10G PON Chipset

10G PON Development Kit
EASY PRX126 REF BOARD

PRX126 SFP+ Reference Board

with
Base Board EASY 98900 V2.2

V2.2.2 HW6.1.02

Getting Started

MaxLinear Confidential

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All	• This document was renamed and incorporated into the HW6.1.02 HDK milestone. • Changed EASY PRX126 REF BOARD version from 2.2.x to 2.2.2.

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Preface

The 10G PON Development Kit EASY PRX126 REF BOARD V2.2.2 SFP+ with the Base Board EASY 98900 V2.2 is a reference and demonstration platform for 10G PON Chipset PRX126 devices. This Getting Started document describes the basic steps for initial operation.

This document uses these synonyms to simplify matters:

PRX126

Synonym used for the 10G PON Chipset PRX126

EASY PRX126 REF BOARD

Synonym used for the 10G PON Development Kit EASY PRX126 REF BOARD V2.2.2

EASY 98900

Synonym used for the Base Board EASY 98900 V2.2

Organization of this Document

- **Chapter 1, Introduction to the EASY PRX126 REF BOARD SFP+**
  This chapter provides basic information about the EASY PRX126 REF BOARD.
- **Chapter 2, Bootloader Preparation**
  This chapter describes how to install, recover, or upgrade the U-Boot* environment on the EASY PRX126 REF BOARD SFP+.
- **Chapter 3, Installing the Software Image Using the Ethernet Interface**
  This chapter provides instructions on how to install the 10G PON Chipset software image.
- **Chapter 4, Microchip Technology* ATmega328 Console and Basic Base Board Debug Features**
  This chapter describes how to use the EASY 98900 debugging features.
- **Chapter 5, Basic PON Operation**
  This chapter shows how use the utilities built into the 10G PON Chipset software in a GPON environment.
- **Literature References**

Document Conventions

These text formatting conventions are used throughout this document.

- *Italicized font* indicates important notes.
- `Monospace font` is used for console output, file names, or directories.
- **`Bold monospace font`** is used for commands the user must enter or to highlight important information in console output.

1 Introduction to the EASY PRX126 REF BOARD SFP+

This chapter lists the contents of the package and the features of the EASY PRX126 REF BOARD SFP+ and the EASY 98900 development kit.

1.1 Contents of the Package

The package contains these items:

- EASY PRX126 REF BOARD SFP+ stick, SC/APC connector (Angled/Polished)
- The Base Board EASY 98900 V2.2
- A 110 - 240 VAC / 12 VDC power supply
- A USB cable with Type-A to USB Micro-B connectors

1.2 Board Overview

Figure 1 shows the EASY PRX126 REF BOARD V2.2.2 plugged into the EASY 98900 V2.2 with the default jumper configuration.

