REPORT

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The test site complies with RSS-Gen, file no: IC 3482A
issued by an Accredited Testing Laboratory

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Date 2013-09-17 Reference 3P05643-F27 Page 1 (2)

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Radio measurements on mRRUS 12 B13 radio equipment with FCC ID: TA8AKRC161332

(9 appendices)

Test object

Product name: mRRUS 12 B13
Product number: KRC 161 332/X, see appendix 1 for details.

Summary

Standard		Compliant	Appendix
FCC CFR 47			
2.1046	RF power output conducted	Yes	2
2.1046	RF power output radiated	Yes	3
2.1049	Occupied bandwidth	Yes	4
2.1051	Band edge	Yes	5
2.1051	Spurious emission at antenna terminals	Yes	6
2.1053	Field strength of spurious radiation	Yes	7
2.1055	Frequency stability	Yes	8

Measurements were performed according to ANSI procedures referenced by FCC and covered by SP's accreditation.

SP Technical Research Institute of Sweden
Electronics - EMC

Performed by
Jörgen Wassholm

Examined by
Christer Karlsson

Table of contents

Appendix 1

Description of the test object

Equipment:	Radio equipment mRRUS 12 B13 supporting LTE KRC 161 332/1, 110-240VAC internal antenna KRC 161 332/2, -48VDC internal antenna KRC 161 332/3, 110-240VAC no internal antenna KRC 161 332/4, -48VDC no internal antenna FCC ID: TA8AKRC161332
Antenna ports:	2 TX/RX ports
RF configurations:	Single carrier, multi carrier, MIMO
Frequency bands:	TX: 746 – 756 MHz RX: 777 – 787 MHz
Nominal output power per antenna port:	Single carrier: 1x 37 dBm (1 x 5W) Multi carrier: 2 x 34 dBm (2 x 2.5W)
Modulations:	QPSK, 16QAM and 64QAM
Channel bandwidth:	5 MHz, 10 MHz
Nominal power voltage:	-48VDC, 120 VAC 60 Hz

Operation mode during measurements

Measurements were performed with the test object transmitting test models as defined in 3GPP TS 36.141. Test model E-TM1.1 was used to represent QPSK, test model E-TM3.2 to represent 16QAM and test model E-TM3.1 to represent 64QAM modulation.

The settings below were deemed representative for all traffic scenarios when settings with different modulations, channel bandwidths, number of carriers and RF configurations has been tested to find the worst case setting.The settings below were used for all measurements if not otherwise noted.

MIMO mode single carrier: E-TM1.1

MIMO mode multi carrier: 2 carriers E-TM1.1

All measurements were performed with the test object configured for the maximum transmit power applicable for the tested configuration.

Conducted measurements

The test object was supplied with -48 VDC by an external power supply. Additional connections are documented in the set-up drawings below.
All measurements were made on RF A and additional measurements on RF B to verify that the ports were electrical identical, as declared by the client.

Radiated measurements

The test object was powered with -48 VDC. All measurements were performed with the test object configured for maximum transmit power.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47.

References

Measurements were done according to relevant parts of the following standards:
ANSI 63.4-2009
ANSI/TIA/EIA-603-C-2004
CFR 47 part 2, October 1st , 2012
CFR 47 part 27, October 1st, 2012
3GPP TS 36.141, version 11.4.0

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation ”SP-QD 10885”. The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).
Compliance evaluation is based on a shared risk principle with respect to the measurement uncertainty.

Reservation

The test results in this report apply only to the particular test object as declared in the report.

Delivery of test object

The test object was delivered 2013-08-09.

Manufacturer’s representative

Christer Gustavsson

Test engineers

Tomas Isbring, Jörgen Wassholm, Hyder Khalaf and Kexin Chen SP

Test participants (partially)

Mihai Simon, Erik Nilsson

Measurement equipment

	Calibration Due	SP number
Test site Tesla	2014-01	503 881
R&S ESU 26	2014-05	901 553
R&S FSQ 40	2014-03	504 143
R&S FSW 43	2014-07	902 073
Control computer with R&S software EMC32 version 8.52.0	-	503 899
High pass filter	2014-07	901 501
High pass filter	2014-07	901 502
High pass filter	2014-07	504 199
High pass filter	2014-09	901 373
High pass filter	2014-07	503 740
RF attenuator	2014-07	504 159
RF attenuator	2014-07	900 233
RF attenuator	2014-07	900 691
RF attenuator	2014-07	901 384
RF attenuator	2013-12	901 508
Chase Bilog Antenna CBL 6111A	2014-10	503 182
EMCO Horn Antenna 3115	2014-01	502 175
µComp Nordic, Low Noise Amplifier	2014-04	901 545
Temperature and humidity meter, Testo 635	2014-06	504 203
Temperature and humidity meter, Testo 625	2014-06	504 188
Temperature Chamber	2013-11	503 360
Multimeter Fluke 87	2014-08	502 190

Test frequencies during measurements

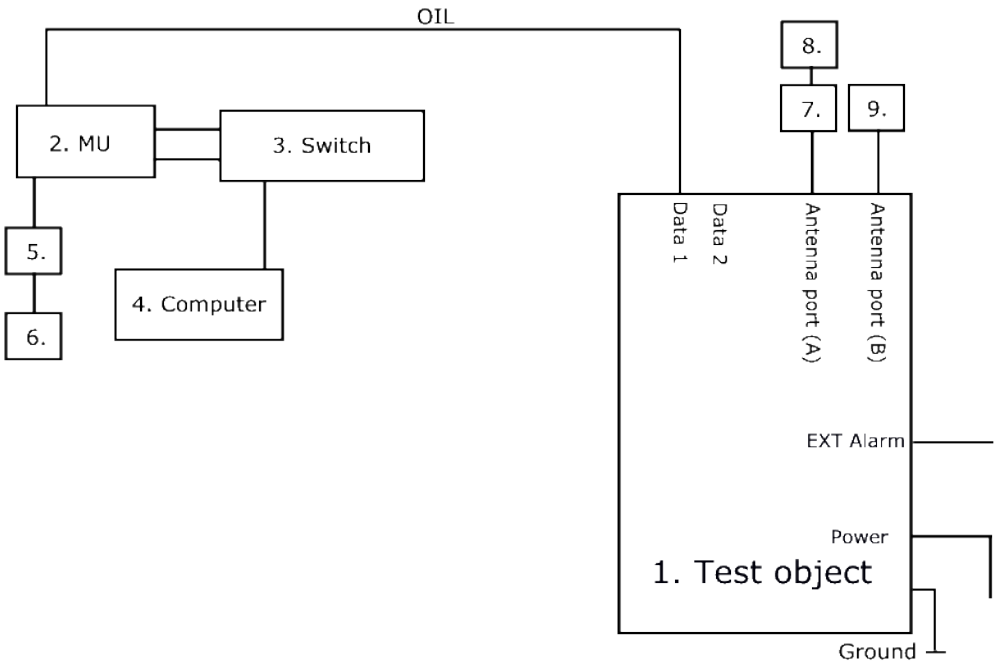
Single RAT TX test frequencies

EARFCN Downlink	Frequency [MHz]	Symbolic name	Comment
5205	748.5	B	TX bottom frequency in 5 MHz BW configuration
5230	751.0	M	TX middle frequency in 10 MHz BW configuration
5255	753.5	T	TX bottom frequency in 5 MHz BW configuration
5205 5255	748.5 753.5	M2	2 carrier TX band bottom constellation 5 MHz BW configuration

All RX frequencies were configured 31 MHz below the corresponding TX frequency according the applicable duplex offset for the operating band.

Appendix 1

Test set-up conducted measurements



Test object:

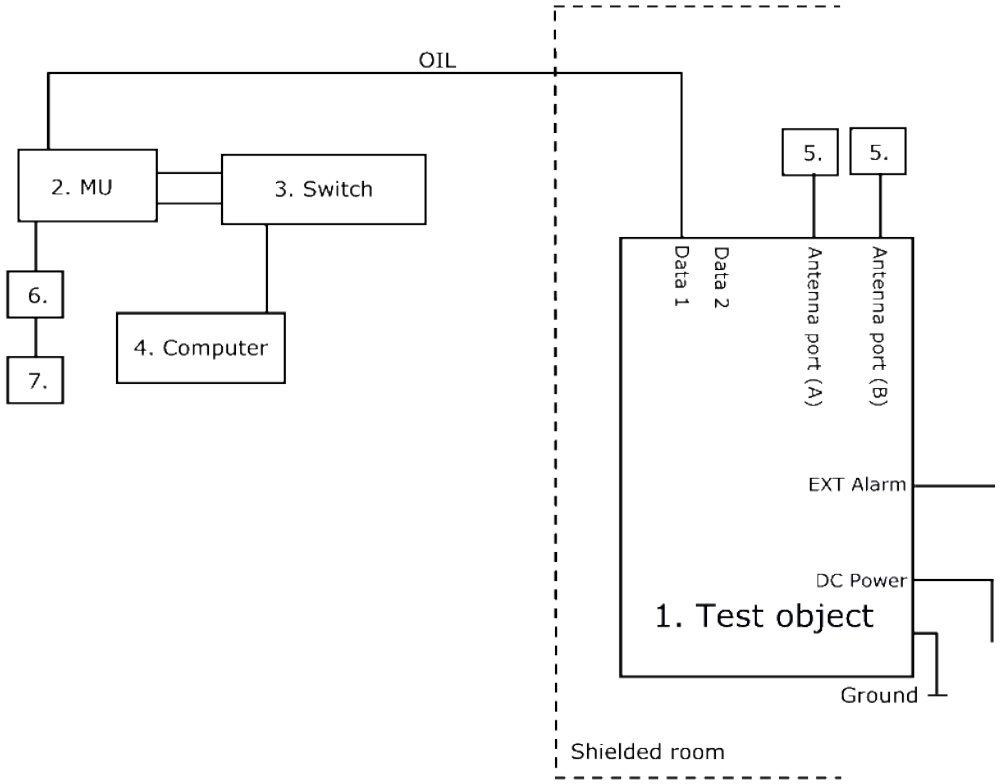
1.	Configuration AC: mRRUS 12 B13, KRC 161 332/3, rev. R1A, s/n: C827113798 Configuration DC: mRRUS 12 B13, KRC 161 332/4, rev. R1A, s/n: C827115345 working software CXP 901 7316/2, Rev. R51ML with FCC ID: TA8AKRC161332

Functional test equipment:

2.	Main Unit DUS 41 01 KDU 137 624/1 R5A, s/n: D168382181, hosted in SUP 6601 1/BFL 901 009/4, rev. R1E, s/n. BR88258854
3.	Switch Netgear PROSAFE GSM 7224, BAMS-1000850754
4	Computer Sun microsystems ultra 27, BAMS – 1000861874
5.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8K356490
6.	GPS Active Antenna, KRE 101 2082/1
7.	SP Test Instrumentation according to measurement equipment list
8.	SP Test Instrumentation according to measurement equipment list
9.	Terminator, 50 ohm

Appendix 1

Test set-up radiated measurements



Test object:

1.	Configuration DC: mRRUS 12 B13, KRC 161 332/2, rev. R1A, s/n: C827115310 Configuration DC: mRRUS 12 B13, KRC 161 332/4, rev. R1A, s/n: C827115345 working software CXP 901 7316/2, Rev. R51ML with FCC ID: TA8AKRC161332

Functional test equipment:

2.	Main Unit DUS 41 01 KDU 137 624/1 R5A, s/n: D168382181, hosted in SUP 6601 1/BFL 901 009/4, rev. R1E, s/n. BR88258854
3.	Switch Netgear PROSAFE GSM 7224, BAMS-1000850754
4.	Computer Sun microsystems ultra 27, BAMS – 1000861874
5.	Terminator
6.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8K356428
7.	GPS Active Antenna, KRE 101 2082/1

Appendix 1

Interfaces:	**Type of port:**
Power: -48 VDC	DC Power
Antenna port (A), N-connector, terminated	Antenna
Antenna port (B), N-connector, terminated	Antenna
Opto 1, Optical Interface Link, single mode opto fibre	Signal
Opto 2, Optical Interface Link, single mode opto fibre, not in use	Signal
Ext Alarm, unshielded multi wire	Signal
Ground wire	Ground

RBS software:

	Software	**Revision**
DUS	CXP 102 051/19	R17Z

Appendix 2

RF power output measurements according to CFR 47 §27.50

Date	Temperature	Humidity
2013-09-04	23 °C ± 3 °C	47 % ± 5 %

Test set-up and procedure

The test object was connected to a signal analyzer measuring peak and RMS output power in CDF mode. A resolution bandwidth of 50 MHz was used.

