

ISDB-T

MS8901A

Digital Broadcast Signal Analyzer

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ISDB-T

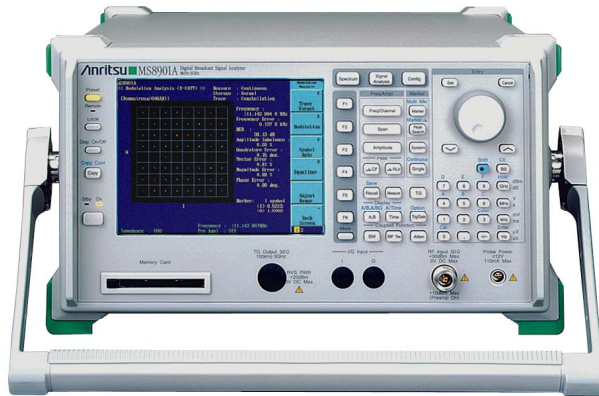
Product Introduction

(Version 1.00)



ISDB-T Analyzer

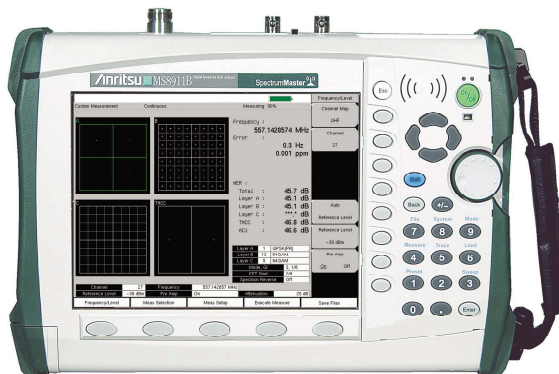
MS8901A



Applications: Tx Evaluation Tests and Field Measurements

- ▶ ISDB-T Signal analysis functions
- ▶ Spectrum analyzer (9 kHz to 3 GHz)
- ▶ Dimension 177 x 320 x 411 mm
(excluding handle, legs, front fan cover)
- ▶ Weight: <16 kg
- ▶ Color LCD (6.5")

MS8911B



Applications: Field Measurements

- ▶ ISDB-T Signal analysis
- ▶ Spectrum analyzer (100 kHz to 7.1 GHz)
- ▶ Compact: 313 x 211 x 77 mm
- ▶ Lightweight: <2.9 kg (excluding options)
- ▶ Battery operation: >2 hours
- ▶ Color LCD, wide display (8")
- ▶ Car cigarette lighter adapter (12 V)
- ▶ Easy file saving (Compact Flash, USB)

MS8901A Product Configuration

MX890110A

ISDB-T Field Test Software

MX890120B

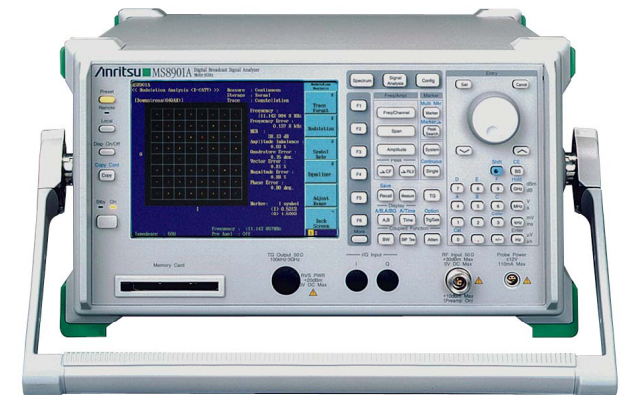
ISDB-T Signal Analysis Software

MU890100A

ISDB-T Demodulation Unit

Spectrum Analyzer

for ISDB-T



MS8911B Product Configuration

MS8911B-050

DVB-T/H Analysis Software

MS8911B-057 (Option 057)

DVB-T/H BER Unit

MS8911B-052 (Option 052)

