Product Introduction

Measurement of Mobile ISDB-T and GPS

MG3700A
Vector Signal Generator

Measurement of Mobile ISDB-T and GPS

Version 2.00

ANRITSU CORPORATION

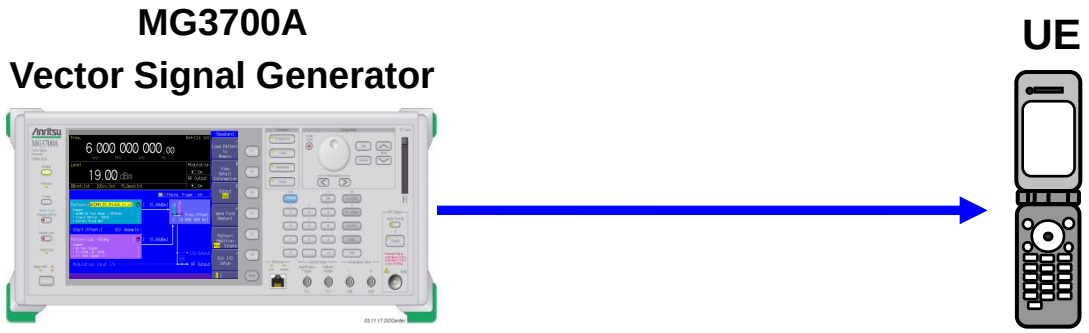
Contents

The MG3700A Vector Signal Generator

The MG3700A Vector Signal Generator

The MG3700A vector signal generator is based on arbitrary waveforms. Various digital modulation signals can be output by selecting waveform patterns before.

The SG supports not only main signal waveform patterns, but also GPS, Bluetooth and Wireless LAN. Moreover, TD-SCDMA and HSDPA functions can be added by options.



♦**Built-in** Waveform Pattern
- •W-CDMA, •GSM/EDGE,
- •CDMA2000 1x/1xEV-DO,
- •PDC, •PHS, •AWGN,
- •*Bluetooth*®, •GPS*1
- •Broadcasting (ISDBT*2/BS/CS/CATV)
- •Wireless LAN (IEEE802.11a/11b/11g)

*1: see slide17,18, *2: see slide15

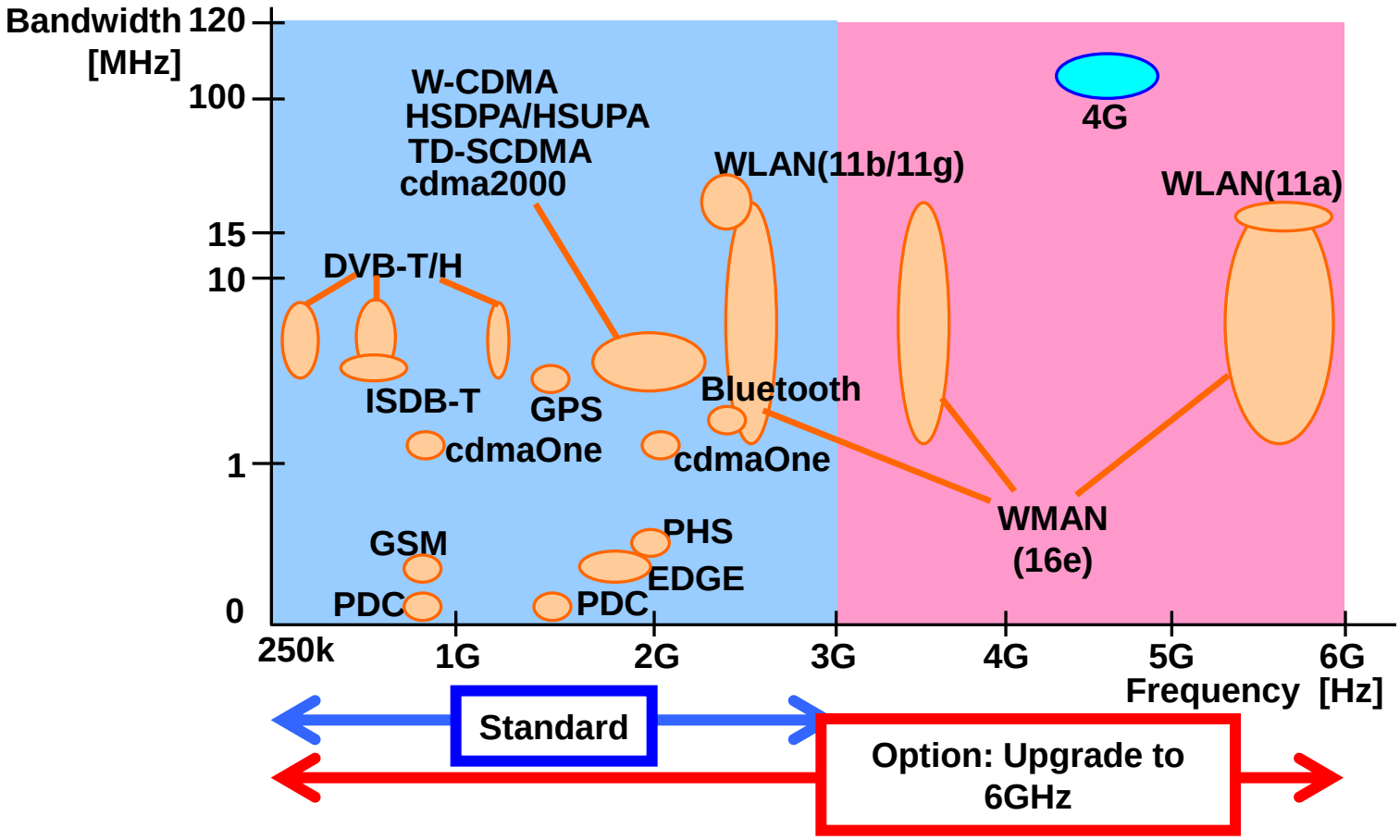
♦Option Waveform Pattern (Sold separately)
- •TD-SCDMA
- •Public Radio Systems (RCR STD-39, ARIB STD-T61/T79/T86)

