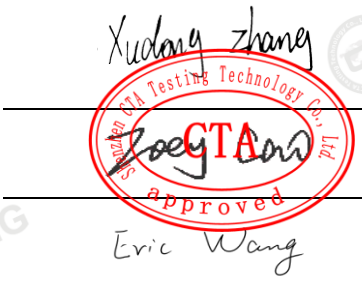
Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No......:	**CTA24103000301**
FCC ID..... **:**	**2AQ9M-SIR7223**
Compiled by (position+printed name+signature)..:	File administrators Xudong Zhang
Supervised by (position+printed name+signature)..:	Project Engineer Zoey Cao
Approved by (position+printed name+signature)..:	RF Manager Eric Wang
Date of issue.....:	Dec. 03, 2024



Testing Laboratory Name .....:	**Shenzhen CTA Testing Technology Co., Ltd.**
Address .....:	Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China
Applicant's name.....:	**Beijing Silion Technology Corp.,LTD.**
Address .....:	5 Floor, Building A, No.3 Longyu North St., Changping District, Beijing, 102200 China
Test specification .....**:**	
Standard .....:	**FCC Part 15.247**

Test item description .....:	**UHF RFID READER**
Trade Mark .....:	N/A
Manufacturer .....:	Beijing Silion Technology Corp.,LTD.
Model/Type reference.....:	SIR7223
Listed Models .....:	N/A
Frequency.....	From 902.75MHz to 927.25MHz
Rating .....:	DC 12.0V from external circuit or DC 53.5V from POE
Result.....:	**PASS**

TEST REPORT

Equipment under Test	:	UHF RFID READER
Model /Type	:	SIR7223
Listed Models	:	N/A
Applicant	:	Beijing Silion Technology Corp.,LTD.
Address	:	5 Floor, Building A, No.3 Longyu North St., Changping District, Beijing, 102200 China
Manufacturer	:	Beijing Silion Technology Corp.,LTD.
Address	:	5 Floor, Building A, No.3 Longyu North St., Changping District, Beijing, 102200 China

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Oct. 30, 2024
Testing commenced on	:	Oct. 30, 2024
Testing concluded on	:	Dec. 03, 2024

2.2 Product Description

Product Description:	UHF RFID READER
Model/Type reference:	SIR7223
Power supply:	DC 12.0V from external circuit or DC 53.5V from POE
Adapter information:	Model: P120D2000G Input: AC 100-240V 50/60Hz Output: DC 12.0V 2.0A
POE switch information: (Auxiliary test supplied by testing Lab):	Model: TL-SG1005P Input: DC 53.5V 1.22A Output: DC 53.5V 1.22A
Testing sample ID:	CTA241030003-1# (Engineer sample), CTA241030003-2# (Normal sample)
RFID	
Modulation Technology:	ASK
Operation frequency:	902.75MHz-927.25MHz
Channel number:	50
Antenna type:	External antenna
Antenna gain:	6.00 dBi
Note:	Four antennas cannot be used at the same time.

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 12.0V from external circuit or DC 53.5V from POE

2.4 Short description of the Equipment under Test (EUT)

This is a UHF RFID READER.
For more details, refer to the user's manual of the EUT.

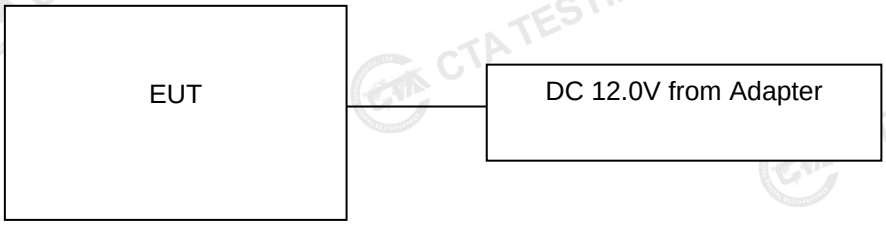
2.5 EUT operation mode

The Applicant provides communication tools software(Engineer mode) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 50 channels provided to the EUT and Channel 01/25/50 were selected to test.

Operation Frequency：

Channel	Frequency (MHz)
01	902.75
02	903.25
⋮	⋮
24	914.25
25	914.75
26	915.25
⋮	⋮
49	926.75
50	927.25

2.6 Block Diagram of Test Setup



2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen CTA Testing Technology Co., Ltd.
Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community,Fuhai Street, Bao'an District, Shenzhen, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:
FCC-Registration No.: 517856 Designation Number: CN1318

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6534.01

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:
Radiated Emission:

Temperature:	24 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

AC Power Conducted Emission:

Temperature:	25 ° C
Humidity:	46 %
Atmospheric pressure:	950-1050mbar

Conducted testing:

Temperature:	25 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

3.4 Summary of measurement results

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Test result
§15.247(a)(1)	Carrier Frequency separation	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Middle	Compliant
§15.247(a)(1)	Number of Hopping channels	ASK	☒ Full	ASK	☒ Full	Compliant
§15.247(a)(1)	Time of Occupancy (dwell time)	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Middle	Compliant
§15.247(a)(1)	Spectrumbandwidth of aFHSS system20dB bandwidth	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.247(b)(1)	Maximum output peak power	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.247(d)	Band edgecompliance conducted	ASK	☒ Lowest ☒ Highest	ASK	☒ Lowest ☒ Highest	Compliant
§15.205	Band edgecompliance radiated	ASK	☒ Lowest ☒ Highest	ASK	☒ Lowest ☒ Highest	Compliant
§15.247(d)	TX spuriousemissions conducted	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.247(d)	TX spuriousemissions radiated	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.209(a)	TX spurious Emissions radiated Below 1GHz	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Middle	Compliant
§15.107(a) §15.207	Conducted Emissions 9KHz-30 MHz	ASK	☒ Lowest ☒ Middle ☒ Highest	ASK	☒ Middle	Compliant

Remark:

1.The measurement uncertainty is not included in the test result.

2. We tested the product using adapters and POE, and documented in the report that the worst test result was adapter power.

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen CTA Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.14 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6 Equipments Used during the Test

