## Part Numbering

### AC Line Filters

(Part Number)

| PL | A | 10 | A | S | 152 | 2R0 | R | 2 | B |
|---|---|---|---|---|---|---|---|---|---|
| ❶ | ❷ | ❸ | ❹ | ❺ | ❻ | ❼ | ❽ | ❾ | ❿ |

❶Product ID

| Product ID | |
|---|---|
| PL | Common Mode Choke Coils |

❷Type

| Code | Type |
|---|---|
| A | AC Standard |
| H | AC High-frequency |
| Y | AC Hybrid Choke Coils |

❸Applications

| Code | Applications |
|---|---|
| 10 | for AC Line |
| 17 | |

❹Structure

| Code | Structure |
|---|---|
| A | Core Vertical |
| B | Core Horizontal |

❺Features

| Code | Features |
|---|---|
| S | Safety Recognized |
| N | General Use |
| H | High Inductance |
| V | High Inductance Safety Recognized |

❻Inductance

Expressed by three figures. The unit is micro-henry (μH). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two figures.

❼Rated Current

Expressed by three-digit alphanumerics. The unit is amperes (A). A decimal point is expressed by the capital letter "**R**." In this case, all figures are significant digits.

❽Winding Mode

| Code | Winding Mode |
|---|---|
| A | Parallel Winding |
| B | Parallel Winding (High-Performance) |
| D | Sectional Winding |
| R | Standard |
| P | Single Layer Winding |

❾Lead Dimensions

| Code | Lead Dimensions |
|---|---|
| 2 | 3.5mm |

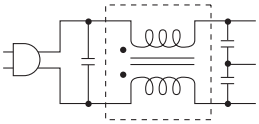
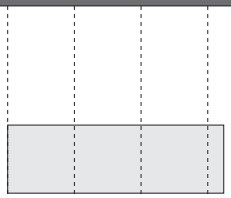
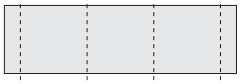
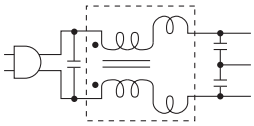
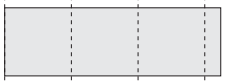
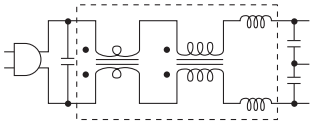
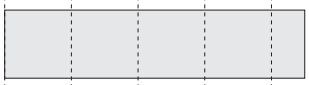
❿Packaging

| Code | Packaging | Series |
|---|---|---|
| B | Bulk | All series |

# Outline of EMI Suppression Filter (EMIFIL®) for AC Power Lines

EMI (Electromagnetic Interference) suppression filters for AC power lines eliminate noise entering equipment from commercial power lines or noise generated from electronic equipment.
Common mode chokes, line bypass capacitors, and across the line capacitors are generally used as AC EMI suppression filter devices. In suppressing common mode noise, common mode chokes are the most important devices. Because the characteristics of common mode chokes influence the performance of the total filter block, MURATA provides two types of common mode chokes (standard type and high frequency type).
A hybrid choke coil is a high-performance EMI suppression device that can suppress both common mode noise and differential mode noise at the same time. It is effective in AC power supplies with active devices for a higher harmonic countermeasure, which tends to emit relatively higher differential mode noise.

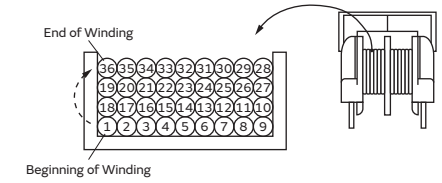
## Classification of EMI Suppression Filter for AC Power Lines

| Product Name | Appearance | Effective Frequency Range (Hz) 10k 100k 1M 10M 100M 1G | Application |
|---|---|---|---|
| Common Mode Choke Coil  | Standard Type  **PLA10** |  | Suppression of general common mode noise |
| | High Frequency Type  **PLH10** |  | Suppression of common mode noise which contains high frequency noise above 10MHz |
| Hybrid Choke Coil  |  **PLY10** |  | Suppression of conduction noise in AC power line with active device for higher harmonic countermeasure. Suppression of AC power line noise which contains both common mode noise and differential mode noise. |
| Hybrid Choke Coil  |  **PLY17** |  | For AC power supply, AC adaptor. Set for low-profile equipment. |

