DEKRA Testing and Certification, S.A.U.
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c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

ISED CABid: ES1909

Test report No:
NIE: 66594REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-20 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	The HTSXMO32L-22 is a Sigfox certified system-in-package (SiP) module
(*) Trademark	HT Micron
(*) Model and /or type reference	HTSXMO32L-22
Other identification of the product	HW version: V2.2 SW version: V2.8.1 FCC ID: 2A7ZW-HTSXMO32L
(*) Features	Sigfox communication and regular MCU GPIOs, ADCs, USART
Manufacturer	HT Micron Semicondutores Avenida Unisinos 1550, Cristo Rei, São Leopoldo-RS, Brazil ZIP code: 93022-750
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-20 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Industrial & Automotive EMC Lab. Manager Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456) Fecha: 2022.07.28 09:46:31 +02'00'
Date of issue	2022-07-27
Report template No	FDT08_23 (*) “Data provided by the client”

Index

Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
OM	Operation Mode
S/	Sample
V	Verdict

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 the appropriate scope of accreditation that covers the performed tests in this report, FCC designation number ES0004.

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.

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 measured conducted disturbance characteristics of EUT from 150 kHz to 30 MHz is I = ± 3,9 dB for quasi-peak measurements, I = ± 3,2 dB for peak measurements (k = 2).

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 consists of a Sigfox certified system-in-package (SiP) module, HTSXMO32L-22.

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 under test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	66594C_11.1	Module	--	--	2021-07-26	Element Under Test
	66594C_2.1	SMA Cable	--	--	2021-01-20	Element Under Test
	66594C_3.1	Antenna	--	--	2021-01-20	Element Under Test
	CTC-4667-U	PC laptop	Dell	1M1WFW2	--	Auxiliary element

Test sample description

<table>
<tr><td rowspan="4">Ports…… :</td><td rowspan="2">Port name and description</td><td colspan="4">Cable</td></tr>
<tr><td>Specified max length [m]</td><td>Attached during test</td><td>Shielded</td><td>Coupled to patient</td></tr>
<tr><td>DC supply via USB</td><td>1</td><td>[X]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>Header pins</td><td>0.15</td><td>[X]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td></td><td>SMA RF out</td><td>0.5</td><td>[X]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>Supplementary information to the ports…… :</td><td colspan="5">.....</td></tr>
<tr><td rowspan="6">Rated power supply .....:</td><td colspan="2" rowspan="2">Voltage and Frequency</td><td colspan="4">Reference poles</td></tr>
<tr><td>L1</td><td>L2</td><td>L3</td><td>N</td><td>PE</td></tr>
<tr><td>[ ]</td><td>AC: .....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>[ ]</td><td>AC: .....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>[X]</td><td colspan="5">DC: 5Vdc. (USB port on computer)</td></tr>
<tr><td>[ ]</td><td colspan="5">DC: .....</td></tr>
<tr><td>Rated Power .....:</td><td colspan="6">0.66-1W only during transmission</td></tr>
<tr><td>Clock frequencies.....:</td><td colspan="6">MCU maximum clock os 32MHz, S2LP clock reference is 50MHz crystal oscillator</td></tr>
<tr><td>Other parameters .....:</td><td colspan="6">.....</td></tr>
<tr><td>Software version .....:</td><td colspan="6">V2.8.1</td></tr>
<tr><td>Hardware version .....:</td><td colspan="6">V2.2</td></tr>
<tr><td>Dimensions in cm (W x H x D) ....:</td><td colspan="6">2x2x8 of the evaluation board provided</td></tr>
<tr><td rowspan="5">Mounting position .....:</td><td>[X]</td><td colspan="5">Table top equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Wall/Ceiling mounted equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Floor standing equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Hand-held equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Other: .....</td></tr>
</table>

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	HTSXMO32L-22	System-in-package	HT Micron
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	Test-board to perform the tests	PCB	HT Micron
	.....	.....	.....
Documents as provided by the applicant.....:	Description	File name	Issue date
	.....	.....	.....

Identification of the client

HT Micron Semicondutores

Avenida Unisinos 1550, Cristo Rei, São Leopoldo-RS, Brazil ZIP code: 93022-750

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-01-12
Date (finish)	2022-01-13

Document history

Report number	Date	Description
66594REM.001	2022-07-27	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. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

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. = 30 % Max. = 60 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

The tests have been performed by the technical personnel: Jaime Barranquero Gómez.

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
7763	HORN ANTENNA 1-18GHz	BBHA 9120D	SCHWARZBECK MESS-ELEKTRONIK	2022-11-15
7769	PREAMPLIFIER 30dB 500MHz-18GHz	BBV 9718 C	SCHWARZBECK	2023-03-25
7817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-12-30
7826	ULTRALOG ANTENNA 30MHz-6GHz	HL562E_UPG	ROHDE AND SCHWARZ	2022-10-15
8130	SEMIANECHOIC ABSORBER LINED CHAMBER VI	P29419	ALBATROSS	---
8134	SHIELDED ROOM	P29419	ALBATROSS PROJECTS GMBH	---

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-20 Edition) & ICES-003 Issue 7 (October 2020)	RE Radiated emission. Electromagnetic field measure	Pass	--
	CE Continuous conducted emission	N/A	(1)

Supplementary information and remarks:

(1) Test not applicable because there is no AC port.

