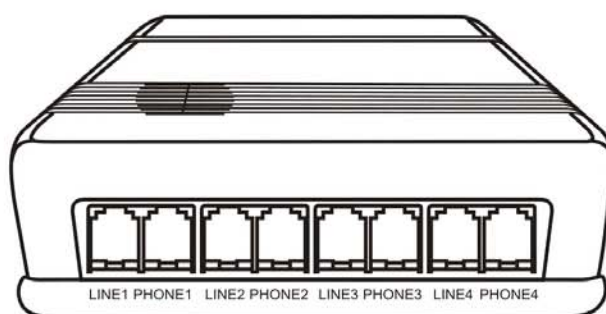


4-Line Computer Telephony interface AD409/AD409C Tech Handbook



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Summarization

Brief Introduction

The most trouble for software programmer is they know very little about hardware structuring, once the customer's requirements can not be meet by just implementing program based on one PC, then works with some external device is a must for the combination, such as record caller ID numbers, start and end call time & date, record dialed numbers, control line operating status, detect phone connection, judge inbound ringer and ringer times, detect phone using status, check line polarity reversal for phone billing, etc. Under such circumstance, it's really difficult for them to design application software independently, so if they don't know how the hardware works, it's really hard for them to get started the application designing. For this purpose, ARTECH is dedicating provide a complete CTI computer telephony interface solution, and fully open SDK & source code for the second development, we're looking for to cooperating with the software integrators. Except for AD409, we have also launched AD409C and AD409+ for some special environment.

AD409c

AD409c is a 4-line computer telephony interface special designed for telephone billing solution, the difference between AD409c and AD409 is primary status on connection, when AD409c is power off or software inactive, telephone can not dial out in this case, but AD409 can do this. This structuring is used to avoid extra charges when the power is off or software disable status so that the user can not dial out in this way.

AD409+

AD409+ is designed for generating 12KHz and 16KHz pulse for telephone billing, some special locations do not use line polarity for startup billing, but use 12KHz or 16KHz pulse for activating billing, the difference between AD409+ and AD409 is it can detect 12KHz or 16KHz signal, once the signal is successfully detected will pass it into PC software to startup billing.

General Description

Although the communicative system is progressing constantly, telephone is still the simplest and convenient way. In particular it comes to business field which integrated with computer, many transactions are verified by telephone, in order to avoid forgetting, misunderstanding or dishonest, the recording equipment for call detailed records is a must for some trades. Combining computer & telephony integration, ARTECH is launching CTI series product now. We provide hardware, SDK/API, VC/VB/DELPHI source code, DEMO program for application second development.

Key Features

- Record incoming/outgoing call no., time & date
- Live line operating status display
- Flexible system parameter programming
- Standalone 4-line under one unit
- Expand up to 16 units for 64 lines under one PC
- Specified inbound call ringer control
- Unallowed inbound & outbound call number setting
- Telephone real-time status control
- Support external billing info device display
- Compatible with ETSI/Bellcore FSK & DTMF Caller ID
- Simulate FSK & DTMF CID signal for testing
- Additional I/O port control available for option
- Line polarity reversal detection

- Standard RS232 serial port friendly interface
- Busy tone detection, right & left channel voice control
- Fully open SDK for application development

Target User

- Telephone Shopping Transactions
- Real Estate Liaison
- Customer Service Center
- Banking & Financial Transactions
- Private Enterprise
- Credit Reference Agency
- SOHO Family Studio
- Security Employee Direct Line
- Call Center Solution
- Call Shop Billing
- Family User for Harassment Collection
- Commercial Transactions

Installation

Operating Condition

1. System Requirement:

Pentium 400 MHz CPU or above
Windows98se/XP/2000/NT OS
10MB HD space or above
128 MB RAM RAM
CD-ROM
Standard USB port
Standard RJ11 port

2. Environment Requirement:

Operating Temp: 0°C - 50°C (32°F - 122°F)
Storage Temp: -30°C - 65°C (-22°F - 149°F)
Operating Humidity: 10% - 90% without congealment

