

PXE6410 User Manual

Rev. 1.0

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Document Revision History

Table 1.1 Document Revision History

Revision	Date	Description	Author
1.0	07-Dec.-2023	• Original version.	Jakob Apelblat

Acronyms & Abbreviations

Table 1.2 Acronyms & Abbreviations

Acronym	Description
μs or us	Microseconds
ADC	Analog to Digital Converter
AM	Amplitude Modulation
ASIC	Application-Specific Integrated Circuit
ATE	Automatic Test Equipment
AWG	Arbitrary Waveform Generators
AWT	Arbitrary Waveform Transceiver
BNC	Bayonet Neill–Concelm (coax connector)
BW	Bandwidth
CW	Carrier Wave
DAC	Digital to Analog Converter
dBc	dB/carrier. The power ratio of a signal to a carrier signal, expressed in decibels
dBm	Decibel-Milliwatts. E.g., 0 dBm equals 1.0 mW.
DDC	Digital Down-Converter
DHCP	Dynamic Host Configuration Protocol
DSO	Digital Storage Oscilloscope
DUC	Digital Up-Converter
ENoB	Effective Number of Bits
ESD	Electrostatic Discharge
EVM	Error Vector Magnitude
FPGA	Field-Programmable Gate Arrays
GHz	Gigahertz
GPIO	General Purpose Interface Bus
GS/s	Giga Samples per Second
GUI	Graphical User Interface
HP	Horizontal Pitch (PXIe module horizontal width, 1 HP = 5.08mm)
Hz	Hertz
IF	Intermediate Frequency
I/O	Input / Output
IP	Internet Protocol
IQ	In-phase Quadrature
IVI	Interchangeable Virtual Instrument
JSON	JavaScript Object Notation
kHz	Kilohertz
LCD	Liquid Crystal Display

Acronym	Description
LO	Local Oscillator
MAC	Media Access Control (address)
MDR	Mini D Ribbon (connector)
MHz	Megahertz
MIMO	Multiple-Input Multiple-Output
ms	Milliseconds
NCO	Numerically Controlled Oscillator
ns	Nanoseconds
PC	Personal Computer
PCAP	Projected Capacitive Touch Panel
PCB	Printed Circuit Board
PCI	Peripheral Component Interconnect
PRBS	Pseudorandom Binary Sequence
PRI	Pulse Repetition Interval
PXI	PCI eXtension for Instrumentation
PXle	PCI Express eXtension for Instrumentation
QC	Quantum Computing
Qubits	Quantum bits
RADAR	Radio Detection And Ranging
R&D	Research & Development
RF	Radio Frequency
RT-DSO	Real-Time Digital Oscilloscope
s	Seconds
SA	Spectrum Analyzer
SCPI	Standard Commands for Programmable Instruments
SFDR	Spurious Free Dynamic Range
SFP	Software Front Panel
SMA	Subminiature version A connector
SMP	Subminiature Push-on connector
SPI	Serial Peripheral Interface
SRAM	Static Random-Access Memory
TFT	Thin Film Transistor
T&M	Test and Measurement
TPS	Test Program Sets
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus
VCP	Virtual COM Port
Vdc	Volts, Direct Current
V p-p	Volts, Peak-to-Peak
VSA	Vector Signal Analyzer
VSG	Vector Signal Generator
WDS	Wave Design Studio

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1 General

1.1 Scope

The scope of this manual is to describe the setup and operating procedures of the Tabor Electronics PXE6410 PXIe based 6 slot Gen 3 x 4 chassis.

1.2 Related Documentation

- Wave Design Studio User Manual
- Proteus Programming Manual
- Proteus Module User Manual
- Lucid-X PXIe User Manual

1.3 Maintenance

1.3.1 Preventive Maintenance

No periodic preventive maintenance is required.

1.3.2 Long Term Storage or Repackaging For Shipment

If the instrument is to be stored for a long period of time or shipped immediately, proceed as directed below. If you have any questions, contact your local Tabor Electronics representative or the Tabor Electronics Customer Service Department.

