

Prüfbericht-Nr.: Test report no.:	CN22MP0M(P15C-BT) 001	Auftrags-Nr.: Order no.:	238538652	Seite 1 von 23 Page 1 of 23
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2022-01-14	
Auftraggeber: Client:	Microchip Technology Inc., 2355 West Chandler Blvd. Chandler, Arizona 85224-6199, United States.			
Prüfgegenstand: Test item:	Bluetooth module			
Bezeichnung / Typ-Nr.: Identification / Type no.:	BM20SPKXYNBZ, BM20SPKS1NBC (X=A-Z, 0-9; Y=A-Z, 0-9; Z=A-Z, 0-9)			
Auftrags-Inhalt: Order content:	FCC Part 15C Test report (BT)			
Prüfgrundlage: Test specification:	FCC 47CFR Part 15: Subpart C Section 15.247			
Wareneingangsdatum: Date of sample receipt:	2022-01-12			
Prüfmuster-Nr.: Test sample no.:	A003199156-001 A003199156-002			
Prüfzeitraum: Testing period:	2022-02-01 - 2022-03-03			
Ort der Prüfung: Place of testing:	EMC/RF Taipei Testing Site			
Prüflaboratorium: Testing laboratory:	Taipei Testing Laboratories			
Prüfergebnis*: Test result*:	Pass			
zusammengestellt von: compiled by:			genehmigt von: authorized by:	
Datum: Date:	2022-05-16	Ausstellungsdatum: Issue date:	2022-05-16	
Stellung / Position:	Senior Project Manager	Stellung / Position:	Senior Project Manager	
Sonstiges / Other:	This is update report for 2nd source crystal change. Hence, we only evaluate and verify the output power and radiated spurious emissions tests. The other test results are referred to report no. 10050931 002. FCC ID is A8TBM20SPKXYNBZ.			
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 P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
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.				

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.247(b) & 15.203	Antenna Requirement	Pass
5.1.2	15.247(b)(1)	Peak Output Power	Pass
-	15.247(a)(1)	20 dB Bandwidth	Refer to report no. 10050931 002
-	2.1049	99% Occupied Bandwidth	
-	15.247(d)	Conducted Spurious Emission and Band Edges	
5.1.3	15.247(d) & 15.205 & 15.209	Radiated Spurious Emissions and Band Edges	Pass
-	15.247(a)(1)	Hopping Channel Separation	Refer to report no. 10050931 002
-	15.247(a)(1) (iii)	Number of Hopping Frequency Used	
-	15.247(a)(1) (iii)	Dwell Time on Each Channel	
5.2.1	15.207	Mains Conducted Emission	Pass

Note:

1. If the Frequency Hopping Systems operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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

APPENDIX SP - PHOTOGRAPHS TEST SETUP

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HISTORY OF THIS TEST REPORT

Version	Description	Date Issued
00	Original Release	2022-03-08
01	Re-evaluated the output power value	2022-05-16

1. General Remarks

1.1 Complementary Materials

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

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

Appendix SP - Photographs Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

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

1.2 Decision Rule of Conformity

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

2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

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

2.2 Test Facility

Taipei Testing Laboratories

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

2.3 Traceability

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

2.4 Calibration

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

2.5 Measurement Uncertainty

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

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.30 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.30 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.54 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.52 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

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

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

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	Bluetooth module
Type Identification	BM20SPKXYNBZ, BM20SPKS1NBC (X=A-Z, 0-9; Y=A-Z, 0-9; Z=A-Z, 0-9)
FCC ID	A8TBM20SPKXYNBZ

Technical Specification of EUT

Item	EUT information
Operating Frequency	2402 MHz ~ 2480 MHz
Channel Spacing	1 MHz
Channel Number	79
Operation Voltage	5Vdc
Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Maximum Output Power (mW)	1.291
Antenna Information	Refer to 5.1.1
Accessory Device	Refer to 4.4

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

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

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

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

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

Table for Parameters of Test Software Setting

Frequency (MHz)	Power Setting	
	GFSK	8DPSK
2402	min.	min.
2441	min.	min.
2480	min.	min.

4.2 Carrier Frequency and Channel

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

4.3 Test Operation and Test Software

Setup for testing: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	ISRT Ver:2.1.31.5011
---------------	----------------------

The samples were used as follows:

A003199156-001 for conducted test

A003199156-002 for radiated test

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

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

Note:

1. For Radiated emission test, pre-tested GFSK, $\pi/4$ -DQPSK, 8DPSK modulation type and found 8DPSK was the worse, therefore chosen for the final test and presented in the test report.
2. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on Z-plane.
3. "-" means no effect.

Antenna Port Conducted Measurement

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

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

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Modulation Type	Packet Type
Power only	2402 to 2480	2402, 2441, 2480	GFSK	1DH5
Power only	2402 to 2480	2402, 2441, 2480	8DPSK	3DH5

Radiated Spurious Emissions (Above 1 GHz)

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

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

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Modulation Type	Packet Type
-	2402 to 2480	2402, 2441, 2480	GFSK	1DH5
-	2402 to 2480	2402, 2441, 2480	8DPSK	3DH5

Radiated Spurious Emissions (Below 1 GHz)

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

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

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Modulation Type	Packet Type
-	2402 to 2480	2441	8DPSK	3DH5

Mains Conducted Emission Test

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

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

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	Modulation Type	Packet Type
-	2402 to 2480	2441	8DPSK	3DH5

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Conducted Measurement	21.3 °C	69 %	Stanislas Charles
Radiated Spurious Emissions above 1 GHz	18.9-19.8 °C	53-56 %	Hunter Wang
Radiated Spurious Emissions below 1 GHz	18.9-19.8 °C	53-56 %	Hunter Wang
Mains Conducted Emission	20.1-20.9 °C	53-57 %	Hunter Wang

4.4 Special Accessories and Auxiliary Equipment

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

Accessory of EUT

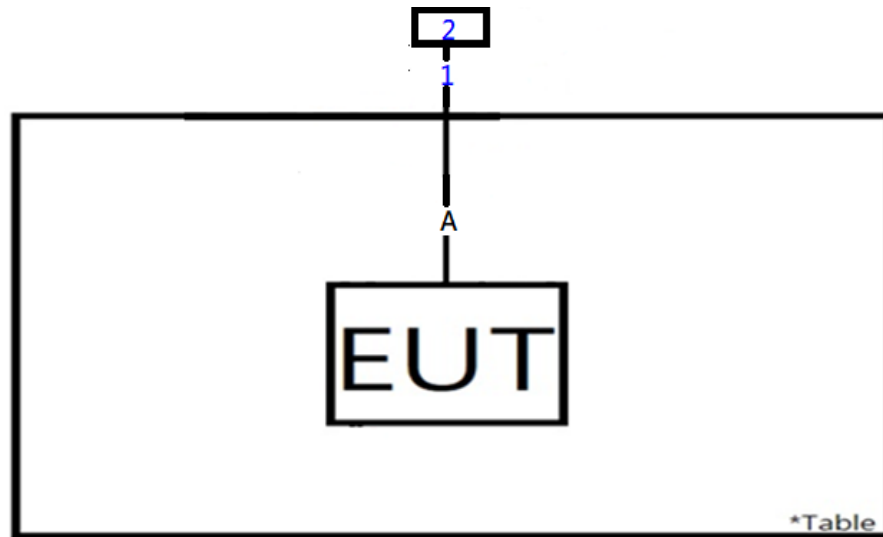
None.

