

3513B-001

MULTI-SYSTEM DIGITAL MODULATOR



General

This unit is all-in-one type digital modulator which can select and output digital modulated wave, such as DVB-T system (Terrestrial : COFDM modulation), DVB-C system (Cable : QAM modulation) and DVB-S system (Satellite : QPSK modulation) of digital broadcasting system in Europe and ATSC system (Terrestrial : 8VSB modulation) and ITU-T J.83B system (Cable : QAM modulation).

TS signal generator and noise signal generator are built-in, so that picture evaluation test of receiver can be made by this unit only. Also, by using Eiden's 7706A Transmission Tester, BER measurement of TS format is possible.

Features

- Digital modulated wave, such as DVB-T system (Terrestrial : COFDM modulation : BDW 6, 7 and 8MHz), DVB-C system (Cable : QAM modulation), DVB-S system (Satellite : QPSK modulation), ATSC system (Terrestrial : 8VSB modulation) and ITU-T J.83B (Cable : QAM modulation), can be selected and output (output is 1 route).
- DVB-T system is corresponding to layer transmission mode.
- 2 routes of TS generator are built-in. Data of video and audio are used by writing to internal memory via compact flash memory (CF card). (Eiden's software is used for writing).
Data capacity is each approx. 1Gbytes. Also, up to max. 4 kinds of contents can be put per 1 route.
- Noise signal generator is built-in and BER measurement of TS packet format is possible by combining with Eiden's 7706A Transmission Tester.
- Output center frequency for DVB-T, DVB-C, ATSC and ITU-T J.83B system is 47~870MHz and for DVB-S system is 950MHz~2150MHz.
- Output level is -65dB~-10dBm
- Remote control by GP-IB (IEEE-488.2) is possible.
- IF signal of 44MHz input/output terminals are equipped for DVB-T, ATSC and DVB-C system.
By this, connection with Eiden's All Channel Up Converter 4222A, 4220C and 4401A-DA□(Diversity converter) becomes possible, so that expansion to fading wave generation system including 2- diversity is also possible.
*commercializing of the type built-in CATV system of the U.S.A. (Annex-B) is prepared.
- System selecting function
Digital modulated wave, such as DVB-T (Terrestrial : COFDM modulation : BDW 6, 7 and 8MHz), DVB-C (Cable : QAM modulation), DVB-S(Satellite : QPSK modulation, ATSC (Terrestrial : 8VSB modulation) and ITU-T J.83B (Cable : QAM modulation) system, can be selected and be output.
- Modulation parameter setting function
Modulation parameter in each system can be changed.
- Frequency setting function
Output center frequency is 47~870MHz for DVB-T, DVB-C, ATSC and ITU-T J.83B system and is 950~2150MHz for DVB-S system.
- RF output level setting function.
Varying of -99~0dBm in 0.1dB step for DVB-T, DVB-C, ATSC and ITU-T J.83B system and of -80~-0dBm in 0.1dBm step for DVB-S system is possible.
- Noise signal generating function
ON/OFF of noise signal and C/N setting are possible.
Setting range of C/N can be set 0~40dB for DVB-T, DVB-C, ATSC and ITU-T J.83B system and 0~30dB for DVB-S system in 0.1dB step.
- PRBS generating function
For BER measurement, generation of PRBS in modulator is possible.
(223-1, generating polynomial : X²³+X¹⁸+1)
- Reference TS clock variable output function
For external TS signal generator, output of byte clock variable in 1Hz step is possible.
- TS generation output function
2 routes of TS are generated, and output to external as DVB-ASI signal is possible.

- Also, up to max. 4 kinds of contents can be put per 1 route.
- TS packet length automatic selecting function
Automatic judgement for packet length of input TS, whether it is 188Bytes or 204Bytes, is possible.
- Stuffing function
Function of stuffing process for input TS signal is equipped. In case that rate of input TS signal is less than that of regulated rate of each system, null packets are inserted automatically and meeting to sending rate is done.
Also, in case that rate is over sending rate, null packets are removed from input TS
- State indicating function
Issuing of FAN alarm and total alarm by red LED on front panel, and input/output state of TS and using state of noise signal generator by green LED are possible to confirm.
- Remote control function
Remote control by GP-IB (IEEE-488.2) is possible.

