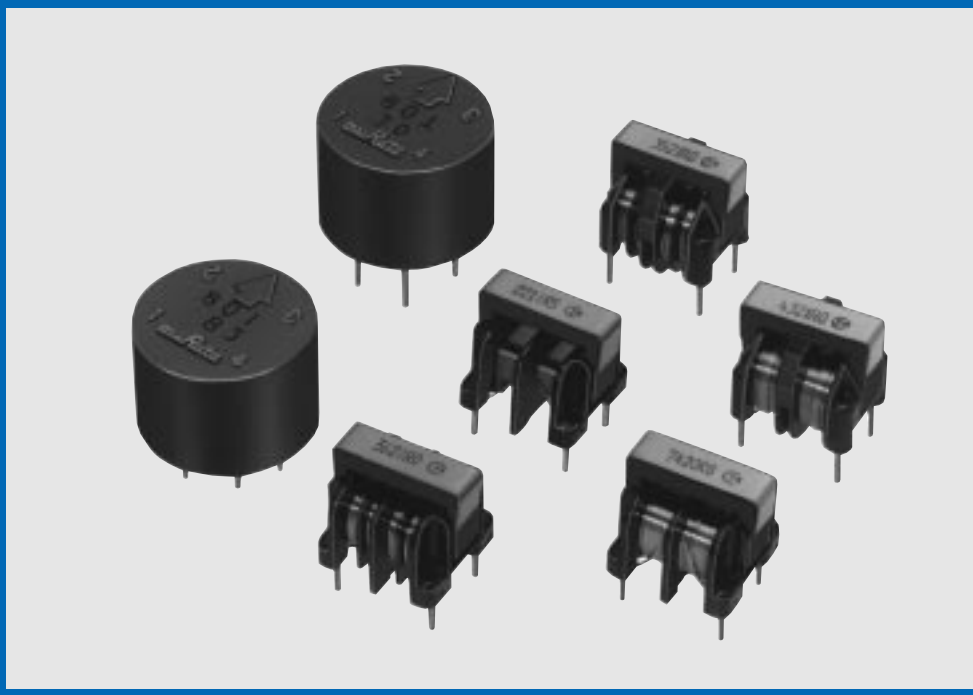
EMI Suppression Filters(EMIFIL®) for AC Power Lines

Murata EMC Solutions : http://www.murata.co.jp/emc/

EMI SUPPRESSION FILTERS



GLOBAL PART NUMBERS
JUNE 2001

muRata Innovator in Electronics
Murata
Manufacturing Co., Ltd.

Cat.No.C09E-5

CONTENTS

Part Numbering (The structure of the "Global Part Numbers" that have been adopted since June 2001 and the meaning of each code are described herein. If you have any questions about details, inquire at your usual Murata sales office or distributor.)

Lead Type Common Mode Choke Coils / AC Line Filters

(Global 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
T	DC Type
A	Standard Type
H	High-freqency Type
Y	Hybrid Choke Coils Type

❸Applications

Code	Applications
08	for DC Line
09	for DC Line High-frequency Type
10	for AC Line

❹Structure

Code	Structure
A	Core Vertical Type
H	Core Horizontal Type
C	Case Type

❺Features

Code	Features
S	Safety Recognized
N	General Use

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 zero which follow the two figures. If there is a decimal point, it is expressed by capital letter "**R**". In this case, all figures are significant digits. If inductance is less than 0.1 μH, the inductance code is expressed by combination of two figures and capital letter "**N**", and the unit of inductance is nano-henry (nH). Capital letter "**N**" indicates the unit of "nH", and also expresses a decimal point. In this case, all figure are significant digits.

❼Rated Current

Expressed by three figures. The unit is in ampere (A). A decimal point is expressed capital letter "**R**". In this case, all figures are significant digits.

❽Winding Mode

Code	Winding Mode
D	Sectional Winding Type
R	Standard Type
P	Aligned Winding Type
T	Troidal Type

❾Lead Dimensions

Code	Lead Dimensions
2	3.5mm
1	5mm
0	4mm (PLT)
3	4mm (Except for PLT)

❿Packaging

Code	Packaging
B	Bulk
M	Magazine Package

•Please contact us for FKOB type.

