

# **VDSL CPE CONVERTER USER'S MANUAL**

## **VDSL Solution**

The VDSL (Very High Data Rate DSL) networking solution delivers cost-effective, high-performance broadband access to multiunit buildings (hotels, apartment, and multi-tenant unit office buildings) and enterprise campus environments such as manufacturing, educational campuses, and medical facilities. VDSL technology dramatically extends Ethernet over existing Category 1/2/3 wiring at speeds 10Mbps (full duplex) and distances up to 1200 meters. The VDSL technology delivers broadband service on the same lines as Plain Old Telephone Service (POTS), digital telephone, and ISDN system. In addition, VDSL supports modes compatible with asymmetric digital subscriber line (ADSL), allowing service providers to provision VDSL to buildings where broadband services already exist.

The VDSL solution includes VDSL Concentrator (VDSL switches), and VDSL Modem for Customer Premise Equipment (CPE) device.

The VDSL solution delivers everything needed to quickly deploy an Ethernet-based network with the performance required to deliver high-speed Internet access at much greater distances and drive services like IP telephony and audio/video streaming. With this technology, a broad range of customers can benefit from lower operating costs and rapid deployment. The VDSL solution provides multicast, Layer 2 quality of service (QOS), Link Aggregation (LACP) dynamic trunking group, security, GVRP, IGMP for VOD (Video on demand) and SNMP RMON management and Web-based Switch network management.

The VDSL Concentrator is a bridge between external Internet backbone through a router for IP sharing and the building 110D telephone rack or telephone box. It utilizes the available telephone wire to enable high-speed Internet access to building residents.

The Concentrator uses the phone line networking technology endorsed by the VDSL, and the Concentrator utilizes the already existing telephone wire

to deliver 10 Mbps Internet access on each RJ-11 port.

This gives users a low-cost, end-to-end solution and eliminates the need to train installation teams on multiple systems.

## **Foreword**

The VDSL Converter is an Ethernet to VDSL adapter that enables high speed internet access to building residents, campuses students and hotel guests by connecting Ethernet equipped computers, set-top box or any internet access device to the existing telephone wires.

The VDSL converter uses the phoneline networking technology endorsed by the VDSL, an association of industry-leading companies for in – networking focus on the existing telephone wire.

The Converter utilize the already existing telephone wire to deliver 10Mbps internet access with no interference on the existing telephone service. It allows user to make calls while access the internet on the same wire simultaneously. It even allows staying connected 24 hours on internet connections, thus, eliminating dial up prior to internet access.

The Converter is simple to install and use. One RJ-45 Ethernet connects to a Router, Ethernet Switch or to LAN card. The RJ11 ports available to connect to any existing modular phone jack.

There are two RJ-11 jack on the Converter to provide a phone extensions. No software installation makes the converter highly compatible with different operating system ( Windows, Linux, Apple....etc).

# Converter

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## Contents

<b>1. Unpacking Information</b>	
Check List -----	4
<b>2. Installation</b>	
Hardware Installation -----	5
Pre-Installation Requirements -----	5
General Rules -----	6
Connecting the Converter -----	6
Connecting the RJ-11/RJ-45 Ports -----	7
<b>3. Hardware Description</b>	
Front Indicators-----	9
Rear Connectors -----	11
Power On -----	11
<b>4. Applications</b>	
Application for Home networking -----	12
<b>Appendix A Cable Requirement</b> -----	13
<b>Appendix B Product Specifications</b> -----	15
<b>Appendix C Trouble Shooting</b> -----	16
<b>Appendix D Link Recover Procedures</b> -----	19
<b>Appendix E Accessories-Bracket</b> -----	20
<b>Appendix F Compliant and Safety Information</b> -----	21
<b>FCC/CE Warning</b> .....	23
<b>Warranty</b> .....	24

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# 1. Unpacking Information

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## **Check List**

Carefully unpack the package and check its contents against the checklist.

### Package Contents

- Ethernet to VDSL Converter
- Four plastic feet
- Diskette User Manual
- AC to DC Power Adapter
- Ethernet Straight-through cable
- RJ-11 cable

Please inform your dealer immediately for any missing, or damaged parts. If possible, retain the carton, including the original packing materials, Use them to repack the unit in case there is a need to return for repair.

