RADIO TEST REPORT

Report No.:STS2103057W08

Issued for

Chengdu Vantron Technology Co., Ltd.

No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

Product Name:	Module
Brand Name:	VANTRON
Model Name:	MOB-WBT-56
Series Model:	N/A
FCC ID:	2AAGEWBT56
IC:	11152A-WBT56
Test Standard:	FCC Part 15.247 RSS-247 Issue 2, February 2017

Shenzhen STS Test Services Co., Ltd.
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TEST RESULT CERTIFICATION

Applicant's Name ..... :	Chengdu Vantron Technology Co., Ltd.
Address ..... :	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045
Manufacturer's Name ..... :	Chengdu Vantron Technology Co., Ltd.
Address ..... :	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

Product Description

Product Name ..... :	Module
Brand Name ..... :	VANTRON
Model Name ..... :	MOB-WBT-56
Series Model ..... :	N/A
Test Standards ..... :	FCC Part 15.247 RSS-247 Issue 2, February 2017 RSS-Gen Issue 5 ,March 2019
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 of receipt of test item ..... :	11 Mar. 2021
Date (s) of performance of tests ..... :	11 Mar. 2021 ~ 31 Mar. 2021
Date of Issue ..... :	31 Mar. 2021
Test Result ..... :	**Pass**

Testing Engineer : 

(Chris Chen)

Technical Manager : 

(Sean she)

Authorized Signatory : 

(Vita Li)

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	31 Mar. 2021	STS2103057W08	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 8.8	Conducted Emission	PASS	--
15.247 (a)(2) RSS-Gen 6.7 RSS-247 5.2 a)	6dB&99% Bandwidth	PASS	--
15.247 (b)(3) RSS-247 5.4 d)	Output Power	PASS	--
15.247 (c) RSS-Gen 8.9 8.10	Radiated Spurious Emission	PASS	--
15.247 (d) RSS-247 5.5 RSS-Gen 8.9 8.10	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e) RSS-247 5.2 b)	Power Spectral Density	PASS	--
15.205 RSS-Gen 8.9 8.10	Restricted Band Edge Emission	PASS	--
Part 15.247(d)/part 15.209(a) RSS-247 5.5 RSS-Gen 8.9 8.10	Band Edge Emission	PASS	--
15.203 RSS-Gen 6.8	Antenna Requirement	PASS	--
RSS-Gen 6.11 8.11	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	±0.68dB
2	Unwanted Emissions, conducted	±2.988dB
3	All emissions, radiated 9K-30MHz	±2.84dB
4	All emissions, radiated 30M-1GHz	±4.39dB
5	All emissions, radiated 1G-6GHz	±5.10dB
6	All emissions, radiated>6G	±5.48dB
7	Conducted Emission (9KHz-150KHz)	±2.79dB
8	Conducted Emission (150KHz-30MHz)	±2.80dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

<table>
<tr><td>Product Name</td><td>Module</td></tr>
<tr><td>Trade Name</td><td>VANTRON</td></tr>
<tr><td>Model Name</td><td>MOB-WBT-56</td></tr>
<tr><td>Series Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Module
<table>
<tr><td>Operation Frequency:</td><td>802.11b/g/n 20: 2412~2462 MHz</td></tr>
<tr><td>Modulation Type:</td><td>802.11b(DSSS):CCK,DQPSK,DBPSK
802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM
802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM</td></tr>
<tr><td>Bit Rate of Transmitter:</td><td>802.11b:11/5.5/2/1 Mbps
802.11g:54/48/36/24/18/12/9/6Mbps
802.11n(20MHz):
65/58.5/52/39/26/19.5/13/6.5Mbps</td></tr>
<tr><td>Number of Channel:</td><td>802.11b/g/n20: 11CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please refer to see Note 3.</td></tr>
<tr><td>AntennaGain (dBi):</td><td>2.66dBi</td></tr>
<tr><td>Duty Cycle:</td><td>>98%</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Power Rating</td><td>Input: Input:3.3Vdc</td></tr>
<tr><td>Hardware version number</td><td>V2.1</td></tr>
<tr><td>Software version number</td><td>nftm_med-userdebug 9 1.2FCC 210226 test-keys</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the Note 1.</td></tr>
</table>

Note:

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

2.

Operation Frequency of channel	
802.11b/g/n(20MHz)	
Channel	Frequency
01	2412
02	2417
03	2422
04	2427
05	2432
06	2437
07	2442
08	2447
09	2452
10	2457
11	2462

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, themiddle frequency, and the highest frequency of channel were selected to perform the test, and the selectedchannel see below:
Carrier Frequency Channel

2.4GHz Test Frequency:

For 802.11b/g/n (HT20)	
Channel	Freq.(MHz)
01	2412
06	2437
11	2462

3.

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	VANTRON	MOB-WBT-56	PIFA	N/A	2.66dBi	WLAN Antenna

Note: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.

2.2 DESCRIPTION OF THE TEST MODES

Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate
Mode 1	TX IEEE 802.11b CH1	1 Mbps
Mode 2	TX IEEE 802.11b CH6	1 Mbps
Mode 3	TX IEEE 802.11 b CH11	1 Mbps
Mode 4	TX IEEE 802.11g CH1	6 Mbps
Mode 5	TX IEEE 802.11g CH6	6 Mbps
Mode 6	TX IEEE 802.11g CH11	6 Mbps
Mode 7	TX IEEE 802.11n HT20 CH1	MCS 0
Mode 8	TX IEEE 802.11n HT20 CH6	MCS 0
Mode 9	TX IEEE 802.11n HT20 CH11	MCS 0

Note:

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

(2) We tested for all available 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) The battery is fully-charged during the radiated and RF conducted test.

AC Conducted Emission

Test Case	
AC Conducted Emission	Mode10: Keeping WIFI TX

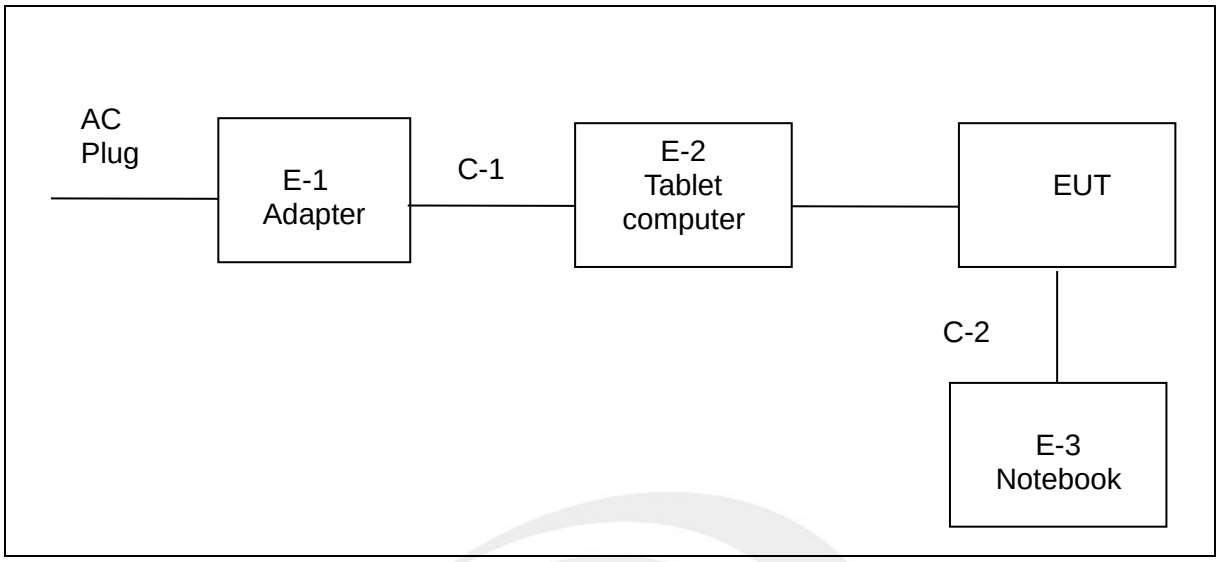
2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

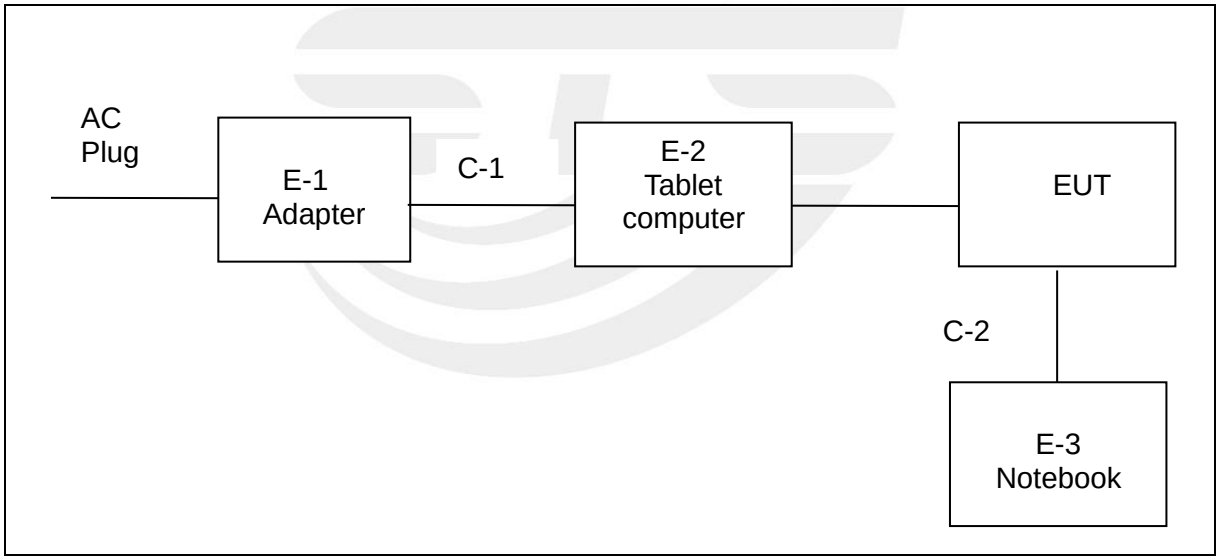
RF Function	Type	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
WIFI(2.4G)	2.4G WIFI	802.11b	2.66	default	RFTestTool
		802.11g		default	
		802.11n(HT20)		default	

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiation Test Set



Conduction Test Set



2.5 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.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-1	Adapter	N/A	WT48-1203000-T	N/A	N/A
E-2	Tablet computer	N/A	N/A	N/A	N/A
C-1	DC Cable	N/A	N/A	150cm	YES
E-3	Notebook	DELL	Inspiron 14-3467	N/A	N/A
C-2	USB Cable	N/A	N/A	80cm	NO

Note:

(1) For detachable type I/O cable should be specified the length in cm in『Length』column.

(2) “YES” is means “with core”; “NO” is means “without core”.

2.6 EQUIPMENTS LISTS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2020.10.12	2021.10.11
Signal Analyzer	R&S	FSV 40-N	101823	2020.10.10	2021.10.09
Active loop Antenna	ZHINAN	ZN30900C	16035	2019.07.11	2021.07.10
Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.12	2022.10.11
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2019.10.15	2021.10.14
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2020.10.12	2022.10.11
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2020.10.12	2021.10.11
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2020.10.12	2021.10.11
Pre-Amplifier (18G-40GHz)	SKET	LNPA-1840-50	SK2018101801	2020.10.10	2021.10.09
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12
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	2020.10.12	2021.10.11
LISN	R&S	ENV216	101242	2020.10.12	2021.10.11
LISN	EMCO	3810/2NM	23625	2020.10.12	2021.10.11
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)			

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Power Sensor	Keysight	U2021XA	MY55520005	2020.10.10	2021.10.09
			MY55520006	2020.10.10	2021.10.09
			MY56120038	2020.10.10	2021.10.09
			MY56280002	2020.10.10	2021.10.09
Signal Analyzer	Agilent	N9020A	MY51110105	2021.03.04	2022.03.03
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted Emissionlimit (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.

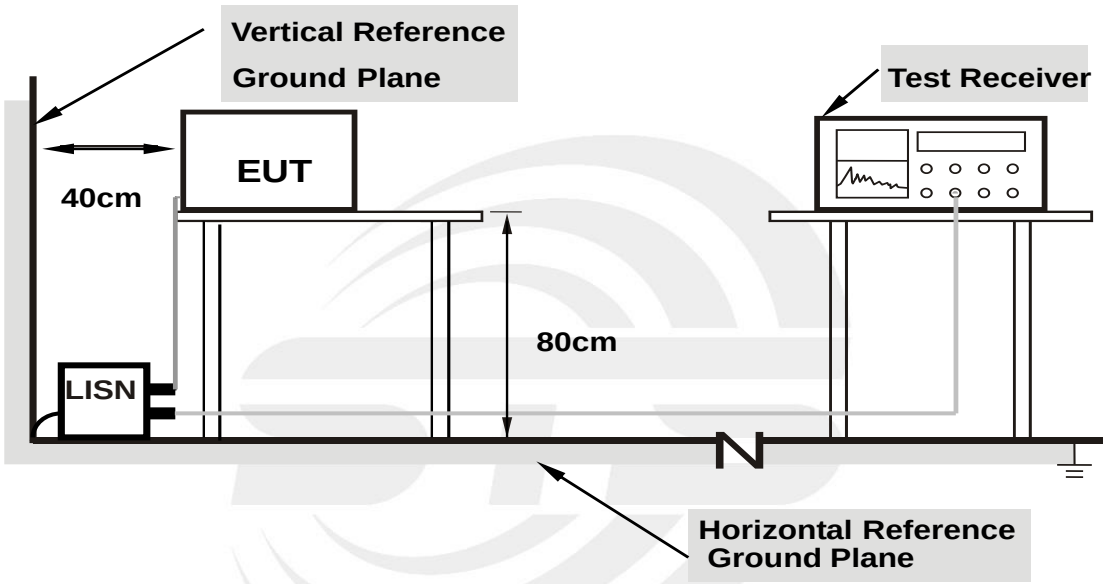
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 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 is at least 80 cm from the nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 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 cm from other units and other metal planes support units.

3.1.4 EUT OPERATING CONDITIONS

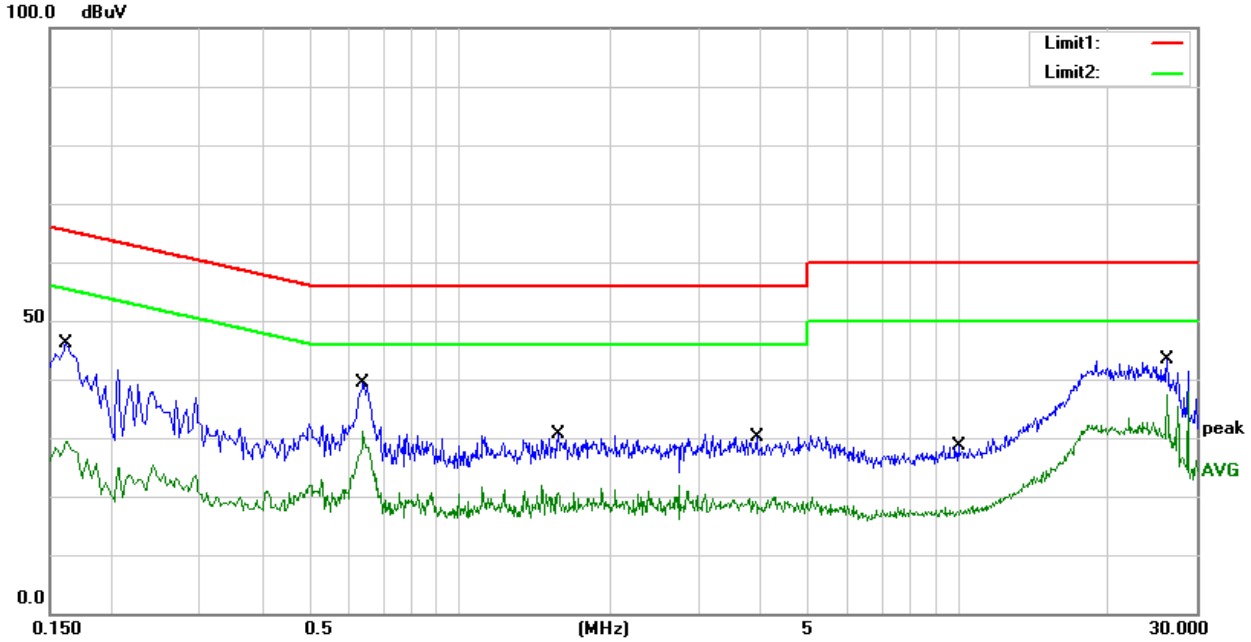
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5 TEST RESULT

Temperature:	26.8(C)	Relative Humidity:	66%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 10		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1620	25.90	20.22	46.12	65.36	-19.24	QP
2	0.1620	9.23	20.22	29.45	55.36	-25.91	AVG
3	0.6380	19.02	20.33	39.35	56.00	-16.65	QP
4	0.6380	10.75	20.33	31.08	46.00	-14.92	AVG
5	1.5740	10.42	20.15	30.57	56.00	-25.43	QP
6	1.5740	0.50	20.15	20.65	46.00	-25.35	AVG
7	3.9340	10.12	20.06	30.18	56.00	-25.82	QP
8	3.9340	-0.49	20.06	19.57	46.00	-26.43	AVG
9	9.9820	8.90	19.85	28.75	60.00	-31.25	QP
10	9.9820	-2.22	19.85	17.63	50.00	-32.37	AVG
11	26.1460	22.70	20.75	43.45	60.00	-16.55	QP
12	26.1460	16.61	20.75	37.36	50.00	-12.64	AVG

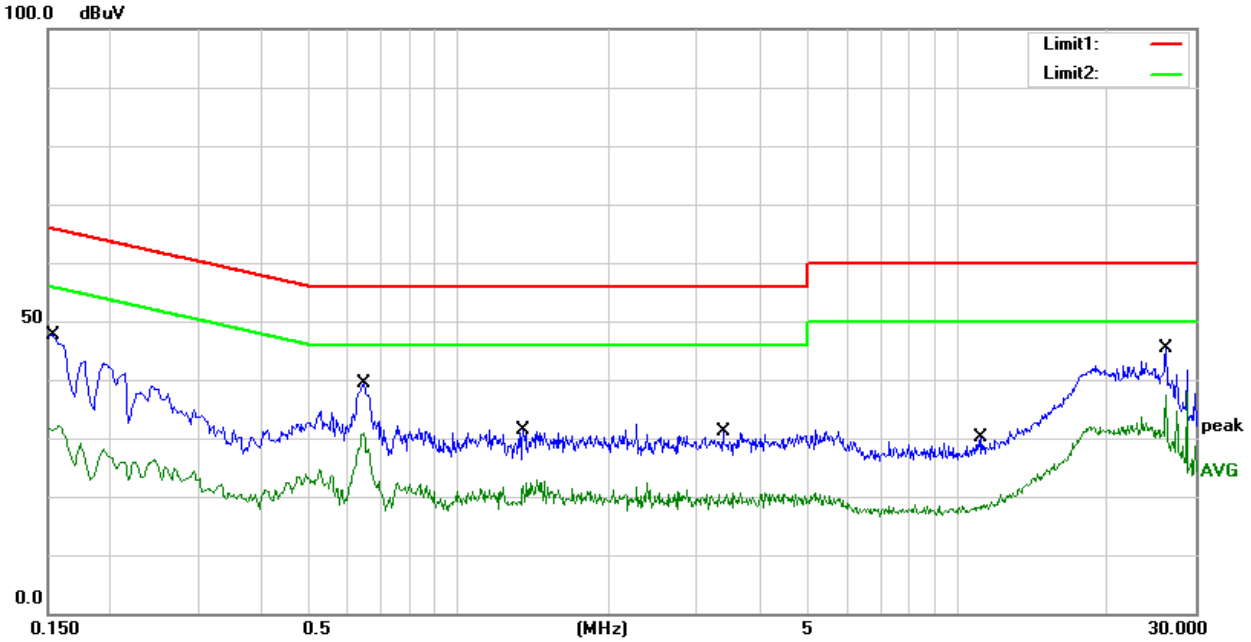
Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)



