

# RADIO TEST REPORT

**No. 811671-1**

## EQUIPMENT UNDER TEST

Equipment: Remote Control  
Type / model: DRC-MP D2  
Manufacturer: Scanreco AB  
Tested by request of: Scanreco AB

## SUMMARY

The equipment complies with the requirements of the following standards:

47 CFR, Part 15, Subpart B (2008) and Subpart C (2008);

RSS-GEN, Issue 2 (June 2007)

RSS-210, Issue 7 (June 2007)

Industry Canada listed test facility No. IC 2042G-1



Date of issue: December 10, 2008

Tested by:

*Stefan Andersson*  
*Niklas Boström*

Stefan Andersson /  
Niklas Boström

Approved by:

*Niklas Boström*

Niklas Boström

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**1. CLIENT INFORMATION**

The EUT has been tested by request of

Company: SCANRECO AB  
Box 47144  
100 74 Stockholm  
Sweden  
Name of contact: Ramin Fardi

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

Equipment: Remote Control  
Type/Model: DRC-MP D2  
Brand name: Scanreco  
Serial number: No visible serial number on EUT  
Manufacturer: Scanreco AB  
Rating/Supplying voltage: 120VAC  
Rating RF output power:  $12 \pm 2$  dBm  
Antenna gain: 0 dBi  
External antenna connector: NO  
Operating temperature range: -10 to +55 °C  
Frequency range: 903.000 – 926.120 MHz  
Number of channels: 50  
Channel spacing: 340 kHz  
Modulation characteristics: GFSK  
Stand by mode supported: Yes



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### 3. TEST SPECIFICATIONS

#### 3.1 Standards

FCC 47 CFR part 15 (2008) Subpart B – Unintentional radiators

FCC 47 CFR part 15 (2008) Subpart C – Intentional Radiators; §15.247 Operation within the bands 902-928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz.

Measurements methods according to ANSI C63.4-2003 - Methods of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

RSS-Gen, Issue 2 (june 2007): General Requirements and Information for the Certification of Radiocommunication Equipment

RSS-210, Issue 7 (June 2007): Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment.

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

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

#### 3.3 Test set-up

Measurement set-ups for the test of conducted disturbance voltage in the frequency range 0,15-30 MHz and out-of-band spurious emissions test are described in corresponding sections. During other tests the EUT was connected to the spectrum analyzer by cable.

#### 3.4 Operating environment

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

Air temperature: 20-25 °C  
Relative humidity: 25-45 %



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**4. TEST SUMMARY**

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

FCC reference	IC reference	Test	Result	Note
15.247(b)	RSS-210 A8.4 (1)	Peak output power	PASS	
15.247(a)	RSS-210 A8.1 (c)	20 dB Bandwidth	PASS	
15.247(a)	RSS-210 A8.1 (b)	Carrier frequency separation	PASS	
15.247(a)	RSS-210 A8.1 (c)	Number of hopping frequencies (channels)	PASS	
15.247(a)	RSS-210 A8.1 (c)	Time of occupancy (dwell time)	PASS	
15.247(d)	RSS-210 A8.5	Band edge compliance	PASS	
15.247(d)	RSS-210 A8.5	Out of band spurious emissions, radiated	PASS	
15.247(d)	RSS-210 A8.5	Out of band spurious emissions, conducted	PASS	
15B	RSS-Gen Table 1	Out of band spurious emissions, radiated	PASS	1
15B	RSS-Gen Table 2	Conducted emission at AC port	PASS	1



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**5. PEAK OUTPUT POWER**

**5.1 Test protocol**

Date of test: 2008-12-03

EUT mode of operation: TX and hopping on one channel.

Spectrum analyzer settings:

Span: 100 kHz  
 RBW: 30 kHz  
 VBW: 30 kHz  
 Sweep time: Auto  
 Detector: Peak  
 Trace: Max Hold

Channel (MHz)	Peak Output Power (dBm)	Plot	Limit value (dBm)
903,00	14,7	plot P5.1	< 30
914,56	14,6	plot P5.2	
926,12	14,4	plot P5.3	

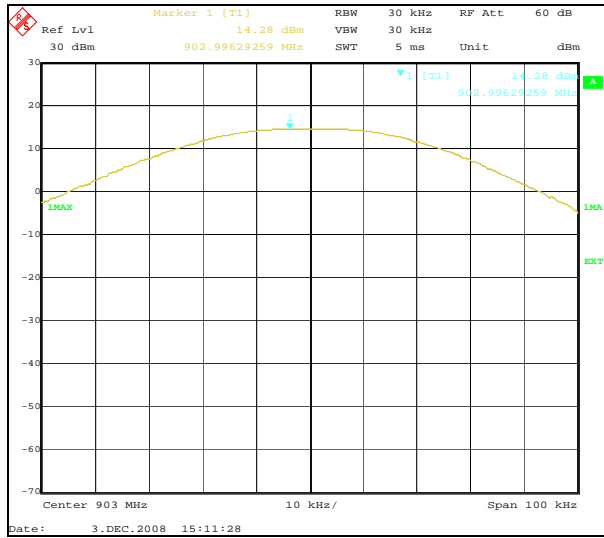
Measurement results are corrected for attenuation in the set-up configuration and antenna gain declared by the manufacturer.

Example calculation:

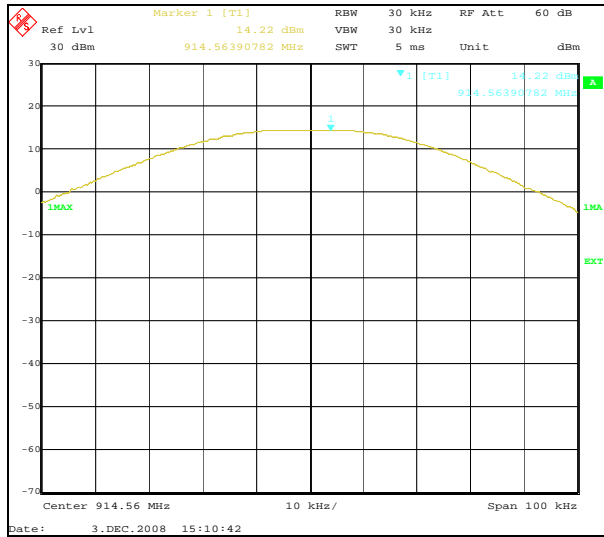
Peak output power [dBm] = Analyser reading [dBm] + cable loss [dB] + EUT antenna gain [dBi]



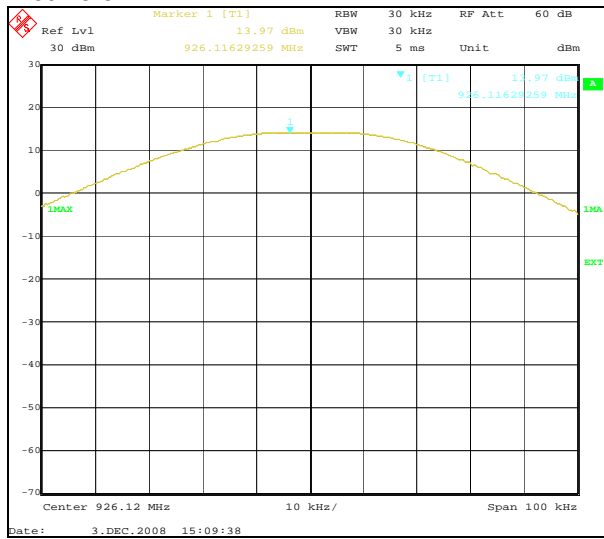
Plot P5.1



Plot P5.2



Plot P5.3



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**6. 20 dB BANDWIDTH**

**6.1 Test protocol**

Date of test: 2008-12-03

EUT mode of operation: TX and hopping on one channel.

