FCC Part 15E Test Report

FCC ID:2AUG8-8320

Product Name:	FS SENSOR
Trademark:	FASTSENSOR
Model Name :	8320
Prepared For : Address :	GTI TECHNOLOGIES INC 1000 N WEST STREET, SUITE 1200, CITY WILMINGTON, DELAWARE, USA
Prepared By : Address :	Shenzhen BCTC Testing Co., Ltd. BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	Aug. 23, 2019 – Sep. 05, 2019
Date of Report :	Sep. 05, 2019
Report No.:	BCTC-LH190800944E

TEST RESULT CERTIFICATION

Applicant's name ..... :	GTI TECHNOLOGIES INC
Address ..... :	1000 N WEST STREET, SUITE 1200, CITY WILMINGTON, DELAWARE, USA
Manufacture's Name ..... :	GTI TECHNOLOGIES INC
Address ..... :	1000 N WEST STREET, SUITE 1200, CITY WILMINGTON, DELAWARE, USA
Product description	
Product name ..... :	FS SENSOR
Trademark ..... :	FASTSENSOR
Model and/or type reference .:	8320
Standards ..... :	FCC Part15 15.407 ANSI C63.10-2013 KDB 662911 D01 v02r01 KDB 789033 D02 v01r02

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Prepared by(Engineer):	Leke Xie	Leke Xie
Reviewer(Supervisor):	Eric Yang	Eric Yang
Approved(Manager):	Zero Zhou	Zero Zhou

Table of Contents

Page

1 . SUMMARY OF TEST RESULTS 6
1.1 TEST FACILITY 7
1.2 MEASUREMENT UNCERTAINTY 7
3 . EMC EMISSION TEST 14
3.1 CONDUCTED EMISSION MEASUREMENT 14
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS 14
3.1.2 TEST PROCEDURE 15
3.1.3 DEVIATION FROM TEST STANDARD 15
3.1.4 TEST SETUP 15
3.1.5 EUT OPERATING CONDITIONS 15
3.2 RADIATED EMISSION MEASUREMENT 18
3.2.1 APPLICABLE STANDARD 18
3.2.2 CONFORMANCE LIMIT 18
3.2.3 MEASURING INSTRUMENTS 18
3.2.4 TEST CONFIGURATION 19
3.2.5 TEST PROCEDURE 20
3.2.6 TEST RESULTS (9KHZ – 30 MHZ) 21
3.2.7 TEST RESULTS (30MHZ – 1GHZ) 22
3.2.8 TEST RESULTS (1GHZ-40GHZ) 24
4 . POWER SPECTRAL DENSITY TEST 25
4.1 APPLIED PROCEDURES / LIMIT 25
4.2 TEST PROCEDURE 26
4.3 DEVIATION FROM STANDARD 26
4.4 TEST SETUP 26
4.5 EUT OPERATION CONDITIONS 26
4.6 TEST RESULTS 27
5 . 6DB & 99% EMISSION BANDWIDTH 31
5.1 APPLIED PROCEDURES / LIMIT 31
5.2 TEST PROCEDURE 31
5.3 EUT OPERATION CONDITIONS 32
5.4 TEST RESULTS 33
5.5 PPLIED PROCEDURES / LIMIT 38
5.6 TEST PROCEDURE 38
5.7 DEVIATION FROM STANDARD 40
5.8 TEST SETUP 40
5.9 EUT OPERATION CONDITIONS 40

Table of Contents

Page

5.10 TEST RESULTS 41

6 . OUT OF BAND EMISSIONS 42
6.1 APPLICABLE STANDARD 42
6.2 TEST PROCEDURE 42
6.3 DEVIATION FROM STANDARD 42
6.4 TEST SETUP 42
6.5 EUT OPERATION CONDITIONS 42
6.6 TEST RESULTS 43

8.SPURIOUS RF CONDUCTED EMISSIONS 46
8.1CONFORMANCE LIMIT 46
8.2MEASURING INSTRUMENTS 46
8.3TEST SETUP 46
8.4TEST PROCEDURE 46
8.5TEST RESULTS 46

9. FREQUENCY STABILITY MEASUREMENT 53
9.1 LIMIT 53
9.2 TEST PROCEDURES 53
9.3 TEST SETUP LAYOUT 53
9.4 EUT OPERATION DURING TEST 53
9.5 TEST RESULTS 54

10. ANTENNA REQUIREMENT 57
10.1 STANDARD REQUIREMENT 57
10.2 EUT ANTENNA 57

11. EUT TEST PHOTO 58

12. EUT PHOTO 60

Revision History

Report No.	Version	Description	Issued Date
BCTC-LH190800944E	Rev.01	Initial issue of report	Sep. 05, 2019

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.209(a), 15.407 (b)(1) 15.407 (b)(4) 15.407 (b)(6)	Spurious Radiated Emissions	PASS	
15.207	Conducted Emission	PASS	
15.407 (a)(1) 15.407 (a)(3) 15.1049	26 dB and 99% Emission Bandwidth	PASS	
15.407(e)	Minimum 6 dB bandwidth	PASS	
15.407 (a)(1) 15.407 (a)(3)	Maximum Conducted Output Power	PASS	
2.1051, 15.407(b)(1) 15.407(b)(4)	Band Edge	PASS	
15.407 (a)(1) 15.407 (a)(3)	Power Spectral Density	PASS	
2.1051, 15.407(b)	Spurious Emissions at Antenna Terminals	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

Outsourcing: The 26G-40G Spurious Radiated Emissions in this test were outsourced to the Shenzhen Academy of Metrology & Quality Inspection

1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.
Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
FCC Test Firm Registration Number: 712850
IC Registered No.: 23583

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
3	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
4	Conducted Adjacent channel power	U=1.38dB
5	Conducted output power uncertainty Above 1G	U=1.576dB
6	Conducted output power uncertainty below 1G	U=1.28dB
7	humidity uncertainty	U=5.3%
8	Temperature uncertainty	U=0.59℃