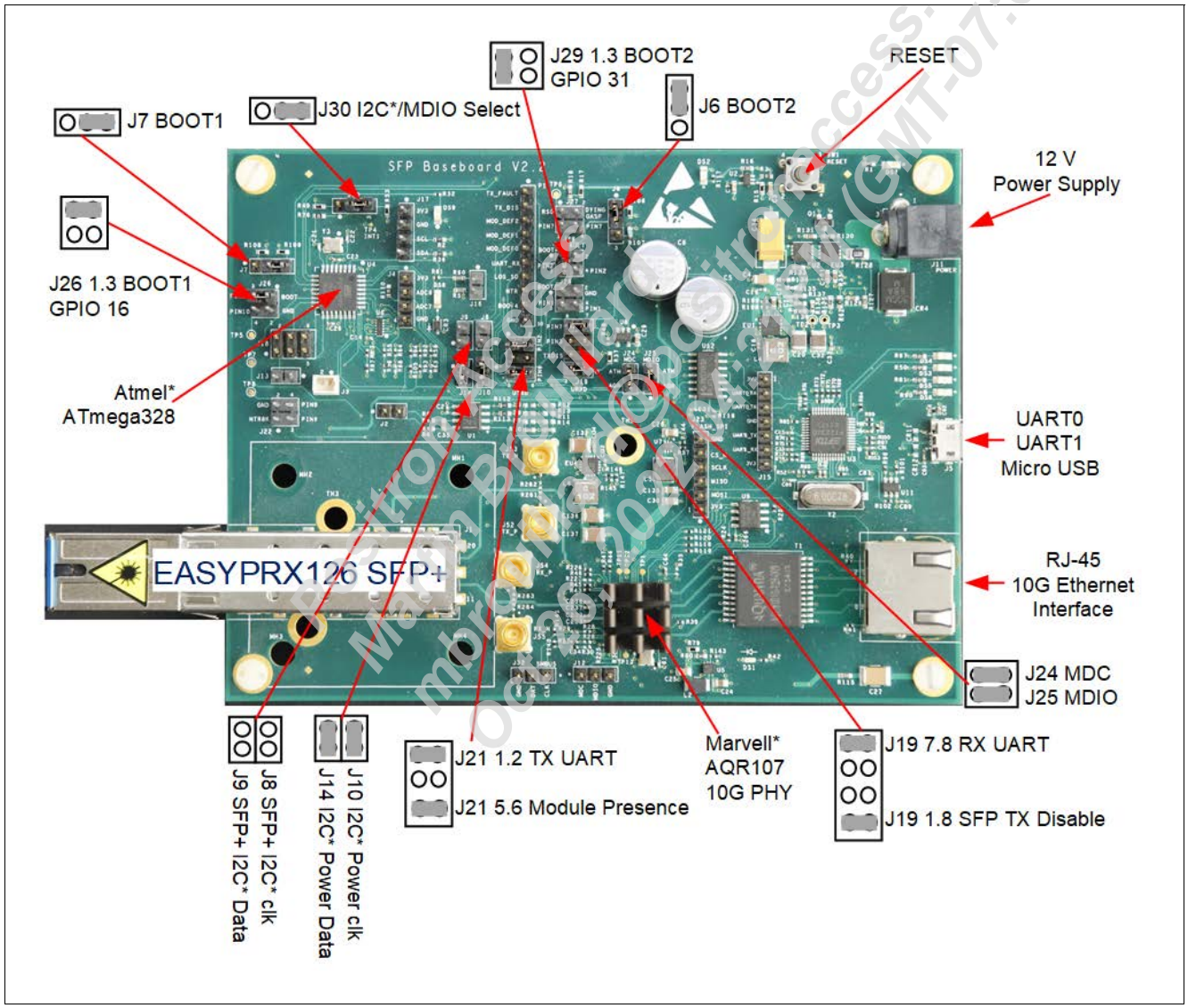

Figure 1 EASY PRX126 REF BOARD V2.2.2

1.3 EASY PRX126 REF BOARD V2.2.2 SFP+ Relevant Features

These are notable features of the EASY PRX126 REF BOARD SFP+ and the EASY 98900:

- An FTDI* FT2232D device mounted on the base board provides two serial ports (UART0 and UART1) for debugging purposes. These ports are accessible via a USB Micro-B connector.
- The 10G Ethernet interface supports 10GBASE-T, 2.5GBASE-T, 1000BASE-T, and auto-negotiates to the fastest available mode. This capability allows host PCs that do not support 10GBASE-T to connect to the EASY 98900.
  - The 10G Ethernet interface does not support 10BASE-T and 100BASE-T modes.
  - The Ethernet interfaces are dedicated for user traffic, updating the 10G PON Chipset software image, or for allowing access control, such as SSH or TFTP.
- The default boot mode for standard operation is Quad Bit NAND (QSPI).
- MaxLinear provides the EASY PRX126 REF BOARD SFP+ with a pre-installed 10G PON Chipset Linux* software image.
  - Updating the software image requires an Ethernet connection between the EASY PRX126 REF BOARD SFP+ and the host PC.
- The EASY 98900 is equipped with an ATmega328 a single-chip microcontroller from Microchip Technology*, accessible over UART1. It provides extended debug features, such as power consumption measurement.
- The EASY 98900 is not designed for extensive qualification tests over a wide temperature range.

1.4 Initial Configuration

This section describes how to connect to and operate the EASY PRX126 REF BOARD SFP+.

Complete these steps to connect to the EASY PRX126 REF BOARD SFP+:

Note: These steps use Microsoft Windows* as an example host PC. The EASY PRX126 REF BOARD SFP+ is also configurable from Linux*-based PCs. Adapt and use the provided information when using a Linux*-based PC.*

1. Plug the EASY PRX126 REF BOARD SFP+ into the EASY 98900.
2. Connect the USB cable:
   a) Connect the Type-A connector to the host PC.
   b) Connect the USB Micro-B connector to the EASY PRX126 REF BOARD SFP+.
3. Power on the EASY 98900:
   a) Connect AC/DC power supply to an AC power outlet.
   b) Connect the power connector from the AC/DC power supply to the EASY 98900.
4. Wait for Microsoft* Windows* to detect the FTDI* FT2232D device and install the required drivers. These drivers are available at the FTDI* website.
5. Open a terminal emulation software and verify Microsoft* Windows* installed the UART0 and UART1 interfaces as COM ports. **Figure 2** provides an example of how these interfaces appear when using the TeraTerm* terminal emulation software.
6. Configure the terminal software with these parameters when connecting to UART0:
   a) Baud: 115200
   b) Data bits: 8
   c) Parity: None
   d) Stop bits: 1
   e) Flow control: None
7. Configure the terminal software with these parameters when connecting to UART1:
   a) Baud: 57600
   b) Data bits: 8
   c) Parity: None
   d) Stop bits: 1
   e) Flow control: None
8. Initiate the connection to the EASY PRX126 REF BOARD SFP+ over the base board.
9. (Optional) Connect an Ethernet cable from the EASY 98900 10G Ethernet port and the host PC when updating the 10G PON Chipset Linux* software image, see **Section 2.1.2**.

Note: Sometimes the EASY PRX126 REF BOARD console does not appear after power cycling. When this occurs, restart the terminal software and reconnect to the COM port.

