Anritsu envision : ensure

Digital Wireless Measurement Solution

Signal Analyzer
MS2690A/MS2691A/MS2692A/MS2840A/MS2830A

- Vector Modulation Analysis Software MX269017A
- Vector Signal Generator MS269xA-020, MS2840A-020/021, MS2830A-020/021
- TDMA IQproducer MX269902A

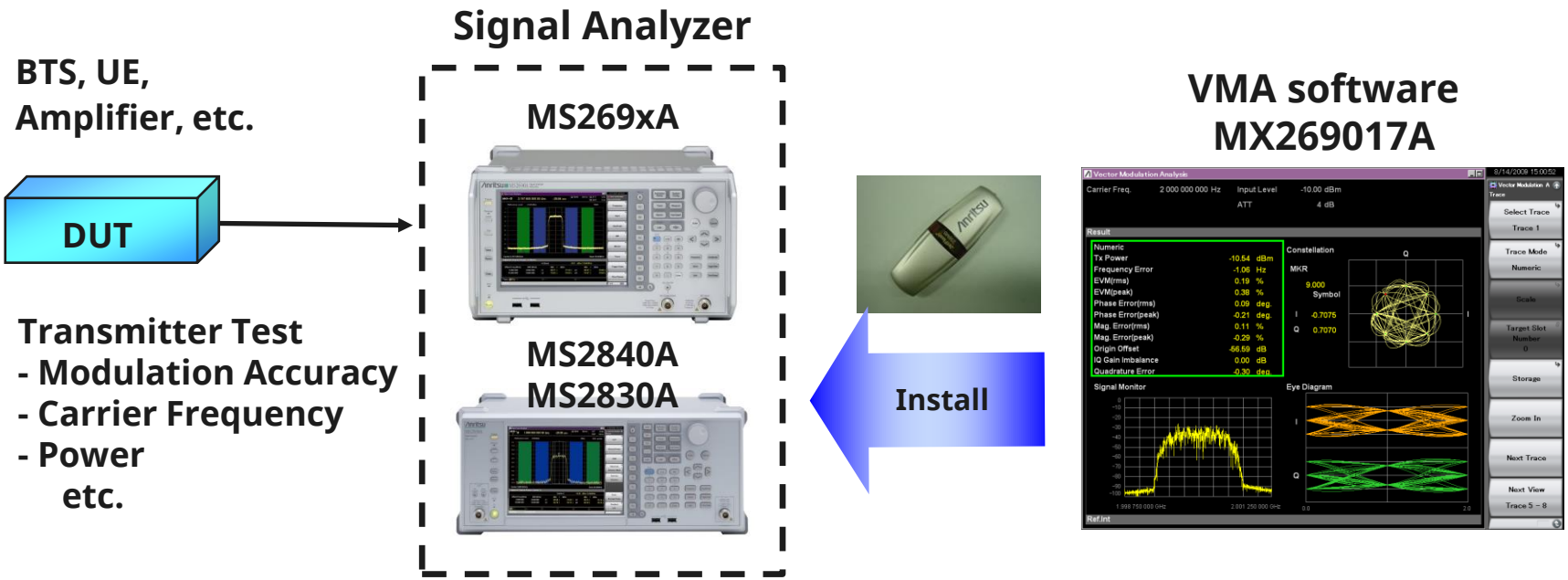
Version 5.00

Vector Modulation Analysis Software MX269017A

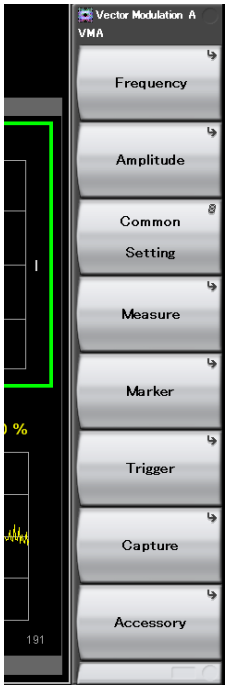
The Vector Modulation Analysis Software MX269017A supports analysis of Digital wireless signals. Installing it in the MS269xA/MS2830A measures modulation accuracy, carrier frequency, and transmission power.

Modulation (Firmware package version: 10.02.00)

BPSK, QPSK, O-QPSK, π/4DQPSK, 8PSK,
16QAM, 32QAM, 64QAM, 128QAM, 256QAM,
2FSK, 4FSK, H-CPM, MSK



Basic setting (1/2)



[a] Frequency

[b] Amplitude

[c] Detail Parameter

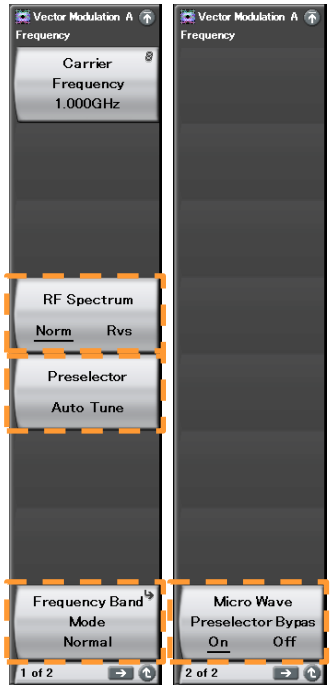
[d] Measure

[e] Marker

[f] Trigger

[g] Capture

[a]



[b]

[d]

[e]

[f]

[g]

[c] Refer to the slide 19-30
[g] Refer to the slide 31-36

Refer to the next page

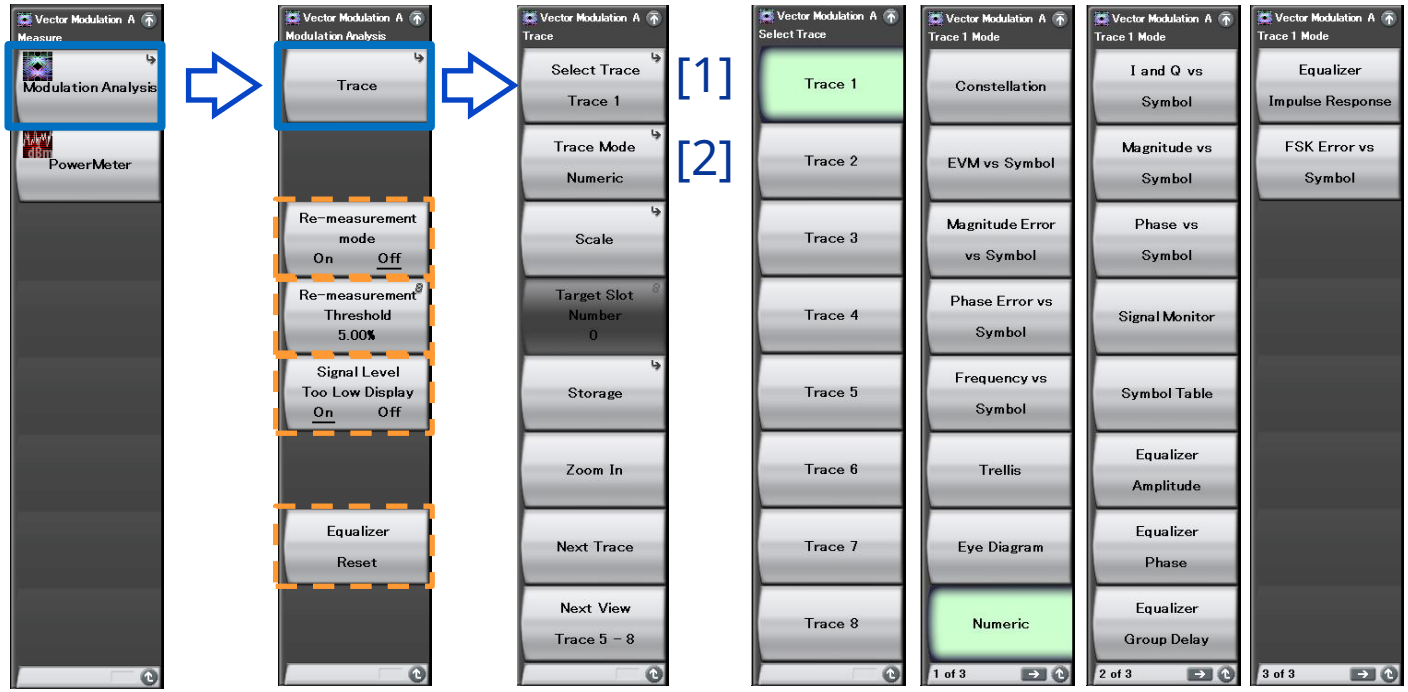
- RF Spectrum: Sets whether to reverse the input signal IQ spectrum.
- Pre-selector Auto Tune*1: Auto-tunes pre-selector.
- Frequency Band Mode: Selects frequency band mode (Spurious or Normal).
  Pre-selector Pass-through Low Frequency
  Normal: > 6 GHz, Spurious: ≥ 3 GHz (MS2691A/MS2692A + Opt.003)
  Normal: > 4 GHz, Spurious: ≥ 3.5 GHz (MS2830A-041/043/044/045,MS2840A-041/044/046)
- Micro Wave Pre-Selector Bypass*2 Disables/enables the pre-selector bypass.

*1: Only available for MS2691A/MS2692A, MS2840A Opt-044/046 or MS2830A Opt-044/045.
*2: This function is available with MS2840A/MS2830A Opt-067/167.

Basic setting (2/2)

[d]Measure

Refer to the "Power Meter Function" (Slide 37)



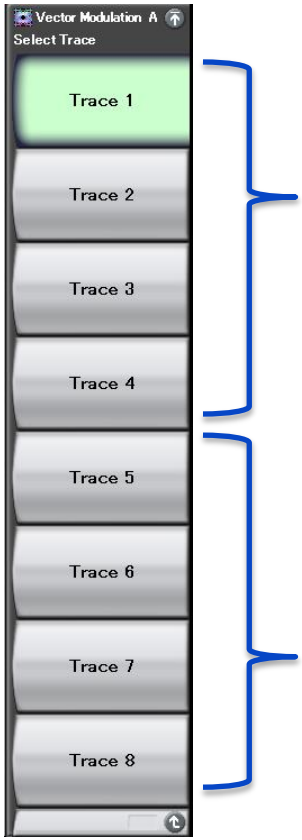
Refer to the "Measurement"

- Re-measurement Mode: When the Re-measurement mode is On, when the next measurement exceeds the threshold value, re-measurement is performed automatically once only.
- Re-measurement threshold: Sets the threshold value
  QPSK: EVM peak, xxQAM: EVM peak, FSK: FSK Error peak
- Signal Level Too Low Display: Sets the warning display when the signal is too low either On or Off.
- Equalizer Reset: Initializes filter factors of Equalizer.

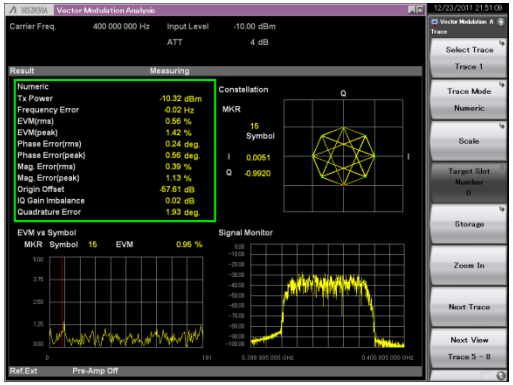
Measurement: Trace (1/14)

One screen can display four convenient traces, and switching between Traces 1 – 4 and Traces 5 – 8 on two screens makes it easy to evaluate 8 traces at a glance.

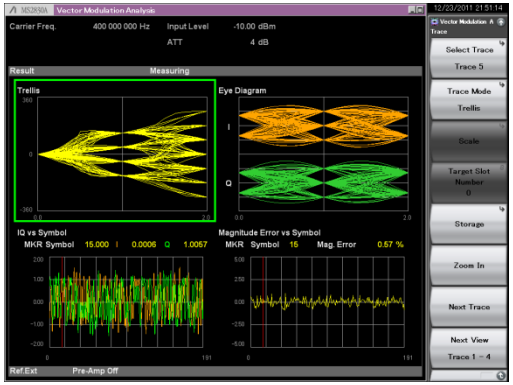
[1]



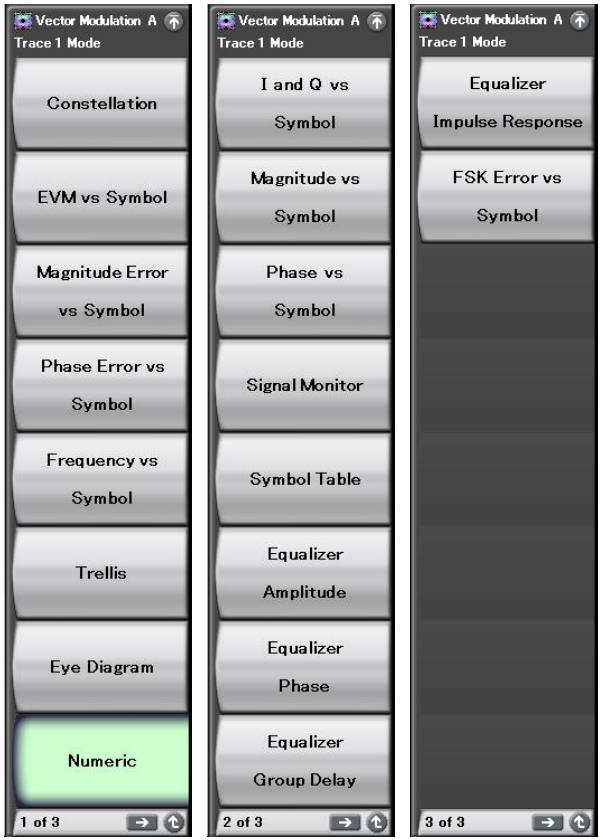
4-pane screen (Traces 1 – 4)



4-pane screen (Traces 5 – 8)



[2]



Measurement: Trace (2/14)

Whether the measurement result is displayed depends on the Modulation Type setting. The relationship between Modulation Type and the result display are described in Table. If the measurement result is not displayed, 'Not Supported' is displayed in the trace area.

