1000BASE-T1 MEDIACONVERTER EMC

USER MANUAL

August 2019

Manual-Version: 3.3

Hardware-Version: 1.4 und 2.0.

CONTENT

1 GENERAL INFORMATION

1.1 Functionality and Features of the 1000BASE-T1 MediaConverter_EMC

Figure 1-1:1000BASE-T1 MediaConverter_EMC

The **Technica Engineering 1000BASE-T1 MediaConverter_EMC** transmits data frames directly from the physical layer 1000BASE-T1 to a chosen physical layer of the used SFP module. This SFP modules can be standard Ethernet RJ45 modules or optical Gbit Ethernet SFP modules with constant delay.

Features:

- 1 Port 1000Base-T1 Ethernet with Marvell 88Q2112 A2 Transceiver, 1000 MBit/s Fullduplex on a single unshielded twisted pair
- 1 SFP Port Gigabit Ethernet
- MATEnet Connector
- Robust steel case
- DIP Switches for easy configuration

General Information:

Power requirement:	8 to 16 Volt DC (nominal 12 Volt DC)
Power consumption:	2 Watt
Size:	95 x 100 x 27 mm
Weight:	0,3 kg
International Protection:	IP 2 0
Operating temperature:	-40° to +80 °Celsius

LINKS:

The User can download the latest firmware and documentation for the 1000BASE-T1 MediaConverter_EMC here:

https://technica-engineering.de/produkt/1000base-t1-emc-converter/

1.2 Warranty and Safety Information

Before operating the device, read this manual thoroughly and retain it for your reference.
The latest documentation for the 1000BASE-T1 MediaConverter_EMC can be downloaded here:
https://technica-engineering.de/produkt/1000base-t1-emc-converter/

Use the device only as described in this manual.
Use only in dry conditions.
Do not apply power to a damaged device.

Do not open the device. Otherwise warranty will be lost.

This device is designed for engineering purpose only.
Special care has to be taken for operation.
Do not use this device in a series production car.
As this device is likely to be used under rough conditions, warranty is limited to 1 year.
Manufacturer liability for damage caused by using the device is excluded.

1.3 Declaration of conformity

EG-Konformitätserklärung

gemäß der EG-Richtlinie 2004/108/EG (elektromagnetische Verträglichkeit) vom 15. Dezember 2004

Hiermit erklären wir, dass das nachstehend bezeichnete Gerät in seiner Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Richtlinie 2004/108/EG entspricht. Bei einer mit uns nicht abgestimmten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit.

Hersteller: Technica Engineering
Leopoldstr. 236
80807 München

Bevollmächtigter: Joseba Rodriguez

Beschreibung des Gerätes:
1000BASE-T1 MediaConverter_EMC

Datum der Erklärung: 21.06.2017

Name des Unterzeichners: Joseba Rodriguez

Unterschrift: .....

Figure 1-2: Declaration of conformity

2 HARDWARE INTERFACES

2.1 Connectors

On the label on top of the device you can see an overview about all HW-Interfaces of the 1000BASE-T1 MediaConverter_EMC.

Figure 2-1: Label of 1000BASE-T1 MediaConverter_EMC with pinning information

2.1.1 MATEnet Connectors

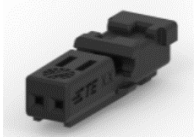
Name	Picture	Part Number
Tyco 1-PORT MATENET HDR ASSY 90DEG		9-2304372-9
Tyco MATENET, FEMALE INSERT MODUL, BLACK		965776-1
Tyco Nano MQS crimp contact		1-1703930-2

Table 2-1: Parts of Tyco MATEnet Connector

Note: You can use the official Tyco tool for these crimp contacts.

The pinning of the ECU connector is shown on the label on top of the device as well. (See FIGURE 2-1).

The left MATEnet connector is for power supply.
The right MATEnet connector is for BUS connection to the device under test (DUT).

Warning: If you apply a voltage higher than 18 Volt, the device will be damaged!

Pinning:

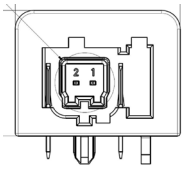


Figure 2-2: MATEnet Connector

Pin	Function
1	Minus
2	Plus

Table 2-2: MATEnet Connector

2.1.2 Optical Interface on the backside

The optical interface is a serial terminal connection. For using this, a special USB Adapter is required. For detailed Information see CHAPTER 4.

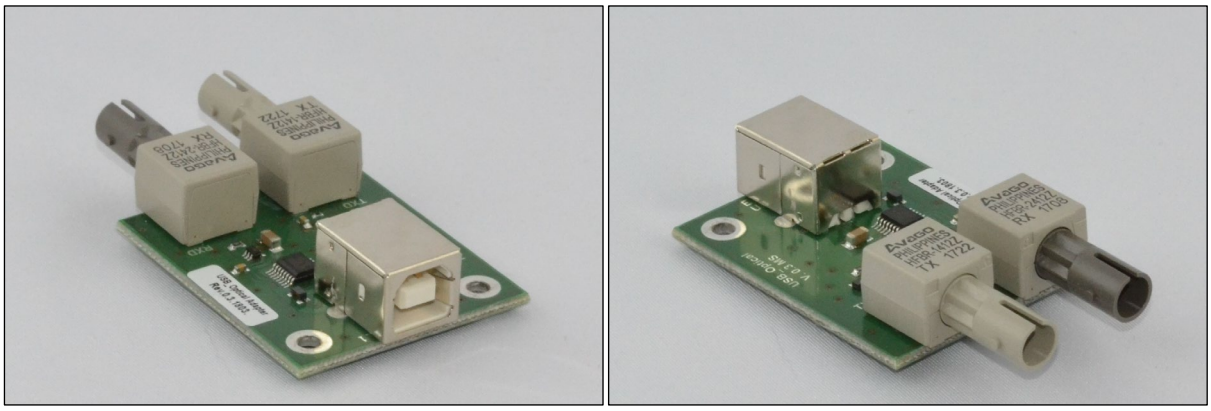


Figure 2-3: USB-Opto-Adapter

- Plug in the optical cable on both sides crossover. RX – TX
- Open a Terminal program (e.g. TeraTerm) at your PC and open the USB Device as serial connection.
- Speed settings: 14.400 kbaud/s and 8N1.
- Status information is displayed. The error counter can be reset by pressing “Space” key

