FCC Radio Test Report

FCC ID: 2AWVKH11BTG

Report No.	:	BTL-FCCP-1-2007T116
Equipment	:	Wireless Trackball Mouse
Model Name	:	TS-H11BTG
Brand Name	:	Tesoro
Applicant	:	Tesoro Technology USA Inc.
Address	:	142N Milpitas Blvd #328 Milpitas, CA, 95035, USA
Radio Function	:	Bluetooth Low Energy
FCC Rule Part(s)	:	FCC Part15, Subpart C (15.247)
Measurement Procedure(s)	:	ANSI C63.10-2013
Date of Receipt	:	2020/7/24
Date of Test	:	2020/7/24 ~ 2020/8/18
Issued Date	:	2020/9/8

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	2020/9/8

1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

FCC Part 15, Subpart C (15.247)				
Standard(s) Section	**Description**	**Test Result**	**Judgement**	**Remark**
15.207	AC Power Line Conducted Emissions	------	N/A	NOTE(1)
15.205 15.209 15.247(d)	Radiated Emissions	APPENDIX A APPENDIX B	Pass	------
15.247(a)(2)	Bandwidth	APPENDIX C	Pass	------
15.247(b)(3)	Output Power	APPENDIX D	Pass	------
15.247(e)	Power Spectral Density	APPENDIX E	Pass	------
15.247(d)	Antenna conducted Spurious Emission	APPENDIX F	Pass	------
15.203	Antenna Requirement	------	Pass	------

NOTE:
(1) ”N/A” denotes test is not applicable in this Test Report.
(2) The report format version is TP.1.1.1.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
The test sites and facilities are covered under FCC RN: 674415 and DN: TW0659.

☐ C05 ☐ CB08 ☐ CB11 ☐ CB15 ☐ CB16
☐ SR06

No.18, Ln. 171, Sec. 2, Jiuzong Rd., Neihu Dist., Taipei City 114, Taiwan
The test sites and facilities are covered under FCC RN: 270329 and DN: TW0030.

☐ C03 ☒ CB18 ☐ CB19 ☒ SR06

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k = 2**, providing a level of confidence of approximately **95 %**. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

A. Radiated emissions test :

Test Site	Measurement Frequency Range	U,(dB)
CB18	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

B. Conducted test :

Test Item	U,(dB)
Bandwidth	1.13
Output power	1.06
Power Spectral Density	1.20
Conducted Spurious emissions	1.14
Conducted Band edges	1.13

NOTE:
Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Test Voltage	Tested by
Radiated emissions below 1 GHz	Refer to data	DC 1.5V	Aven Ho
Radiated emissions above 1 GHz	Refer to data	DC 1.5V	Aven Ho
Bandwidth	25.2 °C, 54 %	DC 1.5V	William Wei
Output Power	25.2 °C, 54 %	DC 1.5V	William Wei
Power Spectral Density	25.2 °C, 54 %	DC 1.5V	William Wei
Antenna conducted Spurious Emission	25.2 °C, 54 %	DC 1.5V	William Wei

1.4 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

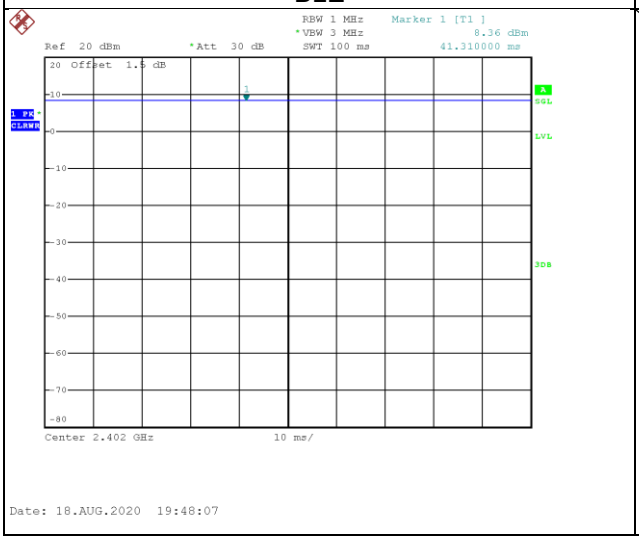
Test Software	EMI_TEST_v1.5			
Modulation Mode	2402 MHz	2440 MHz	2480 MHz	Data Rate
GFSK	10.5	10.5	10.5	1 Mbps

1.5 DUTY CYCLE

If duty cycle is ≥ 98 %, duty factor is not required.
If duty cycle is < 98 %, duty factor shall be considered.

Remark	Delta 1			Delta 2	On Time/Period	10 log(1/Duty Cycle)
Mode	ON (ms)	Numbers (ON)	On Time (B) (ms)	Period (ON+OFF) (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE	100.000	1	100.000	100.000	100.00%	0

BLE



2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	Wireless Trackball Mouse
Model Name	TS-H11BTG
Brand Name	Tesoro
Model Difference	N/A
Power Source	DC voltage supplied from battery.
Power Rating	DC 1.5V
Products Covered	N/A
S/N No	H11BTG BJ0700001
Frequency Range	2400 MHz ~ 2483.5 MHz
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Technology	GFSK
Transfer Rate	1Mbps
Output Power Max.	9.63 dBm (0.0092 W)
Test Model	TS-H11BTG
Sample Status	Engineering Sample
EUT Modification(s)	N/A

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

(3) Table for Filed Antenna:

Ant.	Brand	Test Model	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	N/A	0.71

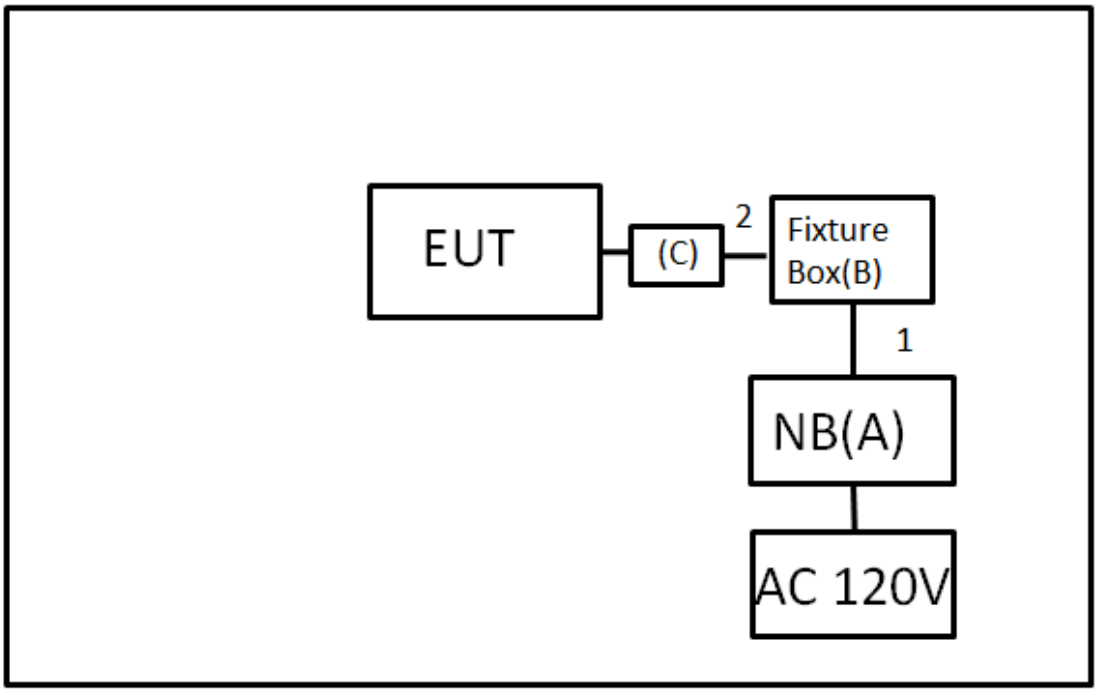
2.2 TEST MODES

Test Items	Test mode	Channel	Note
Transmitter Radiated Emissions (below 1GHz)	1 Mbps	39	-
Transmitter Radiated Emissions (above 1GHz)	1 Mbps	00/39	Bandedge
	1 Mbps	00/19/39	Harmonic
Bandwidth	1 Mbps	00/19/39	-
Output Power	1 Mbps	00/19/39	-
Power Spectral Density	1 Mbps	00/19/39	-
Antenna conducted Spurious Emission	1 Mbps	00/19/39	-

NOTE:
(1) The Radiated emissions test was verified based on the worst conducted power and Bandwidth test results reported in the original report.
(2) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (Horizontal) is recorded.
(3) All X, Y and Z axes are evaluated, but only the worst case (X axis) is recorded.
(4) There were no emissions found below 30 MHz within 20 dB of the limit.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.4.



2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	NB	HP	TPN-I119	N/A	Furnished by test lab.
B	Fixture Box	TELiNK	NA	N/A	Supplied by test requester.
C	Fixture Board	NA	NA	N/A	Supplied by test requester.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	NO	YES	1m	USB Cable	Supplied by test requester.
2	NO	NO	0.3m	Fixture Cable	Supplied by test requester.

3 RADIATED EMISSIONS TEST

3.1 LIMIT

In case the emission fall within the restricted band specified on 15.205, then the 15.209 limit in the table below has to be followed.

