FCC Co-Location Test Report

FCC ID	:	**P27NA502S**
Equipment	:	**Multiple RF Home Gateway**
Model No.	:	**NA502S**
Brand Name	:	**Sercomm**
Multiple Listing	:	**Refer to item 1.1.1 for more details**
Applicant	:	**Sercomm Corporation**
Address	:	**8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.**
Standard	:	**47 CFR FCC Part 15.247** **47 CFR FCC Part 15.407** **47 CFR FCC Part 22 Subpart H** **47 CFR FCC Part 24 Subpart E**
Received Date	:	**Nov. 21, 2016**
Tested Date	:	**Dec. 06, 2016**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR6N2103CO	Rev. 01	Initial issue	Mar. 03, 2017

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.407(b) 15.209 22.917(a) 24.238(a)	Radiated Emissions	[dBuV/m at 3m]: 43.58MHz 34.68 (Margin -5.32dB) - PK	Pass

1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Sercomm	NA502Sxxxxxxxx	Multiple RF Home Gateway	the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-" , for marketing purpose.
MiOS	G550xxxxx	Multiple RF Home Gateway	
Nortek	GC1xxxxxxxx	Multiple RF Home Gateway	
Vera	VeraSecurexxxxx	Multiple RF Home Gateway	
Vera	VeraSecurexxxxx	Advanced Smart Home Security Controller	

- All models are electrically identical, different model names are for marketing purpose.
- The above models, model **NA502S** was selected as a representative one for the final test and only its data was recorded in this report.

1.1.2 Specification of the Equipment under Test (EUT)

WLAN	
Operating Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5745 ~ 5825 MHz
Modulation Type	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n/ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
BT LE	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulaton Type	Bluetooth 4.0 LE: GFSK
WWAN	
Operating Frequency	GPRS: 824.2 ~ 848.8 MHz WCDMA: 826.4 ~ 846.6 MHz GPRS: 1850.2 ~ 1909.8 MHz WCDMA: 1852.4 ~ 1907.6 MHz
Modulaton Type	GPRS: GMSK EDGE: 8PSK WCDMA / HSDPA / HSUPA: QPSK (uplink)
ZigBee	
Operating Frequency	2405~2480
Modulaton Type	DSSS-O-QPSK
Z-Wave	
Operating Frequency	908.40~916.00
Modulaton Type	FSK / GFSK

1.1.3 Antenna Details

For WLAN

Ant. No.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)		
				2400~2483.5	5150~5250	5725~5850
1	2.4G-1	PIFA	UFL	3.7	---	---
2	2.4G-2	PIFA	UFL	3.9	---	---
3	5G-1	Dipole	UFL	---	1.1	2.2
4	5G-2	PIFA	UFL	---	1.4	3.6

Type	Gain (dBi)	Connector	Remarks
PIFA	4	UFL	BT LE

Type	Gain (dBi)	Connector	Remark
PIFA	4	UFL	GPRS / WCDMA 850
PIFA	2	UFL	GPRS / WCDMA 1900

Type	Gain (dBi)	Connector	Remark
PIFA	3.4	UFL	ZigBee
Monopole	-2.6	No	Z-Wave

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from adapter

1.2 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Dec. 06, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Dec. 06, 2016				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 2017
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.3 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247
47 CFR FCC Part 15.407
47 CFR FCC Part 22 Subpart H
47 CFR FCC Part 24 Subpart E
ANSI C63.10-2013
FCC KDB 558074 D01 DTS Meas Guidance v03r05
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03
FCC KDB 412172 D01 Determining ERP and EIRP v01r01
FCC KDB 971168 D01 Power Meas License Digital Systems v02r02
FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	**Uncertainty**
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	21-24°C / 61-62%	Kevin Lee Vincent Yeh
RF Conducted	TH01-WS	21°C / 64%	Alex Huang

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Test Mode
Radiated Emissions	Mode 1. GPRS50 CH128 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz Mode 2. GPRS1900 CH810 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Conducted Emissions	5G 11ac VHT40 CH151 + BLE CH39

Note1: The selected channel is the maximum power channel of each function
Note2: Conducted emission is performed for Bluetooth and Wi-Fi function only since both functions share same antenna.

