FOR.A
INNOVATIONS IN VIDEO
and AUDIO TECHNOLOGY

OPERATION MANUAL

UFM-30MUX

3G/HD/SD Digital Audio Multiplexer

UFM-3MUXAI

1st Edition - Rev. 2

FOR-A COMPANY LIMITED

Edition Revision History

Edit.	Rev.	Date	Description	Section/Page
1	-	2013/03/29	First Edition	
1	1	2013/04/30	Added "Operation Examples" Corrected factual errors.	Sec. 5
1	2	2013/08/27	Added "no signal" indication in SDI AUDIO IN SYNC Added "no signal" indication in SDI AUDIO IN PCM Added "no signal" indication in AES IN SYNC Added "no signal" indication in AES AUDIO IN PCM Spec details added to Audio Input (SDI embedded, AES/EBU) and Audio Output (SDI embedded) UFM-30MUX power current changed	Sec. 6-6-4 Sec. 6-6-5 Sec. 6-6-8 Sec. 6-6-9 Sec. 10-1-1 Sec. 10-1-1

Precautions

Important Safety Warnings

[Power]

 Stop	**Do not** place or drop heavy or sharp-edged objects on power cord. A damaged cord can cause fire or electrical shock hazards. Regularly check power cord for excessive wear or damage to avoid possible fire / electrical hazards.

[Circuitry Access]

 Stop	**Do not** touch any parts / circuitry with a high heat factor. Capacitors can retain enough electric charge to cause mild to serious shock, even after power is disconnected. Capacitors associated with the power supply are especially hazardous. Avoid contact with any capacitors.
 Hazard	Unit **should not** be operated or stored with cover, panels, and / or casing removed. Operating unit with circuitry exposed could result in electric shock / fire hazards or unit malfunction.

[Potential Hazards]

 Caution	If abnormal smells or noises are noticed coming from the unit, turn power off immediately and disconnect power cord to avoid potentially hazardous conditions. If problems similar to above occur, contact authorized service representative **before** attempting to again operate unit.

[Consumables]

 Caution	The consumables used in unit must be replaced periodically. For further details on which parts are consumables and when they should be replaced, refer to the specifications at the end of the Operation Manual. Since the service life of the consumables varies greatly depending on the environment in which they are used, they should be replaced at an early date. For details on replacing the consumables, contact your dealer.

Upon Receipt

Unpacking

UFM-30MUX Digital Audio Multiplexer modules are fully inspected and adjusted prior to shipment. Operation can be performed immediately upon completing all required connections and operational settings.
Check your received items against the packing lists below. Check to ensure no damage has occurred during shipment. If damage has occurred, or items are missing, inform your supplier immediately.

◆ **UFM-30MUX box**

ITEM	QTY	REMARKS
UFM-30MUX	1 set	Front module 1 Rear module 1
Operation Manual	1	(This manual)

UFM-3MUXAI box (Analog Input Option)

ITEM	QTY	REMARKS
UFM-3MUXAI	1 set	Front module 1 Rear module 1
Flat cable	1	For connection to UFM-30MUX
Gasket	1	For attachment to UFM-30MUX

UFM-30MUX and UFM-3MUXAI modules are used by installing them into a UF-106B or UF-112 UFM Frame.
UF-106B supports up to 6 pairs of modules (Up to 4 pairs if UF-106BPS is installed)
UF-112 supports up to 12 pairs of modules.

Remote Control Options

ITEM	REMARKS
UFM-30CTL	Control Card

Table of Contents

1. Prior to Starting

1-1. Welcome

Congratulations! By purchasing UFM-30MUX Digital Audio Multiplexer modules you have entered the world of FOR-A and its many innovative products. Thank you for your patronage and we hope you will turn to FOR-A products again and again to satisfy your video and audio needs. FOR-A provides a wide range of products, from basic support units to complex system controllers, which have been increasingly joined by products for computer video-based systems. Whatever your needs, talk to your FOR-A representative. We will do our best to be of continuing service to you.

The UFM-30MUX, Digital Audio Multiplexer plug-in module is installed into a UF-106B or UF-112 UFM Frame. The unit accepts 3G/HD/SD-SDI signal input and 8-ch AES/EBU audio input and multiplexes the video and audio signals into an SDI output. The AES 7/8 input port can also accept LTC signal by changing the switch setting on the front panel. LTC input can be also embedded into the SDI output.

The UFM-3MUXAI optional analog input module for the UFM-30MUX is also installed into the UFM frame. The unit converts analog input audio (4 stereo pairs) to digital audio signals and embeds them into the SDI output stream from the UFM-30MUX.

1-2. Features

- Accepts an SDI stream and 4-pair (8ch) AES/EBU input and outputs the signal as an SDI stream.
- Supports 3G/HD/SD-SDI.
- Maximum 32 ch audio source: 16 channels of SDI de-embedded audio, 8 channels of AES/EBU input and 8 channels (4 stereo pairs) of optional analog input
- Free mapping of audio source channels to the SDI output on a per-channel basis (for asynchronous channels on a per-group basis)
- Incorporates a Sampling Rate Converter for each AES/EBU input.
- Accepts timecode (LTC) input (using the LTC IN and AES 7/8 switchable input or LTC IN on an optional module card).
- Allows input timecode to be overlaied onto the ANC area of SDI output.
- Relay bypass from SDI input to SDI output (when unit power is Off or set to Bypass)
- UFM-3MUXAI option modules provide analog audio input and indipendent LTC input.

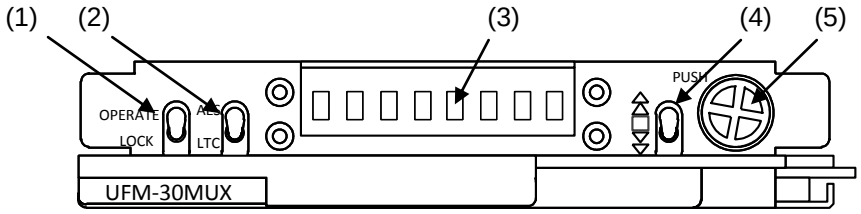
1-3. About This Manual

This manual is intended to help the user easily operate this product and make full use of its functions during operation. Before connecting or operating your unit, read this operation manual thoroughly to ensure you understand the product. Afterwards, it is important to keep this manual in a safe place and available for reference.

2. Panel Descriptions

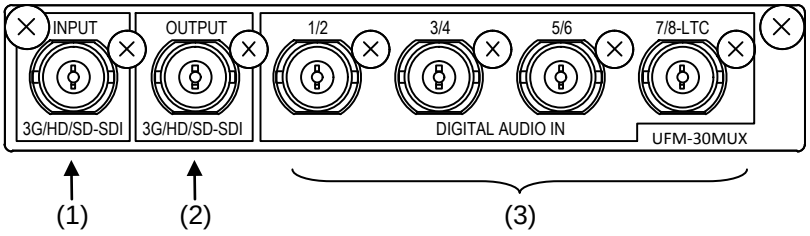
2-1. UFM-30MUX

◆ **Front Panel**



No.	Name	Description
(1)	OPERATE/LOCK	If set to OPERATE, the switch is set to Menu mode and menu settings can be made. If set to LOCK, the switch is set to Menu Lock mode and menu settings cannot be made.
(2)	AES/LTC switch	Switches the 7/8-LTC port between AES 7/8 and LTC.
(3)	Display panel	Used to display menus and perform operational settings.
(4)	Up/Down switch	Used to move to higher or lower menu layers.
(5)	Menu Control	Used to perform menu settings.

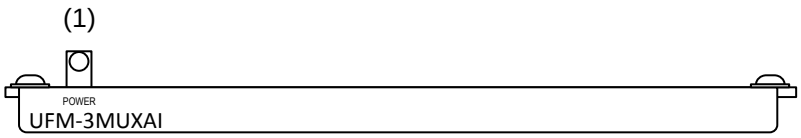
◆ **Rear Panel**



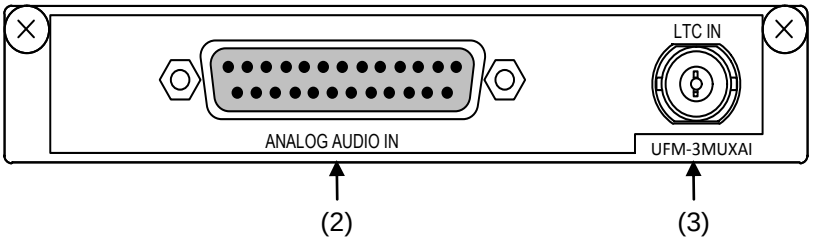
No.	Name	Description
(1)	3G/HD/SD-SDI INPUT	Used to input serial digital component video.
(2)	3G/HD/SD-SDI OUTPUT	Used to output serial digital component video, in which specified audio channels are multiplexed (embedded). The SDI input signal is directly sent to this output via relay, if set to BYPASS or the power supply is down. (See section 6-5-1. "SDI BYPASS."
(3)	DIGITAL AUDIO IN	Used to input 4 AES/EBU stereo pairs. Channel 7/8 input can be changed to an LTC input. (See (2) in Front Panel above.)

2-2. UFM-3MUXAI (Option)

◆ **Front Panel**



◆ **Rear Panel**



No.	Name	Description
(1)	POWER LED	Displays the power status.
(2)	ANALOG AUDIO IN	Used to input analog audio. See section 3-3-1. "Analog Audio Connection."
(3)	LTC IN	Used to input LTC time code.

3. Connection

3-1. Installing to a UFM frame

UFM-30MUX and UFM-3MUXAI modules are used by installing them into UF-106B or UF-112 UFM frames.