EMI Suppression Filters(EMIFIL®) for AC Power Lines

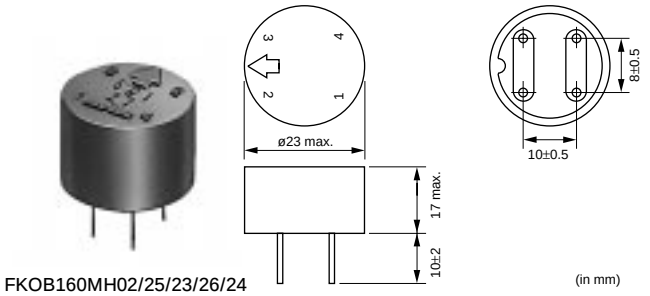
muRata

Common Mode Choke Coil

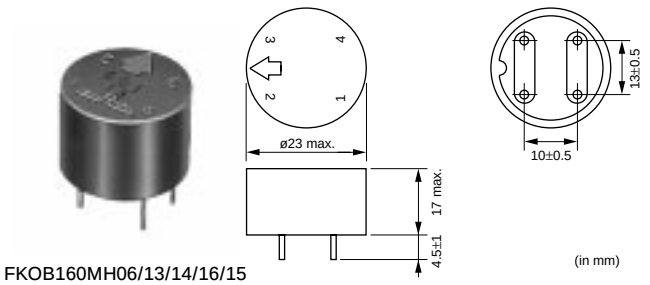
FKOB Series

■ Features

The FKOB series is compact size AC common mode choke coil which uses troidal type ferrite core.
Its broad band frequency characteristic enables simple filter composition in relative low noise equipments.



FKOB160MH02/25/23/26/24 (in mm)



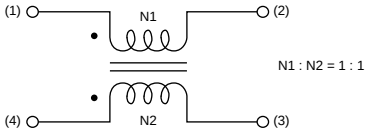
FKOB160MH06/13/14/16/15 (in mm)

Part Number	Common Mode Inductance (μH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)	Lead Pitch (mm)	Lead Length (mm)
FKOB160MH02	250 min.	2.5	250	100 min.	8/10	10
FKOB160MH06	250 min.	2.5	250	100 min.	13/10	4.5
FKOB160MH13	600 min.	2.5	250	100 min.	13/10	4.5
FKOB160MH14	800 min.	2.5	250	100 min.	13/10	4.5
FKOB160MH15	1500 min.	1.5	250	100 min.	13/10	4.5
FKOB160MH16	1000 min.	1.5	250	100 min.	13/10	4.5
FKOB160MH23	800 min.	2.5	250	100 min.	8/10	4.5
FKOB160MH24	1500 min.	1.5	250	100 min.	8/10	10
FKOB160MH25	600 min.	2.5	250	100 min.	8/10	10
FKOB160MH26	1000 min.	1.5	250	100 min.	8/10	10

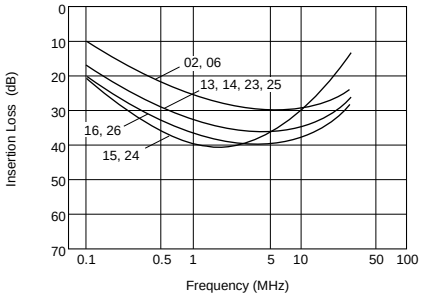
Operating Temperature Range(Ambient Temperature Range+Winding Temperature Rise) : -20°C to 95°C Widing Temperature Rise(at Rated Current) : 35K max.

1

■ Equivalent Circuit Diagram



■ Insertion Loss Characteristics (Typical)

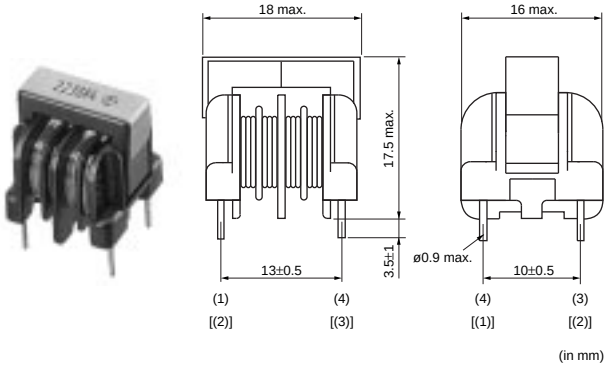


PLA10 Series Sectional Winding Type

The PLA10 series is compact size AC common mode choke coil. It can obtain high inductance value in spite of its compact shape.

