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EMV-Systeme & Komponenten

Coupling- / Decoupling Network

- 150 kHz – 300 MHz
  IEC 61000 - 4 - 6 and
  CISPR 15 / CISPR 22
- 150 kHz – 230 MHz
  IEC 61000 - 4 - 6
- 10 kHz – 230 MHz
  IEC 61000 - 4 - 6 and
  IEC 61326 - 3 - 2 and
  NE-21

Coupling and decoupling devices (**CDN´s**) are used for immunity tests to conducted disturbances induced by radio frequency fields according to IEC / EN 61000-4-6 and other.

Guidance for selecting the appropriate CDN is given in the following table:

Type	Field of application
M	**Unscreened supply lines (mains)**
AF	**Unscreened non-balanced interconnection lines**
T **RJ**	**Unscreened balanced interconnection lines**
CAN-BUS	**BUS-lines**
S **RJ45S** **USB** **HDMI** **FireWire**	**Screened interconnection lines**

Precise description index by type number - look at the following pages

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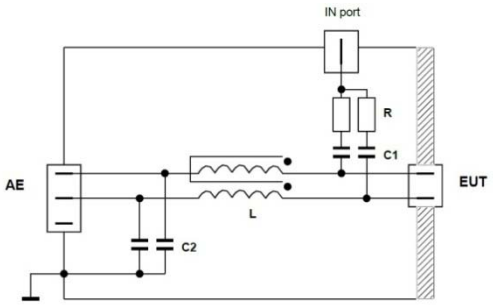
CDN AF-Type

Coupling / Decoupling
of disturbing signal to

unscreened unsymmetrical
nonbalanced interconnection lines



CDN AF 5-MC - EUT-Seite

CDN AF 5-MC - AE-Seite

Circuit of CDN AF2 (Simplified diagram valid until CDN AF6). For CDN AF8, C2 is eliminated.

Specification:

Order number	**CDN AF…**
RF In	
Frequency range (RF in)	(10 kHz) 150 kHz – 80 MHz / 230 MHz (300 MHz)
Power Rating (RF In)	6 W (continuous)
Decoupling attenuation (RF In – AE)	> 20 dB (150 kHz – 230 MHz) / > 40dB (1 MHz – 100 MHz)
Insertion loss (RF In – EUT)	10 dB ± 1 dB (150 kHz – 80 MHz) / 10dB + 3dB (150 KHz –230 MHz)
Connector	BNC
EUT / AE	
Maximum input voltage	100 VAC / 150 VDC
Current rating (AE – EUT)	1,0 A
Insertion loss (AE – EUT)	< 1dB (DC – 100 kHz)
Connectors	Terminal block; safety banana jack
Mechanical date	
Dimensions (W x H x D)	160 x 84,5 x 240mm

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Order number e.g. CDN AF4-MC	Current Rating (AE - EUT) (A)	Input voltage		Frequency range RF In					Case size		Connector		
		AC (V)	DC (V)	10 kHz–80 MHz	10 kHz–230 MHz	150 kHz–80 MHz	150 kHz–230 MHz	150 kHz–300 MHz*	160 x 84,5 x 240 mm 1	200 x 122,5 x 400 mm 2	4 mm safety banana sockets	Terminal clamp	9 pin Sub-D female
AF2	1	100	150					x	x			x	
AF2-MC	1	100	150					x	x		x		
AF2-MC_10	1	100	150		x				x		x		
AF3	1	100	150				x		x			x	
AF3-MC	1	100	150				x		x		x		
AF3-MC_10	1	100	150		x				x		x		
AF4	1	100	150				x		x			x	
AF4-MC	1	100	150				x		x		x		
AF4-MC_10	1	100	150		x				x		x		
AF5-MC	1	100	150				x		x		x		
AF5-MC_10	1	100	150		x				x		x		
AF8	1	100	150				x		x			x	
AF8-MC	16	250	400			x				x	x		
AF8-MC_10	16	250	400	x						x	x		
AF8-SUB-D_10	1	100	150		x				x				x

*also for emission testing CISPR15 / CISPR22

Calibration adaptor to CDN AF....

AF - type	Order number
AF 2	CDG A 3102
AF 2-MC	CDG A 3101
AF 2-MC_10	CDG A 3101
AF 3	CDG A 3108
AF 3-MC	CDG A 3101
AF 3-MC_10	CDG A 3101
AF4	CDG A 3108
AF4-MC	CDG A 3128 – EUT-port
	CDG A 3107 – AE-port
AF4-MC_10	CDG A 3128 – EUT-port

AF - type	Order number
AF5-MC	CDG A 3128 – EUT-port
	CDG A 3107 – AE-port
AF5-MC_10	CDG A 3128 – EUT-port
AF8	CDG A 3110
AF8-MC	CDG A 3114
AF8-MC_10	CDG A 3114
AF8-SUB-D_10	CDG A xx
Fastening angle with 50/150 Ohm adaptor	CDG A 3100




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CDN M-Type

Coupling / Decoupling
of disturbing signal to

unscreened supply lines (mains) AC + DC

Rated voltage up to 1000 V
Rated current up to 100 A

Picture similar
CDN M2+M3 (up to 32A)

AE site
CDN M5 (up to 32A)

AE site
CDN M4-N (up to 32A)

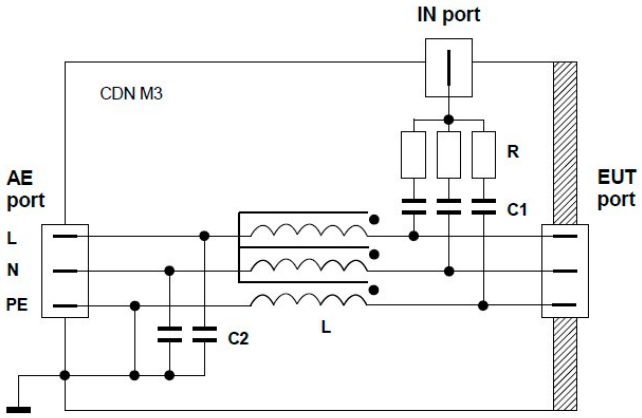

Diagram of CDN M3

Specification:

Type	CDN M1 / M2 / M3 / M4 / M5 – M2+M3 -16A / 32A	CDN M2 / M3 / M4 / M5 -32A –HV (VHV)	CDN M2 /3 /4 /5 -63A -100A -HV
RF In	(10 kHz) 150 kHz – 80 MHz / 230 MHz (300 MHz)		
Power rating (RF In)	6 W (100 % ED)		
Decoupling attenuation (RF In – AE)	> 30 dB (150 kHz – 80 MHz) > 20 dB (80 MHz – 230 MHz)	> 30 dB (150 kHz – 80 MHz) > 15 dB (80 MHz – 230 MHz)	
Insertion loss (RF In – EUT)	10 dB +2/-1 dB (150 kHz – 80 MHz) 10 dB + 5 dB (80 MHz – 230 MHz)	10 dB +2/-1 dB (150 kHz – 80 MHz) 10 dB + 5 dB (80 MHz – 230 MHz)	
Connector	BNC		
EUT / AE			
Max. input voltage AC (L – PE)	250 V	600 V (1000 VHV-Type)	600 V
Max. input voltage DC	400V	1000 V	600 V
Current rating (AE – EUT)	16A / 32A / 63 A / 100 A; (M1 / M2+3 I_{PE} <0.5 A)		
Connectors	4mm MC safety banana jack		6mm round connectors for current > 32A **Adequate safety test leads included**
Insertion loss (AE – EUT)	< 1dB (DC – 100 kHz)		
Dimensions (W x H x D)	160 x 84,5 x 240mm	200 x 122,5 x 400mm	

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Order number e.g. CDN M4-16	Current Rating (AE-EUT) (A)	Input voltage		Frequency range RF In					Terminal assignment	Case size		Connectors	
		AC (V)	DC (V)	10 kHz – 80 MHz	10 kHz – 230 MHz	150 kHz – 80 MHz	150 kHz – 230 MHz	150 kHz – 300 MHz *		160 x 84,5 x 240 mm 1	200 x 122,5 x 400 mm 2	4 mm safety banana sockets	6 mm round connectors **
M1	16	250	400				x		PE	x		x	
M1_10	16	250	400		x				PE	x		x	
L1-16	16	250	400				x		L	x		x	
M2-16	16	250	400					x	L, N	x		x	
M2-16_10	16	250	400		x				L, N	x		x	
M2-32	32	250	400				x		L, N	x		x	
M2-32 HV	32	600	1000				x		L, N		x	x	
M2-63 HV	63	600	1000			x			L, N		x		x
M2-100 HV	100	600	1000			x			L, N		x		x
M2+M3-16	16	250	400					x	L, N, PE	x		x	
M2+M3-16_10	16	250	400		x				L, N, PE	x		x	
M2+M3-32	32	250	400				x		L, N, PE	x		x	
M3-16	16	250	400					x	L,N, PE	x		x	
M3-L16	16	250	400				x		3 x L	x		x	
M3-32	32	250	400				x		L, N, PE	x		x	
M3-L32	32	250	400				x		3 x L	x		x	
M3-L32_10	32	250	400		x				3 x L	x		x	
M3-LN32	32	250	400				x		L1, L2, N	x		x	
M3-32 HV	32	600	1000			x			L, N, PE		x	x	
M3-63 HV	63	600	1000			x			L, N, PE		x		x
M3-100 HV	100	600	1000			x			L, N, PE		x		x
M4-16	16	250	400				x		3 x L, PE	x		x	
M4-N16	16	250	400				x		3 x L, N	x		x	
M4-32	32	250	400				x		3 x L, PE	x		x	
M4-N32	32	250	400				x		3 x L, N	x		x	
M4-32_10	32	250	400		x				3 x L, PE	x		x	
M4-32 HV	32	600	1000			x			3 x L, PE		x	x	
M4-N63 HV	63	600	1000			x			3 x L, N		x		x
M4-63 HV	63	600	1000			x			3 x L, PE		x		x
M4-100 HV	100	600	1000			x			3 x L, PE		x		x
M4-N100 HV	100	600	1000			x			3 x L, N		x		x
M5-16	16	250	400				x		3 x L, N, PE	x		x	
M5-32	32	250	400				x		3 x L, N, PE	x		x	
M5-32 HV	32	600	1000			x			3 x L, N, PE		x	x	
M5-32 VHV	32	1000	1000			x			3 x L, N, PE		x	x	
M5-63 HV	63	600	1000			x			3 x L, N, PE		x		x
M5-100 HV	100	600	1000			x			3 x L, N, PE		x		x

*also for emission testing CISPR15 / CISPR22

for current ≥ 63 A **(safety test leads are included)

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Calibration adaptor to CDN M....

M - type	Order number
M1	CDG A 3101
M1_10	CDG A 3101
L1-16	CDG A 3101
M2-16	CDG A 3101
M2-16_10	CDG A 3101
M2-32	CDG A 3101
M2-32 HV	CDG A 3125
M2-63 HV	CDG A 3125
M2-100 HV	CDG A 3126
M2+M3-16	CDG A 3101
M2+M3-16_10	CDG A 3101
M2+M3-32	CDG A 3101
M3-16	CDG A 3101
M3-L16	CDG A 3101
M3-32	CDG A 3101
M3-L32	CDG A 3101
M3-L32_10	CDG A 3101
M3-LN32	CDG A 3101
M3-32 HV	CDG A 3125
M3-63 HV	CDG A 3125
M3-100 HV	CDG A 3126
M4-16	CDG A 3107 – AE-port
	CDG A 3128 – EUT-port
M4-N16	CDG A 3107 – AE-port
	CDG A 3128 – EUT-port

M - type	Order number
M4-32	CDG A 3107 – AE-port CDG A 3128 – EUT-port
M4-N32	CDG A 3107 – AE-port
	CDG A 3128 – EUT-port
M4-32_10	CDG A 3107 – AE-port
	CDG A 3128 – EUT-port
M4-32 HV	CDG A 3115
M4-N63 HV	CDG A 3115
M4-63 HV	CDG A 3115
M4-100 HV	CDG A 3116
M4-N100 HV	CDG A 3116
M5-16	CDG A 3107 – AE-port
	CDG A 3128 – EUT-port
M5-32	CDG A 3107 – AE-port
	CDG A 3128 – EUT-port
M5-32 HV	CDG A 3115
M5-32 VHV	CDG A 3115
M5-63 HV	CDG A 3115
M5-100 HV	CDG A 3116
Fastening angle with 50/150 Ohm adaptor	CDG A 3100

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CDN RJ -Type

Coupling / Decoupling
of disturbing signal to

unscreened
balanced interconnection lines

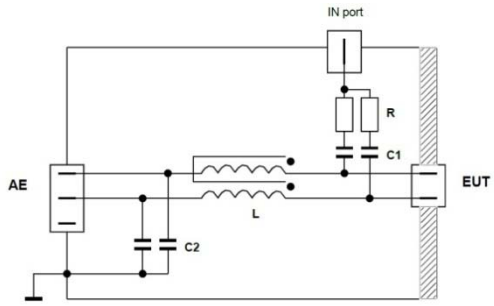

Diagram of CDN RJ11 (On CDN RJ45, 8 pins, C2 is eliminated.)

