Serial Cables

PCI-SWGEN3-81U

PCIe Switch Board User's Manual

Revision 1.0

Change History

Ver	Date of Release	Description
V01	15th March 2018	Initial Release

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Introduction

1.1 Overview

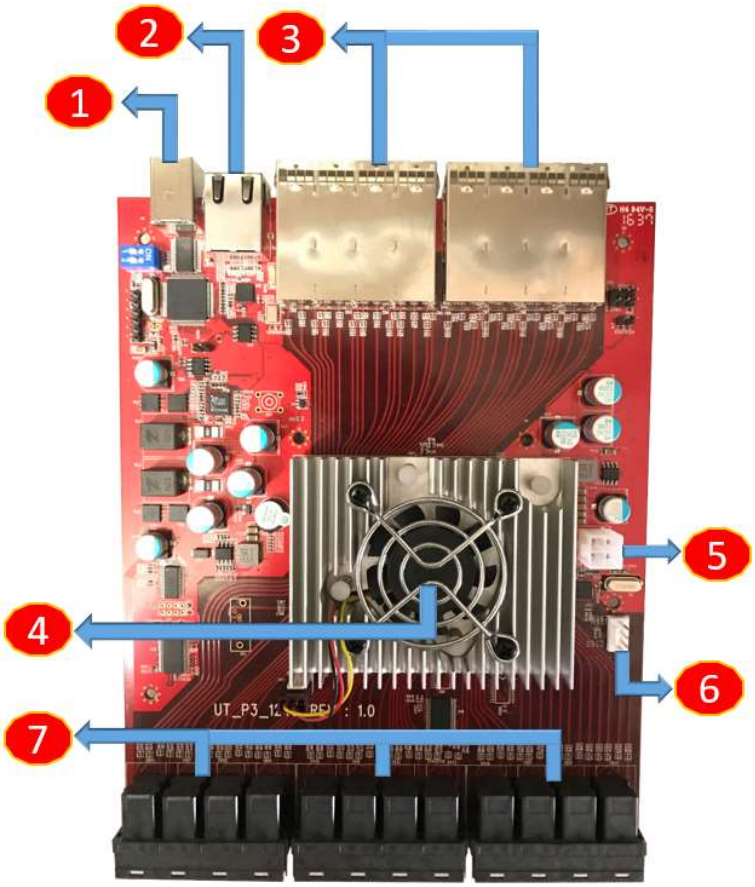
SERIAL CABLES PCI-SWGEN3-81U NVMe switch board is designed to provide 12Bays NVMe storage space expansion, The switch board equipped with two x16 SFF8644 for connecting host or cascading.
The total maximum bandwidth is PCIe gen3 x32 512GT/s and allows up to 1-4 head-nodes access the NVMe JBOF enclosure.
Downstream ports support twelve (12) SFF8643 connectors. It allows users to connect NVMe SSD thru customized back plane board or SFF8643-SFF8639 cable adapter.

Switch board integrates Avago Technologies ExpressFabric Capella 2 PCIe Gen3 switch PEX9781, implemented micro-controller provide users CLI commands for board and NVMe SSDs management.

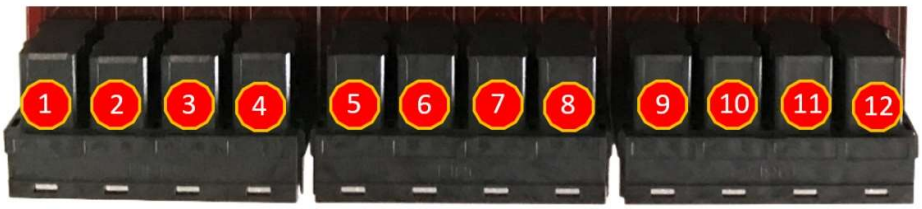
Hardware Description

2.1 Components Description

1. USB Port (Terminal)
2. Ethernet Port
3. Quad Port MiniSAS HD SFF-8644 Connectors x2 pcs
4. FAN-Sink for PCIe Switch
5. Power connector
6. Connector for external FAN
7. Quad Port MiniSAS HD SFF-8643 Connectors x3 pcs

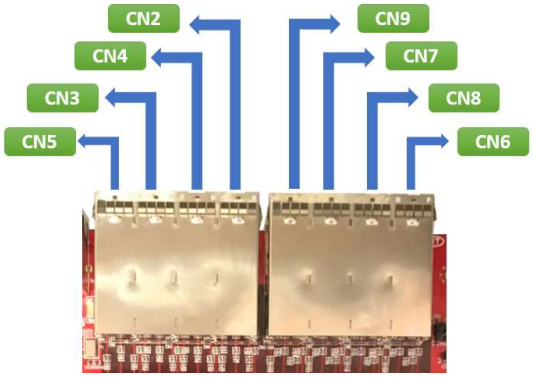


[SFF8643 Ports location definition]



2.2 Connectors Pin Definition

SFF8644 connector



CN5	
Pin No.	Pin names
A4	PEX_CONN_PERP28
A5	PEX_CONN_PERN28
A7	PEX_CONN_PERP29
A8	PEX_CONN_PERN29
B4	PEX_CONN_PERP30
B5	PEX_CONN_PERN30
B7	PEX_CONN_PERP31
B8	PEX_CONN_PERN31
C4	PEX_CONN_PETP28
C5	PEX_CONN_PETN28
C7	PEX_CONN_PETP29
C8	PEX_CONN_PETN29
D4	PEX_CONN_PETP30
D5	PEX_CONN_PETN30
D7	PEX_CONN_PETP31
D8	PEX_CONN_PETN31

CN9	
Pin No.	Pin names
A4	PEX_CONN_PERP60
A5	PEX_CONN_PERN60
A7	PEX_CONN_PERP61
A8	PEX_CONN_PERN61
B4	PEX_CONN_PERP62
B5	PEX_CONN_PERN62
B7	PEX_CONN_PERP63
B8	PEX_CONN_PERN63
C4	PEX_CONN_PETP60
C5	PEX_CONN_PETN60
C7	PEX_CONN_PETP61
C8	PEX_CONN_PETN61
D4	PEX_CONN_PETP62
D5	PEX_CONN_PETN62
D7	PEX_CONN_PETP63
D8	PEX_CONN_PETN63

CN3	
Pin No.	Pin names
A4	PEX_CONN_PERP24
A5	PEX_CONN_PERN24
A7	PEX_CONN_PERP25
A8	PEX_CONN_PERN25
B4	PEX_CONN_PERP26
B5	PEX_CONN_PERN26
B7	PEX_CONN_PERP27
B8	PEX_CONN_PERN27
C4	PEX_CONN_PETP24
C5	PEX_CONN_PETN24
C7	PEX_CONN_PETP25
C8	PEX_CONN_PETN25
D4	PEX_CONN_PETP26
D5	PEX_CONN_PETN26

CN7	
Pin No.	Pin names
A4	PEX_CONN_PERP56
A5	PEX_CONN_PERN56
A7	PEX_CONN_PERP57
A8	PEX_CONN_PERN57
B4	PEX_CONN_PERP58
B5	PEX_CONN_PERN58
B7	PEX_CONN_PERP59
B8	PEX_CONN_PERN59
C4	PEX_CONN_PETP56
C5	PEX_CONN_PETN56
C7	PEX_CONN_PETP57
C8	PEX_CONN_PETN57
D4	PEX_CONN_PETP58
D5	PEX_CONN_PETN58

D7	PEX_CONN_PETP27
D8	PEX_CONN_PETN27

D7	PEX_CONN_PETP59
D8	PEX_CONN_PETN59

CN4	
Pin No.	Pin names
A4	PEX_CONN_PERP20
A5	PEX_CONN_PERN20
A7	PEX_CONN_PERP21
A8	PEX_CONN_PERN21
B4	PEX_CONN_PERP22
B5	PEX_CONN_PERN22
B7	PEX_CONN_PERP23
B8	PEX_CONN_PERN23
C4	PEX_CONN_PETP20
C5	PEX_CONN_PETN20
C7	PEX_CONN_PETP21
C8	PEX_CONN_PETN21
D4	PEX_CONN_PETP22
D5	PEX_CONN_PETN22
D7	PEX_CONN_PETP23
D8	PEX_CONN_PETN23

CN8	
Pin No.	Pin names
A4	PEX_CONN_PERP52
A5	PEX_CONN_PERN52
A7	PEX_CONN_PERP53
A8	PEX_CONN_PERN53
B4	PEX_CONN_PERP54
B5	PEX_CONN_PERN54
B7	PEX_CONN_PERP55
B8	PEX_CONN_PERN55
C4	PEX_CONN_PETP52
C5	PEX_CONN_PETN52
C7	PEX_CONN_PETP53
C8	PEX_CONN_PETN53
D4	PEX_CONN_PETP54
D5	PEX_CONN_PETN54
D7	PEX_CONN_PETP55
D8	PEX_CONN_PETN55

CN2	
Pin No.	Pin names
A4	PEX_CONN_PERP16
A5	PEX_CONN_PERN16
A7	PEX_CONN_PERP17
A8	PEX_CONN_PERN17
B4	PEX_CONN_PERP18
B5	PEX_CONN_PERN18
B7	PEX_CONN_PERP19
B8	PEX_CONN_PERN19
C4	PEX_CONN_PETP16
C5	PEX_CONN_PETN16
C7	PEX_CONN_PETP17
C8	PEX_CONN_PETN17
D4	PEX_CONN_PETP18
D5	PEX_CONN_PETN18
D7	PEX_CONN_PETP19
D8	PEX_CONN_PETN19

CN6	
Pin No.	Pin names
A4	PEX_CONN_PERP48
A5	PEX_CONN_PERN48
A7	PEX_CONN_PERP49
A8	PEX_CONN_PERN49
B4	PEX_CONN_PERP50
B5	PEX_CONN_PERN50
B7	PEX_CONN_PERP51
B8	PEX_CONN_PERN51
C4	PEX_CONN_PETP48
C5	PEX_CONN_PETN48
C7	PEX_CONN_PETP49
C8	PEX_CONN_PETN49
D4	PEX_CONN_PETP50
D5	PEX_CONN_PETN50
D7	PEX_CONN_PETP51
D8	PEX_CONN_PETN51

SFF8643 connector

Pin No.	Pin names	Direction	Description
A1	SSD_CLK_0_N	OUT	HCSL type, non-SSC 100MHz reference clock output
A2	SSD_CLK_0_P	OUT	
A4	PEX_GF_PERP3	IN	
A5	PEX_GF_PERN3	IN	
A7	PEX_GF_PERP2	IN	
A8	PEX_GF_PERN2	IN	
B1	PORT_GOOD#_0	OUT	1. Assert "L" state when port link up without any error. 2. H or H to L translation represents physical error detected or link in Gen1 or Gen2 speed.
B2	SSD_RESET#_0	OUT	Reset output to device
B4	PEX_GF_PERP1	IN	
B5	PEX_GF_PERN1	IN	
B7	PEX_GF_PERP0	IN	
B8	PEX_GF_PERN0	IN	
C1	NC		
C2	NC		
C4	PEX_CONN_PETP3	OUT	
C5	PEX_CONN_PETN3	OUT	
C7	PEX_CONN_PETP2	OUT	
C8	PEX_CONN_PETN2	OUT	
D1	SSD_PRE0	IN	Present "H" and IFDET "L" indicates an enterprise NVMe SSD detected
D2	SSD_IFDET#0	IN	
D4	PEX_CONN_PETP1	OUT	
D5	PEX_CONN_PETN1	OUT	
D7	PEX_CONN_PETP0	OUT	
D8	PEX_CONN_PETN0	OUT	

Power Connector

P12V	GND
P12V	GND

FAN Connector

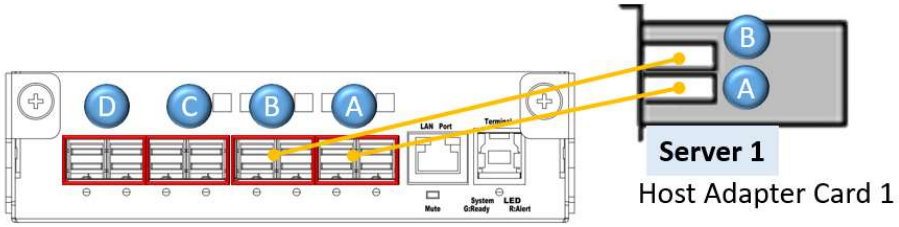
GND
P12V
TACH
PWM

2.3 Switch Mode Selection

SERIAL CABLES PCI-SWGEN3-81U PCIe switch board features "mode selection" that allows multiple host (up to 4)

connecting in switch board to access the NVMe SSD.