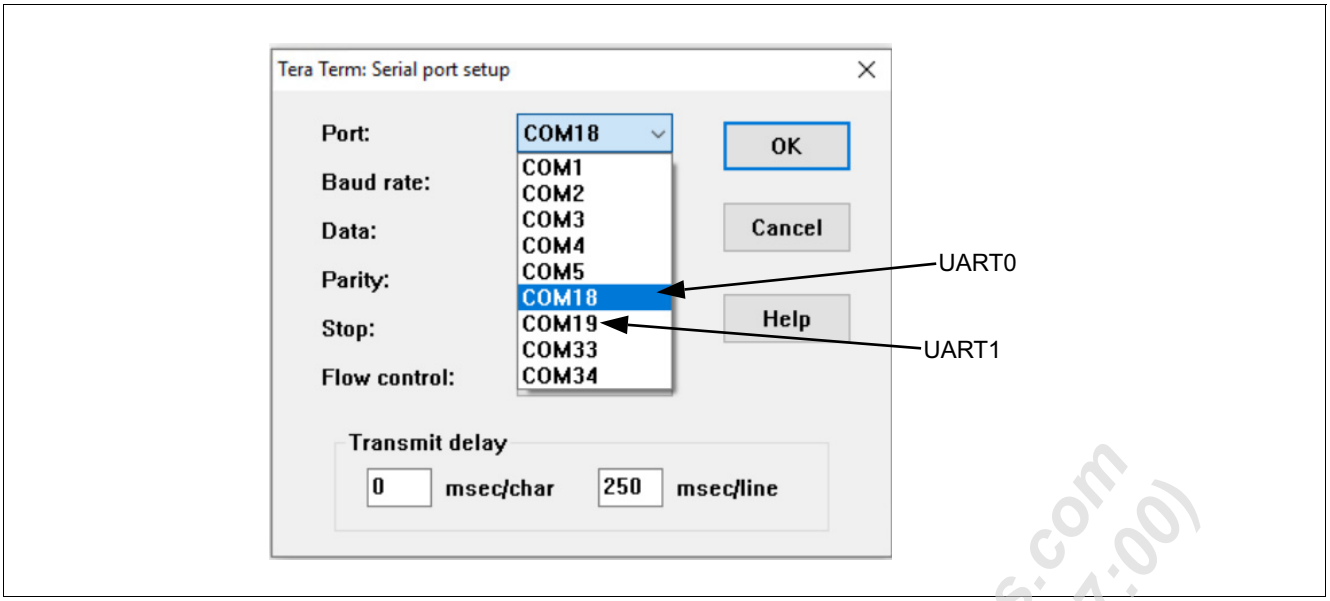

Figure 2 UART0 and UART1 Detected as COM Ports

Note: The assignment of COM port numbers possibly varies from PC to PC.

2 Bootloader Preparation

Updating U-Boot* on the EASY PRX126 REF BOARD SFP+ is required in two situations:

- To restore a corrupted or deleted flash memory.
- To update the 10G PON Chipset software.

The EASY 98900 hardware jumpers control the board's boot mode. Refer to **[1]** for more information on supported boot modes.

2.1 Boot Mode Selection

Certain conditions require modifying the default boot mode.

See **Section 2.1.1** for instructions on repairing U-Boot* using the serial interface.

See **Section 2.1.2** for instructions on updating U-Boot* using the Ethernet interface.

2.1.1 Repairing U-Boot* Using the Serial Interface

This section describes how to repair the U-Boot* environment using the serial interface.

1. Not all boot modes are available for use on the EASY 98900 because the golden finger edge connector on the EASY PRX126 REF BOARD SFP+ has a limited number of pins available. Due to this limitation, SFP+ reference boards lead to an invalid boot mode (0x3) that triggers a UART update. To avoid this situation, configure the jumpers according to **Table 1** and **Figure 3** so that the EASY PRX126 REF BOARD SFP+ boots from UART0 (`0x4`). Refer to **[1]** for more information on boot modes.
2. Connect to the EASY 98900 from the host PC using terminal emulation software.
3. Unplug the SFP+ from the EASY 98900.
4. Power on the EASY 98900.
5. Plug the SFP+ to the EASY 98900.
6. Transfer the `u-boot.asc` file. This file is located in this folder of the 10G PON Chipset SDK:
   `<sdk_folder>/sw/PRX300_DEBUG/uboot-prx126-sfu-qspi-nand/`
   Figure 4 shows an example of using Tera Term* to send this file.
7. This console output shows an example of an EASY PRX126 REF BOARD SFP+ UART0 boot sequence:

```
ROM VER: 2.1.0
CFG 03
B
No valid image detected
UART
**************************DdrOk
<<< LINES INTENTIONALLY REMOVED >>>
**************************
U-Boot 2016.07-MXL-v-3.1.241 (Feb 02 2022 - 06:45:55 +0000), Build: prx126-sfp-
qspi-nand
4Kec
      Watchdog enabled
DRAM:  128 MiB
NAND:  device found, Manufacturer ID: 0xef, Chip ID: 0xba
128 MiB
Bad block table found at page 65472, version 0x01
Bad block table found at page 65408, version 0x01
In:    serial
Out:   serial
Err:   serial
Reset cause: POR RESET
Net:   No ethernet found.
Watchdog timer stopped
run flash_flash to bring up the kernel
Hit any key to stop autoboot:  0
PRX300 #
```

   Interrupt the boot process when the `Hit any key to stop autoboot` message appears.
8. Prepare the host PC's terminal software to transfer the `u-boot-nand.bin` file from the `\uboot-PRX126-sfu-qspi-nand\` folder[1)] using the Kermit protocol.
9. Enter this command from the EASY PRX126 REF BOARD SFP+ serial console:

```
PRX300 # loadb 0xa0400000
## Ready for binary (kermit) download to 0xA0400000 at 115200 bps...
## Total Size      = 0x000343f0 = 214000 Bytes
```

1) The location of this file depends on the option selected during the build process.

```
## Start Addr      = 0xA0400000
PRX300 #
```

