



25VST-AMP

HD/SD COFDM Transmitter



User Manual

IMT PUBLICATION: M22-25VST-AMP-1A1, REV 1.0

Revision History

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IMT 25VST-AMP User Manual

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FCC ID: I4U-25VST-AMP

This device complies with Part 2 and Part 90 of the Federal Communications Commission (FCC) Rules.

CAUTION:

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



Chapter One **1**

Introduction

1 Introduction

This document is a user manual for IMT's 25VST-AMP microwave video transmitter with high power amplifier. The 25VST-AMP is a compact transmitter with high power amplifier that digitally encodes video signals and transmits them using COFDM modulation over microwave frequencies using secure methods. The unit accepts composite video inputs in NTSC or PAL format. It has a built in MPEG4 (H.264) encoder and COFDM modulator. The 25VST-AMP is housed on an easy to install plate.

Throughout this manual, the product is referred to as the "25VST-AMP," or simply the "transmitter."

1.1 Manual Overview

The contents of this manual are as follows:

Chapter 2 – Describes the theory of operation and the features of the 25VST-AMP.

Chapter 3 – Contains a list of the 25VST-AMP specifications. The specifications include transmitter feature specifications, power requirements, environmental specifications, and I/O specifications.

Chapter 4 – Explains how to install the 25VST-AMP.

Chapter 5 – Describes operating procedures for the 25VST-AMP. It also contains an overview of the 25VST-AMP programmable serial interface.

A preface at the front of this manual contains Warranty and Repair information.

The rear of this manual contains warranty and repair information.



Chapter Two **2**

Description

2 25VST-AMP Description

This chapter describes the 25VST-AMP transmitter theory of operation, features, and benefits. It also contains a block diagram of the 25VST-AMP transmitter circuitry.

The 25VST-AMP features an interface board for all input connections. Audio, video and power are input to the 25VST-AMP via the interface board. A programmable user interface is also accessed via a serial port on the interface. This can be used to pre-configure the 25VST-AMP settings and to check the status of the settings.

The 25VST-AMP internal circuitry compresses the audio and video signals, organizes the compressed data into digital video transport streams, and optionally encrypts the data. The transmitter uses COFDM modulation and transmits at microwave frequencies in the band supported by the unit. The signal level out of the base transmitter is calibrated for ideal power into the final amplifier. The High Power Amplifier linearly amplifies the COFDM signal and outputs via a SMA-Female type connector.

Though the unit ships pre-configured, a graphical user interface that runs on a PC is available to modify the operating parameters. Optionally, custom software written to implement the RS232 command set may be used. Refer to Chapter 5, “Operation” for more information.

IMT has the ability, should the need ever arise, to provide the user with firmware files and instructions for local firmware installation, such as for feature upgrades, etc.

2.1 25VST-AMP Features and Benefits

Table 2-1: 25VST-AMP - Summary of High Level Features and Benefits

Feature	Benefit
COFDM Microwave Digital Video Transmitter	MPEG 4 COFDM Transmitter
Frequency Agile Transmitter	User programmable channels and offsets within frequency ranges.
Accepts NTSC or PAL Composite Video Inputs	Compatible with industry standard video camera outputs.
Optional Stereo Analog Audio Inputs	Direct audio input option for use with video signals that do not contain audio.
MPEG4 (H.264) Encoder	Industry standard video compression. Implements latest algorithms including B frames.
High Power Output	The integrated amplifier offers range extension

Remote Control GUI for Programming the 25VST-AMP

Convenient menu and button based graphical user interface for Windows PC's. GUI uses 25VST-AMP RS-232 remote control serial port. Can be used to program the preset settings on the top panel.