Measurement equipment	SP number
R&S FSW	902 073
RF attenuator	902 282
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 1.1 dB

Results

MIMO mode, single carrier

Rated output power level at RF connector 2x 37 dBm. Total nominal RF power 40 dBm.

Tested configuration	[RMS dBm/ PAR dB]		
BW and frequency	Port RF A	Port RF B	Total power[1)]
5 MHz, B	36.10/ 6.71	36.06/ 6.73	39.09
5 MHz, T	36.15/ 6.73	36.11/ 6.75	39.14
10 MHz, M	36.12/ 6.75	36.06/ 6.78	39.10
5 MHz, M2	36.06/ 6.78	36.04/ 6.80	39.06

[1)]: summed output power according to FCC KDB662911 Multiple transmitter output v01r02

Limits

§27.50 (b): The maximum output power may not exceed 2000 W (ERP)/ MHz.

Complies?	Yes

RF power output measurements according to CFR 47 §27.50 (b), radiated

Date	Temperature	Humidity
2013-08-14	22°C ± 3°C	44 % ± 5 %
2013-08-19	23°C ± 3°C	46 % ± 5 %
2013-08-20	23°C ± 3°C	47 % ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.4-2009.

The test was performed with continuous transmission.

The test of radiated emission was performed in a semi anechoic chamber. The measurements were performed with both horizontal and vertical polarizations of the antenna. The antenna distance was 3.0 m.

The fundamental was scanned with PEAK-detector with the antenna height was varied between 1-4 m and the turntable was rotated between 0-360 degrees for maximum response. The carrier power was measured with RMS- detector activated with a RBW of 1 MHz. The output power was verified with the substitution method .The antenna distance during the measurements was 3.0 m.

Measurement equipment

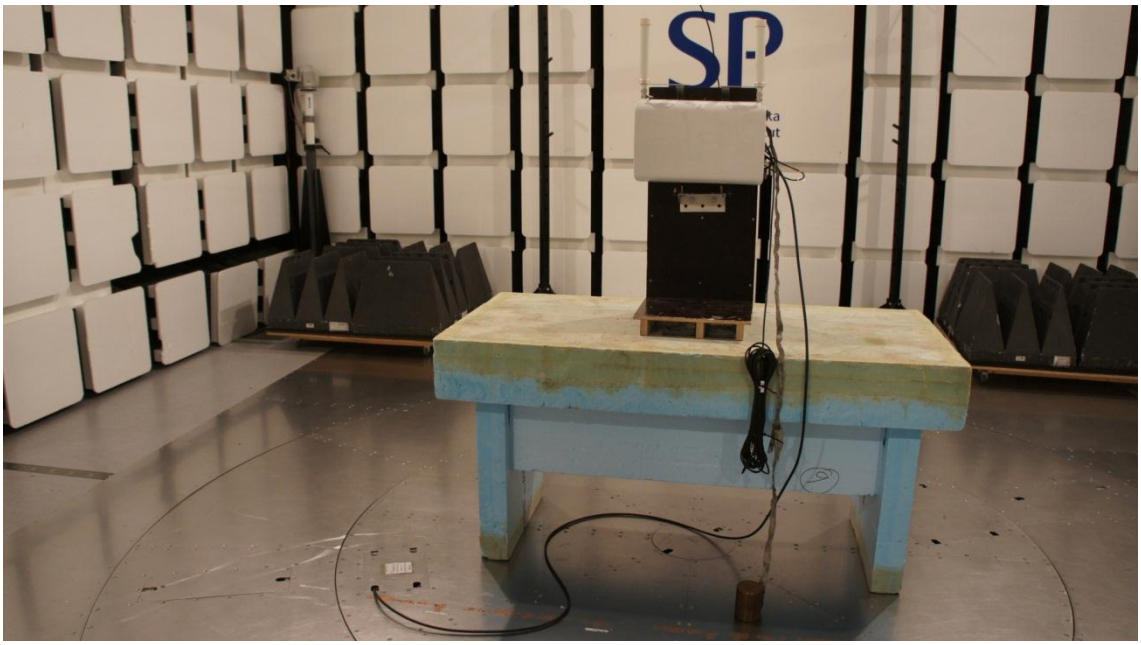
Measurement equipment	SP number
Semi anechoic chamber	503 881
R&S ESU 26	901 553
EMC 32 ver. 8.52.0	503 745
EMCO Horn Antenna 3115	502 175
EMCO Horn Antenna 3115	902 212
R&S SMB 100A	900 120
Attenuator	504 159
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty:

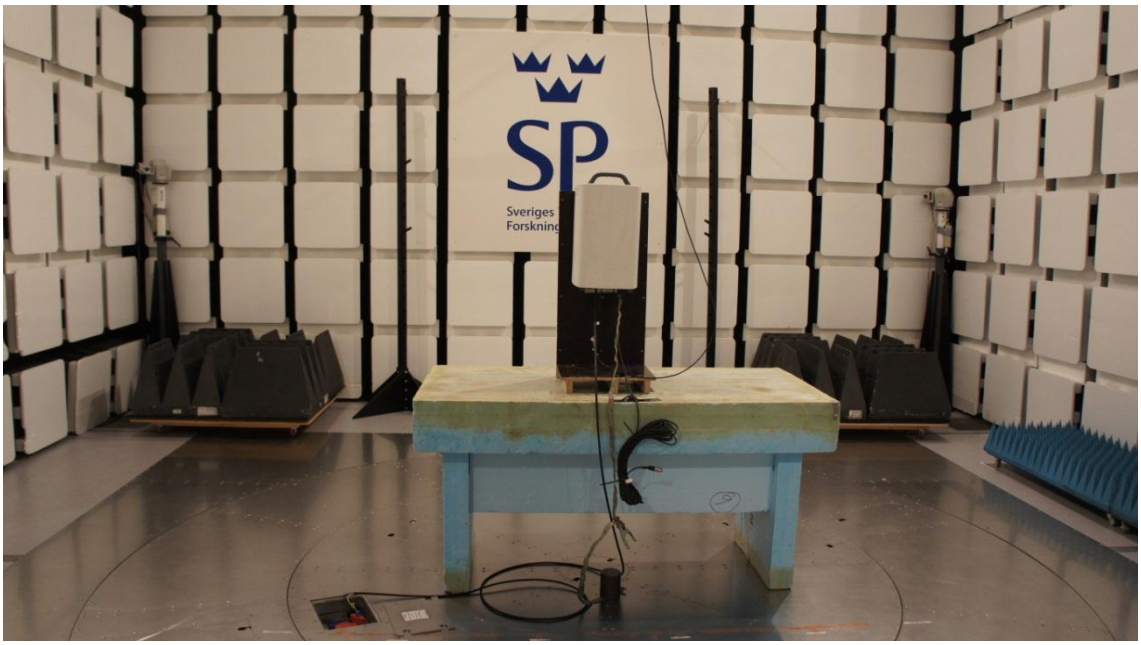
3.2 dB

Appendix 3

The test set-up during the effective radiated output power measurements measurements is shown in the picture below, side mounted with Semi-Integrated Omni Antenna KRE 101 2245/1.

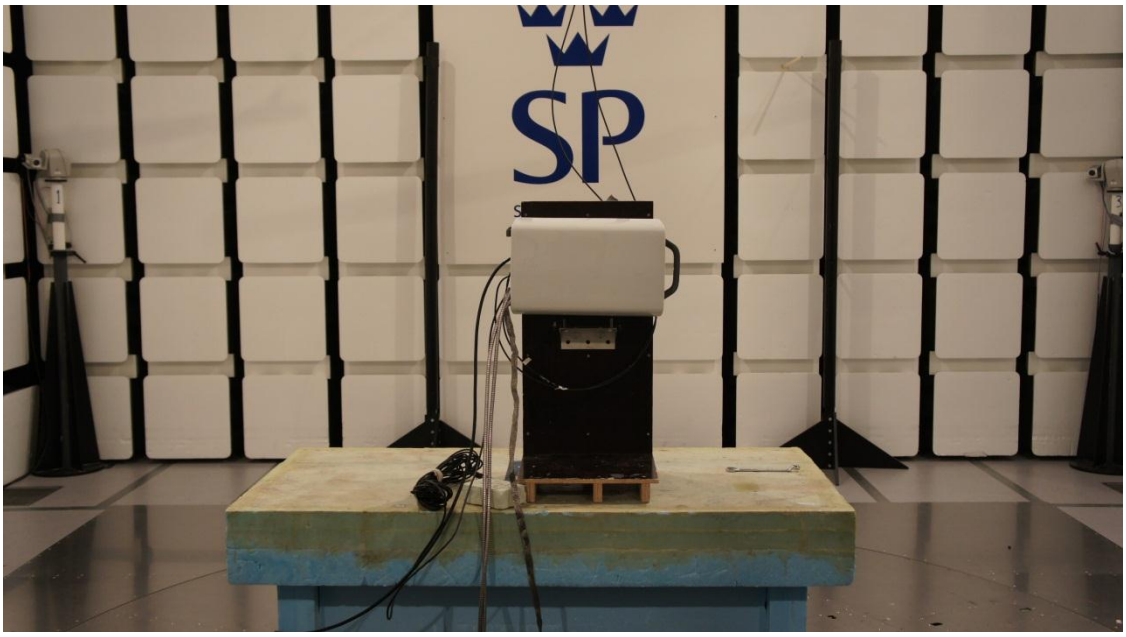


The test set-up during the effective radiated output power measurements is shown in the picture below, upright mounted with internal antenna.



Appendix 3

The test set-up during the effective radiated output power measurements is shown in the picture below, side mounted with internal antenna.



Results

Internal antenna, upright mounted

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power		Horizontal/ Vertical RMS power		Horizontal/ Vertical RMS power	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	34.7/ 33.5	3.0/ 2.2	-	-	34.7/ 33.6	3.0/ 2.3
10	-	-	31.7/ 30.6	1.5/ 1.1	-	-

Internal antenna, side mounted

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power		Horizontal/ Vertical RMS power		Horizontal/ Vertical RMS power	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	33.8/ 34.9	2.4/ 3.1	-	-	34.0/ 34.8	2.5/ 3.0
10	-	-	30.9/ 31.9	1.2/ 1.6	-	-

External antenna, side mounted (Semi-Integrated Omni Antenna KRE 101 2245/1)

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power		Horizontal/ Vertical RMS power		Horizontal/ Vertical RMS power	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	27.0/ 32.0	0.5/ 1.6	-	-	26.9/ 32.5	0.5/ 1.8
10	-	-	24.3/ 28.0	0.3/ 0.6	-	-

Limits

§27.50 (b): The maximum output power may not exceed 2000 W (ERP)/ MHz.

