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 Date
 Reference
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 5P06895-F27 W
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C D I TE Accred. No. 1007 Testing ISO/IEC 17025

NED,

Ericsson AB Mats Falk PDU HW Lindholmspiren11 417 56 Göteborg

Radio measurements on Radio 2203 B66A 1700/2100 MHz radio equipment with FCC ID: TA8AKRC161553-1 and IC: 287AB-AS1615531

(9 appendices)

Test object

Product name: Radio 2203 B66A. Product number: KRC 161 553/1.

Summary

See appendix 1 for general information and appendix 9 for external photos

Standard	Compliant	Appendix	
FCC CFR 47 part 2 ar			
2.1046 / RSS-139 6.5	RF power output conducted	Yes	2
2.1046 / RSS-139 6.5	RF power output radiated	Yes	3
2.1049 / RSS-Gen 6.6	Occupied bandwidth	Yes	4
2.1051 / RSS-139 6.6	Band edge	Yes	5
2.1051 / RSS-139 6.6	Spurious emission at antenna terminals	Yes	6
2.1053 / RSS-139 6.6	Field strength of spurious radiation	Yes	7
2.1055 / RSS-139 6.4	Frequency stability	Yes	8

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Description of the test object

Equipment:	Product name: Radio 2203 B66A Product number: KRC 161 553/1	
FCC ID:	FCC ID TA8AKRC161553-1	
IC ID:	IC 287AB-AS1615531	
HVIN:	AS1615531	
Hardware revision state:	R1B	
FVIN:	CXP 901 7316/2 rev. R62CC	
Tested configuration:	WCDMA FDD single RAT	
Frequency bands:	TX: 2110 – 2155 MHz RX: 1710 – 1755 MHz	
IBW:	45 MHz, Valid for all power classes in both contiguous and non- contiguous operation.	
Antenna ports:	2 TX/RX ports	
RF configuration:	Single carrier, multi carrier, 2x2 MIMO	
RF power tolerance	+ 0.6 / - 2.0 dB	
Nominal output power per antenna port:	Single carrier: 1 x 37.0 dBm (5W) Multi carrier: 2 x 34.0 dBm (5W) 3 x 32.2 dBm (5W) 4 x 31.0 dBm (5W)	
Frequency stability tolerance:	±0.05 PPM	
Optional internal antenna type:	Integrated wide sector antenna, cross polarized antenna elements for indoor and outdoor use. Product no KRE 101 2249/1 antenna gaion, 10.1 dBi	

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, your Cience	00L100			Appendix 1	
	Tested external antenna type:	Product no	KRE 101 22	Antenna for indoor and 33/1, antenna gain 2 d 45/1, antenna gain 2 d	lBi
	Channel bandwidths:	4.2 to 5 M	Hz (configura	ble in steps of 100/20	0 kHz)
	Channel spacing:	4.4 to 5 M	Hz (configura	ble in steps of 100/20	0 kHz)
	Modulations:	QPSK, 16	QAM and 640	QAM	
	Nominal supply voltage:	36 VDC			



Operation mode during measurements

Measurements were performed with the test object transmitting test models as defined in 3GPP TS 25.141. Test model 1 (TM1) was used to represent QPSK. Test model 5 (TM5) to represent 16QAM modulation and Test model 6 (TM6) 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. 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 TM1: 64 DPCH:s at 30 ksps (SF=128)

MIMO mode multi carrier, 2 carriers TM1: 32 DPCH:s at 30 ksps (SF=128)

Channel bandwidth 5 MHz

Conducted measurements

The test object was supplied with 36 VDC via the PSU 48 05 if not noted otherwise. Additional connections are documented in the setup drawings below. Complete measurements were made on the RF port representing worst case for each measurement.

Radiated measurements

The test object was tested stand-alone and powered with 36 VDC. All measurements were performed with the test object configured for maximum transmit power. Additional connections are documented in the test setup drawings.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47 part 2 and 27, IC RSS-139 and IC RSS-Gen.

References

Measurements were done according to relevant parts of the following standards:

ANSI 63.4-2009 ANSI/TIA/EIA-603-C-2004 3GPP TS 25.141, version 13.0.0 CFR 47 part 2, October 1st, 2014 CFR 47 part 27, October 1st, 2014 RSS-Gen Issue 4 RSS-139 Issue 3 KDB 662911 Multiple transmitter output v02r01 KDB 971168 D01 Power Meas Licens, v02r02



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 2015-10-22.

Manufacturer's representative

Ove Nilsson, Ericsson AB.

Test engineers

Tomas Lennhager, Tomas Isbring, Jörgen Wassholm, Patric Augustsson and Rolf Kühn, SP.

Test participants

Magnus Gyllenhammar and Erik Nilsson.



Measurement equipment

	Calibration Due	SP number
Test site Tesla	2017-01	503 881
R&S ESU 40	2016-07	901 385
R&S FSW 43	2016-07	902 073
R&S ESI 26	2016-07	503 292
R&S FSQ 40	2016-07	504 143
Control computer with	-	503 899
R&S software EMC32 version 9.15.0		
R&S SMB 100A	2016-07	900 120
High pass filter	2016-07	504 200
High pass filter	2015-12	BX40074
RF attenuator	2016-10	900 691
RF attenuator	2016-10	902 282
RF attenuator	2016-01	504 159
Directional coupler	2016-10	901 496
Chase Bilog Antenna CBL 6111A	2017-10	503 182
EMCO Horn Antenna 3115	2016-09	502 175
EMCO Horn Antenna 3115	2015-12	902 212
µComp Nordic, Low Noise Amplifier	2016-01	901 545
Flann STD Gain Horn Antenna 20240-20	-	503 674
Flann STD Gain Horn Antenna 22240-20		503 674
Miteq, Low Noise Amplifier	2016-08	503 278
Schwarzbeck preamplifier BBV 9742	2015-12	504 085
Temperature and humidity meter, Testo 635	2016-04	504 203
Temperature Chamber	-	503 360
Multimeter Fluke 87	2016-08	502 190



Appendix 1

UARFCN	Frequency	Symbolic	Comment
Downlink	[MHz]	name	
1537	2112.4	В	Single carrier TX bottom frequency
1537	2112.4	B2	2 carrier TX band bottom constellation
1562	2117.4		
1537	2112.4	B4-Rspr	4 carrier TX band bottom constellation for radiated
1587	2122.4	_	spurious emission
1638	2132.6		
1688	2142.6		
1638	2132.6	М	Single carrier TX band mid frequency
1638	2132.6	M2	2 carrier TX band mid constellation
1663	2137.6		
1537	2112.4	M2 IM	2 carrier TX band constellation
1738	2152.6		
1537	2112.4	M3-IM	3 carrier TX band constellation
1638	2132.6		
1738	2152.6		
1537	2112.4	M4-IM	4 carrier TX band constellation
1638	2117.4		
1713	2147.6		
1738	2152.6		
1738	2152.6	Т	Single carrier TX top frequency
1713	2147.6	T2	2 carrier TX band top constellation
1738	2152.6		

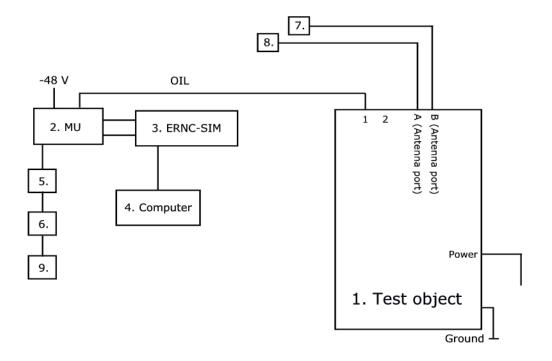
Test frequencies during measurements

All RX frequencies were configured 400 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.	Radio 2203 B66A, KRC 161 553/1, rev. R1B, s/n: C82A095765
	with Radio Software: CXP 901 7316/2, Rev. R62CC
	FCC ID TA8AKRC161553-1 and IC 287AB-AS1615531

Associated equipment:

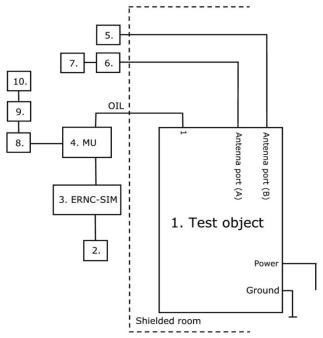
2.	RBS 6601 Main Unit:
	SUP 6601, 1/BFL 901 009/4, rev. R1E, s/n: BR81844332
	DUW 41 01, KDU 127 174/4, rev. R2E, s/n: TU8XQ62907
	SW: CXP 902 2391, R5MB46
5.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8K474887
9.	GPS Active Antenna, KRE 101 2082/1

Functional test equipment

I une	tional test equipment
3.	ERNC-SIM 065, BAMS – 1000579038
	Switch, Netgear ProSafe GSM 7224, BAMS - 1000850751
4.	HP Z230 Workstation, BAMS – 1001561278
6.	1x4 GPS SPLITTER, KRY 101 1946/1, s/n: FG1017916
7.	Attenuator/ terminator 50 ohm
8.	SP Test Instrumentation according to measurement equipment list
	The signal analyzer was connected to the SP 10 MHz reference standard during the
	measurements.



