

***ALS120 Integrated Audio Controller
w/ 3D Sound+ALSFM Synthesizer***

User's Guide

Ver. 1.20

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Chapter 1

Introduction

Introduction

The ALS120 Integrated Audio Subsystem is a single chip designed for plug and play specification which minimizes support and installation issues. This highly integrated plug and play audio subsystem for IDE CD-ROM interface incorporates the following functions:

- Subsystem control logic
- Built-in 3D Sound Effect Processor
- Digital to analog and analog to digital conversions
- Mixer functions
- Built-in ALSFM Synthesizer w/external wavetable support
- Enhanced Game/MIDI port support
- IDE CD-ROM controller
- The ALS120 fully supports the ISA Plug and Play standard. For non-ISA Plug and Play compatible systems, a software utility "ISA Configuration Utility", (ICU) is available that sets the IRQ and DMA addresses. Sound card implementations designed around the ALS120 are completely jumper and switch free.

Important Notice

This User's Guide is intended to assist OEM customers in evaluating Avance Logic graphics products; it is not intended to be the User's Guide for the end-user. Avance Logic encourages the development of documentation based on the information contained herein. For your convenience, copies of this manual are available on diskette in Microsoft Word 97 & PDF format. Ask your local Avance Logic sales representative for a copy. This manual is also available on the Avance Logic Web site at <http://www.realtek.com.tw/cp/download.htm>.

Chapter 2

Specifications

Hardware Features

- Single, mixed-signal, high performance VLSI sound ASIC
- Three software selectable DMA lines (0, 1, 3)
- Software selectable interrupt lines (5, 7, 9, 10, 11)
- 8-bit ISA Plug and Play bus interface
- 16-bit CD-ROM interface
- DMA interface with FIFO
- Enhanced Game port support
- MIDI port with input and output FIFO
- 8-bit or 16-bit monaural/stereo digital audio from 4 kHz to 48 kHz
- Full duplex
- ◆ 3D Sound Effect Processor
- ◆ ALSFM Synthesizer
- ◆ I²S/E²PROM Interface

Built-in Functional Blocks

- ISA Plug and Play support logic and resource ROM
- High speed 16-bit digital to analog and analog to digital converters with filters
- 3D Sound Effect Processor
- ALSFM Synthesizer
- Thirty-two level stereo audio mixer with six input sources (DAC, synthesizer, PC speaker, microphone, line in, and CD audio)
- Built-in amplifier for the microphone input
- ADPCM decompression engine
- High speed DMA interface with FIFO
- MPU-401 MIDI controller with FIFO
- IDE CD-ROM controller

Control logic is built into the ALS120 to support the following functions:

- Audio Input
 - CD-ROM Audio
 - Line In
 - Wavetable
 - Microphone
 - PC Speaker In
- Audio Output
 - Stereo Line-Out
 - Power stereo output
- Game/MIDI Port
 - External MIDI input and output
 - Joystick input and MIDI connector
- Wavetable connector
 - Optional Yamaha OPL4 Wavetable Synthesizer
- CD-ROM Controller
 - ATAPI IDE

Software Support

- Windows 3.1
- Windows 95
- Windows 98
- Windows NT 3.51 and 4.0
- Windows Sound System
- OS/2 Warp
- All DOS-based games

Compatibility

- Adlib
- All Sound Blaster Pro applications
- All Sound Blaster 16 applications
- Yamaha OPL3 FM Synthesizer
- Yamaha OPL4 Wavetable Synthesizer
- MPU-401 UART MIDI

Applications

- 16-bit stereo sound cards
- PC motherboard based sound systems
- MIDI controller
- Enhanced Game port support
- IDE CD-ROM controller
- Wavetable card support

Emulation

- Sound Blaster Pro
- Sound Blaster 16
- Sound Blaster ADPCM
- MPU-401 UART MIDI interface

Chapter 3

Hardware Installation

Evaluation Sound Card

AS9707 Sound Card Description

- 16-bit ISA Plug and Play design
- ATAPI IDE CD-ROM interface
- Game/MIDI port
- Audio inputs from:
 - External Wavetable card
 - ATAPI IDE CD-ROM audio
 - Microphone
 - Line In
- Audio Outputs to:
 - Line Out
 - Main/Speaker Out
- External Wavetable support

Input/Output Connections

Phonejacks, connectors, and headers are used to connect other devices to the sound cards. A phonejack is a single hole receptacle for a phoneplug and headers and connectors are multi-hole receptacles for multi-pin plugs. The Main speaker Out, Line Out, Line In, and Microphone In connections are phonejacks, the Game/MIDI Port is a D-shell 15-pin connector, and the Wavetable, CD-ROM audio, CD-ROM data/external controller connections are headers of various sizes.

