RADIO TEST REPORT

Report No:STS1906072W08

Issued for

eInfochips Inc

2025 Gateway Place Suite 270, San Jose, Ca 95110, USA

Product Name:	Eragon™ 624
Brand Name:	Eragon™ 624
Model Name:	Eragon™ 624 SOM
Series Model:	EIC-Q624-300
FCC ID:	2ATUP-Q624300
IC：	25301-Q624300
Test Standard:	FCC Part 15.247
	RSS-247 Issue 2, February 2017

Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

TEST RESULT CERTIFICATION

Applicant's Name.....:	eInfochips Inc
Address .....:	2025 Gateway Place Suite 270, San Jose, Ca 95110, USA
Manufacture's Name.....:	eInfochips Inc
Address .....:	2025 Gateway Place Suite 270, San Jose, Ca 95110, USA
Product Description	
Product Name.....:	Eragon™ 624
Brand Name .....:	Eragon™ 624
Model Name .....:	Eragon™ 624 SOM
Series Model.....:	EIC-Q624-300
Test Standards.....:	FCC Part15.247
	RSS-247 Issue 2, February 2017
Test Procedure .....:	ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC/IC requirements. And it is applicable only to the tested sample identified in the report.
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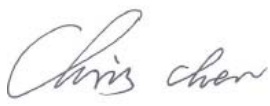
Date of Test.....:	
Date (s) of performance of tests .....:	24 July 2019 ~ 12 Oct. 2019
Date of Issue.....:	12 Oct. 2019
Test Result.....:	**Pass**

Testing Engineer : 

(Chris Chen)

Technical Manager : 

(Sunday Hu)

Authorized Signatory : 

(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	12 Oct. 2019	STS1906072W08	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02

FCC Part 15.247,Subpart C RSS-247 Issue 2			
Standard Section	Test Item	Judgment	Remark
15.207 RSS-Gen Issue 5, Amendment 1, March 2019	Conducted Emission	PASS	--
15.247 (a)(2)	6dB Bandwidth	PASS	--
RSS-GEN clause 6.7	99% Bandwidth	PASS	--
15.247 (b)(3) RSS-247 Issue 2, February 2017 (5.4)	Output Power	PASS	--
15.247 (d) RSS-247 Issue 2, February 2017 (5.5)	Radiated Spurious Emission	PASS	--
15.247 (d) RSS-247 Issue 2, February 2017 (5.5)	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e) RSS-247 Issue 2, February 2017	Power Spectral Density	PASS	--
15.205 RSS-Gen Issue 5, Amendment 1, March 2019	Restricted frequency bands	PASS	--
Part 15.247(d)/part 15.209(a) RSS-247 Issue 2, February 2017	Band Edge Emission	PASS	--
15.203 RSS-Gen Issue 5, Amendment 1, March 2019	Antenna Requirement	PASS	--
RSS-Gen Issue 5, Amendment 1, March 2019	Frequency Stability	PASS	--

NOTE:

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

(2) All tests are according to ANSI C63.10-2013

1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD
Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China
FCC test Firm Registration Number: 625569
IC test Firm Registration Number: 12108A
A2LA Certificate No.: 4338.01

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	RF output power, conducted	±0.71dB
2	Unwanted Emissions, conducted	±0.63dB
3	All emissions, radiated 30-200MHz	±3.43dB
4	All emissions, radiated 200MHz-1GHz	±3.57dB
5	All emissions, radiated>1G	±4.13dB
6	Conducted Emission (9KHz-150KHz)	±3.18dB
7	Conducted Emission (150KHz-30MHz)	±2.70dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Eragon™ 624
Trade Name	Eragon™ 624
Model Name	Eragon™ 624 SOM
Series Model	EIC-Q624-300
Model Difference	Only different in model name.
Product Description	The EUT is a Eragon™ 624 Operation Frequency: 2402~2480 MHz Modulation Type: GFSK Radio Technology: BLE Bluetooth Version: 4.2 Bluetooth Configuration: LE Number Of Channel: 40 Antenna Designation: Please see Note 3. Antenna Gain (dBi) 1.5 dBi
Channel List	Please refer to the Note 2.
Adapter	Input: AC 100-240V, 1500mA, 50/60Hz Output: DC 12V, 3000 mA
Power Rating	Input: 3.8V --- 6.67A (As the 3.8V supply is coming from Carrier Board.)
Hardware version number	SOM: Rev 1.2
Software version number	AND.8.1.0_EI.1.2.0
Radio Hardware Version of Test Equipment	MPLY.LR9.W1444,MD.LWTG.MP.V79.P4
Radio Software Version of Test Equipment	SC6531_W13.04.05_Release
Test Software	3.18.19
RF Power Setting TEST Software (power class)	(1)2.4 GHz:GFSK(1Mbps):-6.5
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.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	10	2422	20	2442	30	2462
01	2404	11	2424	21	2444	31	2464
02	2406	12	2426	22	2446	32	2466
03	2408	13	2428	23	2448	33	2468
04	2410	14	2430	24	2450	34	2470
05	2412	15	2432	25	2452	35	2472
06	2414	16	2434	26	2454	36	2474
07	2416	17	2436	27	2456	37	2476
08	2418	18	2438	28	2458	38	2478
09	2420	19	2440	29	2460	39	2480

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	Eragon™ 624	Eragon™ 624 SOM	Ceramic	N/A	1.5 dBi	BLE ANT.

2.2 DESCRIPTION OF THE TEST MODES

For conducted test items and radiated spurious emissions
Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

Worst Mode	Description	Data/Modulation
Mode 1	TX CH00(2402MHz)	1 MHz/GFSK
Mode 2	TX CH19(2440MHz)	1 MHz/GFSK
Mode 3	TX CH39(2480MHz)	1 MHz/GFSK

Note:

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

(2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report

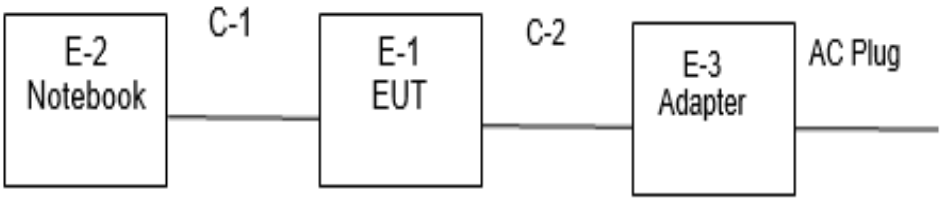
(3) Controlled using a bespoke application on the laptop PC supplied by the customer. The application was used to enable a continuous transmission mode and to select the test channels, data rates and modulation schemes as required.

For AC Conducted Emission

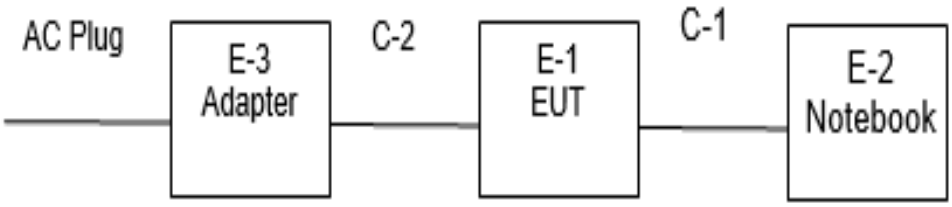
Test Case	
AC Conducted Emission	Mode 4 : Keeping BT TX

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Emission Test



2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-3	Adapter	N/A	YHY-12003000	N/A	N/A
E-2	DC Cable	N/A	110cm	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	DELL	3480	N/A	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A

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.

(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.5 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2019.07.29	2020.07.28
Signal Analyzer	Agilent	N9020A	MY51110105	2019.03.02	2020.03.01
Active loop Antenna	ZHINAN	ZN30900C	16035	2018.03.11	2021.03.10
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.1
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2021.03.10
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2018.10.13, 2019.10.09	2019.10.12, 2020.10.08
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2018.10.13, 2019.10.09	2019.10.12, 2020.10.08
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11, 2019.10.09	2019.10.10, 2020.10.08
turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)			

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2019.07.29	2020.07.28
LISN	R&S	ENV216	101242	2018.10.11, 2019.10.09	2019.10.10, 2020.10.08
LISN	EMCO	3810/2NM	23625	2018.10.11, 2019.10.09	2019.10.10, 2020.10.08
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11, 2019.10.09	2019.10.10, 2020.10.08
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 CE)			

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2018.10.13, 2019.10.09	2019.10.12, 2020.10.08
Signal Analyzer	Agilent	N9020A	MY49100060	2018.10.13, 2019.10.09	2019.10.12, 2020.10.08
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11, 2019.10.09	2019.10.10, 2020.10.08
Test SW	FARAD	LZ-RF /LzRf-3A3			

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) and RSS-Gen Issue 5 limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

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.

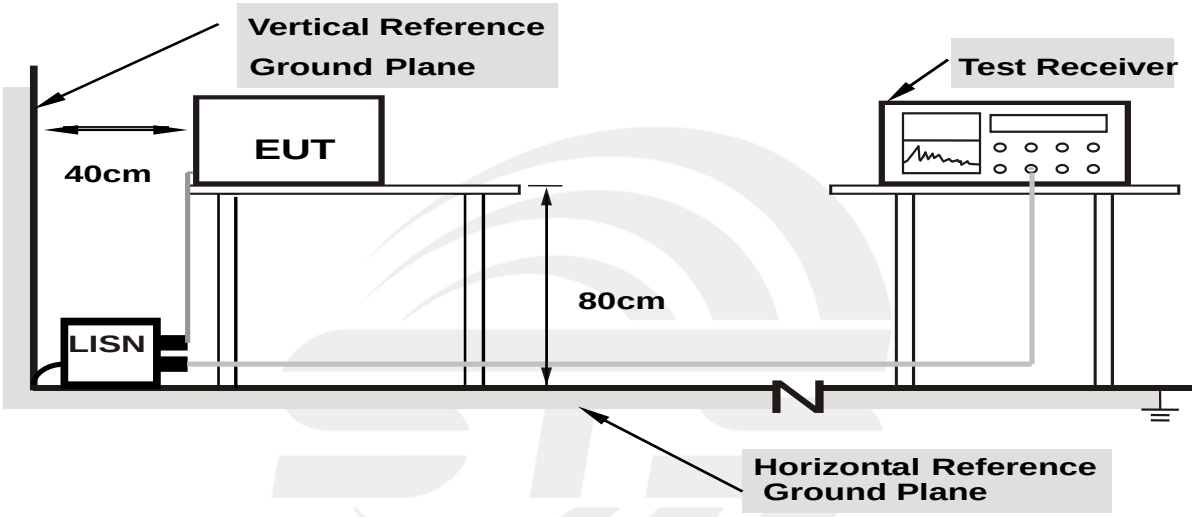
The following table is the setting of the receiver

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

3.2 TEST PROCEDURE

a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical 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.

