

# RADIO TEST REPORT

1110792-3

## RF performance

### EQUIPMENT UNDER TEST

Equipment: AO Interface Unit  
Type / model: N/A  
Manufacturer: St Jude Medical Systems AB  
Tested by request of: St Jude Medical Systems AB

### SUMMARY

The equipment complies with the requirements of the following standards:

47 CFR, Part 15, Subpart B (2010) and Subpart C (2010);


RSS-GEN, Issue 3 (December 2010)

RSS-210, Issue 8 (December 2010)

Industry Canada listed test facility No. IC 2042G-2

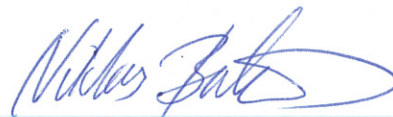
Date of issue: April 26, 2011

Tested by:



Stefan Andersson

Approved by:



Niklas Boström

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## 1 1. CLIENT INFORMATION

The EUT has been tested by request of

Company: St Jude Medical Systems AB  
Box 6350  
751 35 Uppsala  
Sweden

Name of contact: Mattias Dahlberg

## 2 2. EQUIPMENT UNDER TEST (EUT)

### 2.1 2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment: AO Interface Unit  
Type / Model: N/A  
Brand name: N/A  
Serial number: Unmarked  
Manufacturer: St Jude Medical Systems AB  
Rating/Supplying voltage: 4 – 8 V DC  
Antenna gain: 1,8 dBi  
External antenna connector: No  
Operating temperature range: 10 to 40 °C  
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

### 2.2 2.2 Additional hardware information about the EUT

The EUT consists of the following units:

Unit	Type	Serial number
AO Interface Unit	N/A	Unmarked
AC/DC Adapter	FRIWO, 15.2765	Unmarked

### 3 TEST SPECIFICATIONS

#### 3.1 Standards

FCC 47 CFR part 15 (2010) Subpart B – Unintentional radiators

FCC 47 CFR part 15 (2010) Subpart C – Intentional Radiators; §15.249 Operation within the bands 902-928 MHz, 2400 – 2483.5 MHz, 5725 – 5850 MHz and 24.0 – 24.25 GHz

RSS-Gen, Issue 3 (December 2010): General Requirements and Information for the Certification of Radiocommunication Equipment

RSS-210, Issue 8 (December 2010): Low Power Licence-Exempt Radio communication Devices (All Frequency Bands): Category I Equipment.

Measurements methods according to

ANSI C63.4-2009 - Methods of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

and

ANSI C63.10-2009 - Standard for Testing Unlicensed Wireless Devices

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

No deviations or exclusions have been made from standards.

#### 3.3 Test facility

Measurements were performed at Intertek Semko AB, located in Stockholm, Sweden

#### 3.4 Test set-up

The EUT was connected to a measuring instrument by cable if not otherwise specified in the report.

#### 3.5 Test conditions

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

Parameter	Normal
Supplying voltage, V	120 V AC (AC/DC adapter)
Air temperature, °C	20-25

#### 4 TEST SUMMARY

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

Test	FCC Reference	IC Reference	Result
Radiated output power	15.249	RSS-210, A2.9	Pass
Occupied bandwidth	15.215(c)	RSS-GEN, 4.6.1	Pass
Out of band spurious emission, radiated	15.249	RSS-210, A2.9	Pass
Conducted emission, AC port	15.207	RSS-Gen Table 4	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.

## 5 RADIATED OUTPUT POWER

Date of test: 2011-04-06

Ambient temperature 22 °C      Relative humidity 31 %

### 5.1 Test protocol

Detector	Equivalent Isotropic Radiated Power, [dBuV/m]		
	Low channel	Mid channel	High channel
Peak	95.9	95.1	94.3
Average	85.3	84.5	83.7

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

The EUT transmits pulsed emission. Pulse train is 10 ms and transmitter on time is less than 5\*0,175 ms. This gives an average factor of -10.6 dB.

### 5.2 Limit

The equivalent isotropic radiated power shall be equal to or less than 94.0 dB $\mu$ V/m Average and 114.0 dB $\mu$ V/m Peak.

Fulfil requirements: Yes

## 6 SPURIOUS EMISSIONS (RADIATED)

Date of test: 2011-04-06

Ambient temperature: 22 °C      Relative humidity: 31 %

### 6.1 Measurement uncertainty

Radiated disturbance electric field intensity, 30 – 1000 MHz:  $\pm 4,6$  dB

Radiated disturbance electric field intensity, 1000 – 26000 MHz:  $\pm 6,0$  dB

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. The uncertainty is given with a level of confidence of approximately 95% (k=2).

### 6.2 Test equipment

Equipment	Manufacturer	Type	Inv. No.	Calibration due date
<i>Test site: Semi-anechoic shielded chamber, Stora Hallen</i>			30300	
Software	Rohde & Schwarz	EMC 32		
Measurement receiver	Rohde & Schwarz	ESU 8	12866	2011-06
Measurement receiver	Rohde & Schwarz	ESU 40	13178	2011-07
Antenna, bilog	Chase	CBL6111	8578	2011-09
Preamplifier	Semko	AM1331	7992	2011-07
Cable	Suhner	Sucoflex 104PEA	40035	2011-07
Cable	Suhner	RG214	30224	2011-07
Horn antenna	Rohde & Schwarz	HF907	31245	2013-11
Preamplifier	BONN Elektronik	BLMA 0118-M	31246	2011-07
Cable	Rosenberger	Utiflex FA142A	9747	2011-07
Horn antenna with preamplifier	BONN Elektronik	BLMA 1826-5A	31247	2013-12
Horn antenna with preamplifier	BONN Elektronik	BLMA 2640-5A	31248	2013-12
Cable	Rosenberger	Utiflex FB311A	9748	2011-07
High pass filter	K & L Microwave Inc.	4410-X4500/18000-0	5133	2011-07
Band rejection filter	K & L Microwave Inc.	6N45-2450/T 100-0/0	12389	2011-07

### 6.3 Measurement set-up

#### Test site Semi-anechoic shielded chamber

The radiated disturbance electric field intensity was measured in a semi-anechoic chamber at a distance of 3 m and the EUT was placed on a non-metallic table, 0,8 m above the reference ground plane. The specified test mode was enabled. Test set-up photos are given below.

An overview sweep with peak detection of the electric field intensity 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.

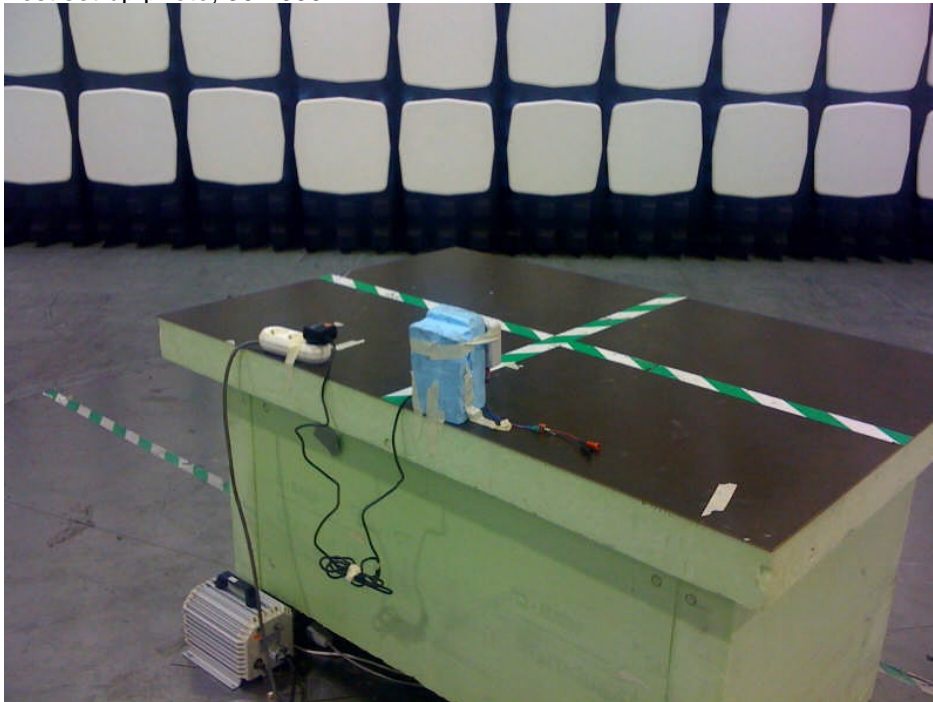
Above 1 GHz the overview sweep was performed in a fully anechoic chamber.

