Prüfbericht - Produkte
Test Report - Products

TÜVRheinland®

Prüfbericht-Nr.: *Test report no.:*	**CN208T1A 001**	**Auftrags-Nr.:** *Order no.:*	168292799	Seite 1 von 21 *Page 1 of 21*
Kunden-Referenz-Nr.: *Client reference no.:*	N/A	**Auftragsdatum:** *Order date:*	2020-11-30	
Auftraggeber: *Client:*	**Stephan Electronics SARL** 9 rue du Maupas, 1004 Lausanne, Switzerland			
Prüfgegenstand: *Test item:*	Mooltipass Mini BLE			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	Mooltipass Mini BLE (Trademark: Mooltipass)			
Auftrags-Inhalt: *Order content:*	RED approval			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 15: Subpart B Section 15.107 CFR47 FCC Part 15: Subpart B Section 15.109			
Wareneingangsdatum: *Date of sample receipt:*	2020-12-02	Please refer to photo documents		
Prüfmuster-Nr.: *Test sample no.:*	A002956157 001 to 003			
Prüfzeitraum: *Testing period:*	2020-12-03 - 2020-12-31			
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: *Test result*:*	Pass			
geprüft von: *tested by:*	Ryan G. H. Yang	**genehmigt von:** *authorized by:*	Winnie Hou	
Datum: *Date:* 2021-01-20		**Ausstellungsdatum:** *Issue date:* 2021-01-20		
Stellung / Position	Assistant Project Manager	**Stellung** / Position	Technical Certifier	

Sonstiges / *Other:*

FCC ID: 2AYPT-MBLE1

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:* — Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged:*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhalt
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	1 = very good	2 = good	3 = satisfactory	4 = sufficient	5 = poor
	P(ass) = passed a.m. test specifications(s)		F(ail) = failed a.m. test specifications(s)	N/A = not applicable	N/T = not tested

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.

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.

V05

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER
RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY
RESULT: Pass

5.1.4 6DB BANDWIDTH
RESULT: Pass

5.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH
RESULT: Pass

5.1.6 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.7 CONDUCTED EMISSION ON AC MAINS
RESULT: Pass

5.1.8 RADIATED EMISSION
RESULT: Pass

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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: Photographs of the Test Set-up

Appendix B: Test Results of Bluetooth Low Energy

Appendix C: Test Results of FCC Part 15B

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.
362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Accreditation Designation No.: CN1260
ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Radio Spectrum Testing (TS8997)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
Signal Analyzer	R&S	FSV 40	101441	2021-08-10
OSP	R&S	OSP 150	101017	2021-12-10
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
Power Meter	R&S	NRP2	107105	2021-12-10
Wideband Power Sensor	R&S	NRP-Z81	105350	2021-12-17
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2021-07-23
Unwanted Emission Testing (TS9975)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	R&S	ESR 7	102021	2021-08-11
Signal Analyzer	R&S	FSV 40	101439	2021-08-10
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2021-08-10
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2021-08-10
Amplifier	R&S	SCU-18F	180070	2021-08-10
Amplifier	R&S	SCU40A	100475	2021-09-10
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	2021-09-02
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-07-06

Conducted Emission on AC Mains				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
EMI Test Receiver	R&S	ESR3	102680	2021-05-19
Artificial Mains Network	R&S	ENV216	101445	2021-05-19
EMC32 test software	R&S	EMC32(Ver.10.50.01)	N/A	N/A
Radiated Emission (3m chamber)				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
3m SAC	ETS	SAC3	CT001632-Q1362	2021-08-23
EMI Test Receiver	R&S	ESR7	102111	2021-01-02
Horn Antenna	R&S	HF907	102706	2022-08-07
Preamplifier	FIT	SCU-18F	180077	2021-08-16
EMC32 test software	R&S	EMC32(Ver.10.50.01)	N/A	N/A

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Radio Frequency	±1 x 10-7
RF Power (conducted)	±2.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	±6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	±6 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	±3.70 dB / ±3.30 dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	±4.52 dB
Radiated Emission (3m SAC), above 1000MHz	±4.37 dB
Temperature	±1 °C
Humidity	±5 %
Voltage (DC)	±1 %
Voltage (AC, <10kHz)	±2 %

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd.. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The product is a Mooltipass Mini BLE which supports Bluetooth 4.1 low energy technology.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Mooltipass Mini BLE
Type Designation	Mooltipass Mini BLE
Trademark	Mooltipass
FCC ID	2AYPT-MBLE1
Operating Voltage	DC 5V via USB port DC 1.2V@300mAh NI-MH battery
Testing Voltage	Fully charged battery DC 5V by USB port
Technical Specification of BLE	
Frequency Range	2402 MHz to 2480 MHz
Type of Modulation	GFSK
Channel Number	40 channels
Data Rate	1 Mbps
Channel Separation	2 MHz
Antenna Type	PCB Layout antenna
Antenna Gain	3.0 dBi

Table 3: RF Channel and Frequency of BLE

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (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**

Test frequencies are lowest channel: 2402 MHz, middle channel: 2440 MHz and highest channel: 2480 MHz

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Bluetooth transmitting mode
   1. Low channel
   2. Middle channel
   3. High channel

B. On, BT connecting mode

C. On, Normal operation mode

D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Rating Label
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.

According to clause 3.1, all tests were performed on model *Mooltipass Mini BLE* in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 4: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	T480	PF-16A6N8	N/A
Portable Laptop	Lenovo	ThinkPad T480	10Q67059	N/A
Mobile phone	HUAWEI	STK-AL00	N/A	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

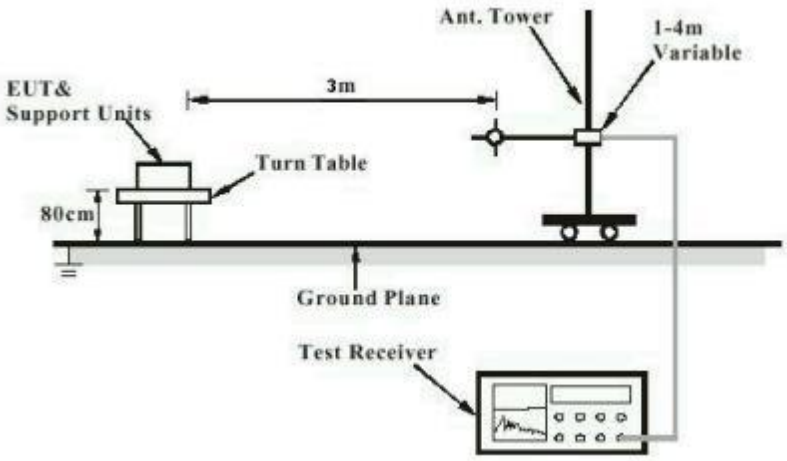


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

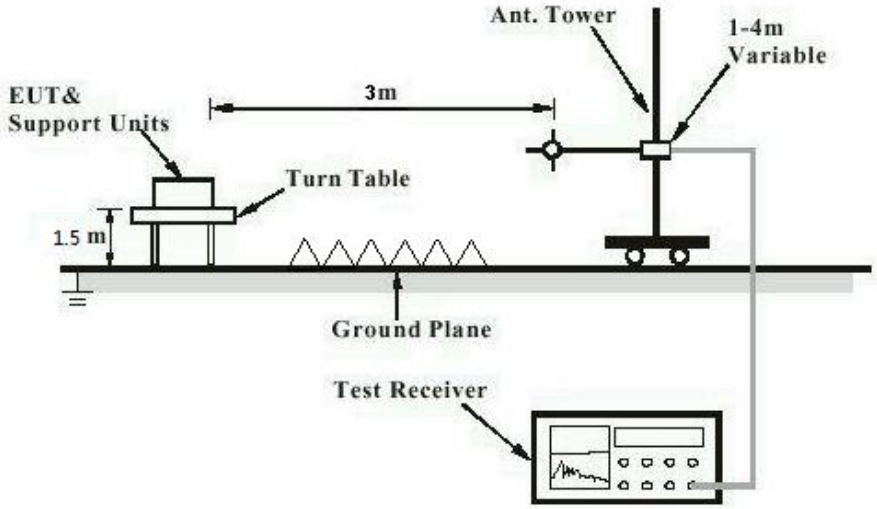


Diagram of Measurement Configuration for Mains Conduction Measurement

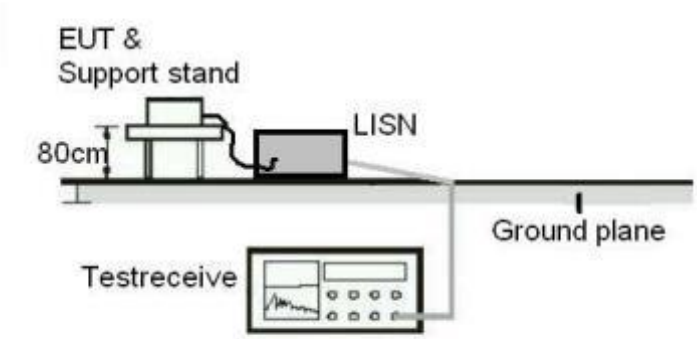
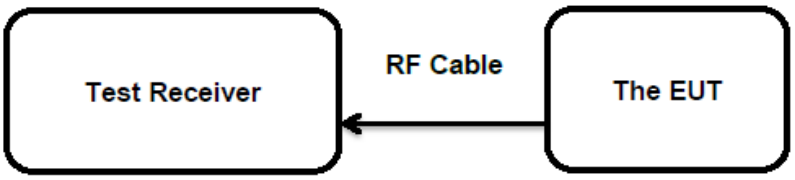


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 3.0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(3)
Basic standard	:	ANSI C63.10: 2013
Limits	:	1.0 Watts
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-12-21
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.5 ℃
Relative humidity	:	51 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 5: Test Result of Maximum Peak Conducted Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
GFSK (BLE)	2402.00	-0.94	0.0010	< 1.0
	2440.00	-0.83	0.0010	
	2480.00	-0.94	0.0010	
Maximum Measured Value		-0.83	0.0010	

Note:
1) The cable loss is taken into account in results.
2) Antenna gain(G): 3.0 dBi,

5.1.3 Conducted Power Spectral Density

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(e)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 8 dBm / 3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-12-30
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.5 ℃
Relative humidity	:	51 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 6: Test Result of Power Spectral Density

Test Mode	Test Channel (MHz)	Measured Peak Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
GFSK (BLE)	2402.00	-18.82	8 dBm / 3kHz
	2440.00	-19.06	
	2480.00	-19.14	
Maximum Measured Value		-18.82	

Note: The cable loss is taken into account in results.

For the measurement records, refer to the appendix B.

5.1.4 6dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(a)(2)
Basic standard	:	ANSI C63.10: 2013
Limits	:	> 500 KHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-12-21
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.5 ℃
Relative humidity	:	51 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 7: Test Result of 6dB Bandwidth

Test Mode	Test Channel (MHz)	-6dB Bandwidth (KHz)	Limit (kHz)
GFSK (BLE)	2402.00	772.28	> 500
	2440.00	772.28	
	2480.00	772.28	
Minimum Measured Value		772.28	

For the measurement records, refer to the appendix B.

5.1.5 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d)
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	Refer to test result
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.5 ℃
Relative humidity	:	51 %
Atmospheric pressure	:	101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

5.1.6 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205
Basic standard	:	ANSI C63.10: 2013
Limits	:	FCC Part 15.209(a)
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2020-12-14 ~ 2020-12-15
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	Refer to test result
Relative humidity	:	Refer to test result
Atmospheric pressure	:	101 kPa

Remark:
Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

5.1.7 Conducted Emission on AC Mains

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207(a) & FCC Part 15.107(a)
Basic standard	:	ANSI C63.10: 2013 & ANSI C63.4: 2014
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a) & FCC Part 15.107(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-12-23
Input voltage	:	DC 5V by USB port
Operation mode	:	B+C
Earthing	:	Not connected
Ambient temperature	:	22 ℃
Relative humidity	:	64 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C.

