FCC Radio Test Report

FCC ID: 2AF5PMGMT87

Report No.	:	BTL-FCCP-3-2006T060
Equipment	:	D3.1 Cable Modem plus AX6000 Router with Voice
Model Name	:	MT8733, MG8725
Brand Name	:	MOTOROLA
Applicant	:	MTRLC LLC
Address	:	225 Franklin Street, 26th Floor, Boston, MA 02110 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	:	2020/6/12
Date of Test	:	2020/6/12 ~ 2020/8/11
Issued Date	:	2020/8/26

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

Prepared by : Peter Chen, Engineer

Approved by : Scott Hsu , Manager

BTL Inc.
No.18, Ln. 171, Sec. 2, Jiuzong Rd., Neihu Dist., Taipei City 114, Taiwan
Tel: +886-2-2657-3299 Fax: +886-2-2657-3331 Web: www.newbtl.com

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.	2020/8/26

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	APPENDIX A	Pass	------
15.205 15.209 15.247(d)	Radiated Emissions	APPENDIX B APPENDIX C	Pass	------
15.247(a)(2)	Bandwidth	APPENDIX D	Pass	------
15.247(b)(3)	Output Power	APPENDIX E	Pass	------
15.247(e)	Power Spectral Density	APPENDIX F	Pass	------
15.247(d)	Antenna conducted Spurious Emission	APPENDIX G	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

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. AC power line conducted emissions test:

Test Site	Method	Measurement Frequency Range	U (dB)
C05	CISPR	150 kHz ~ 30MHz	3.44

B. Radiated emissions test :

Test Site	Measurement Frequency Range	U,(dB)
CB15	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

C. 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
AC Power Line Conducted Emissions	24 °C, 57 %	AC 120V	William Wei
Radiated emissions below 1 GHz	Refer to data	AC 120V	Aven Ho
Radiated emissions above 1 GHz	Refer to data	AC 120V	Aven Ho
Bandwidth	24.7 °C, 54 %	AC 120V	Tim Lee
Output Power	24.7 °C, 54 %	AC 120V	Tim Lee
Power Spectral Density	24.7 °C, 54 %	AC 120V	Tim Lee
Antenna conducted Spurious Emission	24.7 °C, 54 %	AC 120V	Tim Lee

1.4 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

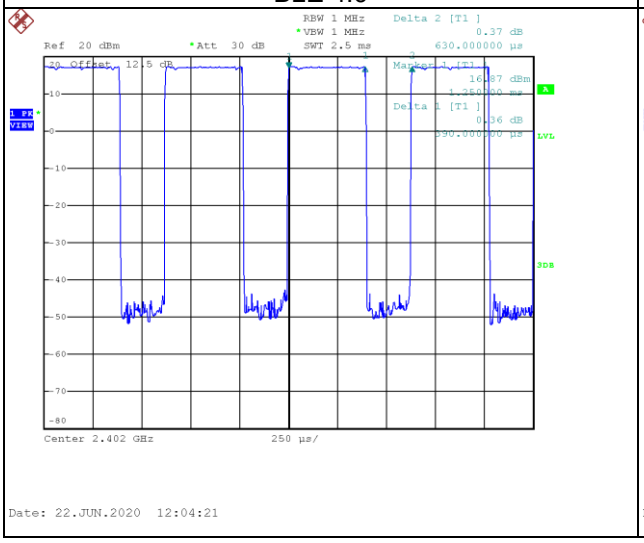
Test Software	Tera Term proxy extension V 1.0.0.18			
Modulation Mode	2402 MHz	2440 MHz	2480 MHz	Data Rate
BLE 4.0	140	140	137	1 Mbps
BLE 5.0	140	140	133	2 Mbps

1.5 DUTY CYCLE

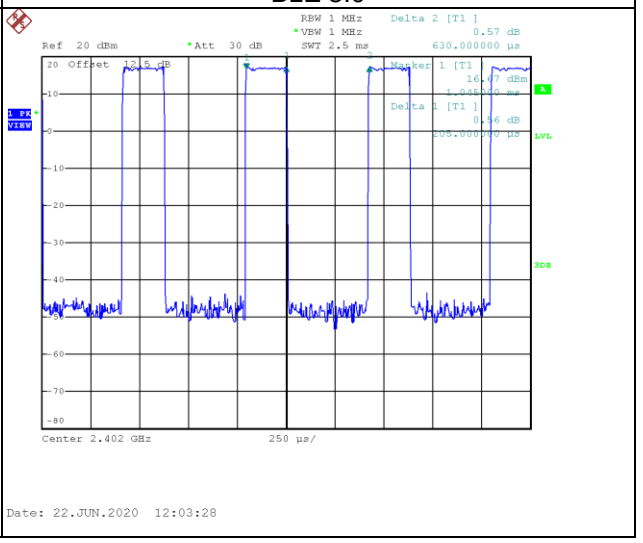
If duty cycle is ≥ 98 %, duty factor is not required.
If duty cycle is < 98 %, duty factor shall be considered.

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 4.0	0.390	1	0.390	0.630	61.90%	2.08
BLE 5.0	0.205	1	0.205	0.630	32.54%	4.88

BLE 4.0



BLE 5.0



2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	D3.1 Cable Modem plus AX6000 Router with Voice
Model Name	MT8733, MG8725
Brand Name	MOTOROLA
Model Difference	Model Name: MT8733 — VoIP port: YES Model Name: MG8725 — VoIP port: NO
Power Source	DC Voltage supplied from AC/DC adapter. #1 Ktec / KSA-36W-120300HU #2 HONOR / ADS-40FSI-12 12036EPCU
Power Rating	#1 Input: 100-240V~ 50/60Hz 1.0A Output: 12Vdc 3.0A #2 Input: 100-240V~ 50/60Hz Max. 1.0A Output: 12Vdc 3.0A
Products Covered	2 * Adapter: (1) Ktec / KSA-36W-120300HU (2) HONOR / ADS-40FSI-12 12036EPCU
Frequency Range	2400 MHz ~ 2483.5 MHz
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Technology	GFSK
Transfer Rate	BLE 4.0: 1 Mbps BLE 5.0: 2 Mbps
Output Power Max.	BLE 4.0: 18.13 dBm (0.0650 W) BLE 5.0: 18.15 dBm (0.0653 W)
Test Model	MT8733
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.	Model No.	Antenna Type	Connector	Gain (dBi)
1	Metal	PIFA	SMA	3

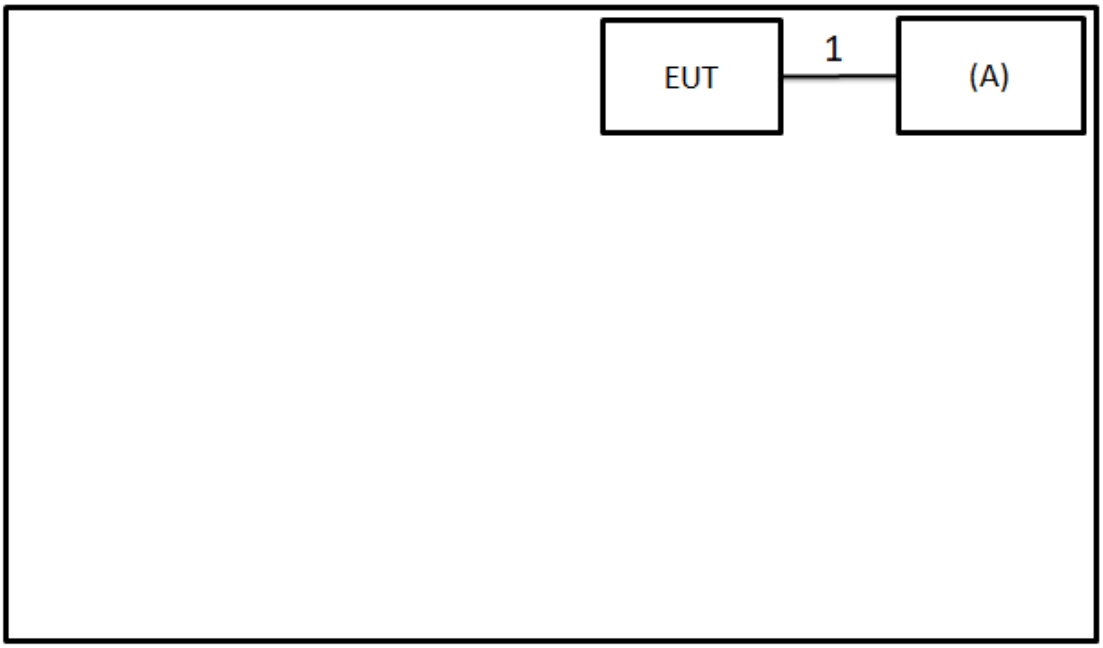
2.2 TEST MODES

Test Items	Test mode	Channel	Note
AC power line conducted emissions	Normal/Idle	-	-
Transmitter Radiated Emissions (below 1GHz)	BLE 5.0	39	-
Transmitter Radiated Emissions (above 1GHz)	BLE 4.0 / BLE 5.0	00/39	Bandedge
	BLE 4.0 / BLE 5.0	00/19/39	Harmonic
Bandwidth	BLE 4.0 / BLE 5.0	00/19/39	-
Output Power	BLE 4.0 / BLE 5.0	00/19/39	-
Power Spectral Density	BLE 4.0 / BLE 5.0	00/19/39	-
Antenna conducted Spurious Emission	BLE 4.0 / BLE 5.0	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.
(5) All adapter are evaluated, the KSA-36W-120300HU is the worst and recorded as below test data.

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	Adapter	Ktec	KSA-36W-120300HU	N/A	Supplied by test requester.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	N/A	N/A	1.5m	Power cable	Supplied by test requester.

3 AC POWER LINE CONDUCTED EMISSIONS TEST

3.1 LIMIT

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56 *	56 - 46 *
0.50 - 5.0	56	46
5.0 - 30.0	60	50

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.
(3) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor (if use)
Margin Level = Measurement Value – Limit Value
Calculation example:

Reading Level		Correct Factor		Measurement Value
38.22	+	3.45	=	41.67

Measurement Value		Limit Value		Margin Level
41.67	-	60	=	-18.33

The following table is the setting of the receiver.

Receiver Parameter	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

3.2 TEST PROCEDURE

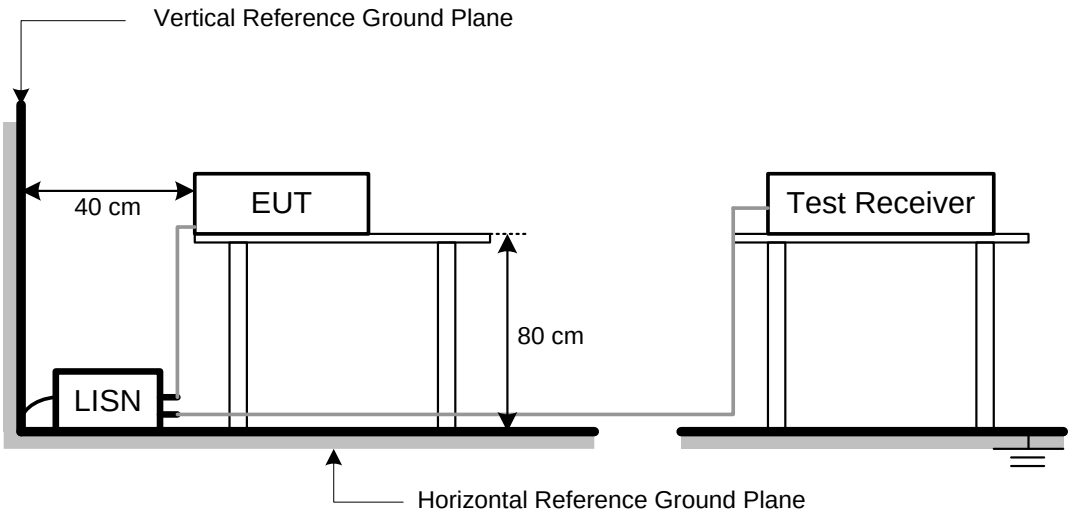
a. The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through a line impedance stabilization network (LISN).
All other support equipment were powered from an additional LISN(s).
The LISN provides 50 Ohm/50uH of impedance for the measuring instrument.
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 to keep the cable above 40 cm.
c. Excess I/O cables that are not connected to a peripheral shall be bundled in the center.
The end of the cable will be terminated, using the correct terminating impedance.
The overall length shall not exceed 1 m.
d. The LISN is spaced at least 80 cm from the nearest part of the EUT chassis.
e. For the actual test configuration, please refer to the related Item – EUT TEST PHOTO.

NOTE:
(1) In the results, each reading is marked as Peak, QP or AVG per the detector used.
BW=9 kHz (6 dB Bandwidth)
(2) All readings are Peak unless otherwise stated QP or AVG in column of Note. Both the QP and the AVG readings must be less than the limit for compliance.

3.3 DEVIATION FROM TEST STANDARD

No deviation.

3.4 TEST SETUP



3.5 TEST RESULT

Please refer to the **APPENDIX A**.

4 RADIATED EMISSIONS TEST

4.1 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
41.91	+	-8.36	=	33.55

Measurement Value		Limit Value		Margin Level
33.55	-	43.50	=	-9.95

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

4.2 TEST PROCEDURE

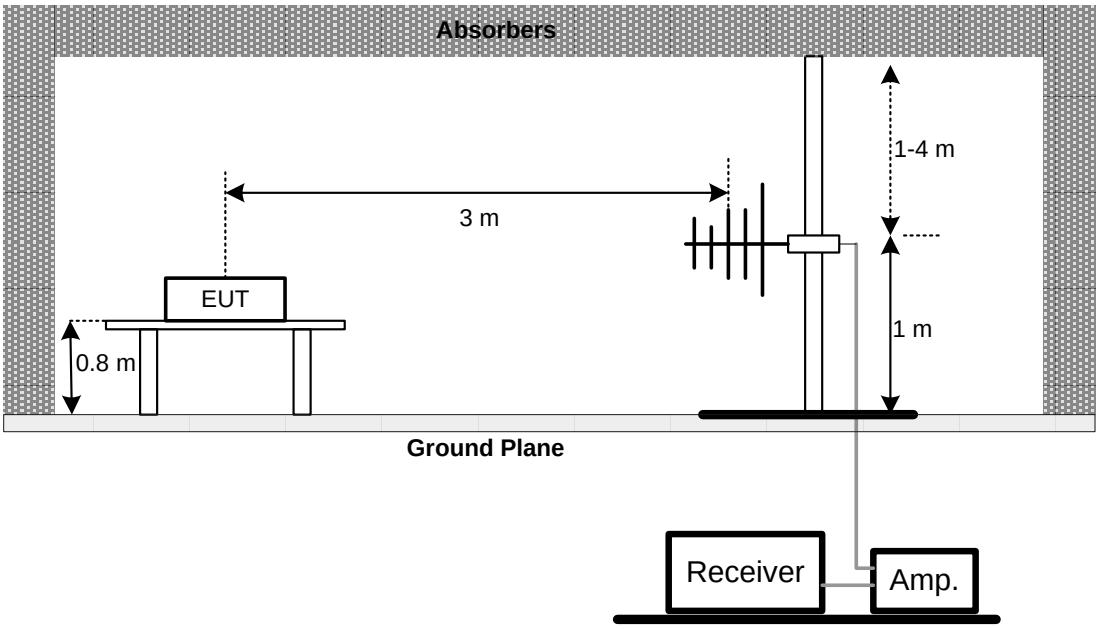
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance 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.