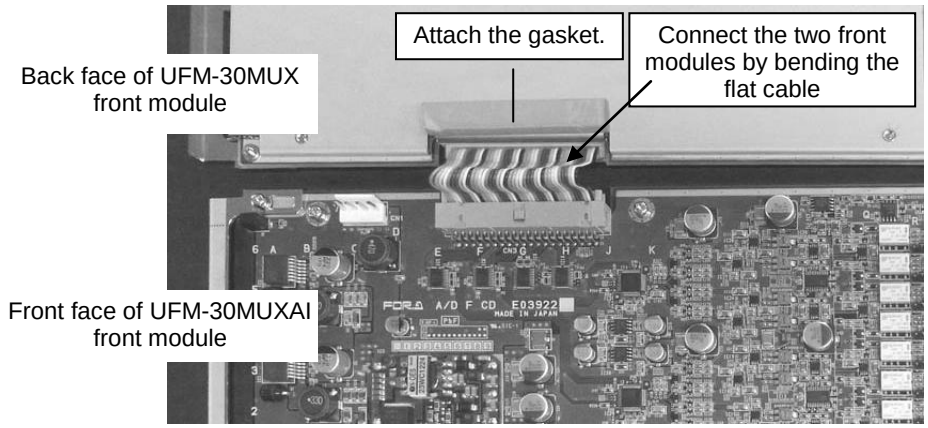
◆ **UFM-30MUX**

UFM-30MUX modules can be installed in any empty slot on UFM frames.
A UFM-30MUX module set consists of a front and rear module. Be sure to always install the front and rear modules in the same slot positions.

◆ **UFM-3MUXAI**

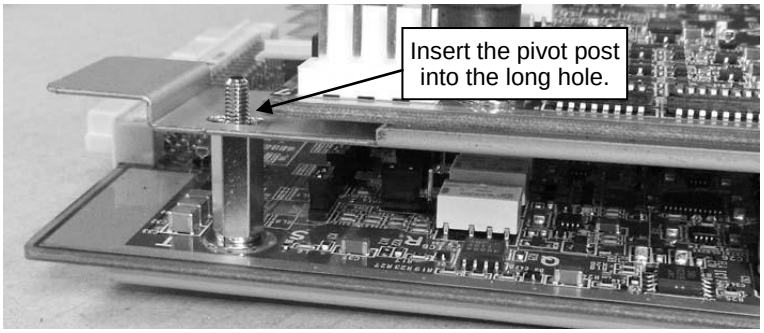
Install a UFM-3MUXAI module set into the slot **just below the UFM-30MUX slot**.

(1) Attach the gasket supplied with the UFM-3MUXAI on the UFM-30MUX card as shown in the figure below.
Then, connect the UFM-30MUX and UFM-3MUXAI front modules with the supplied flat cable. Bend the flat cable as shown in the figure below.

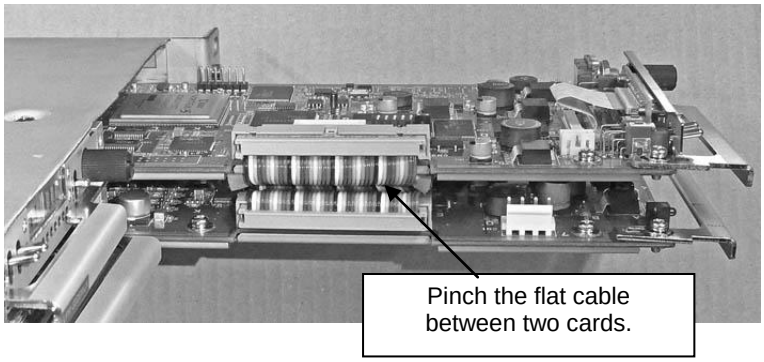


IMPORTANT
Make sure that when a UFM-3MUXAI is connected to the UFM-30MUX, the supplied gasket is attached to the UFM-30MUX card.

(2) After connecting the flat cable, align the two module cards so that the pivot post on the UFM-3MUXAI card is correctly inserted into the pivot hole of the UFM-30MUX card.

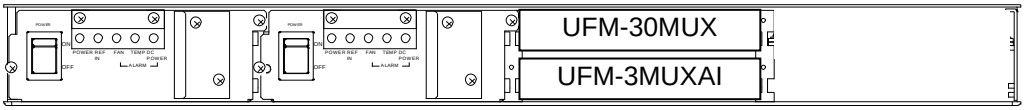


(3) Insert the two front modules into slots on a UFM frame by pinching the flat cable between two card modules as shown below.

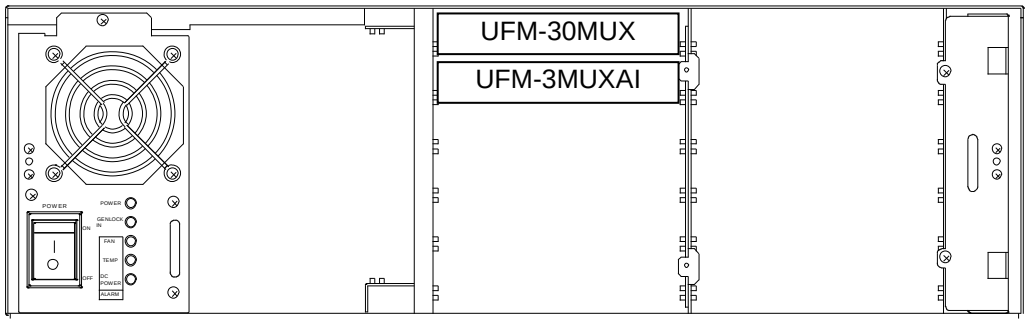


(4) A UFM-3MUXAI module set consists of a front and rear module. Be sure to install the front and rear modules in the same slot positions.

UF-106B front panel



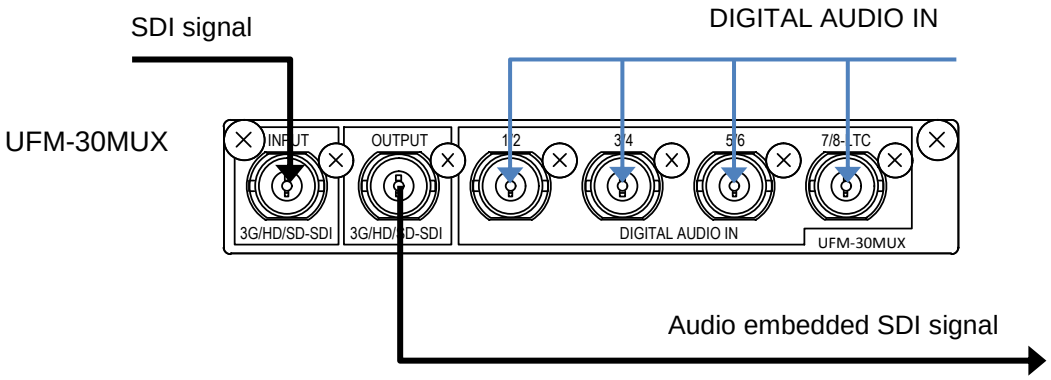
UF-112 front panel



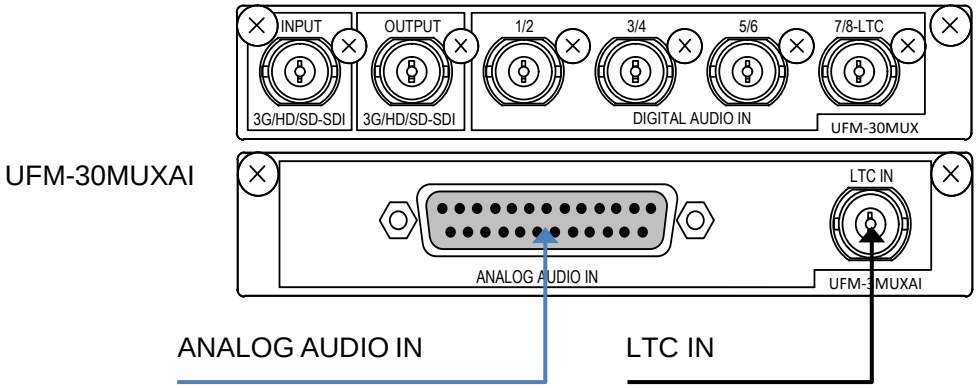
IMPORTANT
Refer to the UF-106B or UF-112 Operation Manual for details on the module installaion.

3-2. Basic Configuration (UFM-30MUX)

Connect UFM-30MUX modules to peripheral devices referring to the figure below.



3-3. Optional Configuration (UFM-3MUXAI)



IMPORTANT
The UFM-30MUX and UFM-3MUXAI front modules must be connected using the supplied flat cable.

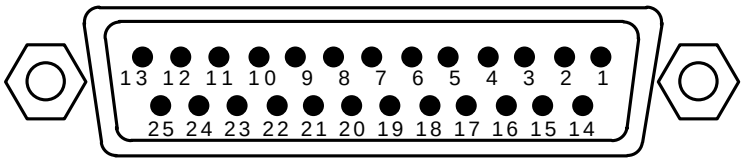
3-3-1. Analog Audio Connection

For balanced audio signals, connect the **hot**, **cold** and **shield** conductor to "**+**" ," **-** " and "**COM"** pins respectively.

For unbalanced audio signals, connect the conductor that carries **audio** to a "**+**" pin and **ground** to "**COM.**"

☞ Use jumpers on the front module to switch between balanced and unbalanced stereo audio. See section 8-1. "UFM-3MUXAI FRONT CARD" for details.

◆ **Analog Audio Connector (25-pin D-sub , Female, Inch screws)**



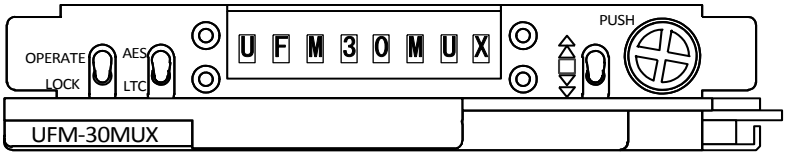
◆ **Signal Assignments (25-pin D-sub , Female)**

Pin No.	Setting
1	CH4 R+
2	CH4 R COM
3	CH4 L-
4	CH3 R+
5	CH3 R COM
6	CH3 L-
7	CH2 R+
8	CH2 R COM
9	CH2 L-
10	CH1 R+
11	CH1 R COM
12	CH1 L-
13	NC
14	CH4 R-
15	CH4 L+
16	CH4 L COM
17	CH3 R-
18	CH3 L+
19	CH3 L COM
20	CH2 R-
21	CH2 L+
22	CH2 L COM
23	CH1 R-
24	CH1 L+
25	CH1 L COM

4. Operation

4-1. Power ON

After verifying that all wiring is correctly connected, apply power to the UFM frame. The UFM-30MUX will start up and display "UFM30MUX" as shown below.

