


**REPORT: FCC / IC Radio Frequency (RF) test report**

**PRODUCT:**

Test item description:	Radio remote control
Trade Mark:	Scanreco
Model/Type reference:	G4 Handy 10 / 48381
Serial number:	269
	270
Customer:	SCANRECO Industrielektronik AB BOX 47144 / Årsta Skolgränd 22 S-100 74 Stockholm Sweden
Contact person:	Katrin Ekvall
Manufacturer:	SCANRECO Industrielektronik AB BOX 47144 / Årsta Skolgränd 22 S-100 74 Stockholm Sweden

**DATE:** 30.11.2009

**TESTED BY:**   
Matti Virkki ; Test engineer

**APPROVED BY:**   
Tuomo Hahl ; Test engineer

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## 1 LABORATORY INFORMATION

<b>Test Laboratory</b>	Intertek ETL Semko OY EMC Laboratory Koneenkatu 12 / K17 05830 Hyvinkää FINLAND  Tel: +358 10 424 6200 Fax: +358 10 424 6201 e-mail: firstname.surname@intertek.com
<b>FCC registration number:</b> <b>IC file number:</b>	910391 (January 27, 2003) IC 2042C-1 (May 14, 2003)

## 2 SUMMARY OF TEST RESULTS

The tests listed in this report have been done to demonstrate compliance to the FCC rules section §15.107, §15.109, §15.247 and IC standard RSS-GEN / RSS-210.

### Transmitter measurements

Section in CFR 47	Section in RSS-210	Test	Result
15.247, a 1	A8.1 (2)	Carrier frequency separation	PASS
15.247, a 1 iii	A8.1 (4)	Number of hopping frequencies	PASS
15.247, a 1 iii	A8.1 (4)	Time of occupancy	PASS
15.247, a	A8.1 (1)	20dB bandwidth	PASS
15.247, b 1	A8.4 (2)	Peak output power	-
15.247, d	A8.5	Band-edge compliance of RF emissions	PASS
15.247, d	A8.5	Spurious RF conducted emissions	PASS
15.247, d	A8.5	Radiated spurious emissions	-
	RSS-GEN 4.4.1	99% bandwidth	-

PASS Pass  
FAIL Fail  
X Measured, but there is no applicable performance criteria  
- Not done

### 3 EUT INFORMATION

The EUT and accessories used in the tests are listed below. Later in this report only EUT numbers are used as reference.

	Device	Type	S/N	EUT number
EUT	Radio remote control	Scanreco G4 Handy 10 / 48381	270, Rev:090917, YYWW 0940	1*
	Radio remote control	Scanreco G4 Handy 10 / 48381	269, Rev:090917, YYWW 0940	2 **
Accessories	-	-	-	-

Notes:

- \* Antenna replaced with SMA-connector
- \*\* Continuous transmission

#### 3.1 EUT description

EUT is handheld transmitter operating in the 900MHz ISM frequency band. The system supports only simplex communication.

The transmitter software was updated to switch off an amplifier output during frequency change.

#### 4 EUT TEST SETUPS

For each test the EUT was exercised to find out the worst case of operation modes and device configuration.

Two different test setups were used: one for conducted measurements, another for radiated measurements. One EUT was equipped with an external antenna connector for conductive measurements.

The test setup photographs are in the document referenced in section **Error! Reference source not found.**

#### 5 APPLICABLE STANDARDS

The tests were performed in guidance of:

CFR 47 Part:

§15.107  
§15.109  
§15.209  
§15.247  
ANSI C63.4 (2003)

IC standard:

RSS-GEN, Issue 1  
RSS-210, Issue 7  
CISPR 22, 2002

Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method" for each test case.

## 6 CARRIER FREQUENCY SEPARATION

<b>EUT</b>	1		
<b>Accessories</b>	-		
<b>Temp, Humidity, Air Pressure</b>	22 °C	23 %RH	1004 hPa
<b>Date of measurement</b>	November 12, 2009		
<b>FCC rule part</b>	15.247, a 1		
<b>RSS-210 section</b>	A8.1 (2)		
<b>Measured by</b>	Matti Virkki		

### 6.1 Test setup and testing method



Picture 1: Test setup for carrier frequency separation measurement

Spectrum analyzer was set to sweep the EUT operating band 902 – 928 MHz. 10 kHz resolution bandwidth and maximum hold function was used to measure the EUT transmission over sufficient time. Carrier frequency separation was read from the screen.

## 6.2 EUT operation mode

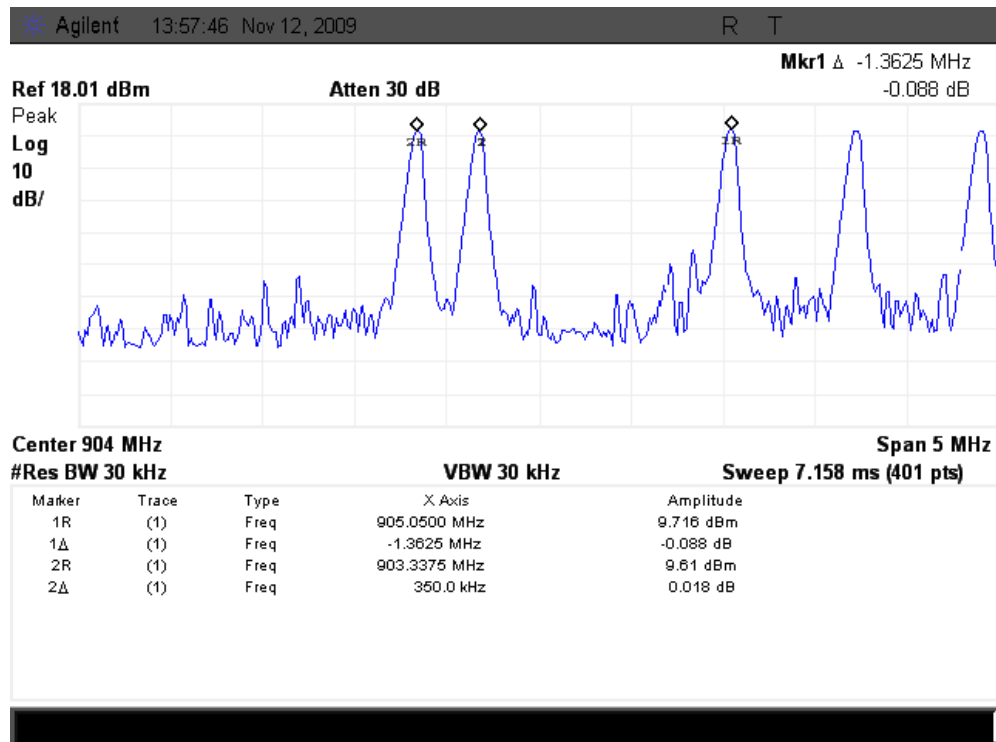
<b>EUT operation mode</b>	Transmit, FSK modulation
<b>EUT channel</b>	Hopping
<b>EUT TX power level</b>	max

## 6.3 Results

Table 1: Carrier frequency separation measurement results

Limit	Result
>25 kHz	350 kHz

## 6.4 Screen shots



Picture 2: Carrier frequency separation.

## 7 NUMBER OF HOPPING FREQUENCIES

<b>EUT</b>	1		
<b>Accessories</b>	-		
<b>Temp, Humidity, Air Pressure</b>	22 °C	23 %RH	1004 hPa
<b>Date of measurement</b>	November 12, 2009		
<b>FCC rule part</b>	15.247, a 1 iii		
<b>RSS-210 section</b>	A8.1 (4)		
<b>Measured by</b>	Matti Virkki		

### 7.1 Test setup



Picture 3: Test setup for measurement of number of hopping frequencies

Spectrum analyzer was set to sweep the EUT operating band 902 – 928 MHz. 100 kHz resolution bandwidth and maximum hold function was used to measure the EUT transmission over sufficient time. Number of hopping frequencies was calculated from the screen.