4.3 DEVIATION FROM TEST STANDARD

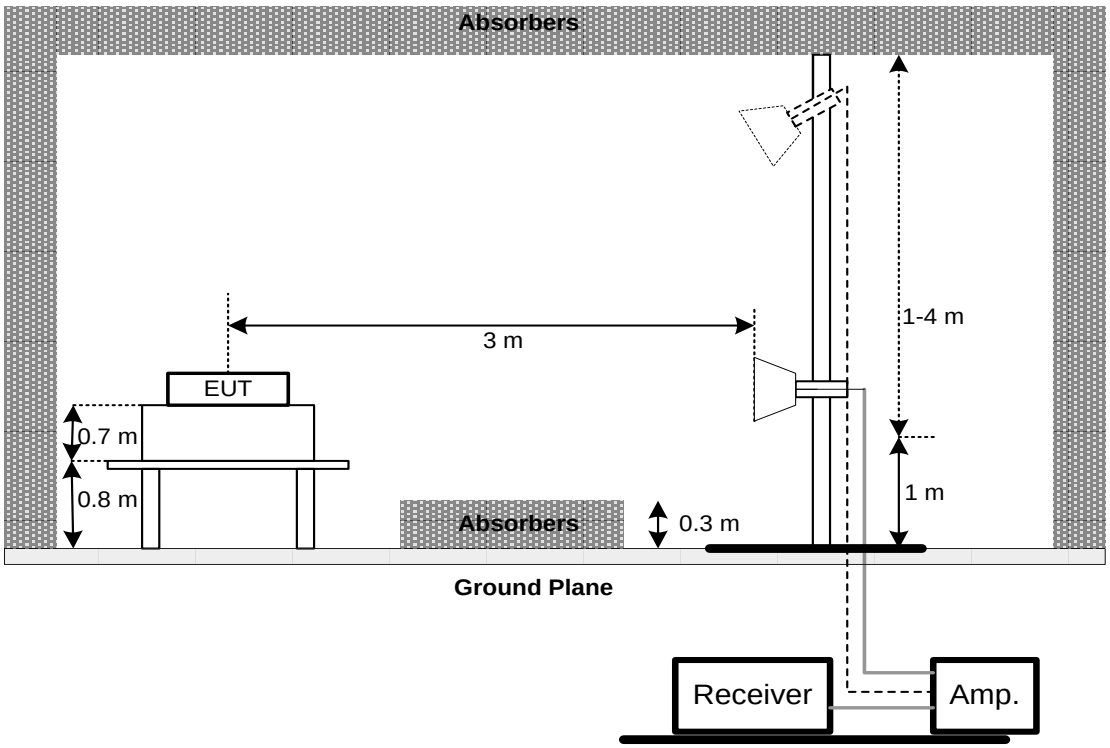
No deviation.

4.4 TEST SETUP

30 MHz to 1 GHz



Above 1 GHz



4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT – 30 MHZ TO 1 GHZ

Please refer to the APPENDIX B.

4.7 TEST RESULT – ABOVE 1 GHZ

Please refer to the APPENDIX C.

NOTE:

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

5 BANDWIDTH TEST

5.1 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

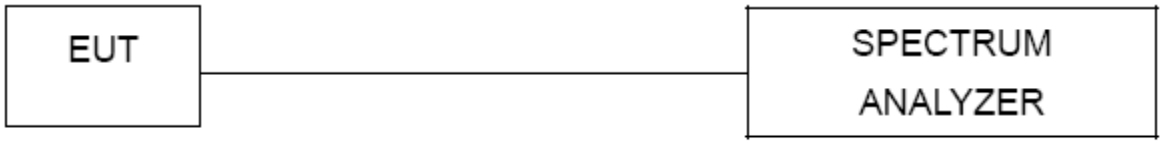
5.2 TEST PROCEDURE

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.

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 3.5 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 OUTPUT POWER TEST

6.1 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

6.2 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.

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 3.5 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 POWER SPECTRAL DENSITY TEST

7.1 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

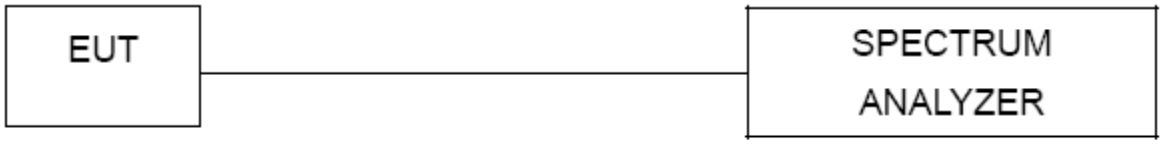
7.2 TEST PROCEDURE

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=3KHz, VBW=10 KHz, Sweep time = auto.

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 3.5 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 ANTENNA CONDUCTED SPURIOUS EMISSION

8.1 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.

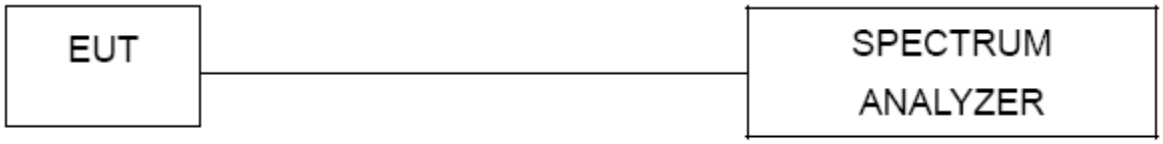
8.2 TEST PROCEDURE

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.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

Please refer to the APPENDIX G.

9 LIST OF MEASURING EQUIPMENTS

AC Power Line Conducted Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	2020/6/11	2021/6/11
2	Test Cable	EMCI	EMC400-BM-BM-5000	170501	2019/8/15	2020/8/14
3	EMI Test Receiver	R&S	ESR7	101433	2019/12/13	2020/12/11
4	Measurement Software	EZ	EZ_EMC (Version NB-03A1-01)	N/A	N/A	N/A

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-0-625	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.

10 EUT TEST PHOTO

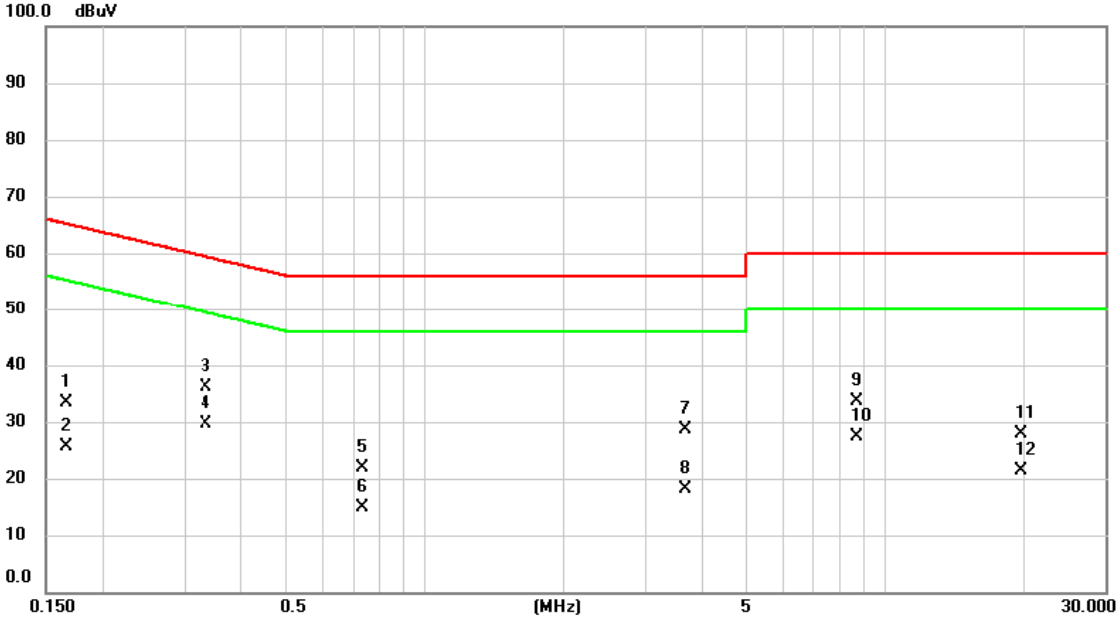
Please refer to document Appendix No.: TP-2006T060-FCCP-1 (APPENDIX-TEST PHOTOS).

11 EUT PHOTOS

Please refer to document Appendix No.: EP-2006T060-1 (APPENDIX-EUT PHOTOS).

APPENDIX A AC POWER LINE CONDUCTED EMISSIONS

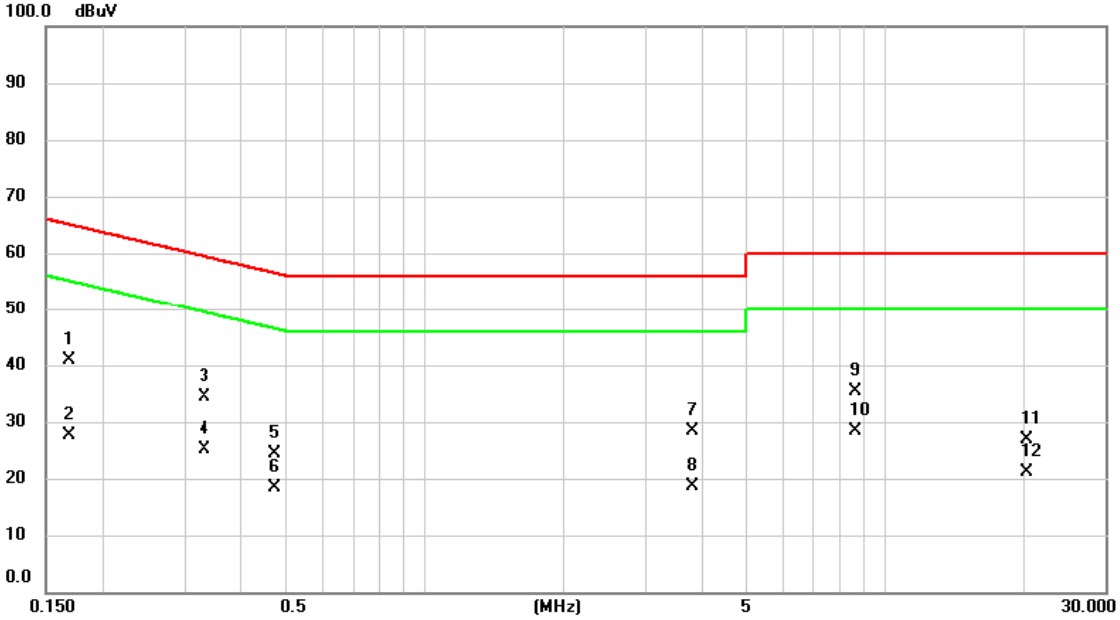
Test Mode	Normal	Tested Date	2020/7/3
Test Frequency	-	Phase	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1657	23.78	9.67	33.45	65.17	-31.72	QP	
2		0.1657	16.01	9.67	25.68	55.17	-29.49	AVG	
3		0.3344	26.50	9.71	36.21	59.34	-23.13	QP	
4	*	0.3344	19.80	9.71	29.51	49.34	-19.83	AVG	
5		0.7327	12.22	9.73	21.95	56.00	-34.05	QP	
6		0.7327	5.03	9.73	14.76	46.00	-31.24	AVG	
7		3.6577	18.91	9.81	28.72	56.00	-27.28	QP	
8		3.6577	8.27	9.81	18.08	46.00	-27.92	AVG	
9		8.6977	23.76	9.91	33.67	60.00	-26.33	QP	
10		8.6977	17.50	9.91	27.41	50.00	-22.59	AVG	
11		19.6935	17.74	10.02	27.76	60.00	-32.24	QP	
12		19.6935	11.39	10.02	21.41	50.00	-28.59	AVG	

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

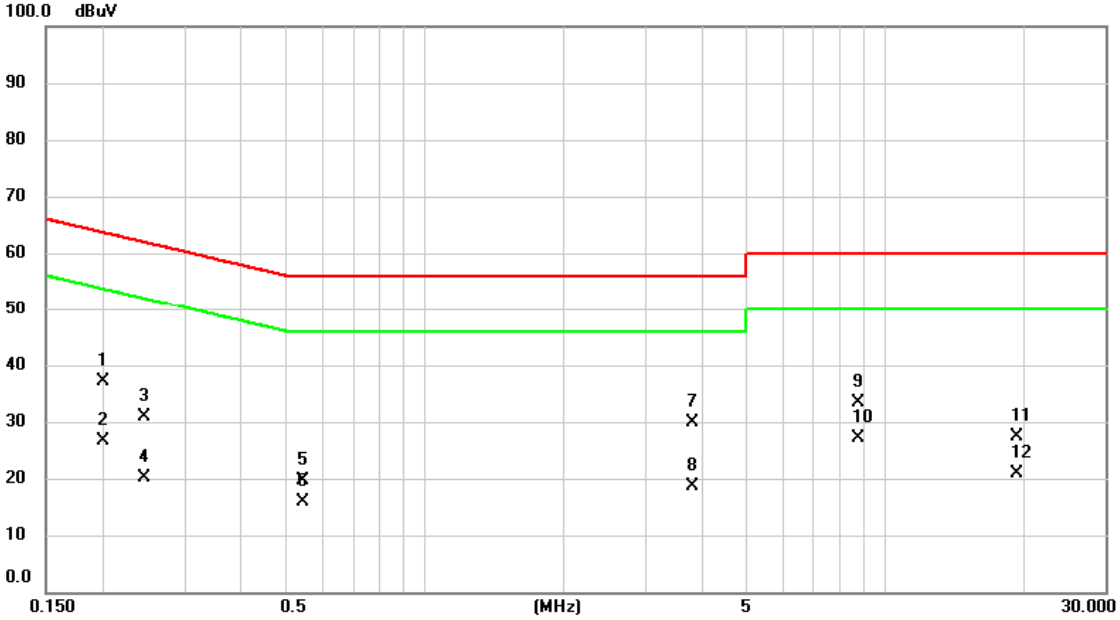
Test Mode	Normal	Tested Date	2020/7/3
Test Frequency	-	Phase	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1680	31.14	9.67	40.81	65.06	-24.25	QP	
2		0.1680	18.00	9.67	27.67	55.06	-27.39	AVG	
3		0.3322	24.65	9.71	34.36	59.40	-25.04	QP	
4		0.3322	15.36	9.71	25.07	49.40	-24.33	AVG	
5		0.4740	14.75	9.71	24.46	56.44	-31.98	QP	
6		0.4740	8.64	9.71	18.35	46.44	-28.09	AVG	
7		3.8040	18.60	9.81	28.41	56.00	-27.59	QP	
8		3.8040	8.75	9.81	18.56	46.00	-27.44	AVG	
9		8.6393	25.44	9.91	35.35	60.00	-24.65	QP	
10	*	8.6393	18.53	9.91	28.44	50.00	-21.56	AVG	
11		20.2357	16.91	10.02	26.93	60.00	-33.07	QP	
12		20.2357	11.18	10.02	21.20	50.00	-28.80	AVG	