Specification:

Order number	**.CDN RJ 11 and CDN RJ 45**
RF In	
Frequency Range (RF In)	(10 kHz) 150 kHz – 80 MHz /230 MHz
Power Rating (RF In)	6 W (continuous)
Decoupling attenuation (RF In – AE)	> 20 dB (150 kHz – 230 MHz)
Insertion loss (RF In – EUT)	10 dB ± 1 dB (150 kHz – 80 MHz) 10 dB + 3 dB (80 MHz – 230 MHz)
Connector	BNC
EUT / AE	
Maximum Input Voltage	100 VAC / 150 VDC
Current Rating (AE – EUT)	1,5 A
Insertion loss (AE – EUT)	< 1 dB (DC – 10 MHz) < 10 dB (10 MHz – 100 MHz)
Connector	RJ11 / RJ45 sockets
Mechanical Data	Case size 1
Dimensions (W x H x D)	160mm x 84.5mm x 240 mm

Calibration adaptor to CDN RJ...

RJ - type	Order number
RJ 11	CDG A 3120
RJ 45	CDG A 3118
Fastening angle with 50/150 Ohm adaptor	CDG A 3100

RJ 45

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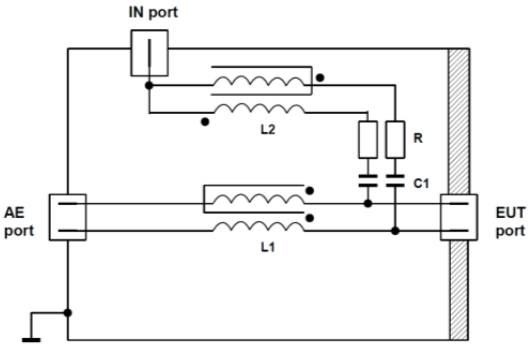
CDN T-Type

Coupling / Decoupling
of disturbing signal to unscreened
balanced interconnection lines

picture similar



Simplified diagram for CDN T2 /T4 /T8

Specification:

Order number	**CDN T 2** **CDN T 4** **CDN T 8**	**CDN T 2_10** **CDN T 4_10**
RF In		
Frequency Range (RF In)	150 kHz – 230 MHz	10 kHz – 80 MHz
Power Rating (RF In)	6 W (continuous)	
Decoupling attenuation (RF In – AE)	> 20 dB (150 kHz – 230 MHz)	
Insertion loss (RF In – EUT)	10 dB ± 1 dB (150 kHz – 230 MHz))	
Connector	BNC	
EUT / AE		
Maximum Input Voltage AC	100 V	
Maximum Input Voltage DC	150 V	
Current Rating (AE – EUT)	0.5 A	
Insertion loss (AE – EUT)	< 1 dB (DC – 1 MHz) < 10 dB (1 MHz – 100 MHz)	
Connector (EUT + AE)	Terminal clamp (T2, T4); RJ45 female (T8)	
Mechanical Data	Case size 1	
Dimensions (W x H x D)	160mm x 84.5mm x 240 mm	

Calibration adaptor to CDN T...

T- type	Order number
T 2 (also T 2_10)	CDG A 3111
T 4 (also T 4_10)	CDG A 3112
T 8 (RJ45 male)	CDG A 3118
Fastening angle with 50/150 Ohm adaptor	CDG A 3100

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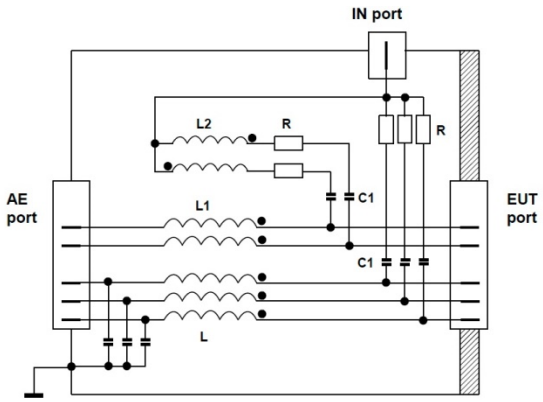
CDN CAN-BUS

Coupling / Decoupling
of disturbing signal to CAN-BUS-lines



Simplified diagram for CAN-BUS (L5)

Specification:

Order number	**CDN CAN-BUS**
RF In	
Frequency Range (RF In)	150 kHz – 230 MHz
Power Rating (RF In)	6 W (continuous)
Decoupling attenuation (RF In – AE)	PIN 2+7: > 35 dB (150 kHz – 230 MHz) PIN 3+6+9: > 35 dB (150 kHz – 200 MHz), > 25dB (200 MHz – 230 MHz)
Insertion loss (RF In – EUT)	10 dB ± 1 dB (150 kHz – 230 MHz);
Connector	BNC
EUT / AE	
Maximum Input Voltage AC	50 V
Maximum Input Voltage DC	50 V
Current Rating (AE – EUT)	PIN 2+7 = 0,5A PIN 3+6+9 = 3A
Insertion loss (AE – EUT)	PIN 2+7: < 1dB (DC – 10 MHz), < 10 dB (10 MHz – 500 MHz) PIN 3+6+9: < 1 dB (DC – 100 kHz)
Connector (AE – EUT)	9 pin Sub-D female
Mechanical Data	Case size 1
Dimensions (W x H x D)	160mm x 84.5mm x 240 mm

Calibration adapter to CDN CAN

CAN type	Order number
CAN-BUS	CDG A 3131 (9 pin. male Sub-D)
Fastening angle with 50/150 Ohm adaptor	CDG A 3100

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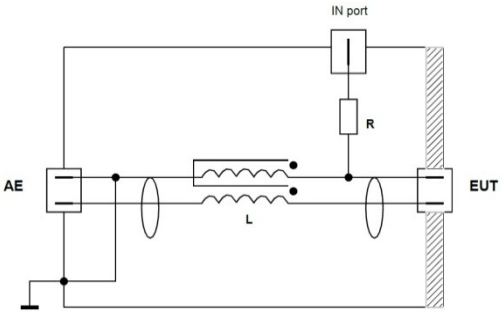
CDN S-Type

Coupling / Decoupling of disturbing signal to

screened lines



Simplified diagram for CDN S1

Although several cable / connector configurations are available, the disturbing signal is always injected on to the screened cable via a 100 Ω resistor.
A direct injection device - without decoupling circuit is available as well – see type CDN D 100.

