

# RADIO TEST REPORT

No. 704810-2

RF Performance

## EQUIPMENT UNDER TEST

Equipment: Wireless PressureWire® system  
Type / model: 12056  
Manufacturer: Radi Medical Systems AB  
Tested by request of: Radi Medical Systems AB

## SUMMARY

All selected test cases specified in this report comply with the requirements according to the following standard:

FCC, Part 15 (2006), Subpart B and C

Date of issue: 2007-11-28

Tested by:



Approved by:



Stefan Andersson

Björn Utermöhl

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**1. CLIENT INFORMATION**

The EUT has been tested by request of

Company: Radi Medical Systems AB  
Palmladsgatan 10  
754 50 Uppsala  
Sweden

Name of contact: Björn Palmgren

**2. EQUIPMENT UNDER TEST (EUT)****2.1 Identification of the EUT according to the manufacturer/client declaration**

Equipment: Wireless PressureWire® system  
Type / Model: 12056  
Brand name: PressureWire® Aeris  
Manufacturer: Radi Medical Systems AB  
Rating/Supplying voltage: 3,0 V DC, Class III  
Antenna gain: 1,2 dBi  
External antenna connector: No  
Frequency range: 2400 - 2483,5 MHz  
Number of channels: 79  
Modulation characteristics: FHSS  
Stand by mode supported: No  
Low channel: 2402 MHz  
Mid channel: 2441 MHz  
High channel: 2480 MHz  
Duty cycle: 7%



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### 3. TEST SPECIFICATIONS

#### 3.1 Standards

FCC 47 CFR part 15 (2006) Subpart B – Unintentional radiators, class B  
FCC 47 CFR part 15 (2006) Subpart C – Intentional radiators

Measurements methods according to ANSI C63.4-2003

#### 3.2 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

#### 3.3 Test set-up

Measurement set-up for all tests is described in the radiated spurious emissions section.

#### 3.4 Test conditions

If not additionally specified, the tests were performed under the following environmental conditions:

Parameter	Normal
Supplying voltage, V	3,0 V DC
Air temperature, °C	20-24°C



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**4. TEST SUMMARY**

The results in this report apply only to the sample tested.

Test	FCC Reference	Result
Radiated output power	15.249	Pass
Band Edge Compliance	15.249	Pass
Out of band spurious emission, radiated	15.249	Pass*

NT = Not Tested

NA = Not Applicable

\*The measured result is below the limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance with the specification limit.



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## 5. RADIATED SPURIOUS EMISSIONS

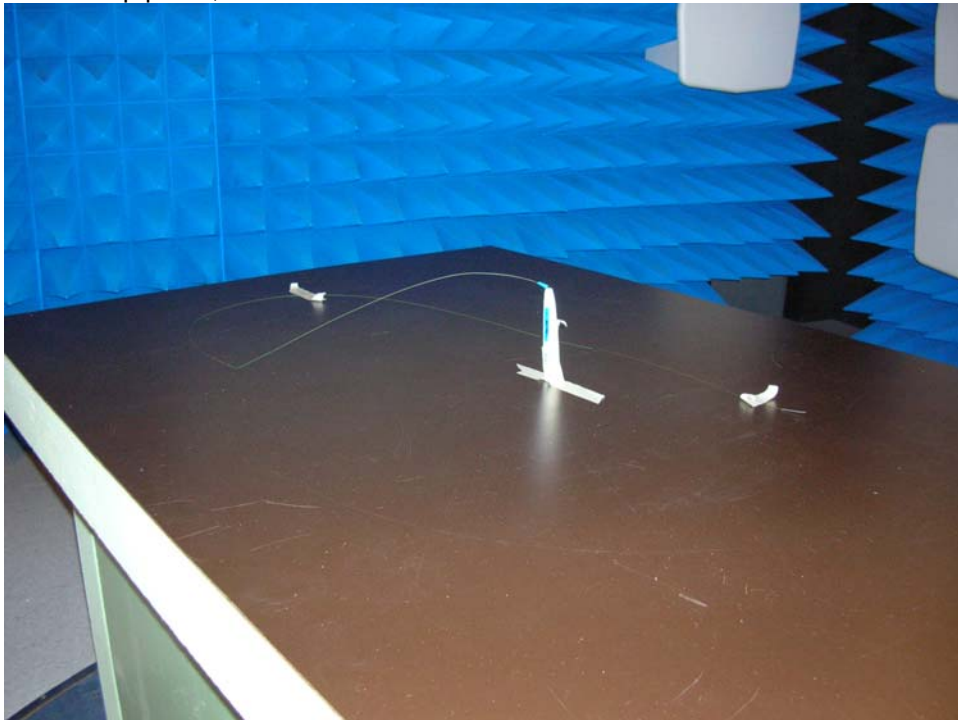
### 5.1 Measurement set-up

Test site: Small anechoic shielded chamber (30 – 1000 MHz)

In the Small anechoic shielded chamber the EUT was placed on a non-metallic table, 1,5 m above the floor. The radiated power was measured at a distance of 3 m. An overview sweep with peak detection was performed with the measurement receiver in max-hold and with the antenna placed 1.5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps. The specified test mode was enabled.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new peak measurements were carried out.

Test set-up photo, transmitter:



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Test site: Radio anechoic shielded chamber (1 – 26 GHz)

In the Radio anechoic shielded chamber the EUT was placed on a non-metallic table, 1,5 m above the floor. The radiated power was measured at a distance of 3 m. An overview sweep with peak detection was performed with the measurement receiver in max-hold and with the antenna placed 1.5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps. The specified test mode was enabled.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new peak measurements were carried out.

