DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909

Test Report No:
NIE: 69743RRF.012A1

Partial Test Report

USA FCC 15.31(h), 15.209, 15.247, 22, 27, 90
CANADA ISED RSS-119, RSS-132, RSS-139, RSS-199, RSS-247, RSS-Gen

(*) Identification of item tested	CR50 Communications Controller
(*) Trademark	Leica
(*) Model and /or type reference	CR50
Other identification of the product	FCC ID: RFD-CR50 IC: 3177A-CR50 - Contains FCC ID: N7NEM75 - Contains IC: 2417C-EM75 - Contains FCC ID: MRBSATEL-TA43 Contains IC: 2422A-SATELTA43
(*) Features	Bluetooth, 802.11@2.4GHz, E, 400 MHz Radio HW version: 2A SW version: 0.1.1707
Applicant	LEICA GEOSYSTEMS AG Heinrich-Wild-Strasse, 9435 Heerbrugg, Switzerland
Test method requested, standard	USA FCC Part 15.31(h) (10-1-20 Edition): Measurement standard. USA FCC Part 15.209 (10-1-20 Edition): Radiated emission limits; general requirements. USA FCC Part 15.247 (10-1-20 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 22 (10-1-20 Edition): Public Mobile Services. USA FCC Part 27 (10-1-20 Edition): Miscellaneous Wireless Communications Services. USA FCC Part 90 (10-1-20 Edition): Private Land Mobile Radio Services. CANADA ISED RSS-119 Issue 12 Amendment 1, Apr. 2022. CANADA ISED RSS-132 Issue 3, Jan. 2013. CANADA ISED RSS-139 Issue 3, Jul. 2015. CANADA ISED RSS-199 Issue 3, Dec. 2016. CANADA ISED RSS-247 Issue 2, Feb. 2017. CANADA ISED RSS-Gen Issue 5, Amendment 2, Feb. 2021.

	Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. Measurement Guidance for Certification of Licensed Digital Transmitters. 971168 D01 Power Meas License Digital Systems v03r01 dated April 9, 2018. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. ANSI C63.26-2015. IEEE/ANSI Standard for Testing of Transmitters Used in Licensed Radio Services.
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager  2022.10.18 17:28:30 +02'00'
Date of issue	2022-10-18
Report template No.	FDT08_24 (*) "Data provided by the client"

Index

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación) to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification S.A.U is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification S.A.U is an ISED-recognized accredited testing laboratory, CABid: ES1909, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA Testing and Certification S.A.U.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of the EUT from 30 MHz to 1 GHz is: Measurement uncertainty $\leq \pm$ 5.35 dB with factor (k=2).

The total uncertainty of the measurement system for the radiated emissions of the EUT from 1 to 17 GHz is: Measurement uncertainty $\leq \pm$ 4.32 dB with factor (k=2).

The total uncertainty of the measurement system for the radiated emissions of the EUT from 17 to 26 GHz is: Measurement uncertainty $\leq \pm$ 5.51 dB with factor (k=2).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample of the model CR50 is an on-machine communication unit.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial No.	Date of Reception	Application
S/01	69743_12.1	CR50 Communications Controller	CR50	0001004	2021-12-02	Equipment Under Test
S/01	69743_17.1	iCG100 GNSS Controller	iCG100	0001002	2021-12-02	Auxiliary Equipment
S/01	69743_24.1	Magnetic Antenna	GMLFML195	--	2021-12-02	Auxiliary Equipment
S/01	69743_44.1	PCTEL Antenna	MLPV430	--	2021-12-02	Auxiliary Equipment
S/01	69743_56.1	MSMA Antenna	WW-COVDB2458-7FT	--	2021-12-02	Auxiliary Equipment
S/01	69743_59.1	USB to USB modem cable	--	--	2021-12-02	Auxiliary Equipment
S/01	69743_62.1	USB Type A - Jack	--	--	2021-12-02	Auxiliary Equipment
S/01	69743_68.1	USB Type A - Jack	--	--	2021-12-02	Auxiliary Equipment
S/01	69743_73.1	D9+Power Cable	--	--	2021-12-02	Auxiliary Equipment
S/01	69743_82.1	C15 Robust Antenna Cable 5M	--	--	2021-12-02	Auxiliary Equipment
S/01	69743_88.1	GNSS Antenna	CGA100	4207189	2021-12-02	Auxiliary Equipment
S/01	69743_110.1	AEC M12T M/F 5,0m cable	950559	--	2021-12-02	Auxiliary Equipment
S/01	69743_126.1	Auto-Link-SPE-M device	--	--	2022-04-04	Auxiliary Equipment
S/01	69743_128.1	Connecting cable	--	--	2022-04-04	Auxiliary Equipment

Id	Type
S/01	Sample used for radiated tests.

Test sample description

Ports……:	Port name and description	Cable							
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)				
			☐	☐	☐				
			☐	☐	☐				
			☐	☐	☐				
			☐	☐	☐				
Supplementary information to the ports……:	-								
Rated power supply¡ ..... :	Voltage and Frequency			Reference poles					
				L1	L2	L3	N	PE	
	☐	AC:		☐	☐	☐	☐	☐	
	☐	AC:		☐	☐	☐	☐	☐	
	☒	DC: 12V							
	☐	DC:							
Rated Power..... :	7.2W								
Clock frequencies..... :	-								
Other parameters ..... :	Supply voltage range: 9 V to 36 V DC								
Software version..... :	0.1.1707								
Hardware version ..... :	2A								
Dimensions in cm (W x H x D) ... :	150mm x 145mm x 40mm								
Mounting position ..... :	☐	Table top equipment							
	☐	Wall/Ceiling mounted equipment							
	☐	Floor standing equipment							
	☐	Hand-held equipment							
	☒	Other: In cabin of a machine							
Modules/parts..... :	Module/parts of test item			Type		Manufacturer			
	Cellular module			EM7565		Sierra Wireless			
	SRD module			TR489		Satel			
Accessories (not part of the test item) ..... :	Description			Type		Manufacturer			
Documents as provided by the applicant..... :	Description			File name		Issue date			

(3) Only for Medical Equipment

Identification of the client

LEICA GEOSYSTEMS AG

Heinrich-Wild-Strasse, 9435 Heerbrugg

Switzerland

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-06-03
Date (finish)	2022-06-07

Document history

Report number	Date	Description
69743RRF.012	2022-09-13	First release.
69743RRF.012A1	2022-10-18	First modification: update of typos. This modification test report cancels and replaces the test report 69743RRF.012.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semi-anechoic chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: José Manuel Jiménez.

Used instrumentation:

Radiated Measurements:

Equipment	Model	Manufacturer	Next Calibration
SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	2024-06-07
SHIELDED ROOM	S101	ETS LINDGREN	N/A
PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2022-12-01
HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-10-29
PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	2023-03-17
HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2023-08-24
HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2023-05-05
PRE-AMPLIFIER G>30dB 17-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2022-09-08
EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-12-30
DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	N/A
DIGITAL MULTIMETER	175	FLUKE	2022-11-04
EMC/RF MEASUREMENT SOFTWARE	EMC32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured :	N/M

Summary

FCC 15, FCC 22, FCC 27, FCC 90 / RSS-119, RSS-132, RSS-139, RSS-199, RSS-247, RSS-Gen		
Requirement – Test case	**Verdict**	**Remark**
FCC 15.31 (h), FCC 15.209 (a), FCC 15.247 (d), FCC 22.917, FCC 27.53, FCC 90.210 / RSS-119 5.8, RSS-132 5.5, RSS-139 6.6, RSS-199 4.5 (b), RSS-247 5.5, RSS-Gen 8.9 Emission limitations radiated (Transmitter)	P	(1)
Supplementary information and remarks: (1) Only Co-location radiated spurious emission test was requested.		

