Synway ATP Series

SHT-16B-CT/cPCI 2.0

SHT-16B-CT/cPCI/MP3 2.0

Analog Tap Passive Board

Hardware Manual

Version 2.1

Synway Information Engineering Co., Ltd

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Contents

Copyright Declaration

Revision History

Version	Date	Comments
Version 1.0	2004-5	Initial publication
Version 2.0	2006-7	Changes: Made hardware improvement, eliminated models with the front connection panel, added illustrations of boards and modules for better understanding, and separated call-recoding products from the CTI series to be a new series.
Version 2.1	2009-6	Changes: Added the CT_EN jumper and the description on it.

Note: Please visit our website http://www.synway.net to obtain the latest version of this document.

Chapter 1 Overview

The ATP Series SHT-16B-CT/cPCI is a 16-channel analog tap passive board with CompactPCI bus and hot-swap feature. By configuring different recording modules in different ways, this board can be used for high-impedance recording of analog phone lines and direct recording of microphones.

1.1 Functions

- High-impedance connection ensures no interruption of data transmission on the monitored line

- A variety of ways to start/stop recording

- Supports simultaneous recording on 16 channels, each with a different format

- Calling party info (Caller ID) detection, DTMF and FSK support

- DTMF digits detection

- Programmable tone analyzer detects all kinds of tones

- Activity/silence detection

- Automatic Gain Control (AGC) support in recording operation

- Call progress monitoring

- Automatic line voltage detection

- Automatically checks board to see if recording modules are correctly inserted

1.2 Features

- **CompactPCI 2.1 Bus Support**

  Includes CompactPCI 2.1 bus with burst data transmission rate up to 133 MB/s; PNP (plug and play) feature eliminates the need for jumper leads; supports hot swap while running the application software (most advanced hot-swap operation for CompactPCI system).

- **Connects via Rear Connection Panel**

  The use of the rear connection panel for connection eliminates the need for reconnection upon changing the board, which facilitates system development and debugging, and enhances runtime stability.

- **Module Configurable**

  8 on-board dual channel modules can be freely arranged in pairs or groups for various complex, multi-functional applications, such as call center and recording functions available on a single board.

- **On-board SIMM Slots**

  Fit recording modules to board. Contacts on both sides of the SIMM slots greatly improve connection and ease installation.

- **RJ11 and DB44 Connectors Available**

  A rear connection panel has eight 4-pin RJ11 jacks and a 16-way DB44 connector

which can be directly connected to phone lines via a proper arrangement of lines and cables, making connection easy and malfunctions rare.

- **2 to 16 Port Hi-Z Monitoring of Analog Lines**

  Flexible positioning of the access point on the communication line between Central Office Terminal (COT) and PBX, COT and telephones, PBX and telephones, etc. allows monitoring of any analog tone signal such as tone signals from radio stations. This function is widely used in small-to-large capacity call recording systems, call centers and microphone recording systems.

- **Programmable Tone Detector**

  Detects single or dual tones at any frequency, offering facility for use with a variety of switches and enterprise phone systems.

- **High-impedance Recording**

  The recording impedance is up to 10KΩAC/2MΩDC, ruling out interruption on transmission of monitored signals.

- **Various CODECs Support**

  Offers a large selection of voice CODECs, including hardware-based A-law (G.711), μ-law, IMA-ADPCM, MP3, software-based 16-bit linear PCM, MP3 and VOX.

- **Supports WAV File**

  The recorded speech files can be edited and played by audio tools such as Cooledit.

- **Audio Output Interface**

  The analog tone amplifier circuit equipped on the first channel and the audio output jack on the rear connection panel allow the board to connect directly with the headset or sound box, and monitor a specific channel in real time via a simple function call.

- **TDM Capability**

  The use of the on-board H.110 bus in a CompactPCI chassis facilitates smooth connectivity to third-party boards with H.110 bus for the transfer of acquired voice signals to other devices.

