Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**GTS20190531004-1-4**
FCC ID..... :	**2AUL8SAAT-F527A**
Compiled by (position+printed name+signature)..:	File administrators Peter Xiao
Supervised by (position+printed name+signature)..:	Test Engineer Moon Tan
Approved by (position+printed name+signature)..:	Manager Simon Hu
Date of issue.....:	Sep.09, 2019
Representative Laboratory Name .:	**Shenzhen Global Test Service Co.,Ltd.**
Address .....:	No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong
Applicant's name.....:	**Shenzhen Aerospace Innotech Corporation Limited**
Address .....:	D9,The 10th Kejinan Road,High-Tech Zone,Nanshan Dist, Shenzhen,P.R.China
Test specification .....:	
Standard .....:	**FCC Part 15.247**
TRF Originator.....:	Shenzhen Global Test Service Co.,Ltd.
Master TRF.....:	Dated 2014-12

Shenzhen Global Test Service Co.,Ltd. All rights reserved.
This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Global Test Service Co.,Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Global Test Service Co.,Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description .....:	**RFID Reader**
Trade Mark .....:	N/A
Manufacturer .....:	Shenzhen Aerospace Innotech Corporation Limited
Model/Type reference.....:	SAAT-F527A
Listed Models .....:	SAAT-F526B, SAAT-F527B, SAAT-F527, HT-I730, HT-F730I, SAAT-E221C, SAAT-E221B, SAAT-E221C-POE, SAAT-F526B-A
Modulation Type .....:	GFSK
Operation Frequency.....:	From 2405-2480MHz
Hardware Version .....:	N/A
Software Version .....:	N/A
Rating .....:	DC 12.0V by Adapter
Result.....:	**PASS**

T E S T R E P O R T

Test Report No. :	GTS20190531004-1-4	Sep.09, 2019 Date of issue

Equipment under Test	:	RFID Reader
Model /Type	:	SAAT-F527A
Listed Models	:	SAAT-F526B, SAAT-F527B, SAAT-F527, HT-I730, HT-F730I, SAAT-E221C, SAAT-E221B, SAAT-E221C-POE, SAAT-F526B-A
Applicant	:	**Shenzhen Aerospace Innotech Corporation Limited**
Address	:	D9,The 10th Kejinan Road,High-Tech Zone,Nanshan Dist, Shenzhen,P.R.China
Manufacturer	:	**Shenzhen Aerospace Innotech Corporation Limited**
Address	:	D9,The 10th Kejinan Road,High-Tech Zone,Nanshan Dist, Shenzhen,P.R.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 4

2. SUMMARY 5

2.1. General Remarks 5
2.2. Product Description 5
2.3. Equipment Under Test 6
2.4. Short description of the Equipment under Test (EUT) 6
2.5. EUT operation mode 6
2.6. Block Diagram of Test Setup 6
2.7. Special Accessories 6
2.8. Related Submittal(s) / Grant (s) 6
2.9. Modifications 6

3. TEST ENVIRONMENT 7

3.1. Address of the test laboratory 7
3.2. Test Facility 7
3.3. Environmental conditions 7
3.4. Test Description 8
3.5. Statement of the measurement uncertainty 8
3.6. Equipments Used during the Test 9

4. TEST CONDITIONS AND RESULTS..... 10

4.1. AC Power Conducted Emission 10
4.2. Radiated Emission 13
4.3. Maximum Peak Output Power 17
4.4. Power Spectral Density 18
4.5. 6dB Bandwidth 20
4.6. Band Edge Compliance of RF Emission 22
4.7. Antenna Requirement 25

5. TEST SETUP PHOTOS OF THE EUT 26

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT 28

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
KDB558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Aug. 27, 2019
Testing commenced on	:	Aug. 27, 2019
Testing concluded on	:	Sep.09, 2019

2.2. Product Description

Product Name:	RFID Reader
Trade Mark:	N/A
Model/Type reference:	SAAT-F527A
List Model	SAAT-F526B, SAAT-F527B, SAAT-F527, HT-I730, HT-F730I, SAAT-E221C, SAAT-E221B, SAAT-E221C-POE, SAAT-F526B-A
Model Declaration	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Power supply:	DC 12.0V by Adapter
RFID	
Operation frequency	2405-2480MHz
Channel Number	16 channels
Channel Spacing	5MHz
Modulation Type	GFSK
Antenna Description	External Antenna; 2.0dBi

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 12V form Adapter

2.4. Short description of the Equipment under Test (EUT)

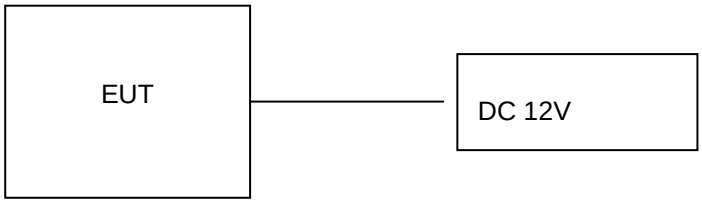
This is a RFID Reader.
For more details, refer to the user's manual of the EUT.