Temperature:	26.8(C)	Relative Humidity:	66%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 10		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1540	27.34	20.20	47.54	65.78	-18.24	QP
2	0.1540	11.98	20.20	32.18	55.78	-23.60	AVG
3	0.6460	19.05	20.32	39.37	56.00	-16.63	QP
4	0.6460	10.55	20.32	30.87	46.00	-15.13	AVG
5	1.3460	11.15	20.15	31.30	56.00	-24.70	QP
6	1.3460	2.32	20.15	22.47	46.00	-23.53	AVG
7	3.3860	11.08	20.07	31.15	56.00	-24.85	QP
8	3.3860	0.65	20.07	20.72	46.00	-25.28	AVG
9	11.1540	10.17	19.89	30.06	60.00	-29.94	QP
10	11.1540	-1.32	19.89	18.57	50.00	-31.43	AVG
11	26.1460	24.60	20.75	45.35	60.00	-14.65	QP
12	26.1460	16.53	20.75	37.28	50.00	-12.72	AVG

Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)



3.2 RADIATED EMISSION MEASUREMENT

3.2.1RADIATED EMISSION LIMITS

In 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 (0.009MHz - 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 (1000MHz-25GHz)

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

FCC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	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	Above 38.6
13.36-13.41			

IC:

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/QP/AV
Start Frequency	9 KHz/150KHz(Peak/QP/AV)
Stop Frequency	150KHz/30MHz(Peak/QP/AV)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz); 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz

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(Peak) 1 MHz/1/T MHz(AVG)

For Restricted band

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2300 to 2403 MHz Upper Band Edge: 2450 to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

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

3.2.2 TEST PROCEDURE

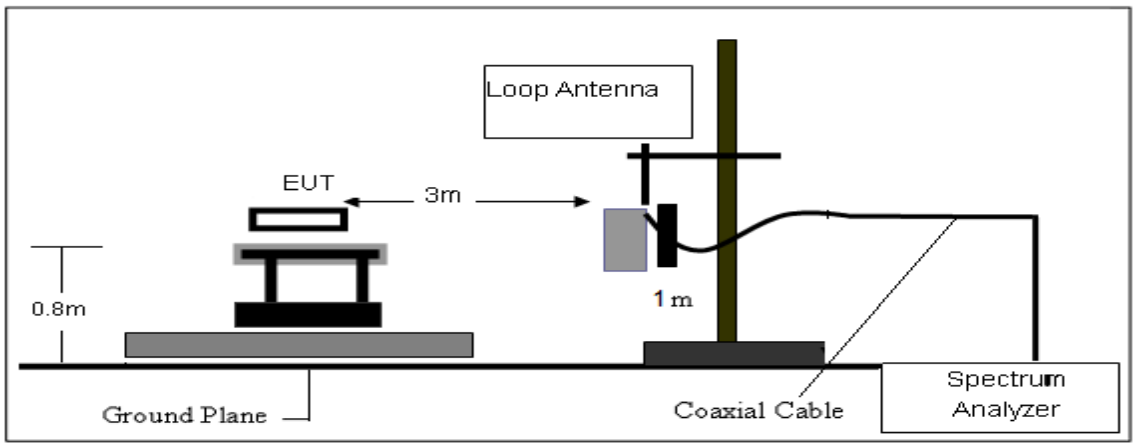
a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position 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 polarization 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 QuasiPeak detector mode will be re-measured.
e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

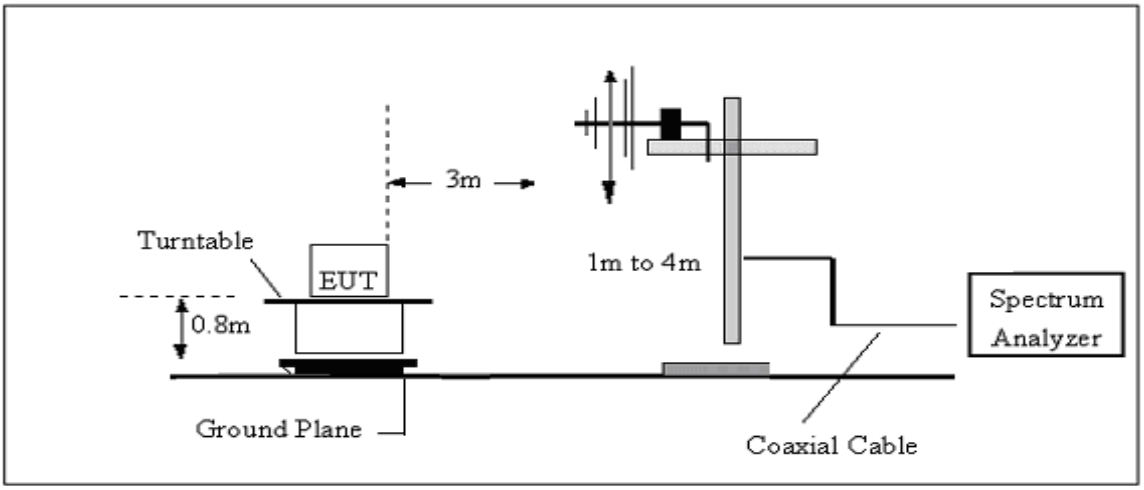
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 TEST SETUP

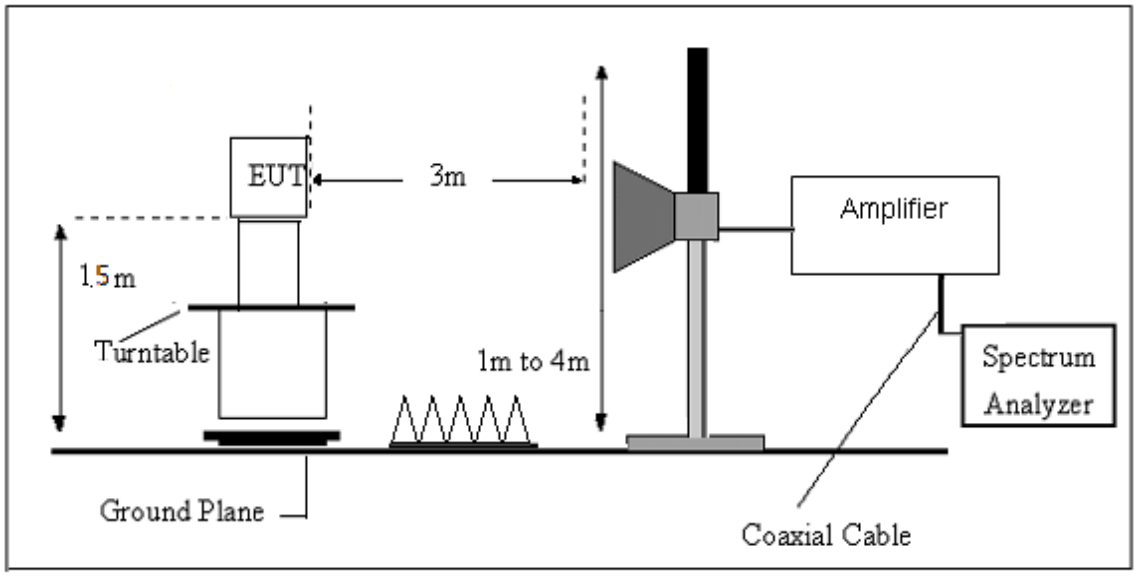
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.4 EUT OPERATING CONDITIONS

Please refer to section 3.1.4 of this report.

3.2.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting theAmplifier 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

3.2.6 TEST RESULT

9KHz-30MHz

Temperature:	23.1(C)	Relative Humidtity:	60%RH
Test Voltage:	DC 3.3V	Polarization:	--
Test Mode:	TX Mode		

Freq.	Reading	Limit	Margin	State	Test Result
(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.

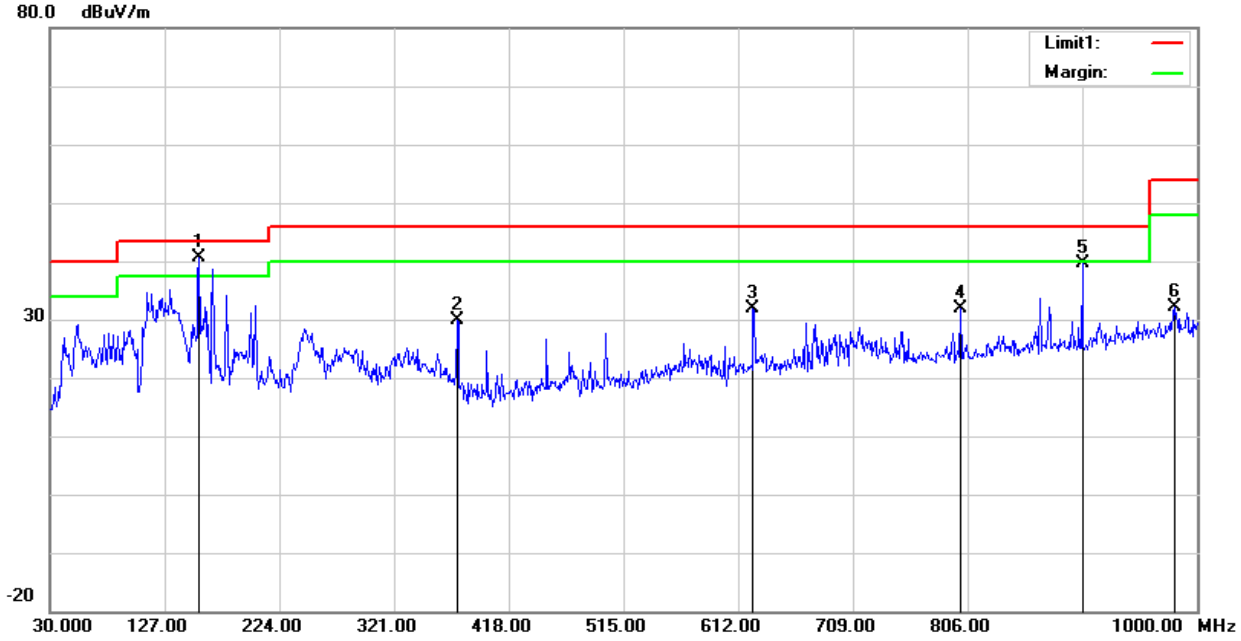
(30MHz - 1000MHz)

Temperature:	23.1(C)	Relative Humidtity:	60%RH
Test Voltage:	DC 3.3V	Phase:	Horizontal
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 7 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	156.1000	59.33	-18.66	40.67	43.50	-2.83	QP
2	374.3500	42.26	-12.39	29.87	46.00	-16.13	QP
3	624.6100	37.26	-5.29	31.97	46.00	-14.03	QP
4	800.1800	33.98	-2.05	31.93	46.00	-14.07	QP
5	903.0000	40.11	-0.37	39.74	46.00	-6.26	QP
6	980.6000	29.49	2.63	32.12	54.00	-21.88	QP

Remark:

1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

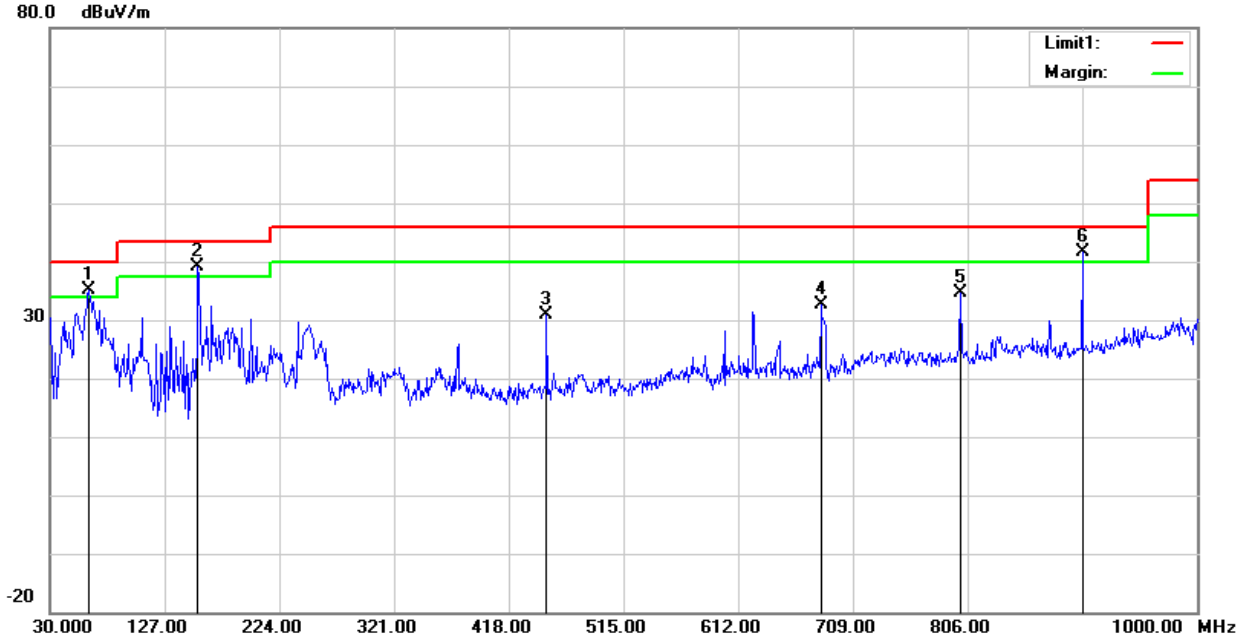


Temperature:	23.1(C)	Relative Humidtity:	60%RH
Test Voltage:	DC 3.3V	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 7 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	62.9800	60.74	-25.70	35.04	40.00	-4.96	QP
2	155.1300	57.74	-18.63	39.11	43.50	-4.39	QP
3	450.0100	40.62	-9.67	30.95	46.00	-15.05	QP
4	681.8400	36.86	-4.29	32.57	46.00	-13.43	QP
5	800.1800	36.76	-2.05	34.71	46.00	-11.29	QP
6	903.0000	41.97	-0.37	41.60	46.00	-4.40	QP

Remark:.

1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



(1000MHz-25GHz) Restricted band and Spurious emission Requirements

802.11 n(HT20)

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
Low Channel (802.11n20/2412 MHz)										
3264.74	61.04	44.70	6.70	28.20	-9.80	51.24	74.00	-22.76	PK	Vertical
3264.74	51.60	44.70	6.70	28.20	-9.80	41.80	54.00	-12.20	AV	Vertical
3264.75	61.02	44.70	6.70	28.20	-9.80	51.22	74.00	-22.78	PK	Horizontal
3264.75	50.28	44.70	6.70	28.20	-9.80	40.48	54.00	-13.52	AV	Horizontal
4824.41	59.02	44.20	9.04	31.60	-3.56	55.46	74.00	-18.54	PK	Vertical
4824.41	49.77	44.20	9.04	31.60	-3.56	46.21	54.00	-7.79	AV	Vertical
4824.53	58.60	44.20	9.04	31.60	-3.56	55.04	74.00	-18.96	PK	Horizontal
4824.53	49.71	44.20	9.04	31.60	-3.56	46.15	54.00	-7.85	AV	Horizontal
5359.62	48.65	44.20	9.86	32.00	-2.34	46.31	74.00	-27.69	PK	Vertical
5359.62	40.31	44.20	9.86	32.00	-2.34	37.97	54.00	-16.03	AV	Vertical
5359.79	48.31	44.20	9.86	32.00	-2.34	45.97	74.00	-28.03	PK	Horizontal
5359.79	38.37	44.20	9.86	32.00	-2.34	36.03	54.00	-17.97	AV	Horizontal
7235.90	54.87	43.50	11.40	35.50	3.40	58.27	74.00	-15.73	PK	Vertical
7235.90	43.92	43.50	11.40	35.50	3.40	47.32	54.00	-6.68	AV	Vertical
7235.78	54.84	43.50	11.40	35.50	3.40	58.24	74.00	-15.76	PK	Horizontal
7235.78	44.48	43.50	11.40	35.50	3.40	47.88	54.00	-6.12	AV	Horizontal
Middle Channel (802.11n20/2437 MHz)										
3264.79	60.86	44.70	6.70	28.20	-9.80	51.06	74.00	-22.94	PK	Vertical
3264.79	50.43	44.70	6.70	28.20	-9.80	40.63	54.00	-13.37	AV	Vertical
3264.79	62.12	44.70	6.70	28.20	-9.80	52.32	74.00	-21.68	PK	Horizontal
3264.79	50.85	44.70	6.70	28.20	-9.80	41.05	54.00	-12.95	AV	Horizontal
4874.40	59.25	44.20	9.04	31.60	-3.56	55.69	74.00	-18.31	PK	Vertical
4874.40	49.68	44.20	9.04	31.60	-3.56	46.12	54.00	-7.88	AV	Vertical
4874.41	58.35	44.20	9.04	31.60	-3.56	54.79	74.00	-19.21	PK	Horizontal
4874.41	50.20	44.20	9.04	31.60	-3.56	46.64	54.00	-7.36	AV	Horizontal
5359.66	48.68	44.20	9.86	32.00	-2.34	46.34	74.00	-27.66	PK	Vertical
5359.66	39.63	44.20	9.86	32.00	-2.34	37.29	54.00	-16.71	AV	Vertical
5359.87	47.42	44.20	9.86	32.00	-2.34	45.08	74.00	-28.92	PK	Horizontal
5359.87	38.85	44.20	9.86	32.00	-2.34	36.51	54.00	-17.49	AV	Horizontal
7310.71	54.66	43.50	11.40	35.50	3.40	58.06	74.00	-15.94	PK	Vertical
7310.71	44.02	43.50	11.40	35.50	3.40	47.42	54.00	-6.58	AV	Vertical
7310.67	54.24	43.50	11.40	35.50	3.40	57.64	74.00	-16.36	PK	Horizontal
7310.67	44.32	43.50	11.40	35.50	3.40	47.72	54.00	-6.28	AV	Horizontal