Shown Information:

Mainly there are SQI and Block Error Counter displayed. Here is an example:

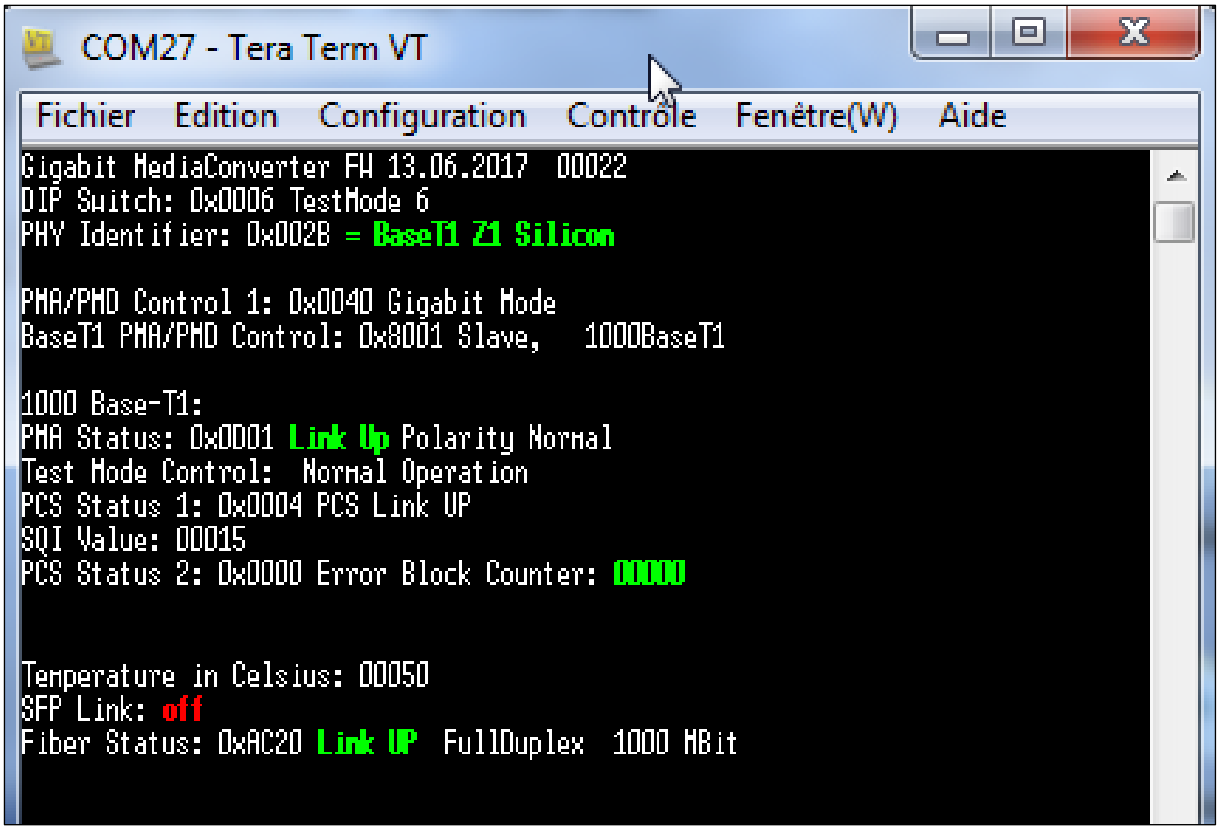


Figure 2-4: Example for shown values in Tera Term

2.1.3 SFP-Interface

There is one SFP cage for a MiniGBIC module.

Following SFP-modules are tested and recommended:

- Copper SFP-module:
  BEL SFP-1GBT-05, 10/100/1000BASE-T SFP

- Optical SFP-module:
  Delock 86186

2.1.4 USB mini connector

This is an interface for programming and debugging (for development.)

2.2 Other interfaces

2.2.1 DIP-Switches

The 1000BASE-T1 MediaConverter_EMC has four DIP-Switches for configuration (see CHAPTER 3).

2.2.2 Status LEDs

The 1000BASE-T1 MediaConverter_EMC has four LEDs at the frontside of the case.

Upper left LED (No. 1):
Green Color. It is lit when there is a linkup on the SFP-Port

Lower left LED (No. 2):
Yellow Color. It is toggling (approx. 0,5 sec) when the processor is working fine.

Upper right LED (No. 3):
Green Color. It is lit when there is a linkup on the 1000BASE-T1 port.

Lower right LED (No. 4):
Yellow Color. It is lit, if power on. And it is toggling during communication on the 1000BASE-T1 port.

3 CONFIGURATION OF THE DEVICE

The 1000BASE-T1 MediaConverter_EMC is configured by two **DIP-Switches** on the front of the device.

DIP-Switch	Status	Description
1	ON (up) OFF (down)	1000BASE-T1 Port is set to Master 1000BASE-T1 Port is set to Slave
2-4	ON (up) OFF (down)	2 OR 3 OR 4: Test Modes for PHYs All OFF: Normal Operation Mode

Table 3-1: Configuration of DIP-Switches

Note: In a 1000BASE-T1 Link one device must be set as Master, the other must be set as Slave.

4 1000BASE-T1 MediaConverter EMC mode A0 and A2

Nowadays, when we speak about 1000BASE-T1 MediaConverter EMC, we have to mention that there are two devices but with a small difference.

On one hand 1000BASE-T1 Media Converter HW 1.4 (TE- 1400). It works with a PHY A0 from Marvell (88Q2112) which is only compatible with PHY Z0, Z1 and A0 versions. However, when connecting to 1000BASE-T1 Transceivers of different vendors, no linkup is possible.

On the other hand, is 1000BASE-T1 Media Converter HW 2.0 (TE-1400-1). It is a “new” version of the TE-1400 with A2 PHY from Marvell, where it has the following behavior.

There is available DIP switch, which will be able to change the mode by hand and in order to set-up the 1000BASE-T1 SFP Module with A0 PHY (TE-1435).
It must access the PHY register settings, so that the mode-change must be taken care of by the user themselves.

5 USB-OPTO-ADAPTER

5.1 General Information

Note: The information in CHAPTER 4 is only for the 1000BASE-T1 MediaConverter EMC with the PHY 88Q2112A2 from Marvell.