## **2. Installing the Converter**

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### **Hardware Installation**

This chapter describes how to install the converter and establishes network connections. You may install the converter on any level surface (e.g, a table or shelf). However, please take note of the following minimum site requirements before you begin. Stick the 4 plastic feet at the bottom.

### **Pre-installation Requirements**

Before you start actual hardware installation, make sure you can provide the right operating environment, including power requirements, sufficient physical space, and proximity to other network devices that are to be connected. Verify the following installation requirement:

- Power requirements: DC5V/1A or above.
- The converter should be located in a cool dry place, with at least 10cm/4in of space at the front and back for ventilation.
- Place the Converter out of direct sunlight, and away from heat sources or areas with a high amount of electromagnetic interference.
- Check if network cables and connectors needed for installation are available

**General Rules**

Before making any connections to the converter, note the following rules:

- Ethernet Port (RJ-45)

All network connections to the Converter Ethernet port must be made using Category 5 UTP for 100Mbps; Category 3,4 UTP for 10Mbps

No more than 100 meters of cabling may be use between the MUX or HUB and an end node.

- VDSL Port (RJ-11)

All Home network connections to the RJ-11Port made using 24~26 Gauge phone wiring.

- We do not recommend using 28 Gauge or above phone line.

**Connecting the Converter**

The converter has one ETHERNET port which support connection to Ethernet operation. The devices attached to these ports must support auto-negotiation or 10Base-T OR 100Base-TX unless they will always operate at half duplex.

Use any of the Ethernet ports to connect to devices such as HUB, concentrator, bridge or router. You can also connect to another compatible converter to an RJ-45 port on the other device.

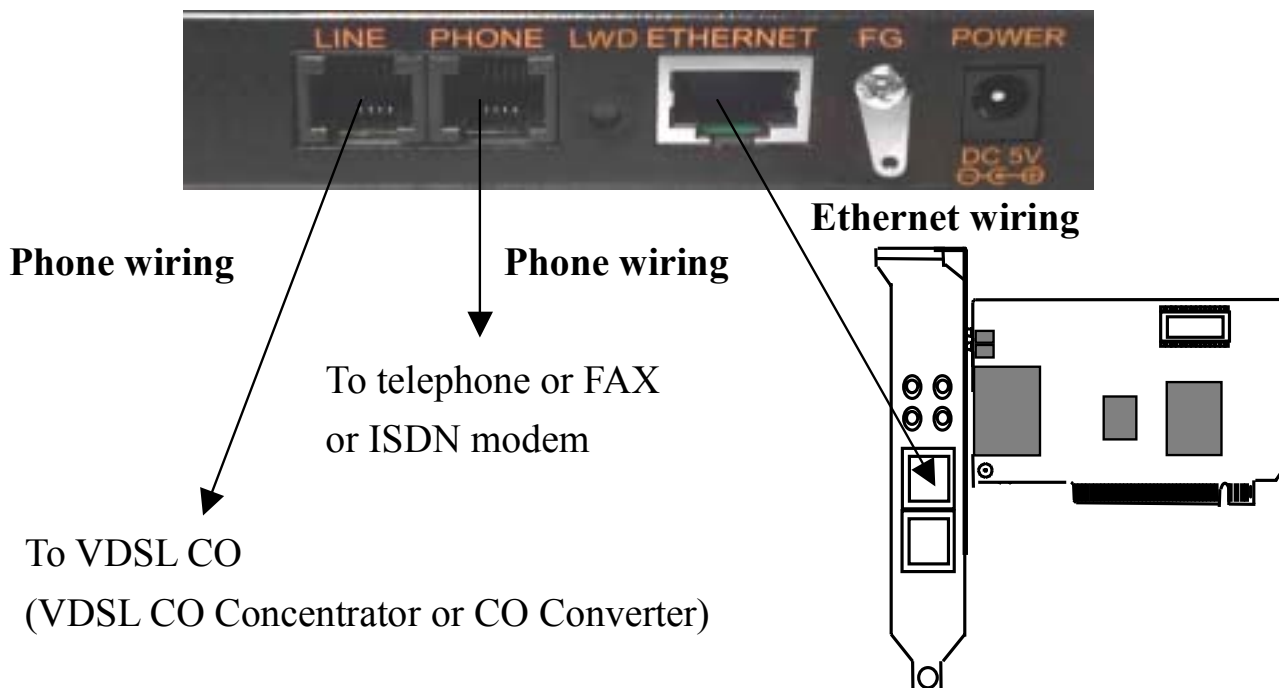
The RJ11 Line port are use to connect to the wall RJ-11 modular socket which is connect to VDSL Switch or VDSL converter CO side

