

MS8911A

Digital Broadcast Field Analyzer 100 kHz to 7.1 GHz

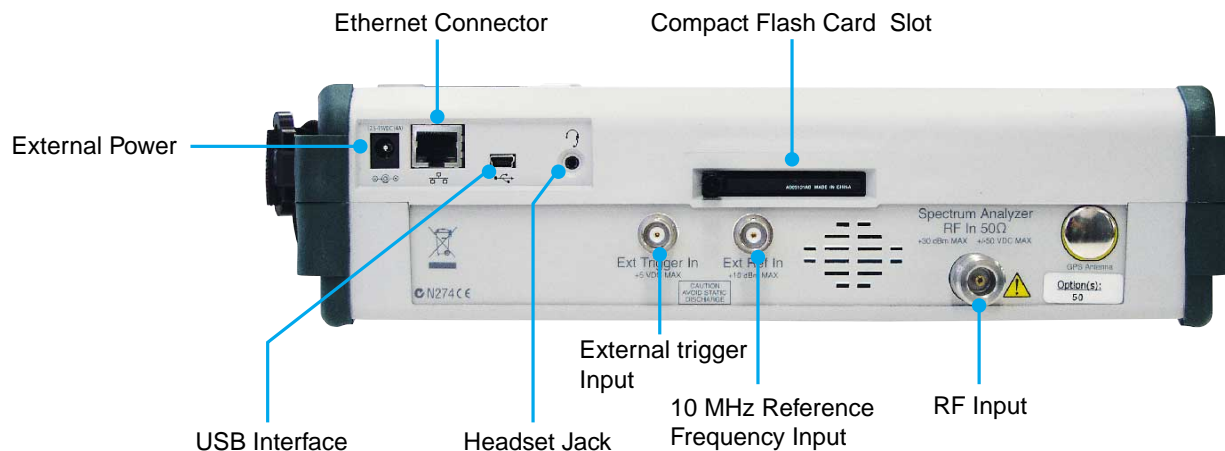
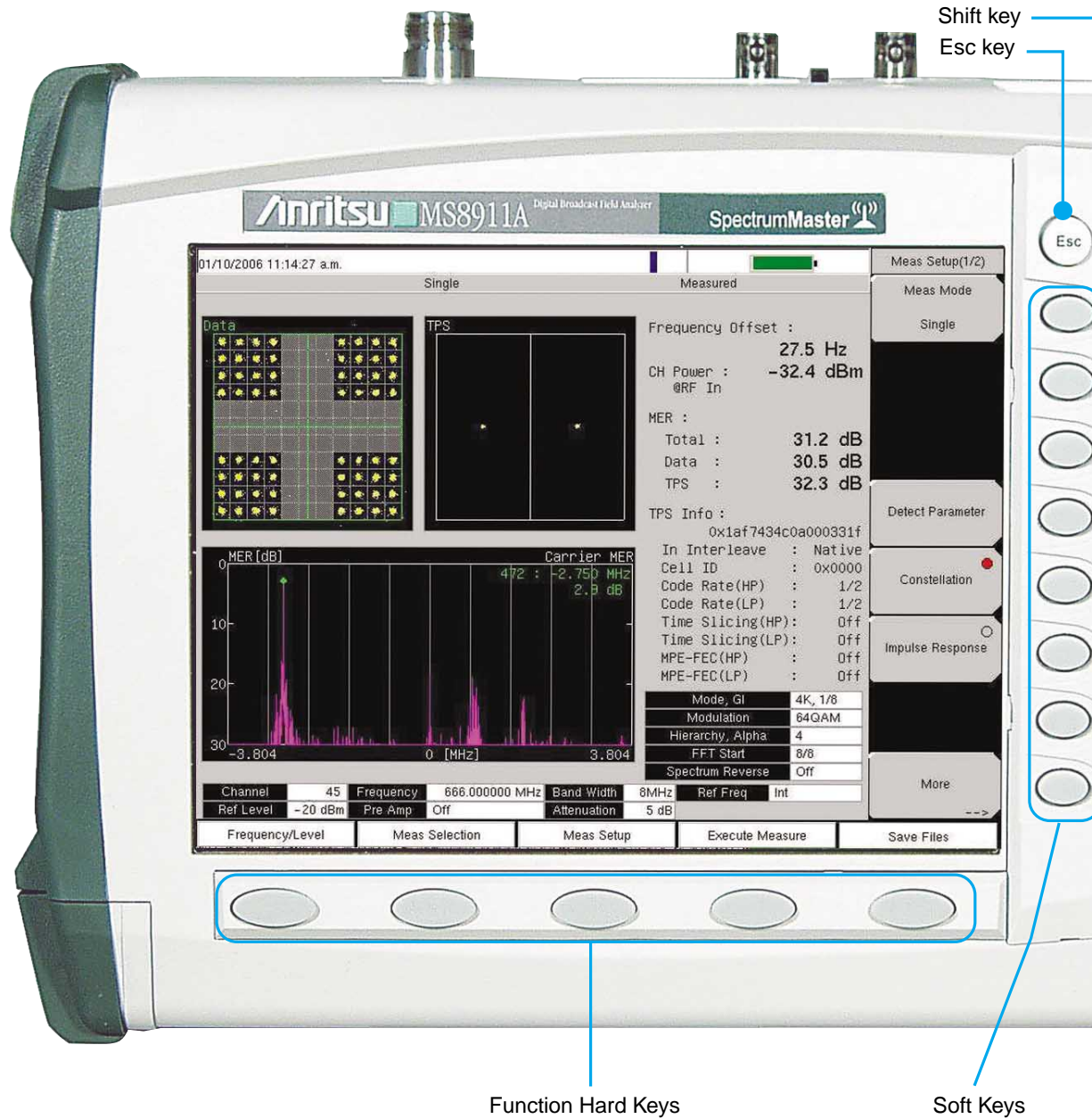
MS8911A/50

