



NEDA ISO/IEC 17025

Contact person Tomas Isbring Electronics +46 10 516 59 16 Tomas.Isbring@sp.se Date Reference 2014-07-01 3P08659-F27

Page 1(2)

Ericsson AB Mats Falk PDU HW Lindholmspiren 11 417 56 Göteborg

# Radio measurements on mRRUS 12 B12 radio equipment with FCC ID: TA8AKRC161331 and IC: 287AB-AS161331

(9 appendices)

# **Test object**

Product name: mRRUS 12 B12 Product number: KRC 161 331/X, see appendix 1 for details.

# **Summary**

Standard		Compliant	Appendix
FCC CFR 47 / IC RSS-			
2.1046 / RSS-130 4.4	RF power output	Yes	2
2.1046 / RSS-130 4.4	RF power output, radiated	Yes	3
2.1049 / RSS-Gen 4.6.1	Occupied bandwidth	Yes	4
2.1051 / RSS-130 4.6	Band edge	Yes	5
2.1051 / RSS-130 4.6	Spurious emission at antenna terminals	Yes	6
2.1053 / RSS-130 4.6	Field strength of spurious radiation	Yes	7
2.1055 / RSS-130 4.3	Frequency stability	Yes	8

Note: Above RSS-130 items are given as cross-reference only. 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

Examined by

ala\_ Signed by: Jörgen Wassholm Reason: I am the author of this document Date & Time: 2014-07-01 13:54:45 ±02:00

Signed by: Krister Kilbrandt Reason: 1 have reviewed this document Date & Time: 2014-07-01 14:06:58 +02:00

Jörgen Wassholm

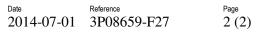
Krister Kilbrant

# SP Technical Research Institute of Sweden

Postal address SP Box 857 SE-501 15 BORÅS Sweden

Office location Västeråsen Brinellgatan 4 SE-504 62 BORÅS Phone / Fax / E-mail +46 10 516 50 00 +46 33 13 55 02 info@sp.se

Laboratories are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) under the terms of Swedish legislation. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.





# Table of contents

Description of the test object	Appendix 1
Operation mode during measurements	Appendix 1
Test setups	Appendix 1
Purpose of test	Appendix 1
RF power output conducted	Appendix 2
RF power output radiated	Appendix 3
Occupied bandwidth	Appendix 4
Band edge	Appendix 5
Spurious emission at antenna terminals	Appendix 6
Field strength of spurious radiation	Appendix 7
Frequency stability	Appendix 8
External photos	Appendix 9



Appendix 1

# Description of the test object

Equipment:	Product name: mRRUS 12 B12, supporting LTE Product number: KRC 161 331/1, 110-240 VAC internal antenna Product number: KRC 161 331/2, -48VDC internal antenna Product number: KRC 161 331/3, 110-240 VAC no internal antenna Product number: KRC 161 331/4, -48 VDC no internal antenna FCC ID: TA8AKRC161331 IC ID: 287AB-AS161331			
	IC model numbers: IC MODEL NO: AS1613311 IC MODEL NO: AS1613312 IC MODEL NO: AS1613313 IC MODEL NO: AS1613314			
Antenna ports:	2 TX/RX ports			
RF configurations:	Single carrier, multi carrier, TX diversity and MIMO 2x2			
Frequency bands:	TX: 729 – 745 MHz RX: 699 – 715 MHz			
Nominal output power per antenna port:	Single carrier:       1x 37.0 dBm (1 x 5W)         Multi carrier:       2 x 34.0 dBm (2 x 2.5W)         4 x 31.0 dBm (4 x 1.25W)			
Internal antenna type:	Integrated wide sector antenna, cross polarized antenna elements. Product no KRE 101 2134/1:			
Internal Antenna gain:	5dBi			
Tested external antenna type:	Semi-Integrated Omni Antenna for indoor and outdoor use. Product no KRE 101 2245/1:			
Tested external antenna gain:	2dBi			
Modulations:	QPSK, 16QAM and 64QAM			
Channel bandwidth Single carrier:	5 MHz, 10 MHz and 15 MHz.			
Channel bandwidth Multi carrier:	1.4 MHz, 3MHz ,5 MHz and 10 MHz			
Nominal power voltage:	-48 VDC 110-240 VAC			



Appendix 1

Page

2(8)

# **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 represent QPSK modulation, test model E-TM3.2 represent 16QAM modulation and test model E-TM3.1 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. All measurements were performed with the test object configured for maximum transmit power. 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

#### **Conducted measurements**

The test object was supplied with -48 VDC by an external power supply. Frequency stability measurements were also tested using 120 VAC. 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 and 120VAC.

# **Purpose of test**

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47 and IC RSS-130 and RSS-Gen.

# References

Measurements were done according to relevant parts of the following standards: 3GPP TS 36.141, version 11.4.0 ANSI/TIA/EIA-603-C-2004 CFR 47 part 2, December 16<sup>th</sup>, 2013 CFR 47 part 27, December 16<sup>th</sup>, 2013 RSS-Gen Issue 3 RSS-130 Issue 1





Appendix 1

# Measurement equipment

	Calibration Due	SP number
Test site Tesla	2017-01	503 881
R&S FSIQ 40	2014-07	503 738
R&S ESIB 26	2014-07	503 292
R&S FSQ 40	2014-07	504 143
R&S FSW 43	2014-07	902 073
Control computer with	-	503 899
R&S software EMC32 version 8.52.0		
High pass filter	2015-01	BX40074
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	2014-09	503 739
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	2014-11	901 508
Chase Bilog Antenna CBL 6111A	2014-10	503 182
EMCO Horn Antenna 3115	2015-09	502 175
Std.gain horn FLANN model 20240-20	-	503 674
Std.gain horn FLANN model 22240-20	-	503 674
µComp Nordic, Low Noise Amplifier	2015-01	901 545
Miteq Low Noise Amplifier	2014-09	503 285
Schwartzbeck preamplifier BBV 9742	2015-02	504 085
Temperature and humidity meter, Testo 635	2015-03	504 203
Temperature and humidity meter, Testo 625	2014-06	504 188
Temperature Chamber	2015-03	501 031
Multimeter Fluke 87	2014-08	502 190



SP SP SP SP

Appendix 1

Page

4(8)

# 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 2014-05-16.

# Manufacturer's representative

Christer Gustavsson, Ericsson AB.

# **Test engineers**

Andreas Johnson, Tomas Lennhager, Tomas Isbring, Jörgen Wassholm and Rolf Kühn, SP

# **Test participant**

Mihai Simon, Ericsson AB.



 Date
 Reference
 Page

 2014-07-01
 3P08659-F27
 5 (8)

# Appendix 1

# Test frequencies during measurements

	encies during	-		
EARFCN	Frequency	BW	Symbolic	Comment
Downlink	[MHz]	[MHz]	name	
5035	731.5	5	В	TX bottom frequency in 5 MHz BW configuration
5060	734.0	10	В	TX bottom frequency in 10 MHz BW configuration
5085	736.5	15	В	TX bottom frequency in 15 MHz BW configuration
5090	737.0	all	М	TX mid frequency all BW configurations
5145	742.5	5	Т	TX top frequency in 5 MHz BW configuration
5120	740.0	10	T	TX top frequency in 10 MHz BW configuration
5095	737.5	15	Т	TX top frequency in 15 MHz BW configuration
5075	131.3	15	1	TX top frequency in 15 write b w configuration
5017	729.7	1.4	B1.4	2 carrier TX bottom frequency in 1.4 and 5 MHz BW configuration
5145	742.5	5	D1.4	
5145	742.5	3		with maximum spacing inbetween and with 1.4MHz centered close
5025	720.5	2	<b>D</b> 2	to band edge.
5025	730.5	3	B3	2 carrier TX bottom frequency in 3 and 5 MHz BW configuration
5145	742.5	5		with maximum spacing inbetween and with 3MHz centered close to
				band edge.
5035	731.5	1.4	B1.4-2.5be	2 carrier TX bottom frequency in 1.4 and 5 MHz BW configuration
5145	742.5	5		with maximum spacing inbetween, and with 1.4MHz centered
				2.5MHz offset to band edge.
5035	731.5	3	B3-2.5be	2 carrier TX bottom frequency in 3 and 5 MHz BW configuration
5145	742.5	5		with maximum spacing inbetween, and with 3MHz centered
				2.5MHz offset to band edge.
5090	737	1.4	M1.4	2 carrier TX mid frequency in 1.4 and 5 MHz BW configuration
5145	742.5	5		with maximum spacing inbetween
5090	737	3	M3	2 carrier TX mid frequency in 3 and 5 MHz BW configuration with
5145	742.5	5		maximum spacing inbetween
5035	731.5	5	T1.4-2.5be	2 carrier TX top frequency in 5 and 1.4 MHz BW configuration
5145	742.5	1.4	11.1 2.500	with maximum spacing inbetween, and with 1.4MHz centered
5145	742.5	1.4		2.5MHz offset to band edge.
5035	731.5	5	T3-2.5be	2 carrier TX top frequency in 5 and 3 MHz BW configuration with
5145	742.5	3	13-2.500	maximum spacing inbetween, and with 3MHz centered 2.5MHz
5145	742.5	5		
5025	701.5	~	<b>T</b> 1 4	offset to band edge.
5035	731.5	5	T1.4	2 carrier TX top frequency in 5 and 1.4 BW configuration with
5163	744.3	1.4		maximum spacing inbetween and with 1.4MHz centered close to
		-		band edge.
5035	731.5	5	T3	2 carrier TX top frequency in 5 and 3 MHz BW configuration with
5155	743.5	3		maximum spacing inbetween and with 3MHz centered close to band
				edge.
5035	731.5	5	B2_1	2 carrier TX bottom frequency in 5 and 1.4 MHz BW configuration
5067	734.7	1.4		
5035	731.5	5	B2_2	2 carrier TX bottom frequency in 5 and 3 MHz BW configuration
5075	735.5	3		
5035	731.5	1.4	B2_3	2 carrier TX bottom frequency in 1.4 and 5 MHz BW configuration,
5067	734.7	5		and with 1.4MHz centered 2.5MHz offset to band edge.
5035	731.5	3	B2_4	2 carrier TX bottom frequency in 3 and 5 MHz BW configuration,
5075	735.5	5	_	and with 3MHz centered 2.5MHz offset to band edge.
5017	729.7	1.4	B2_5	2 carrier TX bottom frequency in 1.4 and 5 MHz BW configuration,
5049	732.9	5		and with 1.4MHz centered close to band edge.
5025	730.5	3	B2_6	2 carrier TX bottom frequency in 3 and 5 MHz BW configuration,
5065	734.5	5	22_0	and with 3MHz centered close to band edge.
5065	734.5	1.4	M2_1	2 carrier TX mid frequency in 1.4 and 5 MHz BW configuration
5097	737.7	5	11/12_1	2 carner 1X line nequency in 1.4 and 5 winz b w configuration
			MOD	2 corrier TV mid frequency in 2 and 5 MIL-DWf
5065	734.5	3	M2_2	2 carrier TX mid frequency in 3 and 5 MHz BW configuration
5105	738.5	5	T2 2	
5105	738.5	3	T2_2	2 carrier TX top frequency in 3 and 5 MHz BW configuration
5145	742.5	5		
5113	739.3	5	T2_3	2 carrier TX top frequency in 5 and 1.4 MHz BW configuration, and
5145	742.5	1.4		with 1.4MHz centered 2.5MHz offset to band edge.
5105	738.5	5	T2_4	2 carrier TX top frequency in 5 and 3 MHz BW configuration, and
5145	742.5	3		with 3MHz centered 2.5MHz offset to band edge.
5131	741.1	5	T2_5	2 carrier TX top frequency in 5 and 1.4 MHz BW configuration, and
5163	744.3	1.4		with 1.4MHz centered close to band edge.
5115	739.5	5	T2_6	2 carrier TX top frequency in 5 and 3 MHz BW configuration, and
5155	743.5	3		with 3MHz centered close to band edge.
		-		
1				



 Date
 Reference
 Page

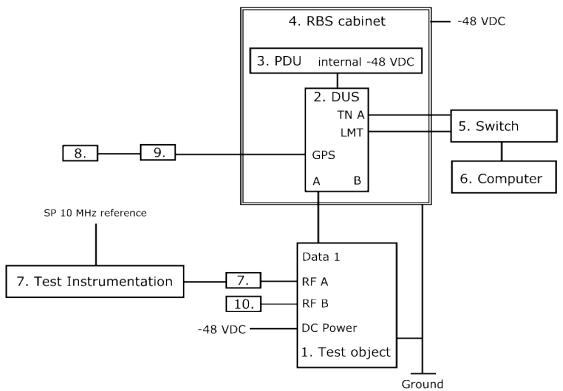
 2014-07-01
 3P08659-F27
 6 (8)

Appendix 1

5035 5075 5105	731.5 735.5 738.5	5 3 3	B4	4 carrier TX bottom frequency in 5, 3, 3 and 5 MHz BW configuration
5145	742.5	5		

All RX frequencies were configured 30 MHz below the corresponding TX frequency according the applicable duplex offset for the operating band.