- **Unique Hardware Serial Number**

  Each board has a unique hardware serial number written in the firmware to distinguish itself from other boards and prevent piracy. The number is available via an easy function call with applications.

- **Authorized Code Identification Circuit**

  The on-board authorized code identification circuit is designed for software safety. Users can apply to our company for the authorized code.

- **Synway's Unified SynCTI Driver Development Platform**

  Synway owns the intellectual property rights for the unified high-intelligence SynCTI driver development platform. Each system supports up to 2048 channels. Functions such as the detection and analysis of rings, tones and Caller IDs, are available via simple function calls on the driver platform, without having to understand complex call procedures.
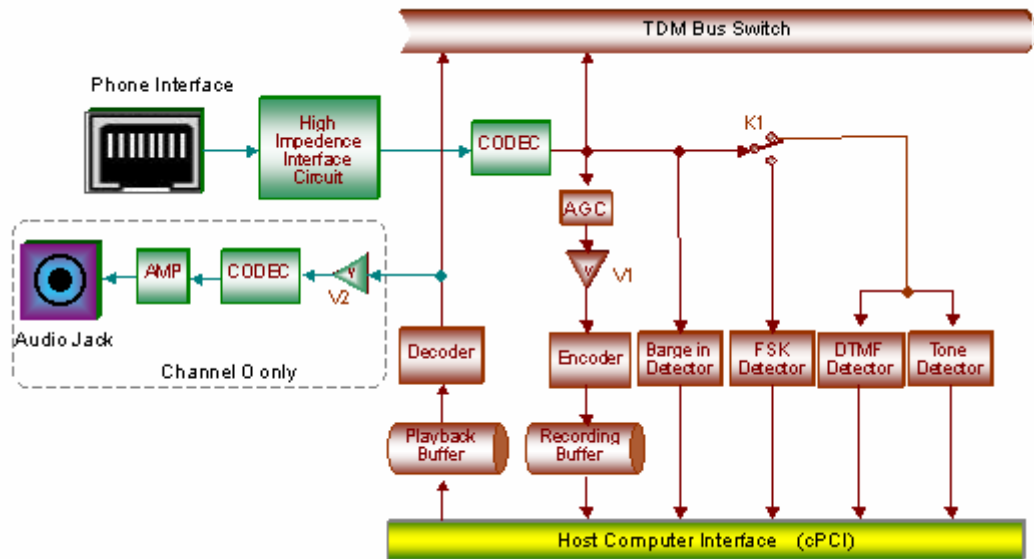
1.3 Operation Principle

Figure 1-1 Operation Principle

Notes: Channel 0 mentioned in this figure corresponds to Channel 1 marked on the board.

1.4 Functional Modules

This board can be used with two kinds of recording modules: High-impedance recording module and microphone module.

● **High-impedance recording module**

Equipped with high-impedance input interfaces, this module is used for the recording of local lines, extension lines, dynamic microphones and other audio tones. See Figure 2-5 and Figure 2-6 for details.

● **Microphone module**

Equipped with battery feed circuits, this module connects directly to condenser microphones (common sound-card-compatible microphones). See Figure 2-7 and Figure 2-8 for details.

Chapter 2 Installation

2.1 Hardware Structure

- **SHT-16B-CT/cPCI board**

Handle with a Lock

Module Slot 1 (Ch1-Ch2)
Module Slot 2 (Ch3-Ch4)
Module Slot 3 (Ch5-Ch6)
Module Slot 4 (Ch7-Ch8)

Module Slot 5 (Ch9-Ch10)
Module Slot 6 (Ch11-Ch12)
Module Slot 7 (Ch13-Ch14)
Module Slot 8 (Ch15-Ch16)

