DEKRA Testing and Certification, S.A.U.
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C.I.F. A29 507 456

Test report No:
NIE: 67117REM.002

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)

(*) 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: GM02Sv2 SW Version: LR8.0.0.3-51813 IMEI TAC: 01577000 FCC ID: 2AAGMGM02SA IC: 12732A-GM02SA
(*) Features	LTE-M, 3GPP LTE Release 14
Manufacturer	SEQUANS COMMUNICATIONS 55 Boulevard Charles de Gaulle 92700, Colombes, FRANCE
Test method requested, standard	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager 2021.03.12 14:12:35 +01'00'
Date of issue	2021-03-11
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.

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.

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 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 I = ± 4,9 dB for quasi-peak measurements, I = ± 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 I = ± 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 of the model GM02S is a multi-band module supporting cellular LTE-M release 14. It 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 Nº	Date of Reception	Application
S/01	67117_09	Antenna	OmniLOG 90200	---	2021-02-03	Element under test
S/01	67117_10	LTE Cat-M Cellular communication module	GM02S	G2K2101030003050	2021-02-03	Element under test
S/01	67117_10	NETKAR Evaluation KIT for Cat-M GM02S module	NEKTAR-B HWPT011B4	---	2021-02-03	Auxiliary element
S/01	67117_12	UFL to SMA cable	---	---	2021-02-03	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	☐	☐	☐		
			☐	☐	☐		
Supplementary information to the ports…… :	--						
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 3.3Vdc					
Rated Power .....:	--						
Clock frequencies.....:	--						
Other parameters .....:	--						
Software version .....:	LR8.0.0.3-51813						
Hardware version .....:	GM02Sv2						
Dimensions in cm (W x H x D) ....:	--						
Mounting position .....:	☒	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☐	Other:					
Modules/parts.....:	Module/parts of test item		Type		Manufacturer		
	GM02S module		Cat-M Module		Sequans		
	USB Cable						
	External antenna				Aaronia AG		
Accessories (not part of the test item) .....:	Description		Type		Manufacturer		
	--						
Documents as provided by the applicant.....:	Description		File name		Issue date		
	User Manual		NEKTAR-B_EvalKitUser Manual-Rev2		2020-11-20		
	AT Commands Reference Manual		GM02S -LR80-ATCommands RefMan_Rev2		2020-11-13		

(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)	2021-02-17
Date (finish)	2021-02-17

Document history

Report number	Date	Description
67117REM.002	2021-03-11	First release

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 semianechoic 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 chamber for conducted measurements, 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: Carlos Haro.

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
4523	EMI TEST RECEIVER 20Hz-26.5GHz	ESU26	ROHDE AND SCHWARZ	2022-05-27
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 (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	Radiated emission	Pass	---
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	Conducted emission	N/A	(1)

Notes:
(1) This test is not applicable according to the standard as EUT is powered in DC.

Appendix A: Test results

Appendix A Content

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Description of the operation modes

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 (worst case). Power supply of EUT: 3.3Vdc.

Test standards version applied

The operation modes described in this paragraph constitute a functionality of the sample under test for itself

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 (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	Radiated emission

Test Cases Details

FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)

RE Radiated emission

Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Sec. 15.109 & ICES-003 Issue 7 (October 2020):

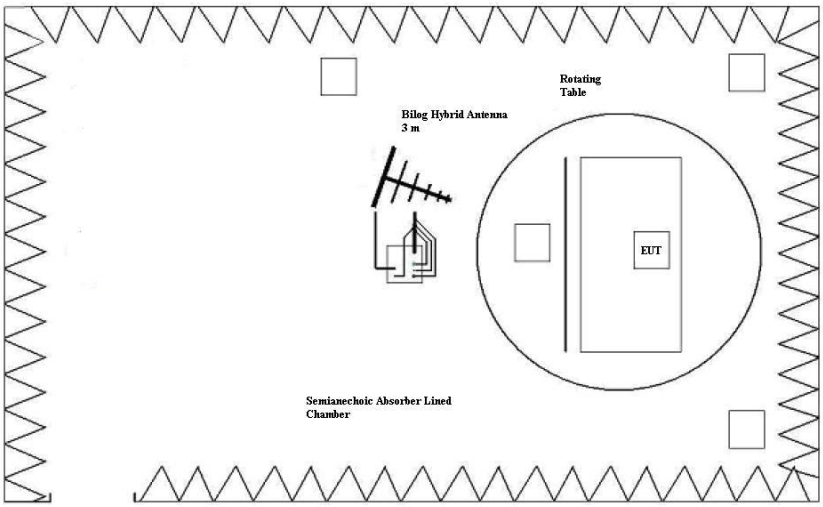
Table 2: Radiated emission limits

Frequency range (MHz)	FCC Part 15B Class B (3 m) Quasi-Peak (dBµV/m)	ICES-003 Issue 7 Limit at 3 m Quasi-Peak (dBµV/m)	FCC Part 15B & ICES-003 Issue 7	
			PK Limit at 3m (dBµV/m)	AVG Limit at 3m (dBµV/m)
30-88	40.0	40.0	---	---
88-216	43.5	43.5	---	---
216-230	46.0	46.0	---	---
230-960	46.0	47.0	---	---
960-1000	54.0	54.0	---	---
1 GHz – F_M	---	---	74	54