Specification:

Order number	CDN S1 *	CDN S2	CDN S4	CDN S8	CDN S9	CDN S9_10	CDN S15	CDN S25
RF In								
Frequency range (RF In)	150 kHz – 230 MHz					10kHz – 230 MHz	150 kHz – 230 MHz	
Power Rating (RF In)	6 W (continuous)							
Decoupling attenuation (RF In – AE)	> 35 dB (150 kHz – 80 MHz) > 30 dB (80 MHz – 230 MHz)							
Insertion loss (RF In – EUT)	10 dB ± 1 dB (150 kHz – 80 MHz); 10 dB + 3 dB (80 MHz - 230 MHz)							
Connector	BNC female							
EUT / AE								
Maximum Input Voltage AC	150 VAC / 200 VDC							
Current Rating (AE – EUT)	1.5 A							
Insertion loss (AE – EUT)	< 1dB (0 – 10 MHz) < 10 dB (10 MHz – 500 MHz)							
Connectors EUT	BNC fem.	XLR ma.	5 pin ma. XLR	8 pin ma. Mini- DIN	9 pin male Sub-D		15 pin ma. Sub-D	25 pin ma. Sub-D
Connectors AE	BNC fem.	XLR fem.	5 pin fem. XLR	8 pin ma. Mini- DIN	9 pin female Sub-D		15 pin fem. Sub-D	25 pin fem. Sub-D
Mechanical Data	Case size 1							
Dimensions (W x H x D)	160mm x 84.5mm x 240 mm							

*also special version CDN S1_75 (with 75 ohm) available

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Calibration adapter to CDN S.... *(Only need on EUT side!)*

S - type	Order number
S 1	CDG A 3103
S 1-75	CDG A 3103
S 2	CDG A 3104
S 4	CDG A 3130
S 8	CDG A 3129
S 9	CDG A 3105 (9 pin female Sub-D)
S 9_10	CDG A 3105 (9 pin female Sub-D)
S 15	CDG A 3113 (15 pin female Sub-D)
S 25	CDG A 3106 (25 pin female Sub-D)
Fastening angle with 50/150 Ohm adaptor	CDG A 3100

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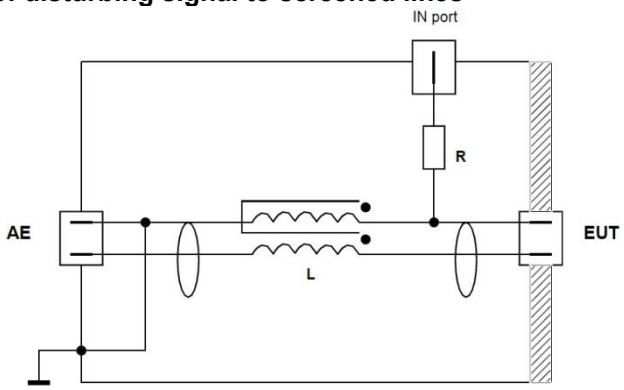
CDN RJ45S / HDMI / FireWire

Coupling / Decoupling
of disturbing signal to screened lines



Specification:

Order number	CDN RJ 45S	CDN RJ 45S_10	CDN HDMI	CDN FireWire
RF In				
Frequency range (RF In)	150 kHz – 230 MHz	10 kHz – 230 MHz	150 kHz – 230 MHz	
Power Rating (RF In)	6 W (continuous)			
Decoupling attenuation (RF In – AE)	> 30 dB (150 kHz – 230 MHz)		> 50 dB (150 kHz – 80 MHz) > 25 dB (80 MHz – 230 MHz)	
Insertion loss (RF In – EUT)	10 dB ± 1 dB (150 kHz – 80 MHz) 10 dB + 3 dB (80 MHz – 230 MHz)			
Connector	BNC			
EUT / AE				
Maximum Input Voltage	100 VAC / 150 VDC			
Current Rating (AE – EUT)	1,0 A		0,5 A	0,5 A
Insertion loss (AE – EUT)	< 0.3dB (DC – 10 MHz) < 1 dB (10 MHz – 100 MHz) < 3 dB (100 MHz – 500 MHz)		< 1dB (DC – 10 MHz) < 10 dB (10 MHz – 500 MHz))	
Connectors	Shielded RJ45 jack		HDMI 19 pin	FireWire 6 pin
Mechanical Data	Case size 1			
Dimensions (W x H x D)	160mm x 84.5mm x 240 mm			

Calibration adapter to CDN RJ 45S, CDN HDMI, CDN FireWire....

xx - type	Order number
RJ 45 S (also RJ 45 S_10)	CDG A 3117
HDMI	CDG A 3123
FireWire	CDG A 3127
Fastening angle with 50/150 Ohm adaptor	CDG A 3100

HDMI

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SCHLÖDER
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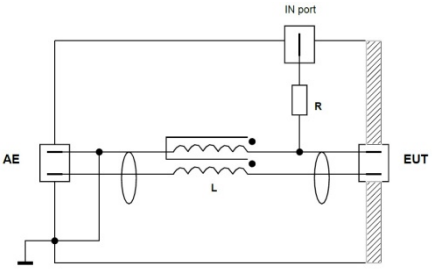
CDN-USB-P /USB 3.0-P /USB-C /USB 3.0-C

Coupling / Decoupling
of disturbing signal to Screened lines

CDN USB-P

CDN USB-C



Seeing from EUT side

CDN USB 3.0-P

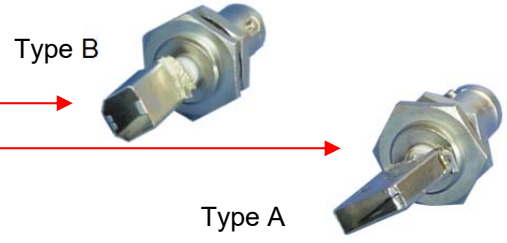
CDN USB 3.0-C

Specification:

Order number	CDN USB 3.0-P /-C	CDN USB-P	USB-P_10	CDN USB-C	USB-C_10
RF In					
Frequency range (RF In)	150 kHz - 230 MHz	150 kHz – 230 MHz	10 KHz- 230 MHz	150 kHz- 230 MHz	10 kHz- 230 MHz
Power Rating (RF In)	6 W (continuous)				
Decoupling attenuation (RF In – AE)	> 50 dB (150 kHz – 80 MHz) > 25 dB (80 MHz – 230 MHz)				
Insertion loss (RF In – EUT)	10 dB ± 1 dB (150 kHz – 80 MHz) 10 dB + 3 dB (80 MHz – 230 MHz)				
Connector	BNC				
EUT / AE					
Maximum Input Voltage AC	100 VAC / 150 VDC				
Current Rating (AE – EUT)	0,9 A	0,5 A		0,5 A	
Insertion loss (AE – EUT)	< 1dB (DC – 10 MHz) < 10 dB (10 MHz – 500 MHz))				
Connectors: USB socket	EUT: Type A / B (3.0) AE: Type B / A (3.0)	EUT: Type A AE: Type B		EUT: Type B AE: Type A	
Mechanical Data	Case size 1				
Dimensions (W x H x D)	160mm x 84.5mm x 240 mm				

Calibration adapter to CDN USB-x (USB 2.0 plug)

CDN - type	Order number
USB-C (also USB-C_10 & USB 3.0-C)	CDG A 3121
USB-P (also USB-P_10 & USB 3.0-P)	CDG A 3122
Fastening angle with 50/150 Ohm adaptor	CDG A 3100



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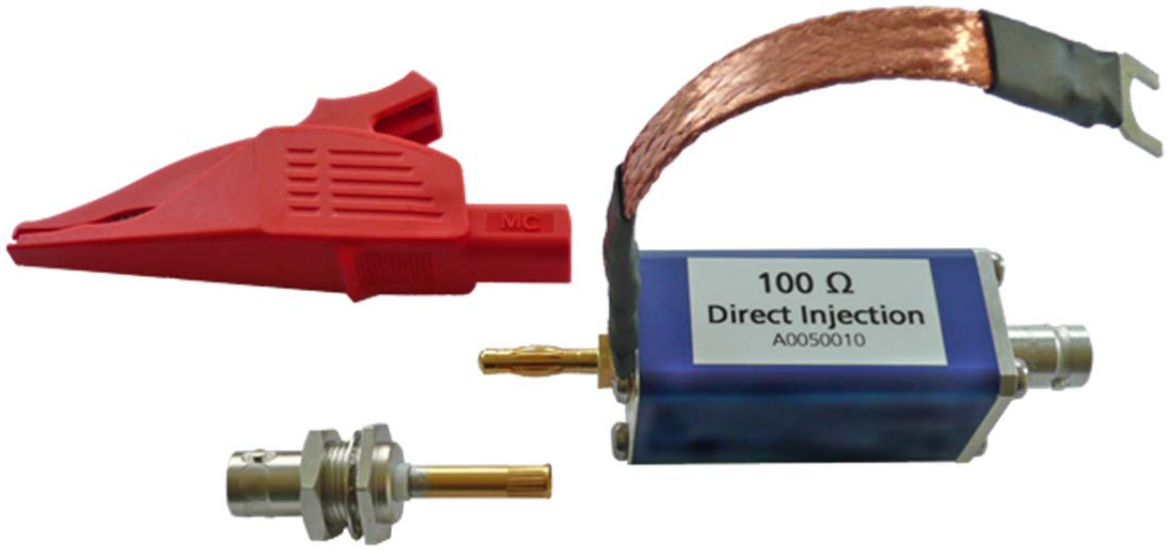
Direct injection device
- CDN D 100

100 Ω connector for RF disturbances 10 kHz – 230 MHz

The disturbing signal coming from the test generator is injected on to screened and coaxial cables via a 100 Ω resistor (even if the shield is ungrounded or grounded at one end only). In between the auxiliary equipment (AE) and the injection point, a decoupling circuit shall be inserted as close as possible to the injection point. To increase decoupling and to stabilize the circuit, a ground connection shall be made from the screen of the direct injection device´s input port to the ground reference plane.



Delivery including calibration adapter

Electrical Data	**CDN D 100**
Frequency range (RF In)	10 kHz – 230 MHz
Common mode impedance (IN/OUT)	100 Ω
Power Rating (RF In)	6 W (continuous)
Connector Out	Alligator clip; max. cable diameter 20 mm (30 mm on request)
Connector In	BNC

