

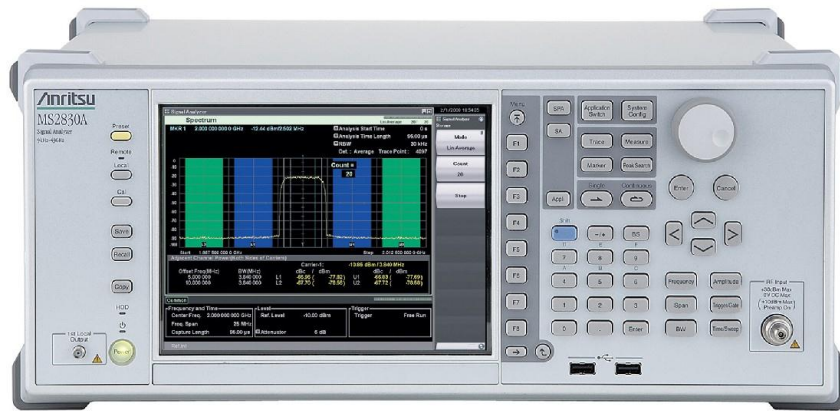
# Mobile Backhaul Measurement Solutions

**MS2830A**  
Signal Analyzer

# MS2830A Signal Analyzer series Application Note

**MS2830A-044 26.5GHz Signal Analyzer**  
**MS2830A-045 43GHz Signal Analyzer**

## Mobile Backhaul Measurement Solutions



**MS2830A-044: 9 kHz to 26.5 GHz**  
**MS2830A-045: 9 kHz to 43.0 GHz**

**Version 2.00**

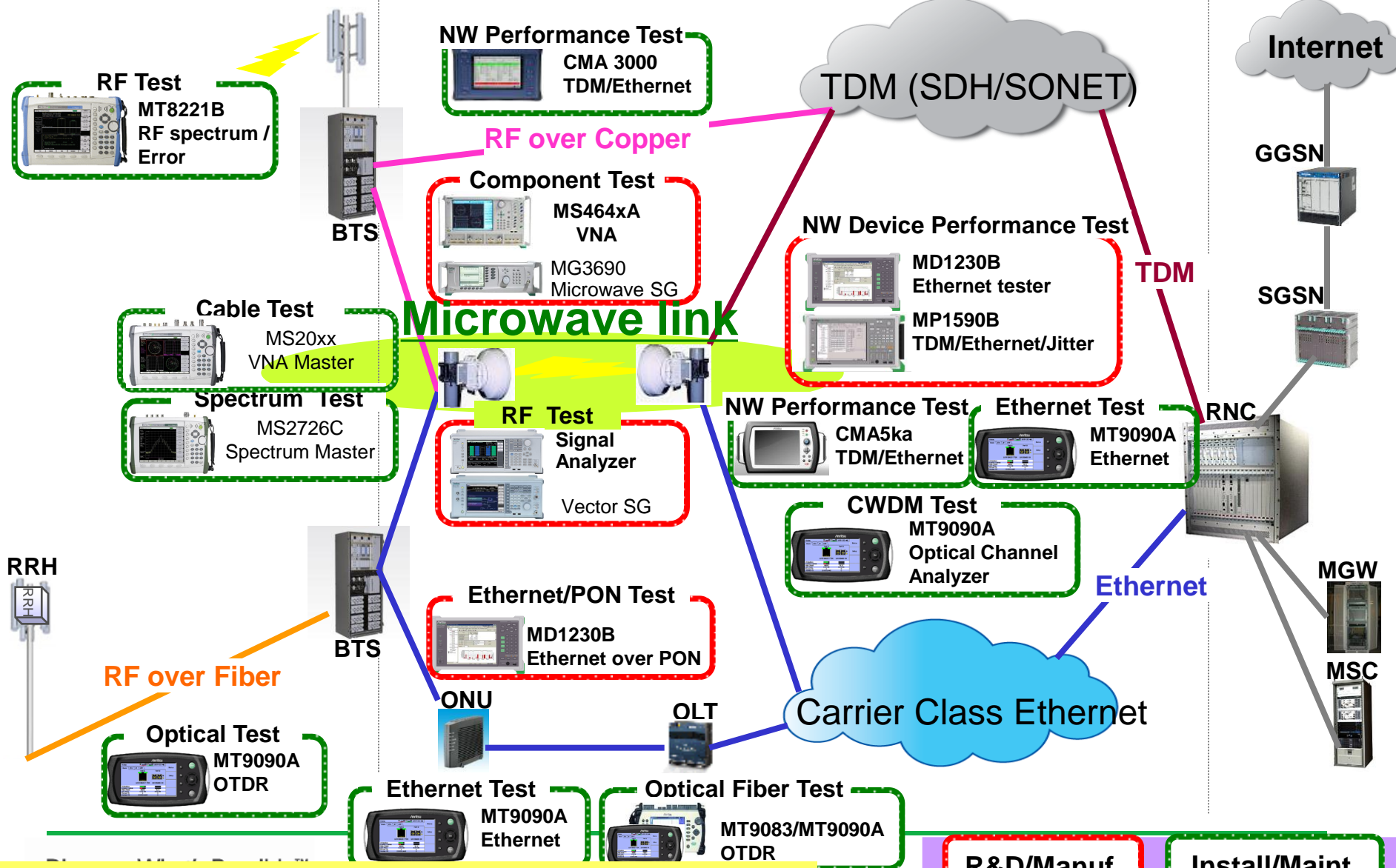
**ANRITSU CORPORATION**

# Anritsu T&M Solution

Antenna

Mobile Backhaul

Mobile Core



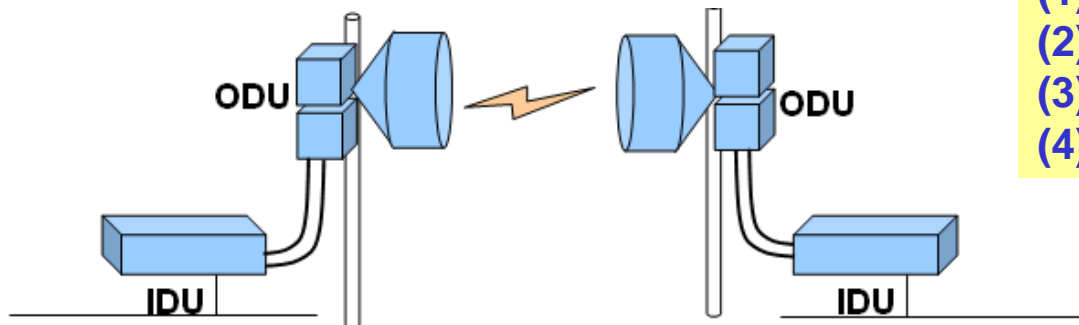
R&D/Manuf.