Test set-up photo, transmitter:



Intertek Semko AB

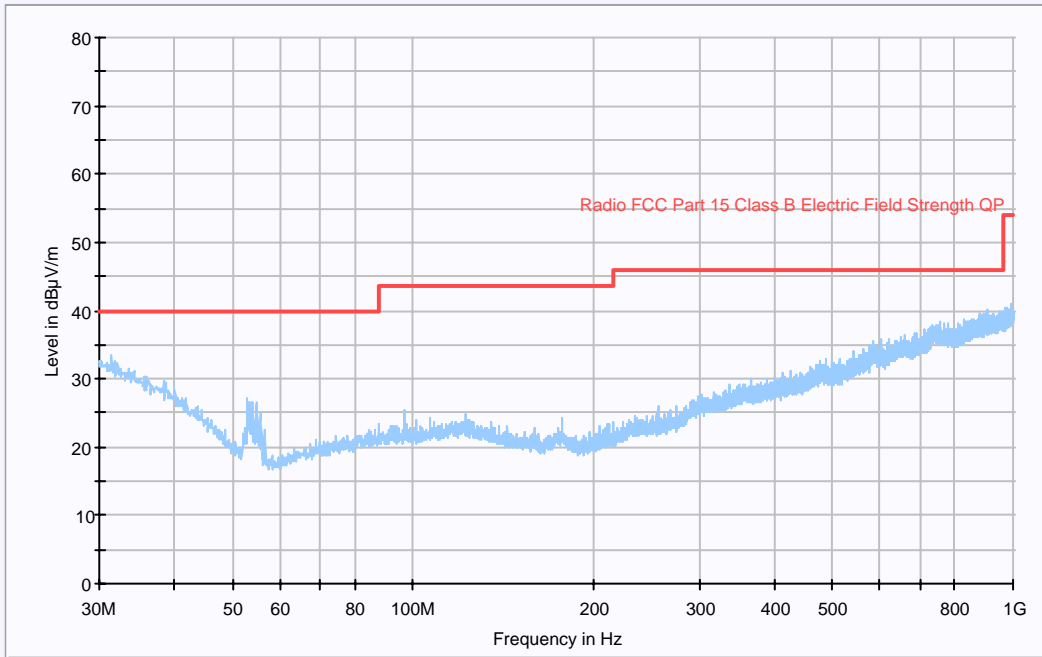
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**5.2 Test protocol**