S6

SHT-16-CT/CPCI 2.0
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CT_EN Jumper

cPCI Connector with Alignment Pin

H.110 Bus Interface

cPCI Connector

Figure 2-1 Front View

Network Access License
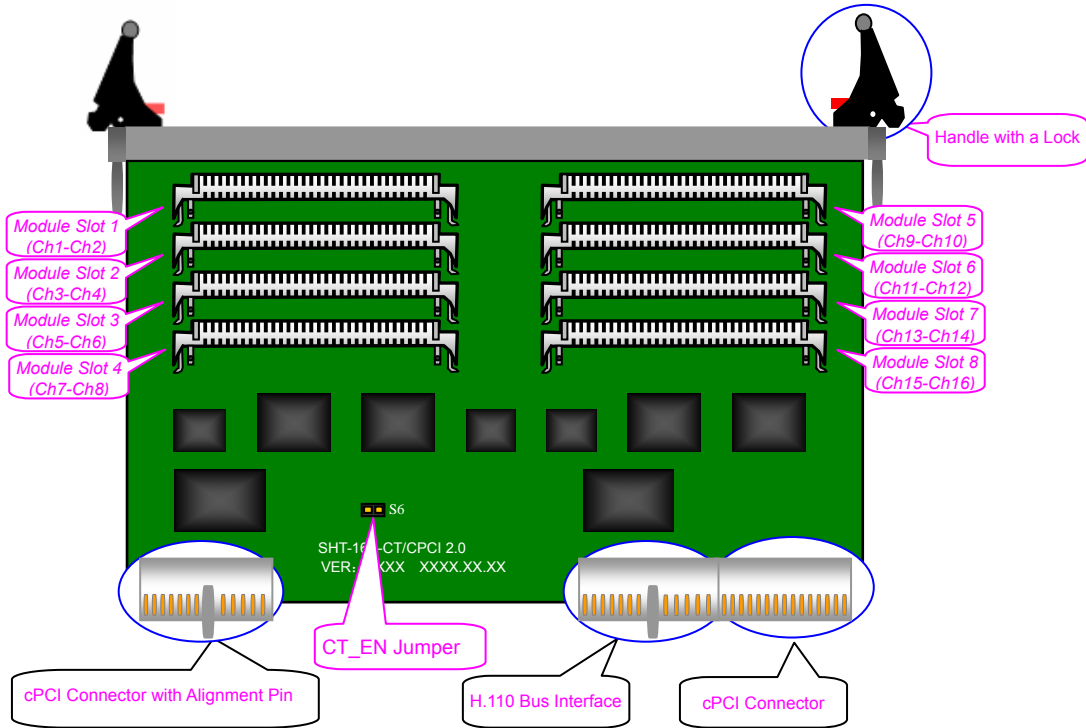
Corporate Logo

XXXXXXX

Serial Number

SHT-16B/cPCI

Board Model

Figure 2-2 Rear View

- **Rear connection panel for SHT-16B-CT/cPCI**

cPCI Connector with Alignment Pin
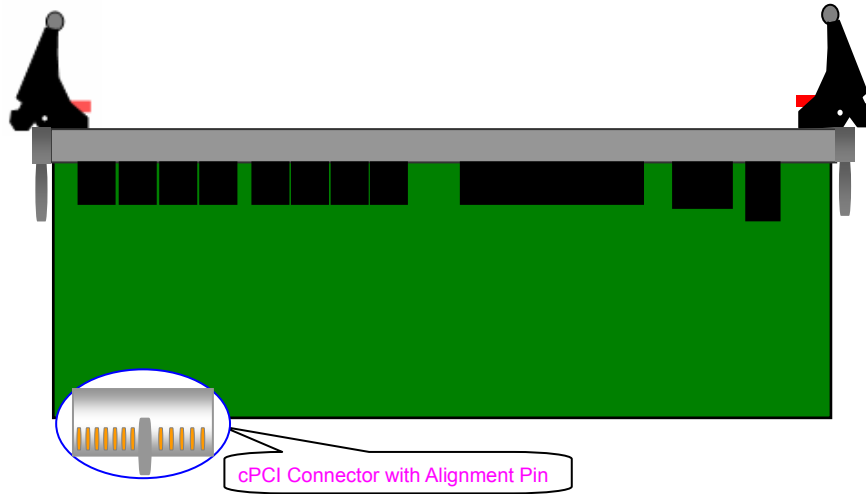
Figure 2-3 Front View