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 measurements with the correct detector(s) were carried out.

#### Example calculation

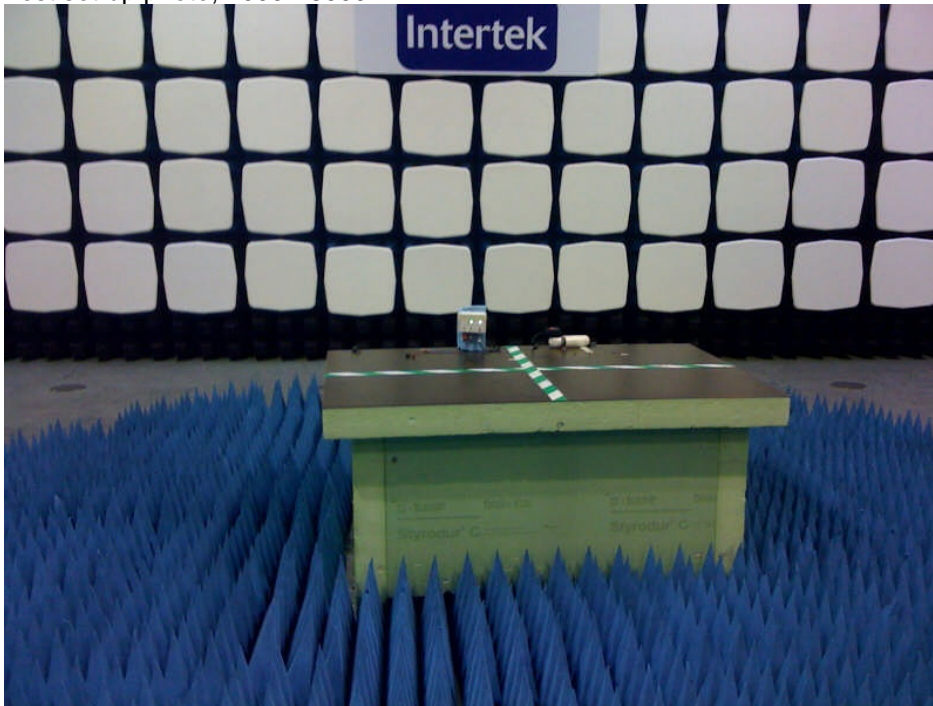
Measured level [dB $\mu$ V/m] = Analyser reading [dB $\mu$ V] + cable loss [dB] – preamplifier gain [dB] + antenna factor [1/m]

Test set-up photo, 30-1000 MHz:





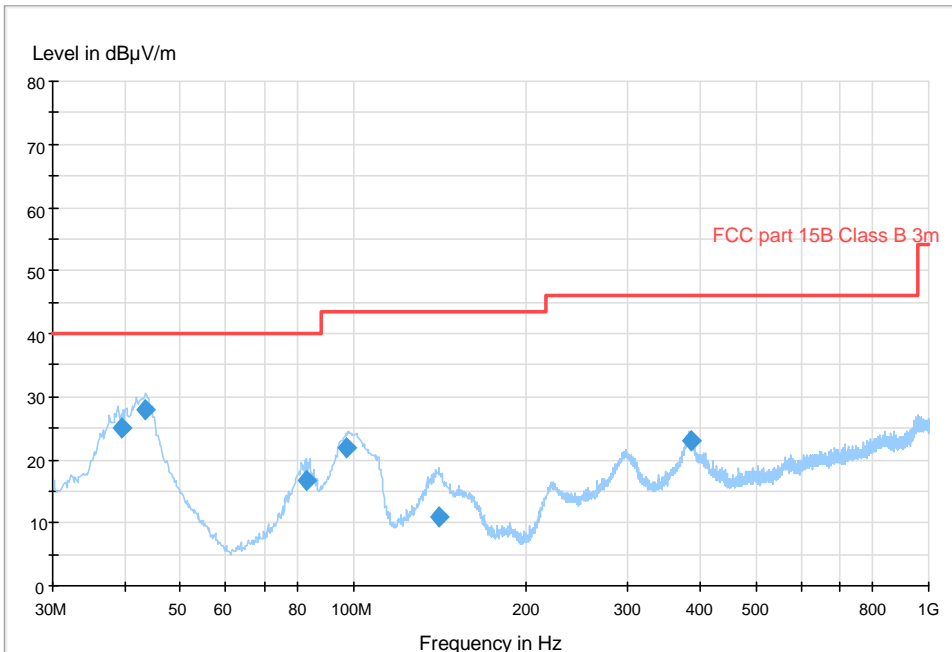
Test set-up photo, 1000-26000 MHz:



**6.4 Test graphs, TX mode**

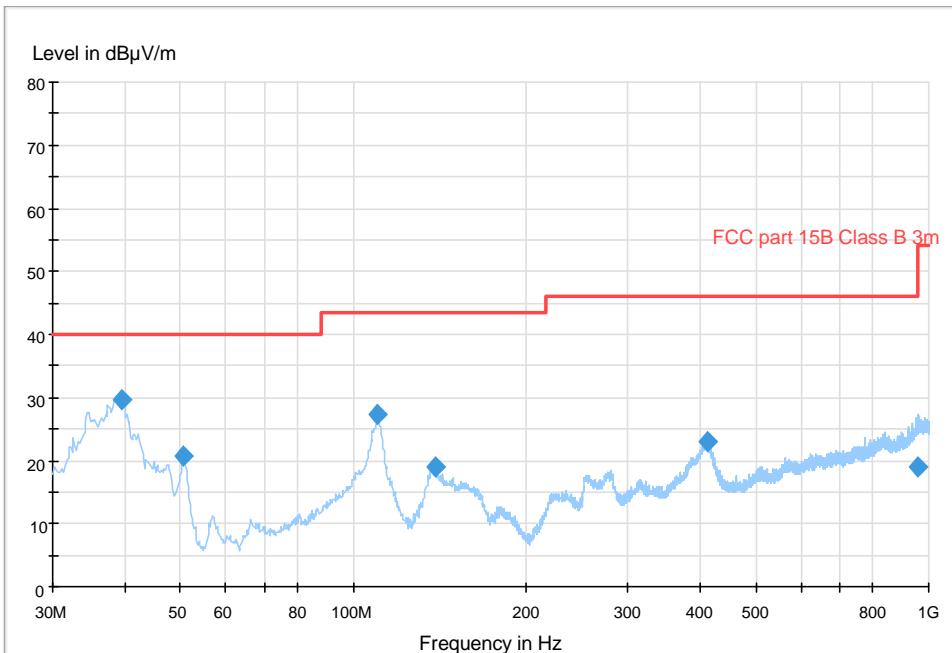
30 – 1000 MHz, max peak at a distance of 3 m, TX low channel