♦Waveform Generating Software:
IQproducer (*: sold separately)
- •W-CDMA, •AWGN, •HSDPA/HSUPA*
- •TDMA*, •CDMA2000 1xEV-DO*, •Multi-carrier*
- •Mobile WiMAX*, •DVB-T/H*

The MG3700A Vector Signal Generator
Excellent Basic Performances

♦**Frequency Range**
250 kHz to 3 GHz (Standard)
250 kHz to 6 GHz (Option)

♦**Broadband Vector Modulation**:
150 MHz (When using external IQ)
120 MHz (Built-in base band generator)

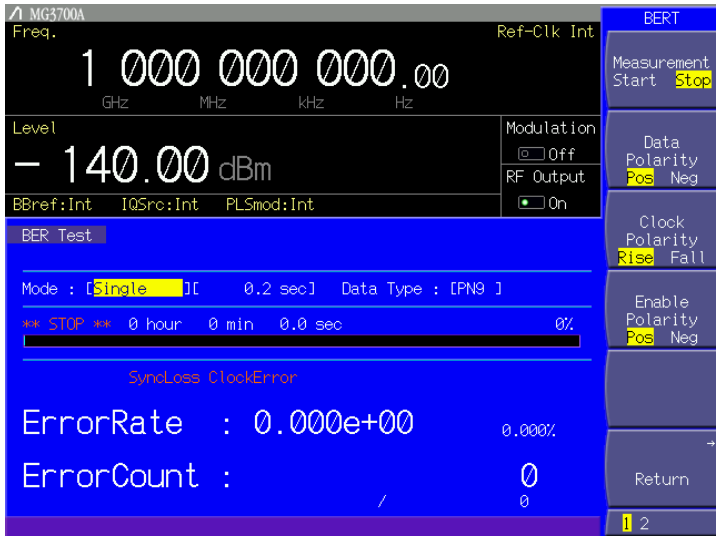


The MG3700A Vector Signal Generator
Built-in BER Measuring Instrument

♦ **Includes BER Measuring Instrument for Rx. Characteristics Evaluation as Standard Equipment**

Built-in BER measuring instrument supports up to 20 Mbps.
Rx. Instrument's BER can be measured by simple operations.