Appendix A: Test results

Appendix A content

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. EUT in RX mode. Device connected to a laptop. Power Supply: 5 Vdc (USB)

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 (10-1-20 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	RE Radiated emission.

Test Cases Details

FCC 47 CFR Part 15B

RE Radiated emission. Electromagnetic field measure

Limits

Limits of interference Class B

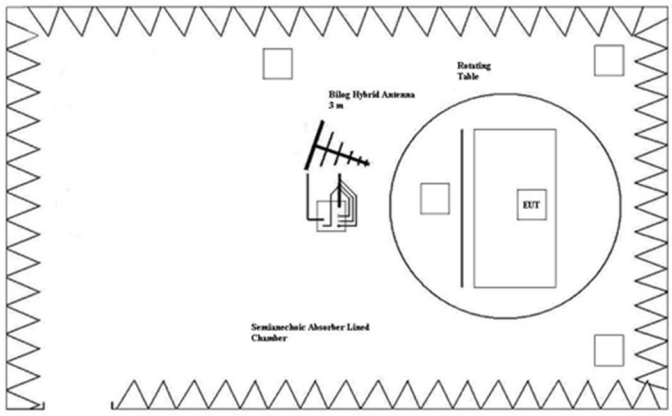
The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	(µV/m)	(dBµV/m)	(µV/m)	(dBµV/m)	(dBµV/m)	(dBµV/m)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46	---	---
230 to 960	200	46	224	47		
960 to 1000	500	54	500	54	---	---
Above 1000	---	---	---	---	74	54

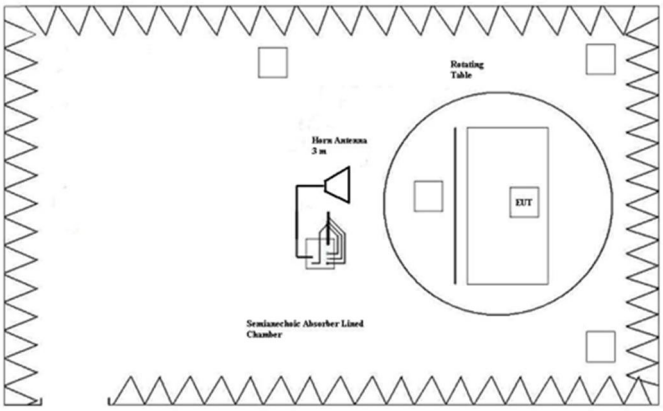
NOTE: FCC QP and AVG limits are in concordance with RSS-Gen Issue 5 (March 2019), Secs. 7.1 and 7.3.

Limits according to FCC Part 15B, equal to o more stringent than those of ICES-003 Issue 7.

Setup for measurements



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

Results

S/	OM	Code	Freq Rng (MHz)	Comments	V
01	OM/01	RE0101LR	[30, 1000]		P
01	OM/01	RE0101HR	[1000, 12750]		P

Verdict

Pass

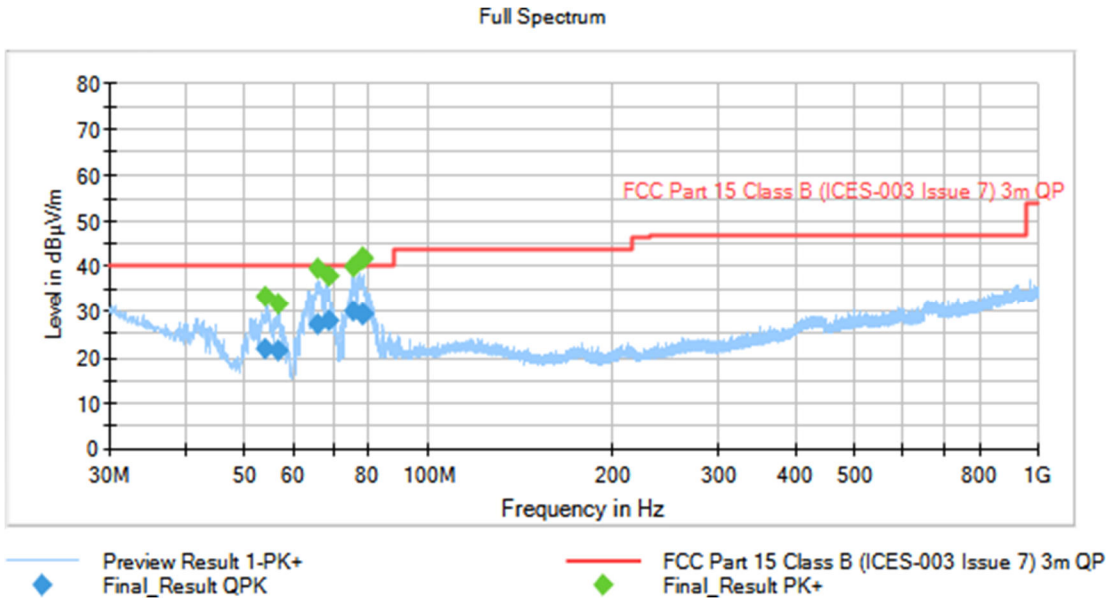
Attachments

EMC Test Code = RE0101LR, Frequency Range MHz = [30, 1000]

Sample ID: S/01

Operation Mode: OM/01. EUT ON. DUT in RX mode. Power Supply: 5 Vdc (USB).

Images:



Documents:

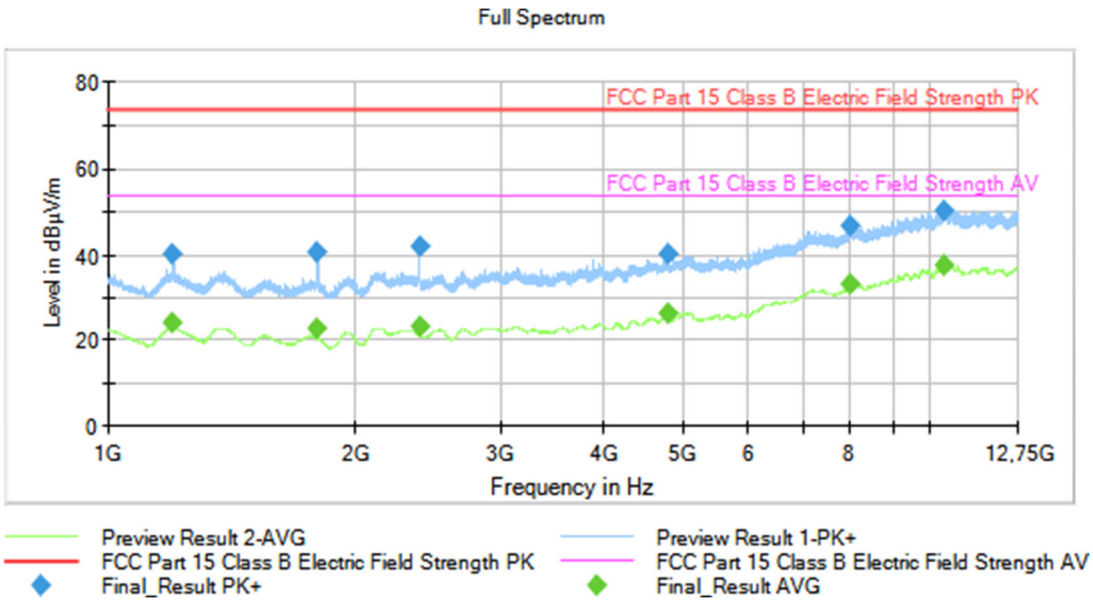
Frequency(MHz)	QuasiPeak(dBµV/m)	MaxPeak(dBµV/m)	Limit(dBµV/m)	Margin(dB)	Height(cm)	Pol	Azimuth(deg)
54.086000	---	33.49	---	---	111.0	V	1.0
54.086000	22.01	---	40.00	17.99	111.0	V	1.0
56.890000	---	31.71	---	---	142.0	V	54.0
56.890000	21.56	---	40.00	18.44	142.0	V	54.0
65.955000	---	39.58	---	---	183.0	V	148.0
65.955000	27.08	---	40.00	12.92	183.0	V	148.0
68.825000	28.01	---	40.00	11.99	151.0	V	163.0
68.825000	---	37.95	---	---	151.0	V	163.0
75.507000	---	39.99	---	---	100.0	V	97.0
75.507000	29.99	---	40.00	10.01	100.0	V	97.0
77.975000	---	42.12	---	---	108.0	V	41.0
77.975000	29.78	---	40.00	10.22	108.0	V	41.0
78.006000	29.20	---	40.00	10.80	155.0	V	183.0
78.006000	---	41.57	---	---	155.0	V	183.0

EMC Test Code = RE0101HR, Frequency Range MHz = [1000, 12750]

Sample ID: S/01

Operation Mode: OM/01. EUT ON. DUT in RX mode. Power Supply: 5 Vdc (USB).

Images:



Documents:

Frequency(MHz)	MaxPeak(dBµV/m)	Average(dBµV/m)	Limit(dBµV/m)	Margin(dB)
1196.000000	---	24.07	53.97	29.90
1196.000000	40.10	---	73.97	33.87
1796.400000	40.46	---	73.97	33.51
1796.400000	---	22.86	53.97	31.11
2389.200000	41.81	---	73.97	32.16
2389.200000	---	23.28	53.97	30.69
4796.800000	40.01	---	73.97	33.96
4796.800000	---	26.38	53.97	27.59
7995.600000	46.64	---	73.97	27.33
7995.600000	---	33.08	53.97	20.89
10395.200000	---	37.60	53.97	16.37
10395.200000	50.42	---	73.97	23.55