5.1.8 Radiated Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.109(a)
Basic standard	:	ANSI C63.4: 2014
Frequency range	:	30 - 6000MHz
Classification	:	Class B
Limits	:	FCC Part 15.109(a)
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2020-12-23
Input voltage	:	DC 5V by USB port
Operation mode	:	B, C
Earthing	:	Not connected
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix C.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

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Appendix B: Test Results of Bluetooth LE

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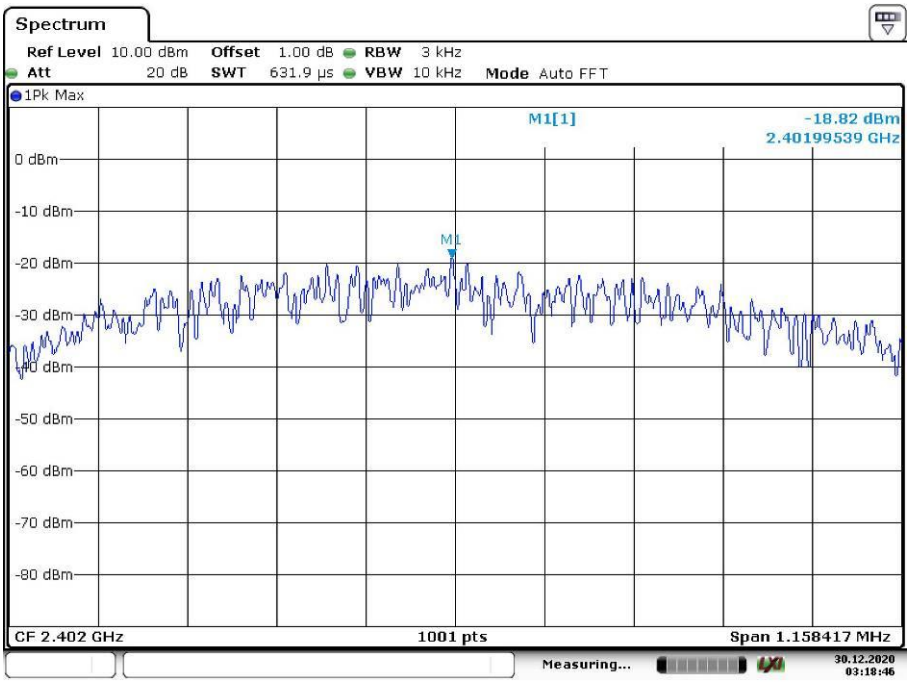
Appendix B.1: Test Results of Conducted Power Spectral Density



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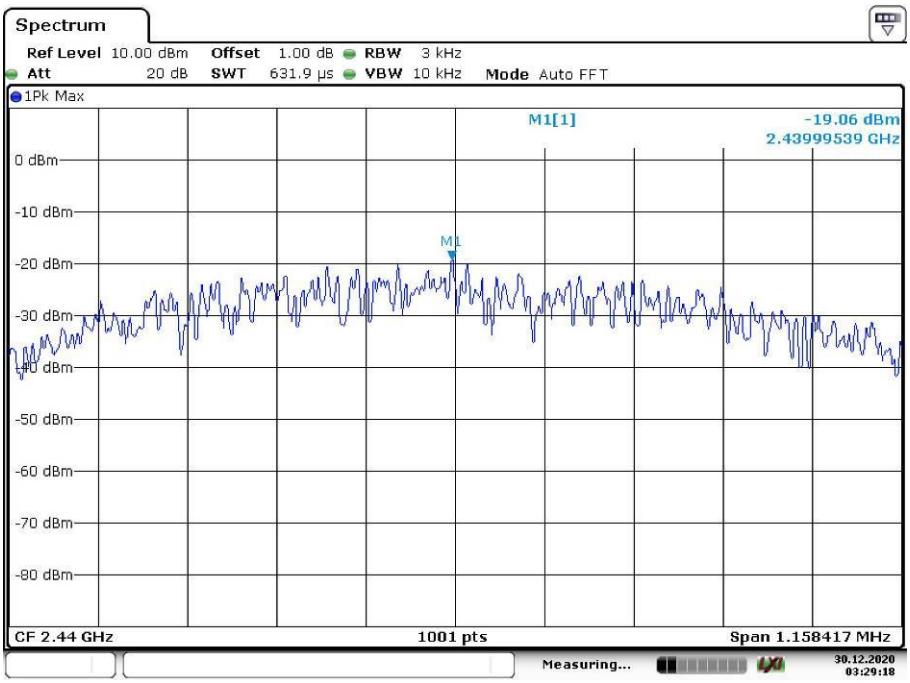

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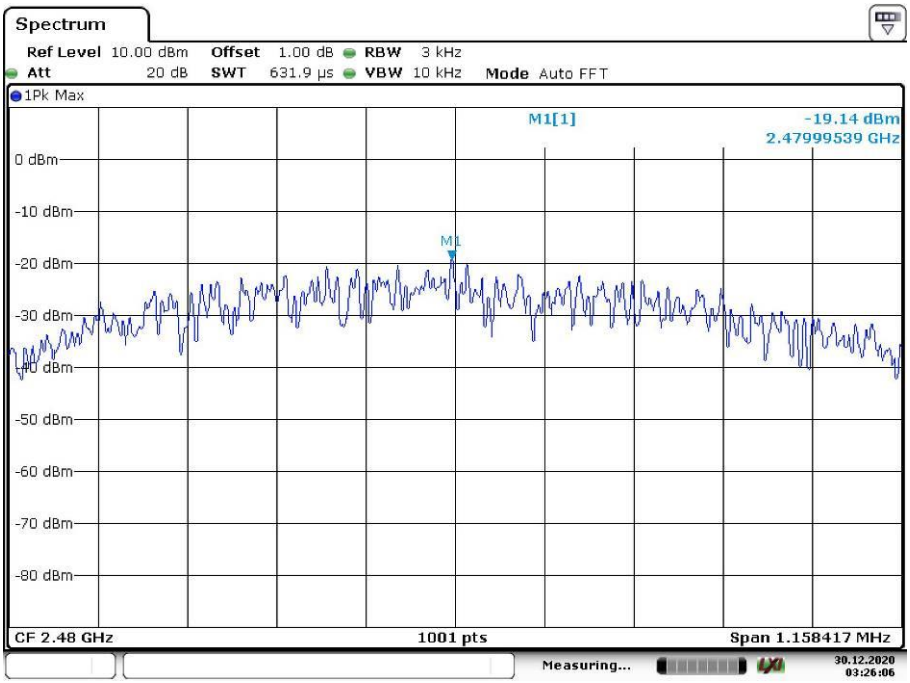


Date: 30.DEC.2020 03:26:06

Appendix B.2: Test Results of 6dB Bandwidth

FCC Part 47 §15.247 2400-2483.5 MHz 2017

Minimum Emission Bandwidth 6 dB (2402 MHz; 10.000 dBm; 1 MHz)

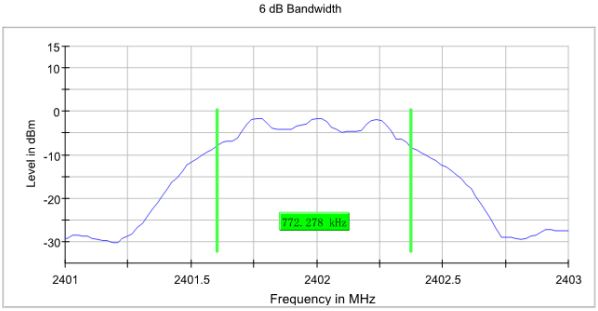
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10-2013

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.772278	0.500000	---	2401.603960	2402.376238

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2402.000000	-1.6	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 40
Sweeptime	18.938 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.25 dB	0.50 dB

FCC Part 47 §15.247 2400-2483.5 MHz 2017

Minimum Emission Bandwidth 6 dB (2440 MHz; 10.000 dBm; 1 MHz)

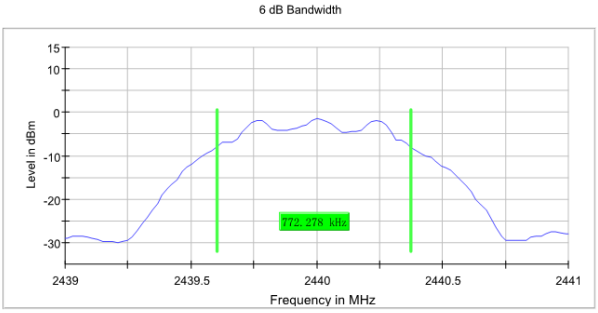
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10-2013

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2440.000000	0.772278	0.500000	---	2439.603960	2440.376238

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2440.000000	-1.5	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43900 GHz	2.43900 GHz
Stop Frequency	2.44100 GHz	2.44100 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 40
Sweeptime	18.938 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.16 dB	0.50 dB

FCC Part 47 §15.247 2400-2483.5 MHz 2017

Minimum Emission Bandwidth 6 dB (2480 MHz; 10.000 dBm; 1 MHz)

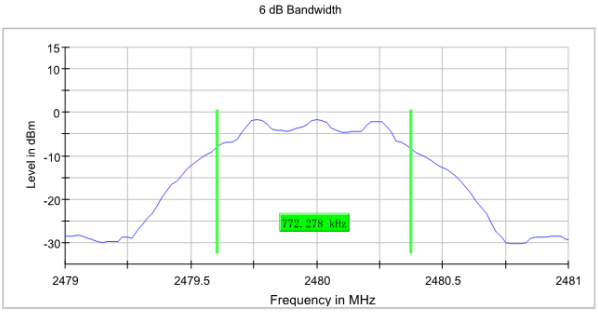
Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10-2013

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.772278	0.500000	---	2479.603960	2480.376238

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	-1.7	PASS

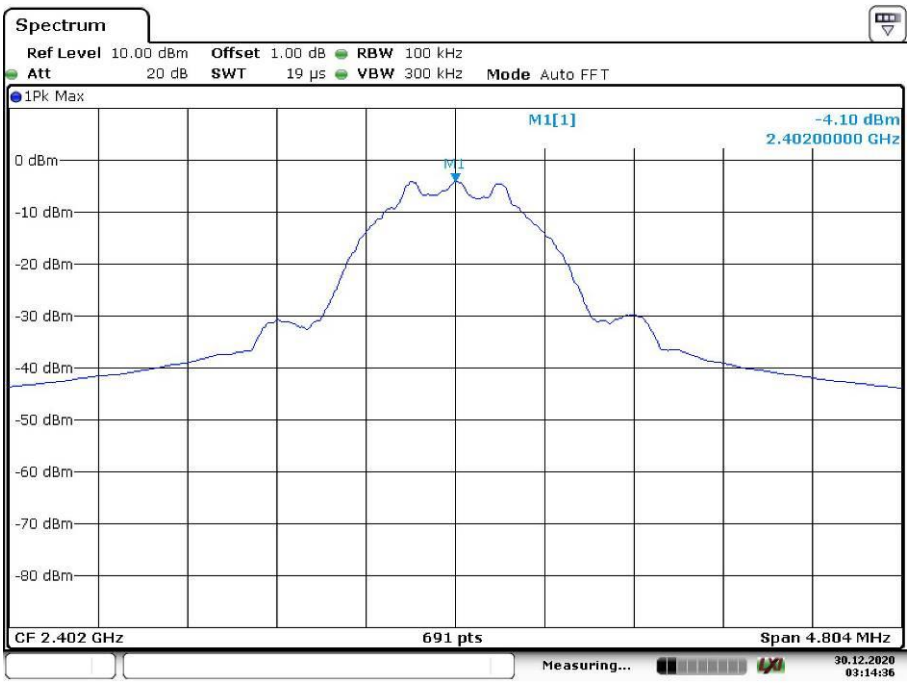


Measurement

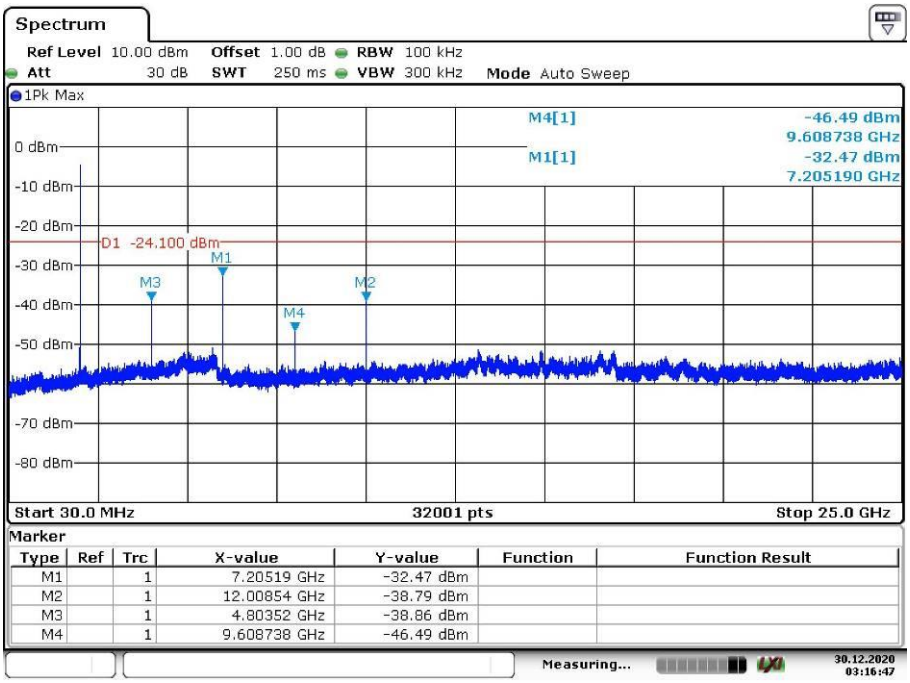
Setting	Instrument Value	Target Value
Start Frequency	2.47900 GHz	2.47900 GHz
Stop Frequency	2.48100 GHz	2.48100 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 40
Sweeptime	18.938 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.06 dB	0.50 dB

Appendix B.3: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Low Channel:



Date: 30.DEC.2020 03:14:36

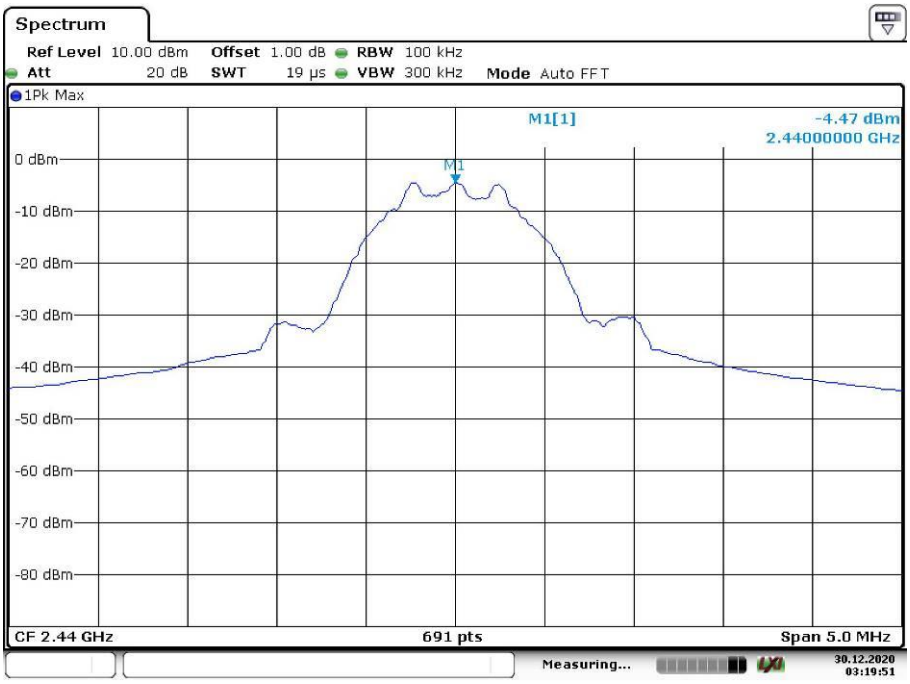


Marker

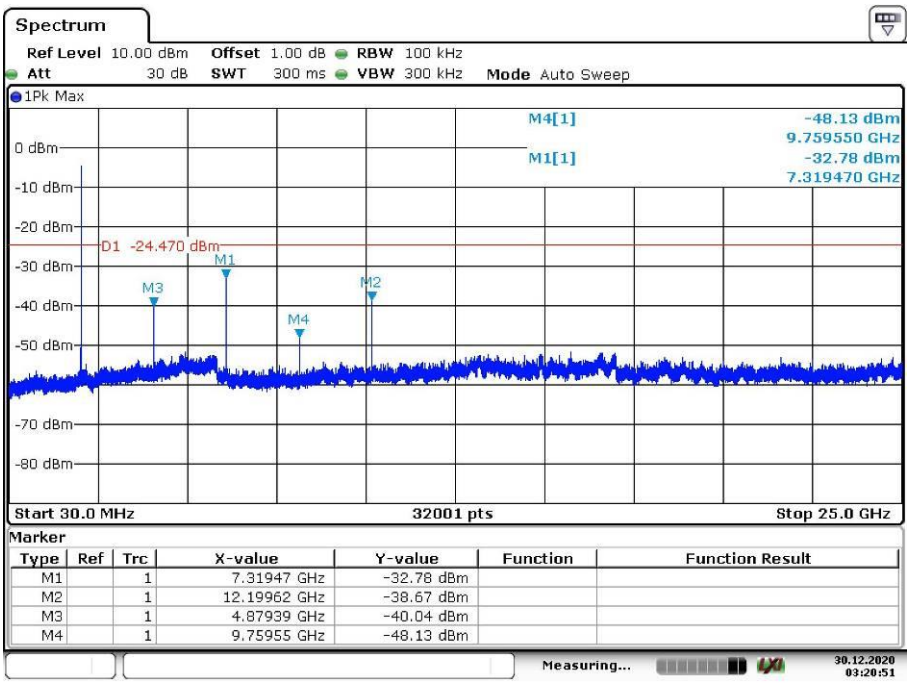
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	7.20519 GHz	-32.47 dBm		
M2		1	12.00854 GHz	-38.79 dBm		
M3		1	4.80352 GHz	-38.86 dBm		
M4		1	9.608738 GHz	-46.49 dBm		

Date: 30.DEC.2020 03:16:47

Middle Channel:



Date: 30.DEC.2020 03:19:51

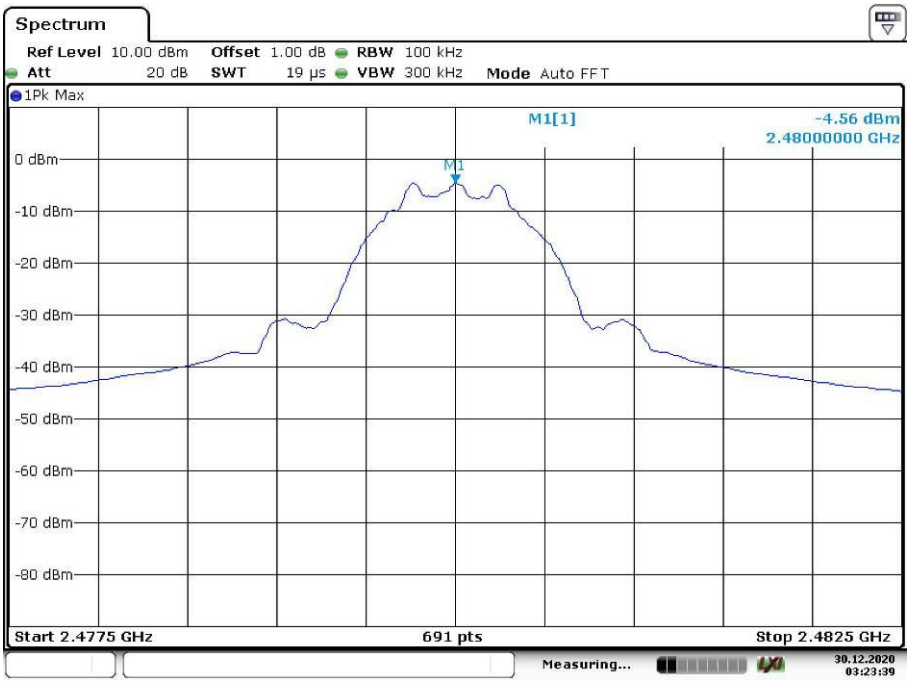


Marker

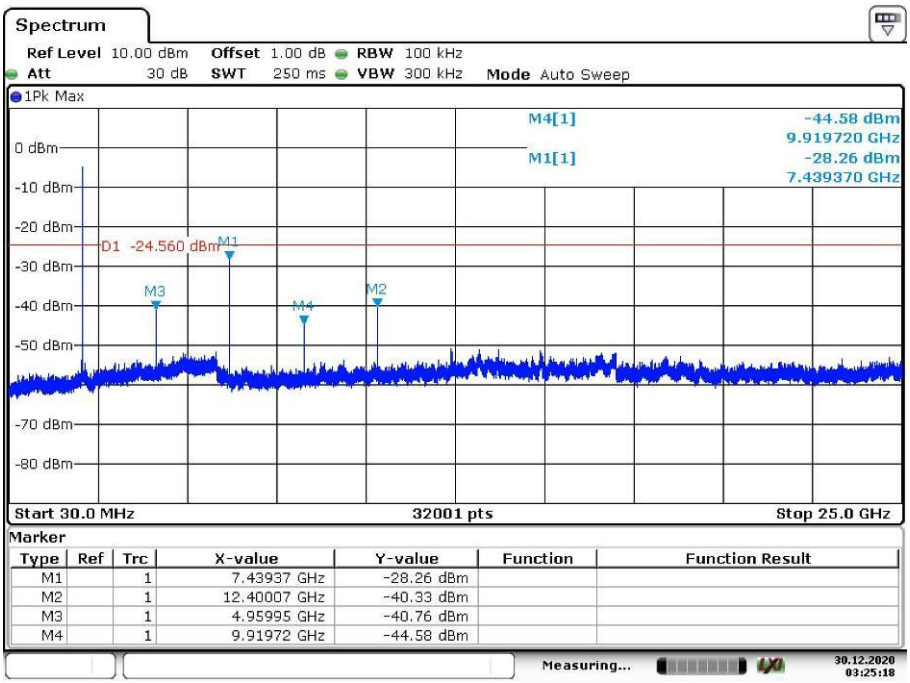
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	7.31947 GHz	-32.78 dBm		
M2		1	12.19962 GHz	-38.67 dBm		
M3		1	4.87939 GHz	-40.04 dBm		
M4		1	9.75955 GHz	-48.13 dBm		

Date: 30.DEC.2020 03:20:51

High Channel:



Date: 30.DEC.2020 03:23:39

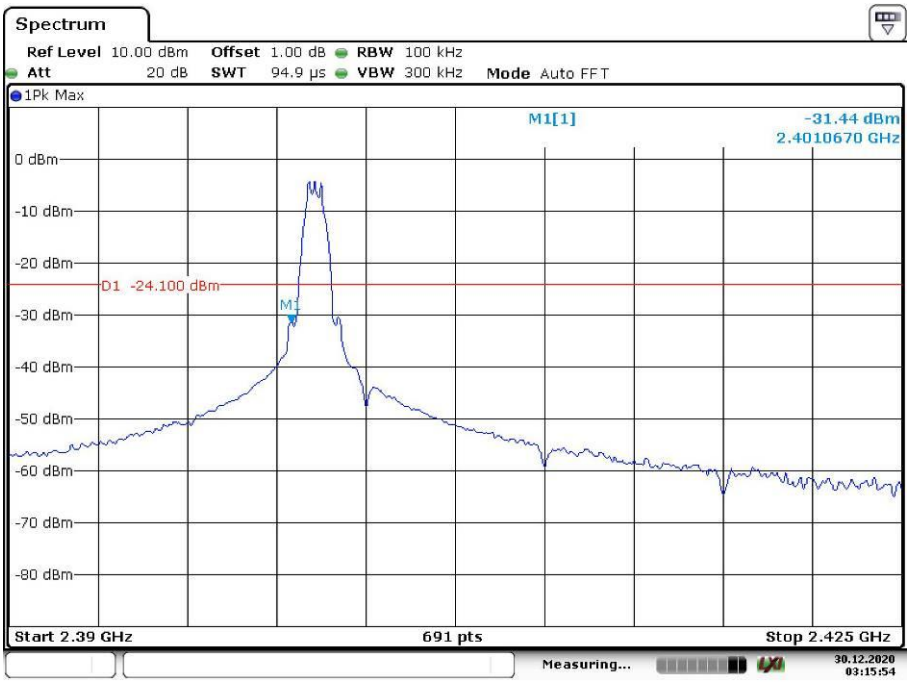


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	7.43937 GHz	-28.26 dBm		
M2		1	12.40007 GHz	-40.33 dBm		
M3		1	4.95995 GHz	-40.76 dBm		
M4		1	9.91972 GHz	-44.58 dBm		

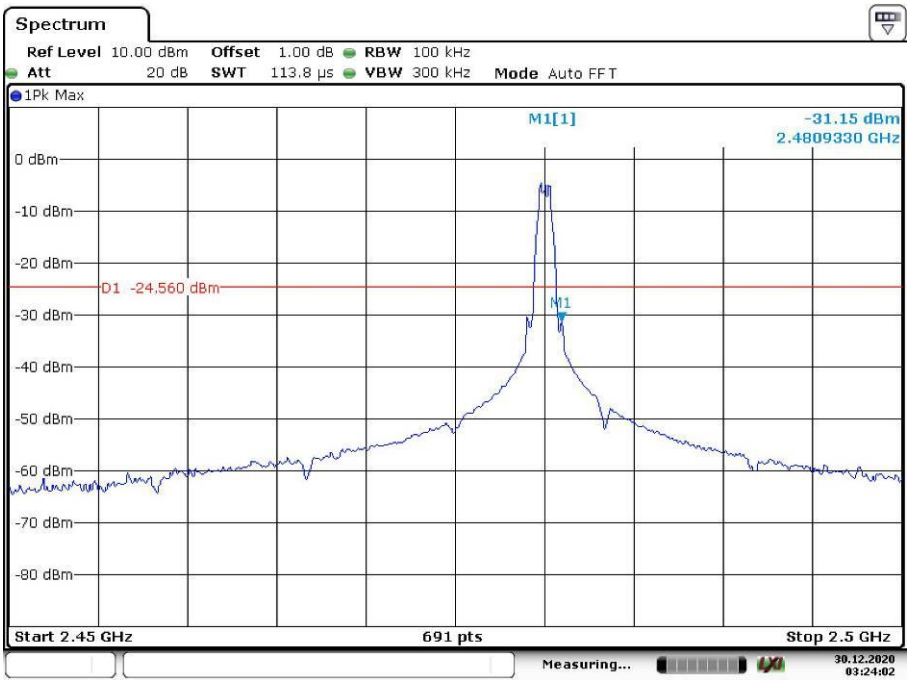
Date: 30.DEC.2020 03:25:18

Band Edge, Low Channel:



Date: 30.DEC.2020 03:15:53

Band Edge, High Channel:



Date: 30.DEC.2020 03:24:02

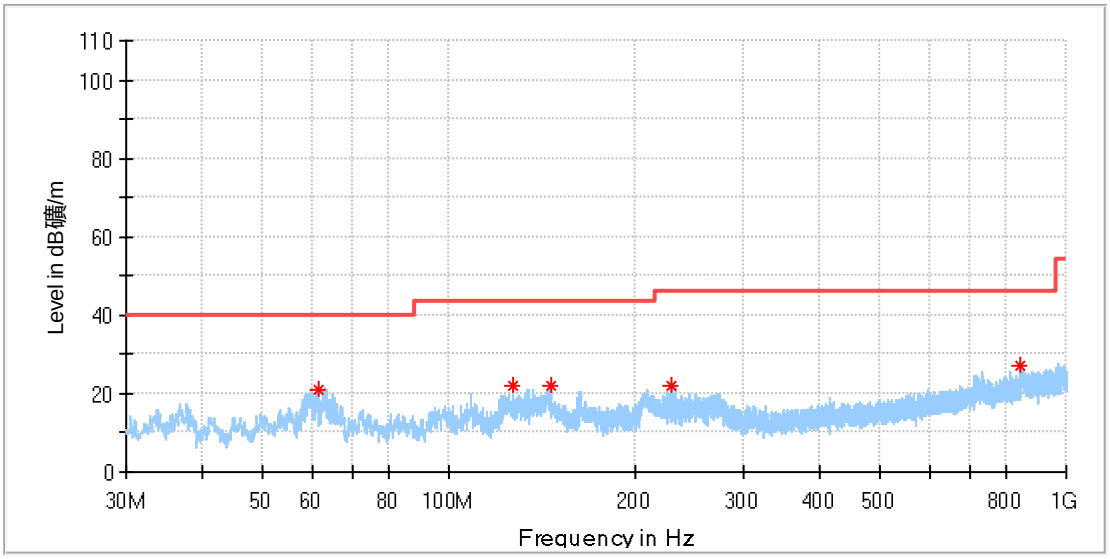
Appendix B.4: Test Results of Radiated Spurious Emissions

Note:
1) This testing was carried out on different modulations, but only the worst case was presented in this report.
2) Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