Spectrum analyzer settings:

Span: 60 kHz  
RBW: 1 kHz  
VBW: 1 kHz  
Sweep time: 5 ms  
Detector: Peak  
Trace: Max Hold

Channel (MHz)	20 dB Bandwidth (kHz)	Plot	Limit value (kHz)
903,00	14,1	plot P6.1	< 500
914,56	13,6	plot P6.2	
926,12	14,3	plot P6.3	

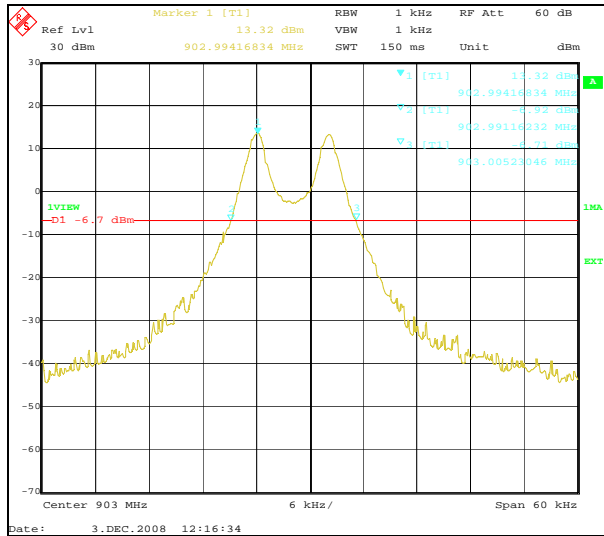


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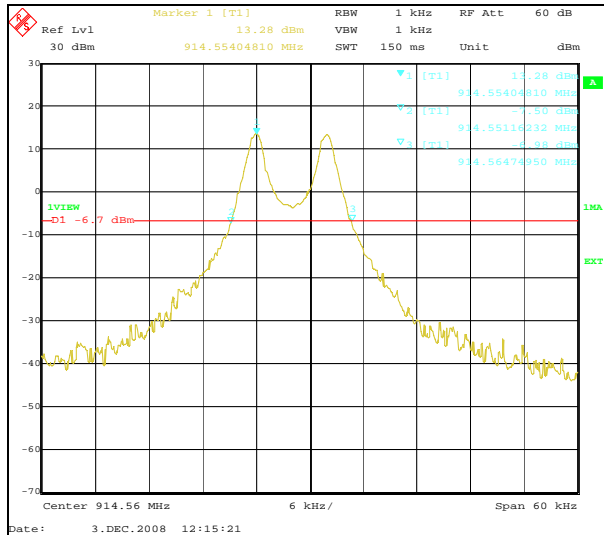
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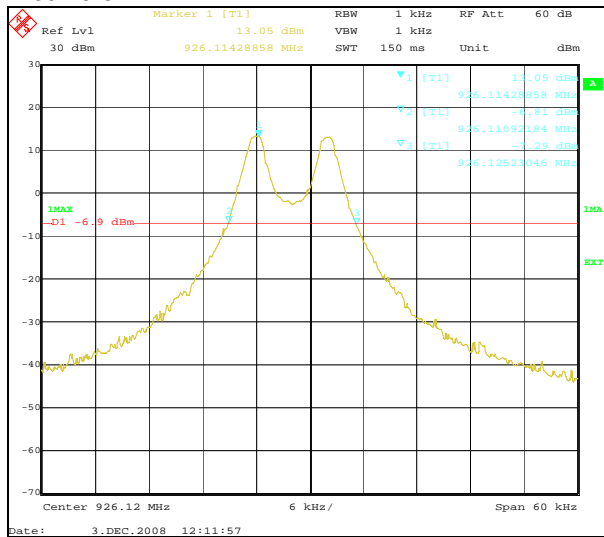
Plot P6.1



Plot P6.2



Plot P6.3



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**7. CARRIER FREQUENCY SEPARATION**

**7.1 Test protocol**

Date of test: 2008-12-03

EUT mode of operation: TX and hopping on.

Spectrum analyzer settings:

Span: 1 MHz  
 RBW: 100 kHz  
 VBW: 100 kHz  
 Sweep time: Auto  
 Detector: Peak  
 Trace: Max Hold

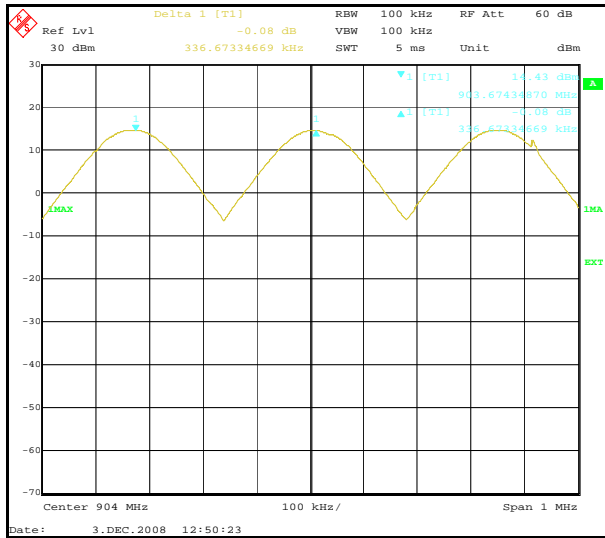
Channel	Carrier frequency separation from the next channel (kHz)	Plot	Limit value (kHz)
Low	336,7	plot P7.1	> 25
Mid	340,7	plot P7.2	> 25
High	344,7	plot P7.3	> 25



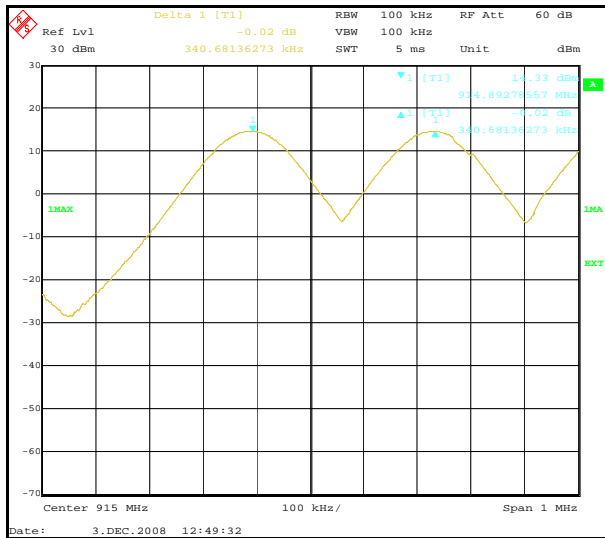
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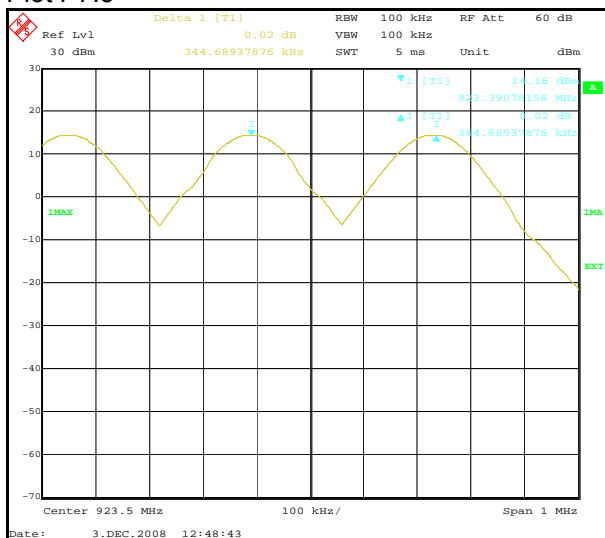
Plot P7.1



Plot P7.2



Plot P7.3



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**8. NUMBER OF HOPPING CHANNELS**

**8.1 Test protocol**

Date of test: 2008-12-03

EUT mode of operation: TX and hopping on.