■ Features

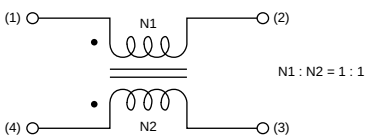
1. Compact and light weight.
2. Low profile in vertical core layout.
3. Both standard winding type and sectional winding type for higher frequency noise are available.



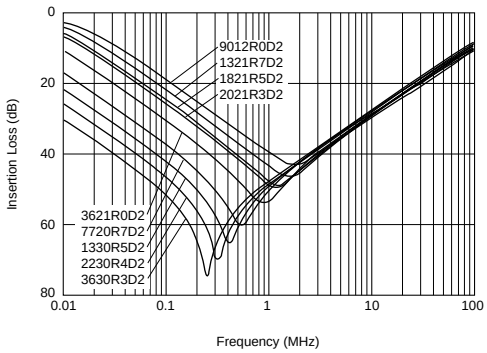
Part Number	Common Mode Inductance (mH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)
PLA10AN9012R0D2	0.9 min.	2.0	300	100 min.
PLA10AN1321R7D2	1.3 min.	1.7	300	100 min.
PLA10AN1821R5D2	1.8 min.	1.5	300	100 min.
PLA10AN2021R3D2	2.0 min.	1.3	300	100 min.
PLA10AN3621R0D2	3.6 min.	1.0	300	100 min.
PLA10AN7720R7D2	7.7 min.	0.7	300	100 min.
PLA10AN1330R5D2	13.0 min.	0.5	300	100 min.
PLA10AN2230R4D2	22.0 min.	0.4	300	100 min.
PLA10AN3630R3D2	36.0 min.	0.3	300	100 min.

Operating Temperature Range(Ambient Temperature Range + Winding Temperature Rise) : -25°C to 120°C Widing Temperature Rise(at Rated Current) : 60K max.

■ Equivalent Circuit Diagram



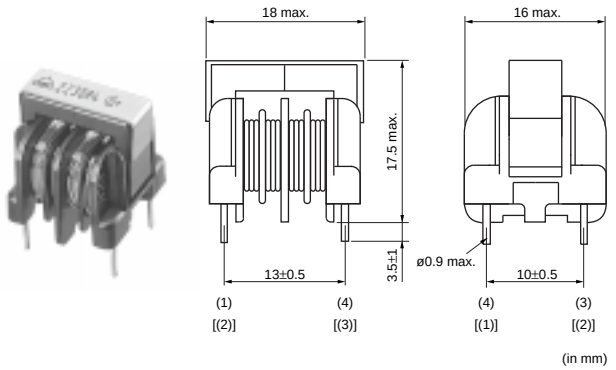
■ Insertion Loss Characteristics (Typical)



PLA10 Series Sectional Winding Type (Safety Standard Recognized)

■ Features

1. Compact and light weight.
2. Low profile in vertical core layout.
3. Both standard winding type and sectional winding type for higher frequency noise are available.
4. Safety standards : EN60065
   : IEC65



(in mm)

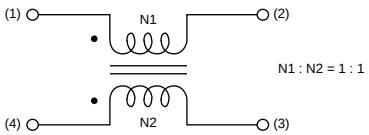
■ Applications

• Switching power supply, electric ballast (AC-AC converter)