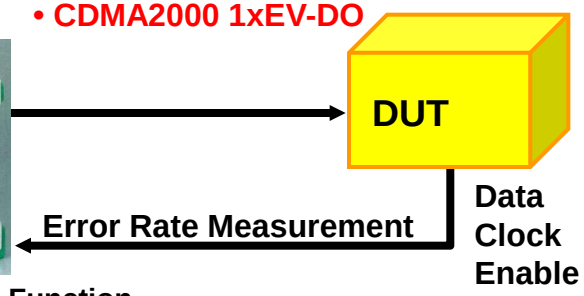
Rear Panel Connector



MG3700A
Vector Signal Generator

Wanted Signal

- W-CDMA/HSDPA
- GSM/EDGE
- CDMA2000 1x
- CDMA2000 1xEV-DO
- TD-SCDMA
- PDC
- PHS



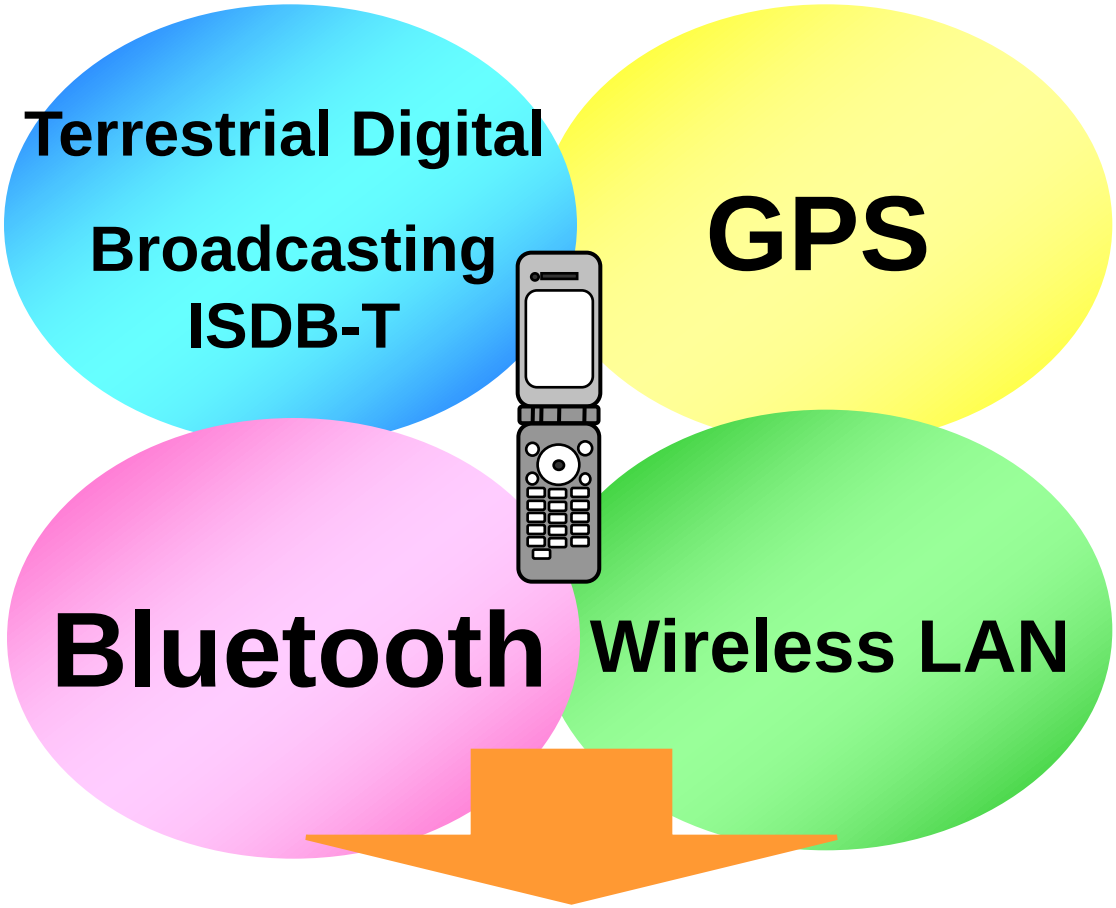
Built-in Error Rate Measuring Function

- **Input Bit Rate: from 1 kbps to 20 Mbps**

♦ **BER measurement items are included in Rx. sensitivity test**
>>> such as W-CDMA, GSM, PHS, PDC
♦ **Built-in BER measuring instrument cuts space, supports easy-to-operate receiver tests.**

Proposal for Diversifying UE Evaluation and Solution for Future Subjects

For Next Generation Mobile UE!
Evaluation of Multi-functional UE



Digital Terrestrial Broadcasting
The picture quality is very important for animation services. To offer stable quality, performance difference among mobiles must be checked.

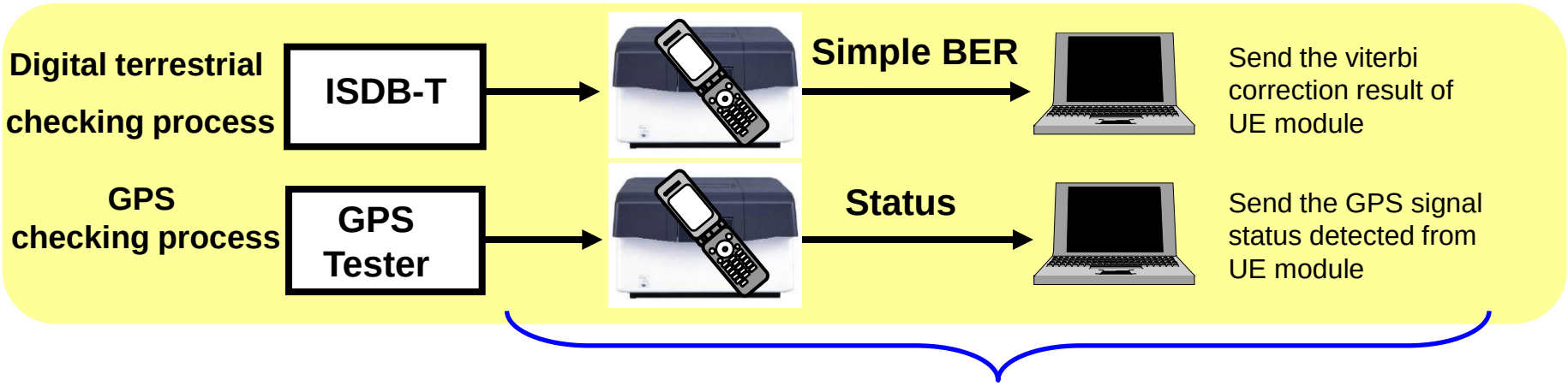
GPS
GPS application is launched in July 2005 as pedestrian navigation. It becomes mandatory from 2007 to get location information at the case of emergency. Each mobile must be checked its functions to avoid malfunction at urgent moments.