1. **Mode 1: Base mode, x16 configuration.**



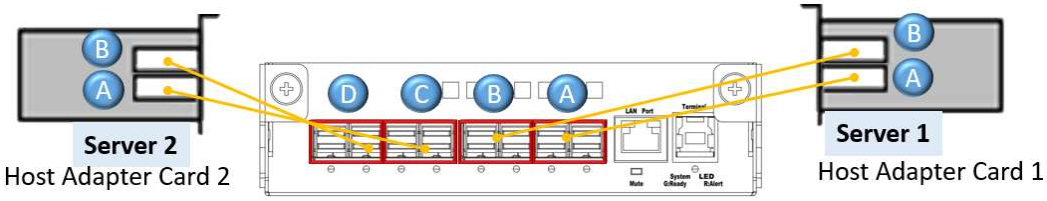
Bandwidth:

PCIe switch board: PCIe Gen3 x16 128GT/s

NVMe SSD:

Server 1 can assess NVMe SSDs in SFF8643 Port 1 to 12.

2. **Mode 2: Two VR mode, x16 configuration**



Bandwidth:

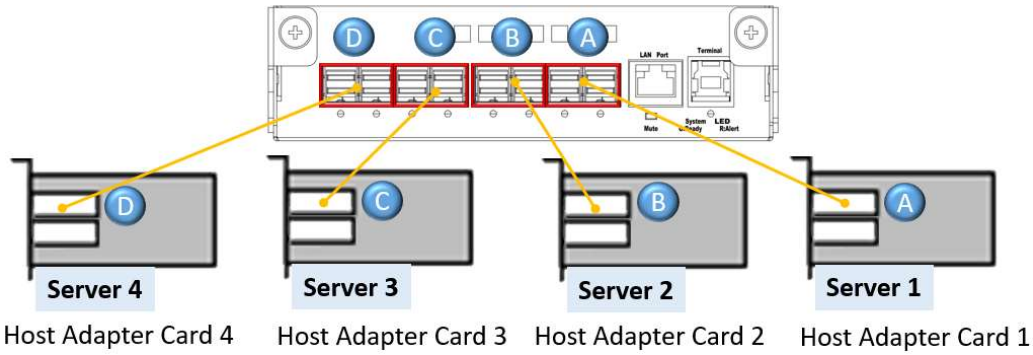
PCIe switch board: PCIe Gen3 x32 256GT/s

NVMe SSD:

Server 1 can assess NVMe SSDs in SFF8643 Port 1 to 6.

Server 1 can assess NVMe SSDs in SFF8643 Port 7 to 12.

3. Mode 3: Four VR mode, x8 configuration



Bandwidth:

PCIe switch board: PCIe Gen3 x32 256GT/s

NVMe SSD:

Server 1 can assess NVMe SSDs in SFF8643 Port 1 to 3.

Server 2 can assess NVMe SSDs in SFF8643 Port 4 to 6.

Server 3 can assess NVMe SSDs in SFF8643 Port 7 to 9.

Server 4 can assess NVMe SSDs in SFF8643 Port 10 to 12.

CLI Manager

3.1 Start-uP VT100 Screen

PCIe switch board uses the USB port as the serial port interface. Please use the USB type A male to Type B male cable to connect PCIe switch board to PC and operation system will detect a new "USB-to-Serial COM Port". Please use this serial port to configure the PCIe switch board.

Note: USB-to-Serial bridge chip is Prolific PL2303, user can download Windows, Mac OS X driver from http://www.prolific.com.tw

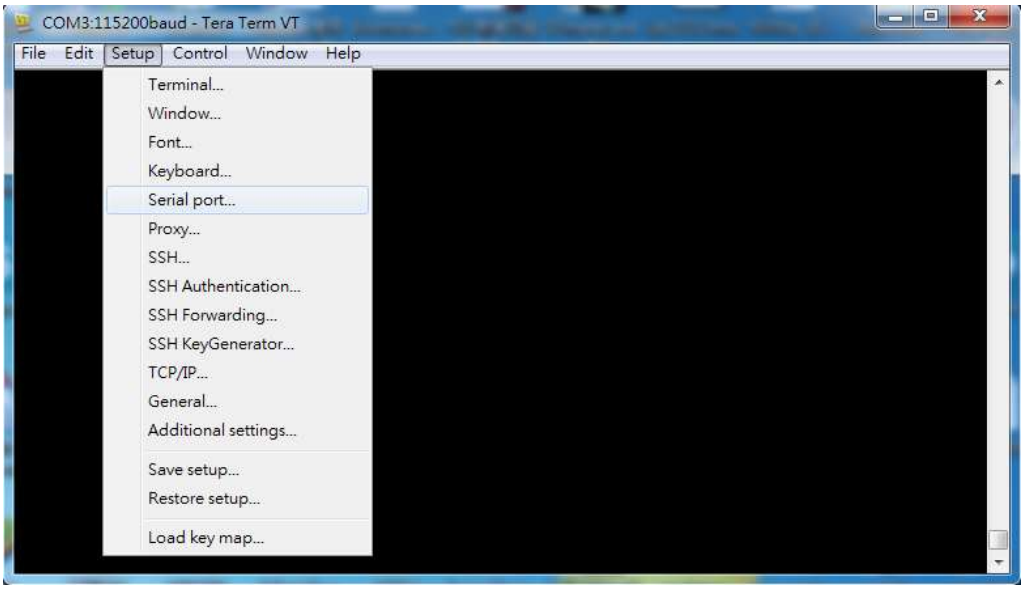
By connecting a VT100 compatible terminal, or a PC operating in an equivalent terminal emulation mode, all CLI administration functions can be exercised from the VT100 terminal.

There are a wide variety of Terminal Emulation packages, but for the most part they should be very similar. The following setup procedure is an example setup VT100 Terminal in Windows 7 system using Tera Term 4.83 (a VT100 Terminal Emulation program and it's an open-source, free, software implemented, Terminal Emulator program).

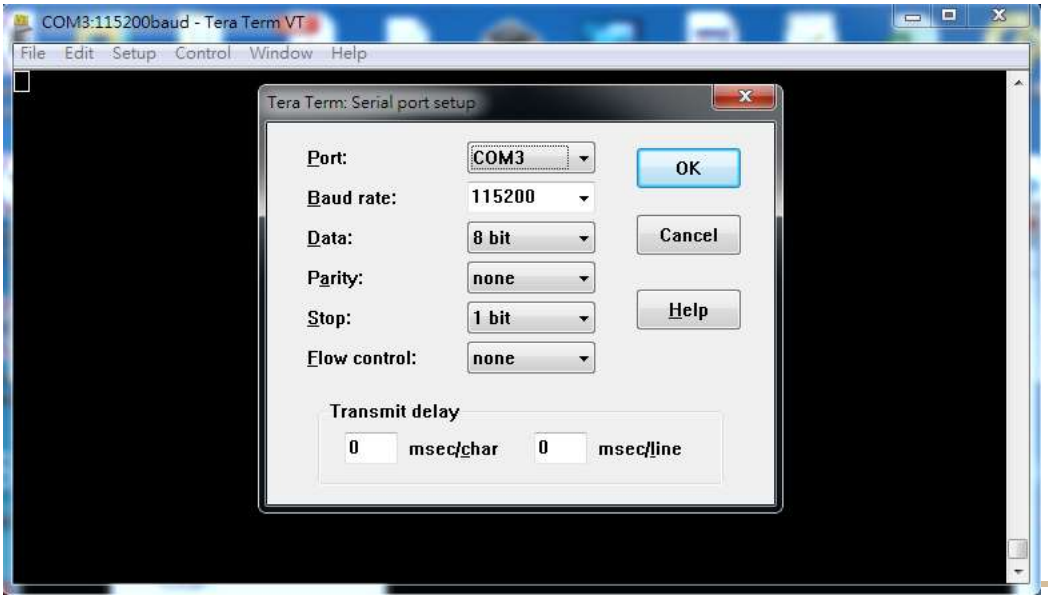
Note: If you have encountered an issue with newer version of Tera Term, we recommend you to use old version Tera Term. (4.83 or older version)

Step 1. Install and launch Tera Term application (or Hyper Terminal requires version 3.0 or higher).

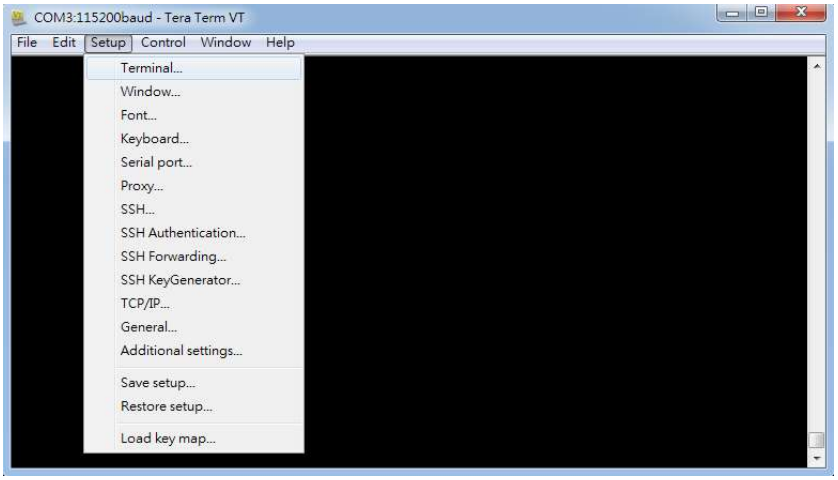
Step 2: To ensure proper communications between PCIe switch board and the VT100 Terminal emulation, please configure the VT100 Terminal emulation settings to the values shown below:



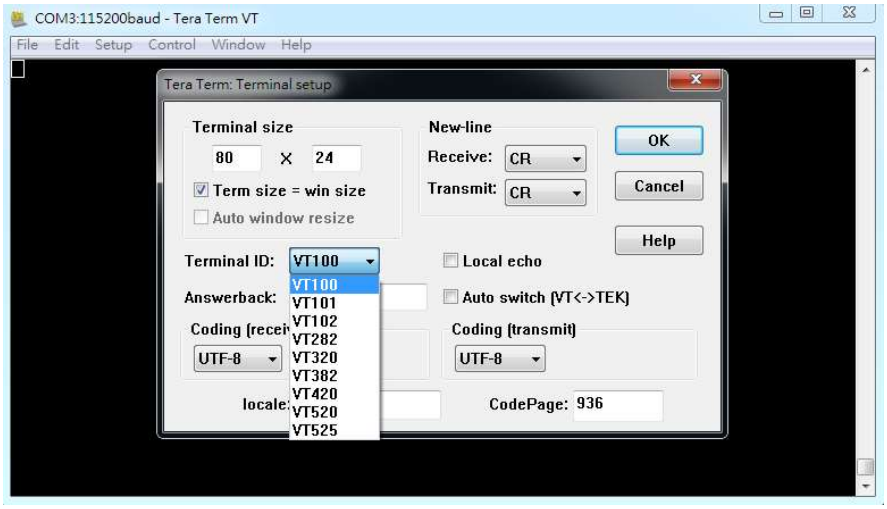
For "Port", select COM3 in this example. (Depend on which COM port used on Host)
For "Baud rate", select 115200.
For "Data", select 8 bit. For "Parity", select none.
For "Stop", select 1 bit. For "Flow control", select: none.
Click OK when you have finished your selections.



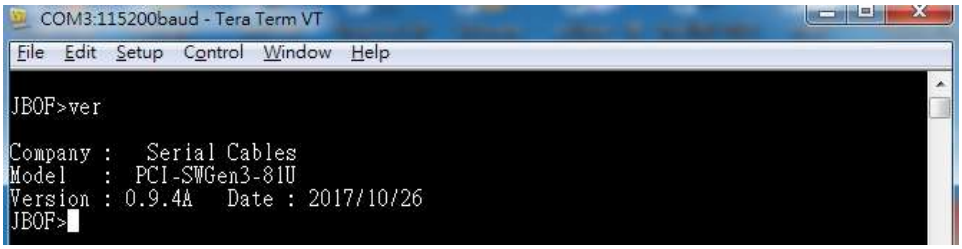
Step 3: Configure Terminal emulation type, please configure the VT100 Terminal emulation settings to the values shown below:



For "Terminal ID", select VT100.
Click OK when you have finished your selections.