# Outline of EMI Suppression Filter (EMIFIL®) for AC Power Lines

## Common Mode Choke Coil Standard Winding and Sectional Winding

### Standard Winding

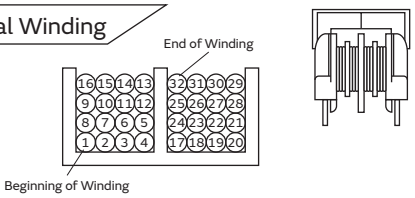



High-frequency noise can pass through the Filter easily because both edges of coils are close, as shown above

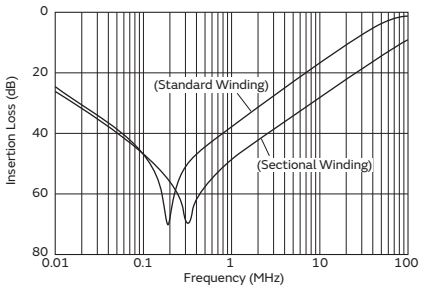
Standard Winding
Large inductance is available
→Highly Efficient in Low Frequency

Sectional Winding
Excellent performance in high frequency
Stray capacity between windings is low

### Sectional Winding

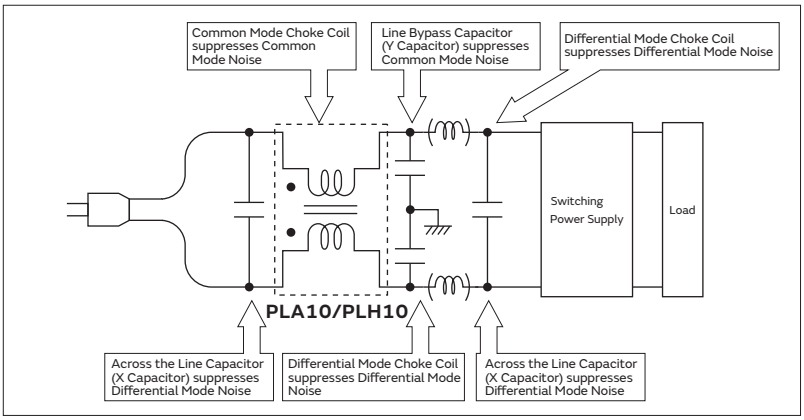



High-frequency noise can hardly pass through the Filter because both edges of coil are not close as shown above




## Noise Measures for Switching Power Supply

Noise is generated from Switching Power Supply
- Common Mode Noise
- Differential Mode Noise



# EMI Suppression Filters (EMIFIL®) for AC Power Lines

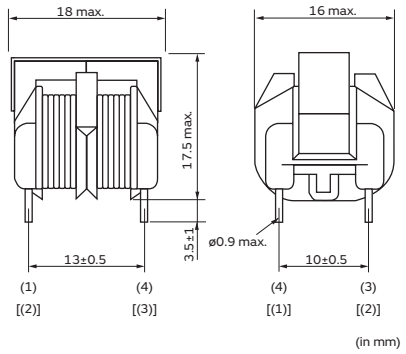
## Hybrid Choke Coil



### PLY10 Series

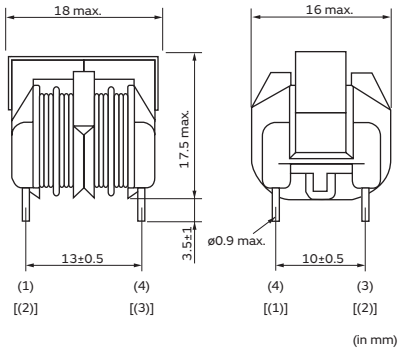
The PLY10 is a compact and high-performance hybrid choke coil that can handle differential mode noise caused by the harmonics currents regulation circuit as well as common mode noise. It can handle noise problems much more compactly than a combination of a conventional common mode choke coil and a differential mode choke coil.

