



Test Report No.:
FCC2022-0065-RF2

RF Test Report

EUT : **LNx3 Mobile Printer**

MODEL : **LNx3-0**

BRAND NAME : **Honeywell**

APPLICANT : **HONEYWELL INTERNATIONAL INC.
HONEYWELL SAFETY AND PRODUCTIVITY SOLUTIONS**

CLASSIFICATION OF TEST : **N/A**

CVC Testing Technology Co., Ltd.



CVC Testing Technology Co., Ltd.

Test Report No.: FCC2022-0065-RF2

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Applicant		Name : HONEYWELL INTERNATIONAL INC. HONEYWELL SAFETY AND PRODUCTIVITY SOLUTIONS Address : 9680 OLD BAILES RD., FORT MILL SC 29707-7539, USA	
Manufacturer		Name : HONEYWELL INTERNATIONAL INC. HONEYWELL SAFETY AND PRODUCTIVITY SOLUTIONS Address : 9680 OLD BAILES RD., FORT MILL SC 29707-7539, USA	
Equipment Under Test		Name: LNX3 Mobile Printer Model/Type: LNX3-0 Brand: Honeywell Serial No.: N/A Sample No.: 3-1	
Date of Receipt.	2022.08.29	Date of Testing	2022.08.30~2022.11.10
Test Specification		Test Result	
FCC Part 15, Subpart C, Section 15.247 Canada RSS-247 Issue 2 (2017-02) Canada RSS-Gen Issue 5+A1+A2 (2021-02)		PASS	
Evaluation of Test Result		The equipment under test was found to comply with the requirements of the standards applied. Seal of CVC Issue Date: 2022.12.29	
Tested by:  Xu ZhenFei Name Signature		Reviewed by:  Liu YongHai Name Signature	
		Approved by:  Chen HuaWen Name Signature	
Other Aspects: NONE.			
Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested			

This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC.



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FCC2022-0065-RF2	Original release	2022.12.29



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15 Subpart C, Canada RSS-247, Canada RSS-Gen			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
FCC Part 15.207 RSS-Gen 8.8	AC Power Conducted Emission	PASS	Meet the requirement of limit.
FCC Part 15.247(d) FCC Part 15.209 RSS-247 8.10 Table 7 RSS-247 8.9 Table 5	Radiated Emissions	PASS	Meet the requirement of limit.
FCC Part 15.247(d) RSS-247 5.5	Band Edge Measurement	PASS	Meet the requirement of limit.
FCC Part 15.247(a)(2) RSS-247 5.2(a)	6dB Bandwidth Measurement	PASS	Meet the requirement of limit.
RSS-Gen 6.7	Occupied Bandwidth Measurement	PASS	Meet the requirement of limit.
FCC Part 15.247(b) RSS-247 5.4(d)	Conducted Output power	PASS	Meet the requirement of limit.
FCC Part 15.247(e) RSS-2475.2(b)	Power Spectral Density	PASS	Meet the requirement of limit.
FCC Part 15.203 FCC Part 15.247(b)	Antenna Requirement	PASS	Meet the requirement of limit.



1.1 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
WIFI & Bluetooth Test System 1					/
Communication Shielded Room 2	4m*3m*3m	CRTDSWКСR 44301	VGDS-0700	CRT	2024/04/24
Bluetooth system integration	/	/	-	Tonscend	/
Spectrum Analyzer	FSV40	101580	DZ-000238-3	R&S	2023/06/05
Comprehensive Test Instrument	CMW270	100304	DZ-000240-1	R&S	2023/12/06
Analog Signal Generator	SMB100A	181858	DZ-000238-2	R&S	2023/06/05
Vector Signal Generator	SGT100A	111661	DZ-000238-1	R&S	2023/06/05
RF Radio Frequency Switch	JS0806-2	19H9080187		Tonscend	2023/06/06
Programmable DC Power Supply	E3644A	MY58036222	DZ-000178	KEYSIGHT	2023/04/21
Radiation Spurious Test System					/
3m Semi-Anechoic Chamber	FACT-4	ST08035	WKNA-0024	ETS	2024/12/12
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2023/03/02
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2023/03/02
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2023/06/25
Waveguide Horn Antenna	HF906	360306/008	EM-000093	R&S	2023/03/04
Waveguide Horn Antenna	BBHA9170	00949	DZ-000209-2	SCHWARZBECK	2023/07/31
Preamplifier	BBV 9721	9721-050	DZ-000209-1	SCHWARZBECK	2023/06/05
5G Bandstop Filters	WRCJV12-4900-5100-5900-6100-50EE	851770	DZ-000186	WI	2023/12/06
Comprehensive tester	CMW500	159000	DZ-000240-2	R&S	2023/12/06
Conducted emission					/
EMI Test Receiver	ESCI	100857	WKNB-0081	R&S	2023-12-08
EMI Test Receiver	ESR3	102394	VG DY-0705	R&S	2023-03-04
LISN	NSLK 8127	8127644	VG DY-0150	SCHWARZBECK	2023-09-04
LISN	NSLK 8128	8128-316	VG DY-0149	SCHWARZBECK	2023-09-04
LISN	NSLK 8129	8129-268	EM-000388	SCHWARZBECK	2023-03-03
Plus Limiter (#1)	VTSD 9561 F-N	00515	VG DY-0808	SCHWARZBECK	2023-03-04
Plus Limiter (#2)	VTSD 9561	9561-F017	VG DY-0152	SCHWARZBECK	2024-09-04
Impedance Stabilization Network	ISN T800	27095	WKNE-0195	TESEQ	2023-09-04
Impedance Stabilization Network	NTFM8158	8158-0092	VG DY-0356	SCHWARZBECK	2023-06-07
Impedance Stabilization Network	NTFM8131	#184	EM-000498	SCHWARZBECK	2023-06-07
Voltage Probe	TK9420	9420-499	VG DY-0128	SCHWARZBECK	2023-03-04
Power Divider	4901.17.B	22643830	DB-0016	HUBER+SUHNER	2023-09-01
Video Signal Generator	GV-798+	151064920001	VGDS-0215	PROMAX	2023-05-30
Audio Signal Generator	GAG-810	EK871591	EM-000309	GW	2023-12-08
Shielding Room(#1)	GP1A	001	WKNF-0001	LEINING	2024-08-08
Shielding Room(#2)	GP1A	002	WKNF-0006	LEINING	2024-08-08
Current probe	EZ-17	0816.2063.02	EM-000567	R&S	2023-01-16



1.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

No.	ITEM	FREQUENCY	UNCERTAINTY
1	Conducted emissions	9kHz~30MHz	±2.66dB
2	Radiated emissions	9KHz ~ 30MHz	±0.769dB
		30MHz ~ 1GMHz	±0.877dB
		1GHz ~ 18GHz	±0.777dB
		18GHz ~ 40GHz	±1.315dB

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

1.3 TEST LOCATION

The tests and measurements refer to this report were performed by EMC testing Lab. of CVC Testing Technology Co., Ltd.

Address: No.3,TiantaiyiRoad,KaitaiAvenue,ScienceCity,Guangzhou,China
Post Code: 510663 Tel: 020-32293888
FAX: 020-32293889 E-mail: office@cvc.org.cn



2 GENERAL INFORMATION

2.1 GENERAL PRODUCT INFORMATION

PRODUCT	LNX3 Mobile Printer				
BRAND	Honeywell				
MODEL	LNX3-0				
ADDITIONAL MODEL	N/A				
FCC ID	HD5-LNX3-0				
IC ID	1693B-LNX30				
POWER SUPPLY	1. DC 7.4V from Li-ion battery 2. DC 5V from Charging base 3. DC 5V from Adapter				
sMODULATION TYPE	GKSK				
OPERATING FREQUENCY	2402MHz ~ 2480MHz				
NUMBER OF CHANNEL	40				
PEAK OUTPUT POWER	7.96dBm (Maximum)				
ANTENNA TYPE (Remark 4)	PCB Antenna, with 0dBi gain				
HARDWARE VERSION:	V1.7				
SOFTWARE VERSION:	V1.7				
I/O PORTS	Refer to user's manual				
CABLE SUPPLIED	N/A				
Remark: 1. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report. 3. Please refer to the EUT photo document for detailed product photo. (Report NO.: FCC2022-0065) 4. Please refer to the antenna report. 5. The difference between these two models is that the LNX3-1 has WiFi and BT modules, while the LNX3-0 has only BT modules. 6. Because the models are similar, the LNX3-1 model is fully tested for electromagnetic compatibility, and the LNX3-0 model is only tested for Radiated Emission and Bandedge Measurement, the results of other test items are all referenced from report no.: FCC2022-0062-RF2, which is considered to meet the relevant electromagnetic compatibility requirements. 7. The EUT have SISO function, provides 1 completed transmitter and 1 receiver.					
<table border="1"><thead><tr><th>MODULATION MODE</th><th>TX FUNCTION</th></tr></thead><tbody><tr><td>BT-LE (1Mbps)</td><td>1TX/1RX</td></tr></tbody></table>		MODULATION MODE	TX FUNCTION	BT-LE (1Mbps)	1TX/1RX
MODULATION MODE	TX FUNCTION				
BT-LE (1Mbps)	1TX/1RX				



2.2 Description of Accessories

N/A

2.3 OTHER INFORMATION

Operating frequency of each channel

BT-LE (1Mbps)							
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

- The channels which were indicated in bold type of the above channel list were selected as representative test channel. Therefore, only the data of the test channels were recorded in this report.
- By means of test software which provided by manufacture, the power levels during the tests were set according to the following codes:

BT-LE(1 Mbps)					
GFSK					
CHANNEL	POWER SETTING	CHANNEL	POWER SETTING	CHANNEL	POWER SETTING
0	5	19	5	39	5

FIX FREQUENCY SOFTWARE NAME:
BR BLUELETSUITE



2.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, xyz axis and antenna ports

EUT CONFIGURE MODE	APPLICABLE TEST ITEMS				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
A	√	√	√	√	BT Function

Where **RE < 1G**: Radiated Emission below 1GHz **RE ≥ 1G**: Radiated Emission above 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

RADIATED EMISSION TEST (BELOW 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
- The worst case was found when positioned on x axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	BT-LE	0 to 39	0,19, 39	DTS	GFSK	1.0 Mbit/s

For the test results, only the worst case was shown in test report.