Appendix A: Test results FCC 15.31(h), 15.209, 15.247, 22, 27, 90 / RSS-119, RSS-132, RSS-139, RSS-199, RSS-247, RSS-Gen

INDEX

TEST CONDITIONS

(*): Data provided by the Applicant.

POWER SUPPLY (*):

Vnominal: 12 Vdc
Type of Power Supply: External DC.

ANTENNA (*):

802.11 b/g/n SISO:

Type of Antenna: Internal.

Maximum Declared Antenna Gain: +5.2 dBi

Cellular:

Band	Maximum Declared Antenna Gain	Type of Antenna
3G Band V	+2.5 dBi	External
LTE Band 41	+2.5 dBi	
LTE Band 66	+2.5 dBi	

SRD 400 MHz:

Type of Antenna: External.

Maximum Declared Antenna Gain: 0 dBi.

SUPPORTED BANDS:

The EUT supports the following wireless bands. Based on their EIRP for each band, it was selected the worst case for each range:

Frequency range	Technologies	Modulations	Worst case
2.4 GHz (*)	Bluetooth Classic Wi-Fi 2.4GHz	GFSK, PI/4-DQPSK, 8DPSK Wi-Fi (b, g and n20)	Wi-Fi b (CH Low)

(*): Both technologies cannot work simultaneously: only one.

TEST FREQUENCIES (*):

	CELLULAR	
Band:	3G Band V	
Frequency Range:	824 – 849 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	High: 4233	846.6
Band:	LTE Band 41	
Frequency Range:	2496 – 2690 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	Mid: 40620	2593 MHz (BW 20 MHz, RB Size 1, RB Offset 0, QPSK)

Band:	LTE Band 66	
Frequency Range:	1710 – 1780 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	Mid: 132322	1745 MHz (BW 20 MHz, RB Size 1, RB Offset 0, QPSK)

	WLAN 2.4 GHz (IEEE 802.11 bgn20) / DTS	
Mode:	802.11 b: 1 Mbps	
Channel Spacing:	20 MHz	
Frequency Range:	2412 MHz to 2462 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 1	2412

	SRD 400 MHz	
Mode:	8FSK	
Channel Spacing:	12.5 kHz	
Frequency Range:	403 MHz to 473 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	Middle 2	450.5

The test set-up was made according to the general provisions of FCC 558074 D01 15.247 Meas Guidance v05r02 dated April 2, 2019.

The EUT was tested in the following operating mode during the transmitter tests:

For cellular technologies, the EUT was controlled by a communication tester to transmit at maximum power on the test channels and modes as required.

For non-cellular technologies, the EUT was controlled by the software tool provided by the applicant to operate in a continuous transmit mode on the test channel and modulation as required.

Selected Transmission Modes for each Radio:

The following configurations were selected based on preliminary testing that identified these settings as the worst cases:

* Cellular 3G Band V: Transmitter radiated spurious emissions tests were performed with the EUT transmitting on High Channel in WCDMA mode configuration as this combination was found to transmit the highest EIRP.

* Cellular LTE Band 41: Transmitter radiated spurious emissions tests were performed with the EUT transmitting on Middle Channel with the following configuration as this combination was found to transmit the highest EIRP: QPSK, BW 20 MHz, RB Size 1, RB Offset 0.

* Cellular LTE Band 66: Transmitter radiated spurious emissions tests were performed with the EUT transmitting on Middle Channel with the following configuration as this combination was found to transmit the highest EIRP: QPSK, BW 20 MHz, RB Size 1, RB Offset 0.

* WLAN 2.4 GHz: Transmitter radiated spurious emissions tests were performed with the EUT transmitting on Low Channel in 802.11 b / 1 Mbps mode configuration as this combination was found as the worst case in terms of spurious emissions compared with the other WLAN 2.4 GHz modes.

* SRD 400 MHz: Transmitter radiated spurious emissions tests were performed with the EUT transmitting at 450.5 MHz with 12.5 kHz bandwidth in 8FSK mode configuration as this combination was found as the worst case in terms of spurious emissions compared with the other SRD 400 MHz modes.

Simultaneous Transmission Modes tested:

*** Co-Location mode 3G V, WLAN 2.4 GHz, SRD 400 MHz**, with the EUT configured to simultaneously transmit three signals at maximum output power:

3G V WCDMA / High Channel (846.6 MHz), WLAN 2.4 GHz 802.11b / Low Channel (CH1: 2412 MHz), SRD 400 MHz / Middle Channel 2 (450.5 MHz).

*** Co-Location mode LTE 66, WLAN 2.4 GHz, SRD 400 MHz**, with the EUT configured to simultaneously transmit three signals at maximum output power:

LTE 66 / Middle Channel (1745 MHz), WLAN 2.4 GHz 802.11b / Low Channel (CH1: 2412 MHz), SRD 400 MHz / Middle Channel 2 (450.5 MHz).

*** Co-Location mode LTE 41, WLAN 2.4 GHz, SRD 400 MHz,** with the EUT configured to simultaneously transmit three signals at maximum output power:

LTE 41 / Middle Channel (2593 MHz), WLAN 2.4 GHz 802.11b / Low Channel (CH1: 2412 MHz), SRD 400 MHz / Middle Channel 2 (450.5 MHz).

*** Co-Location mode WLAN 2.4 GHz, SRD 400 MHz**, with the EUT configured to simultaneously transmit two signals at maximum output power:

WLAN 2.4 GHz 802.11b / Low Channel (CH1: 2412 MHz), SRD 400 MHz / Middle Channel 2 (450.5 MHz).

Radiated emissions

Limits

802.11 WLAN 2.4 GHz. FCC §15.247 (d) and RSS-247 Issue 2 Clause 5.5.

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	-	300
0.490 - 1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function corresponding to 20 dB above the indicated values in the table above.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

SRD 400 MHz. FCC §90.210 (d) and RSS-119 Issue 12 Clause 5.8.3.

FCC 90.210 (d) Emission Mask D - 12.5 kHz channel bandwidth equipment.
RSS-119 Clause 5.8.3 Emission Mask D.

> For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:
>
> (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation

At Po transmitting power, the specified minimum attenuation becomes 50+10 log (Po), and the level in dBm relative to Po becomes:

$$Po\ (dBm) – [50 + 10 \log (Po\ in\ mW) - 30] = -20\ dBm$$

3G Band V. FCC §2.1053 and §22.917 / RSS-132 Issue 3 Clause 5.5.

FCC §2.1053 and §22.917. RSS-132 Clause 5.5.

> The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
>
> In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz.

At Po transmitting power, the specified minimum attenuation becomes 43+10 log (Po), and the level in dBm relative to Po becomes:

Po (dBm) – [43 + 10 log (Po in mW) - 30] = -13 dBm

LTE Band 41. FCC §2.1053 and §27.53 (m) (4) / RSS-199 Issue 3 Clause 4.5 (b).

