



Prüfbericht-Nr.: <i>Test report no.:</i>	CN21DEDK(P15C-BLE) 001	Auftrags-Nr.: <i>Order no.:</i>	238495775	Seite 1 von 27 Page 1 of 27
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2020-12-29	
Auftraggeber: <i>Client:</i>	Kinship Partners, Inc. 1355 Market St., Suite 210, San Francisco, California, United States, 94103			
Prüfgegenstand: <i>Test item:</i>	Whistle Switch			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	Switch			
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15C Test report (BLE)			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.247			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020-12-30			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A002978819-009 A002978819-018			
Prüfzeitraum: <i>Testing period:</i>	2021-01-05 - 2021-01-12			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>reviewed by:</i>		genehmigt von: <i>authorized by:</i>		
Datum: <i>Date:</i>	2021-03-29	Ausstellungsdatum: <i>Issue date:</i>	2021-03-29	
Stellung / Position:	David Huang Project Manager	Stellung / Position:	Brenda Chen Senior Project Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.247(b) & 15.203	Antenna Requirement	Pass
5.1.2	15.247(b)(3)	Peak Output Power	Pass
5.1.3	15.247(a)(2)	6 dB Bandwidth	Pass
5.1.3	2.1049	99% Occupied Bandwidth	Pass
5.1.4	15.247(e)	Power Spectral Density	Pass
5.1.5	15.247(d)	Conducted Spurious Emissions and Band Edges	Pass
5.1.6	15.247(d) & 15.205 & 15.209	Radiated Spurious Emissions and Band Edges	Pass
5.2.1	15.207	Mains Conducted Emission	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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APPENDIX A - TEST RESULT OF CONDUCTED

APPENDIX B - TEST RESULT OF RADIATED EMISSIONS & MAINS CONDUCTED EMISSION

APPENDIX SP - PHOTOGRAPHS OF TEST SETUP

APPENDIX EP - PHOTOGRAPHS OF EUT

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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN21DEDK(P15C-BLE) 001	Original Release	2021-03-29

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A - Test Result of Conducted

Appendix B - Test Result of Radiated Emissions & Mains Conducted Emission

Appendix SP - Photographs of Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart C Section 15.247
FCC 47CFR Part 2: Subpart J Section 2.1049
ANSI C63.10:2013
KDB 558074 D01 15.247 Meas Guidance v05r02

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 226631
ISED Registration No.: 25563

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.32 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.31 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.53 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.50 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Whistle Switch. It contains a Bluetooth compatible module enabling the user to communicate data through a wireless interface.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	Whistle Switch
Type Identification	Switch
FCC ID	2AYHI-W05A

Technical Specification of EUT

Item	EUT information
Operating Frequency	2402 MHz ~ 2480 MHz
Channel Spacing	2 MHz
Channel Number	40
Data Rate	1Mbps
Operation Voltage	3.8Vdc
Modulation	GFSK
Maximum Output Power (mW)	0.88
Antenna Information	Refer to 5.1.1
Accessory Device	Refer to 4.4

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output expected by the customer and is going to be fixed on the firmware of the final end product.

Table for Parameters of Test Software Setting

Frequency (MHz)	Power Setting
2402	Default
2440	Default
2480	Default

4.2 Carrier Frequency and Channel

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

4.3 Test Operation and Test Software

Setup for testing: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.
 This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	DevID_driver_installer_0593200023.exe
---------------	---------------------------------------

The samples were used as follows:

A002978819-009 for conducted

A002978819-018 for radiated

Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable To			Description	
	Antenna Port Conducted Measurement	Radiated Spurious Emissions above 1 GHz	Radiated Spurious Emissions below 1 GHz		Mains Conducted Emission
-	√	√	√	√	-

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on Y-plane.
2. "-" means no effect.

Antenna Port Conducted Measurement

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Date Rate (Mbps)
-	2402 to 2480	2402, 2440, 2480	1

Radiated Spurious Emissions (Above 1 GHz)

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Date Rate (Mbps)
-	2402 to 2480	2402, 2440, 2480	1

Radiated Spurious Emissions (Below 1 GHz)

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Date Rate (Mbps)
-	2402 to 2480	2480	1

Mains Conducted Emission

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Date Rate (Mbps)
-	2402 to 2480	2480	1

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Conducted Measurement	20.9-21.2 °C	65.5-65.6 %	Stanislas Charles
Radiated Spurious Emissions above 1 GHz	18.6-20.6 °C	50-55 %	Eagle Tsai
Radiated Spurious Emissions below 1 GHz	18.6-20.6 °C	50-55 %	Eagle Tsai
Mains Conducted Emission	22 °C	62 %	Nick Hsu

4.4 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Accessory of EUT

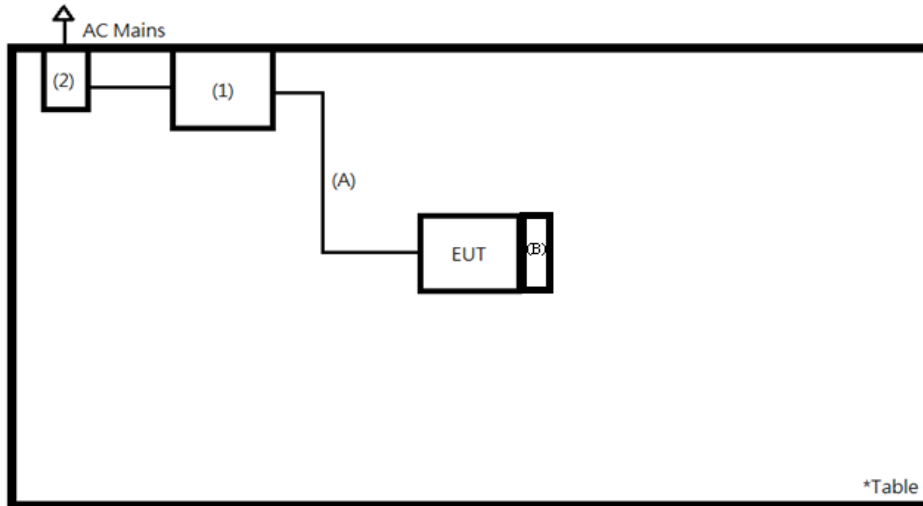
No.	Description	Brand	Model	S/N	Remark
Radiated and Mains Conducted Tests					
A	Micro Usb Cable	A.P.G	A.P.G001	-	100cm shielded cable w/o core
B	Battery	A.P.G	TBB204900189	-	-

Support Unit

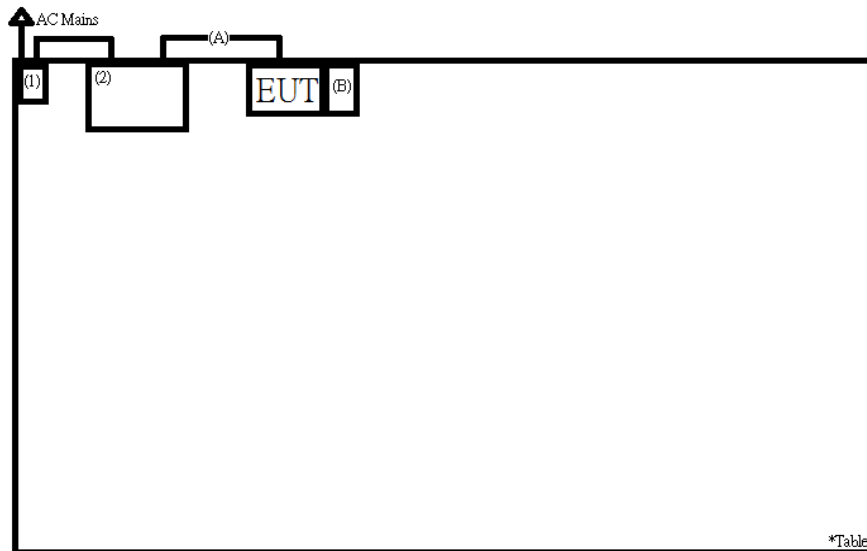
No.	Description	Brand	Model	S/N	Remark
Radiated Test					
-	Fixture	A.P.G	2045WS	-	-
1	Notebook	Lenovo	TP00094F	PF-1V4YV0	-
2	Adapter	Lenovo	ADLX65YLC3A	N/A	180cm shielded cable w/o core
Mains Conducted Test					
1	Adapter	HP	TPN-CA16	-	180cm non-shielded cable w/o core
2	Notebook	HP	15s-du0007TX	CND93662VF	-
Conducted Test					
-	Notebook	HP	TPN-C139	CND93662WT	-

4.5 Test Setup Diagram

<Radiated Spurious Emissions mode>



<Mains Conducted Emission mode>



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

Requirement Use of approved antennas only

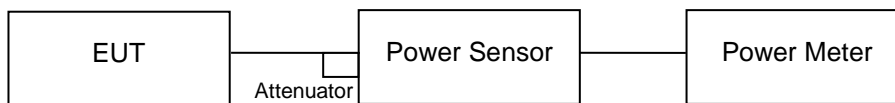
According to the manufacturer declaration, the EUT has an antenna with a directional gain of -0.49 dBi. The antenna is PIFA Antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision. Refer to EUT photo for details.