RADIATED EMISSION TEST (ABOVE 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
- The worst case was found when positioned on x axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE PARAMETER
A	BT-LE	0 to 39	0,19, 39	DTS	GFSK	1.0 Mbit/s



POWER LINE CONDUCTED EMISSION TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CONDITION
B	BT Link

ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE PARAMETER
A	BT-LE	0 to 39	0,19, 39	DTS	GFSK	1.0 Mbit/s

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE<1G	24deg. C, 55%RH	DC 7.4V from Li-ion battery	Liu ShiWei
RE≥1G	24deg. C, 55%RH	DC 7.4V from Li-ion battery	Liu ShiWei
PLC	24deg. C, 55%RH	DC 7.4V from Li-ion battery	Liu ShiWei
APCM	25deg. C, 58%RH	DC 7.4V from Li-ion battery	Liu ShiWei



2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

- FCC PART 15, SUBPART C. SECTION 15.247**
- KDB 558074 D01 15.247 MEAS GUIDANCE V05R02**
- ANSI C63.10-2020**
- CANADA RSS-247 ISSUE 2 (2017-02)**
- CANADA RSS-GEN ISSUE 5+A1+A2 (2021-02)**

All test items have been performed and recorded as per the above standards

2.6 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support Equipment							
NO	Description	Brand	Model No.	Serial Number	Supplied by		
1	N/A	N/A	N/A	N/A	N/A		
Support Cable							
NO	Description	Quantity (Number)	Length (cm)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A



3 TEST TYPES AND RESULTS

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 Limit

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.
NOTE: 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.1.2 Measurement procedure

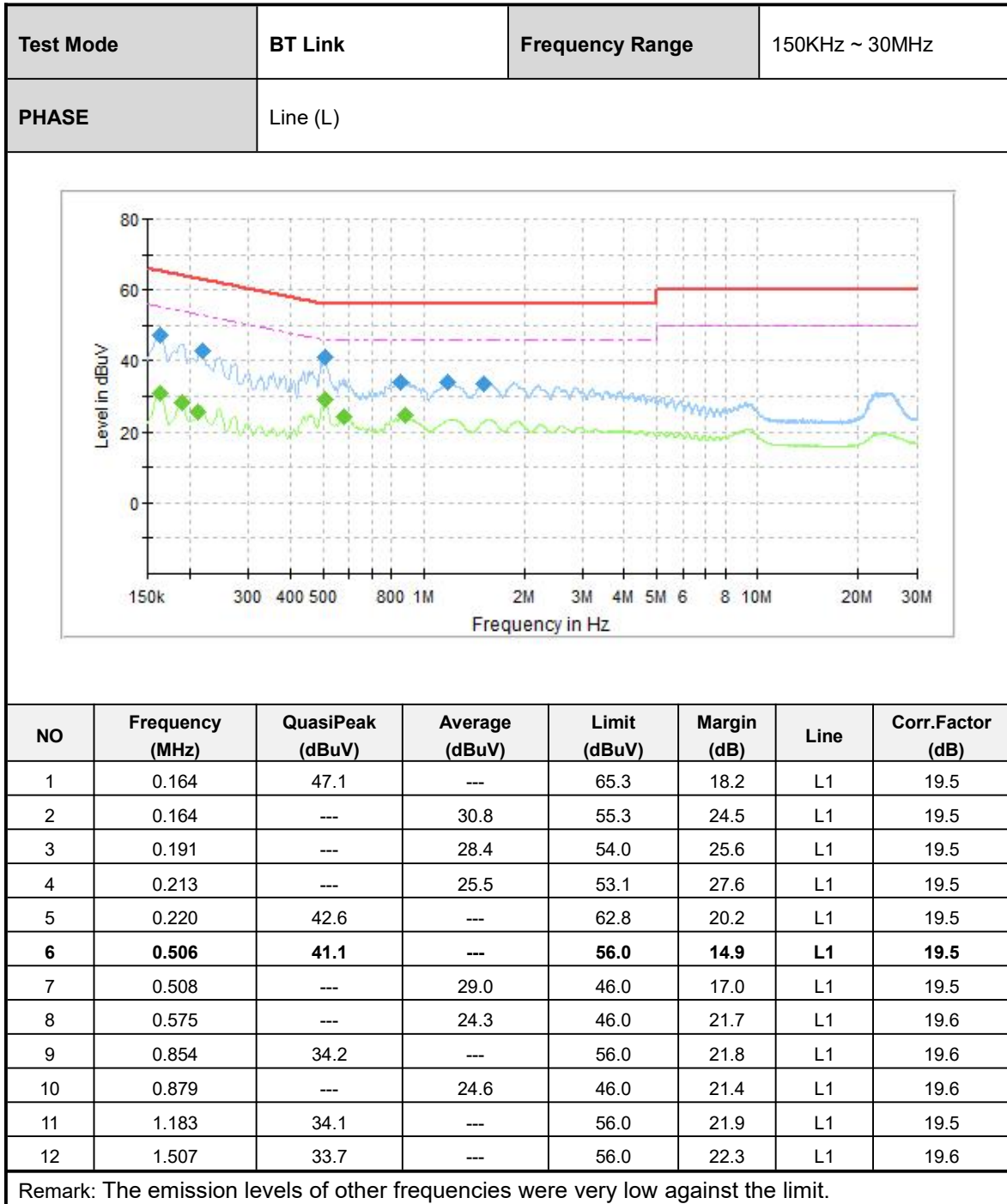
- a. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the Test photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The equipment under test shall be placed on a support of non-metallic material, the height of which shall be 1.5m above the ground,
- b. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- c. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.1.3 Test

setup

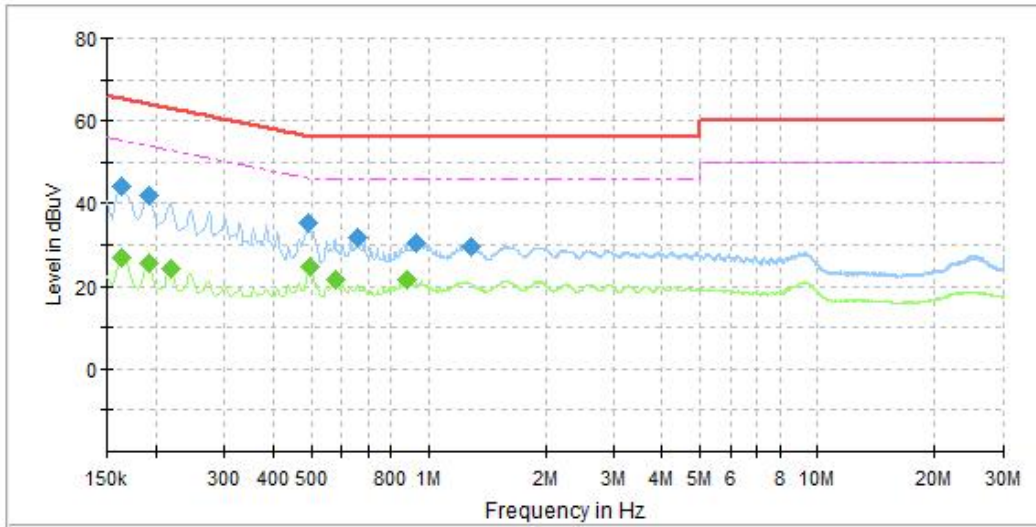


3.1.4 Test results





Test Mode	BT Link	Frequency Range	150KHz ~ 30MHz
PHASE	Line (N)		



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.164	---	27.1	55.3	28.2	N	19.5
2	0.164	44.3	---	65.3	21.0	N	19.5
3	0.193	42.0	---	63.9	21.9	N	19.5
4	0.193	---	25.6	53.9	28.3	N	19.5
5	0.220	---	24.4	52.8	28.5	N	19.5
6	0.492	35.5	---	56.1	20.7	N	19.6
7	0.494	---	24.9	46.1	21.2	N	19.6
8	0.575	---	21.6	46.0	24.4	N	19.6
9	0.656	31.6	---	56.0	24.4	N	19.6
10	0.877	---	21.4	46.0	24.6	N	19.6
11	0.931	30.2	---	56.0	25.8	N	19.6
12	1.286	29.5	---	56.0	26.5	N	19.6

Remark: The emission levels of other frequencies were very low against the limit.



3.2 RADIATED EMISSION AND BAND EDGE MEASUREMENT

3.2.1 Limit

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

FREQUENCIES (MHz)	FIELD STRENGTH (Microvolts/Meter)	MEASUREMENT DISTANCE (Meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE: 1. The lower limit shall apply at the transition frequencies.
 NOTE: 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
 NOTE: 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

3.2.2 Measurement procedure

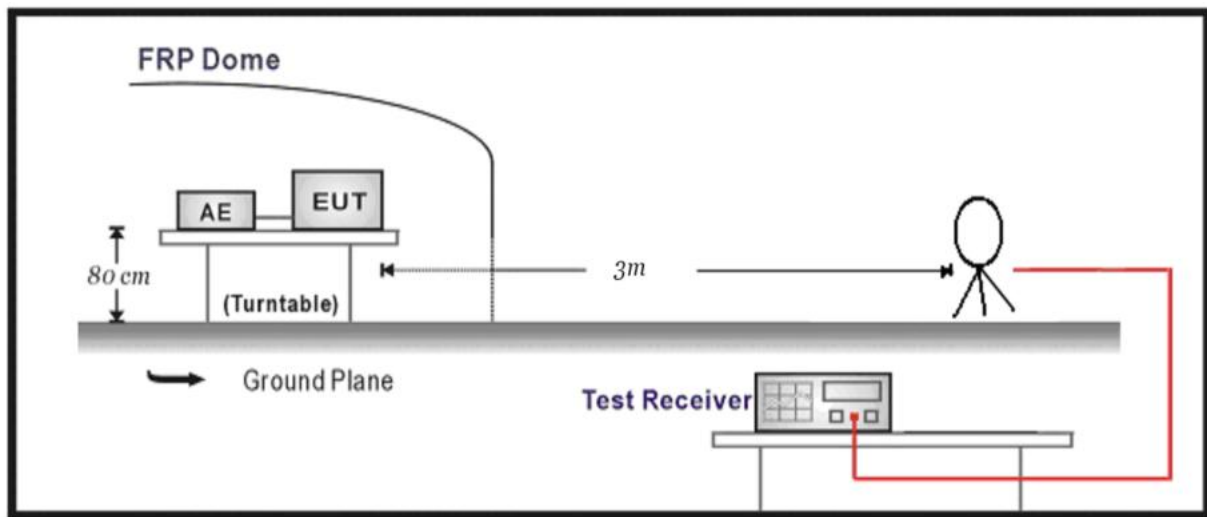
- a. The EUT was placed on the top of a rotating table 1.5 meters(above 1GHz) and 0.8 meters(below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

