

TEST REPORT

Applicant: Intermatic Inc

Address of Applicant: 7777 Winn Road, Spring Grove, Illinois 60081, United States

Manufacturer: Intermatic Inc

Address of Manufacturer: 7777 Winn Road, Spring Grove, Illinois 60081, United States

Equipment Under Test (EUT)

Product Name: Programmable Switches

Model No.: ALC-4B-BT, ALC-2B-BT

FCC ID: DGZALC24B

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: January 18, 2024

Date of Test: January 19-26, 2024

Date of report issued: January 26, 2024

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Robinson Luo

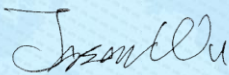
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	January 26, 2024	Original

Prepared By:

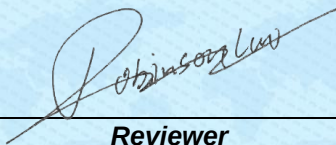


Date:

January 26, 2024

Project Engineer

Check By:



Reviewer

Date:

January 26, 2024

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Output Power	15.247 (b)(3)	Pass
Channel Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Remarks:

1. Pass: The EUT complies with the essential requirements in the standard.
2. Test according to ANSI C63.10:2013

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz-30MHz	3.1dB	(1)
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	Programmable Switches
Model No.:	ALC-4B-BT, ALC-2B-BT
Test Model No.:	ALC-4B-BT, ALC-2B-BT
Remark: The product models ALC-4B-BT , ALC-2B-BT are identical in the same PCB layout, interior structure and electrical circuits, the difference is the for ALC-4B-BT for 4 key control, ALC-2B-BT for 2 key control.	
Test sample(s) ID:	GTS2024010241-1
Sample(s) Status:	Engineer sample
S/N:	N/A
Hardware Version	V1.0
Software Version	V1.0
Operation Frequency:	2402MHz~2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Data Rate:	LE 2M PHY: 2 Mb/s LE 1M PHY: 1 Mb/s
Antenna Type:	PCB Antenna
Antenna Gain:	-3.34dBi(declare by applicant)
Power Supply:	DC 24V or DC 3V(1*3V Size“CR2032” Battery)

Remark:

1. Antenna gain information provided by the customer
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.

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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: New battery is used during all test.	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
MEILI	DC POWER SUPPLY	MCH-305A	11121168

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations: ● FCC—Registration No.: 381383 Designation Number: CN5029 Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. ● ISED—Registration No.: 9079A CAB identifier: CN0091 The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing ● NVLAP (LAB CODE:600179-0) Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).
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5.7 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

5.8 Additional Instructions

Test Software	Special test software provided by manufacturer
Power level setup	Default

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	June 23, 2021	June 22, 2024
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 14, 2023	April 13, 2024
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 19, 2023	March 18, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	April 17, 2023	April 16, 2025
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 14, 2023	April 13, 2024
8	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 13, 2023	Nov.12, 2024
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 14, 2023	April 13, 2024
10	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 14, 2023	April 13, 2024
11	Horn Antenna (18-26.5GHz)	/	UG-598A/U	GTS664	Oct. 29, 2023	Oct. 28, 2024
12	Horn Antenna (26.5-40GHz)	A.H Systems	SAS-573	GTS665	Oct. 29, 2023	Oct. 28, 2024
13	FSV·Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	March 13, 2023	March 12, 2024
14	Amplifier	/	LNA-1000-30S	GTS650	April 14, 2023	April 13, 2024
15	CDNE M2+M3-16A	HCT	30MHz-300MHz	GTS692	Nov. 08, 2023	Nov.07, 2024
16	Wideband Amplifier	/	WDA-01004000-15P35	GTS602	April 14, 2023	April 13, 2024
17	Thermo meter	JINCHUANG	GSP-8A	GTS643	April 19, 2023	April 18, 2024
18	RE cable 1	GTS	N/A	GTS675	July 31. 2023	July 30. 2024
19	RE cable 2	GTS	N/A	GTS676	July 31. 2023	July 30. 2024
20	RE cable 3	GTS	N/A	GTS677	July 31. 2023	July 30. 2024
21	RE cable 4	GTS	N/A	GTS678	July 31. 2023	July 30. 2024
22	RE cable 5	GTS	N/A	GTS679	July 31. 2023	July 30. 2024
23	RE cable 6	GTS	N/A	GTS680	July 31. 2023	July 30. 2024
24	RE cable 7	GTS	N/A	GTS681	July 31. 2023	July 30. 2024
25	RE cable 8	GTS	N/A	GTS682	July 31. 2023	July 30. 2024

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	July 12, 2022	July 11, 2027
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 14, 2023	April 13, 2024
3	LISN	ROHDE & SCHWARZ	ENV216	GTS226	April 14, 2023	April 13, 2024
4	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
6	Thermo meter	JINCHUANG	GSP-8A	GTS642	April 19, 2023	April 18, 2024
7	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	April 14, 2023	April 13, 2024
8	ISN	SCHWARZBECK	NTFM 8158	GTS565	April 14, 2023	April 13, 2024
9	High voltage probe	SCHWARZBECK	TK9420	GTS537	April 14, 2023	April 13, 2024
10	Antenna end assembly	Weinschel	1870A	GTS560	April 14, 2023	April 13, 2024

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	April 14, 2023	April 13, 2024
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 14, 2023	April 13, 2024
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	April 14, 2023	April 13, 2024
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 14, 2023	April 13, 2024
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 14, 2023	April 13, 2024
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 14, 2023	April 13, 2024
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 14, 2023	April 13, 2024
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 14, 2023	April 13, 2024
9	Thermo meter	JINCHUANG	GSP-8A	GTS641	April 19, 2023	April 18, 2024
10	EXA Signal Analyzer	Keysight	N9010B	MY60241168	Nov. 03, 2023	Nov. 02, 2024

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	KUMAO	SF132	GTS647	April 19, 2023	April 18, 2024

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
E.U.T Antenna:	
The antenna is PCB antenna, reference to the appendix II for details	

7.2 Conducted Emissions

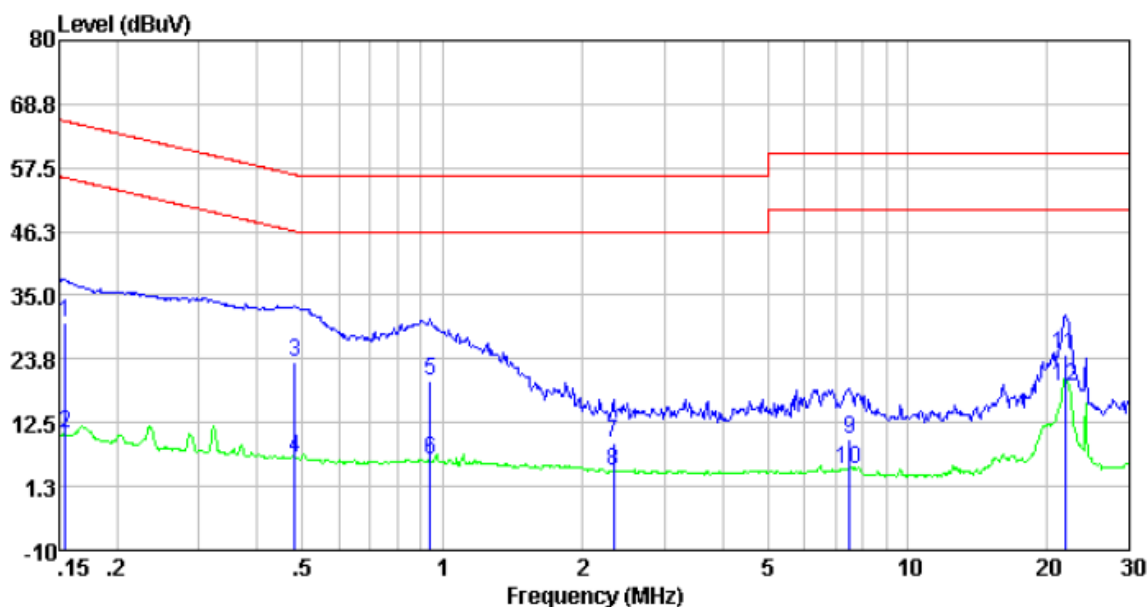
Test Requirement:	FCC Part15 C Section 15.207						
Test Method:	ANSI C63.10:2013						
Test Frequency Range:	150KHz to 30MHz						
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto						
Limit:	Frequency range (MHz)		Limit (dBuV)				
			Quasi-peak		Average		
	0.15-0.5		66 to 56*		56 to 46*		
	0.5-5		56		46		
	5-30		60		50		
* Decreases with the logarithm of the frequency.							
Test setup:	Reference Plane 40cm LISN 40cm AUX Equipment E.U.T Test table/Insulation plane 80cm 40cm LISN Filter EMI Receiver AC power Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m						
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.						
Test Instruments:	Refer to section 6.0 for details						
Test mode:	Refer to section 5.2 for details						
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar	
Test voltage:	AC 120V, 60Hz						
Test results:	Pass						

Measurement data

Pre-scan all test modes, found worst case at 2402MHz, and so only show the test result of 2402MHz, Both 1MHz and 2MHz bandwidth were tested and passed, only report the worst condition (GFSK_1MHz)

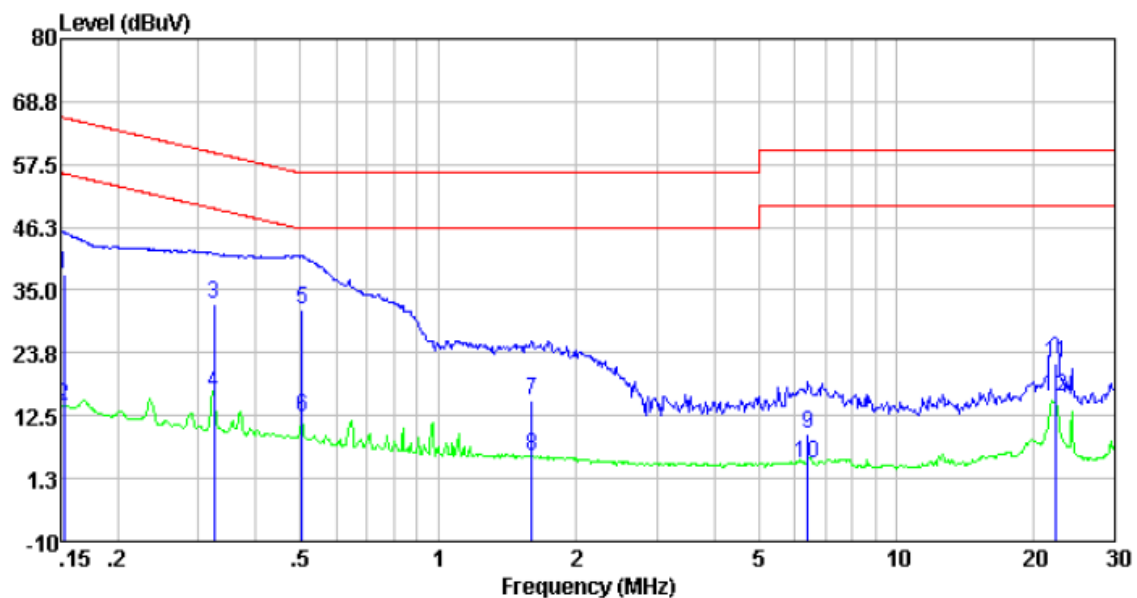
Model No.: ALC-4B-BT

Line:



Freq	Reading	LISN/ISN	Cable		Limit	Over	
	level	factor	loss	Level	level	limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.15	20.69	9.56	0.01	30.26	65.74	-35.48	QP
0.15	0.86	9.56	0.01	10.43	55.74	-45.31	Average
0.48	13.67	9.49	0.01	23.17	56.32	-33.15	QP
0.48	-3.16	9.49	0.01	6.34	46.32	-39.98	Average
0.94	10.51	9.49	0.03	20.03	56.00	-35.97	QP
0.94	-3.64	9.49	0.03	5.88	46.00	-40.12	Average
2.33	-0.82	9.58	0.05	8.81	56.00	-47.19	QP
2.33	-5.64	9.58	0.05	3.99	46.00	-42.01	Average
7.53	0.24	9.31	0.09	9.64	60.00	-50.36	QP
7.53	-5.08	9.31	0.09	4.32	50.00	-45.68	Average
21.83	14.41	10.00	0.19	24.60	60.00	-35.40	QP
21.83	8.78	10.00	0.19	18.97	50.00	-31.03	Average