Support Unit

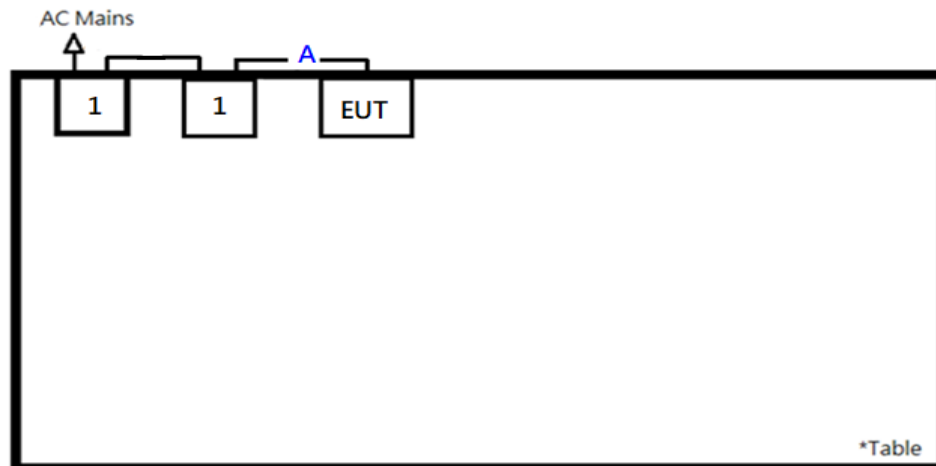
No.	Description	Brand	Model	S/N	Remark
Radiated Test					
A	USB Cable	Microchip	-	-	145 cm shielded cable w/o core
1	USB Cable	TUV	TUV-001	-	175 m shielded cable with 4 core
2	Notebook	Lenovo	81BL	MP1DCD6Y	-
Mains Conducted Test					
A	USB Cable	Microchip	-	-	145 cm shielded cable w/o core
1	Notebook	Lenovo	81BL	MP1DCD6Y	-
Conducted Test					
-	Notebook	HP	TPN-C139	CND93662VF	-

4.5 Test Setup Diagram

<Radiated Spurious Emissions mode>



<Mains Conducted Emission mode>



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

Requirement Use of approved antennas only

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 1.927 dBi. The antenna is PCB Antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision. Refer to EUT photo for details.

5.1.2 Peak Output Power

Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Power Meter	Anritsu	ML2495A	1901008	2021/3/24	2022/3/23	2022/3/3	2022/3/3
Power Sensor	Anritsu	MA2411B	1725269	2021/3/24	2022/3/23	2022/3/3	2022/3/3

Test Procedures

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

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

Test Result

Peak Output Power

<GFSK>

Channel	Channel Frequency	Peak Output Power		Limit
	(MHz)	(dBm)	(mW)	(mW)
Low Channel	2402	-0.17	0.962	125
Middle Channel	2441	-0.08	0.982	125
High Channel	2480	-0.19	0.957	125

<8DPSK>

Channel	Channel Frequency	Peak Output Power		Limit
	(MHz)	(dBm)	(mW)	(mW)
Low Channel	2402	0.85	1.216	125
Middle Channel	2441	0.96	1.247	125
High Channel	2480	1.11	1.291	125

Average Power

<GFSK>

Channel	Channel Frequency	Average Power	
	(MHz)	(dBm)	(mW)
Low Channel	2402	-0.44	0.904
Middle Channel	2441	-0.40	0.912
High Channel	2480	-0.51	0.889

<8DPSK>

Channel	Channel Frequency	Average Power	
	(MHz)	(dBm)	(mW)
Low Channel	2402	-1.86	0.652
Middle Channel	2441	-1.79	0.662
High Channel	2480	-1.91	0.644

5.1.3 Radiated Spurious Emissions and Band Edges

Limit

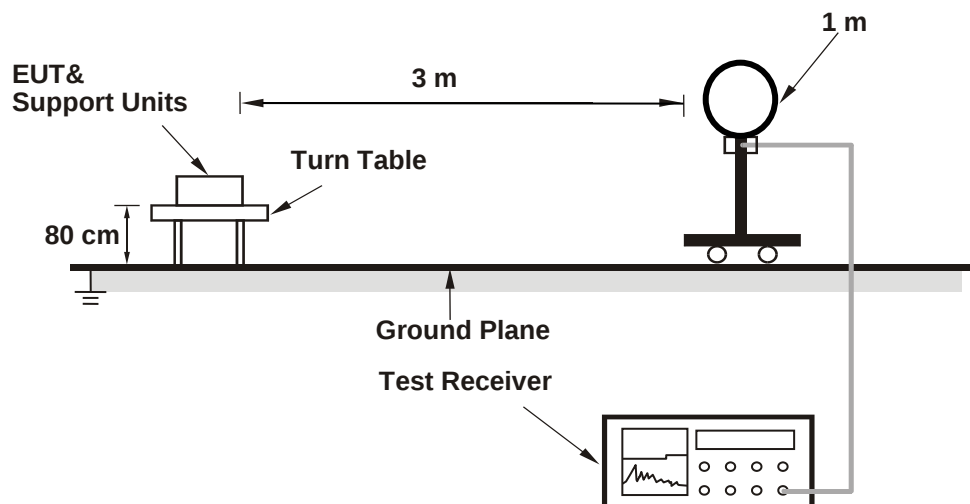
Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