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	FS SENSOR	
Trade Name	FASTSENSOR	
Model Name	8320	
Model Difference	N/A	
Product Description	IEEE 802.11 WLAN Mode Supported	☒802.11a/n/ac(20MHz channel bandwidth) ☒802.11n/ac(40MHz channel bandwidth) ☒802.11ac(80MHz channel bandwidth)
	Data Rate	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15; 802.11ac(VHT20): NSS1, MCS0-MCS8 802.11ac(VHT40/VHT80):NSS1, MCS0-MCS9
	Modulation	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac;
	Operating Frequency Range	☐5180-5240MHz for 802.11a/n(HT20)/ac20; 5190-5230MHz for 802.11n(HT40)/ac40; 5210MHz for 802.11 ac80; ☒5745-5825 MHz for 802.11a/n(HT20)/ac20; 5755-5795 MHz for 802.11a/n(HT40)/ac40; 5775MHz for 802.11 ac80;
	Number of Channels	☐4 channels for 802.11a/n20/ac20 in the 5180-5240MHz band ; 2 channels for 802.11 n40/ac40 in the 5190-5230MHz band ; 1 channels for 802.11 ac80 in the 5210MHz band ; ☒5 channels for 802.11a/n20/ac20 in the 5745-5825MHz band ; 2 channels for 802.11 n40/ac40 in the 5755-5795MHz band ; 1 channels for 802.11 ac80 in the 5775MHz band ;
	Antenna Type	Internal Antenna
	Antenna Gain	4.01dBi
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Channel List	Please refer to the Note 2.	
Ratings	DC 12V	
Adapter	MODEL: FS-PA120100 INPUT: 100-240V ~50/60Hz OUTPUT: 12V 1A	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Frequency and Channel list for 802.11a/n(20 MHz) band IV (5745-5825MHz):

802.11a/n/ac(20 MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	-	-	-	-	-	-

802.11n/ac 40MHz Carrier Frequency Channel					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795	-	-

802.11ac 80MHz Carrier Frequency Channel	
Channel	Frequency (MHz)
155	5775

Antenna A gain: 1dBi, Antenna B gain: 1dBi,
For MIMO mode for 802.11 n / ac, Directional gain=[10log(GA+ G B)] dbi =4.01dbi

Tx Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
A	N/A	N/A	Internal antenna	1	
B	N/A	N/A	Internal antenna	1	

2.2 DESCRIPTION OF TEST MODES

Pretest Mode	Description
Mode 1	802.11a /n/ ac 20 CH149/ CH157/ CH 165
Mode 2	802.11n/ ac40 CH 151 / CH 159
Mode 3	802.11 ac80 CH 155
Mode 4	802.11a /n/ ac 20 CH149/ CH157/ CH 165
Mode 5	Link Mode

Conducted Emission	
Final Test Mode	Description
Mode 5	Link Mode

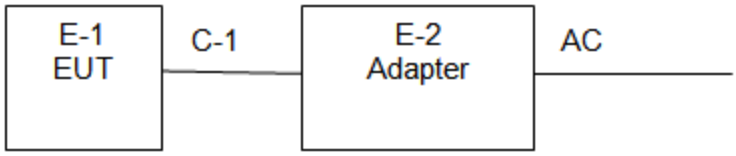
For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11a /n/ ac 20 CH149/ CH157/ CH 165
Mode 2	802.11n/ ac40 CH 151 / CH 159
Mode 3	802.11 ac80 CH 155
Mode 4	802.11a /n/ ac 20 CH149/ CH157/ CH 165

Note:

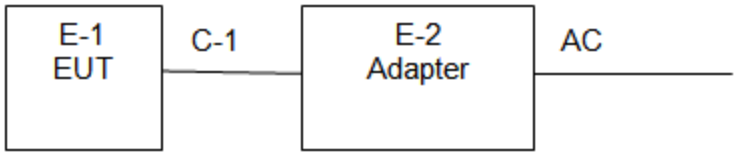
(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	FS SENSOR	FASTSENSOR	8320	N/A	EUT
E-2	Adapter	N/A	FS-PA120100	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1.2M	DC cableunshielded

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45109572	Jun. 13, 2019	Jun. 12, 2020
2	Test Receiver (9kHz-7GHz)	R&S	ESR7	101154	Jun. 13, 2019	Jun. 12, 2020
3	Bilog Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	VULB9163-942	Jun. 22, 2019	Jun. 21, 2020
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1541	Jun. 22, 2019	Jun. 21, 2020
5	Horn Antenna (18GHz-40GHz)	SCHWARZBECK	BBHA9170	822	Jun. 22, 2019	Jun. 21, 2020
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	Jun. 25, 2019	Jun. 24, 2020
7	Amplifier (0.5GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	Jun. 25, 2019	Jun. 24, 2020
8	Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	Jun. 17, 2019	Jun. 16, 2020
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	014	Jul. 02, 2019	Jul. 01, 2020
10	RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
11	RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	Jun. 25, 2019	Jun. 24, 2020
12	RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	Jun. 25, 2019	Jun. 24, 2020
13	Power Metter	Keysight	E4419	\	Jun. 17, 2019	Jun. 16, 2020
14	Power Sensor (AV)	Keysight	E9 300A	\	Jun. 17, 2019	Jun. 16, 2020
15	Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	Jun. 13, 2019	Jun. 12, 2020
16	Spectrum Analyzer 9kHz-40GHz	Aglient	FSP40	100363	Jun. 13, 2019	Jun. 12, 2020
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESR3	102075	Jun. 13, 2019	Jun. 12, 2020
2	LISN	SCHWARZBECK	NSLK8127	8127739	Jun. 13, 2019	Jun. 12, 2020
3	LISN	R&S	ENV216	101375	Jun. 13, 2019	Jun. 12, 2020
4	RF cables	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
5	Software	Frad	EZ-EMC	EMC-CON 3A1	\	\

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class B (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	FCC/ RSS-247
0.50 -5.0	56.00	46.00	FCC/ RSS-247
5.0 -30.0	60.00	50.00	FCC/ RSS-247

