



ACT EM1401
Encoder &
Modulator

User Guide

Revision A

ACT EM1401 HD & SD Encoder & Modulator

User Manual

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This document is produced to assist professional and properly trained personnel with installation and maintenance issues for the product. The capabilities, system requirements and/or compatibility with third-party products described herein are subject to change without notice.

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Revision History

Revision	Date	Reason for Change
A	2/17/2016	Initial Release

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Chapter 1. Introduction

1.1 General Description

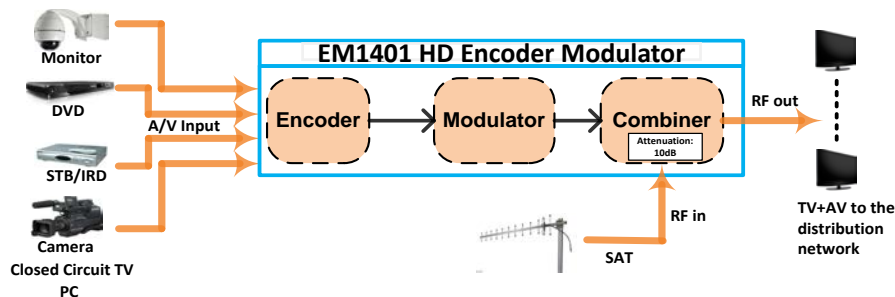
Ascent's EM1401 HD & SD Encoder & Modulator is designed based on consumer electronics which allow for an audio/video signal input in TV distributions. It has applications in home entertainment, surveillance control, hotel digital signage, shops, and more.

The EM1401 is an all-in-one device integrating MPEG-4 AVC/H.264 encoding and modulating to convert audio/video signals to a DVB-T RF output.

The signals source can be from STBs, satellite receivers, closed-circuit television cameras, or antennas. The output signal can be received by DVB-T standard TVs or STBs.



1.2 Working Principle



1.3 Technical Specifications

HDMI Encoding Section

Video	Encoding	H.264 MP@L 3.0 / 3.1 / 4.0	
	Interface	HDMI × 1	
	Resolution	Input	Output
		480@59.94/60p	480@60p
		480@59.94/60i	480@30p
		576@50i	576@25p
		720@50/59.94/60p	720@50/59.94/60p
		1080@50i	1080@25p
		1080@59.94/60i	1080@30p
		1080@59.94/60p	1080@30p
	Aspect Ratio	16:9	
	Bit rate	1.000 ~ 18.000 Mbps	
Audio	Encoding	MPEG1 layer 2	
	Sample rate	48 kHz	
	Bit rate	64, 96, 128, 192, 256, 320 kbps	

CVBS Encoding Section

Video	Encoding	H.264 MP@L 3.0	
	Interface	CVBS × 1 (RCA)	
	Resolution	Input	Output
		480@60p	480@60p
		480@60i	480@30p
		576@50p	576@50p
		576@50i	576@25p
	Aspect Ratio	4:3	
	Bit rate	1.000 ~ 18.000 Mbps	
Audio	Encoding	MPEG1 layer 2	
	Interface	Analog stereo / mono (unbalanced RCA)	
	Sample rate	48 kHz	
	Bit rate	64, 96, 128, 192, 256, 320 kbps	

DVB-T Modulator Section

Standard	DVB-T COFDM
Bandwidth	6M, 7M, 8M
Constellation	QPSK, 16QAM, 64QAM
Code rate	1/2, 2/3, 3/4, 5/6, 7/8
Guard Interval	1/32, 1/16, 1/8, ¼
Transmission Mode:	2K, 8K
MER	≥ 31dB
RF frequency	142.5 ~ 946 MHz, 1 kHz step
RF output level	-14 ~ +6dBm, 0.1 db step

System

RF mix in ATT	10 dB
Management	Local LCD + control buttons
Language	English
LCN Insertion	Yes
Upgrade	USB

General

Power supply	DC 12V
Dimensions	183 × 110 × 50mm
Weight	< 1 kg

Chapter 2. Safety Instruction and Installations

2.1 Safety Instructions



Note

Do not hot plug the device as it may halt the system.



Warning

To prevent fire or electrical shock, do not expose the device to rain or moisture.