High Channel (802.11n20/2462 MHz)										
3264.62	61.14	44.70	6.70	28.20	-9.80	51.34	74.00	-22.66	PK	Vertical
3264.62	51.59	44.70	6.70	28.20	-9.80	41.79	54.00	-12.21	AV	Vertical
3264.65	61.88	44.70	6.70	28.20	-9.80	52.08	74.00	-21.92	PK	Horizontal
3264.65	49.84	44.70	6.70	28.20	-9.80	40.04	54.00	-13.96	AV	Horizontal
4924.40	58.21	44.20	9.04	31.60	-3.56	54.65	74.00	-19.35	PK	Vertical
4924.40	50.10	44.20	9.04	31.60	-3.56	46.54	54.00	-7.46	AV	Vertical
4924.37	58.72	44.20	9.04	31.60	-3.56	55.16	74.00	-18.84	PK	Horizontal
4924.37	49.42	44.20	9.04	31.60	-3.56	45.86	54.00	-8.14	AV	Horizontal
5359.84	48.62	44.20	9.86	32.00	-2.34	46.28	74.00	-27.72	PK	Vertical
5359.84	39.21	44.20	9.86	32.00	-2.34	36.87	54.00	-17.13	AV	Vertical
5359.68	47.12	44.20	9.86	32.00	-2.34	44.78	74.00	-29.22	PK	Horizontal
5359.68	39.12	44.20	9.86	32.00	-2.34	36.78	54.00	-17.22	AV	Horizontal
7385.71	54.01	43.50	11.40	35.50	3.40	57.41	74.00	-16.59	PK	Vertical
7385.71	44.11	43.50	11.40	35.50	3.40	47.51	54.00	-6.49	AV	Vertical
7385.73	54.76	43.50	11.40	35.50	3.40	58.16	74.00	-15.84	PK	Horizontal
7385.73	44.07	43.50	11.40	35.50	3.40	47.47	54.00	-6.53	AV	Horizontal

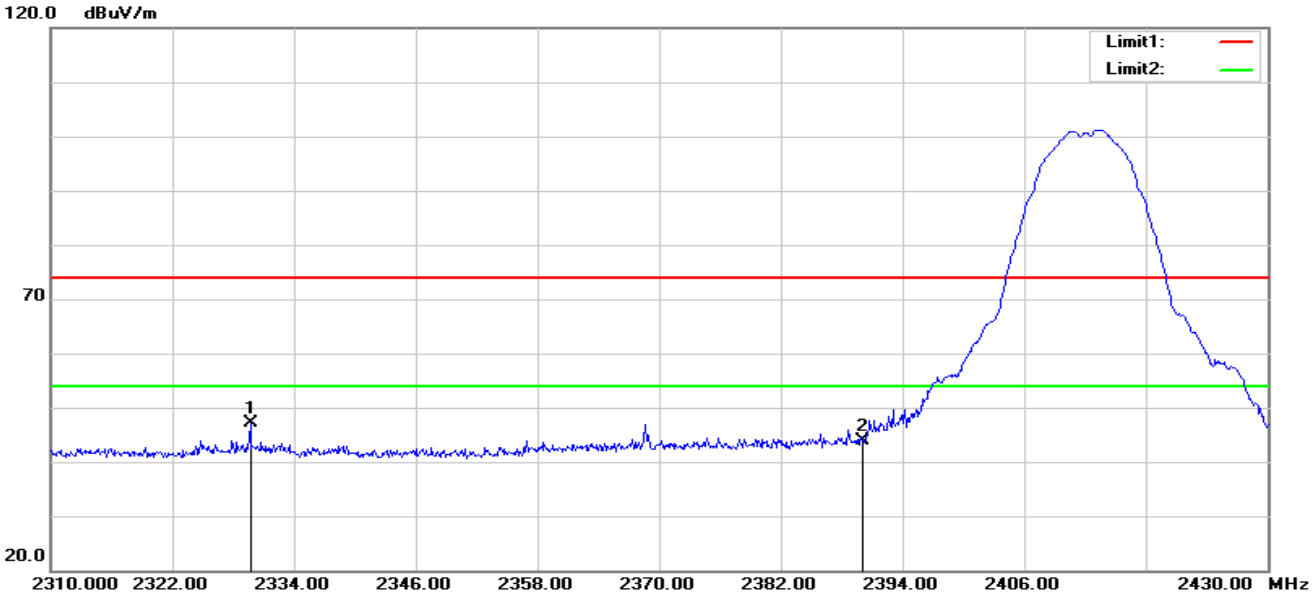
Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Scan with 802.11b, 802.11g, 802.11n (HT-20), the worst case is 802.11 n(HT20).
   Emission Level = Reading + Factor
   Margin = Limit - Emission Level
3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

3.2.6 TEST RESULTS(Band edge Requirements)

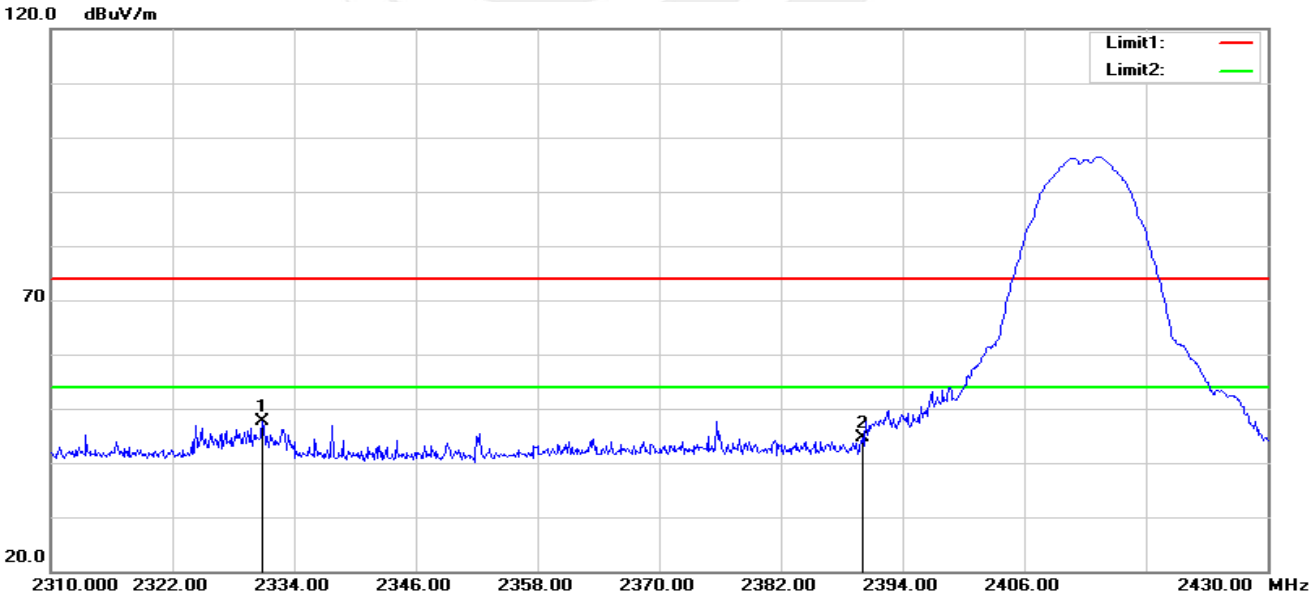
802.11 n(HT20)-Low

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2329.680	43.44	3.63	47.07	74.00	-26.93	peak
2	2390.000	39.47	4.34	43.81	74.00	-30.19	peak

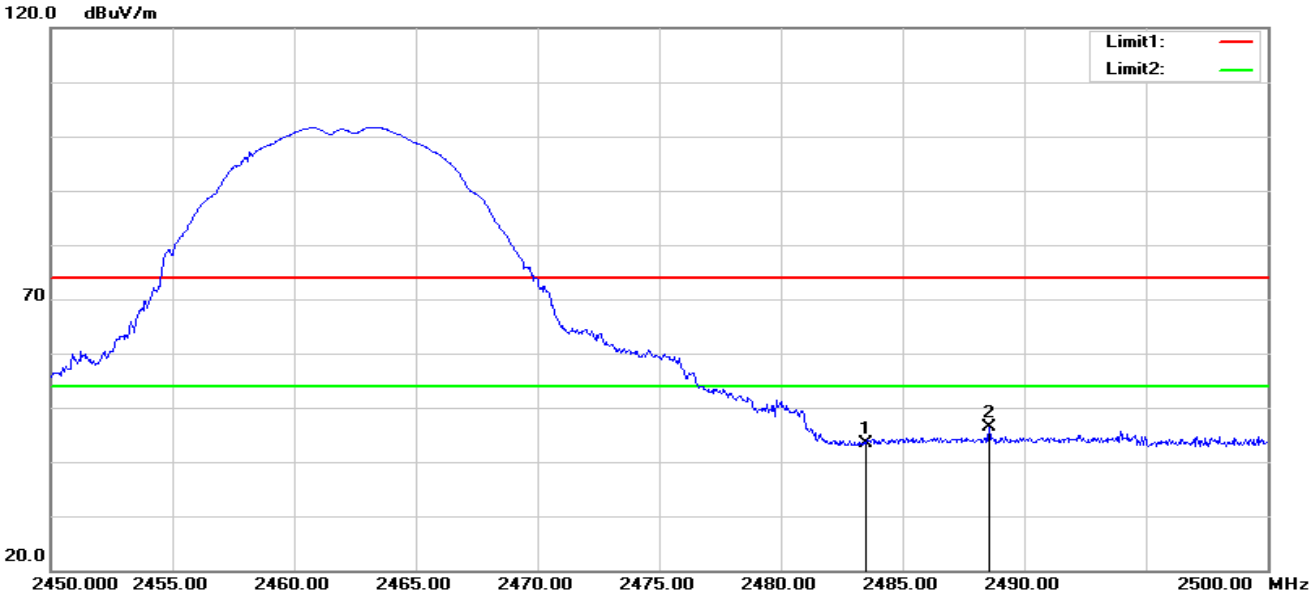
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2330.880	44.03	3.63	47.66	74.00	-26.34	peak
2	2390.000	40.22	4.34	44.56	74.00	-29.44	peak

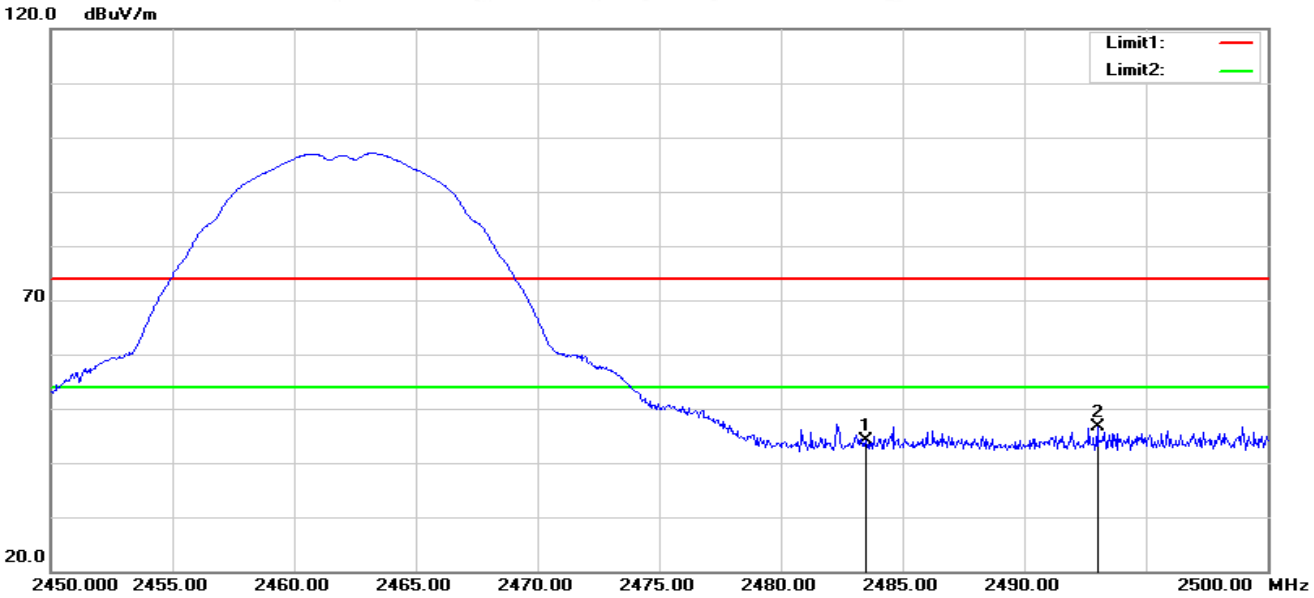
802.11 n(HT20)-High

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	38.78	4.60	43.38	74.00	-30.62	peak
2	2488.550	41.76	4.62	46.38	74.00	-27.62	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	39.59	4.60	44.19	74.00	-29.81	peak
2	2493.000	41.87	4.64	46.51	74.00	-27.49	peak

Note: 802.11b, 802.11g, 802.11n (HT-20) mode all have been tested, the worst case is 802.11 n(HT20), only show the worst case.

4.CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 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.

4.2 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 to 2412 MHz Upper Band Edge: 2462 to 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP

The EUT which is powered by the DC Power, is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; 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.

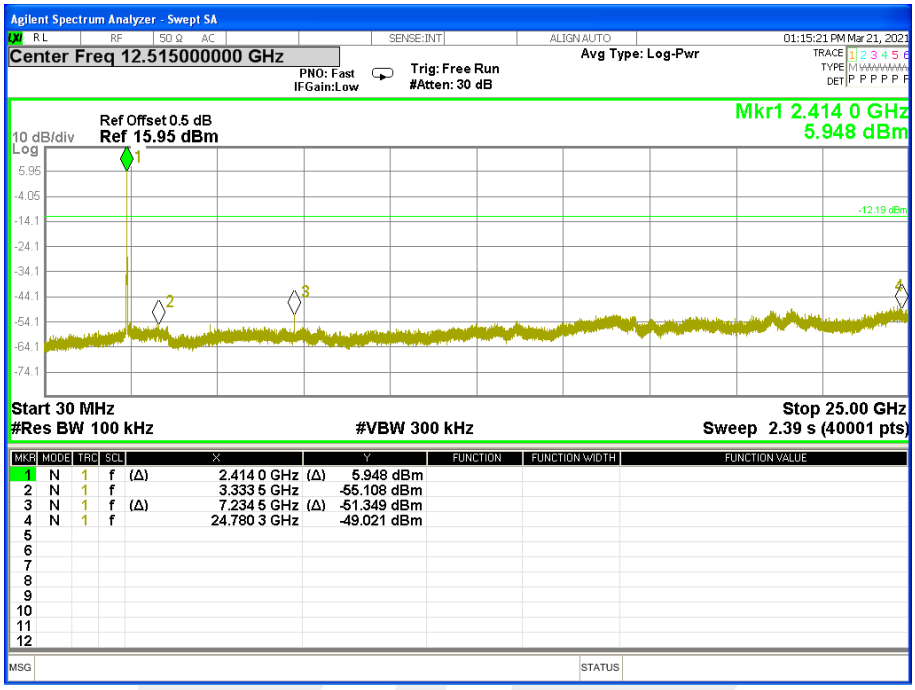
4.5 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