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

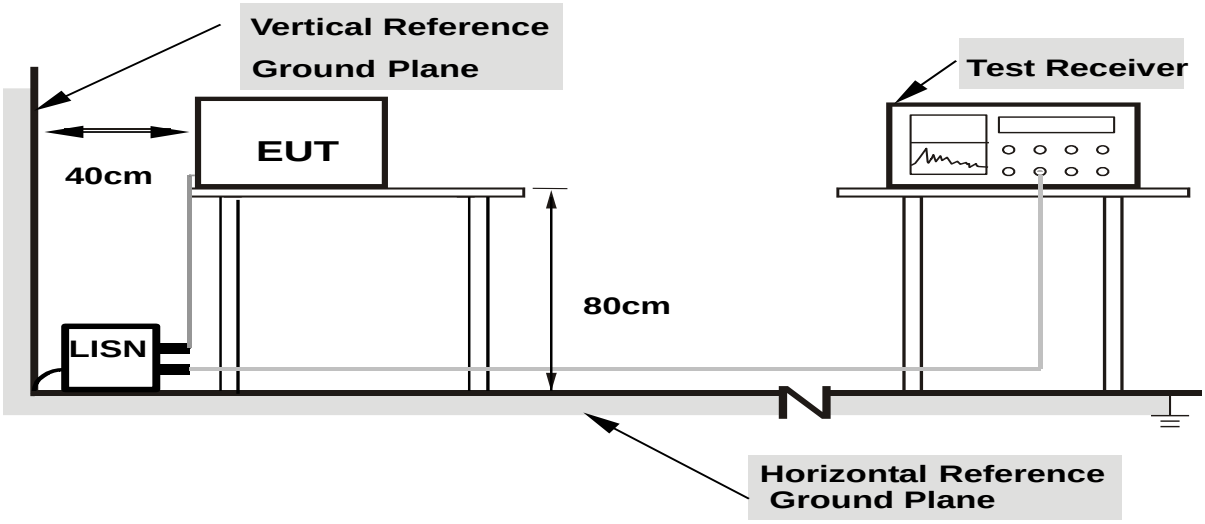
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP

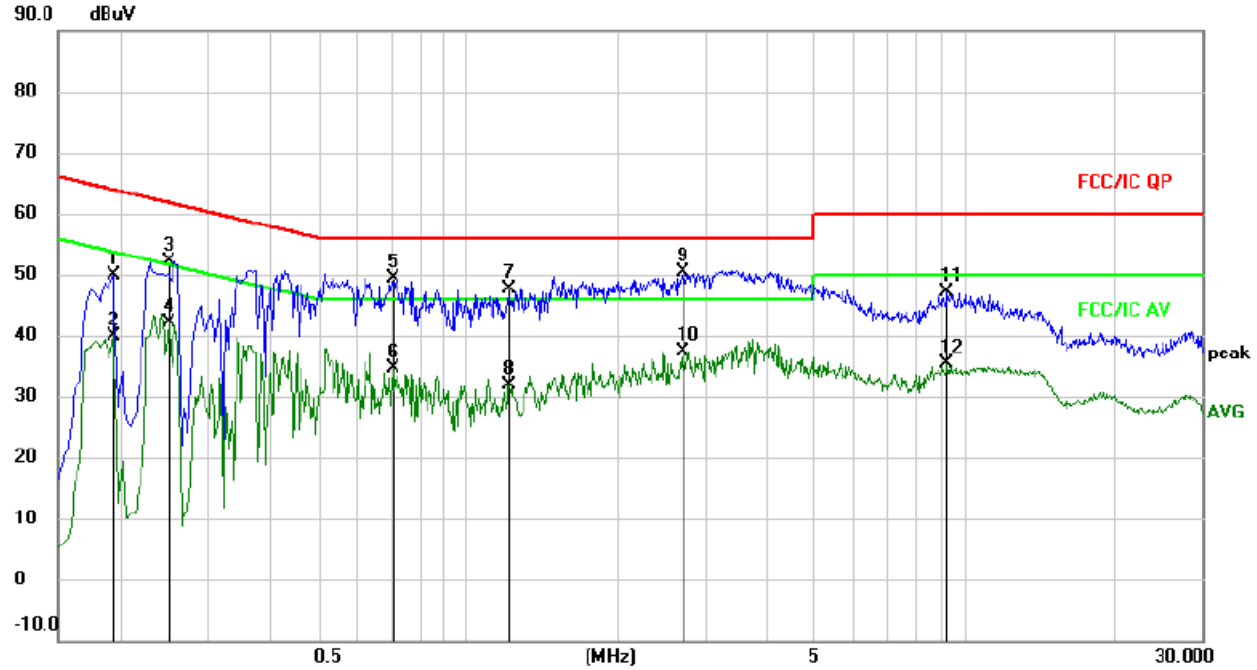


Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

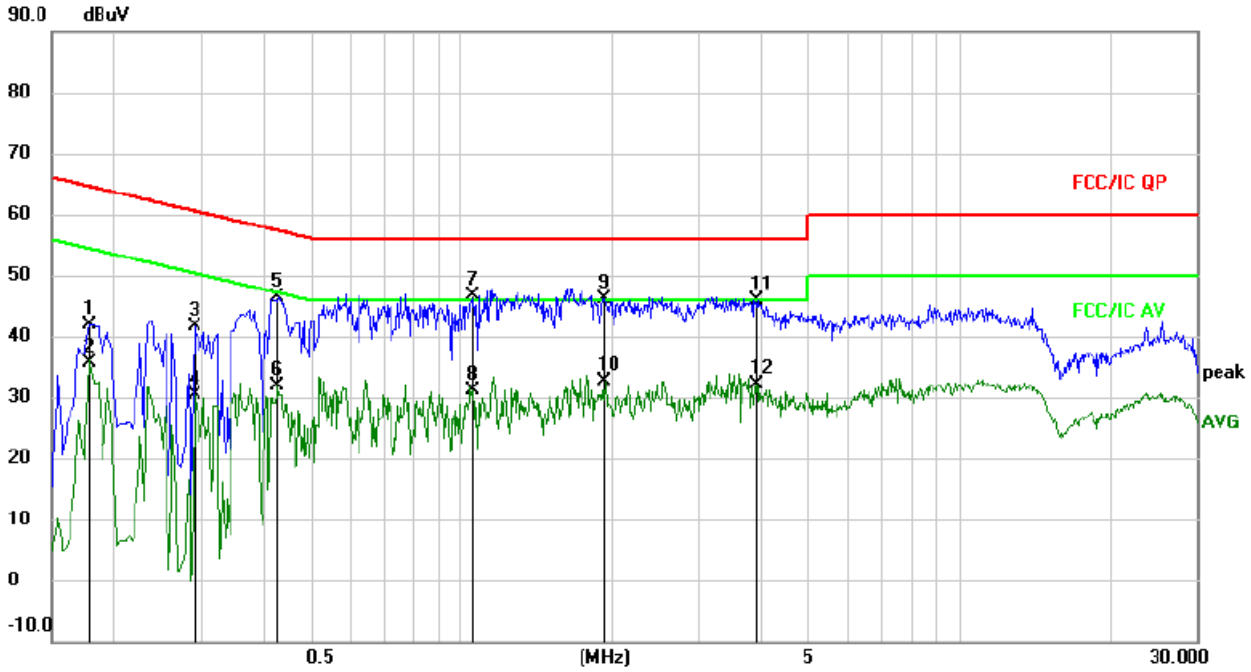
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	L
Test Voltage ：	AC120V 60Hz	Test Mode：	Mode 5



Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV		dBuV	dBuV	dB	Detector	Comment
1		0.1940	40.46	9.47	49.93	63.86	-13.93	QP	
2		0.1940	30.53	9.47	40.00	53.86	-13.86	AVG	
3		0.2500	42.63	9.52	52.15	61.76	-9.61	QP	
4		0.2500	32.51	9.52	42.03	51.76	-9.73	AVG	
5		0.7100	39.74	9.65	49.39	56.00	-6.61	QP	
6		0.7100	24.89	9.65	34.54	46.00	-11.46	AVG	
7		1.2100	38.03	9.57	47.60	56.00	-8.40	QP	
8		1.2100	22.38	9.57	31.95	46.00	-14.05	AVG	
9	*	2.7100	40.77	9.64	50.41	56.00	-5.59	QP	
10		2.7100	27.71	9.64	37.35	46.00	-8.65	AVG	
11		9.2340	37.44	9.70	47.14	60.00	-12.86	QP	
12		9.2340	25.58	9.70	35.28	50.00	-14.72	AVG	

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	N
Test Voltage ：	AC120V 60Hz	Test Mode：	Mode 5



Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV		dBuV	dBuV	dB	Detector	Comment
1		0.1780	32.47	9.49	41.96	64.58	-22.62	QP	
2		0.1780	26.02	9.49	35.51	54.58	-19.07	AVG	
3		0.2900	32.02	9.57	41.59	60.52	-18.93	QP	
4		0.2900	20.84	9.57	30.41	50.52	-20.11	AVG	
5		0.4260	36.89	9.52	46.41	57.33	-10.92	QP	
6		0.4260	22.36	9.52	31.88	47.33	-15.45	AVG	
7	*	1.0500	36.95	9.57	46.52	56.00	-9.48	QP	
8		1.0500	21.50	9.57	31.07	46.00	-14.93	AVG	
9		1.9340	36.60	9.59	46.19	56.00	-9.81	QP	
10		1.9340	23.07	9.59	32.66	46.00	-13.34	AVG	
11		3.9220	36.17	9.72	45.89	56.00	-10.11	QP	
12		3.9220	22.29	9.72	32.01	46.00	-13.99	AVG	

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): 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)).
According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	10.6-12.7
6.26775-6.26825	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	2690-2900	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	(2)
13.36-13.41			

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	2400/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

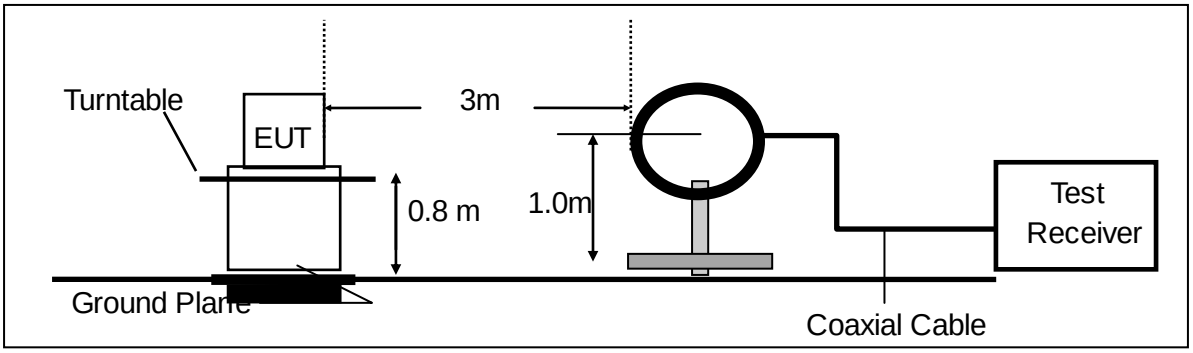
Remark :1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

3.2.3 MEASURING INSTRUMENTS

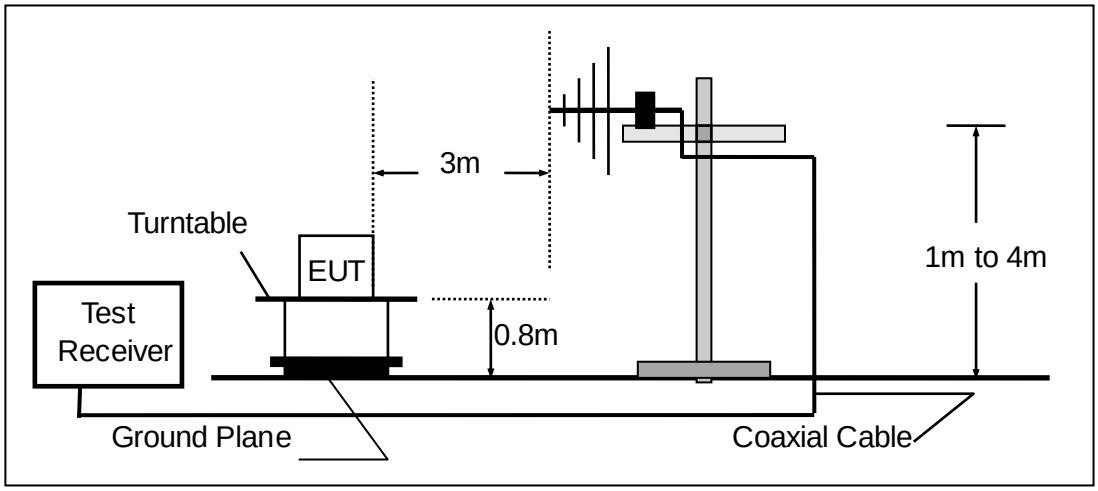
The Measuring equipment is listed in the section 6.3 of this test report.

