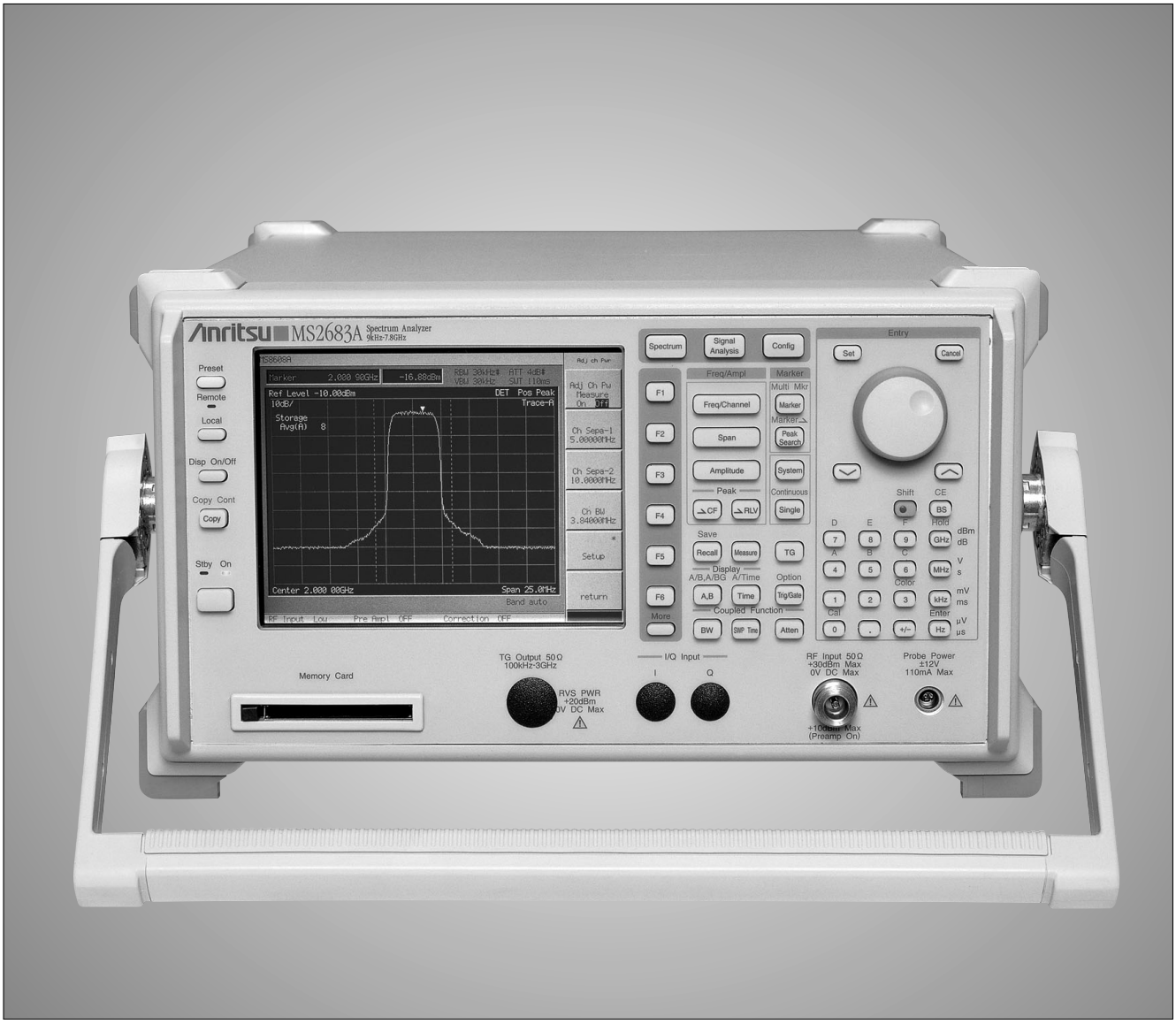
Discover What's Possible™

MX268X series Measurement Software

(For MS2681A/MS2683A/MS2687B Spectrum Analyzer)

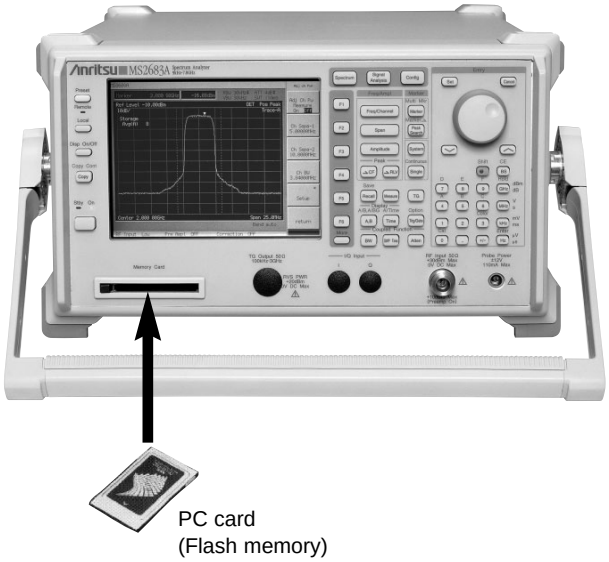


For evaluation of the digital mobile communications system in the world

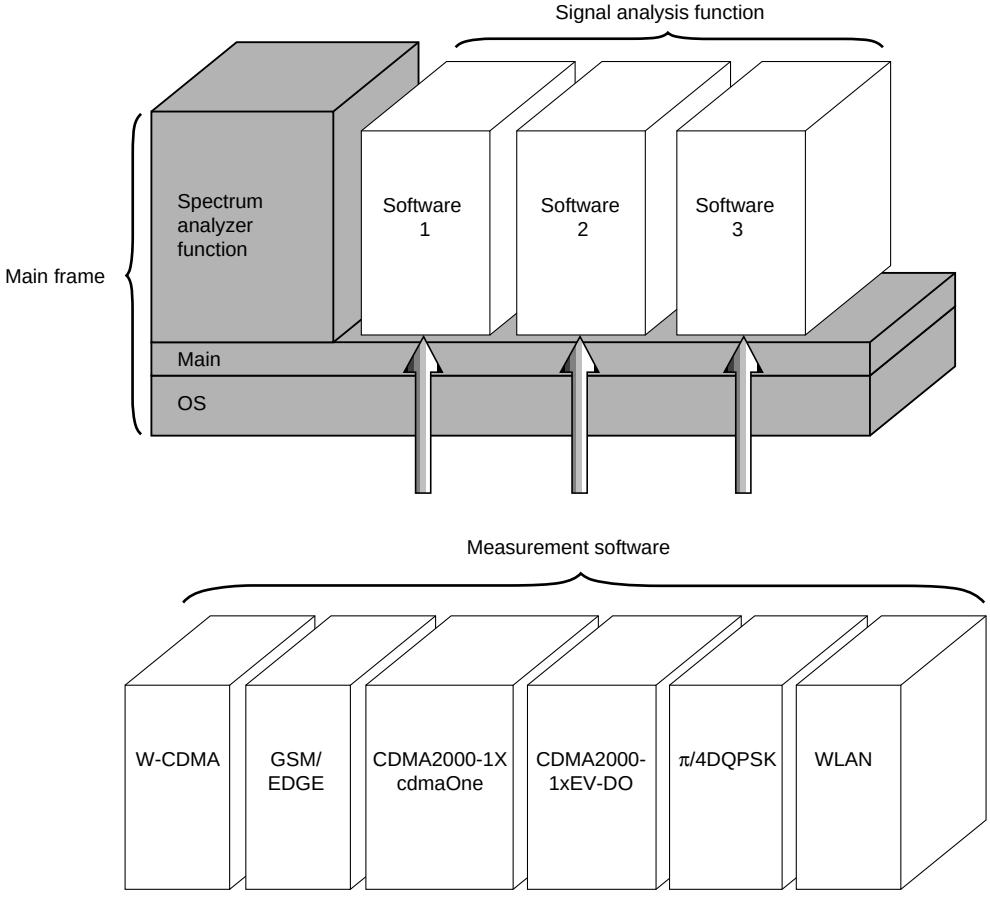
The MS2681A/MS2683A/MS2687B Spectrum Analyzer has been designed to provide the optimum performance required for evaluation of the advanced radio communication devices. They have a wide dynamic range, wide resolution bandwidth (20 MHz), and high-speed sweep (refresh rate: 20 times/s).
When measurement software is stalled in the mainframe, the analysis function of spectrum analyzer to each communication system will be extended. In this case, more advanced analysis can be performed.

Selection guide

Communication system	Measurement software
W-CDMA	MX268101B/MX268301B/MX268701B W-CDMA Measurement software
GSM EDGE	MX268102A/MX268302A/MX268702A GSM Measurement software
cdmaOne CDMA2000 1X	MX268103A/MX268303A/MX268703A cdma Measurement software
CDMA2000 1xEV-DO	MX268104A/MX268304A/MX268704A 1xEV-DO Measurement software
π/4DQPSK PDC PHS NADC (IS-136) STD-39/T79 STD-T61	MX268105A/MX268305A/MX268705A π/4DQPSK Measurement software
WLAN IEEE802.11a/b/g HiSWANa HiperLAN2	MX268130A/MX268330A/MX268730A Wireless LAN Measurement software
WLAN IEEE802.11a/b/g HiSWANa HiperLAN2	MX268132A/MX268332A/MX268732A Wireless LAN Measurement software Limited Version



- Measurement software is installed in main frame using a memory card.
- The signal of various kinds is analyzable with the function of the measurement software installed in main frame. The notebook PC for analyzing a signal is unnecessary.
- Measurement software is installable in one set of a spectrum analyzer to three.



W-CDMA Measurement Software MX268101B/MX268301B/MX268701B

– Evaluation of W-CDMA transmission system with single unit –

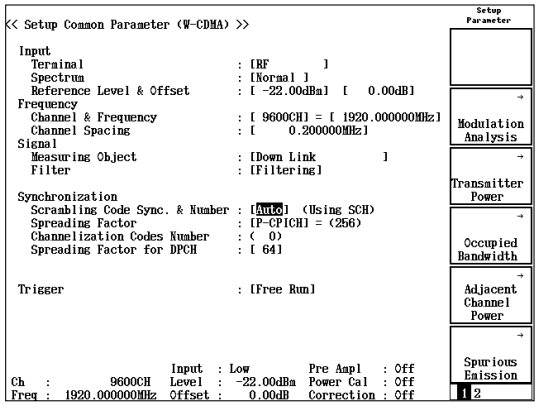
MX268101B/MX268301B/MX268701B W-CDMA Measurement Software is the application software used in the MS2681A/MS2683A/MS2687B Spectrum Analyzer. The installation in Spectrum Analyzer main frame enables to measure functions and performance of W-CDMA digital mobile equipment simply.

• Measured items

Modulation analysis:
Carrier frequency, Vector error, Phase error, Magnitude error, Code domain analysis (Code domain power, Code domain error), Code vs. time
Amplitude measurement: Transmission power measurement
Occupied bandwidth measurement
Adjacent channel power
Spurious measurement
Demodulation data monitoring
Spectrum emission mask
CCDF measurement
IQ level measurement

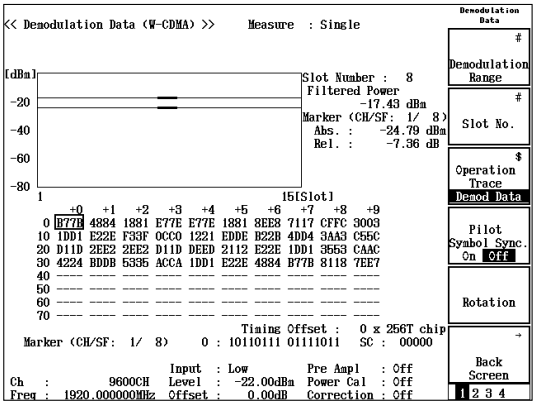
Parameter Setup

A setup screen is provided for the entry of required parameters for modulation accuracy and code domain power measurements in W-CDMA analysis. Measurement can be performed after parameter setup.



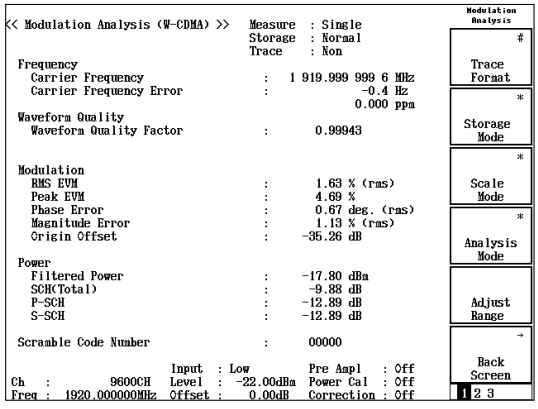
Demodulation data monitoring

After de-spreading, up to 10 frames of demodulation data can be evaluated.



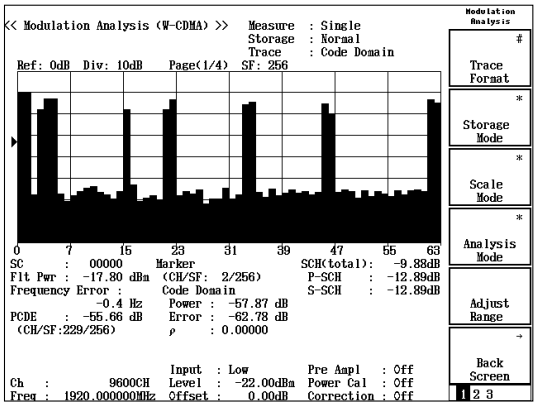
Modulation Accuracy Measurement

Frequency error, modulation accuracy and code domain analysis are performed and then results are displayed on the screen. The measurement accuracy is 1% (typical value) of residual vector error (rms).



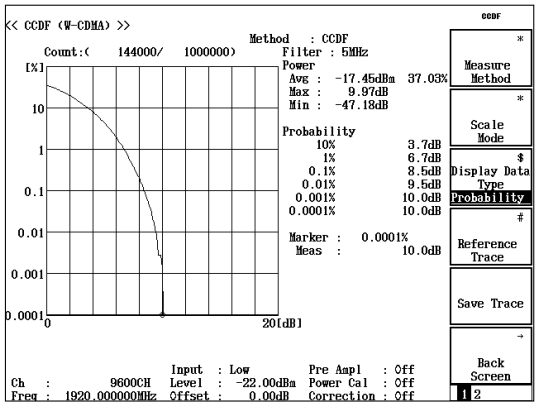
BTS Code Domain Analysis

Perform code domain analysis of forward link signals in approx. 2 seconds. Code domains of IQ phase are displayed on the screen.



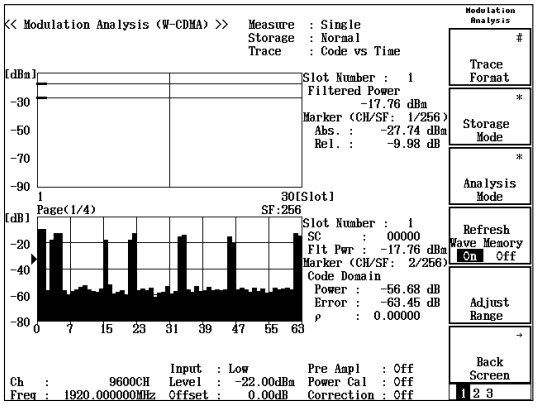
CCDF Measurement

It enables distribution display or cumulative distribution display of the power difference between instantaneous power and average power.
Max. 20 MHz of filter bandwidth is able to perform multi-carrier measurement.



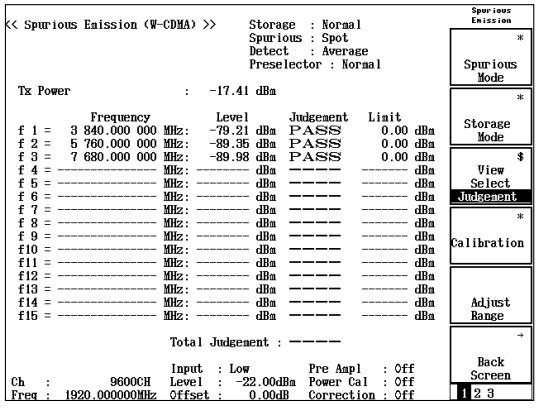
Code vs. time

This function is for measuring code power of specified code channel for each slot in the continuous slot range. It enables to check some functions, such as power control of code channel and compressed mode of down link (Spreading Factor Reduction), efficiently.



Spurious Close to the Carrier Measurement

Spurious close to the carrier is measured using the spectrum analyzer function. The PASS/FAIL result of a template judgement is displayed on the screen.



Specifications

Following specifications are guaranteed after optimized internal level (Range of internal receiver is automatically adjusted by pushing Adjust Range key).
The “pre-amp on” of MS2681A and MS2683A can be set up when MS2681A-08/MS2683A-08 of an option are carried.

