

TEST REPORT

Product : PANEL PC
Trade mark :  IEI
Model/Type reference : IOVU-210AD-RK39
Serial Model : /
Report Number : EED39N00008303
FCC ID : RFH-IOVU-210AD
Date of Issue : July 16,2021

Test Standards	Result
<input checked="" type="checkbox"/> 47 CFR Part 15 Subpart C	PASS

Prepared for:

IEI INTEGRATION CORP.**NO.29,ZHONGXING RD.,XIZHI DIST.,NEW TAIPEI CITY 22161,TAIWAN**

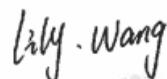
Prepared by:

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Date:

July 16,2021

Check No.: 3915514199

Report No. : EED39N00008303

Modification Record

No.	Last Report No.	Modification Description
1	EED39N00008303	First report
2	EED39N00008303	Second report

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1. Test Summary

Test item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15Subpart C Section 15.207	ANSI C63.10-2013	PASS
Maximum conducted output power	47 CFR Part 15Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
DTS Bandwidth	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Maximum Power Spectral Density	47 CFR Part 15Subpart C Section 15.247 (e)	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS

Remark:

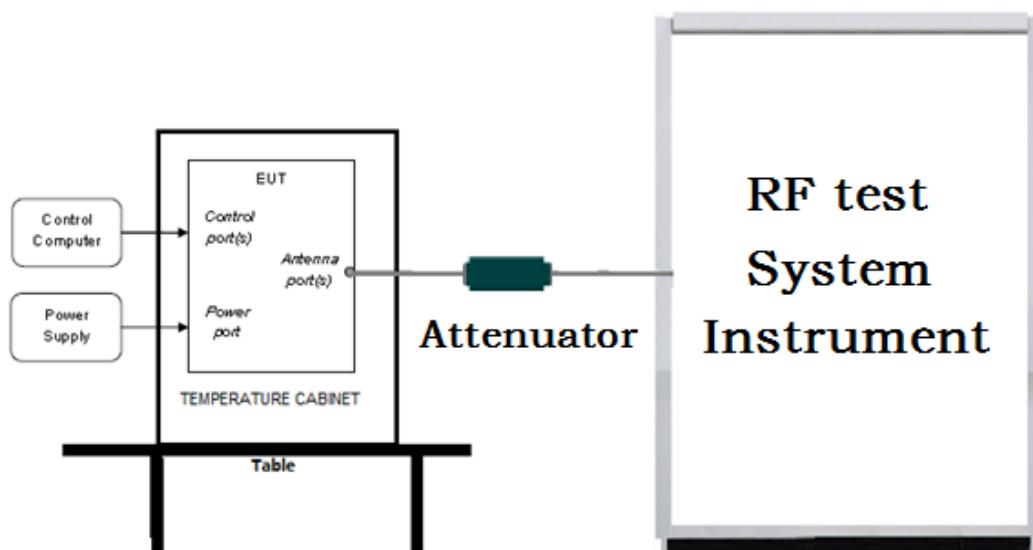
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

The tested samples and the sample information are provided by the client.

2. Test Requirement

2.1. Test Setup

For Conducted Test Setup



For Radiated Emissions Test Setup

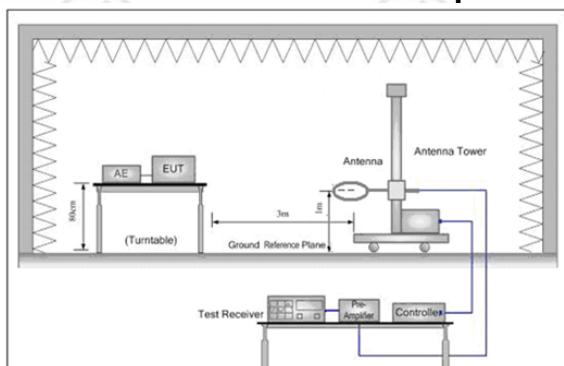


Figure 1. Below 30MHz

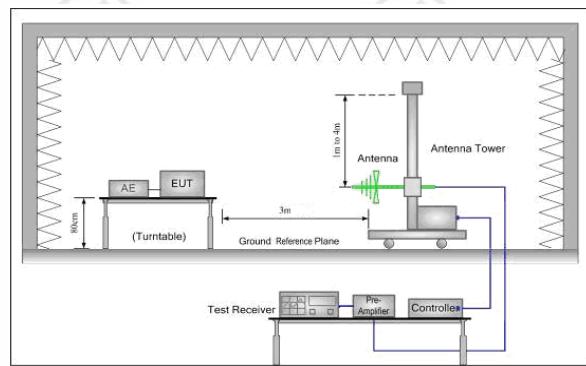


Figure 2. 30MHz to 1GHz

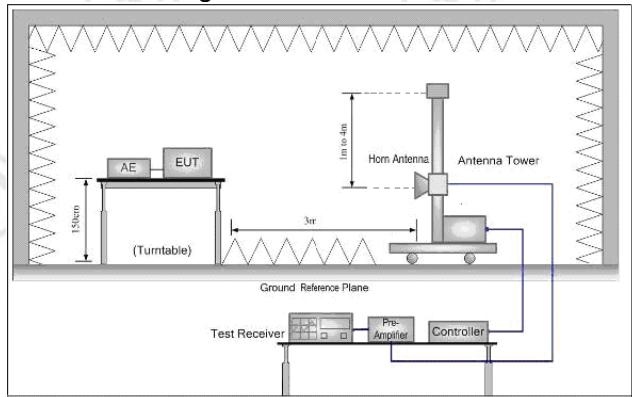
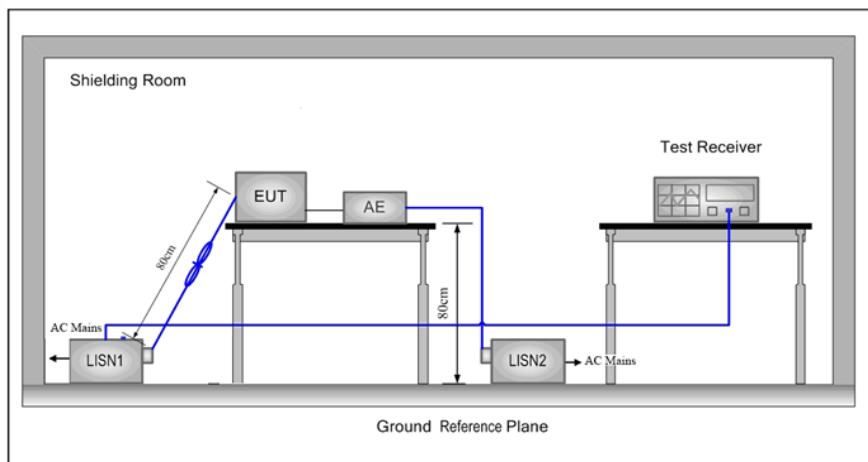


Figure 3. Above 1GHz

For Conducted Emissions Test Setup



2.2. Test Environment

Operating Environment:

Temperature:	19.8 °C
Humidity:	55 % RH
Atmospheric Pressure:	1019mbar

2.3. Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 1	Channel 20	Channel 40
		2402MHz	2440MHz	2480MHz
Transmitting mode:		Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.		

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3. General Information

3.1. Client Information

Applicant:	IEI INTEGRATION CORP.
Address of Applicant:	NO.29,ZHONGXING RD.,XIZHI DIST.,NEW TAIPEI CITY 22161,TAIWAN
Manufacturer:	IEI INTEGRATION CORP.
Address of Manufacturer:	NO.29,ZHONGXING RD.,XIZHI DIST.,NEW TAIPEI CITY 22161,TAIWAN
Factory:	Armorlink SH Corp.
Address of Factory:	No.515,Shenfu Rd,Xinzhuang Industrial Development Zone,Minhang District,Shanghai,P.R.China

3.2. General Description of EUT

Product Name:	PANEL PC
Model No.(EUT):	IOVU-210AD-RK39
Trade Mark:	
EUT Supports Radios application:	2.4G WIFI: IEEE802.11b/g/n(20MHz), 2412MHz-2462MHz 5G WIFI: IEEE802.11a/ac(HT20)/ac(HT40)/ac(HT80),5150-5350MHz,5470-5725MHz, 5725-5850MHz. Bluetooth BR+EDR& Bluetooth V4.1 BLE NFC13.56MHz
Power Supply:	Model No: FSP060-DHAN3 Input: AC100-240V 1.8A, 50/60Hz Output: DC 12V 5.0A
Sample Received Date:	Feb 09, 2021
Sample tested Date:	Feb 09, 2021 to July 12,2021

3.3. Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	Bluetooth LE4.1
Modulation Technique:	DSSS
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	Mobile production
Test Software of EUT:	AMPK TOOL (manufacturer declare)
Antenna Type:	FPC Antenna
Antenna Gain ^① :	ANT1 Gain for BT :2.46dBi
Test Voltage:	AC120V/60Hz

Note: 1 The antenna gain is provided by the client and we Centre Testing International (Suzhou) CO., LTD. test lab is not responsible for the accuracy of the antenna gain information.

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

3.4. Description of Support Units

The EUT has been tested independently.

3.5. Test Location

All test facilities used to collect the test data are located at Building 18, Zhihui New Town Ecological Industrial Park, No. 1206, Jinyang East Road, Lujia Town, Kunshan, Jiangsu, China.

3.6. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

A2LA-Lab Cert. No. 5734.01

Centre Testing International (Suzhou) CO., LTD. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration. Laboratories and any additional program requirements in the identified field of testing.

FCC-Designation No.:CN1290

Centre Testing International Group Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The American association for Centre Testing International Group Co., Ltd. EMC laboratory accreditation Designation No.:CN1290

3.7. Deviation from Standards

None.

3.8. Abnormalities from Standard Conditions

None.

3.9. Other Information Requested by the Customer

None.