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

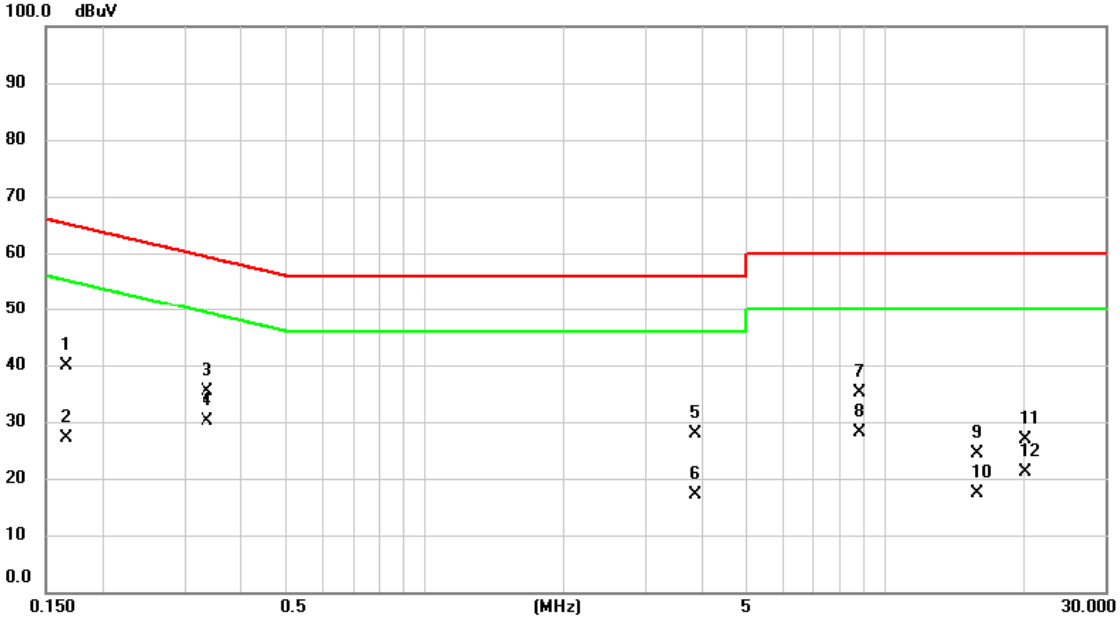
Test Mode	Idle	Tested Date	2020/7/3
Test Frequency	-	Phase	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1995	27.42	9.66	37.08	63.63	-26.55	QP	
2		0.1995	17.01	9.66	26.67	53.63	-26.96	AVG	
3		0.2445	21.21	9.66	30.87	61.94	-31.07	QP	
4		0.2445	10.53	9.66	20.19	51.94	-31.75	AVG	
5		0.5460	9.87	9.71	19.58	56.00	-36.42	QP	
6		0.5460	6.10	9.71	15.81	46.00	-30.19	AVG	
7		3.7928	20.01	9.81	29.82	56.00	-26.18	QP	
8		3.7928	8.89	9.81	18.70	46.00	-27.30	AVG	
9		8.7405	23.56	9.91	33.47	60.00	-26.53	QP	
10	*	8.7405	17.11	9.91	27.02	50.00	-22.98	AVG	
11		19.3154	17.46	10.02	27.48	60.00	-32.52	QP	
12		19.3154	10.98	10.02	21.00	50.00	-29.00	AVG	

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

Test Mode	Idle	Tested Date	2020/7/3
Test Frequency	-	Phase	Neutral

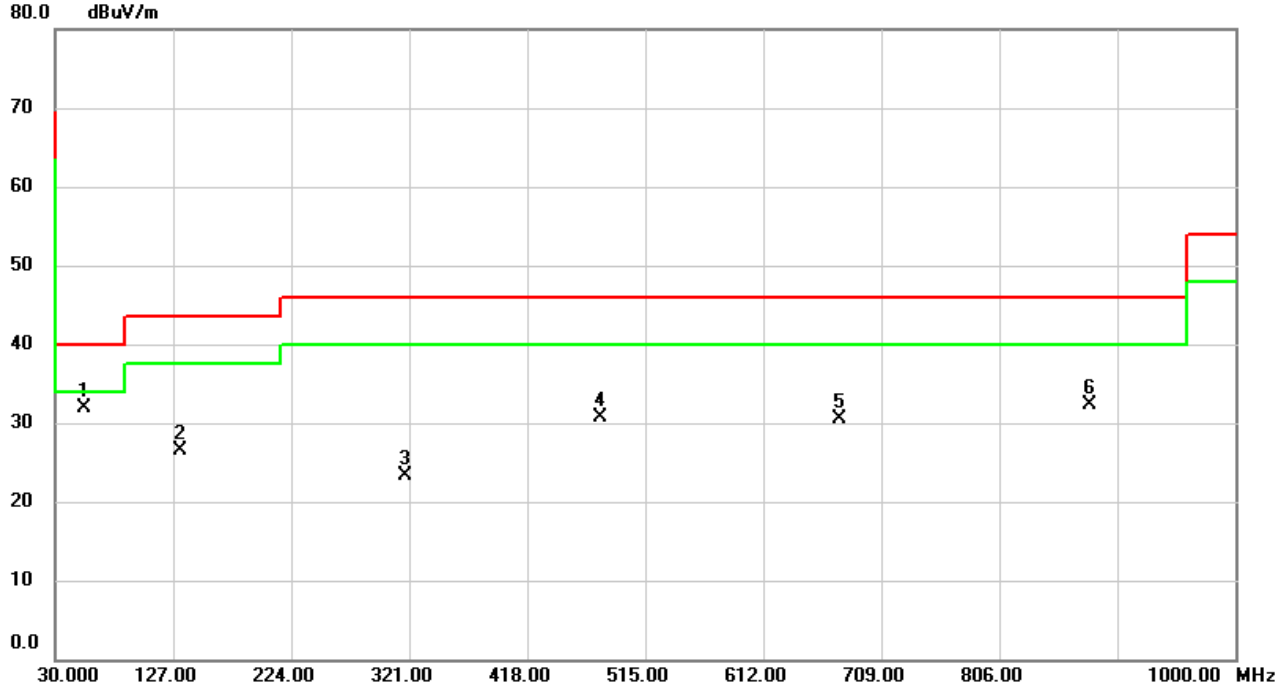


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1658	30.22	9.67	39.89	65.17	-25.28	QP	
2		0.1658	17.47	9.67	27.14	55.17	-28.03	AVG	
3		0.3367	25.61	9.71	35.32	59.28	-23.96	QP	
4	*	0.3367	20.32	9.71	30.03	49.28	-19.25	AVG	
5		3.8670	18.07	9.81	27.88	56.00	-28.12	QP	
6		3.8670	7.30	9.81	17.11	46.00	-28.89	AVG	
7		8.7810	25.29	9.92	35.21	60.00	-24.79	QP	
8		8.7810	18.14	9.92	28.06	50.00	-21.94	AVG	
9		15.7830	14.32	9.99	24.31	60.00	-35.69	QP	
10		15.7830	7.40	9.99	17.39	50.00	-32.61	AVG	
11		20.1615	16.95	10.02	26.97	60.00	-33.03	QP	
12		20.1615	11.12	10.02	21.14	50.00	-28.86	AVG	

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

APPENDIX B RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

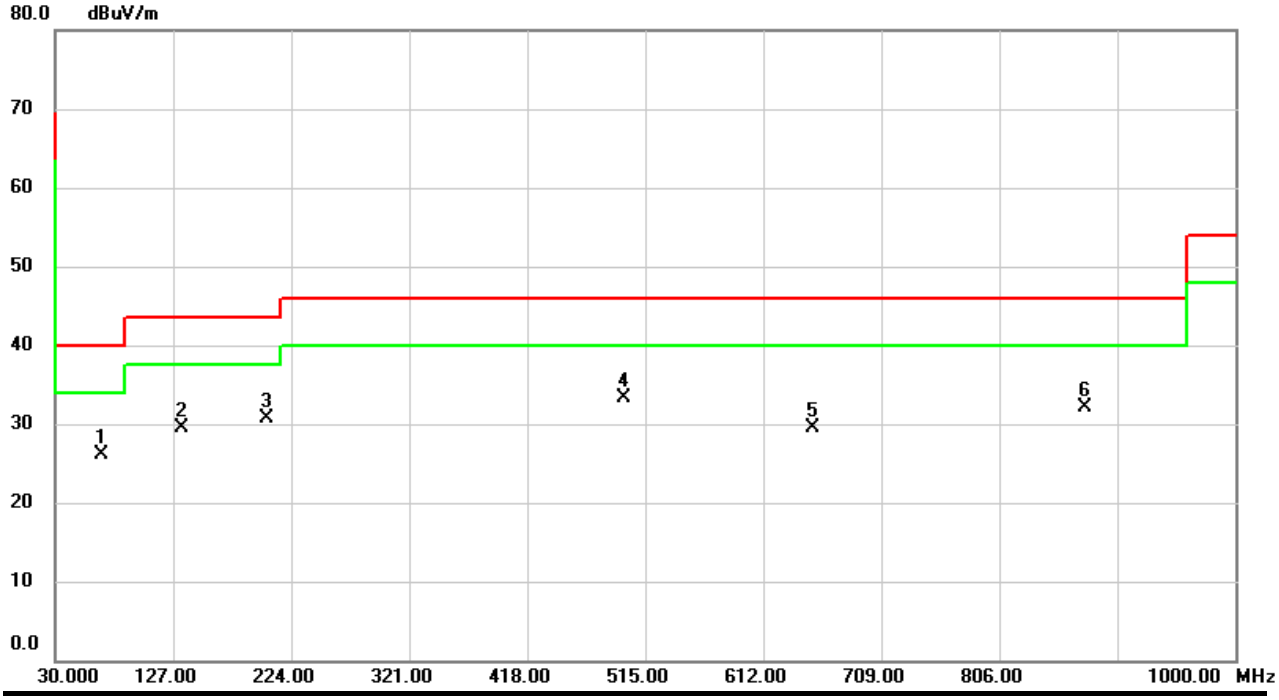
Test Mode	BLE 5.0	Test Date	2020/7/7
Test Frequency	2480	Polarization	Vertical
Temp	22°C	Hum.	61%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	53.2800	39.90	-7.91	31.99	40.00	-8.01	peak	
2		132.8200	36.24	-9.70	26.54	43.50	-16.96	peak	
3		318.0900	30.14	-6.86	23.28	46.00	-22.72	peak	
4		478.1400	33.98	-3.18	30.80	46.00	-15.20	peak	
5		675.0500	29.85	0.62	30.47	46.00	-15.53	peak	
6		880.6900	28.72	3.61	32.33	46.00	-13.67	peak	

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

Test Mode	BLE 5.0	Test Date	2020/7/7
Test Frequency	2480	Polarization	Horizontal
Temp	22°C	Hum.	61%

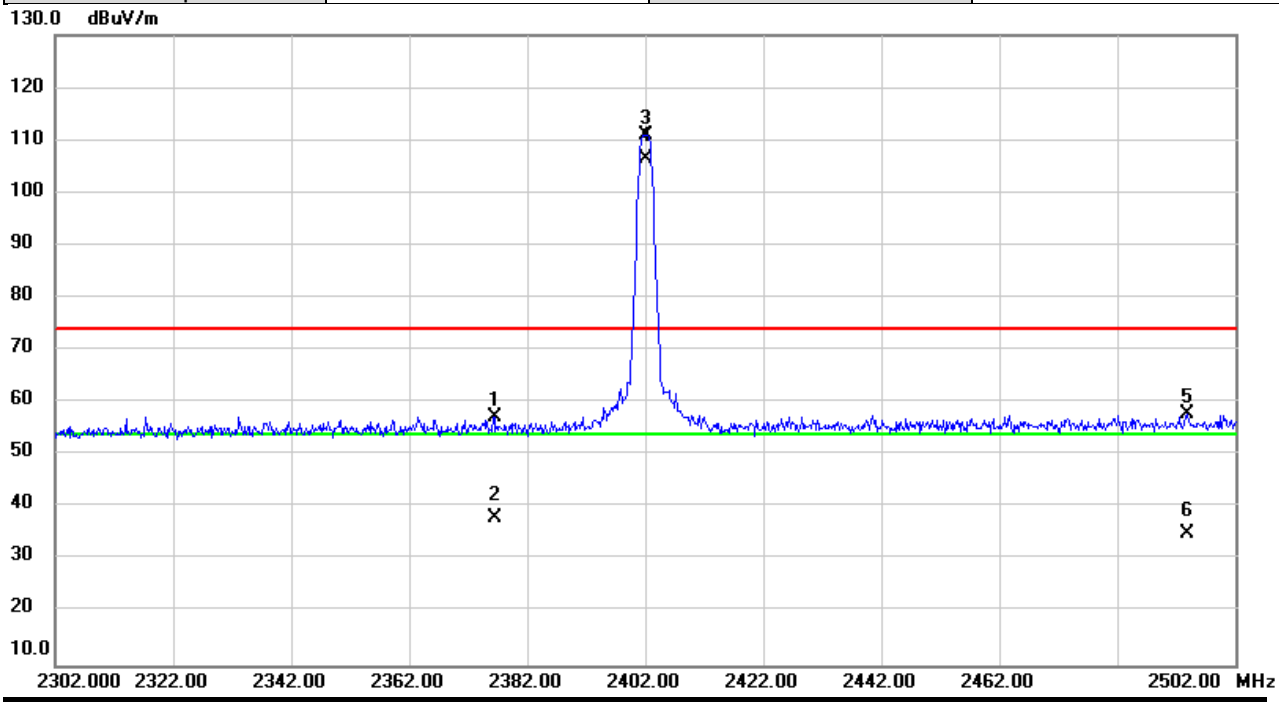


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		67.8300	36.34	-10.20	26.14	40.00	-13.86	peak	
2		133.7900	39.01	-9.59	29.42	43.50	-14.08	peak	
3		203.6300	41.50	-10.81	30.69	43.50	-12.81	peak	
4	*	497.5400	36.21	-2.88	33.33	46.00	-12.67	peak	
5		652.7400	29.36	0.19	29.55	46.00	-16.45	peak	
6		875.8400	28.54	3.54	32.08	46.00	-13.92	peak	

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

APPENDIX C RADIATED EMISSIONS - ABOVE 1 GHZ

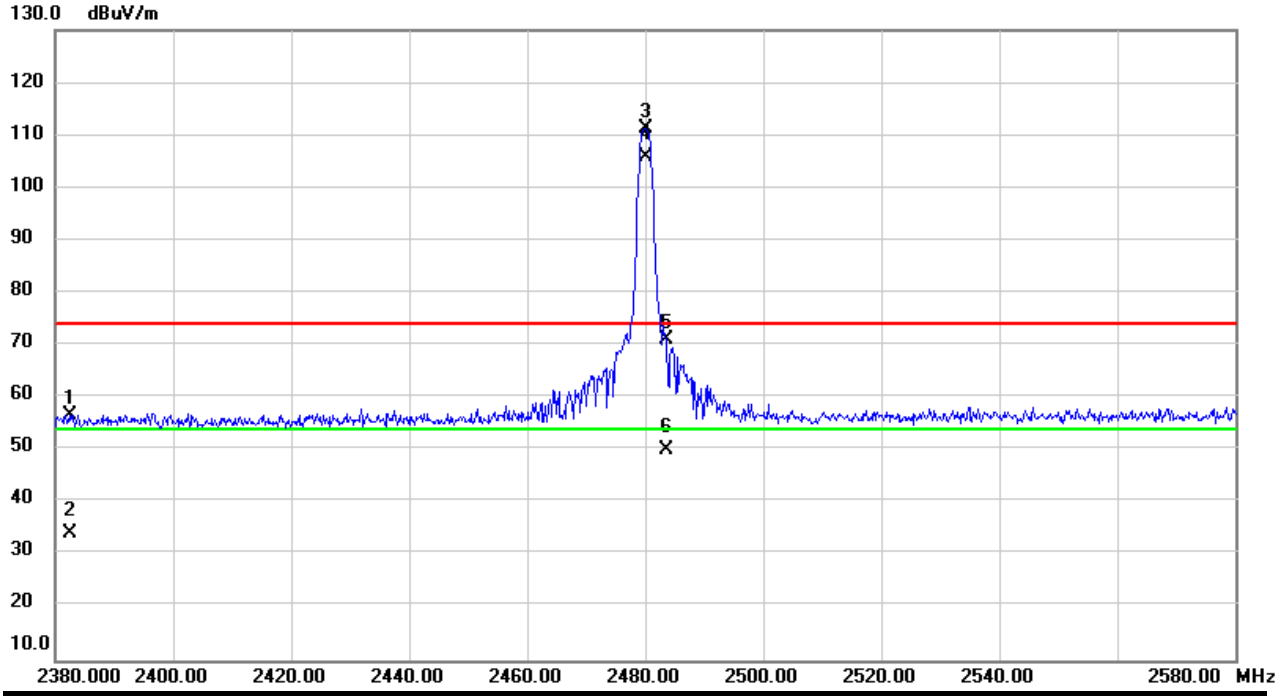
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2402	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2376.400	26.30	31.06	57.36	74.00	-16.64	peak	
2		2376.400	6.91	31.06	37.97	54.00	-16.03	AVG	
3	X	2402.000	79.86	31.16	111.02	74.00	37.02	peak	NoLimit
4	*	2402.000	75.44	31.16	106.60	54.00	52.60	AVG	NoLimit
5		2493.800	26.19	31.51	57.70	74.00	-16.30	peak	
6		2493.800	3.43	31.51	34.94	54.00	-19.06	AVG	

