

MX370106A

DVB-T/H IQproducer™

MG3700A
Vector Signal Generator

For MG3700A Vector Signal Generator

MX370106A DVB-T/H IQproducer™ Product Introduction



Version 3.00

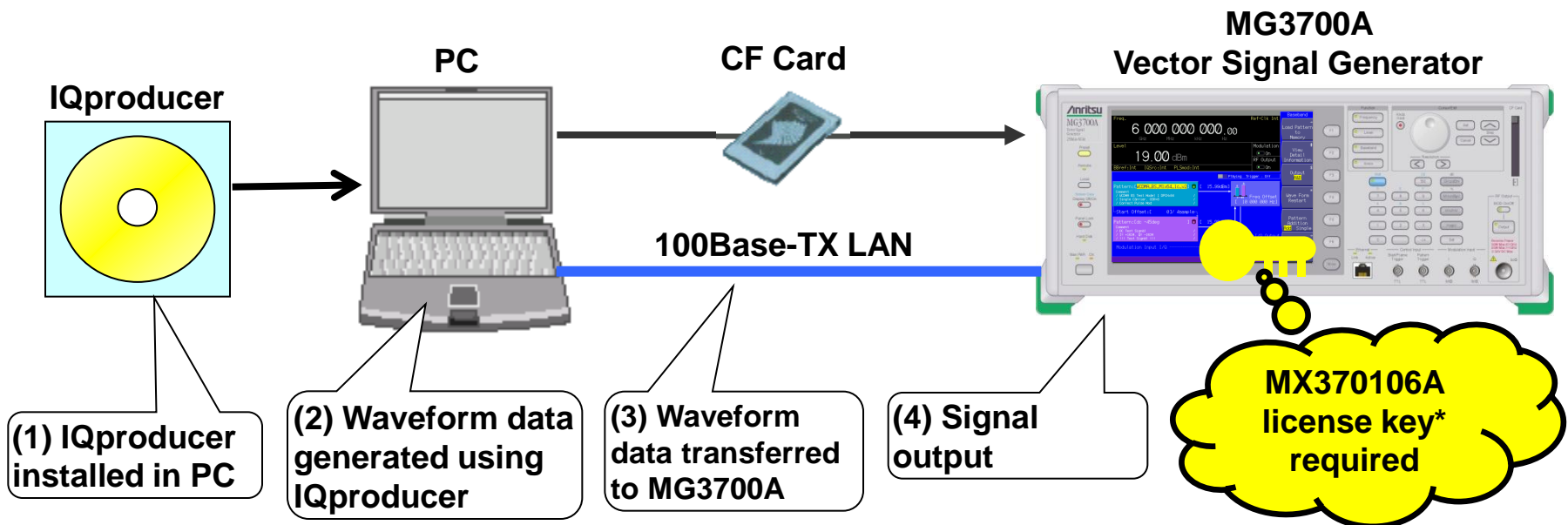
ANRITSU CORPORATION

Ordering Information

Model/ Order No.	Name	Remarks	
— Mainframe —			
MG3700A	Vector Signal Generator		Required
— Options —			
MG3700A-002	Mechanical Attenuator	Standard Electron Attenuator is changed into Mechanical Attenuator.	
MG3700A-011	Upper Frequency 6 GHz	Standard “250 kHz to 3 GHz” is extended to “250 kHz to 6 GHz.”	
MG3700A-021	ARB Memory Upgrade 512 M sample	Standard “128 Msample/channel × 2” is extended to “256 Msample/channel × 2.”	Recommendation The play time of 1GB movie file is about 16 seconds. When movie file is used, this option is recommended to be added beforehand.
MG3700A-031	High Speed BER Test Function	Standard “1 kbps to 20 Mbps” is extended to “100 bps to 120 Mbps.”	
— Softwares (License Key for IQproducer system) —			
MX370106A	DVB-T/H IQproducer		Required
MX370104A	Multi-carrier IQproducer		Indispensability When the band is 10MHz or more, MX370104A Multi-Carrier IQproducer is needed.
— Optional accessories —			
W2495AE	MG3700A operation manual	Booklet	Recommendation The PDF manual is on the software CD. Order this when a booklet is required.
W2496AE	MG3700A IQproducer operation manual	Booklet	
W2539AE	MG3700A standard waveform pattern operation manual	Booklet	
W2798AE	MX370106A DVB-T/H IQproducer operation manual	Booklet	
W2798AE	MX370104A Multi-carrier IQproducer operation manual	Booklet	
J1261D	Ethernet Cable (Shield Type)	Cross, 3 m	
Z0777	Standard waveform pattern upgrade kit	DVD set of pre-install wave form pattern of latest version	
G0141	HDD ASSY	Exchange HDD when built-in HDD break.	
J1277	IQ Output Conversion Adapter	Cable that converts IQ output connector (D-sub) of mainframe into BNC	Recommendation Converts IQ output connector on back of MG3700A from D-sub to BNC.

What is DVB-T/H IQproducer?

The MX370106A DVB-T/H IQproducer is GUI-driven PC application software meeting the ETSI EN 300 744 V1.5.1 2004-11 Physical Layer standard. Generated waveform patterns are downloaded to the MG3700A and used by the ARB generation function to output DVB-T/H modulation baseband signals and RF signals.



*Install the license key file in the main frame when adding a system license to a shipped unit. The MG3700A main frame does not require return to the factory.

What is DVB-T/H IQproducer?