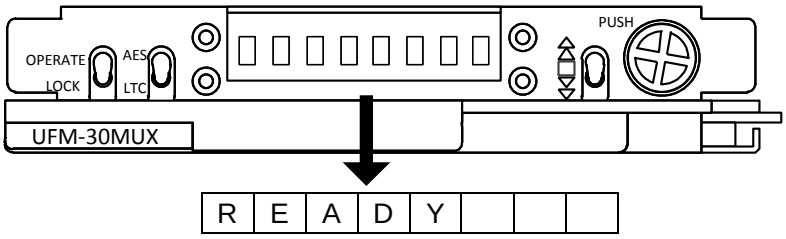


4-2. Operation and Menu Modes

4-2-1. Operation (Normal) Mode

After powering itself on, the UFM-30MUX will enter **Operation** mode and display the SDI signal status.

If the SDI signal is normal, "**READY**" will be displayed.
If the SDI signal is abnormal, an error message will be displayed. (See the table below.)



SDI status display	Description
READY	SDI signal is present.
NO SIG	No SDI signal is present.
CRC ERR	A CRC error is detected.
OP ERR	An incompatible option item is installed.

IMPORTANT
"OP ERR" is displayed when an incompatible option module is connected to the UFM-30MUX. Power off the frame, remove and disconnect the optional module.

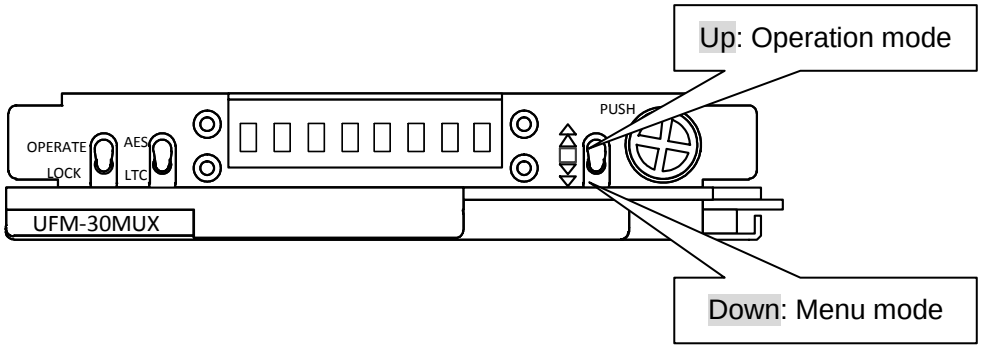
◆ **To return to Operation mode**
To return to **Operation** mode from **Menu** mode, move the Up/Down switch to the **Up** position.

4-2-2. Menu Mode

The Menu mode is used to set up modules.

◆ **To Enter Menu mode**

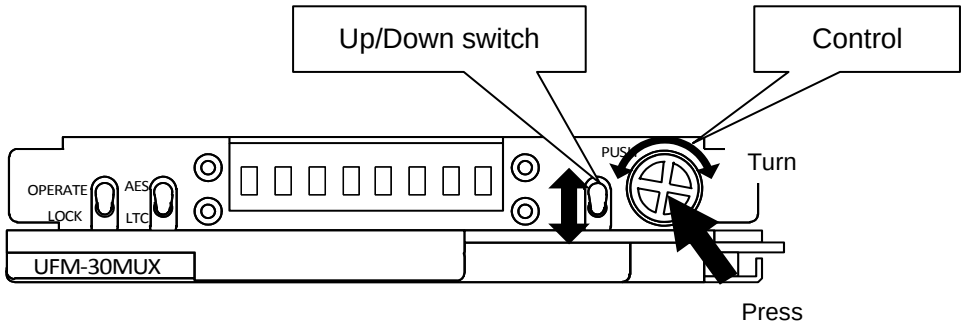
To enter **Menu** mode from **Operation** mode, move the Up/Down switch to the **Down** position.



The UFM-30MUX menu is composed of three or four levels or hierarchies: menus, parameters, channels and values. Channels are not included in some menus. See section 5-3. "Menu Details" for details.

◆ **Menu Display**

(Moving between items or levels)	Menu	Parameter	Channel	Value
	Input Mapping Output etc.	SDI SYNC SDI MAP EMB THRU etc.	Group1 CH1 CH1/2 etc.	Auto SDI CH1 Stereo etc.
Turn Control	↕	↕	↕	↕
Press Control Up/Down switch to Down	→	→	→	→
Up/Down switch to Up	←	←	←	←



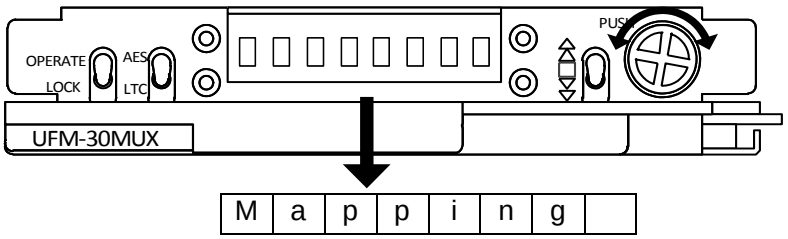
- To select an item in each level, **turn** the **Control** knob.
- To move to a lower level, move the **Up/Down switch** to the **Down** position, and to move to a higher level, move the switch to **Up**.
- Pressing the control knob or moving the switch to **Down** in the Value level applies the changed value. The cursor will automatically return to the Channel level.

4-2-3. Menu Operation Example

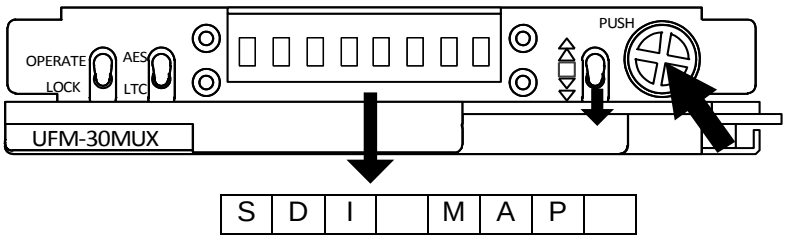
This chapter explains how to set menu parameters using a menu operational example, in which CH2 AES audio is assigned to CH2 SDI-embedded audio.

Menu	Parameter	Channel	Value
Input Mapping Output LTC System Status	SDI MAP	CH1 CH2 CH3 CH4 CH5 |	SDI CH1 | AES CH1 AES CH2 AES CH3 |

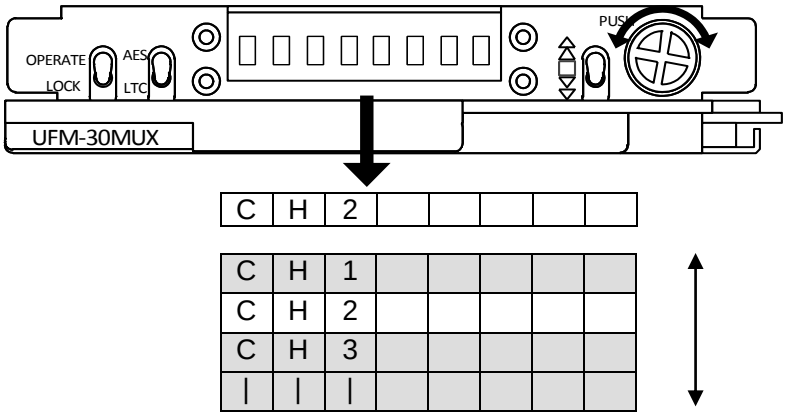
(1) Turn the control knob to select the Mapping menu.



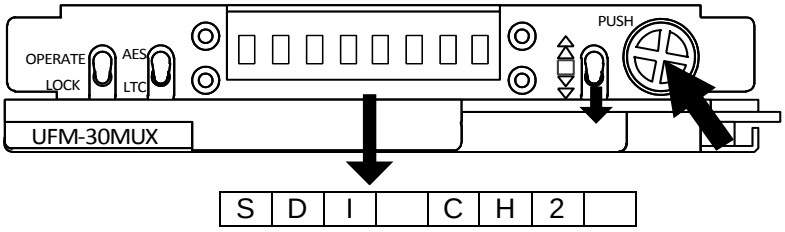
(2) Press the control or move the switch down to go to the parameter level.
When SDI MAP is displayed, press the control again or move the switch down to go to the channel level.



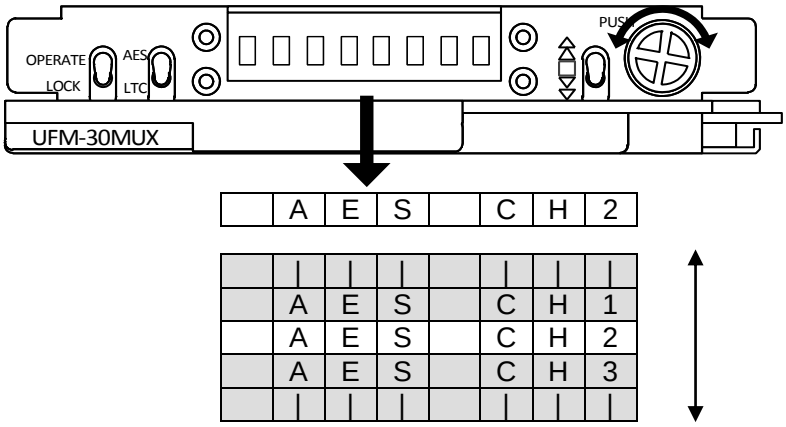
(3) Turn the control to select CH2.



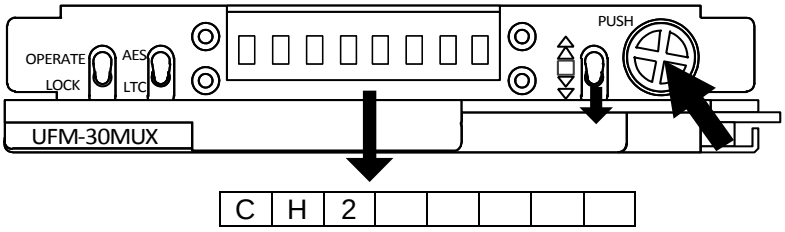
(4) Press the control or move the switch down. The current setting (SDI CH 2) will blink.