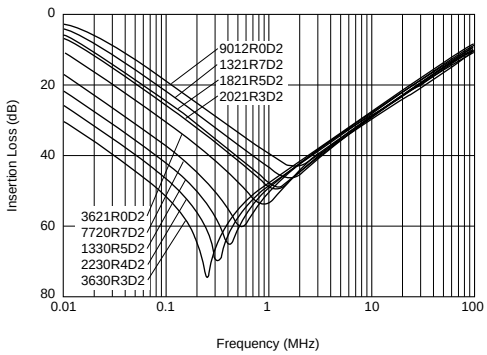
Part Number	Common Mode Inductance (mH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)
PLA10AS9012R0D2	0.9 min.	2.0	250	100 min.
PLA10AS1321R7D2	1.3 min.	1.7	250	100 min.
PLA10AS1821R5D2	1.8 min.	1.5	250	100 min.
PLA10AS2021R3D2	2.0 min.	1.3	250	100 min.
PLA10AS3621R0D2	3.6 min.	1.0	250	100 min.
PLA10AS7720R7D2	7.7 min.	0.7	250	100 min.
PLA10AS1330R5D2	13.0 min.	0.5	250	100 min.
PLA10AS2230R4D2	22.0 min.	0.4	250	100 min.
PLA10AS3630R3D2	36.0 min.	0.3	250	100 min.

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

■ Equivalent Circuit Diagram



■ Insertion Loss Characteristics (Typical)

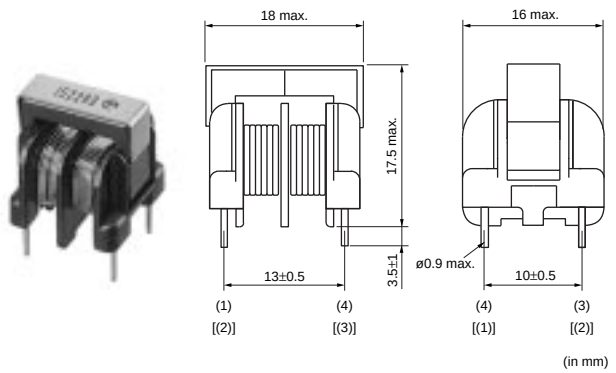


PLA10 Series Standard Winding Type

The PLA10 series is compact size AC common mode choke coil. It can obtain high inductance value in spite of its compact shape.

■ Features

1. Compact and light weight.
2. Low profile in vertical core layout.
3. Both standard winding type and sectional winding type for higher frequency noise are available.

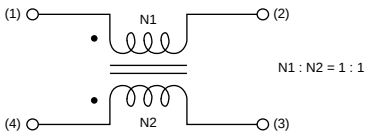


(in mm)

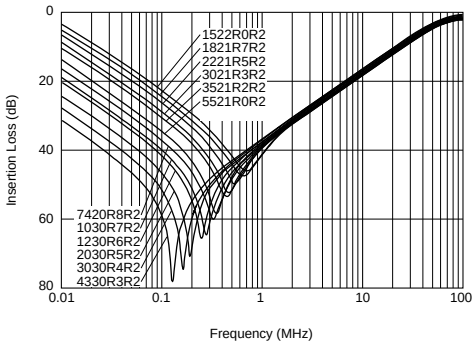
Part Number	Common Mode Inductance (mH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)
PLA10AN1522R0R2	1.5 min.	2.0	300	100 min.
PLA10AN1821R7R2	1.8 min.	1.7	300	100 min.
PLA10AN2221R5R2	2.2 min.	1.5	300	100 min.
PLA10AN3021R3R2	3.0 min.	1.3	300	100 min.
PLA10AN3521R2R2	3.5 min.	1.2	300	100 min.
PLA10AN5521R0R2	5.5 min.	1.0	300	100 min.
PLA10AN7420R8R2	7.4 min.	0.8	300	100 min.
PLA10AN1030R7R2	10.0 min.	0.7	300	100 min.
PLA10AN1230R6R2	12.0 min.	0.6	300	100 min.
PLA10AN2030R5R2	20.0 min.	0.5	300	100 min.
PLA10AN3030R4R2	30.0 min.	0.4	300	100 min.
PLA10AN4330R3R2	43.0 min.	0.3	300	100 min.

Operating Temperature Range(Ambient Temperature Range + Winding Temperature Rise) : -25°C to 120°C Widing Temperature Rise(at Rated Current) : 60K max.