FCC 30 - 1000 MHz FCC class B 3m



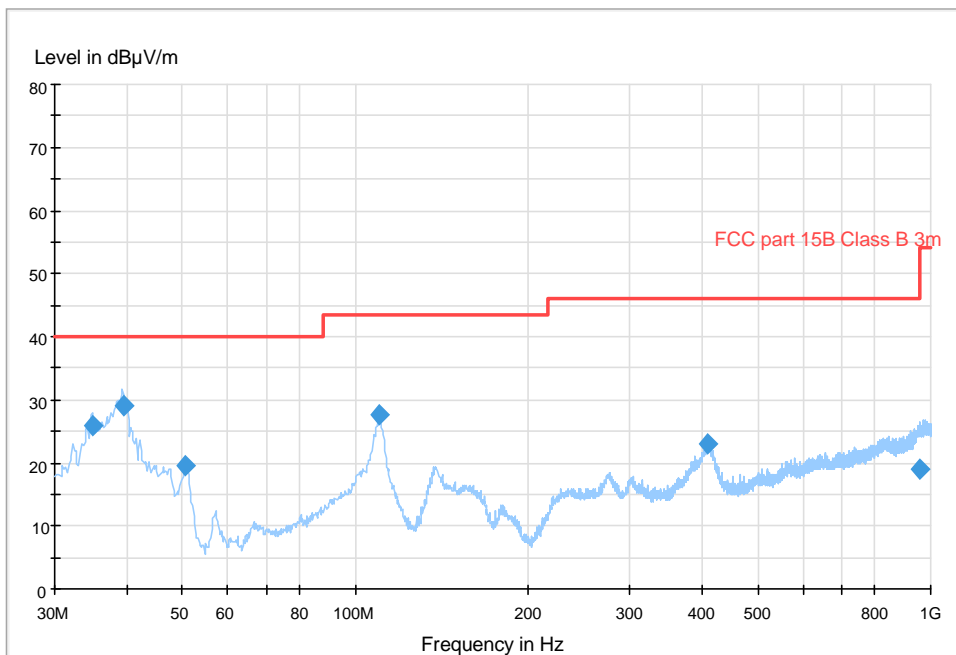
30 – 1000 MHz, max peak at a distance of 3 m, TX middle channel

FCC 30 - 1000 MHz FCC class B 3m



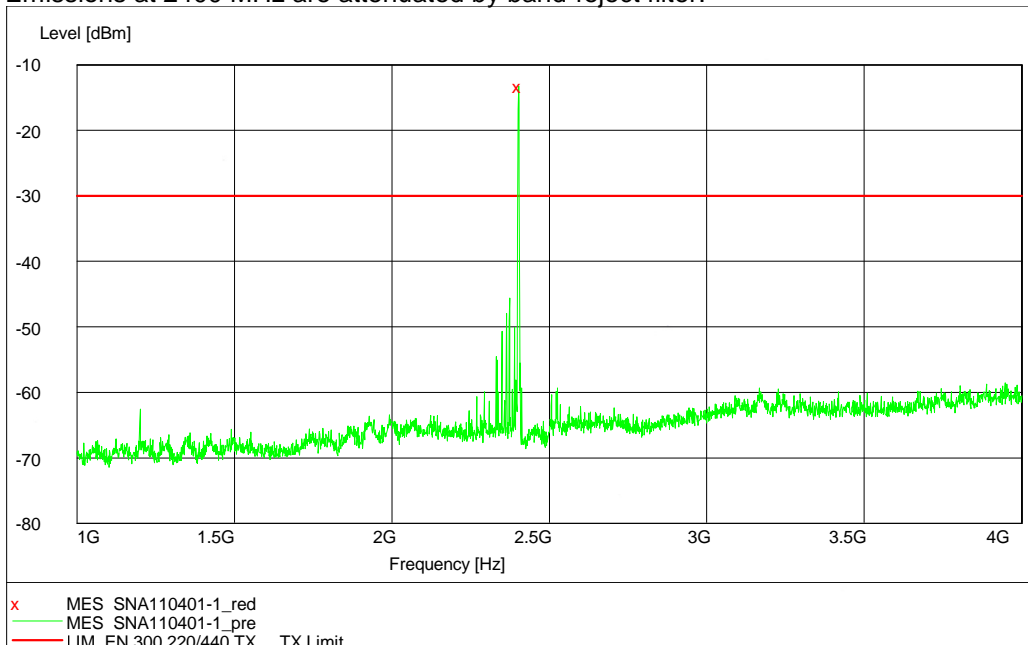
30 – 1000 MHz, max peak at a distance of 3 m, TX high channel