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

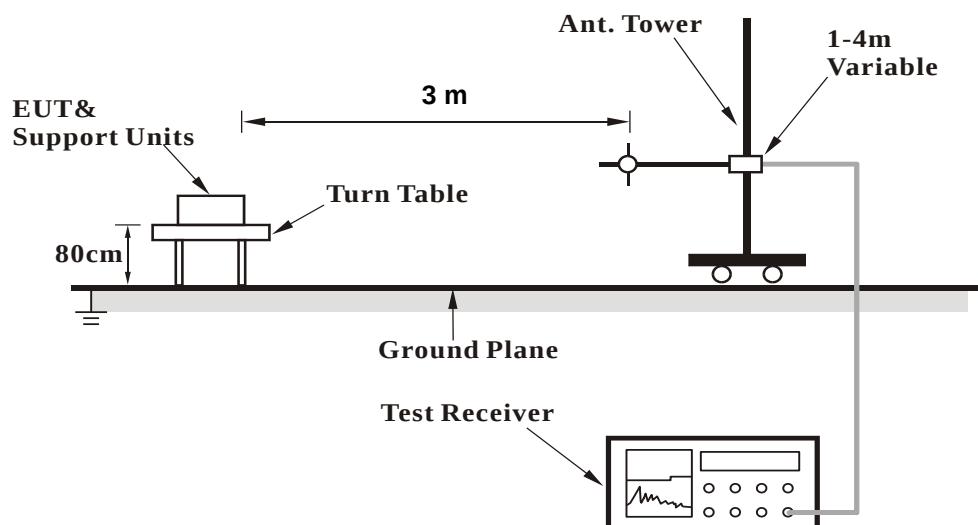
Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

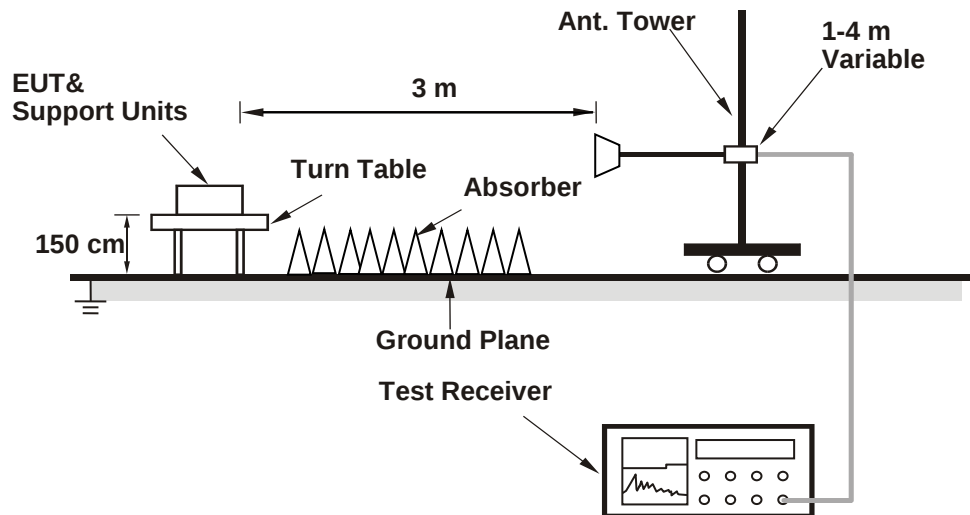
<Radiated Emissions below 30 MHz>



<Radiated Emissions 30 MHz to 1 GHz>



<Radiated Emissions above 1 GHz>



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

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Signal Analyzer	R&S	FSV40	101508	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2021/2/18	2022/2/17
Horn Antenna	ETS-Lindgren	3117	00218930	2021/12/20	2022/12/19
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
LF-AMP	Agilent	8447D	2944A10772	2021/2/18	2022/2/17
HF-AMP + AC source	EMCI	EMC051845SE	980633	2021/2/9	2022/2/8
HF-AMP + AC source	EMCI	EMC184045SE	980657	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC184045SE	980656	2022/1/20	2023/1/19
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15
Loop Antenna	SCHWARZBECK	FMZB1519B	00215	12/8/2021	2022/12/7

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

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

Note:

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

For Radiated Emissions above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
4. For fundamental frequency: The average value is "Average = Peak value + 20log(Duty cycle)
Where the duty factor is calculated from following formula for DH5 packet type which has worst duty factor:
 $20\log(\text{Duty cycle}) = 20\log(\text{dwell time} / 100\text{ms}) = 20\log(3.125 / 100) = -30.1 \text{ dB}$
5. All modes of operation were investigated and the worst-case emissions are reported.

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6. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation.
The worst-case Axis orientation is recorded in this test report.

Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)

Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix A.

5.2 Mains Emission

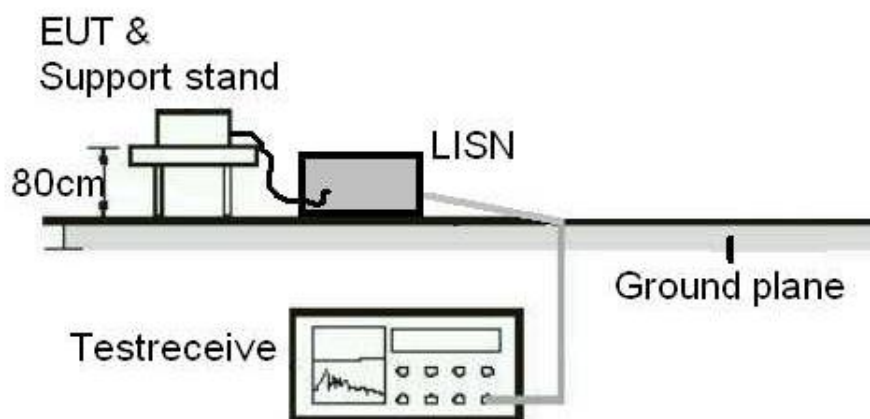
5.2.1 Mains Conducted Emission

Limit

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

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
RF Cable	N/A	N/A	EMC-003	2021/3/16	2022/3/15
Two-Line V-Network	Rohde & Schwarz	ENV216	101938	2021/9/23	2022/9/22
EMI Test Receiver	R&S	ESCI	1816063	2021/11/15	2022/11/14

Test Procedures

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

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

Test Results

Please refer to Appendix A.

Appendix A: Test Results of Radiated Spurious Emissions & Mains Conducted Emission Test

Band Edges, 2.31GHz ~ 2.9GHz

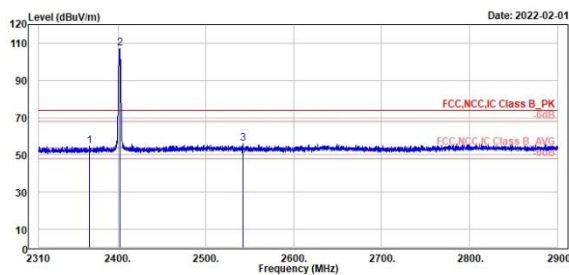
GFSK

Low Channel (Horizontal) Peak

Low Channel (Vertical) Peak



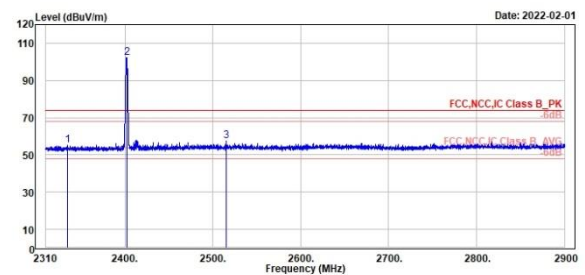
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Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	2357.47	54.87	17.41	37.46	74.00	-19.13	349	139 Peak	Horizontal		
2 *	2402.00	107.00	69.37	37.63	74.00	33.00	349	139 Peak	Horizontal		
3	2542.58	56.13	18.23	37.90	74.00	-17.87	349	139 Peak	Horizontal		