■ Equivalent Circuit Diagram



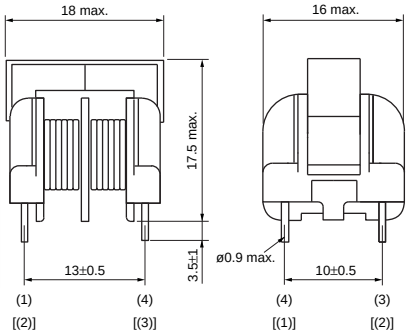
■ Insertion Loss Characteristics (Typical)



PLA10 Series Standard Winding Type (Safety Standard Recognized)

■ Features

1. Compact and light weight.
2. Low profile in vertical core layout.
3. Both standard winding type and sectional winding type for higher frequency noise are available.
4. Safety standards : EN60065
   : IEC65



(in mm)

■ Applications

• Switching power supply, electric ballast (AC-AC converter)

Part Number	Common Mode Inductance (mH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)
PLA10AS1522R0R2	1.5 min.	2.0	250	100 min.
PLA10AS1821R7R2	1.8 min.	1.7	250	100 min.
PLA10AS2221R5R2	2.2 min.	1.5	250	100 min.
PLA10AS3021R3R2	3.0 min.	1.3	250	100 min.
PLA10AS3521R2R2	3.5 min.	1.2	250	100 min.
PLA10AS5521R0R2	5.5 min.	1.0	250	100 min.
PLA10AS7420R8R2	7.4 min.	0.8	250	100 min.
PLA10AS1030R7R2	10.0 min.	0.7	250	100 min.
PLA10AS1230R6R2	12.0 min.	0.6	250	100 min.
PLA10AS2030R5R2	20.0 min.	0.5	250	100 min.
PLA10AS3030R4R2	30.0 min.	0.4	250	100 min.

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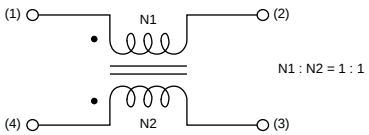
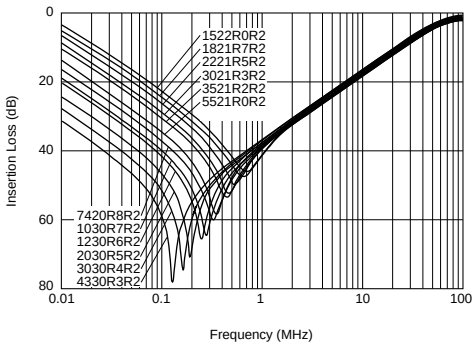
Part Number	Common Mode Inductance (mH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)
PLA10AS4330R3R2	43.0 min.	0.3	250	100 min.

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

■ Equivalent Circuit Diagram



■ Insertion Loss Characteristics (Typical)

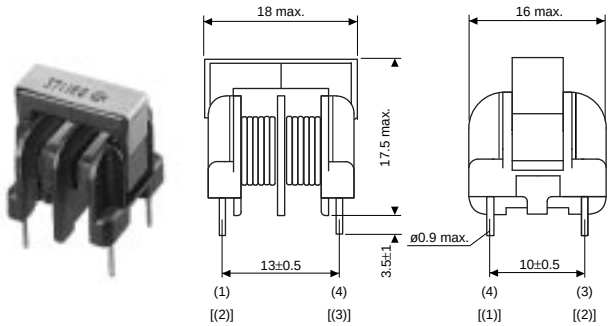


PLH10 Series

The PLH10 series is common mode choke coil for high frequency. The same dimension as PLA10 series enables flexible design.

■ Features

1. High performance in high frequency range.
2. Low profile in vertical core layout.
3. Compact and light weight.



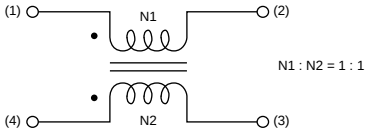
(in mm)

Part Number	Common Mode Inductance (μH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)
PLH10AN7003R6P2	70 min.	3.6	300	100 min.
PLH10AN1112R6P2	110 min.	2.6	300	100 min.
PLH10AN1612R1P2	160 min.	2.1	300	100 min.
PLH10AN2211R5P2	220 min.	1.5	300	100 min.
PLH10AN2911R2P2	290 min.	1.2	300	100 min.
PLH10AN3711R0P2	370 min.	1.0	300	100 min.