[Parameter Setting Items Outline]

- **System: DVB-T, DVB-H**
- **Physical Layer: Transmission, Mode, Subcarrier Number, Bandwidth, Modulation Type and Guard Interval**
- **Function: Outer Coder, Outer Interleaver, Inner Coder, Code Rate, Inner Interleaver**
- **Data Pattern: When TS File is selected, any MPEG-2TS file (multiplexed audio/video binary data) can be loaded to generate a waveform pattern for monitoring.**
- **DVB-H: In-depth Symbol Interleaver, Time Slicing, MPE-FEC**
- **Filter**
- **Multipath**

- **Generating waveform patterns using MX3701xxA**

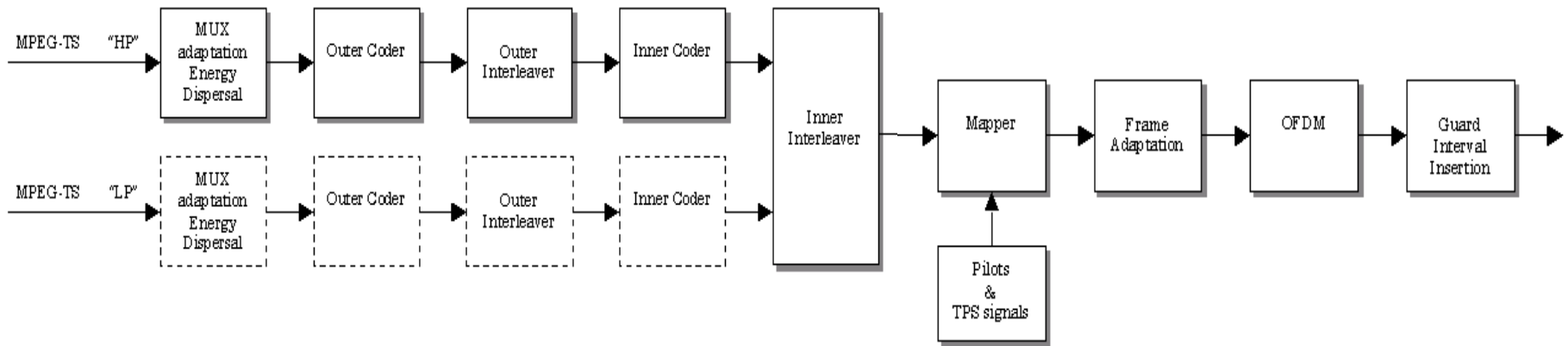
=> The main frame requires a license.

The unlicensed software will run on the PC to test waveform pattern generation but an unlicensed MG3700A cannot output signals because it does not recognize the waveform patterns.

- **Generating waveform patterns using EDA Tools (C, MATLAB, Microwave Office) => Free license**

What is DVB-T/H IQproducer?

This software processes the DVB-T/H Physical Layer as shown below. Outer Coder, Outer Interleaver, Inner Coder, Inner When all of Outer Coder, Outer Interleaver, Inner Coder, and Inner Interleaver are turned on and the data selected by Data Pattern is input to the MPEG-TS part. When each block is turned off, all blocks on the front side are turned off. The data selected by Data Pattern is inserted by skipping off blocks.



What is DVB-T/H IQproducer?

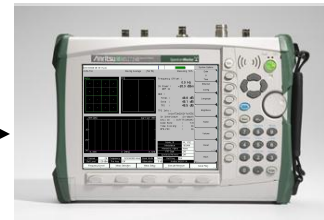
The MG3700A Vector Signal Generator outputs the DVB-T/H signal by using the waveform pattern generated by the MX370106A.

The MG3700A is used as a reference signal source for device Tx requirement tests and equipment Rx requirement tests.

MG3700A
Vector Signal Generator



MS2721B Spectrum Master
MS2721B-064 DVB-T/H Analysis Software



MER, OBW
Spectrum Mask,
Frequency, etc.

MG3700A
Vector Signal Generator



Monitor Check



BER Test using
error correction

DVB-T/H Rx Requirement Tests

The ETSI TR 101 290 DVB measurement guidelines for Rx tests are as follows:

Clause	Items	Outline	MG3700A	
9.14	BER vs. C/N ratio by variation of Gaussian noise power	This measurement can be used to compare the performance of a receiver with theory or with other receivers. - PRBS23 - Gaussian noise (AWGN)		- PRBS23 cannot be used. - Two signals (wanted signal and AWGN) can be output by one unit.
9.15	BER before Viterbi (inner) decoder	This measurement gives an in-service indication of the un-coded performance of the transmitter, channel and receiver. - BER Measurement before Viterbi decoding - The measurement should be based on at least several hundred bit errors.	OK	
9.16	BER before RS (outer) decoder	The BER is the primary parameter that describes the quality of the digital transmission link.		
9.16.1	Out of Service	- Null TS packet (4bytes: 0x47, 0x1F, 0xFF, 0x10. followed by 184 bytes: 0x00)	OK	- Null TS can be selected with Data Pattern.
9.16.2	In Service	- Compare the bit pattern of TS packet before and after RS decoding. - BER < 1e-3	OK	

Merits of MG3700A + MX370106A!

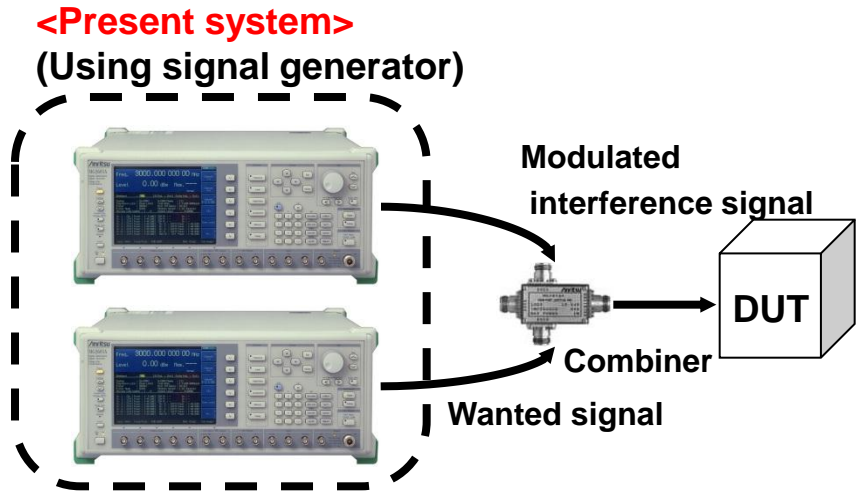
- ◆ One MG3700A unit outputs both wanted and interference signals.

