

Mobile Computing Solutions **Ethernet mini PCIe Module w/ BroadR-Reach 100Mbps PIME1000**

User Manual

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PREFACE

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Acknowledgements

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RoHS Compliance



DELTA COMPONENTS GmbH RoHS Environmental Policy and Status Update

DELTA COMPONENTS GmbH is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment.

RoHS restricts the use of Lead (Pb) < 0.1% or 1,000ppm, Mercury (Hg) < 0.1% or 1,000ppm, Cadmium (Cd) < 0.01% or 100ppm, Hexavalent Chromium (Cr6+) < 0.1% or 1,000ppm, Polybrominated biphenyls (PBB) < 0.1% or 1,000ppm, and Polybrominated diphenyl Ethers (PBDE) < 0.1% or 1,000ppm. In order to meet the RoHS compliant directives, DELTA COMPONENTS GmbH has established an engineering and manufacturing task force to implement the introduction of green products. The task force will ensure that we follow the standard DELTA COMPONENTS GmbH development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which DELTA COMPONENTS GmbH are renowned.

How to recognize DELTA COMPONENTS GmbH RoHS Products?

For existing products where there are non-RoHS and RoHS versions, the suffix (LF) will be added to the compliant product name.

All new product models launched after January 2013 will be RoHS compliant. They will use the usual DELTA COMPONENTS GmbH naming convention.

Safety Information

Before installing and using the device, note the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Follow all warnings and cautions in this manual.
- When replacing parts, ensure that your service technician uses parts specified by the manufacturer.
- Avoid using the system near water, in direct sunlight, or near a heating device.
- The load of the system unit does not solely rely for support from the rackmounts located on the sides. Firm support from the bottom is highly necessary in order to provide balance stability.

Installation Recommendations

Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.

Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:

- A Philips screwdriver
- A flat-tipped screwdriver
- A grounding strap
- An anti-static pad

Using your fingers can disconnect most of the connections. It is recommended that you do not use needlenose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.

Safety Precautions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect the equipment from any AC outlet before cleaning or installing a component inside the chassis. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. To prevent electrostatic build-up, leave the module in its anti-static bag until you are ready to install it.
5. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
6. Keep the module away from humidity.
7. Put the module on a stable surface. Dropping it or letting it fall may cause damage.
8. Wear anti-static wrist strap.
9. Do all preparation work on a static-free surface.
10. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
11. Hold the module only by its edges. Be careful not to touch any of the components, contacts or connections.
12. All cautions and warnings on the module should be noted.
13. Use the correct mounting screws and do not over tighten the screws.
14. Keep the original packaging and the anti-static bag; in case the board has to be returned for repair or replacement.

Technical Support and Assistance

1. For the most updated information of DELTA COMPONENTS products, visit DELTA COMPONENTS website at www.delta-components.de
2. For technical issues that require contacting our technical support team or sales representative, please have the following information ready before calling:
 - Product name and serial number
 - Detailed information of the peripheral devices
 - Detailed information of the installed software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wordings of the error messages

Warning!

1. Handling the unit: carry the unit with both hands and handle it with care.
2. Maintenance: to keep the unit clean, use only approved cleaning products or clean with a dry cloth.

Package Contents

Before continuing, verify that the PIME1000 package that you received is complete. Your package should have all the items listed in the following table.

Item	Part Number	Description	Qty
1		PIME1000	1
2		I Head Screw Long Fei:I2x3 NI Nylok I2x3 NI Nylo	2
3		DB9 Cable for PIME1000 L=250mm	1

Ordering Information

The following provides ordering information

PIME1000

Ethernet mini PCIe Module w/ BroadR-Reach 100Mbps
BROADCOM BCM89811, D-Sub HD9 conn., -40°C to 85°C