30 MHz to 1GHz

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

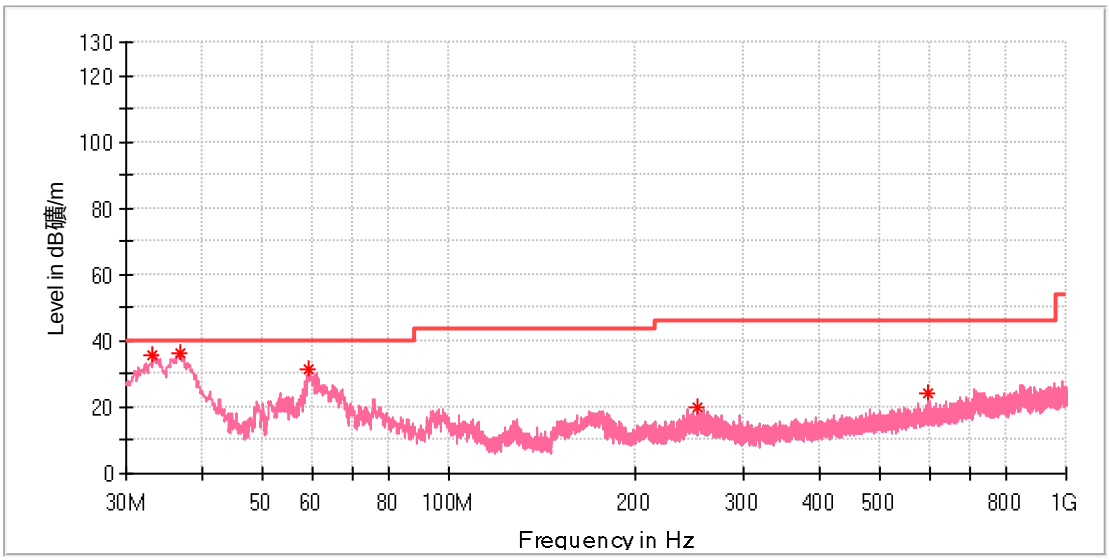


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
61.282500	20.97	40.00	19.03	100.0	H	204.0	-19.6
127.097000	21.99	43.50	21.51	100.0	H	256.0	-21.9
145.963500	21.91	43.50	21.59	100.0	H	267.0	-22.6
229.092500	21.95	46.00	24.05	100.0	H	267.0	-18.5
845.091000	27.23	46.00	18.77	100.0	H	194.0	-6.0

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

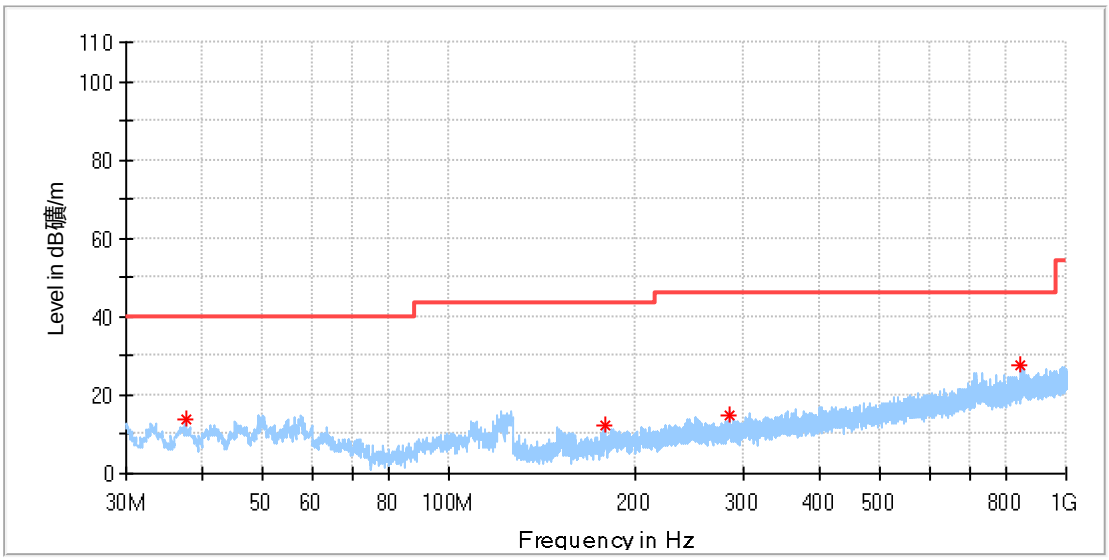


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.152500	35.66	40.00	4.34	100.0	V	0.0	-22.8
36.790000	35.99	40.00	4.01	100.0	V	33.0	-21.5
59.391000	31.21	40.00	8.79	100.0	V	141.0	-19.2
253.342500	20.18	46.00	25.82	100.0	V	300.0	-17.6
597.353000	23.95	46.00	22.05	100.0	V	189.0	-10.3

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

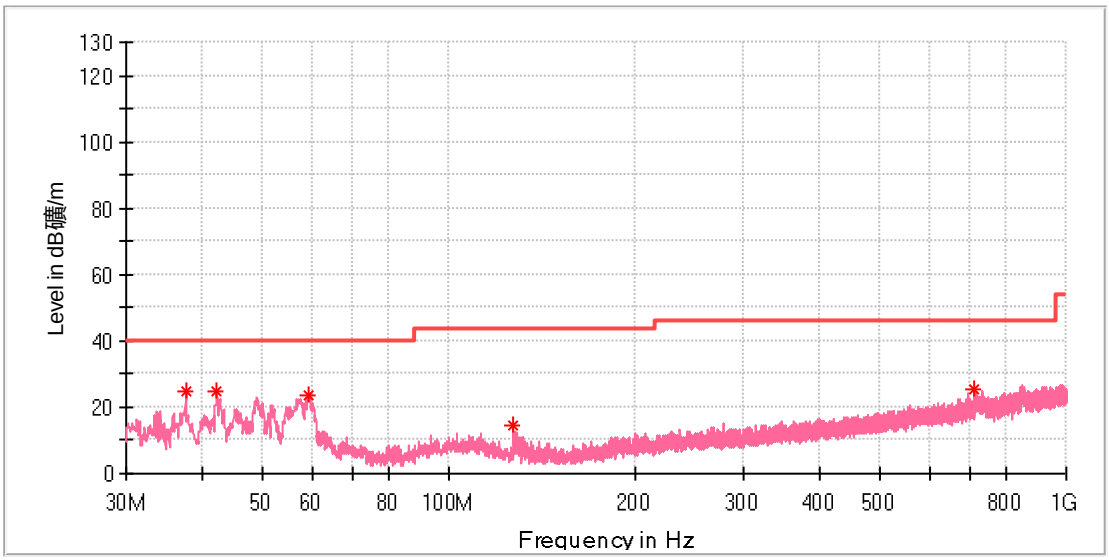


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
37.420500	13.90	40.00	26.10	100.0	H	76.0	-21.3
178.652500	12.12	43.50	31.38	100.0	H	105.0	-20.9
285.304000	14.66	46.00	31.34	100.0	H	164.0	-17.0
844.994000	27.86	46.00	18.14	100.0	H	0.0	-6.0

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



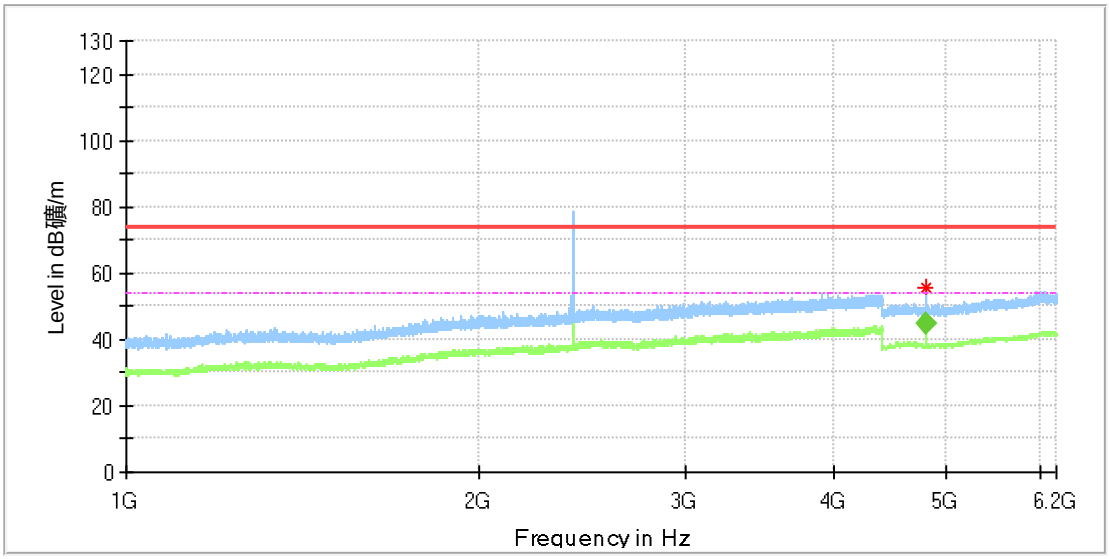
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
37.469000	24.92	40.00	15.08	100.0	V	0.0	-21.3
42.028000	24.59	40.00	15.41	100.0	V	316.0	-19.9
59.051500	23.86	40.00	16.14	100.0	V	284.0	-19.2
127.000000	14.29	43.50	29.21	100.0	V	237.0	-21.9
709.921500	25.34	46.00	20.66	100.0	V	45.0	-8.3

1GHz-18GHz
Note: The highest waveform in the figure is Bluetooth Fundamental.

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 23 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

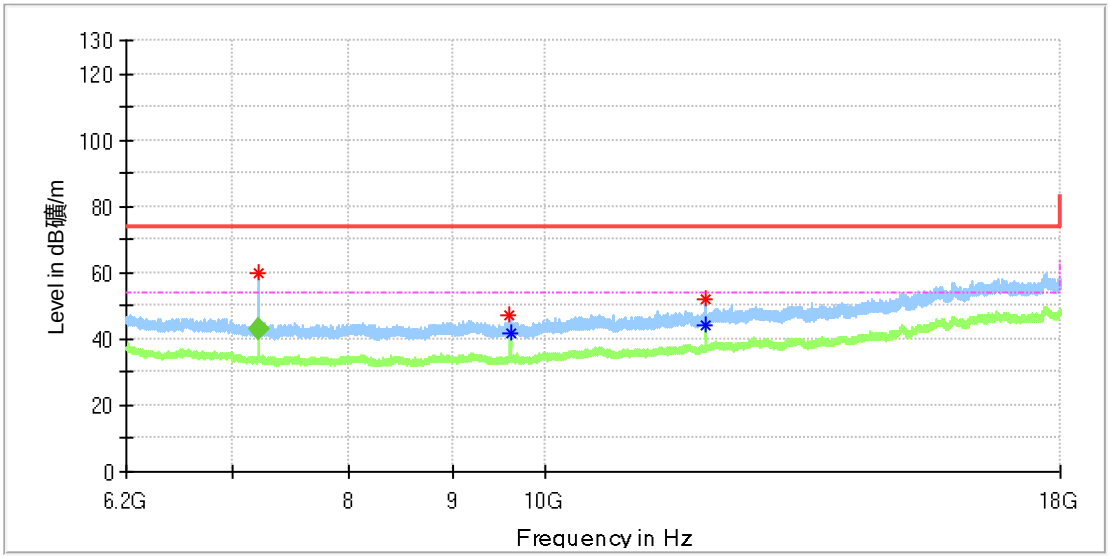
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4804.000000	55.43	---	74.00	18.57	100.0	H	253.0	11.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.755556	---	44.55	54.00	9.45	105.0	H	258.0	11.8

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

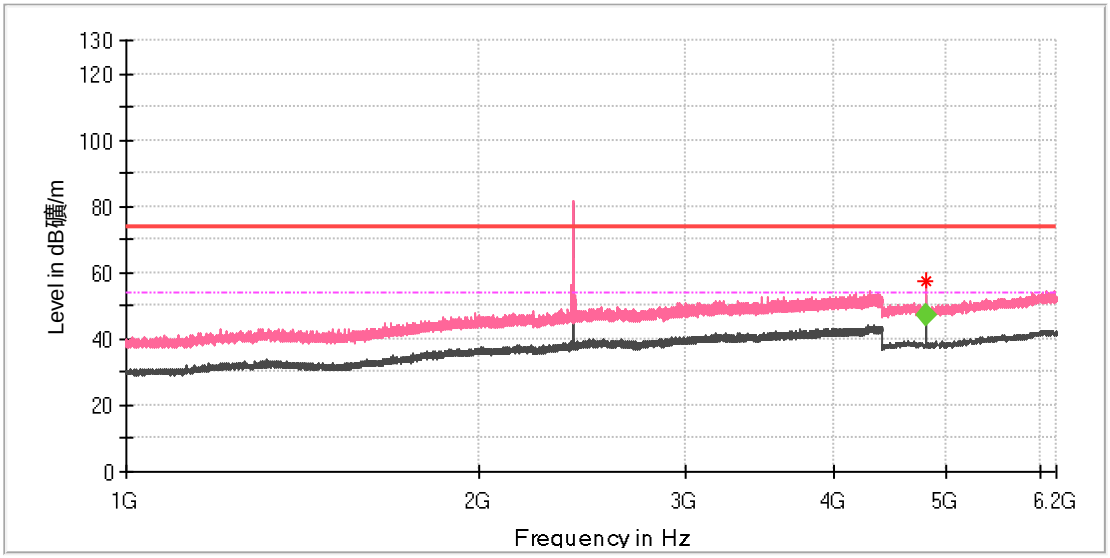
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.257917	59.64	---	74.00	14.36	100.0	H	110.0	8.8
9606.758333	47.27	---	74.00	26.73	100.0	H	95.0	10.4
9607.741667	---	41.89	54.00	12.11	100.0	H	95.0	10.4
12009.041667	---	44.42	54.00	9.58	100.0	H	196.0	14.0
12011.008333	51.92	---	74.00	22.08	100.0	H	196.0	14.0

