

APPLICATION NOTE

MG3700A

Vector Signal Generator

BS Load test

ANRITSU CORPORATION

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Application Note ~ BS Load test ~

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MG3700A

Vector Signal Generator



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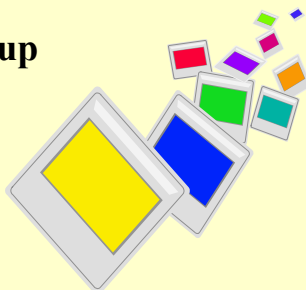
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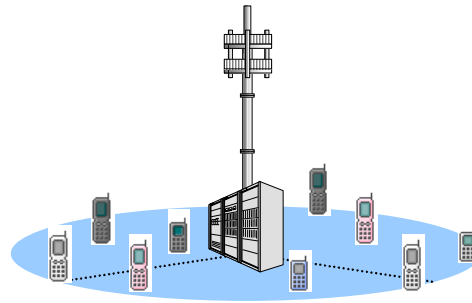
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Introduction

- A Base Station (BS) for wireless communication systems must communicate with many UEs (User Equipments). Therefore, the performance of a BS must be verified in a load condition with many UEs.
- One MG3700A provides the multi-user signals to simulate the load conditions.
- This document presents MG3700A operation technique for W-CDMA as a typical example of this kind of application. The same technique can be applied in other systems as well.



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Example of W-CDMA multi-user signal pattern

- This assumes that a signal pattern file for 80 users is created, and a BS tests the BER.
 - » Using *HSDPA IQproducer*
 - Create the signal pattern files for a single user with W-CDMA/HSDPA capability in uplink.
 - The users will have different scrambling code in uplink.
 - DTCH will carry the PN9 for BER test.
 - » Using *Multi-carrier IQproducer*
 - Create the signal pattern files for 20 users that combine the signal pattern files for a single user.
 - Create the signal pattern files for 80 users that combine the signal pattern files for 20 users.
 - The BS will receive the following:
 - All users on the same frequency
 - Equal power between all users
 - DPCH frames at the same time
 - Random phase between all uplink signal

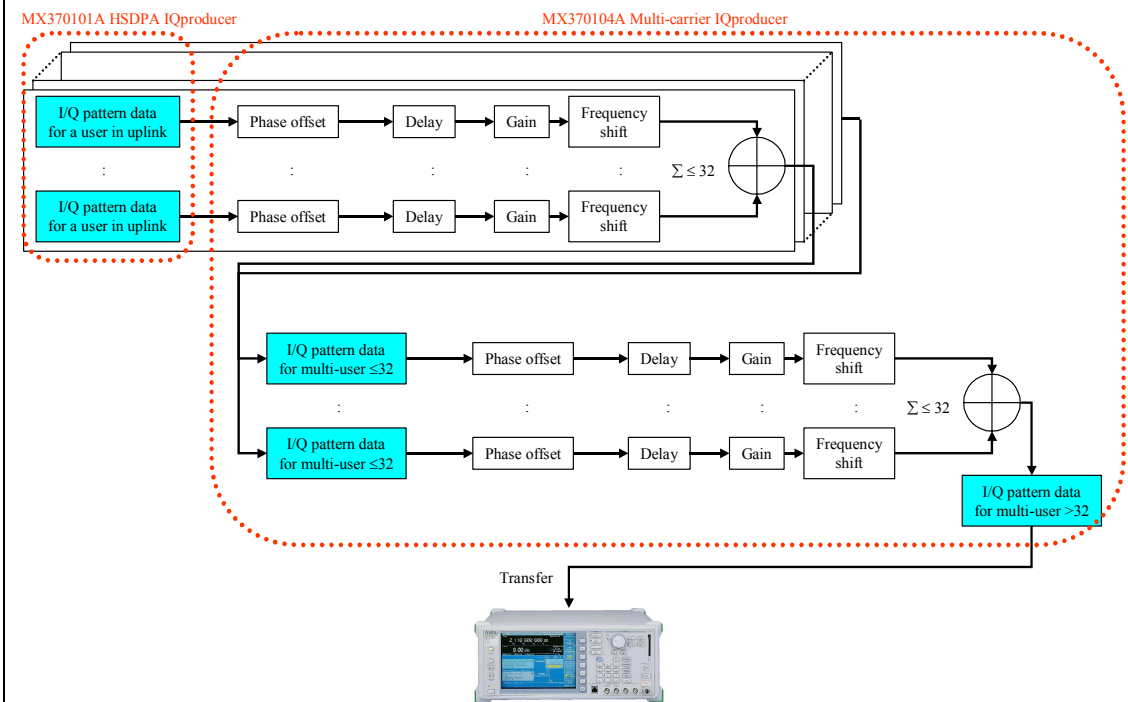
Multi-carrier IQproducer can combine up to 32 signal pattern files.