3.2.4 TEST CONFIGURATION

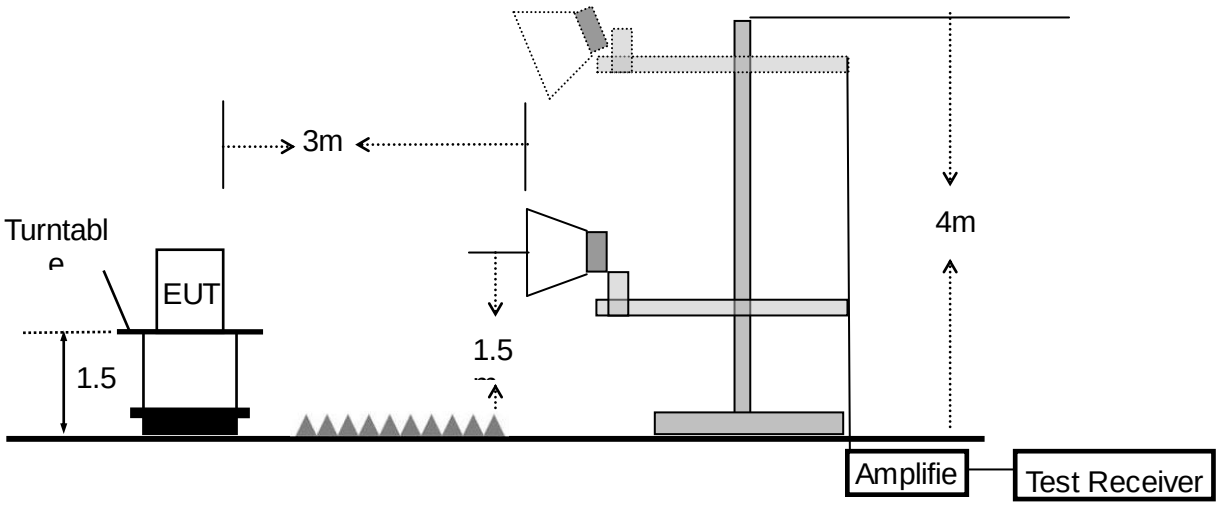
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



3.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

3.2.6 TEST RESULTS (9KHZ – 30 MHZ)

Temperature:	26℃	Relative Humidtity:	54%
Pressure:	101kPa	Test Voltage ：	DC12V
Test Mode ：	Mode 5	Polarization :	--

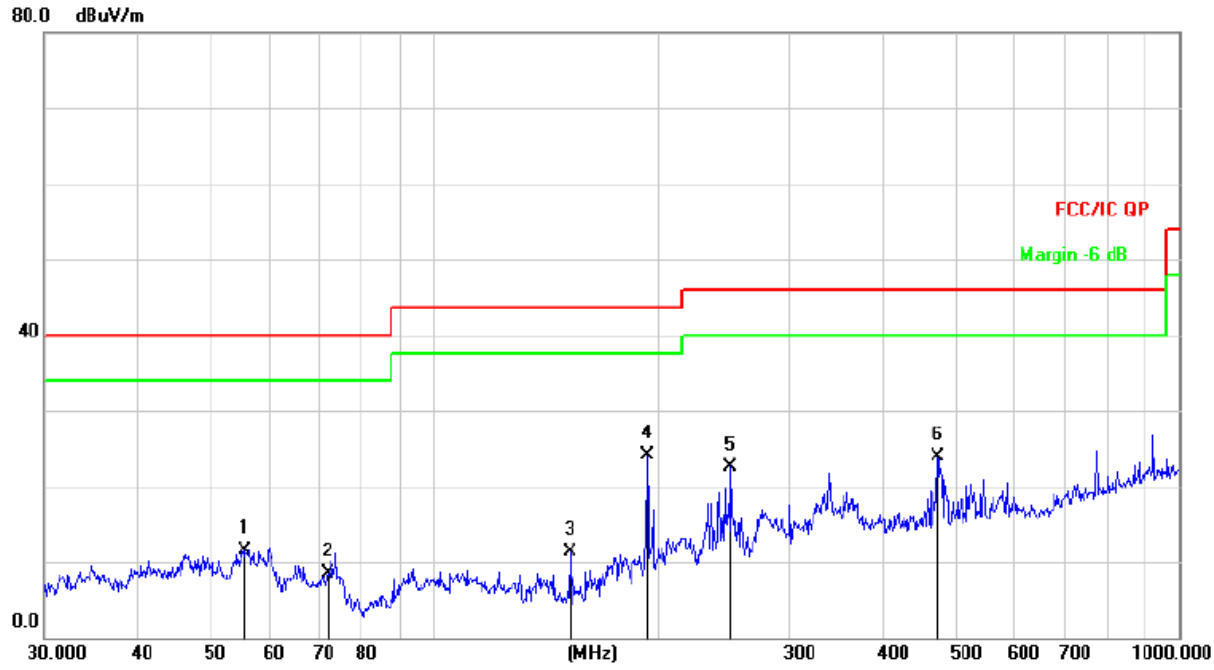
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (30MHZ – 1GHZ)

