

BUELEC

100/1000Base-T1-TX-E
BUELEC 100/1000Base-T1 to RJ45
(100/1000Base-TX) Automotive
Ethernet Media Converter E Version

100/1000Base-T1-TX-E User Manual



Data	Version	Description
2024/11/1	V10	

BUELEC	100/1000Base-T1-TX-E BUELEC 100/1000Base-T1 to RJ45 (100/1000Base-TX) Automotive Ethernet Media Converter E Version
---------------	---

1 Introduction

1.1 Low Cost Product Series

Product Name	T1 Interface	Power Supply	T1 Phy	Tx Phy	Size LxHxW(mm)
100/1000Base-T1-TX-E	15EDG3.81mm-2P MATENET Adapter MATENET Adapter	Type C	Marvell 88Q2112	RTL8211FI	50 × 20× 83
100/1000Base-T1-TX-TE	MATENET Male, 2302461-9	Type C DC Jack	Marvell 88Q2112	RTL8211FI	50 × 20× 83
100/1000Base-T1-TX-HMDT	H-MDT Male, E6S20A-40MT5-Z	Type C DC Jack	Marvell 88Q2112	RTL8211FI	50 × 20× 83

1.2 Product Description

The BUELEC 100/1000Base-T1-TX-E is a compact, high-performance media converter designed to bridge automotive single-pair Ethernet (100/1000BASE-T1) networks with standard twisted-pair Gigabit Ethernet (100/1000BASE-TX) infrastructure.

Utilizing the Marvell 88Q2112 PHY for T1 interface and Realtek RTL8211FI PHY for TX interface, this converter ensures seamless interoperability between modern automotive Ethernet systems and traditional IT/networking environments.

It is ideal for in-vehicle diagnostics (DoIP), smart cockpit domain controller flashing/upgrades, ADAS camera/radar development and debugging, industrial automation, and fleet management applications.

1.3 Product Features

- Protocol Compliance:** Fully supports IEEE 802.3bw (1000BASE-T1) for automotive single-pair Ethernet and IEEE 802.3ab (1000BASE-T) for traditional Gigabit Ethernet, enabling reliable data transmission in mixed-network setups.
- High-Speed Performance:** Delivers up to 1 Gbps full-duplex transmission rates over both T1 (single twisted pair) and TX (RJ45) interfaces, with auto-negotiation for 100/1000 Mbps compatibility and low-latency forwarding.