Bluetooth
Since in Japan and Europe it's prohibited to hold a mobile on hand during drive, built-in Bluetooth has been well adopted there.Now, many luxury car has navigation system with built-in Bluetooth, and many hands–free communications instruments are sold in Japan. While usage opportunity is increasing like this, stable connectivity and high-quality voice function are required for mobiles.

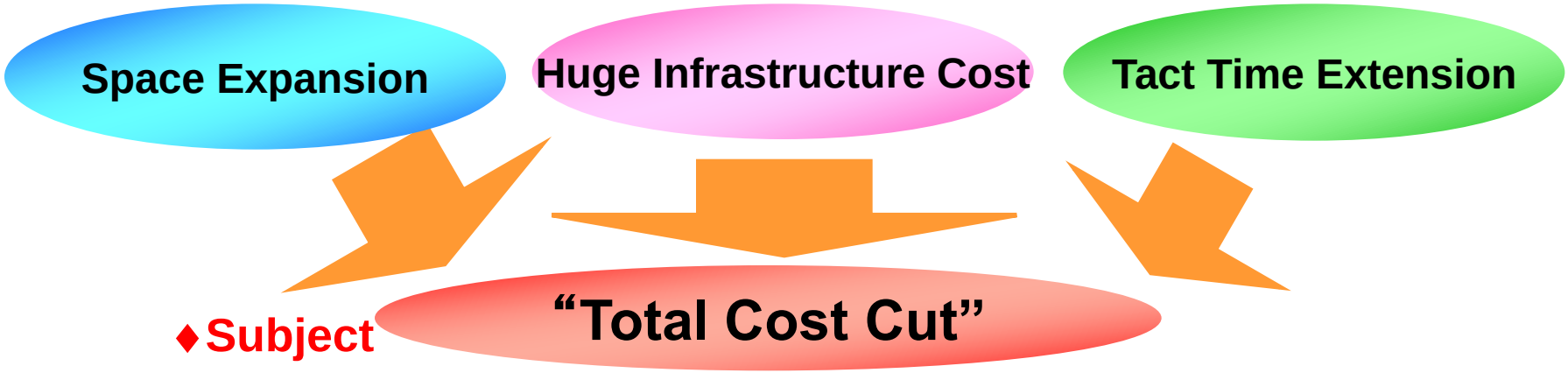
Wireless LAN (Mobile centrex)
Mainly, this service targets enterprises. 2 functions like WLAN for inside company and W-CDMA for outside company can be supported using single mobile.
Since this service is basically for voice calling, the minimum function check of WLAN is required.

The Problem Assumed at Manufacturing Stage

♦Measuring System (when using dedicated SG)



♦Problems



Solution
The MG3700A Cuts Space and Tact Time

♦**Subject**

Various Additional Functions must be Tested

“Total Cost Cut”

♦**The MG3700A Measuring System**

Cut the space for one unit

Status

*The adjustment with measuring object is required for test mode.

- ISDB-T 1segment*
- GPS*
(Others: Bluetooth*, WLAN)

Digital Terrestrial & GPS Checking Process

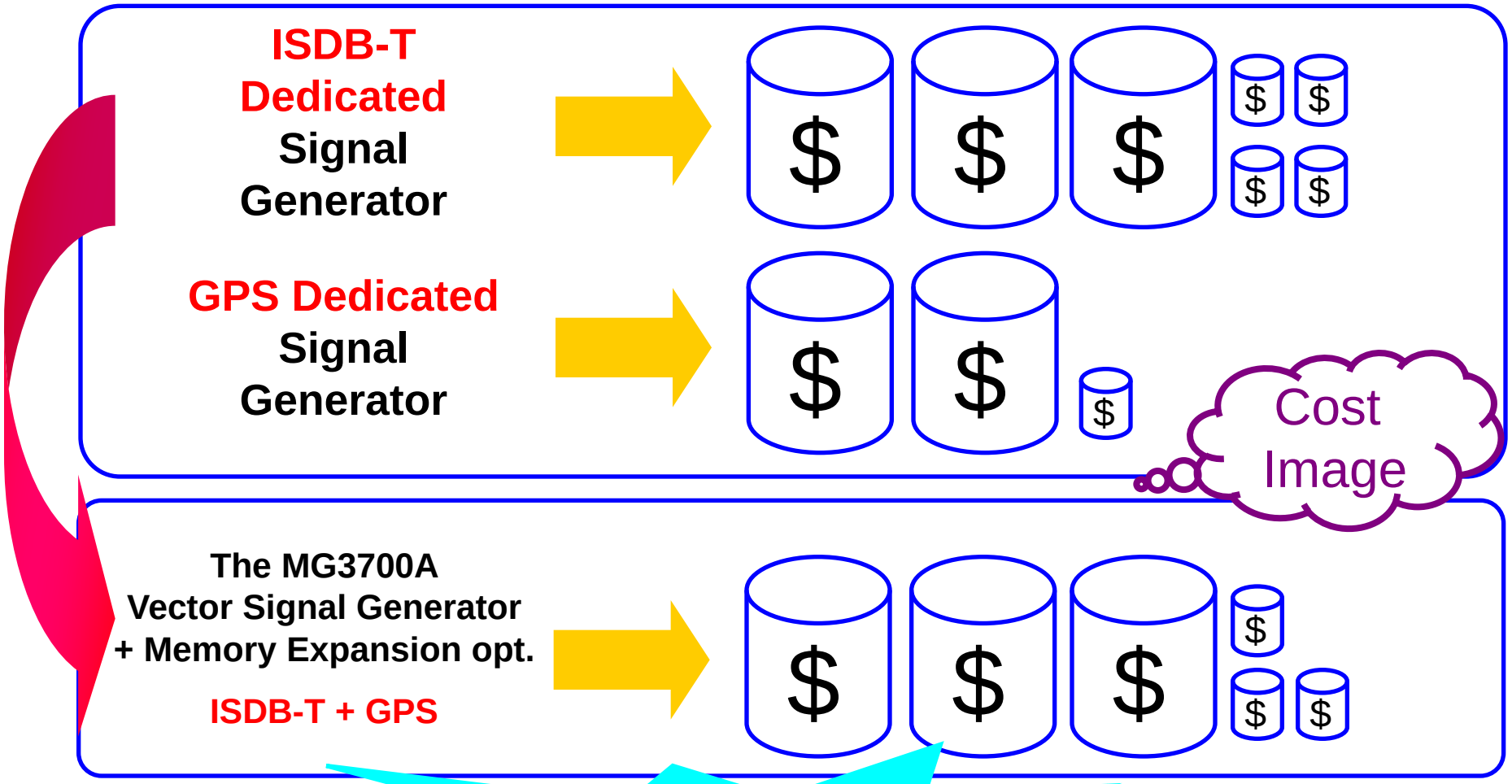
Cut Space!

