

3GPP LTE Solution

MS2690A/MS2691A/MS2692A

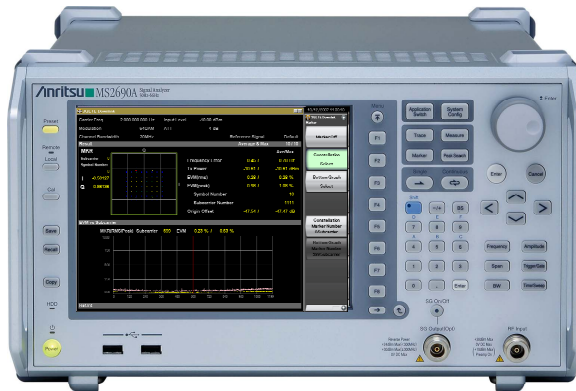
Signal Analyzer

MX269020A LTE Downlink Measurement Software

MX269021A LTE Uplink Measurement Software

MX269908A LTE IQproducer

MS2690A/MS2691A/MS2692A Signal Analyzer 3GPP LTE Solution



April, 2008

Anritsu Corporation

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Slide 1

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MS269xA Signal Analyzer

MS2690A/MS2691A/MS2692A Signal Analyzer

- Frequency Range
MS2690A: 50 Hz to 6.0 GHz. MS2691A: 50 Hz to 13.5 GHz. MS2692A: 50 Hz to 26.5 GHz
- Windows XP Professional OS

Spectrum Analyzer

- World-class Dynamic Range and Total Level Accuracy
- Display Average Noise Level: -155 dBm/Hz. TOI: $\geq +22$ dBm
- Total Level Accuracy: ± 0.5 dB (50 Hz to 6 GHz)

Vector Signal Analysis (VSA) Function

- Wideband FFT Analysis up to 125 MHz Included as Standard
- World-class Dynamic Range, Total Level Accuracy, and Measurement Speed
- Display Average Noise Level: -152.5 dBm/Hz. TOI: $\geq +22$ dBm
- Total Level Accuracy: ± 0.5 dB (50 Hz to 6 GHz)

Digitize Function

- High Accuracy Waveform Capture Based on High-performance RF
- Large 128 Msample Memory Built-in as Standard

Vector Signal Generator (Option)

- Covers Frequencies up to 6 GHz
- 120 MHz RF Modulation Band
- Superior ACLR function

IQproducer (Option)

HSDPA/HSUPA,
TDMA, Multi-carrier,
Mobile WiMAX, **LTE**

Analysis Software (Option)

Mobile WiMAX, **LTE**,
W-CDMA BS...

- Advanced Architecture Provides top-of-the-line RF Performance
- Leading Vector Signal Analysis Function Combines Speed and Reliable RF Performance
- High Accuracy Digitize Function Captures RF Signal without Loss



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MS269xA Signal Analyzer – Expandability

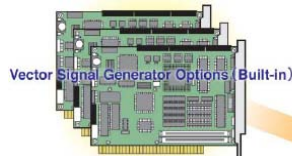
The MS269xA extendible modular structure supports customization by adding options. It supports 4G as well as W-CDMA/HSDPA, WiMAX, and 3GPP LTE.

Main Frame

MS2690A (50 Hz to 6.0 GHz)

MS2691A (50 Hz to 13.5 GHz)

MS2692A (50 Hz to 26.5 GHz)



Option

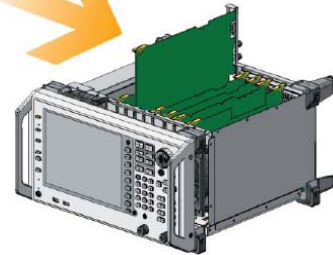
Vector Signal Generator (125 MHz to 6 GHz)

Wideband Analysis Hardware (125MHz)

6GHz Pre-amplifier (100kHz to 6GHz)

Rubidium Reference Oscillator

W-CDMA RNC Simulator



*** Planned**

Measurement Software

3GPP LTE, W-CDMA/HSDPA BS, Mobile WiMAX, HSPA Evolution*, GSM/EDGE/EDGE Evolution* ...