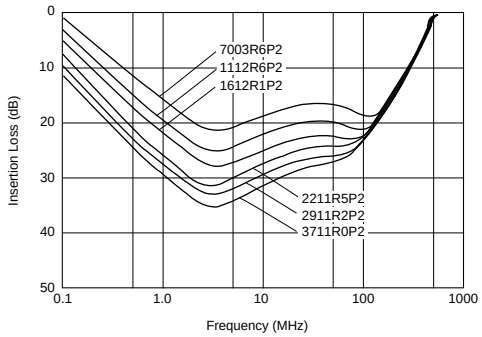
Operating Temperature Range(Ambient Temperature Range + Winding Temperature Rise) : -25°C to 120°C Widing Temperature Rise(at Rated Current) : 60K max.

1

■ Equivalent Circuit Diagram

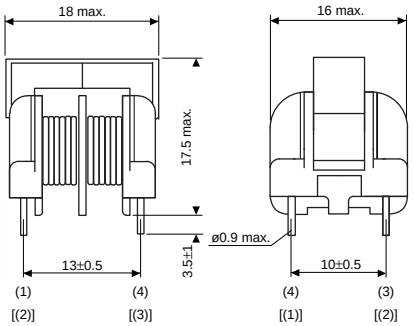


■ Insertion Loss Characteristics (Typical)



PLH10 Series (Safety Standard Recognized)

The PLH10 series is common mode choke coil for high frequency. The same dimension as PLA10 series enables flexible design.



(in mm)

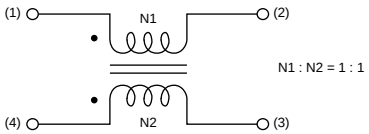
■ Features

1. High performance in high frequency range.
2. Low profile in vertical core layout.
3. Compact and light weight.

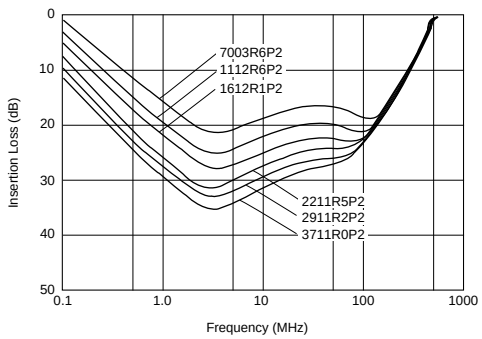
Part Number	Common Mode Inductance (μH)	Rated Current (Arms)	Rated Voltage (Vac)	Insulation Resistance (M ohm)
PLH10AS7003R6P2	70 min.	3.6	250	100 min.
PLH10AS1112R6P2	110 min.	2.6	250	100 min.
PLH10AS1612R1P2	160 min.	2.1	250	100 min.
PLH10AS2211R5P2	220 min.	1.5	250	100 min.
PLH10AS2911R2P2	290 min.	1.2	250	100 min.
PLH10AS3711R0P2	370 min.	1.0	250	100 min.

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

■ Equivalent Circuit Diagram



■ Insertion Loss Characteristics (Typical)

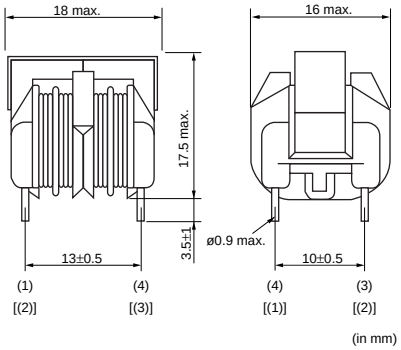


EMI Suppression Filters(EMIFIL®) for AC Power Lines

Hybrid Choke Coil

PLY10 Series Sectional Winding Type

The PLY10 is compact and high performance hybrid choke coil which can meet differential mode noise caused by the harmonic currents limitation circuit as well as common mode noise. It can meet noise problem much more compactly than combination of conventional common mode choke coil and differential mode choke coil.