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3.10. Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Occupied Bandwidth	0.56%
2	RF Power conducted	0.59 dB
3	Power Spectral Density, conducted	2.37 dB
4	Unwanted Emission, conducted	2.68 dB
5	All Emission, radiated	4.41 dB(30MHz-1GHz) 4.99 dB(1GHz-18GHz) 5.307 dB(18GHz-40GHz)
6	Temperature test	0.54°C
7	Humidity test	1.62%
8	DC and low frequency voltages test	1.14%

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4. Equipment List

RF test system					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	R&S	SMB100A	182002	2020-10-23	2021-10-22
Communication test set test set	R&S	CMW500	107929	2020-04-27	2021-04-26
Spectrum Analyzer	R&S	FSV40	101588	2020-10-23	2021-10-22
Vector signal generator	R&S	SMBV100B	101985	2020-10-23	2021-10-22
Temperature/Humidity Indicator	testo	608-H1	1945222628	2020-12-10	2021-11-08
Switch Automatic control	R&S	OSP-B157W8	101111	2020-10-23	2021-10-22
High-low temperature chamber	GIANT FORCE	GTH-800-40-CP	MAA1908-003	2020-12-08	2021-12-07
Automatic test software	Shenzhen JS TONSCEND	/	V2.6.77.0518	/	/

966 Semi-anechoic Chamber					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESU8	100537	2020-12-10	2021-12-09
Spectrum analyzer	R&S	FSV40	101185	2020-12-10	2021-12-09
Preamplifier (30MHz~1GHz)	SONOMA	317	393347	2020-12-04	2021-12-03
Preamplifier (1GHz~18GHz)	R&S	SCU-18D	1987397	2020-12-10	2021-12-09
Preamplifier (18GHz~40GHz)	/	MTLNA1804003 0235	12009007	2020-10-23	2021-10-22
Loop Antenna (9kHz~30MHz)	TESEQ	HLA6121	54575	2021-02-27	2022-02-26
Antenna (30MHz~1GHz)	SCHWARZBEC K	VULB9163	9163-965	2020-10-16	2021-10-15
Antenna (1GHz~18GHz)	R&S	HF907	102524	2020-12-15	2021-12-14
Antenna (18GHz~40GHz)	R&S	BBHA9170	1032	2020-10-23	2021-10-22
Band rejection filter	Xi'an xingbo	XBLBQ-DZA81	200827-1-02	/	/

5. Radio Technical Requirements Specification

5.1. Reference Documents for Testing

No.	Identity	Document Title
1	FCC Part15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

5.2. Test Results List

Test requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10 Section 11.8.1	DTS Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10 Section 11.9.1	Maximum conducted output power	PASS	Appendix B)
Part15C Section 15.247 (e)	ANSI C63.10 Section 11.10.2	Maximum power spectral density	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10 Section 11.13.3.2	Band-edge for RF Conducted Emissions	PASS	Appendix D)
Part15C Section 15.247(d)	ANSI C63.10 Section 11.11	Conducted Spurious Emissions	PASS	Appendix E)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15C Section 15.207	ANSI C63.10 Section 6.2	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10 Section 6.10.5	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10 Section 6.4,6.5,6.6	Radiated Spurious Emissions	PASS	Appendix I)

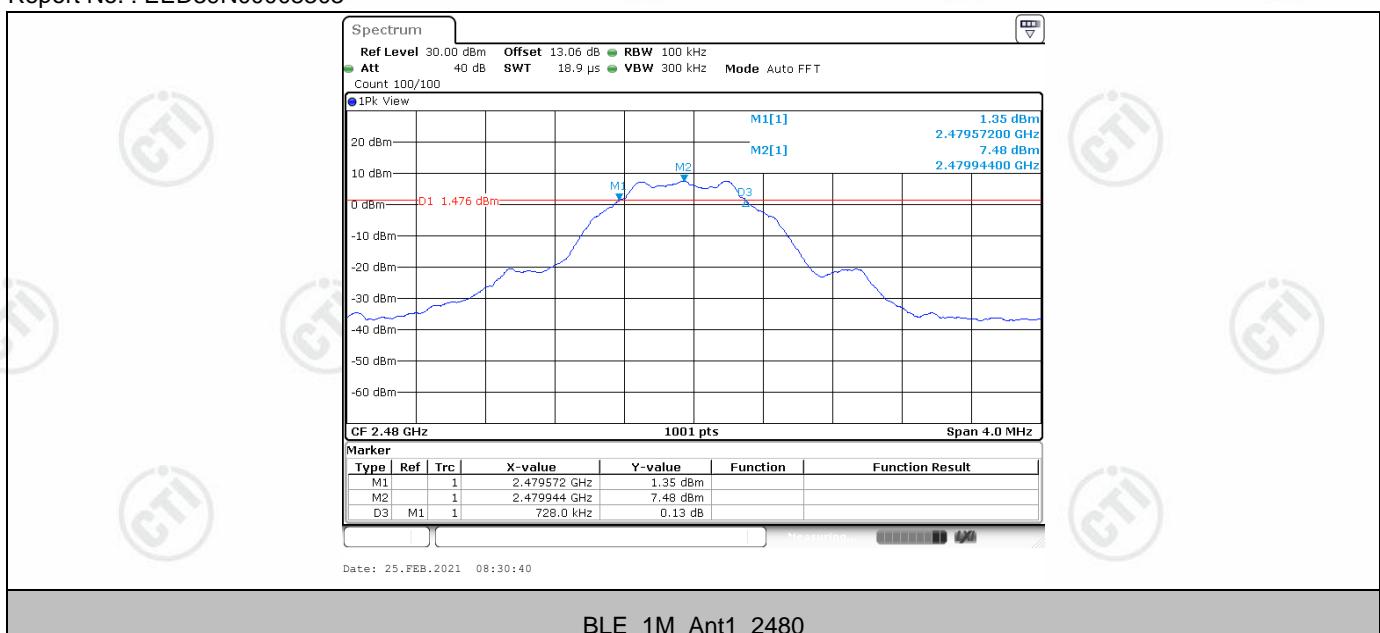
Appendix A): DTS Bandwidth

Result Table:

Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.728	2401.588	2402.316	0.5	PASS
		2440	0.728	2439.580	2440.308	0.5	PASS
		2480	0.728	2479.572	2480.300	0.5	PASS

Test Graph:


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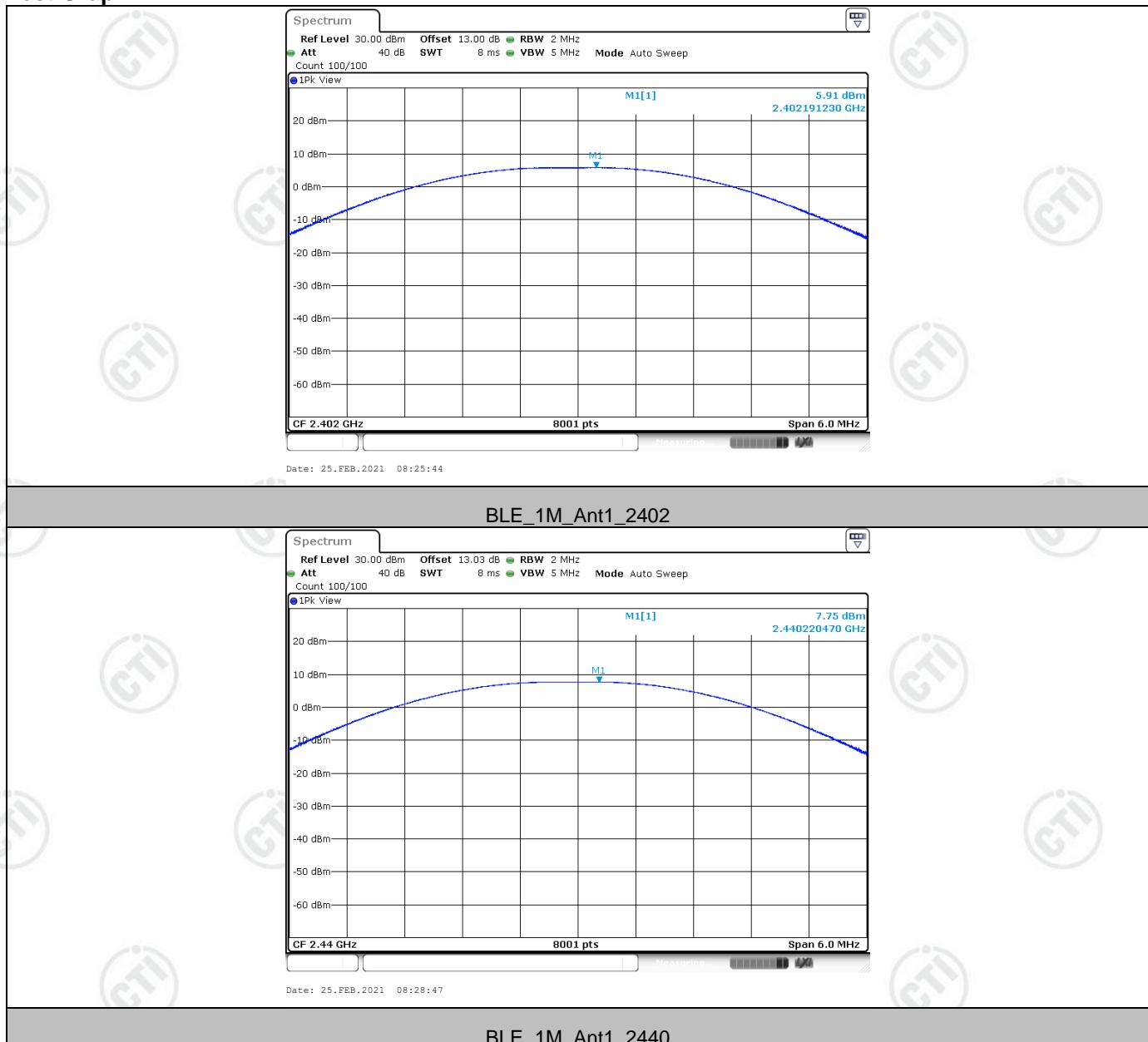


