10 MBIT SINGLE PAIR ETHERNET

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

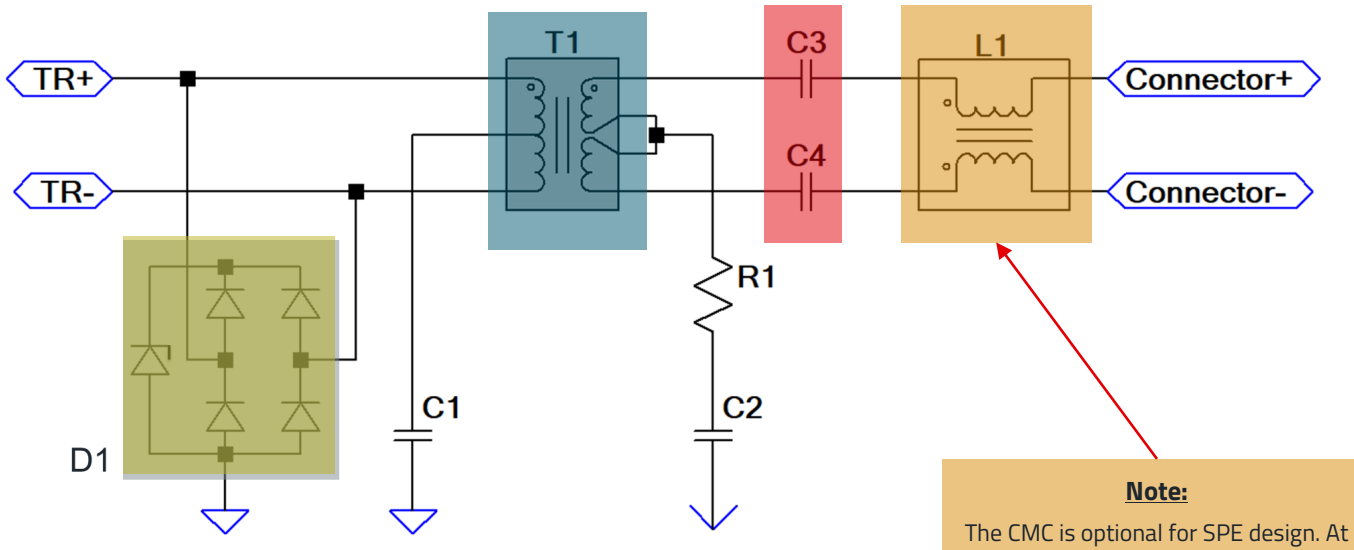
SPE FILTERING DESIGN

Design requirements - Industry

Requirements

Isolation	1500 V
Isolation DC	60 V
CM Attenuation	✓
Return Loss	✓
Mode Conversion	✓
ESD Protection	✓