DVB-T/H Analysis Software 30 MHz to 990 MHz



For field measurement and maintenance of DVB-T/H digital broadcasting equipment

The Digital Broadcast Field Analyzer features high performance spectrum analyzer functions in a compact battery-operated unit. The MS8911A is very useful for area survey and field maintenance of digital broadcasting equipment.



MS8911A Digital Broadcast Field Analyzer

MS8911A/50 DVB-T/H Analysis Software



High Performance Handheld Spectrum Analyzer

This analyzer is equipped with a high performance spectrum analyzer from 100 kHz to 7.1 GHz.

DVB-T/H Terrestrial Digital Broadcasting Measurement

DVB-T/H field strength measurement, modulation analysis MER, constellation, frequency offset, impulse response and frequency response are integrated. This analyzer is ideal for the area survey and maintenance of DVB-T/H equipment.

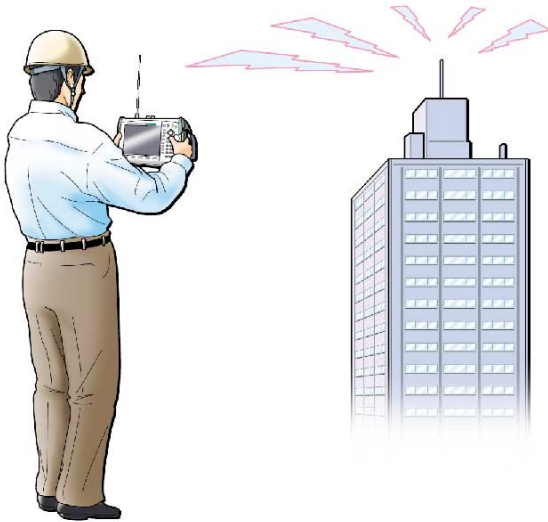
Usability

MS8911A/50 is designed to minimize the steps required to measure DVB-T/H signals so even beginners can analyze the signals quickly.



High Performance Handheld Spectrum Analyzer Functions

The MS8911A Digital Broadcasting Field Analyzer has the spectrum analyzer function from 100 kHz to 7.1 GHz.



Field Measurements

The MS8911A shortens the measurement time in the field, while covering a wide dynamic range (Figure 1). User can save the measurement results to the internal memory.

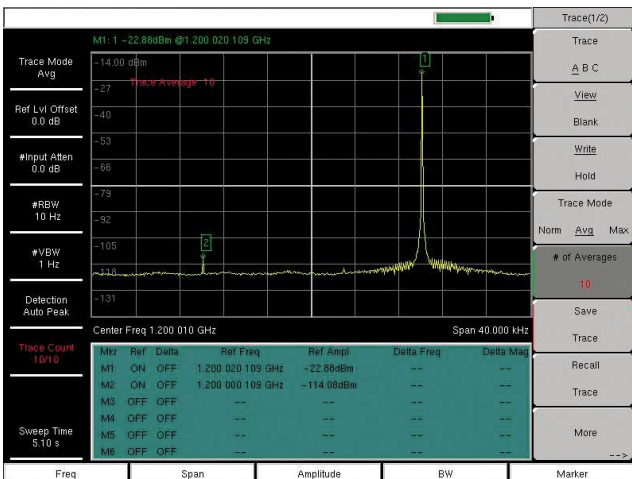


Figure 1: Measuring a small signal in the presence of a very large signal

R&D Measurements

This analyzer is equipped with various functions like the setting of RBW, VBW and span. This analyzer can be used as a high performance spectrum analyzer in development and manufacturing. The power line side-band noise of a signal source can be measured (Figure 2).