3.3 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

3.4 EUT OPERATING CONDITIONS

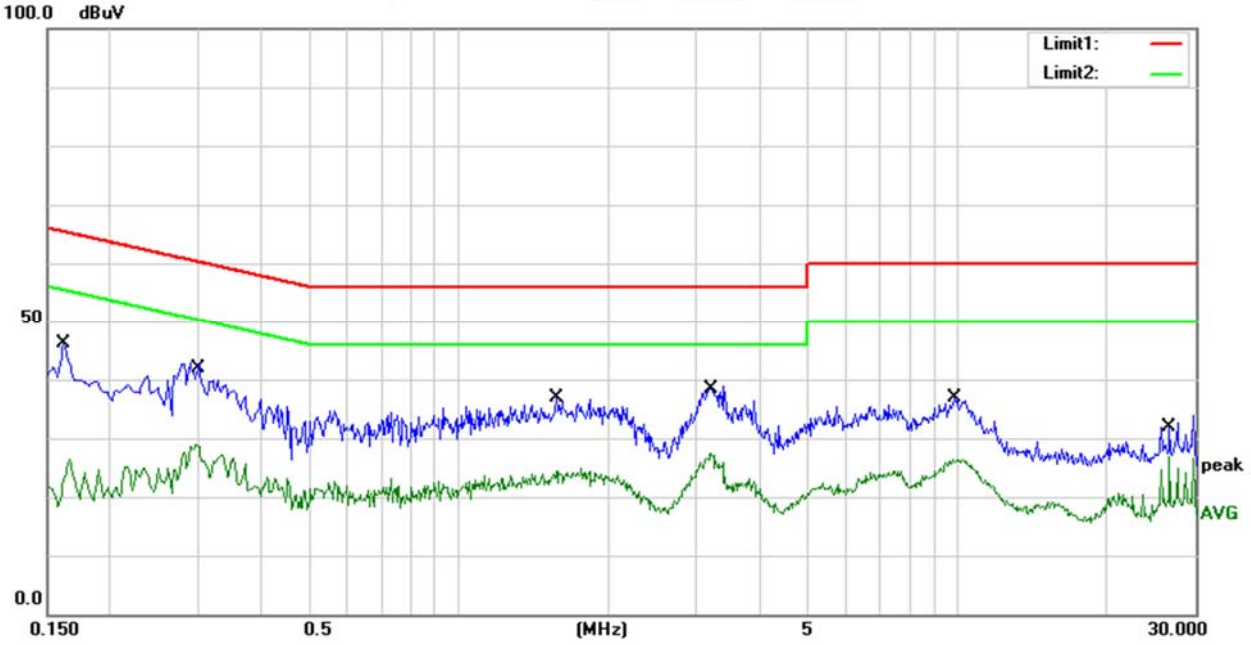
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.5 TEST RESULTS

Temperature:	25.3(C)	Relative Humidity:	62%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1620	-9.75	55.85	46.10	65.36	-19.26	QP
2	0.1620	-29.45	55.85	26.40	55.36	-28.96	AVG
3	0.2980	-12.75	55.66	42.91	60.30	-17.39	QP
4	0.2980	-26.89	55.66	28.77	50.30	-21.53	AVG
5	1.5740	-18.09	55.02	36.93	56.00	-19.07	QP
6	1.5740	-30.67	55.02	24.35	46.00	-21.65	AVG
7	3.1940	-14.34	53.13	38.79	56.00	-17.21	QP
8	3.1940	-25.71	53.13	27.42	46.00	-18.58	AVG
9	9.8740	-8.90	45.75	36.85	60.00	-23.15	QP
10	9.8740	-19.36	45.75	26.39	50.00	-23.61	AVG
11	26.6220	-5.35	39.22	33.87	60.00	-26.13	QP
12	26.6220	-12.43	39.22	26.79	50.00	-23.21	AVG

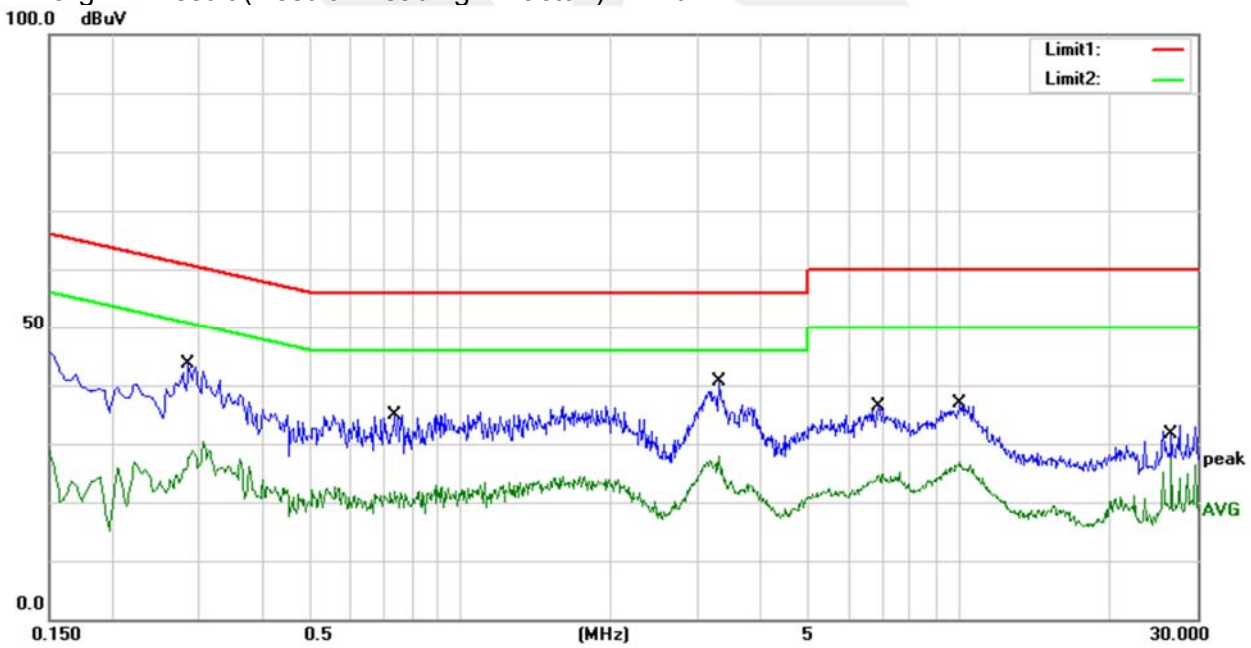
Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor)–Limit



Temperature:	25.3(C)	Relative Humidity:	62%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2860	-12.10	55.69	43.59	60.64	-17.05	QP
2	0.2860	-25.31	55.69	30.38	50.64	-20.26	AVG
3	0.7420	-20.59	55.52	34.93	56.00	-21.07	QP
4	0.7420	-33.66	55.52	21.86	46.00	-24.14	AVG
5	3.3060	-12.27	52.98	40.71	56.00	-15.29	QP
6	3.3060	-25.21	52.98	27.77	46.00	-18.23	AVG
7	6.8980	-12.62	48.97	36.35	60.00	-23.65	QP
8	6.8980	-23.92	48.97	25.05	50.00	-24.95	AVG
9	10.0580	-8.69	45.57	36.88	60.00	-23.12	QP
10	10.0580	-19.25	45.57	26.32	50.00	-23.68	AVG
11	26.6260	-6.12	39.22	33.10	60.00	-26.90	QP
12	26.6260	-11.95	39.22	27.27	50.00	-22.73	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor)–Limit



4. RADIATED EMISSION MEASUREMENT

4.1 RADIATED EMISSION LIMITS

n any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a), RSS-Gen Issue 5, Amendment 1, March 2019 and RSS-247 Issue 2, February 2017 (5.5) limit in the table and according to ANSI C63.10-2013 below has to be followed

LIMITS OF RADIATED EMISSION MEASUREMENT (Frequency Range 9kHz-1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

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

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

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5

8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 3 MHz

For Band edge

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2300 to 2403 MHz Upper Band Edge: 2479 to 2500 MHz
RB / VB (emission in restricted band)	1 MHz / 3 MHz

Receiver Parameter	**Setting**
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2 TEST PROCEDURE

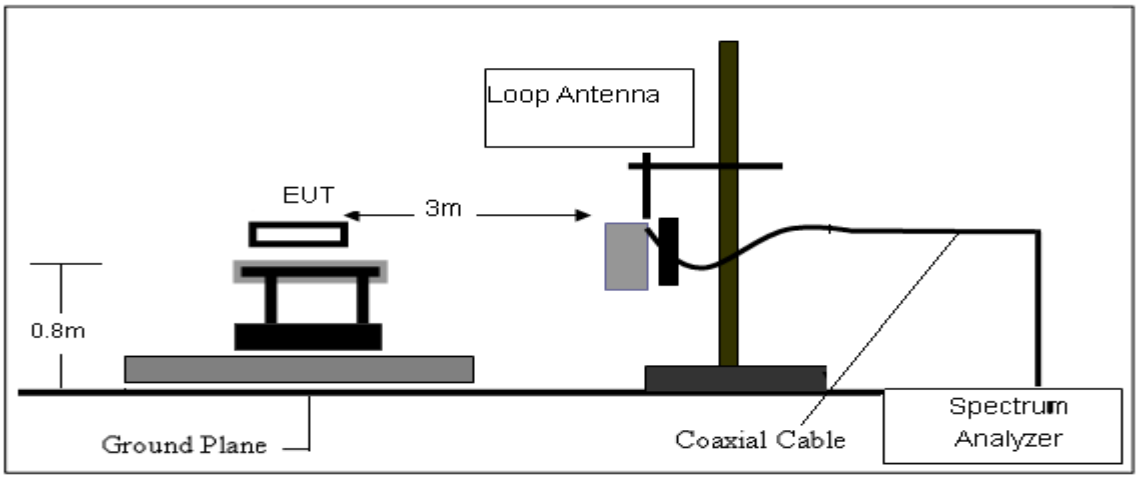
a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. 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:

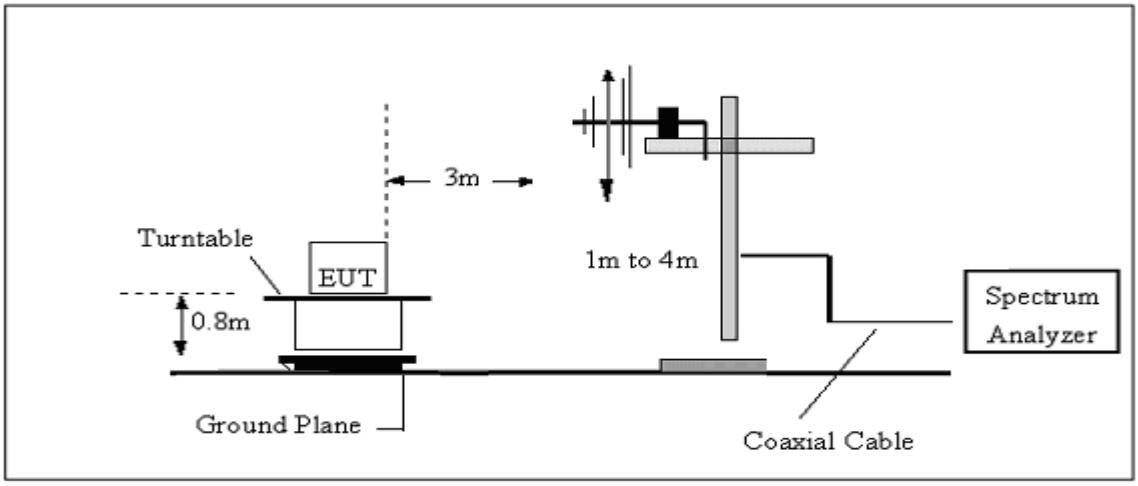
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

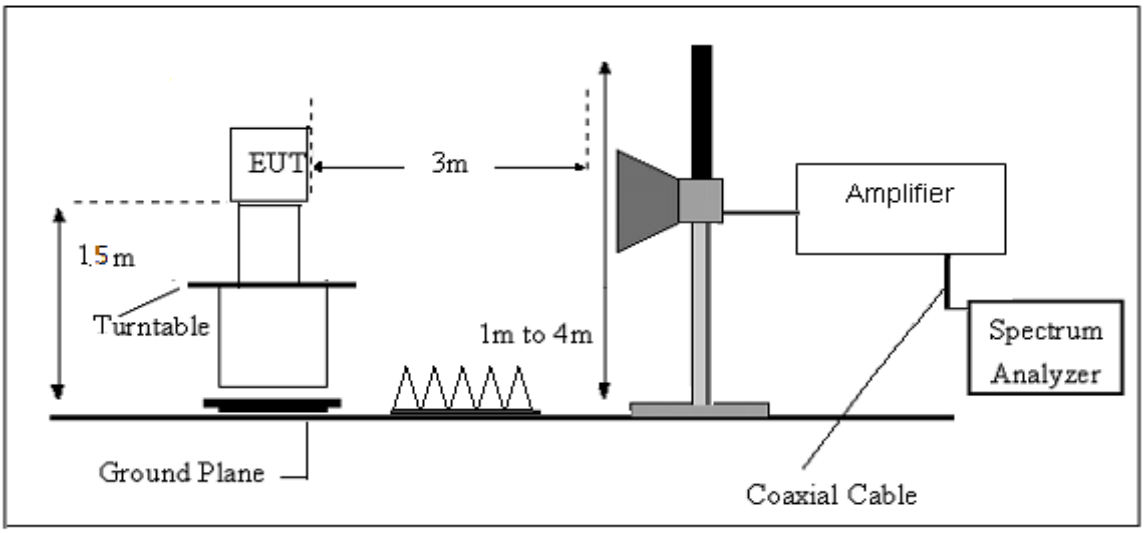
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