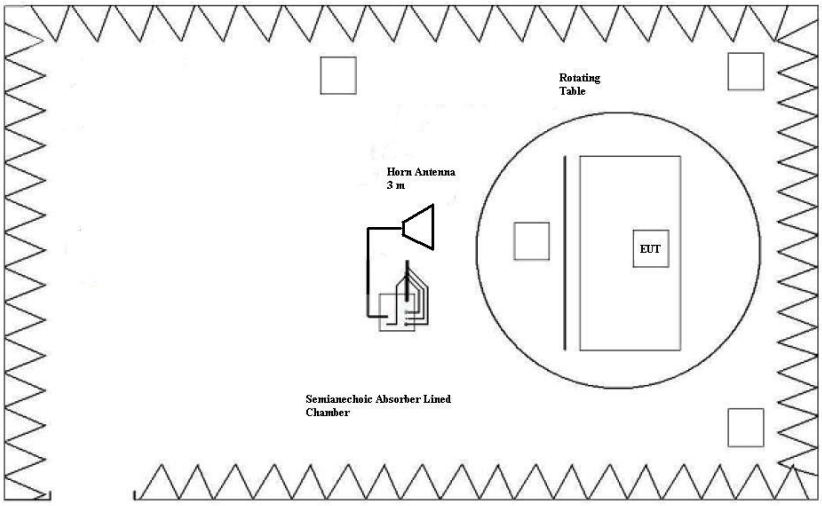
Above 1 GHz, except for outdoor units of home satellite receiving systems, the ITE or digital apparatus shall comply with the limits specified in table 2 up to the frequency F_M, which shall be determined as per table 3.

Table 3: Required highest measurement frequency for radiated emission

Highest internal Frequency (F_X)	Highest measurement Frequency (F_M)
$F_X \leq 108$ MHz	1 GHz
108 MHz < $F_X \leq 500$ MHz	2 GHz
500 MHz < $F_X \leq 1$ GHz	5 GHz
$F_X > 1$ GHz	5 × F_X up to a maximum of 40 GHz
F_x is the highest fundamental frequency generated and/or used in the ITE or digital apparatus under test.	



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

RESULTS

REmmnnRR	Description	Result
RE0101LR	Range: 30 MHz – 1000 MHz.	P
RE0101HR	Range: 1 GHz – 12.75 GHz.	P

REmmnnRR: RE: Radiated Emission; mm: Sample number; nn: Operation mode; RR: Measurement range.

Note: According to FCC 47 CFR Part 15B / ICES-003 Issue 7, test required only to the 5th harmonic of the maximum internal work frequency in the EUT.

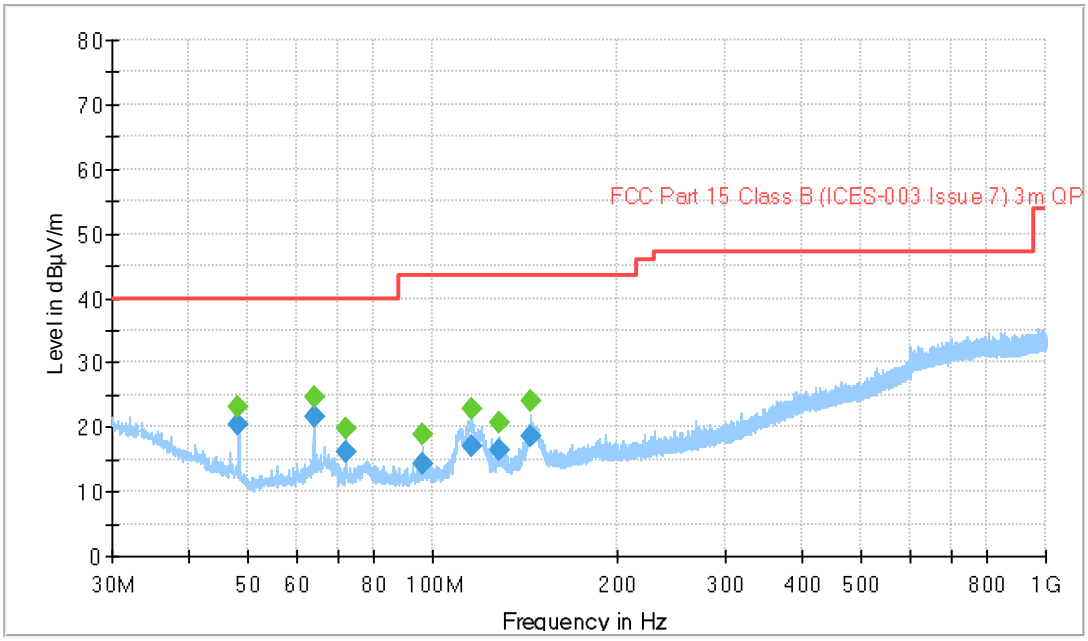
VERDICT

Pass

Images:

Project:	67117REM.002
Company:	SEQUANS COMMUNICATIONS
Sample:	S/01
Operation mode:	01
Graphical code:	RE0101LR
Description:	EUT ON. MS in IDLE mode. LTE Cat. M1 Band 12 (worst case). Power supply of EUT: 3.3Vdc.
Verdict:	Passed

RE FCC Part 15 Class B

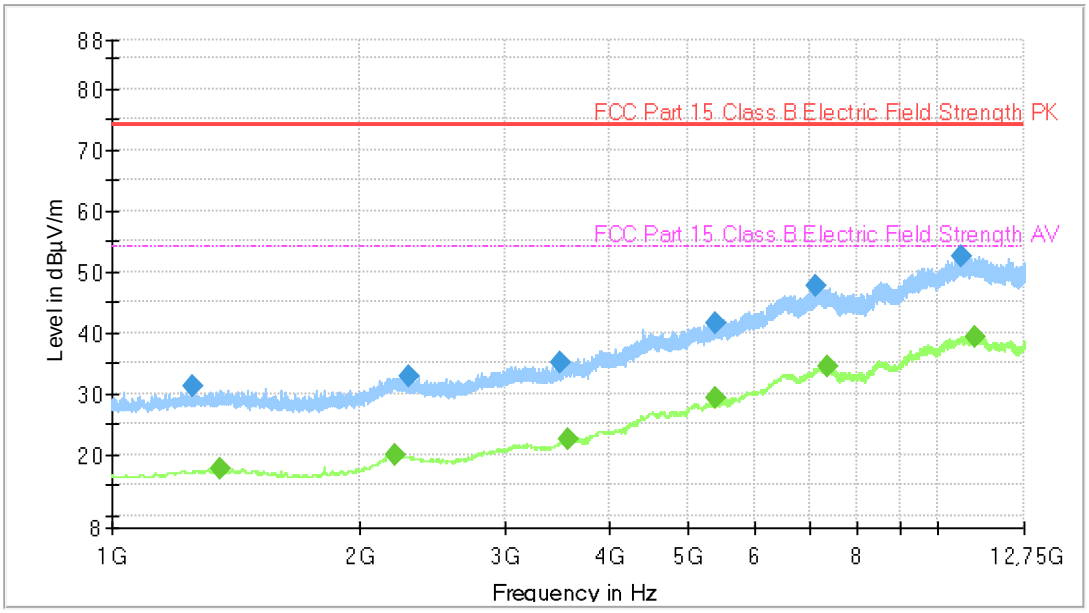


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
48.267000	---	23.00	---	---	165.0	V	39.0
48.267000	20.47	---	40.00	19.53	165.0	V	39.0
63.990000	---	24.78	---	---	174.0	V	-143.0
63.990000	21.67	---	40.00	18.33	174.0	V	-143.0
72.403000	---	19.89	---	---	153.0	V	-9.0
72.403000	16.22	---	40.00	23.78	153.0	V	-9.0
96.511000	---	18.73	---	---	217.0	V	-131.0
96.511000	14.27	---	43.52	29.25	217.0	V	-131.0
115.747000	17.16	---	43.52	26.36	115.0	V	-112.0
115.747000	---	22.85	---	---	115.0	V	-112.0
128.013000	16.30	---	43.52	27.22	133.0	V	58.0
128.013000	---	20.71	---	---	133.0	V	58.0
144.733000	---	23.97	---	---	100.0	V	10.0
144.733000	18.63	---	43.52	24.89	100.0	V	10.0

Project:	67117REM.002
Company:	SEQUANS COMMUNICATIONS
Sample:	S/01
Operation mode:	01
Graphical code:	RE0101HR
Description:	EUT ON. MS in IDLE mode. LTE Cat. M1 Band 12 (worst case). Power supply of EUT: 3.3Vdc.
Verdict:	Passed

RE FCC Part 15 Class B



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Corr. (dB/m)
1253.600000	31.19	---	73.97	42.78	-33.6
1349.600000	---	17.79	53.97	36.18	-33.4
2199.200000	---	20.01	53.97	33.96	-30.2
2286.800000	32.91	---	73.97	41.06	-30.5
3495.600000	35.13	---	73.97	38.84	-28.3
3568.400000	---	22.44	53.97	31.53	-27.9
5376.400000	41.52	---	73.97	32.45	-24.8
5376.800000	---	29.15	53.97	24.82	-24.8
7112.400000	47.83	---	73.97	26.14	-19.0
7376.800000	---	34.38	53.97	19.59	-19.0
10668.400000	52.53	---	73.97	21.44	-16.2
11117.200000	---	39.44	53.97	14.53	-16.5