



ST-7000 Series

Single Channel High-Definition Modulator



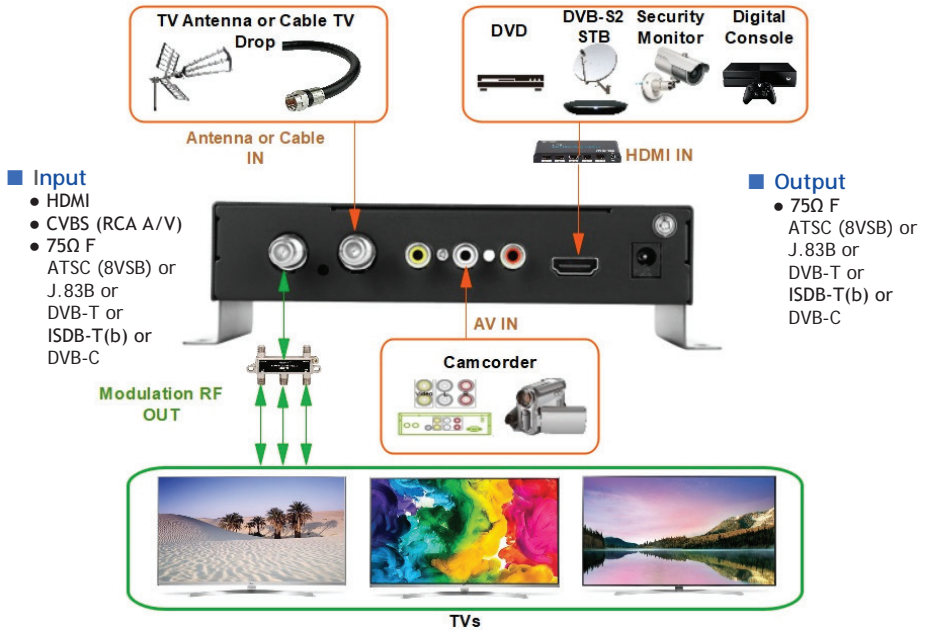
Start Guide

v1.3
April, 2021

support@starlink7.com

Introduction

■ Multiple Video Input with Single Modulation Output



ST-7000 Single Channel High-Definition (HD) modulator provides single channel delivery of multiple video/audio digital/analog sources over signal coaxial cable. HD video output resolution can be up to 1080p @ 30 fps with adjustable output power level from 70 to 100 dB μ V in 1 dB step.

Output frequency ranges from 50 MHz to 860 MHz in 6 MHz, 7 MHz or 8 MHz channel bandwidth depending on the modulation technique.

The operation of ST-7000 is intuitive by using on-panel keypad and 2.4" color LCD screen.

Overview



■ Operation Panel

- 2.4" color LCD
- Keypad
 - **RETURN** Return or escape to upper level menu and confirm the current operation
 - **◀▶▶▶** Arrow keys to traverse between fields or increase / decrease selected field value
 - **OK** Confirm the selection
- LEDs
 - PWR solid red Power is up
 - HD solid red No HDMI input
 - HD solid amber HDMI input detected
 - CVBS solid amber AV input detected

■ Installation Requirement

- Available video/audio source from Cable TV, antenna and HDMI device
- Available TV set
- Available electrical power socket

■ TV Standards

- Cable TV (USA) J.83B
- Over-the-Air TV (USA) ATSC (8VSB), ATSC3
- Cable TV (EU, SA) DVB-C (J.83A/C)
- Over-the-Air TV (CO) DVB-T
- Over-the-Air (SA) ISDB-T(b)

■ Peripheral Interface

Front Panel

- RF-OUT Modulated RF output, 75Ω F
- ANT-IN Antenna or Cable RF Input, 75Ω F
- HD IN HDMI Input, HDMI
- RCA IN CVBS AV Input
- DC 12V IN Power Input
- GND Grounding

Back Panel

- 1000Base-T Gigabit Ethernet, RJ-45
- Mini USB USB for software upgrade from PC

■ Package Content

- ST-7000 modulator
- Mini USB-male / A-male cable
- Coaxial cable (RG6)
- HDMI Cable
- AC/DC power adapter
- Start Guide

LCD Configuration Menu

■ Modulation

- ◆ Country press ◀▶ to show the country list, ▲▼ to select country. Depending on the Modulation mode selected, channel plan of selected country will be loaded for Channel Plan and Frequency setup. If channel plan is unavailable for your country, select the nearby country.
- ◆ Channel Plan press ◀▶ to show the channel table to select, ▲▼ to traverse, OK to select HDMI output frequency from channel table.
- ◆ Frequency press OK to edit HDMI output frequency, ◀▶ to move cursor and ▲▼ to change frequency in modulation range, press RETURN to save and escape.
- ◆ RF Output Level press ◀▶ to change RF output level between 70 and 100 dBμV.
- ◆ Bandwidth press ◀▶ to change modulation channel bandwidth.
- ◆ Signal Source press ◀▶ to select HDMI (digital) or CVBS (optional composite analog) signal source.
- ◆ LCN press OK to edit LCN, ◀▶ to move cursor and ▲▼ to change LCN, press RETURN to save and escape.
- ◆ Channel No. press OK to edit HDMI channel number, ◀▶ to move cursor and ▲▼ to change channel number, press RETURN to save and escape.
- ◆ Subchannel No. press OK to edit HDMI subchannel number, ◀▶ to move cursor and ▲▼ to change subchannel number, press RETURN to save and escape.
- ◆ Program Name press OK to edit program name with alphanumerical soft keypad, press RETURN to save and escape.