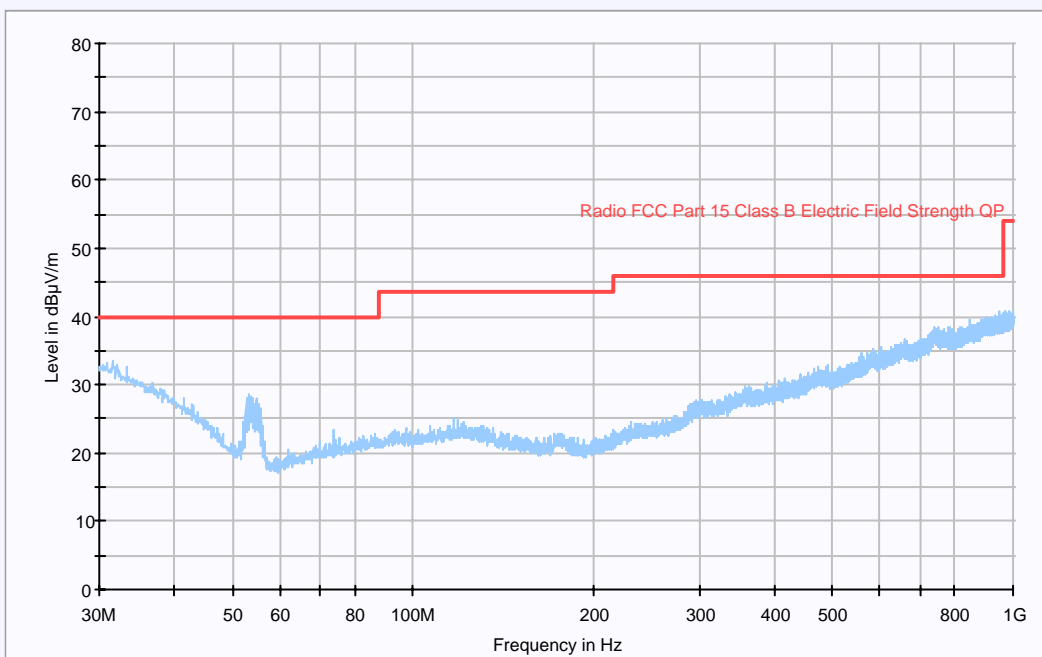
Small anechoic shielded chamber

Date of test: 2007-11-20

30 – 1000 MHz, max peak at a distance of 3 m on the lowest TX channel



30 – 1000 MHz, max peak at a distance of 3 m on the middle TX channel

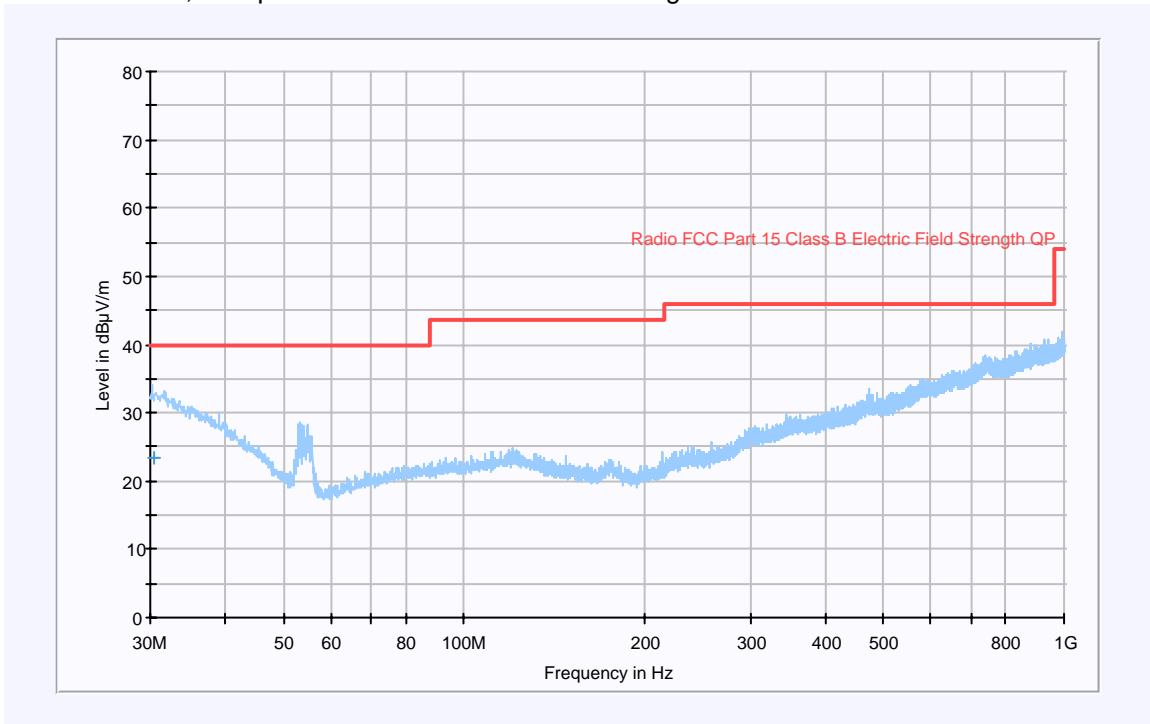


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30 – 1000 MHz, max peak at a distance of 3 m on the highest TX channel



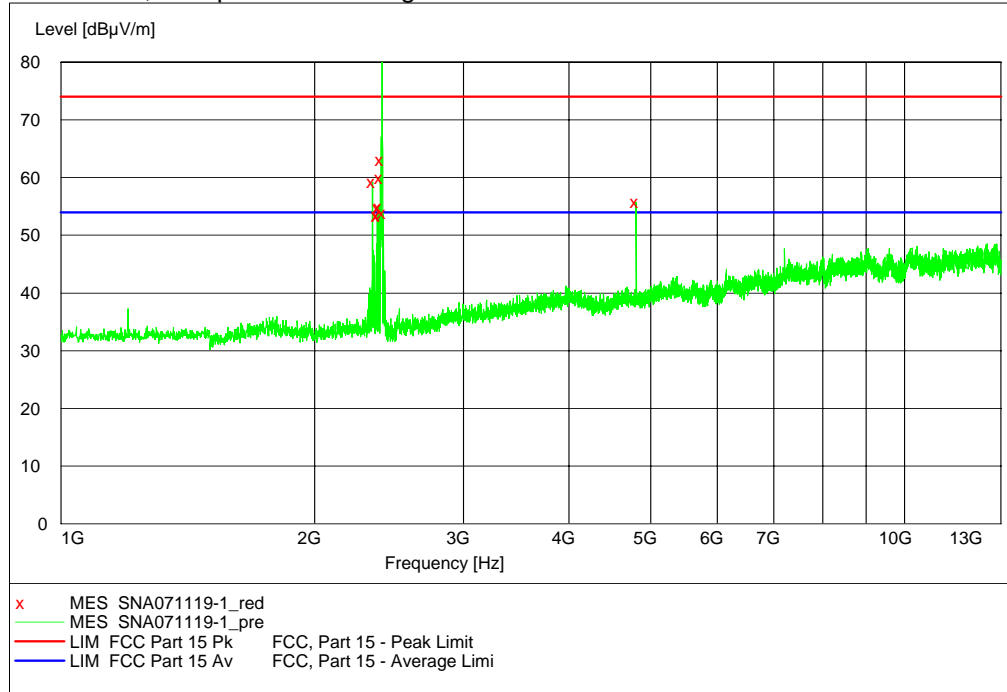
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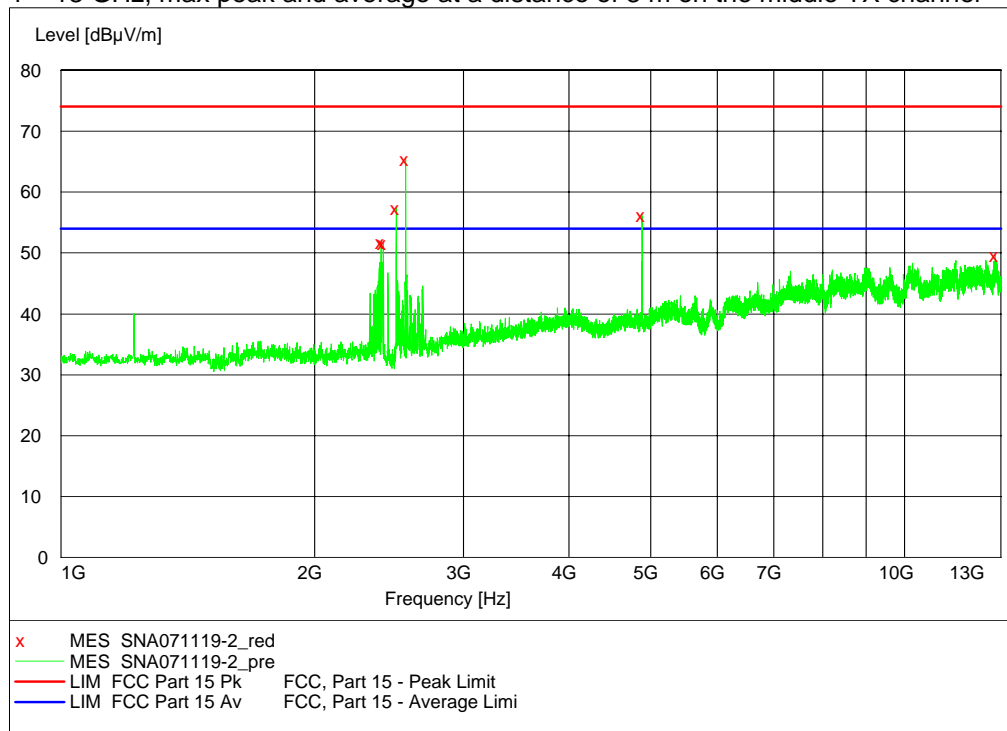
Radio anechoic shielded chamber