Speaker Out- The Speaker Out phonejack provides the built-in power amplifier outputs for the left and right stereo channels. The power amplifier has a maximum output power of two watts per channel with four ohm speakers.

Line Out - The Line Out phonejack provides the non-amplified outputs for the left and right stereo channels. This output is for attaching powered speakers or an external audio amplifier.

Line In - The Line In phonejack is used to attach monaural or stereo devices such as a cassette, Digital Audio Tape, or Minidisc players for playback, mixing, or recording.

Mic In - The Microphone In phonejack is used to attach a monaural microphone for live audio input for playback, mixing, or recording.

Game/MIDI Port - The Game/MIDI Port connector is used to attach a joystick for game interaction or to attach an external MIDI device for playback, mixing, or recording.

Wavetable - The Wavetable connector is used to attach a Wavetable card for playback, mixing, or recording.

ATAPI IDE/Sony CD-ROM Audio - The ATAPI IDE/Sony CD-ROM Audio connector is used to connect the audio cable from either an ATAPI IDE or Sony CD-ROM drive for playback, mixing, and recording.

Mitsumi CD-ROM Audio - The Mitsumi CD-ROM Audio connector is used to connect the audio cable from a Mitsumi CD-ROM drive for playback, mixing, or recording. Only one of the two CD-ROM audio connectors may be used at a time.

ATAPI IDE CD-ROM Data - The ATAPI IDE CD-ROM Data connector is used to connect the data cable from an ATAPI IDE CD-ROM device.

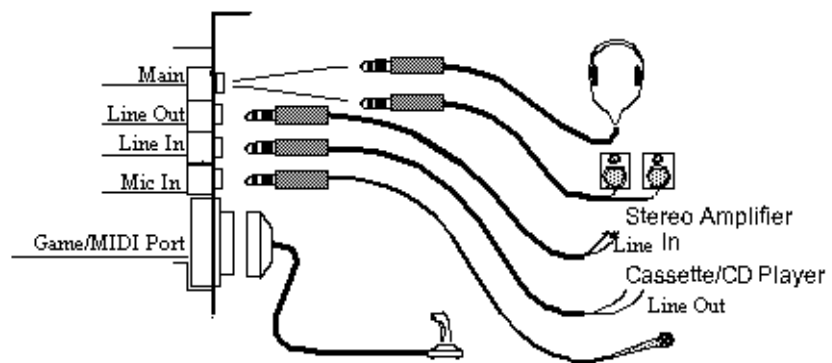
Sound Card Installation

1. Power off the system and all peripheral devices. Unplug all power cords from the power utility outlets.
2. Momentarily touch the chassis of the system unit with your bare hand to discharge any static electricity.
3. Remove the cover from the system unit.
4. Locate a free 16-bit ISA expansion slot and remove its cover plate. Retain the screw.
5. Carefully remove the sound card from the anti-static envelope and install it into the expansion slot.
6. Secure the sound card with the screw removed earlier.
7. Attach any CD-ROM Audio, CD-ROM Data, and Wavetable card cables to the sound card.

Note: Only one CD-ROM may be connected to the sound card at a time. If installing an ATAPI IDE CD-ROM and the sound card has no ATAPI IDE CD-ROM Data cable connector or you do not wish to use the ATAPI IDE CD-ROM

controller on the sound card, connect the CD-ROM Data cable to the secondary IDE interface connector on the motherboard. If a CD-ROM Data cable is connected to a CD-ROM Data cable connector on the sound card, the secondary IDE interface on the motherboard must be disabled. See your system instructions for the procedure.

8. Replace the system unit cover.
9. Attach all external devices to the sound card as shown below.



Note: If anything is connected to the Game/MIDI Port on the sound card, nothing can be connected to any other Game/MIDI Port connector on the system.

10. Plug all power cords into power utility outlets.
11. Power on the system and install the appropriate software driver. Refer to Software Driver Installation in Chapter 4 for instructions on installing the software driver.