■ DVB Settings

- ◆ Technique Press ◀▶ to change modulation technique.
- ◆ Symbol Rate press OK to edit symbol rate in MHz, ◀▶ to move cursor and ▲▼ to change symbol rate.
- ◆ Code Rate Press ◀▶ to change code rate.
- ◆ Carrier Type Press ◀▶ to change carrier type.
- ◆ Guard Interval Press ◀▶ to change guard band interval.
- ◆ Interleaving Press ◀▶ to change interleaving

■ Transport Stream (TS) Settings

- ◆ NID Network ID between 1 and 65535.
- ◆ ONID Organization Network ID between 1 and 65535.
- ◆ TSID Transport Stream ID between 1 and 65535.
- ◆ SID Service Stream ID between 1 and 65535.
- ◆ PMT PID Program Map Table (PMT) Packet ID (PID) between 1 and 8191.
- ◆ Video PID Video Packet ID (PID) between 1 and 8191.
- ◆ Audio PID Audio Packet ID (PID) between 1 and 8191.
press OK to edit IDs, ◀▶ to move cursor and ▲▼ to change values,
press RETURN to save and escape.
- ◆ Service Provider press OK to edit service provider name with alphanumerical soft keypad,
press RETURN to save and escape.
- ◆ Network Name press OK to edit network name with alphanumerical soft keypad,
press RETURN to save and escape.

■ System Setup

- ◆ OSD Language press ◀▶ to change on-screen-display language.
- ◆ Modulator Type press ◀▶ to change modulator type.
- ◆ Key Tone press ◀▶ to toggle keypad beep sound between ON and OFF.
- ◆ IP Address press OK to edit IP Address, ◀▶ to move cursor and ▲▼ to change value,
press RETURN to save and escape.
- ◆ Cooling Fan press ◀▶ to toggle cooling fan between ON and OFF.
- ◆ Factory Reset press OK to reset and restore factory defaults.

Modulation Attributes

■ ATSC

◆ Modulator Type	ATSC-Air (8VSB) or ATSC-Cable (J.83B)
◆ Frequency Range	50 MHz to 860 MHz
◆ Channel Bandwidth	6 MHz
◆ Technique	ATSC 8VSB J.83B 64QAM, 128QAM, 256QAM
◆ MER	≥35 dB

■ DVB-T

◆ Frequency Range	50 MHz to 860 MHz
◆ Channel Bandwidth	6 MHz (Colombia/Panama), 7 MHz (Australia), 8 MHz (Europe, New Zealand)
◆ Technique	16QAM, 64QAM, QPSK
◆ Carrier Type	2K, 8K
◆ Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
◆ Guard Interval	1/4, 1/8, 1/16, 1/32

■ ISDB-T(b)

◆ Frequency Range	50 MHz to 860 MHz
◆ Channel Bandwidth	8 MHz
◆ Technique	16QAM, 64QAM, DQPSK, QPSK
◆ Carrier Type	2K, 4K, 8K
◆ Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
◆ Guard Interval	1/4, 1/8, 1/16, 1/32
◆ Interleave	Mode 1, Mode 3, Disabled. Used for robustness of Forward Error Correction (FEC).

■ DVB-C

◆ Frequency Range	50 MHz to 860 MHz
◆ Channel Bandwidth	8 MHz
◆ Symbol Rate	editable, 6.875 Mbps
◆ Technique	16QAM, 32QAM, 64QAM, 128QAM, 256QAM

■ Video Quality

Video quality is optimized by determining the size and the speed to transmit MPEG packets to the TV. The packet latency and delay variation are adjusted automatically by the Modulator to reach the best video quality and performance on the TV.

■ Audio Codec

Audio encoding is automatically selected by the Modulator to reach the best quality according to local modulation technique.

AC3 2.1 Dolby Digital Audio coding applies to ATSC (8VSB) broadcasting in North America.

MPEG MPEG-2 Layer 1 audio coding applies to DVB-T broadcasting in Europe and South America.

ACC Advanced Audio Coding for MPEG-4 applies to ISDB-T broadcasting in South America and certain ATSC (8VSB) broadcasting in North America.

Before Installation

■ Combining (Cable) TV Signals from Service Provider (e.g. Comcast)

- In order to combine the existing TV broadcasting channels from service provider, it's necessary to select an output frequency and output channel (ATSC only) for Modulator's HDMI video. The channel information of your local over-the-air broadcasting or local Cable TV service can normally be found online or from the channel listing table provided by your service provider.
- For business installers, a handheld spectrum analyzer up to 1 GHz can be helpful to make the installation easier and faster although it's not mandatory.
- If the modulator output is going to feed a Digital Cable Converter box or a set-top box, some service providers offer a dedicated channel (and frequency) for modulated video and some service providers may need a specific PID to be configured by the Modulator for MPEG streams to be recognized by the set-top box. Refer to the section of [MPEG Transport Stream Parameters](#) for PID setup.
- If the output power level of the Modulator is too high, it may oversaturate the TV signals delivered by service providers. It's necessary to lower the output power level or use an attenuator to reduce the oversaturation.

■ Choose Modulated Output Frequency for HDMI Video on TV

- Modulated output frequency of HDMI video can be any existing channel frequency available from your local [Channel Plan](#).
- Depending on the modulation technique of over-the-air broadcasting TV or Cable TV used in your area, refer to the corresponding appendix for [Channel Plan](#) information.
- Select an unused or an unimportant channel from the [Channel Plan](#) as output frequency of HDMI video.
- If you are unsure about which output frequency to be used for HDMI video
 - ◇ Pick a frequency between channel gap, make sure it's 6 MHz or 8 MHz away from the previous and the next channels.
 - ◇ Use the recommended frequency indicated on the corresponding [Channel Plan](#) appendix.
 - ◇ Use the default frequency selected by the Modulator.
- Modulated output frequency and channel number can be configured from the LCD menu or Web Configuration page.
- Follow the instructions of this Start Guide to set up output frequency and channel number to watch HDMI video on your TV.
- Your TV needs to learn the HDMI video channel by auto or manual channel rescan. Refer to the user's guide of your TV set to practice the rescan for channel detection of HDMI video.