Install/Maint.

**Anritsu is a total solution provider!**

# Microwave Link Measurement Solution (R&D/Manufacturing)

Anritsu offers both wired and wireless measuring instruments for evaluating Microwave link devices, modules, and equipment.



- (1) ODU Evaluation
- (2) ODU Device/Module Evaluation
- (3) IDU Evaluation
- (4) System Evaluation

## Microwave Link Measurement Solutions



Signal Analyzer



Signal Generator



Network Analyzer



Ethernet Tester

# Microwave Link Measurement Solution (R&D/Manufacturing)

## (1) ODU Evaluation

The Tx and Rx performance of ODU equipment can be evaluated using a signal analyzer and signal generator supporting high frequency bands.

### Tx Test



- 43 GHz max. (With external mixer: 110GHz)
- High-speed power/spectrum measurements
- Modulation quality test using vector modulation analysis software



- Up to 6 GHz using IF signal source
- PSK/QAM signal output using waveform generation software

### Measurements

- Frequency Error
- Max Power
- Spectrum Mask
- Spurious
- Tx EVM

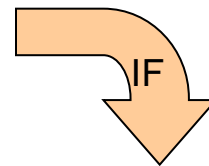
### Rx Test

Wanted Waveform



- 70 GHz max.
- PSK/QAM signal output using waveform generation software

MG3690C Microwave Signal Generator + MG3710A Vector Signal Generator



MS269xA/MS2830A Signal Analyzer

- High-speed power/spectrum measurements
- Modulation quality test using vector modulation analysis software

### Measurements

- Rx EVM
- NF

# Microwave Link Measurement Solution (R&D/Manufacturing)

## (2) ODU Device/Module Evaluation

ODU devices and modules can be evaluated using network analyzers and signal generators supporting high frequencies.



MS464xA  
Vector Network Analyzer

- Wide frequency setting range from 70 kHz to 70 GHz



ME7828A  
Wideband Millimeter Wave Network Analysis System

- Wide frequency setting range from 70 kHz to 110 GHz
- Supports up to 500 GHz as waveguide solution

### Measurement Targets

- Passive Components
  - Filters/Duplexers
  - Power Dividers/Combiners
- Active Components
  - Power Amps
  - Low-noise Amps
- Frequency Converters
- Antennas



MG369xC  
Microwave Signal Generator

- Supports 0.1 Hz to 70 GHz
- Frequency expansion to 335 GHz using waveguide
- Reduced degraded EVM when using as LO signal source with low phase noise option

### Applications

- LO Signal Replacement
- Interference Waves

# Microwave Link Measurement Solution (R&D/Manufacturing)

## (3) IDU Evaluation

IDU evaluations can be performed using signal analyzers, signal generators and Ethernet testers covering the IF band.

### IF Tests

- High-speed power/spectrum measurements
- Modulation quality test using vector modulation analysis software

- IF signal generation up to 6 GHz
- PSK/QAM signal output using waveform generation software
- Rx sensitivity test

### Measurements

- Tx power, power control
- Tx EVM (IF)
- BER (IDU internal)

MS269xA/MS2830A  
Signal Analyzer  
(with VSG option)