Trace Mode	Function
Constellation	Displays the waveform of the analysis interval on IQ coordinate or frequency axis graph.
EVM vs Symbol	Displays the EVM of each symbol on a graph.
Magnitude Error vs Symbol	Displays the amplitude error of each symbol on a graph.
Phase Error vs Symbol	Displays the phase error of each symbol on a graph.
Frequency vs Symbol	Displays the FM frequency deviation of the waveform in the analysis interval on a graph.
Trellis	Displays the phase transition of the waveform in the analysis interval on a graph.
Eye Diagram	Displays the amplitude of the I phase and Q phase of the waveform in the analysis interval on a graph.
Numeric	Displays the numeric results.
I and Q vs Symbol	Displays the amplitude of the I phase and Q phase of the waveform in the analysis interval on a graph.
Magnitude vs Symbol	Displays the amplitude of the waveform in the analysis interval on a graph.
Phase vs Symbol	Displays the phase of the waveform in the analysis interval on a graph.
Signal Monitor	Displays the spectrum of the waveform in the analysis interval on a graph.
Symbol Table	Displays the demodulation bit for each symbol.
EqualizerAmplitude	Displays the equalizer amplitude characteristics.
Equalizer Phase	Displays the equalizer phase characteristics.
Equalizer Group Delay	Displays the equalizer group delay characteristics.
Equalizer Impulse Response	Displays the equalizer impulse response.
FSK Error vs Symbol	Displays the FSK error of each symbol on a graph.
Fidelity vs Symbol	Displays the analysis results of Modulation Fidelity vs Symbol.
Histogram	Displays the appearance frequency of each symbol.
Custom Numeric	Displays the numerical results that the user has specified in numerical values and bars.

Trace Mode	Modulation Type			
	BPSK QPSK O-QPSK PI/4DQPSK 8PSK 2ASK 4ASK	16QAM 64QAM 256QAM	2FSK 4FSK H-CPM	MSK
Constellation	✓	✓	✓	✓
EVM vs Symbol	✓	✓	✓	✓
Magnitude Error vs Symbol	✓	✓	✓	✓
Phase Error vs Symbol	✓	✓	✓	✓
Frequency vs Symbol	–	–	✓	✓
Trellis	✓	✓	✓	✓
Eye Diagram	✓	✓	✓	✓
Numeric	✓	✓	✓	✓
I and Q vs Symbol	✓	✓	✓	✓
Magnitude vs Symbol	✓	✓	✓	✓
Phase vs Symbol	✓	✓	✓	✓
Signal Monitor	✓	✓	✓	✓
Symbol Table	✓	✓	✓	✓
Equalizer Amplitude	✓	✓	–	–
Equalizer Phase	✓	✓	–	–
Equalizer Group Delay	✓	✓	–	–
Equalizer Impulse Response	✓	✓	–	–
FSK Error vs Symbol	–	–	✓	✓
Fidelity vs Symbol	–	–	✓*	✓
Histogram	–	–	✓	✓
Custom Numeric	✓	✓	✓	✓

✓: Displays measured results.

–: Does not display measured results.

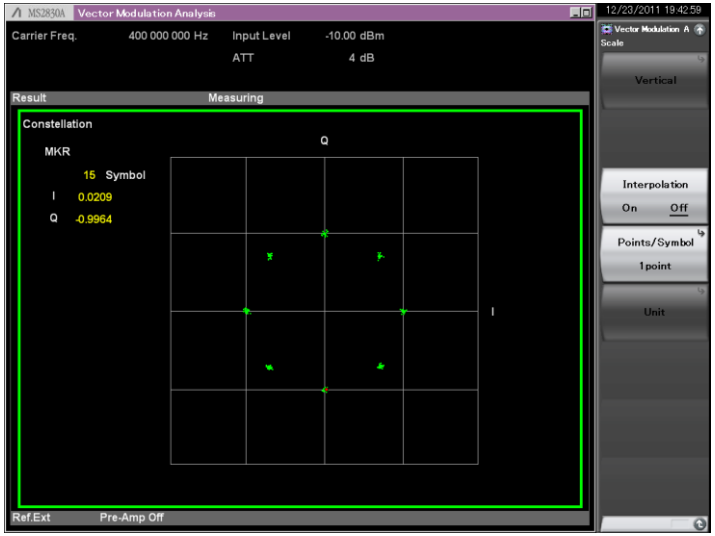
*: Available only when Modulation Type is set to 2FSK, 4FSK, H-CPM.

Measurement: Trace (3/14)

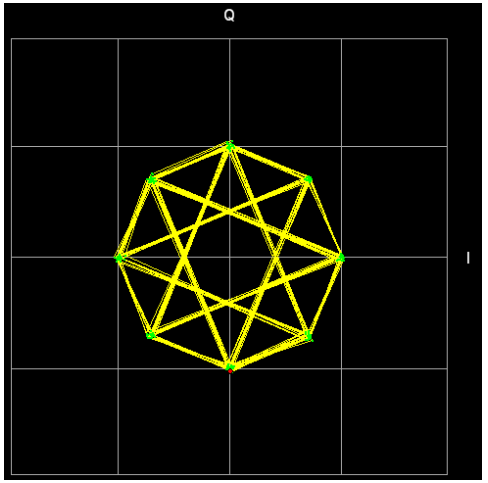
Constellation:

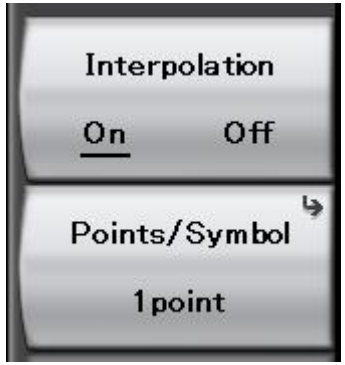
Displays the waveform in the analysis interval on the IQ axis. Sets the data "interpolation" between the symbols displayed on the graph and the display complementation. On the interpolation display, data is interpolated by using the number of splits between symbols specified in Points/Symbol and a graph is displayed with each data connected with straight lines.

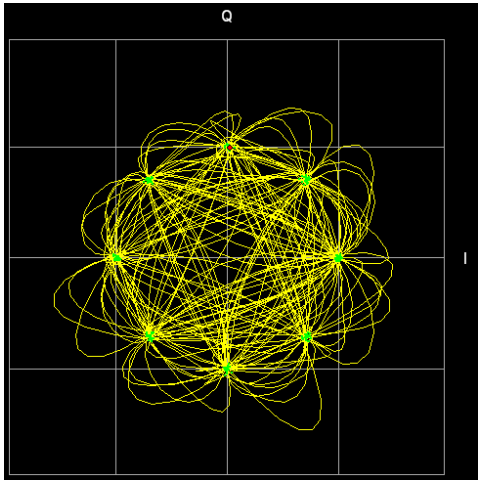
Constellation (Interpolation: OFF)

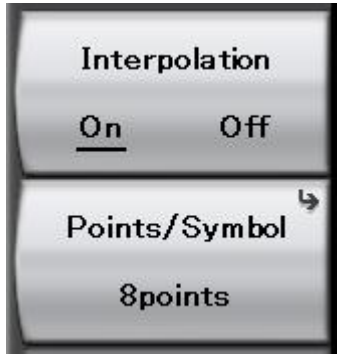


Constellation (Interpolation: OFF)





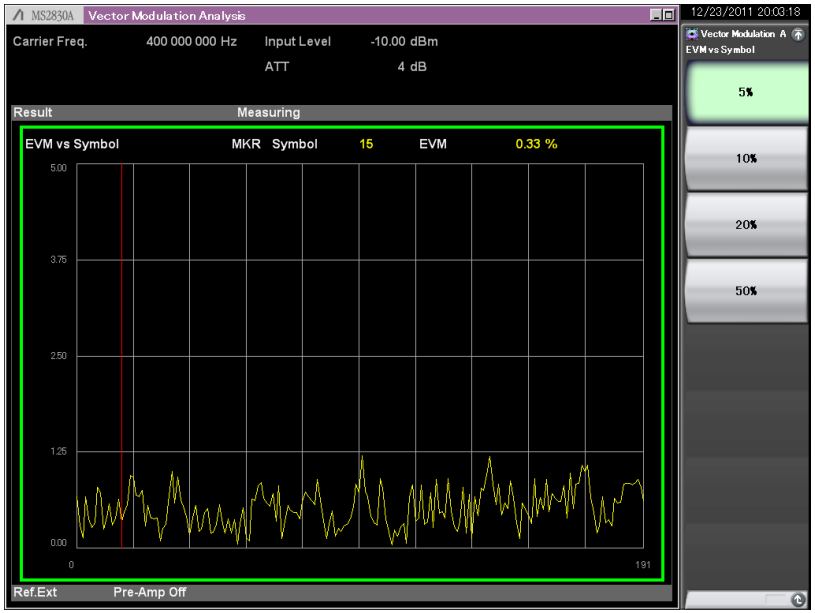




Measurement: Trace (4/14)

EVM vs. Symbol:

Displays EVM of each symbol in the analysis interval as a percentage.



Scale: Vertical
5%, 10%, 20%, 50%

Magnitude Error vs. Symbol:

Displays the amplitude error of each symbol in the analysis interval as a percentage.

Scale: Vertical
±5%, ±10%, ±20%, ±50%

Measurement: Trace (5/14)

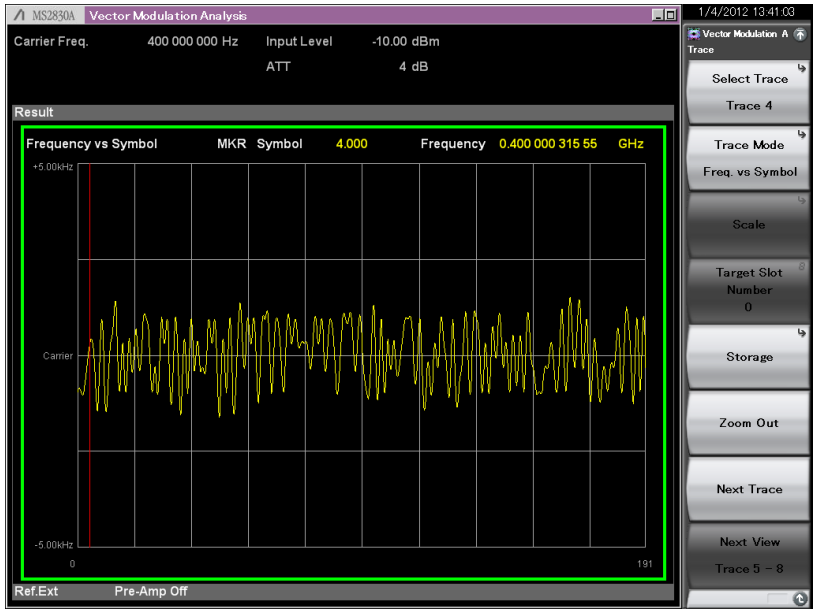
Phase Error vs. Symbol:

Displays the phase error of each symbol in the analysis interval in degrees.

Scale: Vertical
±5 degree, ±10 degree,
±20 degree, ±50 degree

Frequency vs. Symbol:

Displays the frequency deviation of each 1/8th of the symbol interval in the analysis interval in Hz units.

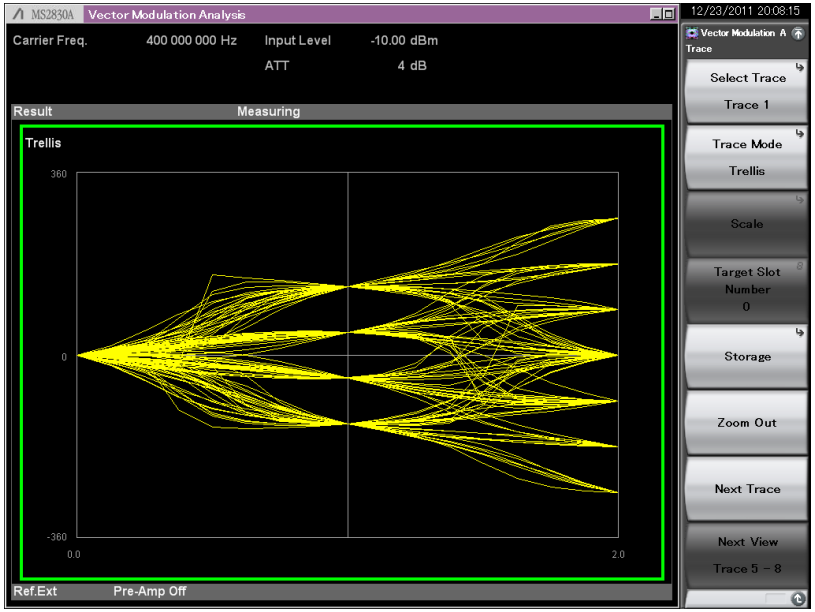


Scale: Vertical
(Auto)

Measurement: Trace (6/14)

Trellis:

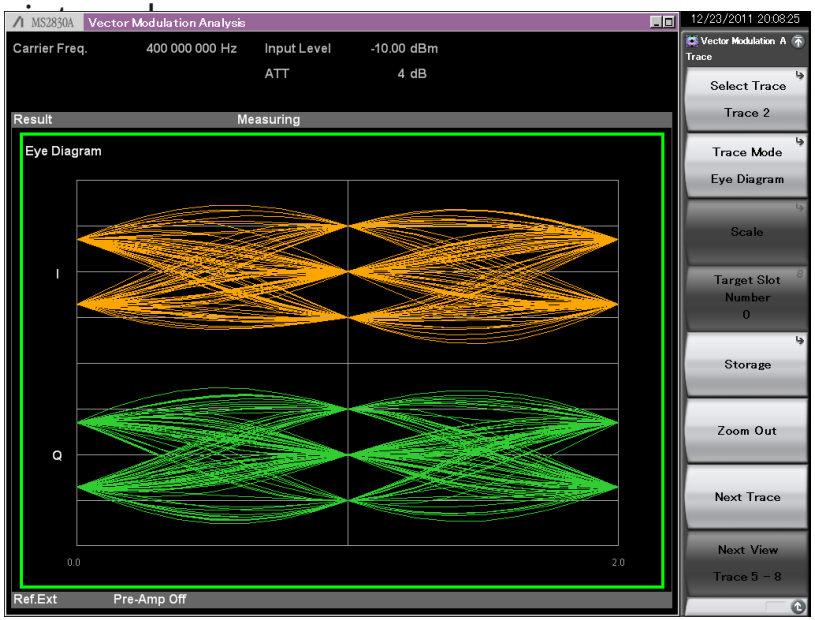
Displays the phase transition for each 1/8th of the symbol in the analysis interval, in degrees. The graph's horizontal axis is displayed in intervals of 2 symbols.



