

WURTH ELECTRONICS Product Line for Common Mode Chokes

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Introduction

Purpose

- Provide an overview of the common mode choke series and an understanding of how they work.

Objectives

- Discuss the features and benefits of using common mode chokes

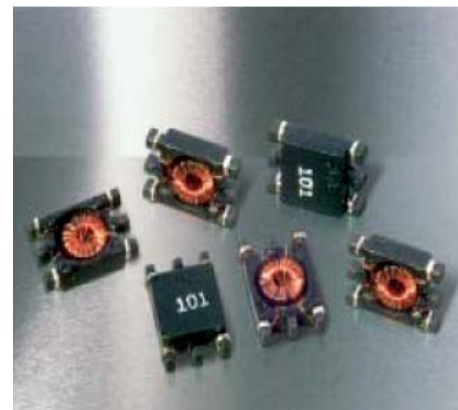
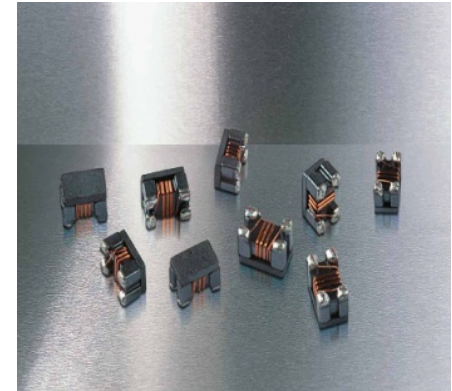
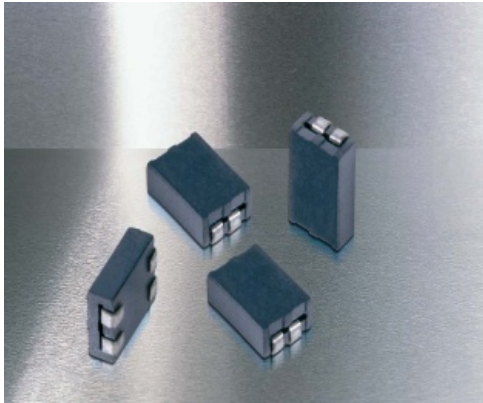
Content

- 19 pages

Estimated Completion Time

- 20 minutes

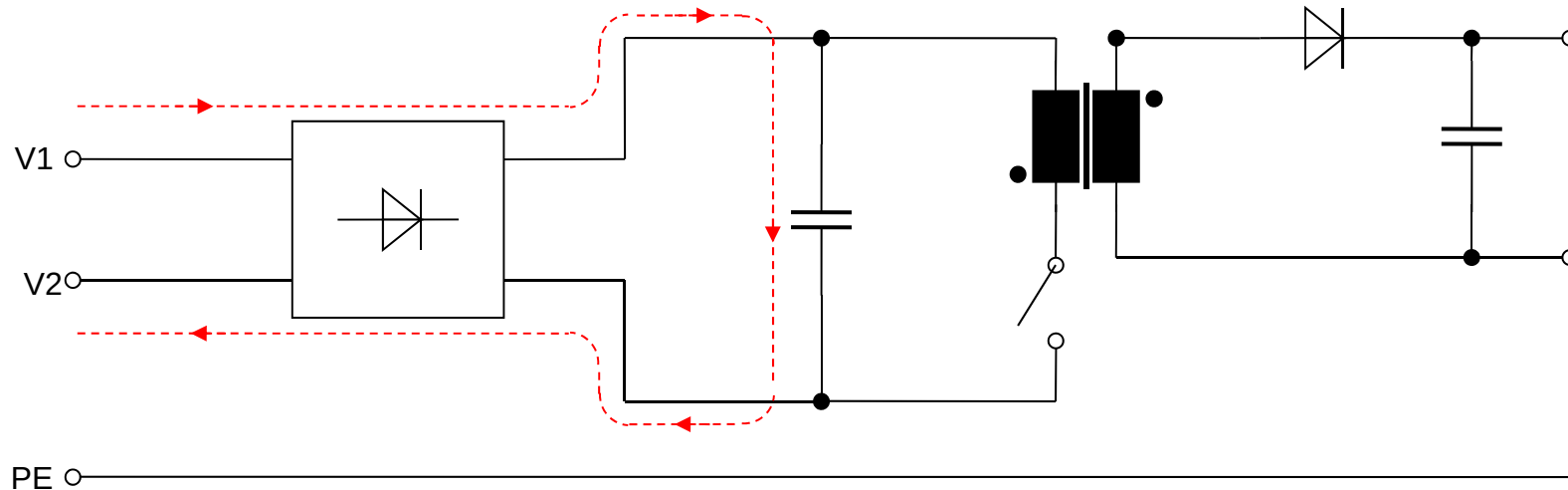
Common Mode vs Differential mode



Example: Flyback Converter

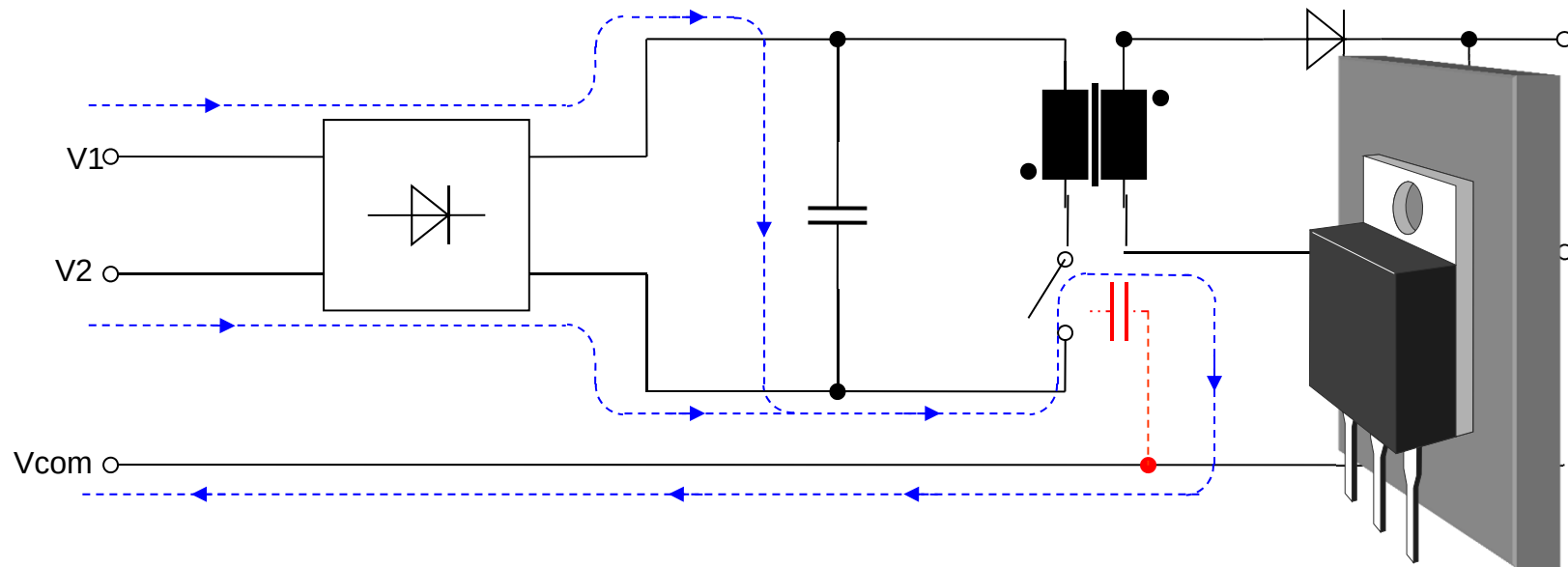
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Formation of a differential mode interference current on the mains supply line of a flyback converter.



