

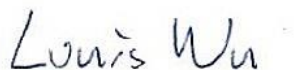


FCC RADIO TEST REPORT

FCC ID : T4522084
Equipment : TCU 2.2
Brand Name : LID Technologies
Model Name : 22084
Applicant : LID Technologies S.A.S.
3 rue GIOTTO Parc Technologique du canal,
Ramonville-Saint-Agne, France 31520
Manufacturer : LID Technologies S.A.S.
3 rue GIOTTO Parc Technologique du canal,
Ramonville-Saint-Agne, France 31520
Factory : SVI Public Company Limited
141-142 Moo 5 Bangkadi Industrial Park,
Tiwanon Road Bangkadi, Muang, Pathumthani
12000 Thailand
Standard : FCC Part 15 Subpart C §15.209

The product was received on Mar. 05, 2024 and testing was performed from May 13, 2024 to Jun. 20, 2024. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issue Date
FR430602B	01	Initial issue of report	Sep. 16, 2024
FR430602B	02	Revise Product Feature of Equipment Under Test This report is an updated version, replacing the report issued on Sep. 16, 2024.	Oct. 01, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.207	AC Power Line Conducted Emissions	Not Required	-
3.1	15.215(c)	20dB Spectrum Bandwidth	Pass	-
	2.1049	99% OBW Spectrum Bandwidth	Pass	-
3.2	15.209	Field Strength of Fundamental Emissions	Pass	Max level 22.12 dB μ V/m at 0.125 MHz
		Radiated Spurious Emissions	Pass	6.87 dB under the limit at 180.12MHz
3.3	15.203	Antenna Requirements	Pass	-

Note: The power source method of the EUT is to use Car Battery (DC power source), and there is no other AC power port, after assessing, AC Conduction Emission test is not required.

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Yun Huang

Report Producer: Clio Lo

1. General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	TCU 2.2
FCC ID	T4522084
Brand Name	LID Technologies
Model Name	22084
Integrated WWAN Module	Brand Name: Quectel Model Name: BG95-M3, BG95-M3 MINIPCIE FCC ID: XMR201910BG95M3
EUT supports Radios application	Bluetooth-LE, RFID and SRD.
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer.

1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx / Rx Frequency	125 kHz
Antenna Type	Resonant Ferrite antenna
Type of Modulation	OOK

Remark: The above EUT's information was declared by manufacturer. Please refer to Disclaimer in report summary.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH03-HY	03CH07-HY
Test Engineer	Eric Wu	Ken Wu
Temperature (°C)	23.1~25.1	24.8~25.5
Relative Humidity (%)	39~41	67.2~70.9

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190

1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.209
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2. Test Configuration of Equipment Under Test

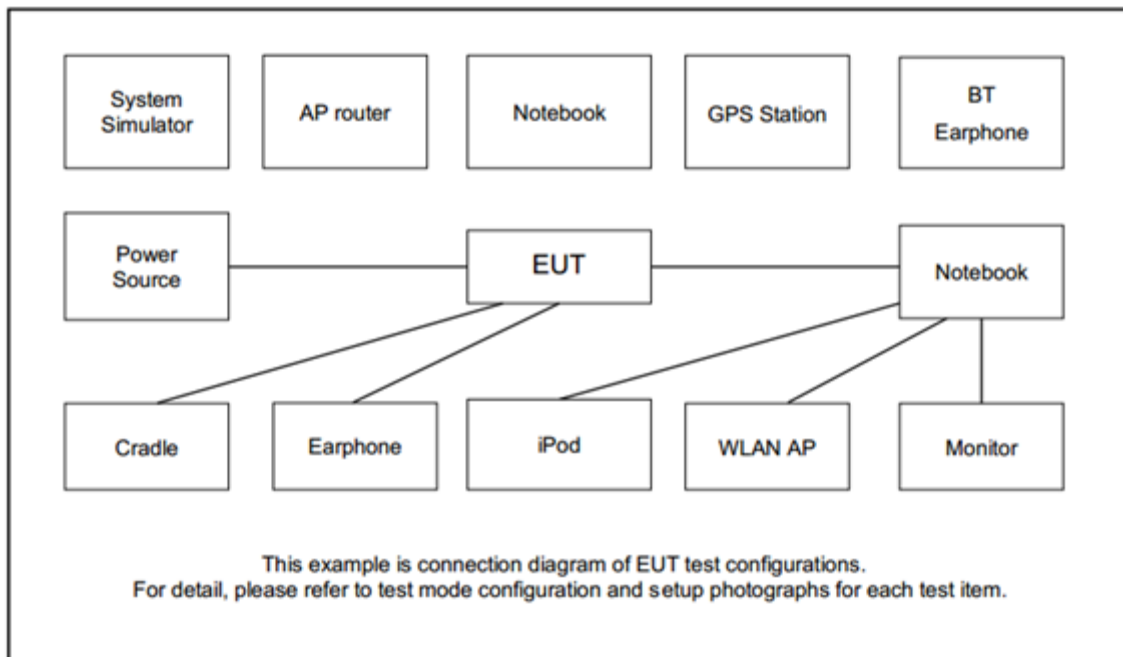
2.1 Descriptions of Test Mode

Investigation has been done on all the possible configurations.

The following table is a list of the test modes shown in this test report.

Test Items	
20dB Spectrum Bandwidth / 99OB	Field Strength of Fundamental Emissions
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Dell	E3340	N/A	N/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m
2.	USB to RS232	UGREEN	N/A	N/A	N/A	N/A
3.	DC Power Supply	GW Instek	GPE2323	N/A	N/A	N/A

2.4 EUT Operation Test Setup

EUT turn on the RFID function.