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

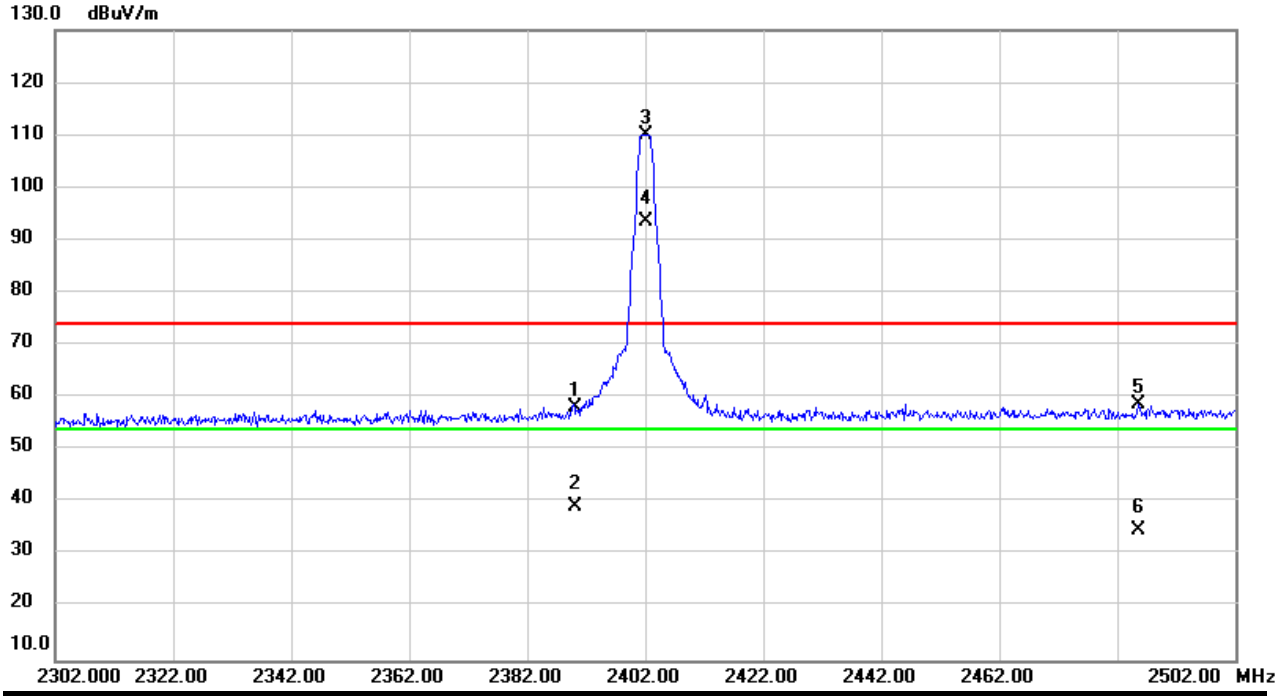
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2480	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2382.400	25.69	31.08	56.77	74.00	-17.23	peak	
2		2382.400	3.13	31.08	34.21	54.00	-19.79	AVG	
3	X	2480.000	79.81	31.46	111.27	74.00	37.27	peak	NoLimit
4	*	2480.000	74.37	31.46	105.83	54.00	51.83	AVG	NoLimit
5		2483.500	39.55	31.47	71.02	74.00	-2.98	peak	
6		2483.500	18.57	31.47	50.04	54.00	-3.96	AVG	

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

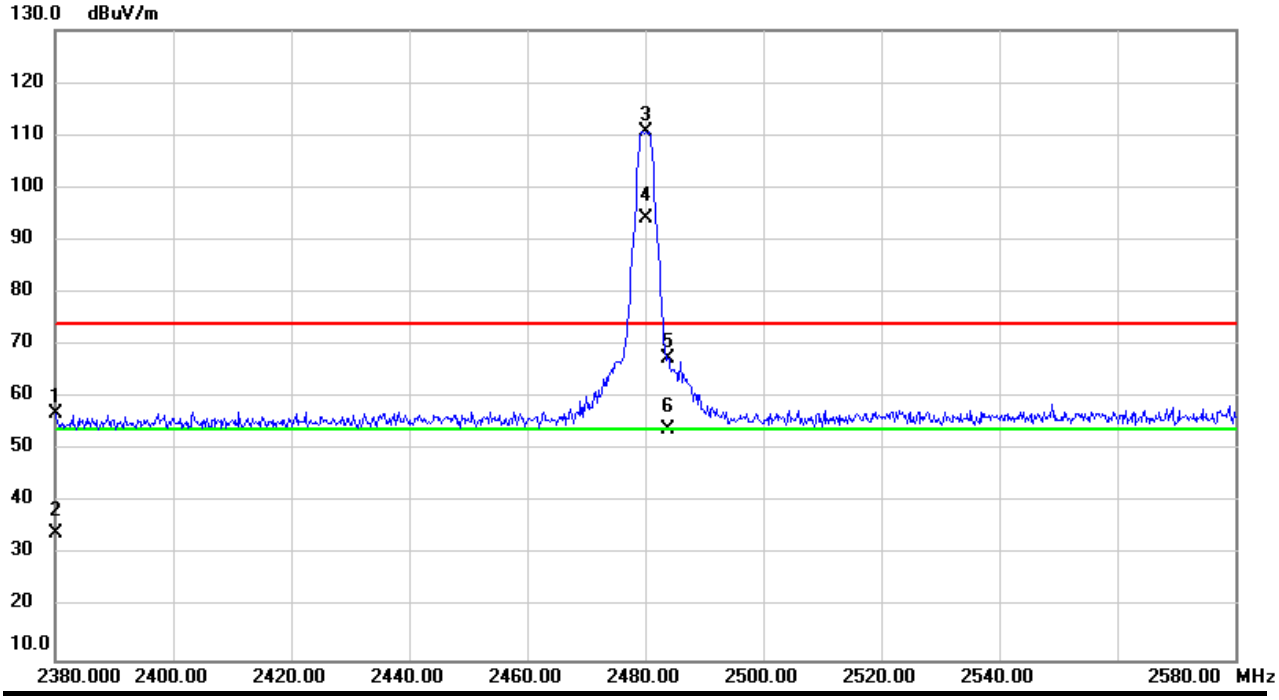
Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2402	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	27.06	31.11	58.17	74.00	-15.83	peak	
2		2390.000	8.20	31.11	39.31	54.00	-14.69	AVG	
3	X	2402.000	78.96	31.16	110.12	74.00	36.12	peak	NoLimit
4	*	2402.000	62.31	31.16	93.47	54.00	39.47	AVG	NoLimit
5		2485.600	27.30	31.47	58.77	74.00	-15.23	peak	
6		2485.600	3.42	31.47	34.89	54.00	-19.11	AVG	

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

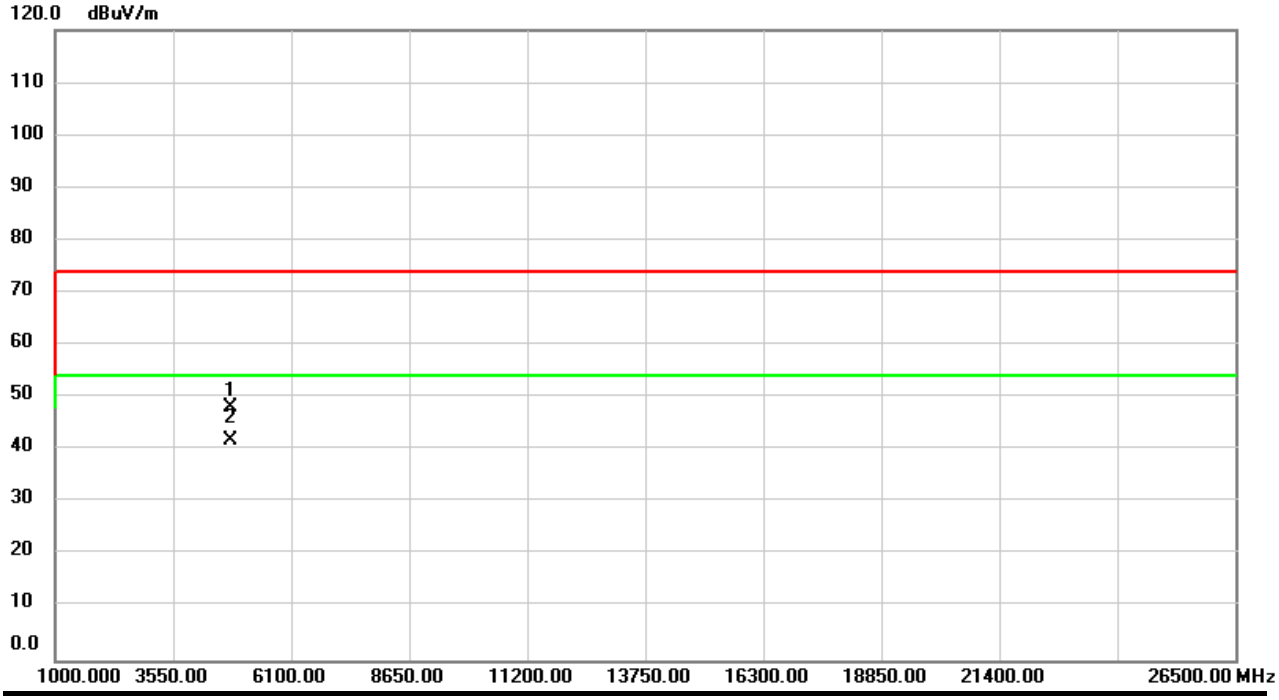
Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2480	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2380.000	25.90	31.08	56.98	74.00	-17.02	peak	
2		2380.000	3.16	31.08	34.24	54.00	-19.76	AVG	
3	X	2480.000	79.19	31.46	110.65	74.00	36.65	peak	NoLimit
4	*	2480.000	62.58	31.46	94.04	54.00	40.04	AVG	NoLimit
5		2483.800	36.08	31.47	67.55	74.00	-6.45	peak	
6		2483.800	22.44	31.47	53.91	54.00	-0.09	AVG	

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

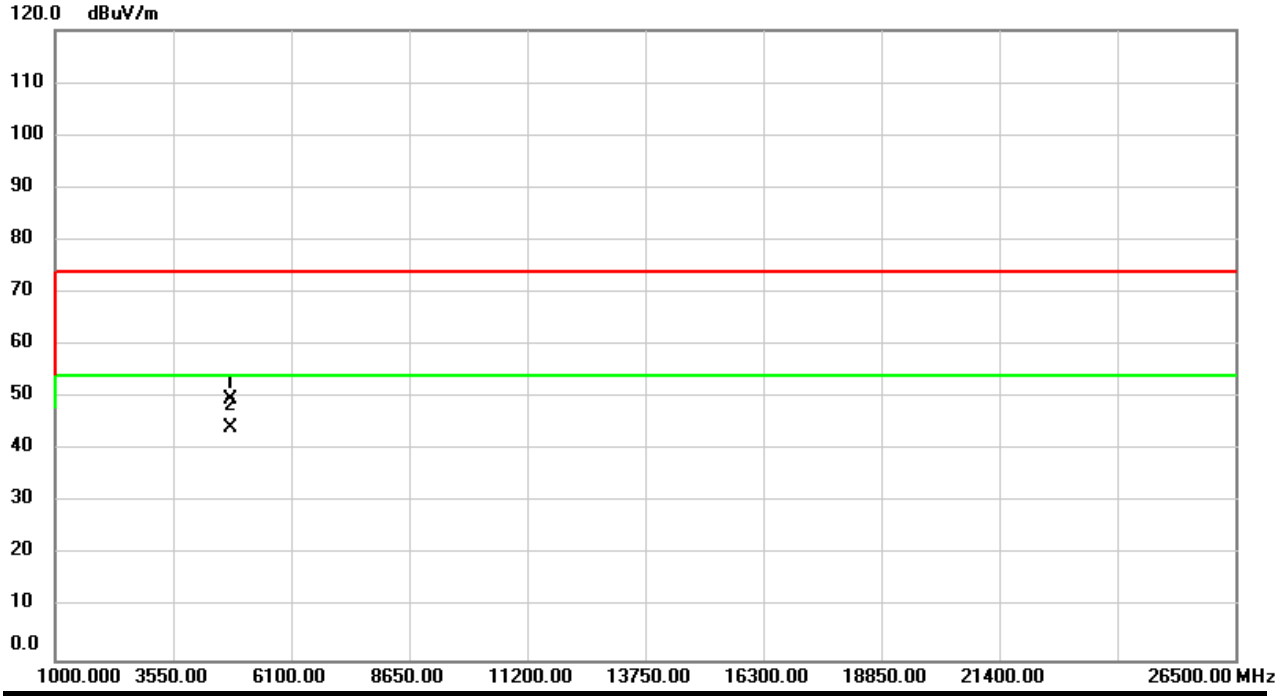
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2402	Polarization	Vertical
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	58.22	-10.01	48.21	74.00	-25.79	peak	
2	*	4804.000	51.98	-10.01	41.97	54.00	-12.03	AVG	