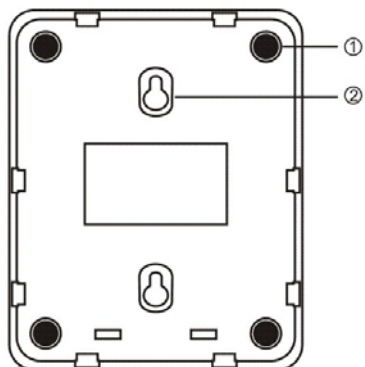
3. Product Spec:

Name: 4-Line Computer Telephony Interface
Model: AD409
Dimension: 151(L) × 208(W) × 70(H) (mm)
Weight: 720g
Packing Contents: AD409 Hardware · Driver CD · RJ11 Cord · User's Manual · RS232 Cable · DC18V Power Adapter · Audio Cable · Expanded Cable · Suspension Screws · Round Power Plug Converter

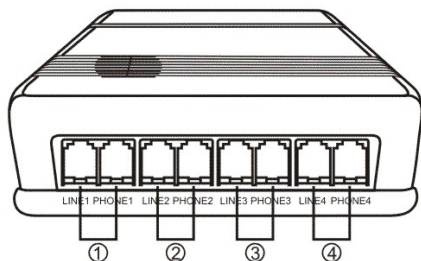
Hardware Structure

1. Product Overview

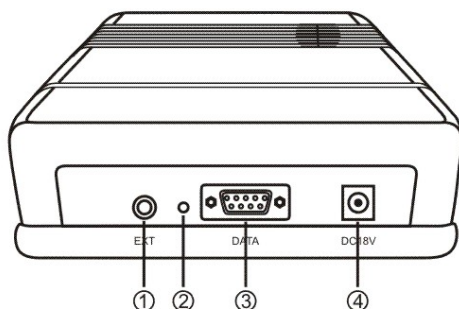
Please have a good look for each part of AD409 device before operating.



1. Cushion
2. Hanging hole



1. RJ-11 Line 1/ Phone 1 Jack
2. RJ-11 Line 2/ Phone 2 Jack
3. RJ-11 Line 3/ Phone 3 Jack
4. RJ-11 Line 4/ Phone 4 Jack



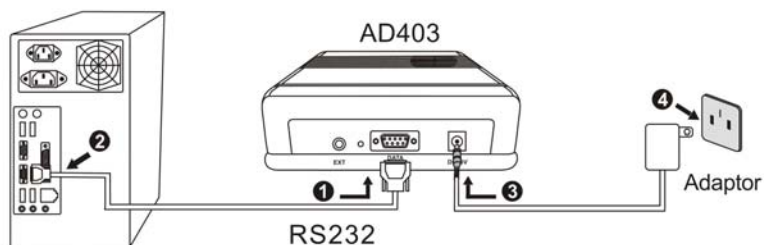
1. External voice Jack
2. Message indicator
3. RS-232 Com Port Jack
4. DC18V power input

2. Packing Contents

1. AD409 Hardware
2. Driver CD
3. RS232 Cable
4. RJ11 Cord x 4pcs
5. DC18V Power Adapter
6. Audio Cable
7. Expanded Cable
8. Suspension Screws
9. Round Power Plug Converter

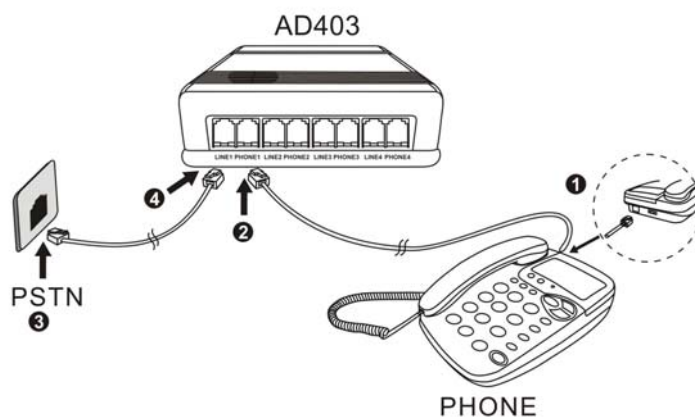
3. Installaion

1. One RS232 interface connects to PC
2. Four RJ11 Line ports connect to PSTN/C.O. Line from Telecom station
3. Four RJ11 Phone ports connect to normal analog telephone set