FCC §27.53 (m)

> (4) For mobile digital stations, the attenuation factor shall be not less than 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

RSS-199 Clause 4.5

> (b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
>
> iii. 55 + 10 log10 p at X MHz and beyond from the channel edges
>
> In addition, the attenuation shall not be less than 43 + 10 log10 p on all frequencies between 2490.5 MHz and 2496 MHz, and 55 + 10 log10 p at or below 2490.5 MHz.
>
> In (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

At Po transmitting power, the specified minimum attenuations become:

Po (dBm) – [55 + 10 log (Po in mW) - 30] = -25 dBm

Po (dBm) – [43 + 10 log (Po in mW) - 30] = -13 dBm

LTE Band 66. FCC §2.1053 and §27.53 (h) / RSS-139 Issue 3 Clause 6.6.

FCC §2.1053 and §27.53 (h). RSS-139 Clause 6.6.

> For operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

At Po transmitting power, the specified minimum attenuation becomes 43+10 log (Po), and the level in dBm relative to Po becomes:

Po (dBm) – [43 + 10 log (Po in mW) - 30] = -13 dBm

Method

The measurement was performed with the EUT inside a semi-anechoic chamber.

The spectrum was scanned from 30 MHz to at least the 10th harmonic of the highest frequency of the co-located radios up to 26 GHz.

The EUT was placed on a non-conductive stand at a 3-meter distance from the measuring antenna for measurements up to 17 GHz, and at 1.5-meter distance for measurements above 17 GHz. A distance correction factor is applied for measurements performed at 1.5 meters.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

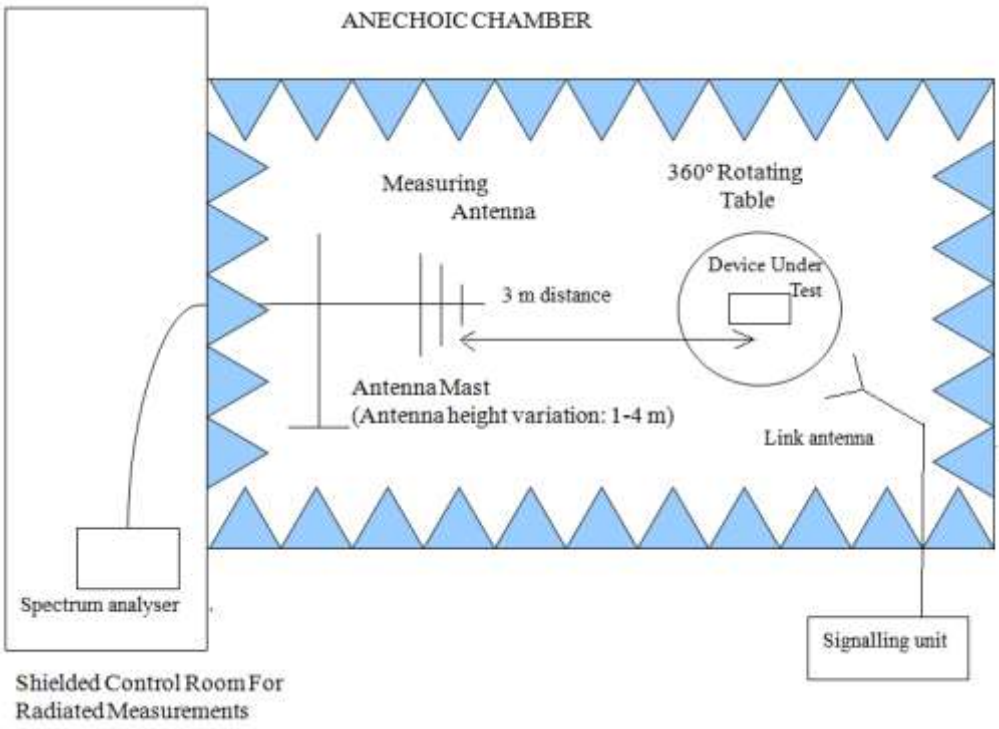
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

These measurements were performed in order to check the impact of the Co-Location of all radio interfaces (that can transmit simultaneously).

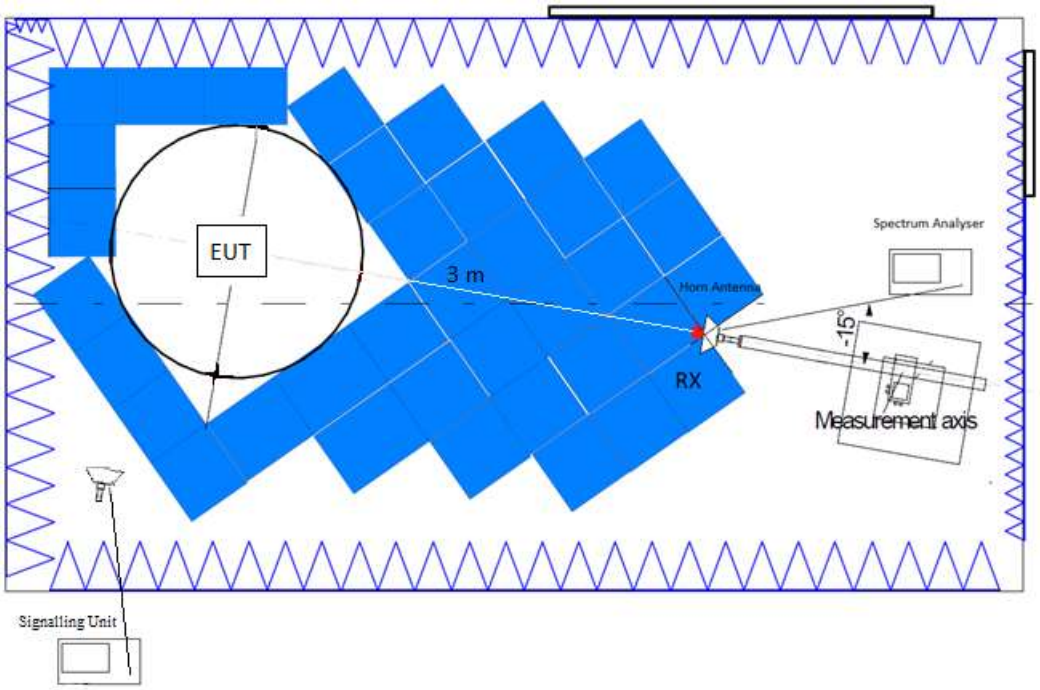
A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for spectrum below 1 GHz and 1MHz / 3 MHz for spectrum above 1 GHz.