IF

IF

or

IF



MG3710A  
Vector Signal Generator

### Network Tests

Ethernet Tester



- Loop-back BER test

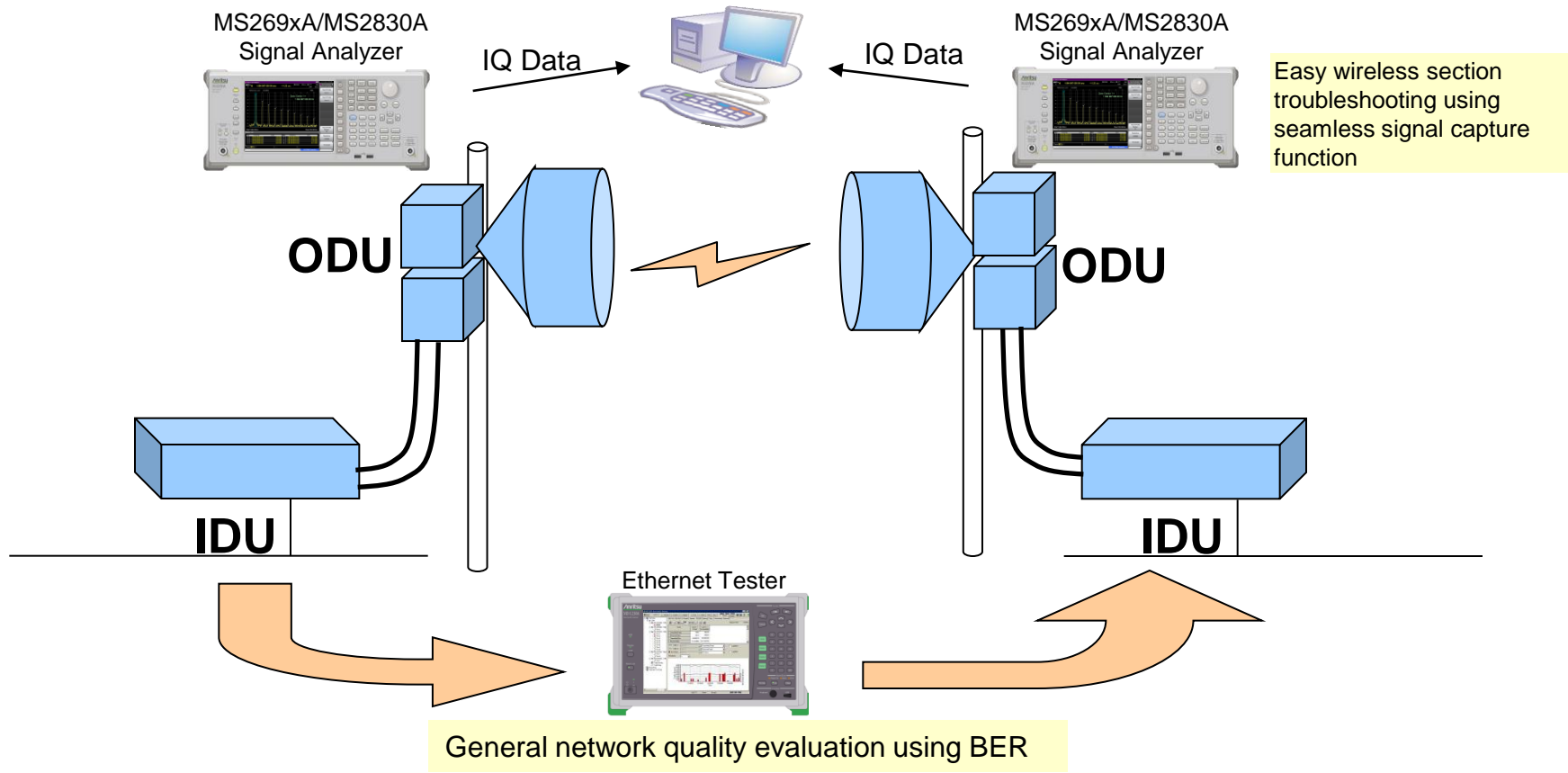
### Measurements

- BER (SDH)

# Microwave Link Measurement Solution (R&D/Manufacturing)

## (4) System Evaluation

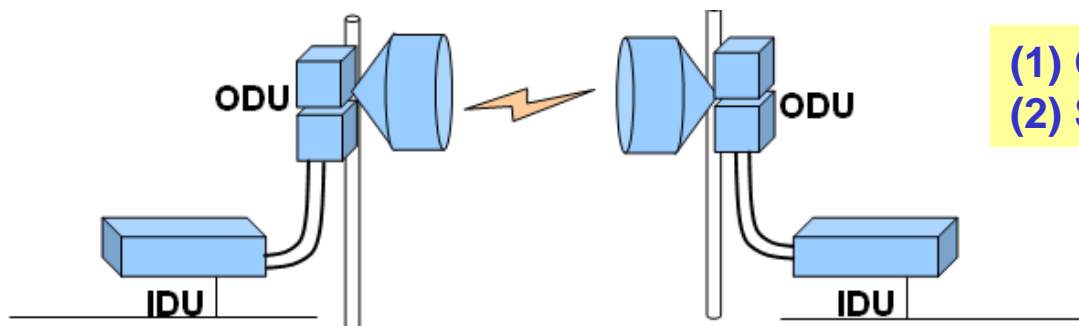
General network quality can be evaluated by BER tests using an Ethernet tester. The signal analyzer seamless capture function makes it easy to troubleshoot wireless sections.





# Microwave Link Measurement Solutions (Installation and Maintenance)

Anritsu offers compact measuring instruments for spectrum, cable and Ethernet evaluations used at Microwave link installation and maintenance.



(1) Optical Cable, Ethernet Tester  
(2) Spectrum, Cable Tester

## Microwave Link Measurement Solutions



**Optical Cable Tester**



**Ethernet Tester**



**Network Analyzer**



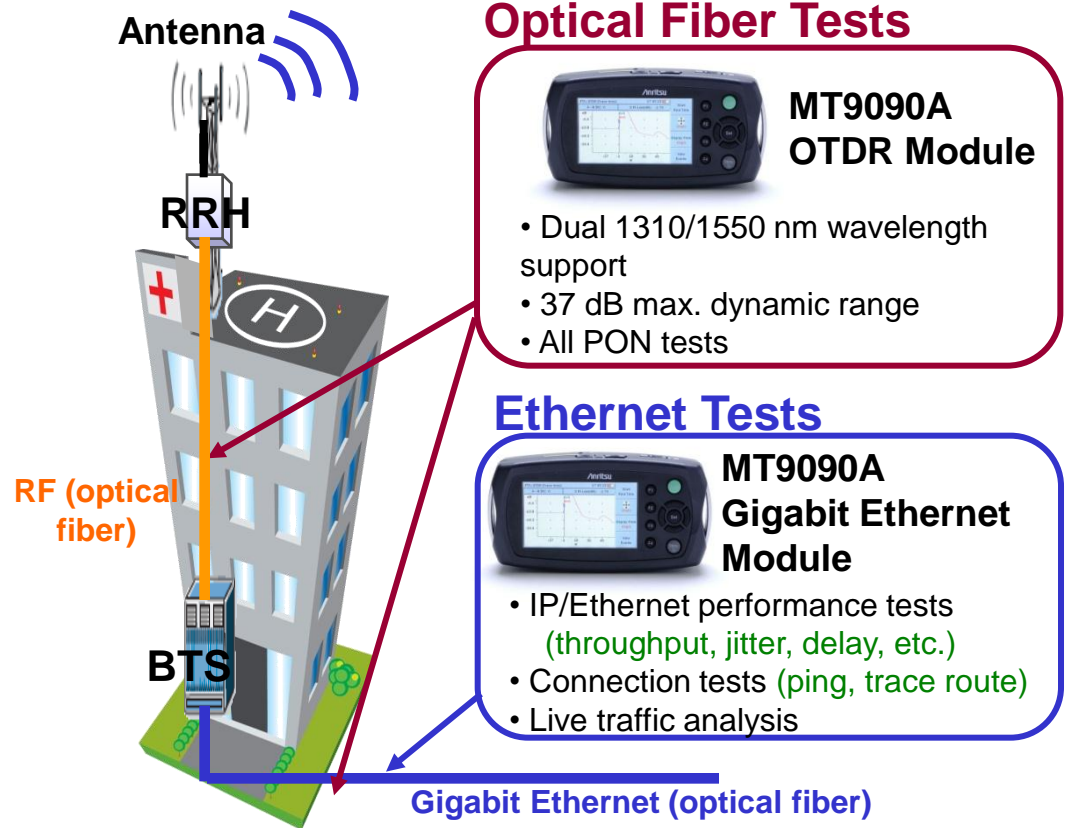
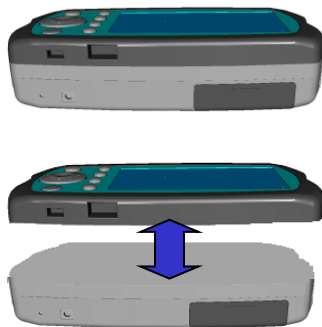
**Spectrum  
Analyzer**

