



TEST REPORT

No. I19D00119-EMC01

For

Client : Inseego Corp.

**Production: Industrial Cellular Gateway with
Ethernet,WiFi,Bluetooth,GPS/GLNSS
and USB Connectivity**

Model Name : SKG1EM7455

Brand Name: SKYUS 160NE

FCC ID: PKRISGSKG1EM7455

IC ID: 3229A-SKG1EM7455

Hardware Version: P2

Software Version: 2.110.1.2

Issued date: 2019-11-07

NOTE

1. The test results in this test report relate only to the devices specified in this report.
2. This report shall not be reproduced except in full without the written approval of East China Institute of Telecommunications.
3. The measurement uncertainty is not taken into account when deciding conformity, and the results of measurement (or the average of measurement results) are directly used as the criterion for the stating conformity.

Test Laboratory:

East China Institute of Telecommunications

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Revision Version

Report Number	Revision	Date	Memo
I19D00119-EMC01	00	2019-10-23	Initial creation of test report
I19D00119-EMC01	01	2019-11-07	Second creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301
FCC designation No:	CN1177
IC designation No:	10766A-1

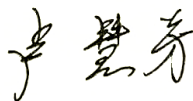
1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	30-60% RH
Supply Voltage	120V/60Hz

1.3. Project data

Project Leader:	Chen Minfei
Testing Start Date:	2019-07-19
Testing End Date:	2019-08-19

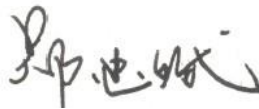
1.4. Signature



Lu Huifang
(Prepared this test report)



You Jinjun
(Reviewed this test report)



Zheng Zhongbin
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name	Inseego Corp.
Address	9605 Scranton Road, Suite 300, San Diego, CA 92121, USA
Telephone	+1 858-812-0606
Postcode	/

2.2. Manufacturer Information

Company Name	Inseego Corp.
Address	9605 Scranton Road, Suite 300, San Diego, CA 92121, USA
Telephone	+1 858-812-0606
Postcode	/

3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

ProductName	Industrial Cellular Gateway with Ethernet, WiFi,Bluetooth,GPS/GLNSS and USB Connectivity
Model name	SKG1EM7455
UMTS Frequency Band	WCDMA Band I / II /III/IV / V /VIII
LTE Frequency Band	LTE Band 1/2/3/4/5/7/12/13/20/25/26/29/30/41
Additional Communication Function	BLE;WIFI 802.11a,b,g,n,ac;Galileo;GLONASS;GPS;

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N16	/	P2	2.110.1.2	2019-07-12

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN
CA01	Adapter	ASSA53W-120150	/
BA02	Battery	16002	/
EB05	4G Antenna	/	/
EB07	4G Antenna	/	/
EC02	GPS Antenna	/	/
AE1	Notebook PC	DELL Latitude E6510	/
AE2	USB Cable	/	/
AE3	LAN Cable	/	/

*AE ID: is used to identify the test sample in the lab internally.

*The AE were provided by the lab.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices	2019/6/21
ANSI C63.4	Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014
ICES-003	Information Technology Equipment(Including Digital Apparatus)-Limits and Methods of Measurement	2016

5. Test Results

5.1. Summary of Test Results

Items	Test List	Clause in FCC rules	Verdict
1	Radiated Emission	15.109(a)	Pass
2	AC Conducted Emission	15.107(a)	Pass

5.2. Statements

The SKG1EM7455 supporting WCDMA/LTE.etc, manufactured by Inseego Corp. is a new product for testing. ECIT only performed test cases which identified with Pass/Fail/Inc result in section 5.1.

ECIT has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Test Equipments Utilized

6.1 Radiated Emission Equipments list

Item	Instrument Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication	CMU200	123126	R&S	2019-05-10	1 year
2	Universal Radio Communication	CMW500	104178	R&S	2019-05-10	1 year
3	Test Receiver	ESU40	100307	R&S	2019-05-10	1 year
4	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-02-25	3 years
5	Double Ridged Guide	ETS-3117	00135890	ETS	2017-01-11	3 years
6	EMI Test Software	EMC32 V9.15	NA	R&S	NA	NA
7	GPS Simulator	GSS 4200	1182	SPIRENT	2018-12-17	1 year
8	Signal Generator	SMBV100 A	257984	R&S	2019-03-06	1 Year

6.2 AC Conducted Emission Equipments list

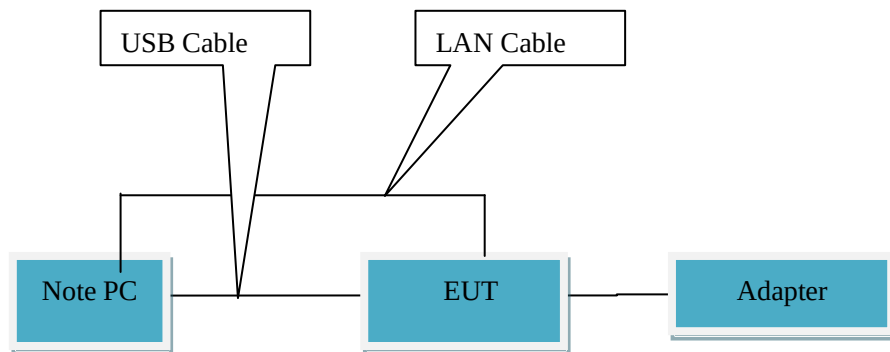
Item	Instrument Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication	CMU200	123123	R&S	2019-05-10	1 year
2	Universal Radio Communication	CMW500	104178	R&S	2019-05-10	1 year
3	Test Receiver	ESCI	101235	R&S	2019-05-10	1 year
4	2-Line V-Network	ENV216	101380	R&S	2019-04-24	1 year
5	EMI Test Software	EMC32 V10.35.02	NA	R&S	NA	NA
6	GPS Simulator	GSS 4200	1182	SPIRENT	2018-12-17	1 year
7	Signal Generator	SMBV100 A	257984	R&S	2019-03-06	1 Year

7. System Configuration during Test

7.1 Test Mode

Test Item	Function Type
AC Conducted Emission	Mode 1: Working mode (Full system)<Figure 1> Mode 2: Galileo mode<Figure 2> Mode 3: GLONASS mode<Figure 2> Mode 4: GPS mode<Figure 2> Mode 5: WCDMA Band II receiver <Figure 2>
Radiated Emission	Mode 1: Working mode (Full system)<Figure 1> Mode 2: Galileo mode<Figure 2> Mode 3: GLONASS mode<Figure 2> Mode 4: GPS mode<Figure 2> Mode 5: WCDMA Band II receiver <Figure 2>
Remark: 1. All test modes are performed, only the worst cases test data are recorded in this report. 2. Full system : EUT is connected to the corresponding Auxiliary equipment via cables and is at maximum load for PING command data exchange. 3. After laboratory verification, WCDMA Band II receiver is the worst mode of receiving part. 4. EUT and GPS simulator (GSS4200) connection is established. 5. EUT and Vector signal generator (SMBV100A) connection is established.	

7.2 Connection Diagram of Test System



<Figure 1> Mode 1



<Figure 2> Mode 2~5

8. Measurement Results

Only the worst test result was shown in this report.

8.1 Radiated Emission 30MHz-18GHz

Method of Measurement

- a. For 30MHz -1000MHz, the EUT was placed on the top of a rotating 0.8-m table above the ground at a semi-anechoic chamber. The distance between the EUT and the received antenna was 3 meters. The table was rotated 360 degree and the received antenna mounted on a variable-height antenna tower was varied from 1m to 4m to find the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement. Tested in accordance with the procedures of ANSI C63.4-2014, section 8.3.
- b. For 1000MHz-18000MHz, The maximal emission value was acquired by adjusting the antenna height, The table was rotated 360 degree to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement.

Limits for Radiated Emission at a measuring distance of 3m

Frequency Range (MHz)	Quasi-Peak (dBuV/m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Frequency Range (MHz)	Peak (dBuV/m)	Average (dBuV/m)
Above 1000	74	54

Test conditions

Frequency Range (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120kHz/300kHz	Auto
1000-18000	1MHz/3MHz	Auto

Uncertainty Measurement

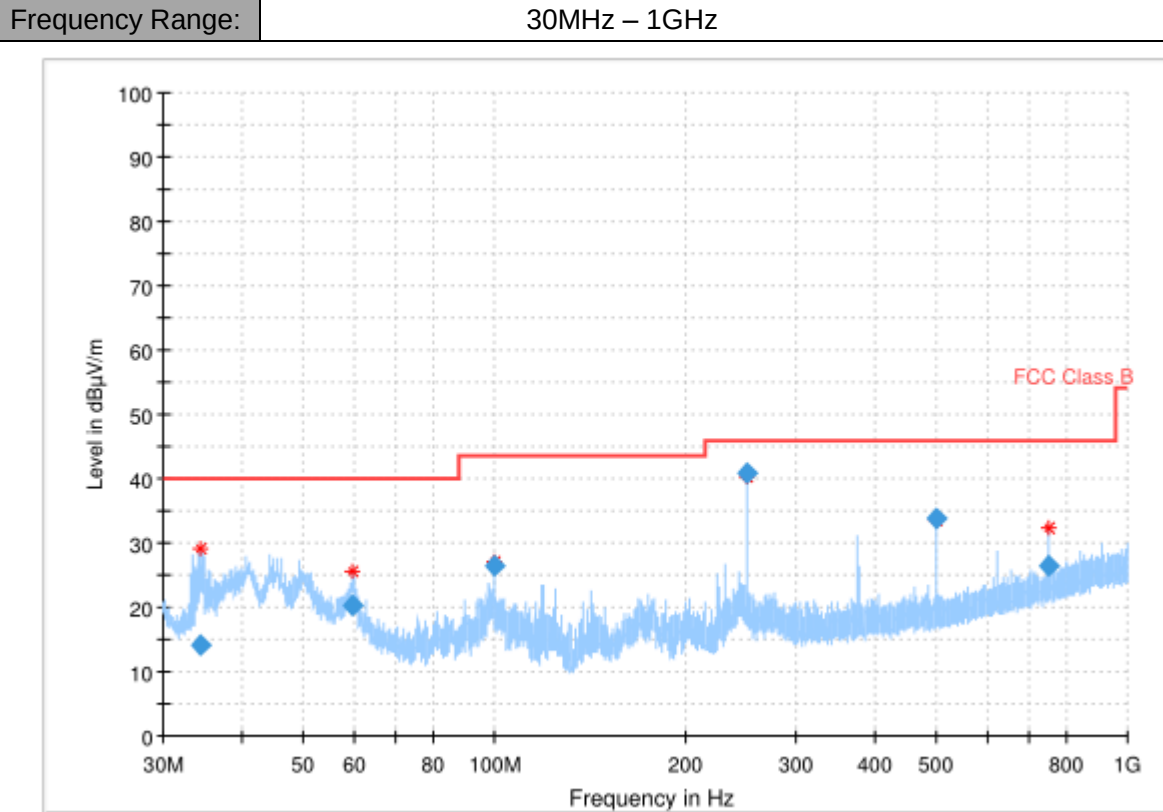
The measurement uncertainty(30MHz-1000MHz) is 4.98 dB (k=2).

The measurement uncertainty(1000MHz-18000MHz) is 5.06 dB (k=2).

Test Results

Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier, the Emissions in the frequency band 18GHz-40GHz is more than 20dB below the limit are not report.

Mode 1: Working mode (Full system)<Figure 1>



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.431856	14.10	40.00	25.90	1000.0	120.000	100.0	V	59.0	-27.3
59.589963	20.43	40.00	19.57	1000.0	120.000	100.0	V	19.0	-27.0
99.996507	26.42	43.50	17.08	1000.0	120.000	100.0	V	6.0	-27.3
250.009152	40.92	46.00	5.08	1000.0	120.000	175.0	H	109.0	-26.9
499.996125	33.76	46.00	12.24	1000.0	120.000	125.0	H	202.0	-21.8
749.977851	26.41	46.00	19.59	1000.0	120.000	121.0	V	113.0	-16.6

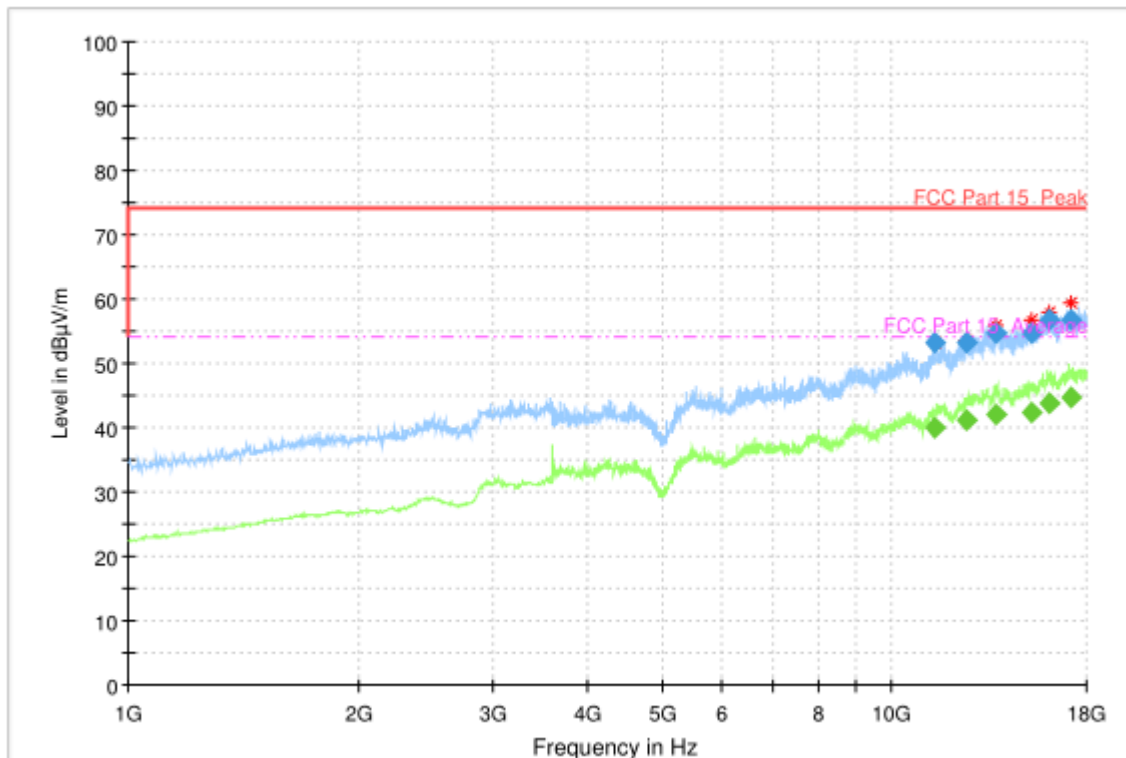
Note:

1. Emission level(QP)=Raw value by receiver + Corr(Antenna factor + cable loss - preamplifier gain)
2. The raw value is used to calculate by software which is not shown in the sheet.
3. Margin=limit value – emission level.

Mode 1: Working mode (Full system)<Figure 1>

Frequency Range:

1GHz –18GHz, Horizontal



Final Result

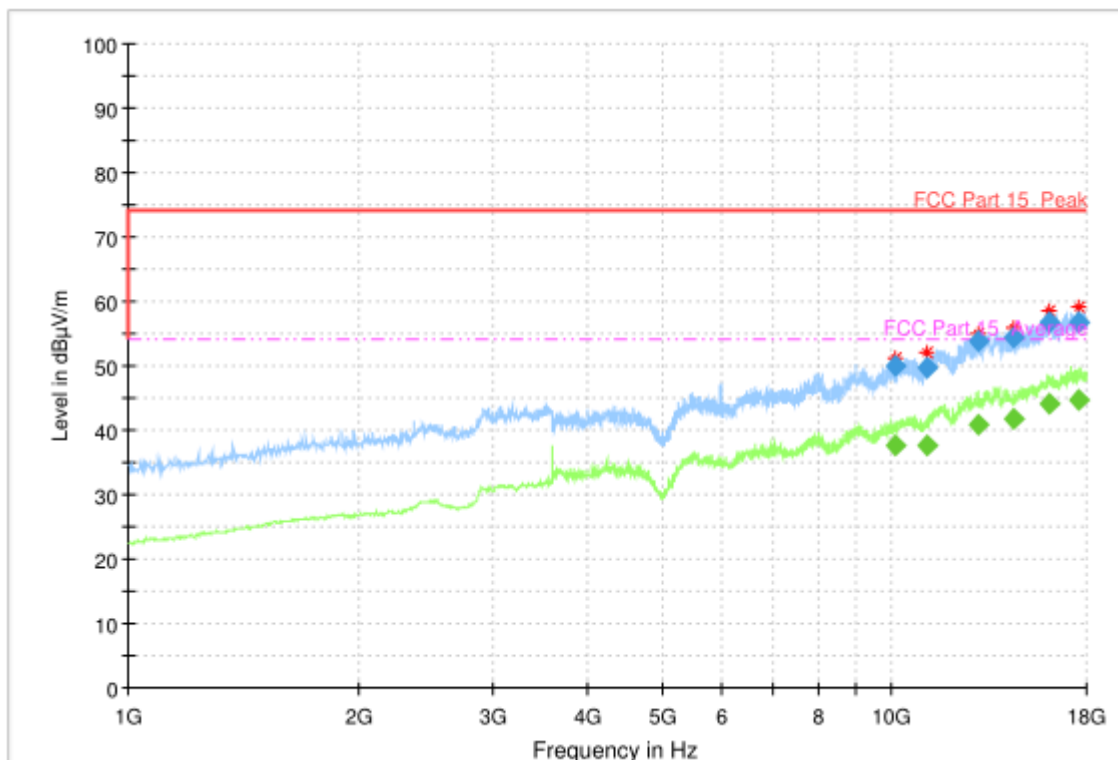
Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margi n	Meas. Time	Bandwidht h	Heigh t	Po l	Azim uth	Corr. (dB)
11410.8000	---	40.01	54.00	13.99	100.0	1000.000	200.0	H	13.0	14.8
11410.8000	53.19	---	74.00	20.81	100.0	1000.000	200.0	H	13.0	14.8
12513.0000	53.32	---	74.00	20.68	100.0	1000.000	100.0	H	347.0	16.6
12513.0000	---	41.20	54.00	12.80	100.0	1000.000	100.0	H	347.0	16.6
13720.4000	---	41.94	54.00	12.06	100.0	1000.000	100.0	H	78.0	18.8
13720.4000	54.70	---	74.00	19.30	100.0	1000.000	100.0	H	78.0	18.8
15267.2000	54.73	---	74.00	19.27	100.0	1000.000	100.0	H	263.0	20.7
15267.2000	---	42.35	54.00	11.65	100.0	1000.000	100.0	H	263.0	20.7
16122.8000	56.88	---	74.00	17.12	100.0	1000.000	100.0	H	253.0	22.4
16122.8000	---	43.93	54.00	10.07	100.0	1000.000	100.0	H	253.0	22.4
17176.8000	56.76	---	74.00	17.24	100.0	1000.000	200.0	H	24.0	24.1
17176.8000	---	44.82	54.00	9.18	100.0	1000.000	200.0	H	24.0	24.1

Note:

1. Emission level(peak or average)=Raw value by receiver + Corr(Antenna factor+ cable loss - preamplifier gain)
2. The raw value is used to calculate by software which is not shown in the sheet.
3. Margin=limit value – emission level.

Frequency Range:

1GHz –18GHz, Vertical



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time	Bandwidth h	Heigh t	Po l	Azim uth	Corr. (dB)
10111.6000	---	37.58	54.00	16.42	100.0	1000.000	200.0	V	0.0	11.7
10111.6000	50.08	---	74.00	23.92	100.0	1000.000	200.0	V	0.0	11.7
11087.0000	---	37.72	54.00	16.28	100.0	1000.000	200.0	V	326.0	13.3
11087.0000	49.69	---	74.00	24.31	100.0	1000.000	200.0	V	326.0	13.3
12943.4000	---	40.87	54.00	13.13	100.0	1000.000	100.0	V	273.0	17.6
12943.4000	53.77	---	74.00	20.23	100.0	1000.000	100.0	V	273.0	17.6
14454.8000	---	41.67	54.00	12.33	100.0	1000.000	200.0	V	0.0	19.1
14454.8000	54.28	---	74.00	19.72	100.0	1000.000	200.0	V	0.0	19.1
16035.0000	56.82	---	74.00	17.18	100.0	1000.000	200.0	V	220.0	22.5
16035.0000	---	44.11	54.00	9.89	100.0	1000.000	200.0	V	220.0	22.5
17582.6000	56.62	---	74.00	17.38	100.0	1000.000	200.0	V	125.0	24.6
17582.6000	---	44.77	54.00	9.23	100.0	1000.000	200.0	V	125.0	24.6

Note:

1. Emission level(peak or average)=Raw value by receiver + Corr(Antenna factor+ cable loss - preamplifier gain)
2. The raw value is used to calculate by software which is not shown in the sheet.
3. Margin=limit value – emission level.

8.2 AC Conducted Emission

Method of Measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies with the band 150 kHz to 30MHz shall not exceed the limits. Both lines of the power mains connected to the EUT were checked for maximum conducted interference. Tested in accordance with the procedures of ANSI C63.4-2014, section 7.3

Limit of AC Conducted Emission

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency		

Test Condition in Charging Mode

Voltage (V)	Frequency (Hz)	RBW	Sweep Time (s)
120	60	9 kHz	Auto

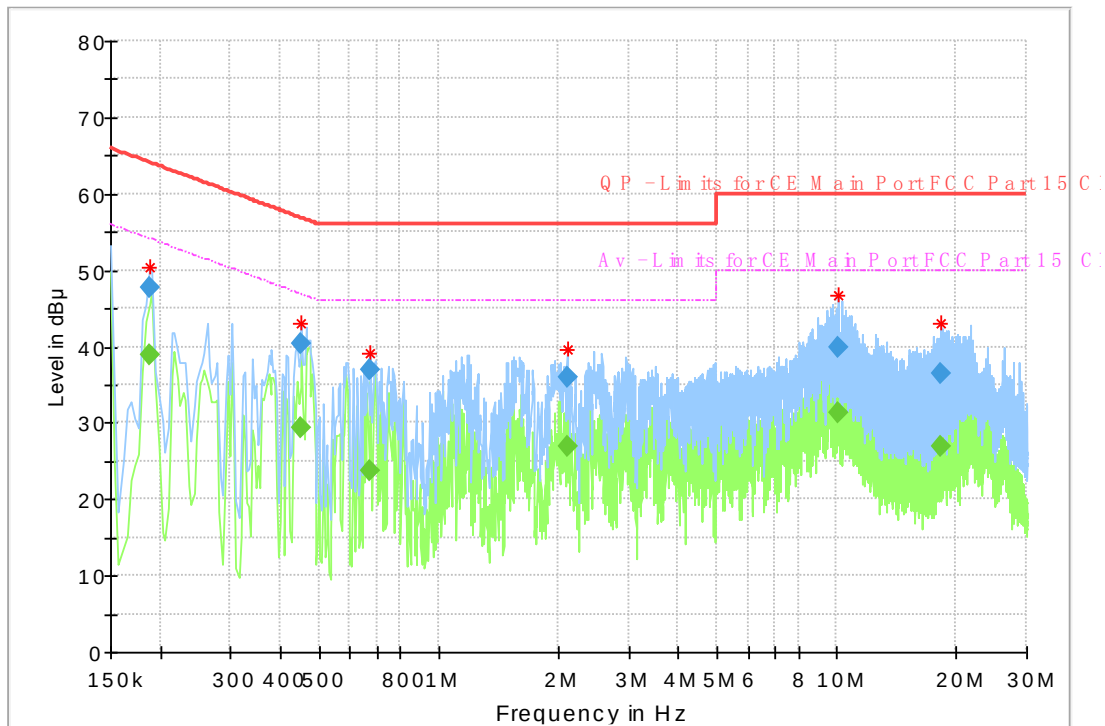
Uncertainty Measurement

The measurement uncertainty is 3.66dB (k=2).

Test Results

Mode 1: Working mode (Full system)<Figure 1>

Frequency Range: 150kHz – 30MHz



Final Result

Frequency (MHz)	QuasiPeak (dBμ V)	Average (dBμ V)	Limit (dBμ V)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.187313	---	38.88	54.16	15.28	15000.	9.000	L1	ON	9.6
0.187313	47.81	---	64.16	16.34	15000.	9.000	L1	ON	9.6
0.452231	---	29.27	46.83	17.57	15000.	9.000	N	ON	9.8
0.452231	40.48	---	56.83	16.35	15000.	9.000	N	ON	9.8
0.672375	---	23.73	46.00	22.27	15000.	9.000	N	ON	9.7
0.672375	36.93	---	56.00	19.07	15000.	9.000	N	ON	9.7
2.101444	---	27.01	46.00	18.99	15000.	9.000	N	ON	9.9
2.101444	35.96	---	56.00	20.04	15000.	9.000	N	ON	9.9
10.082588	39.81	---	60.00	20.19	15000.	9.000	L1	ON	9.9
10.082588	---	31.22	50.00	18.78	15000.	9.000	L1	ON	9.9
18.224175	36.46	---	60.00	23.54	15000.	9.000	L1	ON	10.2
18.224175	---	26.92	50.00	23.08	15000.	9.000	L1	ON	10.2

Note:

1. Emission level(quasi-peak or Average peak)=Raw value by receiver + Corr(Insertion loss+ cable loss)
2. The raw value is used to calculate by software which is not shown in the sheet.
3. Margin=limit value – emission level.
4. L1 and N line is all have been tested, the result of them is synthesized in the above data diagram.

Annex A Accreditation Certificate

Accredited Laboratory

A2LA has accredited

EAST CHINA INSTITUTE OF TELECOMMUNICATIONS
Shanghai, People's Republic of China

for technical competence in the field of
Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 6th day of May 2019.



Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

*****END OF REPORT*****