Test setup

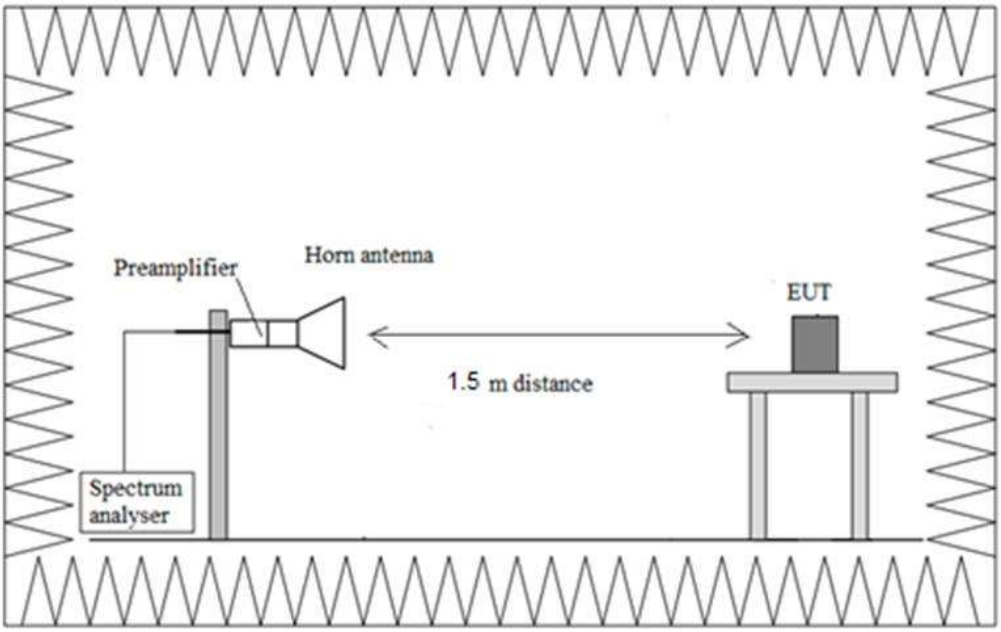
Radiated measurements below 1 GHz.



Radiated measurements between 1 GHz and 17 GHz.



Radiated measurements above 17 GHz.



Results

- **Co-location mode: Cellular 3G V, WLAN 2.4 GHz, SRD 400 MHz.**

3G V:	High Channel (846.6 MHz). WCDMA.
WLAN 2.4 GHz:	Low Channel (2412 MHz). 802.11 b. BW: 20 MHz. 1 Mbps.
SRD 400 MHz:	Middle Channel 2 (450.5 MHz). Channel spacing 12.5 kHz. 8FSK.

Power configuration used: SRD 400 MHz power 1000 mW, WLAN 2.4 GHz power 13 dBm.

The spurious frequencies were measured at 3 meters. The test limit is as follows:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 8.5 GHz	Peak	43 + 10 log (P) dB = -13 dBm → 82.23 dBµV/m
8.5 GHz to 26 GHz	Peak	74 dBµV/m
8.5 GHz to 26 GHz	Average	54 dBµV/m (*)

(*) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Frequency range 30 MHz – 1 GHz:

No spurious frequencies at less than 20 dB below the limit.

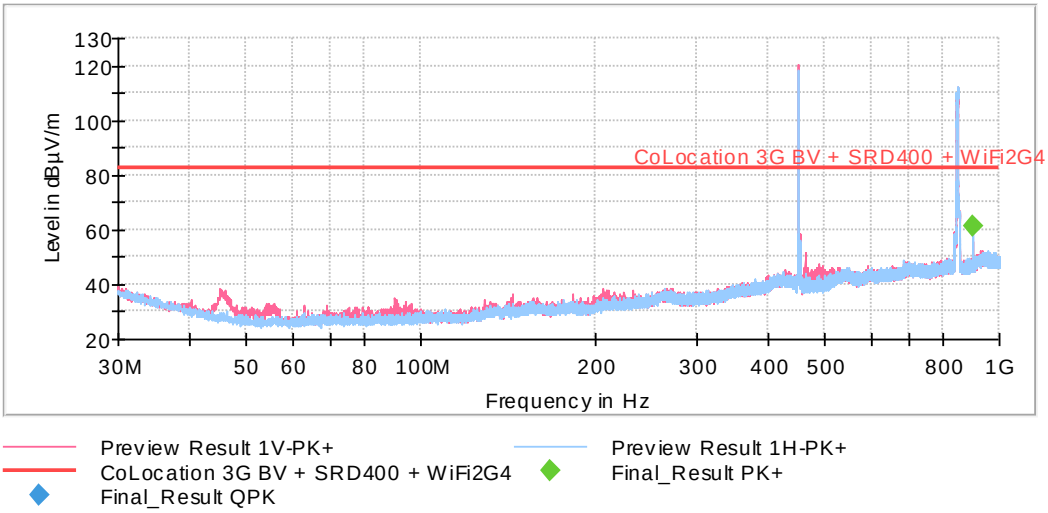
Frequency range 1 – 26 GHz:

No spurious frequencies at less than 20 dB below the limit.

Verdict: PASS

Attachments

FREQUENCY RANGE 30 MHz – 1 GHz:

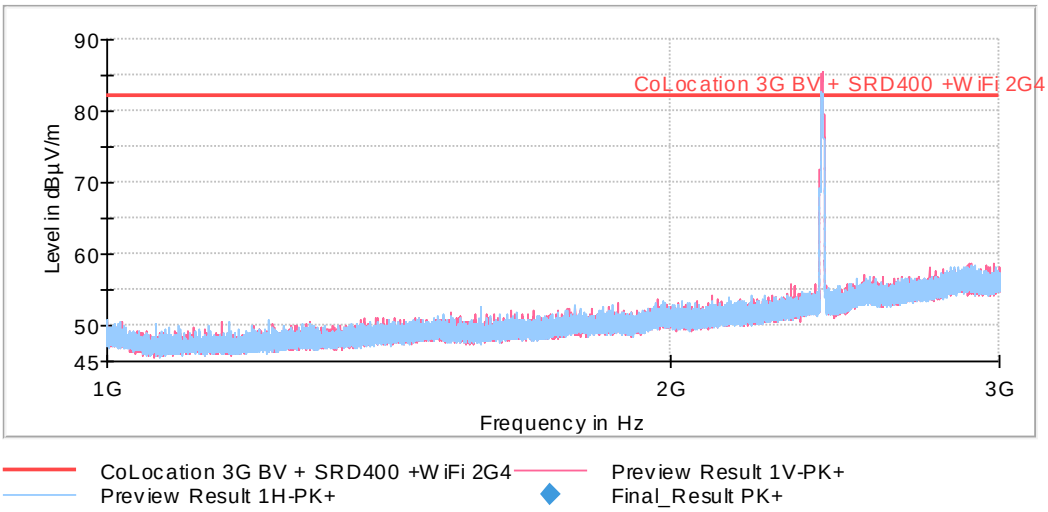


Settings: RBW = 100 kHz / VBW = 300 kHz / Sweep Time = 1s / Sweep points = 32001

The peak on the left above the limit is the SRD 400 MHz (450.5 MHz) carrier frequency.

The peak on the right above the limit is the 3G V (846.6 MHz) carrier frequency.