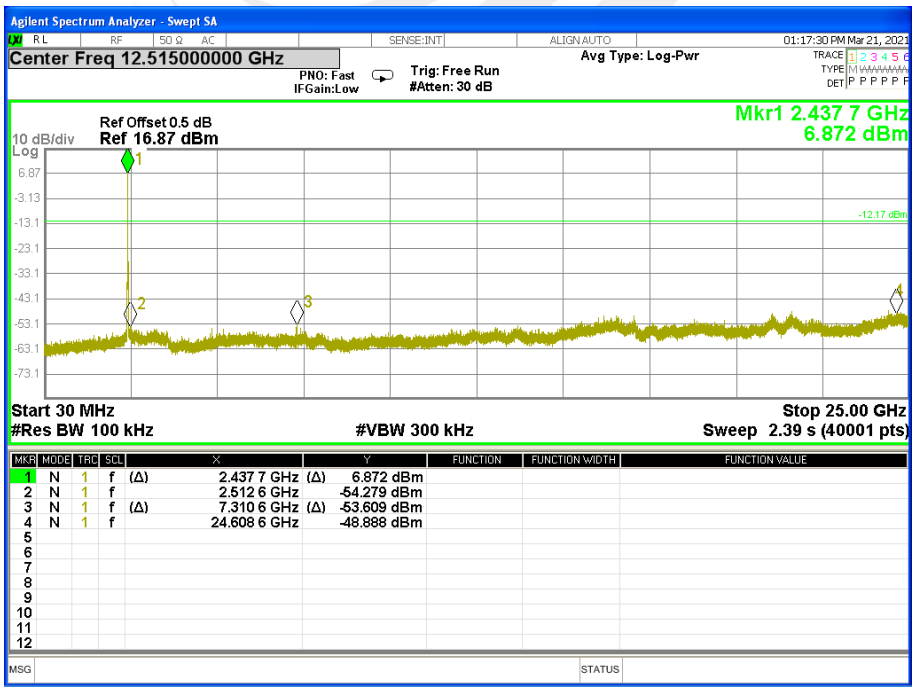
4.6 TEST RESULTS

Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX b Mode /CH01, CH06, CH11

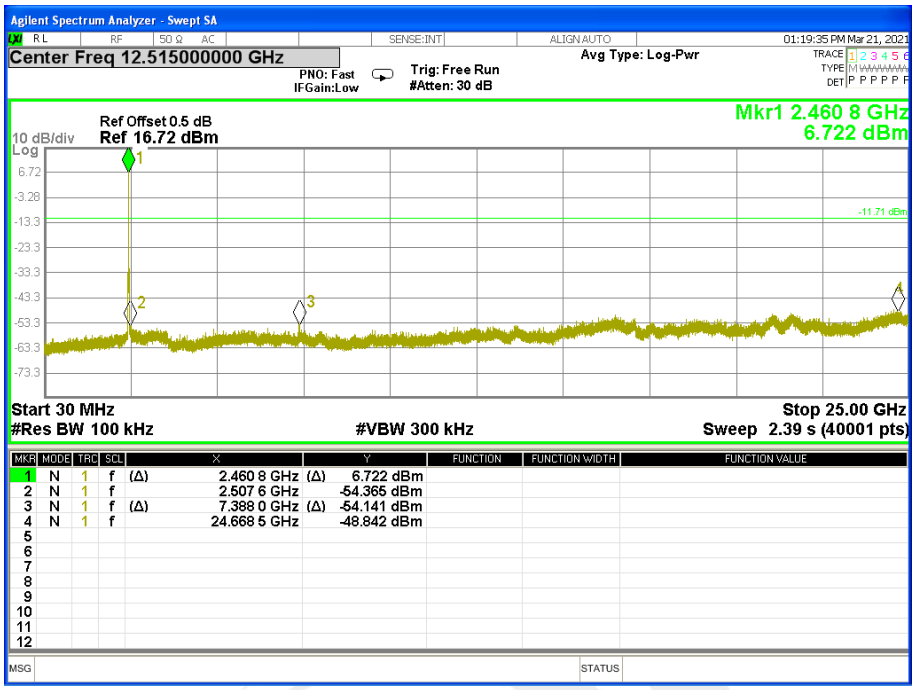
CH 01



CH 06

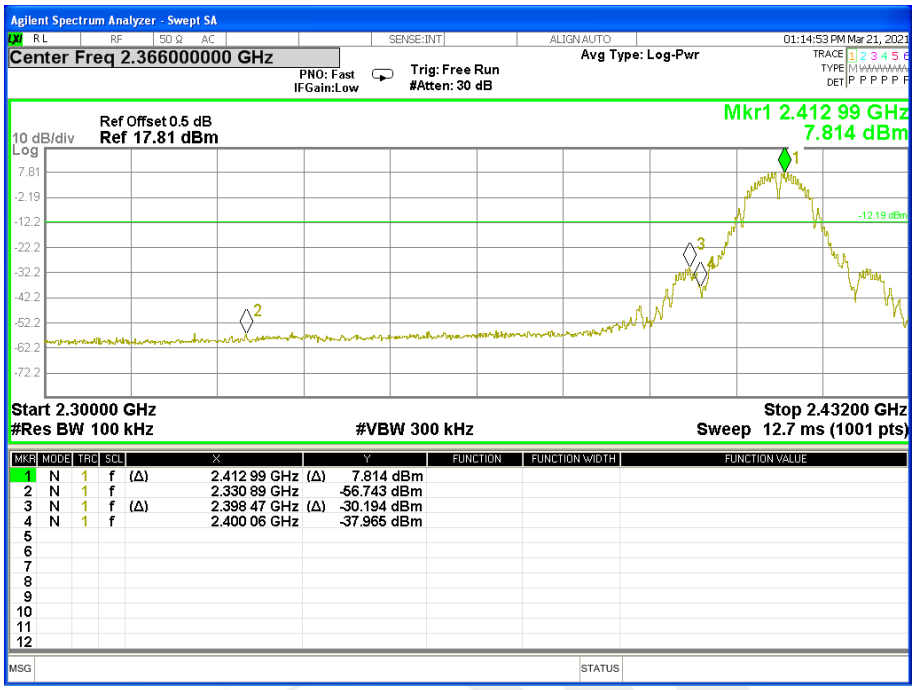


CH 11

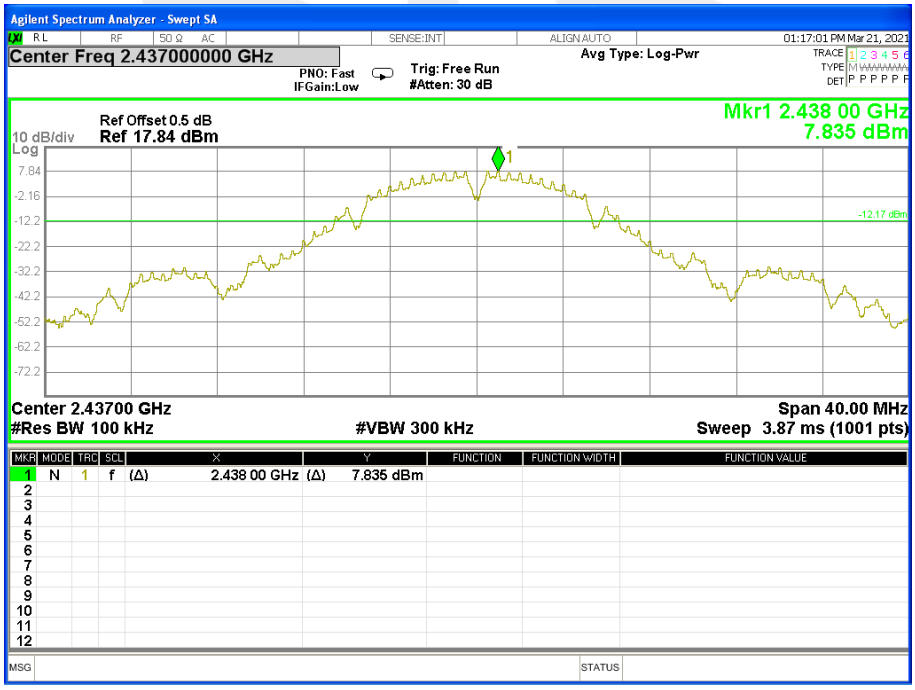

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
01:19:35 PM Mar 21, 2021
Ref Offset 0.5 dB
10 dB/div
Log
Ref 16.72 dBm
Mkr1 2.460 8 GHz
6.722 dBm
-11.71 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.39 s (40001 pts)
1 N 1 f (Δ) 2.460 8 GHz (Δ) 6.722 dBm
2 N 1 f 2.507 6 GHz -54.365 dBm
3 N 1 f (Δ) 7.388 0 GHz (Δ) -54.141 dBm
4 N 1 f 24.668 5 GHz -48.842 dBm

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

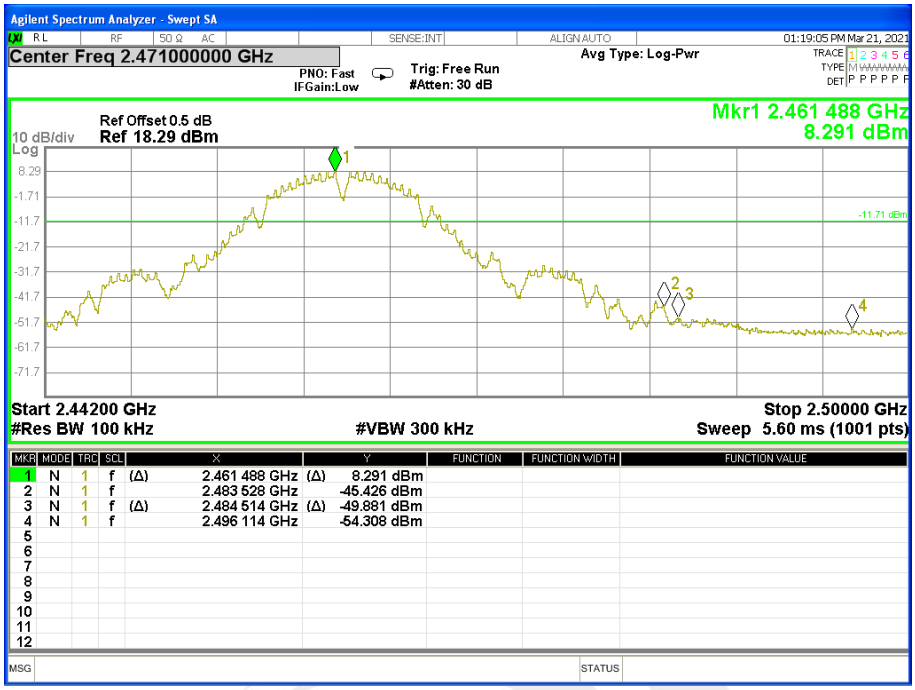
CH 01



CH 06

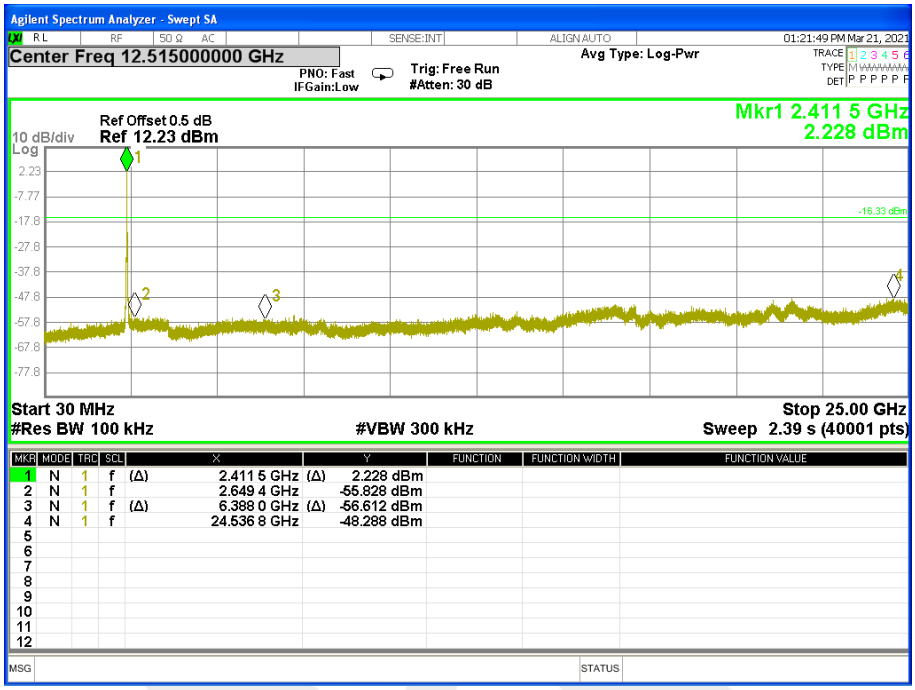


CH 11

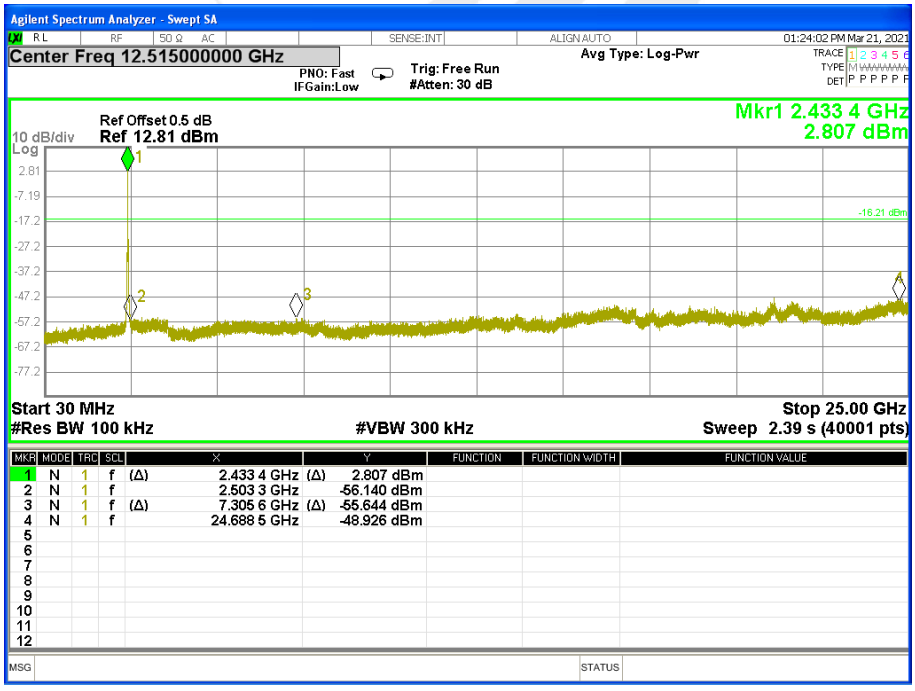

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.471000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
01:19:05 PM Mar 21, 2021
Ref Offset 0.5 dB
10 dB/div
Log
Ref 18.29 dBm
Mkr1 2.461 488 GHz
8.291 dBm
-11.71 dBm
Start 2.44200 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 5.60 ms (1001 pts)
1 N 1 f (Δ) 2.461 488 GHz (Δ) 8.291 dBm
2 N 1 f 2.483 528 GHz -45.426 dBm
3 N 1 f (Δ) 2.484 514 GHz (Δ) -49.881 dBm
4 N 1 f 2.496 114 GHz -54.308 dBm

Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX g Mode /CH01, CH06, CH11

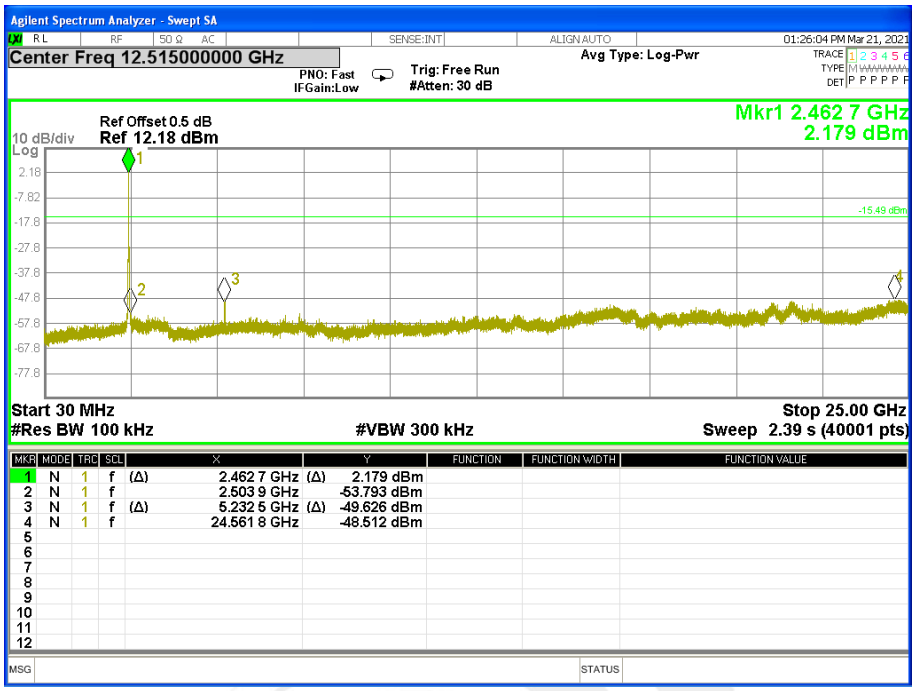
CH 01



CH06

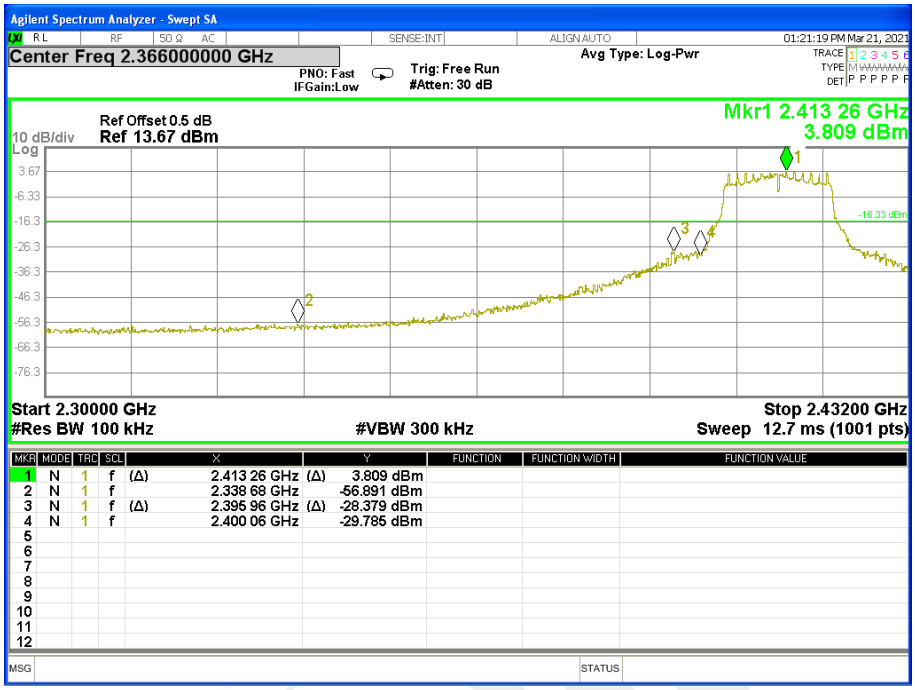


CH 11

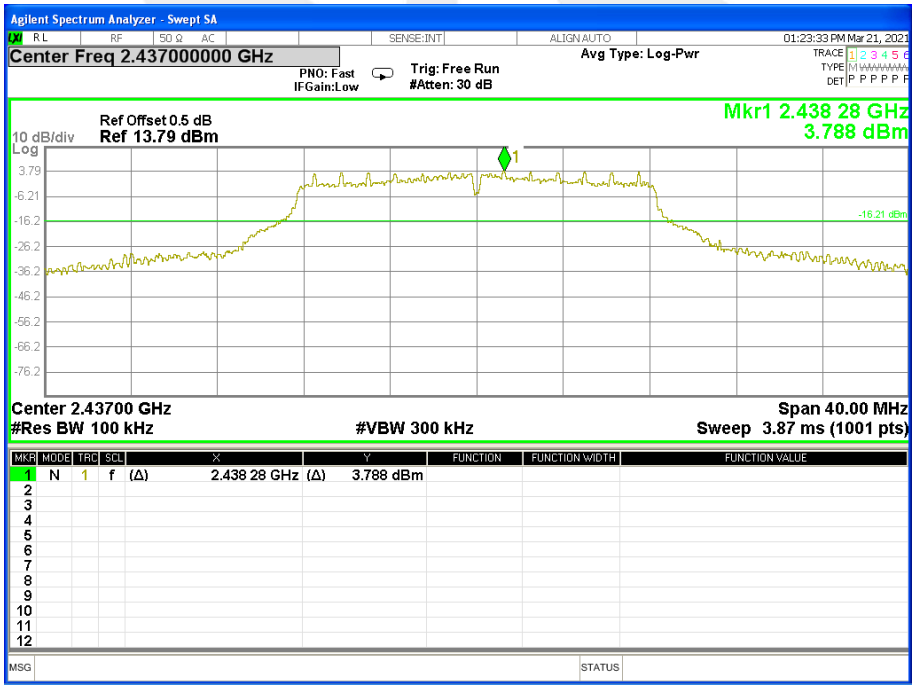

Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
01:26:04 PM Mar 21, 2021
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P P P P P
Ref Offset 0.5 dB
10 dB/div
Log
Ref 12.18 dBm
Mkr1 2.462 7 GHz
2.179 dBm
2.18
-7.82
-17.8
-27.8
-37.8
-47.8
-57.8
-67.8
-77.8
-15.49 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.39 s (40001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f (Δ) 2.462 7 GHz (Δ) 2.179 dBm
2 N 1 f 2.503 9 GHz -53.793 dBm
3 N 1 f (Δ) 5.232 5 GHz (Δ) -49.626 dBm
4 N 1 f 24.561 8 GHz -48.512 dBm
5
6
7
8
9
10
11
12
MSG
STATUS