3 Transmitter Test Results

3.1 Unwanted Emissions into Restricted Frequency Bands

3.1.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.1.2 Test Procedures

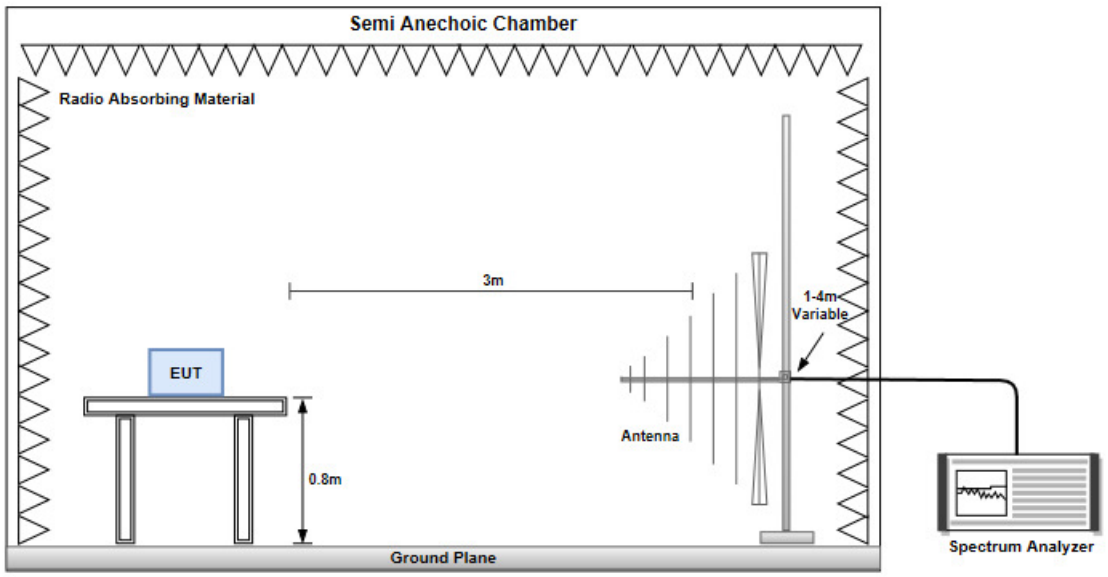
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

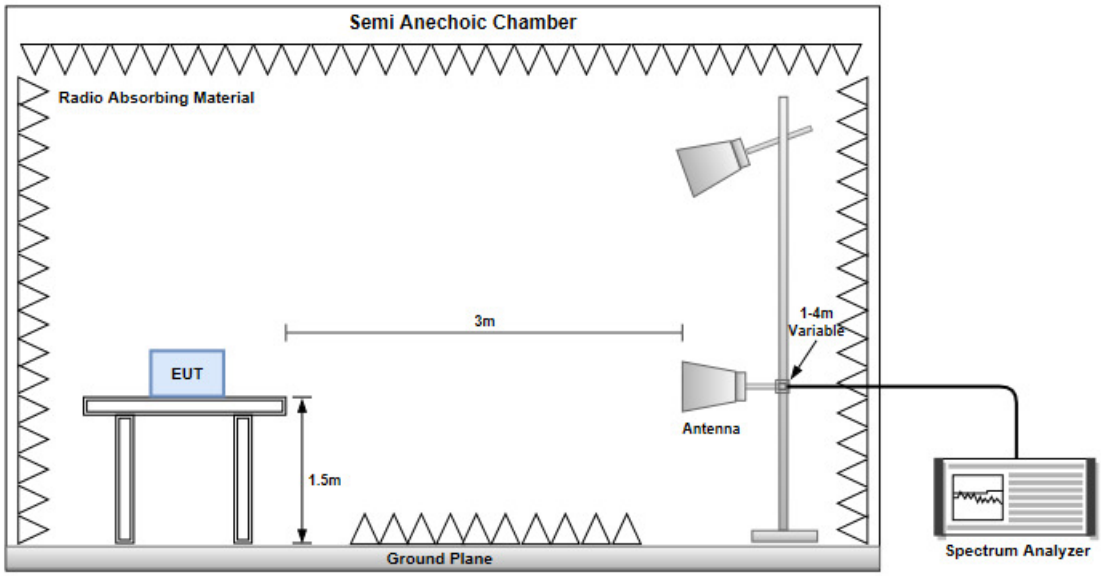
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.1.3 Test Setup

