Product Introduction

MX370107A

Fading IQproducer

MG3710A

Vector Signal Generator

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MG3710A
Vector Signal Generator

Version 1.00

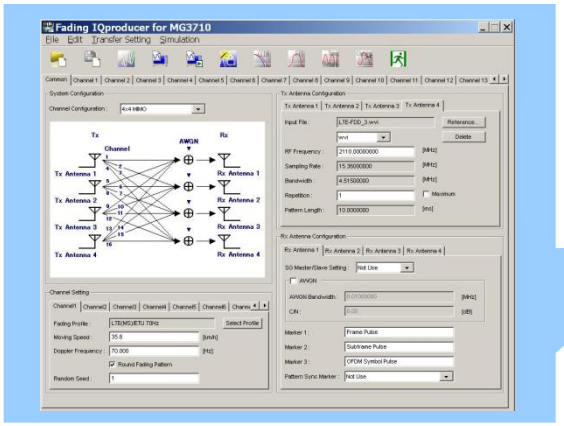
ANRITSU CORPORATION

What is Fading IQproducer?

Fading IQproducer is PC software to set fading parameters and generate waveform patterns by reading waveform patterns for the MG3710A. It runs under the Windows installed in the MG3710A and outputs modulation signals by selecting generated waveform patterns. A license is required for the main frame to output signals.

***Read the "MX3701xxA IQproducer" brochure for detail parameter setting range.**

Fading IQproducer



Install

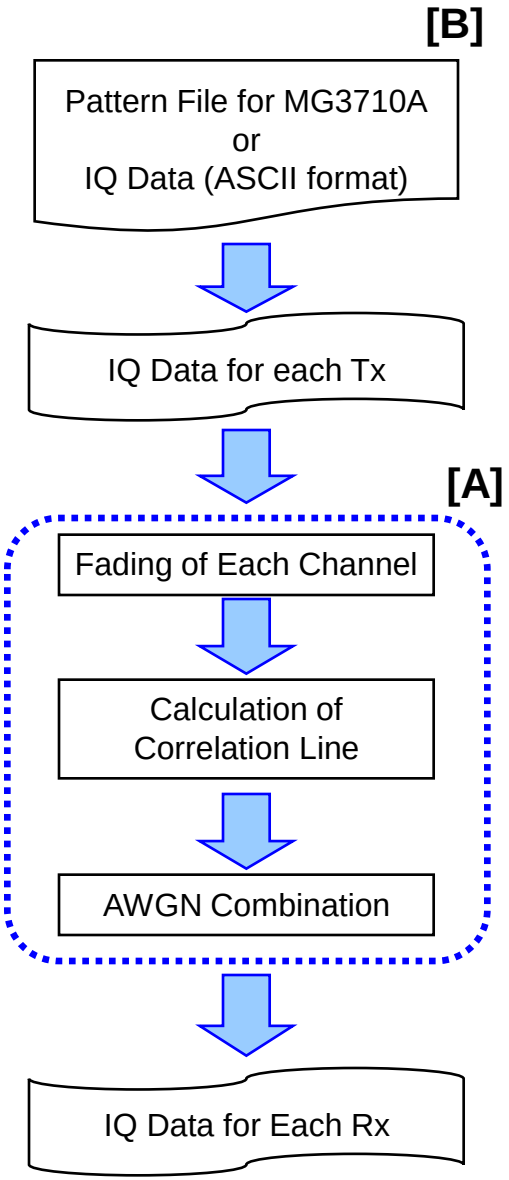
- Generating waveform patterns using Fading IQproducer => The main frame requires a license.
The unlicensed software will run on the PC to test waveform pattern generation but an unlicensed SG cannot output signals because it does not recognize the waveform patterns.

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

What is Fading IQproducer?

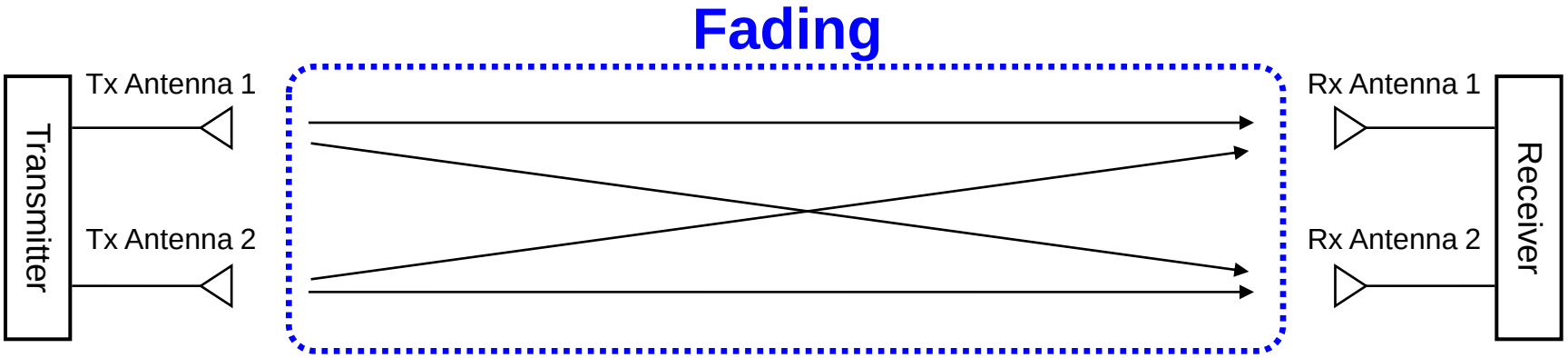
The MX370107A supports the processes inside the dotted line of the block diagram on the right (fading of each IQ channel, calculation of correlation line, AWGN combination). [A]

Either waveform patterns created by another IQproducer or IQ data (ASCII) created by general simulation tools can be selected as the input data file. [B]

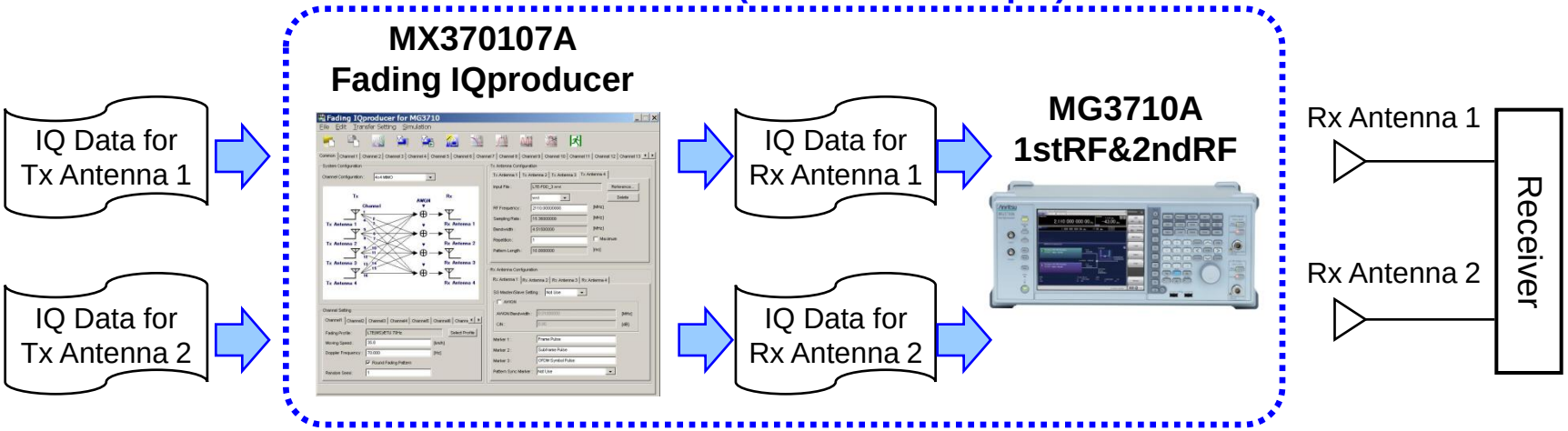


What is Fading IQproducer?

Fading IQproducer supports testing of Rx characteristics in a fading environment.

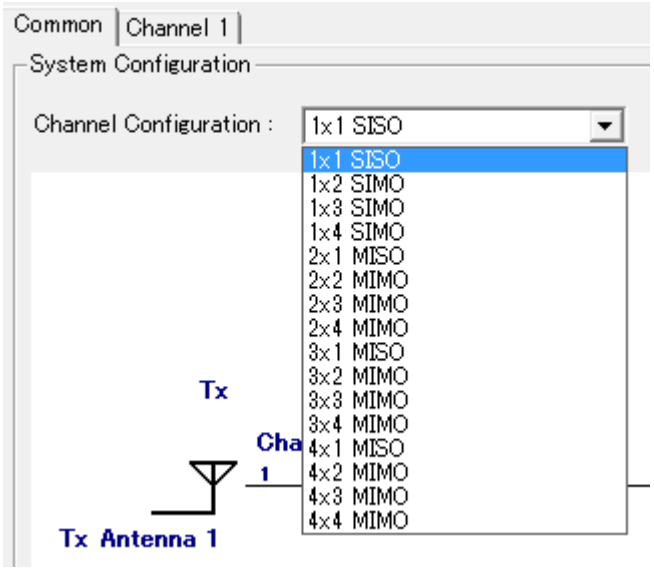


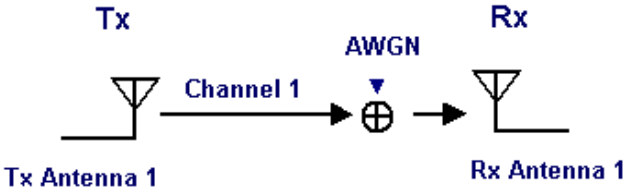
Evaluation of Fading Environment using MG3710A (2x2 MIMO Example)



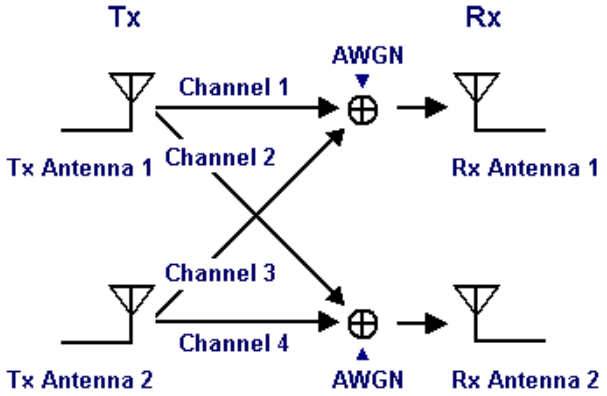
Channel Configuration

Channel configurations 1x1 SISO to 4x4 MIMO can be selected in Channel Configuration.