Circuit

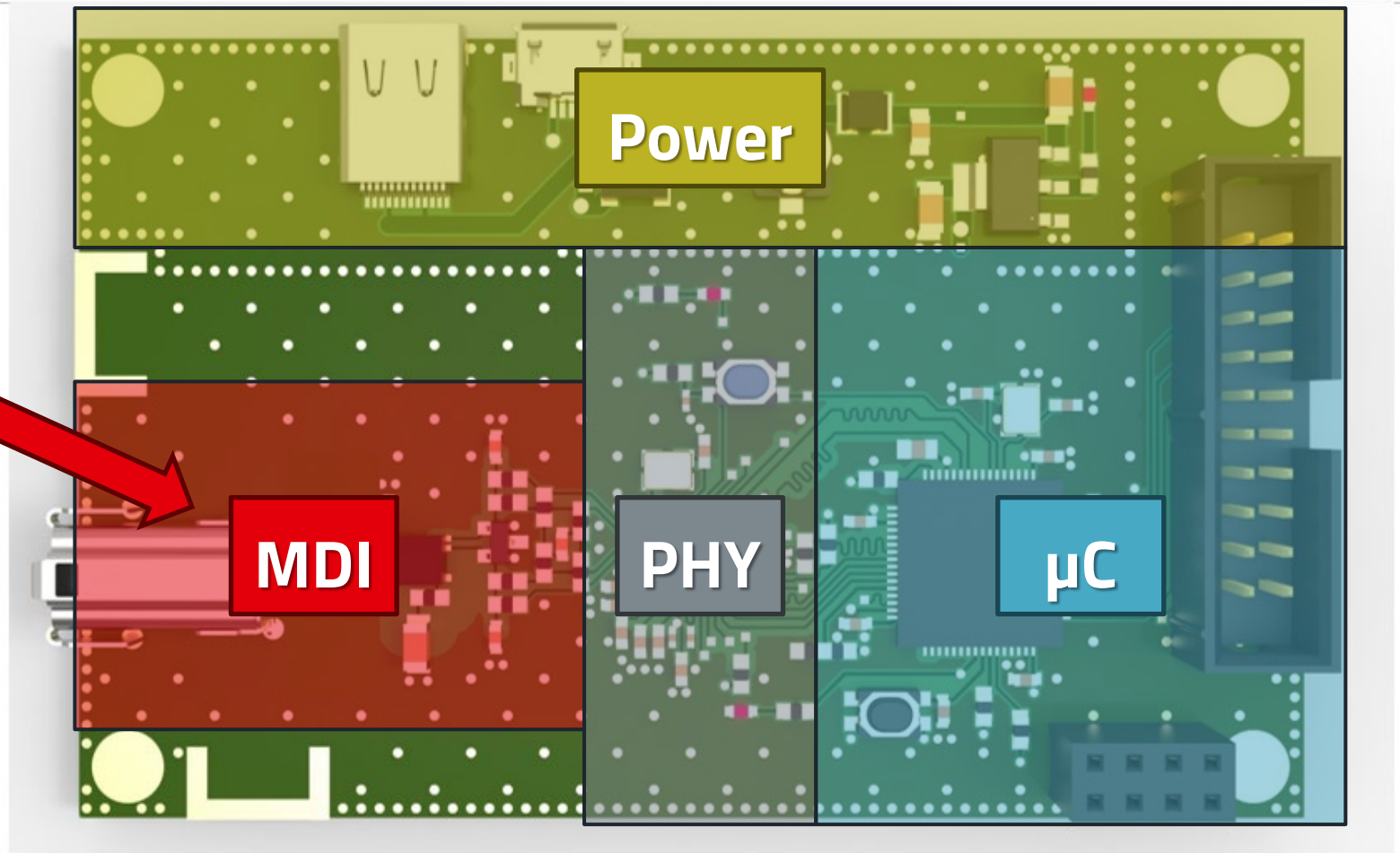


Note:
The CMC is optional for SPE design. At lower speeds such as 10Mbit/s, it can be neglected.