The encoder modulator is powered with a voltage of 12V DC. The power supply voltage must not exceed the recommended voltage, as that may cause irreparable damage to the device and invalidate the warranty. Therefore:

- Do not replace the power supply with a voltage greater than 12V DC.
- Do not connect the device to the power supply if the power cord is damaged.
- Do not plug the device into the mains supply until all cables have been correctly connected.
- Do not cut the cord.



Caution:

Avoid placing the device next to central heating components.

Avoid placing the device in areas of high humidity.

Do not cover the device with elements that obstruct the ventilation slots.

If the encoder modulator has been kept in cold conditions for a long time, keep it in a warm room for a minimum of 2 hours before plugging into the mains.

Mount the device in a vertical position with the connectors located on the top side.

When replacement parts are required, be sure the service technician uses replacement parts specified by the manufacturer or have the same characteristics as the original parts. Unauthorized substitutes may result in fire, electric shock, or other hazards.

Safety check- Upon completion of any service or repairs to this device, ask the service technician to perform safety checks to ensure that the device is in proper condition.

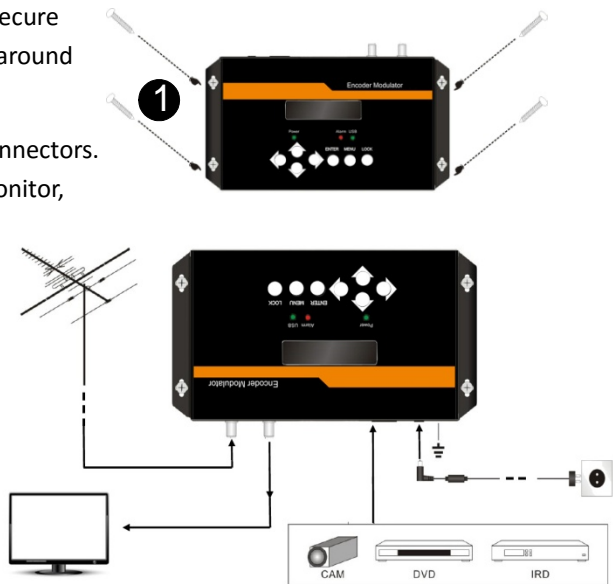
2.2 Installation

Risk of damage to the unit

Mechanically handling the unit may result in damage. Do not connect the unit to the power supply before or during assembly. Connect the unit as below instructed.

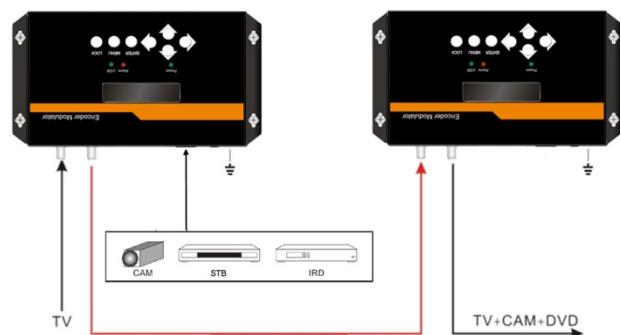
Do not hot plug the unit and connect the cable using the following steps

1. Mount and tighten the screws and plugs to secure the unit to the wall. Leave 10 cm of free space around each unit.
2. Connect the signal input in the respective connectors. The signal source can be from a surveillance monitor, DVD, set-top box, CCTV etc.
3. Optionally, connect the loop-through RF input to a coaxial cable.
4. Connect the RF output cable to STB/TV.
5. Power supply connection:
 - a) Connect the earth cable.
 - b) Connect the power plug to the unit mains connector.
 - c) Connect the power plug to the mains socket



2.3 Cascade Installation

The EM1401 unit has 1 TV signal to RF output encoded as a DVB-T Digital TV signal. Several EM1401 units can be cascaded in order to increase the capacity. The maximum capacity of a series of N units is $1 \times N$ incorporated TV signals. To cascade 2 or more units, connect the RF output of the preceding unit to the TV input (loop-through) of the next unit (see illustration on the right).



