SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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TEST REPORT

Application No.:	SZEM1712012472CR (SHEM1711007481CR)
Applicant:	Hansong (Nanjing) Technology Ltd.
Address of Applicant:	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China
Manufacturer:	Hansong (Nanjing) Technology Ltd.
Address of Manufacturer:	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China
Address of Factory:	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China
FCC ID:	XCO-HSPTC867
IC:	7756A-HSPTC867
Equipment Under Test (EUT):	
EUT Name:	Bluetooth Low-latency Transceiver with switchable Receiver and Transmitter
Model No.:	BTT
Trade mark:	Platin
Standard(s) :	47 CFR Part 15, Subpart C 15.247 RSS-247 Issue 2 RSS-Gen Issue 4
Date of Receipt:	2017-11-06
Date of Test:	2017-11-11 to 2017-11-21
Date of Issue:	2018-01-15
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

Revision Record				
Version	***Chapter***	***Date***	***Modifier***	***Remark***
00	/	2018-01-15	/	Original

Authorized for issue by:				
				
		Foray Chen /Project Engineer		
				
		Eric Fu /Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
99% Occupied Bandwidth	---	RSS-Gen Section 6.6	RSS-Gen section 6.6	PASS

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Adapter 1 Manufacturer: SHENZHEN FUJIA APPLIANCE CO.,LTD Model: FJ-SW266B50501000U Input: AC 120-240V, 50/60Hz 0.4A Max Output: DC 5V , 1.0A Adapter 2 Manufacturer: AQUIL STAR PRECISION INDUSTRIAL(SHENZHEN)CO.,LTD Model: ASUC69a-050100 Input: AC 100-240V, 50/60Hz 0.3A Output: DC 5V , 1.0A
Test voltage:	AC 120V, 60Hz
Cable:	AC Cable: 0cm DC Cable: 100cm
Operation Frequency:	2402MHz-2480MHz
BT Version:	BT4.2 Classic
Modulation Type:	FHSS (GFSK, π/4DQPSK, 8DPSK)
Number of Channel:	79
Antenna Type	PIFA Antenna
Antenna gain:	2dbi

4.2 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Supply by
Laptop 1	LENOVO	R400	SGS

4.3 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
TNVN	22	120V

Note:

VN:Normal Voltage VL:Low Extreme Test Voltage VH:High Extreme Test Voltage

TN:Normal Temperature TL:Low Extreme Test Temperature TH:High Extreme Test Temperature

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412 MHz	31	2432 MHz	51	2452 MHz	71	2472 MHz
12	2413 MHz	32	2433 MHz	52	2453 MHz	72	2473 MHz
13	2414 MHz	33	2434 MHz	53	2454 MHz	73	2474 MHz
14	2415 MHz	34	2435 MHz	54	2455 MHz	74	2475 MHz
15	2416 MHz	35	2436 MHz	55	2456 MHz	75	2476 MHz
16	2417 MHz	36	2437 MHz	56	2457 MHz	76	2477 MHz
17	2418 MHz	37	2438 MHz	57	2458 MHz	77	2478 MHz
18	2419 MHz	38	2439 MHz	58	2459 MHz	78	2479 MHz
19	2420 MHz	39	2440 MHz	59	2460 MHz	79	2480 MHz
20	2421 MHz	40	2441 MHz	60	2461 MHz		

Using test software was control EUT work in continuous transmitter and receiver mode. And select test channel as below:

For GFSK, π/4DQPSK, 8DPSK modulation

Channel	Frequency
The lowest channel (CH1)	2402MHz
The middle channel (CH40)	2441MHz
The highest channel (CH79)	2480MHz

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25 x 10-8
2	Timeout	2s
3	Duty cycle	0.37%
4	Occupied Bandwidth	3%
5	RF conducted power	0.75dB
6	RF power density	2.84dB
7	Conducted Spurious emissions	0.75dB
8	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
9	Radiated Spurious emission test	4.2dB (Below 30MHz)
		4.4dB (30MHz-1GHz)
		4.6dB (1GHz-18GHz)
10	Temperature test	1°C
11	Humidity test	3%
12	Supply voltages	1.5%
13	Time	3%

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Conducted Emission at AC Power Line					
EMI test receiver	R&S	ESR7	SHEM162-1	2016-12-29	2017-12-28
LISN	Schwarzbeck	NSLK8127	SHEM061-1	2016-12-29	2017-12-28
LISN	EMCO	3816/2	SHEM019-1	2016-12-29	2017-12-28
Pulse limiter	R&S	ESH3-Z2	SHEM029-1	2017-08-12	2018-08-11
CE test Cable	/	CE01	/	2016-12-29	2017-12-28
Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2017-04-24	2018-04-23
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2017-09-26	2018-09-25
Power meter	R&S	NRP	SHEM057-1	2016-12-29	2017-12-28
Power Sensor	R&S	NRP-Z22	SHEM136-1	2017-07-22	2018-07-21
Power Sensor	R&S	NRP-Z91	SHEM057-2	2016-12-29	2017-12-28
Signal Generator	R&S	SMR40	SHEM058-1	2017-07-03	2018-07-02
Signal Generator	Agilent	N5182A	SHEM182-1	2017-09-26	2018-09-25
Communication Tester	R&S	CMW270	SHEM183-1	2017-10-22	2018-10-21
Switcher	Tonscend	JS0806	SHEM184-1	2017-09-26	2018-09-25
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2017-09-26	2018-09-25
AC Power Stabilizer	WOCEN	6100	SHEM045-1	2017-01-14	2018-01-13
DC Power Supply	QJE	QJ30003SII	SHEM046-1	2017-01-14	2018-01-13
Conducted test Cable	/	RF01, RF 02	/	2016-12-29	2017-12-28
Radiated Test					
EMI test receiver	R&S	ESU40	SHEM051-1	2017-09-26	2018-09-25
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2017-04-24	2018-04-23
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2017-04-10	2020-04-09
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2017-02-28	2020-02-27
Antenna (25MHz-3GHz)	Schwarzbeck	HL562	SHEM010-1	2017-02-28	2020-02-27
Horn Antenna (1-8GHz)	Schwarzbeck	HF906	SHEM009-1	2017-10-24	2020-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2017-01-14	2020-01-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2017-02-13	2018-01-15
Pre-amplifier (9KHz-2GHz)	CLAVIIO	BDLNA-0001-412010	SHEM164-1	2017-08-22	2018-08-21
Pre-amplifier (1-18GHz)	CLAVIIO	BDLNA-0118-352810	SHEM050-2	2017-08-22	2018-08-21
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2017-02-13	2018-01-15
Band filter	LORCH	9BRX-875/X150-SR	SHEM156-1	/	/
Band filter	LORCH	13BRX-1950/X500-SR	SHEM083-2	/	/
Band filter	LORCH	5BRX-2400/X200-SR	SHEM155-1	/	/
Band filter	LORCH	5BRX-5500/X1000-SR	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G-100SS	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700-3SS	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2017-07-22	2020-07-21
RE test Cable	/	RE01, RE02, RE06	/	2016-12-29	2017-12-28

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(c)

6.1.2 Conclusion

Standard Requirement:

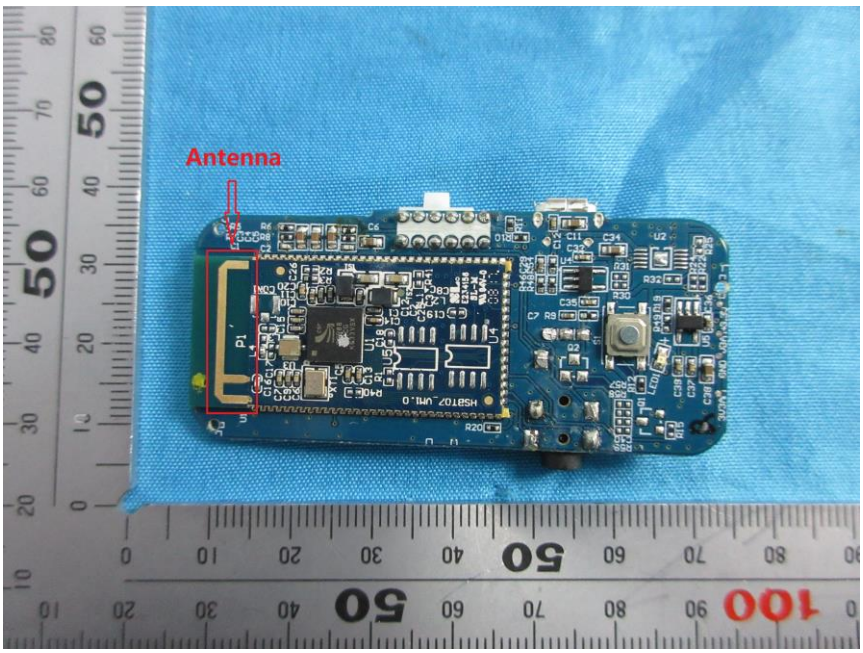
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is PIFA antenna and integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.



6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: 29 -1 = 511 bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band s

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	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.		