Repack the instrument using the wrappings, packing material and accessories originally shipped with the unit. If the original container is not available, purchase replacement materials. Be sure the carton is well sealed with strong tape or metal straps. Mark the carton with the model and serial number. If it is to be shipped, show sending and return address on two sides of the box. If the instrument is to be shipped for service or repair, the following information must be included with the shipment:

- Name and address of the owner.
- Record the model and serial number of the instrument, options, and firmware version.
- Note the problem and symptoms – detailed information will help in verifying the problem
 - What was the instrument setup, such as the run mode, arbitrary/task mode, task table etc.
 - Did the unit work; then fail or was it dead on arrival.
 - What other equipment was connected to the generator when the problem occurred, such as external trigger or clock.
- The name and telephone number of someone familiar with the problem who can be contacted by Tabor Electronics if any further information is required.
- Show the returned authorization order number (RMA) as well as the date and method of shipment.

Note

Always obtain a return authorization number from the factory before shipping the instrument to Tabor Electronics.

1.4 Safety

To avoid electrical shock, fire or personal injury:

- Use only the proper power cord and certified for the country of use.
- This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, the grounding conductor must be connected to the ground. Before connecting to the power input or output, ensure that the product is properly grounded.
- Do not operate this product with removed covers or panels.
- Observe all the ratings and markings on the product. Search this manual for further rating information, before connecting to it. Do not apply potential that is higher than the maximum rating.
- Do not operate in dark or wet conditions.
- Do not operate in an explosive environment. Keep product clean and dry.

2 Introduction

The PXE6410 is a PXIe based 6 slot Gen 3 x 4 chassis, that supports the Tabor Lucid family of analog signal generators, the Tabor Proteus family of AWG's and the Tabor TE320x family of PXIe RF amplifiers. The chassis allows you to purchase any Proteus/Lucid PXIe module and later add or upgrade to more channels, higher sample rates or higher output power. The system includes an embedded PC with an internal SSD drive, HDMI connection, USB interfaces for a mouse and keyboard, as well as control using USB Type-C and 1000BASE-T LAN.

Table 2.1 Ordering Information

Model	Description
PXE6410	6 slot PXIe chassis with an embedded PC

Table 2.2 Options

Option	Description
COM1	Upgrade of the PXE6410 to an Intel Xeon 4 core, 6 MB cache, 2.2 GHz processor
COM2	Upgrade of the PXE6410 to an Intel Xeon 8 core, 12 MB cache, 2 GHz processor
COM3	Upgrade of the PXE6410 to an Intel Xeon 12 core, 18 MB cache, 1.5 GHz processor
RAM32	Upgrade to 32 GB on-board memory for the COM
RAM64	Upgrade to 64 GB on-board memory for the COM
RAM128	Upgrade to 128 GB on-board memory for the COM



Figure 2.1 PXE6410 6 Slot PXIe Chassis

2.1 Front Panel

Below is the front panel of the PXE6410 chassis:



Figure 2.2 PXE6410 Front Panel

- **Power Button** – Power on/off button with light.
- **PXIe Gen3 4 Lanes Slot** – 6 slots for Proteus/Lucid modules.
- **1 – 6** – PXIe slot numbering.
- **USB** – USB Type A interface for connecting a USB device such as a memory device (formatted as FAT32) for storing and recalling instrument setups, keyboard, or mouse.

Note

Connector pin assignments of the PXI Express Peripheral Slots comply with the default pin assignments as defined in PXI-5 PXI Express hardware specification Rev.1.0.