## 7.2 EUT operation mode

<b>EUT operation mode</b>	Transmit, FSK modulation
<b>EUT channel</b>	Hopping
<b>EUT TX power level</b>	max

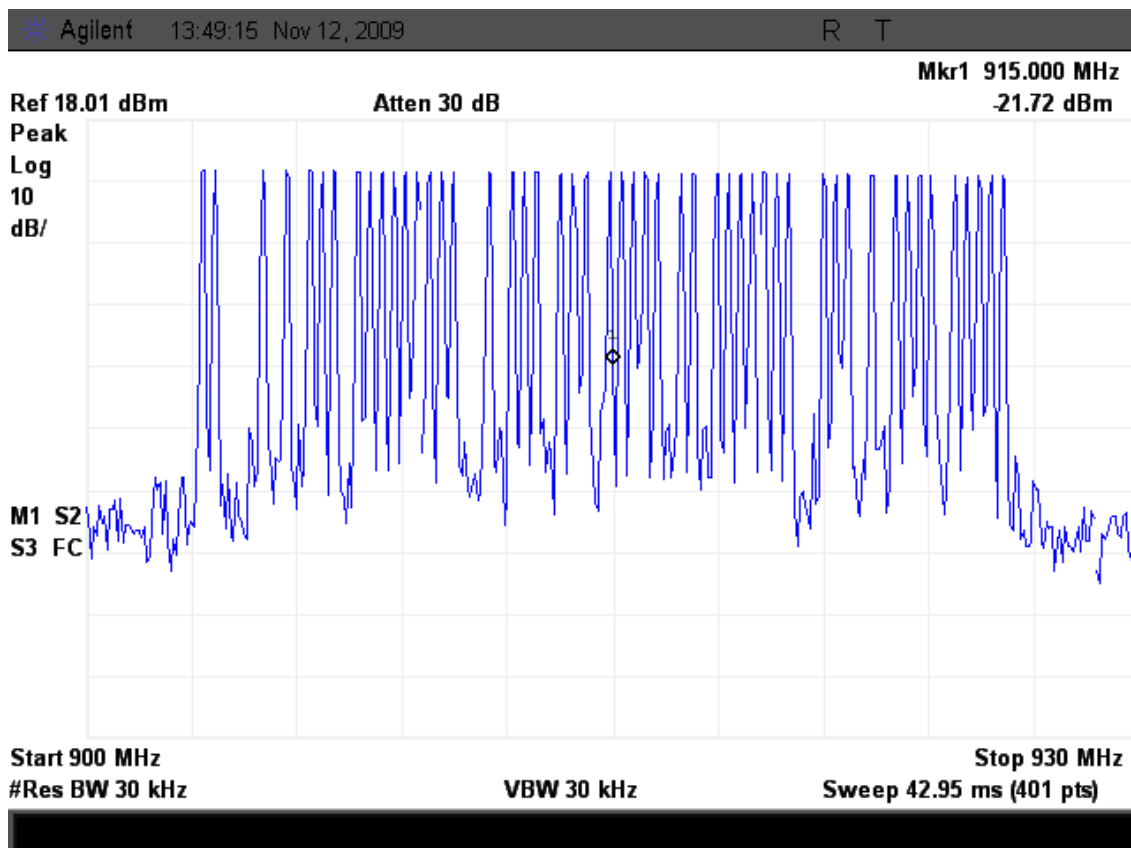
## 7.3 Results

Table 2: Number of hopping frequencies measurement results

Limit	Result
$\geq 50$	50

## 7.4 Screen shots

Picture 4: Number of hopping frequencies measurement



## 8 TIME OF OCCUPANCY

<b>EUT</b>	1		
<b>Accessories</b>	-		
<b>Temp, Humidity, Air Pressure</b>	22 °C	23 %RH	1004 hPa
<b>Date of measurement</b>	November 12, 2009		
<b>FCC rule part</b>	15.247, a 1 iii		
<b>RSS-210 section</b>	A8.1 (4)		
<b>Measured by</b>	Matti Virkki		

### 8.1 Test setup and testing method



Picture 5: Test setup for conducted RF output power measurement

Spectrum analyzer with single sweep and 0 Hz span was used to monitor the transmitter operation over time.

## 8.2 EUT operation mode

<b>EUT operation mode</b>	Transmit, FSK modulation
<b>EUT channel</b>	Hopping
<b>EUT TX power level</b>	max

## 8.3 Results

Table 3: Time of occupancy during connection mode measurement results

Limit	Result
≤ 0,4 s over 20 s period	0,388 s

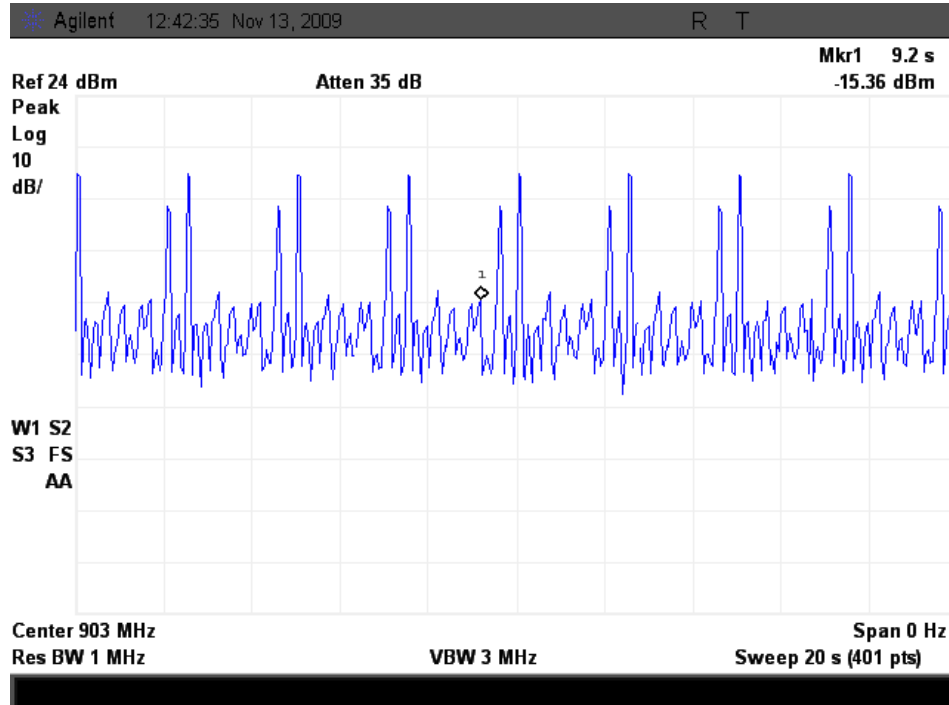
### Limit:

EUT's 20 dB bandwidth is less than 250 kHz. As defined in 15.247, a 1 i, the limit for time of occupancy is 0,4s within a 20 second period.

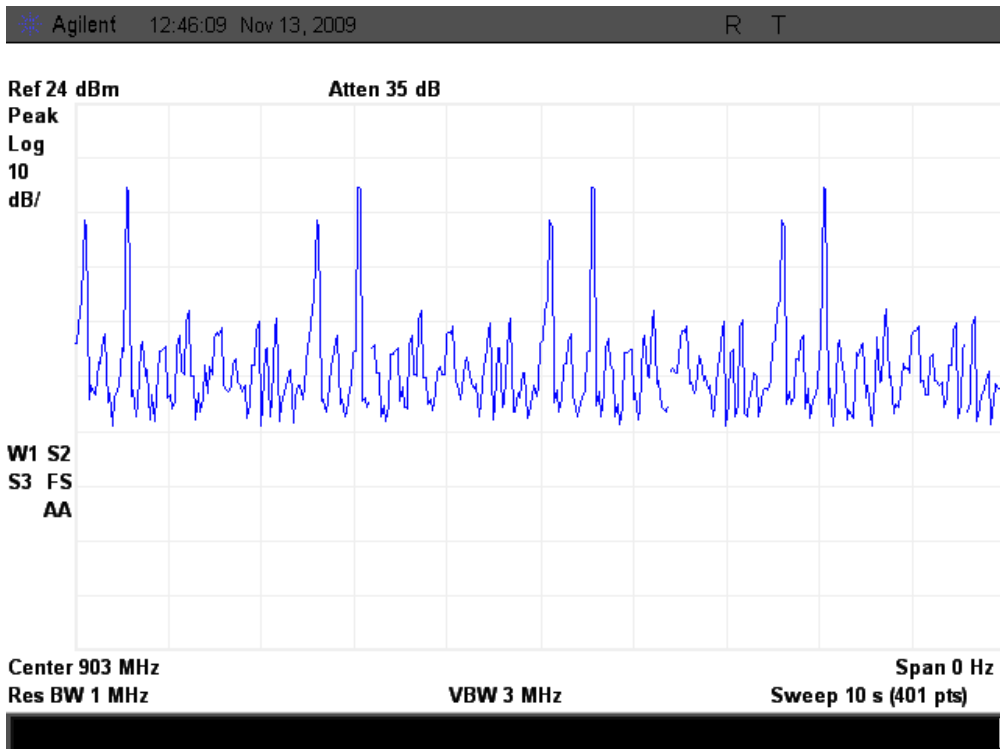
### Results:

In measurement time of 20 s, total of 16 transmissions occurred. The duration of one transmission was 25 ms. Based on these measurements the transmitter operated  $16 * 25 \text{ ms} = 0,388 \text{ s}$  during the 20 s period

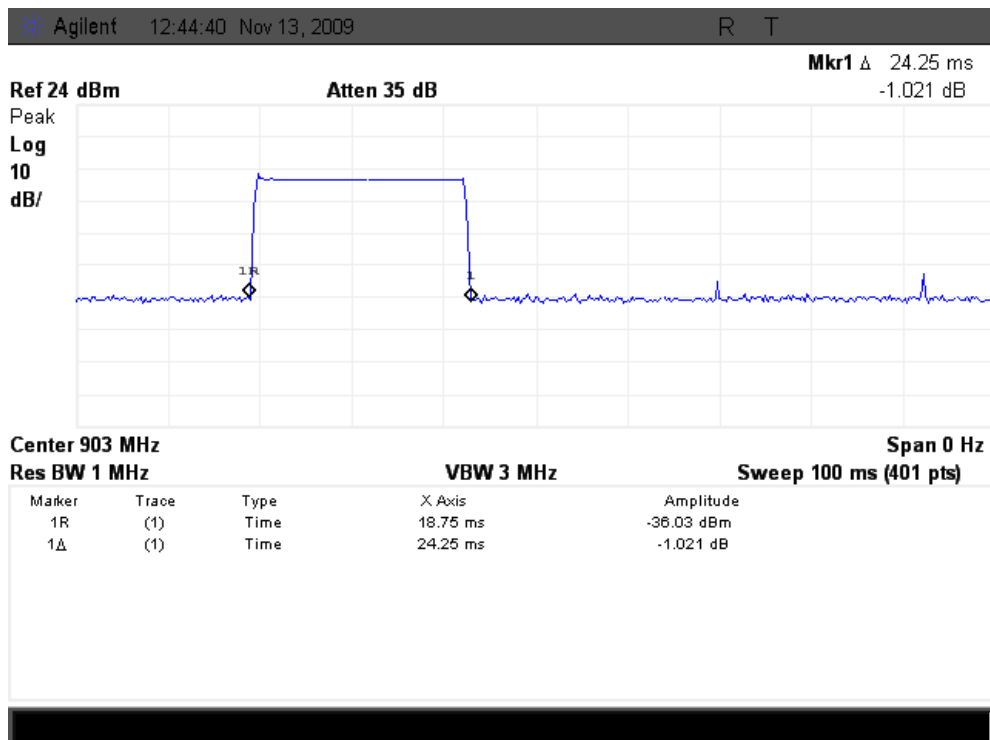
## 8.4 Screen shots



Picture 6: Number of transmissions on connection state 20s



Picture 7: Number of transmissions on connection state 10s



Picture 8: Duration of one transmission on connection state

## 9 20 dB BANDWIDTH

<b>EUT</b>	1		
<b>Accessories</b>	-		
<b>Temp, Humidity, Air Pressure</b>	22 °C	23 %RH	1004 hPa
<b>Date of measurement</b>	November 12, 2009		
<b>FCC rule part</b>	15.247, a		
<b>RSS-210 section</b>	A8.1 (1)		
<b>Measured by</b>	Matti Virkki		

### 9.1 Test setup and measurement method



Picture 9: Test setup for conducted RF output power measurement

The 20dB bandwidth was measured using 100 Hz resolution bandwidth and maximum hold function of the spectrum analyzer. 20dB bandwidth was defined by measuring the maximum level on the measured channel and by placing delta markers 20 dB below this value and read the value.

### 9.2 EUT operation mode

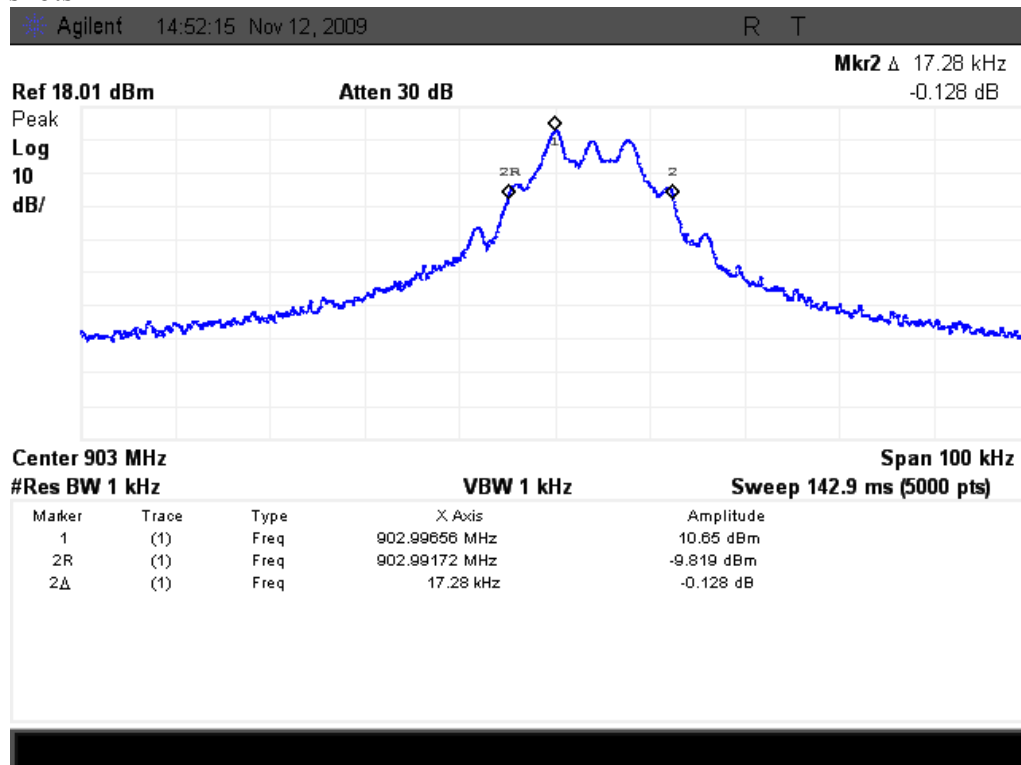
<b>EUT operation mode</b>	Transmit, FSK modulation
<b>EUT channel</b>	Low, middle, high
<b>EUT TX power level</b>	max

### 9.3 Results

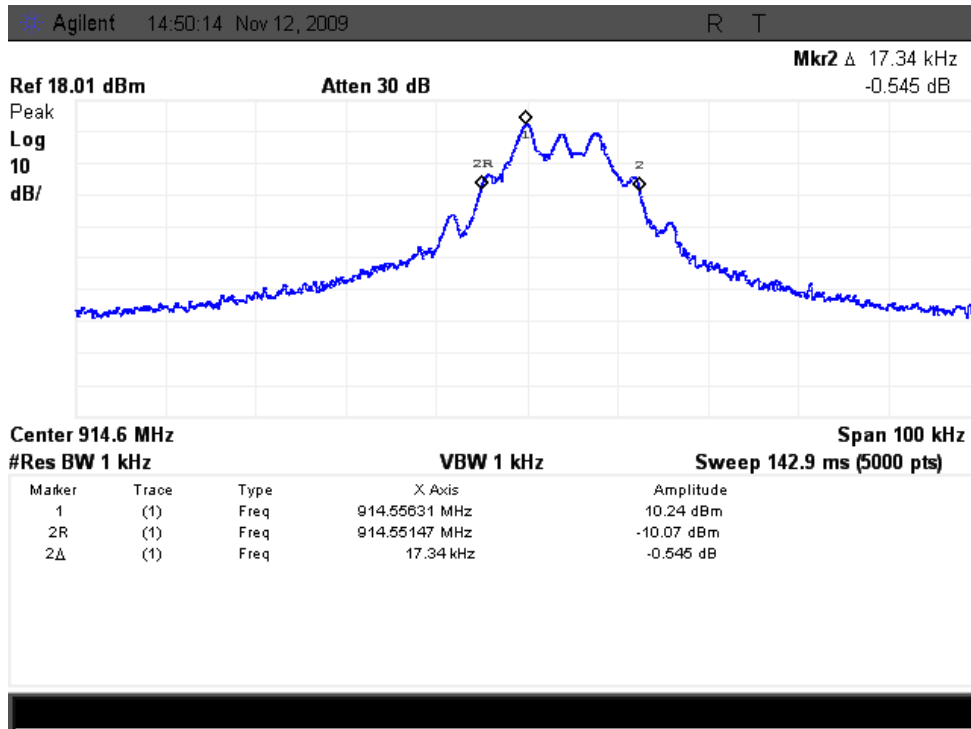
Table 4: 20dB bandwidth measurement results