Slide8

[Merit] Wanted signal + Interference signal

Waveform combine function <Standard>

The MG3700A contains two built-in arbitrary waveform memories (A and B) each of which can save one waveform pattern. The MG3700A outputs a signal from one memory or a combined signal from both memories.



• MG3700A Setting Screen Example

Easy level setting
- Each level
- C/N setting

Memory A: Wanted signal

Memory B: Interference signal

Frequency offset

2 140 000 000.00
GHz MHz kHz Hz

Level
0.00 dBm

BBref: Int IQSrc: Int PLSmod: Int

File Select : [WCDMA_LBS_ACS]

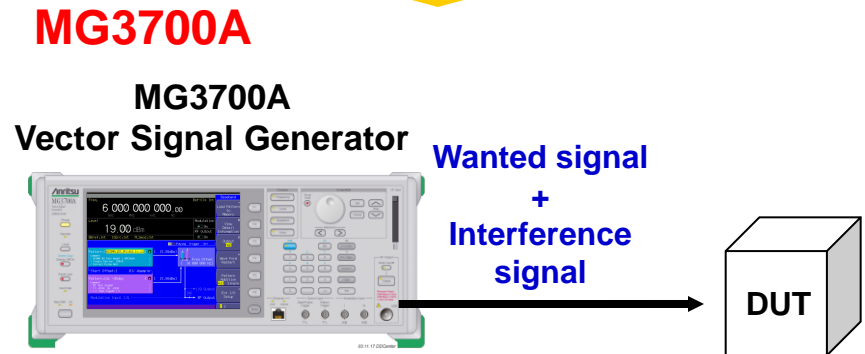
Output C&N

Waveform Restart

C/N Set Constant

Ext I/O Setup

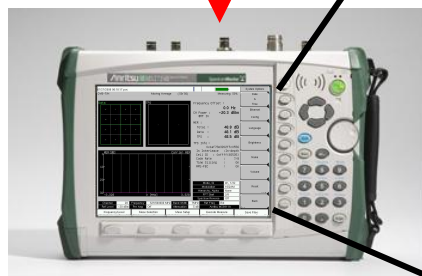
Modulation Input I/Q



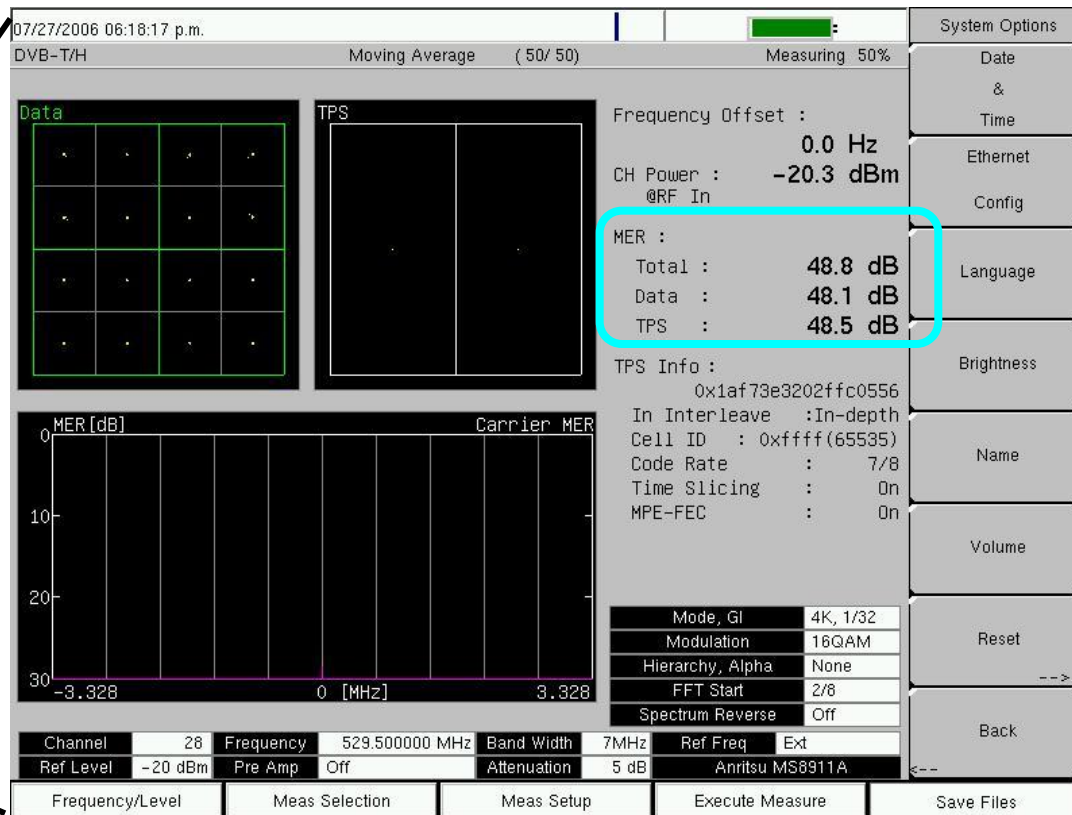
- Merit 1: One MG3700A unit outputs two signals
- Merit 2: No external combiner
- Merit 3: Simple level adjustment

[Merit] MG3700A MER Performance

**MG3700A
Vector Signal Generator**



- MS2721B Spectrum Master**
- MS2721B-064 DVB-T/H Analysis Software**
- MS2721B-078 DVB-T/H SFN Field Measurement Software**
- MS2721B-057 DVB-T/H BER Unit**



MER: 48 dB*

*The figure shows one measurement sample—not a guaranteed value.

Operation Image

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Setup

Connect the MG3700A and PC as shown below.

Install IQproducer in the PC.

Install the MX370106A license key in the MG3700A.