Composition

Main Unit	1
Dimensions	425(W)×132(H)×480(D) mm (Excluding projections)
Weight	Approx. 12 kg
Accessories	
Power Cable (Including 3pin→2pin converter)	1
Instruction Manual and Quality Guaranty Card	1
CF Card (1Gbytes)	2
(Note) Operation of card other than attached with this unit is not guaranteed.CF Card	
CF Card Reader	1
CF Card Case	1
Power Source	
Input Voltage Allowable Range	: AC90V~AC250V (50Hz/60Hz)
Power Consumption	: Approx. 100VA
Operating Environment	
Temperature	: +5°C ~ +40°C
Humidity	: 45% ~ 85% RH (No dew generation)

Rating

• Input Terminal

- TS input Terminal
For input of DVB-T, DVB-C, ATSC and ITU-T J.83B (TERRESTRIAL/CABLE)
[TS INPUT1 (HP)/ASI], [TS INPUT2 (LP)/ASI]
For input of DVB-S (SATELLITE)
[TS INPUT/ASI]
Connector : BNC-R
Impedance : 75 Ω
Signal Format : Conforming to DVB-ASI
※[TS INPUT2(LP)/ASI(75 Ω)] terminal can be used only at layer transmission mode of DVB-T system. LP (Low Priority) input.

IF Input Terminal [IF INPUT]

- Connector : BNC-R
Impedance : 50 Ω
Input Center Frequency : 44MHz
Input Signal Level : -10dB

(Note) Terminal for DVB-T, ATSC, DVB-C, ITU-T J.83. And this terminal is connected with IF output terminal by attached U-link normally.

• Output Terminal

- TS Output Terminal [TS OUTPUT/ASI], [TS OUTPUT/ASI]
Connector : BNC-R
Impedance : 75 Ω
Signal Format : Conforming to DVB-ASI
Output Rate : Max. 90Mbps

TS CLK Output Terminal

- [TS CLK OUTPUT1/TTL., TS CLK OUTPUT2/TTL]
Connector : BNC-R
Impedance : 50 Ω
Electrical Interface : TTL
Output Frequency : Max. 11.25MHz (Output as BYTE CLOCK)

IF Output Terminal [IF OUTPUT]

- Connector : BNC-R
Impedance : 50 Ω
Output Center Frequency : 44MHz
Output Signal Level : 10dBm (at noise OFF)

(Note) Terminal for DVB-T, ATSC, DVB-C and ITU-T J.83. And this terminal is connected with IF input terminal by attached U-link normally.

RF Output Terminal

- [RF OUTPUT/MAX -10dBm] (Equipped on front panel)
Connector : BNC-R
Impedance : 75 Ω

Output Center Frequency :
47MHz~870MHz, 1Hz step varied (DVB-T, DVB-C, ATSC and ITU-T J.83B system) 950-2150MHz, 10KHz step varied (DVB-S system)
Output Signal Level : -99dBm~0dBm, 0.1dB step varied (DVB-T, DVB-C, ATSC and ITU-T J.83B system)
-80dBm~0dBm, 0.1dB step varied (DVB-S system)

Other Interface

GP-IB Interface[GP-IB] : conforming to IEEE-488.2
Compact flash card slot for TS data [CF CARD]
Compact flash card slot for TS data [CF CARD]
Using Media : Compact flash card [CF CARD]
Type1, Type2
Capacity 1Gbytes

Performance

• Performance of DVB-T, DVB-C, ATSC and ITU-T 83.B system

Output Frequency Accuracy : Within ± 5 KHz
Output Level Stability : Within ± 0.5 dB *Regulated at -10dBm setting
Out Level Accuracy : *Regulated at 470MHz
Within ± 1.5 dB (-41~-10dBm)
Within ± 2.0 dB (-56~-41dBm)
Within ± 2.5 dB (-65~-56dBm)
Spurious Characterctic : Less than -60dB
*Regulated at 47~870MHz
*Regulated with non-harmonics level referenced to average power value.