Step 4: Setup is complete. Type "ver" [Enter] to check terminal, screen will print information shown below:



3.2 CLI Command

This section provides detailed information about PCIe switch board's CLI function. Please type in lower case for all of commands

- **help Command**

This command provides an on-line table of contents, providing brief descriptions of the supported command groups and built-in commands.

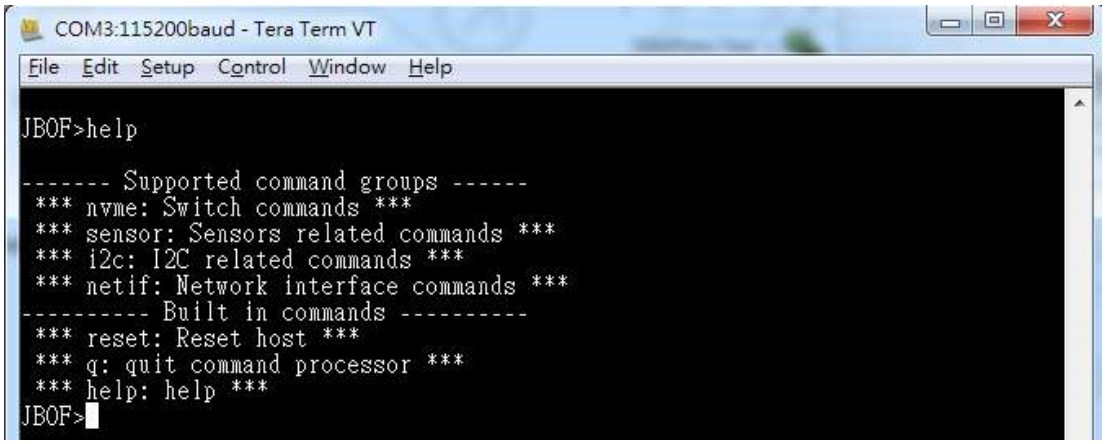
Type "help" to get detail information about the CLI commands summary.

Syntax

Usage: help <group name>

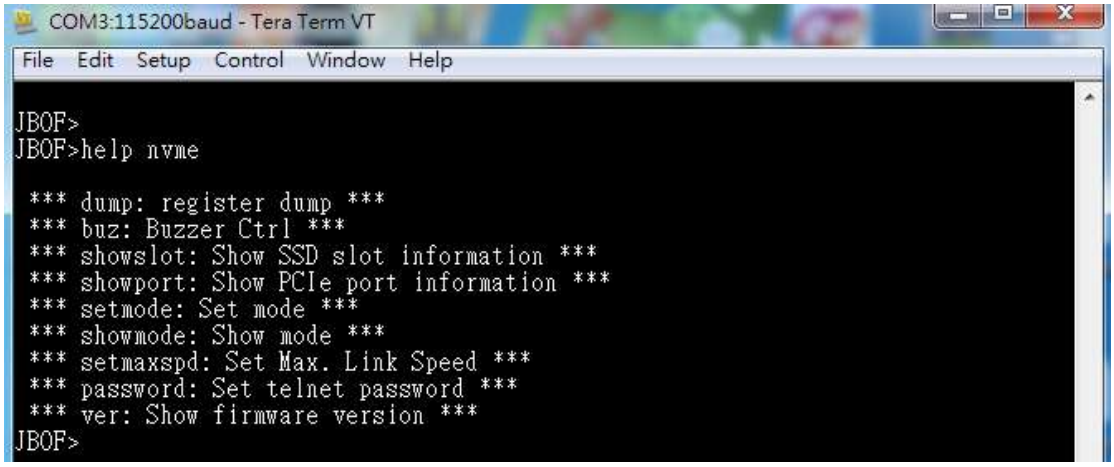
Example:

JBOF>help

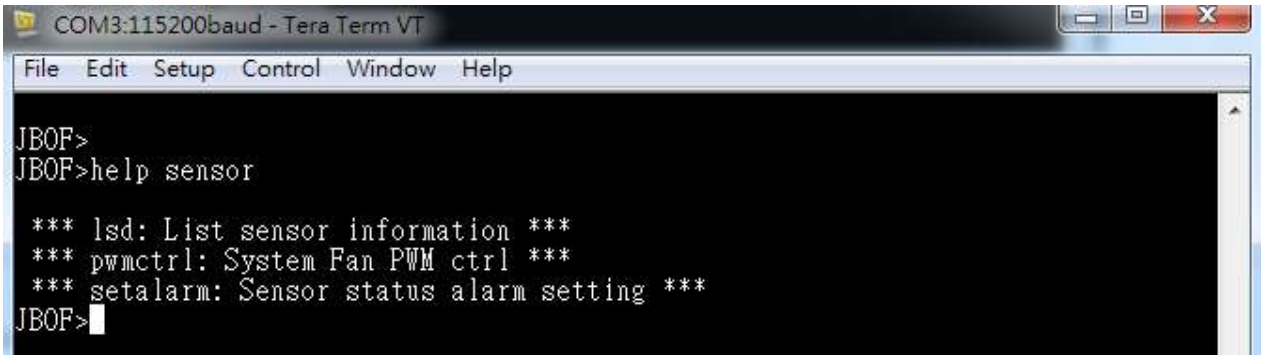


There are 4 command groups, if user want to check CLI commands in one of any groups.

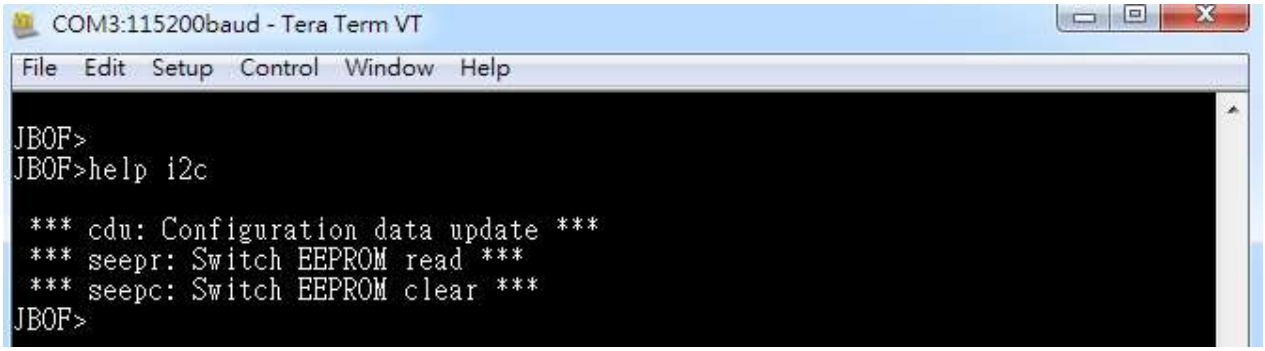
JBOF>help nvme



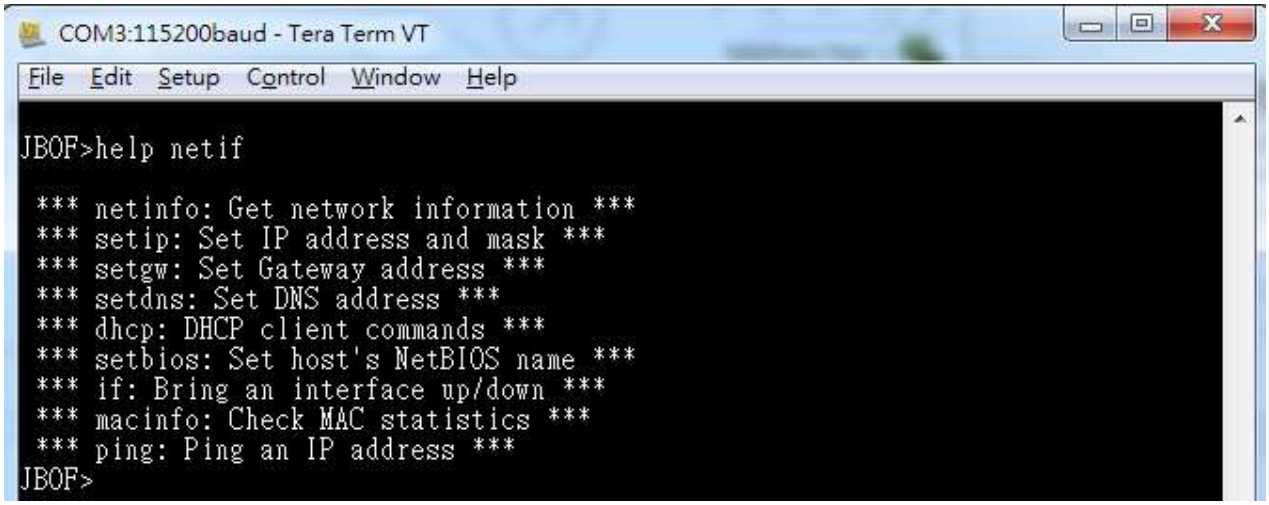
JBOF>help sensor



JBOF>help i2c



JBOF>help netif



- **netinfo Command**

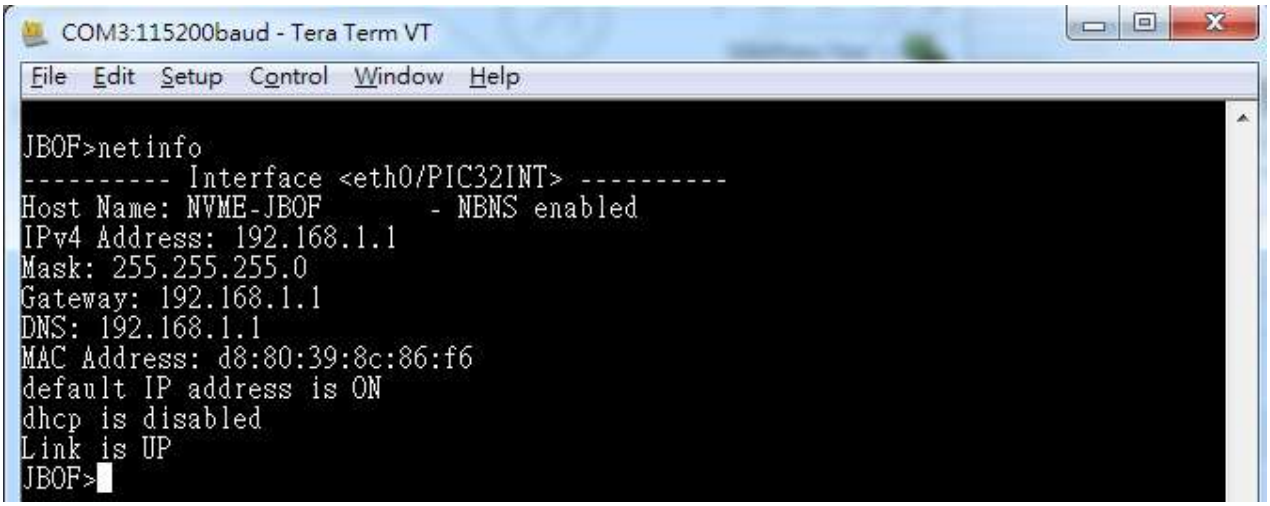
This command provides detail information of Ethernet interface.
Type"netinfo" to get detail information about the Ethernet interface.