Test setup radiated measurements



Test object:

1. Radio 2203 B66A, KRC 161 553/1, rev. R1B, S/N: C82A095788 With radio software CXP 901 7316/2, rev. R62CC FCC ID TA8AKRC161553-1 and IC 287AB-AS1615531

Associated equipment:

4.	RBS 6601 Main Unit:
	SUP 6601, 1/BFL 901 009/4, rev. R1E, s/n: BA88186222
	DUW 41 01, KDU 127 174/4, rev. R2E, S/N: TU8XQ61965
	SW: CXP 902 3291, Rev. R5MB46
8.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8KH75515
10.	GPS Active Antenna, KRE 101 2082/1

Functional test equipment:

2.	HP Z230 Workstation, BAMS – 1001561277
3.	ERNC-SIM 065, BAMS-1000579038
	Switch Neatgear ProSafe GSM7224, BAMS – 1000850754
5.	Attenuator/ terminator 50 ohm
6.	Attenuator
7.	R&S ESIB 26 SP 503 292, for supervision only
9.	1x4 GPS SPLITTER, KRY 101 1946/1
7.	

Interfaces:	Type of port:
Power: 36 VDC	DC Power
RF port A, N connector, combined TX/RX	Antenna
RF port B, N connector, combined TX/RX	Antenna
1, optical interface	Signal
Ground wire	Ground



Appendix 3

RF power output measurements according to CFR 47 §27.50 / IC RSS-139 6.5, conducted.

Date	Temperature	Humidity
2015-10-27	$23 \ ^{\circ}C \pm 3 \ ^{\circ}C$	$24~\%\pm5~\%$
2015-10-28	$22 \ ^{\circ}C \pm 3 \ ^{\circ}C$	$23~\%\pm5~\%$

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 80 MHz was used.

Measurement equipment	SP number
R&S FSW 43	902 073
RF attenuator	900 691
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 1.1 dB



Appendix 3

Results

MIMO, single carrier

Rated output power level at each RF port 1x 37 dBm.

	Output power CCDF [RMS dBm/ PAR dB]			
BW configuration [MHz] symbolic name	Port RF A	Port RF B	Total power ¹⁾	
5, B	36.9/ 7.4	36.8/7.4	39.86	
4.2, B	37.0/ 7.3	36.9/ 7.3	39.96	
5, M	36.8/ 7.4	36.8/ 7.4	39.81	
5, T	36.9/ 7.4	36.9/ 7.4	39.91	
4.2, T	37.0/ 7.3	37.0/ 7.3	40.01	

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

MIMO mode, multi carrier

Rated output power level at RF connector 2x 34 dBm.					
	Output power CCDF [RMS dBm/ PAR dB]				
symbolic name	Port RF APort RF BTotal power10				
B2 5	36.9/ 7.2	39.86			
M2 5	36.9/ 7.2	39.91			
T2 5	36.9/ 7.2	36.8/ 7.3	39.86		
M2-IM	36.8/7.3	36.7/7.3	37.76		

¹⁾: Summed output power according to FCC KDB662911 D01 Multiple transmitter output

MIMO mode, multi carrier

Rated output	power level	at RF co	onnector 3x	32.2 dBm.

	Output power CCDF [RMS dBm/ PAR dB]				
symbolic name	Port RF APort RF BTotal power10				
M3-IM	37.0/ 7.1	37.0/ 7.1	40.01		

¹⁾: Summed output power according to FCC KDB662911 D01 Multiple transmitter



Appendix 3

MIMO mode, multi carrier

Rated output power level at RF connector 4x 31 dBm.

	Output power CCDF [RMS dBm/ PAR dB]			
symbolic name	Port RF A Port RF B Tota power			
M4-IM	36.8/ 7.2	36.8/ 7.2	39.81	

¹⁾: Summed output power according to FCC KDB662911 D01 Multiple transmitter output

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

	Output power per 1 MHz [RMS dBm]		
BW configuration [MHz] symbolic name	Port RF B	Total power ¹⁾	
5, B	31.3	34.3	
4.2, B	31.4	34.4	
5, M	31.4	34.4	
5, T	31.4	34.4	
4.2, T	31.6	34.6	

Rated output power level at RF connector 1x 37 dBm.

¹⁾: Measured according to FCC KDB662911 D01 Multiple Transmitter Output. Method E), 2), c). "Measure and add 10 log(NAnt)".



Appendix 3

Limits

§27.50 (d)

The power of each base station transmitting in the 2110-2180 MHz band and located in any county with population density of 100 or fewer persons per square mile is limited to an EIRP of 3280 W/MHz, when transmitting with an emission bandwidth greater than 1 MHz.

The power of each base station transmitting in the 2110-2180 MHz band and situated in any geographic location other than that described above is limited to an EIRP of 1640 W/MHz, when transmitting with an emission bandwidth greater than 1 MHz.

A licensee operating a base station in the 2110-2180 MHz band utilizing a power greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all parties addressed in the rules.

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

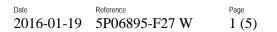
RSS-139 6.5:

There is no power limit specified for base station equipment in the RSS-139.

EIRP compliance is addressed at the time of licensing, as required by the responsible IC Bureau. Licensee's are required to take into account the antenna gain to get the maximum usable power settings to prevent the radiated output power to exceed the ERP/EIRP limits specified in SRSP-513

When the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

Complies?	Yes





Appendix 3

RF power output measurements according to CFR 47 §27.50/ IC RSS-139 6.4, radiated

Date	Temperature	Humidity
2015-11-03	$22^{\circ}C \pm 3^{\circ}C$	36 % ± 5 %
2015-11-04	$23^{\circ}C \pm 3^{\circ}C$	34 % ± 5 %
2015-11-05	$23^{\circ}C \pm 3^{\circ}C$	$32~\%~\pm 5~\%$
2015-11-13	$23^{\circ}C \pm 3^{\circ}C$	39 % ± 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.

Measurement equipment

Measurement equipment	SP number
Semi anechoic chamber	503 881
R&S ESU 40	901 385
EMC 32 ver. 8.52.0	503 889
EMCO Horn Antenna 3115	502 175
EMCO Horn Antenna 3115	902 212
R&S SMB 100A	900 120
Attenuator 40 dB	504 159
Testo 625 temperature and humidity meter	504 188

Measurement uncertainty:

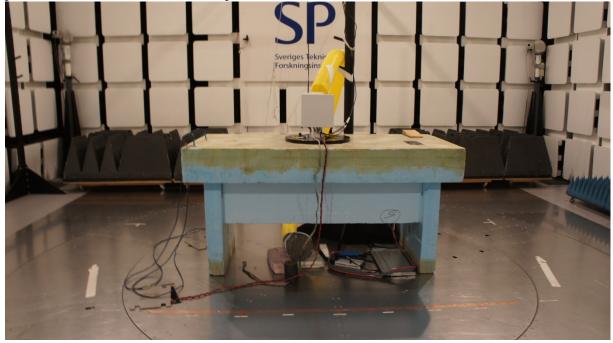
3.1 dB





Appendix 3

The test set-up with integrated antenna KRE 101 2249/1 during the effective radiated output power measurements is shown in the picture below.



The test set-up with external Omni antenna KRE 101 2233/1 during the effective radiated output power measurements is shown in the picture below.









The test set-up with external Omni antenna KRE 101 2245/1 during the effective radiated output power measurements is shown in the picture below.