2.2 Rear Panel

Below is the rear panel of the PXE6410 chassis:

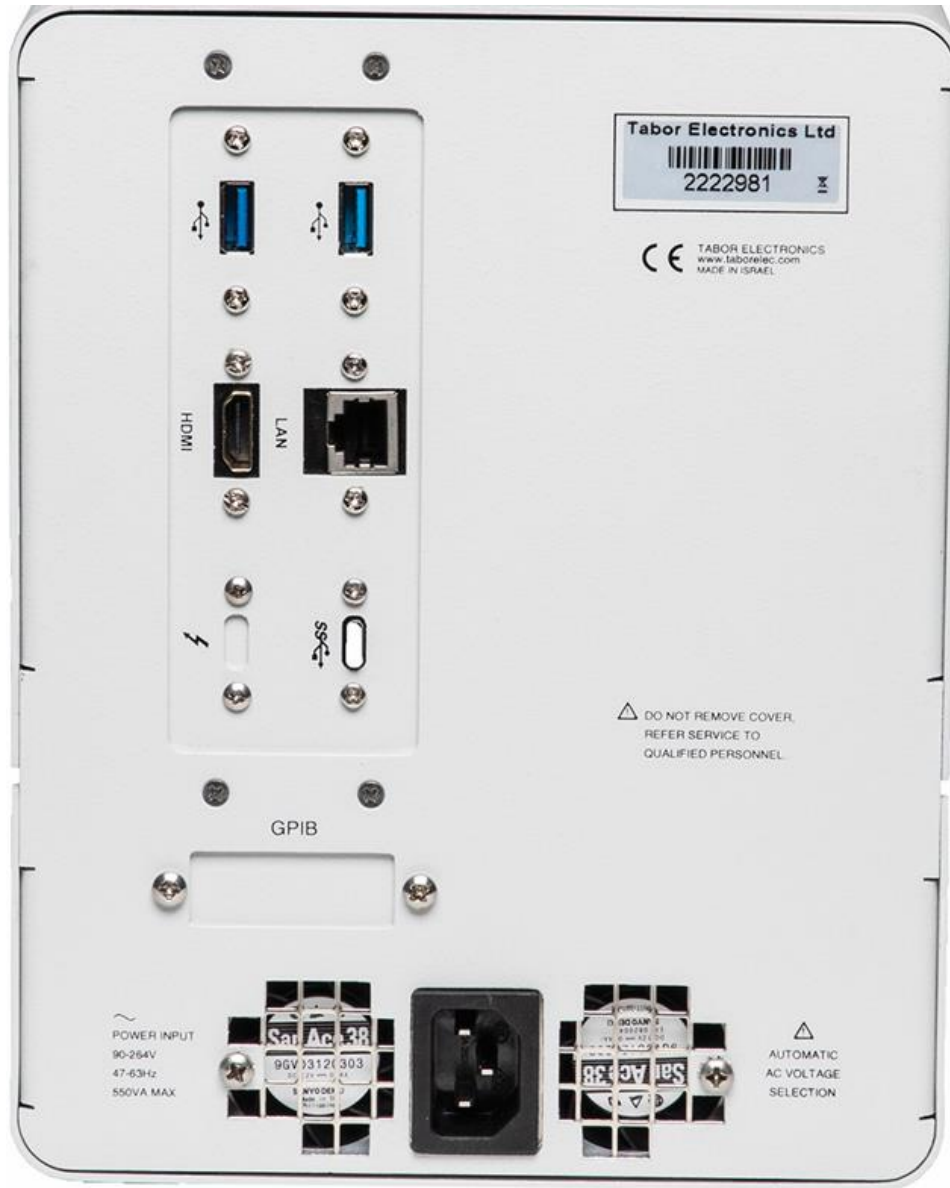


Figure 2.3 PXE6410 Rear Panel

- **USB Host** – 2 x USB 3 Type A interface for connecting a USB device such as a memory device (FAT32) for storing and recalling instrument setups, keyboard, or mouse.
- **HDMI** – HDMI Type A for connecting an external display.
- **LAN RJ45** – RJ45 1000BaseT Ethernet connector for connecting a control PC via the LAN.
- **Thunderbolt** – Optional factory installed. Thunderbolt 3 high speed interfaces.
- **USB Device** – USB device Type C.
- **GPIB** – Optional factory installed. Interface for connecting a legacy control PC.

- **AC Power Socket** – 3 Pins IEC320 C14 inlet power plug socket.