Scale: Vertical
Fixed to ±360 degrees.

Eye Diagram:

Displays the normalized amplitude of the I phase and Q phase for each 1/8th of the symbol in the analysis interval. The graph's horizontal axis is displayed in 2 symbol



Scale: Vertical
Fixed to ±2.0 for both the I phase and the Q phase.

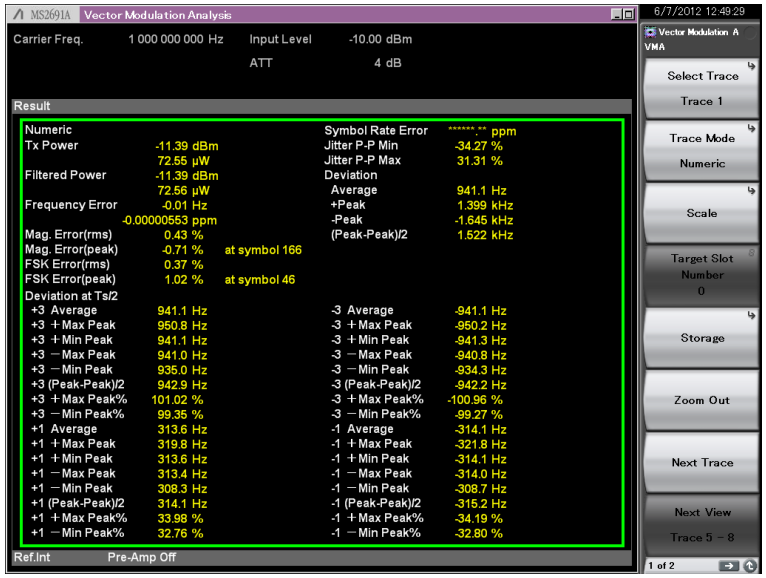
Measurement: Trace (7/14)

Numeric (1/3):

Displays the numeric result of modulation analysis. The measured items vary depending on the Modulation Type setting.

If a 4 trace split screen is displayed, Filtered Power, Frequency Error (ppm), Droop Factor, MER (rms, peak), or Deviation at Ts/2 is not displayed on the screen.

Ex.) Modulation Type: PI/4DQPSK



Ex.) Modulation Type: 4FSK

Ex.) Modulation Type: O-QPSK

Measurement: Trace (8/14)

Numeric (2/3):

The measured items vary depending on the Modulation Type setting.

Measured Items	Modulation Type					
	BPSK	QPSK O-QPSK	PI/4DPQSK 8PSK	16QAM 32QAM 64QAM 128QAM 256QAM MSK	2FSK 4FSK H-CPM	2ASK 4ASK
Tx Power	✓	✓	✓	✓	✓	✓
Filtered Power	✓	✓	✓	✓	✓	✓
Frequency Error	✓	✓	✓	✓	✓	✓
EVM (rms)	✓	✓	✓	✓		✓
EVM (peak)	✓	✓	✓	✓		✓
Phase Error (rms)	✓	✓	✓	✓		
Phase Error (peak)	✓	✓	✓	✓		
Magnitude Error (rms)	✓	✓	✓	✓	✓	✓
Magnitude Error (peak)	✓	✓	✓	✓	✓	✓
FSK Error (rms)					✓	
FSK Error (peak)					✓	
Modulation Fidelity (rms)					✓*4	
Modulation Fidelity (peak)					✓*4	
Symbol Rate Error	✓	✓	✓	✓	✓	✓
Jitter P-P Min					✓	
Jitter P-P Max					✓	
Deviation					✓	
Deviation rms (%)					✓*2	
Deviation at Ts/2					✓*3	
BER	✓*5	✓*5	✓*5	✓*5	✓*5	✓*5
Specific Word (Hex)	✓	✓	✓	✓	✓	✓
Origin Offset	✓	✓	✓	✓		
Droop Factor	✓		✓	✓*7		✓
IQ Gain Imbalance		✓	✓	✓		
Quadrature Error		✓	✓	✓		
MER (rms)	✓	✓	✓	✓		✓
MER (peak)	✓	✓	✓	✓		✓
Offset EVM (rms)		✓*1				
Offset EVM (peak)		✓*1				
Modulation Index (rms)						✓*6
Eye Opening (X-Time)						✓*6
Eye Opening (Y-Amplitude)						✓*6
Timing Offset	✔	✔	✔	✔	✔	✔

✓: Displays measured results.
Blank: Does not display measured results.
*1: Only O-QPSK
*2: Only 2FSK
*3: Only 2FSK and 4FSK
*4: Only 2FSK, 4FSK and H-CPM
*5: Only BER = On
*6: Only 2ASK/4ASK
*7: Only MSK

Measurement: Trace (9/14)

Numeric (3/3): The measured items vary depending on the Modulation Type setting.

- **Tx Power:** Displays the average RF level before the signal has passed through the measurement filter.
- **Filtered Power:** Displays the average RF level after the signal has passed through the measurement filter.
- **Frequency Error:** Displays the frequency error.
- **EVM (rms):** Displays rms value of EVM.
- **EVM (peak):** Displays the EVM Peak value and the number of the symbol for which the peak value was detected.
- **Phase Error (rms):** Displays rms value of Phase Error.
- **Phase Error (peak):** Displays the Phase Error Peak value and the number of the symbol for which the peak value was detected.
- **Magnitude Error (rms):** Displays rms value of Magnitude Error.
- **Magnitude Error (peak):** Displays the Magnitude Error Peak value and the number of the symbol for which the peak value was detected.
- **FSK Error (rms):** Displays rms value of FSK Error.
- **FSK Error (peak):** Displays the FSK Error Peak value and the number of the symbol for which the peak value was detected.
- **Modulation Fidelity (rms):** Displays the Modulation Fidelity Peak value and the number of the symbol for which the peak value was detected.
- **Symbol Rate Error:** Displays Symbol Rate Error. However, when Single measurement and Storage Mode is Off, no measurement result is displayed.
- **Jitter P-P Min:** Displays the minimum peak-to-peak value for jitter.
- **Jitter P-P Max:** Displays the maximum peak-to-peak value for jitter.
- **Deviation:** Displays the average value, peak value, and peak-to-peak value of the frequency deviation.
- **Deviation rms (%):** Displays rms value of Deviation in %.
- **Deviation at Ts/2:** Displays the average value, the maximum + frequency peak value, the minimum + frequency peak value, the maximum – frequency peak value, the minimum – frequency peak value, and peak-to-peak value of the frequency deviation.
- **BER:** Displays the Bit Error Rate.
- **Specific Word:** Displays an extracted part of specific bits.
- **Origin Offset:** Displays origin offset value.
- **Droop Factor:** Displays droop factor.
- **IQ Gain Imbalance:** Displays the amplitude difference between the I phase and the Q phase.
- **Quadrature Error:** Displays how perpendicular the I phase is to the Q phase.
- **MER (rms):** Displays rms value of MER.
- **MER (peak):** Displays the MER peak value and the number of the symbol for which the peak value was detected.
- **Offset EVM (rms):** Displays rms value of Offset EVM.
- **Offset EVM (peak):** Displays the Offset EVM peak value and the number of the symbol for which the peak value was detected.
- **Modulation Index (rms):** Displays the Modulation Index in ratio (no unit).
- **Eye Opening (X-Time):** Displays the Eye Opening (X-Time) in %.
- **Eye Opening (Y-Amplitude):** Displays the Eye Opening (Y-Amplitude) in %.
- **Timing Offset:** Displays the time difference between external trigger and Symbol [0], in units of µs.

Measurement: Trace (10/14)

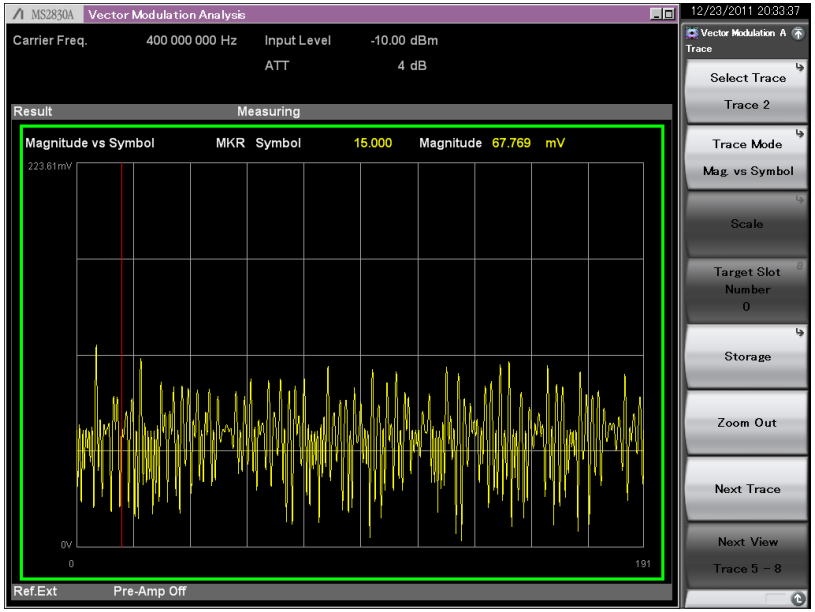
I and Q Symbol:

Displays the normalized amplitude of the I phase and Q phase for each 1/8th of the symbol in the analysis interval.

Scale: Vertical
Fixed to ±2.0.

Magnitude vs Symbol:

Displays the amplitude for each 1/8th of the symbol in the analysis interval in volts.

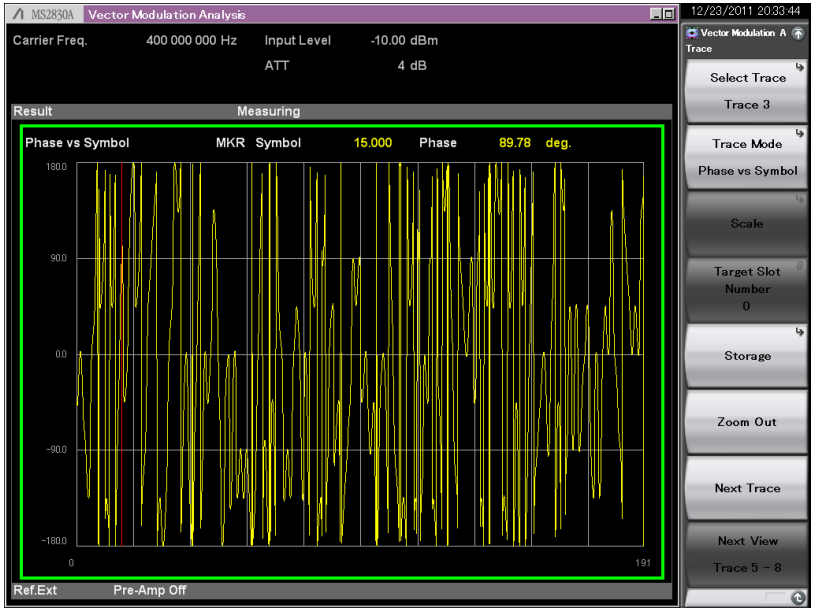


Scale: Vertical
(Auto)

Measurement: Trace (11/14)

Phase vs Symbol:

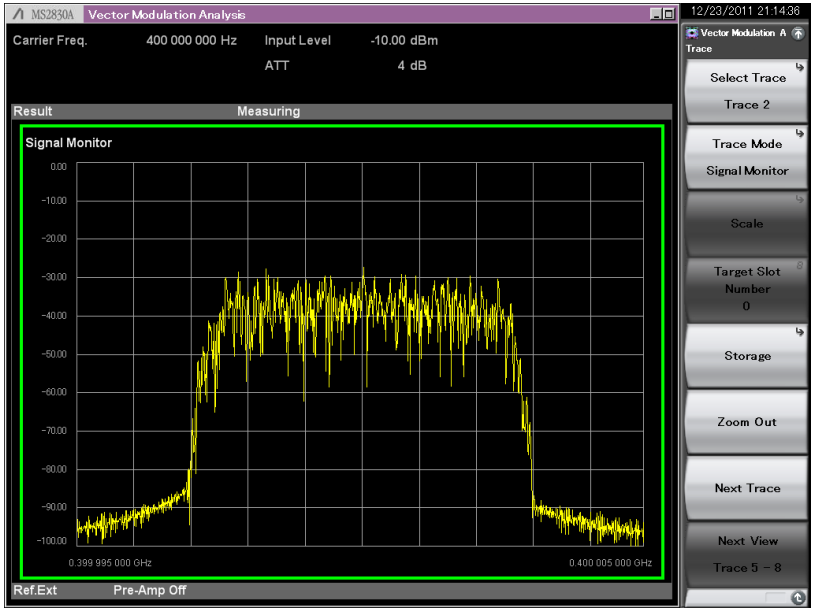
Displays the phase for each 1/8th of the symbol in the analysis interval, in degrees.



Scale: Vertical
Fixed to ±180 degrees.