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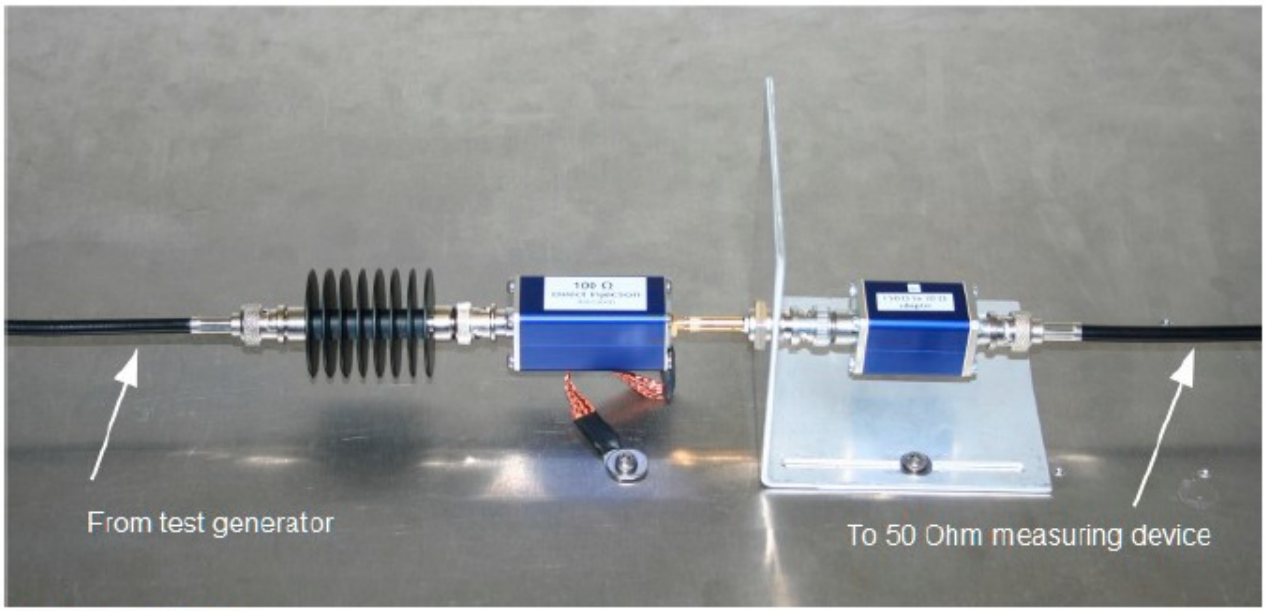
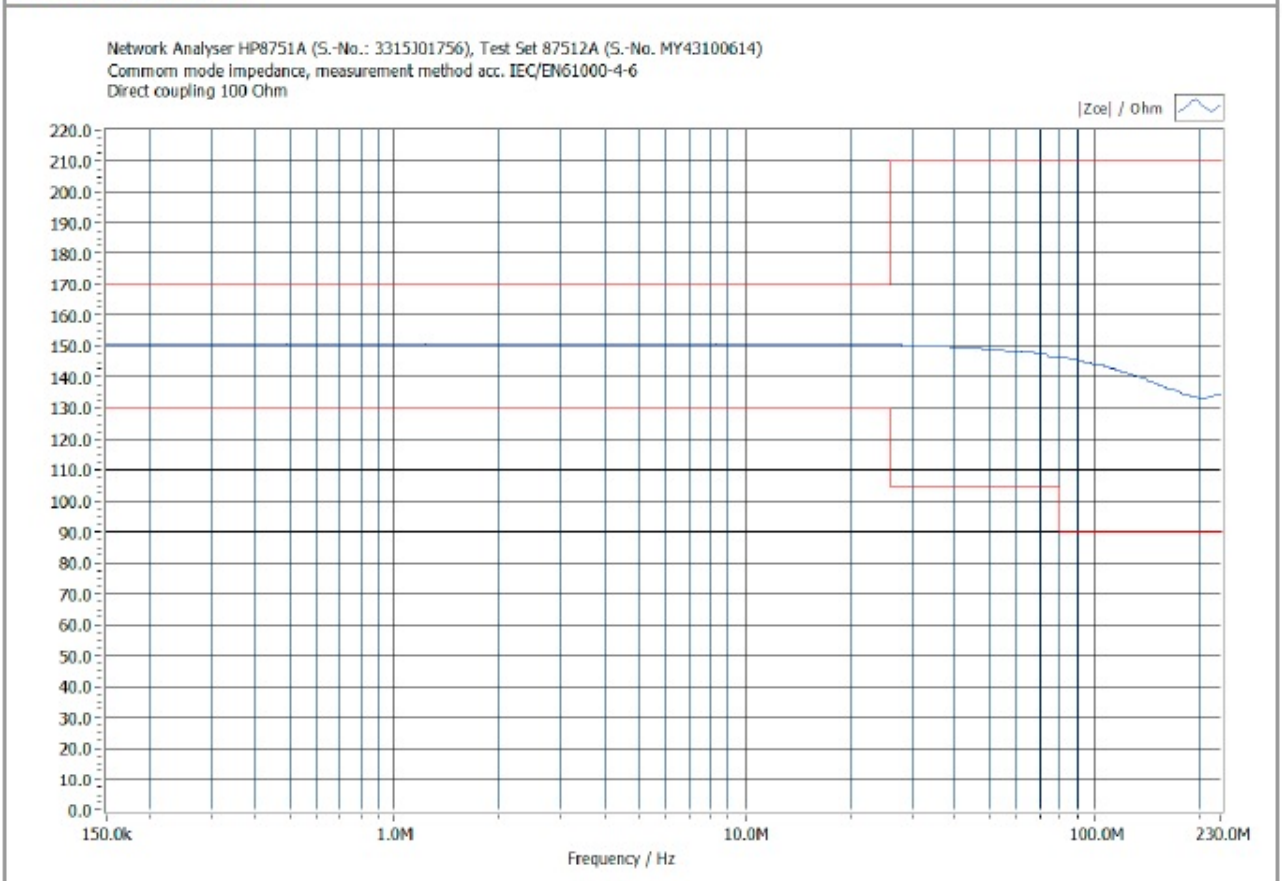
Calibration CDN D100