ATSC ← Over-the-Air TV with HDMI Modulation

If TV signal is originally coming from an outdoor or an indoor antenna, follow the steps below to combine the HDMI video with over-the-air TV video.

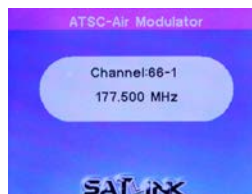
The Modulator with default settings can work as a plug-and-play device if it's unsure about how to setup the output frequency of HDMI video.

If you plan to customize the settings, refer to the section [Choose Modulated Output Frequency for HDMI Video on TV](#) to pick up the output frequency and channel number of HDMI video.

The on-screen-display language can be changed by going to System Setup → OSD Language.

- ① Power on the Modulator with power adapter included in the package.
- ② Disconnect the end of coaxial cable connected to the RF/Antenna IN port of the TV.
- ③ Connect the end of the coaxial cable removed from step 2 to the ANT IN port of the Modulator.
- ④ Connect the RF OUT port of the Modulator to the RF/Antenna IN port of the TV with a coaxial cable included in the package.
- ⑤ Connect the HD IN port of the Modulator to the HDMI OUT port of video players or input devices like DVD player, Satellite TV Set-Top Box, Video Stream, Security Monitor ... etc.
It's recommended to set the video output of HDMI device with fixed resolution at 1080p or 720p.
- ⑥ Go through the LCD menu screen on the Modulator to configure settings. Press OK to go to the main menu and System Setup → Modulator Type → select ATSC-Air Modulation → Channel Plan → select from the existing channel plan for HDMI video frequency or Modulation → Frequency → press OK to edit frequency in MHz with ◀▶▲▼ keys
Modulation → Channel No. → press OK to edit channel number with ◀▶▲▼ keys
Modulation → Subchannel No. → press OK to edit subchannel number with ◀▶▲▼ keys
Modulation → Program Name → press OK to edit channel name with soft alphanumeric keypad
- ⑦ Turn on the TV. Refer to the user's manual of the TV and run Auto Scan for channel detection.
- ⑧ Change the TV channel to the channel number entered in step 6. Default channel is channel 66.
- ⑨ HDMI video is displayed on the TV if HDMI video source is inserted. Otherwise, the SATLINK logo is displayed.

Once the HDMI video source is detected and modulated, the HD LED on panel glows solid amber.



ATSC ← Cable TV with HDMI Modulation

If TV signal is originally coming from a Cable TV coaxial drop, follow the steps below to combine the HDMI video with Cable TV video.

The Modulator with default settings can work as a plug-and-play device if it's unsure about how to setup the output frequency of HDMI video.

If you plan to customize the settings, refer to the section [Choose Modulated Output Frequency for HDMI Video on TV](#) to pick up the output frequency and channel number of HDMI video.

The on-screen-display language can be changed by going to System Setup → OSD Language.

- ① Power on the Modulator with power adapter included in the package.
- ② Disconnect the end of coaxial cable connected to the RF/Antenna IN port of the TV.
- ③ Connect the end of the coaxial cable removed from step 2 to the ANT IN port of the Modulator.
- ④ Connect the RF OUT port of the Modulator to the RF/Antenna IN port of the TV with a coaxial cable included in the package.
- ⑤ Connect the HD IN port of the Modulator to the HDMI OUT port of video players or input devices like DVD player, Satellite TV Set-Top Box, Video Stream, Security Monitor ... etc.
It's recommended to set the video output of HDMI device with fixed resolution at 1080p or 720p.
- ⑥ Go through the LCD menu screen on the Modulator to configure settings. Press OK to go to the main menu and System Setup → Modulator Type → select ATSC-Cable DVB Settings → Constellation → select 64QAM or 256QAM Modulation → Channel Plan → select from the existing channel plan for HDMI video frequency or Modulation → Frequency → press OK to edit frequency in MHz with ◀▶▲▼ keys
Modulation → Channel No. → press OK to edit channel number with ◀▶▲▼ keys
Modulation → Subchannel No. → press OK to edit subchannel number with ◀▶▲▼ keys
Modulation → Program Name → press OK to edit channel name with soft alphanumeric keypad
- ⑦ Turn on the TV. Refer to the user's manual of the TV and run Auto Scan for channel detection.
- ⑧ Change the TV channel to the channel number entered in step 6. Default channel is channel 66.
- ⑨ HDMI video is displayed on the TV if HDMI video source is inserted. Otherwise, the SATLINK logo is displayed.

Once the HDMI video source is detected and modulated, the HD LED on panel glows solid amber.



DVB-T ⇐ Over-the-Air TV with HDMI Modulation

If TV signal is originally coming from an indoor or an outdoor antenna, follow the steps below to combine the HDMI video with DVB-T TV video. The Modulator with default settings can work as a plug-and-play device if it's unsure about how to setup the output frequency of HDMI video. If you plan to customize the settings, refer to the section [Choose Modulated Output Frequency for HDMI Video on TV](#) to pick up the output frequency and channel number of HDMI video.

The on-screen-display language can be changed by going to System Setup → OSD Language.