3 Installation

3.1 Installation Overview

This chapter contains information and instructions necessary to prepare the PXE6410 chassis for operation. Details are provided for initial inspection, grounding safety requirements, repackaging instructions for storage or shipment, and installation information.

3.2 Unpacking and Initial Inspection

Unpacking and handling of the device requires normal precautions and procedures applicable to handling of sensitive electronic equipment. The contents of all shipping containers should be checked for included accessories and certified against the packing slip to determine that the shipment is complete.

The PXE6410 chassis is supplied with:

- Power cord with a plug according to customer country standard.
- USB Type C cable for connecting a control PC to the instrument.
- CD with WDS software, user manuals and instrument drivers.

Caution!

The PXE6410 chassis ships in an antistatic package to prevent damage from electrostatic discharge (ESD). When storing the unit, use the antistatic case.

3.3 Safety Precautions

This product is intended for use by qualified persons who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. The following sections contain information and cautions that must be observed to keep the device operating in a correct and safe condition.

**Caution**

For maximum safety, do not touch the product, test cables, or any other instrument parts while power is applied to the circuit under test. ALWAYS remove power from the entire test system before connecting cables or jumpers, installing, or removing cards from the chassis. Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always keep your hands dry while handling the instrument.

**Caution**

Carefully read the Safety Precautions instructions that are supplied with your test fixtures. Any adjustment, maintenance, and repair of an opened, powered-on instrument must be performed by authorized service personnel.

3.4 Operating Environment

The device is intended for indoor use and should be operated in a clean, dry environment with an ambient temperature within the range of 0°C to 40°C.

Warning

The PXE6410 chassis must not be operated in explosive, dusty, or wet atmospheres. Avoid installation of the module close to strong magnetic fields.

The design of the device has been verified to conform to EN 61010-1 safety standard per the following limits: Installation (Overvoltage) Category I (Measuring terminals) Pollution Degree 2 Installation (Overvoltage) Category I refers to signal level, which is applicable for equipment measuring terminals that are connected to source circuits in which measures are taken to limit transient voltages to an appropriately low level. Pollution Degree 2 refers to an operating environment where normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation must be expected.

3.5 Power Requirements

The chassis may be operated from a wide range of mains voltage from 100 to 264 VAC. Voltage selection is automatic and does not require switch setting. The chassis operates over the power mains frequency range of 47 to 63Hz. Always verify that the operating power mains voltage is the same as that specified on the rear panel. The instruments power consumption is 550 W max.

The device should be operated from a power source with neutral or near ground (earth potential). The instrument is not intended for operation from two phases of a multi-phase ac system or across the legs of a single-phase, three-wire AC power system. Crest factor (ratio of peak voltage to RMS) should be typically within the range of 1.3 to 1.6 at 10% of the nominal RMS mains voltage.

3.6 Grounding Requirements

To ensure the safety of operating personnel, the U.S. O.S.H.A. (Occupational Safety and Health) requirement and good engineering practice mandate that the instrument panel and enclosure be “earth” grounded.

3.7 Performance Checks

The chassis has been inspected for mechanical and electrical performance before shipment from the factory. It is free of physical defects and in perfect electrical order. Check the instrument for possible damage in transit and perform the electrical procedures outlined in the section entitled Unpacking and Initial Inspection.

3.8 Long Term Storage or Repackaging for Shipment

If the instrument is to be stored for a long period of time or shipped immediately, proceed as directed below. If you have any questions, contact your local Tabor Electronics representative or the Tabor

Electronics customer service department.

- Repack the instrument using the wrappings, packing material and accessories originally shipped with the unit. If the original container is not available, purchase replacement materials.
- Be sure the carton is well sealed with strong tape or metal straps.
- Mark the carton with the model and serial number. If it is to be shipped, show sending and return address on two sides of the box.

Note

If the instrument is to be shipped to Tabor Electronics for calibration or repair, attach a tag to the instrument identifying the owner. Note the problem, symptoms, and service or repair desired. Record the model and serial number of the instrument. Show the returned material authorization (RMA) order number as well as the date and method of shipment. Always obtain an RMA number from the factory before shipping the instrument to Tabor Electronics.

