

Test report No:
 NIE: 66697REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (April 2019)

(*) Identification of item tested	LTE Cat-M Cellular communication module
(*) Trademark	Sequans Communication
(*) Model and /or type reference	GM02S
Other identification of the product	HW Version: GM02Sv1 SW Version: LR8.0.0.1-51281 FCC ID: 2AAGMGM02S IC: 12732A-GM02S IMEI TAC: 01577000
(*) Features	LTE-M, 3GPP LTE Release 13
Manufacturer	SEQUANS COMMUNICATIONS 55 Boulevard Charles de Gaulle 92700 Colombes. France.
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (April 2019)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager
Date of issue	2020-12-23
Report template No	FDT08_23 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
Avg	Radiated Average Level
Avg	Conducted Average Level
Az	Azimuth
CPL	Zones / Coupling Cables
Code	EMC Test Code
Freq	Frequency
Freq Rng	Frequency Range
H	Height
Line	Conducted Emissions - Tested Line
MP	Measurement Point
Max	Conducted Maximum Level
MaxPeak	Radiated Maximum Peak Level
OM	Operation Mode
Pol	Polarization
QuasiPeak	Conducted Quasi Peak Level
QuasiPeak	Radiated Quasi Peak Level
S/	Sample
V	Verdict
Volt Immunity Lvl	Voltage Immunity Severity Level
Volt Immunity Type	Voltage Immunity Type

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.

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.

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Uncertainty

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

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is $l = \pm 4,9$ dB for quasi-peak measurements, $l = \pm 4,6$ dB for peak measurements ($k= 2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is $l = \pm 2,6$ dB for peaks and average measurements ($k = 2$).

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 consists of a GM02S, it is a multi-band module supporting cellular LTE-M release 13. Supports HD-FDD.

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 N°	Date of Reception	Application
S/01	66697_07	Module	NEKTAR-EVK	NEKTAR - EVK	2020-11-30	Element under test
S/01	66697_09	Antenna	OMNILG 90200	59080	2020-11-30	Element under test
S/01	66697_08	USB cable	---	---	2020-11-30	Auxiliary element

Notes referenced to samples during the project.

Id	Note
S/01	N/A

Test sample description

Ports..... :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾
	USB	2	X		
Supplementary information to the ports..... :	N/A				
Rated power supply	Voltage and Frequency		Reference poles		
			L1	L2	L3
	X	DC: EUT: 3.3Vdc (through USB port)			
Rated Power	Not provided data				
Clock frequencies..... :	Not provided data				
Other parameters..... :	Not provided data				
Software version	LR8.0.0.1-51281				
Hardware version..... :	GM02Sv1				
Dimensions in cm (W x H x D)..... :	Not provided data				
Mounting position..... :	X	Table top equipment			
		Wall/Ceiling mounted equipment			
		Floor standing equipment			
		Hand-held equipment			
		Other:			
Modules/parts	Module/parts of test item		Type	Manufacturer	
	NEKTAR-B-GM02S		Eval Kit	Sequans	
	USB Cable				
	External antenna: http://www.aaronia.com/Datasheets/Antenas/Aaronia_Broadband_Antenna_Omnidirectional_90200_datasheet.pdf				
Accessories (not part of the test item)	Description		Type	Manufacturer	
	N/A				
Documents as provided by the applicant .. :	Description		File name	Issue date	
	N/A				

⁽³⁾ Only for Medical Equipment

Identification of the client

SEQUANS COMMUNICATIONS
55 Boulevard Charles de Gaulle
92700 Colombes. France.

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-12-11
Date (finish)	2020-12-11

Document history

Report number	Date	Description
66697REM.001	2020-12-23	First release

Environmental conditions

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

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

In the semianechoic chamber, the following limits were not exceeded during the test.