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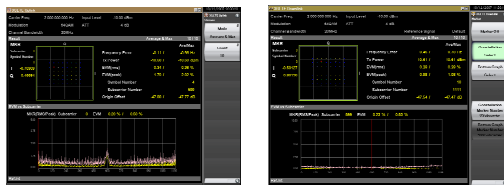
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LTE Measurement Software

3GPP LTE transmitter measurement

MX269020A LTE Downlink Measurement Software

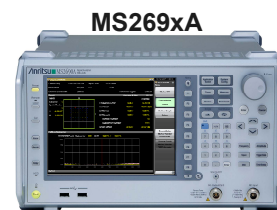
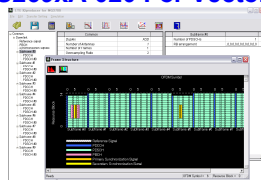
MX269021A LTE Uplink Measurement Software



3GPP LTE Receiver measurement

MX269908A LTE IQproducer™

(MS269xA-020 For Vector Signal Generator Option)



Perform LTE TX/RX Analysis with one set

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Features of LTE Measurement Software

- LTE measurement software offer low residual EVM: 1% (typ. 0.5% or less) and ± 0.6 dB of total level accuracy which is required by LTE equipment development
- EVM Window Length function offers flexible changing of FFT timing. This is usable for verification such as effect of multi-path and Ramp
- Spectrum analysis (Channel Power, OBW, ACLR, SEM) with wide dynamic range at one touch of a button
- Built-in analysis software, which doesn't need to use external PC, brings comfortable operating and measurement speed

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LTE Measurement Software - Graphical User Interface



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Common functions

- Operating Band
800M to 2700MHz
- Channel Bandwidth
1.4 / 3 / 5 / 10 / 15 / 20 MHz
- PDSCH/PUSCH modulation scheme
QPSK / 16QAM / 64QAM
- Analysis Time Length
10 subframe max (1 frame)

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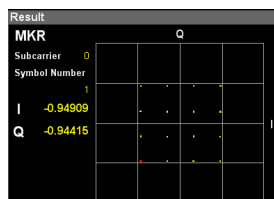
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Measurement functions

Average & Max		10/10
Frequency Error	0.15 /	Avg/Max 0.38 Hz
Output Power	-15.77 /	-15.77 dBm
Mean Power	-15.77 /	-15.77 dBm
EVM(rms)	0.26 /	0.27 %
EVM(peak)	0.87 /	0.97 %
Symbol Number	6	
Subcarrier Number	529	
Origin Offset	-63.63 /	-63.02 dB

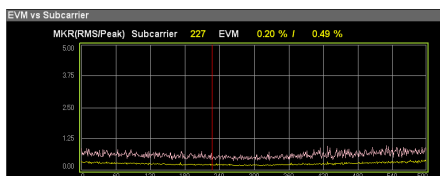
Text Display

- Frequency Error
- Output Power
- Mean Power
- EVM (Peak/RMS EVM)
- Origin Offset



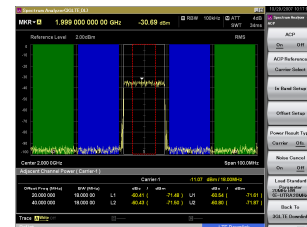
Constellation Display

- Constellation



Graphical Display

- EVM versus Subcarrier
- EVM versus Symbol
- Spectral Flatness



Spectrum Display

- Adjacent Channel Power (ACLR)
- Channel Power
- Occupied Bandwidth (OBW)
- Spectrum Emission Mask (SEM)

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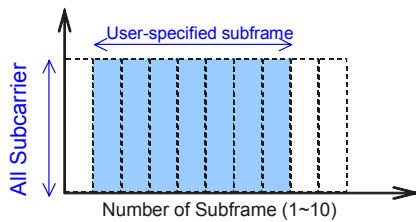
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Measurement functions (frequency error, Tx Power, EVM)

Display all active subcarriers' Frequency Error, Output Power, Mean Power, EVM (rms, peak) etc. in user-specified subframes (10 subframes max) in text.

Display average and Max on the same screen by choosing Average/Max display. This function is usable for dispersion evaluation of DUT feature.