CHAPTER 1: PRODUCT INTRODUCTION

Overview

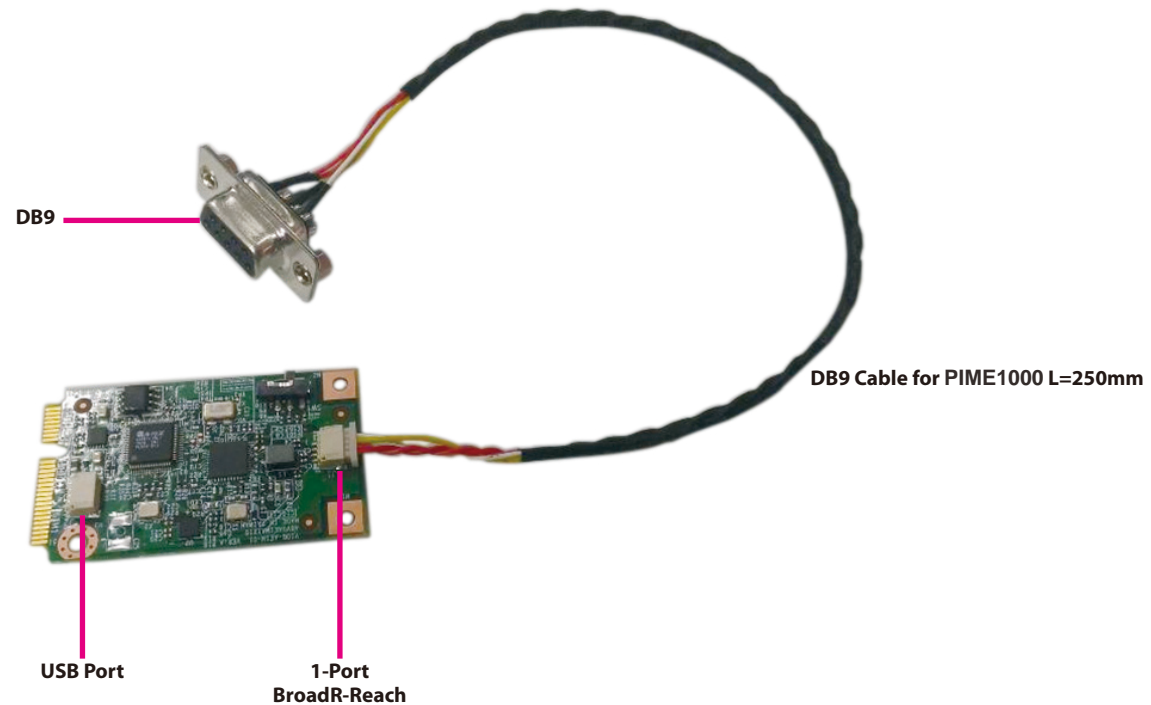
PIME1000 is designed with one port automotive Ethernet which is compliant with IEEE 802.3bw to satisfy the modern infotainment applications by just using one UTP cable to work. Besides, it can reduce the vehicle weight compared to traditional Ethernet and save a specific infrastructure cost. With mPCIe form-factor design, the user can easily install PIME1000 to any vehicle computers or any devices with a built-in mPCIe slot suitable for vehicle audio/video stream access or vehicle lab for testing.

Key Features

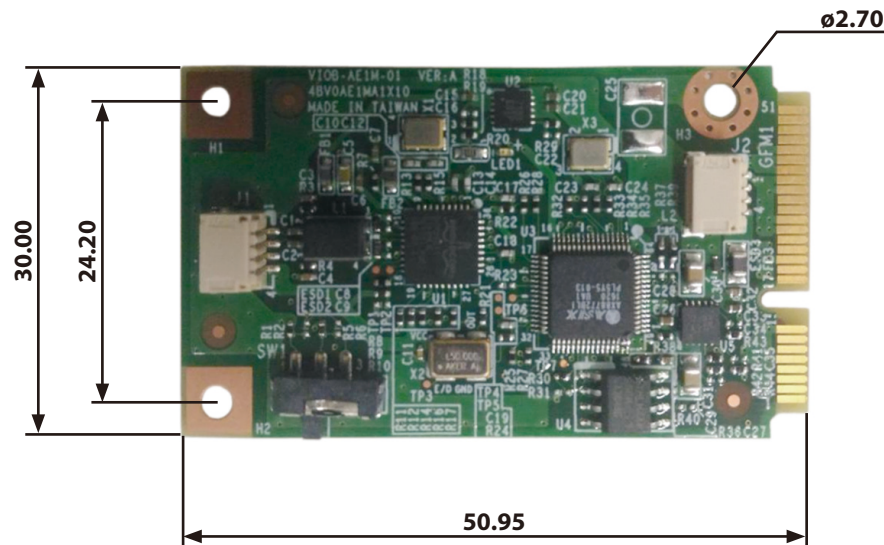
- Compliant with IEEE 100BASE T1 (IEEE 802.3bw)
- Single UTP to use to reduce the overall cost
- Mini-PCIe form factor for easy & quick installation
- Alternative USB interface (Signal shared with Mini-PCIe)
- Wide-range operating temperature
- Easy to leverage existing Ethernet environments
- Master-Slave Configuration via a switch to reduce latency during handshaking