- ① Power on the Modulator with power adapter included in the package.
- ② Disconnect the end of coaxial cable connected to the RF/Antenna IN port of the TV.
- ③ Connect the end of the coaxial cable removed from step 2 to the ANT IN port of the Modulator.
- ④ Connect the RF OUT port of the Modulator to the RF/Antenna IN port of the TV with a coaxial cable included in the package.
- ⑤ Connect the HD IN port of the Modulator to the HDMI OUT port of video players or input devices like DVD player, Satellite TV Set-Top Box, Video Stream, Security Monitor ... etc.
It's recommended to set the video output of HDMI device with fixed resolution at 1080p or 720p.
- ⑥ Go through the LCD menu screen on the Modulator to configure settings. Press OK to go to the main menu and System Setup → Modulator Type → select DVB-T
DVB Settings → Carrier Type → select 8K
DVB Settings → Constellation → select 64QAM
Modulation → Country → select your country if it's available
Modulation → Channel Plan → select from the existing channel plan for HDMI video frequency or
Modulation → Frequency → press OK to edit frequency in MHz with ◀▶▲▼ keys
Modulation → Bandwidth → select 8MHz channel bandwidth if unsure
Modulation → Program Name → press OK to edit channel name with soft alphanumerical keypad
- ⑦ Turn on the TV. Refer to the user's manual of the TV and run Auto Scan for channel detection.
- ⑧ Change the TV channel to the channel plan number selected in step 6.
- ⑨ HDMI video is displayed on the TV if HDMI video source is inserted. Otherwise, the SATLINK logo is displayed.

Once the HDMI video source is detected and modulated, the HD LED on panel glows solid amber.



ISDB-T(b) ← Over-the-Air TV with HDMI Modulation

If TV signal is originally coming from an indoor or an outdoor antenna, follow the steps below to combine the HDMI video with ISDB-T(b) video. The Modulator with default settings can work as a plug-and-play device if it's unsure about how to setup the output frequency of HDMI video.

If you plan to customize the settings, refer to the section [Choose Modulated Output Frequency for HDMI Video on TV](#) to pick up the output frequency and channel number of HDMI video.

The on-screen-display language can be changed by going to System Setup → OSD Language.

- ① Power on the Modulator with power adapter included in the package.
- ② Disconnect the end of coaxial cable connected to the RF/Antenna IN port of the TV.
- ③ Connect the end of the coaxial cable removed from step 2 to the ANT IN port of the Modulator.
- ④ Connect the RF OUT port of the Modulator to the RF/Antenna IN port of the TV with a coaxial cable included in the package.
- ⑤ Connect the HD IN port of the Modulator to the HDMI OUT port of video players or input devices like DVD player, Satellite TV Set-Top Box, Video Stream, Security Monitor ... etc.
It's recommended to set the video output of HDMI device with fixed resolution at 1080p or 720p.
- ⑥ Go through the LCD menu screen on the Modulator to configure settings. Press OK to go to the main menu and System Setup → Modulator Type → select ISDB-T
DVB Settings → Carrier Type → select 8K
DVB Settings → Constellation → select 64QAM
Modulation → Country → select your country if it's available
Modulation → Channel Plan → select from the existing channel plan for HDMI video frequency or
Modulation → Frequency → press OK to edit frequency in MHz with ◀▶▲▼ keys
Modulation → Program Name → press OK to edit channel name with soft alphanumerical keypad
- ⑦ Turn on the TV. Refer to the user's manual of the TV and run Auto Scan for channel detection.
- ⑧ Change the TV channel to the channel plan number selected in step 6.
- ⑨ HDMI video is displayed on the TV if HDMI video source is inserted. Otherwise, the SATLINK logo is displayed.

Once the HDMI video source is detected and modulated, the HD LED on panel glows solid amber.



DVB-C ⇐ Cable TV with HDMI Modulation

If TV signal is originally coming from a Cable TV coaxial drop, follow the steps below to combine the HDMI video with DVB-C Cable TV video.

The Modulator with default settings can work as a plug-and-play device if it's unsure about how to setup the output frequency of HDMI video.

If you plan to customize the settings, refer to the section [Choose Modulated Output Frequency for HDMI Video on TV](#) to pick up the output frequency and channel number of HDMI video.

The on-screen-display language can be changed by going to System Setup → OSD Language.

- ① Power on the Modulator with power adapter included in the package.
- ② Disconnect the end of coaxial cable connected to the RF/Antenna IN port of the TV.
- ③ Connect the end of the coaxial cable removed from step 2 to the ANT IN port of the Modulator.
- ④ Connect the RF OUT port of the Modulator to the RF/Antenna IN port of the TV with a coaxial cable included in the package.
- ⑤ Connect the HD IN port of the Modulator to the HDMI OUT port of video players or input devices like DVD player, Satellite TV Set-Top Box, Video Stream, Security Monitor ... etc.
It's recommended to set the video output of HDMI device with fixed resolution at 1080p or 720p.

- ⑥ Go through the LCD menu screen on the Modulator to configure settings.

Press OK to go to the main menu and

System Setup → Modulator Type → select DVB-C

DVB Settings → Symbol Rate → press OK to edit symbol rate in kHz with ◀▶▲▼ keys

DVB Settings → Constellation → select 128QAM or 256QAM

Modulation → Country → select your country if it's available

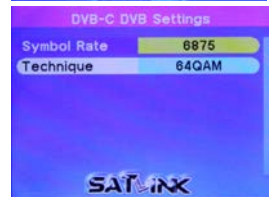
Modulation → Channel Plan → select from the existing channel plan for HDMI video frequency or

Modulation → Frequency → press OK to edit frequency in MHz with ◀▶▲▼ keys

Modulation → Program Name → press OK to edit channel name with soft alphanumeric keypad

- ⑦ Turn on the TV. Refer to the user's manual of the TV and run Auto Scan for channel detection.
- ⑧ Change the TV channel to the channel plan number selected in step 6.
- ⑨ HDMI video is displayed on the TV if HDMI video source is inserted. Otherwise, the SATLINK logo is displayed.