Appendix B): Maximum conducted output power

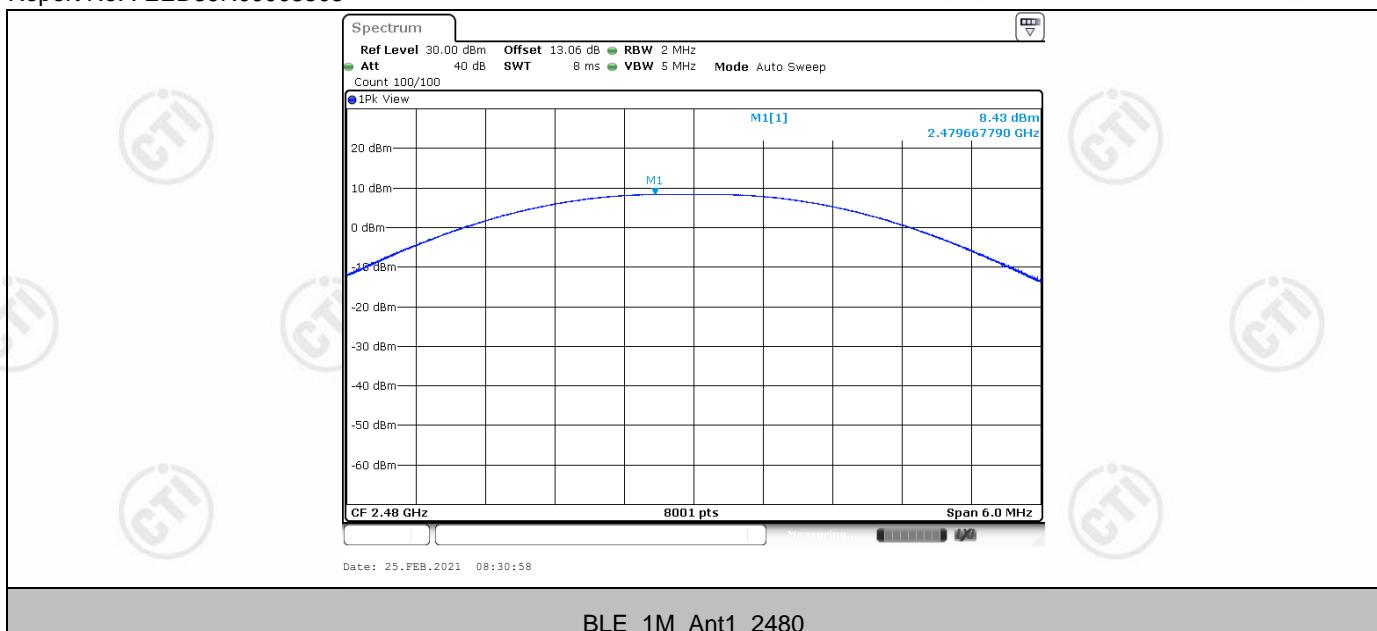
Result Table:

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	5.91	<=30	PASS
		2440	7.75	<=30	PASS
		2480	8.43	<=30	PASS

Test Graph:



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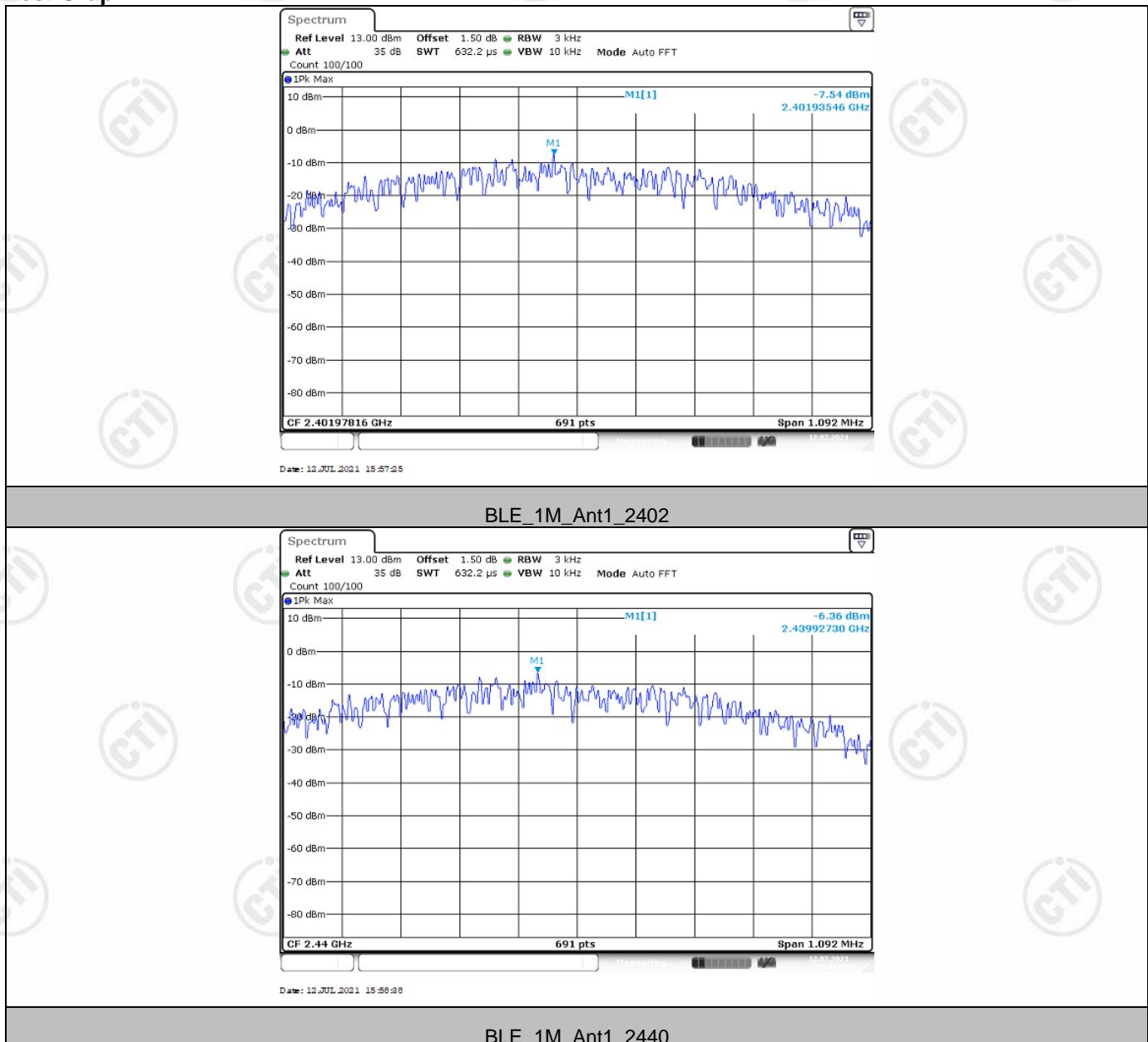


Appendix C): Maximum power spectral density

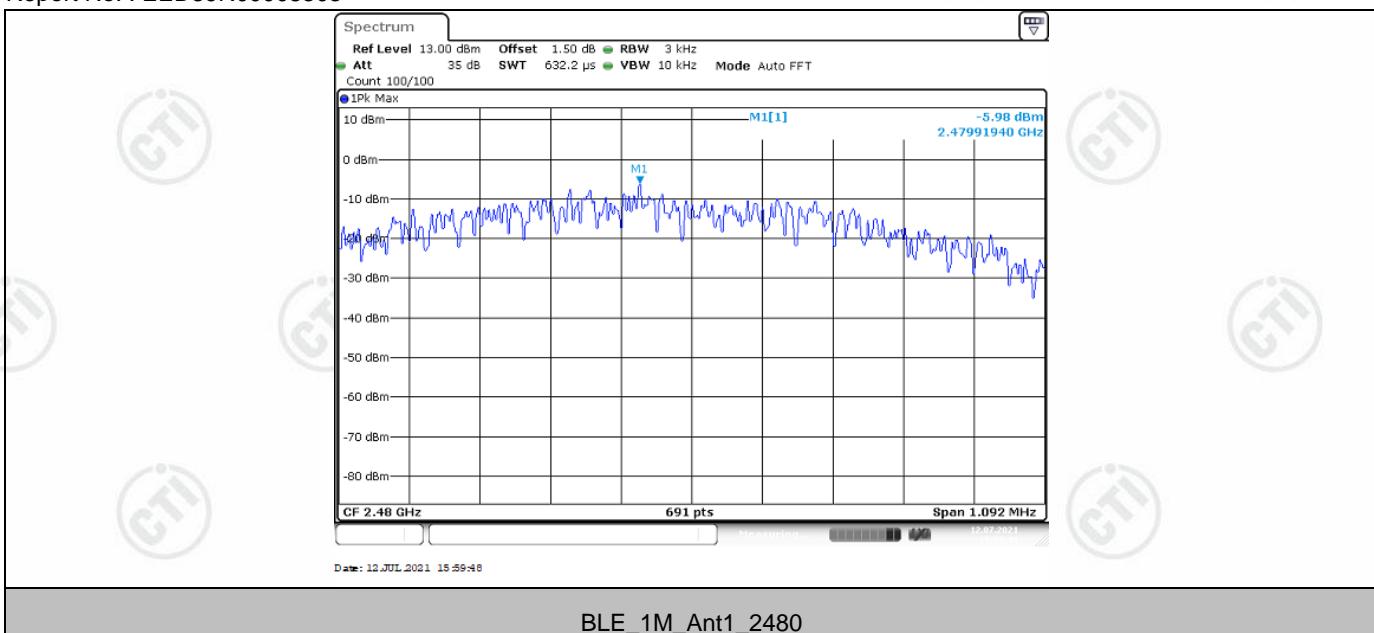
Result Table:

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-7.54	<=8	PASS
		2440	-6.36	<=8	PASS
		2480	-5.98	<=8	PASS

Test Graph:



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BLE_1M_Ant1_2480

Appendix D): Band-edge for RF Conducted Emissions

Result Table:

Test Mode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	4.91	-45.79	<=-15.09	PASS
		High	2480	7.52	-43.55	<=-12.48	PASS

Test Graph:



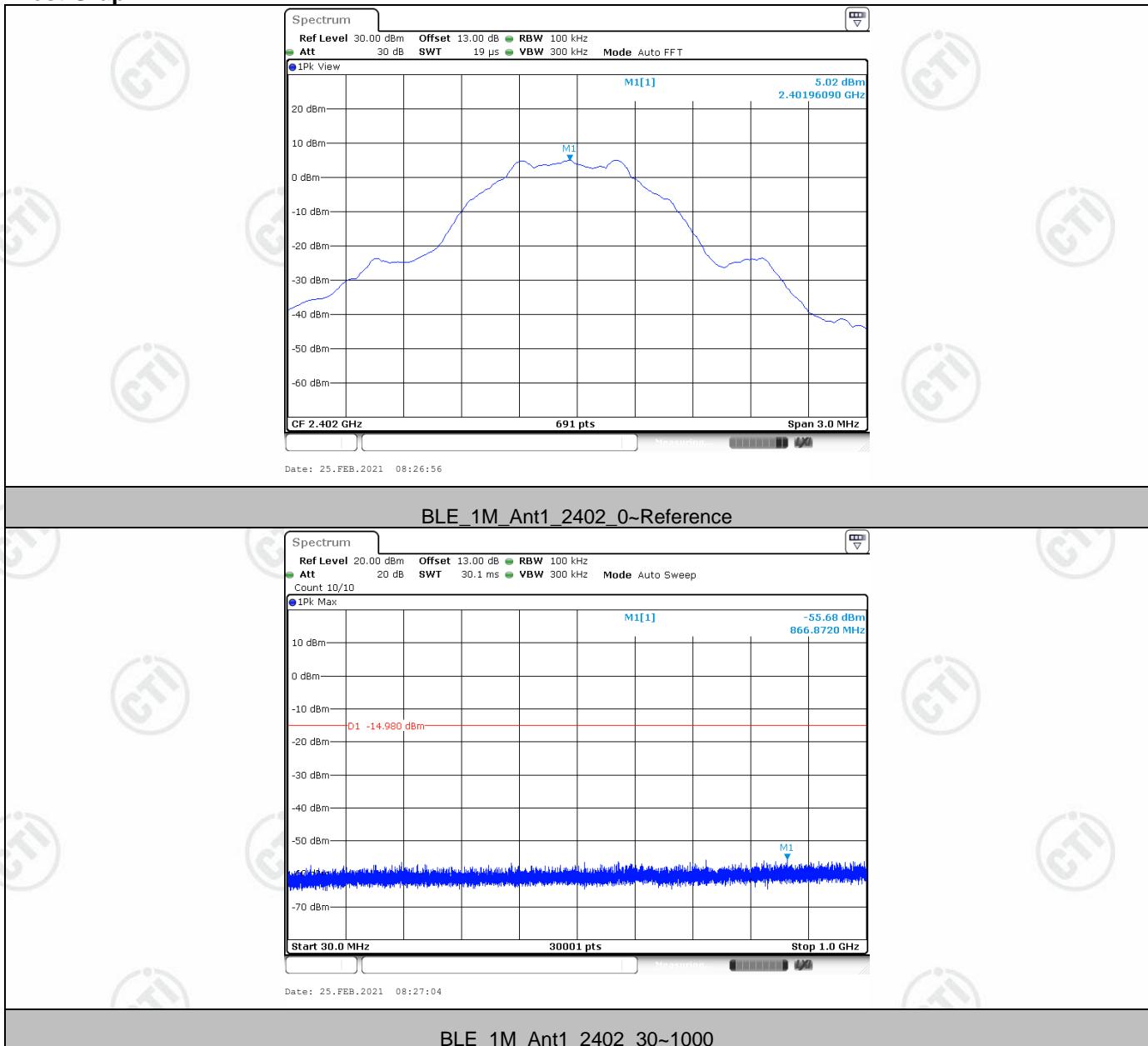
Appendix E): Conducted Spurious Emissions

Result Table:

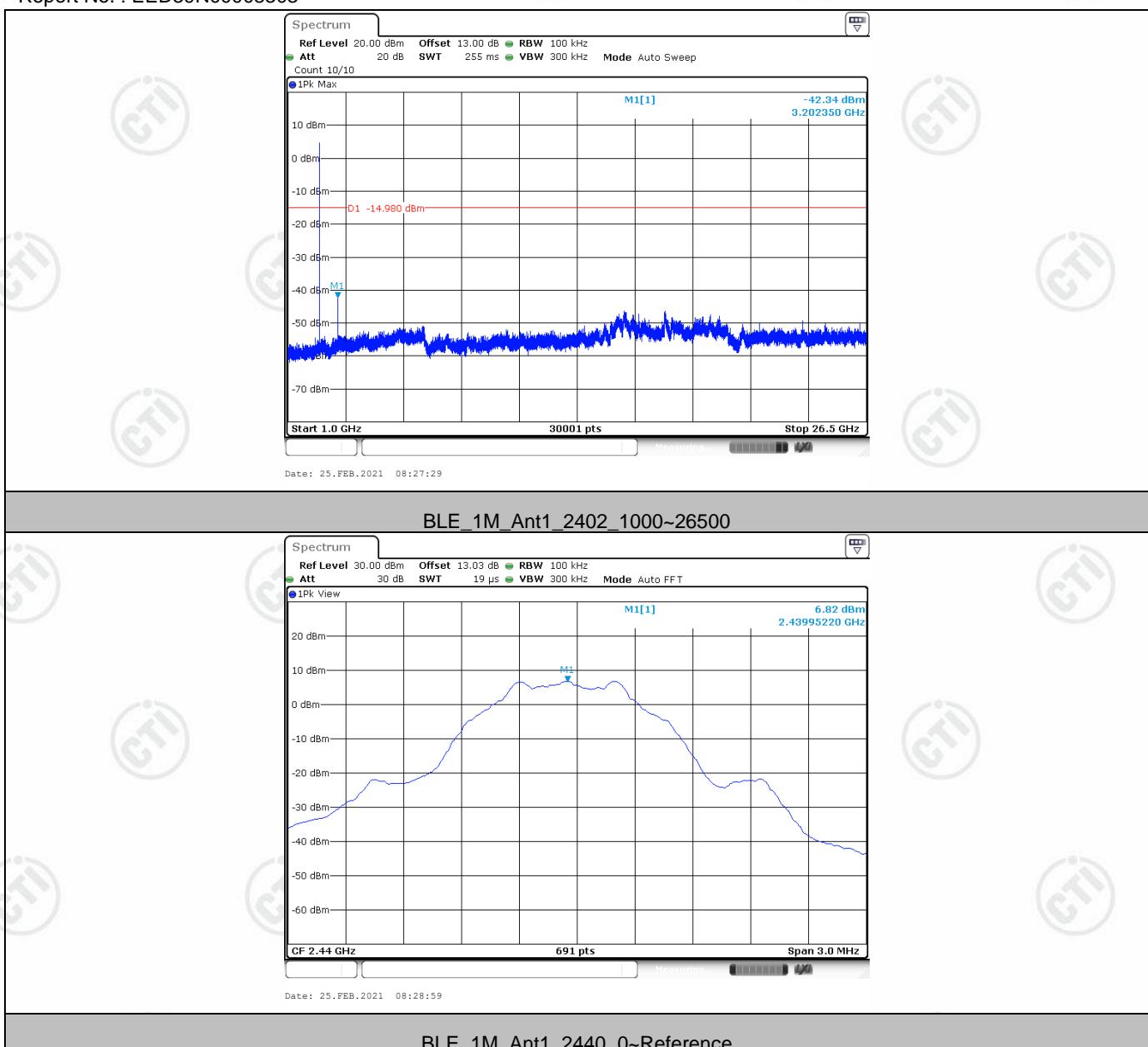
Test Mode	Antenna	Channel	Freq Range [MHz]	Ref Level [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	5.02	5.02	---	PASS
			30~1000	5.02	-55.68	<=-14.98	PASS
			1000~26500	5.02	-42.34	<=-14.98	PASS
		2440	Reference	6.82	6.82	---	PASS
			30~1000	6.82	-55.89	<=-13.18	PASS
			1000~26500	6.82	-44.13	<=-13.18	PASS
		2480	Reference	7.51	7.51	---	PASS
			30~1000	7.51	-55	<=-12.49	PASS
			1000~26500	7.51	-45.09	<=-12.49	PASS

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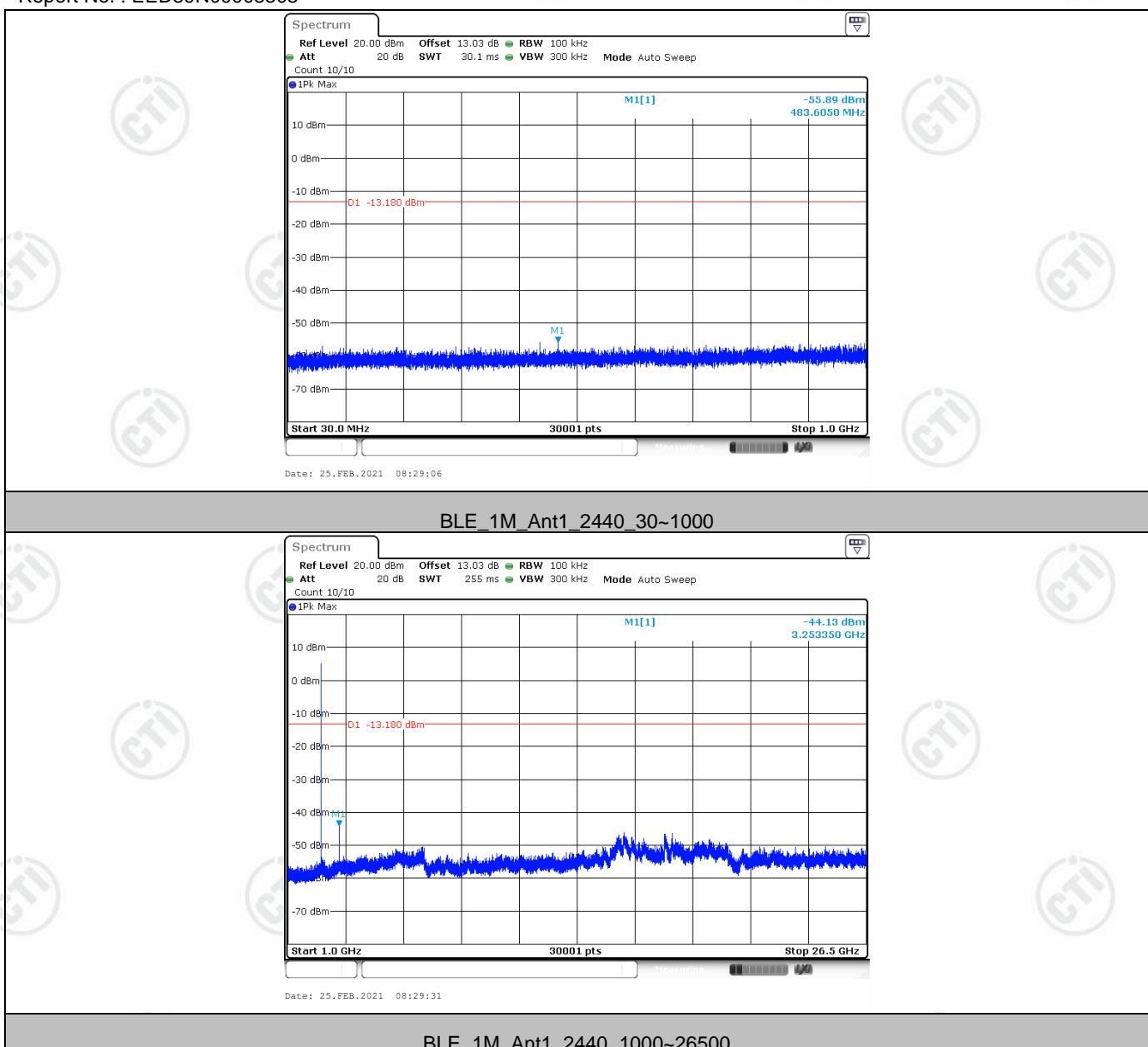
Test Graph:



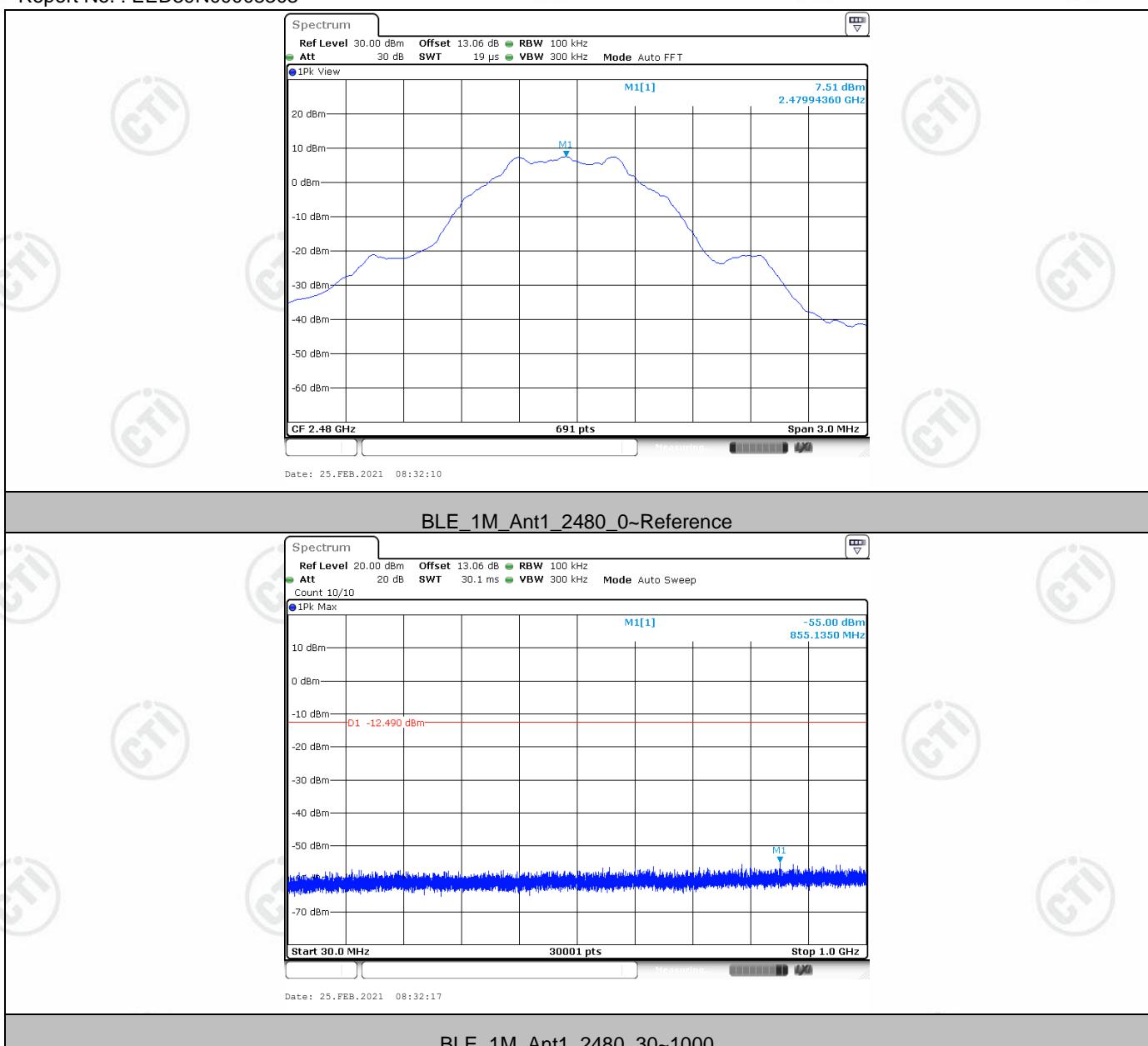
Report No. : EED39N00008303



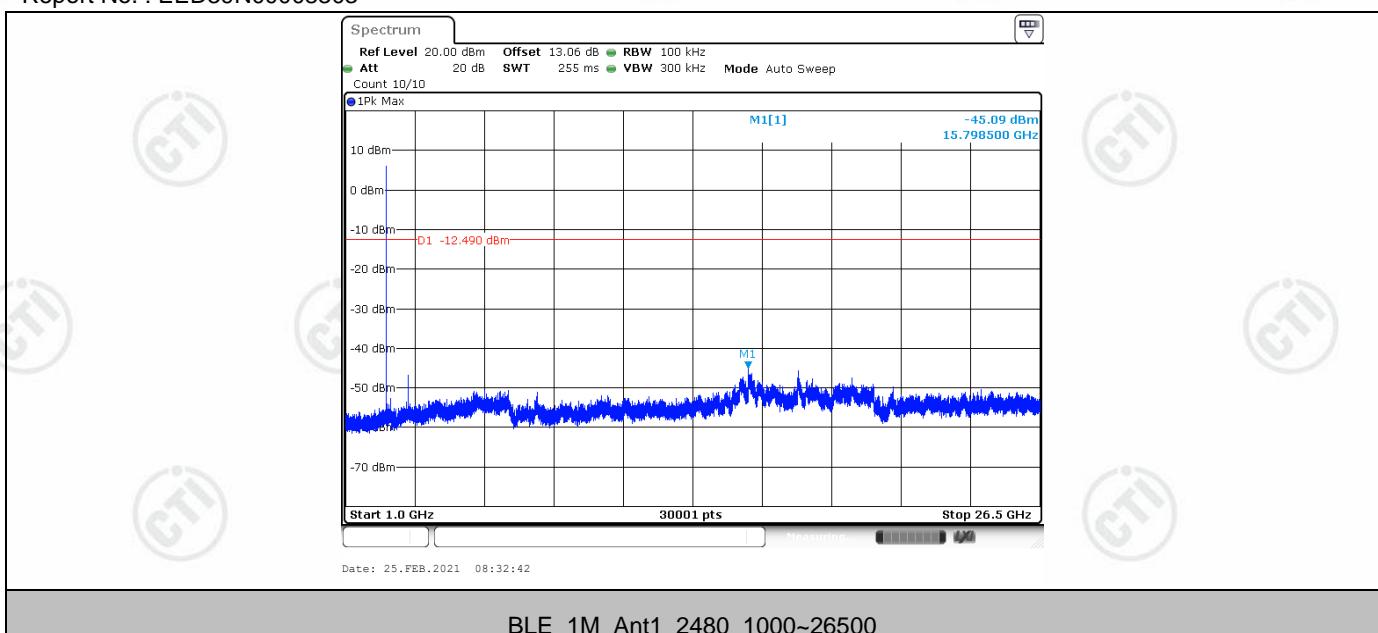
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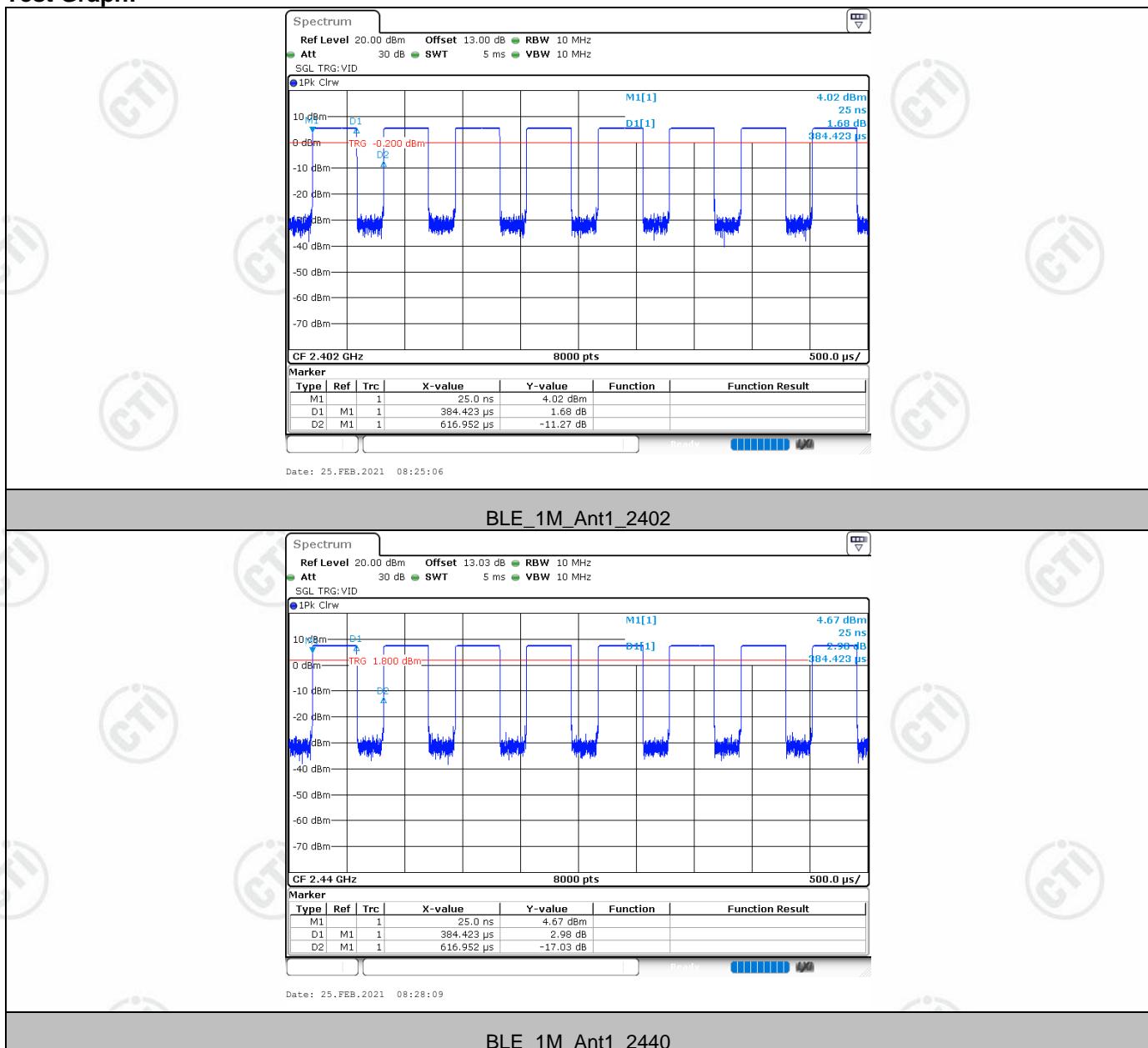
BLE_1M_Ant1_2480_1000~26500