Spectrum analyzer settings:

Start frequency: 902 and 915 MHz

Stop frequency: 915 and 928 MHz

RBW: 200 kHz

VBW: 200 kHz

Sweep time: Auto

Detector: Peak

Trace: Max Hold

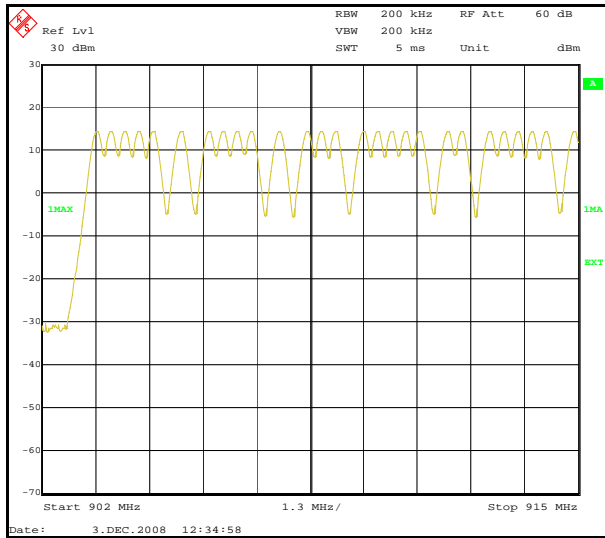
Number of hopping channels	Plot	Limit value
27 + 23 = 50	plot P8.1 and plot P8.2	≥ 50



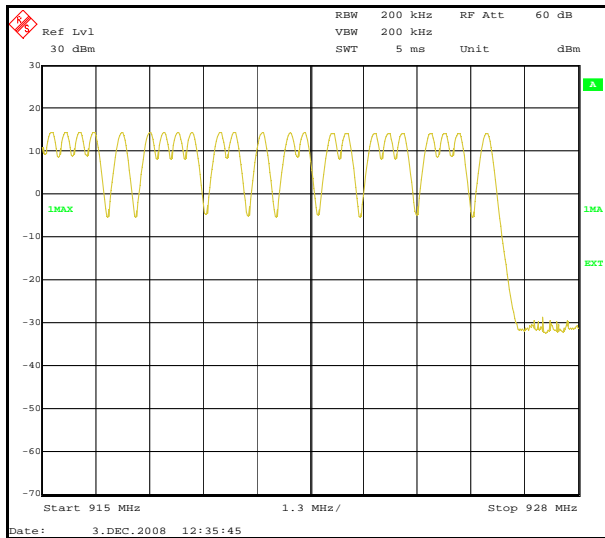
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Plot P8.1



Plot P8.2



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**9. TIME OF OCCUPANCY (DWELL TIME)**

**9.1 Test protocol**

Date of test: 2008-12-03

EUT mode of operation: TX and hopping on.

Spectrum analyzer settings:

*Determination of transmitting time T*

Span: 0 Hz  
 RBW: 1 MHz  
 VBW: 1 MHz  
 Sweep time: 200 ms  
 Single sweep  
 Detector: Peak  
 Trace: Clear/Write  
 Trigger: Video

*Determination of the number of times n the channel is active during the sweep time of 10 s*

RBW: 100 kHz  
 VBW: 100 kHz  
 Sweep time: 20 s

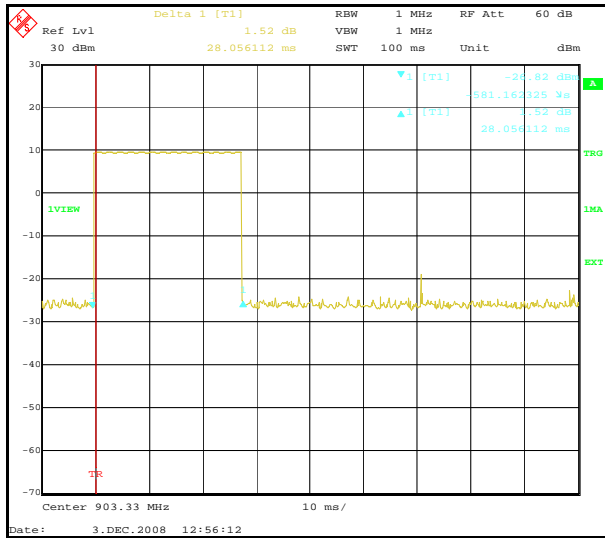
Test parameters	Channel (MHz)			Limit value (ms)
	low	mid	high	
T (ms)	28,056 (plot P9.1)	28,056 (plot P9.2)	28,056 (plot P9.3)	-
n	7 (plot P9.4)	7 (plot P9.5)	7 (plot P9.6)	-
Dwell time (ms) =	196,4	196,4	196,4	< 400



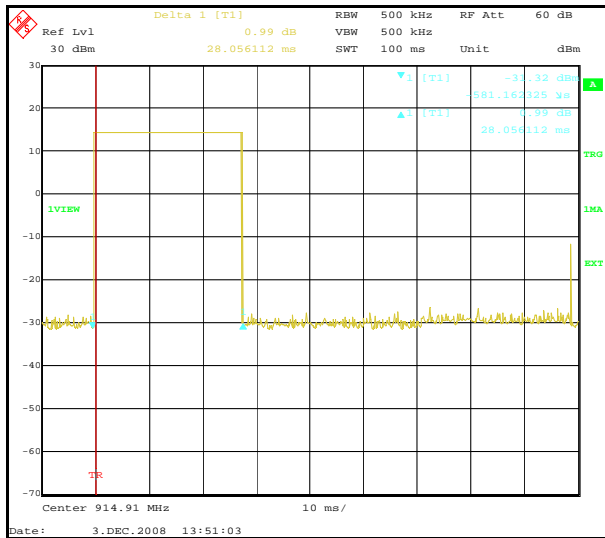
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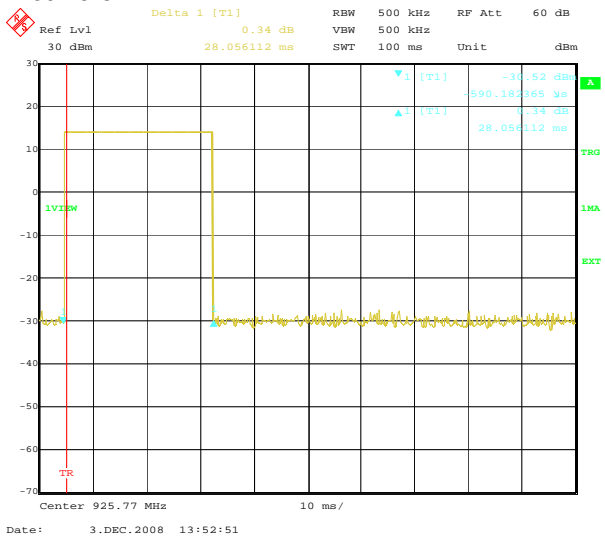
Plot P9.1