Once the HDMI video source is detected and modulated, the HD LED on panel glows solid amber.



MPEG Transport Stream Parameters

It's not recommended to change MPEG Transport Stream (TS) parameters unless you understand the MPEG PID structure well or your Service Provider requires you to configure specific Packet Identifier (PID) describing the payload data for set-top box initialization.

Refer to Wikipedia for more information about MPEG Transport Stream structure.

https://en.wikipedia.org/wiki/MPEG_transport_stream

https://en.wikipedia.org/wiki/Program-specific_information

- ◆ NID Network ID contained in Network Information Table (NIT).
- ◆ ONID Organization Network ID contained in Network Information Table (NIT).
- ◆ TSID Transport Stream ID contained in Service Description Table (SDT).
- ◆ SID Service ID contained in Service Description Table (SDT) to identify transport stream.
- ◆ PMT PID Program Map Table (PMT) PID contains the directory listing of all program map tables in the transport stream, including the program number and the list of elementary streams.
- ◆ Video PID Video content stream PID contained in MPEG transport stream for demultiplexer to locate by sorting the incoming packets.
- ◆ Audio PID Audio content stream PID contained in MPEG transport stream for demultiplexer to locate by sorting the incoming packets.
- ◆ Service Provider Name of the broadcaster responsible for the service availability or authority contained in Service Description Table (SDT).
- ◆ Network Name Name of the network contained in Network Information Table (NIT).

Installing Multiple Modulators

In case multiple units of ST-7000 series modulators are installed on the same coax network/wiring or connected to the same TV set, pay attention to following items to avoid conflicts or interference among modulators.

- Set up and connect the modulator to coax network or TV set one modulator at a time.
- Make sure the following settings for HDMI video modulation are different among modulators
 - ① Output frequency refer to the section [Choose Modulated Output Frequency for HDMI Video on TV](#) to pick up different output frequencies for different modulators
 - ② Channel name default channel name on ST-7000 series is SLK HD1, the channel naming can be SLK HD n , where n indicates the modulator count.
 - ③ Channel number and subchannel number (available on ATSC modulator only)
- A combiner or multiplexer is needed to combine the output signals of multiple modulators if the coax network and the TV sets share the source of video output of modulators.
- If ST-7000 modulator is used together with other brands' modulators, harmony settings of RF output (power) level and output frequency must be found. Refer to the section [Combining Service Provider Signals](#) for more information.
- Make a note on each modulator with RF output level and output frequency for quick reference and easy trouble shooting whenever needed.
- If more than more than 40 TV sets are connected to share the modulator output signal, it might be necessary to use active splitter or combiner to amplify the output power to reach individual TV at the far end. The receiving power of each TV should be higher than 75 dB μ V or the signal can be instable.
- Depending on the quality and aged damage, splitters, combiners and coaxial cable itself can introduce high attenuation or insertion loss to the coax wiring. Power loss budget calculation might be necessary along the delivery path.

Web Configuration / Remote Control

- ① Connect the Ethernet (RJ-45) port on the back panel of the Modulator and the Ethernet port of a PC with an Ethernet cable. Power on the Modulator.
- ② Configure the IP address of the PC to be 192.168.1.100.
- ③ Launch a Web browser on PC and type <http://192.168.1.15>.
The default IP address of the Modulator is 192.168.1.15. The current IP address of the Modulator can be found from LCD menu command System Setup → IP Address.
- ④ On the Web management pages of the Modulator, all configuration settings from LCD menu are available for remote access through Web interface.

The image displays four screenshots of the web configuration interface for different modulation standards:

- ATSC-Cable Modulation:** Shows settings for Country (ATSC_Cable), Channel Plan (2 (57.0 MHz)), Channel Number (66), Subchannel Number (1), Technique (64QAM), and RF Output Level (100 dBuV).
- ATSC-Air Modulation:** Shows settings for Country (ATSC_Air), Channel Plan (2 (57.0 MHz)), Channel Number (66), Subchannel Number (1), Technique (64QAM), and RF Output Level (100 dBuV).
- DVB-T Modulation:** Shows settings for Country (UK), Channel Plan (CH-21 (474.0 MHz)), Bandwidth (8M), Carrier Type (8K), Technique (64QAM), Code Rate (2/3), Guard Interval (1/32), and RF Output Level (100 dBuV).
- ISDB-T Modulation:** Shows settings for Country (Brazil), Channel Plan (CH-07 (177.1 MHz)), Carrier Type (8K), Technique (64QAM), Code Rate (7/8), Guard Interval (1/32), Interleave (Mode3), and RF Output Level (100 dBuV).

The **Transport Stream Setup** page shows the following settings:

Program Name:	CH1	(1 to 15 characters)
Provider Name:	Provider	(1 to 15 characters)
Network Name:	Network	(1 to 15 characters)
LCN:	100	(1 to 999)
Service ID:	19153	(1 to 65535)
PMT PID:	2010	(1 to 8191)
Video PID:	2011	(1 to 8191)
Audio PID:	2012	(1 to 8191)

Specifications

Note: Specifications are subject to change without notice.