- **Indicators and interfaces on the SHT-16B-CT/cPCI board and the rear connection panel**

Indicator for Ch.1
⋮
Indicator for Ch.16

Error Indicator

Run Indicator

Hot-swap Indicator

RJ11 Jack for Ch.1 and Ch.2
⋮
RJ11 Jack for Ch.15 and Ch.16

DB44 Connector

P&R

SPK
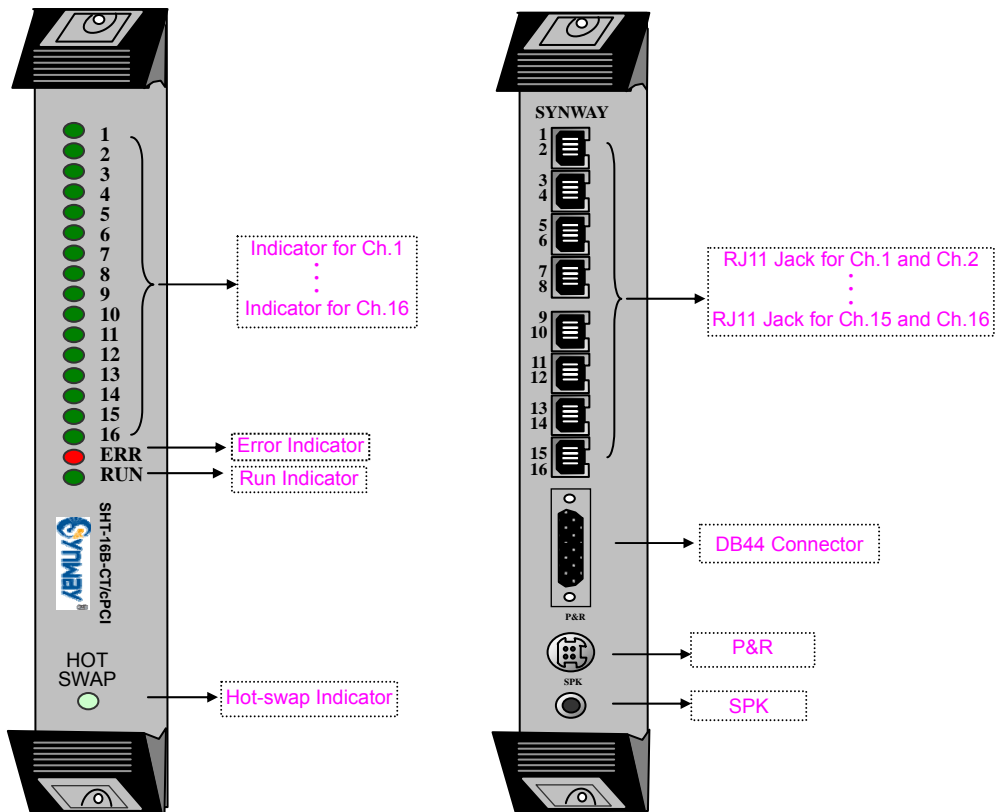
SHT-16B-CT/cPCI Board   Rear Connection Panel

Figure 2-4 Indicators & Interfaces on SHT-16B-CT/cPCI Board and Rear Connection Panel

The above indicators and interfaces function as follows:

Indicators for 16 Channels	Lamp Status	Channel State
Green Lamps	ON	Recording
	OFF	Idle

Table 2-1 Indicators for 16 Channels

Run Indicator	Lamp Status	Runtime Status
Green Lamp	ON	Abnormal
	OFF	Abnormal
	FLASH	Normal