5.1.2 Peak Output Power

Limit 1 watt (30 dBm)

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Power Meter	Anritsu	ML2495A	1901008	2020/4/6	2021/4/5	2021/1/5	2021/1/5
Power Sensor	Anritsu	MA2411B	1725269	2020/4/7	2021/4/6	2021/1/5	2021/1/5

Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

Test Result
Peak Output Power
<1Mbps>

Channel	Channel Frequency	Peak Output Power		Limit (dBm)
	(MHz)	(dBm)	(mW)	
Low Channel	2402	-0.55	0.88	30
Middle Channel	2440	-0.59	0.87	30
High Channel	2480	-0.64	0.86	30

Average Power
<1Mbps>

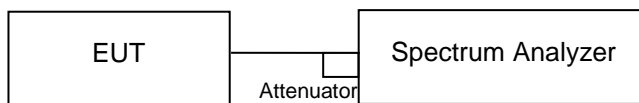
Channel	Channel Frequency	Average Power	
	(MHz)	(dBm)	(mW)
Low Channel	2402	-0.60	0.87
Middle Channel	2440	-0.64	0.86
High Channel	2480	-0.68	0.86

5.1.3 6 dB Bandwidth and 99% Occupied Bandwidth

Limit The minimum 6 dB bandwidth shall be at least 500 kHz.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101512	2020/2/18	2021/2/16	2021/1/7	2021/1/7

Test Procedure

- Set resolution bandwidth (RBW) = 100 kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
- For 99% occupied bandwidth measurement, the transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to PEAK. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean power of a given emission.

Test Results

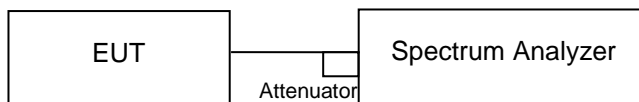
Please refer to Appendix A.

5.1.4 Power Spectral Density

Limit

The power spectral density shall not be greater than 8 dBm in any 3 kHz band.

Kind of Test Site Shielded room

Test Setup

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101512	2020/2/18	2021/2/16	2021/1/7	2021/1/7

Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d. Set the VBW $\geq 3 \times \text{RBW}$.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

Test Results

Please refer to Appendix A.

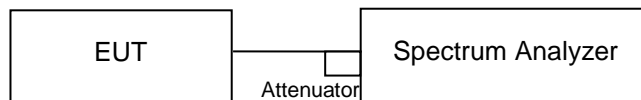
5.1.5 Conducted Spurious Emissions and Frequency Band Edges Measured in 100kHz Bandwidth

Limit

20dB (below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.)

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101512	2020/2/18	2021/2/16	2021/1/7	2021/1/7

Test Procedure

Measurement procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement procedure OOBE

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

Test Results

Please refer to Appendix A.

5.1.6 Radiated Spurious Emissions and Band Edges

Limit

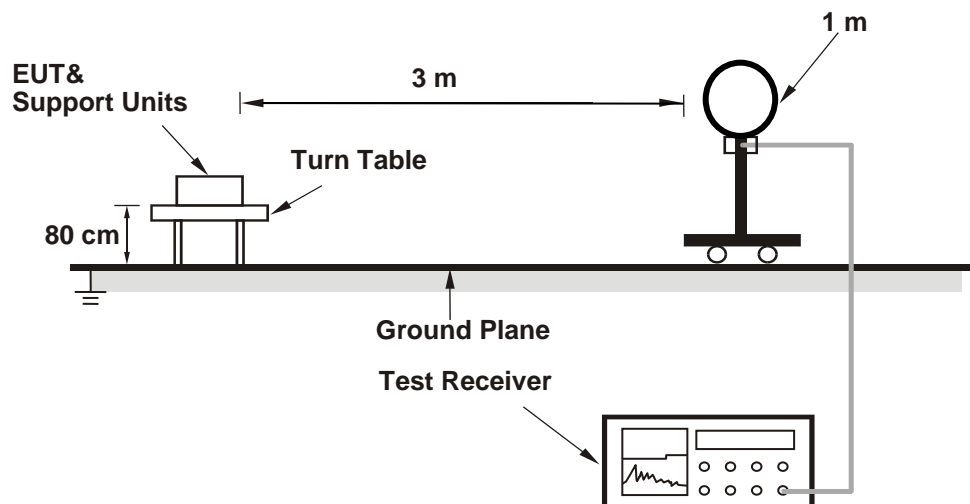
Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Emissions radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in §15.247(d).

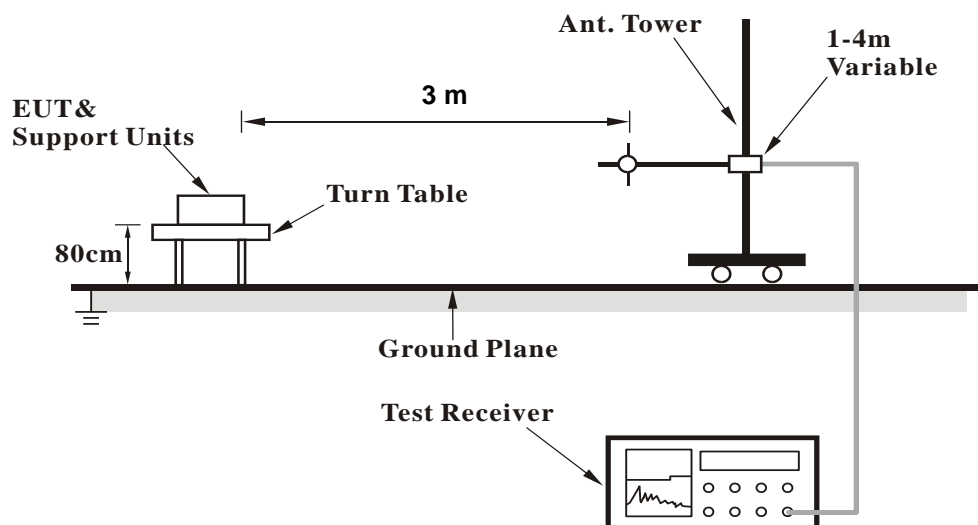
Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