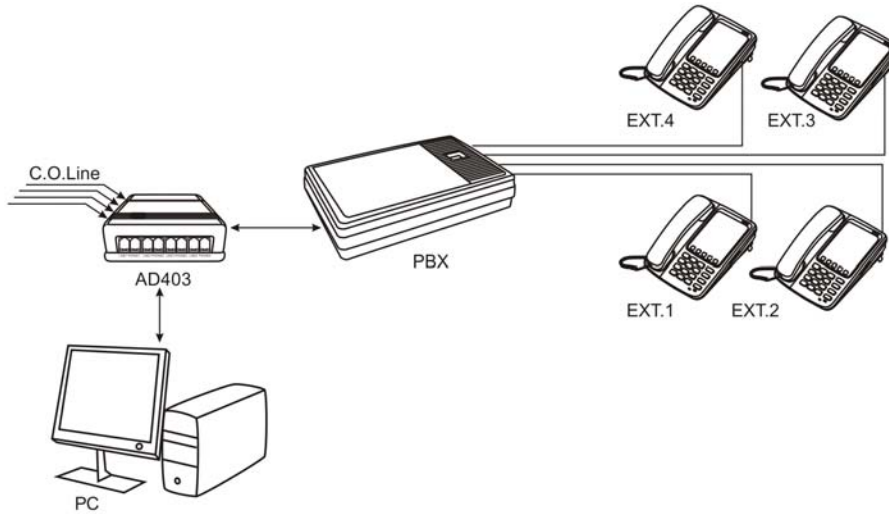


4. Installing Procedures

1. Connect one side of RS232 to COM port of AD409
2. Connect another side of RS232 to COM port of PC
3. Plug one side of power adapter to DC Jack of AD409
4. Plug another side of power adapter to AC Jack of AC power
5. Connect one side of Line cable to Line1 Jack of AD409
6. Connect another side of Line cable to PSTN/C.O. Line from Telecom station
7. Connect one side of Phone cable to Phone1 Jack of AD409
8. Connect another side of Phone cable to normal analog telephone set
9. The installation for Line2~Line4, Phone2~Phone4 are same as Line1, Phone1



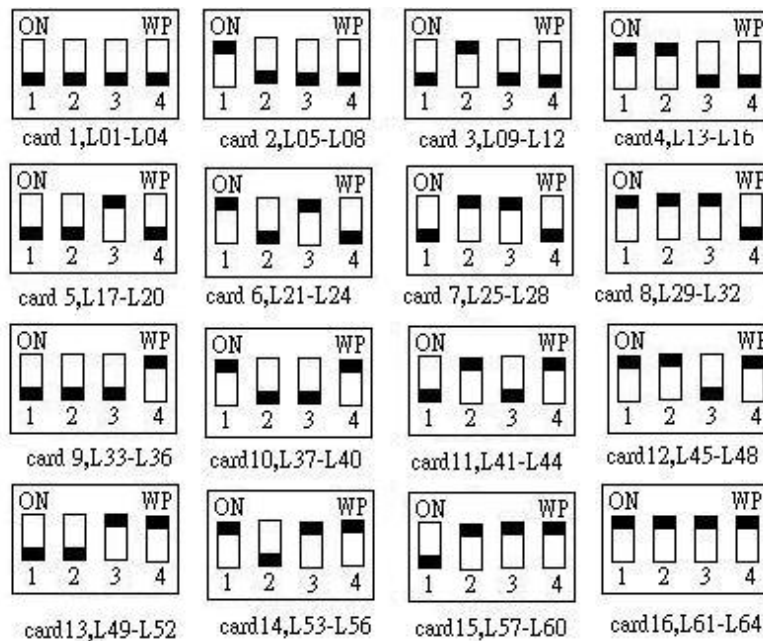
5. Connection Diagram:



AD409 transmits data via RS232 serial port, all call details will be automatically logged on PC, such as inbound and outbound call number, time & date, control phone status, phone connection detecting, incoming ringer & ringing times judgement, line polarity detection, live line status, etc. On expandable feature, AD409 can expand up to 16 units for 64 lines working simultaneously under one PC.

Expanded Device ID Setting

One AD409 features 4 lines, it can expand up to 16 units for 64 lines at the same time, you only need set different device ID to distinguish them by DIP switch, please make sure the switch position is correct for each card, below switch setting is for 16 device(Card1~Card16):



Device Expanding

When you intend to expand device for more lines, the firstly thing is to set device ID for distinguishing different device, then you need to connect each unit via the expanded cable, after done you only need connect the first device to PC via RS232 connection, other units do not need connect with PC. Moreover, the expanded PIN for connecting each unit is intelligently designed, worry-free, no need care the PIN position, if the position is incorrect you can not connect them at all. Please use the expanded cable to connect each unit one by one on the PIN Jack.

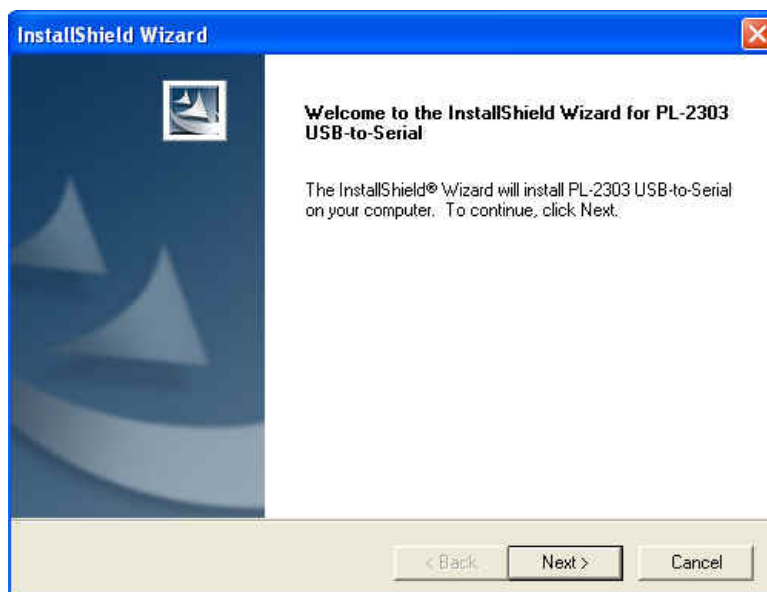
Hardware Installation & DEMO Program Introduction