2.2 25VST-AMP Theory of Operation

2.2.1 25VST-AMP Block Diagram

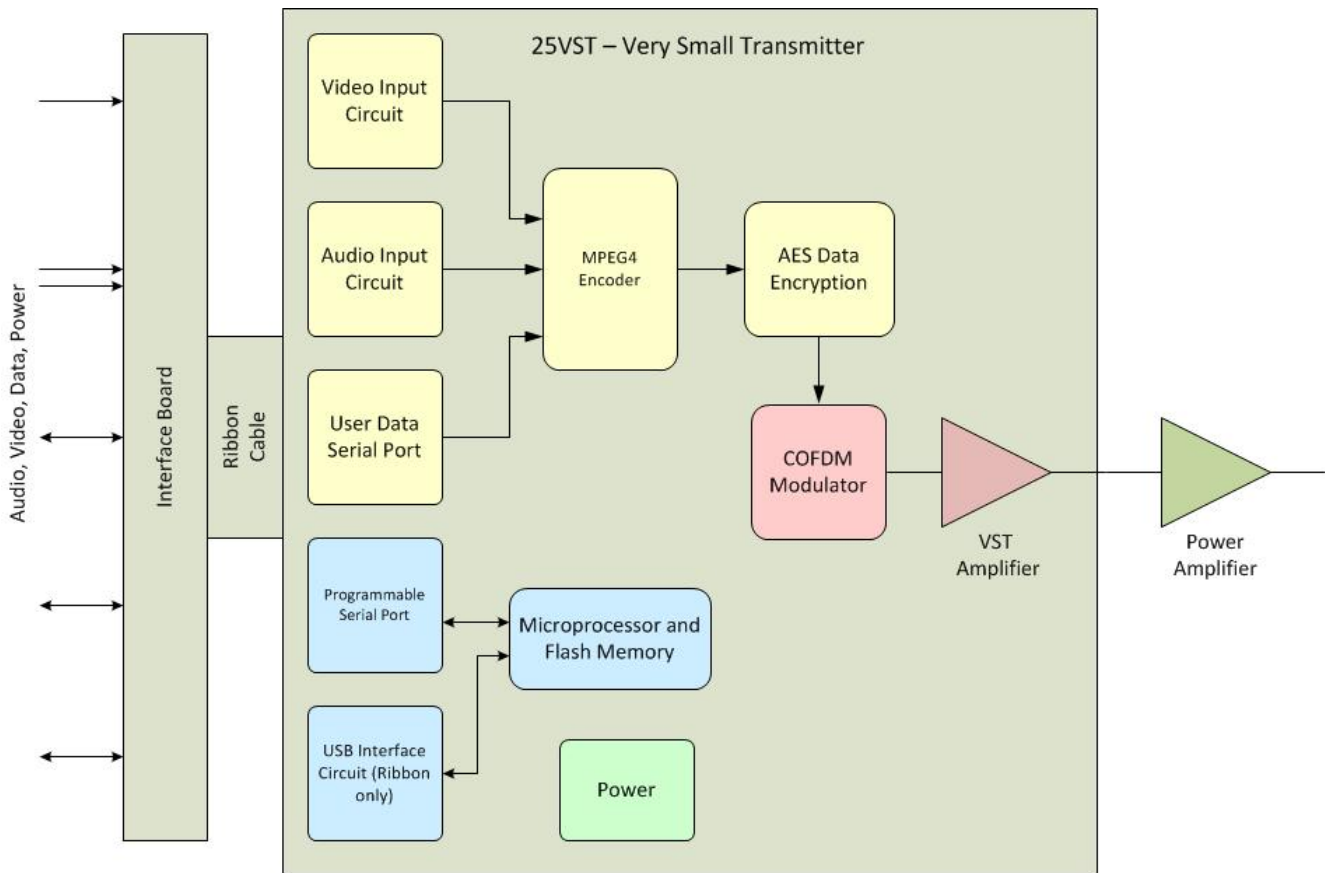


Figure 2-1: 25VST-AMP Block Diagram

Major blocks in the 25VST-AMP include:

- Interface
 - NTSC Composite Video Input Interface
 - Stereo/Mono Audio Input Interface
 - Programmers Serial Interface for Remote Control Purposes
 - Internal Microprocessor and Memory

- USB Interface for Firmware Updates
- Power Circuitry
- COFDM Transmitter
 - MPEG4 Video Compression Circuit
 - Data Encryption Circuit
 - COFDM Modulator
 - Microwave Transmission Amplifier
- Power Distribution
- High Power Amplifier

2.2.2 Interface Board

2.2.2.1 Power and Control Interface Connector

The 25VST-AMP Power and Control Interface includes power and ground connections plus two RS-232 serial port interfaces. One of the RS-232 interfaces can be connected to a laptop or other PC to program the transmitter configuration. The second RS-232 interface can be used to transmit user data through the transmitter along with the audio and video streams.

2.2.2.2 Audio and Video Input Connectors

This 25VST-AMP model has two analog audio inputs that can be used for stereo audio and one NTSC or PAL composite video input. Refer to Chapter 3 for specifications of these signals.

2.2.3 COFDM Transmitter

2.2.3.1 MPEG4 Encoder

The 25VST-AMP compresses the input video signal before modulation and transmission to reduce bandwidth. The 25VST-AMP contains a built-in MPEG4 (H.264) compliant encoder for this purpose. The 25VST-AMP features the latest compression methods utilizing B frames for more accurate encoding of compressed video signals.

2.2.3.2 Encryption

The transmitter supports BCRYPT1 and BCRYPT2. BCRYPT2 is very similar to BCRYPT1 with improvements made to support re-multiplexing. Both encryption modes support AES 128 and AES256 key lengths.

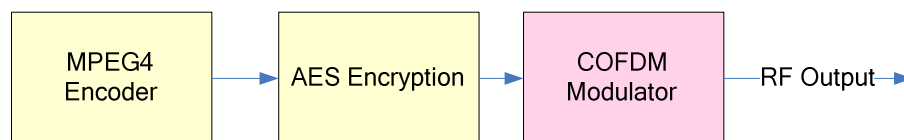


Figure 2-2 - Encryption Circuit

2.2.3.3 COFDM Modulator

The COFDM modulator receives data from the output of the MPEG4 encoder through a circuit that enhances the security of transmissions.

The 25VST-AMP is able to transmit data at high data rates and with low error rates using COFDM modulation techniques. The data rate used by the transmitter depends upon the COFDM modulator settings used.

2.2.3.4 Transmitter Amplifier

The 25VST-AMP microwave transmitter circuits mix the signal to the desired microwave frequency. The signal is filtered and boosted through a low noise output amplifier.

The 25VST-AMP has a single SMA-Female type connector. The output impedance is 50 ohms.

2.2.4 Power Distribution

Distributes power to components.

2.2.5 Booster Amplifier

The 25VST-AMP features a 5 Watt booster amplifier. The booster amplifier may be packaged as a stand-alone amplifier for user installation or as part of an integrated product.

2.2.6 Remote Control via Serial Interface

An RS-232 command set is implemented to allow remote control of all configuration options, as well as monitoring of internal status and settings. Commands and responses are sent via the RS-232 serial interface located on the Interface Board.

The IMT NanoController GUI is available for controlling the unit via the RS-232 serial interface. Any Windows compatible computer running Windows XP or Windows 7 with 500 MB of memory and 1 GHz Pentium or above can be used. Refer to Chapter 5, “Operation” for more information.

Optionally, users can create custom control interfaces as required to suit their applications. The RS-232 command set, or “remote protocol”, is available upon request for this purpose.

2.2.7 Firmware updates

The unit firmware may be updated via the USB interface on the Interface Board, using the IMT NanoTx Programmer software. .