IQproducer



**100Base-TX LAN
Crossover cable**

**MG3700A Vector Signal Generator
+ MX370106A License key**



IQproducer™ Operating Environment

CPU	Pentium III, 1 GHz or faster
Memory	> 512 Mbytes or more
HDD	> 5 Gbytes or more
Display	1024 x 768 pixels or more
OS	Windows2000 ^(R) Professional, Windows XP ^(R)

*Read the appended [IQproducer Upgrade Procedure] for the IQproducer installation method.

*Read the appended [LAN Connection] for the LAN connection method between the PC and MG3700A.

Starting IQproducer

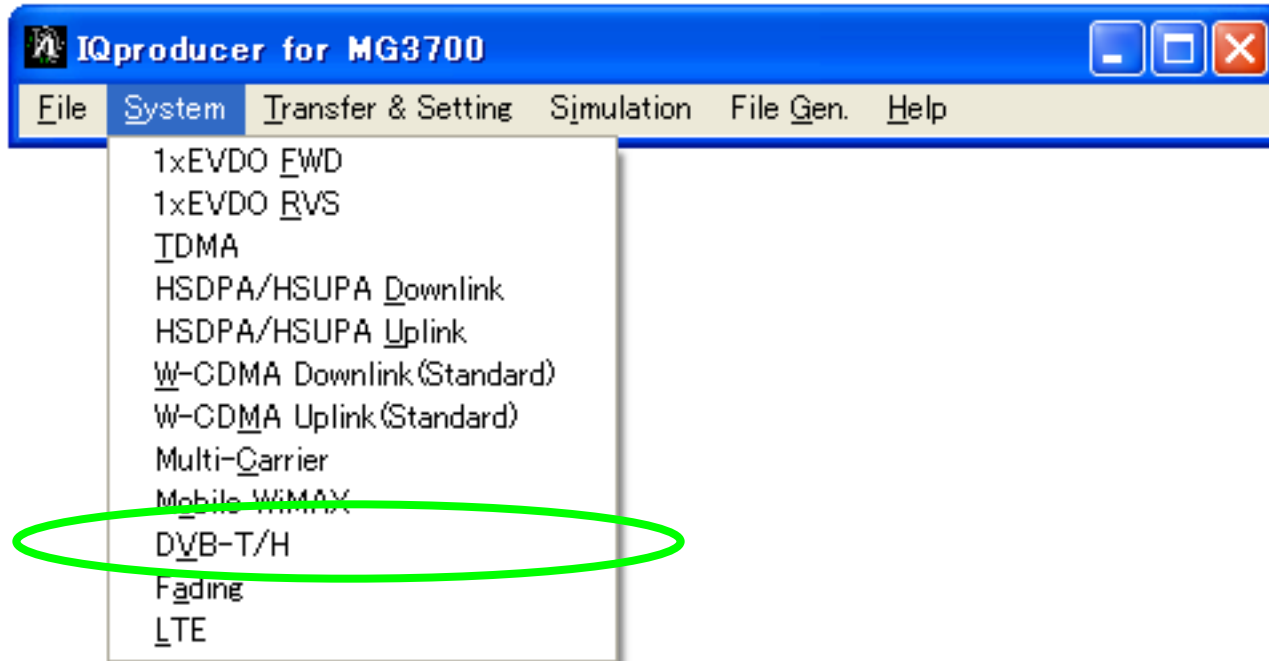
Start IQproducer as follows:

Start > Programs > Anritsu Corporation > IQproducer for MG3700A

IQproducer Main Screen

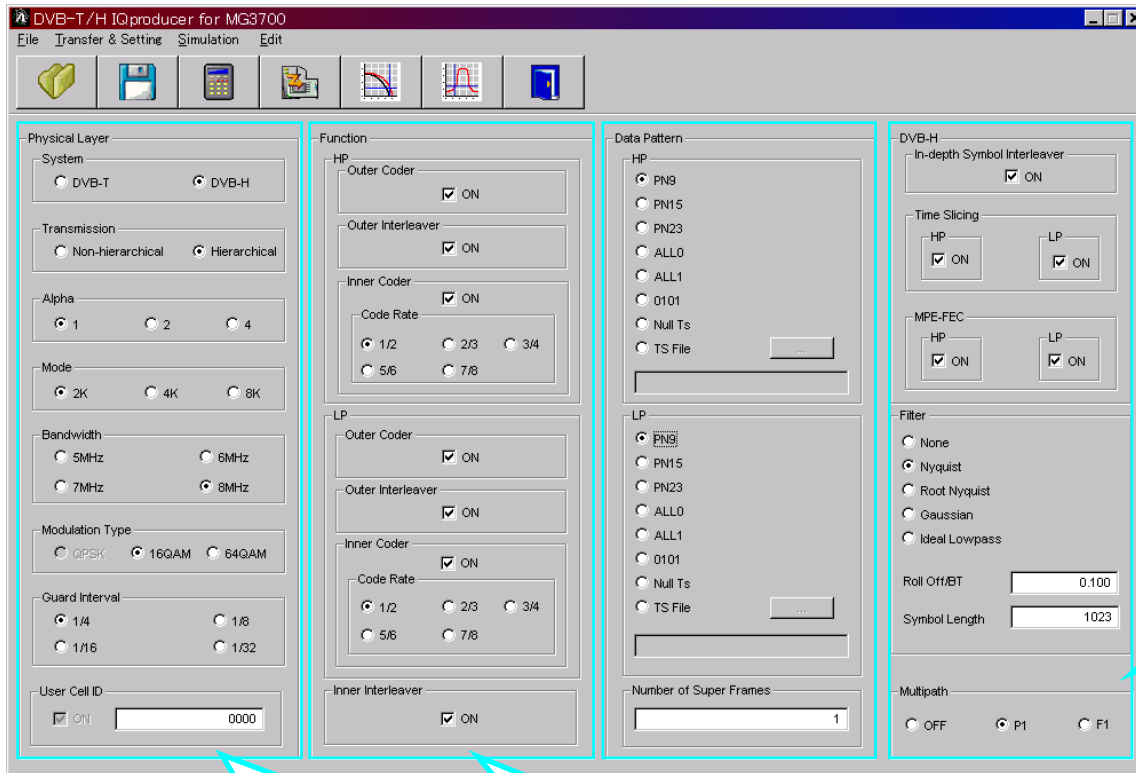
When IQproducer starts, the following screen is displayed.