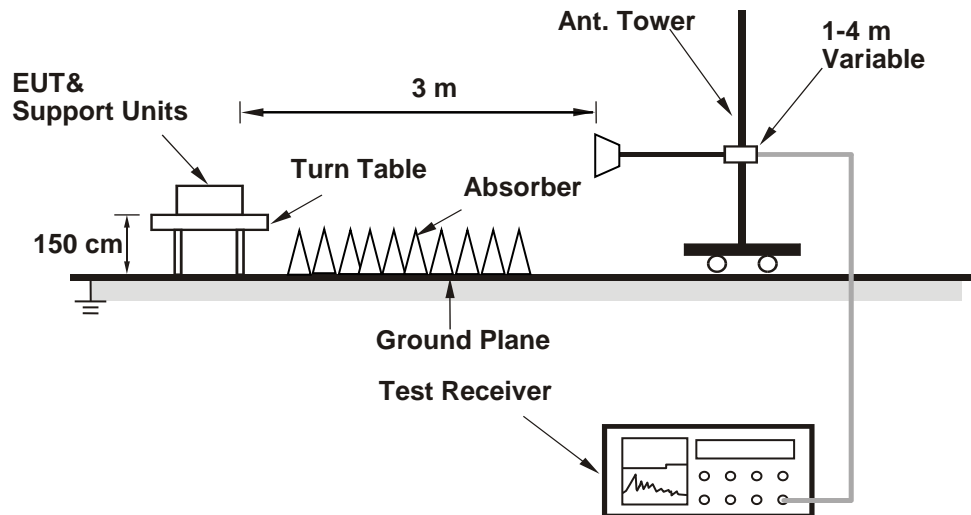
<Radiated Emissions below 30 MHz>



<Radiated Emissions 30 MHz to 1 GHz>



<Radiated Emissions above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101509	2020/5/5	2021/5/4
Receiver	R&S	ESR7	102109	2020/3/30	2021/3/29
Bilog Antenna	SCHWARZBECK	VULB-9168	00950	2020/1/20	2021/1/18
Horn Antenna	ETS-Lindgren	3117	00218929	2020/11/6	2021/11/5
LF-AMP	Agilent	8447D	2727A05146	2020/2/17	2021/2/15
HF-AMP + AC source	EMCI	EMC051845SE	980635	2020/2/11	2021/2/9
HF-AMP + AC source	EMCI	EMC184045SE	980656	2020/2/11	2021/2/9
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2020/4/13	2021/4/12
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800057/4EA	2020/4/22	2021/4/21
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	802244/4	2020/4/22	2021/4/21
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37203/4	2020/4/22	2021/4/21
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800897/2EA	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800902/2EA	2020/3/25	2021/3/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801026/2EA	2020/3/25	2021/3/24
Loop Antenna	Chance Most	EMCILPA600 +calibration	287	2021/1/7	2022/1/6

Test Procedures**For Radiated Emissions below 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated Emissions above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. 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 height of antenna 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

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Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix B.

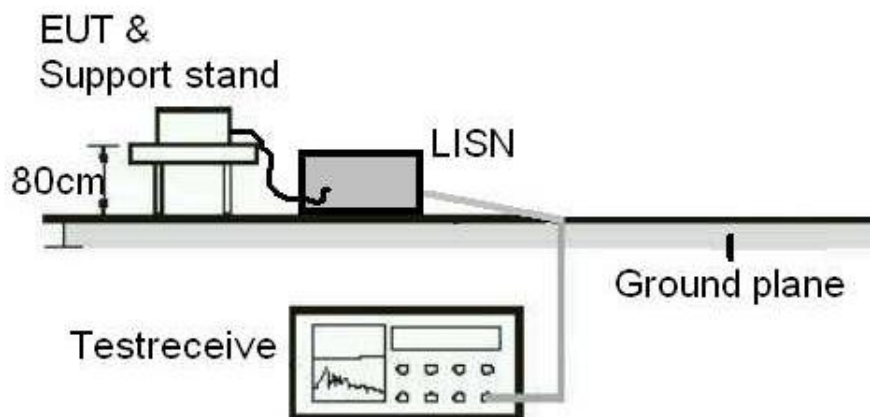
5.2 Mains Emission

5.2.1 Mains Conducted Emission

Limit

Mains Conducted Emission as defined in §15.207 must comply with the mains conducted emission limits.

Kind of Test Site Shielded room

Test Setup

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
EMI Test Receiver	Rohde & Schwarz	ESR 7	102114	2020/04/13	2021/04/13
Two-Line V-Network (for EUT)	Rohde & Schwarz	ENV216	101262	2020/08/04	2021/08/04
Test Software	Audix	e3	Ver. 9	N/A	N/A

Test Procedures

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

Test Results

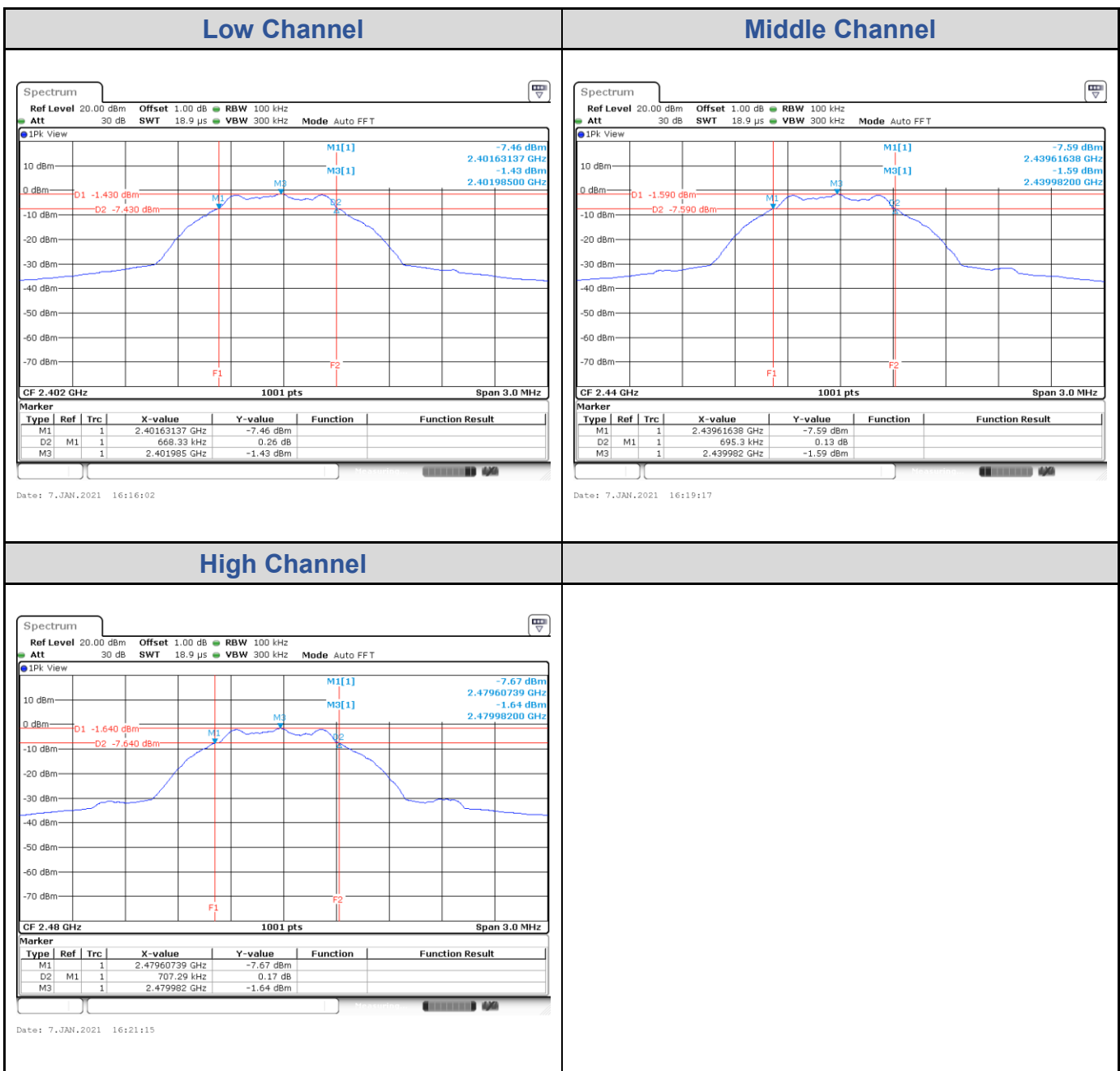
Please refer to Appendix B.