Complies?	Yes

Occupied bandwidth measurements according to 47 CFR 2.1049

Date	Temperature	Humidity
2013-09-04	23 °C ± 3 °C	47 % ± 5 %
2013-09-05	23 °C ± 3 °C	50 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §2.1049. The output was connected to a signal analyzer with the RMS detector activated. The signal analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
R&S FSW 902 073	902 073
RF attenuator	902 282
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

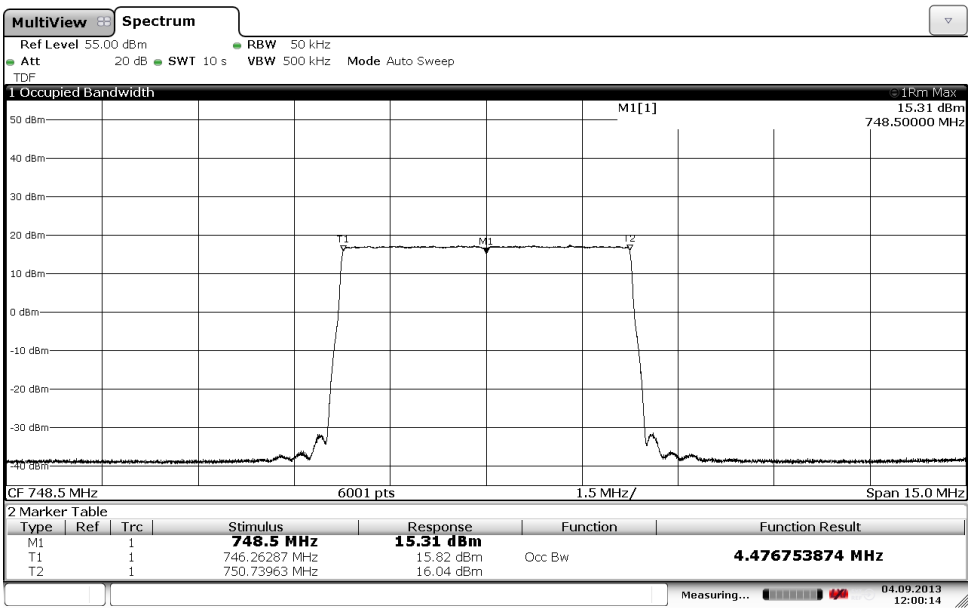
Results

MIMO mode, single carrier

Diagram	BW configuration	Tested frequency	Tested Port	Occupied BW (99%) [MHz]
1	5 MHz	B	RF A	4.48
2	5 MHz	T	RF A	4.48
3	10 MHz	M	RF A	8.93
4	10 MHz	M	RF B	8.93

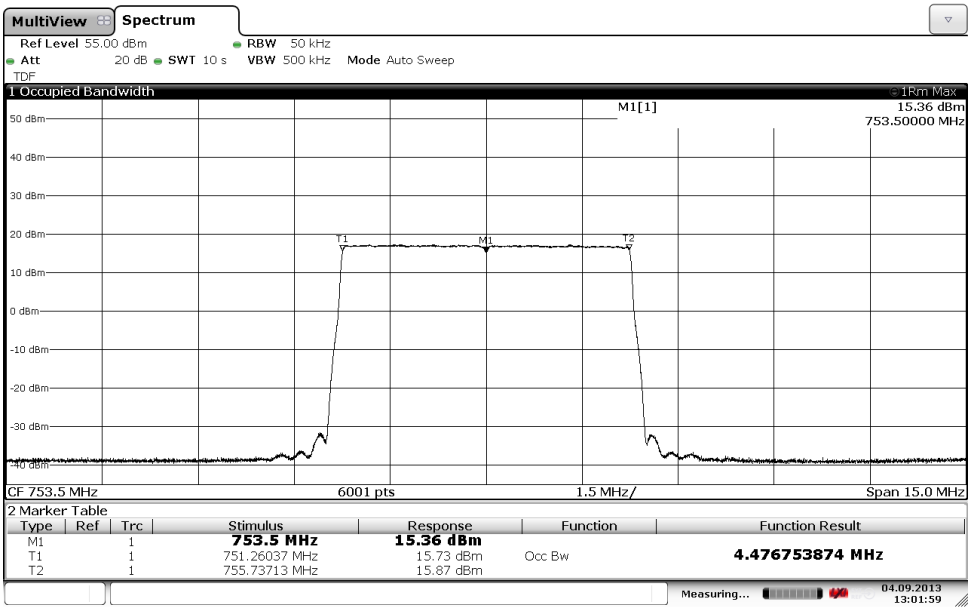
Appendix 4

Diagram 1:



Date: 4.SEP.2013 12:00:13

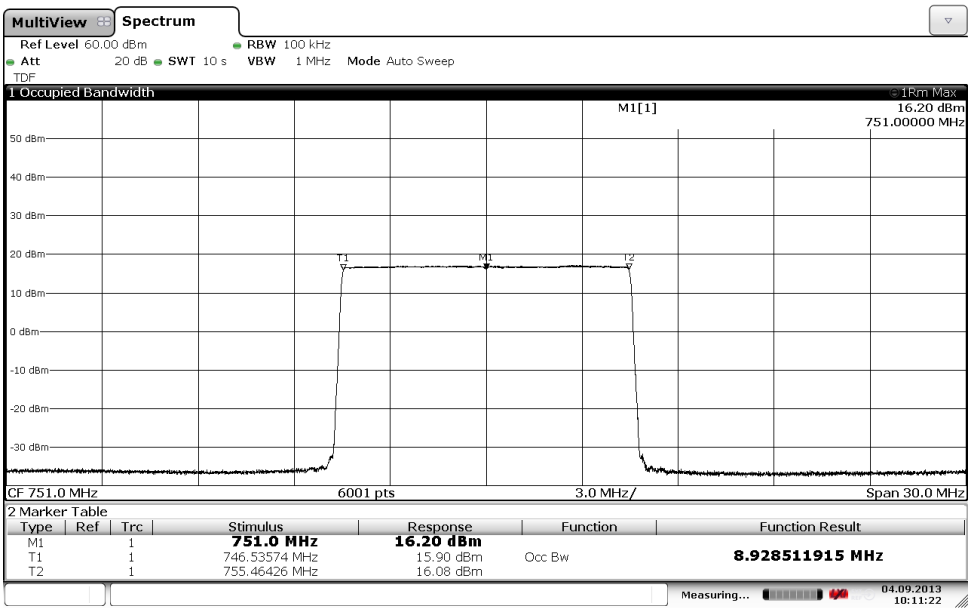
Diagram 2:



Date: 4.SEP.2013 13:01:59

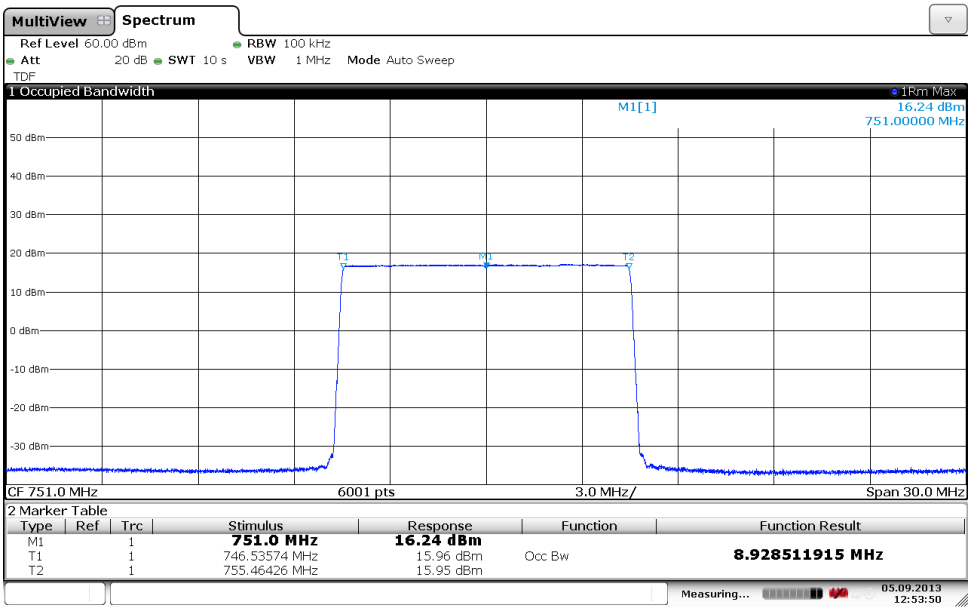
Appendix 4

Diagram 3:



Date: 4.SEP.2013 10:11:22

Diagram 4:



Date: 5.SEP.2013 12:53:50

Band edge measurements according to CFR 47 §27.53(c)

Date	Temperature	Humidity
2013-09-04	23 °C ± 3 °C	47 % ± 5 %
2013-09-05	23 °C ± 3 °C	50 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §27.53(c). The test object was connected to a spectrum analyzer with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

FCC rules specify a RBW of at least 30 kHz for offsets up to 100 kHz from the band edge and a RBW of 100 kHz for measurements of emissions more than 100 kHz away from the band edges.

Before comparing the results to the limit, 3 dB [10 log (2)] should be added according to method 2 “measure and add 10 log(N_{ANT})” of FCC KDB662911 D01 Multiple Transmitter Output v01r02

Measurement equipment	SP number
R&S FSW	902 073
RF attenuator	902 282
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

MIMO mode

Diagram	BW configuration	Tested frequency	Tested Port
1	5 MHz	B	RF A
2	10 MHz	M	RF A
3	5 MHz	T	RF A
4	5 MHz	T	RF B
5	5 MHz	M2	RF A

Limits

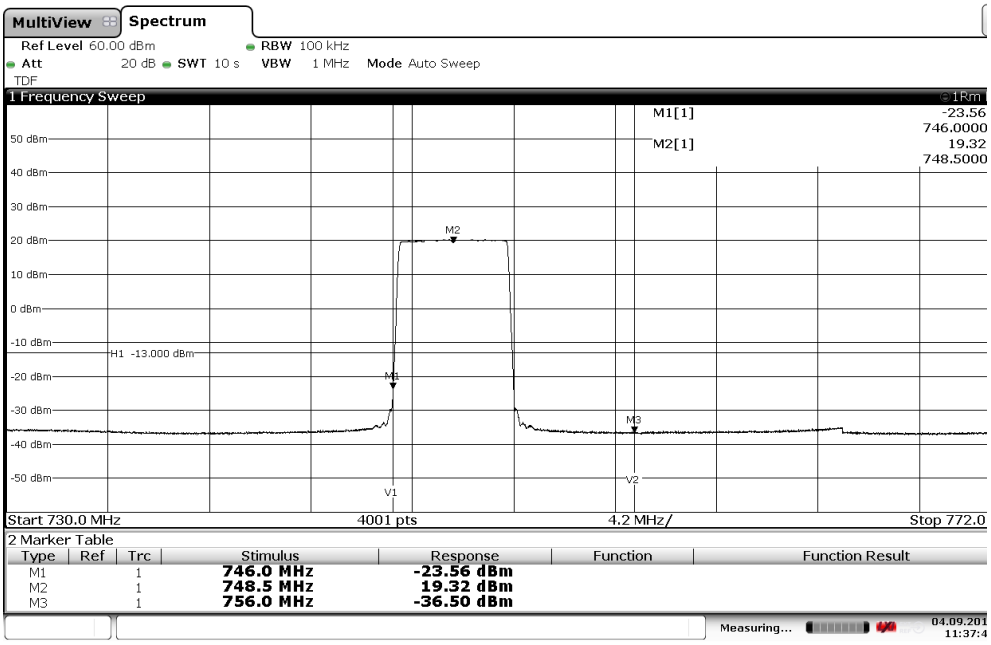
CFR 47 §27.53(c)

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm.