Model		MX268101B	MX268301B	MX268701B
Modulation/ frequency measurement	Measurement frequency range	50 MHz to 3 GHz 50 MHz to 2.3 GHz (with MS2681A-08/MS2683A-08)		50 MHz to 3 GHz
	Measurement level range	–60 to +30 dBm (average power, pre-amp off) –80 to +10 dBm (average power, pre-amp on)		–50 to +30 dBm (average power)
	Carrier frequency accuracy	Input level : ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on), at 1 code channel ± (reference frequency accuracy + 10 Hz)		Input level: ≥–30 dBm, at 1 code channel ± (reference frequency accuracy + 10 Hz)
	Modulation accuracy (residual vector error)	Input level: ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on), at 1 code channel <2.0% (rms)		Input level: ≥–30 dBm, at 1 code channel <2.0% (rms)
	Origin offset accuracy	Input level: ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on), at 1 code channel, relative to signal with origin offset of –30 dBc ±0.50 dB		Input level: ≥–30 dBm, at 1 code channel, relative to signal with origin offset of –30 dBc ±0.50 dB
	Waveform display	Displays the following items for 1 CH to multi-CH input signal. Constellation display, Eye pattern display, Vector error vs. Chip no. display, Phase error vs. Chip no. display, Amplitude error vs. Chip no. display		
Code domain analysis	Frequency range	50 MHz to 3 GHz, 50 MHz to 2.3 GHz (with MS2681A-08/MS2683A-08)		50 MHz to 3 GHz
	Measurement level range	–60 to +30 dBm (average power, pre-amp off) –80 to +10 dBm (average power, pre-amp on)		–50 to +30 dBm (average power)
	Code domain power accuracy	Input level: ≥–10 dBm (pre-amp off), ≥–20 dBm (pre-amp on) ±0.1 dB (code power ≥–10 dB) ±0.3 dB (code power ≥–25 dB)		Input level: ≥–10 dBm ±0.1 dB (code power ≥–10 dBc) ±0.3 dB (code power ≥–25 dBc)
	Code domain error	Input level: ≥–10 dBm (pre-amp off), ≥–20 dBm (pre-amp on) Spread factor: 512 (down-link)/256 (up-link) Residual error: <–50 dB, the input signal does not have the origin offset Measurement accuracy: ±0.5 dB (at error of –30 dBc), the input signal does not have the origin offset		Input level: ≥–10 dBm Spread factor: 512 (down-link)/256 (up-link) Residual error: <–50 dB, the input signal does not have the origin offset Measurement accuracy: ±0.5 dB (at error of –30 dBc), the input signal does not have the origin offset
	Display function	Code domain power, code domain error Spread factor: 4 to 256 (up-link)/4 to 512 (down-link) IQ separately displayed at up-link Automatic spreading factor detection function available SCH level measuring function available		
	Code vs. slot measurement	Measures code domain power for each slot of specified code channel up to 150 slots (applicable to compressed mode of down link)		
Amplitude measurement	Frequency range	50 MHz to 3 GHz, 50 MHz to 2.3 GHz (with MS2681A-08/MS2683A-08)		50 MHz to 3 GHz
	Measurement level range	–60 to +30 dBm (average power): pre-amp off –80 to +10 dBm (average power): pre-amp on		–50 to +30 dBm (average power)
	Tx power measurement range	–20 to +30 dBm (average power): pre-amp off –20 to +10 dBm (average power): pre-amp on		–20 to +30 dBm (average power)
	Tx power measurement accuracy	±2.0 dB (Typical)		±2.0 dB (Typical)
	Power measurement linearity	Input level: ≥–10 dBm (pre-amp off), ≥–20 dBm (pre-amp on), unchanged reference level setup after range adjustment ±0.20 dB (0 to –40 dB)		Input level: ≥–10 dBm, unchanged reference level setup after range adjustment ±0.20 dB (0 to –30 dB)
	Filter selection function	Enables the measurement of the value of the power passed through the RRC (α = 0.22)		
	Transmitter power control measurement function	Displays relative power for each slot of maximum 150 slots. Pass/Fail judgment function available.		
	RACH measuring function	Measures the time difference between preamble RACH signal and message RACH signal		
Occupied bandwidth measurement	Frequency range	50 MHz to 3 GHz		
	Measurement level range	–60 to +30 dBm (average power): pre-amp off –80 to +10 dBm (average power): pre-amp on		–50 to +30 dBm (average power)
	Measurement method	Sweep method: After measuring the signal with the sweep type spectrum analyzer, performs calculation and displays the result. FFT Method: After analyzing the signal with FFT, performs calculation and displays the result.		
Adjacent channel power	Frequency range	50 MHz to 3 GHz, 50 MHz to 2.3 GHz (with MS2681A-08/MS2683A-08)		50 MHz to 3 GHz
	Input level range	–10 to +30 dBm (average power): pre-amp off		–10 to +30 dBm (average power)
	Measurement method	Sweep method (all): After measuring the signal with the sweep type spectrum analyzer, performs calculation and displays the result. Sweep method (separate): After measuring adjacent channel and the channel next to the adjacent channel with the sweep type spectrum analyzer, performs calculation and displays the result. Filter method: Measures power at adjacent channel and at the channel next to the adjacent channel after it passes the built-in receive filter (RRC: α = 0.22) and displays the value.		

Model		MX268101B	MX268301B	MX268701B
Adjacent channel power	Measurement range	Input level: ≥0 dBm, filter method, in broad dynamic range mode At code channel 1CH 5 MHz offset: ≥55 dBc, 10 MHz offset: ≥62 dBc At multiple code channel 16CH (only with Option 08) 5 MHz offset: ≥50 dBc, 10 MHz offset: ≥60 dBc Input level: ≥–10 dBm, filter method, in broad dynamic range mode At code channel 1CH 5 MHz offset: 55 dBc Typical, 10 MHz offset: 62 dBc Typical At multiple code channel 16CH 5 MHz offset: 50 dBc Typical, 10 MHz offset: 60 dBc Typical		Input level: 0 dBm, filter method, in broad dynamic range mode At code channel 1CH 5 MHz offset: ≥55 dBc, 10 MHz offset: ≥62 dBc At multiple code channel 16CH 5 MHz offset: ≥55 dBc, 10 MHz offset: ≥60 dBc Input level: ≥–10 dBm, filter method, in broad dynamic range mode At code channel 1CH 5 MHz offset: 55 dBc Typical, 10 MHz offset: 62 dBc Typical At multiple code channel 16CH 5 MHz offset: 50 dBc Typical, 10 MHz offset: 60 dBc Typical
Spurious measurement	Measurement frequency range	9 kHz to 3.0 GHz (except within ±50 MHz of carrier frequency)	9 kHz to 7.8 GHz (except within ±50 MHz of carrier frequency)	9 kHz to 12.75 GHz (except within ±50 MHz of carrier frequency
	Input level range (Tx power)	0 to +30 dBm (average power): pre-amp off		0 to +30 dBm (average power)
	Measurement method	Sweep method: After sweeping the designated frequency range with the spectrum analyzer, detects the peak value and displays it. Calculates the ratio with the transmitted power value, which is the power ratio, and displays it. Detection mode should be AVERAGE. Spot method: After measuring the designated frequency in time domain of the spectrum analyzer, displays the average value. Calculates the ratio with the transmitted power value, which is the power ratio, and displays it. Detection mode should be AVERAGE. Search method: After sweeping the designated frequency range with the spectrum analyzer and detecting the peak value, measures the frequency in time domain, and displays the average value. Calculates the ratio with the transmitted power value, which is the power ratio, and displays it. Detection mode should be AVERAGE.		
	Measurement range (typical)	Carrier frequency: 1800 to 2200 MHz When carrier frequency is in a 2030.354 to 2200 MHz range, spurious will be generated at the frequency below. f (spurious) = f (in) – 2030.345 MHz		
		≥79 dB (RBW: 1 kHz, 9 kHz to 150 kHz) ≥79 dB (RBW: 10 kHz, 150 kHz to 30 MHz) ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz) ≥76 – f [GHz] dB (RBW: 1 MHz, 1 GHz to 3.0 GHz)	≥79 dB (RBW: 1 kHz, 9 kHz to 150 kHz, band 0) ≥79 dB (RBW: 10 kHz, 150 kHz to 30 MHz, band 0) ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz, band 0) ≥76 – f [GHz] dB (RBW: 1 MHz, 1 GHz to 3.15 GHz, band 0) ≥76 dB (RBW: 1 MHz, 3.15 GHz to 7.8 GHz, band 1)	≥79 dB (RBW: 1 kHz, 9 kHz to 150 kHz) ≥79 dB (RBW: 10 kHz, 150 kHz to 30 MHz) ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz) ≥76 – f [GHz] dB (RBW: 1 MHz, 1 GHz to 3.15 GHz) ≥76 dB (RBW: 1 MHz, 3.15 GHz to 7.9 GHz) at MS2687A ≥68 dB (RBW: 1 MHz, 7.9 to 12.75 GHz) at MS2687B ≥74 dB (RBW: 1 MHz, 7.9 to 12.75 GHz)
Spectrum emission mask measurement		After measuring the signal with the sweep type spectrum analyzer, performs judgment with template and displays it.		
Demodulation measurement		Maximum ten frames data of the designated code channel After De-Spreading is outputted.		
CCDF measurement	Frequency range	50 MHz to 3 GHz, 50 MHz to 2.3 GHz (with MS2681A-08/MS2683A-08)		50 MHz to 3 GHz
	Measurement level range	–60 to +30 dBm (average power): pre-amp off –80 to +10 dBm (average power): pre-amp on		–50 to +30 dBm (average power)
	Measurement method	CCDF: Displays the cumulative distribution of the power difference between instantaneous power and average power. APD: Displays the distribution of the power difference between instantaneous power and average power.		
	Filter selection function	20 MHz, 10 MHz, 5 MHz, 3 MHz, RRC: α = 0.22, RC: α = 0.22		
Electric performance (IQ input)	Input impedance	1 MΩ (parallel capacitance: <100 pF), 50 Ω		
	Balance input	With MS2681A-17/MS2683-17A Differential voltage: 0.1 to 1 Vp-p (input terminals) In-phase voltage: ±2.5 V(input terminals)		—
	Unbalance Input	With MS2681A-18/MS2683A-18/MS2687B-18 0.1 to 1 Vp-p (input terminals) DC/AC coupling: Changeable		
	Measurement items	Modulation accuracy, code domain power, amplitude, occupied bandwidth (FFT method), IQ level		
	Modulation accuracy measurement residual vector error	Input level: ≥0.1 V (rms) <2%(rms), DC coupling, the input signal does not have the origin offset		
	IQ level measurement	Measures input level of I and Q (rms, p-p)		
	IQ phase difference measurement	When the CW signal is inputted to I and Q input terminals, measures and displays the phase difference between I-phase and Q-phase signals.		

GSM Measurement Software MX268102A/MX268302A/MX268702A

– Evaluation of GSM transmission system with single unit –

MX268102A/MX268302A/MX268702A GSM measurement software is the application software used in the MS2681A/MS2683A/MS2687B Spectrum Analyzer. The installation in Spectrum Analyzer main frame enables to measure functions and performance of GSM digital mobile equipment simply.

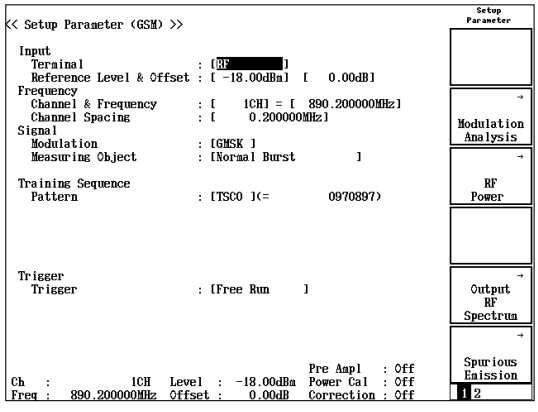
• Measured items

Modulation analysis, Frequency:
- [Numerical result]
  - EVM
  - Phase error
  - Magnitude error
  - Origin offset
  - 95:th Percentile
- [Waveform display]
  - Constellation display
  - Trellis display (at GMSK modulation)
  - Eye pattern display
  - EVM vs. bit number display (at 8PSK modulation)
  - Phase error vs. bit number display
  - Magnitude error vs. bit number display
  - IQ diagram display

Amplitude measurement: Transmitted power
Output RF spectrum
Spurious measurement

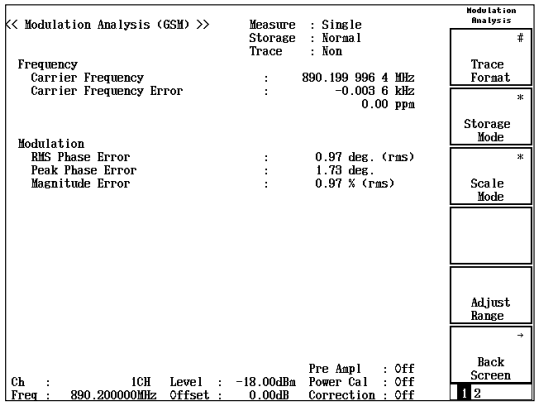
Parameter Setup

This screen is used to set common parameters such as input terminal, frequency, signal modulation, and training sequence and so on before starting an analysis. Setting these parameters simplifies measurement operations.



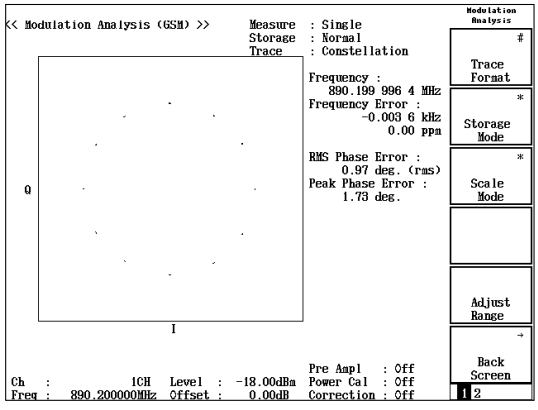
Modulation analysis (Numerical result)

Displays numeric results, including the frequency, phase error, magnitude error, origin offset, and modulation accuracy (EVM).

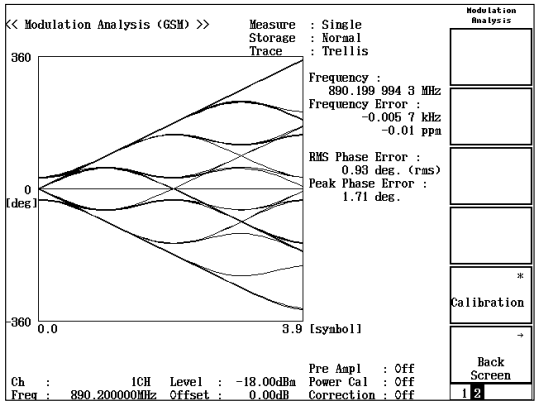


Modulation analysis (Waveform display)

The waveform (constellation, trellis, etc.) for modulation analysis can be displayed.



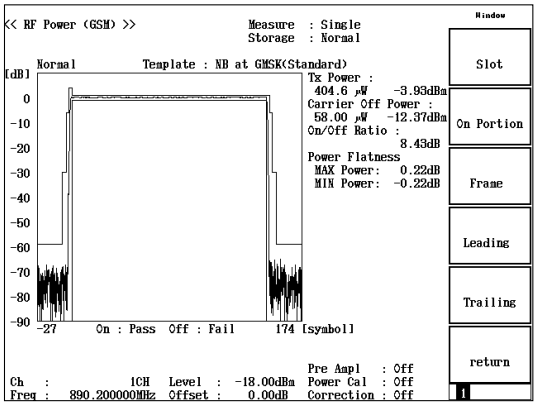
Constellation display

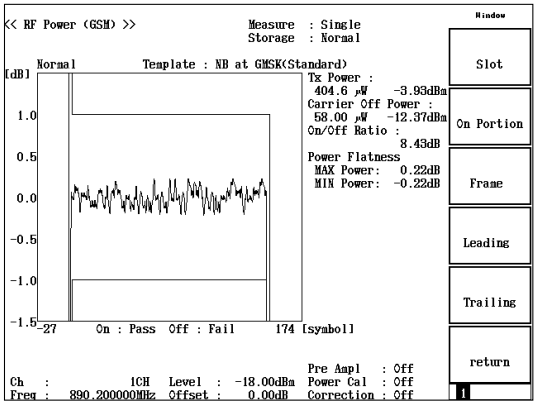


Trellis display

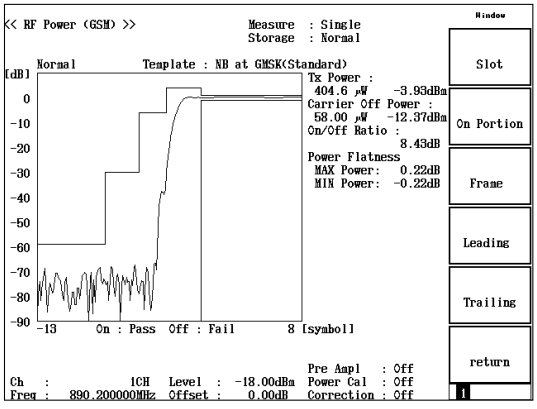
RF Power

The numerical results (Tx power, Carrier Off power, Power flatness) are displayed. Moreover, it is possible to display the waveform of a “slot”, “ON-portion”, “leading”, and “trailing.”



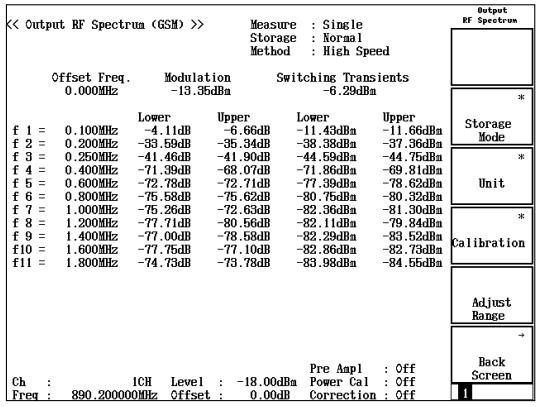


RF power slot display



RF power on-portion display

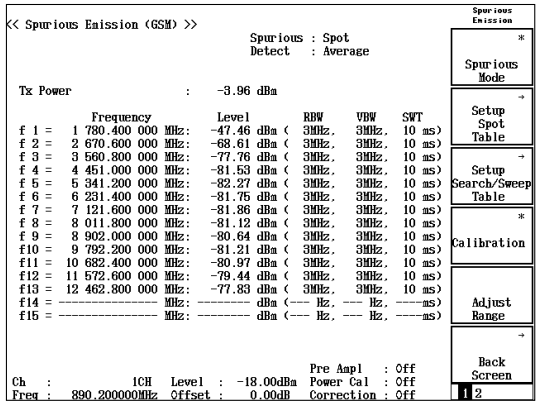
RF power leading display

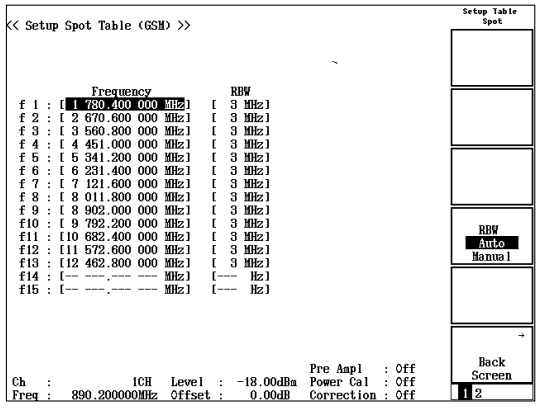


RF Power spectrum

Spurious emission

Three kinds of measurement modes (spot, search, and sweep) are used, and “frequency of spurious” and a “level of spurious” are measured. Simultaneously, “RBW”, “VBW” and “SWT” are displayed.