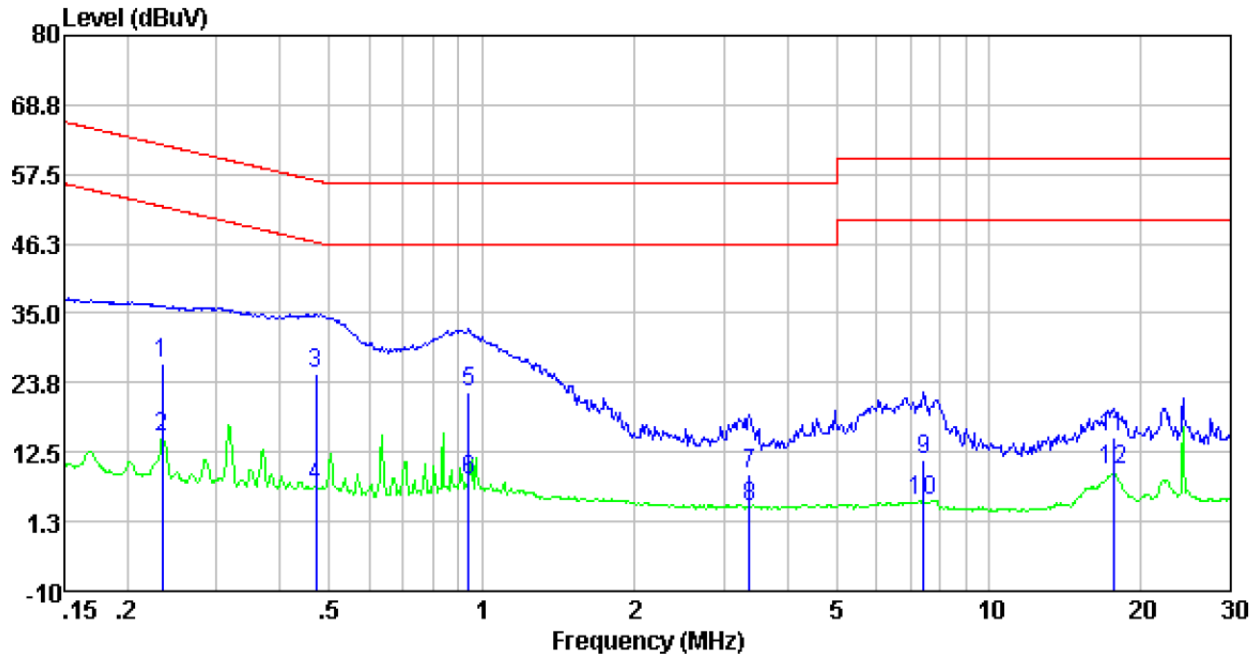
Neutral:



Freq	Reading	LISN/ISN	Cable	Level	Limit	Over	Remark
MHz	dBuV	factor	loss	dBuV	dBuV	limit	
0.15	28.15	9.55	0.01	37.71	65.87	-28.16	QP
0.15	4.71	9.55	0.01	14.27	55.87	-41.60	Average
0.32	23.10	9.56	0.01	32.67	59.62	-26.95	QP
0.32	7.16	9.56	0.01	16.73	49.62	-32.89	Average
0.50	21.95	9.57	0.01	31.53	56.00	-24.47	QP
0.50	2.57	9.57	0.01	12.15	46.00	-33.85	Average
1.60	5.70	9.55	0.04	15.29	56.00	-40.71	QP
1.60	-4.42	9.55	0.04	5.17	46.00	-40.83	Average
6.42	-0.32	9.54	0.08	9.30	60.00	-50.70	QP
6.42	-5.54	9.54	0.08	4.08	50.00	-45.92	Average
22.30	11.44	10.18	0.19	21.81	60.00	-38.19	QP
22.30	5.50	10.18	0.19	15.87	50.00	-34.13	Average

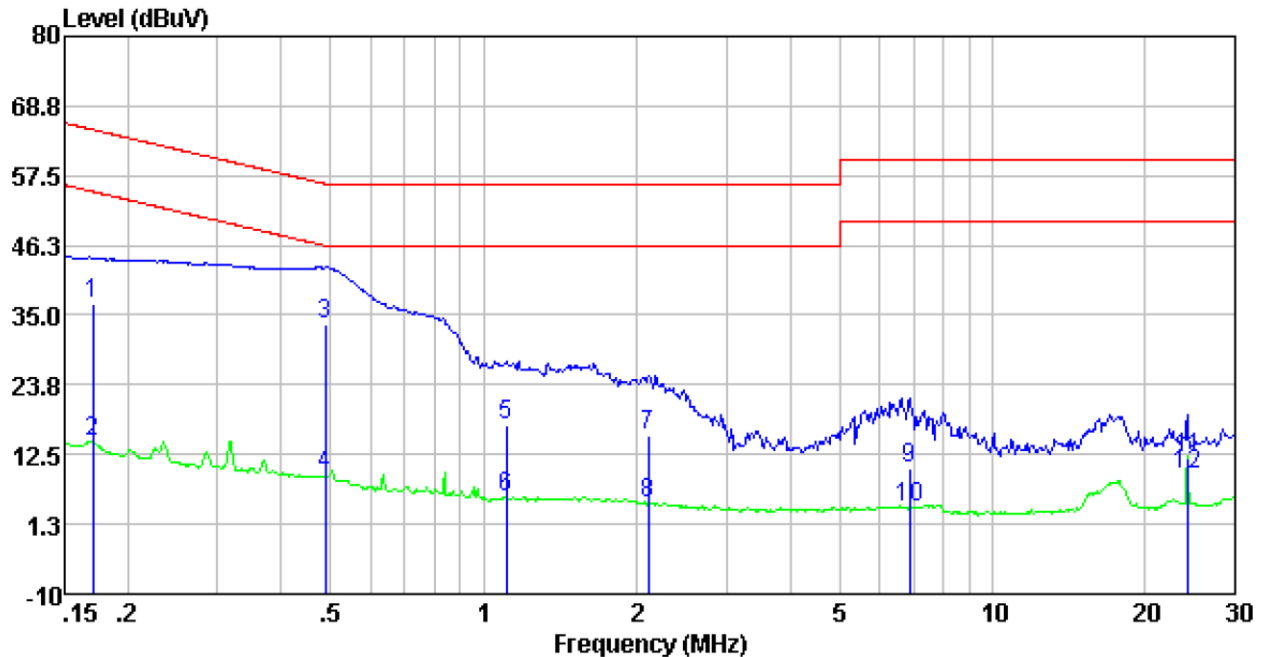
Model No.: ALC-2B-BT

Line:



Freq	Reading	LISN/ISN	Cable		Limit	Over	
	level	factor	loss	Level	level	limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.23	17.29	9.51	0.01	26.81	62.30	-35.49	QP
0.23	5.32	9.51	0.01	14.84	52.30	-37.46	Average
0.47	15.65	9.49	0.01	25.15	56.49	-31.34	QP
0.47	-2.42	9.49	0.01	7.08	46.49	-39.41	Average
0.94	12.67	9.49	0.03	22.19	56.00	-33.81	QP
0.94	-1.72	9.49	0.03	7.80	46.00	-38.20	Average
3.36	-0.57	9.52	0.05	9.00	56.00	-47.00	QP
3.36	-5.83	9.52	0.05	3.74	46.00	-42.26	Average
7.45	1.96	9.31	0.09	11.36	60.00	-48.64	QP
7.45	-4.86	9.31	0.09	4.54	50.00	-45.46	Average
17.57	4.78	9.81	0.17	14.76	60.00	-45.24	QP
17.57	-0.38	9.81	0.17	9.60	50.00	-40.40	Average

Neutral:

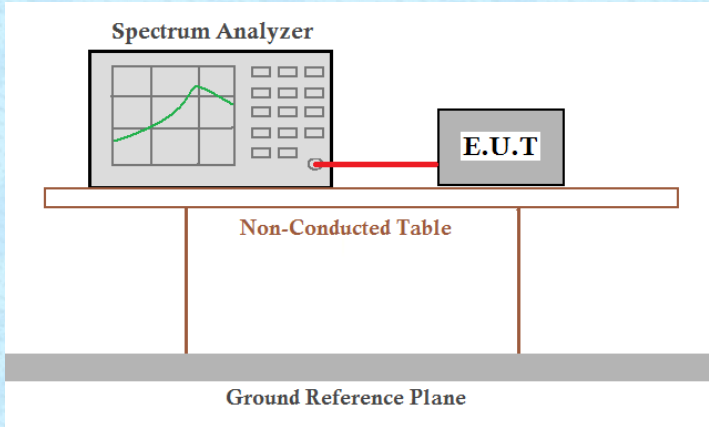


Freq	Reading	LISN/ISN	Cable	Level	Limit	Over	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.17	27.24	9.55	0.01	36.80	64.94	-28.14	QP
0.17	4.99	9.55	0.01	14.55	54.94	-40.39	Average
0.49	23.90	9.57	0.01	33.48	56.19	-22.71	QP
0.49	-0.37	9.57	0.01	9.21	46.19	-36.98	Average
1.11	7.51	9.55	0.03	17.09	56.00	-38.91	QP
1.11	-3.97	9.55	0.03	5.61	46.00	-40.39	Average
2.11	5.98	9.55	0.05	15.58	56.00	-40.42	QP
2.11	-5.11	9.55	0.05	4.49	46.00	-41.51	Average
6.88	0.52	9.53	0.08	10.13	60.00	-49.87	QP
6.88	-5.71	9.53	0.08	3.90	50.00	-46.10	Average
24.23	1.53	10.25	0.19	11.97	60.00	-48.03	QP
24.23	-1.26	10.25	0.19	9.18	50.00	-40.82	Average

Notes:

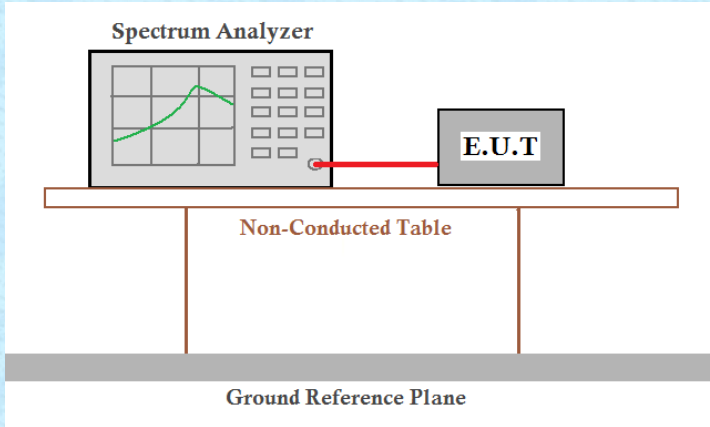
1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 Conducted Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	30dBm
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

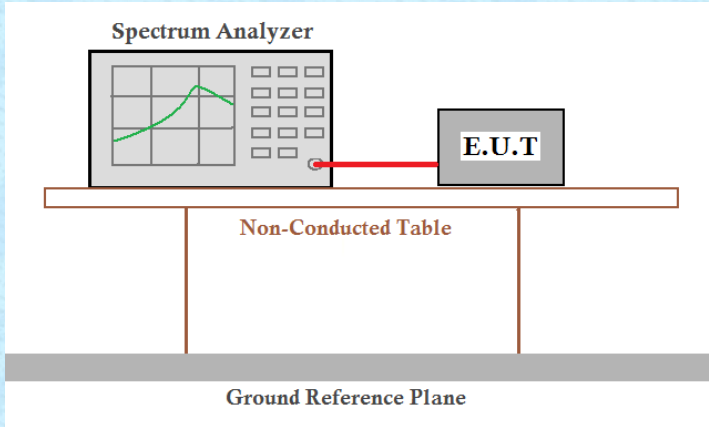
Measurement Data: The detailed test data see Appendix for BLE.

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	>500KHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer, showing a frequency spectrum on its screen, is connected to an Equipment Under Test (E.U.T.) by a red cable. Both the Spectrum Analyzer and the E.U.T. are positioned on a Non-Conducted Table. This table is supported by a Ground Reference Plane, which is represented by a thick grey bar at the bottom of the setup area.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for BLE.

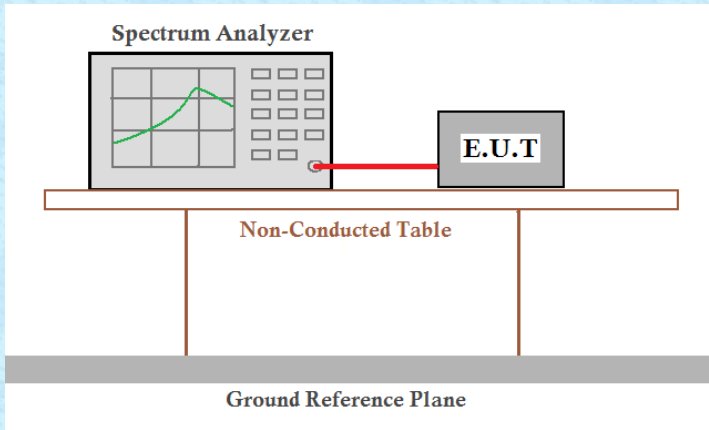
7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	8dBm/3kHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer, shown with a green trace on its screen, is connected to an E.U.T. (Equipment Under Test) by a red cable. Both the Spectrum Analyzer and the E.U.T. are positioned on a Non-Conducted Table. This table is supported by a Ground Reference Plane, which is represented by a thick grey bar at the bottom of the setup.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for BLE.