LIMITS OF RADIATED EMISSIONS MEASUREMENT (9 kHz to 1000 MHz)

Frequency (MHz)	Field Strength (microvolts/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
960~1000	500	3

LIMITS OF RADIATED EMISSIONS MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	Radiated Emissions (dBuV/m)		Measurement Distance (meters)
	Peak	Average	
Above 1000	74	54	3

NOTE:
(1) The limit for radiated test was performed according to FCC Part 15, Subpart C.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).
(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value
Calculation example:

Reading Level		Correct Factor		Measurement Value
19.11	+	2.11	=	21.22

Measurement Value		Limit Value		Margin Level
21.22	-	54	=	-32.78

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

3.2 TEST PROCEDURE

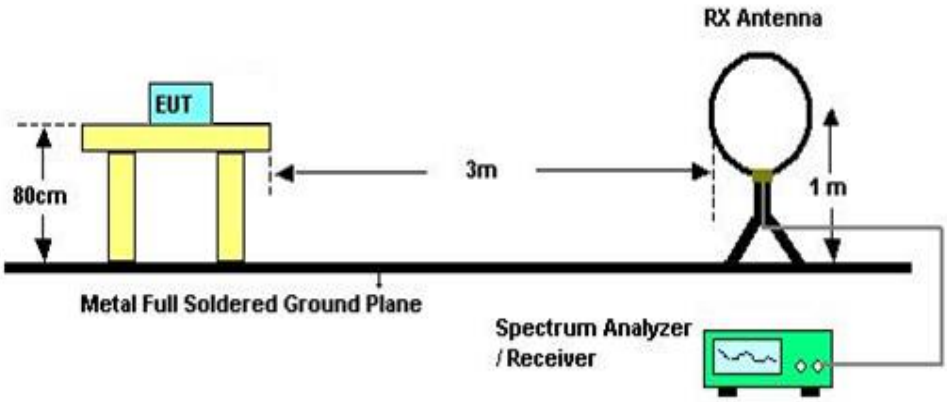
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1GHz)
h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
i. For the actual test configuration, please refer to the related Item – EUT TEST PHOTO.

3.3 DEVIATION FROM TEST STANDARD

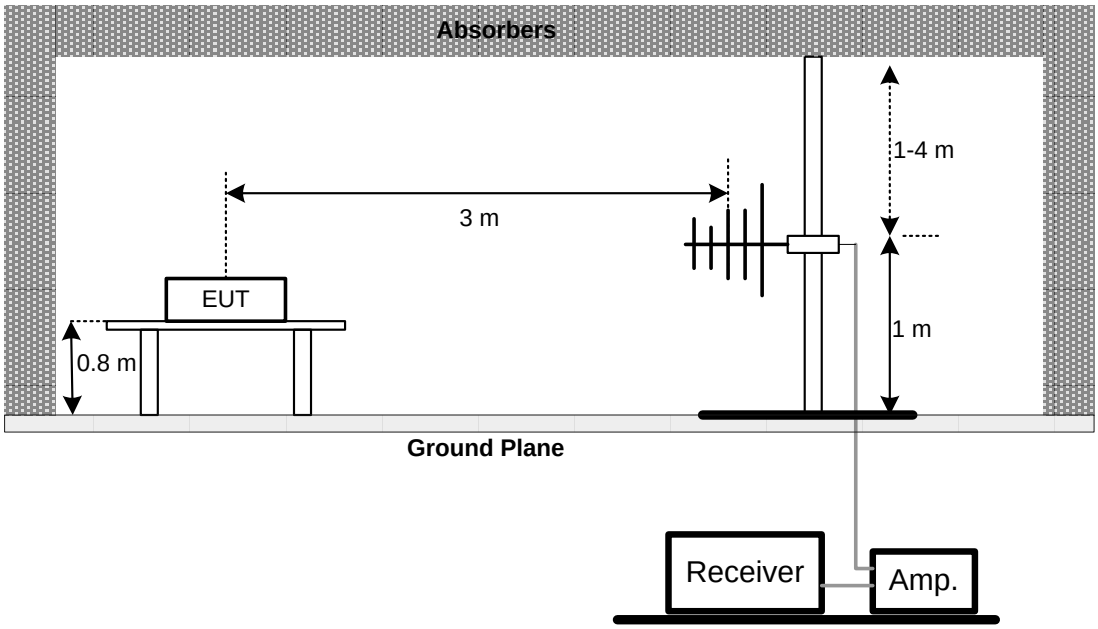
No deviation.

3.4 TEST SETUP

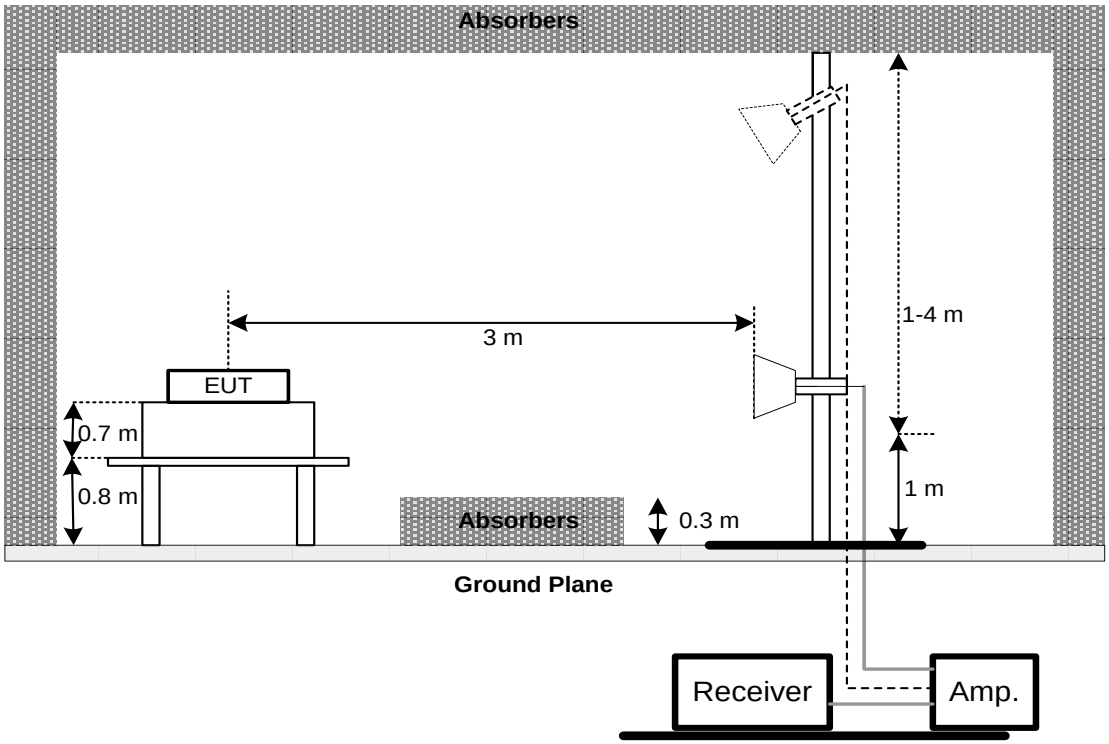
9 kHz to 30 MHz



30 MHz to 1 GHz



Above 1 GHz



3.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.6 TEST RESULT – 30 MHZ TO 1 GHZ

Please refer to the APPENDIX A.

3.7 TEST RESULT – ABOVE 1 GHZ

Please refer to the APPENDIX B.

NOTE:

(1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

4 BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

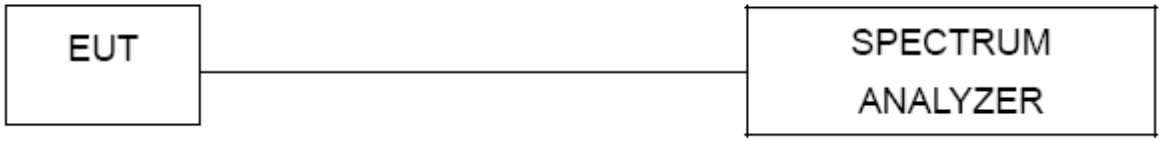
4.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

4.6 TEST RESULTS

Please refer to the APPENDIX C.

5 OUTPUT POWER TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Maximum Output Power	1 watt or 30dBm	2400-2483.5	PASS

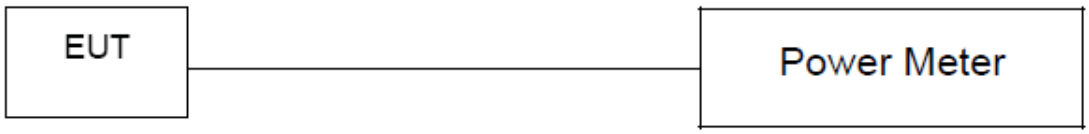
5.2 TEST PROCEDURE

a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
b. The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

Please refer to the APPENDIX D.

6 POWER SPECTRAL DENSITY TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

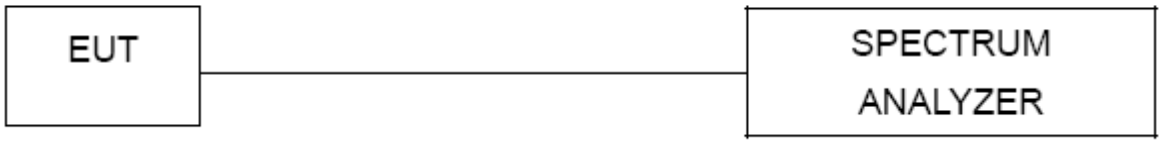
6.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW=3KHz, VBW=10 KHz, Sweep time = auto.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Please refer to the APPENDIX E.