2.5. EUT operation mode

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 16 channels provided to the EUT. Channel 00/07/15 was selected to test.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	**2405**	8	2445
1	2410	9	2450
2	2415	10	2455
3	2420	11	2460
4	2425	12	2465
5	2430	13	2470
6	2435	14	2475
7	**2440**	**15**	**2480**

2.6. Block Diagram of Test Setup



2.7. Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
Mean Well Enterpriese Co.,Ltd	Adapter	PS36IBCAY300H	--	SDOC

2.8. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AUL8SAAT-F527A** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.9. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong,China.

3.2. Test Facility

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

CNAS (No. CNAS L8169)
Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA (Certificate No. 4758.01)
Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.

3.3. Environmental conditions

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

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(b)(1)	Maximum output power	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	complies
§15.247(d)	Band edge compliance conducted	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.205	Band edge compliance radiated	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	☒	☐	☐	☐	complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	complies

Remark:
1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

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 CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service 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 GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 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

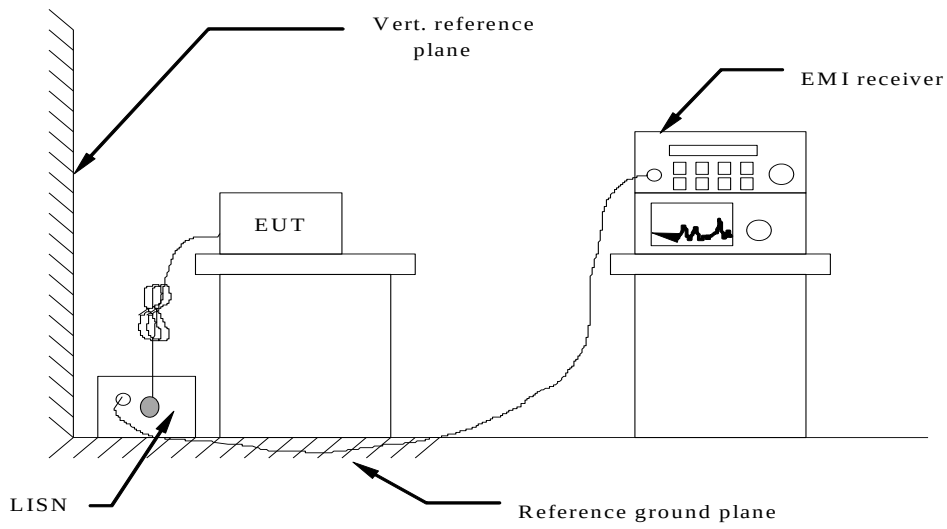
Note: 1. The Cal.Interval was one year.

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2018/09/28	2019/09/27
LISN	R&S	ESH2-Z5	893606/008	2018/09/27	2019/09/26
By-log Antenna	SCHWARZBECK	VULB9163	000976	2018/09/29	2019/09/28
EMI Test Receiver	R&S	ESCI	101102	2018/09/26	2019/09/25
Spectrum Analyzer	Agilent	N9020A	MY48010425	2018/09/17	2019/09/16
Spectrum Analyzer	R&S	FSV40-N	101800	2018/09/17	2019/09/16
Controller	EM Electronics	Controller EM 1000	N/A	2018/09/21	2019/09/20
Double Ridged Horn Antenna (1~18GHz)	SCHWARZBECK	BBHA 9120D	01622	2018/09/19	2019/09/18
Double Ridged Horn Antenna	Rohde&Schwarz	HF907	100265	2018/09/19	2019/09/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2018/09/19	2019/09/18
Horn Antenna (18GHz~40GHz)	ETS	3116	00086467	2018/12/29	2019/12/28
Amplifier (26.5GHz~40GHz)	EMCI	EMC2654045	980028	2018/09/18	2019/09/17
Amplifier (0.1GHz~26.5GHz)	EMCI	EMC012645SE	980355	2018/09/19	2019/09/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2018/09/20	2019/09/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2018/09/20	2019/09/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2018/09/20	2019/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2018/09/20	2019/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2018/09/20	2019/09/19
RF Cable	HUBER+SUHNER	RG214	N/A	2018/09/20	2019/09/19
Broadband Antenna	SCHWARZBECK	VULB 9163	00976	2018/09/29	2019/09/28
Conducted Emission	ES-K1	V1.71	N/A	N/A	N/A
Radiated Emission	JS32-RE	V2.5.0.9	N/A	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 DC5V power, the adapter received AC120V/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

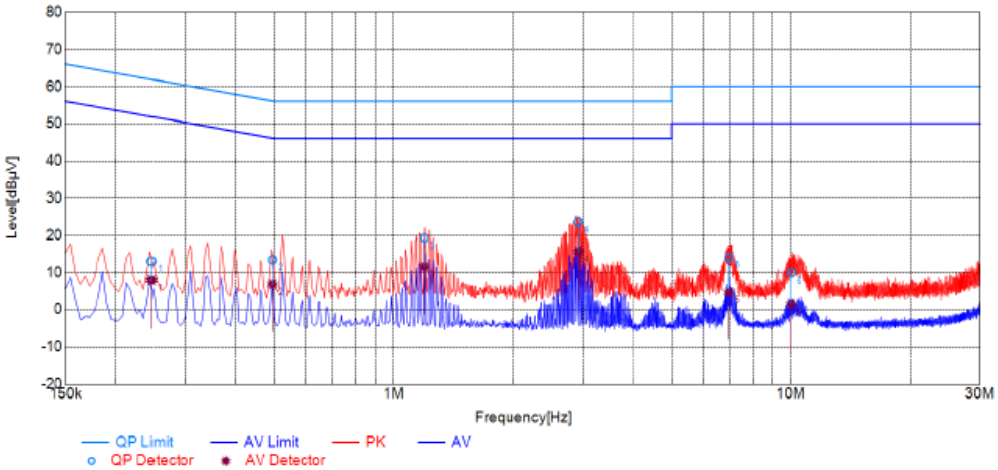
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