Signal Monitor:

Displays the spectrum in the analysis interval. The range of the graph's horizontal axis is fixed to ±(Span/2) [Hz]. The value of Span is calculated from the Modulation setting and the Symbol Rate setting.

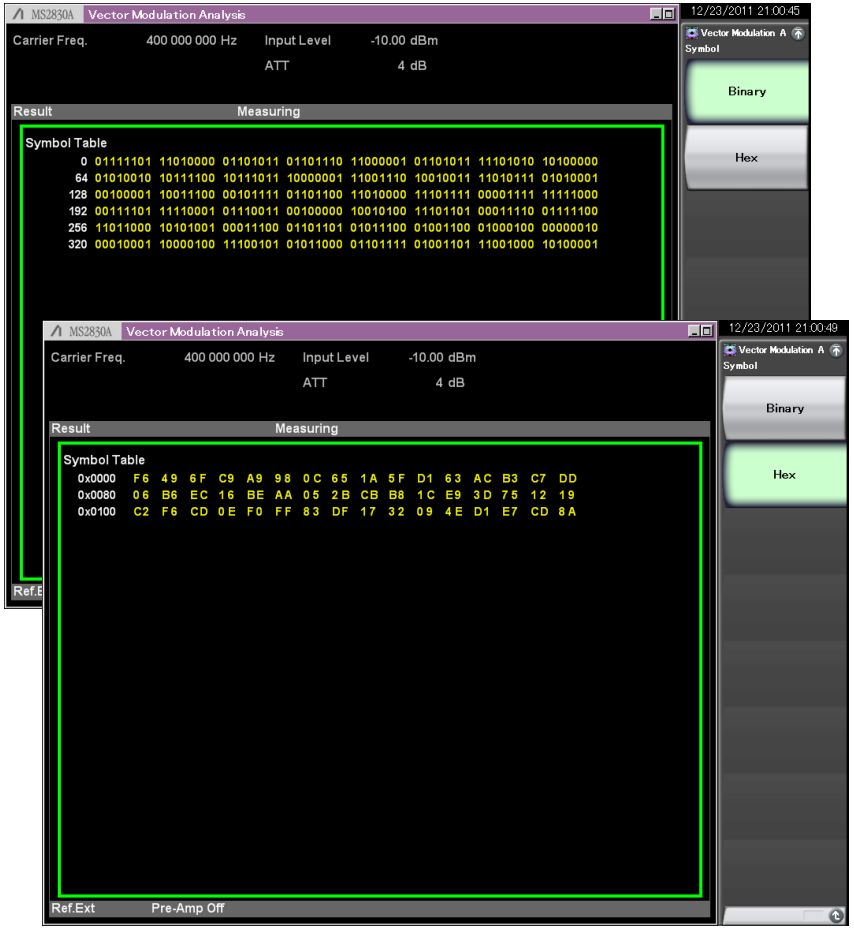


Scale: Vertical
Fixed to the range of +10 to −90 dB if Input Level is set to 0 dB.

Measurement: Trace (12/14)

Symbol Table:

Displays the demodulation result for each symbol.



Unit: [Binary], [Hex]

Equalizer Amplitude:

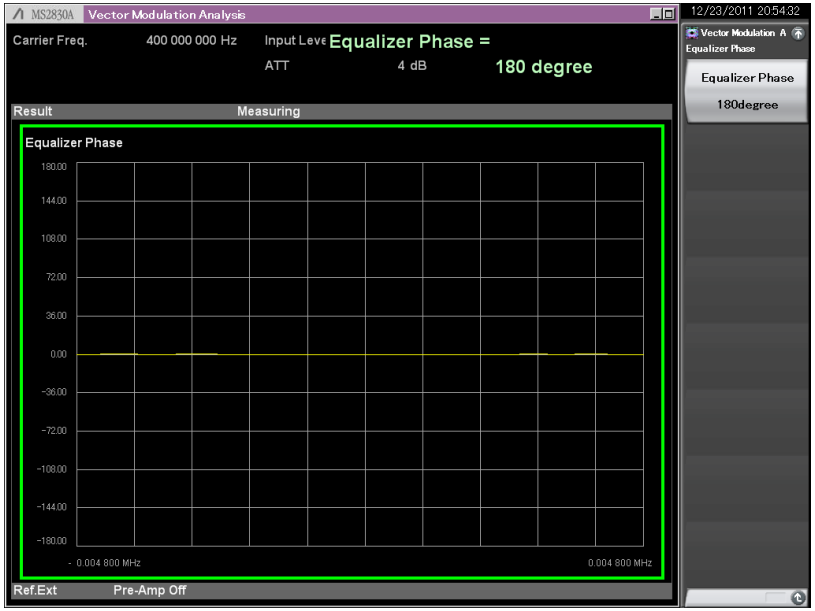
Displays the equalizer amplitude characteristics in dB. The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.

Scale: Vertical
±0.1 to ±50 dB

Measurement: Trace (13/14)

Equalizer Phase:

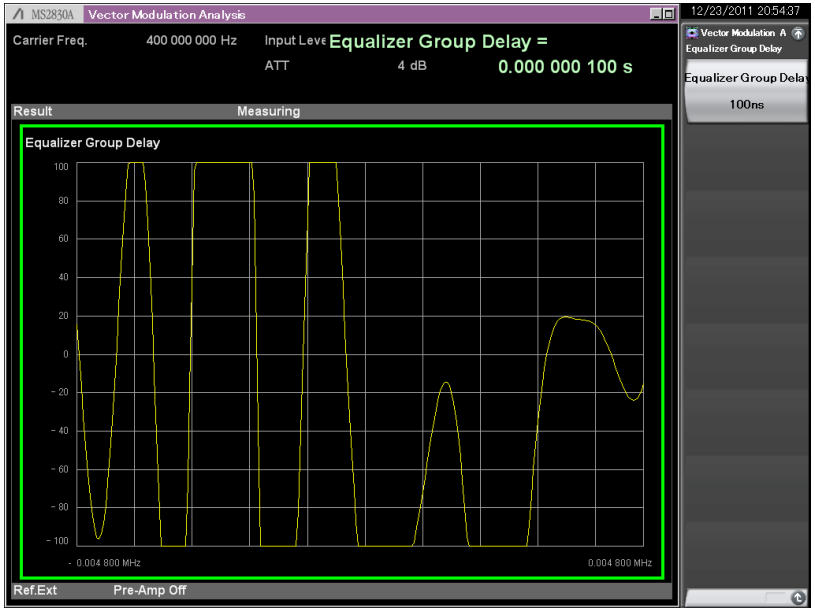
Displays the equalizer phase characteristics in degree. The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.



Scale: Vertical
±1 Degree to ±180 Degree

Equalizer Group Delay:

Displays the equalizer group delay characteristics in s. The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.



Scale: Vertical
±100 ns to ±1 ms

Measurement: Trace (14/14)

Equalizer Impulse Response:

Displays the equalizer impulse response in dB. The analysis results are displayed when either On or Hold is selected at the Adaptive setting of Equalizer.

Scale: Vertical
20 dB, 50 dB, 100 dB

FSK Error vs Symbol:

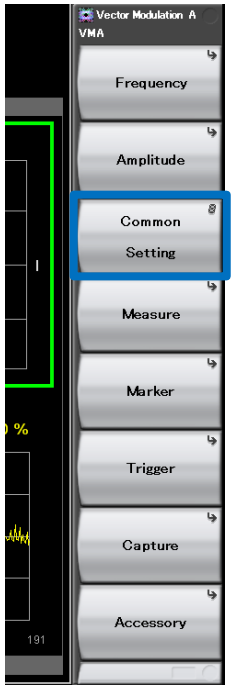
Displays the FSK Error for each symbol in the analysis segment in % units.

Scale: Vertical
5%, 10%, 20%, 50%

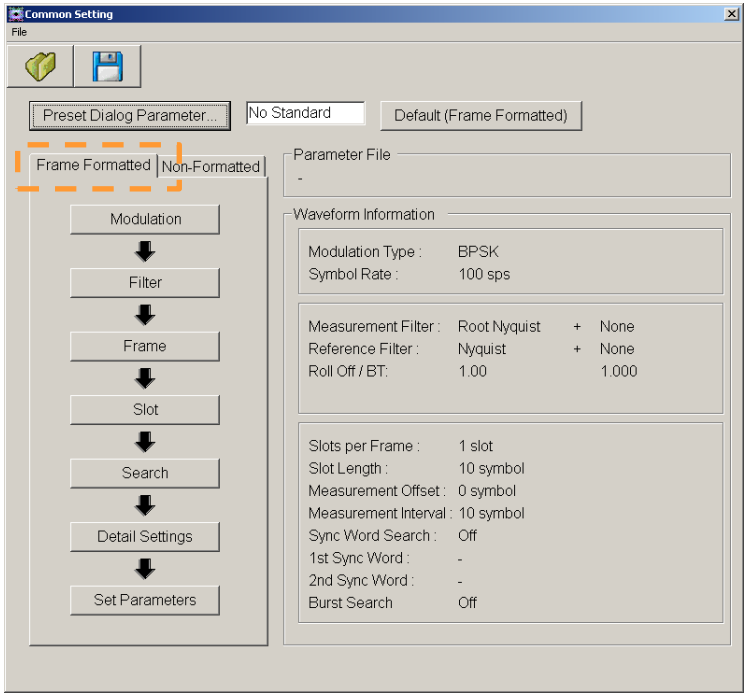
Common Setting (1/12)

Common Setting sets signal measurement parameters for either “Frame Formatted” or “Non-Formatted” signals.

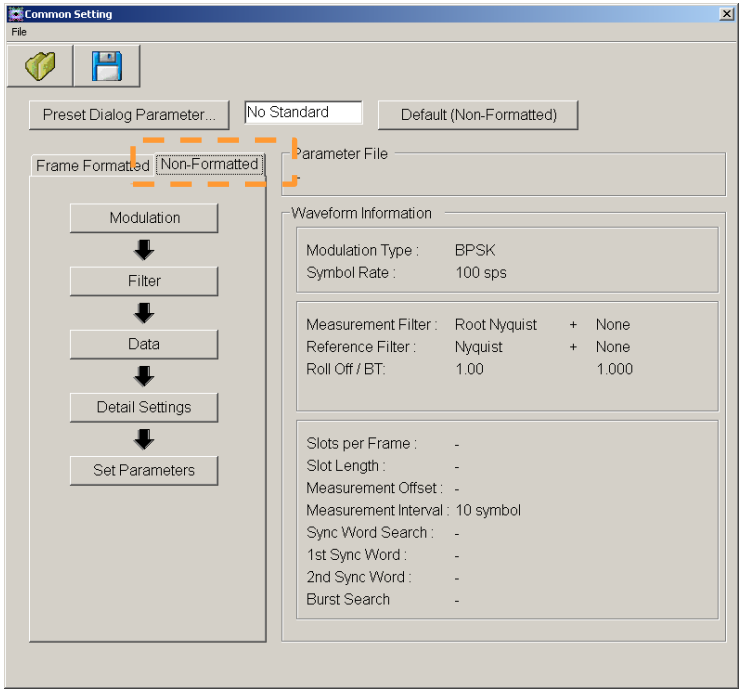
[3]



Common Setting
Frame Formatted



Common Setting
Non-Formatted

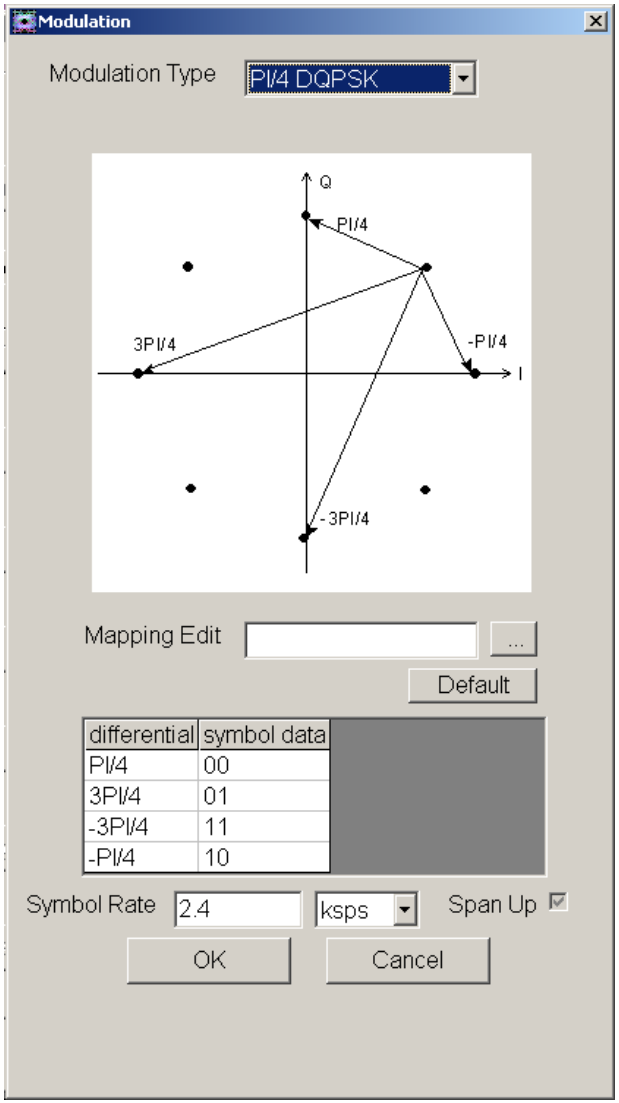


Common Setting (2/12): Modulation

Select the modulation mode for the measured signal.