Date of test: 2007-11-20

1 – 13 GHz, max peak and average at a distance of 3 m on the lowest TX channel



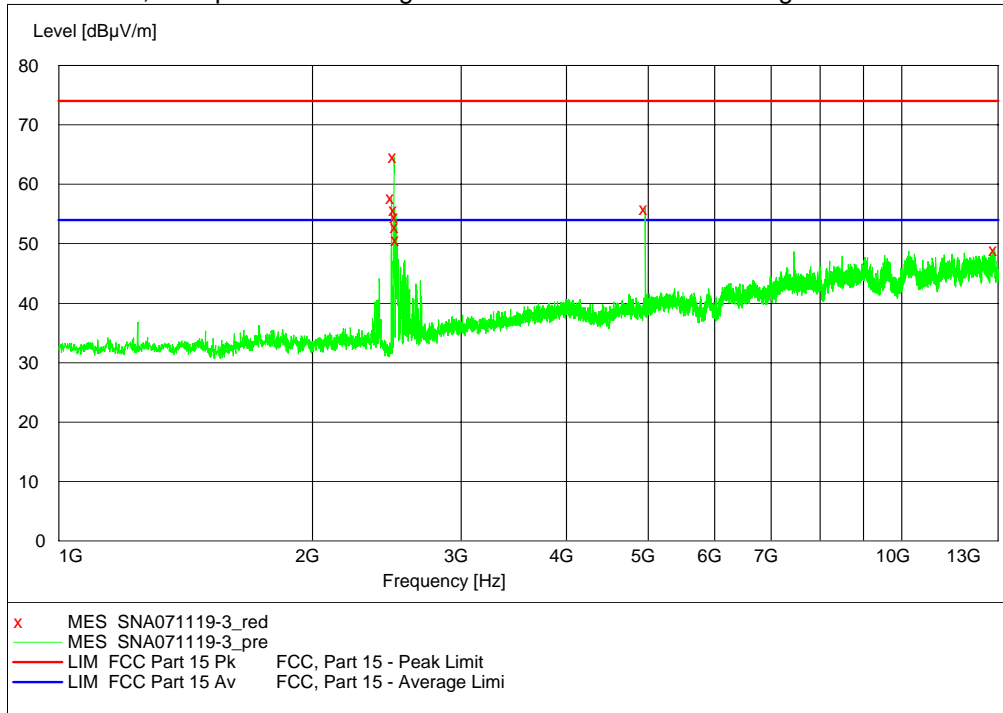
1 – 13 GHz, max peak and average at a distance of 3 m on the middle TX channel



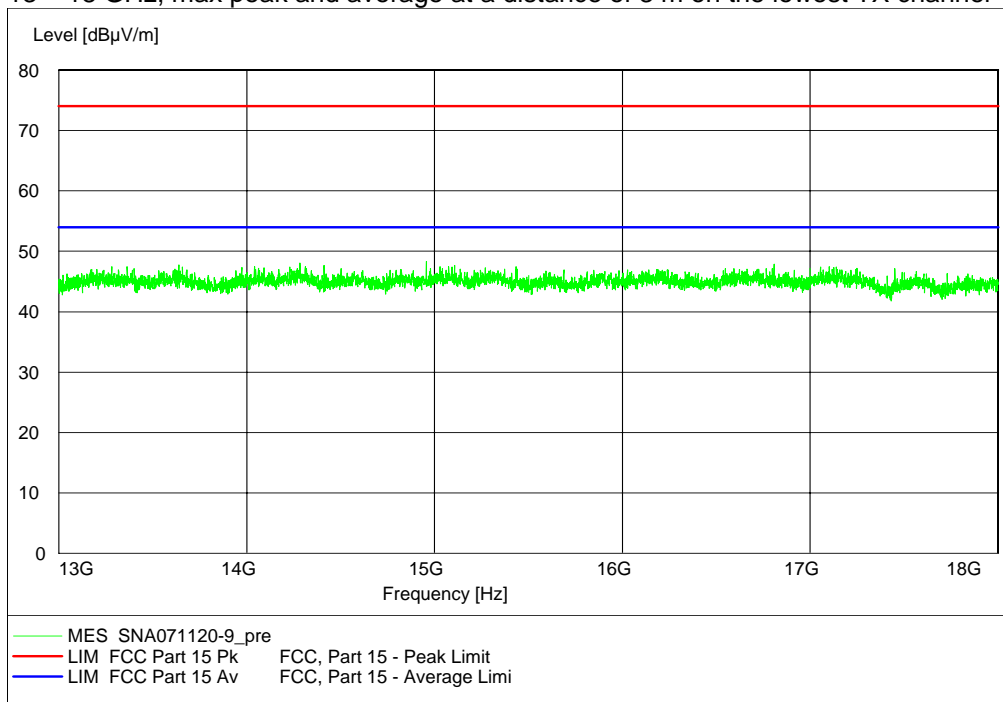
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1 – 13 GHz, max peak and average at a distance of 3 m on the highest TX channel