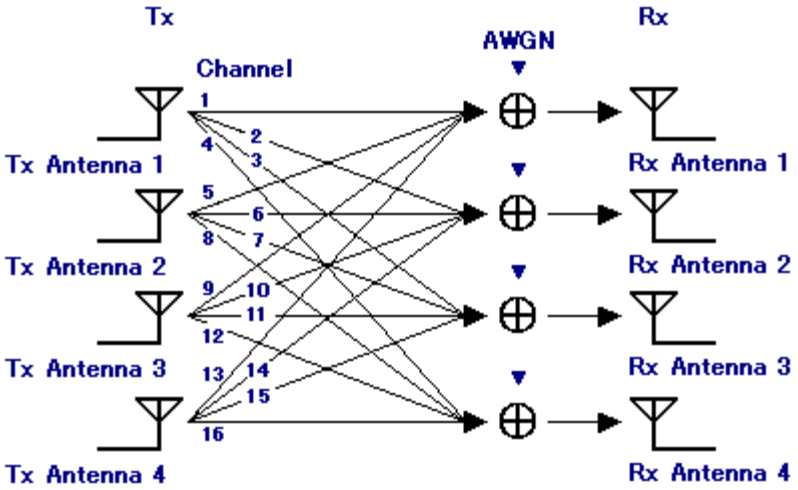




1x1 SISO



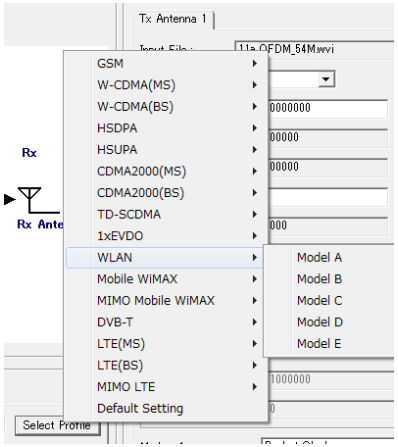
2x2 MIMO



4x4 MIMO

Fading Profile

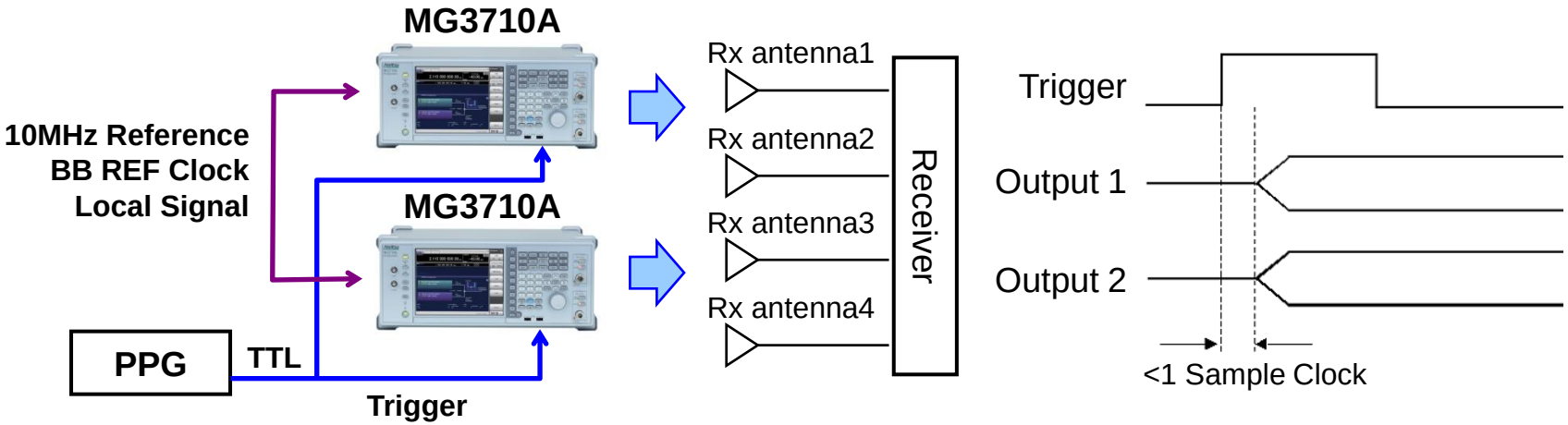
Click the [Select Profile] button to display the profile list, and select a system to set the corresponding parameters.



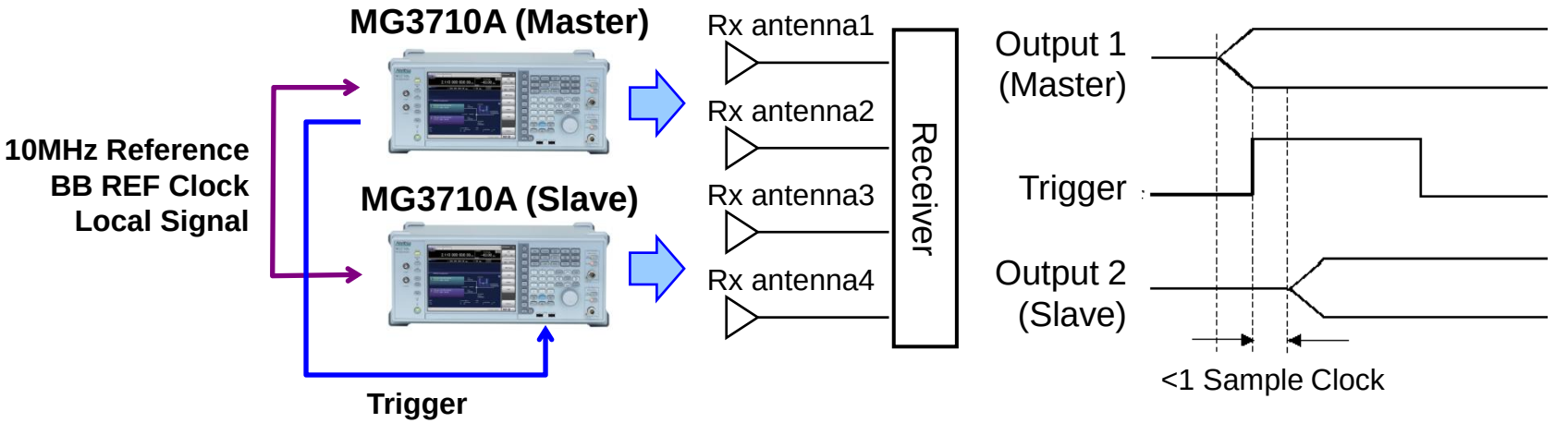
System	Channel Model
GSM	Rural Area 6tap, Rural Area 4tap, Hilly Terrain 12 tap-1, Hilly Terrain 12 tap-2, Hilly Trrain 6 tap-1, Hilly Trrain 6 tap-2, Urban Area 12 tap-1, Urban Area 12 tap-2, Urban Area 6 tap-1, Urban Area 6 tap-2, Equalisation Test 6 tap, Typical small cell 2 tap
W-CDMA (MS)	Case1, Case2, Case3, Case4, Case5, Case6, Moving propagation, Birth-Death propagation, High Speed Train
W-CDMA (BS)	Case1, Case2, Case3, Case4, Moving propagation, Birth-Death propagation, High Speed Train
HSDPA	Case1, Case2, Case3, Case4, Case5, Case6, Case8, ITU Pedestrian A, ITU Pedestrian B, ITU Vehicular A
HSUPA	Case1, Case2, Case3, Case4, ITU Pedestrian A, ITU Pedestrian B, ITU Vehicular A
CDMA2000 (MS)	Case1, Case2, Case3, Case4, Case5, Case6
CDMA2000 (BS)	Case1, Case2, Case3, Case4
TD-SCDMA	Case1, Case2, Case3, ITU Pedestrian A, ITU Pedestrian B, ITU Vehicular A
1xEV-DO	Configuration1, Configuration2, Configuration3, Configuration4, Configuration5
WLAN	Model A, Model B, Model C, Model D, Model E
Mobile WiMAX	ITU Pedestrian B, ITU Vehicular A, Large delay spread
MIMO Mobile WiMAX	2x2 MIMO(ITU Pedestrian B, ITU Vehicular A, Large delay spread)
DVB-T	Typical Urban (TU6), Typical Rural Area (RA6)
LTE (MS)	EPA 5Hz, EVA 5Hz, EVA 70Hz, ETU 70Hz, ETU 300Hz, High Speed Train
LTE (BS)	EPA 5Hz, EVA 5Hz, EVA 70Hz, ETU 70Hz, ETU 300Hz, High Speed Train
MIMO LTE	1x2 SIMO(EPA 5Hz, EVA 5Hz, EVA 70Hz, ETU 70Hz, ETU 300Hz), 2x2 MIMO(EPA 5Hz, EVA 5Hz, EVA 70Hz, ETU 70Hz, ETU 300Hz), 4x2 MIMO(EPA 5Hz, EVA 5Hz, EVA 70Hz, ETU 70Hz, ETU 300Hz), 4x4 MIMO(EPA 5Hz, EVA 5Hz, EVA 70Hz, ETU 70Hz, ETU 300Hz)