- Modulation:
  BPSK, QPSK, O-QPSK, π/4DQPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, H-CPM, MSK
- Auto (Deviation Auto Detection): (2FSK/4FSK only)
  Detects Deviation automatically.
- Modulation Index: (2FSK only)
  Sets the modulation index for the 2FSK signal.
- Maximum Frequency Deviation: (4FSK only)
  Sets the maximum frequency Deviation for the 4FSK signal.
- Mapping Edit:
  Mapping Edit is used to change the bit value in the symbol data column corresponding to that in the allocation column from the default setting. The setting is changed by recalling the file that specifies the bit value in the symbol data column corresponding to that in the allocation column.
- Symbol Rate: Sets the symbol rate of the measured signal.
  (Upper limit depends on analysis bandwidth 10 MHz/31.25 MHz/62.5 MHz/125 MHz)
- Span Up: Defines the span width for the symbol rate (excluding 2FSK/4FSK/O-QPSK)

Modulation

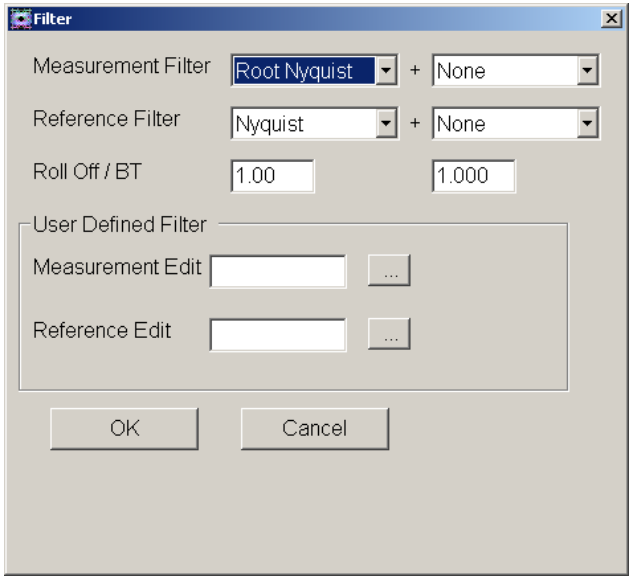


Common Setting (3/12): Filter

Select the filter for the measured signal.

- **Measurement Filter:** Sets the reception filter. The setting dialog shows the basic filter on the left and the 2nd filter on the right. Displayed characteristics are combined characteristics of 2 filters.
- **Reference Filter:** Sets the filter used for the reference signal. The setting dialog shows the filter on the left and the 2nd filter on the right. Displayed characteristics are combined characteristics of 2 filters.
- **Roll Off/BT:** Sets the filter roll off ratio (Root Nyquist/Nyquist/ARIB STD-T98) or BT.
- **User Defined Filter:** When User Defined is set at Measurement Filter or Reference Filter, any filter (user filter) can be used.
- **Measurement Edit:** This selects the definition file for the user filter used as the Measurement Filter. If no file is specified, the setting is the same as Root Nyquist.
- **Reference Edit:** This selects the definition file for the user filter used as the Reference Filter. If no file is specified, the setting is the same as Nyquist.

Filter



Setting Options of Measurement Filter

Filter Type	Modulation Type					
	Other than 2FSK/4FSK /O-QPSK /2ASK/4ASK	O-QPSK	2FSK	4FSK	H-CPM	2ASK /4ASK
Root Nyquist	✓	✓	✓	✓	✓	✓
Nyquist	✓	✓	✓	✓	✓	✓
None	✓	✓	✓	✓	✓	✓
Gaussian	–	–	✓	✓	✓	–
ARIB STD-T98	–	–	–	✓	–	–
Rect	–	–	–	✓	–	–
Inverse Rect	–	–	–	✓	–	–
Inverse Gaussian	–	–	–	✓	–	–
H-CPM_P25	–	–	–	–	✓	–
User Defined	✓	✓	✓	✓	✓	✓

Setting Options of Reference Filter

Filter Type	Modulation Type						
	Other than 2FSK/4FSK /O-QPSK /2ASK/4ASK /MSK	O-QPSK	2FSK	4FSK	H-CPM	2ASK /4ASK	MSK
Root Nyquist	✓	✓	✓	✓	✓	✓	✓
Nyquist	✓	✓	✓	✓	✓	✓	✓
Gaussian	–	–	✓	✓	✓	✓	✓
Gaussian2	–	–	✓	✓	✓	✓	
ARIB STD-T98	–	–	–	✓	–	–	
Half-sine	–	✓	–	–	–	–	
Rect	–	–	✓	✓	✓	–	
H-CPM_P25	–	–	–	–	✓	–	
User Defined	✓	✓	✓	✓	✓	✓	✓

Common Setting (4/12): Filter

[Footnote]

Measurement Filter

Measurement filter is used to filter the received signal just before demodulation. Some systems split the pulse-shaping filter between the transmitter and receiver side (ex. Root Nyquist at transmitter and Root Nyquist at receiver) and in this case the filter at the receiver side is the Measurement filter.

Reference Filter

Reference filter is used to filter the ideal (no error) signal. It is the total filtering used in the system (transmitter filter plus receiver filter).

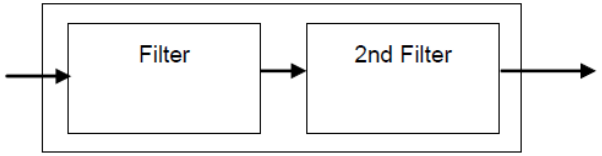
Filter and 2nd Filter

For both Measurement Filter and Reference Filter, normally select the type of Filter only and select None for 2nd Filter. Then, the characteristics of Measurement Filter and Reference Filter shall be those set in the Filter Parameter Setting dialog. If other than None is selected for both Filter and 2nd Filter, then the characteristics of Measurement Filter and Reference Filter are combined characteristics of Filter and 2nd Filter.

On Filter Settings and Measurement

The signal received by the measuring instrument passes through the measurement filter. Next, the signal is demodulated and the bit string of the transmission signal is generated. A symbol data string is generated through symbol mapping from the generated bit string. The symbol data string is then passed through the reference filter, and the resulting signal is used as the reference signal. The difference between the received signal that has passed through the measurement filter and the reference signal is used to calculate the modulation analysis result's EVM, Phase Error and Magnitude Error.

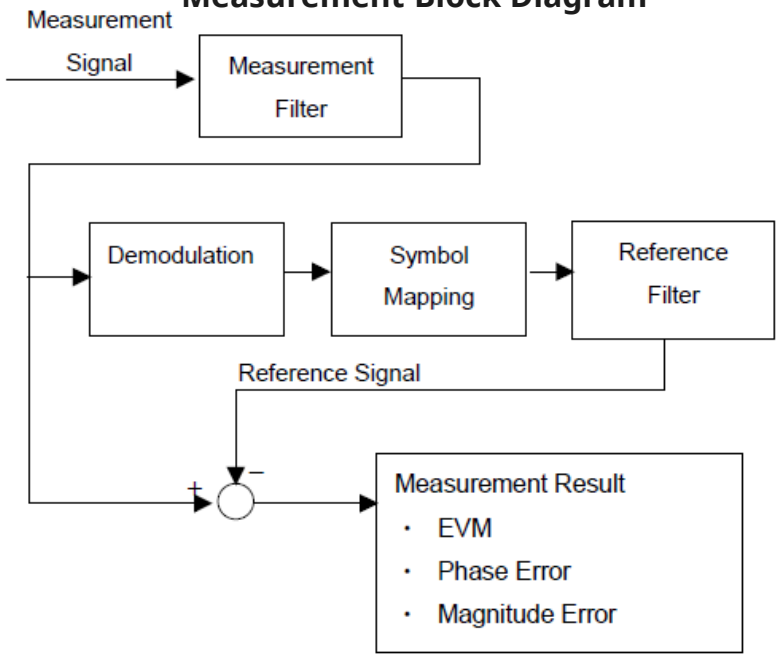
Schematic diagram of Filter and 2nd Filter



Common Measurement and Reference Filter

Pulse-shaping Filter used in transmitter	Measurement Filter	Reference Filter
Root Nyquist	Root Nyquist	Nyquist
Nyquist	None	Nyquist
Gaussian	None	Gaussian

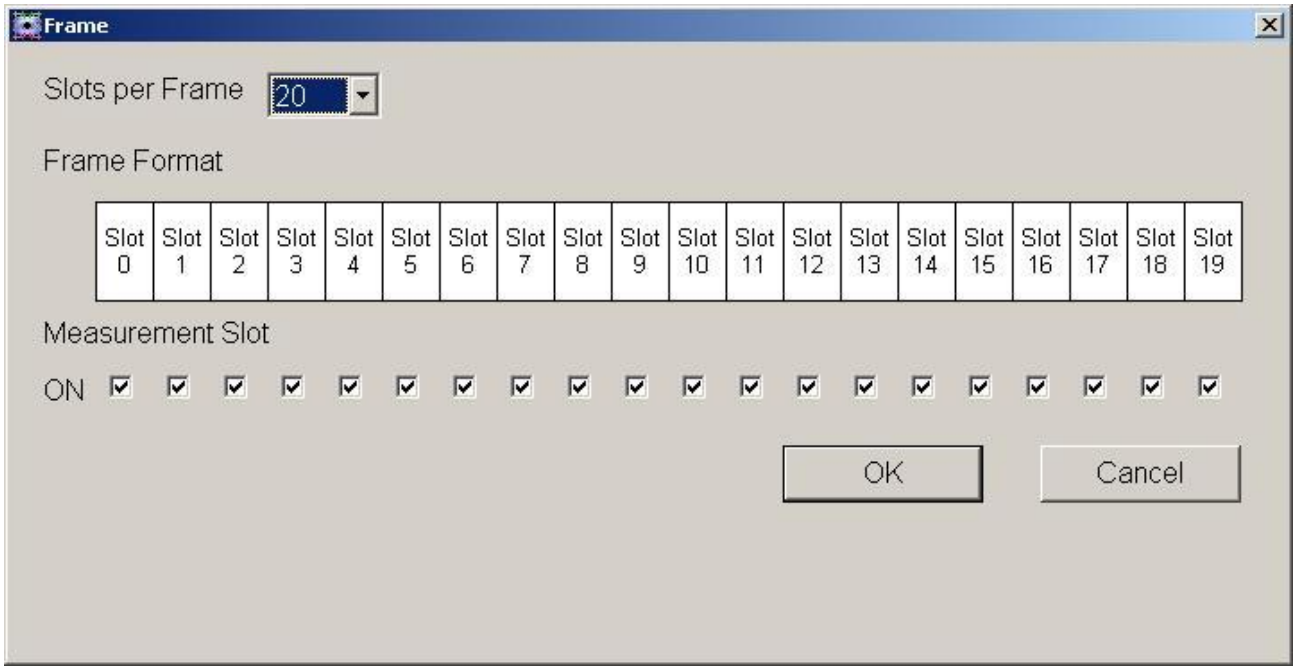
Measurement Block Diagram



Common Setting (5/12): Frame

Sets the number of slots in one frame for the measured signal.

Frame

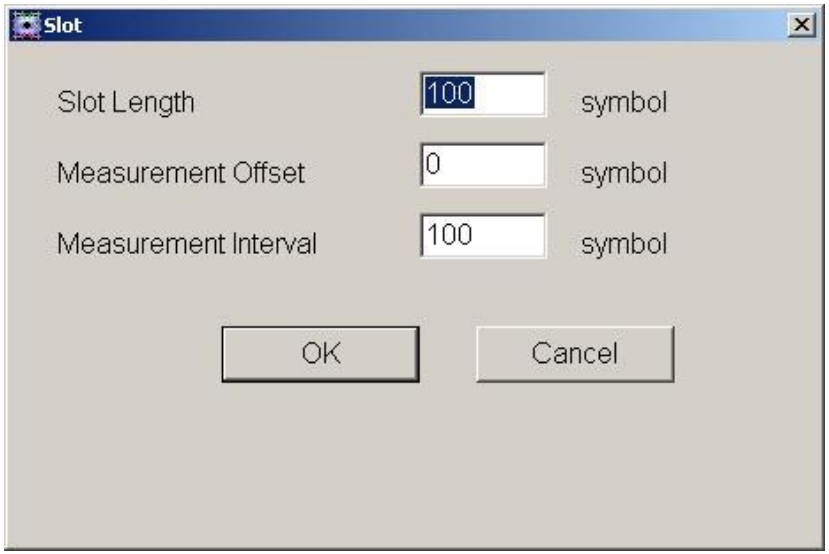


- Slot per Frame: 1 to 20
  Sets the number of slots in one frame.
- Measurement Slot: Select the check box for the slot to be analyzed.
  When checked: The target slot will be analyzed.
  When unchecked: The target slot will not be analyzed.

Common Setting (6/12): Slot

Sets the number of symbols in the slot and the symbol measurement target.

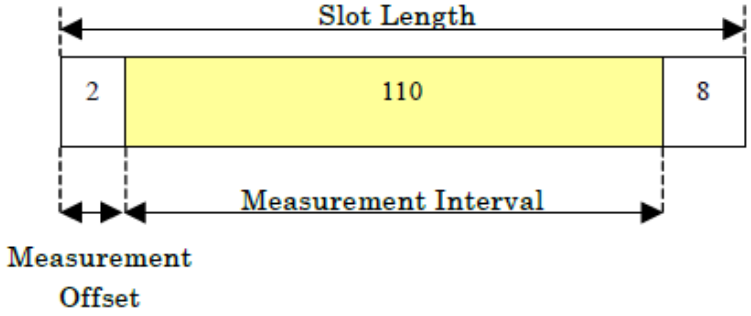
Slot



- Slot Length: 10 to 4096
  Sets the number of symbols in one slot.
- Measurement Offset: 0 to (Slot Length - 10)
  Sets the start position of the measurement interval in symbols.
- Measurement Interval:
  10 to (Slot Length-Measurement Offset)
  Sets the measurement interval in symbols.

Setting example
When one slot includes 120 symbols and the measured interval is the 110 symbol interval starting at the third symbol.