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.325416	---	43.14	54.00	10.86	139.0	H	112.0	8.8

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 23 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

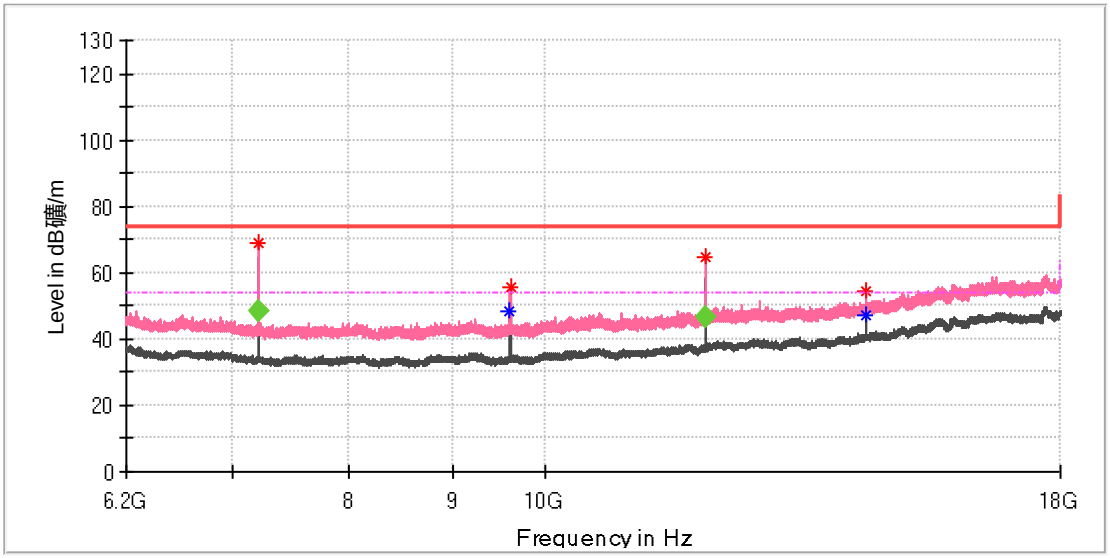
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.500000	57.33	---	74.00	16.67	100.0	V	195.0	11.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.838889	---	47.04	54.00	6.96	100.0	V	188.0	11.8

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

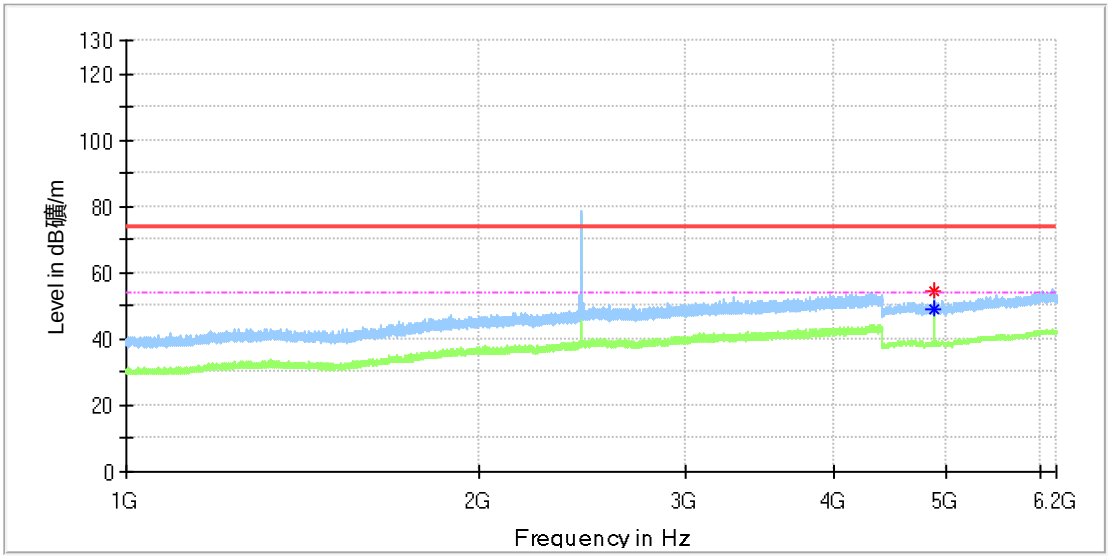
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7204.966667	68.84	---	74.00	5.16	100.0	V	0.0	8.8
9607.250000	---	48.47	54.00	5.53	100.0	V	314.0	10.4
9607.741667	55.50	---	74.00	18.50	100.0	V	194.0	10.4
12008.550000	64.74	---	74.00	9.26	100.0	V	5.0	14.0
14410.341667	54.33	---	74.00	19.67	100.0	V	300.0	16.9
14413.783333	---	47.10	54.00	6.90	100.0	V	300.0	16.9

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.289584	---	48.34	54.00	5.67	100.0	V	-5.0	8.8
12008.902500	---	46.55	54.00	7.45	100.0	V	241.0	14.0

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Mid channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

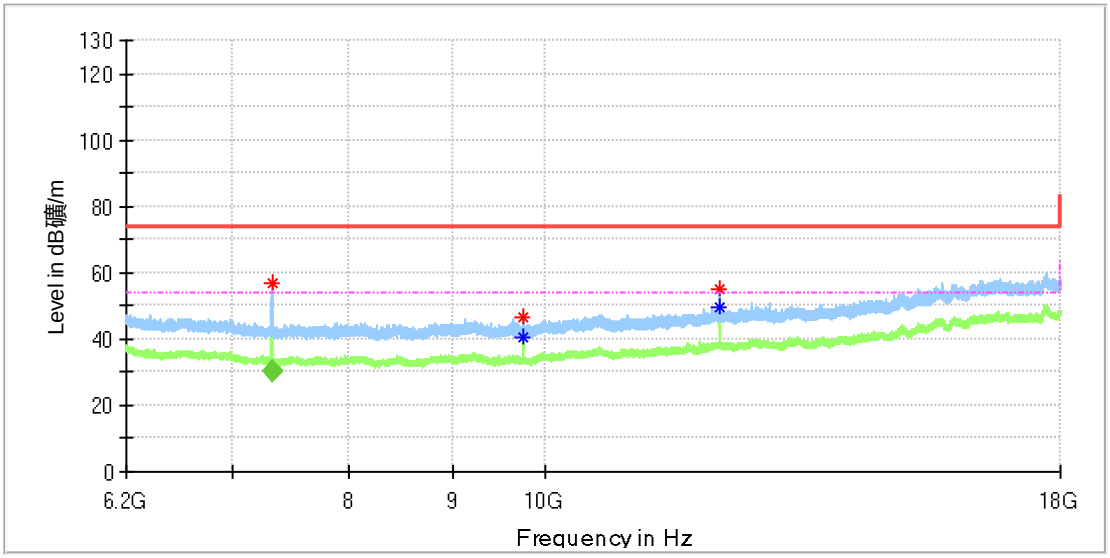
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4879.000000	54.44	---	74.00	19.56	100.0	H	250.0	11.8
4880.000000	---	48.84	54.00	5.16	100.0	H	265.0	11.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---		---	---

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

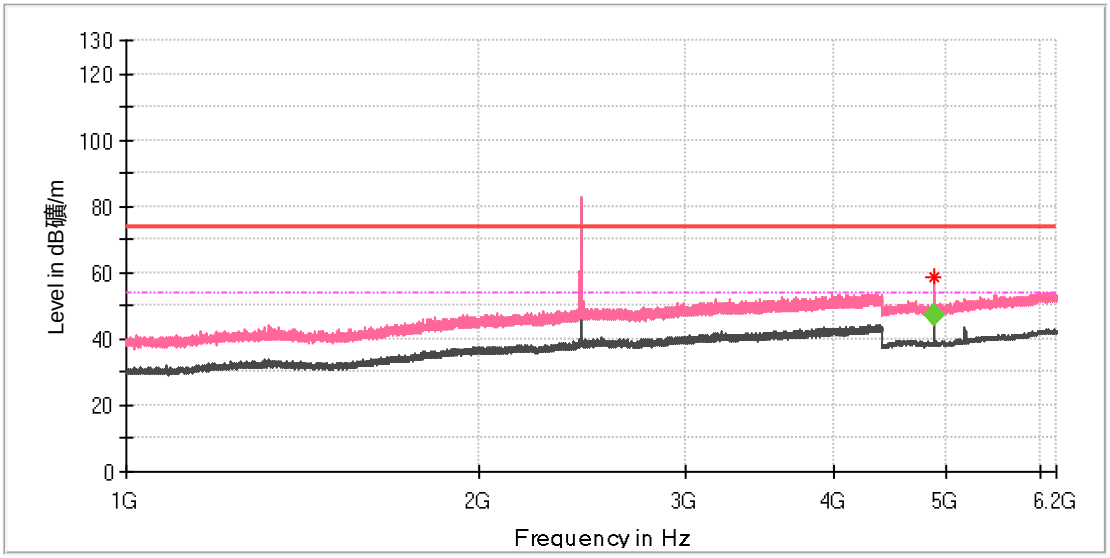
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7320.865833	56.75	---	74.00	17.25	100.0	H	296.0	8.2
9759.175000	46.74	---	74.00	27.26	100.0	H	283.0	10.4
9759.175000	---	40.49	54.00	13.51	100.0	H	283.0	10.4
12198.825000	55.16	---	74.00	18.84	100.0	H	268.0	14.7
12198.825000	---	49.65	54.00	4.35	100.0	H	268.0	14.7

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7319.445833	---	30.38	54.00	23.62	150.0	H	70.0	8.2

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Mid channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

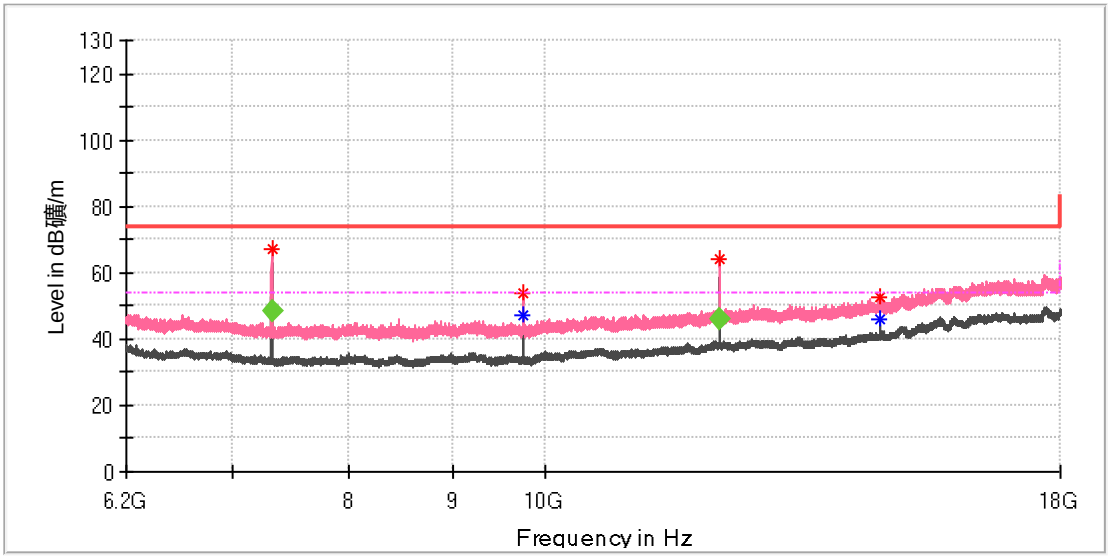
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4879.322222	58.71	---	74.00	15.29	100.0	V	326.0	11.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4879.897222	---	47.38	54.00	6.62	100.0	V	325.0	11.8

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

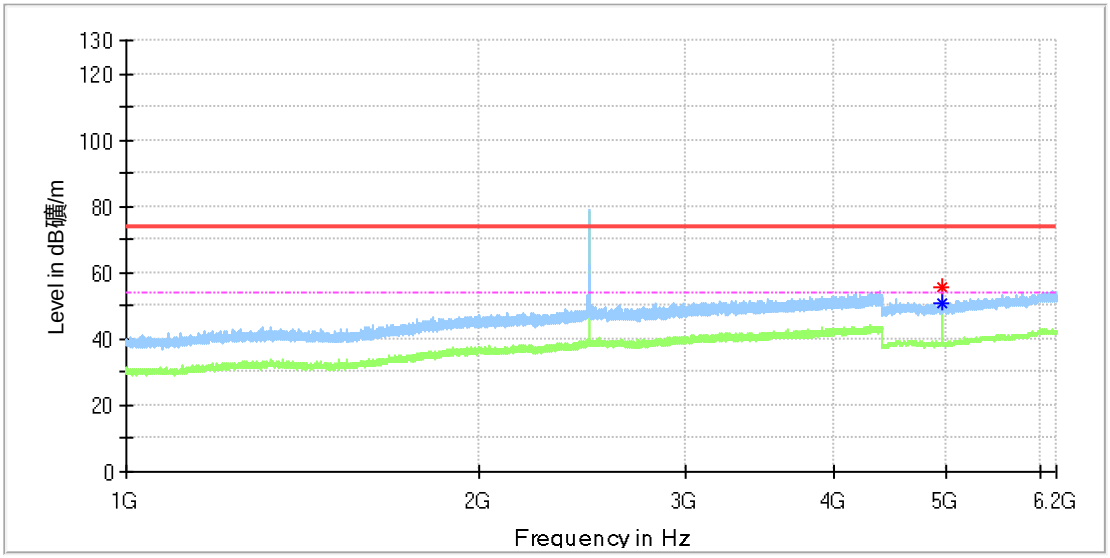
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7319.033333	66.95	---	74.00	7.05	100.0	V	139.0	8.2
9758.683333	53.72	---	74.00	20.28	100.0	V	165.0	10.4
9760.650000	---	46.89	54.00	7.11	100.0	V	165.0	10.4
12201.283333	64.33	---	74.00	9.67	100.0	V	2.0	14.7
14638.475000	52.80	---	74.00	21.20	100.0	V	139.0	17.1
14638.475000	---	46.22	54.00	7.78	100.0	V	139.0	17.1