4.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

4.5 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

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

Factor=AF+CL-AG

4.6 TEST RESULTS

(Between 9KHz – 30 MHz)

Temperature:	27.0(C)	Relative Humidtity:	65%RH
Test Voltage:	AC 120V/60Hz	Polarization:	--
Test Mode:	TX Mode		

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);

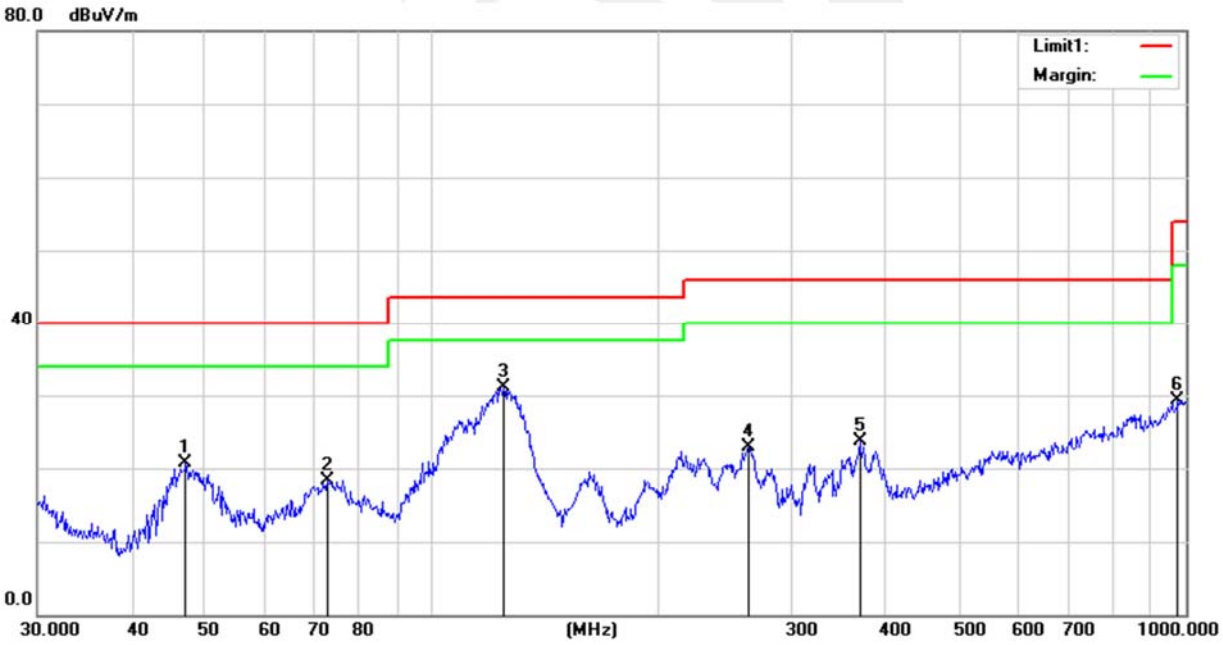
Limit line = specific limits(dBuv) + distance extrapolation factor.

(30MHz -1000MHz)

Temperature:	27.0(C)	Relative Humidity:	65%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3 (Mode 1 worst mode)		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	47.1600	42.53	-21.76	20.77	40.00	-19.23	QP
2	72.5916	42.69	-24.39	18.30	40.00	-21.70	QP
3	124.5690	49.25	-18.23	31.02	43.50	-12.48	QP
4	262.8955	37.71	-14.76	22.95	46.00	-23.05	QP
5	369.4045	36.14	-12.52	23.62	46.00	-22.38	QP
6	975.7528	26.85	2.38	29.23	54.00	-24.77	QP

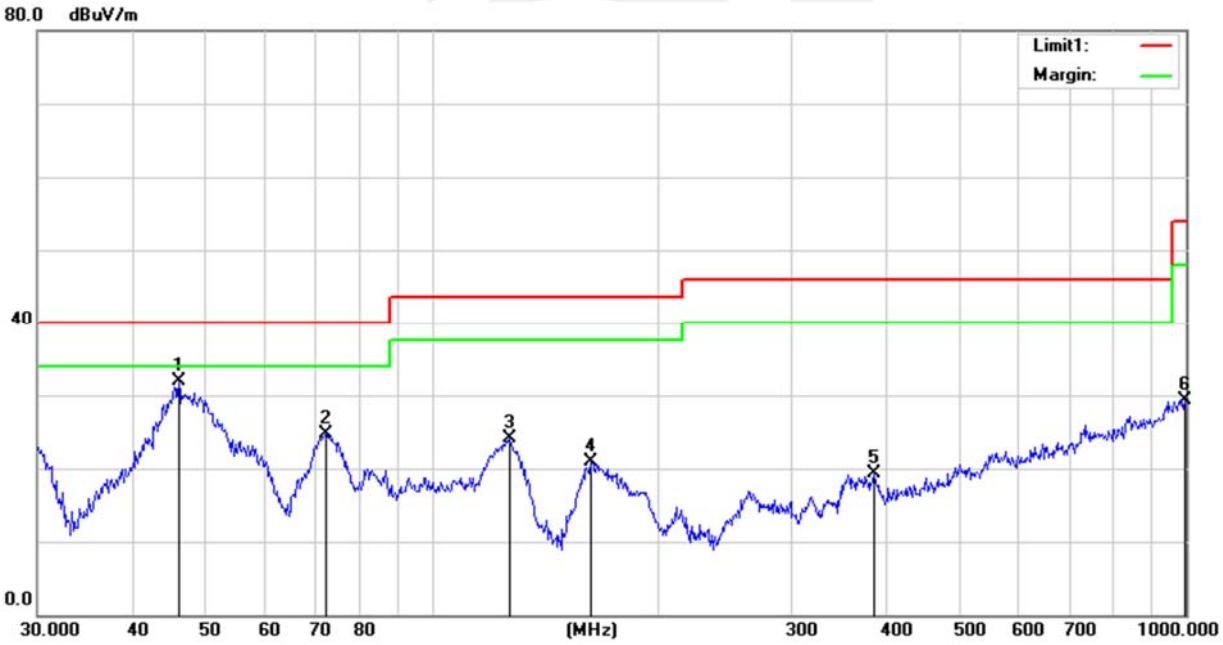
Remark:
1. Margin = Result (Result =Reading + Factor)–Limit



Temperature:	27.0(C)	Relative Humidity:	65%RH
Test Voltage:	AC 120V/60Hz	Phase:	Vertical
Test Mode:	Mode 1/2/3 (Mode 1 worst mode)		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	46.1780	53.11	-21.24	31.87	40.00	-8.13	QP
2	72.3376	49.13	-24.44	24.69	40.00	-15.31	QP
3	126.7723	42.41	-18.24	24.17	43.50	-19.33	QP
4	162.6106	39.95	-19.08	20.87	43.50	-22.63	QP
5	385.2805	31.28	-11.91	19.37	46.00	-26.63	QP
6	996.4996	27.29	2.04	29.33	54.00	-24.67	QP

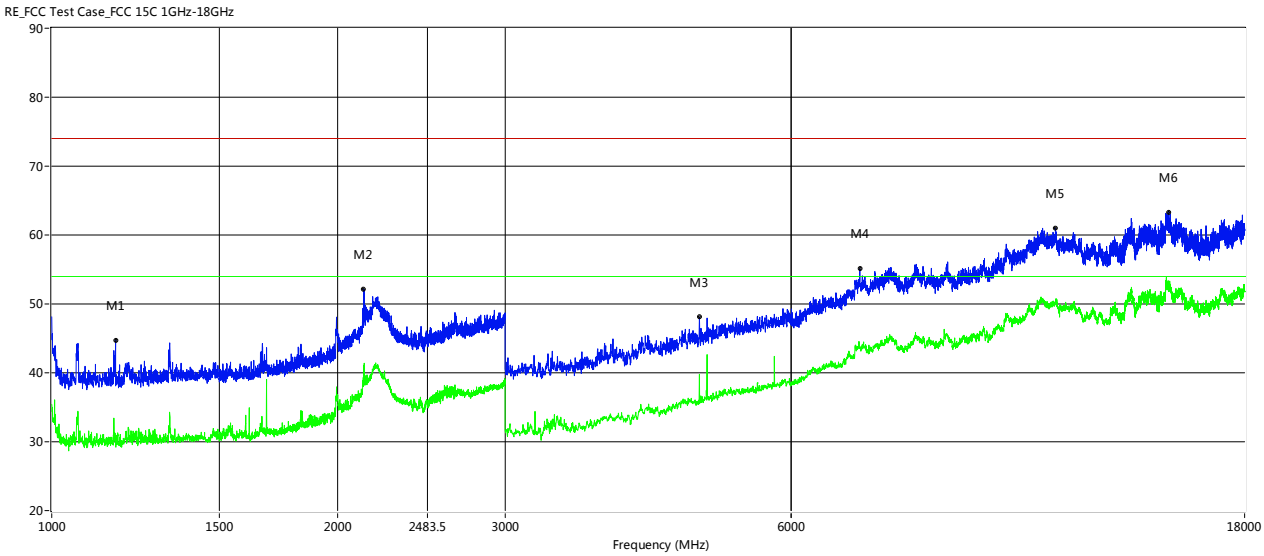
Remark:
1. Margin = Result (Result =Reading + Factor)–Limit



(1GHz-25GHz)Restricted band and Spurious emission Requirements

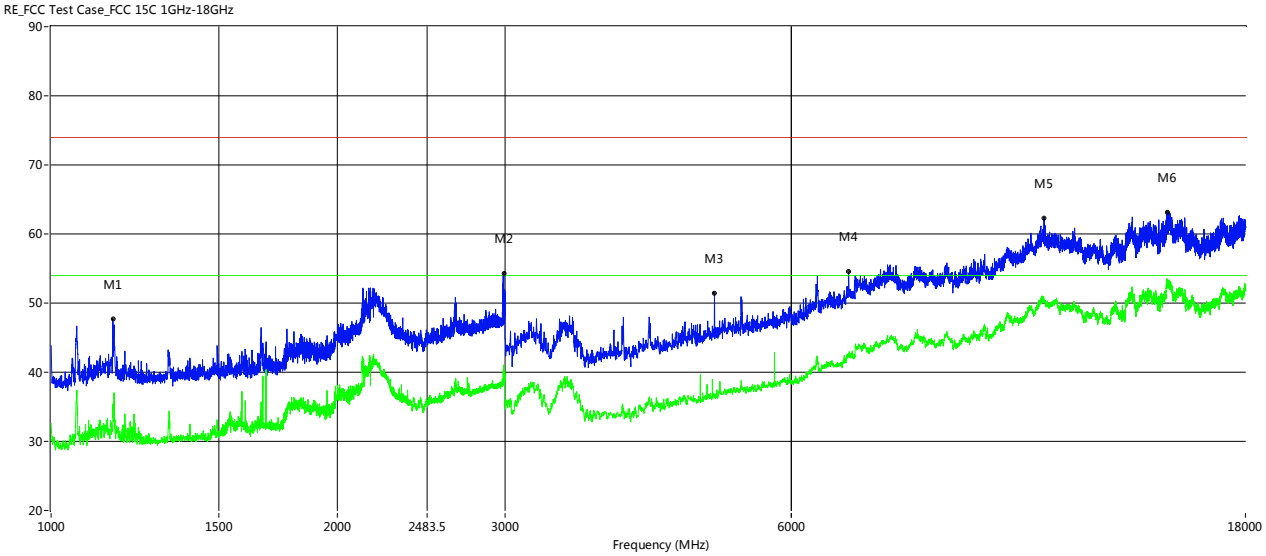
GFSK-Low

Horizontal



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1167.000	44.77	--	30.83	-1.06	74.0	--	54.0	-23.17	Horizontal	Pass
2129.000	52.17	--	41.09	6.82	74.0	--	54.0	-12.91	Horizontal	Pass
4802.500	48.12	--	39.80	-5.71	74.0	--	54.0	-14.20	Horizontal	Pass
7085.000	55.11	--	43.87	3.37	74.0	--	54.0	-10.13	Horizontal	Pass
11382.500	61.01	--	50.19	9.71	74.0	--	54.0	-3.81	Horizontal	Pass
14972.500	63.26	--	53.02	12.39	74.0	--	54.0	-0.98	Horizontal	Pass