7 ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

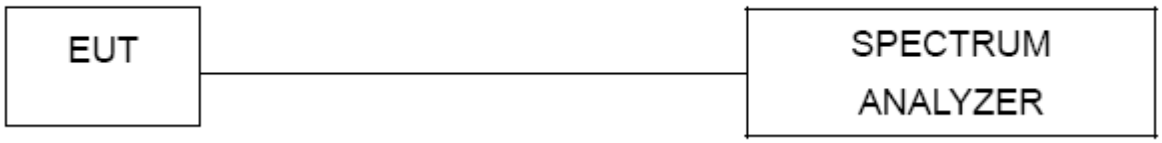
7.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 10 ms.
c. Offset=antenna gain+cable loss

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

Please refer to the APPENDIX F.

8 LIST OF MEASURING EQUIPMENTS

Radiated Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC02325B	980217	2020/4/10	2021/4/9
2	Preamplifier	EMCI	EMC012645B	980267	2020/4/10	2021/4/9
3	Preamplifier	EMCI	EMC2654045	980030	2020/1/31	2021/1/30
4	Test Cable	EMCI	EMC104-SM-SM-800	150207	2020/4/10	2021/4/9
5	Test Cable	EMCI	EMC104-SM-SM-3000	151205	2020/4/10	2021/4/9
6	Test Cable	EMCI	EMC-SM-SM-7000	180408	2020/4/10	2021/4/9
7	MXE EMI Receiver	Agilent	N9038A	MY554200087	2020/6/10	2021/6/9
8	Signal Analyzer	Agilent	N9010A	MY56480554	2020/6/4	2021/6/3
9	Horm Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	2020/6/12	2021/6/11
10	Horm Ant	Schwarzbeck	BBHA 9170	187	2019/12/21	2020/12/20
11	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	0992	2020/7/10	2021/7/9
12	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0508	2020/7/10	2021/7/9

Bandwidth						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP 40	100129	2020/6/15	2021/6/14

Output Power						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Power Meter	Keysight	8990B	MY51000517	2020/4/6	2021/4/5
2	Power Sensor	Keysight	N1923A	MY58310005	2020/4/6	2021/4/5

Power Spectral Density						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP 40	100129	2020/6/15	2021/6/14

Antenna conducted Spurious Emission						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP 40	100129	2020/6/15	2021/6/14

Remark: “N/A” denotes no model name, no serial no. or no calibration specified.
All calibration period of equipment list is one year.

9 EUT TEST PHOTO

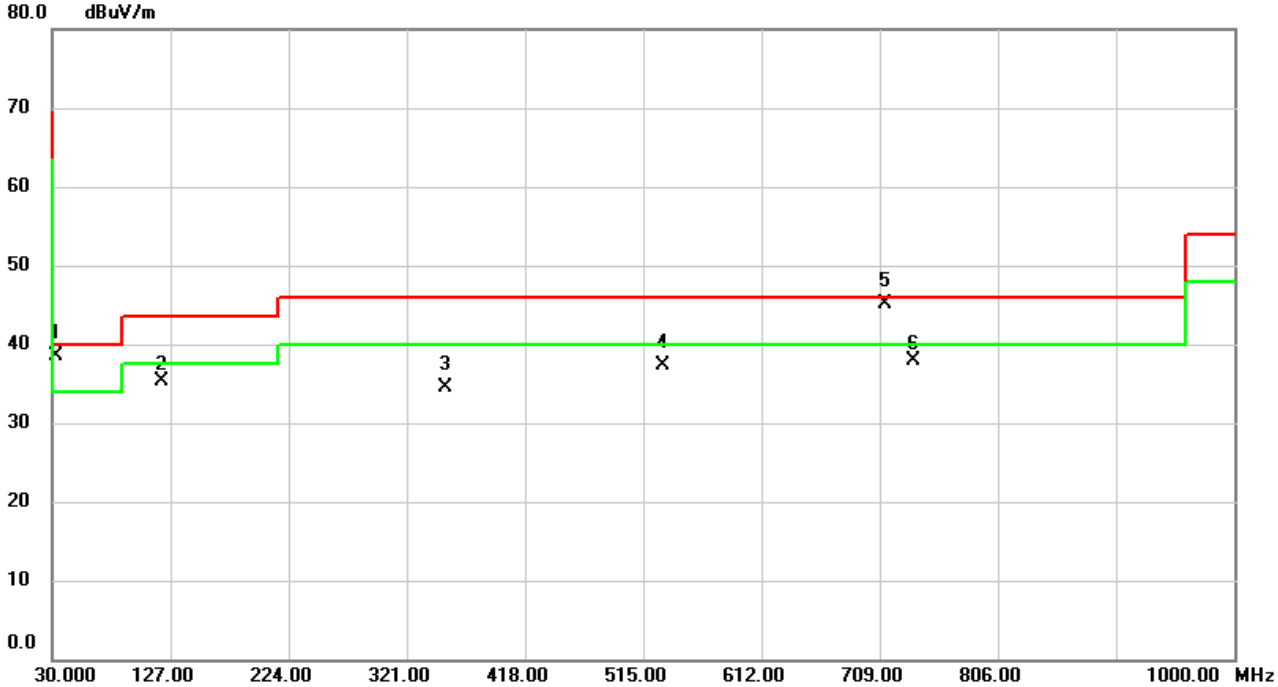
Please refer to document Appendix No.: TP-2007T116-FCCP-1 (APPENDIX-TEST PHOTOS).

10 EUT PHOTOS

Please refer to document Appendix No.: EP-2007T116-2 (APPENDIX-EUT PHOTOS).

APPENDIX A RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

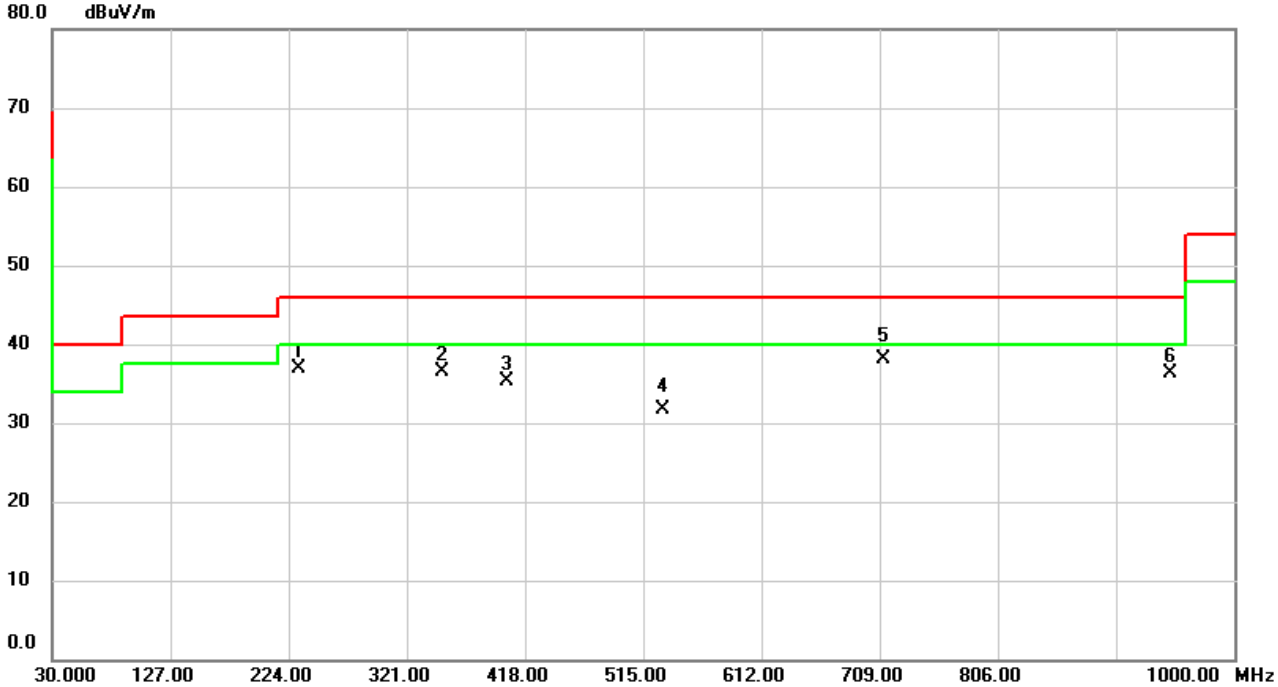
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2480MHz	Polarization	Vertical
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	!	32.9100	47.53	-9.04	38.49	40.00	-1.51	QP	
2		120.2100	45.82	-10.44	35.38	43.50	-8.12	peak	
3		352.0400	40.69	-6.09	34.60	46.00	-11.40	QP	
4		531.4900	39.48	-2.15	37.33	46.00	-8.67	QP	
5	*	713.8500	43.94	1.13	45.07	46.00	-0.93	QP	
6		737.1300	36.23	1.64	37.87	46.00	-8.13	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2480MHz	Polarization	Horizontal
Temp	23°C	Hum.	67%