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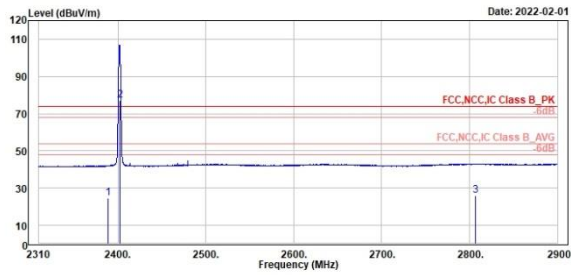
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	2334.43	55.39	18.07	37.32	74.00	-18.61	386	255 Peak	Vertical		
2 *	2402.00	102.11	64.48	37.63	74.00	28.11	386	255 Peak	Vertical		
3	2514.97	57.46	19.59	37.87	74.00	-16.54	386	255 Peak	Vertical		

GFSK

Low Channel (Horizontal) Average



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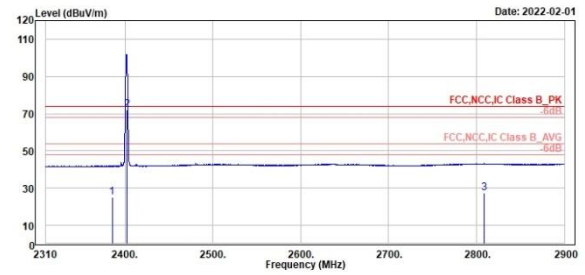


Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	2388.47	24.77	-12.80	37.57	54.00	-29.23	349	139	Average	Horizontal	CF
2 *	2402.00	76.90	39.27	37.63	54.00	22.90	349	139	Average	Horizontal	CF
3	2807.02	26.03	-12.17	38.20	54.00	-27.97	349	139	Average	Horizontal	CF

Low Channel (Vertical) Average



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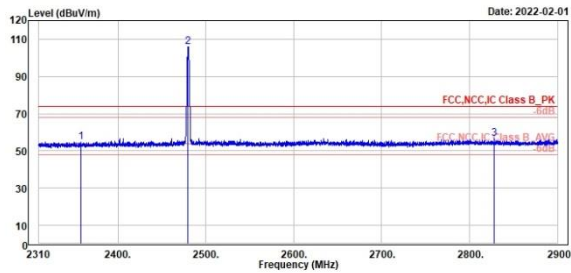
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	2385.52	25.29	-12.26	37.55	54.00	-28.71	386	255	Average	Vertical	CF
2 *	2402.00	72.01	34.38	37.63	54.00	18.01	386	255	Average	Vertical	CF
3	2808.31	27.36	-10.83	38.19	54.00	-26.64	386	255	Average	Vertical	CF

GFSK

High Channel (Horizontal) Peak



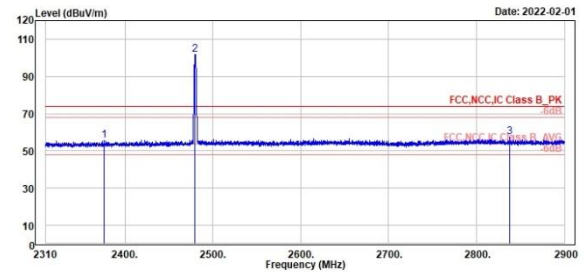
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Peak	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	2358.58	54.94	17.53	37.41	74.00	-19.06	294	308 Peak		Horizontal		
2 *	2480.00	105.96	68.17	37.79	74.00	31.96	294	308 Peak		Horizontal		
3	2827.55	56.61	18.43	38.18	74.00	-17.39	294	308 Peak		Horizontal		



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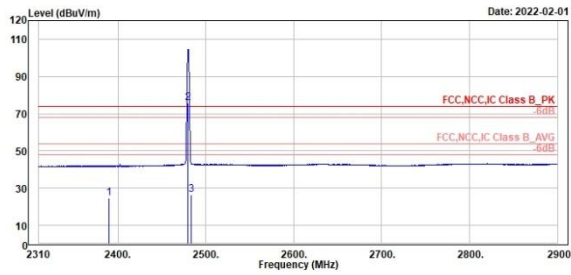
Peak	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	2376.55	55.52	18.01	37.51	74.00	-18.48	356	254 Peak		Vertical		
2 *	2480.00	101.67	63.88	37.79	74.00	27.67	356	254 Peak		Vertical		
3	2837.81	57.30	19.13	38.17	74.00	-16.70	356	254 Peak		Vertical		

GFSK

High Channel (Horizontal) Average



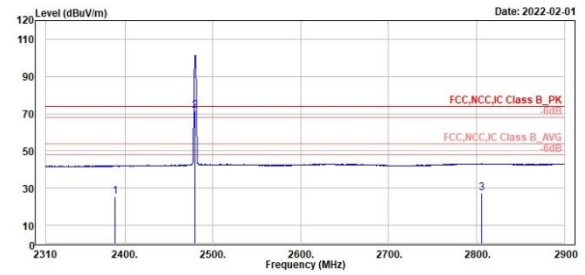
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Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2389.65	24.84	-12.74	37.58	54.00	-29.16	294	388	Average	Horizontal	CF
2 *	2488.00	75.86	38.07	37.79	54.00	21.86	294	388	Average	Horizontal	CF
3	2483.50	26.51	-11.29	37.80	54.00	-27.49	294	388	Average	Horizontal	CF



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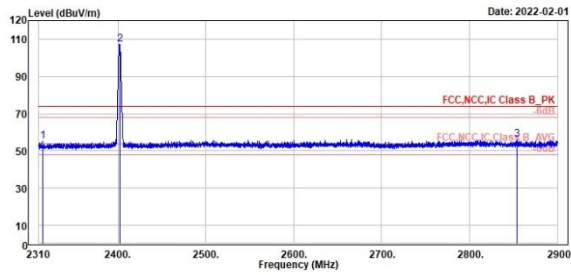
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2388.82	25.42	-12.16	37.58	54.00	-28.58	356	254	Average	Vertical	CF
2 *	2488.00	71.57	33.78	37.79	54.00	17.57	356	254	Average	Vertical	CF
3	2805.72	27.20	-11.00	38.20	54.00	-26.80	356	254	Average	Vertical	CF