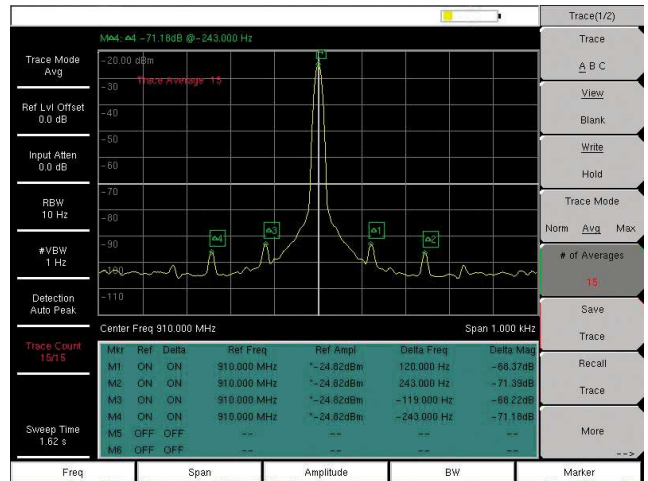


Figure 2: Power line related sidebands on a synthesized signal generator

Other Features

- High-speed sweep (900 ms: fullband, 50 μ s: Zero Span)
- Maximum input level + 43 dBm (20 W)
- Drawing the limit lines
- Multi-marker
- Noise marker
- Frequency counter marker (The frequency of the set marker point can be read in 1Hz resolution)
- One Button measurements (Channel power ^{*1}, field strength ^{*1}, occupied frequency bandwidth, adjacent channel leak power, C/I: carrier vs interference)
- AM/FM demodulation function
- External control tool (external control software tool using Ethernet or USB)
- Local language support (English, Japanese, French, German, Italian, Korean, Chinese, Spanish)

*1: Method with the Spectrum Measurement

MS8911A/50 DVB-T/H Analysis Software Functions

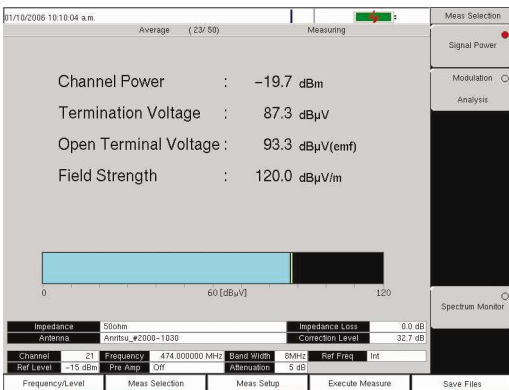
The MS8911A/50 DVB-T/H Analysis Software is the measurement software, which analyzes the terrestrial digital broadcasting (DVB-T) and the mobile terminal (DVB-H). This is very useful for area survey, installation and maintenance of terrestrial digital broadcasting equipment.

MS8911A/50 Measurement Items

- Terminal voltage, channel power and field strength measurement
- Impulse response
- MER, constellation and frequency offset measurement
- Detecting function of Mode, GI and TPS parameters

Signal Power Measurement

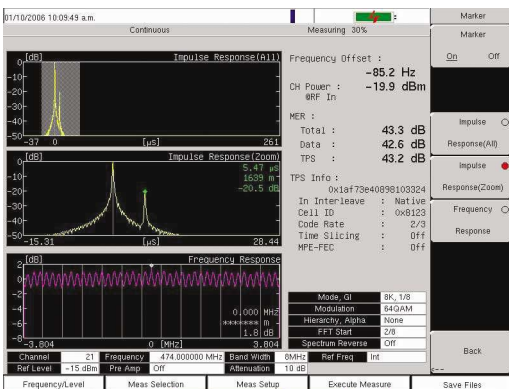
This function measures terminal voltage, channel power and field strength (dB μ V/m) accurately. The measurement results are displayed by numerical and bar graph. This function is useful when adjusting the antenna angle or area survey.



Signal Power Measurement

Impulse Response Measurement

This function measures the difference of time and level of the multi-path signals. By measuring the frequency response of the channel, the influence of multi-path or frequency selective fading can be observed. This is useful to adjust timing of the SFN repeaters.



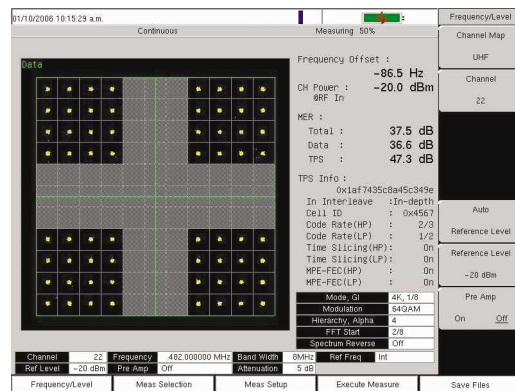
Impulse Response Measurement

MER/Constellation Measurement

MER measurement function, which can evaluate the modulation signal quality of the digital broadcasting signal directly and quantitatively, is essential for the management of signal margin, fixed deterioration of equipment over time and to maintain the stable broadcast services. MER. (Residual MER: 47 dB (Typ.))