SPE – IN DETAIL

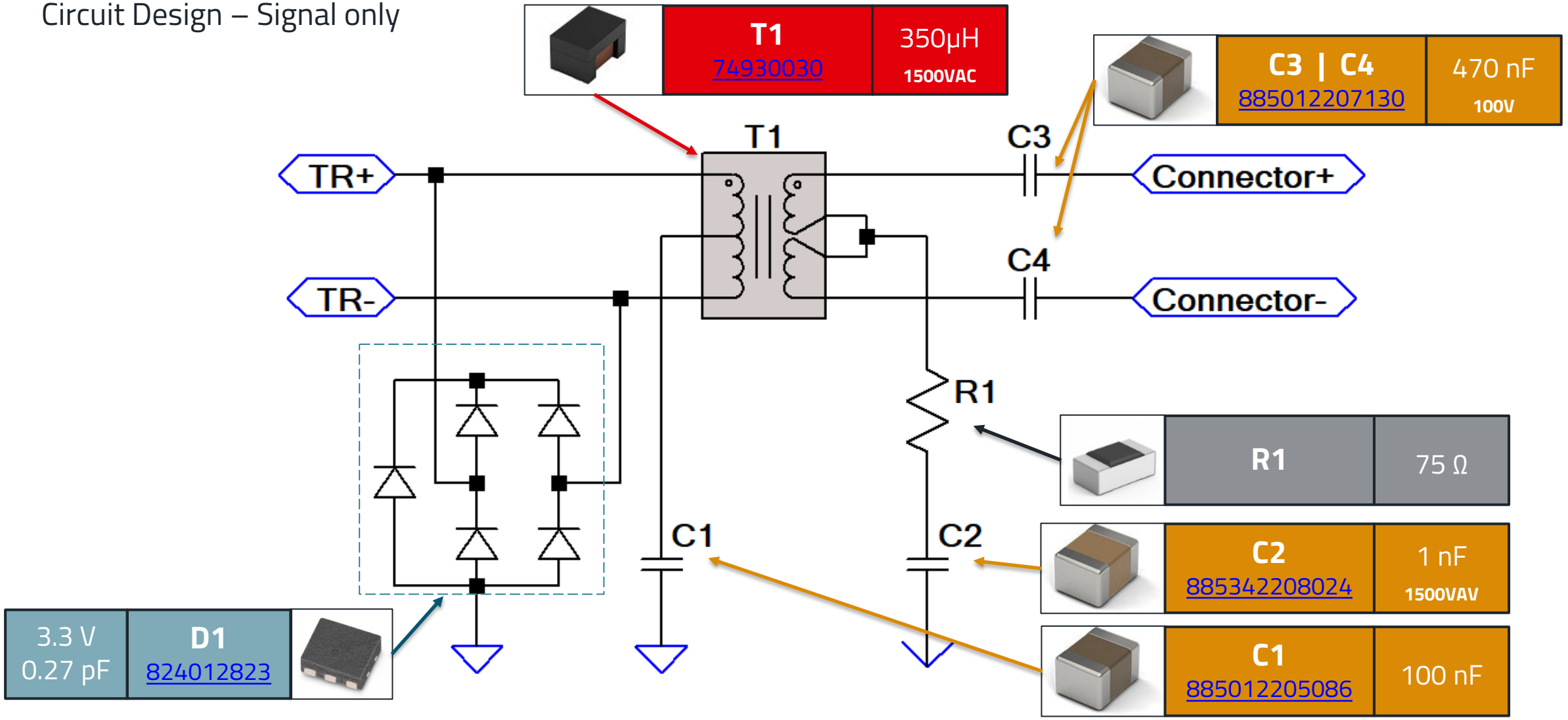
10BASE-T1 –MDI for only Signal Transmission

The **filtering Section** beween Cable and PHY Controller is the „Media Dependent Interface“ → the **MDI**



