

# 3509A-001

## OFDM IF MODULATOR



Corresponding list between type and remote interface.

Type	Remote Interface
3509A-001	GP-IB & RS-232C
3509A-003	GP-IB & 10BASE-T

### General

This unit is OFDM IF modulator corresponding to ISDB-T terrestrial digital television broadcasting system and conforms to "The technical condition of terrestrial digital television broadcasting system" in "The technical condition relating to digital broadcasting system" of Telecommunication Technology Deliberative Assembly Consultation No.74.

This unit corresponds to broadcasting TS input described in chapter 5 of "Annex-Operation Guideline for Terrestrial Digital Television Broadcasting" of ARIB STD-B31 ver.1.1, and each setting (Mode, guard interval rate and settings related to TMCC, such as modulation scheme, number of segment to be used and etc.) is made automatically according to input broadcasting TS. Interface is ASI or SPI.

### Features

- TS input is broadcasting TS. Interface equips ASI and SPI. Each setting of this unit is set automatically according to input broadcasting TS.
- PN signal generator ( $g(x) = X^{23} + X^{18} + 1$ : Invert output and  $g(x) = X^{15} + X^{14} + 1$ : Invert output) is built-in on Reed-Solomon Code adding part and carrier modulation part, so that error rate measurement before/after Reed-Solomon correction and before Viterbi correction is possible.
- Function to pass each process individually, such as Reed-Solomon code adding, energy dispersion, bit interleave, byte interleave, time interleave and frequency interleave, is equipped.
- OFDM modulated wave of center frequency of 37.15MHz is output. SAW band-pass filter is built-in and output has enough margin spectrum mask of ARIB.
- Output monitor terminal is equipped on front panel.
- Synchronization with reference frequency (10MHz or 512/63MHz) input from external is possible.
- For remote control, GP-IB interface and RS-232C interface are equipped as the standard. As an option, changing RS-232C to 10BASE-T is possible.

### Composition

Main Unit ..... 1

Dimensions 425(W)×99(H)×480(D) mm (Excluding projections)  
Weight Approx. 12 kg

### Accessories

Power Cable (Including 3pin→2pin converter) ..... 1  
Rack Mount Adapter ..... 1set  
Instruction Manual and Test Result Sheet ..... 1

### Power Source

Input Voltage Allowable Range : AC90V ~ AC250V (50Hz/60Hz)  
Power Consumption : Approx. 100VA

※This unit has cleared power source immunity test in compliance with "IEC61000-4-11 Rank C"

### Operating Environment

Temperature : +5°C ~ +40°C  
Humidity : 45% ~ 85%RH (No dew generation)

### Rating

#### System

This unit corresponds to MODE1, MODE2 and MODE3 of ISDB-T, and guard interval rate of 1/4, 1/8, 1/16 and 1/32 according to "The technical condition of terrestrial digital television broadcasting system" in "The technical condition relating to digital broadcasting system" of Telecommunication Technology Deliberative Assembly Consultation No.74. Also this unit corresponds to carrier modulation scheme (DQPSK, QPSK, 16QAM and 64QAM), convolution coding rate (1/2, 2/3, 3/4, 5/6 and 7/8), time interleave (0, 1, 2, 4, 8, 16 and 32, but depending on MODE) and number of segment (0~13) in each layer.

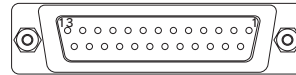
#### Input

##### • DVB-ASI (Broadcasting TS) Input (TS IN)

BNC-R : 1 route  
Interface : Conforming to DVB-ASI  
Impedance : 75 Ω  
Data Transmission Speed :  $(8 \times 256 \times 10E6) / 63 \approx 32.508\text{Mbps}$   
Transmission Format : Conforming to Chapter 5 of ARIB STD-B31 Ver. 1.1

##### • DVB-SPI (Broadcasting TS) Input (TS IN)

D-sub25S (Fixing Base—#40 Inch size screw) : 1 route  
Interface : Conforming to DVB-SPI (Conforming to TIA/EIA-644)  
Data Transmission Speed :  $(256 \times 10E6) / 63 \approx 4.064\text{Mbytes/s}$   
Transmission Format : Conforming to Chapter 5 of ARIB STD-B31 Ver. 1.1  
Connector Pin Assignment : Following list