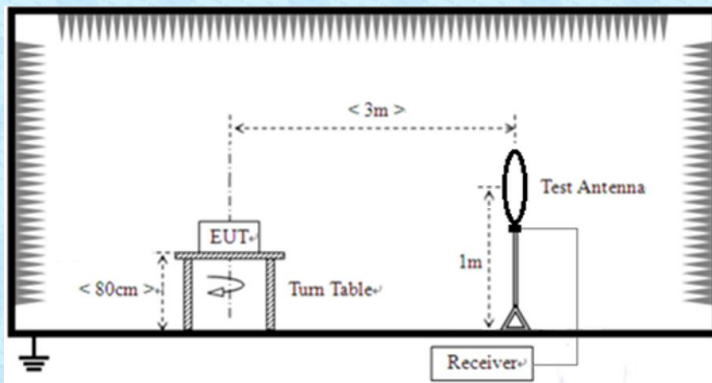
7.6 Spurious Emission in Non-restricted & restricted Bands

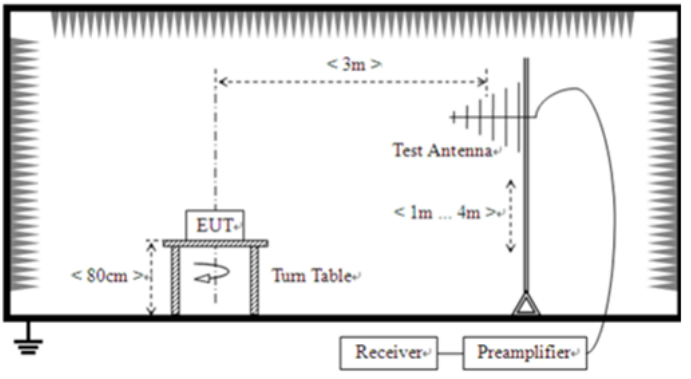
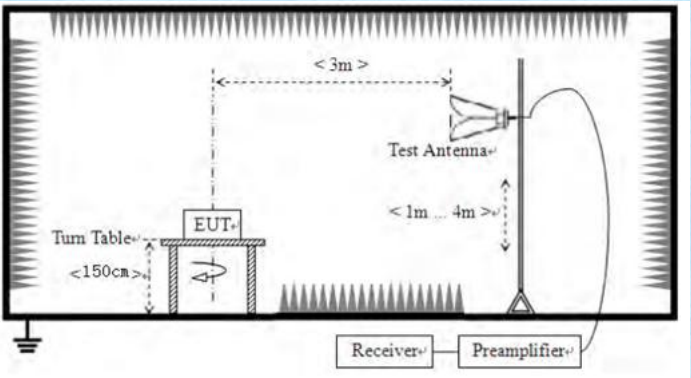
7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for BLE.

7.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Note: For Duty cycle $\geq 98\%$, average detector set as above For Duty cycle $< 98\%$, average detector set as below: $VBW \geq 1 / T$					
Limit:	Frequency	Limit (uV/m)	Value	Measurement Distance	
	0.009MHz-0.490MHz	2400/F(KHz)	QP/PK/AV	300m	
	0.490MHz-1.705MHz	24000/F(KHz)	QP	30m	
	1.705MHz-30MHz	30	QP	30m	
	30MHz-88MHz	100	QP	3m	
	88MHz-216MHz	150	QP		
	216MHz-960MHz	200	QP		
	960MHz-1GHz	500	QP		
	Above 1GHz	500	Average		
		5000	Peak		
Test setup:	For radiated emissions from 9kHz to 30MHz				
					

	For radiated emissions from 30MHz to 1GHz  For radiated emissions above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement data:

Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

■ 9kHz~30MHz

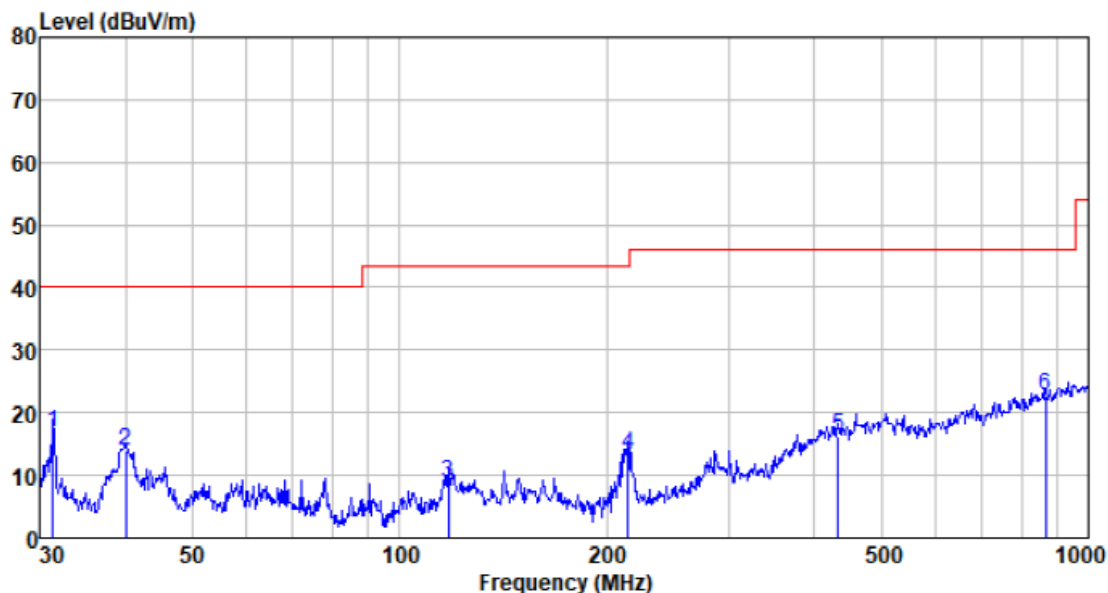
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

■ Below 1GHz

Pre-scan all test modes, found worst case at 2402MHz, and so only show the test result of 2402MHz, Both 1MHz and 2MHz bandwidth were tested and passed, only report the worst condition (GFSK_1MHz)

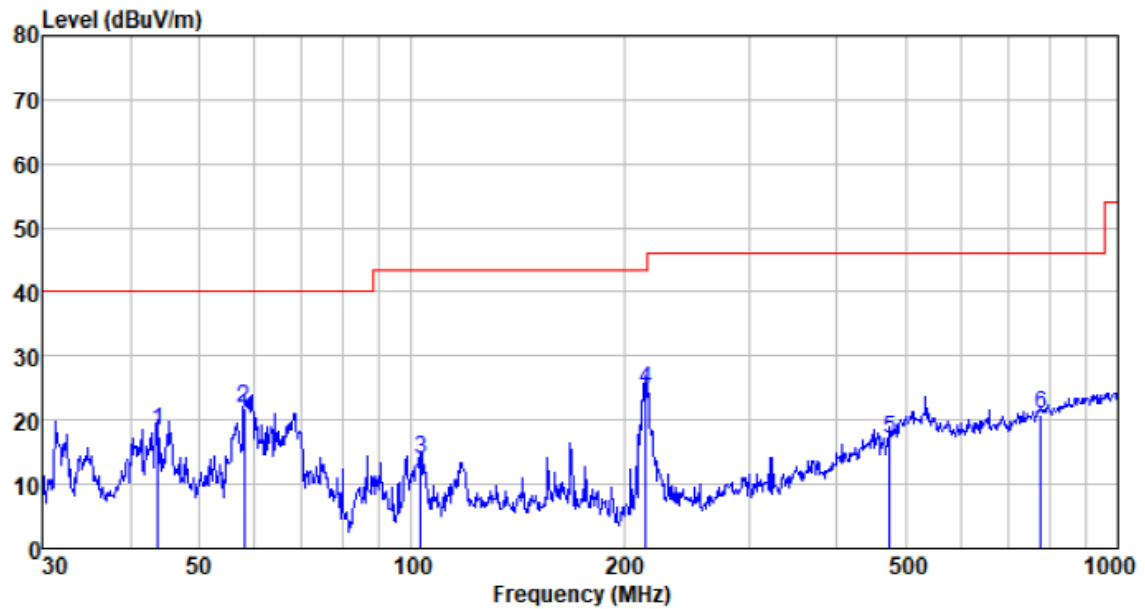
Model No.: ALC-4B-BT

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
31.399	37.82	12.28	0.57	33.79	16.88	40.00	-23.12	QP
39.994	33.56	13.50	0.66	33.73	13.99	40.00	-26.01	QP
117.773	29.93	11.05	1.34	33.41	8.91	43.50	-34.59	QP
214.514	34.19	10.01	1.93	32.78	13.35	43.50	-30.15	QP
432.546	29.02	16.37	3.01	32.20	16.20	46.00	-29.80	QP
866.088	25.53	23.51	4.73	31.06	22.71	46.00	-23.29	QP

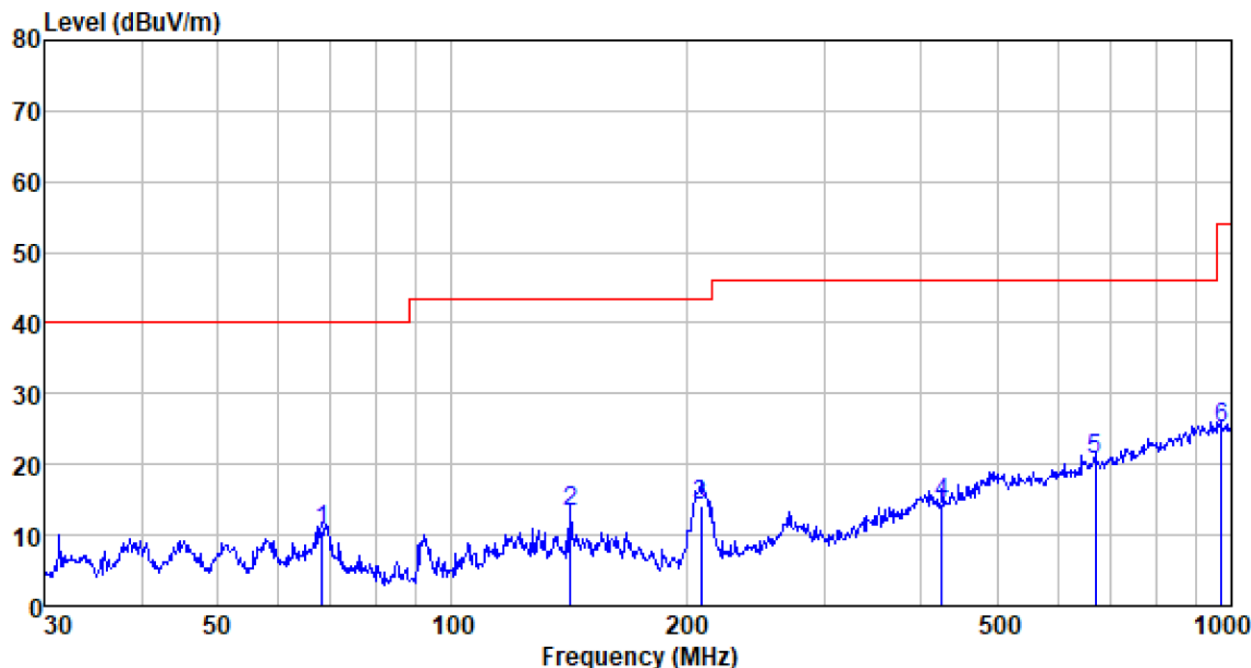
Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
43.812	37.82	13.38	0.71	33.71	18.20	40.00	-21.80	QP
57.999	41.95	12.71	0.84	33.64	21.86	40.00	-18.14	QP
103.080	36.40	9.95	1.22	33.56	14.01	43.50	-29.49	QP
214.514	45.60	10.01	1.93	32.78	24.76	43.50	-18.74	QP
475.499	28.68	17.17	3.21	32.07	16.99	46.00	-29.01	QP
776.878	25.58	22.28	4.37	31.34	20.89	46.00	-25.11	QP