# Test setup conducted measurements



# Test object

mRRUS 12 B12, KRC 161 331/4, rev. R1C, s/n: C827931793
software CXP 901 7316/2, rev. R51NN with
FCC ID: TA8AKRC161331 and IC ID: 287AB-AS161331
For frequency stability AC:
KRC 161 331/3, rev. R1C, s/n: C827929841
F

# **Functional test equipment**

2.	DUS 41 01, KDU 137 624/1, rev. R5A/A, s/n: D16C491372
3.	SUP 6601 1/BFL 901 009/4, rev. R1E, s/n: BR88237597
4.	RBS 6601, BFL 901 009/4
5	Fast Ethernet switch, Netgear GSM7212, BAMS:1000517295
6.	Computer, Ultra 27, BAMS – 1000758440
7.	SP Test Instrumentation according to measurement equipment list
8.	GPS Active Antenna, KRE 101 2082/1, and 1x4 GPS splitter, KRY 101 1946/1
9.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8K474887
10.	Terminator, 50 ohm

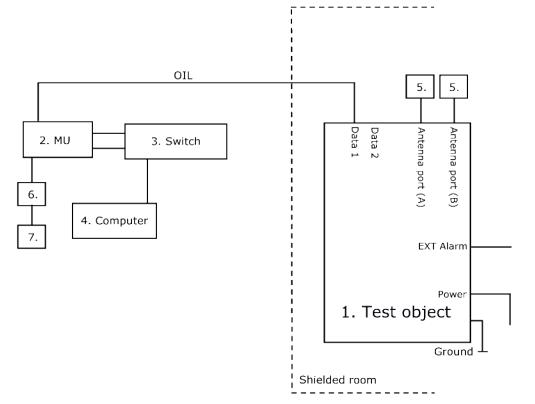




Appendix 1

# Test setup radiated measurements

REPORT



#### **Test object:**

 mRRUS 12 B12, KRC 161 331/2, rev. R1C, s/n: C827930693 mRRUS 12 B12, KRC 161 331/4, rev. R1C, s/n: C827931793 working software CXP 901 7316/2, rev. R51NN with FCC ID: TA8AKRC161331 and IC ID: 287AB-AS161331

# **Functional test equipment:**

2.	Main Unit
	SUP 6601 1/BFL 901 009/4, rev. R1E, s/n. BR88258854
	DUS 41 01, KDU 137 624/1, rev. R5A, s/n: D168382181
3.	Netgear Switch GSM7212, BAMS – 1000517299
4.	Computer Sun ultra27-01, BAMS – 1000758436
5.	Terminator or Antenna, see antenna details below
6.	GPS 02 01, NCD 901 41/1, rev. R1C, s/n: A401677751
7.	GPS Active Antenna, KRE 101 2082/1

#### **Integrated antenna**

Sector antenna, KRE 101 2134/1, rev. R1C, s/n: T89U200136 Representing version: KRC 161 331/1 and KRC 161 331/2

# Semi-integrated omni antenna

VPol Omni 694-894, KRE 101 2245/1, s/n: D7G3305551, D7G3305547 Type no. 80010846 Representing version: KRC 161 331/3 and KRC 161 331/4



 Date
 Reference
 Page

 2014-07-01
 3P08659-F27
 8 (8)

Appendix 1

# Interfaces:Power: -48 VDCPowerAntenna port (A), N-connectorAntennaAntenna port (B), N-connectorAntennaData 1, Optical Interface Link, single mode opto fibreSignalData 2, Optical Interface Link, single mode opto fibre, not used in this configurationSignalEXT Alarm, shielded multi-wireSignalGround wireGround

# **RBS** software:

Product number	Revision
CXP 102 051/19	R39BC



Appendix 2

# RF power output measurements according to CFR 47 §27.50 and RSS-130 4.4, conducted

Date	Temperature	Humidity
2014-06-05 to 2014-06-27	$19^{\circ}$ C to $24^{\circ}$ C $\pm 3^{\circ}$ C	$33\%$ to $60\% \pm 5\%$

# Test set-up and procedure

The test object was connected to a signal analyser measuring peak and RMS output power in CDF mode. A resolution bandwidth of 80 MHz was used.

Measurement equipment	SP number
R&S FSW	902 073
RF attenuator	900 691
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 1x 37.0 dBm.

Tested configuration	[RMS dBm/ PAR dB]			
BW and frequency	Port RF A	Port RF B	Total power <sup>1)</sup>	
5 MHz, B	36.54/ 6.78	36.82/ 6.78	39.69	
10 MHz, B	36.73/ 6.90	36.85/ 6.88	39.80	
15 MHz, B	36.73/ 6.94	36.80/ 6.92	39.78	
5 MHz, M	36.71/ 6.72	36.79/ 6.72	39.76	
10 MHz, M	36.60/ 6.76	36.81/ 6.76	39.72	
15 MHz, M	36.67/ 6.90	36.75/ 6.32	39.72	
5 MHz, T	36.85/ 6.72	36.90/ 6.74	39.89	
10 MHz, T	36.80/ 6.74	36.84/ 6.76	39.83	
15 MHz, T	36.73/ 6.86	36.78/ 6.84	39.77	



Appendix 2

# MIMO mode, multi Carrier Rated output power 2 x 34.0 dBm per RF port. Channel Power measurements of 1.4 and 3 MHz

Carrier BW	Symbolic	[RMS	Total power <sup>1)</sup>	
[MHz]	name	Port RF A	Port RF B	[RMS dBm]
1.4	B1.4	33.24	33.22	36.24
3	B3	33.52	33.43	36.49
1.4	B1.4-2.5be	33.44	33.48	36.47
3	B3-2.5be	33.56	33.60	36.59
1.4	M1.4	33.69	33.76	36.74
3	M3	33.73	33.86	36.81
1.4	T1.4-2.5be	33.82	33.79	36.82
3	T3-2.5be	33.82	33.85	36.85
1.4	T1.4	33.84	33.67	36.77
3	Т3	33.87	33.85	36.87

# MIMO mode, multi Carrier Rated output power 2 x 34.0 dBm per RF port.

Tested configuration	[]	[RMS dBm/ PAR dB]			
BW and frequency	Port RF A	Port RF B	Total power <sup>1)</sup>		
5+1.4 MHz, B2_1	36.80/ 6.94	36.80/ 6.96	39.81		
5+3 MHz, B2_2	36.91/6.88	36.92/6.88	39.87		
1.4+5 MHz, B2_3	36.76/6.98	36.67/6.92	39.73		
3+5 MHz, B2_4	36.69/6.86	36.54/6.86	39.63		
1.4+5 MHz, B2_5	36.59/6.98	36.65/6.98	39.63		
3+5 MHz, B2_6	36.69/6.94	36.74/6.92	39.73		
5+1.4 MHz, M2_1	36.54/ 6.90	36.58/ 6.90	39.57		
3+5 MHz, M2_2	37.63/ 6.78	36.76/ 6.78	39.71		
3+5 MHz, T2_2	36.71/6.78	36.82/6.80	39.78		
5+1.4 MHz, T2_3	36.64/6.88	36.65/6.76	39.66		
5+3 MHz, T2_4	36.75/6.76	36.72/6.78	39.75		
5+1.4 MHz, T2_5	36.57/6.90	36.59/6.94	39.59		
5+3 MHz, T2_6	36.65/6.78	36.65/6.80	39.66		



 Date
 Reference
 Page

 2014-07-01
 3P08659-F27
 3 (5)

Appendix 2

# Rated output power 4 x 31.0 dBm per RF port.

Tested configuration	[RMS dBm/ PAR dB]				
BW and frequency	Port RF A Port RF B Total power <sup>1)</sup>				
5+3+3+5 MHz, B4	36.66/ 6.96	36.57/ 6.96	39.63		

<sup>1)</sup>: Summed output power according to FCC KDB662911 Multiple transmitter output v02r01.

Note: The PAR value is the 0.1 % Peak to Average Ratio.



Appendix 2

# Single carrier, MIMO

Measured output power per 1 MHz.

Carrier BW	Symbolic	[RMS	[RMS dBm]		
[MHz]	name	Port RF A	Port RF B	[RMS dBm]	
5	В	30,62	30.83	33.83	
10	В	27.80	27.93	30.93	
15	В	26.03	25.96	29.03	
5	М	30.68	30.69	33.69	
10	М	27.65	27.78	30.78	
15	М	25.96	26.03	29.03	
5	Т	30.73	30.78	33.78	
10	Т	27.72	27.80	30.80	
15	Т	26.06	26.03	29.06	

2 carrier MIMO (1.4 and 3.0 MHz carrier only supported together with at least a 5MHz carrier BW)

Carrier BW	Symbolic [RMS dBm]			Total power <sup>1)</sup>	
[MHz]	name	Port RF A	Port RF B	[RMS dBm]	
1.4	B1.4	32,17	32.16	35.17	
3	B3	29.37	29.32	32.37	
1.4	B1.4- 2.5be	32,43	32.40	35.43	
3	B3-2.5be	29.49	29.50	32.50	
1.4	M1.4	32.66	32.78	35.78	
3	M3	29.68	29.68	32.68	
1.4	T1.4- 2.5be	32.78	32.46	35.78	
3	T3-2.5be	29.76	29.61	32.76	
1.4	T1.4	32.77	32.56	35.77	
3	Т3	29.74	29.71	32.74	

 Measured according to FCC KDB662911 D01 Multiple Transmitter Output v02r01. Method E), 2), c). "Measure and add 10 log(N<sub>Ant</sub>)"



Appendix 2

# Remark

ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/IC Bureau(s). Licensee's are required to take into account maximum antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

# Limits

§ 27.50 (c) (3):	Base stations transmitting in the 698–746 MHz band with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz.
RSS-130 4.4:	The transmitter output power shall be measured in terms of average power. For base and fixed equipment, refer to SRSP-518 for power limits The maximum output power may not exceed 3280 W (EIRP)/ MHz
	In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

Complies?	Yes

SP Technical Research Institute of Sweden





Appendix 3

# RF power output measurements according to CFR 47 §27.50 / IC RSS-130 4.4, radiated

Date	Temperature	Humidity
2014-05-27	$22^{\circ}C \pm 3^{\circ}C$	32 % ± 5 %
2014-05-28	$22^{\circ}C \pm 3^{\circ}C$	27 % ± 5 %
2014-06-02	$23^{\circ}C \pm 3^{\circ}C$	33 % ± 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 ESI 26	503 292
EMC 32 ver. 8.52.0	503 899
Schwarzbeck dipol	500 592
R&S SMB 100A	900 120
Attenuator	504 159
Testo 635 temperature and humidity meter	504 203

# Measurement uncertainty:

3.2 dB



Appendix 3

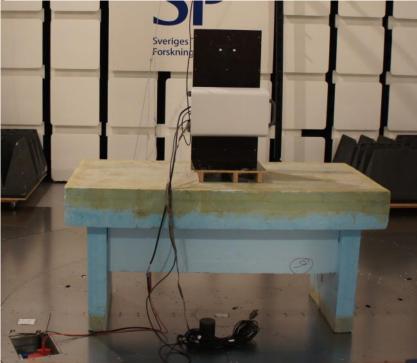
Page

2(7)

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



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



# Results

Internal antenna, upright mounted

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power (ERP)		Horizontal/ Vertical RMS power (ERP)		Horizontal/ Vertical RMS power (ERP)	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	-	-	32.9/ 32.0	1.9/ 1.6	-	-
10	-	-	29.8/ 28.9	1.0/ 0.8	-	-
15	-	-	28.3/ 27.0	0.7/ 0.5	-	-
1.4+5	35.6/ 34.4	3.6/ 2.8	35.5/ 34.3	3.5/ 2.7	35.7/ 35.4	3.7/ 3.5
3+5	-	-	32.1/ 30.8	1.6/ 1.2	-	-





Appendix 3

Page

4(7)

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power (ERP)		Horizontal/ Vertical RMS power (ERP)		Horizontal/ Vertical RMS power (ERP)	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	-	-	30.9/ 34.2	1.2/ 2.6	-	-
10	-	-	28.8/ 31.2	0.8/ 1.3	-	-
15	-	-	27.6/ 30.2	0.6/ 1.0	-	-
1.4+5	34.7/ 36.7	3.0/ 4.7	34.7/ 36.6	3.0/ 4.6	34.8/ 37.4	3.0/ 5.5
3+5	-	-	31.1/ 32.9	1.3/ 1.9	-	-

# Internal antenna, side mounted

# 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 (ERP)		Horizontal/ Vertical RMS power (ERP)		Horizontal/ Vertical RMS power (ERP)	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	-	-	25.4/ 32.4	0.3/ 1.7	-	-
10	-	-	22.4/ 29.0	0.2/ 0.8	-	-
15	-	-	20.7/ 27.7	0.1/ 0.6	-	-
1.4+5	28.2/ 34.8	0.7/ 3.0	27.4/ 34.5	0.5/ 2.8	28.5/ 35.1	0.7/ 3.2
3+5	-	-	24.5/ 31.0	0.3/ 1.3	-	-



Date Reference 2014-07-01 3P08659-F27

Appendix 3

<sup>Page</sup> 5 (7)

# Internal antenna, upright mounted

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power (EIRP)		Horizontal/ Vertical RMS power (EIRP)		Horizontal/ Vertical RMS power (EIRP)	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	-	-	35.1/ 34.2	3.2/ 2.6	-	-
10	-	-	32.0/ 31.1	1.6/ 1.3	-	-
15	-	-	30.5/ 29.2	1.1/ 0.8	-	-
1.4+5	37.8/ 36.6	6.0/ 4.5	37.7/ 36.5	5.8/ 4.4	37.9/ 37.6	6.1/ 5.7
3+5	-	-	34.3/ 33.0	2.7/ 2.0	-	-

# Internal antenna, side mounted

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power (EIRP)		Horizontal/ Vertical RMS power (EIRP)		Horizontal/ Vertical RMS power (EIRP)	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	-	-	33.1/ 36.4	2.0/ 4.3	-	-
10	-	-	31.0/ 33.4	1.2/ 2.2	-	-
15	-	-	29.8/ 32.4	0.9/ 1.7	-	-
1.4+5	36.9/ 38.9	4.8/ 7.7	36.9/ 38.9	4.8/ 7.5	37.0/ 39.6	5.0/ 9.0
3+5	-	-	33.3/ 35.1	2.1/ 3.2	-	-



 Date
 Reference
 Page

 2014-07-01
 3P08659-F27
 6 (7)

Appendix 3

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Horizontal/ Vertical RMS power (EIRP)		Horizontal/ Vertical RMS power (EIRP)		Horizontal/ Vertical RMS power (EIRP)	
	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz
5	-	-	27.6/ 34.6	0.6/ 2.9	-	-
10	-	-	24.6/ 31.2	0.3/ 1.3	-	-
15	-	-	22.9/ 29.9	0.2/ 1.0	-	-
1.4+5	30.4/ 37.0	1.1/ 5.0	29.6/ 36.7	0.9/ 4.6	30.7/ 37.3	1.2/ 5.3
3+5	-	-	26.7/ 33.2	0.5/ 2.1	-	-

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



Page 7 (7)



Appendix 3

# Remark

ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/IC Bureau(s). Licensee's are required to take into account maximum antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

# Limits

§ 27.50 (c) (3):	Base stations transmitting in the 698–746 MHz band with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000
	watts/MHz.
RSS-130 4.4:	The transmitter output power shall be measured in terms of average power.
	For base and fixed equipment, refer to SRSP-518 for power limits
	The maximum output power may not exceed 3280 W (EIRP)/ MHz
	In addition, the peak-to-average power ratio (PAPR) of the transmitter shall
	not exceed 13 dB for more than 0.1% of the time and shall use a signal
	corresponding to the highest PAPR during periods of
	continuous transmission.