I/O Addresses

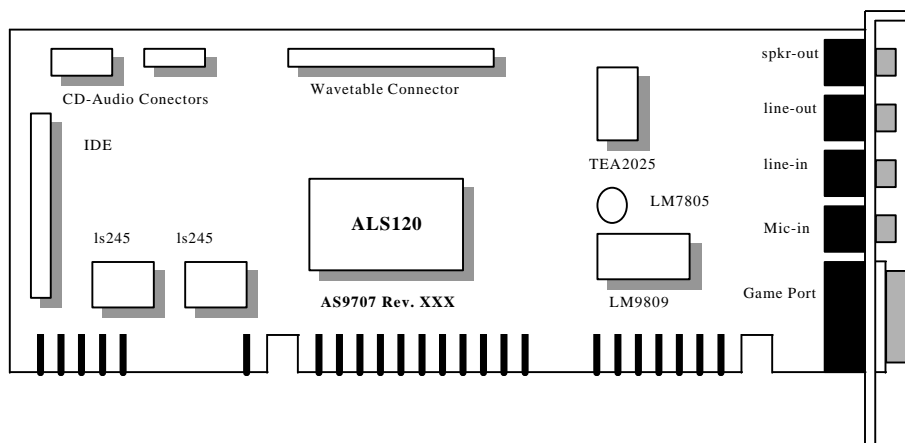
The following table shows the addresses occupied by the devices supported by the sound system designs.

I/O Address Range	Devices
170H to 177H, 376H to 377H	ATAPI IDE CD-ROM Interface
200H, 201H	Game Port
220H to 22FH	Audio Interface
330H to 331H	MPU-401 UART MIDI Interface
388H to 38FH	FM Music Synthesizer

PC Motherboard Settings

All of the sound cards and sound system designs based on the ALS120 Integrated Audio Subsystems are completely compatible with the ISA Plug and Play interface. No jumpers or switch settings are required.

AS9707 Sound Card



Specification:

Item	Specification
System Requirements	<ul style="list-style-type: none">• An 80386 computer or higher with an EGA or VGA card installed(VGA recommended)• 5 MB of hard disk space• An unused 16-bit expansion slot
Input/Output Connectors	<ul style="list-style-type: none">• Wavetable• Game/MIDI Port• ATAPI IDE CD-ROM Data• Line Out• Main/Speaker Out• Line In• Mic In• ATAPI IDE/Sony CD-ROM Audio
Card Size	95mm by 156mm
Raw Card Stock	Standard thickness with two layer planes
Bus Connector	ISA Plug and Play
Operating Temperature	0 to 70 ⁰ C
Storage Temperature	-50 to 125 ⁰ C
Operating Humidity	15 to 90%
Storage Humidity	0 to 90%

Chapter 4

Software Driver Installation

Software Applications Supported

Applications	Diskette Names
Windows 3.1	<i>ALS120 DOS/Windows 3.1/Windows 95 Drivers and Utilities</i>
Windows 95/98	<i>ALS120 DOS/Windows 3.1/Windows 95/98 Drivers and Utilities</i>
Windows NT 3.51/4.0	<i>ALS120 Windows NT 3.51/4.0 Drivers</i>
OS/2 Warp 3.0/4.0	<i>ALS120 OS/2 Warp 3.0/4.0 Drivers</i>
DOS	<i>ALS120 DOS/Windows 3.1/Windows 95/98 Drivers and Utilities</i>

Software Driver Installation

Windows 3.1

1. Start Windows 3.1.
2. Insert the ALS120 DOS/Windows 3.1/Windows 95 Drivers and Utilities” diskette into diskette drive A (or B).
3. Select [Run] from the Program Manager File menu and type A: setup on the command line.
4. A Welcome dialog box will appear, Click [Next] to continue the installation.
5. A Choose Destination Location dialog box will appear. Click [Next] in the Choose Destination dialog box to install the ALS120 sound driver to the default directory or click on Browse if you want to install to a different directory.
6. Setup will automatically create a folder and icons for the sound application.
7. A Modifying AUTOEXEC.BAT dialog box will appear and Click on [Next] to accept the default to “ Let Setup modify the AUTOEXEC.BAT. file”.
8. A Configuration Panel dialog box will appear for the first time installation and please check each hardware settings and make changes according to hardware installed and also if you do not hear music at tests.
9. Click on [Finish]. Setup will configure the hardware settings. Refer to the Setup Utility Program in the next chapter to configure your sound card.
10. After the configuration is complete, remove the diskette from the diskette drive.