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

Power supply:	AC 120V/60Hz	Polarization	L

Test Graph



Final Data List

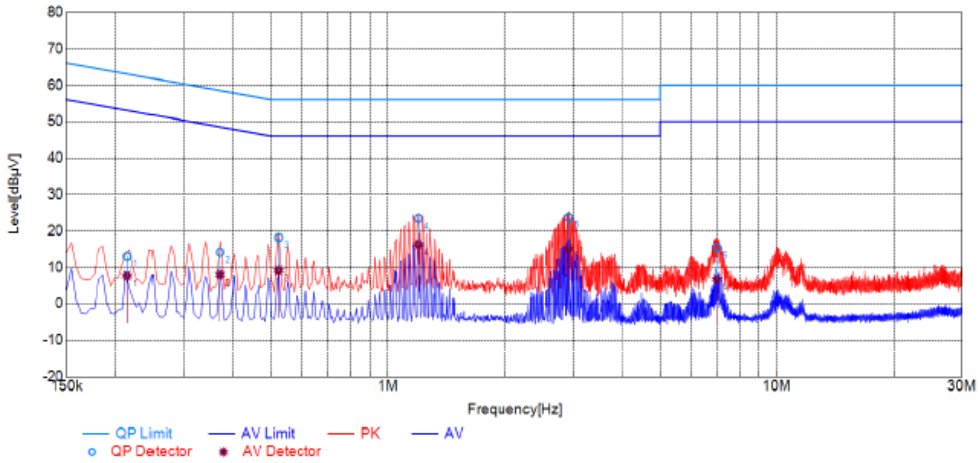
NO.	Frequency [MHz]	QP Reading [dBµV]	AVG. Reading [dBµV]	Factor [dB]	QP Result [dBµV]	AVG. Result [dBµV]	QP Limit [dBµV]	AVG. Limit [dBµV]	QP Margin [dB]	AVG. Margin [dB]	Line	Remark
1	0.2461	2.89	-2.16	10.13	13.02	7.97	61.89	51.89	48.87	43.92	L1	PASS
2	0.4946	3.17	-3.29	10.26	13.43	6.97	56.09	46.09	42.66	39.12	L1	PASS
3	1.1927	9.07	1.33	10.21	19.28	11.54	56.00	46.00	36.72	34.46	L1	PASS
4	2.9099	13.27	5.25	10.34	23.61	15.59	56.00	46.00	32.39	30.41	L1	PASS
5	6.9899	3.59	-5.70	10.51	14.10	4.81	60.00	50.00	45.90	45.19	L1	PASS
6	10.0184	-0.66	-9.04	10.58	9.92	1.54	60.00	50.00	50.08	48.46	L1	PASS

Note: 1. Result (dBµV) = Reading (dBµV) + Factor (dB).

2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

Power supply:	AC 120V/60Hz	Polarization	N

Test Graph



Final Data List

NO.	Frequency [MHz]	QP Reading [dBµV]	AVG. Reading [dBµV]	Factor [dB]	QP Result [dBµV]	AVG. Result [dBµV]	QP Limit [dBµV]	AVG. Limit [dBµV]	QP Margin [dB]	AVG. Margin [dB]	Line	Remark
1	0.2144	2.89	-2.37	10.14	13.03	7.77	63.03	53.03	50.00	45.26	N	PASS
2	0.3691	4.02	-2.08	10.15	14.17	8.07	58.52	48.52	44.35	40.45	N	PASS
3	0.5226	7.98	-1.07	10.24	18.22	9.17	56.00	46.00	37.78	36.83	N	PASS
4	1.1950	13.24	6.11	10.21	23.45	16.32	56.00	46.00	32.55	29.68	N	PASS
5	2.9100	13.37	4.79	10.34	23.71	15.13	56.00	46.00	32.29	30.87	N	PASS
6	7.0184	4.99	-3.64	10.51	15.50	6.87	60.00	50.00	44.50	43.13	N	PASS