Table 2-2 Run Indicator

Hot-swap Indicator	Lamp Status	Runtime Status
Blue Lamp	ON	In the course of hot-swap
	OFF	Normal

Table 2-3 Hot-swap Indicator

ERR: Error indicator, not supported by the driver yet

RJ11 Jack: links two voice paths (channels)

DB44 Connector: links all the 16 voice paths (channels)

P&R: An interface for ringing current and battery feed power supply, which is not being used since an analog tap passive board can work without ringing current and battery feed power supply

SPK: Audio output interface, which is a φ3.5 stereo jack

- **On-board high-impedance recording module**

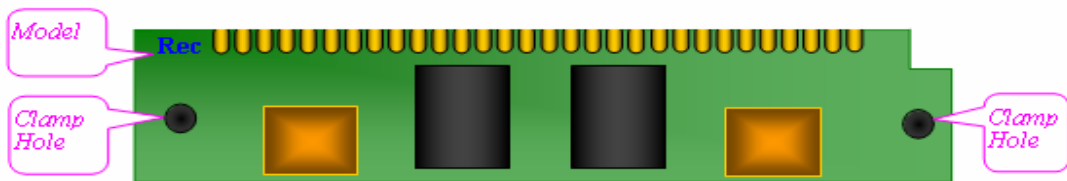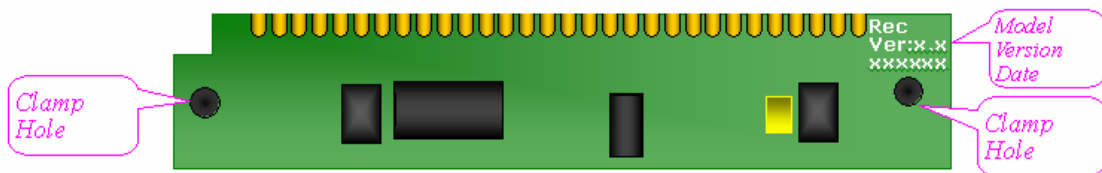Figure 2-5 Front View

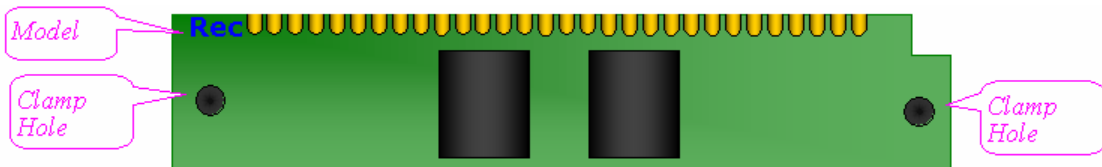Figure 2-6 Rear View

- **On-board microphone module**

Figure 2-7 Front View

Figure 2-8 Rear View

2.2 System Requirements

Host System Requirements

CPU: 300MHz Intel® Pentium®Ⅱ or above

Memory: 256M or more

HD: Depends on individual requirements

Supported Operating Systems

Refer to *SynCTI Programmer's Manual.pdf*.

2.3 Installation Procedure

Step1: **Plug the desired modules into the module slots on the board**

Step2: **Configure the CT_EN jumper.**

Short-circuit the CT_EN jumper if the cPCI industrial computer has no CT-BUS slot on the backboard, or, the indicator will be on blue all the time and the board can not work normally; disconnect the CT_EN jumper if the cPCI industrial computer has a CT-BUS slot on the backboard, or, the hot-swap operation may bring a damage to the computer or the board.

Step3: **Fit the board and the rear connection panel into a pair of empty slots on the CompactPCI chassis**

With the board completely inserted, push the upper and bottom handles inwards at the same time until a 'click' sound is heard and the red locks flip into position. The board is now properly fitted. The board can be further fastened with screws (on the outside of the upper and bottom handles) for extended use and prevention of accidental removal.