Duty Cycle

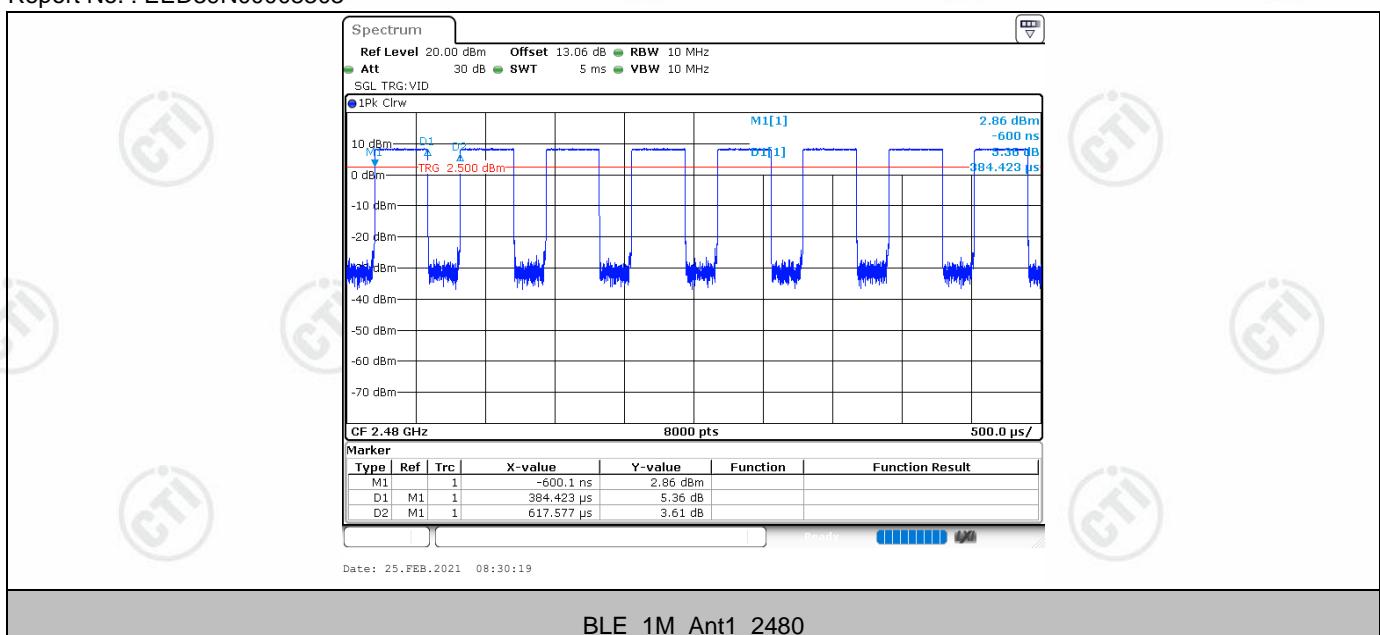
Result Table:

TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	X Factor	Limit	Verdict
BLE_1M	Ant1	2402	0.38	0.62	0.6129	61.29	2.13	---	PASS
		2440	0.38	0.62	0.6129	61.29	2.13	---	PASS
		2480	0.38	0.62	0.6129	61.29	2.13	---	PASS

Test Graph:



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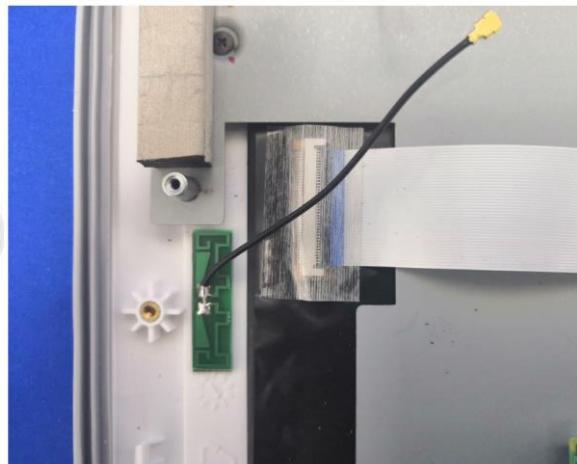
Appendix F): Antenna Requirement

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

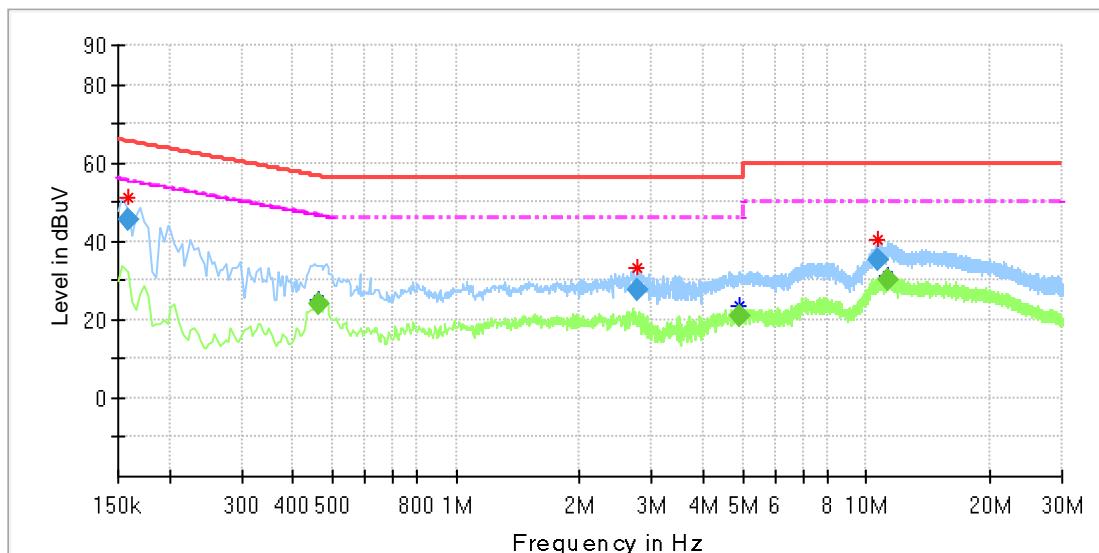
Appendix G): AC Power Line Conducted Emission

Test Procedure:	<p>Test frequency range :150KHz-30MHz</p> <ol style="list-style-type: none"> 1)The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement. 														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.</p> <p>NOTE: The lower limit is applicable at the transition frequency</p>	Frequency range (MHz)	Limit (dB μ V)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dB μ V)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

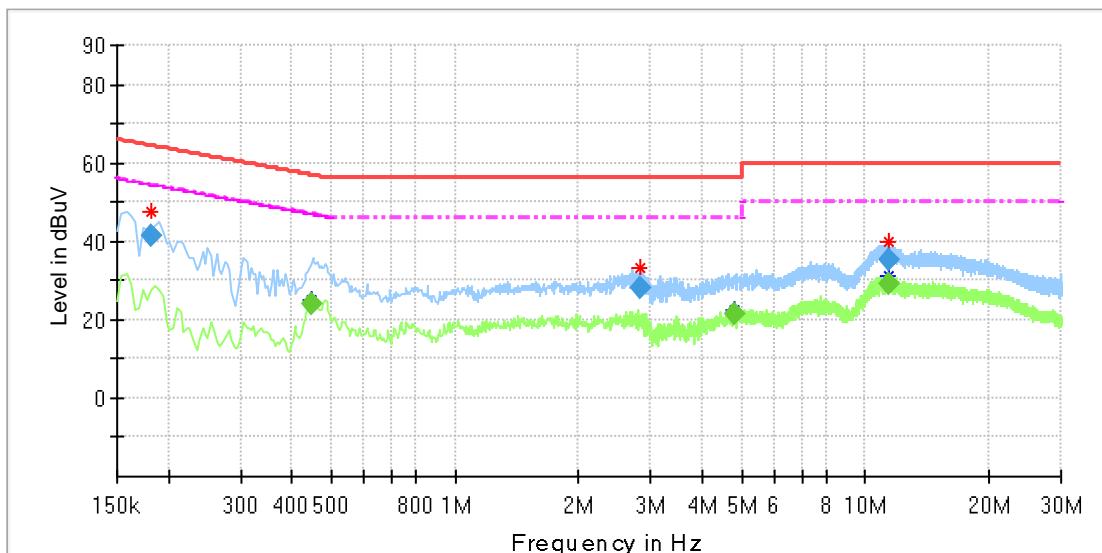


Final_Result

Frequency (MHz)	QuasiPeak (dbuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.158990	45.32	---	65.52	20.20	1000.0	9.000	L1	20.0
0.460838	---	24.00	46.68	22.68	1000.0	9.000	L1	20.1
2.748758	27.74	---	56.00	28.26	1000.0	9.000	L1	20.2
4.923402	---	20.89	46.00	25.11	1000.0	9.000	L1	20.1
10.671790	35.45	---	60.00	24.55	1000.0	9.000	L1	20.0
11.331960	---	29.94	50.00	20.06	1000.0	9.000	L1	20.0