Appendix A: Test Results of Conducted Test

Test Result of 6 dB Bandwidth

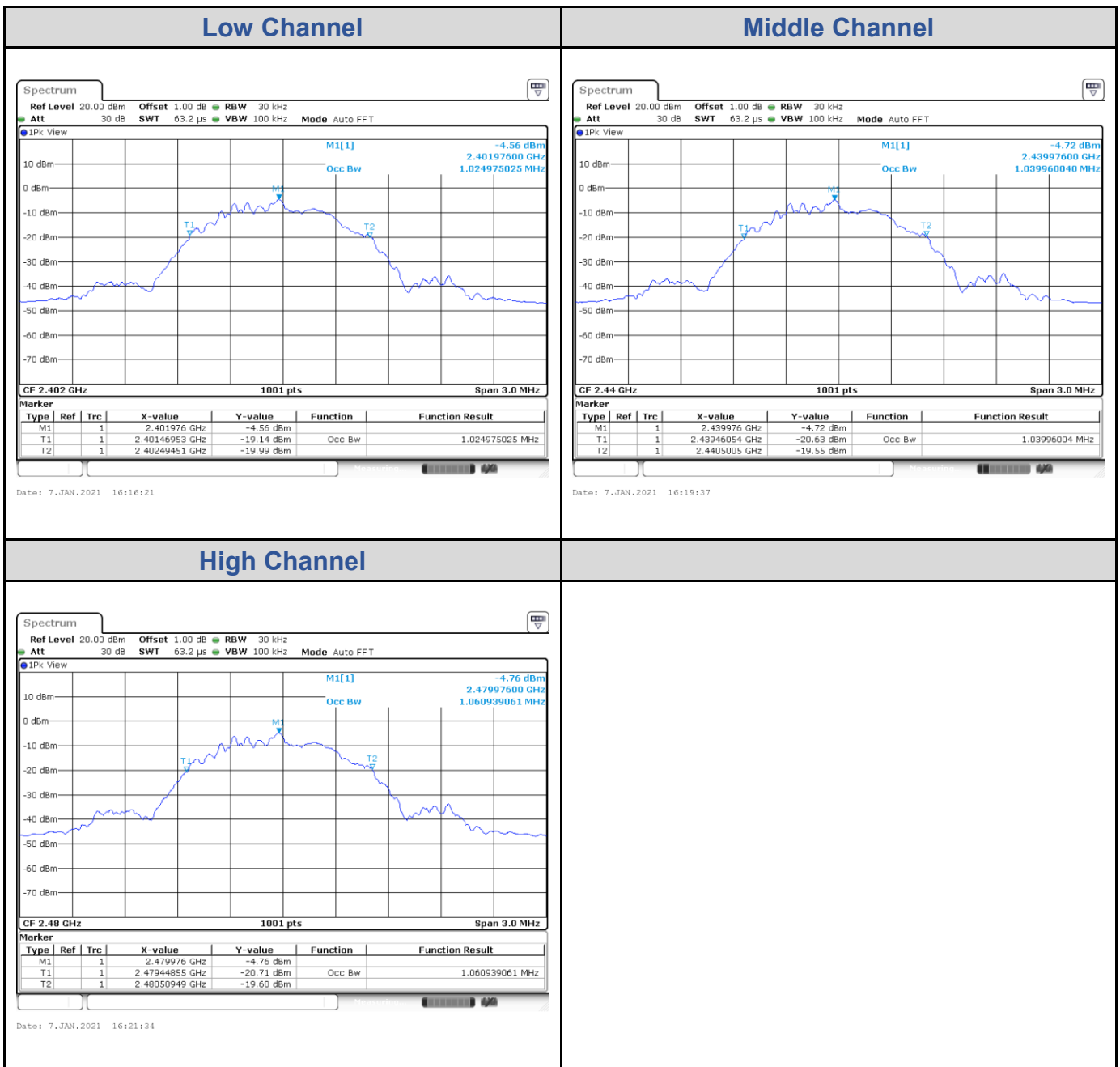
BLE_1M

Channel	Channel Frequency (MHz)	6 dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	668.33	> 500	Pass
Middle Channel	2440	695.3	> 500	Pass
High Channel	2480	707.29	> 500	Pass



Test Result of 99% Occupied Bandwidth
BLE_1M

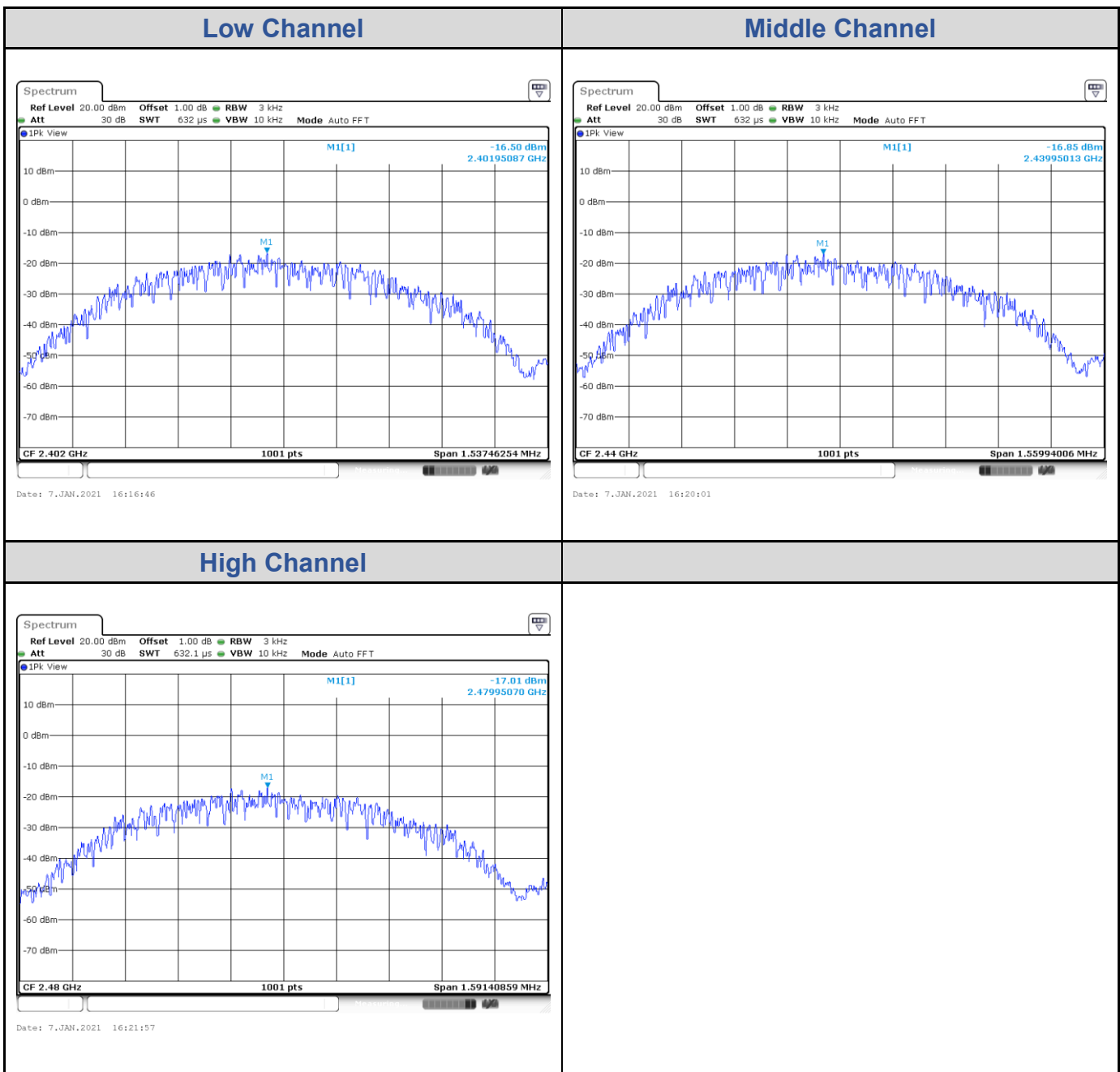
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)
Low Channel	2402	1.02
Middle Channel	2440	1.04
High Channel	2480	1.06