- Slot Length = 120
- Measurement Offset = 2
- Measurement Interval = 110

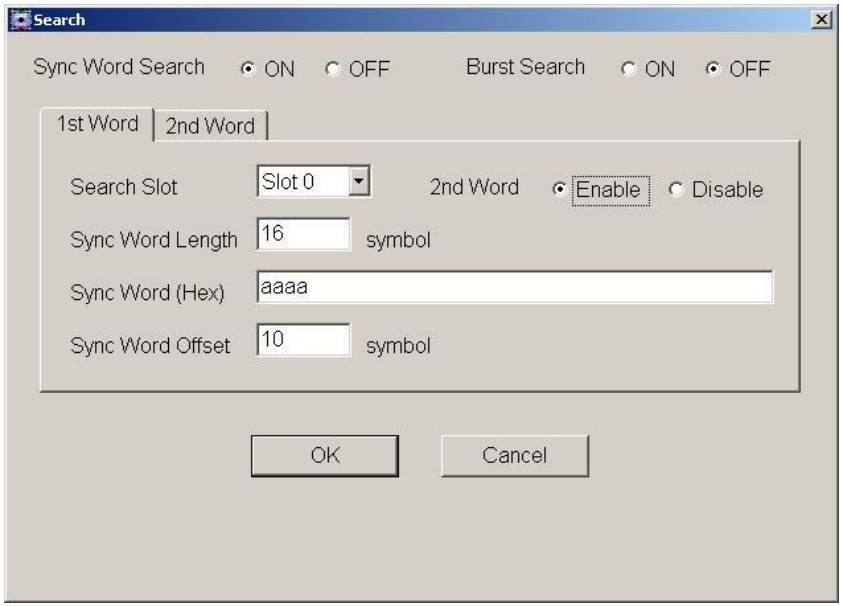


Common Setting (7/12): Search

Set the Search parameter that determines the symbol positions in the slot.

- Sync Word Search: ON, OFF
  Sets whether to search for a sync word consisting of a specific pattern.
- Burst Search: ON, OFF
  Sets whether to detect burst signals.
- 2nd Word Search: Enable, Disable
  Sets whether to detect the 2nd word.
- Search Slot:
  Sets the number of the slot in which a sync word was detected.
- Sync Word Length: (Refer to the table)
  Sets the length of the sync word in Symbols.
- Sync Word: 0 to (Sync Word Length - 1)
  Sets the sync word as a left-padded hexadecimal value.
- Sync Word Offset:
  0 to (Slot Length[Symbol] - Sync Word Length[Symbol])
  Sets the interval between the first symbol in the slot and the first symbol in the sync word, in symbols.

Search



Sync Word Length

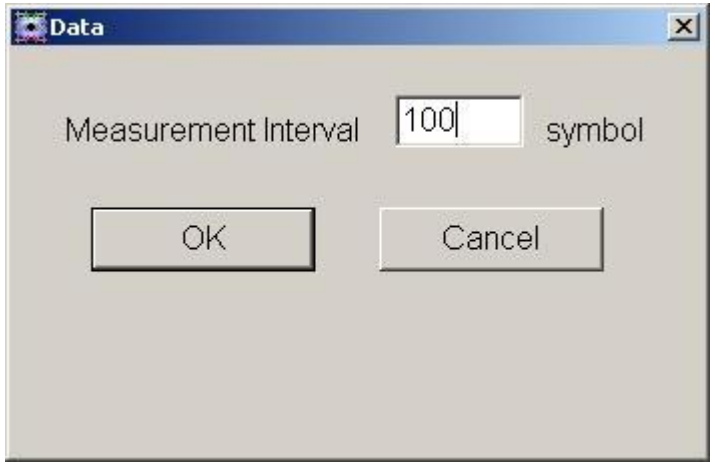
Modulation Type	Setting Range
BPSK, 2FSK	1 to (128 or Slot Length, whichever smaller)
QPSK, PI/4DQPSK, 4FSK	1 to (64 or Slot Length, whichever smaller)
8PSK	1 to (42 or Slot Length, whichever smaller)
16QAM	1 to (32 or Slot Length, whichever smaller)
64QAM	1 to (21 or Slot Length, whichever smaller)

Common Setting (8/12): Data

Set the interval for measurement.

- Measurement Interval: 10 to 4096
  Sets the measurement interval in symbols.

Data



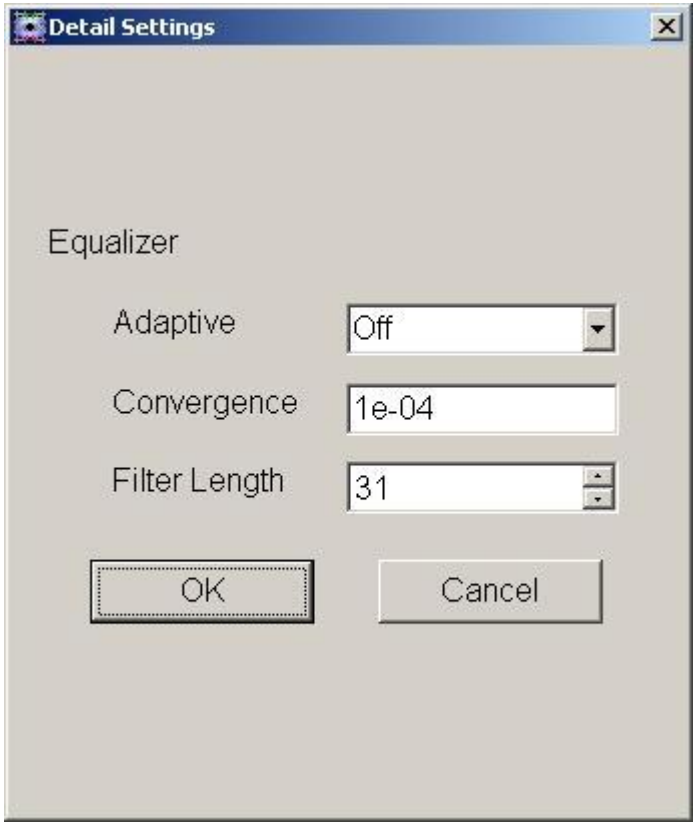
Common Setting (9/12): Detail Settings

The parameters (Adaptive, Convergence, and Filter Length) for Equalizer can be set.

(Non-Formatted and Modulation ≠ 2FSK/4FSK)

- Adaptive: Sets Equalizer Mode.
  On: Uses Equalizer. The filter factors of Equalizer are updated for each measurement.
  Hold: Uses Equalizer. The values before selecting Hold are applied to the filter factors of Equalizer, and they will not be updated.
  Off: Does not use Equalizer.
- Convergence: 1.0e-20 to 1
  Sets Convergence factor for updating the Equalizer filter.
- Filter Length: 11 to 101
  Sets Filter Length for Equalizer.

Detail Settings (Non-Formatted & Modulation ≠ 2FSK/4FSK)



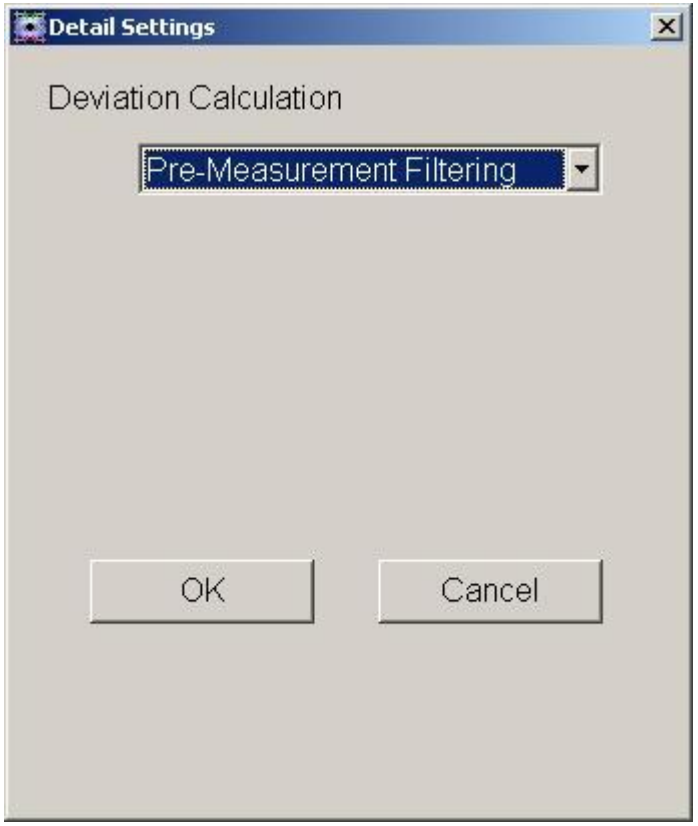
Common Setting (10/12): Detail Settings

Sets the timing to calculate Deviation.

(Modulation = 2FSK/4FSK)

- Pre-Measurement Filtering:
  Calculates Deviation before applying Measurement Filter.
- Post-Measurement Filtering:
  Calculates Deviation after applying Measurement Filter.

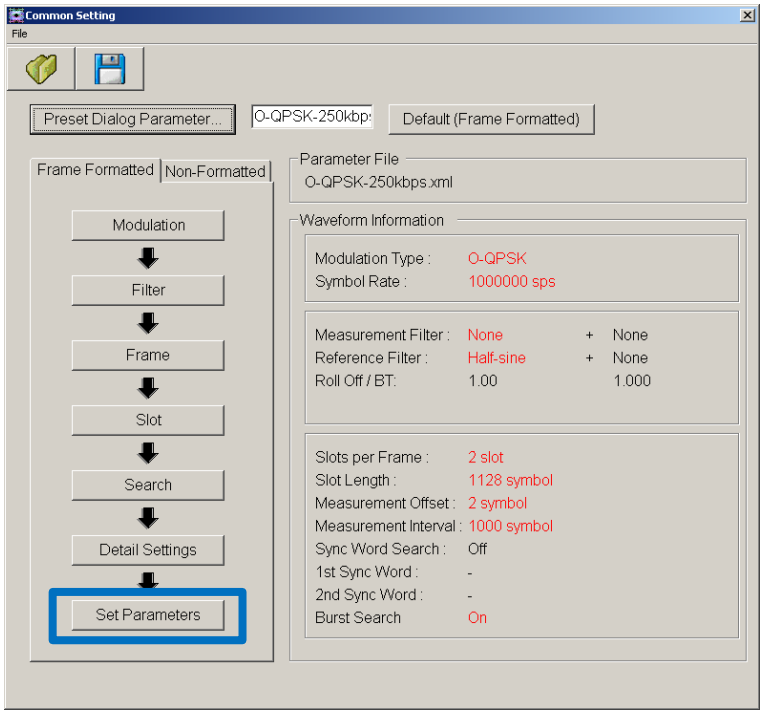
Detail Settings
(Modulation = 2FSK/4FSK)



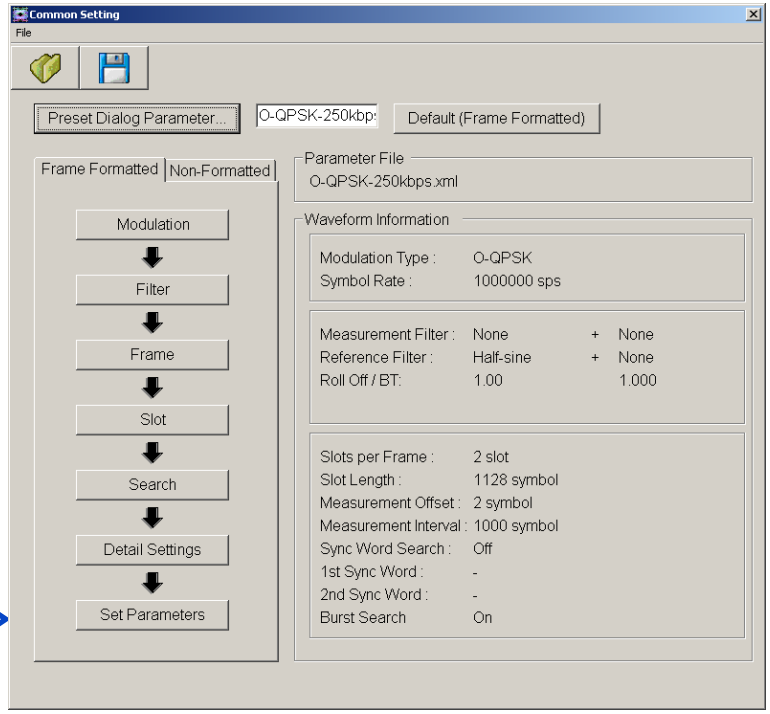
Common Setting (11/12): Set Parameters

Press [Set Parameters] in the Common Setting dialog to confirm the parameter change.

Common setting



Common setting



Red shows changed parameters.
They are not set until [Set Parameters] is clicked.

After clicking [Set Parameters], the set parameters in the Common Setting dialog change to black to show they have been set.

