20	CNF31 CNH31	CNH30	CNF41 CNH41
Style	1.6×0.8	2.0×1.25	3.2×1.25	3.2×1.6	4.5×1.6
A	0.5	0.6	1.3	1.3	2.0
B	1.2	1.5	2.3	2.3	3.5
C	0.8	1.0	1.2	1.3	1.3

CNF10,CNH10,CNF20,CNH20 types are used exclusively for reflow soldering.

Flow soldering



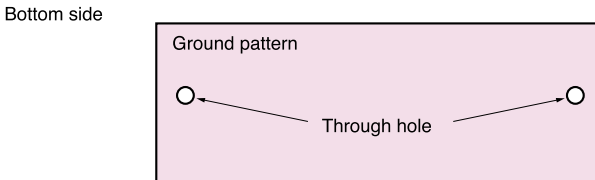
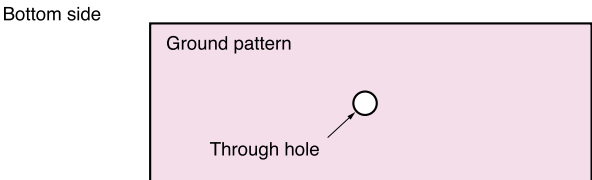
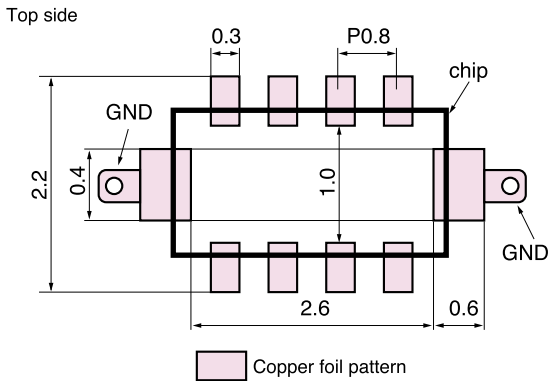
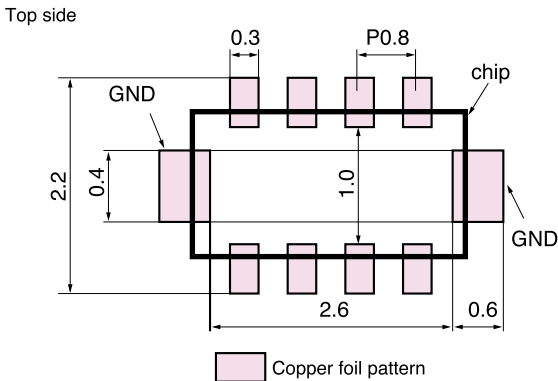
Unit : mm

Type	CNF31 CNH31	CNH30	CNF41 CNH41
Style	3.2×1.25	3.2×1.6	4.5×1.6
A	1.3	1.3	1.5
B	1.5	1.5	2.0
C	2.3	2.3	3.5
D	1.2	1.3	1.3
E	3.0	3.0	3.0
F	0.6	0.6	0.6

#### [CNA30 series]

Reflow soldering

\*The CNA30 Series is used exclusively for reflow soldering.



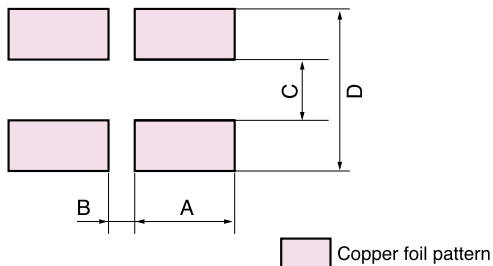
# HANDLING PRECAUTIONS

## [CNX series]

### Reflow soldering

\*The CNX Series is used exclusively for reflow soldering.

