MX370001A
TD-SCDMA
Waveform Pattern
Operation Manual

Third Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided within the MG3700A Vector Signal Generator Operation Manual (Mainframe). Please also refer to this document before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Document No.: M-2533AE-3.0

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To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

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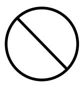
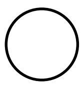
Safety Symbols Used on Equipment and in Manual

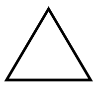
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



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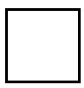
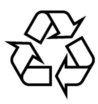
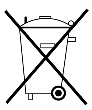


This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MX370001A
TD-SCDMA Waveform Pattern
Operation Manual

29 November 2004 (First Edition)
12 September 2006 (Third Edition)

Equipment Certificate

Anritsu guarantees that this equipment was inspected at shipment and meets the published specifications.

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- During the warranty period, Anritsu will repair or exchange this software free-of-charge if it proves defective when used as described in the operation manual.
- The warranty period is one year from the purchase date.
- The warranty period after repair or exchange will remain 1 year from the original purchase date, or 30 days from the date of repair or exchange, depending on whichever is longer.
- This warranty does not cover damage to this software caused by Acts of God, natural disasters, and misuse or mishandling by the customer.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

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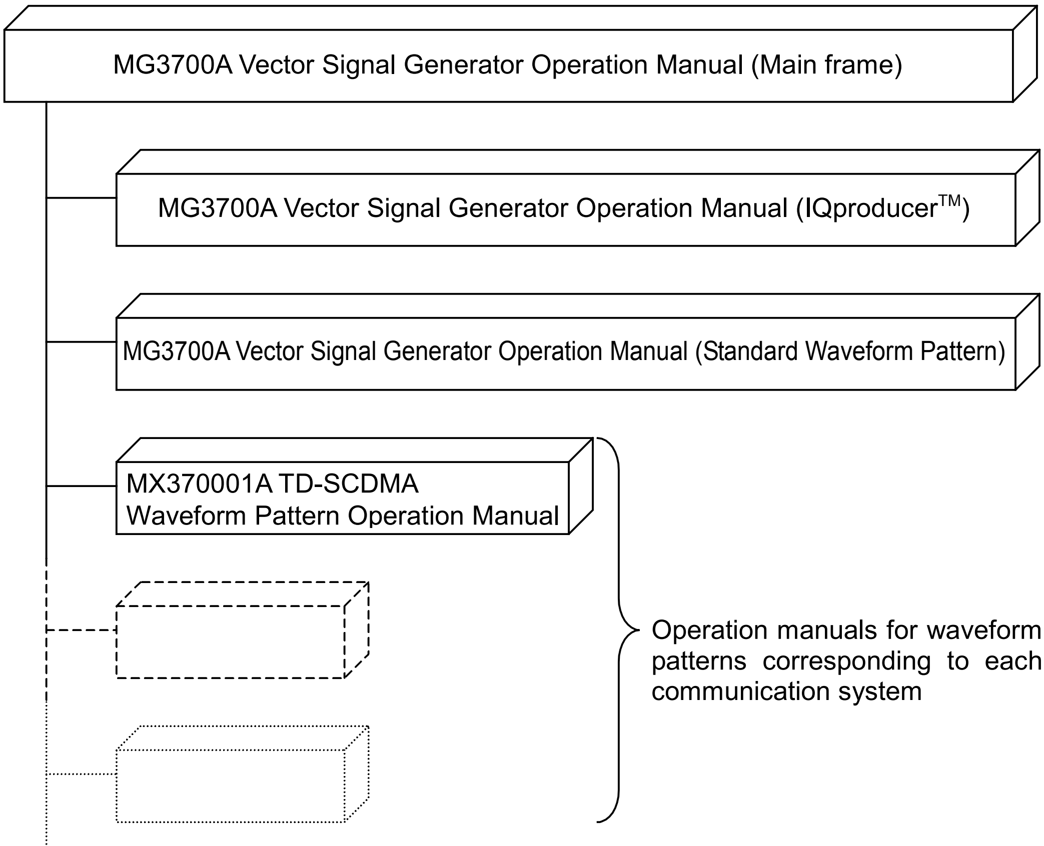
About This Manual

■ Composition of Operation Manuals

The operation manuals for the MG3700A Vector Signal Generator are comprised as shown in the figure below. Read them when needed in addition to this manual.



■ Scope of This Manual

This manual mainly describes how to use the waveform patterns included in the MX370001A TD-SCDMA Waveform Pattern that can be used in the arbitrary waveform generators integrated in the MG3700A Vector Signal Generator, the detailed specifications for each waveform pattern are given as well. Detailed information about the TD-SCDMA waveform patterns is described in Section 3 “Details of Waveform Pattern.”
The detailed operation method of the waveform pattern in the MG3700A Vector Signal Generator is described in the MG3700A Operation Manual (Mainframe). Read it in conjunction with this manual.

Table of Contents

Section 1 Outline

This section provides an outline of the product and describes the standard product composition for the MX370001A TD-SCDMA Waveform Pattern.

1.1 Outline of Product

The MX370001A TD-SCDMA Waveform Pattern (hereafter referred to as "MX370001A") includes standard waveform patterns that are prescribed in 3GPP TD-SCDMA (1.28 Mcps TDD Option).

The TD-SCDMA waveform patterns are classified broadly into the following signals:

- Downlink signals for BS transmitter tests:
  Used to evaluate the devices used by the BS.
- Uplink signals for BS receiver tests:
  Used to evaluate the reception systems such as BS reception sensitivity measurement.
- Downlink signals for UE receiver tests:
  Used to evaluate the reception systems such as UE reception sensitivity measurement.

Waveform patterns included in the MX370001A can be output as modulated signals by downloading them to the MG3700A Vector Signal Generator (hereafter referred to as "MG3700A") that integrates an arbitrary waveform pattern generator.

Note:

The waveform pattern described here indicates arbitrary waveform data used for supporting various radio communication systems that can be used by the arbitrary waveform generator integrated in the MG3700A.
The waveform pattern consists of two files: arbitrary waveform file and waveform information file. The arbitrary waveform file is a binary-format file with the extension ".wvd". The waveform information file is a text-format file with the extension ".wvi", used to control arbitrary waveform data and set the hardware for waveform data output.

A license for the MX370001A must be purchased that matches the serial number of the MG3700A to be used. When using the MX370001A with two or more MG3700A units, purchase the license for the MX370001A for the number of the MG3700A units to be used.