DVB-T/H SFN Field Measurement Software

Spectrum Analyzer

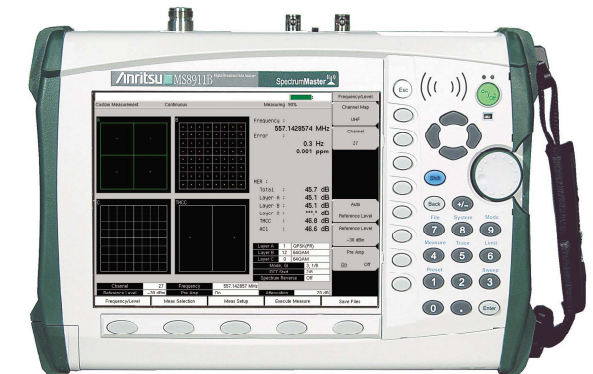
MS8911B-030 (Option 030)

ISDB-T Analysis Software

MS8911B-032 (Option 032)

ISDB-T SFN Field Measurement Software

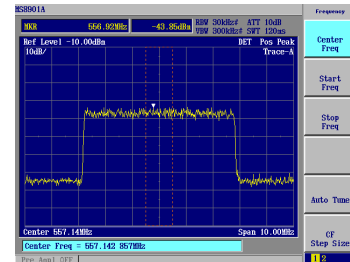
for DVB-T/H



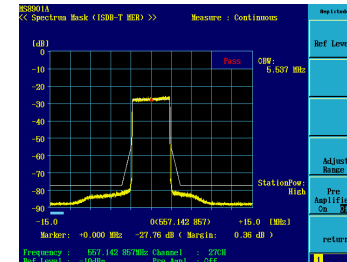
for ISDB-T

Tx Test Items

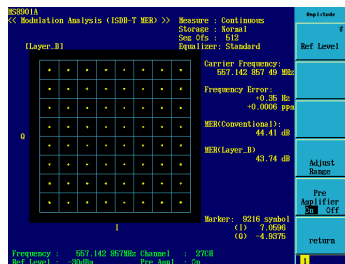
Spectrum Monitor (Spectrum Analyzer)



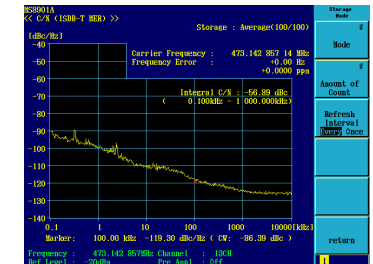
Spectrum Mask



Frequency Offset, MER, Constellation



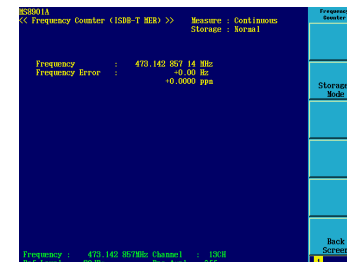
C/N (for Continuous Wave)



Signal Power

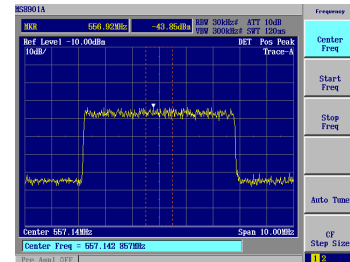


Frequency Counter (for Continuous Wave)

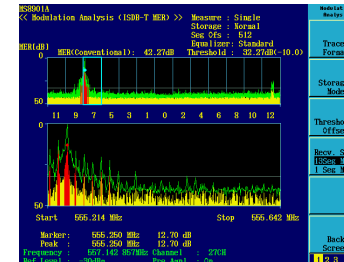


Field Measurement Items

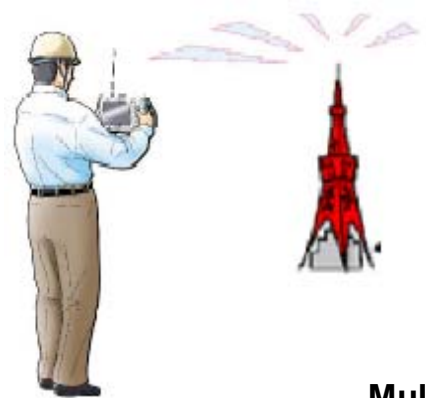
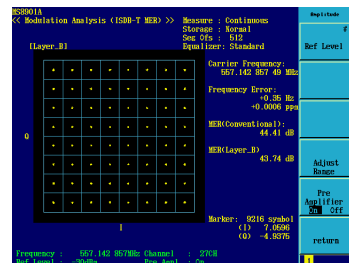
Spectrum Monitor (Spectrum Analyzer)