The RJ11 Phone port of the converter can connected to a telephone and a computer sharing one telephone wire for making calls and accessing the internet at the same time.

**Connecting the RJ-11/RJ-45 Ports**

1. The Converter's RJ-11 ports support the transmission of data up to 10Mbps across existing phone wiring, without interfering with standard voice transmissions, easy-to-use does not require the installation of any additional wiring. Every RJ-11 modular phone jack in the home can become a port on the LAN. Networking devices can be installed on a single telephone wire that can span within 1.9KM (6000 feet) between the two farthest points. (Figure 1.0).
2. VDSL Converter has embedded Splitter between every VDSL side (Line) and POTS (Phone) side. It permit you can delivers broadband service on the same lines as Plain Old Telephone Service (POTS), PBX, ISDN traffic and VDSL Signal.

Figure 1.0 converter use as adapter to connect RJ-11 and the LAN card inside the PC



**10/100 Fast Ethernet Networking Interface Card**

1. The RJ-11 port support 10 Mbps connections. When inserting a RJ-11 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated.
2. Do not plug a RJ-11 phone jack connector into the Ethernet port (RJ-45 port). This may damage the converter. Instead; use only twisted-pair cables with RJ-45 connectors that conform to FCC standard.

**Notes:**

1. Be sure each twisted-pair cable (RJ-45) does not exceeds 100 meters (333 feet).
2. RJ-11 port use 24 ~ 26 gauge phone wiring, we do not recommend 28 gauge or above.
3. We advise using Category 3,4,5 cable for Cable Modem or Router connections to avoid any confusion or inconvenience in the future when you upgrade attached to high band width devices.

## **3 Hardware Description**

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This section describes the important parts of the converter. It features the front indicators and rear connectors.

### **3.1 Front Indicators**

The following figure shows the front panel.

Figure Chapter 2.2 Front Indicators



Three LED indicators.

At a quick glance of the front panel, it will be easy to tell if the converter has power, if it has signal from its Ethernet RJ-45 port and if there is phone line signal RJ-11port

**Front Indicators**

## LED Description and Operation

The Converter has three LED indicators.

<b>LEDs</b>	<b>Status</b>	<b>Descriptions</b>
Ready (Ready LED)	Steady Green	It will light up (ON) to show that the product is power good, and system reset OK.
Ethernet (Ethernet LED)	Steady Green Flashing (LINK/ACT)	Each RJ45 station port on the Ethernet is assigned an LED light for monitoring port "Good Linkage". LED is normally OFF after the power on operation, but will light up steadily to show good linkage. And Flashing to show data transmission.
VDSL (VDSL LED)	Steady Green	RJ11 station port on the VDSL is assigned an LED light for monitoring port "Good Linkage". LED is normally OFF after the power on operation, but will light up steadily to show good linkage.

## **Rear Panel**

The following figure shows the rear connectors

Figure Chapter 2.3 Rear Connectors



### **Converter Rear Side Connectors**

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<b>Connectors</b>	<b>Description</b>	<b>Type</b>
Line	For connecting to the RJ-11 wall jack Using a RJ-11 cable	RJ-11
Phone	For connecting to the telephone or Fax or ISDN modem	RJ-11
LWD	For recovering LINK status between CPE & CO	N/A
Ethernet	For connecting to a Ethernet equipped device	RJ-45

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### **Power On**

1. Check the converter is properly connected
2. Verify the power LED is steadily on

## **3.Applications**

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### **APPLICATION FOR HOME NETWORKING**

The 10Mbps Converter is used to connect any device equipped with a standard 10/100Mbps Ethernet port to a VDSL LAN.