Complies?	Yes



Appendix 4

# Occupied bandwidth measurements according to CFR 47 2.1049 and RSS-Gen 4.6.1

Date	Temperature	Humidity
2014-06-19	$21 \degree C \pm 3 \degree C$	51 % ± 5 %
2014-06-26	22 °C ± 3 °C	38 % ± 5 %
2014-06-27	$22 \degree C \pm 3 \degree C$	38 % ± 5 %

# Test set-up and procedure

The measurements were made per definition in §2.1049 and RSS-Gen 4.6.1. 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 43	902 073
RF attenuator	900 691
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB





Appendix 4

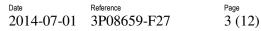
# Results

Single carrier

Diagram	BW configuration	Tested frequency	Tested Port	Occupied BW (99%) [MHz]
1	5 MHz	В	RF A	4.48
2	10 MHz	В	RF A	8.93
3	15 MHz	В	RF A	13.40
4	5 MHz	М	RF A	4.48
5	5 MHz	М	RF B	4.48
6	10 MHz	М	RF A	8.93
7	10 MHz	М	RF B	8.94
8	15 MHz	М	RF A	13.41
9	15 MHz	М	RF B	13.41
10	5 MHz	Т	RF A	4.48
11	10 MHz	Т	RF A	8.93
12	15 MHz	Т	RF A	13.41

(1.4 and 3.0 MHz carrier only supported together with at least a 5MHz carrier BW)

Diagram	BW configuration	Tested frequency	Tested Port	Occupied BW (99%) [MHz]
13	1.4 MHz	B1.4	RF A	1.09
14	3 MHz	В3	RF A	2.69
15	1.4 MHz	M1.4	RF A	1.09
16	1.4 MHz	M1.4	RF B	1.09
17	3 MHz	M3	RF A	2.69
18	3 MHz	M3	RF B	2.69
19	1.4 MHz	T1.4	RF A	1.09
20	3 MHz	Т3	RF A	2.69





Appendix 4

Diagram 1:

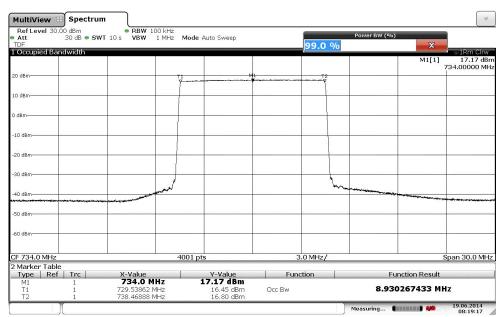
MultiView 😁 Spectrum V 
 Ref Level 30.00 dbm
 BBW
 50 kHz

 Att
 30 db
 SWT 10 s
 VBW
 500 kHz
 Mode Auto Sweep

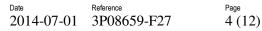
 TDF
 1
 Occupied Bandwidth
 Image: Sweet Swe Power BW (%) 99.0 % X ●1Rm Clrw 16.02 dBm 731.50000 MHz M1[1] 20 dBn 10 dBml dBn 10 dBr 20 dBr -30 dBn ٦ ٨ 40 dBm -50 dBm -60 dBm 4001 pts CF 731.5 MHz oan 15.0 MHz .5 MHz/ 2 Marker Table Type | Ref | Trc | Function Result Function X-Value 731.5 MHz Y-Value 16.02 dBm Occ Bw 4.476380905 MHz T1 729.26556 MHz 733.74194 MHz 16.47 dBm 16.56 dBm deasuring... 🚺 🗰 🗰 19.06.2014 08:11:07

Date: 19.JUN.2014 08.11:07

#### Diagram 2:



Date: 19 JUN 2014 08:19:17





Appendix 4

Diagram 3:

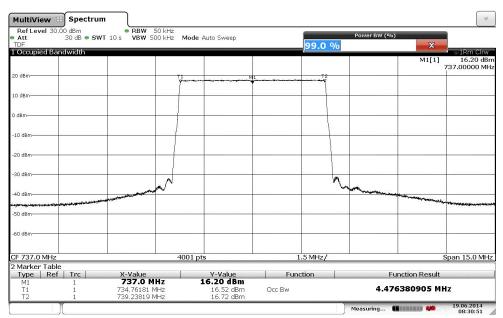
MultiView 😁 Spectrum V 
 Ref Level
 30.00 dBm
 RBW
 200 kHz

 Att
 30 dB
 SWT
 10 s
 VBW
 2 MHz

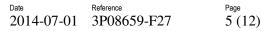
 Mode
 Auto Sweep
 Power BW (%) 99.0 % 1 Occupied Bandwidth м1[1] 18.52 dBn 736.5000 MHz 20 dBr 10 dBmd dBn 10 dBr 20 dBr -30 dBn 50 dB -60 dBr CF 736.5 MHz 2 Marker Table Type | Ref | Trc | 4001 pt an 45.0 MHz Function Result Function X-Value 736.5 MHz Y-Value 18.52 dBm M1 T1 T2 Occ Bw 13.39540115 MHz 729.8079 MHz 743.2033 MHz 17.36 dBm 17.48 dBm Aeasuring... 19.06.2014 08:26:38

Date: 19.JUN.2014 08:26:38

#### Diagram 4:



Date: 19.JUN.2014 08:30:51





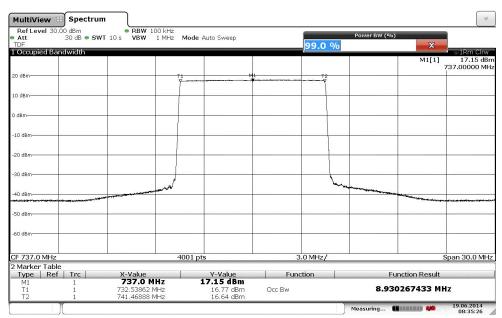
Appendix 4

Diagram 5:

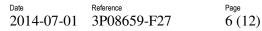
214814						
MultiViev	s 🗃 Spectrum					$\bigtriangledown$
Ref Level Att TDF	30.00 dBm 30 dB • SWT	<ul> <li>RBW 50 kHz</li> <li>10 s VBW 500 kHz</li> </ul>	Mode Auto Sweep	99.0	Power BW (9	<sup>36)</sup>
1 Occupied	Bandwidth			00.0	70	● 1Rm Clrw
						M1[1] 16.28 dBm
2010 - 1.12 -						737.00000 MHz
20 dBm		11 72	M1	T2		
					8	
10 dBm		·		·····	<u>()</u>	
					l I	
0 dBm						
o ubili						
					1	
-10 dBm						
-20 dBm			{		- ]	
		f.				
-30 dBm						
-30 dBm-					A	
		L. N			N	
-40 dBm					Mana	
*****		and the second the second s			and the second sec	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-50 dBm		·				
22.12						
-60 dBm						
CF 737.0 M	Hz	4(	001 pts	1.5 MHz/	<u></u>	Span 15.0 MHz
2 Marker T			501 pc	1.0 00027		Spain 1510 Miliz
	Ref   Trc	X-Value	Y-Value	Function		Function Result
M1	1	737.0 MHz	16.28 dBm	. anedon		1
T1	ī	734.76181 MHz	16.65 dBm	Occ Bw	4.4	76380905 MHz
T2	1	739.23819 MHz	16.80 dBm	and a second second		a construction and the second s
	1 M				Measuring	19.06.2014
						09:06:59

Date: 19 JUN 2014 09:06:59

# Diagram 6:



Date: 19 JUN 2014 08:35:26





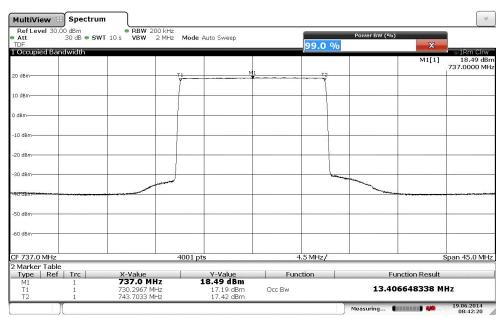
Appendix 4

Diagram 7:

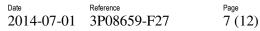
MultiView	B Spectrum					▽
Ref Level 3 Att TDF	30 dB 🖷 SWT	• RBW 100 kHz 10 s VBW 1 MHz 1	Mode Auto Sweep	99.0	Power BW	×
1 Occupied B	andwidth					⊖ 1Rm Clrw
						M1[1] 17.18 dBn 737.00000 MH;
20 dBm						737.00000 MH.
20-0611		7				
12.4.0044-001						
10 dBm						
0 dBm						
-10 dBm		· · · · · · · · · · · · · · · · · · ·		······································		
		1			e	
-20 dBm			·····		<u></u>	
-30 dBm	-					
		1				
-40 dBm			1		has	
		and a state of the			and the second second	*************
-50 dBm						
-50 ubin						
53.12		·				
-60 dBm						
CF 737.0 MH	z	4(	001 pts	3.0 MHz/		Span 30.0 MHz
2 Marker Tal						
Type R	ef   Trc	X-Value	Y-Value	Function		Function Result
M1 T1	1	737.0 MHz 732.53112 MHz	17.18 dBm 16.42 dBm	Occ Bw	8	.937765559 MHz
T2	1	741.46888 MHz	16.65 dBm	OUL DW		
	Υ.					19.06.2014
					measuring.	19.06.2014 09:11:57

Date: 19.JUN.2014 09:11:57

# Diagram 8:



Date: 19 JUN 2014 08:42:20





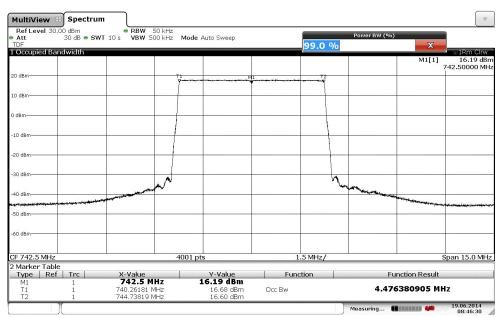
Appendix 4

Diagram 9:

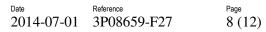
U										
MultiVi	ew 🖽	Spectrum								
Att     TDF		0 dB 🖷 SWT 1	• RBW 2 0 s VBW		ode Auto Sweep		99.0	Power BW (%	•) — X	
	ed Bandv	vidth				1.	-		M1[1]	©1Rm Clrw 18.64 dBm 737.0000 MHz
20 dBm				T1			<u>T2</u> Y			
10 dBm					· · · · · · · · · · · · · · · · · · ·		1	·······		1 
0 dBm				· · · · · · · · · · · · · · · · · · ·			1			
-10 dBm				· · · · · · · · · · · · · · · · · · ·						· · · · · · · · · · · · · · · · · · ·
-20 dBm						; /				· · · · · · · · · · · · · · · · · · ·
-30 dBm							-			
~40'08m							1	Maron contraction		
-50 dBm								·····		
-60 dBm										
CF 737.0				400	01 pts		4.5 MHz/			Span 45.0 MHz
2 Marker Type		Trc	X-Value		Y-Value	Fun	ction	F	unction Result	
M1 T1 T2		1 1 1	737.0 MI 730.2967 M 743.7033 M	Hz	18.64 dBm 17.29 dBm 17.45 dBm	Occ Bw		13.4	06648338 M	Hz
								Measuring	(	19.06.2014 09:17:05

Date: 19 JUN 2014 09:17:05

# Diagram 10:



Date: 19 JUN 2014 08:46:30





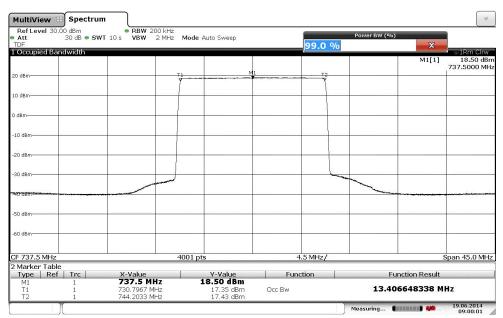
Appendix 4

Diagram 11:

MultiView	Spectrum								▽
Ref Level 3 Att TDF		• RBW 1 10 s VBW		Iode Auto Sweep		99.0		• BW (%)	
1 Occupied B	andwidth					00.0	70		IRm Clrw ○
								M1[1]	17.09 dBm 740.00000 MHz
20 dBm			71 7	M		τ2 γ			
10 dBm				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
0 dBm			-			-			
-10 dBm		:		5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		-			
-20 dBm						-			
-30 dBm		·				- - 			
-40 dBm		11-198				-	The second second		
-50 dBm						-			
-60 dBm						- - - - - - - - - - - - - - - - - - -			
CF 740.0 MH			40	01 pts		3.0 MHz/			Span 30.0 MHz
2 Marker Tal									
Type Ro M1 T1	ef   Trc  1 1	X-Value 740.0 M 735.53112	MHz	Y-Value 17.09 dBm 16.61 dBm	Occ Bw	nction		Function Result 8.930267433 M	
T2		744.46138	MHZ	16.77 dBm			Measur	ing 💵 🖬 🚧	19.06.2014 08:55:56

Date: 19 JUN 2014 08:55:55

# Diagram 12:



Date: 19 JUN 2014 09:00:01



Appendix 4

Diagram 13:

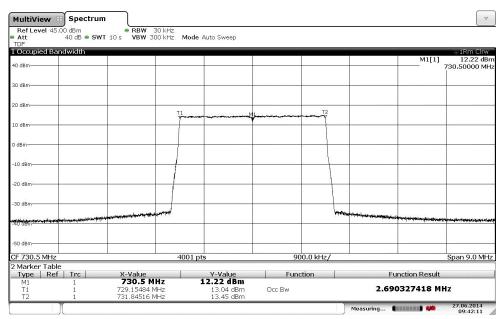
Ø MultiView 😁 Spectrum 
 Ref Level 45.00 dBm
 RBW
 20 kHz.