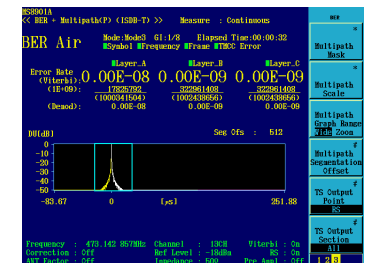
Carrier MER



Frequency Offset, MER, Constellation



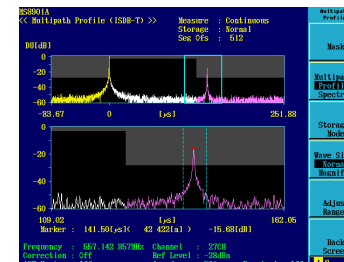
BER



Signal Power



Multi-Path



List of Functions and Measurement Items

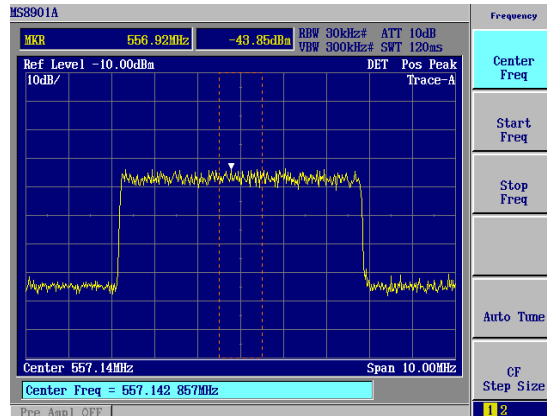
	Measurement Functions	MS8901A (ISDB-T)	MS8911B (ISDB-T)	Tx Evaluation	Field Measurem ent
1	Spectrum Monitor (Spectrum Analyzer)	Yes	Yes	Important	Important
2	Signal Power	Yes	Yes	Important	Important
3	Frequency Offset	Yes	Yes	Important	
4	MER	Yes	Yes	Important	Important
5	Constellation Diagram	Yes	Yes	Important	Important
6	Carrier MER Graph	Yes	No		Important
7	Multi Path Graph (Impulse Response Graph)	Yes	Yes		Important
8	Spectrum Mask	Yes	Yes	Important	
9	C/N (for Continuous Wave)	Yes	Yes	Important	
10	Frequency Counter (for Continuous Wave)	Yes	Yes	Important	
11	BER	Yes	No		Important
12	DVB-ASI Output	Yes	No		
13	Signal Power (Each Path)	No	Yes		
14	Impulse Response Graph (Long-term Delay)	No	Yes		

Determining Signal Quality

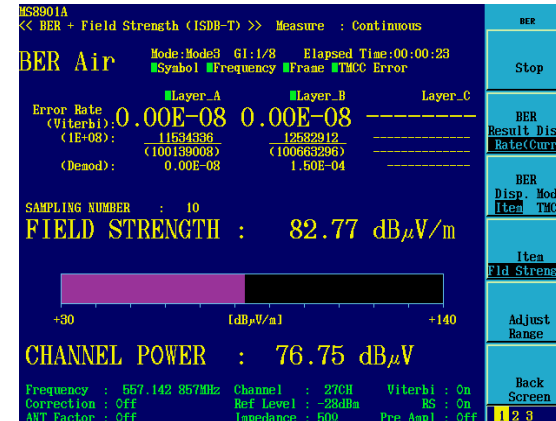
Video = OK, Waveform = OK, Level = OK, BER = OK