FCC 30 - 1000 MHz FCC class B 3m

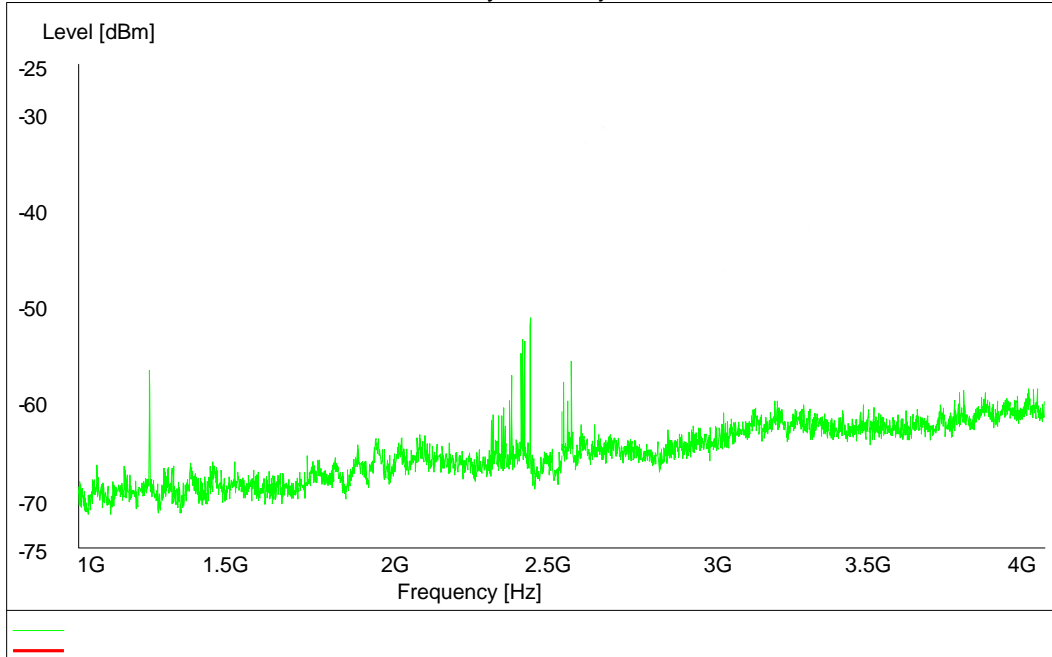


1000 – 4000 MHz, max peak at a distance of 3 m, TX low channel

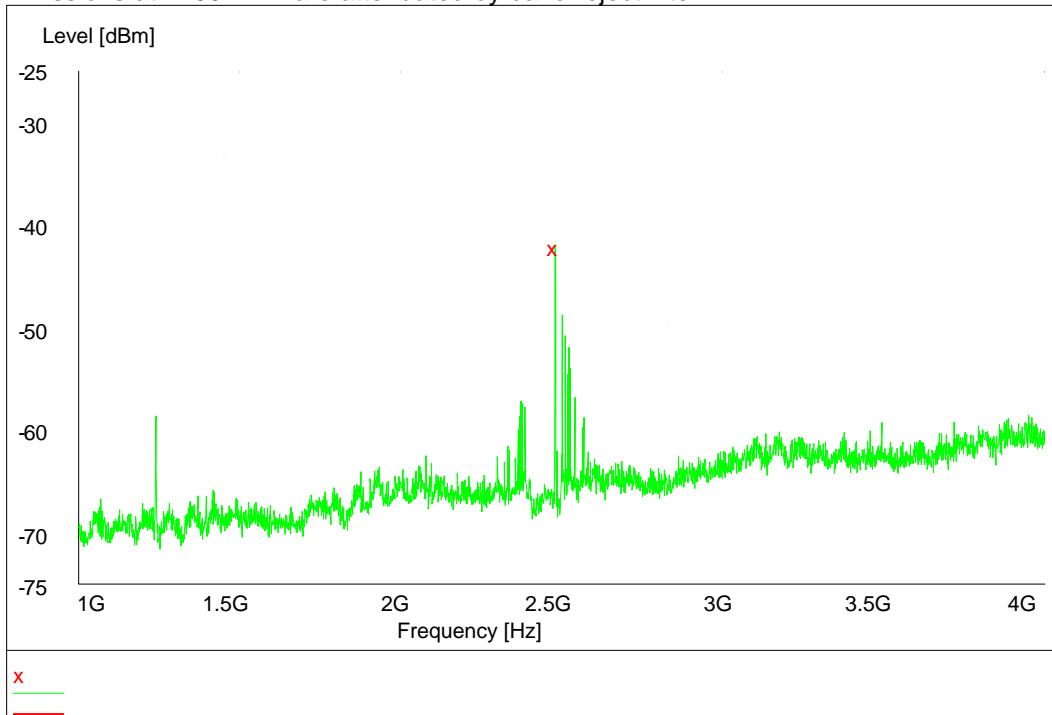
Emissions at 2400 MHz are attenuated by band-reject filter.



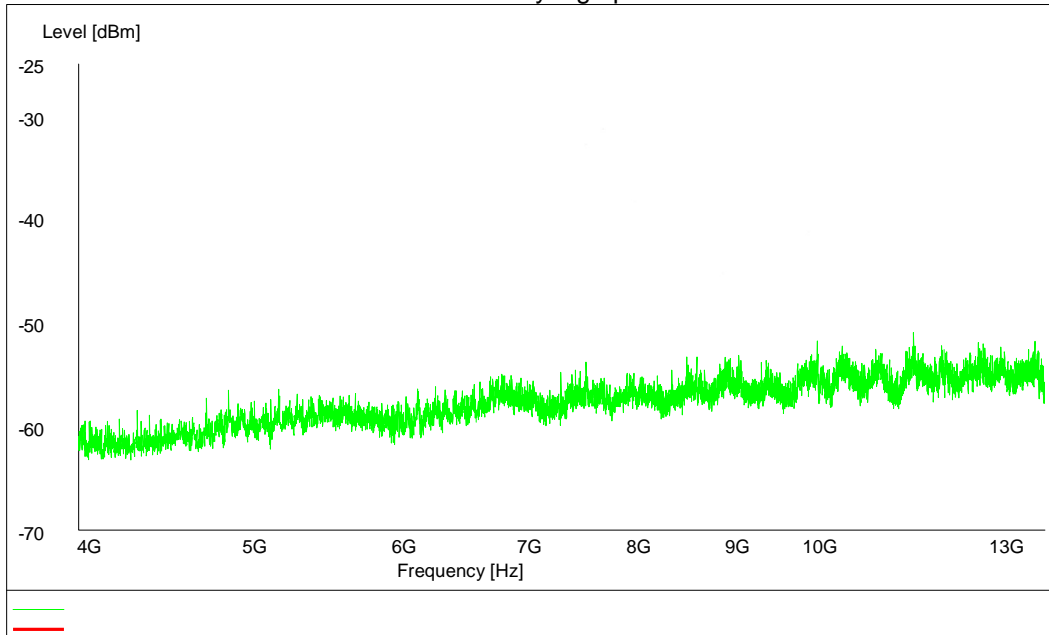
1000 – 4000 MHz, max peak at a distance of 3 m, TX middle channel  
Emissions at 2400 MHz are attenuated by band-reject filter.



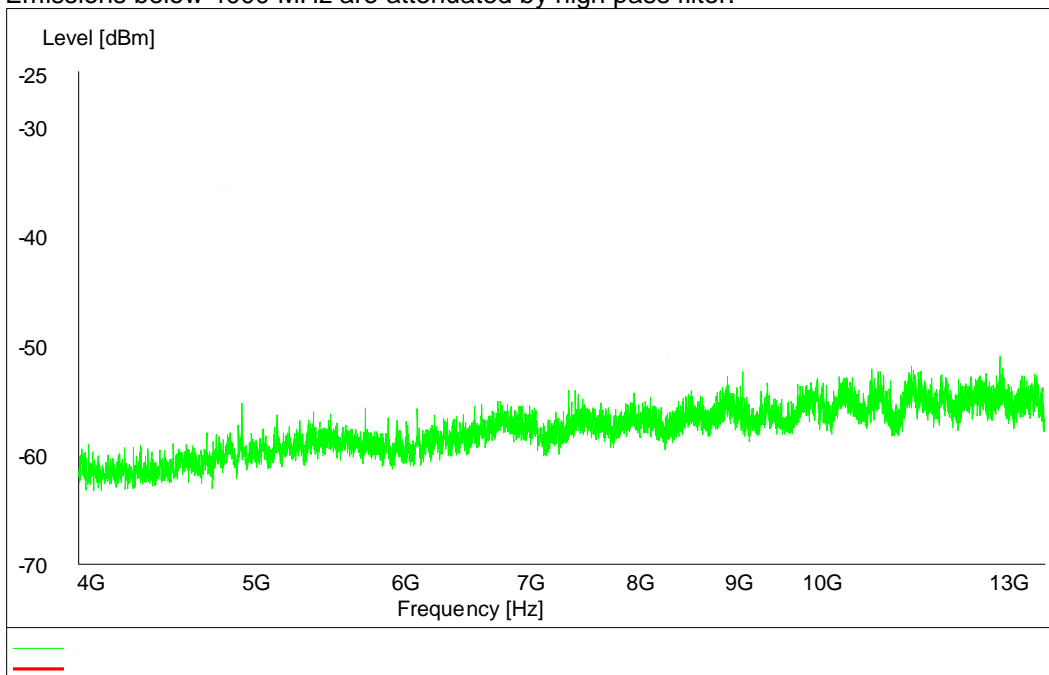
1000 – 4000 MHz, max peak at a distance of 3 m, TX high channel  
Emissions at 2400 MHz are attenuated by band-reject filter.