Modulation		
Output Frequency	50 to 860 MHz, 1 kHz Step	
Output Level	70 to 100 dBmV, 1 dB Step	
Encoding	MPEG-2; 5 to 15 Mb/s compression rate	
Interface	HDMI x 1, 75Ω F x 2, RCA AV x 1	
Video		
CVBS (Optional)		
Resolution	576i PAL 480i NTSC	
HDMI		
Resolution MPEG-2 CVBS (PAL, NTSC)	Input	Output
	1920 x 1080_60p	1920 x 1080_30p
	1920 x 1080_50p	1920 x 1080_25p
	1920 x 1080_60i	1920 x 1080_30i
	1920 x 1080_50i	1920 x 1080_25i
	1280 x 720_60p	1280 x 720_30p
1280 x 720_50p	1280 x 720_25p	
Aspect Ratio	16:9; 4:3	
Audio		
Encoding	MPEG-1 Layer 2	
Sampling Rate	48 kHz	
Bit Rate	64, 96, 128, 192, 256, 320 kbps	
General		
Power Supply	12 VDC, 1.5A	
Dimensions with Rack	8" x 5.35" x 2" (204 x 136 x 51 mm)	
Weight	1.1 lb (0.5 kg)	
Temperature	0 to 50 °C (Operation) -20 to 80 °C (Storage)	



SATLINK logo screen on TV

Note: In order to display video normally on TV

- Signal accepted by the TV must comply with standard MPEG-2 encoding
- The video content is not protected under High-Bandwidth Digital Content Protection (HDCP) agreement

ATSC (8VSB) Channel Plan

Reference only for Over-the-Air Broadcasting TV in the US.
 Channel Bandwidth: 6 MHz 8VSB

- Suggested settings for HDMI video
 Frequency 473.000 MHz
 Channel Number 66.1
 Channel Name SLK HD1
- Channel Plan is for reference only. It may vary across countries, areas or cities.

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
VHF		UHF	
2	57	42	641
3	63	43	647
4	69	44	653
5	79	45	659
6	85	46	665
VHF High Band III		47	671
7	177	48	677
8	183	49	683
9	189	50	689
10	195	51	692
11	201	52	701
12	207	53	707
13	213	54	713
UHF		55	719
14	473	56	725
15	479	57	731
16	485	58	737
17	491	59	743
18	497	60	749
19	503	61	755
20	509	62	761
21	515	63	767
22	521	64	773
23	527	65	779
24	533	66	785
25	539	67	791
26	545	68	797
27	551	69	803
28	557	70	809
29	563	71	815
30	569	72	821
31	575	73	827
32	581	74	833
33	587	75	839
34	593	76	845
35	599	77	851
36	605	78	857
37	611	79	863
38	617	80	869
39	623	81	875
40	629	82	881
41	635	83	887

J.83B Channel Plan

Reference only for Digital Cable TV in the US.
Channel Bandwidth: 6 MHz QAM

- Suggested settings for HDMI video
Frequency 783.000 MHz (# 122)
Channel Name SLK HD1
- Channel Plan is for reference only. It may vary across countries, areas or cities.

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
Low		Super		Hyper		Jumbo	
2	57	28	249	62	453	112	723
3	63	29	255	63	459	113	729
4	69	30	261	64	465	114	735
1	75	31	267	Ultra		115	741
5	79.00 / 81.00	32	273	65	471	116	747
6	85.00 / 87.00	33	279	66	477	117	753
Mid		34	285	67	483	118	759
95	93	35	291	68	489	119	765
96	99	36	297	69	495	120	771
97	105	Hyper		70	501	121	777
98	111	37	303	71	507	122	783
99	117	38	309	72	513	123	789
14	123	39	315	73	519	124	795
15	129	40	321	74	525	125	801
16	135	41	327	75	531	126	807
17	141	42	333	76	537	127	813
18	147	43	339	77	543	128	819
19	153	44	345	78	549	129	825
20	159	45	351	79	555	130	831
21	165	46	357	80	561	131	837
22	171	47	363	81	567	132	843
High		48	369	82	573	133	849
7	177	49	375	83	579	134	855
8	183	50	381	84	585	135	861
9	189	51	387	85	591	136	867
10	195	52	393	86	597	137	873
11	201	53	399	87	603	138	879
12	207	54	405	88	609	139	885
13	213	55	411	89	615	140	891
Super		56	417	90	621	141	897
23	219	57	423	91	627	142	903
24	225	58	429	92	633	143	909
25	231	59	435	93	639	144	915
26	237	60	441	94	645	145	921
27	243	61	447	Jumbo		146	927
				100	651	147	933
				101	657	148	939
				102	663	149	945
				103	669	150	951
				104	675	151	957
				105	681	152	963
				106	687	153	969
				107	693	154	975
				108	699	155	981
				109	705	156	987
				110	711	157	993
				111	717	158	999

DVB-T Channel Plan

Reference only for Digital Terrestrial TV in Europe.
Channel Bandwidth: 7 MHz or 8 MHz QAM, QPSK

- Suggested settings for HDMI video
Frequency 474.000 MHz (CH-21)
Channel Name SLK HD1
- Channel Plan is for reference only. It may vary across countries, areas or cities. Refer to the LCD menu screen of the Modulator to load country-wise Channel Plan if available.