Top side



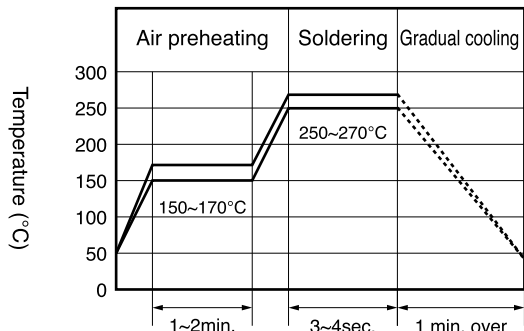
Unit : mm

Type	CNX20	CNX41
Style	2.0×1.25	4.5×1.6
A	0.8	1.8
B	0.4	0.5
C	0.5	1.2
D	1.9	3.2

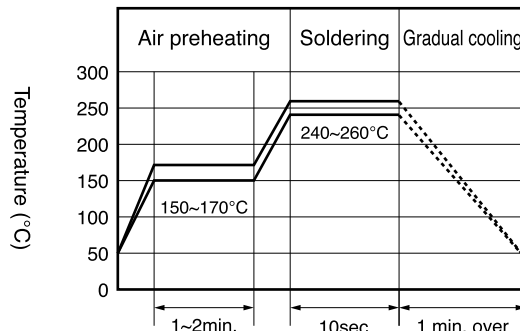
## 2. General cautions for soldering

- (1) High soldering temperature and long soldering time can cause leaching of the termination, decrease in adhesion strength, and a drop in capacitance value, etc.
- (2) For soldering, please refer to the soldering curves below.

Flow soldering (air preheating) recommended conditions (Lead-free solder)



Reflow soldering recommended conditions (Lead-free solder)



- (3) Please use a mild flux (containing less than 0.2wt% Cl). Also, if the flux is water soluble, be sure to wash thoroughly to remove any residue from the underside of components that could affect resistance.

## 3. Cleaning

When using ultrasonic cleaning, the board may resonate if the output power is too high. Because this vibration can cause cracking or decrease in the adherence of the termination, we recommend the conditions below.

- Frequency : 28kHz
- Output power : 20W/liter
- Cleaning time : 5 minutes max.

EMI FILTERS

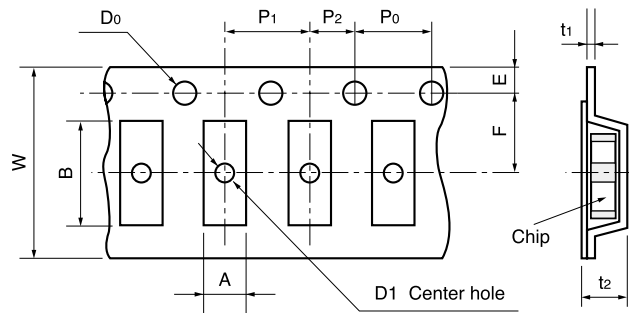
**PACKAGE FORM DETAILS**

[ LCF · CNF · CNH Series ]

■ Taping

Taping Specification

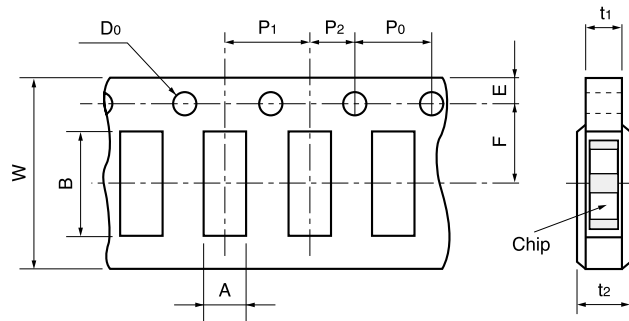
LCF20 (t=1.0), CNH20 (t=1.0), CNF41 and CNH41 type, CNX20 and CNX41 type : Plastic carrier tape dimensions



Unit : mm

	A	B	W	F	E	P1	P2	P0	D0	D1	t1	t2	Hole
LCF20(t=1.0) CNH20(t=1.0)	1.62±0.2	2.30±0.2	8.0±0.2	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.1	4.0±0.1	1.5 <sup>+0.1</sup> <sub>-0</sub>	1.5min.	0.6max.	2.0max.	Square embossed hole
CNX20													
CNF41													
CNH41	1.80±0.2	4.70±0.2	12.0±0.2	5.5±0.05							2.5max.		
CNX41													

CNF10, CNH10, LCF20(t=0.8mm), CNF20, CNH20(t=0.8mm), CNF31, CNH31, CNA30 type : Paper carrier tape dimensions



Unit : mm

	A	B	W	F	E	P1	P2	P0	D0	t1	t2	Hole
CNF10	1.00±0.2	1.90±0.2	8.0±0.3	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.1	4.0±0.1	1.5 <sup>+0.1</sup> <sub>-0</sub>	1.1max.	1.4max.	Square Punch-hole
LCF20, CNF20, CNH20 (t=0.8)	1.62±0.2	2.30±0.2										
CNF31, CNH31	1.70±0.2	3.50±0.2										
CNH30	2.00±0.2	3.60±0.2										
CNA30												

■ Package Qty.