EUT Channel	Limit (kHz)	Measured value (kHz)
Low	≤ 500	17,28
Middle		17,34
High		17,02

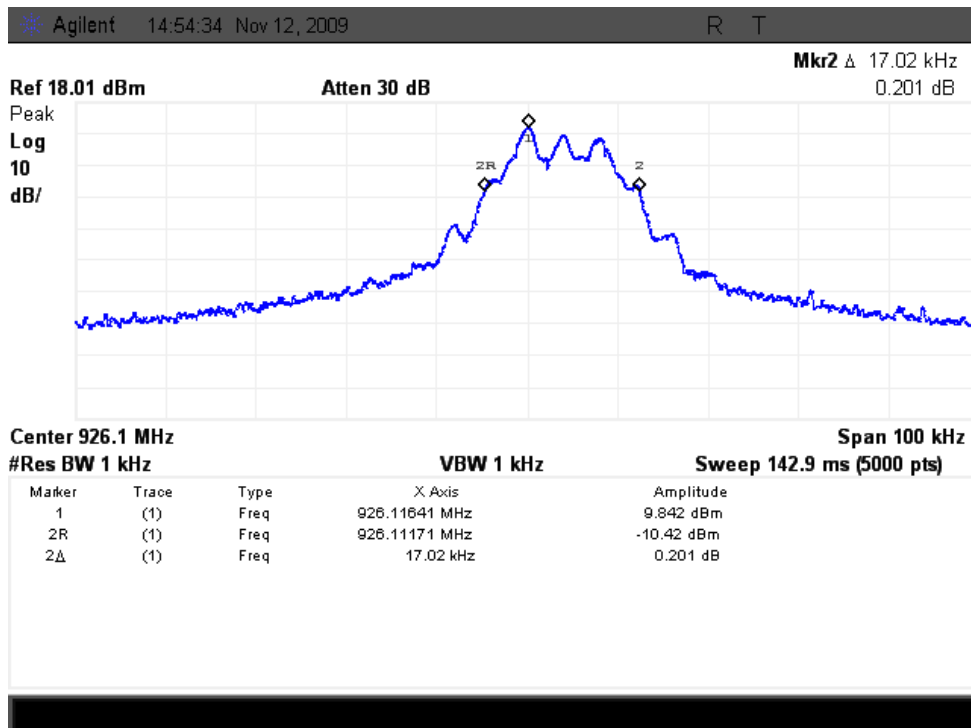
### 9.4 Screen shots



Picture 10: 20dB Bandwidth measurement result, Low Channel



Picture 11: 20dB Bandwidth measurement result, Middle Channel

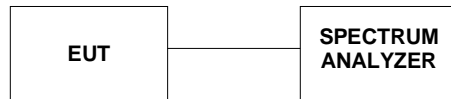


Picture 12: 20dB Bandwidth measurement result, High Channel

## 10 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

<b>EUT</b>	1		
<b>Accessories</b>	-		
<b>Temp, Humidity, Air Pressure</b>	22 °C	23 %RH	1004 hPa
<b>Date of measurement</b>	November 12, 2009		
<b>FCC rule part</b>	15.247, d		
<b>RSS-210 section</b>	A8.5		
<b>Measured by</b>	Matti Virkki		

### 10.1 Test setup and measurement method



Picture 13: Test setup for band edge compliance measurement

Band edge compliance of RF-conducted emissions was measured by setting the band edge as center frequency in the spectrum analyzer and measuring the power on the transmission on channels low and high. The measured power and power on the band edge was then compared.



## 10.2 Hopping enabled

### 10.2.1 EUT operation mode

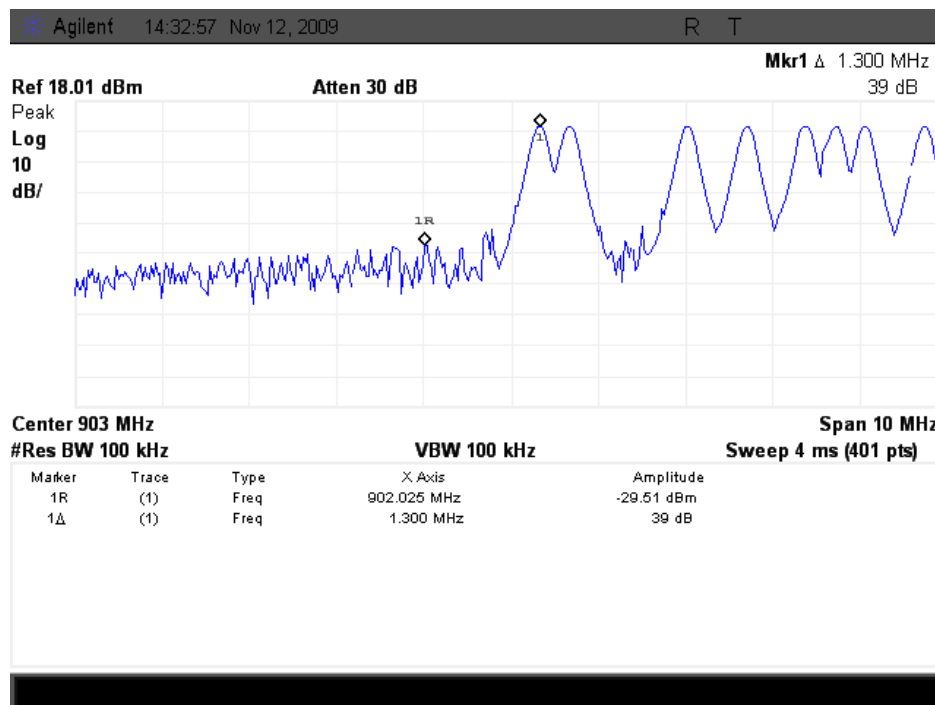
<b>EUT operation mode</b>	Transmit, FSK modulation
<b>EUT channel</b>	Hopping
<b>EUT TX power level</b>	max

### 10.2.2 Results

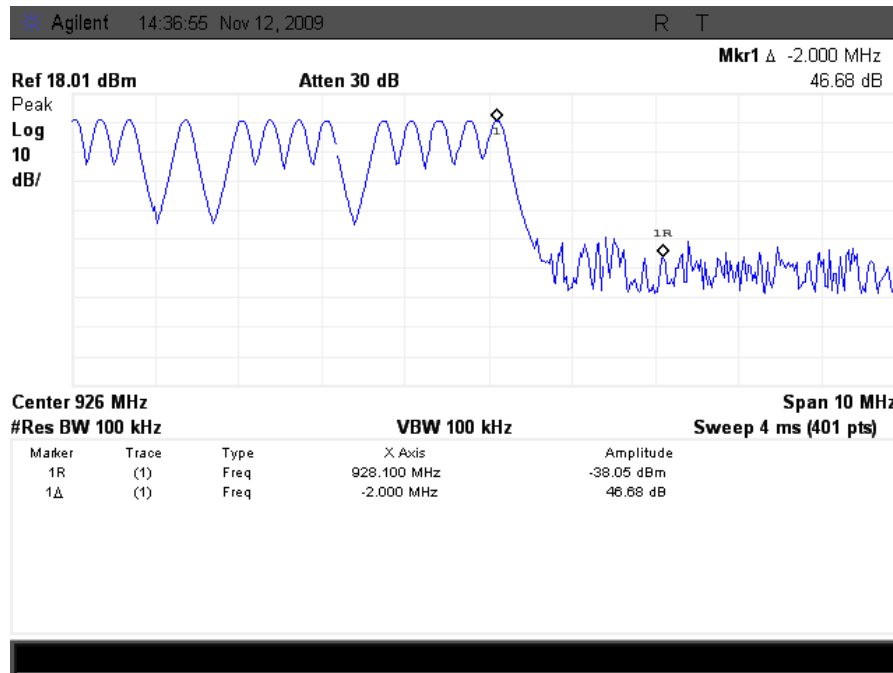
Table 5: Number of hopping frequencies measurement results