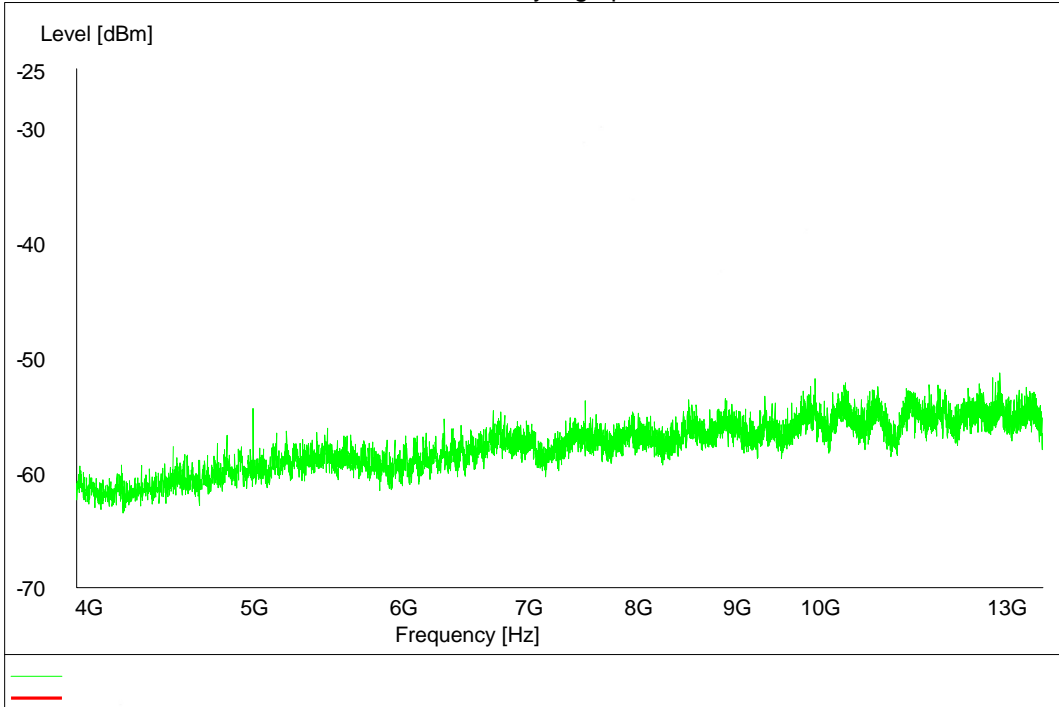
4000 – 13000 MHz, max peak at a distance of 3 m, TX low channel  
Emissions below 4000 MHz are attenuated by high-pass filter.



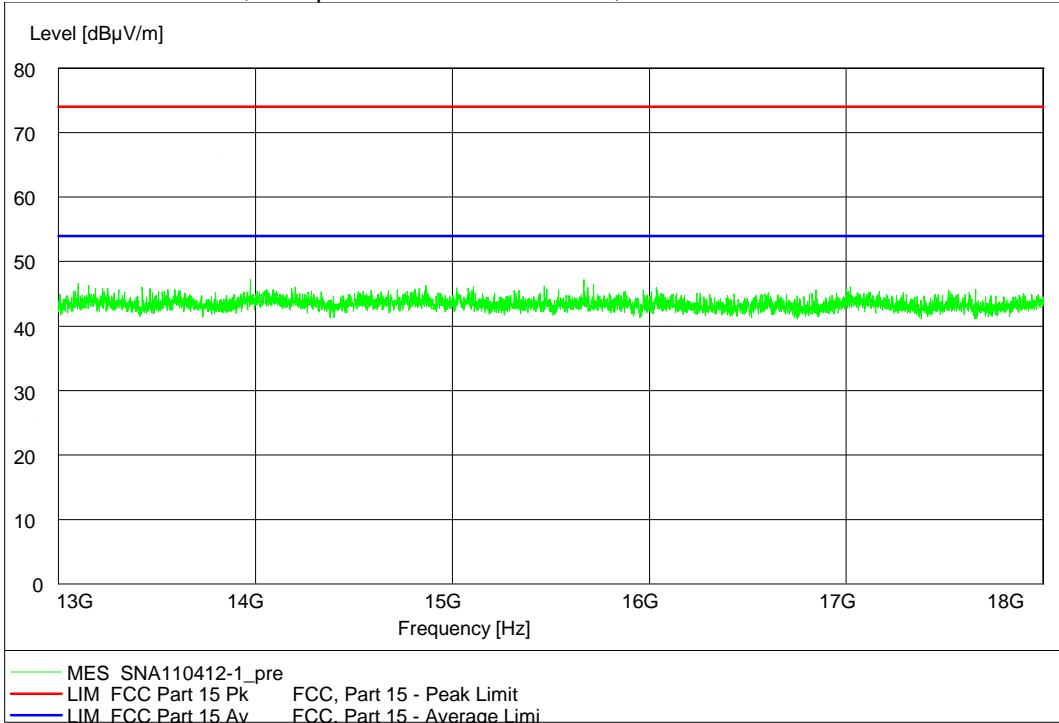
4000 – 13000 MHz, max peak at a distance of 3 m, TX middle channel  
Emissions below 4000 MHz are attenuated by high-pass filter.



4000 – 13000 MHz, max peak at a distance of 3 m, TX high channel  
Emissions below 4000 MHz are attenuated by high-pass filter.



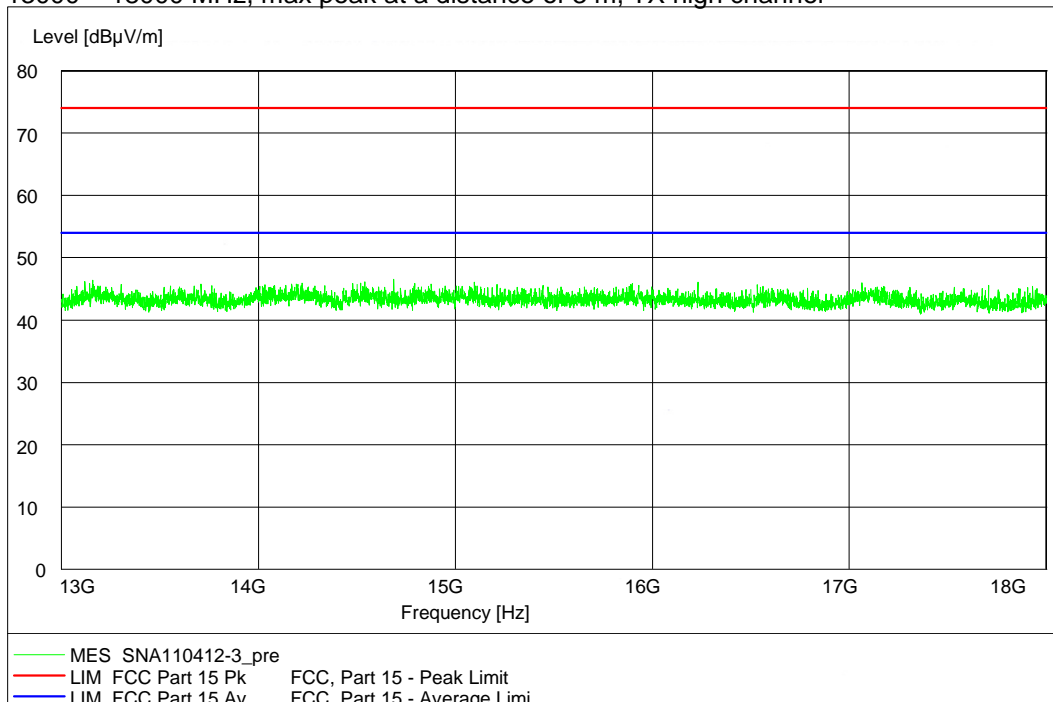
13000 – 18000 MHz, max peak at a distance of 3 m, TX low channel