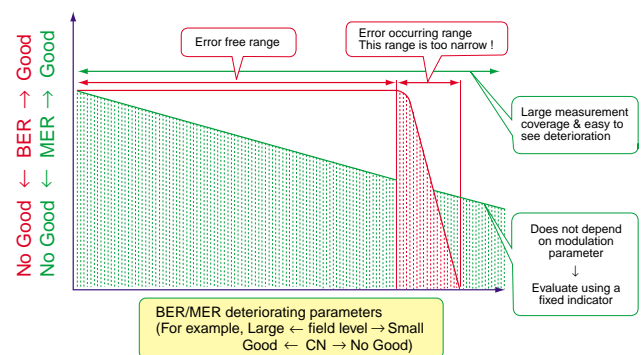
The constellation is very useful for analyzing the condition of the received signal by monitoring the modulation symbol movement.

Moreover this function measures the center frequency accurately by using a proprietary advanced signal processing technique.



MER / Constellation Measurement

Relationship between BER/MER and CN

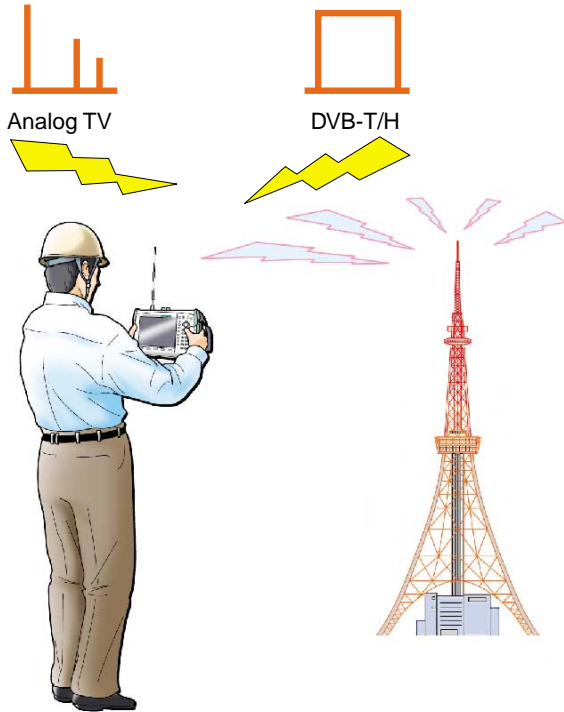


[Merits of measuring MER]

- MER shows the signal deterioration even if BER (Bit Error Rate) can't detect errors (Error free range). \rightarrow Possible to maintain margin quality
- MER is not related to modulation parameters, so MER result is easily comparable to other MER results.

The Measurement of in-band Interference

This function identifies the signal frequency of interfering or spurious signals which hide within the bandwidth of the DVB-T/H signal using the Carrier vs MER function.



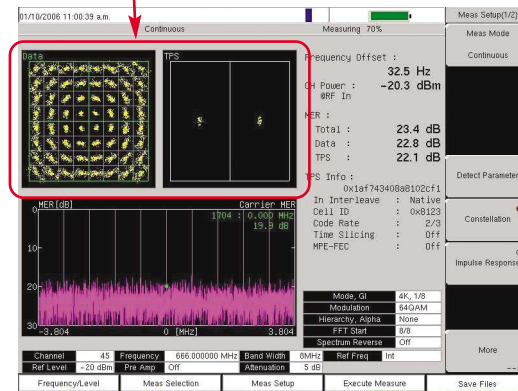
Investigation into the cause of trouble

The MS8911A/50 has the Anritsu proprietary analysis technique observing troubles such as AM or PM visually with the constellation.