EUT Channel	Limit (dBc)	Test result (dBc)
Low	≤ -20	-39
High		-46,7

### 10.2.3 Screen shots



Picture 14: Band edge compliance, low channel, hopping enabled



Picture 15: Band edge compliance, high channel, hopping enabled

### 10.3 Hopping disabled

#### 10.3.1 EUT operation mode

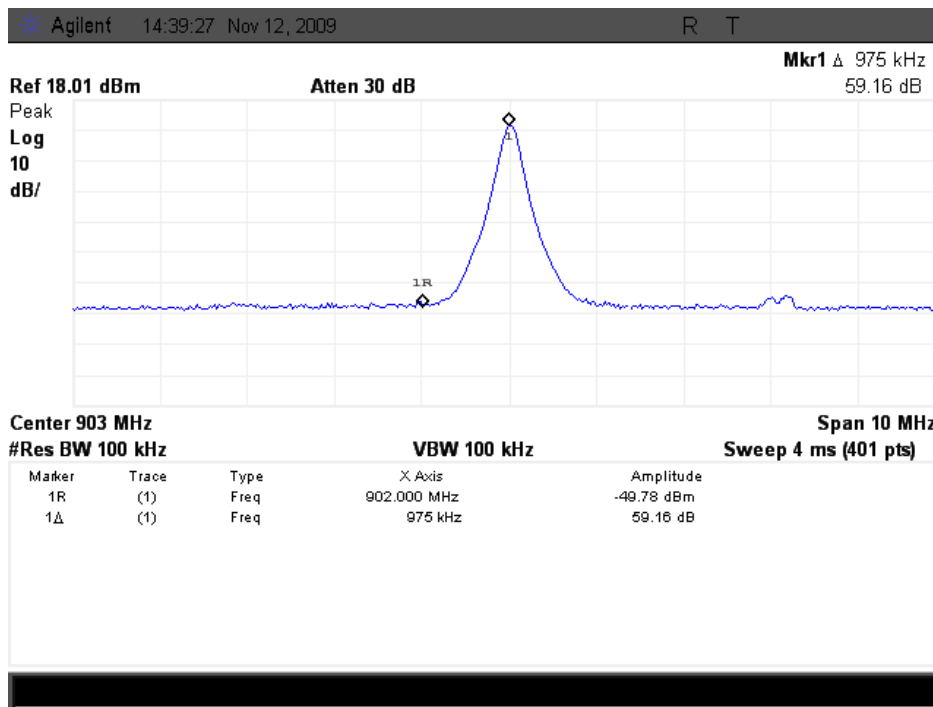
<b>EUT operation mode</b>	Transmit, FSK modulation
<b>EUT channel</b>	Low, high
<b>EUT TX power level</b>	max

#### 10.3.2 Results

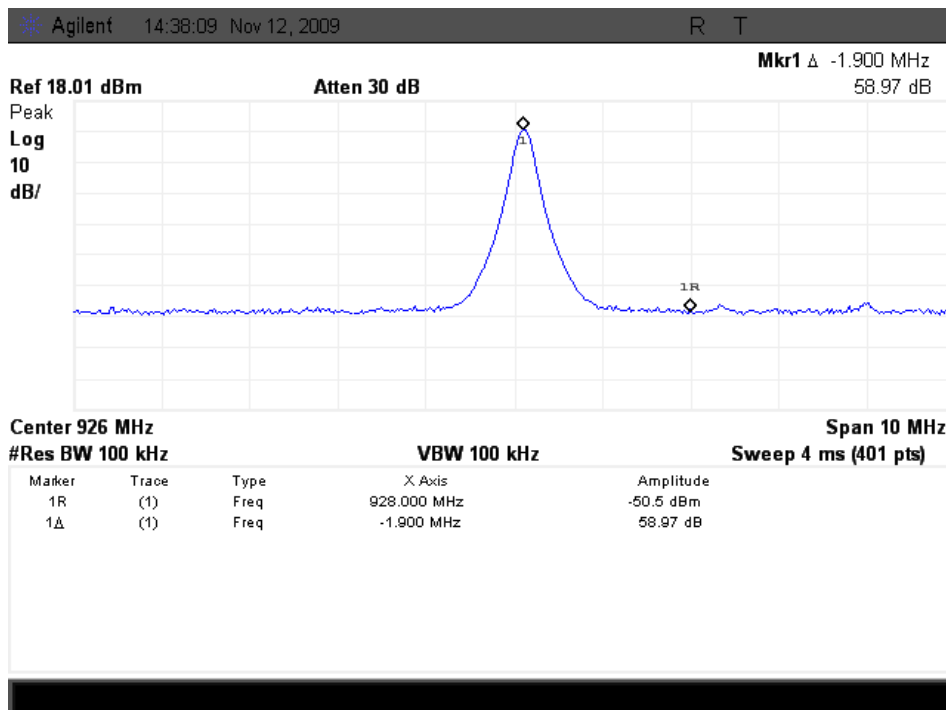
Table 6: Band edge compliance measurement results

EUT Channel	Limit (dBc)	Test result (dBc)
Low	$\leq -20$	-59,2
High		-59,0

10.3.3 Screen shots



Picture 16: Band edge compliance, low channel, hopping disabled

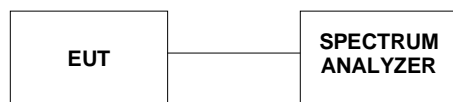


Picture 17: Band edge compliance, high channel, hopping disabled

## 11 SPURIOUS RF CONDUCTED EMISSIONS

<b>EUT</b>	2		
<b>Accessories</b>	4		
<b>Temp, Humidity, Air Pressure</b>	23 °C	31 RH%	1009 hPa
<b>Date of measurement</b>	November 12, 2008		
<b>FCC rule part</b>	15.247, d		
<b>RSS-210 section</b>	A8.5		
<b>Measured by</b>	Matti Virkki		

### 11.1 Test setup and measurement method



Spectrum analyzer was used to record conducted spurious emissions on frequency range 30 MHz – 25 GHz. Frequency range was scanned using 100 kHz resolution bandwidth  
Spurious emissions levels relative to the carrier level were read from the measured results.

### 11.2 EUT operation mode

<b>EUT operation mode</b>	Connection, GFSK modulation
<b>EUT channel</b>	0 (903 MHz), 24 (914,5 MHz) and 49 (926,2 MHz)
<b>EUT TX power level</b>	max