4 x 4 MIMO Connection Example

♦Using EXT-Trigger



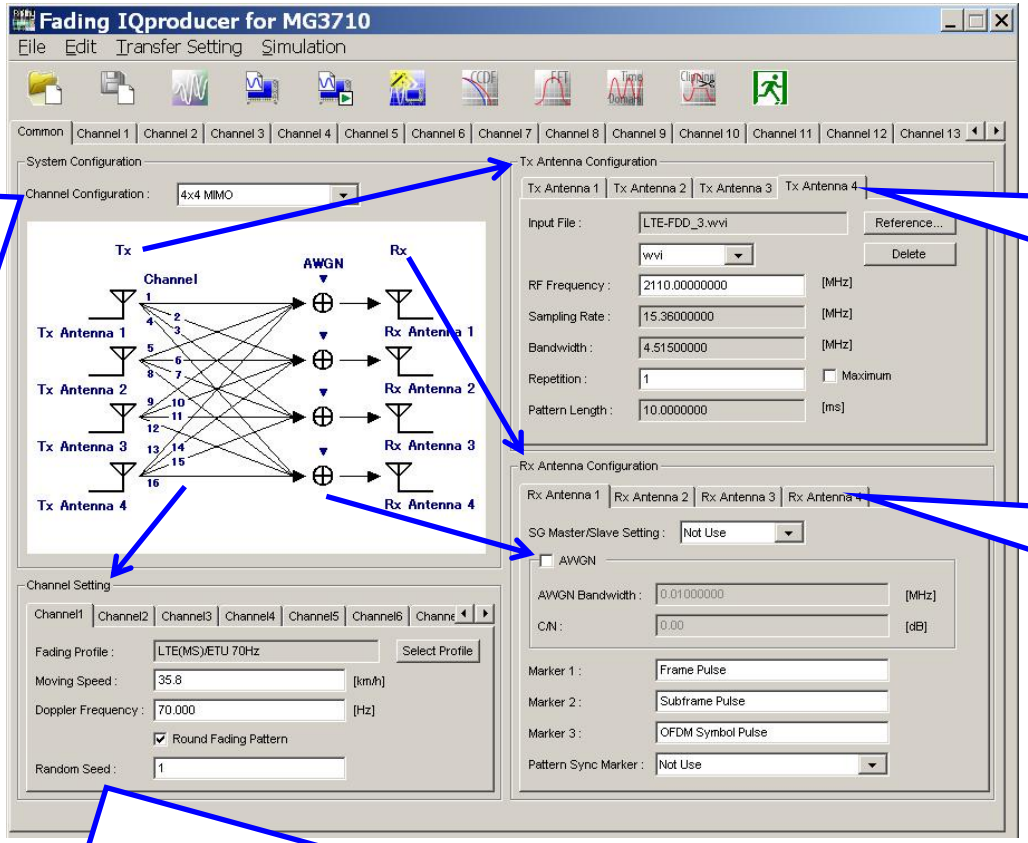
♦Using Master/Slave



Common setting

The following screen is displayed by selecting Fading at [System]. Tx Antenna, Rx Antenna, Channel, AWGN are set at the Common tab. Channel Configurations 1x1 SISO to 4x4 MIMO can be selected in Channel Configuration.

1x1 SISO
1x2 SIMO
1x3 SIMO
1x4 SIMO
2x1 MISO
2x2 MIMO
2x3 MIMO
2x4 MIMO
3x1 MISO
3x2 MIMO
3x3 MIMO
3x4 MIMO
4x1 MIMO
4x2 MIMO
4x3 MIMO
4x4 MIMO



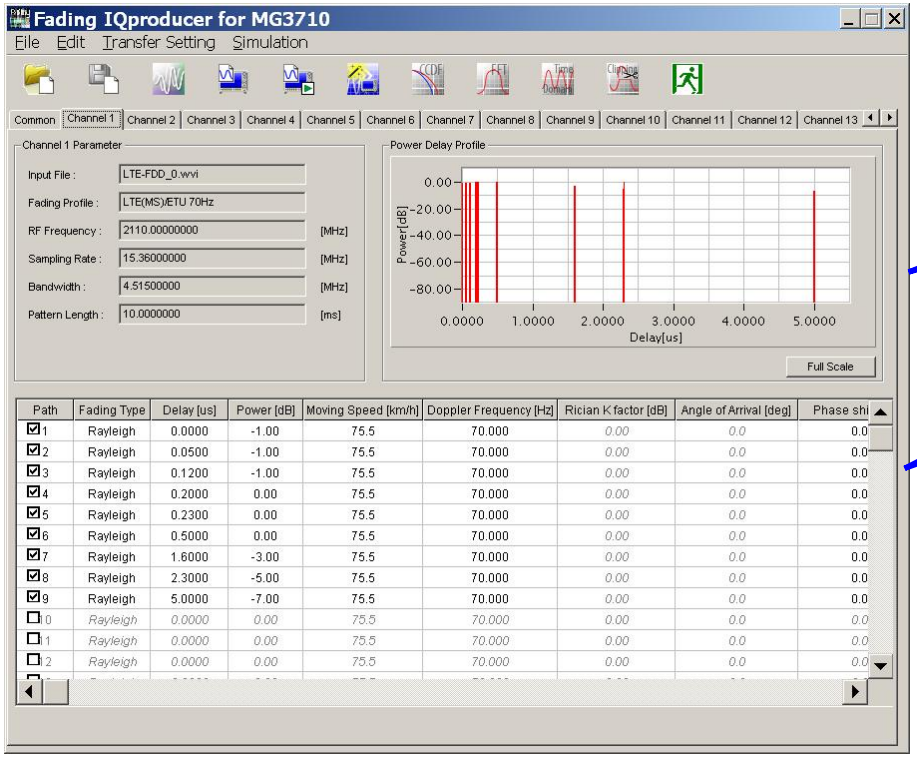
Tx Antenna Settings
Settings for Tx signal:
Either MG3710A waveform pattern or arbitrary IQ data (ASCII) can be selected.

Rx Antenna Settings
Settings for AWGN combine:
Master or Slave can be selected when there are two Rx systems.

Channel Settings
Settings for Fading Profile of each channel, Moving Speed, and Doppler Frequency

Channel setting

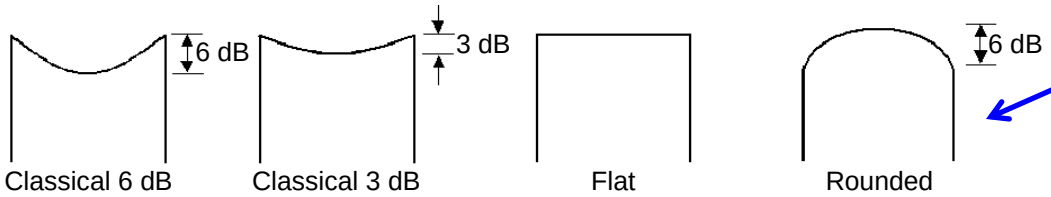
Multi-path settings for each channel



Power Delay Profile
The state of each path is displayed on the horizontal axis (delay) and vertical axis (power).

Multi-path Settings
The settings are listed in the below table.

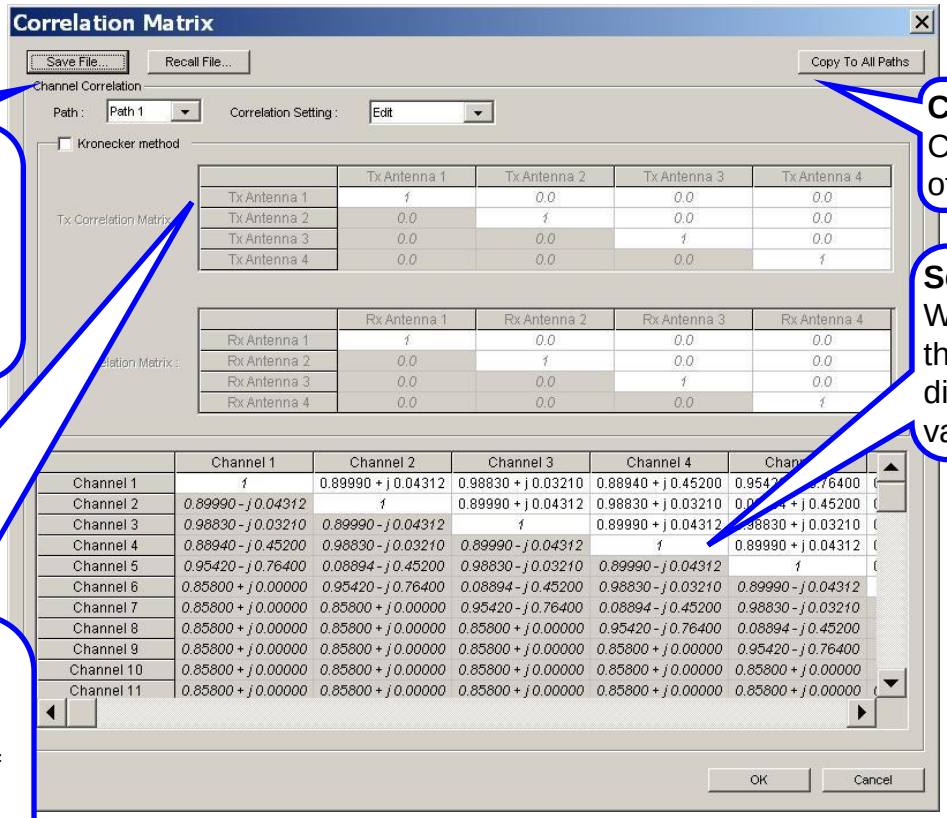
Path	1 to 20
Fading Type	Rayleigh, Rice, Constant
Delay	0.0000 to 2000.0000 us
Power	-80.00 to 0.00 dB
Moving Speed	0.0 to 5000.0 km/h
Doppler Frequency	0.000 to Sampling Rate/2
Rician K factor	-40.00 to 40.00 dB
Angle of Arrival	0.0 to 180.0 deg
Phase shift	0.0 to 359.9 deg
Spectrum Shape	Classical 6 dB, Classical 3 dB, Flat, Rounded
Correlation Setting	Edit, Not Use, Path number setting at Edit



Correlation Matrix Sheet

Sets All Valid Paths. Using the diagonal components of the Correlation Matrix as the border, the bottom-left element is set automatically so the top-right and bottom-left elements form a complex conjugation.

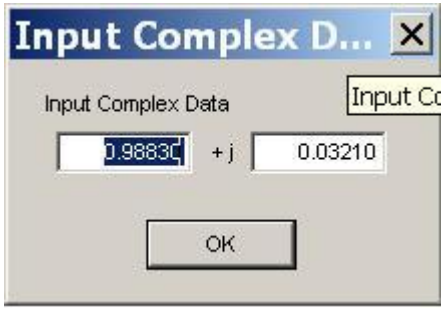
Save File…:
Saves Valid Path Correlation Matrix parameters as .csv file.
Recall File…:
Loads .csv file to set Correlation Matrix parameters.



Copy To All Paths:
Copies set Path parameter to other All Valid Paths.