Physical Features

PIME1000



Mechanical Dimension



Hardware Specifications

Form Factor

- Mini-PCle form factor

PC Interface

- USB 2.0 (VCP, baud rate 57.6kbps)

I/O Connector

- 4-pin wafer connector (USB 2.0 I/F)
- DB9 connector for 1-Port BroadR-Reach (IEEE 802.3bw)
[w/ an external cable]

USB 2.0 to Ethernet

- MAC/RMII Chip: ASIX: AX88772BLI

1-Port BroadR-Reach 100Mbps

- PHY Chip: BROADCOM BCM89811
- Copper MDI: full-duplex, one-pair UTP
- IEEE 1588/802.1AS
- Reach distance: 15m
- Compliant to IEEE 802.3bw™ (IEEE 100Base-T1)

Dimension

- 51mm (L) x 30mm (W) (2.01" x 1.18")
- Weight: 13g

Environment

- Operating Temperatures: -40 ~ 85°C
- Storage Temperatures: -40 ~ 90°C
- Related Humidity (with system chassis): 5% ~ 90%

Vibration/Shock

Vibration test

- Operating:
 - IEC 60068-2-64, 2G
 - MIL-STD-810G, 514.6C Procedure 1, Category 4
- Storage:
 - MIL-STD-810G, 514.6E Procedure 1, Category 24

Shock test

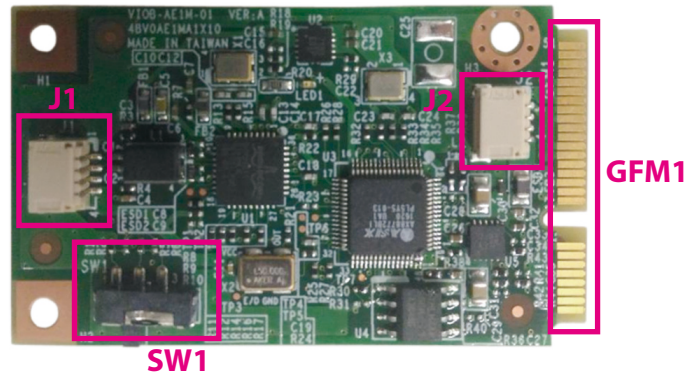
- MIL-STD-810G, 516.6 Procedure I, trucks and semi-trailers=40g
- Crash hazard: Procedure V, ground equipment=75g

Operating System

- Linux kernel 3.x (above)