 Att
 40 dB
 SWT 10 s
 VBW 200 kHz.
 Mode Auto Sweep

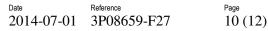
 TDF
 Occupied Bandwidth
 10
 VBW 200 kHz.
 Mode Auto Sweep
 M1[1] 12.43 dBn 729.70000 MH: 40 dBm 30 dBm 20 dBn 10 dBr dBn 10 dB 20 dBr 30 dB 50 dBm CF 729.7 MHz 2 Marker Table Type | Ref | Trc | M1 1 <u>n 6.0 M</u>Hz 4001 p 600.0 kHz Function Function Result X-Value 729.7 MHz Y-Value 12.43 dBm M1 T1 T2 729.15414 MHz 730.24586 MHz 1.091727068 MHz Occ Bw 13.81 dBm 13.45 dBm Measuring... 🚺 👬 🗰 27.06.2014 09:20:56

Date: 27. JUN. 2014 09:20:55

# Diagram 14:



Date: 27.JUN.2014 09:42:11





Appendix 4

Diagram 15:

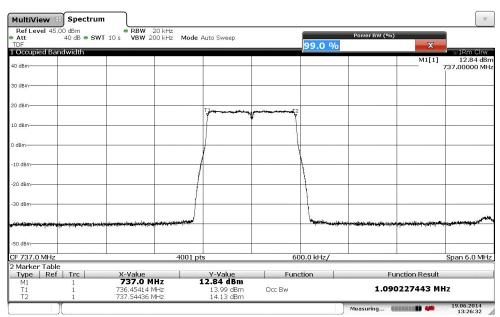
MultiView 😁 Spectrum Ø 
 Ref Level 45.00 dBm
 RBW
 20 kHz

 Att
 40 dB
 SWT
 10 s
 VBW
 200 kHz

 TDF
 40 dB
 SWT
 10 s
 VBW
 200 kHz
 Power BW (%) 99.0 % X 1 Occupied Bandwidth M1[1] 12.87 dBn 737.00000 MH: 40 dBm 30 dBn 20 dBn 10 dBn l dBn 10 dBr 20 dB 30 dBn 50 dB CF 737.0 MHz 2 Marker Table Type | Ref | Trc | 4001 pt 600.0 kHz an 6.0 MHz Function Result Function Y-Value 12.87 dBm X-Value 737.0 MHz M1 T1 T2 Occ Bw 1.090227443 MHz 736.45414 MHz 737.54436 MHz 14.24 dBm 14.25 dBm 19.06.2014 11:10:23

Date: 19 JUN 2014 11:10:23

#### Diagram 16:



Date: 19 JUN 2014 13:26:32





Appendix 4

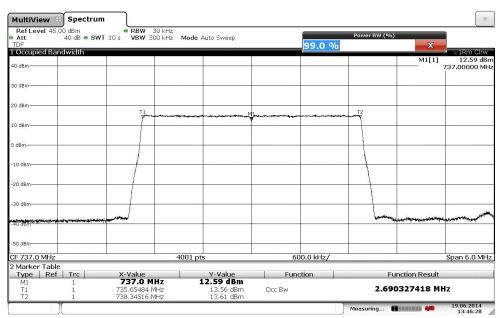
Page 11 (12)

Diagram 17:

Spectrum	1				▽
	<ul> <li>RBW 30 kHz</li> <li>10 s VBW 300 kHz</li> </ul>	Mode Auto Sweep	99.0 %	Power BW (%)	×
idwidth			00.0 /	4	● 1Rm Clrw
	· · · ·				M1[1] 12.15 dBi 737.00000 MH
	· · · · · · · · · · · · · · · · · · ·		: 		
	т1			TO	
	ý~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	MI			
antheration in the second s	اليديق ومحمد وعدم			- hills with the start of the	****************
			-		
		4001 pts	600.0 kHz/		Span 6.0 MH
			- · ·		
1 1 1	737.0 MHz 735.65484 MHz 738.34516 MHz	12.15 dBm 13.38 dBm 13.53 dBm	Occ Bw		nction Result 327418 MHz
	J0 dBm 40 dB <b>● SWT</b> ndwidth	00 dBm         • RBW 300 kHz           40 dB • SWT 10 s         • RBW 300 kHz           IdWidth         • IdWidth           • T1         • IdWidth           • IdWidth         • IdWidth	Do dbm 40 db         SWT 10 s         RBW VBW 300 kHz         Mode Auto Sweep           Idwidth         Image: SWT 10 s         Image: SWT 20 s         Image: SWT 20 s           Idwidth         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s           Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s         Image: SWT 20 s	00 dbm     • RBW     30 kHz     Mode Auto Sweep     99.0 %       40 db     • SWT 10 s     • WBW 300 kHz     Mode Auto Sweep     99.0 %       Idwidth     • • • • • • • • • • • • • • • • • • •	Oddm         SWT 10 s         RBW 30 kHz         Mode Auto Sweep         Power BW (%)           40 db = SWT 10 s         VBW 300 kHz         Mode Auto Sweep         99.0 %           Idwidth         1         1         1         1         12.15 dBm         1         1         1         12.15 dBm         0 cc Bw         2.690

Date: 19 JUN 2014 12:38:56

# Diagram 18:



Date: 19 JUN 2014 13 46:27



Page 12 (12)



Appendix 4

Diagram 19:

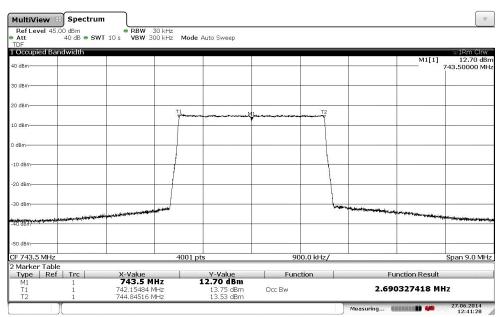
MultiView 😁 Spectrum V 
 Ref Level 45.00 dBm
 RBW 20 kHz

 Att
 40 dB • SWT 10 s
 VBW 200 kHz

 Mode Auto Sweep
 TDF
 1 Occupied Bandwidth M1[1] 12.84 dBn 744.30000 MH: 40 dBm 30 dBm 20 dBm 10 dBn ) dBm 10 dBr 20 dB 30 dBm 50 dB CF 744.3 MHz 4001 pt Span 6.0 MHz 600.0 kHz 2 Marker Table Type | Ref | Trc | Function Result Function Y-Value 12.84 dBm X-Value 744.3 MHz M1 T1 T2 Occ Bw 1.091727068 MHz 743.75414 MHz 744.84586 MHz 14.56 dBm 14.43 dBm Measuring... 🚺 🚧 27.06.2014 12:32:12

Date: 27 JUN 2014 12:32:12

#### Diagram 20:



Date: 27.JUN.2014 12:41:28



Appendix 5

# Band edge measurements according to CFR 47 2.1051 / RSS-130 4.6

Date	Temperature	Humidity
2014-06-10 to 2014-06-27	$19^{\circ}$ C to $24^{\circ}$ C $\pm 3^{\circ}$ C	$28\%$ to $60\% \pm 5\%$

# Test set-up and procedure

The measurements were made per definition in CFR 47 §27.53 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.

The measurements were made as defined in §27.53 (f). The FCC rules, specifying a RBW of at least 30k up to 100 kHz away from the band edges and a RBW of 100 kHz for measurements of emissions more than 100 kHz away from the band edges.

A resolution bandwidth of 100 kHz was used at the band edges up to 10 MHz 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 43	902 073
RF attenuator	900 691
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB



 Date
 Reference
 Page

 2014-07-01
 3P08659-F27
 2 (43)

Appendix 5

Results

Single carrier

Diagram	BW configuration	Tested frequency	Tested Port
1	5 MHz	В	RF A
2	5 MHz	В	RF B
3	10 MHz	В	RF A
4	15 MHz	В	RF A
5	15 MHz	В	RF B
6	5 MHz	Т	RF A
7	5 MHz	Т	RF B
8	10 MHz	Т	RF A
9	15 MHz	Т	RF A
10	15 MHz	Т	RF B

# Multi carrier

Diagram	BW configuration	Testedfrequency	Tested Port
11	5 and 1.4 MHz	B2_1	RF A
12	5 and 3 MHz	B2_2	RF A
13	5 and 3 MHz	B2_2	RF B
14 a+b	1.4 and 5 MHz	B2_5	RF A
15 a+b	3 and 5 MHz	B2_6	RF A
16	3 and 5 MHz	T2_2	RF A
17	3 and 5 MHz	T2_2	RF B
18 a+b	5 and 1.4 MHz	T2_5	RF A
19 a+b	5 and 3 MHz	T2_6	RF A
20	5+3+3+5 MHz	B4	RF A
21	5+3+3+5 MHz	B4	RF B

# Limits

CFR 47 § 27.53 (f) and RSS-130 4.6:

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 1:

TDF		 : Mode Auto Swee				
Frequency:	Sweep				M1[1]	©1Rm Max -23.16 dBr
40 dBm			5 12 12	-	 #0	729.00000 MH
30 dBm		·			 	
0 dBm			- 		 <u>.</u>	-
10 dBm	<u> </u>	·	- 	- - -		
I dBm				-	<u></u>	11/
10 dBm	1. 1. 100 No. 10 - 10			- - -		11/
20 dBm	H1 -13.000 dBm	-				M
30 dBm						J
40 dBm			- - 	- - -	 $\sim$	
50 dBm						
60 dBm						
719.0 MHz		4001 pts		1.1 MHz/		730.0 MH

# Diagram 2:

	Sweep			©1Rm Max M1[1] -23.75 dBr
				#0 729.00000 MH
O dBm				 
0 dBm		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	 
0 dBm				
0 dBm				 
dBm				
10 dBm	H1 -13.000 dBm			 
20 dBm	H1 -13.000 0000			M
30 dBm				
10 dBm				 $\sim$
50 dBm			· · · · · · · · · · · · · · · · · · ·	

Date: 10 JUN 2014 13:19:43



Appendix 5

Diagram 3:

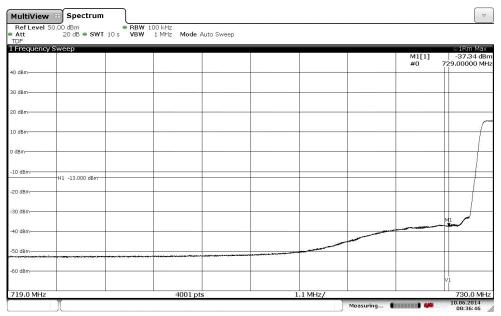
MultiView 🕀 Spectrum V 
 Ref Level 50.00 dBm
 • RBW 100 kHz.

 • Att
 20 dB • SWT 10 s
 VBW
 1 MHz
 Mode Auto Sweep

 TDF
 Trequency Sweep
 1
 1
 1
 1
 1
 1Rm Max M1[1] #0 -36.95 dBn 729.00000 MH 40 dBn 30 dBm 20 dBm 10 dBm dBm -10 dBm H1 -13.000 dBm -20 dBm -30 dBm 40 dBm -S0 dBm -60 dBm-719.0 MHz 4001 pt 1 MHz 730.0 MHz 0.06.2014 08:33:08 Measuring... 

Date: 10.JUN.2014 08:33:09

#### Diagram 4:



Date: 10 JUN 2014 08:36:47



Appendix 5

Diagram 5:

MultiView 😁 Spectrum  $\bigtriangledown$  
 Ref Level
 50.00 dBm

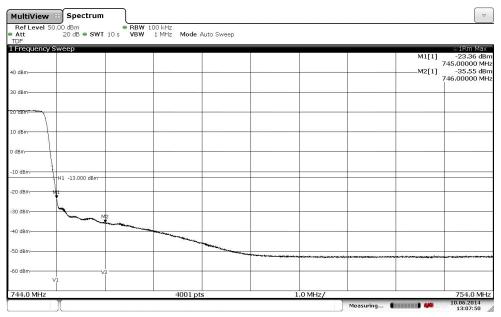
 RBW 100 kHz.

 Att
 20 dB
 SWT 10 s
 VBW 500 kHz.
 Mode Auto Sweep

 TDF
 Trequency Sweep
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1 M1[1] #0 -41.48 dBn 729.00000 MH 40 dBn 30 dBm 20 dBm 10 dBm dBn -10 dBm H1 -13.000 dBm -20 dBm -30 dBm 40 dBm -SO dBm -60 dBm 730.0 MHz 719.0 MHz 4001 pt .1 MHz/ Measuring... 0.06.2014 13:22:41

Date: 10.JUN.2014 13:22:41

#### Diagram 6:



Date: 10 JUN 2014 13:07:49



Appendix 5

Diagram 7:

MultiView 😁 Spectrum V 
 Ref Level 50.00 dBm
 • RBW 100 kHz.

 • Att
 20 dB • SWT 10 s
 VBW
 1 MHz
 Mode Auto Sweep

 TDF
 Trequency Sweep
 1
 1
 1
 1
 1
 M1[1] -24.58 dBm 745.00000 MHz M2[1] 40 dBn -39.49 dBn 746.00000 MH: 30 dBmdBI 10 dBmdBm -10 dBm H1 -13.000 dBm--20 dBm -30 dBn 40 dBm -S0 dBn 60 dBm-754.0 MHz 744.0 MHz 4001 pt .0 MHz/ 0.06.2014 13:25:19 Measuring...

Date: 10.JUN.2014 13:25:18

#### Diagram 8:



Date: 10 JUN 2014 13:11:24



Appendix 5

Diagram 9:

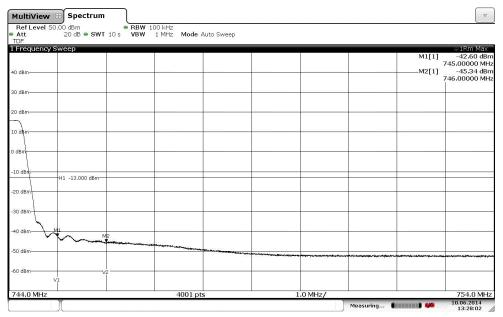
MultiView 😁 Spectrum V 
 Ref Level 50.00 dBm
 • RBW 100 kHz.