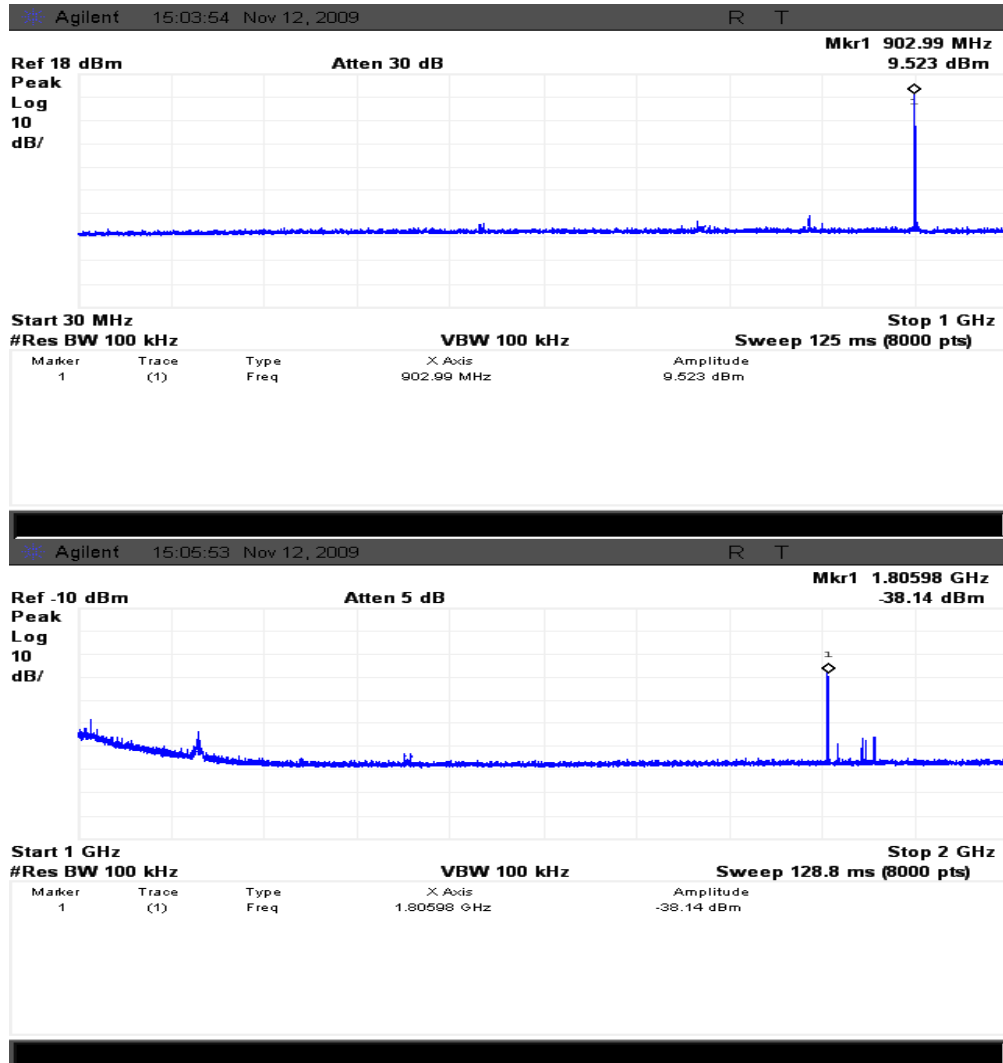
### 11.3 Limit

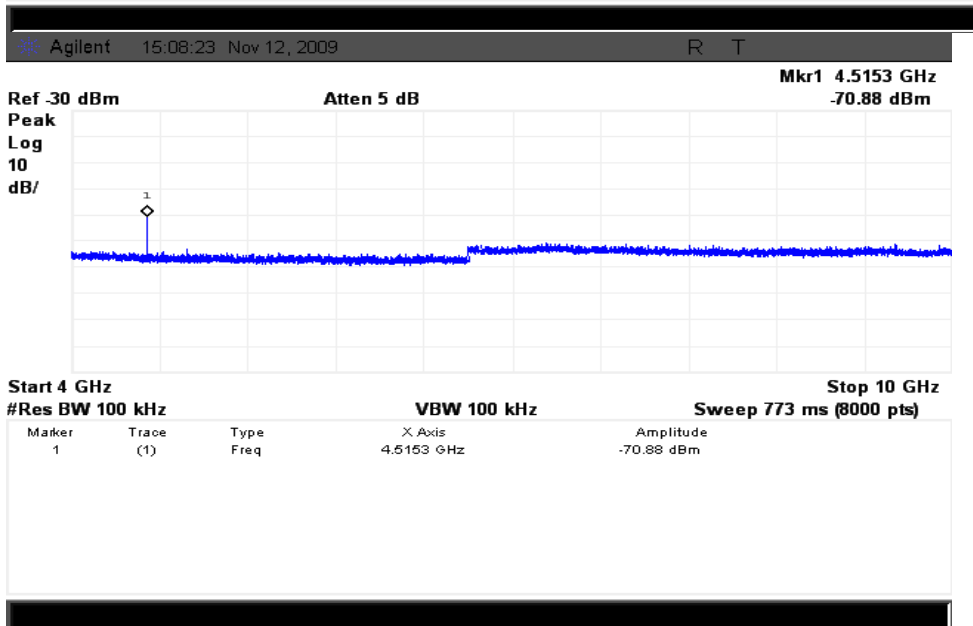
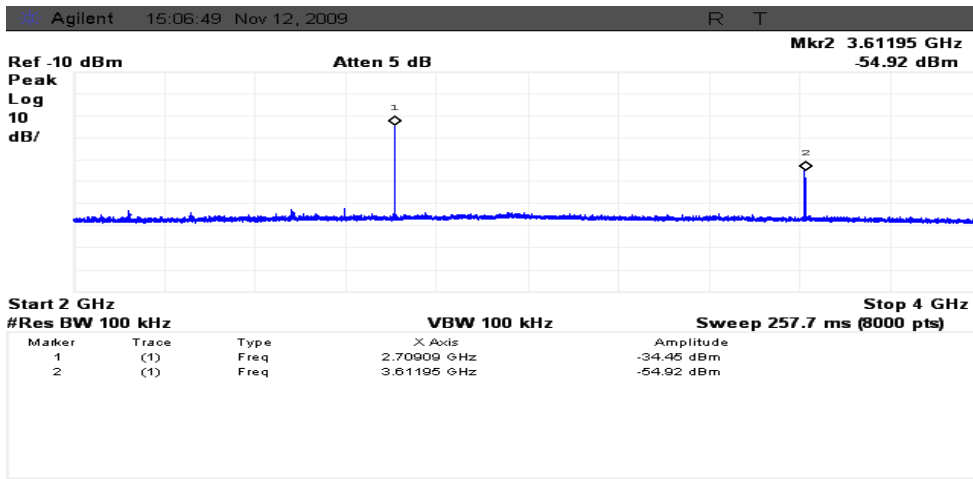
<b>EUT Channel</b>	<b>Limit (dBc)</b>
0	≤ -20
24	
49	

### 11.4 Results

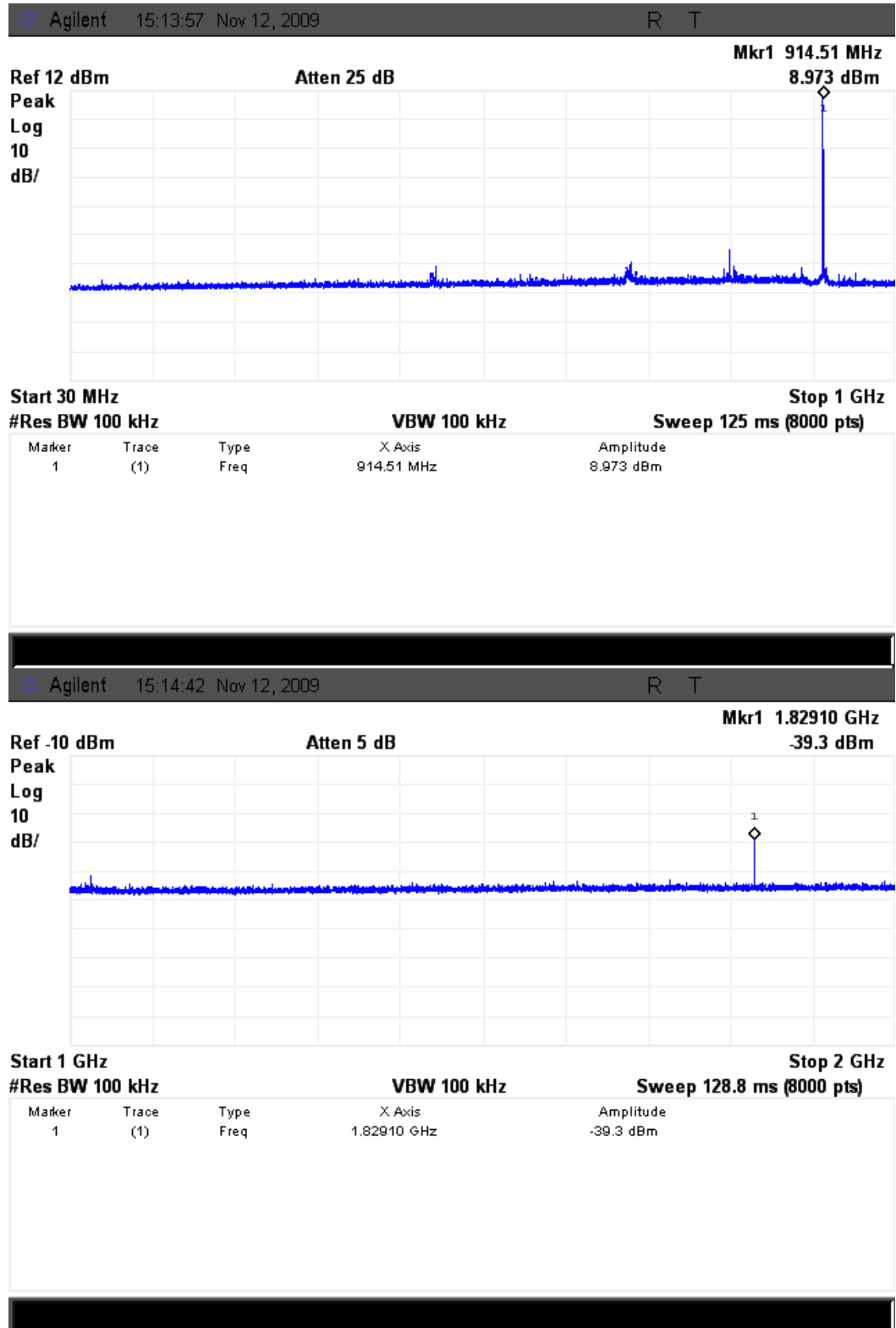
All spurious emissions measured were least 35 dB below the carrier level.