Cut Infrastructure Cost!

Cut Tact Time!

Solution

The MG3700A Cuts Infrastructure Cost

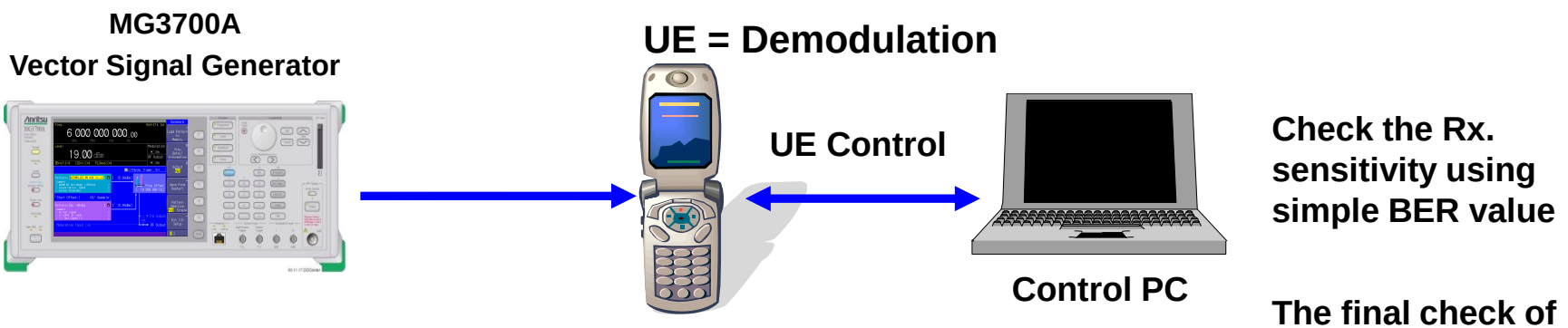


Measurement Examples

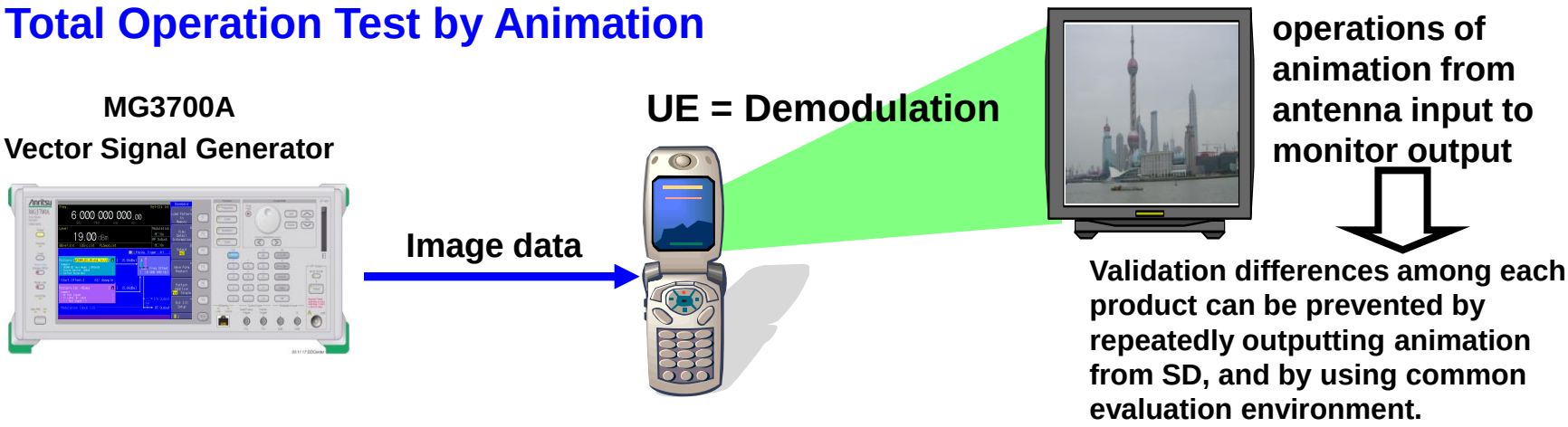
Digital Terrestrial Broadcasting (ISDB-T)
- Measurement Examples -