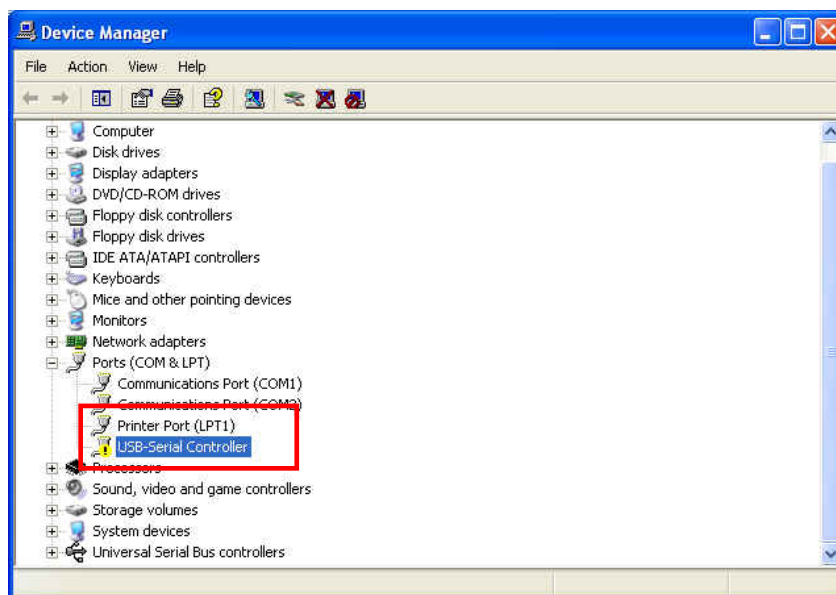
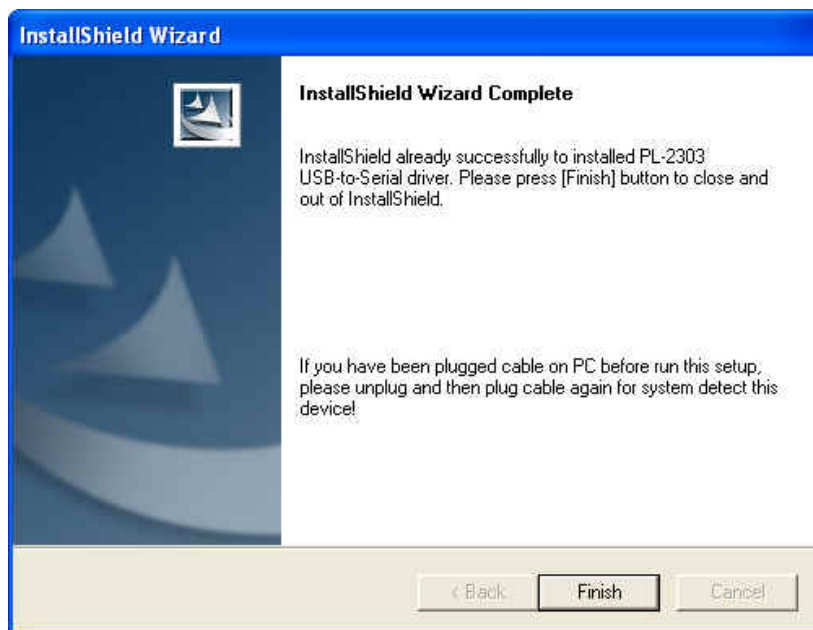
AD409 equips RS232 interface, if you want to design your application on laptop, then you may need use a RS232 to USB port converter for connection, as usually the laptop does not equip COM port, below is the converter for COM port to USB for your reference. (AD410 equips with USB interface directly)



(Reference Image, not from accessoires)