Example of amplitude fluctuated signal

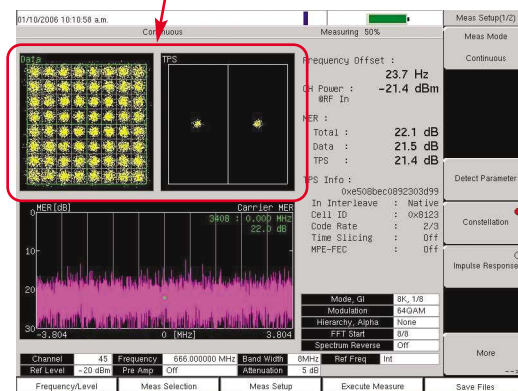


Example of frequency fluctuated signal



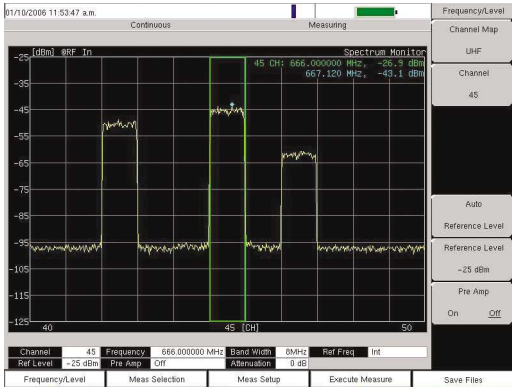
Carrier vs MER Graph

Example of signal distortion



Spectrum Monitor

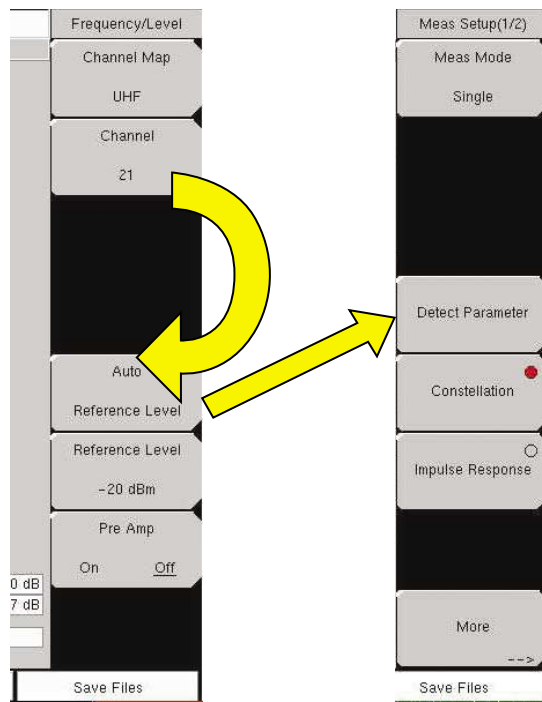
Spectrum Monitor function shows the frequency response around desired channel. The span is variable, so up to 51 channels can be displayed simultaneously. With this function, the broadcasting service signals can be checked at a glance.



Spectrum Monitor (Span = 11 Channels)

Ease of Use

In the field, there are lots of restrictions on time, place and the user's level of skill. The MS8911A/50 provides easy operation so that the beginner user can operate this instrument by only setting the desired channel number, Auto Reference Level and Detect Parameter buttons are used to set the reference level and transmission parameters automatically.



Basic Operation to Analyze the Signal:
Channel → Auto Reference Level → Detect Parameter



Optional Accessories



61382 Soft Carrying Case



Soft Carrying Case (With Cover Opened)



633-44 Rechargeable battery, Li-Ion



Stand



760-235 Transit Case





Specifications

■ MS8911A Digital Broadcast Field Analyzer

Frequency	Frequency range	100 kHz to 7.1 GHz				
	Tuning Resolution	1 Hz				
	Frequency Reference	Aging: ± 1 ppm/ year Accuracy: ± 1 ppm ($25^{\circ}\text{C} \pm 25^{\circ}\text{C}$) +long term drift				
	Frequency Span	10 Hz to 7.1 GHz plus 0 Hz (zero span)				
	Span Accuracy	Accuracy: ± 1 ppm ($25^{\circ}\text{C} \pm 25^{\circ}\text{C}$) +long term drift				
	Sweep Time	Minimum 100ms, 50 μs in zero span				
	Sweep Time Accuracy	$\pm 2\%$ in zero span				
	Sweep Trigger	Free run, Single, Video, External				
	Resolution Bandwidth	(-3 dB width) 10 Hz to 3 MHz in 1-3 sequence $\pm 10\%$, 8 MHz demodulation bandwidth				
	Video Bandwidth	(-3 dB) 1 Hz to 3 MHz in 1-3 sequence				
	SSB Phase Noise	-100 dBc/Hz max at 10, 20 and 30 kHz offset from carrier -102 dBc/Hz max at 100 kHz offset from carrier				
Amplitude	Measurement Range	DANL to +30 dBm				
	Absolute amplitude accuracy Power levels ≥ -50 dBm, < 35 dB input attenuation, preamp off	100 kHz to 10 MHz ± 1.5 dB >10 MHz to 4 GHz ± 1.25 dB >4 MHz to 7.1 GHz ± 1.75 dB				
	Second Harmonic Distortion (0 dB input attenuation, -30 dBm input)	-50 dB: 0.05 to 0.75 GHz -40 dB: >0.75 to 1.05 GHz -50 dB: >1.05 to 1.4 GHz -70 dB: >1.4 to 2 GHz -80 dB: >2 GHz				
	Third Order Intercept (TOI) (preamplifier off)	Frequency	Typical			
		50 MHz to 300 MHz	>8 dBm			
		>300 MHz to 2.2 GHz	>10 dBm			
		>2.2 GHz to 2.8 GHz	>15 dBm			
		>2.8 GHz to 4.0 GHz	>10 dBm			
		>4.0 GHz to 7.1 GHz	>13 dBm			
	Displayed Average Noise Level DANL in 10 Hz RBW, 0 dB attenuation reference level -50 dBm	Frequency	Preamp On		Preamp Off	
			Typical	Max	Typical	Max
	>10 MHz to 1 GHz	-153	-151	-130	-127	
	>1 GHz to 2.2 GHz	-150	-149	-126	-123	
	>2.2 GHz to 2.8 GHz	-146	-143	-120	-116	
	>2.8 GHz to 4.0 GHz	-150	-149	-129	-126	
	>4.0 GHz to 7.1 GHz	-148	-146	-121	-117	
					dBm	
Noise Figure (Derived from DANL measurement) 0 dB attenuation, reference level -50dBm, 23°C, preamp on	Frequency	Typical				
	>10 MHz to 1 GHz	11 dB				
	>1 GHz to 2.2 GHz	14 dB				
	>2.2 GHz to 2.8 GHz	18 dB				
	>2.8 GHz to 4.0 GHz	14 dB				
	>4.0 GHz to 7.1 GHz	16 dB				
Display Range	1 to 15 dB/div in 1 dB steps. Ten divisions displayed					
Amplitude Units	Log Scale modes: dBm, dBV, dBmV, dB μ V Linear Scale modes: nV, μ V, mV, V, kV, nW, μ W, mW, W, kW					
Attenuator Range	0 to 65 dB					
Attenuator Resolution	5 dB steps					
Input Related Spurious *Exceptions: Input Frequency 1674 MHz >1674 to 1774 MHz	-60 dBc max*, (< -70 dBc Typical), -30 dBm input, 0 dB RF attenuation -70 dBc) Spur Level -46 dBc max (-56 dBc typical), 0 to 2800 MHz -50 dBc max (-60 dBc typical), at F input -1674 MHz					