Setting of the output level



Typical common mode impedance

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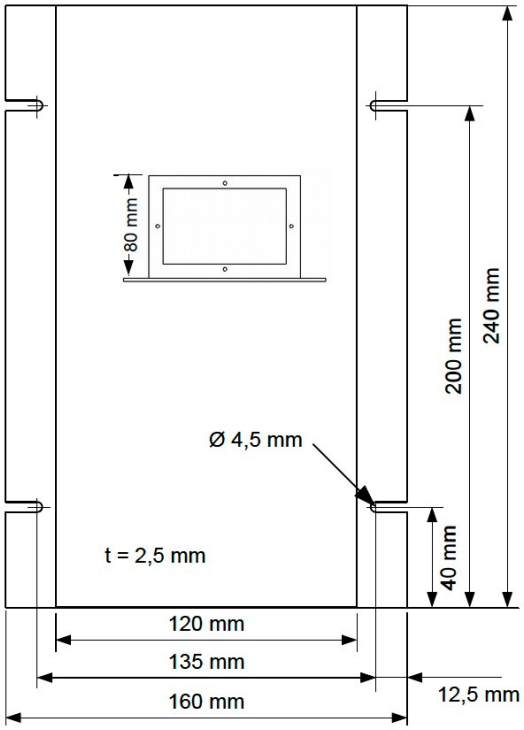
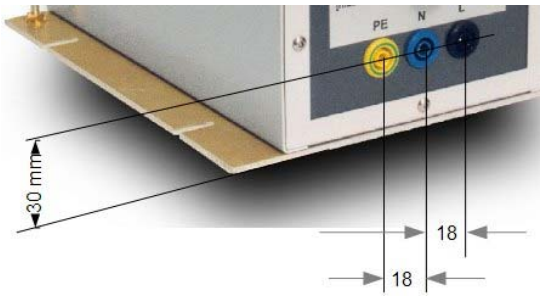
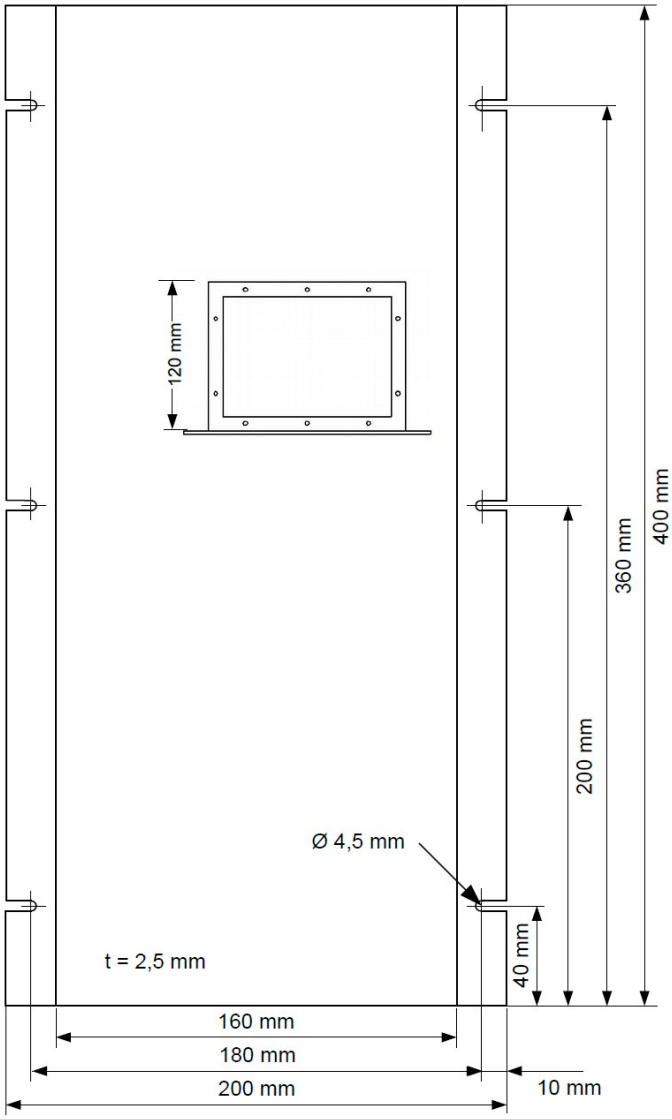
Dimensions [mm]

Case size 1
All types without M-Types > 32 A





Case size 2
Only M-Types > 32 A (e.g. CDN Mx-63 HV)
and AF8-MC or AF8-MC_10



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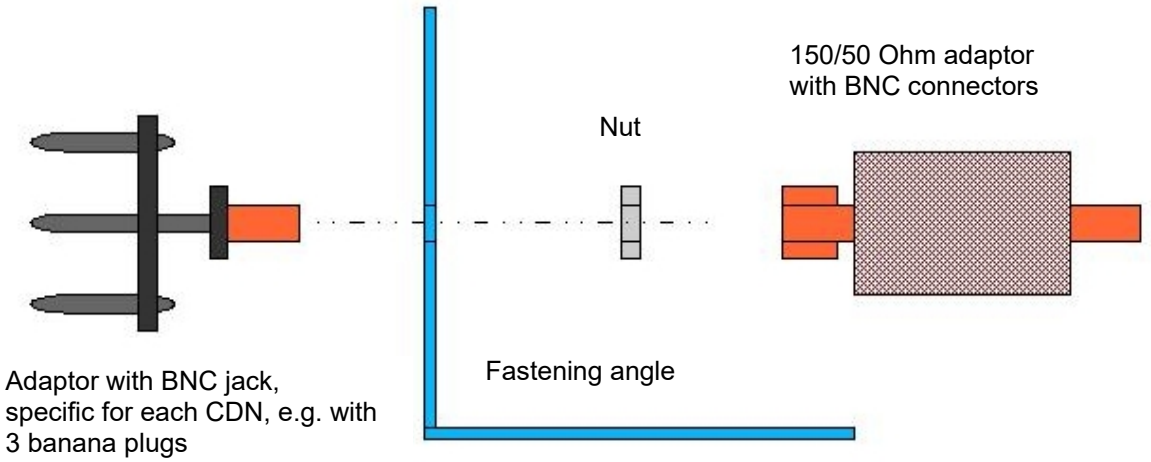
CDN calibration set

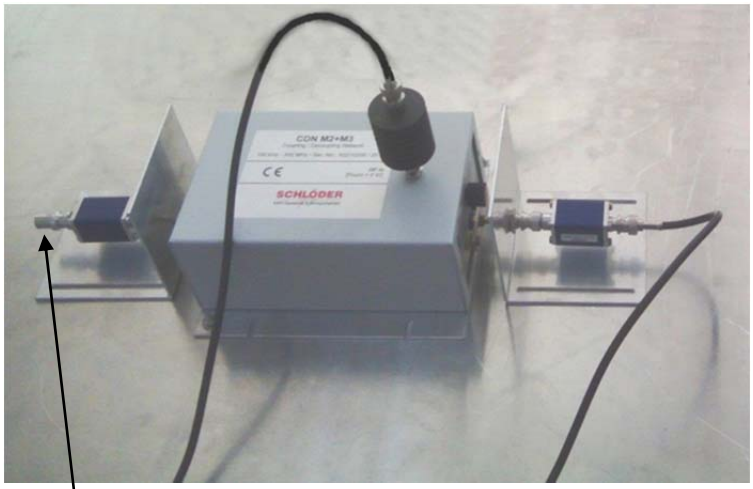
To calibrate a CDN the following items are required:

- **2 x CDG A 31xx** (**specific calibration** adaptor for CDN)
- **2 x CDG A 3100** (**fastening angle** and **150/50 Ohm adaptor**)

Two fastening angle and 150/50 Ohm adaptor should be ordered for the first CDN. For each following CDN only two specific adaptors has to be ordered.