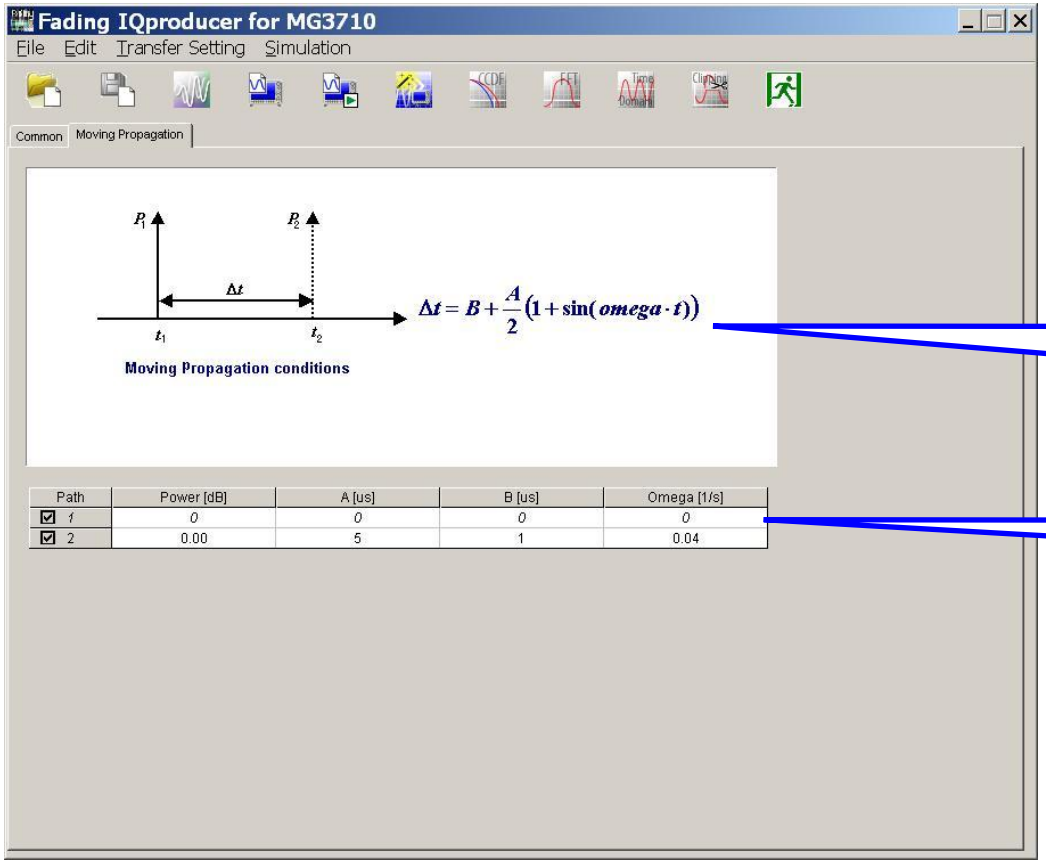
Select each element value:
When an element is selected, the window shown below is displayed to input numeric values.

Kronecker Method
Sets Kronecker Method ON and OFF.
At ON, the Kronecker result of multiplying the Tx Correlation Matrix and Rx Correlation Matrix is reflected in the Correlation Matrix.



Moving Propagation

Moving Propagation can be set when
System Configuration = 1x1 SISO,
and Fading Profile = Moving Propagation (W-CDMA)



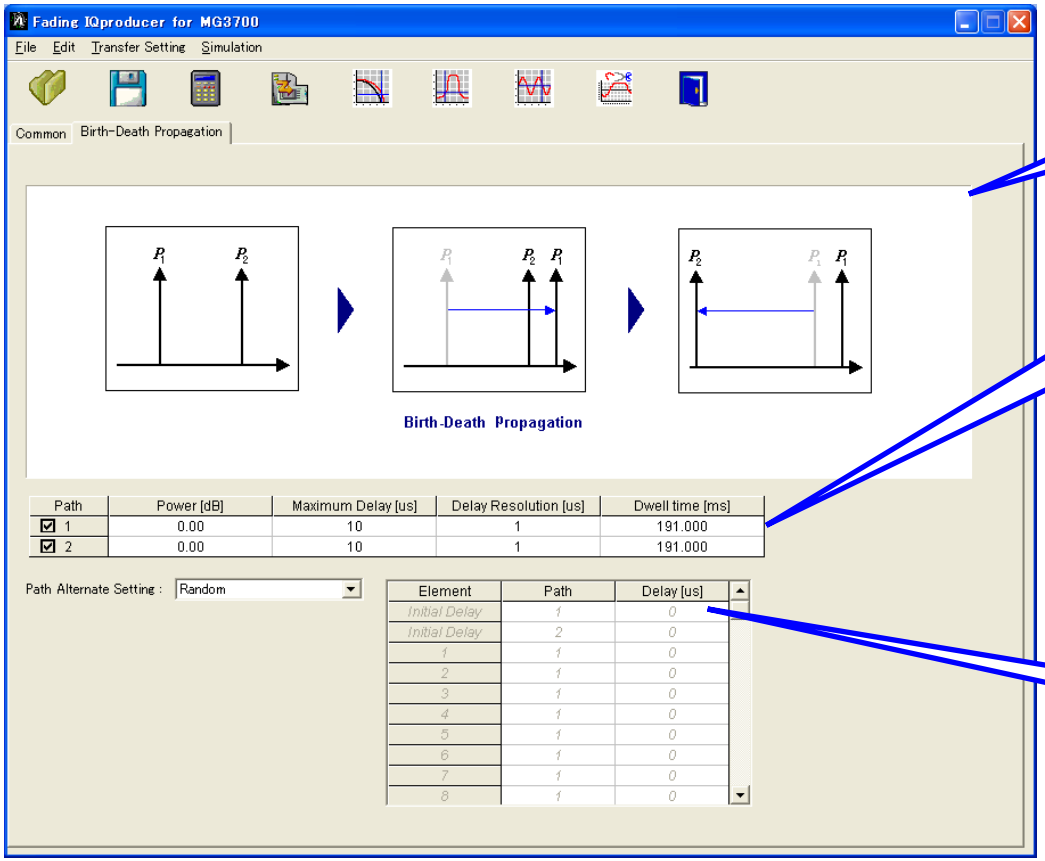
The delay of Path 2 to Path 1 changes according to the expression.

The setting items are listed in the table below.

Path	2
Power	-80.00 to 0.00 dB
A (Offset)	0 to 500 us
B (Variation)	0 to 500 us
Omega	0.00 to 1.00 Hz

Birth-Death Propagation

Birth-Death Propagation can be set when
System Configuration = 1x1 SISO,
and Fading Profile = Birth-Death Propagation (W-CDMA)



The delay of Path 1 and Path 2 is switched at random.

The setting items are listed in the table below.

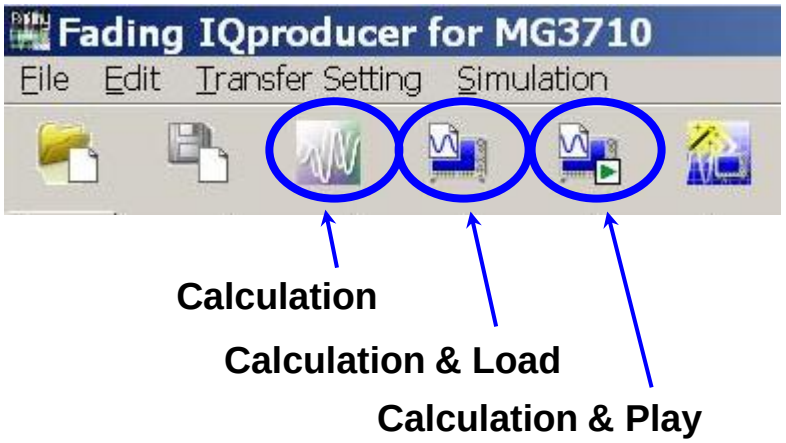
Path	2
Power	-80.00 to 0.00 dB
Maximum Delay	1 to 400 us
Delay Resolution	1 to Maximum Delay us
Dwell time	0.001 to 200.000 ms
Path Alternate setting	Random, Sequence

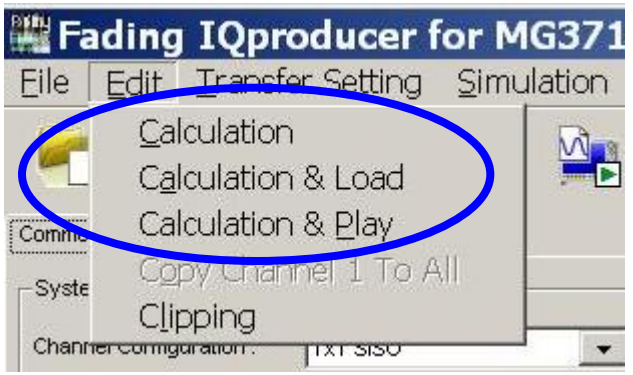
The setting items are listed in the table below.

Path	1, 2, Termination
Delay	0 to Maximum Delay

Generating Waveform: Calculation

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





Calculation:

Generates a waveform pattern after parameters are set.
/Calculation/

Calculation & Load:

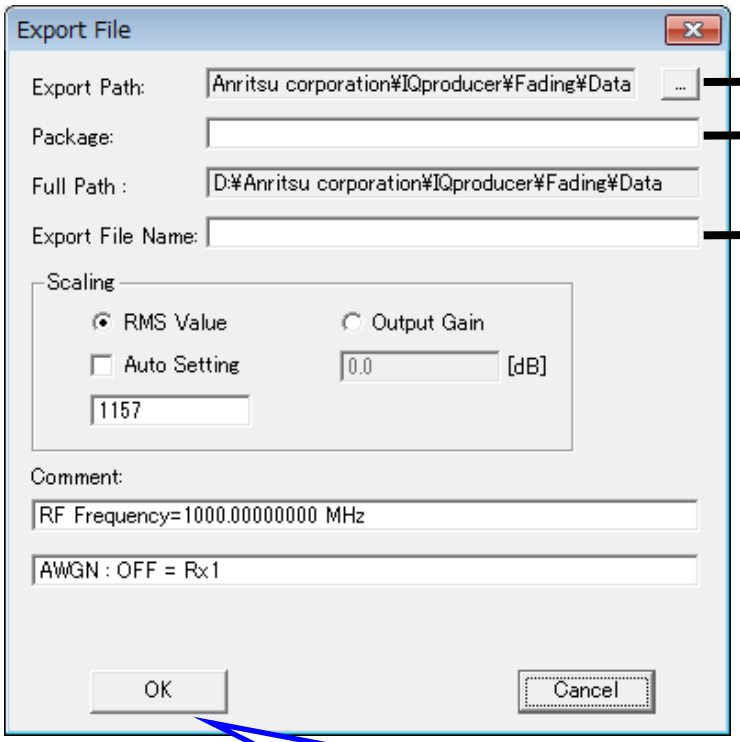
After waveform generation is finished, the created waveform pattern is loaded into the MG3710A waveform memory.
/Calculation/ > /Load/

Calculation & Play:

After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A waveform memory.
/Calculation/ > /Load/ > /Select/

Generating Waveform: Calculation

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



File export destination folder

Name of waveform pattern package:
31 characters max.