2.4 Typical Applications

...for communities of residents
an information channel on their television



...for restaurants
information about daily menus ,special deals,etc



...for hotels
meeting rooms,exhibitions,message,etc



...for hospitals
training courses, healthy guide, etc



...for Public Spaces
adversing,user information,news,etc



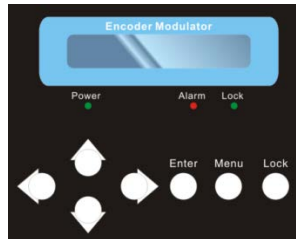
...for shopping centres
new collections,special deals,etc



Create your own advertising and information channel
using only your EM1401 Encoder Modulator

Chapter 3. Operations and Management

The EM1401 is controlled and managed through its keyboard and LCD display.



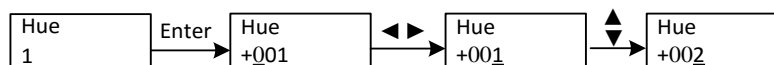
LCD Display – Presents the selected menu and parameter settings. The backlight in the display is on when power is applied.

LED – These lights indicate the device's working status

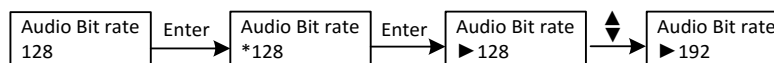
- **Power:** Lights on when the power supply is connected.
- **Alarm:** Lights on when there is an error such as signal source loss.
- **USB:** Lights on when the USB is properly connected and detected.

Left/Right/Up/Down buttons – Use these buttons to turn the screen pages, shift target items by moving the selection triangle, or change parameter settings in program mode.

Enter – Use this button to enter a submenu or save a new setting after adjustments. Press it to start adjusting the value of certain items with Up/Down buttons when the corresponding underline flashes.



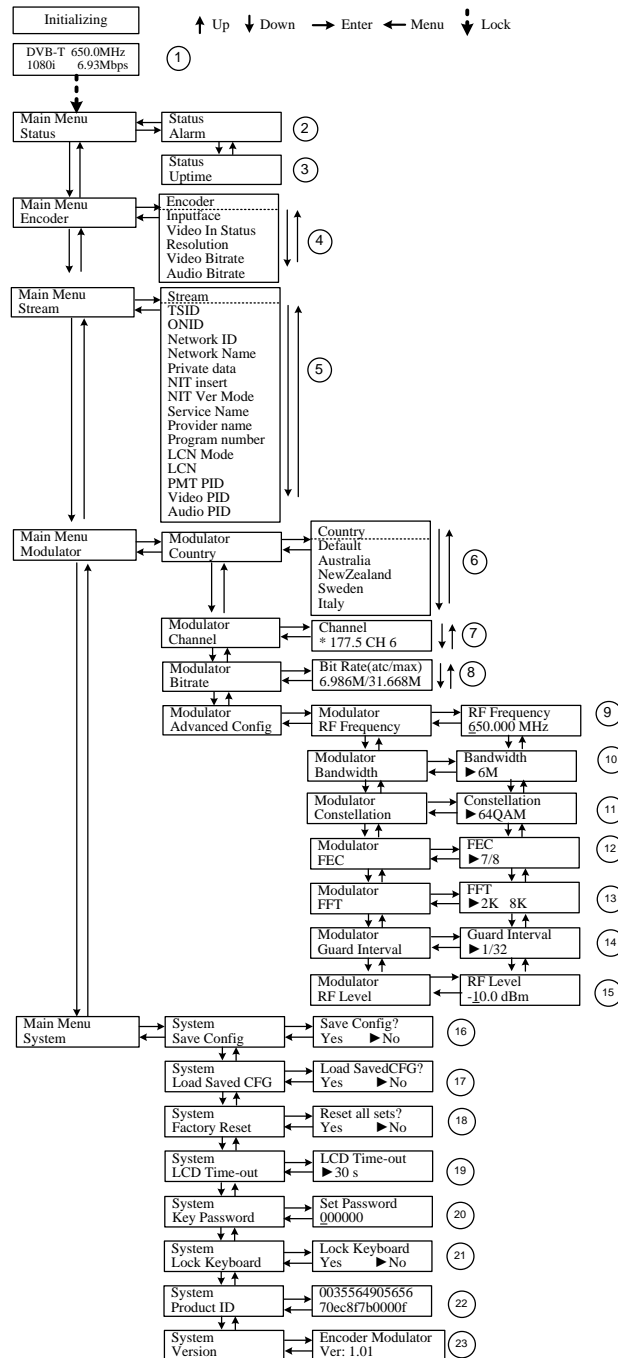
Press it to activate hidden selections and change the setting with the Up/Down (or Left/ Right) buttons.