NOTE:

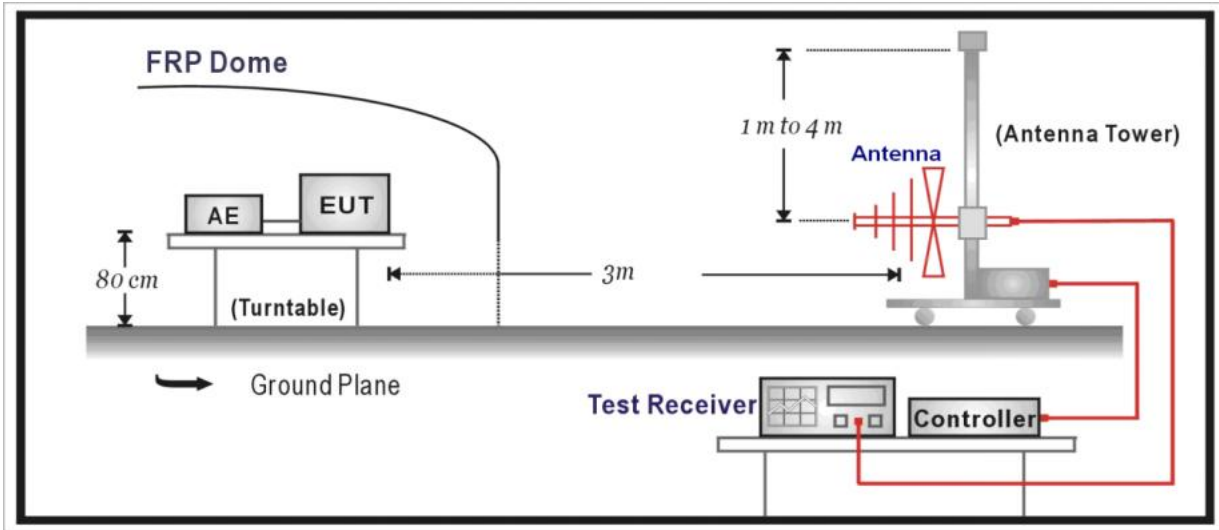
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

3.2.3 Test setup

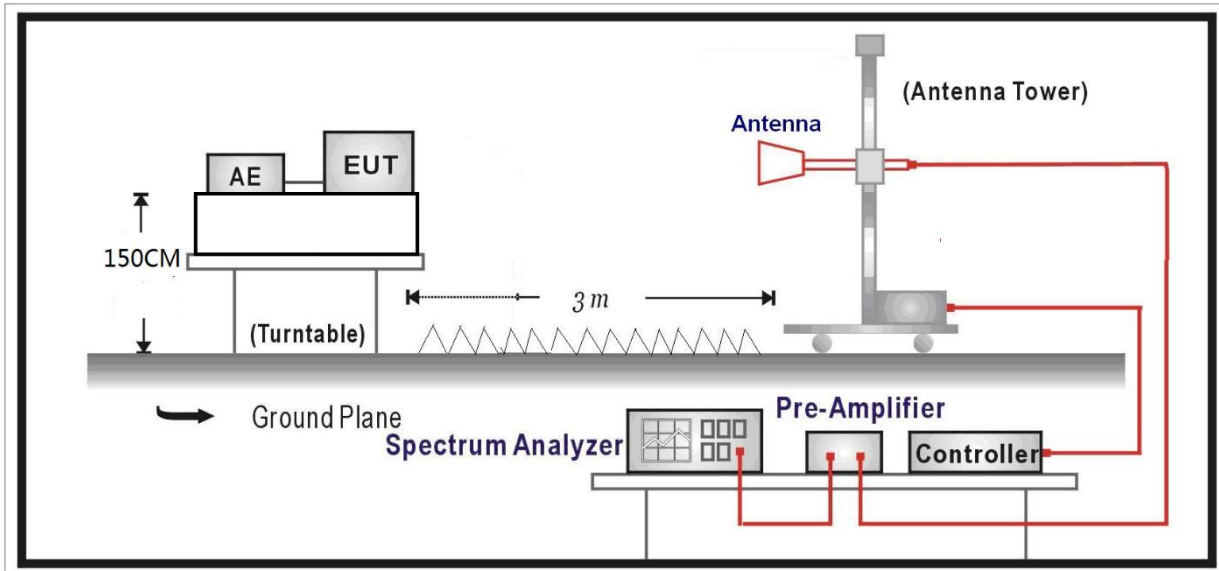
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:

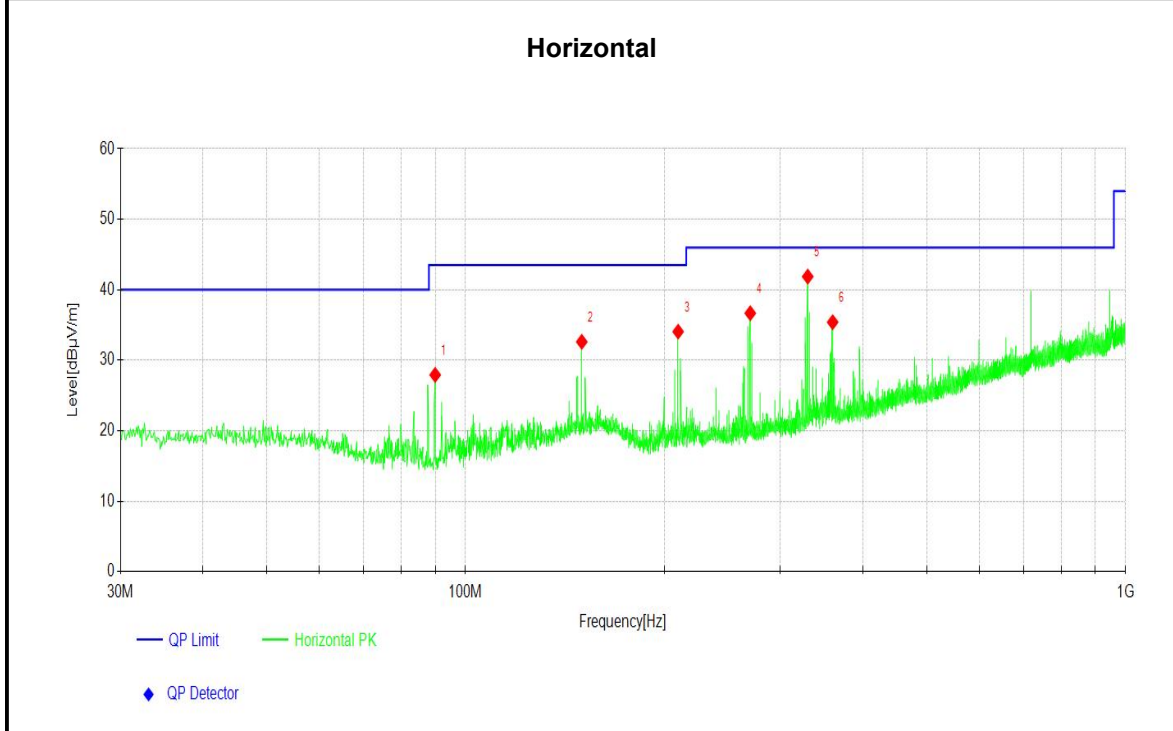




3.2.4 Test results

BELOW 1GHz WORST-CASE DATA:

Worst Test Mode	BT-LE	Channel	CH 0
Frequency Range	9KHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

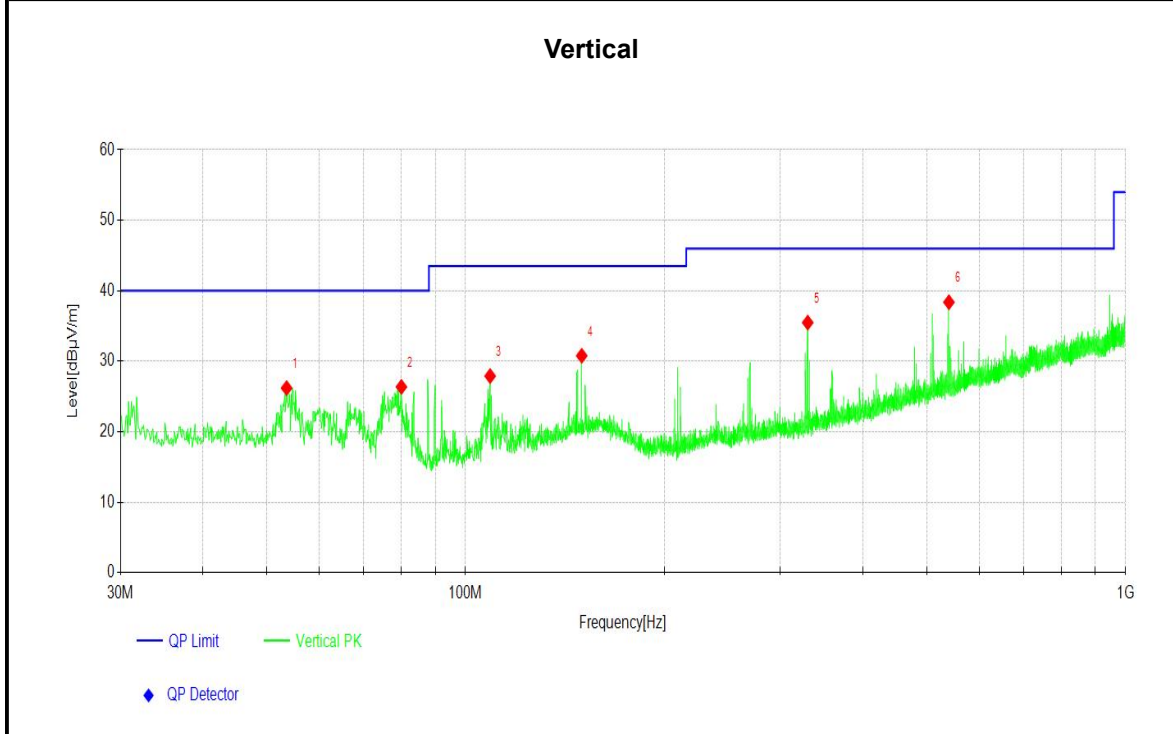


NO	Freq. [MHz]	Reading [dBuV/m]	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]
1	89.9520	12.35	15.57	27.92	43.50	15.58	200	2
2	150.0010	12.14	20.48	32.62	43.50	10.88	200	134
3	209.9530	17.22	16.84	34.06	43.50	9.44	100	260
4	270.0020	17.61	19.06	36.67	46.00	9.33	100	277
5	329.9540	21.54	20.33	41.87	46.00	4.13	100	177
6	359.9300	14.37	21.03	35.40	46.00	10.60	100	60