Plot P9.2



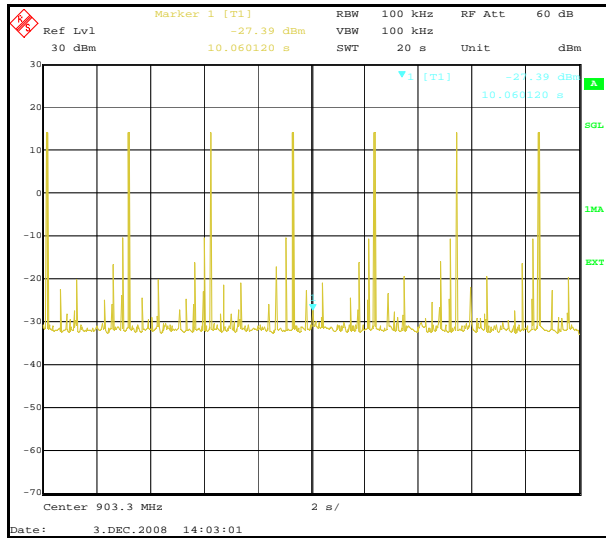
Plot P9.3



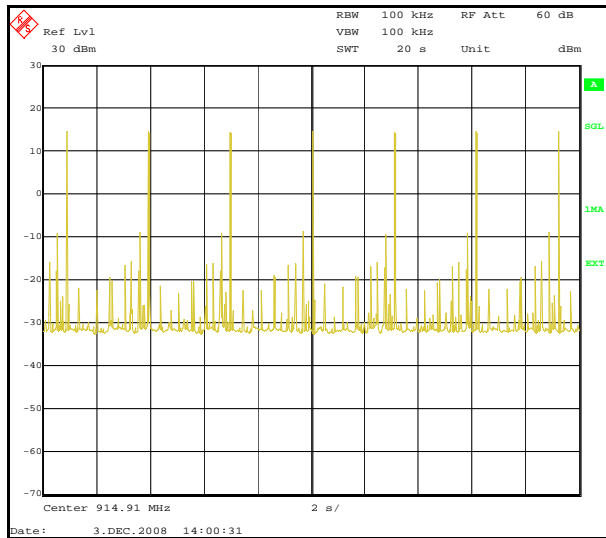
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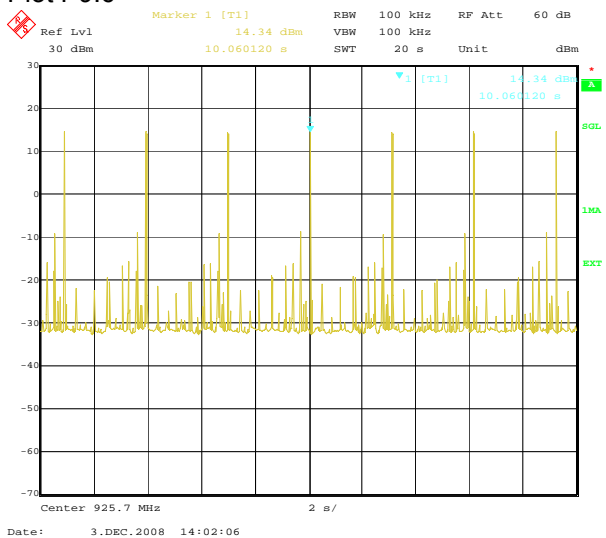
Plot P9.4



Plot P9.5



Plot P9.6



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**10. BAND EDGE COMPLIANCE**

**10.1 Test protocol**

Date of test: 2008-12-03

EUT mode of operation: TX and hopping on.

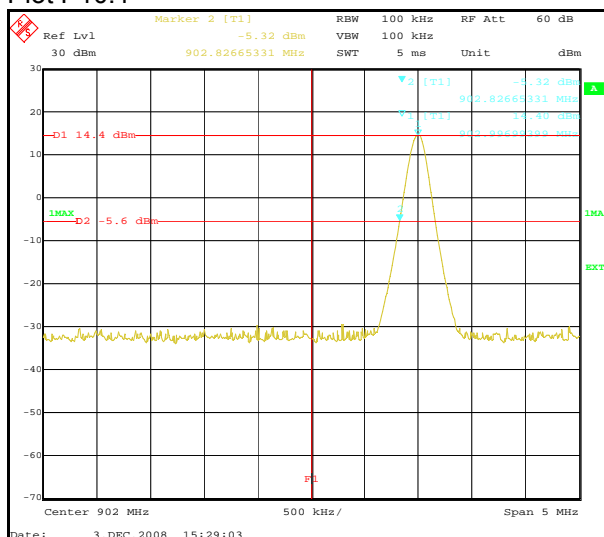
TX and hopping on one channel. (low and high channels)

Spectrum analyzer settings:

Span: 5 MHz  
 Center frequency: at band edges  
 RBW: 100 kHz  
 VBW: 100 kHz  
 Sweep time: Auto  
 Detector: Peak  
 Trace: Max Hold

Channel	Plot	Results	Limit value (dBc)
Low	plot P10.1	PASS	20
High	plot P10.2	PASS	20
Hopping	plot P10.3 and plot P10.4	PASS	20

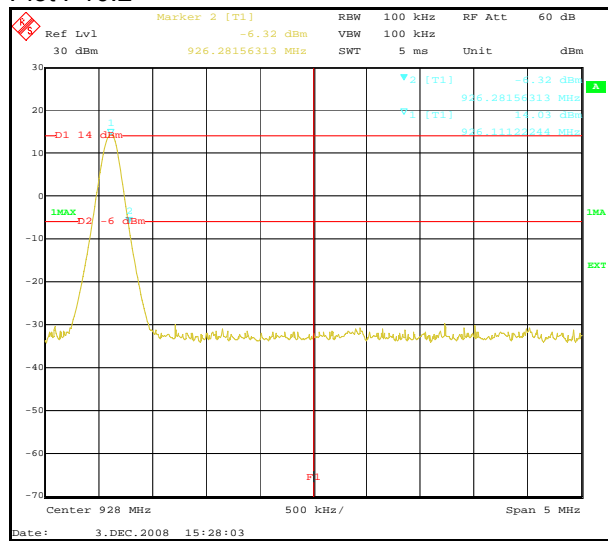
Plot P10.1



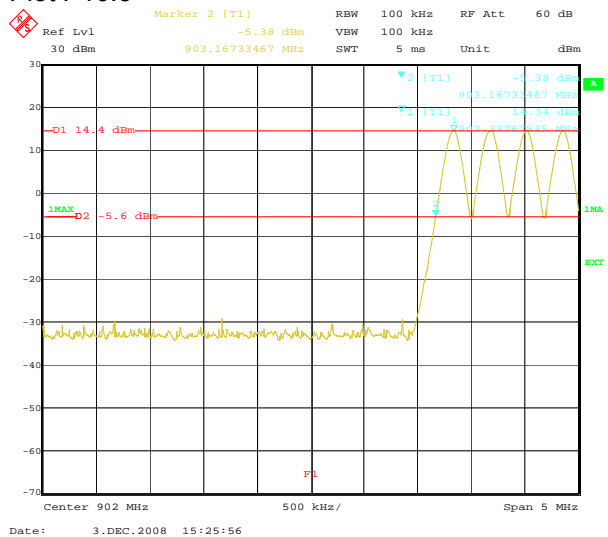
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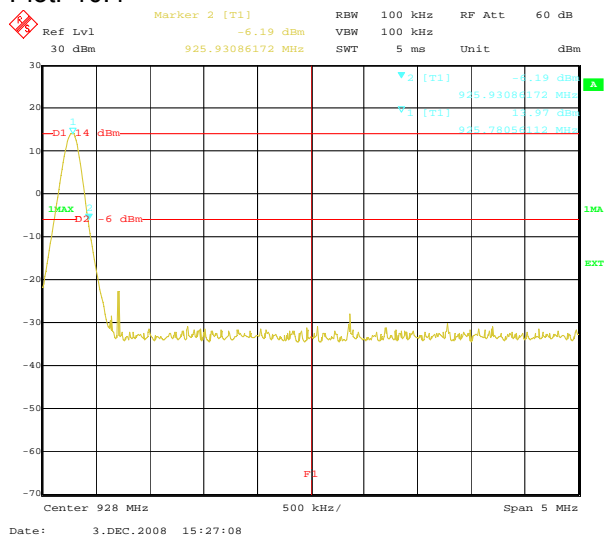
Plot P10.2



Plot P10.3



Plot P10.4



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**11. RADIATED SPURIOUS EMISSIONS**

**11.1 Operating environment**

Temperature: 20-25 °C (10 – 40 °C)  
 Relative Humidity: 25-45 % (10 - 90 %)

**11.2 Measurement uncertainty**

Radiated disturbance electric field intensity, 30 – 1000 MHz: ± 4,6 dB  
 Radiated disturbance electric field intensity, 1000 – 13000 MHz: ± 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 measurement uncertainty is given with a confidence of 95%.