Menu – Press this button to return to the previous menu.

Lock – Lock the screen / cancel the lock state and enter the main menu after the device is initialized. After pressing the Lock button, the system will question the user on whether they want to save the settings or not. If not, the LCD will display the current configuration state.

When power is connected, the LCD will start to initialize the program. The LCD menu follows the below chart:



1) DVB-T: modulating standard; XX.XXX MHz: the current output frequency; 1080i: video resolution of signal source; X.XX Mbps: the current encoding bit rate

2) Alarm Status: If the signal is lost, an alarm will go off and the error type will be displayed under this menu. For example: *Video Not Lock*

3) Uptime: Displays the working time duration of the device. Time starts upon power on.

4) Encoder Parameters: User can enter items respectively to set Encoder parameters.

Interface: Selects the input port (Auto, HDMI, or CVBS). The device will process the signal from the corresponding interface.

Video in Status: User can view the video status under this menu.

Resolution: Signal source resolution, read-only.

Video Bit Rate: Adjust in the range of 1.000 ~ 18.000 Mbps.

Audio Bit Rate: Select audio bitrate among 64, 96, 128, 192, 256, and 320 kbps.

5) Stream: User can view or adjust the TSID (Transport Stream ID), ONID (Original Network ID), Network ID, Network Name, Program number, LCN (Logical channel number) etc. for the output TS in this menu.

NIT (Network Information Table): The NIT table is a very important table for describing the network and TS. User can enter the submenus displayed and edit the values or select modes.

6) Country: User can select a country under this menu. There are five options: Default, Australia, New Zealand, Sweden and Italy. If user chooses Default, modulating parameters need to be set manually through advanced configuration. If one of the other four is chosen, user does not need to set RF frequency, bandwidth, constellation, FEC, FFT, guard interval and RF Level. The device will automatically configure according to the Country and Channel.

7) Channel: User can select a Channel under this submenu.

8) Bit Rate: User can read the current modulating bitrate and the maximum bitrate

9) RF Frequency: Adjustable between 142.5 MHz and 946 MHz. Set it according your regional situation or inquire with your local services.

10) Bandwidth: choose between 6M, 7M, and 8M.

11) Constellation: The DVB-T modulator contains 3 constellation modes – 64 QAM, QPSK, and 16 QAM.

12) FEC: Forward Error Correction rate. It contains 1/2, 2/3, 3/4, 5/6 and 7/8.

13) FFT (Transmission Mode): Select between 2K and 8K.

14) Guard Interval: Select among 1/32, 1/16, 1/8 and 1/4.

15) RF Level: Adjustable between -14 ~ +6 dBm.



Note

The different combination of bandwidth, constellation, guard interval, and FEC (code rate) will form a different output code rate. Please refer to appendix table 2. To ensure output image quality, the output code rate should be higher than 22 MHz.

16) Save Config: Yes/No - to save/cancel setting adjustments.

17) Load Saved CFG: Yes/No - to load/not load the saved configuration.

18) Factory Reset: Yes/No – to reset/not reset to the factory default configuration.

19) LCD Time Out: Set a time limit for the LCD light to turn off. Choose among 5s, 10s, 45s, 60s, 90s and 120s.

20) Key Password: Set a 6-digit password for unlocking the keyboard.

21) Lock Keyboard: Choose *Yes* to lock the keyboard, which means the keyboard will be locked and cannot be used. Input the password to unlock the key board. This operation is one-off. (If password is forgotten, please use the universal code "000000".)

22) Product ID: User can view the serial number of this device. It is read-only and unique.

23) Version: Displays the version information of this device.

Encoder Modulator: Name of the device

Ver: Version number of the device.

Chapter 4. How to Upgrade

The EM1401 encoder modulator is embedded with a USB Port for upgrading. The supported file format is IMG and the file name must be “encoder_hdmi_cvbs.img”.



USB Port for Upgrade

Upgrade steps: Insert USB device→Upgrade automatically (will require 10-20 seconds to upgrade)

→Remove USB device→Power off→Power on.