Standard Winding




(in mm)

Sectional Winding




(in mm)

#### Features

1. PLY10 has both functions of a common mode choke coil and a differential mode choke coil in its compact body.
2. Low profile in vertical core layout
3. PLY10 has the same pin layout as a general common mode choke coil which enables it to replace conventional components.
4. Both a standard winding and a sectional winding for higher frequency noise is available.

#### EMI Problem for harmonics currents regulation

There are some methods that meet harmonics currents regulations (IEC1000-3, EN60555-2) such as an active filter and one converter. However, they cause new EMI problems of differential mode noise because they use active components. For that reason, additional filter components to meet differential mode noise must be applied.

### Standard Winding

| Part Number | Common Mode Inductance (min.) (mH) | Normal Mode Inductance (min.) (μH) | Rated Current (A) | Rated Voltage | |
|---|---|---|---|---|---|
| | | | | (VAC) | (VDC) |
| **PLY10AN9012R0R2B** | 0.9 | 65 | 2.0 | 300 | 500 |
| **PLY10AN1121R8R2B** | 1.1 | 90 | 1.8 | 300 | 500 |
| **PLY10AN1521R6R2B** | 1.5 | 110 | 1.6 | 300 | 500 |
| **PLY10AN2121R4R2B** | 2.1 | 150 | 1.4 | 300 | 500 |
| **PLY10AN2821R2R2B** | 2.8 | 190 | 1.2 | 300 | 500 |
| **PLY10AN4321R0R2B** | 4.3 | 300 | 1.0 | 300 | 500 |
| **PLY10AN6220R8R2B** | 6.2 | 400 | 0.8 | 300 | 50 |
| **PLY10AN8720R7R2B** | 8.7 | 530 | 0.7 | 300 | 50 |
| **PLY10AN9920R6R2B** | 9.9 | 690 | 0.6 | 300 | 50 |
| **PLY10AN1430R5R2B** | 14.0 | 1000 | 0.5 | 300 | 50 |

Operating Temperature Range: -25°C to 60°C  Winding Temperature Rise (at Rated Current): 60°C (max.)

### Sectional Winding

| Part Number | Common Mode Inductance (min.) (mH) | Normal Mode Inductance (min.) (μH) | Rated Current (A) | Rated Voltage | |
|---|---|---|---|---|---|
| | | | | (VAC) | (VDC) |
| **PLY10AN7012R0D2B** | 0.7 | 50 | 2.0 | 300 | 500 |
| **PLY10AN1121R7D2B** | 1.1 | 65 | 1.7 | 300 | 500 |

Continued on the following page.↗

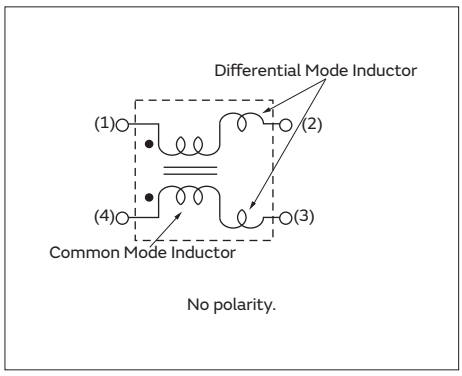
Continued from the preceding page.↘

| Part Number | Common Mode Inductance (min.) (mH) | Normal Mode Inductance (min.) (μH) | Rated Current (A) | Rated Voltage | |
|---|---|---|---|---|---|
| | | | | (VAC) | (VDC) |
| **PLY10AN1421R4D2B** | 1.4 | 110 | 1.4 | 300 | 500 |
| **PLY10AN2321R2D2B** | 2.3 | 160 | 1.2 | 300 | 500 |
| **PLY10AN3521R0D2B** | 3.5 | 240 | 1.0 | 300 | 500 |
| **PLY10AN4420R8D2B** | 4.4 | 320 | 0.8 | 300 | 50 |
| **PLY10AN8720R7D2B** | 8.7 | 500 | 0.7 | 300 | 50 |
| **PLY10AN9720R6D2B** | 9.7 | 670 | 0.6 | 300 | 50 |
| **PLY10AN1130R5D2B** | 11.0 | 840 | 0.5 | 300 | 50 |