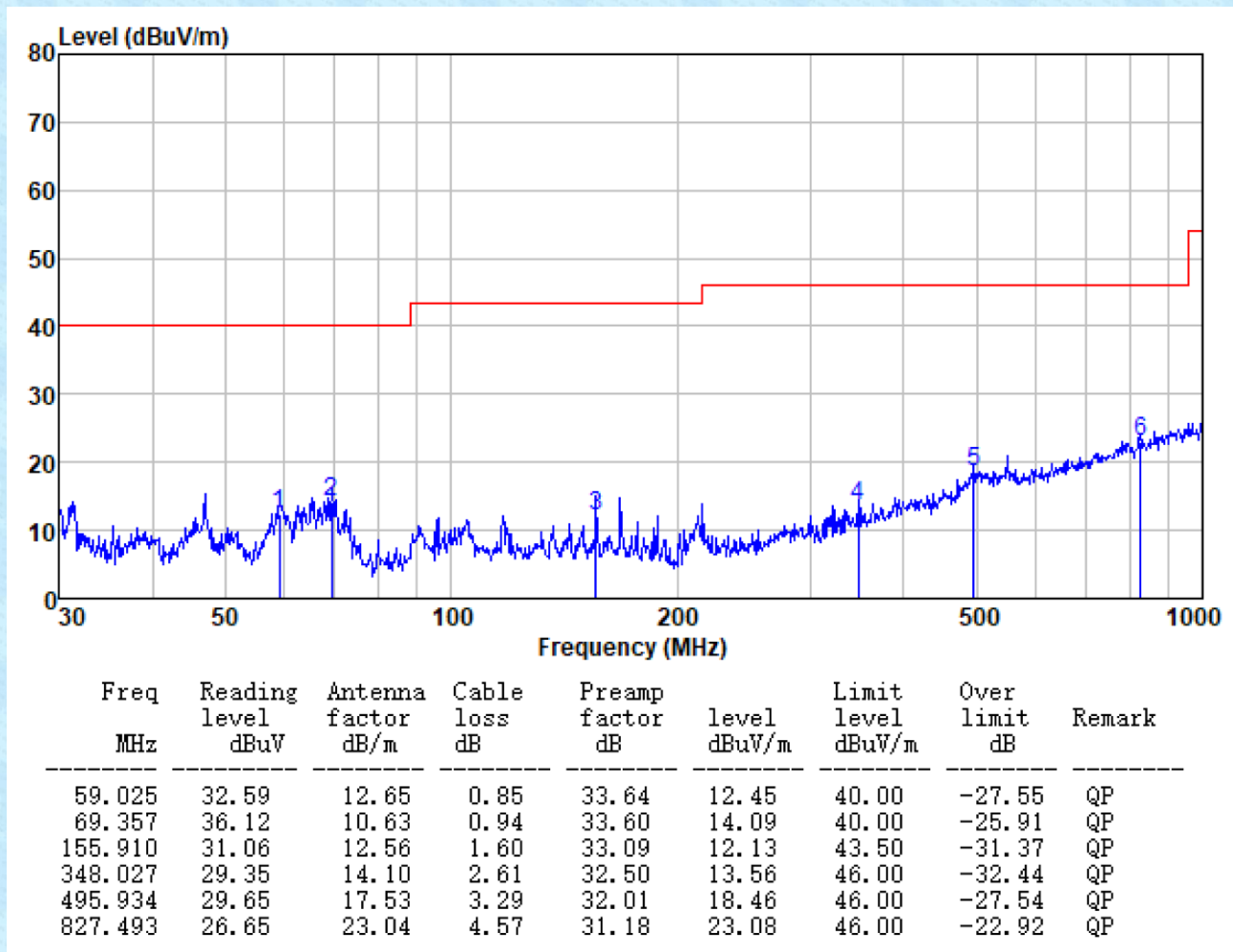
Model No.: ALC-2B-BT

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
68.151	32.52	10.86	0.93	33.61	10.70	40.00	-29.30	QP
141.826	32.65	12.42	1.52	33.20	13.39	43.50	-30.11	QP
208.580	35.49	9.68	1.89	32.79	14.27	43.50	-29.23	QP
425.028	27.45	16.22	2.97	32.22	14.42	46.00	-31.58	QP
668.142	27.95	20.35	3.97	31.66	20.61	46.00	-25.39	QP
972.337	26.24	24.49	5.12	30.77	25.08	54.00	-28.92	QP

Vertical:

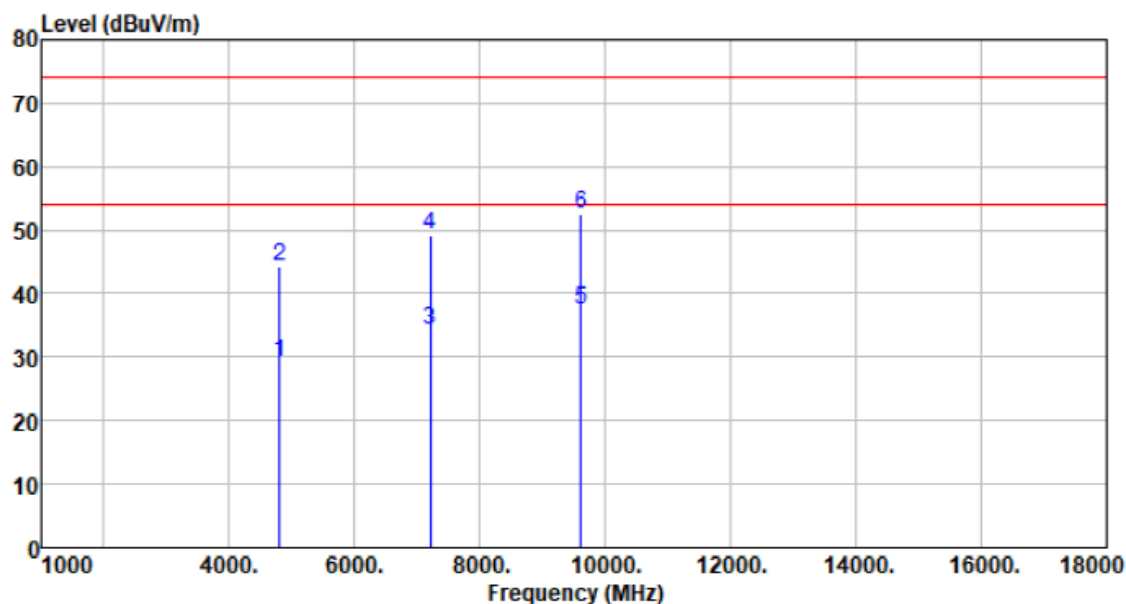


■ Above 1GHz

■ Unwanted Emissions in Non-restricted Frequency Bands

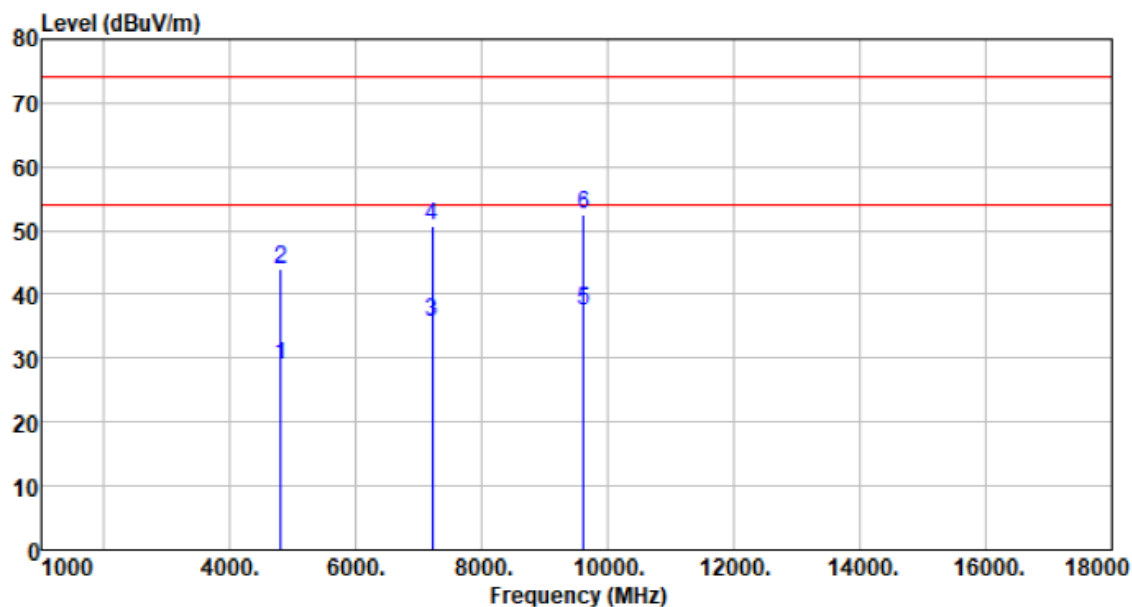
Model No.: ALC-4B-BT

Test channel:	Lowest	Polarization:	Horizontal
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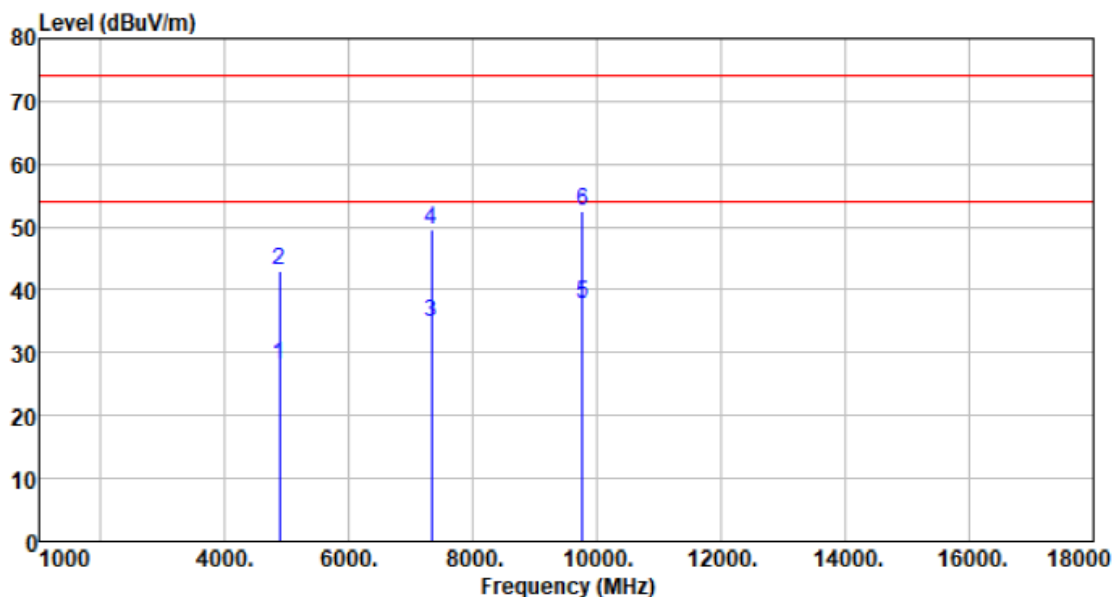
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4804.000	29.22	31.05	7.35	38.36	29.26	54.00	-24.74	Average
4804.000	44.15	31.05	7.35	38.36	44.19	74.00	-29.81	Peak
7206.000	27.93	35.91	9.49	38.96	34.37	54.00	-19.63	Average
7206.000	42.86	35.91	9.49	38.96	49.30	74.00	-24.70	Peak
9608.000	29.31	37.91	9.97	39.68	37.51	54.00	-16.49	Average
9608.000	44.24	37.91	9.97	39.68	52.44	74.00	-21.56	Peak

Test channel:	Lowest	Polarization:	Vertical
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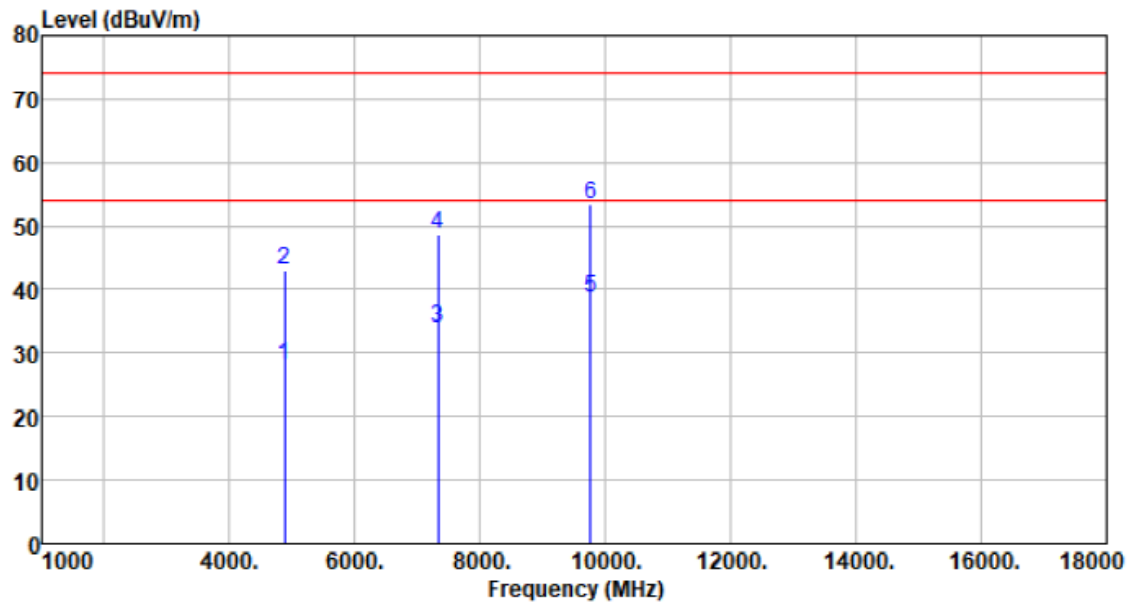
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4804.000	29.03	31.05	7.35	38.36	29.07	54.00	-24.93	Average
4804.000	43.96	31.05	7.35	38.36	44.00	74.00	-30.00	Peak
7206.000	29.26	35.91	9.49	38.96	35.70	54.00	-18.30	Average
7206.000	44.19	35.91	9.49	38.96	50.63	74.00	-23.37	Peak
9608.000	29.37	37.91	9.97	39.68	37.57	54.00	-16.43	Average
9608.000	44.30	37.91	9.97	39.68	52.50	74.00	-21.50	Peak