8DPSK

Low Channel (Horizontal) Peak



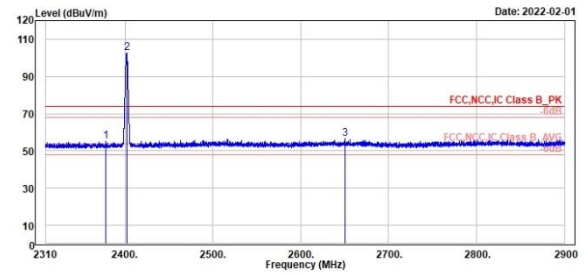
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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2314.84	55.19	17.93	37.26	74.00	-18.81	348	148	Peak	Horizontal		
2 *	2402.00	107.40	69.77	37.63	74.00	33.40	348	148	Peak	Horizontal		
3	2853.74	56.20	18.02	38.18	74.00	-17.80	348	148	Peak	Horizontal		



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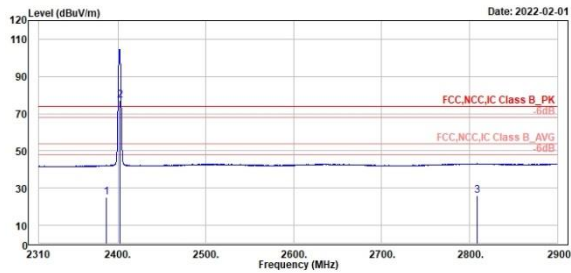
	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2378.32	55.16	17.64	37.52	74.00	-18.84	385	256	Peak	Vertical		
2 *	2402.00	102.46	64.83	37.63	74.00	28.46	385	256	Peak	Vertical		
3	2649.96	56.47	18.44	38.03	74.00	-17.53	385	256	Peak	Vertical		

8DPSK

Low Channel (Horizontal) Average



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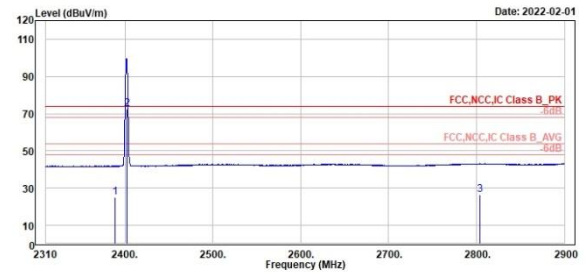


Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2386.70	25.09	-12.48	37.57	54.00	-28.91	348	140	Average	Horizontal	CF
2 *	2402.00	77.30	39.67	37.63	54.00	23.30	348	140	Average	Horizontal	CF
3	2809.02	26.10	-12.09	38.19	54.00	-27.90	348	140	Average	Horizontal	CF

Low Channel (Vertical) Average



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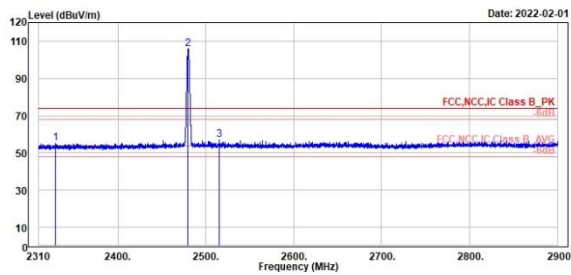
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	cm	deg			
1	2389.06	25.06	-12.52	37.58	54.00	-28.94	385	256	Average	Vertical	CF
2 *	2402.00	72.36	34.73	37.63	54.00	18.36	385	256	Average	Vertical	CF
3	2804.18	26.37	-11.83	38.20	54.00	-27.63	385	256	Average	Vertical	CF

8DPSK

High Channel (Horizontal) Peak



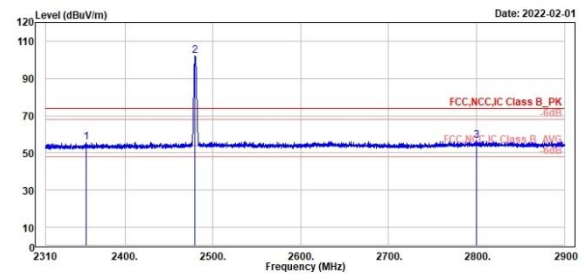
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Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	2329.23	55.10	17.79	37.31	74.00	-18.90	330	139	Peak	Horizontal	
2 *	2480.00	105.67	67.68	37.99	74.00	31.67	330	139	Peak	Horizontal	
3	2514.97	56.85	18.98	37.87	74.00	-17.15	330	139	Peak	Horizontal	



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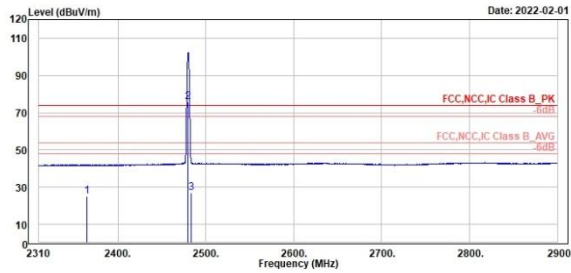
Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	2355.67	55.54	18.14	37.40	74.00	-18.46	357	253	Peak	Vertical	
2 *	2480.00	101.99	64.20	37.79	74.00	27.99	357	253	Peak	Vertical	
3	2799.46	56.41	18.21	38.20	74.00	-17.59	357	253	Peak	Vertical	

8DPSK

High Channel (Horizontal) Average



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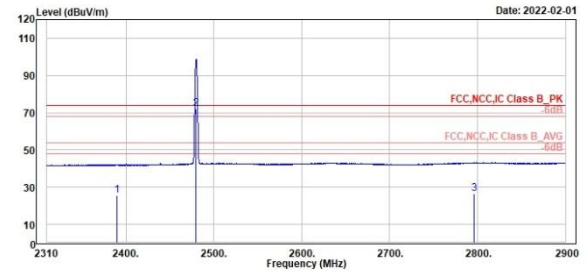


	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	2364.52	25.00	-12.45	37.45	54.00	-29.00	330	139	Average	Horizontal	CF	
2 *	2488.00	75.57	37.78	37.79	54.00	21.57	330	139	Average	Horizontal	CF	
3	2483.50	26.75	-11.05	37.80	54.00	-27.25	330	139	Average	Horizontal	CF	

High Channel (Vertical) Average



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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	2389.41	25.44	-12.14	37.58	54.00	-28.56	357	253	Average	Vertical	CF	
2 *	2488.00	71.89	34.10	37.79	54.00	17.89	357	253	Average	Vertical	CF	
3	2796.04	26.31	-11.89	38.20	54.00	-27.69	357	253	Average	Vertical	CF	