(5) Turn the control to select AES CH 2.



(6) Press the control or move the switch down to confirm the change. The display will automatically return to the channel level.



To set other channels in the same parameter, repeat Steps (3) to (6).
To set another menu parameter, move the switch up once or twice then select a menu and/or parameter, select a channel, then set its value.
After all settings are completed, move the switch up the required number of times to return to Operation mode.

4-3. Menu List

Menu	Description
Input	Sets up embedded and AES audio input.
Mapping	Assigns input audio channels, SDI-embedded and AES, to SDI-embedded output channels.
Output	Sets up embedded audio output.
LTC	Selects a time code for SDI output.
System	Sets up the system and SDI signals.
Status (Display only)	Displays the embedded and AES audio and LTC input status.

IMPORTANT
To reset all menu parameters to factory settings, see section 6-5-7. "FACTORY SET."

◆ **Input Menu**

Parameter		Channel	Setting	Refer to
Full name	Menu name			
SDI IN SYNC MODE	SDI SYNC	Group1 to 4	Auto Sync Async	6-1-1
AES IN SYNC MODE	AES SYNC	CH1-4 , CH5-8	SRC On Sync Async	6-1-2
SDI IN PCM MODE	SDI PCM	Group 1 to 4	Auto PCM NonPCM	6-1-3
AES IN PCM MODE	AES PCM	CH1/2 to CH7/8	Auto PCM NonPCM	6-1-3
ANALOG INPUT LEVEL	ANA LVL	CH1/2 to CH7/8	+10dB +8dB +4dB 0dB -4dB -10dB -20dB	6-1-4
SDI IN GAIN	SDI Gain	CH1 to 16	+20.0dB +19.9dB | -19.9dB -20.0dB	6-1-5
AES IN GAIN	AES Gain	CH1 to 8		6-1-5
ANALOG GAIN	ANA Gain	CH1 to 8		6-1-5

◆ **Mapping Menu**

Parameter		Channel	Setting	Refer to
Full name	Menu name			
SDI OUT MAPPING	SDI MAP	CH1 to 16	SDI CH1 to 16 AES CH1 to 8 ANA CH1 to 8 SDI GRP 1 to 4	6-2-1

◆ **Output Menu**

Parameter		Channel		Setting	Refer to
Full name	Menu name				
EMB THRU	EMB THRU	3G HD	Group 1 to 4	Embed Through	6-3-1
		SD	---		
SDI OUT STEREO MODE	SDI MODE	CH1/2 to CH15/16		Stereo L-CH R-CH L+R L-Mute R-Mute	6-3-2
SDI OUT RESOLUTION	SDI RESO	CH1 to 16		24bit 20bit 16bit	6-3-3
SDI OUT GAIN	SDI Gain	CH1 to 16		+20.0dB +19.9dB | -19.9dB -20.0dB	6-3-4

◆ **LTC Menu**

Parameter		Setting	Refer to
Full name	Menu name		
LTC MUX	LTC MUX	Through MUX	6-4-1
LTC SEL	LTC SEL	AES Analog	6-4-2

◆ **System Menu**

Parameter		Setting	Refer to
Full name	Menu name		
SDI BYPASS	SDI BYPS	Operate Bypass	6-5-1
SDI LOCK MODE	SDI Lock	Auto Internal	6-5-2
TV SYSTEM	Format	(See the "Format settings" table below)	6-5-3
MINIMUM DELAY	MIN DLY	On, Off	6-5-4
REF LEVEL	REF LVL	-20dB -18dB	6-5-5
TEST MODE	Test SIG	On, Off	6-5-6
FACTORY SET	FACT SET	EXEC	6-5-7

Format settings

3G SDI	HD SDI		SD SDI
1080/59a 1080/50a 1080/60a 1080/59b 1080/50b 1080/60b a: Level A b: Level B	1080/59i 1080/50i 1080/60i 1080/30p 1080/29p 1080/25p 1080/24p 1080/23p 1080/24s 1080/23s	720/59p 720/50p 720/60p 720/24p 720/23p 1035/59i 1035/60i s: PsF	525/60 625/50

◆ **Status Menu (Display only)**

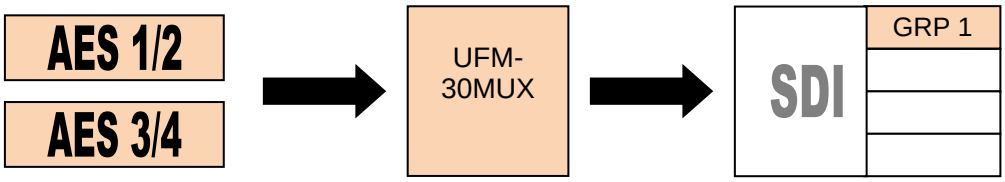
Parameter		Channel	Display	Refer to
Full name	Menu name			
SDI STATUS	SDI ERR		No Error No SIG CRC ERR	6-6-1
SDI TV SYSTEM	Format		(See the "Format settings" table on the previous page.)	6-6-2
SDI AUDIO IN ON/OFF	SDI AUD	Group 1 Group 2 Group 3 Group 4	4oooo 1 8ooxx 5 12xxxo 9 16xxxx13	6-6-3
SDI AUDIO IN SYNC	SDI Sync		G4aassG1	6-6-4
SDI AUDIO IN PCM	SDI PCM		G4ppnpG1	6-6-5
LTC IN ON/OFF	LTC In	SDI AES ANA	On Off	6-6-6
AES IN ON/OFF	AES In		78oooo12	6-6-7
AES IN SYNC	AES Sync		78aass12	6-6-8
AES AUDIO IN PCM	AES PCM		78ppnp12	6-6-9
SLOT	Slot		1 to 12	6-6-10
OPTION	Option		No Opt 3MUXAI	6-6-11
VERSION	Version	CPU FPGA CPLD	XX.XX XX.XX XX.XX	6-6-12

5. Operation Examples

5-1. AES CH1-4 >> SDI EMB CH1-4

This example embeds AES input (CH1-4) to SDI embedded audio Group 1 (CH1-4).

Audio source	AES input CH1 to 4
Channels to which audio source is embedded	SDI output CH1 to 4 (Group 1)



◆ **Setting Required Parameters**

Menu	Parameter	Channel	Setting	Description	Refer to
Mapping	SDI MAP	CH1	AES CH1	Assigns AES input CH1-4 to SDI output CH1-4.	6-2-1
		CH2	AES CH2		
		CH3	AES CH3		
		CH4	AES CH4		
Output	EMB THRU	Group1 *	Embed (default)	Embeds the audio source to Group 1.	6-3-1
System	SDI BYPS	---	Operate (default)	Performs audio embedding.	6-5-1

* For SD-SDI signals, Embed or Through should be selected for all groups.

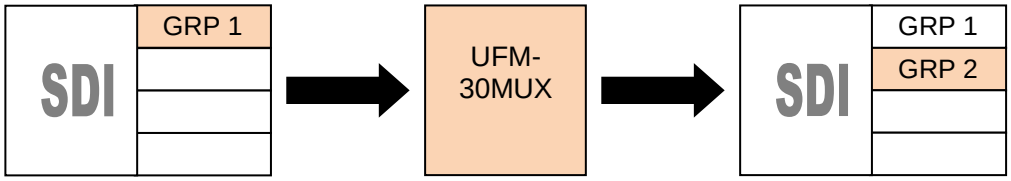
◆ **Adjustable Parameters**

Menu	Parameter	Channel	Default Setting	Description	Refer to
Input	AES SYNC	CH1-4	SRC On	Allows you to select Sync or Async for audio source.	6-1-2
	AES PCM	CH1/2 CH3/4	Auto	Allows you to select PCM or nonPCM for audio source.	6-1-3
	AES Gain	CH1-4	0.0dB	Allows you to adjust input gain.	6-1-5
Output	SDI MODE	CH5/6 CH7/8	Stereo	Allows you to select stereo or mono for output audio.	6-3-2
	SDI RESO	CH5-8	24bit	Allows you to select bit depth for output audio.	6-3-3
	SDI Gain	CH5-8	0.0dB	Allows you to adjust output gain.	6-1-5
System	SDI Lock	---	Auto	Allows you to select an SDI format if set to **Internal**.	6-5-2
	Test SIG	---	Off	Allows you to output the audio test signal if set to **On**.	6-5-6

5-2. SDI EMB GRP1 >> SDI EMB GRP2

This example remaps asynchronous SDI embedded audio channels. Embedded audio Group1 (CH1-4) is assigned to Group 2(CH5-8).

Audio source	SDI input CH1 to 4 (Group 1)
Channels to which audio source is embedded	SDI output CH5 to 8 (Group 2)



◆ **Setting Required Parameters**

Menu	Parameter	Channel	Setting	Description	Refer to
Input	SDI SYNC	Group1	Auto (default)	Automatically changes mode to asynchronous.	6-1-1
Mapping	SDI MAP	CH5	SDI GRP1	Assigns embedded audio Group 1 in the SDI input to Group 2 in the SDI output.	6-2-1
Output	EMB THRU	Group2 *	Embed (default)	Embeds the audio source to Group 2.	6-3-1
System	SDI BYPS	---	Operate (default)	Performs audio embedding.	6-5-1

* For SD-SDI signals, Embed or Through should be selected for all groups.