■ New EMI Problem

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

■ Features

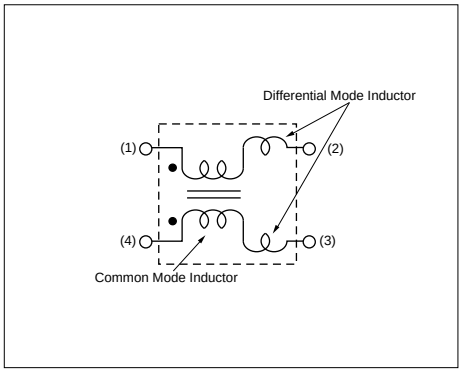
1. PLY10 has both function of common mode choke coil and differential mode chhoke coil in its compact body.
2. Low profile in vertical core layout.
3. PLY10 has same pin layout as general type common mode choke coil which makes it possible to replace conventional component.

Part Number	Common Mode Inductance (mH)	Normal Mode Inductance (mH)	Rated Current (Arms)	Rated Voltage (Vac)
PLY10AN1130R5D2	11.0 min.	0.84 min.	0.5	300
PLY10AN9720R6D2	9.7 min.	0.67 min.	0.6	300
PLY10AN8720R7D2	8.7 min.	0.50 min.	0.7	300
PLY10AN4420R8D2	4.4 min.	0.32 min.	0.8	300
PLY10AN3521R0D2	3.5 min.	0.24 min.	1.0	300
PLY10AN2321R2D2	2.3 min.	0.16 min.	1.2	300
PLY10AN1421R4D2	1.4 min.	0.11 min.	1.4	300
PLY10AN1121R7D2	1.1 min.	0.065 min.	1.7	300
PLY10AN7012R0D2	0.7 min.	0.050 min.	2.0	300

Operating Temperature(Ambient Temperature Range+Winding Temperature Rise) : -25°C to 120°C Winding Temperature Rise (at Rated Current) : 60K max.

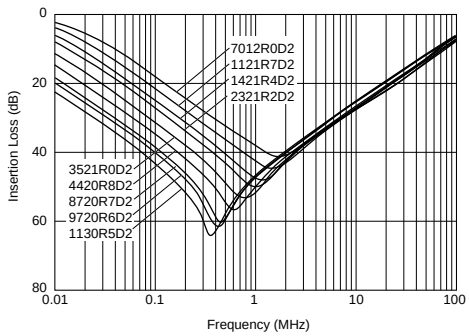
2

■ Equivalent Circuit Diagram

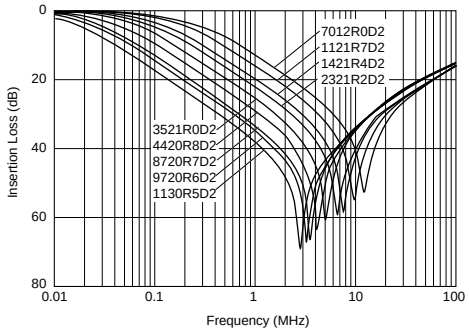


■ Insertion Loss Characteristics (Typical)

Common Mode

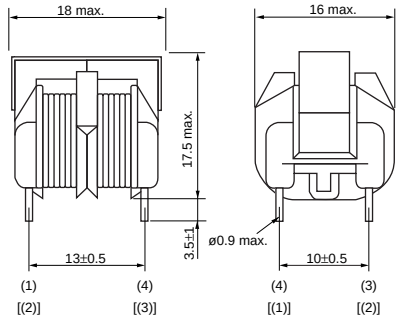


Differential Mode



PLY10 Series Standard Winding Type

The PLY10 is compact and high performance hybrid choke coil which can meet differential mode noise caused by the harmonic currents limitation circuit as well as common mode noise. It can meet noise problem much more compactly than combination of conventional common mode choke coil and differential mode choke coil.



■ New EMI Problem

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

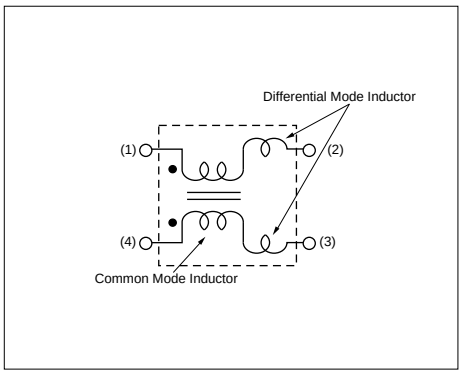
■ Features

1. PLY10 has both function of common mode choke coil and differential mode chhoke coil in its compact body.
2. Low profile in vertical core layout.
3. PLY10 has same pin layout as general type common mode choke coil which makes it possible to replace conventional component.