Remark: 1. 9KHz~30MHz have been test and test data more than 20dB margin.
 2. The emission levels of other frequencies were greater than 20dB margin.
 3. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
 4. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 5. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]



Worst Test Mode	BT-LE	Channel	CH 0
Frequency Range	9KHz ~ 1GHz	Detector Function	Quasi-Peak (QP)



NO	Freq. [MHz]	Reading [dBuV/m]	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]
1	53.5734	6.91	19.28	26.19	40.00	13.81	100	3
2	79.9600	11.04	15.32	26.36	40.00	13.64	100	2
3	108.9659	11.07	16.83	27.90	43.50	15.60	300	111
4	150.0010	10.30	20.48	30.78	43.50	12.72	100	27
5	329.9540	15.16	20.33	35.49	46.00	10.51	200	170
6	539.9800	13.54	24.84	38.38	46.00	7.62	100	111

Remark: 1. 9KHz~30MHz have been test and test data more than 20dB margin.
 2. The emission levels of other frequencies were greater than 20dB margin.
 3. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
 4. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 5. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]



ABOVE 1GHz DATA

Channel		BT-LE CH0		Frequency		2402MHz			
Frequency Range		Above 1G		Detector Function		PK/AV			
Horizontal									
NO	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2390.0000	36.55	-0.15	36.40	54.00	17.60	184	1	AV
2	2390.0000	44.85	-0.15	44.70	74.00	29.30	245	254	PK
3	2401.8552	75.47	-0.03	75.44			159	261	AV
4	2402.2542	76.46	-0.03	76.43			183	261	PK
5	4804.0000	44.10	9.29	53.39	74.00	20.61	201	60	PK
6	4804.0000	36.31	9.29	45.60	54.00	8.40	243	64	AV
7	7206.0000	20.00	12.81	32.81	54.00	21.19	289	166	AV
8	7206.0000	28.53	12.81	41.34	74.00	32.66	173	150	PK
9	9608.0000	28.45	13.32	41.77	74.00	32.23	276	59	PK
10	9608.0000	19.69	13.32	33.01	54.00	20.99	275	1	AV
Vertical									
NO	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2390.0000	36.04	-0.15	35.89	54.00	18.11	154	348	AV
2	2390.0000	44.95	-0.15	44.80	74.00	29.20	212	145	PK
3	2401.7602	76.09	-0.04	76.05			169	256	PK
4	2401.7982	75.20	-0.03	75.17			303	256	AV
5	4804.0000	43.34	9.29	52.63	74.00	21.37	233	138	PK
6	4804.0000	36.53	9.29	45.82	54.00	8.18	208	257	AV
7	7206.0000	20.21	12.81	33.02	54.00	20.98	266	305	AV
8	7206.0000	28.70	12.81	41.51	74.00	32.49	279	305	PK
9	9608.0000	22.82	13.32	36.14	54.00	17.86	283	112	AV
10	9608.0000	27.81	13.32	41.13	74.00	32.87	279	338	PK
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBμV/m] - Level [dBμV/m]									



Channel		BT-LE CH19		Frequency		2440MHz			
Frequency Range		Above 1G		Detector Function		PK/AV			
Horizontal									
NO	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	4880.0000	44.56	9.80	54.36	74.00	19.64	169	284	PK
2	4880.0000	37.58	9.80	47.38	54.00	6.62	281	276	AV
3	7320.0000	20.55	11.01	31.56	54.00	22.44	229	360	AV
4	7320.0000	29.40	11.01	40.41	74.00	33.59	298	296	PK
5	9760.0000	29.07	13.25	42.32	74.00	31.68	169	108	PK
6	9760.0000	22.41	13.25	35.66	54.00	18.34	125	108	AV
Vertical									
NO	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4880.0000	43.48	9.80	53.28	74.00	20.72	121	6	PK
2	4880.0000	35.90	9.80	45.70	54.00	8.30	276	105	AV
3	7320.0000	20.57	11.01	31.58	54.00	22.42	284	18	AV
4	7320.0000	28.63	11.01	39.64	74.00	34.36	174	288	PK
5	9760.0000	29.74	13.25	42.99	74.00	31.01	120	125	PK
6	9760.0000	22.38	13.25	35.63	54.00	18.37	141	121	AV
<p>Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBµV/m) = Reading (dBµV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]</p>									



Channel		BT-LE CH39		Frequency		2480MHz			
Frequency Range		Above 1G		Detector Function		PK/AV			
Horizontal									
NO	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2479.8770	79.05	0.32	79.37			267	260	AV
2	2479.9910	80.07	0.31	80.38			231	260	PK
3	2483.5000	37.69	0.46	38.15	54.00	15.85	264	240	AV
4	2483.5000	50.04	0.46	50.50	74.00	23.50	146	246	PK
5	4960.0000	37.36	10.69	48.05	54.00	5.95	143	276	AV
6	4960.0000	45.11	10.69	55.80	74.00	18.20	152	272	PK
7	7440.0000	29.68	9.75	39.43	74.00	34.57	283	124	PK
8	7440.0000	21.66	9.75	31.41	54.00	22.59	200	18	AV
9	9920.0000	21.94	13.83	35.77	54.00	18.23	153	96	AV
10	9920.0000	28.77	13.83	42.60	74.00	31.40	236	103	PK
Vertical									
NO	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2479.7820	77.14	0.33	77.47			295	258	AV
2	2480.2760	78.12	0.33	78.45			125	258	PK
3	2483.5000	37.69	0.46	38.15	54.00	15.85	274	35	AV
4	2483.5000	49.77	0.46	50.23	74.00	23.77	137	28	PK
5	4960.0000	35.64	10.69	46.33	54.00	7.67	176	96	AV
6	4960.0000	43.57	10.69	54.26	74.00	19.74	277	271	PK
7	7440.0000	28.23	9.75	37.98	74.00	36.02	279	178	PK
8	7440.0000	20.93	9.75	30.68	54.00	23.32	201	227	AV
9	9920.0000	20.69	13.83	34.52	54.00	19.48	235	161	AV
10	9920.0000	28.51	13.83	42.34	74.00	31.66	251	1	PK
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBμV/m] - Level [dBμV/m]									

3.3 6dB BANDWIDTH MEASUREMENT

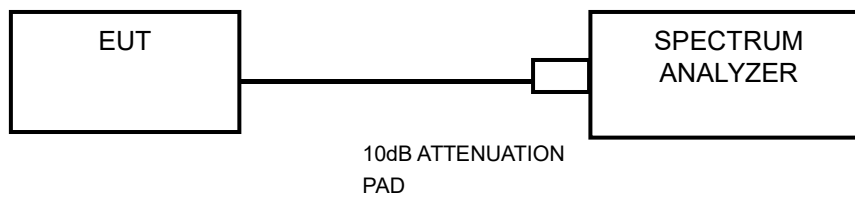
3.3.1 Limits

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

3.3.2 Measurement procedure

- a. Set resolution bandwidth (RBW) = 100KHz
- b. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. 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.

3.3.3 Test setup



3.3.4 Test result

Please refer Annex A

3.4 CONDUCTED OUTPUT POWER

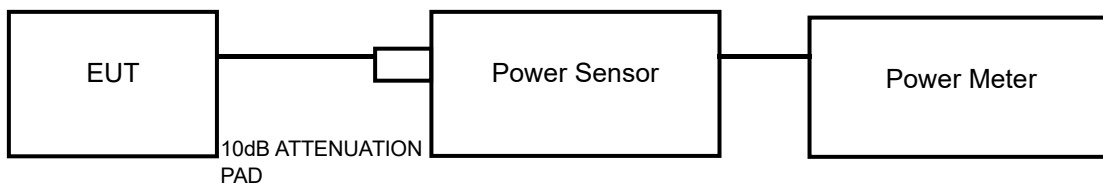
3.4.1 Limits

Forsystems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm).

3.4.2 Measurement procedure

- 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 and set the detector to PEAK. Record the power level.
- An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor and set the detector to AVERAGE. Record the power level.

3.4.3 Test setup



3.4.4 Test result

Please refer Annex A.

3.5 POWER SPECTRAL DENSITY MEASUREMENT

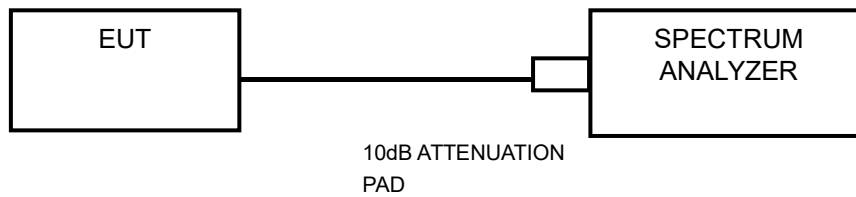
3.5.1 Limits

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

3.5.2 Measurement procedure

- a. Set instrument center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set RBW to: 3KHz
- d. Set VBW $\geq 3 \times$ RBW.
- e. Detector = peak
- f. Ensure that the number of measurement points in the sweep $\geq 2 \times$ span/RBW.
- g. Sweep time = auto couple.
- h. Use the peak marker function to determine the maximum amplitude level.

3.5.3 Test setup



3.5.4 Test result

Please refer Annex A.