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

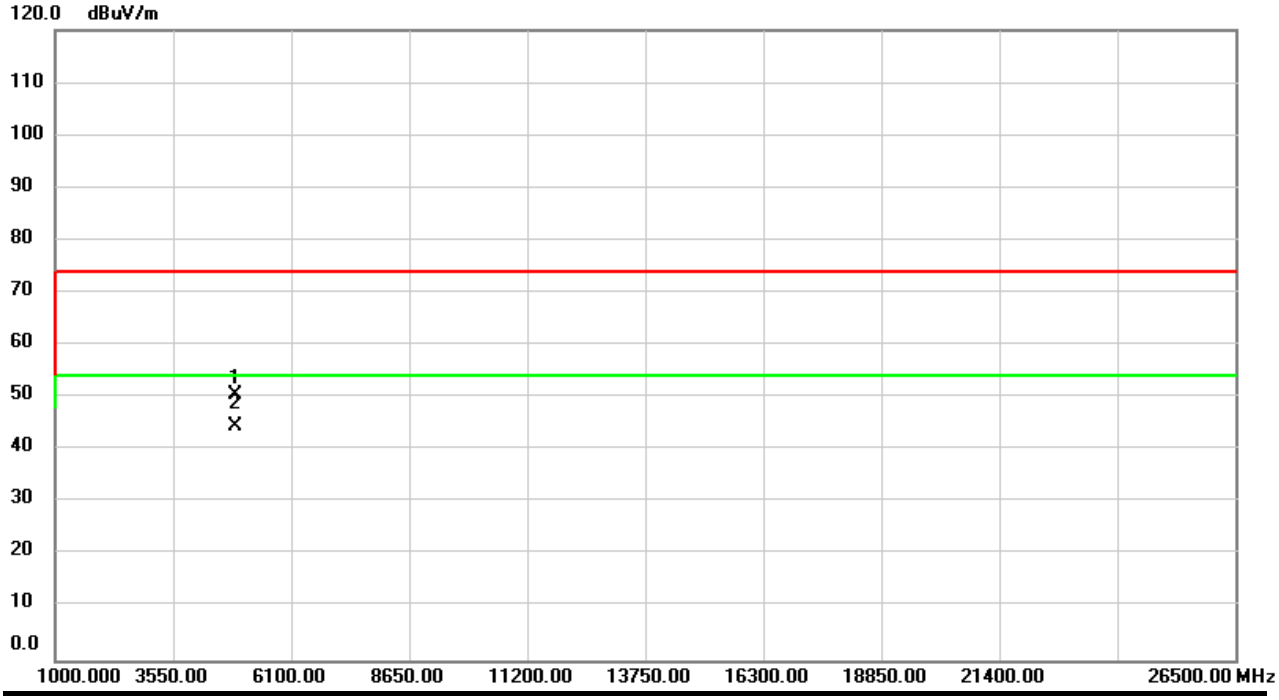
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2402	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	59.63	-10.01	49.62	74.00	-24.38	peak	
2	*	4804.000	54.22	-10.01	44.21	54.00	-9.79	AVG	

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

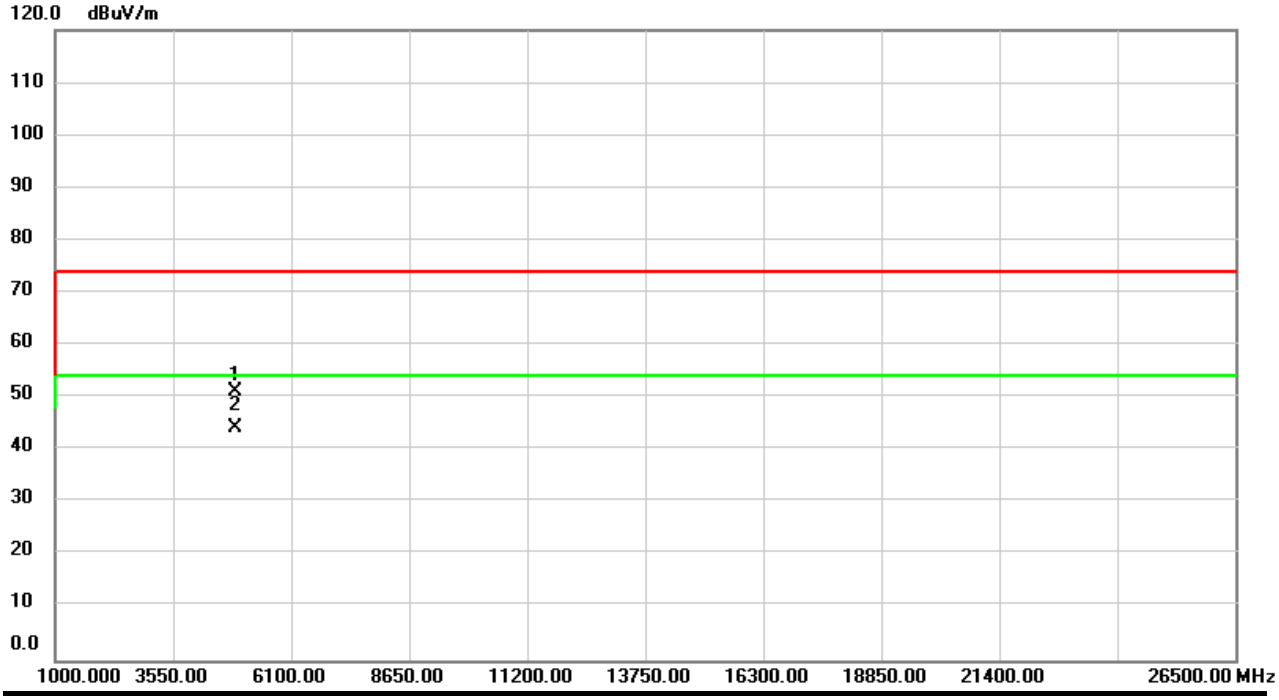
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2440	Polarization	Vertical
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4880.000	60.38	-9.72	50.66	74.00	-23.34	peak	
2	*	4880.000	54.39	-9.72	44.67	54.00	-9.33	AVG	

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

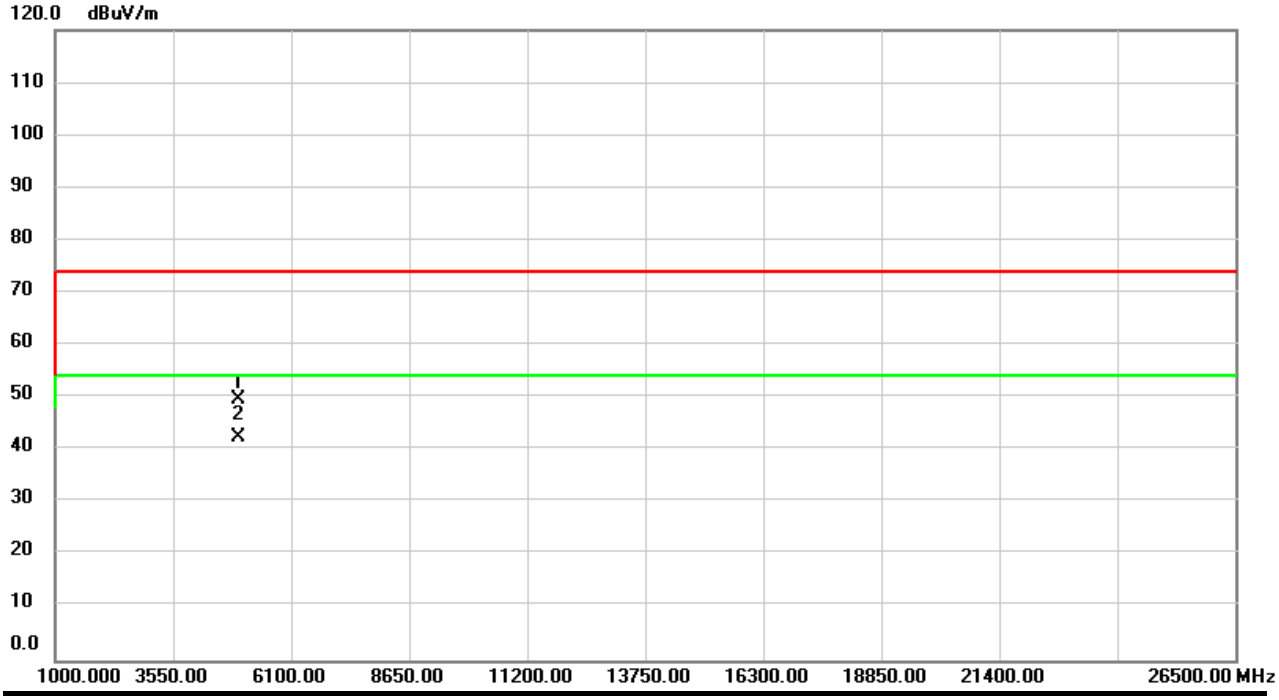
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2440	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4880.000	60.81	-9.72	51.09	74.00	-22.91	peak	
2	*	4880.000	54.09	-9.72	44.37	54.00	-9.63	AVG	

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

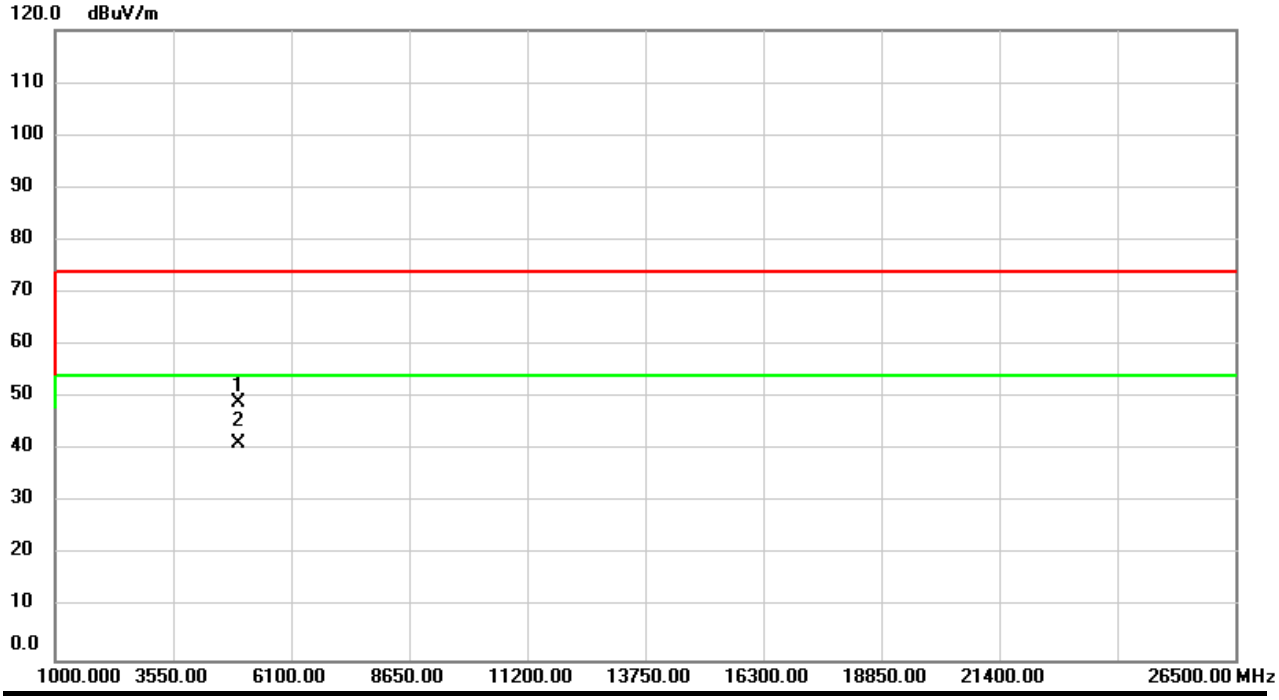
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2480	Polarization	Vertical
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	58.97	-9.41	49.56	74.00	-24.44	peak	
2	*	4960.000	51.91	-9.41	42.50	54.00	-11.50	AVG	

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

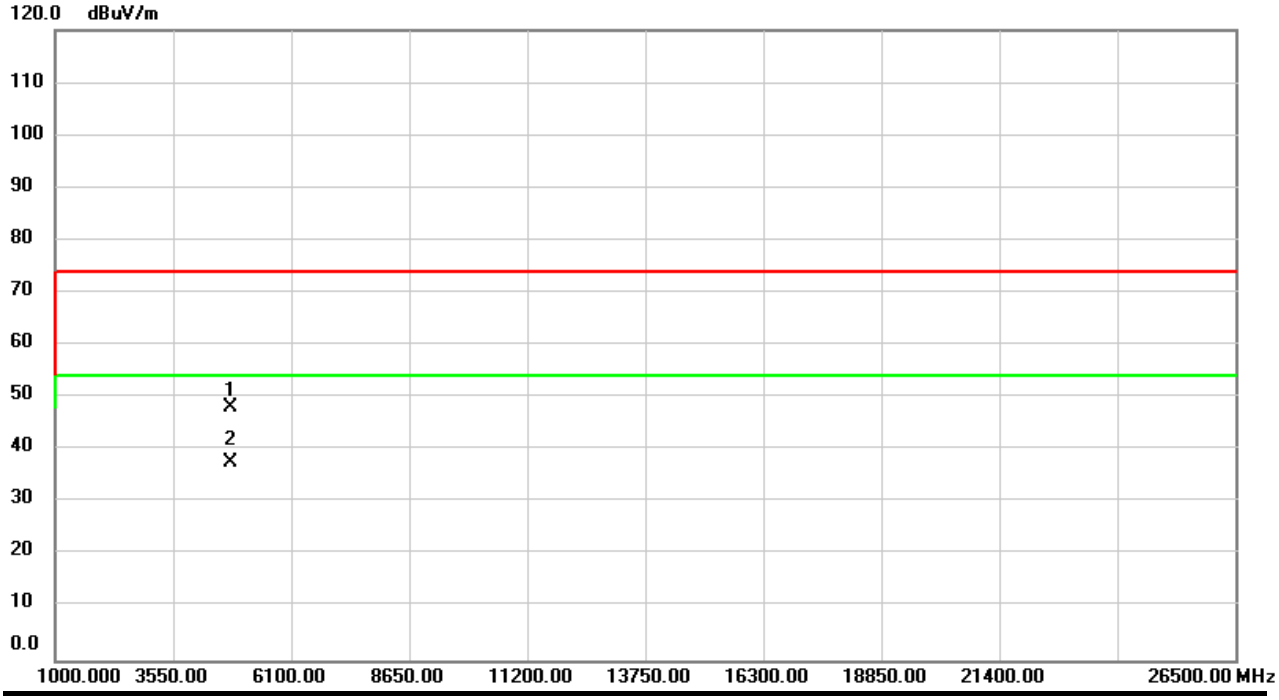
Test Mode	BLE 4.0	Test Date	2020/7/2
Test Frequency	2480	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	58.32	-9.41	48.91	74.00	-25.09	peak	
2	*	4960.000	50.81	-9.41	41.40	54.00	-12.60	AVG	