Amplitude	Residual Spurious, Preamp Off (RF input terminated, 0 dB RF attenuation) **Exceptions	-90 dBm max**, 100 kHz to <3200 MHz -84 dBm max**, 3200 kHz to 7100 MHz
	Frequency 250, 300 and 350 MHz to 4010 MHz to 5084 MHz to 5894 MHz to 7028 MHz	Spur Level -85 dBm max -80 dBm max (-90 dBm typical) -70 dBm max (-83 dBm typical) -75 dBm max (-87 dBm typical) -80 dBm max (-92 dBm typical)
	Residual Spurious, Preamp On	-100 dBm max (RF input terminated, 0 dB RF attenuation)
General	RF Input VSWR	2.0: 1 maximum, 1.5: 1 typical \geq (10 dB attenuation)
	Maximum Continuous Input	\geq 10 dB attenuation, +30 dBm
	Input Damage Level	\geq 10dB attenuation, >+43 dBm, \pm 50 Vdc <10dB attenuation, >+23 dBm, \pm 50 Vdc Input protection relay opens at >30 dBm with \geq 10 dB input attenuation and approximately 10 to 23 dBm with <10 dB attenuation
	ESD Damage Level	>10 kV \geq 10 dB attenuation
	External Standard Frequency	1 MHz, 1.2288 MHz, 1.544 MHz, 2.4576 MHz, 4.8 MHz, 4.9152 MHz, 5 MHz, 9.8304 MHz, 10 MHz, 13 MHz, 19.6608 MHz, Input level: -10 to +10 dBm
	Display	Bright Color Transmissive LCD, Full SVGA, 8"
	Languages	Built-in English, Spanish, French, German, Japanese, Chinese, Italian and Korean.
	Marker Modes	Six Markers, Seven Modes: Standard, Delta, Marker to Peak, Marker to Center, Marker to Reference Level, Next Peak Left, Next Peak Right, All Makers Off, Noise Marker, Frequency Counter Marker (1 Hz resolution)
	Sweeps	Full span, Zero span, Span Up/Span Down
	Detection	Peak, RMS, Negative, Sample
	Memory	The internal memory provides for the storage and recall of more than 1000 measurement setups and more than 1000 traces. The contents of the internal memory can be copied to and from a removable Compact Flash card.
	Traces	Displayed Traces: Three traces overlay. One trace is always the live data, two traces can be either stored data or traces which have been mathematically manipulated.
	Interfaces	Type N Female RF Connector BNC female connectors for external frequency reference and external trigger Mini-B USB 2.0 for data transfer to a PC RJ45 connector for Ethernet 10/100-BaseT 2.5mm 3-wire headset connector
	Size and Weight	313 x 211 x 77 mm, <2.9 kg typical
	Environmental	MIL-PRF-28800F Class 2 Operating: -10°C to 55°C, humidity 85% or less Storage: -51°C to 71°C
	Safety	Conforms to EN 61010-1 for Class 1 portable equipment
Electromagnetic Compatibility	Meets European Community requirements for CE marking	



Specifications

■ The following shows the standard when this software is installed into the MS8911A.

Electric Characteristic	These specifications are based on when the MS8911A/50 is installed in the MS8911A. For performance specifications, each value is assumed to be obtained from measurement after 10-minute preheating under constant ambient temperature conditions.			
Setting	Common	Channel Map	UHF, None	
		Channel	When channel map is UHF, the numerical value 21 to 69 (setting resolution: 1 channel) can be set to channel. This time, the central frequency is set to $474 + (\text{channel} - 21) \times \text{Band Width}$	
		Frequency	When channel map is None, frequency range is 30 to 990 MHz (setting resolution: 1 Hz).	
		Band Width	8 MHz	
		Pre Amp	On, Off	
		Reference Level	+20 dBm to -25 dBm/ 5 dB step (Pre Amp = Off) -10 dBm to -50 dBm/ 10 dB step (Pre Amp = On)	
	Signal Power	Meas Mode	Single, Continuous, Average, Moving Average, Max Hold	
		Average Count	1 to 100	
		Correction table for Field Strength	Level correction data table for measuring the Field Strength can be stored within the measurement instrument.	
		Impedance	50 Ω , 75 Ω (External impedance converter corresponds with the case of 75 Ω)	
	Modulation Analysis	Meas Mode	Single, Continuous, Average, Moving Average	
		Average Count	1 to 100	
		Screen Select	Constellation, Impulse Response	
		Mode	4K, 8K	
		GI	1/4, 1/8, 1/16, 1/32	
		Modulation	QPSK, 16QAM, 64QAM	
		Hierarchy	None, $\alpha=1$, $\alpha=2$, $\alpha=4$	
		FFT Start Position	0/8, 1/8, 2/8, 3/8, 4/8, 5/8, 6/8, 7/8, 8/8	
		Spectrum Reverse	On, Off	
	Detect Parameters	Automatic detection for the Mode, GI, Modulation, and Hierarchy parameter		
	Spectrum Monitor	Meas Mode	Single, Continuous	
		Span	1, 3, 5, 11, 31, 51 Channel	