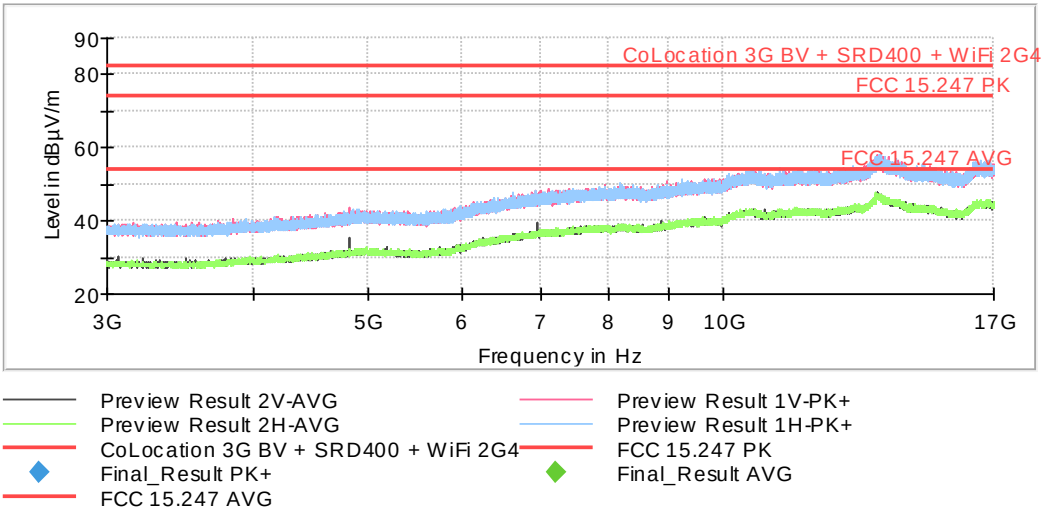
FREQUENCY RANGE 1 GHz – 3 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

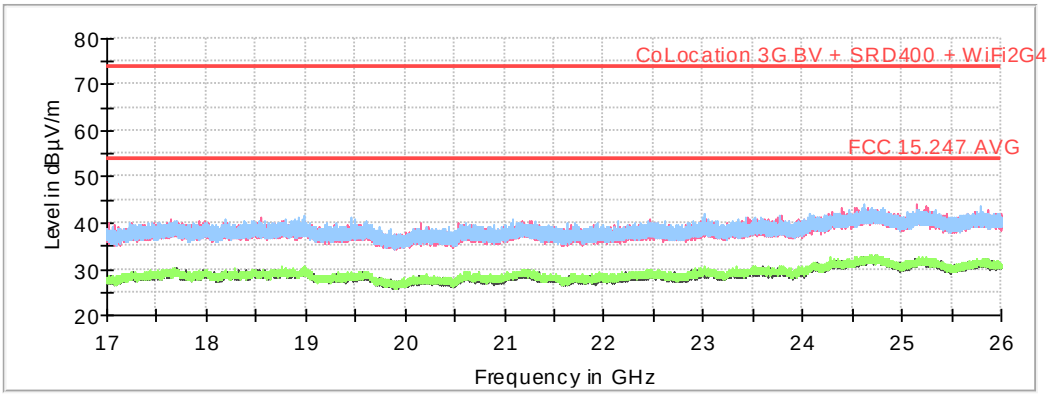
The peak above the limit is the WLAN 2.4 GHz (2412 MHz) carrier frequency.

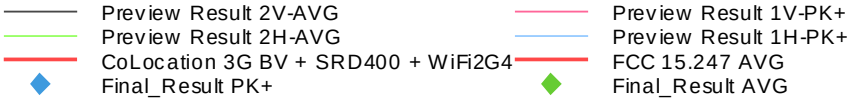
FREQUENCY RANGE 3 GHz – 17 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

FREQUENCY RANGE 17 GHz – 26 GHz:





Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

Results

- **Co-location mode: Cellular LTE 66, WLAN 2.4 GHz, SRD 400 MHz.**

LTE 66:	Middle Channel (1745 MHz). QPSK, 20 MHz, RB 1, RB Offset 0.
WLAN 2.4 GHz:	Low Channel (2412 MHz). 802.11 b. BW: 20 MHz. 1 Mbps.
SRD 400 MHz:	Middle Channel 2 (450.5 MHz). Channel spacing 12.5 kHz. 8FSK.

Power configuration used: SRD 400 MHz power 1000 mW, WLAN 2.4 GHz power 13 dBm.

The spurious frequencies were measured at 3 meters. The test limit is as follows:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 18 GHz	Peak	43 + 10 log (P) dB = -13 dBm → 82.23 dBµV/m
18 GHz to 26 GHz	Peak	74 dBµV/m
18 GHz to 26 GHz	Average	54 dBµV/m (*)

(*) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Frequency range 30 MHz - 1 GHz:

No spurious frequencies at less than 20 dB below the limit.

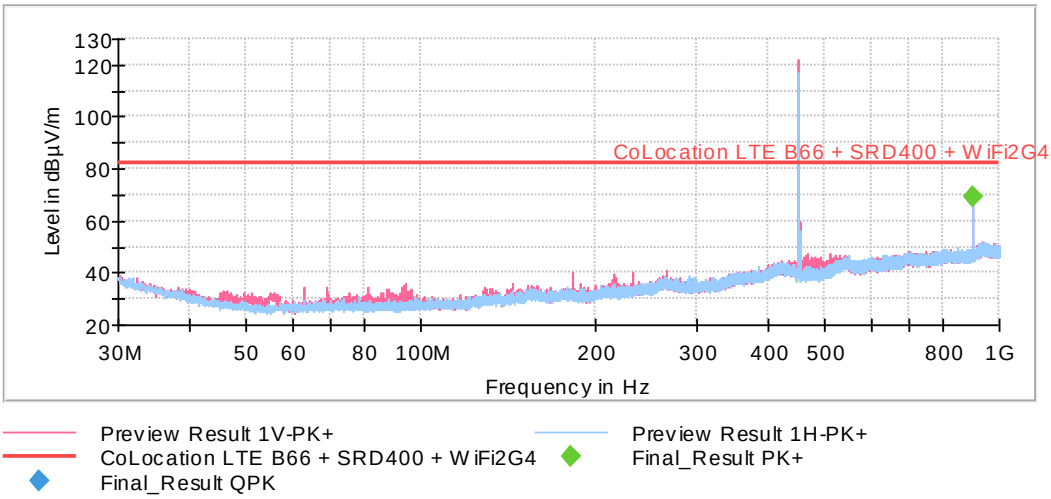
Frequency range 1 GHz – 26 GHz:

No spurious frequencies at less than 20 dB below the limit.

Verdict: PASS

Attachments

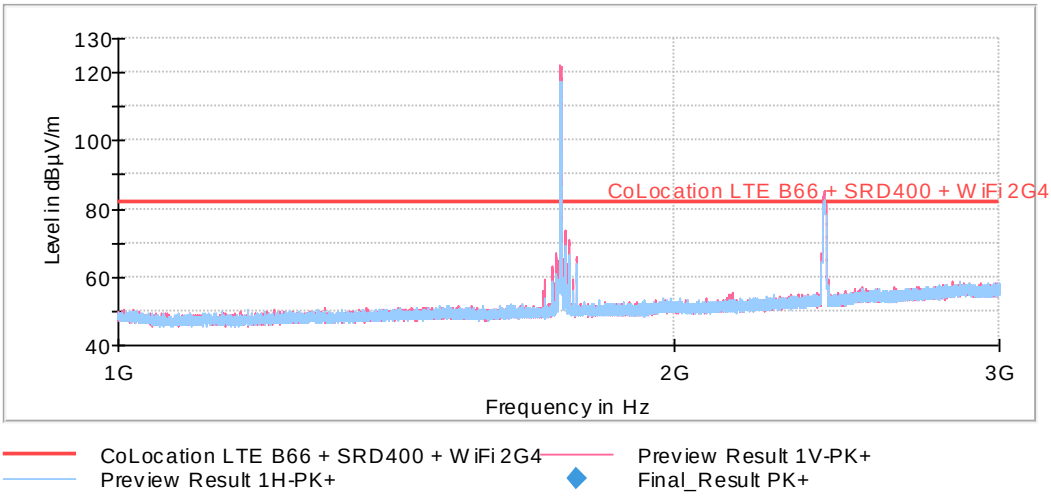
FREQUENCY RANGE 30 MHz – 1 GHz:



Settings: RBW = 100 kHz / VBW = 300 kHz / Sweep Time = 1s / Sweep points = 32001

The peak above the limit is the SRD 400 MHz (450.5 MHz) carrier frequency.