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

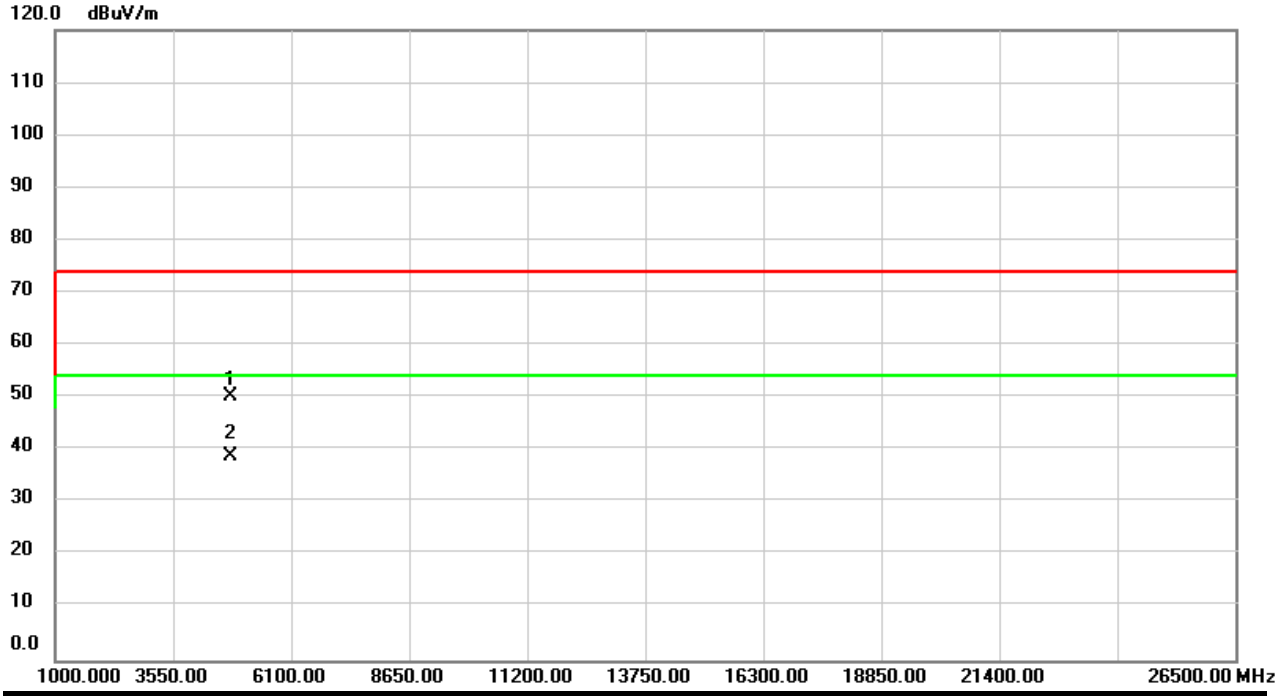
Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2402	Polarization	Vertical
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	58.12	-10.01	48.11	74.00	-25.89	peak	
2	*	4804.000	47.80	-10.01	37.79	54.00	-16.21	AVG	

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

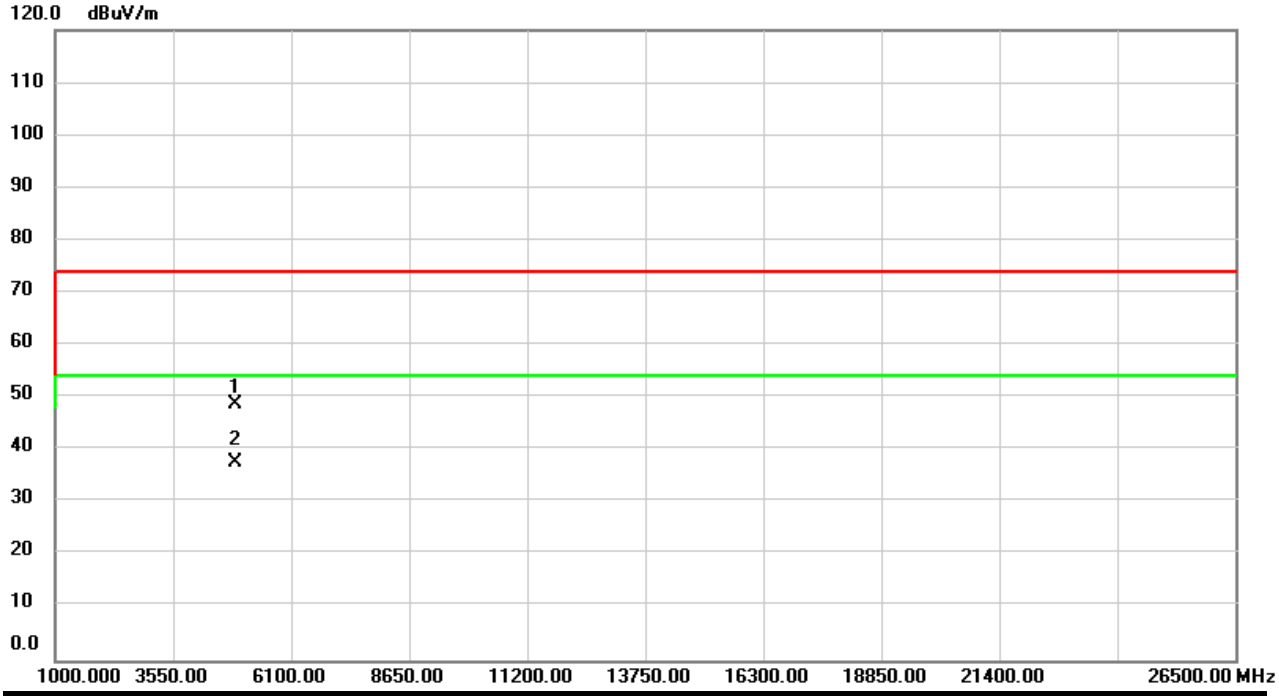
Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2402	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	60.13	-10.01	50.12	74.00	-23.88	peak	
2	*	4804.000	48.86	-10.01	38.85	54.00	-15.15	AVG	

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

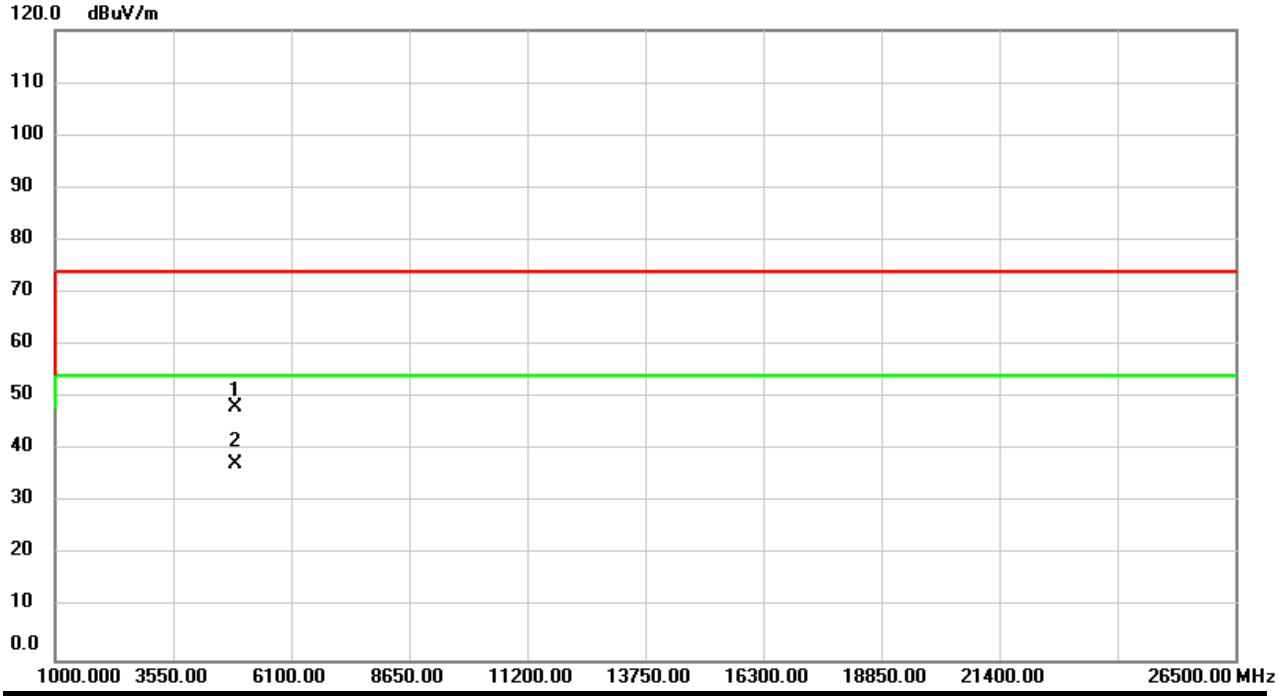
Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2440	Polarization	Vertical
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4880.000	58.34	-9.72	48.62	74.00	-25.38	peak	
2	*	4880.000	47.35	-9.72	37.63	54.00	-16.37	AVG	

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

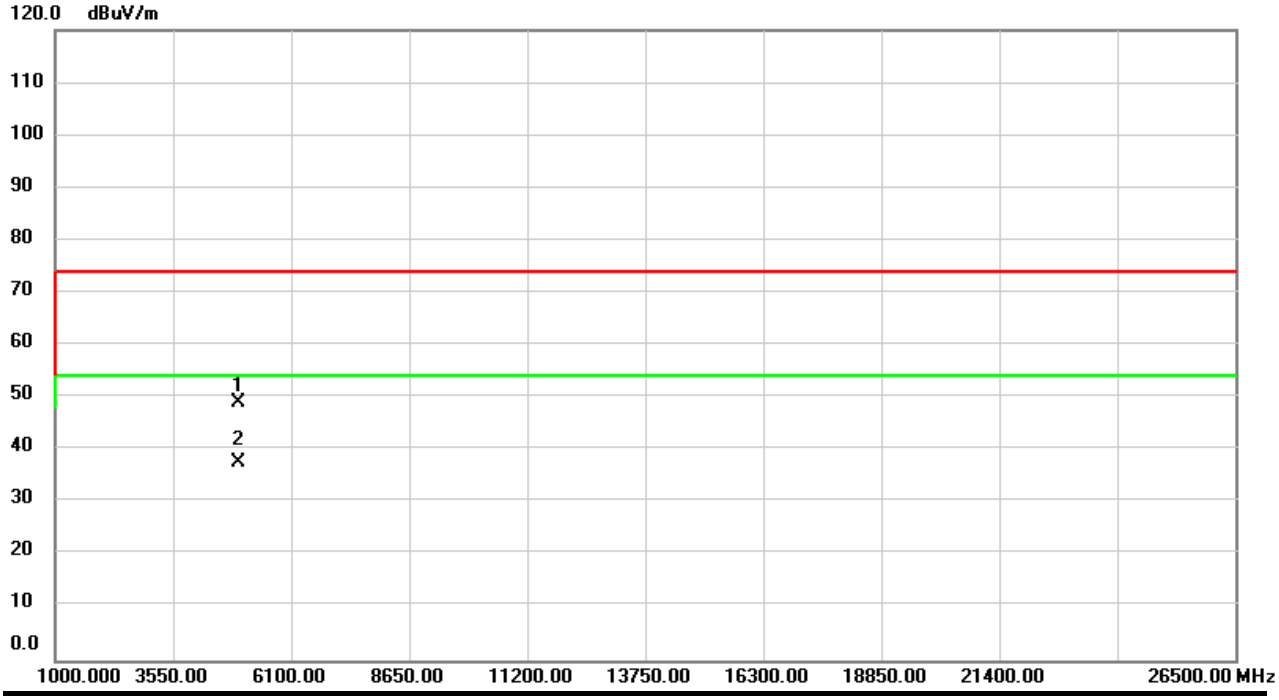
Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2440	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4880.000	57.79	-9.72	48.07	74.00	-25.93	peak	
2	*	4880.000	47.13	-9.72	37.41	54.00	-16.59	AVG	

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

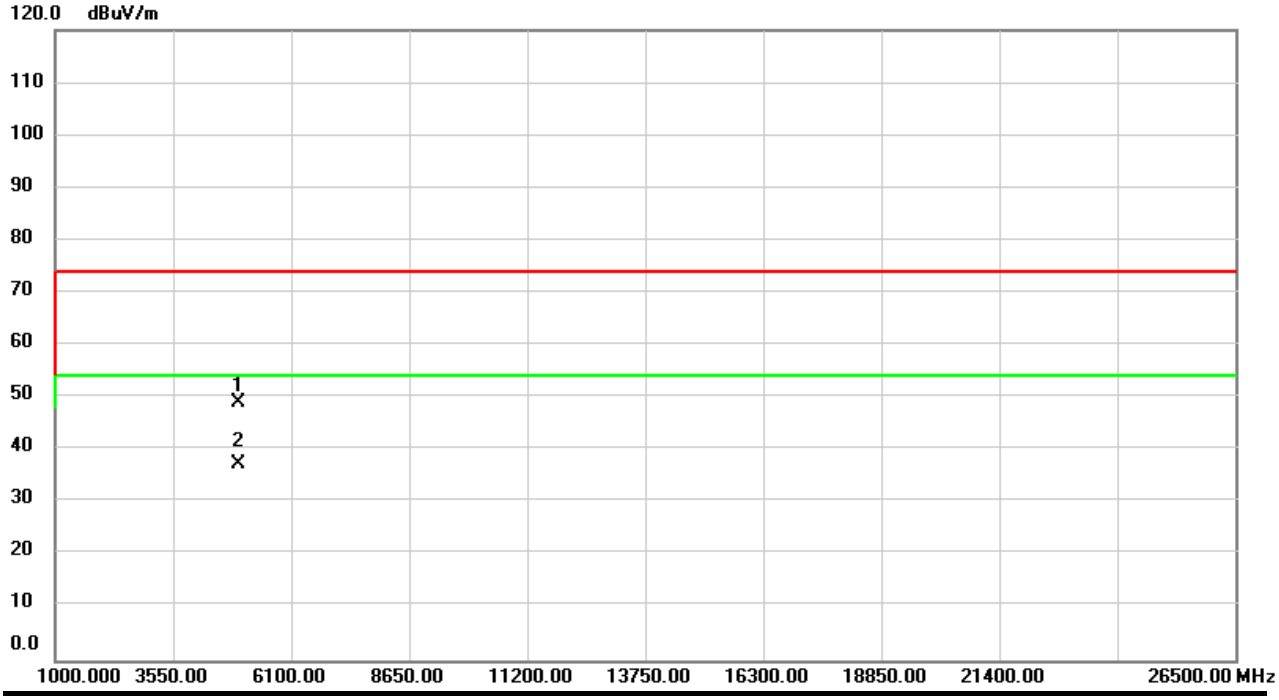
Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2480	Polarization	Vertical
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	58.33	-9.41	48.92	74.00	-25.08	peak	
2	*	4960.000	47.17	-9.41	37.76	54.00	-16.24	AVG	

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

Test Mode	BLE 5.0	Test Date	2020/7/2
Test Frequency	2480	Polarization	Horizontal
Temp	22°C	Hum.	52%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	58.34	-9.41	48.93	74.00	-25.07	peak	
2	*	4960.000	46.76	-9.41	37.35	54.00	-16.65	AVG	

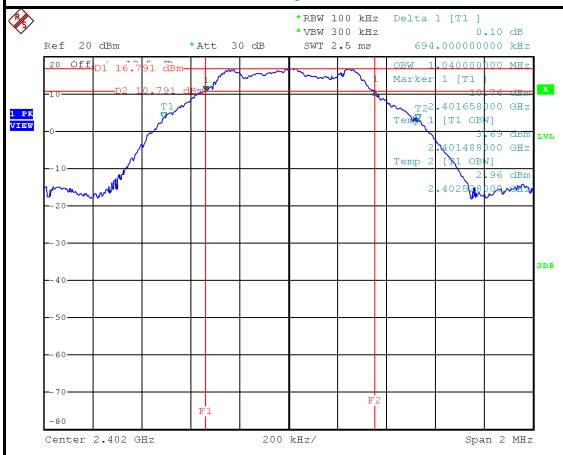
REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX D BANDWIDTH

Test Mode:	BLE 4.0

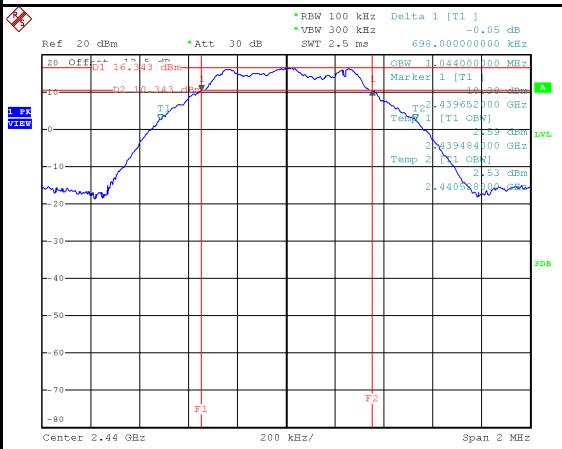
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.69	1.04	500	Pass
2440	0.70	1.04	500	Pass
2480	0.70	1.04	500	Pass