Name of waveform pattern file:
20 characters max.

Comment on MG3710A screen:
38 characters max. per line

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

File size of waveform patterns

The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable. Set the combination of installed options based on the following setting items.

Items	Combinations of Options
Memory 64M samples	None
Memory 64M samples × 2	Option48 and Option 78
Memory 256M samples	Option45 or Option 75
Memory 256M samples × 2	Option 45 and Option 48 or Option 75 and Option 78
Memory 1024M samples	Option46 or Option 76
Memory 1024M samples × 2	Option 46 and Option 48 or Option 76 and Option 78

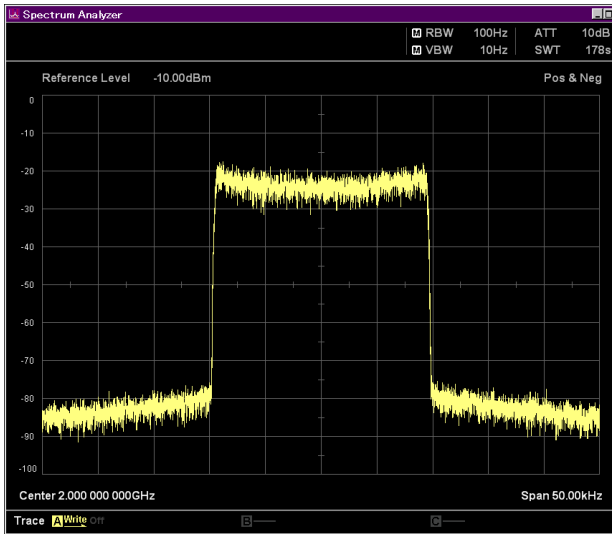
The maximum size of the generated waveform pattern for each of the setting items is shown below.

Items	Maximum Size
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option48, 78)	512M samples
Memory 1024M samples	512M samples
Memory 1024M samples × 2 (With Option48, 78)	512M samples

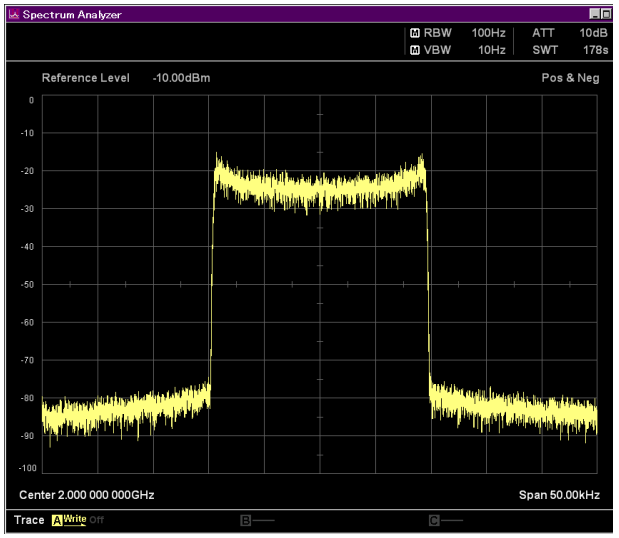
Appendix

MX370107A Fading IQproducer
Example of Fading Characteristics

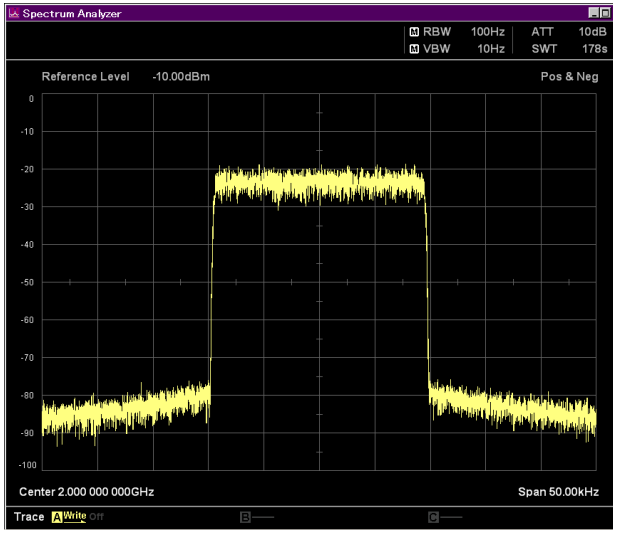
Doppler Spectrum [Rayleigh]



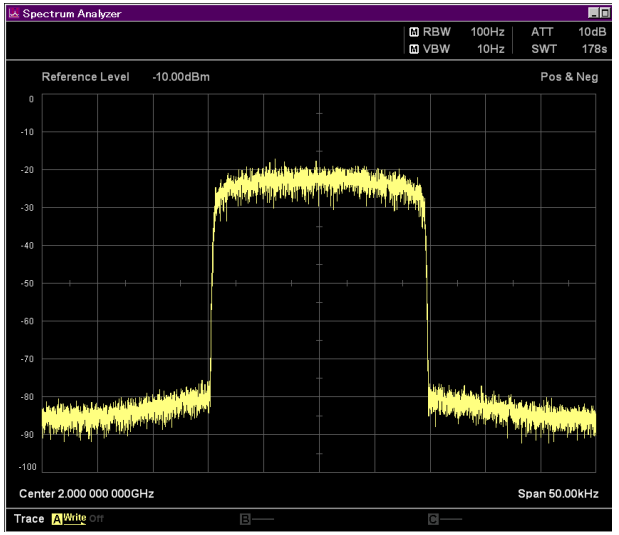
Rayleigh with Classical 3 dB



Rayleigh with Classical 6 dB

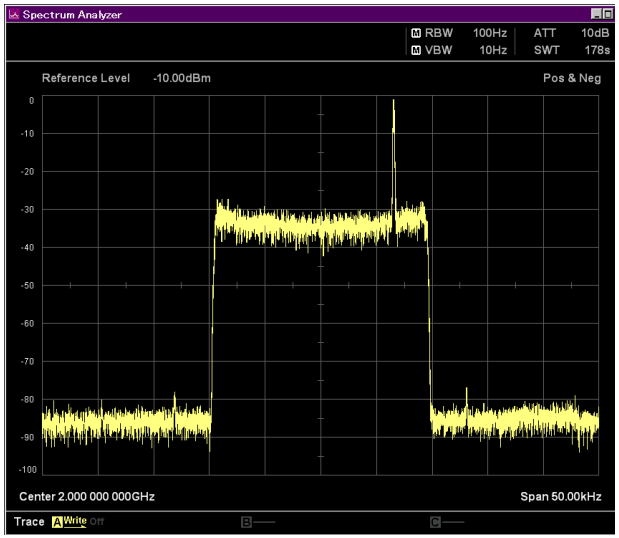


Rayleigh with Flat

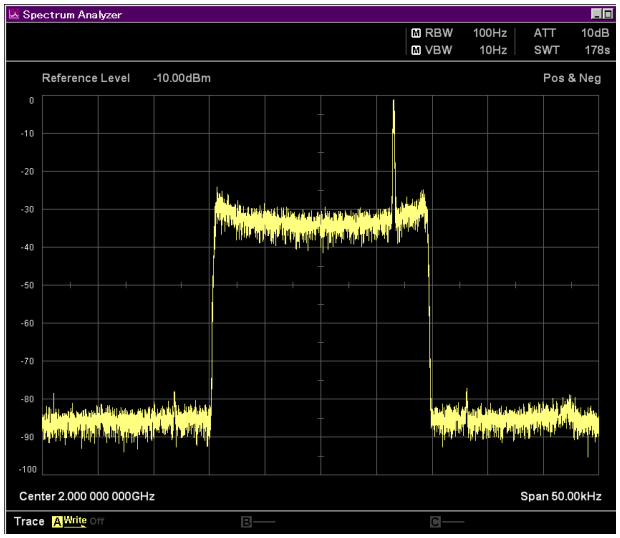


Rayleigh with Rounded

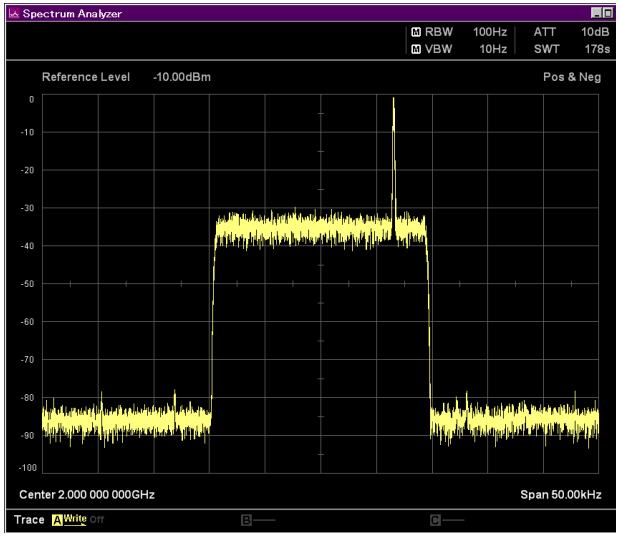
Doppler Spectrum [Rice]