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

Remark Pretest all modulation type and record the worst data of GFSK in the report

7.1.2 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

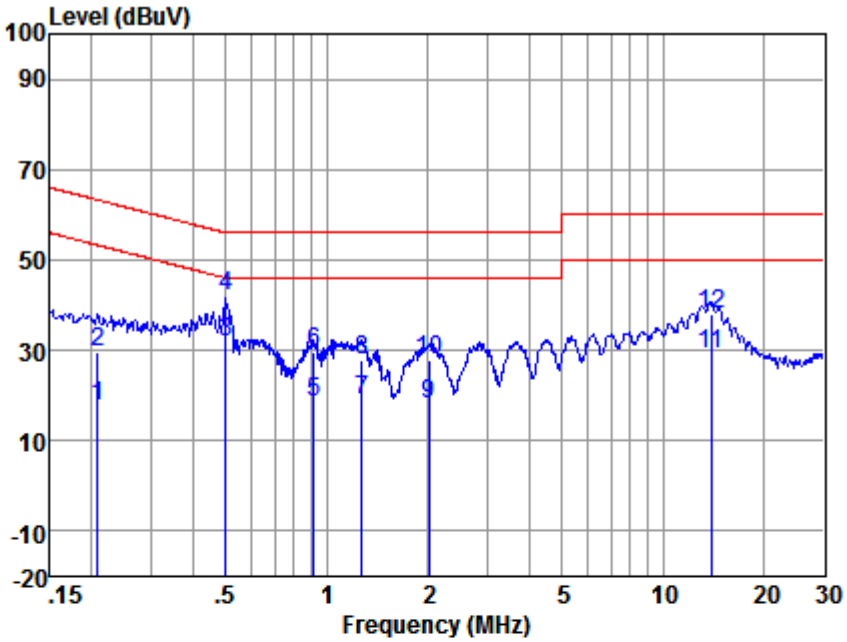
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

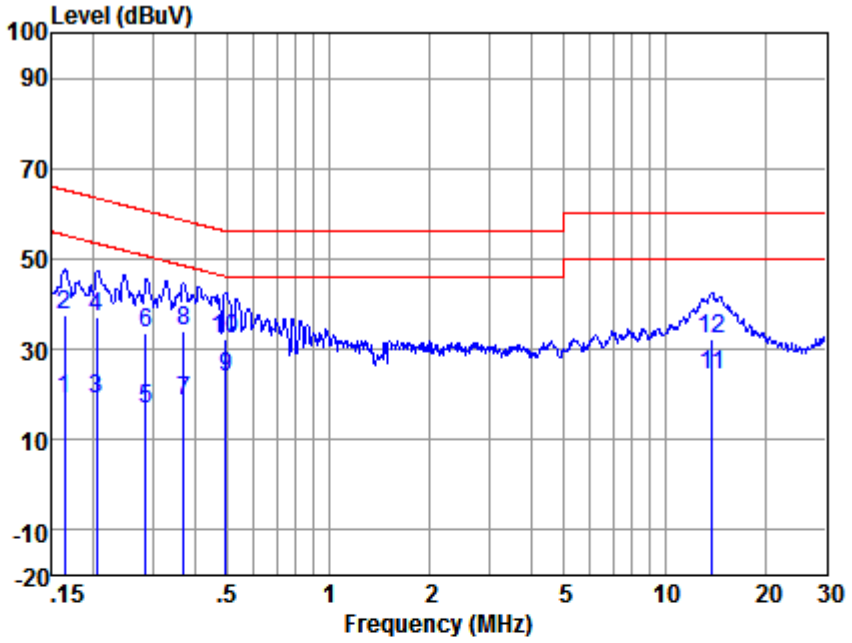
Remark: LISN=Read Level+ Cable Loss+ LISN Factor

Adapter-ASUC69a-050100



Site : chamber
Condition : LISN-L-2017
Project No: 7481CR
Test mode : b

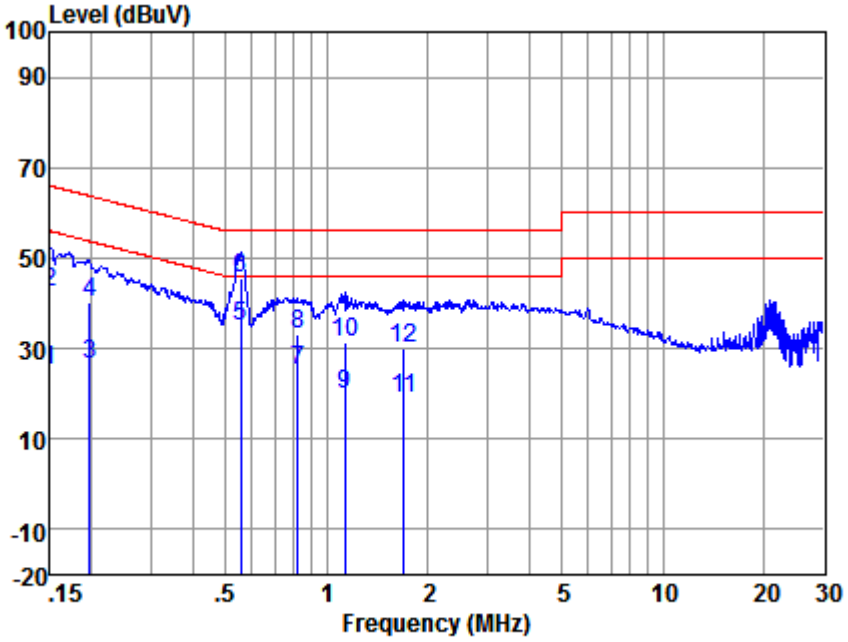
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.208	7.71	0.11	9.81	17.63	53.27	-35.64	Average
2	0.208	19.82	0.11	9.81	29.74	63.27	-33.53	QP
3	0.499	21.95	0.11	9.82	31.88	46.01	-14.13	Average
4	0.499	32.02	0.11	9.82	41.95	56.01	-14.06	QP
5	0.918	8.73	0.11	9.83	18.67	46.00	-27.33	Average
6	0.918	19.62	0.11	9.83	29.56	56.00	-26.44	QP
7	1.269	8.95	0.11	9.84	18.90	46.00	-27.10	Average
8	1.269	17.95	0.11	9.84	27.90	56.00	-28.10	QP
9	2.012	8.11	0.12	9.85	18.08	46.00	-27.92	Average
10	2.012	17.82	0.12	9.85	27.79	56.00	-28.21	QP
11	13.915	18.84	0.14	10.00	28.98	50.00	-21.02	Average
12	13.915	28.03	0.14	10.00	38.17	60.00	-21.83	QP



Site : chamber
Condition : LISN-N-2017
Project No: 7481CR
Test mode : b

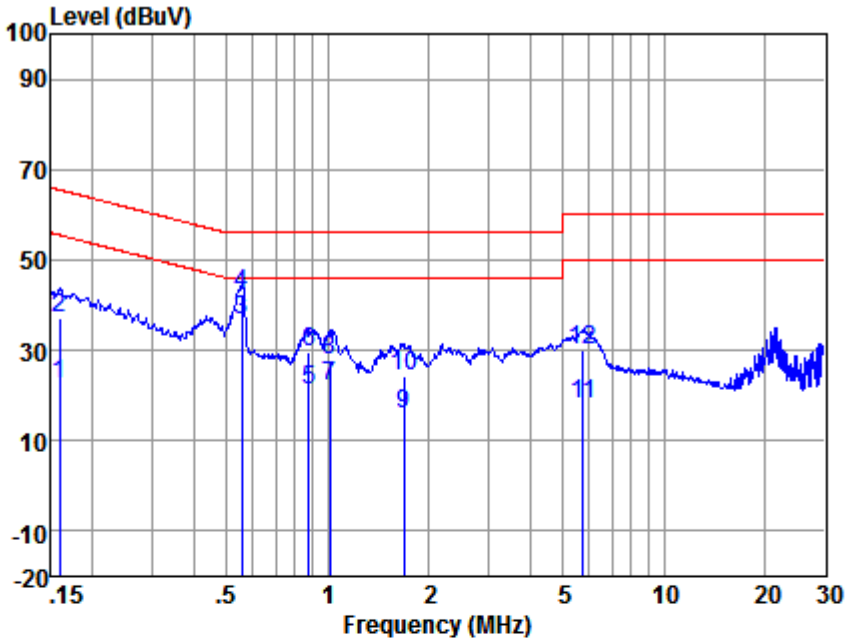
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.163	9.19	0.12	9.81	19.12	55.30	-36.18	Average
2	0.163	27.52	0.12	9.81	37.45	65.30	-27.85	QP
3	0.204	8.94	0.12	9.81	18.87	53.45	-34.58	Average
4	0.204	27.02	0.12	9.81	36.95	63.45	-26.50	QP
5	0.285	6.87	0.11	9.81	16.79	50.68	-33.89	Average
6	0.285	23.72	0.11	9.81	33.64	60.68	-27.04	QP
7	0.369	8.56	0.11	9.81	18.48	48.52	-30.04	Average
8	0.369	24.09	0.11	9.81	34.01	58.52	-24.51	QP
9	0.494	13.70	0.11	9.82	23.63	46.10	-22.47	Average
10	0.494	22.23	0.11	9.82	32.16	56.10	-23.94	QP
11	13.841	13.92	0.16	10.00	24.08	50.00	-25.92	Average
12	13.841	22.29	0.16	10.00	32.45	60.00	-27.55	QP

Adapter-FJ-SW266B5050-1000U



Site : chamber
Condition : LISN-L-2017
Project No: 7481CR
Test mode : b

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	15.23	0.11	9.81	25.15	56.00	-30.85	Average
2	0.150	32.54	0.11	9.81	42.46	66.00	-23.54	QP
3	0.198	16.61	0.11	9.81	26.53	53.71	-27.18	Average
4	0.198	30.09	0.11	9.81	40.01	63.71	-23.70	QP
5	0.555	24.80	0.11	9.82	34.73	46.00	-11.27	Average
6	0.555	35.39	0.11	9.82	45.32	56.00	-10.68	QP
7	0.822	15.23	0.11	9.83	25.17	46.00	-20.83	Average
8	0.822	23.28	0.11	9.83	33.22	56.00	-22.78	QP
9	1.129	10.01	0.11	9.84	19.96	46.00	-26.04	Average
10	1.129	21.39	0.11	9.84	31.34	56.00	-24.66	QP
11	1.698	9.14	0.11	9.84	19.09	46.00	-26.91	Average
12	1.698	20.19	0.11	9.84	30.14	56.00	-25.86	QP



Site : chamber
Condition : LISN-N-2017
Project No: 7481CR
Test mode : b

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.159	12.77	0.12	9.81	22.70	55.52	-32.82	Average
2	0.159	27.35	0.12	9.81	37.28	65.52	-28.24	QP
3	0.555	26.58	0.11	9.82	36.51	46.00	-9.49	Average
4	0.555	32.42	0.11	9.82	42.35	56.00	-13.65	QP
5	0.880	11.23	0.11	9.83	21.17	46.00	-24.83	Average
6	0.880	19.76	0.11	9.83	29.70	56.00	-26.30	QP
7	1.016	11.96	0.11	9.84	21.91	46.00	-24.09	Average
8	1.016	18.00	0.11	9.84	27.95	56.00	-28.05	QP
9	1.680	6.11	0.12	9.84	16.07	46.00	-29.93	Average
10	1.680	14.33	0.12	9.84	24.29	56.00	-31.71	QP
11	5.744	8.30	0.13	9.86	18.29	50.00	-31.71	Average
12	5.744	19.96	0.13	9.86	29.95	60.00	-30.05	QP

7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)

Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for <50 hopping channels
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 38.1 % RH Atmospheric Pressure: 1020 mbar

Test mode b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

7.2.2 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.3 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)

Test Method: ANSI C63.10 (2013) Section 7.8.7

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 38.6 % RH Atmospheric Pressure: 1020 mbar

Test mode b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

7.3.2 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.4 Carrier Frequencies Separation

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.2
Limit:	2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 37.7 % RH Atmospheric Pressure: 1020 mbar

Test mode a:TX_Hop mode: Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

7.4.2 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.5 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Channel Number(minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
2725-5850	75

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 37.8 % RH Atmospheric Pressure: 1020 mbar

Test mode a:TX_Hop mode: Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

7.5.2 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.6 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S
5725-5850	0.4S within a 30S period

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 38 % RH Atmospheric Pressure: 1020 mbar

Test mode a:TX_Hop mode: Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

7.6.2 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.7 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.6
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 37.6 % RH Atmospheric Pressure: 1020 mbar

Pretest these mode to find the worst case:	a:TX_Hop mode: Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.. b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.
The worst case for final test:	a:TX_Hop mode: Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.. b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation..