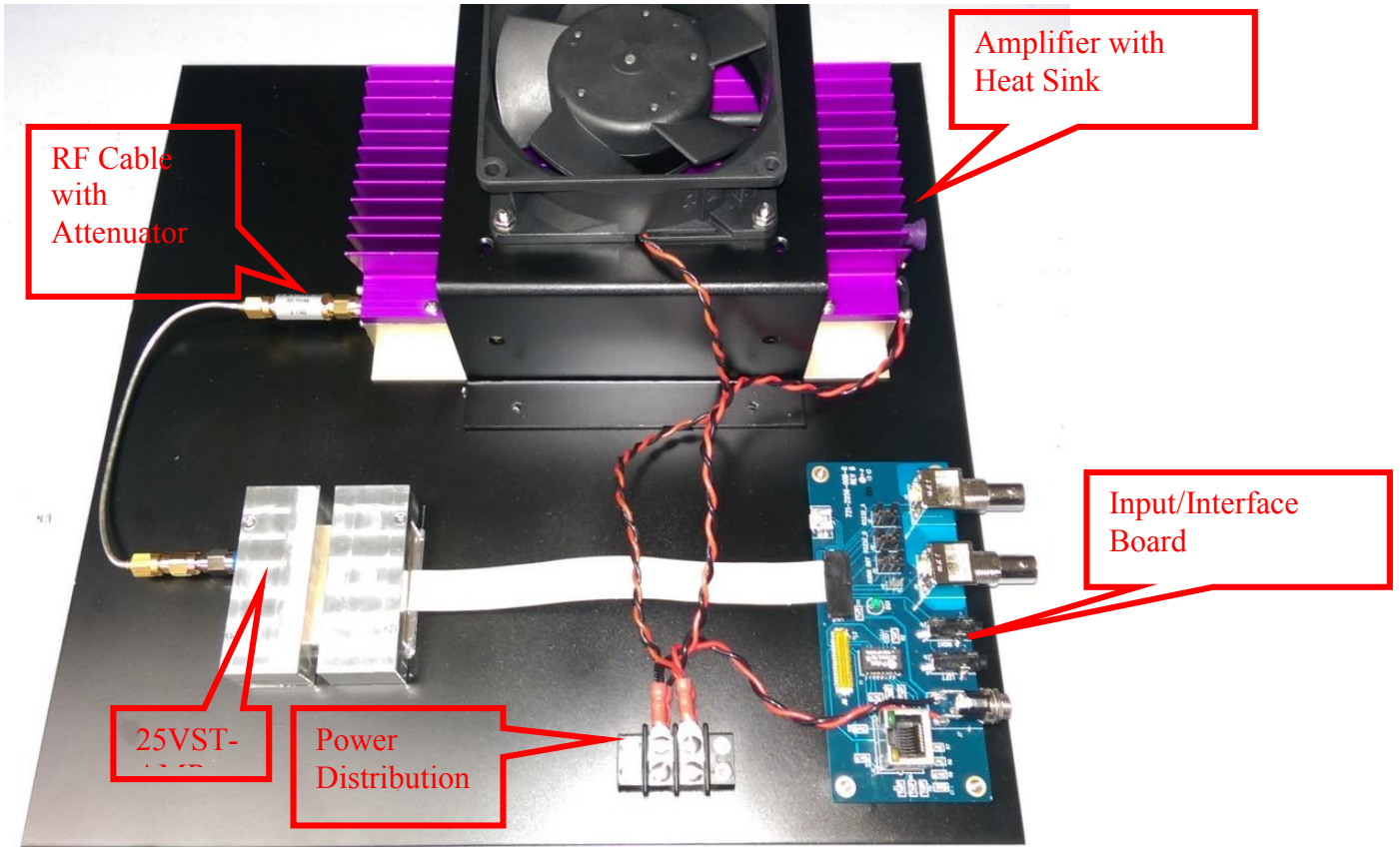


Figure 2-3: Booster Amplifier Configuration

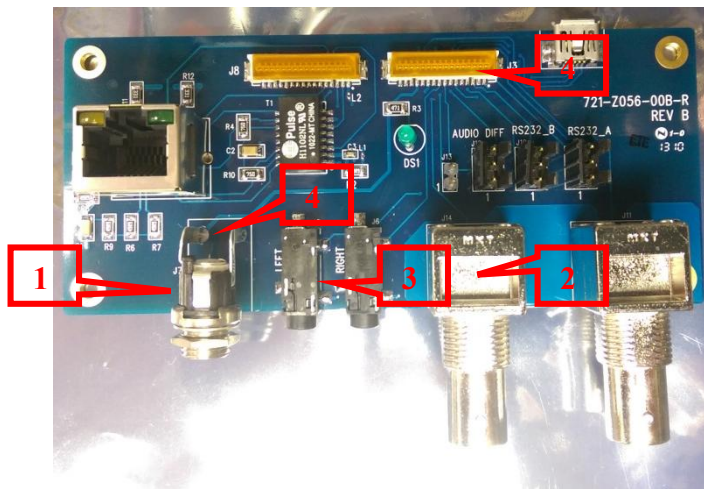


Figure 2-4: Input/Interface Board for Booster Amplifier

Table 2-2: Booster Amplifier Interfaces

Reference	Function	Connector
1	Power In	2.5mm jack

2	Video In	BNC - Female
3	Audio In	Left and Right jack
4	Transmitter Interface	Ribbon Connector (J3)
5	Power to Distribution	Leads with spade lugs
6	RF Output	SMA Female

Chapter Three

3

Specifications

3 Specifications

3.1 Frequency Bands

Base Part Number	Frequency (GHz)	RF Power (dBm)	DC Power (W)
25VST-13	2.400-2.483	37	<75

Tuning step size:250 kHz step size
 Frequency stability:± 10ppm
 Transmit Modes via Remote Control:
 Standby:No RF output
 Normal:Instantly on frequency transmission

3.2 Modulation Modes

Modulation 1

Modulation Formats:COFDM (DVB-T)
 Carriers:2K
 Constellation:QPSK, 16QAM
 Code Rate:1/2, 2/3, 3/4, 5/6, 7/8
 Guard Interval:1/32, 1/16, 1/8, 1/4
 Bandwidth:6 MHz, 7 MHz, and 8 MHz

Modulation 2 (Optional)

Modulation Formats:COFDM (Proprietary)
 Carriers:2K
 Constellation:QPSK
 Code Rate:1/2, 3/4
 Guard Interval:1/32
 Bandwidth:1.25MHz, 2.5MHz

3.3 MPEG Encoder

Method:MPEG-4 Part 10/H.264

3.3.1 Video

Video Coding:AVC
 Video Input:Composite
 NTSC:720 x 480(4:2:0)
 PAL:720 x 576(4:2:0)

3.3.2 Audio

Audio Coding:ISO/IEC 11172-3(Layer II)
Audio Sample Rate:..... 48Khz
Audio Channels:1 Stereo, 2Mono Standard,
Audio Input:Line, Gain selectable
.....Mic, Gain selectable
Tone:Level Adjustable

3.4 System

Video Present: Remote Standby or Test Generator
Test Generator (Dynamic):SMPTE CB(NTSC)/100%
.....CB(PAL)
.....16 Character ID (Matches SDT Service name).
.....1KHz Tone/Pulse
Encryption (optional): AES Block Cypher, supporting key size of 12
.....and 256bit (FIPS PUB 197)
User Data:RS232 Side channel, 300-115K Baud
Remote Control:Remote RS232
Local Control:None
Presets:16 user configurable presets through GUI.