FREQUENCY RANGE 1 GHz – 3 GHz:

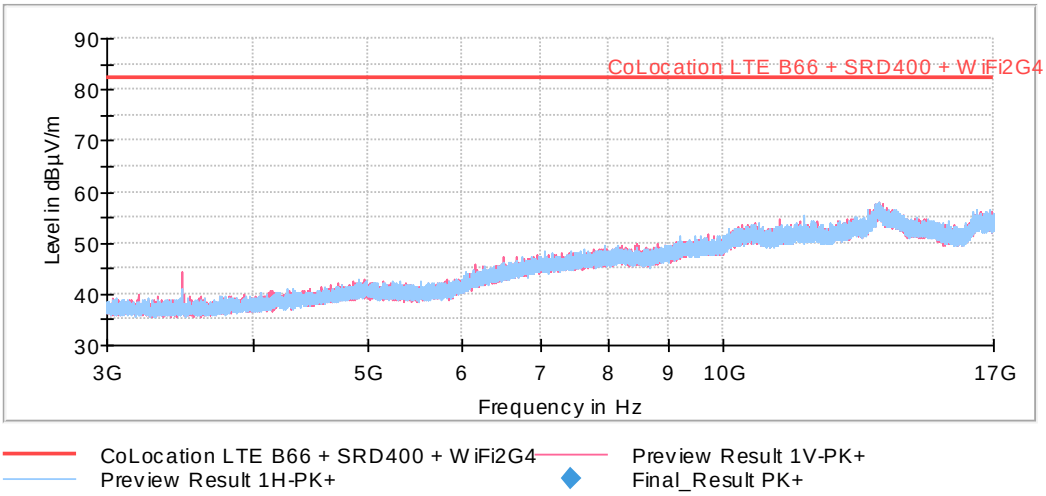


Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

The peak on the left above the limit is the LTE 66 (1745 MHz) carrier frequency.

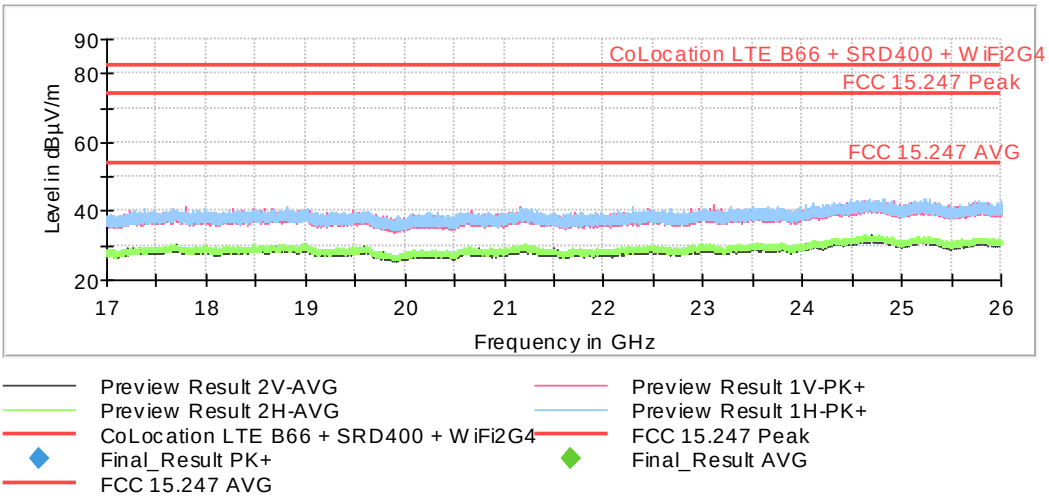
The peak on the right above the limit is the WLAN 2.4 GHz (2412 MHz) carrier frequency.

FREQUENCY RANGE 3 GHz – 17 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

FREQUENCY RANGE 17 GHz – 26 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

Results

- **Co-location mode: Cellular LTE 41, WLAN 2.4 GHz, SRD 400 MHz.**

LTE 41:	Middle Channel (2593 MHz). QPSK, 20 MHz, RB 1, RB Offset 0.
WLAN 2.4 GHz:	Low Channel (2412 MHz). 802.11 b. BW: 20 MHz. 1 Mbps.
SRD 400 MHz:	Middle Channel 2 (450.5 MHz). Channel spacing 12.5 kHz. 8FSK.

Power configuration used: SRD 400 MHz power 1000 mW, WLAN 2.4 GHz power 13 dBm.

The spurious frequencies were measured at 3 meters. The test limit is as follows:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 26 GHz	Peak	43 + 10 log (P) dB = -13 dBm → 82.23 dBµV/m

Frequency range 30 MHz – 1 GHz:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission level (dBµV/m)	Polarization	Detector
901.0297	63.96	V	Peak

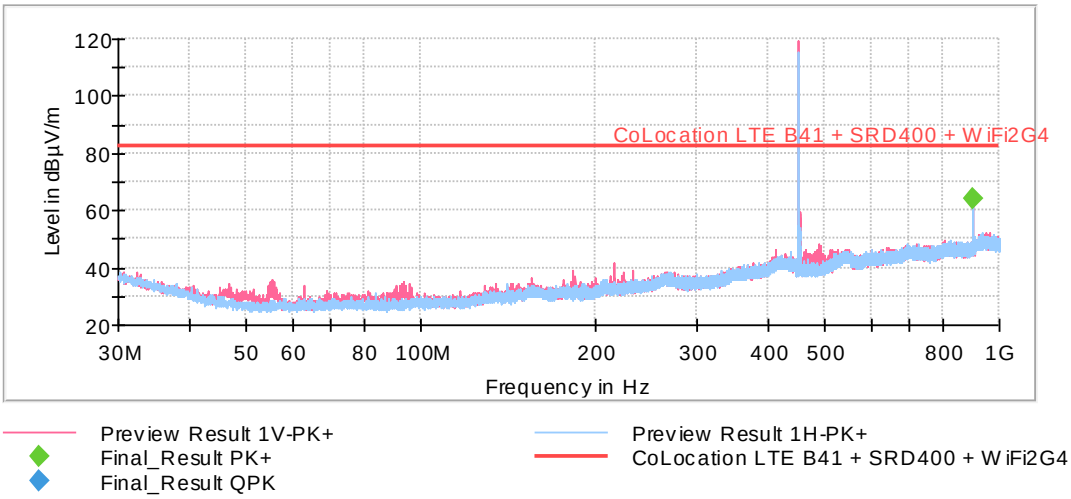
Frequency range 1 GHz – 26 GHz:

No spurious frequencies at less than 20 dB below the limit.