7.7.2 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.8 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.8
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

7.8.1 E.U.T. Operation

Operating Environment:

Temperature:	22 °C	Humidity:	37.9 % RH	Atmospheric Pressure:	1020	mbar	

Test mode b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

7.8.2 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.9 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.10.5
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.9.1 E.U.T. Operation

Operating Environment:

Temperature:	22	°C	Humidity:	50.6	% RH	Atmospheric Pressure:	1020 mbar

Test mode b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

7.9.2 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

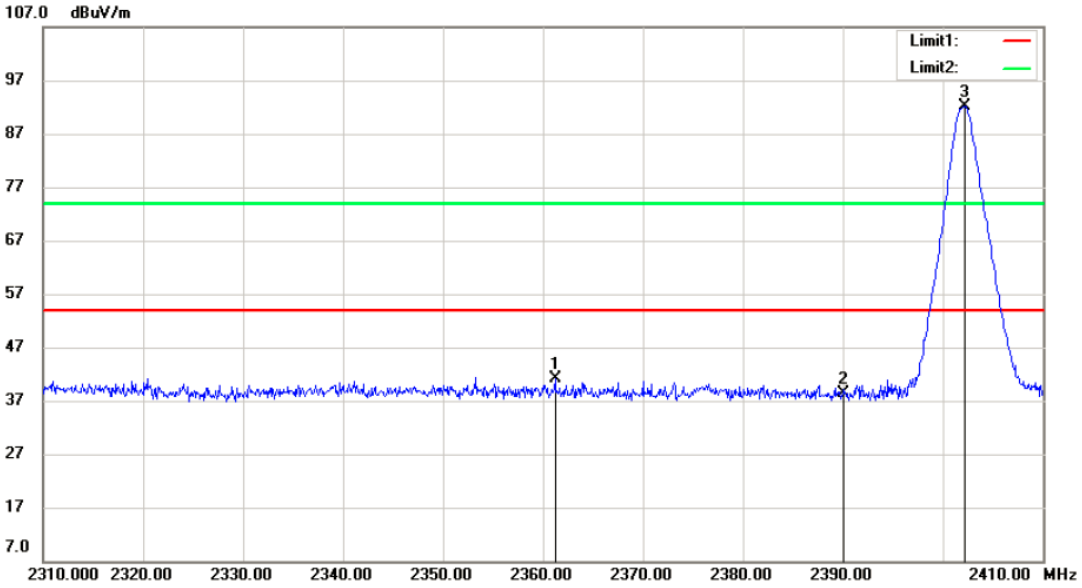
j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

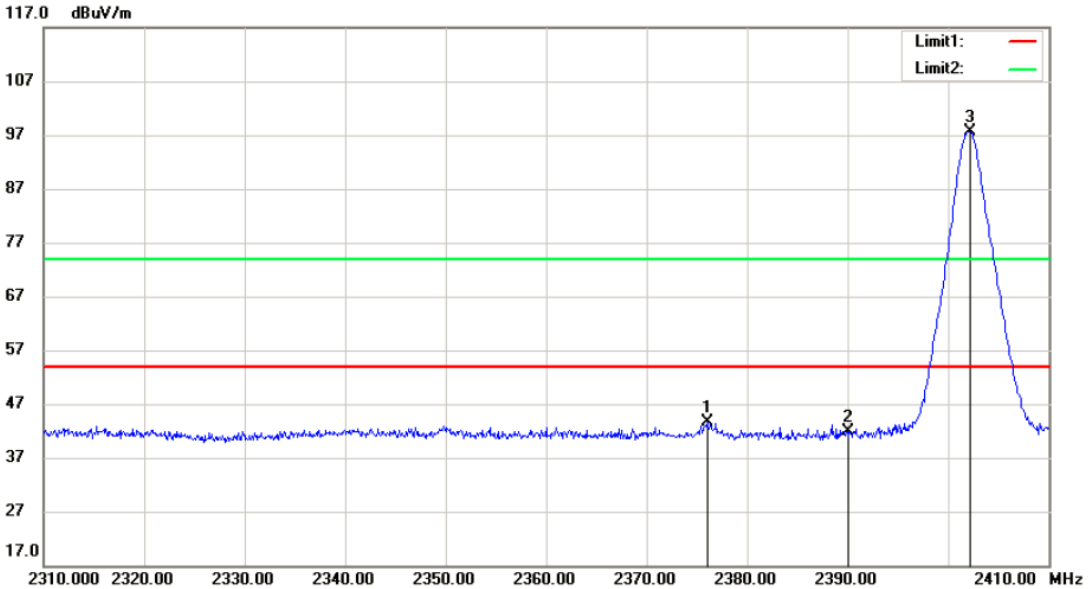
Lowest Channel(2402MHz) **Modulation: GFSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2361.2	44.86	-3.8	41.06	54	-12.94	Peak	Vertical
2	2390	42.15	-3.89	38.26	54	-15.74	Peak	Vertical
3	2402.2	96.07	-3.92	92.15	54	38.15	Peak	Vertical
1	2376	47.37	-3.84	43.53	54	-10.47	Peak	Horizontal
2	2390	45.79	-3.89	41.9	54	-12.1	Peak	Horizontal
3	2402.2	101.62	-3.92	97.7	54	43.7	Peak	Horizontal

Vertical:



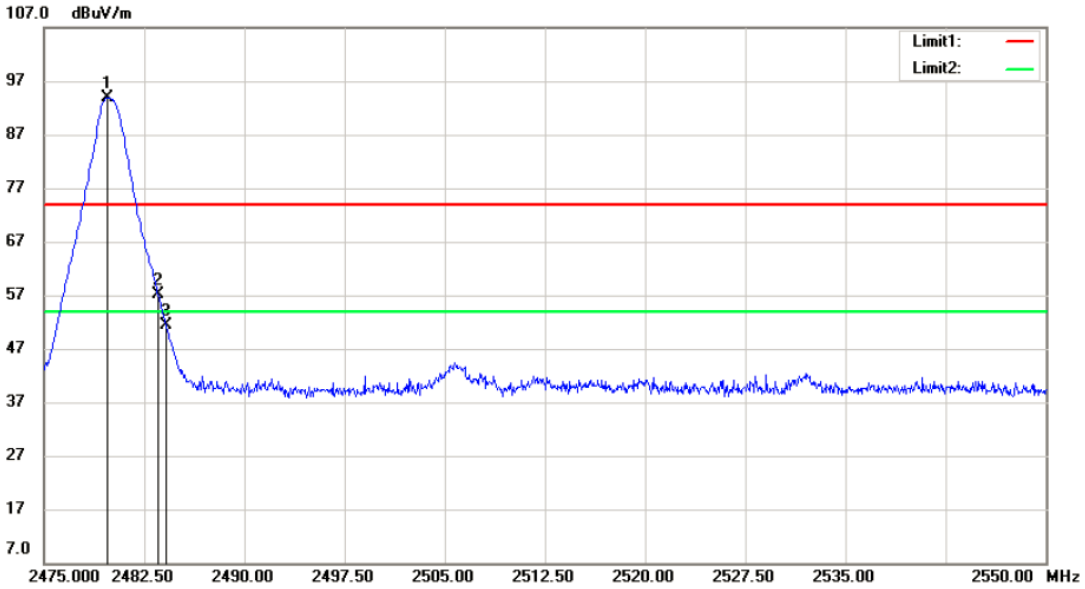
Horizontal:



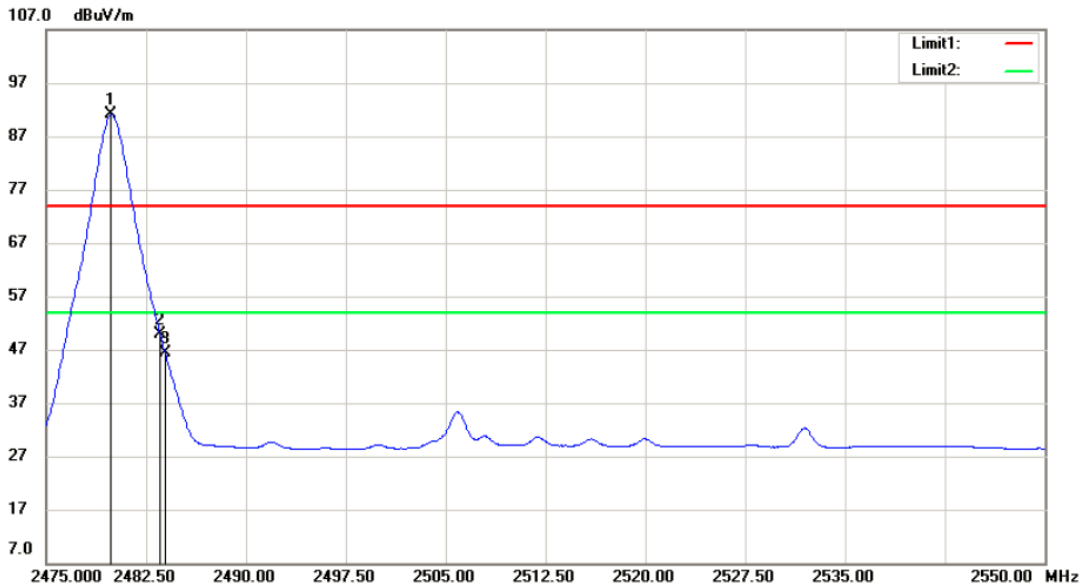
Highest Channel(2480MHz) **Modulation: GFSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2479.725	97.92	-4.01	93.91	74	19.91	Peak	Horizontal
2	2483.5	61.08	-4.01	57.07	74	-16.93	Peak	Horizontal
3	2484.15	55.32	-4.02	51.3	74	-22.7	Peak	Horizontal
1	2479.875	95.13	-4	91.13	54	37.13	Average	Horizontal
2	2483.5	53.86	-4.01	49.85	54	-4.15	Average	Horizontal
3	2483.925	50.35	-4.02	46.33	54	-7.67	Average	Horizontal