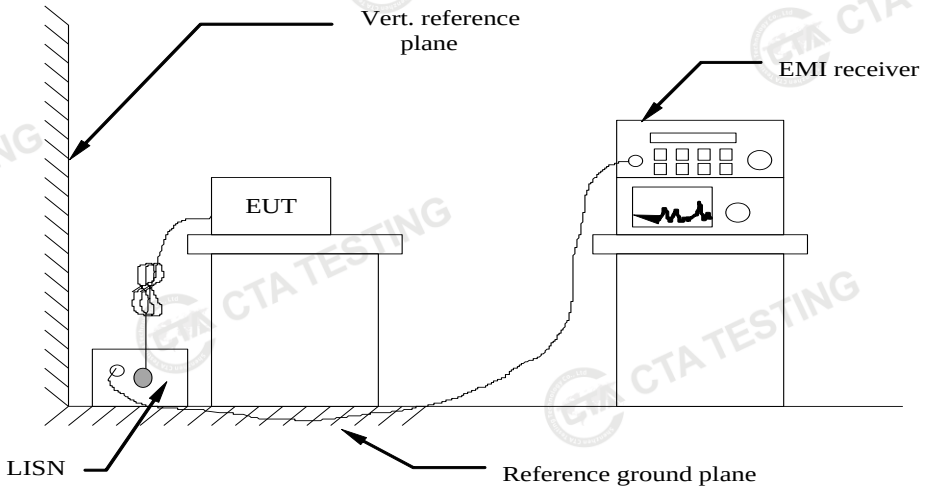
Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	CTA-308	2024/08/03	2025/08/02
LISN	R&S	ENV216	CTA-314	2024/08/03	2025/08/02
EMI Test Receiver	R&S	ESPI	CTA-307	2024/08/03	2025/08/02
EMI Test Receiver	R&S	ESCI	CTA-306	2024/08/03	2025/08/02
Spectrum Analyzer	Agilent	N9020A	CTA-301	2024/08/03	2025/08/02
Spectrum Analyzer	R&S	FSP	CTA-337	2024/08/03	2025/08/02
Vector Signal generator	Agilent	N5182A	CTA-305	2024/08/03	2025/08/02
Analog Signal Generator	R&S	SML03	CTA-304	2024/08/03	2025/08/02
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	R&S	CTA-302	2024/08/03	2025/08/02
Temperature and humidity meter	Chigo	ZG-7020	CTA-326	2024/08/03	2025/08/02
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	CTA-310	2023/10/17	2026/10/16
Horn Antenna	Schwarzbeck	BBHA 9120D	CTA-309	2023/10/13	2026/10/12
Loop Antenna	Zhinan	ZN30900C	CTA-311	2023/10/17	2026/10/16
Horn Antenna	Beijing Hangwei Dayang	OBH100400	CTA-336	2023/10/17	2026/10/16
Amplifier	Schwarzbeck	BBV 9745	CTA-312	2024/08/03	2025/08/02
Amplifier	Taiwan chengyi	EMC051845B	CTA-313	2024/08/03	2025/08/02
Directional coupler	NARDA	4226-10	CTA-303	2024/08/03	2025/08/02
High-Pass Filter	XingBo	XBLBQ-GTA18	CTA-402	2024/08/03	2025/08/02
High-Pass Filter	XingBo	XBLBQ-GTA27	CTA-403	2024/08/03	2025/08/02
Automated filter bank	Tonscend	JS0806-F	CTA-404	2024/08/03	2025/08/02
Power Sensor	Agilent	U2021XA	CTA-405	2024/08/03	2025/08/02
Amplifier	Schwarzbeck	BBV9719	CTA-406	2024/08/03	2025/08/02

Test Equipment	Manufacturer	Model No.	Version number	Calibration Date	Calibration Due Date
EMI Test Software	Tonscend	TS®JS32-RE	5.0.0.2	N/A	N/A
EMI Test Software	Tonscend	TS®JS32-CE	5.0.0.1	N/A	N/A
RF Test Software	Tonscend	TS®JS1120-3	3.1.65	N/A	N/A
RF Test Software	Tonscend	TS®JS1120	3.1.46	N/A	N/A

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency range (MHz)	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.		

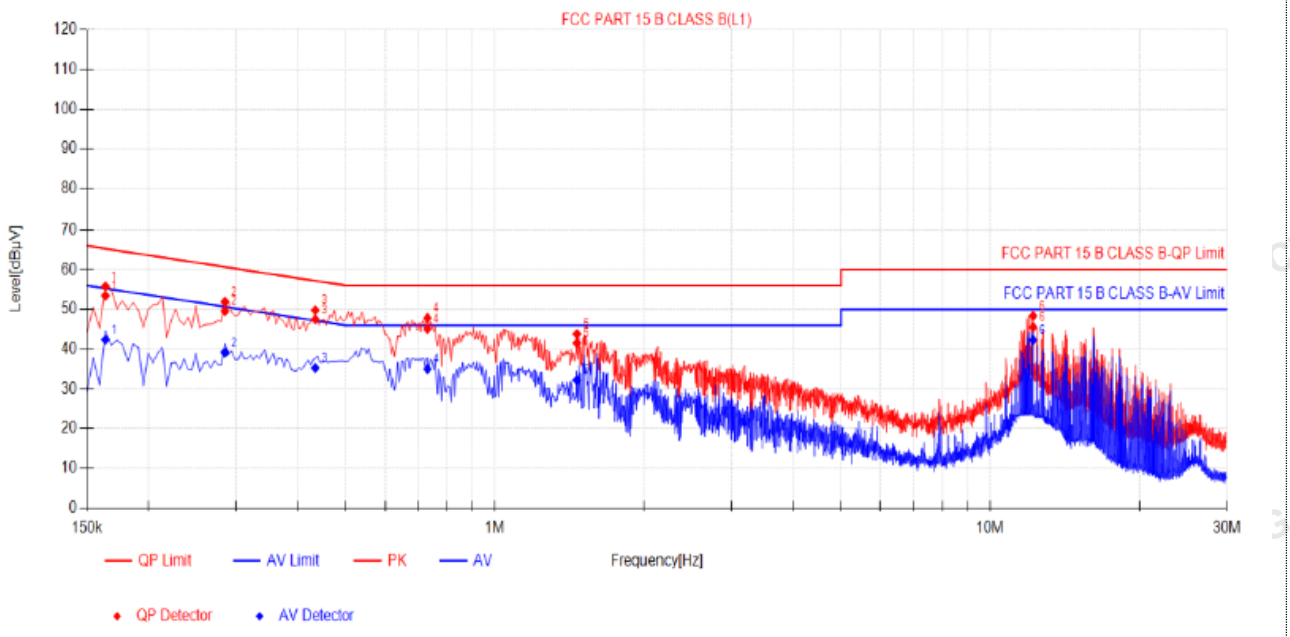
TEST RESULTS

Remark:

1. RFID were test at Low, Middle, and High channel; only the worst result of RFID Middle Channel was reported as below:

2. Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:

Power supply:	DC 12V From Adapter AC 120V/60Hz	Polarization	L

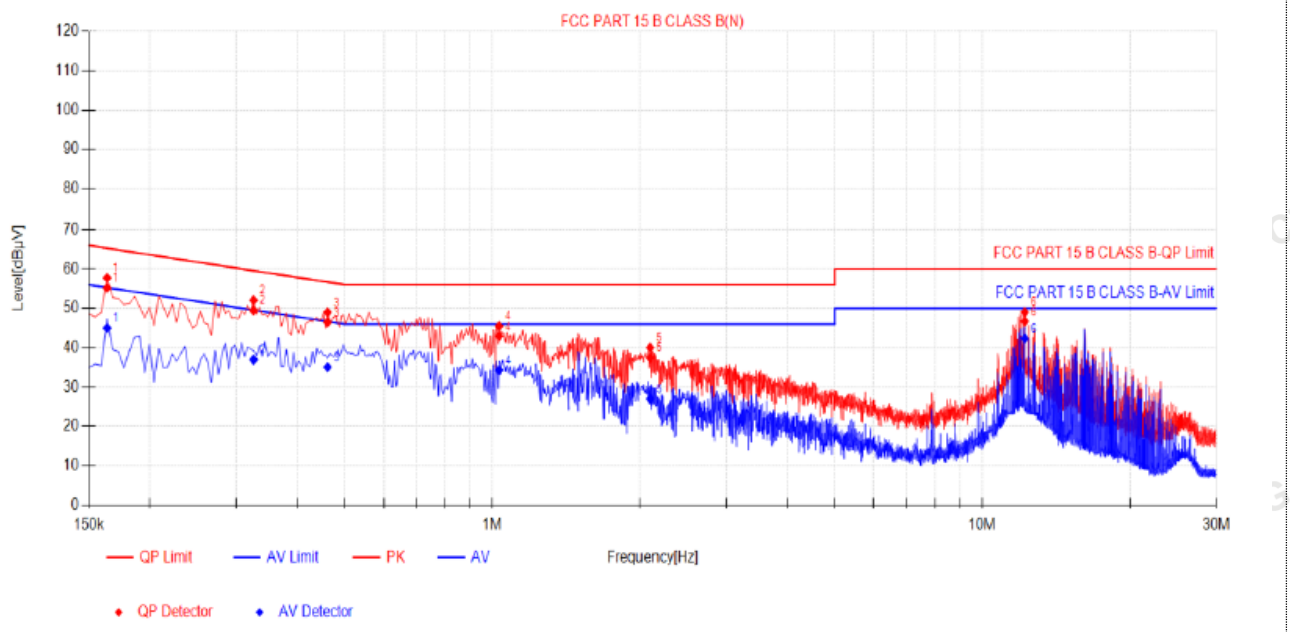


Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading[dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1635	9.93	43.52	53.45	65.28	11.83	32.46	42.39	55.28	12.89	PASS
2	0.285	9.95	39.64	49.59	60.67	11.08	29.23	39.18	50.67	11.49	PASS
3	0.4335	9.92	37.57	47.49	57.19	9.70	25.34	35.26	47.19	11.93	PASS
4	0.7305	9.93	35.18	45.11	56.00	10.89	25.09	35.02	46.00	10.98	PASS
5	1.464	9.90	31.61	41.51	56.00	14.49	22.28	32.18	46.00	13.82	PASS
6	12.1965	10.28	35.27	45.55	60.00	14.45	32.04	42.32	50.00	7.68	PASS

Note:1).QP Value (dBµV)= QP Reading (dBµV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). QPMargin(dB) = QP Limit (dBµV) - QP Value (dBµV)
4). AVMargin(dB) = AV Limit (dBµV) - AV Value (dBµV)

Power supply:	DC 12V From Adapter AC 120V/60Hz	Polarization	N



Final Data List

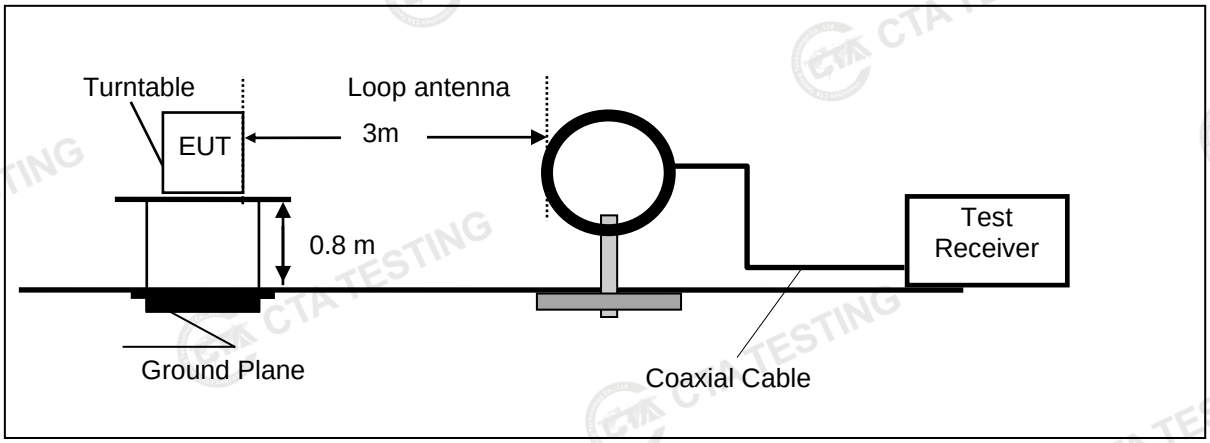
NO.	Freq. [MHz]	Factor [dB]	QP Reading[dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1635	10.05	45.15	55.20	65.28	10.08	34.97	45.02	55.28	10.26	PASS
2	0.3255	9.86	39.66	49.52	59.57	10.05	27.11	36.97	49.57	12.60	PASS
3	0.4605	9.98	36.48	46.46	56.68	10.22	25.10	35.08	46.68	11.60	PASS
4	1.032	10.13	32.83	42.96	56.00	13.04	24.17	34.30	46.00	11.70	PASS
5	2.0985	10.18	27.29	37.47	56.00	18.53	16.87	27.05	46.00	18.95	PASS
6	12.1965	10.41	36.27	46.68	60.00	13.32	31.96	42.37	50.00	7.63	PASS

Note:1).QP Value (dBµV)= QP Reading (dBµV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). QPMargin(dB) = QP Limit (dBµV) - QP Value (dBµV)
4). AVMargin(dB) = AV Limit (dBµV) - AV Value (dBµV)