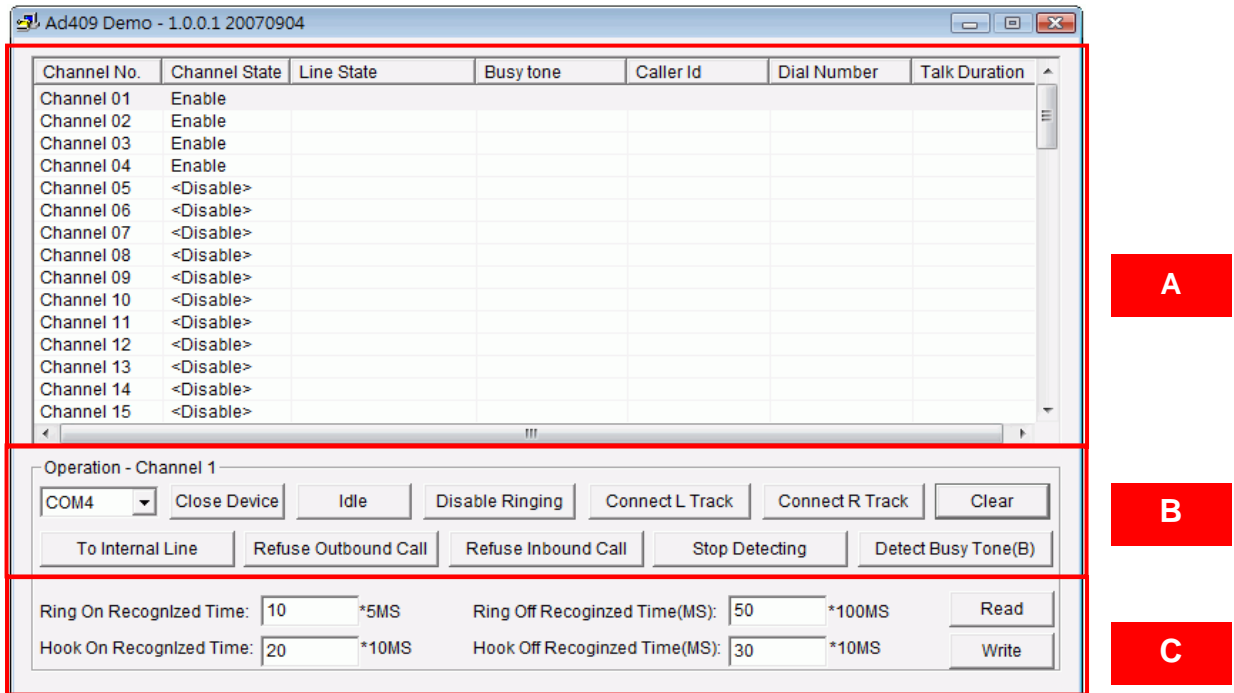
Then you need install the driver for converting COM to USB, after installation, you can check the new-added converter on device manager, on COM and LPT options will have [Prolific USB –to-Serial Comm Port(COMx)].





Demo Program Introduction

1. Complete the hardware installation as per the indication
2. Run DEMO program: AD409 Demo\AD409 Demo.exe
3. Then will show below DEMO program friendly user interface:



A area is for live Line status display
 B area is for device function control
 C area is for system parameter programming

1. A area for current Line status display

Channel No.: Stands expand up to 16 units of AD410 device, totally include 64 channels

Channel State: Stands device connecting status, [Enable] stands connecting success, [Disable] stands connecting failed

Line State: Stands system live Line operating status, all status as shown in below table:

Line Status	Introduction
Hook On (Outbound)	Hang up phone(outbound call)
Hook Off (Outbound)	Pick up phone(outbound call)
Hook On (Inbound)	Hang up phone(inbound call)
Hook Off (Inbound)	Pick up phone(inbound call)
Polarity Reversal	Receive line polarity reversal signal
Ring On	Inbound ringer On
Ring Off	Inbound ringer Off
Caller ID	Receive caller ID number
Dial Number	Dialing number
Talking	Talking on the phone
Missed Call	Missed incoming call

Busy Tone: When AD409 itself is online (press this button for DEMO) and active [Detect Busy Tone (A)] or [Detect Busy Tone (B)], when busy tone is detected will show [Have Busy Tone], else will show [No Busy Tone]

Caller ID: Show incoming caller ID number

Dialer Number: Show outgoing dialed number

Talk Duration: When pick up phone to get through inbound call will automatically count duration after dialing over and waiting 3 seconds

2. B area for device function control

Close Device(Open Device): Press it is to enable/disable device

Busy(Idle): Press it will control line to be busy status, when you call in will hear busy tone, press again will release line to be standby mode

Disable Ringing(Enable Ringing): Press it to disable incoming ringer, press again will become normal

Connect L Track(Disconnect L Track): Press it while incoming call can connect left channel of Audio out from PC to Audio in of AD409

Connect R Tack(Disconnect R Track): Press it while incoming call can connect right channel of Audio out from PC to Audio in of AD409