**11.3 Test equipment**

Equipment	Manufacturer	Type	SEMKO No.
<i>Test site: Semi-anechoic shielded chamber, 5,7 x 8,7 x 5,4 m (W x L x H)</i>			
Software:	Rohde & Schwarz	EMC32	
Measurement receiver:	Rohde & Schwarz	ESCI	12798
Integrated Measurement System:	Rohde & Schwarz	IMS	12800
Antenna: Ultra Broadband	Rohde & Schwarz	HL562	30711
<i>Test site: Radio anechoic shielded chamber, 3,7 x 7,0 x 2,4 m (W x L x H)</i>			
Software:	Rohde & Schwarz	ES-K1, V1.70	
Signal analyser:	Rohde & Schwarz	FSIQ 40	12793
Preamplifier:	MITEQ	AFS6/AFS44	12335
Antenna: Double Ridge Guide Horn (1-13GHz)	EMCO	3115	4936
Transformer	Tufvassons	AFM-1500	30317



#### 11.4 Measurement set-up

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

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 photo is 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, 2,5 m and 3,5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps.

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 were carried out.

The EUT was supplied by 120 VAC (60 Hz) during the test.

Test set-up photo:



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

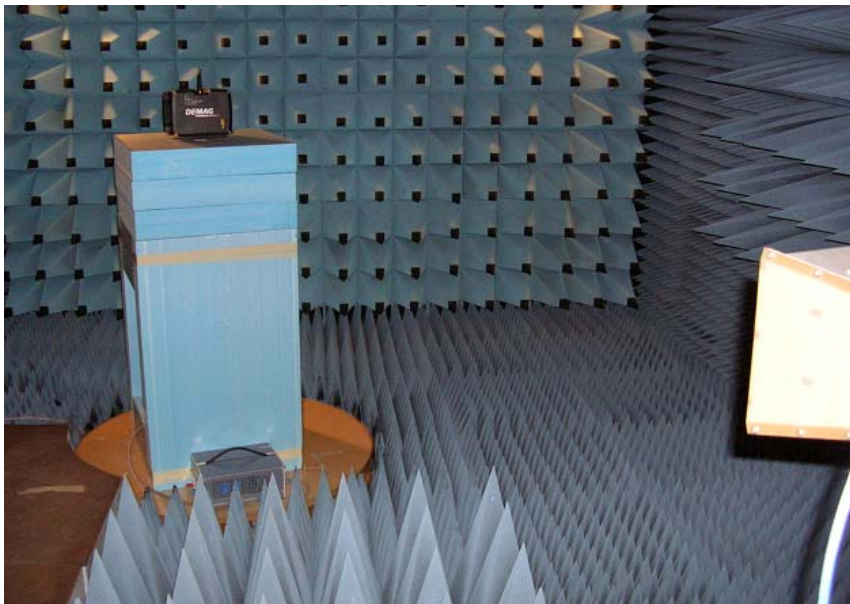
In the Radio anechoic chamber the EUT was placed on a non-metallic table, 1,4 m above the floor. The radiated disturbance electric field intensity was measured at a distance of 3 m. The specified test mode was enabled.

An overview sweep with peak detection of the electric field intensity was performed with the spectrum analyser in max-hold and with the antenna placed 1,4 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps.

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 were carried out.

The EUT was supplied by 120 VAC (50 Hz) during the test.

Test set-up photo:



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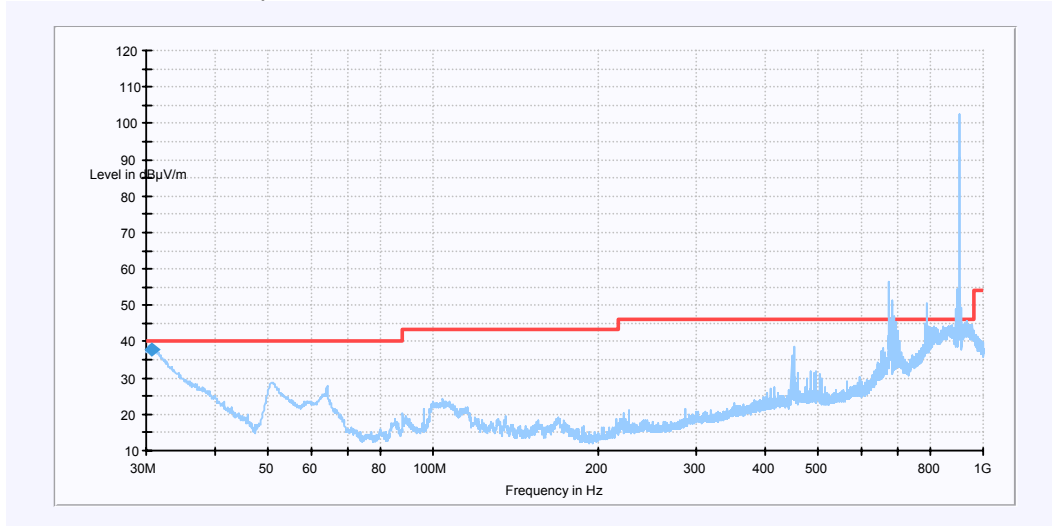
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### 11.5 Test protocol