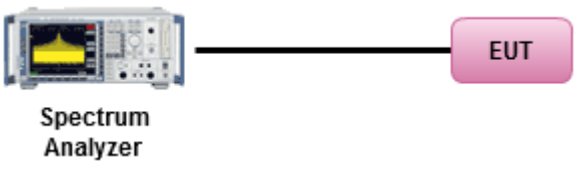
Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz

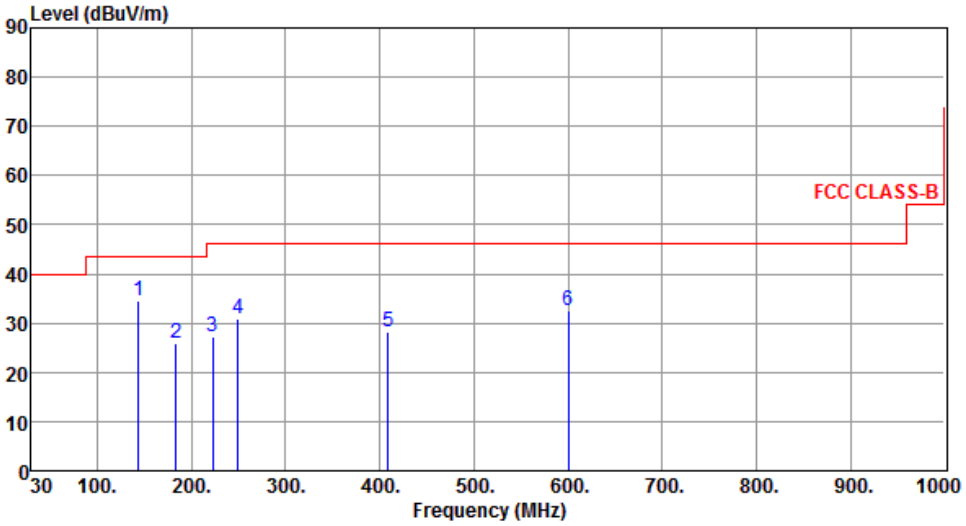


Transmitter Conducted Unwanted Emissions (30MHz~40GHz)



3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

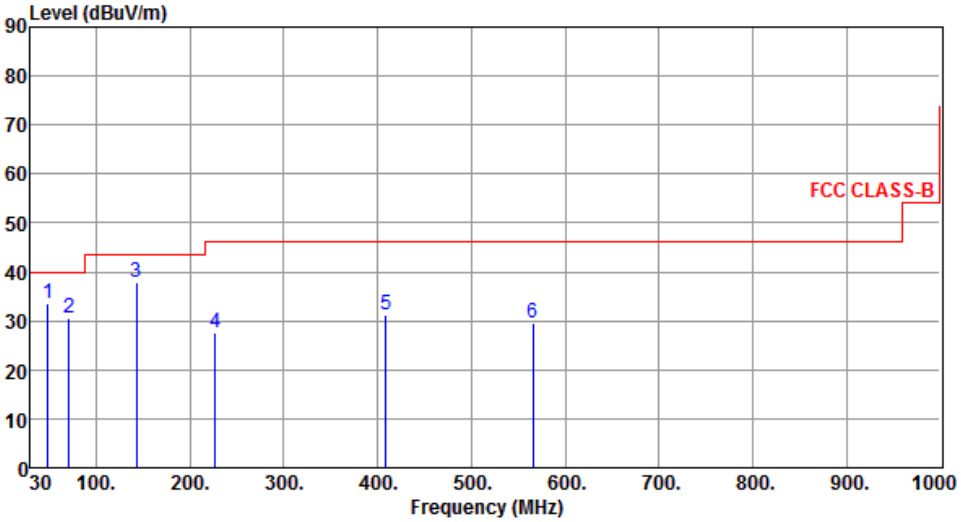
Mode	Mode 1: GPRS850 CH128 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Horizontal