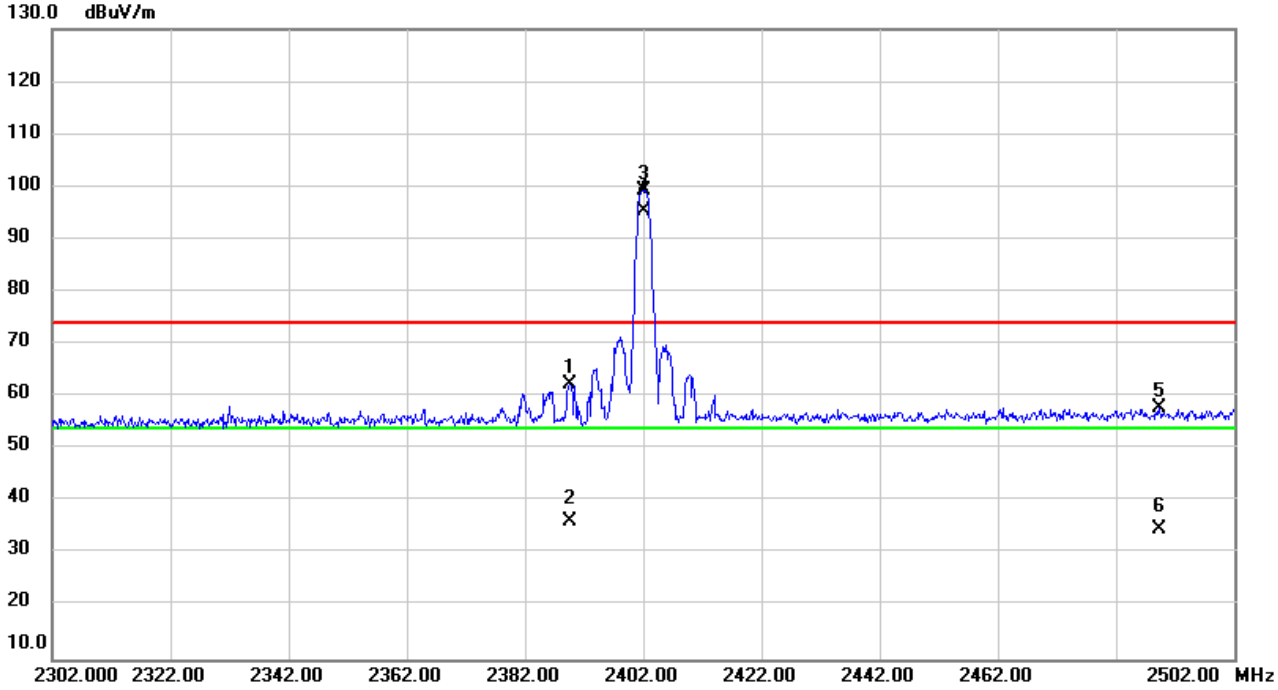


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		231.7600	47.20	-10.24	36.96	46.00	-9.04	peak	
2		350.1000	42.63	-6.14	36.49	46.00	-9.51	peak	
3		403.4500	39.99	-4.75	35.24	46.00	-10.76	peak	
4		531.4900	33.92	-2.15	31.77	46.00	-14.23	QP	
5	*	711.9100	36.95	1.07	38.02	46.00	-7.98	QP	
6		947.6200	31.19	5.04	36.23	46.00	-9.77	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX B RADIATED EMISSIONS - ABOVE 1 GHZ

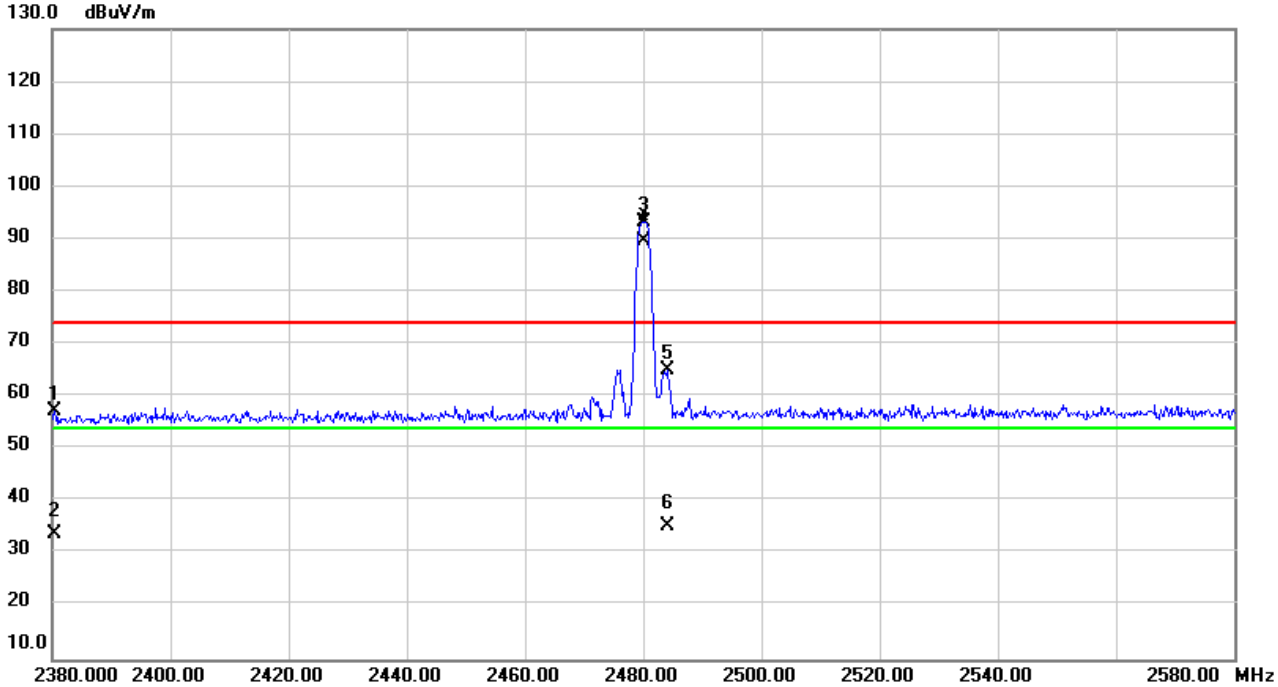
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2402MHz	Polarization	Horizontal
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2389.600	31.46	30.78	62.24	74.00	-11.76	peak	
2		2389.600	5.36	30.78	36.14	54.00	-17.86	AVG	
3	X	2402.000	68.41	30.84	99.25	74.00	25.25	peak	NoLimit
4	*	2402.000	64.46	30.84	95.30	54.00	41.30	AVG	NoLimit
5		2489.400	26.80	31.18	57.98	74.00	-16.02	peak	
6		2489.400	3.48	31.18	34.66	54.00	-19.34	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

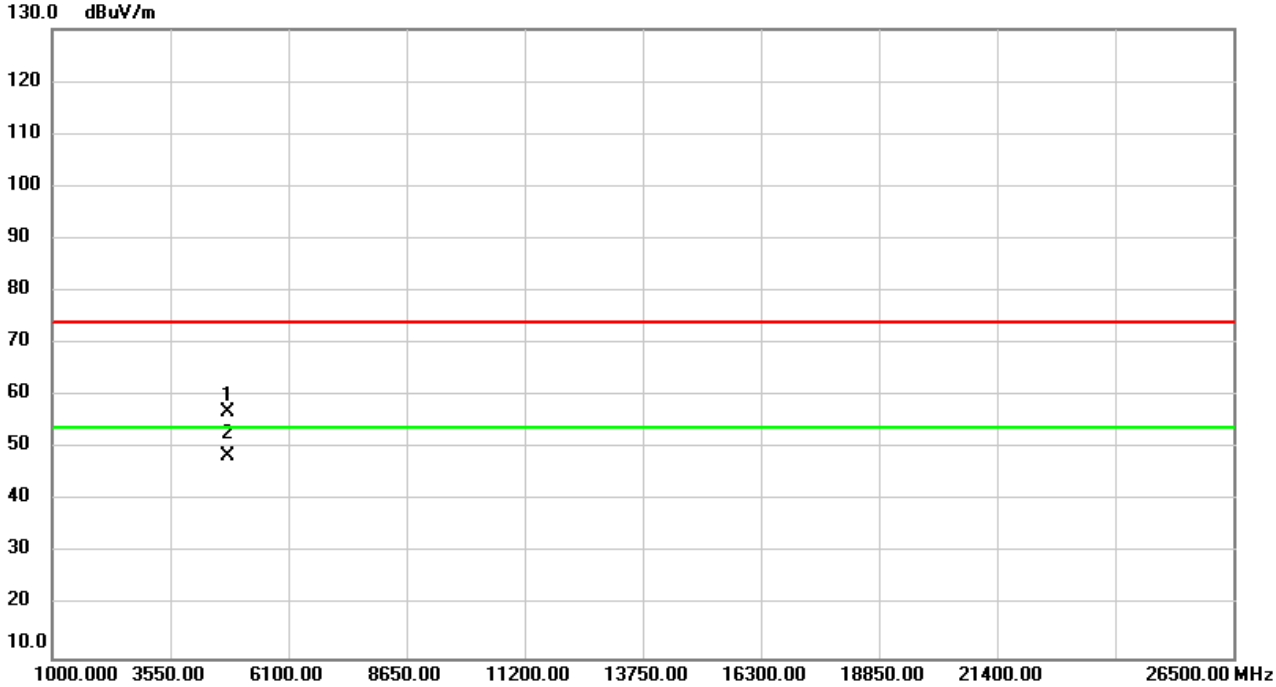
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2480MHz	Polarization	Horizontal
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2380.400	26.46	30.75	57.21	74.00	-16.79	peak	
2		2380.400	3.12	30.75	33.87	54.00	-20.13	AVG	
3	X	2480.000	62.17	31.15	93.32	74.00	19.32	peak	NoLimit
4	*	2480.000	58.62	31.15	89.77	54.00	35.77	AVG	NoLimit
5		2484.200	33.91	31.17	65.08	74.00	-8.92	peak	
6		2484.200	4.10	31.17	35.27	54.00	-18.73	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