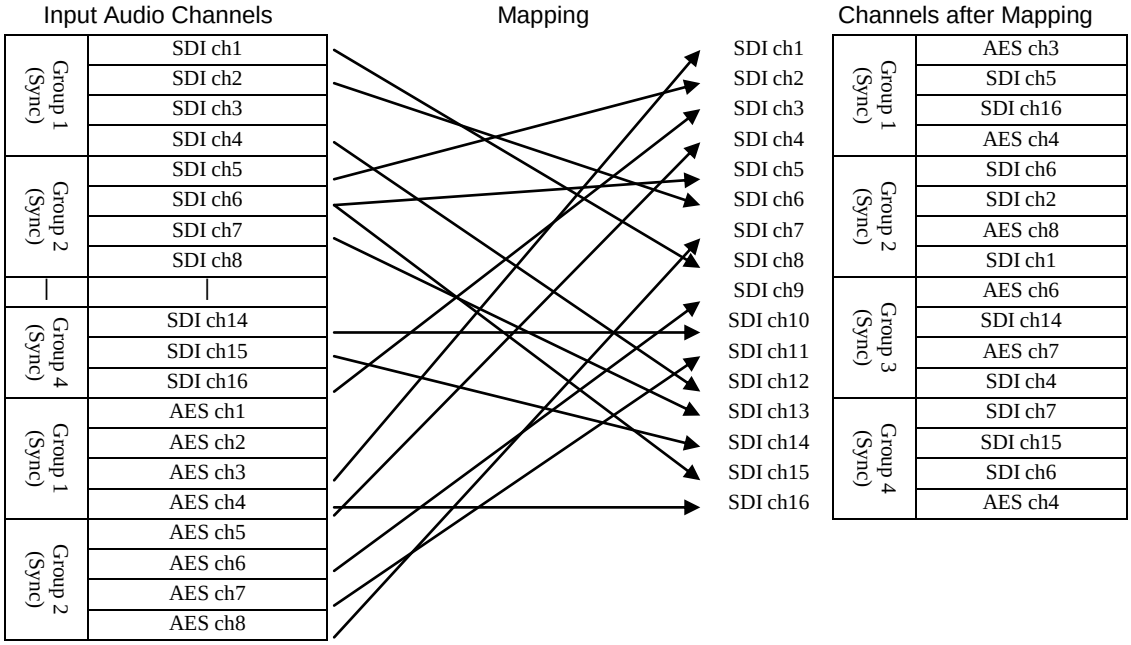
◆ **Adjustable Parameters**

Menu	Parameter	Channel	Default Setting	Description	Refer to
Input	SDI PCM	Group1	Auto	Allows you to select PCM or nonPCM for audio source.	6-1-3
	SDI Gain	CH1-4	0.0dB	Allows you to adjust input gain.	6-1-5
Output	SDI MODE	CH5/6 CH7/8	Stereo	Allows you to select stereo or mono for output audio.	6-3-2
	SDI RESO	CH5-8	24bit	Allows you to select bit depth for output audio.	6-3-3
	SDI Gain	CH5-8	0.0dB	Allows you to adjust output gain.	6-3-4
System	SDI Lock	---	Auto	Allows you to select an SDI format if set to **Internal**.	6-5-2
	Test SIG	---	Off	Allows you to output the audio test signal if set to **On**.	6-5-6

5-3. Synchronous / Asynchronous Audio Mapping

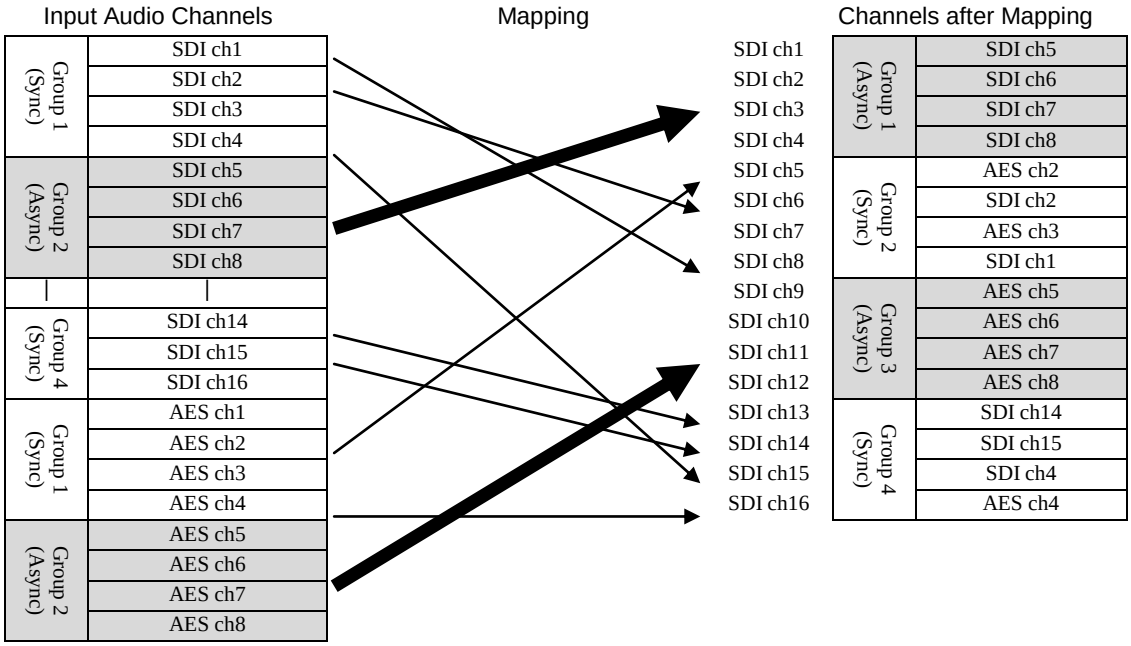
If audio source channels are synchronized with the SDI input, they can be freely mapped to SDI audio output channels. If audio source channels are asynchronous, however, they are mapped on a per-group basis.

◆ **Synchronous Audio Mapping Example (Freely assignable on a per-channel basis)**



◆ **Synchronous and Asynchronous Audio Mapping Example**

Freely assignable on a per-channel (for synchronous audio) and group basis (for asynchronous audio)



IMPORTANT
If audio channels are mapped on a per-channel basis and some audio channels are changed from synchronous to asynchronous during processing, the audio channels may play out improperly or noisily. In such case, verify and remap the channels on a per-group basis.

6. Menu Details

6-1. Input Menu

6-1-1. SDI IN SYNC MODE

Parameter	Channel	Default	Description
SDI SYNC	Group1 to 4	Auto	Selects the sync mode for embedded audio processing. (3G/HD-SDI) **Auto** Automatically selects Sync or Async mode according to the information in embedded audio. **Sync** Processes audio in synchronous mode. **Async** Processes audio in asynchronous mode.

* The "asx" of the UDW (user data word) bits in embedded audio packets indicates the audio sync mode.

* If **Sync** or **Async** is selected, it is also set in the "asx" of the UDW bits in output audio.

6-1-2. AES IN SYNC MODE

Parameter	Channel	Default	Description
AES SYNC	CH1-4 CH5-8	SRC On	Selects the sync mode for AES audio processing. **SRC On** Enables SRC (Sample Rate Converter) to synchronize audio to video. **Sync** Processes audio in synchronous mode. **Async** Processes audio in asynchronous mode.

* If **Sync** or **Async** is selected, it is also set in the "asx" of the UDW bits in output audio.

NOTE
Asynchronous audio mapping can only be performed on a per-group basis. Otherwise, some audio channels may be noisy or output improperly due to the mixture of synchronous and asynchronous audio channels in a group. SDI embedded audio input cannot be assigned to output audio in Mininum Delay mode.

6-1-3. SDI IN PCM MODE／AES IN PCM MODE

Parameter	Channel	Default	Description
SDI PCM	Group1 to 4	Auto	Selects PCM (linear PCM, uncompressed) or non-PCM (non-linear PCM) mode for embedded and AES audio processing. **Auto** Automatically selects PCM or non-PCM mode according to the information in embedded audio. **PCM** Processes audio in PCM mode. **NonPCM** Processes audio in non-PCM mode.
AES PCM	CH1/2 to 7/8		

* The PCM or non-PCM information is included in the corresponding Channel Status bit.

◆ **PCM and NonPCM**

Linear PCM audio indicates raw and uncompressed digital audio data, which is encoded from analog audio signals using the Linear Pulse Code Modulation (LPCM) method.
NonPCM (non-linear) audio indicates digital audio data other than linear PCM audio and includes compressed audio streams such as Dolby E or AC3.

IMPORTANT
Note that some audio channels may be output improperly if PCM and non-PCM or non-PCM of different-format audio channels are included in a group.

6-1-4. ANALOG INPUT LEVEL

Parameter	Channel	Default	Description
ANA LVL	CH1/2 to 7/8	+4dB	Sets the ANALOG audio input level on a per-channel pair basis. (UFM-3MUXAI required) See section 8-2. "Digital Output Level versus Analog Input Level" for details on audio output level settings. -**20dB, -10dB, -4dB, 0dB, +4dB, +8dB, +10dB**

* Analog audio impedance and balance/unbalance can be selected using jumpers on the UFM-3MUXAI front module. (See section 8-1. "UFM-3MUXAI FRONT CARD.")

6-1-5. SDI IN GAIN／AES IN GAIN／ANALOG GAIN

Parameter	Channel	Default	Description
SDI Gain	CH1 to 16	0.0dB	Adjusts the input gain for each embedded, AES and analog audio channel. Gain adjustment cannot be performed for non-PCM audio channels. (See section 6-1-3.) **-20.0dB to +20.0dB** (in 0.1dB steps)
AES Gain	CH1 to 8		
ANA Gain	CH1 to 8		

6-2. Mapping Menu

6-2-1. SDI OUT MAPPING

Parameter	Channel	Default	Description
SDI MAP	CH1 to 16	Same as SDI IN.	Assigns audio input channels to output channels. Basically, audio assignments can be performed on a per-channel basis, however, asynchronous (non-PCM) audio must be assigned on a per-group basis. Available audio channels are: **SDI CH1 to 16** **AES CH1 to 8** **ANA CH1 to 8** (UFM-3MUXAI required) **SDI GRP1 to 4**

6-3. Output Menu

6-3-1. EMB THRU

Parameter	Channel		Default	Description
EMB THRU	3G HD	Group 1 to 4	Embed	**Embed** Embeds the selected channels under SDI OUT MAPPING to the SDI output. **Through** Passes through the SDI input audio without modification. For 3G/HD-SDI signals, set the parameter for each group. For SD-SDI signals, set the parameter for all groups.
	SD	---		

6-3-2. SDI OUT STEREO MODE

Parameter	Channel	Default	Description
SDI MODE	CH1/2 to CH15/16	Stereo	**Stereo** Outputs audio in normal stereo mode. **L-CH** Outputs L-CH audio for both L and R. **R-CH** Outputs R-CH audio for both L and R. **L+R** Outputs L and R mixed audio (monaural) for both L and R. **L-Mute** Mutes L-CH audio. **R-Mute** Mutes R-CH audio.