Syntax

Usage: netinfo

Example: Check Ethernet interface information

JBOF>netinfo



NBNS – NetBIOS Name Service protocol

IPv4 Address – IP address of Interface

Mask – Netmask mask

Gateway – Default Gateway

DNS – IP address of DNS

MAC Address – A unique MAC address of Interface

default IP address On/Off

dhcp function enable/disable

Link status of Interface

● **setip Command**

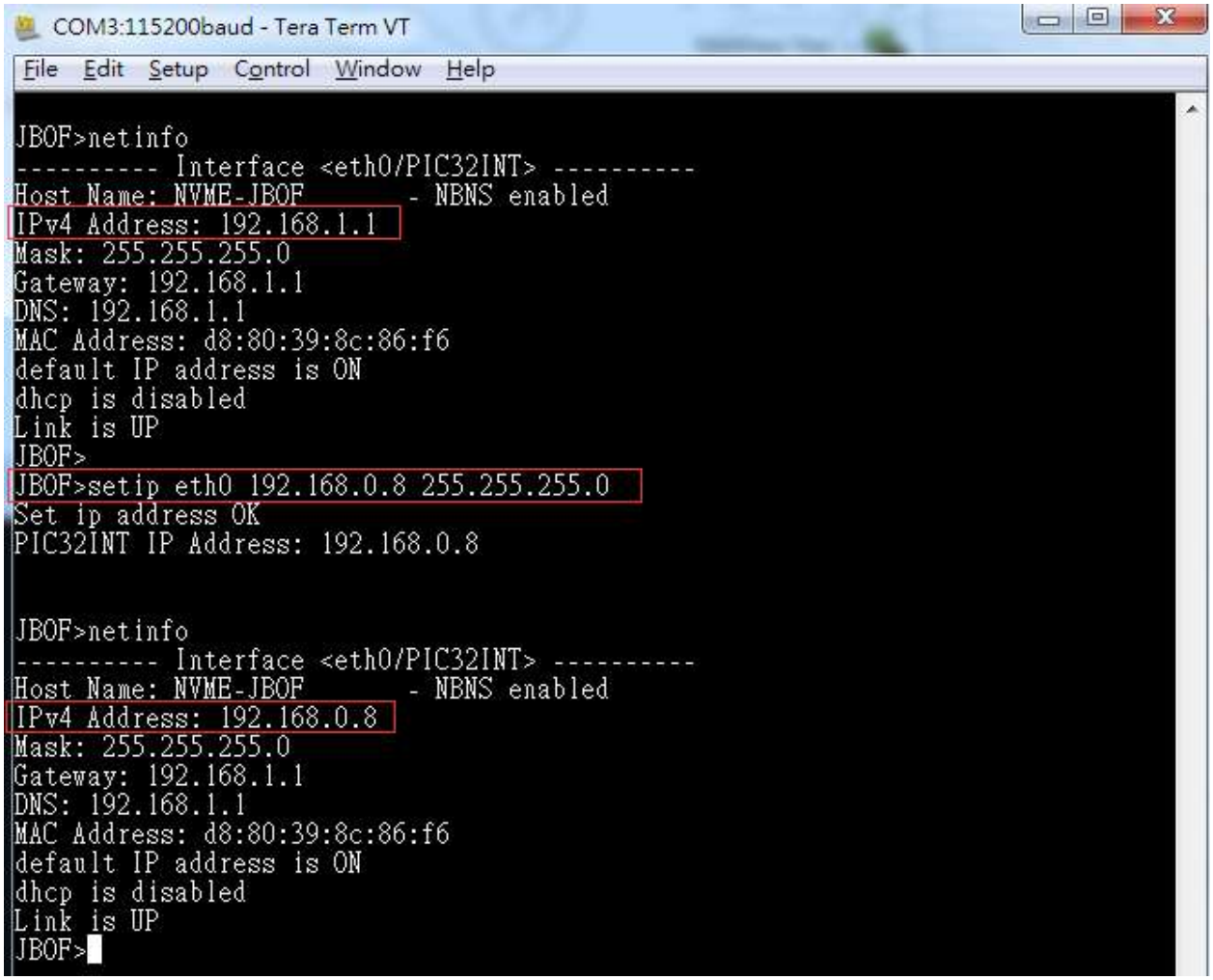
Set IP address and Subnetwork mask of Ethernet interface.

Syntax

Usage: setip <interface> <ipv4/6 address> <ipv4mask/ipv6 prefix len>

Example: Change Ethernet port IP address of interface eth0 to 192.168.0.8

JBOF>setip eth0 192.168.0.8 255.255.255.0



● **setgw Command**

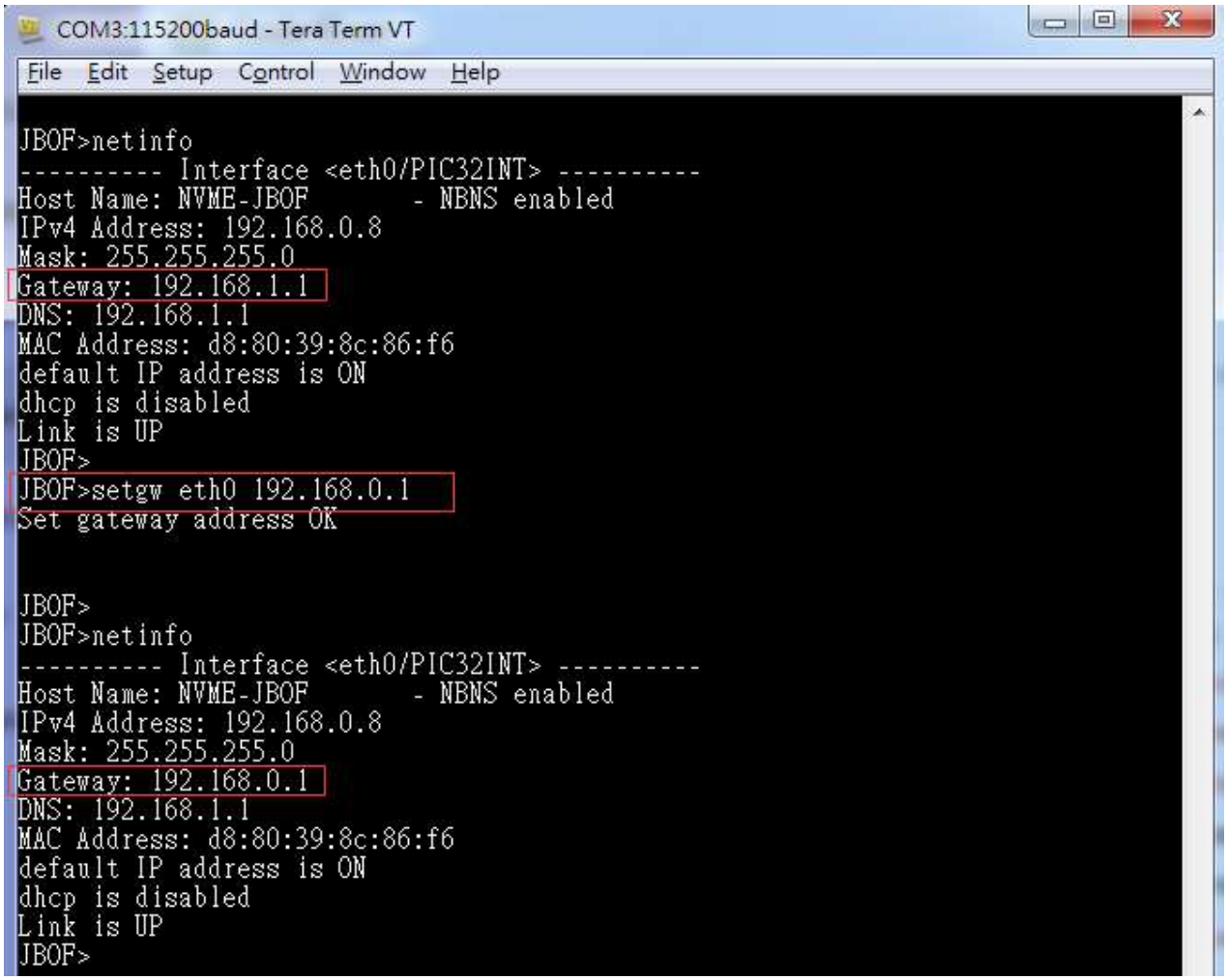
Set gateway IP address

Syntax

Usage: setgw <interface> <ipv4/6 address> <validTime>

Example: Change gateway IP address of interface eth0 to 192.168.0.1

JBOF>setgw eth0 192.168.0.1



● **setdns Command**

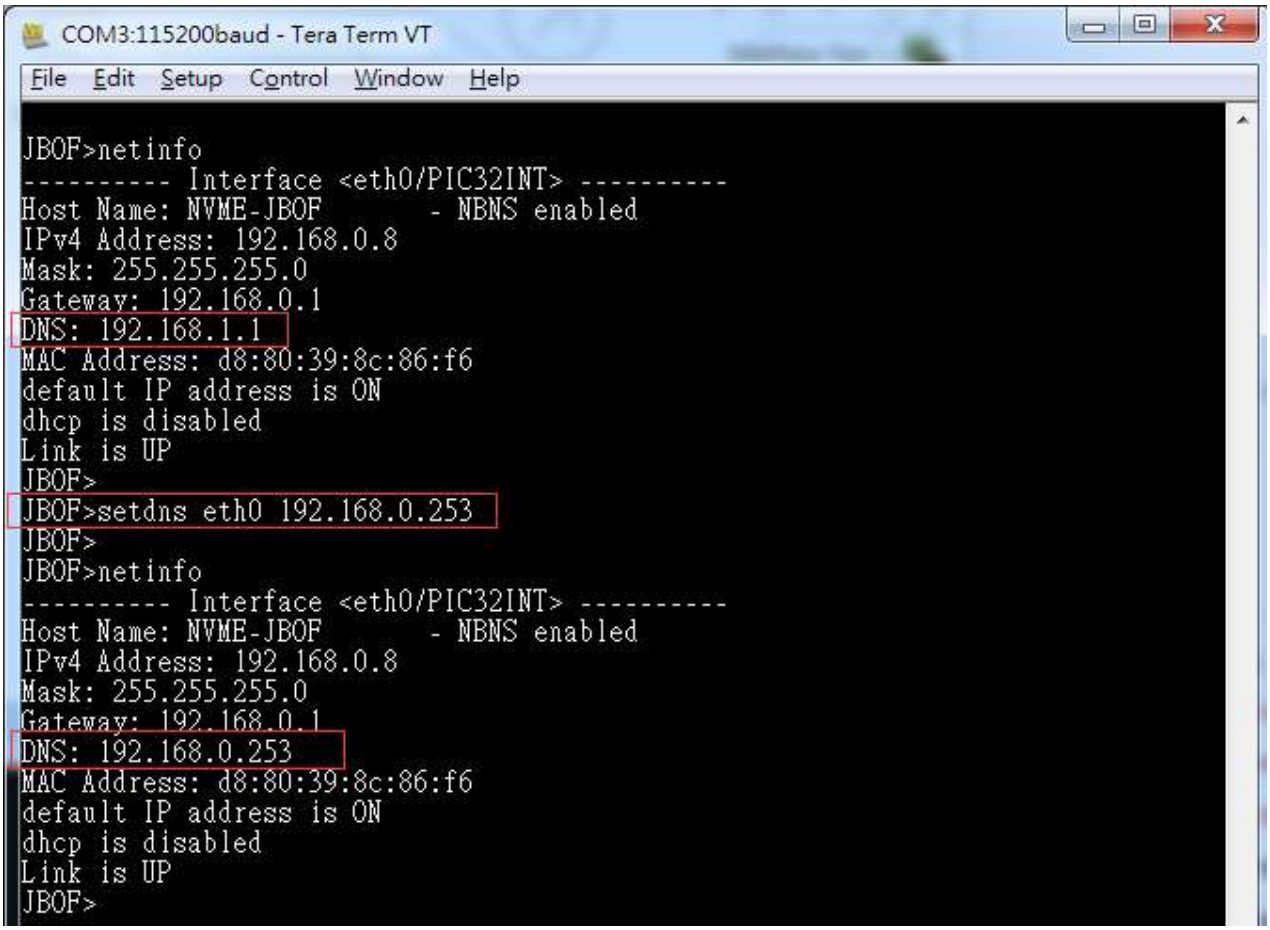
Set DNS IP address.

Syntax

Usage: setdns <interface> <x.x.x.x>

Example: Change DNS server IP address of interface eth0 to 192.168.0.253

JBOF>setdns eth0 192.168.0.253



● dhcp Command

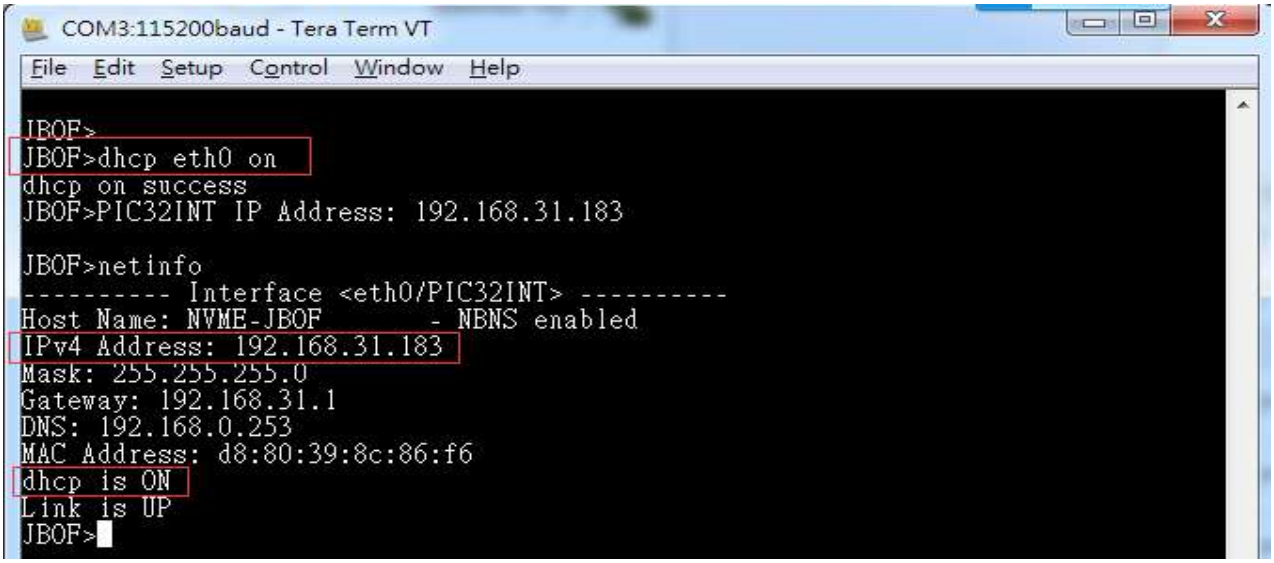
DHCP client command.