Ex) Rx. Sensitivity Test Using Simple BER (the count of forward error correction)

Note : Due to huge data capacity , the MG3700A doesn't support the waveform pattern of PN-BER measurement (such as PN23). However, simple BER (Viterbi BER) is supported.



Ex) Total Operation Test by Animation



Digital Terrestrial Television Broadcasting (ISDB-T)
- The MG3700A ISDB-T Support Status -

♦Standard Waveform Patterns Digital Broadcast

Pattern Name	Parameter	Application
ISDBT_1layer_1ch	Mode: 3, GI: 1/8 A-Layer:13seg, 64QAM	Physical layer waveform pattern of ISDB-T for device evaluation.
ISDBT_2layer_1ch	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK B-Layer: 12seg, 64QAM	Physical layer waveform pattern of ISDB-T for device evaluation.
ISDBT_2layer_Movie	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 2 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 2	Waveform pattern for ISDB-T partial reception, mainlyused for evaluation of image and voice data of terminals. The waveform length is 40 frames.
ISDBT_2layer_Movie2	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 4 B-Layer: 12seg, 64QAM, CR = 3/4, TI = 2	
ISDBT_2layer_Coded	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 2 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 2	Waveform pattern for ISDB-T partial reception, mainlyused for simple BER measurement. The waveform length is 4 frames.
ISDBT_QPSK_1_2	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 1/2, TI = 0 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 1	
ISDBT_QPSK_2_3	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 0 B-Layer: 12seg, 64QAM, CR = 7/8, TI =1	
ISDBT_16QAM_1_2	Mode: 3, GI: 1/8 A-Layer: 1seg, 16QAM, CR = 1/2, TI = 0 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 1	
ISDBT_QPSK_2_3_TI4	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 4 B-Layer: 12seg, 64QAM, CR = 3/4, TI = 2	

Usage: Each waveform pattern can be used for animation/voice check, simple BER and interference of ISDB-T 1/12 segment.

Digital Terrestrial Television Broadcasting (ISDB-T)
- The MG3700A ISDB-T Support Status -

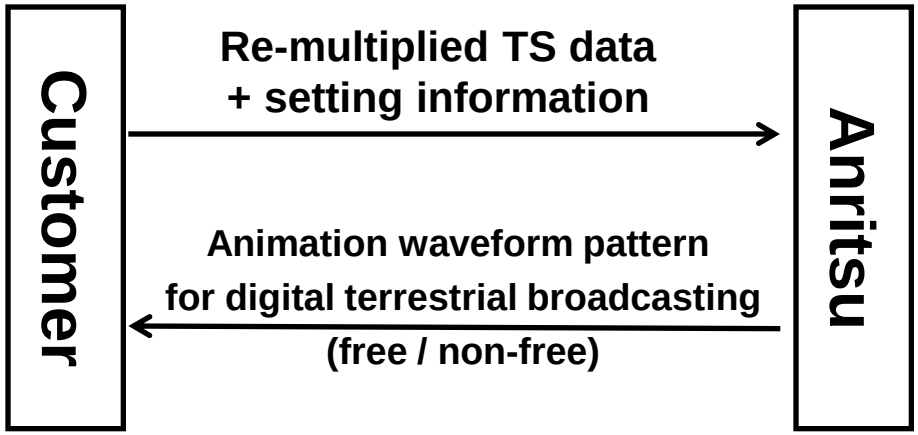
♦Animation Waveform Pattern for Digital Terrestrial Broadcasting

Usually, customer uses own contents for evaluating animation like digital terrestrial broadcasting. Therefore, Anritsu offers service converting customers' re-multiplied TS data to the waveform pattern format for the MG3700A. Along with TS data, the following setting information are required for the conversion.