Peak



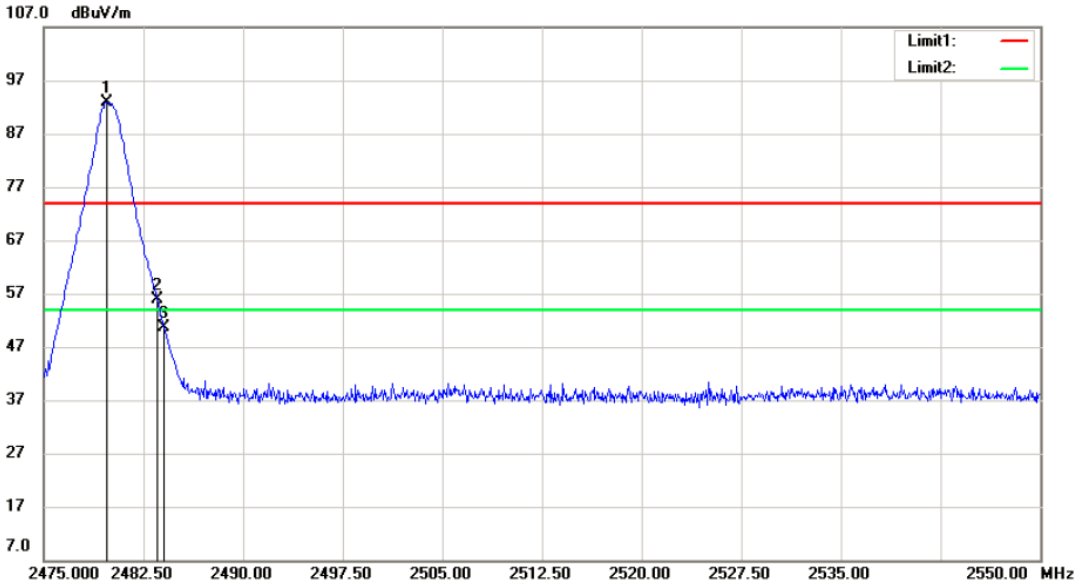
Average



Highest Channel(2480MHz) **Modulation: GFSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2479.725	96.79	-4.01	92.78	74	18.78	Peak	Vertical
2	2483.5	59.8	-4.01	55.79	74	-18.21	Peak	Vertical
3	2484.075	54.64	-4.02	50.62	74	-23.38	Peak	Vertical
1	2479.875	94.11	-4	90.11	54	36.11	Average	Vertical
2	2483.5	52.79	-4.01	48.78	54	-5.22	Average	Vertical
3	2484.225	46.67	-4.02	42.65	54	-11.35	Average	Vertical

Peak



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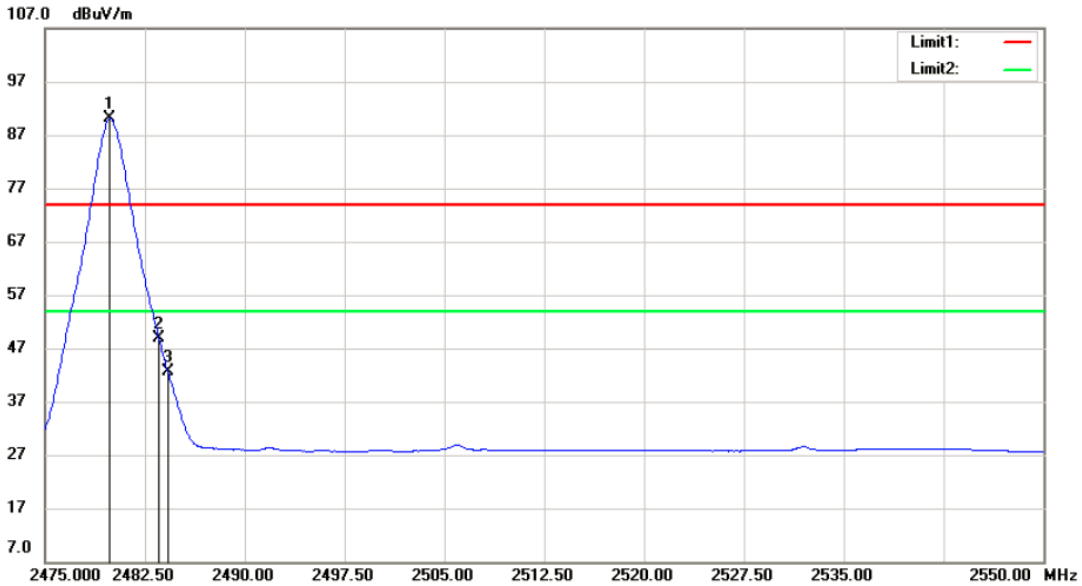
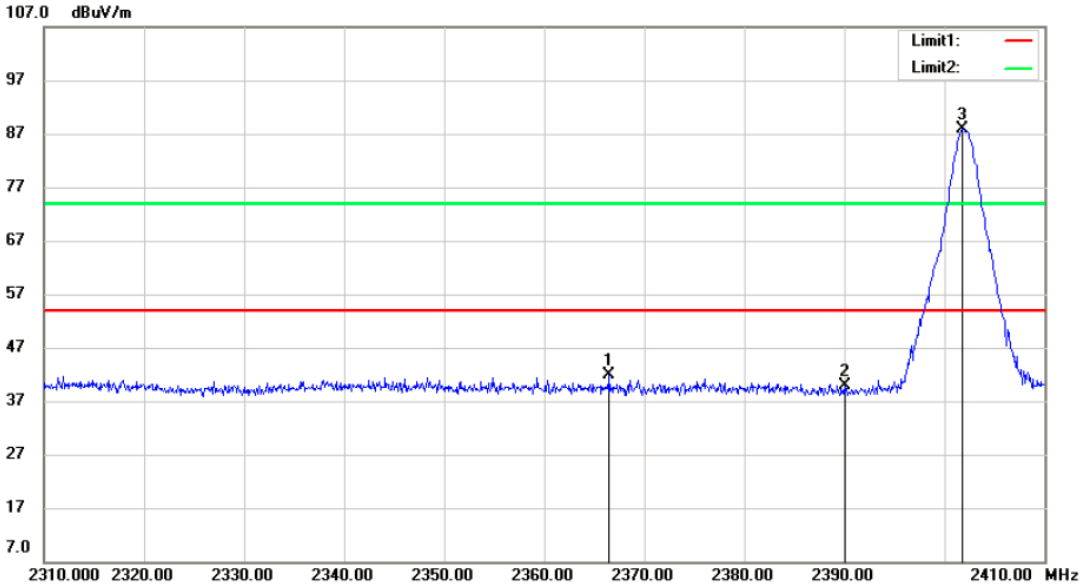


Lowest Channel(2402MHz) **Modulation: π/4DQPSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2366.5	45.59	-3.82	41.77	54	-12.23	Peak	Vertical
2	2390	43.74	-3.89	39.85	54	-14.15	Peak	Vertical
3	2401.8	91.73	-3.91	87.82	54	33.82	Peak	Vertical
1	2383.5	46.01	-3.87	42.14	54	-11.86	Peak	Horizontal
2	2390	44.02	-3.89	40.13	54	-13.87	Peak	Horizontal
3	2401.8	97.61	-3.91	93.7	54	39.7	Peak	Horizontal

Vertical:



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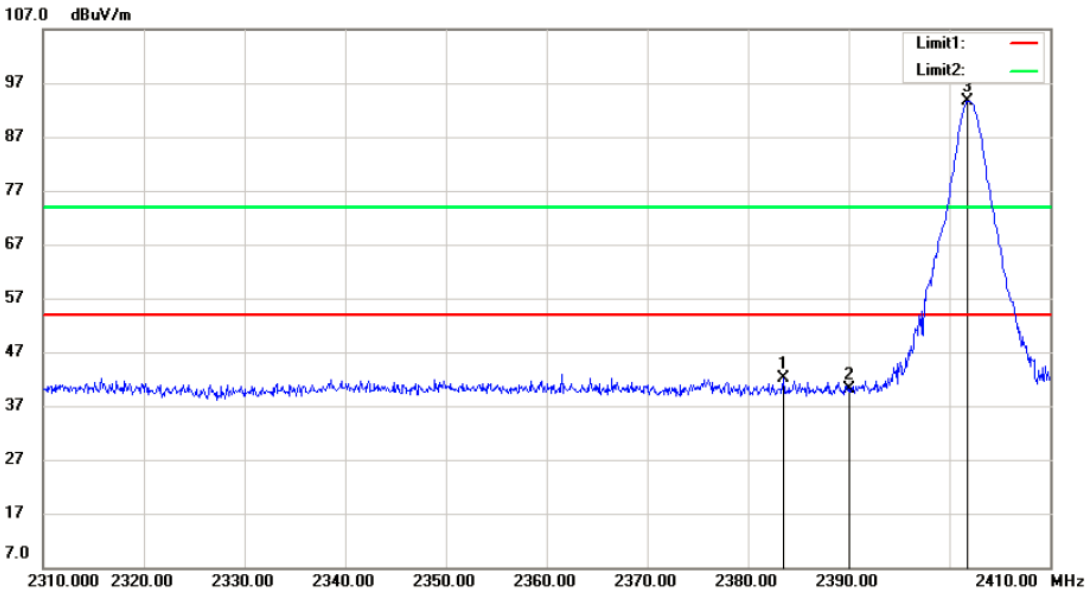
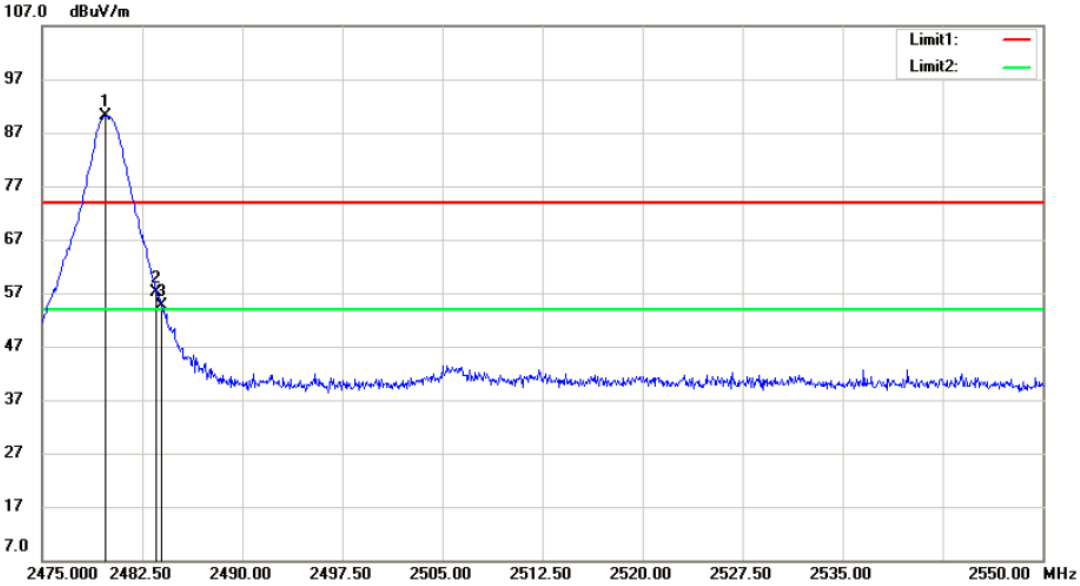


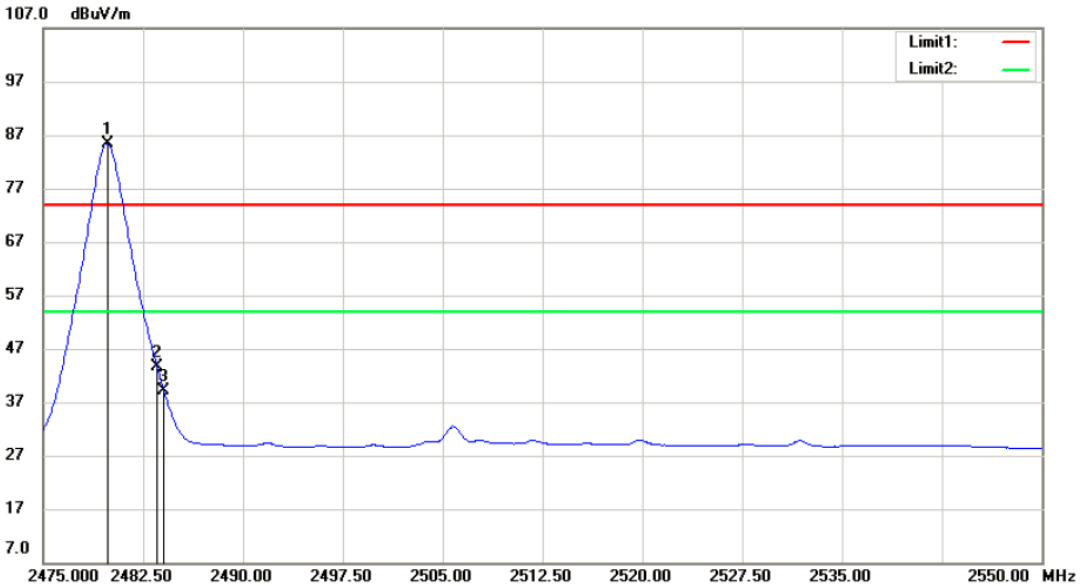
Highest Channel(2480MHz) **Modulation: π/4DQPSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2479.725	94.2	-4.01	90.19	74	16.19	Peak	Horizontal
2	2483.5	61.1	-4.01	57.09	74	-16.91	Peak	Horizontal
3	2483.925	58.75	-4.02	54.73	74	-19.27	Peak	Horizontal
1	2479.8	89.49	-4	85.49	54	31.49	Average	Horizontal
2	2483.5	47.52	-4.01	43.51	54	-10.49	Average	Horizontal
3	2484.075	43.1	-4.02	39.08	54	-14.92	Average	Horizontal

Peak



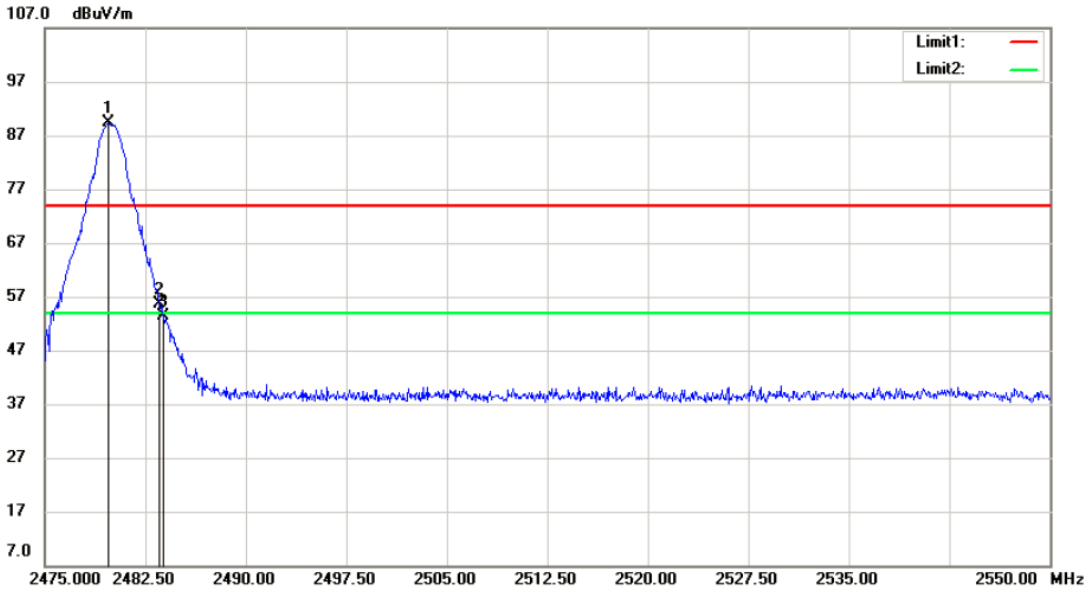
Average



Highest Channel(2480MHz) **Modulation: π/4DQPSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2479.725	93.27	-4.01	89.26	74	15.26	Peak	Vertical
2	2483.5	59.76	-4.01	55.75	74	-18.25	Peak	Vertical
3	2483.85	57.49	-4.02	53.47	74	-20.53	Peak	Vertical
1	2479.8	88.59	-4	84.59	54	30.59	Average	Vertical
2	2483.5	46.61	-4.01	42.6	54	-11.4	Average	Vertical
3	2484.45	39.34	-4.02	35.32	54	-18.68	Average	Vertical

Peak



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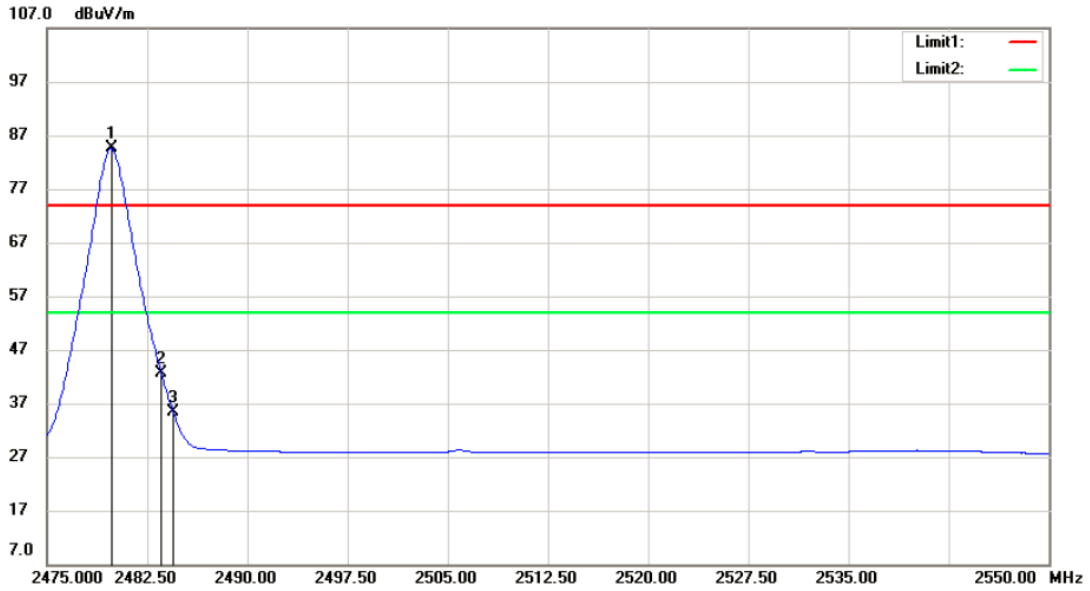
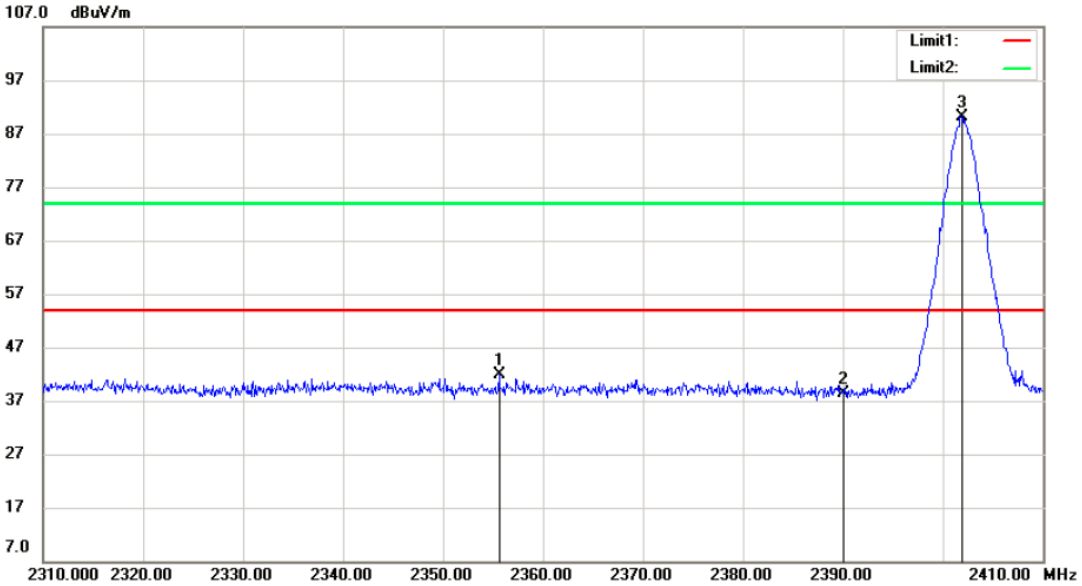