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Overview



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Create signal pattern files for a single user first ~ HSDPA IQproducer ~

License option MX370101A

Create a pattern file

- Created sample rate
- 3x oversampling

TPC Bit Pattern	Transmitter power control command
Ntpcc = 2	11
	00

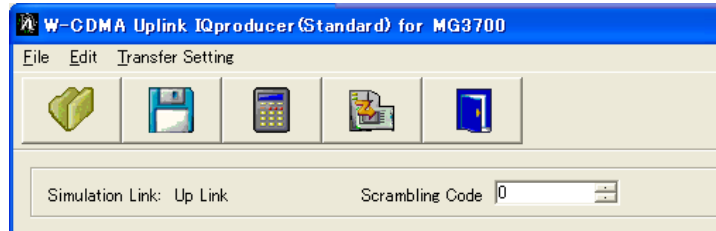
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Scrambling code Setup

- **Scrambling code**
 - » BS identifies UE by the scrambling code allocated to each UE
 - » 38,400 chip (10 ms) segments
 - » Applies to scrambling (spreading)
- **Set the scrambling sequence $n_{23} \dots n_0$ receivable by BS**
 - 0 ~ 16,777,215



Different scrambling code between all users

Create signal pattern file for multi-user ~ Multi-carrier IQproducer ~

License option MX370104A

Random phase automatically

Equal power

Max Freq Offset = ± 11.904000MHz
Available frequency offset

Σ ≤ 32

Resampling

Create the signal pattern files for 20 users.
Repeat 4 times to 80 users.

It will take about one day to complete depending on the PC spec.
The temporary large hard disk will be required.

Create signal pattern file for multi-user >32

20 users
20 users
20 users
20 users

Created signal pattern files for multi-user ≤ 32

Resampling

Create the signal pattern files for 80 users.

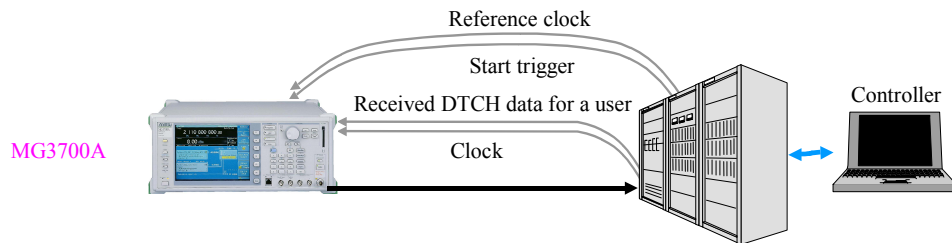
It will take about one day to complete depending on the PC spec. The temporary large hard disk will be required.

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Connections



- Start trigger
 - Front panel [Start/Frame Trigger] Input
 - 40 ms × n clock
 - e.g. SFN reset timing of Downlink BCH (4096 frame × 10 ms)
- Reference clock
 - Apply only one
 - Rear panel [Baseband Ref Clock] Input
 - 3.84 MHz, 2 × 3.84 MHz (7.68 MHz), 4 × 3.84 MHz (15.36 MHz)
 - Rear panel [10MHz/5MHz Ref] Input
- Controller
 - Launches UL RMC in the receivable state by FTM (Factory Test Mode) control.
 - Reports the internal BER/BLER calculation for received DTCH.