Test channel:	Middle	Polarization:	Horizontal
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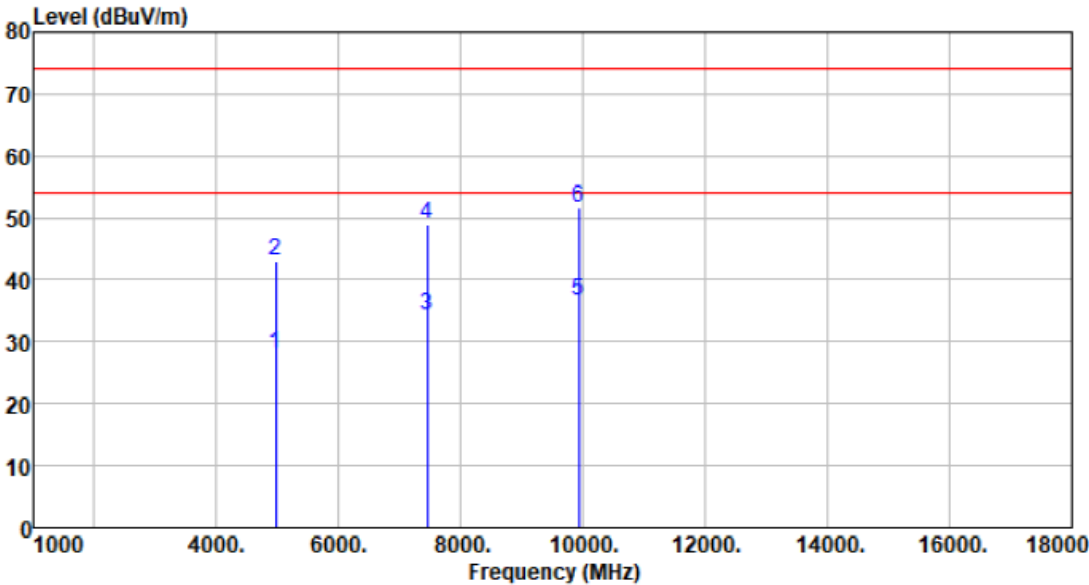
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.000	28.21	31.26	7.04	38.38	28.13	54.00	-25.87	Average
4880.000	43.14	31.26	7.04	38.38	43.06	74.00	-30.94	Peak
7320.000	28.38	36.14	9.18	39.00	34.70	54.00	-19.30	Average
7320.000	43.31	36.14	9.18	39.00	49.63	74.00	-24.37	Peak
9760.000	29.09	38.06	10.27	39.73	37.69	54.00	-16.31	Average
9760.000	44.02	38.06	10.27	39.73	52.62	74.00	-21.38	Peak

Test channel:	Middle	Polarization:	Vertical
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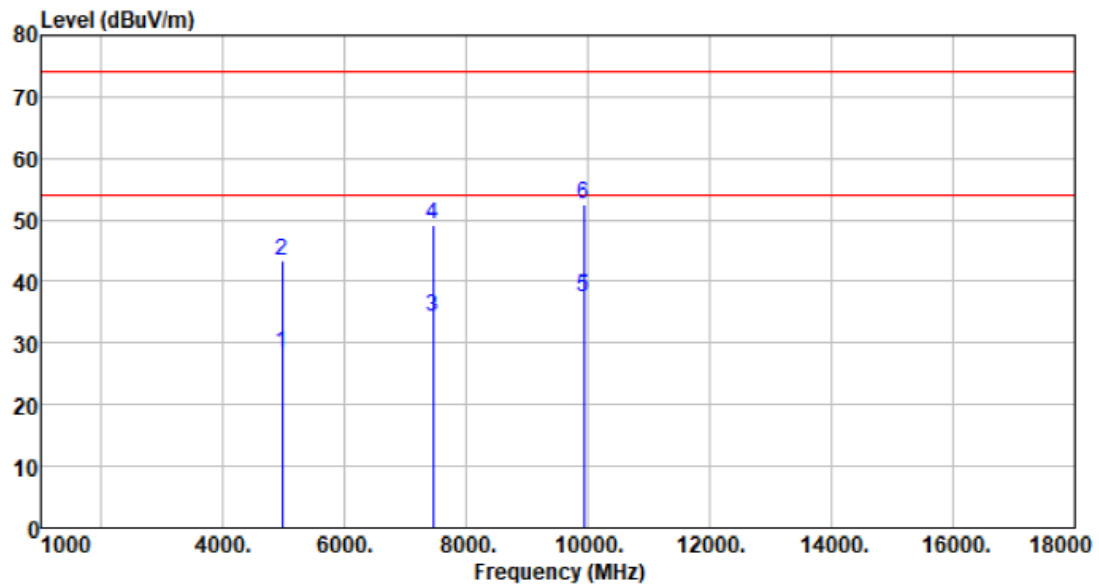
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.000	28.11	31.26	7.04	38.38	28.03	54.00	-25.97	Average
4880.000	43.04	31.26	7.04	38.38	42.96	74.00	-31.04	Peak
7320.000	27.51	36.14	9.18	39.00	33.83	54.00	-20.17	Average
7320.000	42.44	36.14	9.18	39.00	48.76	74.00	-25.24	Peak
9760.000	29.99	38.06	10.27	39.73	38.59	54.00	-15.41	Average
9760.000	44.92	38.06	10.27	39.73	53.52	74.00	-20.48	Peak

Test channel:	Highest	Polarization:	Horizontal
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4960.000	28.22	31.49	6.71	38.39	28.03	54.00	-25.97	Average
4960.000	43.15	31.49	6.71	38.39	42.96	74.00	-31.04	Peak
7440.000	27.77	36.38	9.02	39.03	34.14	54.00	-19.86	Average
7440.000	42.70	36.38	9.02	39.03	49.07	74.00	-24.93	Peak
9920.000	28.10	38.22	10.07	39.78	36.61	54.00	-17.39	Average
9920.000	43.03	38.22	10.07	39.78	51.54	74.00	-22.46	Peak

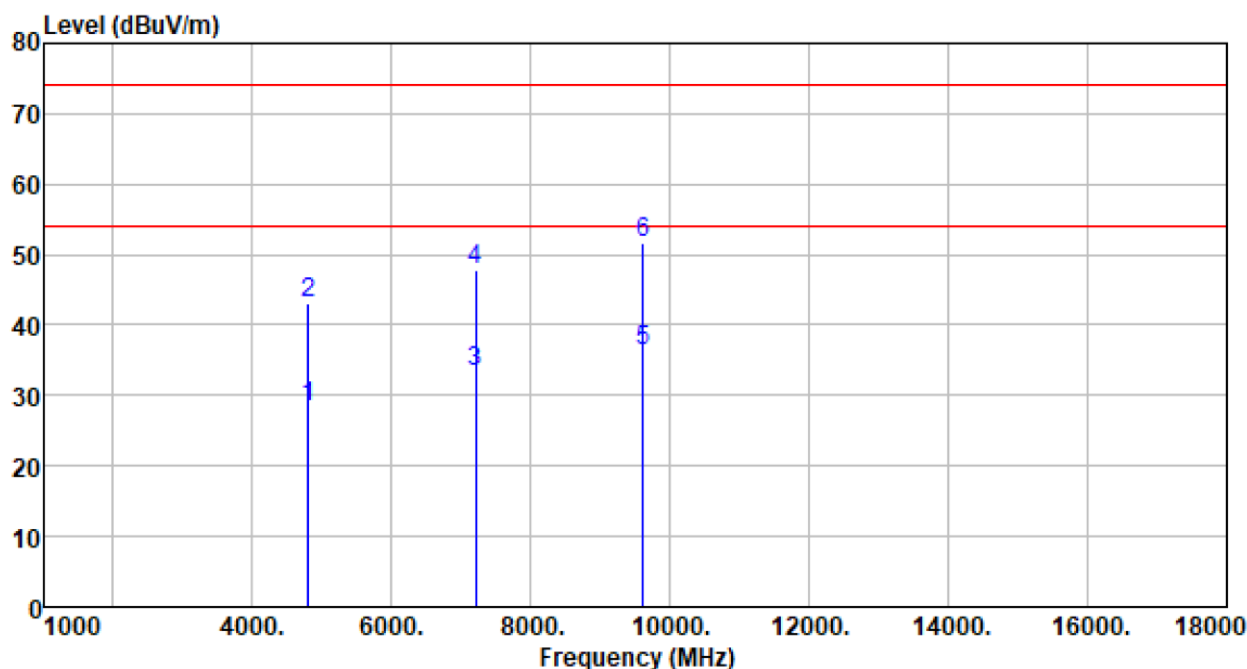
Test channel:	Highest	Polarization:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4960.000	28.54	31.49	6.71	38.39	28.35	54.00	-25.65	Average
4960.000	43.47	31.49	6.71	38.39	43.28	74.00	-30.72	Peak
7440.000	27.99	36.38	9.02	39.03	34.36	54.00	-19.64	Average
7440.000	42.92	36.38	9.02	39.03	49.29	74.00	-24.71	Peak
9920.000	29.12	38.22	10.07	39.78	37.63	54.00	-16.37	Average
9920.000	44.05	38.22	10.07	39.78	52.56	74.00	-21.44	Peak