3.5 Power Requirements

Input range:DC: +9 to +18
Power consumption:See table above

3.6 Environmental

Item	Specification
Temperature Range, Operational, Bottom Surface	-10° to +65°C Base plate temperature
Temperature Range, Storage	-40° to +80°C
Humidity	0% to 95% RH, non-condensing
Altitude, Operating	0 to 20,000ft (6,000 m) Maximum
Altitude, Storage	0 to 50,000ft (15,000 m) Maximum

Chapter Four

4

Installation

4 Installation

This chapter contains steps for installing the 25VST-AMP transmitter in typical environments where it may be used.

4.1 Overview

The 25VST-AMP is used as an integrated part of a system that typically contains a camera and power supply. 25VST-AMP applications may also contain a host processor that is used in the field to re-configure settings in the 25VST-AMP.

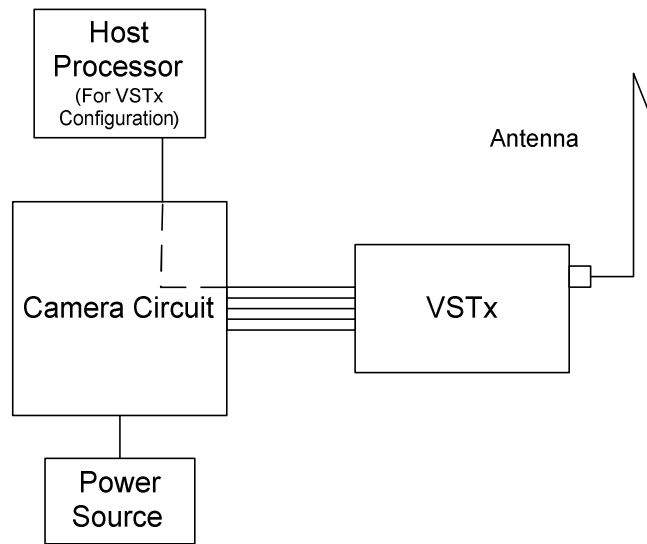
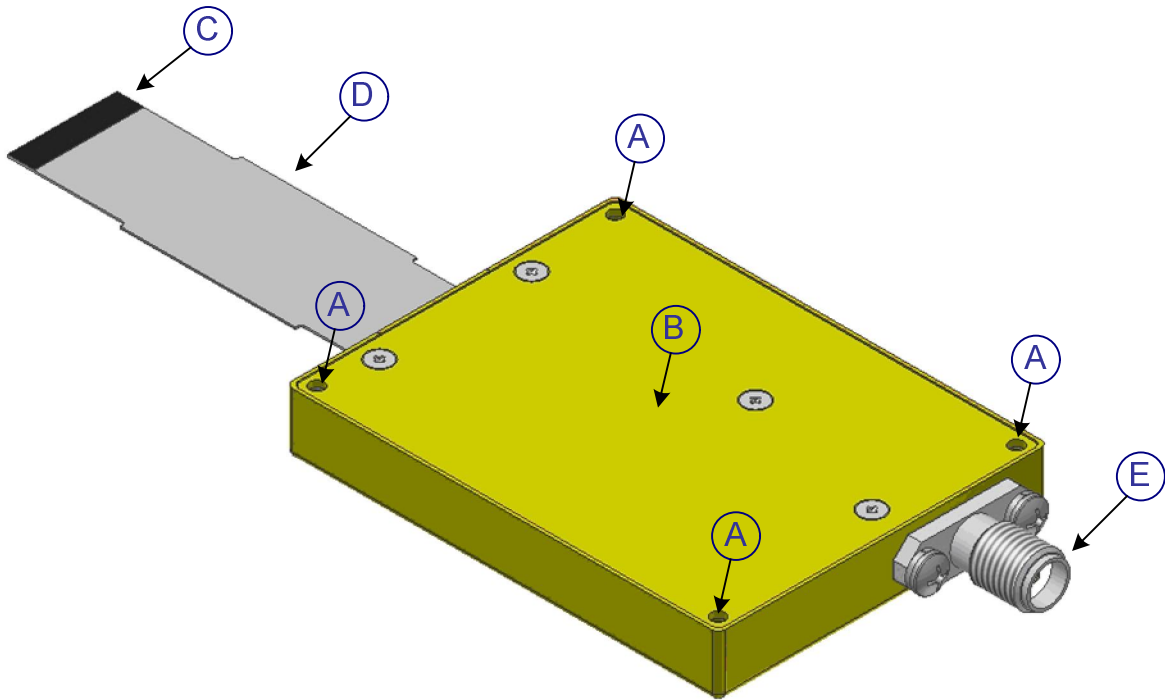


Figure 4-1: 25VST-AMP Application With Optional Host Processor

4.2 Identifying 25VST-AMP Physical Features and Interfaces

4.2.1 COFDM Transmitter



A Screw Holes for Mounting	D Ribbon Cable
B 25VST-AMP Top Surface	E Antenna Port
C Ribbon Cable Connector; <i>Arrow points to Pin 1. (26 pins total)</i>	

Figure 4-2: 25VST-AMP – COFDM Transmitter

Table 4-1: OEM Model Ribbon Connector Pin Out

VST - Multi-pin Connector [Hirose P/N FH33-26s-0.5sh(10)]			
Pin Number	Signal Name	Direction	Description
1	GND		
2	NC		
3	NC		
4	NC		
5	RS232 RX UD	IN	RS232 User data
6	RS232 TX UD	OUT	RS232 User data
7	RS232 RX_RC	IN	RS232 Remote Control
8	RS232 TX_RC	OUT	RS232 Remote Control

9	GND		
10	USB_PWR		USB Interface
11	USB_DP		USB Interface
12	USB_DM		USB Interface
13	GND		
14	NC		
15	NC	OUT	
16	AUDIO 1	IN	Audio 1 Single ended
17	AUDIO 2	IN	Audio 2 Single ended
18	GND		
19	NC		
20	COMPOSITE	IN	Composite IN
21	GND		
22	NC		
23	NC		
24	GND		
25	12VDC	IN	Power Input +9 to +18 VDC
26	12VDC	IN	Power Input +9 to +18 VDC

4.3 Interface

The interface board includes all the input connections to the 25VST-AMP. Refer to the figure and table below for reference.