3.8.1 Installation

The chassis must be installed in a way that clears air passage to its cooling fans. For inspection and normal bench operation, place the instrument on the bench so it is clear of any obstructions to the rear/bottom fan, to ensure proper airflow.



Warning

Once the chassis is installed in the chassis cover all remaining open slots to ensure proper airflow. Using the device without proper airflow will result in damage to the instrument. It is also recommended to use the highest fan setting available on the chassis to ensure proper cooling of the PXE6410 chassis.

3.8.2 Installing Instrument Drivers

The PXE6410 chassis necessary installation drivers, control software and relevant documentation can be downloaded from the Tabor Electronics website at <http://www.taborelec.com/downloads>. Follow the instructions below to install all the necessary drivers and DLLs on your PC to communicate and control you Proteus device.

Note

Check the Tabor Electronics website for the most recent software, driver, firmware, and documentation updates. www.taborelec.com/downloads.

3.9 Installing Proteus/Lucid Modules

The PXE6410 supports up to six modules.

1. Select an available slot (1 to 6)
2. Depress the module's latch and align the module's top and bottom edges with the card guides.
3. Carefully slide the module into the chassis.
4. Lift the latch until the module is securely seated in the chassis' backplane.
5. Tighten the screws on the module's front panel.

Note

To improve efficiency of heat dissipation, you should install filler plates for all unused slots.

4 Wave Design Studio (WDS)

The PXE6410 comes with a powerful CPU with Windows 10 IOT installed. You can install the Tabor Wave Design Studio (WDS) for control and operation of the chassis. WDS can be downloaded from the Tabor website at www.taborelec.com/downloads.

5 PXE6410 Specifications

5.1 Characteristics

Table 5.1 Characteristics

Parameter	Description
Input Voltage Range	100 VAC to 264 VAC
Input Frequency Range	47 Hz to 63Hz
Power Consumption	60 W max per slot
PXIe	6 slot PXIe Gen 3 x 4 lanes with a total of 32 Gb/s system bandwidth
PXIe Pin Assignment	PXI-5 PXI Express hardware specification Rev.1.0
DC Current Consumption Per Slot	+3.3 V 4 A max., +12 V 4 A max.
CPU	Intel Pentium 3 MB Cache, 2.20 GHz (upgradeable)
Memory	8 GB (upgradeable)
Storage	120 GB (upgradeable)
Operating System	Windows 10 IOT
USB	1 x front panel USB host (Type A), 2 x rear panel USB host, (Type A), 1 x rear panel USB device (Type C)
Lan (Base-T)	1 x rear panel RJ-45 1000/100/10
SFP+ (Optional, Replaces RJ45)	1 x rear panel SFP+ 10G Optical
GPIO (Optional)	IEEE 488.2 – GPIO
Display	1 x rear panel HDMI
Input Voltage Range	100 VAC to 264 VAC
Input Frequency Range	47 Hz to 63 Hz
Power Consumption	60 W max per slot

5.2 Configurations

Table 5.2 Configurations

Parameter	Description
Slot Usages	
Proteus AWG	2 slots
Proteus AWT	3 slots

TE320x Amplifiers	1 slot
Typical Configurations	
12 CH RF-AWG	3 x P9484M RF AWG module
4 CH RF-AWG, High Power	1 x P9484M RF AWG module 2 x TE3202 RF amplifier
8 CH AWG, 2 CH Digitizer	1x P9484M RF AWT module 1x P9484M RF AWG module

5.3 General

Table 5.3 General

Parameter	Description
Weight	
Without Package	7.5 kg
Shipping Weight	9 kg
Dimensions	
With feet	175 x 221 x 316 mm (W x H x D)
Without feet	175 x 235 x 316 mm (W x H x D)
Temperature	
Operating	0°C to +40°C
Storage	-40°C to +70°C 15 minutes
Warm Up Time	15 minutes
Humidity	85% RH, non-condensing
Safety:	CE Marked, EC61010-1:2010
EMC:	IEC 61326-1:2013