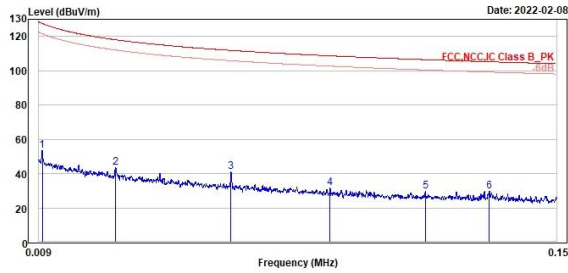
Spurious Emissions, Tx Mode, 9kHz ~ 30MHz

8DPSK

Middle Channel 9kHz~150kHz(Open)



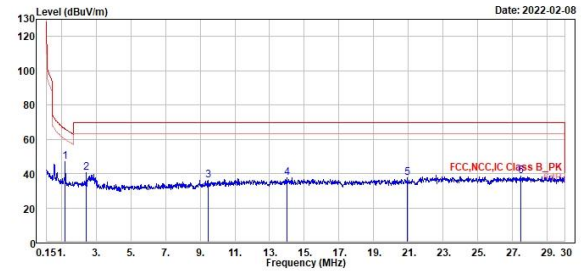
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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	0.01	53.55	35.81	17.74	127.60	-74.05	100	337	QP	Open		
2	0.03	43.65	24.11	19.54	118.07	-74.42	100	195	QP	Open		
3	0.06	41.01	21.91	19.10	111.83	-70.82	100	306	QP	Open		
4	0.09	31.77	13.25	18.52	108.68	-76.91	100	5	QP	Open		
5	0.11	29.42	11.11	18.31	106.44	-77.02	100	1	QP	Open		
6	0.13	29.87	11.50	18.37	105.21	-75.34	100	209	QP	Open		



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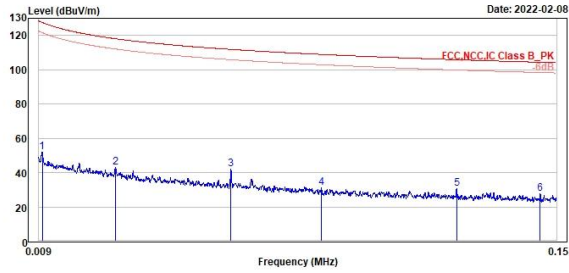
	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	1.21	47.18	27.85	19.33	65.95	-18.77	100	240	QP	Open		
2	2.45	40.64	21.18	19.46	69.50	-28.86	100	240	QP	Open		
3	9.45	36.33	15.17	21.16	69.50	-33.17	100	141	QP	Open		
4	13.99	37.68	16.03	21.65	69.50	-31.82	100	48	QP	Open		
5	20.93	37.81	15.72	22.09	69.50	-31.69	100	230	QP	Open		
6	27.48	38.61	16.28	22.33	69.50	-30.89	100	317	QP	Open		

8DPSK

Middle Channel 9kHz~150kHz(Close)



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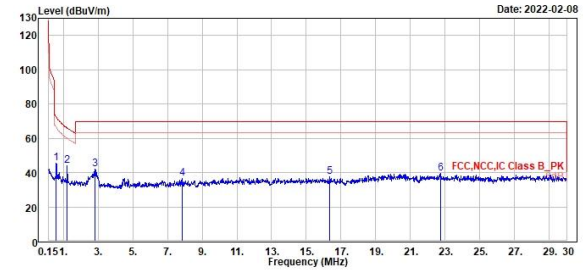


	Freq	Level	Read	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	0.01	51.95	34.21	17.74	127.60	-75.65	100	360 QP	Close		
2	0.03	43.03	23.49	19.54	116.07	-75.04	100	52 QP	Close		
3	0.06	41.98	22.88	19.10	111.83	-69.85	100	94 QP	Close		
4	0.09	31.06	12.49	18.57	108.91	-77.85	100	149 QP	Close		
5	0.12	30.61	12.27	18.34	105.81	-75.20	100	357 QP	Close		
6	0.15	27.54	9.12	18.42	104.34	-76.00	100	13 QP	Close		

Middle Channel 150kHz~30MHz(Close)



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	Freq	Level	Read	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg			
1	0.60	45.31	26.26	19.05	72.07	-26.76	100	148 QP	Close		
2	1.22	44.06	24.73	19.33	65.84	-21.78	100	145 QP	Close		
3	2.81	41.78	22.27	19.51	69.50	-27.72	100	165 QP	Close		
4	7.84	36.47	15.97	20.50	69.50	-33.03	100	70 QP	Close		
5	16.34	37.62	15.81	21.81	69.50	-31.88	100	18 QP	Close		
6	22.75	39.36	17.21	22.15	69.50	-30.14	100	307 QP	Close		

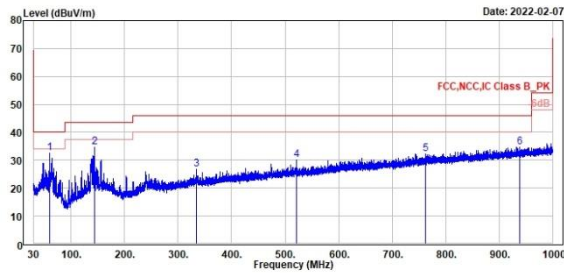
Spurious Emissions, Tx Mode, 30MHz ~ 1GHz

8DPSK

Middle Channel (Horizontal)



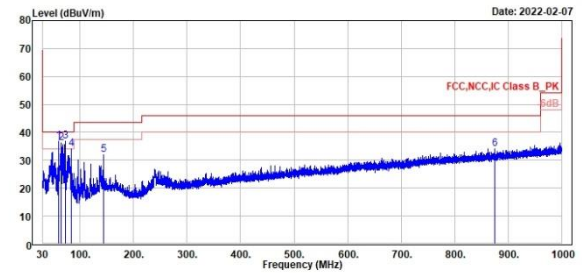
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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	59.88	32.49	41.14	-8.65	40.00	-7.51	300	255	QP	Horizontal		
2	143.88	34.63	42.24	-7.61	43.50	-8.87	200	204	QP	Horizontal		
3	334.68	26.63	32.26	-5.63	46.00	-19.37	100	142	QP	Horizontal		
4	521.98	30.08	32.66	-2.58	46.00	-15.92	100	307	QP	Horizontal		
5	762.64	32.22	30.79	1.43	46.00	-13.78	400	0	QP	Horizontal		
6	938.11	34.70	30.54	4.16	46.00	-11.30	100	157	QP	Horizontal		



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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	60.07	36.88	45.55	-8.67	40.00	-3.12	100	238	QP	Vertical		
2	64.73	36.24	45.70	-9.46	40.00	-3.76	100	272	QP	Vertical		
3	71.90	36.00	47.19	-10.39	40.00	-3.20	100	292	QP	Vertical		
4	83.93	34.15	47.20	-13.05	40.00	-5.85	100	65	QP	Vertical		
5	143.78	31.83	39.44	-7.61	43.50	-11.67	100	114	QP	Vertical		
6	874.39	34.13	31.12	3.01	46.00	-11.87	354	360	QP	Vertical		