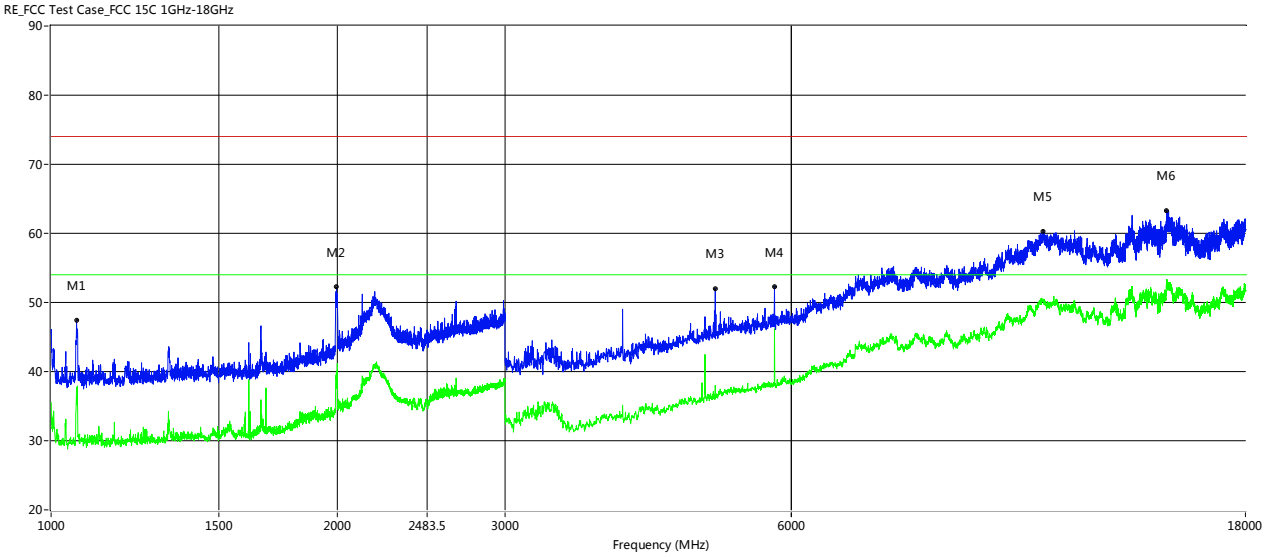
Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1161.500	47.66	--	35.38	-1.09	74.0	--	54.0	-18.62	Vertical	Pass
2991.000	54.25	--	41.07	7.84	74.0	--	54.0	-12.93	Vertical	Pass
4980.000	51.47	--	36.85	-4.57	74.0	--	54.0	-17.15	Vertical	Pass
6892.500	54.52	--	42.45	2.25	74.0	--	54.0	-11.55	Vertical	Pass
11057.500	62.22	--	50.36	10.01	74.0	--	54.0	-3.64	Vertical	Pass
14896.250	63.19	--	53.42	12.35	74.0	--	54.0	-0.58	Vertical	Pass

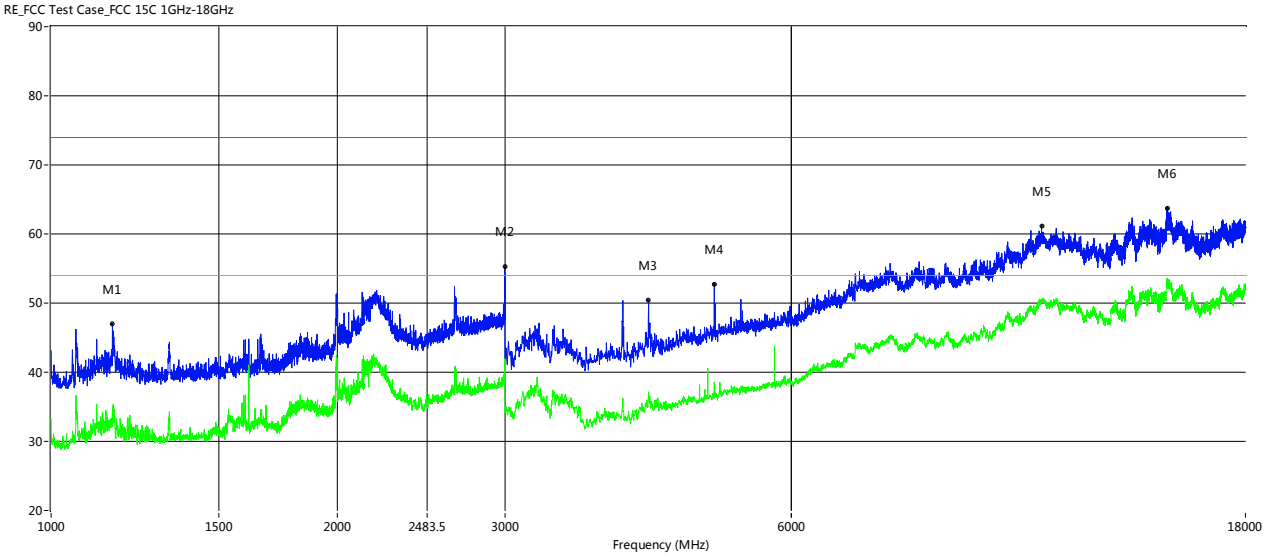
GFSK-Mid

Horizontal



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1063.500	47.43	--	37.37	-1.50	74.0	--	54.0	-16.63	Horizontal	Pass
1996.000	52.24	--	40.08	2.68	74.0	--	54.0	-13.92	Horizontal	Pass
4990.000	52.03	--	38.01	-4.56	74.0	--	54.0	-15.99	Horizontal	Pass
5760.000	52.29	--	46.18	-2.48	74.0	--	54.0	-7.82	Horizontal	Pass
11032.500	60.27	--	50.33	10.14	74.0	--	54.0	-3.67	Horizontal	Pass
14886.250	63.36	--	53.33	12.26	74.0	--	54.0	-0.67	Horizontal	Pass

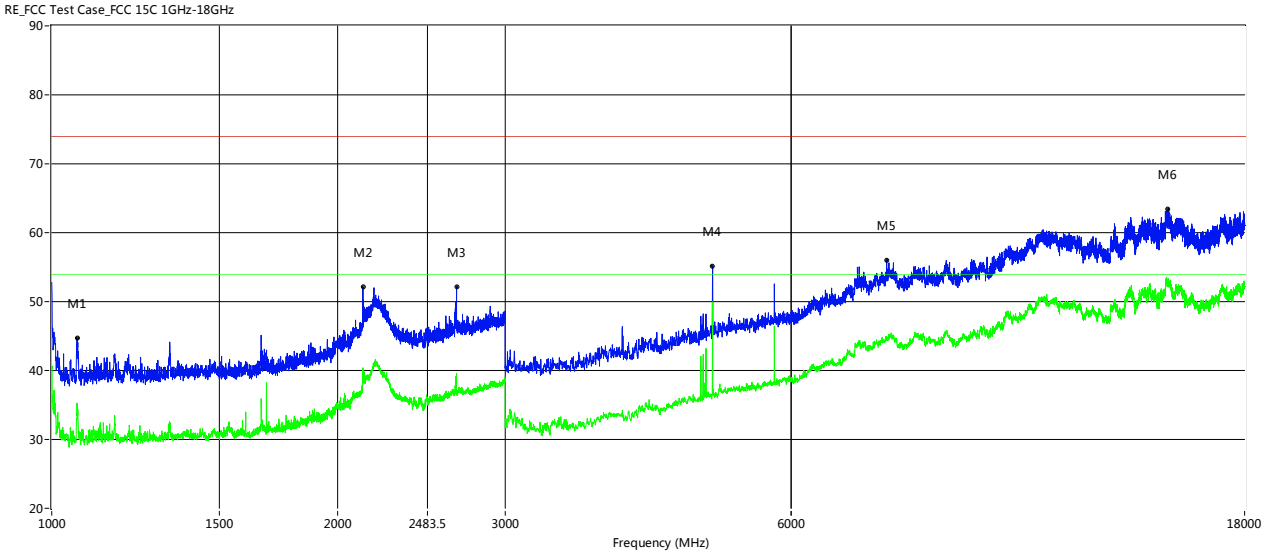
Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1160.000	47.03	--	33.11	-1.10	74.0	--	54.0	-20.89	Vertical	Pass
2998.500	55.29	--	41.66	8.12	74.0	--	54.0	-12.34	Vertical	Pass
4247.500	50.38	--	37.14	-6.79	74.0	--	54.0	-16.86	Vertical	Pass
4977.500	52.73	--	38.59	-4.58	74.0	--	54.0	-15.41	Vertical	Pass
10992.500	61.20	--	50.29	10.27	74.0	--	54.0	-3.71	Vertical	Pass
14911.250	63.78	--	52.68	12.38	74.0	--	54.0	-1.32	Vertical	Pass

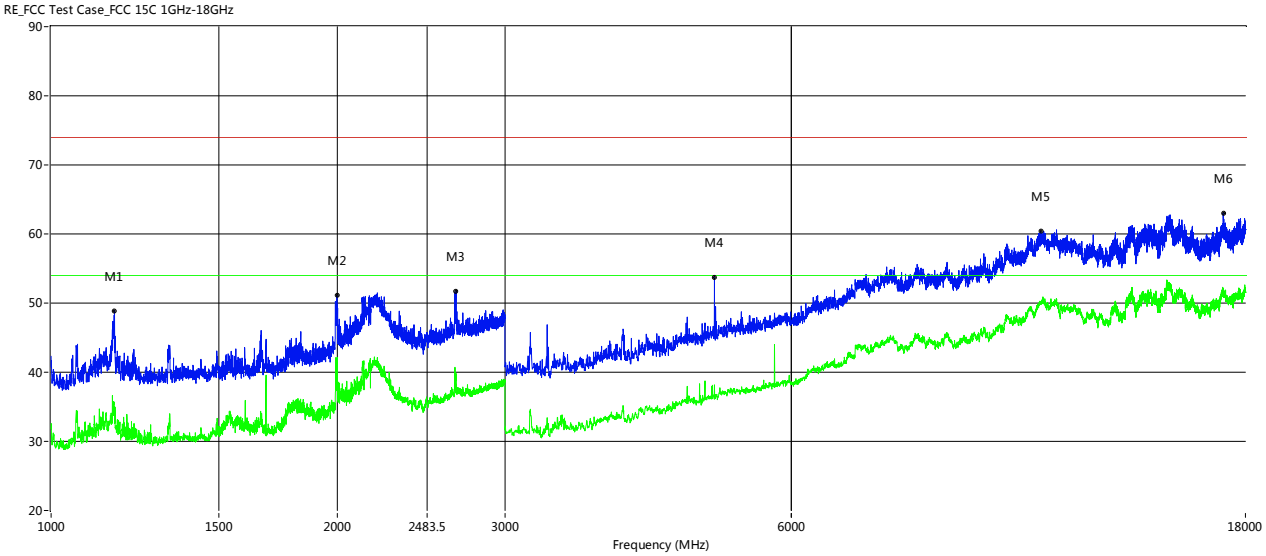
GFSK-High

Horizontal



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1063.000	44.77	--	35.28	-1.50	74.0	--	54.0	-18.72	Horizontal	Pass
2125.000	52.12	--	40.42	6.41	74.0	--	54.0	-13.58	Horizontal	Pass
2667.000	52.15	--	39.56	6.27	74.0	--	54.0	-14.44	Horizontal	Pass
4960.000	55.14	--	49.97	-4.60	74.0	--	54.0	-4.03	Horizontal	Pass
7562.500	56.03	--	44.93	4.05	74.0	--	54.0	-9.07	Horizontal	Pass
14955.000	63.48	--	53.09	12.39	74.0	--	54.0	-0.91	Horizontal	Pass