<Video>



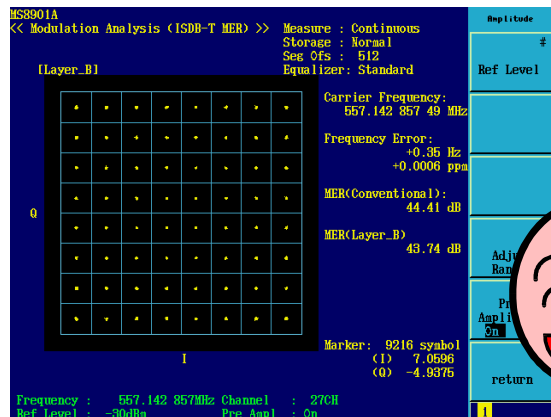
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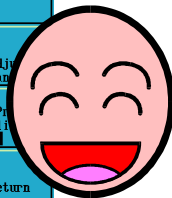
<BER>

But what about MER and Constellation?

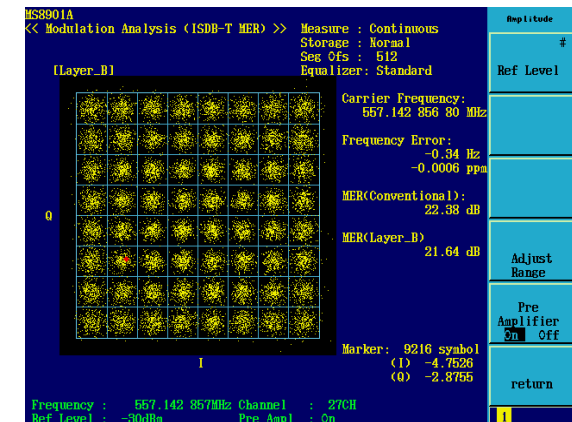
Good Signal Quality



Signal quality is
unknown until analyzed!



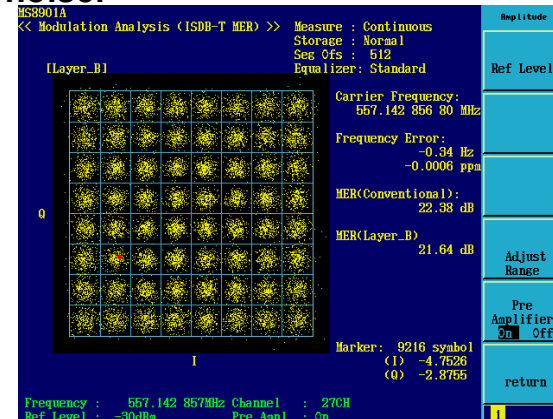
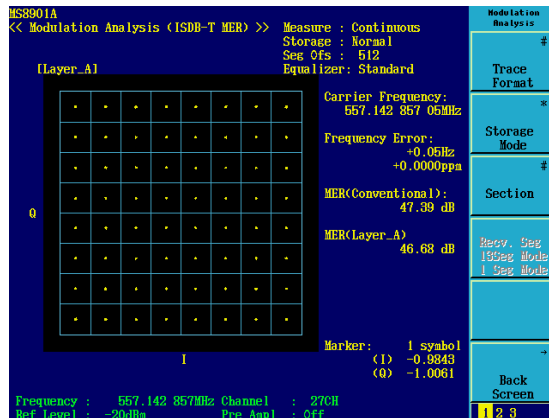
Bad Signal Quality



What Do Constellation Measurements Show?

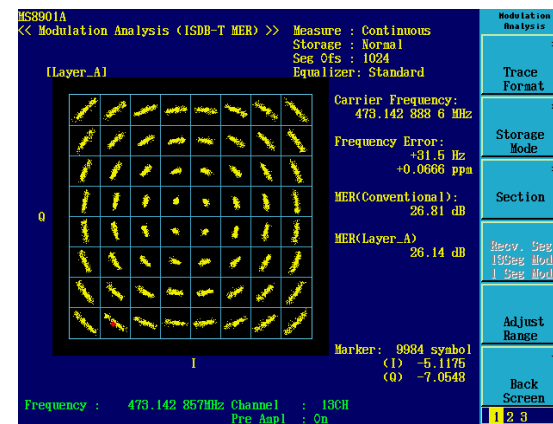
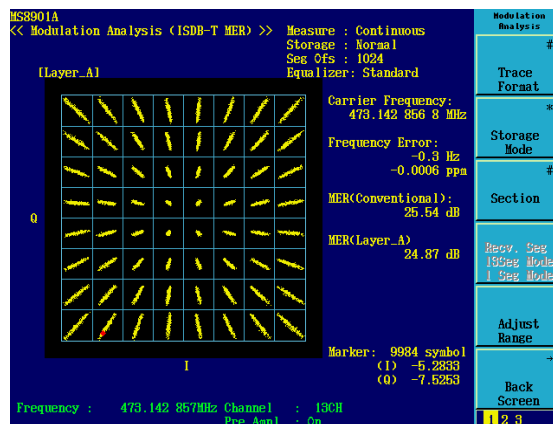
When the signal is normal, the analysis signal is centered on each cell. However, when the signal is abnormal, various odd phenomena occur.