Results	Common	Reference Frequency	Internal, External (10 MHz)	
	Signal Power	DVB-T/H signal, 1 channel input		
		Channel Power	Measures the channel power	
		Resolution	0.1 dB	
		Accuracy	Channel: 21 to 69, Band Width: 8 MHz, Averaging Count: 10, Target's VSWR is under 1.5, 50 Ω termination Preamplifier: Off ±2.0 dB (+20 to 10 dBm, typical) ±2.0 dB (–10 to 60 dBm) Preamplifier: On ±2.0 dB (–20 to 84 dBm)	
		DANL (Display Average Noise Level)	Channel: 21 to 69, Band Width: 8 MHz, Averaging Count: 50, RF input 50 Ω termination, 20 to 30°C Preamplifier: Off, Reference Level: –25 dBm ≤ –69 dBm Preamplifier: On, Reference Level: –50 dBm ≤ –93 dBm	
		Unit	dBm	
		Termination Voltage, Open Terminal	Voltage, Field Strength	
		Display Item	Termination Voltage [dBuV], Open Terminal Voltage [dBuV (emf)], Field Strength [dBuV/m]	
		Graph	Termination Voltage [dBuV] is displayed as bar chart	
		Modulation Analysis	Common	DVB-T/H signal, 1 channel input
	Frequency Lock Range			±90 kHz
	Frequency Offset			Measures the central frequency offset of the modulation signal
	Unit			Hz
	Display Resolution			0.1 Hz
	Accuracy			–20 dBm, MER>40 dB, Preamplifier: off, Average Count 10, Channel : 21 to 69, Band Width: 8 MHz, Mode: 8K GI: 1/8, Modulation: 64QAM, Hierarchy: None ± (Measurement frequency _ Reference frequency accuracy) ±0.3 Hz
	Channel Power			Measures the channel power (@RF In)
	Resolution			0.1 dB
	MER			Measures MER (Modulation Error Ratio)
	Display Item			Total, Data, TPS
	Display Resolution			0.1 dB
	Residual MER			MER: Total, Channel : 21 to 69, Band Width: 8 MHz, Mode: 8K, GI:1/8, Modulation: 64 QAM, Hierarchy: None, Average Count: 10, Typical Preamplifier: Off, Reference Level: –20 dBm input ≥42 dB Preamplifier: On, Reference Level: –50 dBm input ≥37 dB
	Interference			MER: Total, Channel : 21 to 69, Band Width: 8 MHz, Mode: 8K, GI:1/8, Modulation: 64 QAM, Hierarchy: None, Average Count: ten, Reference Level: –25 dBm, ±2ch interfering wave, 0 dBm typical for the desired wave ≥30 dB (Preamplifier: Off, –35 dBm)

Results	Modulation Analysis	Common	TPS	TPS information (68 bits) is displayed in hexadecimal		
			Inner Interleave	Native, In-depth		
			Cell ID	Cell ID (16 bits) is displayed in hexadecimal		
			Code Rate	1/2, 2/3, 3/4, 5/6, 7/8 HP and LP are displayed in hierarchical mode		
			Time Slicing	On, Off HP and LP are displayed in hierarchical mode		
			MPE-FEC	On, Off HP and LP are displayed in hierarchical mode		
		Constellation	Constellation		Display Item	Data, TPS
			Carrier MER Graph		For field measurement	
			Horizontal Axis		Frequency Displays the central frequency as 0 MHz	
			Display Range		When Band Width is 8 MHz: -3.804 to 3.804 MHz	
			Valid Range		When Mode is 4K: -3.750 to 3.750 MHz When Mode is 8K: -3.777 to 3.777 MHz	
			Resolution		When Mode is 4K: 2.232 kHz When Mode is 8K: 1.116 kHz	
			Vertical Axis		MER	
			Display Range		0 to 30 dB	
			Resolution		0.1 dB	
			Marker		Carrier number, Offset frequency and MER are displayed	
			Impulse Response	Impulse Response Graph		
		Horizontal Axis		Delayed time Displays the maximal level signal as 0 μ s		
		Display Range		All graph: -1/24 of the valid symbol length to 7/24 of the valid symbol length Zoom graph: 43.75 μ s in width at the optional position within the whole graph		
		Valid Range		0 μ s to guard interval		
		Resolution		0.11 μ s		
		Vertical Axis		Level		
		Display Range		5 dB, 10 dB, 25 dB, 50 dB		
		Marker		On, Off When marker is on, Delay, Distance and Level are displayed		
		Frequency Response Graph				
		Horizontal axis		Displays the central frequency as 0 MHz		
		Display Range		When Band Width is 8 MHz: -3.804 to 3.804 MHz		
Valid Range		When Mode is 4K: -3.750 to 3.750 MHz When Mode is 8K: -3.777 to 3.777 MHz				
Resolution		When Mode is 4K: 2.232 kHz When Mode is 8K: 1.116 kHz				
Vertical Axis						
Display Range		5 dB, 10 dB, 25 dB, 50 dB				
Marker		On, Off When marker is on, the offset frequency and the relative level are displayed				