Measurement Area



Measurement Results (text)

	Average & Max	10 / 10
		Avg/Max
Frequency Error	0.15 /	0.38 Hz
Output Power	-15.77 /	-15.77 dBm
Mean Power	-15.77 /	-15.77 dBm
EVM(rms)	0.26 /	0.27 %
EVM(peak)	0.87 /	0.97 %
Symbol Number		5
Subcarrier Number		529
Origin Offset	-63.63 /	-63.02 dB

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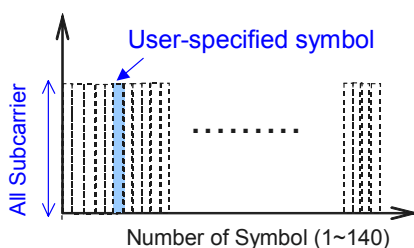
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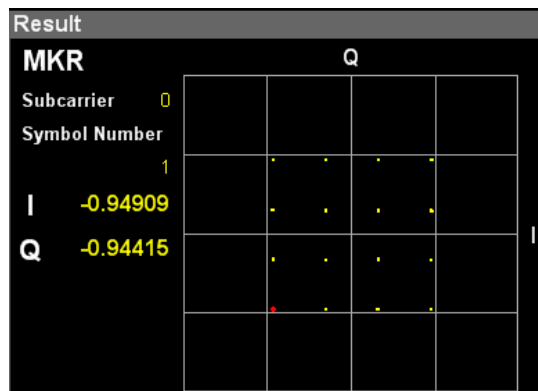
Measurement Functions (Constellation)

Display Constellation Graph of all active subcarriers in user-specified symbol. Analyze QPSK/16QAM/64QAM.

Measurement Area



Constellation



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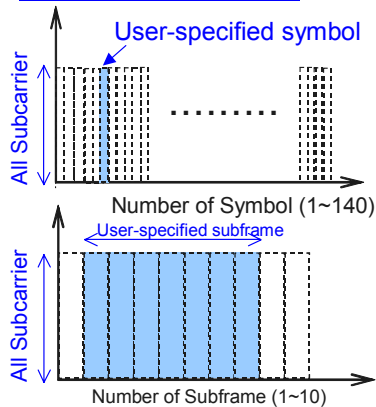
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Measurement Functions (EVM versus subcarrier)

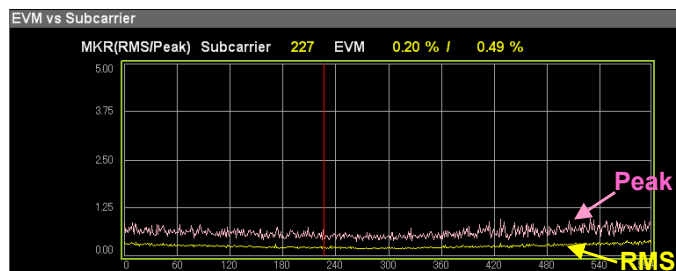
Display EVM graph per-subcarrier targeting user-specified symbol or user-specified subframes (10 subframes max).

Display Peak and Average (RMS) on the same screen. This enables measurement of instantaneous EVM.

Measurement Area



EVM versus Subcarrier



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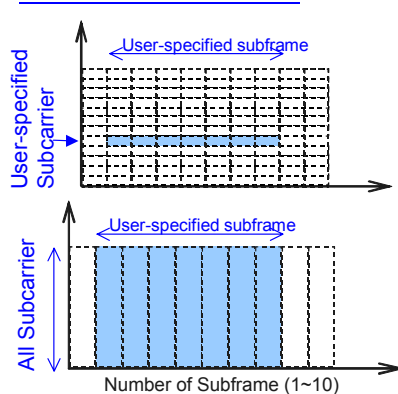
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Measurement Functions (EVM versus Symbol)

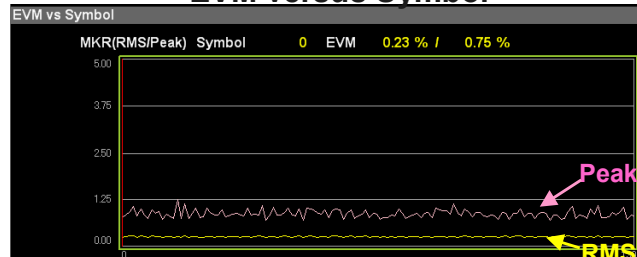
Display EVM graph per-symbol targeting user-specified symbol or user-specified subframes.

Display Peak and Average (RMS) on the same screen. This enables measurement of instantaneous EVM.