Appendix 3

Results

Integrated antenna KRE 101 2249/1

Tested fr B	equency	Tested frequency M		Tested fr	requency Γ
Vertical/H RMS pow		Vertical/Horizontal RMS power (EIRP)		Vertical/Horizontal RMS power (EIRP)	
dBm/ MHz	W/ MHz	dBm/ MHz W/ MHz		dBm/ MHz	W/ MHz
28.4/ 43.6	0.70/ 22.91	32.4/ 43.0	1.72/ 20.00	35.7/ 42.9	3.73/ 19.59

External omni antenna KRE 101 2233/1

Tested frequency		Tested fro		Tested frequency		
B		M		T		
Vertical/Horizontal		Vertical/Horizontal		Vertical/Horizontal		
RMS power (EIRP)		RMS power (EIRP)		RMS power (EIRP)		
dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	
39.0/ 27.8	8.00/ 0.60	39.0/ 27.7	7.93/ 0.59	38.1/ 27.7	6.52/ 0.59	

External omni antenna KRE 101 2245/1

Tested frequency		Tested fro	equency	Tested frequency		
B		M	[T		
Vertical/Horizontal		Vertical/Horizontal		Vertical/Horizontal		
RMS power (EIRP)		RMS power (EIRP)		RMS power (EIRP)		
dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	dBm/ MHz	W/ MHz	
38.0/ 25.1	6.34/ 0.32	37.8/24.6	6.05/ 0.29	37.8/ 23.9	5.98/ 0.24	





Limits

§27.50 (d)

The power of each base station transmitting in the 2110-2180 MHz band and located in any county with population density of 100 or fewer persons per square mile is limited to an EIRP of 3280 W/MHz, when transmitting with an emission bandwidth greater than 1 MHz. The power of each base station transmitting in the 2110-2180 MHz band and situated in any

geographic location other than that described above is limited to an EIRP of 1640 W/MHz, when transmitting with an emission bandwidth greater than 1 MHz.

A licensee operating a base station in the 2110-2180 MHz band utilizing a power greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all parties addressed in the rules.

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

RSS-139 6.5:

There is no power limit specified for base station equipment in the RSS-139.

EIRP compliance is addressed at the time of licensing, as required by the responsible IC Bureau. licensee's are required to take into account the antenna gain to get the maximum usable power settings to prevent the radiated output power to exceed the ERP/EIRP limits specified in SRSP-513

When the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

Complies? Yes



Occupied bandwidth measurements according to 47 CFR 2.1049 / RSS-Gen 6.6

Date	Temperature	Humidity
2015-10-27	$23 \ ^{\circ}C \pm 3 \ ^{\circ}C$	24 % ± 5 %
2015-10-29	$23 \ ^{\circ}C \pm 3 \ ^{\circ}C$	$24~\%\pm5~\%$

Test set-up and procedure

The measurements were made per definition in FCC: KDB: 971168 D01 Power Meas Licens and IC: RSS-Gen section 6.6. The output was connected to a signal analyzer with the Peak detector activated in max hold.

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

Results

Diagram	BW configuration	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
1	5 MHz	В	RF B	4.17
2	4.2 MHz	В	RF B	3.87
3	5 MHz	М	RF A	4.17
4	5 MHz	М	RF B	4.17
5	5 MHz	Т	RF B	4.17
6	4.2 MHz	Т	RF B	3.87



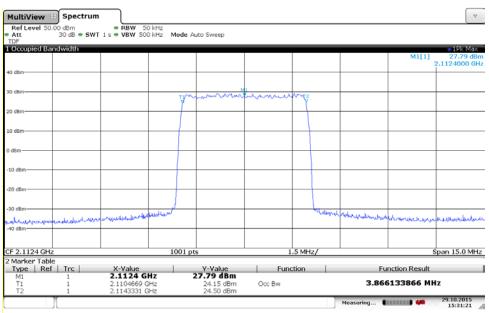


Appendix 4

Diagram 1: MultiView 🖽 Spectrum V Ref Level 50.00 dBm RBW 50 kHz Att 30 dB • SWT 1 s • VBW 500 kHz Mode Auto Sweep TDF 30 dB • SWT 1 s • VBW 500 kHz Mode Auto Sweep 1 Occupied Bandwidth 1Pk Max м1[1] 27.86 dBm 2.1124000 GHz 20 de 20 d 30 d handle market to do a share we have been deally work and margaretic provides CF 2.1124 GHz 2 Marker Table Type | Ref | Trc | M1 5 1001 pts 1.5 MHz Span 15.0 MHz X-Value 2.1124 GHz 2.1103171 GHz 2.1144829 GHz L Y-Value 27.86 dBm 20.36 dBm 20.40 dBm Function Function Result 4.165834166 MHz T1 Occ Bw

Date: 29.0CT.2015 15:26:40

Diagram 2:



Date: 29.0CT.2015 15:31:22





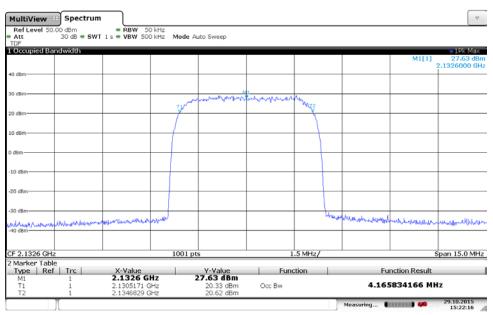
Appendix 4

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Diagram 3: MultiView 🖽 Spectrum V Ref Level 50.00 dBm RBW 50 kHz Att 30 dB • SWT 1 s • VBW 500 kHz Mode Auto Sweep TDF 30 dB • SWT 1 s • VBW 500 kHz Mode Auto Sweep 1 Occupied Bandwidth 1 DI- Max м1[1] 27.83 dBn 2.1326000 GHz 20 de 20 d 50 d with him propries would have been a state of the second states and the second states are second states and the second states are sec the strategies CF 2.1326 GHz 2 Marker Table Type | Ref | Trc | M1 1 1001 pts 1.5 MHz, Span 15.0 MHz X-Value 2.1326 GHz 2.1305171 GHz 2.1346829 GHz L Function Function Result Y-Value 27.83 dBm 4.165834166 MHz T1 20.38 dBm 20.91 dBm Occ Bw Measuring... 🗰 🗰 🕬 29.10.2015 15:20:24

Date: 29.0CT.2015 15:20:25

Diagram 4:



Date: 29.0CT.2015 15:22:16



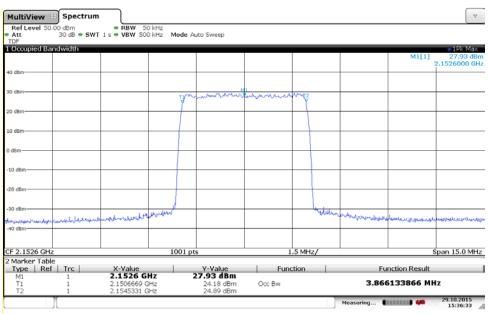


Appendix 4

Diagram 5: MultiView 🖽 Spectrum V Ref Level 50.00 dBm RBW 50 kHz Att 30 dB • SWT 1 s • VBW 500 kHz Mode Auto Sweep TDF 30 dB • SWT 1 s • VBW 500 kHz Mode Auto Sweep 1 Occupied Bandwidth 1Pk Max M1[1] 28.03 dBn 2.1526000 GHz 20 de 20 d 20 d ليلقس 1 mound dentrate CF 2.1526 GHz 2 Marker Table Type | Ref | Trc | M1 1 1001 pts 1.5 MHz Span 15.0 MHz L Y-Value 28.03 dBm 20.65 dBm 21.08 dBm Function Function Result X-Value 2.1526 GHz 4.165834166 MHz T1 2.1505171 GHz 2.1546829 GHz Occ Bw Measuring... 🗰 🗰 🗰 29.10.2015 15:41:09

Date: 29.0CT.2015 15:41:08

Diagram 6:



Date: 29.0CT.2015 15:36:33



Band edge measurements according to CFR 47 §27.53(h) / IC RSS-139 6.6

Date	Temperature	Humidity
2015-10-27	$23 \ ^{\circ}C \pm 3 \ ^{\circ}C$	$24~\%\pm5~\%$
2015-10-28	$22 \degree C \pm 3 \degree C$	$23~\%\pm5~\%$

Test set-up and procedure

The measurements were made per definition in §27.53(h) and IC RSS-139 6.6. The test object was connected to a spectrum analyzer with the RMS detector activated.