3.6 OUT OF BAND EMISSION MEASUREMENT

3.6.1 Limits

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

3.6.2 Measurement procedure

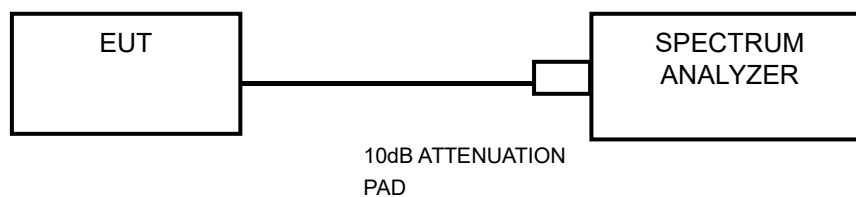
Measurement Procedure -Reference Level

- a. Set the RBW = 100 kHz.
- b. Set the VBW \geq 300 kHz.
- c. Detector = peak.
- d. Sweep time = auto couple.
- e. Trace mode = max hold.
- f. Allow trace to fully stabilize.
- g. Use the peak marker function to determine the maximum power level in any 100 kHzband segment within the fundamental EBW.

Measurement Procedure –Unwanted Emission Level

- a. Set RBW = 100 kHz.
- b. Set VBW \geq 300 kHz.
- c. Set span to encompass the spectrum to be examined
- d. Detector = peak.
- e. Trace Mode = max hold.
- f. Sweep = auto couple.

3.6.3 Test setup



3.6.4 Test result

Please refer Annex A.

3.7 OCCUPIED BANDWIDTH MEASUREMENT

3.7.1 Measurement procedure

The transmitter antenna output was connected to the spectrum analyzer through an attenuator. The resolution bandwidth shall be set to the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

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.

3.7.2 TEST SETUP



3.7.3 Test result

Please refer Annex A.



4 PHOTOGRAPHS OF TEST SETUP

Please refer to the attached file (Test Setup Photo).



5 PHOTOGRAPHS OF THE EUT

Please refer to the attached file (External Photos report and Internal Photos).



6 Appendix A (Please refer to the following pages for test results.)

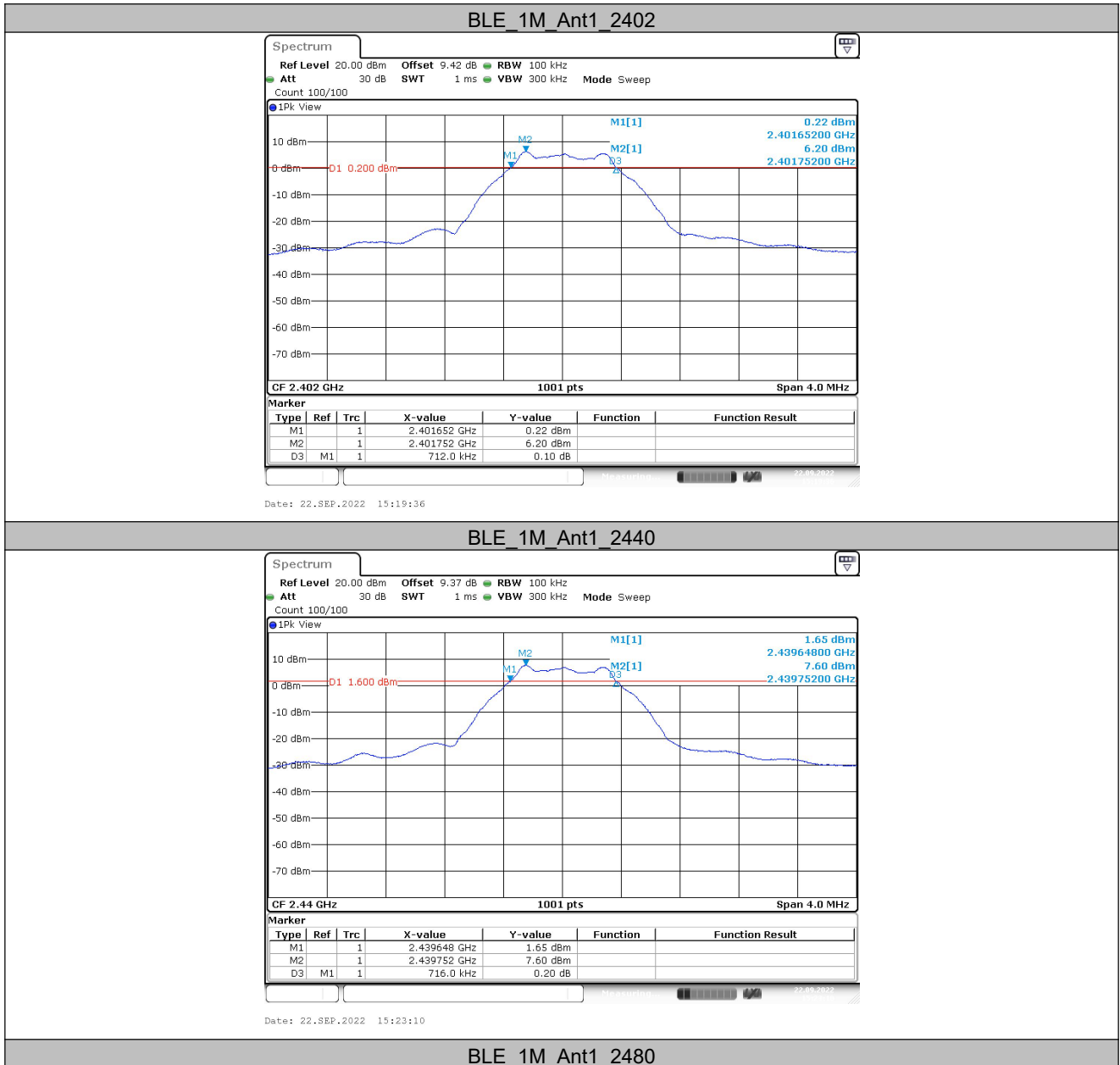
6.1 6DB BANDWIDTH MEASUREMENT

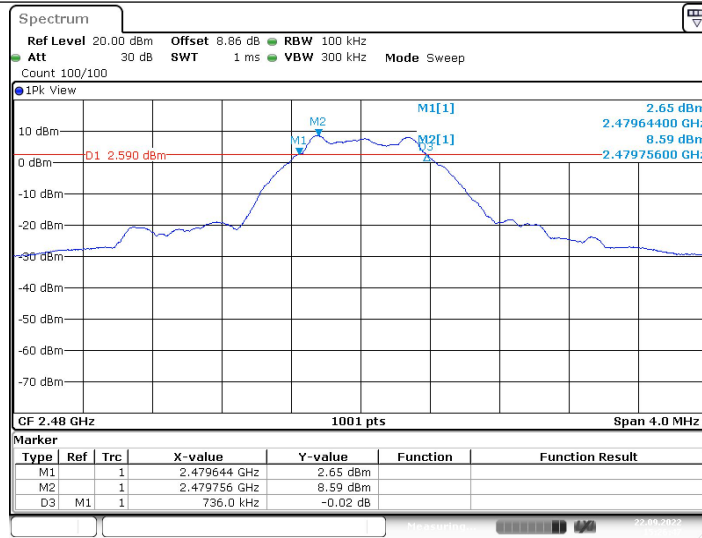
6.1.1 Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.71	2401.65	2402.36	0.5	PASS
		2440	0.72	2439.65	2440.36	0.5	PASS
		2480	0.74	2479.64	2480.38	0.5	PASS