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

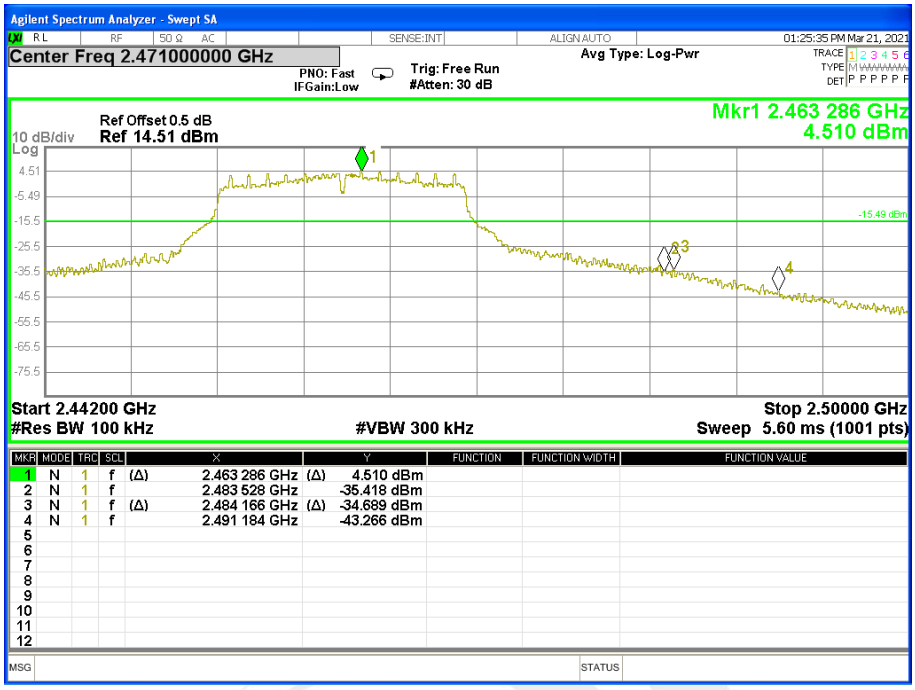
CH 01



CH06

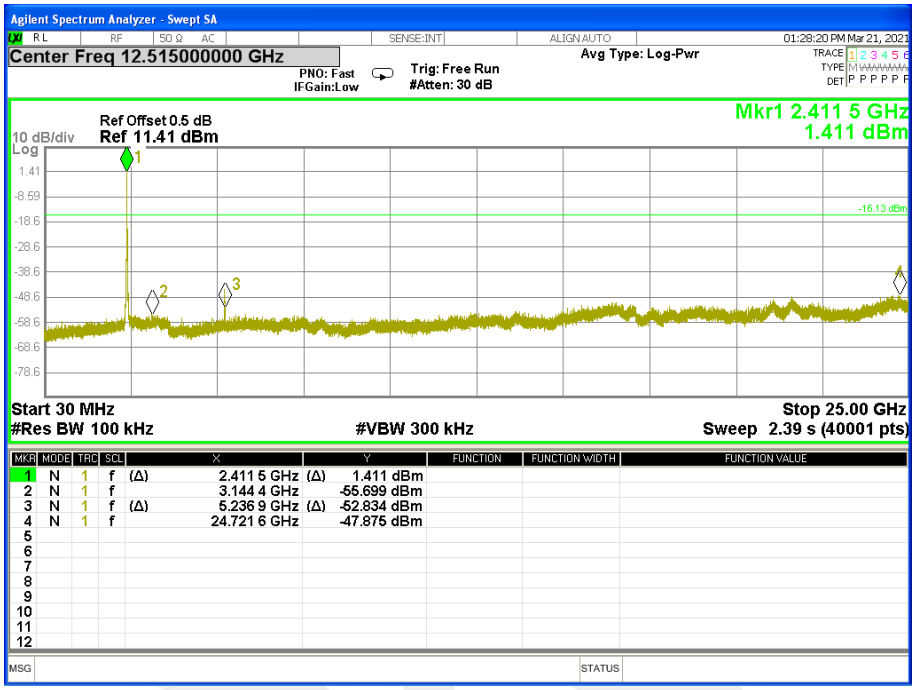


CH11

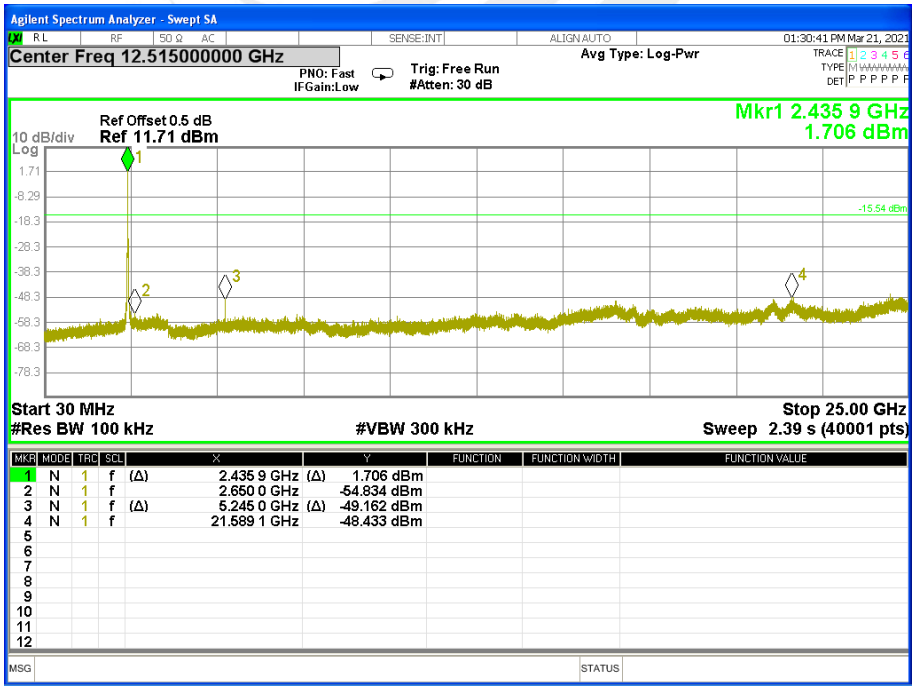

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.471000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
01:25:35 PM Mar 21, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 14.51 dBm
Mkr1 2.463 286 GHz
4.510 dBm
-15.49 dBm
Start 2.44200 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 5.60 ms (1001 pts)
1 N 1 f (Δ) 2.463 286 GHz (Δ) 4.510 dBm
2 N 1 f 2.483 528 GHz -35.418 dBm
3 N 1 f (Δ) 2.484 166 GHz (Δ) -34.689 dBm
4 N 1 f 2.491 184 GHz -43.266 dBm

Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX n Mode(20M) /CH01, CH06, CH11

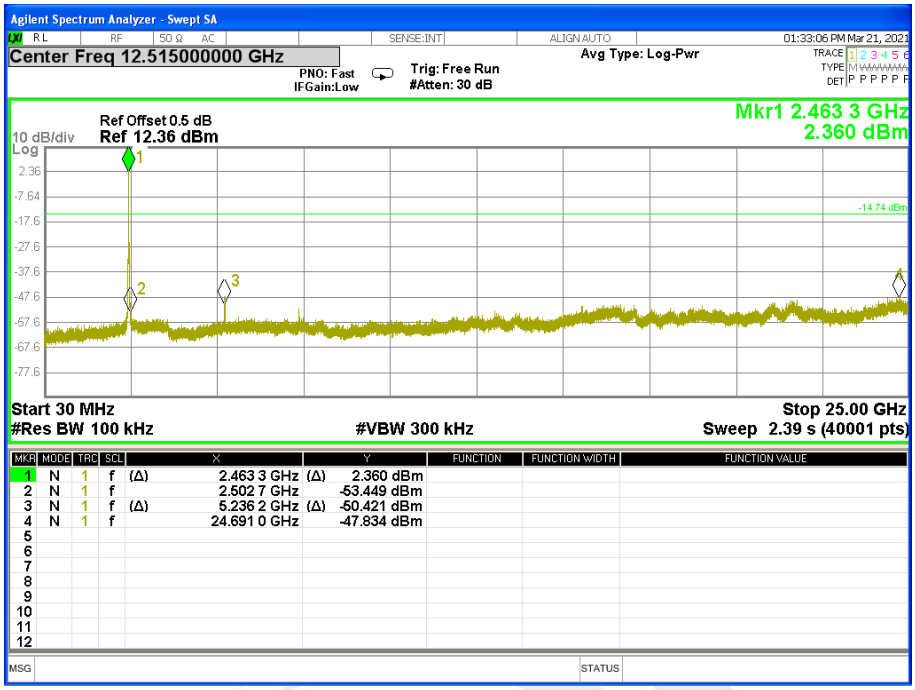
CH 01



CH 06

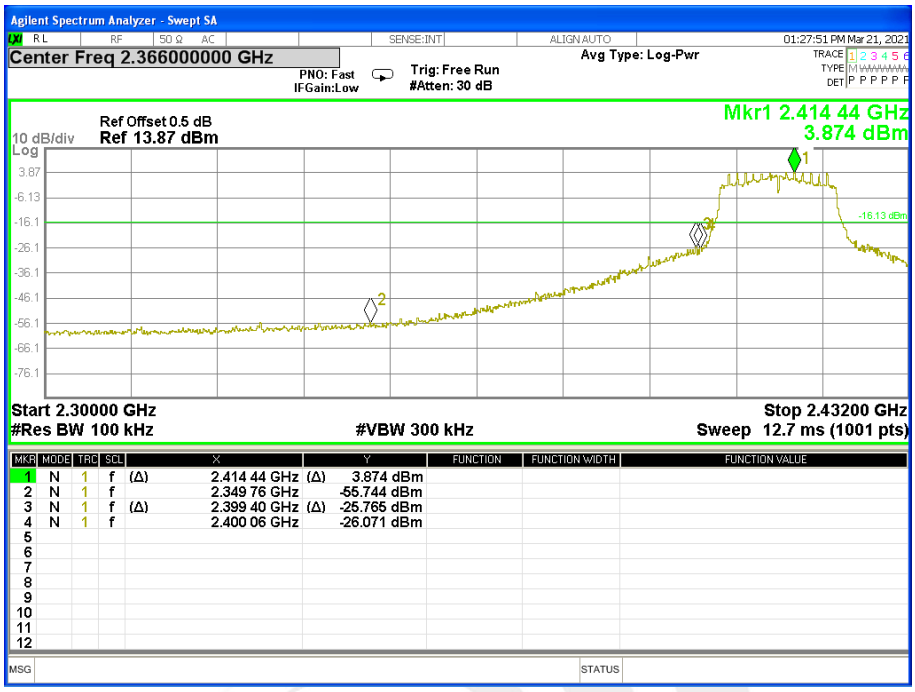


CH 11

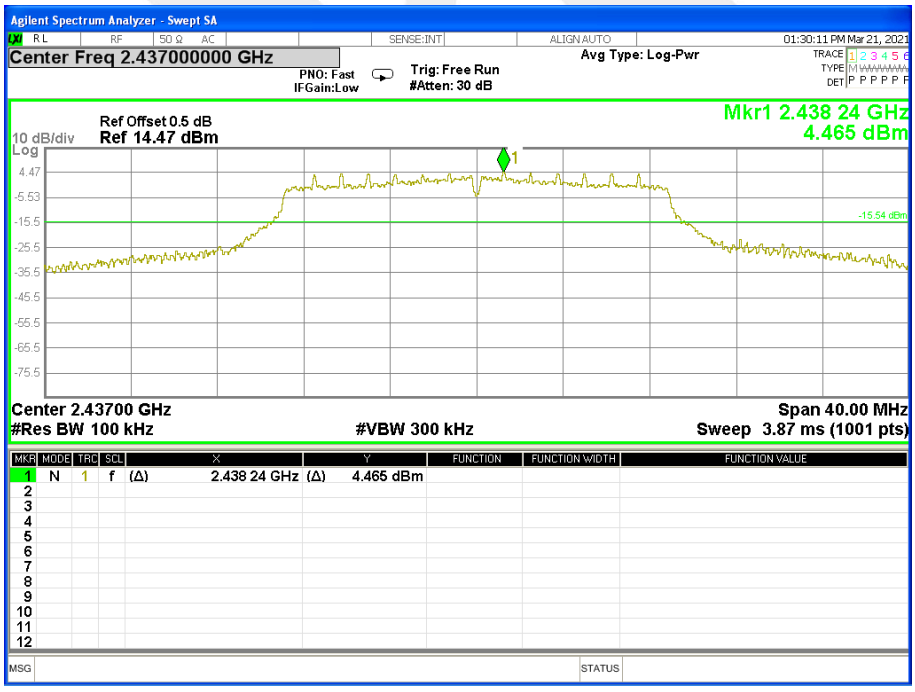

Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
01:33:06 PM Mar 21, 2021
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P
Ref Offset 0.5 dB
10 dB/div
Log
Ref 12.36 dBm
Mkr1 2.463 3 GHz
2.360 dBm
2.36
-7.64
-17.6
-27.6
-37.6
-47.6
-57.6
-67.6
-77.6
-14.74 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.39 s (40001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f (Δ) 2.463 3 GHz (Δ) 2.360 dBm
2 N 1 f 2.502 7 GHz -53.449 dBm
3 N 1 f (Δ) 5.236 2 GHz (Δ) -50.421 dBm
4 N 1 f 24.691 0 GHz -47.834 dBm
5
6
7
8
9
10
11
12
MSG
STATUS

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

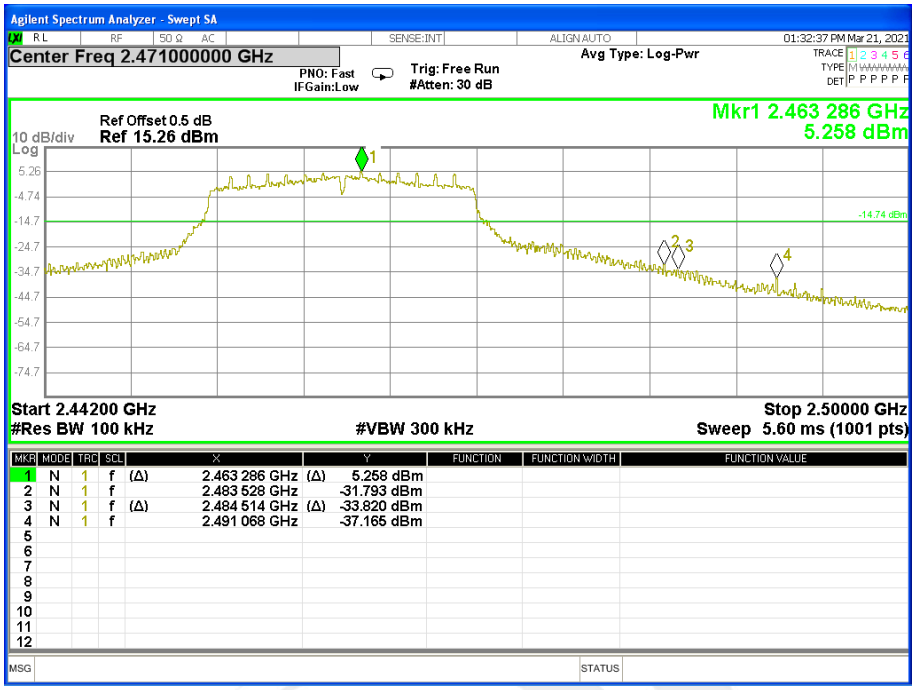
CH 01



CH 06



CH 11


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.471000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
01:32:37 PM Mar 21, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 15.26 dBm
Log
Mkr1 2.463 286 GHz
5.258 dBm
-14.74 dBm
Start 2.44200 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 5.60 ms (1001 pts)
1 N 1 f (Δ) 2.463 286 GHz (Δ) 5.258 dBm
2 N 1 f 2.483 528 GHz -31.793 dBm
3 N 1 f (Δ) 2.484 514 GHz (Δ) -33.820 dBm
4 N 1 f 2.491 068 GHz -37.165 dBm

5. POWER SPECTRAL DENSITY TEST

5.1 LIMIT

FCC Part15.247 , 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

5.2 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 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.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP

5.5 EUT OPERATION CONDITIONS

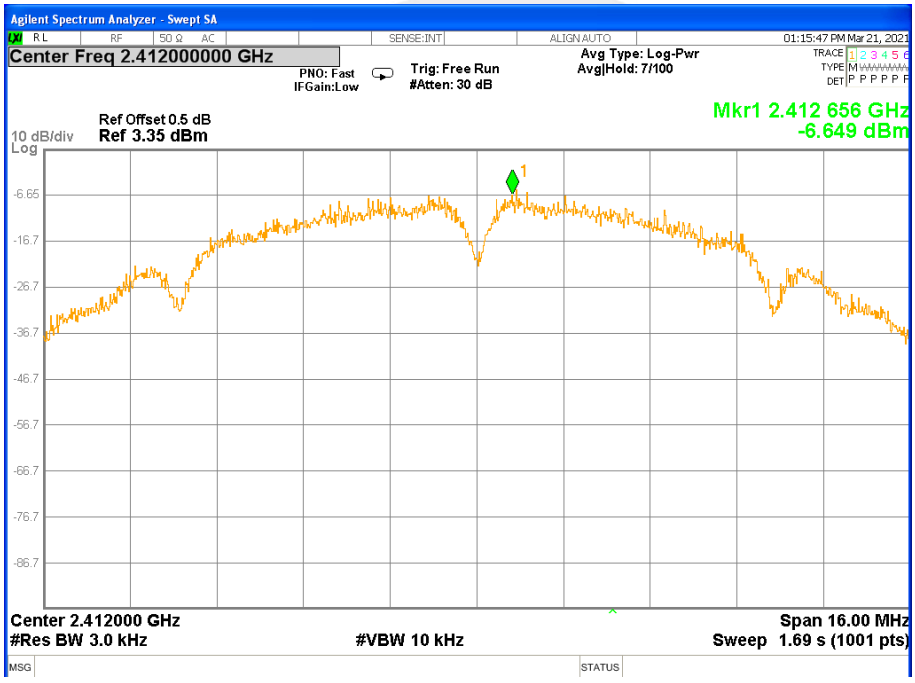
Please refer to section 3.1.4 of this report.