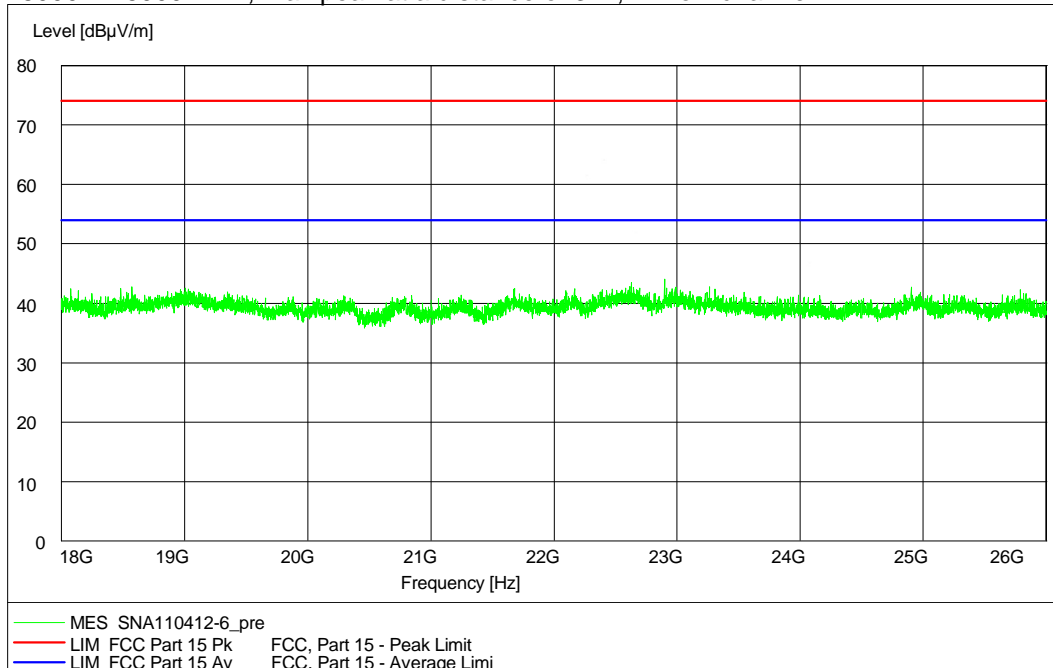
13000 – 18000 MHz, max peak at a distance of 3 m, TX middle channel



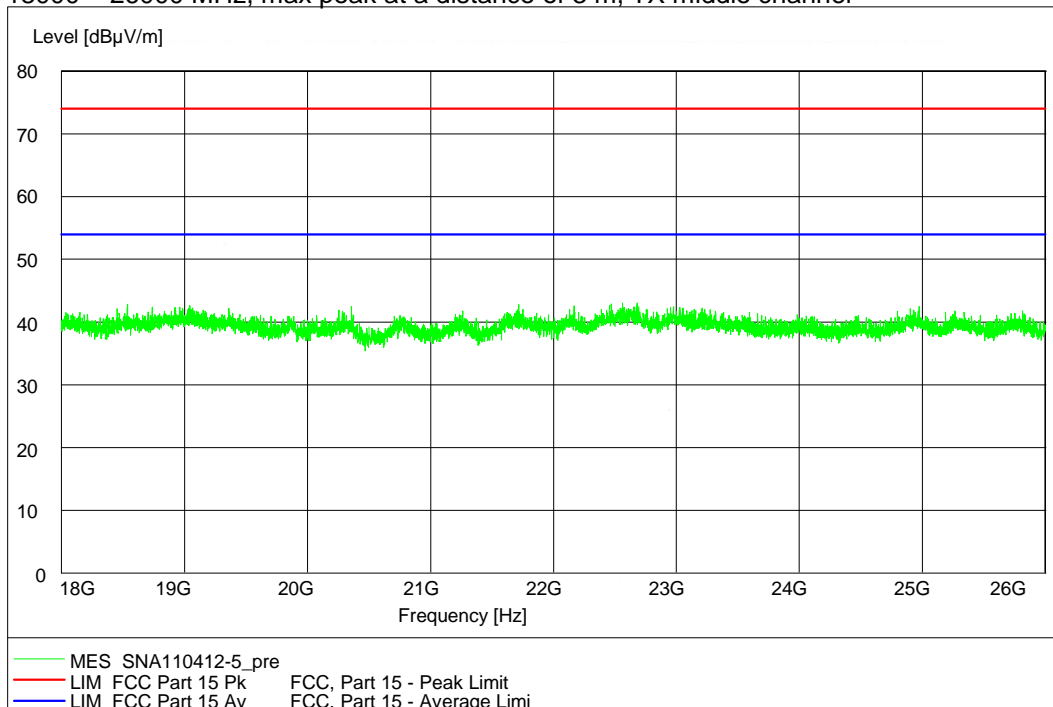
13000 – 18000 MHz, max peak at a distance of 3 m, TX high channel



18000 – 26000 MHz, max peak at a distance of 3 m, TX low channel

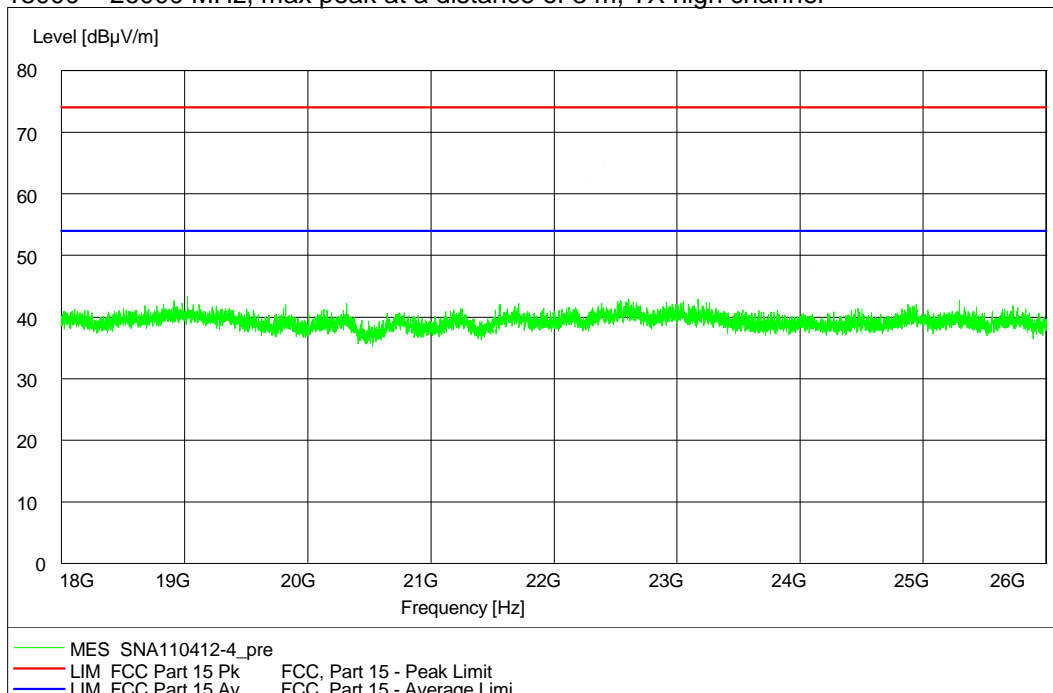


18000 – 26000 MHz, max peak at a distance of 3 m, TX middle channel





18000 – 26000 MHz, max peak at a distance of 3 m, TX high channel



## 6.5 Test protocol, TX mode

### TX low channel

SPURIOUS EMISSIONS LEVEL RADIATED				
Frequency- [MHz]	Detector QP/Av/Pk	Measured value [dB $\mu$ V/m]	Limits [dB $\mu$ V/m]	Comment / Note
39.539	QP	24.9	40.0	
43.406	QP	28.0	40.0	
82.670	QP	16.6	40.0	
97.436	QP	21.8	43.5	
140.687	QP	10.9	43.5	
385.004	QP	23.1	46.0	
1000-26000	Pk	-	74.0	No significant peaks above noise floor
	Av	-	54.0	

### TX middle channel

SPURIOUS EMISSIONS LEVEL RADIATED				
Frequency- [MHz]	Detector QP/Av/Pk	Measured value [dB $\mu$ V/m]	Limits [dB $\mu$ V/m]	Comment / Note
39.496	QP	29.8	40.0	
50.727	QP	20.7	40.0	
110.208	QP	27.2	43.5	
138.309	QP	19.1	43.5	
411.201	QP	23.0	46.0	
959.490	QP	18.9	46.0	
1220.80	Pk	41.3	74.0	
	Av	22.1	54.0	
4882.03	Pk	44.8	74.0	
	Av	34.2	54.0	
13000-26000	Av	-	54.0	No significant peaks above noise floor
	Pk	-	74.0	