Results	Spectrum Monitor	Spectrum Graph	
		Horizontal axis	Channel or Frequency
		Display width	1, 3, 5, 11, 31, 51 Channel
		Vertical Axis	
		Display Range	100 dB of the range between –150 to 20 dB (Preamplifier: On, Reference level: Over –50 dBm, Preamplifier: Off, Reference level: 20 dBm)
		Channel Power	Measures the channel power (@RF In)
	Display Resolution	0.1 dB	
Other	Reference Frequency	Frequency	10 MHz
		Level	–10 dBm to +10 dBm
	Save the Measurement Results		JPEG file on the measurement screen and the CSV file of the numerical data (Except for graph data) can be stored within the internal memory. The file of the measurement results within the memory can be copied to the external memory.
	Save Recall of the Setting Information		Saves the panel setting information into the internal memory. Recalls the panel set information which is saved, to reflect to the panel setting
	Display Language	English or Japanese is selectable	

Compliant with ETSI EN 300 744 and TR 101 290.



Ordering Information

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

Part Number	Description	Remarks
Main frame		
MS8911A	Digital Broadcast Field Analyzer	
	Standard Accessories	
W2535AE	Operation Manual	
61382	Soft Carrying Case	
2300-498	Master Software Tools Program CD ROM	
633-44	Rechargeable battery, Li-Ion	
40-168	AC-DC Adapter	
806-141	Automotive Cigarette Lighter/12 Volt DC Adapter	
2000-1360	USB Cable (A-mini B)	
2000-1371	Ethernet Cable 7 feet (213 cm)	
2000-1358	64MB Compact Flash Memory	
1091-27	Adapter, N (m) to SMA (f), 50 Ω	
1091-172	Adapter, N (m) to BNC,50 Ω	
Software		
MS8911A/50	DVB-T/H Analysis Software	
	Standard Accessory	
W2641AE	Operation Manual	
Optional Accessories		
61382	Soft Carrying Case	
2300-498	Master Software Tools Program CD ROM	
633-44	Rechargeable battery, Li-Ion	
40-168	AC-DC Adapter	
806-141	Automotive Cigarette Lighter/12 Volt DC Adapter	
2000-1360	USB Cable (A-mini B)	
2000-1371	Ethernet Cable 7 feet (213 cm)	
2000-1358	64 MB Compact Flash Memory	
1091-27	Adapter, N (m) to SMA (f), 50 Ω	
1091-172	Adapter, N (m) to BNC, 50 Ω	
42N50A-30	Attenuator 30 dB, 50 W, Bi-directional, DC-18 GHz, N (m)-N (f)	
15NNF50-1.5C	Test port cable armored	1.5 m, N (m)-N (f), 6 GHz
J0576D	Coaxial cord N, 2 m	
J0127C	Coaxial cord BNC, 0.5 m	
J0127A	Coaxial cord BNC, 1 m	
MP640A	Coaxial cord DC to 1700 MHz	
MP721A	Attenuator 3 dB	
MP721B	Attenuator 6 dB	
MP721C	Attenuator 10 dB	
MP721D	Attenuator 20 dB	
MP721E	Attenuator 30 dB	
MA1621A	50 Ω to 75 Ω impedance converter	Insertion Loss: 1.9 dB, 25 Ω resistance
MA8994A	Impedance converter	N to F
12N50-75B	N (m) 50 Ω to N (f) 75 Ω	Impedance Converter Insertion Loss: 7.5 dB, resistance-pad
760-235	Transit Case for MS8911A	
2000-1374	Dual External, Li-Ion charger with universal power supply	
MP651A	Dipole Antenna	470 MHz to 1700 MHz, Equipped with 5D-2W cable
MP651B	Dipole Antenna	470 MHz to 1700 MHz, Equipped with RG-55/U cable
MP635A	Log-Periodic Antenna	80 MHz to 1000 MHz
MP666A	Log-Periodic Antenna	200 MHz to 2000 MHz



Specifications are subject to change without notice.

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