5.6 TEST RESULTS

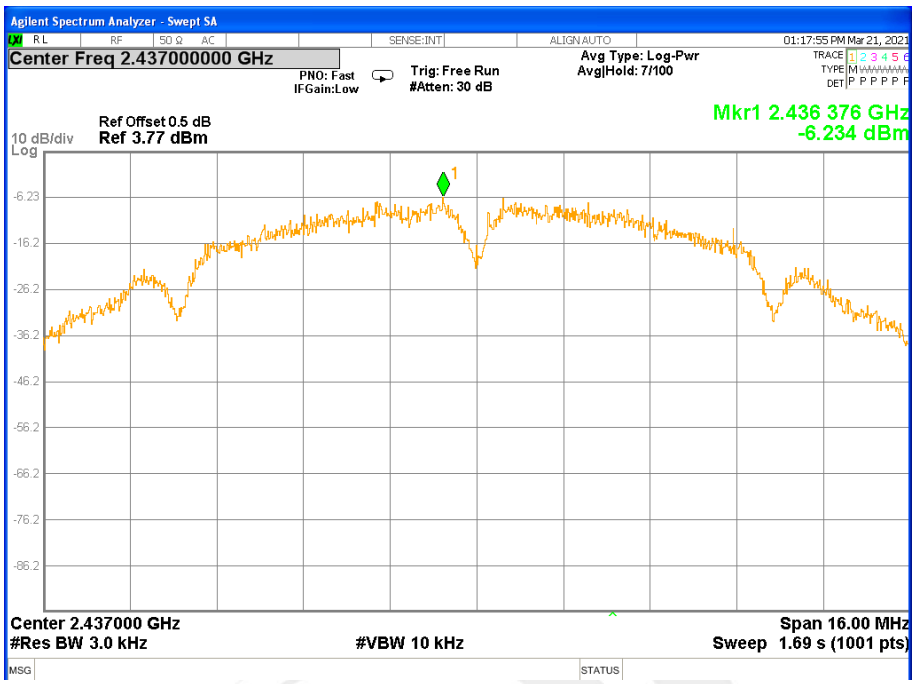
Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX b Mode /CH01, CH06, CH11

Frequency	Power Density (dBm/3kHz)	Limit (dBm/3KHz)	Result
2412 MHz	-6.649	≤8	PASS
2437 MHz	-6.234	≤8	PASS
2462 MHz	-5.935	≤8	PASS

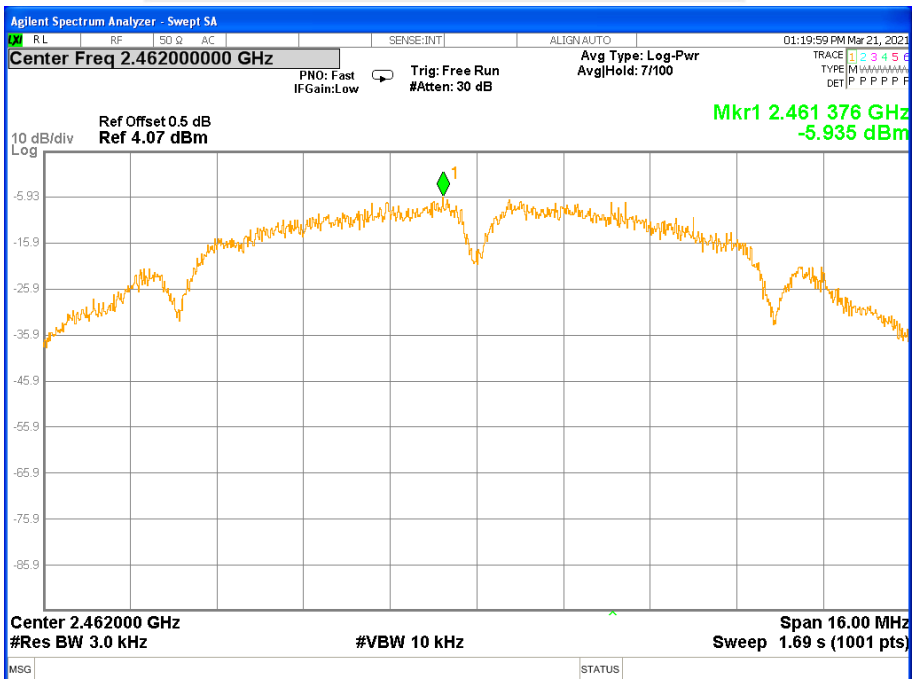
TX CH01



TX CH06



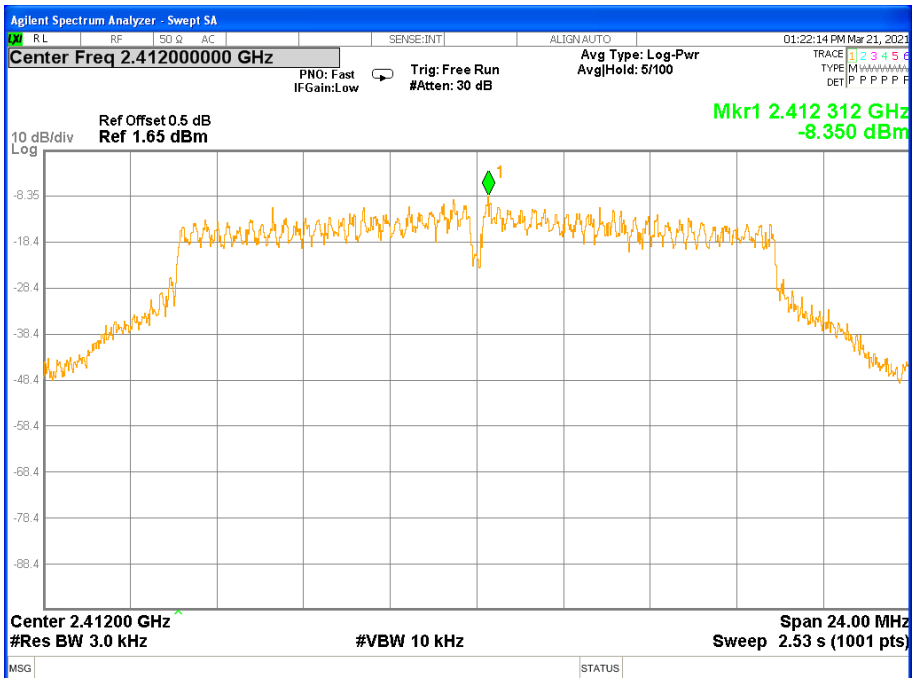
TX CH11



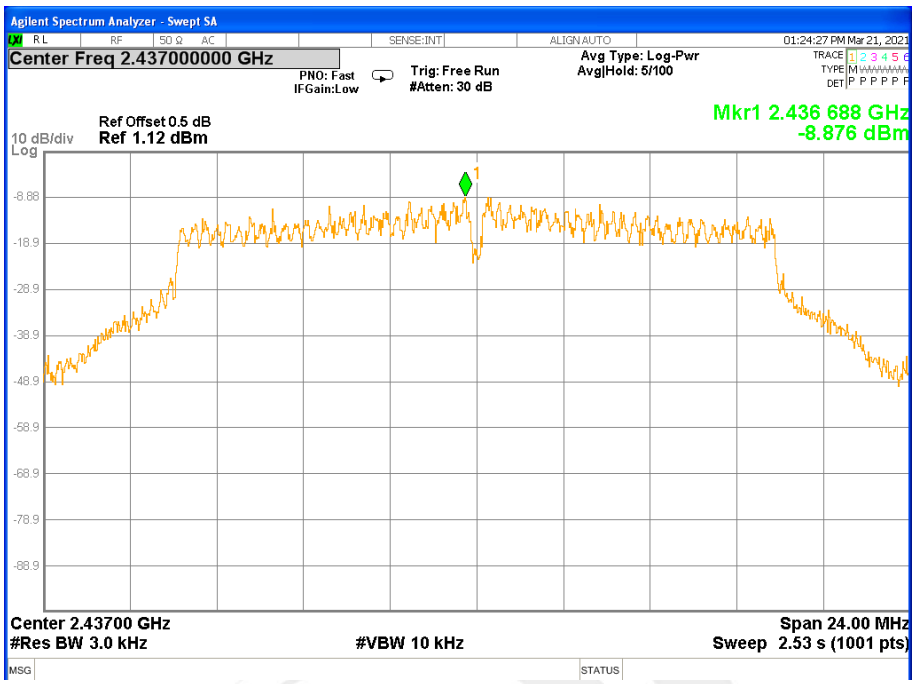
Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX g Mode /CH01, CH06, CH11

Frequency	Power Density (dBm/3kHz)	Limit (dBm/3KHz)	Result
2412 MHz	-8.3500	≤8	PASS
2437 MHz	-8.8760	≤8	PASS
2462 MHz	-7.2670	≤8	PASS

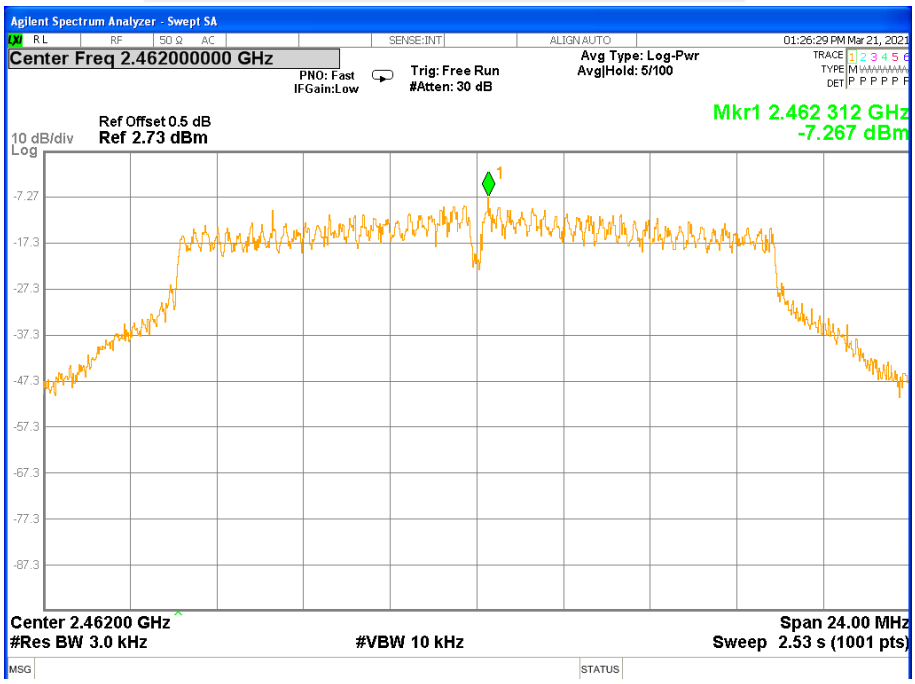
TX CH01



TX CH06



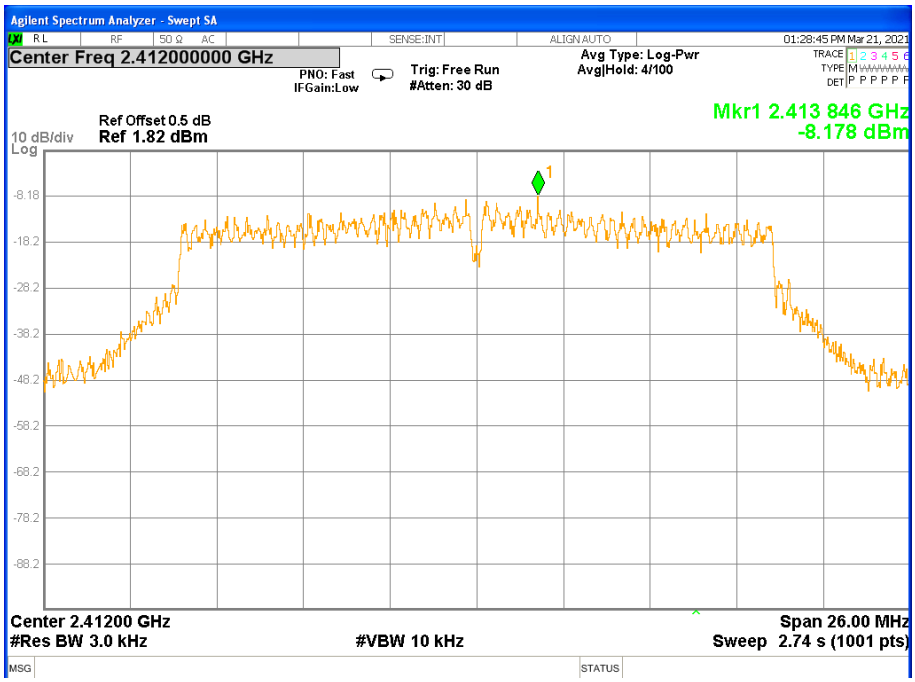
TX CH11



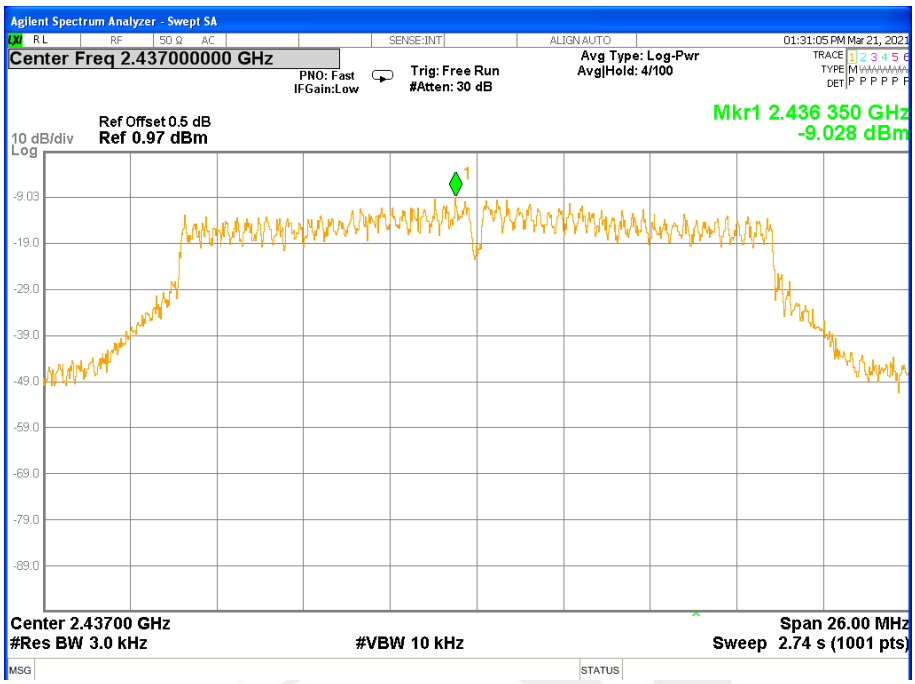
Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX n Mode(20M) /CH01, CH06, CH11

Frequency	Power Density (dBm/3kHz)	Limit (dBm/3KHz)	Result
2412 MHz	-8.1780	≤8	PASS
2437 MHz	-9.0280	≤8	PASS
2462 MHz	-8.9630	≤8	PASS

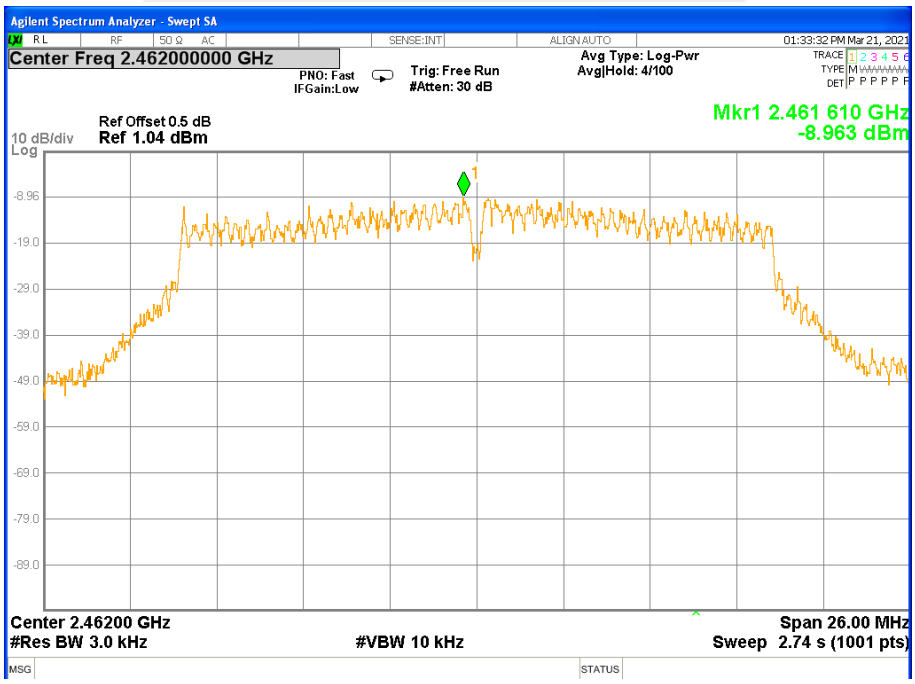
TX CH01



TX CH06



TX CH11



6. BANDWIDTH TEST

6.1 LIMIT

FCC Part15.247,Subpart C RSS-Gen Clause 6.7				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2) RSS-Gen Clause 6.7	Bandwidth	≥500KHz (6dB bandwidth)	2400-2483.5	PASS
RSS-Gen Clause 6.7	99% Bandwidth	For reporting purposes only.	2400-2483.5	PASS

6.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW≥3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be≥6 dB.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP

6.5 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

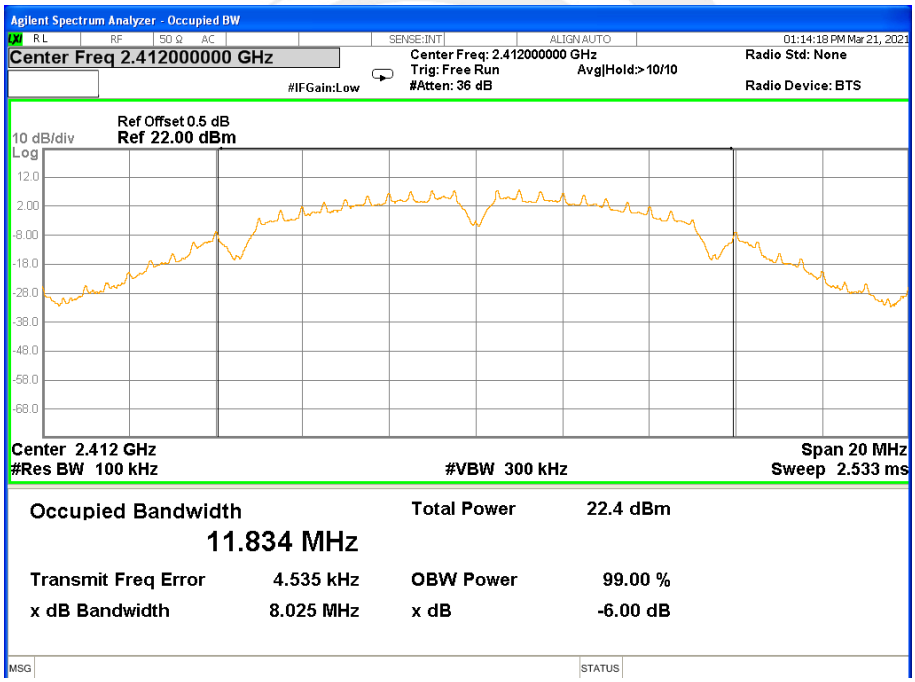
6.6 TEST RESULTS

Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX b Mode /CH01, CH06, CH11

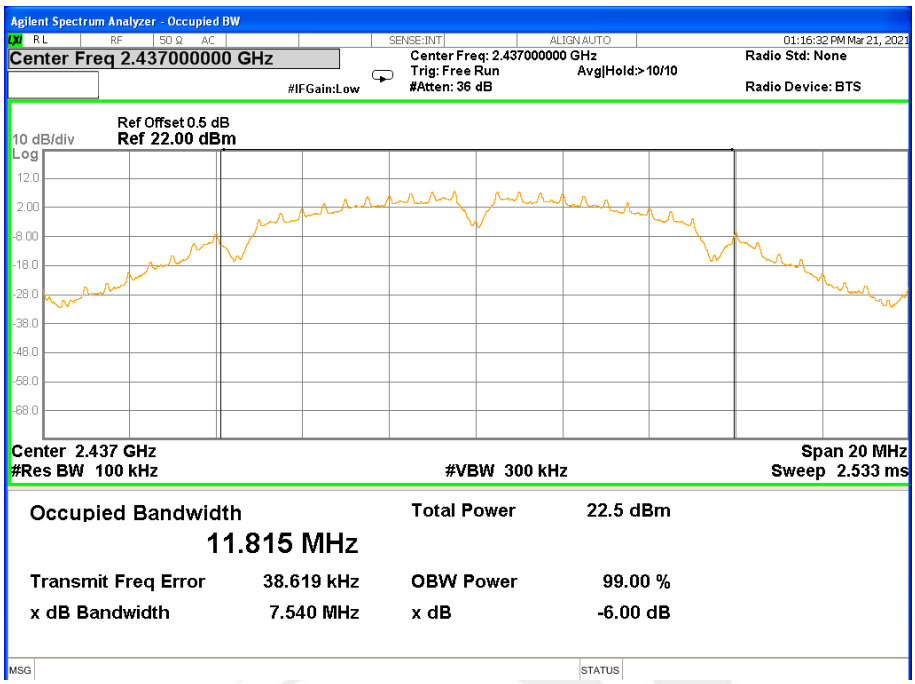
Remark: PEAK DETECTOR IS USED

Frequency	6dB Bandwidth	99% Bandwidth	Limit	Result
	(MHz)	(MHz)	(KHz)	
2412 MHz	8.025	11.785	≥500KHz	PASS
2437 MHz	7.540	11.802	≥500KHz	PASS
2462 MHz	7.572	11.911	≥500KHz	PASS