Type	Taping Qty.	Bulk Qty.
CNF10, CNH10	4,000pcs/reel	1,000pcs/bag
LCF20, CNF20, CNH20 (t=0.8)	4,000pcs/reel	1,000pcs/bag
LCF20, CNH20 (t=1.0)	2,000pcs/reel	1,000pcs/bag
CNX20	2,000pcs/reel	1,000pcs/bag
CNF31, CNH31	4,000pcs/reel	1,000pcs/bag
CNH30	4,000pcs/reel	1,000pcs/bag
CNA30	4,000pcs/reel	1,000pcs/bag
CNF41, CNH41	2,000pcs/reel	1,000pcs/bag
CNX41	2,000pcs/reel	1,000pcs/bag

## CHIP TYPE FEED THROUGH CAPACITORS [ CTH Series ]

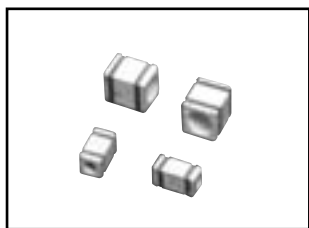
The CTH Series is made of ceramics on which low-resistance multilayer electrodes are formed. The simple structure and high withstanding voltage are suitable for high-frequency noise control in large-current circuits.

### ■ Features

- The structure will hardly allow residual inductance, and the self resonant frequency extends to the microwave band. Ideal for high-frequency noise control.
- The multilayer electrode structure excels in solder heat resistance and solderability. It is also applicable to Pb-free solder.
- The ceramics and external electrodes are completely Pb-free.

### ■ Applications

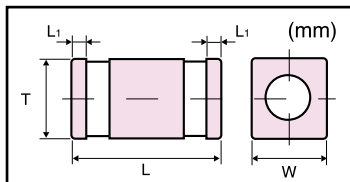
DC power supply lines and signal lines in automotive electronics, base station for mobile telephone, microwave transmission, test equipment, medical apparatus, industrial meter, SW power supply, DC-DC converter etc.



### ■ Part Number System

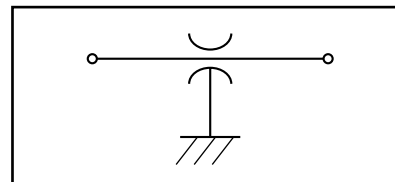
<b>CTH</b>	<b>30</b>	<b>V</b>	<b>222</b>	<b>S</b>	<b>15A</b>	<b>- T</b>	<b>M</b>
Series	Style 20:2.0×1.25 30:3.2×1.6 32:3.2×2.5 (L) (W)	Temperature characteristics T: +22, -33% R: ±15% U: +22, -56% V: +22, -82%	Capacitance	Capacitance tolerance S : +50, -20%	Rated current	Packing form T : Taping B : Bulk	Termination M : Ni-Barrier termination

### ■ Dimensions



Type	L	W	t	L1
CTH20	2.0±0.2	1.25±0.2	1.25±0.2	0.2±0.1
CTH30	3.2±0.2	1.6±0.2	1.6±0.2	0.3±0.2
CTH32	3.2±0.2	2.5±0.2	2.5±0.2	0.3±0.2

### ■ Equivalent circuit

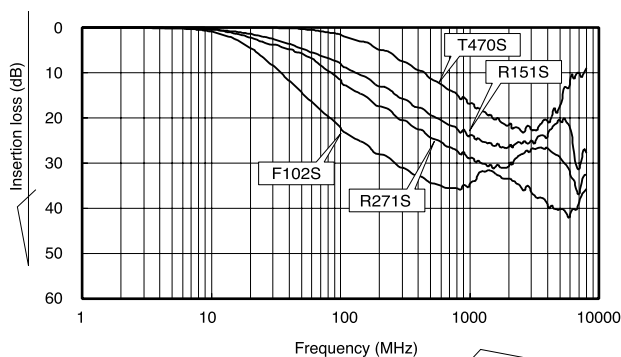


### ■ Part Number List • Specifications

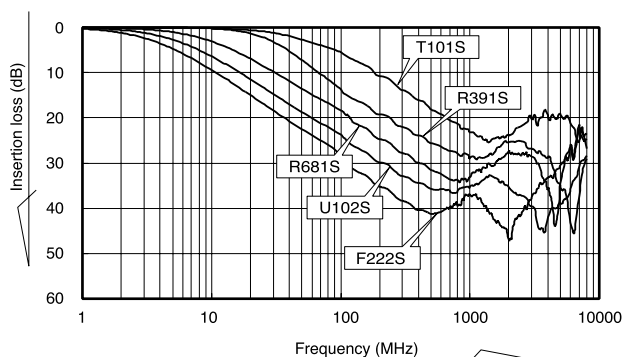
Part number	Capacitance	Capacitance tolerance	Temperature characteristics	Rated voltage	Rated current	IR	DC resistance	Temp. range
CTH20T470S10A-□M	47pF	+50, -20%	+22, -33%	50V DC	10A DC	10,000MΩmin.	5mΩmax.	-55 ~ +125°C
CTH20R151S10A-□M	150pF		±15%					
CTH20R271S10A-□M	270pF		±15%					
CTH20V102S10A-□M	1,000pF		+22, -82%					
CTH30T101S15A-□M	100pF		+22, -33%	100V DC	15A DC			-25 ~ +85°C
CTH30R391S15A-□M	390pF		±15%					
CTH30R681S15A-□M	680pF		±15%					
CTH30U102S15A-□M	1,000pF		+22, -56%					
CTH30V222S15A-□M	2,200pF		+22, -82%					
CTH32R102S20A-□M	1,000pF		±15%					
CTH32V332S20A-□M	3,300pF	+22, -82%	-25 ~ +85°C					