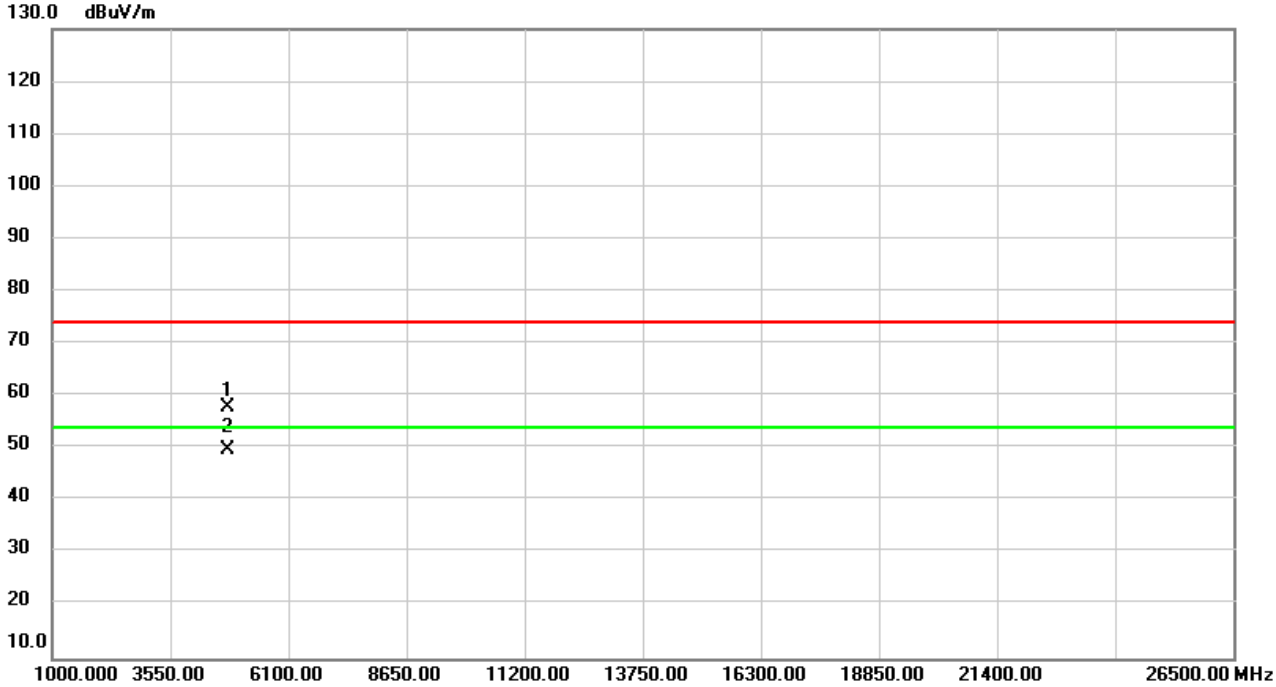
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2402MHz	Polarization	Vertical
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	67.57	-10.47	57.10	74.00	-16.90	peak	
2	*	4804.000	59.04	-10.47	48.57	54.00	-5.43	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

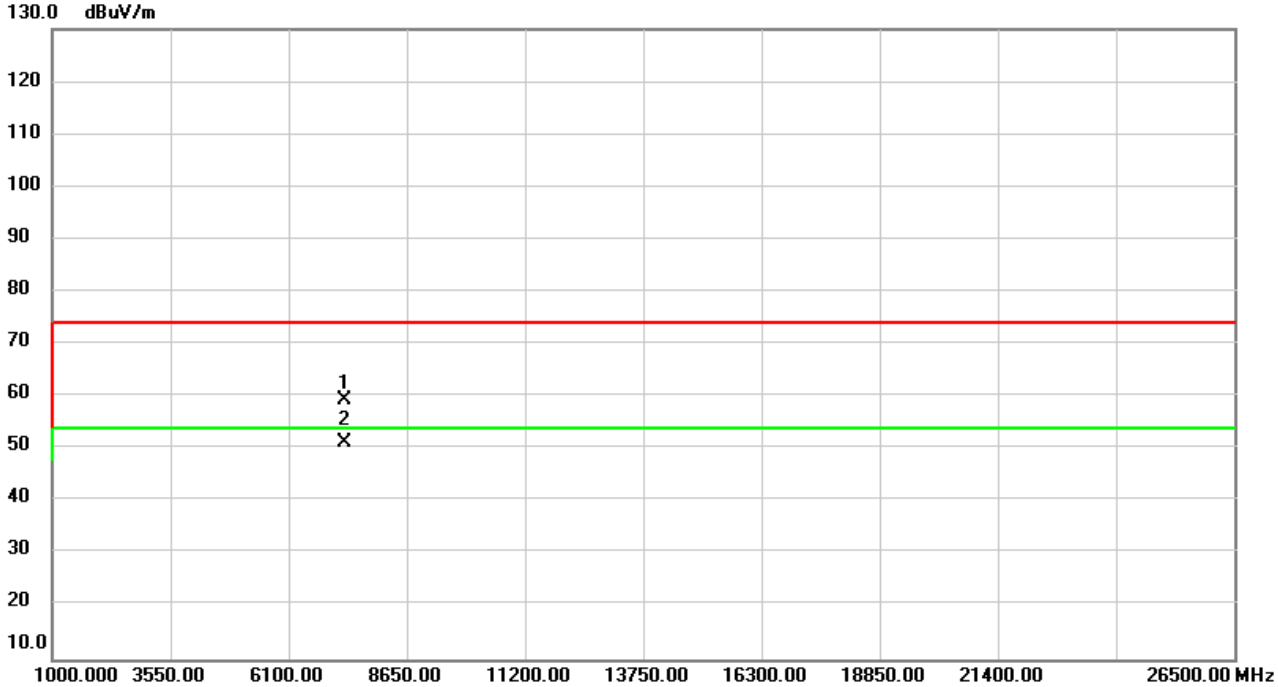
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2402MHz	Polarization	Horizontal
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	68.25	-10.47	57.78	74.00	-16.22	peak	
2	*	4804.000	60.19	-10.47	49.72	54.00	-4.28	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

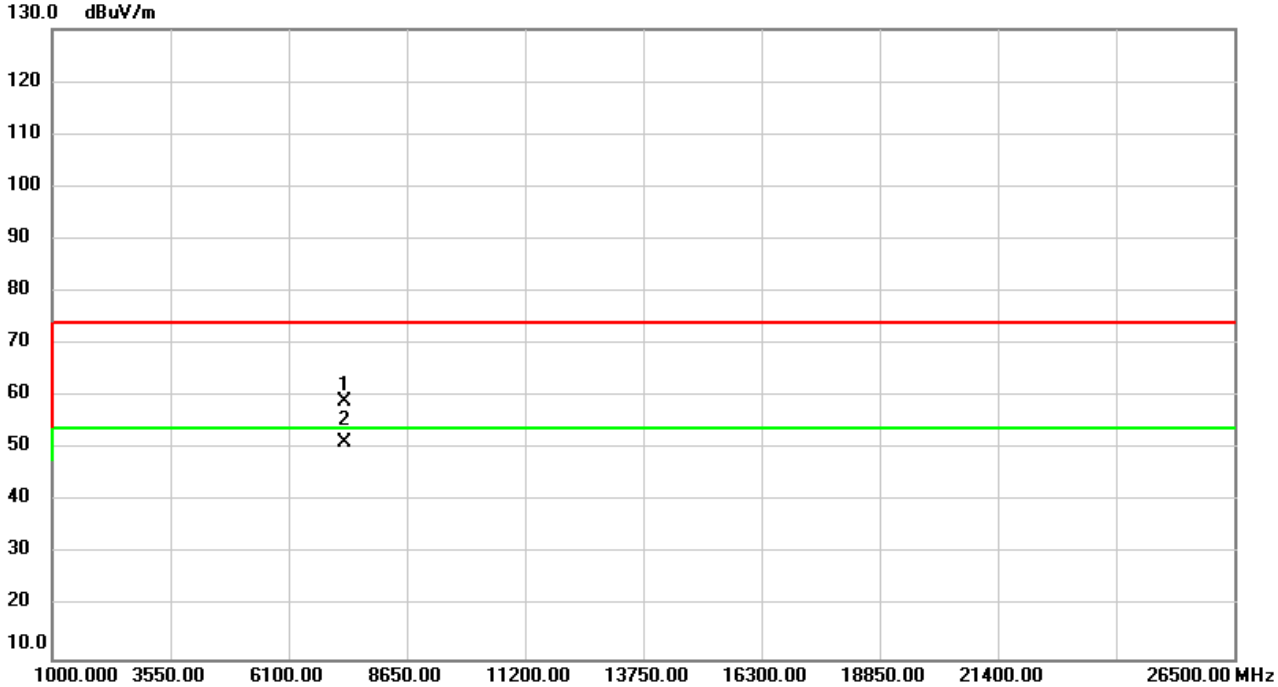
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2440MHz	Polarization	Vertical
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		7320.000	61.86	-2.39	59.47	74.00	-14.53	peak	
2	*	7320.000	53.68	-2.39	51.29	54.00	-2.71	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