The Converter have been designed to operate on the telephone wire installed in homes throughout the world. They utilize the same modular patch cords and connectors commonly used for telephones.

To install the Converter or to access the Internet, you simply plug into your existing telephone jacks just like you would a telephone modem or a fax machine. There is no need for special splitters, terminators or filters. In fact, there is no need to add or modify the home telephone wiring at all.

The Converter uses a frequency division multiplexing approach that enables standard telephone wiring to simultaneously carry POTS voice, ISDN and VDSL signals without any of the services impacting each other.

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## **Appendix A: Cable Requirement**

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A CAT 3,4 or 5 UTP (unshielded twisted pair) cable is typically used To connect the Ethernet device to the converter.

A 10Base-T cable often consists of four pairs of wires, two of which are used for transmission. The connector at the end of the 10Base-T cable is referred to as an RJ-45 connector and it consists of eight pins.

The Ethernet standard uses pins 1,2,3 and 6 for data transmission purposes.

Table RJ-45 Ethernet Connector Pin out Assignments

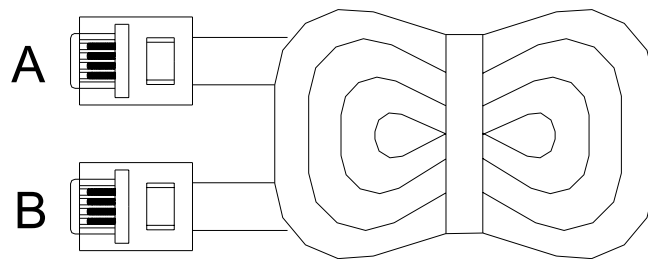
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<b>PIN</b>	<b>MNEMONIC</b>	<b>FUNCTION</b>
1	TX+	Ethernet differential Transmit signal(+)
2	TX-	Ethernet differential Transmit signal(-)
3	RX+	Ethernet differential receive signal(+)
4	NC	Unused
5	NC	Unused
6	RX-	Ethernet differential receive signal(-)
7	NC	Unused
8	NC	Unused

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Standard telephone wire of any gauge or type-flat, twisted or quad is used to connect the Converter to the telephone network. A telephone cable typically consists of three pairs of wires, one of which is used for transmission. The connector at the end of the telephone cable is called an RJ-11 connector and it consists of six pins. POTS (plain old telephone services) use pins 3 and 4 for voice transmission. A telephone cable is shown below.

Figure Telephone cable



The A and B connectors on the rear of the converter are RJ-11 connectors. These connectors are wired identically. The RJ-11 connectors have six positions, two of which are wiring, The Converter uses the center two pins. The pin out assignment for these connectors is presented below.

Table	RJ-11 Pin	out Assignments
Pin#	MNEMONIC	FUNCTION
1	NC	Unused
2	NC	Unused
3	TIP	POTS
4	RING	POTS
5	NC	Unused
6	NC	Unused_

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## **Appendix B: Product Specification**

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**Product Name : VDSL To Ethernet Converter (VDSL Modem)**

**Application : Home networking solution**

**Product Specification :**

Compliant with IEEE 802.3 & 802.3u Ethernet Standards

- Compliant with ETSI, ITU, ANSI VDSL standards.
- Provides 1 x 10/100M auto-sensing RJ-45 Ethernet ports.
- Provides 1 x VDSL RJ-11 port.
- Provides 1 x POTS / ISDN RJ-11 splitter on board.
- Spectral compatibility with xDSL, ISDN (2B1Q/4B3T).
- Robust operation on severely distorted line.
- Symmetric and asymmetric data transmission on the same line.
- Supports flow control IEEE802.3x for Full Duplex & Back Pressure for Half Duplex.
- Long driver capable up to 1.9Km(4/1Mbps)1.5Km(5Mbps) /1.2Km(10M)/1Km(15M).
- Surge protection.
- Provides Ready LED.
- Provides LED indication Link/Active Status for Ethernet port and Link for VDSL port.
- External switching power adapter Input: AC 100-240 volts/50-60Hz; Output: DC 5V/1A or above.
- Dimensions: 95 x 110 x 24 mm.
- Operating Temperature : 0°C~50°C(32F ~ 122F).
- Humidity: 10%~90% non-condensing.
- EMI by FCC/CE
- Safety by EN60950
- Chipset : Infineon 10Base-S