Test Result of Power Spectral Density

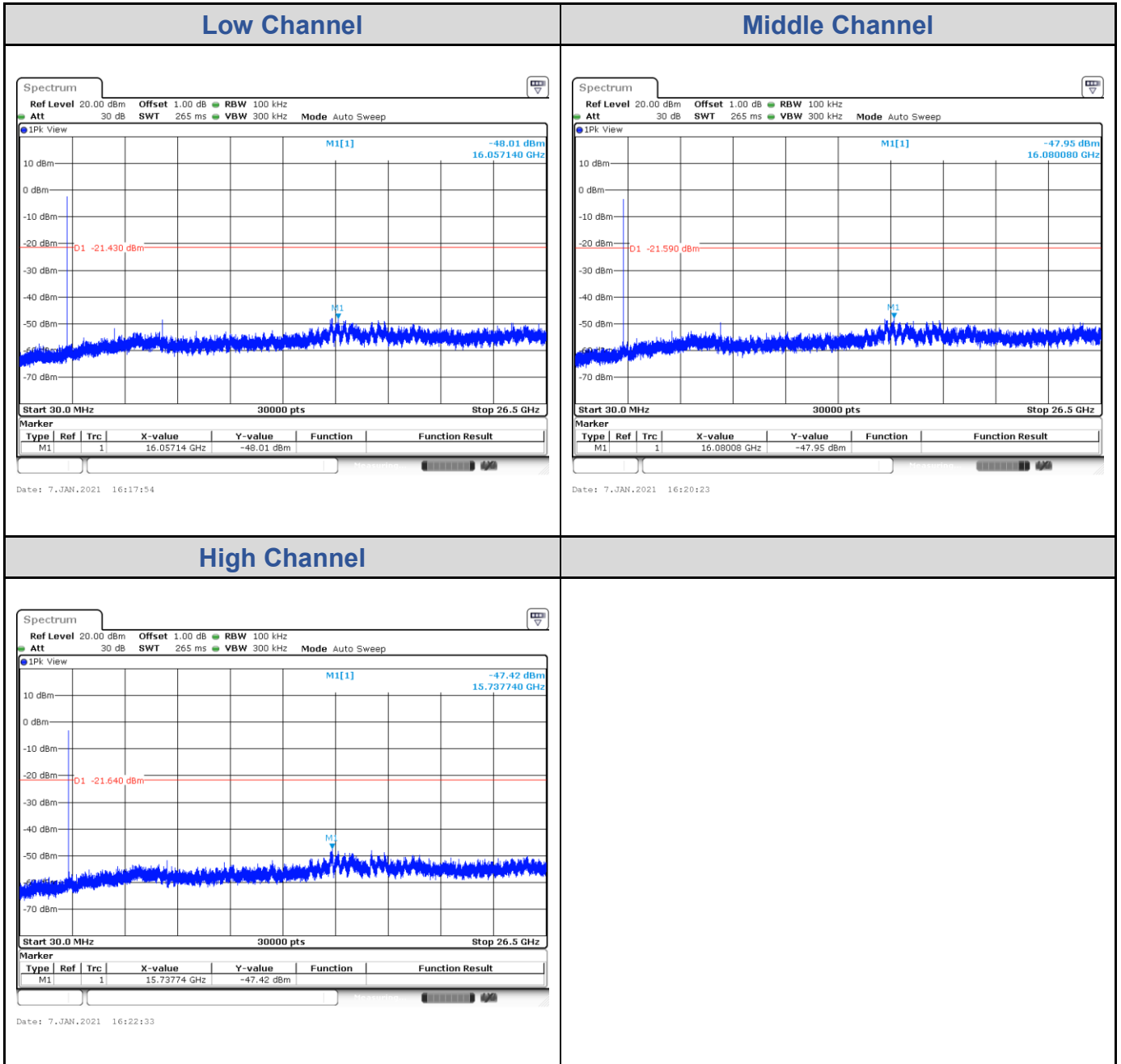
BLE_1M

Channel	Channel Frequency (MHz)	Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2402	-16.50	8	Pass
Middle Channel	2440	-16.85	8	Pass
High Channel	2480	-17.01	8	Pass



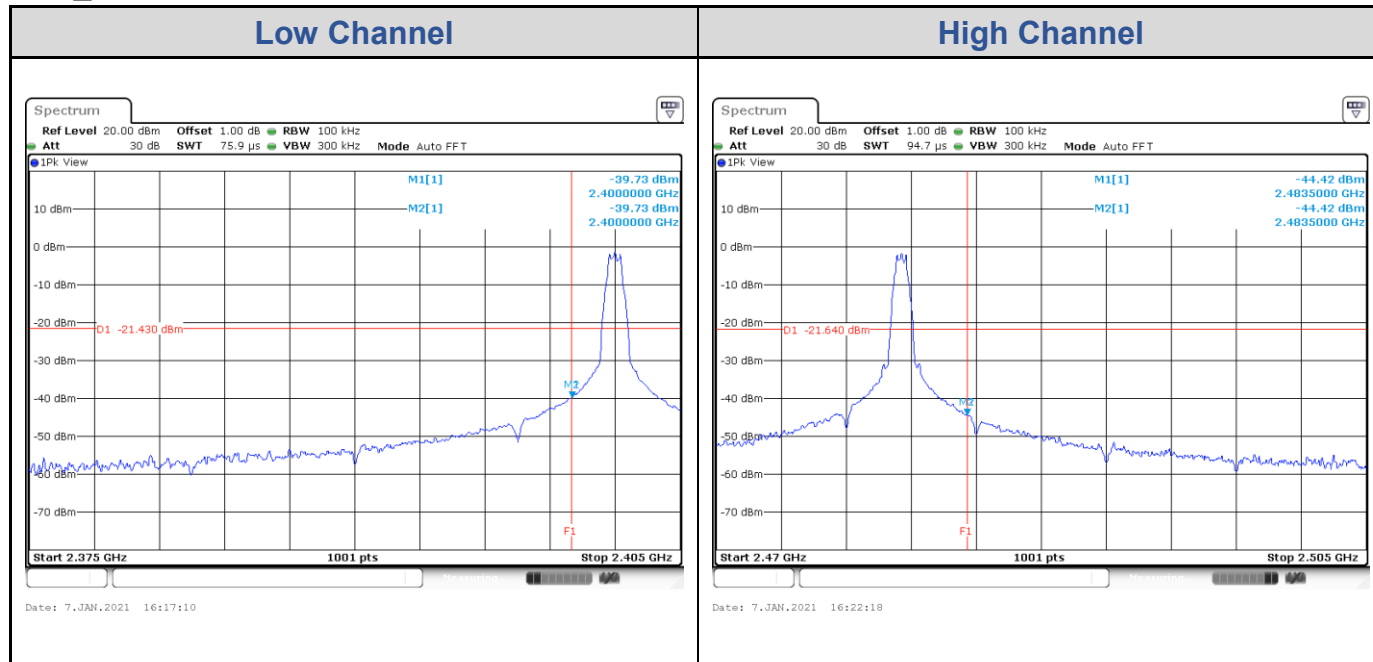
Test Result of Conducted Spurious Emissions, Tx Mode

BLE_1M



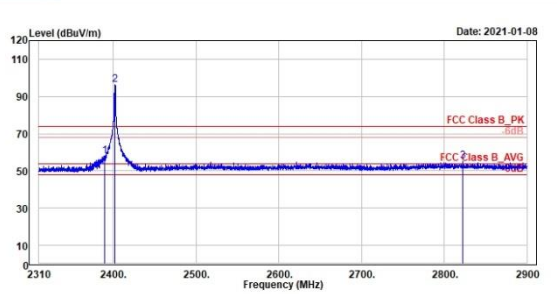
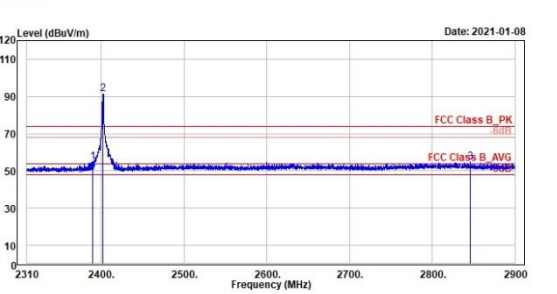
Test Result of Conducted Band Edge, Tx Mode

