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
Lab Company Number: 4621A

Test report No:
74986REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-21 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	Ultrasonic Water Meter
(*) Trademark	flowIQ®2200
(*) Model and /or type reference	KWM2220
Other identification of the product	FCC ID: OUY-2023NB82 IC: 22376-2023NB82
(*) Features	Features: LTE Cat NB2 and SRD in ISM band. HW version: 55502095-A4 (Top PCB) ; 55502080-D5 (Bottom PCB); SW version: 50981795 (Top PCB)
Manufacturer	Kamstrup A/S Industrivej 28 8660 Skanderborg, Denmark
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-21 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez EMC Consumer & RF Lab. Manager Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456) Fecha: 2023.10.23 10:32:55 +02'00'
Date of issue	2023-10-23
Report template No	FDT08_24 (*) "Data provided by the client"

Index

Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
MP	Measurement Point
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, Company Number: 4621A, 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 peak 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 Ultrasonic Water Meter. The KWM2220 is based on 2 PCB boards and an Antenna. - Top PCB, where the MCU of the Meter calculator, the MCU of the communication and the NB-IoT modem and a short range device (SRD) radio are presented. - Bottom PCB, used for water flow measurement via Piezo electric device controlled with an ASIC. - The Antenna is a click-on antenna or a wall antenna. The KWM2220 contains a NB-IoT module with the FCC ID: XMR2021BC660KGL. The NB-IoT module is controlled by the RF micro controller. The KWM2220 forwards data directly to Meter Data Management system (MDM) READY Manager over the NB-IoT network with a subscription handled by Kamstrup. The main configuration of the KWM2220 is 1 daily data transmission.

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	74986C_2.1	Water Meter	flowIQ® 2200	02K82D18B8CA	2023-08-31	Element Under Test
	74986C_5.1	Click On Antenna	6699663		2023-08-31	Element Under Test
S/02	74986C_2.1	Water Meter	flowIQ® 2200	02K82D18B8CA	2023-08-31	Element Under Test
	74986C_6.1	Wall Antenna	6699666		2023-08-31	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Radiated
S/02	Radiated

Test sample description

<table>
<tr><td rowspan="7">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(3)</td></tr>
<tr><td>Antenna port</td><td>7.5</td><td>[X]</td><td>[X]</td><td>[ ]</td></tr>
<tr><td>.....</td><td>.....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>.....</td><td>.....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>.....</td><td>.....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>.....</td><td>.....</td><td>[ ]</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="5">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: 3.6 Volt D celle Battery</td></tr>
<tr><td>[ ]</td><td colspan="5">DC: .....</td></tr>
<tr><td>Rated Power .....:</td><td colspan="6">.....</td></tr>
<tr><td>Clock frequencies.....:</td><td colspan="6">.....</td></tr>
<tr><td>Other parameters .....:</td><td colspan="6">.....</td></tr>
<tr><td>Software version .....:</td><td colspan="6">.....</td></tr>
<tr><td>Hardware version .....:</td><td colspan="6">.....</td></tr>
<tr><td>Dimensions in cm (W x H x D) ....:</td><td colspan="6">.....</td></tr>
<tr><td rowspan="4">Mounting position .....:</td><td>[ ]</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>
</table>

	[X]	Other: in the water pipe-Line in house or in the a pit.		
Modules/parts.....:	Module/parts of test item		Type	Manufacturer
	KWM2220		02K82D18B8UB	Kamstrup
	KWM2220		02K82D18B8CA	Kamstrup
	.....		.....	.....
	.....		.....	.....
Accessories (not part of the test item) .....:	Description		Type	Manufacturer
	USB optical eye		6699099	Kamstrup
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
Documents as provided by the applicant.....:	Description		File name	Issue date
	Instruction to how set the test item into diff. testmodes		KWM_NB-C2 Instruction Manual	10-07-2023
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....

(3) Only for Medical Equipment

Identification of the client

Kamstrup A/S
Industrivej 28 8660 Skanderborg, Denmark

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-09-05
Date (finish)	2023-09-05

Document history

Report number	Date	Description
74986REM.001	2023-10-23	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: Ivan Guerrero González.