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	143.49	34.57	43.50	-8.93	42.87	-8.30	Peak	---	---
2	183.26	26.00	43.50	-17.50	36.13	-10.13	Peak	---	---
3	223.03	27.37	46.00	-18.63	37.63	-10.26	Peak	---	---
4	249.22	30.83	46.00	-15.17	40.04	-9.21	Peak	---	---
5	409.27	28.13	46.00	-17.87	32.90	-4.77	Peak	---	---
6	600.36	32.41	46.00	-13.59	33.13	-0.72	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

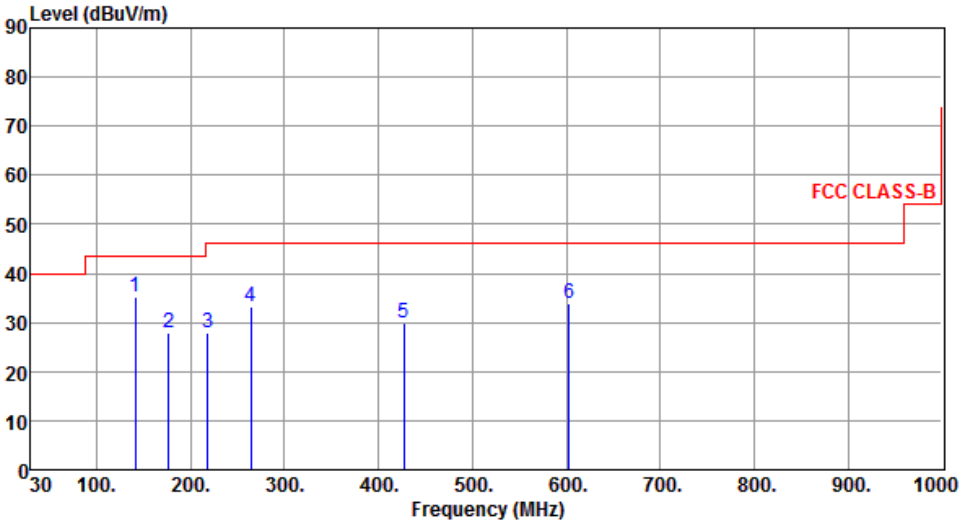
Mode	Mode 1: GPRS850 CH128 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Vertical



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	48.43	33.49	40.00	-6.51	41.06	-7.57	Peak	---	---
2	70.74	30.40	40.00	-9.60	41.18	-10.78	Peak	---	---
3	142.52	37.93	43.50	-5.57	46.23	-8.30	Peak	---	---
4	226.91	27.58	46.00	-18.42	37.33	-9.75	Peak	---	---
5	409.27	31.27	46.00	-14.73	36.04	-4.77	Peak	---	---
6	565.44	29.61	46.00	-16.39	31.13	-1.52	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

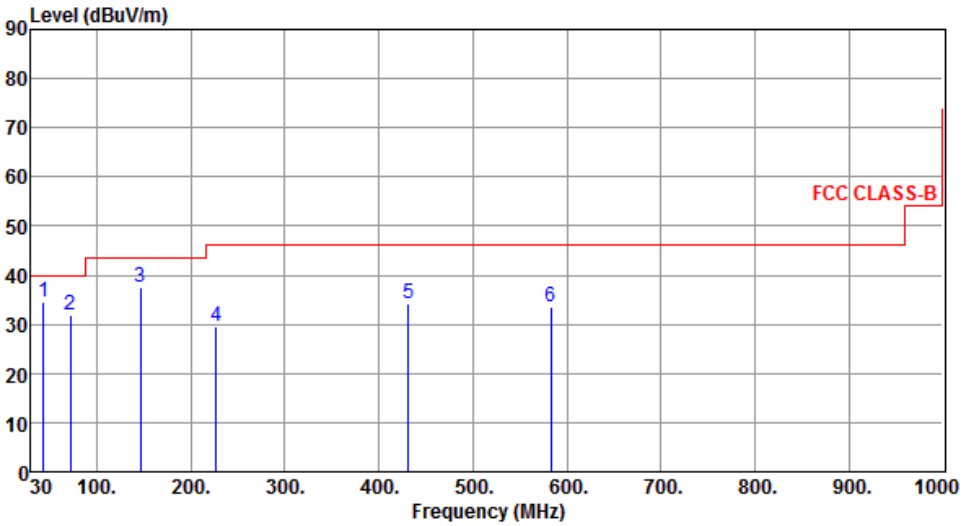
Mode	Mode 2: GPRS1900 CH810 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Horizontal