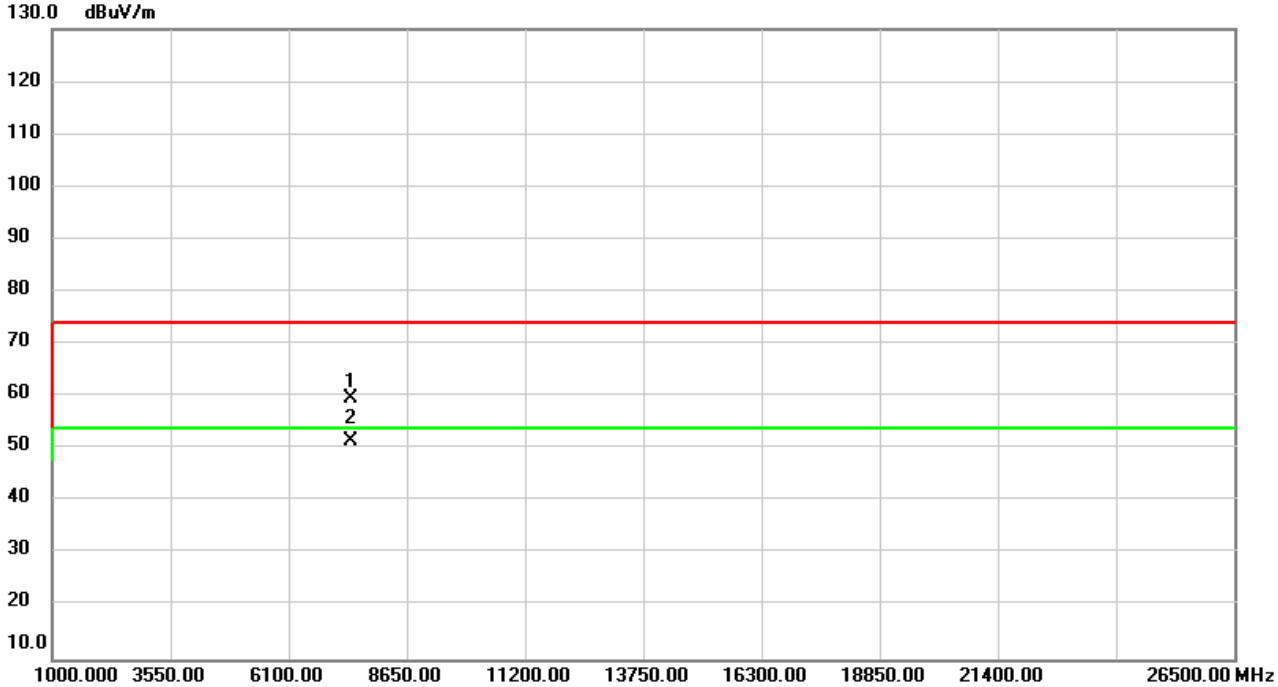
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2440MHz	Polarization	Horizontal
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		7320.000	61.53	-2.39	59.14	74.00	-14.86	peak	
2	*	7320.000	53.54	-2.39	51.15	54.00	-2.85	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

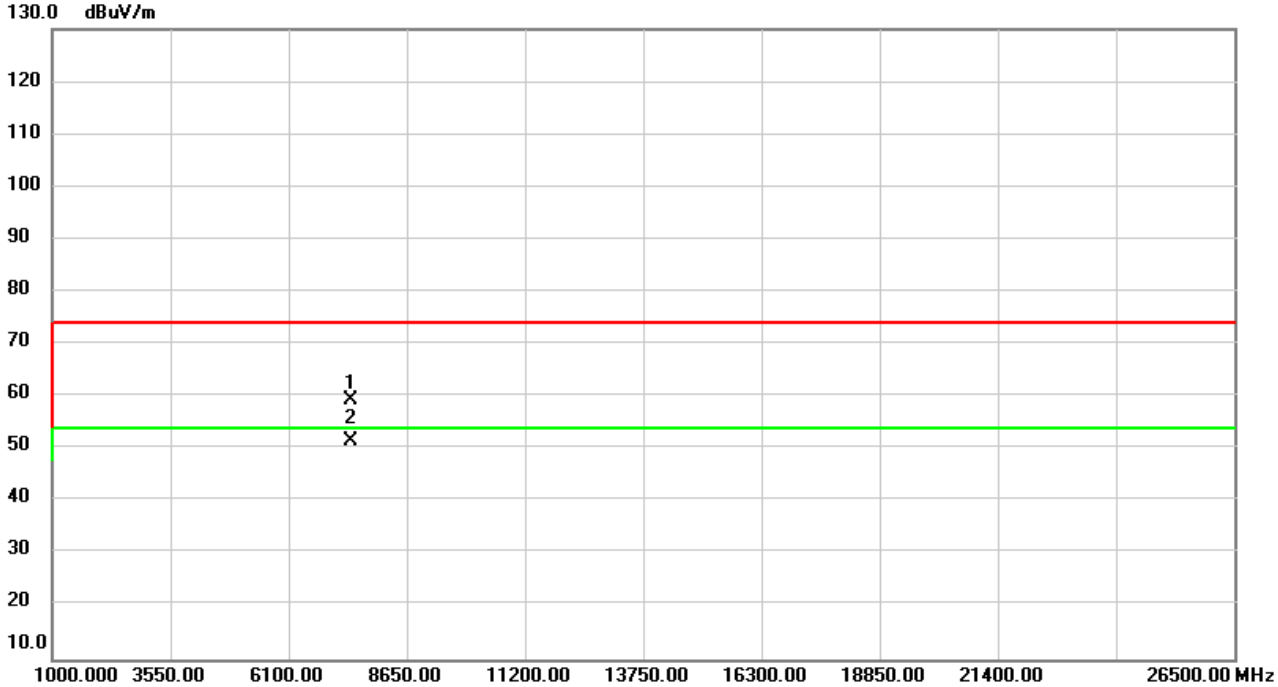
Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2480MHz	Polarization	Vertical
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		7440.000	61.48	-1.83	59.65	74.00	-14.35	peak	
2	*	7440.000	53.36	-1.83	51.53	54.00	-2.47	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2020/8/10
Test Frequency	2480MHz	Polarization	Horizontal
Temp	23°C	Hum.	67%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		7440.000	61.28	-1.83	59.45	74.00	-14.55	peak	
2	*	7440.000	53.25	-1.83	51.42	54.00	-2.58	AVG	

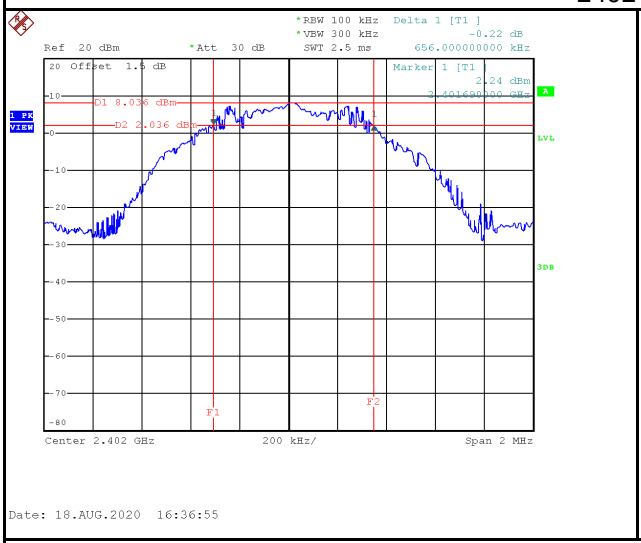
REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

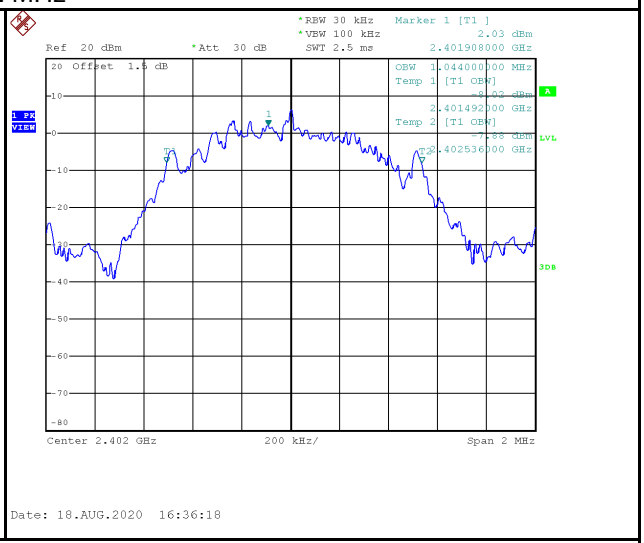
APPENDIX C BANDWIDTH

Test Mode:	TX Mode _1Mbps

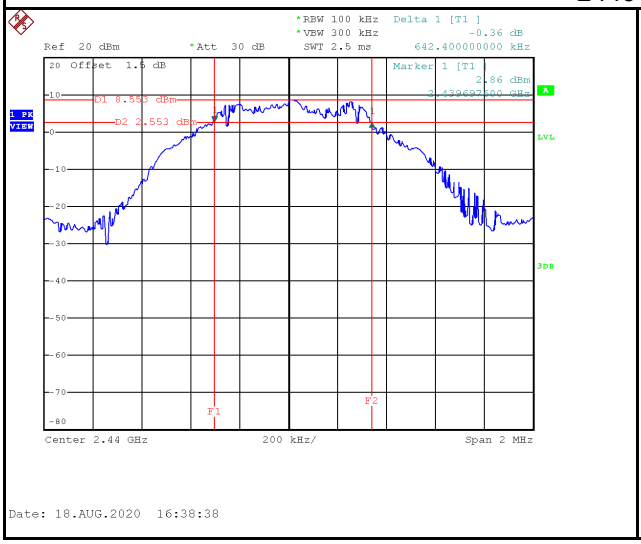
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.66	1.04	500	Pass
2440	0.64	1.04	500	Pass
2480	0.67	1.03	500	Pass