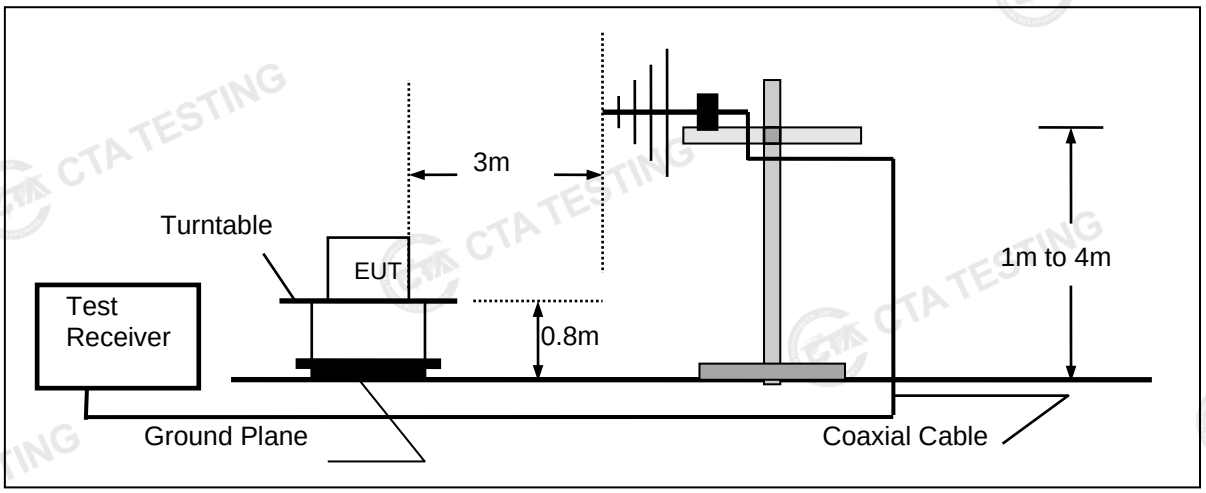
4.2 Radiated Emission

TEST CONFIGURATION

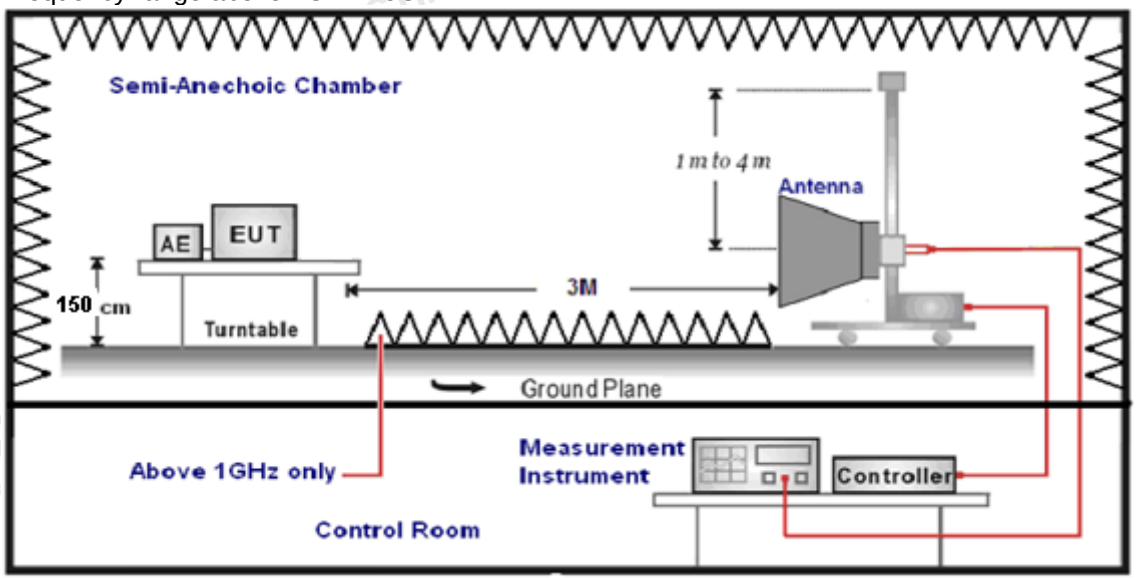
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

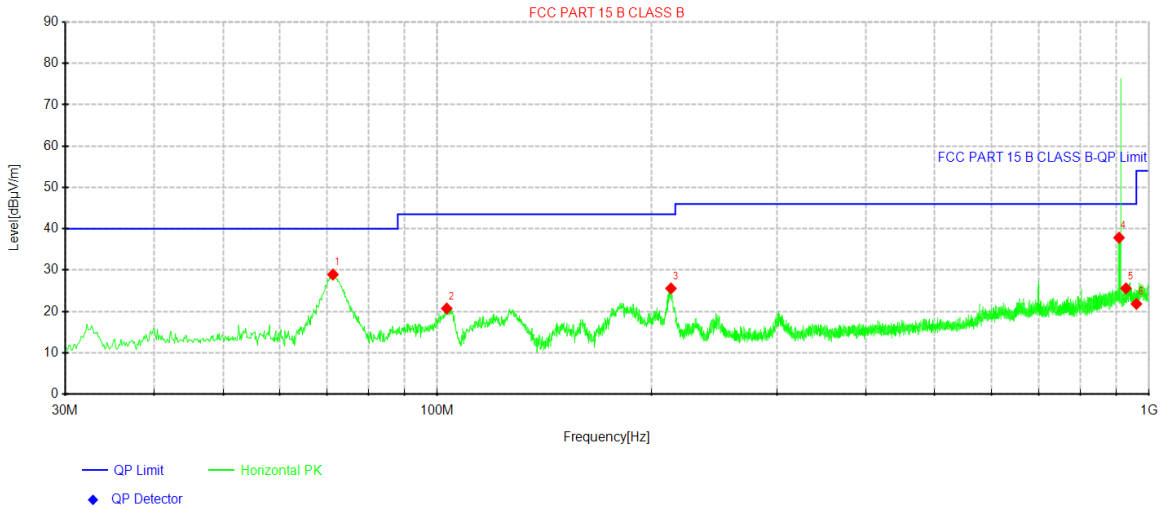
TEST RESULTS

Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. For below 1GHz testing recorded worst at RFID Low channel.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Horizontal



Suspected Data List

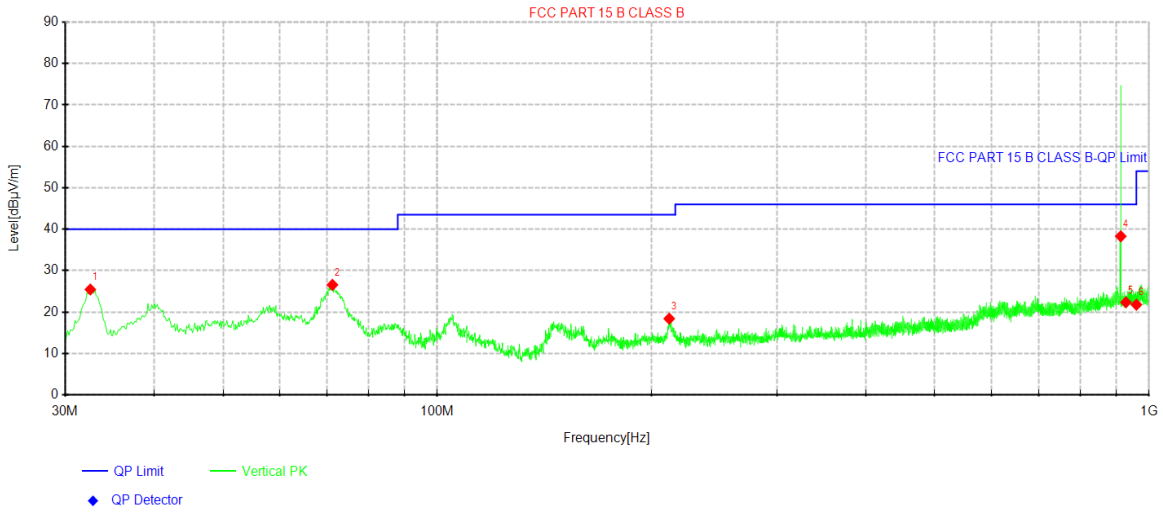
NO.	Freq. [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	71.3462	43.99	28.93	-15.06	40.00	11.07	100	155	Horizontal
2	103.1138	33.72	20.72	-13.00	43.50	22.78	100	350	Horizontal
3	212.9662	38.23	25.57	-12.66	43.50	17.93	100	212	Horizontal
4	902	40.48	37.84	-2.64	46.00	11.16	100	155	Horizontal
5	928	27.90	25.59	-2.31	46.00	20.41	100	165	Horizontal
6	960	23.96	21.83	-2.13	54.00	32.17	100	327	Horizontal

Note:1).Level (dBµV/m)= Reading (dBµV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBµV/m) - Level (dBµV/m)

Vertical



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	32.5462	39.39	25.45	-13.94	40.00	14.55	100	356	Vertical
2	71.225	41.59	26.57	-15.02	40.00	13.43	100	91	Vertical
3	211.7538	31.11	18.41	-12.70	43.50	25.09	100	266	Vertical
4	902	40.89	38.30	-2.59	46.00	7.70	100	103	Vertical
5	928	24.67	22.36	-2.31	46.00	23.64	100	173	Vertical
6	960	23.91	21.78	-2.13	54.00	32.22	100	161	Vertical

Note:1).Level (dBµV/m)= Reading (dBµV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBµV/m) - Level (dBµV/m)

For 1GHz to 10GHz

Frequency(MHz):			902.75		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1805.5	59.87	PK	74.00	14.13	72.14	25.46	3.6	41.33	-12.27
1805.5	41.98	AV	54.00	12.02	54.25	25.46	3.6	41.33	-12.27
2708.25	50.69	PK	74.00	23.31	59.85	28.32	5.12	42.6	-9.16
2708.25	40.51	AV	54.00	13.49	49.67	28.32	5.12	42.6	-9.16

Frequency(MHz):			902.75		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1805.5	58.82	PK	74.00	15.18	71.09	25.46	3.6	41.33	-12.27
1805.5	41.10	AV	54.00	12.90	53.37	25.46	3.6	41.33	-12.27
2708.25	50.05	PK	74.00	23.95	59.21	28.32	5.12	42.6	-9.16
2708.25	39.29	AV	54.00	14.71	48.45	28.32	5.12	42.6	-9.16