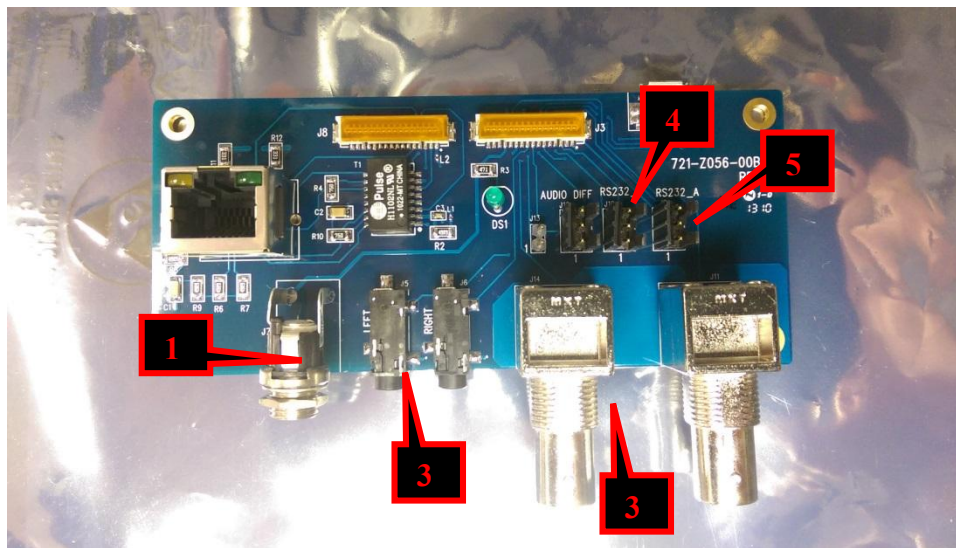


Figure 4-3: 25VST-AMP Interface Connections

25VST-AMP Interface Board Connections		
Reference	Signal Name	Description
1	Power	2.5mm Jack
2	Video In	Composite – BNC Female

3	Audio	Left and Right - Jack
4	RS232 TX UD	3 Pin Molex
5	RS232 RX_RC	3 Pin Molex RS232 Remote Control

4.4 Physical Installation

The 25VST-AMP is configured via the programmable serial interface. Should you desire to program the unit while in your application, then your application design must provide a means to connect to the serial interface. If your application cannot support a means to connect to the serial interface, then you must pre-configure the unit prior to installation. Refer to Section 5.

The 25VST-AMP requires installation using proper thermal dissipation methods. The unit has an internal fan and the fan openings must not be blocked.

The unit should not be operated inside another enclosure unless sufficient cooling is provided such that the case temperature is within the range specified in Chapter 3.

Warning: Before applying power ensure proper antenna and/or termination is on the RF port.

4.5 Amplifier Installation

The Booster amplifier will come pre-installed on a plate with all interface board and connections. Simply connect 12VDC power supply to power jack, and antenna via RF cable to the RF Output.