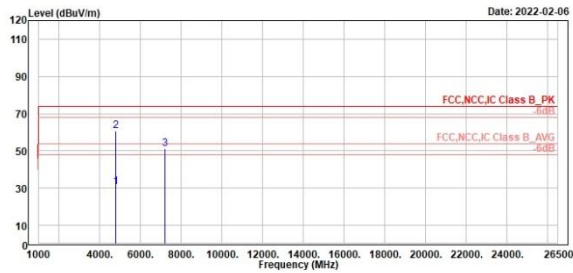
Spurious Emissions, Tx Mode, 1GHz ~ 26.5GHz

GFSK

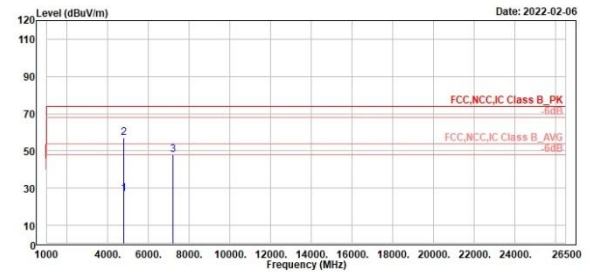
Low Channel (Horizontal)



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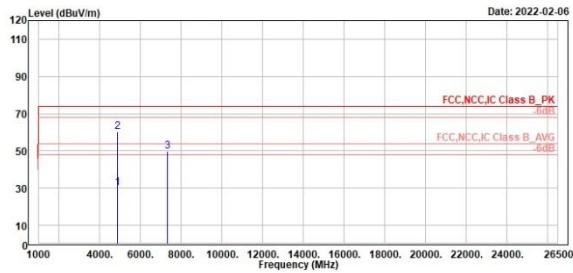


GFSK

Middle Channel (Horizontal)



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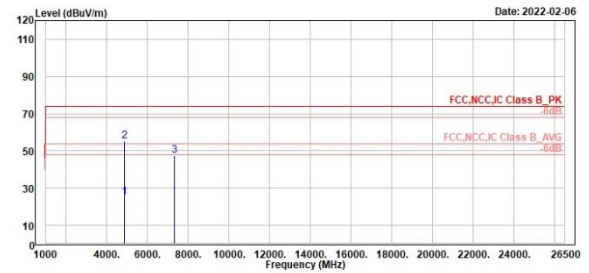


	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	4882.00	30.06	39.84	-9.78	54.00	-23.94	400	329	Average	Horizontal	CF	
2	4882.00	60.16	69.94	-9.78	74.00	-13.84	400	329	Peak	Horizontal		
3	7323.00	49.77	57.25	-7.48	74.00	-24.23	100	281	Peak	Horizontal		

Middle Channel (Vertical)



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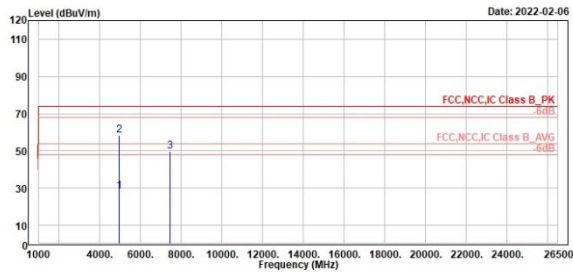


	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	4882.00	25.04	34.82	-9.78	54.00	-28.96	400	259	Average	Vertical	CF	
2	4882.00	55.14	64.92	-9.78	74.00	-18.86	400	259	Peak	Vertical		
3	7323.00	47.65	55.13	-7.48	74.00	-26.35	400	168	Peak	Vertical		

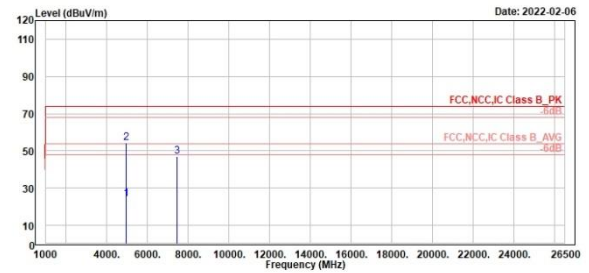
GFSK

High Channel (Horizontal)

High Channel (Vertical)



	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	4960.00	28.35	37.89	-9.54	54.00	-25.65	264	0	Average	Horizontal	CF	
2	4960.00	58.45	67.99	-9.54	74.00	-15.55	264	0	Peak	Horizontal		
3	7440.00	49.92	57.27	-7.35	74.00	-24.08	100	282	Peak	Horizontal		



	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg				
1	4960.00	24.34	33.88	-9.54	54.00	-29.66	400	279	Average	Vertical	CF	
2	4960.00	54.44	63.98	-9.54	74.00	-19.56	400	279	Peak	Vertical		
3	7440.00	47.06	54.41	-7.35	74.00	-26.94	100	198	Peak	Vertical		

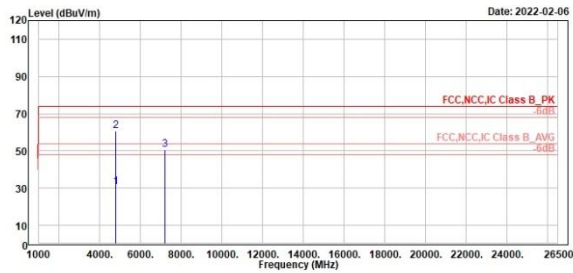
8DPSK

Low Channel (Horizontal)

Low Channel (Vertical)



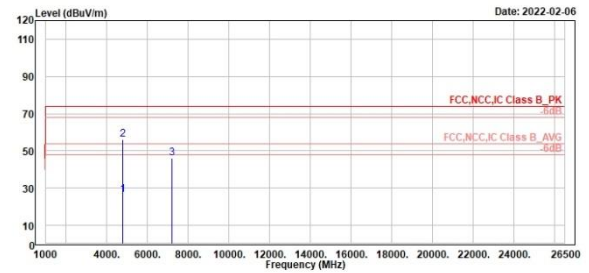
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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	4894.00	30.52	40.39	-9.87	54.00	-23.48	191	360	Average	Horizontal	CF	
2	4894.00	60.62	70.49	-9.87	74.00	-13.38	191	360	Peak	Horizontal		
3	7206.00	50.67	58.00	-7.33	74.00	-23.33	100	299	Peak	Horizontal		