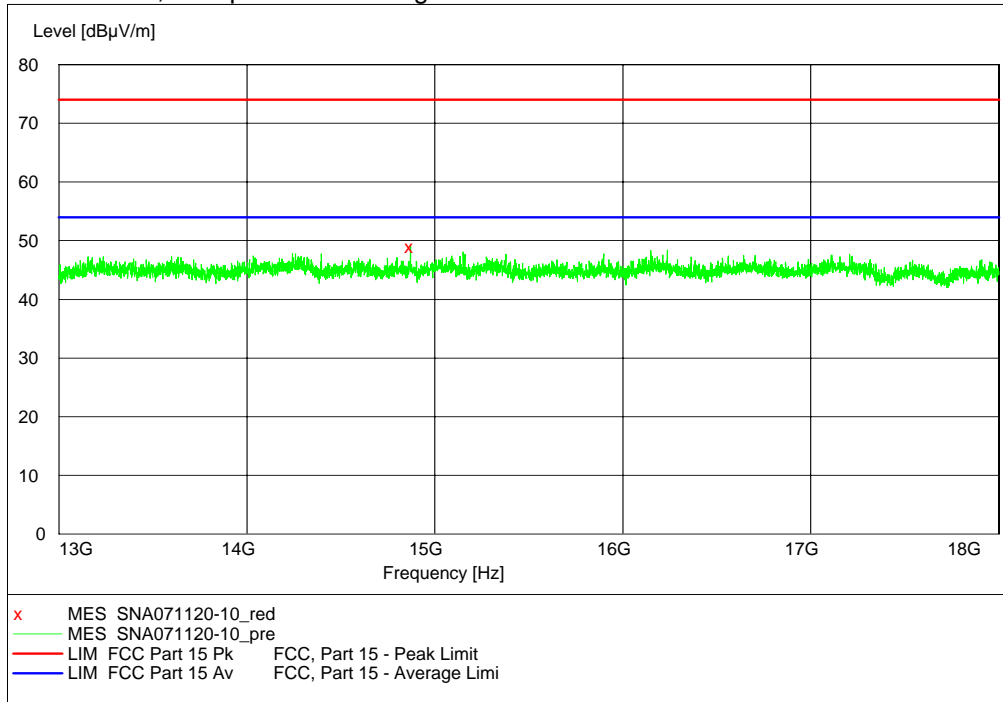
13 – 18 GHz, max peak and average at a distance of 3 m on the lowest TX channel



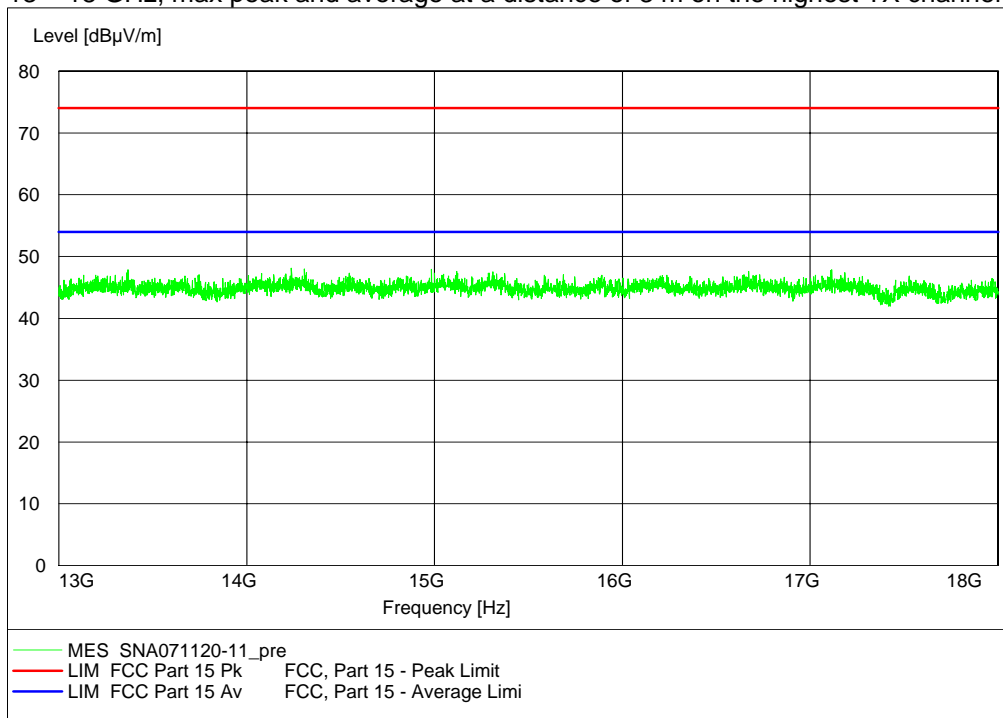
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13 – 18 GHz, max peak and average at a distance of 3 m on the middle TX channel



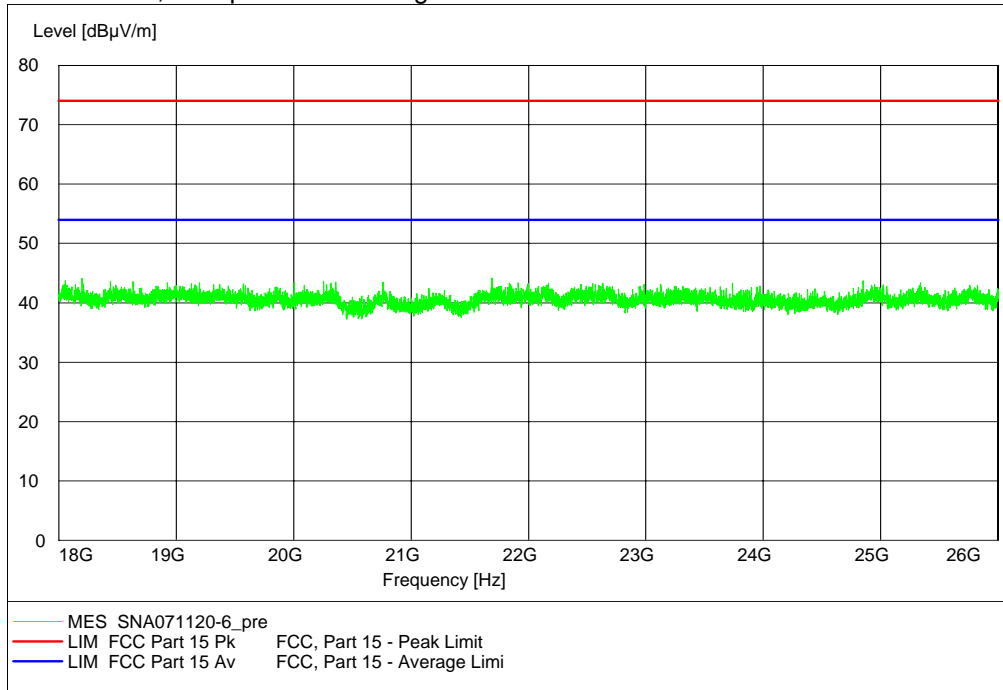
13 – 18 GHz, max peak and average at a distance of 3 m on the highest TX channel