Measurement Area



EVM versus Symbol



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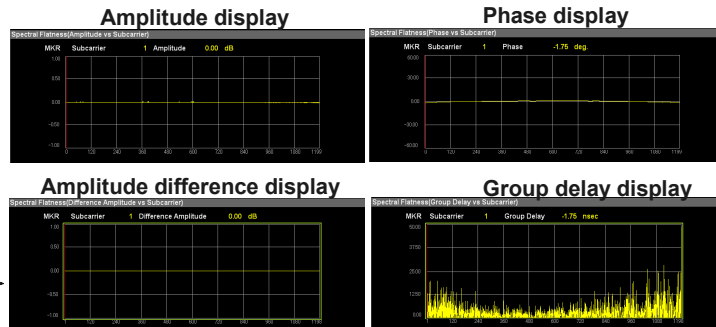
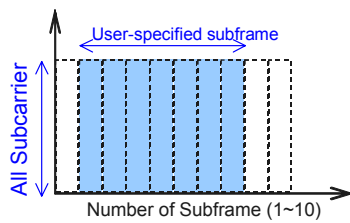
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Measurement Functions (Spectral flatness)

Display amplitude/phase/group delay graph per-subcarrier in user-specified subframes.

Detect OFDM-specific problems such as symbol timing error between subcarriers.

Measurement Area



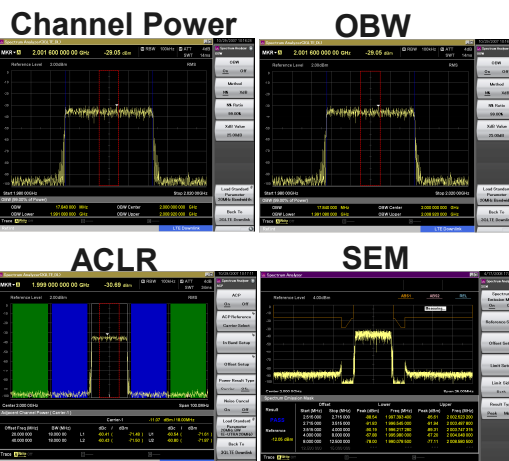
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Measurement Functions (Spectrum Measurement)

3GPP LTE spectrum measurement (ACLR, channel power, OBW, SEM) can be performed at one touch of a button using MS269xA series' outstanding level accuracy and wide dynamic range spectrum analyzer/signal analyzer function.



* SEM template requires for the initial parameter setting due to the undefined 3GPP specification.

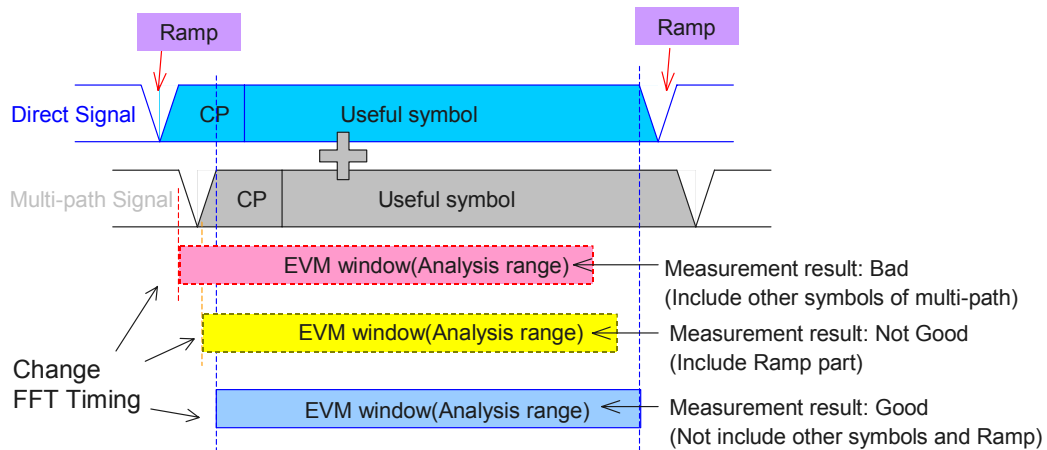
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EVM Window Length Function

EVM Window Length function offer flexible changing of FFT timing. This is usable for verification such as effect of multi-path and Ramp.