10. Transfer the file.
    For example, from Tera Term* select the **File > Transfer > Kermit > Send**... menu option to transfer the file. See **Figure 4**.
11. Wait until the file has been successfully transferred to the EASY PRX126 REF BOARD SFP+. This file is temporarily stored in the DDR memory.
12. To first erase the NAND flash memory before writing to it, use the following command:

```
PRX300 # nand erase 0 40000
NAND erase: device 0 offset 0x0, size 0x40000
Erasing at 0x0 -- 50% complete.
Erasing at 0x20000 -- 100% complete.
OK
```

13. To write the U-Boot* image to the NAND flash memory, use the following command:

```
PRX300 # nand write a0400000 0 40000
NAND write: device 0 offset 0x0, size 0x40000
262144 bytes written: OK
```

14. Unplug the SFP+ from the EASY 98900.
15. Set the EASY PRX126 REF BOARD SFP+ to boot from the QSPI NAND flash memory by configuring the hardware jumpers (J7 and J6) on the EASY 98900 as indicated in **Figure 1**.
16. Plug the SFP+ into the EASY 98900.
17. Verify that the EASY PRX126 REF BOARD SFP+ boots from U-Boot*.

Proceed to **Chapter 3** to install the 10G PON Chipset software image.

Table 1 UART Boot Jumper Configuration for the EASY PRX126 REF BOARD SFP+

Value	Name	RefDes
1.2	Boot1	J7
1.2	Boot2, Boot3	J6

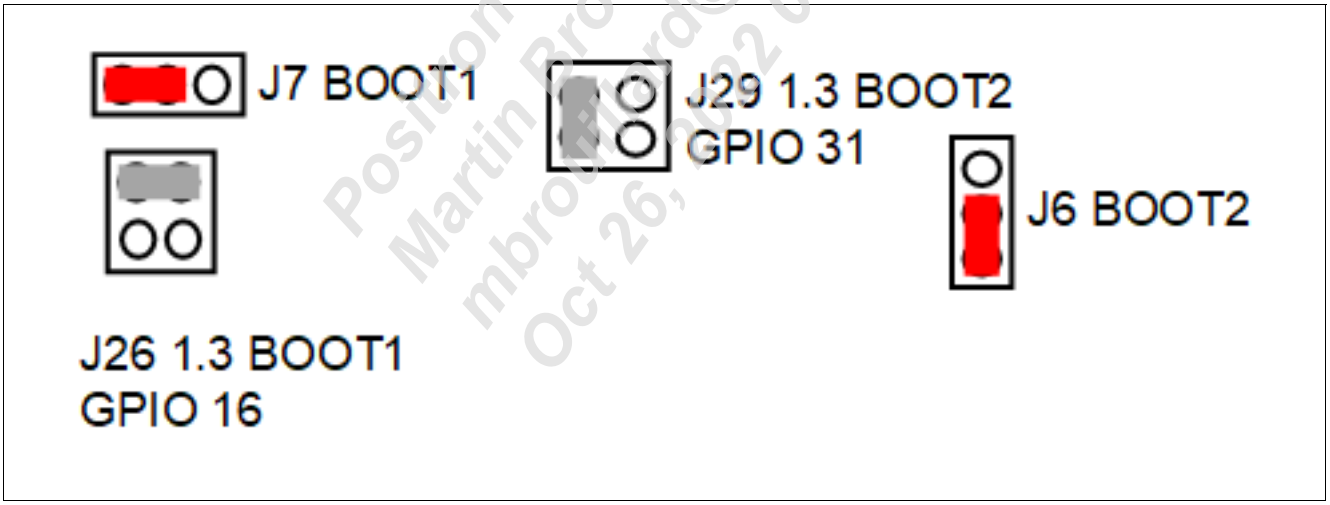

Figure 3 EASY 98900 UART Boot Jumper Configuration

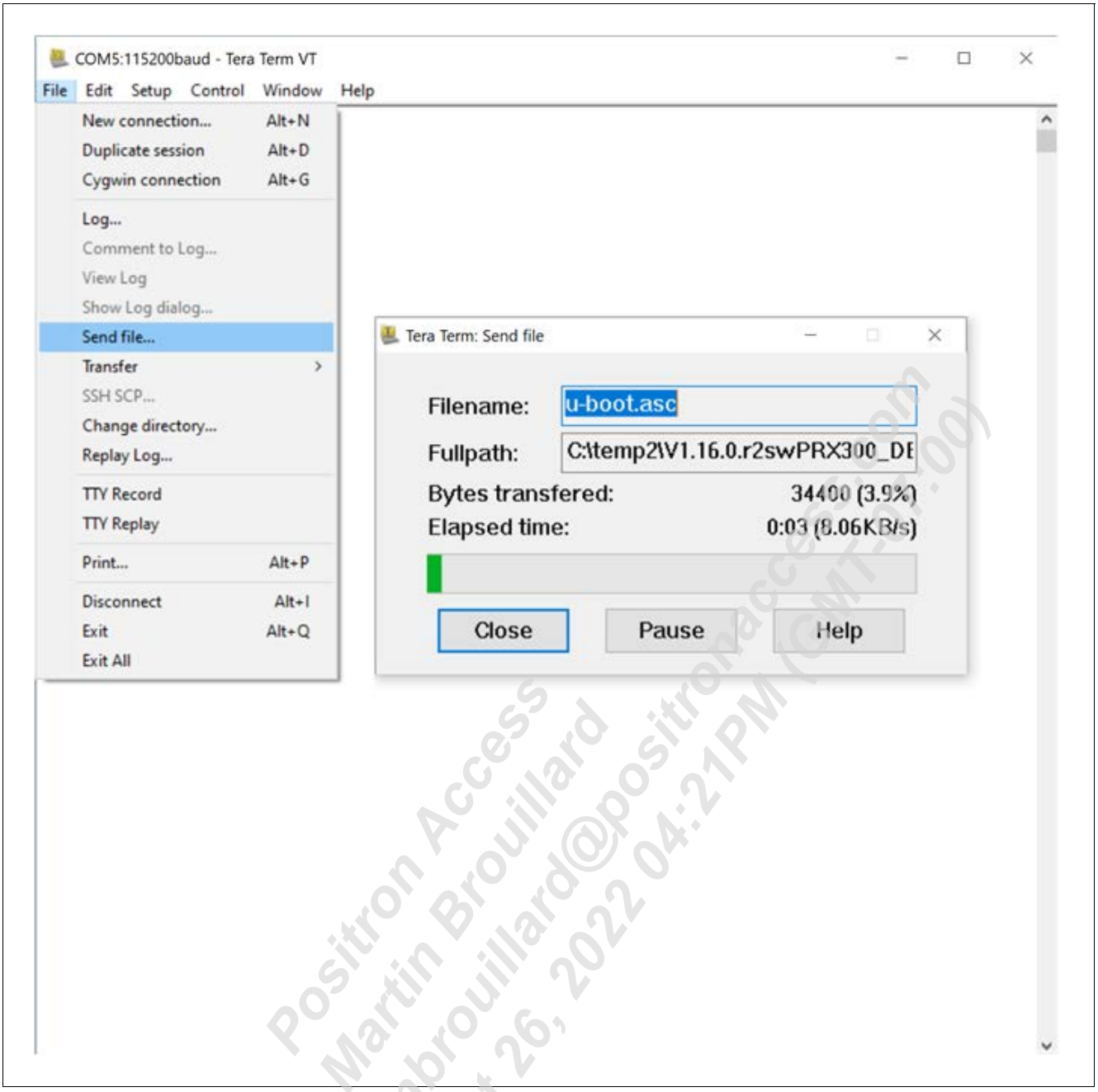

Figure 4 UART ASC File Transfer

2.1.2 Updating U-Boot* Using the Ethernet Interface

This section describes how to update U-Boot* using the 10G Ethernet interface.

Attention: The instructions provided in this section do not work when using UART boot.

1. Set the U-Boot* environment's networking variables in accordance with the network and host PC configuration to allow downloading the U-Boot* image via the Ethernet port.

```