2402 MHz



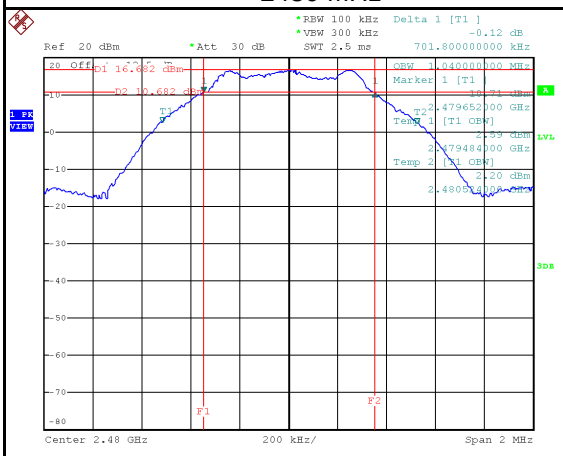
Date: 22.JUN.2020 11:50:18

2440 MHz



Date: 22.JUN.2020 11:44:32

2480 MHz



Date: 3.JUL.2020 12:25:27

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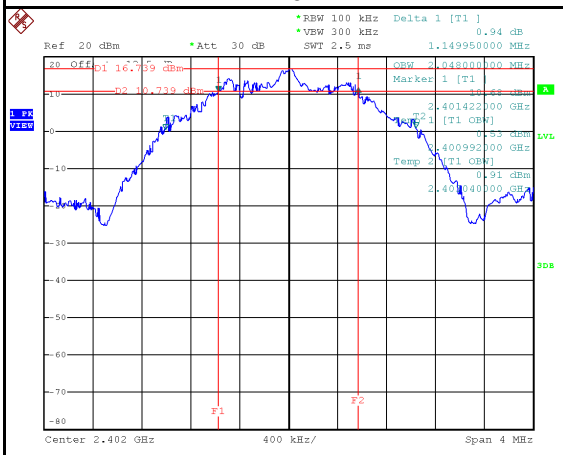
Test Mode:	BLE 5.0

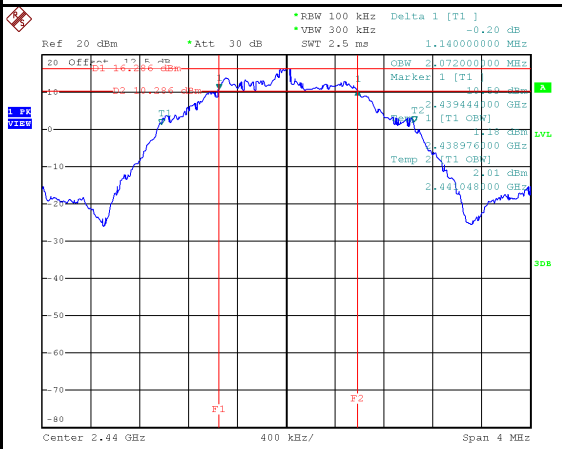
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	1.15	2.05	500	Pass
2440	1.14	2.07	500	Pass
2480	1.14	2.07	500	Pass

2402 MHz



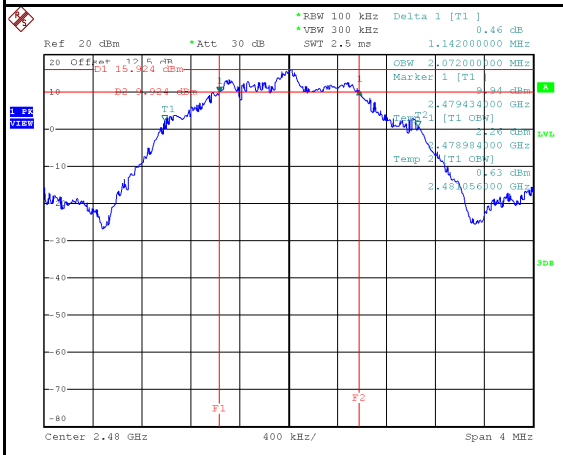
Date: 22.JUN.2020 11:55:14

2440 MHz



Date: 22.JUN.2020 11:58:02

2480 MHz



Date: 3.JUL.2020 12:19:49

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APPENDIX E OUTPUT POWER

Test Mode :	BLE 4.0	Tested Date	2020/7/3

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	18.13	0.0650	30.00	1.0000	Pass
2440	17.85	0.0610	30.00	1.0000	Pass
2480	17.94	0.0622	30.00	1.0000	Pass

Test Mode :	BLE 5.0	Tested Date	2020/7/3

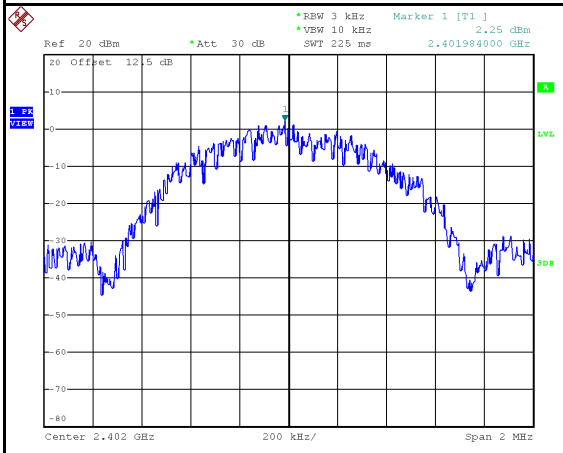
Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	18.15	0.0653	30.00	1.0000	Pass
2440	17.86	0.0611	30.00	1.0000	Pass
2480	17.31	0.0538	30.00	1.0000	Pass

APPENDIX F POWER SPECTRAL DENSITY TEST

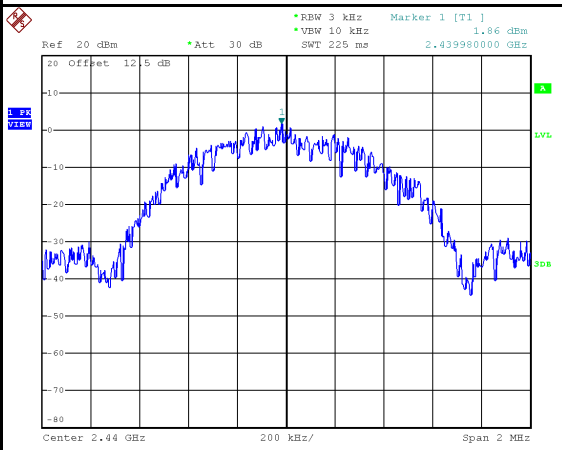
Test Mode :	BLE 4.0

Frequency (MHz)	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Test Result
2402	2.25	8	Pass
2440	1.86	8	Pass
2480	2.21	8	Pass

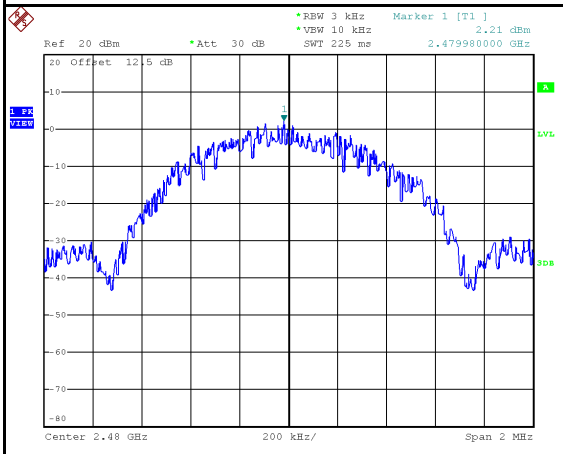
2402 MHz



2440 MHz



2480 MHz



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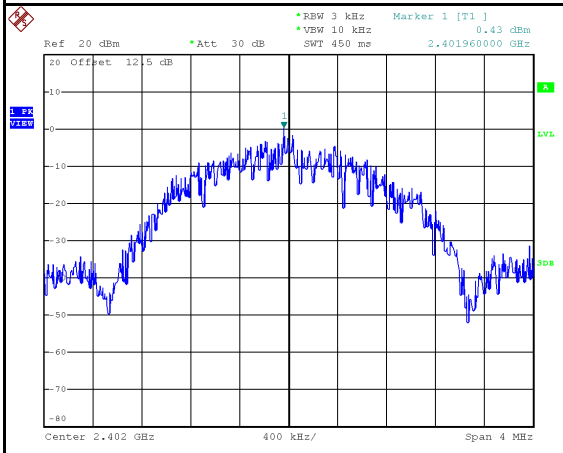
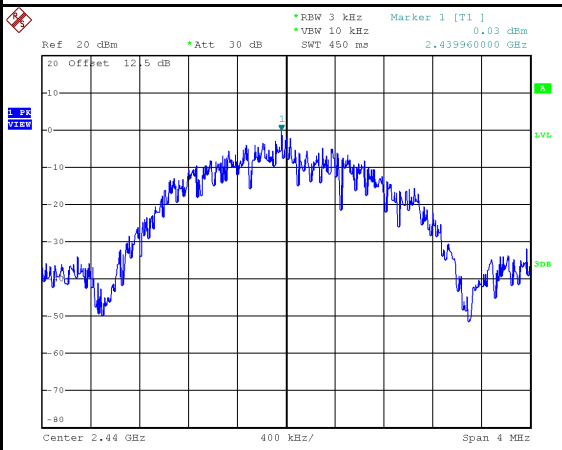
Test Mode :	BLE 5.0

Frequency (MHz)	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Test Result
2402	0.43	8	Pass
2440	0.03	8	Pass
2480	-0.52	8	Pass

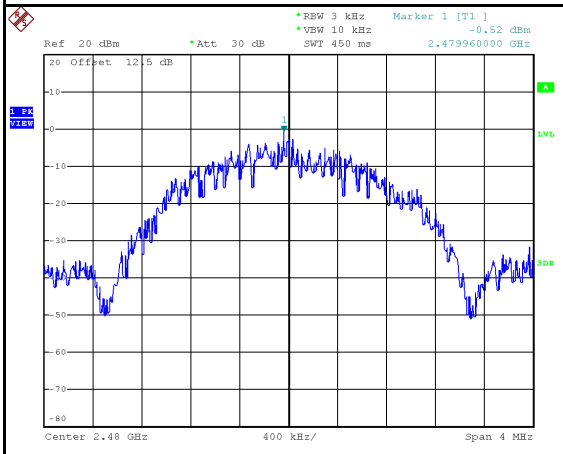
2402 MHz



2440 MHz



2480 MHz



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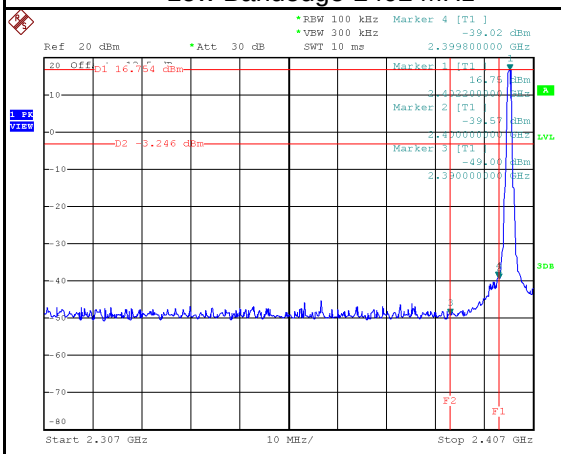
APPENDIX G ANTENNA CONDUCTED SPURIOUS EMISSION