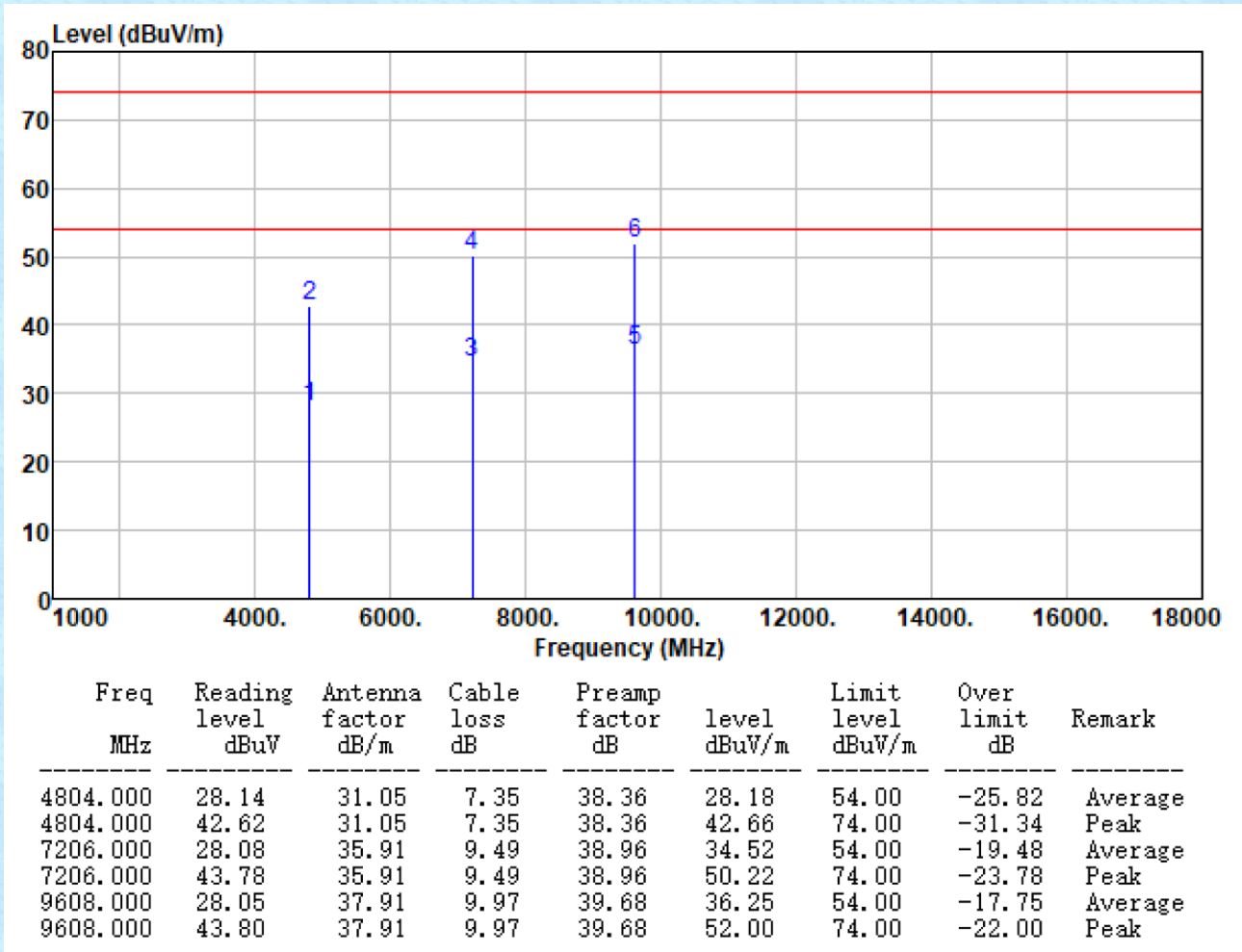
Model No.: ALC-2B-BT

Test channel:	Lowest	Polarization:	Horizontal
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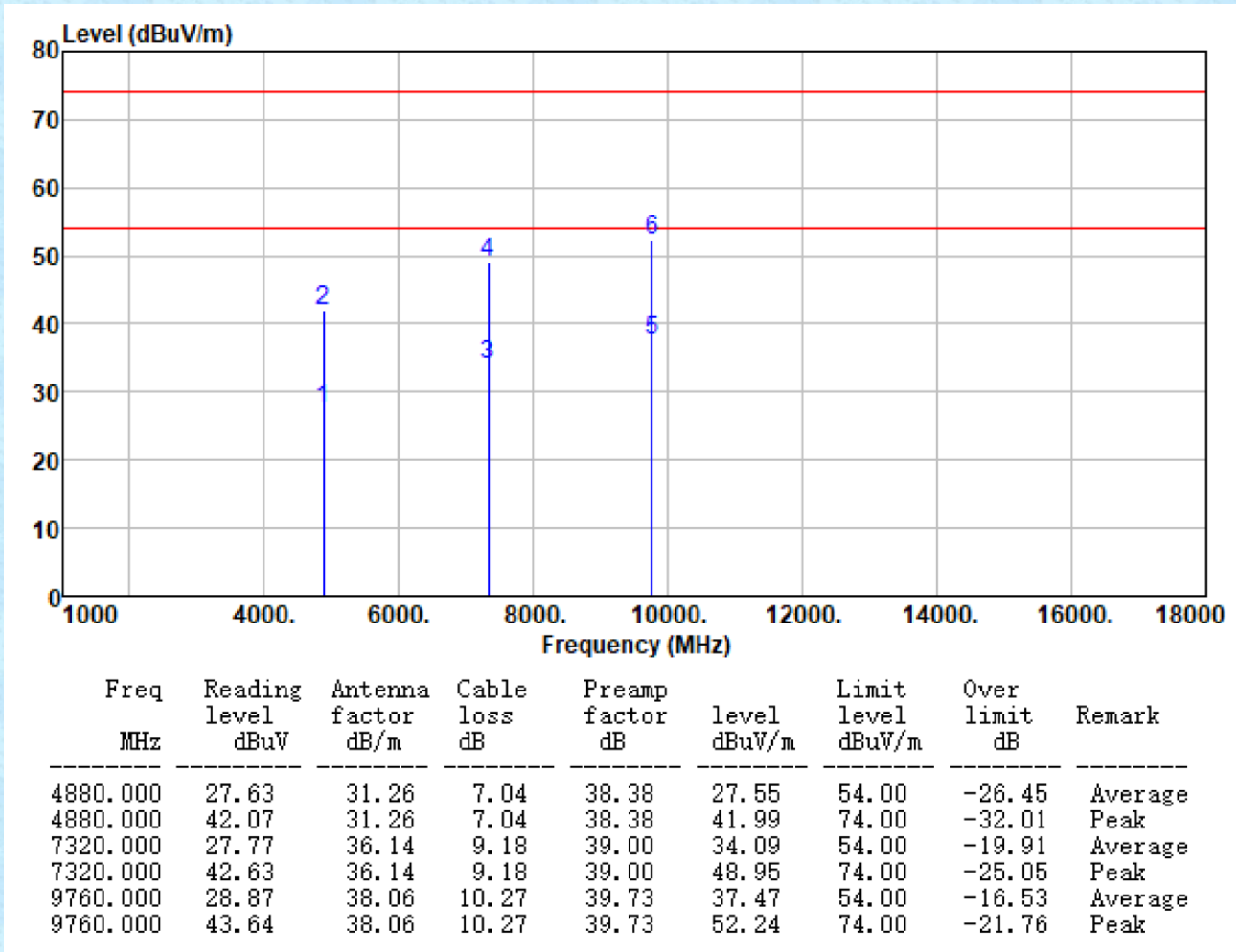


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4804.000	28.43	31.05	7.35	38.36	28.47	54.00	-25.53	Average
4804.000	43.05	31.05	7.35	38.36	43.09	74.00	-30.91	Peak
7206.000	26.90	35.91	9.49	38.96	33.34	54.00	-20.66	Average
7206.000	41.47	35.91	9.49	38.96	47.91	74.00	-26.09	Peak
9608.000	28.00	37.91	9.97	39.68	36.20	54.00	-17.80	Average
9608.000	43.49	37.91	9.97	39.68	51.69	74.00	-22.31	Peak

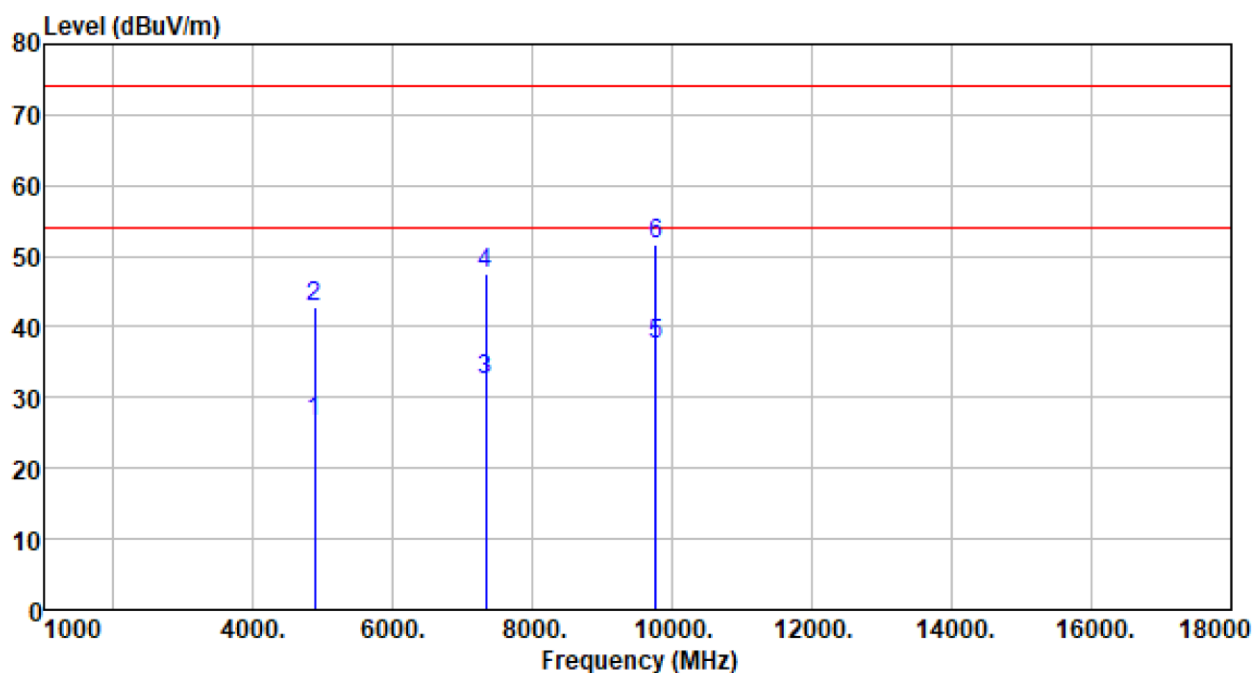
Test channel:	Lowest	Polarization:	Vertical
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Test channel:	Middle	Polarization:	Horizontal
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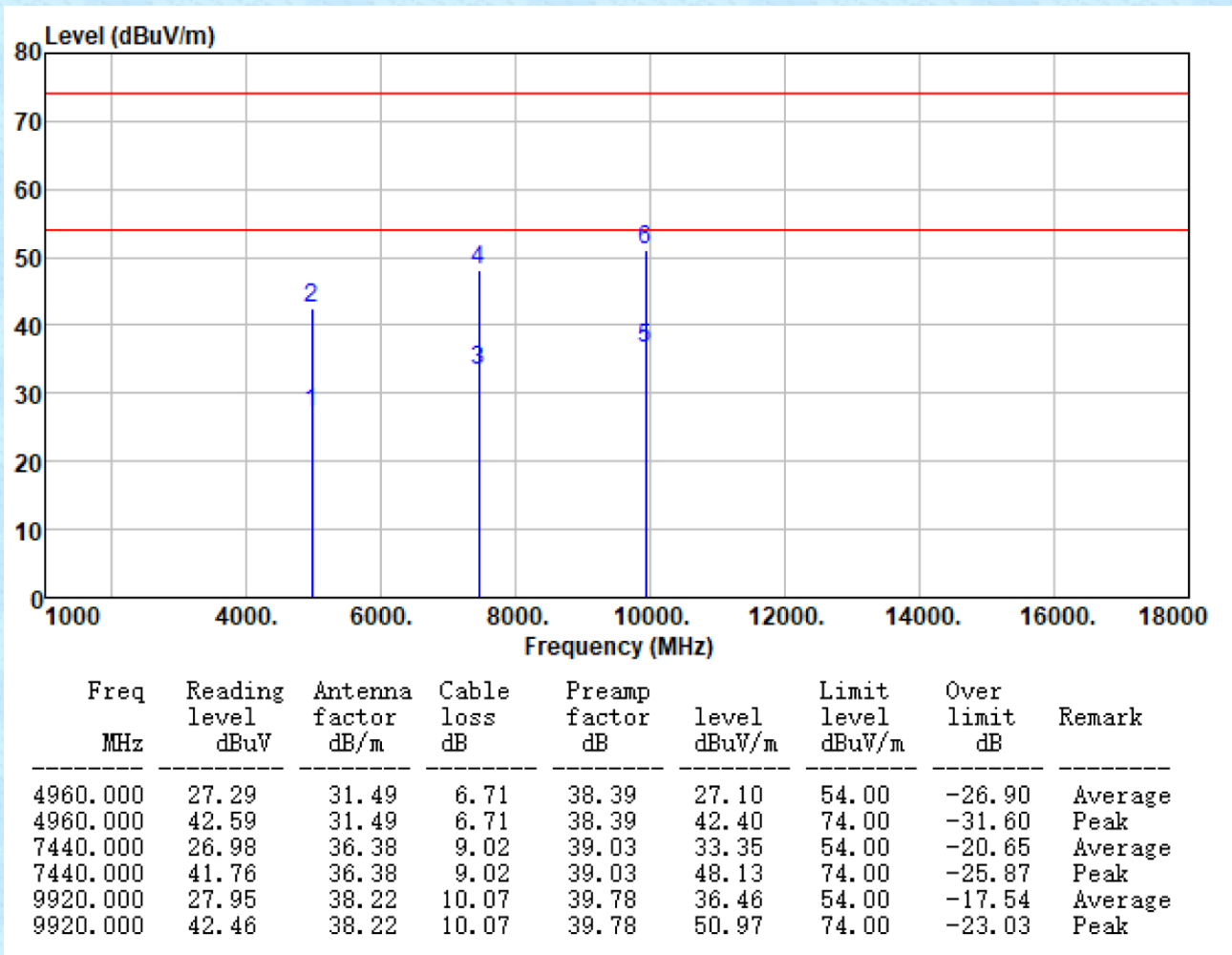


Test channel:	Middle	Polarization:	Vertical
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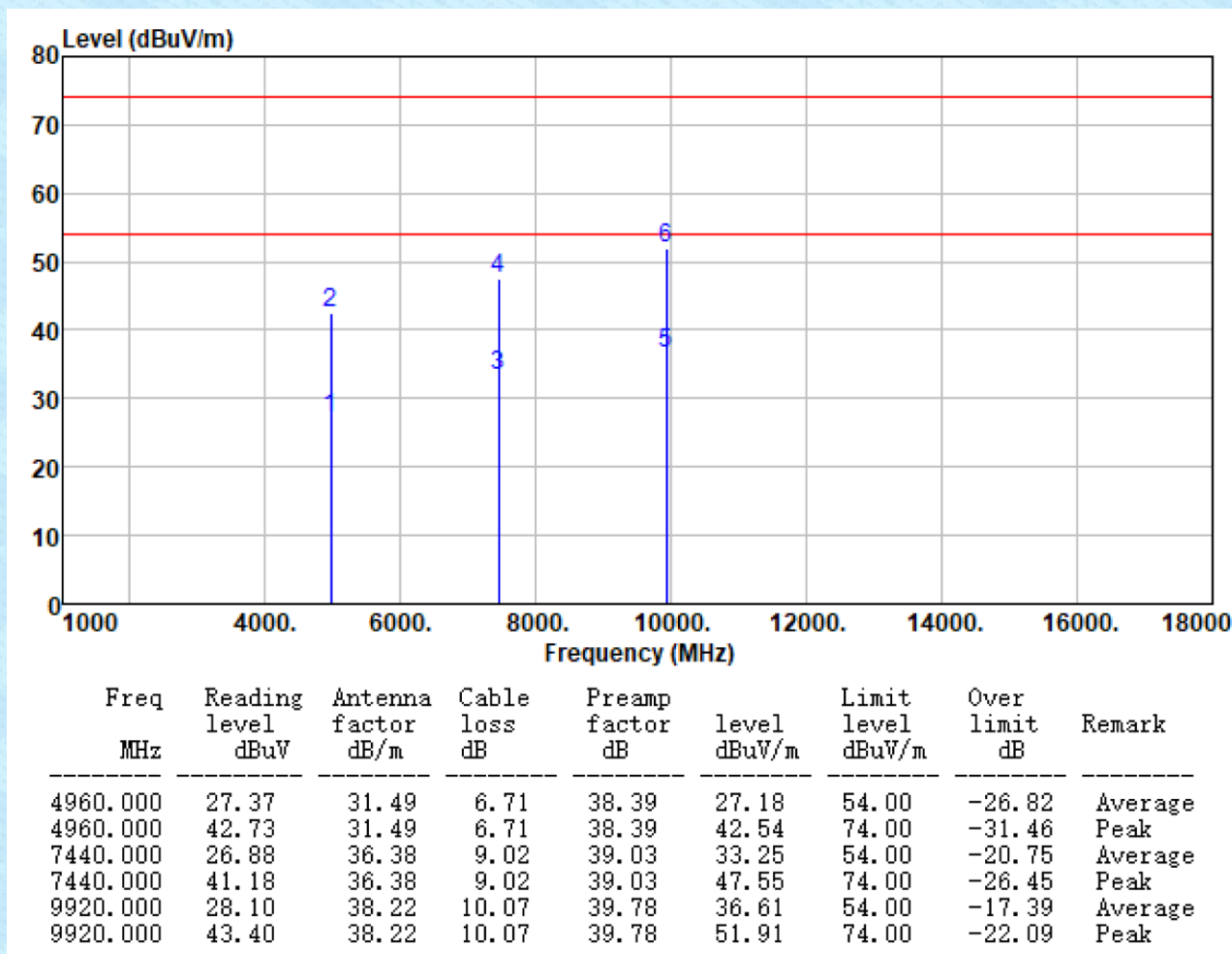