Example: Flyback Converter

Formation of a common mode interference current on the mains supply line of a flyback converter.

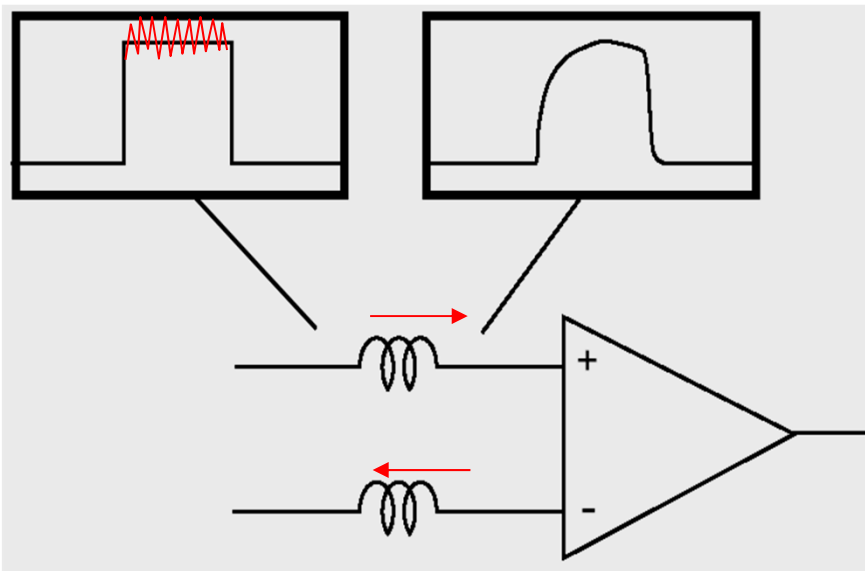


Common Mode Chokes – Advantages



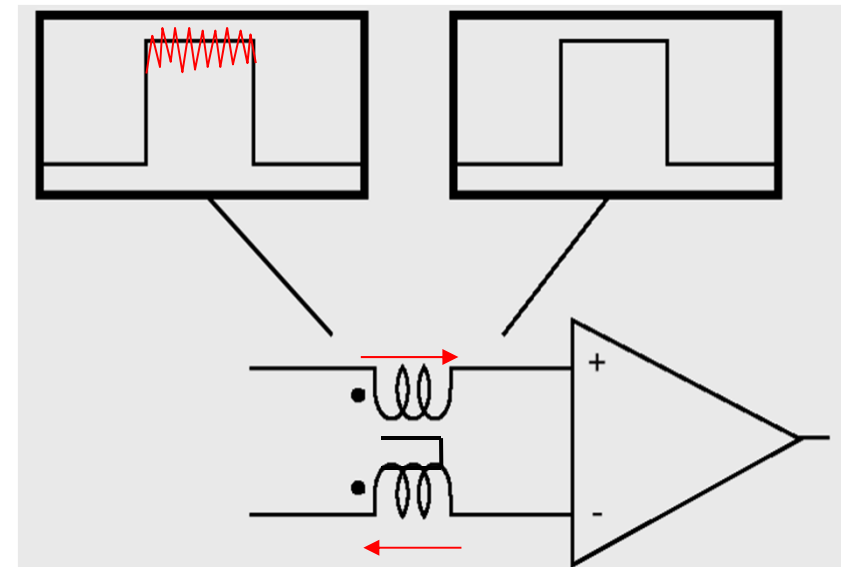
Filter using two chokes

signal input signal output



Filter using Common Mode Choke

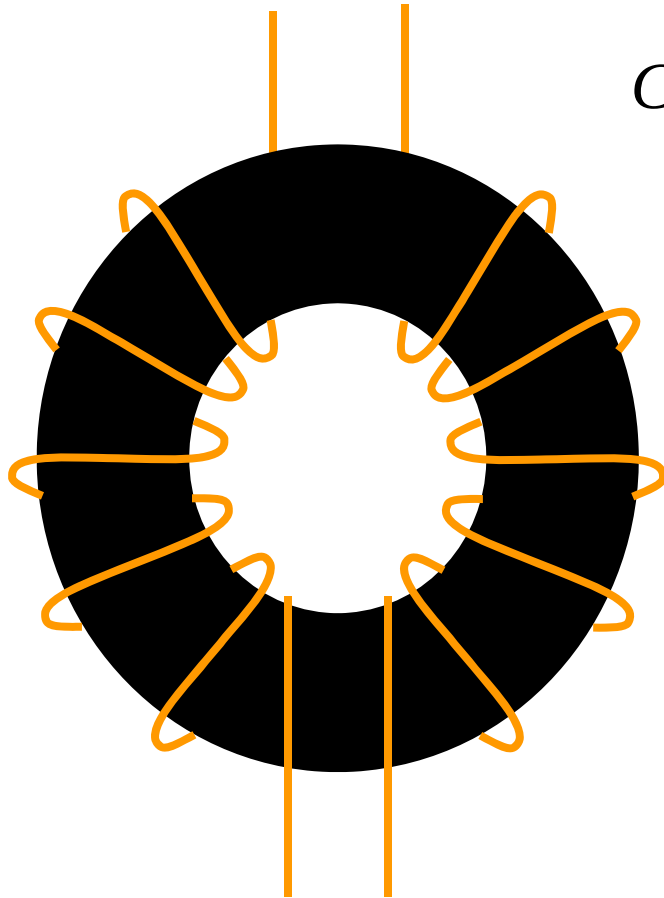
signal Input signal output