Frequency(MHz):			914.75		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1829.5	59.35	PK	74.00	14.65	71.63	25.45	3.6	41.33	-12.28
1829.5	42.49	AV	54.00	11.51	54.77	25.45	3.6	41.33	-12.28
2744.25	50.42	PK	74.00	23.58	59.59	28.3	5.12	42.59	-9.17
2744.25	39.65	AV	54.00	14.35	48.82	28.3	5.12	42.59	-9.17

Frequency(MHz):			914.75		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1829.5	58.27	PK	74.00	15.73	70.55	25.45	3.6	41.33	-12.28
1829.5	41.86	AV	54.00	12.14	54.14	25.45	3.6	41.33	-12.28
2744.25	50.01	PK	74.00	23.99	59.18	28.3	5.12	42.59	-9.17
2744.25	38.26	AV	54.00	15.74	47.43	28.3	5.12	42.59	-9.17

Frequency(MHz):			927.25		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1854.5	59.03	PK	74.00	14.97	71.18	25.62	3.63	41.4	-12.15
1854.5	41.08	AV	54.00	12.92	53.23	25.62	3.63	41.4	-12.15
2781.75	50.26	PK	74.00	23.74	59.36	28.46	5.14	42.7	-9.1
2781.75	40.15	AV	54.00	13.85	49.25	28.46	5.14	42.7	-9.1

Frequency(MHz):			927.25		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1854.5	58.03	PK	74.00	15.97	70.18	25.62	3.63	41.4	-12.15
1854.5	41.66	AV	54.00	12.34	53.81	25.62	3.63	41.4	-12.15
2781.75	50.03	PK	74.00	23.97	59.13	28.46	5.14	42.7	-9.1
2781.75	39.91	AV	54.00	14.09	49.01	28.46	5.14	42.7	-9.1

REMARKS:
1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)- Pre-amplifier
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

4.3 Maximum Peak Output Power

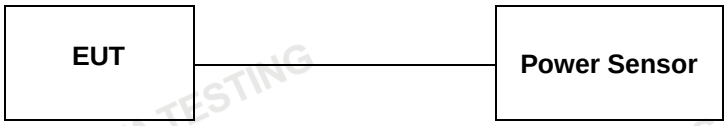
Limit

The Maximum Peak Output Power Measurement is 1W (30dBm).

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the powersensor.

Test Configuration



Test Results

Channel	Output power (dBm)	Limit (dBm)	Result
CH01	29.442	30.0	Pass
CH25	29.468		
CH50	29.479		

Note: 1.The test results including the cable lose.

4.4 20dB Bandwidth

Limit

For frequency hopping systems operating in the 902MHz-928MHz no limit for 20dB bandwidth.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 KHz RBW and 100 KHz VBW.

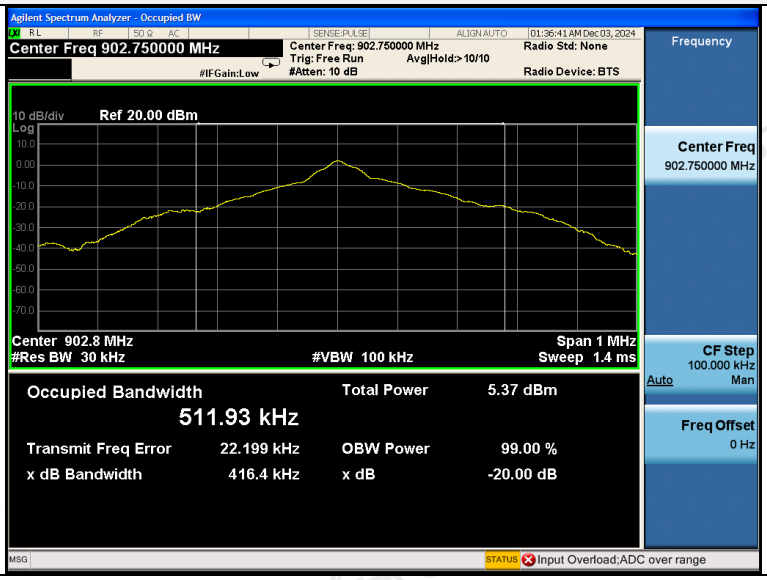
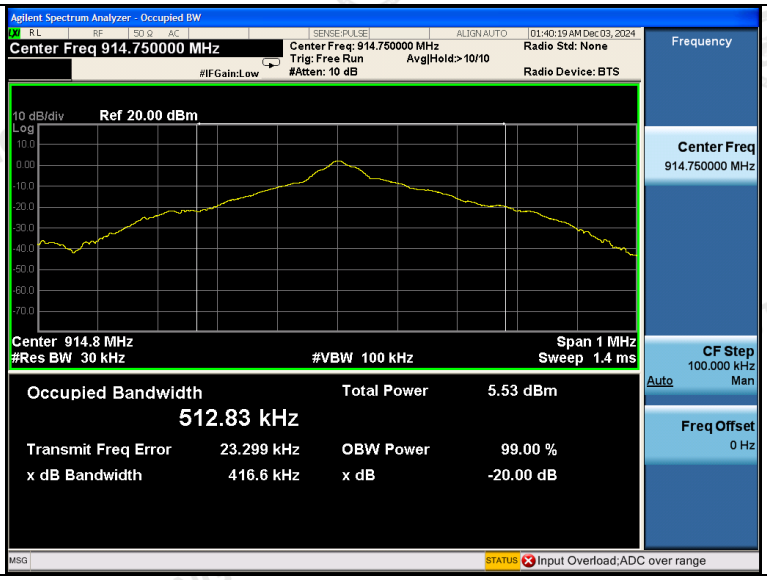
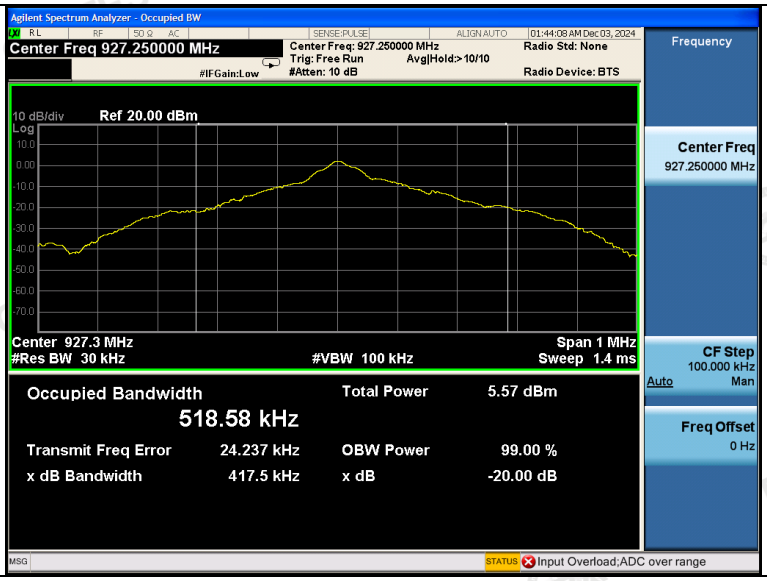
The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration

Test Results

Channel	20dB bandwidth (MHz)	Result
CH00	0.4164	Pass
CH31	0.4166	
CH63	0.4175	

Test plot as follows:

ASK

CH01

CH25

CH50

4.5 Frequency Separation

LIMIT

According to 15.247(a)(1),frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with30 KHz RBW and 100 KHz VBW.