10BASE-T1 s & L IN DETAIL

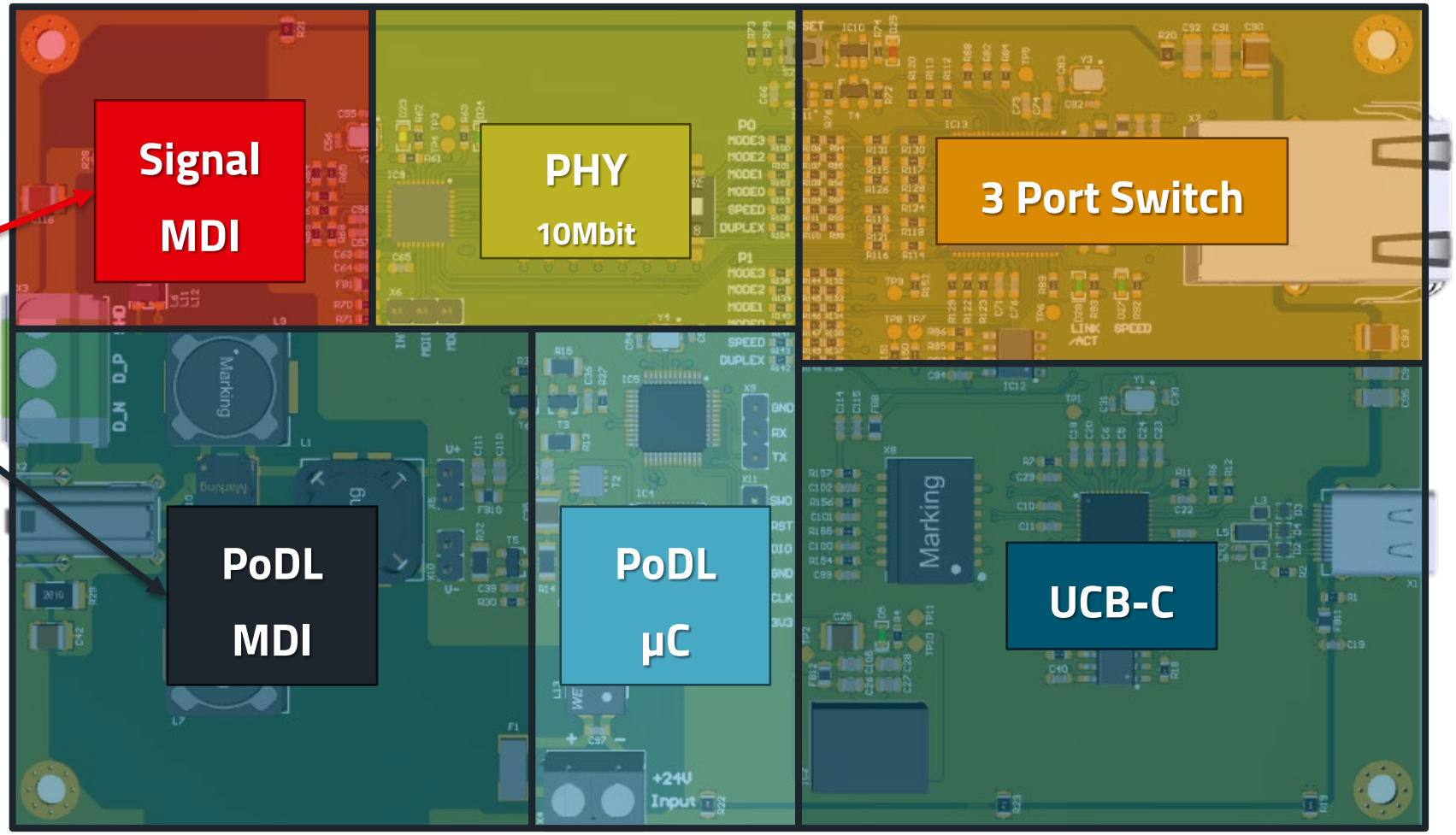
Circuit Design – Signal only



SPE AND PODL

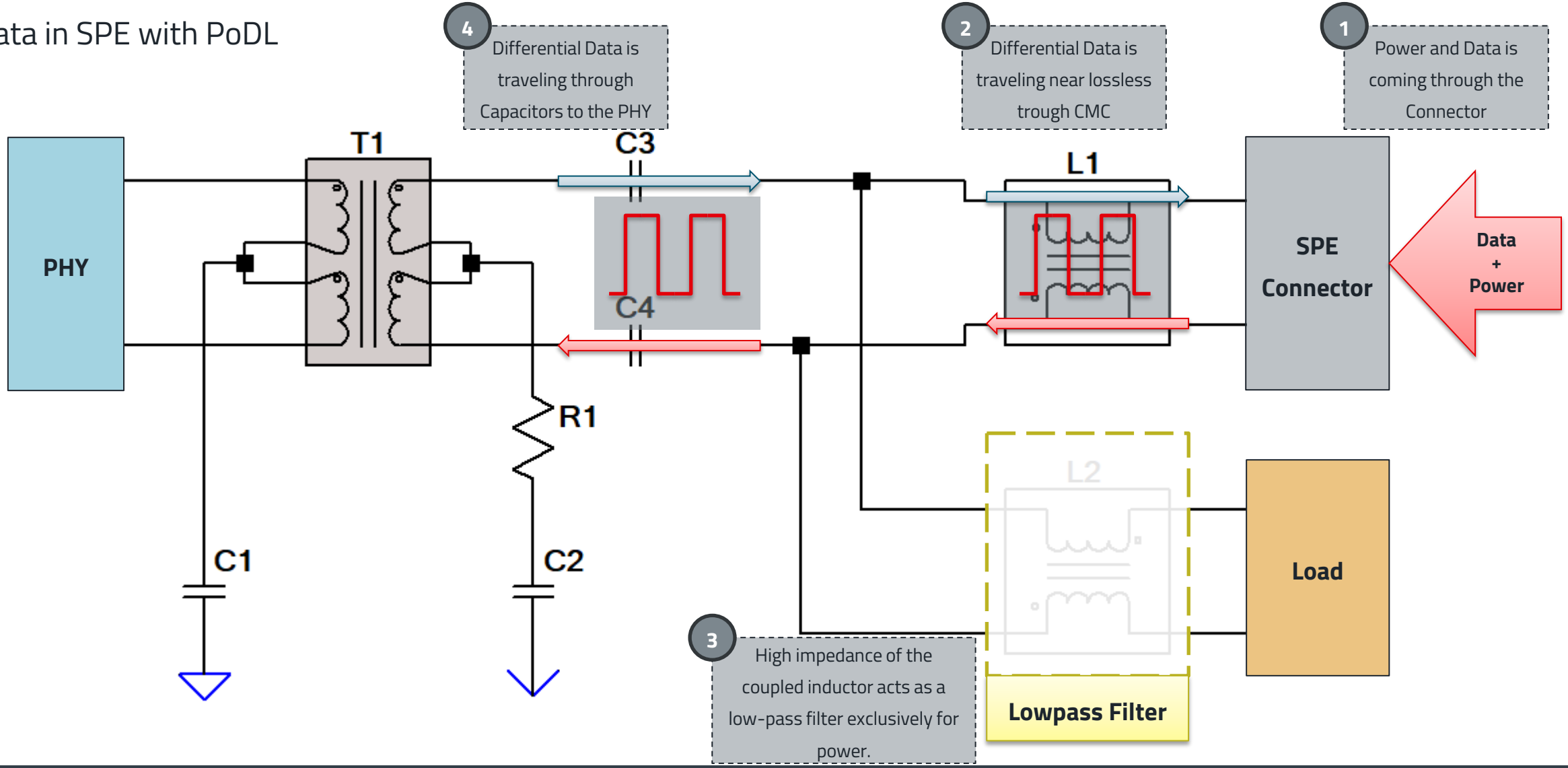
10BASE-T1L + PoDL

For PoDL, the MDI is split into a **signal path** and a **power path.**



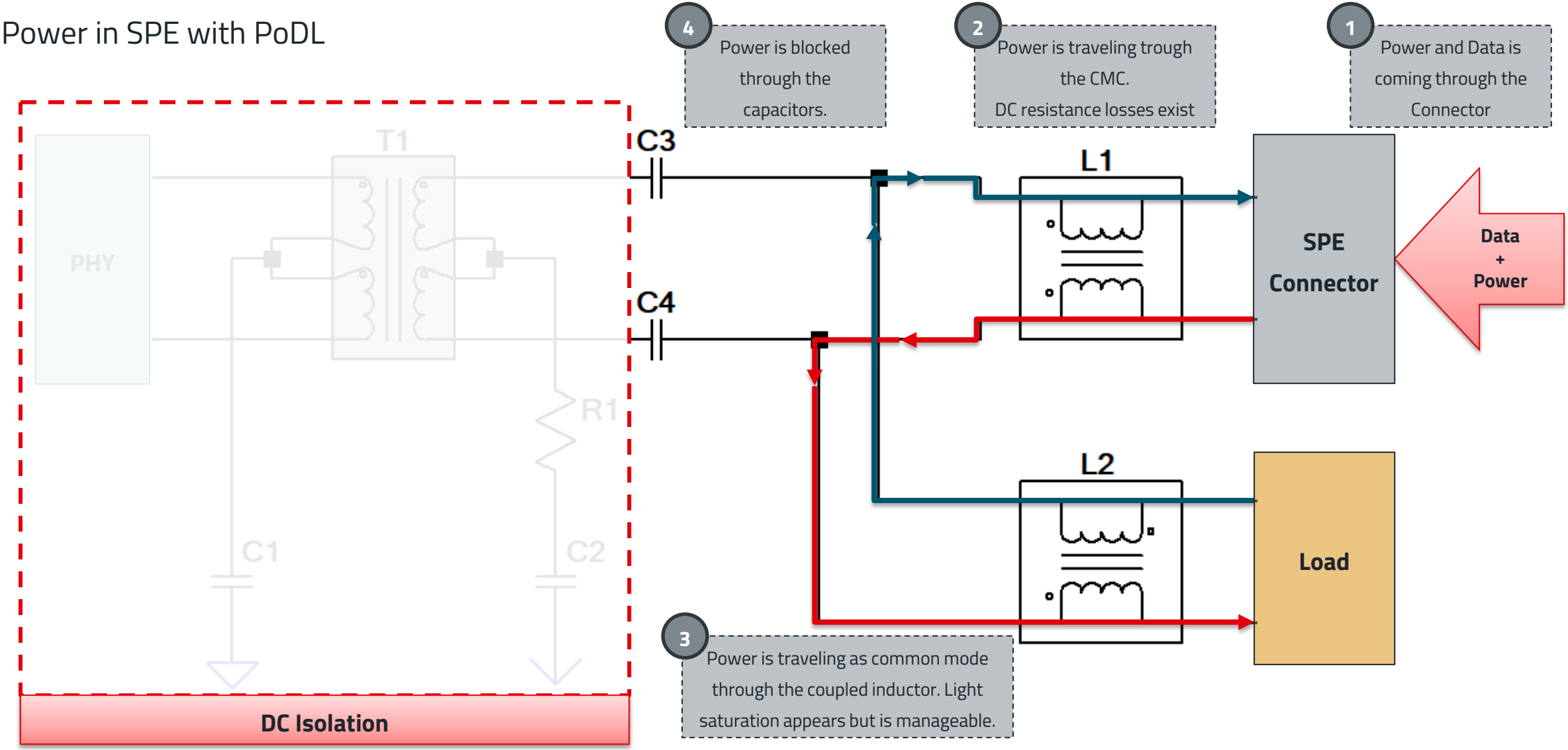
PODL CIRCUIT

Data in SPE with PoDL



PODL CIRCUIT

Power in SPE with PoDL



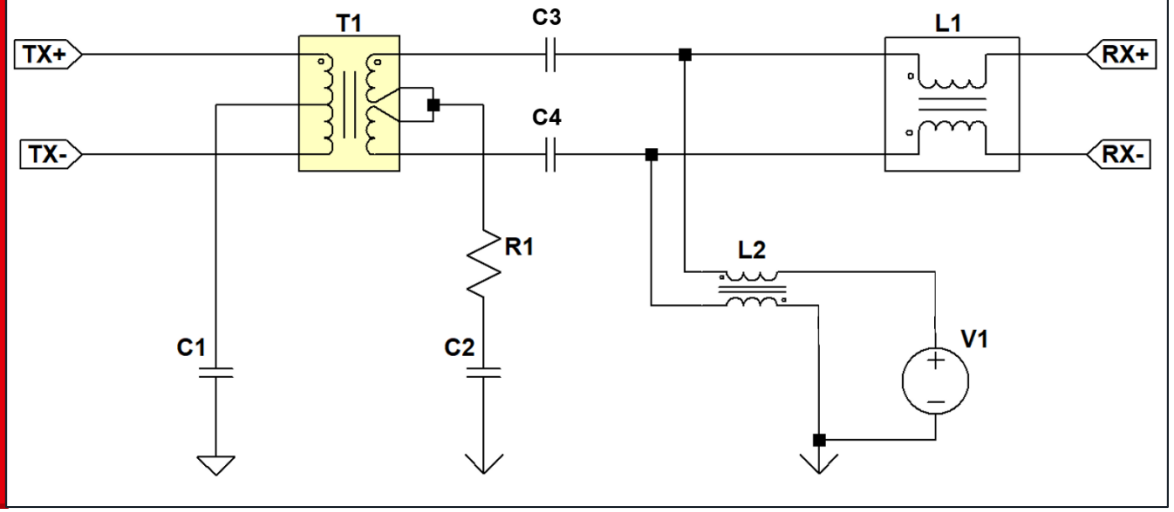
PODL POWER CLASSES

Class	0	1	2	3	4	5	6	7	8	9
U	5,5…18V	5,5…18V	14…18V	14…18V	12…36V	12…36V	26…36V	26…36V	48…60V	48…60V
I	0,1A	0,22A	0,25A	0,47A	0,1A	0,34A	0,21A	0,46A	0,73A	1,3A
P	0,5W	1W	3W	5W	1W	3W	5W	10W	30W	50W