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

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 35 %

Remarks and comments

The tests have been performed by the technical personnel: Lorena Oviedo.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
2942	EMI TEST RECEIVER 20Hz-40GHz	ESU40	ROHDE AND SCHWARZ	2021-09-17
4612	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2021-06-14
5641	HYBRID BILOG ANTENNA 30MHZ-6GHz	3142E	ETS LINDGREN	2021-07-31
6064	SEMIANECHOIC ABSORBER LINED CHAMBER III	SAC-3	Frankonia	---
6126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-17
6132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-20
6195	PRE-AMPLIFIER G>55dB 1-18GHz	AMF-7D-01001800-22-10P	NARDA	2021-05-19
6329	SHIELDED ROOM	---	FRANKONIA	---

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B and C (10-1-19 Edition) Secs. 15.107 and 15.207 & ICES-003 Issue 6 (April 2019). ANSI C63.4 (2014)	Radiated emission	Pass	---
FCC CFR 47, Part 15, Subpart B and C (10-1-19 Edition) Secs. 15.107 and 15.207 & ICES-003 Issue 6 (April 2019). ANSI C63.4 (2014)	Conducted emission	N/A	(1)

(1) Not applicable according to standard.

Appendix A: Test results

Appendix A context

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Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
OM_01	EUT ON. MS in IDLE mode. LTE Cat. M1 Band 12. Power supply of EUT: 3.3Vdc (through USB port)

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B and C (10-1-19 Edition) Secs. 15.107 and 15.207 & ICES-003 Issue 6 (April 2019).	ANSI C63.4 (2014)	Radiated emission

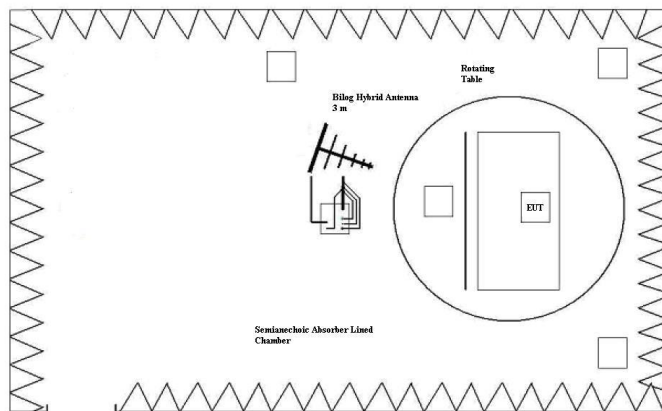
Test Cases Details

FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Sec. 15.109 & ICES-003 Issue 6 (April 2019) RE Radiated emission

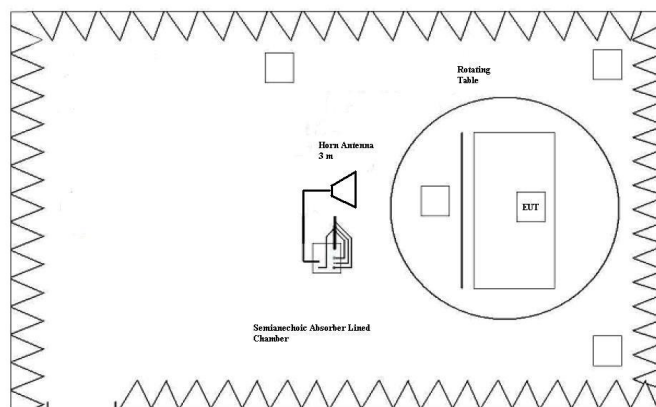
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 6 (Updated 04-2019)

Frequency of emission (MHz)	Field strength (microvolt/meter)
30-88	100
88-216	150
21-960	200
Above 960	500
*Above 1GHz, the limit is defined for an AVG detector.	



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

RESULTS

CRmmnnRR	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR	Range: 1 GHz – 12.75 GHz.	P
CR0101HR2	Range: 12.75 GHz – 26 GHz.	N/A*

mm: Sample number; nn: Operation mode; RR: Measurement range.

*According to FCC 47 CFR Part 15B / ICES-003 Issue 6, test required only to the 5th harmonics of the maximum internal work frequency in the EUT.