# Microwave Link Measurement Solutions (Installation and Maintenance) Optical Cable and Ethernet Tests

## Compact Field Solutions

### MT9090A Network Master Series

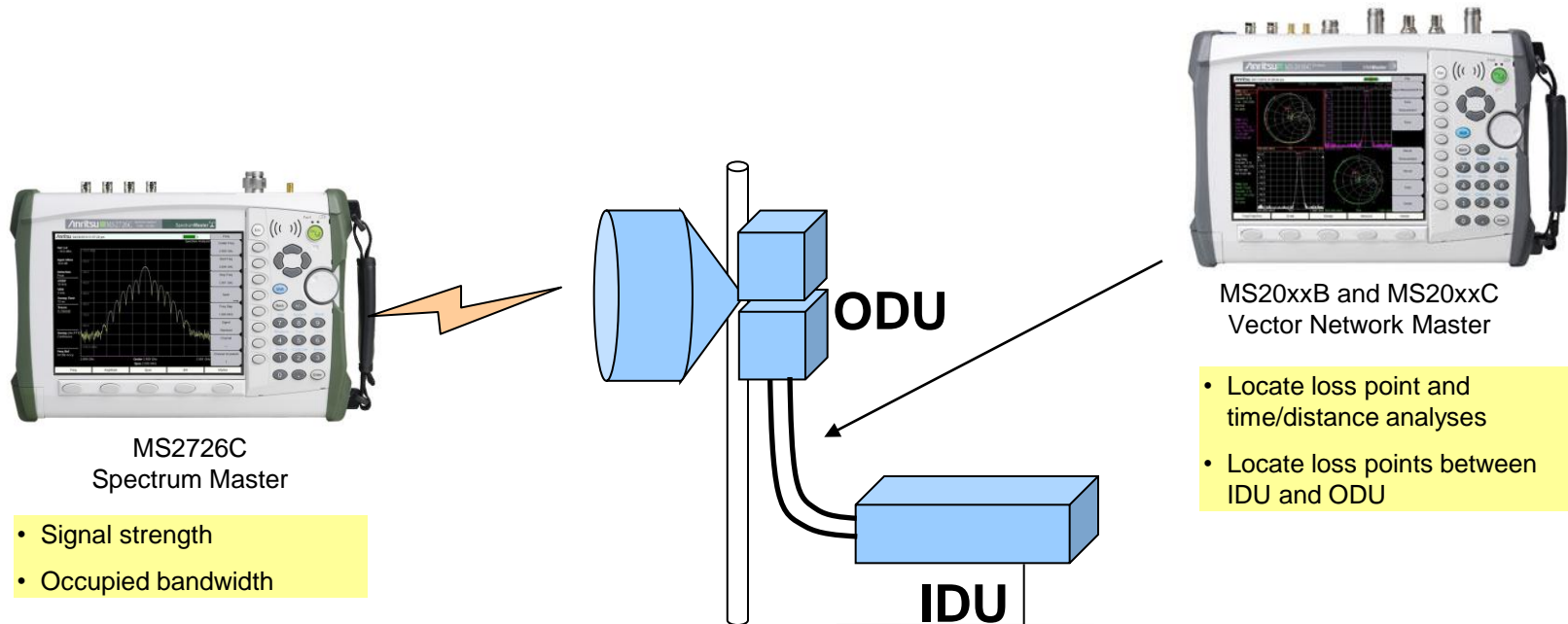
- **Compact** (190 x 96 x 48 mm)
- **Lightweight** (700 g max.)
- **Battery powered**
- **Easy field portability**
- **One-key operation**



# Microwave Link Measurement Solutions (Installation and Maintenance)

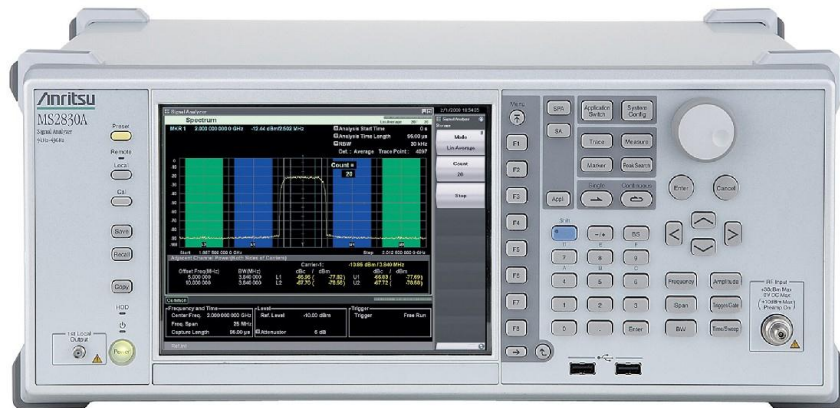
## Spectrum and Cable Tests

Spectrum and cable measurements are supported by compact spectrum and network analyzers.



# MS2830A Signal Analyzer series

## ETSI Standard Measurements



**MS2830A-044: 9 kHz to 26.5 GHz**  
**MS2830A-045: 9 kHz to 43.0 GHz**

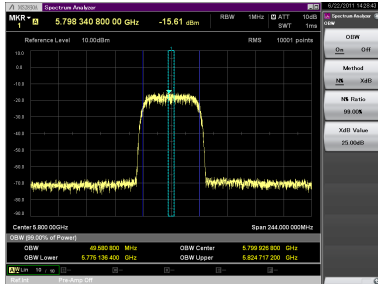
# ETSI Standard Measurements (1/9)

ETSI standard measurements can be done simply and efficiently by the MS2830A excellent dynamic range performance and extensive measurement functions.