Notes:1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.181608	41.20	---	64.41	23.21	1000.0	9.000	N	19.9
0.448964	---	23.90	46.89	22.99	1000.0	9.000	N	19.9
2.822548	27.92	---	56.00	28.08	1000.0	9.000	N	19.9
4.775968	---	21.35	46.00	24.65	1000.0	9.000	N	19.8
11.347976	35.16	---	60.00	24.84	1000.0	9.000	N	19.8
11.405584	---	29.25	50.00	20.75	1000.0	9.000	N	19.8

Notes:1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

Appendix H): Restricted bands around fundamental frequency (Radiated)

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark	
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak	
	Above 1GHz	Peak	1MHz	3MHz	Peak	
		Peak	1MHz	1/T	Average	
Test Procedure:	Below 1GHz test procedure as below:					
	<ol style="list-style-type: none"> The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel 					
	Above 1GHz test procedure as below:					
	<ol style="list-style-type: none"> Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter). Test the EUT in the lowest channel , the Highest channel The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. Repeat above procedures until all frequencies measured was complete. 					
Limit:	Frequency	Limit (dB μ V/m @3m)	Remark			
	30MHz-88MHz	40.0	Quasi-peak Value			
	88MHz-216MHz	43.5	Quasi-peak Value			
	216MHz-960MHz	46.0	Quasi-peak Value			
	960MHz-1GHz	54.0	Quasi-peak Value			
	Above 1GHz	54.0	Average Value			
		74.0	Peak Value			

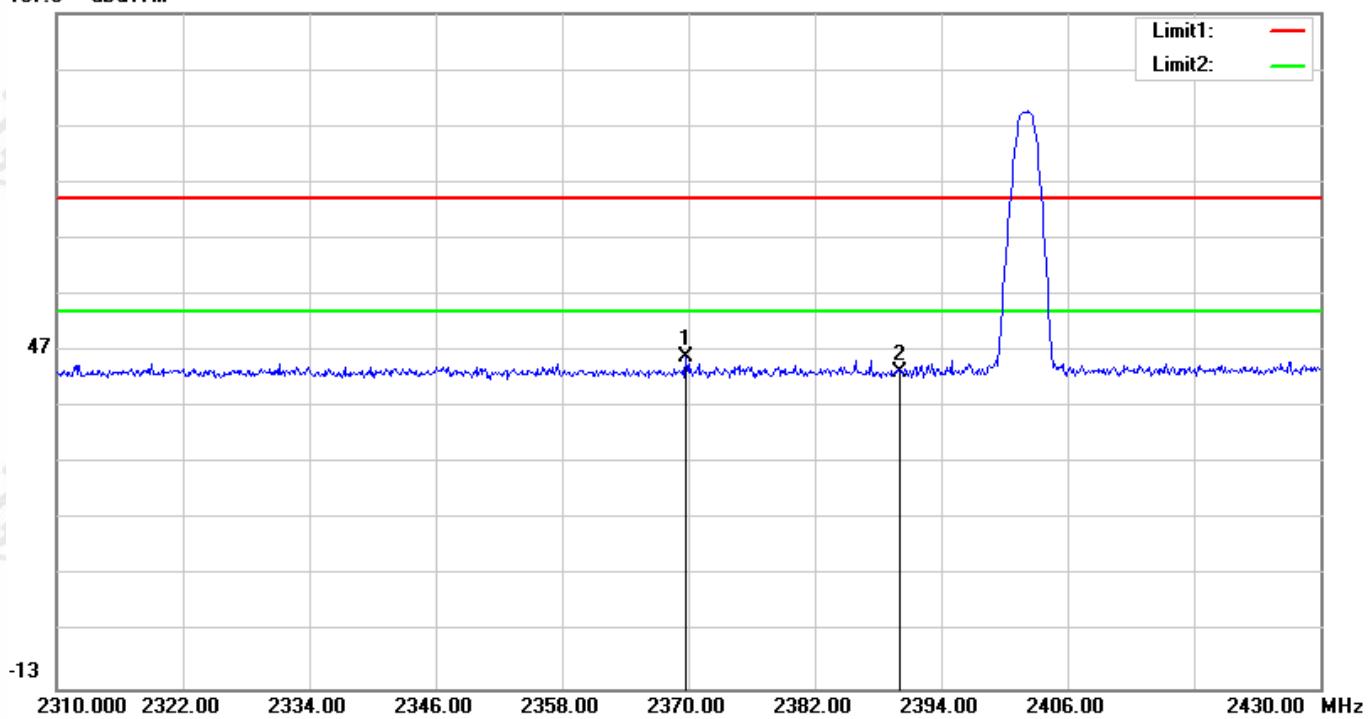
Report No. : EED39N00008303

Test plot as follows:

Mode:	GFSK Transmitting	Channel:	2402
Remark:	Horizontal		

Test Graph

107.0 dB_{uV/m}

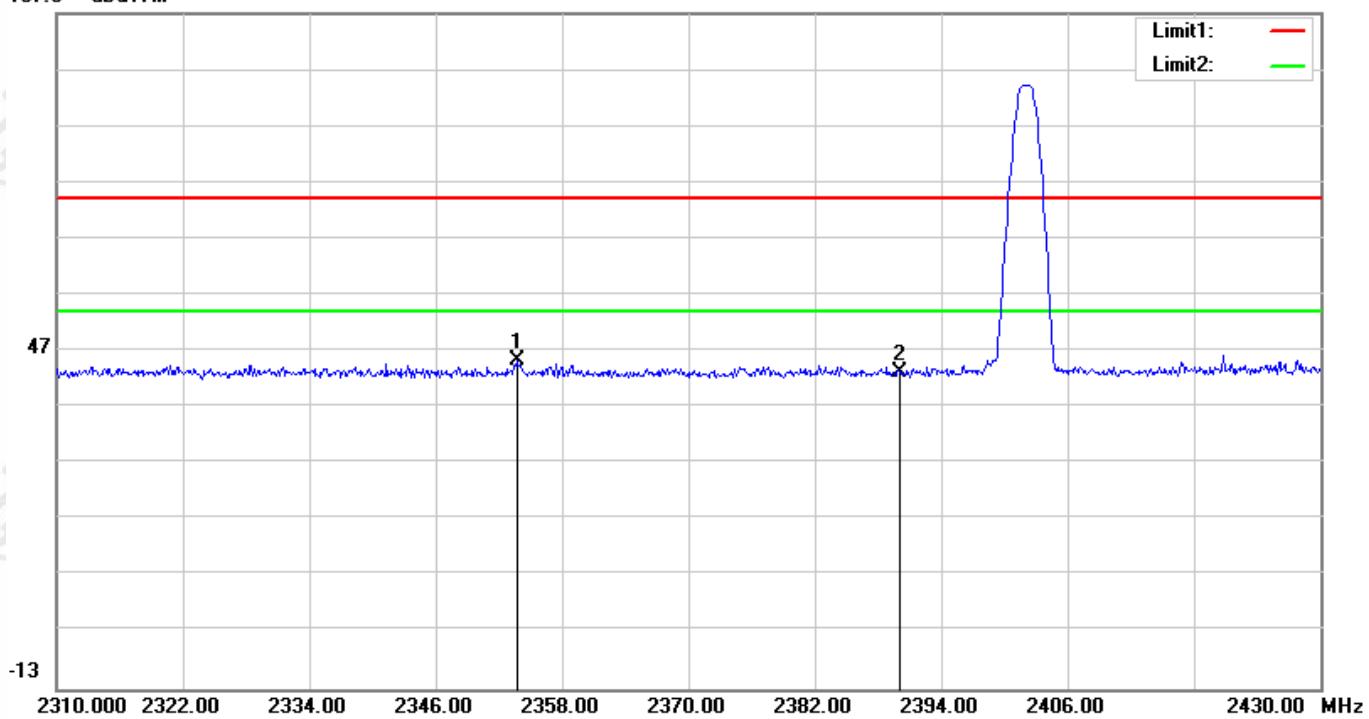


No.	Frequency (MHz)	Reading (dB _{uV})	Correct Factor(dB/m)	Result (dB _{uV/m})	Limit (dB _{uV/m})	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2369.760	43.23	2.66	45.89	74.00	-28.11	184	360	peak
2	2390.000	40.59	2.71	43.30	74.00	-30.70	100	52	peak