Choose **F**ading from the [**S**ystem] pull-down menu.



Editing Parameters: Main Screen

When DVB-T/H is selected, the Main screen displays all setting parameters. Selecting the buttons on this one screen sets all the parameters.



Physical Layer:
System, Transmission,
Mode, Subcarrier Number,
Bandwidth, Modulation Type
and Guard Interval

Function:
- Outer Coder
- Outer Interleaver
- Inner Coder
- Code Rate
- Inner Interleaver

Data Pattern:
**When "TS File" is selected, any MPEG-2TS file
(multiplexed audio/video binary data)
can be loaded to generate a waveform pattern for monitoring.**

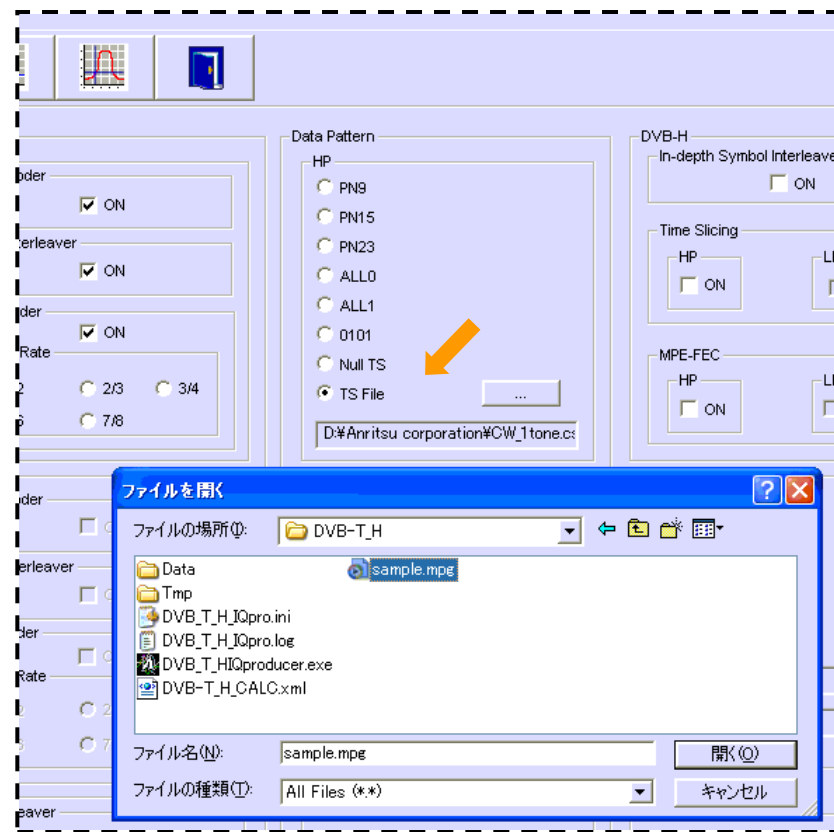
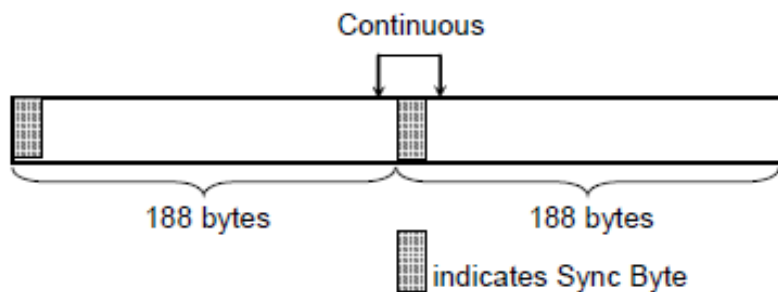
Editing Parameters: Data Pattern

When **TS File** is selected, a created TS (Transport Stream: multiplexed audio/video binary data) file can be loaded.

By using this movie file, the **integrated operation check** from antenna reception to image playback can be monitored.

[TS Data]

TS data consists of two or more packets (1 packet = 188 bytes). The first byte of each packet is the Sync Byte and is always 47 (hexadecimal). If a TS file not meeting this requirement is selected, an error message is displayed when the [Calculation] button is clicked.



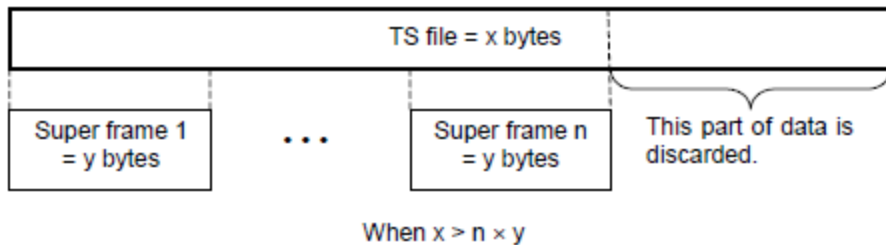
Editing Parameters: Number of Super Frames

The setting range of Number of Super Frames changes with the MG3700A Mode setting and installed memory option as shown on the right.

The data selected by Data Pattern is truncated at the end of the last super frame set here.

The data processing changes with size of TS File and setting of number of super frames when TS File is selected by Data Pattern (see figure below).