1.2 Product Composition

Table 1.2-1 below lists the product composition of the MX370001A. After opening the package, confirm that all the products listed below are included in the box. If anything is missing or damaged, contact Anritsu Corporation or one of its distributors.

Table 1.2-1 Product composition

Item	Model/No.	Product	Q'ty	Remarks
Main unit	MX370001A	TD-SCDMA Waveform Pattern	1	Provided in two DVDs. The license file and operation manual file are included.

Section 2 How to Use Waveform Pattern

This section describes how to use the MX370001A.

2.1 How to Use Waveform Pattern

The MX370001A is shipped in two DVDs.

The following shows the procedure to output modulated signals from the MG3700A by using the MX370001A:

<Procedure>

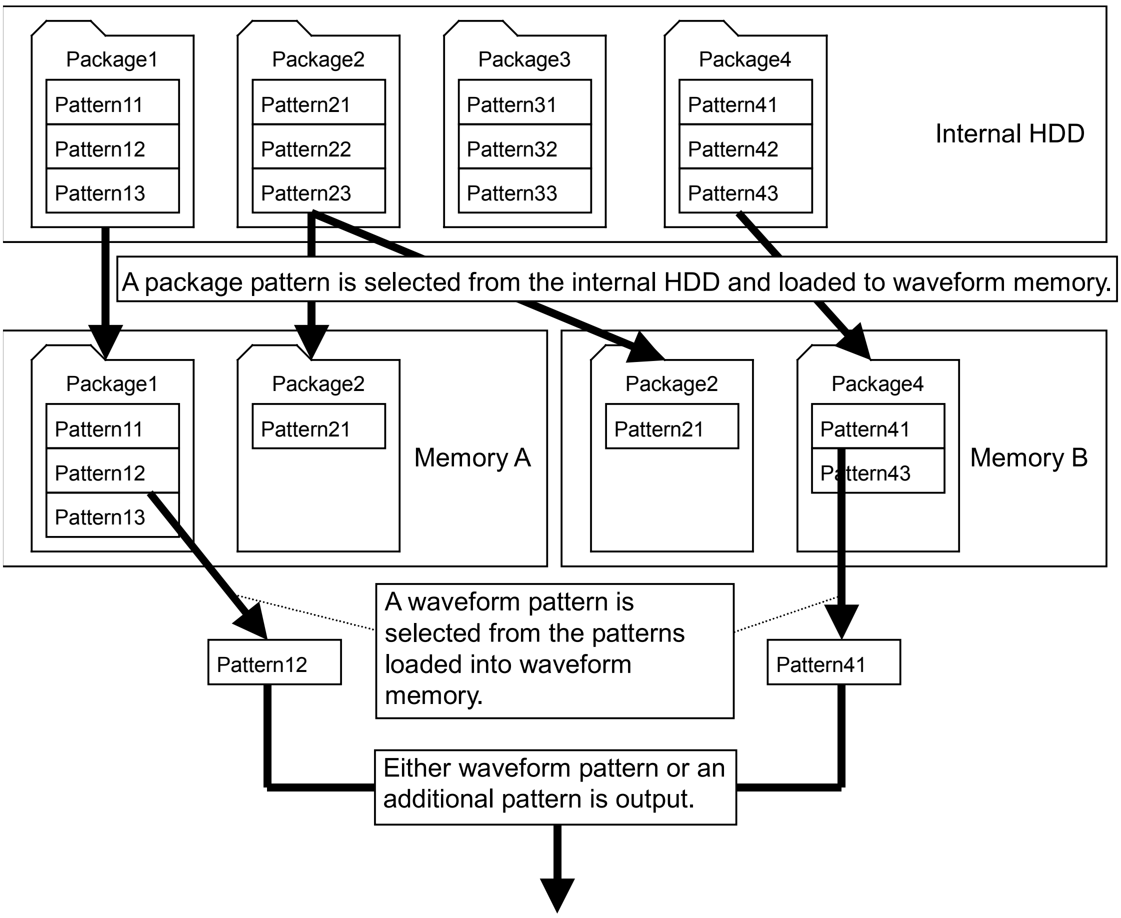
1. Install the MX370001A license file (MX370001A.key) stored in the DVD into the MG3700A to be used.
2. Transfer the waveform pattern stored in the DVD to the MG3700A internal hard disk.
3. Load the waveform pattern transferred and saved in the MG3700A internal hard disk to an arbitrary waveform memory.
4. Select the waveform pattern loaded in the arbitrary waveform memory as an output waveform pattern.

Refer to Section 3.9.9 “Installation” in the MG3700A Operation Manual (Main frame) or Section 5.1 “Installing License File” in the MG3700A Operation Manual (IQproducer™) for how to install the license file.

There are two methods for transferring waveform patterns to the MG3700A internal hard disk: using a compact flash card and via LAN.
Refer to Section 3.5.2 “Using waveform pattern for modulation” in the MG3700A Operation Manual (Mainframe) for details of the transfer method using a compact flash card.
Refer to Section 4.6 “File Transfer and Loading to Memory in Transfer & Setting Panel Screen” in the MG3700A Operation Manual (IQproducer™) for details of the transfer method via LAN.

The operational outlines for the loading of the waveform patterns stored in the internal hard disk to an arbitrary waveform memory and waveform pattern selection are provided below.
Waveform patterns are classified by communication type and are stored in a folder. This folder is called a “package.” The MX370001A are stored in the “TD-SCDMA (MX370001A)” package.

When reproducing a waveform pattern, it is necessary first to load the package pattern stored in the internal hard disk to a waveform memory in the MG3700A. The MG3700A has two waveform memories A and B that have the I/Q 2-channel configuration. Waveform patterns are loaded to either or both of these two waveform memories.
Then, select a waveform pattern to be output from the patterns loaded into the waveform memory. Only one waveform pattern can be selected from each memory. A waveform pattern is selected from waveform memory A or B, or an additional waveform is generated by adding the two waveform patterns selected from both waveform memories A and B to be output.



Refer to Section 3.5.2 “Using waveform pattern for modulation” in the MG3700A Operation Manual (Mainframe) for details on waveform pattern selection.

Section 3 Details of Waveform Pattern

This section describes details of the MX370001A, the trigger function, and auxiliary signal output.

3.1 Waveform Pattern Types

The MX370001A includes the following standard TD-SCDMA waveform patterns that conform to the 3GPP standard.