**TX high channel**

SPURIOUS EMISSIONS LEVEL RADIATED				
Frequency- [MHz]	Detector QP/Av/Pk	Measured value [ dB $\mu$ V/m ]	Limits [ dB $\mu$ V/m ]	Comment / Note
34.885	QP	25.8	40.0	
39.487	QP	29.0	40.0	
50.696	QP	19.6	40.0	
110.039	QP	27.5	43.5	
408.543	QP	23.0	46.0	
955.316	QP	19.1	46.0	
1240.00	Pk	39.0	74.0	
	Av	19.9	54.0	
2483.50	Pk	63.2	74.0	
	Av	52.6	54.0	
4959.96	Pk	43.6	74.0	
	Av	33.0	54.0	
13000-26000	Av	-	54.0	No significant peaks above noise floor
	Pk	-	74.0	

Fulfil requirements = YES

**7 OCCUPIED BANDWIDTH**

**7.1 Test equipment**

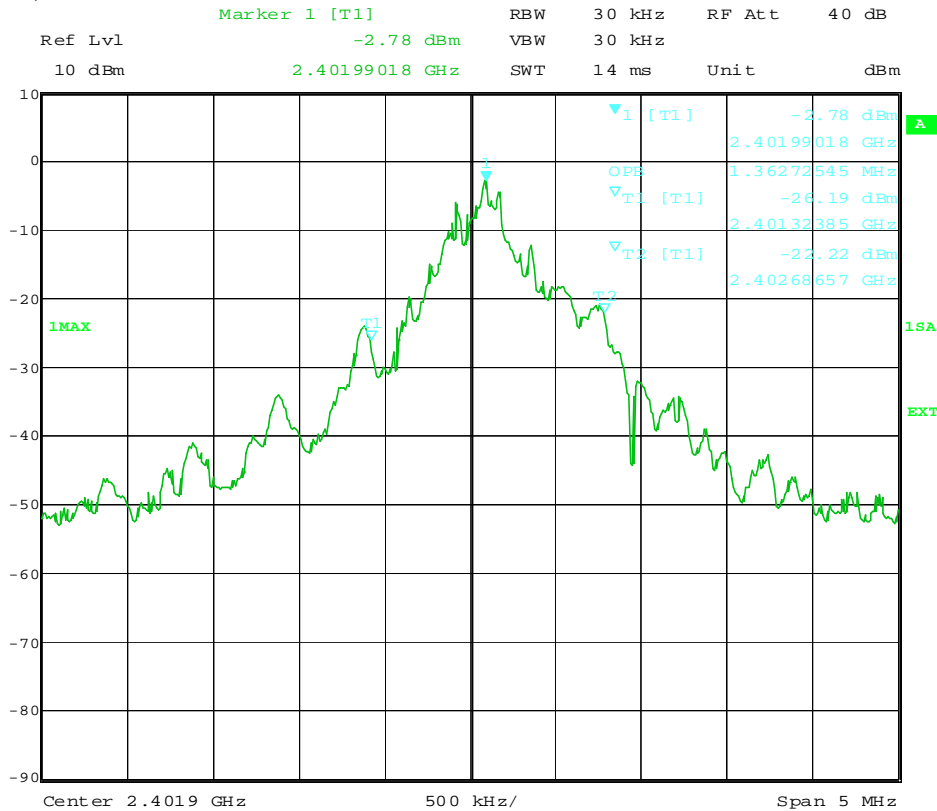
Equipment	Manufacturer	Type	Inv. No.	Calibration due date
Signal Analyzer	Rhode & Schwarz	FSIQ	12793	2011-07
Cable	Huber + Suhner	Sucoflex 104	5188	2011-07
RF attenuator	Hewlett Packard	8491A	30088	2011-07

**7.2 Test protocol**

Date of test: 2011-04-14

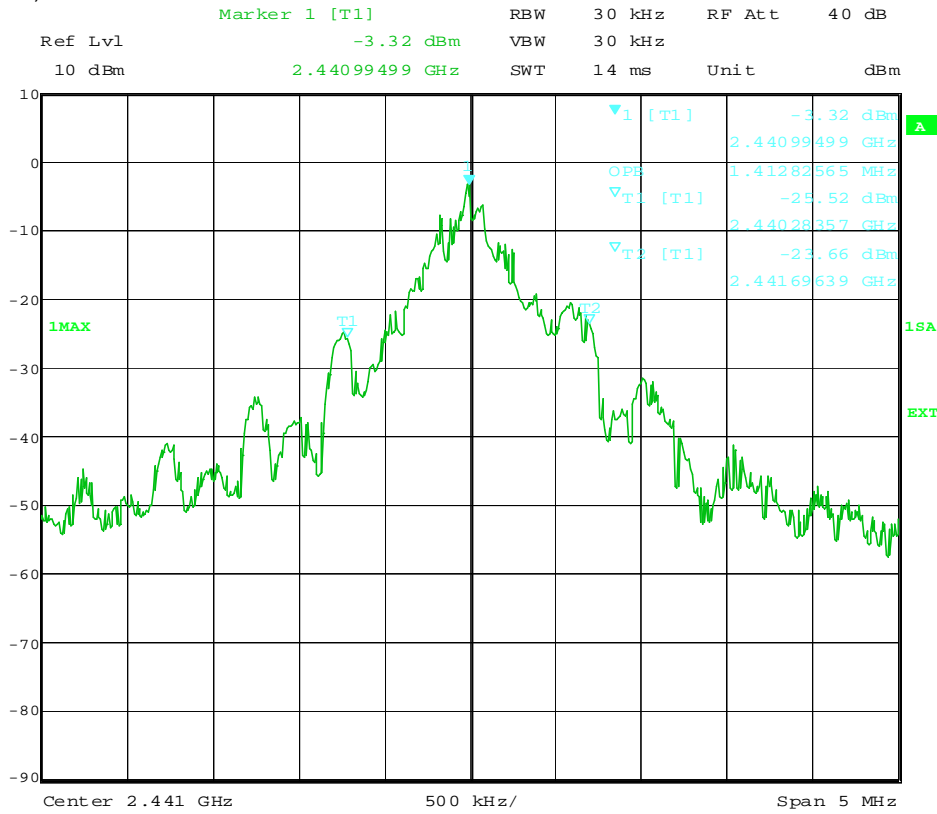
Channel	99% Bandwidth	Low frequency	High frequency	Allowed frequency band	Pass/Fail
MHz	MHz	MHz	MHz	MHz	
2402	1.36	2401.32	2402.69	2400-2483.5	Pass
2441	1.41	2440.28	2441.70	2400-2483.5	Pass
2480	1.30	2479.32	2480.62	2400-2483.5	Pass