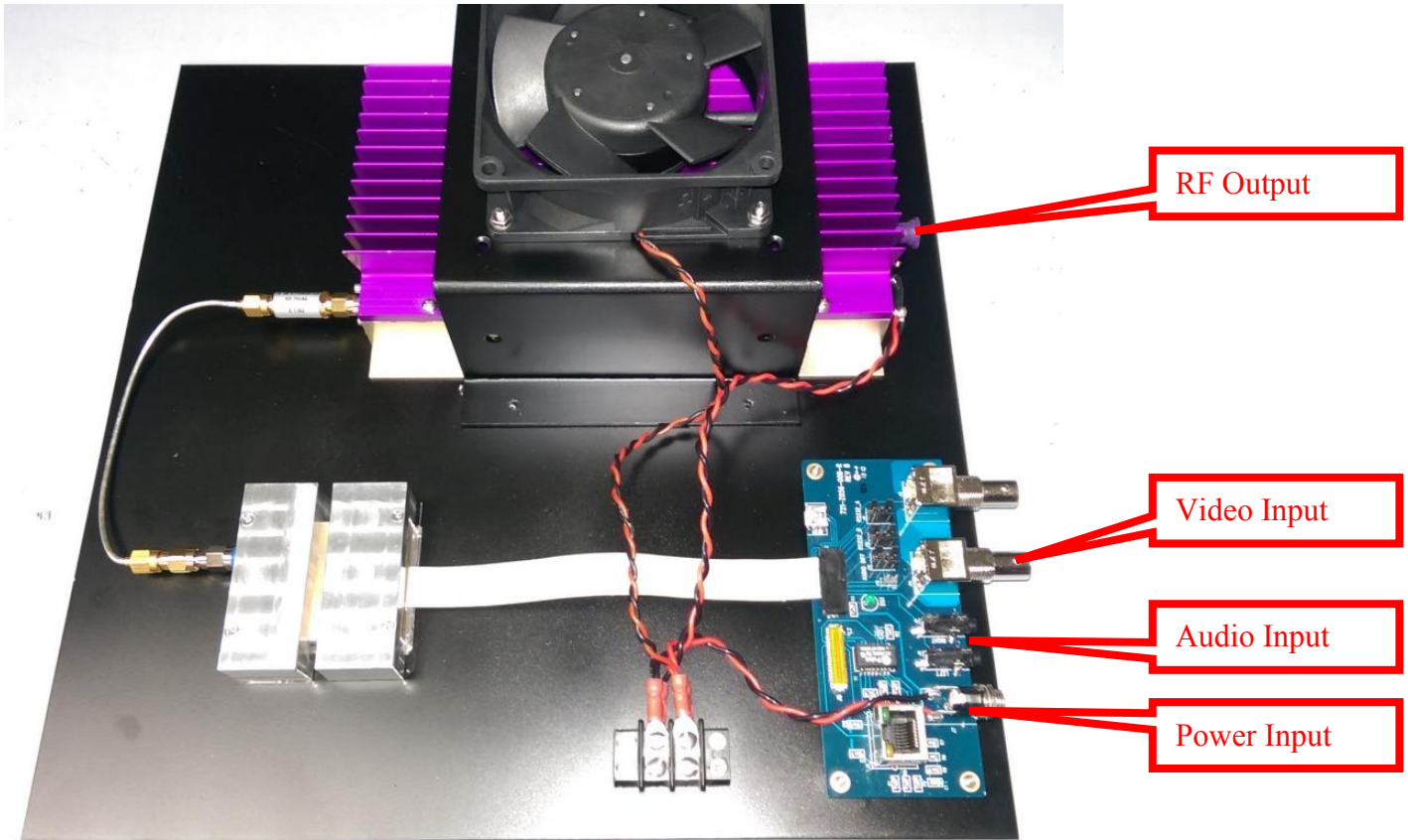


Figure 4-4: Booster Amplifier Connections

4.6 Application Limitations

4.6.1 Shielding Integrity

When this device is integrated into a user configuration, care shall be taken to maintain Radio Frequency (RF) shielding integrity. All RF paths shall employ coaxial cable and high-quality RF connectors. Integration drawings and photographs shall be provided to IMT for review upon request. IMT retains responsibility for the function of this device as designed and granted. Device integrators assume responsibility for ensuring that the installed environment is equivalent to the reference design environment, and for maintaining RF performance integrity as related to integration and installation.

The antenna for this device shall be installed with a separation of not less than 20cm from other antennas in the installed environment. This recommendation is for system-to-system isolation. More separation might be necessary, depending on the characteristics of other systems present.

4.6.2 RF Power Measurement

Upon completion of integration, and prior to commencing transmitter operation, an RF output power measurement shall be made to ensure that the output power does not exceed 5W.

4.6.3 FCC RF Exposure Requirements

This device is intended for application as a mobile radio transmitter, and it produces RF energy when transmitting. The Federal Communications Commission (FCC) requires that RF Exposure to personnel be

limited in accordance with their published regulatory standards (47 CFR 1.1307(b), 1.1310, 2.1091, 2.1093). The recommendations of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers, Inc. (IEEE), and the National Council on Radiation Protection and Measurements (NCRP) were used in the development of the FCC limits for human RF exposure. Additional information regarding the hazards of RF exposure can be found in the FCC OET Bulletin No. 56.

By FCC definition, a mobile transmitter installation requires a minimum safe separation distance of 20cm between a transmitting antenna and any person. The 25VST-AMP has been designed to comply with FCC RF exposure regulations for occupational/controlled-environment conditions at this separation distance when an antenna with gain not exceeding 2.5dBi is installed. This is the maximum antenna gain that can be used consistent with the approval granted to this device. Higher gain antennas shall not be used, and users shall verify that the proper antenna has been installed before commencing transmitter operation. The antenna used for this transmitter must be installed to provide a separation distance of 20cm from all persons, and must not transmit simultaneously with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. In the event that the transmitter is not visible to the user when installed, a warning label requiring this separation distance shall be placed in a prominent and visible location adjacent to the transmitting antenna. Please contact IMT to procure additional labels if needed.

As noted above, this device is intended for use only by trained occupational/professional staff and only in a work-related use condition. Users of this device shall be made fully aware that the transmitter produces RF energy, and shall be able to exercise control over their exposure to RF energy from this device. RF Exposure allowable limits are higher in occupational/controlled-environment conditions as a result of the foregoing conditions. Consequently, the foregoing awareness and control conditions shall be strictly maintained.

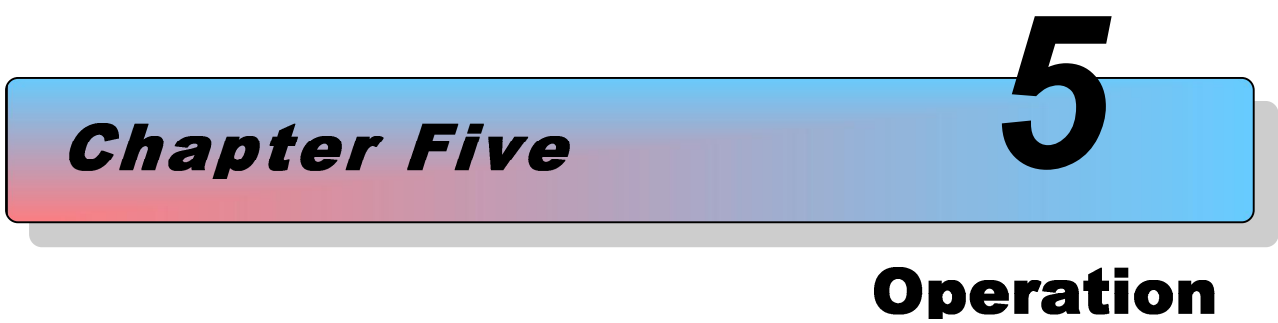
4.6.4 Labeling Visibility

As noted above, when this device is installed in a mobile platform, care shall be exercised to maintain visibility of product identification and warning/caution labels. The FCC-ID label shall be visible either on the installed product, or when the transmitter location is accessed. Also as noted above, the RF Exposure warning label shall be visible adjacent to the transmitting antenna, or a duplicate label shall be placed such that it is visible adjacent to the transmitting antenna. Additional labels can be procured from IMT if needed.

4.6.5 Other Cautions

This device is not approved for use in explosive or combustible environments such as vehicle fueling or other locations where flammable vapors or particulates might be present. Obey all posted mobile radio usage limitations.

This device could present a hazard of unexpected activation of explosive apparatus when used in the vicinity of blasting operations. Obey all posted mobile radio usage limitations in the vicinity of active blasting areas.

A horizontal graphic with a blue-to-red gradient background. On the left, the text "Chapter Five" is written in a bold, italicized black font. On the right, a large, bold black number "5" is displayed. Below the graphic, the word "Operation" is written in a bold black font.

Chapter Five **5**

Operation

5 Operation

While this chapter contains basic information about the operation of the 25VST-AMP transmitter, the programming of the unit (including preset configuration) via the NanoController GUI is not covered. Please refer to the “Nano Controller” manual (IMT Publication: M27-0001-00A) for detailed information on how to program and configure the unit.

In this section you will find info on how to use the transmitter to transmit video, audio, and user data. At the end of the chapter you will find troubleshooting and maintenance information.