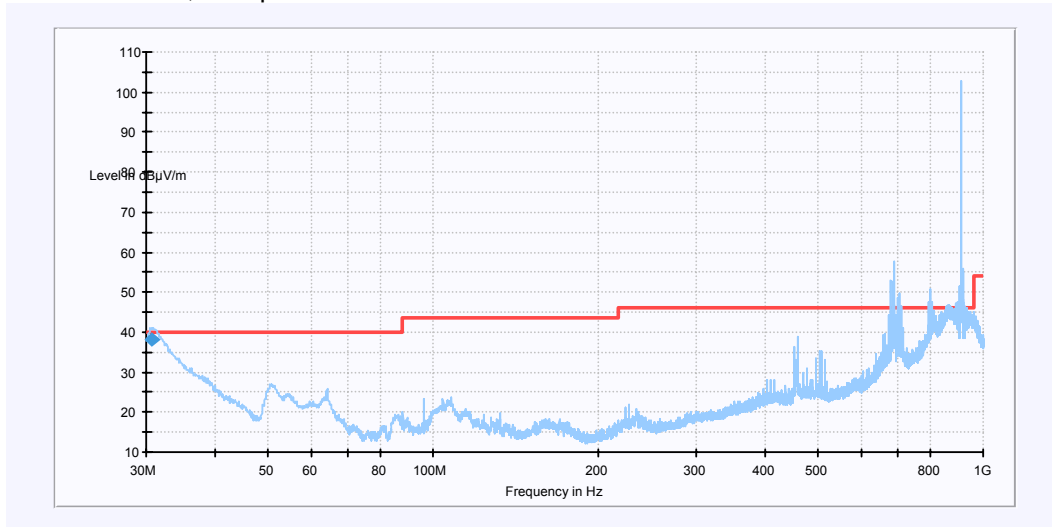
#### Semi-anechoic shielded chamber

Date of test: 2008-09-10

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



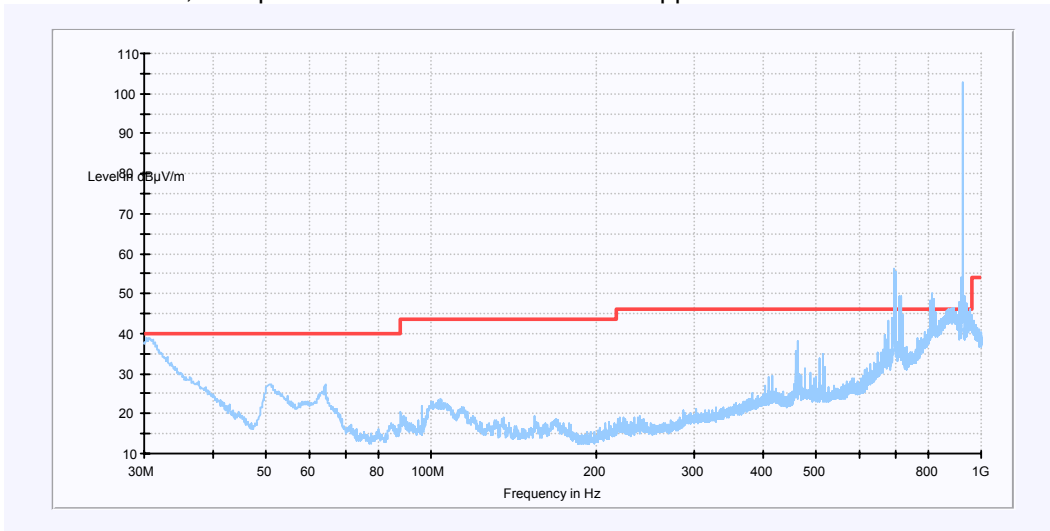
30 – 1000 MHz, max peak at a distance of 3 m on the middle TX channel



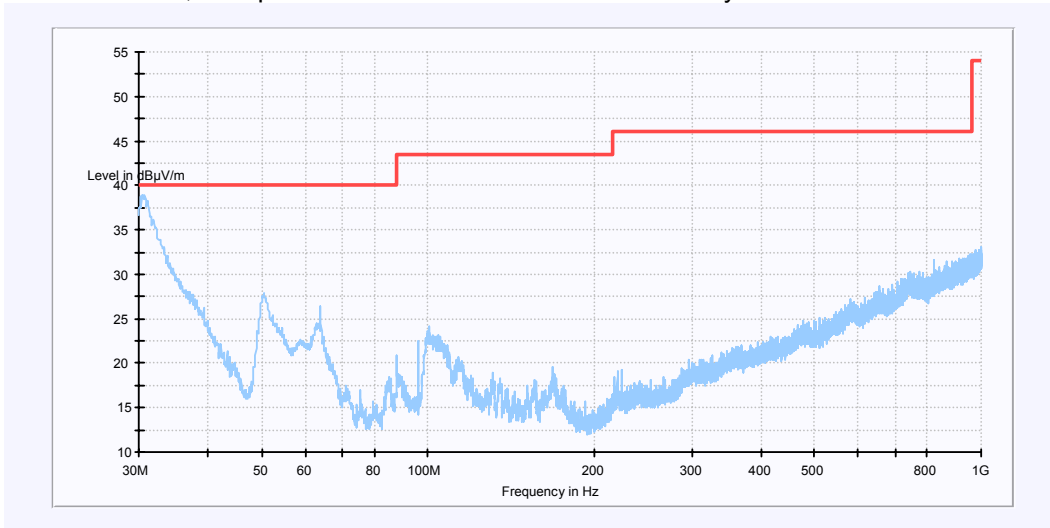
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30 – 1000 MHz, max peak at a distance of 3 m on the upper TX channel



30 – 1000 MHz, max peak at a distance of 3 m in the stand by mode



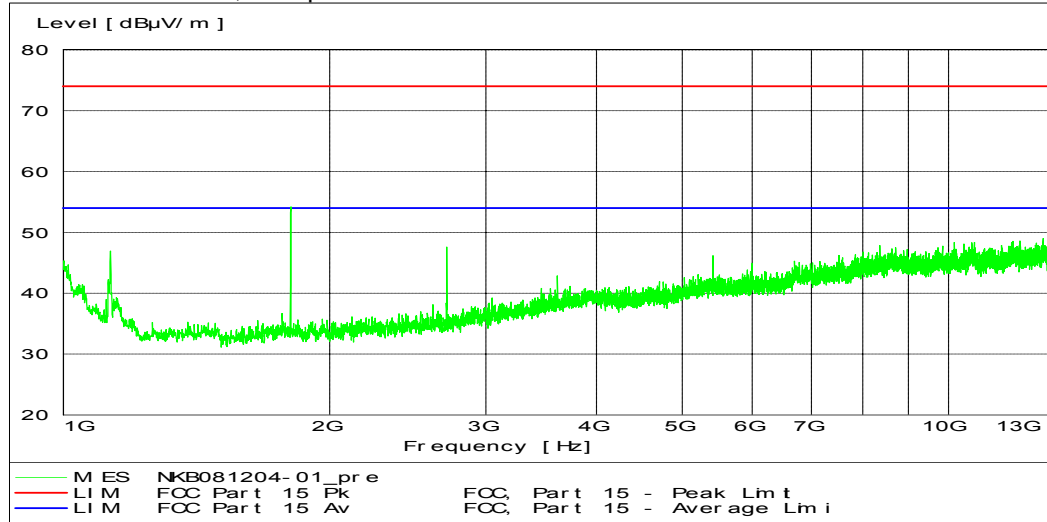
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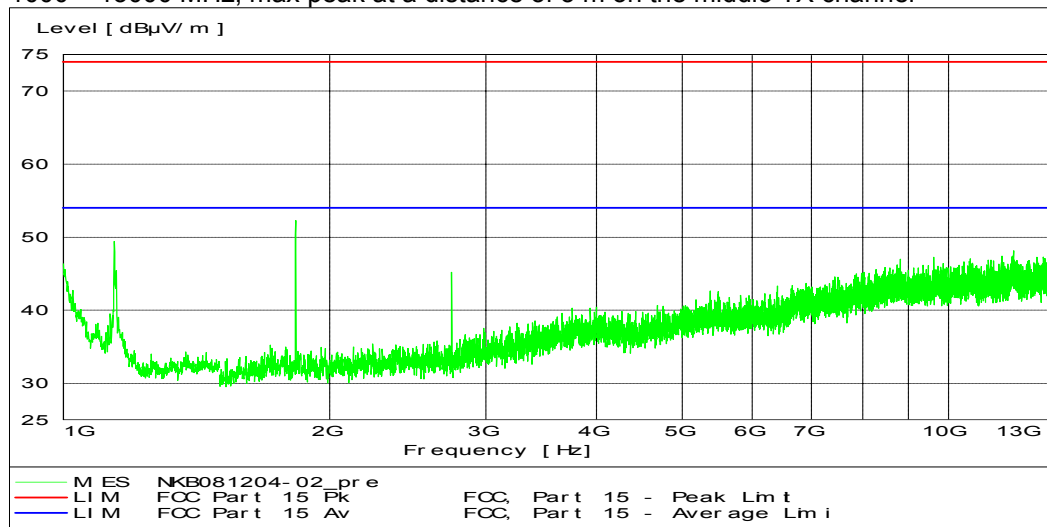
Radio anechoic shielded chamber