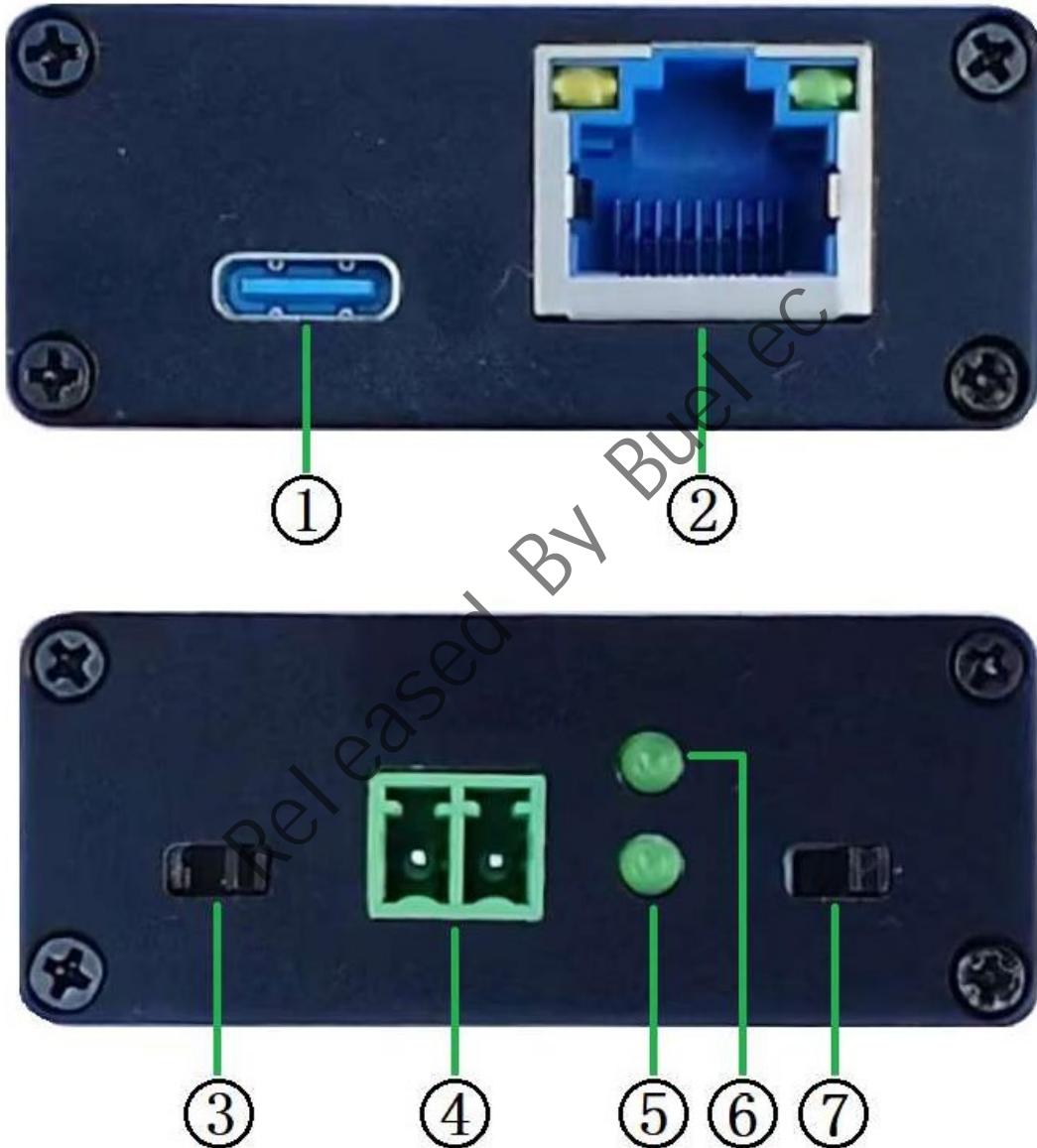
BUELEC

100/1000Base-T1-TX-E
BUELEC 100/1000Base-T1 to RJ45
(100/1000Base-TX) Automotive
Ethernet Media Converter E Version

- **Robust Protection:** Integrated over-voltage, over-current, and ESD (electrostatic discharge) protection safeguards against electrical surges, meeting automotive-grade reliability standards.
- **Industrial-Grade Durability:** Engineered to industrial standards with a wide operating temperature range (-40°C to +85°C), humidity tolerance (0-95% RH non-condensing), vibration resistance, and EMI shielding, making it suitable for harsh environments like vehicles, factories, and outdoor installations.
- **Advanced Networking Support:** Includes IEEE 802.1Q VLAN tagging for traffic segmentation, QoS prioritization, and enhanced security in multi-device ecosystems.
- **Plug-and-Play Design:** Compact form factor (50mm x 20mm x 83mm) with standard T1 differential signal terminal (15EDG3.81mm-2P) on one side and RJ45 port on the other; powered via USB Type-C (DC 5V ± 0.5V, ≤355mA) for flexible deployment.

2 Hardware

2.1 Interfaces and Indicators (Detailed Description)



BUELEC

100/1000Base-T1-TX-E
BUELEC 100/1000Base-T1 to RJ45
(100/1000Base-TX) Automotive
Ethernet Media Converter E Version

	Interface	Description
(1)	Power	USB Type-C power input (DC 5V). Connects via included Type-C USB cable for stable power supply.
(2)	RJ45	100/1000BASE-T Ethernet port. Connects to PCs, switches, or other network devices using 4 pairs of standard twisted-pair cable (CAT6 recommended).
(3)	Slave/Master Switch	Physical toggle switch for 100/1000BASE-T1 Master/Slave mode selection . Mode change takes effect immediately upon switching.
(5)	Status LED	Dual-function system and link/activity indicator: <ul style="list-style-type: none">• Solid Green: System self-test passed, and device is operating normally.
(6)	Status LED	<ul style="list-style-type: none">• Solid (T1 Link): 100/1000BASE-T1 link established.• Blinking: Data transmission/reception in progress on T1 interface.
(4)	+ / - (T1 Port)	100/1000BASE-T1 differential signal interface using 15EDG3.81mm-2P terminal block . Connects to ECU or other automotive Ethernet devices via a single twisted pair.
(7)	100M/1000M Switch	Physical toggle switch for selecting 100 Mbps or 1000 Mbps mode on the 100/1000BASE-T1 interface. Speed change takes effect immediately.