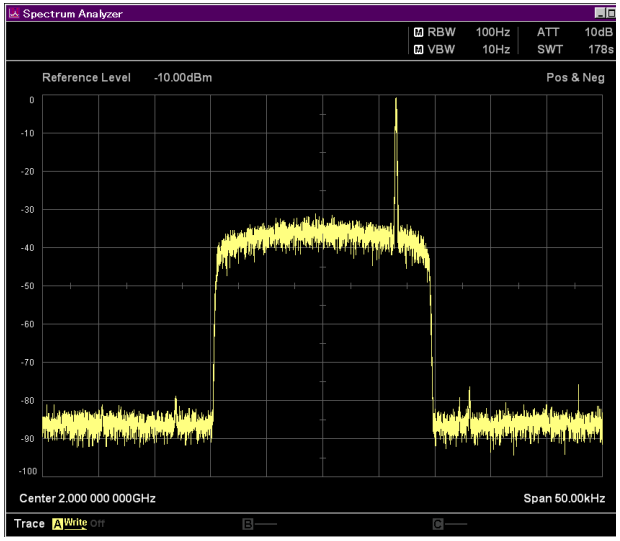
Rice with Classical 3 dB



Rice with Classical 6 dB



Rice with Flat

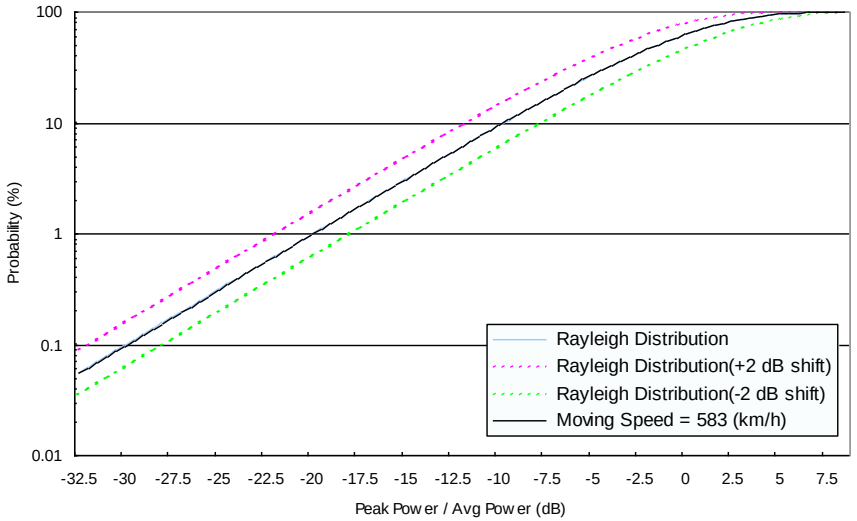


Rice with Rounded

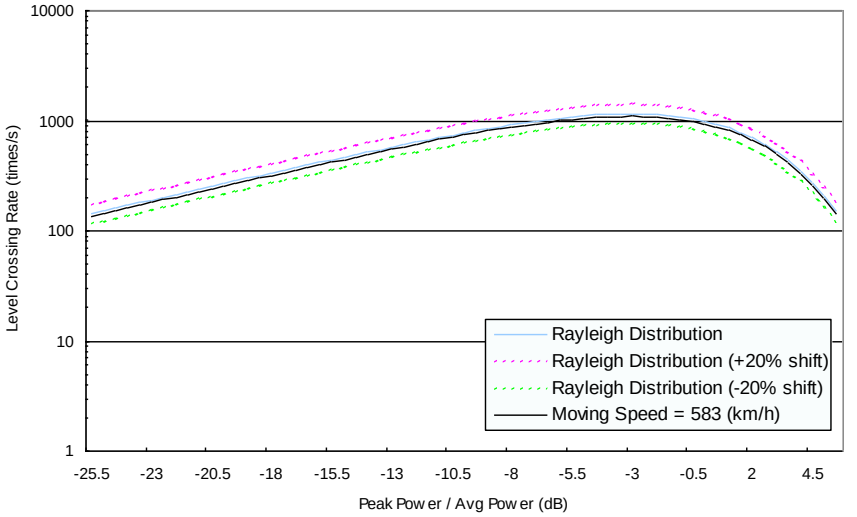
Cumulative Distribution and Level Crossing Rate (1/3)

Example: Calculated cumulative distribution and level crossing rate for following parameters

System Configuration	
Channel Configuration	1x1 SISO
Tx Antenna Configuration (Tx Antenna 1)	
RF Frequency	2000.00000000 MHz
Sampling Rate	11.52 MHz
Repetition	1
Pattern Length	10220 ms
Channel Setting (Channel 1)	
Moving Speed	2.3, 50, 120, 250, 583 km/h
Doppler Frequency	4.262, 92.657, 222.376, 463.283, 1080.377 Hz
Round Fading Pattern	without check
Random Seed	1
Rx Antenna Configuration (Rx Antenna 1)	
AWGN	without check

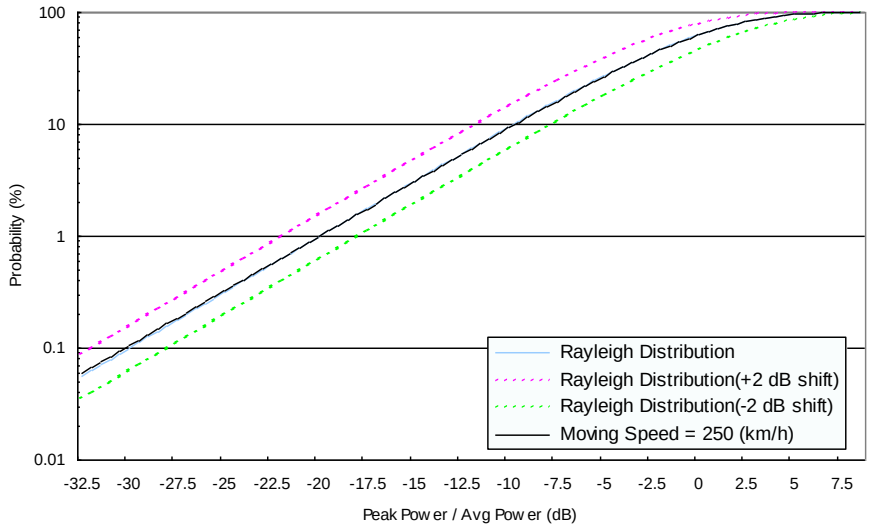


Cumulative Distribution (Moving Speed = 583 km/h)

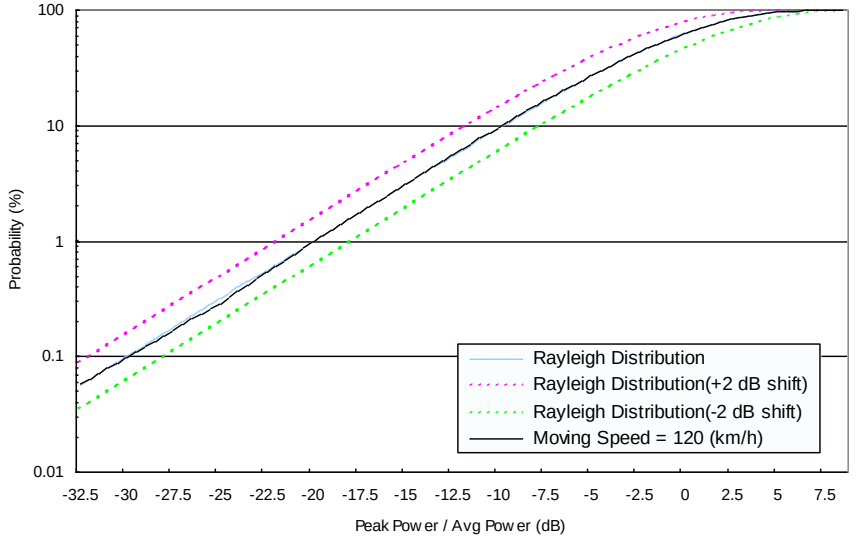


Level Crossing Rate (Moving Speed = 583 km/h)

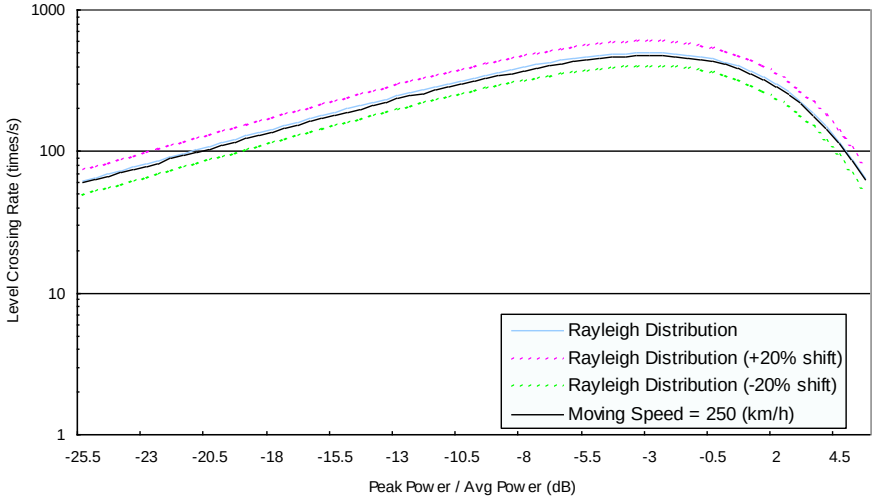
Cumulative Distribution and Level Crossing Rate (2/3)



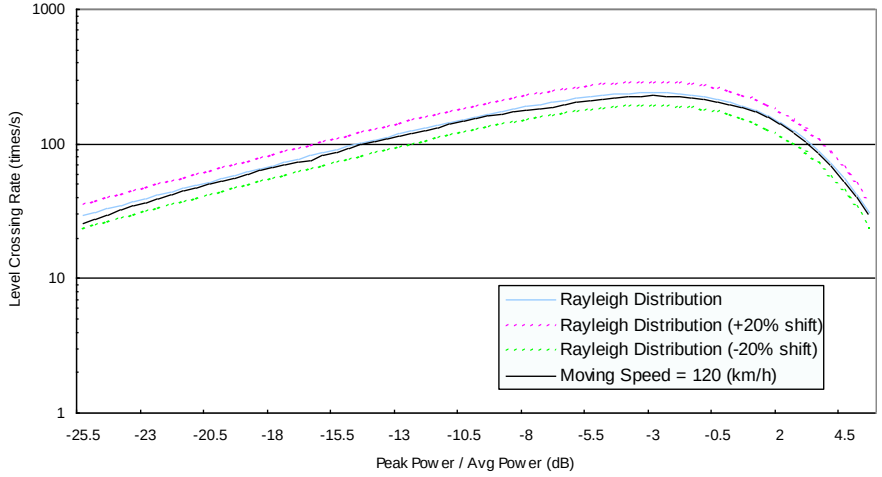
Cumulative Distribution (Moving Speed = 250 km/h)



Cumulative Distribution (Moving Speed = 120 km/h)