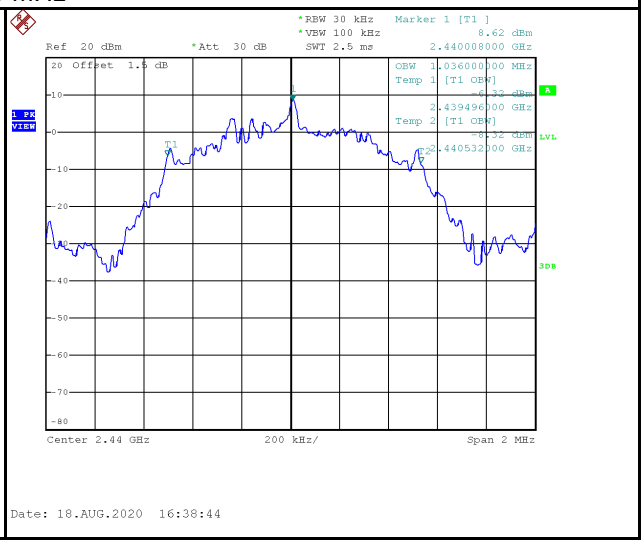
2402 MHz



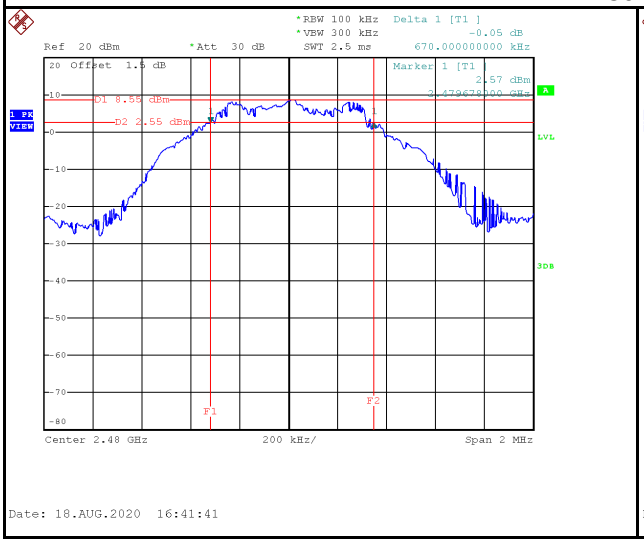


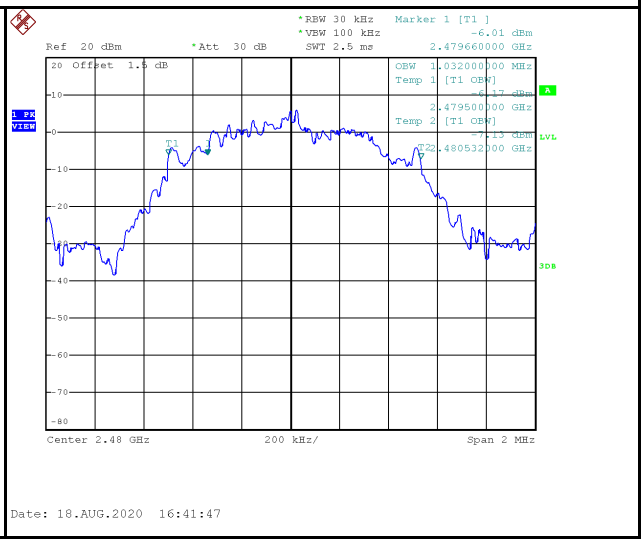
2440 MHz





2480 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 1 [T1]
-0.05 dB
670.000000000 kHz
Ref 20 dBm
Att 30 dB
20 Offset 1.5 dB
Marker 1 [T1]
2.57 dBm
2.479678000 GHz
D1 8.55 dBm
D2 2.55 dBm
F1
F2
Center 2.48 GHz
200 kHz/
Span 2 MHz
Date: 18.AUG.2020 16:41:41


RBW 30 kHz
VBW 100 kHz
SWT 2.5 ms
Marker 1 [T1]
-6.01 dBm
2.479660000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 1.5 dB
OBW 1.032000000 MHz
Temp 1 [T1 OBW]
-6.17 dBm
2.479500000 GHz
Temp 2 [T1 OBW]
-7.13 dBm
T2 2.480532000 GHz
T1
Center 2.48 GHz
200 kHz/
Span 2 MHz
Date: 18.AUG.2020 16:41:47

APPENDIX D OUTPUT POWER

Test Mode :	TX Mode _1Mbps	Tested Date	2020/8/18

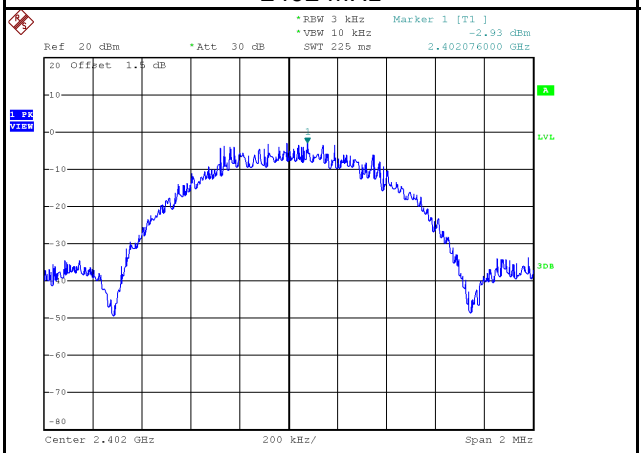
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	9.63	0.0092	30.00	1.0000	Pass
2440	9.22	0.0084	30.00	1.0000	Pass
2480	9.01	0.0080	30.00	1.0000	Pass

APPENDIX E POWER SPECTRAL DENSITY TEST

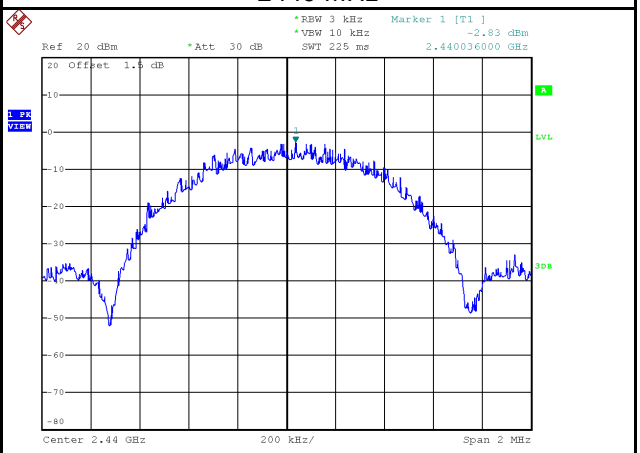
Test Mode:	TX Mode _1Mbps

Frequency (MHz)	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Test Result
2402	-2.93	8.00	Pass
2440	-2.83	8.00	Pass
2480	-1.82	8.00	Pass

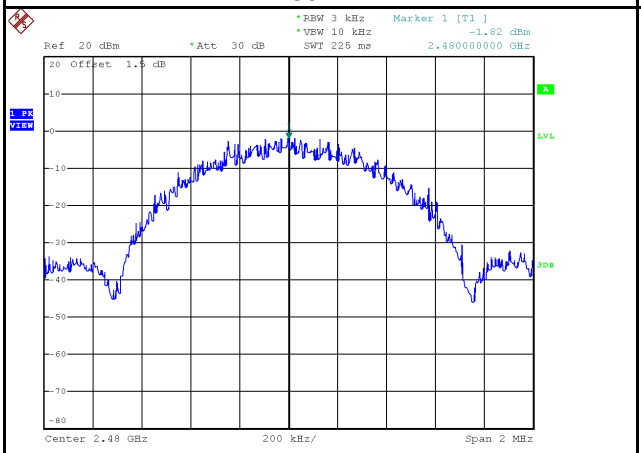
2402 MHz



2440 MHz



2480 MHz



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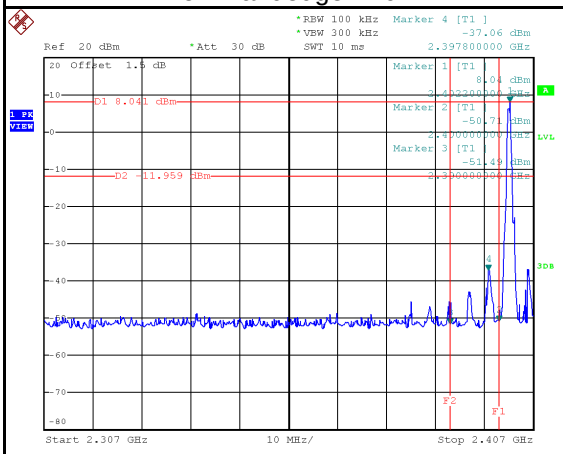
APPENDIX F ANTENNA CONDUCTED SPURIOUS EMISSION