Lowest Channel(2402MHz) **Modulation: 8DPSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2355.6	45.73	-3.79	41.94	54	-12.06	Peak	Vertical
2	2390	42.36	-3.89	38.47	54	-15.53	Peak	Vertical
3	2401.9	94.1	-3.91	90.19	54	36.19	Peak	Vertical
1	2374.9	46.05	-3.85	42.2	54	-11.8	Peak	Horizontal
2	2390	43.98	-3.89	40.09	54	-13.91	Peak	Horizontal
3	2401.8	100	-3.91	96.09	54	42.09	Peak	Horizontal

Vertical:



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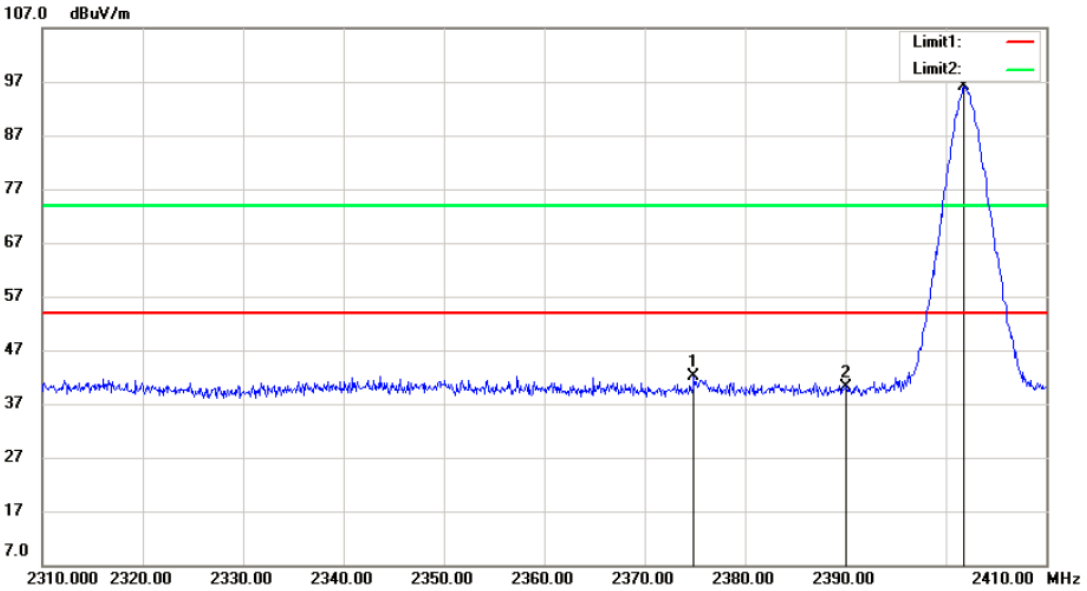
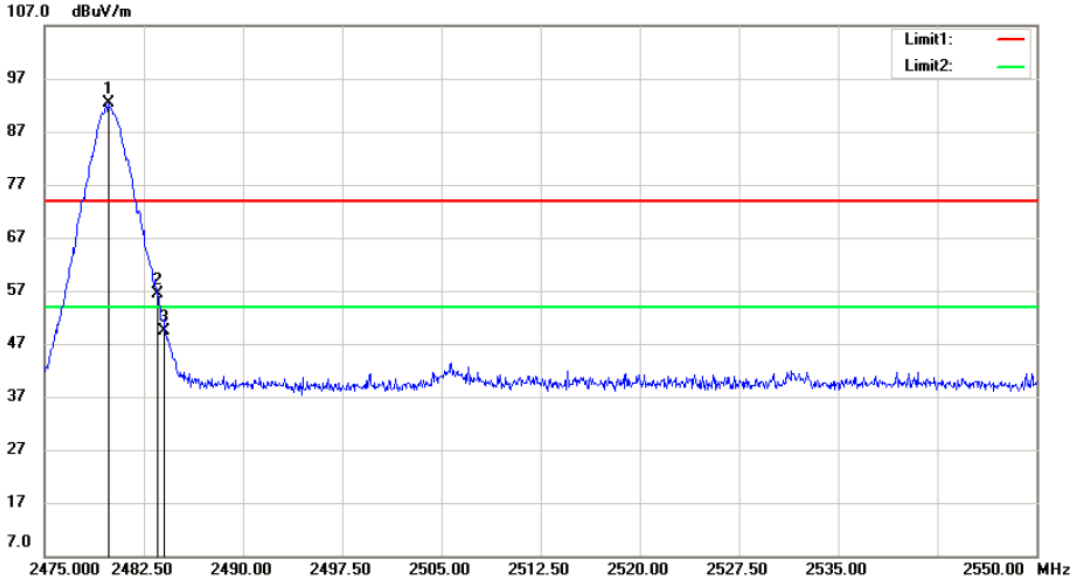


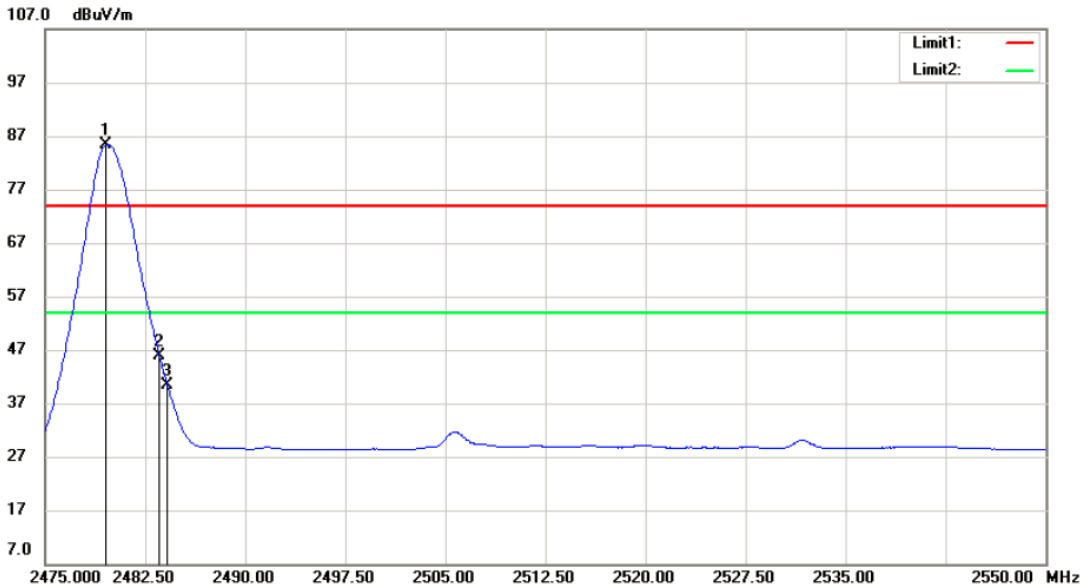
Highest Channel(2480MHz) **Modulation: 8DPSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2479.8	96.38	-4	92.38	74	18.38	Peak	Horizontal
2	2483.5	60.49	-4.01	56.48	74	-17.52	Peak	Horizontal
3	2484.075	53.45	-4.02	49.43	74	-24.57	Peak	Horizontal
1	2479.575	89.42	-4.01	85.41	54	31.41	Average	Horizontal
2	2483.5	50.01	-4.01	46	54	-8	Average	Horizontal
3	2484.15	44.48	-4.02	40.46	54	-13.54	Average	Horizontal