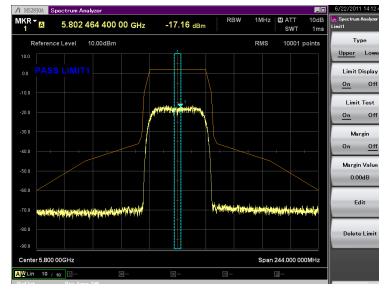
Clause	Measurement items	Required equipment
5.2.1	Transmitter power range	PM (SA)
5.2.2	Transmitter power and frequency control	
5.2.2.1.1	Automatic Transmit Power Control (ATPC)	PM (SA)
5.2.2.1.2	Remote Transmit Power Control (RTPC)	PM (SA)
5.2.2.2	Remote Frequency Control (RFC)	SA (FC)
5.2.3	Transmitter power tolerance	SA
5.2.4	RF Spectrum Mask	SA
5.2.5	Discrete CW components exceeding the spectrum masks limits	SA
5.2.6	Spurious emissions-external	SA
5.2.7	Dynamic Change of Modulation Order	SA
5.2.8	Radio frequency tolerance	SA

PM: Power Meter  
SA: Spectrum Analyzer  
FC: Frequency Counter

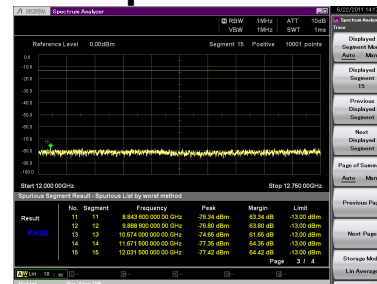
### OBW



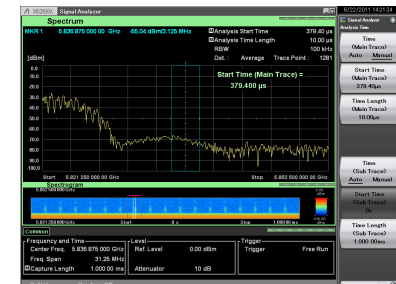
### Limit line



### Spurious



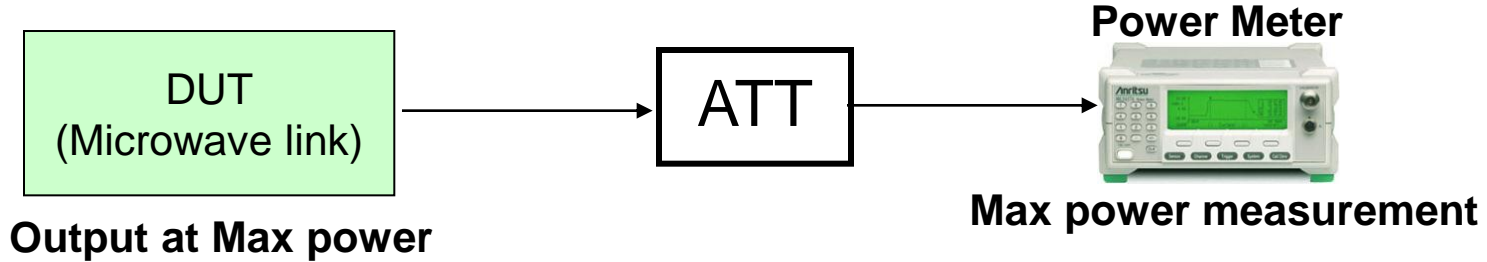
### VSA



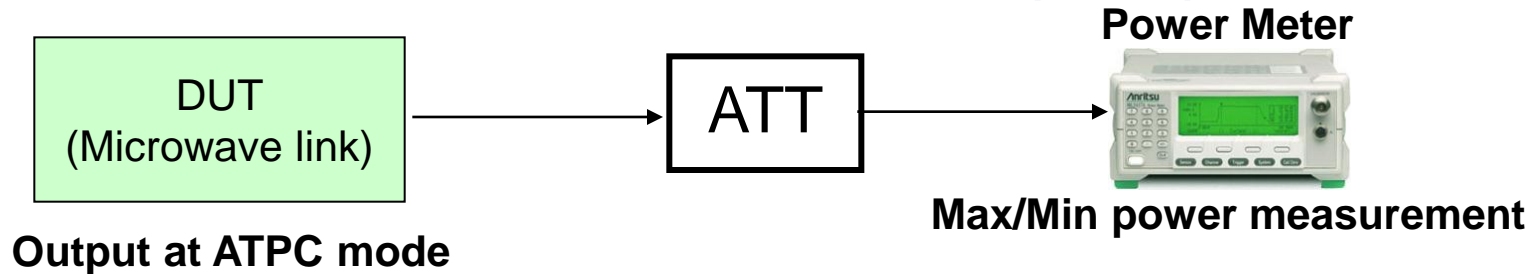
# ETSI Standard Measurements (2/9)