Plot, low channel



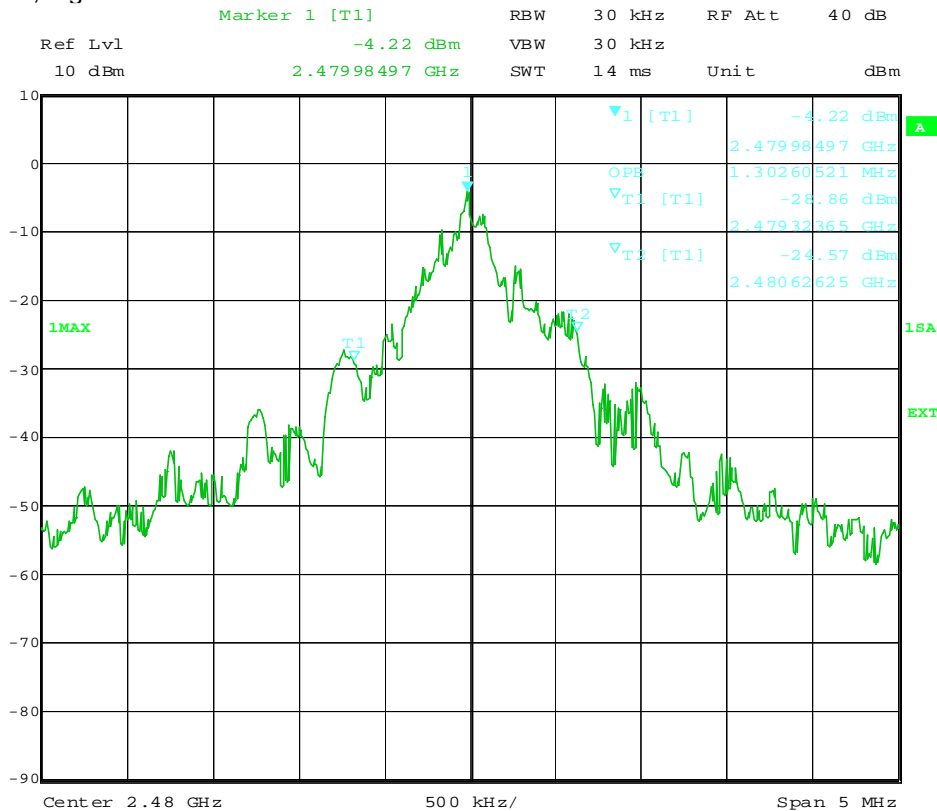
Date: 14.APR.2011 14:39:22

Plot, middle channel



Date: 14.APR.2011 14:40:47

Plot, high channel



Date: 14.APR.2011 14:41:44

**8 CONDUCTED EMISSION, AC PORT**

**8.1 Test equipment**

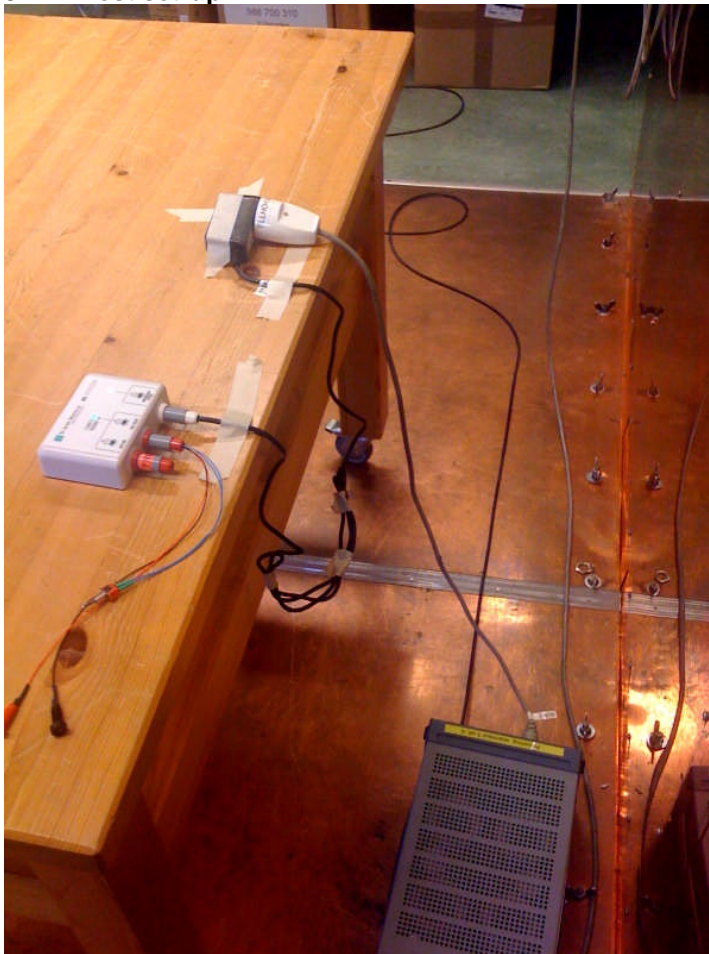
Equipment	Manufacturer	Type	Inv. No.	Calibration due date
Signal Analyzer	Rhode & Schwarz	ESCI	31686	2011-12
Cable	-	-	9883	2011-07
AMN	Rhode & Schwarz	ESH3-Z5	8768	2011-07

**Measurement uncertainty**

Conducted disturbance, 0.15 – 30 MHz:  $\pm 3,6$  dB

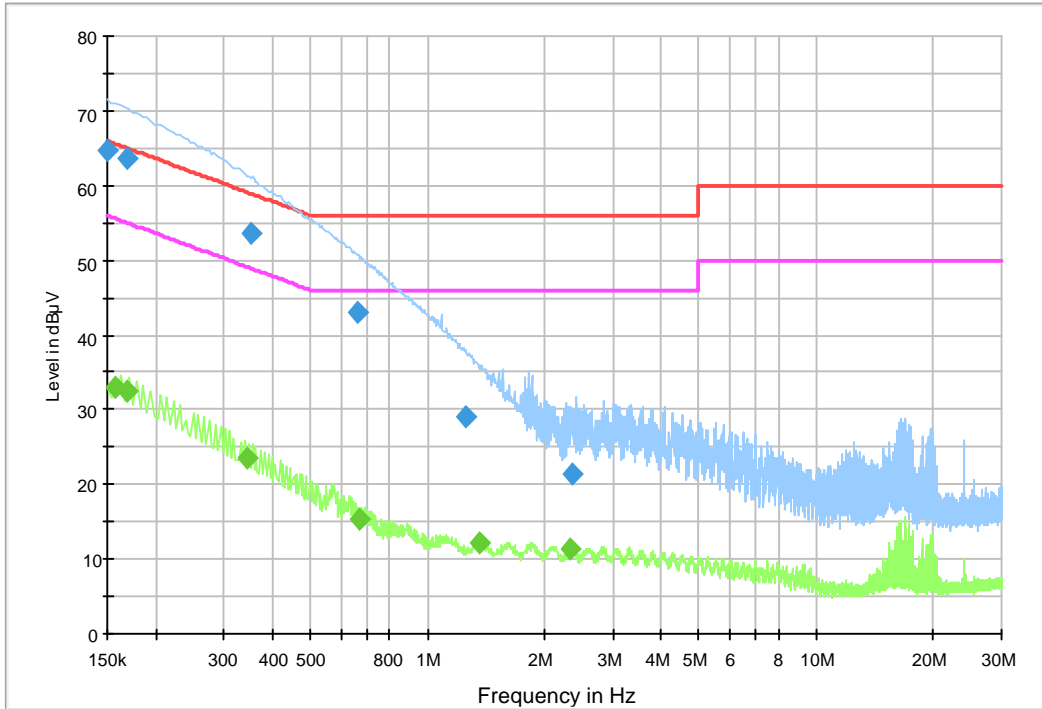
The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT. Measurement uncertainty is calculated in accordance with EA-4/02-1997. The uncertainty is given with a level of confidence of approximately 95% (k=2).

**8.2 Test set-up**



**8.3 Test protocol**

Date of test: 2011-04-21



SPURIOUS EMISSIONS LEVEL RADIATED				
Frequency- [MHz]	Detector QP/Av/Pk	Measured value [dBµV]	Limits [ dBµV]	Comment / Note
0.150	QP	64.6	66.0	1
0.168	QP	63.5	65.1	1
0.352	QP	53.7	58.9	
0.660	QP	42.9	56.0	
1.260	QP	29.1	56.0	
2.348	QP	21.4	56.0	
0.158	Av	32.9	55.6	
0.168	Av	32.3	55.1	
0.344	Av	23.6	49.1	
0.672	Av	15.3	46.0	
1.360	Av	12.2	46.0	
2.328	Av	11.4	46.0	

1) 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.

**PHOTO OF THE EUT**