5.1 Power Up the 25VST-AMP

Turn on the power to the overall system.

Note: The 25VST-AMP requires up to 40 seconds to complete its internal power up sequence. Supply current will jump up in steps as internal circuits are powered. The final DC supply current will settle after 20 seconds.

5.2 Pre-Configure the 25VST-AMP user options

The 25VST-AMP has a wide range of programmable settings. Before using the 25VST-AMP in your application, you should pre-configure it to for the settings you want to use in your application. Settings are selected and configured using the *NanoController* software, or a third party alternative. Please refer to the *NanoController* documentation for details, or contact IMT Technical Support.

5.3 User Interfaces

The interface board includes all input connections to the 25VST-AMP. Refer to the figure for reference.

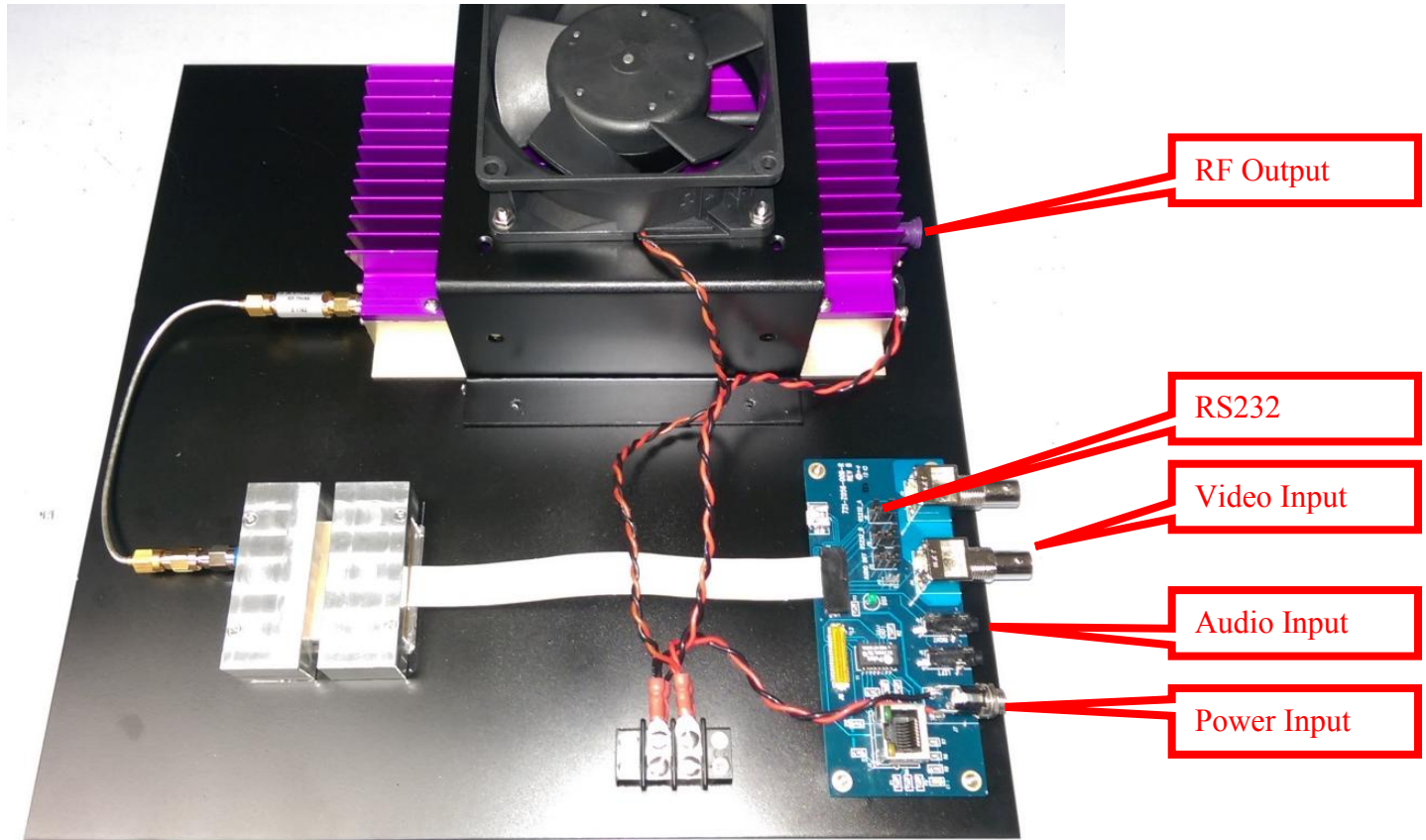


Figure 4 3: 25VST-AMP Interface Connections

5.4 Using the 25VST-AMP to Transmit Audio and Video Signals

The 25VST-AMP uses a COFDM modulation scheme. Receiver systems used with the 25VST-AMP must be compatible and capable of receiving the type of video transport streams transmitted by the 25VST-AMP. Compatible receivers include the IMT *VSRx* receivers and certain other IMT products. Contact IMT for more information.

5.4.1 Select User Level Settings

By use of the available interface(s), make appropriate settings so that your transmitter and suitable receiver are on the same RF and modulation settings.

5.4.2 Transmit Mode

Via the Remote Control, place the unit in to TX mode. The 25VST-AMP may be set in the configured presets to automatically turn on in the transmit mode either at all times or when it detects a video presence.

5.4.3 *Verify Operation*

Verify unit operation by one of the following methods:

- If your system contains a host processor capable of communicating with the unit via the serial interface, use the NanoController to check the status of the unit.
- Detect the transmitted signal using a spectrum analyzer.
- Using an appropriate receiver, verify that you are receiving audio and video from your application setup.

5.5 Using the 25VST-AMP To Transmit User Data

The User Data Interface can be used to packetize user data along with the main audio and video information. The User Data can be received and output by compatible IMT receivers. The user data interface must be programmed using the serial interface.

5.6 User Interface/*NanoController*

The IMT NanoController GUI is used both as the user interface and as the preset configurator. The NanoController Software is sent with the 25VST-AMP via USB stick. To Install the NanoController insert the USB stick into your computer and follow the installation instructions. The NanoController software installs the same way as most Windows applications. Refer to the NanoController manual for further use instructions

5.7 Using alternate/custom controllers

The implementation of an RS-232 command set, or Remote Protocol, allows the use of customized interfaces to perform virtually all unit operations, including:

- Configure Settings
- Query Status

The Remote Protocol consists of command and response messages, or packets. The internal CPU handles interpretation of the packets to set unit parameters, and provide responses back through the serial interface.