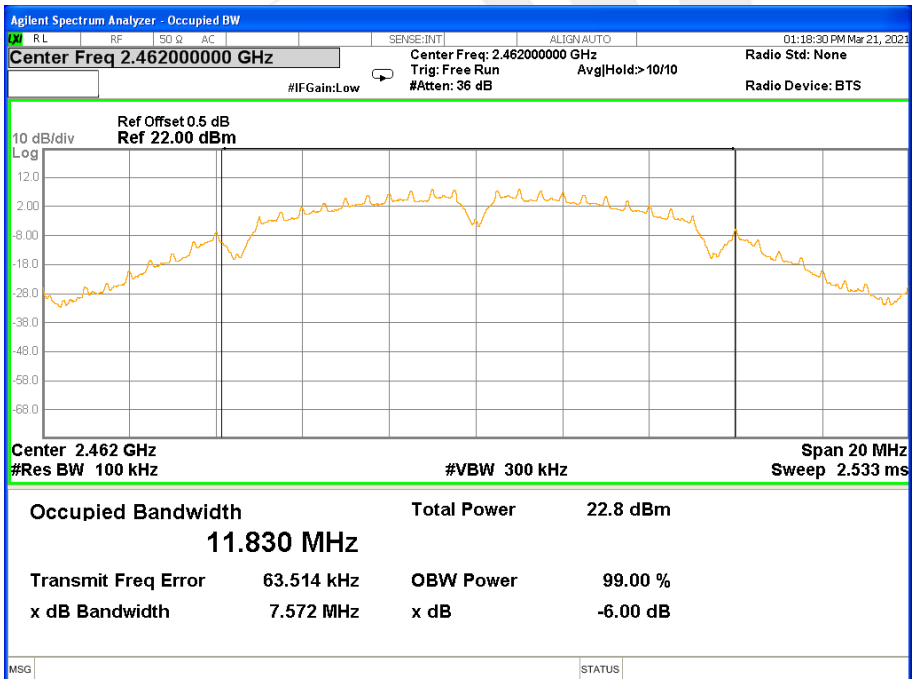
6dB Bandwidth TX CH 01



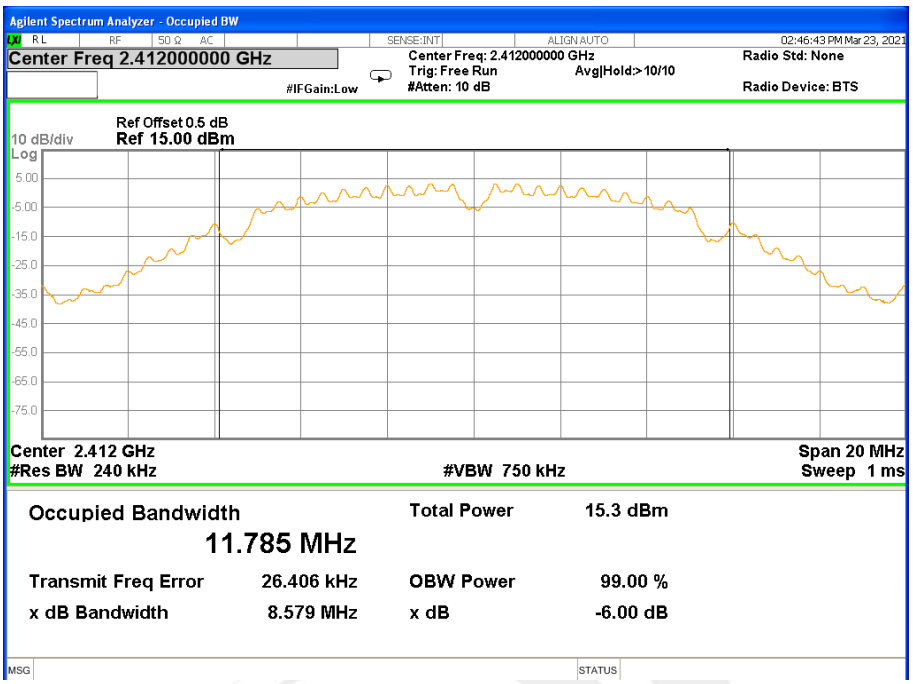
6dB Bandwidth TX CH 06



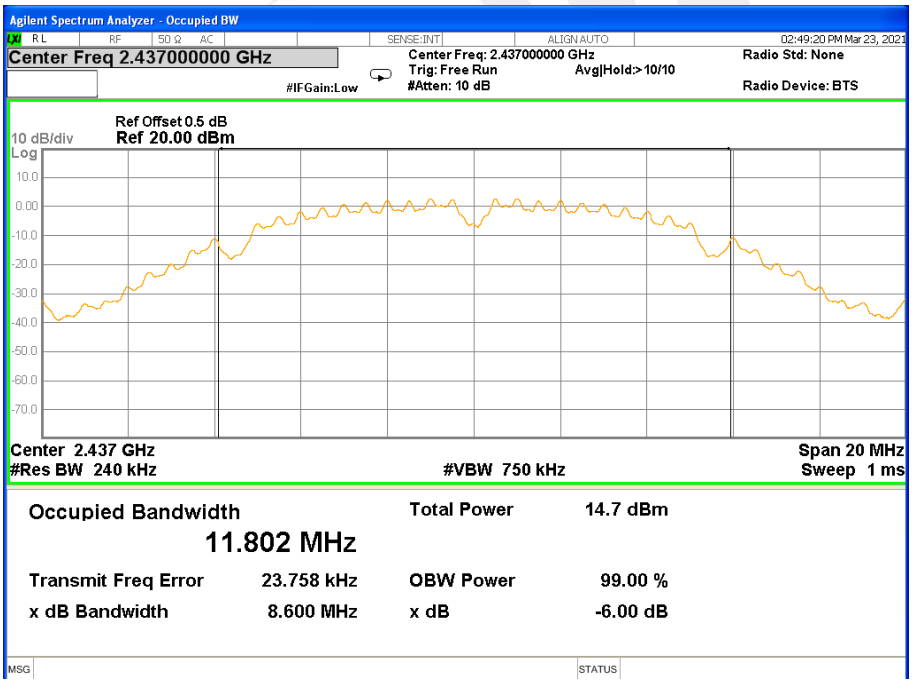
6dB Bandwidth TX CH 11



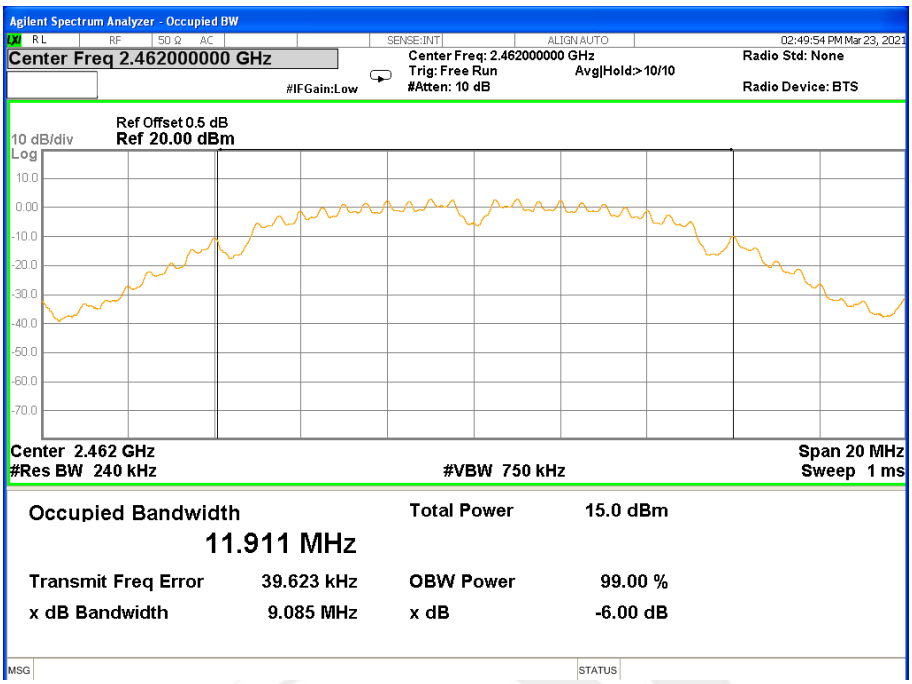
99% Bandwidth TX CH 01



99% Bandwidth TX CH 06



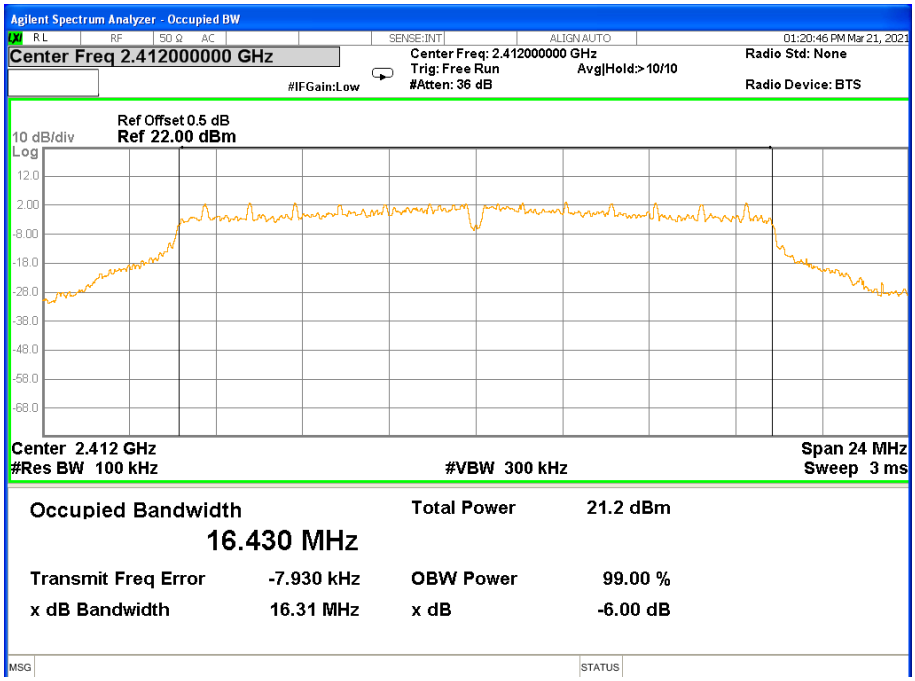
99% Bandwidth TX CH 11



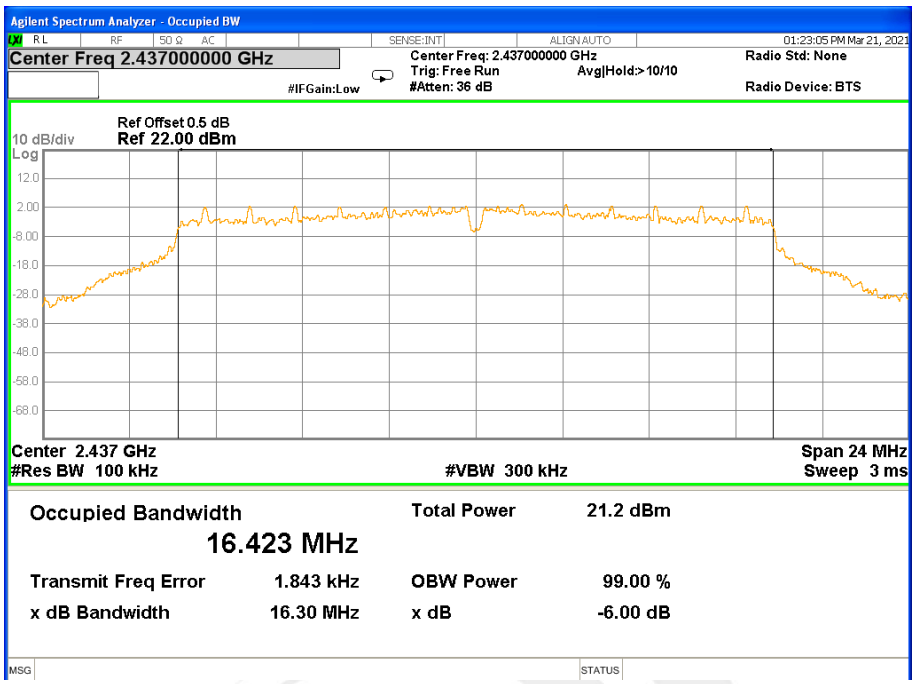
Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX g Mode /CH01, CH06, CH11

Frequency	6dB Bandwidth	99% Bandwidth	Limit	Result
	(MHz)	(MHz)	(KHz)	
2412 MHz	16.31	17.69	≥500KHz	PASS
2437 MHz	16.30	17.65	≥500KHz	PASS
2462 MHz	15.74	17.52	≥500KHz	PASS