This is the pattern when white noise is added to an OFDM waveform. The constellation is evenly diffused and we can conjecture that the cause of the degradation is white noise.



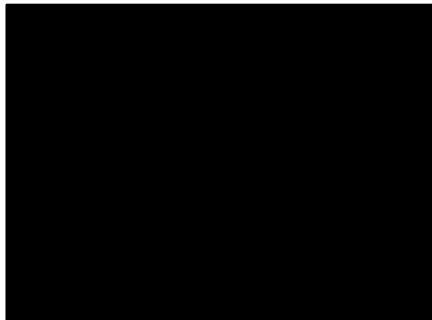
This indicates variations in level due to fading and inadequate AGC.

This indicates frequency drift (phase drift) due to loss of PLL and FFT sampling errors.

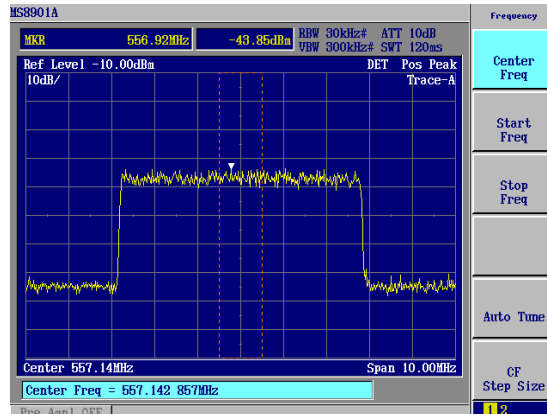


Finding Causes of Degraded Signal

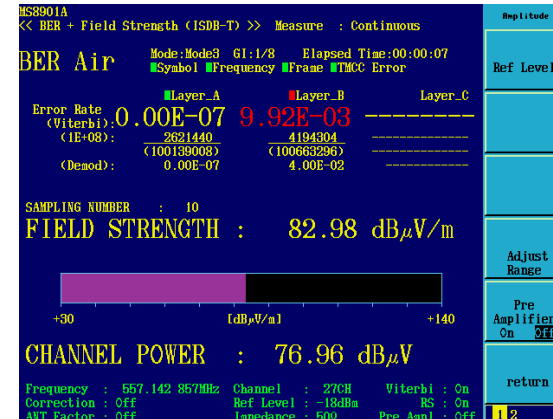
Video = **NG**, Waveform = OK, Level = OK, BER = **NG**