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7319.450000	---	48.35	54.00	5.65	100.0	V	186.0	8.2
12198.725833	---	45.98	54.00	8.02	100.0	V	2.0	14.7

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

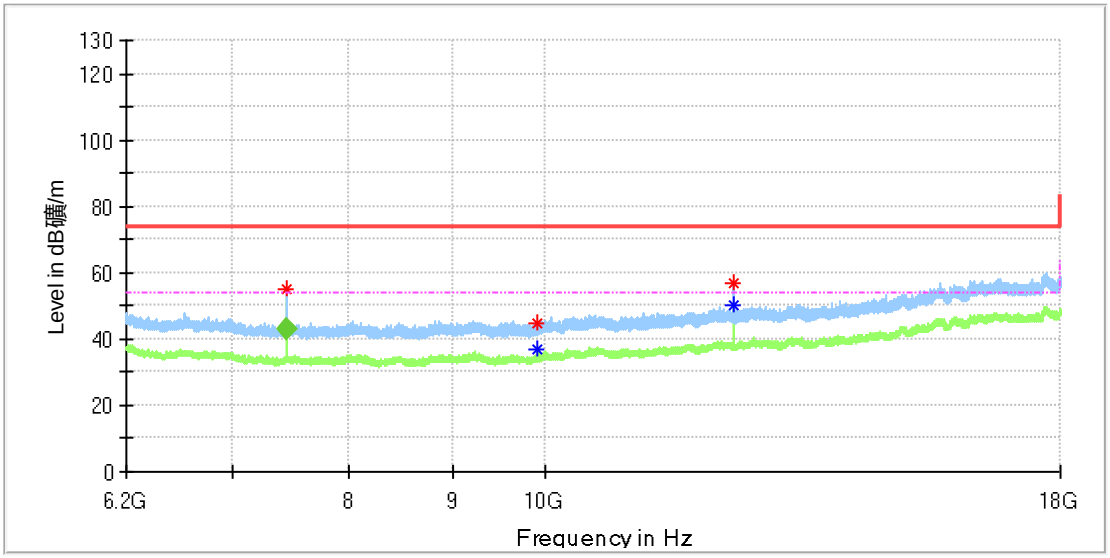
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.500000	55.84	---	74.00	18.16	100.0	H	234.0	11.8
4960.000000	---	50.58	54.00	3.42	100.0	H	262.0	11.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---		---	---

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

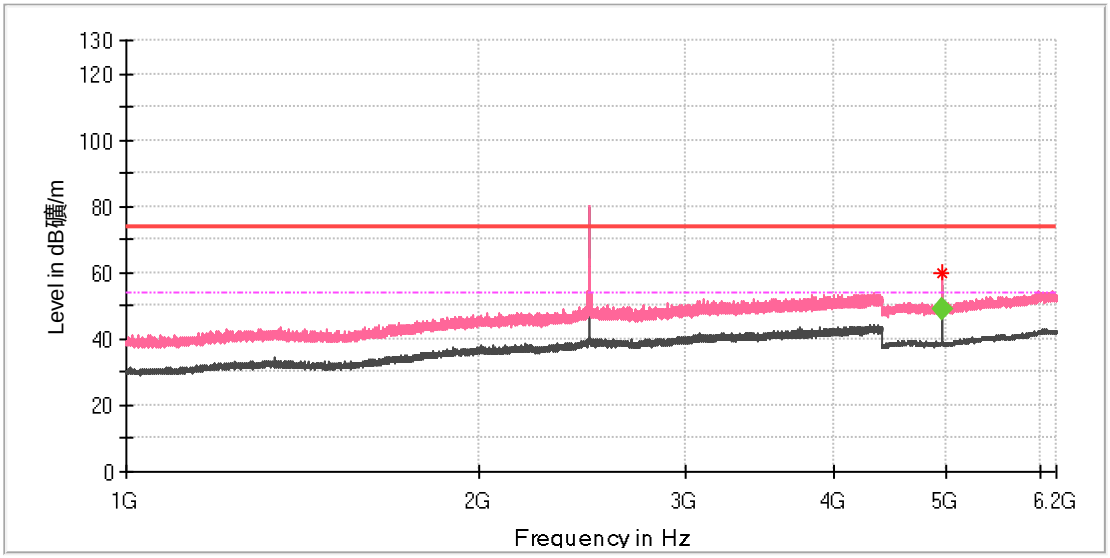
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.364167	55.29	---	74.00	18.71	100.0	H	80.0	8.4
9918.475000	---	37.02	54.00	16.98	100.0	H	246.0	10.8
9919.458333	44.68	---	74.00	29.32	100.0	H	246.0	10.8
12401.391667	57.00	---	74.00	17.00	100.0	H	94.0	14.7
12401.391667	---	50.26	54.00	3.74	100.0	H	94.0	14.7

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.258333	---	42.73	54.00	11.27	105.0	H	35.0	8.4

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

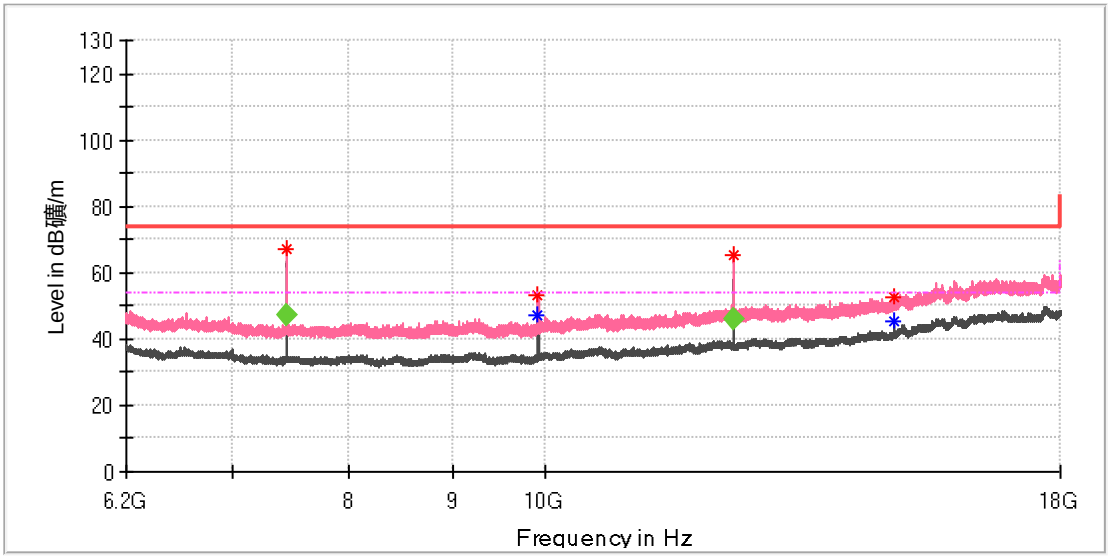
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.472222	59.89	---	74.00	14.11	100.0	V	321.0	11.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.919444	---	48.81	54.00	5.19	100.0	V	317.0	11.8

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7440.788333	67.16	---	74.00	6.84	100.0	V	325.0	8.4
9918.475000	52.98	---	74.00	21.02	100.0	V	0.0	10.8
9918.966667	---	47.24	54.00	6.76	100.0	V	0.0	10.8
12401.391667	65.05	---	74.00	8.95	100.0	V	0.0	14.7
14878.408333	---	45.35	54.00	8.65	100.0	V	126.0	17.5
14881.850000	52.43	---	74.00	21.57	100.0	V	309.0	17.5

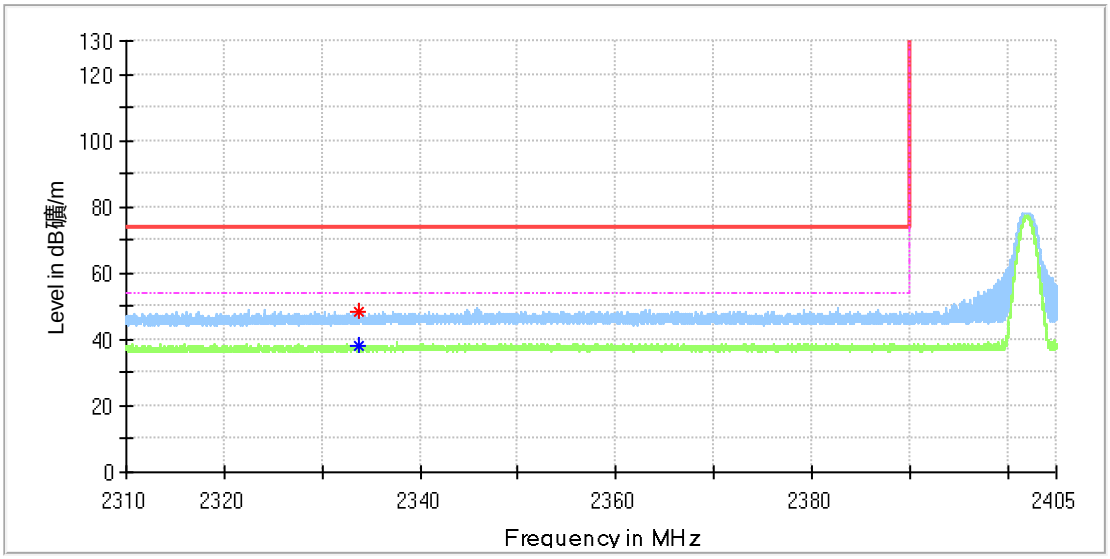
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.360417	---	47.19	54.00	6.81	100.0	V	-7.0	8.4
12398.776250	---	46.01	54.00	7.99	100.0	V	42.0	14.7

Appendix B.5: Test Results of Radiated Emissions in Restricted Bands

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 23 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

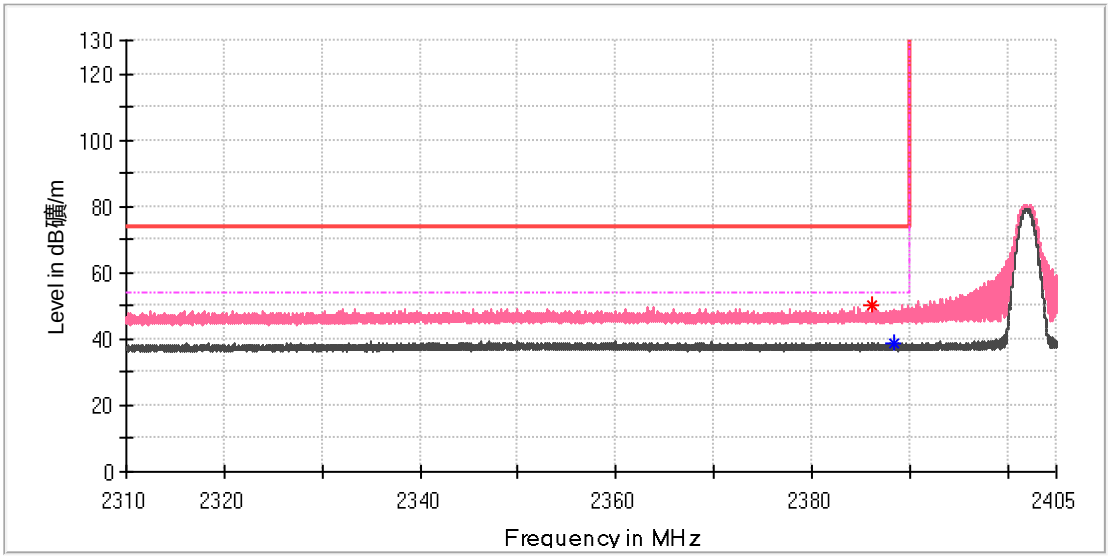
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2333.649063	---	38.06	54.00	15.94	100.0	H	99.0	6.7
2333.660938	48.23	---	74.00	25.77	100.0	H	225.0	6.7

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---		---	---

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_Low channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

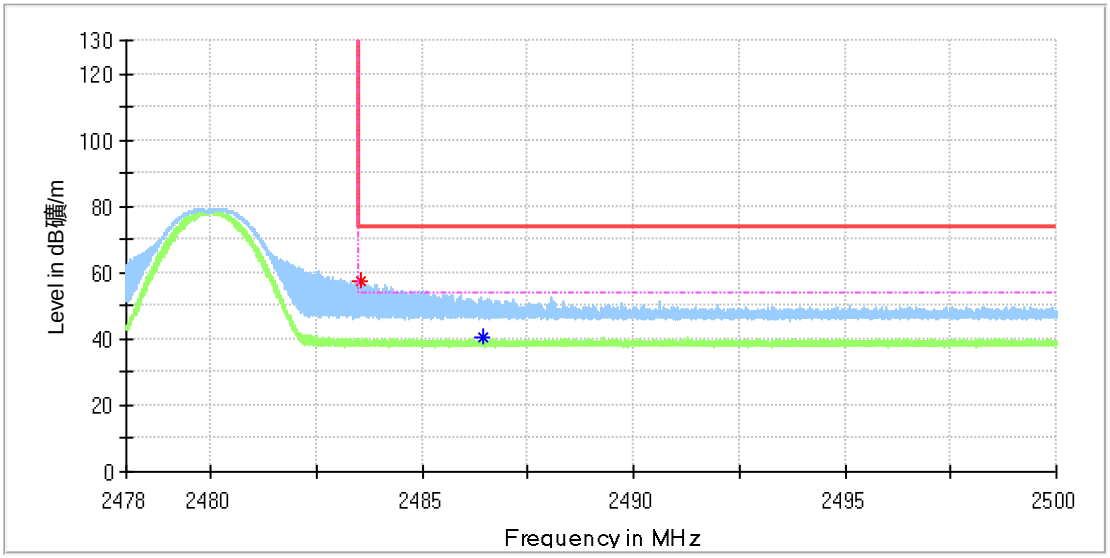
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2386.216875	49.98	---	74.00	24.02	100.0	V	331.0	7.0
2388.428438	---	38.93	54.00	15.07	100.0	V	354.0	7.0