6.1.2 Test Graphs





Date: 22.SEP.2022 15:26:48



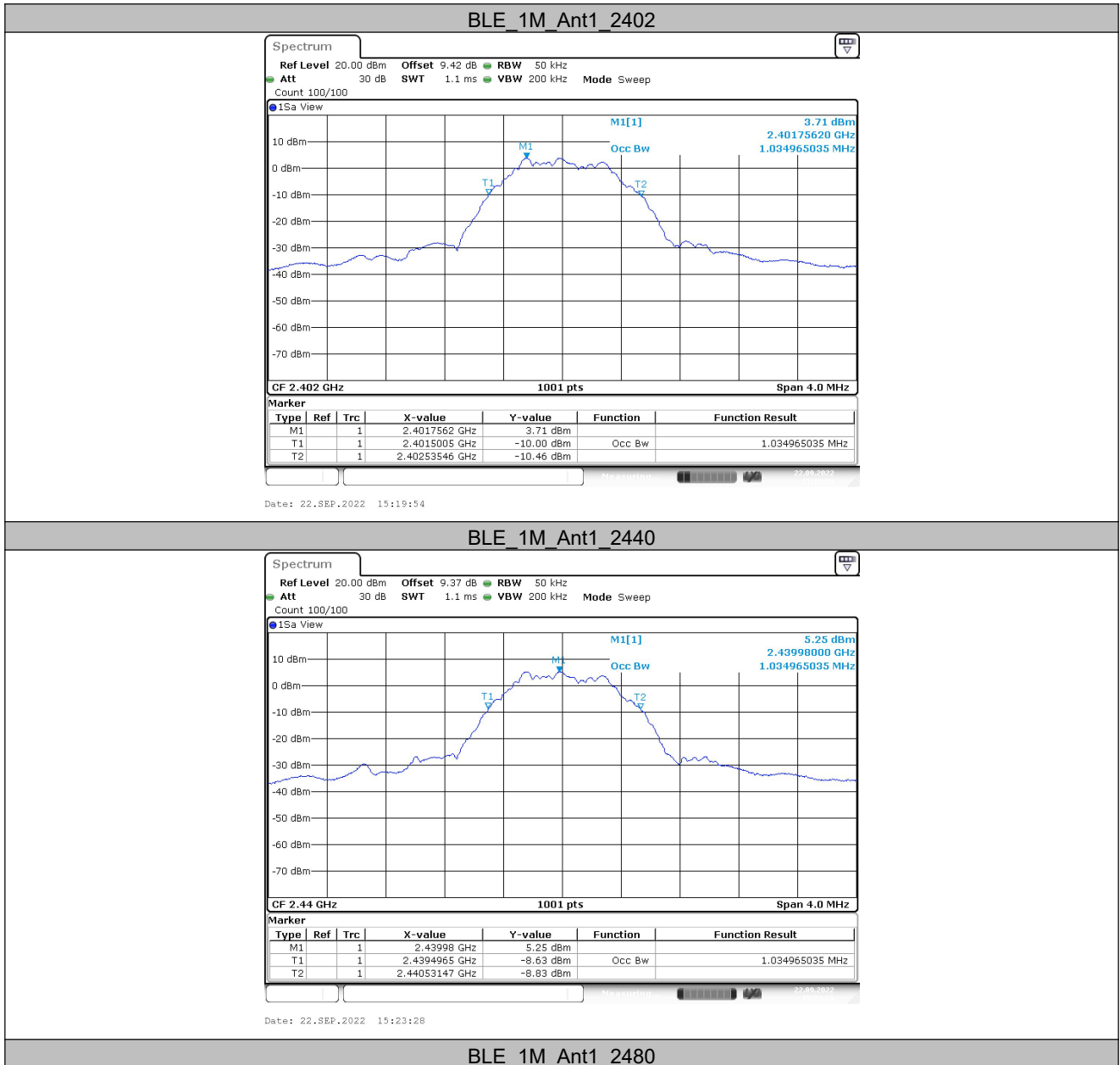
6.2 Occupied Channel Bandwidth

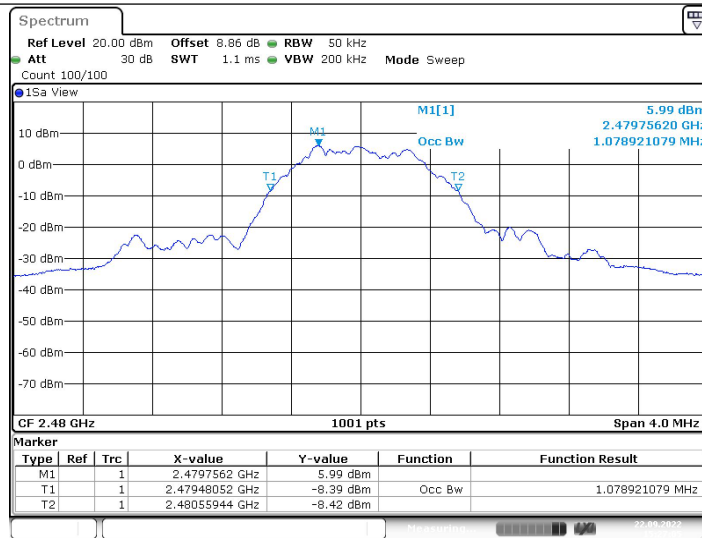
6.2.1 Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.035	2401.500	2402.535	---	---
		2440	1.035	2439.497	2440.531	---	---
		2480	1.079	2479.481	2480.559	---	---



6.2.2 Test Graphs





Date: 22.SEP.2022 15:27:06



6.3 CONDUCTED OUTPUT POWER

6.3.1 Test Result Peak

TestMode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
BLE_1M	Ant1	2402	5.78	≤30	5.78	≤36.00	PASS
		2440	7.15	≤30	7.15	≤36.00	PASS
		2480	7.96	≤30	7.96	≤36.00	PASS

6.3.2 Test Result Average

Test Mode	Antenna	Frequency[MHz]	Average power [dBm]	Limit [dBm]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
BLE_1M	Ant1	2402	4.83	≤30.00	4.83	≤36.00	PASS
		2440	6.61	≤30.00	6.61	≤36.00	PASS
		2480	7.51	≤30.00	7.51	≤36.00	PASS



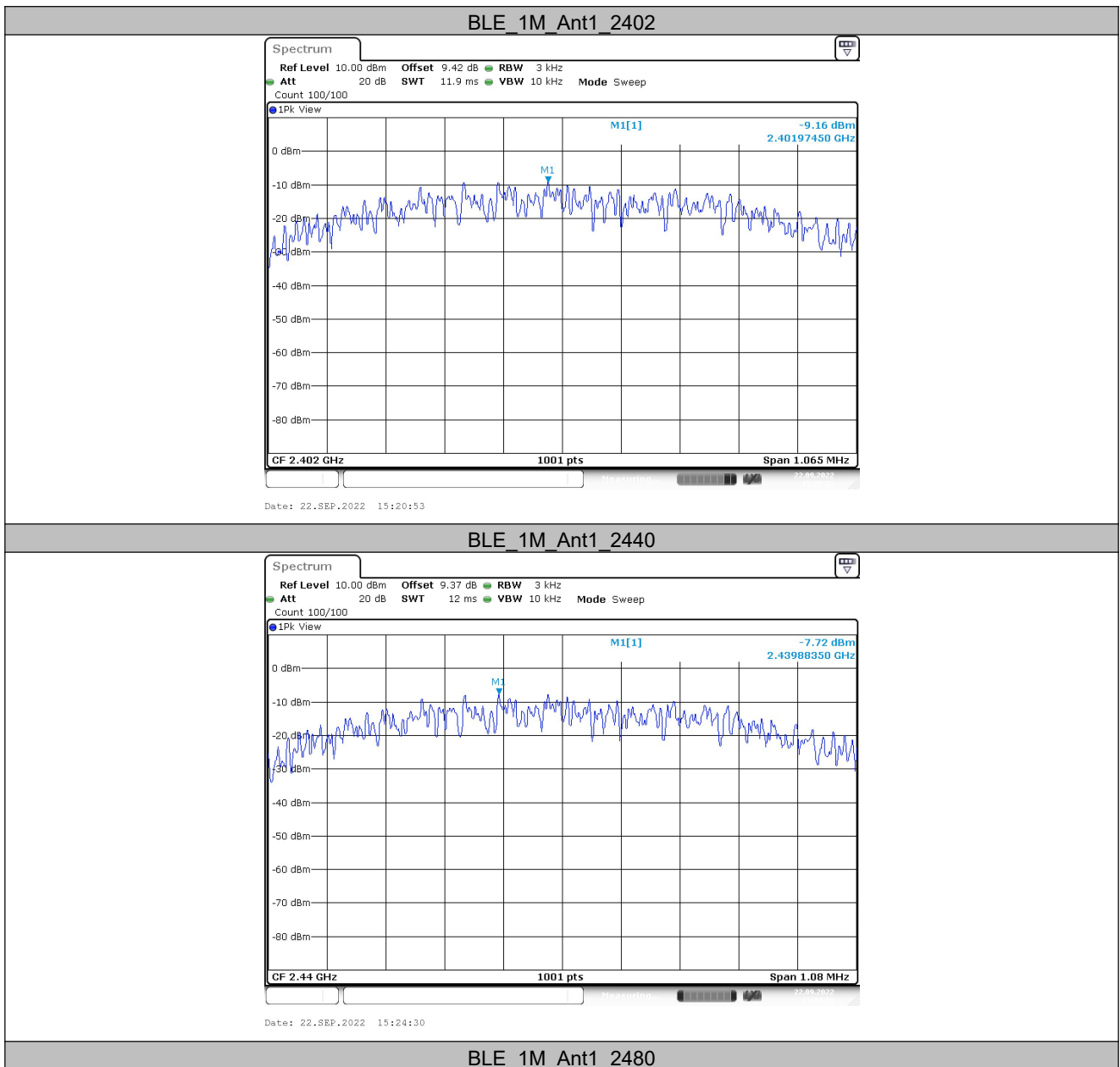
6.4 POWER SPECTRAL DENSITY MEASUREMENT

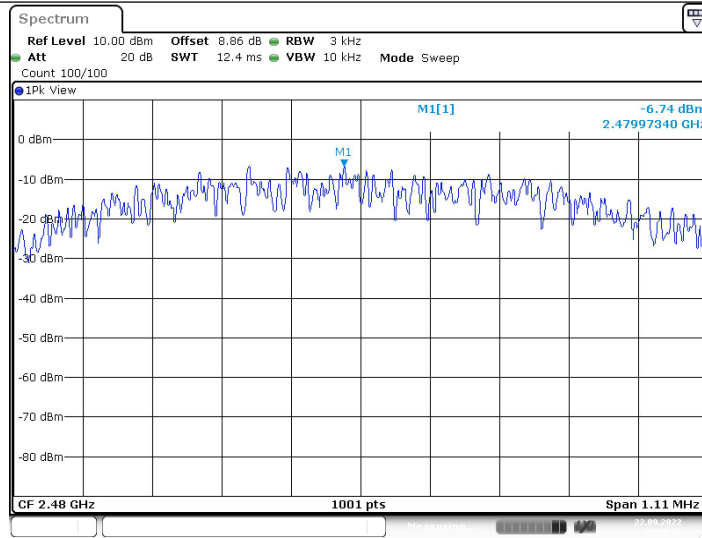
6.4.1 Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-9.16	≤8.00	PASS
		2440	-7.72	≤8.00	PASS
		2480	-6.74	≤8.00	PASS