Vertical

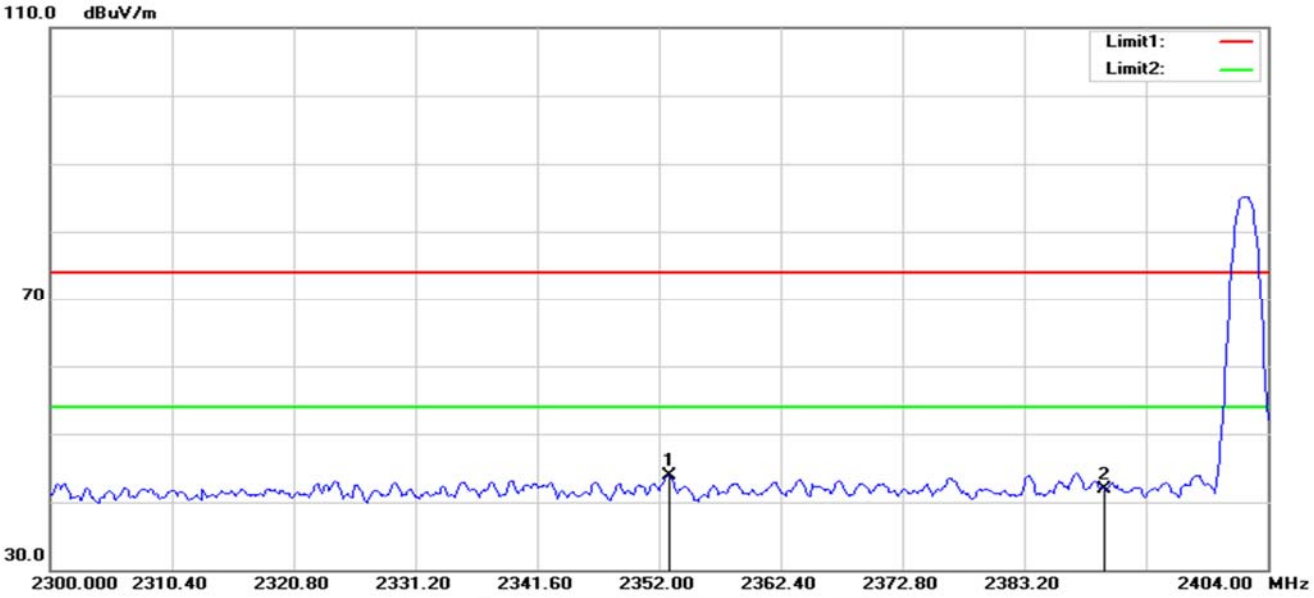


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1166.000	48.91	--	34.70	-1.07	74.0	--	54.0	-19.30	Vertical	Pass
1991.500	55.77	--	42.29	2.56	74.0	--	54.0	-11.71	Vertical	Pass
2665.000	51.78	--	39.32	6.20	74.0	--	54.0	-14.68	Vertical	Pass
4980.000	53.78	--	38.17	-4.57	74.0	--	54.0	-15.83	Vertical	Pass
10967.500	60.39	--	50.20	10.12	74.0	--	54.0	-3.80	Vertical	Pass
17063.750	63.05	--	51.79	11.50	74.0	--	54.0	-2.21	Vertical	Pass

4.6 TEST RESULTS (Restricted Bands Requirements)

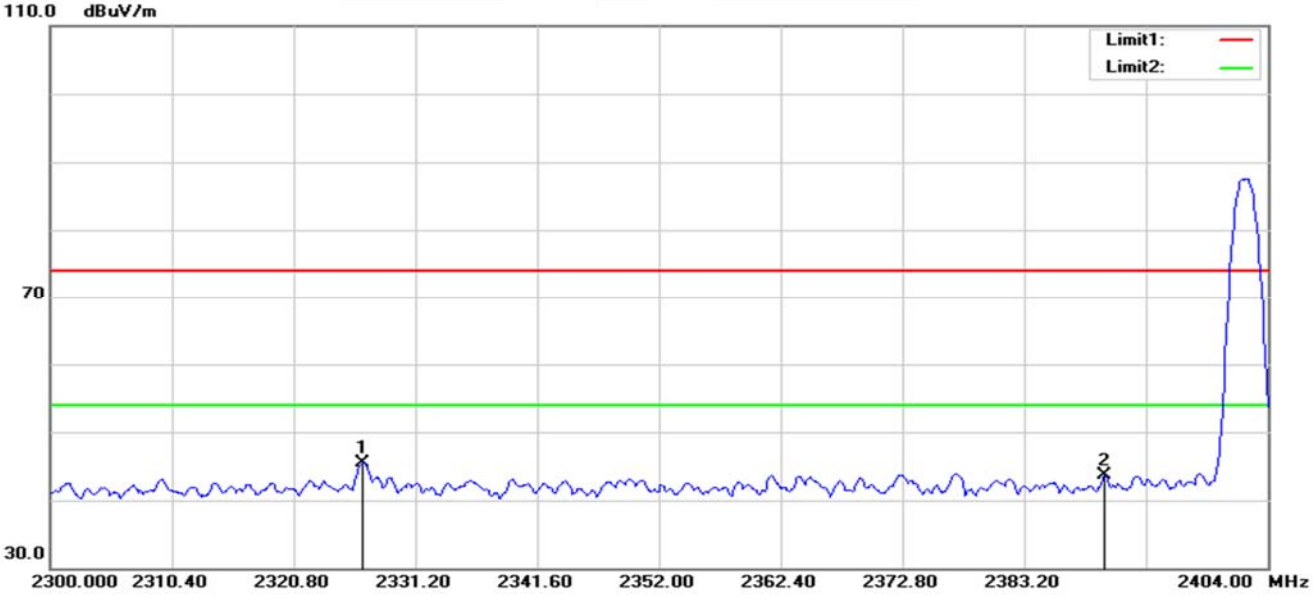
GFSK-Low

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2352.832	40.14	3.78	43.92	74.00	-30.08	peak
2	2390.000	37.53	4.34	41.87	74.00	-32.13	peak

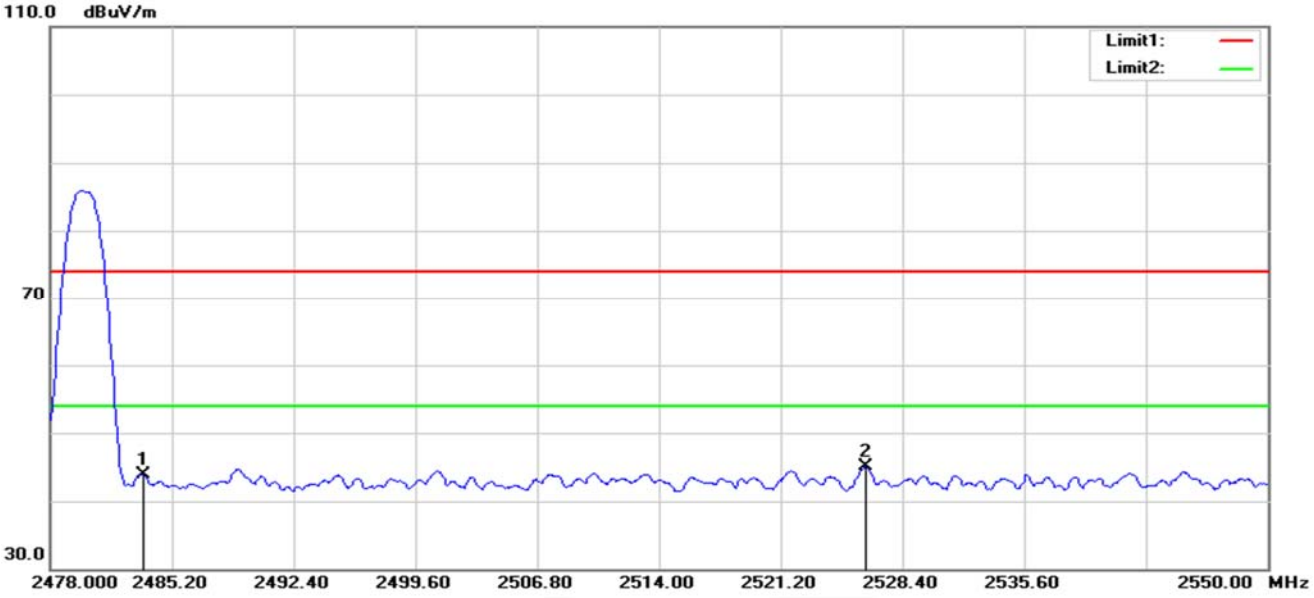
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2326.728	41.99	3.61	45.60	74.00	-28.40	peak
2	2390.000	39.30	4.34	43.64	74.00	-30.36	peak

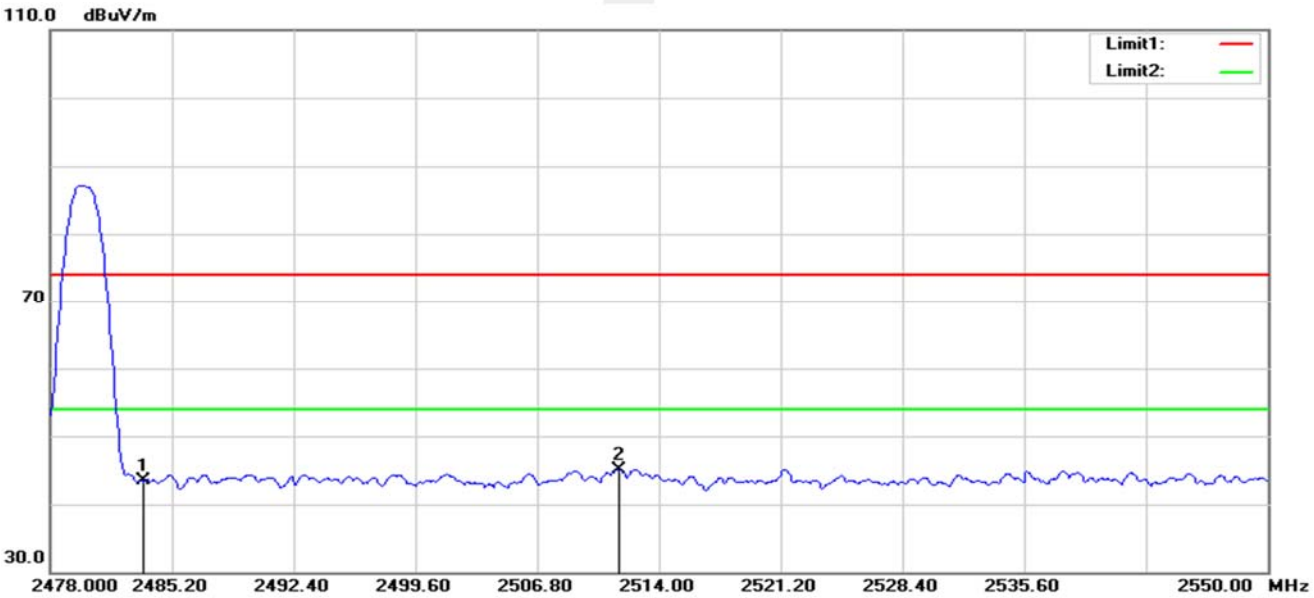
GFSK-High

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	39.21	4.60	43.81	74.00	-30.19	peak
2	2526.240	40.19	4.82	45.01	74.00	-28.99	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	38.86	4.60	43.46	74.00	-30.54	peak
2	2511.624	40.45	4.72	45.17	74.00	-28.83	peak

5. CONDUCTED SPURIOUS & BAND EDGE EMISSION

5.1 LIMIT

According to FCC section 15.247(d) & RSS-247 Issue 2, in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

.