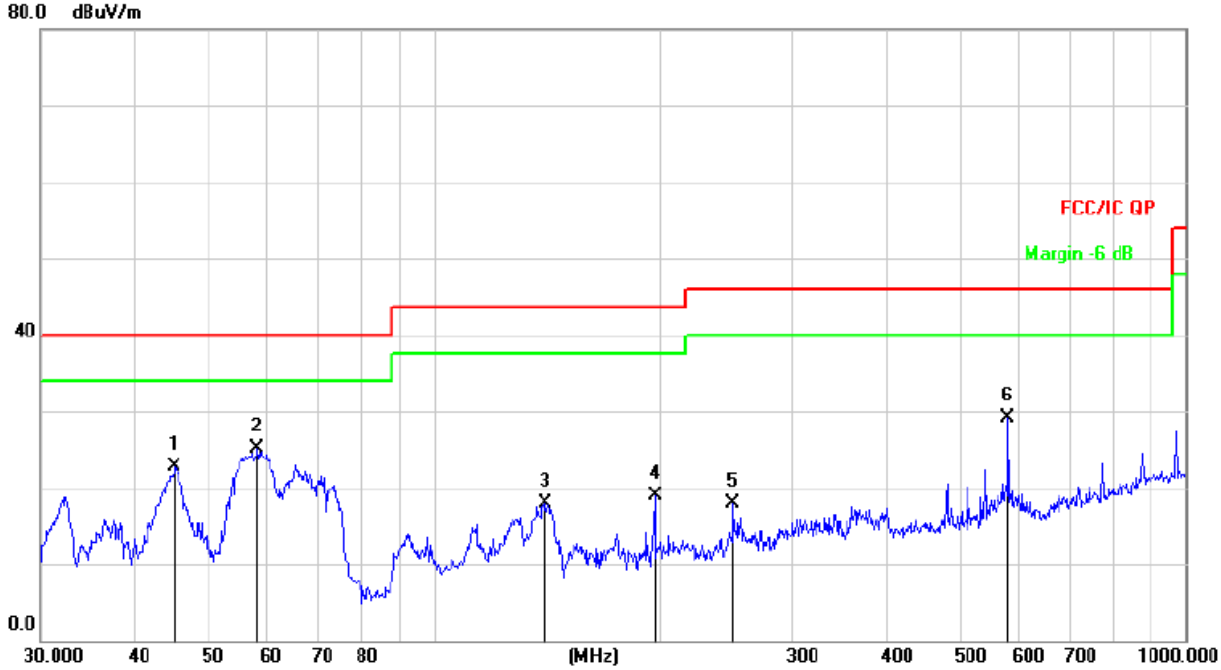
Temperature：	26℃	Relative Humidity：	54%
Pressure：	101 kPa	Polarization：	Horizontal
Test Voltage ：	DC 12V		
Test Mode ：	Mode 5		



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		55.8047	26.92	-15.47	11.45	40.00	-28.55	QP
2		72.0843	27.07	-18.65	8.42	40.00	-31.58	QP
3		152.1297	30.69	-19.36	11.33	43.50	-32.17	QP
4	*	193.0945	40.76	-16.74	24.02	43.50	-19.48	QP
5		250.3012	37.56	-15.14	22.42	46.00	-23.58	QP
6		473.8347	33.40	-9.48	23.92	46.00	-22.08	QP

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Polarization：	Vertical
Test Voltage ：	DC 12V		
Test Mode ：	Mode 5		



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		45.2166	37.75	-15.12	22.63	40.00	-17.37	QP
2	*	58.2030	40.92	-15.72	25.20	40.00	-14.80	QP
3		140.3421	36.78	-18.88	17.90	43.50	-25.60	QP
4		196.5098	35.36	-16.52	18.84	43.50	-24.66	QP
5		250.3012	33.04	-15.14	17.90	46.00	-28.10	QP
6		580.7026	36.09	-6.97	29.12	46.00	-16.88	QP

3.2.8 TEST RESULTS (1GHz-40GHz)

Test Mode :	TX (5.8G) -- 802.11a

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G									
Vertical	4679.195	59.95	5.94	35.40	44.00	57.29	74.00	-16.71	Pk
Vertical	4679.195	39.67	5.94	35.40	44.00	37.01	54.00	-16.99	AV
Vertical	11490.364	59.53	8.46	39.75	44.50	63.24	74.00	-10.76	Pk
Vertical	11490.364	42.16	8.46	39.75	44.50	45.87	54.00	-8.13	AV
Vertical	17235.101	55.53	10.12	38.80	44.10	60.35	74.00	-13.65	Pk
Vertical	17235.101	38.63	10.12	38.80	42.70	44.85	54.00	-9.15	AV
Horizontal	4679.332	57.96	5.94	35.18	44.00	55.08	74.00	-18.92	Pk
Horizontal	4679.332	44.51	5.94	35.18	44.00	41.63	54.00	-12.37	AV
Horizontal	11490.164	56.67	8.46	38.71	44.50	59.34	74.00	-14.66	Pk
Horizontal	11490.164	40.13	8.46	38.71	44.50	42.8	54.00	-11.2	AV
Horizontal	17235.196	58.67	10.12	38.38	44.10	63.07	74.00	-10.93	Pk
Horizontal	17235.196	42.23	10.12	38.38	44.10	46.63	54.00	-7.37	AV
middle Channel (5785 MHz)-Above 1G									
Vertical	4592.228	59.85	6.48	36.35	44.05	58.63	74.00	-15.37	Pk
Vertical	4592.228	43.32	6.48	36.35	44.05	42.1	54.00	-11.9	AV
Vertical	11570.203	61.17	8.47	37.88	44.51	63.01	74.00	-10.99	Pk
Vertical	11570.203	43.22	8.47	37.88	44.51	45.06	54.00	-8.94	AV
Vertical	17355.147	59.55	10.12	38.8	44.10	64.37	74.00	-9.63	Pk
Vertical	17355.147	42.21	10.12	38.8	42.70	48.43	54.00	-5.57	AV
Horizontal	4592.526	58.63	6.48	36.37	44.05	57.43	74.00	-16.57	Pk
Horizontal	4592.526	43.38	6.48	36.37	44.05	42.18	54.00	-11.82	AV
Horizontal	11570.123	60.01	8.47	38.64	44.50	62.62	74.00	-11.38	Pk
Horizontal	11570.123	42.27	8.47	38.64	44.50	44.88	54.00	-9.12	AV
Horizontal	17355.269	57.53	10.12	38.38	44.10	61.93	74.00	-12.07	Pk
Horizontal	17355.269	42.28	10.12	38.38	44.10	46.68	54.00	-7.32	AV
High Channel (5825 MHz)-Above 1G									
Vertical	6039.199	57.62	7.10	37.24	43.50	58.46	74.00	-15.54	Pk
Vertical	6039.199	42.27	7.10	37.24	43.50	43.11	54.00	-10.89	AV
Vertical	11652.562	58.93	8.46	37.68	44.50	60.57	74.00	-13.43	Pk
Vertical	11652.562	41.16	8.46	37.68	44.50	42.8	54.00	-11.2	AV
Vertical	17473.128	58.53	10.12	38.8	44.10	63.35	74.00	-10.65	Pk
Vertical	17473.128	40.38	10.12	38.8	42.70	46.6	54.00	-7.4	AV
Horizontal	6039.232	59.94	7.10	37.24	43.50	60.78	74.00	-13.22	Pk
Horizontal	6039.232	43.36	7.10	37.24	43.50	44.2	54.00	-9.8	AV
Horizontal	11652.319	52.23	8.46	38.57	44.50	54.76	74.00	-19.24	Pk
Horizontal	11652.319	40.13	8.46	38.57	44.50	42.66	54.00	-11.34	AV
Horizontal	17474.062	57.72	10.12	38.38	44.10	62.12	74.00	-11.88	Pk
Horizontal	17474.062	40.33	10.12	38.38	44.10	44.73	54.00	-9.27	AV