6-3-3. SDI OUT RESOLUTION

Parameter	Channel	Default	Description
SDI RESO	CH1 to 16	24bit	Sets the sampling resolution (bit depth) for output audio. The sampling resolution cannot be set for non-PCM audio. (See section 6-1-3.) **24bit** Outputs embedded 24-bit audio. **20bit** Outputs embedded 20-bit audio. **16bit** Outputs embedded 16-bit audio.

6-3-4. SDI OUT GAIN

Parameter	Channel	Default	Description
SDI Gain	CH1 to 16	0.0dB	Adjusts the output gain for each embedded audio channel. Gain adjustment cannot be performed for non-PCM audio channels. (See section 6-1-3.) **-20.0dB** to **+20.0dB** (in 0.1dB steps)

6-4. LTC Menu

See section 7-2. "TIME CODE Processing" for details on time code processing.

6-4-1. LTC MUX

Parameter	Default	Description
LTC MUX	Through	Passes through or changes ANC time code data in the SDI output. **Through** Passes through ANC data in SDI input without modification. **MUX** Overwrites ANC data with the LTC selected under LTC SEL below.

6-4-2. LTC SEL

Parameter	Default	Description
LTC SEL	AES	Selects LTC (time code) data to be embedded into the SDI output. **AES** Uses the time code data of AES CH7/8 input for SDI output. **Analog** Uses the time code data input from the UFM-30MUX AI for SDI output.

* Time code input for AES CH7/8 can be selected on the front panel. (See section 2-1. UFM-30MUX.)

6-5. System Menu

6-5-1. SDI BYPASS

Parameter	Default	Description
SDI BYPS	Operate	Selects whether the SDI input is processed or bypassed when powered On. Basically, the SDI input signal is directly sent to the SDI output via relay when powered Off. **Operate** Processes and sends the SDI input signal to the SDI output. **Bypass** Directly sends the SDI input to the SDI output via relay.

6-5-2. SDI LOCK MODE

Parameter	Default	Description
SDI Lock	Auto	Selects the Auto Detect or Specified TV standard for SDI signals. **Auto** Automatically detects and sets the SDI TV standard. If the SDI input signal is abnormal, the standard set under **Format** (see the next parameter) is applied. **Internal** Forcibly applies the TV standard set under **Format** to SDI signals.

6-5-3. TV SYSTEM

Parameter	Default	Description
Format	1080/59i	Sets the SDI TV standard. (See the SDI LOCK MODE parameter described above.) See the table below for available formats.

Format settings

3G SDI	HD SDI		SD SDI
1080/59a 1080/50a 1080/60a 1080/59b 1080/50b 1080/60b a: Level A b: Level B	1080/59i 1080/50i 1080/60i 1080/30p 1080/29p 1080/25p 1080/24p 1080/23p 1080/24s 1080/23s	720/59p 720/50p 720/60p 720/24p 720/23p 1035/59i 1035/60i s: PsF	525/60 625/50

6-5-4. MINIMUM DELAY

Parameter	Default	Description	
MIN DLY	Off	**On**	Sets the SDI I/O delay time to minimum (within 4 µsec). But audio channel mapping is unavailable. (See section 7-3 "MINIMUM DELAY.")
		Off	Sets the SDI I/O delay time to normal (1H). Audio channel mapping is available.

6-5-5. REF LEVEL

Parameter	Default	Description
REF LVL	-20dB	Selects the digital audio reference level. (See section 8-2." Digital Output Level versus Analog Input Level.") **-20dB** **-18dB**

6-5-6. TEST MODE

Parameter	Default	Description	
Test SIG	Off	Setting to ON outputs an audio test signal.	
		On	Outputs an internally generated 1 kHz audio test signal (by embedding into SDI signals).
		Off	Outputs the selected input audio.

6-5-7. FACTORY SET

Parameter	Execution	Description
FACT SET	EXEC	Allows you to reset all parameters to factory values. To reset all parameters, **press the control** or move the **Up/Down** switch to **Up** while EXEC is displayed.

6-6. Status Menu (Display only)

6-6-1. SDI STATUS

Parameter	Description
SDI ERR	Displays the SDI input status. **No Error** Normal **No SIG** No SDI signal detected **CRC ERR** CRC error detected

6-6-2. SDI TV SYSTEM

Parameter	Description
Format	Displays the detected SDI input signal format. If TV standard detection has failed, "**UNKNOWN**" is displayed.

6-6-3. SDI AUDIO IN ON/OFF

Parameter	Channel	Description
SDI AUD	Group1 Group2 Group3 Group4	Displays the presence or absence of embedded audio in the SDI input on each channel. **4oooo 1** CH4 to 1 status **8ooxx 5** CH8 to 5 status **12xxxo 9** CH12 to 9 status **16xxxx13** CH16 to 13 status (**o**: Audio present **x**: Audio absent)

6-6-4. SDI AUDIO IN SYNC

Parameter	Description
SDI Sync	Displays the embedded audio sync information in the SDI input on each group. **G4aassG1** Group 4 to 1 status (**a**: Asynchronous **s**: Synchronous **x**: No signal)

6-6-5. SDI AUDIO IN PCM

Parameter	Description
SDI PCM	Displays the embedded audio PCM/non-PCM information in the SDI input on each group. **G4ppnpG1** Group 4 to 1 status (**p**: PCM **n**: Non-PCM **x**: No signal)

6-6-6. LTC IN ON/OFF

Parameter		Description
LTC In	SDI AES ANA	Displays the presence or absence of LTC signal. **ON** LTC present **OFF** LTC absent

6-6-7. AES IN ON/OFF

Parameter	Description
AES In	Displays the presence or absence of AES audio input to each channel pair. **78oooo12** AES 7/8 to 1/2 status (**o**: Audio present **x**: Audio absent)

6-6-8. AES IN SYNC

Parameter	Description
AES Sync	Displays the sync information of AES audio input to each channel pair. **78aass12** AES 7/8 to 2/1 status (**a**: Asynchronous **s**: Synchronous **x**: No signal)

6-6-9. AES AUDIO IN PCM

Parameter	Description
AES PCM	Displays the PCM/non-PCM information of AES audio input to each channel pair. **78ppnp12** AES 7/8 to 2/1 status (**p**: PCM **n**: Non-PCM **x**: No signal)

6-6-10. SLOT

Parameter	Description
Slot	Displays the installed slot number of the UFM frame.

6-6-11. OPTION

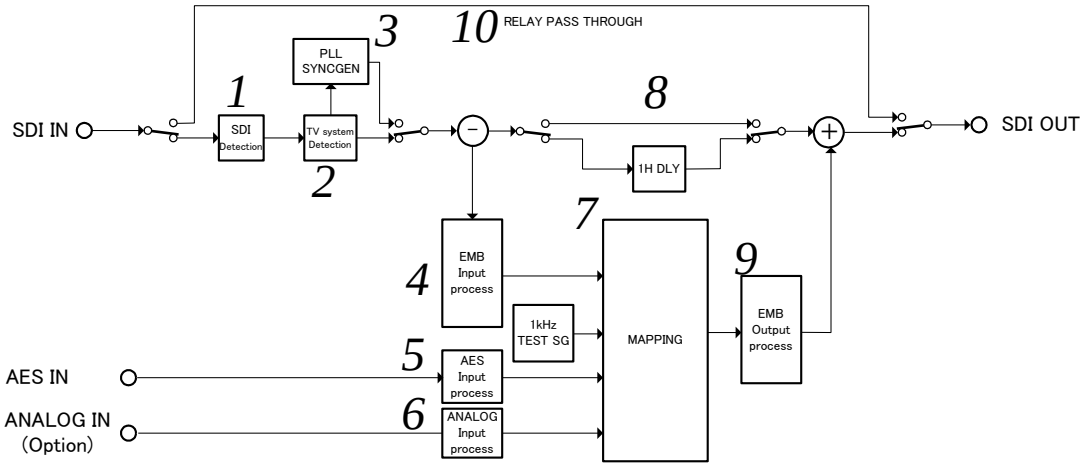
Parameter	Description
Option	Displays the option module status. **No Opt** No option installed. **3MUXAI** UFM-3MUXAI option installed.

6-6-12. VERSION

Parameter		Description
Version	CPU FPGA CPLD	Displays version information.

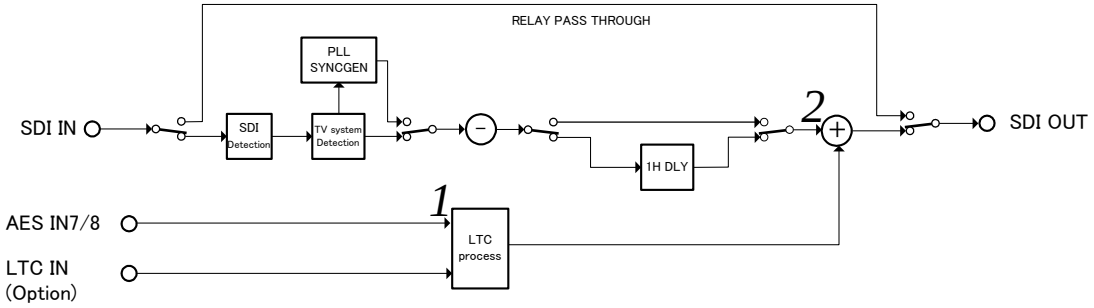
7. Workflow Block Diagrams

7-1. AUDIO Processing



No.	Process	Menu Parameter Reference			
1	SDI input signal detection	6-6-1	6-6-2		
2	TV standard detection	6-5-3			
3	PLL & SYNC generator	6-5-2			
4	SDI AUDIO input	6-1-1 6-6-4	6-1-3 6-6-5	6-1-5	6-6-3
5	AES AUDIO input	6-1-2 6-6-8	6-1-3 6-6-9	6-1-5	6-6-7
6	ANALOG AUDIO input	6-1-4	6-1-5	6-5-5	
7	Channel mapping	6-2-1	6-5-6		
8	Video 1H delay line	6-5-4			
9	SDI AUDIO output	6-3-1	6-3-2	6-3-3	6-3-4
10	SDI Relay pass-through	6-5-1			