DOS

1. Install the ALS120 sound card (see “Sound Card Installation” in Chapter 3. Insert the “ALS120 DOS/Windows 3.1/Windows 95 Drivers and Utilities” diskette into diskette drive A (or B).
2. If Windows 3.1 is running, exit the application.
3. At the C:\> prompt, type *a: (or b) and press the Enter key. At the A:\> prompt, type DOSINST.EXE and press the Enter key.*

4. The Avance Sound Chip Installation Program screen will be displayed showing the following defaults:

Avance software copy to: C:\A3SOUND

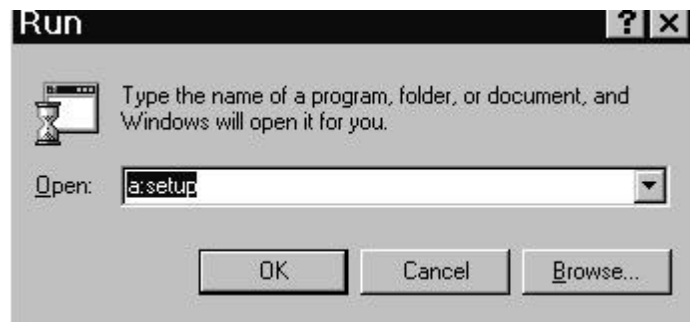
System bootup drive: C:\

- To make changes to the defaults, select the parameter with the Up/Down Arrow keys and press the Enter key. Then change the parameter and press the Enter key again to accept the change.
 - When satisfied with the new parameters or to accept the defaults, select “accept the above” with the Up/Down Arrow keys and press the Enter key.
5. The installation of the Avance Logic software drivers will now begin.
 6. When all of the files are copied to the fixed disk, installation program will automatically update the autoexec.bat, saving copies of the original files with the extension “.als”, and the a3config.exe utility will automatically start. Use the instructions given in “Setup Utility Program” on the next page to set up the ALS120 sound card.
 7. When the installation and setup are complete, remove the diskette from the diskette drive.

Windows 95

1. Power on the system and when the “New Hardware Found” window comes up, Click [OK] to accept the default. Select “Driver from disk provided by hardware manufacturer.”
2. Click on [OK] when the “Install From Disk” dialog box appears.
3. Insert the “ALS120 DOS/Windows 3.1/Windows 95 Drivers and Utilities” diskette into diskette drive A (or B), select the correct directory and click on [OK]. Windows 95 will automatically copy all of the needed files and configure the ALS120 sound card.

4. The sound application is included on this diskette and you have the option of installing it now. If you do not need to install the application, remove the diskette from the diskette drive and skip procedures 5 thru 10.
5. Select [Run] from the start menu, a Run dialog box appears:



6. Type A:\setup and Click on [OK].
7. Click [Next] in the Welcome dialog box.
8. A Choose Destination dialog box will appear, Click [Next] to install the sound driver to the default directory or click on Browse if you want to install to a different directory.
9. Windows will automatically create a folder and icon for the sound application.
10. Click [Finish]. The installation is complete.
11. Remove the diskette from the diskette drive.

Windows 98 WDM

1. Ensure that ALS120 is installed properly into an ISA slot and power on the system.
2. Windows 98 will prompt user with a “New Hardware Found” dialog box for ALS120 sound card is ISA Plug & Play. To install the Windows98 driver, select your hard drive location in which the driver database exists under or insert the “ALS120 Win98 Drivers and Utilities” diskette into the appropriate drive and select that drive from the prompted dialog box and click on [NEXT]. Windows98 will copy all necessary files and setup all the logical devices on the sound card automatically.

3. Install the ALSRACK(Avance MediaRack Player) by running the “SETUP.EXE” file found in the ALS120 Win98 Drivers & Utilities disk/database. This will create the Avance Sound Program Group by the ALSRACK utility icon. Please check “README” file for full description of ALSRACK function.