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	141.13	35.06	43.50	-8.44	43.37	-8.31	Peak	---	---
2	176.58	27.88	43.50	-15.62	37.25	-9.37	Peak	---	---
3	218.44	27.87	46.00	-18.13	38.54	-10.67	Peak	---	---
4	264.28	33.26	46.00	-12.74	41.97	-8.71	Peak	---	---
5	427.28	29.92	46.00	-16.08	34.25	-4.33	Peak	---	---
6	602.87	33.88	46.00	-12.12	34.57	-0.69	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Mode	Mode 2: GPRS1900 CH810 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Vertical

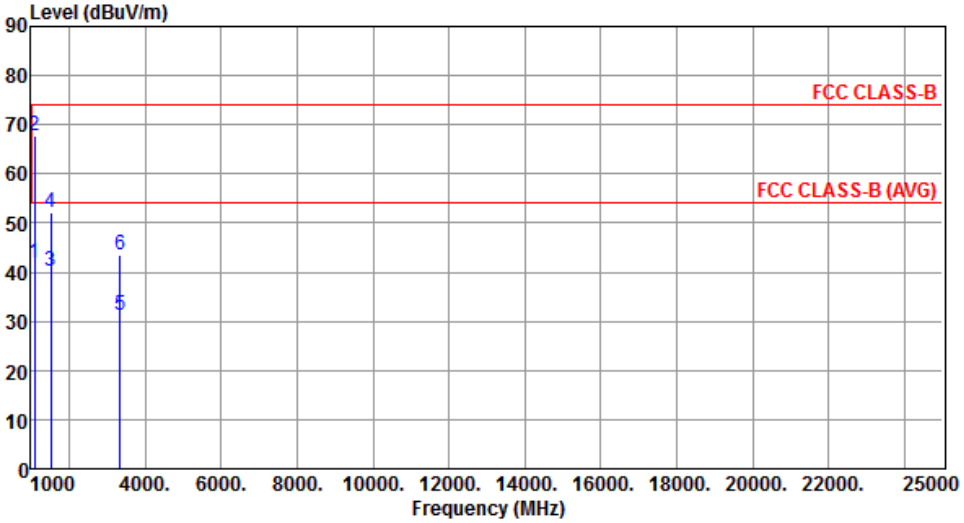


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	43.58	34.68	40.00	-5.32	42.28	-7.60	Peak	---	---
2	71.67	31.79	40.00	-8.21	42.74	-10.95	Peak	---	---
3	146.83	37.59	43.50	-5.91	45.86	-8.27	Peak	---	---
4	227.03	29.70	46.00	-16.30	39.44	-9.74	Peak	---	---
5	431.36	34.30	46.00	-11.70	38.53	-4.23	Peak	---	---
6	583.15	33.58	46.00	-12.42	34.69	-1.11	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