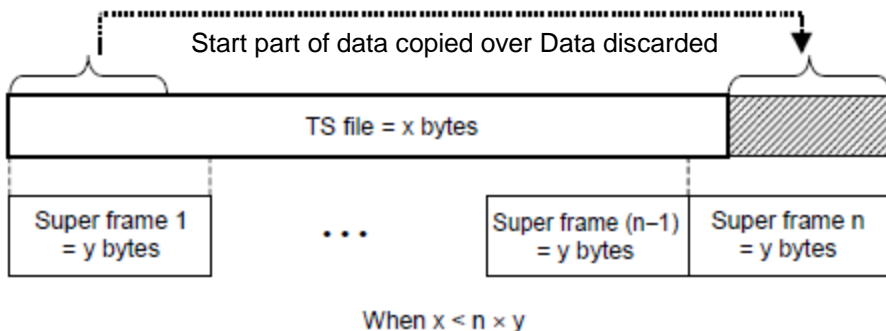
Maximum Number of Super Frames	Select Option	Mode
384	With Option 21 "ARB memory 512Msa" is an option.	2 k
192		4 k
96		8 k
192	Without Option 21 Only standard ARB memory	2 k
96		4 k
48		8 k



Size of TS File (x bytes)

> Setting of number of super frames ($n \times y$ bytes)

- The TS file data is discontinued on the way.



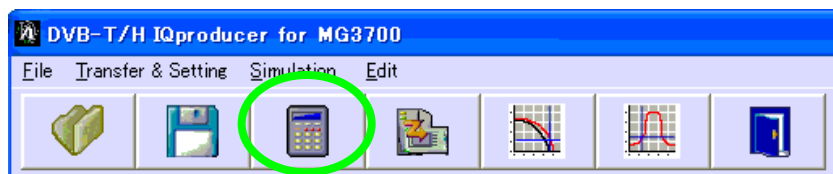
Size of TS File (x bytes)

< Setting of number of super frames ($n \times y$ bytes)

- The same TS File data is repeated from the head.

Generating Waveform: Calculation

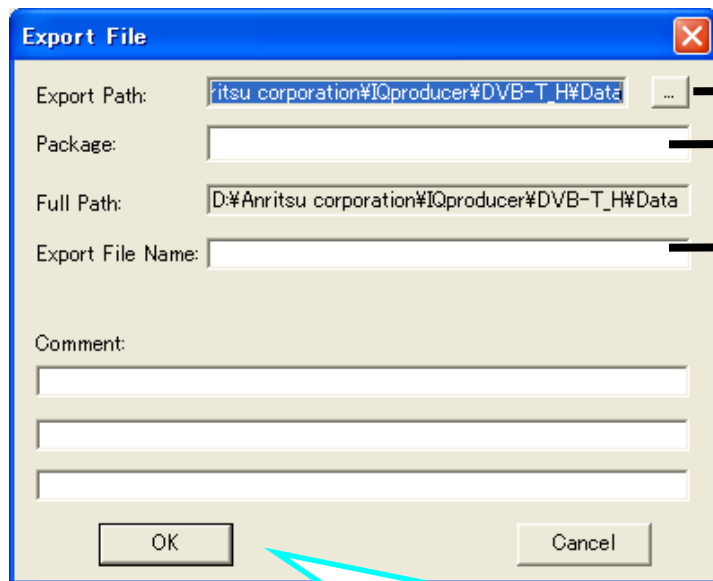
Click the [Calculation] icon to start creation of the waveform pattern after setting the parameters.



Calculation: Creates waveform pattern



Calculation: Creates waveform pattern



File export destination folder

Name of waveform pattern package:
(31 characters max.)

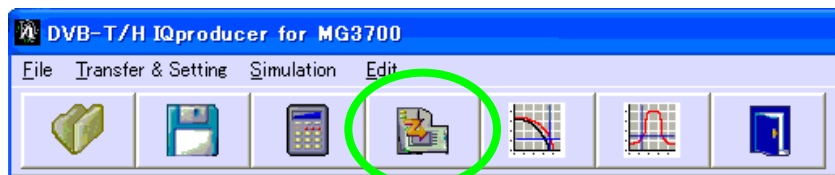
Name of waveform pattern file:
20 characters max.

Comment on MG3700A screen:
38 characters max. per line

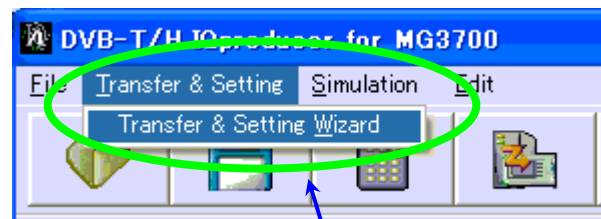
Generate the waveform pattern by clicking the [OK] button.

Transferring Waveform Pattern

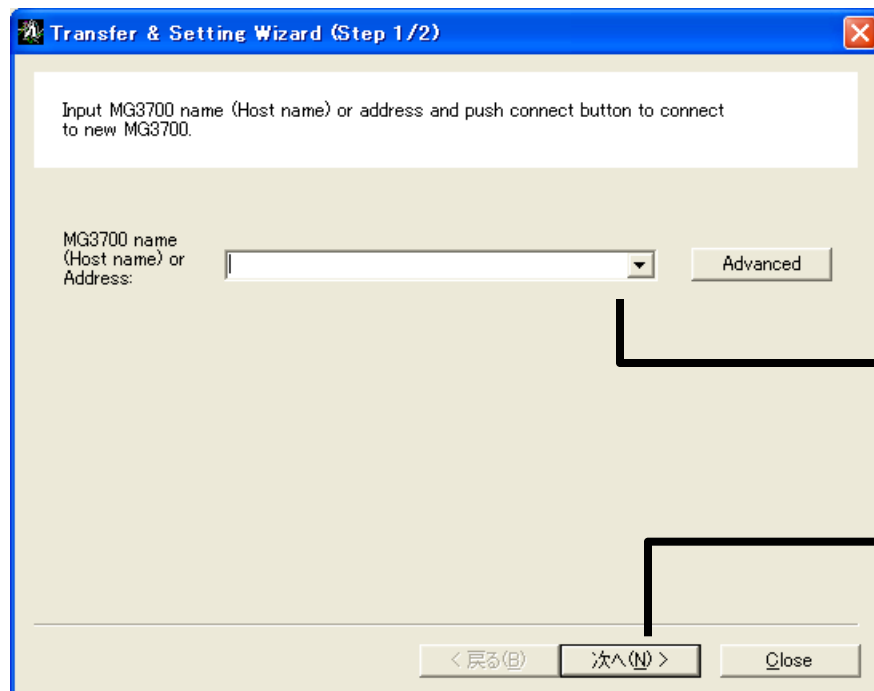
Connect the MG3700A and PC via a LAN.