## 5.2.1 Transmitter power range

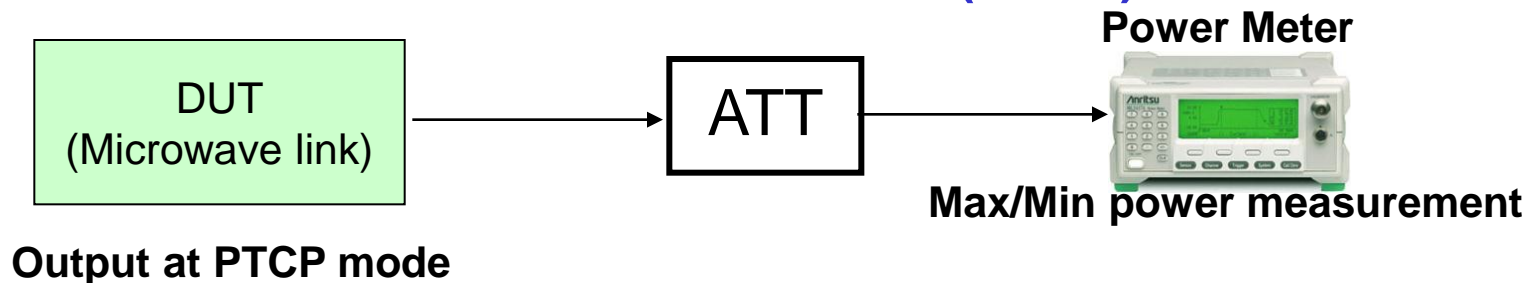
## 5.2.3 Transmitter power tolerance



## 5.2.2.1.1 Automatic Transmit Power Control (ATPC)



## 5.2.2.1.1 Remote Transmit Power Control (RTPC)



# ETSI Standard Measurements (3/9)

## 5.2.2.2 Remote Frequency Control (RFC)

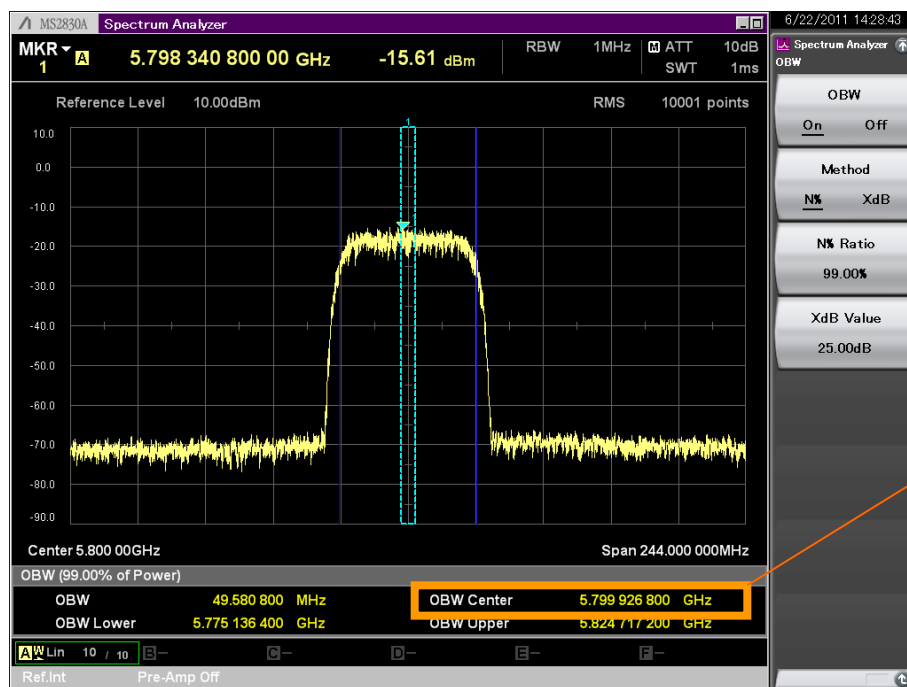
## 5.2.8 Radio frequency tolerance

DUT  
(Microwave link)

ATT



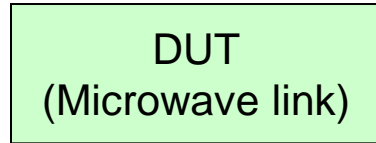
MS2830A  
Frequency Measurement



Frequency measurement during modulation using OBW function

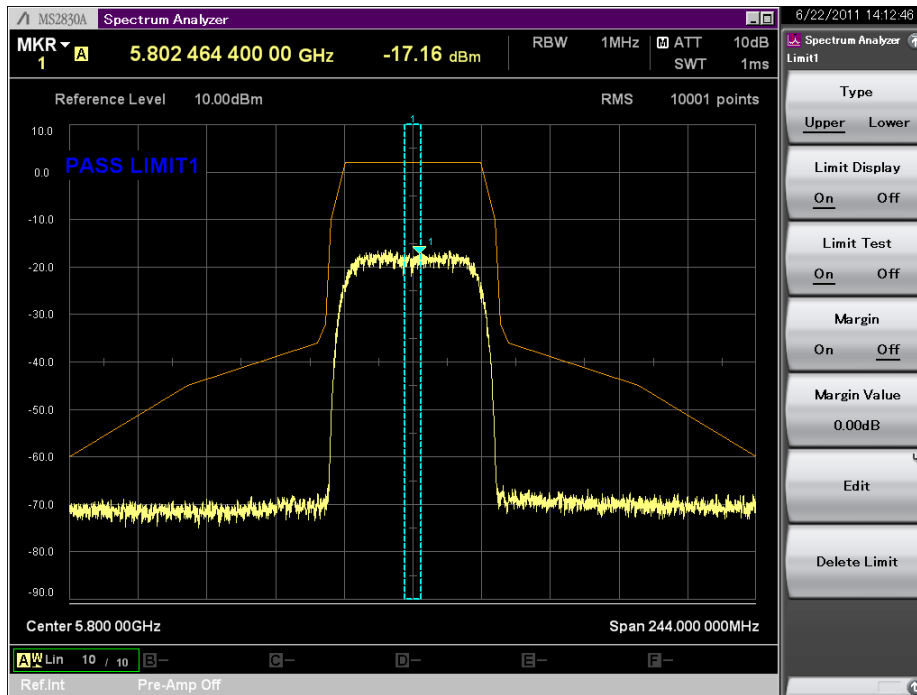
# ETSI Standard Measurements (4/9)

## 5.2.4 RF Spectrum Mask (1/2)



Output at each frequency, bandwidth and modulation method

Judge measurement with Limit Line function

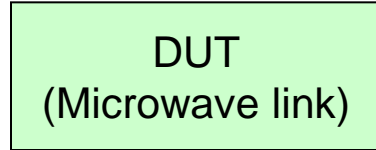


- Easy mask measurement using Limit Line function
- Optional Mask Test of -60 dB at 38 GHz can be done with enough margin by MS2830A excellent dynamic range