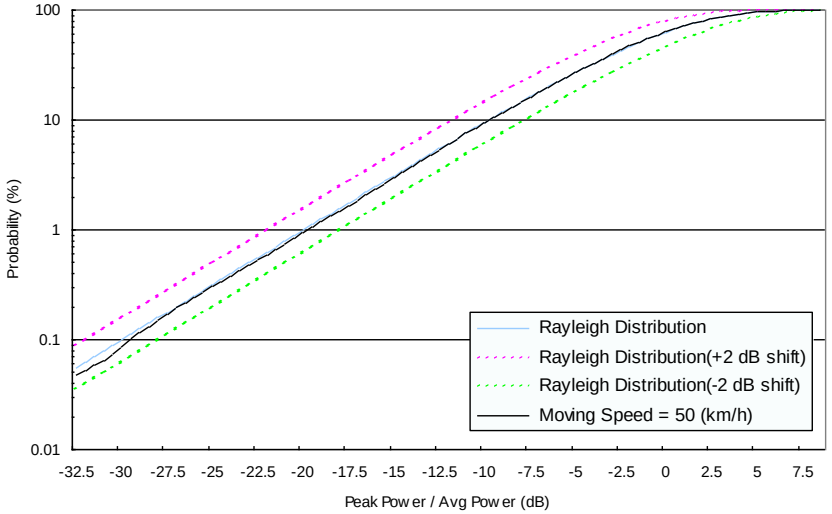


Level Crossing Rate (Moving Speed = 250 km/h)

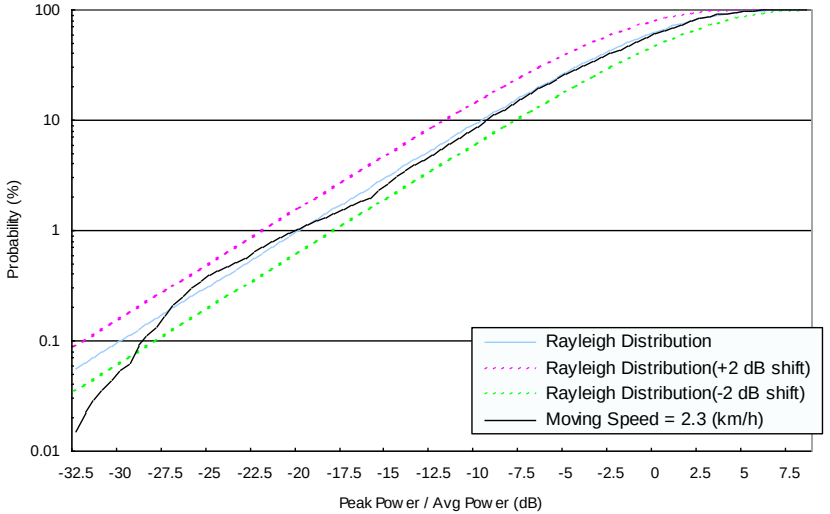


Level Crossing Rate (Moving Speed = 120 km/h)

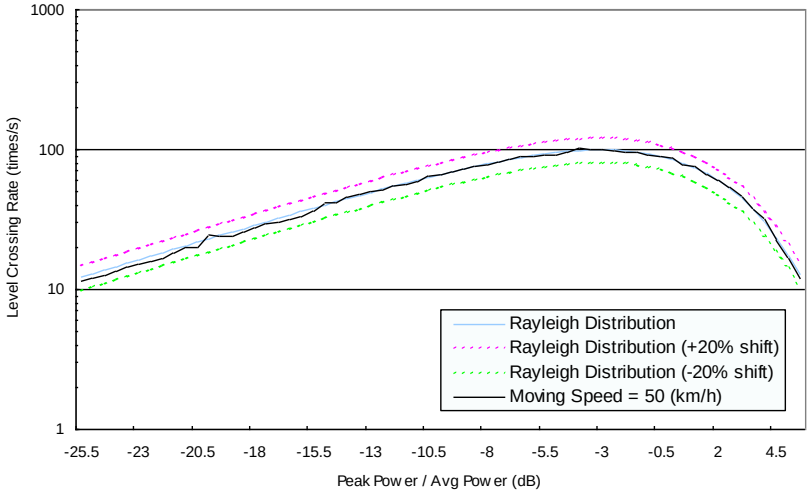
Cumulative Distribution and Level Crossing Rate (3/3)



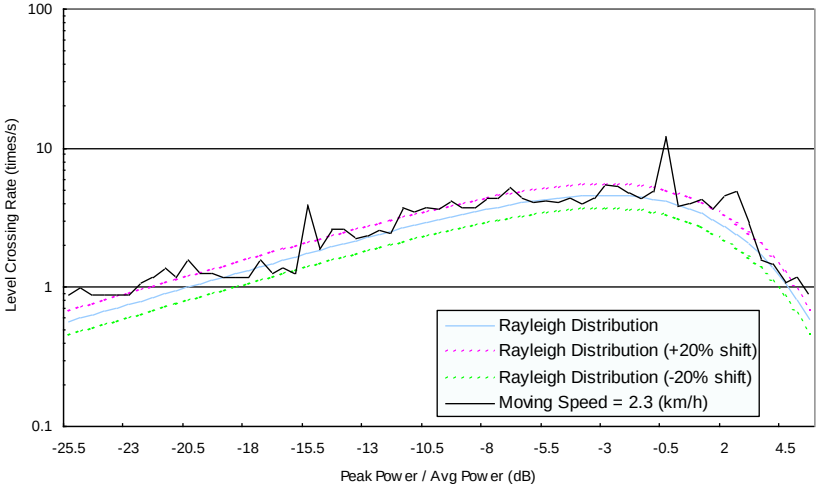
Cumulative Distribution (Moving Speed = 50 km/h)



Cumulative Distribution (Moving Speed = 2.3 km/h)



Level Crossing Rate (Moving Speed = 50 km/h)



Level Crossing Rate (Moving Speed = 2.3 km/h)

Waveform Pattern Playback Time (1/6)

The MG3710A has a built-in 1024 Msample max. arbitrary waveform memory as an option. The waveform pattern playback time is limited by the memory size. The following shows examples of replay times with LTE(MS).

*These values are not guaranteed because the playback time depends on the conditions.

BW	Sampling Rate	Maximum Playback Time[s]		
		256MSample	512MSample	1024MSample
1.4M	3.84M	69.91	139.81	279.62
3.0M	7.68M	34.96	69.91	139.82
5.0M	15.36M	17.48	34.95	69.90
10.0M	30.72M	8.74	17.48	34.96
15.0M	30.72M	8.74	17.48	34.96
20.0M	61.44M	4.37	8.74	17.48

UE Conformance testing (3GPP 36521-1-840)
Minimum Test time for PDSCH Single Antenna Port Performance
Minimum Test time for PDSCH Single Antenna Port Performance with 1 PRB
Minimum Test time for PDSCH Transmit diversity 2x2
Minimum Test time for PDSCH Transmit diversity 4x2
Minimum Test time for PDSCH Open Loop Spacial Multiplexing 2x2
Minimum Test time for PDSCH Open Loop Spacial Multiplexing 4x2
Minimum Test time for PDSCH Closed Loop Single/Multilayer Spacial Multiplexing 2x2
Minimum Test time for PDSCH Closed Loop Single/Multilayer Spacial Multiplexing 4x2

Waveform Pattern Playback Time (2/6)

Table G.3.5-1: Minimum Test time for PDSCH Single Antenna Port Performance

Test number	Demodulation scenario plain text:	Minimum number of subframes(MNS) to reach target +- 2%	(256 Msample) / (512 Msample)	Minimum number of active subframes	(256 Msample) / (512 Msample)
1 [1.1]	R.2(10 MHz, full, QPSK, 1/3) (1x2 Low) EVA,5	7482	O / O	9000	× / O
2 [1.2]	R.2(10 MHz, full, QPSK, 1/3) (1x2 Low) ETU,70	682	O / O	2000	O / O
3 [1.3]	R.2(10 MHz, full, QPSK, 1/3) (1x2 Low) ETU,300	174	O / O	2000	O / O
4 [1.4]	R.2(10 MHz , full, QPSK, 1/3) (1x2 Low) HST	96	O / O	tbd	- / -
5 [2.1]	R.4(1.4 MHz, full, QPSK, 1/3) (1x2 Low) EVA,5	17789	O / O	19000	O / O
6 [1.5]	R.3(10 MHz, full, 16QAM, ½) (1x2 Low) EVA,5	9041	× / O	11000	× / O
7 [1.6]	R.3(10 MHz, full, 16QAM, ½) (1x2 Low) ETU,70	243	O / O	2000	O / O

Table G.3.5-1: Minimum Test time for PDSCH Single Antenna Port Performance

Test number	Demodulation scenario plain text:	Minimum number of subframes(MNS) to reach target +- 2%	(256 Msample) / (512 Msample)	Minimum number of active subframes	(256 Msample) / (512 Msample)
8 [1.7]	R.3(10 MHz, full 64 QAM, 1/2) (1x2 High) ETU,300	1346	O / O	3000	O / O
9 [2.2]	R.5(3 MHz, full, 64QAM, ¾) (1x2 Low) EVA,5	28159	O / O	30000	O / O
10 [2.3]	R.6(5 MHz, full, 64QAM, 3/4) (1x2 Low) EVA,5	17448	O / O	19000	× / O
11 [1.8]	R.7(10 MHz, full, 64QAM, ¾) (1x2 Low) EVA,5	3039	O / O	5000	O / O
12 [1.9]	R.7(10 MHz, full, 64QAM, ¾) (1x2 Low) ETU,70	896	O / O	2000	O / O
13 [1.10]	R.7(10 MHz, full, 64 QAM, 3/4) (1x2High) EVA,5	7697	O / O	9000	× / O
14 [2.4]	R.8(15 MHz, full, 64QAM, ¾) (1x2 Low) EVA,5	4919	O / O	6000	O / O

Waveform Pattern Playback Time (3/6)

Table G.3.5-1: Minimum Test time for PDSCH Single Antenna Port Performance

Test number	Demodulation scenario plain text:	Minimum number of subframes(MNS) to reach target +- 2%	(256 Msample) / (512 Msample)	Minimum number of active subframes	(256 Msample) / (512 Msample)
15 [2.5]	R.9(20 MHz, full, 64QAM, 3/4) (1x2 Low) EVA,5	5730	× / O	7000	× / O
16 [3.1]	R.0(3 MHz, 1PRB, 16QAM,1/2) (1x2 Low) ETU,70	2379	O / O	4000	O / O
17 [3.2]	R.1(10 MHz, 1PRB, 16QAM, ½) (1x2 Low) ETU,70	2373	O / O	4000	O / O
18 [3.3]	R.1(20 MHz, 1PRB, 16QAM, ½) (1x2 Low) ETU,70	9173	× / ×	11000	× / ×

Test No	Demod Scenario (info)	Target, Simulation	(256 Msample) / (512 Msample)	Min No of active subframes	(256 Msample) / (512 Msample)
1 [3.4]	R.29(10MHz, 1PRB, 16QAM, ½) (1x2 Low) ETU,70 [MBFSN]	3779	O / O	5000	O / O