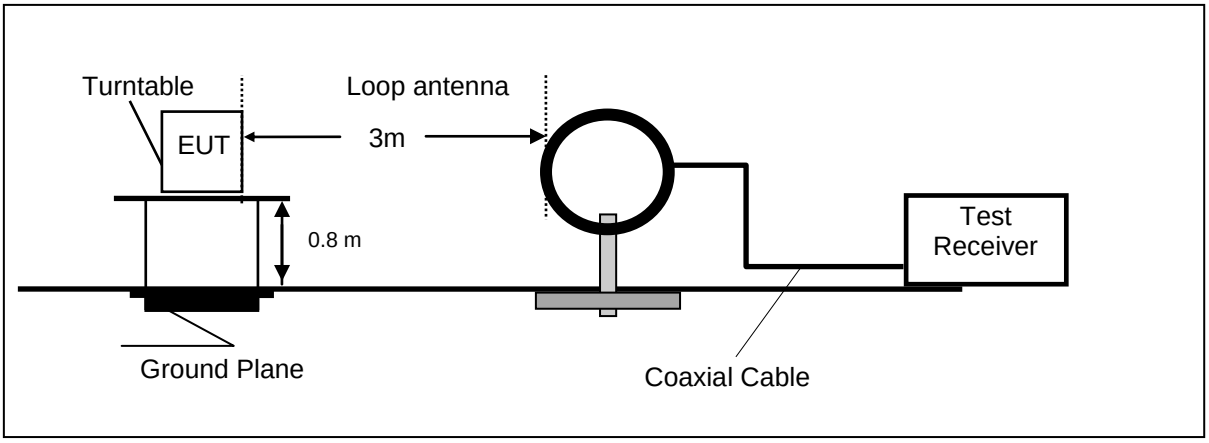
Note: 1. Result (dBµV) = Reading (dBµV) + Factor (dB).

2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

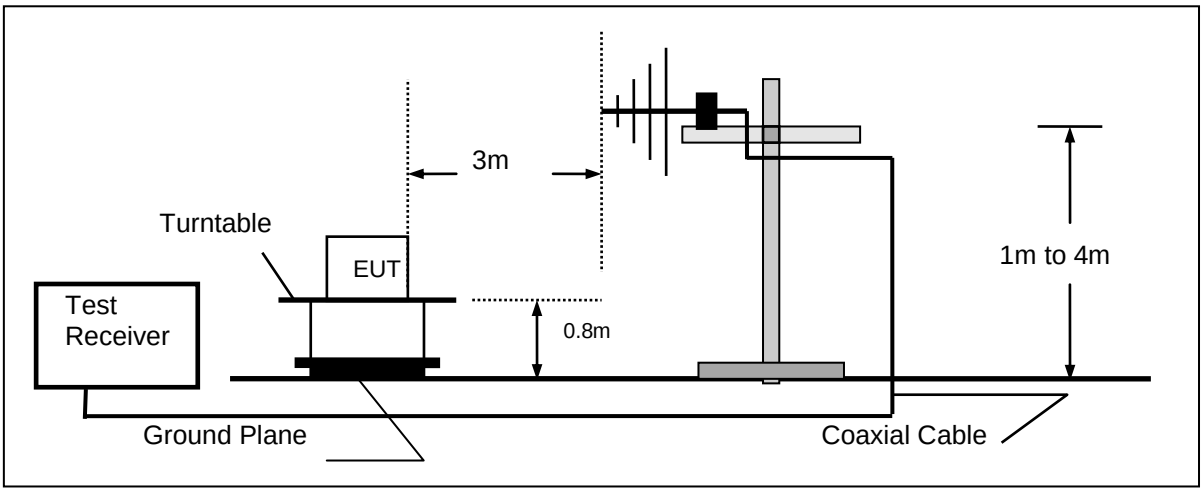
4.2. Radiated Emission

TEST CONFIGURATION

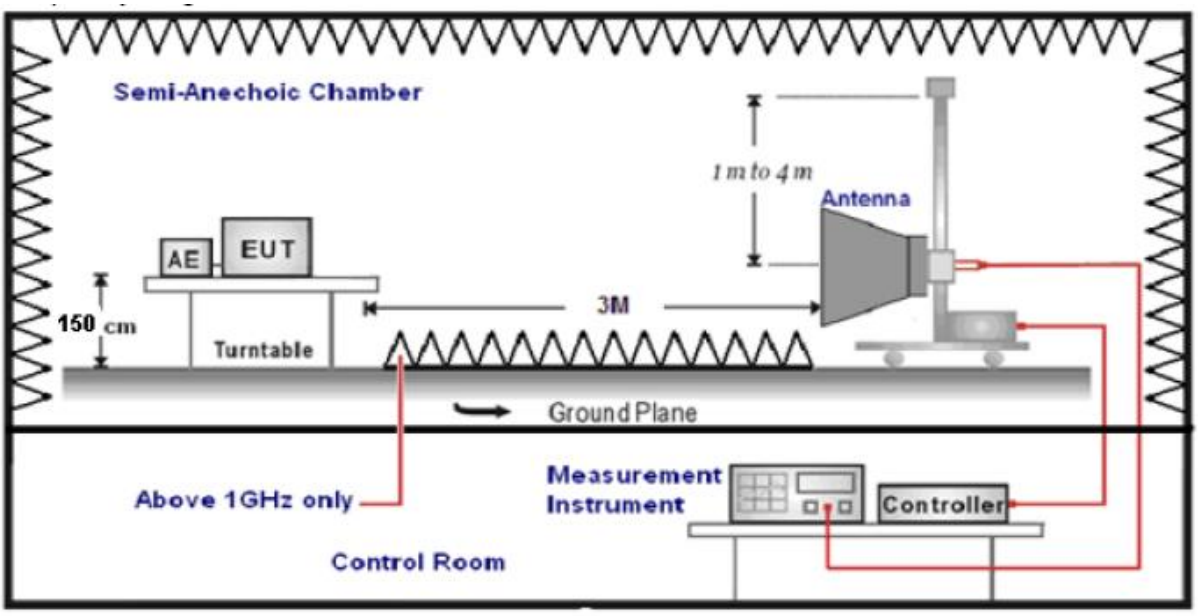
Frequency range 9 KHz – 30MHz



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. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so 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.