2.2 Typical Applications

PC/ARM ↔ RJ45 ↔ [1000BASE-T1-TX-E] ↔ Automotive Device / Network

Input Protocol	Output Protocol	Applications
100BASE-Tx	100BASE-T1	Vehicle diagnostics (DoIP), smart cockpit flashing, ADAS sensor debugging
1000BASE-Tx	1000BASE-T1	High-speed camera/radar data, ECU programming, R&D testing

The 1000BASE-T1-TX-E enables seamless conversion between industrial Ethernet and automotive single-pair Ethernet networks.

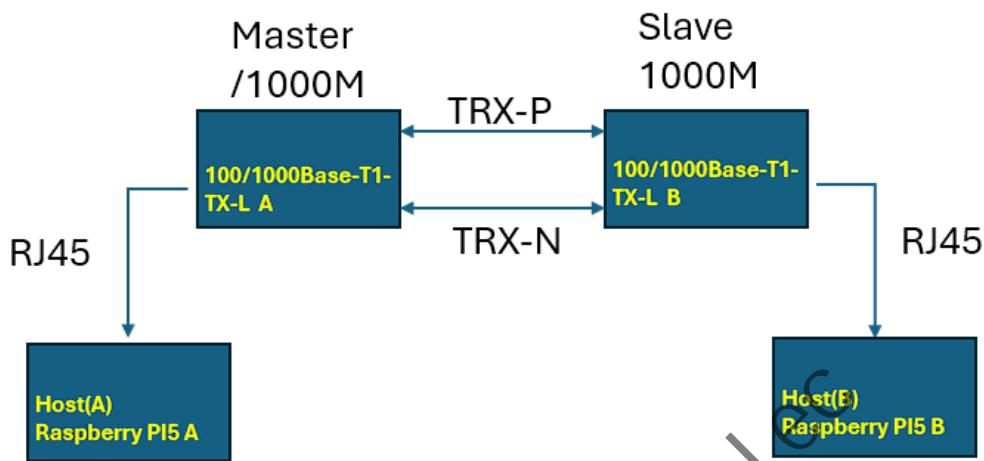
2.3 Product Specifications

Parameter	Specification
Input Voltage	5V ± 0.5V
Operating Current	≤ 355mA
Operating Temperature	-40°C to +85°C
Operating Humidity	0~95% RH (non-condensing)
Dimensions LxHxW	50mm × 20mm × 83mm

2.4 Automotive Ethernet Transmission Distance

T1 Speed Mode	Cable Type	Max Distance
100BASE-T1	Unshielded Twisted Pair (UTP)	20 m
100BASE-T1	Shielded Twisted Pair (STP)	50 m
1000BASE-T1	Unshielded Twisted Pair (UTP)	15 m
1000BASE-T1	Shielded Twisted Pair (STP)	40 m

3 Connection Diagram



Note:

There must be one device set as Master, Another One set as Slave.
Both of the devices should set to the same Speed.

4 User Guide for Linux OS

We use 2 Raspberry PI5, one as client(Master) and one as server(Slave)

Hardware connection as chapter 3.

4.1 Install iperf3

Open terminal window of both raspberry pi5.

```
sudo apt-get install iperf3
```

Note: Do not choose iperf3 as a daemon automatically.

Or it will fail when you run next boot.

Download python scripts from our github.

```
sudo git clone https://github.com/buelec-tech/100-1000Base-T1-TX-L
```

4.2 Turn off WI-FI

4.3 Set IP And Ping

Host A As Client (190.19.1.9), Host B As Server (190.19.1.90)

Host A (Raspberry Pi5 A), Client	Host B (Raspberry Pi5 B), Server
sudo ifconfig eth0 down	sudo ifconfig eth0 down
sudo ifconfig eth0 190.19.1.9	sudo ifconfig eth0 190.19.1.90
sudo ifconfig eth0 up	sudo ifconfig eth0 up

Open **Host A** Terminal window, run below command check if network connected.

```
sudo ping eth0 -i 190.19.1.90
```

- If work, then go ahead with chapter 4.4
- If it does not work, re-check connection follow chapter3