6.4.2 Test Graphs





Date: 22.SEP.2022 15:28:07



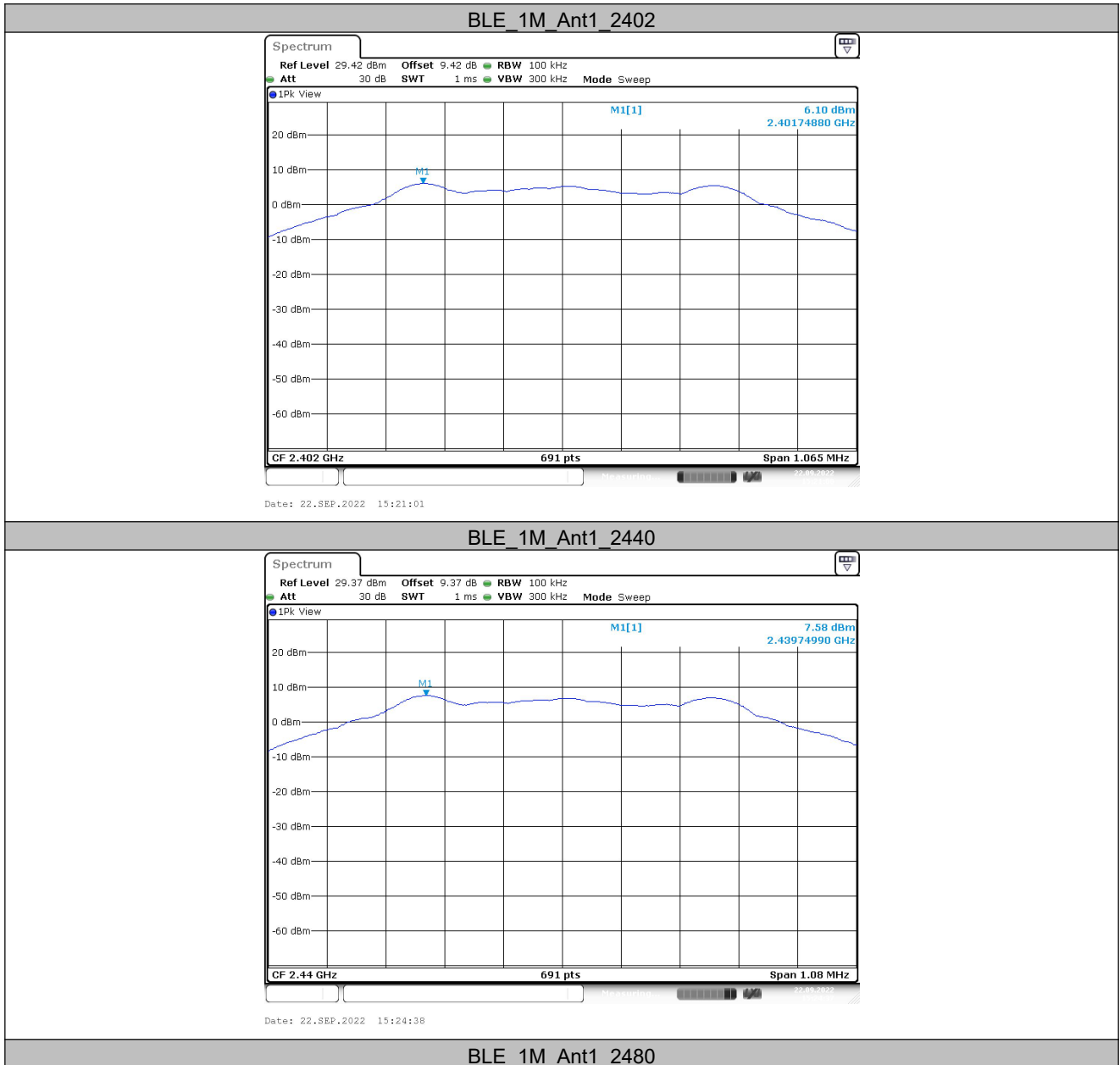
6.5 REFERENCE LEVEL MEASUREMENT

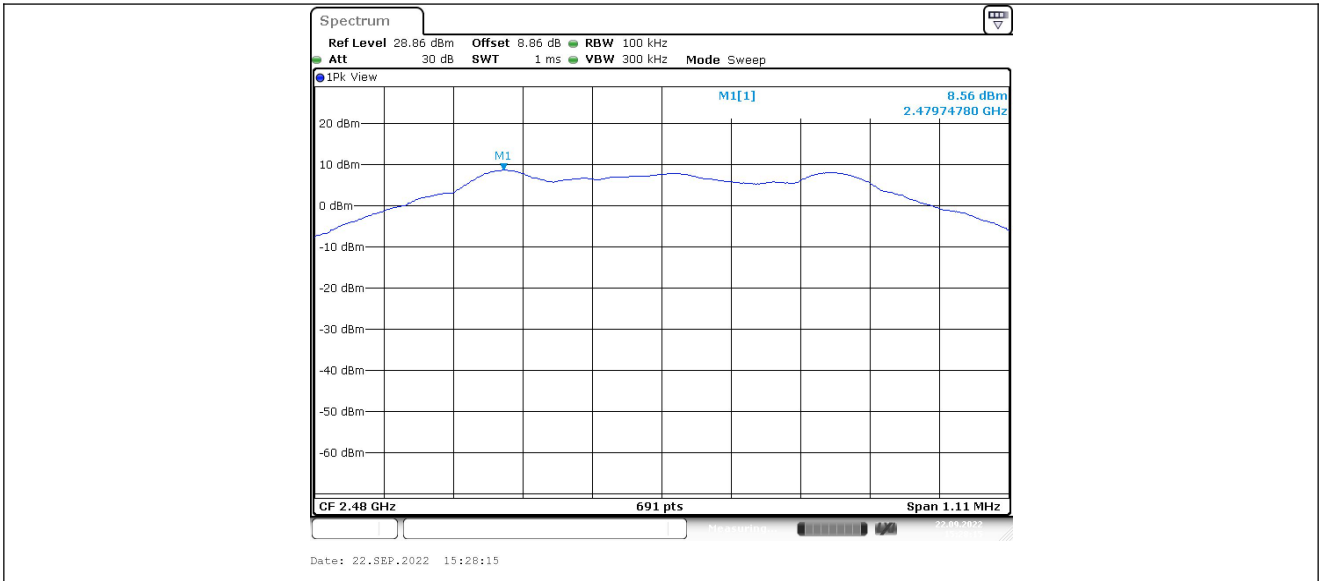
6.5.1 Test Result

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
BLE_1M	Ant1	2402	2401.75	6.10
		2440	2439.75	7.58
		2480	2479.75	8.56



6.5.2 Test Graphs







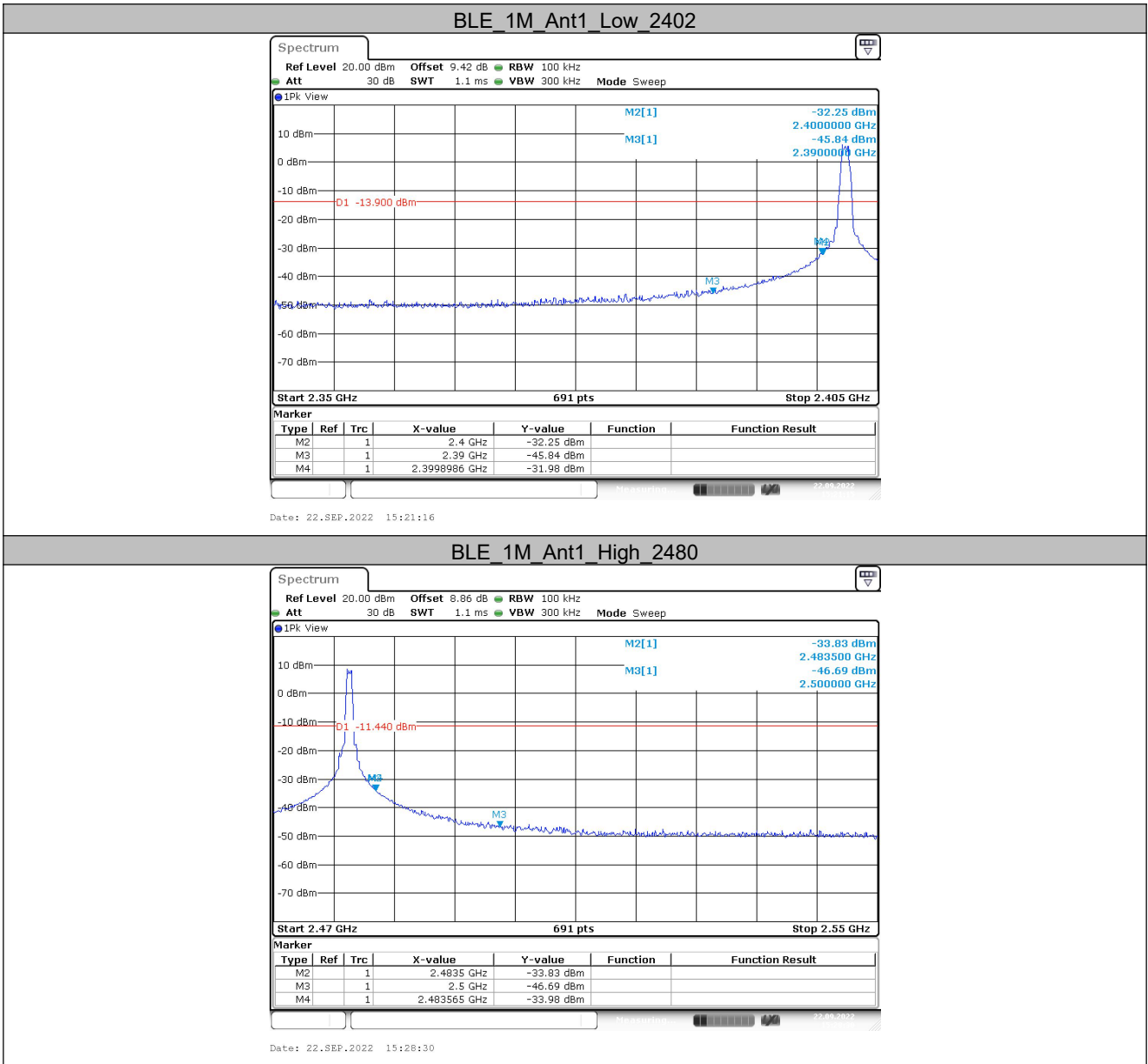
6.6 Band edge measurements

6.6.1 Test Result

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	6.10	-31.98	≤ -13.9	PASS
		High	2480	8.56	-33.98	≤ -11.44	PASS