Date of test: 2008-12-04

1000 – 13000 MHz, max peak at a distance of 3 m on the lower TX channel



1000 – 13000 MHz, max peak at a distance of 3 m on the middle TX channel

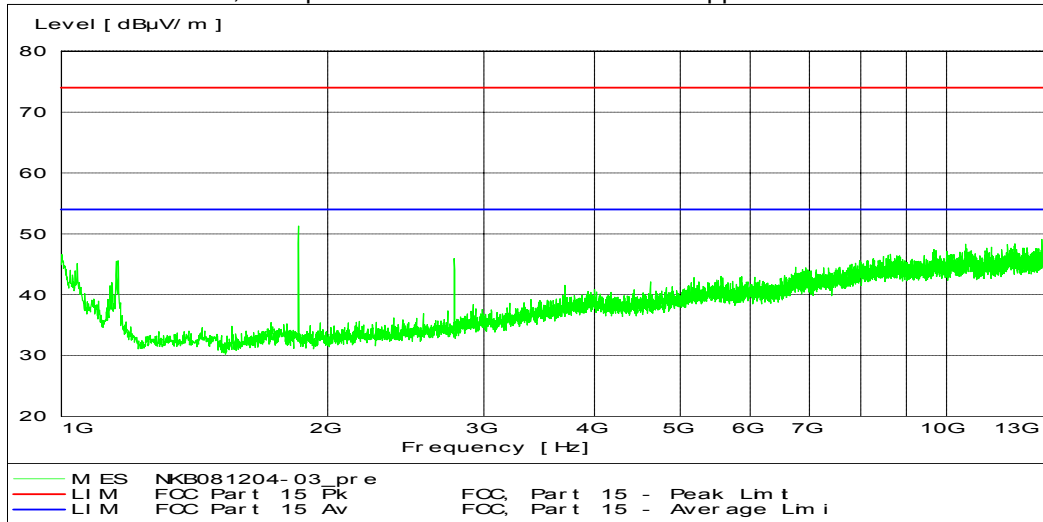


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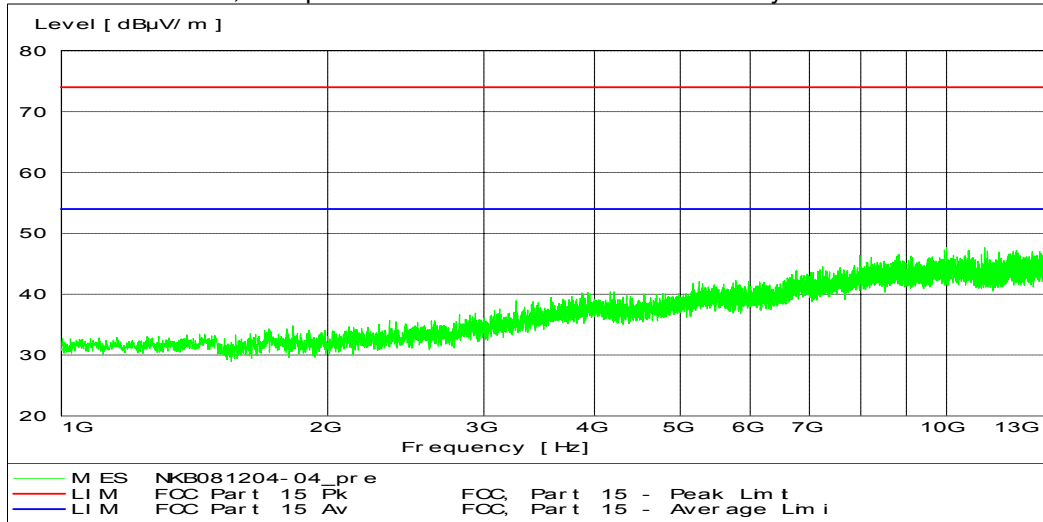
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1000 – 13000 MHz, max peak at a distance of 3 m on the upper TX channel



1000 – 13000 MHz, max peak at a distance of 3 m in the stand by mode



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Data summary

Field strength of spurious emissions low channel						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB( $\mu$ V/m)]	QP/AV [dB( $\mu$ V/m)]	Peak [dB( $\mu$ V/m)]	QP/AV [dB( $\mu$ V/m)]	
454.503	120	-	43.7	-	96.6	1
675.677	120	-	57.9	--	96.6	1
681.831	120	-	53.5	-	96.6	1
687.947	120	-	50.0	-	96.6	1
893.85	120	-	50.1	-	96.6	1
900.006	120	-	58.3	-	96.6	1
936.859	120	-	42.8	-	96.6	1
1806.113	1000	61.9	-	96.6	-	1

Note 1) Not in a restricted band, so the field strength limit is 20 dB below highest emission in TX band. This was measured to be 116.6 dB $\mu$ V/m. This gives a limit of 96.6 dB $\mu$ V/m

Field strength of spurious emissions middle channel						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB( $\mu$ V/m)]	QP/AV [dB( $\mu$ V/m)]	Peak [dB( $\mu$ V/m)]	QP/AV [dB( $\mu$ V/m)]	
681.102	120	-	53.6	-	95.5	1
687.218	120	-	59.6	-	95.5	1
699.530	120	-	50.6	-	95.5	1
705.646	120	-	51.3	-	95.5	1
711.802	120	-	49.5	-	95.5	1
803.980	120	-	50.6	-	95.5	1
1141.023	1000	51.1	48.2	74	54	
1829.159	1000	57.2	-	95.5	-	1

Note 1) Not in a restricted band, so the field strength limit is 20 dB below highest emission in TX band. This was measured to be 115.5 dB $\mu$ V/m. This gives a limit of 95.5 dB $\mu$ V/m

Field strength of spurious emissions high channel						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB( $\mu$ V/m)]	QP/AV [dB( $\mu$ V/m)]	Peak [dB( $\mu$ V/m)]	QP/AV [dB( $\mu$ V/m)]	
692.645	120	-	58.4	-	98.3	1
698.801	120	-	57.8	-	98.3	1
711.073	120	-	52.0	-	98.3	1
717.229	120	-	53.2	-	98.3	1
815.523	120	-	50.3	-	98.3	1
932.284	120	-	51.5	-	98.3	1
940.668	120	-	50.0	-	98.3	1
1852.205	1000	55.5	51.6	98.3	-	1

Note 1) Not in a restricted band, so the field strength limit is 20 dB below highest emission in TX band. This was measured to be 118.3 dB $\mu$ V/m. This gives a limit of 98.3 dB $\mu$ V/m



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Field strength of spurious emissions standby						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	
30.600	120	-	37.6	-	40	
30.767	120	-	37.6	-	40	
31.257	120	-	36.4	-	40	
31.620	120	-	35.2	-	40	
32.266	120	-	33.5	-	40	
88-216	120	< 25	-	-	43.5	
216-960	120	< 33	-	-	46	
960-1000	120	< 34	-	-	54	
1000-13000	1000	< 48	-	-	54	

Example calculation:

Measured level [dBμV/m] = Analyser reading [dBμV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [1/m]



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**13. CONDUCTED DISTURBANCE VOLTAGE IN THE FREQUENCY RANGE 0,15 - 30 MHZ****13.1 Operating environment**

Temperature: °C (10 – 40 °C)  
 Relative Humidity: % (10 - 90 %)

**13.2 Measurement uncertainty**

Conducted disturbance voltage, quasi-peak detection: ±2,0 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 measurement uncertainty is given with a confidence of 95%.

**13.3 Test equipment**

Test site:	FCC		
Equipment	Manufacturer	Type	SEMKO No.
Software:	Rohde & Schwarz	ES-K1 V1.60	
Measurement receiver:	Rohde & Schwarz	ESHS 30	4946
Artificial mains network:	Rohde & Schwarz	ESH3-Z5	2727
Transformer:	TUFVASSONS	AFM-1500	375
AC source	Chroma	61605	12573

**13.4 Measurement set-up**

The mains terminal disturbance voltage was measured with the EUT located 0,8 m above the ground plane and 0,4 m from the vertical ground plane. The EUT was connected to an artificial mains network (AMN). The AMN was placed on the ground plane. Amplitude measurements were performed with a quasi-peak detector.