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.000	26.59	31.26	7.04	38.38	26.51	54.00	-27.49	Average
4880.000	42.96	31.26	7.04	38.38	42.88	74.00	-31.12	Peak
7320.000	26.17	36.14	9.18	39.00	32.49	54.00	-21.51	Average
7320.000	41.32	36.14	9.18	39.00	47.64	74.00	-26.36	Peak
9760.000	28.83	38.06	10.27	39.73	37.43	54.00	-16.57	Average
9760.000	43.19	38.06	10.27	39.73	51.79	74.00	-22.21	Peak

Test channel:	Highest	Polarization:	Horizontal
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Test channel:	Highest	Polarization:	Vertical
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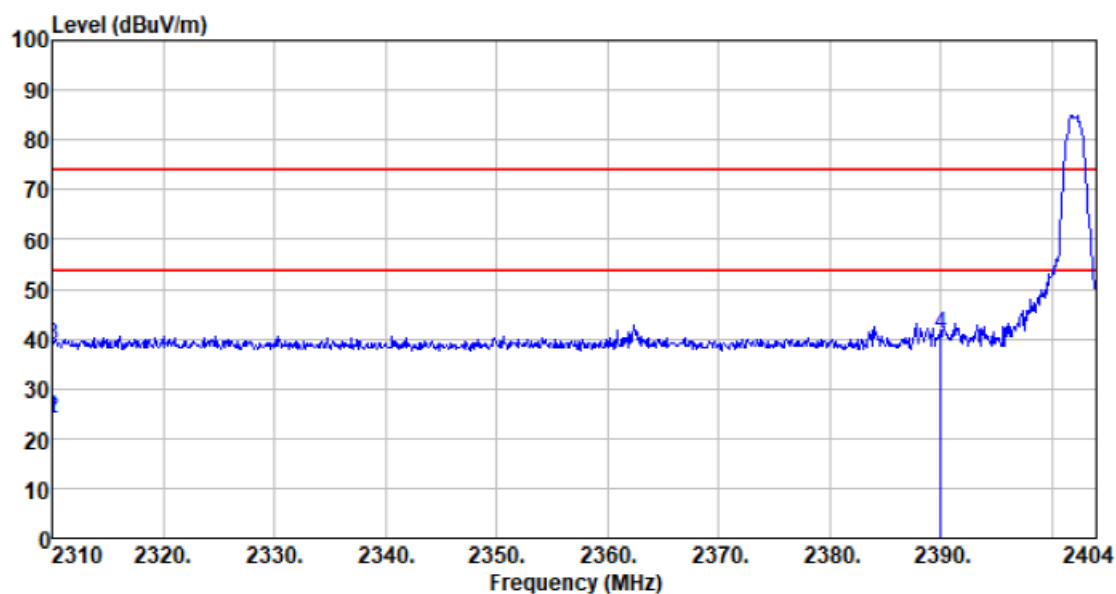
Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Both 1MHz and 2MHz bandwidth were tested and passed, only report the worst condition(GFSK_1MHz)

■ Unwanted Emissions in Restricted Frequency Bands

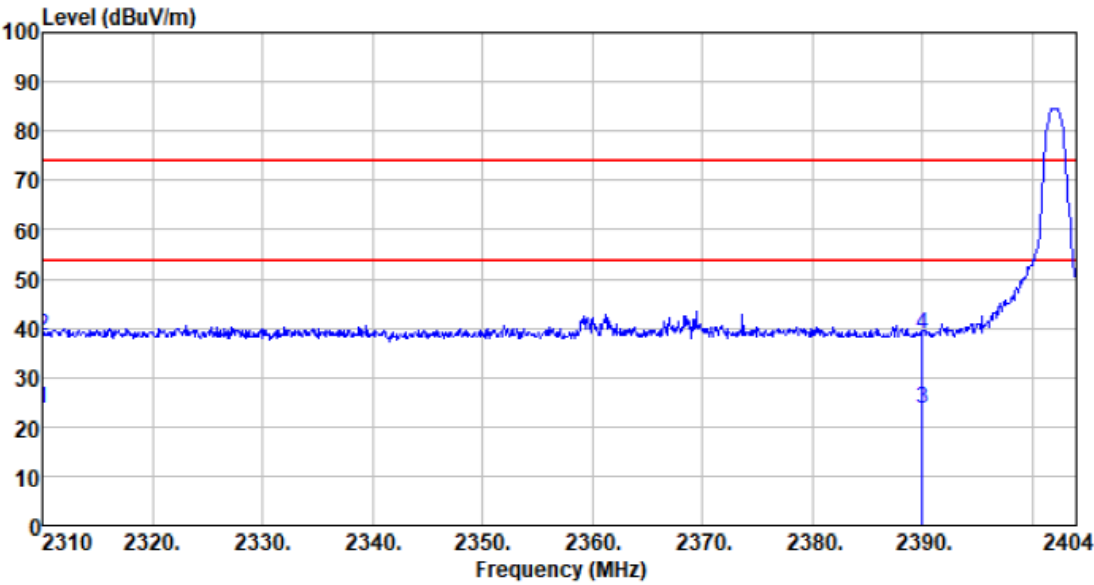
Model No.: ALC-4B-BT

Test channel:	Lowest	Polarization:	Horizontal
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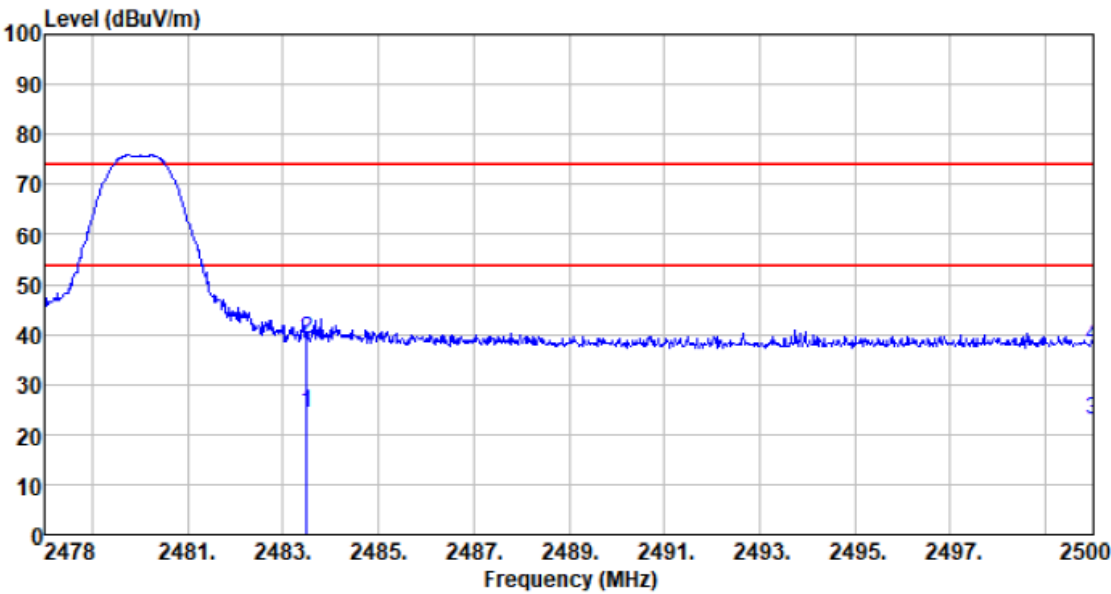
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	30.72	27.17	4.60	38.52	23.97	54.00	-30.03	Average
2310.000	30.72	27.17	4.60	38.52	23.97	54.00	-30.03	Average
2310.000	45.65	27.17	4.60	38.52	38.90	74.00	-35.10	Peak
2390.000	47.76	27.27	4.65	38.56	41.12	74.00	-32.88	Peak

Test channel:	Lowest	Polarization:	Vertical
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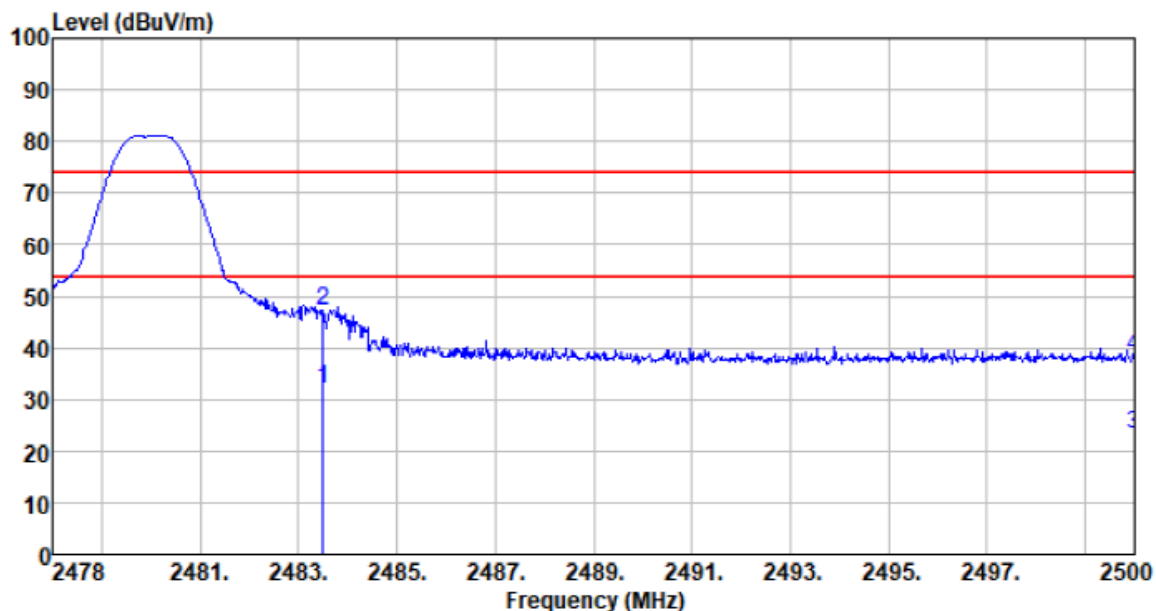
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	30.23	27.17	4.60	38.52	23.48	54.00	-30.52	Average
2310.000	45.16	27.17	4.60	38.52	38.41	74.00	-35.59	Peak
2390.000	30.33	27.27	4.65	38.56	23.69	54.00	-30.31	Average
2390.000	45.26	27.27	4.65	38.56	38.62	74.00	-35.38	Peak

Test channel:	Highest	Polarization:	Horizontal
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2483.500	31.06	27.38	4.52	38.59	24.37	54.00	-29.63	Average
2483.500	45.99	27.38	4.52	38.59	39.30	74.00	-34.70	Peak
2500.000	29.56	27.40	4.49	38.60	22.85	54.00	-31.15	Average
2500.000	44.49	27.40	4.49	38.60	37.78	74.00	-36.22	Peak