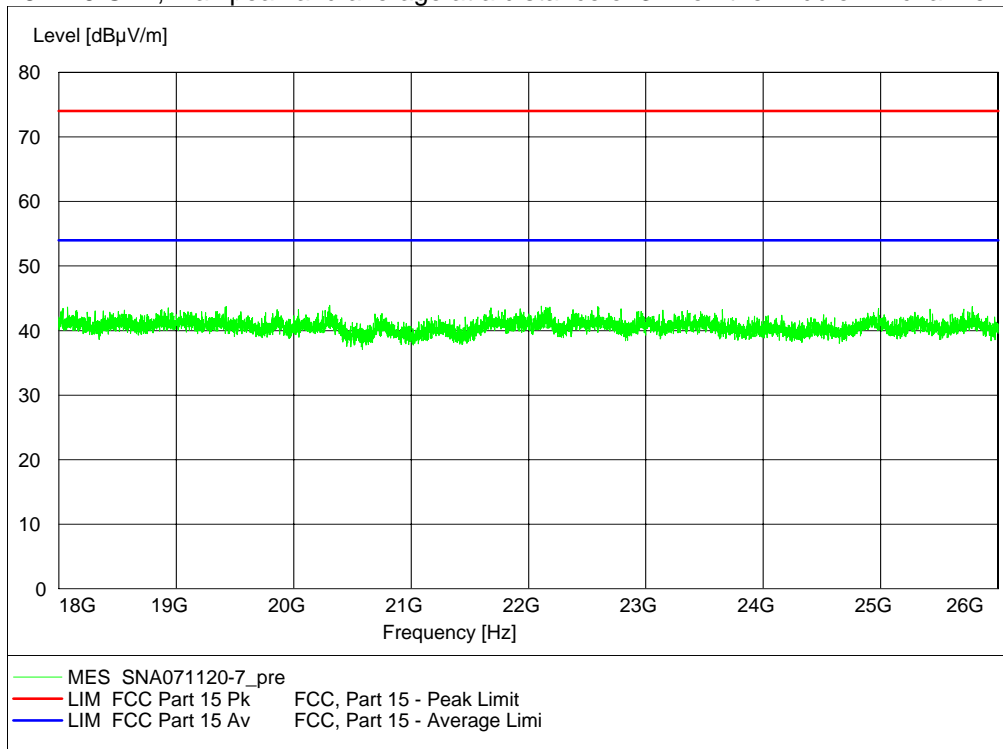
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18 – 26 GHz, max peak and average at a distance of 3 m on the lowest TX channel



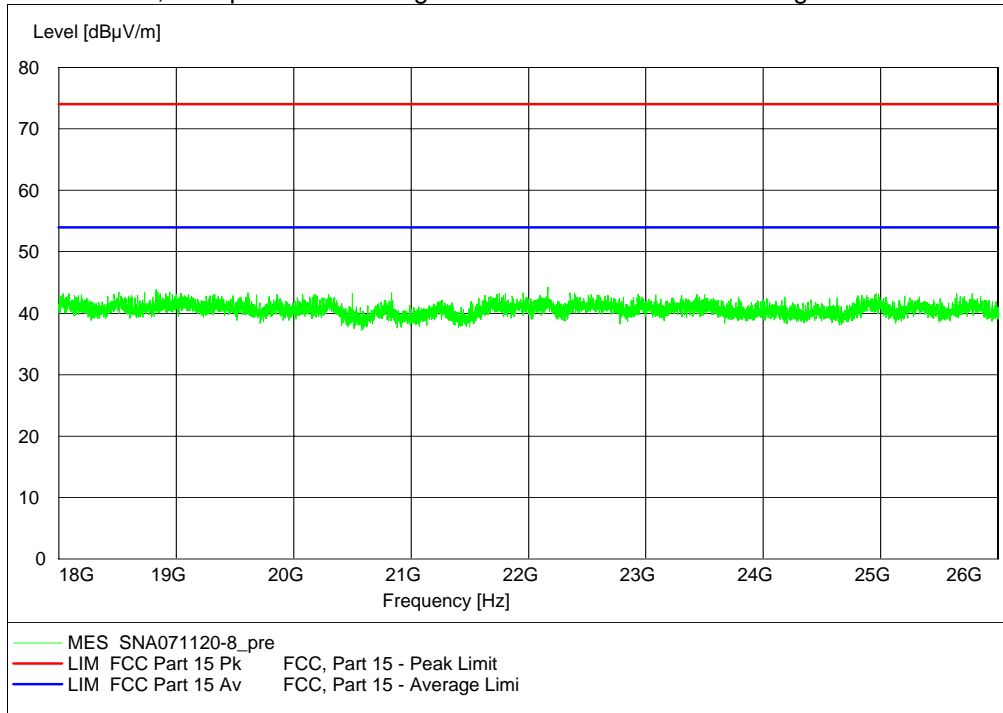
18 – 26 GHz, max peak and average at a distance of 3 m on the middle TX channel



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18 – 26 GHz, max peak and average at a distance of 3 m on the highest TX channel



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Data summary

Spurious emissions, TX Low channel						
Frequency	Measured level		Limit		Note	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
1201.00	33.1	48.6	54	74		
2339.78	41.4	70.0	54	74		*
4803.61	48.9	60.4	54	74		

Spurious emissions, TX Mid channel						
Frequency	Measured level		Limit		Note	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
1220,50	32.1	44.3	54	74		
2561,92	40.6	68.5	54	74		
4881,00	40.8	55.9	54	74		

Spurious emissions, TX High channel						
Frequency	Measured level		Limit		Note	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
2497.66	49.7	68.9	54	74		
4960,00	47.0	57.3	54	74		

\* The measured result is below the limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance with the specification limit.

No other significant peaks above the noise floor were found.

Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:

$$\text{Measured level [dBm]} = \text{Analyser reading [dBm]} + \text{cable loss [dB]} + \text{attenuator loss [dB]}$$

Fulfil requirements: Yes



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**6. RADIATED OUTPUT POWER**

**6.1 Test protocol**

Date of test: 2007-10-31

**QPSK**

Detector	Equivalent Isotropic Radiated Power, [dBuV/m]		
	Low channel	Mid channel	High channel
Average	76.6	76.7	76.8
Peak	97.8	97.8	97.9

Measurement results are corrected for attenuation in the set-up configuration.

**6.2 Limit**

The equivalent isotropic radiated power shall be equal to or less than 94.0 dBuV/m Average and 114.0 dBuV/m Peak.

Fulfil requirements: Yes



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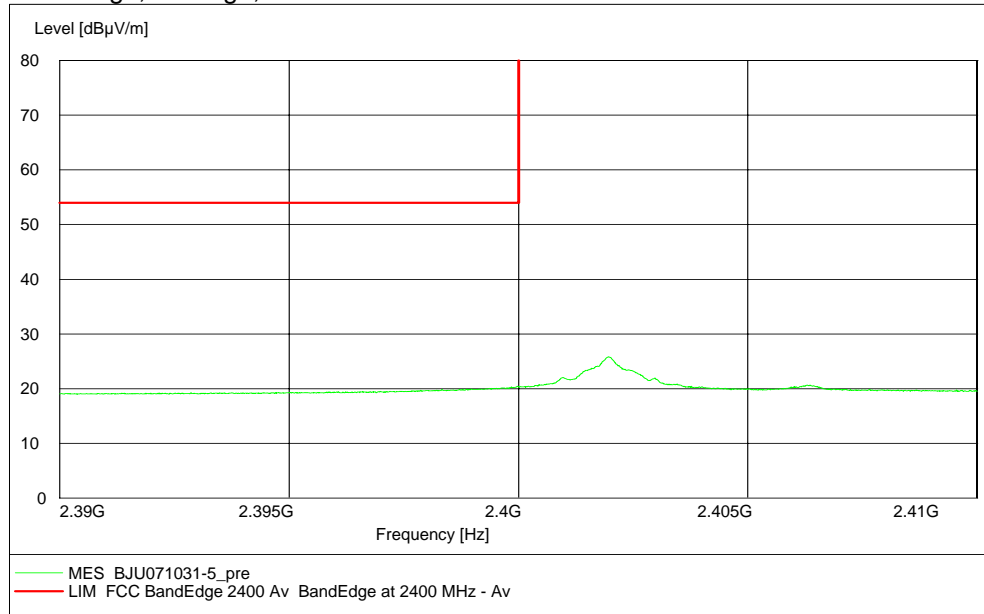