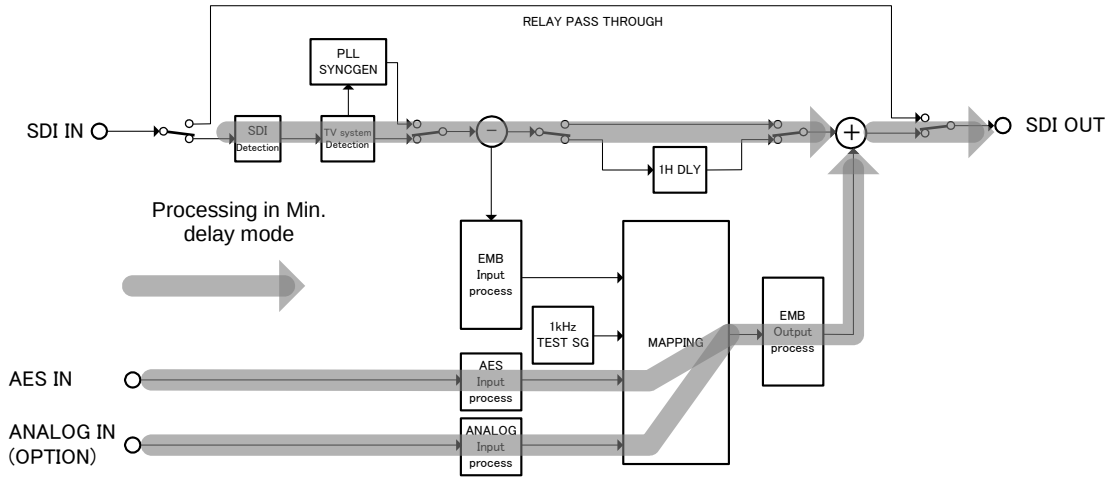
7-2. TIME CODE Processing



No.	Process	Menu Parameter Reference	
1	LTC signal detection	6-4-2	6-6-6
2	TIME CODE multiplexer	6-4-1	

7-3. MINIMUM DELAY

Minimum Delay mode allows users to perform signal processing from input to output in a minimum amount of time, within 4 µsec. (See section 6-5-4.) In normal processing mode, processing takes about 1 H and can control all menu parameters.
In minimum delay mode, AES or analog audio can be embedded to the SDI output stream, but the SDI input audio channels cannot be remapped.



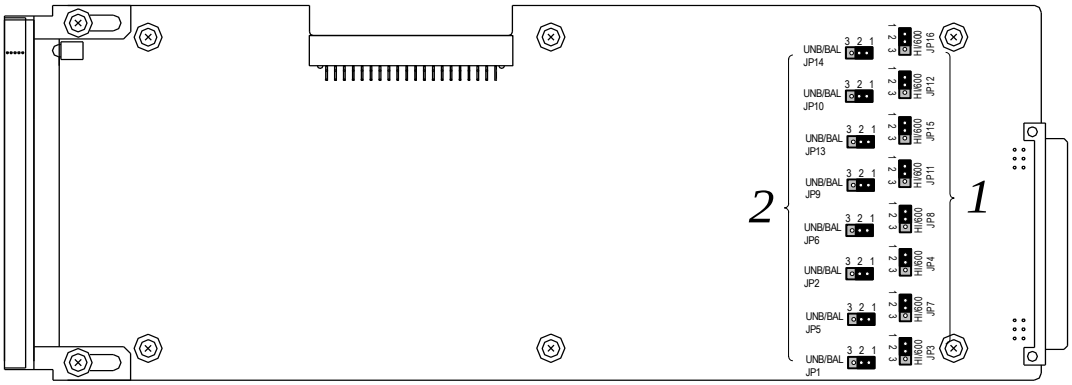
◆ **Available Menu Parameters in Minimum Delay mode**

Section	Menu Parameters
6-1-2	AES IN SYNC MODE
6-1-3	AES IN PCM MODE
6-1-4	ANALOG INPUT LEVEL
6-1-5	AES IN GAIN and ANALOG GAIN
6-2-1	SDI OUT MAPPING Available settings: **AES CH1 to 8** and **ANA CH1 to 8**
6-3-2	SDI OUT STEREO MODE (Available only for channels to which AES or analog input audio is assigned.)
6-3-3	SDI OUT RESOLUTION (Available only for channels to which AES or analog input audio is assigned.)
6-3-4	SDI OUT GAIN (Available only for channels to which AES or analog input audio is assigned.)
6-4-1	LTC MUX
6-4-2	LTC SEL
6-5-1 to 7	All System menu parameters
6-6-1 to 12	All Status menu parameters

8. UFM-3MUXAI Card Settings

No settings are required for UFM-30MUX front cards.
No settings are required for UFM-30MUX rear cards.

8-1. UFM-3MUXAI FRONT CARD



No.	Name	Description
1	HI/600	Selects analog audio input impedance. **600 ohm** **1-2 Short** (factory default) **Hi impedance** **2-3 Short** JP16 CH4-R JP12 CH4-L JP15 CH3-R JP11 CH3-L JP8 CH2-R JP4 CH2-L JP7 CH2-R JP3 CH2-L
2	UNB/BAL	Selects balanced or unbalanced analog audio inputs. **Balanced** **1-2 Short** (factory default) **Unbalanced** **2-3 Short** JP14 CH4-R JP10 CH4-L JP13 CH3-R JP9 CH3-L JP6 CH2-R JP2 CH2-L JP5 CH2-R JP1 CH2-L

No settings are required for UFM-3MUXAI rear cards.

8-2. Digital Output Level versus Analog Input Level

Analog Input Level parameters: ANALOG INPUT LEVEL (See section 6-1-4)
Digital Reference Level parameters: REF LEVEL (See section 6-5-5)

◆ **If the digital reference level is set to -20dBFS:**

Analog Input Level setting (dB)

Analog input level	-20	-10	-4	0	+4	+8	+10
-20	-20dBFS	-30dBFS	-36dBFS	-40dBFS	-44dBFS	-48dBFS	-50dBFS
-10	-10dBFS	-20dBFS	-26dBFS	-30dBFS	-34dBFS	-38dBFS	-40dBFS
-4	-4dBFS	-14dBFS	-20dBFS	-24dBFS	-28dBFS	-32dBFS	-34dBFS
0	0dBFS	-10dBFS	-16dBFS	-20dBFS	-24dBFS	-28dBFS	-30dBFS
+4	CLIP	-6dBFS	-12dBFS	-16dBFS	-20dBFS	-24dBFS	-26dBFS
+8	CLIP	-2dBFS	-8dBFS	-12dBFS	-16dBFS	-20dBFS	-22dBFS
+10	CLIP	0dBFS	-6dBFS	-10dBFS	-14dBFS	-18dBFS	-20dBFS

0dB≒0.775V(rms)

◆ **If the digital reference level is set to -18dBFS:**

Analog Input Level setting (dB)

Analog input level	-20	-10	-4	0	+4	+8	+10
-20	-18dBFS	-28dBFS	-34dBFS	-38dBFS	-42dBFS	-46dBFS	-48dBFS
-10	-8dBFS	-18dBFS	-24dBFS	-28dBFS	-32dBFS	-36dBFS	-38dBFS
-4	-2dBFS	-12dBFS	-18dBFS	-22dBFS	-26dBFS	-30dBFS	-32dBFS
0	CLIP	-8dBFS	-14dBFS	-18dBFS	-22dBFS	-26dBFS	-28dBFS
+4	CLIP	-4dBFS	-10dBFS	-14dBFS	-18dBFS	-22dBFS	-24dBFS
+8	CLIP	0dBFS	-6dBFS	-10dBFS	-14dBFS	-18dBFS	-20dBFS
+10	CLIP	CLIP	-4dBFS	-8dBFS	-12dBFS	-16dBFS	-18dBFS

0dB≒0.775V(rms)

9. Troubleshooting

If any of the following problems occur while operating your UFM-30MUX, proceed as indicated below to see if the problem can be corrected before assuming a unit malfunction has occurred.

Problem	Check	Action
Cannot operate the front panel switches.	Is the **OPERATE/LOCK** switch on the front panel set to **LOCK**?	Set the switch to **OPERATE**.
No video displayed.	<SDI signal connection> Is an SDI signal present? **No SIG** or **CRC ERR** is displayed under [Status - SDI ERR] (See section 6-6-1.)	Verify the physical SDI connection.
	<SDI signal format> Is the SDI input format supported? **UNKNOWN** is displayed under [Status - Format]. (See section 6-6-2.)	Input a supported SDI signal. (See section 6-5-3. "TV SYSTEM" for details on supported TV standards.)
	<SDI signal format> Are the [System - Format] setting (see section 6-5-3) and the SDI input format different?	Set [System - SDI Lock] to **Auto**. (See section 6-5-2.) Or, set [System - Format] to the SDI input format. (See section 6-5-3.)
Cannot map audio channels.	Is [System - SDI BYPS (SDI BYPASS)] set to **Bypass**? (See section 6-5-1.)	Set to **Operate**.
	Is [System - MIN DLY (MINIMUM DELAY)] set to **ON**? (See section 6-5-4.)	Set to **OFF**.
	Is [Output - EMB THRU] set to **Through**? (See section 6-3-1.)	Set to **Embed**.
Cannot map audio per channel.	Is an audio channel asynchronous? "**a**" is displayed under [Status - SDI Sync] (See section 6-6-4.) "**a**" is displayed under [Status - AES Sync] (See section 6-6-8.)	Group audio mapping is automatically performed if an asynchronous audio channel is included in a group.
Strange or noisy sound output (SDI)	Are asynchronous or non-PCM audio forcibly assigned per channel? (See sections 6-1-1 to 6-1-3.)	Assign audio per group if an asynchronous or non-PCM audio channel is included in a group.
Cannot output (embed) the AES7/8 audio input.	Is the **AES/LTC** switch on the front panel set to **LTC**?	Set the switch to **AES**.
Cannot output (embed) the LTC signal, which is input from AES7/8.	Is the **AES/LTC** switch on the front panel set to **AES**?	Set the switch to **LTC**.
	Is [LTC- LTC MUX] set to **Through**? (See section 6-4-1.)	Set to **MUX**.