Transfer & Setting



Transfer & Setting

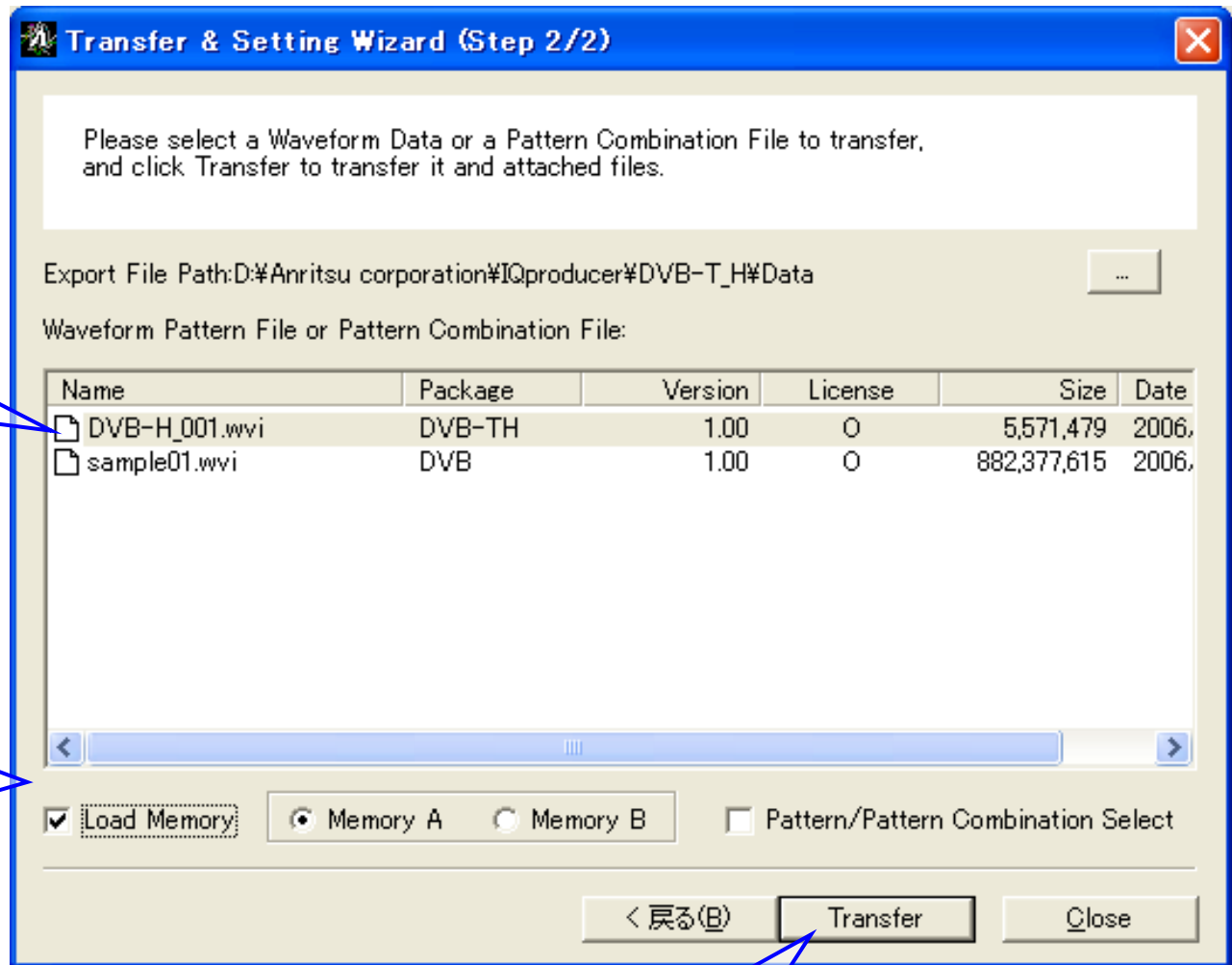


Input name or IP address of MG3700A.

Connect to LAN.

*Read the appended [LAN Connection] for the LAN connection method between the PC and MG3700A.

Transferring Waveform Pattern



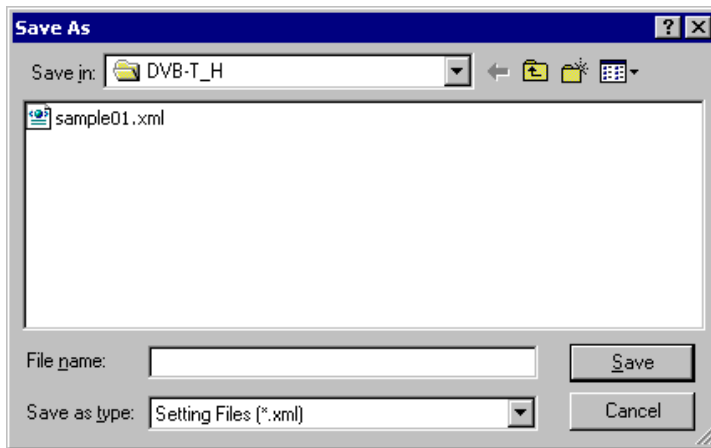
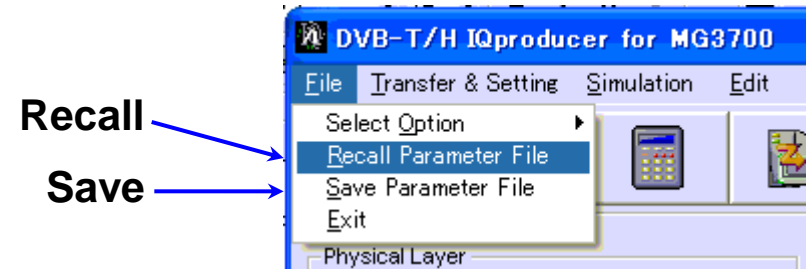
Select waveform pattern stored on MG3700A HDD.