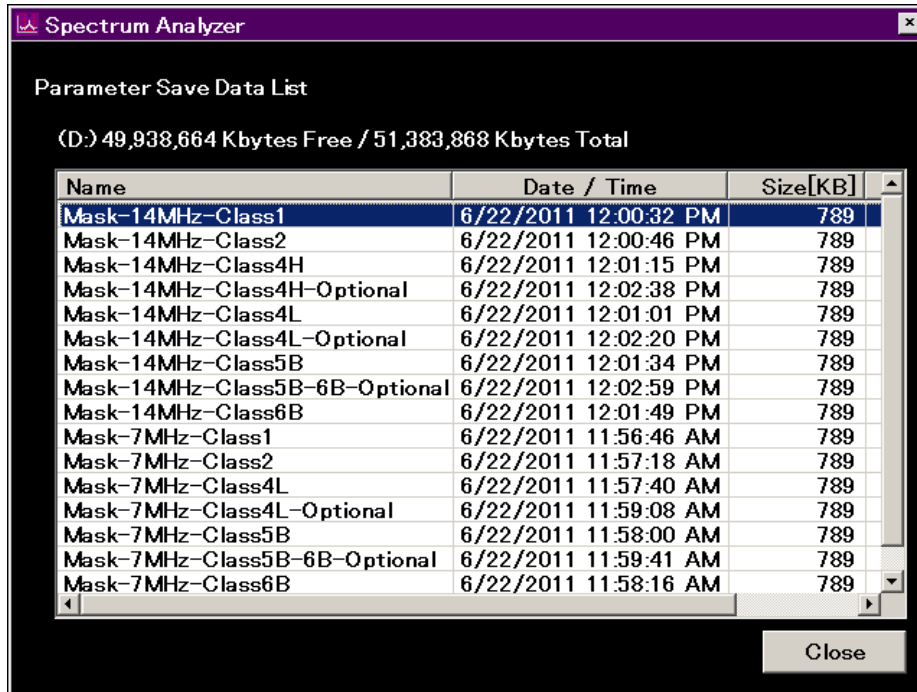
# ETSI Standard Measurements (5/9)

## 5.2.4 RF Spectrum Mask (2/2)



Measurement with Limit Line function

Output at each frequency, bandwidth and modulation method



Spectrum Analyzer

Parameter Save Data List

(D:) 49,938,664 Kbytes Free / 51,383,868 Kbytes Total

Name	Date / Time	Size [KB]
Mask-14MHz-Class1	6/22/2011 12:00:32 PM	789
Mask-14MHz-Class2	6/22/2011 12:00:46 PM	789
Mask-14MHz-Class4H	6/22/2011 12:01:15 PM	789
Mask-14MHz-Class4H-Optional	6/22/2011 12:02:38 PM	789
Mask-14MHz-Class4L	6/22/2011 12:01:01 PM	789
Mask-14MHz-Class4L-Optional	6/22/2011 12:02:20 PM	789
Mask-14MHz-Class5B	6/22/2011 12:01:34 PM	789
Mask-14MHz-Class5B-6B-Optional	6/22/2011 12:02:59 PM	789
Mask-14MHz-Class6B	6/22/2011 12:01:49 PM	789
Mask-7MHz-Class1	6/22/2011 11:56:46 AM	789
Mask-7MHz-Class2	6/22/2011 11:57:18 AM	789
Mask-7MHz-Class4L	6/22/2011 11:57:40 AM	789
Mask-7MHz-Class4L-Optional	6/22/2011 11:59:08 AM	789
Mask-7MHz-Class5B	6/22/2011 11:58:00 AM	789
Mask-7MHz-Class5B-6B-Optional	6/22/2011 11:59:41 AM	789
Mask-7MHz-Class6B	6/22/2011 11:58:16 AM	789

Close

Templates are swelling in number due to the different mask templates for each output frequency, bandwidth, and modulation method. Using the MS2830A Limit Line editing function and flexible Save/Recall function makes Mask tests easy and fast.

# ETSI Standard Measurements (6/9)

## 5.2.5 Discrete CW components exceeding spectrum mask limits

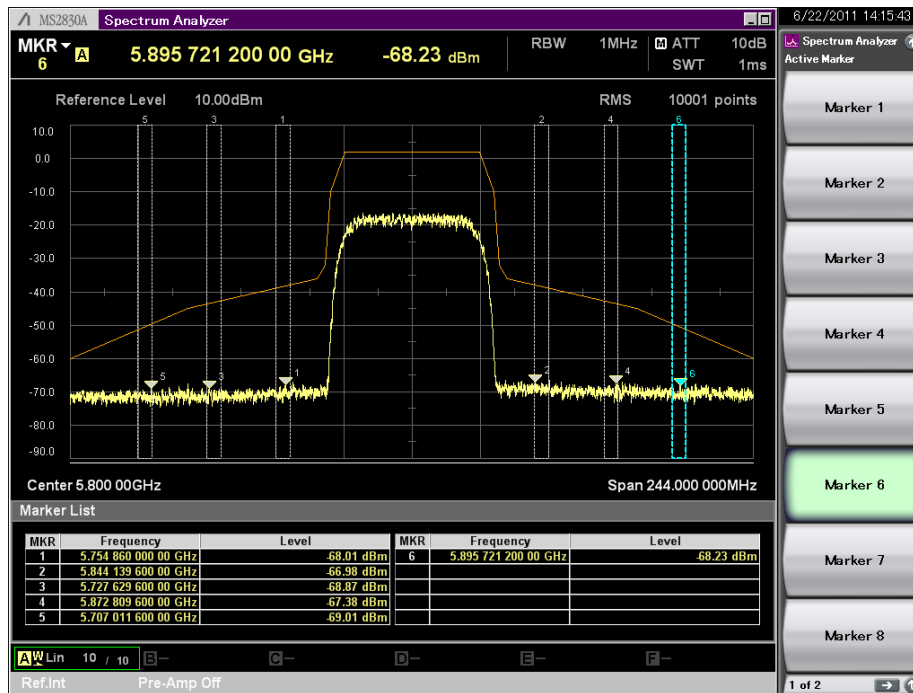
DUT  
(Microwave link)

ATT



Output at each frequency, bandwidth and modulation method

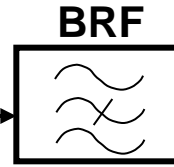
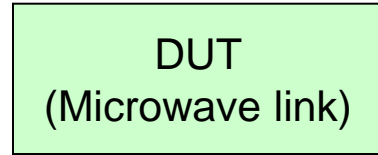
Measure CW components exceeding Limit Line with Mask function



- Up to 10 separate markers can be set with the Multi-Marker function.
- Even frequency with randomness can be easily measured using the Zone Marker function to display peak values within a specifiable setting range.