VERDICT

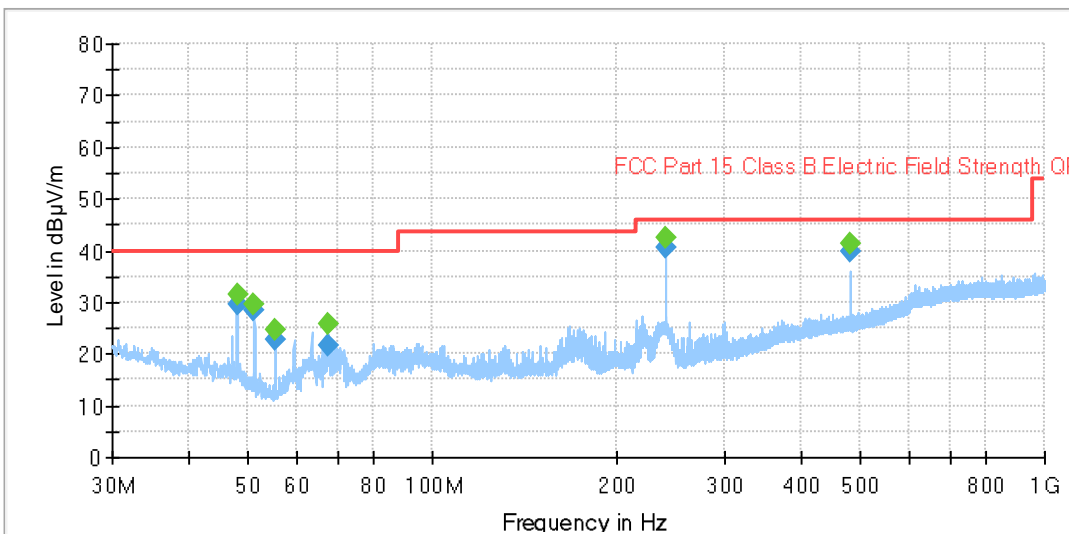
Pass

Images:

Project: 66697REM.001
 Company: SEQUANS COMMUNICATIONS
 Sample: S/01
 Operation mode: 01
 Graphical code: RE0101LR
 Description: EUT ON. MS in IDLE mode. LTE Cat. M1 Band 12. Power supply of EUT: 3.3Vdc (through USB port).

Verdict: Passed

Full Spectrum



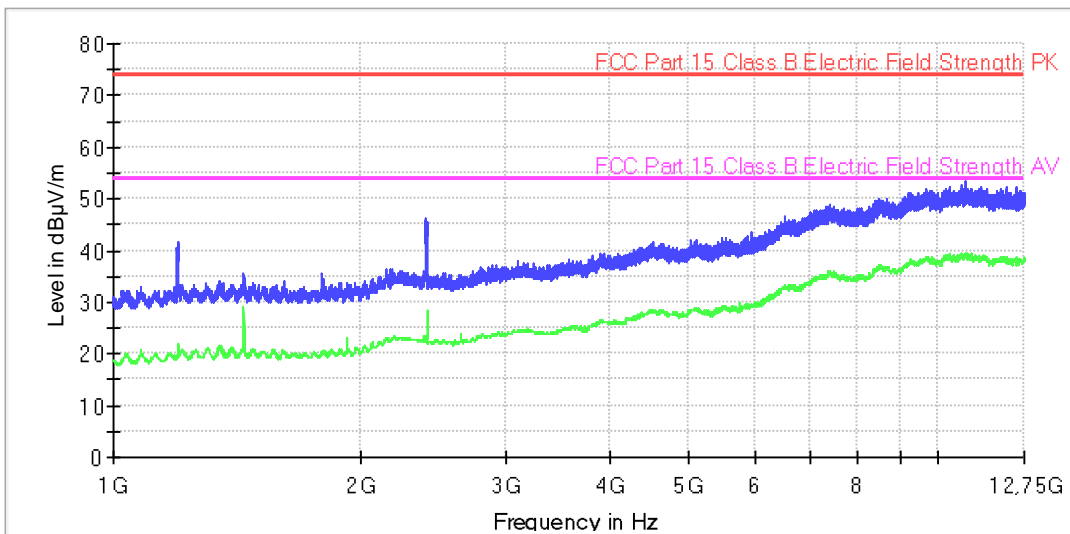
Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
47.965000	29.63	---	40.00	10.37	100.0	V	59.0
47.965000	---	31.57	---	---	100.0	V	59.0
51.205000	28.48	---	40.00	11.52	100.0	V	50.0
51.205000	---	29.71	---	---	100.0	V	50.0
55.291000	22.68	---	40.00	17.32	102.0	V	42.0
55.291000	---	24.59	---	---	102.0	V	42.0
67.575000	21.47	---	40.00	18.53	149.0	V	118.0
67.575000	---	25.94	---	---	149.0	V	118.0
239.984000	---	42.34	---	---	136.0	H	-48.0
239.984000	40.54	---	46.00	5.46	136.0	H	-48.0
479.970000	---	41.25	---	---	178.0	H	62.0
479.970000	39.88	---	46.00	6.12	178.0	H	62.0