The specified measurement bandwidth for out of band emission measurement is 1 MHz. However, In the 1 MHz band immediately outside and adjacent to the band edges, the unwanted emission power may be measured with a resolution bandwidth of at least 1% of the emission bandwidth. A narrower resolution bandwidth is allowed to be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the emission bandwidth, as applicable. Where a smaller RBW was used the limit in the plot is adjusted by 10 log (RBW_{used}/RBW_{specified}) [dB].

A resolution bandwidth of 200 kHz was used 1 MHz to 6 MHz away from the band edges, to compensate for the reduced measurement bandwidth the limit was adjusted by 7 dB to -20 dBm (10 log (200 kHz/ 1 MHz)).

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.

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



Results

single carrier

Diagram	Tested frequency	Tested port
1 a-c	В	RF B
2 a-c	Т	RF B

multi carrier

Diagram	Tested frequency	Tested port
3 a-c	B2	RF B
4 a-c	T2	RF B

Limits

CFR 47 §27.53(h) and RSS-139 6.6

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	Ap	pendix	5
------------	----	--------	---

Diagram 1a:

 MultiView
 Spectrum

 Ref Level 40.00 dbm
 • RBW 50 kHz

 • Att
 25 dB • SWT 10 s
 • VBW 500 kHz

 TDF
 • VBW 500 kHz
 Mode Auto Sweep
 ~ M1[1] -23.95 dB 2.110000000 G 0 d 10 dB -10 de H1 -13.000 dBm -20 dBr -30 dBr -40 dBr 50 dBr -60 dBn -70 dBr VI 2.111 GHz 28.10.2015 07:02:23 2.109 GHz 200.0 kHz 3001 pt Measuring... Date: 28.0CT.2015 07:02:23

Diagram 1b:

Att TDF		 2 MHz Mode	- aco on cop	 	 	
Frequency	Sweep				M1[1]	 1Rm Max -42.40 dB
0 dBm					2	2.10894130 G
5 GDIII						
d8m		 				
.0 dBm						
0 dBm	H1 -20.000 d8m					
0 0011	111 -20.000 0011					
0 dBm						
						I .
0 dBm					 	and the second
i0 dBm		 				
0 dBm						
0 dBm-						
J GBm-						
0 dBm						
0 dBm						

Date: 28.0CT.2015 07:06:46





Appendix 5

Diagram 1c

MultiView 🕀	Spectrum							~
Ref Level 20.0 Att	0 dBm 20 dB = SWT	10 s RBW 10 s VBW		Auto Sweep				
DF Frequency Sw	/eep							1Rm Max
							M1[1]	-41.30 dBn 2.10398250 GH
) dBm								
d8m					 			
IO dBm								
20 dBm	1 -13.000 dBm							
0 dBm								
su dBm								
i0 dBm					 			
i0 dBm								
i0 dBm					 			
10 dBm								
10 dBm								
o dbiii								
90 dBm								+
2.094 GHz			2001 p	ts	1.0 MHz/			2.104 GHz
						Measuring		28.10.2015 07:08:17

Date: 28.OCT.2015 07:08:17



Appendix 5

Diagram 2a:

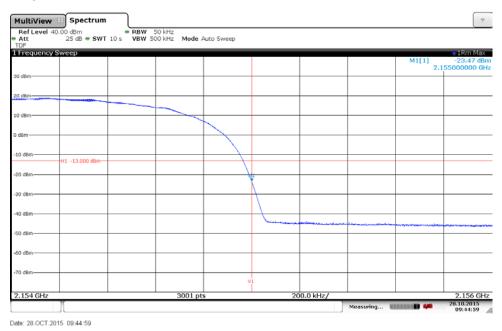
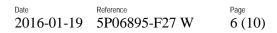


Diagram 2b:

MultiView 🕀									~
Ref Level 20.0 Att DF	0 dBm 20 dB = SWT	• RBW 3 10 s VBW		Auto Sweep					
Frequency Sv	/eep								1Rm Max
								M1[1]	-41.84 dBi 2.15602120 GF
0 dBm									+
d8m-									+
10 dBm									
10 0811									
20 dBm	11 -20.000 d8m						_		_
30 dBm-									
40 dBm	-	walker and a second							+
50 dBm									••••••••
50 GBm									
60 dBm									
70 dBm-									
80 dBm									
90 dBm									
70 0011									
2.156 GHz			2001 pt		50	00.0 kHz/			2.161 GH
1100 0112	C		2001 pt	a	5	5010 Ki 12/	Measuring		28.10.2015

Date: 28.0CT.2015 09:46:49



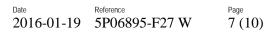


Appendix 5

Diagram 2c:

MultiView 🗄	Spectrum							~
Ref Level 20.0	00 dBm	RBW	1 MHz					
DF	20 dB 🖷 SWT 10	s VBW 1	0 MHz Mode	Auto Sweep				
Frequency Sv	veep							IRm Max
							M1[1] 2	-38,49 dB 16106750 GF
3 dBm								
d8m								
0 dBm					 			
0 dBm	H1 -13.000 d8m							
0 dBm								
10 dBm-					 			
i0 dBm					 			
0 dBm								
0 dBm								
U dBm								
0 dBm				-				
0 dBm					 			
.161 GHz			2001	ots	1.0 MHz/			2.171 GH
	r					Measuring		29.10.2015 06:41:48

Date: 29.OCT.2015 06:41:47





Appendix 5

Diagram 3a:

 MultiView
 Spectrum

 Ref Level 40.00 dbm
 • RBW 50 kHz

 • Att
 25 dB • SWT 10 s
 • VBW 500 kHz

 TDF
 • VBW 500 kHz
 Mode Auto Sweep
 V M1[1] -26.58 2.110000000 10 de 10 di H1 -13.000 d8m -20 de 30 de 40 d 60 dB 70 de VI 2.111 GHz 28.10.2015 12:02:31 2.109 GHz 3001 p 200.0 kHz Measuring... Date: 28.0CT.2015 12:02:31

Diagram 3b:

	v 🗄 Spectrum							
Att	20.00 dBm 20 dB • SWT	200 KHZ 2 MHZ Mode /	Auto Sweep					
IDF Frequenc	y Sweep							• 1Rm Ma:
							M1[1]	-43.92 dE 2.10894130 G
0 dBm								+
d8m		 						
0 dBm								
0 dBm	H1 -20.000 dBm							
0 dBm								
0 dBm								
		 				a para para mining ng para kasi mangangan para para para pangan di pangangan pangangan pangangan pangangan pang		
0 dBm								
0 dBm								
) dBm								
) dBm								
0 dBm								+
.104 GHz		2001 pt	<u> </u>	5	00.0 kHz/			2.109 G

Date: 28.0CT.2015 12:06:05



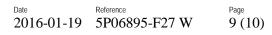


Appendix 5

Diagram 3c:

4ultiView 🖯	🗉 Spectrum	l							~
Ref Level 20. Att DF	00 dBm 20 dB • SWT		1 MHz 10 MHz Mode	Auto Sweep					
Frequency S	weep								1Rm Max
								M1[1]	-40.89 dBr 2.10398750 GH
) dBm									
d8m									
10 dBm									
20 dBm	H1 -13.000 dBm								
U GBM									
i0 dBm-									
10 dBm									
i0 dBm									
0 dBm									
'0 dBm									+
10 dBm									
0 dBm									
.094 GHz			2001 p	ts	1	1.0 MHz/		1	2.104 GH
	Y		2001 p	ca.		1.0 141127	Measuring		28.10.2015 12:09:14

Date: 28.0CT.2015 12:09:15





	А	ppendix	5
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Diagram 4a:

 MultiView
 Spectrum

 Ref Level 40.00 dbm
 • RBW 50 kHz

 • Att
 25 dB • SWT 10 s
 • VBW 500 kHz

 TDF
 • VBW 500 kHz
 Mode Auto Sweep
 ~ M1[1] -26.59 dB 2.155000000 G 0 di 10 dBn -10 dB H1 -13.000 dBm -20 dB 30 de -40 dB 50 de -60 dBr -70 dBr VI 2.156 GHz 28.10.2015 13:02:03 200.0 kHz 2.154 GHz 3001 pt Measuring... Date: 28.0CT.2015 13:02:03

Diagram 4b:

2F		TO S VDW	2 MHz Mode	Auto Sweep			
requency S	weep					M1[1]	1Rm Max -43.76 dB 2.15602120 G
dBm							
i8m							
) dBm							
) dBm	H1 -20.000 dBm						
) dBm							
) dBm					 		
) dBm					 	 	
) dBm							
) dBm							
) dBm							

Date: 28.0CT.2015 13:02:48





Appendix 5

Diagram 4c:

MultiView 🗄	Spectrum								~
Ref Level 20.0	00 dBm	- RBW	1 MHz						
DF	20 dB 🗢 SWT 10	s ARM 1	U MHZ Mode	Auto Sweep					
Frequency Sv	weep								1Rm Max
								M1[1]	-39,14 dBr 2,16106750 GH
0 dBm									
d8m									
10 dBm-									
20 dBm	H1 -13.000 d8m								
o ubm									
30 dBm									+
i0 dBm									
i0 dBm									
0 dBm									
0 dBm									
10 dBm						_			-
0 dBm									
161 GHz			2001	ots	-	1.0 MHz/	-		2.171 GH:
							Measuring		29.10.2015 06:51:40

Date: 29.OCT.2015 06:51:39



Conducted spurious emission measurements according to CFR 47 §27.53(h)/ IC RSS-139 6.6

Date	Temperature	Humidity
2015-10-27	$23 \ ^{\circ}C \pm 3 \ ^{\circ}C$	$24~\%\pm5~\%$
2015-10-28	$22 \ ^{\circ}C \pm 3 \ ^{\circ}C$	$23~\%\pm5~\%$

Test set-up and procedure

The measurements were made per definition in §27.53(h) and IC RSS-139.6.6. The output was connected to a spectrum analyzer with a RBW setting of 1 MHz and RMS detector activated.

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.

Measurement equipment	SP number
R&S FSW 43	902 073
RF attenuator	900 691
High pass filter	BX40074
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB



Appendix 6

Results

Single carrier

Diagram	BW configuration	Symbolic name	Tested Port
1 a+b+c+d	5 MHz	В	RF B
2 a+b+c+d	5 MHz	М	RF A
3 a+b+c+d	5 MHz	М	RF B
4 a+b+c+d	5 MHz	Т	RF B

Multi carrier

Diagram	BW configuration	Symbolic name	Tested Port	
5 a+b+c+d+e	5 MHz	M2-IM	RF B	
6 a+b+c+d+e	5 MHz	M3-IM	RF B	
7 a+b+c+d+e	5 MHz	M4-IM	RF B	

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 2.155 GHz. The measurements were made up to 22 GHz (10x2.155 GHz = 21.55 GHz).

Limits

§27.53(h) and RSS-139 6.6

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 1 MHz RBW.

Complies?	Yes
-----------	-----





Appendix 6

Diagram 1a:

♥ IRm Max M1[1] 31.38 dBm 2.1124000 GHz M2[1] -34.24 dBm 3.0000000 GHz M2[1] 30 de 20 dB 10 dP 10 di 41 -13.000 de -20 dBn 30 dBr 40 dBm 50 dBr 60 de 3.0 GHz 32001 pts 9.0 kHz 300.0 MHz/ 28.10.2015 06:56:04 Measuring... 🚺 🗰 🗰 Date: 28.0CT.2015 06:56:04

Diagram 1b:

Ref Level 10.00 dBm Offset 1						
Att 25 dB • SWT	10 s VBW 10 MH;	Mode Auto Sweep				
Frequency Sweep						IRm Max
					M1[1]	-35,75 dB 8,452500 GF
dām					M2[1]	-33.84 dB
						8.834430 G
0 dBm						
H1 -13.000 dBm						
0 dBm						
0 dBm					102	
				M1	M2	
0.dBm						
50 dBm-						
0 dBm						+
0 dBm						
0 dBm-						
0 dBm						+
00 dBm						-
.0 GHz	320)01 pts	700.0 Mł	lz/		10.0 GH

Date: 28.OCT.2015 07:35:53



Appendix 6

Diagram 1c:

TDF Frequency	Cuucon					1Rm Max
rrequency	sweep				M1[1]	-38,85 dBi 13,771350 GF
d8m						
l0 dBm	H1 -13.000 d8m				 	
20 dBm						
30 dBm						
40 dBm				 M1 T		
50 dBm						
50 dBm						
70 dBm						
i0 dBm						
10 dBm						
100 dBm						
			ts	00.0 MHz/		16.0 GH

Diagram 1d:

Ref Level	Spectrum 10.00 dBm Offse	t 0.70 dB = R	BW 1 MHz						
Att	15 dB 🖷 SWT			de Auto Sweep					
Frequency	Sweep								1Rm Max
								M1[1]	-34.23 dB 21.991840 G
d8m									
0 dBm	H1 -13.000 d8m								
0 dBm									
0 dBm									
J dBm									
0 00m									
0 dBm									
0 dBm									-
0 dBm									
0 dBm									
0 dBm									
0.0011									
00 dBm									
6.0 GHz			32001 p	ts	6	00.0 MHz/	-		22.0 GF 28.10.2015

Date: 28.0CT.2015 07:38:04





Appendix 6

Diagram 2a:

 MultiView
 Spectrum

 Ref Level 55.00 dbm
 # RBW 1 MHz

 * Att
 30 dB = SWT 30 s

 * UBW 10 MHz
 Mode Auto Sweep
 V 1Rm Max M1[1] 31.25 dBm 2.1326000 GHz M2[1] -29.47 dBm 3.0000000 GHz 50 dBn 40 dBr 30 dB 10 d 1 -13.000 dBm 60 di 3.0 GHz 32001 pts 300.0 MHz/ 9.0 kHz Measuring... 🚺 🗰 27.10.2015 15:54:37 Date: 27.0CT.2015 15:54:37

Diagram 2b:

	Spectrum						 	~
Ref Level 10.0 Att	0 dBm Offset 20 dB = SWT	1.50 dB • R 10 s V	BW 1 MHz BW 10 MHz	Mode Auto Swe	ep			
rdf .								• 1Rm Max
Frequency Sw	/eep						M1[1]	-38,49 dB 8,811240 G
d8m								
IO dBm-	(1 -13.000 d8m					_		
20 dBm					_		 	
00 dBm							 	<u> </u>
10 dBm-							M1	
							T	
i0 dBm-								
i0 dBm								
0 dBm								
0 dBm-							 	+
0 dBm							 	
00 dBm								
3.0 GHz			32001	pts		700.0 MHz/	 	10.0 GH 27.10.2015

Date: 27.0CT.2015 15:49:44



Ap	pendix	6
1 sp	penuix	υ

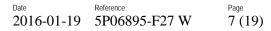
Diagram 2c:

Att TDF		s VBW 10 MHz Mode Au	to Sweep	
Frequency	Sweep			 1Rm Max M1[1] -38.96 dB 13.789160 GF
d8m				
10 dBm	H1 -13.000 dBm			
0 dBm	H1 -13.000 Gam			
30 dBm				
U GBM			M1	
10 dBm				
50 dBm				
i0 dBm				
70 dBm				
30 dBm				
10 dBm				
100 dBm				
10.0 GHz		32001 pts	600.0 MHz/	16.0 GH

Diagram 2d:

	B Spectrum						~
Ref Level 10. Att	00 dBm Offset 0 15 dB = SWT	.70 dB • RBW 1 M	Hz Hz Mode Auto Sw	eep			
IDF		100 1011 1011					
Frequency S	weep						 1Rm Max M1[1] -34.16 dB
							21.997280 G
d8m							
0 dBm	H1 -13.000 d8m						
0 dBm							
D dBm							
J dBm							
0 dBm							
0 dBm							
0 dBm							
0 dBm					-		
0 dBm							
00 d8m							
6.0 GHz		3	2001 pts		500.0 MHz/		22.0 GF
0.0 012	Y.	3	2001 pta		555.0 Militz/	Measuring	07.10.0015

Date: 27.0CT.2015 15:37:09





Appendix 6

Diagram 3a:

 MultiView
 Spectrum

 Ref Level 55.00 dbm
 # RBW 1 MHz

 * Att
 30 dB = SWT 30 s

 * UBW 10 MHz
 Mode Auto Sweep
 V 1Rm Max M1[1] 31.25 dBm 2.1326000 GHz M2[1] -29.35 dBm 3.0000000 GHz 50 dBn 40 dBr 30 dB 10 d 1 -13.000 dBm 60 di 3.0 GHz 32001 pts 300.0 MHz/ 9.0 kHz Measuring... 🚺 🗰 27.10.2015 15:55:19 Date: 27.OCT.2015 15:55:19

Diagram 3b:

	Spectrum		1 MHZ					
Att	20 dB • SWT	10 s VBW	10 MHz Mo	de Auto Sweep				
IDF Frequency	/ Sweep							IRm Max
							M1[1]	-38.64 dB 8.865050 GF
d8m								
l0 dBm	H1 -13.000 d8m							
20 dBm								
30 dBm								
10 dBm							M1 T	
0 dBm								
i0 dBm								
0 dBm								
30 dBm								
0 dBm								
00 dBm								
3.0 GHz			32001 pt	s	7	00.0 MHz/		10.0 GH 27.10.2015

Date: 27.OCT.2015 15:50:48



Appendix 6

Diagram 3c:

Att TDF 1 Frequenc	15 dB • SWT 10 y Sweep	s VBW 10 MHz Mode Auto	Sweep		●1Rm Max
					M1[1] -38.66 dB 15.992970 GF
) d8m					
10 dBm	H1 -13.000 dBm				
20 dBm					
30 dBm					
-30 dbm					
40 dBm					
50 dBm	-				
(a. in					
60 dBm					
-70 dBm					
80 dBm					
90 dBm					
30 00m					
100 dBm					
10.0 GHz		32001 pts	600.0 MH	7/	16.0 GH

Diagram 3d:

• 1Rm Ma M1[1] -34.16 d 21.997280 d	M1[1						
						ncy Sweep	
							18m
			 _		 18m	H1 -13.00	I dBm
			 		 		dBm
		_					dBm
			 				dBm-
							I dBm-
					 		I dBm
) dBm
			 				dBm
					 		I dBm
							10
							agw
				+			0 d8m
							-90 dBm

Date: 27.0CT.2015 15:46:45





Appendix 6

Diagram 4a:

♥ 1Rm Max
 31.47 dBm
 2.1526000 GHz
 -34.31 dBm
 3.0000000 GHz M1[1] -M2[1] 30 de 20 dB 10 dP 10 d 41 -13.000 d -20 dBr 30 dBr 40 dBm 50 dBr 60 de 3.0 GHz 32001 pts 9.0 kHz 300.0 MHz/ 28.10.2015 09:53:24 Measuring... 🚺 🗰 🗰 Date: 28.0CT.2015 09:53:24

Diagram 4b:

Ref Level	10.00 dBm Offset 1.50	B RBW 1 MHz					
DF	25 dB 🖷 SWT	10 s VBW 10 MHz	Mode Auto Sweep				
Frequency	/ Sweep						1Rm Max
						M1[1]	-33.90 dB 8.837930 G
d8m							<u> </u>
0 dBm	H1 -13.000 dBm						-
0 dBm						 	
10 dBm						MI	
10 dBm-						 	
50 dBm							<u> </u>
0 dBm						 	
0 dBm							
0 dBm						 	
0 dBm							
100 dBm							
.0 GHz		3200	l pts	700.	0 MHz/		10.0 GH

Date: 28.OCT.2015 09:55:54



Ap	pendix	6
1 sp	penuix	υ

Diagram 4c:

Att	0.00 dBm Offset 0.70 15 dB • SWT 10	ob = RBW 1 MHz)s VBW 10 MHz Mode Auto S	weep	
IDF Frequency	Sween			1Rm Max
rrequercy	SMCCP			M1[1] -38.85 dB 13.753730 G
d8m				
10 dBm	H1 -13.000 d8m			
0 dBm				
30 dBm				
10 dBm			MI	
io obin				
50 dBm				
i0 dBm				
0 dBm				
0 dBm				
0 dBm				
100 dBm				
0.0 GHz		32001 pts	600.0 MHz/	16.0 GH

Diagram 4d:

	Spectrum							~
Att	0.00 dBm Offse 15 dB • SWT	NBW 1 MHz /BW 10 MHz M	ode Auto Sweep	,				
DF Frequency	Sween							● 1Rm Ma>
requeries	Sweep						M1[1]	-34.01 dE 21.997660 G
men								
0 dBm	H1 -13.000 d8m							
) dBm								
0 dBm								
) dBm								
0 dBm								
dBm		 						
) dBm								
) dBm								
) dBm								+
10 dBm								
5.0 GHz		32001 p	ots	6	00.0 MHz/			22.0 Gł
	Y	02002				Measuring		28.10.2015

Date: 28.0CT.2015 09:57:45



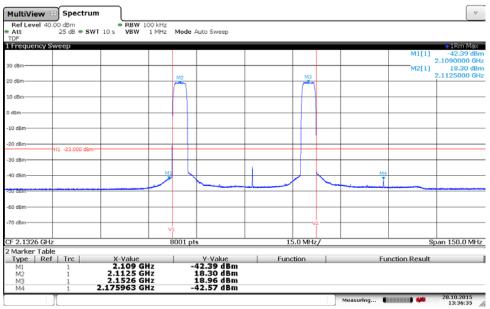
Appendix 6

Diagram 5a:

MultiView 🕀 Spectrum ♥ 1 Frequency Sweep 1Rm Max 28.06 dBm 2.1124000 GHz 28.20 dBm 2.1526000 GHz M1[1] HO de M2[1] 30 dB 10 di 10 d -13.000 20 dB 30 dBr 40 dBm 50 dBr 60 dB 9.0 kHz 32001 pts 300.0 MHz/ 3.0 GHz 2 Marker Table Type | Ref | Trc | X-Value 2.1124 GHz 2.1526 GHz 2.99086 GHz Y-Value 28.06 dBm 28.20 dBm -34.10 dBm I. Function 1 Function Result I M2 M3 Measuring... 🚺 🗰 🦇 28.10.2015 13:15:03

Date: 28.0CT.2015 13:15:03

Diagram 5b:



Date: 28.0CT.2015 13:36:34





Ap	pendix	6
1 sp	penuix	υ

Diagram 5c:

fultiView EB Spectrum	1 MHz					
Att 25 dB • SWT		Auto Sweep				
Frequency Sweep						IRm Max
					M1[1]	-33.92 dB 8.841430 GF
d8m						
0 dBm						
0 dBm						
0 dBm						
0.40					MI	
0 dBm						
0 dBm-						
0 dBm						
0 dBm						-
0 dBm						
0 dBm						
00 dBm						
.0 GHz	32001 pts		700.0 MH:	z/		10.0 GH
1				Measuring		28.10.2015 13:16:24

Diagram 5d:

	Spectrum Offset 0.70 dB	- DOW I MH-			~
Ref Level 1 Att DF		BW 10 MHz Mode Auto Sv VBW 10 MHz Mode Auto Sv	veep		
DF Frequency	Sweep				• 1Rm Max
					M1[1] -38.83 dB 13.768350 GF
d8m					
0 dBm					
O GBIN	H1 -13.000 d8m				
0 dBm					
0 dBm					
o obiii			Ma		
0 dBm					
0 dBm					
0.0011					
0 dBm					
0 dBm					
0 dBm					
0 dBm					
00 dBm					
0.0 GHz		32001 pts	600.0 MHz/		16.0 GF
	Y	01001 P.00	00010 111 127	Measuring	

Date: 28.0CT.2015 13:17:17





Appendix 6

Diagram 5e:

 MultiView
 Spectrum

 Ref Level 10.00 dbm
 Offset 0.70 db = RBW 1 MHz

 * Att
 15 db = SWT

 TDF
 10 s
 VBW 10 MHz

 Hrequency Sweep
 10 s
 V 1Rm Max M1[1] -34.09 dBm 21.987160 GHz 10 de 41 -13.000 dBr -20 dBr -30 dBr 50 di -60 dBr 70 di 80 d -90 dBr 100 d 22.0 GHz 32001 pts 600.0 MHz/ 16.0 GHz 28.10.2015 13:18:17 Measuring... 🚺 🗰 🚧

Date: 28.0CT.2015 13:18:16



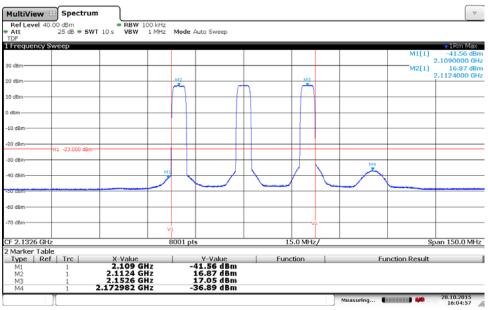
Appendix 6

Diagram 6a:

MultiView 🖽 Spectrum ♥ 1 Frequency Sweep 1Rm Max M1[1] 26.58 dBm 2.1124000 GHz 26.62 dBm 2.1326000 GHz 0 de M2[1] 30 dBr 20 dBn 10 dB 20 de 30 de 40 dBr 50 dBm 60 dBr 9.0 kHz 32001 pts 300.0 MHz/ 3.0 GHz 2 Marker Table Type | Ref | Trc | X-Value 2.1124 GHz 2.1326 GHz 2.1526 GHz 2.173106 GHz Y-Value 26.58 dBm 26.62 dBm 26.90 dBm -27.53 dBm Function Result M1 M2 M3 M4 Measuring... 🚺 🗰 28.10.2015 16:01:46

Date: 28.0CT.2015 16:01:46

Diagram 6b:



Date: 28.0CT.2015 16:04:57





Appendix 6

Diagram 6c:

 MultiView
 Spectrum

 Ref Level 10.00 dbm
 Offset 1.50 db = RBW
 1 MHz

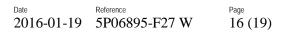
 * Att
 25 db = SWT
 10 s
 VBW
 10 MHz
 Mode Auto Sweep

 * Tree
 Intraguency Sweep
 10 s
 VBW
 10 MHz
 Mode Auto Sweep
 V 1Rm Max M1[1] -34.03 dBm 8.851050 GHz 10 de (1 -13.000 dB) -20 dB -30 dB 50 d -60 dBr 70 di 80 d -90 dBr 100 di 10.0 GHz 3.0 GHz 32001 pts 700.0 MHz/ 28.10.2015 16:06:03 Measuring... Date: 28.0CT.2015 16:06:02

Diagram 6d:

Att	10.00 dBm Offset 0.70 15 dB • SWT 1	dB = RBW 1 MHz Os VBW 10 MHz Mo	de Auto Sweep				
IDF Frequency	Sweep						• 1Rm Max
						M1[1]	-38.96 dB 13.748480 GF
d8m							13.748480 G
l0 dBm-	H1 -13.000 d8m						
20 dBm							
30 dBm							
10 dBm				M1			
io dom							
50 dBm							
i0 dBm							
70 dBm							
0 dBm							
0 dBm							
100 dBm							
0.0 GHz		32001 pt		600.0 MHz/	,		16.0 GF
0.0 GHZ		32001 pt	5	600.0 MHz/	, 		28.10.2015

Date: 28.OCT.2015 16:07:02





Appendix 6

Diagram 6e:

1ultiView	🖽 Spectrum	ר ר					~
Ref Level 1 Att	0.00 dBm Offset 0. 15 dB = SWT		iz Iz Mode Auto Swe	sep.			
DF		100 1011					
Frequency	Sweep					M1[1]	 1Rm Max -34.14 dBr 21.997280 GH
d8m							
0 dBm	H1 -13.000 dBm						
0 dBm							
0 dBm							
U dBm							
0 dBm							
0 dBm							
) dBm							
) dBm							
0 dBm							
00 dBm							
6.0 GHz		32	001 pts	600.0	MHz/		22.0 GH
	The second secon				Measuring.		28.10.2015 16:08:00

Date: 28.0CT.2015 16:08:00





Appendix 6

Diagram 7a:

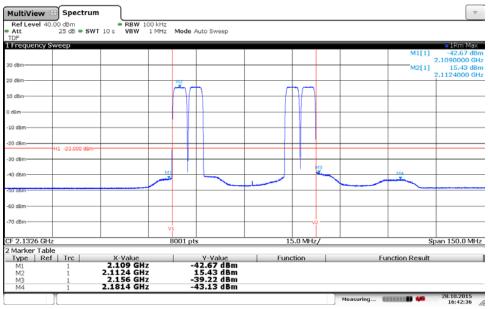
MultiView 🖽 Spectrum v
 Ref Level
 50.00 dBm
 RBW
 1 MHz

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

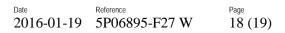
 TDF
 10
 10
 10
 1 Frequency Sweep 18m Max 25.18 dBm 2.1124000 GHz 25.49 dBm 2.1526000 GHz M1[1] 0 de M2[1] 30 dBr 1 I 20 dBn 10 dB 20 de 30 de VV 40 dBr 50 dBm 60 dBr 9.0 kHz 32001 pts 300.0 MHz/ 3.0 GHz 2 Marker Table Type | Ref | Trc | X-Value 2.1124 GHz 2.1526 GHz 2.179593 GHz 2.987334 GHz Y-Value 25.18 dBm 25.49 dBm -33.80 dBm -34.33 dBm Function Result 1 M1 M2 M3 M4 Measuring... 28.10.2015 16:44:53

Date: 28.0CT.2015 16:44:53

Diagram 7b:



Date: 28.0CT.2015 16:42:36





Ap	pendix	6
¹ ¹ ¹	penuix	υ

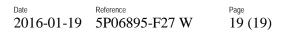
Diagram 7c:

Att TDF	25 dB 🖷 SWT	10 s VE	3W 10 MHz M	ode Auto Sweep	>			
Frequency S	weep						M1[1]	 1Rm Max -33,93 dBr 8,812120 GH
d8m								
IO dBm	H1 -13.000 d8m							
0 dBm								
30 dBm							 мі	
40 dBm-								
50 dBm								
60 dBm								
0 dBm								
10 dBm								
0 dBm								
00 d8m								
.0 GHz			32001 p	its	7	00.0 MHz/		10.0 GH

Diagram 7d:

Ref Level 1	Spectrum Offset 0.70 c					~
Att	15 dB • SWT 10	s VBW 10 MHz Mod	e Auto Sweep			
Frequency	Sweep					• 1Rm Max
						M1[1] -38.78 dB 13.751290 G
d8m						
10 dBm						
LU UBIII	H1 -13.000 dBm					
20 dBm						
30 dBm						
40 dBm				M1 T		
50 dBm						
60 dBm						
00 0811						
70 dBm						
80 dBm						
90 dBm						
100 dBm						
10.0 GHz		32001 pts		600.0 MHz/	Measuring	16.0 GH 28.10.2015

Date: 28.0CT.2015 16:47:41





Appendix 6

Diagram 7e:

4ultiView	🖽 Spectrum							~
Ref Level 1 Att	0.00 dBm Offset 0 15 dB = SWT	.70 dB = RBW 1 MR 10 s VBW 10 MR	1z Hz Mode Auto Sv	veep				
DF		100 1011	12 11000 11000 01					
Frequency	Sweep						M1[1]	 1Rm Max -34.11 dBr 21.994470 GH
d8m								
0 dBm	H1 -13.000 d8m							
0 dBm								
10 dBm								
O dBm								
60 dBm								
U dBm								
0 dBm								
0 dBm								
0 dBm								
0 dBm								
00 dBm								
6.0 GHz		32	2001 pts		600.0 MHz/			22.0 GHz
	Y					Measuring		28.10.2015 16:49:07

Date: 28.OCT.2015 16:49:07



Appendix 7

Field strength of spurious radiation measurements according to 47 CFR 27.53 (h) / IC RSS-139 6.6

Date	Temperature	Humidity
2015-10-28	$23^{\circ}C \pm 3^{\circ}C$	35 % ± 5 %
2015-10-29	$23^{\circ}C \pm 3^{\circ}C$	33 % ± 5 %
2015-10-30	$23^{\circ}C \pm 3^{\circ}C$	$32\%\pm5\%$

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 - 18 GHz and 1m in the frequency range 18 - 22 GHz.

In the frequency range 30 MHz - 22 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

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

The measurement procedure was as the following:

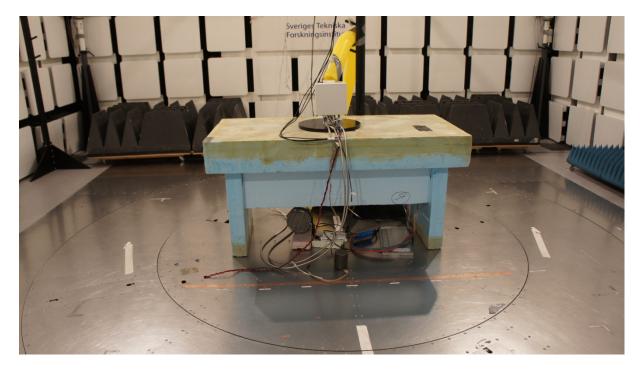
- 1. The pre-measurement was first performed with peak detector. For measurement < 1 GHz the test object was measured in eight directions with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m. For measurements > 1 GHz the test object was measured in seventeen directions with the antenna height 1.0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





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 ESU40	901 385
EMC 32 ver. 9.15.0	503 899
Chase Bilog Antenna CBL 6111A	503 182
EMCO Horn Antenna 3115	502 175
FLANN 20240-20, Std gain horn antenna	503 674
High pass filter	504 200
µComp Nordic, Low Noise Amplifier	901 545
Miteq, Low Noise Amplifier	503 278
Testo 625 temperature and humidity meter	504 188



Appendix 7

Tested configurations:

Symbolic name
В
М
Т
M2-IM
B4-Rspr

Results, representing worst case

M, Diagram 1 a-c

	Spurious emission level (dBm)				
Frequency (MHz)	Vertical	Horizontal			
30-22 000	All emission > 20 dB below limit	All emission > 20 dB below limit			

Measurement uncertainty:

3.2 dB up to 18 GHz, 3.6 dB above 18 GHz

Limits

§27.53(h) and RSS-139 6.6

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 1 MHz RBW.

Complies? Yes



Appendix 7



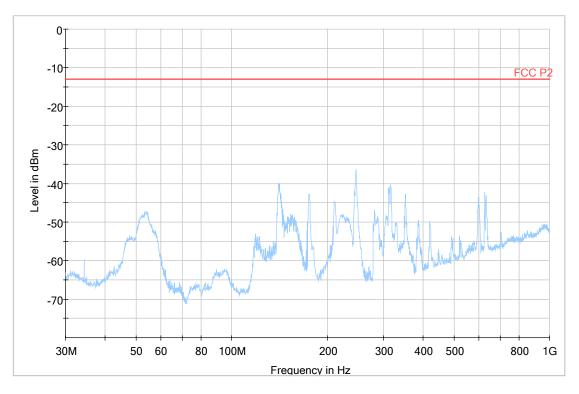
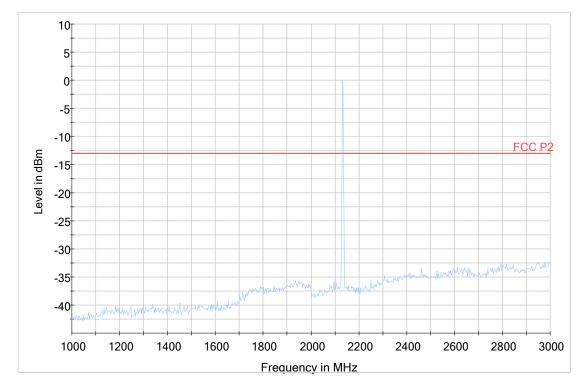


Diagram 1b:



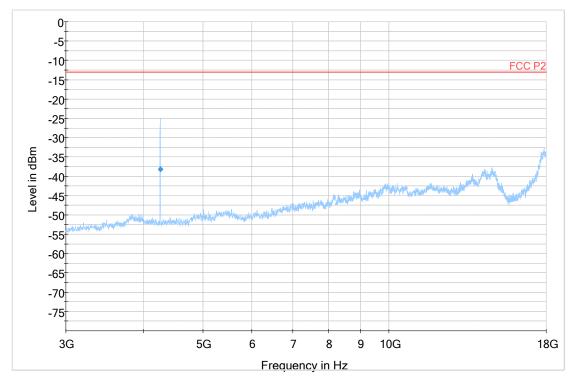
Note: The emission at 2132.6 MHz is the carrier frequency and shall be ignored in the context.





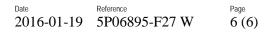
Appendix 7

Diagram 1c:



Final Result

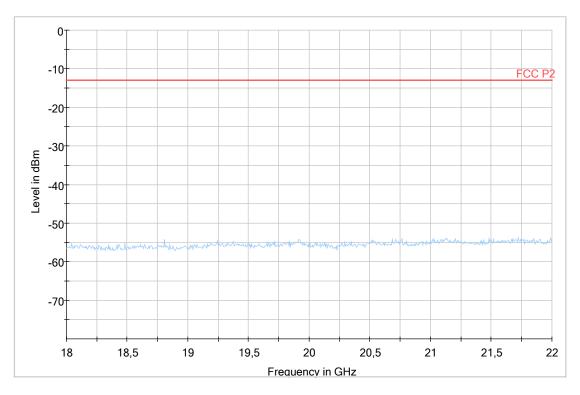
Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
4265.106	-38.20		-13.00	25.20	5000.0	1000.000	245.0	۷	30.0





Appendix 7

Diagram 1d:





Appendix 8

Frequency stability measurements according to CFR 47 §27.54/ IC RSS-139 6.4

Date	Temperature (test equipment)	Humidity (test equipment)
2015-11-07 to 2015-11-12	22-23 °C ± 3 °C	25-29 % ± 5 %

Test set-up and procedure

The measurement was made per 3GPP TS 25.141. The output was connected to a spectrum analyser. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements.

The measurement was also made using a resolution bandwidth of 1% of the emission bandwidth, a reference point at the unwanted emission level which complies with the attenuation of $43 + 10 \log 10 p$ (watts) (i.e. -13dBm) (for MIMO -16dBm) at the band edge of the lowest and highest channel was selected, and the frequency at these points was recorded as fL and fH respectively.

Measurement equipment	SP number
Rohde & Schwarz signal analyzer FSQ 40	504 143
RF attenuator	900 691
Testo 635, Temperature and humidity meter	504 203
Temperature cabinet	503 360



Appendix 8

Results

Nominal transmitter frequency was 2132.6 MHz (M) with a bandwidth of 5 MHz. Rated output power level at connector RF A (maximum): 37 dBm.

The optional fan unit was disconnected during the measurements in order to represent worst case configuration to include the optional configuration with maximum 34.8 dBm without fan.

Test condit	Frequency error (Hz)		
Supply voltage $DC(V)$	Temp.		
DC (V)	(°C)		
-48.0	+20	-5	
-55.2	+20	+8	
-40.8	+20	+5	
-48.0	+30	-6	
-48.0	+40	-6	
-48.0	+50	+8	
-48.0	+10	+6	
-48.0	0	-7	
-48.0	-10	+8	
-48.0	-20	+7	
-48.0	-30	-8	
Maximum freq.	8		
Measurement ur	$< \pm 1 \ge 10^{-7}$		

The Radio 2203 B66A was powered via the PSU 48 05.

The Radio 2203 B66A was powered via the PSU AC 10.

Test condit			
Supply voltageTemp.DC (V)(°C)		Frequency error (Hz)	
120	+20	+3	
138	+5		
102	-4		
Maximum freq.	5		
Measurement ur	$< \pm 1 \times 10^{-7}$		



Appendix 8

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 (2110 MHz) [kHz]	fH [MHz]	Offset to upper band edge (2155 MHz) [kHz]
-48.0	+20	5	2110.027	27.0	2154.975	25.0

Rated output power level at connector RF A (maximum): 37 dBm

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

Remark

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

Limits

§27.54:

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

RSS-139 6.4 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

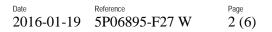


Appendix 9

External photos

Front side of Radio 2203 B66A







Appendix 9

Front side, KRC 161 553/1 with internal antenna and PSU 48 05





Appendix 9

Front side, KRC 161 553/1 with Omni antenna KRE 101 2245/1 and PSU 48 05



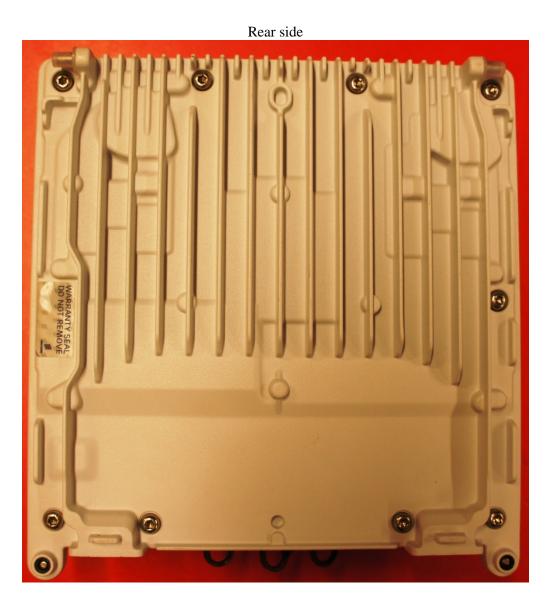


Appendix 9

Front side, KRC 161 553/1 with Omni antenna KRE 101 2233/1 and PSU 48 05









Appendix 9

Left side

Right side



Bottom side