CHAPTER 2: PINOUT ASSIGNMENTS

Locations of the DIP Switches & Connectors

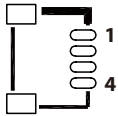


Connector Pin Definitions

USB Connector

Connector type: 1x4 4-pin header

Connector location: J2

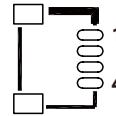


Pin	Definition	Pin	Definition
1	GND	2	USB_P
3	USB_N	4	5V

1-Port BroadR-Reach (100Mbps) Connector

Connector type: 1x4 4-pin header

Connector location: J1

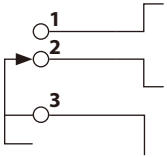


Pin	Definition	Pin	Definition
1	TRD+	2	TRD-
3	LED-	4	LED+

Master/Slave Switch

Connector type: 3-pin switch

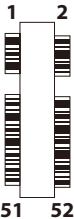
Connector location: SW1



Pin	Definition	Pin	Definition
1	SLAVE	2	MASTER
3	COM		

Mini-PCle Golden Finger

Connector location: GFM1

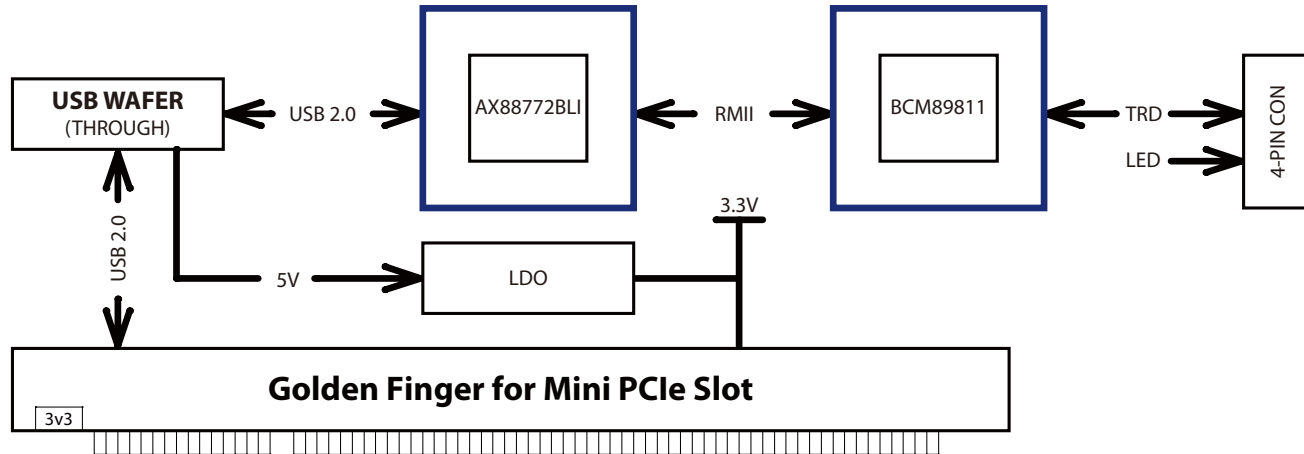


Pin	Definition	Pin	Definition
1	NA	2	3V3
3	NA	4	GND
5	NA	6	NA
7	NA	8	NA
9	GND	10	NA
11	NA	12	NA
13	NA	14	NA
15	GND	16	NA
17	NA	18	GND
19	NA	20	CN_DISABLE#
21	GND	22	SYS_RST#
23	NA	24	3V3
25	NA	26	GND

Pin	Definition	Pin	Definition
27	GND	28	NA
29	GND	30	NA
31	NA	32	NA
33	NA	34	GND
35	GND	36	MINI_DN
37	GND	38	MINI_DP
39	3V3	40	GND
41	3V3	42	NA
43	GND	44	NA
45	NA	46	NA
47	NA	48	NA
49	NA	50	GND
51	NA	52	3V3