Syntax

Usage: dhcp <interface> <on/off/renew/request/info>

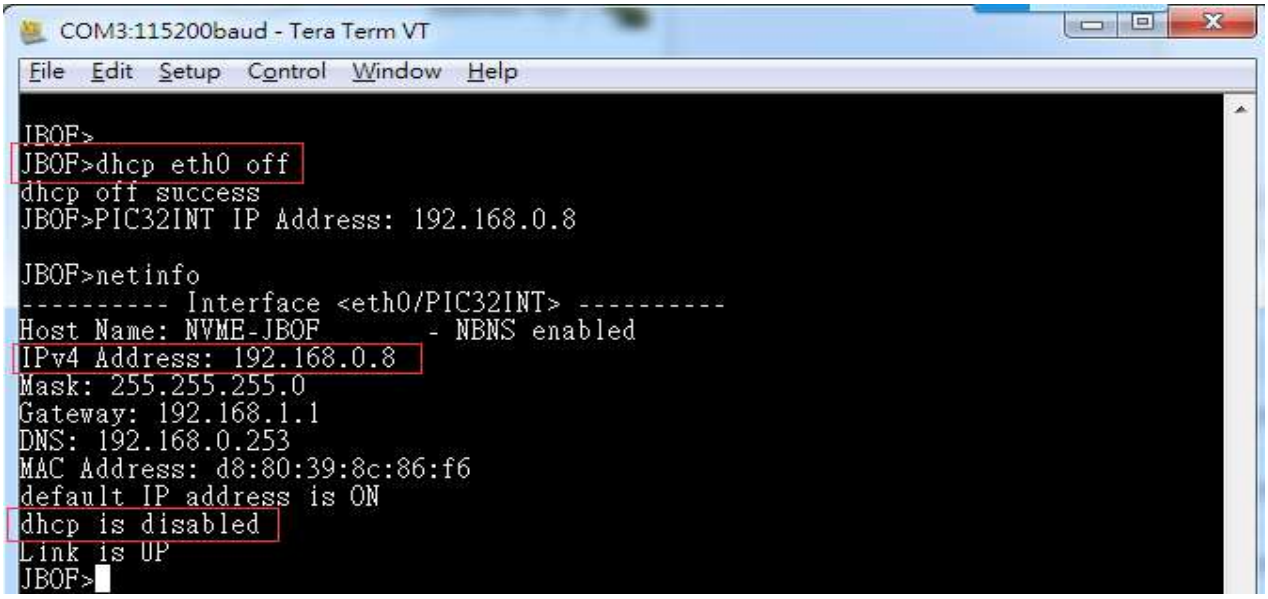
Example: Enable DHCP client function

JBOF>dhcp eth0 on



Example: Disable DHCP client function

JBOF>dhcp eth0 off



● **setbios Command**

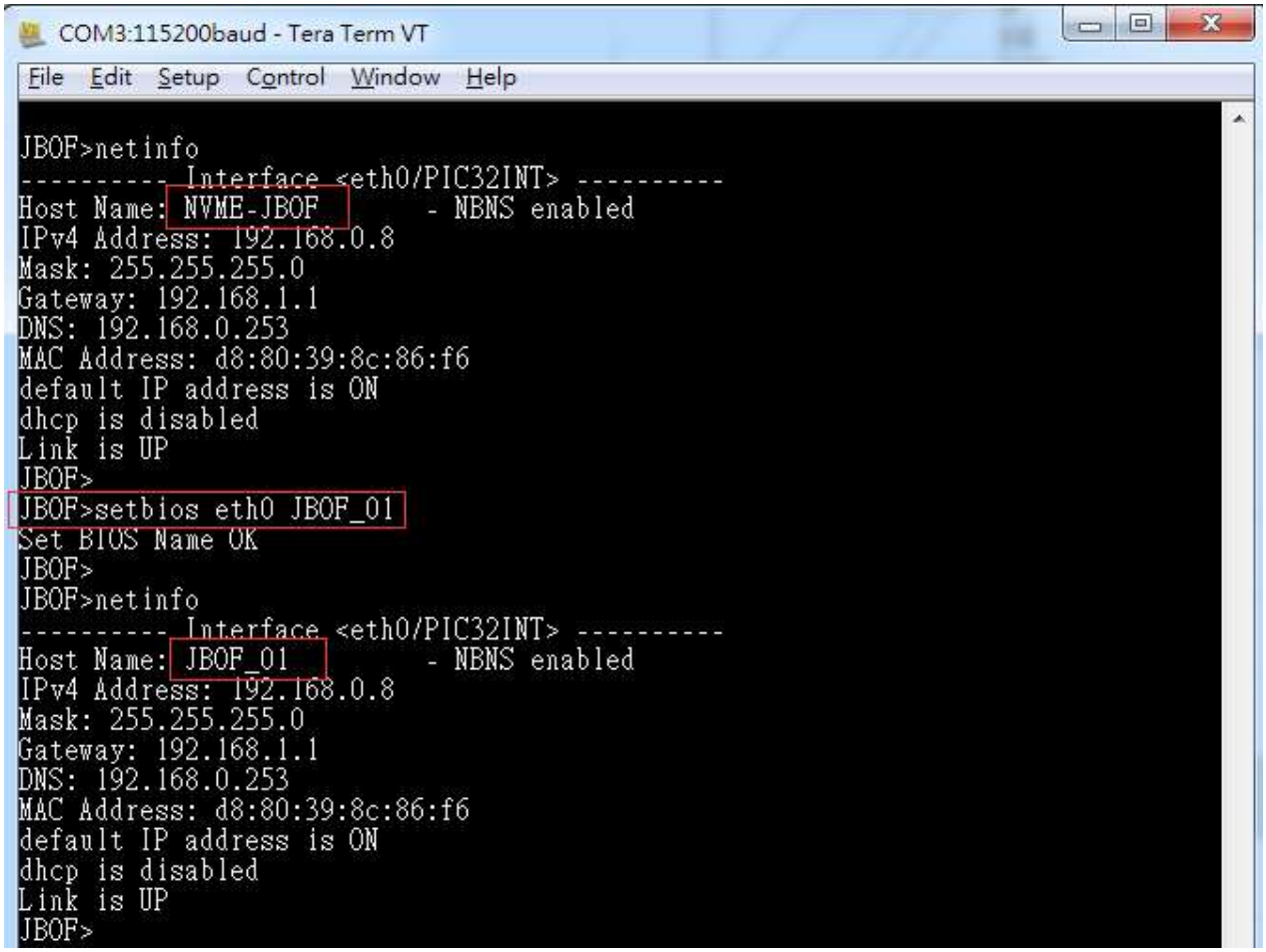
Set host's NetBIOS name.

Syntax

Usage: setbios <interface> <string>

Example: Change host's NetBIOS to "JBOF_01"

JBOF>setbios eth0 JBOF_01



- **if Command**

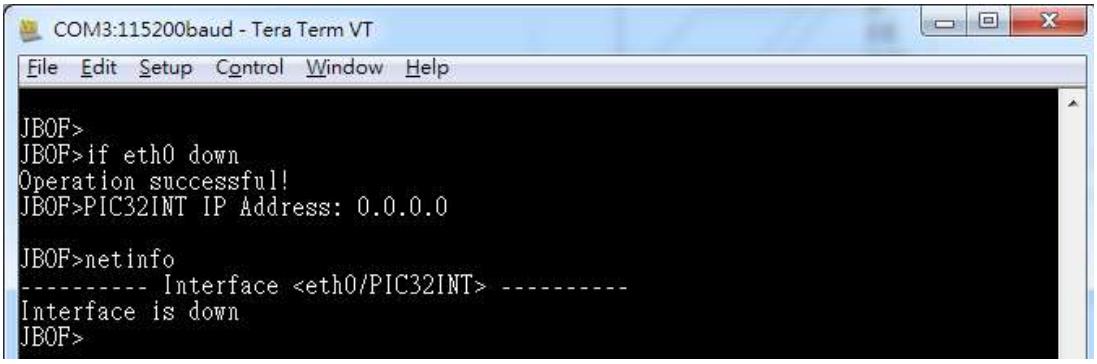
Ethernet interface enable/disable.

Syntax

Usage: if <interface> <down/up>

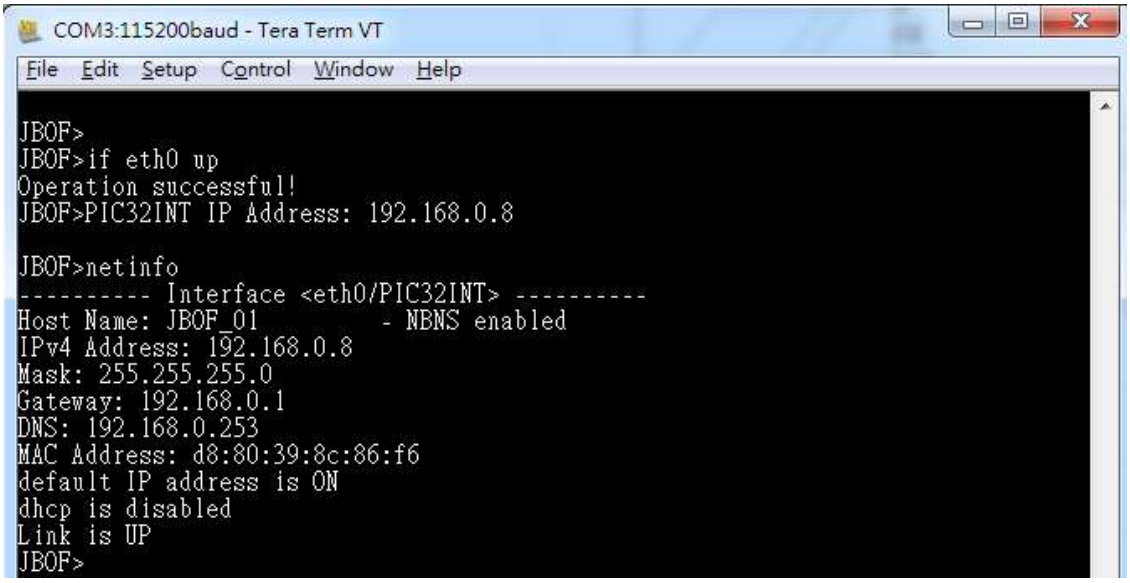
Example: Disable Ethernet interface eth0

JBOF>if eth0 down



Example: Enable Ethernet interface eth0

JBOF>if eth0 up



- **macinfo Command**

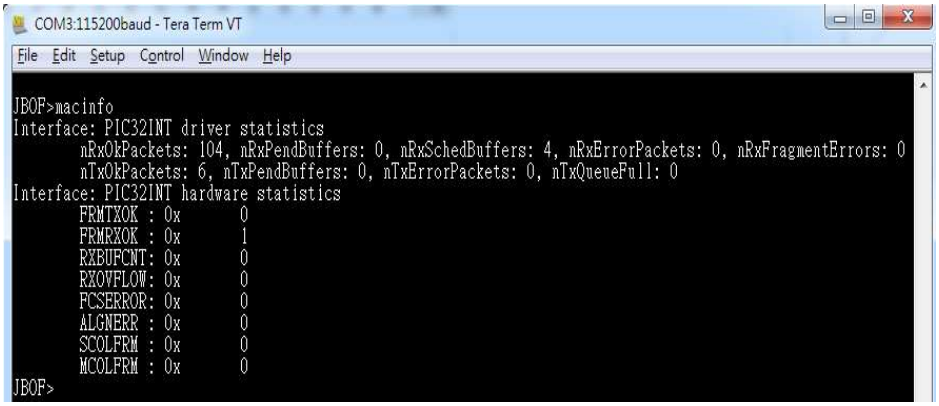
Check MAC statistics.