BLE_1M



Appendix B: Test Results of Radiated Emissions & Mains Conducted Emission Test

Band Edges, 2.31GHz ~ 2.9GHz

BLE_1M																																																																																																															
Low Channel (Horizontal) Peak	Low Channel (Vertical) Peak																																																																																																														
<div style="text-align: right; font-size: small;"> TÜV Rheinland Taiwan Ltd. No. 438-18, Sec 2, Fenliiao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.) Tel: +886-2172-1000 Fax: +886-2172-1322 </div> <div style="text-align: center; margin-top: 10px;"> </div> <div style="text-align: right; font-size: x-small; margin-bottom: 5px;">Date: 2021-01-08</div>  <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <thead> <tr> <th>Freq</th> <th>Level</th> <th>Read Level</th> <th>Factor</th> <th>Limit</th> <th>Over Limit</th> <th>APos</th> <th>TPos</th> <th>Remark</th> <th>Pol/Phase</th> <th>Note</th> </tr> <tr> <th>MHz</th> <th>dBuV/m</th> <th>dBuV</th> <th>dB/m</th> <th>dBuV/m</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2389.2960</td> <td>58.08</td> <td>20.86</td> <td>37.22</td> <td>74.00</td> <td>-15.92</td> <td>342</td> <td>249 Peak</td> <td>Horizontal</td> <td></td> </tr> <tr> <td>2</td> <td>*2402.0000</td> <td>96.23</td> <td>58.99</td> <td>37.24</td> <td>74.00</td> <td>22.23</td> <td>342</td> <td>249 Peak</td> <td>Horizontal</td> <td></td> </tr> <tr> <td>3</td> <td>2822.2380</td> <td>55.04</td> <td>16.89</td> <td>38.15</td> <td>74.00</td> <td>-18.96</td> <td>342</td> <td>249 Peak</td> <td>Horizontal</td> <td></td> </tr> </tbody> </table>	Freq	Level	Read Level	Factor	Limit	Over Limit	APos	TPos	Remark	Pol/Phase	Note	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				1	2389.2960	58.08	20.86	37.22	74.00	-15.92	342	249 Peak	Horizontal		2	*2402.0000	96.23	58.99	37.24	74.00	22.23	342	249 Peak	Horizontal		3	2822.2380	55.04	16.89	38.15	74.00	-18.96	342	249 Peak	Horizontal		<div style="text-align: right; font-size: small;"> TÜV Rheinland Taiwan Ltd. No. 438-18, Sec 2, Fenliiao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.) Tel: +886-2172-1000 Fax: +886-2172-1322 </div> <div style="text-align: center; margin-top: 10px;"> </div> <div style="text-align: right; font-size: x-small; margin-bottom: 5px;">Date: 2021-01-08</div>  <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <thead> <tr> <th>Freq</th> <th>Level</th> <th>Read Level</th> <th>Factor</th> <th>Limit</th> <th>Over Limit</th> <th>APos</th> <th>TPos</th> <th>Remark</th> <th>Pol/Phase</th> <th>Note</th> </tr> <tr> <th>MHz</th> <th>dBuV/m</th> <th>dBuV</th> <th>dB/m</th> <th>dBuV/m</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2389.8860</td> <td>54.81</td> <td>17.59</td> <td>37.22</td> <td>74.00</td> <td>-19.19</td> <td>115</td> <td>355 Peak</td> <td>Vertical</td> <td></td> </tr> <tr> <td>2</td> <td>*2402.0000</td> <td>91.44</td> <td>54.28</td> <td>37.24</td> <td>74.00</td> <td>17.44</td> <td>115</td> <td>355 Peak</td> <td>Vertical</td> <td></td> </tr> <tr> <td>3</td> <td>2845.8380</td> <td>54.95</td> <td>16.77</td> <td>38.18</td> <td>74.00</td> <td>-19.05</td> <td>115</td> <td>355 Peak</td> <td>Vertical</td> <td></td> </tr> </tbody> </table>	Freq	Level	Read Level	Factor	Limit	Over Limit	APos	TPos	Remark	Pol/Phase	Note	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				1	2389.8860	54.81	17.59	37.22	74.00	-19.19	115	355 Peak	Vertical		2	*2402.0000	91.44	54.28	37.24	74.00	17.44	115	355 Peak	Vertical		3	2845.8380	54.95	16.77	38.18	74.00	-19.05	115	355 Peak	Vertical	
Freq	Level	Read Level	Factor	Limit	Over Limit	APos	TPos	Remark	Pol/Phase	Note																																																																																																					
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1	2389.2960	58.08	20.86	37.22	74.00	-15.92	342	249 Peak	Horizontal																																																																																																						
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3	2822.2380	55.04	16.89	38.15	74.00	-18.96	342	249 Peak	Horizontal																																																																																																						
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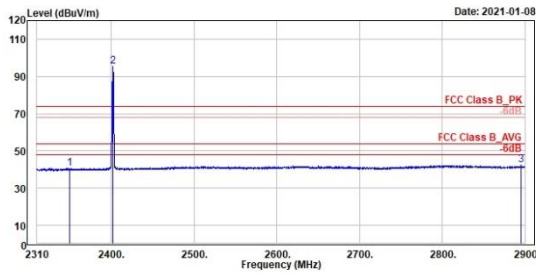
BLE_1M

Low Channel (Horizontal) Average

Low Channel (Vertical) Average



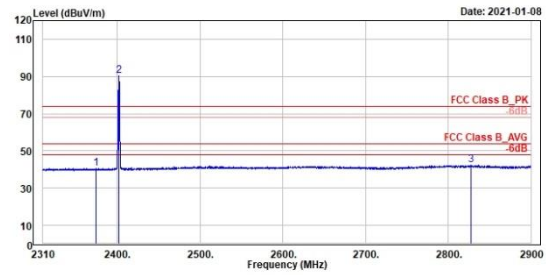
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Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1 2349.6488	48.63	3.46	37.17	54.00	-13.37	342	249	Average	Horizontal	
2 *2402.0900	95.25	58.81	37.24	54.00	41.25	342	249	average	Horizontal	
3 2895.3988	42.26	4.29	37.97	54.00	-11.74	342	249	Average	Horizontal	



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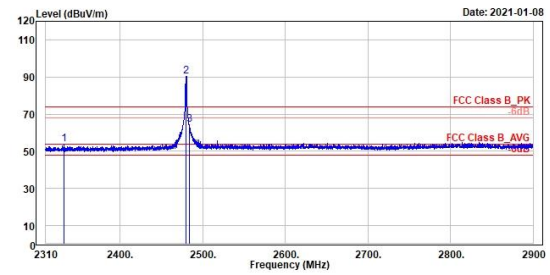
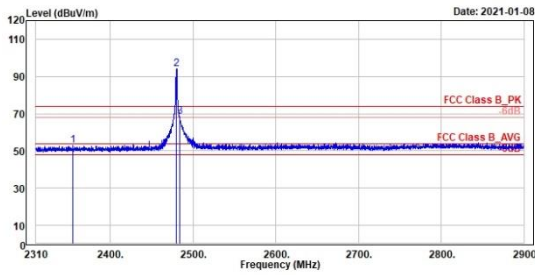


Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1 2374.1920	48.59	3.39	37.20	54.00	-13.41	115	355	Average	Vertical	
2 *2402.0900	90.45	53.21	37.24	54.00	36.45	115	355	Average	Vertical	
3 2827.3120	42.36	4.20	38.16	54.00	-11.64	115	355	Average	Vertical	

BLE_1M

High Channel (Horizontal) Peak

High Channel (Vertical) Peak



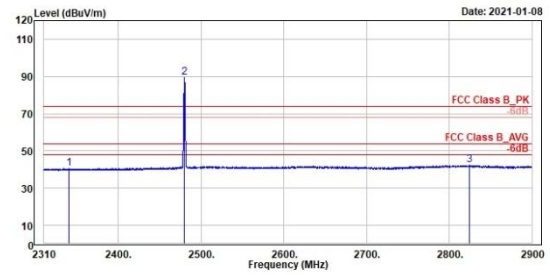
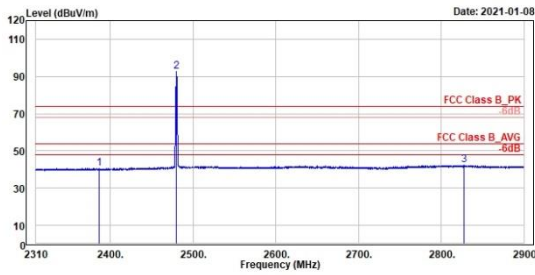
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2355.8768	52.73	15.55	37.18	74.00	-21.27	316	257	Peak	Horizontal	
2	*2480.8000	93.89	50.27	37.62	74.00	19.89	316	257	Peak	Horizontal	
3	12483.5000	68.64	31.00	37.64	74.00	-5.36	316	257	Peak	Horizontal	

Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2332.5300	53.95	16.90	37.05	74.00	-20.05	127	5	Peak	Vertical	
2	*2480.8000	90.49	52.87	37.62	74.00	16.49	127	5	Peak	Vertical	
3	2483.6960	64.40	26.76	37.64	74.00	-9.60	127	5	Peak	Vertical	