Bifilar / Sectional Winding

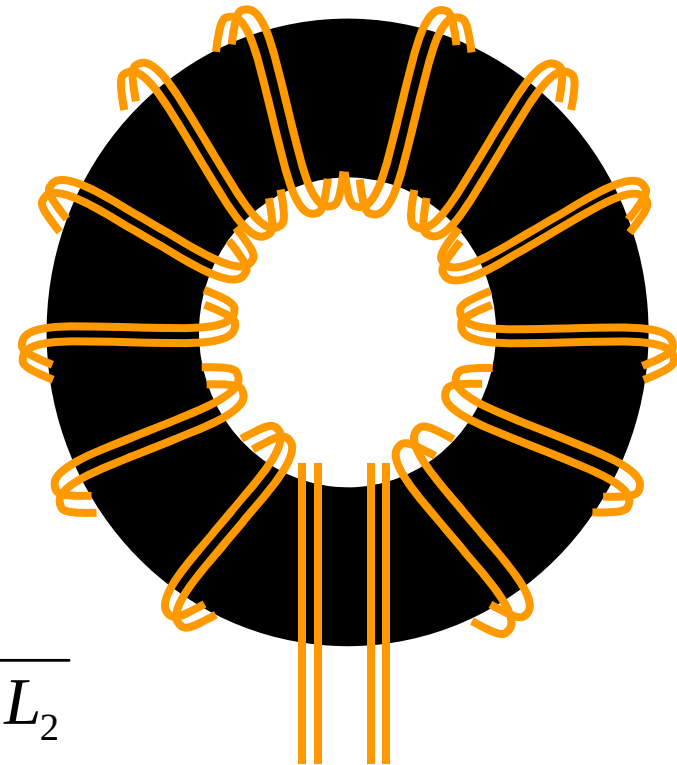
Nidcom

Sectional



$$C = \varepsilon_0 \cdot \varepsilon_R \cdot \frac{A}{d}$$

Bifilar

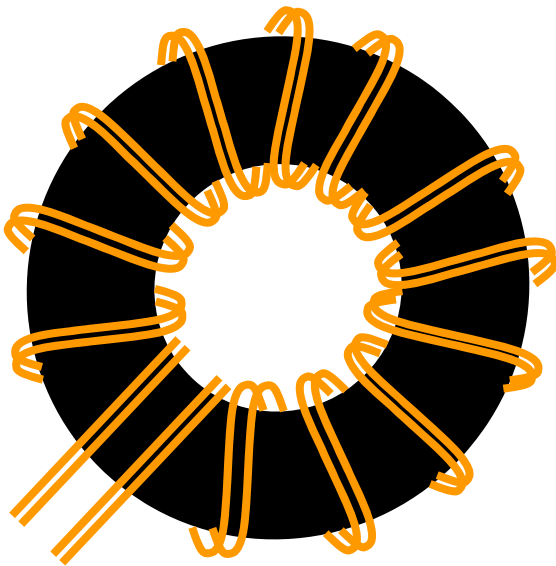


$$M = k \cdot \sqrt{L_1 \cdot L_2}$$

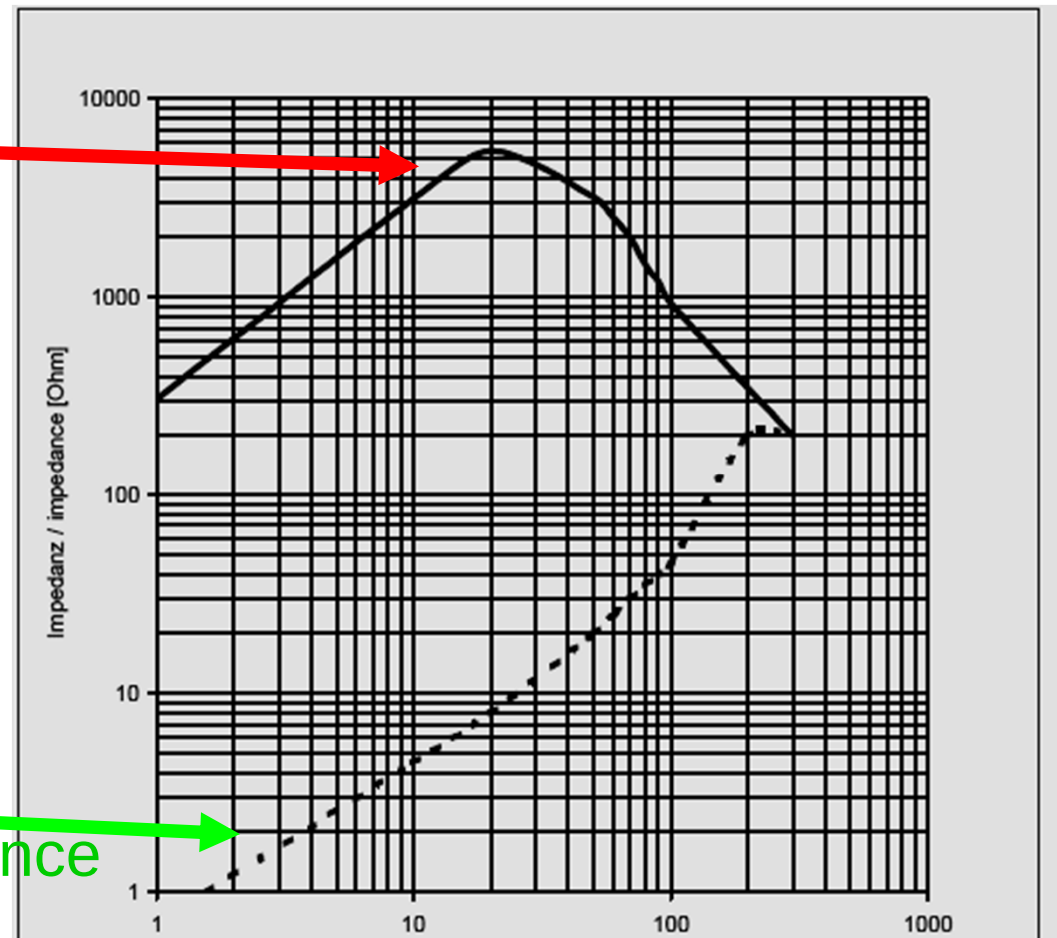
Bifilar Winding

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Example: WE-SL2 744227
Common Mode Impedance:



Differential Mode Impedance

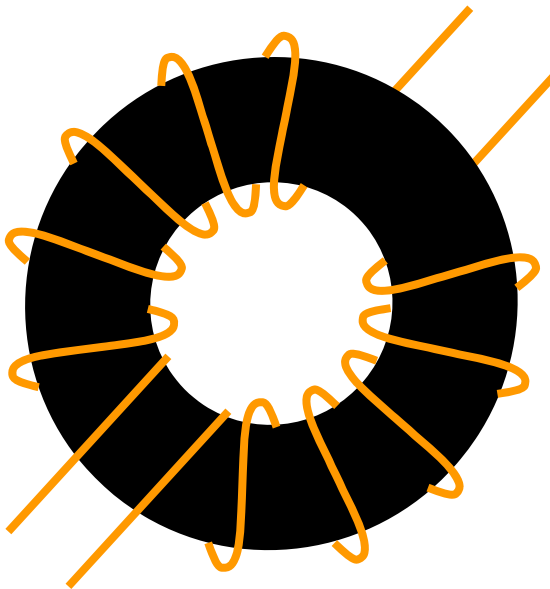


Sectional Winding

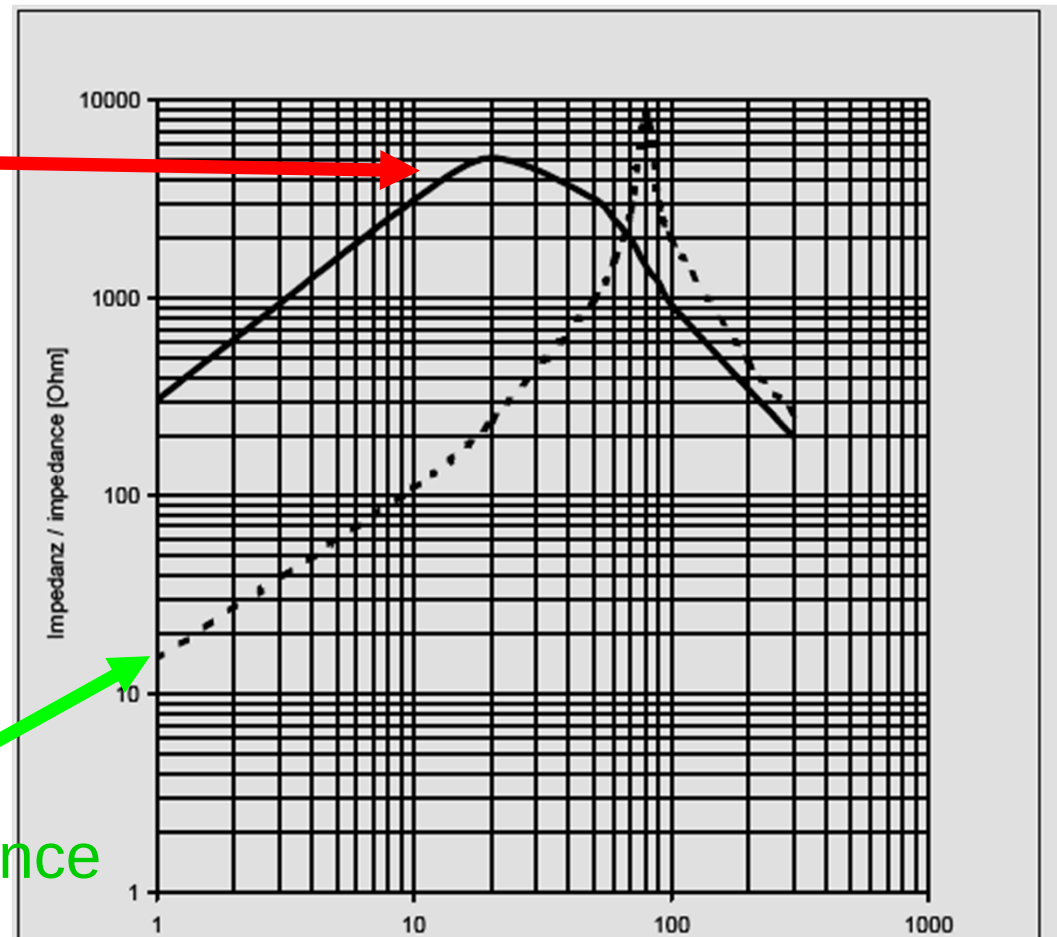
Midcom

Example: WE-SL2 744227S

Common Mode Impedance:



Differential Mode Impedance

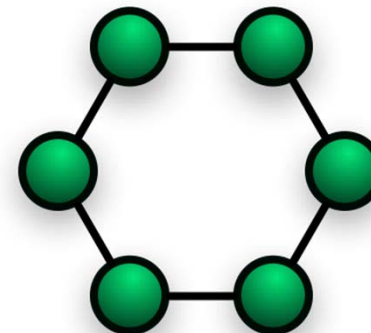
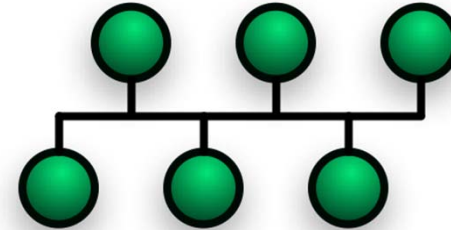


Data Line Common Mode Chokes

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Data Lines – topologies:

- Bus Topology
- Line Topology
- Ring Topology



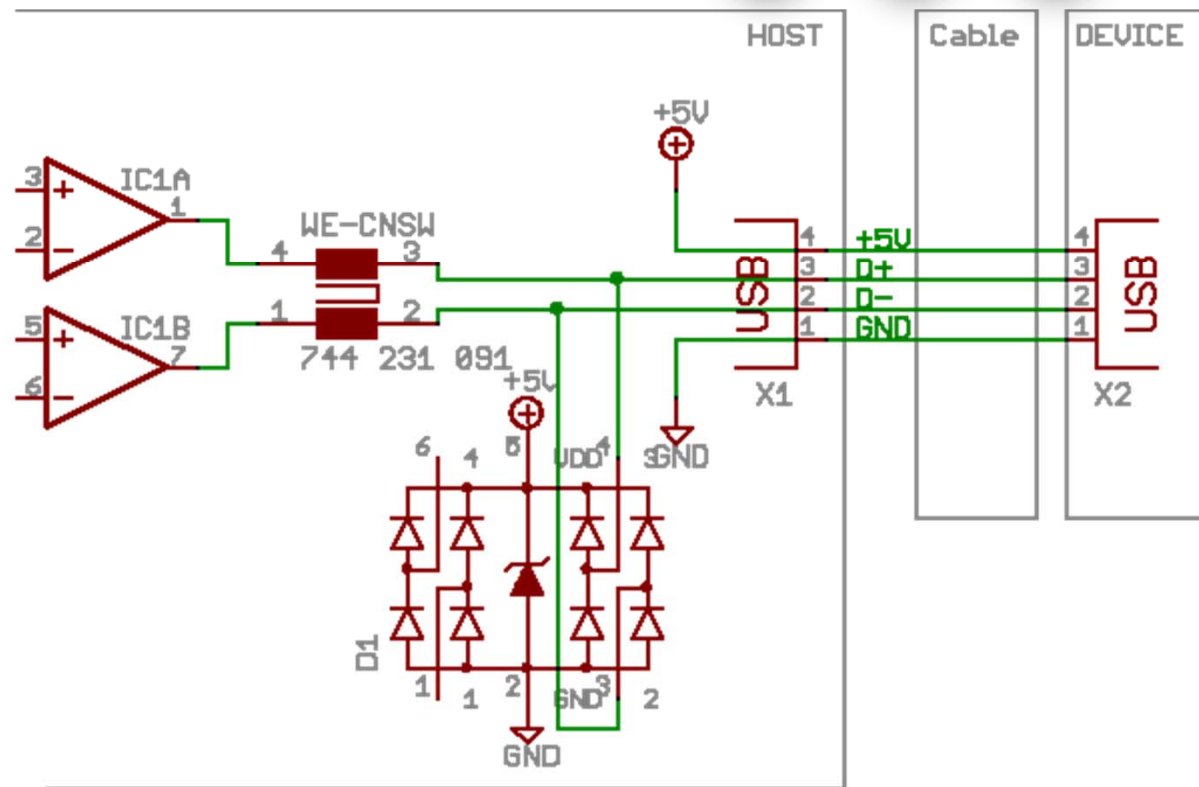
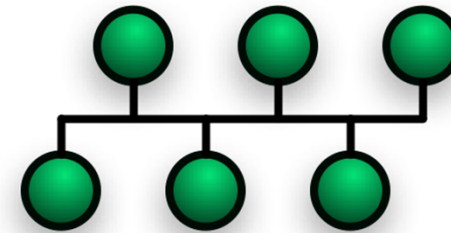
Data Line Common Mode Chokes

Midcom



Data buses – topologies:

- Bus Topology
- USB:



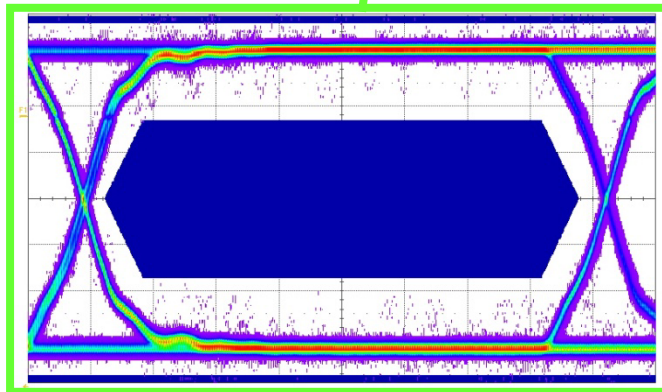
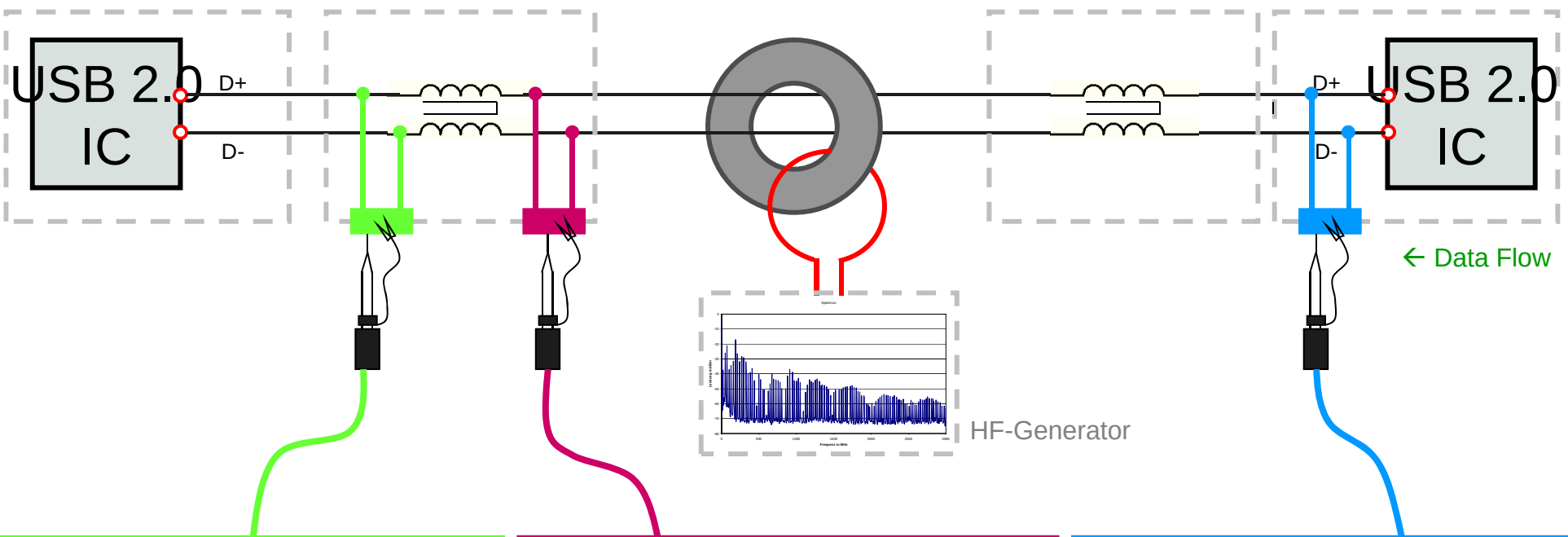
Common Mode Choke – Example: USB

Nidcom

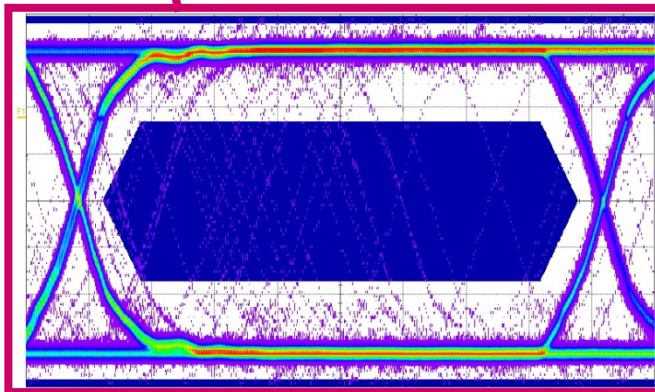


Common Mode Choke

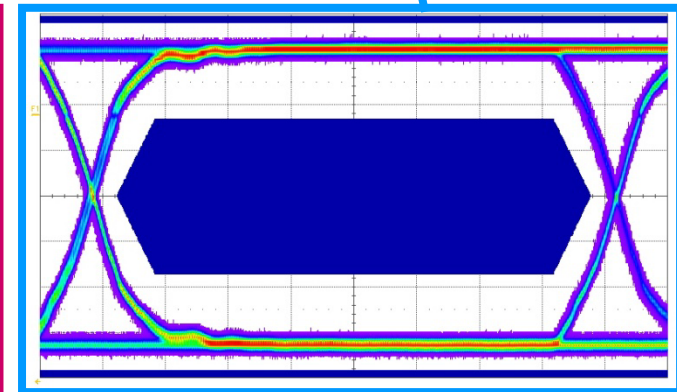
Common Mode Choke



→ Filtered

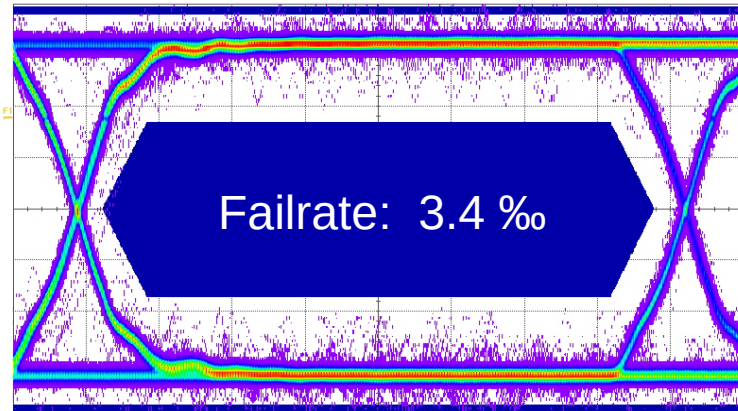


→ Unfiltered / Distorted



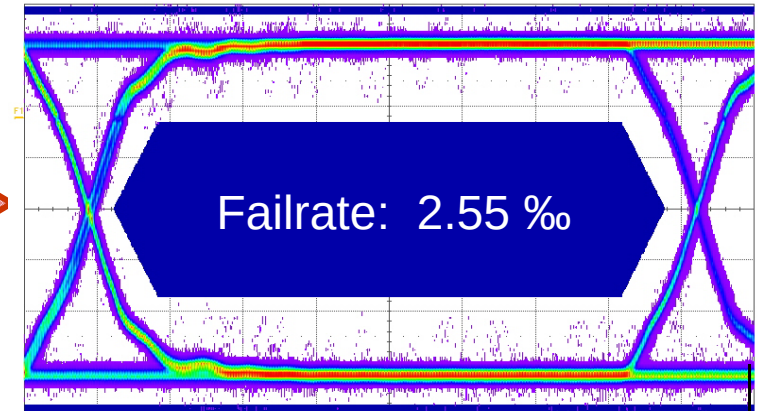
→ Undistorted (Unfiltered)