Notes:

① The rear connection panel should be inserted into the slot which corresponds to that of the analog tap passive board.

② Due to the structural design of the cPCI IPC, it is necessary to push the board home into the slot until it can go no further, and ensure that it is not inclined at an angle before applying lever action on the handles to secure it. Connecting parts on the mainboard of the IPC may be damaged if:

(I) Handles are used too early
(II) Handles are used while the board is inclined
(III) Force on handles is not applied evenly.

③ Board insertion is allowed when computer is powered on. However, as strong static electricity may lead to damages, the operator should touch a grounded conductor to discharge the static electricity on him before inserting the board.

Step4: **Connect to analog phone lines or other input signals**

There are two types of interfaces - RJ11 and DB44 connectors - on the rear connection panel, which correspond to the 16 voice channels on the SHT-16B-CT/cPCI board.

Each rear connection board has eight 4-pin RJ11 jacks. Each RJ11 jack can be connected to a 4-lead line that corresponds to two channels: the middle two pins correspond to an odd-numbered channel (e.g. the 1st, 3rd, 5th, 7th… channel), and the outer two pins to an even-numbered channel (e.g. the 2nd, 4th, 6th, 8th… channel). See Figure 2-4. Pins in DB44 connector are illustrated and described in Figure 2-9 and Table 2-4 below, following which users can connect them with 16 voice channels via a proper arrangement of lines and cables.
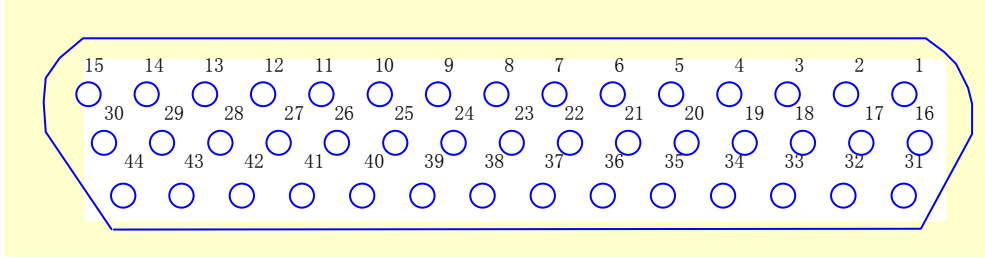
Figure 2-9 Pin Layout for DB44

Channel No.	Pin No.	Polarity	Channel No.	Pin No.	Polarity
1	44	+	**9**	23	-
	43	-		8	+
2	30	-	**10**	22	-
	15	+		7	+
3	29	-	**11**	21	-
	14	+		6	+
4	28	-	**12**	20	-
	13	+		5	+
5	27	-	**13**	19	-
	12	+		4	+
6	26	-	**14**	18	-
	11	+		3	+
7	25	-	**15**	17	-
	10	+		2	+
8	24	-	**16**	16	-
	9	+		1	+

Table 2-4 Pin Description for DB44

Notes:

① The remaining few pins unmentioned above stay unused.

② Each RJ11 jack can be connected to lines via a 2-way hub.

③ See Table 2-1 for correct channel number and pin polarity when connecting DB44 to lines.

Step5: Connect the microphone module

Skip this step if there is no need to record the condenser microphone.

Notes: We absolutely advise against connecting the microphone module to phone lines from the PBX terminal, or it could be damaged. Pay attention to the pin polarity shown in Figure 2-10 below while connecting lines to the modules.
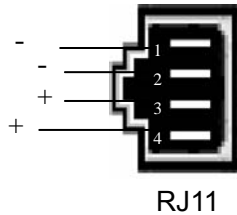
RJ11

Figure 2-10 Polarity for Connection of Microphone Module

Step6:   Connect the sound box or other proper sound devices

Skip this step if there is no need to 'monitor in real time' or 'play'.