BLE_1M

High Channel (Horizontal) Average

High Channel (Vertical) Average



Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dB/m	dBuV/m	dB	cm	deg			
1	2386.4640	48.67	3.45	37.22	54.00	-13.33	316	257	Average	Horizontal	
2	*2480.0000	92.04	55.22	37.62	54.00	38.04	316	257	Average	Horizontal	
3	2828.0200	42.54	4.38	38.16	54.00	-11.46	316	257	Average	Horizontal	

Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dB/m	dBuV/m	dB	cm	deg			
1	2340.5620	48.66	3.56	37.10	54.00	-13.34	127	5	Average	Vertical	
2	*2480.0000	89.42	51.09	37.62	54.00	35.42	127	5	Average	Vertical	
3	2824.7160	42.29	4.13	38.16	54.00	-11.71	127	5	Average	Vertical	

Spurious Emissions, Tx Mode, 9kHz ~ 30MHz

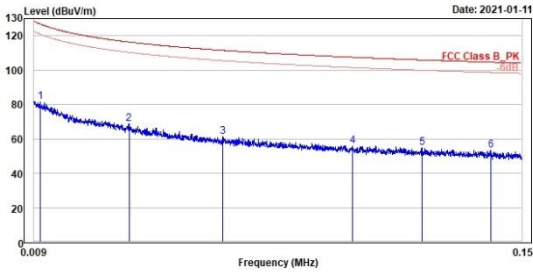
BLE_1M

High Channel (Open) 9kHz~150kHz

High Channel (Open) 150kHz~30MHz



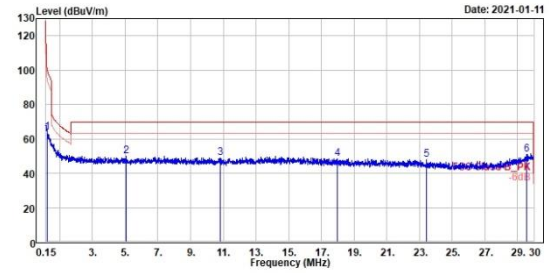
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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	0.01078	81.34	2.99	78.35	126.94	-45.60	100	135 QP	Open
2	0.03647	68.74	0.06	68.68	116.35	-47.61	100	202 QP	Open
3	0.06365	61.38	-1.80	63.18	111.52	-50.14	100	282 QP	Open
4	0.10102	55.73	-3.46	59.19	107.51	-51.78	100	245 QP	Open
5	0.12118	55.01	-3.02	58.03	105.93	-50.92	100	337 QP	Open
6	0.14106	53.38	-3.49	56.87	104.61	-51.23	100	7 QP	Open



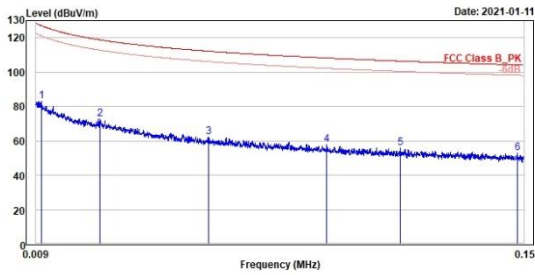
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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	0.25149	63.61	11.70	51.91	99.59	-35.98	100	65 QP	Open
2	5.05137	49.92	11.57	38.35	69.50	-19.58	100	84 QP	Open
3	10.79451	48.61	11.53	37.28	69.50	-20.69	100	278 QP	Open
4	17.95851	48.68	11.83	36.85	69.50	-20.82	100	275 QP	Open
5	23.43300	47.91	12.63	35.28	69.50	-21.59	100	360 QP	Open
6	29.57016	50.80	12.10	38.70	69.50	-18.70	100	305 QP	Open

BLE_1M
High Channel (Close) 9kHz~150kHz
High Channel (Close) 150kHz~30MHz

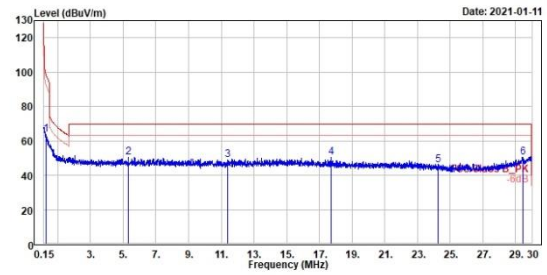

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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	0.01855	83.08	4.59	78.49	127.12	-44.04	100	346 QP	Close
2	0.02758	72.79	1.62	71.17	118.78	-45.99	100	163 QP	Close
3	0.05880	62.25	-1.57	63.82	112.21	-49.96	100	133 QP	Close
4	0.09301	57.91	-2.18	60.09	108.23	-50.32	100	195 QP	Close
5	0.11433	55.62	-2.80	58.42	106.43	-50.81	100	274 QP	Close
6	0.14811	52.85	-3.61	56.46	104.19	-51.34	100	205 QP	Close



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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	0.26940	63.62	12.25	51.37	98.99	-35.37	100	92 QP	Close
2	5.31405	50.58	12.23	38.35	69.50	-18.92	100	257 QP	Close
3	11.73760	48.85	11.61	37.24	69.50	-20.65	100	201 QP	Close
4	17.73762	50.25	13.33	36.92	69.50	-19.25	100	40 QP	Close
5	24.25686	46.22	11.56	34.66	69.50	-23.28	100	189 QP	Close
6	29.45673	50.56	12.15	38.41	69.50	-18.94	100	125 QP	Close

Spurious Emissions, Tx Mode, 30MHz ~ 1GHz

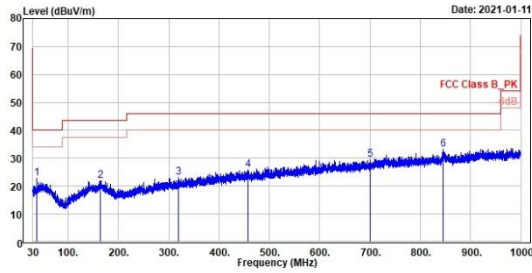
BLE_1M

High Channel (Horizontal)

High Channel (Vertical)



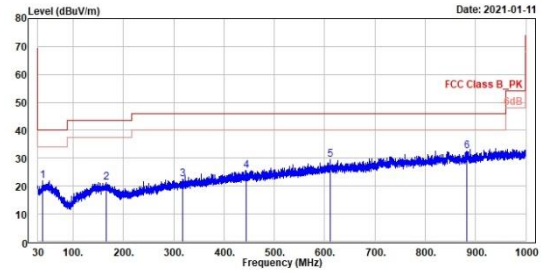
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Freq	Level	Read	Limit	Over	Apos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	37.08100	22.79	29.52	-6.73	40.00	-17.21	200	283 QP	horizontal
2	164.73300	22.03	27.87	-5.84	43.50	-21.47	200	274 QP	horizontal
3	319.06000	23.06	27.75	-4.69	46.00	-22.94	200	92 QP	horizontal
4	458.44900	25.74	28.07	-2.33	46.00	-20.26	300	165 QP	horizontal
5	701.24000	29.62	28.34	1.28	46.00	-16.38	100	301 QP	horizontal
6	846.15000	33.07	29.82	3.25	46.00	-12.93	100	169 QP	horizontal



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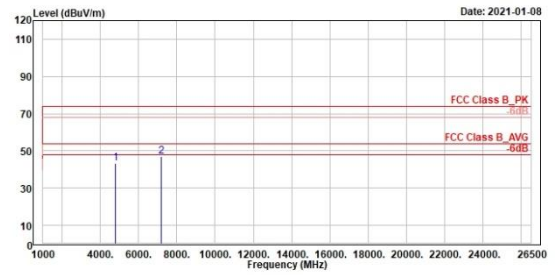
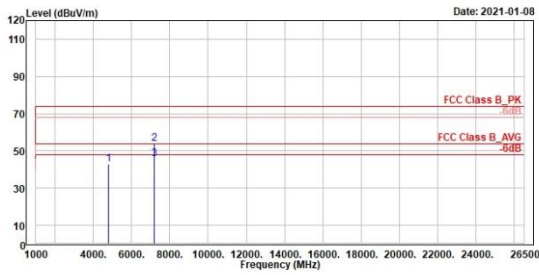
Freq	Level	Read	Limit	Over	Apos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	38.53600	22.04	28.86	-6.82	40.00	-17.96	157	360 QP	vertical
2	166.28500	21.32	27.12	-5.80	43.50	-22.18	100	222 QP	vertical
3	317.70200	22.40	27.11	-4.71	46.00	-23.60	200	339 QP	vertical
4	443.41400	25.49	28.01	-2.52	46.00	-20.51	200	359 QP	vertical
5	611.41800	29.53	29.28	0.25	46.00	-16.47	300	66 QP	vertical
6	882.33900	32.61	28.90	3.71	46.00	-13.39	100	178 QP	vertical