Table 3.1-1 List of TD-SCDMA waveform patterns for UE reception system evaluation

Test Target	**UE Receiver Test (DL)**				
	UE				
Test Signal	**UE-DL RMC**				
Waveform Pattern	**rmc12_2k _ue_dl**	**rmc12k_ ocns_ ue_dl**	**rmc64k_ ocns_ ue_dl**	**rmc144k_ ocns_ ue_dl**	**rmc384k_ ue_dl**
Reference Standard	**TS25.102**				
DwPTS/UpPTS SYNC_DL/UL NUMBER (quadruples)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)
P-CCPCH	Add	Add	Add	Add	Add
Scrambling Code	0	0	0	0	0
midamble ID	0	0	0	0	0
Maximum User (user number)	8 (1)	8 (1)	8 (1)	8 (1)	8 (1)
Spreading Factor	16	16	16	16	16
TimeSlot Number	4	4	4	4,5	3, 4, 5, 6
Number of DPCH0	0	8	2	2	0
DPCH Channelization Codes	C (i, 16) i = 1, 2	C (i, 16) i = 1, 2	C (i, 16) i = 1, …, 8	C (i, 16) i = 1, …, 8	C (i, 16) i = 1, …, 10
DPCH0 Channelization Codes	–	C (i, 16) $3 \le i \le 10$	C (i, 16) $9 \le i \le 10$	C (i, 16) $9 \le i \le 10$	–
Data: DPCH0	PN9	PN9	PN9	PN9	PN9
Data: other channel	P-CCPCH*	P-CCPCH*	P-CCPCH*	P-CCPCH*	P-CCPCH*
Σ DPCH_Ec/Ior [dB]	0	–7	–	–	–
DPCH0_Ec/Ior [dB]	–	–10	–10	–10	0
DPCH Channelization Codes Power [dB]/1ch	–3.01	–10.00	–10.00	–10.00	–10
DPCH0 Channelization Codes Power [dB]/1ch	–	–10.00	–10.00	–10.00	–
IQ output level	$\sqrt{I^2 + Q^2} = 320\text{mV}$				

*: "Frame number/2" is inserted to the first 11 bits for P-CCPCH. The frame number is a repetition of 0, 1, 2, 3, 0, 1, 2, 3, …

Table 3.1-2 List of TD-SCDMA waveform patterns for BS transmission system evaluation

Test Target	BS Transmitter Test (DL)			
	BS			
Test Signal	**BS-DL RMC**			
Waveform Pattern	**rmc–1code_bs_dl**	**rmc–P-CCPCH_bs_dl**	**rmc–8 code_bs_dl**	**rmc–10 code_bs_dl**
Reference Standard	**TS25.142**			
DwPTS/UpPTS SYNC_DL/UL NUMBER (quadruples)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)
P-CCPCH	–	add	–	–
Scrambling Code	0	0	0	0
midamble ID	0	0	0	0
Maximum User (user number)	2 (1)	8 (1)	2 (1)	2 (1)
Spreading Factor	16	16	16	16
TimeSlot Number	4, 5, 6	0	4, 5, 6	4, 5, 6
Number of DPCH0	–	–	0	0
DPCH Channelization Codes	C (i, 16) $i = 1$	–	C (i, 16) $1 \le i \le 8$	C (i, 16) $1 \le i \le 10$
DPCH0 Channelization Codes	–	–	–	–
Data: DPCH0	PN9*1	–	PN9*1	PN9*1
Data: other channel	–	P-CCPCH*2	–	–
Σ DPCH_Ec/Ior [dB]	0	–	0	0
DPCH0_Ec/Ior [dB]	–	–	–	–
DPCH Channelization Codes Power [dB]/1ch	0	–	–9	–10
DPCH0 Channelization Codes Power [dB]/1ch	–	–	–	–
IQ output level	$\sqrt{I^2 + Q^2} = 320\text{mV}$			

*1: 1-frame period data

*2: “Frame number/2” is inserted to the first 11 bits for P-CCPCH. The frame number is a repetition of 0, 1, 2, 3, 0, 1, 2, 3, …

Table 3.1-3 List of TD-SCDMA waveform patterns for BS reception system evaluation

Test Target	**BS Receive Test (UL)**				
	BS				
Test Signal	**BS-UL RMC**				
Waveform Pattern	**rmc12_2k _bs_ul**	**rmc12k_ ocns_ _bs_ul**	**rmc64k_ ocns_ _bs_ul**	**rmc144k _bs_ul**	**rmc384k _bs_ul**
Reference Standard	**TS25.142**				
DwPTS/UpPTS SYNC_DL/UL NUMBER (quadruples)	–	–	–	–	–
P-CCPCH	–	–	–	–	–
Scrambling Code	0	0	0	0	0
midamble ID	0	0	0	0	0
Maximum User (user number)	2 (1)	2 (1)	2 (1)	2 (1)	2 (1)
Spreading Factor	8	8	2, 8	2, 8	8, 2
TimeSlot Number	1	1	1	1, 2	1, 2, 3, 4
Number of DPCH0	0	4	1	1	0
DPCH Channelization Codes	C (i, 8) $i = 1$	C (i, 8) $i = 1$	C (i, 2) $i = 1$	C (i, 2) $i = 1$	C (i, 2) $i = 1$ C (i, 8) $i = 5$
DPCH0 Channelization Codes	–	C (i, 8) $2 \le i \le 5$	C (i, 8) $i = 5$	C (i, 8) $i = 5$	–
Data: DPCH0	PN9	PN9	PN9	PN9	PN9
Data: other channel	–	–	–	–	–
Σ DPCH_Ec/Ior [dB]	0	–	–	–	0
DPCH0_Ec/Ior [dB]	–	–7	–7	–7	–
DPCH Channelization Codes Power [dB]/1ch	0	–7	–0.97	–0.97	C (i, 2) = –6.99 C (i, 8) = –0.97
DPCH0 Channelization Codes Power [dB]/1ch	–	–7	–7	–7	–
IQ output level	$\sqrt{I^2 + Q^2} = 320\text{mV}$				

3.2 Waveform Pattern Frame Format

This section shows the frame formats of the MX370001A and describes the settings in detail.