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 – 2403 MHz Upper Band Edge: 2479 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

5.3 TEST SETUP

The EUT which is powered by the Adapter, is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

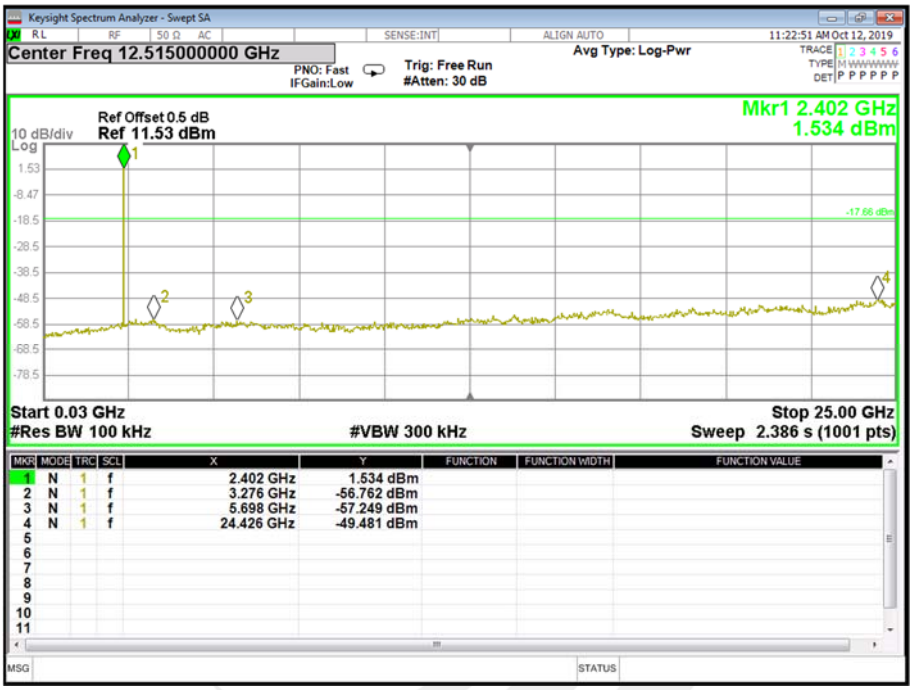
5.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

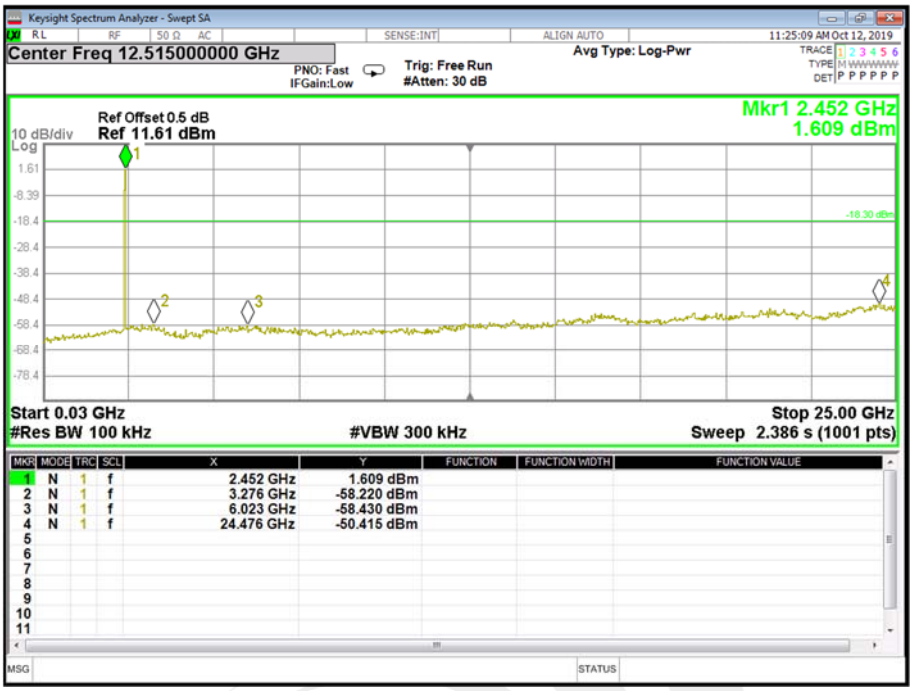
5.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
Test Voltage:	AC 120V/60Hz	Test Mode:	TX Mode /CH00, CH19, CH39

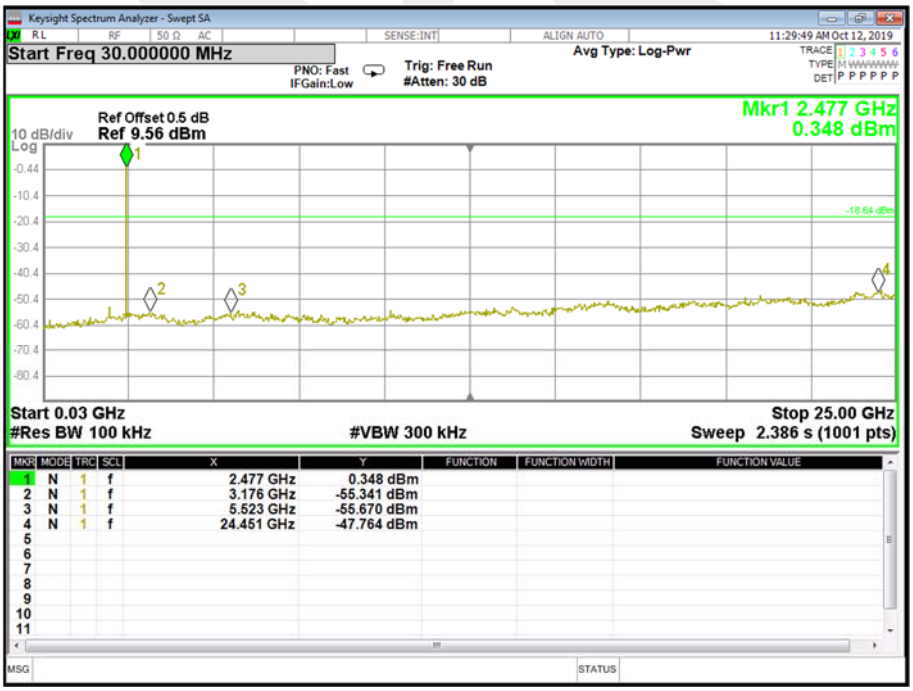
00 CH



19 CH

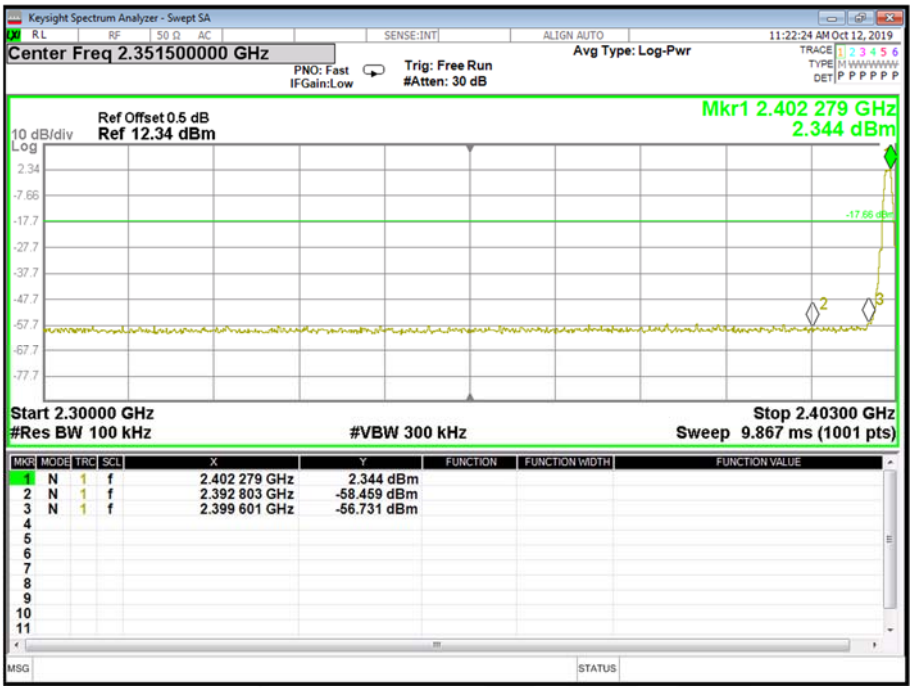

Keysight Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:25:09 AM Oct 12, 2019
Ref Offset 0.5 dB
10 dB/div
Ref 11.61 dBm
Mkr1 2.452 GHz
1.609 dBm
-18.30 dBm
Start 0.03 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
1 N 1 f 2.452 GHz 1.609 dBm
2 N 1 f 3.276 GHz -58.220 dBm
3 N 1 f 6.023 GHz -58.430 dBm
4 N 1 f 24.476 GHz -50.415 dBm

39 CH

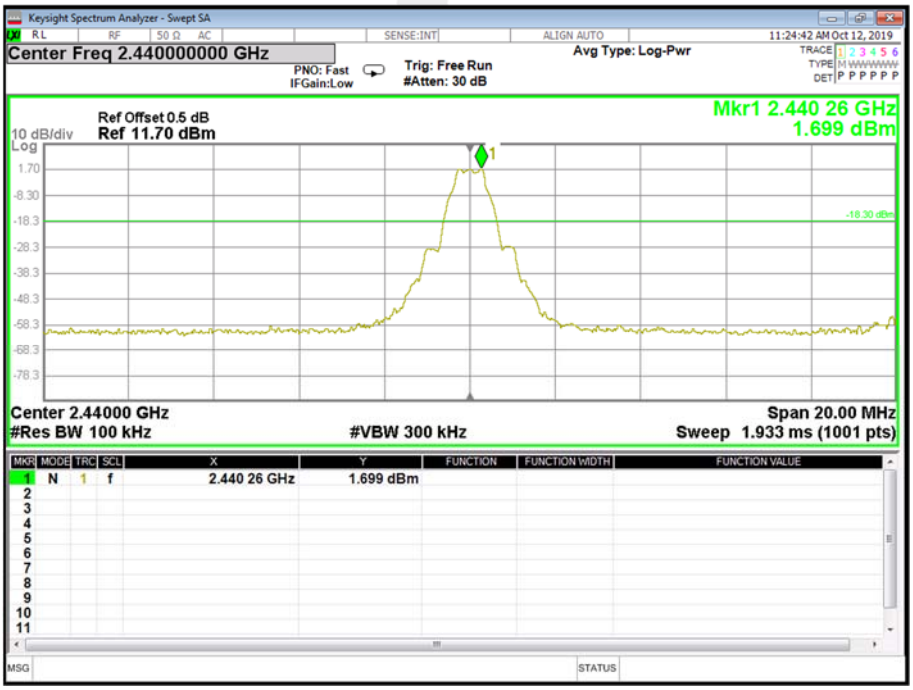

Keysight Spectrum Analyzer - Swept SA
Start Freq 30.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:29:49 AM Oct 12, 2019
Ref Offset 0.5 dB
10 dB/div
Ref 9.56 dBm
Mkr1 2.477 GHz
0.348 dBm
-18.64 dBm
Start 0.03 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
1 N 1 f 2.477 GHz 0.348 dBm
2 N 1 f 3.176 GHz -55.341 dBm
3 N 1 f 5.523 GHz -55.670 dBm
4 N 1 f 24.451 GHz -47.764 dBm

For Band edge(it's also the reference level for conducted spurious emission)

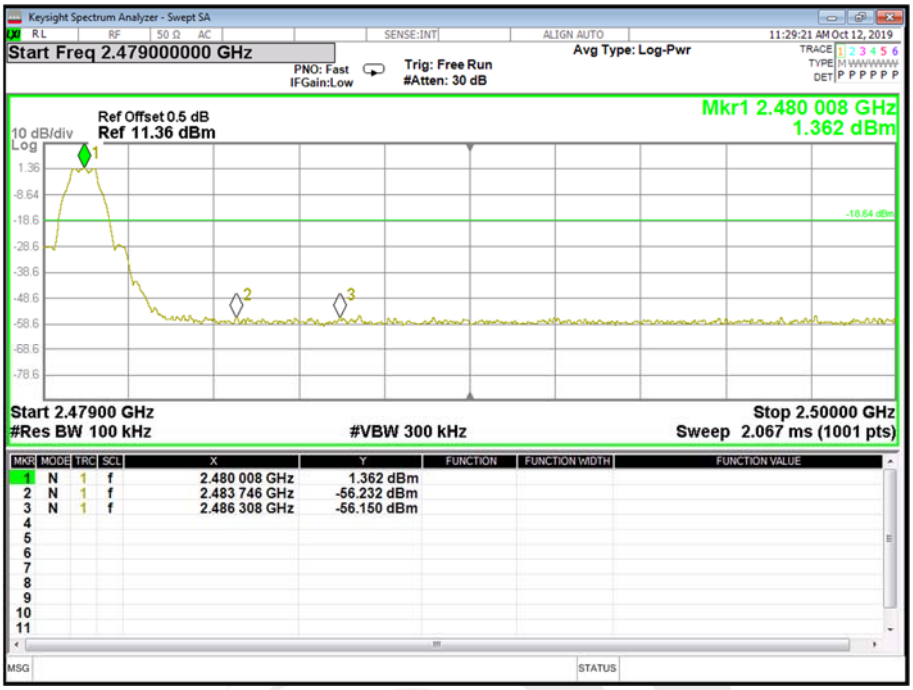
00 CH



19 CH



39 CH


Keysight Spectrum Analyzer - Swept SA
Start Freq 2.479000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:29:21 AM Oct 12, 2019
Ref Offset 0.5 dB
10 dB/div
Ref 11.36 dBm
Mkr1 2.480 008 GHz
1.362 dBm
-18.64 dBm
Start 2.47900 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 2.067 ms (1001 pts)
1 N 1 f 2.480 008 GHz 1.362 dBm
2 N 1 f 2.483 746 GHz -56.232 dBm
3 N 1 f 2.486 308 GHz -56.150 dBm