Appendix

Australia Air Channels			
Ch.	Frequency		
	Start	Center	End
VHF			
C00	45	48.5	52
C01	56	59.5	63
C02	63	66.5	70
C03	85	88.5	92
C04	94	97.5	101
C05	101	104.5	108
C5A	137	140.5	144
C06	174	177.5	181
C07	181	184.5	188
C08	188	191.5	195
C09	195	198.5	202
C9A	202	205.5	209
C10	209	212.5	216
C11	216	219.5	223
C12	223	226.5	230
UHF			
C20	470	473.5	477
C21	477	480.5	484
C22	484	487.5	491
C23	491	494.5	498
C24	498	501.5	505
C25	505	508.5	512
C26	512	515.5	519
C27	519	522.5	526
C28	526	529.5	533
C29	533	536.5	540
C30	540	543.5	547
C31	547	550.5	554
C32	554	557.5	561
C33	561	564.5	568
C34	568	571.5	575
C35	575	578.5	582
C36	582	585.5	589
C37	589	592.5	596

Australia Air Channels			
Ch.	Frequency		
	Start	Center	End
C38	596	599.5	603
C39	603	606.5	610
C40	610	613.5	617
C41	617	620.5	624
C42	624	627.5	631
C43	631	634.5	638
C44	638	641.5	645
C45	645	648.5	652
C46	652	655.5	659
C47	659	662.5	666
C48	666	669.5	673
C49	673	676.5	680
C50	680	683.5	687
C51	687	690.5	694
C52	694	697.5	701
C53	701	704.5	708
C54	708	711.5	715
C55	715	718.5	722
C56	722	725.5	729
C57	729	732.5	736
C58	736	739.5	743
C59	743	746.5	750
C60	750	753.5	757
C61	757	760.5	764
C62	764	767.5	771
C63	771	774.5	778
C64	778	781.5	785
C65	785	788.5	792
C66	792	795.5	799
C67	799	802.5	806
C68	806	809.5	813
C69	813	816.5	820
C70	820	823.5	827
C71	827	830.5	834
C72	834	837.5	841
C73	841	844.5	848
C74	848	851.5	855
C75	855	858.5	862

Table 1 Australia Television Frequency/Channels (MHz)

Modulation Constellation	FEC	6MHz Bandwidth				7MHz Bandwidth				8MHz Bandwidth			
		Guard Interval				Guard Interval				Guard Interval			
		1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
QPSK	1/2	The weak ability of error-correcting and anti-interference in this area											6.03
	2/3				6.03	5.80	6.45	6.83	7.03	6.64	7.37	7.81	8.04
	3/4		6.22	6.58	6.78	6.53	7.25	7.68	7.91	7.46	8.29	8.78	9.05
	5/6	6.22	6.91	7.31	7.54	7.25	8.06	8.53	8.79	8.29	9.22	9.76	10.05
	7/8	6.53	7.25	7.68	7.91	7.62	8.46	8.96	9.23	8.71	9.68	10.25	10.56
16QAM	1/2	7.46	8.29	8.78	9.04	8.70	9.67	10.24	10.55	9.95	11.06	11.71	12.06
	2/3	9.95	11.05	11.70	12.06	11.61	12.90	13.66	14.07	13.27	14.75	15.61	16.09
	3/4	11.19	12.44	13.17	13.57	13.06	14.51	15.36	15.83	14.93	16.59	17.56	18.10
	5/6	12.44	13.82	14.63	15.08	14.51	16.12	17.07	17.59	16.59	18.43	19.52	20.11
64QAM	7/8	13.06	14.51	15.36	15.83	15.24	16.93	17.93	18.47	17.42	19.35	20.49	21.11
	1/2	11.19	12.44	13.17	13.57	13.06	14.51	15.36	15.83	14.93	16.59	17.56	18.10
	2/3	14.92	16.58	17.56	18.09	17.41	19.35	20.49	21.11	19.91	22.12	23.42	24.13
	3/4	16.79	18.66	19.76	20.35	19.59	21.77	23.05	23.75	22.39	24.88	26.35	27.14
	5/6	18.66	20.73	21.95	22.62	21.77	24.19	25.61	26.39	24.88	27.65	29.27	30.16
	7/8	19.59	21.77	23.05	23.75	22.86	25.40	26.89	27.71	26.13	29.03	30.74	31.67

Table 2 Recommended MPEG-2 Code Rate

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