Clear: Clear all line status

To Internal Line(To External Line): Press it can switch line to internal mode or external mode (Internal mode means disconnect phone and line, external mode means connect phone and line)

Refuse Outbound Call(Allow Outbound Call): Press it can forbid outbound call

Refuse Inbound Call(Allow Inbound Call): Press it can forbid inbound call

Detect Busy Tone (A)(Stop Detecting): Press it can detect busy tone from line, AD409 can detect busy tone from 2 lines simultaneously, and you can select required line for busy tone detection

Detect Busy Tone (B) (Stop Detecting): Press it can detect busy tone from line, AD409 can detect busy tone from 2 lines simultaneously, and you can select required line for busy tone detection

3. C are for system parameter programming

Ring On Recognized Time: Recongized ringing on time, factory default is 10(50ms), time unit is 5ms

Ring Off Recognized Time: Recongized ringing off time, factory default is 50(500ms), time unit is 10ms

Hook On Recognized Time: Recongized hang up phone time, factory default is 20(200ms), time unit is 10ms

Hook Off Recognized Time: Recongized pick up phone time, factory default is 30(300ms), time unit is 10ms

RELEVANT KNOWLEDGE

RS232 Interface

RS232 is named by Serial Port, it is the data transmission interface in serial connection, normally have DB 9pin(DB9) and DB25Pin(DB25) 2 types, the max speed can reach to 115200bps. On window it is also named Com Port (Communication Port), it used for between mouse and telephone dialing modem. Since the USB interface has been found, it is becoming more and more indifference for normal computer system, just used on the industry for some large projects.

USB Interface

USB is the abbreviation of Universal Serial Bus. USB is created and constituted by Compaq, DEC, Intel, Microsoft, NEC and Northern Telecom corporations, it is the perfect replacement for the serial and parallel bus communication currently, due to its convenient with easy-of-use interface and high-performance speed for data transmission, it has been becoming the main human friendly interface, almost all computer including laptop featured with USB function. The USB interface has below main features.

A. Easy-of-use Operation

USB interface can connect serverl different devices, support plug in and out immediately, on software programming side, the USB driver program and application can auto startup without any user interference. Otherwise, USB device also will not involve in IRQ conflict problem, it has independent reserve interrupt resources, so it does not occupy the PC recources with other devices, it ultimately eliminates your doubles and annoyances while researching. The key for USB is able to freely work as an instant PIPO device.

B. Hi-Speed Data Transmission

USB high speed data transmission is one of the main features, the hightes USB transmission interface can reach up to 12Mb/s, it is much quicker with 100 times against COM port, and much quicker with 10 times against parallel port, nowadays the speed for USB transmission is up to 100Mb/s or above.

C. Flexible Connection

USB supports several different devices connection, theoretically one USB port can connect 127 units of USB devices. The connecting way is very flexiabe, your can either use serial connecting, or you can use USB hub to gather with many devices, then connect to USB port of PC. Under USB connection, all device equipped the USB Jack in the outlook of device, no need open casing. The USB supports PIPO feature, so no need turn off power to plug in/out USB device. Likewise, USB provide serial connection way, each USB jack can be connected together with another one. In this way, one USB controller can reach 127 USB devices simultaneously, each device distance can be up to 5 meters, it can also wisely recognize which USB device is plugged in and out under the serial connection.

D. Direct USB Powered

Normally the serial and parallel connection device need external power, but USB device has no external power adapter required, powered by the build-in power inside USB interface, USB power can provide DC 5V power for device powering, so no AC power support, and the R&D cost is economized accordingly.

E. CID - Calling Identity Delivery

The worldwide caller ID(Calling Identity Delivery - simplified to CID) format provide 2 ways, DTMF and FSK,

those caller ID data are transmitted out before picking up phone. The caller ID in DTMF format is sent out before the first ringing, and FSK caller ID is sent out between the first ringer and second ringer. The DTMF caller ID signal is DTMF tone, shortcoming is by its slow speed and no checksum features, FSK caller ID has the contrary feature with quick speed transmission and have checksum, but if you pick up phone immediately after first ringer, there'll not show caller ID data. In some cities, the caller ID service is charged by telecom station, if your telephone can not show caller ID, please check whether you subscribe caller ID service or not. Please note in general DTMF caller ID data only includes call number, but FSK caller ID includes date, time, caller name and call numbers together.