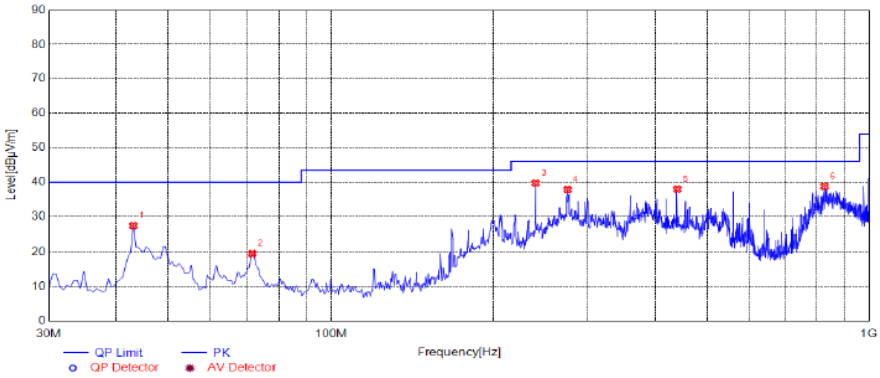
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

For 30MHz to 1000MHz

Horizontal

Test Graph



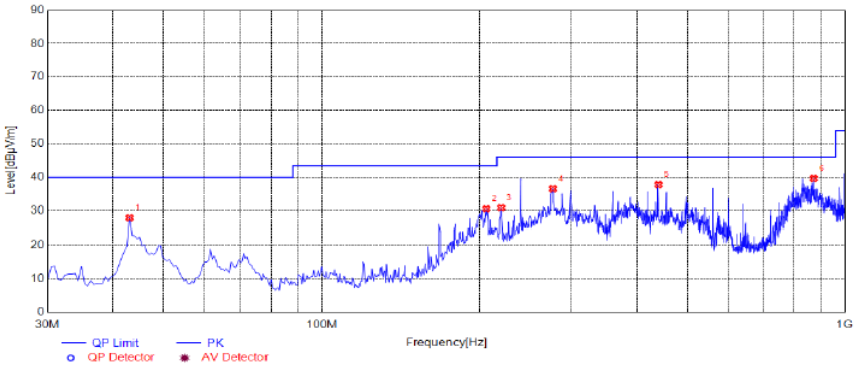
Suspected List											
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	43.1016	42.55	-15.21	27.34	40.00	12.66	100	210	PK	Horizonta	PASS
2	71.7309	38.87	-19.28	19.59	40.00	20.41	100	70	PK	Horizonta	PASS
3	240.1101	55.01	-15.31	39.70	46.00	6.30	100	110	PK	Horizonta	PASS
4	275.0475	52.31	-14.49	37.82	46.00	8.18	100	250	PK	Horizonta	PASS
5	440.0300	49.00	-11.06	37.94	46.00	8.06	100	180	PK	Horizonta	PASS
6	827.2536	42.99	-4.21	38.78	46.00	7.22	100	230	PK	Horizonta	PASS

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

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

Vertical

Test Graph



Suspected List											
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	43.1016	43.15	-15.21	27.94	40.00	12.06	100	290	PK	Vertical	PASS
2	206.1431	46.97	-16.38	30.59	43.50	12.91	100	20	PK	Vertical	PASS
3	220.2151	46.87	-15.96	30.91	46.00	15.09	100	210	PK	Vertical	PASS
4	276.5033	51.08	-14.49	36.59	46.00	9.41	100	360	PK	Vertical	PASS
5	440.0300	48.86	-11.06	37.80	46.00	8.20	100	50	PK	Vertical	PASS
6	871.8959	43.73	-4.08	39.65	46.00	6.35	100	170	PK	Vertical	PASS

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

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

For 1GHz to 25GHz

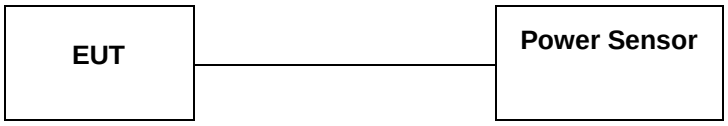
Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBµV)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
TX-2405									
4810	52.38	32.44	30.25	7.95	62.52	74.00	-11.48	Pk	Vertical
4810	39.34	32.44	30.25	7.95	49.48	54.00	-4.52	AV	Vertical
4810	53.48	32.44	30.25	7.95	63.62	74.00	-10.38	Pk	Horizontal
4810	41.44	32.44	30.25	7.95	51.58	54.00	-2.42	AV	Horizontal
TX-2440									
4880	50.47	32.52	30.31	8.12	60.80	74.00	-13.20	Pk	Vertical
4880	39.30	32.52	30.31	8.12	49.63	54.00	-4.37	AV	Vertical
4880	52.18	32.52	30.31	8.12	62.51	74.00	-11.49	Pk	Horizontal
4880	42.64	32.52	30.31	8.12	52.97	54.00	-1.03	AV	Horizontal
TX-2480									
4960	51.74	32.68	30.27	7.88	62.03	74.00	-11.97	Pk	Vertical
4960	39.08	32.68	30.27	7.88	49.37	54.00	-4.63	AV	Vertical
4960	48.79	32.68	30.27	7.88	59.08	74.00	-14.92	Pk	Horizontal
4960	38.15	32.68	30.27	7.88	48.44	54.00	-5.56	AV	Horizontal