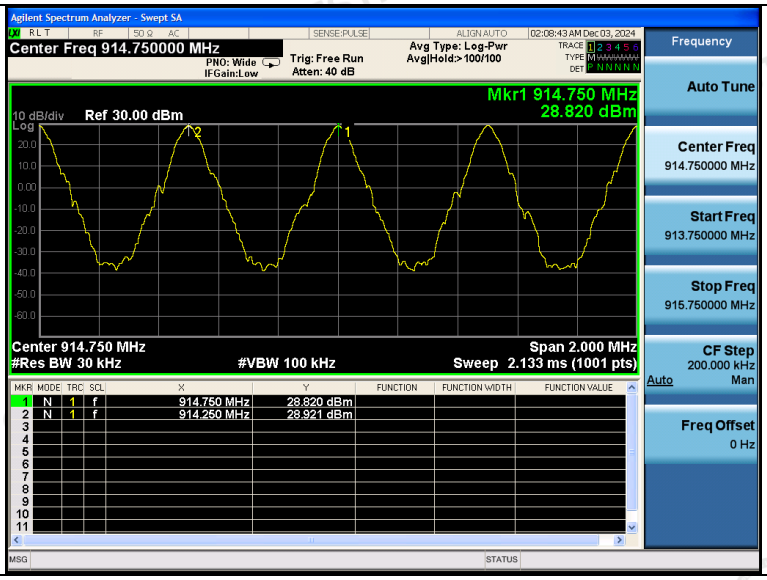
TEST CONFIGURATION

TEST RESULTS

Channel	Channel Separation (MHz)	Limit(MHz)	Result
CH24	0.5	25KHz or 2/3*20dB bandwidth	Pass
CH25			

Note:
We have tested all mode at high, middle and low channel, and recorded worst case at middle

Test plot as follows:



ASK

4.6 Number of hopping frequency

Limit

⩾50 For Frequency hopping systems in the 902–928MHz band

Test Procedure

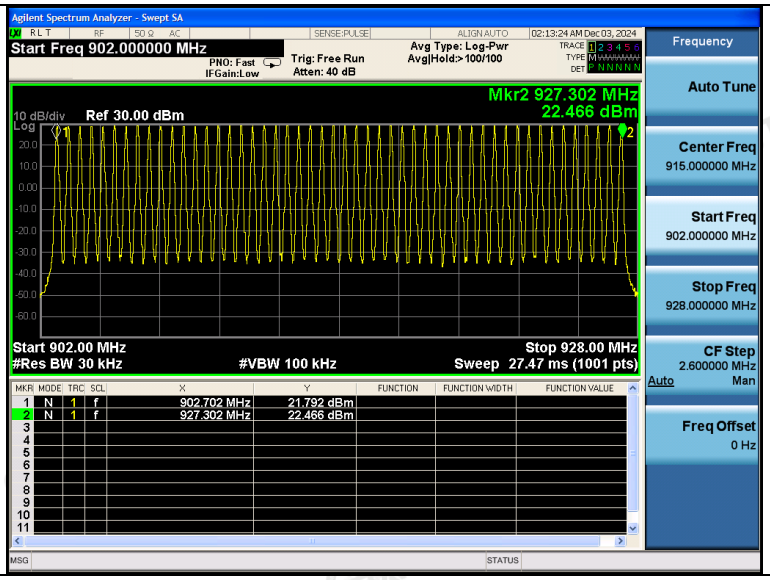
The transmitter output was connected to the spectrum analyzer through an attenuator. Set spectrum analyzer start 903MHz to 906MHz with 100 KHz RBW and 300 KHz VBW.

Test Configuration

Test Results

Number of Hopping Channel	Limit	Result
50	⩾50	Pass

Test plot as follows:



ASK

4.7 Time of Occupancy (Dwell Time)

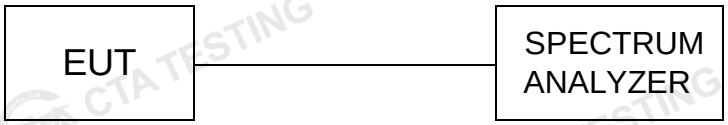
Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with 1MHz RBW and 1MHz VBW, Span 0Hz.

Test Configuration

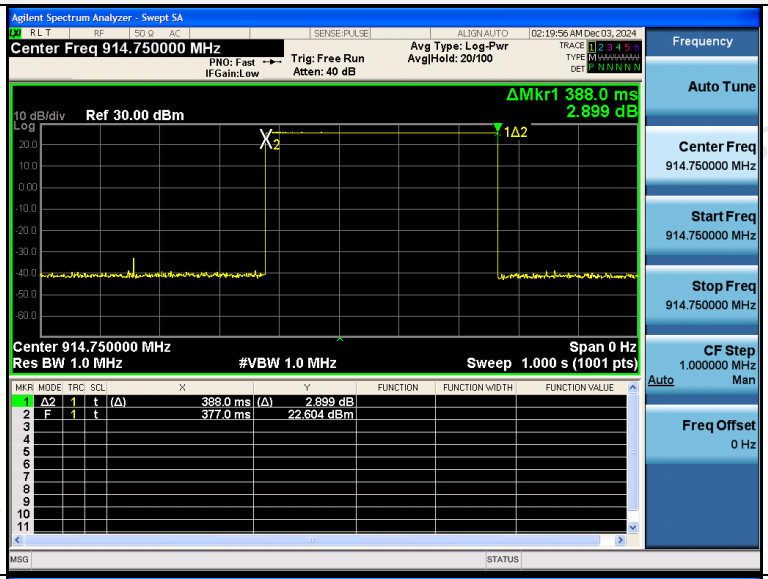
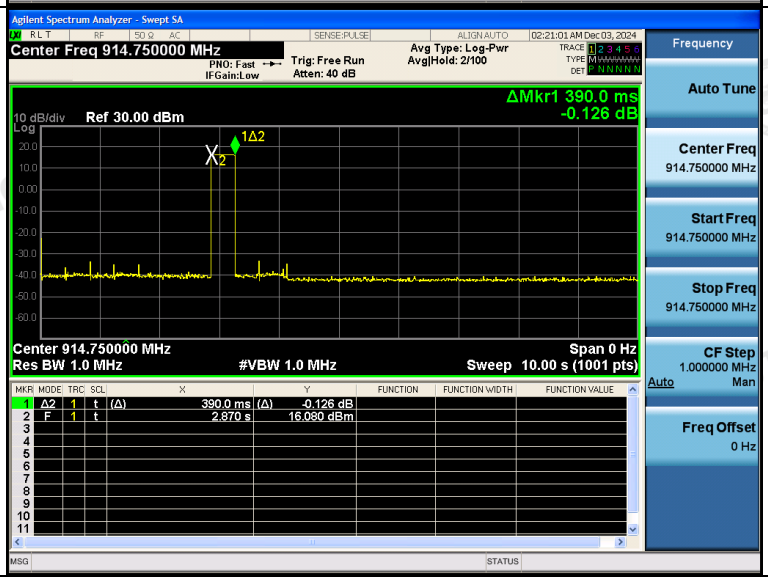


Test Results

CH	Burst time (ms)	Dwell time (s)	Limit (s)	Result
25	0.388	0.390	0.40	Pass

Note:We have tested all mode at high,middle and low channel,and recoreded worst case at middle channel.