PRX300 # setenv ethaddr 00:50:F1:50:D2:E0
PRX300 # setenv ipaddr 192.168.1.1
PRX300 # setenv gatewayip 192.168.1.100
PRX300 # setenv netmask 255.255.255.0
PRX300 # setenv serverip 192.168.1.100
PRX300 # setenv tftppath
PRX300 # saveenv
```

   Ensure that the `ethaddr` MAC address is correct.
2. Connect an Ethernet cable from the EASY 98900 10G Ethernet port to the host PC/LAN. The link from the 10G Ethernet to the host PC must support 10GBASE-T or 1000BASE-T. 100BASE-T and 10BASE-T are not supported.
3. Issue a ping command to verify network connectivity between the EASY PRX126 REF BOARD SFP+ and the host PC:

```
PRX300 # ping 192.168.1.100
Using prx300-eth device
host 192.168.1.100 is alive
```

4. Ensure the U-Boot* variables `serverip` and `tftppath` are correctly configured before executing this command:

```
PRX300 # run update_uboot
Using prx300-eth device
TFTP from server 192.168.1.100; our IP address is 192.168.1.1
Filename 'uboot-prx126-sfu-qspi-nand/u-boot-nand.bin'.
Load address: 0x82000000
Loading: ################
         41 KiB/s
done
Bytes transferred = 216768 (34ec0 hex)
NAND erase: device 0 offset 0x0, size 0x100000
Erasing at 0xe0000 -- 100% complete.
OK
NAND write: device 0 offset 0x0, size 0x34ec0
 216768 bytes written: OK
```

3 Installing the Software Image Using the Ethernet Interface

When the U-Boot* environment installation is complete and operational, install the 10G PON Chipset software, which consists of a Linux* kernel and file system, to the NAND flash memory. This chapter describes how to perform the installation.

1. Interrupt the boot process when the `Hit any key to stop autoboot` message appears.
2. Issue a ping command to verify network connectivity between the EASY PRX126 REF BOARD SFP+ and the host PC:

```
PRX300 # ping 192.168.1.100
Using prx300-eth device
host 192.168.1.100 is alive
```