Project: 66697REM.001
 Company: SEQUANS COMMUNICATIONS
 Sample: S/01
 Operation mode: 01
 Graphical code: RE0101HR_PH
 Description: EUT ON. MS in IDLE mode. LTE Cat. M1 Band 12. Power supply of EUT: 3.3Vdc (through USB port). Horizontal polarization

Verdict: Passed

RE FCC Part 15 ClassB 1-12,75 GHz



— AVG_CLRWR — PK+_CLRWR
 — FCC Part 15 Class B Electric Field Strength PK — FCC Part 15 Class B Electric Field Strength A'

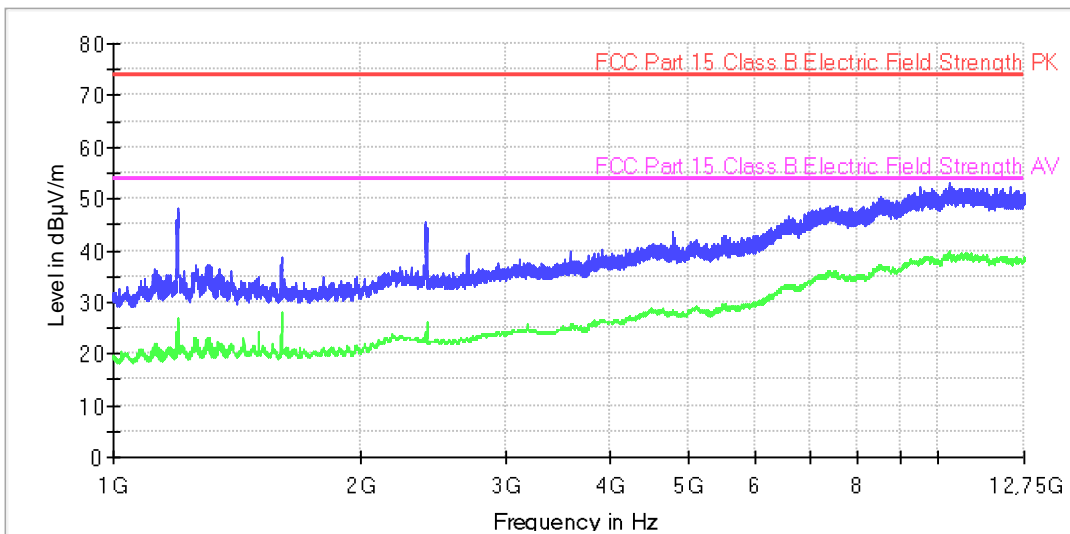
Subrange Maxima

Frequency (MHz)	PK+_CLRWR (dBµV/m)	AVG_CLRWR (dBµV/m)
1198.800000	41.6	21.9
2397.600000	46.3	22.4
4518.000000	41.6	28.3
5485.600000	42.6	29.2
6527.600000	46.6	33.0
7414.000000	48.8	35.8
9130.400000	50.3	37.2
10332.800000	52.4	39.0
10809.200000	53.6	39.1
12456.000000	52.3	38.5

Project: 66697REM.001
 Company: SEQUANS COMMUNICATIONS
 Sample: S/01
 Operation mode: 01
 Graphical code: RE0101HR_PV
 Description: EUT ON. MS in IDLE mode. LTE Cat. M1 Band 12. Power supply of EUT: 3.3Vdc (through USB port). Vertical polarization

Verdict: Passed

RE FCC Part 15 ClassB 1-12,75 GHz



— AVG_CLRWR — PK+_CLRWR
 — FCC Part 15 Class B Electric Field Strength PK — FCC Part 15 Class B Electric Field Strength AV

Subrange Maxima

Frequency (MHz)	PK+_CLRWR (dBµV/m)	AVG_CLRWR (dBµV/m)
1197.600000	48.1	20.6
2389.200000	45.5	22.7
4516.400000	41.4	28.5
4777.600000	43.6	28.2
6611.600000	46.8	33.1
7521.200000	48.7	35.5
9203.200000	50.9	37.3
10342.800000	53.0	39.5
10426.000000	52.2	38.4
12290.400000	52.5	38.1