<Video>



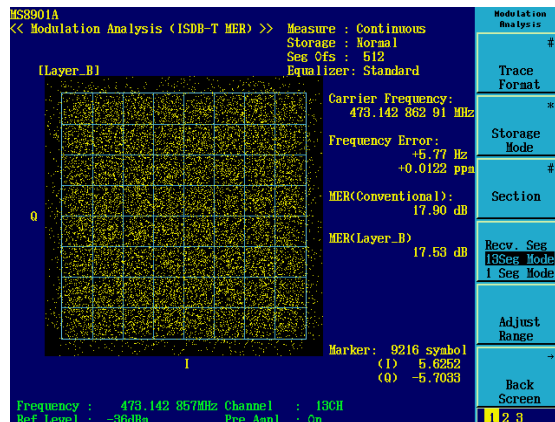
<Waveform>



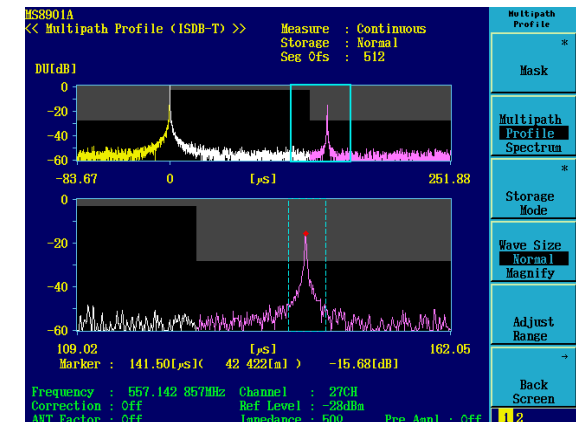
<BER>

What's causing errors?

Poor C/N



Signal delay out of GI range

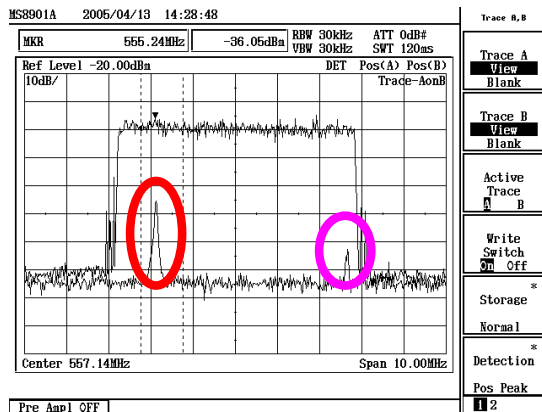


The cause is unknown
until the signal is
analyzed!

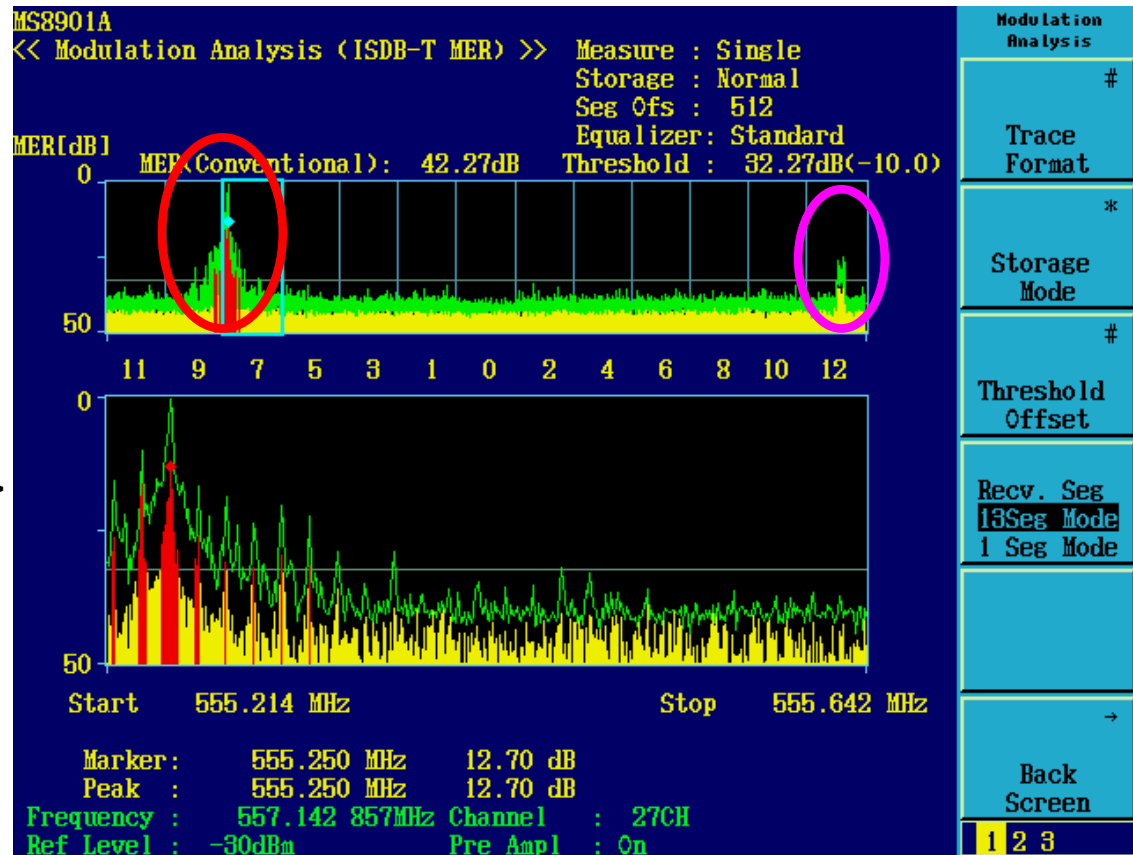
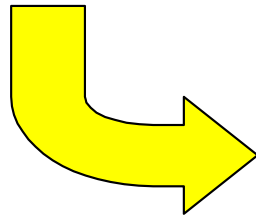