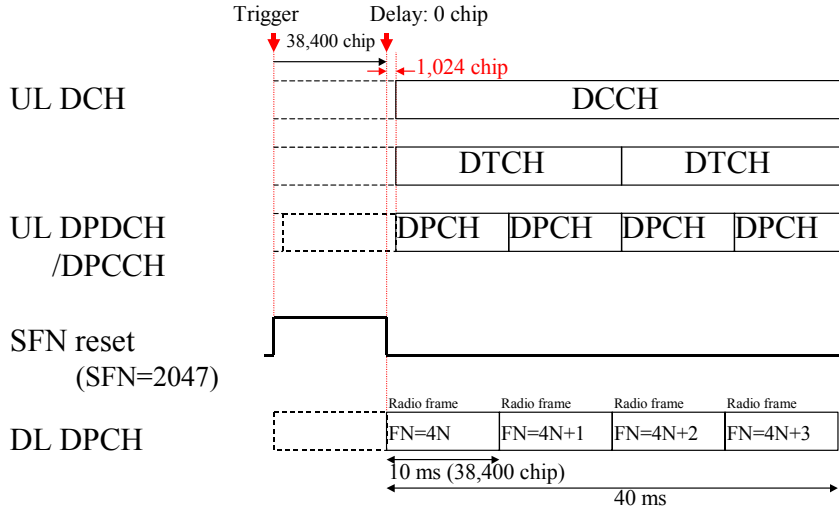
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Timing synchronization Setup example

- **Start trigger delay**
 - » Set the timing to which BS can receive UL RMC



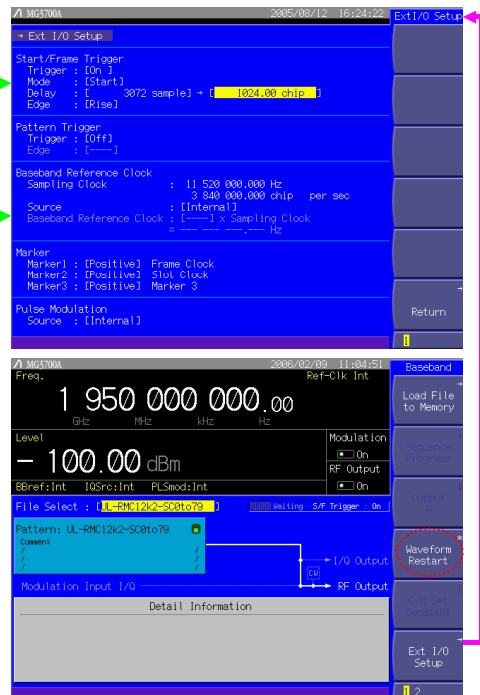
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Timing synchronization Setup example

- **Setting External Start trigger**
 - » Captures/ Synchronizes the Trigger only once
- **Reference clock:**
 - » [Baseband Ref Clock] Input applicable case
 - Source : [External]
 - Baseband Reference Clock:
 - [1],[1/2],[1/4],[1/8],[1/16] ×
 - » [10MHz/5MHz Ref] Input applicable case
 - Source : [Internal]
- **Trigger recapture/ synchronization**

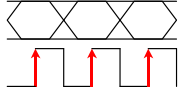
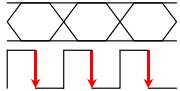


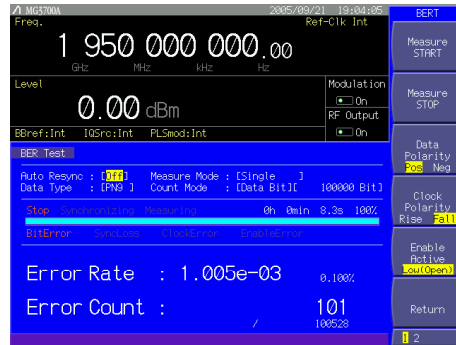
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BERT Setup example

- **Received DTCH data**
 - » PN9
- **Clock**
 - » Rise
 - Data 
 - Clock
 - » Fall
 - Data 
 - Clock
- **Measuring bit/time**
- **Automatic re-synchronization**
 - » On
 - Sync Loss is detected.
 - » Off
 - Sync Loss is ignored.





Specifications are subject to change without notice.

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