| < --- CDG A 31xx ----> | < ---------- CDG A 3100 ---------- > |



50 Ohm
termination

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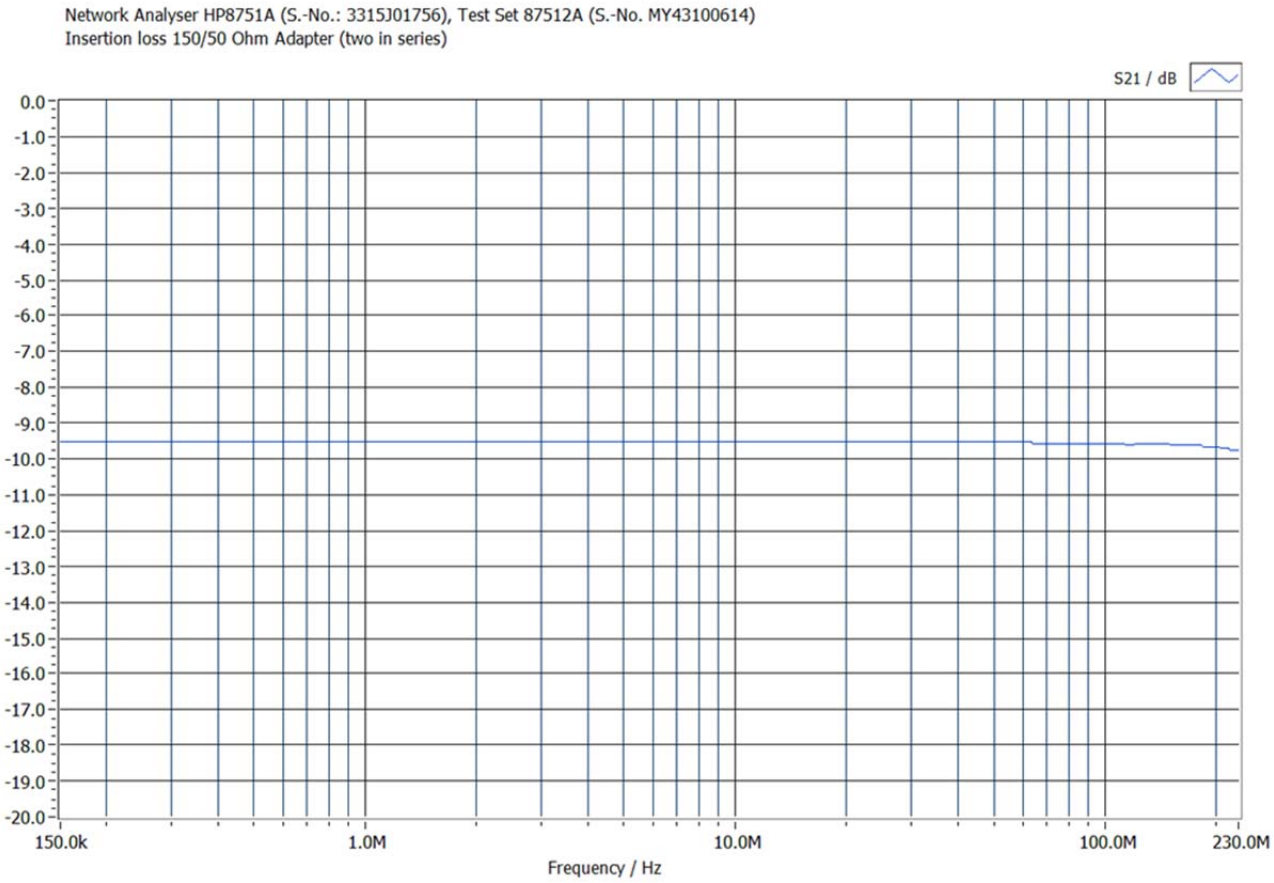
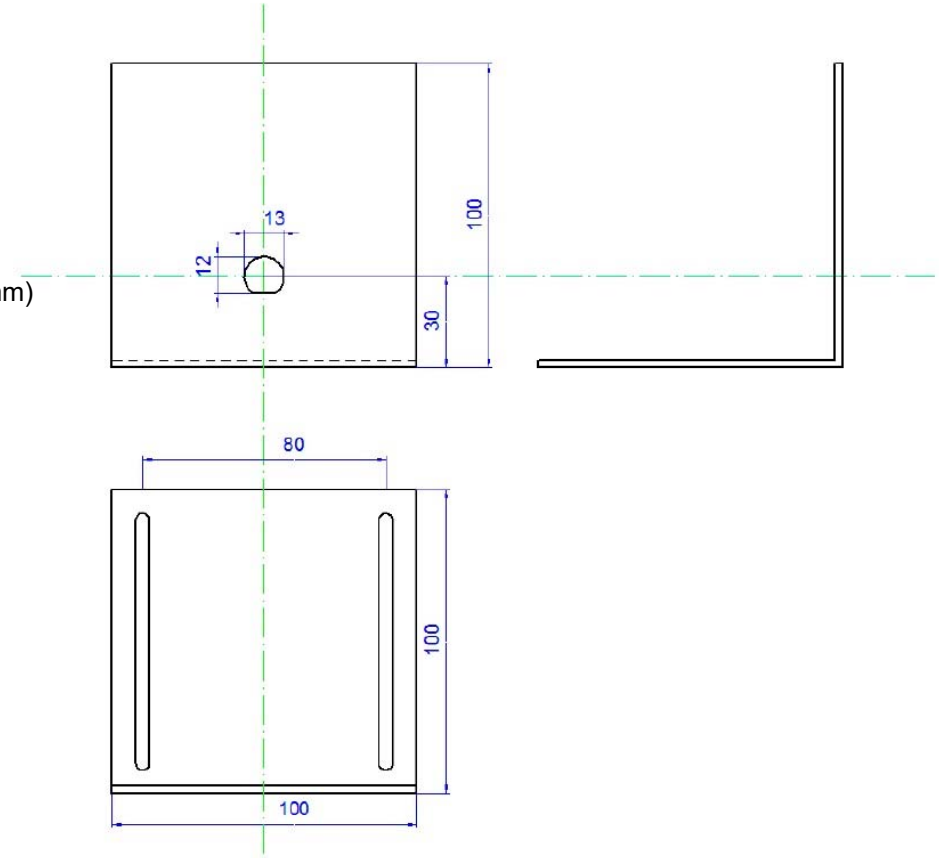


Insertion loss 150 / 50 Ohm adaptor (two in series)

Alu mounting plate (thick 2.5 mm)



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