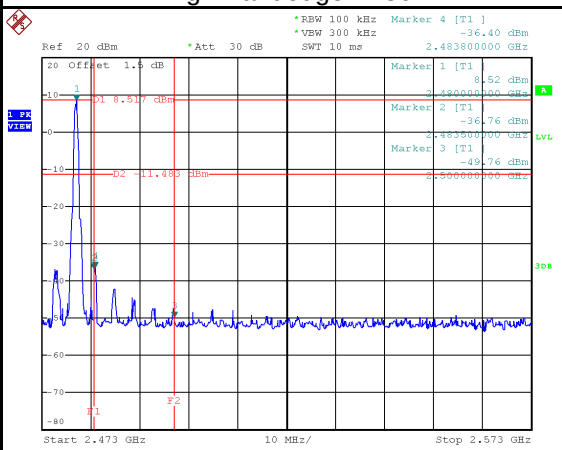
Test Mode :	TX Mode _1Mbps

Low Bandedge-2402 MHz



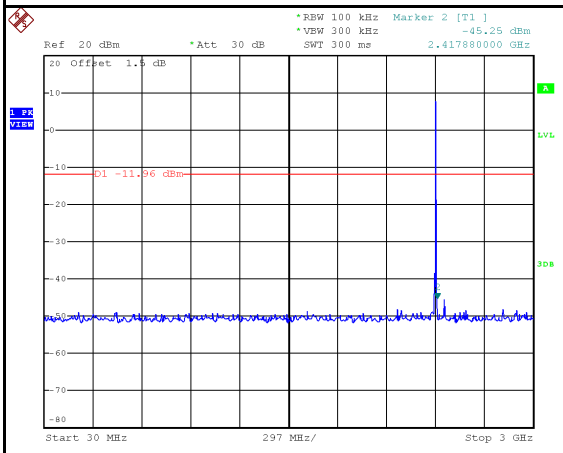
Date: 18.AUG.2020 16:37:02

High Bandedge-2480 MHz

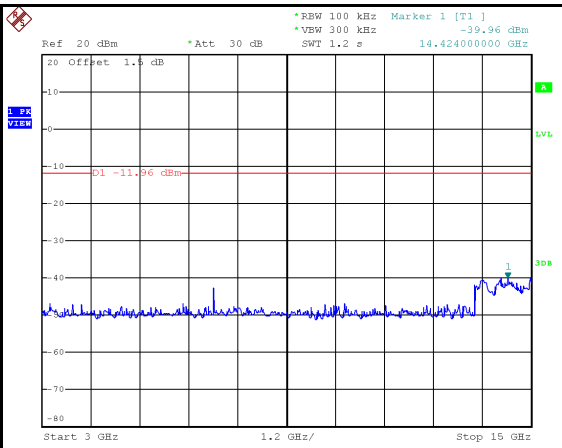


Date: 18.AUG.2020 16:41:54

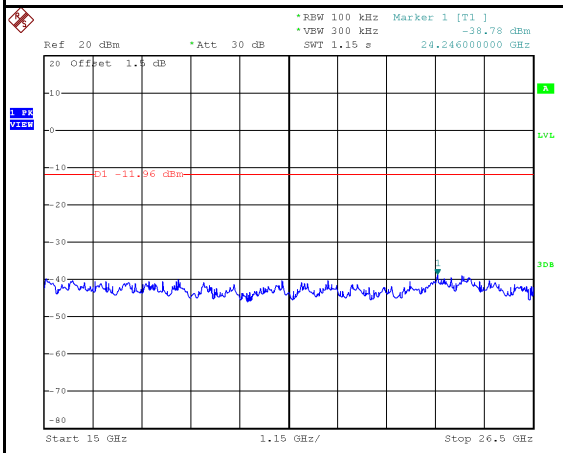
2402 MHz-10th Harmonics



Date: 18.AUG.2020 16:37:15



Date: 18.AUG.2020 16:37:22



Date: 18.AUG.2020 16:37:28

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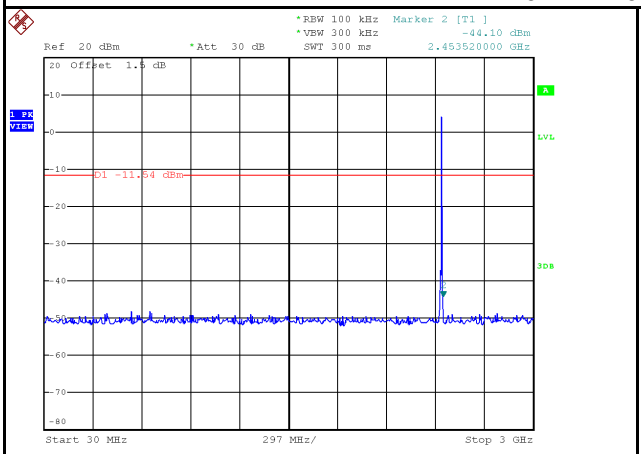
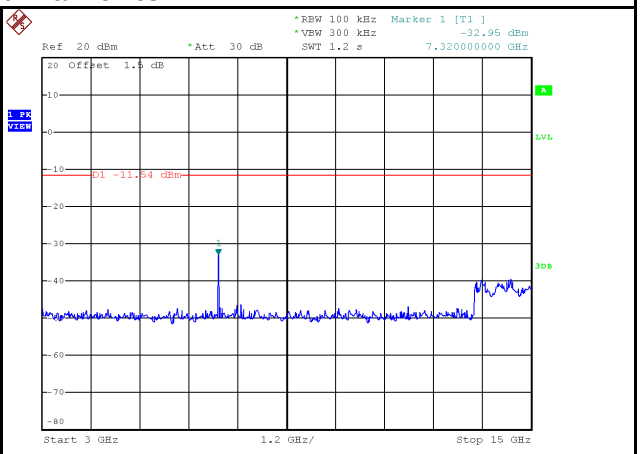
2440 MHz-10th Harmonics



Date: 18.AUG.2020 16:39:20



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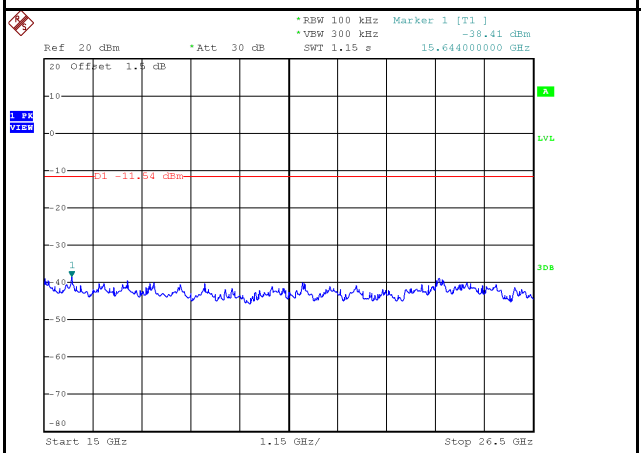

Date: 18.AUG.2020 16:39:34

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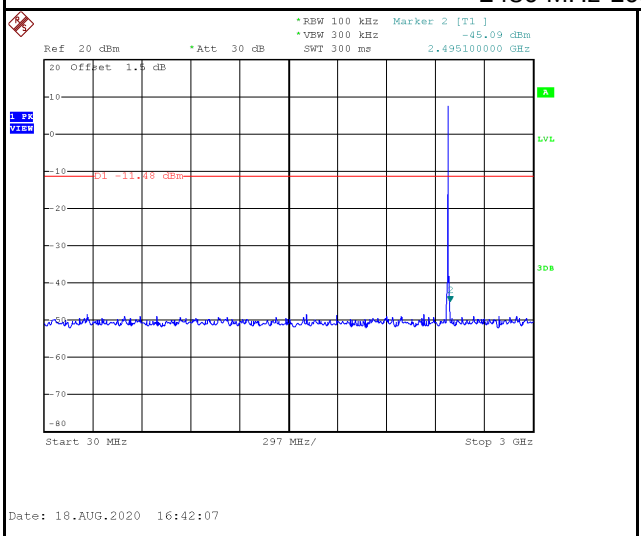
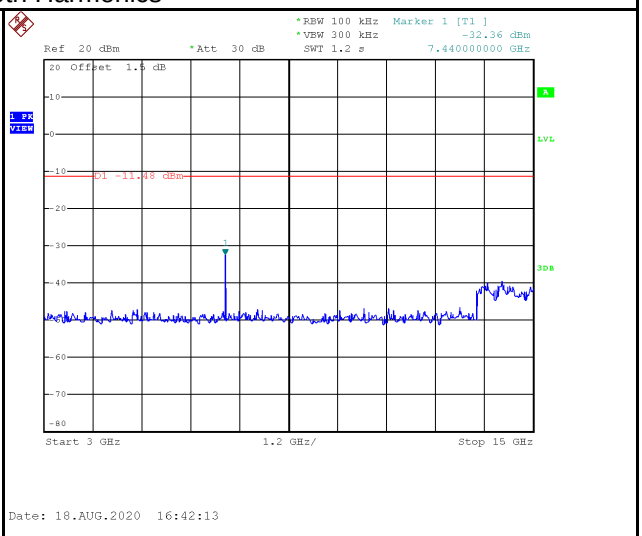
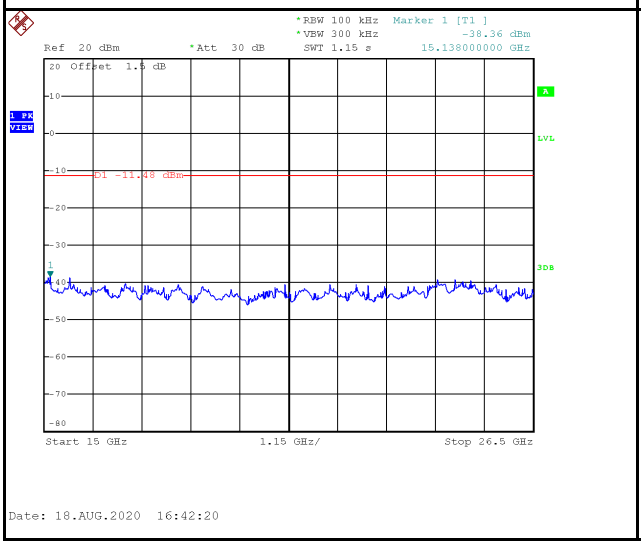
2480 MHz-10th Harmonics







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End of Test Report