 • Att
 20 dB • SWT 10 s
 VBW
 1 MHz
 Mode Auto Sweep

 TDF
 Trequency Sweep
 1
 1
 1
 1
 1
 M1[1] -33.84 dBm 745.00000 MHz -M2[1] 40 dBn -35.48 dBn 746.00000 MH: 30 dBn 20 dBm 10 de ) dBn -10 dBr H1 -13.000 dBm--20 dBn -30 dBn 40 dBm -50 dBm 60 dBm 744.0 MHz 4001 pt .0 MHz, 754.0 MHz 0.06.2014 13:02:18 Measuring... -----

Date: 10.JUN.2014 13:02:18

## Diagram 10:



Date: 10 JUN 2014 13:28:02





Appendix 5

Diagram 11:

Frequency	Sweep				M1[1]	⊖1Rm Max -27.24 dBr
10 dBm		, , ,		-	#0	729.00000 MH
UUDIII			n			
0 dBm			······		 	<u> </u>
				-		
) dBm				-		
0 dBm			1 1	-	 	
				-		
dBm			·····			
10 dBm				-		
to upin	H1 -13.000 dBm		<u>.</u>	<u>.</u>		
20 dBm			2.		 	
				н 3 1		Ma
30 dBm		- - -		т. 1	1	4
40 dBm		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	·····		 - And	
				* 1		
50 dBm						
50 dBm				-		
						V1
719.0 MHz		4001 pts	1	1.1 MHz/		730.0 MH

## Diagram 12:

Frequency	Sweep					M1[1]	⊖1Rm Max -27.28 dBn
		4 1				#0	729.00000 MH
40 dBm							
30 dBm			1 1 1 1				
20 dBm				-			
10 dBm			·				[
) dBm							
10 dBm	H1 -13.000 dBm						1
20 dBm							
30 dBm			7 	* * *			J.
40 dBm							
50 dBm				and the second	And the second		
-60 dBm							

Date: 11 JUN 2014 09:39:42



Appendix 5

Diagram 13:

MultiView 🕀 Spectrum V 
 Ref Level
 50.00 dBm
 RBW
 100 kHz.

 Att
 20 dB
 SWT
 10 s
 VBW
 500 kHz.
 Mode Auto Sweep

 TDF
 Trequency Sweep
 10 s
 VBW
 500 kHz.
 Mode Auto Sweep
 IRm Max M1[1] #0 -26.10 dBn 729.00000 MH 40 dBn 30 dBm 20 dBm 10 dBm l dBn -10 dBm H1 -13.000 dBm -20 dBm -30 dBm 40 dBm -S0 dBm -60 dBm 719.0 MHz 4001 pt 1 MHz 730.0 MHz 1.06.2014 10:42:42 Measuring...

Date: 11.JUN.2014 10:42:42

## Diagram 14a:



Date: 26 JUN 2014 14:59:19



Page 10 (43)



Appendix 5

Diagram 14b:

1 Frequency	Sweep					M1[1]	⊖1Rm Max -32,41 dBr
						#0	728.89860 MH
IO dBm							
and the second second second							
0 dBm							
0 dBm				-			
o ubiii							
.0 dBm							
							1
I dBm		-					
				-			
10 dBm	in the test of the second second second second	2					
	H1 -13.000 dBm						
20 dBm			2. 2.				-
30 dBm							1
40 dBm						and the second second	
						Agreen and a state of the	
50 dBm			1		Lines with the state of the state		
****	<b>~~</b>		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		and a state of the		
60 dBm				-			
718.0 MHz		4001		1.09 MHz/			728.9 MH;

## Diagram 15a:

Frequency	Sweep				00110110110011001100110011001100110011001	○1Rm Max
					M1[1]	-28.56 dBn
					#0 729	9.0000000 MH
i0 dBm						
				-		
0 dBm		· · · · · · · · · · · · · · · · · · ·	<u>{</u>	·······	 	
0 dBm			[	-	 	
0 dBm		·			 	
o doni						
dBm				-		
UBIII						
10 dBm	H1 -13.000 dBm					
	111 913,000,001					
20 dBm			2			
			M1			
80 dBm				- TA	 	
0.08				-	 	
50 dBm		2		1		
o abin						
		·		-		I
0 dBm						
			V1	-		
728.9 MHz		400	1 pts	20.0 kHz/		729.1 MH

Date: 26.JUN.2014 16:16:07



Page 11 (43)



Appendix 5

Diagram 15b:

l Frequency	Sweep							M1[1]	©1Rm Max -32.86 dBr
O dBm					а 11 12			#0	728.89860 MH
0 dBm					1 2 3 4 4 2		· ·		
0 dBm									
LO dBm			· ·		- - -	-			
dBm									
10 dBm	H1 -13.000 dBm	-	-						
20 dBm						а 27 2			
30 dBm						2 			
40 dBm									
50 dBm	**	ورين و غرف والزمر و و و مع مع ماليه							
50 dBm						2 2 2 3	· · · · · · · · · · · · · · · · · · ·		
718.0 MHz			4001 p	ts		1.09 MHz/			728.9 MH

# Diagram 16:

Bm     746.0000 MH       Bm     Image: Second seco	Frequency Sweep				⊜1Rm Max
Bm     M2[1]     -36.14 dBr       Bm     746.0000 MH       Bm     1					
Bm     746.0000 Mi       Bm     1        Bm     1	6 100a				
Bm     Image: Constraint of the second	dBm				
Bm     Image: Constraint of the second					746.00000 Mir
Bm     Image: Constraint of the second	dBm				
Bm     Image: Constraint of the second					
Bm     Image: Constraint of the second	10				
	dBm				
	1				
dBm     H1 -13.000 dBm     Image: Constraint of the second	dBm		[		
dBm     H1 -13.000 dBm     Image: Constraint of the second	}				
dBm     H1 -13.000 dBm     Image: Constraint of the second	dBm				
H1 -13.000 dBm	V I				
H1 -13.000 dBm					
	0 dBm				2
	H1 -13,000 0BII				
	0 dBm		2		
	M1				
d8m2	) dBm	Concerning and a second s			
d8m2		and the second sec			
d8m2	0 dBm		Wangers and statements		
	10				
vi la	0 dBm V2			· · · · · · · · ·	
	V1		· · · · · · · · · · · · · · · · · · ·		-

Date: 12.JUN.2014 08:04:01



Appendix 5

# Diagram 17:

Frequency Sweep	101100110011001100110011001100110011001100110011001100110011001				⊙1Rm Max
0 dBm			-		M1[1] -26.93 dBm 745.00000 MH 
0 dBm					
0 dBm			-		
0 dBm	- - 				
dBm			-		
10 dBm			- - - -		
0 dBm					
0 dBm					
			- 		
0 dBm					
0 dBm					
50 dBm V2		·····		·	

Date: 12 JUN 2014 07 38:42



Page 13 (43)



Appendix 5

Diagram 18a:

TDF		10.0	300 kHz Mode	Adio Sweep				
Frequency	Sweep						M1[1]	⊖1Rm Mar -27.21 dB
							 74	15.0000000 MI
0 dBm				5	· · · · · · · · · · · · · · · · · · ·			-
								1
0 dBm			· · · · · · · · · · · · · · · · · · ·	<u> </u>	J	<	 	
					- 2	-		
) dBm				2	7	-	 	2
								1
) dBm				k		· · · · · · · · · · · · · · · · · · ·	 	
						-		5
dBm						-	 	- <u></u>
						-		÷
.0 dBm	H1 -13.000 dBm							3
			and the second division of the second divisio					
20 dBm				No. of Concession, Name	41			-
20200				Constant and the second second	Froman			
0 dBm								
0 dBm			-			1		fager of an and the second party of
								1
i0 dBm								
								1
0 dBm	-			1 			 	
				. v	1			-
44.9 MHz			4001 pt	°C .		20.0 kHz/		745.1 M

# Diagram 18b:

I Frequency	Sweep	011011011001100110011001100110		00110011001100110011001100110011					○1Rm Max
								M1[1]	-29.23 dBr
0 dBm								#0	745.10140 MF
U dBm-					-				
0 dBm			·		2 2	:			
0 dBm				2 	· · · · · · · · · · · · · · · · · · ·	- - -			
0 dBm		-	5		- - - -	-			
dBm					-				
10 dBm	H1 -13.000 dBm								
20 dBm	H1 -13,000 0Bm			- 		5			
30 dBm						* 1			
and a second sec					2		1		
10 dBm		and the state of t							
50 dBm				and the set of the set		4 2			
				and a second sec	****	*****			*****
i0 dBm					: 2		a i		
-60 dBm			- 	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		- 			
45.1 MHz			4001 pt	s	1	.09 MHz/			756.0 M

Date: 27.JUN.2014 07:03:51



Page 14 (43)



Appendix 5

Diagram 19a:

TDF Frequency S	WOOD								⊖1Rm Max
Trequency 5	меер							M1[1]	-28.37 dB 5.0000000 MI
i0 dBm								24	5.000000 M
0 dBm					- - - 				
0 dBm						-	- - -		
0 dBm									-
dBm			-	-					
10 dBm	H1 -13.000 dBm				- 	-			
20 dBm			-	-	2	2			
30 dBm					M1				
								dadda.hawnaraa	
40 dBm		-							
i0 dBm									
50 dBm					V1	-			
744.9 MHz			4001 g			20.0 kHz/			745.1 MF

# Diagram 19b:

Frequency S								⊖1Rm Max
							M1[1]	-30.99 dB
		ĺ					#0	745.10140 MH
) dBm								
) dBm			·		- 	-		
		ĺ		-	-			
) dBm						- : -		
) dBm							 	
dBm								
0 dBm	H1 -13.000 dBm							
0 dBm	112 -13,000 000			- 	2.	<i>.</i>		
0 dBm								
		l .						
0 dBm		an and a second s				· · · · · ·	 	-
0 dBm			the second s					
		l .					 ******	

Date: 27.JUN.2014 07:09:14



Page 15 (43)



Appendix 5

Diagram 20:

l Frequency	Sweep				M1[1]	⊖1Rm Max -29.96 dBr
10 dBm					#0 7	729.00000 MH
UUBIII			-			
0 dBm		· · · · · · · · · · · · · · · · · · ·			 	
			-			
0 dBm					 	
		·		-		
0 dBm						
dBm		· · · · · · · · · · · · · · · · · · ·				
			е. 11. 12.			
10 dBm	H1 -13.000 dBm			5 2 2		
	H1 -13.000 0Bm		-			1
20 dBm			1			1
30 dBm				1 1		M∯.
					1	4
40 dBm			······			
50 dBm						
50 dBm						
					3	V1
719.0 MHz		4001 pts		1.1 MHz/		730.0 MH

# Diagram 21:

Frequency	Sweep			M1[1]	01Rm Max -30.22 dBr
					29.00000 MH
D dBm			· · · · · · · · · · · · · · · · · · ·		
0 dBm				 	1 2 
0 dBm		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	 	
D dBm				 	
dBm					
LO dBm					
20 dBm	H1 -13.000 dBm				1
o dom					
30 dBm					
10 dBm				 $\sim$	
i0 dBm				 	-
	<ul> <li>Date and a provident second s Second second sec second second sec</li></ul>	<ul> <li>Contraction and the second seco</li></ul>			

Date: 12 JUN 2014 09:54:00



Appendix 5

# Conducted spurious emission measurements according to CFR 47 §27.53 and RSS-130 4.6

Date	Temperature	Humidity
2014-06-11 to 2014-06-27	$19^{\circ}$ C to $23^{\circ}$ C $\pm 3^{\circ}$ C	$28\%$ to $60\% \pm 5\%$

## Test set-up and procedure

The measurements were made per definition in §27.53. 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 43	902 073
RF attenuator	900 691
RF filter	901501
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB



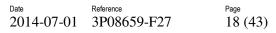


Appendix 5

# Results

# Single carrier

Diagram	BW configuration [MHz]	Tested frequency	Tested Port
1 a+b	5 MHz	В	RF A
2 a+b	15 MHz	В	RF A
3 a+b	5 MHz	Μ	RF A
4 a+b	5 MHz	Μ	RF B
5 a+b	10 MHz	Μ	RF A
6 a+b	15 MHz	Μ	RF A
7 a+b	5 MHz	Т	RF A
8 a+b	15 MHz	Т	RF A





Appendix 5

Multi carrier			
Diagram	BW configuration	Tested frequency	Tested Port
9 a+b	5+1.4 MHz	B2_1	RF A
10 a+b	5+1.4 MHz	B2_1	RF B
11 a+b	5+3 MHz	B2_2	RF A
12 a+b	5+3 MHz	B2_2	RF B
13 a+b	1.4+5 MHz	B2_5	RF A
14 a+b	3+5 MHz	B2_6	RF A
15 a+b	1.4+5 MHz	M2_1	RF A
16 a+b	1.4+5 MHz	M2_1	RF B
17 a+b	3+5 MHz	M2_2	RF A
18 a+b	3+5 MHz	M2_2	RF B
19 a+b	3+5 MHz	T2_2	RF A
20 a+b	3+5 MHz	T2_2	RF B
21 a+b	5+1.4 MHz	T2_5	RF A
22 a+b	5+3 MHz	T2_6	RF A
23 a+b	5+3+3+5 MHz	B4	RF A
24 a+b	5+3+3+5 MHz	B4	RF B

Note: Measurements were limited to port RF A due to the measurement result in LTE single carrier MIMO mode that shows that the ports are electrical identical as declared by the client.



Appendix 5

Page

19 (43)

# 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 745 MHz. The measurements were made up to 8 GHz (10x745 MHz = 7.45 GHz).

## Limits

CFR 47 § 27.53 (f) and RSS-130 4.6:

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.