Testing verdicts

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

List of equipment used during the test

Control No.	Equipment	Model	Manufacturer	Next Calibration
8866	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-09-21
6132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2024-04-21
6126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2024-04-21
4612	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2024-07-13
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2024-09-15
9360	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2024-07-25
6064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	Frankonia	--
6329	SHIELDED ROOM	--	FRANKONIA	--
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	--

Summary

Test Specification	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B (10-1-21 Edition) & ICES-003 Issue 7 (October 2020)	RE Radiated emission. Electromagnetic field measure	P	(1)
	CE Continuous conducted emission	N/A	(2)

Supplementary information and remarks:

(1) Range: f>12.75 GHz. Test required only to the 5th harmonics of the maximum internal work frequency in the EUT.
(2) This test is not applicable: DUT battery powered

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.

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. Cellular searching networks. Power supply: Internal batteries.

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 (10-1-21 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

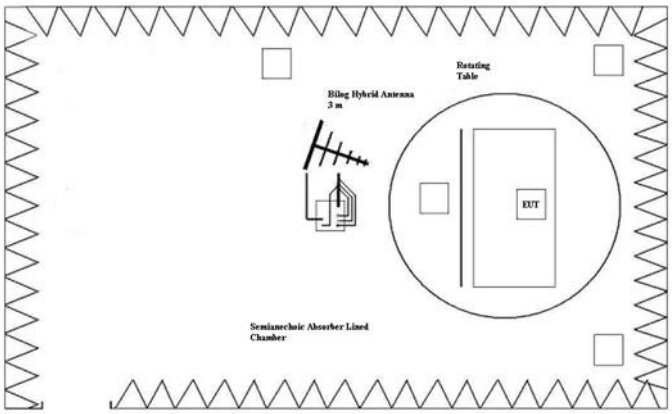
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-21 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

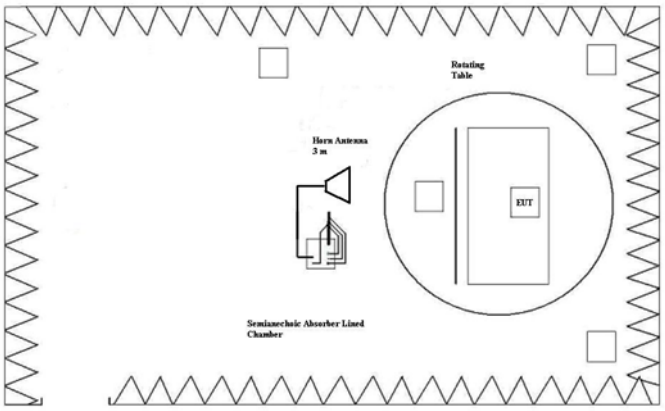
Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	(μV/m)	(dBμV/m)	(μV/m)	(dBμV/m)	(dBμV/m)	(dBμV/m)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46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

Limits according to FCC Part 15B, are equal or 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)	V
01	OM/01	RE0101LR	[30, 1000]	P
01	OM/01	RE0101HR	[1000, 12750]	P
02	OM/01	RE0201LR	[30, 1000]	P
02	OM/01	RE0201HR	[1000, 12750]	P

Verdict

Pass

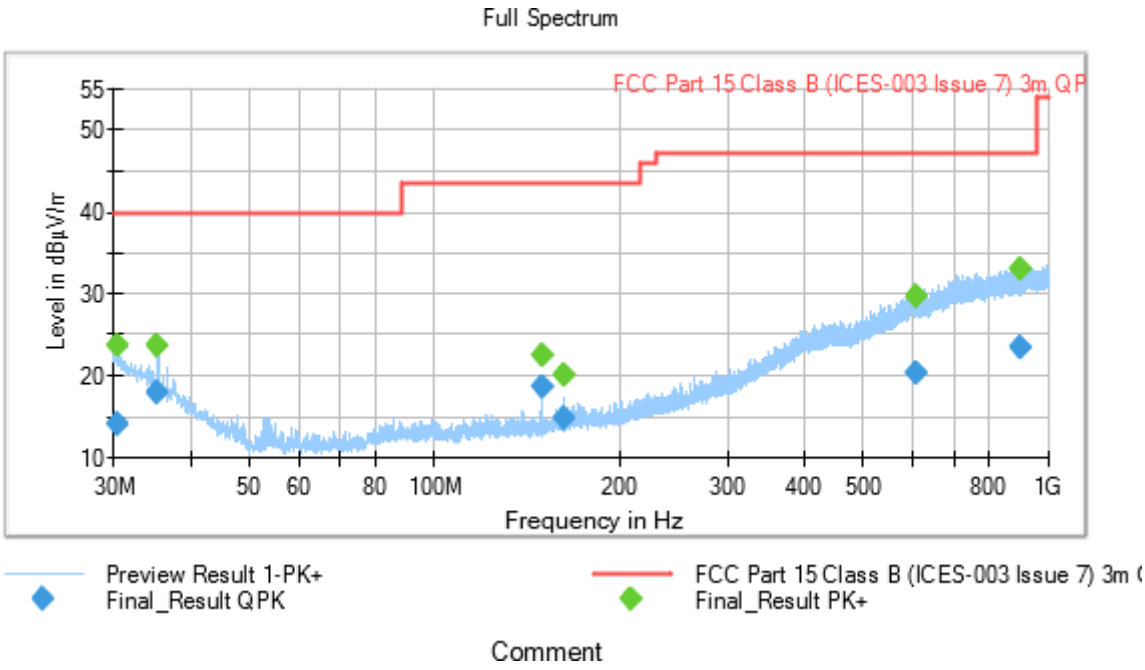
Attachments

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

Sample ID: S/01

Operation Mode: OM/01. EUT ON. Cellular searching networks. Power supply: Internal batteries.

Images:



Tables:

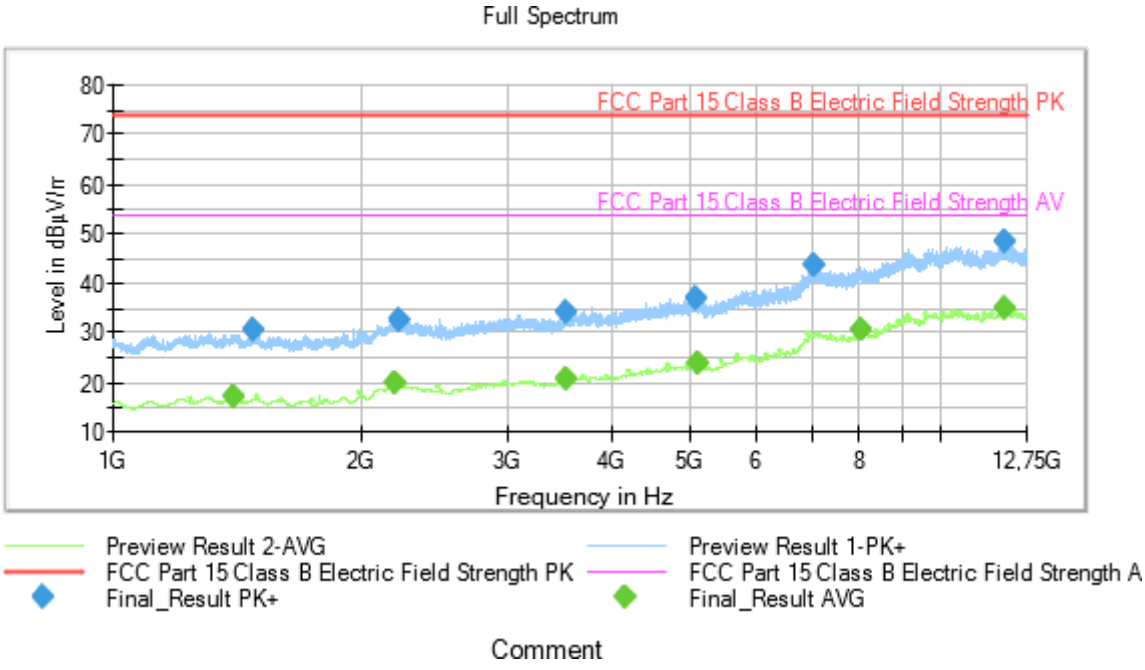
Frequency(MHz)	QuasiPeak(dBµV/m)	MaxPeak(dBµV/m)	Limit(dBµV/m)	Margin(dB)	Height(cm)	Pol	Azimuth(deg)
30.467000	---	23.56	---	---	150.0	V	-69.0
30.467000	14.14	---	40.00	25.86	150.0	V	-69.0
35.412000	17.96	---	40.00	22.04	184.0	H	34.0
35.412000	---	23.58	---	---	184.0	H	34.0
149.975000	---	22.38	---	---	100.0	V	142.0
149.975000	18.51	---	43.52	25.01	100.0	V	142.0
162.503000	14.67	---	43.52	28.85	100.0	V	21.0
162.503000	---	20.03	---	---	100.0	V	21.0
611.093000	---	29.56	---	---	125.0	H	-118.0
611.093000	20.27	---	47.00	26.73	125.0	H	-118.0
900.790000	---	33.06	---	---	322.0	V	70.0
900.790000	23.40	---	47.00	23.60	322.0	V	70.0

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

Sample ID: S/01

Operation Mode: OM/01. EUT ON. Cellular searching networks. Power supply: Internal batteries.

Images:



Tables:

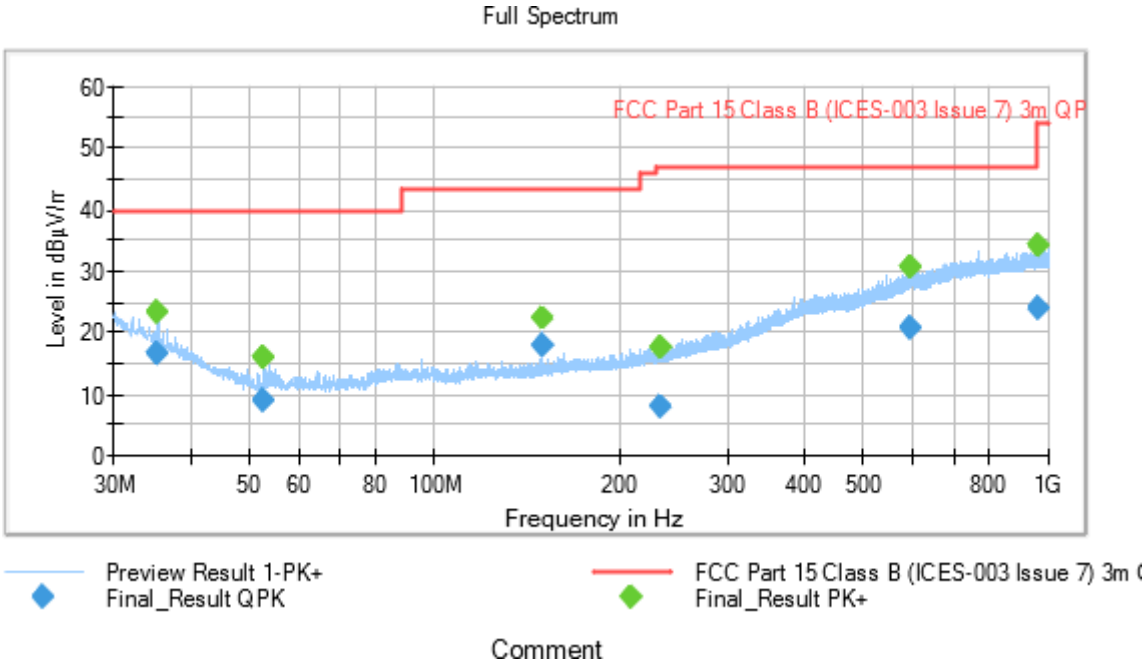
Frequency(MHz)	MaxPeak(dBµV/m)	Average(dBµV/m)	Limit(dBµV/m)	Margin(dB)
1399.250000	---	17.29	53.97	36.68
1475.500000	30.71	---	73.97	43.26
2192.000000	---	19.73	53.97	34.24
2216.500000	32.59	---	73.97	41.38
3525.500000	---	20.67	53.97	33.30
3532.750000	33.96	---	73.97	40.01
5069.750000	37.02	---	73.97	36.95
5096.750000	---	23.69	53.97	30.28
7060.500000	43.51	---	73.97	30.46
8055.500000	---	30.42	53.97	23.55
12018.750000	---	35.02	53.97	18.95
12031.250000	48.30	---	73.97	25.67

EMC Test Code = RE0201LR Frequency Range MHz = [30, 1000]

Sample ID: S/02

Operation Mode: OM/01. EUT ON. Cellular searching networks. Power supply: Internal batteries.

Images:



Tables:

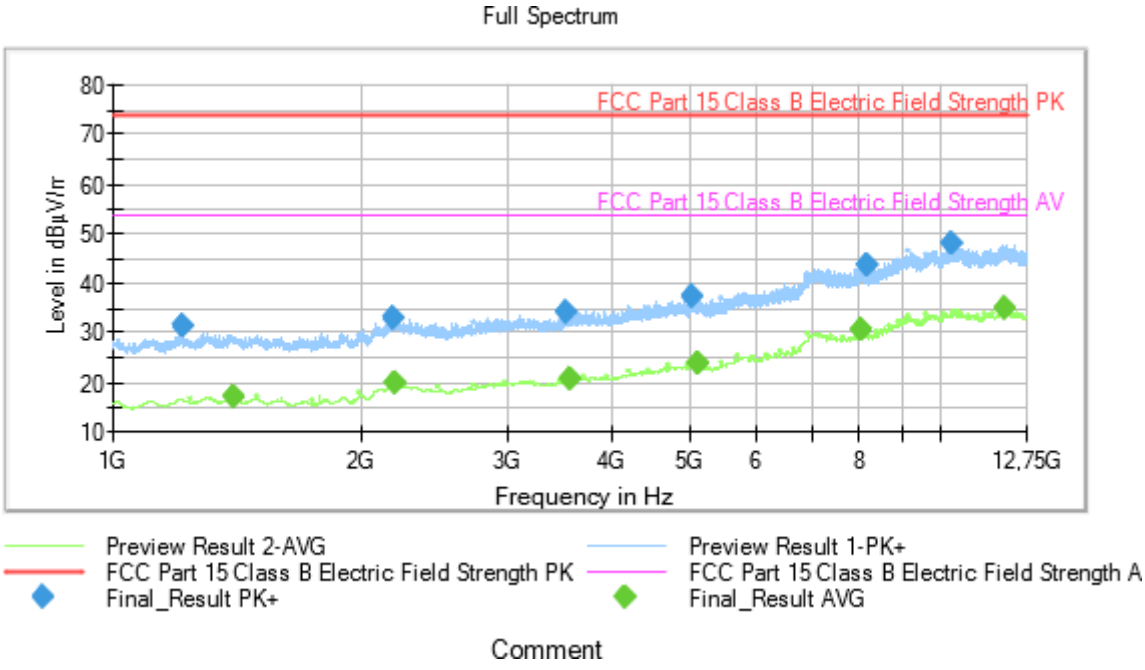
Frequency(MHz)	QuasiPeak(dBµV/m)	MaxPeak(dBµV/m)	Limit(dBµV/m)	Margin(dB)	Height(cm)	Pol	Azimuth(deg)
35.395000	16.69	---	40.00	23.31	204.0	H	-20.0
35.395000	---	23.24	---	---	204.0	H	-20.0
52.532000	---	15.84	---	---	137.0	V	-37.0
52.532000	8.79	---	40.00	31.21	137.0	V	-37.0
150.005000	17.84	---	43.52	25.68	115.0	V	163.0
150.005000	---	22.28	---	---	115.0	V	163.0
232.999000	8.11	---	47.00	38.89	137.0	H	137.0
232.999000	---	17.49	---	---	137.0	H	137.0
598.089000	---	30.72	---	---	126.0	H	-52.0
598.089000	20.74	---	47.00	26.26	126.0	H	-52.0
964.119000	23.79	---	53.97	30.18	209.0	V	126.0
964.119000	---	34.12	---	---	209.0	V	126.0

EMC Test Code = RE0201HR Frequency Range MHz = [1000, 12750]

Sample ID: S/02

Operation Mode: OM/01. EUT ON. Cellular searching networks. Power supply: Internal batteries.

Images:



Tables:

Frequency(MHz)	MaxPeak(dBµV/m)	Average(dBµV/m)	Limit(dBµV/m)	Margin(dB)
1210.500000	31.31	---	73.97	42.66
1400.000000	---	17.26	53.97	36.71
2177.000000	33.12	---	73.97	40.85
2190.000000	---	19.74	53.97	34.23
3523.500000	33.95	---	73.97	40.02
3569.500000	---	20.67	53.97	33.30
5010.250000	37.20	---	73.97	36.77
5095.500000	---	23.68	53.97	30.29
8051.750000	---	30.47	53.97	23.50
8156.500000	43.46	---	73.97	30.51
10363.750000	48.13	---	73.97	25.84
12018.500000	---	35.01	53.97	18.96