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---		---	---

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

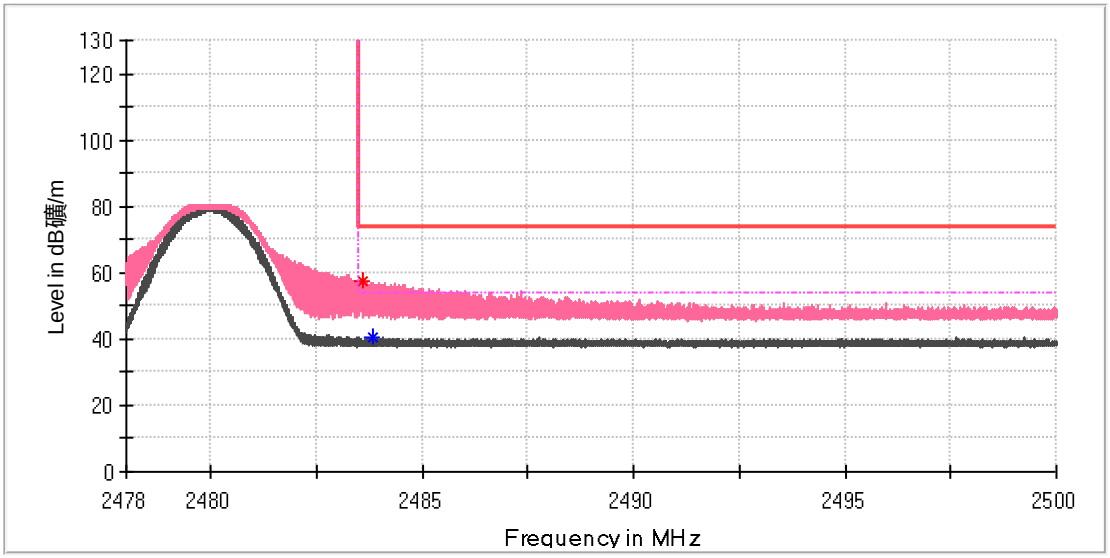
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.558125	57.54	---	74.00	16.46	100.0	H	251.0	7.4
2486.451250	---	40.34	54.00	13.66	100.0	H	67.0	7.4

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---		---	---

EUT Information

EUT Name:	Mooltipass Mini BLE
Model:	Mooltipass Mini BLE
Test Mode:	BLE_High channel
Test Voltage::	Battery
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.605875	57.36	---	74.00	16.64	100.0	V	19.0	7.4
2483.827250	---	40.78	54.00	13.22	100.0	V	146.0	7.4

Final_Result

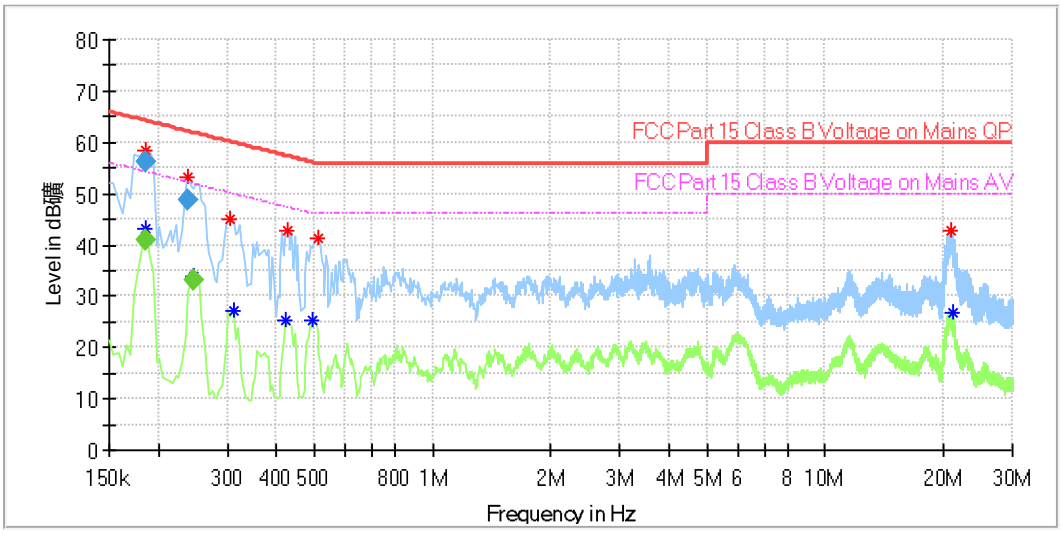
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---		---	---

Appendix B.6: Test Plots of Conducted Emission on AC Mains

BT Connecting +Normal operation mode

EUT Information

EUT Name:	Mooltipass Mini BLE
Order No:	168292799(60)
Model:	Mooltipass Mini BLE
Test Model:	ON
Test Voltage:	DC5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	SR2



Critical_Freqs

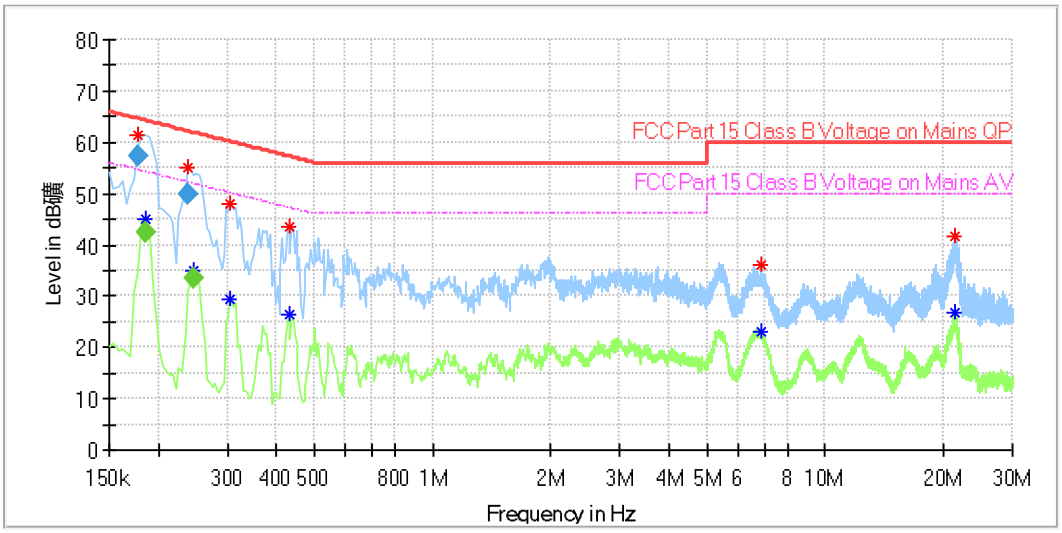
Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.185500	58.56	---	64.04	5.48	L1
0.185500	---	43.10	54.21	11.11	L1
0.237500	53.03	---	62.17	9.13	L1
0.245500	---	33.70	51.76	18.05	L1
0.306000	45.12	---	60.08	14.96	L1
0.310000	---	27.12	49.97	22.85	L1
0.422000	---	25.38	47.41	22.03	L1
0.426000	42.61	---	57.33	14.72	L1
0.494000	---	25.14	46.10	20.96	L1
0.510000	41.48	---	56.00	14.52	L1
20.894000	42.84	---	60.00	17.16	L1
21.098000	---	26.63	50.00	23.37	L1

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.185500	---	40.85	54.24	13.38	1000.0	9.000	L1
0.185500	56.26	---	64.24	7.97	1000.0	9.000	L1
0.237500	48.78	---	62.18	13.41	1000.0	9.000	L1
0.245500	---	32.99	51.91	18.92	1000.0	9.000	L1

EUT Information

EUT Name:	Mooltipass Mini BLE
Order No:	168292799(60)
Model:	Mooltipass Mini BLE
Test Model:	ON
Test Voltage:	DC5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	SR2



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.177500	61.57	---	64.39	2.83	N
0.185500	---	44.92	54.39	9.47	N
0.237500	54.95	---	62.17	7.22	N
0.245500	---	34.87	51.89	17.02	N
0.306000	---	29.57	50.08	20.50	N
0.306000	47.89	---	60.08	12.19	N
0.430000	---	26.50	47.25	20.75	N
0.430000	43.47	---	57.25	13.78	N
6.846000	36.13	---	60.00	23.87	N
6.862000	---	23.02	50.00	26.98	N
21.294000	41.73	---	60.00	18.27	N
21.394000	---	26.70	50.00	23.30	N

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.177500	57.12	---	64.60	7.48	1000.0	9.000	N
0.185500	---	42.25	54.24	11.98	1000.0	9.000	N
0.237500	49.87	---	62.18	12.31	1000.0	9.000	N
0.245500	---	33.45	51.91	18.46	1000.0	9.000	N

Appendix C: Test Results of FCC 15B

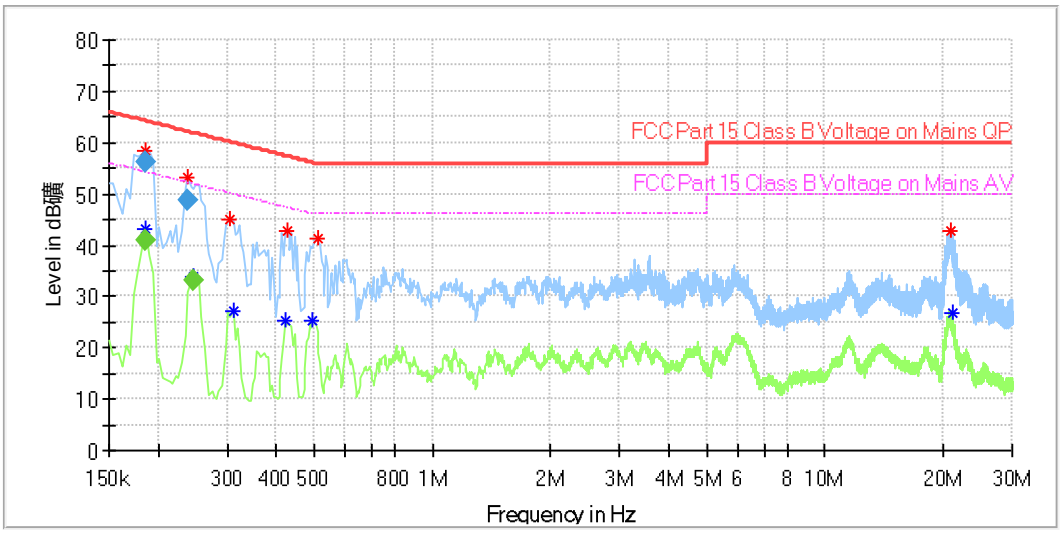
APPENDIX C: TEST RESULTS OF FCC 15B **1**
APPENDIX C.1: TEST PLOTS OF CONDUCTED EMISSION ON AC MAINS 2
BT Connecting +Normal operation mode *2*
APPENDIX C.2: TEST PLOTS OF RADIATED EMISSION, BELOW 1GHZ 4
Normal operation mode *4*
APPENDIX C.3: TEST PLOTS OF RADIATED EMISSION, ABOVE 1GHZ 6
Normal operation mode *6*

Appendix C.1: Test Plots of Conducted Emission on AC Mains

BT Connecting +Normal operation mode

EUT Information

EUT Name:	Mooltipass Mini BLE
Order No:	168292799(60)
Model:	Mooltipass Mini BLE
Test Model:	ON
Test Voltage:	DC5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	SR2



Critical_Freqs

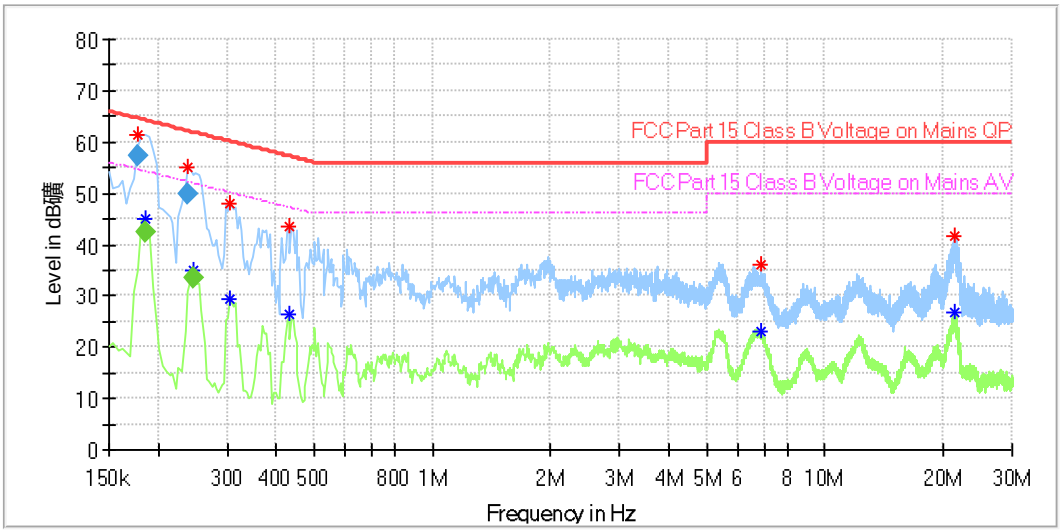
Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.185500	58.56	---	64.04	5.48	L1
0.185500	---	43.10	54.21	11.11	L1
0.237500	53.03	---	62.17	9.13	L1
0.245500	---	33.70	51.76	18.05	L1
0.306000	45.12	---	60.08	14.96	L1
0.310000	---	27.12	49.97	22.85	L1
0.422000	---	25.38	47.41	22.03	L1
0.426000	42.61	---	57.33	14.72	L1
0.494000	---	25.14	46.10	20.96	L1
0.510000	41.48	---	56.00	14.52	L1
20.894000	42.84	---	60.00	17.16	L1
21.098000	---	26.63	50.00	23.37	L1