Measurement result

Specifications

Following specifications are guaranteed after optimized internal level (Range of internal receiver is automatically adjusted by pushing Adjust Range key).
The “pre-amp on” of MS2681A and MS2683A can be set up when MS2681A-08/MS2683A-08 of an option is carried.

Model		MX268102A	MX268302A	MX268702A
Modulation/ frequency measurement	Measurement frequency range	50 MHz to 2.7 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst signal): when pre-amplifier is OFF –60 to +10 dBm (average power within burst signal): when pre-amplifier is ON		–40 to +30 dBm (average power within burst signal)
	Carrier frequency accuracy	Input level (average power within burst signal): ≥–30 dBm (when pre-amplifier is OFF), ≥–40 dBm (when pre-amplifier is ON) ± (reference frequency accuracy + 10 Hz)		Input level (average power within burst signal): ≥–30 dBm ± (reference frequency accuracy + 10 Hz)
	Modulation accuracy	Input level (average power within burst signal): ≥–30 dBm (when pre-amplifier is OFF), ≥–40 dBm (when pre-amplifier is ON)		Input level (average power within burst signal): ≥–30 dBm
	Residual phase error (GMSK modulation)	<0.5 degree (rms), <2.0 degree (peak)		
	Residual vector error (8PSK modulation)	<1.0%(rms)		
	Waveform display	Constellation Trellis display (at GMSK modulation) Eye pattern display EVM vs. bit number display (at 8PSK modulation) Phase error vs. bit number display Amplitude error vs. bit number display IQ diagram display		
Amplitude measurement	Frequency range	50 MHz to 2.7 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst signal): when pre-amplifier is OFF –60 to +10 dBm (average power within burst signal): when pre-amplifier is ON		–40 to +30 dBm (average power within burst signal)
	Tx power measurement range	–10 to +30 dBm (average power within burst signal): when pre-amplifier is OFF –10 to +10 dBm (average power within burst signal): when pre-amplifier is ON		–10 to +30 dBm (average power within burst signal)
	Tx power measurement accuracy (typical)	±2.0 dB		
	Power measurement linearity	Input level (average power within burst signal): ≥–10 dBm (when pre-amplifier is OFF), ≥–20 dBm (when pre-amplifier is ON), ±0.2 dBm (0 to –30 dB) without changing reference level setting after range optimization		Input level (average power within burst signal): ≥–10 dBm, ±0.2 dBm (0 to –30 dB) without changing reference level setting after range optimization
	Power measurement when carrier is OFF	Input level (average power within burst signal): ≥–10 dBm (when pre-amplifier is OFF), ≥–20 dBm (when pre-amplifier is ON)		Input level (average power within burst signal): ≥–10 dBm
	Normal mode measurement range	≥60 dB (compared with average power within burst signal)		
	Broad dynamic range mode measurement range	Average power within burst signal: compared with 10 mV ≥80 dB Note that the measurement limit is determined depending on the average noise level: ≤–70 dBm (50 MHz to 2.7 GHz).		
	Rise/fall characteristics	Waveform is displayed in synchronization with the data of measured signal. Specified line can be displayed (measured in 1 MHz bandwidth), equipped with pass/fail judging function		
Output RF spectrum	Frequency range	100 MHz to 2.7 GHz		
	Input level range	–10 to +30 dBm (average power within burst signal): when pre-amplifier is OFF –20 to +10 dBm (average power within burst signal): when pre-amplifier is ON		–10 to +30 dBm (average power within burst signal)
	Modulation measurement range (spectrum due to modulation)	At CW signal input ≥60 dB (≥200 kHz offset) ≥68 dB (≥250 kHz offset) (<1.8 MHz offset is RBW: 30 kHz, ≥1.8 MHz offset is RBW: 100 kHz)		
	Transient section measurement range (Switching transient)	At CW signal input ≥63 dB (≥400 kHz offset)		

Model		MX268102A	MX268302A	MX268702A
Spurious measurement	Frequency range	100 kHz to 3.0 GHz, except for the range within carrier frequency ±50 MHz	100 kHz to 7.8 GHz, except for the range within carrier frequency ±50 MHz	100 kHz to 12.75 GHz, except for the range within carrier frequency ±50 MHz
	Input level range (transmitted power)	0 to +30 dBm (average power of burst signal)		0 to +30 dBm (average power within burst signal)
	Measurement method	Sweep method: After sweeping the designated frequency range with the spectrum analyzer, detects the peak value and displays it. Calculates the ratio with the transmitted power value, which is the power ratio, and displays it. Detection mode should be AVERAGE. Spot method: After measuring the designated frequency in time domain of the spectrum analyzer, displays the average value. Calculates the ratio with the transmitted power value, which is the power ratio, and displays it. Detection mode should be AVERAGE. Search method: After sweeping the designated frequency range with the spectrum analyzer and detecting the peak value, measures the frequency in time domain, and displays the average value. Calculates the ratio with the transmitted power value, which is the power ratio, and displays it. Detection mode should be AVERAGE.		
	Measurement range (typical)	Carrier frequency: 800 MHz to 1 GHz and 1.8 to 2 GHz		
		≥72 dB (RBW: 10 kHz, 100 kHz to 50 MHz) ≥72 dB (RBW: 100 kHz, 50 to 500 MHz) ≥66 – f [GHz] dB (RBW: 3 MHz, 500 MHz to 3 GHz, except for harmonic frequency)	≥72 dB (RBW: 10 kHz, 100 kHz to 50 MHz, Band 0) ≥72 dB (RBW: 100 kHz, 50 to 500 MHz, Band 0) At normal mode ≥66 – f [GHz] dB (RBW: 3 MHz, 500 MHz to 3.15 GHz, Band 0, except for harmonic frequency) ≥66 dB (RBW: 3 MHz, 3.15 to 7.8 GHz, Band 1) With MS2683A-03, at spurious mode ≥66 dB (RBW: 3 MHz, 1.6 to 7.8 GHz, Band 1)	≥72 dB (RBW: 10 kHz, 100 kHz to 50 MHz, Band 0) ≥72 dB (RBW: 100 kHz, 50 to 500 MHz, Band 0) ≥66 – f [GHz] dB (RBW: 3 MHz, 500 MHz to 3.15 GHz, Band 0, except for harmonic frequency) ≥66 dB (RBW: 3 MHz, 3.15 to 7.9 GHz, Band 1) With MS2687B-22 ≥66 – f [GHz] dB (RBW: 3 MHz, 500 MHz to 3.15 GHz, Band 0, except for harmonic frequency) ≥66 dB (RBW: 3 MHz, 3.15 to 7.9 GHz, Band 1: n = 1) ≥65 dB (RBW: 3 MHz, 7.9 to 12.75 GHz, Band 1: n = 2)
Electric performance (IQ input)	Input method	With Option 17 and option 18. Selectable between balanced and unbalanced		With Option 18 Unbalanced
	Input impedance	Selectable between 1 MΩ (parallel capacity <100 pF) and 50 Ω		
	Input level range balance input	With Option 17. Differential voltage range: 0.1 to 1 Vp-p (at input terminal) In-phase voltage range: ±2.5 V (at input terminal)		–
	Input level range unbalance Input	With option 18. 0.1 to 1 Vp-p (at input terminal) Changeable between DC connection and AC connection		With option 18. 0.1 to 1 Vp-p (at input terminal) Changeable between DC connection and AC connection
	Measurement items	Modulation accuracy, amplitude, IQ level		
	Modulation accuracy measurement	Input level: ≥0.1 V (rms), at ambient temperature 18˚ to 28 ˚C Modulation accuracy residual vector error (at GMSK modulation) : <0.5 degree (rms), DC connection Residual EVM (at 8PSK modulation) : <1.0% (rms), DC connection		
	IQ level measurement	Measures input voltage (rms value and p-p value) of I and Q, and displays them.		
	IQ phase difference measurement	When CW signal is input to each input terminal of I and Q, measures the phase difference between I phase signal and Q phase signal and displays it.		

cdma Measurement Software MX268103A/MX268303A/MX268703A

– Evaluation of CDMA2000 1X transmission system with one tester –

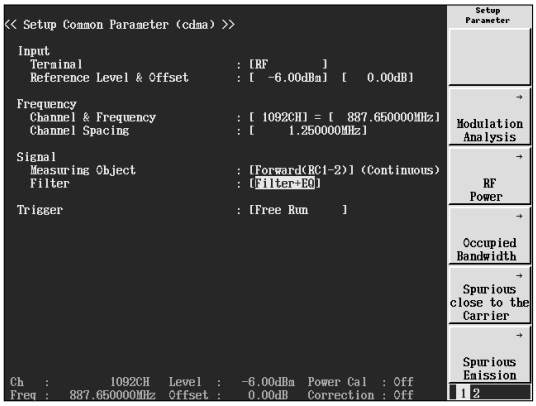
MX268103A/MX268303A/MX268703A cdma Measurement Software is the application software used in the MS2681A/MS2683A/MS2687B Spectrum Analyzer. The installation of MX268103A/MX268303A/MX268703A enables evaluation of base station or mobile transmitters conforming to the cdmaOne and CDMA2000 1X standards.

• Measured items

Modulation analysis:
  Carrier frequency, vector error, phase error, magnitude error
Code domain analysis:
  Code domain power, code domain timing offset, code domain phase offset
Amplitude measurement: Transmission power
Spurious close to the carrier measurement
Spurious measurement
Occupied bandwidth measurement
IQ level measurement

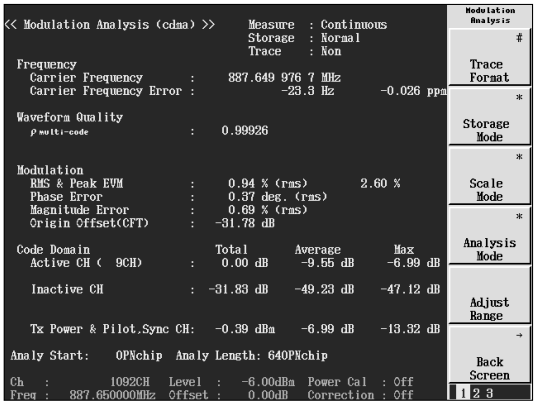
Parameter Setup

A setup screen is provided for the entry of required parameters for modulation accuracy and code domain power measurements in cdmaOne or CDMA2000 1X analysis. Measurement can be performed after parameter setup.



Modulation Accuracy Measurement

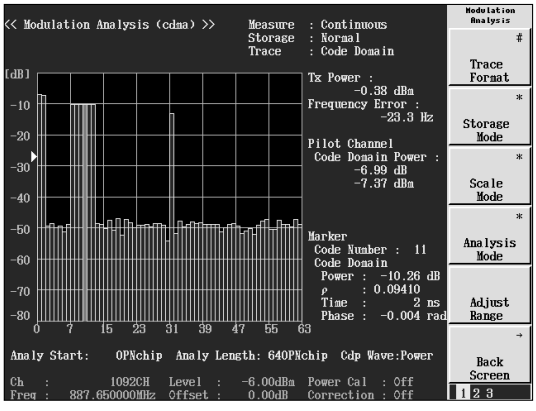
Frequency error, modulation accuracy and code domain analysis are performed and then results are displayed on the screen. The measurement accuracy is 1% (typical value) of residual vector error (rms).



BTS Code Domain Analysis

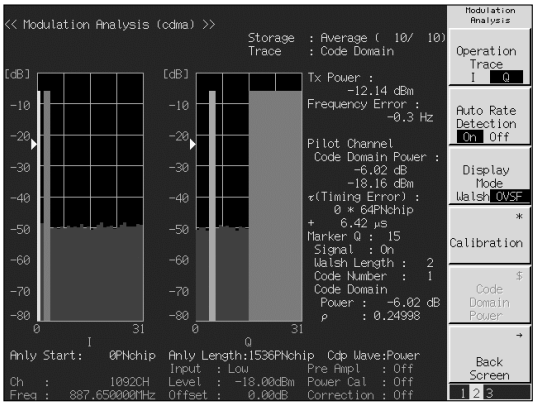
Only 2 seconds are required for code domain analysis of CDMA2000 1X signals, RC*1 through RC5 can be measured. Spreading factor of each code is automatically detected and displayed on the screen.

*: Radio Configuration



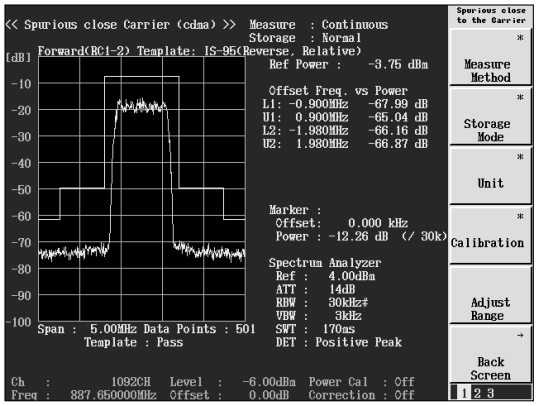
MS Code Domain Analysis

Perform code domain analysis of CDMA2000 1X signals in RC3 and RC4 in only 2 seconds. Code domains of IQ phase are displayed on the screen.



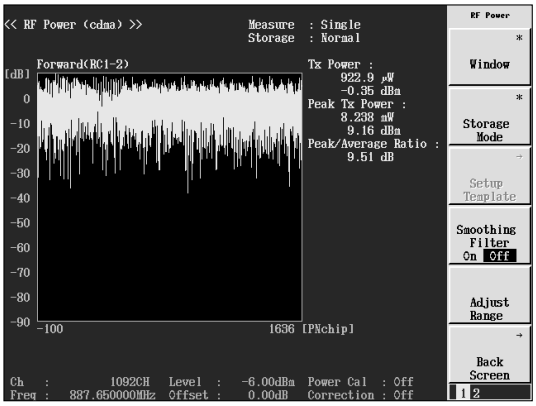
Spurious Close to the Carrier Measurement

Spurious close to the carrier is measured using the spectrum analyzer function. The PASS/FAIL result of a template judgement is displayed on the screen.



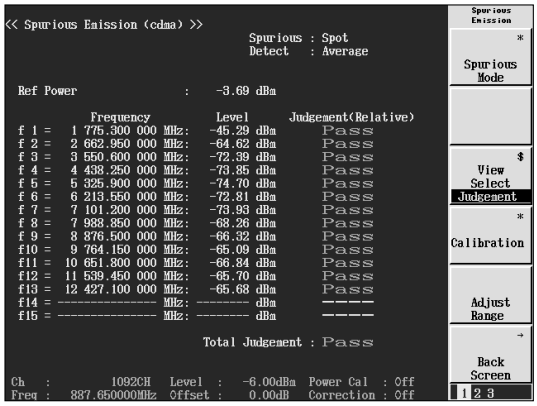
Transmission Power Measurement

When transmission power is measured both the value and signal waveform are displayed on the screen.



Spurious Measurement

A frequency table can be set up in spurious measurement to provide a PASS/FAIL measurement result. Fifteen different frequencies and their limit values can be entered.



Specifications

Following specifications are guaranteed after optimized internal level (Range of internal receiver is automatically adjusted by pushing Adjust Range key).
The “pre-amp On” of MS2681A and MS2683A can be set up when MS2681A-08/MS2683A-08 of an option are carried.