REMARKS:

1. Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor
2. Margin value = Emission level-Limits
3. -- Mean the PK detector measured value is below average limit.
4. The other emission levels were very low against the limit.
5. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power,9.1.2.
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

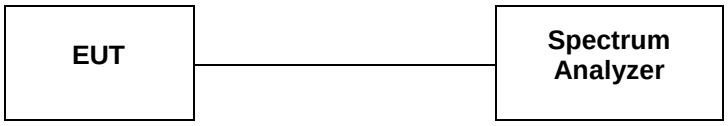
TEST RESULTS

Modulation	Channel	Peak Output power (dBm)	Limit (dBm)	Result
GFSK	0	22.10	30	Pass
	07	22.58		
	15	21.46		

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

4.4. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

1.Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2.Set the RBW =3 kHz.
3.Set the VBW =10 KHz.
4.Set the span to 1.5 times the DTS channel bandwidth.
5.Detector = peak.
6.Sweep time = auto couple.
7.Trace mode = max hold.
8.Allow trace to fully stabilize.
9.Use the peak marker function to determine the maximum power level.
10.If measured value exceeds limit,reduce RBW(no less than 3 kHz)and repeat.
11.The resulting peak PSD level must be 8 dBm.

LIMIT

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

Modulation	Channel	Power Spectral Density	Limit (dBm/3KHz)	Result
GFSK	0	4.97	8.00	Pass
	07	5.68		
	15	4.96		

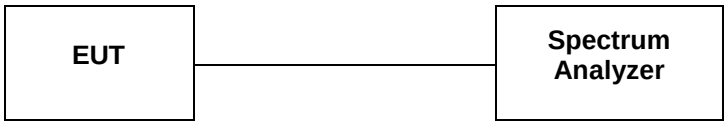
CH00

CH07

CH15

4.5. 6dB Bandwidth

TEST CONFIGURATION



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 RBW=100 KHz and VBW=300KHz.
The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.
According to KDB558074 D01 V03 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

LIMIT

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

TEST RESULTS

Modulation	Channel	6dB Bandwidth (KHz)	Limit (KHz)	Result
GFSK	0	712.0	≥500	Pass
	07	536.0		
	15	504.0		

CH00

CH07

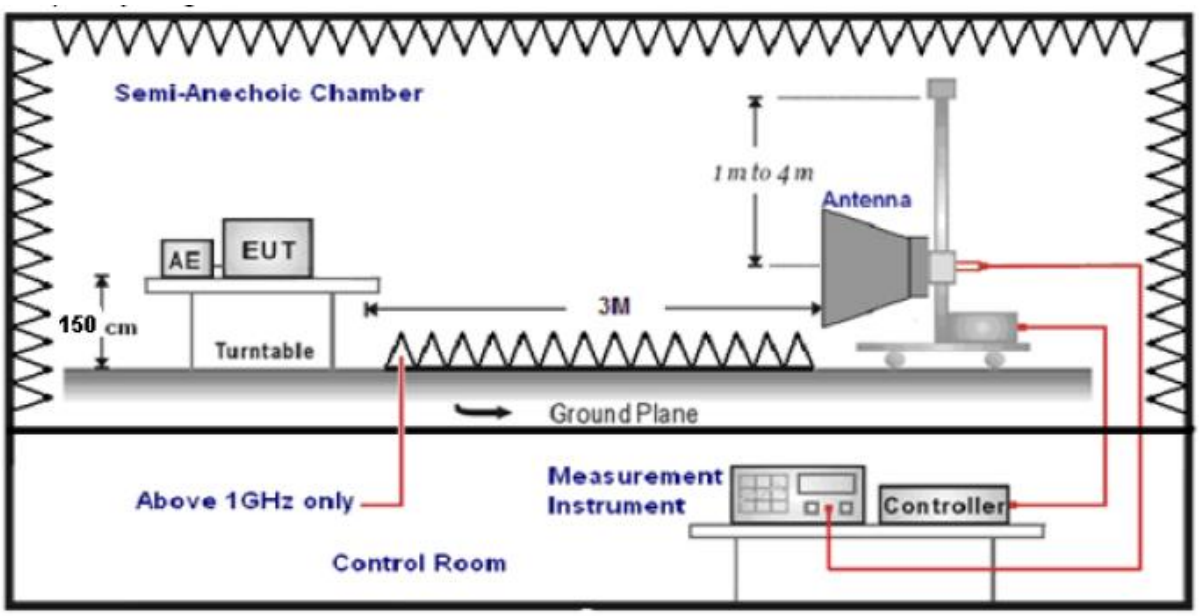
CH15

4.6. Band Edge Compliance of RF Emission

TEST REQUIREMENT

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)).