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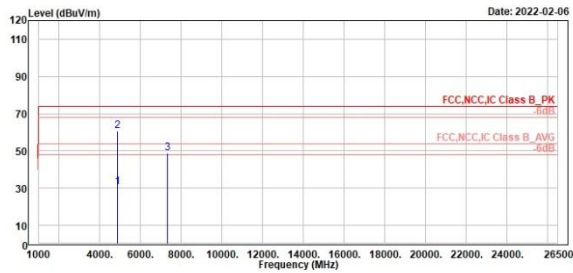
	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	4894.00	26.25	36.12	-9.87	54.00	-27.75	400	247	Average	Vertical	CF	
2	4894.00	56.35	66.22	-9.87	74.00	-17.65	400	247	Peak	Vertical		
3	7206.00	46.30	53.63	-7.33	74.00	-27.70	100	138	Peak	Vertical		

8DPSK

Middle Channel (Horizontal)



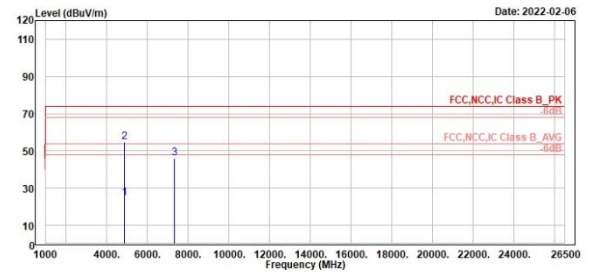
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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	4882.00	30.79	40.57	-9.78	54.00	-23.21	300	354	Average	Horizontal	CF	
2	4882.00	60.69	70.67	-9.78	74.00	-13.11	300	354	Peak	Horizontal		
3	7323.00	48.93	56.41	-7.48	74.00	-25.07	100	278	Peak	Horizontal		



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	Freq	Level	Read	Level	Factor	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB	cm	deg			
1	4882.00	24.80	516.04	-491.24	54.00	-29.20	400	261	Average	Vertical	CF	
2	4882.00	54.90	64.68	-9.78	74.00	-19.10	400	261	Peak	Vertical		
3	7323.00	46.22	53.70	-7.48	74.00	-27.78	400	334	Peak	Vertical		

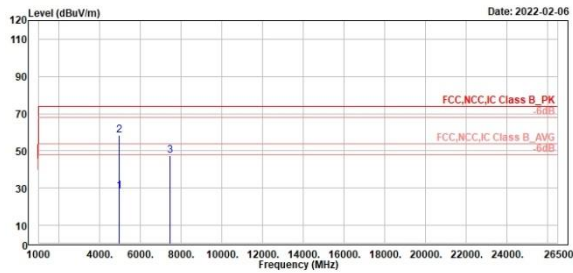
8DPSK

High Channel (Horizontal)

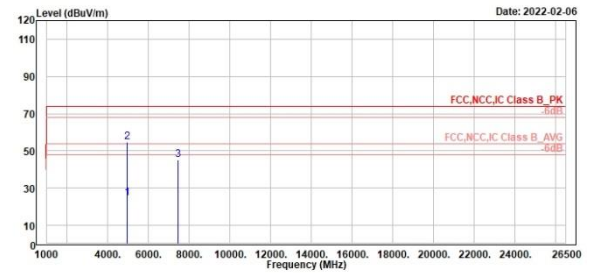
High Channel (Vertical)



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Mains Conducted Emission, 150kHz ~ 30MHz

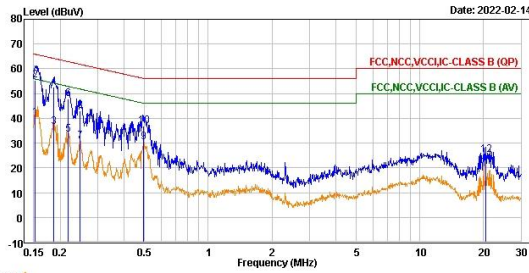
Worst Band

(Line)

(Neutral)



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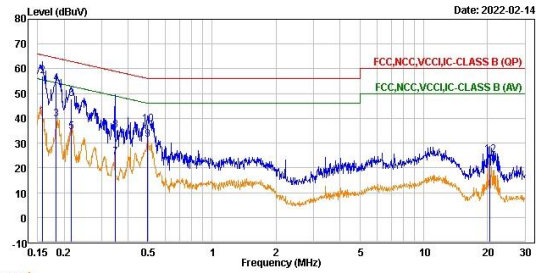


Trace: 1

	Freq	Level	Read	Factor	Limit	Over			
	MHz	dBuV	dBuV	dB	dBuV	dB	Remark	Pol/Phase	Note
1	0.15	40.39	30.70	9.69	55.92	-15.53	Average	line1	
2	0.15	55.20	45.51	9.69	65.92	-10.72	QP	line1	
3	0.19	36.66	26.98	9.68	54.22	-17.56	Average	line1	
4	0.19	52.72	43.04	9.68	64.22	-11.50	QP	line1	
5	0.22	33.45	23.77	9.68	52.90	-19.45	Average	line1	
6	0.22	47.89	38.21	9.68	62.90	-15.01	QP	line1	
7	0.25	30.66	20.98	9.68	51.86	-21.20	Average	line1	
8	0.25	42.87	33.19	9.68	61.86	-18.99	QP	line1	
9	0.50	30.52	20.84	9.68	46.06	-15.54	Average	line1	
10	0.50	36.85	27.17	9.68	56.06	-19.21	QP	line1	
11	20.54	20.50	10.70	9.80	50.00	-29.50	Average	line1	
12	20.54	25.18	15.38	9.80	60.00	-34.82	QP	line1	



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Trace: 1

	Freq	Level	Read	Factor	Limit	Over			
	MHz	dBuV	dBuV	dB	dBuV	dB	Remark	Pol/Phase	Note
1	0.16	40.68	31.01	9.67	55.59	-14.91	Average	neutral	
2	0.16	57.04	47.37	9.67	65.59	-8.55	QP	neutral	
3	0.18	39.63	29.97	9.66	54.34	-14.71	Average	neutral	
4	0.18	54.08	44.42	9.66	64.34	-10.26	QP	neutral	
5	0.22	34.44	24.78	9.66	52.98	-18.54	Average	neutral	
6	0.22	47.70	38.04	9.66	62.98	-15.28	QP	neutral	
7	0.35	24.14	14.49	9.65	49.00	-24.86	Average	neutral	
8	0.35	35.11	25.46	9.65	59.00	-23.89	QP	neutral	
9	0.50	31.45	21.79	9.66	46.06	-14.61	Average	neutral	
10	0.50	37.70	28.04	9.66	56.06	-18.36	QP	neutral	
11	20.54	20.16	10.29	9.87	50.00	-29.84	Average	neutral	
12	20.54	25.31	15.44	9.87	60.00	-34.69	QP	neutral	