Complies?	Yes

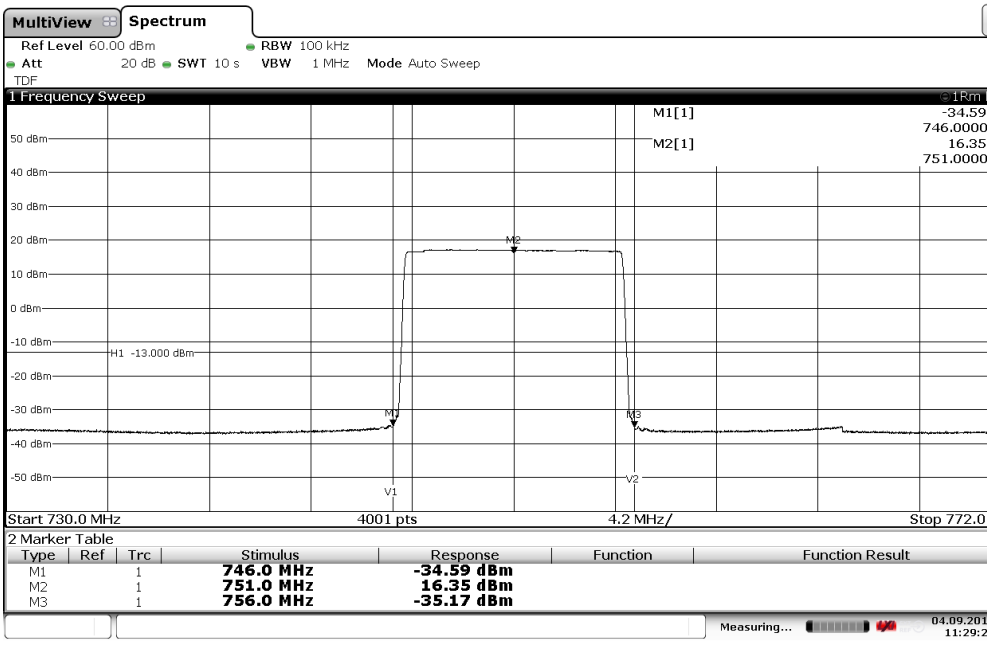
Appendix 5

Diagram 1a:



Date: 4.SEP.2013 11:37:47

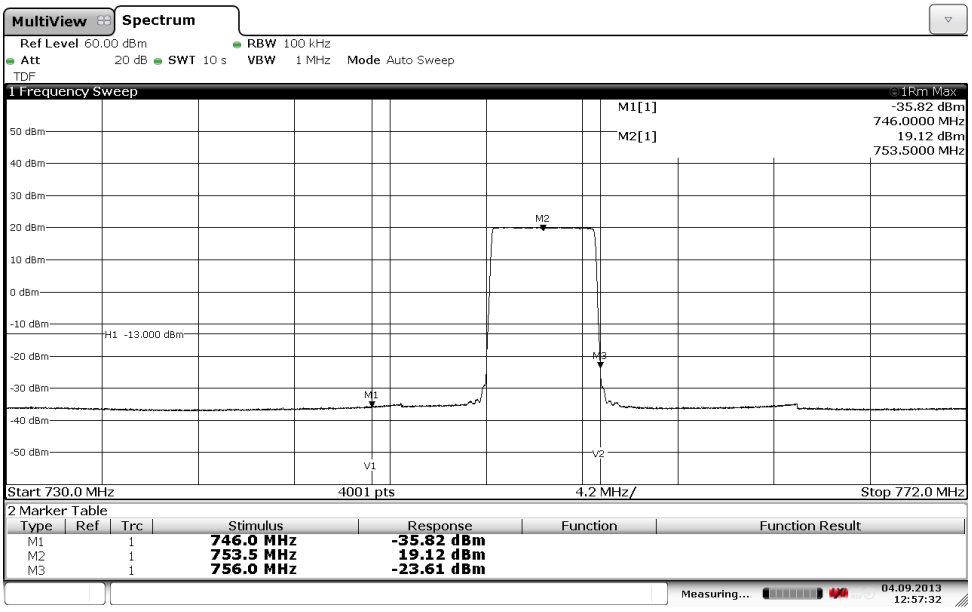
Diagram 2:



Date: 4.SEP.2013 11:29:27

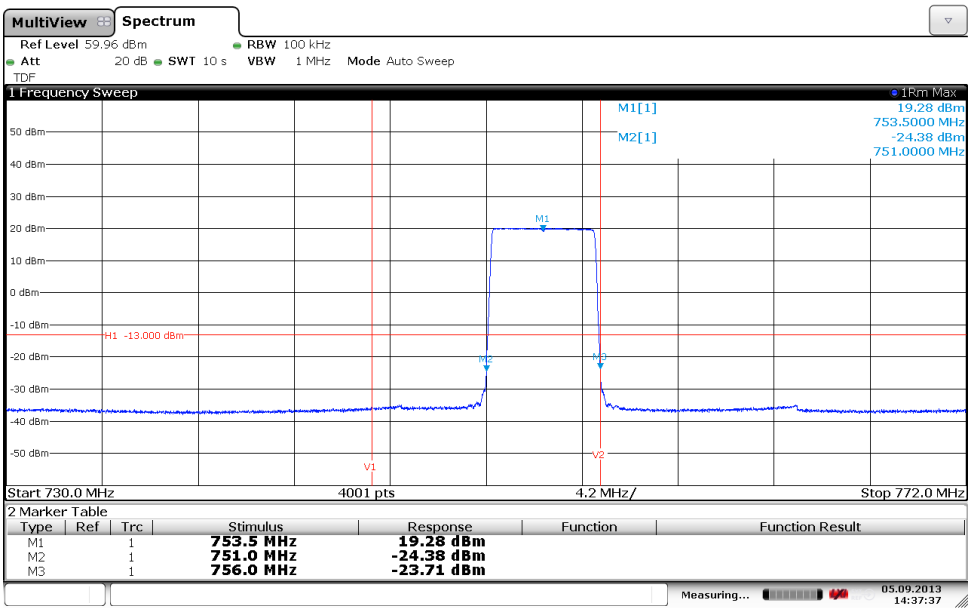
Appendix 5

Diagram 3:



Date: 4.SEP.2013 12:57:32

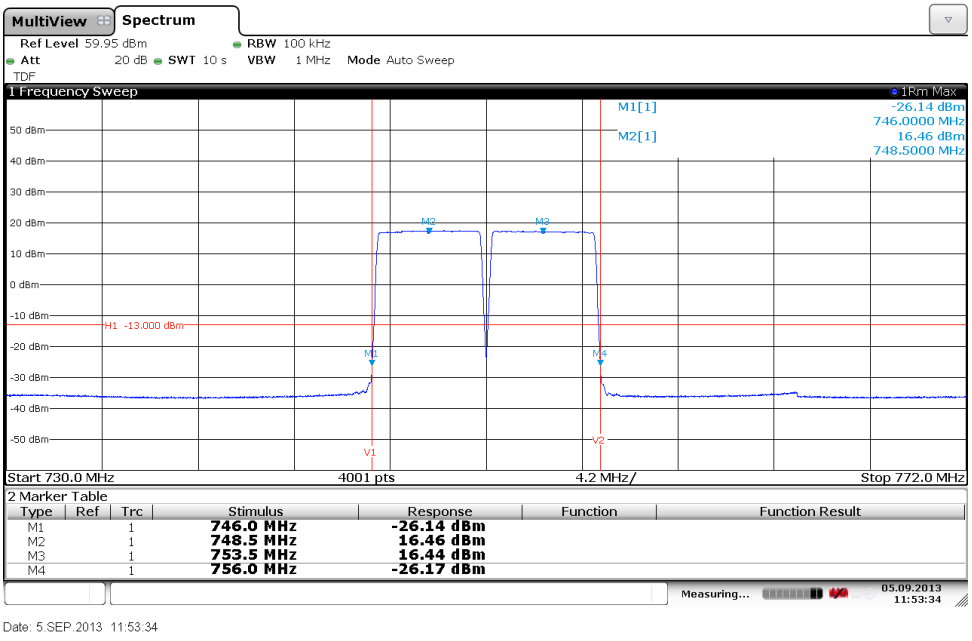
Diagram 4:



Date: 5.SEP.2013 14:37:37

Appendix 5

Diagram 5:



Date: 5.SEP.2013 11:53:34

Conducted spurious emission measurements according to CFR 47 §27.53(c)

Date	Temperature	Humidity
2013-09-04	23 °C ± 3 °C	47 % ± 5 %
2013-09-05	23 °C ± 3 °C	50 % ± 5 %
2013-09-09	23 °C ± 3 °C	51 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §27.53(c). The output was connected to a spectrum analyzer with a RBW setting of 1 MHz and RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Before comparing the results to the limit, 3 dB [10 log (2)] should be added according to method 2 “measure and add 10 log(N_{ANT})” of FCC KDB662911 D01 Multiple Transmitter Output v02

Measurement equipment	SP number
R&S FSW	902 073
RF attenuator	902 282
RF attenuator	900 691
HP filter	901 501
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

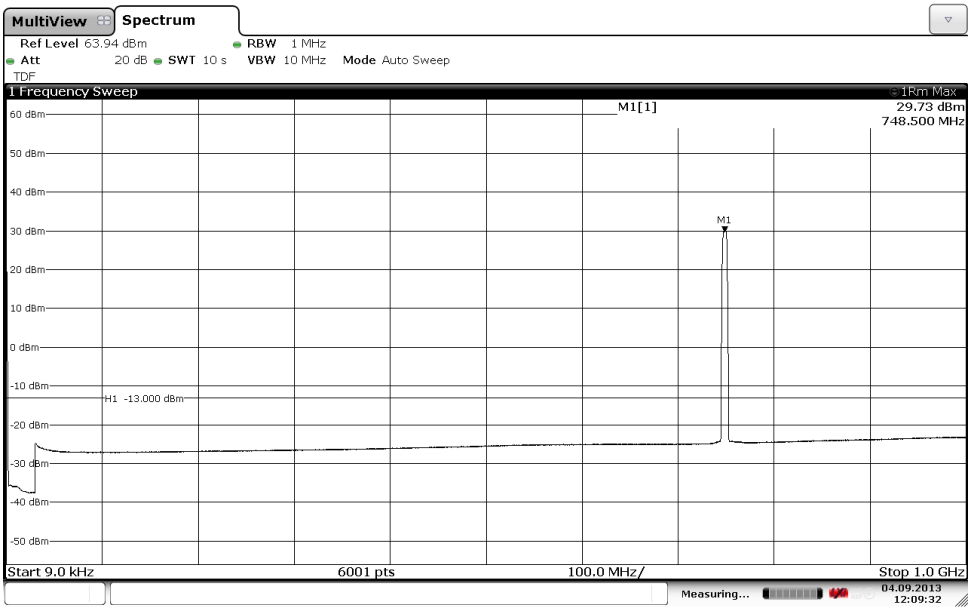
Results

MIMO mode, Single and multi carrier

Diagram	BW configuration / [MHz]	Tested frequency	Tested Port
1 a+b+c+d	5 MHz	B	RF A
2 a+b+c+d	10 MHz	M	RF A
3 a+b+c+d	5 MHz	T	RF A
4 a+b+c+d	5 MHz	M2	RF A
5 a+b+c+d	5 MHz	M2	RF B

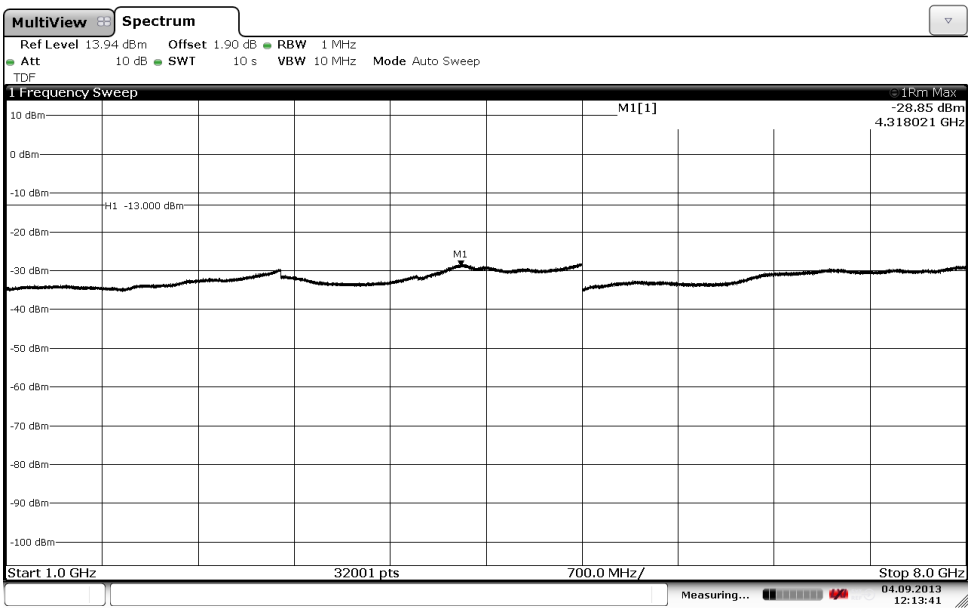
Appendix 6

Diagram 1a:



Date: 4.SEP.2013 12:09:32

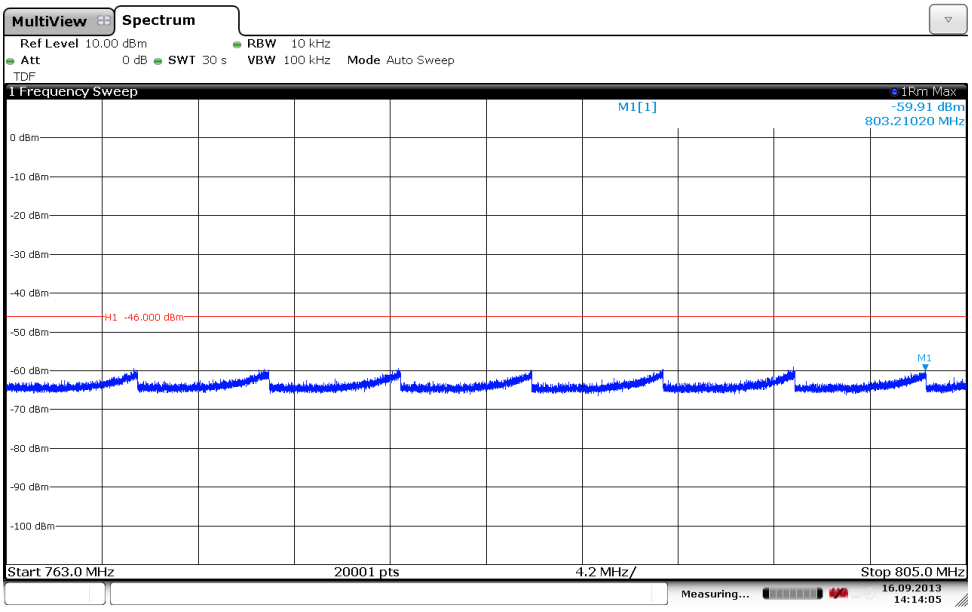
Diagram 1b:



Date: 4.SEP.2013 12:13:40

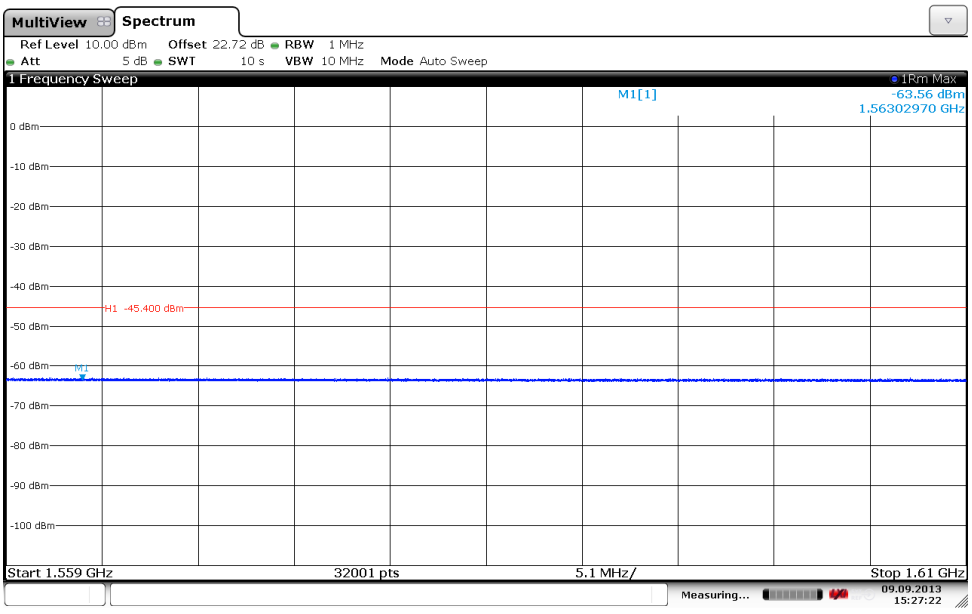
Appendix 6

Diagram 1c:



Date: 16.SEP.2013 14:14:05

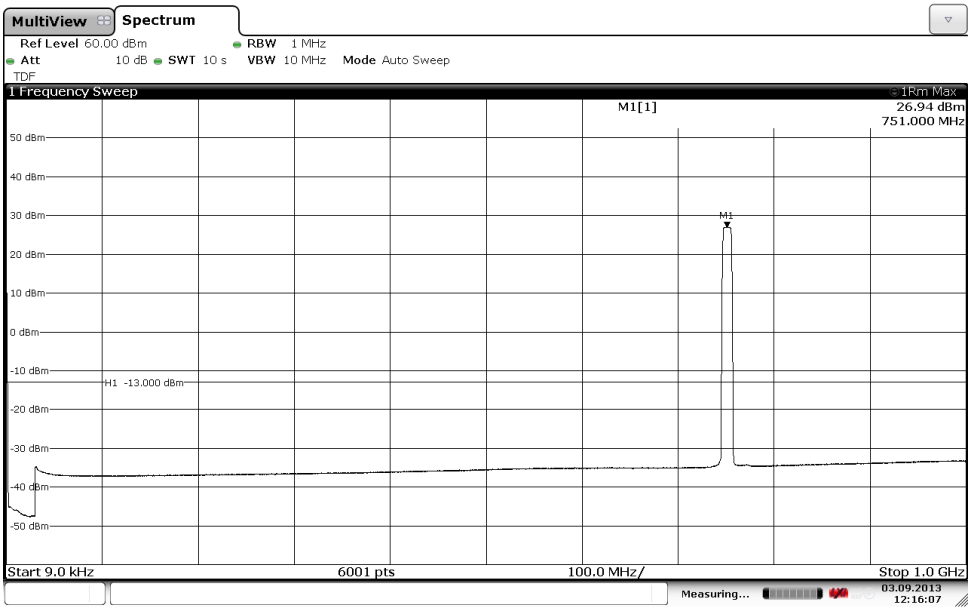
Diagram 1d:



Date: 9.SEP.2013 15:27:21

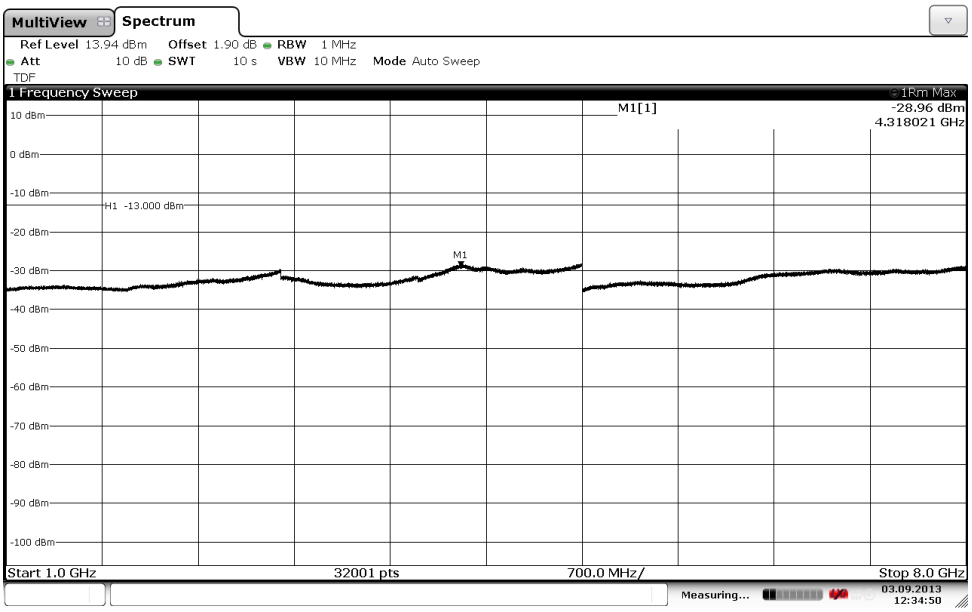
Appendix 6

Diagram 2a:



Date: 3.SEP.2013 12:16:07

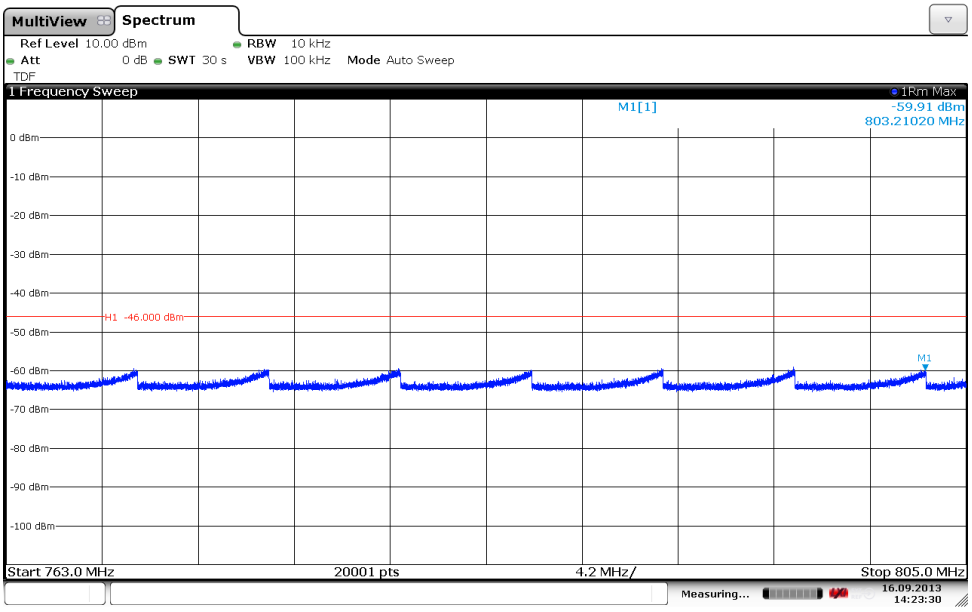
Diagram 2b:



Date: 3.SEP.2013 12:34:50

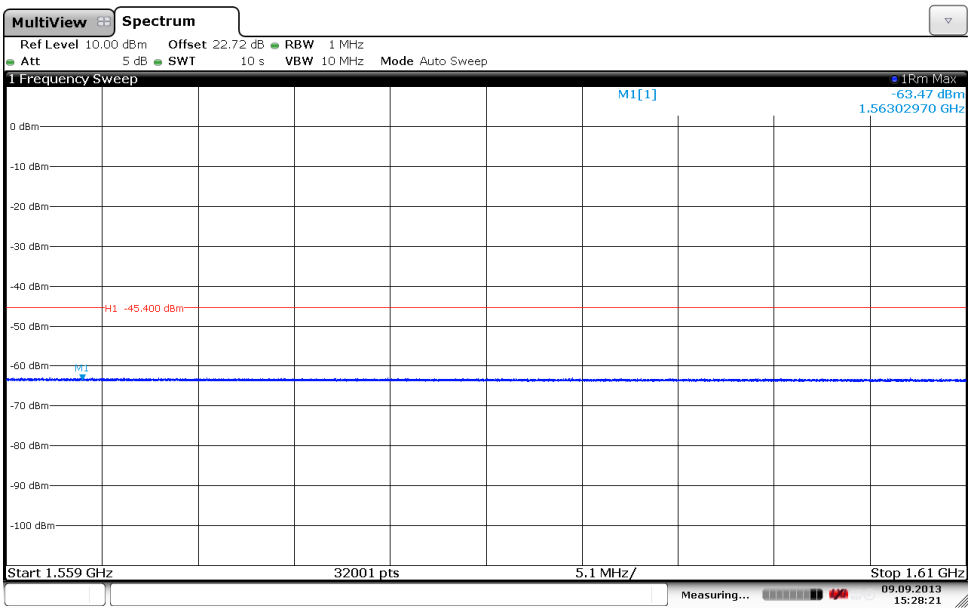
Appendix 6

Diagram 2c:



Date: 16.SEP.2013 14:23:30

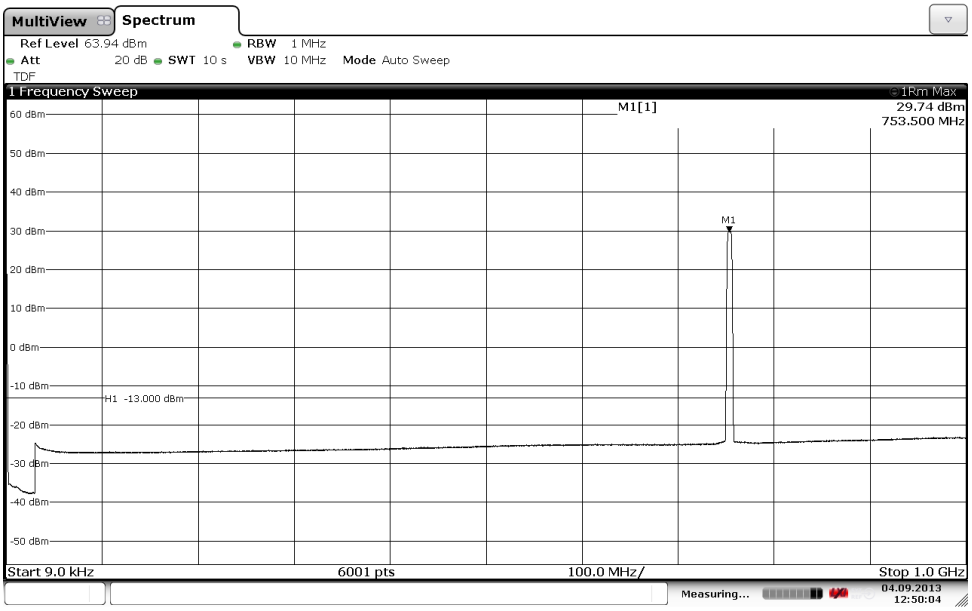
Diagram 2d:



Date: 9.SEP.2013 15:28:21

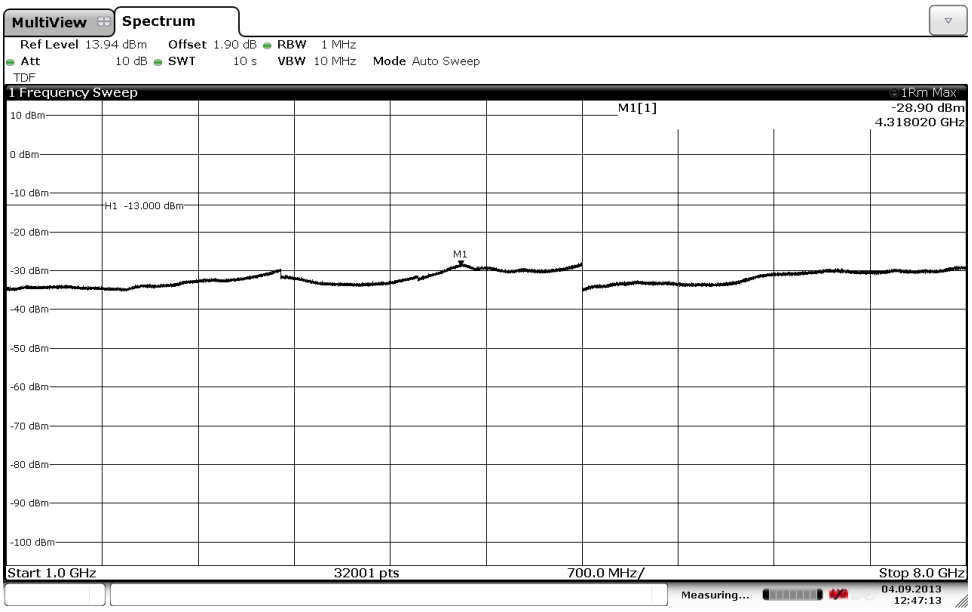
Appendix 6

Diagram 3a:



Date: 4.SEP.2013 12:50:04

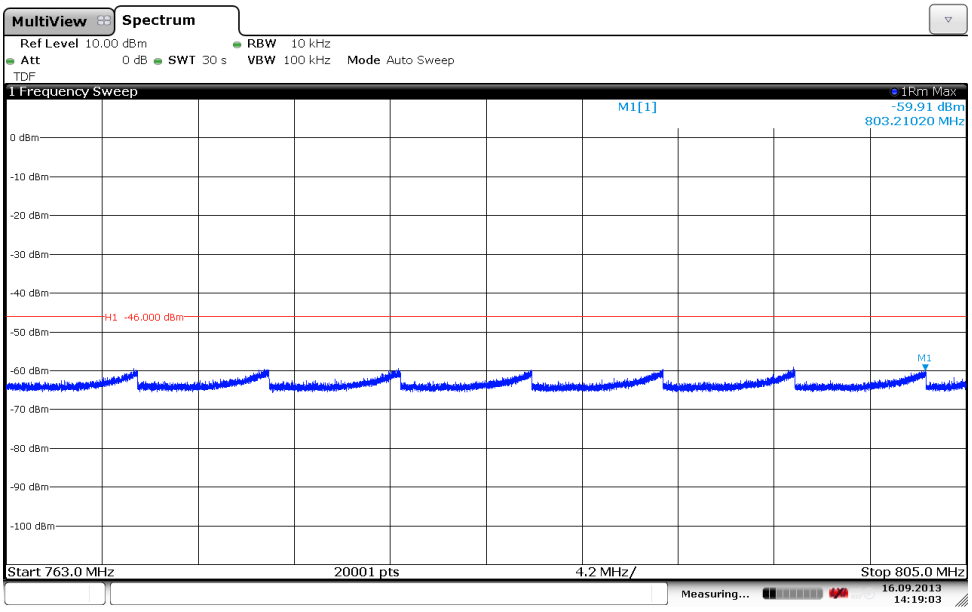
Diagram 3b:



Date: 4.SEP.2013 12:47:12

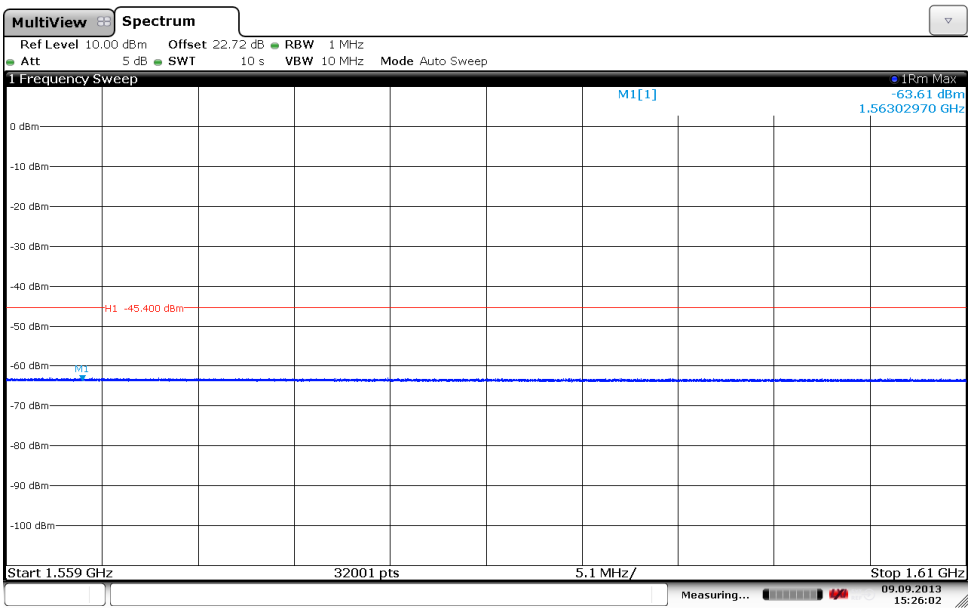
Appendix 6

Diagram 3c:



Date: 16.SEP.2013 14:19:03

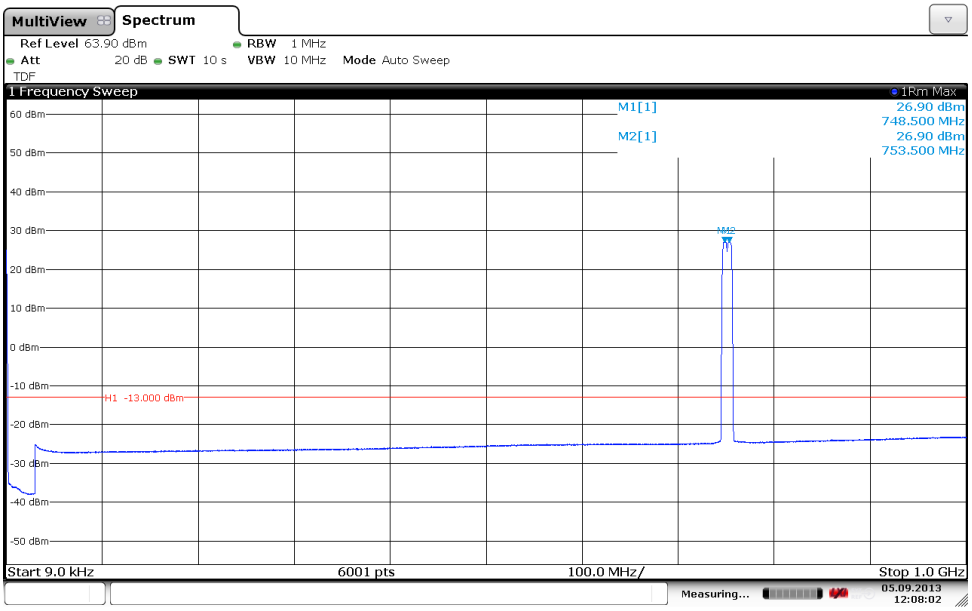
Diagram 3d:



Date: 9.SEP.2013 15:26:02

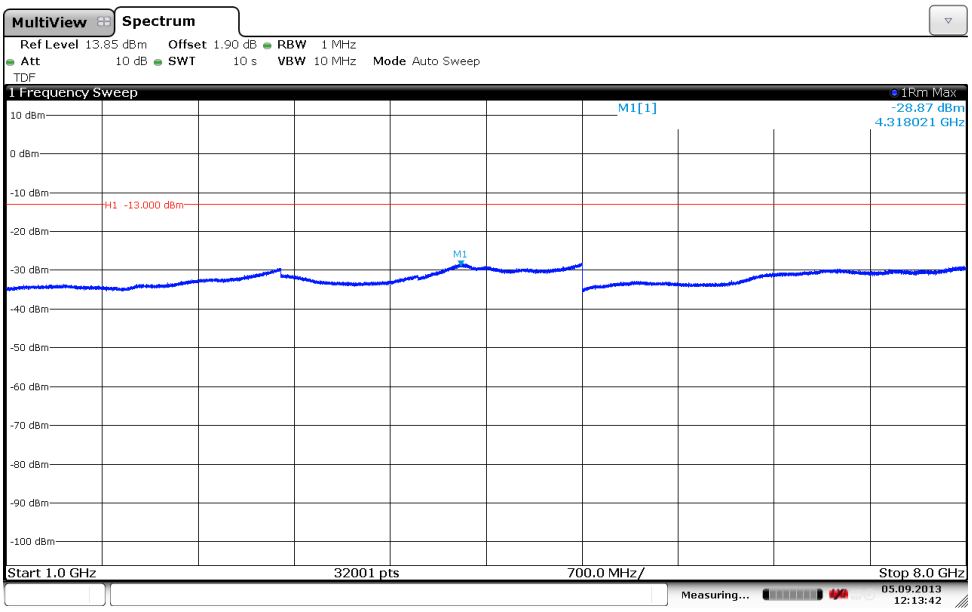
Appendix 6

Diagram 4a:



Date: 5.SEP.2013 12:08:02

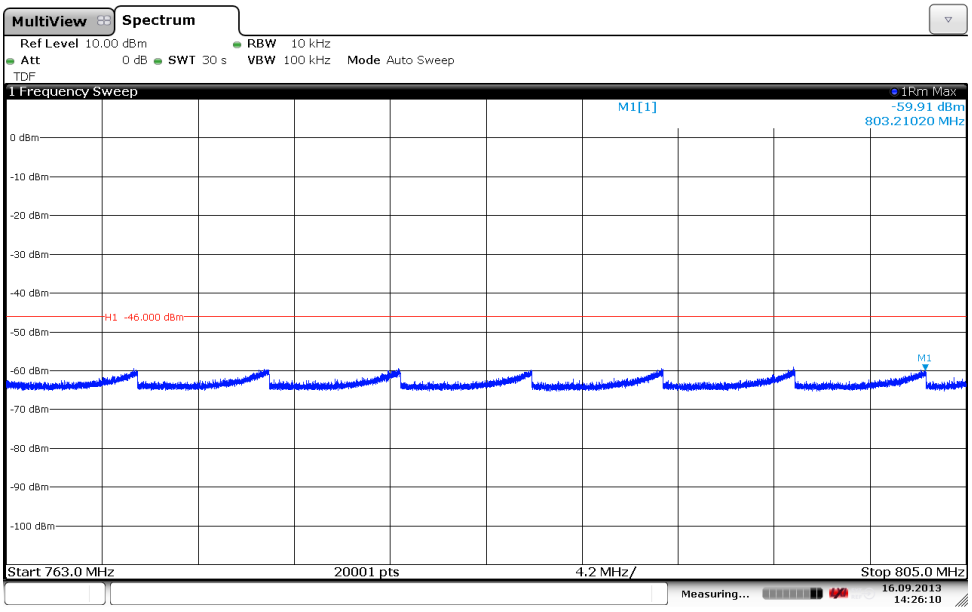
Diagram 4b:



Date: 5.SEP.2013 12:13:43

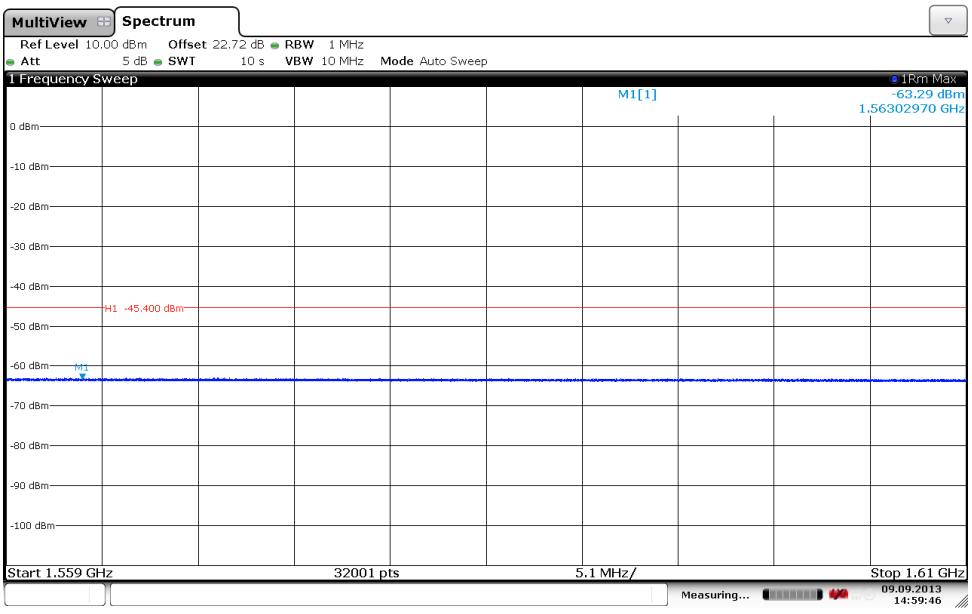
Appendix 6

Diagram 4c:



Date: 16.SEP.2013 14:26:10

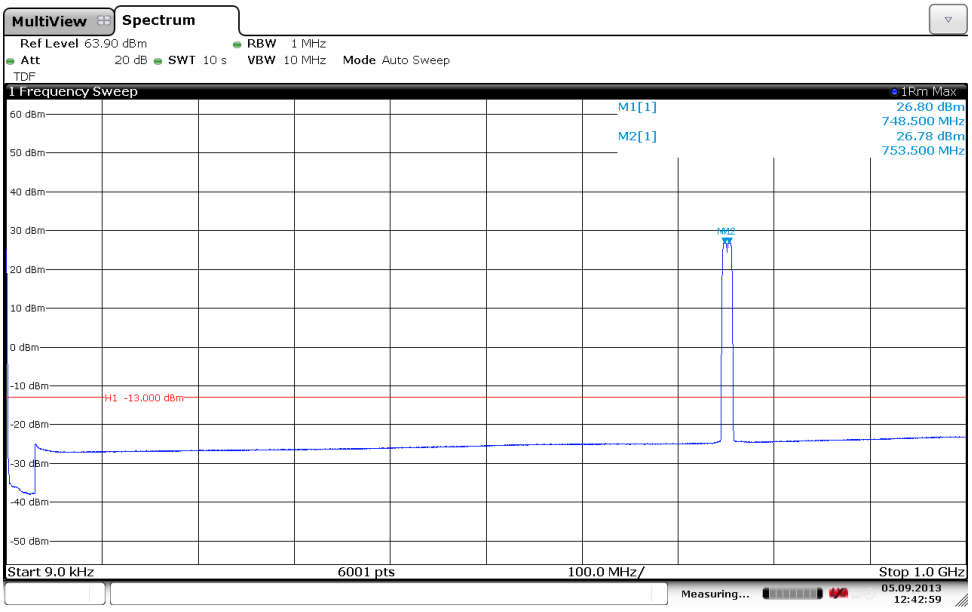
Diagram 4d:



Date: 9.SEP.2013 14:59:46

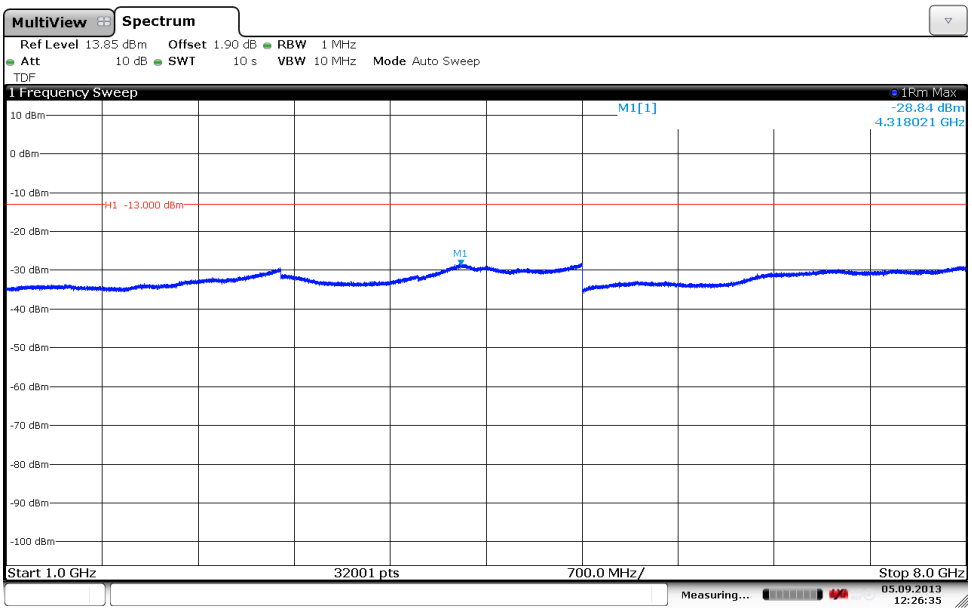
Appendix 6

Diagram 5a:



Date: 5.SEP.2013 12:42:59

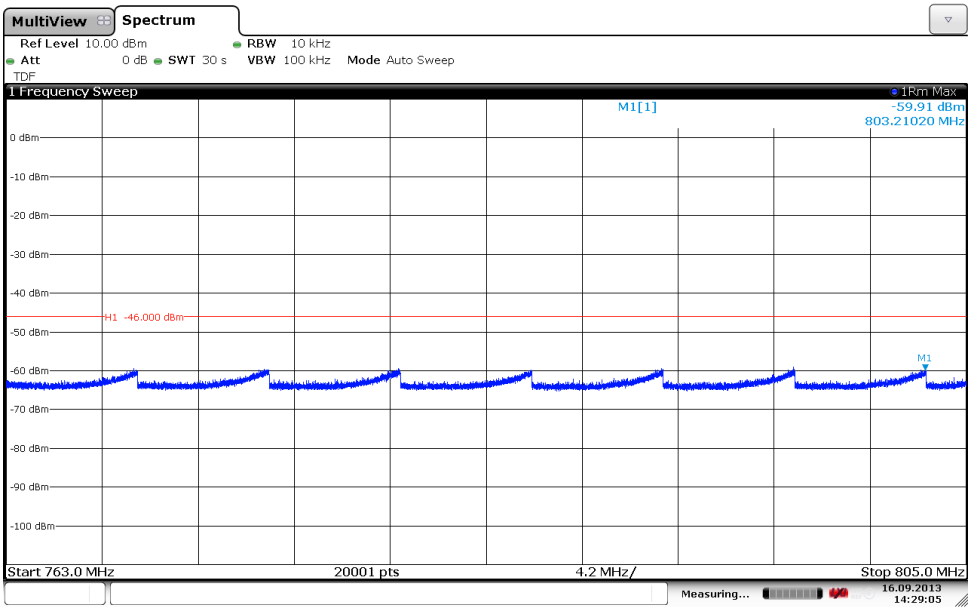
Diagram 5b:



Date: 5.SEP.2013 12:26:35

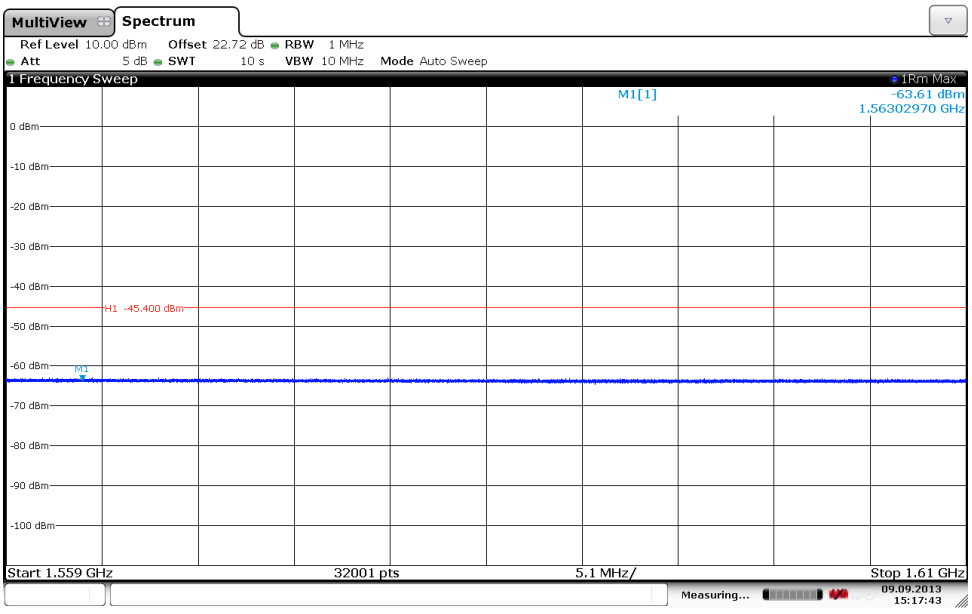
Appendix 6

Diagram 5c:



Date: 16.SEP.2013 14:29:06

Diagram 5d:



Date: 9.SEP.2013 15:17:42

Remark

The emission at 9 kHz on the plots was not generated by the test object. A complementary measurement with a smaller RBW showed that it was related to the LO feed-through.