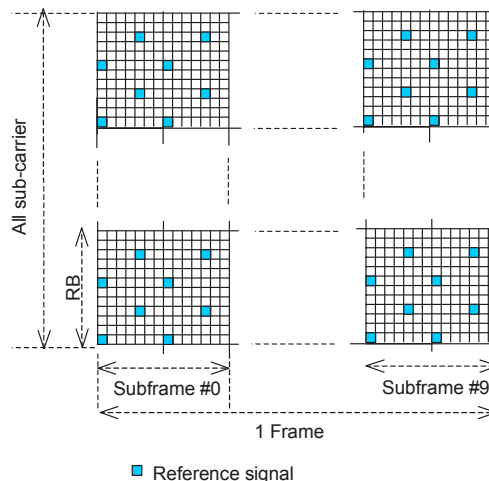
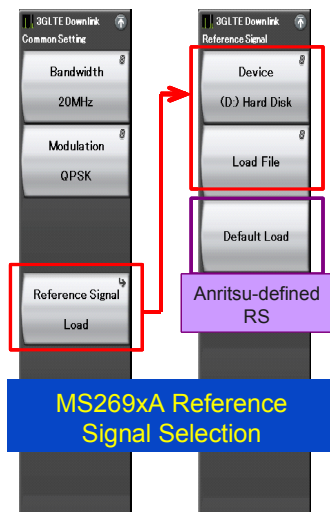
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Reference Signal Setting Function (DL)

Evaluate user's DL signal by loading user-defined Reference Signal file.



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LTE IQproducer (for MS269xA-020 Vector Signal Generator option)

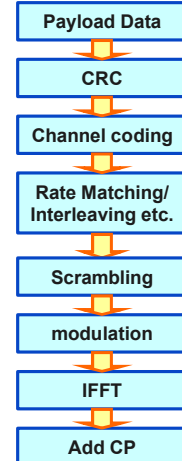
LTE IQproducer is a software to generate Uplink and Downlink Tx/Rx waveform for 3GPP LTE (FDD).

Available to work on MS269xA built-in Windows XP or external PC.

Downlink Reference Signal
Primary/Secondary Synchronization Signal
Synchronization Signal
PBCH (P-BCH)
PDCCH (Downlink control channel information)
PDSCH (DL-SCH)

Uplink Reference Signal
PUCCH (Uplink control channel information)
PUSCH (UL-SCH)
PRACH (RACH)

Flow of signal generating



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LTE IQproducer - Graphical User Interface

Outstanding operability brings easy waveform generation

The screenshot shows the LTE IQproducer for MG3700 GUI. It features a tree structure on the left for navigating through settings like Common, Downlink, and Uplink. The main area displays a 'Frame Structure' diagram with a time-frequency grid. Annotations highlight key features:

- Parameters for Common settings (PHY, FFT size, Band width, etc.):** Points to the 'Common' settings tab.
- Details of channels:** Points to the 'Subframe #0' details panel.
- Tree structure display (Down/Up Link, Channels, etc.):** Points to the left-hand navigation tree.
- Displays Frame Structure, FFT, Time domain, CCDF for generated waveform:** Points to the main visualization area.

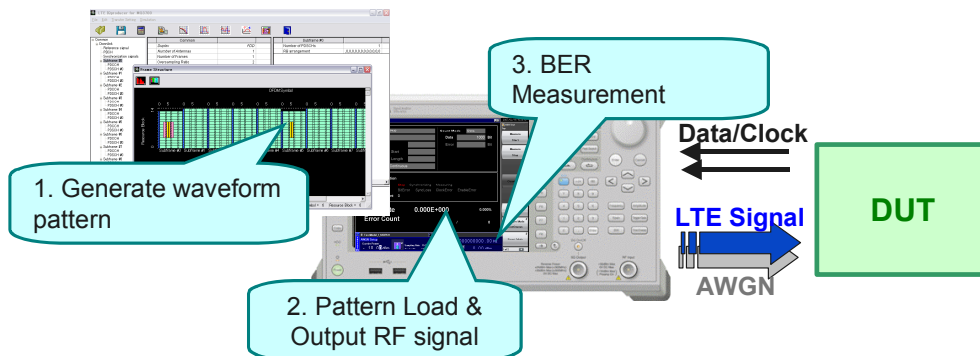
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Receiver Measurement

MS269xA-020 vector signal generator option supports AWGN waveform combine function and BER counter function. These are useful for Rx performance test.



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