Verdict: PASS

Attachments

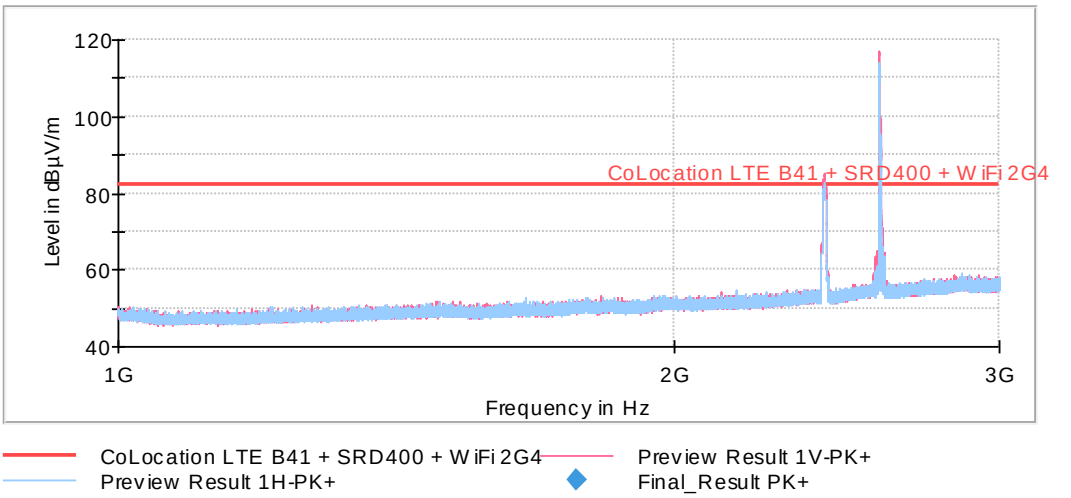
FREQUENCY RANGE 30 MHz – 1 GHz:



Settings: RBW = 100 kHz / VBW = 300 kHz / Sweep Time = 1s / Sweep points = 32001

The peak above the limit is the SRD 400 MHz (450.5 MHz) carrier frequency.

FREQUENCY RANGE 1 GHz – 3 GHz:

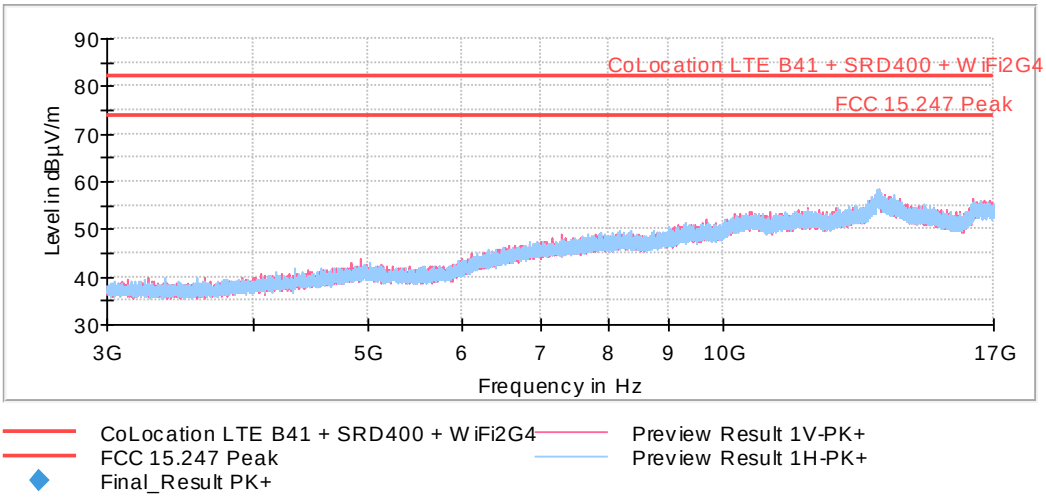


Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

The peak on the left above the limit is the WLAN 2.4 GHz (2412 MHz) carrier frequency.

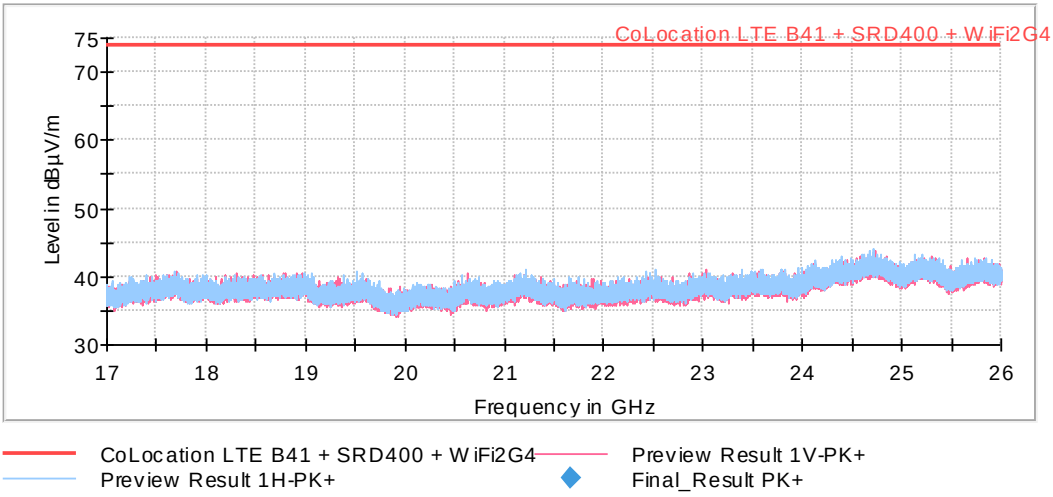
The peak on the right above the limit is the LTE 41 (2593 MHz) carrier frequency.

FREQUENCY RANGE 3 GHz – 17 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

FREQUENCY RANGE 17 – 26 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

Results

- **Co-location mode: WLAN 2.4 GHz, SRD 400 MHz.**

WLAN 2.4 GHz: Low Channel (2412 MHz). 802.11 b. BW: 20 MHz. 1 Mbps.
SRD 400 MHz: Middle Channel 2 (450.5 MHz). Channel spacing 12.5 kHz. 8FSK.

Power configuration used: SRD 400 MHz power 1000 mW, WLAN 2.4 GHz power 13 dBm.

The spurious frequencies were measured at 3 meters. The test limit is as follows:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 4.7 GHz	Peak	50 + 10 log (P) dB = -20 dBm → 75.23 dBµV/m
4.7 GHz to 26 GHz	Peak	74 dBµV/m
4.7 GHz to 26 GHz	Average	54 dBµV/m (*)

(*) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Frequency range 30 MHz – 1 GHz:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission level (dBµV/m)	Polarization	Detector
900.9994	61.82	H	Peak