DVB-T Channel Plan in UK

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
CH-05	177.5*	CH-42	642	CH-21	474	CH-50	706
CH-06	184.5*	CH-43	650	CH-22	482	CH-51	714
CH-07	191.5*	CH-44	658	CH-23	490	CH-52	722
CH-08	198.5*	CH-45	666	CH-24	498	CH-53	730
CH-09	205.5*	CH-46	674	CH-25	506	CH-54	738
CH-10	212.5*	CH-47	682	CH-26	514	CH-55	746
CH-11	219.5*	CH-48	690	CH-27	522	CH-56	754
CH-12	226.5*	CH-49	698	CH-28	530	CH-57	762
CH-21	474	CH-50	706	CH-29	538	CH-58	770
CH-22	482	CH-51	714	CH-30	546	CH-59	778
CH-23	490	CH-52	722	CH-31	554	CH-60	786
CH-24	498	CH-53	730	CH-32	562	CH-61	794
CH-25	506	CH-54	738	CH-33	570	CH-62	802
CH-26	514	CH-55	746	CH-34	578	CH-63	810
CH-27	522	CH-56	754	CH-35	586	CH-64	818
CH-28	530	CH-57	762	CH-36	594	CH-65	826
CH-29	538	CH-58	770	CH-37	602	CH-66	834
CH-30	546	CH-59	778	CH-38	610	CH-67	842
CH-31	554	CH-60	786	CH-39	618	CH-68	850
CH-32	562	CH-61	794	CH-40	626	CH-69	858
CH-33	570	CH-62	802	CH-41	634		
CH-34	578	CH-63	810	CH-42	642		
CH-35	586	CH-64	818	CH-43	650		
CH-36	594	CH-65	826	CH-44	658		
CH-37	602	CH-66	834	CH-45	666		
CH-38	610	CH-67	842	CH-46	674		
CH-39	618	CH-68	850	CH-47	682		
CH-40	626	CH-69	858	CH-48	690		
CH-41	634			CH-49	698		

Note: * indicates channels with 7 MHz bandwidth. 7 MHz channels are not available in the UK.

ISDB-T(b) Channel Plan

Reference only for Digital Terrestrial TV in South America.
Channel Bandwidth: 6 MHz QAM, DQPSK, QPSK

- Suggested settings for HDMI video
Frequency 473.143 MHz (CH-14)
Channel Name SLK HD1
- Channel Plan is for reference only. It may vary across countries, areas or cities.

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
CH-07	177.143	CH-39	623.143
CH-08	183.143	CH-40	629.143
CH-09	189.143	CH-41	635.143
CH-10	195.143	CH-42	641.143
CH-11	201.143	CH-43	647.143
CH-12	207.143	CH-44	653.143
CH-13	213.143	CH-45	659.143
CH-14	473.143	CH-46	665.143
CH-15	479.143	CH-47	671.143
CH-16	485.143	CH-48	677.143
CH-17	491.143	CH-49	683.143
CH-18	497.143	CH-50	689.143
CH-19	503.143	CH-51	695.143
CH-20	509.143	CH-52	701.143
CH-21	515.143	CH-53	707.143
CH-22	521.143	CH-54	713.143
CH-23	527.143	CH-55	719.143
CH-24	533.143	CH-56	725.143
CH-25	539.143	CH-57	731.143
CH-26	545.143	CH-58	737.143
CH-27	551.143	CH-59	743.143
CH-28	557.143	CH-60	749.143
CH-29	563.143	CH-61	755.143
CH-30	569.143	CH-62	761.143
CH-31	575.143	CH-63	767.143
CH-32	581.143	CH-64	773.143
CH-33	587.143	CH-65	779.143
CH-34	593.143	CH-66	785.143
CH-35	599.143	CH-67	791.143
CH-36	605.143	CH-68	797.143
CH-37	611.143	CH-69	803.143
CH-38	617.143		

DVB-C (J.83A/C) Channel Plan

Reference only for Digital Cable TV in the world.
Channel Bandwidth: 8 MHz QAM

- Suggested settings for HDMI video
Frequency 778.000 MHz (# 88)
Channel Name SLK HD1
- Channel Plan is for reference only. It may vary across countries, areas or cities.

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	52.5	34	339	67	610
2	60.5	35	347	68	618
3	68.5	36	355	69	626
4	80	37	363	70	634
5	88	38	371	71	642
13	115	39	379	72	650
14	123	40	387	73	658
15	131	41	395	74	666
16	139	42	403	75	674
17	147	43	411	76	682
18	155	44	419	77	690
19	163	45	427	78	698
6	171	46	435	79	706
7	179	47	443	80	714
8	187	48	451	81	722
9	195	49	459	82	730
10	203	50	474	83	738
11	211	51	482	84	746
12	219	52	490	85	754
20	227	53	498	86	762
21	235	54	506	87	770
22	243	55	514	88	778
23	251	56	522	89	786
24	259	57	530	90	794
25	267	58	538	91	802
26	275	59	546	92	810
27	283	60	554	93	818
28	291	61	562	94	826
29	299	62	570	95	834
30	307	63	578	96	842
31	315	64	586	97	850
32	323	65	594	98	858
33	331	66	602	99	866

Notes

■ Warranty

This device has two-year Limited Hardware Warranty and 90-day free software updates after purchase. This Limited Warranty Statement gives the customer specific legal rights. The customer may also have other rights which vary from State to State in the United States, from province to province in Canada, and from country to country elsewhere in the world. To the extent that this Limited Warranty Statement shall be deemed modified to be consistent with such local law. Under such local law, certain disclaimers and limitations of this Warranty Statement may not apply to the customer.

■ Important Safety Instructions

Basic safety precautions should always be followed to reduce the risk of fire, electrical shock, and personal injury, including the following:

- Do not use this product near water – for example, near a bathtub, kitchen sink, laundry tub, or swimming pool, or in a wet basement; only clean with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus including amplifiers that produce heat.
- Do not remove the cover of the modulator, cover the modulator with thick or heavy objects.
- Use only the power cord indicated in this manual if applicable.