Model		MX268103A	MX268303A	MX268703A
Modulation/ frequency measurement	Measurement frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Carrier frequency accuracy*1	± (reference frequency accuracy + 10 Hz)		
	Modulation accuracy (residual vector error)*1	<2.0%(rms)		
	Origin offset accuracy*1	Relative to signal with origin offset of –30 dBc: ±0.50 dB		
	Waveform display	Displays the following items for 1 CH to multi CH input signals: constellation, eye pattern, vector error vs.chip number, phase error vs. chip number, amplitude error vs. chip number		
Code domain analysis	Frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Code domain power accuracy	±0.1 dB (code power: ≥–10 dBc), ±0.3 dB (code power: ≥–25 dBc) At Input level: ≥–10 dBm (pre-amp off), ≥–20 dBm (pre-amp on)		±0.1 dB (code power: ≥–10 dBc), ±0.3 dB (code power: ≥–25 dBc) At Input level: ≥–10 dBm
	Display function	Code domain power, code domain timing offset, code domain phase offset		
Amplitude measurement	Frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Tx power measurement range	–20 to +30 dBm (average power within burst, pre-amp off) –20 to +10 dBm (average power within burst, pre-amp on)		–20 to +30 dBm (average power within burst)
	Tx power measurement accuracy	±2 dB typical		
	Power measurement linearity	±0.20 dB (0 to –40 dB) Input level: ≥–10 dBm (average power within burst, pre-amp off), ≥–20 dBm (average power within burst, pre-amp on), unchanged reference level setup after range adjustment		±0.20 dB (0 to –30 dB) Input level: ≥–10 dBm, unchanged reference level setup after range adjustment
	Burst analysis	Rising/falling characteristics and on/off ratio analysis function		
Occupied bandwidth measurement	Frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Measurement method	Sweep method: Sweeps signal using spectrum analyzer and calculates result FFT Method: Analyzes signal with FFT and calculates result		
Spurious close carrier to the measurement	Frequency range	50 MHz to 2.3 GHz		
	Input level range	–10 to +30 dBm (average power within burst, pre-amp off)		–10 to +30 dBm (average power within burst)
	Measurement method	Calculates and displays the ratio of Tx power to the power measured by spectrum analyzer with sweep method		
	Tx power measurement	Tx power method: Carrier power measured in 1.23 MHz bandwidth SPA method: Carrier power measured in RBW: 3 MHz, VBW: 3 kHz, detection mode: sample, frequency span: 0 Hz		
	Measurement range*2	At RBW: 30 kHz, VBW: 300 kHz, Detection: Positive ≥50 dBc (900 kHz offset), ≥60 dBc (1.98 MHz offset)		

Model		MX268103A	MX268303A	MX268703A
Spurious measurement	Measurement frequency range	10 MHz to 3.0 GHz (except within ±50 MHz of carrier frequency)	10 MHz to 7.8 GHz (except within ±50 MHz of carrier frequency)	10 MHz to 12.75 GHz (except within ±50 MHz of carrier frequency)
	Input level range (Tx power)	0 to +30 dBm (average power within burst)		
	Measurement method	Sweep method: Sweeps specified frequency range using spectrum analyzer and calculates ratio of carrier power and peak value detected during the sweep. Detection mode is average. Spot method: Measures average power of specified frequencies in time domain using spectrum analyzer and calculates ratio of carrier power and measured power of the frequencies. Detection mode is average. Search method: Sweeps specified frequency range using spectrum analyzer and detects frequency of peak spurious. Measures average power of the detected frequencies in time domain using spectrum analyzer and calculates ratio of carrier power and the measured power for the frequencies. Detection mode is Average.		
	Tx power measurement	Tx power method: Carrier power measured in 1.23 MHz bandwidth SPA method: Carrier power measured in RBW: 3 MHz, VBW: 3 kHz, detection mode: sample, frequency Span: 0 Hz		
	Measurement range (typical)	Carrier frequency: 800 to 1000 MHz/1.8 to 2.2 GHz, referential value of power ratio in Tx power. When carrier frequency is in a 2030.354 to 2200 MHz range, spurious will be generated at the frequency below. f (spurious) = f (input) – 2030.345 MHz		
		≥79 dB (RBW: 10 kHz, 10 to 30 MHz), ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz) Normal mode: ≥76 – f [GHz] dB (RBW: 1 MHz, 1 to 3 GHz)	≥79 dB (RBW: 10 kHz, 10 MHz to 30 MHz), ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz) Normal mode: ≥76 – f [GHz] dB (RBW: 1 MHz, 1 to 3.15 GHz, band 0), ≥76 dB (RBW: 1 MHz, 3.15 to 7.8 GHz, band 1) Spurious mode (Can be set when MS2683A-03 option is installed in the main frame.): ≥76 dB (RBW: 1 MHz, 1.6 to 7.8 GHz, band 2)	≥79 dB (RBW: 10 kHz, 10 to 30 MHz), ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz) ≥76 – f [GHz] dB (RBW: 1 MHz, 1 to 3.15 GHz, band 0) ≥76 dB (RBW: 1 MHz, 3.15 to 7.9 GHz, band 1) ≥74 dB (RBW: 1 MHz, 7.9 to 12.75 GHz, band 2)
Electric performance (IQ input)*3	Input impedance	1 MΩ (parallel capacitance: <100 pF), 50 Ω		
	Balance input	Differential voltage: 0.1 to 1 Vp-p In-phase voltage: ±2.5 V		–
	Unbalance Input	0.1 to 1 Vp-p DC/AC coupling: Changeable		
	Measurement items	Modulation accuracy, code domain power, amplitude, occupied bandwidth (FFT method), IQ level		
	Modulation accuracy measurement	<2% (rms) DC coupling, input level: ≥0.1 V (rms)		
	IQ level measurement	Measures input level of I and Q (rms, p-p)		
	IQ phase difference measurement	When the CW signal is inputted to I and Q input terminals, measures and displays the phase difference between I- and Q-phase signals.		

*1 [MS2687B] Input level: ≥–30 dBm, at 1 code channel
[MS2681A/MS2683A] Input level ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on), at 1 code channel
*2 [MS2687B] Input level (average power within burst): ≥0 dBm
[MS2681A/MS2683A] Input level (average power within burst): ≥0 dBm(pre-amp off)
*3 Specifications of electric performance are applied when the following option is mounted.
[MS2681A] MS2681A-17, MS2681A-18
[MS2683A] MS2683A-17, MS2683A-18
[MS2687B] MS2687B-18

CDMA2000 1xEV-DO Measurement Software MX268104A/MX268304A/MX268704A

– Evaluation of CDMA2000 1X transmission system with single unit –

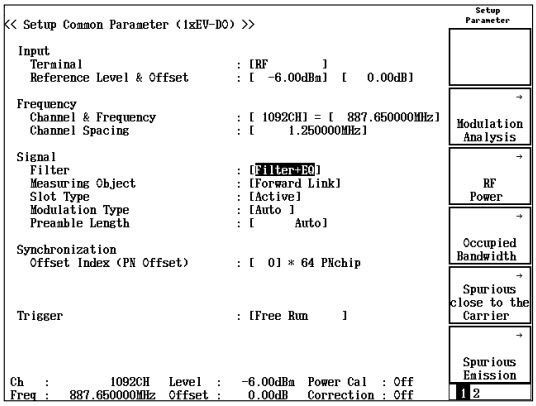
MX268104A/MX268304A/MX268704A CDMA2000 1xEV-DO Measurement Software is the application software used in the MS2681A/MS2683A/MS2687B Spectrum Analyzer. The installation in MX268104A/MX268304A/MX268704A enables evaluation of base station or mobile transmitters conforming to the 3GPP2C.S0024 standards.

• Measured items

Modulation analysis:
  Carrier frequency, Vector error, Phase error, Magnitude error
Code domain analysis:
  Code domain power, Code domain timing offset, Code domain phase offset
Amplitude measurement:
  Transmission power measurement
Spurious close to the carrier measurement
Spurious measurement
Occupied bandwidth measurement
IQ level measurement
CCDF measurement

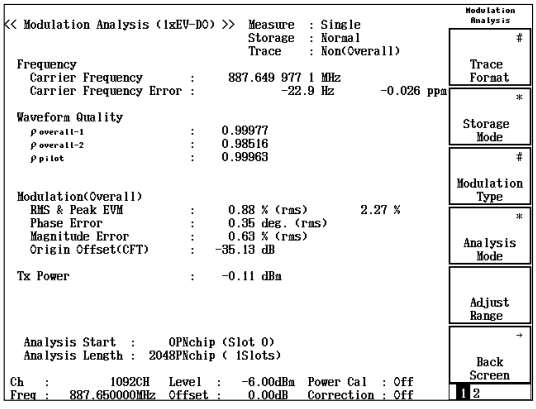
Parameter Setup

A setup screen is provided for the entry of required parameters for modulation accuracy and code domain power measurements in CDMA2000 1xEV-DO analysis. Measurement can be performed after parameter setup.



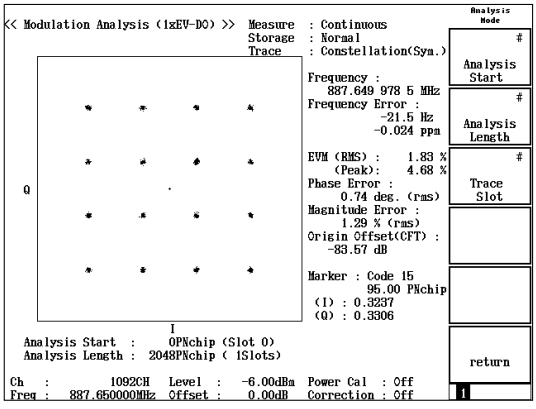
Modulation Accuracy Measurement

Frequency error, modulation accuracy and code domain analysis are performed and then results are displayed on the screen. The measurement accuracy is 1% (typical value) of residual vector error (rms).



Constellation Display

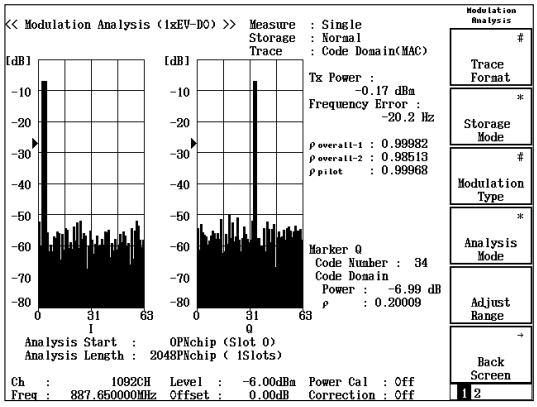
Auto setup is available for modulation system and preamble length setup, simplifying operations by automated detection.



• CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA).

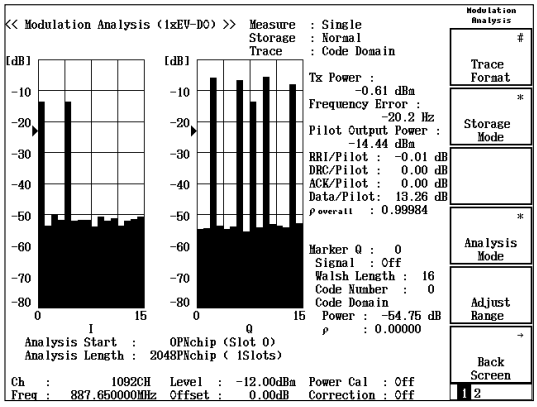
BTS Code Domain Analysis

Perform code domain analysis of forward link signals in approx. 2 seconds. Code domains of IQ phase are displayed on the screen.



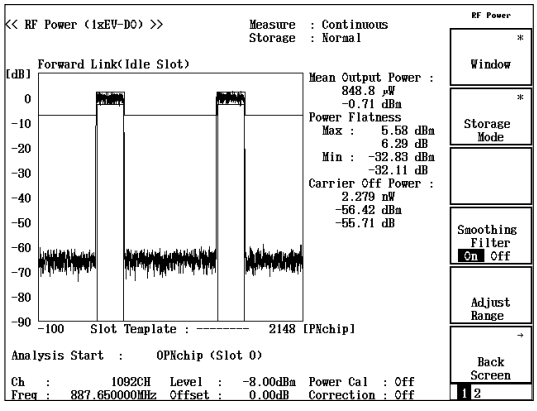
MS Code Domain Analysis

Perform code domain analysis of reverse link signals in approx. 2 seconds. Code domains of IQ phase are displayed on the screen.



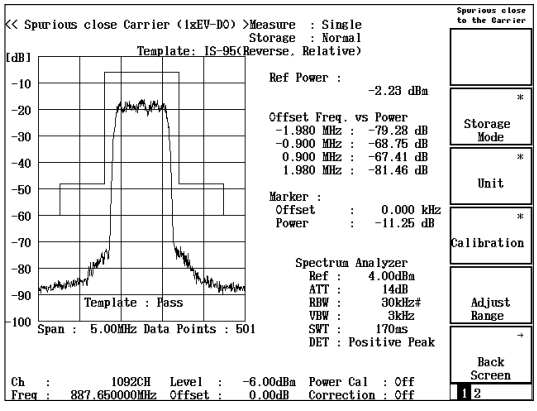
Transmission Power Measurement

When transmission power is measured both the value and signal waveform are displayed on the screen.



Spurious Close to the Carrier Measurement

Spurious close to the carrier is measured using the spectrum analyzer function. The PASS/FAIL result of a template judgement is displayed on the screen.



Specifications

Following specifications are guaranteed after optimized internal level (Range of internal receiver is automatically adjusted by pushing Adjust Range key).
“Pre-amp on” can be set when MS2681A-08/MS2683A-08 option is installed in the main frame.

Model		MX268104A	MX268304A	MX268704A
Modulation/ frequency measurement	Measurement frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Carrier frequency accuracy	Input level: ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on), at 1 code channel ± (reference frequency accuracy + 10 Hz)		Input level: ≥–30 dBm, at 1 code channel ± (reference frequency accuracy + 10 Hz)
	Modulation accuracy (residual vector error)	Input level: ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on), at 1 code channel <2.0% (rms)		Input level: ≥–30 dBm, at 1 code channel <2.0% (rms)
	Origin offset accuracy	Input level: ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on), at 1 code channel, relative to signal with origin offset of –30 dBc ±0.50 dB		Input level: ≥–30 dBm, at 1 code channel, relative to signal with origin offset of –30 dBc ±0.50 dB
	Waveform display	Forward link Displays the following items for each or entire domain of DATA, MAC and Pilot: Constellation, Eye pattern, Vector error vs. chip number, Phase error vs. chip number, Amplitude error vs. chip number Displays the symbol constellation of DATA domain Reverse link Displays the following items for 1CH to multi CH input signals: Constellation, Eye pattern, Vector error vs.chip number, Phase error vs. chip number, Amplitude error vs. chip number		
Code domain analysis	Frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Code domain power accuracy	Input level: ≥–10 dBm (pre-amp off), ≥–20 dBm (pre-amp on) ±0.2 dB (code power ≥–10 dB) ±0.4 dB (code power ≥–25 dB)		Input level: ≥–10 dBm ±0.2 dB (code power ≥–10 dB) ±0.4 dB (code power ≥–25 dB)
	Analysis signal	Forward link, Reverse link		
	Waveform display	Forward link Displays the code domain power for each DATA and MAC domain: Code domain power for DATA domain, Spread factor: IQ separate display for fixed 16 codes Code domain power for MAC domain, Spread factor: IQ separate display for fixed 64 codes Reverse link: Displays the code domain power for IQ separately, Detects the following channels		
Amplitude measurement	Frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst): pre-amp off –60 to +10 dBm (average power within burst): pre-amp on		–30 to +30 dBm (average power within burst)
	Tx power measurement range	–20 to +30 dBm (average power within burst): pre-amp off –20 to +10 dBm (average power within burst): pre-amp on		–20 to +30 dBm (average power within burst)
	Tx power measurement accuracy	±2.0 dB typical		
	Power measurement linearity	Input level: ≥0 dBm (pre-amp off), ≥–20 dBm (pre-amp on), unchanged reference level setup after range adjustment ±0.20 dB (0 to –40 dB)		Input level: ≥0 dBm, unchanged reference level setup after range adjustment ±0.20 dB (0 to –40 dB)
	Idle slot analysis	Rise/Fall characteristics and On/Off ratio analysis function are equipped.		
Occupied bandwidth measurement	Frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst): pre-amp off –60 to +10 dBm (average power within burst): pre-amp on		–30 to +30 dBm (average power within burst)
	Measurement method	Sweep method: Sweeps signal using spectrum analyzer and calculates result FFT Method: Analyzes signal with FFT and calculates result		

Model		MX268104A	MX268304A	MX268704A
Spurious close carrier to the measurement	Frequency range	50 MHz to 2.3 GHz		
	Input level range	–10 to +30 dBm (average power within burst): pre-amp off		
	Measurement method	Calculates and displays the ratio of Tx power to the power measured by spectrum analyzer with sweep method.		
	Tx power measurement	Tx power method: Carrier power measured in 1.23 MHz bandwidth. SPA method: Carrier power measured in RBW: 3 MHz, VBW: 3 kHz, detection mode: sample, frequency span: 0 Hz.		
	Measurement range	Input level (average power within burst): ≥0 dBm (pre-amp off), RBW: 30 kHz, VBW:3 kHz, detection mode: positive 750 kHz offset: ≥45 dBc, (at span 2 MHz) 1.98 MHz offset: ≥60 dBc		
Spurious measurement	Measurement frequency range	10 MHz to 3.0 GHz (except within ±50 MHz of carrier frequency)	10 MHz to 7.8 GHz (except within ±50 MHz of carrier frequency)	10 MHz to 12.75 GHz (except within ±50 MHz of carrier frequency)
	Input level range (Tx power)	0 to +30 dBm (average power within burst): pre-amp off		0 to +30 dBm (average power within burst)
	Measurement method	Sweep method: Sweeps specified frequency range using spectrum analyzer and calculates ratio of carrier power and peak value detected during the sweep. Detection mode is average. Spot method: Measures average power of specified frequencies in time domain using spectrum. Analyzer and calculates ratio of carrier power and measured power of the frequencies. Detection mode is average. Search method: Sweeps specified frequency range using spectrum analyzer and detects frequency of peak spurious. Measures average power of the detected frequencies in time domain using spectrum analyzer and calculates ratio of carrier power and the measured power for the frequencies. Detection mode is Average.		
	Tx power measurement	Tx power method: Carrier power measured in 1.23 MHz bandwidth SPA method: Carrier power measured in RBW: 3 MHz, VBW: 3 kHz, detection mode: sample, frequency, span: 0 Hz		
	Measurement range (typical)	Carrier frequency: 800 to 1000 MHz/1.8 to 2.2 GHz, reference value of power ratio in Tx power[*1].		
		≥79 dB (RBW: 10 kHz, 10 MHz to 30 MHz) ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz) Normal mode: ≥76 – f [GHz] dB (RBW: 1 MHz, 1 GHz to 3.0 GHz)	≥79 dB (RBW: 10 kHz, 10 MHz to 30 MHz, Band 0) ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz, Band 0) Normal mode: ≥76 – f [GHz] dB (RBW: 1 MHz, 1 GHz to 3.15 GHz, Band 0) ≥76 dB (RBW: 1 MHz, 3.15 GHz to 7.8 GHz, Band 1) With MS2683A-03 option, at spurious mode ≥76 dB (RBW: 1 MHz, 1.6 GHz to 7.8 GHz, Band 1)	≥79 dB (RBW: 10 kHz, 10 MHz to 30 MHz, Band 0) ≥79 dB (RBW: 100 kHz, 30 MHz to 1 GHz, Band 0) Normal mode: ≥76 – f [GHz] dB (RBW: 1 MHz, 1 GHz to 3.15 GHz, Band 0) ≥76 dB (RBW: 1 MHz, 3.15 GHz to 7.9 GHz, Band 1) at MS2687A ≥68 dB (RBW: 1 MHz, 7.9 to 12.75 GHz) at MS2687B ≥74 dB (RBW: 1 MHz, 7.9 to 12.75 GHz)
CCDF measurement	Frequency range	50 MHz to 2.3 GHz		
	Measurement level range	–60 to +30 dBm: pre-amp off –80 to +10 dBm: pre-amp on		–50 to +30 dBm
	Measurement method	CCDF: Displays the cumulative distribution of the power difference between instantaneous power and average power. APD: Displays the distribution of the power difference between instantaneous power and average power.		
	Filter selection function	20 MHz, 10 MHz, 5 MHz, 3 MHz, 1.23 MHz		
Electric performance (IQ input)	Input impedance	1 MΩ (parallel capacitance: <100 pF), 50 Ω		
	Balance input	With MS2681A-17/MS2683A-17 Differential voltage: 0.1 to 1 Vp-p In-phase voltage: ±2.5 V		—
	Unbalance Input	With MS2681A-18/MS2683A-18/MS2687B-18 0.1 to 1 Vp-p DC/AC coupling: Changeable		
	Measurement items	Modulation accuracy, code domain power, amplitude, occupied bandwidth (FFT method), IQ level		
	Modulation accuracy measurement	Input level: ≥0.1 V (rms) <2% (rms), DC coupling		
	IQ level measurement	Measures input level of I and Q (rms, p-p)		
	IQ phase difference measurement	When the CW signal is inputted to I and Q input terminals, measures and displays the phase difference between I-phase and Q-phase signals.		