TEST CONFIGURATION



TEST PROCEDURE

1.The EUT was placed on a turn table which is 1.5m above ground plane.
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.The distance between test antenna and EUT was 3 meter:
6.Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

LIMIT

Below -20dB of the highest emission level in operating band.
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)

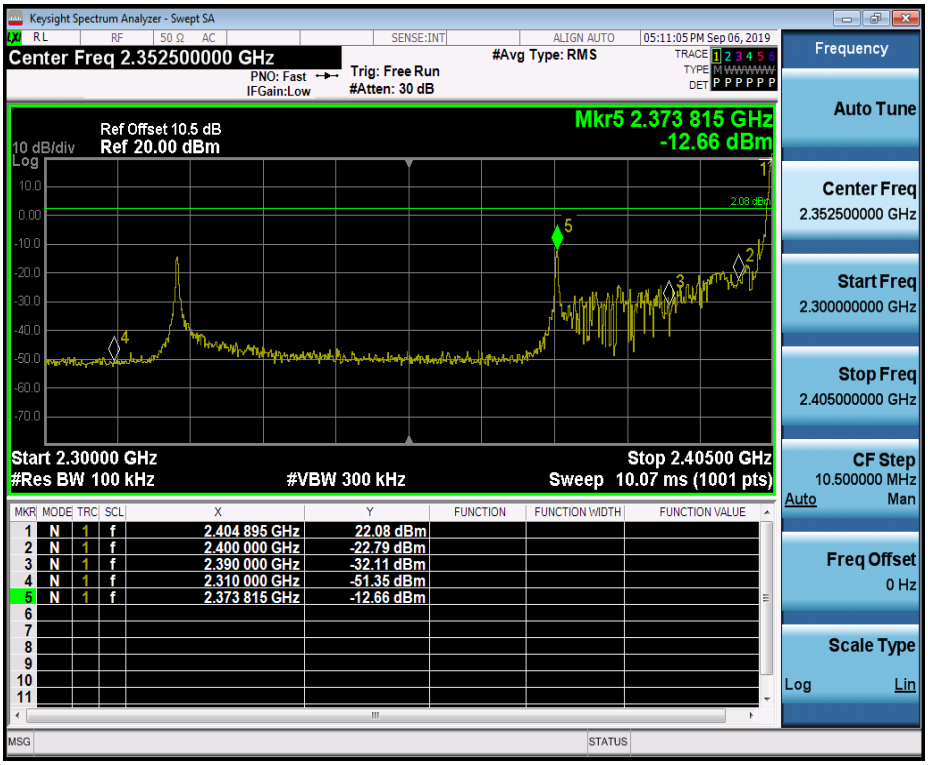
TEST RESULTS

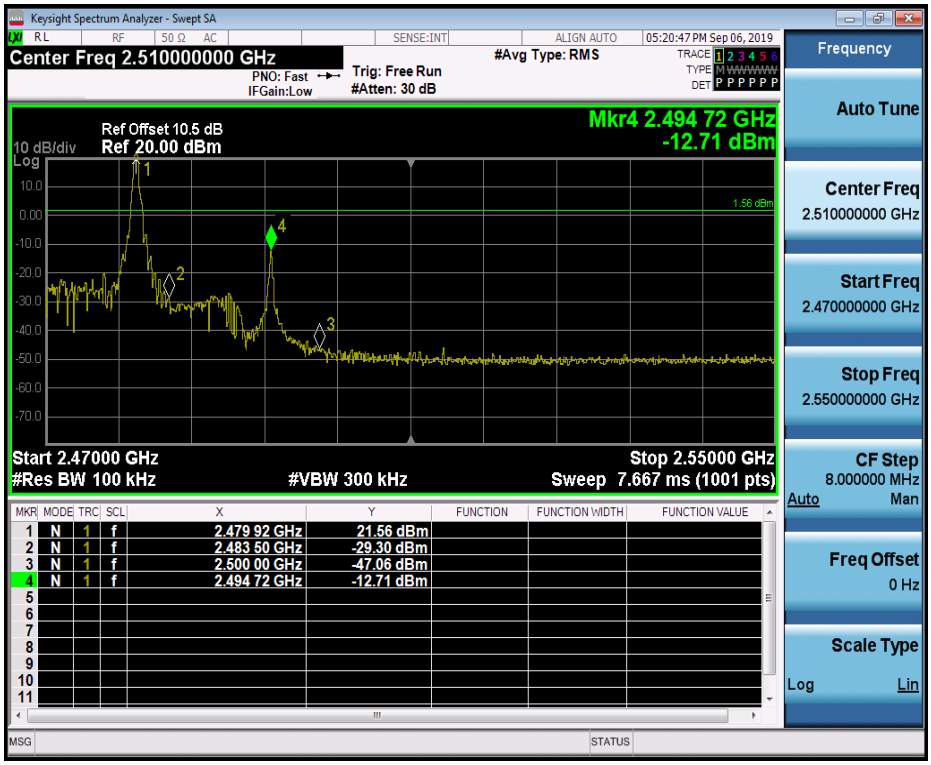
4.6.1 For Radiated Bandedge Measurement

Frequency(MHz):			2405			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2318.74	45.46	PK	74	-28.54	1	235	50.77	27.49	3.32	36.12	-5.31
2318.74	34.10	AV	54	-19.90	1	235	39.41	27.49	3.32	36.12	-5.31
2373.82	45.45	PK	74	-28.55	1	158	50.76	27.49	3.32	36.12	-5.31
2373.82	33.99	AV	54	-20.01	1	158	39.30	27.49	3.32	36.12	-5.31
2390.00	42.19	PK	74	31.81	1	149	47.50	27.49	3.32	36.12	-5.31
2390.00	26.49	AV	54	27.51	1	149	31.80	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2405**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2318.74	46.46	PK	74	-27.54	1	257	51.77	27.49	3.32	36.12	-5.31
2318.74	35.07	AV	54	-18.93	1	257	40.38	27.49	3.32	36.12	-5.31
2373.82	46.31	PK	74	-27.69	1	112	51.62	27.49	3.32	36.12	-5.31
2373.82	35.43	AV	54	-18.57	1	112	40.74	27.49	3.32	36.12	-5.31
2390.00	42.19	PK	74	31.81	1	87	47.50	27.49	3.32	36.12	-5.31