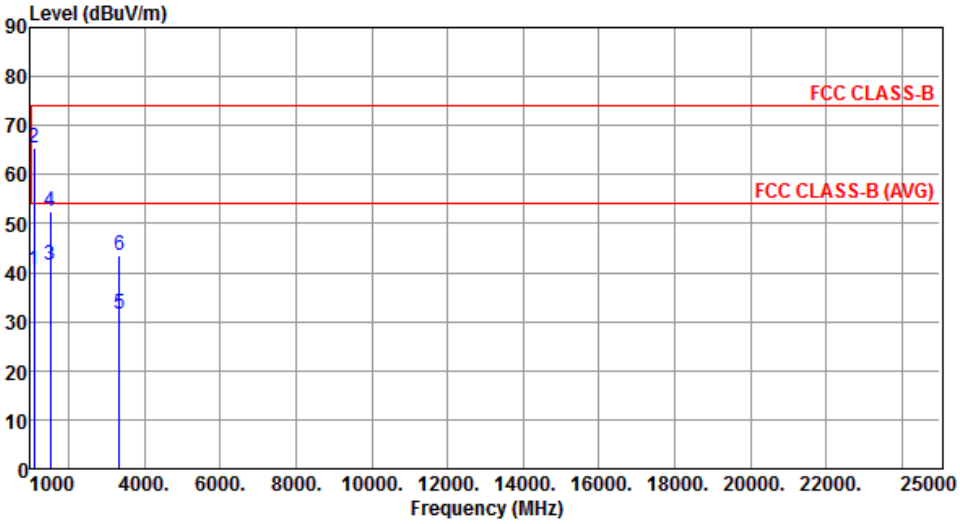
Mode	Mode 1: GPRS850 CH128 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Horizontal



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1102.60	41.90	54.00	-12.10	51.32	-9.42	Average	206	170
2	1102.60	67.66	74.00	-6.34	77.08	-9.42	Peak	206	170
3	1520.30	40.29	54.00	-13.71	46.96	-6.67	Average	100	135
4	1520.30	52.10	74.00	-21.90	58.77	-6.67	Peak	100	135
5	3353.00	31.24	54.00	-22.76	31.71	-0.47	Average	100	194
6	3353.00	43.38	74.00	-30.62	43.85	-0.47	Peak	100	194

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

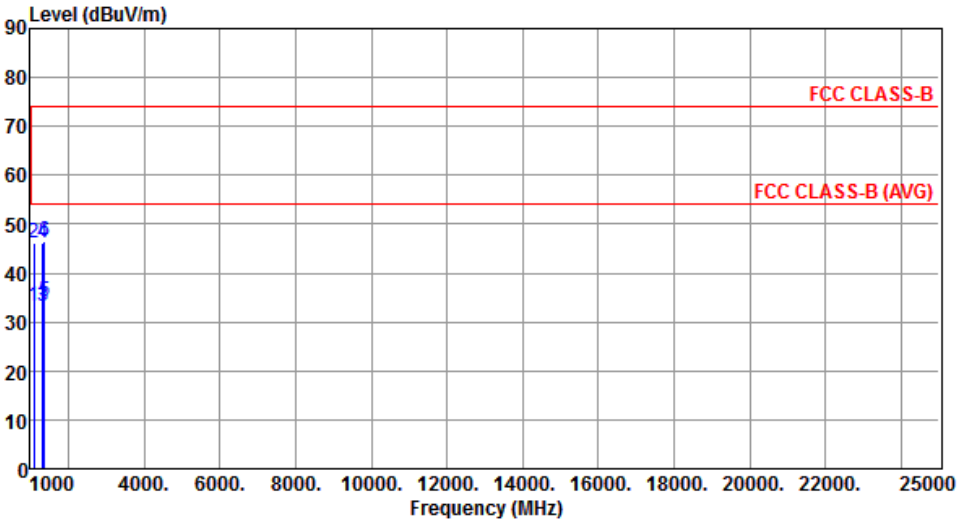
Mode	Mode 1: GPRS850 CH128 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Vertical



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1102.60	40.55	54.00	-13.45	49.97	-9.42	Average	100	195
2	1102.60	65.58	74.00	-8.42	75.00	-9.42	Peak	100	195
3	1520.30	41.44	54.00	-12.56	48.11	-6.67	Average	100	213
4	1520.30	52.56	74.00	-21.44	59.23	-6.67	Peak	100	213
5	3353.00	31.58	54.00	-22.42	32.05	-0.47	Average	153	283
6	3353.00	43.64	74.00	-30.36	44.11	-0.47	Peak	153	283