Mode:	GFSK Transmitting	Channel:	2402
Remark:	Vertical		

Test Graph

107.0 dB_{uV/m}

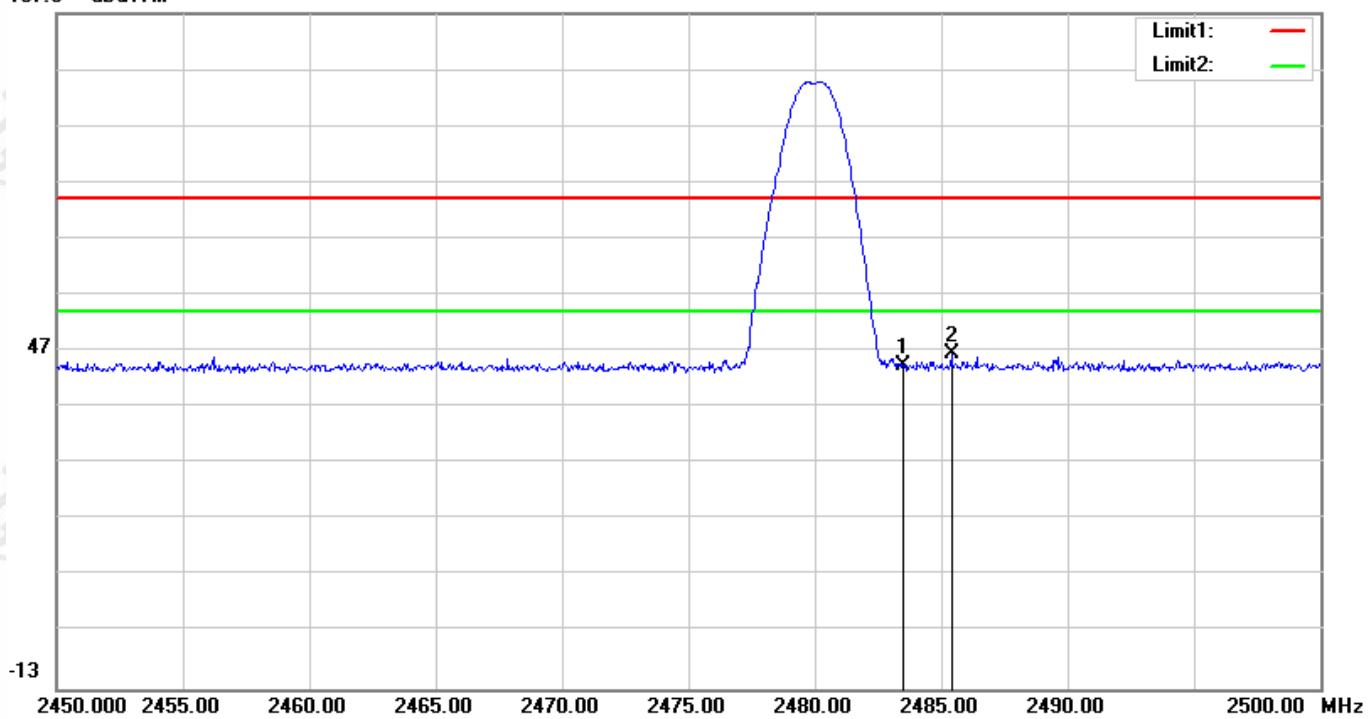


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dB _{uV})	Factor(dB/m)	(dB _{uV/m})	(dB _{uV/m})	(dB)	(cm)	(deg.)	
1	2353.680	42.64	2.61	45.25	74.00	-28.75	100	27	peak
2	2390.000	40.40	2.71	43.11	74.00	-30.89	100	360	peak

Mode:	GFSK Transmitting	Channel:	2480
Remark:	Horizontal		

Test Graph

107.0 dB_{UV}/m

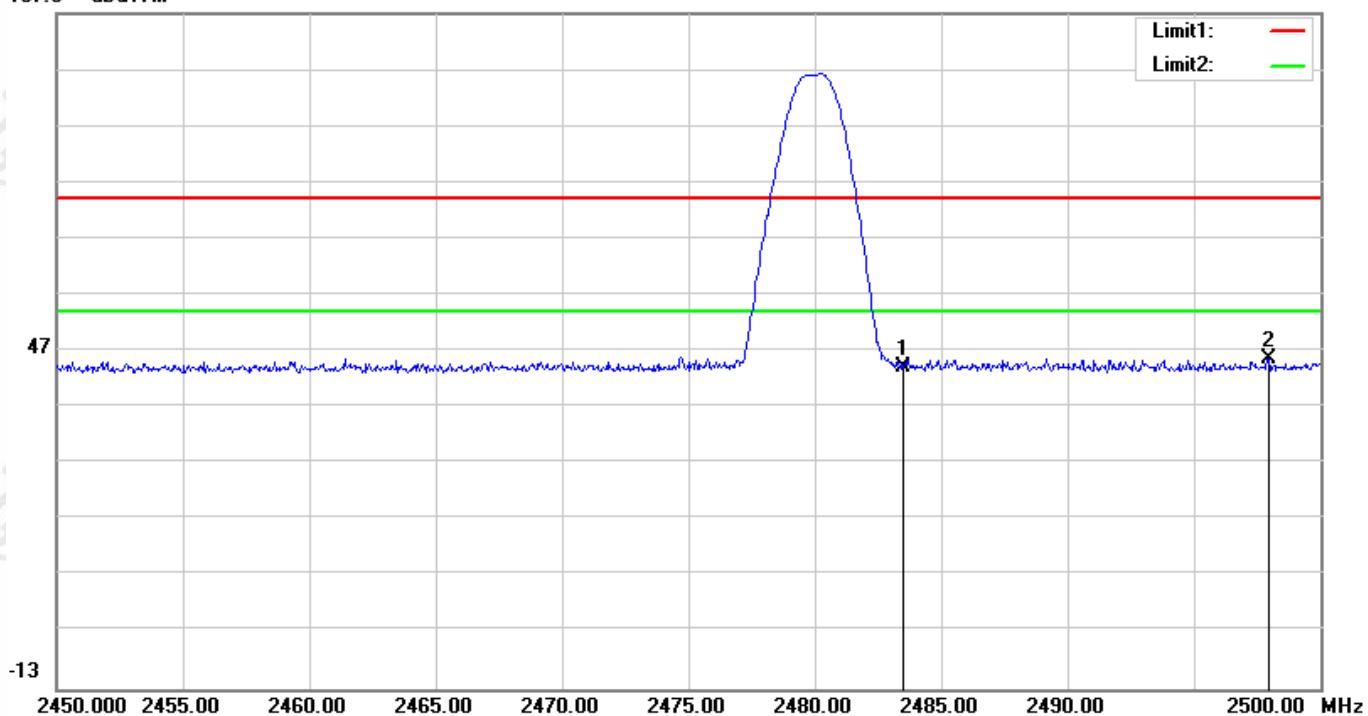


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dB _{UV})	Factor(dB/m)	(dB _{UV} /m)	(dB _{UV} /m)	(dB)	(cm)	(deg.)	
1	2483.500	41.40	2.92	44.32	74.00	-29.68	153	360	peak
2	2485.400	43.64	2.92	46.56	74.00	-27.44	100	173	peak

Mode:	GFSK Transmitting	Channel:	2480
Remark:	Vertical		

Test Graph

107.0 dB μ V/m



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dB μ V)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	2483.500	41.26	2.92	44.18	74.00	-29.82	200	185	peak
2	2497.950	42.82	2.95	45.77	74.00	-28.23	164	360	peak

Note:

1) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation. So, only the peak values are measured:

2) The field strength is calculated by adding the correct Factor. The basic equation with a sample calculation is as follows:

Final Test Level = Reading +Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

Appendix I): Radiated Spurious Emissions

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak	
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average	
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak	
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak	
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average	
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak	
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak	
Above 1GHz	Peak	1MHz	3MHz	Peak	
	Peak	1MHz	1/T	Average	

Test Procedure:	Below 1GHz test procedure as below:				
a.	The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.				
b.	The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.				
c.	The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. 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 from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.				
e.	The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.				
f.	If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.				

Test Procedure:	Above 1GHz test procedure as below:				
a.	Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter (Above 18GHz the distance is 1 meter and table is 1.5 meter).				
b.	Test the EUT in the lowest channel, the middle channel, the Highest channel				
c.	The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which is worse case.				
d.	Repeat above procedures until all frequencies measured was complete.				

Limit:	Frequency	Field strength microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-		300
0.490MHz-1.705MHz	24000/F(kHz)	-	-		30
1.705MHz-30MHz	30	-	-		30
30MHz-88MHz	100	40.0	Quasi-peak		3
88MHz-216MHz	150	43.5	Quasi-peak		3
216MHz-960MHz	200	46.0	Quasi-peak		3
960MHz-1GHz	500	54.0	Quasi-peak		3
Above 1GHz	500	54.0	Average		3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

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Radiated Spurious Emissions test Data:
Radiated Emission below 1GHz:

Mode:	GFSK Transmitting		Channel:	2480		
Remark:						

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
43.5800	V	54.67	-22.55	32.12	40.00	-7.88	QP
625.5800	V	48.05	-16.50	31.55	46.00	-14.45	QP
697.3600	V	51.20	-16.31	34.89	46.00	-11.11	QP
717.7300	V	52.58	-15.83	36.75	46.00	-9.25	QP
738.1000	V	48.81	-15.31	33.50	46.00	-12.50	QP
875.8400	V	50.32	-14.12	36.20	46.00	-9.80	QP
<hr/>							
42.6100	H	45.02	-22.65	22.37	40.00	-17.63	QP
83.3500	H	49.03	-26.94	22.09	40.00	-17.91	QP
245.3400	H	50.25	-22.91	27.34	46.00	-18.66	QP
600.3600	H	44.98	-16.37	28.61	46.00	-17.39	QP
717.7300	H	48.12	-15.83	32.29	46.00	-13.71	QP
874.8700	H	46.77	-14.13	32.64	46.00	-13.36	QP

Notes:

- 1) Through Pre-scan then find the GFSK-CH39 is the worst case mode and only the worst data was recorded.

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Transmitter Emission above 1GHz:

Mode:	GFSK Transmitting	Channel:	2402
Remark:			

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	3193.000	40.57	5.21	45.78	74.00	-28.22	100	22	peak
2	7086.000	33.57	11.82	45.39	74.00	-28.61	100	45	peak
3	10214.000	32.07	15.15	47.22	74.00	-26.78	100	10	peak

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	3193.000	44.71	5.21	49.92	74.00	-24.08	100	328	peak
2	10214.000	31.57	15.15	46.72	74.00	-27.28	100	94	peak
3	12458.000	29.46	18.20	47.66	74.00	-26.34	100	250	peak

Mode:	GFSK Transmitting	Channel:	2440
Remark:			

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	3193.000	40.84	5.21	46.05	74.00	-27.95	100	324	peak
2	7375.000	32.31	12.28	44.59	74.00	-29.41	100	360	peak
3	11183.000	31.55	16.82	48.37	74.00	-25.63	100	260	peak

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	3193.000	45.10	5.21	50.31	74.00	-23.69	100	327	peak
2	7664.000	32.23	12.57	44.80	74.00	-29.20	100	69	peak
3	11013.000	31.95	16.53	48.48	74.00	-25.52	100	17	peak

Mode:	GFSK Transmitting	Channel:	2480
Remark:			

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	3193.000	40.75	5.21	45.96	74.00	-28.04	100	22	peak
2	6865.000	33.49	11.57	45.06	74.00	-28.94	100	22	peak
3	8803.000	31.75	13.88	45.63	74.00	-28.37	100	359	peak

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	3193.000	45.17	5.21	50.38	74.00	-23.62	100	333	peak
2	7358.000	32.84	12.25	45.09	74.00	-28.91	100	236	peak
3	10605.000	31.29	16.00	47.29	74.00	-26.71	100	299	peak

Note:

1) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak values are measured:

2) The field strength is calculated by adding the correct Factor. The basic equation with a sample calculation is as follows:

Final Test Level = Reading +Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Refer to Report No. EED39N00008301 for test setup photos.

APPENDIX 2 PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Refer to Report No. EED39N00008301 for EUT external and internal photos.

The testing data and results in this report are just for scientific research, education, internal quality control and product development etc.

*** End of Report ***

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