3. Ensure the U-Boot* variables `serverip` and `tftppath` are correctly configured before executing this command. Install the software image to the flash memory using the Ethernet interface with this command:

```
PRX300 # run update_fullimage
ubi0: attaching mtd1
ubi0: scanning is finished
ubi0: empty MTD device detected
ubi0: attached mtd1 (name "mtd=6", size 108 MiB)
ubi0: PEB size: 131072 bytes (128 KiB), LEB size: 126976 bytes
ubi0: min./max. I/O unit sizes: 2048/2048, sub-page size 2048
ubi0: VID header offset: 2048 (aligned 2048), data offset: 4096
ubi0: good PEBs: 864, bad PEBs: 0, corrupted PEBs: 0
ubi0: user volume: 0, internal volumes: 1, max. volumes count: 128
ubi0: max/mean erase counter: 1/0, WL threshold: 4096, image sequence number: 0
ubi0: available PEBs: 820, total reserved PEBs: 44, PEBs reserved for bad PEB
handling: 40
Using prx300-eth device
TFTP from server 10.91.163.13; our IP address is 10.91.184.123
Filename 'lede-intel_mips-prx300-PRX126_SFU_QSPI_PON-squashfs-fullimage.img'.
Load address: 0x82000000
Loading: #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #################################################################
         #######
         759.8 KiB/s
done
Bytes transferred = 11643560 (b1aaa8 hex)
Image contains header with name [PON_1.16.0.r2]
Volume kernelB not found!
Creating dynamic volume kernelB of size 2172944
Erasing NAND...
```

```
Erasing at 0x120000 -- 100% complete.
Writing to NAND... OK
Image contains header with name [MIPS 4Kec Bootcore]
Volume bootcoreB not found!
Creating dynamic volume bootcoreB of size 5484864
Erasing redundant NAND...
Erasing at 0x160000 -- 100% complete.
Writing to redundant NAND... OK
Image contains header with name [UGW RootFS]
Volume rootfsB not found!
Creating dynamic volume rootfsB of size 3985616
Erasing NAND...
Erasing at 0x120000 -- 100% complete.
Writing to NAND... OK
Image contains header with name [PON_1.16.0.r2]
Volume kernelA not found!
Creating dynamic volume kernelA of size 2172944
Erasing redundant NAND...
Erasing at 0x160000 -- 100% complete.
Writing to redundant NAND... OK
Image contains header with name [MIPS 4Kec Bootcore]
Volume bootcoreA not found!
Creating dynamic volume bootcoreA of size 5484864
Erasing NAND...
Erasing at 0x120000 -- 100% complete.
Writing to NAND... OK
Image contains header with name [UGW RootFS]
Volume rootfsA not found!
Creating dynamic volume rootfsA of size 3985616
Erasing redundant NAND...
Erasing at 0x160000 -- 100% complete.
Writing to redundant NAND... OK
Volume rootfs_data not found!
PRX300 #
```

4. When the NAND flash update is complete, use the following command to power cycle or soft-reset the system:

```
PRX300 # reset
```

4 Microchip Technology* ATmega328 Console and Basic Base Board Debug Features

This chapter describes how to use the EASY 98900 debugging features. These features include the ability to measure power consumption and investigate the I²C* bus. This debugging ability is provided by a Microchip Technology* ATmega328 microcontroller onboard the EASY 98900. This microcontroller is programmed with the following basic tools that are accessible from UART1.

4.1 Available Commands

The following commands are available in the ATmega328 console.

```
sfp:# help
Help - usage
       i2ccfg clk(kHz) - config two wire
       i2cget [-l len] [adr] [reg] - read register(s) on two wire. Adr and reg Values
in hex
       i2cset [adr] [reg] [val1] ... [valn] - read register(s) on two wire. Values
in hex
       i2cclr - clear bus (9 scl cycles)
       i2cdetect - detect devices on two wire
       pinget [port:b,c,d] [pin] - get pin value
       pinset [port:b,c,d] [pin] [val] - set pin to val
       ina - display voltage, power and current
```

4.2 Power Consumption Measurement

The power consumption test is a fundamental SFP+ design diagnostic tool. The EASY 98900 allows the measuring of the voltage level of the 3.3 V power rail, the total current flowing to the SFF golden finger edge connector (mA), and the total power consumption of the SFP+ module plugged into the SFP+ cage (mW). This information is available at all times. To view this information, connect to the UART1 console and type the `ina` command. Here is an example output of this command:

```
sfp:# ina
3320 mV
1340 mW
401 mA
```

4.3 I²C* Address Range Detection

To enable I²C* access between the ATmega328 and the SFP+ module inserted into the SFP+ cage, attach a jumper between J8 and J9 as indicated in **Figure 1**. This jumper is not attached by default. To verify the I²C* addresses available to the EASY 98900 for the connected SFP+ module, type the `i2cdetect` command. Here is an example output of this command:

```
sfp:# i2cdetect
#0       x - - - - - - -
#08 - - - - - - - -
#10 - - - - - - - -
#18 - - - - - - - -
#20 - - - - - - - -
#28 - - - - - - - -
#30 - - - - - - - -
#38 - - - - - - - -
#40 x - - - - - - -
```

```
#48 - - - - - - - -
#50 x x - - - - - -
#58 - - - - - - - -
#60 - - - - - - - -
#68 - - - - - - - -
#70 - - - - - - - -
#78 - - - - - - - -
```

Those jumpers are open by default, therefore the ATmega328 cannot detect I²C* device addresses of the SFP+ that are plugged in the EASY 98900.

The `i2cdetect` command reports the 7-bit device addresses found via the scan. The `i2cdetect` example above shows several devices were found, these include devices at:

- Address `0x40` corresponds to an I²C* power meter IC mounted on the EASY 98900 (used for the `ina` command).
- Address `0x50` and `0x51` corresponds to the EASY PRX126 REF BOARD SFP+ module as represented in a 7-bit address range. In an 8-bit address range, according to the SFF-8431 specifications, the device addresses are A0h and A2h.

4.4 I²C* Device Read

To read register values see the following examples of the `0x50` address of the EASY PRX126 REF BOARD SFP+.