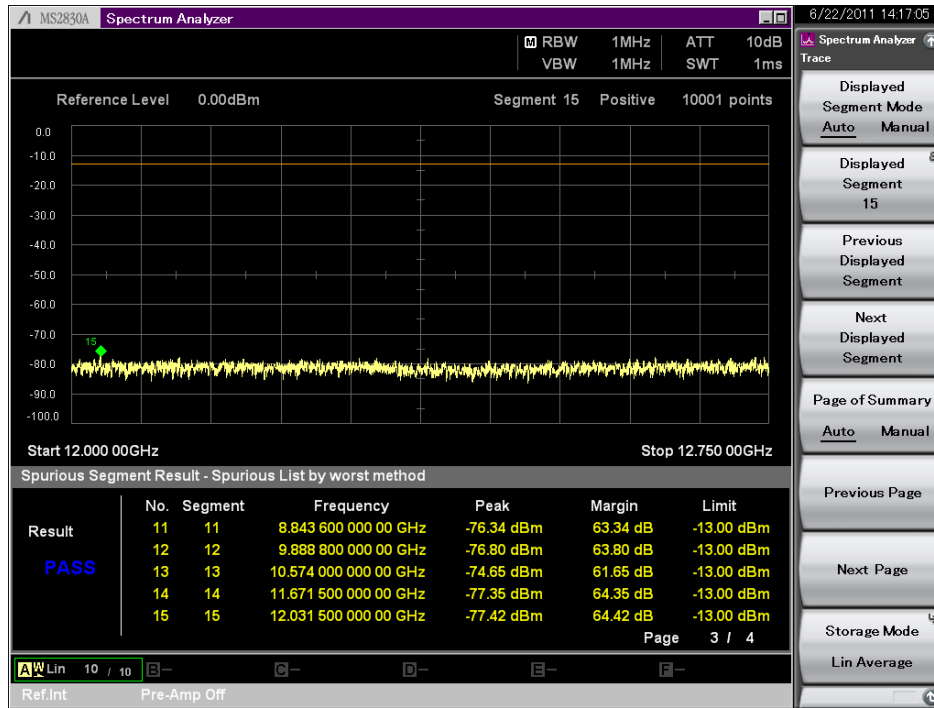
# ETSI Standard Measurements (7/9)

## 5.2.6 Spurious emissions-external



Output at Max power

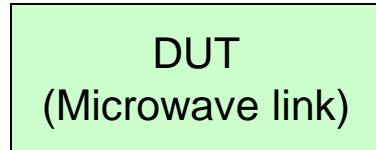
Spurious measurement with Spurious function



- Up to 20 segments can be measured at high speed using the Spurious function.
- With the excellent Dynamic Range performance, the MS2830A reduces the number of required filters and amps to support a simple, low-cost test solution.

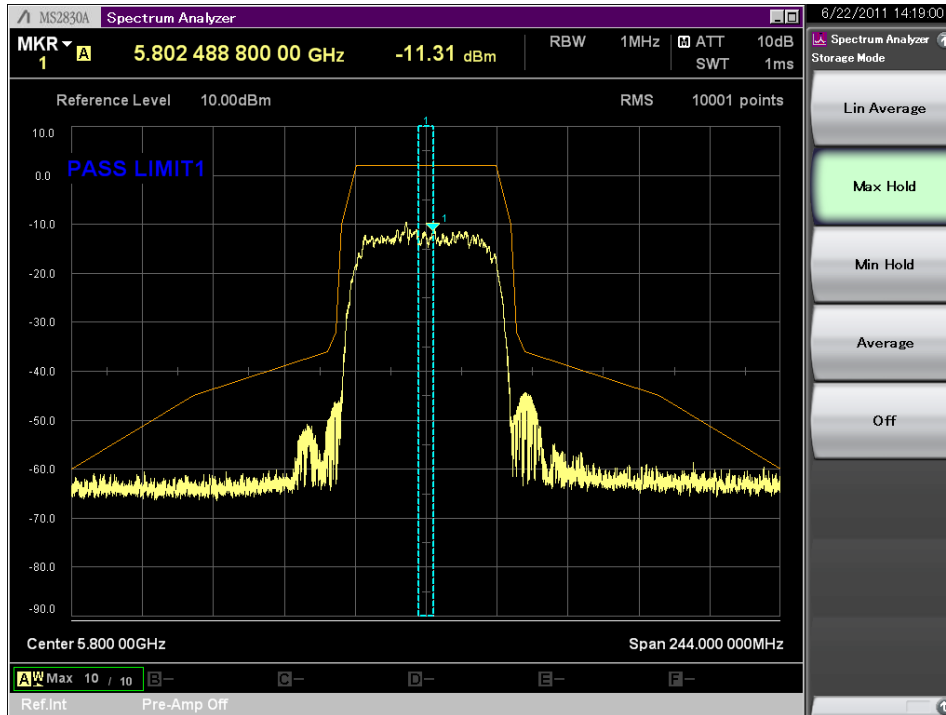
# ETSI Standard Measurements (8/9)

## 5.2.7 Dynamic Change of Modulation Order (1/2)



Output at each modulation method

Measurement with Limit Line  
function in Max Hold status



- The presence/absence of quality deterioration can be easily identified using the Limit Line function in the Max Hold mode.
- The VSA function explained on the next slide is useful for investigating the deterioration timing.

# ETSI Standard Measurements (9/9)

## 5.2.7 Dynamic Change of Modulation Order (2/2)

DUT  
(Microwave link)

ATT

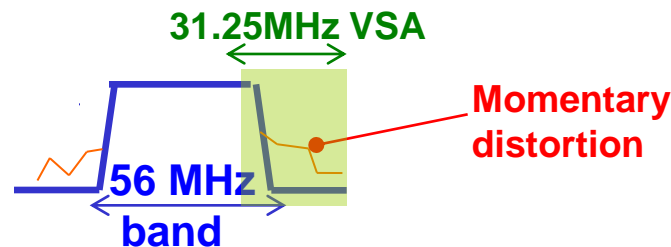


Output at each modulation method

Measure with VSA function



The timing of signal deterioration can be found easily using the VSA to seamlessly capture signals.  
(Example: degraded waveform quality when switching from 16QAM to 256QAM, etc.)



## Reference:

- (1) **MS2830A-044/045 26.5/43GHz Signal Analyzer Product Introduction (MS2830A-E-L-4)**

# Note

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