Spurious Emissions, Tx Mode, 1GHz ~ 26.5GHz

BLE_1M

Low Channel (Horizontal)

Low Channel (Vertical)



Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dB/m	dBuV/m	dB	cm	deg			
1	4894.0000	42.04	52.38	-9.54	74.00	-31.15	338	0	Peak	horizontal	
2	7206.0000	53.76	60.59	-6.83	74.00	-20.24	100	24	Peak	horizontal	
3	7206.0000	45.44	52.27	-6.83	54.00	-8.56	100	24	Average	horizontal	

Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dB/m	dBuV/m	dB	cm	deg			
1	4894.0000	43.32	52.86	-9.54	74.00	-30.68	100	272	Peak	vertical	
2	7206.0000	46.79	53.62	-6.83	74.00	-27.21	100	360	Peak	vertical	

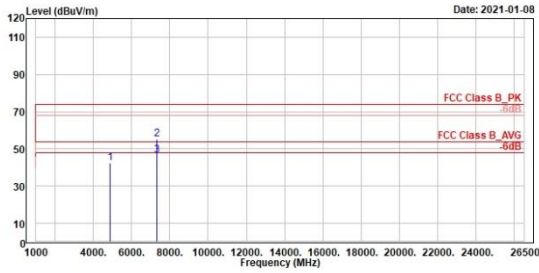
BLE_1M

Middle Channel (Horizontal)

Middle Channel (Vertical)



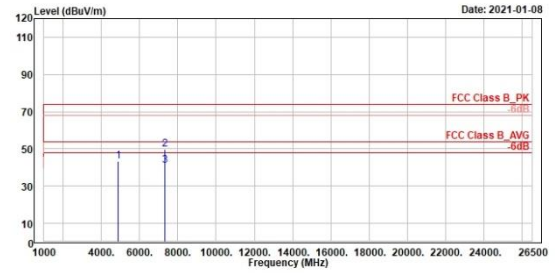
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Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4880.0000	42.51	51.98	-9.47	74.00	-31.49	300	159 Peak	horizontal	
2	7320.0000	55.23	62.09	-6.86	74.00	-18.77	100	20 Peak	horizontal	
3	7320.0000	46.61	53.47	-6.86	54.00	-7.39	100	20 Average	horizontal	



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Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	4880.0000	43.16	52.63	-9.47	74.00	-30.84	100	273 Peak	vertical	
2	7320.0000	49.87	56.73	-6.86	74.00	-24.13	100	4 Peak	vertical	
3	7320.0000	40.95	47.81	-6.86	54.00	-13.05	100	4 Average	vertical	

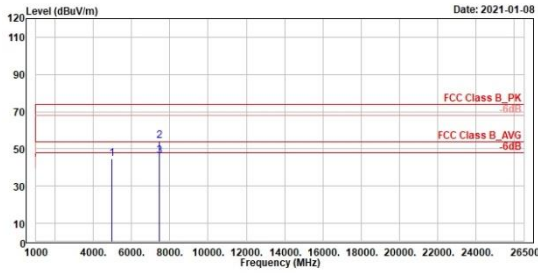
BLE_1M

High Channel (Horizontal)

High Channel (Vertical)



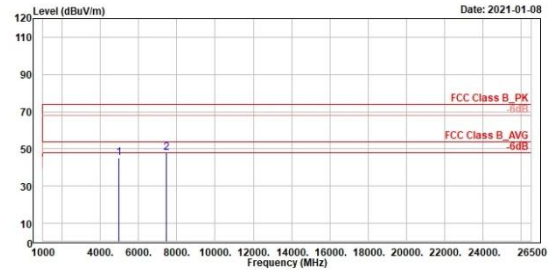
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Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1 4960.0000	44.51	53.86	-9.35	74.00	-29.49	300	308	Peak	horizontal	
2 7440.0000	54.29	61.15	-6.86	74.00	-19.71	100	17	Peak	horizontal	
3 7440.0000	46.17	53.03	-6.86	54.00	-7.83	100	17	Average	horizontal	



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Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1 4960.0000	45.26	54.61	-9.35	74.00	-28.74	100	294	Peak	vertical	
2 7440.0000	47.72	54.58	-6.86	74.00	-26.28	100	48	Peak	vertical	

Mains Conducted Emission, 150kHz ~ 30MHz

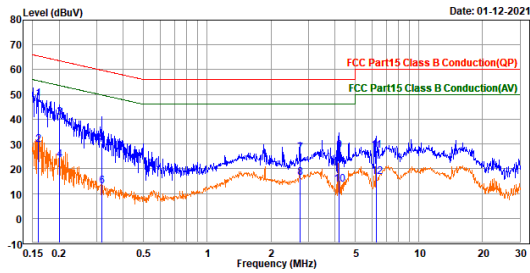
Worst Band

(Line)

(Neutral)



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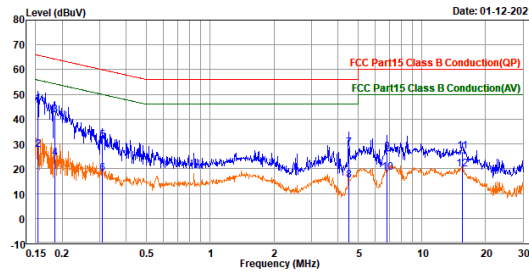


Trace: 1

	Read Freq	Level	Factor	Level	Limit	Over	Remark	Pol/Phase	Note
	MHz	dBuV	dB	dBuV	dBuV	dB			
1	0.159	38.63	9.66	48.29	65.50	-17.21	QP	line1	
2	0.159	20.18	9.66	29.84	55.50	-25.66	Average	line1	
3	0.201	31.16	9.65	40.81	63.56	-22.75	QP	line1	
4	0.201	13.96	9.65	23.61	53.56	-29.95	Average	line1	
5	0.317	20.77	9.64	30.41	59.79	-29.38	QP	line1	
6	0.317	3.22	9.64	12.86	49.79	-36.93	Average	line1	
7	2.742	16.71	9.68	26.39	56.00	-29.61	QP	line1	
8	2.742	6.80	9.68	16.48	46.00	-29.52	Average	line1	
9	4.189	17.52	9.70	27.22	56.00	-28.78	QP	line1	
10	4.189	4.02	9.70	13.72	46.00	-32.28	Average	line1	
11	6.272	17.40	9.73	27.13	60.00	-32.87	QP	line1	
12	6.272	7.12	9.73	16.85	50.00	-33.15	Average	line1	



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Trace: 1

	Read Freq	Level	Factor	Level	Limit	Over	Remark	Pol/Phase	Note
	MHz	dBuV	dB	dBuV	dBuV	dB			
1	0.153	36.51	9.68	46.19	65.83	-19.64	QP	neutral	
2	0.153	18.04	9.68	27.72	55.83	-28.11	Average	neutral	
3	0.184	32.17	9.67	41.84	64.30	-22.46	QP	neutral	
4	0.184	14.52	9.67	24.19	54.30	-30.11	Average	neutral	
5	0.309	21.63	9.66	31.29	60.00	-28.71	QP	neutral	
6	0.309	8.27	9.66	17.93	50.00	-32.07	Average	neutral	
7	4.514	18.68	9.73	28.41	56.00	-27.59	QP	neutral	
8	4.514	5.67	9.73	15.40	46.00	-30.60	Average	neutral	
9	6.827	17.01	9.76	26.77	60.00	-33.23	QP	neutral	
10	6.827	8.59	9.76	18.35	50.00	-31.65	Average	neutral	
11	15.460	17.23	9.82	27.05	60.00	-32.95	QP	neutral	
12	15.460	10.02	9.82	19.84	50.00	-30.16	Average	neutral	