Complies?	Yes
e empnes.	100





Appendix 5

Diagram 1a:

r r r oquaray a	Sweep			M2[1] -41.36 dBm 990.7970 MH
iD dBm		 		
0 dBm		 · · · · · · · · · · · · · · · · · · ·	 M1	731.3000 MR
0 dBm			 	
0 dBm		 · · · · · · · · · · · · · · · · · · ·	 	
dBm		 		
10 d8m	H1 -13.000,00m	 · · · · · · · · · · · · · · · · · · ·		
20 dBm				
30 d8m		 	 	1
40 dBm		 · · ·		M2
50 dBm				
∽ 50 dišm		 · · · · ·		

# Diagram 1b:

	y Sweep					⊖1Rm Max
					M1[1]	-38.19 dB 7.948270 GF
dBm						
l0 dBm	H1 -13.000 dBm				 	
0 dBm			: 		 	
0 dBm						
0 dBm				 	 	
<u>O dBoomerto a</u>		<u> </u>			 	
0 dBm			- 	 	 	
) dBm						
D dBm			- - 	i La companya da	 ۲ چینینی میں میں میں میں میں میں میں میں میں می	
) dBm						
		1				

Date: 11.JUN.2014 13:56:07



Page 21 (43)



Appendix 5

Diagram 2a:

TDF	Cuises						O I Des Marci
1 Frequency	Sweep			-		M1[1] M2[1]	736.5000 MH -41.32 dBr
			а 				996.7350 MH
30 dBm		· · · · · · · · · · · · · · · · · · ·		<u> </u>	M1		
20 dBm							
10 dBm			·····				
) dBm				-			-
-10 dBm	H1 -13.000 dBm			- - -			
20 dBm	H1 -13.000 ubii						
-30 dBm							
40 dBm			1 2 3 4 4	-			
40 UBIII							
60 dBm							
-60 dBm							-
9.0 kHz		32001 pts		100.0 MHz/			1.0 GH

# Diagram 2b:

rrequeries	/ Sweep					⊖1Rm Max
					M1[1]	-38.24 dB 7.976920 GH
dBm			· · · · · · · · · · · · · · · · · · ·		 	
) dBm	00 x025555 x20				2	
) dBm	H1 -13.000 dBm				 	
5 GDM						
) dBm			1			
D dBm				 i Generation de la companya de la comp	 	<del>مەر</del> ىيە م <sub>ا</sub> رىن ا <sup>مەر</sup> ىيى
1.dBaserer		~~ <u>~</u>				
) dBm	······································				 	
0 dBm				1		
) dBm					 	
0 dBm						
00 dBm				 	 	

Date: 11 JUN 2014 14:06:15



Page 22 (43)



Appendix 5

Diagram 3a:

l Frequency	/ Sweep					M1[1]	737.9950 MH:
10 dBm					M1	M2[1]	-42.15 dBn 960.3300 MH
IO dBm	·····			- 		-	
20 dBm							
10 dBm				- - -			
) dBm				- - - -			
10 dBm	H1 -13.000 dBm			- - - -			
-20 dBm			· · · · · · · · · · · · · · · · · · ·				
30 dBm							
40 dBm							M2
50 dBm							
-60 dBm							
9.0 kHz		32001 pts	-	100.0 MHz/			1.0 GH;

# Diagram 3b:

riequene	/ Sweep							⊜1Rm Max
							M1[1]	-38.30 dBr 7.983270 GH
dBm			·····			(		
0 dBm	H1 -13.000 dBm				· · · · · · · · · · · · · · · · · · ·		2	
0 dBm								
0 dBm								
0 dBm					: : : : :			
50. d8m		~~ <u>~</u>						
i0 dBm					- - -			
'0 dBm		1	-					
30 dBm	·····		· · · · · · · · · · · · · · · · · · ·		5			
0 dBm								
.00 dBm				-				

Date: 11.JUN.2014 14:12:41



Page 23 (43)



Appendix 5

Diagram 4a:

1 Frequency	Sweep			⊙1Rm Max
100 LUL			-	M1[1] 30.63 dBm 737.0000 MHz ——M2[1] -41.50 dBm
40 dBm			M1	996.0780 MHz
30 dBm		 		
20 dBm				
10 dBm	, , ,	 г		
) dBm				
-10 dBm	H1 -13.000 dBm			
-20 dBm				
-30 dBm				
40 dBm			$+$ $\wedge$ $ \downarrow$	M
50 dBm				
~ 60 dBm				

# Diagram 4b:

				M	1[1] -38.15 dBi
					7.987200 GH
	· · · · · · · · · · · · · · · · · · ·				
-13.000 dBm					
		-			
	 <u>,</u>		<u></u>		<u></u>
		- - 			
	 · · · · · · · · · · · · · · · · · · ·		······		

Date: 11.JUN.2014 14:58:42



Page 24 (43)



Appendix 5

Diagram 5a:

l Frequency	Sweep							⊖1Rm Max
40 dBm							M2[1] M1[1]	990.0470 MH 27.44 dBr
								737.0000 MH
30 dBm		 				Ā.		
20 dBm								
10 dBm			1. 1. 1.		- - -			
) dBm								
10 dBm	H1 -13.000 dBm				-			
20 dBm		 		2.				
30 dBm					* 7 			
40 dBm					- - -			м
50 dBm		 						
$\Box$								
60 dBm			1 1 1	2				
9.0 kHz		32001 p	te	11	00.0 MHz/			1.0 GH:

## Diagram 5b:

l Frequenc	y Sweep					⊖1Rm Max
					M1[1]	-38.46 dBr 7.954170 GH
dBm		 			 	
l0 dBm	H1 -13.000 dBm				2	
0 dBm	H1 -13.000 0Bm	 				
0 dBm				-		
						1
0 dBm				·	 	
0.d8m						
50 dBm		 ····			 	
0 d8m						
0 dBm		 			4 	
0 dBm		2 1	- 1 1			
100 dBm		 			 	

Date: 11.JUN.2014 14:22:25



Page 25 (43)



Appendix 5

Diagram 6a:

TDF I Frequency	Sweep				⊝1Rm M
					M2[1] -41.41 d
					999.6090
40 dBm					M1[1] 25.91 d
					737.0000
30 dBm		1 			
			-	M1	
20 dBm					
CO UBIII					
10 dBm					
) dBm					
10 dBm			1 1 1 1 1		
	H1 -13.000 dBm				
20 dBm			2		
30 dBm					
So upin					
40 dBm					
<b></b>				a contra	
ξ0 dBm				-	
<u> </u>					
60 dBm			2		
		22221	100.0111.1		
9.0 kHz		32001 pts	100.0 MHz/	Measuring	1.0 0

# Diagram 6b:

Frequency	/ Sweep						©1Rm Max
						M1[1]	-38.32 dB 7.955270 GH
dBm		 			(		
0 dBm	H1 -13.000 dBm						
0 dBm	HI -13,000 0BII						
30 dBm							
0 dBm		 					
0.d9m			-				
i0 dBm		 		г			
'0 dBm						-	
0 dBm		· · · · · · · · · · · · · · · · · · ·		-		-	
				, , , , , , , , , , , , , , , , , , ,		- 	
0 dBm							
100 dBm		 		5je			

Date: 11.JUN.2014 14:27:51





Appendix 5

Diagram 7a:

1 Frequency Swe	ep					●1Rm Max M1[1] 30.66 dBi 742.5000 MH M2[1] -41.55 dBi
				-	M1	997.3590 MH
IO dBm						
0 dBm						
0 dBm		·	1 1 1 1 1 1			
dBm						
10 dBm	-13.000 dBm					
20 dBm						
30 dBm						
10 dBm						
50 dBm				- -		
				-		

# Diagram 7b:

Sweep						©1Rm Max
					M1[1]	-38.20 dBi 7.965110 GH
		· · · · · · · · · · · · · · · · · · ·				
H1 -13.000 dBm					 	
				-	 	
			1 3 4 5		-	
	<u> </u>					
······································		····				
	-					

Date: 11.JUN.2014 14:41:13



Page 27 (43)



Appendix 5

Diagram 8a:

Frequency	/ Sweep							M2[1]	⊖1Rm Max -41.48 dBr
i0 dBm					- - -			M1[1]	996.1720 MH 25.86 dB 737.5000 MH
0 dBm					- - -	M1			
0 dBm					- - -				
0 dBm				1 1 2 1					
dBm				-	- - - -				-
LO dBm	H1 -13.000 dBm				- - -				
0 dBm					-				
0 dBm									-
0 dBm							L		
0 dBm		 			- - -				
50 dBm				· · · · · · · · · · · · · · · · · · ·					
9.0 kHz		32001 p	) ts		100.0 MHz/				1.0 GF

# Diagram 8b:

l Frequency	/ Sweep						©1Rm Max
						M1[1]	-38.26 dBi 7.988730 GH
dBm							
0 dBm	H1 -13.000 dBm				-		
0 dBm			211111	:			
0 dBm				-			
0 dBm							
IU UBIII		 					
0.d80							
i0 dBm		 	1 	Commence and Second			
0 dBm							
30 dBm							
0 dBm							
o.ubiii							
100 dBm		 		5, ·····			

Date: 11.JUN.2014 14:45:54





Appendix 5

Diagram 9a:

MultiView 8	Spectrum	1							
Ref Level 50, Att TDF		• RBW 1 30 s VBW 10	MHz MHz Mode	e Auto Sweep					
I Frequency Sv	veep								⊜1Rm Max
								M1[1]	27.56 dBn
40 dBm				2					731.5000 MH 32.86 dBr
				· · · · · · · · · · · · · · · · · · ·			M2	M2[1]	734.7000 MH
30 dBm					·····		M		+
							ſ	1	
20 dBm									
10 dBm									
D dBm					·····				
10 dBm				· · · · · · · · · · · · · · · · · · ·					
	H1 -13.000 dBm								
-20 dBm				6				constitution of the second	
-30 dBm						1			
-30 dBm						1			
-40 dBm					-	1			M3
destruer ord.		102102-007	<u></u>		وروبا ومصحور ورابتهم				
50 dBm		and and a start of the second	-(	-					
$\smile$						1			
-60 dBm				· · · · · · · · · · · · · · · · · · ·					
				i i i i i i i i i i i i i i i i i i i					
9.0 kHz			32001	pts	100.0	MHZ/			1.0 GHz
2 Marker Table Type   Ref		X-Value		Y-Value	Function	<b>`</b>		Function Result	
M1	1	731.5 MH		27.56 dBm	1 4.1600			. ansaon resdit	
M2	1	734.7 MH	Z	32.86 dBm					
MЗ	1	982.923 MH	L	-41.47 dBm					11.06.2014

Date: 11 JUN 2014 12 36 57

# Diagram 9b:

DF Frequency	w Sween		Mode Auto Sweep					⊖1Rm Max
				- - - -			M1[1]	
dBm			-	2				
) dBm	H1 -13.000 dBm	· · · · · · · · · · · · · · · · · · ·		2 				
I dBm				3 2017-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-				
I dBm								
dBm								
L dB married		<u> </u>						
I dBm								
) dBm					-			
I dBm								
dBm				-	· · · ·			
10 dBm					- -			
.00 dBm				- - -				
.0 GHz		32001	pts	70	0.0 MHz/	1		8.0 GI

Date: 11 JUN 2014 13:12:38





Appendix 5

Diagram 10a:

MultiView	B Spectrum								
Ref Level 50 Att TDF		• RBW 1 30 s VBW 10		Auto Sweep					
1 Frequency S	Sweep								©1Rm Max
								M1[1]	27.57 dBn
40 dBm				-		-		M2[1]	731.5000 MH: 32.85 dBm
							M2 M	(VZ[1]	734.7000 MH
30 dBm		·		č		<u>Ś </u>	MI	à	
5-20-02-00-00						-	1 11	1	
20 dBm						· · · · · · · · · · · · · · · · · · ·			
10 dBm									
				-					
0 dBm						e	· · · · · · · · · · · · · · · · · · ·	- /	
						-			
-10 dBm	H1 -13.000 dBm								
	H1 -13.000 00m								
-20 dBm									
-30 dBm				1				1	
00 0011							1 14		
-40 dBm						-	$\square$	: 	4
					and the second second	and a second s			125
50 dBm								-	
$\sim$								1	
-60 dBm									
<u>a a lui</u>			00001						1.0.011
9.0 kHz 2 Marker Tabl			32001	pts	1	00.0 MHz/			1.0 GHz
Z Marker Tabl Type   Re		X-Value		Y-Value	Eun	ction	F	unction Result	
M1	1	731.5 MHz		27.57 dBm	ran			anedon result	
M2	1	734.7 MHz		32.85 dBm					
M3	1	999.016 MHz		-41.41 dBm					
	1						Measuring		11.06.2014 12:29:33

Date: 11.JUN.2014 12:29:33

# Diagram 10b:

Frequency	y Sweep							⊖1Rm Ma>
dBm				- - -			M1[1]	-38.21 dB 7.983050 GI
dBm				-				
l0 dBm	H1 -13.000 dBm							
0 dBm					:			
0 dBm								
D dBm								
U UBIII		<u> </u>	$\sim$					
0.4970								
D dBm								
) dBm								
D dBm						ئىسىسىسىسىسى		
) dBm								
U UBIII								
00 dBm				- -	š			

Date: 11.JUN.2014 13:33:24



Appendix 5

# Diagram 11a:

Frequency S	weep								©1Rm Max
) dBm				- 	e			M3[1]	-41.45 dBr 979.8600 MH
J dBm				-	-		M2	M1[1]	27.48 dBr 731.5000 MH
) dBm				· · · · · · · · · · · · · · · · · · ·			My P		
) dBm		1	-		1	- 			
) dBm			1						
dBm				1					
0 dBm	H1 -13.000 dBm-					-			
D dBm	H1 -13.000 ubii		1		- 				
0 dBm						4. 1			
D dBm					i na set costa				M3
D dBm		and the second second			1047 - 1047 B	55 A 5			
0 dBm				·		-			
o upin					fannen	100.0 MHz/			1.0 GH
.0 kHz			3200	1 pts		100.0 MHZ/			1.0 GF

Date: 11.JUN.2014 12:49:20

# Diagram 11b:

rrequency	Sweep				⊜1Rm Ma
					M1[1] -38.66 dE 7.974520 G
dBm				-	
0 dBm	H1 -13.000 dBm				 · · · · · · · · · · · · · · · · · · ·
I dBm				·	 
) dBm					 2
) dBm					 
dam		<u> </u>			
I dBm			· · · · · · · · · · · · · · · · · · ·	·····	 
dBm					 
dBm			1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2 2 2 2 2	 
dBm					
0 dBm				 6,	 

Date: 11.JUN.2014 13:17:06



Appendix 5

Diagram 12a:

MultiView 🕀 Spectrum Q 
 Ref Level
 50.00 dBm
 • RBW
 1 MHz

 • Att
 20 dB
 • SWT 30 s
 VBW 10 MHz
 Mode Auto Sweep

 TDF
 Trequency Sweep
 • Sweep
 • Sweep
 • Sweep
 n Max M1[1] 27.63 dBm 731.5000 MHz 40 dBr M2[1] 29.99 dBn 735.5000 MH: Ma 30 dBn 20 dBm 10 dBm ) dBn -10 dBm H1 -13.000 dBm--20 dBn -30 dBn 40 dBr 50 dBm -60 dBm- 
 9.0 kHz

 2 Marker Table

 Type
 Ref

 M1
 1

 M2
 1

 M3
 1
 32001 pts 100.0 MHz/ 1.0 GHz X-Value 731.5 MHz 735.5 MHz 994.922 MHz Y-Value 27.63 dBm 29.99 dBm -41.45 dBm Function Result Function 11.06.2014 12:17:57 Measuring...