*1: When carrier frequency is in a 2030.354 to 2200 MHz range, spurious will be generated at the frequency below.
f (spurious) = f (input) – 2030.345 MHz

π/4DQPSK Measurement Software MX268105A/MX268305A/MX268705A

– Evaluation of π/4DQPSK transmission systems with one tester –

The MX268105A/MX268305A/MX268705A application software is used with the MS2681A/MS2683A/MS2687B Spectrum Analyzer to evaluate transmission systems in conformance with the PDC, PHS, NADC (IS-136) standards and general purpose.

• Measured items

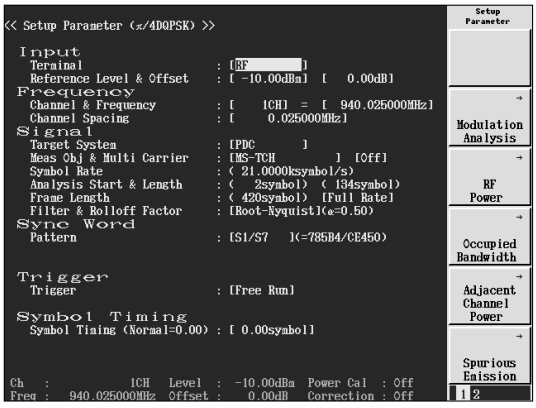
Modulation analysis:
- Carrier frequency, vector error, phase error, magnitude error

Amplitude measurement:
- Transmitter power, carrier-off leakage power, rise/fall characteristics

Adjacent channel power measurement
Spurious measurement
Occupied bandwidth measurement
IQ level measurement
General purpose measurement

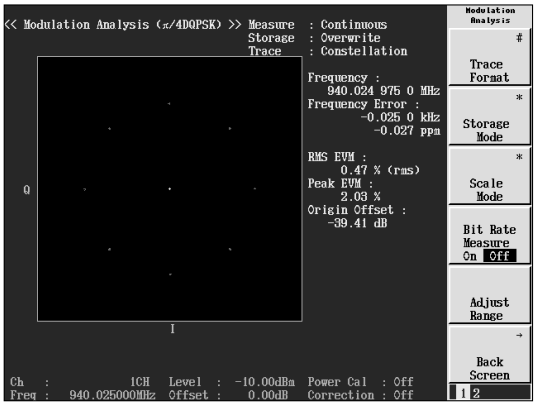
Parameter Setting

Analysis of PDC, PHS and NADC (IS-136) systems requires setting of parameters for important measurement such as modulation accuracy at this screen. Changing the symbol rate also permits analysis of systems other than PDC, PHS and NADC.



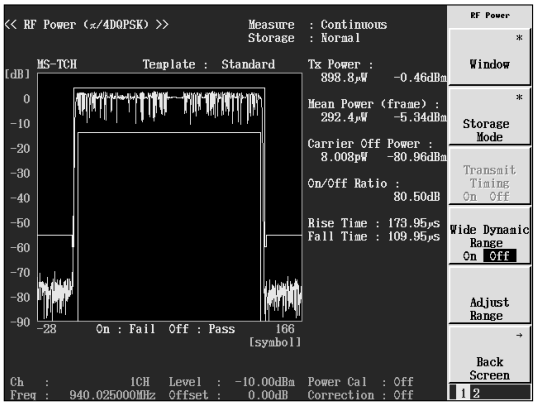
Modulation Accuracy Measurement

The constellation display is combined with the modulation accuracy measurement results to monitor the residual vector error (rms) with a high accuracy of 0.5% (PDC).



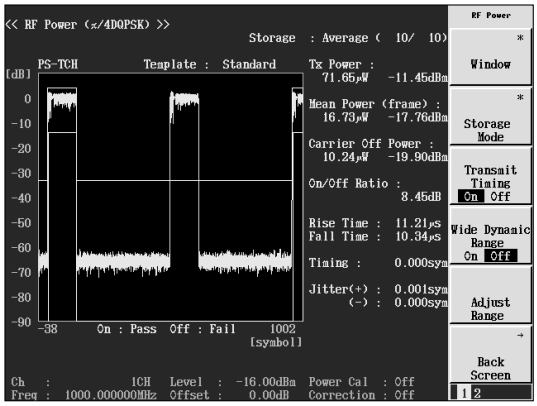
Transmitter Power Measurement

This screen displays the transmitter power and waveform.



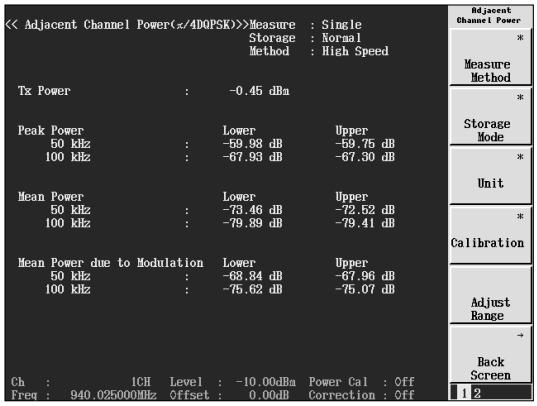
Send Timing Measurement

This screen displays the PHS send timing. In addition, when average measurement is selected, the send jitter is also displayed.



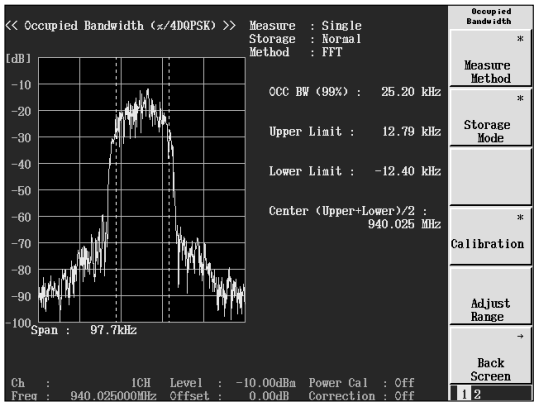
Adjacent Channel Power Measurement

When measurement is performed using a spectrum analyzer, the adjacent channel power is measured after passage through a built-in filter (root Nyquist). A high-speed measurement method can also be selected.



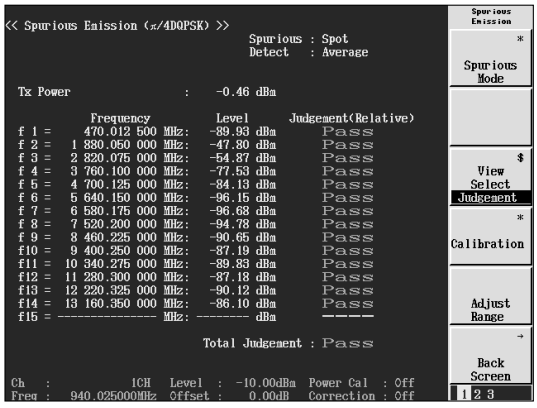
Occupied Bandwidth Measurement

The occupied bandwidth is measured with a spectrum analyzer or by FFT using DSP, and displayed.



Spurious Measurement

There are three methods: spot, sweep and search. Frequency and limit value can be set maximum 15 in the tables. The measurement results are displayed with a limit evaluation.



Specifications

Following specifications are guaranteed after optimized internal level (Range of internal receiver is automatically adjusted by pushing Adjust Range key).
The “pre-amp On” of MS2681A and MS2683A can be set up when MS2681A-08/MS2683A-08 of an option are carried.

Model		MX268105A	MX268305A	MX268705A
Modulation/ frequency measurement	Measurement frequency range	50 MHz to 2.1 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Carrier frequency accuracy*1	± (reference frequency accuracy + 10 Hz)		
	Modulation accuracy (residual vector error)*1	Averaging: 10 times <0.5% (rms) (PDC, NADC), <0.7% (rms) (PHS)		
	Origin offset accuracy*1	Relative to signal with origin offset of –30 dBc: ±0.50 dB		
	Transmission rate accuracy*1	±1 ppm		
	Waveform display	Constellation, eye diagram, EVM vs. symbol No., phase error vs. symbol No., amplitude error vs. symbol No.		
Amplitude measurement	Frequency range	50 MHz to 2.1 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Tx power measurement range	–10 to +30 dBm (average power within burst, pre-amp off) –10 to +10 dBm (average power within burst, pre-amp on)		–10 to +30 dBm (average power within burst)
	Tx power measurement accuracy	±2 dB typical		
	Power measurement linearity	Unchanged reference level setup after range adjustment ±0.20 dB (0 to –30 dB)		
	Carrier-off power measurement*2	Normal mode measurement range: ≥65 dB (PDC, NADC), ≥60 dB (PHS) (Relative to average power within burst) Wide dynamic range mode measurement range: ≥90 dB [measurement limits of average noise level: ≤–80 dBm (50 MHz to 2.1 GHz)] (PDC, NADC) ≥80 dB [measurement limits of average noise level: ≤–70 dBm (50 MHz to 2.1 GHz)] (PHS)		
	Rise/fall characteristics	Display rising/falling edges while synchronizing to modulation data of signal data to be measured. Standard line display, NO/GO judgement function		
Occupied bandwidth measurement	Frequency range	50 MHz to 2.1 GHz		
	Measurement level range	–40 to +30 dBm (average power within burst, pre-amp off) –60 to +10 dBm (average power within burst, pre-amp on)		–30 to +30 dBm (average power within burst)
	Measurement method	Sweep method: Calculates and displays result after signal measured with sweep spectrum analyzer FFT method: Calculates and displays result after FFT		
Adjacent channel power measurement	Frequency range	100 MHz to 2.1 GHz		
	Input level range	–10 to +30 dBm (average power within burst, pre-amp off) –20 to +10 dBm (average power within burst, pre-amp on)		–10 to +30 dBm (average power within burst)
	Measurement method	Sweep method (all): Calculates and displays result after signal measured with sweep spectrum analyzer Sweep method (separate): Calculates and displays after measuring adjacent channel and next adjacent channel signal with sweep spectrum analyzer High-speed method: Calculates and displays after measuring adjacent channel and next adjacent channel power (rms) through internal receive filter		
	Measurement range	CW signal input, at high-speed method) PDC: ≥60 dB (50 kHz offset), ≥65 dB (100 kHz offset) PHS: ≥60 dB (600 kHz offset), ≥60 dB (900 kHz offset) NADC: ≥30 dB (30 kHz offset), ≥60 dB (60 kHz offset), ≥65 dB (90 kHz offset) (Adjacent channel power averaging ratio found from average power within burst and during burst on interval)		

Model		MX268105A	MX268305A	MX268705A
Spurious measurement	Measurement frequency range	10 MHz to 3.0 GHz (except within carrier frequency ±50 MHz)	10 MHz to 7.8 GHz (except within carrier frequency ±50 MHz)	10 MHz to 12.75 GHz (except within carrier frequency ±50 MHz)
	Input level range (Tx power)	0 to +30 dBm (average power within burst)		
	Measurement method	Sweep method: Sweeps the specified range of frequency using the spectrum analyzer, and then detects and displays the peak value. Calculates the rate for transmission power value and displays it as power rate. Waveform detection mode: average Spot method: Measures the specified frequency with time domain from the spectrum analyzer and then displays the average value. Calculates the rate for transmission power value and displays it as power rate. Waveform detection mode: average Search method: Sweeps the specified frequency range using the spectrum analyzer to detect the peak value, then measures the frequency using the time domain to display the average value. Calculates the rate for transmission power value and displays it as power rate. Waveform detection mode: average		
Electric performance (IQ input)*3	Input impedance	1 MΩ (parallel capacitance: <100 pF), 50 Ω		
	Balance input	Differential voltage: 0.1 to 1 Vp-p In-phase voltage: ±2.5 V		–
	Unbalance Input	0.1 to 1 Vp-p DC/AC coupling: Changeable		
	Measurement items	Modulation accuracy, amplitude, occupied bandwidth (FFT method), IQ level		
	Modulation accuracy measurement	Input level: 0.1 V (rms) ∗Temperature range: +18˚ to +28˚C Residual vector error PDC/NADC: <0.5% (rms) ∗Typical, DC coupling PHS: <0.7% (rms) ∗Typical, DC coupling		
	IQ level measurement	Level measurement: Measurement and display each I, Q input voltage (rms, p-p)		
	IQ phase difference measurement	Phase difference between I and Q phase signals when CW signal input to I and Q input terminals		

∗1 [MS2687B] Input level: ≥–30 dBm
[MS2681A/MS2683A] Input level ≥–30 dBm (pre-amp off), ≥–40 dBm (pre-amp on)
∗2 [MS2687B] Input level: ≥–10 dBm
[MS2681A/MS2683A] Input level: ≥–10 dBm (pre-amp off), ≥–20 dBm (pre-amp on)
∗3 Specifications of electric performance are applied when the following option is mounted.
[MS2681A] MS2681A-17, MS2681A-18
[MS2683A] MS2683A-17, MS2683A-18
[MS2687B] MS2687B-18

Wireless LAN Measurement Software MX268130A/MX268330A/MX268730A

– From Development and Production to Construction and Maintenance –

The MX268130A/MX268330A/MX268730A Wireless LAN Measurement Software is application software used by the MS2681A/MS2683A/MS2687B spectrum analyzer. A transmission system conforming to the wireless LAN standards can be evaluated by installing this wireless LAN measurement software into the spectrum analyzer.

Features

- Conforms to the IEEE802.11a, IEEE802.11b, IEEE802.11g (ERP-OFDM, DSSS-OFDM, ERP-DSSS/CCK), HiSWANa and HiperLAN2 standards.
- Analyzes OFDM signals that realize high-speed data transfer at 54 Mbps.
- Integrates a high-performance DSP, enabling high-speed and high-accuracy measurement using the fast A/D sampling (at 64 MHz). Modulation accuracy measurement can be completed in 1 sec or less.
- Capable of measuring harmonics up to 5-time waves of the 5-GHz band wireless LAN (IEEE802.11a, HiSWANa, HiperLAN2) in use of MS2687B.
- One-touch operation of tests on transmission characteristics, including modulation analysis and spurious.
- Provides a batch measurement function which automatically measures items that were individually measured before, and displays judgement results for the specified reference value.

Measured items

Modulation analysis:

[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa, HiperLAN2]
Frequency (Carrier frequency, Carrier frequency error)
Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS)
OFDM-spectrum (Carrier leak, Spectrum flatness)
Display waveform (Constellation, EVM vs Symbol, EVM vs Sub-carrier, Phase error vs Symbol, Spectrum flatness)

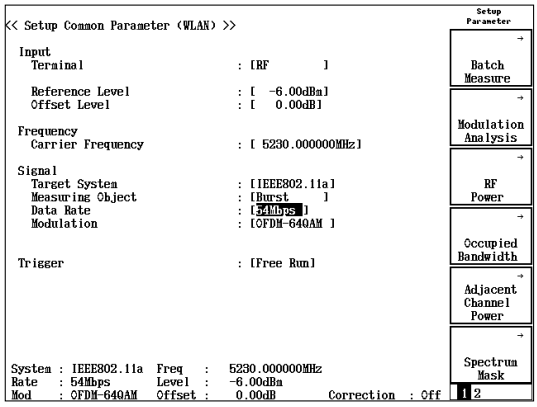
[IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)]
Frequency (Carrier frequency, Carrier frequency error)
Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset)
Display waveform (Constellation, EVM vs Chip, Phase error vs Chip, Eye-diagram)

Power
Average power, Maximum Power, Carrier off power, Burst on/off ratio, Burst rising/falling time

Occupied bandwidth, Spreading bandwidth
Adjacent channel power
Spectrum mask
Spurious, Out-band leakage power
CCDF, APD
Macro function (Batch processing)
Chip clock tolerance
Symbol rate error

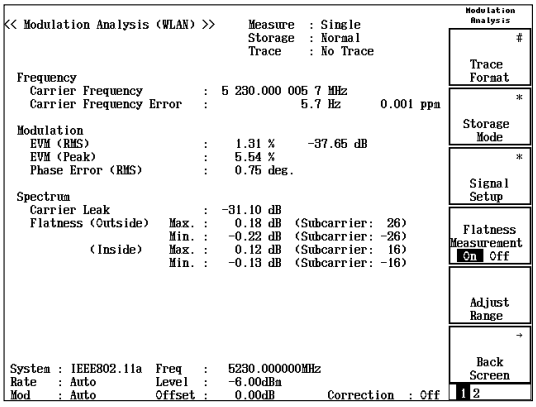
Setup Common Parameter

This screen is used to set common parameters such as signaling system, input level, frequency, data rate and target system before starting analysis. Setting these parameters simplifies measurement operations.



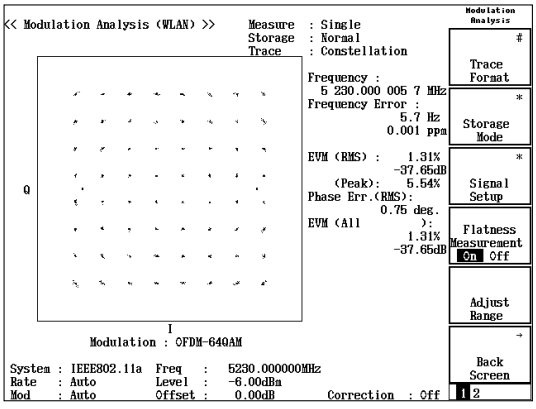
Modulation Analysis

Displays numeric results, including the frequency, execution value and maximum value of the modulation accuracy (EVM) and the execution value of the phase error.