10. Specifications and Dimensions

10-1. Specifications

10-1-1. UFM-30MUX

Video formats	3G-SDI: 1080/59.94p, 50p, 60p (Level A and Level B)		
	HD-SDI: 1080/59.94i, 50i, 60i		
	1080/30p, 29.97p, 25p, 24p, 23.98p, 24PsF, 23.98PsF		
	720/59.94p, 50p, 60p, 24p, 23.98p		
	1035/59.94i, 60i		
	SD-SDI: 525/60,625/50		
	(Auto format detection)		
SDI input	3G-SDI: 3 Gbps		
	HD-SDI: 1.5 Gbps		
	SD-SDI: 270 Mbps		
	75Ω BNC x 1		
SDI output	3G-SDI: 3 Gbps		
	HD-SDI: 1.5 Gbps		
	SD-SDI: 270 Mbps		
	75Ω BNC x 1		
Audio input			
SDI embedded	3G/HD-SDI		
	Number of channels	16 ch	
	Sampling bit rate	16/20/24-bit	
	Sampling frequency	48 kHz (Synchronous) 48 k/44.1 k/32 kHz (Asynchronous, per group)	
	SD-SDI		
	Number of channels	16	
	Sampling bit rate	16/20-bit	
	Sampling frequency	48 kHz (Synchronous only)	
AES/EBU	Unbalanced, 75Ω BNC x 4		
	Number of channels	8 ch	
	Sampling bit rate	16/20/24-bit	
	Sampling frequency	32 kHz to 48 kHz (If SRC used) 48 k(同期) 48 k/44.1 k/32 kHz (Asynchronous, 3G/HD only)	
Time code input	LTC 1.0 V(p-p) ±6.0 dB BNC x 1		
Audio output			
SDI embedded	3G/HD-SDI		
	Number of channels	16 ch	
	Sampling bit rate	16/20/24-bit	
	Sampling frequency	48 kHz (Synchronous) 48 k/44.1 k/32 kHz (Asynchronous, per group)	
	SD-SDI		
	Number of channels	16 ch	
	Sampling bit rate	16/20-bit	
	Sampling frequency	48 kHz (Synchronous only)	
Audio in/out gain	Adjustable from -20 to +20 dB (in 0.1dB steps)		
I/O delay (SDI IN - OUT)	1H or minimum delay (set in menu) Minimum delay time: within 4 μsec (Audio mapping unavailable)		

I/O delay (Audio IN-SDI OUT)	Within 1.8 ms
Temperature	0ºC to 40ºC
Humidity	30% to 85% (no condensation)
Power	Supplied from UFM frame, +24 V DC
Power current	0.4 A
Dimensions	106 (W) x 293.2 (D) mm (Front card) 108.5(W) x 91.6 (D) (Rear card)
Weight	0.5 kg
Consumables	None
Options	UFM-3MUXAI: Analog input option for UFM-30MUX UFM-30CTL: Control card

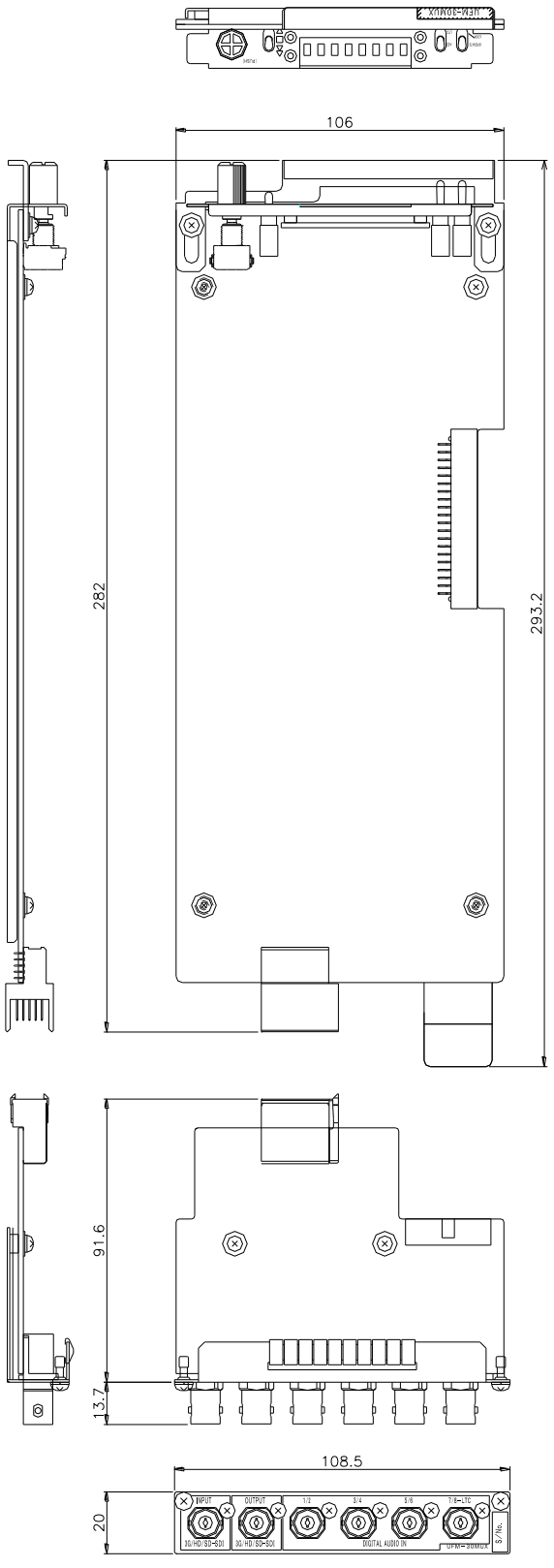
10-1-2. UFM-3MUXAI

Audio Input	
Analog input	Balanced/Unbalanced 8 ch (4 stereo pairs) 25-pin D-sub (female) x 1,
Digital reference level	-18/-20 dBFS selectable
Input level adjust	-20dBu/-10dBu/-4dBu/0dBu/+4dBu/+8dBu/+10dBu selectable (+4dBu: default) 600Ω or high impedance selectable
In/out gain	-20 to +20 dB (adjustable in 0.1dB steps)
Max output level	+24 dB (Balanced), +18dB (Unbalanced)
Sampling frequency	48 kHz (synchronized with video)
Quantization bit	24-bit (16/20/24-bit selectable when in embedding)
Frequency response	±0.2 dB (20 Hz to 20 kHz) (reference level: 1 kHz)
S/N ratio	More than 70 dB (w/o A-Weight filter, 1 kHz full-scale)
Distortion	Less than 0.05% (1 kHz, +24 dB input)
Crosstalk	More than 80 dB (1 kHz, +24 dB input)
Audio output	
SDI embedded	Output from the SDI OUT on the UFM-30MUX as embedded audio. (Free-assignable)
Time code input	LTC 1.0 V(p-p)±6.0 dB Unbalanced BNC x 1
Temperature	0ºC to 40ºC
Humidity	30% to 85% (no condensation)
Power	Supplied from UFM frame, +24 V DC
Power current	0.2 A
Dimensions	106 (W) x 303 (D) mm (Front card) 108.5(W) x 66.1 (D) (Rear card)
Weight	0.5 kg (including flat cable)

10-2. External Dimensions

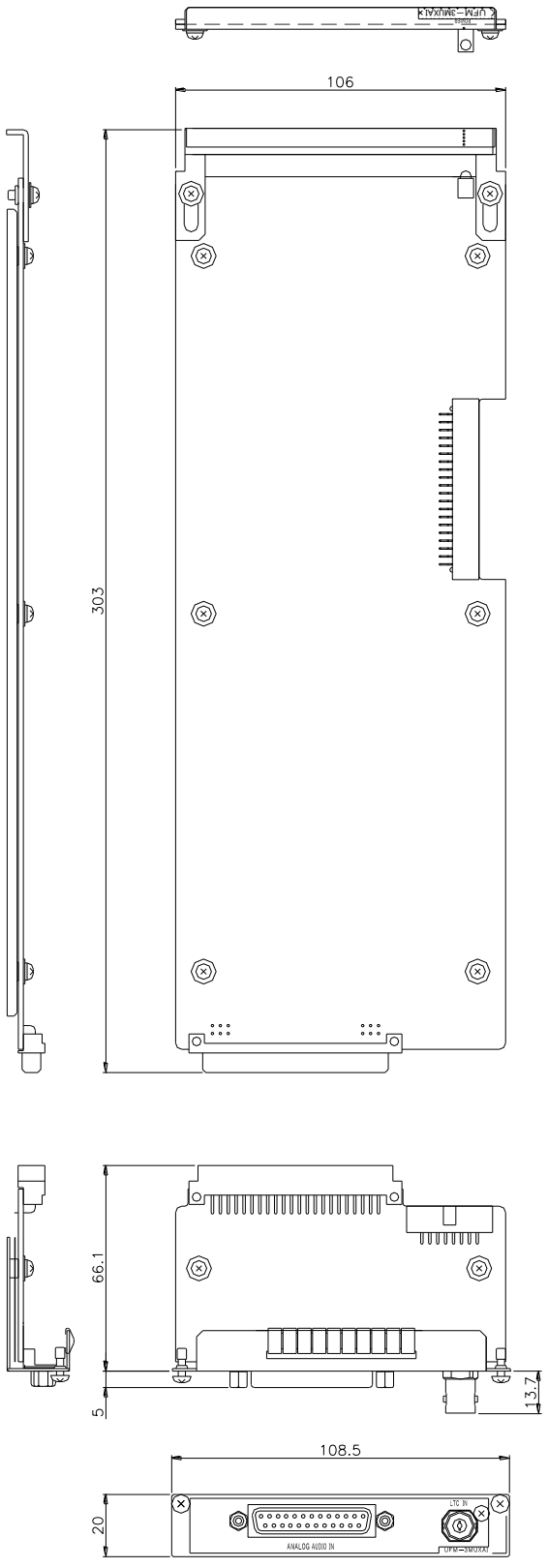
10-2-1. UFM-30MUX

(All dimensions in mm)



10-2-2. UFM-3MUXAI

(All dimensions in mm)



Warning

This equipment has been tested and found to comply with the limits for a Class A digital 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 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.

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