#### Pin Connection List

Pin No.	Signal Name	Pin No.	Signal Name
1	+ CLOCK	14	- CLOCK
2	System Gnd	15	System Gnd
3	+ Data 7 (MSB)	16	- Data 7
4	+ Data 6	17	- Data 6
5	+ Data 5	18	- Data 5
6	+ Data 4	19	- Data 4
7	+ Data 3	20	- Data 3
8	+ Data 2	21	- Data 2
9	+ Data 1	22	- Data 1
10	+ Data 0	23	- Data 0
11	+ DVALID	24	- DVALID
12	+ PSYNC	25	- PSYNC
13	Cable Shield		

BNC-R : 1 route  
Input Level : 0dBm ± 6dB  
Impedance : 50 Ω  
Frequency Accuracy : Within  $\pm 1 \times 10^{-6}$

##### • 512/63MHz Input (512/63MHz IN)

BNC-R : 1 route  
Input Level : TTL  
Impedance : 50 Ω  
Frequency Accuracy : Within  $\pm 1 \times 10^{-6}$

#### Output

##### • IF Signal Output (IF OUT(37.15MHz))

BNC-R : 1 route  
Output Level : -10dBm ± 1dB  
Impedance : 50 Ω  
Center Frequency : 37.15MHz

##### • IF Signal Monitor Output (OUTPUT MONI)

BNC-R : 1 route (Front panel side)  
Output Level : -20dBm ± 1dB  
Impedance : 50 Ω  
Center Frequency : 37.15MHz

##### • 10MHz Output (10MHz OUT)

BNC-R : 1 route  
Output Level : TTL  
Impedance : 50 Ω

#### • Clock Output (TS CLK OUT)

BNC-R	: 1 route
Output Level	: TTL
Impedance	: 50 $\Omega$
Output Frequency	: By setting, selection from 10MHz, 2048/63MHz, 512/63MHz, 256/63MHz
Frequency Accuracy	: Within $\pm 1 \times 10^{-6}$

#### • GP-IB (GP-IB)

GP-IB Connector	: 1 route
Input/Output	: Conforming to IEEE488

#### • RS-232C (RS-232C)

D-sub9S (Fixing Base - #40 Inch size screw)	: 1 route
Asynchronous	
Communication Speed	: 19200bps
Data Length	: 8 bits
Stop Bit	: 1 bit
Parity	: No

※This may be the selection either GP-IB or 10 BASE-T.

※Use straight cable for connection with PC.

#### • 10 BASE-T (10 BASE-T)

RJ-45 type	: 1 route
Input/Output	: Conforming to IEEE802.3

※This may be the selection either 10 BASE-T or RS-232C

※Use cross cable for connection with PC.

### Performance

#### • IF Signal Output

Level Variation	: Within $\pm 1$ dB of rated output
Frequency Accuracy	: Within $\pm 1 \times 10^{-6}$ (After more than 10 min. warm-up after power on)
Modulated Wave Band width	: 5.57MHz
Local Frequency	: Upper side against IF output
Frequency Response in Band	: Within $\pm 0.3$ dB
IM Characteristic	: Less than $-56$ dB
Spurious out of Band	: Less than $-63$ dBc (Except IM)
Phase Noise	: Less than $-95$ dBc/Hz (110Hz offset)
Spectrum Mask	: Following List

#### Break Point of Spectrum Mask

Deviation from Center Frequency	Relative Level	Deviation from Center Frequency	Relative Level
-2.79MHz	0dB	+2.79MHz	0dB
-2.86MHz	-20dB	+2.86MHz	-20dB
-3.00MHz	-27dB	+3.00MHz	-27dB
Less than -4.36MHz	Less than -50dB	More than +4.36MHz	Less than -50dB

※Each setting of spectrum analyzer is that frequency span of less than 20MHz, resolution band width (RBW) of 10KHz and video band width (VBW) of less than 300Hz or averaging.