Note: All 1000BASE-T1 MediaConverter EMC with a serial number higher than 190500000 are built with an A2 PHY.

Note: The CHAPTER 4 only describes how to set the DUT in TestMode. It is not a guide how to execute a Physical Layer Test.

5.2 How to get the USB-Opto-Adapter

This adapter is available from Technica-engineering. Please ask technical-sales@technica-engineering.de or order@technica-engineering.de for the TE-1375

5.3 Setup

- First install terminal program like “TeraTerm”.
- For controlling TestModes please connect the serial optical interface with the USB-debug-adapter to your PC:

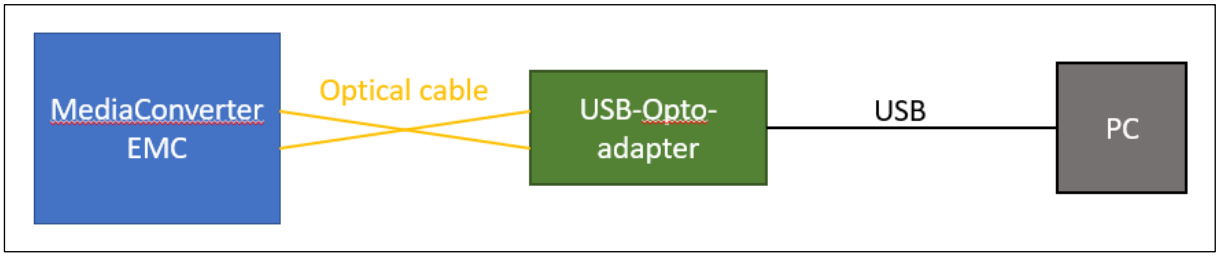


Figure 4-1: Setup

- Plug in the optical cable crossover. RX – TX
- Open a terminal program (TeraTerm) and set it to 14.400 baud per second and 8N1.

5.4 Testmodes and Optical Status Information

5.4.1 First steps

After the Setup, following status information will be displayed:

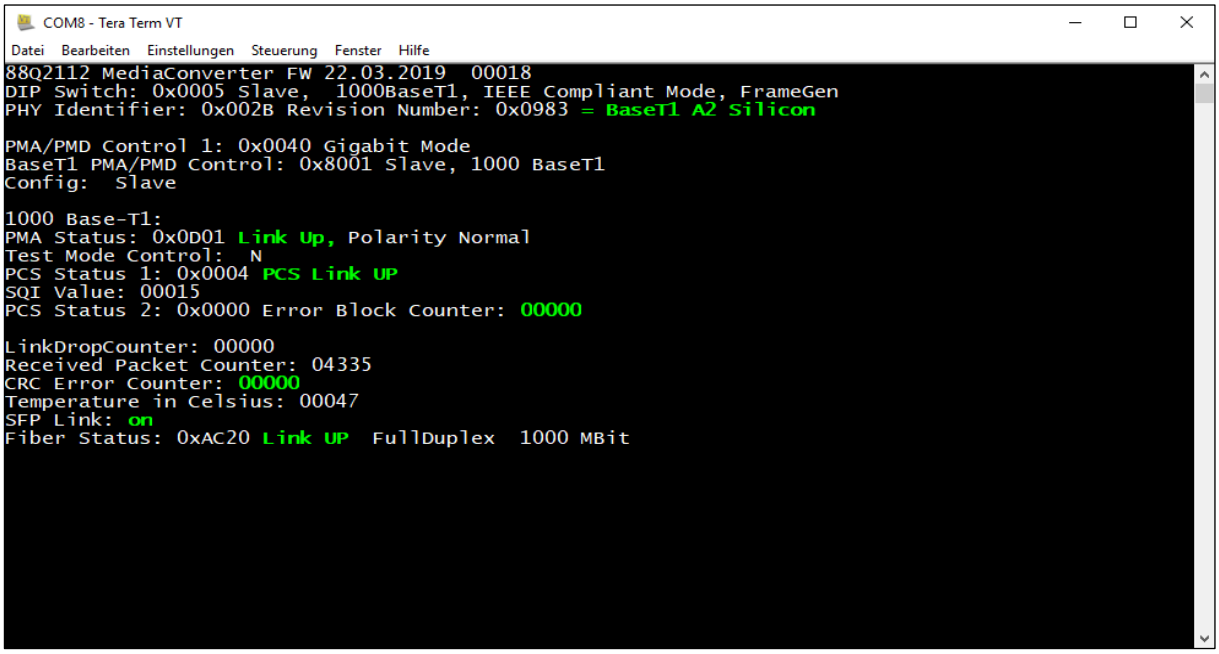


Figure 4-2: Status Information

Sending a capital “T” key to the DUT will enter TestMode Menu:

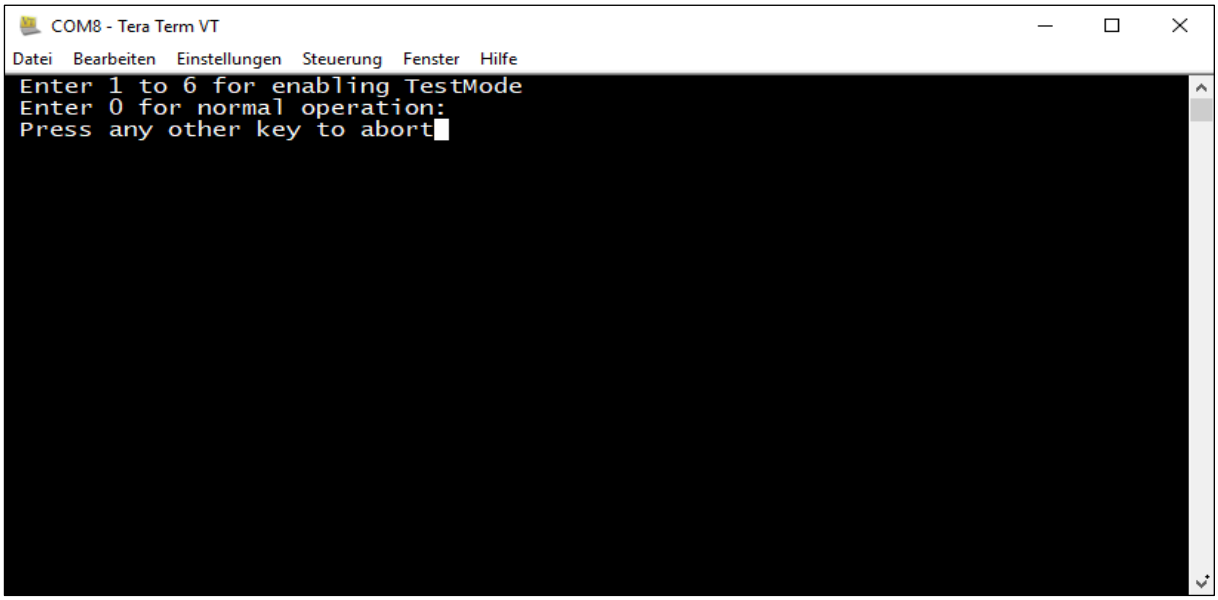


Figure 4-3: TestMode Menu

5.4.2 TestModes

There are 6 TestModes (1 to 6) for 1000BASE-T1 and 5 TestModes (1 to 5) for 100BASE-T1. “0” for normal operation.

TestModes for 100BASE-T1:

0: Normal Operation
1: Droop
2: Transmitter Jitter and Clock Frequency (Master)
3: Transmitter Jitter (Slave)
4: Distortion
5: PSD & Peak Differential Output

TestModes for 1000BASE-T1:

0: Normal Operation
1: Setting MASTER and SLAVE PHYs for transmit clock jitter test in linked mode
2: Transmit MDI jitter test in MASTER mode
3: Reserved
4: Transmit distortion test
5: Normal Operation in Idle Mode. This is for the PSD Mask test
6: Transmitter droop test mode

5.4.3 Examples

In the following you can see some examples for the output during different TestModes

5.4.3.1 DUT in 100BASE-T1 Mode

TestMode 0:

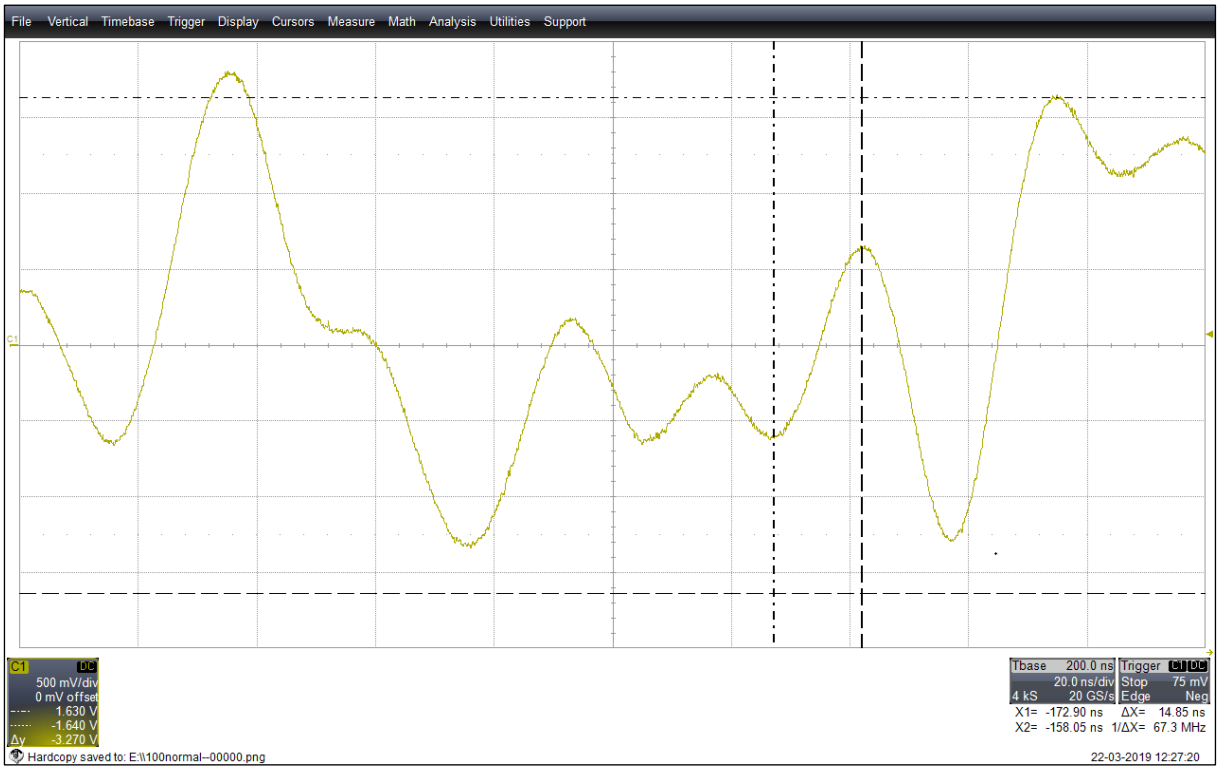


Figure 4-4: Normal Operation for 100BASE-T1 Mode

TestMode 1:

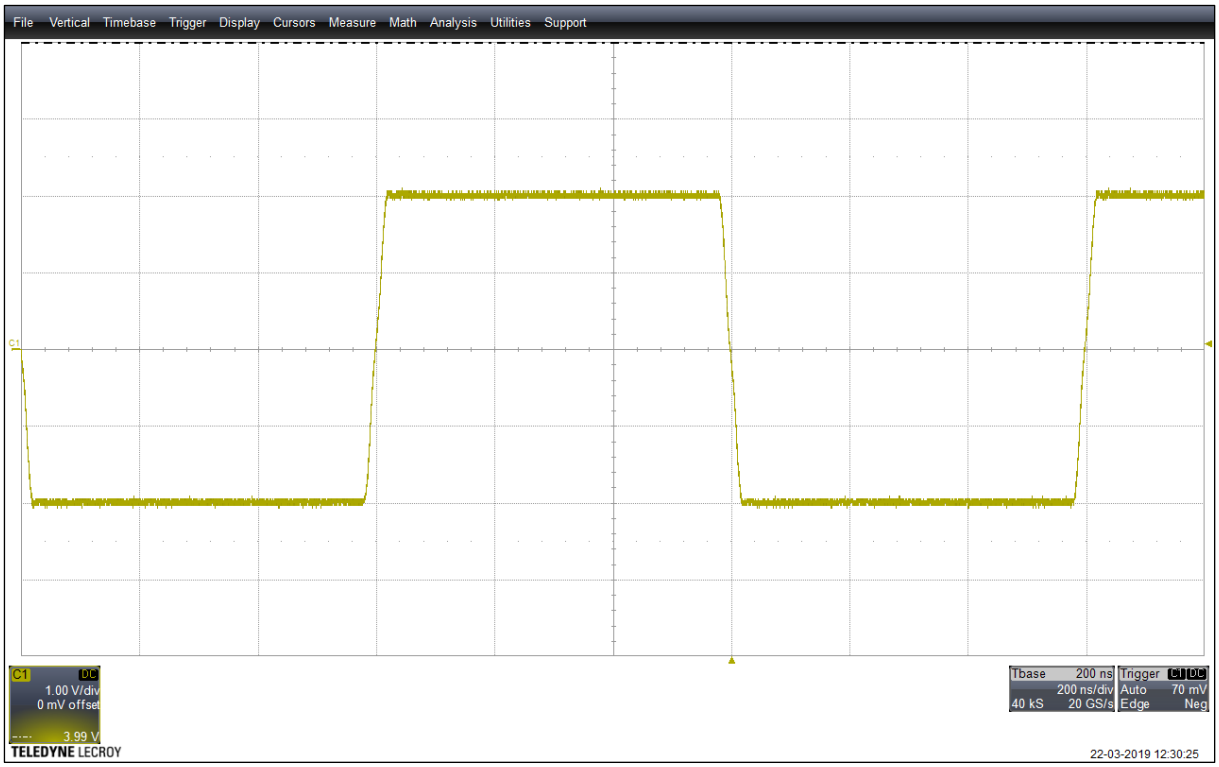


Figure 4-5 TestMode 1 for 100BASE-T1 Mode

TestMode 2:

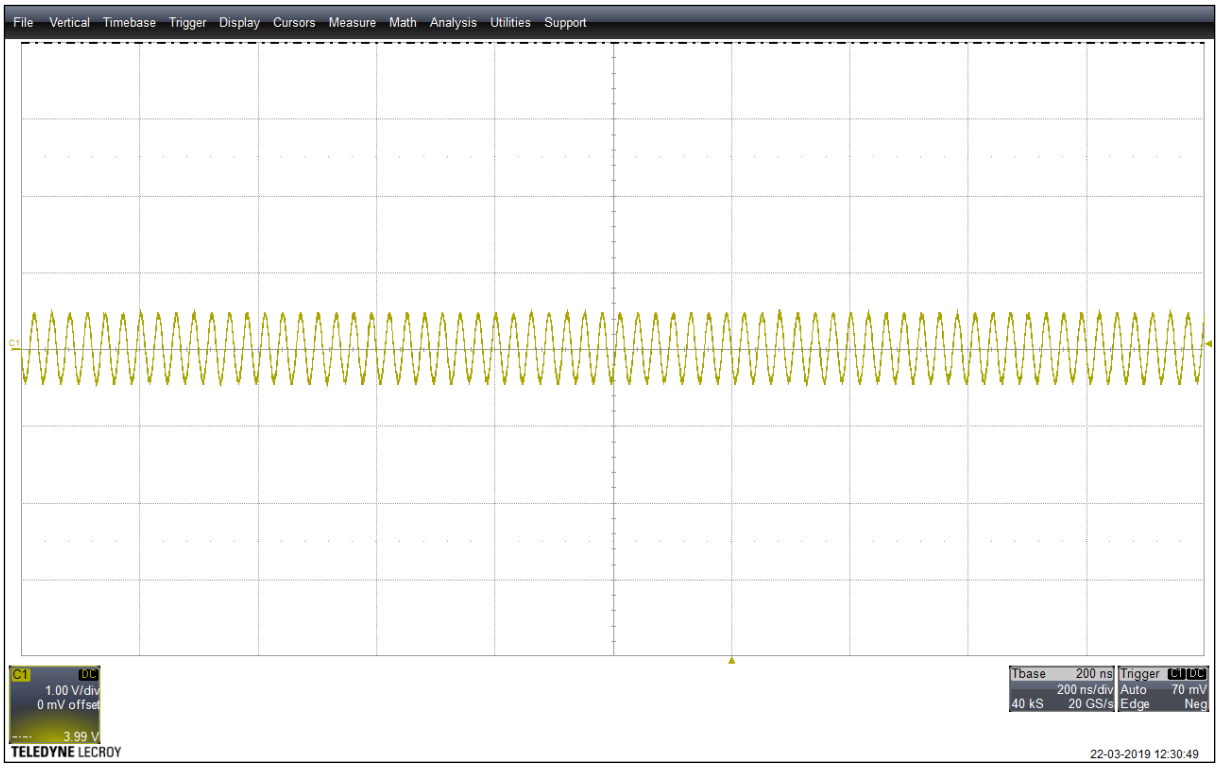


Figure 4-6: TestMode 2 for 100BASE-T1 Mode

TestMode 5:

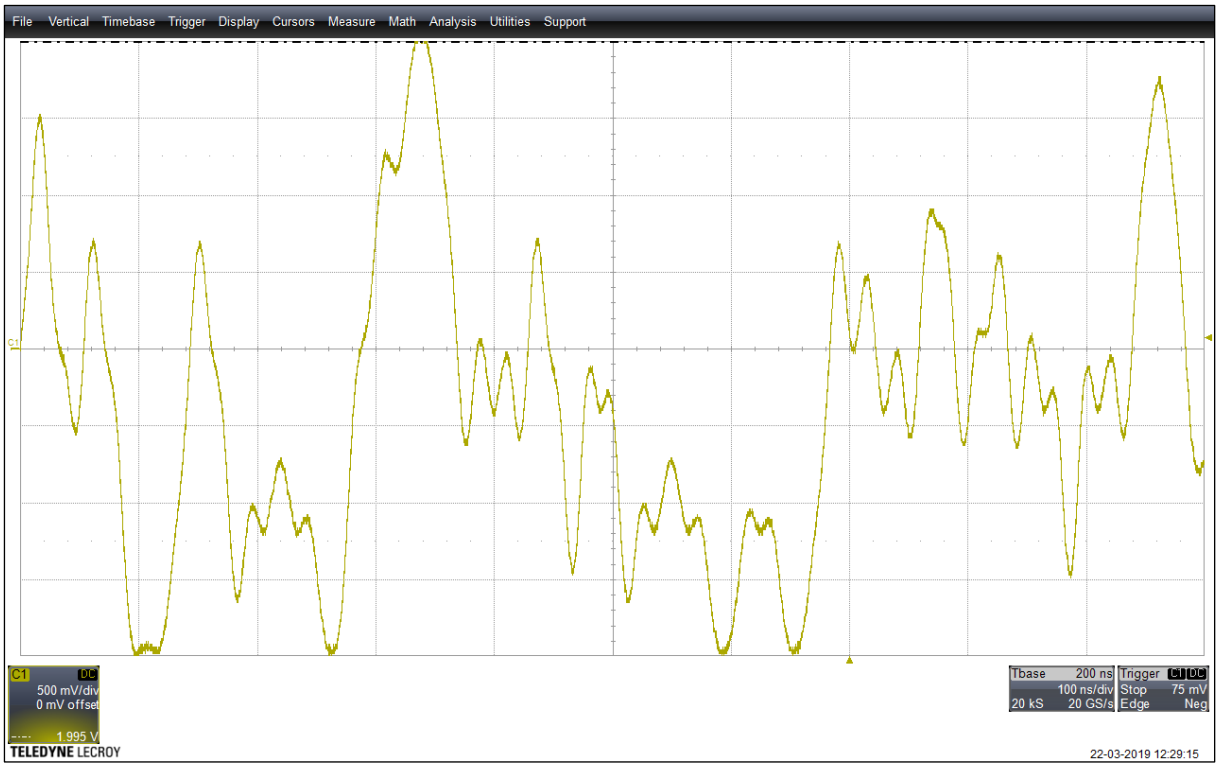


Figure 4-7: TestMode 5 for 100BASE-T1 Mode

5.4.3.2 DUT in 1000BASE-T1 Mode

TestMode 0:

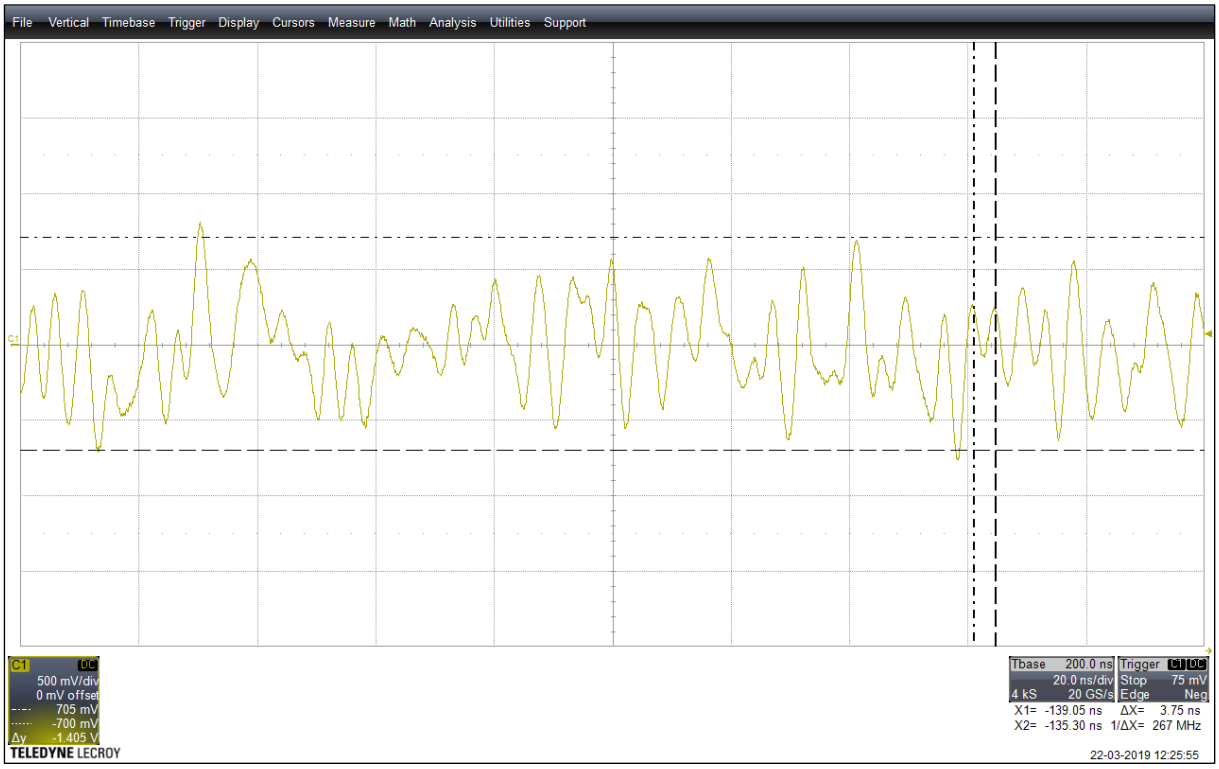


Figure 4-8: Normal Operation for 1000BASE-T1 Mode

TestMode 2:

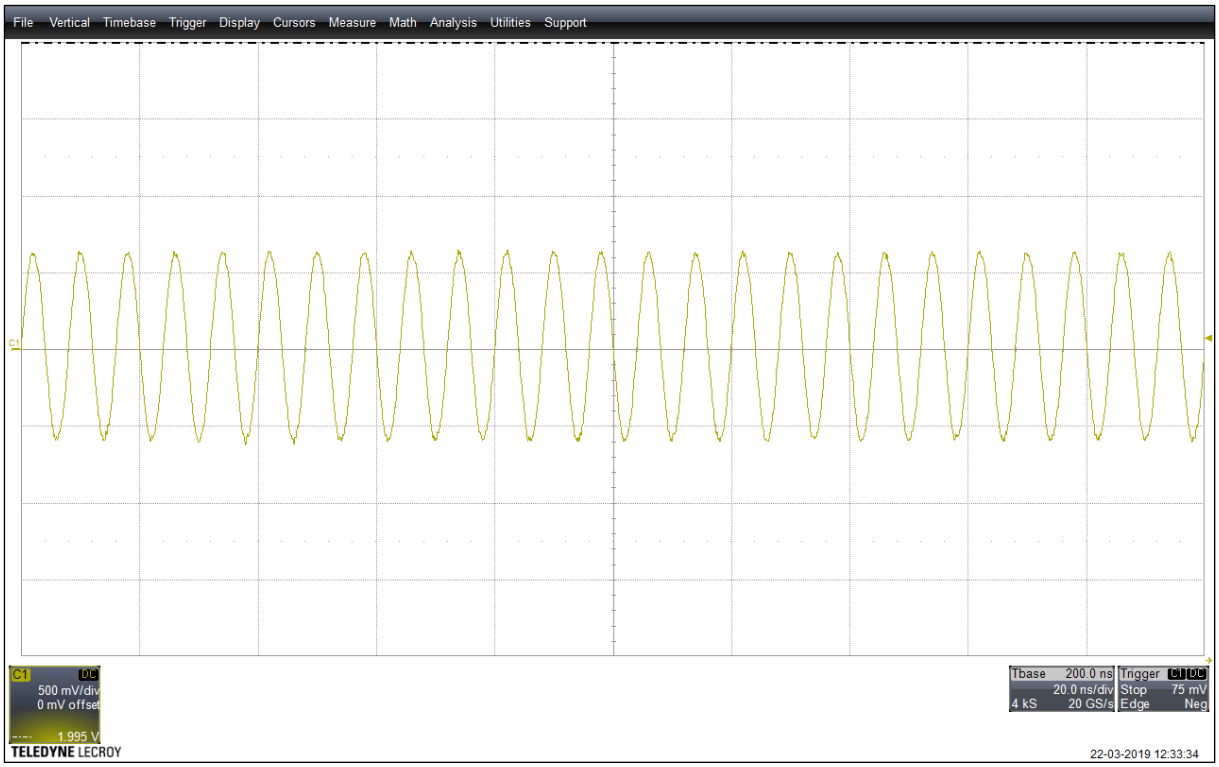


Figure 4-9: TestMode 2 for 1000BASE-T1 Mode

TestMode 5:

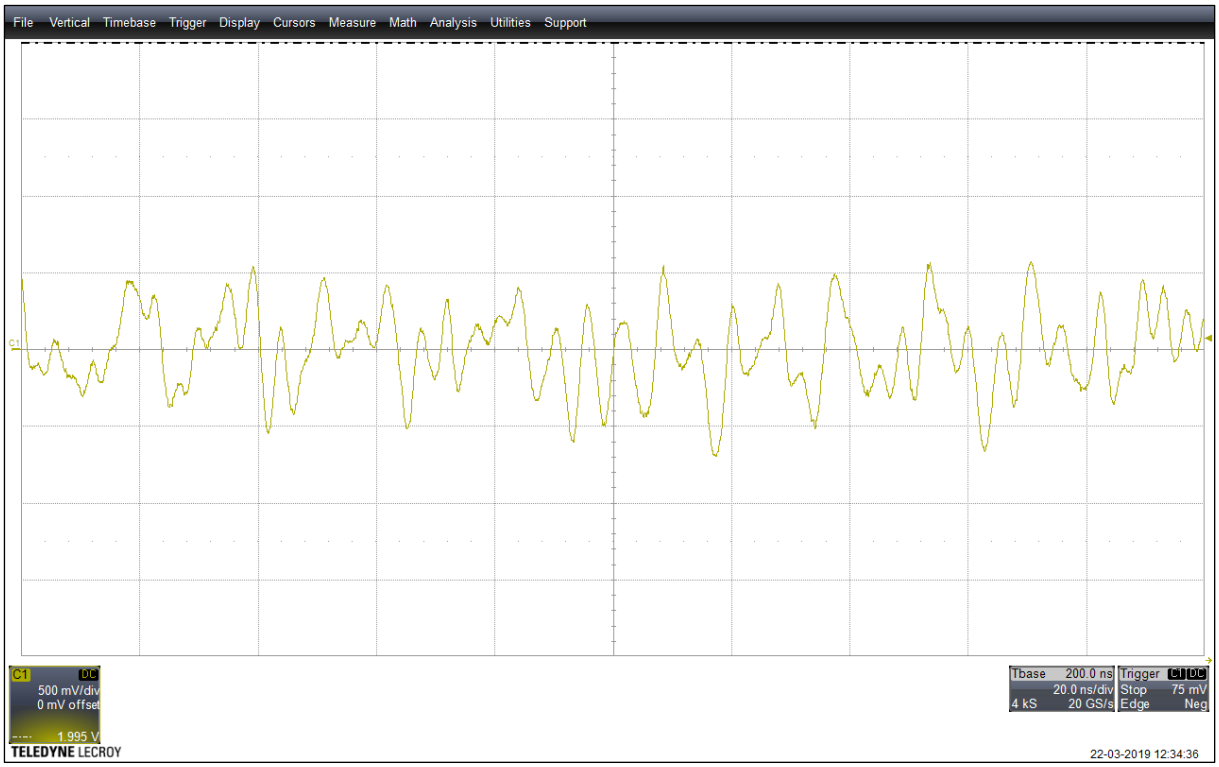


Figure 4-10: TestMode 5 for 1000BASE-T1 Mode

TestMode 6:

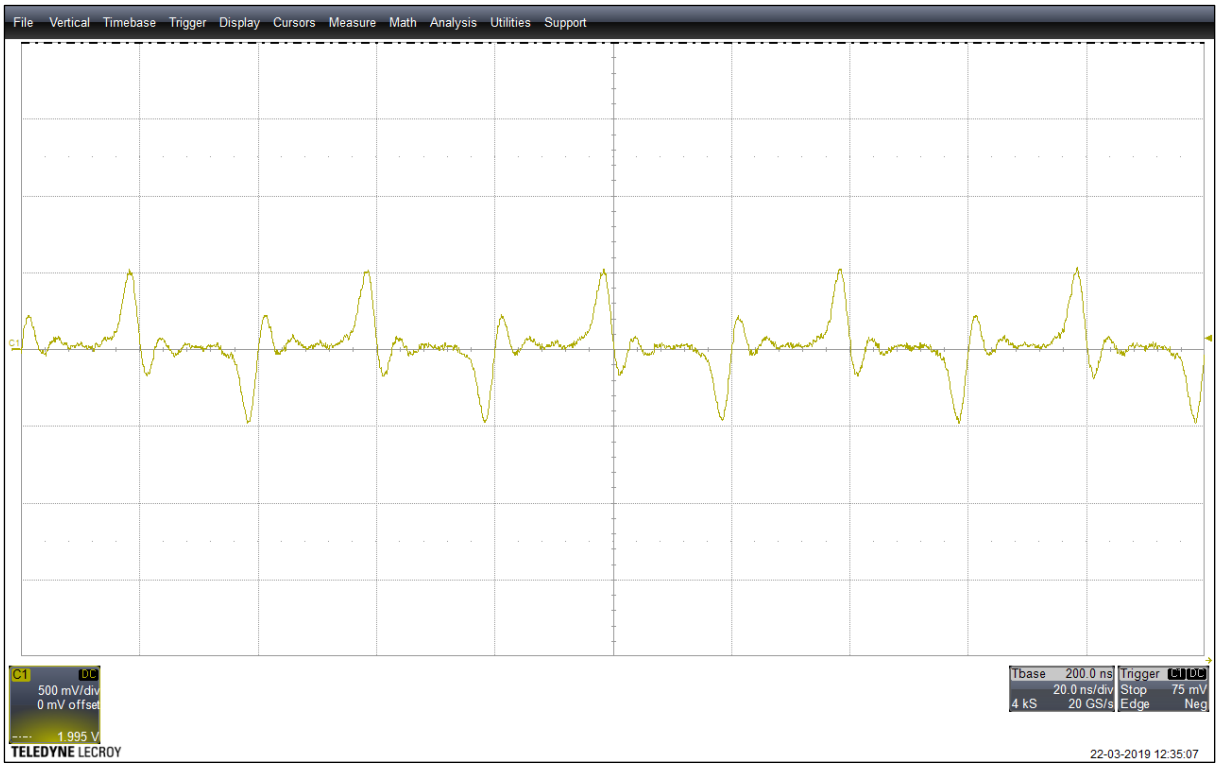


Figure 4-11: TestMode 6 for 1000BASE-T1 Mode

6 1000BASE-T1 Filter

The following 1000BASE-T1 Filter is used in the 1000BASE-T1 MediaConverter_EMC: The Pulse AE5002 is used.

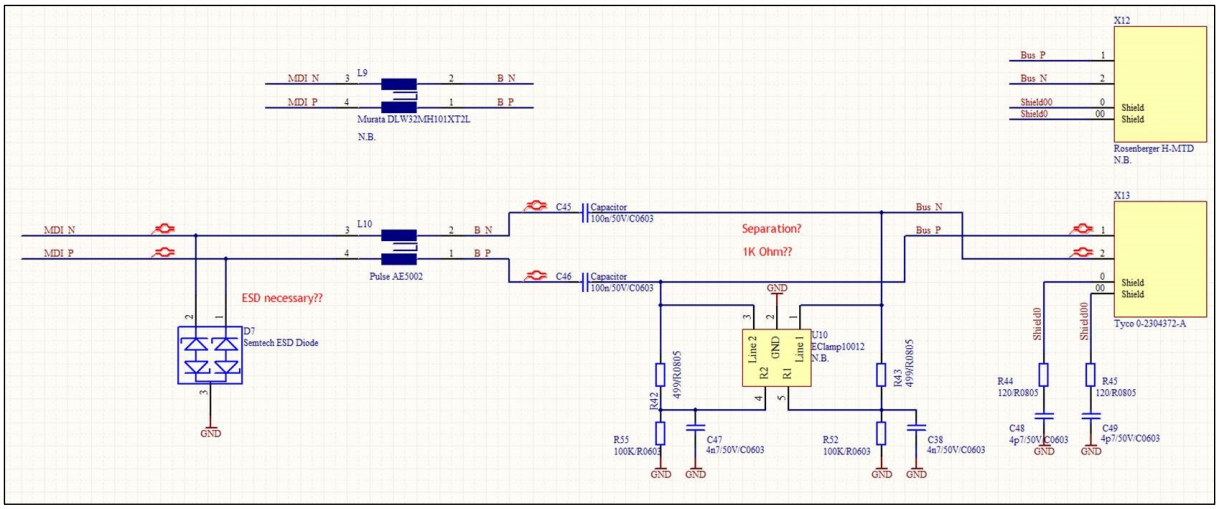


Figure 5-1: Used Filter in 1000BASE-T1 MediaConverter_EMC

7 GENERAL EMC TEST INFORMATION

Testcases:

We test our EMC products with 350 V/m in a Stripline setup from 1 MHz to 1 GHz. The devices are not damaged in this setup.
There will be no Link Drop on 100BASE-T1 or 1000BaseT1.

Warning: At frequencies below 1 MHz immunity must be tested at a maximum of 100V/m. Otherwise the devices will be permanently damaged!

We test our EMC products with 200 mA in a BCI substitution setup from 1 MHz to 1 GHz. The devices are not damaged in this setup.
There will be no Link Drop on 100BASE-T1 or 1000BaseT1.

Warning: BCI closed loop method is not allowed for 100BASE-T1 or 1000BaseT1 products. This test would permanently damage any device (independent of the vendor of device) if your generator is strong enough.

Warning: At frequencies below 1 MHz the immunity must be tested at a maximum of 40 mA. Otherwise the devices will be permanently damaged!

Emission:

We test our EMC devices according to automotive emission standards. Because standards and expectations vary, we grant a 4 week return period. You can test our device according to your needs in your chamber. If you are not satisfied with the result you can return the devices and get refunded.

8 ADDITIONAL INFORMATION

- The 1000BASE-T1 MediaConverter_EMC is optimized for automotive use. The maximum cable length for 1000BASE-T1 segments is limited to 15 meters.
- HW-version until v1.3 was delivered with nano-MQS connector instead of MATEnet connectors. If you need information about the pinning for the old version, please ask for that support@technica-engineering.de.

9 LIST OF FIGURES

10 CHANGELOG

Version	Chapter	Description	Date
1.0	All	First release	
2.0	All	Rework of design and update of all information	19.11.2018
3.0	All	Rework of design and update information	18.02.2019
3.1	4 and 5	Information about USB-Opto-Adapter added	03.04.2019
3.2	2.1.1	Added Connector Information	29.07.2019
3.3	4	Correction chapter	27.08.2019

11 CONTACT

If you have any questions regarding this product, please feel free to contact us:

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General information:
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Most current user manuals and product information:
https://technica-engineering.de/