Select when loading waveform pattern into memory at same time as transmitting.

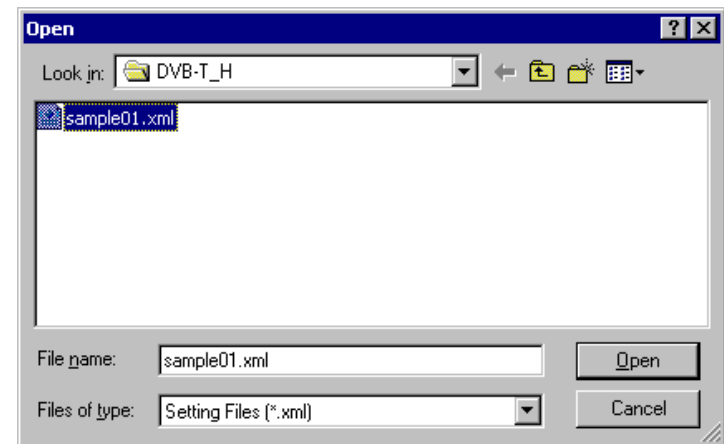
Start transmission.

Saving/Recalling Parameters

The numerical values and settings for each item can be saved as a parameter file for instant recall.



File Save Screen



File Recall Screen

Appendix

MX370106A DVB-T/H IQproducer Parameter Setting Range

Parameter Setting Range (1/2)

No	Segment	Items	Setting Range	Restriction*1
1	Physical Layer	System	DVB-T, DVB-H	
2		Transmission	Non-hierarchical, Hierarchical	
3		Alpha	1, 2, 4	1: When No. 2 = Non-hierarchical
4		Mode	(Sub-carrier of OFDM) 2K, 4K, 8K	"4K" cannot be set when No. 1 = DVB-T.
5		Bandwidth	5 MHz, 6 MHz, 7 MHz, 8 MHz	"5 MHz" cannot be set when No. 1 = DVB-T.
6		Modulation Type	QPSK, 16QAM, 64QAM	"QPSK" cannot be set when No. 2 = Hierarchical
7		Guard Interval	1/4, 1/8, 1/16, 1/32	
8		User Cell ID	ON: 0000 to FFFF (hex), OFF	"ON": When No. 1 = DVB-H
9	Function	Outer Coder	ON, OFF	"LP" cannot be set when No. 2 = Non-hierarchical. OFF: When No. 10 = OFF
10		Outer Interleaver	ON, OFF	"LP" cannot be set when No. 2 = Non-hierarchical. ON: When No. 9 = ON OFF: When No. 11 = OFF
11		Inner Coder	ON, OFF	"LP" cannot be set when No. 2 = Non-hierarchical. ON: When No. 10 = ON OFF: When No. 13 = OFF
12		Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	"LP" cannot be set when No. 2 = Non-hierarchical. Cannot be set: When No. 11 = OFF
13		Inner Interleaver	ON, OFF	ON: When No. 11 = ON

*1: Setting condition of other parameters restricting setting range.

Parameter Setting Range (2/2)

No	Segment	Items	Setting Range	Restriction*1
14	Data Pattern	(Data)	PN9, PN15, PN23, ALL0, ALL1, 0101, Null TS, TS File When TS File is selected, an external TS file is read. The TS file is composed of packets with 188 bytes/packet. The first byte of the packet is the Sync Byte and is set to 47(Hex). If the TS file does not match this format, an error is displayed when the [Calculation] button is clicked. When all of Outer Coder, Outer Interleaver, Inner Coder, and Inner Interleaver are set to ON, Sync Byte is set at the PN9/PN15/PN23/ALL0/ALL1/0101 data. At this time, the data contiguity is kept between "Final data of the packet" and "First data except Sync Byte of the next packet"*2.	"LP" cannot be set when No. 2 = Non-hierarchical.
15		Number of Super Frames	1 to 384	(See next page for details.)
16	DVB-H	In-depth Symbol Interleaver	ON, OFF	OFF: When No. 1 = DVB-T OFF: When No. 4 = 8K OFF: When No. 13 = OFF
17		Time Slicing	ON, OFF: When Time Slicing = ON, bit 49 of the TPS data is set to "1". When Data Pattern = TS File, the selected TS file should be received at the processing of Time Slicing.	OFF: No. 1 = DVB-T "LP" cannot be set when No. 2 = Non-hierarchical.
18		MPE-FEC	ON, OFF: When MPE-FEC = ON, bit 50 of the TPS data is set to 1. When Data Pattern = TS File, the selected TS file should be received at the processing of MPE-FEC.	OFF: When No. 1 = DVB-T "LP" cannot be set when No. 2 = Non-hierarchical.
19	Filter	(Type)	None, Nyquist, Root Nyquist, Gaussian, Ideal Lowpass	
20		Roll Off/BT	0.1 to 1.0	Cannot be set when No. 19 = None/Ideal Lowpass
21		Symbol Length	1 to 1023	Cannot be set when No. 19 = None/Ideal Lowpass 1: When No. 19 = None 1023: When No. 19 = Ideal Lowpass
22	Multipath		OFF, F1, P1	

*1: Setting condition of other parameters restricting setting range

*2: The contiguity of the packet is shown in the figure below.

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