Regarding how to choose proper sound devices, refer to 'Input/output Interface' and 'Audio Specifications' in *Appendix A Technical Specifications*

Notes: The first module slot on the board must be fitted with a module should you wish to play sound via the amplifier.

Step7:   Connect H.110 bus

The IPC has H.110 slots on the chassis and connecting lines already fixed on them. By installing all the necessary boards, the H.110 buses would have already been inter-connected. Hence, no additional work by the user is needed provided each board is correctly and properly installed.

Step8:   Boot your computer and install the driver

Regarding driver installation, refer to *Driver Installation Manual*.

Step9:   Set the high-impedance recording module to be of high-sensitivity (-20dB) by the software

Skip this step if microphone modules are used for recording.

Key Tips:

● As the system is expected to run for long hours unmanned, 'energy-saving' mode should be turned off for both the CPU and the HD in CMOS or WINDOWS operating system. This is to ensure full-speed operation of the computer, or it may lead to a drop in performance or unexpected errors after running for some time.

● It is important to ground the chassis with analog tap passive boards for safety reasons, according to standard industry requirements. A simple way is earthing with the third pin on the plug. No or improper grounding may cause instability in operation as well as decrease in lightning resistance.

2.4   Precaution on Hot-swap Operation at Runtime

The board should not be removed while user applications are running, or it may cause instability problems such as system halt or application failure. The correct way is to release the bottom handle (by the red lock on the handle) and notify the application to stop operations on the board, i.e. upon releasing the board, to wait for the hot-swap blue lamp to light up before pulling it out from the slot.

Also note to never remove the board when it is being initialized. You must end the application before performing a proper board insertion or extraction following the above steps.

This restriction however, applies only when the board is under operation by a user application.

During software runtime, the run indicator blinks at 1-second intervals if the board is working properly, or, it will go on and off at irregular intervals if the driver software detects abnormal behavior by the board and prompt users to replace the existing board. The new board should be of the same model and placed in the same slot as the previous, or software parameters will have to be reconfigured. If the rear connection panel is used, remember to move it along with the board. The rear connection panel can be hot-swapped at anytime without interrupting runtime.

Note: Releasing the bottom handle at runtime will cause your board to stop operating!

Appendix A Technical Specifications

Dimensions

Board: $230 \times 163mm^2$ (excluding handles)

Rear connection panel: $230 \times 82mm^2$

(excluding handles)

Weight

Board: ≈ 500g (including 8 dual channel modules)

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—85℃

Humidity: 8%— 90% non-condensing

Storage humidity: 8%—90% non-condensing

Input/output Interface

Headset jack: One φ3.5 stereo jack

Telephone line jack: Eight 4-pin RJ11 jacks; DB44

Audio Specifications

CODEC: CCITT A/μ-Law 64kbps,

IMA ADPCM 32kbps

Output power: ≥50mW

Distortion: ≤2%

Frequency response: 300-3400Hz($\pm$3dB)

Signal-to-noise ratio ≥38dB

Echo suppression: ≥40dB

Maximum System Capacity

Up to 10 boards concurrently per system; up to 16 channels per board

Power Requirements

+5V DC: 600mA

-12V DC: 80mA

+12V DC: 300mA

Maximum power consumption:≤12W

Impedance

Input impedance: ≥1MΩ/500V DC;

≥10kΩ/1000V AC

Insulation resistance for PC isolation from telephone line: ≥2MΩ/500V DC

Audio Encoding & Decoding

16Bit PCM	128kbps
8Bit PCM	64kbps
A-Law	64kbps
μ-Law	64kbps
VOX	32kbps
ADPCM	32kbps
GSM	13.6kbps
MP3	8kbps

Sampling Rate

8k Hz

Safety

Lightning Resistance: Level 4

Certification: FCC; CE; CCC

Appendix B Technical/sales Support

Thank you for choosing Synway. Please contact us should you have any inquiry regarding our products. We shall do our best to help you.

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