Picture 18: Conducted spurious emissions on antenna port, hannel0



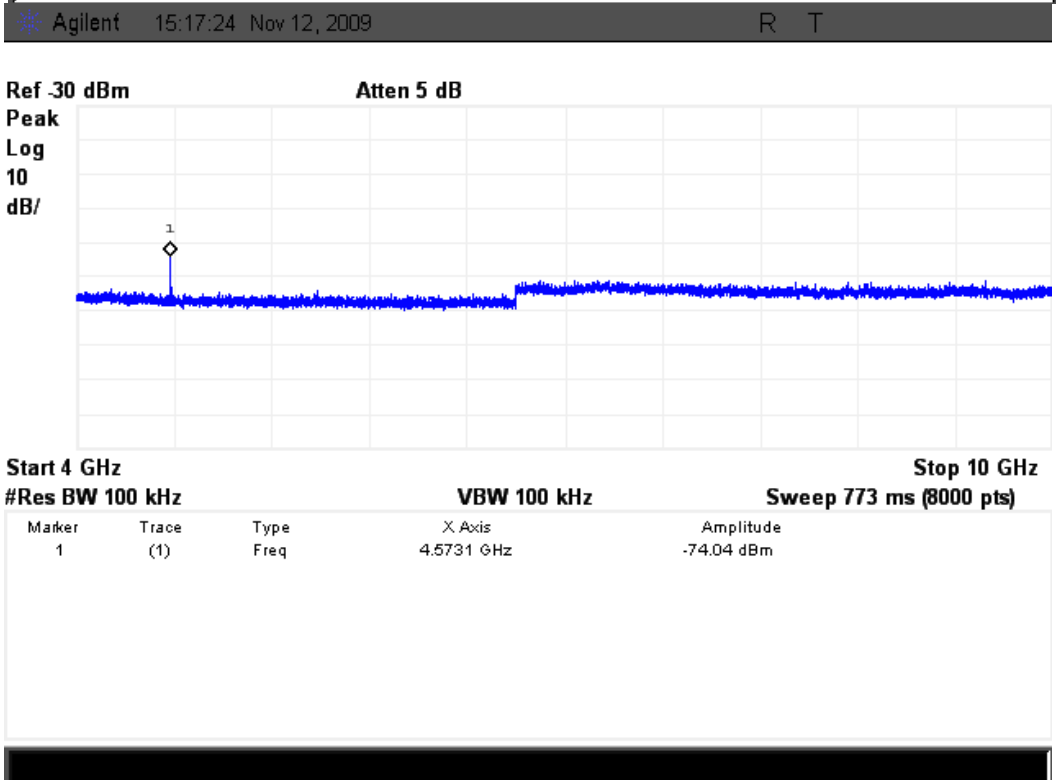
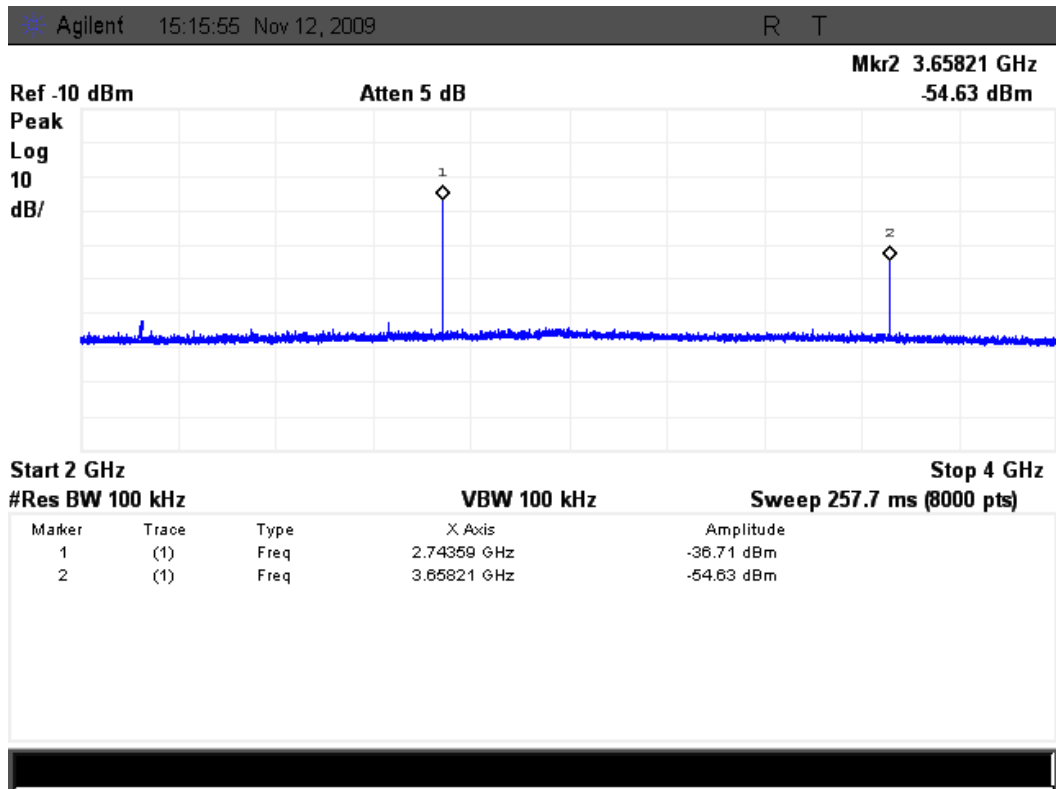