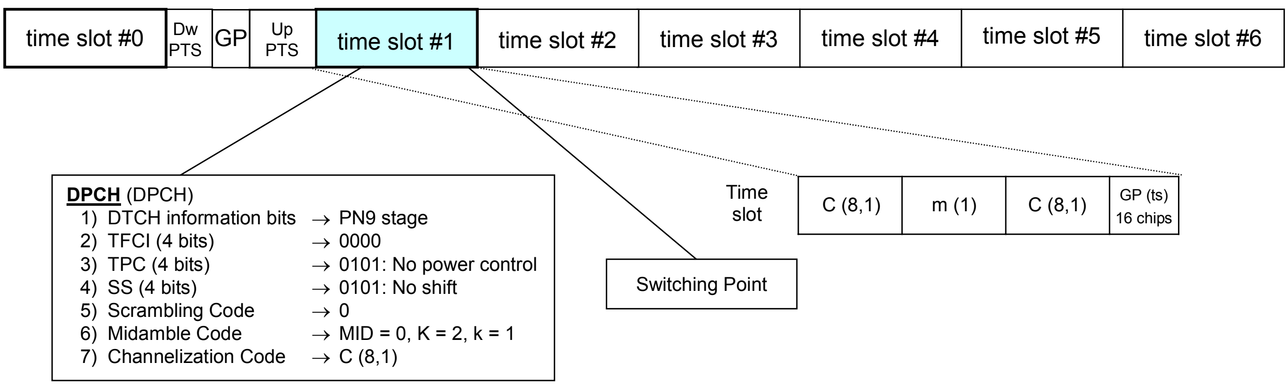
♦rmc12_2k_bs_ul

- For UE transmitter test (Uplink)
  TS25.102: UE UL reference measurement channel A.2.1.2,
  1.28 Mcps, 12.2 kbps, SF = 8

  Test Items: 6.2 Transmit power (Maximum output power)
  6.3 UE frequency stability

- For BS receiver test (Uplink)
  TS25.142: BS UL reference measurement channel A2.1.2,
  1.28 Mcps, SF = 8

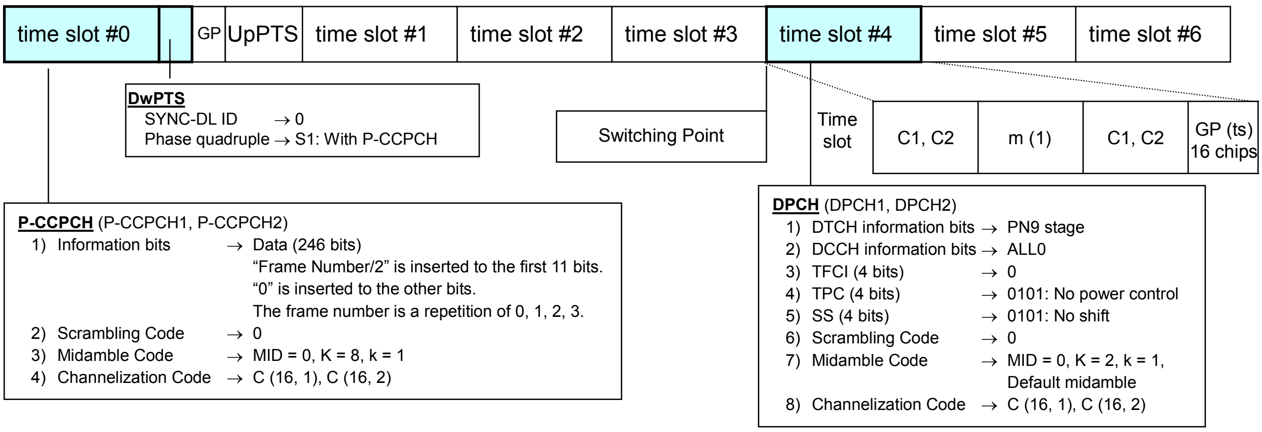
  Test Items: 7.2 Reference sensitivity level
  7.3 Dynamic range
  7.4 Adjacent Channel Selectivity (ACS)
  7.5 Blocking characteristics
  7.6 Intermodulation characteristics



♦ rmc12_2k_ue_dl

- For UE receiver test (Downlink)
  TS25.102: UE DL reference measurement channel A.2.2.2.1,
  1.28 Mcps, 12.2 kbps, SF = 16

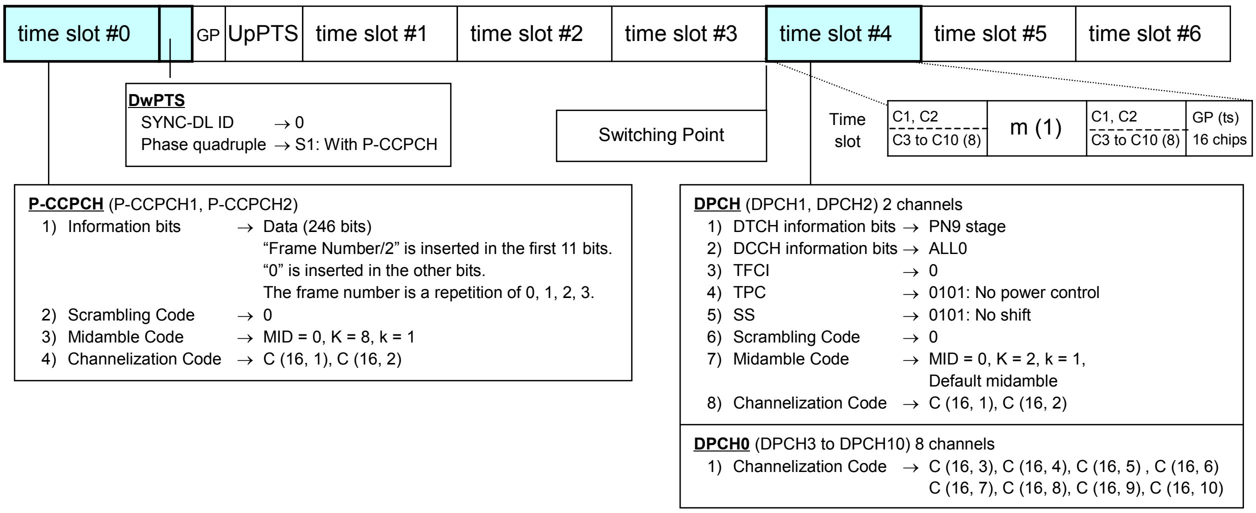
  Test Items: 7.3 Reference sensitivity level
  7.4 Maximum input level
  7.5 Adjacent Channel Selectivity (ACS)
  7.6 Blocking characteristics
  7.7 Spurious response
  7.8 Intermodulation characteristics