Finding in-band Interference

Digital broadcast signals can be observed with a spectrum analyzer (SA), but when there is a heavy interference signal, observation using an SA is very difficult. In these circumstances, it is possible to determine the hidden in-band interference of an ISDB-T signal by analyzing each subcarrier.



<Finding Analog Interference in ISDB-T Waveform>

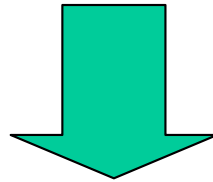


<MX890120B Subcarrier MER Measurement Example>

Analog to Digital Transition

Terrestrial digital broadcasting is transitioning from analog to digital technology.

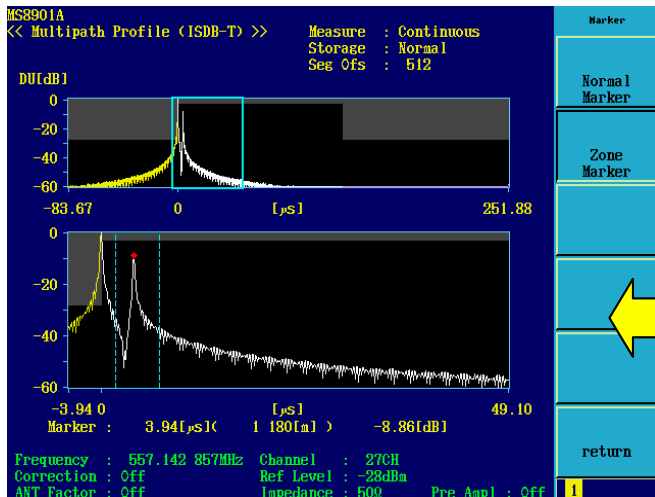
Of course, previous measurements are still required but digital technologies require new measurements.



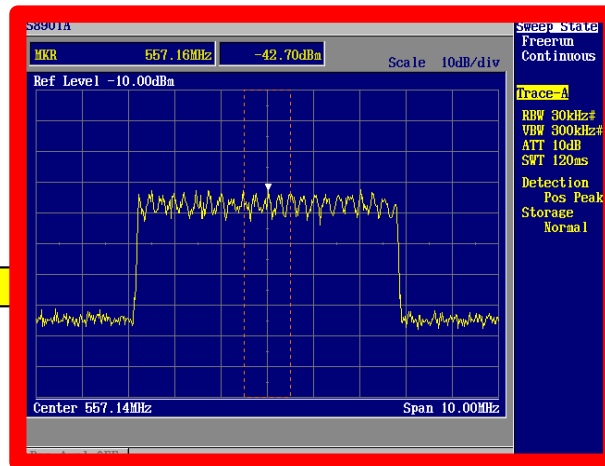
The MS8901A supports these needs.