Peak



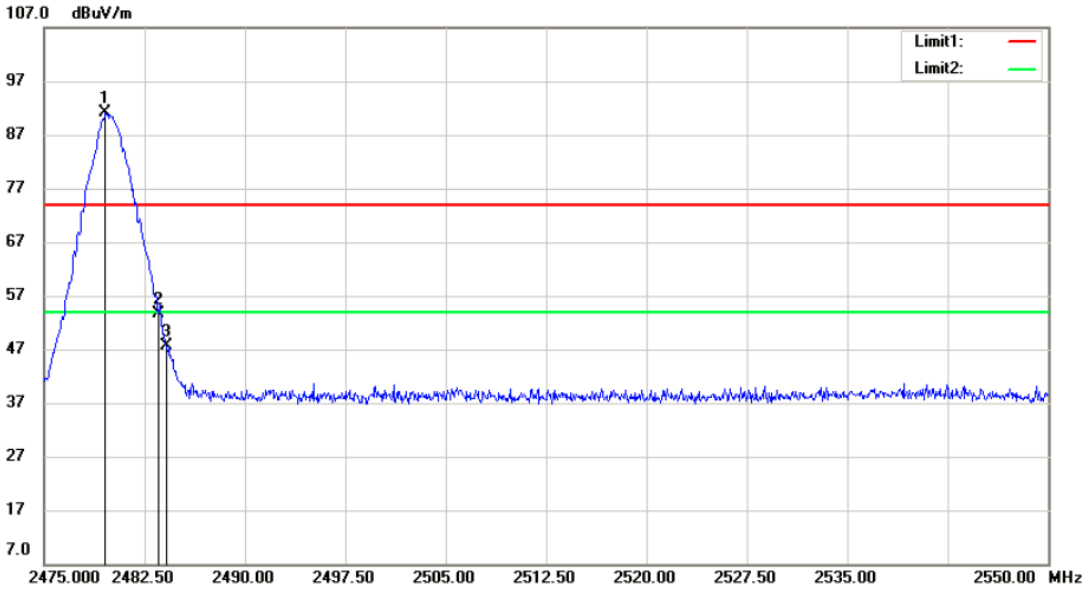
Average



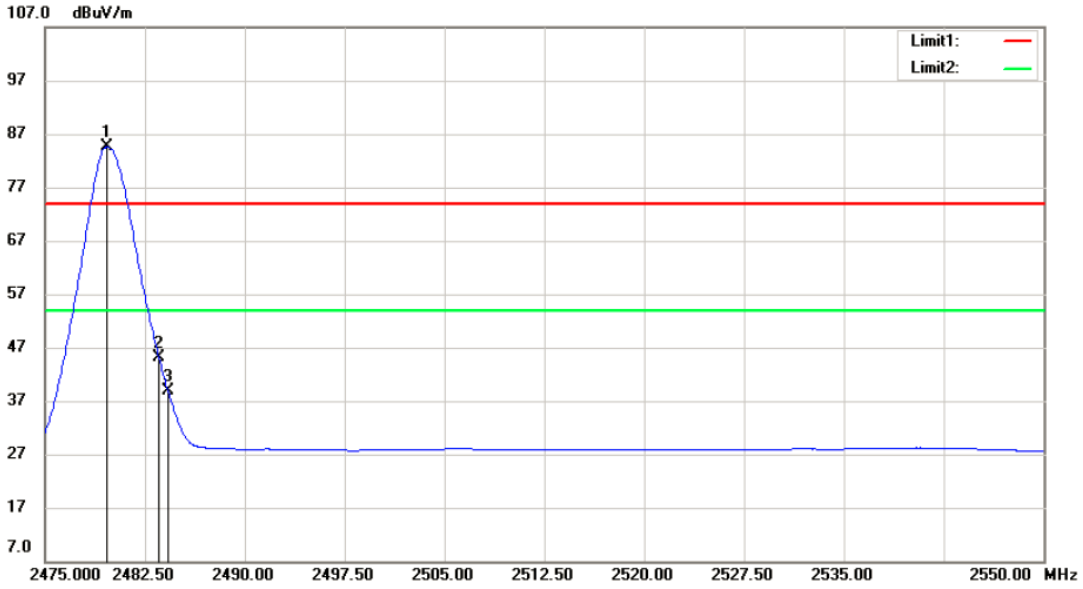
Highest Channel(2480MHz) **Modulation: 8DPSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2479.575	95.06	-4.01	91.05	74	17.05	Peak	Vertical
2	2483.5	57.69	-4.01	53.68	74	-20.32	Peak	Vertical
3	2484.15	51.58	-4.02	47.56	74	-26.44	Peak	Vertical
1	2479.65	88.57	-4.01	84.56	54	30.56	Average	Vertical
2	2483.5	49.11	-4.01	45.1	54	-8.9	Average	Vertical
3	2484.225	43	-4.02	38.98	54	-15.02	Average	Vertical

Peak



Average



All frequencies within the “Restricted bands” have been evaluated to compliance. Except as shown in paragraph of this section, only spurious emissions are permitted in any of the frequency bands listed below:

a. FCC Part 15, Subpart C Section 15.205 Restricted bands of operation.

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.5 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

RSS-Gen section 7.2.2 Restricted bands of operation

MHz	MHz	GHz
0.090-0.110	240-285	9.0-9.2
2.1735-2.1905	322-335.4	9.3-9.5
3.020-3.026	399.9-410	10.6-12.7
4.125-4.128	608-614	13.25-13.4
4.17725-4.17775	960-1427	14.47-14.5
4.20725-4.20775	1435-1626.5	15.35-16.2
5.677-5.683	1645.5-1646.5	17.7-21.4
6.215-6.218	1660-1710	22.01-23.12
6.26775-6.26825	1718.8-1722.2	23.6-24.0
6.31175-6.31225	2200-2300	31.2-31.8
8.291-8.294	2310-2390	36.43-36.5
8.362-8.366	2655-2900	Above 38.6
8.37625-8.38675	3260-3267	
8.41425-8.41475	3332-3339	
12.29-12.293	3345.8-3358	
12.51975-12.52025	3500-4400	
12.57675-12.57725	4500-5150	
13.36-13.41	5350-5460	
16.42-16.423	7250-7750	
16.69475-16.69525	8025-8500	
16.80425-16.80475		
25.5-25.67		
37.5-38.25		
73-74.6		
74.8-75.2		
108-138		
156.52475-156.52525		
156.7-156.9		

7.10 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.10.1 E.U.T. Operation

Operating Environment:

Temperature:	22	°C	Humidity:	50.6	% RH	Atmospheric Pressure:	1020 mbar

Test mode: b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

Remark: Pretest all modulation type and record the worst data of GFSK in the report

7.10.2 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Adapter-ASUC69a-050100

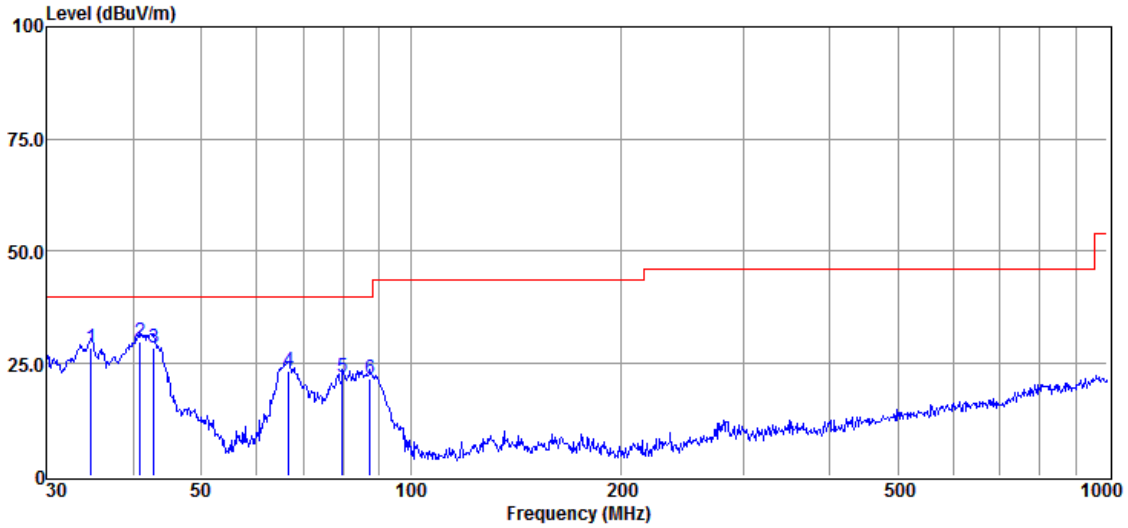
30MHz-1GHz:

Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
1	41.13	43.54	15.59	42.62	0.23	16.74	40.00	-23.26	QP	Horizontal
2	90.86	47.85	8.24	42.68	0.42	13.83	43.50	-29.67	QP	Horizontal
3	135.98	47.82	11.87	42.64	0.60	17.65	43.50	-25.85	QP	Horizontal
4	252.95	48.33	11.59	42.45	0.77	18.24	46.00	-27.76	QP	Horizontal
5	279.04	46.81	12.51	42.42	0.81	17.71	46.00	-28.29	QP	Horizontal
6	455.91	46.21	16.33	42.12	1.10	21.52	46.00	-24.48	QP	Horizontal
1	34.76	55.16	15.81	42.61	0.20	28.56	40.00	-11.44	QP	Vertical
2	40.85	56.48	15.77	42.62	0.22	29.85	40.00	-10.15	QP	Vertical
3	42.75	56.43	14.61	42.63	0.23	28.64	40.00	-11.36	QP	Vertical
4	66.73	53.82	11.78	42.66	0.32	23.26	40.00	-16.74	QP	Vertical
5	79.80	56.05	8.09	42.67	0.38	21.85	40.00	-18.15	QP	Vertical
6	87.42	55.75	8.08	42.68	0.41	21.56	40.00	-18.44	QP	Vertical

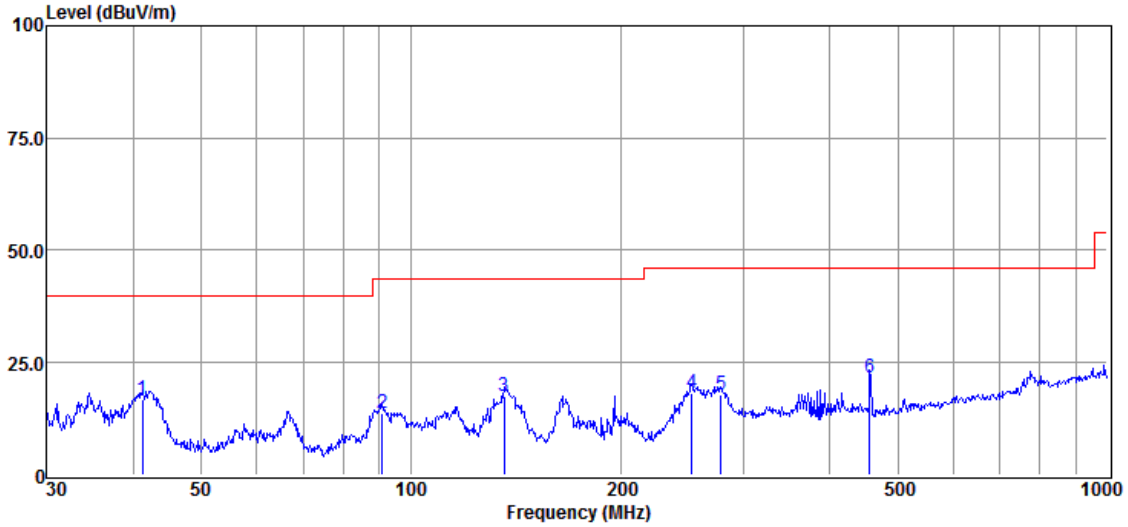
Result Level = Read Level + Antenna Factor + Cable loss - Preamp Factor