♦ rmc12k_ocns_ue_dl

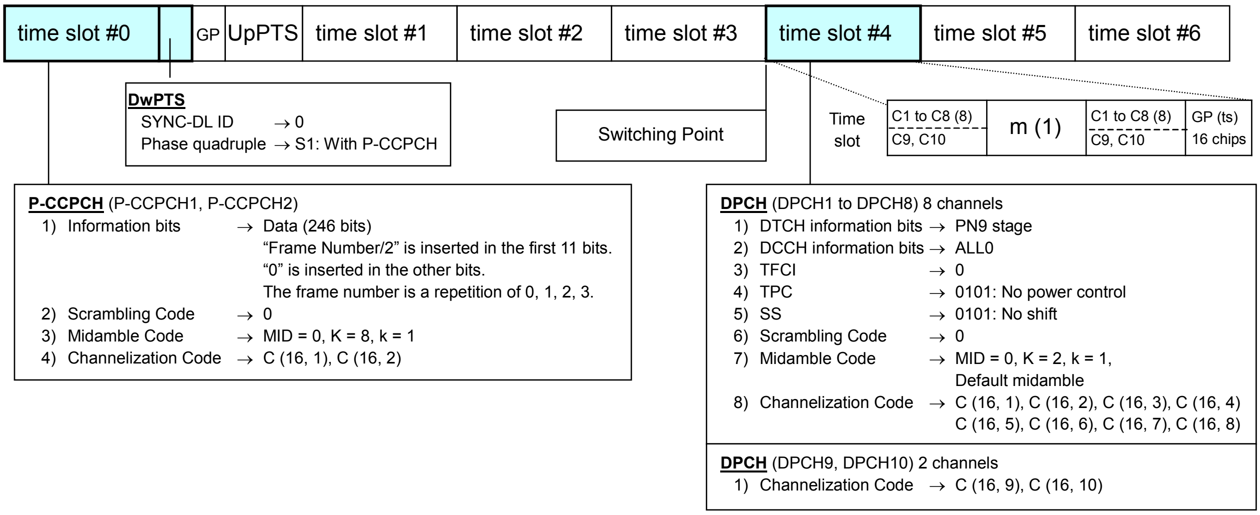
- For UE receiver test (Downlink)
  TS25.102: UE DL reference measurement channel, A.2.2.2, 1.28 Mcps, (12.2 kbps), SF = 16

  Test Items: 7.4 Maximum input level (Minimum Requirement)
  8. Performance requirement (8.2.1.1.2 Table 8.2A)



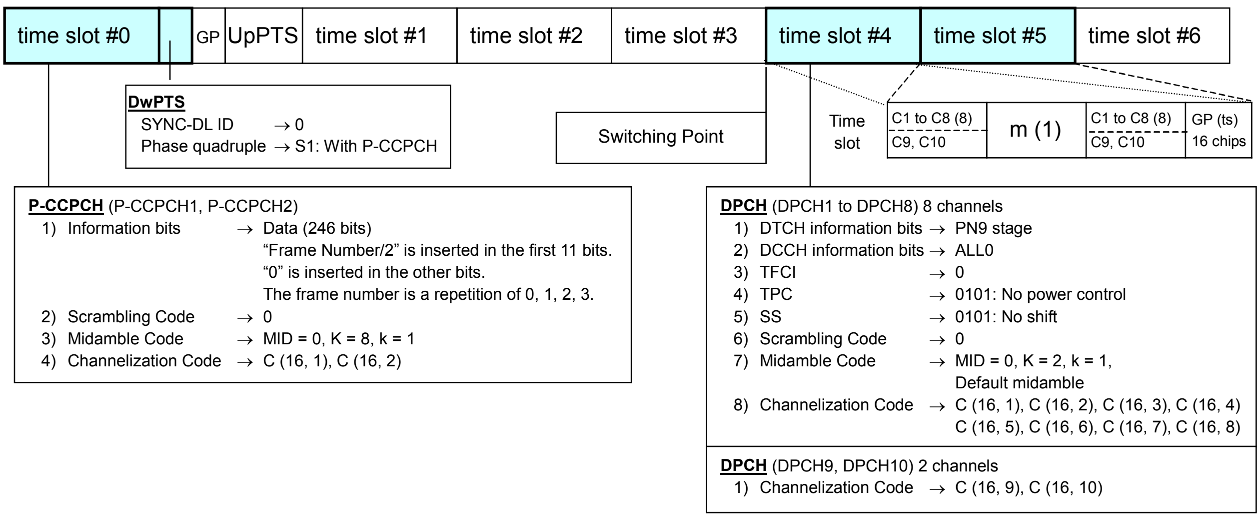
- ♦ rmc64k_ocns_ue_dl
- For UE receiver test (Downlink)
  TS25.102: UE DL reference measurement channel
  A.2.3.2, 1.28 Mcps, (64 kbps), SF = 16

  Test Items: 8. Performance requirement (8.2.1.1.2 Table 8.2A)



- ♦ rmc144k_ocns_ue_dl
- For UE receiver test (Downlink)
  TS25.102: UE DL reference measurement channel
  A.2.4.2, 1.28 Mcps, (144 kbps), SF = 16

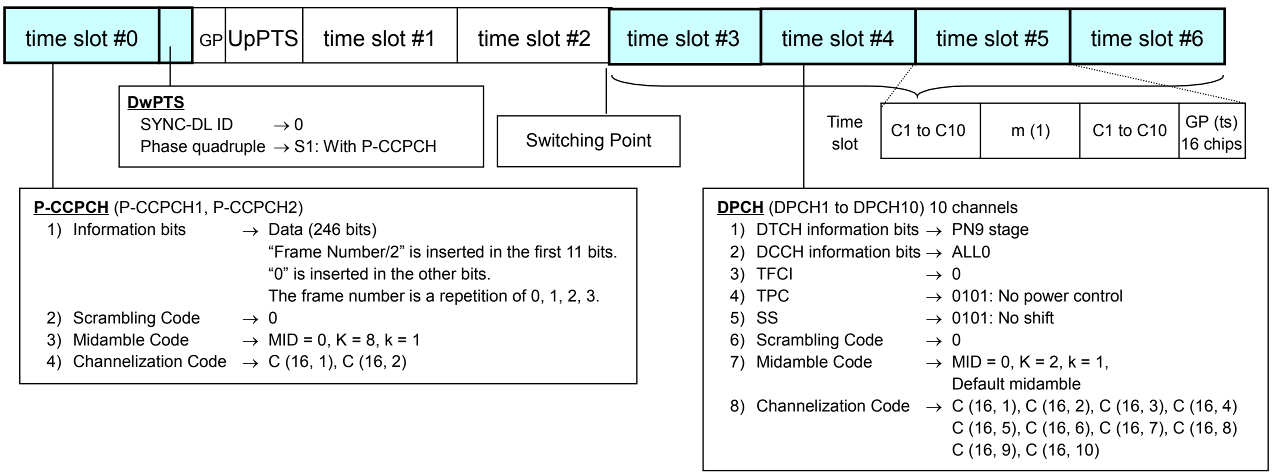
  Test Items: 8. Performance requirement (8.2.1.1.2 Table 8.2A)