Common Mode Choke – Example: USB



CM → 32 Ohm
DM → 0.7 Ohm @ 12 MHz

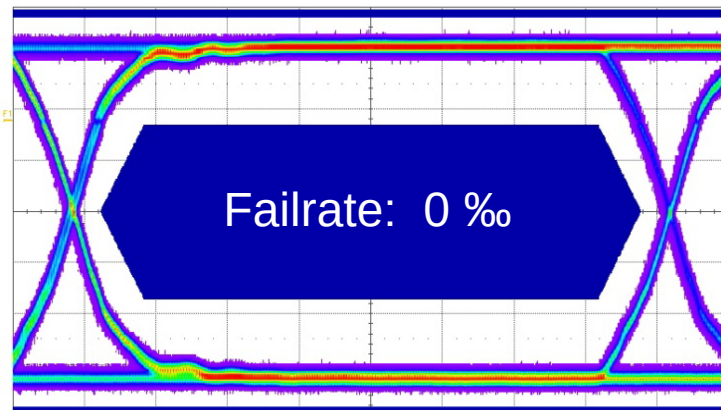
Increasing Impedance



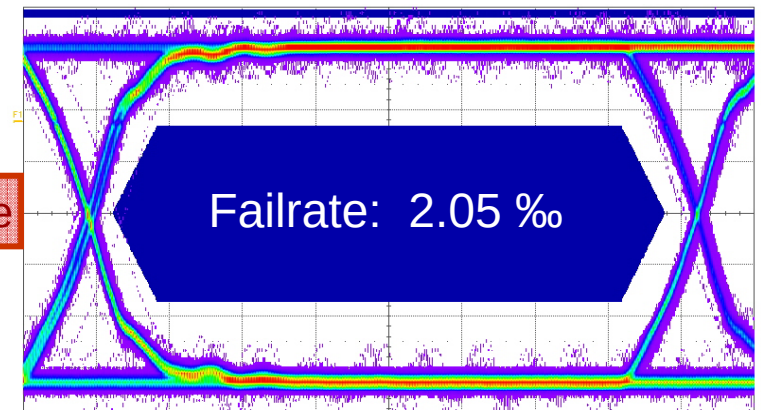
CM → 41 Ohm
DM → 0.7 Ohm @ 12 MHz

↓ Increase Impedance

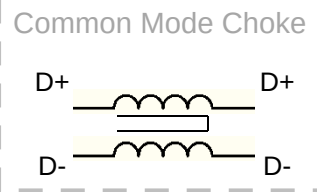
CM → 363 Ohm
DM → 1 Ohm @ 12 MHz



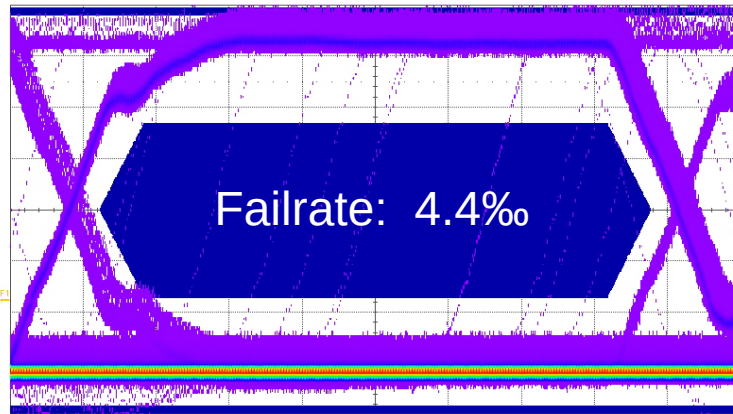
Increasing Impedance



CM → 77 Ohm
DM → 1 Ohm @ 12 MHz

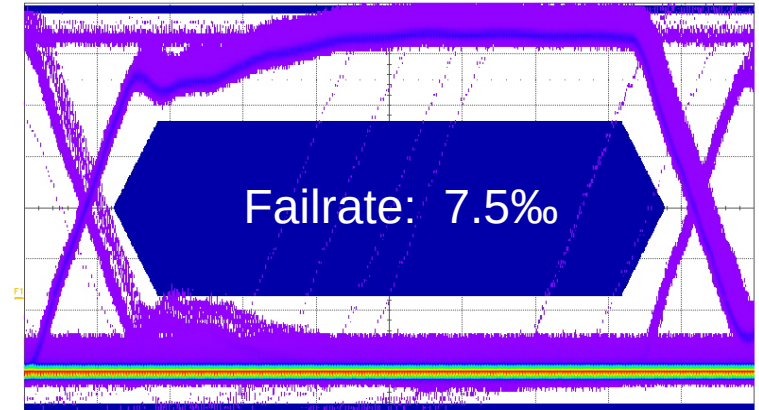
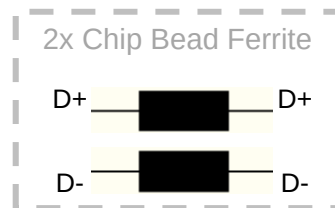