Common Setting (12/12): Preset Dialog Parameter, Save, Recall

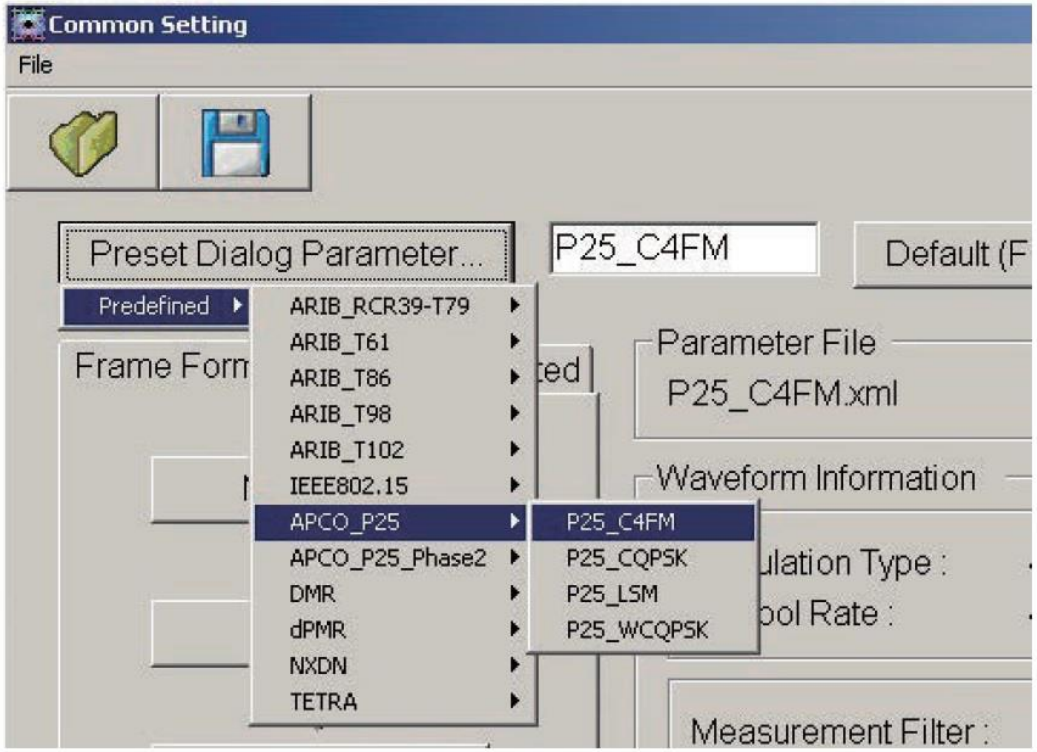
Preset Dialog Parameter:

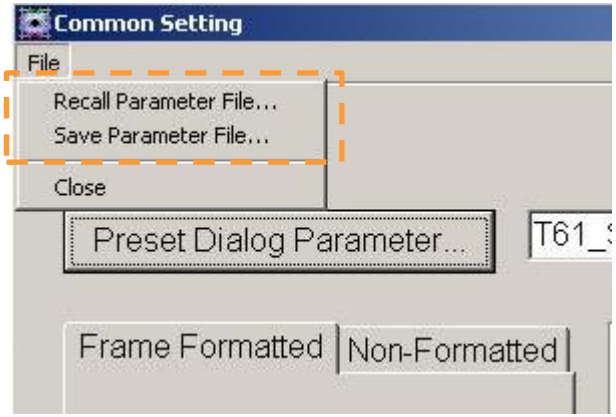
Presets parameters for some communication methods.

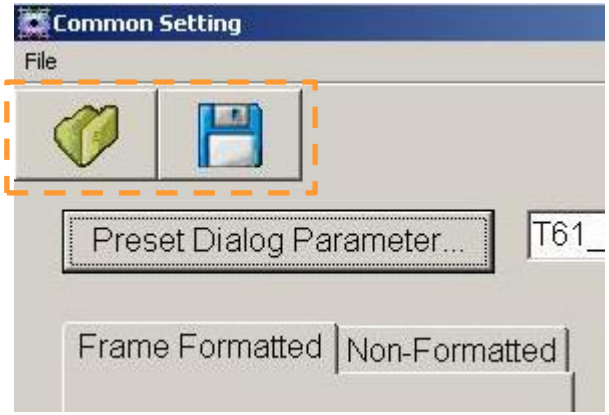
Save, Recall:

Saves and reads Common Setting parameters to/from file.

Common setting



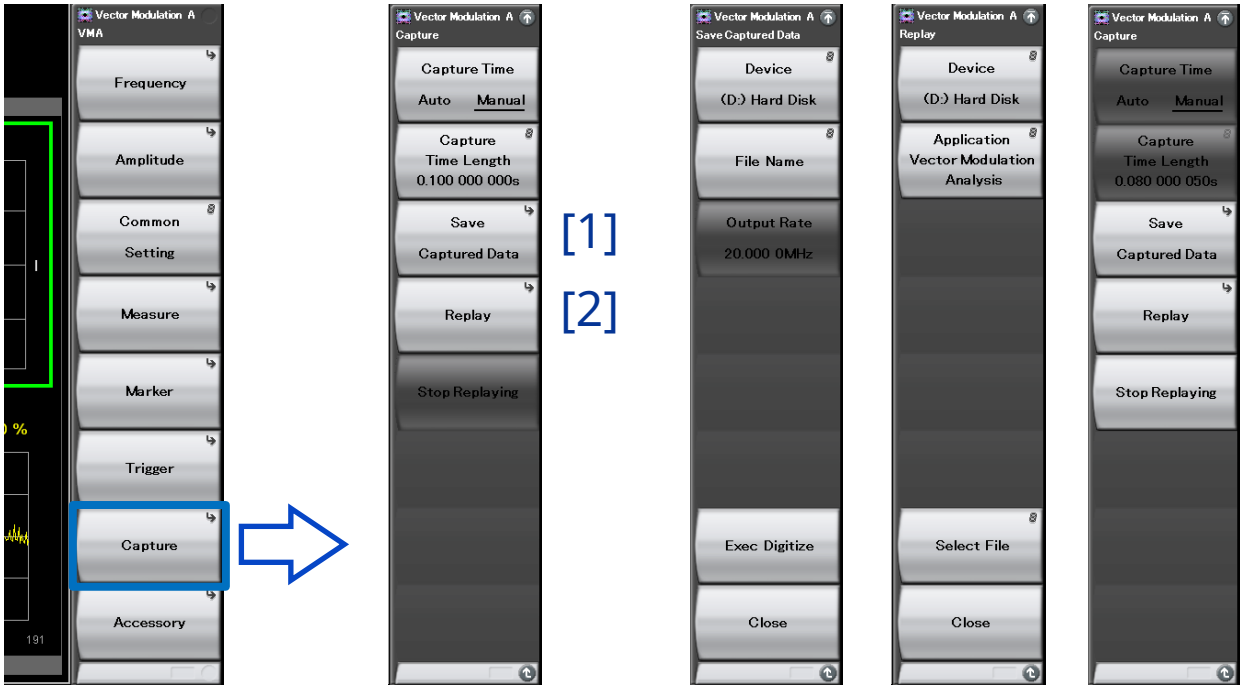




Capture Function (1/6):

Saves and replays IQ data for measurement signals.

[g]Capture



Capture Function (2/6): Capture Time

Sets the capture mode from Capture Time and the capture time length from Capture Time Length.

- Auto:
  This captures the required data at each measurement in accordance with the Common Setting Dialog settings.
- Manual:
  This mode specifies the capture time for each measurement. The capture time is set at Capture Time Length. The Capture Time Length setting range changes according to the Span.

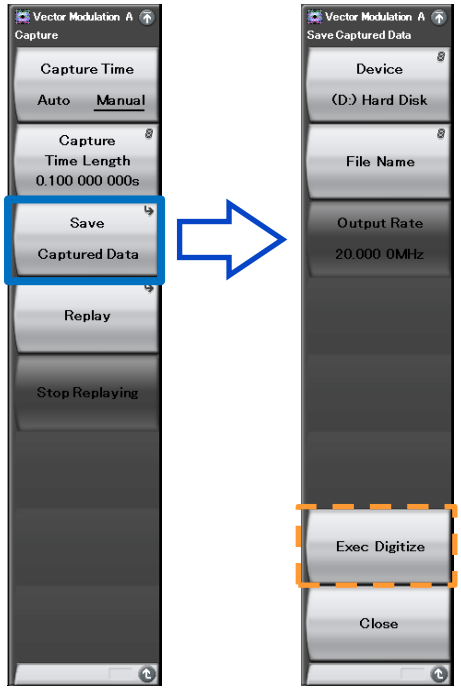
Capture Time Length

Span [Hz]	Maximum Capture Time [s]
1 k	2000
2.5 k	2000
5 k	2000
10 k	2000
25 k	2000
50 k	1000
100 k	500
250 k	200
500 k	100
1 M	50
2.5 M	20
5 M	10
10 M	5
25 M	2
31.25 M	2
50 M	0.5
62.5 M	0.5
100 M	0.5
125 M	0.5

Capture Function (3/6): Save

Outputs and saves temporarily saved IQ data to hard disk or external memory.

[1]



Menu Display	Function
Device	Selects the location of the file to be saved.
File Name	Sets the name of the file to be saved.
Output Rate	Displays the output data rate (this setting cannot be configured).
Exec Digitize	Executes saving.
Close	Closes the Save Captured Data function menu.

When save processing is executed, the following files are created.

- Data file (binary format)
  [File Name].dgz
- Data information file (XML format)
  [File Name].xml
- Common Setting parameter file (XML format)
  [File name same as waveform (without extension)]_VMA.xml”

Capture Function (4/6): Save

[Footnote] Format of data information file

The information on the saved IQ data is recorded in the [File Name].xml file.

Item	Descriptions
CaptureDate	Day/Month/Year of the captured data in the "DD/MM/YYYY" format.
CaptureTime	Data captured time in "HH/MM/SS" format
FileName	Data file name
Format	Data format, fixed to "Float"
CaptureSample	Number of samples of the recorded data [Sample]
Condition	Error status of the recorded data "Normal": No error "OverLoad": Level over
TriggerPosition	Trigger occurrence position [Sample] The start point of the recorded data is 0.
CenterFrequency	Center frequency [Hz]
SpanFrequency	Frequency span [Hz]
SamplingClock	Sampling rate [Hz]
PreselectorBandMode	Frequency band switch mode "Normal": Normal mode "Spurious": Spurious mode
ReferenceLevel	Reference level [dBm] Note that this value does not include the reference level offset.
AttenuatorLevel	Attenuator value [dB]
InternalGain	Internal gain value [dB] This is an internal parameter.
PreAmp	Gain value obtained by PreAmp [dB]
IQReverse	IQ reverse setting, fixed to "Normal"
TriggerSwitch	Trigger On/Off setting "FreeRun":Trigger is not used "Triggered":Trigger is used

Item	Descriptions
TriggerSource	Trigger source "External": External trigger "SGMarker": SG marker trigger
TriggerLevel	Trigger level [dBm] Note that this value does not include the reference level offset. It is in dBm units, even if the scale mode is Lin.
TriggerDelay	Trigger delay time [s] It is the relative time from the trigger input position to the start point of the recorded data.
IQReference0dBm	Reference IQ amplitude value that indicates 0 dB Fixed to "1".
ExternalReferenceDisp	Reference signal information "Ref.Int":Internal reference signal "Ref.Ext":External reference signal "Ref.Int Unlock":Internal reference signal is unlocked. "Ref.Ext Unlock":External reference signal is unlocked.
Correction Factor	Correction value of correction function [dB] The correction factor is added to the IQ data in a data file. 0.000 is automatically set when the Correction function is set to Off.
Terminal	Signal input terminal "RF": RF terminal
ReferencePosition	0-second reference position Indicates the 0-second reference position using the digitized data point position. During Replay function execution, the reference position is displayed as 0 s.
Trigger Slope	Selects the edge where the trigger is generated (rise or fall). "Rise": Rising edge "Fall": Falling edge

Capture Function (5/6): Save

[Footnote] **Format of data file**

The data file is created in binary format. From the beginning of the file, I-phase data and Q-phase data are recorded by 4 bytes. The I-phase data and Q-phase data are recorded as a float type (IEEE real*4).

The IQ data can be converted to power based on the following formula:

$$P = 10Log_{10}\left(I^2 + Q^2\right)$$

P: Power [dBm]

I: I-phase data

Q: Q-phase data

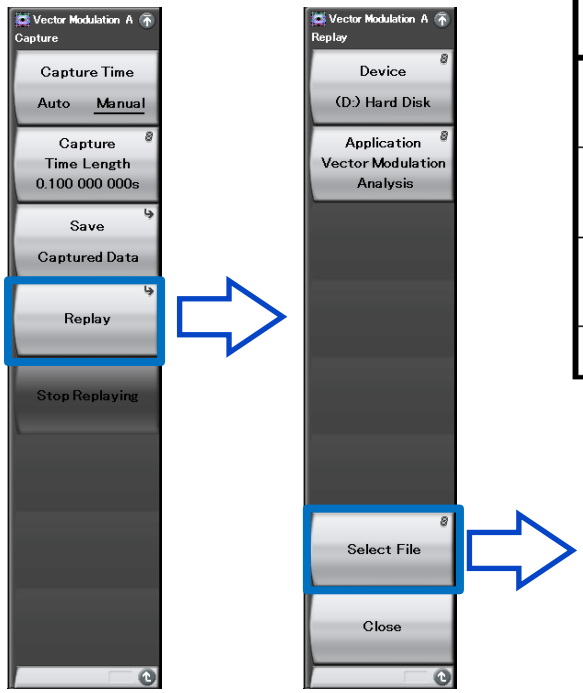
Beginning of file →

I-phase data 1	(4Byte)
Q-phase data 1	(4Byte)
I-phase data 2	(4Byte)
Q-phase data 2	(4Byte)
I-phase data 3	(4Byte)
Q-phase data 3	(4Byte)

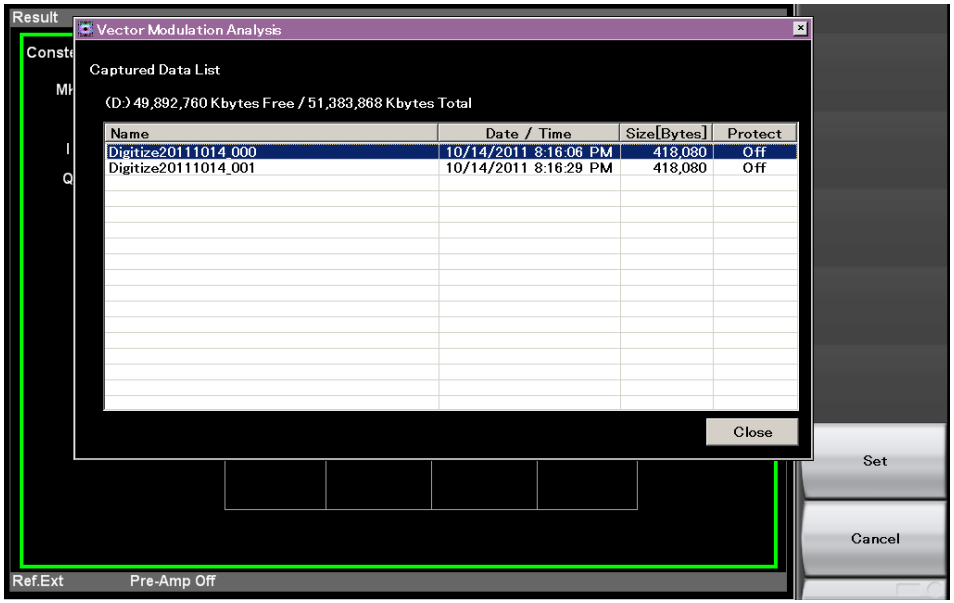
Capture Function (6/6): Replay

The Replay function enables re-analysis of saved IQ data.