♦ rmc384k_ue_dl

- For UE receiver test (Downlink)
  TS25.102: UE DL reference measurement channel
  A.2.5.2, 1.28 Mcps, (384 kbps), SF = 16

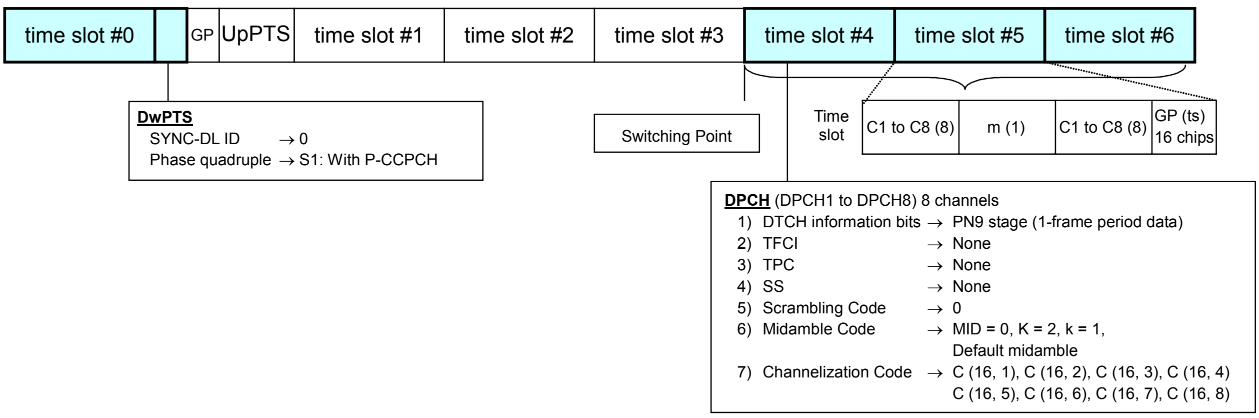
  Test Items: 8. Performance requirement (8.2.1.1.2 Table 8.2A)



♦ rmc–8code_bs_dl

- For BS transmitter test (Downlink)
  TS25.142

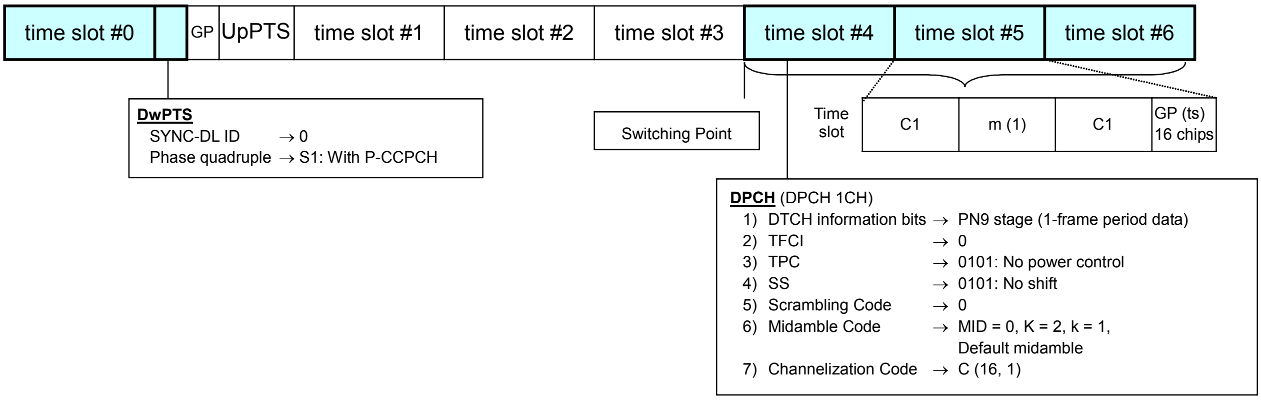
  Test Items: 6.2 Maximum Output power
  6.5 Transmit ON/OFF power
  6.6 Output RF spectrum emission
  6.7 Transmit Intermodulation



♦ rmc–1code_bs_dl

- For BS transmitter test (Downlink)
  TS25.142: SF = 16

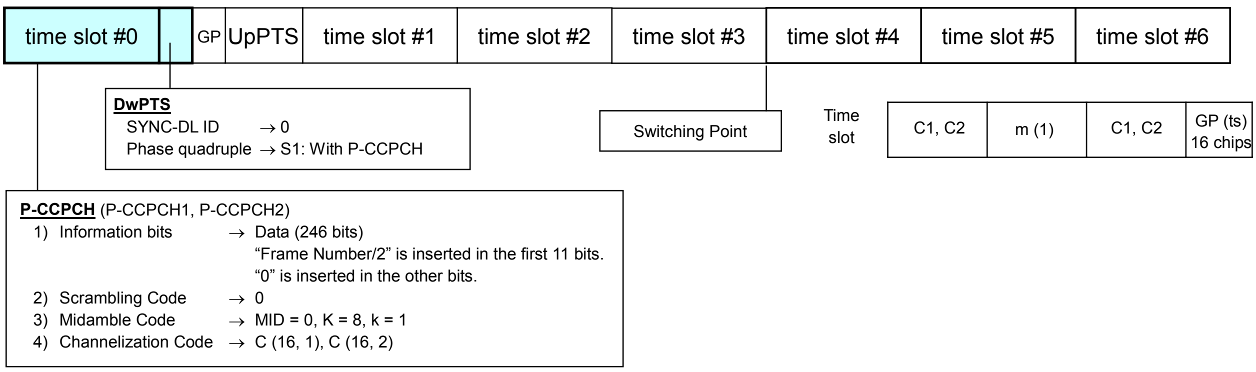
  Test Items: 6.3 Frequency stability
  6.4 Output power dynamics
  (Table 6.4A /Table 6.6A /1Code. Table 6.7A)
  6.8 Transmit Modulation (Table 6.39C)