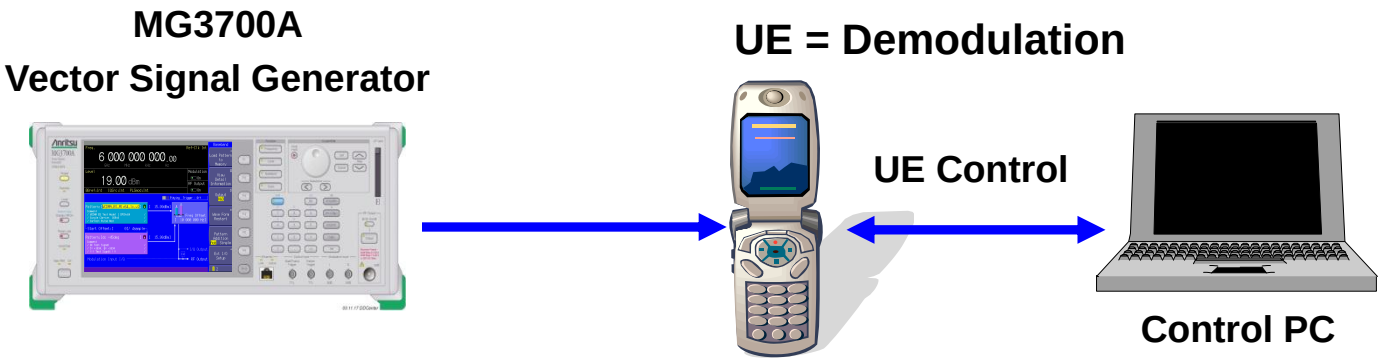
The cost (free/non-free) and development term are depending on the quantity of waveform patterns. Please contact us to consult about it.

♦Setting Information

– Mode
– GI
– The existence of emergency warning fragment
– The existence of parts Rx. fragment
– The segment number of each layer
– The modulation system of each layer
– The convolutional code rate of each layer
– The time interleave length of each layer



GPS
- Measurement Examples -



- Set UE in test mode by controlling PC
- Output GSP signal with specified sensitivity level from SG
- Receive GPS signal with UE
- Send Rx. signal status from UE to PC
- Check the status information with PC