Picture 19: Conducted spurious emissions on antenna port, Channel 24



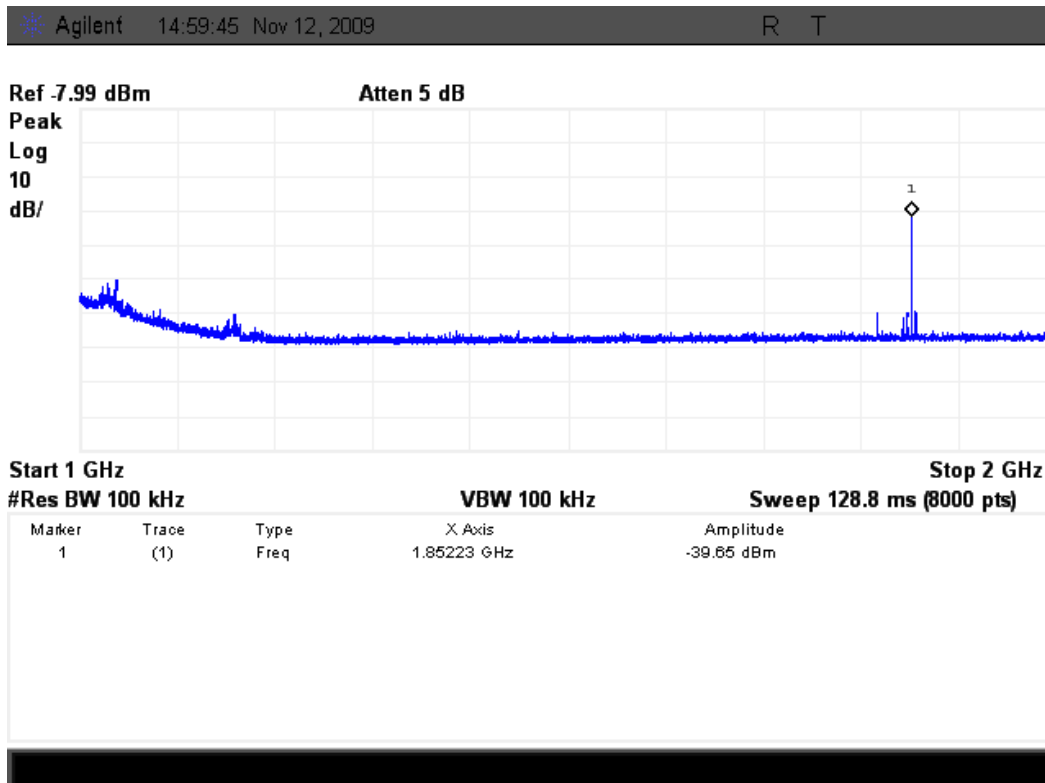
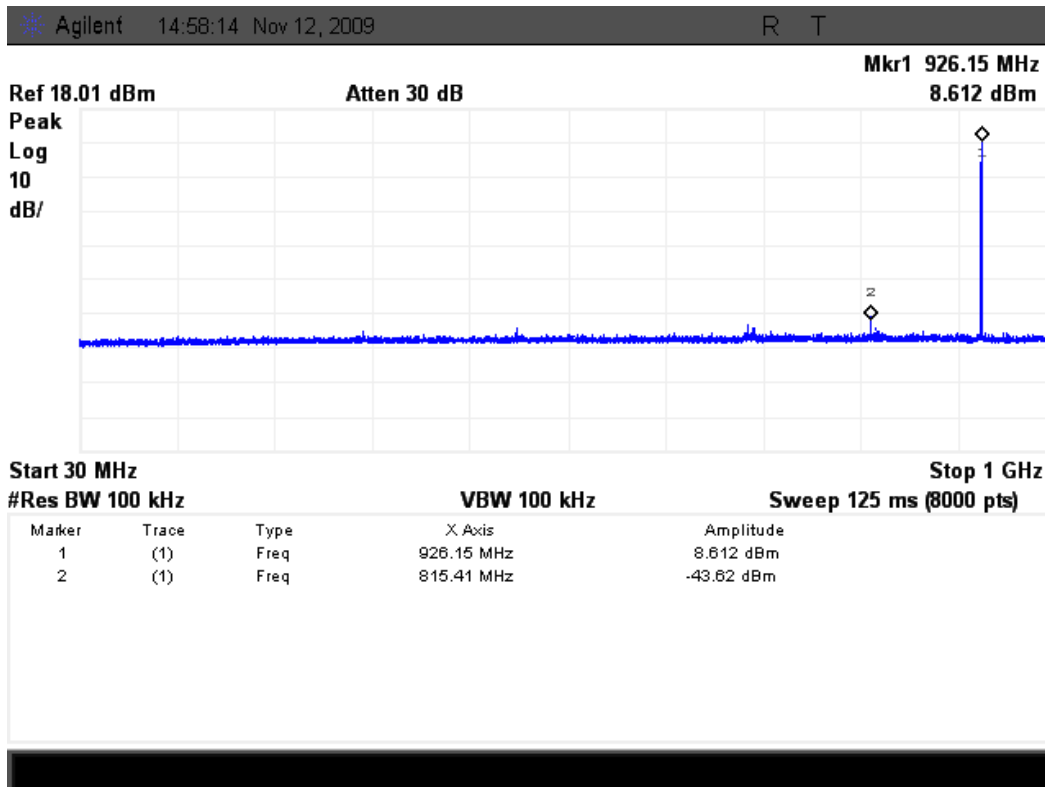
Test results are valid for the tested unit only.

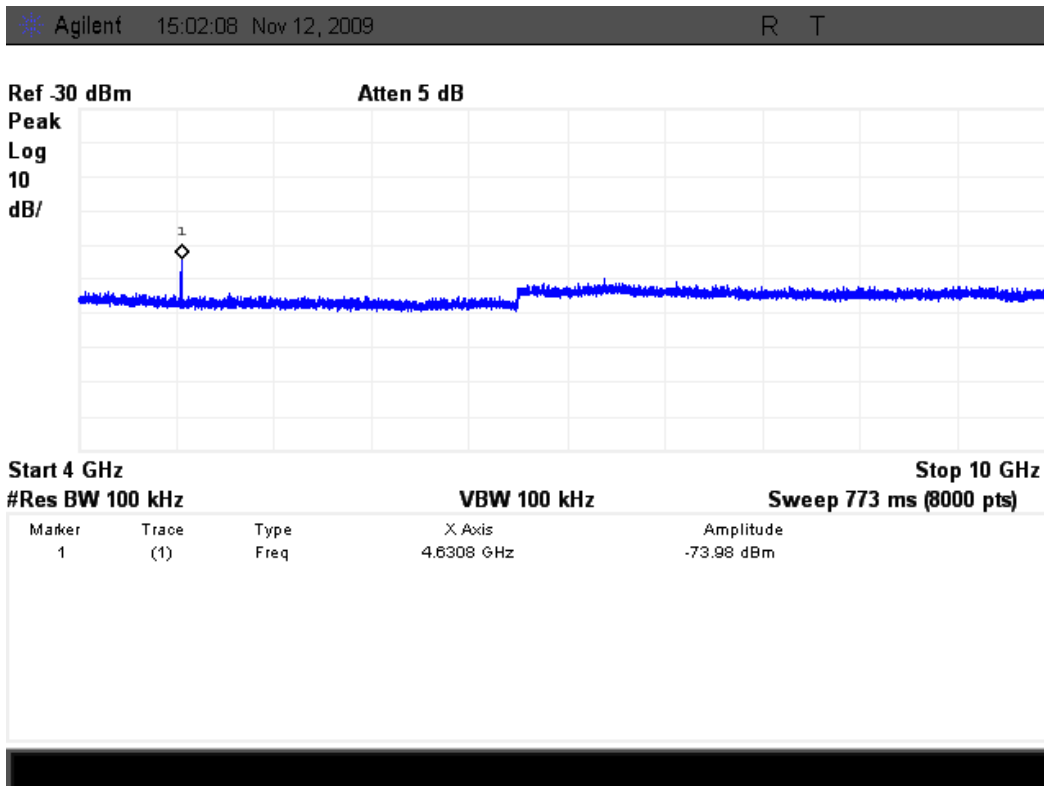
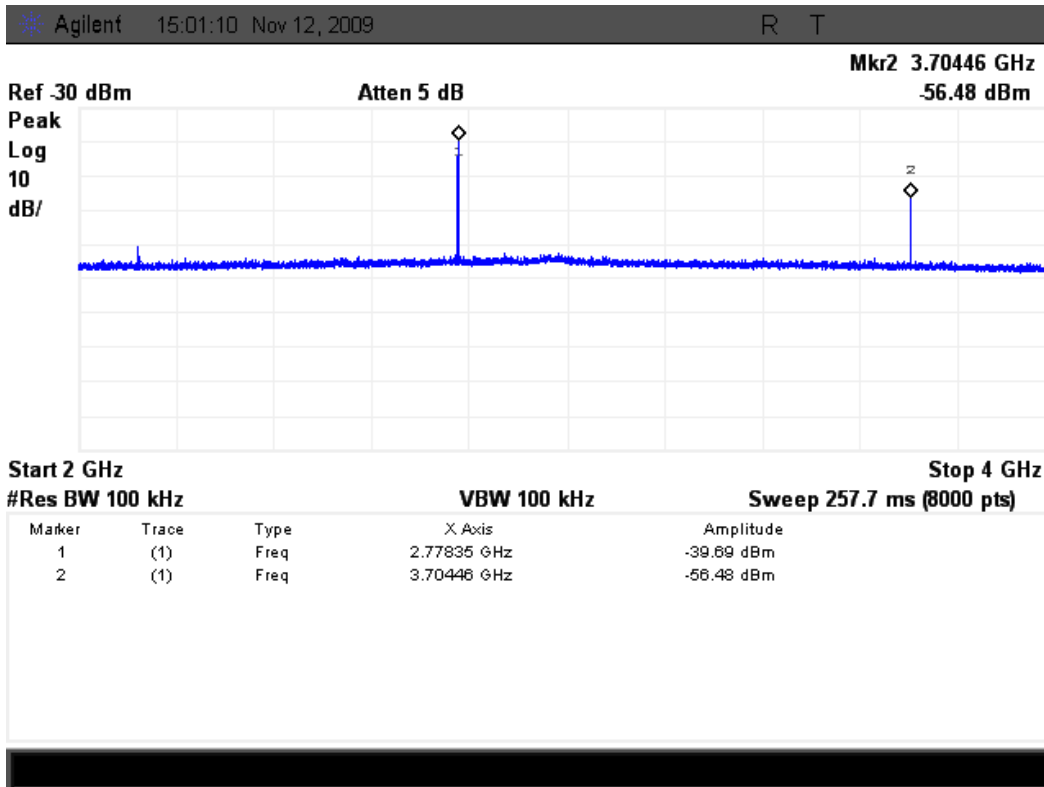
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Picture 20: Conducted spurious emissions on antenna port, Channel 24





## 12 TEST EQUIPMENT

All testing and measurement equipment has been calibrated once a year, except the antennas which are calibrated every two years.

### 12.1 Conducted measurements

Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E7405A