Note:"802.11a(5G)" mode is the worst mode. PK value is lower than the Average value limit, So average didn't record.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value

has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(3)

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz

(3)For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

,

4.2 TEST PROCEDURE

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

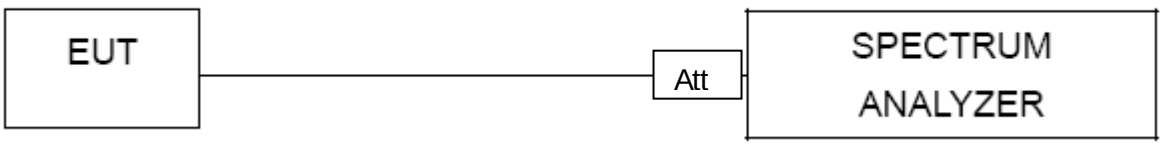
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.6 TEST RESULTS

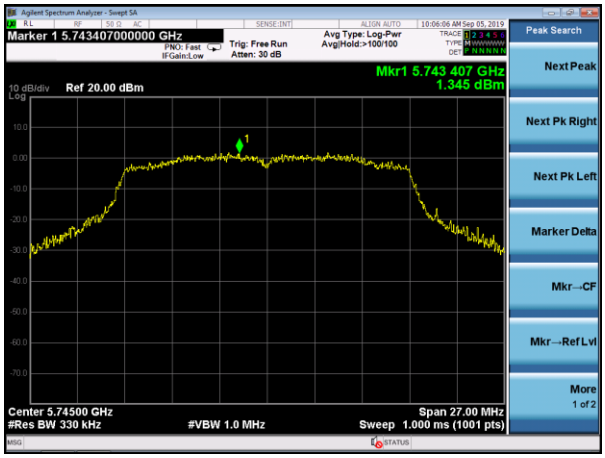
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 12V
Test Mode ：	TX Frequency Band Ⅳ (5745-5825MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna B ,only shown Antenna B Plot.

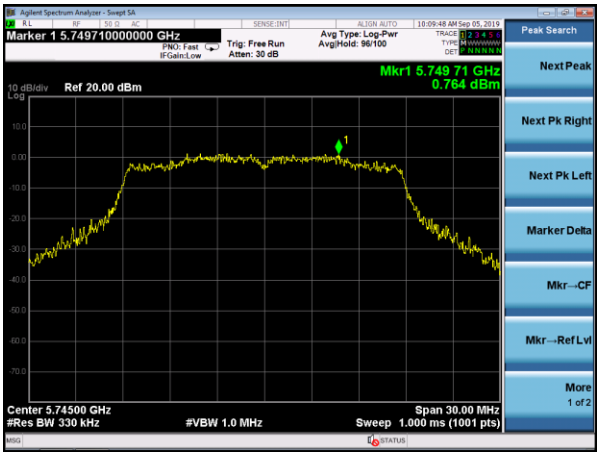
Antenna A gain: 1dBi, Antenna B gain: 1dBi, Directional gain=[10log(GA+ G B)] dbi =4.01dbi

Mode	Frequency	Measured Power Density (dBm)			Limit (dBm)	Result
		ANT A	ANT B	Total		
802.11 a	5745 MHz	0.899	1.345	/	30	PASS
	5785 MHz	1.700	1.740	/	30	PASS
	5825 MHz	1.285	1.449	/	30	PASS
802.11 n20	5745 MHz	1.550	0.764	4.19	30	PASS
	5785 MHz	1.950	1.894	4.93	30	PASS
	5825 MHz	0.026	1.053	3.58	30	PASS
802.11 n40	5755 MHz	2.079	1.534	4.83	30	PASS
	5795 MHz	1.932	1.899	4.93	30	PASS
802.11 AC20	5745 MHz	1.246	1.240	4.25	30	PASS
	5785 MHz	1.112	0.115	3.65	30	PASS
	5825 MHz	1.487	1.023	4.27	30	PASS
802.11 AC40	5755 MHz	2.464	2.302	5.39	30	PASS
	5795 MHz	2.278	1.899	5.10	30	PASS
802.11 AC80	5775 MHz	-0.359	-0.709	2.48	30	PASS