Syntax

Usage: macinfo

Example:

JBOF>macinfo



- **ping Command**

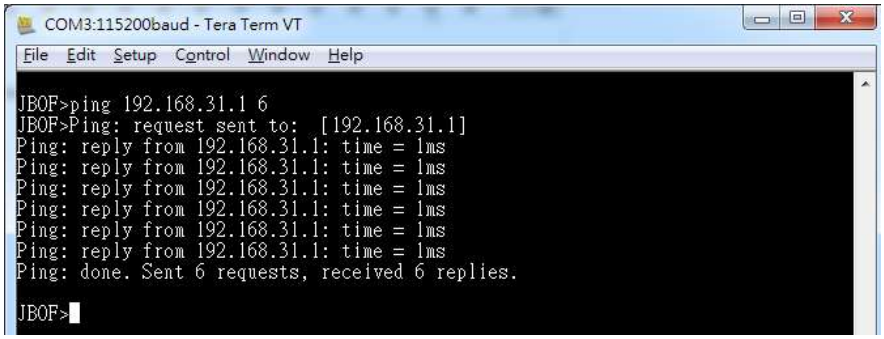
ICMP client ping command.

Syntax

Usage: ping <stop> <if> <name/address> <n> <msDelay>

Example: ping IP address 192.168.31.1 6 times

JBOF>ping 192.168.31.1 6



● **showslot Command**

This command is for display link speed and link width information of specific NVMe drive slot.

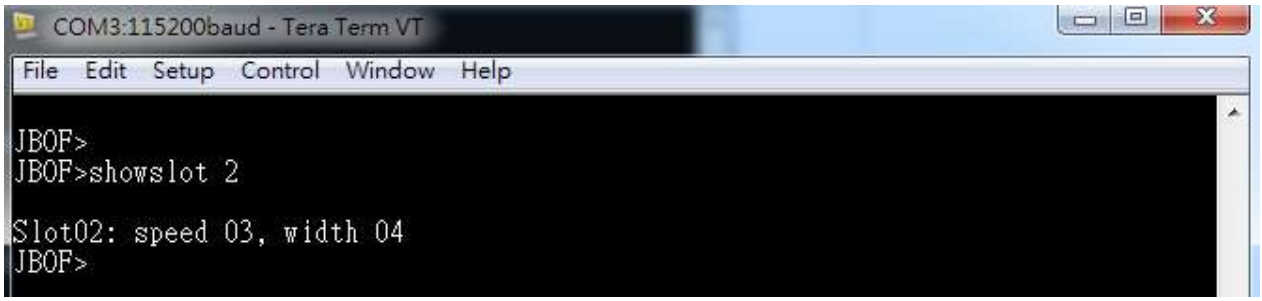
Syntax

Usage: showslot slot(D)

slot : 1 ~ 12

Example: Show link speed and link width of slot 2

JBOF>showslot 2



speed : 01->Gen1, 02->Gen2, 03->Gen3

width : 00->link down, 02-> x2, 04-> x4

Note: There is one Gen3 x4 NVMe SSD installed in Slot02

● buz Command

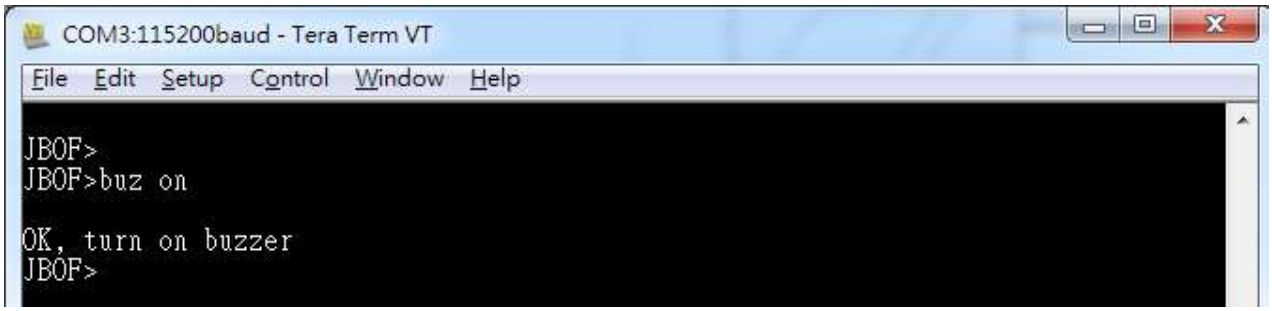
This command is for setting the buzzer of PCIe switch board.

Syntax

Usage: buz on/off

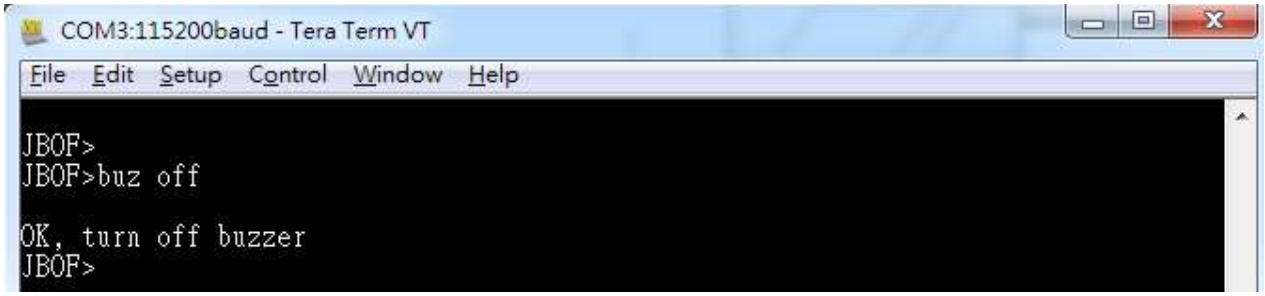
Example: Turn on buzzer

JBOF>buz on



Example: Turn off buzzer

JBOF>buz off



● showport Command

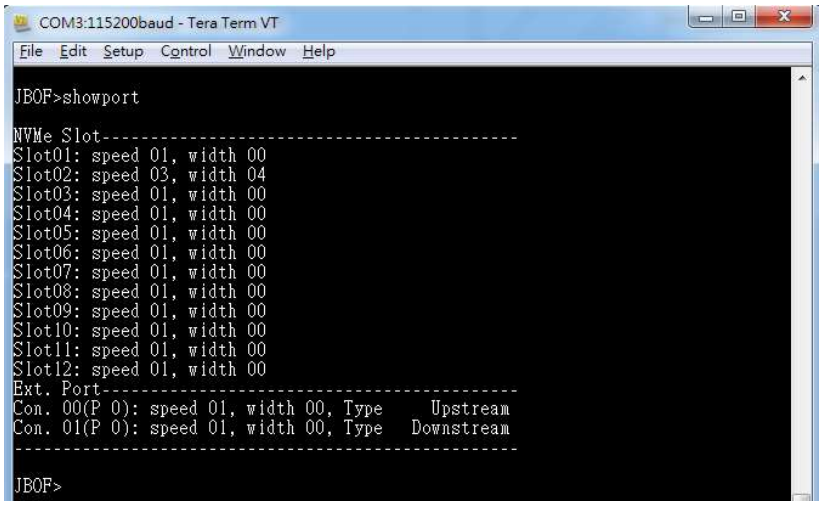
This command is for display link speed and link width information of all NVMe drive slot.

Syntax

Usage: showport

Example: Show link speed and link width of bottom controller board

JBOF>showport



- **setmode Command**

This command is for set configuration of PCIe switch board.

Syntax

Usage: setmode mode(D) option(D)

mode 1 ~ 3

1 : Base mode

2 : 2 Virtual switch

3 : 4 Virtual switch

option 0 ~ 2

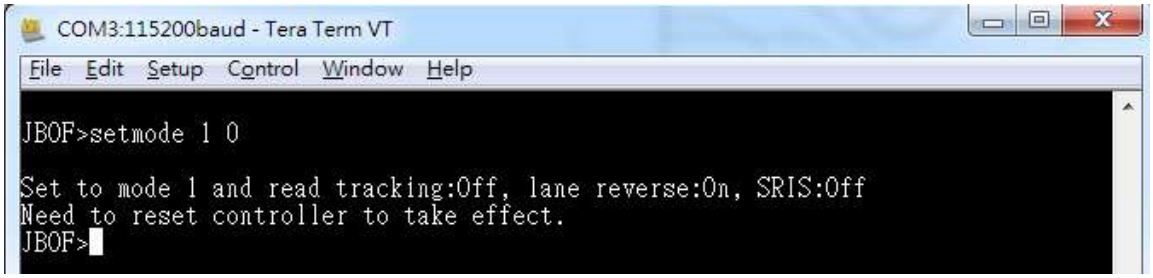
0 : read tracking disable, lane reverse enable, SRIS disable

1 : read tracking enable, lane reverse disable, SRIS disable

2 : read tracking disable, lane reverse enable, SRIS enable

Example 1: select mode 1 with read tracking disable, lane reverse enable, SRIS disable

JBOF>setmode 1 0



• showmode Command

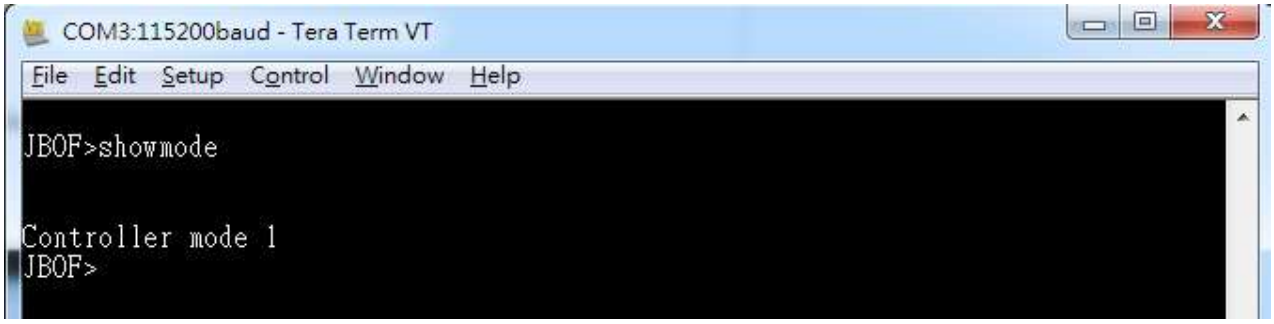
This command is for show configuration of PCIe switch board in system.

Syntax

Usage: showmode

Example: Show mode information of PCIe switch board in system

JBOF>showmode



- **setmaxspd Command**

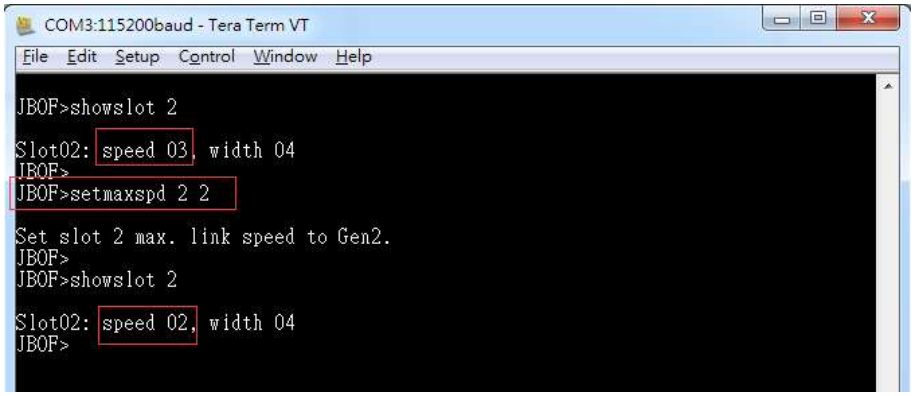
This command is for set link speed of NVMe drive slot.