Chip Bead Ferrite – Example: USB

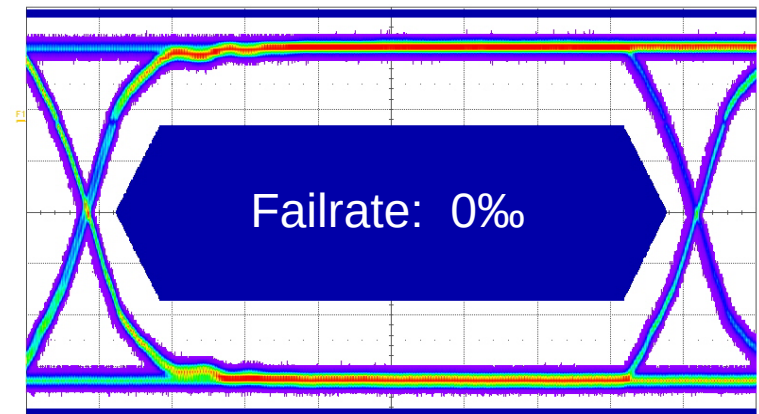


DM → 35 Ohm @ 12 MHz

Increasing Impedance



DM → 110 Ohm @ 12 MHz

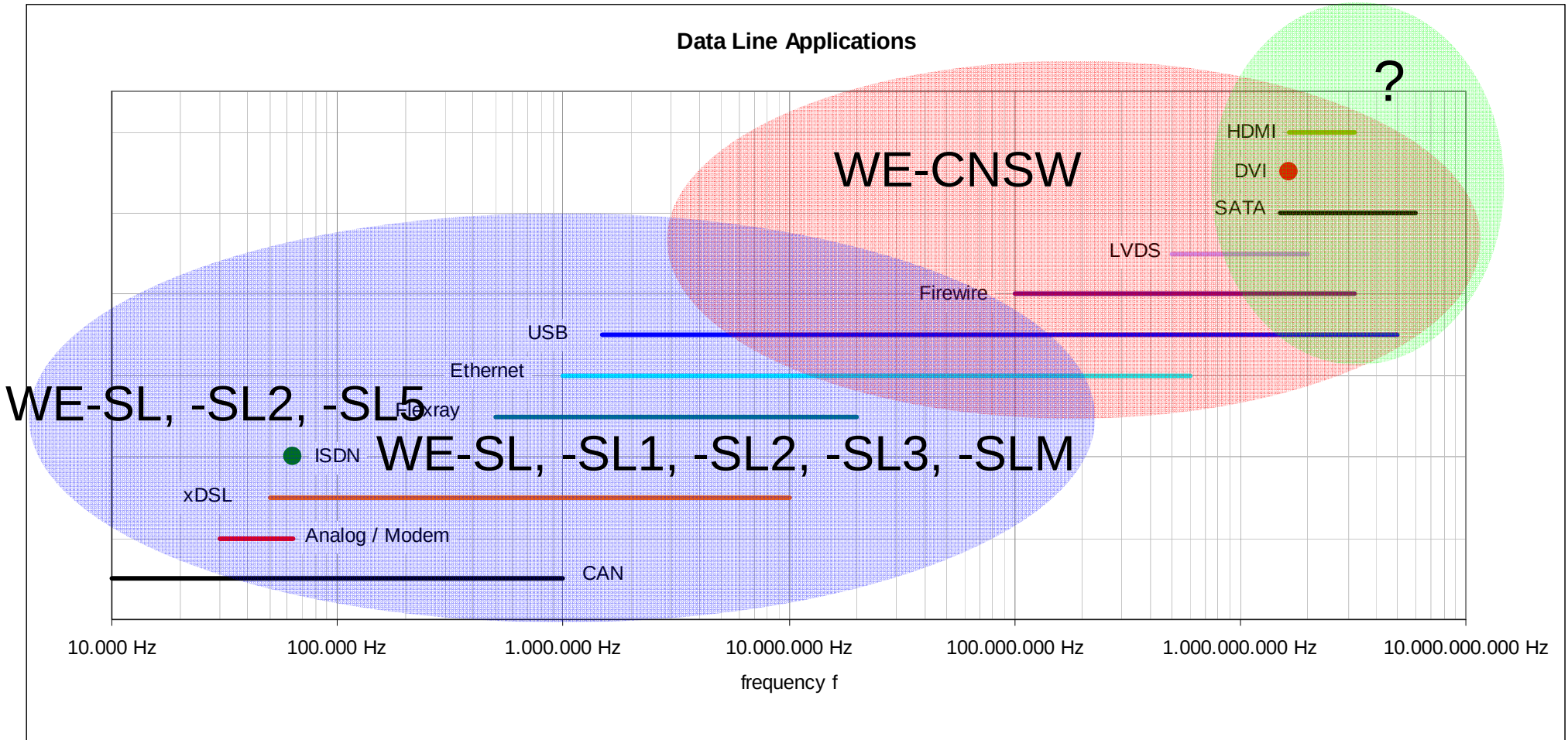


Data Line Common Mode Chokes

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Data Line Applications



Common Mode Chokes (SMD)

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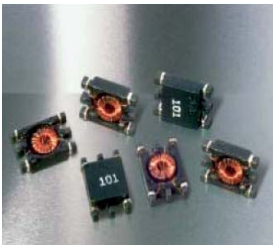


WE-SL2 74422xx

for signal / data lines up to $I_{\max} = 1,6 \text{ A}$

MnZn

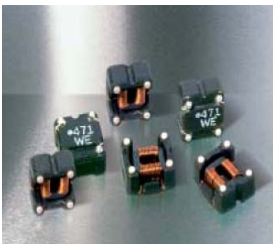
NiZn $L \sim 25 \mu\text{H} \dots \sim 47 \text{ mH}$



WE-SL3 74425xxx

for signal / data lines up to $I_{\max} = 0,7 \text{ A}$

NiZn $L \sim 20 \mu\text{H} \sim 100 \mu\text{H}$

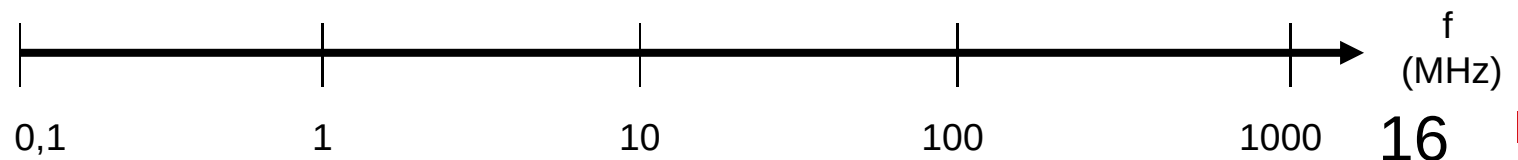


WE-SL5 74427xxxx

for signal / data lines up to $I_{\max} = 2,5 \text{ A}$

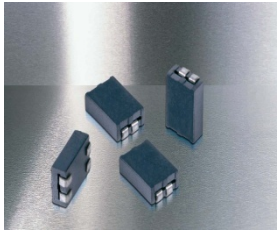
MnZn

$L \sim 120 \mu\text{H} \dots \sim 4,7 \text{ mH}$



Common Mode Chokes (SMD)

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CM SMD-Ferrite 7427521

for signal / data lines up to $I_{\max} = 5 \text{ A}$

NiZn $Z = 52 \text{ Ohm @ } 100\text{MHz}$

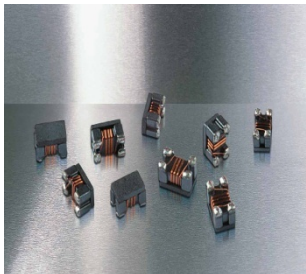


WE-SL 74420x

for signal / data lines up to $I_{\max} = 5,6 \text{ A}$ order code 74420x

MnZn

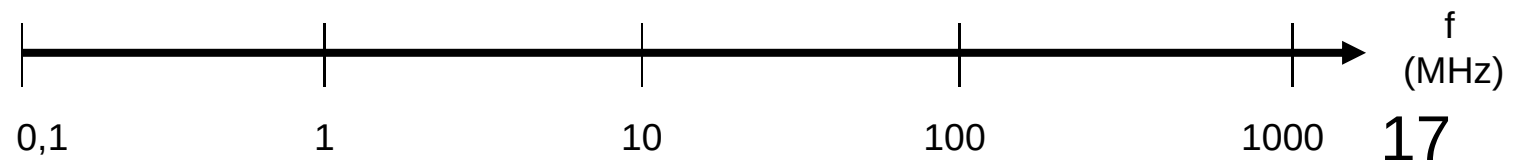
NiZn $L \sim 10 \mu\text{H} \dots \sim 47\text{mH}$



WE-CNSW 74423xxxx

for signal / data lines up to $I_{\max} = 0,4 \text{ A}$ order code 74423xxxx

NiZn $Z = 67\text{--}2200 \text{ Ohm @ } 100 \text{ MHz}$



Offline Common Mode Chokes, WE-FC



Characteristics:

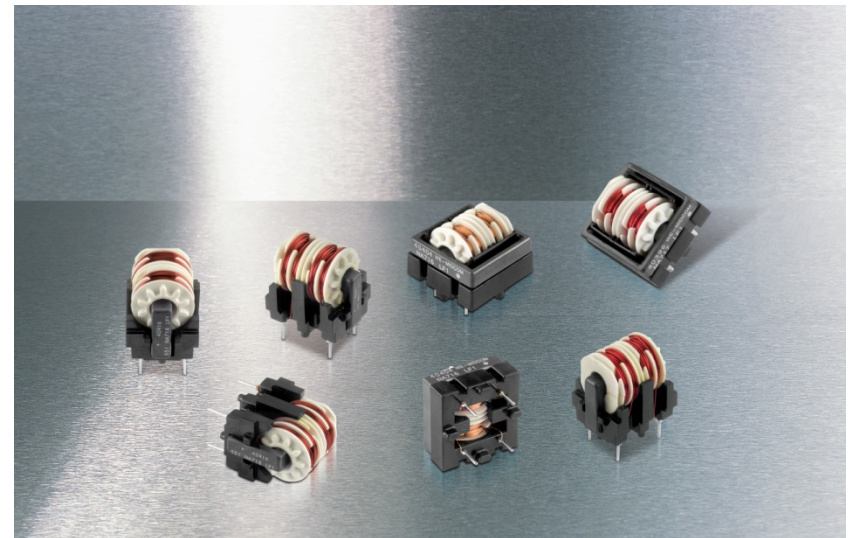
- Closed rectangular ferrite core
- 2-section winding for excellent high frequency performance
- 1% stray inductance for symmetrical interference suppression
- Recyclable due to no encapsulation
- 2kV AC Isolation Voltage
- Operating temperature: -25°C up to $+125^{\circ}\text{C}$

Applications:

- Switch mode power supplies
- Electronic ballasts for lamps

Specifications:

- Rated for 250VAC
- Currents to 2A
- THT only
- Order Code 744864xxxx



Offline CMC, WE-CMB

Characteristics:

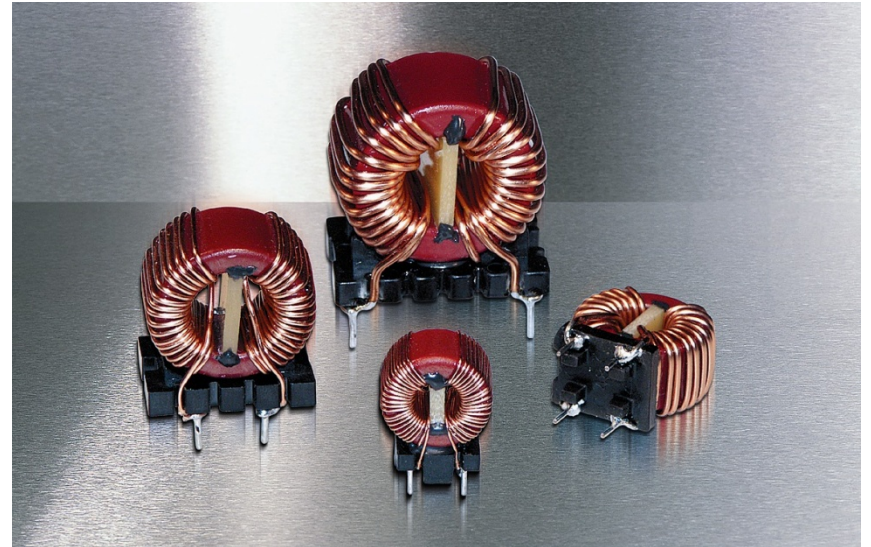
- Nickel-Zinc core
- High suppression rates of assymetric interference @ high and medium frequencies
- Small size
- High interference stability against RF interference and burst signals
- Noise suppression up to 300 MHz

Applications:

- Power electronics
- Power line in- and output filter
- optimized for Burst signals

Specifications:

- Rated to 10A at 250VAC
- THT only
- 1.5KV Isolation



Portfolio Würth Elektronik eiSos

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Common Mode Chokes

for 115 / 250VAC / max. 20A
sectional winding

SMD

THT

WE-LF
SMD

WE-LF

WE-
CMB

WE-FC

for signal / data lines
 $U_{\max.} = 80\text{VDC}$ / I up to 2,5A

THT

SMD

sectional

bifilar

WE-MLS
ferrite
bridge, 6
hole ferrite
bead

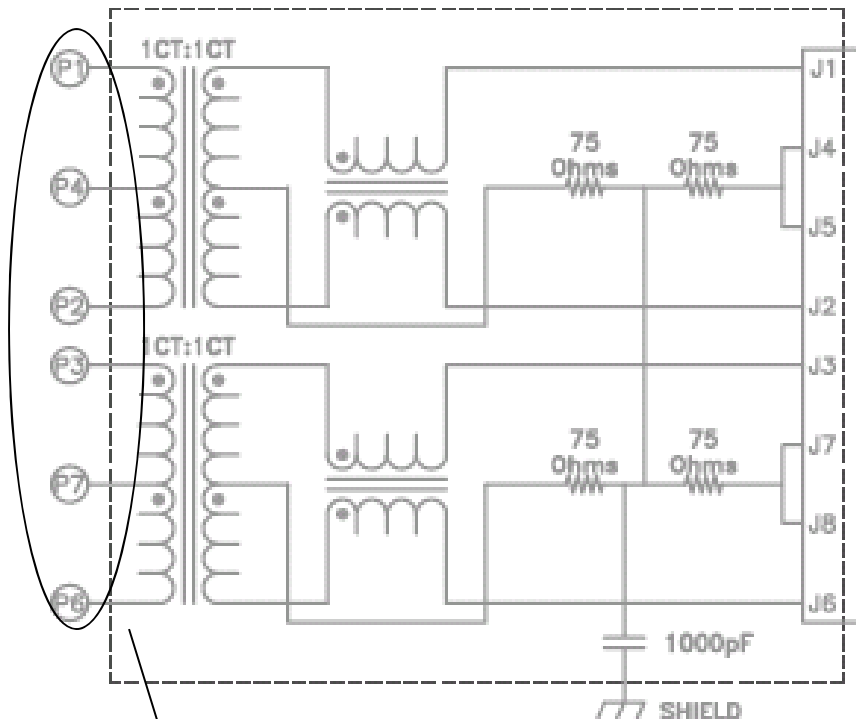
WE-SL series
WE-CNSW
WE-CMS

WE-SL
series

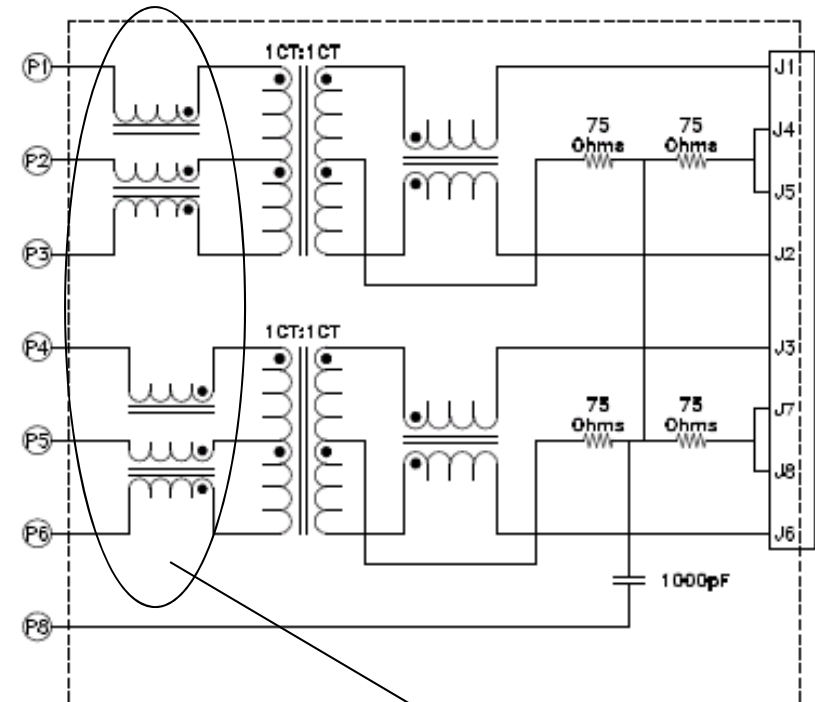
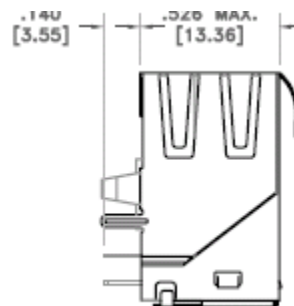
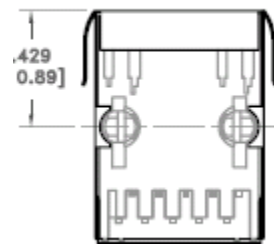
WE-SL series
WE-CNSW

Common Mode chokes internal to our RJ45's

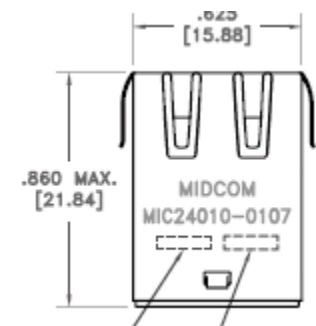
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No common mode
In std RJ45



Common mode added
To HPLE series





This ends the product presentation

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Phone: (817) 804-3888

Fax: (817) 804-3899

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