♦ rmc–P-CCPCH_bs_dl

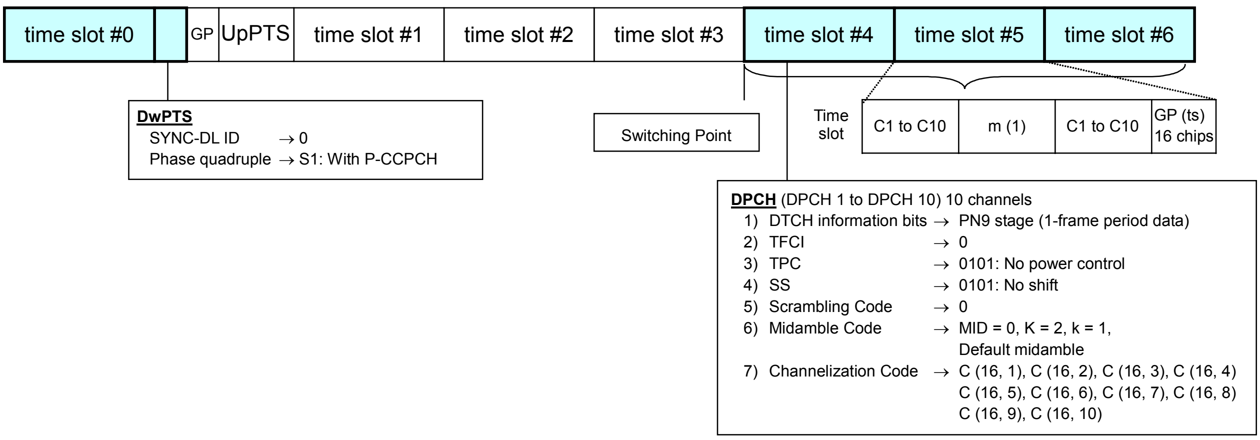
- For BS transmitter test (Downlink)
  TS25.142: SF = 16

  Test Items: 6.4.5 Primary CCPCH power



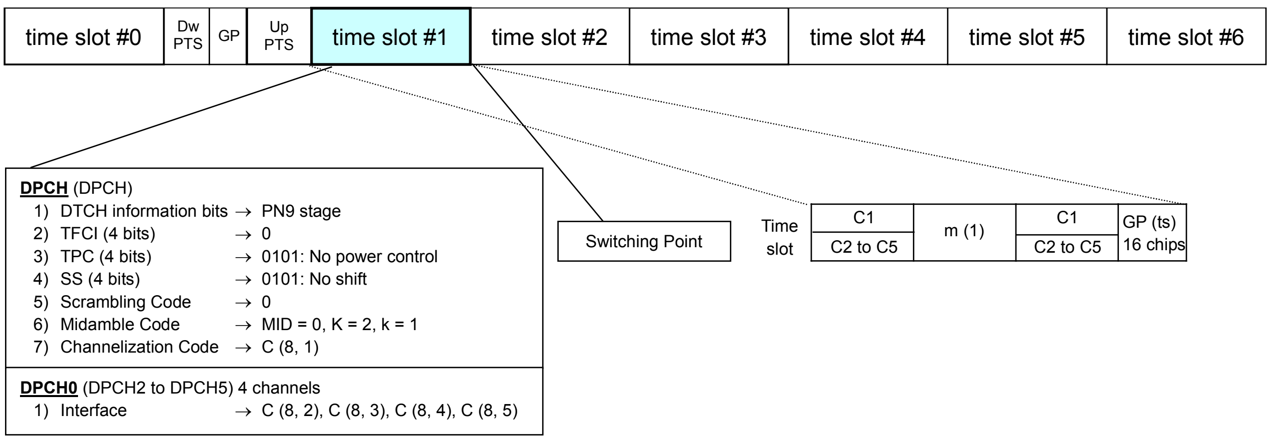
- ♦ rmc–10code_bs_dl
- For BS transmitter test (Downlink)
  TS25.142: SF = 16

  Test Items: 6.8 Transmit Modulation 10 Codes. (Table 6.40A)



- ♦ rmc12k_ocns_bs_ul
- For BS receiver test (Uplink)
  TS25.142: BS UL reference measurement channel, A2.1.2, 1.28 Mcps, SF = 8

  Test Items: 8. Performance requirements. (Table 8.2A)

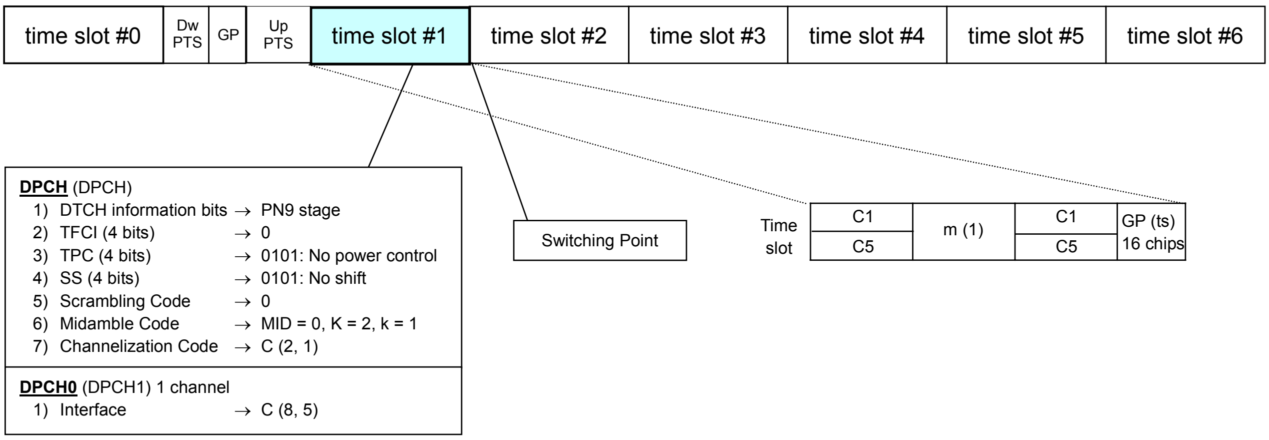


♦ rmc64k_ocns_bs_ul

• For BS receiver test (Uplink)