Syntax

Usage: setmaxspd slot(D) Gen(D)

Example: Set slot 2 max link speed to Gen2

JBOF>setmaxspd 2 2



Note: this setting did not store in configuration, after system reset, max link speed will return to default setting (PCIe Gen3)

- **ver Command**

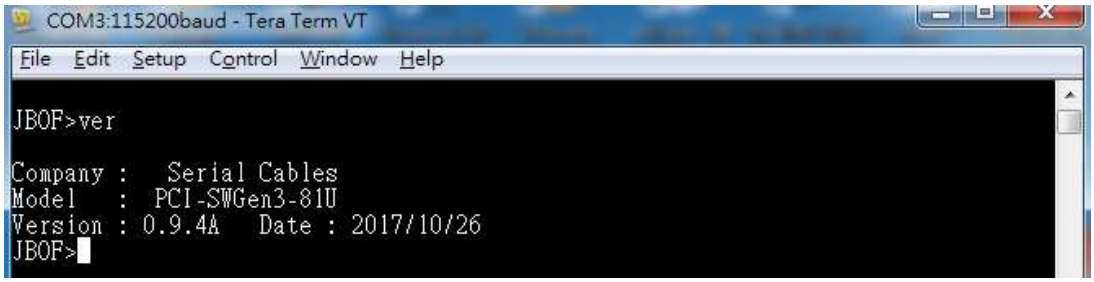
This command is for show microcontroller firmware version of PCIe switch board.

Syntax

Usage: ver

Example: Check microcontroller firmware version

JBOF>ver



- **lsd Command**

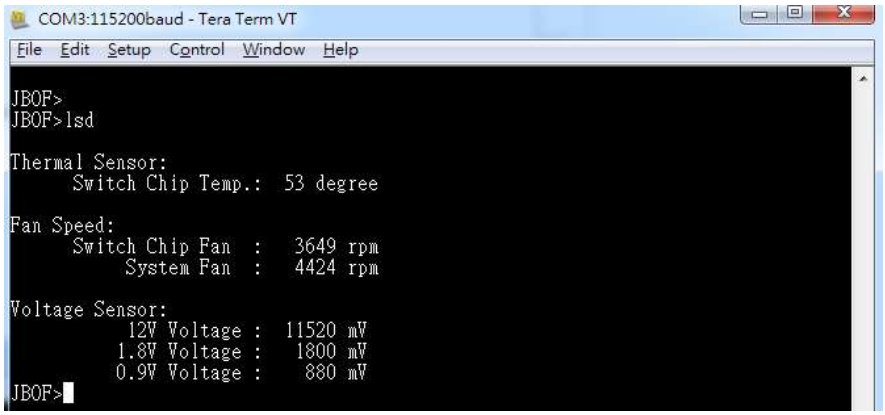
This command is for show environmental conditions information of PCIe switch board.

Syntax

Usage: lsd

Example: Check all sensor reading of PCIe switch board

JBOF>lsd



- **pwmctrl Command**

This command is for change system fan duty on the PCIe switch board.

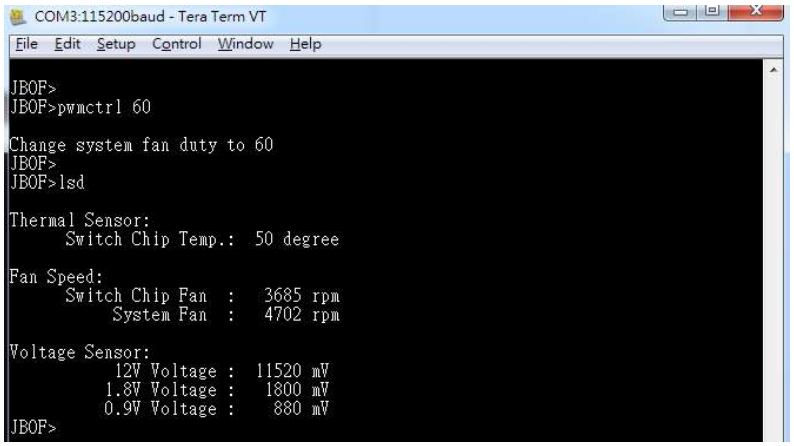
Syntax

Usage: pwmctrl duty(D)

duty(D) : fan duty should be 50 ~ 100

Example: Change system fan duty to 60

JBOF>pwmctrl 60



Note 1: Default system fan duty is 50.

Note 2: This setting will store in configuration, after system reset, system fan duty will set as user setting.

● **setalarm Command**

This command is for set event alarm setting of the PCIe switch board.

Syntax

Usage: setalarm [Event No.] [on/off]

There are 6 events of PCIe switch board.

1. switch chip temperature over temperature
2. switch chip fan failure (fan speed is 0)
3. system fan failure (fan speed 0)
4. 12V voltage over or under voltage
5. 1.8V voltage over or under voltage
6. 0.9V voltage over or under voltage

Each bit corresponding to one event in this setting.

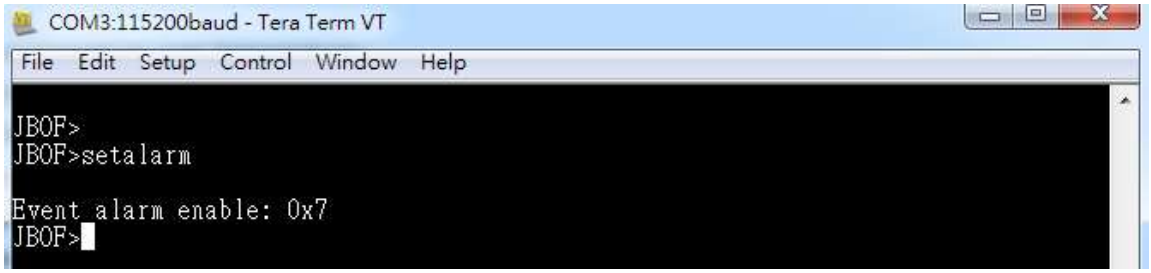
If the alarm bit is enabled, buzzer will alarm when any one of the alarm enabled event occur.

If the alarm bit is disabled, buzzer will not alarm. Only system healthy LED change from "Green" to "Red".

The default setting is 0x07, only event 1,2,3 are enabled.

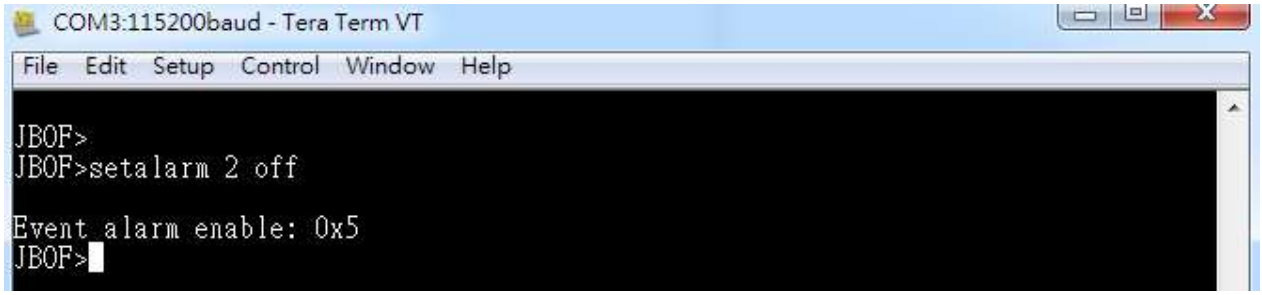
Example: Check event alarm setting.

JBOF>setalarm



Example: Disable switch chip fan failure alarm.

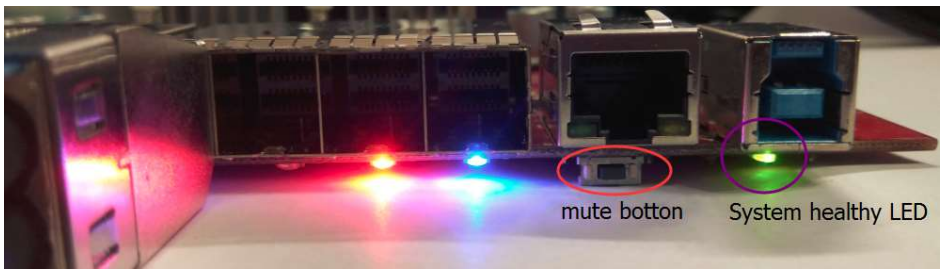
JBOF>setalarm 2 off



Firmware Upgrade

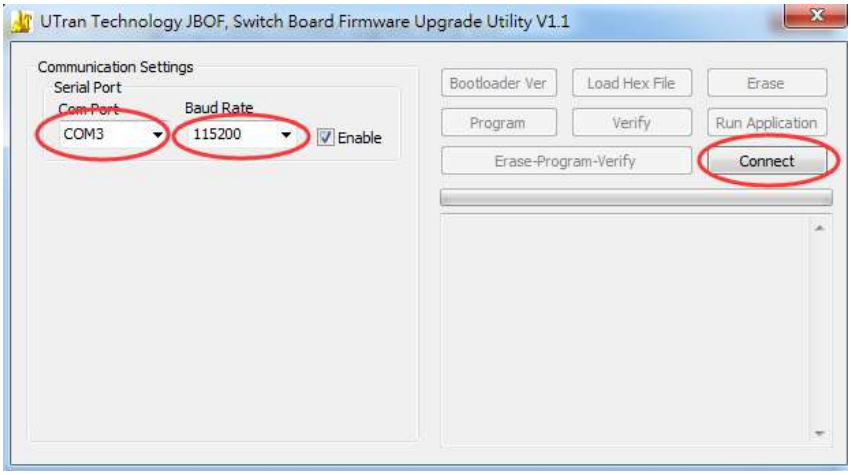
Enter the firmware upgrade mode

Before power on PCIe switch board, press and hold mute button then power on it
If PCIe switch board enter firmware upgrade mode success, user can check "System healthy LED " is blinking (Green/Red)

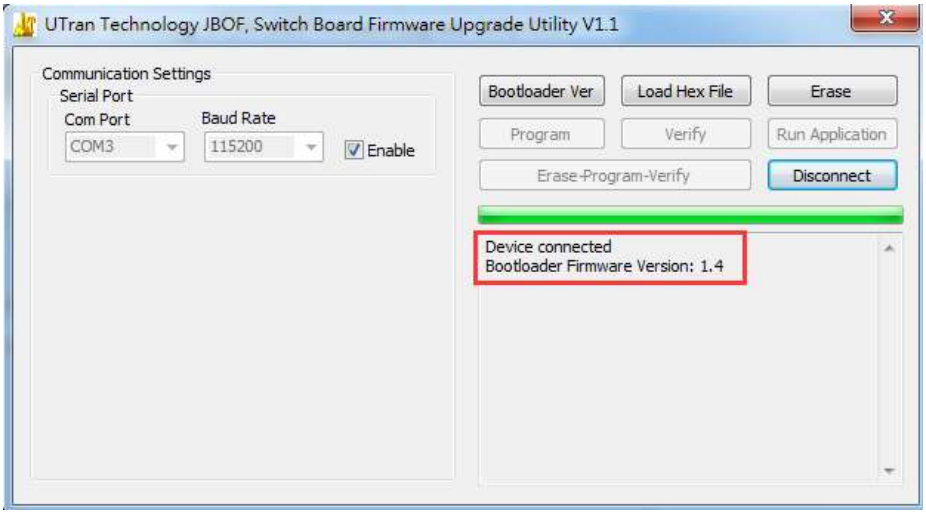


Launch the firmware upgrade application and setting

After launch application, select the "Com Port" used to upgrade firmware and the baud rate is 115200 then click connect