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.185500	---	40.85	54.24	13.38	1000.0	9.000	L1
0.185500	56.26	---	64.24	7.97	1000.0	9.000	L1
0.237500	48.78	---	62.18	13.41	1000.0	9.000	L1
0.245500	---	32.99	51.91	18.92	1000.0	9.000	L1

EUT Information

EUT Name:	Mooltipass Mini BLE
Order No:	168292799(60)
Model:	Mooltipass Mini BLE
Test Model:	ON
Test Voltage:	DC5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	SR2



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.177500	61.57	---	64.39	2.83	N
0.185500	---	44.92	54.39	9.47	N
0.237500	54.95	---	62.17	7.22	N
0.245500	---	34.87	51.89	17.02	N
0.306000	---	29.57	50.08	20.50	N
0.306000	47.89	---	60.08	12.19	N
0.430000	---	26.50	47.25	20.75	N
0.430000	43.47	---	57.25	13.78	N
6.846000	36.13	---	60.00	23.87	N
6.862000	---	23.02	50.00	26.98	N
21.294000	41.73	---	60.00	18.27	N
21.394000	---	26.70	50.00	23.30	N

Final_Result

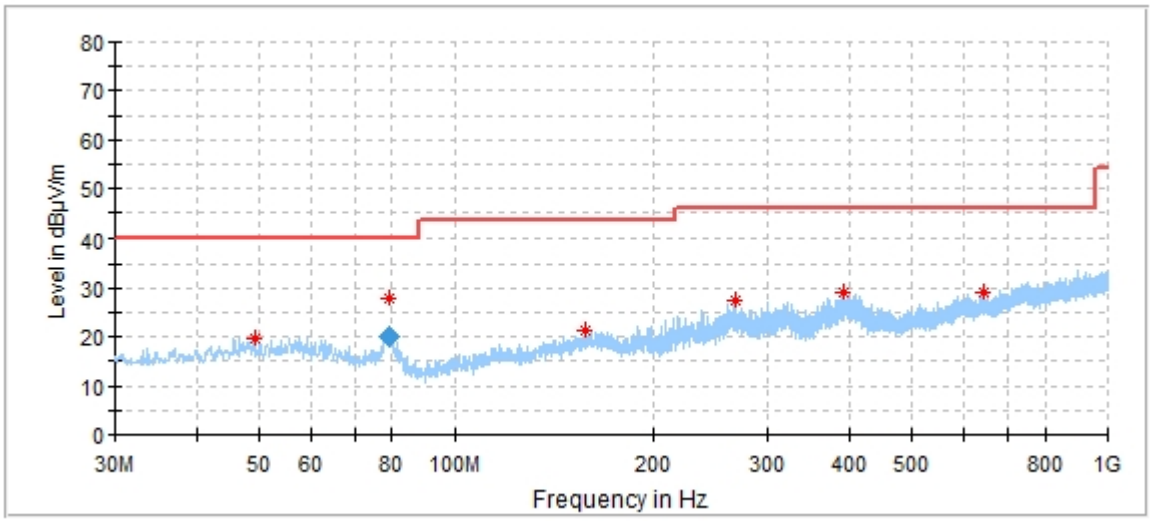
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.177500	57.12	---	64.60	7.48	1000.0	9.000	N
0.185500	---	42.25	54.24	11.98	1000.0	9.000	N
0.237500	49.87	---	62.18	12.31	1000.0	9.000	N
0.245500	---	33.45	51.91	18.46	1000.0	9.000	N

Appendix C.2: Test Plots of Radiated Emission, Below 1GHz

Normal operation mode

EUT Information

EUT Name:	Mooltipass Mini BLE
Model	Mooltipass Mini BLE
Order No:	168292799(60)
Test Mode:	ON
Test Voltage:	DC 5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

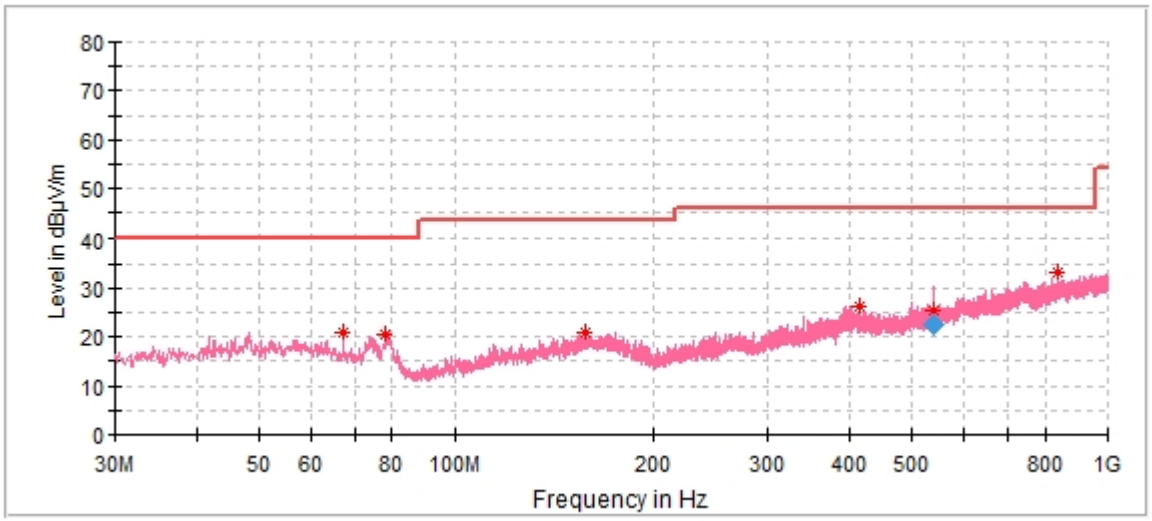
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.109000	19.79	40.00	20.21	200.0	H	203.0	21
79.045000	28.00	40.00	12.00	300.0	H	184.0	16
156.876000	21.30	43.50	22.20	200.0	H	294.0	22
266.874000	27.29	46.00	18.71	100.0	H	72.0	20
392.295000	29.26	46.00	16.74	100.0	H	273.0	23
643.331000	29.33	46.00	16.67	100.0	H	273.0	28

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
79.045000	20.07	40.00	19.93	1000.0	120.000	300.0	H	184.0	16

EUT Information

EUT Name:	Mooltipass Mini BLE
Model	Mooltipass Mini BLE
Order No:	168292799(60)
Test Mode:	ON
Test Voltage:	DC 5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
67.345000	20.83	40.00	19.17	200.0	V	350.0	19
77.918000	20.70	40.00	19.30	100.0	V	118.0	16
157.458000	20.80	43.50	22.70	100.0	V	340.0	22
414.120000	26.40	46.00	19.60	100.0	V	28.0	24
540.725000	25.48	46.00	20.52	137.0	V	166.0	25
838.107000	33.13	46.00	12.87	100.0	V	158.0	31

Final_Result

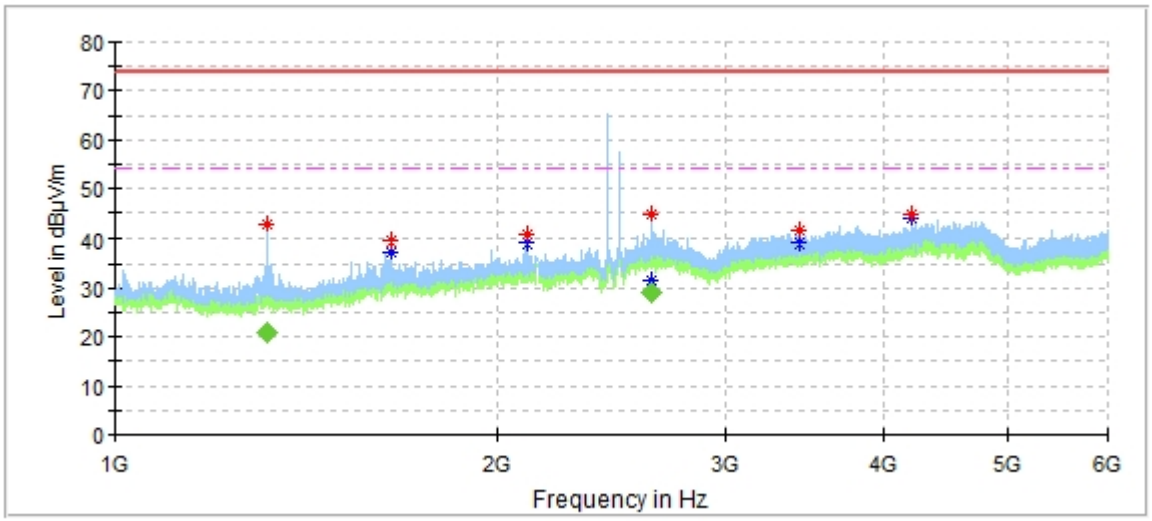
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
540.725000	22.66	46.00	23.34	1000.0	120.000	137.0	V	166.0	25

Appendix C.3: Test Plots of Radiated Emission, Above 1GHz

Normal operation mode

EUT Information

EUT Name:	Mooltipass Mini BLE
Model	Mooltipass Mini BLE
Order No:	168292799(60)
Test Mode:	ON
Test Voltage:	DC 5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

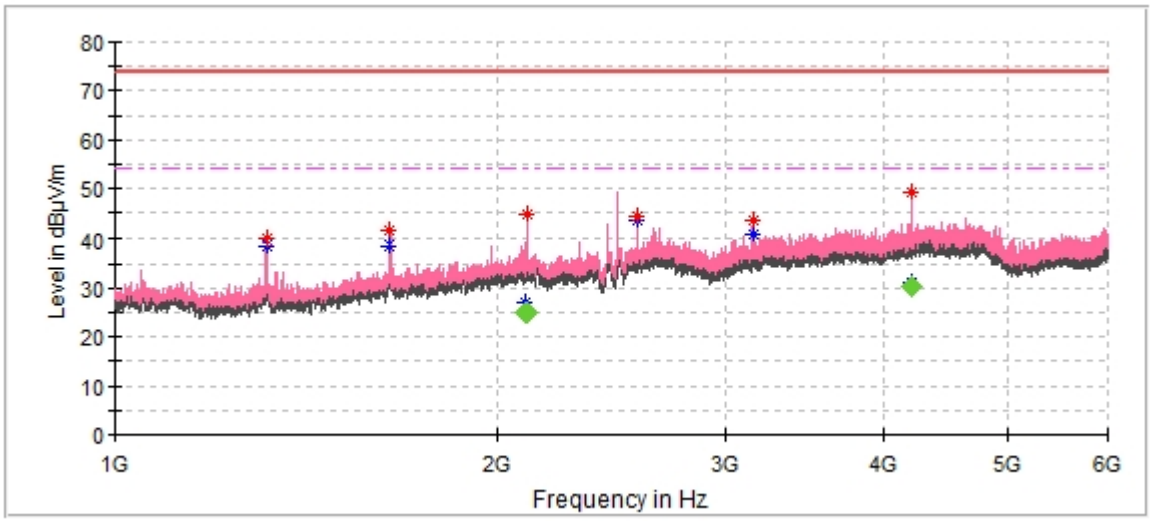
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1316.000000	42.52	---	74.00	31.48	100.0	H	114.0	-13
1316.000000	---	21.22	54.00	32.78	100.0	H	160.0	-13
1646.500000	---	37.17	54.00	16.83	200.0	H	145.0	-10
1647.000000	39.42	---	74.00	34.58	200.0	H	145.0	-10
2107.500000	---	38.94	54.00	15.06	100.0	H	114.0	-8
2107.500000	40.56	---	74.00	33.44	100.0	H	114.0	-8
2628.000000	44.89	---	74.00	29.11	100.0	H	89.0	-4
2633.200000	---	31.44	54.00	22.56	100.0	H	124.0	-4
3437.000000	41.58	---	74.00	32.42	100.0	H	38.0	-1
3437.000000	---	38.94	54.00	15.06	100.0	H	38.0	-1
4208.000000	44.91	---	74.00	29.09	100.0	H	123.0	1
4208.000000	---	43.71	54.00	10.29	100.0	H	123.0	1

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1316.000000	20.76	54.00	33.24	100.0	H	160.0	-13
2633.200000	29.12	54.00	24.88	100.0	H	124.0	-3

EUT Information

EUT Name:	Mooltipass Mini BLE
Model	Mooltipass Mini BLE
Order No:	168292799(60)
Test Mode:	ON
Test Voltage:	DC 5V
Test By:	Ouyang Wang
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1318.000000	39.93	---	74.00	34.07	200.0	V	306.0	-13
1318.000000	---	38.62	54.00	15.38	200.0	V	306.0	-13
1644.500000	---	38.48	54.00	15.52	200.0	V	80.0	-10
1644.500000	41.30	---	74.00	32.70	200.0	V	80.0	-10
2103.100000	---	27.00	54.00	27.00	100.0	V	118.0	-8
2105.500000	44.59	---	74.00	29.41	100.0	V	68.0	-8
2562.000000	44.43	---	74.00	29.57	200.0	V	206.0	-4
2562.500000	---	43.65	54.00	10.35	200.0	V	206.0	-4
3159.000000	43.34	---	74.00	30.66	200.0	V	177.0	-3
3159.000000	---	40.79	54.00	13.21	200.0	V	177.0	-3
4207.000000	49.29	---	74.00	24.71	200.0	V	117.0	1
4213.400000	---	31.00	54.00	23.00	200.0	V	177.0	1

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2103.100000	24.87	54.00	29.13	100.0	V	118.0	-8
4213.400000	30.30	54.00	23.70	200.0	V	177.0	1