Operating Temperature Range: -25°C to 60°C  Winding Temperature Rise (at Rated Current): 60°C (max.)

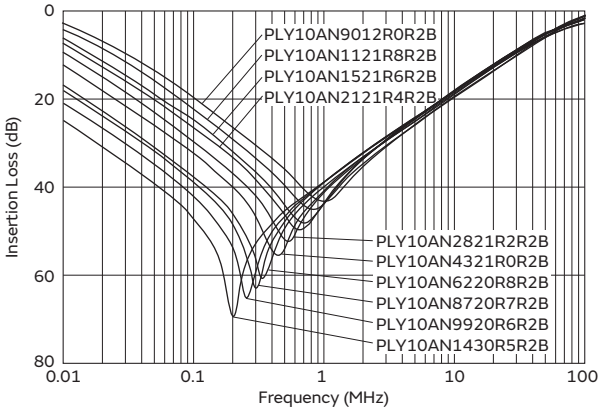


## Equivalent Circuit Diagram

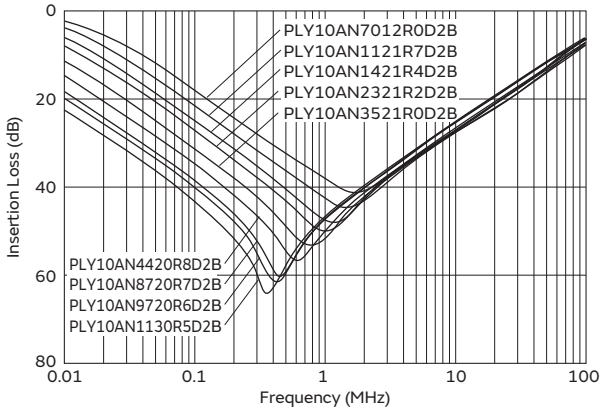



## Common Mode Insertion Loss - Frequency Characteristics

Standard Winding

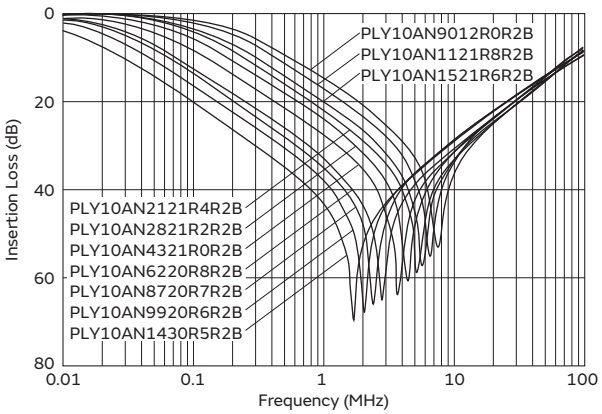



Sectional Winding

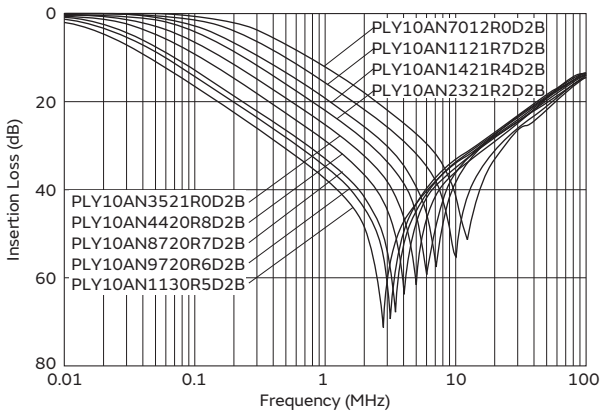



## Differential Mode Insertion Loss - Frequency Characteristics

Standard Winding




Sectional Winding



# ⚠Caution/Notice

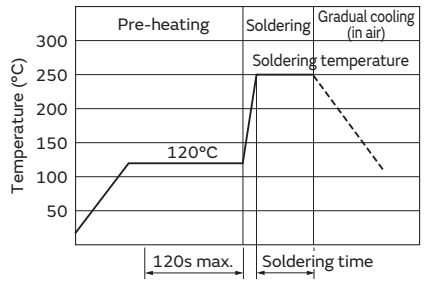
## ⚠Caution (Rating)

1. Rated Current
Operating current should not exceed the rated value. Even if operating current is under the rated value, adequate ventilation is required to avoid excessive heat generated within the product (choke coil) and from surrounding heat sources.
If exceeding these conditions, excessive heat may cause fumes or permanent damage to the product.
Please ensure that the product (choke coil) is evaluated and confirmed against the specification when it is mounted in your final assembled product.
-> Winding temperature should be less than 120°C.
Maximum allowable temperature at the surface of the coil (ambient temperature + winding temperature rise) is in accordance with each safety standard applicable to the final assembled product.
When the temperature at winding exceeds the maximum allowable temperature of the safety standard, the rated current should be derated.
2. Inrush Current
Inrush current should not exceed 10 times the rated current within 1/4 cycle of 50/60Hz commercial power line. Inrush current should be limited to a minimum of 10 seconds after last inrush.

If these conditions are exceeded, excessive heat may cause fumes or permanent damage to the component, or at worst cause ignition.

## Notice (Storage and Operating Conditions)

1. Soldering Conditions
(1) Flux, Solder
· Rosin-based flux should be used. Do not use strong acidic flux with halide content exceeding 0.2wt% (chlorine conversion value)