TS25.142: BS UL reference measurement channel, A2.2.2, 1.28 Mcps, SF = 2, 8

Test Items: 8. Performance requirements. (Table 8.2A)

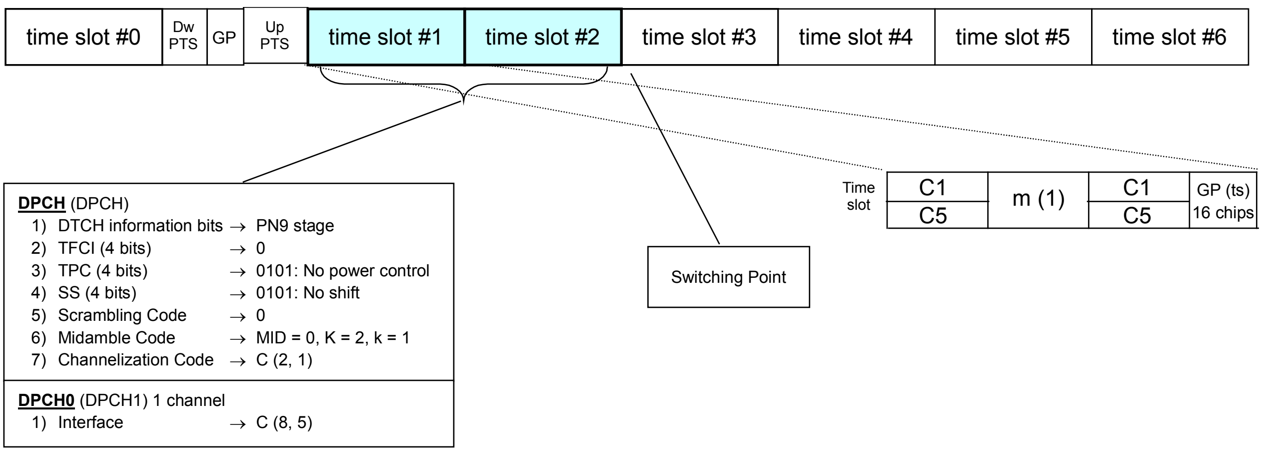


♦ rmc144k_bs_ul

• For BS receiver test (Uplink)

TS25.142: BS UL reference measurement channel, A2.3.2, 1.28 Mcps, SF = 8

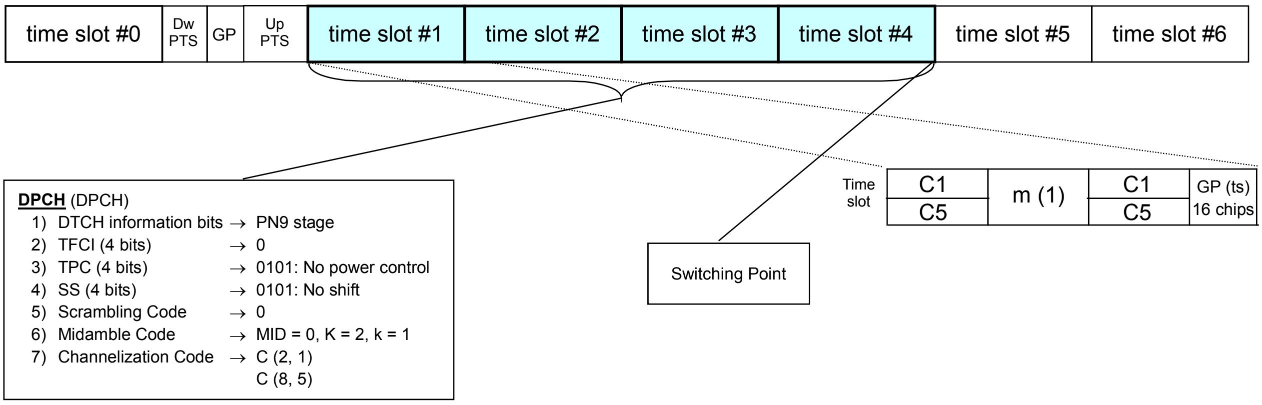
Test Items: 8. Performance requirements. (Table 8.2A)



♦ rmc384k_bs_ul

- For BS receiver test (Uplink)
  TS25.142: BS UL reference measurement channel, A2.3.2, 1.28 Mcps, SF = 2, 8

  Test Items: 8. Performance requirements. (Table 8.2A)



3.3 External Trigger Function

Modulated signals can be output from the MG3700A in synchronization with an external trigger signal by using the external trigger function of the MG3700A. There are two external trigger functions as below. However, the frame trigger function cannot be used with the MX370001A.

Start trigger function: Modulated signal output starts when a trigger signal is input for the first time in the trigger wait status, and signals are output continuously. The trigger delay function is provided.

Frame trigger function: Cannot be used with the MX370001A.
Modulated signal output starts when a trigger signal is input for the first time in the trigger wait status, and signal output stops when signals in one frame have been output. After this, the MG3700A enters the trigger wait status, and repeats the operation above.

Refer to Section 3.5.4 “Outputting signal in sync with external trigger signal” in the MG3700A Operation Manual (Mainframe) for details of the external trigger function.

3.4 Auxiliary Signal Output

When using the MX370001A, the following auxiliary signals are output from the AUX Input/Output connectors on the rear panel of the MG3700A: Frame Clock (from Connector 1), Subframe Clock (from Connector 2), and RF Gate (from Connector 3).

- Frame Clock
  As Frame Clock, a pulse is output in synchronization with the first symbol of a frame. The polarity of the signal can be inverted by changing Polarity of Marker1.

- Subframe Clock
  As Subframe Clock, a pulse is output in synchronization with the first symbol of a subframe. The polarity of the signal can be inverted by changing Polarity of Marker2.

- RF Gate
  When the used waveform pattern is burst, the RF Gate signal indicates the RF output burst ON/OFF status. The correspondence between the burst ON/OFF status and the output signal is as follows:

  Burst ON: High level
  Burst OFF: Low level
  (The correspondence shown above is for the case when Polarity of Marker3 is Positive. It is inverted when Polarity is Negative.)

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