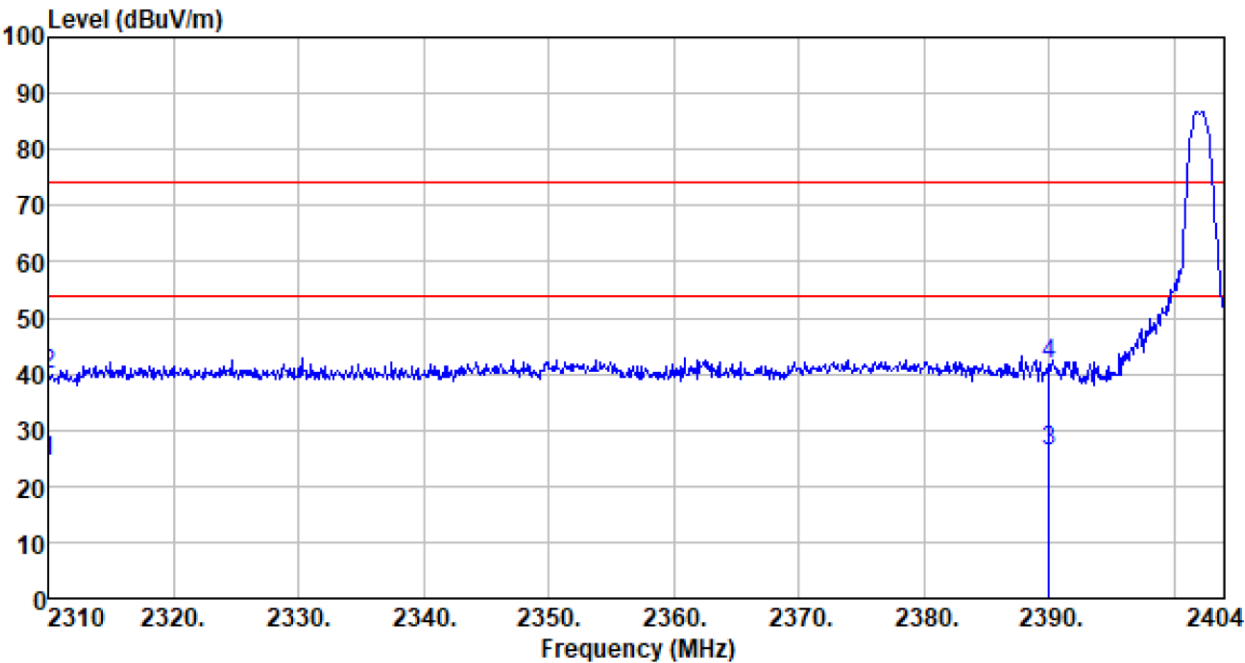
Test channel:	Highest	Polarization:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2483.500	38.89	27.38	4.52	38.59	32.20	54.00	-21.80	Average
2483.500	53.82	27.38	4.52	38.59	47.13	74.00	-26.87	Peak
2500.000	30.11	27.40	4.49	38.60	23.40	54.00	-30.60	Average
2500.000	45.04	27.40	4.49	38.60	38.33	74.00	-35.67	Peak

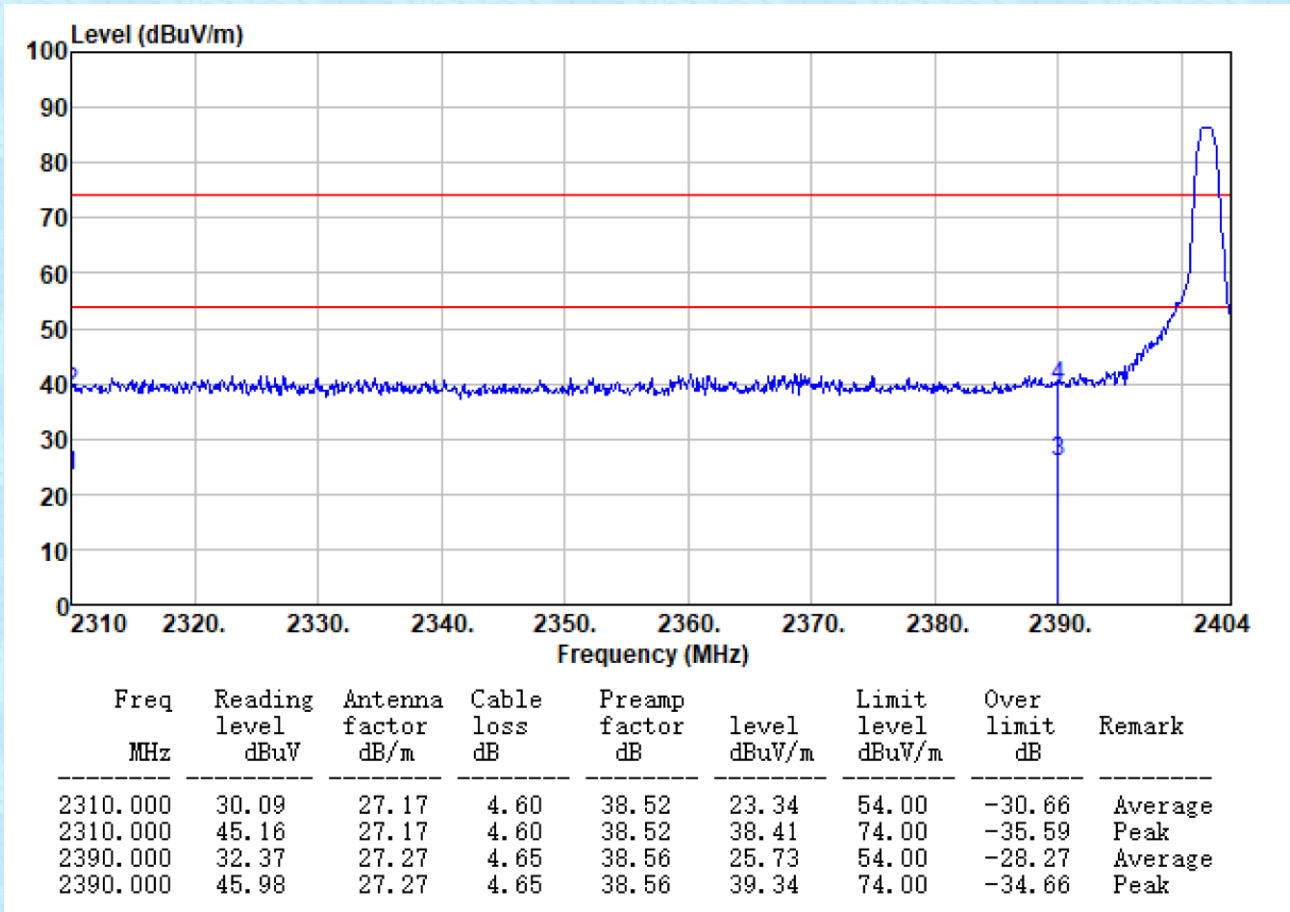
Model No.: ALC-2B-BT

Test channel:	Lowest	Polarization:	Horizontal
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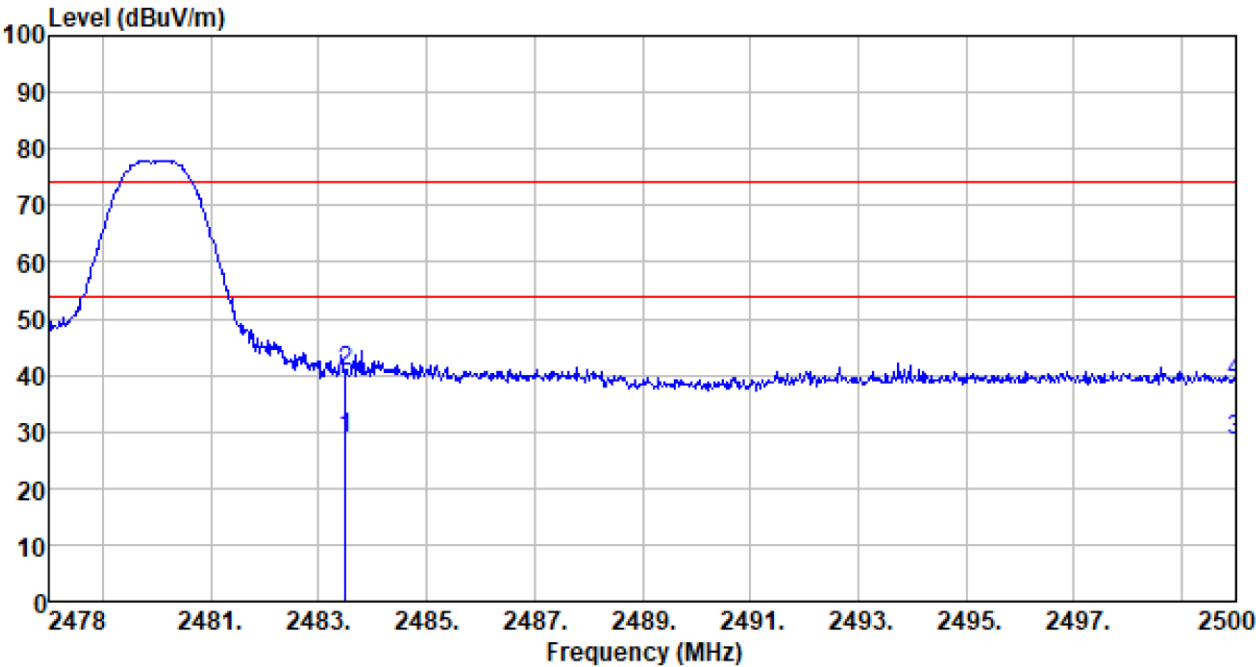


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	30.98	27.17	4.60	38.52	24.23	54.00	-29.77	Average
2310.000	46.65	27.17	4.60	38.52	39.90	74.00	-34.10	Peak
2390.000	32.96	27.27	4.65	38.56	26.32	54.00	-27.68	Average
2390.000	48.50	27.27	4.65	38.56	41.86	74.00	-32.14	Peak

Test channel:	Lowest	Polarization:	Vertical
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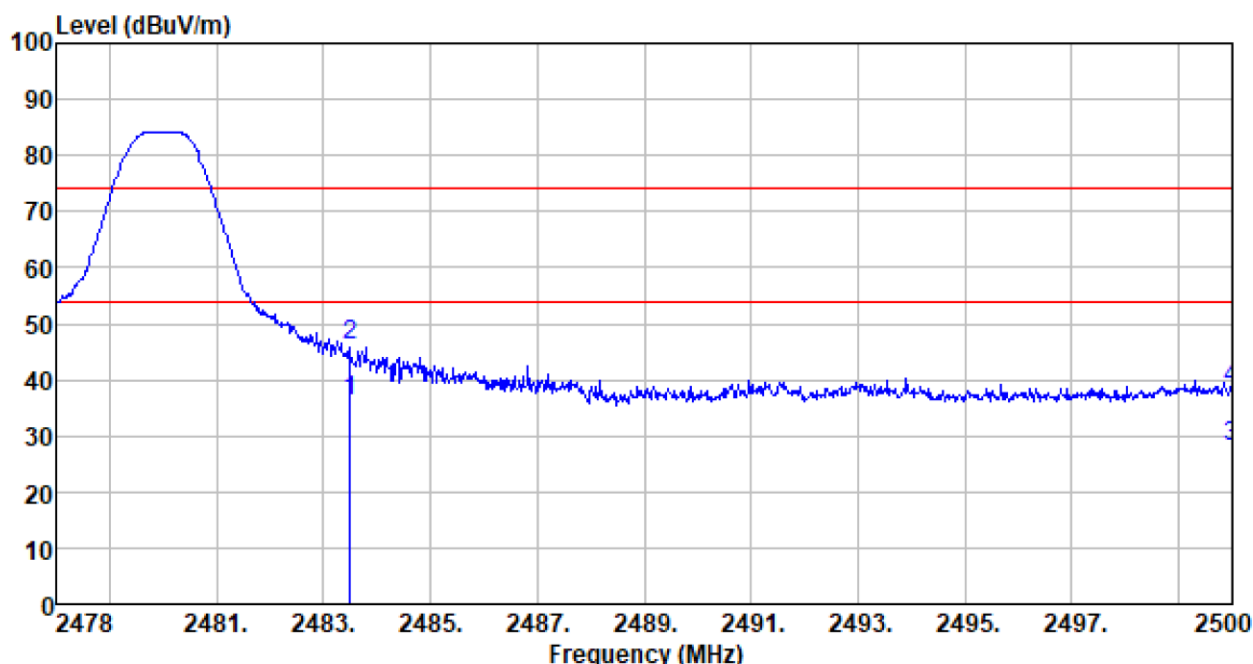


Test channel:	Highest	Polarization:	Horizontal
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2483.500	35.42	27.38	4.52	38.59	28.73	54.00	-25.27	Average
2483.500	47.21	27.38	4.52	38.59	40.52	74.00	-33.48	Peak
2500.000	35.22	27.40	4.49	38.60	28.51	54.00	-25.49	Average
2500.000	45.49	27.40	4.49	38.60	38.78	74.00	-35.22	Peak

Test channel:	Highest	Polarization:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2483.500	43.03	27.38	4.52	38.59	36.34	54.00	-17.66	Average
2483.500	52.86	27.38	4.52	38.59	46.17	74.00	-27.83	Peak
2500.000	34.63	27.40	4.49	38.60	27.92	54.00	-26.08	Average
2500.000	45.04	27.40	4.49	38.60	38.33	74.00	-35.67	Peak

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Both 1MHz and 2MHz bandwidth were tested and passed, only report the worst condition(GFSK_1MHz)

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

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