The EUT was supplied by 120 VAC (60 Hz) during the test.



Test set-up photo:



**13.5 Test protocol**

Date of test: 2008-12-04

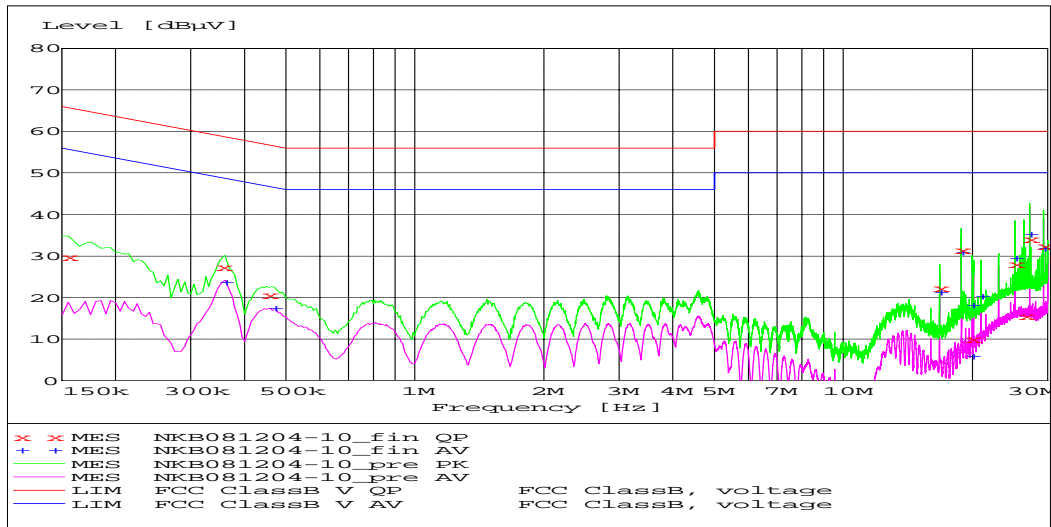
Frequency /MHz	Quasi-Peak	
	Disturbance Level /dB(μV)	Permitted limit /dB(μV)
0.155	29.8	66
0.355	27.4	59
0.455	20.5	57
16.765	22.4	60
18.860	31.5	60
25.150	28.0	60
27.245	34.0	60
29.340	32.3	60



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Overview sweeps performed with peak and average detectors are shown below.



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**14. OUT OF BAND SPURIOUS EMISSIONS, CONDUCTED AT ANTENNA PORT**

Date of test: 2008-12-03

EUT mode of operation: TX and hopping on one channel.

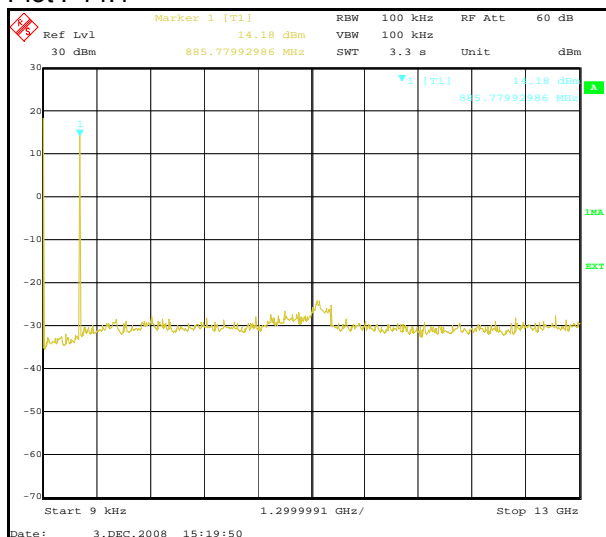
Spectrum analyzer settings:

RBW: 100 kHz  
 VBW: 100 kHz  
 Sweep time: Auto  
 Detector: Peak  
 Trace: Max Hold

Channel	Plot	Results	Limit value (dBc)
Low	plot P14.1	PASS	20
Middle	plot P14.2	PASS	20
High	plot P14.3	PASS	20
Hopping	plot P14.4	PASS	20

Limit: In any 100 kHz bandwidth outside the operating frequency band (902 – 928 MHz), the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

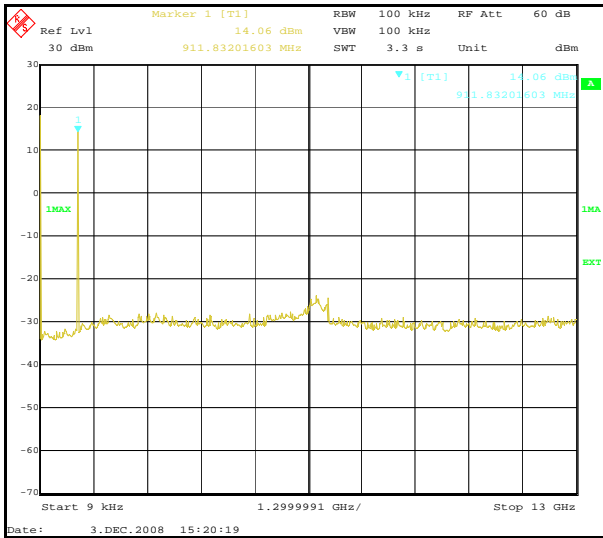
Plot P14.1



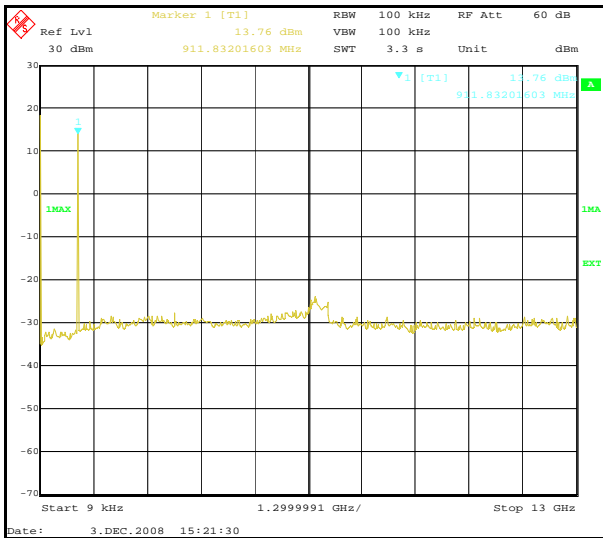
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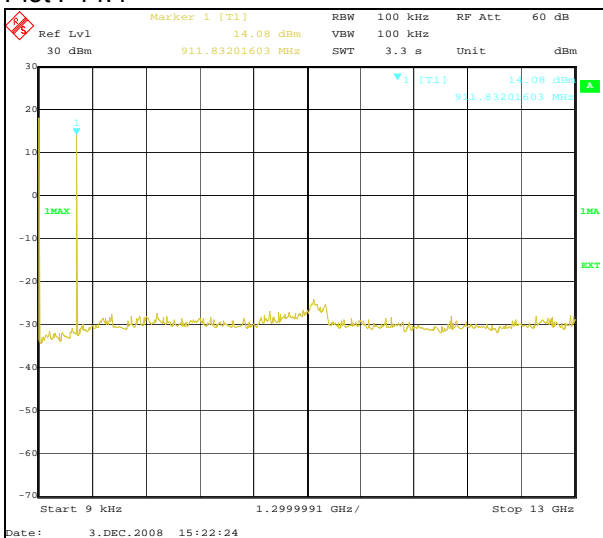
Plot P14.2



Plot P14.3



Plot P14.4



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**APPENDIX – PHOTO OF THE EUT**



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