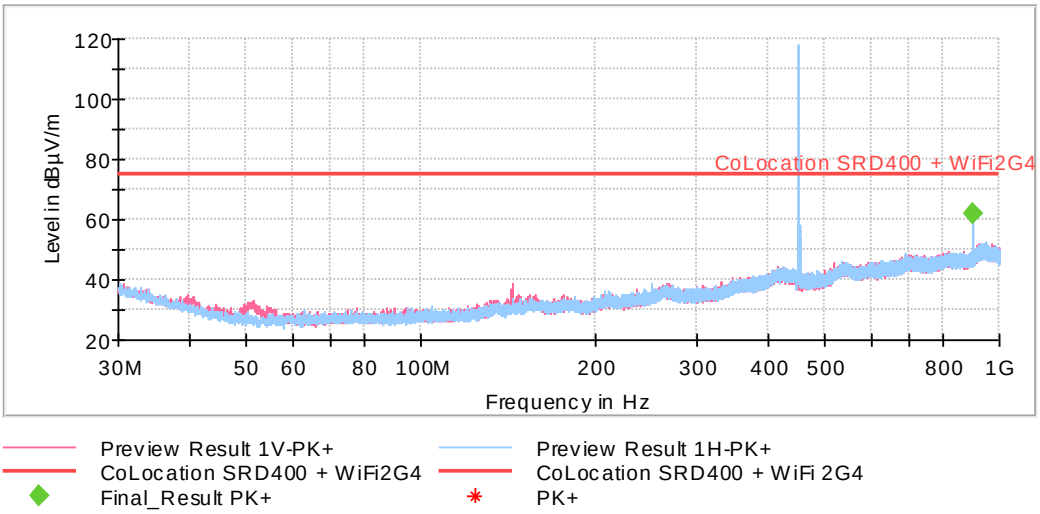
Frequency range 1 GHz – 26 GHz:

No spurious frequencies at less than 20 dB below the limit.

Verdict: PASS

Attachments

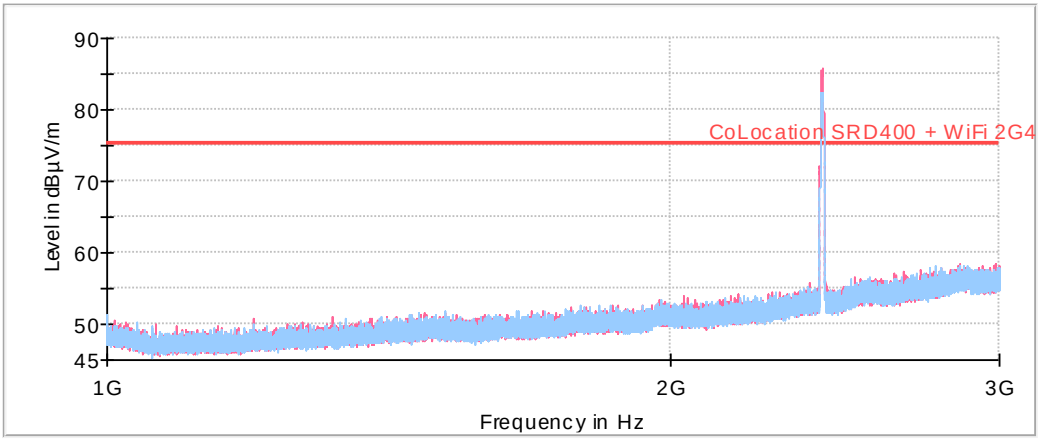
FREQUENCY RANGE 30 MHz – 1 GHz:

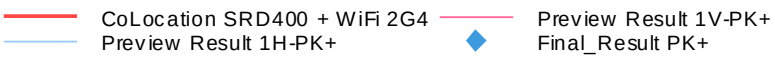


Settings: RBW = 100 kHz / VBW = 300 kHz / Sweep Time = 1s / Sweep points = 32001

The peak above the limit is the SRD 400 MHz (450.5 MHz) carrier frequency.

FREQUENCY RANGE 1 GHz – 3 GHz:

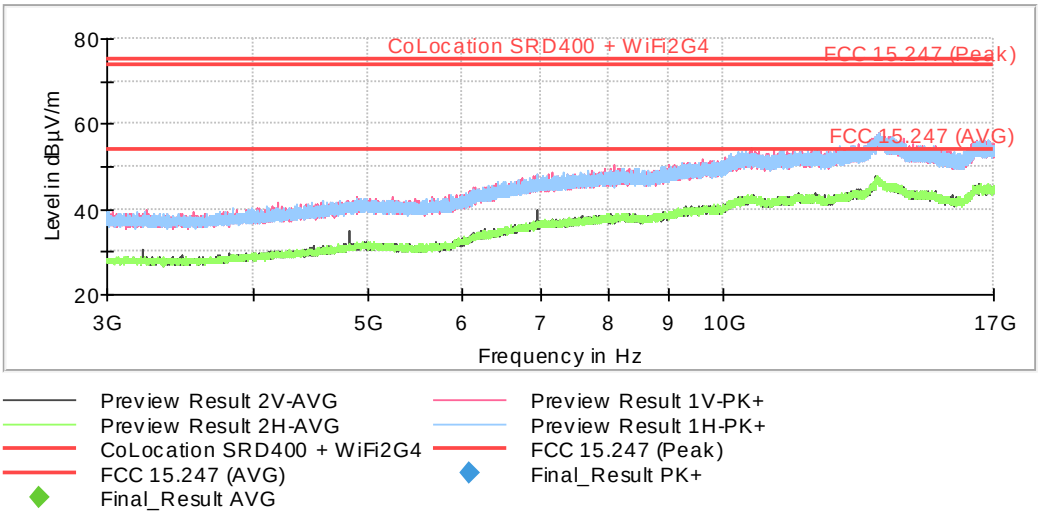




Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

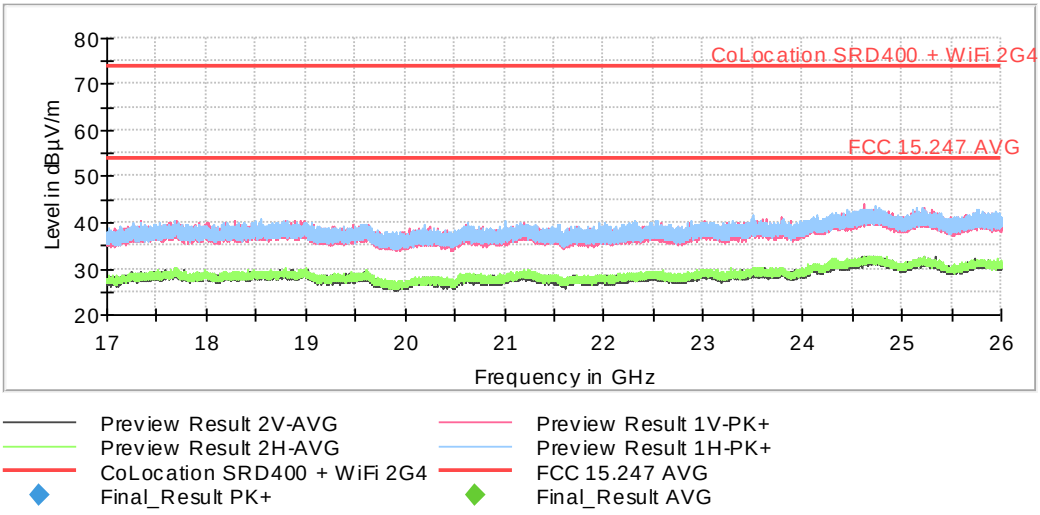
The peak above the limit is the WLAN 2.4 GHz (2412 MHz) carrier frequency.

FREQUENCY RANGE 3 GHz – 17 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000

FREQUENCY RANGE 17 GHz – 26 GHz:



Settings: RBW = 1 MHz / VBW = 3 MHz / Sweep Time = 1s / Sweep points = 32000