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

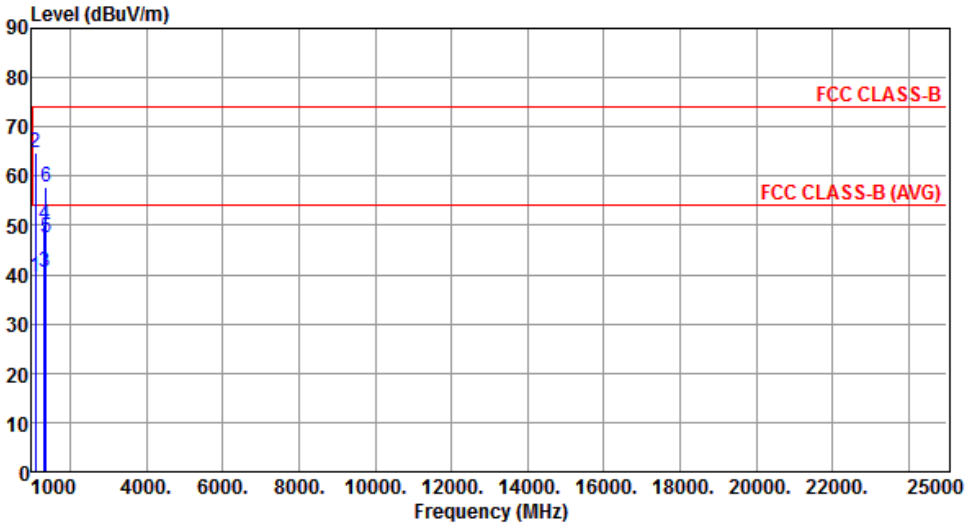
Mode	Mode 2: GPRS1900 CH810 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Horizontal



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1103.00	33.28	54.00	-20.72	42.70	-9.42	Average	115	230
2	1103.00	46.16	74.00	-27.84	55.58	-9.42	Peak	115	230
3	1339.20	33.33	54.00	-20.67	41.15	-7.82	Average	213	184
4	1339.20	46.11	74.00	-27.89	53.93	-7.82	Peak	213	184
5	1383.14	34.21	54.00	-19.79	41.73	-7.52	Average	120	295
6	1383.14	46.58	74.00	-27.42	54.10	-7.52	Peak	120	295

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

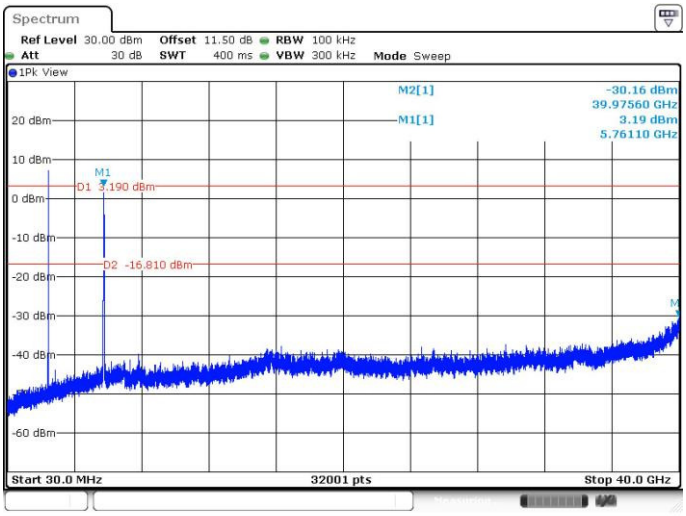
Mode	Mode 2: GPRS1900 CH810 + 5G 11ac VHT40 CH151 + 2.4G HT20 CH6 + Zigbee CH11 + BLE CH39 + Z-wave 916MHz
Polarization	Vertical



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1103.00	39.55	54.00	-14.45	48.97	-9.42	Average	100	200
2	1103.00	64.61	74.00	-9.39	74.03	-9.42	Peak	100	200
3	1339.20	40.38	54.00	-13.62	48.20	-7.82	Average	100	18
4	1339.20	50.19	74.00	-23.81	58.01	-7.82	Peak	100	18
5	1383.14	47.33	54.00	-6.67	54.85	-7.52	Average	100	140
6	1383.14	57.85	74.00	-16.15	65.37	-7.52	Peak	100	140

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.1.6 Conducted Emissions (30MHz~40GHz)

Conducted Emission Plot


4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C..

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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