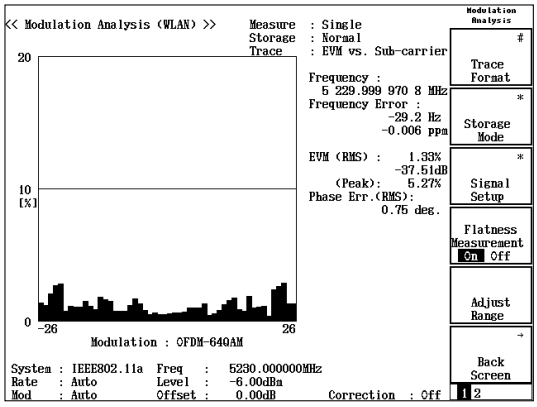
Modulation Analysis: Constellation

Displays the constellation in graph form.



Modulation Analysis: Modulation Accuracy (EVM) vs. Sub-carrier

Displays the modulation accuracy (EVM) for each sub-carrier in graph form if a measured signal is OFDM. Graphs are displayed on the left side, and numeric results on the right side.

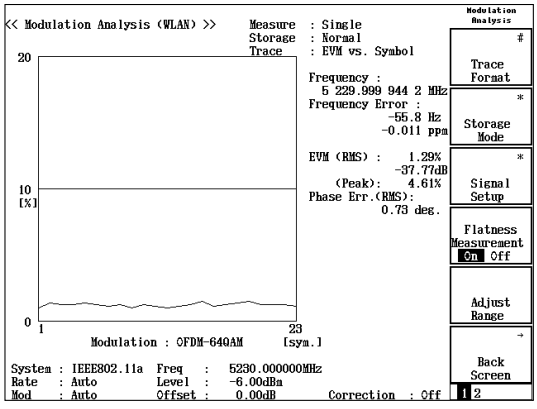


Modulation Analysis: Phase Error vs. Symbol/Chip

Displays the phase error for each symbol/chip in graph form. Graphs are displayed on the left side, and numeric results on the right side.

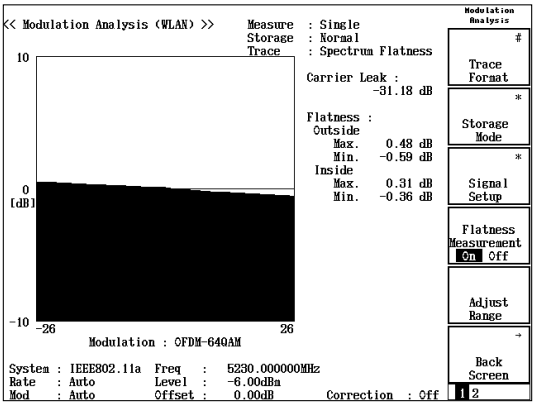
Modulation Analysis: Modulation Accuracy (EVM) vs. Symbol/Chip

Displays the modulation accuracy (EVM) for each symbol/chip in graph form.



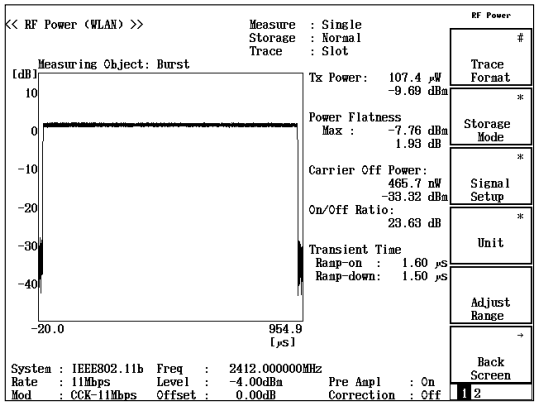
Modulation Analysis: Spectrum Flatness

Displays the spectrum flatness for each sub-carrier in graph form [IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa, HiperLAN2].



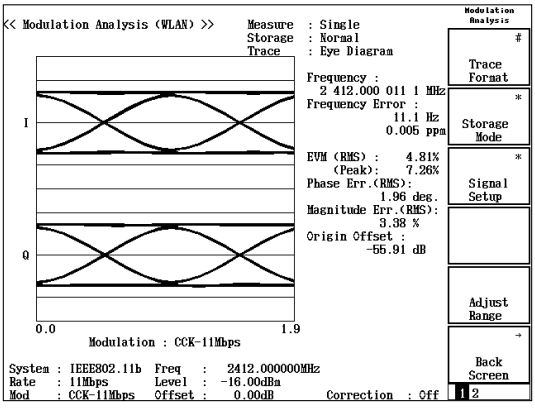
Power: Slot display

Displays a burst waveform of one slot. Numeric results such as the average power and maximum instantaneous power are also displayed.



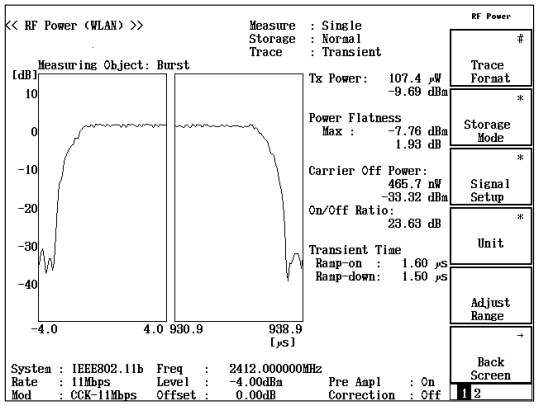
Modulation Analysis: Eye-Diagram

Displays the eye diagrams [IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)].



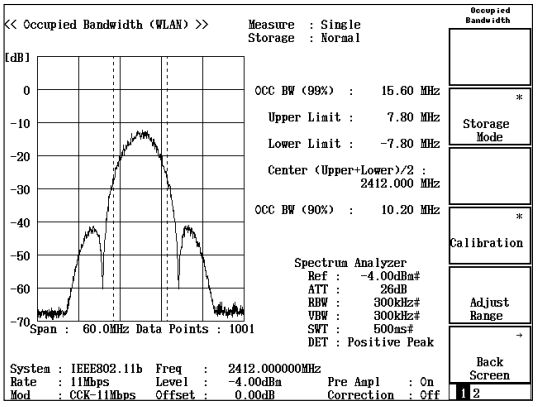
Power: Transient display

Displays an enlarged version of the rising/falling edge of the burst waveform of the slot. The rising/falling time is also displayed in the IEEE802.11b/11g. [IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)]



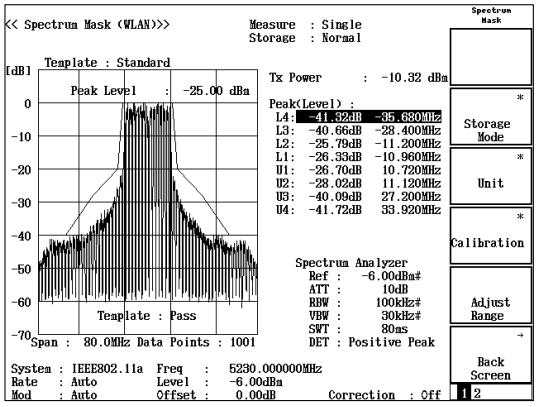
Occupied Bandwidth

Displays the occupied bandwidth, which includes 99% of the total emission power, in graph and numeric data forms. Also, the IEEE802.11b/11g displays the numeric data of spreading bandwidth, which includes 90% of the total emission power.



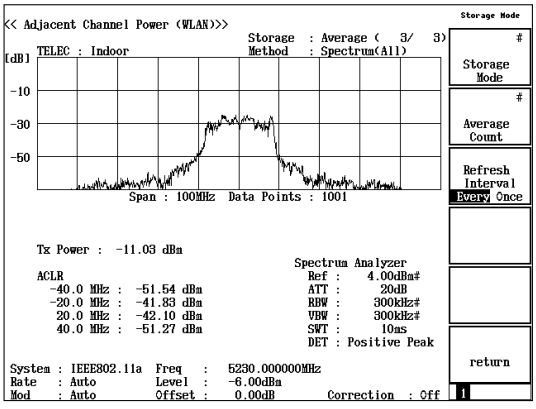
Spectrum Mask

Executes pass/fail judgement using the standard line corresponding to each wireless LAN system. The level difference of the measured value or the measured level value is also displayed with its frequency.



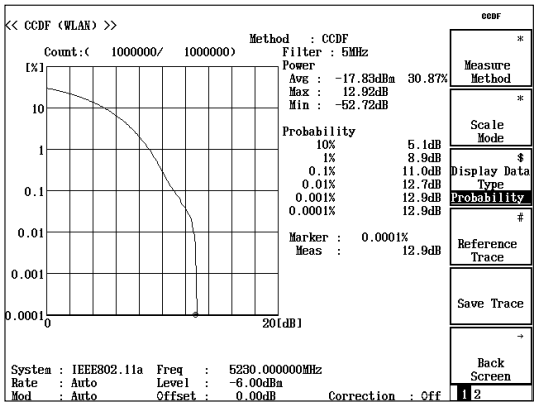
Adjacent Channel Power

Displays the power to second adjacent channel in wide-range graph and numeric data forms. It is also possible to display the power for each channel separately.



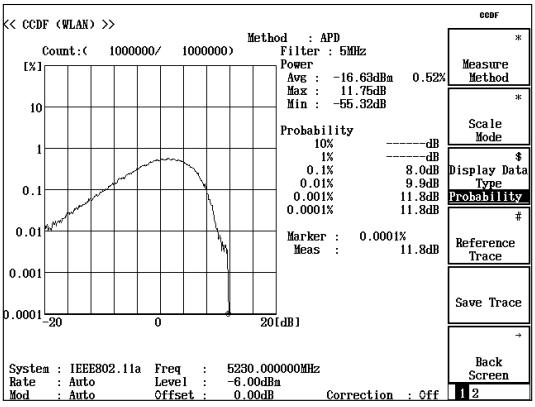
CCDF

Displays the cumulative distribution for the difference between the instantaneous value and the average value of the power that is band-limited by a filter.



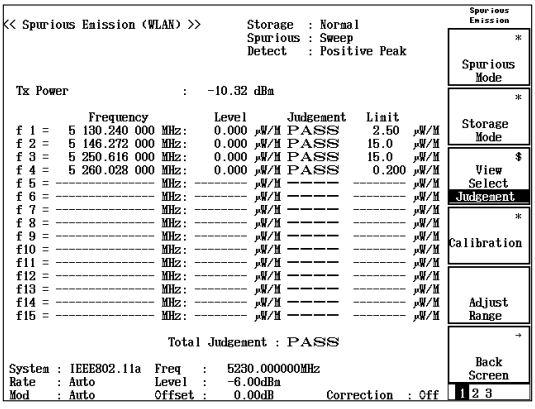
APD

Displays the distribution for the difference between the instantaneous value and the average value of the power that is band-limited by a filter.



Spurious

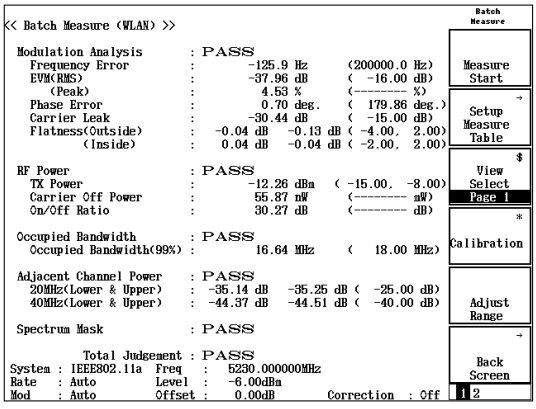
Displays the measured results for the spurious, including frequency, level, judgement result (PASS/FAIL), specifications, RBW and VBW in three sweep modes, on three separate screens. Measured results are automatically judged and the PASS/FAIL is displayed by presetting the Limit.

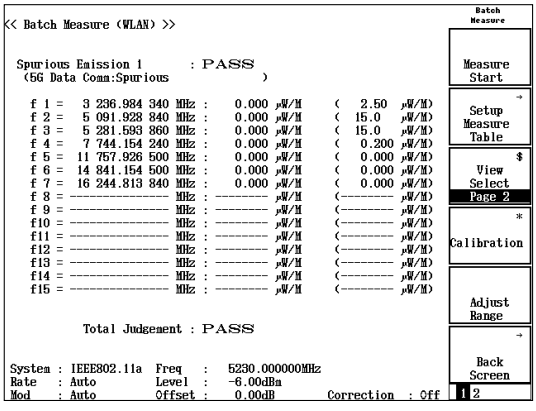


Macro Function (Batch Processing)

By presetting the judgement values, each item listed below is batch measured and judged automatically . Measured results are displayed on four separate screens.

Frequency accuracy,
EVM-RMS, EVM-Peak,
Phase error-RMS,
Amplitude error-RMS,
Origin offset,
Carrier leak,
Spectrum flatness (at burst signal),
TX-power,
Carrier off power (at burst signal),
On/Off ratio (at burst signal),
Burst signal rising/falling time (at burst signal),
Occupied bandwidth,
Adjacent channel power,
Spectrum mask,
Spurious (Two tables can be chosen)





Specifications

Specified values are obtained after warming up the equipment for 30 minutes at a constant ambient temperature.
Guaranteed specifications after Adjust Range and Level Calibration keys pressed.
Pre-amp On can be set when MS2681A-08 and MS2683A-08 are installed in the main frame.
IQ-input can be set when MS2681A-17/18, MS2683A-17/18 and MS2687B-18 are installed in the main frame.

• IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 1/3

Model		MX268130A	MX268330A	MX268730A
Modulation type		OFDM-64QAM, OFDM-16QAM, OFDM-QPSK, OFDM-BPSK		
Data rate		[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 54, 48, 36, 24, 18, 12, 9, 6 Mbps, Auto (at burst signal only) [HiSWANa]: 54, 36, 27, 18, 12, 9, 6 Mbps, Auto (at burst signal only) [HiperLAN2]: 54, 36, 27, 18, 12, 9, 6 Mbps		
Modulation analysis	Measurement items	Frequency (carrier frequency, carrier frequency error), Modulation Characteristic (EVM-RMS, EVM-Peak, phase error-RMS), OFDM-spectrum (carrier leak, spectrum flatness)		
	Frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Measurement frequency intake range	[IEEE802.11a, HiSWANa, HiperLAN2] Temperature: +18˚ to +35 ˚C, setting frequency: ±120 kHz (3 to 6 GHz, MS2681A is object outside.), ±80 kHz (100 MHz to 3 GHz) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Temperature: +18˚ to +35 ˚C, setting frequency: ±80 kHz		
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Carrier frequency accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		Input level: –10 dBm, Averaging 30 times, Temperature: +18˚ to +35 ˚C, ± (reference frequency accuracy x setting frequency + 500 Hz)		
	Modulation accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		Input level: –10 dBm, Averaging 30 times, Temperature: +18˚ to +35 ˚C 1.5%rms (typ.)		
	Display waveform	Constellation, EVM vs symbol number, EVM vs Sub-carrier number Phase error vs symbol number, spectrum flatness		
	Constellation	Display format: 1) All, 2) First Symbol, 3) Last Symbol, 4) Pilot Only, 5) One Sub-Carrier, 6) Outside Pair (When “Target system: HiSWANa” and “Data rate: Auto” are set, 2) and 3) are not selectable) Error scale: 5%, 10%, 20%, 35%, OFF (“Error scale” is available when “Data rate” is not set to “Auto” and “Modulation type” is set to “OFDM-BPSK” or “OFDM-QPSK”)		
	EVM vs symbol	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Symbol number, 1 to 1367 symbol		
	EVM vs sub-carrier	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Sub-carrier number –26 to +26		
	Phase error vs symbol	Vertical line (full scale): 5 deg, 10 deg, 20 deg, 50 deg, 100 deg Horizontal line: Symbol number, 1 to 1367 symbol		
	Spectrum flatness	Vertical line (full scale): 5 dB, 10 dB, 20 dB, 50 dB, 100 dB Horizontal line: Sub-carrier number –26 to +26		
	Analysis length	Setting range: 1 to 1367 OFDM symbol Setting resolution: 1 OFDM symbol Setting method: Manual setting, Auto setting (at burst signal only. When “Data rate” is set to “Auto.” HiperLAN2 is not supported.)		
	Analysis Start Position (HiSWANa only)	Setting range: 1 to [1367 – (“Analysis length” setting value) + 1] OFDM symbol Setting resolution: 1 OFDM symbol		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		

• IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 2/3

Model		MX268130A	MX268330A	MX268730A
RF power	Measurement frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement items*3	Average power, Maximum power, Carrier off power (at burst signal), Burst on/off ratio (at burst signal)		
	Burst average power accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz Averaging 30 times ≤±1.7 dB (Input level: –18 to 0 dBm) ≤±2.0 dB (pre-amp On, Input level: –38 to 0 dBm)	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz, Input level: –18 to 0 dBm, Averaging 30 times ≤±2.7 dB [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz, Input level: –18 to 0 dBm, –38 to 0 dBm (pre-amp On), Averaging 30 times ≤±1.7 dB, ≤±2.0 dB (pre-amp On)	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz, Input level: –26 to 0 dBm, Averaging 30 times ≤±2.9 dB [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz, Input level: –26 to 0 dBm, Averaging 30 times ≤±1.9 dB
	Burst rising detection method	Selects from (1) and (2). (1) The rising edge is detected from change of a signal level. (2) The rising edge is detected from a preamble signal. (Preamble Search)		
	Burst signal length detection method	Selects from (1) and (2). (1) Input data length (2) The falling edge is detected from change of a signal level. (Ramp-down Detection)		
	Slot display	A time domain waveform is displayed. Vertical line: Unit = dBm, dB, % Horizontal line At burst signal: –20.0 (fixed) to 5680.0 µs (based on burst length) At continuous signal: 0.0 to 5660.0 µs (fixed)		
	Transient display	Displays zoom of the rising and falling edges of a slot. Vertical line: Unit = dBm, dB, % Horizontal line: 8.0 to 40.0 µs (setting resolution: 0.1 µs)		
	Analysis length	Setting range: 1 to 1367 OFDM symbol (DSSS-OFDM: 1 to 1300 OFDM symbol) Setting resolution: 1 OFDM symbol Setting method: Manual setting, Auto setting (at burst signal only.)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		
Occupied frequency bandwidth	Frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Reference level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement method	BW (99%): 99% of the total radiation power is defined as the contained frequency width.		
	Storage mode	Normal: Displays the measured result value and waveform after every measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Adjacent channel leakage power	Target system	IEEE802.11a, HiSWANa, HiperLAN2		
	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On)	100 MHz to 6 GHz
	Reference level range	–16 to +26 dBm, –36 to +26 dBm (pre-amp On)		–16 to +24 dBm
	Measurement method	Sweep method (All): After measuring the signal range including upper/lower second adjacent channels at a time with the sweep type spectrum analyzer performs calculation of adjacent/second adjacent channels and displays the result. Sweep method (Separate): After measuring adjacent channel and the channel next to the adjacent channel with the sweep type spectrum analyzer performs calculation and displays the result.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

• IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 3/3

Model		MX268130A	MX268330A	MX268730A
Spectrum mask	Frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Reference level range	–16 to +26 dBm, –36 to +26 dBm (pre-amp On)		–16 to +24 dBm
	Template	Corresponds to the spectrum mask defined in IEEE std 802.11a-1999 17.3.9.2 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Spurious	Frequency range	9 kHz to 3 GHz	9 kHz to 7.8 GHz	9 kHz to 30 GHz
	Reference level range	–6 to +26 dBm		–6 to +24 dBm
	Measurement method	Sweep method: Detects and displays the peak value after sweeping the designated frequency range with the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive Peak. Spot method: Displays the average value after measuring the designated frequency in time domain of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample. Search method: Measures the frequency in time domain and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
CCDF	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On)	100 MHz to 6 GHz
	Reference level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement method	CCDF: Displays cumulative distribution of difference between instantaneous power and average power. APD: Displays distribution of difference between instantaneous power and average power.		
	Data count	10,000 to 2,000,000,000		
	Analysis time	0.001 to 100 ms		
	Filter selection	22 MHz, 20 MHz, 10 MHz, 5 MHz, 3 MHz, RRC: α = 0.22, RC: α = 0.22		
	Trigger	Free run: Regardless of the state of an input signal, a signal is taken in continuously. Wide IF: A signal is taken in synchronizing with a video signal. Trigger edge: Rise, Fall Trigger delay: –10000 to +10000 µs Trigger level: High, Middle, Low External: A signal is taken in synchronizing with the trigger signal inputted into a “Trig/Gate In” connector on the back. Trigger edge: Rise, Fall Trigger delay: –10000 to +10000 µs		
Batch measurement*4	Measurement items	Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Carrier leak, Spectrum flatness (at burst signal), TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Occupied frequency bandwidth, Adjacent channel leakage power, Spectrum mask, Spurious (Two tables can be chosen) * “Adjacent channel leakage power” can be measured complying with “IEEE802.11a, HiSWANa, HiperLAN2.”		
	Judgement	According to the judgment value set per measurement item, PASS or FAIL judgment is automatically performed for each measurement item.		

Model		MX268130A	MX268330A	MX268730A
Symbol rate error measurement	Target System	IEEE802.11a, IEEE802.11g(ERP-OFDM, DSSS-OFDM)		
	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz	
	Measurement level range	–26 to +26 dBm		–26 to +24 dBm
	Analysis length	250 to 1000 OFDM symbol (Setting resolution : 1 OFDM symbol)		
	Measurement range	0.0 to 50.0 ppm		
	Measurement resolution	0.1 ppm		
	Measurement accuracy	[IEEE802.11a] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		± (reference frequency x 10^6 + 1.0) ppm per OFDM symbol rate (250 kHz [= (4 µs)$^{-1}$]).		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

∗1: HiSWANa measurement function cannot carry out the following measurement.
1) Measurement for every MAC frame
2) Measurement of a signal whose cyclic prefix duration is not 800 ns
3) Measurement of a continuous signal whose modulation type is not constant.
∗2: HiperLAN2 measurement function cannot carry out the following measurement.
1) The same measurement as ‘∗1’.
2) Measurement of a burst signal whose modulation type on payload is not constant.
3) Measurement of power time mask.
∗3: When burst interval is 20 µs or less, the Wireless LAN software cannot measure the following item rightly:
1) Carrier off power, 2) On/Off ratio
∗4: “Batch measurement” function cannot carry out when “Target system: HiSWANa” and “Data rate: Auto” are set.

• IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 1/3

Model		MX268130A	MX268330A	MX268730A
Modulation type		CCK, DQPSK, DBPSK		
Data rate		11, 5.5, 2, 1 Mbps, Auto (automatic recognition at burst signal only)		
Filter		No Filter Gaussian BT = 0.3 to 1.0 (setting resolution: 0.1) Rectangular Root Raised Cosine α = 0.30 to 1.00 (setting resolution: 0.01)		
Modulation analysis	Measurement items	Frequency (Carrier frequency, Carrier frequency error), Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset)		
	Frequency range	100 MHz to 3 GHz		
	Measurement frequency intake range	Temperature: +18˚ to +35 ˚C, setting frequency ±80 kHz		
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Carrier frequency accuracy	Frequency: 2.4 to 2.5 GHz, Input level: –10 dBm, Averaging: 30 times, Temperature: +18˚ to +35 ˚C ± (reference frequency accuracy x setting frequency + 200 Hz)		
	Modulation accuracy	Frequency: 2.4 to 2.5 GHz, Input level: –10 dBm, Averaging: 30 times, Temperature: +18˚ to +35 ˚C 2.3%rms (typ.)		
	Display waveform	Constellation, EVM vs chip number, Phase error vs chip number, Eye-diagram		
	Constellation	Error scale: 5%, 10%, 20%, 35%, OFF (It is available when “Data rate” is not set to “Auto”.)		
	EVM vs chip	Vertical line (full scale): 5%, 10%, 20%, 50%, 100% Horizontal line: Chip number 256 to 4096 chip		
	Phase error vs. chip	Vertical line (full scale): 5 deg, 10 deg, 20 deg, 50 deg, 100 deg Horizontal line: Chip number 256 to 4096 chip		
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: Manual setting, Auto setting (at burst signal only. When “Data rate” is set as “Auto.”)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		
RF power	Frequency range	100 MHz to 3 GHz		
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement items[*1]	Average power, Maximum power, Carrier off power (at burst signal), Burst on/off ratio (at burst signal), Burst rising/falling time (at burst signal)		
	Burst average power accuracy	Frequency: 2.4 to 2.5 GHz, Averaging 30 times ≤±1.7 dB (Input level: –18 to 0 dBm), ≤±2.0 dB (Input level: –38 to 0 dBm, pre-amp On)		Frequency: 2.4 to 2.5 GHz, Input level: –26 to 0 dBm, Averaging 30 times, ≤±1.9 dB
	Burst rising detection method	Selects from (1) and (2). (1) The rising edge is detected from change of a signal level. (2) The rising edge is detected from a preamble signal. (Preamble Search)		
	Burst signal length detection method	Selects from (1) and (2). (1) Input data length (2) The falling edge is detected from change of a signal level. (Ramp-down Detection)		
	Slot display	A time domain waveform is displayed. Vertical line: Unit = dBm, dB, % Horizontal line At burst signal: –20.0 (fixed) to 5680.0 µs (based on burst length) At continuous signal: 0.0 to 5660.0 µs (fixed)		
	Transient display	Displays zoom of the rising and falling edges of a slot. Vertical line: Unit = dBm, dB, % Horizontal line: 8.0 to 40.0 µs (setting resolution: 0.1 µs)		
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: Manual setting, Auto setting (at burst signal only.)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		

• IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 2/3

Model		MX268130A	MX268330A	MX268730A
Occupied frequency bandwidth	Frequency range	100 MHz to 3 GHz		
	Reference level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement method	BW (99%): 99% of the total radiation power is defined as the contained frequency width. BW (90%): Frequency bandwidth containing 90% of the total radiation power. This value is called “spreading bandwidth” in TELEC’s Technical Regulations Conformity Certification.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Spectrum mask	Frequency range	100 MHz to 3 GHz		
	Reference level range	–16 to +26 dBm, –36 to +26 dBm (pre-amp On)		–16 to +24 dBm
	Template	Corresponds to the spectrum mask defined in IEEE std 802.11b-1999 18.4.7.3 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Spurious	Frequency range	9 kHz to 3 GHz	9 kHz to 7.8 GHz	9 kHz to 30 GHz
	Reference level range	–6 to +26 dBm		–6 to +24 dBm
	Measurement method	Sweep method: Detects and displays the peak value after sweeping the designated frequency range with the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive Peak. Spot method: Displays the average value after measuring the designated frequency in time domain of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample. Search method: Measures the frequency in time domain and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
CCDF	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On)	100 MHz to 6 GHz
	Reference level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement method	CCDF: Displays cumulative distribution of difference between instantaneous power and average power. APD: Displays distribution of difference between instantaneous power and average power.		
	Data count	10,000 to 2,000,000,000		
	Analysis time	0.001 to 100 ms		
	Filter Selection	22 MHz, 20 MHz, 10 MHz, 5 MHz, 3 MHz, RRC: α = 0.22, RC: α = 0.22		
	Trigger	Free run: Regardless of the state of an input signal, a signal is taken in continuously. Wide IF: A signal is taken in synchronizing with a video signal. Trigger edge: Rise, Fall Trigger delay: –10000 to +10000 µs Trigger level: High, Middle, Low External: A signal is taken in synchronizing with the trigger signal inputted into a “Trig/Gate In” connector on the back. Trigger edge: Rise, Fall Trigger delay: –10000 to +10000 µs		
Batch measurement	Measurement items	Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset, TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Burst signal rising/falling time (at burst signal), Occupied frequency bandwidth, Spectrum mask, Spurious (Two tables can be chosen)		
	Judgement	According to the judgment value set per measurement item, PASS or FAIL judgment is automatically performed for each measurement item.		

• IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 3/3

Model		MX268130A	MX268330A	MX268730A
Chip clock error measurement	Frequency range	100 MHz to 3 GHz		
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Analysis length	11,000 to 44,000 chip (setting resolution: 1 chip)		
	Measurement range	0.0 to ±50.0 ppm		
	Measurement resolution	0.1 ppm		
	Measurement accuracy	Frequency range: 2.4 to 2.5 GHz ± (reference frequency accuracy x 10^6 + 1.0) ppm per chip rate (11 MHz).		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

∗1: When burst interval is 20 µs or less, the Wireless LAN software cannot measure the following item rightly:
1) Carrier off power, 2) On/Off ratio and 3) Burst rising/falling time.

• Electric performance (IQ input)

Model	MX268130A	MX268330A	MX268730A
Input impedance	1 MΩ (parallel capacitance <100 pF), 50 Ω		
Balance input	With MS2681A-17/MS2683A-17 Differential voltage: 0.1 to 1 Vp-p (input terminals) In-phase voltage: ±2.5 V (input terminals)		—
Unbalance input	With MS2681A-18/MS2683A-18 0.1 to 1 Vp-p (input terminals) DC/AC coupling Changeable		With MS2687B-18 0.1 to 1 Vp-p (input terminals) DC/AC coupling Changeable
Measurement items	[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa, HiperLAN2] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level, Symbol rate error measurement [HiSWANa, HiperLAN2] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level [IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)] Modulation accuracy/frequency, RF power, CCDF, Batch measurement, IQ level, Chip clock error measurement		
IQ level measurement	Measures input level of I and Q (rms, p-p)		
IQ phase difference measurement	When the CW signal is inputted to I and Q input terminals, measures and displays the phase difference between I-phase and Q-phase signals.		

Wireless LAN Measurement Software limited version MX268132A/MX268332A/MX268732A

– From Development and Production to

The MX268132A/MX268332A/MX268732A Wireless LAN Measurement Software limited version is application software used by the MS2681A/MS2683A/MS2687B spectrum analyzer. A transmission system conforming to the wireless LAN standards can be evaluated by installing this wireless LAN measurement software into the spectrum analyzer.

Features

- Conforms to the IEEE802.11a, IEEE802.11b, IEEE802.11g (ERP-OFDM, DSSS-OFDM, ERP-DSSS/CCK), HiSWANa and HiperLAN2 standards.
- Analyzes OFDM signals those realize high-speed data transfer at 54 Mbps
- Integrates a high-performance DSP, enabling high-speed and high-accuracy measurement using the fast A/D sampling (at 64 MHz). Modulation accuracy measurement can be completed in 1 sec or less.
- Capable of measuring harmonics up to 5-time waves of the 5-GHz band wireless LAN (IEEE802.11a, HiSWANa, HiperLAN2) in use of MS2687B.
- One-touch operation of tests on transmission characteristics, including modulation analysis and spurious.
- Provides a batch measurement function which automatically measures items that were individually measured before, and displays judgement results for the specified reference value.

Measured items

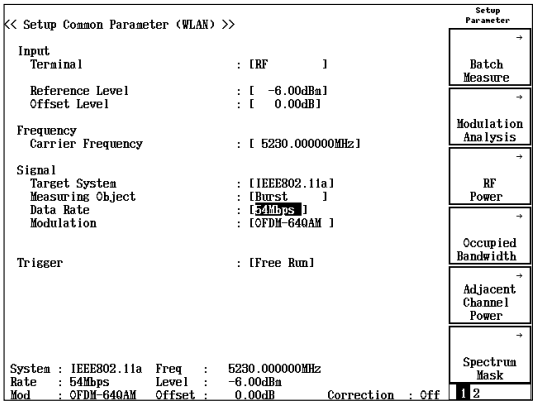
Modulation analysis:
  [IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa, HiperLAN2]
  Frequency (Carrier frequency, Carrier frequency error)
  Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS)
  OFDM-spectrum (Carrier leak, Spectrum flatness)

  [IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)]
  Frequency (Carrier frequency, Carrier frequency error)
  Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset)

Power
  Average power, Maximum Power, Carrier off power, Burst on/off ratio, Burst rising/falling time
Occupied bandwidth, Spreading bandwidth
Adjacent channel power
Spectrum mask
Spurious, Out-band leakage power
CCDF, APD
Macro function (Batch processing)

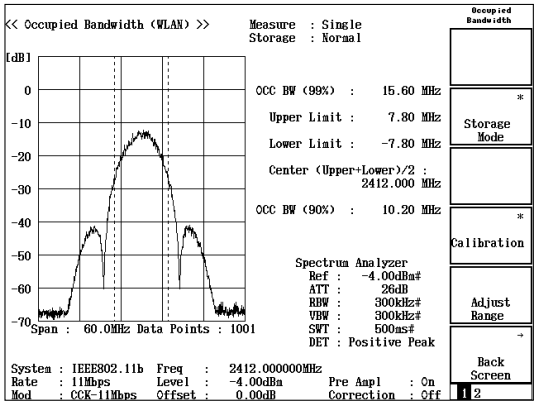
Setup Common Parameter

This screen is used to set common parameters such as signaling system, input level, frequency, data rate, and target system before starting analysis. Setting these parameters simplifies measurement operations.



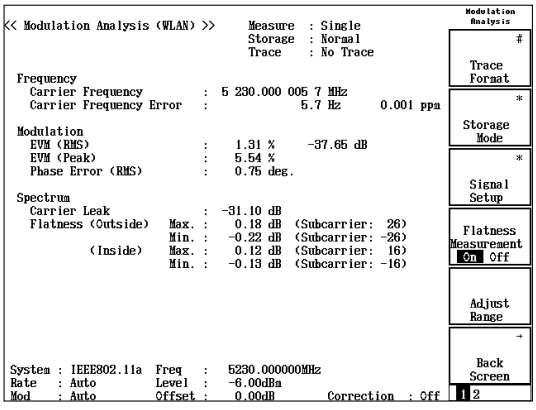
Occupied Bandwidth

Displays the occupied bandwidth, which includes 99% of the total emission power, in graph and numeric data forms. Also, the IEEE802.11b/11g displays the numeric data of spreading bandwidth, which includes 90% of the total emission power.



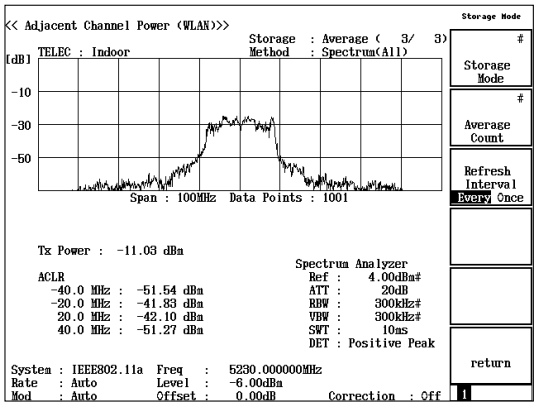
Modulation Analysis

Displays numeric results, including the frequency, execution value and maximum value of the modulation accuracy (EVM) and the execution value of the phase error.



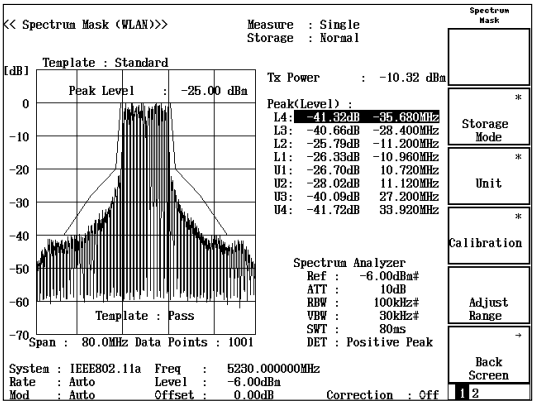
Adjacent Channel Power

Displays the power to second adjacent channel in wide-range graph and numeric data forms. It is also possible to display the power for each channel separately.