In addition to IMT's *NanoController*, alternate control interfaces may be developed, or available from third parties. Additionally, commands and responses may be entered and viewed manually using a command terminal.

The Remote Protocol is available upon request from IMT.

5.7.1 *Serial Interface Rate, Parity, and Stop Bit Specifications*

Refer to the Remote Protocol for information about the baud rate, number of data bits, stop bits, and flow control methods.

5.7.2 *Command and Response Packet Formats*

This section provides a brief introduction to the serial interface command and response packet formats. The command packets use the following format:

NU <tt> <ss><##><cc><dd><CS><CR><LF>

Where the fields are ASCII and are defined as follows:

- NU** Literal
- <tt>** Address of target (0x01 – 0xFF)
- <ss>** Address of source (0x00 – 0xFF)
- <##>** Packet Length (Packet Length = Command Length + Data Length)
- <cc>** Command (0x00-0xFF) – Different values are used for each command.
- <dd>** Data (Hex Format) – Data values are encoded with a variety of meanings.
- <CS>** (1’s complement of <tt> to end of data)
- <CR>** Carriage Return
- <LF>** Line Feed

After a command packet is received, the unit returns a response packet. Response packets have the same basic format as command packets, except that the source and destination are reversed, and the command field specifies the type of response being sent.

5.8 Troubleshooting

Problem	Possible Explanations	Actions to Take
No video	No Power	Check power source
	Camera Malfunction	Try a different camera
	Possible Receiver system issue	Verify that all modulation type and encryption/decryption parameters match at transmitter and receiver.
Video Signal Reception Poor	Receiver not properly positioned	Try improved location
25VST-AMP Programmable Serial Interface Does Not Respond	No Power	Check power source
	Poor connection via ribbon cable	Check connections
	Host processor GUI settings issues	Verify that the host processor running a GUI interface for programming the 25VST-AMP is setup and operating correctly.

Table 5-1: Table of Troubleshooting Tips

5.9 Maintenance Information

Follow these procedures when maintaining the device:

- Dry the device immediately if it comes into contact with water or other liquids. Warranty does not cover liquid damage.
- Do not submerge the device or use it directly in rain.
- Use ESD Precautions whenever handling the device
- Do not touch electrical connections.
- Do not open the device. This voids the warranty.
- Keep the device clean by wiping with a soft, dry cloth. If necessary, dampen only using a solution suitable for cleaning electronic devices. Warranty does not cover cleaning damage.

Proprietary Information and Disclaimer Notice

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IMT has made every effort to ensure the accuracy of this material at the time of printing. However, as the specifications, equipment, and this manual are subject to change without notice, IMT assumes no responsibility or liability whatsoever for any errors or inaccuracies that may appear in this manual, or for any decisions based on its use. This manual is supplied for informational purposes only and should not be construed as a commitment by IMT.

Warranty

Equipment manufactured by IMT, LLC is warranted to meet all published specifications and to be free from defects in material and workmanship within a period of two years from date of original shipment. The company's liability under this warranty is limited to:

- Servicing or adjusting equipment.
- Replacement of defective parts.

Any equipment returned to the factory shall have the freight paid for by the buyer.

Equipment showing damage by misuse, abnormal conditions of operation, or attempts to repair by other than authorized service personnel shall be excluded from this warranty. IMT shall in no event be responsible for incidental injury or property damage. Since IMT has no control over conditions of use, no warranty is made or implied as to suitability for the customer's intended use, beyond such performance specifications as are made part of the purchase order. There are no warranties expressed or implied, except as stated herein. This limitation on warranties shall not be modified by verbal representations.

Shipping Damage

Equipment shipped FOB IMT shall become the property of buyer upon delivery and receipt from carrier. Any damage in shipment should be handled by the buyer directly with the carrier. Immediately request the carrier's inspection upon evidence of damage in shipment.

Field Service

IMT products are designed with easy access to components to facilitate service. However, some modules cannot be service in the field. To prevent voiding of the warranty, please contact Tech Support before servicing or making any repairs. The user is cautioned to read all module descriptions in this manual. Warnings are included in the circuit descriptions and on certain modules themselves.

Replacement Modules

Troubleshooting to the component level is often not cost-effective and frequently impossible. Often the practical method of effecting repairs is to substitute known good spare modules for suspect units. Replacement modules for our standard product line are usually available.

Technical Support Information

Technical Support personnel are available to extend technical assistance to customers while installing, operating, or troubleshooting IMT equipment. Please have your model number and serial number available.

Telephone

During IMT business hours, 8:30am - 5:30pm EST (-5 Hours, GMT), call:

US908-852-3700

International001-1-908-852-3700

After hours, call:

US or International888-531-3892

Email

Email addressservice@nucomm.com

Internet

Web addresswww.imt-solutions.com

Equipment Returns

If equipment cannot be successfully restored through telephone consultation, return to the factory may be required. Loaner items may be available until the repaired items are returned.

For out-of-warranty equipment only: We evaluate all returned units, and then confers with the client on corrective action. If no fault is found, or no corrective action is authorized, a diagnostic fee may be charged.

Prior to returning products to the factory, please obtain a return material authorization (RMA) number and shipping instructions from Tech Support.

When returning equipment, it is very helpful to enclose a note containing the following:

- RMA number.
- Serial number.
- A detailed description of the problem.
- Name of an engineer or technician we may contact regarding problems encountered.
- A "ship to" and "bill to" address.

Ship all returns to:

IMT, LLC
Attn: RMA# (your RMA number)
200 International Drive
Mt. Olive, NJ, 07828, USA
(908) 852-3700

For International returns:

In addition to the instructions above, when shipping internationally we recommend the use of a courier such as Federal Express, UPS, etc, and that the goods be shipped DOOR-TO-DOOR PRE-PAID. This will reduce Customs costs, handling charges and delays. Enclose all the information above, plus a statement that the equipment was manufactured in the United States (*the latter is needed to expedite customs processing*).



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