■ Coaxial Cable

If applicable, the coaxial cable screen shield needs to be connected to the Earth at the building entrance per ANSI/NFPA70, the National Electrical Code (NEC), in particular Section 820.93, "Grounding of Outer Conductive Shield of a Coaxial Cable," or in accordance with local regulation.

■ FCC Class B Equipment

This device 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 and correct the interference by implementing one or more of the following measures:

- Reorient or relocate the device
- Increase the separation between the device and receiver
- Connect the device to an outlet on a circuit different from that to which the receiver is connected (applicable only to power line products)
- Consult the dealer or an experienced radio or television technician for help

■ Declaration of Conformity for Products Marked with the FCC logo - USA Only

This device complies with Part 15 of the FCC Rules license-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation of the device

Where applicable, the Most Technology Service Co., Ltd. performed above specification conformity test and issued certificate # MOSTCT20071786 in accordance with local regulation.

■ Declaration of CE Conformity for EU

Manufacturer: SatLink Electronics Co., Ltd.
No. 26, Zishan Road, Jiangnan High-Tech Park, Licheng District
Quanzhou, Fujian Province, China

Objects: ST-7000, ST-7632

This declaration of conformity is issued under the sole responsibility of the manufacturer for products of HDMI RF modulators that support single channel or multi-channel DVB-T, ISDB-T, DVB-C (J.83B/A/C), and ATSC standards. The object(s) of the declaration described above are in conformity with the relevant Community harmonization legislation:

- Low Voltage Directive (2014/35/EU)
- Electromagnetic Compatibility Directive (2014/30/EU)
- Radio Equipment Directive (2014/53/EU)

And their amendments.

References to the relevant harmonised standards, including the date of the standard, used in relation to which the conformity is declared:

- ETSI EN 301 48901 v2.2.3: 2019-11
- ESTI EN 301 489-53 v1.1.1: 2019-04
- ESTI EN 303 372-2 v1.1.1: 2016-04
- ESTI EN 303 340 v1.2.0: 2020-06
- EN IEC 62368-1:2020+A11:2020

Where applicable, the Most Technology Service Co., Ltd. performed above specification conformity test and issued certificate # MOSTCC21061592 in accordance with local regulation.

Trouble Shooting

- ◆ **The video and the audio from HDMI source are not synchronized on TV**
Unplug and plug the HDMI port on the Modulator to restore.
- ◆ **My HDMI video cannot be viewed on TV but other channels can be viewed**
 - If SATLINK logo screen can be viewed on TV without HDMI source device connected, check the user's guide of your HDMI device to ensure fixed and high resolution to output video signal for modulation correctly.
 - If nothing is displayed on TV with or without HDMI source device connected, check all connections, settings are correct according to the instructions on this Start Guide.
 - Try another TV, if available, without HDMI source device connected to ensure SATLINK logo screen is displayed.
 - If a HDMI switch or a hub is used, some of them don't pass through Extended Display Identification Data (EDID) to tell the video resolution. Connect the HDMI device directly to the Modulator or TV without a switch.
 - If the HDMI source is from a PC/DVI device (e.g. laptop computer), the Modulator doesn't support it. A converter box to convert the DVI video to standard 3D video in 720p or 1080p is required.
- ◆ **The HD LED doesn't stay solid amber all the time**
Make sure the HDMI source device is set to output fixed resolution at 1080p or 720p and connected directly to the Modulator without intermediate components like splitters, combiners or switch.
- ◆ **Video with fast motion doesn't play well or shows ghosting on TV**
Problem: This might be caused by interlacing issue with 1080i resolution on sports or action video.
- ◆ **How to get the best video quality on TV with the Modulator**
 - Change the HDMI video output format to 1080p or 720p (progressive) mode. If TV set doesn't support 1080p, change the HDMI video output format to 720p and enable interlacing.
 - If QAM modulation technique is available from the Modulator, change it to 256QAM.
- ◆ **How do I know my TV supports ATSC (8VSB) or J.83B standard**
Most recent models of TV set sold in the US within the last three years can support both ATSC (8VSB) and J.83B standards but if you are not sure, the broadcasting standard of the TV can be realized by checking the wiring:
 - If the coaxial cable connected to the TV is an outdoor/indoor antenna drop, the TV supports ATSC (8VSB).
 - If the coaxial cable connected to the TV is a Cable TV drop (e.g. from Comcast), the TV supports J.83B.
- ◆ **Some or most channels are instable or cannot be viewed on TV**
The input signal can be too strong for the TV. Reduce the RF output (power) level to lower value, but higher than 70dBuV, from the menu screen on the Modulator.
- ◆ **Audio from HDMI source is skipping or stuttering on TV**
If HDMI source device has Compressed Audio or Dolby Digital Sound enabled, try to set it to traditional Pulse-Code Modulation (PCM) Stereo or Uncompressed Audio output. Double compression of audio signal may cause audio skipping on TV.
- ◆ **How do I replace an old modulator with ST-7000**
Refer to the settings of the old modulator and duplicate them, such as Output Frequency, Output Power Level, Channel Number, Channel Name ... etc. to ST-7000 as much as possible before replacing the old modulator.
- ◆ **The HDMI video stretches or shrinks on TV**
ST-7000 processes HDMI video without alteration in color and aspect ratio. Check the settings of aspect ratio on HDMI device and TV to adjust and fix.



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Jiangnan High Technology Industrial Zone
Licheng District, Quanzhou, Fujian, China
www.satlinkcn.com
sales@satlinkcn.com

North, Central and South America Distribution
StarLink LLC
www.starlink7.com
support@starlink7.com