**7. BAND EDGE COMPLIANCE**

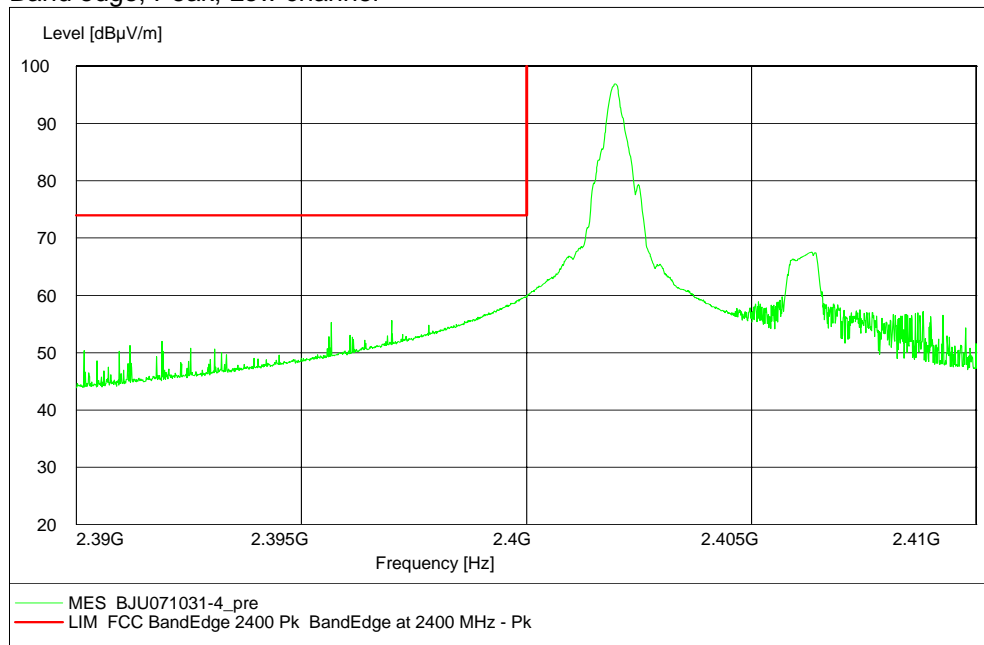
**7.1 Test protocol**

Date of test: 2007-10-31

Band edge, Average, Low channel



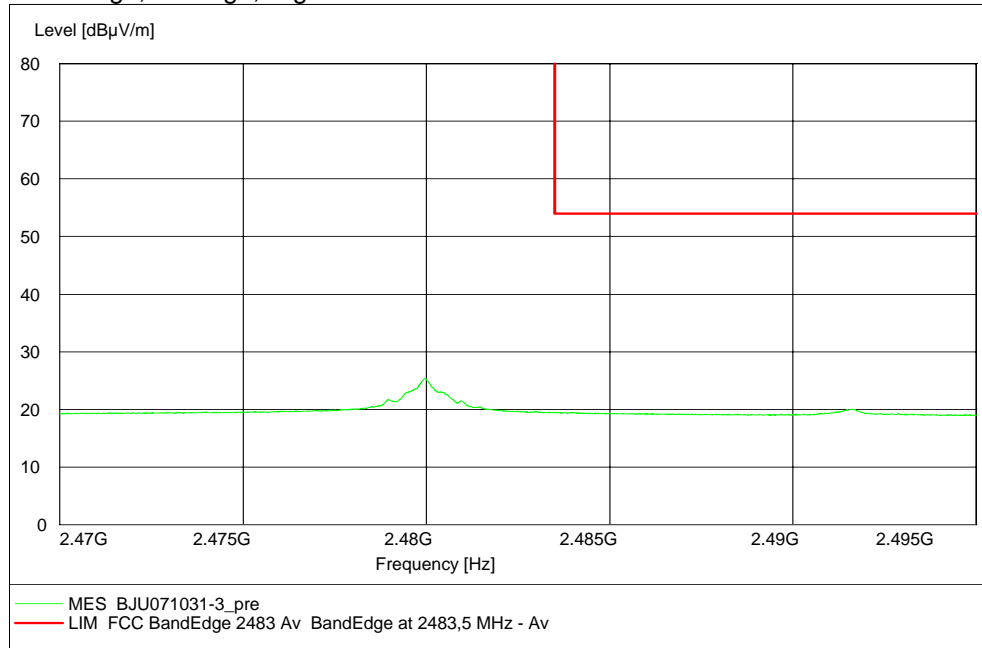
Band edge, Peak, Low channel



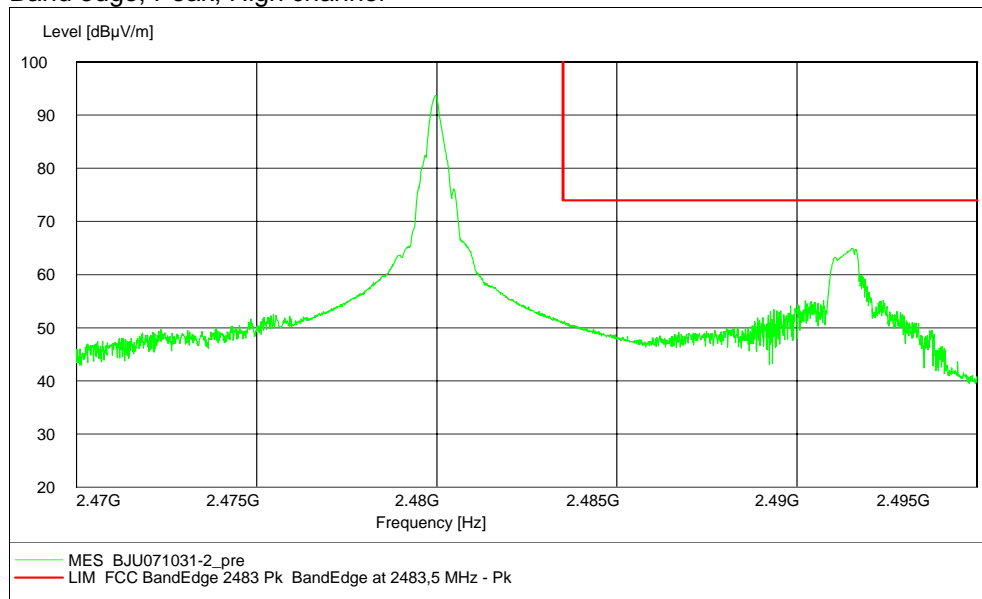
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**Band edge, Average, High channel**



**Band edge, Peak, High channel**



Fulfil requirements: Yes



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**8 INSTRUMENTATION LIST**

Equipment	Manufacturer	Type	SEMKO No.	Last calibration /Next calibration
Spectrum analyser	Rohde & Schwarz	FSIQ40	12793	2007-06-28 /2008-06-28
Measurement receiver	Rohde & Schwarz	ESCI	12798	2007-07-02 /2007-07-02
Preamplifier	MITEQ	AFS6/AFS44	12335	2007-07-02 /2008-07-02
Antenna, bilog	Rohde & Schwarz	HL-562	30711	2006-10-19 /2009-10-19
Antenna horn	EMCO	3115	4936	2007-08-06 /2010-08-06
Antenna horn	EMCO	3160-08	30099	2007-08-06 /2010-08-06
Antenna horn	EMCO	3160-09	30101	2007-08-06 /2010-08-06
Band reject filter	K&L Microwave INC	M/W S/N 1	12389	2006-02-28 /2008-02-28



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**APPENDIX I – UNCERTAINTIES SUMMARY**

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT. Measurement uncertainty is calculated in accordance with EA-4/02-1997. All uncertainties are given with a level of confidence of approximately 95% (k=2).

Measurement uncertainty for radiated disturbance, 30 - 1000 MHz

Uncertainty for the frequency range 30 to 300 MHz using a biconical or a combination antenna at 1 m	± 5,3 dB
Uncertainty for the frequency range 200 to 1000 MHz using a logperiodic or a combination antenna at 1 m	± 6,2 dB
Uncertainty for the frequency range 30 to 300 MHz using a biconical or a combination antenna at 3 m	± 4,6 dB
Uncertainty for the frequency range 200 to 1000 MHz using a logperiodic or a combination antenna at 3 m	± 4,8 dB
Uncertainty for the frequency range 30 to 300 MHz using a biconical or a combination antenna at 10 m	± 4,6 dB
Uncertainty for the frequency range 200 to 1000 MHz using a logperiodic or a combination antenna at 10 m	± 4,6 dB

Measurement uncertainty for conducted disturbances at the antenna port on radio equipment ± 3,6 dB

Measurement uncertainty for Output power

Analog signals, conducted	
Power meter	± 0,6 dB
Spectrum analyser	± 3,5 dB
Analog signals, radiated	
25 - 1000 MHz	± 3,1 dB
1 - 18 GHz	± 3,3 dB
Digital signals, conducted	
Digital signals, radiated	± 0,6 dB
25 - 1000 MHz	± 3,1 dB
1 - 18 GHz	± 3,3 dB

Measurement uncertainty for Peak power density

Conducted:	
8593E	± 2,5 dB
8566B	± 2,7 dB

Radiated:	
25 - 1000 MHz	± 4,5 dB
1 - 18 GHz	± 4,7 dB

Measurement uncertainty for Frequency range

HP 8593E	± 0,2 %
HP 8566B	± 2,3 %



**APPENDIX II – PHOTO OF THE EUT**

EUT, Transmitter



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