## **Appendix C: Troubleshooting**

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### **Diagnosing the Converter's Indicators**

The Converter can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the hub may encounter. This section describes common problems you may encounter and possible solutions

1. Symptom: Ready indicator does not light up (green) after power on.

Cause: Defective External power supply

Solution: Check the power plug by plugging in another that is functioning properly. Check the power cord with another device. If these measures fail to resolve the problem, have the unit power supply replaced by a qualified distributor.

2. Symptom: Link indicator does not light up (green) after making a connection.

Cause: Network interface (e.g, a network adapter card on the attached device), network cable, or switch port is defective.

Solution:

- 2.1 Power off then Power on the VDSL Modem.
- 2.2 Verify that the switch and attached device are powered on.
- 2.3 Be sure the cable is plugged into both the switch and corresponding device.
- 2.4 Verify that the proper cable type is used and its length does not exceed specified limits.
- 2.5 Check the converter on the attached device and cable connections for possible defects.
- 2.6 Replace the defective converter or cable if necessary.
- 2.7 Verify the VDSL switch and VDSL Modem during the same speed mode. You can select VDSL Speed mode by 10 Mbps. Only same speed mode can link and work. VDSL default translation mode is 10 Mbps.

**System Diagnostics****Power and Cooling Problems**

If the POWER indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply as explained in the previous section.

However, if the unit power is off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fan on back of the unit is unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, contact your dealer.

**Installation**

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (e.g., the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

**Transmission Mode**

The default method of selecting the transmission mode for RJ-45 ports is 10/100 Mbps ETHERNET, for RJ-11 port are 10Mbps VDSL.

Therefore, if the Link signal is disrupted (e.g., by unplugging the network cable and plugging it back in again, or by resetting the power), the port will try to reestablish communications with the attached device via auto-negotiation. If auto-negotiation fails, then communications are set to half duplex by default. Based on this type of industry-standard connection policy, if you are using a full-duplex device that does not support auto-negotiation, communications can be easily lost (i.e., reset

to the wrong mode) whenever the attached device is reset or experiences a power fluctuation. The best way to resolve this problem is to upgrade these devices to a version that support Ethernet and VDSL.

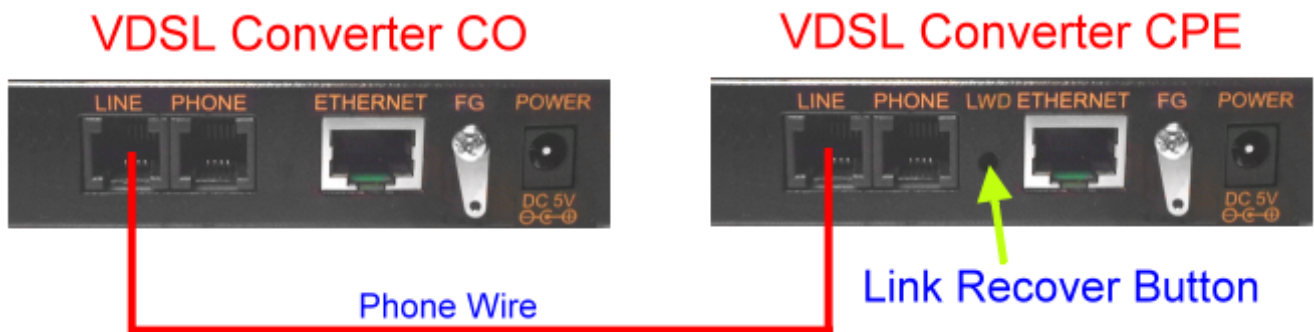
### **Physical Configuration**

If problems occur after altering the network configuration, restore the original connections, and try to track the problem down by implementing the new changes, one step at a time. Ensure that cable distances and other physical aspects of the installation do not exceed recommendations