[2]

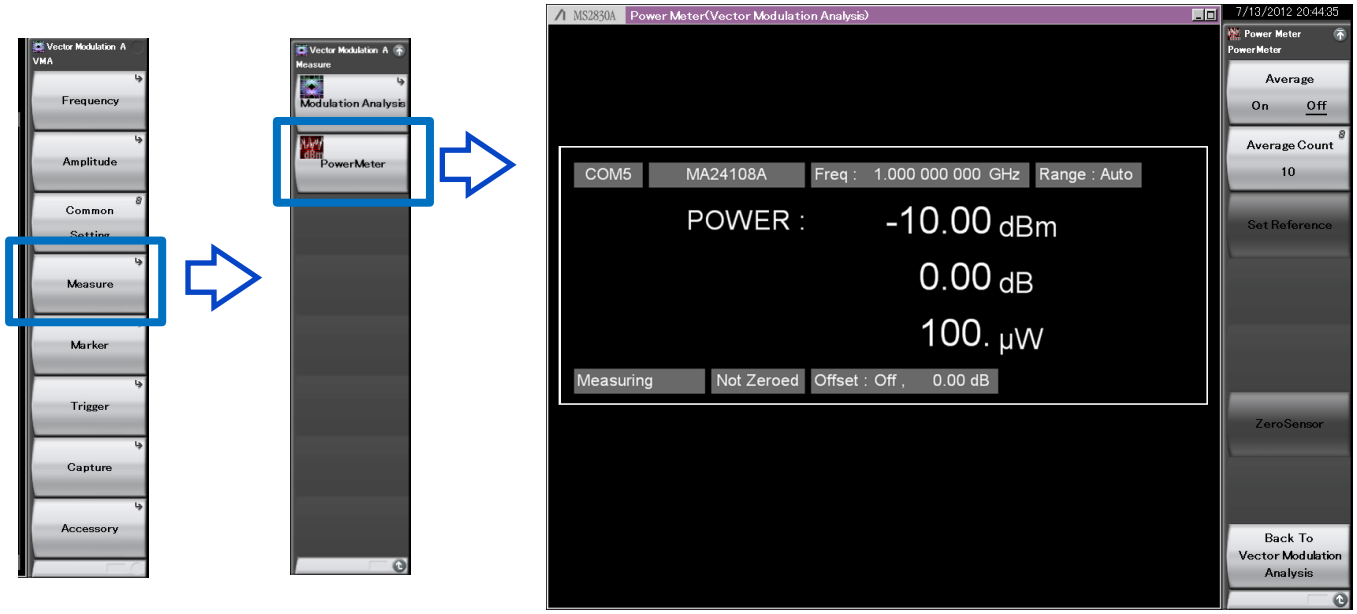


Menu Display	Function
Device	Selects the drive in which the target file is stored.
Application	Selects the name of the application used to save the target file.
Select File	Selects the target file. After selecting the file, the Replay function is executed.
Close	Closes the Replay function menu.



Power Meter Function

The power meter measurement can performed by calling the main-frame.
Power meter function can connect a USB power sensor to the main-frame and read the measurement values.
Settings of Carrier Frequency, Offset, and Offset Value are automatically reflected on the corresponding parameters.



Compatible USB power sensors.

Model	Frequency	Dynamic Range
MA24104A	600 MHz to 4 GHz	+3 to +51.76 dBm
MA24106A	50 MHz to 6 GHz	–40 to +23 dBm
MA24108A	10 MHz to 8 GHz	–40 to +20 dBm
MA24118A	10 MHz to 18 GHz	–40 to +20 dBm
MA24126A	10 MHz to 26 GHz	–40 to +20 dBm

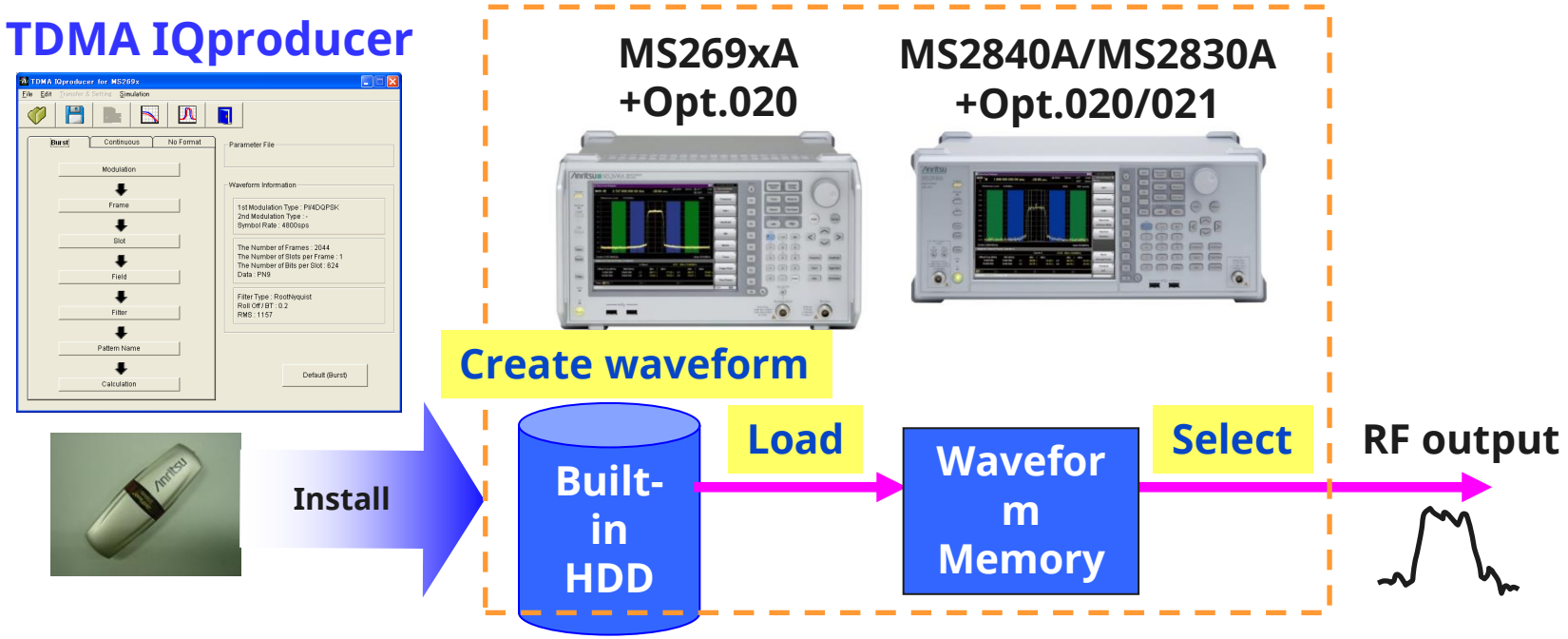
*1: Require loading the power meter function of the main-frame application software.

- 6.0 GHz Vector Signal Generator MS269xA-020
- 3.6 GHz Vector Signal Generator MS2830A-020
- 6.0 GHz Vector Signal Generator MS2830A-021

TDMA IQproducer MX269902A

TDMA IQproducer MX269902A

The TDMA IQproducer MX269902A software generates TDMA waveform patterns for the Vector Signal Generator option for MS269xA/MS2840A/MS2830A . It runs on the MS269xA/MS2840A/MS2830A embedded Windows OS and on an external PC.



- Generating waveform patterns using MX2699xxA >>> The main frame requires a license.
The unlicensed software will run on the PC to test waveform pattern generation but an unlicensed MS269xA/MS2830A cannot output signals because it does not recognize the waveform patterns.

TDMA IQproducer MX269902A

The TDMA IQproducer MX269902A software generates waveform data for any combination of [Modulation type], [Data], and [Filter] shown below.

Modulation Type

- BPSK
- DBPSK
- PI/2DBPSK
- QPSK
- O-QPSK
- DQPSK
- PI/4DQPSK
- 8PSK
- D8PSK
- 16QAM
- 32QAM
- 64QAM
- 256QAM
- 2ASK
- 4ASK
- 2FSK
- 4FSK

Data

- PN9
- PN15
- 16 bit Pattern
- ALL0
- ALL1
- UserFile

Note: PN20 and PN23 are not supported.

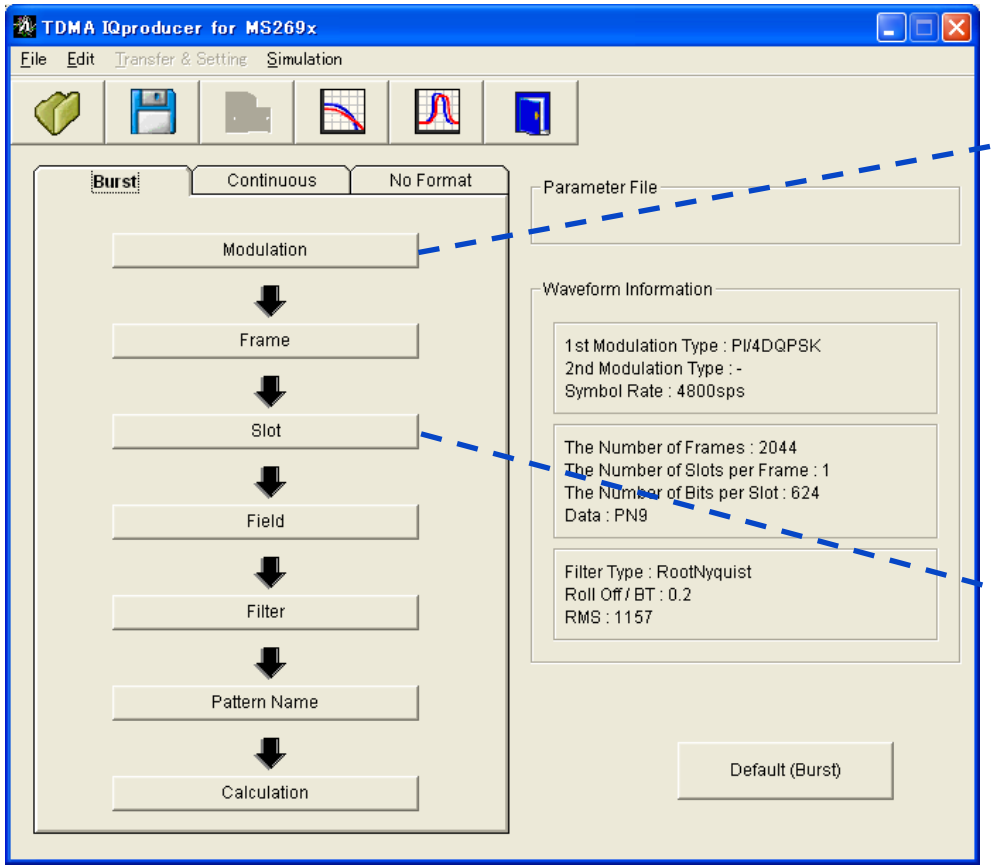
Filter

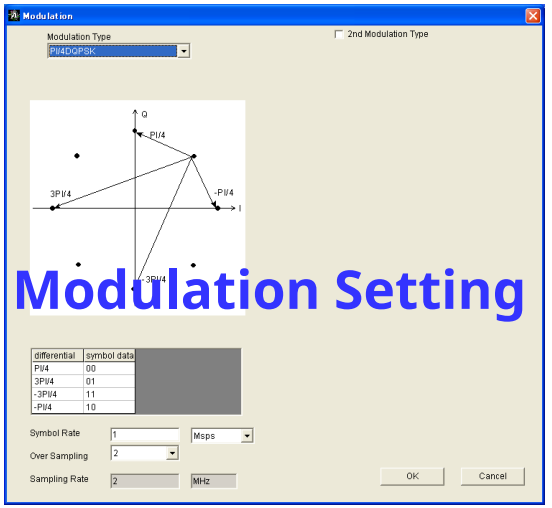
- Nyquist
- RootNyquist
- Gaussian
- Gaussian2
- IdealLowpass
- None
- ARIB STD-T98
- Half-sine
- ARIB STD-T102Part1
- User Defined Filter

TDMA IQproducer Screen Image

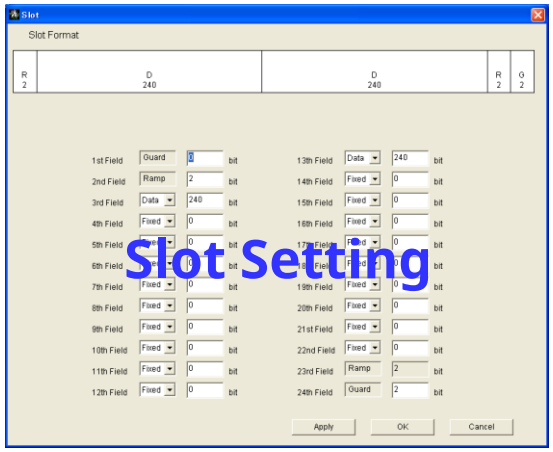
The easy-to-use GUI makes waveform generation easy.

Read the TDMA IQproducer MX269902A Product Introduction for details.





Modulation Setting



Slot Setting

Anritsu

envision : ensure

公知 2017-3 MG No. MX269017A-E-L-1-(5.00)