Table G.3.5-3: Minimum Test time for PDSCH Transmit diversity 2x2

Test No	Demod Scenario (info)	Target, Simulation	(256 Msample) / (512 Msample)	Min No of active subframes	(256 Msample) / (512 Msample)
1 [7.1]	R11(10MHz, full, 16QAM ½) (2x2 Med) EVA,5 [SFBC, Space Frequency Block Code]	14321	× / O	16000	× / O
2 [7.2]	R.10(10MHz, Full, QPSK, 1/3) (2x2 low) HST [SFBC]	94	O / O	tbd	- / -

Table G.3.5-4: Minimum Test time for PDSCH Transmit diversity 4x2

Test No	Demod Scenario (info)	Target, Simulation	(256 Msample) / (512 Msample)	Min No of active subframes	(256 Msample) / (512 Msample)
1 [7.3]	R.12(1.4MHz, full, QPSK 1/3) (4x2 med) EPA,5 [SFBC-FSTD, SFBC-Frequency Shifted Transmit Diversity]	13449	O / O	15000	O / O

Waveform Pattern Playback Time (4/6)

Table G.3.5-5: Minimum Test time for PDSCH Open Loop Spacial Multiplexing 2x2

Test No	Demod Scenario (info)	Target, Simulation	(256 Msample) / (512 Msample)	Min No of active subframes	(256 Msample) / (512 Msample)
1	R.11(10MHz, Full, 16QAM, ½) (2x2 Low) EVA,70 [LD-CDD, Large Delay-Cyclic Delay Diversity]	3439	O / O	5000	O / O
[6.1]					

Table G.3.5-6: Minimum Test time for PDSCH Open Loop Spacial Multiplexing 4x2

Test No	Demod Scenario (info)	Target, Simulation	(256 Msample) / (512 Msample)	Min No of active subframes	(256 Msample) / (512 Msample)
1	R.14(10MHz, full, 16 QAM, ½) (4x2 low) EVA,70 [LD-CDD]	674	O / O	2000	O / O
[6.2]					

Table G.3.5-7: Minimum Test time for PDSCH Closed LoopSingle/Multilayer Spacial Multiplexing 2x2

Test No	Demod Scenario (info)	Target, Simulation	(256 Msample) / (512 Msample)	Min No of active subframes	(256 Msample) / (512 Msample)
1	R.10(10MHz, 6PRB, QPSK, 1/3) (2x2 Low) EVA,5 [SCW, Single Code Word]	2390	O / O	4000	O / O
[4.1]					
2	R.10(10MHz, Full, QPSK, 1/3) (2x2 High) EPA,5 [SCW]	23892	× / ×	25000	× / ×
[4.2]					
3	R.11(10MHz,full, 16QAM ½) (2x2Low) EVA,5 [MCW, Multiple Code Word]	2032	O / O	4000	O / O
[5.1]					
4	R.11(10MHz, full, 16QAM ½) (2x2Low) ETU,70 [MCW]	86	O / O	2000	O / O
[5.2]					

Table G.3.5-8: Minimum Test time for PDSCH Closed LoopSingle/Multilayer Spacial Multiplexing 4x2

Test No	Demod Scenario (info)	Target, Simulation	(256 Msample) / (512 Msample)	Min No of active subframes	(256 Msample) / (512 Msample)
1	R.13(10 MHz, 6PRB, QPSK 1/3) (4x2 Low) EVA,5 [SCW]	1693	O / O	3000	O / O
[4.3]					
2	R.14(10MHz, MCW, 6PRB, 16QAM ½) (4x2low) EVA5 [MCW]	8229	O / O	10000	× / O
[5.3]					

Waveform Pattern Playback Time (5/6)

The MG3710A has a built-in 1024 Msample max. arbitrary waveform memory as an option. The waveform pattern playback time is limited by the memory size. The following shows examples of replay times with other systems.

*These values are not guaranteed because the playback time depends on the conditions.

System	Mxximum Playback Time of MG3700A [s]		
	Waveform Pattern Size		
	(256 Msample)	(512 Msample)	(1024 Msample)
GSM	-	122.6	245.3
W-CDMA(MS)	20.4	40.9	81.8
W-CDMA(BS)	20.4	40.9	81.8
HSDPA	23.3	46.6	93.1
HSUPA	20.4	40.9	81.8
CDMA2000(MS)	52.1	104.2	208.3
CDMA2000(BS)	52.1	104.2	208.3
TD-SCDMA	40.9	81.8	163.5
1xEVDO	52.1	104.1	208.2
WLAN	5.0	10.0	20.1
Mobile WiMAX	12.0	24.0	47.9
DVB	13.9	28.0	55.9

Waveform Generation Condition (part)		
Tx Waveform pattern	Sampling Rate [Hz]	Data Points
DL_MCS-9_1SLOT, (Frame Length = 1875, Gap Length = 13125)	3,250,000	49,822,500
Generation by W-CDMA Downlink IQproducer (Channel Edit → SFN Cycle = Short)	11,520,000	117,734,400
UL_RMC_12_2 kbps	11,520,000	117,734,400
Generation by HSDPA/HSUPA Downlink IQproducer (Easy Setup = H-Set 1 (QPSK), Channel Edit → SFN Cycle = Short, HS-SCCH1 → Edit → Payload Data = PN9fix)	11,520,000	1,382,400
Uplink	11,520,000	235,468,800
FWD_RC1-2_9channel	4,915,200	393,216
RVS_RC1_FCH	4,915,200	393,216
rmc12_2k_ue_dl	5,120,000	104,652,800
FWD_38_4kbps_16slot	4,915,200	524,288
11b_DSSS_2Mbps_PN9 (Frame Length = 188848, Gap Length = 27192)	44,000,000	96,501,328
Generation by Mobile WiMAX IQproducer (BandWidth = 10MHz, FFT Size = 1024, Frame Duration = 5 ms)	22,400,000	
Generation by DVB-T/H IQproducer	18,285,714	1,392,640

Waveform Pattern Playback Time (6/6)

♦Comparison with W-CDMA 3GPP Specifications

Most 3GPP fading frequencies are 800 to 900 times.

The table on the right shows the moving speed when the fading frequency is 1000 times and does not the exceed memory size.

The frequency becomes more than 1000 times when setting faster than the moving speed in the table.

Doppler Frequency is directly proportional to RF, and the size of the waveform pattern file becomes small.

System	Minimum Moving Speed [km/h]		
	Waveform Pattern Size		
	(256 Msample)	(512 Msample)	(1024 Msample)
GSM	-	8.8	17.6
W-CDMA (MS)	52.8	26.4	52.8
W-CDMA (BS)	52.8	26.4	52.8
HSDPA	42.9	21.5	43
HSUPA	52.8	26.4	52.8
CDMA2000 (MS)	20.7	10.4	20.8
CDMA2000 (BS)	20.7	10.4	20.8
TD-SCDMA	26.4	13.2	26.4
1xEVDO	20.7	10.4	20.8
WLAN	215.4	107.6	215.2
Mobile WiMAX	90.1	45	90
DVB	77.5	38.6	77.2

*RF = 1 GHz

Time Required to Generate Waveform Patterns (1/2)

The times required when generating waveforms using the following spectrum are shown below.

Sometimes, the time is very long, However, generated patterns can be stored in the MG3710A hard disk and quickly recalled.

PC Specification and Waveform Generation Conditions

CPU	Intel Core i7 2.67GHz (number of processors: 4)
Memory	2.85GB
OS	Windows XP Professional (32-bit operating system)
Waveform Pattern	**Pattern created with LTE IQproducer** FRC_R_14_FDD_0-3.wvd RF = 2GHz Bandwidth = 10MHz FFT Size = 1024 Frame Duration = 10ms Sampling Rate = 30.72 MHz Repetition = Maximum (Fading Profile) MIMO LTE/4x4 MIMO/ETU 300Hz/High Correlation(9Path) MIMO LTE/2x2 MIMO/ETU 300Hz/High Correlation(9Path) LTE(MS)/ETU 300Hz(9Path) With Opt.045/075 (256 Msamples)

Calc. Result	Pattern Size (1GB×number of output patterns)
4x4MIMO	52 h 11 min
2x2MIMO	11 h 51 min
1x1SISO	2 h 58 min

PC Specification and Waveform Generation Conditions

CPU	Intel Core i7 2.67GHz (number of processors: 4)
Memory	2.85GB
OS	Windows XP Professional
Waveform Pattern	**ISDBT_2layer_movie2.wvd** RF = 500MHz Sampling Rate = 16.25MHz Bandwidth = 5.57MHz Pattern Length = 9253.44ms (Fading Profile) DVB-T/Typical Urban(TU6) 30km/h With Opt.045/075 (256 Msamples)

Calc. Result	Pattern Size (588MB×number of output patterns)	
Path	1Path	6Path
1x2SIMO	47 min	2 h 25 min
1x4SIMO	1 h 32 min	4 h 59 min

Time Required to Generate Waveform Patterns (2/2)

PC Specification and Waveform Generation Conditions

CPU	Intel Core i7 2.67GHz (number of processors: 4)
Memory	2.85GB
OS	Windows XP Professional
Waveform Pattern	**ISDBT_2layer_Coded.wvd** RF = 500MHz Sampling Rate = 16.25MHz Bandwidth = 5.57MHz Repetition = Maximum Pattern Length = 15730.85ms (Fading Profile) DVB-T/Typical Urban(TU6) 30km/h With Opt.045/075 (256 Msamples)

Calc. Result	Pattern Size (1GB×number of output patterns)	
Path	1Path	6Path
1x2SIMO	1 h 15 min	4 h 5 min
1x4SIMO	2 h 32 min	8 h 44 min

PC Specification and Waveform Generation Conditions

CPU	Intel Core i7 2.67GHz (number of processors: 4)
Memory	2.85GB
OS	Windows XP Professional
Waveform Pattern	**ISDBT_2layer_Coded.wvd** RF = 500MHz Sampling Rate = 16.25MHz Bandwidth = 5.57MHz Pattern Length = 15730.85ms (Fading Profile) DVB-T/Typical Urban(TU6) 30km/h With Opt.045/075 (256 Msamples)

Calc. Result	Pattern Size (59MB×number of output patterns)	
Path	1Path	6Path
1x2SIMO	4 min	15 min
1x4SIMO	9 min	30 min

Note

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Specifications are subject to change without notice.

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