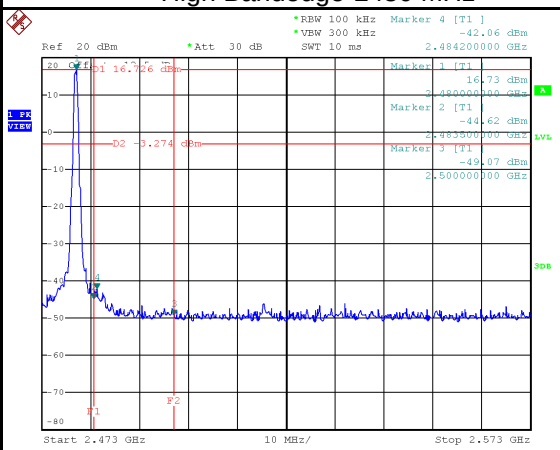
Test Mode :	BLE 4.0

Low Bandedge-2402 MHz



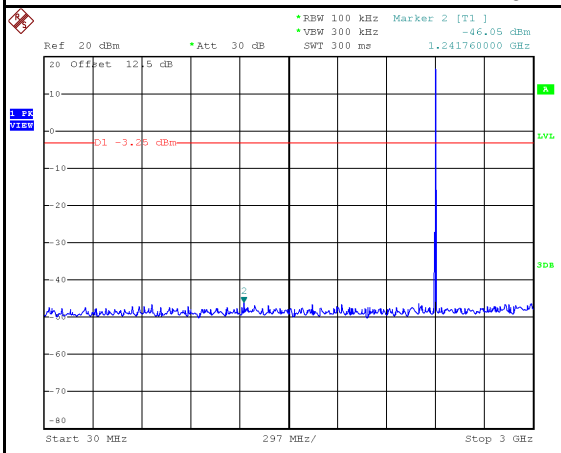
Date: 22.JUN.2020 11:50:42

High Bandedge-2480 MHz

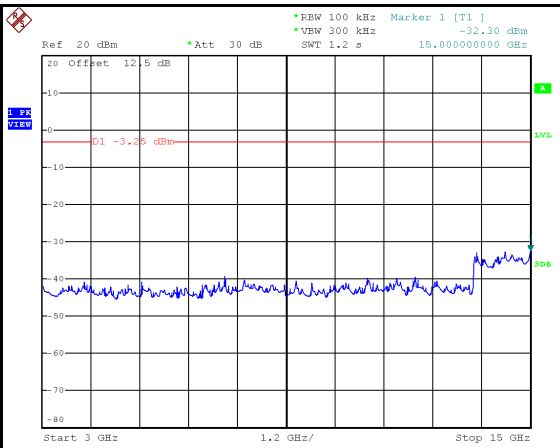


Date: 3.JUL.2020 12:25:35

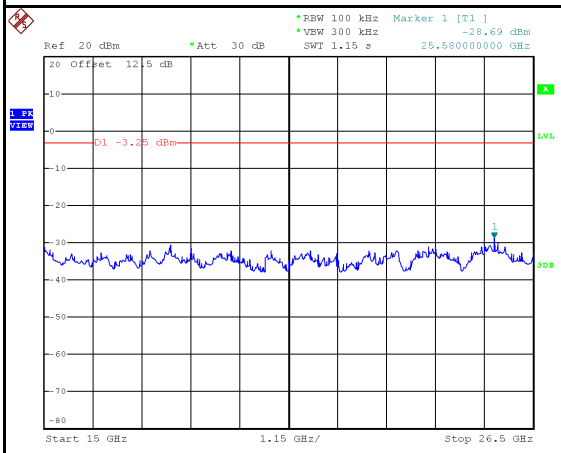
2402 MHz-10th Harmonics



Date: 22.JUN.2020 11:50:55



Date: 22.JUN.2020 11:51:02



Date: 22.JUN.2020 11:51:09

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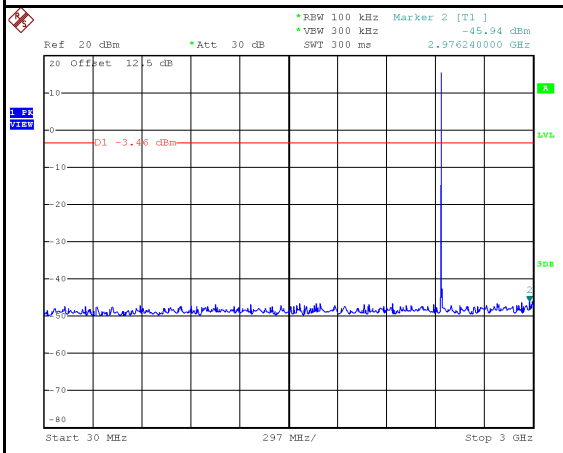
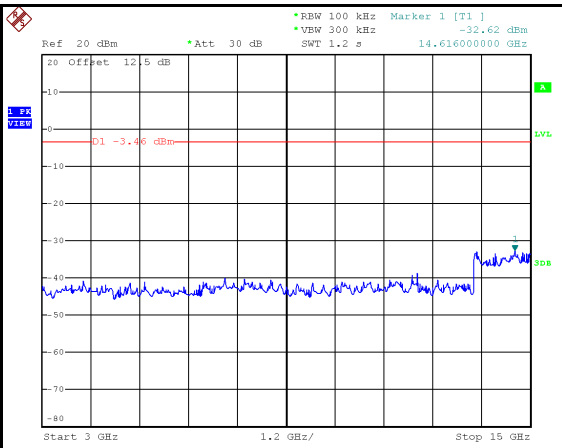
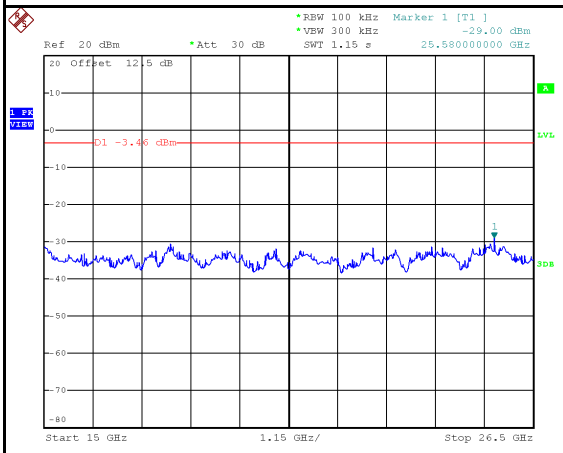
2440 MHz-10th Harmonics



Date: 22.JUN.2020 11:44:52



Date: 22.JUN.2020 11:44:59



Date: 22.JUN.2020 11:45:06

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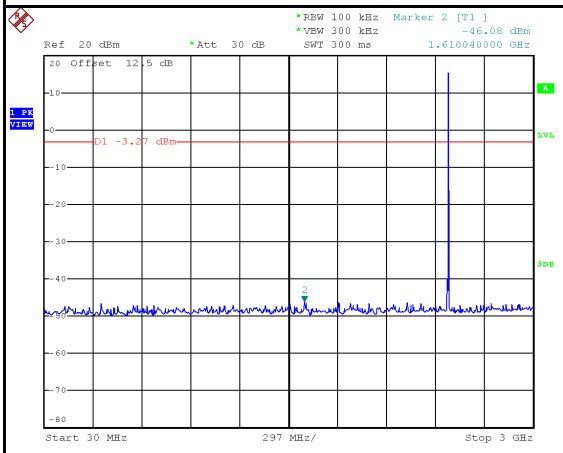
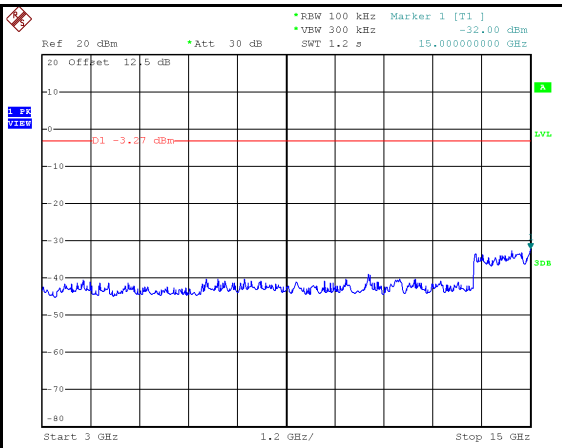
2480 MHz-10th Harmonics



Date: 3.JUL.2020 12:25:48



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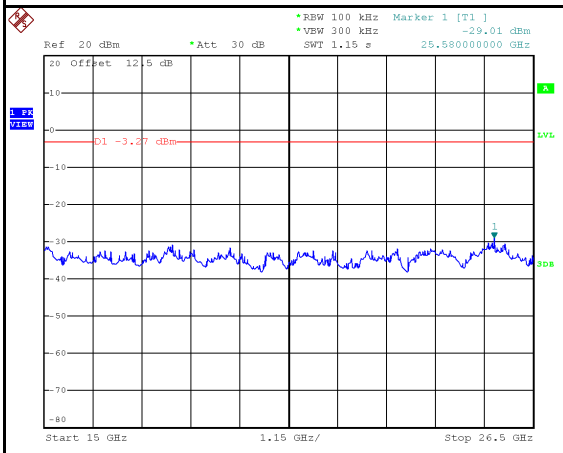

Date: 3.JUL.2020 12:26:01

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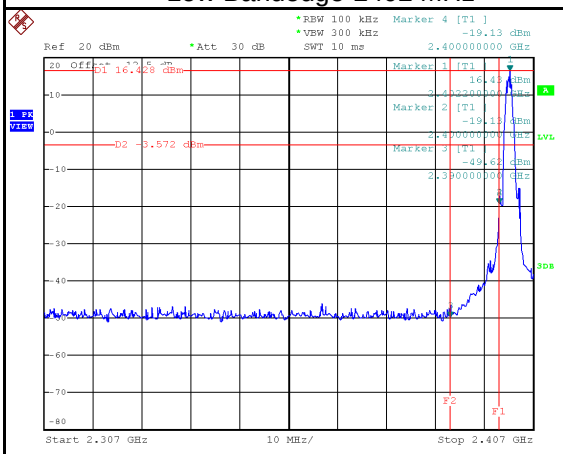
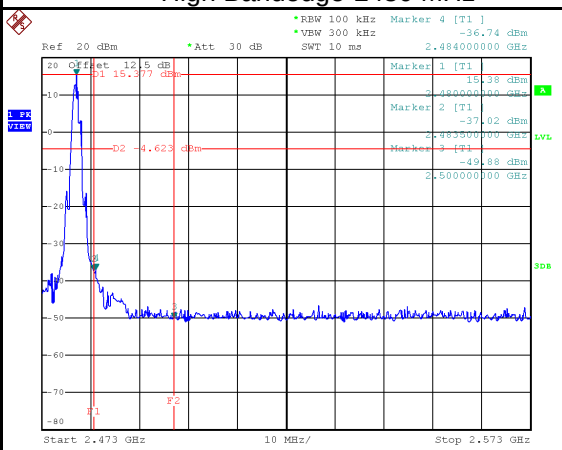
Test Mode :	BLE 5.0

Low Bandedge-2402 MHz



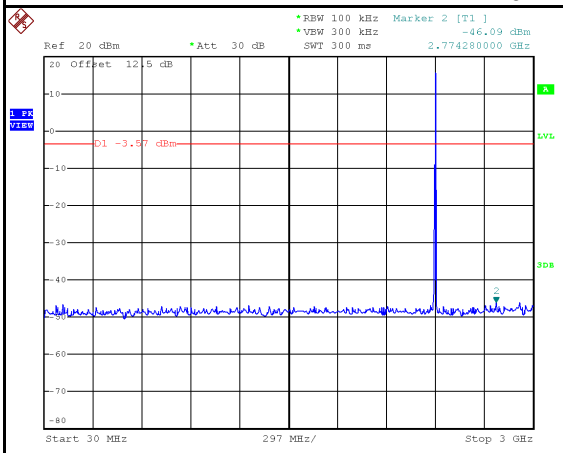
Date: 22.JUN.2020 11:55:22

High Bandedge-2480 MHz

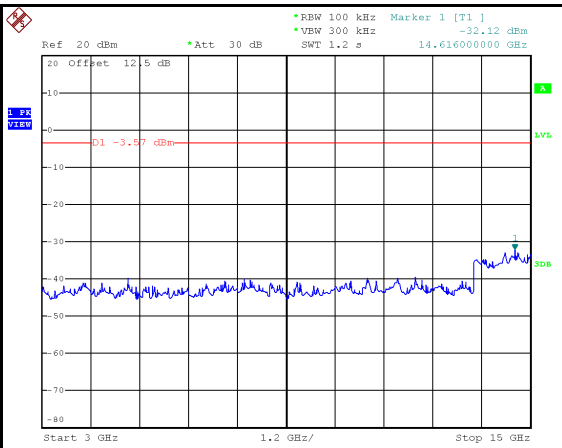


Date: 3.JUL.2020 12:20:14

2402 MHz-10th Harmonics



Date: 22.JUN.2020 11:55:35



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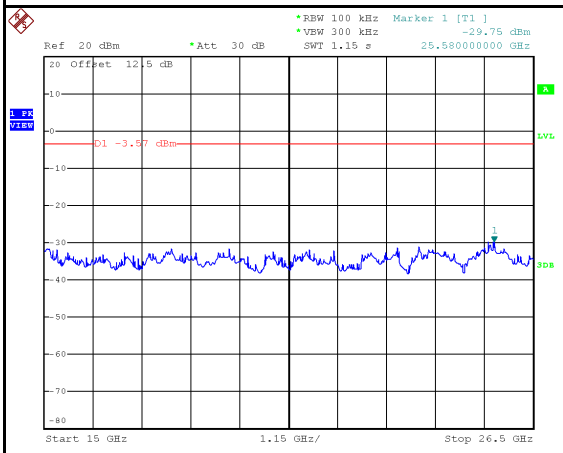

Date: 22.JUN.2020 11:55:48

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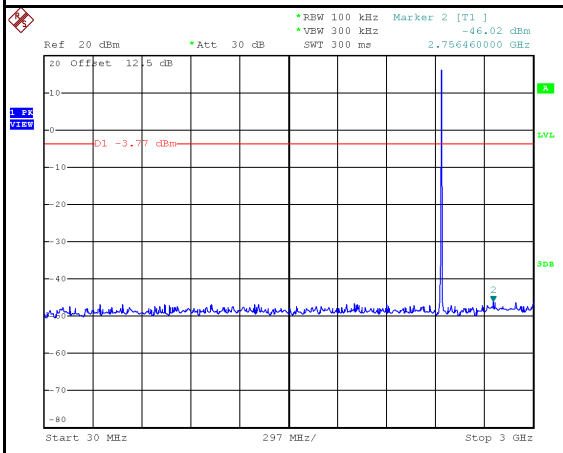
2440 MHz-10th Harmonics



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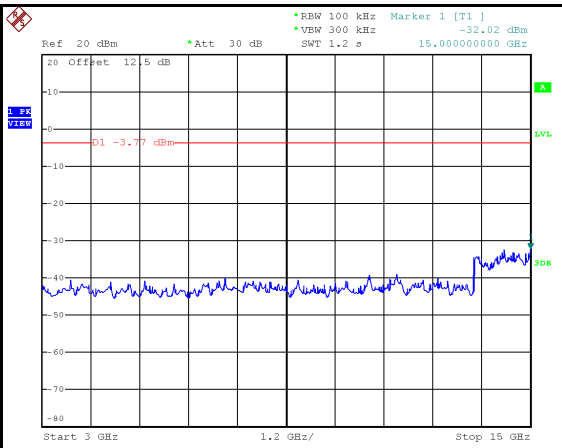

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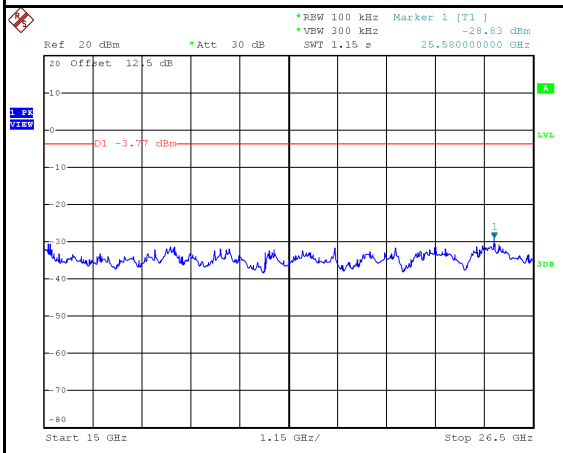

Date: 22.JUN.2020 11:58:53

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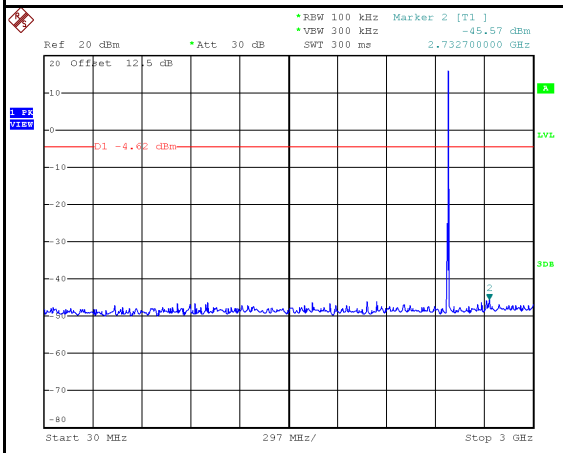
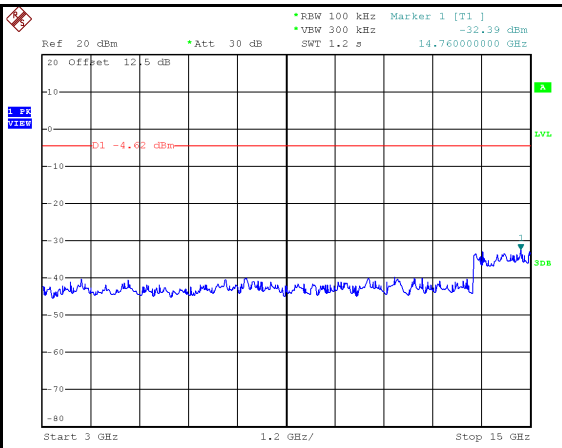
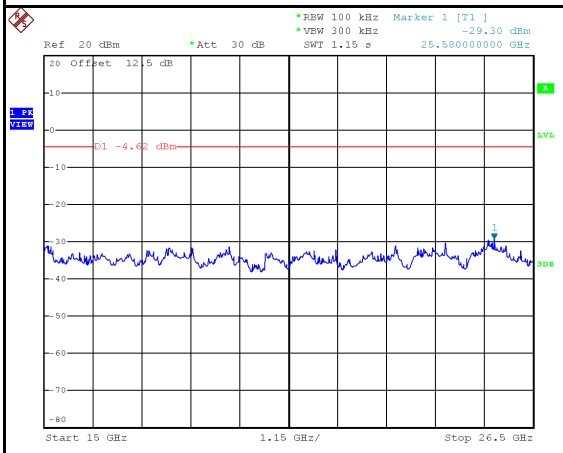
2480 MHz-10th Harmonics	
 Date: 3.JUL.2020 12:20:27	 Date: 3.JUL.2020 12:20:34
 Date: 3.JUL.2020 12:20:41	-

End of Test Report