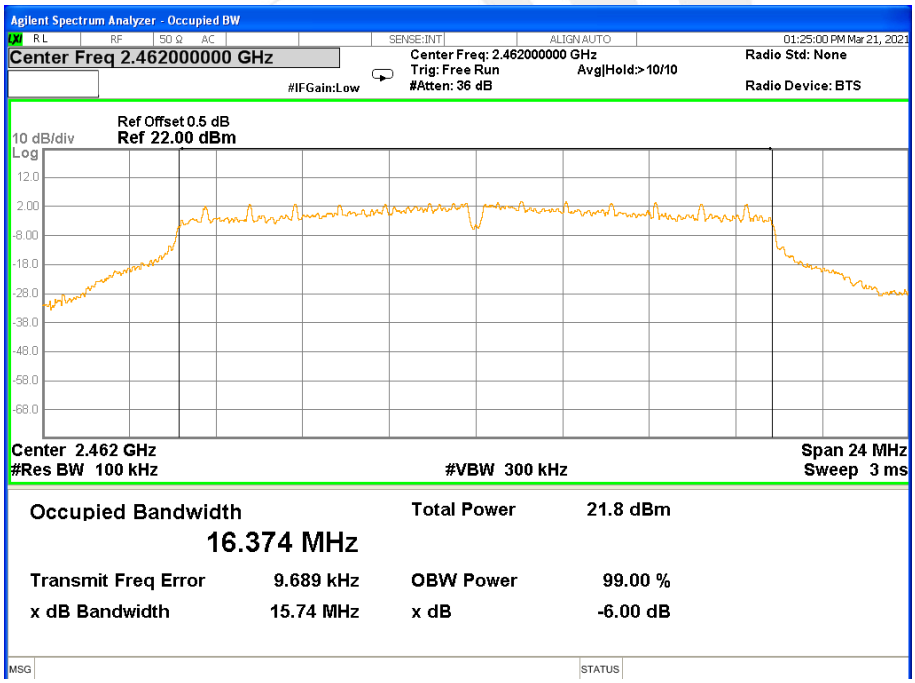
6dB Bandwidth TX CH 01



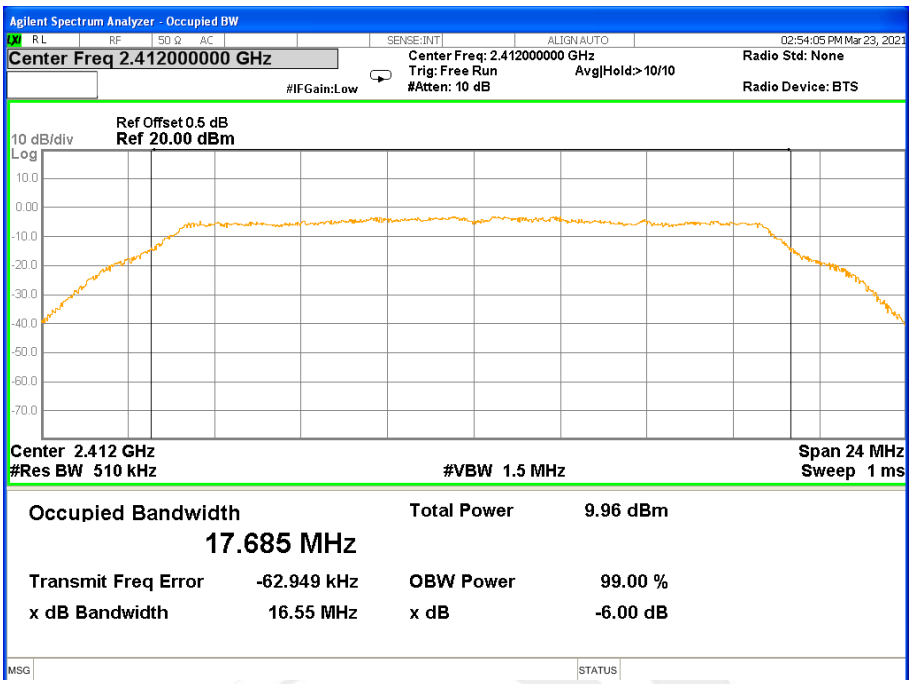
6dB Bandwidth TX CH 06



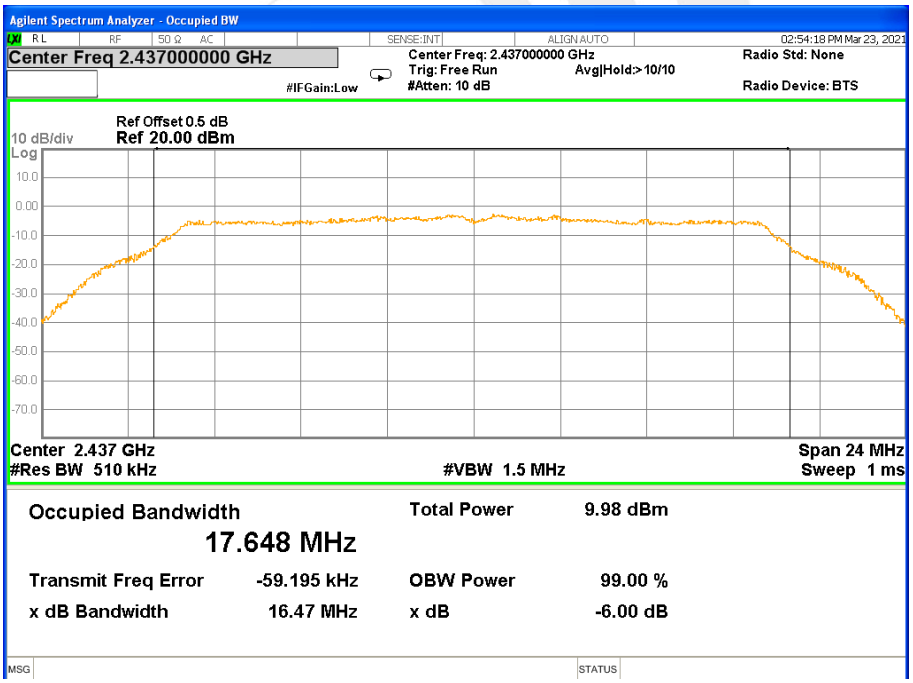
6dB Bandwidth TX CH 11



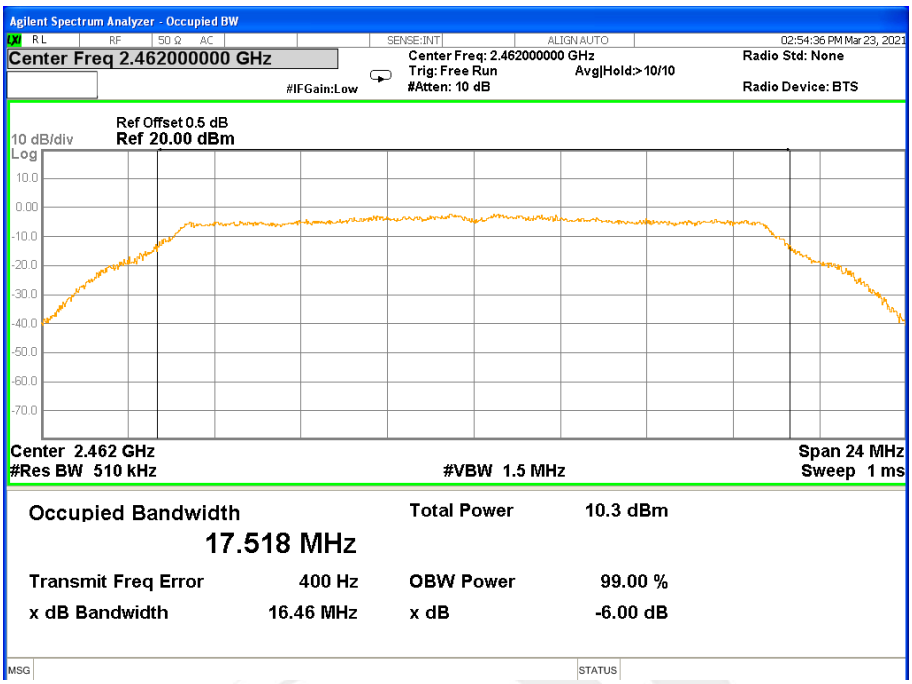
99% Bandwidth TX CH 01



99% Bandwidth TX CH 06



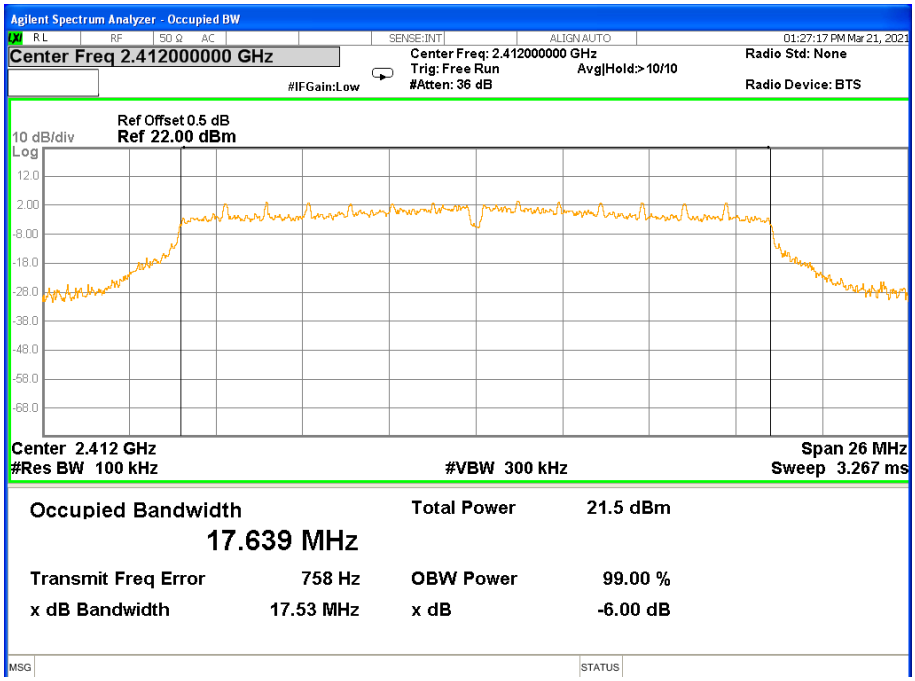
99% Bandwidth TX CH 11



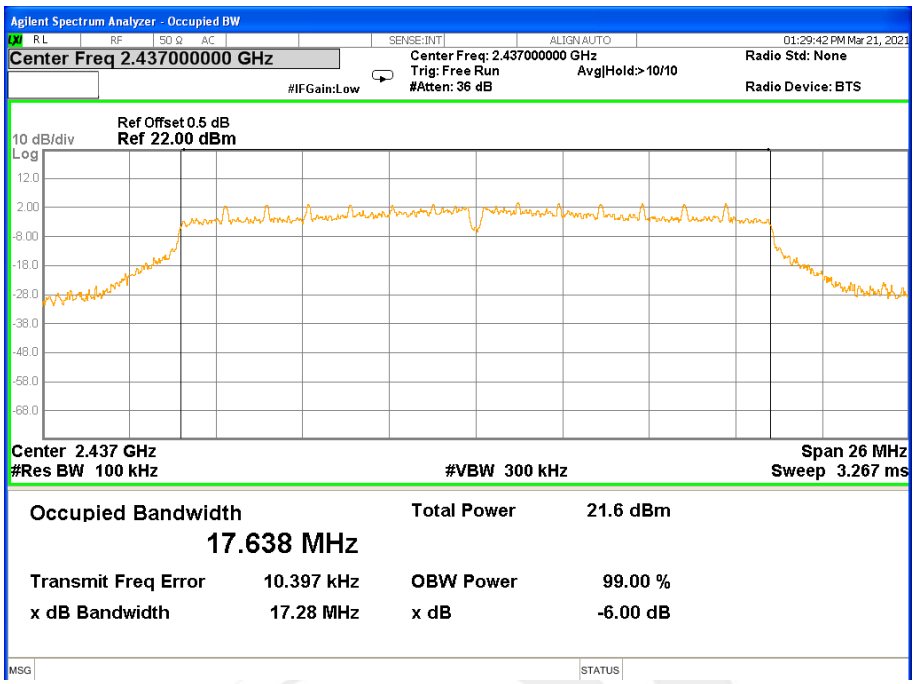
Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V	Test Mode:	TX n Mode(20M) /CH01, CH06, CH11

Frequency	6dB Bandwidth	99% Bandwidth	Limit	Result
	(MHz)	(MHz)	(KHz)	
2412 MHz	17.53	18.50	≥500KHz	PASS
2437 MHz	17.28	18.66	≥500KHz	PASS
2462 MHz	16.21	18.40	≥500KHz	PASS

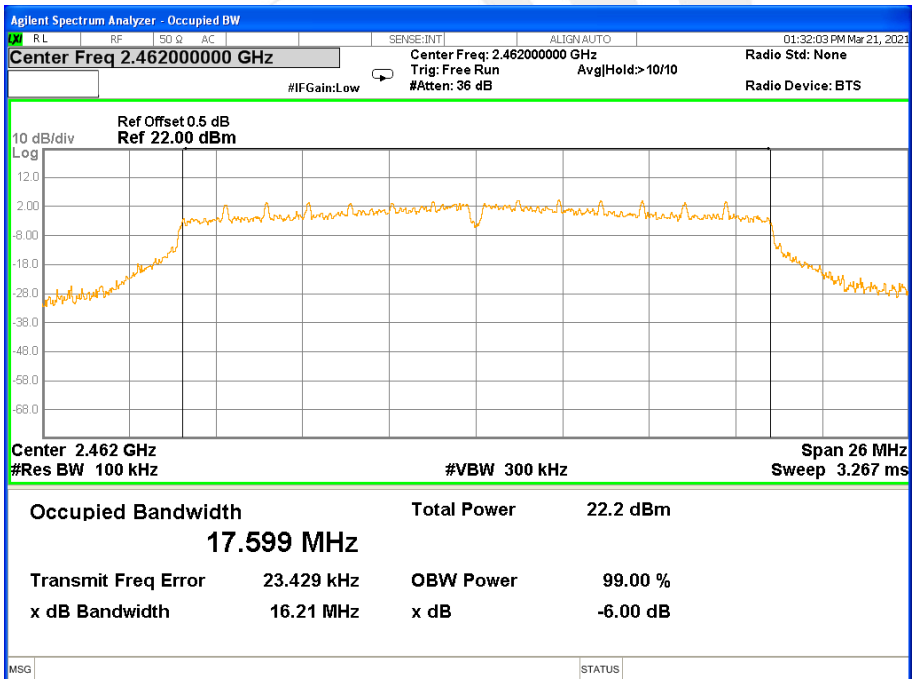
6dB Bandwidth TX CH 01



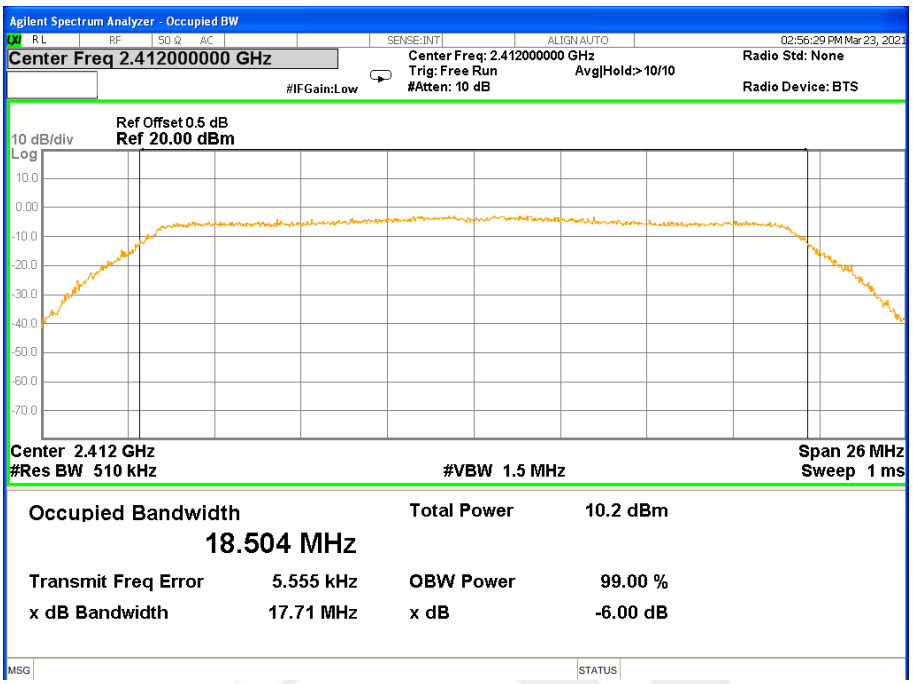
6dB Bandwidth TX CH 06



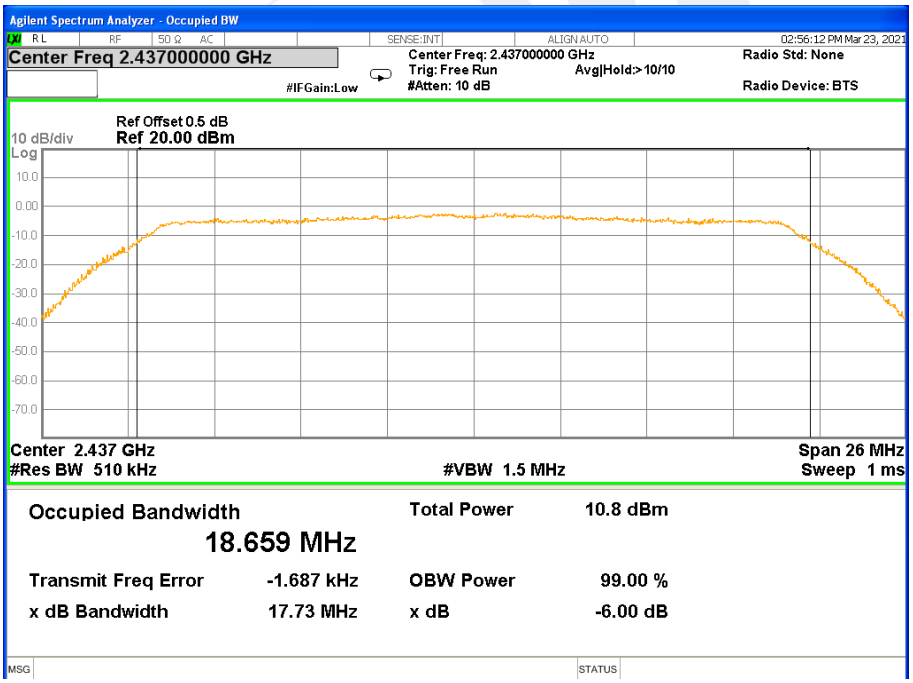
6dB Bandwidth TX CH 11



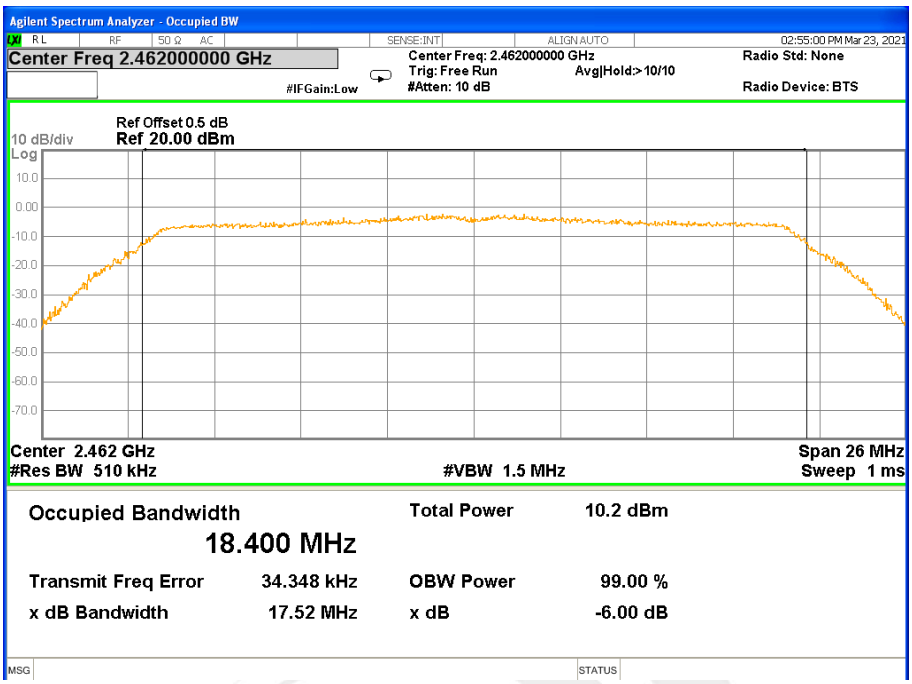
99% Bandwidth TX CH 01



99% Bandwidth TX CH 06



99% Bandwidth TX CH 11



7. PEAK OUTPUT POWER TEST

7.1 LIMIT

FCC Part15.247,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

7.2 TEST PROCEDURE

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

RBW ≥ DTS bandwidth

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

Integrated band power method:

The following procedure can be used when the maximum available RBW of the instrument is less than the
DTS bandwidth:

a) Set the RBW = 1 MHz.
b) Set the VBW ≥ [3 × RBW].
c) Set the span ≥ [1.5 × DTS bandwidth].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

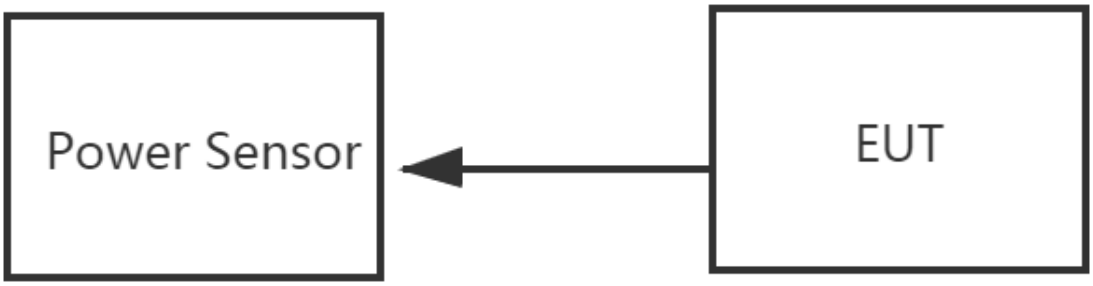
PKPM1 Peak power meter method:

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 use a fast-responding diode detector.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS
Please refer to section 3.1.4 of this report.

7.6 TEST RESULTS

Temperature:	25℃	Relative Humidity:	60%
Test Voltage:	DC 3.3V		

Mode	Test Channel	Frequency	Peak Conducted Output Power	Average Conducted Output Power	LIMIT
		(MHz)	(dBm)	(dBm)	dBm
TX 802.11b	CH01	2412	16.12	12.83	30
	CH06	2437	16.29	13.17	30
	CH11	2462	16.52	13.19	30
TX 802.11g	CH01	2412	16.08	5.79	30
	CH06	2437	16.27	5.52	30
	CH11	2462	16.33	5.72	30
TX 802.11n20	CH01	2412	16.65	5.69	30
	CH06	2437	15.72	5.29	30
	CH11	2462	15.89	5.20	30

EIRP Power

TX 802.11b Mode					
Test Channel	Frequency	Peak Power	Antenna Gain	EIRP Power	LIMIT
	(MHz)	(dBm)	(dBi)	(dBm)	dBm
CH01	2412	16.12	2.66	18.78	36.02
CH06	2437	16.29	2.66	18.95	36.02
CH11	2462	16.52	2.66	19.18	36.02
TX 802.11g Mode					
Test Channel	Frequency	Peak Power	Antenna Gain	EIRP Power	LIMIT
	(MHz)	(dBm)	(dBi)	(dBm)	dBm
CH01	2412	16.08	2.66	18.74	36.02
CH06	2437	16.27	2.66	18.93	36.02
CH11	2462	16.33	2.66	18.99	36.02
TX 802.11n20 Mode					
Test Channel	Frequency	Peak Power	Antenna Gain	EIRP Power	LIMIT
	(MHz)	(dBm)	(dBi)	(dBm)	dBm
CH01	2412	16.65	2.66	19.31	36.02
CH06	2437	15.72	2.66	18.38	36.02
CH11	2462	15.89	2.66	18.55	36.02

8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible partyshall be used with the device.

8.2 EUT ANTENNA

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

9. FREQUENCY STABILITY

9.1 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.

9.2 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.

9.3 TEST RESULT

Channel 06 (2437MHz)

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency(MHz)
6.9	2437.0016
6	2437.0012
5.1	2437.0014
Max.Deviation(MHz)	0.0016
Max.Deviation(ppm)	0.66

Rated working voltage: DC 3.3V

Temperature vs. Frequency Stability

Temperature(℃)	Measurement Frequency(MHz)
-30	2437.0039
-20	2437.0030
-10	2437.0031
0	2437.0038
10	2437.0029
20	2437.0037
30	2437.0031
40	2437.0033
50	2437.0030
Max.Deviation(MHz)	0.0039
Max.Deviation(ppm)	1.60

APPENDIX-PHOTOS OF TEST SETUP

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

※※※※※END OF THE REPORT※※※※※