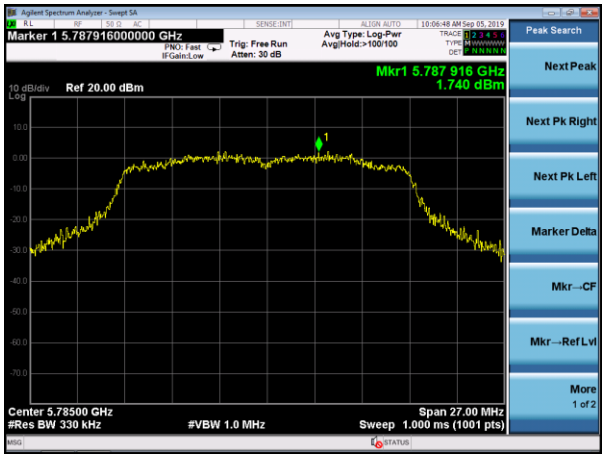
(802.11a) PSD plot on channel 149



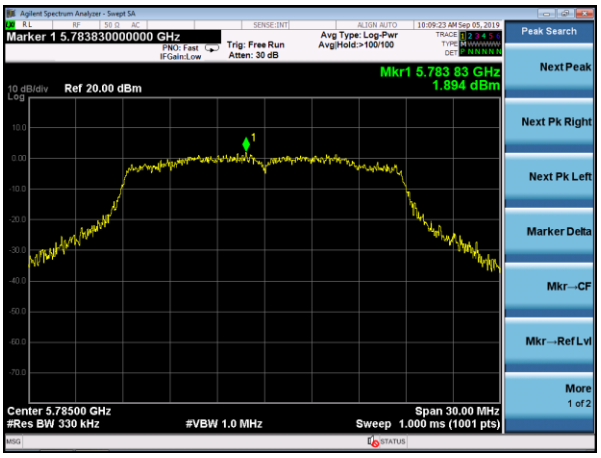
(802.11n20) PSD plot on channel 149



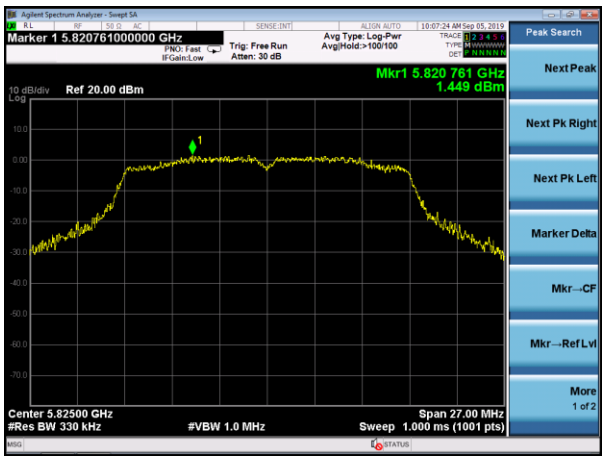
(802.11a) PSD plot on channel 157



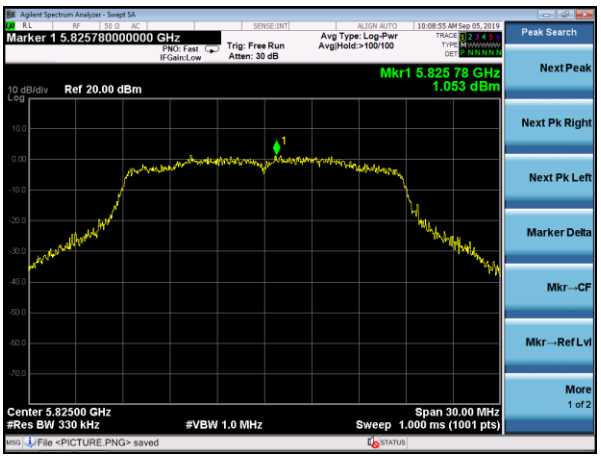
(802.11n20) PSD plot on channel 157



(802.11a) PSD plot on channel 165

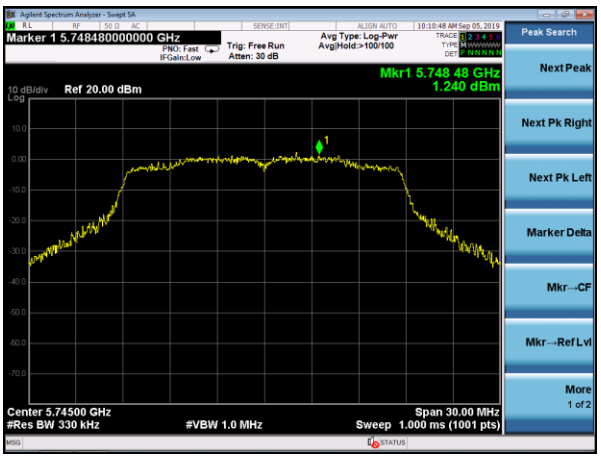


(802.11n20) PSD plot on channel 165



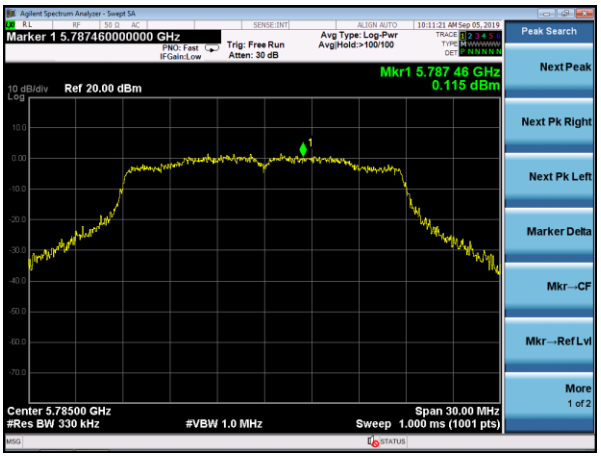
(802.11n40) PSD plot on channel 151

(802.11ac20) PSD plot on channel 149

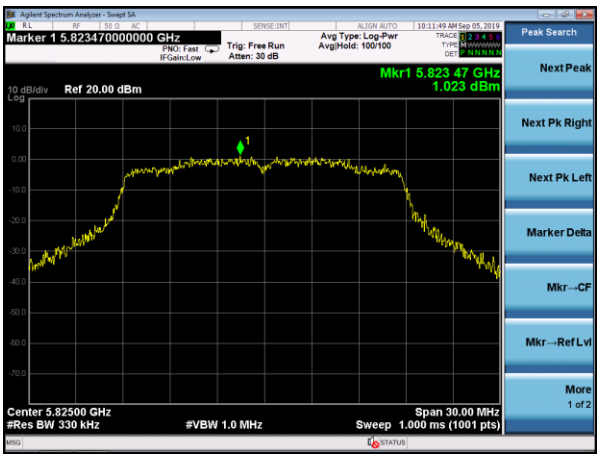


(802.11n40) PSD plot on channel 159

(802.11ac20) PSD plot on channel 157



(802.11ac20) PSD plot on channel 165



(802.11ac40) PSD plot on channel 151

(802.11ac80) PSD plot on channel 155

(802.11ac40) PSD plot on channel 159