Values between byte 1 and 32:

```
sfp:# i2cget -l 32 0x50 1
i2cget: @0x50 20 1
# 0 04 01 00 00 00 00 00   ........
# 8 00 00 03 64 00 28 FF 00  ...d.(..
#10 00 00 00 4D 61 78 4C 69  ...MaxLi
#18 6E 65 61 72 20 20 20 20  near
#20
```

Values starting byte 32, length 32 bytes:

```
sfp:# i2cget -l 32 0x50 32
i2cget: @0x50 20 20
# 0 20 20 20 20 00 00 50 F1     ..P.
# 8 30 20 20 20 20 20 20 20 0
#10 20 20 20 20 20 20 20 20
#18 30 30 30 31 05 1E FF 2B 0001...+
#20
```

5 Basic PON Operation

This chapter describes how to work with PON networking by using the EASY PRX126 REF BOARD SFP+ as an Optical Network Unit (ONU).

5.1 Prerequisites

Complete these steps to set up your environment:

1. Ensure the EASY 98900 is powered off.
2. Insert the EASY PRX126 REF BOARD SFP+ stick into the SFP+ port of the EASY 98900.
3. Connect one end of an optical cable with SC/APC connector into the EASY PRX126 REF BOARD SFP+. Do not use a UPC connector. **Figure 5** shows an example of an SC/APC connector and a UPC connector.
4. Connect the other end of the optical cable into the Optical Line Terminal (OLT).
5. Power on the EASY 98900 and boot into the 10G PON Chipset software Linux* console.

Attention: Always use at least 10 dB of attenuation or more, if directly connected to an OLT. Maintain proper safety protocols when working with laser equipment to avoid personal injury or damage to equipment.

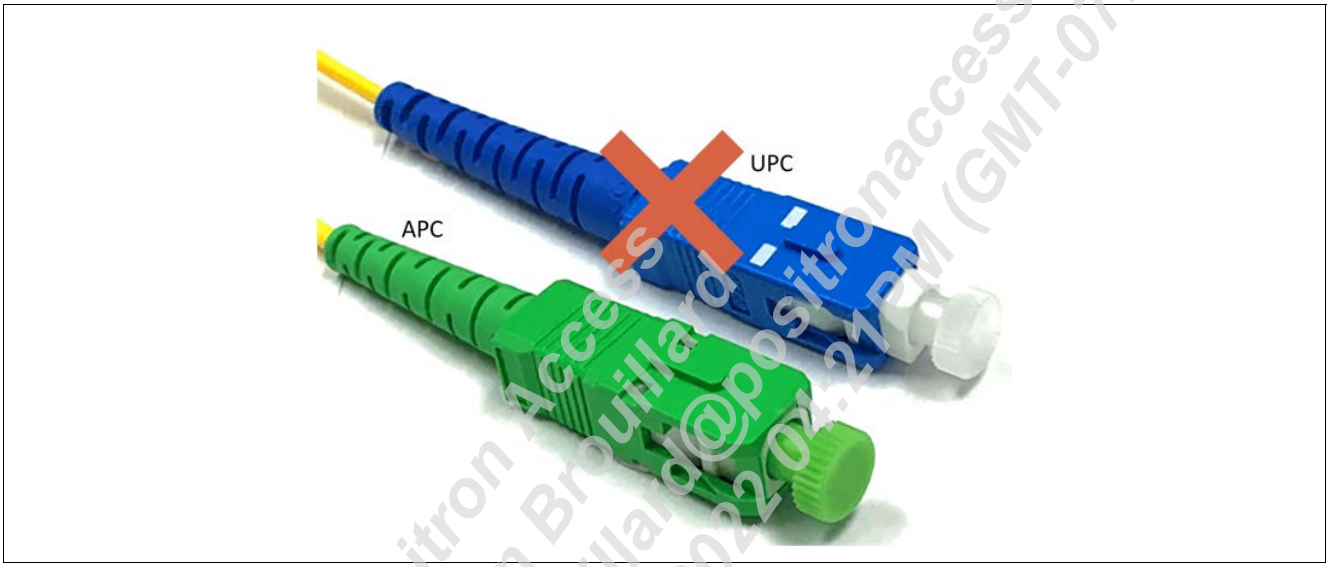

Figure 5 SC/APC Connector and SC/UPC Connector

5.2 Obtaining the Software Version

Use one of the following commands to verify software image version:

```
root@prx126-sfu-pon:/# show_version.sh
------------------------------------------------------------
Intel PRX321 / PRX126 System, Image Revision 1.17.0
------------------------------------------------------------
CLI Library, Version 2.8.0.
Intel PON Adapter, version 1.13.1
Intel PON Eth, version 1.19.4
Intel PON Mailbox driver, version 1.19.4
Intel PON Net Lib, version 1.17.4
Intel PON library CLI, version 1.21.3.0
Intel PON library, Version 1.21.3.0
KPI2UDP driver, version 3.5.1.0
OMCI Simulate, version 8.15.5
```

```
OMCI daemon, version 8.15.5
PON top, version 1
SyncE tool, version 0.1.3
TAPI, Version 4.23.0.0
ToD daemon, version 1.1.0
VMMC device driver, version 1.31.1.0
```

5.3 Monitoring the PLOAM State

Use one of the following commands to verify the PLOAM state:

- `root@prx126-sfu-pon:/# pon ploam_state_get`
  `errorcode=0 current=51 previous=40 time_prev=805`
- `root@prx126-sfu-pon:/# pon psg`
  `errorcode=0 current=51 previous=40 time_prev=805`