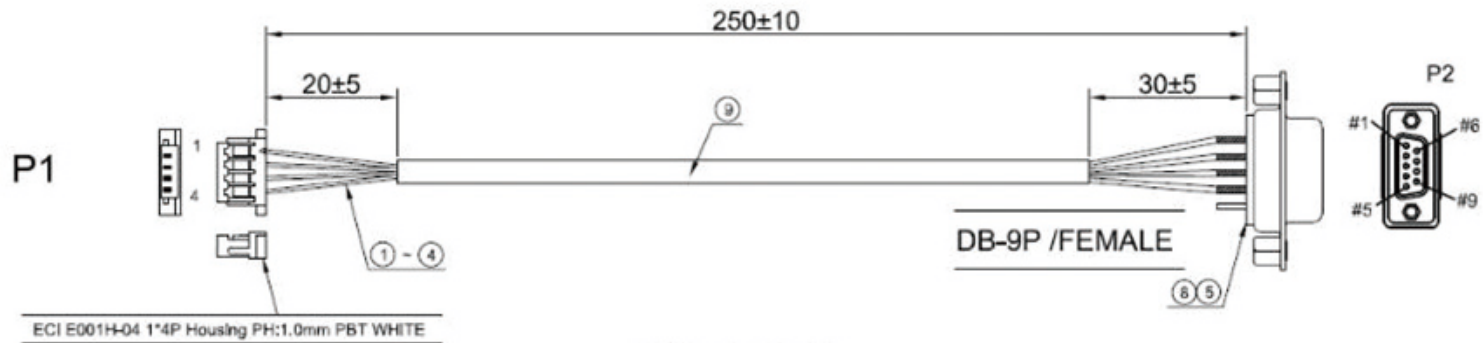
CHAPTER 3: BLOCK DIAGRAM

PIME1000



CHAPTER 4: CABLE DRAWING & PIN-OUT

DB9 Cable for PIME1000



Pin Assignment

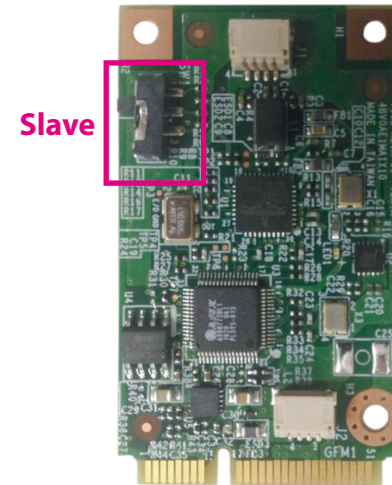
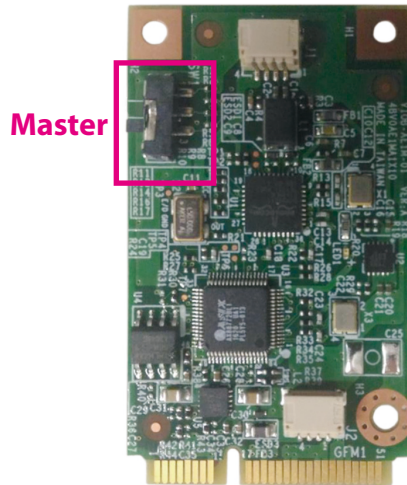
	P1		P2	
TRD+	1	RED	6	Twisted
TRD-	2	ORANGE	1	Twisted
LED-	3	YELLOW	3	
LED+	4	WHITE	4	

CHAPTER 5: INSTALLING PIME1000 ON LINUX

Checking the Module Mode

Master/Slave

Confirm whether the module is in master mode or slave mode by checking the DIP switch as shown below. There should be one master (generally a station management system), while the other should be in slave mode (connected node).



Building the Driver

Starting the Build

1. Root permission
2. Decompress file
 - Switch to console mode
 - `tar xzfp ASIX.4.2.2.nexcom.tar.gz`

```
tar xzfp ASIX.4.2.2.nexcom.tar.gz
ASIX.4.2.2# ls -la
drwxr-xr-x 14 11:02 asix.c
drwxr-xr-x 17 2014 asix.h
drwxr-xr-x 23 2016 axusbnet.c
drwxr-xr-x 18 2016 axusbnet.h
drwxr-xr-x 23 2016 Makefile
drwxr-xr-x 24 2016 readme
```

3. Build driver
 - `cd ASIX.4.2.2`
 - `make; make install`

```
root@VTC1910:/pub/aaa/ASIX.4.2.2# make; make install
make -C /lib/modules/4.4.0-91-generic/build SUBDIRS=/pub/aaa/ASIX.4.2.2 modules
make[1]: Entering directory `/usr/src/linux-headers-4.4.0-91-generic'
  CC [M]  /pub/aaa/ASIX.4.2.2/asix.o
  Building modules, stage 2.
  MODPOST 1 modules
  CC      /pub/aaa/ASIX.4.2.2/asix.mod.o
  LD [M]  /pub/aaa/ASIX.4.2.2/asix.ko
make[1]: Leaving directory `/usr/src/linux-headers-4.4.0-91-generic'
su -c "cp -v asix.ko /lib/modules/4.4.0-91-generic/kernel/drivers/net/usb && /sbin/depmod -a"
'asix.ko' -> '/lib/modules/4.4.0-91-generic/kernel/drivers/net/usb/asix.ko'
```

4. Reboot
 - `reboot`

Checking the Device

Confirming if Successful

1. Please retrieve the network interface information by using the "ifconfig" command.

- `ifconfig`

```
eth9      Link encap:Ethernet  HWaddr 00:09:04:16:88:b3
          inet6 addr: fe80::209:4ff:fe16:88b3/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:25636814 errors:0 dropped:0 overruns:0 frame:0
          TX packets:51273707 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1333161817 (1.3 GB)  TX bytes:77830778456 (77.8 GB)
```