6. POWER SPECTRAL DENSITY TEST

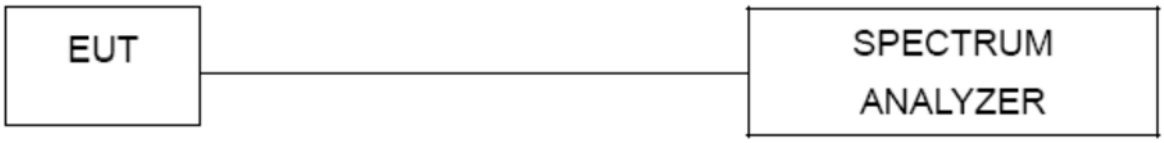
6.1 LIMIT

FCC Part 15.247,Subpart C RSS-247 Issue 2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e) RSS-247 Issue 2	Power Spectral Density	≤8 dBm (RBW≥3KHz)	2400-2483.5	PASS

6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: 100 kHz ≥ RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
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 amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS

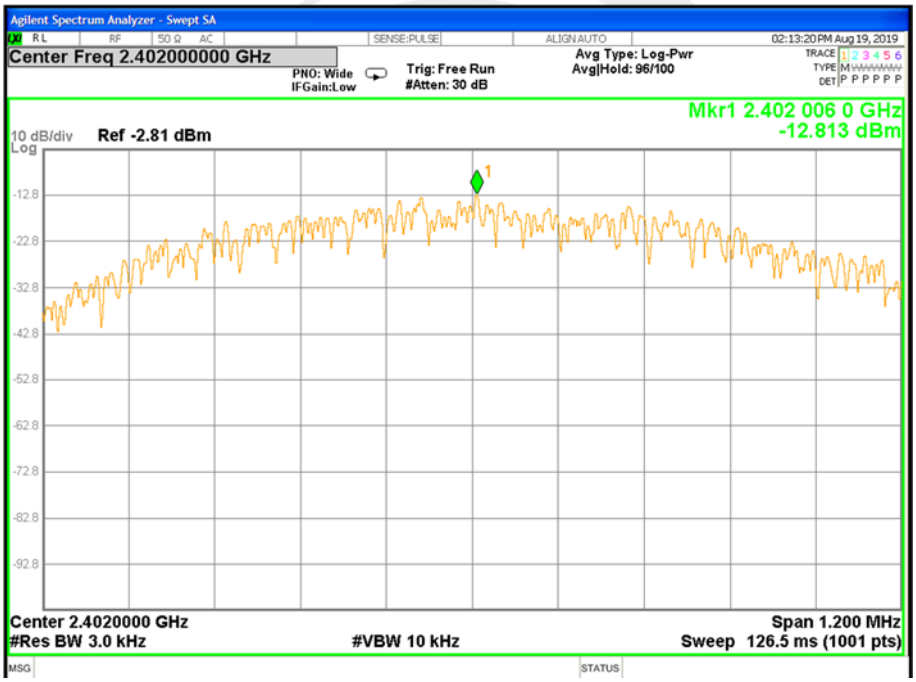
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.5 TEST RESULTS

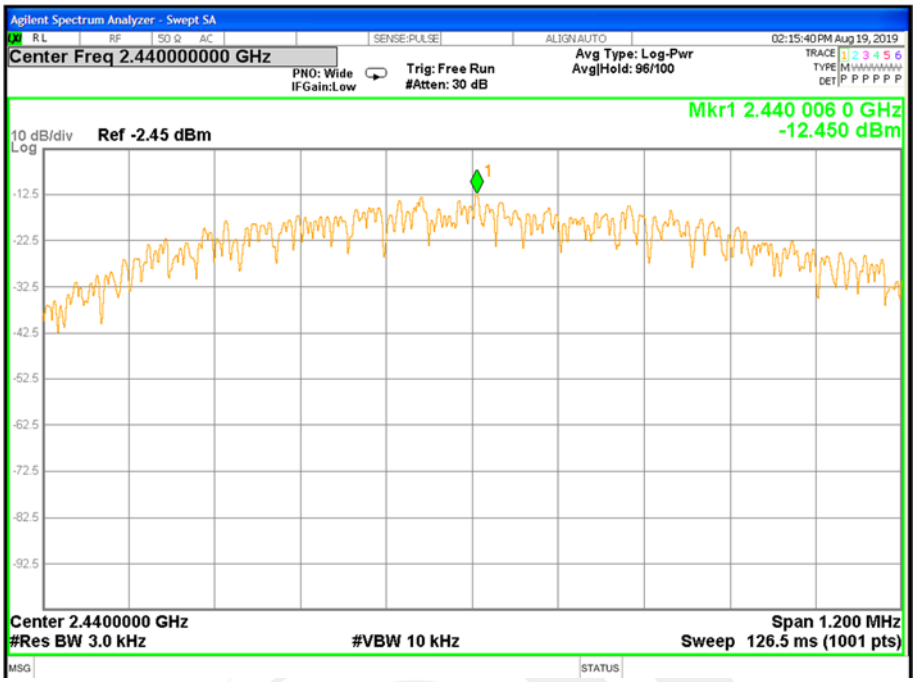
Temperature:	25 ℃	Relative Humidity:	60%
Test Voltage:	AC 120V/60Hz	Test Mode:	TX Mode /CH00, CH19, CH39

Frequency	Power Density (dBm/3kHz)	Limit (dBm/3KHz)	Result
2402 MHz	-12.813	≤8	PASS
2440 MHz	-12.450	≤8	PASS
2480 MHz	-12.537	≤8	PASS

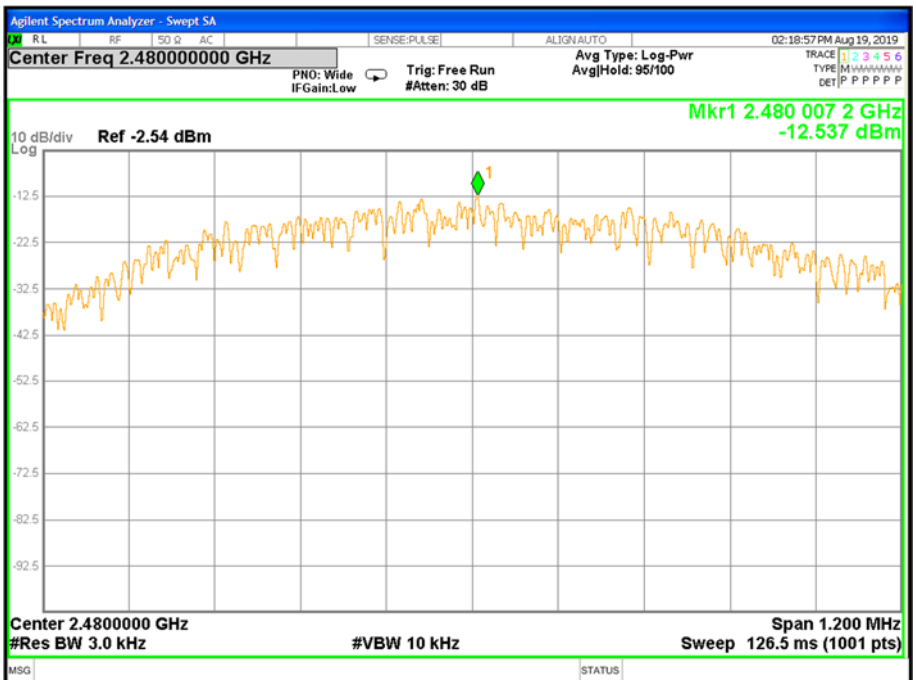
TX CH00



TX CH19



TX CH39



7. BANDWIDTH TEST

7.1 LIMIT

FCC Part 15.247,Subpart C RSS-Gen Clause 6.7				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2) RSS-Gen Clause 6.7	6dB Bandwidth	>= 500KHz	2400-2483.5	PASS
RSS-Gen Clause 6.7	99% Bandwidth	For reporting purposes only.	2400-2483.5	PASS

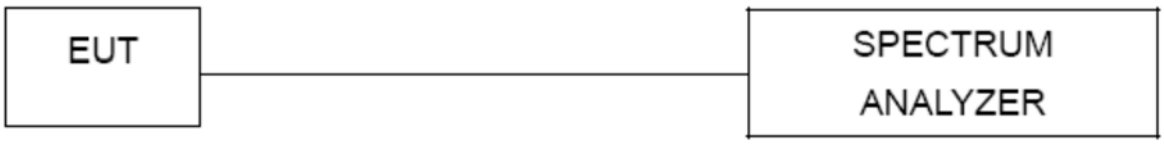
7.2 TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100KHz For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : ≥3 × RBW For 99% Bandwidth : approximately 3×RBW
Trace	Max hold
Sweep	Auto

Allow the trace to stabilize and 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 and 99% relative to the maximum level measured in the fundamental emission.

7.3 TEST SETUP



7.4 EUT OPERATION CONDITIONS

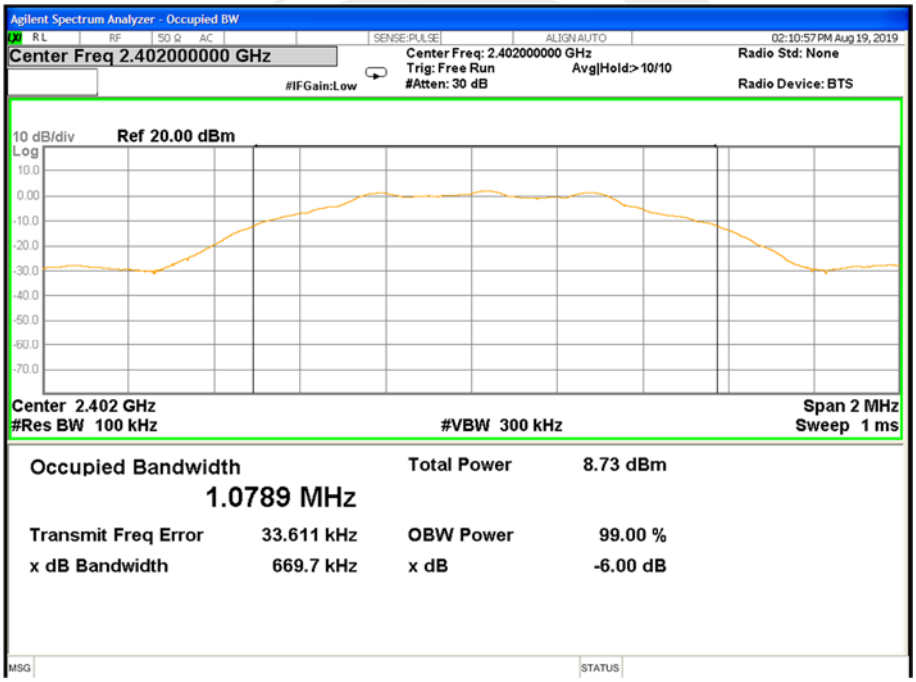
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