APPENDIX

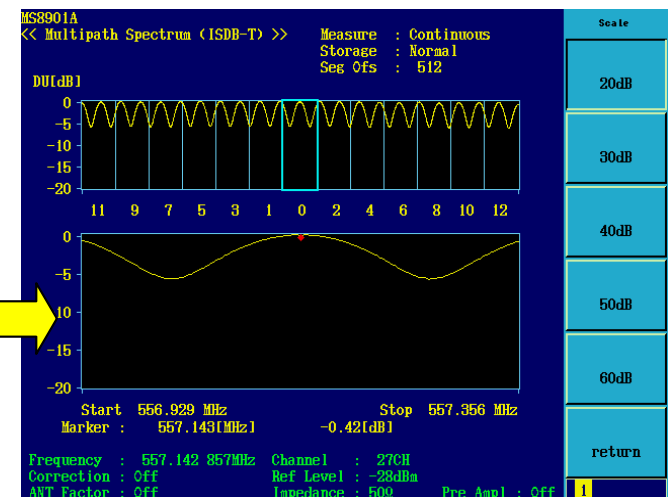
Impact of Signal Delay



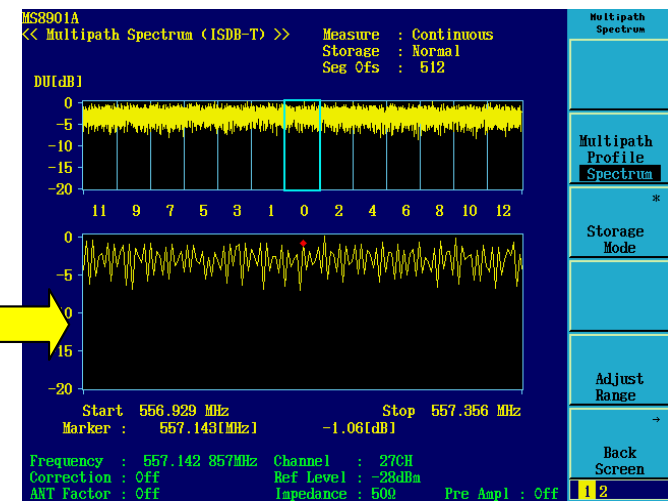
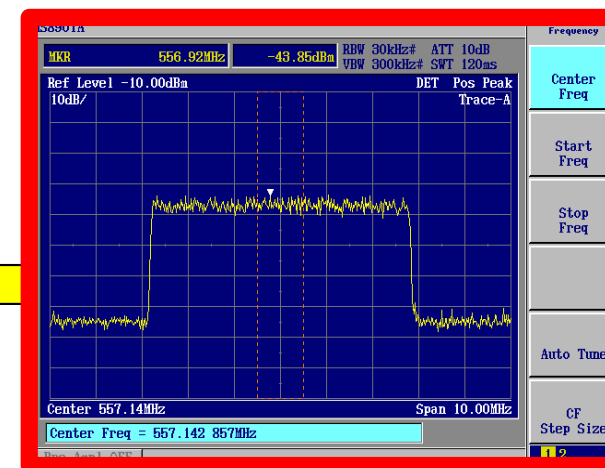
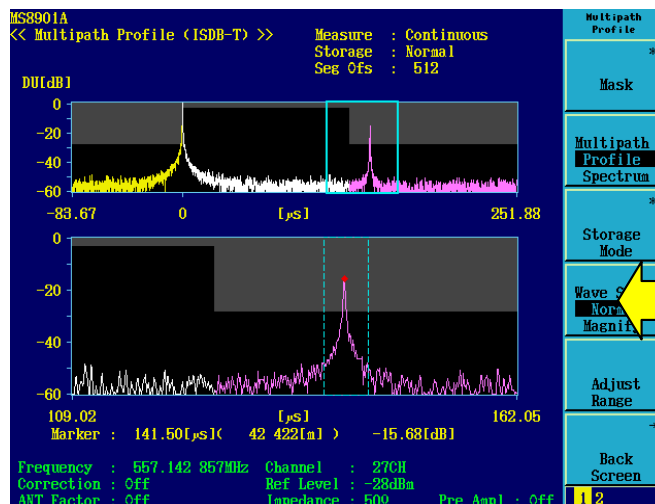
<Delay Profile Measurement>



<Waveform>



<Frequency Characteristics>



Signal quality must be determined by performing various analyses even when monitoring good signals using SPA.

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