Use the `pond` application to continuously monitor the PLOAM state. Run the application in the background and observe the console output when disconnecting and reconnecting the optical cable. This console output shows an example of the behavior during this activity:

```
root@prx126-sfu-pon:/# pond&
alarm Loss of GEM channel delineation set
alarm Loss of downstream synchronization set
ploam state: previous - 51, current - 60
alarm Loss of signal set
alarm Loss of GEM channel delineation cleared
ploam state: previous - 60, current - 11
alarm Loss of signal cleared
alarm Loss of downstream synchronization cleared
ploam state: previous - 11, current - 12
ploam state: previous - 12, current - 23
alarm OMCI Integrity Key has changed triggered
ploam state: previous - 23, current - 40
ploam state: previous - 40, current - 51
```

5.4 Retrieving the ONU Serial Number

Use one of the following commands to print the ONU serial number:

- `root@prx126-sfu-pon:/# pon serial_number_get`
  `errorcode=0 serial_no="INTCF150D2E0"`
- `root@prx126-sfu-pon:/# pon sng`
  `errorcode=0 serial_no="INTC96FBD6C0"`

5.5 Changing the Vendor ID of the ONU

The vendor ID is part of the ONU serial number. When changing the vendor ID is required, modify the line of the configuration file which contains the serial number.

```
root@prx126-sfu-pon:/# vi /etc/config/gpon....
option nSerial 'INTCF150D2E0'
```

5.6 Viewing the PON Status with the pontop Application

`pontop` is a full screen text-based user interface application which collects and displays information about the PON connection. This information originates from 10G PON Chipset software daemons which are constantly updated in the background. After launching `pontop`, the following menu of options appears.

```
root@prx126-sfu-pon:/# pontop
Help
….
?     Help                                s     Status
c     Capability and Configuration        l     LAN Interface Status & Counters
w     Active alarms                       g-s   GEM/XGEM Port Status
g-c   GEM/XGEM Port Counters              g-d   GEM/XGEM port DS Counters
g-u   GEM/XGEM port US Counters           e-d   GEM/XGEM port Eth DS Cnts
e-u   GEM/XGEM port Eth US Cnts           f     FEC Status & Counters
t     GTC/XGTC Status & Counters          p-s   Power Save Status
p-c   PSM Configuration                   a-c   Allocation Counters
p-d   PLOAM Downstream Counters           p-u   PLOAM Upstream Counters
o-s   Optical Interface Status            o-i   Optical Interface Info
d-b   Debug Burst Profile
```

The first and third columns list the key, or key sequence, used to access each information screen. Each screen refreshes at a one-second interval.

Viewing the Optical Interface Information

To view the optical interface information, type the **o** key followed by the **i** key:

```
SFP+ information                                Status
Vendor name                                   : MXL PRX126
Vendor oui                                    :
Part number                                   : GN28L96
Revision                                      : 22
Serial number                                 : no serial number
Date code                                     : 2021xxxx
Wavelength                                    : 1270 nm

Options
------------
Power level declaration                       : Power Level 1
Paging implemented indicator                  : No
Retimer / CDR indicator                       : No
Cooled Transceiver declaration                : No
Linear Receiver Output implemented            : No
Receiver decision threshold implemented       : No
Tunable transmitter technology                : No
RATE_SELECT functionality implemented         : No
TX_DISABLE implemented                        : Yes
TX_FAULT implemented                          : Yes
Inverted loss of signal implemented           : No
Loss of signal implemented                    : Yes

DMI type
-------------
Digital monitoring implemented                : Yes
Calibration                                   : Internal
Received power measurement type               : Average
Address change required                       : Yes
```

```
Enhanced options
--------------------
Optional Alarm/Warnings flags implemented          : Yes
Soft TX_DISABLE control and monitoring implemented : Yes
Soft TX_FAULT monitoring implemented               : Yes
Soft RX_LOS monitoring implemented                 : Yes
Soft RATE_SELECT ctrl and monitoring implemented   : No
Application select control implemented             : No
Soft RATE_SELECT control implemented               : No

Compliance                                         : SFF-8472 Rev 11.0
…
```

Viewing the GEM/XGEM Port Counters

To view the GEM/XGEM port counters, type the **g** key followed by the **c** key:

```
GEM Index GEM ID u/s packets  u/s bytes d/s packets d/s bytes Key Errors
0          1   254           12192     250         12000     0
1          1022 0           0         0           0         0
```

Viewing the GEM/XGEM Port Status

To view the GEM/XGEM port status, type the **g** key followed by the **s** key:

```
GEM Index GEM ID Alloc Id Alloc Id st. Data/OMCI Max.Size Encr. k.r. Direction
0         1      1        Valid        OMCI      1980     None       DS + US
1         1022   1025     Valid        Ethernet  1628     None       DS + US
```

5.6.1 Viewing pontop Information from the Command Line

It also possible to print a single status message from `pontop` to the console without launching the entire application. This method is useful when checking the device status while performing other tasks.

```
pontop -b -g "<information screen>"
```

Replace the text between the double quotation marks with the desired option described in **Section 5.6**. For example, this command prints the optical interface status a single time to the console:

```
root@prx126-sfu-pon:/# pontop -b -g "Optical Interface Status"
```

The printed output is the same as the information displayed in the `o-i` example in **Section 5.6**.

Literature References

[1] 10G PON Chipset PRX126 (PRX126B0BI/PRX126B1BI/PRX126B2BI) Data Sheet Rev. 3.4

[2] 10G PON Subsystem Optical Timing Calibration Application Note Rev. 1.0

Attention: Refer to the latest revisions of the documents.