· Use Sn-3.0Ag-0.5Cu solder
(2) Flow soldering profile




| Standard profile | | Limit profile | | |
|---|---|---|---|---|
| Sn-3.0Ag-0.5Cu solder | | | | |
| Soldering temp. | Soldering time | Soldering temp. | Soldering time | Cycle of flow |
| 250±2°C | 4-6s | 265±3°C | 5s | 2 times |

For additional mounting methods, please contact Murata.

2. Cleaning
Avoid cleaning the product due to non-waterproof construction.
3. Storage and Handling Requirements
(1) Storage period
Product should be used within 12 months after receiving. Solderability should be checked if this period is exceeded.

(2) Storage conditions
Storage Temperature: -10 to 40 °C
Relative humidity: 30 to 70%
Avoid sudden changes in temperature and humidity.
Don't keep products in corrosive gases such as sulfur, chlorine gas or acid, as it may cause oxidation of lead terminals resulting in poor solderability or corrosion of component windings.
(3) Handling conditions
Care should be taken when transporting or handling the product to avoid excessive vibration or mechanical shock.

## Notice (Soldering and Mounting)

Magnetic Flux Leakage
Choke coils generate small amounts of magnetic flux leakage that may adversely affect equipment operation according to component arrangement.
Testing should be completed on final assembly to ensure equipment performance is not affected.

## Notice (Rating)

Coil Humming Noise
Magnetic flux generated between coil and core or between the choke coil windings creates repulsive power between the coil windings. This repulsive power causes the coil winding to vibrate and create a humming noise. The amount of hum produced by the coil is proportionate to the amount of harmonic distortion generated by the operating current. This does not influence the electrical performance of the coils, but it should be considered and tested in actual circuit application.

# Packaging

## Minimum Quantity

| Part Number | Minimum Quantity (pcs.) |
|---|---|
| | Box |
| **PLA10** | 1260 |
| **PLH10** | 1260 |
| **PLY10** | 1200 |
| **PLY17** | 1080 |