Windows NT 3.51/4.0

1. Ensure that ALS120 is installed properly and power on the system.
2. Insert the ‘ALS120 Windows NT Drivers and Utilities’ diskette into drive a: (or b:). Go to [Control Panel/Multimedia/Device/Add] and choose [OK] for ‘Avance Logic, Inc. Sound Chip’.
3. While installing, “Driver Exists” warning message will appear and ask whether to keep the old ‘midimap.cfg’ or [re-install]. Please select [re-install] or else MIDI will not function properly.
4. Configure proper I/O’s and DMA’s if necessary as they appear on screen.
5. Re-boot system and remove driver diskette before driver will take into effect.

OS/2 Warp 4.0

Before installing ALS120 Device Driver, make sure that you’ve installed OS/2 Warp 4.0 Revision 9.023 or later. For verification, please [enter] “VER /R” from an OS/2 command prompt. If OS/2 has already been installed, please proceed to Part II; if not, please proceed to Part I. Part III describes the parameter options available for the ALS120 setup program—*A3SNDB.SYS*.

Part I. OS/2 Warp 4.0 not installed

- A. Diskette Installation of OS/2 Warp 4.0
 1. Install OS/2 Warp 4.0 according to instructions and proceed to PartII for ALS120 Device Driver Installation.
- B. CD-ROM Installation of OS/2 Warp 4.0 with Multimedia Support
 1. Install OS/2 Warp 4.0 with “Multimedia Software Support” and proceed to Part II for ALS120 Device Driver Installation.
- C. CD-ROM Installation of OS/2 Warp 4.0 without Multimedia Support
 1. From WarpCenter, click on [System Setup] object.
 2. Click on [Install/Remove] menu item.
 3. Choose [Selective Install] item and click it.

4. As System Configuration Setting Environment appears, set [Multimedia Device Support] to [None] and click the [Next] tab.
5. As [OS/2 Setup and Installation] appears, select the [Multimedia Software Support] check box.
6. Select [Install] and the software will get installed.
7. Proceed to Part II for ALS120 Device Driver Installation.

Part II. OS/2 Warp 4.0 installed

1. Ensure that ALS120 has been properly installed. Power on your computer and wait for the OS/2 Desktop to appear.
2. Insert ALS120 Device Driver diskette into your floppy disk drive.
3. From OS/2 WarpCenter, click on [System Setup] object. Click on menu item [Install/Remove] and [Multimedia Application Install] will appear.
4. Click on [Multimedia Application Install], and designate the drive name containing the ALS120 Device Driver diskette. Select “ALS120 Adaptor” for installation and proceed until installation is completed.
5. Reboot OS/2.

Part III. Parameter Options for A3SNDB.SYS Setup Program

The following gives an example as to how the parameters are set up with **A3SNDB.SYS**:

Device=C:\MMOS2\A3SNDB.SYS 1 D1 I5 A220 M4 /N:ALS01

D1	: The ‘D’ indicates 8/16 bit DMA channel to be used. For ALS120, 8 bit DMA channels are available for 0,1 & 3.
I5	: The ‘I’ stands for interrupt, and the available interrupts are 7, 9, 10 & 11.
A220	: ‘A’ indicates the base I/O address of DSP, and the available ports are 220, 240, 260 & 280.
M4	: ‘M’ is the DMA buffer size/unit(1K per unit). M4 stands for 4K buffer used.
ALS01	: Physical Device Driver name

Setup Utility Program

A3CONFIG.EXE

This utility is used to set up the ALS120 sound card. It is automatically started when the Avance Logic software drivers are first installed in a DOS or Windows 3.1 application. It should be re-run anytime the system hardware configuration is changed or a change to the ALS120 sound card

configuration is desired. The a3config.exe utility resides in the directory into which the Avance Logic software drivers were stored.

To run the a3config.exe utility, perform the following:

1. If Windows 3.1 is running, exit the application and at the C:\> prompt, set the current directory to the directory containing the a3config.exe utility (A3SOUND was the default directory at installation time), type *a3config.exe*, and then press the Enter key to execute the utility.
2. The ALS120 Sound Chip Configuration Program screen will be displayed. Use the Tab, Space, Enter, Down Arrow, and ESC keys and/or the mouse to select and set options in menus, to move between menus, and to make and set changes to values.
3. In the Sound Chip Configuration Program menu, the SB16 configuration screen showing the I/O port, DMA, and IRQ settings will be displayed, and the default settings are: I/O Port: 220, DMA1: 1, DMA2:3 and IRQ: 5. Select and set any changes or accept the defaults.
4. In the Sound Chip Configuration Program menu, select “MPU401” to configure the external MIDI. The Enable/Disable box can be selected by using mouse or [space] key. If the external MIDI is enabled, the I/O port and IRQ settings will be displayed and can be changed by mouse or [down arrow] key. The default settings are: I/O Port: 330 and IRQ: 9. Select and set any changes or accept the defaults.
5. In the Sound Chip Configuration Program menu, select “CD-ROM” to configure the CD-ROM. The Enable/Disable box can be selected by using mouse or [space] key.
6. In the Sound Chip Configuration Program menu, select “ADLIB” to configure the OPL3. The Enable/Disable box can be selected by using mouse or [space] key.
7. In the Sound Chip Configuration Program menu, select “Game Port” to configure the game port. The Enable/Disable box can be selected by using mouse or [space] key.
8. In the Sound Chip Configuration Program menu, select “Set Volume”. The Setting Volume screen will be displayed. Make and set any changes or accept the existing settings and return to the Main Menu.

9. In the Sound Chip Configuration Program menu, 8-Bit Sound/16-Bit Sound/FM Music box will be displayed. Select each box and verify the correct operation of the ALS120 sound card. Follow the instructions given for each mode. If the sound card does not operate correctly in any mode, reconfigure it by rerunning this procedure.
10. When satisfied with the operation of the ALS120 sound card, select [OK] to exit the utility.

Trouble Shooting

The ALS120 sound card is designed to run trouble free once it is installed and set up. Most problems will be encountered during installation and setup or will be encountered later when something is changed in the system. The following are descriptions of and solutions for the more common problems that you may encounter. Please review these problems before requesting technical assistance.

Problems in DOS

1. Problem: Cannot load the CD-ROM software driver

Cause: The CD-ROM port may not be enabled. Check the config.sys file for the line device=c:\a3sound\cdsetup.sys". If it is not present, perform the steps outlined in the Solution. If it is present, call for technical assistance.

Solution: Run the a3config.exe utility. In the Device menu, select "CD-ROM" and press [OK] to configure the CD-ROM. Verify that the line "device=c:\a3sound\cdsetup.sys" is now in the config.sys file and then proceed to install the CD-ROM software driver provided with your CD-ROM drive.
2. Problem: No sound when playing a DOS game

Cause: There may be a conflict in the SB16 settings.

Solution: Rerun the a3config.exe utility and try another Port, DMA, or IRQ address.

Problems in Windows 3.1

1. Problem: There is no “Sound” or “MIDI Sequencer” item in the Device pull-down menu in the Media Player or the alsrack.exe application does not work.

Cause: The MIDI software driver may not be loaded. Check the system.ini file for the following lines. If any are missing, perform the steps outlined in the Solution. If all are present, call for technical assistance.

```
[boot]
```

```
drivers=mmsystem.dll msmixmgr.dll
```

```
[drivers]
```

```
Wave=a3sndsys.driv
```

```
Aux= a3sndsys.driv
```

```
Mixer= a3sndsys.driv
```

```
Midi=a3opl.driv
```

```
Midi1=a3mpu401.driv
```

```
[386Enh]
```

```
device= a3sndsys.386
```

Solution: Run the a3config.exe utility in its entirety.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Re-orient or relocate the receiving antenna.
2. Increase the separation between the equipment and the receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Shielded interconnect cables must be employed with this equipment to insure compliance with the pertinent RF emission limits governing this device.

Changes or modifications not expressly approved by Avance Logic could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Technical Support

Avance Logic, Inc. is committed to providing the best technical support possible for our products. Our technical support team is standing by to assist you in any way that they can. To better serve you, may we suggest that you review our web site before requesting assistance. Answers to commonly asked questions and the latest information are posted there for your convenience.

Avance Logic, Inc.

Technical Support

3F, No.56, Wu-Kung 6 Road, Wu-Ku Industrial Park

Taipei Hsien, Taiwan(R.O.C.)

Tel : 886- 2-2980098

FAX: 886-2-2980094

BBS: 886-2-2982050

FTP site: <ftp://ftp.realtek.com.tw/SOUND>

WWW site: <http://www.realtek.com.tw>

Telephone Hours

Monday-Friday 9:00 AM - 6:00 PM

Closed Holidays