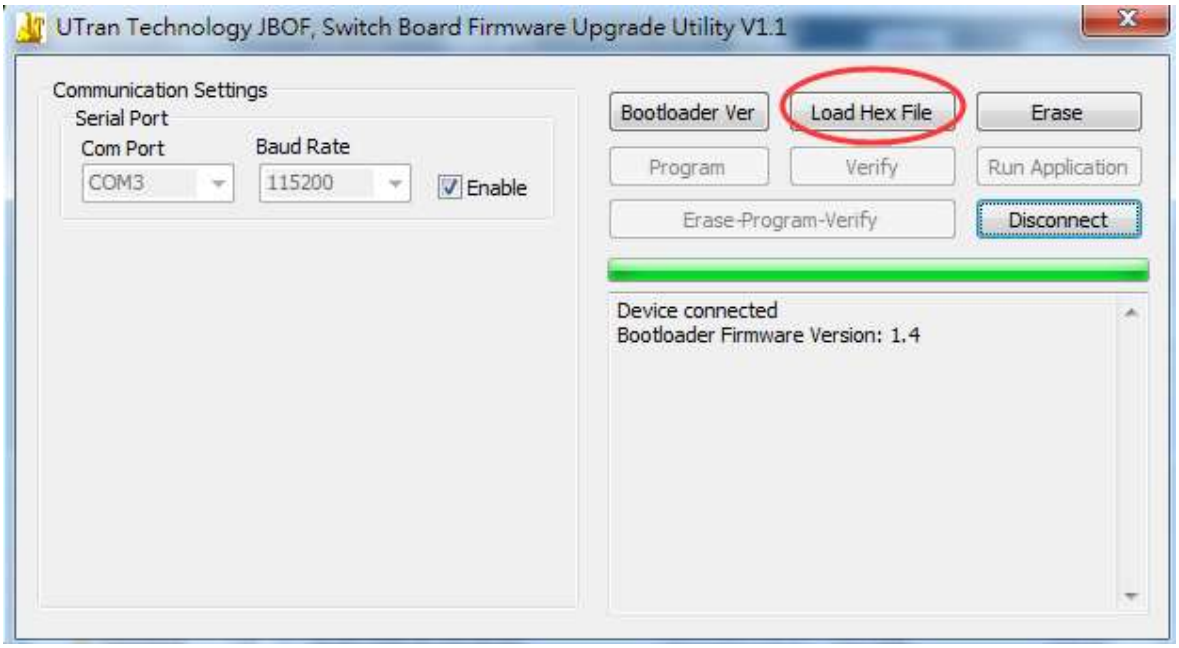


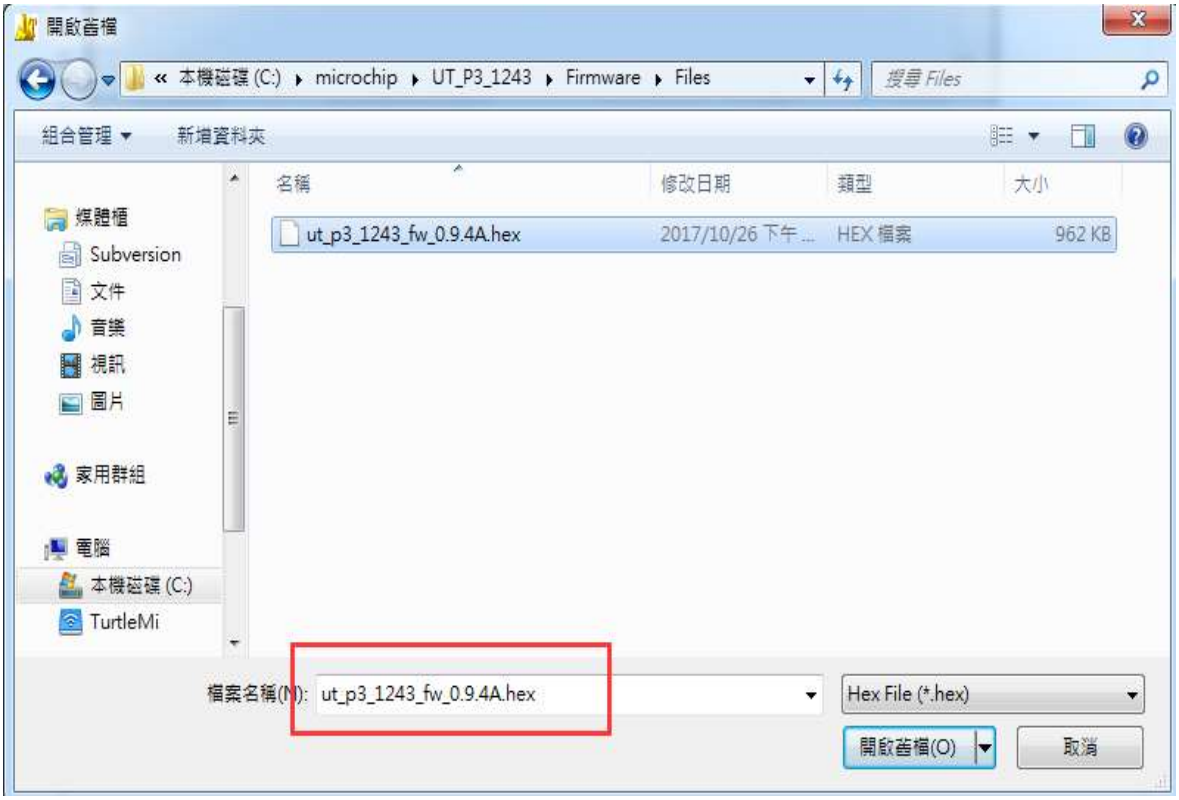
Check the message to make sure device is connected.

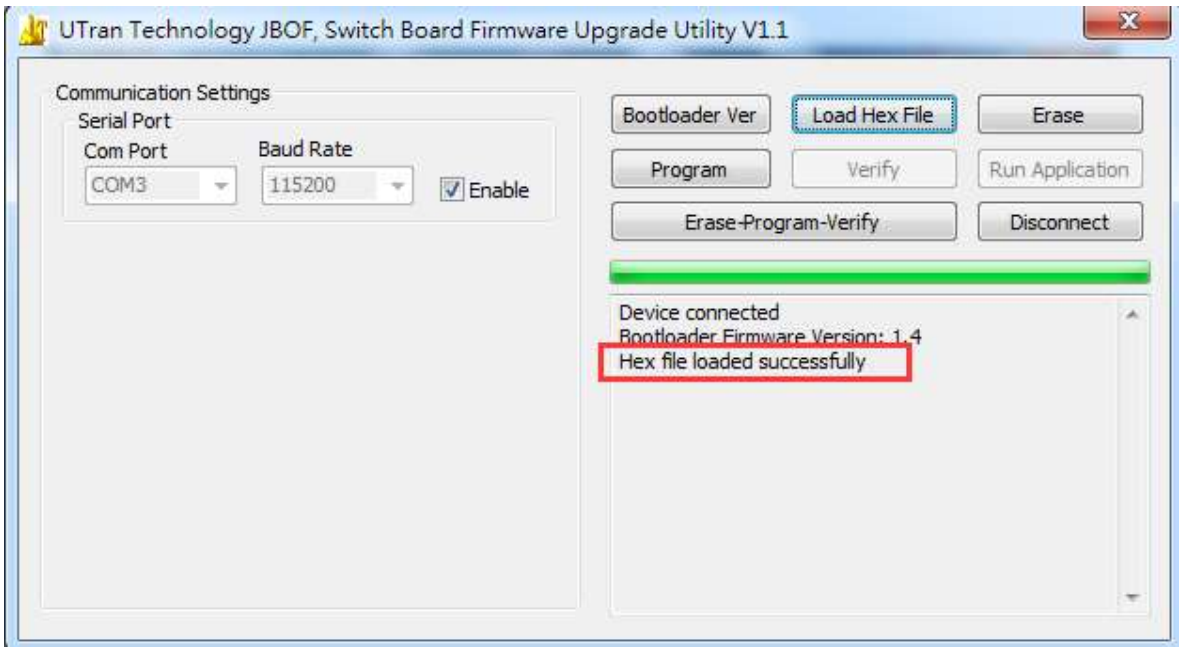


Load firmware file

Click "Load Hex File" button to select firmware file

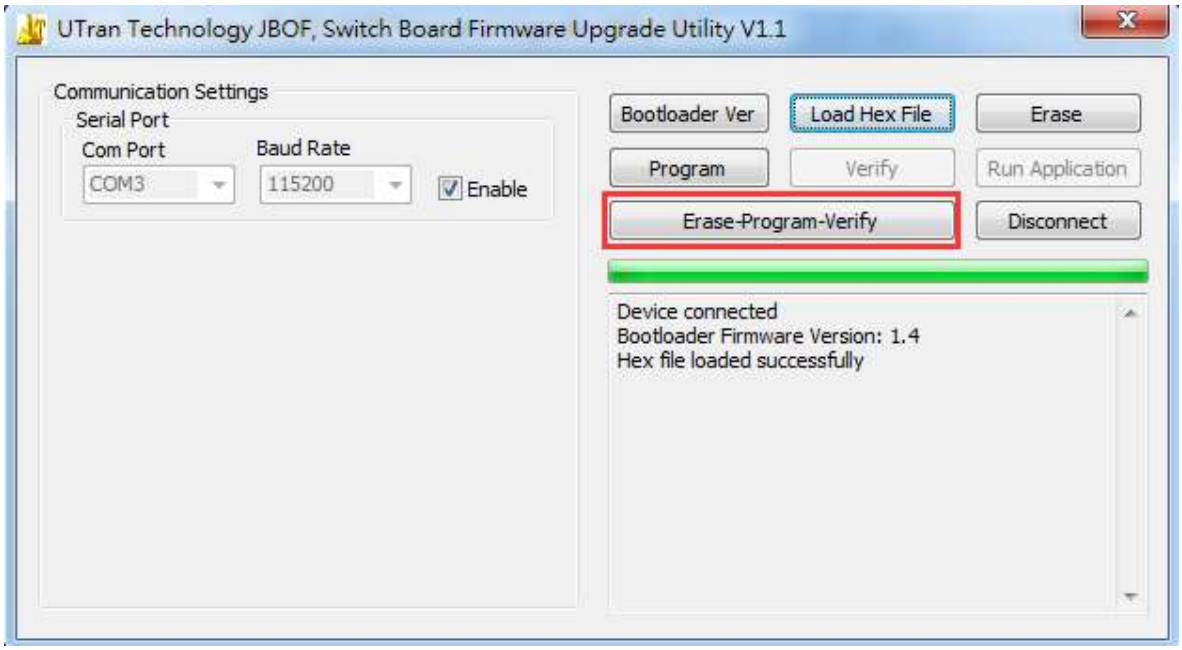


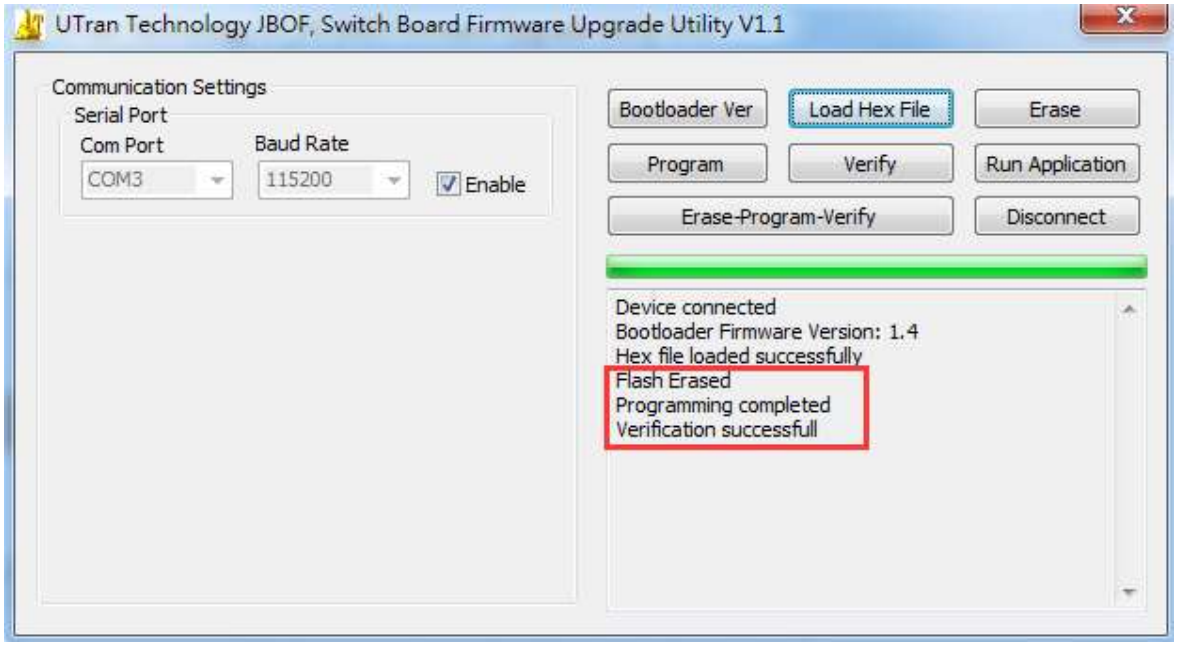



UTran Technology JBOF, Switch Board Firmware Upgrade Utility V1.1
Communication Settings
Serial Port
Com Port
Baud Rate
COM3
115200
Enable
Bootloader Ver
Load Hex File
Erase
Program
Verify
Run Application
Erase-Program-Verify
Disconnect
Device connected
Bootloader Firmware Version: 1.4
Hex file loaded successfully

Begin to upgrade firmware process

After load firmware file, click "Erase-Program-Verify" button to start upgrade process.





Disconnect serial port and power cycle the system