The highest fundamental frequency is 756 MHz. The measurements were made up to 8 GHz (10x756 MHz = 7.56 GHz).

Limits

§27.53(c), (f)

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 1 MHz RBW.

On all frequencies between 763-775 MHz and 793-805 MHz the power of any emission shall be attenuated below the transmitter power (P), by at least 76 + 10 log (P) dB in a 6.25 kHz band segment, resulting in a limit of -46 dBm measured with 10 kHz RBW.

Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP). With respect of the representative antenna gain 5.4 dBi resulting in a limit of -45.4 dBm per 1 MHz RBW.

Complies?	Yes

Field strength of spurious radiation measurements according to 47 CFR 27.53 (c)

Date	Temperature	Humidity
2013-08-12	23°C ± 3°C	51 % ± 31 %
2013-08-13	23°C ± 3°C	45 % ± 34 %

Test set-up and procedure

The test sites are listed at FCC, Columbia with registration number: 93866. The test site complies with RSS-Gen, Industry Canada file no. 3482A-1.

The measurements were performed with both horizontal and vertical polarization of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 8 GHz.

The measurement was performed with a RBW according to table below:

Frequency range	RBW
30-763 MHz	1 MHz
763-775 MHz	10 kHz
775-793 MHz	1 MHz
793-805 MHz	10 kHz
805-8000 MHz	1 MHz

A propagation loss in free space was calculated. The used formula was

$\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.

The measurement procedure was as the following:

1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit in the pre-measurement is scanned 0-360 degrees and the antenna is scanned 1- 4 m for maximum response. The emission is then measured with the RMS detector and the RMS value is reported. Frequencies closer than 10 dB to the limit when measured with the RMS detector were measured with the substitution method according to the standard.

The test set-up during the spurious radiation measurements is shown in the picture below:

Measurement equipment

Measurement equipment	SP number
Semi anechoic chamber	503 881
R&S ESU 26	901 553
EMC 32 ver. 8.52.0	503 899
Chase Bilog Antenna CBL 6111A	503 182
EMCO Horn Antenna 3115	502 175
High pass filter, RLC Electronics	901 373
µComp Nordic, Low Noise Amplifier	901 545
Temperature and humidity meter, Testo 625	504 188

Tested configurations

B
M
M2
T

Results, representing worst case

M2, BW 5 MHz: Diagram 1 a-c

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-8 000	All emission > 20 dB below limit	All emission > 20 dB below limit

Measurement uncertainty:

3.2 dB up to 18 GHz

Limits

§27.53(c)

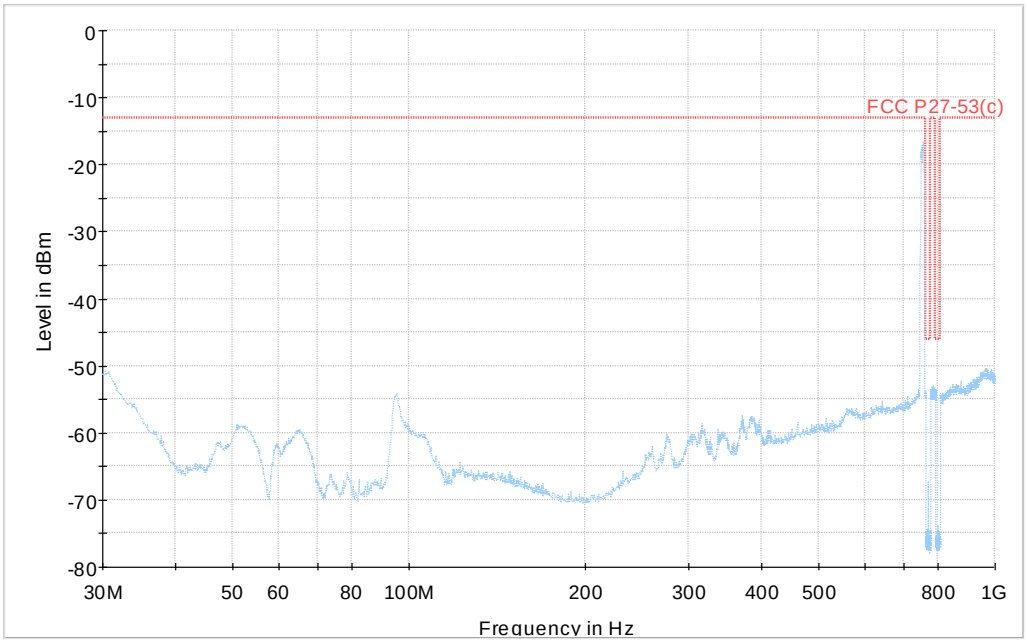
Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 100 kHz RBW.

On all frequencies between 763-775 MHz and 793-805 MHz the power of any emission shall be attenuated below the transmitter power (P), by at least 76 + 10 log (P) dB in a 6.25 kHz band segment, resulting in a limit of -46 dBm measured with 10 kHz RBW.

Complies?	Yes

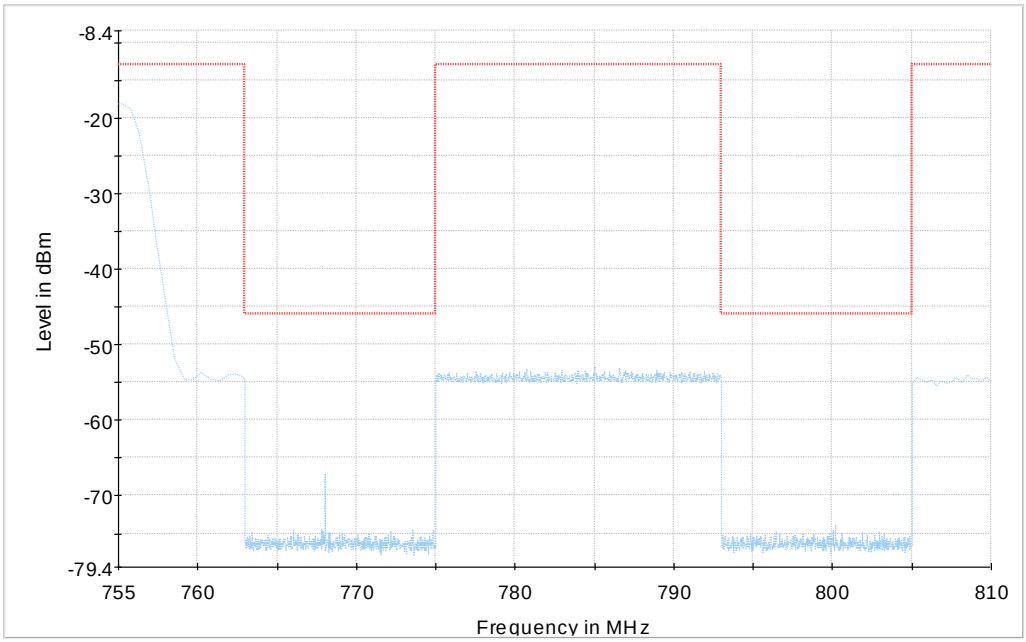
Appendix 7

Diagram 1a:



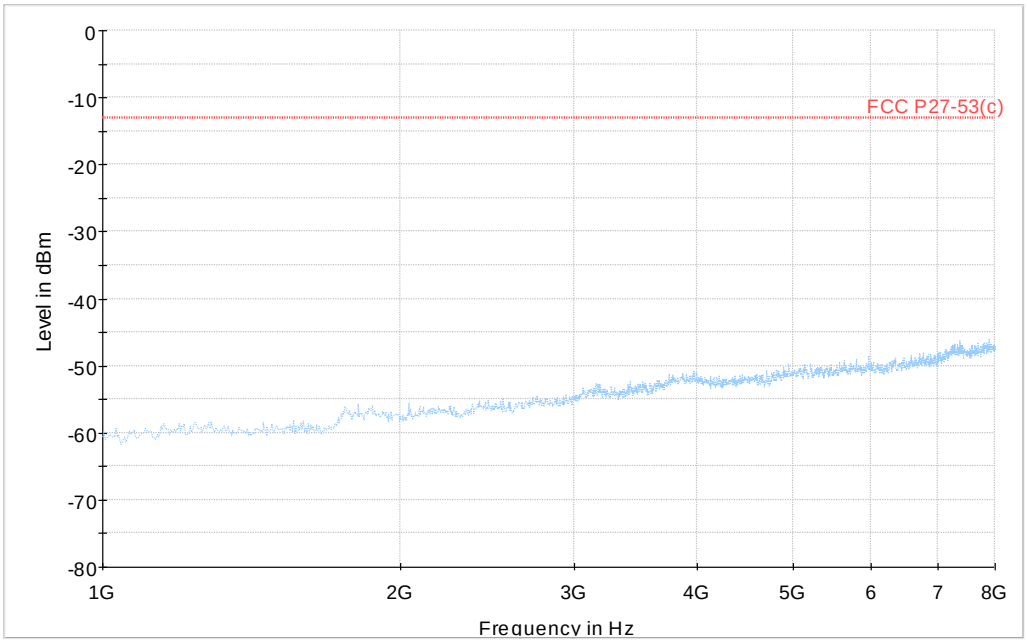
Note: The emission between 746 MHz and 756 MHz is the carrier frequency and shall be ignored in the context.

Diagram 1b: (zoom of diagram 1a)



Appendix 7

Diagram 1c:



Appendix 8

Frequency stability measurements according to CFR 47 §27.54

Date	Temperature	Humidity
2013-08-13	23 °C ± 3 °C	45 % ± 5 %
2013-08-14	22 °C ± 3 °C	44 % ± 5 %
2013-08-15	23 °C ± 3 °C	45 % ± 5 %

Test set-up and procedure

The measurement was made per 3GPP TS 36.141. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
R&S FSQ 40	504 143
RF attenuator 30 dB Weinschel 6405 (EAB equipment)	900 233
Temperature Chamber	503 360
Testo 635, temperature and humidity meter	504 203
Multimeter Fluke 87	502 190

Results

Nominal Voltage -48 V DC

Maximum output power at mid channel (M)

Channel Bandwidth 5MHz

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	Test model E-TM1.1
-48.0	+20	+3
-55.2	+20	+4
-40.8	+20	+3
-48.0	+30	-3
-48.0	+40	-2
-48.0	+50	-2
-48.0	+10	+2
-48.0	0	-2
-48.0	-10	-2
-48.0	-20	-2
-48.0	-30	+3
Maximum freq. error (Hz)		4
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Nominal Voltage 120 V AC 60 Hz

Maximum output power at mid channel (M)

Channel Bandwidth 5MHz

Test conditions		Frequency error (Hz)
Supply voltage AC (V)	T (°C)	Test model E-TM1.1
120	+20	-1
102	+20	+1
138	+20	-2
Maximum freq. error (Hz)		2
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Remark

It was deemed sufficient to test one combination of TX frequency, channel bandwidth configuration and test model (modulation), as all combinations share a common internal reference to derive the TX frequency from.

Remark

It was deemed sufficient to test one combination of TX frequency, channel bandwidth configuration and test model (modulation), as all combinations share a common internal reference to derive the TX frequency from.

Limits

Limit according to 3GPP TS 36.141:

The frequency error shall be within ± 0.05 PPM ± 12 Hz (±49.55 Hz).

§27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Complies?	Yes

Appendix 9

External photos

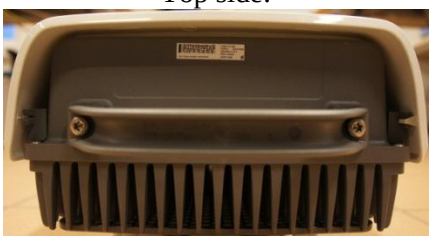
Front side:

Back side:

Left side:

Right side:

Top side:



Bottom side:

Product Label: