RF-EXPOSURE ASSESSMENT REPORT

FCC 47 CFR Part 2.1091
ISED RSS-102

RF-Exposure evaluation of mobile equipment

Report Reference No.....:	G0M-1601-5302-TFC091ME-V02
Testing Laboratory.....:	Eurofins Product Service GmbH
Address.....:	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation.....:	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, Reg.-No.: 96970 ISED OATS Filing assigned code: 3470A
Applicant's name.....:	lesswire GmbH
Address.....:	Rudower Chaussee 30 12489 Berlin GERMANY
Test specification:	
Standard.....:	47 CFR 2.1091 KDB 447498 D01 v06:2015-10-23 RSS-102, Issue 5:2015-03
Equipment under test (EUT):	
Product description	WLAN-LTE-Router
Model No.	CCU5
Additional Model(s)	None
Brand Name(s)	None
Hardware version	C/BWIA3
Firmware / Software version	1.0.119
	FCC-ID: 2AHHACCU5 IC: N/A
Test result	**Passed**

Possible test case verdicts:	
- neither assessed nor tested ..... :	N/N
- required by standard but not appl. to test object..... :	N/A
- required by standard but not tested..... :	N/T
- not required by standard for the test object ..... :	N/R
- test object does meet the requirement..... :	P (Pass)
- test object does not meet the requirement..... :	F (Fail)

Testing:

Test Lab Temperature ..... :	20 – 23 °C	
Test Lab Humidity ..... :	32 – 38 %	
Date of receipt of test item ..... :	2016-01-06	
Date (s) of assessment ..... :	2016-03-10	
Compiled by ..... :	Christian Weber	
Assessed by (+ signature) ..... : (Responsible for Assessment)	Burkhard Pudell	R. Pudell .....
Approved by (+ signature) ..... : (Head of Lab)	Christian Weber	C. Weber .....
Date of issue ..... :	2016-03-24	
Total number of pages ..... :	29	

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
01	2016-03-10	Initial Release	
02	2016-03-24	Hard- and Software Version corrected Reference documents corrected	C. Weber

REPORT INDEX

1 Equipment (Test item) Description

Description	WLAN-LTE-Router
Model	CCU5
Additional Model(s)	None
Brand Name(s)	None
Serial number	None
Hardware version	C/BWIA3
Software / Firmware version	1.0.119
FCC ID	2AHHACCU5
ISED	N/A
Equipment type	End product

1.1 Reference Documents

Document type	Document No.	Issued by	Date
FCC 22H/24E Test Report	G0M-1601-5302-TFC224GS-V02	Eurofins Product Service GmbH	2016-03-24
FCC 27 Test Report	G0M-1601-5302-TFC227UL-V02	Eurofins Product Service GmbH	2016-03-24
FCC 15.247 Test Report	G0M-1601-5302-TFC247WF-V02	Eurofins Product Service GmbH	2016-03-24
FCC Test Report	SYBH(Z-RF)024072014-2001	Huawei	2014-09-09
FCC Test Report	G0M-1211-2443-TFC247W-V02	Eurofins Product Service GmbH	2013-02-13

1.2 Standalone Radiation Sources

Mode #	Description	
GSM/GRPS/ EGPRS 850	Frequency range [MHz]	824.2 - 848.8
	Transmission modes	GMSK, 8-PSK
	Maximum conducted power [dBm]	33.20
	Maximum radiated power [dBm]	35.34
	Maximum transmission duty cycle [%]	50
	Antenna gain [dBi]	2.14
	Antenna diameter [cm]	10.5
	Assessment Frequency [MHz]	824.2
GSM/GRPS/ EGPRS 1900	Frequency range [MHz]	1850.2 - 1909.8
	Transmission modes	GMSK, 8-PSK
	Maximum conducted power [dBm]	30.68
	Maximum radiated power [dBm]	32.82
	Maximum transmission duty cycle [%]	50
	Antenna gain [dBi]	2.14
	Antenna diameter [cm]	10.5
	Assessment Frequency [MHz]	1850.2
WCDMA FDDII	Frequency range [MHz]	1852.4 - 1907.6
	Transmission modes	QPSK
	Maximum conducted power [dBm]	23.21
	Maximum radiated power [dBm]	25.35
	Maximum transmission duty cycle [%]	100
	Antenna gain [dBi]	2.14
	Antenna diameter [cm]	10.5
	Assessment Frequency [MHz]	1852.4

WCDMA FDDV	Frequency range [MHz]	826.4 - 846.6
	Transmission modes	QPSK
	Maximum conducted power [dBm]	23.32
	Maximum radiated power [dBm]	25.46
	Maximum transmission duty cycle [%]	100
	Antenna gain [dBi]	2.14
	Antenna diameter [cm]	10.5
	Assessment Frequency [MHz]	826.4
WCDMA FDDIV	Frequency range [MHz]	1712.4 - 1752.6
	Transmission modes	QPSK
	Maximum conducted power [dBm]	23.05
	Maximum radiated power [dBm]	25.19
	Maximum transmission duty cycle [%]	100
	Antenna gain [dBi]	2.14
	Antenna diameter [cm]	10.5
	Assessment Frequency [MHz]	1712.4
LTE FDD4	Frequency range [MHz]	1710 - 1754.9
	Transmission modes	QPSK, 16-QAM
	Maximum conducted power [dBm]	22.73
	Maximum radiated power [dBm]	24.87
	Maximum transmission duty cycle [%]	100
	Antenna gain [dBi]	2.14
	Antenna diameter [cm]	10.5
	Assessment Frequency [MHz]	1710
LTE FDD13	Frequency range [MHz]	777 - 786.9
	Transmission modes	QPSK, 16-QAM
	Maximum conducted power [dBm]	23.35
	Maximum radiated power [dBm]	25.49
	Maximum transmission duty cycle [%]	100
	Antenna gain [dBi]	2.14
	Antenna diameter [cm]	10.5
	Assessment Frequency [MHz]	777

IEEE 802.11	Frequency range [MHz]	2412 – 2462
	Transmission modes	BPSK, QPSK, 16-QAM, 64-QAM
	Maximum conducted power [dBm]	23.6
	Maximum radiated power [dBm]	24.2
	Maximum transmission duty cycle [%]	100
	Antenna gain [dBi]	0.8
	Antenna diameter [cm]	0.2
	Assessment Frequency [MHz]	2412

1.3 Multi-transmitter Modes

	GSM/GPRS/ EGPRS	WCDMA	LTE	IEEE 802.11
GSM/GPRS/ EGPRS	N/A	N/A	N/A	Yes
WCDMA	N/A	N/A	N/A	Yes
LTE	N/A	N/A	N/A	Yes
IEEE 802.11	Yes	Yes	Yes	N/A

2 Result Summary

FCC 47 CFR Part 2.1091, ISED RSS-102			
Product SpecifISED Standard Section	**Requirement**	**Result**	**Remarks**
47 CFR 2.1091	Maximum permissible exposure @ 20cm below limit	PASS	
RSS-102 2.5.2	Maximum permissible exposure @ 20cm below limit	N/A	
Remarks:			

3 RF-Exposure Classifications

Device Types	
Fixed	A fixed device is defined as a device physically secured at one fixed location and cannot be easily re-located.
Mobile	A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. (47 CFR 2.1091)
Portable	A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. (47 CFR 2.1093)
Exposure Categories	
Occupational / Controlled	Limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
General population / uncontrolled	Exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

4 Assessment

4.1 MPE Assessment Conditions – 47 CFR 2.1091 / RSS-102

MPE ASSESSMENT ACC. TO 47 CFR 2.1091 / ISED RSS-102				VERDICT: PASS
Assessment according to reference	Reference Method			
	FCC OET Bulletin 65 / RSS-102 & Safety Code 6			
Device type	mobile			
Exposure category	General public			
ISED Limits – Occupational / Controlled Exposure				
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [W/m^2]	Averaging time [min]
0.003-10*	170	180	-	Instantaneous*
0.1-10	-	1.6 / f	-	6**
1.29-10	193 / $f^{0.5}$	-	-	6**
10-20	61.4	0.163	-10	6
20-48	129.8 / $f^{0.25}$	0.3444 / $f^{0.25}$	44.72 / $f^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 $f^{0.25}$	0.04138 $f^{0.25}$	0.6455 $f^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000 / $f^{1.2}$
150000-300000	0.354 $f^{0.5}$	9.40 x 10^{-4} $f^{0.5}$	3.33 x 10^{-4} f	616000 / $f^{1.2}$
ISED Limits – General Population / Uncontrolled Exposure				
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [W/m^2]	Averaging time [min]
0.003-10*	83	90	-	Instantaneous*
0.1-10	-	0.73 / f	-	6**
1.1-10	87 / $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07 / $f^{0.25}$	0.1540 / $f^{0.25}$	8.944 / $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000 / $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10^{-4} $f^{0.5}$	6.67 x 10^{-5} f	616000 /$f^{1.2}$
* = Based on nerve stimulation ** = Bases on specific absorption rate				

FCC Limits – Occupational / Controlled Exposure				
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [mW/cm^2]	Averaging time [min]
0.3 – 3.0	614	1.63	(100)*	6
3.0 - 30	1842 / f	4.89 / f	(900 / f^2)*	6
30 - 300	61.4	0.163	1.0	6
300 - 1500	N/A	N/A	f / 300	6
1500 - 100000	N/A	N/A	5.0	6
FCC Limits – General Population / Uncontrolled Exposure				
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [mW/cm^2]	Averaging time [min]
0.3 – 1.34	614	1.63	(100)*	30
1.34 - 30	842 / f	2.19 / f	(180 / f^2)*	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	N/A	N/A	f / 1500	30
1500 - 100000	N/A	N/A	1.0	30
* = Plane wave equivalent power density; f in MHz				

Assessment Relations

$$\lambda[m] = \frac{c\left[\frac{m}{s}\right]}{f[Hz]} \; ; \; R_{FF}[m] \geq \frac{2 \cdot D[m]^2}{\lambda[m]}$$

$$S[mW/cm^2] = \frac{P_{E.I.R.P.}[mW]}{4\pi R[cm]^2} \; ; \; R[cm] = \sqrt{\frac{P_{E.I.R.P.}[mW]}{4\pi S[mW/cm^2]}}$$

$$P_R[mW] = P_C[mW] \cdot G \; ; \; P_R[dBm] = P_C[dBm] + G[dBi]$$

$$DCC\ [dB] = 10 \cdot Log_{10}\left(\frac{DC[\%]}{100}\right)$$

Assessment procedure

For each radio and frequency band the worst case transmission mode with the highest peak conducted or radiated power is evaluated at the frequency that results in the most restrictive rf-exposure limit. From the peak power values, antenna gains and duty cycles taken from the reference documents, the source average radiated power values are calculated. From the average radiated power the power densities at antenna far-field distance, at 20cm separation distance from the radiation source is calculated. Compliance with the RF-Exposure limit is determined at 20cm separation distance.

4.2 Single-Transmitter Assessment – 47 CFR 2.1091 / RSS-102

Assessment result - GSM/GRPS/EGPRS 850		
Transmission mode		
Operating mode frequency range [MHz]	824.2 - 848.8	
Assessment frequency (f) [MHz]	824.2	
Transmission duty cycle (DC) [%]	50	
Peak conducted power (P_C) [dBm]	33.20	
Peak radiated power (P_R) [dBm e.i.r.p.]	35.34	
Peak Antenna gain (G) [dBi]	2.14	
Maximum Antenna Diameter D [cm]	10.5	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.364 m	36.40 cm
Antenna far-field distance (R_{FF})	0.061 m	6.06 cm
Power evaluation		
Peak conducted power (P_C)	2089.30 mW	33.20 dBm
Peak Antenna Gain (G)	1.64	2.14 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	3419.79 mW	35.34 dBm
Measured peak radiated power (P_R)	3419.79 mW	35.34 dBm
Source average Power		
Maximum transmission duty cycle (DC)	50.0 %	
Duty cycle correction (DCC)	0.50	-3.01 dB
Measured peak radiated power (P_R)	3419.79 mW	35.34 dBm
Averaged peak radiated power (P_{RAVG})	1709.90 mW	32.33 dBm
Power density		
Compliance power density limit FCC	0.549 mW/cm^2	5.49 W/m^2
Compliance power density limit ISED	0.258 mW/cm^2	2.58 W/m^2
Power density @ Antenna far-field distance	3.708 mW/cm^2	37.078 W/m^2
Power density @ 20cm	0.340 mW/cm^2	3.402 W/m^2
Distance for compliance power density FCC	0.157 m	15.74 cm
Distance for compliance power density ISED	0.230 m	22.98 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The EUT fulfills the ISED MPE limit @ 22.98 cm!		
Comments:		

Assessment result - GSM/GRPS/EGPRS 1900		
Transmission mode		
Operating mode frequency range [MHz]	1850.2 - 1909.8	
Assessment frequency (f) [MHz]	1850.2	
Transmission duty cycle (DC) [%]	50	
Peak conducted power (P_C) [dBm]	30.68	
Peak radiated power (P_R) [dBm e.i.r.p.]	32.82	
Peak Antenna gain (G) [dBi]	2.14	
Maximum Antenna Diameter D [cm]	10.5	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.162 m	16.21 cm
Antenna far-field distance (R_{FF})	0.136 m	13.60 cm
Power evaluation		
Peak conducted power (P_C)	1169.50 mW	30.68 dBm
Peak Antenna Gain (G)	1.64	2.14 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	1914.26 mW	32.82 dBm
Measured peak radiated power (P_R)	1914.26 mW	32.82 dBm
Source average Power		
Maximum transmission duty cycle (DC)	50.0 %	
Duty cycle correction (DCC)	0.50	-3.01 dB
Measured peak radiated power (P_R)	1914.26 mW	32.82 dBm
Averaged peak radiated power (P_{RAVG})	957.13 mW	29.81 dBm
Power density		
Compliance power density limit FCC	1.000 mW/cm^2	10.00 W/m^2
Compliance power density limit ISED	0.448 mW/cm^2	4.48 W/m^2
Power density @ Antenna far-field distance	0.412 mW/cm^2	4.119 W/m^2
Power density @ 20cm	0.190 mW/cm^2	1.904 W/m^2
Distance for compliance power density FCC	0.087 m	8.73 cm
Distance for compliance power density ISED	0.130 m	13.04 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The power density of the EUT at 20cm is below the ISED MPE limit!		
Comments:		

Assessment result - WCDMA FDDII		
Transmission mode		
Operating mode frequency range [MHz]	1852.4 - 1907.6	
Assessment frequency (f) [MHz]	1852.4	
Transmission duty cycle (DC) [%]	100	
Peak conducted power (P_C) [dBm]	23.21	
Peak radiated power (P_R) [dBm e.i.r.p.]	25.35	
Peak Antenna gain (G) [dBi]	2.14	
Maximum Antenna Diameter D [cm]	10.5	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.162 m	16.20 cm
Antenna far-field distance (R_{FF})	0.136 m	13.62 cm
Power evaluation		
Peak conducted power (P_C)	209.41 mW	23.21 dBm
Peak Antenna Gain (G)	1.64	2.14 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	342.77 mW	25.35 dBm
Measured peak radiated power (P_R)	342.77 mW	25.35 dBm
Source average Power		
Maximum transmission duty cycle (DC)	100.0 %	
Duty cycle correction (DCC)	1.00	0.00 dB
Measured peak radiated power (P_R)	342.77 mW	25.35 dBm
Averaged peak radiated power (P_{RAVG})	342.77 mW	25.35 dBm
Power density		
Compliance power density limit FCC	1.000 mW/cm^2	10.00 W/m^2
Compliance power density limit ISED	0.448 mW/cm^2	4.48 W/m^2
Power density @ Antenna far-field distance	0.147 mW/cm^2	1.471 W/m^2
Power density @ 20cm	0.068 mW/cm^2	0.682 W/m^2
Distance for compliance power density FCC	0.052 m	5.22 cm
Distance for compliance power density ISED	0.078 m	7.80 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The power density of the EUT at 20cm is below the ISED MPE limit!		
Comments:		

Assessment result - WCDMA FDDV		
Transmission mode		
Operating mode frequency range [MHz]	826.4 - 846.6	
Assessment frequency (f) [MHz]	826.4	
Transmission duty cycle (DC) [%]	100	
Peak conducted power (P_C) [dBm]	23.32	
Peak radiated power (P_R) [dBm e.i.r.p.]	25.46	
Peak Antenna gain (G) [dBi]	2.14	
Maximum Antenna Diameter D [cm]	10.5	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.363 m	36.30 cm
Antenna far-field distance (R_{FF})	0.061 m	6.07 cm
Power evaluation		
Peak conducted power (P_C)	214.78 mW	23.32 dBm
Peak Antenna Gain (G)	1.64	2.14 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	351.56 mW	25.46 dBm
Measured peak radiated power (P_R)	351.56 mW	25.46 dBm
Source average Power		
Maximum transmission duty cycle (DC)	100.0 %	
Duty cycle correction (DCC)	1.00	0.00 dB
Measured peak radiated power (P_R)	351.56 mW	25.46 dBm
Averaged peak radiated power (P_{RAVG})	351.56 mW	25.46 dBm
Power density		
Compliance power density limit FCC	0.551 mW/cm^2	5.51 W/m^2
Compliance power density limit ISED	0.258 mW/cm^2	2.58 W/m^2
Power density @ Antenna far-field distance	0.758 mW/cm^2	7.583 W/m^2
Power density @ 20cm	0.070 mW/cm^2	0.699 W/m^2
Distance for compliance power density FCC	0.071 m	7.13 cm
Distance for compliance power density ISED	0.104 m	10.41 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The power density of the EUT at 20cm is below the ISED MPE limit!		
Comments:		

Assessment result - WCDMA FDDIV		
Transmission mode		
Operating mode frequency range [MHz]	1712.4 - 1752.6	
Assessment frequency (f) [MHz]	1712.4	
Transmission duty cycle (DC) [%]	100	
Peak conducted power (P_C) [dBm]	23.05	
Peak radiated power (P_R) [dBm e.i.r.p.]	25.19	
Peak Antenna gain (G) [dBi]	2.14	
Maximum Antenna Diameter D [cm]	10.5	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.175 m	17.52 cm
Antenna far-field distance (R_{FF})	0.126 m	12.59 cm
Power evaluation		
Peak conducted power (P_C)	201.84 mW	23.05 dBm
Peak Antenna Gain (G)	1.64	2.14 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	330.37 mW	25.19 dBm
Measured peak radiated power (P_R)	330.37 mW	25.19 dBm
Source average Power		
Maximum transmission duty cycle (DC)	100.0 %	
Duty cycle correction (DCC)	1.00	0.00 dB
Measured peak radiated power (P_R)	330.37 mW	25.19 dBm
Averaged peak radiated power (P_{RAVG})	330.37 mW	25.19 dBm
Power density		
Compliance power density limit FCC	1.000 mW/cm^2	10.00 W/m^2
Compliance power density limit ISED	0.425 mW/cm^2	4.25 W/m^2
Power density @ Antenna far-field distance	0.166 mW/cm^2	1.660 W/m^2
Power density @ 20cm	0.066 mW/cm^2	0.657 W/m^2
Distance for compliance power density FCC	0.051 m	5.13 cm
Distance for compliance power density ISED	0.079 m	7.87 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The power density of the EUT at 20cm is below the ISED MPE limit!		
Comments:		

Assessment result - LTE FDD4		
Transmission mode		
Operating mode frequency range [MHz]	1710 - 1754.9	
Assessment frequency (f) [MHz]	1710	
Transmission duty cycle (DC) [%]	100	
Peak conducted power (P_C) [dBm]	22.73	
Peak radiated power (P_R) [dBm e.i.r.p.]	24.87	
Peak Antenna gain (G) [dBi]	2.14	
Maximum Antenna Diameter D [cm]	10.5	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.175 m	17.54 cm
Antenna far-field distance (R_{FF})	0.126 m	12.57 cm
Power evaluation		
Peak conducted power (P_C)	187.50 mW	22.73 dBm
Peak Antenna Gain (G)	1.64	2.14 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	306.90 mW	24.87 dBm
Measured peak radiated power (P_R)	306.90 mW	24.87 dBm
Source average Power		
Maximum transmission duty cycle (DC)	100.0 %	
Duty cycle correction (DCC)	1.00	0.00 dB
Measured peak radiated power (P_R)	306.90 mW	24.87 dBm
Averaged peak radiated power (P_{RAVG})	306.90 mW	24.87 dBm
Power density		
Compliance power density limit FCC	1.000 mW/cm^2	10.00 W/m^2
Compliance power density limit ISED	0.424 mW/cm^2	4.24 W/m^2
Power density @ Antenna far-field distance	0.155 mW/cm^2	1.546 W/m^2
Power density @ 20cm	0.061 mW/cm^2	0.611 W/m^2
Distance for compliance power density FCC	0.049 m	4.94 cm
Distance for compliance power density ISED	0.076 m	7.59 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The power density of the EUT at 20cm is below the ISED MPE limit!		
Comments:		

Assessment result - LTE FDD13		
Transmission mode		
Operating mode frequency range [MHz]	777 - 786.9	
Assessment frequency (f) [MHz]	777	
Transmission duty cycle (DC) [%]	100	
Peak conducted power (P_C) [dBm]	23.35	
Peak radiated power (P_R) [dBm e.i.r.p.]	25.49	
Peak Antenna gain (G) [dBi]	2.14	
Maximum Antenna Diameter D [cm]	10.5	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.386 m	38.61 cm
Antenna far-field distance (R_{FF})	0.057 m	5.71 cm
Power evaluation		
Peak conducted power (P_C)	216.27 mW	23.35 dBm
Peak Antenna Gain (G)	1.64	2.14 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	354.00 mW	25.49 dBm
Measured peak radiated power (P_R)	354.00 mW	25.49 dBm
Source average Power		
Maximum transmission duty cycle (DC)	100.0 %	
Duty cycle correction (DCC)	1.00	0.00 dB
Measured peak radiated power (P_R)	354.00 mW	25.49 dBm
Averaged peak radiated power (P_{RAVG})	354.00 mW	25.49 dBm
Power density		
Compliance power density limit FCC	0.518 mW/cm^2	5.18 W/m^2
Compliance power density limit ISED	0.247 mW/cm^2	2.47 W/m^2
Power density @ Antenna far-field distance	0.864 mW/cm^2	8.637 W/m^2
Power density @ 20cm	0.070 mW/cm^2	0.704 W/m^2
Distance for compliance power density FCC	0.074 m	7.37 cm
Distance for compliance power density ISED	0.107 m	10.67 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The power density of the EUT at 20cm is below the ISED MPE limit!		
Comments:		

Assessment result - IEEE 802.11		
Transmission mode		
Operating mode frequency range [MHz]	2412 – 2462	
Assessment frequency (f) [MHz]	2412	
Transmission duty cycle (DC) [%]	100	
Peak conducted power (P_C) [dBm]	23.6	
Peak radiated power (P_R) [dBm e.i.r.p.]	24.2	
Peak Antenna gain (G) [dBi]	0.8	
Maximum Antenna Diameter D [cm]	0.2	
Antenna far-field distance		
Transmission frequency wavelength (λ)	0.124 m	12.44 cm
Antenna far-field distance (R_{FF})	0.000 m	0.01 cm
Power evaluation		
Peak conducted power (P_C)	229.09 mW	23.60 dBm
Peak Antenna Gain (G)	1.20	0.80 dBi
Calculated peak radiated power ($P_{R\text{-}Calc}$)	275.42 mW	24.40 dBm
Measured peak radiated power (P_R)	263.03 mW	24.20 dBm
Source average Power		
Maximum transmission duty cycle (DC)	100.0 %	
Duty cycle correction (DCC)	1.00	0.00 dB
Measured peak radiated power (P_R)	263.03 mW	24.20 dBm
Averaged peak radiated power (P_{RAVG})	263.03 mW	24.20 dBm
Power density		
Compliance power density limit FCC	1.000 mW/cm^2	10.00 W/m^2
Compliance power density limit ISED	0.537 mW/cm^2	5.37 W/m^2
Power density @ Antenna far-field distance	505938.891 mW/cm^2	5059388.910 W/m^2
Power density @ 20cm	0.052 mW/cm^2	0.523 W/m^2
Distance for compliance power density FCC	0.046 m	4.58 cm
Distance for compliance power density ISED	0.062 m	6.25 cm
Verdict		
The power density of the EUT at 20cm is below the FCC MPE limit!		
The power density of the EUT at 20cm is below the ISED MPE limit!		
Comments:		

4.3 Multi-Transmitter Assessment – 47 CFR 2.1091 / RSS-102

Assessment result - GSM/GRPS/EGPRS 850 + IEEE 802.11		
Concurrent Operating Modes		
Number of concurrent operating modes	2	
Compliance Distance		
Distance to EUT used for compliance evaluation [cm]	24	
GSM/GRPS/EGPRS 850		
FCC limit ($S_{FCCLimit}$)	0.549 mW/cm^2	5.49 W/m^2
ISED limit ($S_{ICLimit}$)	0.258 mW/cm^2	2.58 W/m^2
Power density @ compliance distance (S_{CD})	0.236 mW/cm^2	2.36 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.43	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.92	
IEEE 802.11		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.537 mW/cm^2	5.37 W/m^2
Power density @ compliance distance (S_{CD})	0.036 mW/cm^2	0.36 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.04	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.07	
Sum of MPE Ratios		
$\sum S_{CD}$ / $S_{FCCLimit}$ FCC	0.47	
$\sum S_{CD}$ / $S_{ICLimit}$ ISED	0.98	
Verdict		
The EUT fulfils the FCC multi-transmitter MPE limit @ 24.00cm!		
The EUT fulfils the ISED multi-transmitter MPE limit @ 24.00cm!		
Comments:		

Assessment result - GSM/GRPS/EGPRS 1900 + IEEE 802.11		
Concurrent Operating Modes		
Number of concurrent operating modes	2	
Compliance Distance		
Distance to EUT used for compliance evaluation [cm]	20	
GSM/GRPS/EGPRS 1900		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.448 mW/cm^2	4.48 W/m^2
Power density @ compliance distance (S_{CD})	0.190 mW/cm^2	1.90 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.19	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.43	
IEEE 802.11		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.537 mW/cm^2	5.37 W/m^2
Power density @ compliance distance (S_{CD})	0.052 mW/cm^2	0.52 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.05	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.10	
Sum of MPE Ratios		
$\sum S_{CD}$ / $S_{FCCLimit}$ FCC	0.24	
$\sum S_{CD}$ / $S_{ICLimit}$ ISED	0.52	
Verdict		
The EUT fulfils the FCC multi-transmitter MPE limit @ 20.00cm!		
The EUT fulfils the ISED multi-transmitter MPE limit @ 20.00cm!		
Comments:		

Assessment result - WCDMA FDDII + IEEE 802.11		
Concurrent Operating Modes		
Number of concurrent operating modes	2	
Compliance Distance		
Distance to EUT used for compliance evaluation [cm]	20	
WCDMA FDDII		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.448 mW/cm^2	4.48 W/m^2
Power density @ compliance distance (S_{CD})	0.068 mW/cm^2	0.68 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.07	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.15	
IEEE 802.11		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.537 mW/cm^2	5.37 W/m^2
Power density @ compliance distance (S_{CD})	0.052 mW/cm^2	0.52 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.05	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.10	
Sum of MPE Ratios		
$\sum S_{CD}$ / $S_{FCCLimit}$ FCC	0.12	
$\sum S_{CD}$ / $S_{ICLimit}$ ISED	0.25	
Verdict		
The EUT fulfils the FCC multi-transmitter MPE limit @ 20.00cm!		
The EUT fulfils the ISED multi-transmitter MPE limit @ 20.00cm!		
Comments:		

Assessment result - WCDMA FDDV + IEEE 802.11		
Concurrent Operating Modes		
Number of concurrent operating modes	2	
Compliance Distance		
Distance to EUT used for compliance evaluation [cm]	20	
WCDMA FDDV		
FCC limit ($S_{FCCLimit}$)	0.551 mW/cm^2	5.51 W/m^2
ISED limit ($S_{ICLimit}$)	0.258 mW/cm^2	2.58 W/m^2
Power density @ compliance distance (S_{CD})	0.070 mW/cm^2	0.70 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.13	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.27	
IEEE 802.11		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.537 mW/cm^2	5.37 W/m^2
Power density @ compliance distance (S_{CD})	0.052 mW/cm^2	0.52 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.05	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.10	
Sum of MPE Ratios		
$\sum S_{CD}$ / $S_{FCCLimit}$ FCC	0.18	
$\sum S_{CD}$ / $S_{ICLimit}$ ISED	0.37	
Verdict		
The EUT fulfils the FCC multi-transmitter MPE limit @ 20.00cm!		
The EUT fulfils the ISED multi-transmitter MPE limit @ 20.00cm!		
Comments:		

Assessment result - WCDMA FDDIV + IEEE 802.11		
Concurrent Operating Modes		
Number of concurrent operating modes	2	
Compliance Distance		
Distance to EUT used for compliance evaluation [cm]	20	
WCDMA FDDIV		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.425 mW/cm^2	4.25 W/m^2
Power density @ compliance distance (S_{CD})	0.066 mW/cm^2	0.66 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.07	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.15	
IEEE 802.11		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.537 mW/cm^2	5.37 W/m^2
Power density @ compliance distance (S_{CD})	0.052 mW/cm^2	0.52 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.05	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.10	
Sum of MPE Ratios		
$\sum S_{CD}$ / $S_{FCCLimit}$ FCC	0.12	
$\sum S_{CD}$ / $S_{ICLimit}$ ISED	0.25	
Verdict		
The EUT fulfils the FCC multi-transmitter MPE limit @ 20.00cm!		
The EUT fulfils the ISED multi-transmitter MPE limit @ 20.00cm!		
Comments:		

Assessment result - LTE FDD4 + IEEE 802.11		
Concurrent Operating Modes		
Number of concurrent operating modes	2	
Compliance Distance		
Distance to EUT used for compliance evaluation [cm]	20	
LTE FDD4		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.424 mW/cm^2	4.24 W/m^2
Power density @ compliance distance (S_{CD})	0.061 mW/cm^2	0.61 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.06	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.14	
IEEE 802.11		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.537 mW/cm^2	5.37 W/m^2
Power density @ compliance distance (S_{CD})	0.052 mW/cm^2	0.52 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.05	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.10	
Sum of MPE Ratios		
$\sum S_{CD}$ / $S_{FCCLimit}$ FCC	0.11	
$\sum S_{CD}$ / $S_{ICLimit}$ ISED	0.24	
Verdict		
The EUT fulfils the FCC multi-transmitter MPE limit @ 20.00cm!		
The EUT fulfils the ISED multi-transmitter MPE limit @ 20.00cm!		
Comments:		

Assessment result - LTE FDD13 + IEEE 802.11		
Concurrent Operating Modes		
Number of concurrent operating modes	2	
Compliance Distance		
Distance to EUT used for compliance evaluation [cm]	20	
LTE FDD13		
FCC limit ($S_{FCCLimit}$)	0.518 mW/cm^2	5.18 W/m^2
ISED limit ($S_{ICLimit}$)	0.247 mW/cm^2	2.47 W/m^2
Power density @ compliance distance (S_{CD})	0.070 mW/cm^2	0.70 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.14	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.28	
IEEE 802.11		
FCC limit ($S_{FCCLimit}$)	1.000 mW/cm^2	10.00 W/m^2
ISED limit ($S_{ICLimit}$)	0.537 mW/cm^2	5.37 W/m^2
Power density @ compliance distance (S_{CD})	0.052 mW/cm^2	0.52 W/m^2
MPE Ratio (S_{CD} / $S_{FCCLimit}$) FCC	0.05	
MPE Ratio (S_{CD} / $S_{ICLimit}$) ISED	0.10	
Sum of MPE Ratios		
$\sum S_{CD}$ / $S_{FCCLimit}$ FCC	0.19	
$\sum S_{CD}$ / $S_{ICLimit}$ ISED	0.38	
Verdict		
The EUT fulfils the FCC multi-transmitter MPE limit @ 20.00cm!		
The EUT fulfils the ISED multi-transmitter MPE limit @ 20.00cm!		
Comments:		