2390.00	26.49	AV	54	27.51	1	87	31.80	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2480**			**Polarity:**			**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	44.63	PK	74	29.37	1	110	49.98	27.45	3.38	36.55	-5.72
2483.50	29.20	AV	54	24.80	1	110	34.55	27.45	3.38	36.55	-5.72
2497.72	49.77	PK	74	-24.23	1	198	55.49	27.45	3.38	36.55	-5.72
2497.72	36.75	AV	54	-17.25	1	198	42.47	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2480**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2483.50	43.03	PK	74	30.97	1	215	48.38	27.45	3.38	36.55	-5.72
2483.50	28.90	AV	54	25.10	1	215	34.25	27.45	3.38	36.55	-5.72
2497.72	48.77	PK	74	-25.23	1	110	54.49	27.45	3.38	36.55	-5.72
2497.72	35.21	AV	54	-18.79	1	110	40.93	27.45	3.38	36.55	-5.72

NOTE:
Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor
Margin value = Limits-Emission level

4.6.2 For Conducted Bandedge Measurement





4.7. Antenna Requirement

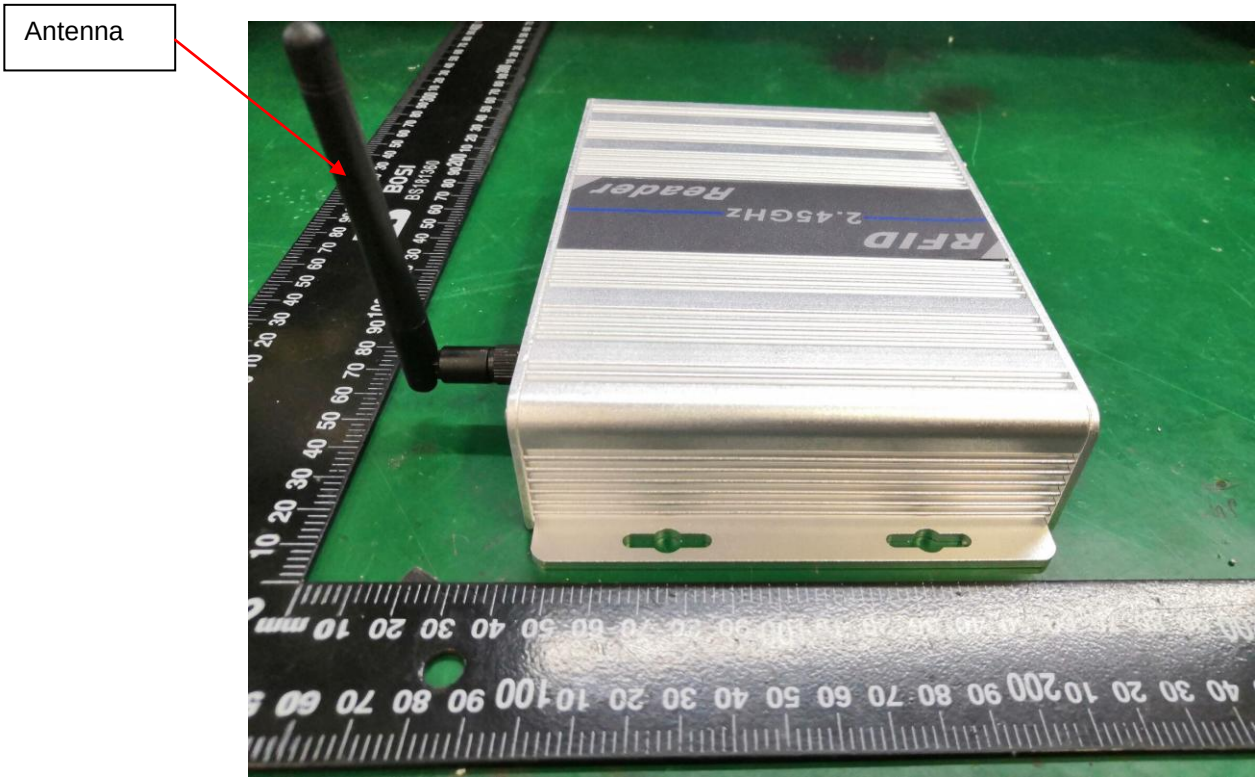
Standard Applicable

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.

Test Result

The antenna used for this product is External Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 2.0dBi.



5. Test Setup Photos of the EUT

Radiated Emission Test

Fig.1

Fig.2

Conducted Emission

Fig.3

6. External and Internal Photos of the EUT

Reference to the test report No. **External and Internal photos**

.

.....End of Report.....