Part Number	Common Mode Inductance (mH)	Normal Mode Inductance (mH)	Rated Current (Arms)	Rated Voltage (Vac)
PLY10AN1430R5R2	14.0 min.	1.0 min.	0.5	300
PLY10AN9920R6R2	9.9 min.	0.69 min.	0.6	300
PLY10AN8720R7R2	8.7 min.	0.53 min.	0.7	300
PLY10AN6220R8R2	6.2 min.	0.40 min.	0.8	300
PLY10AN4321R0R2	4.3 min.	0.30 min.	1.0	300
PLY10AN2821R2R2	2.8 min.	0.19 min.	1.2	300
PLY10AN2121R4R2	2.1 min.	0.15 min.	1.4	300
PLY10AN1521R6R2	1.5 min.	0.11 min.	1.6	300
PLY10AN1121R8R2	1.1 min.	0.09 min.	1.8	300
PLY10AN9012R0R2	0.9 min.	0.065 min.	2.0	300

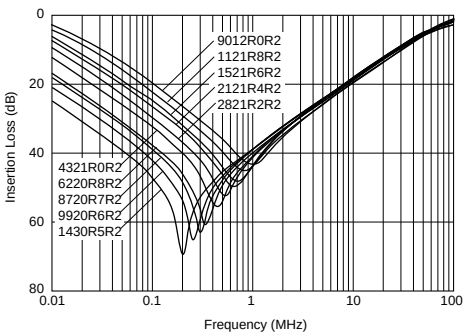
Operating Temperature(Ambient Temperature Range+Winding Temperature Rise) : -25°C to 120°C Winding Temperature Rise (at Rated Current) : 60K max.

■ Equivalent Circuit Diagram

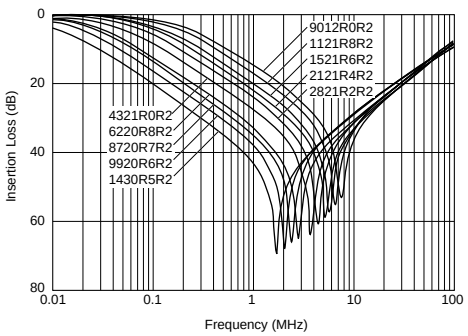


■ Insertion Loss Characteristics (Typical)

Common Mode



Differential Mode



⚠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 produt (choke coil) is evaluted and confirmed against the specufucation when it is mounted in your final assembled product. -> Winding temperature should be less than 120c.. *As for FKOB serise winding temperature should be less than 95C..

Maximum allowable temperature at the surface of coil (ambient temperature + winding temperature rise) is in accordance with each safety standard that final assembeld product is applicable to.

When the temperature at winding exceeds maximum allowable temperature of safety standard, the rated current should be derated.

2. Inrush Current

Inrush current should not exceed 10 times 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 Condition)

1. Soldering Conditions

(1) Flux, Solder

•Rosin-based flux should be used.
Do not use strong acidic flux with halide content exceeding 0.2%wt (chlorine conversion value.)

•Use 63/37 solder (Sn 63%/Pb 37%) or 60/40 solder (Sn 60%/Pb 40%)

(2) Flow soldering

Products should be soldered by flow method under the following conditions.

Soldering Temp. : 240 to 260 C.
Soldering Time : Less than 5 sec.

2. Cleaning

Avoid cleaning 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, or 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 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 effected.

■ 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.)	
	Magazine Package	Box
FKOB	-	100
PLA10	30	210
PLH10	30	210
PLY10	200	200

The order quantity should be an integral multiple of the "Minimum Quantity".

⚠Note:

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   ② Aerospace equipment
   ③ Undersea equipment
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   ⑦ Traffic signal equipment
   ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment
   ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above
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