Test plot as follows:

ASK



4.8 Out-of-band Emissions

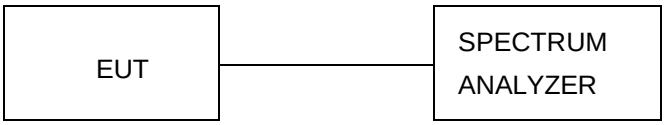
Limit

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 con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies 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.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

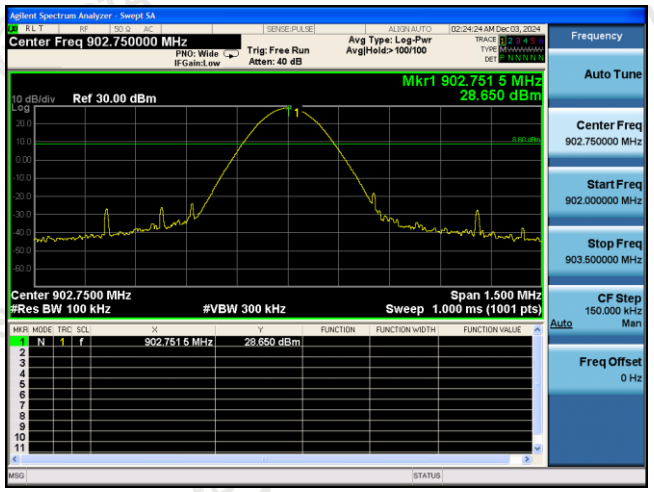
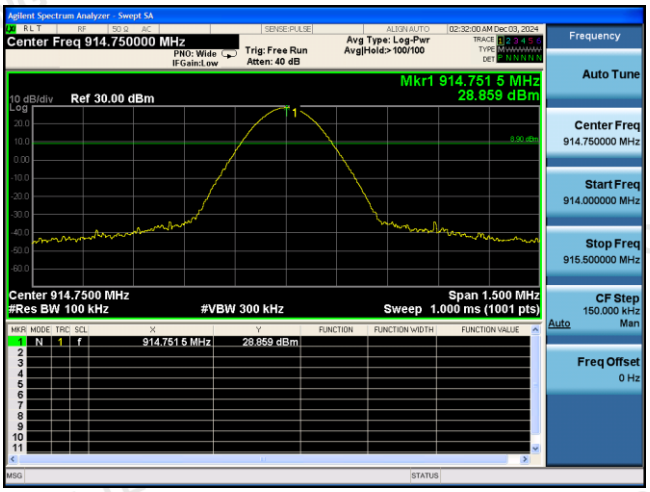
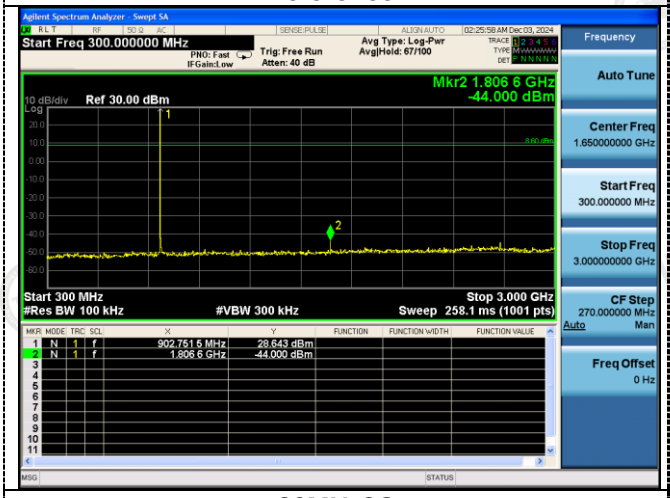
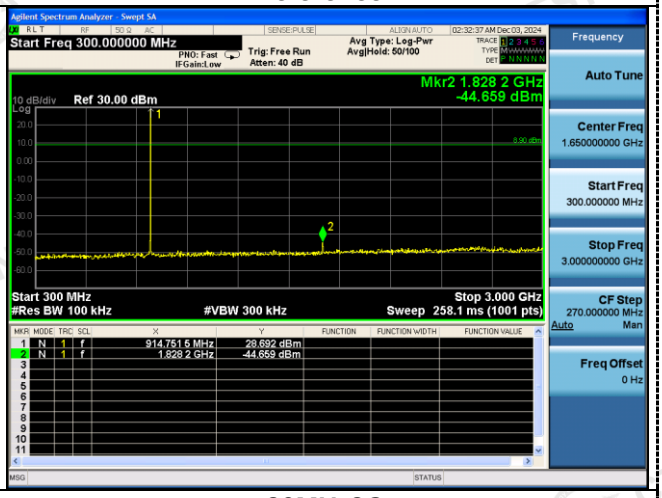
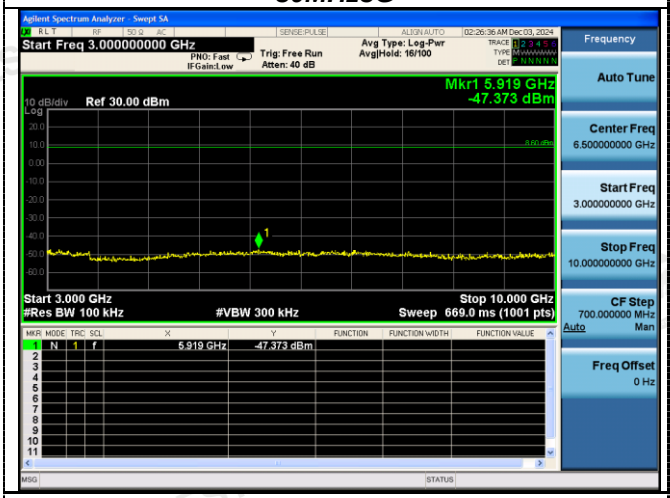
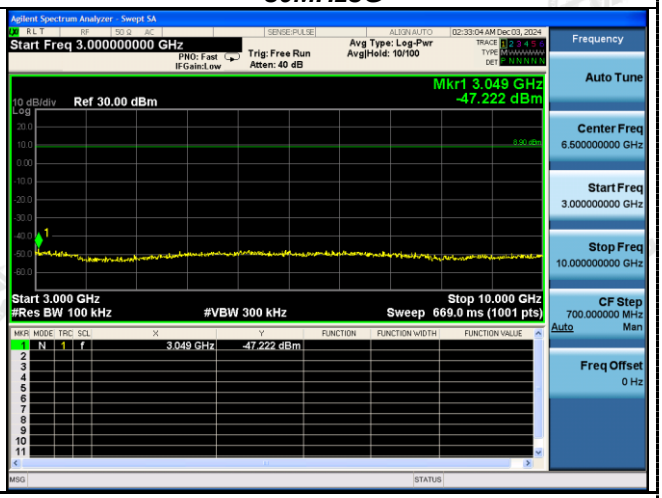
Test Configuration