7.5 TEST RESULTS

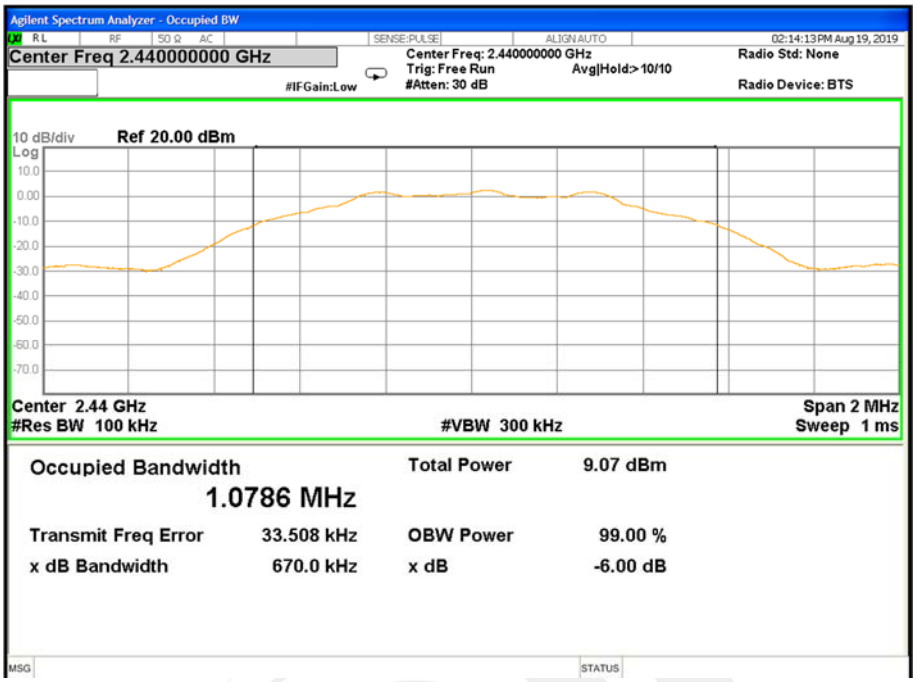
Temperature:	25 ℃	Relative Humidity:	60%
Test Voltage:	AC 120V/60Hz	Test Mode:	TX Mode /CH00, CH19, CH39

Frequency	6dB Bandwidth (KHz)	99% Bandwidth (KHz)	Channel Separation (KHz)	Result
2402 MHz	669.700	915.920	≥500KHz	PASS
2440 MHz	670.000	914.940	≥500KHz	PASS
2480 MHz	674.200	915.040	≥500KHz	PASS

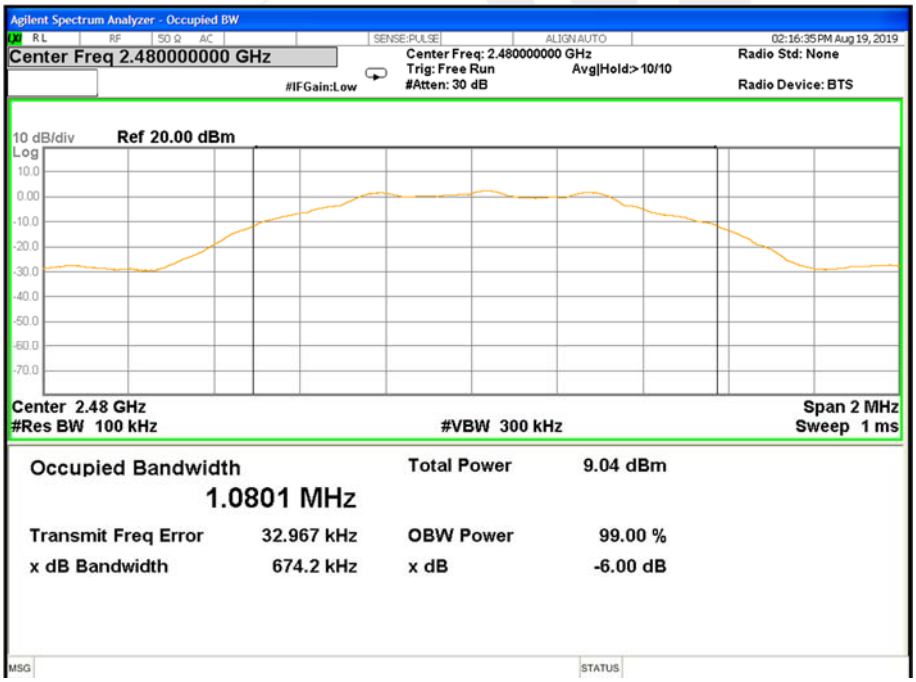
6dB Bandwidth TX CH 00



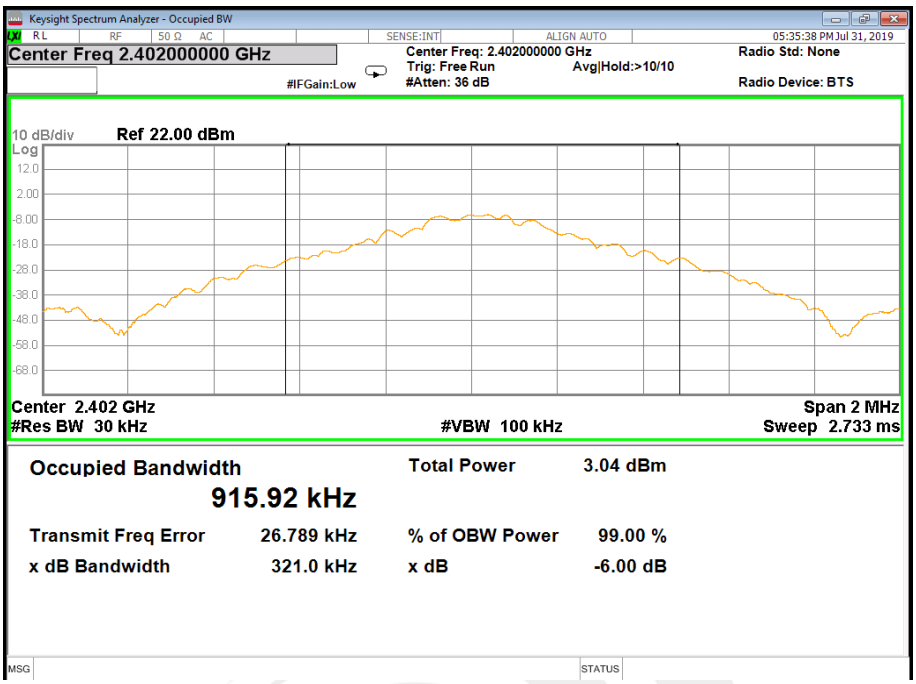
6dB Bandwidth TX CH 19



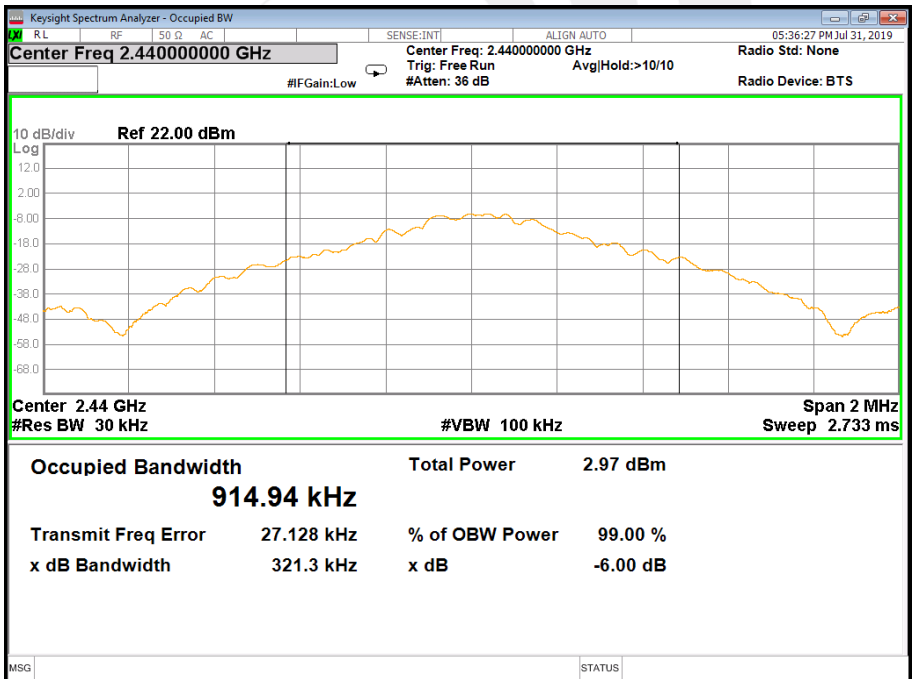
6dB Bandwidth TX CH 39



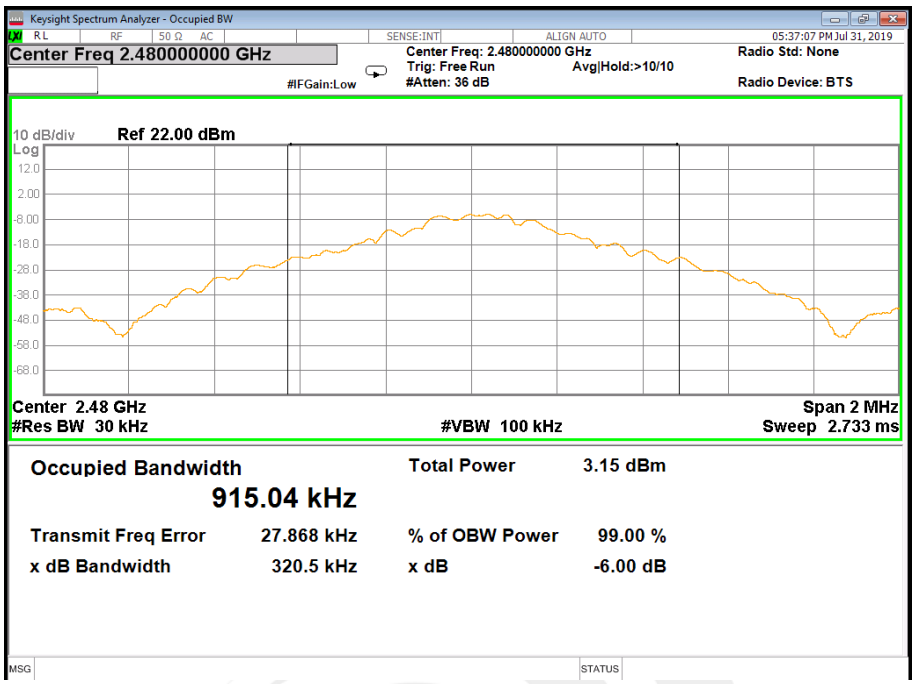
99% Bandwidth TX CH 00



99% Bandwidth TX CH 19



99% Bandwidth TX CH 39



8. PEAK OUTPUT POWER TEST

8.1 LIMIT

FCC Part 15.247,Subpart C RSS-247 Issue 2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3) RSS 247 Issue 2	Output Power	1 watt or 30dBm	2400-2483.5	PASS
RSS-247	EIRP	4W	2400-2483.5	PASS

8.2 TEST PROCEDURE

a. The EUT was directly connected to the Power Sensor&PC

8.3 TEST SETUP

8.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Test Voltage:	AC 120V/60Hz	Test Mode:	TX Mode /CH00, CH19, CH39

Test Channe	Frequency	Peak Conducted Output Power	Average Conducted Output Power	LIMIT
	(MHz)	(dBm)	(dBm)	dBm
CH00	2402	3.09	0.83	30
CH19	2440	3.37	1.09	30
CH39	2480	3.45	1.18	30

EIRP Power

Test Channe	Frequency	Peak Conducted Output Power	Antenna Gain	EIRP Power	LIMIT
	(MHz)	(dBm)	(dBi)	(dBm)	dBm
CH00	2402	3.09	1.50	4.59	36.00
CH19	2440	3.37	1.50	4.87	36.00
CH39	2480	3.45	1.50	4.95	36.00

9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 & RSS-GenIssue 5 requirement: For intentional device, according to 15.203 & RSS-GenIssue 5: 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.

9.2 EUT ANTENNA

The EUT antenna is Ceramic Antenna. It comply with the standard requirement.

10. FREQUENCY STABILITY

10.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/-0.02% of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage,and for a variation in primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees.

10.2 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize,turn the EUT on and measure the operating frequency after 2,5,and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes.The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

10.3 TEST RESULT

Channel 19 (2440MHz)

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency(MHz)
AC 138V/60Hz	2440.0008
AC 120V/60Hz	2440.0001
AC 102V/60Hz	2440.0008
Max.Deviation(MHz)	0.0008
Max.Deviation(ppm)	0.33

Rated working voltage: AC 120V/60Hz

Temperature vs. Frequency Stability

Temperature(℃)	Measurement Frequency(MHz)
-30	2440.0011
-20	2440.0008
-10	2440.0003
0	2440.0009
10	2440.0010
20	2440.0007
30	2440.0005
40	2440.0010
50	2440.0005
Max.Deviation(MHz)	0.0011
Max.Deviation(ppm)	0.45

11. EUT TEST PHOTO

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※