6.6.2 Test Graphs





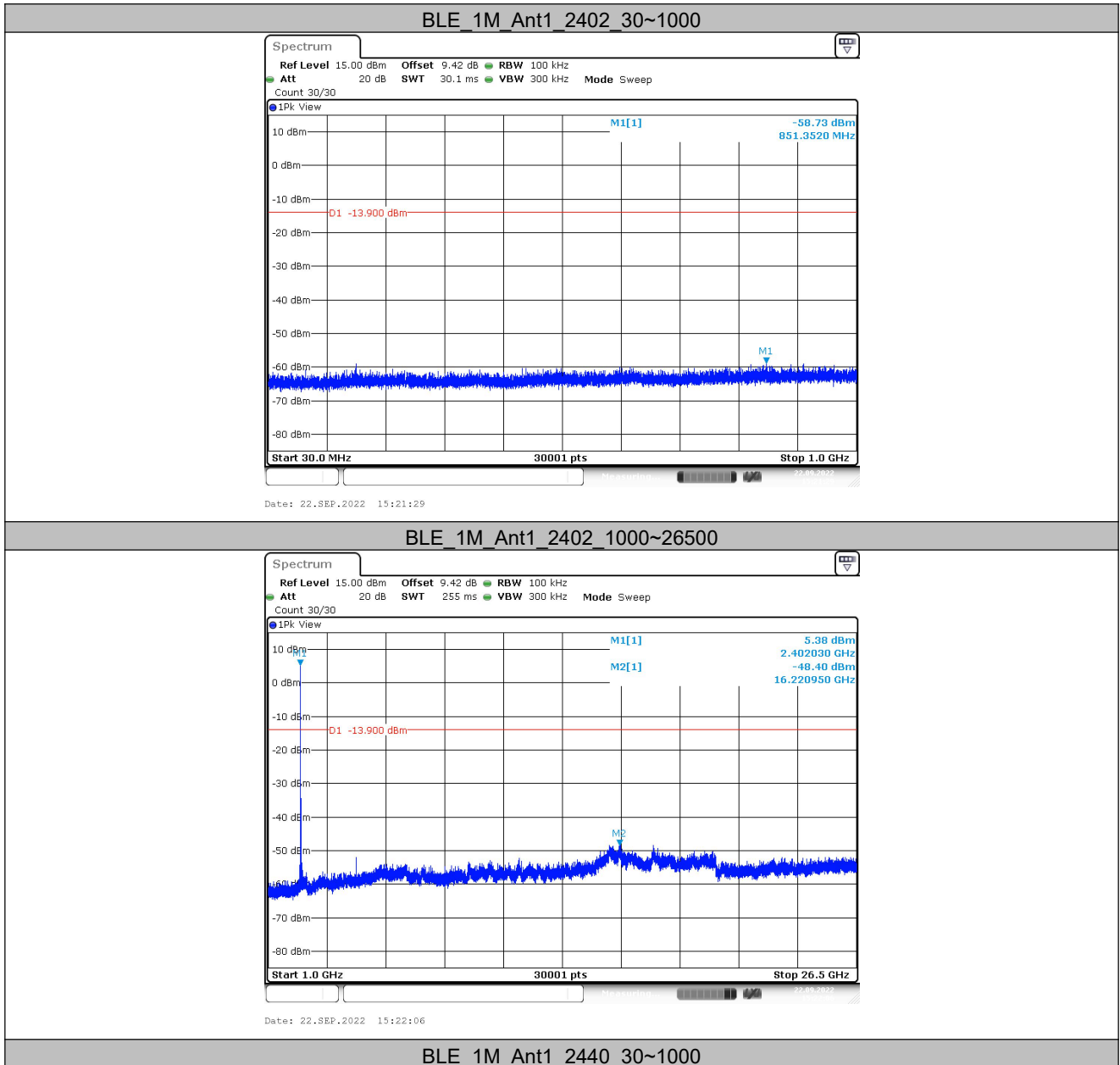
6.7 OUT OF BAND EMISSION MEASUREMENT

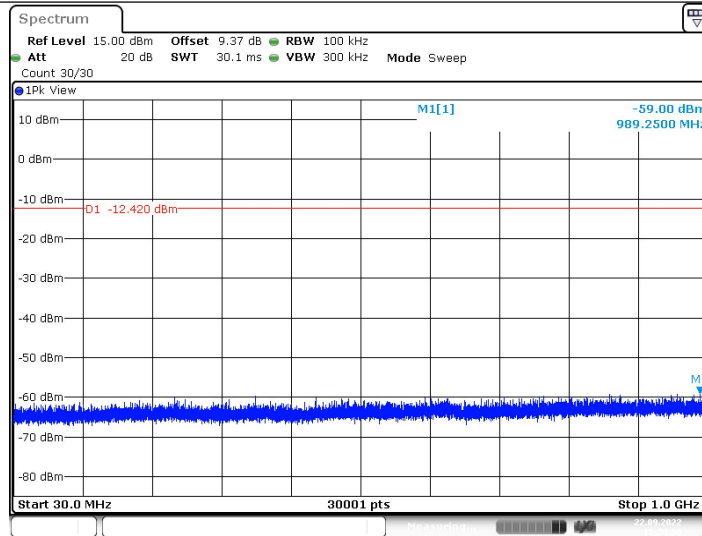
6.7.1 Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	30~1000	6.10	-58.73	≤-13.9	PASS
			1000~26500	6.10	-48.4	≤-13.9	PASS
		2440	30~1000	7.58	-59	≤-12.42	PASS
			1000~26500	7.58	-47.74	≤-12.42	PASS
		2480	30~1000	8.56	-59.53	≤-11.44	PASS
			1000~26500	8.56	-46.1	≤-11.44	PASS



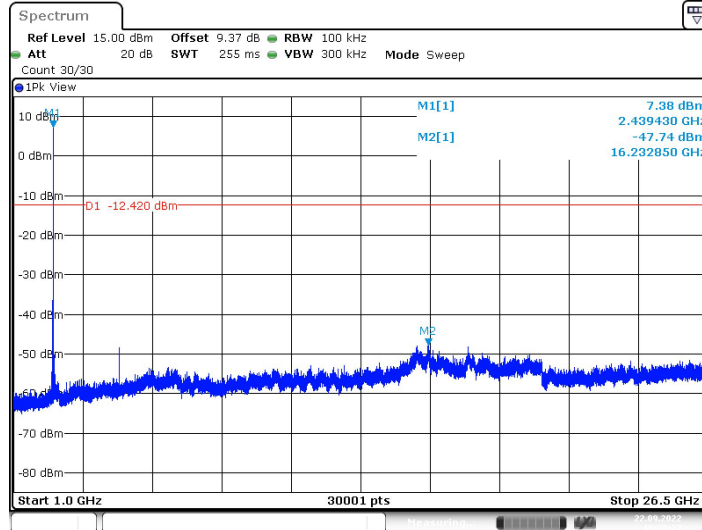
6.7.2 Test Graphs





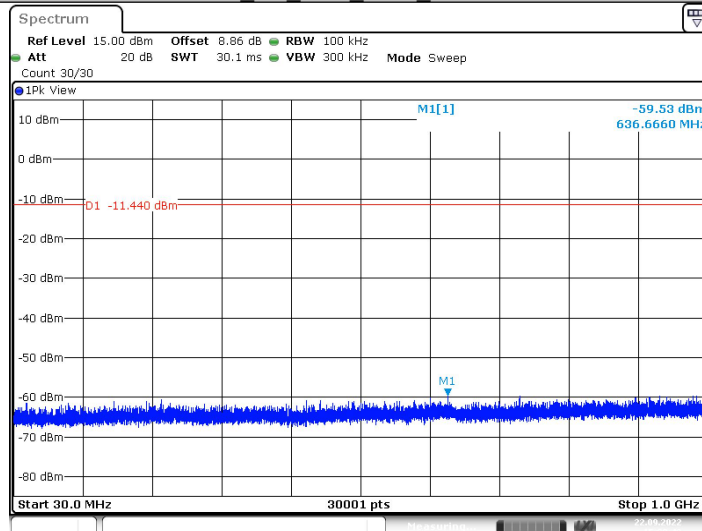
Date: 22.SEP.2022 15:24:50

BLE 1M Ant1 2440_1000~26500

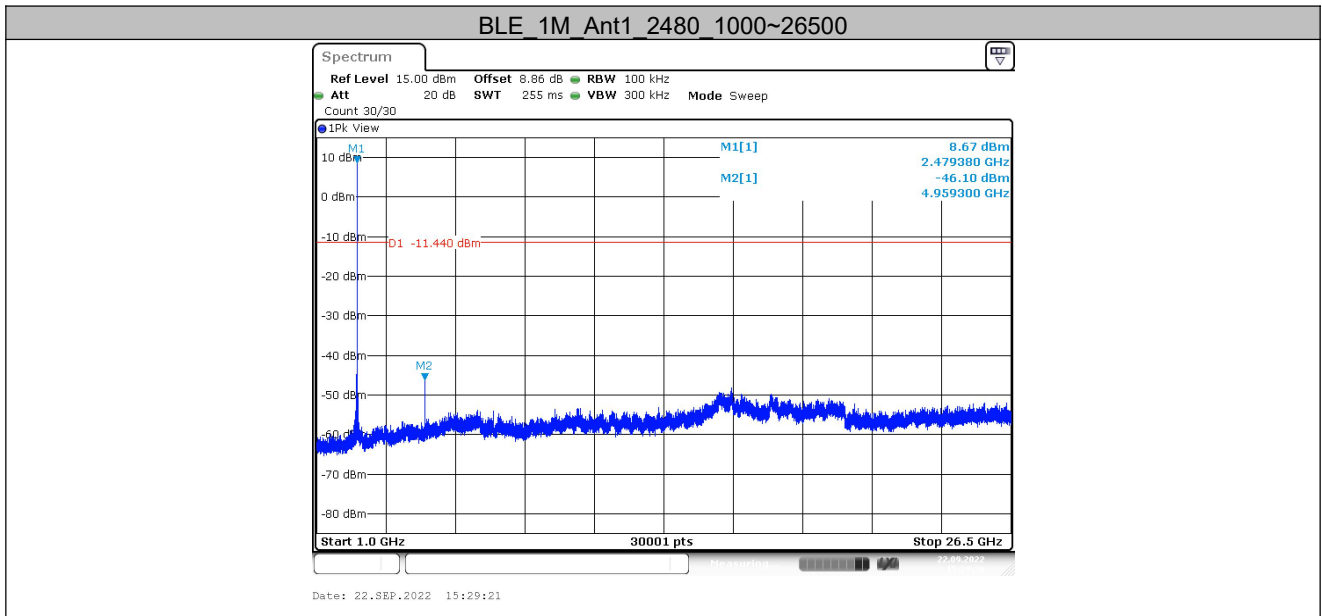


Date: 22.SEP.2022 15:25:27

BLE 1M Ant1 2480_30~1000



Date: 22.SEP.2022 15:28:44





Important

- (1) The test report is valid without the official stamp of CVC;
- (2) Any part photocopies of the test report are forbidden without the written permission from CVC;
- (3) The test report is invalid without the signatures of Approval and Reviewer;
- (4) The test report is invalid if altered;
- (5) Objections to the test report must be submitted to CVC within 15 days.
- (6) Generally, commission test is responsible for the tested samples only.
- (7) As for the test result “-” or “N” means “not applicable”, “/” means “not test”, “P” means “pass” and “F” means “fail”

The test data and test results given in this test report should only be used for purposes of scientific research, teaching and internal quality control when the CMA symbol is not presented.

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