### **System Integrity**

As a last resort verify the switch integrity with a power-on reset. Turn the power to the switch off and then on several times. If the problem still persists and you have completed all the preceding diagnoses, then contact your dealer

## Appendix D : Link Recover Procedures



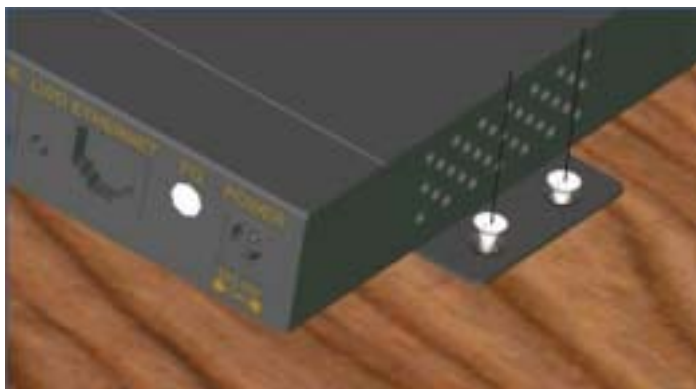
### Operating Procedures:

1. Power on VDSL CO, start the speed change program, change speed mode to 4/1Mbps.
2. Connect phone line between VDSL CO & VDSL CPE.
3. Push still Link Recover Button of VDSL CPE and power on VDSL CPE.
4. Wait for 5 seconds, then release Link Recover Button.
5. Now, VDSL CPE speed mode has changed to 4/1Mbps mode, wait until VDSL CO & VDSL CPE establish link{**You can see that both VDSL LEDs(CO & CPE) are steadily on**}.
6. Run speed change program, you can set your desired speed mode.

**Remark: LWD represents 4/1Mbps.**

**Appendix E : Accessories-Bracket**

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**Two Brackets**



The brackets are specially designed to fix the VDSL converter on the table to avoid someone to freely take it away, like in hotel rooms, internet café or other public areas where providing the internet service. It is suggested to use with the wooden table. This is an optional accessory, please contact with your local dealer for further service.

**Note: Do not install plastic feet at the bottom of the VDSL CPE converter when using brackets.**

## **Appendix F : Compliance and Safety Information**

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### **FCC Radio Frequency Interference Statement**

This equipment has been tested and found to comply with the limits for a computing device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. The equipment and the receiver should be connected to outlets on separate circuits.
4. Consult the dealer or an experienced radio/television technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

If this telephone equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance in order for you to make necessary modifications to maintain uninterrupted service.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

### **Important Safety Instructions**

Caution : The direct plug-in wall transformer serves as the main disconnect for the product. The socket outlet shall be installed near the product and be readily accessible.

Caution : Use only the power supply included with this product. In the event the power supply is lost or damaged : In the United States, use only with CSA certified or UL listed Class 2 power supply, rated 5Vdc 1A or above.

IN Europe, use only with CE certified power supply, rated 5Vdc 1A or above.

Do not use this equipment near water, for example in a wet basement.

Avoid using a telephone during an electrical storm. There may be a remote risk of electrical shock from lightning.

Do not use the telephone to report a gas leak in the vicinity of the leak.

If trouble is experienced with this unit, please contact customer service at the address and phone listed below. **DO NOT DISASSEMBLE THIS EQUIPMENT.** It does not contain any user serviceable components.

**FCC Warning**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**CE Mark Warning**

This is a CE class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

# Warranty

The original owner that the product delivered in this package will be free from defects in material and workmanship for one year parts after purchase. For the warranty to apply, you must register your purchase by returning the registration card indicating the date of purchase.

There will be a minimal charge to replace consumable components, such as fuses, power transformers, and mechanical cooling devices. The warranty will not apply to any products which have been subjected to any misuse, neglect or accidental damage, or which contain defects which are in any way attributable to improper installation or to alteration or repairs made or performed by any person not under control of the original owner.

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY WARRANTY ARISING OUT OF ANY PROPOSAL, SPECIFICATION, OR SAMPLE. SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. WE NEITHER ASSUMES NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT ANY OTHER LIABILITY.

**Note: Please do not tear off or remove the warranty sticker as shown, otherwise the warranty will be void**