Class	10	11	12	13	14	15
U	20…30V	20…30V	20…30V	50…58V	50…58V	50…58V
I	0,092A	0,24A	0,632A	0,231A	0,6A	1,579A
P	1,32W	3,2W	8,4W	7,7W	20W	52W

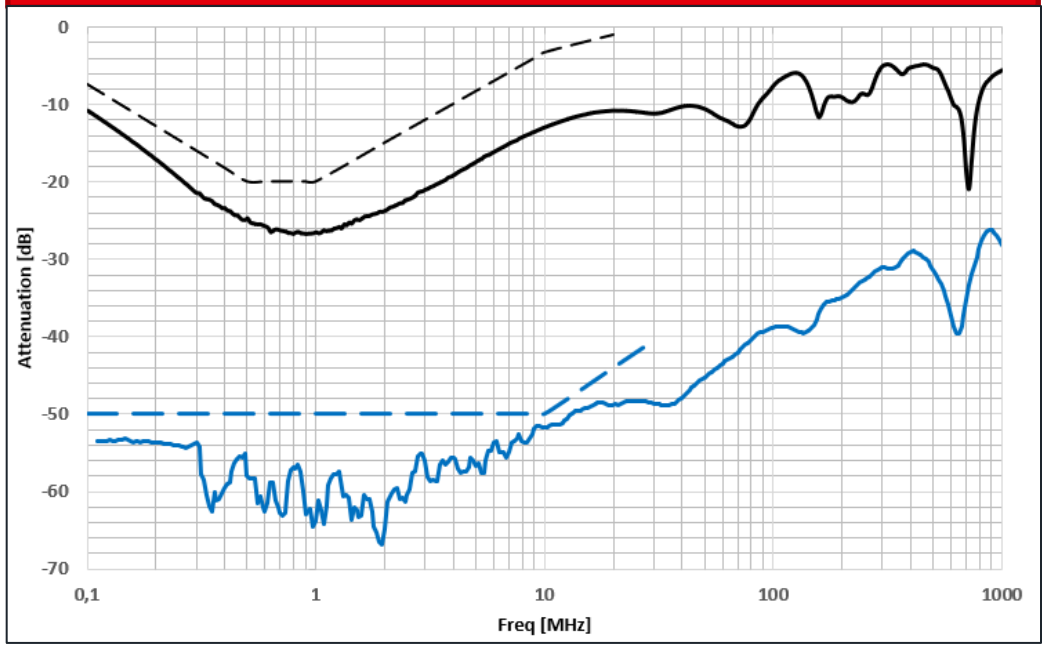
10BASE-T1S & PODL COMPONENTS

Circuit



Name	Value	Isolation	Size	Current Rating	Article number
C1	100 nF	50 V	0402		885012205086
C2	1 nF	2 kV	1206		885342208024
C3, C4	100 nF	100 V	0603		885012206120
T1	350 µH	1500 V	1812		74930030
L1	22 µH	125 V	1812	250 mA	744235220
L2	220 µH	80 V	7335	0.36 A (both) (0.44 A single)	744879221
R1	100 Ω		0603		

Limits



Limit Sdd22
Limit Scd22
Sdd22
Scd22

MORE INFO:

WURTH ELEKTRONIK MORE THAN YOU EXPECT
10 MBIT SINGLE PAIR ETHERNET OVER SHORT RANGE – MDI & PODL DESIGN
Webinar Recording | English
10 Mbit Single Pair Ethernet over short range – MDI & PoDL design

WURTH ELEKTRONIK MORE THAN YOU EXPECT
DESIGN OF THE MDI FOR POWER OVER SINGLE PAIR
Webinar Recording | English
Design of the MDI for Power over Single Pair