4.4 TCP Test

Open Host B (190.19.1.90) Terminal, Set as server

```
sudo iperf3 -s
```

Note: if your system does not install iperf3, follow chapter 4.1

Open Host A (190.19.1.9) Terminal, send data.

```
sudo iperf3 -c 190.19.1.90 -n 8000M -i 30
```

```
Connecting to host 190.19.1.90, port 5201
[ 5] local 190.19.1.9 port 48790 connected to 190.19.1.90 port 5201
[ ID] Interval           Transfer     Bitrate      Retr  Cwnd
[ 5]  0.00-30.00  sec   3.27 GBytes   937 Mbits/sec    0    518 KBytes
[ 5] 30.00-60.00  sec   3.27 GBytes   936 Mbits/sec    0    518 KBytes
[ 5] 60.00-71.63  sec   1.27 GBytes   937 Mbits/sec    0    518 KBytes
[ 5] 71.63-71.63  sec      0 Bytes    0 Mbit/sec   1000  518 KBytes
[ 5] 71.63-71.64  sec   7.81 GBytes   937 Mbits/sec    0             sender
[ 5]   0.00-71.64  sec   7.81 GBytes   937 Mbits/sec    0             receiver
```

4.4 UDP Test

Open Host B (190.19.1.90) Terminal, Set as server

www.buelec-tech.com

sales@buelec-tech.com

support@buelec-tech.com

BUELEC

100/1000Base-T1-TX-E
BUELEC 100/1000Base-T1 to RJ45
(100/1000Base-TX) Automotive
Ethernet Media Converter E Version

```
sudo iperf3 -s
```

Open Host A (190.19.1.9) Terminal , Set as client and send data.

```
sudo iperf3 -c 190.19.1.90 -u -b 8000M -l 8k -n 1000M
```

```
Connecting to host 190.19.1.90, port 5201
[ 5] local 190.19.1.9 port 38178 connected to 190.19.1.90 port 5201
[ ID] Interval      Transfer     Bitrate      Retr  Cwnd
[ 5]  0.00-30.00  sec   3.27 GBytes   937 Mbits/sec    0   544 KBytes
[ 5] 30.00-60.00  sec   3.27 GBytes   937 Mbits/sec    0   1.37 MBytes
[ 5] 60.00-71.63  sec   1.27 GBytes   936 Mbits/sec    0   1.37 MBytes
[ -----
[ ID] Interval      Transfer     Bitrate      Retr
[ 5]  0.00-71.63  sec   7.81 GBytes   937 Mbits/sec    0             sender
[ 5]  0.00-71.63  sec   7.81 GBytes   936 Mbits/sec             receiver

iperf Done.
```

5 User Guide for Windows

We use 2 windows computers, one as client(Master) and one as server(Slave)

Hardware connection as chapter 3.

5.1 Install iperf3

Download from our github link:

<https://github.com/buelec-tech/100-1000Base-T1-TX-L> unzip iperf3.6_64bit.zip

5.2 Turn off firewalls

5.3 Set IP And Ping

Computer A IP,Client	Computer B IP ,Server
----------------------	-----------------------

BUELEC

100/1000Base-T1-TX-E
BUELEC 100/1000Base-T1 to RJ45
(100/1000Base-TX) Automotive
Ethernet Media Converter E Version

<p>General</p> <p>You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.</p> <p><input type="radio"/> Obtain an IP address automatically <input checked="" type="radio"/> Use the following IP address:</p> <p>IP address: 190 . 19 . 1 . 9 Subnet mask: 255 . 255 . 0 . 0 Default gateway: 190 . 19 . 1 . 1</p> <p><input type="radio"/> Obtain DNS server address automatically <input checked="" type="radio"/> Use the following DNS server addresses:</p> <p>Preferred DNS server: 8 . 8 . 8 . 8 Alternate DNS server: 8 . 8 . 4 . 4</p> <p><input type="checkbox"/> Validate settings upon exit Advanced...</p>	<p>General</p> <p>You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.</p> <p><input type="radio"/> Obtain an IP address automatically <input checked="" type="radio"/> Use the following IP address:</p> <p>IP address: 190 . 19 . 1 . 90 Subnet mask: 255 . 255 . 0 . 0 Default gateway: 190 . 19 . 1 . 1</p> <p><input type="radio"/> Obtain DNS server address automatically <input checked="" type="radio"/> Use the following DNS server addresses:</p> <p>Preferred DNS server: 8 . 8 . 8 . 8 Alternate DNS server: 8 . 8 . 4 . 4</p> <p><input type="checkbox"/> Validate settings upon exit Advanced...</p>
190.19.1.9 255.255.0.0 190.19.1.1 8.8.8.8 8.8.4.4	190.19.1.90 255.255.0.0 190.19.1.1 8.8.8.8 8.8.4.4