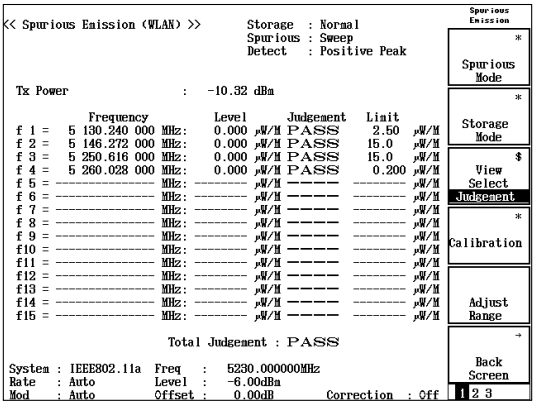
Spectrum Mask

Executes pass/fail judgement using the standard line corresponding to each wireless LAN system. The level difference of the measured value or the measured level value is also displayed with its frequency.



Spurious

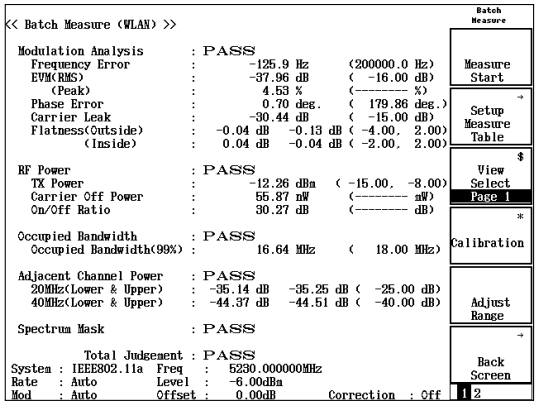
Displays the measured results for the spurious, including frequency, level, judgement result (PASS/FAIL), specifications, RBW and VBW in three sweep modes, on three separate screens.
Measured results are automatically judged and the PASS/FAIL is displayed by presetting the Limit.

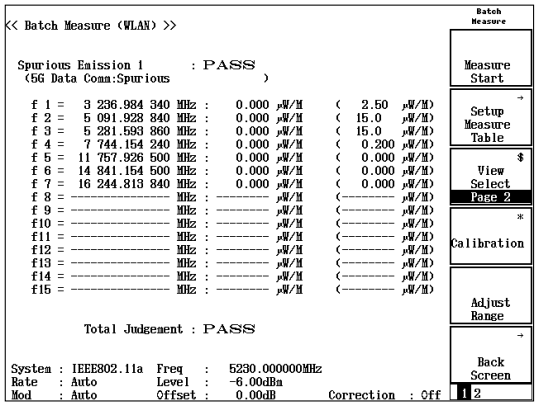


Macro Function (Batch Processing)

By presetting the judgement values, each item listed below is batch measured and judged automatically. Measured results are displayed on four separate screens.

Frequency accuracy,
EVM-RMS, EVM-Peak,
Phase error-RMS,
Amplitude error-RMS,
Origin offset,
Carrier leak,
Spectrum flatness (at burst signal),
TX-power,
Carrier off power (at burst signal),
On/Off ratio (at burst signal),
Burst signal rising/falling time (at burst signal),
Occupied bandwidth,
Adjacent channel power,
Spectrum mask,
Spurious (Two tables can be chosen)





Specifications

Specified values are obtained after warming up the equipment for 30 minutes at a constant ambient temperature and then performing calibration.
Guaranteed specifications after Adjust Range and Level Calibration keys pressed.
Pre-amp On can be set when MS2681A-08 and MS2683A-08 are installed in the main frame.
IQ-input can be set when MS2681A-17/18, MS2683A-17/18 and MS2687B-18 are installed in the main frame.

• IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 1/3

Model		MX268132A	MX268332A	MX268732A
Modulation type		OFDM-64QAM, OFDM-16QAM, OFDM-QPSK,OFDM-BPSK		
Data rate		[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 54, 48, 36, 24, 18, 12, 9, 6 Mbps, Auto (at burst signal only) [HiSWANa]: 54, 36, 27, 18, 12, 9, 6 Mbps, Auto (at burst signal only) [HiperLAN2]: 54, 36, 27, 18, 12, 9, 6 Mbps		
Modulation analysis	Measurement items	Frequency (carrier frequency, carrier frequency error), Modulation Characteristic (EVM-RMS, EVM-Peak, phase error-RMS),OFDM-spectrum (carrier leak, spectrum flatness)		
	Frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Measurement frequency intake range	[IEEE802.11a, HiSWANa, HiperLAN2] Temperature: +18˚ to +35 ˚C, setting frequency: ±120 kHz (3 to 6 GHz, MS2681A is object outside.), ±80 kHz (100 MHz to 3 GHz) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Temperature: +18˚ to +35 ˚C, setting frequency: ±80 kHz		
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Carrier frequency accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		Input level: –10 dBm, Averaging 30 times, Temperature: +18˚ to +35 ˚C, ± (reference frequency accuracy x setting frequency + 500 Hz)		
	Modulation accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz	
		Input level: –10 dBm, Averaging 30 times, Temperature: +18˚ to +35 ˚C 1.5%rms (typ.)		
	Analysis length	Setting range: 1 to 1367 OFDM symbol Setting resolution: 1 OFDM symbol Setting method: Manual setting, Auto setting (at burst signal only. When “Data rate” is set to “Auto.” HiperLAN2 is not supported.)		
	Analysis Start Position (HiSWANa only)	Setting range: 1 to [1367 – (“Analysis length” setting value) + 1] OFDM symbol Setting resolution: 1 OFDM symbol		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform displays are same as “Normal” mode.		
RF power	Measurement frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Measurement level range	–26 to +26 dBm, -46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement items*3	Average power, Maximum power, Carrier off power (at burst signal), Burst on/off ratio (at burst signal)		

• IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(*1), HiperLAN2(*2) 2/3

Model		MX268132A	MX268332A	MX268732A
RF power	Burst average power accuracy	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 2 to 2.5 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz Averaging 30 times ≤±1.7 dB (Input level: –18 to 0 dBm) ≤±2.0 dB (pre-amp On, Input level: –38 to 0 dBm)	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz, Input level: –18 to 0 dBm, Averaging 30 times ≤±2.7 dB [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz, Input level: –18 to 0 dBm, –38 to 0 dBm (pre-amp On), Averaging 30 times ≤±1.7 dB, ≤±2.0 dB (pre-amp On)	[IEEE802.11a, HiSWANa, HiperLAN2] Frequency: 4.9 to 6 GHz, Input level:–26 to 0 dBm, Averaging 30 times ≤±2.9 dB [IEEE802.11g (ERP-OFDM, DSSS-OFDM)] Frequency: 2.4 to 2.5 GHz, Input level: –26 to 0 dBm, Averaging 30 times ≤±1.9 dB
	Burst rising detection method	Selects from (1) and (2). (1) The rising edge is detected from change of a signal level. (2) The rising edge is detected from a preamble signal. (Preamble Search)		
	Burst signal length detection method	Selects from (1) and (2). (1) Input data length (2) The falling edge is detected from change of a signal level. (Ramp-down Detection)		
	Analysis length	Setting range: 1 to 1367 OFDM symbol (DSSS-OFDM: 1 to 1300 OFDM symbol) Setting resolution: 1 OFDM symbol Setting method: Manual setting, Auto setting (at burst signal only.)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		
Occupied frequency bandwidth	Frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Reference level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement method	BW (99%): 99% of the total radiation power is defined as the contained frequency width.		
	Storage mode	Normal: Displays the measured result value and waveform after every measurement. Average: Data display averages the result for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Adjacent channel leakage power	Target system	IEEE802.11a, HiSWANa, HiperLAN2		
	Frequency range	100 MHz to 3 GHz	100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On)	100 MHz to 6 GHz
	Reference level range	–16 to +26 dBm, –36 to +26 dBm (pre-amp On)		–16 to +24 dBm
	Measurement method	Sweep method (All): After measuring the signal range including upper/lower second adjacent channels at a time with the sweep type spectrum analyzer performs calculation of adjacent/second adjacent channels and displays the result. Sweep method (Separate): After measuring adjacent channel and the channel next to the adjacent channel with the sweep type spectrum analyzer performs calculation and displays the result.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

• IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa(∗1), HiperLAN2(∗2) 3/3

Model		MX268132A	MX268332A	MX268732A
Spectrum mask	Frequency range	100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz, 100 MHz to 3 GHz (pre-amp On) [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz	[IEEE802.11a, HiSWANa, HiperLAN2]: 100 MHz to 6 GHz [IEEE802.11g (ERP-OFDM, DSSS-OFDM)]: 100 MHz to 3 GHz
	Reference level range	–16 to +26 dBm, –36 to +26 dBm (pre-amp On)		–16 to +24 dBm
	Template	Corresponds to the spectrum mask defined in IEEE std 802.11a-1999 17.3.9.2 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Spurious	Frequency range	9 kHz to 3 GHz	9 kHz to 7.8 GHz	9 kHz to 30 GHz
	Reference level range	–6 to +26 dBm		–6 to +24 dBm
	Measurement method	Sweep method: Detects and displays the peak value after sweeping the designated frequency range with the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive Peak. Spot method: Displays the average value after measuring the designated frequency in time domain of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample. Search method: Measures the frequency in time domain and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Batch measurement	Measurement items	Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Carrier leak, Spectrum flatness (at burst signal), TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Occupied frequency bandwidth, Adjacent channel leakage power, Spectrum mask, Spurious (Two tables can be chosen) ∗ “Adjacent channel leakage power” can be measured complying with “IEEE802.11a, HiSWANa, HiperLAN2.”		
	Judgement	According to the judgment value set per measurement item, PASS or FAIL judgment is automatically performed for each measurement item.		

∗1: HiSWANa measurement function cannot carry out the following measurement.
1) Measurement for every MAC frame
2) Measurement of a signal whose cyclic prefix duration is not 800 ns
3) Measurement of a continuous signal whose modulation type is not constant.

∗2: HiperLAN2 measurement function cannot carry out the following measurement.
1) The same measurement as ‘∗1’.
2) Measurement of a burst signal whose modulation type on payload is not constant.
3) Measurement of power time mask.

∗3: When burst interval is 20 µs or less, the Wireless LAN software cannot measure the following item rightly:
1) Carrier off power, 2) On/Off ratio

• IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 1/2

Model		MX268132A	MX268332A	MX268732A
Modulation type		CCK, DQPSK, DBPSK		
Data rate		11, 5.5, 2, 1 Mbps, Auto (automatic recognition at burst signal only)		
Filter		No Filter Gaussian BT = 0.3 to 1.0 (setting resolution: 0.1) Rectangular Root Raised Cosine α = 0.30 to 1.00 (setting resolution: 0.01)		
Modulation analysis	Measurement items	Frequency (Carrier frequency, Carrier frequency error), Modulation Characteristic (EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset)		
	Frequency range	100 MHz to 3 GHz		
	Measurement frequency intake range	Temperature: +18˚ to +35 ˚C, setting frequency ±80 kHz		
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Carrier frequency accuracy	Frequency: 2.4 to 2.5 GHz, Input level: –10 dBm, Averaging: 30 times, Temperature: +18˚ to +35 ˚C ± (reference frequency accuracy x setting frequency + 200 Hz)		
	Modulation accuracy	Frequency: 2.4 to 2.5 GHz, Input level: –10 dBm, Averaging: 30 times, Temperature: +18˚ to +35 ˚C 2.3%rms (typ.)		
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: Manual setting, Auto setting (at burst signal only. When “Data rate” is set as “Auto.”)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
RF power	Frequency range	100 MHz to 3 GHz		
	Measurement level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement items*1	Average power, Maximum power, Carrier off power (at burst signal), Burst on/off ratio (at burst signal), Burst rising/falling time (at burst signal)		
	Burst average power accuracy	Frequency: 2.4 to 2.5 GHz, Averaging 30 times ≤±1.7 dB (Input level: –18 to 0 dBm), ≤±2.0 dB (Input level: –38 to 0 dBm, pre-amp On)		Frequency: 2.4 to 2.5 GHz, Input level: –26 to 0 dBm, Averaging 30 times, ≤±1.9 dB
	Burst rising detection method	Selects from (1) and (2). (1) The rising edge is detected from change of a signal level. (2) The rising edge is detected from a preamble signal. (Preamble Search)		
	Burst signal length detection method	Selects from (1) and (2). (1) Input data length (2) The falling edge is detected from change of a signal level. (Ramp-down Detection)		
	Analysis length	Setting range: 256 to 4096 chip Setting resolution: 1 chip Setting method: Manual setting, Auto setting (at burst signal only.)		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode. Overwrite: Waveform is overwritten without erasing previous waveform. Data display is same as “Normal” mode.		
Occupied frequency bandwidth	Frequency range	100 MHz to 3 GHz		
	Reference level range	–26 to +26 dBm, –46 to +26 dBm (pre-amp On)		–26 to +24 dBm
	Measurement method	BW (99%): 99% of the total radiation power is defined as the contained frequency width. BW (90%): Frequency bandwidth containing 90% of the total radiation power. This value is called “spreading bandwidth” in TELEC’s Technical Regulations Conformity Certification.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		

• IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK) 2/2

Model		MX268132A	MX268332A	MX268732A
Spectrum mask	Frequency range	100 MHz to 3 GHz		
	Reference level range	–16 to +26 dBm, –36 to +26 dBm (pre-amp On)		–16 to +24 dBm
	Template	Corresponds to the spectrum mask defined in IEEE std 802.11b-1999 18.4.7.3 and IEEE std 802.11g-2003 19.5.4/19.7.2. Arbitrary spectrum mask is also available.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Spurious	Frequency range	9 kHz to 3 GHz	9 kHz to 7.8 GHz	9 kHz to 30 GHz
	Reference level range	–6 to +26 dBm		–6 to +24 dBm
	Measurement method	Sweep method: Detects and displays the peak value after sweeping the designated frequency range with the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Positive Peak. Spot method: Displays the average value after measuring the designated frequency in time domain of the spectrum analyzer. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample. Search method: Measures the frequency in time domain and displays the average value after sweeping the designated frequency range with the spectrum analyzer and detecting the peak value. Calculates and displays the ratio to the transmitted power value (power ratio). Detection mode is Sample.		
	Storage mode	Normal: Refresh waveform/data for each measurement. Average: Displays the measured result value averaged for the designated number of measurements. Averaging count: 2 to 999. Waveform display is same as “Normal” mode.		
Batch measurement	Measurement items	Frequency accuracy, EVM-RMS, EVM-Peak, Phase error-RMS, Amplitude error-RMS, Origin offset, TX-power, Carrier off power (at burst signal), On/Off ratio (at burst signal), Burst signal rising/falling time (at burst signal), Occupied frequency bandwidth, Spectrum mask, Spurious (Two tables can be chosen)		
	Judgement	According to the judgment value set per measurement item, PASS or FAIL judgment is automatically performed for each measurement item.		

∗1: When burst interval is 20 µs or less, the Wireless LAN software cannot measure the following item rightly:
1) Carrier off power, 2) On/Off ratio and 3) Burst rising/falling time.

• Electric performance (IQ input)

Model	MX268132A	MX268332A	MX268732A
Input impedance	1 MΩ (parallel capacitance <100 pF), 50 Ω		
Balance input	With MS2681A-17/MS2683A-17 Differential voltage: 0.1 to 1 Vp-p (input terminals) In-phase voltage: ±2.5 V (input terminals)		—
Unbalance input	With MS2681A-18/MS2683A-18 0.1 to 1 Vp-p (input terminals) DC/AC coupling Changeable		With MS2687B-18 0.1 to 1 Vp-p (input terminals) DC/AC coupling Changeable
Measurement items	[IEEE802.11a, IEEE802.11g (ERP-OFDM, DSSS-OFDM), HiSWANa, HiperLAN2]: Modulation accuracy/frequency, RF power, Batch measurement, IQ level [IEEE802.11b, IEEE802.11g (ERP-DSSS/CCK)]: Modulation accuracy/frequency, RF power, Batch measurement, IQ level		
I/Q level measurement	Measures input level of I and Q (rms, p-p)		
IQ phase difference measurement	When the CW signal is inputted to I and Q input terminals, measures and displays the phase difference between I-phase and Q-phase signals.		

Ordering Information

Please specify the model/order number, name, and quantity when ordering.

Model	Name	Remarks
	– Main frame –	
MX268101B	W-CDMA Measurement Software	For MS2681A
MX268301B	W-CDMA Measurement Software	For MS2683A
MX268701B	W-CDMA Measurement Software	For MS2687B
MX268102A	GSM Measurement Software	For MS2681A
MX268302A	GSM Measurement Software	For MS2683A
MX268702A	GSM Measurement Software	For MS2687B
MX268103A	cdma Measurement Software	For MS2681A
MX268303A	cdma Measurement Software	For MS2683A
MX268703A	cdma Measurement Software	For MS2687B
MX268104A	1xEV-DO Measurement Software	For MS2681A
MX268304A	1xEV-DO Measurement Software	For MS2683A
MX268704A	1xEV-DO Measurement Software	For MS2687B
MX268105A	π/4DQPSK Measurement Software	For MS2681A
MX268305A	π/4DQPSK Measurement Software	For MS2683A
MX268705A	π/4DQPSK Measurement Software	For MS2687B
MX268130A	Wireless LAN Measurement Software	For MS2681A
MX268330A	Wireless LAN Measurement Software	For MS2683A
MX268730A	Wireless LAN Measurement Software	For MS2687B
MX268132A	Wireless LAN Measurement Software Limited Version	For MS2681A
MX268332A	Wireless LAN Measurement Software Limited Version	For MS2683A
MX268732A	Wireless LAN Measurement Software Limited Version	For MS2687B
	– Standard accessories –	
W1746AE	W-CDMA operation manual	For MX268101B/268301B/268701B
W1854AE	MX268102A/302A/702A operation manual	For MX268102A/268302A/268702A
W1865AE	MX860x03A/MX268x03A operation manual	For MX268103A/268303A/268703A
W2090AE	MX860x04A/MX268x04A operation manual	For MX268104A/268304A/268704A
W1866AE	MX860x05A/MX268x05A operation manual	For MX268105A/268305A/268705A
W2080AE	MX268∗30A/MX860∗30A operation manual	For MX268130A/268330A/268730A
W2137AE	MX268∗32A/MX860∗32A operation manual	For MX268132A/268332A/268732A
JT32MA3-NT1	PC ATA Card (32 MB, for backup)	

Anritsu

Specifications are subject to change without notice.

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