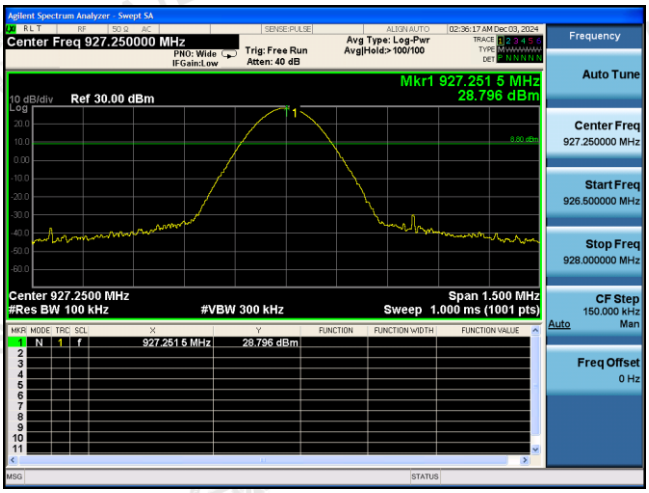
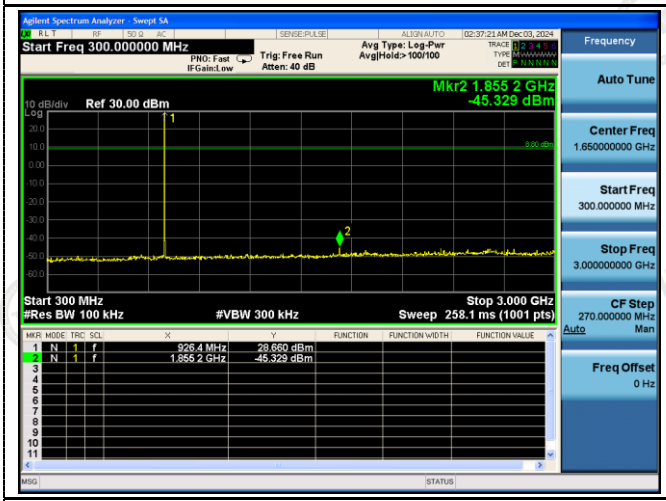
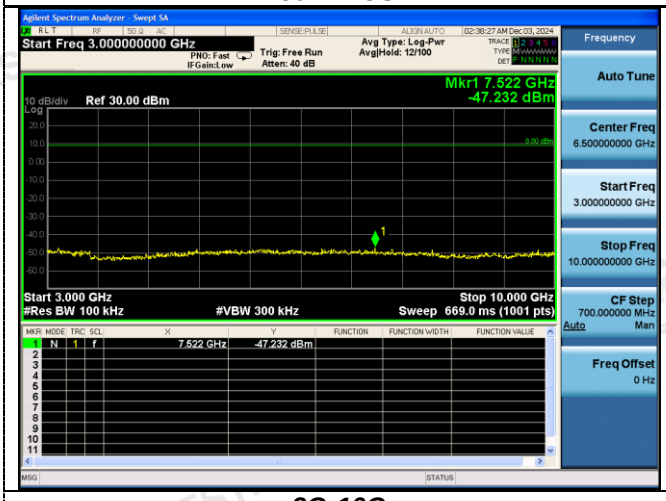


Test Results

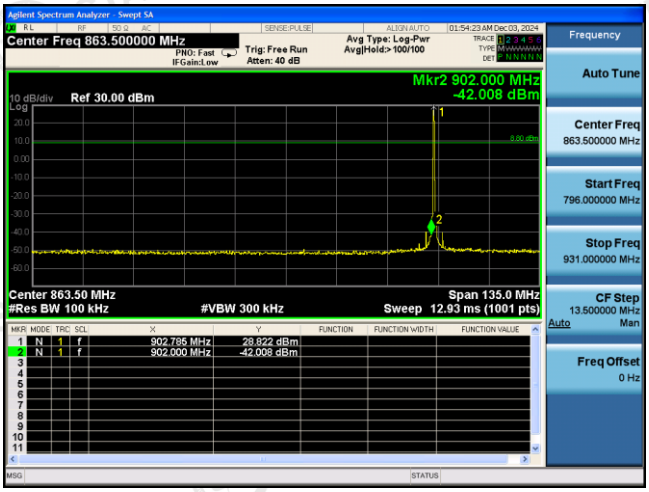
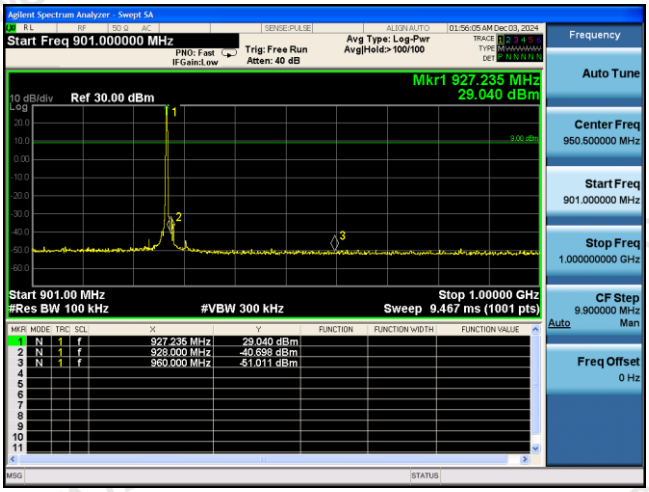
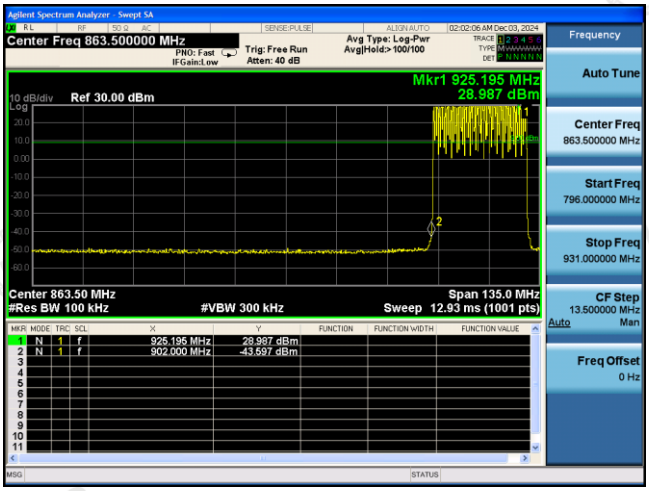
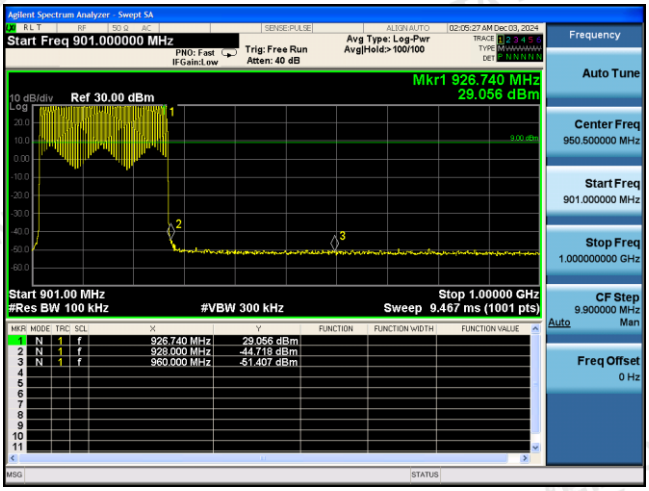
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

Test plot as follows:

CH01	CH25
	
reference	reference
	
30MHz3G	30MHz3G
	
3G-10G	3G-10G

CH50	
	
reference	
	
30MHz3G	
	
3G-10G	

Band-edge Measurements for RF Conducted Emissions:

ASK	
	
Left Band edge hoping off	Right Band edge hoping off
	
Left Band edge hoping on	Right Band edge hoping on

4.9 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The maximum gain of antenna was 6.00 dBi.

Remark: The antenna gain is provided by the customer , if the data provided by the customer is not accurate, Shenzhen CTA Testing Technology Co., Ltd. does not assume any responsibility.

5 Test Setup Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

6 Photos of the EUT

Please refer to separated files for External & Internal Photos of the EUT.

********** End of Report **********