Open Terminal (Admin) on Computer A, Switch to the iperf3 directory

Terminal

Terminal (Admin)

cd F:\iperf3.6_64bit

```
ping -i 190.19.1.9 190.19.1.90          # ping from 190.19.1.9(client)
PS F:\iperf3.6_64bit> ping -i 190.19.1.9 190.19.1.90

Pinging 190.19.1.90 with 32 bytes of data:
Reply from 190.19.1.90: bytes=32 time=2ms TTL=128
Reply from 190.19.1.90: bytes=32 time=2ms TTL=128
Reply from 190.19.1.90: bytes=32 time=2ms TTL=128
Reply from 190.19.1.90: bytes=32 time=3ms TTL=128

Ping statistics for 190.19.1.90:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

BUELEC

100/1000Base-T1-TX-E
BUELEC 100/1000Base-T1 to RJ45
(100/1000Base-TX) Automotive
Ethernet Media Converter E Version

5.4 100M Test

Open Host B (190.19.1.90) Terminal, Set as server

```
.\iperf3.exe -B 190.19.1.90 -s # Host B listen
```

Open Host A (190.19.1.9) Terminal, Set as client and send data.

```
.\iperf3.exe -c 190.19.1.90 -B 190.19.1.9 -w 100M -t 10 # Host A send data
```

```
PS F:\iperf3.6_64bit> .\iperf3.exe -c 190.19.1.90 -B 190.19.1.9 -w 100M -t 10
warning: Ignoring nonsense TCP MSS 0
Connecting to host 190.19.1.90, port 5201
[ 5] local 190.19.1.9 port 9557 connected to 190.19.1.90 port 5201
[ ID] Interval           Transfer     Bitrate
[ 5]  0.00-1.00   sec   111 MBytes   933 Mbits/sec
[ 5]  1.00-2.00   sec   11.2 MBytes  94.4 Mbits/sec
[ 5]  2.00-3.00   sec   11.4 MBytes  95.3 Mbits/sec
[ 5]  3.00-4.00   sec   11.4 MBytes  95.5 Mbits/sec
[ 5]  4.00-5.00   sec   11.2 MBytes  94.4 Mbits/sec
[ 5]  5.00-6.00   sec   11.4 MBytes  95.3 Mbits/sec
[ 5]  6.00-7.00   sec   11.2 MBytes  94.4 Mbits/sec
[ 5]  7.00-8.00   sec   11.4 MBytes  95.5 Mbits/sec
[ 5]  8.00-9.00   sec   11.2 MBytes  94.4 Mbits/sec
[ 5]  9.00-10.00  sec   11.4 MBytes  95.4 Mbits/sec
- - - - - [ ID] Interval           Transfer     Bitrate
[ 5]  0.00-10.00  sec   213 MBytes  179 Mbits/sec
[ 5]  0.00-10.13  sec   114 MBytes  94.6 Mbits/sec
                                         sender
                                         receiver
```

5.4 1000M Test

Open Host B (190.19.1.90) Terminal, Set as server

```
.\iperf3.exe -B 190.19.1.90 -s # Host B listen
```

Open Host A (190.19.1.9) Terminal, Set as client and send data.

```
.\iperf3.exe -c 190.19.1.90 -B 190.19.1.9 -w 100M -t 1
# -c <host address> , -B <Client address >
```

6 Packing List

No.	Item	Quantity	Unit
1	1000BASE-T1-TX-E Converter	1	pcs
2	2-Pin Terminal Block (15EDG3.81mm-2P)	1	pcs
3	Type-C USB Power Cable	1	pcs
4	CAT6 Ethernet Cable	1	pcs
5	TE MATEnet (1x1) 150mm pigtail to terminal block 	1	pcs
6	Rosenberger HMD-T 150mm pigtail to terminal block 	1	pcs

6.1 Accessories Recommend

<https://www.buelec-tech.com/product/1000base-t1-cable-h-mdt/>

<https://www.buelec-tech.com/product/1000base-t1-cable-matenet-connector/>

BUELEC

100/1000Base-T1-TX-E
BUELEC 100/1000Base-T1 to RJ45
(100/1000Base-TX) Automotive
Ethernet Media Converter E Version