FAQ

A. Why startup failed or device can not be found by Windows?

The problem may be caused by:

1. Firstly please make sure the USB connection is correct, if the connection is ok, then please check the BIOS setting to enable USB device.
2. Then reboot your PC for entering BIOS setting to enable USB interface.
3. Please check the USB driver is successfully installed on your OS, please refer to above details for installation.
4. As for NT4.0 OS, due to the USB inability of NT OS, so it can not support USB device.

B. Why caller ID data can not be received?

The problem may be caused by:

1. Pick up phone on the first ringer while coming caller ID in FSK format.
2. Your caller ID service is not subscribed in telecom station yet.
3. No caller ID data transmitted on this call.
4. Connect to some ext. line of PBX, some PBXs can not send caller ID data before talking.
5. On Win98 OS, if caused by user other program, please reconnect device by more times.

C. What should we care if plug in/out device while using?

When you plug device to use, you'd better not plug out it immediately, especially don't repeat plug in/out so frequently, as the OS needs some responding time, the best interval should be at least 5 seconds or above.

D. How many AD409 device can be used based on one PC?

One PC can work with 16 units of AD409 for 64 lines simultaneously.

Appendix**Technical Parameters**

RS232 Interface: standard RS232 transmission

Input Impedance: > 50 K ohm

Signal Noise Ratio: Typical 50 dB

Frequency Response: 300-3400 Hz

Modulation Method: PCM, 64KBPS, 8Kb/sec

Channel Current: < 50mA

Power Consumption: < 250mW

ARTECH CTI Series Product Spec Comparison Table

	AD101	AD120	AD410	AD409
Line Amount	1	1	4	4
Expandable Line Amount	4	4	64	64
Device Power	Powered by USB	Powered by USB	Power Adapter	Power Adapter
Data Transmission	USB	USB	USB	RS232
LED Indicator	●	●	●	●
Polarity Reversal Detection	●	●	●	●
Line Online Control	●	●	●	●
Caller ID Format	DTMF	DTMF	DTMF	DTMF
	Bellcord FSK	Bellcord FSK	Bellcord FSK	Bellcord FSK
	ETSI FSK	ETSI FSK	ETSI FSK	ETSI FSK
Line Recording		USB Transmitting Recording		
Record Dialed No.	●	●	●	●
Record Inbound No.	●	●	●	●
Phone Status Detection	●	●	●	●
Line Status Detection	●	●	●	●
Talking Start & End Time	●	●	●	●
Play on Line		USB Transmitting Voice Playback	Audio Transmitting Voice Playback	Audio Transmitting Voice Playback
Busy Tone Dection		Detected by PC	Detected by Hardware	Detected by Hardware
Ringer Detection	●	●	●	●
Phone Status after Power Off	Can Dial Line	Can Dial Line	Can Dial Line	Can Dial Line
Device Dialing		Send DTMF Tone by PC		
DEMO Program Source Code	●	●	●	●
DEMO Program	●	●	●	●
API Source Code	●	●	●	●
Operating Voltage	USB DC5V	USB DC5V	DC24V Adapter	DC18V Adapter
Operating Current	70~80mA	400~450mA	150~200mA	150~200mA
Max Power	0.4W	2.25W	4.8W	4.3W
Dimension(mm)	95 x 66 x 26	140 x 105 x 26	224 x 160 x45	182 x 147 x42
Net Weight(g)	74	208	540	400
Packing Dimension(mm)	95 x 60 x 115	114 x 55 x 155	255 x 230 x 60	255 x 230 x 60
Weight(g)	186	361	982	868

● Stands featured this function.