• Performance of DVB-S system

Output Frequency Accuracy : Within ± 25 KHz
Output Level Stability : Within ± 2.0 dB
Out Level Accuracy : *Regulated at 950MHz
Within ± 2.0 dB (-41~-10dBm)
Within ± 2.5 dB (-56~-41dBm)
Within ± 4.0 dB (-65~-56dBm)
*Regulated with DVB-T 8MHz OFDM modulated wave
Spurious Characterctic : Less than -40dB
*Regulated at 950~2150MHz
*Regulated with non-harmonics level referenced to average power value.

Main Parameter of Each System

DVB-T Main Paramater

	DVB-T (6MHz)	DVB-T (7MHz)	DVB-T (8MHz)
COMPLIANT	EN300.744		
MAX TS RATE(188Byte)	23.75Mbps	27.70Mbps	31.66Mbps
MAX TS RATE(204Byte)	25.77Mbps	30.06Mbps	34.36Mbps
RANDOMIZATION	$1+X^{14}+X^{15}$		
OUTER CODING	RS(204,188,t=8)		
INTERLEAVING	Convolutional interleaving depth I=12		
CODE RATE	1/2,2/3,3/4,5/6,7/8		
FFT SIZE	2K,8K		
GUARD INTERVAL	1/4,1/8,1/16,1/32		
CONSTELLATION	QPSK,16QAM,64QAM		
ALPHA	1,2,4		
MODULATION	COFDM		

DVB-C Main Paramater

	DVB-C (Annex A)
COMPLIANT	EN300.429
MAX TS RATE(188Byte)	51.31Mbps
MAX TS RATE(204Byte)	55.68Mbps
RANDOMIZATION	$1+X^{14}+X^{15}$
OUTER CODING	RS(204,188,t=8)
INTERLEAVING	Convolutional interleaving depth I=12
ROLL OFF FACTOR	15%
CONSTELLATION	QPSK,16,32,64,128,256QAM
MODULATION	QAM

DVB-S Main Paramater

	DVB-S
COMPLIANT	EN300.421
MAX TS RATE(188Byte)	72.573529Mbps
MAX TS RATE(204Byte)	78.75Mbps
RANDOMIZATION	$1+X^{14}+X^{15}$
OUTER CODING	RS(204,188,t=8)
INTERLEAVING	Convolutional interleaving depth I=12
CODE RATE	1/2,2/3,3/4,5/6,7/8
ROLL OFF FACTOR	35%
MODULATION	QPSK

ATSC Main Paramater

	ATSC
COMPLIANT	ATSC DOC A53,A54
MAX TS RATE(188Byte)	19.392658Mbps
RANDOMIZATION	$1+X+X^3+X^5+X^7+X^{11}+X^{12}+X^{13}+X^{16}$
OUTER CODING	RS(207,187,t=10)
INTERLEAVING	Convolutional interleaving depth I=52
TRELLIS CODE	R=2/3
ROLL OFF FACTOR	11.52%
MODULATION	8VSB

ITU-T J.83B ATSC Main Paramater

	ITU-T J.83B(Annex B)
COMPLIANT	ITU-T J.83B
MAX TS RATE(188Byte)	31.81064Mbps
MAX TS RATE(204Byte)	42.113736Mbps
RANDOMIZATION	$1+X^7+X^3$
OUTER CODING	RS(128,122,t=3)
INTERLEAVING	Convolutional interleaving level1,level2
ROLL OFF FACTOR	18%(64QAM),12%(256QAM)
CONSTELLATION	64QAM,256QAM
MODULATION	QAM

Specifications and appearance described in this catalogue may be changed without any prior notice in order to improve product.