Date: 11.JUN.2014 12:17:57

## Diagram 12b:

	Sweep			⊜1Rm Max
				M1[1] -38.26 dB 7.974520 GF
dBm		· · · · · · · · · · · · · · · · · · ·		-
0 dBm	H1 -13.000 dBm			
0 dBm		 · · · · · · · · · · · · · · · · · · ·		)
0 dBm				
) dBm	_			
1dBasert				
) dBm		 · · · · · · · · · · · · · · · · · · ·	- - 	
) dBm				
) dBm		 ·····	<u></u>	ununund
) dBm				
10 dBm		· · · · · · · · · · · · · · · · · · ·		

Date: 11.JUN.2014 13:36:58



Page 32 (43)



Appendix 5

Diagram 13a:

MultiView 8	Spectrum	- <u> </u>							▼
Ref Level 50.0 Att TDF	0 dBm 20 dB • SW1	• RBW 1 30 s VBW 1		le Auto Sweep					
1 Frequency Sw	veep							M1[1]	01Rm Max 32.30 dBm 729.7000 MH
40 dBm			1	1	-		M1	M2[1]	27.59 dBm 732.9000 MHz
30 dBm									
20 dBm									
10 dBm				···· [······		-			
0 dBm									
-10 dBm	11 -13.000 dBm-		-	2. 2.					
-20 dBm			s		- 	12		<u></u>	
-30 dBm			-		1	-			
-40 dBm									M
50 dBm									
-60 dBm						-	-		
9.0 kHz			3200	1 pts	1	00.0 MHz/	: 		1.0 GHz
2 Marker Table Type   Ref	Trc	X-Value	1	Y-Value	Fu	nction	F	unction Result	
M1 M2 M3	1	729.7 MH 732.9 MH 995.922 MH	IZ	32.30 dBm 27.59 dBm -41.40 dBm					
	(						Measuring	eresee 🖬 🦇 👘	26.06.2014 15:44:16

Date: 26.JUN.2014 15:44:16

## Diagram 13b:

Frequency	y Sweep				⊙1Rm Ma
		·	-	м	1[1] -38.22 dE 7.963140 G
dBm			 		
D dBm	H1 -13.000 dBm	-		 	
) dBm			 	 	
) dBm				 	
			1		
) dBm			 	 	
1.d8m,				 	
) dBm			 • • •		
I dBm			-	 	
I dBm			: : :	 	
) dBm					
00 dBm			 	 	

Date: 12.JUN.2014 15:25:48



Page 33 (43)



Appendix 5

Diagram 14a:

MultiView	Spectrum						▽
Ref Level 50. Att		RBW 1 MHz 30 s VBW 10 MHz	Model Analysis				
TDF	20 UD 🖶 3 W I	30 S VDW 10 MIL2	Mode Auto Sweep				
I Frequency S	weep						©1Rm Max
						M1[1]	29.48 dBn
40 dBm							730.5000 MH
					a survey	M2[1]	27.57 dBn 734.5000 MH
0 dBm				·····	ML		734.3000 MH
					1 17		
0 dBm			A.				
0 dBm							
			1				
I dBm				·····		-1	
				-		i i	
10 dBm	H1 -13.000 dBm			·····	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		
	H1 -13.000 00m						
20 dBm		·					
ana ayon ar							
30 dBm							
							Ň
40 dBm		0 and					
50 dBm							
50 dBm							
50 dBm							
00 0011							
					······		
9.0 kHz			32001 pts	100.0 MHz/			1.0 GHz
Marker Table			1		-		
Type   Ref	Trc	X-Value 730.5 MHz	Y-Value	Function	F	unction Result	
M1 M2	1	734.5 MHz	29.48 dBm 27.57 dBm				
M3	1 9	96.766 MHz	-41.35 dBm				
	Υ				]		26,06,2014
	Л				Measuring		16:24:25

Date: 26.JUN.2014 16:24:26

## Diagram 14b:

Frequency					⊝1Rm Ma
					M1[1] -38.32 dE 7.968390 G
dBm					
0 dBm	H1 -13.000 dBm	 			 
0 dBm					 
D dBm		 			
) dBm		 	and the second second	and the second s	
<u>1.d0m</u>		 			
) dBm		 			
) dBm					 
D dBm		 			 
dBm					

Date: 26.JUN.2014 16:26:32





Appendix 5

Page 34 (43)

Diagram 15a:

MultiView	🗟 Spectrum	1					$\bigtriangledown$
Ref Level 50. Att			z z <b>Mode</b> Auto Sweep				
TDF			· · · · · · · · · · ·				
1 Frequency S	weep					M1[1]	⊖1Rm Max 32.66 dBr
						MILII	734.5000 MH
40 dBm					M1	M2[1]	27.60 dBn
			······································		M1 M2		737.7000 MH
30 dBm					a contraction of the second seco		-
20 dBm	1						
							i l
10 dBm							
				-			
0 dBm							
-10 dBm			: 	-			
-10 0000	H1 -13.000 dBm	-				-	2
-20 dBm						4	
							1
-30 dBm	-	· · · · · · · · · · · · · · · · · · ·					
							N
-40 dBm				and second and an arrival			
50 dBm						1	
-60 dBm			i	-			
						1	
9.0 kHz			32001 pts	100.0 MHz	/	2	1.0 GHz
2 Marker Table							
Type Ref	Trc	X-Value	Y-Value	Function	Fi	unction Result	
M1 M2	1	734.5 MHz 737.7 MHz	32.66 dBm 27.60 dBm				
M2 M3	1	996.36 MHz	-41.50 dBm				
	1				Measuring		17.06.2014

Date: 17.JUN.2014 09:28:12

## Diagram 15b:

Frequency	/ Sweep				 	⊜1Rm Ma
dBm					 M1[1]	-38.28 dE 7.976700 G
asm			-			
0 dBm	H1 -13.000 dBm					
) dBm			1 [1] (1] (1] (1] (1] (1] (1] (1] (1] (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	1	 	
) dBm		-	1			
) dBm						
J UBIII		 				
1.dBps			(			
) dBm		 			 -	
) dBm						
) dBm					 -	
) dBm			- 1 1			
00 dBm		 		S	 	

Date: 17 JUN 2014 09:32:56



Page 35 (43)



Appendix 5

Diagram 16a:

MultiView	B Spectrun	ī							▼
Ref Level 50 Att TDF		• RBW 1 30 s VBW 1		ode Auto Sweep					
1 Frequency S	Sweep							M1[1]	⊖1Rm Max 32.57 dBr
40 dBm						-		-	734.5000 MH
TO ODITE.					1		M1	M2[1]	27.50 dBn 737.7000 MH
30 dBm			******		<u>.</u>	. 6	N12		1
20 dBm						-			
LO UBIII						а. П			
LO dBm					1				
) dBm				-	1	-			
, abiii						-			
-10 dBm	H1 -13.000 dBm-		-			-			
-20 dBm	111 101000 0011		4						
Loubh				-		-			-
30 dBm		-		1	1				
40 dBm					1	2 6 7			M3
	-	1 49444				in the second			
50 dBm			and a search			-			
-60 dBm							1		
00 0011						-			
9.0 kHz			320	001 pts	2	100.0 MHz/			1.0 GHz
2 Marker Tab									
Type Re M1	f   Trc	X-Value 734.5 MH	7	Y-Value 32.57 dBm	Fu	nction	F	unction Result	
M2	1	737.7 MH	z	27.50 dBm					
M3	1	960.455 MH	IZ	-41.47 dBm					
	Л						Measuring	SESSERE 🚺 🦇 🔅	17.06.2014 14:43:19

Date: 17.JUN.2014 14:43:19

## Diagram 16b:

I Frequenc	y Sweep							⊖1Rm Ma×
) dBm							M1[1]	-38.20 dB 7.974080 GI
dBm			-					
10 dBm	H1 -13.000 dBm							
0 dBm								
0 dBm					1		1	
0 dBm					: 	Contration contration of the		
								100 Contractor 10
0 d8m								
0 dBm		: 	······	·····	:			
0 dBm								
30 dBm							• • •	
0 dBm								
o.ubiii					3			

Date: 17.JUN.2014 14:46:52





Appendix 5

Diagram 17a:

MultiView 8	Spectrun	ı ]							V
Ref Level 50.0 Att TDF		■ RBW I 30 s VBW		ode Auto Sweep					
1 Frequency Sv	weep								⊜1Rm Max
								M1[1]	29.69 dBm
40 dBm									734.5000 MH:
io ubiic							1	M2[1]	27.72 dBn 738.5000 MH;
30 dBm							M12		738.3000 MH
00 000							1 17		
20 dBm									
10 dBm						1			
a politiko eta									
0 dBm					5	·····	2. 2		
							1 4		
-10 dBm			-						
	H1 -13.000 dBm-								
-20 dBm									
-30 dBm			-				+ + +		
							1 1 1		
-40 dBm							+ + + +		
N Karana and						<u>, , , , , , , , , , , , , , , , , , , </u>			
50 dBm							-		
$\sim$						1			
-60 dBm									
				: 					
9.0 kHz		·	320	01 pts	1	00.0 MHz/			1.0 GHz
2 Marker Table									
Type Ref		X-Value		Y-Value	Fur	nction	F	unction Result	
M1	1	734.5 M		29.69 dBm 27.72 dBm					
M2 M3	4	738.5 MI 999.891 MI	12	-41.41 dBm					
UNI CINI	1	5551551 PI	12	-42,42 000					12.06.2014
							Measuring		08:44:35

Date: 12.JUN.2014 08:44:35

## Diagram 17b:

	Sweep						
				- - - 7 - 3 - 4		M1[1]	
dBm							
0 dBm	H1 -13.000 dBm			3 	1		
0 dBm					: 	 	
0 dBm						 	
0 dBm						 	
0.cl8mmmm							
0 dBm		,					
		r					
0 dBm			-	-			
0 dBm						 	
) dBm						 	

Date: 12 JUN 2014 08:47:35



Page 37 (43)



Appendix 5

Diagram 18a:

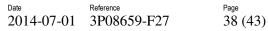
MultiView 8	Spectrum	J							▽
Ref Level 50. Att		• RBW 1 30 s VBW 10		to Sween					
TDF		0000 1011 10	nine nigao na	co o 1100p					
Frequency Sy	weep								©1Rm Max
								M1[1]	29.66 dBn 734.5000 MH
O dBm					-			M2[1]	27.65 dBr
								MZ[1]	738,5000 MH
0 dBm		·v			d		M12		
							1 11	1	
0 dBm									
0 dBm							· · · · · · · · · · · · · · · · · · ·		
					-				
dBm							2	)	
LO dBm									
	H1 -13.000 dBm								
20 dBm				·			a		
								1	
30 dBm				1					
							1 11		
0 dBm							+ / \		M
		1000 - 10 - 10 - 10 - 10 - 10 - 10 - 10	and the second				<u></u>		28.5k
50 dBm		an a	. 7716,						
J								1	
50 dBm									
							2		
9.0 kHz			32001 pts		100	.0 MHz/	3		1.0 GHz
Marker Table	3								
Type   Ref	Trc	X-Value		Y-Value	Functi	on	F	unction Result	
M1	1	734.5 MHz	2	9.66 dBm 7.65 dBm					
M2	1	738.5 MHz	2	7.65 dBm					
M3	1 9	989.829 MHz	-4	1.38 dBm					
							Moacuring	ERRERAR 🦇	11.06.2014 16:04:43

Date: 11.JUN.2014 16:04:43

## Diagram 18b:

	/ Sweep							
				2 2 3			M1[1]	-38.30 dE 7.948700 G
dBm					-	();,,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, , ,, ,, ,, ,, ,, , ,, , , , , , , , , , , , , , , , , , , ,		
0 dBm	H1 -13.000 dBm							
0 dBm						: 	<u></u>	
0 dBm					-			
0 dBm								****
0.49m		<u> </u>						
0 dBm								
0 dBm								
					: : :			
) dBm			-				-	
0 dBm								
		1				1	1	

Date: 11.JUN.2014 15:49:55





Appendix 5

Diagram 19a:

MultiView 😁 Spectrum ♥ 
 Ref Level
 50.00 dBm
 RBW
 1 MHz

 Att
 20 dB
 SWT 30 s
 VBW 10 MHz
 Mode Auto Sweep

 TDF

 1 Frequency Sweep m Max м1[1] 29.74 dBm 738.5000 MHz 27.59 dBm 742.5000 MHz 40 dBm M2[1] M12 30 dBm-20 dBr 10 dBn l dBr -10 dBm H1 -13.000 dBm--20 dBm 30 dBr 40 dBn -60 dBm 9.0 kHz 2 Marker Table Type | Ref | Trc | 1.0 GHz 32001 pt 100.0 MHz X-Value 738.5 MHz 742.5 MHz 993.735 MHz Y-Value 29.74 dBm 27.59 dBm -41.48 dBm Function Result Function M1 M2 M3 Measuring... 12.06.2014 08:02:31

Date: 12 JUN 2014 08:02:31

## Diagram 19b:

	Sweep						○1Rm Max
						M1[1]	-38.42 dE 7.961830 G
dBm				-	ر مىدەندەتدەتدەتلەت		
0 dBm	H1 -13.000 dBm		2 	· · · ·			
0 dBm		 	· · · · · · · · · · · · · · · · · · ·			<u>}</u>	
0 dBm							
0 dBm		 		i			
0,d9m		 					
0 dBm				-			
0 dBm							
0 dBm			- 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	t Generationenenenenenenen			
0 dBm							

Date: 12.JUN.2014 07:59:26





Appendix 5

Page 39 (43)

Diagram 20a:

MultiView	Spectrum								▼
Ref Level 50 Att TDF		• RBW 11 30 s VBW 101		Auto Sweep					
1 Frequency S	weep								⊖1Rm Max
								M1[1]	29.84 dBm 738.5000 MHz
40 dBm		· · · ·						M2[1]	27.80 dBm
							M12	1 A.	742.5000 MHz
30 dBm							<b>N</b>		
20 dBm				1	1	1		1	
10 dBm					5	-	· · · · · · · · · · · · · · · · · · ·		
						-			
0 dBm									
-10 dBm				1			1		
-10.000	H1 -13.000 dBm-				A				
-20 dBm		· · · · · · · · · · · · · · · · · · ·		61	- Artese				
				2					
-30 dBm	-								
-40 dBm									M3
-40 dBm		10.5 × 1 × 1 × 1	an ann anti-						<b>T</b>
50 dBm			1.00 L 10		and a second and a second a s	-			
$\overline{\Box}$									
-60 dBm					2 	-			
						- 			
9.0 kHz	•		32001	ots	10	00.0 MHz/			1.0 GHz
2 Marker Tabl						•			
Type Ref	F Trc	X-Value 738.5 MHz		Y-Value 29.84 dBm	Fun	ction	Fi	Inction Result	
M2	î	742.5 MHz		27.80 dBm					
MЗ	1	988.454 MHz		-41.40 dBm					
	1						Measuring		12.06.2014 07:50:37

Date: 12.JUN.2014 07:50:37

### Diagram 20b:

	Sweep					⊖1Rm Max
					 M1[1]	-38.27 dE 7.949140 G
dBm			- - -	-		
0 dBm	H1 -13.000 dBm	-				
0 dBm		<u></u>	: 	····	 	
0 dBm					 	
0 dBm					 	
0.dBrewerer		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
D dBm						
0 dBm						
0 dBm		·····	· · · · · · · · · · · · · · · · · · ·			
D dBm						

Date: 12 JUN 2014 07:53:34



Page 40 (43)



Appendix 5

Diagram 21a:

MultiView 8	Spectrum	n )							
Ref Level 50. Att TDF		● RBW F30s VBW		ode Auto Sweep					
1 Frequency S	weep							M1[1]	⊖1Rm Max 27.50 dBm
40 dBm					2 2 2 2 4 2 2	- - -	M2	M2[1]	741.1000 MH; 32.53 dBn 744.3000 MH;
30 dBm					2		M		
20 dBm			-			-		-	
10 dBm			-						
0 dBm		-				-			
-10 dBm						-			
-20 dBm	H1 -13.000 dBm—								
-30 dBm				-	n 1	-			
			- 						N
-40 dBm									
150 dBm									
-60 dBm									
9.0 kHz			320	IO1 pts	1	00.0 MHz/			1.0 GHz
2 Marker Table Type   Ref		X-Value		Y-Value	Fu	nction	Fu	Inction Result	
M1 M2 M3	1 1 1	741.1 M 744.3 M 999.484 M	Hz	27.50 dBm 32.53 dBm -41.38 dBm					
	r.						Measuring	anannan 🦇	27.06.2014 06:47:00

Date: 27.JUN.2014 06:46:59

### Diagram 21b:

	/ Sweep					⊖1Rm Ma
						M1[1] -38.25 dE 7.954830 G
dBm			· · ·	-		1
0 dBm	H1 -13.000 dBm					 
0 dBm						 
0 dBm						
) dBm				and the second second	1 2 	
0.490						
) dBm						 
) dBm						
) dBm		2 1 1	· · · · · · · · · · · · · · · · · · ·	- - - -		
0 dBm						 

Date: 27 JUN 2014 06:36:36



Page 41 (43)



Appendix 5

Diagram 22a:

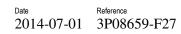
MultiView 8	Spectrun	ı )							
Ref Level 50, Att TDF			1 MHz 10 MHz	Mode Auto Sweep					
1 Frequency Sv 40 dBm	weep					-		M1[1]	018m Max 27.53 dBm 739.5000 MHz 29.64 dBm
30 dBm			) 	······································	1 2 2		M2 My		743.5000 MHz
20 dBm									
10 dBm	-		1						
0 dBm			l			- 	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
-10 dBm	H1 -13.000 dBm-					-			
-20 dBm					- 				
-30 dBm		-							МЗ
-40 dBm									<b>X</b>
-60 dBm									
9.0 kHz			32	2001 pts	10	0.0 MHz/	- - 		1.0 GHz
2 Marker Table Type   Ref M1 M2 M3	1 1	X-Value 739.5   743.5   983.985	4Hz 4Hz	Y-Value 27.53 dBm 29.64 dBm -41.34 dBm	Fun	ction	Fu	Inction Result	
	][						Measuring	ananana) 🦇	27.06.2014 07:20:01

Date: 27.JUN.2014 07:20:00

### Diagram 22b:

Frequency							⊖1Rm Ma
						M1	
dBm							;
) dBm	H1 -13.000 dBm				1		
) dBm					: : 		
) dBm							
) dBm			·····				_
).cl@powel-www.a		<u> </u>					
) dBm							
I dBm							
) dBm				-	: : :		
dBm							
I dBm					· · · · · · · · · · · · · · · · · · ·		
			T.	1			1

Date: 27.JUN.2014 07:21:51



Page 42 (43)



Appendix 5

Diagram 23a:

MultiView 8	Spectrum	ı )							
Ref Level 50.0 Att TDF		■ RBW 1 30 s VBW		ode Auto Sweep					
1 Frequency Sv	veep							M1[1]	©1Rm Max 24.29 dBm
40 dBm						- 		M2[1]	731.5000 MHz 24.61 dBm 742.5000 MHz
30 dBm							M1M2		
20 dBm		-							
10 dBm		-				-			
0 dBm			1			-			
-10 dBm	11 -13.000 dBm-		-		-				
-20 dBm			1			-			
-30 dBm									мз
-40 dBm		<u> </u>			<u>an nga na</u>	e can n un			¥
-50 dBm						- - -			
-60 dBm				- 		-			
9.0 kHz			320	001 pts	1	00.0 MHz/			1.0 GHz
2 Marker Table Type   Ref		X-Value		Y-Value	Fun	nction	Fu	nction Result	
M1 M2 M3	1 1 1	731.5 M 742.5 M 982.735 M	Hz	24.29 dBm 24.61 dBm -41.52 dBm					
	[						Measuring	EVERIE D 🤲	12.06.2014 09:31:25

Date: 12.JUN.2014 09:31:24

### Diagram 23b:

Frequency	Sweep						©1Rm Ma
		·		- - -		M1[1]	-38.61 dE 7.953300 G
dBm							
) dBm	H1 -13.000 dBm		· · · · · · · · · · · · · · · · · · ·				
I dBm		1 1			:	 	
I dBm				- - -			
dBm							
d Ran							
1 <u>d</u> 9 <u>20</u>				2 - -			
I dBm			<u></u>	2	2	 <u> </u>	
) dBm		· · · · · · · · · · · · · · · · · · ·					
dBm					e e Generalista non a non a national de cala	 	
dBm					: 	 	
		1	1	1.			

Date: 12 JUN 2014 08:56:52



Appendix 5

## Diagram 24a:

-20 dBm						M3
20 dBm		4	 	······		
1 dBm	).000 dBm	-	-			
0 dBm		· · · · · · · · · · · · · · · · · · ·	 			
:0 dBm			-			
0 dBm			· · · · · · · · · · · · · · · · · · ·		M2[1]	731.5000 MH 24.44 dBi 742.5000 MH

Date: 12.JUN.2014 09:55:54

### Diagram 24b:

	weep						○1Rm Max
						M1[1]	-38.33 dB 7.980200 GF
dBm	· · · · · · · · · · · · · · · · · · ·	 					
0 dBm	H1 -13.000 dBm						
0 dBm	·	 					
0 dBm							
0 dBm	· · · · · · · · · · · · · · · · · · ·	 ~		-			
0.dem.							
0 dBm		 					
) dBm							
D dBm	· · · · · · · · · · · · · · · · · · ·	 -	, , , , , , , , , , , , , , ,	Exercised and a second	, , , , ,		
) dBm							

Date: 12 JUN 2014 09:58:13





Appendix 7

# Field strength of spurious radiation measurements according to 47 CFR 27.53 (f) / IC RSS-130 4.6

Date	Temperature	Humidity
2014-05-26	$23^{\circ}C \pm 3^{\circ}C$	36 % ± 5 %

### 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.

In the frequency range 30 MHz - 8 GHz the measurement was performed in power with a RBW of 1 MHz. A propagation loss in free space was calculated. The used formula was

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

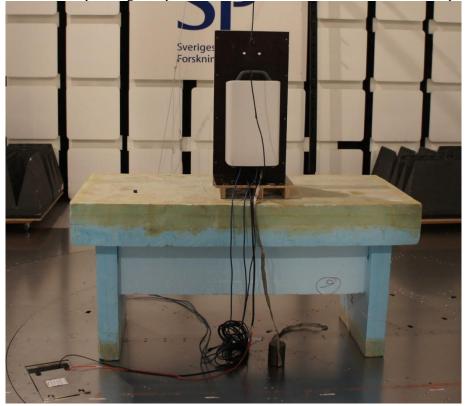
The measurement procedure was as the following:

- 1. A pre-measurement is performed with peak detector. For measurement < 1 GHz the test object is measured in eight directions with the antenna at three heights, 1.0 m, 1.5 m and 2.0. For measurements > 1 GHz the test object was measured in seventeen directions with the antenna at 1.0 m in height.
- 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.



SP SP SP Server

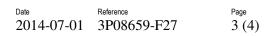
### Appendix 7



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 ESI 26	503 292
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
Testo 625 temperature and humidity meter	504 188



Appendix 7

Tested configurations

В
М
Т
M2_1
M2_2
M4_1

Results, representing worst case

M, BW: 5 MHz

Diagram 1 a-b

	Spurious emission level (dBm)			
Frequency (MHz)	Vertical	Horizontal		
30-8000	All emission > 20 dB below limit	All emission > 20 dB below limit		

### Measurement uncertainty:

3.2 dB up to 18 GHz

### Limits

CFR 47 §27.53 (f) / RSS-130 4.6

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.

Complies? Yes

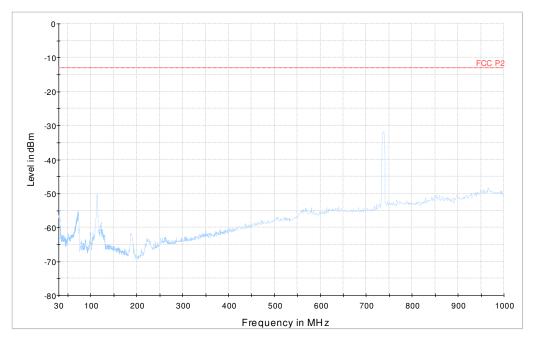






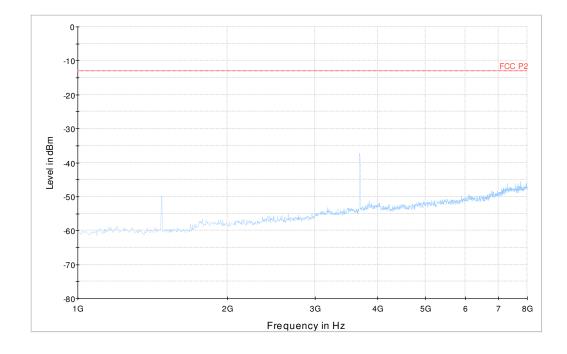
Appendix 7

## Diagram 1a:



Note: The emission between 729 to 745 MHz is the carriers frequency and shall be ignored in the context.

Diagram 1b:





Appendix 8

### Frequency stability measurements according to CFR 47 § 27.54 / IC RSS 130 4.3

Date	Temperature (test equipment)	Humidity (test equipment)
2014-05-19	23°C ± 3 °C	26% ± 5 %
2014-05-20	22°C ± 3 °C	28% ± 5 %

### Test set-up and procedure

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

Measurement equipment	SP number
R&S FSQ 40	504 143
RF attenuator	900 233
RF Terminator	-
Temperature Chamber	503 360
Testo 635, temperature and humidity meter	504 203
Multimeter Fluke 87	502 190



SP SP SP

Appendix 8

### Results

Nominal Voltage -48 V DC

Maximum output power at mid channel (M)

Channel Bandwidth 5 MHz

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	Test model E-TM1.1
-48.0	+20	-8
-55.2	+20	-6
-40.8	+20	-7
-48.0	+30	-7
-48.0	+40	-9
-48.0	+50	-9
-48.0	+10	-10
-48.0	0	-7
-48.0	-10	-8
-48.0	-20	-8
-48.0	-30	-7
Maximum freq. error (Hz)		-10
Measurement uncertainty		$4 \pm 1 \times 10^{-7}$

Measurements according to 3GPP TS 36.141.

Appendix 8

### Results

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	
102.0	+20	-7	
120.0 +20		-8	
138.0 +20		-8	
Maximum freq. error (Hz)		-8	
Measurement uncertainty		$\leq \pm 1 \ge 10^{-7}$	

Measurements according to 3GPP TS 36.141.

### Results

Rated output power level at connector RF A (maximum): 37.0 dBm (5 W)

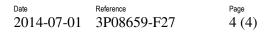
Test conditions		Frequency margin to band edge at -16dBm				
Supply voltage	Temp [°C].	Carrier Bandwidth [MHz]	Test frequency Symbolic name Bottom		Test freq	uency Symbolic name Top
DC [V]			fL [MHz]	Offset to lower band edge (728 MHz) [kHz]	fH [MHz]	Offset to upper band edge (746 MHz) [kHz]
-48.0	+20	5	729.086	1086	744.918	1082

Measurements according to IC RSS 130 4.3.

The frequency error results clearly shows that the frequency stability is good enough to ensure that the transmitted carrier stay within the operating band.







Appendix 8

### 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  $\pm 0.1$  PPM  $\pm 12$  Hz ( $\pm 86.5$  Hz).

CFR 47 § 27.54 Frequency stability

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

### RSS-130 4.3 Frequency:

The frequency stability shall be sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

Complies?	Yes
compiles.	105



SP Technical Research Institute of Sweden







**External photos** 



Left side





Rigth side



Page 1 (3)





 Date
 Reference
 Page

 2014-07-01
 3P08659-F27
 2 (3)

Appendix 9

# <image>

SP Technical Research Institute of Sweden



Page 3 (3)



Appendix 9

Top side