Below is the plot of worst case on lowest channel:

Vertical:



Horizontal:



Above 1GHz:

Lowest Channel(2402MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4804	38.34	6.18	44.52	54	-9.48	peak	Horizontal
2	7206	35.15	10.63	45.78	54	-8.22	peak	Horizontal
3	9608	35.91	14.38	50.29	54	-3.71	peak	Horizontal
4	4804	35.56	6.18	41.74	54	-12.26	peak	Vertical
5	7206	34.97	10.63	45.6	54	-8.4	peak	Vertical
6	9608	31.28	14.38	45.66	54	-8.34	peak	Vertical

Middle Channel(2441MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4882	35.55	7	42.55	54	-11.45	peak	Horizontal
2	7323	38.53	11.13	49.66	54	-4.34	peak	Horizontal
3	9764	35.3	14.36	49.66	54	-4.34	peak	Horizontal
4	4882	36.95	7	43.95	54	-10.05	peak	Vertical
5	7323	38.65	11.13	49.78	54	-4.22	peak	Vertical
6	9764	33.84	14.36	48.2	54	-5.8	peak	Vertical

Highest Channel(2480MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4960	35.49	7.49	42.98	54	-11.02	peak	Horizontal
2	7440	36.54	11.65	48.19	54	-5.81	peak	Horizontal
3	9920	34.17	14.4	48.57	54	-5.43	peak	Horizontal
4	4960	39.55	7.49	47.04	54	-6.96	peak	Vertical
5	7440	36.15	11.65	47.8	54	-6.2	peak	Vertical
6	9920	34	14.4	48.4	54	-5.6	peak	Vertical

Remark: 1) Emission = Receiver Reading + Factor

2) Factor = Antenna Factor + Cable Loss + Pre-amplifier Factor.

3) If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

Adapter-FJ-SW266B5050-1000U

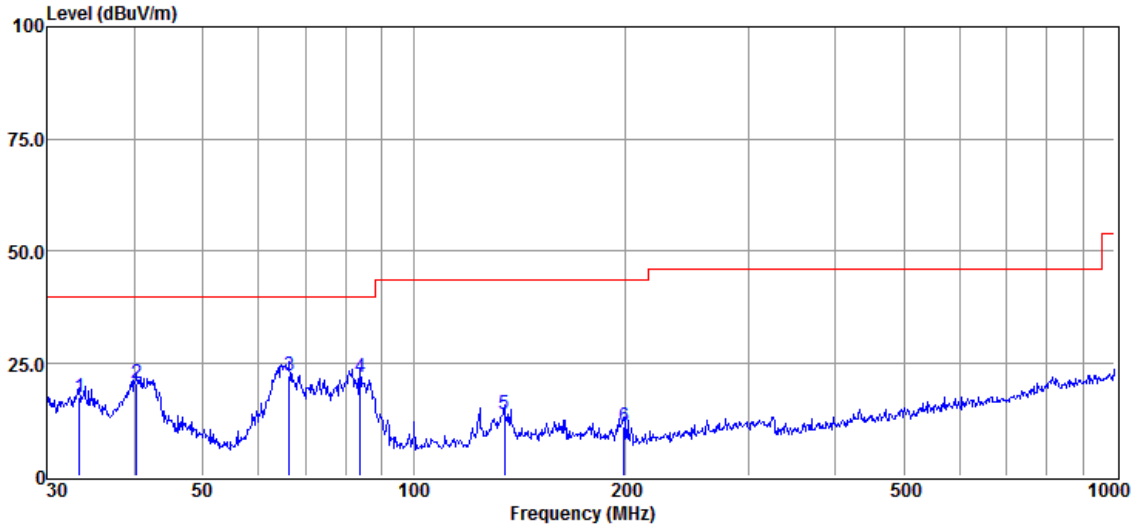
30MHz-1GHz:

Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
1	135.03	49.61	12.01	42.64	0.60	19.58	43.50	-23.92	QP	Horizontal
2	199.99	49.98	9.40	42.52	0.69	17.55	43.50	-25.95	QP	Horizontal
3	271.33	48.34	12.25	42.43	0.80	18.96	46.00	-27.04	QP	Horizontal
4	387.99	47.07	14.89	42.13	0.98	20.81	46.00	-25.19	QP	Horizontal
5	425.03	46.01	15.67	42.11	1.04	20.61	46.00	-25.39	QP	Horizontal
6	824.60	40.52	22.11	42.33	2.11	22.41	46.00	-23.59	QP	Horizontal
1	33.33	44.26	15.67	42.61	0.20	17.52	40.00	-22.48	QP	Vertical
2	40.28	46.83	16.12	42.62	0.22	20.55	40.00	-19.45	QP	Vertical
3	66.50	52.80	11.81	42.66	0.32	22.27	40.00	-17.73	QP	Vertical
4	83.82	56.11	8.04	42.68	0.39	21.86	40.00	-18.14	QP	Vertical
5	134.56	43.72	12.09	42.64	0.60	13.77	43.50	-29.73	QP	Vertical
6	199.29	43.30	9.46	42.52	0.69	10.93	43.50	-32.57	QP	Vertical

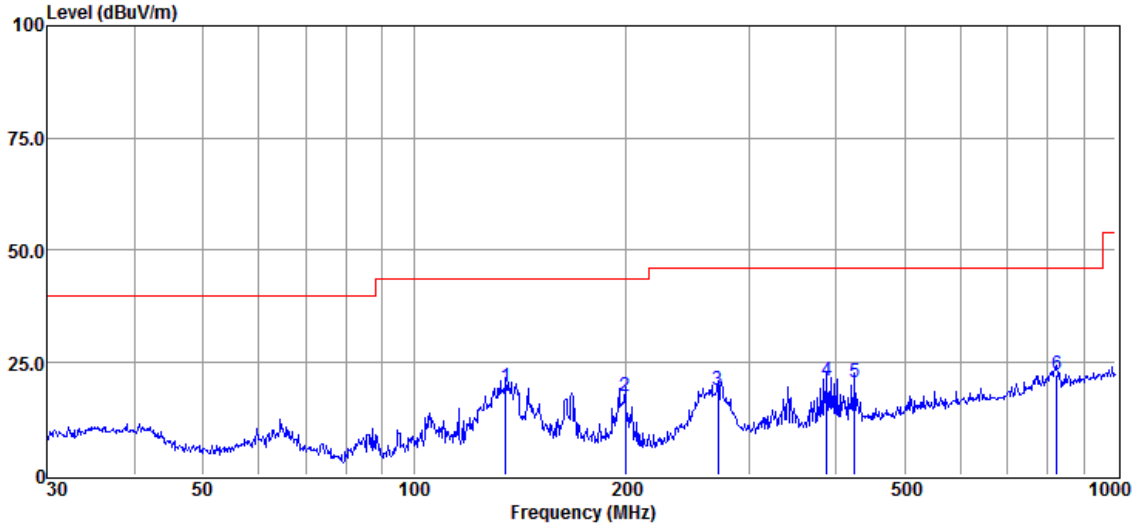
Result Level = Read Level + Antenna Factor + Cable loss - Preamp Factor

Below is the plot of worst case on lowest channel:

Vertical:



Horizontal:



Above 1GHz:

Lowest Channel(2402MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4804	41.36	6.18	47.54	54	-6.46	peak	Horizontal
2	7206	36.11	10.63	46.74	54	-7.26	peak	Horizontal
3	9608	34.98	14.38	49.36	54	-4.64	peak	Horizontal
4	4804	36.41	6.18	42.59	54	-11.41	peak	Vertical
5	7206	34.35	10.63	44.98	54	-9.02	peak	Vertical
6	9608	34.75	14.38	49.13	54	-4.87	peak	Vertical

Middle Channel(2441MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4882	33.85	7	40.85	54	-13.15	peak	Horizontal
2	7323	39.06	11.13	50.19	54	-3.81	peak	Horizontal
3	9764	31.88	14.36	46.24	54	-7.76	peak	Horizontal
4	4882	38.47	7	45.47	54	-8.53	peak	Vertical
5	7323	34.21	11.13	45.34	54	-8.66	peak	Vertical
6	9764	31.42	14.36	45.78	54	-8.22	peak	Vertical

Highest Channel(2480MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4960	36.83	7.49	44.32	54	-9.68	peak	Horizontal
2	7440	36.43	11.65	48.08	54	-5.92	peak	Horizontal
3	9920	33.87	14.4	48.27	54	-5.73	peak	Horizontal
4	4960	36.93	7.49	44.42	54	-9.58	peak	Vertical
5	7440	38.45	11.65	50.1	54	-3.9	peak	Vertical
6	9920	34.2	14.4	48.6	54	-5.4	peak	Vertical

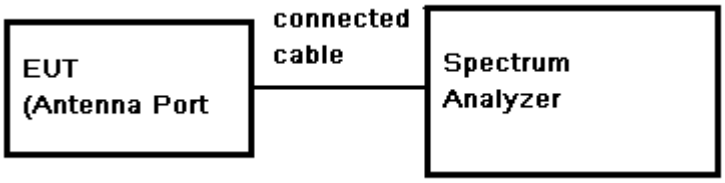
Remark: 1) Emission = Receiver Reading + Factor

2) Factor = Antenna Factor + Cable Loss + Pre-amplifier Factor.

3) If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

7.11 99% Occupied Bandwidth

Test Configuration:



Test Procedure:

1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2) Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
3) Set the spectrum analyzer: RBW >= 1% of the selected span (set 30 kHz). VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4) Mark the peak frequency and 99% bandwidth points.

7.11.1E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode b:TX_non-Hop mode: Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation.

Test Date:

The detailed test data see: Appendix 15.247

8 Test Setup Photographs

Refer to the < Test Setup photos-FCC >.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

--End of the Report--