GPS
- The MG3700A GPS Support Status -

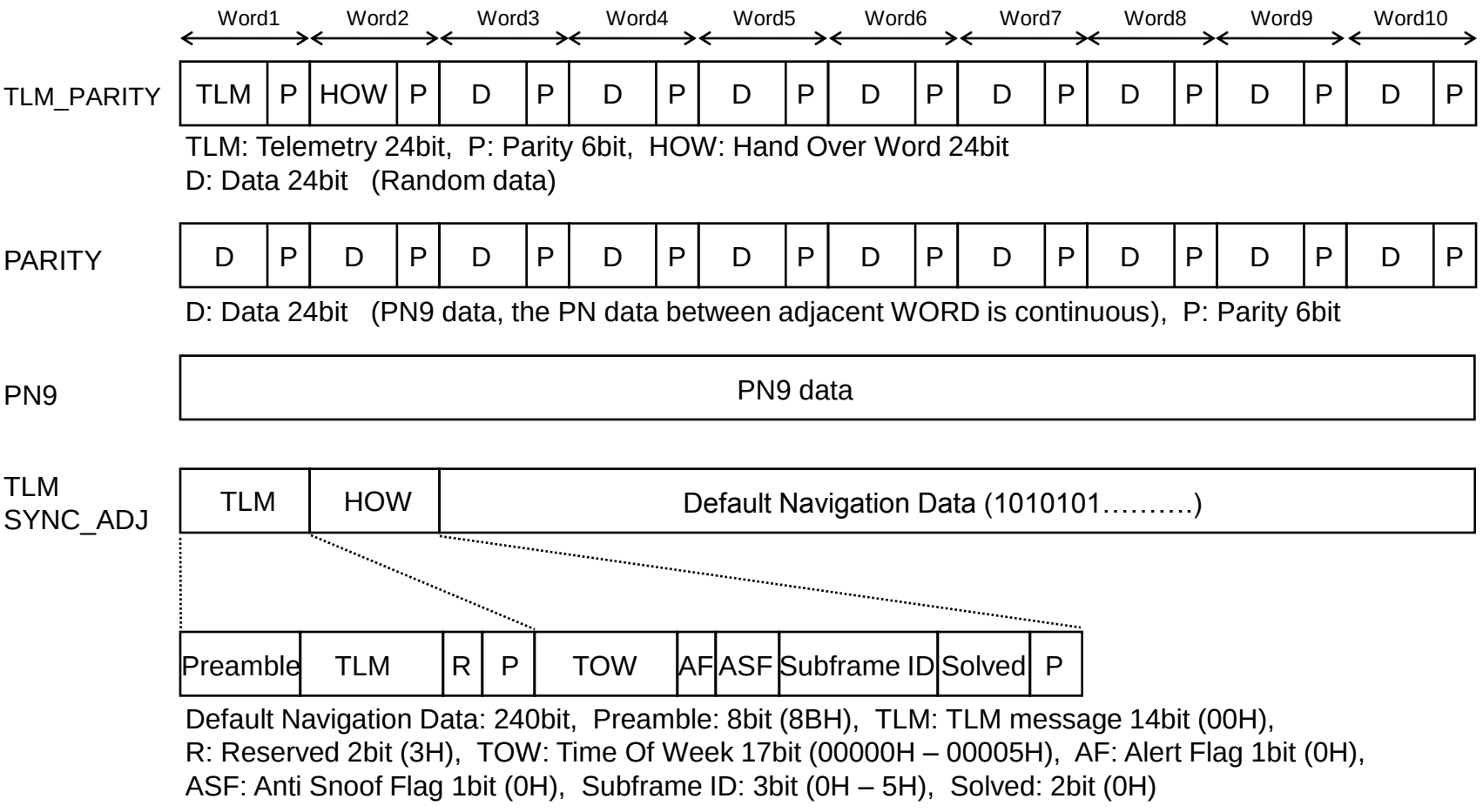
♦ *GPS Waveform Patterns*

Pattern Name	Data Overview
SYNC_ADJ *1	This is TLM, HOW and Default Navigation Data, which formatted on the GSP specification*2 subframe configuration base. One cycle is composed from 6 subframes.
TLM	This is TLM, HOW and Default Navigation Data, which formatted on the GSP specification*2 subframe configuration base.
PARITY	This Word format is compiled with the GSP specification*2. 1Word is composed from 24 bit PN9 data and 6bit parity bit.
TLM_PARITY	This Word format is compiled with GPS specification *2. 1 Word is composed from 24 bit NAV data (1 frame cycle) and 6 bit parity bit.
PN9	This is PN9 continuous data without subframe format.

*1: Since SYNC_ADJ is used with DATA0, DATA1 and DATA10, you need to select file. Please press the MG3700A base-band key, and set the Pattern Combination in Defined, and select a file.
*2: GLOBAL POSITIONING SYSTEM STANDARD POSITIONING SERVICE SIGNAL SPECIFICATION

Note) At least 4 satellite numbers are received by the GPS module device evaluation. However, above mentioned 4 waveform patterns are not supported for the evaluation of GPS measuring function, because these satellite numbers are fixed in “1”. These waveform patterns can be used for the performance validation, the Tx./Rx. characteristics evaluation and the synchronizing adjustment of mobile with evaluated module device.

♦GPS Waveform Pattern Frame Format



GPS
- The MG3700A GPS Support Status -

♦ *The Usage of GPS Waveform Pattern*

Waveform	Usage	Measurement	Remark
SYNC_ADJ	Synchronization adjustment of CDMA2000 system UE	For the synchronization adjustment to GPS *3 (For the synchronization to 2PPS signal)	It adjust the mobile with GPS by synchronizing to the MT8820A 2 seconds cycle trigger, and by outputting GPS signal.
TLM	Rx. sensitivity measurement, Operation check	Rx. level measurement, Rx. data detection	Satellite number and C/N information are obtained at operation check using controller *4
TLM_PARITY	Rx. sensitivity measurement, Operation check	Rx. level measurement, Rx. data detection with Defualt Navi Data	Satellite number and C/N information are obtained at operation check using controller *4
PARITY	Rx. Characteristic	Parity detection, BER measurement	It validates the parity check function by using a waveform, which has data and parity format. *4
PN9	Rx. Characteristic	BER measurement	It measures BER by using a continuous wave, which doesn't have packet format. *4

*3: The RF subframe output timing is within 10 ns regards to external start trigger input. (right diagram)

*4: The special test mode, which checks GPS performance, is required for mobile function.

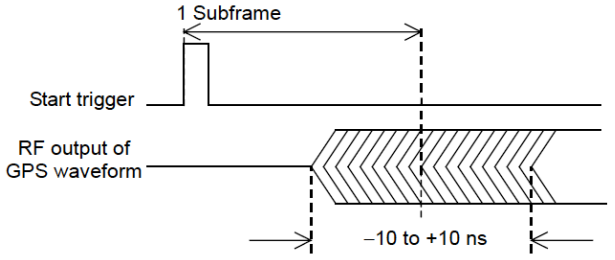


Diagram SYNC_ADJ output timing

Ordering Information

	Model	Name	Remark
	-Main Body-		
Mandatory	MG3700A	Vector Signal Generator	
	-Option-		
	MG3700A-002	Mechanical Attenuator	This option replaces standard Electronic Attenuator with Mechanical Attenuator. Output power becomes from +13dBm to +19dBm. Adjacent Channel Power is improved about 1~2dB.
	MG3700A-011	Upper Frequency 6 GHz	This option expands standard frequency range from 250 kHz~3 GHz to250 kHz~6 GHz.
Recommended	MG3700A-021	ARB Memory Expansion 512 M Sample	This option expands standard ARB memory size from 128 Msamples/channel × 2 to 256 Msamples/channel × 2. We recommend to expand the memory size of animation,because it requires 256Msa/one file for playing 16 seconds.
	MG3700A-031	High-speed BER Measuring Function	This option is replaced with standard buit-in BER. It's recommended for R&D , because it has threshold adjustment function, and supports higer error rate than standard function.
	-Software-		
	(License for IQproducer System)		
	MX370104A	Multi-carrier IQproducer	It's required when generating multicarrer waveform pattern usinfg PC.
	-Optional Accessories-		
	J1277	IQ Output Convert Adapter	This adapter is required when evaluating using IQ output (Balance), converts the MG3700A IQ output connecter D-Sub into BNC.
Recommended	J1261D	Ethernet Cable with Shield (Cross)	The cross cable is required when connecting PC(Iqproducer)and the MG3700A directly. When it connected via Hub, you can use a straight cable too.

Anritsu

Specifications are subject to change without notice.

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