### ■ Insertion loss (Reference)

CTH20 TYPE



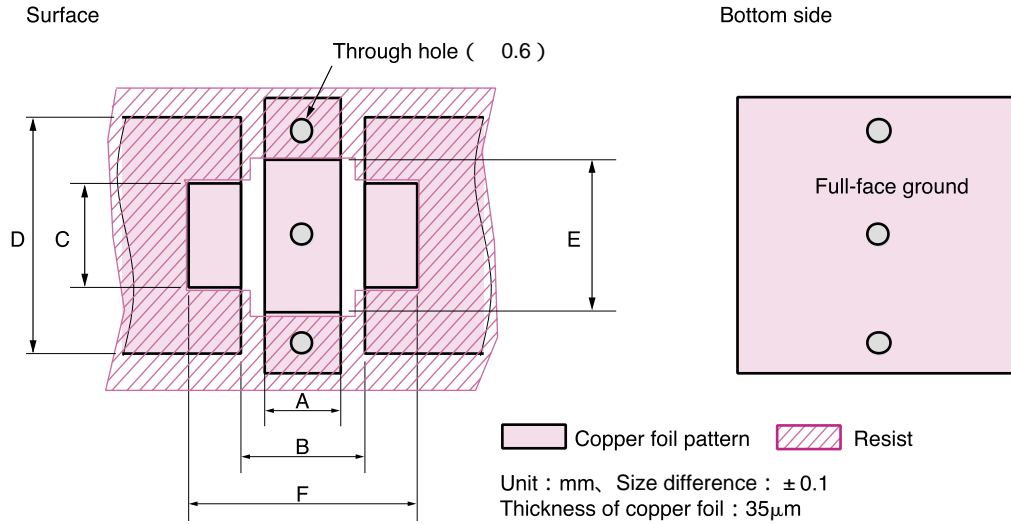
CTH30 TYPE



## HANDLING PRECAUTIONS

### ■Soldering (Exclusively for reflow soldering. Not applicable to flow soldering.)

Recommended board pattern

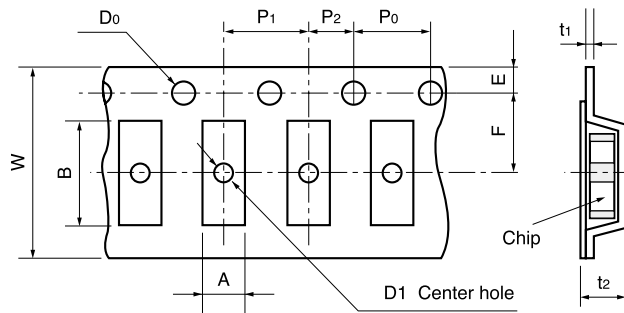


Type	A	B	C	D	E	F
CTH20 type	0.8	1.5	1.2	2.5	1.8	2.8
CTH30 type	1.5	2.5	2.2	4.0	3.2	4.8
CTH32 type	1.5	2.5	3.0	6.0	5.0	4.8

\*The D dimension presupposes the rated current.

### ■Taping

Taping Specifications



Type	A	B	W	F	E	P1	P2	P0	D0	D1	t1	t2	Hole
CTH20	1.45±0.2	2.3±0.2	8.0 ±0.2	3.50 ±0.05	1.75 ±0.1	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	1.5 +0.1 -0	1.15 ±0.05	0.6 max.	3.0 max.	Square embossed hole
CTH30	2.0±0.2	3.6±0.2											
CTH32	2.9±0.2	3.6±0.2											

### ■Package Qty.

Type	Taping Qty.	Bulk Qty.
CTH20	2,000pcs / reel	1,000pcs / bag
CTH30	2,000pcs / reel	1,000pcs / bag
CTH32	1,000pcs / reel	1,000pcs / bag