3. Test Results

3.1 20dB and 99% OBW Spectrum Bandwidth Measurement

3.1.1 Limit

Reporting only

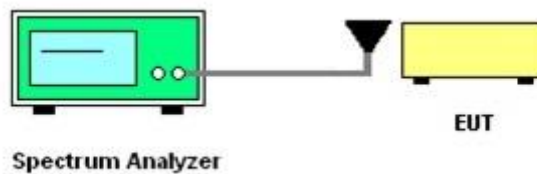
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% OBW.

3.1.4 Test Setup



3.1.5 Test Result of RF Near Field Test Items

Please refer to Appendix A.

3.2 Radiated Emissions Measurement

3.2.1 Limit

The field strength of any emissions which appear band shall not exceed the general radiated emissions limits.

Frequencies (MHz)	Field Strength ($\mu\text{V/m}$)	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

3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Measuring Instrument Setting

The following table is the setting of receiver:

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

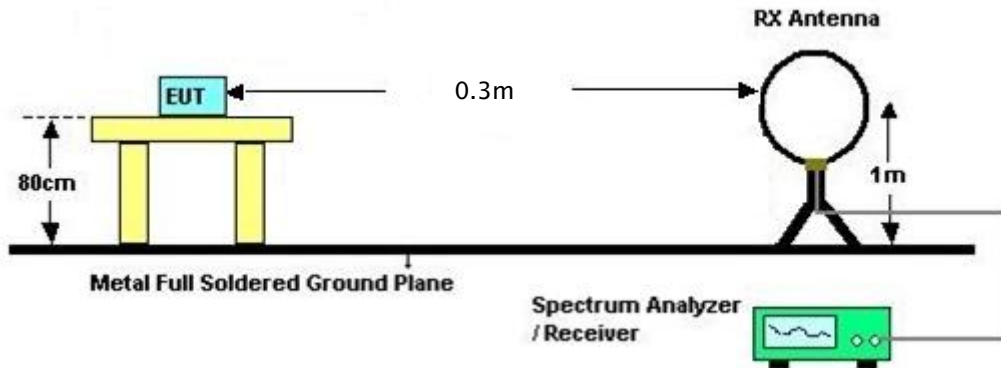
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.2.4 Test Procedures

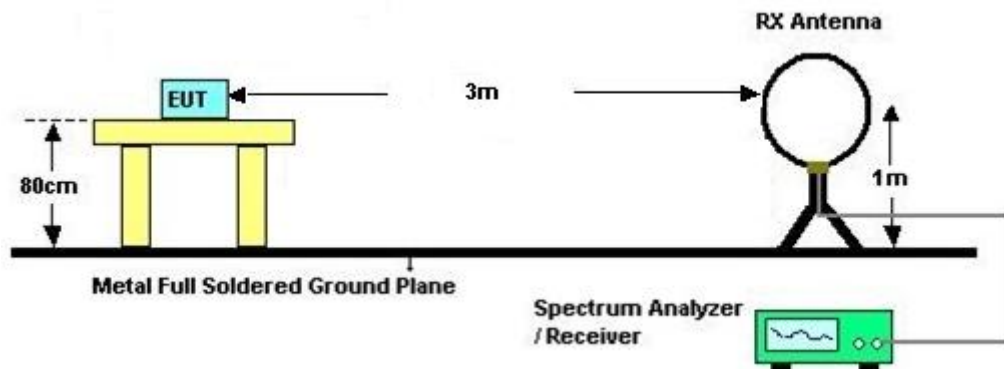
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver.
8. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as “-”.

3.2.5 Test Setup

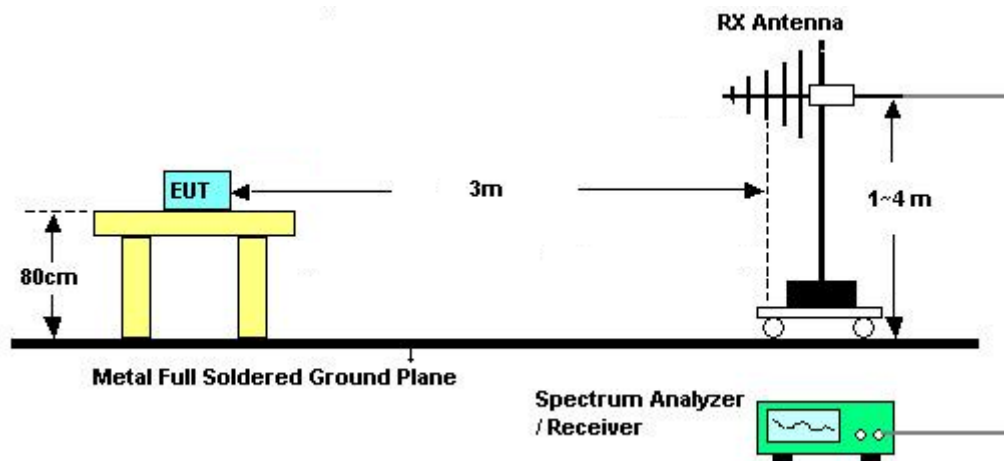
Field Strength of Fundamental Emissions



For radiated emissions below 30MHz



For radiated emissions above 30MHz





3.2.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix B.

Remark:

1. There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.
2. According to C63.10 radiated test, the EUT pre-scanned horizontal, vertical, and ground-parallel three polarization's, the worst case is horizontal & vertical polarization, test data of two mode was reported.



3.3 Antenna Requirements

3.3.1 Standard Applicable

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.3.2 Antenna Anti-Replacement Construction

Antenna permanently attached.



4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Feb. 01, 2024	May 13, 2024	Jan. 31, 2025	Radiation (03CH07-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35419 & 03	30MHz~1GHz	Apr. 22, 2024	May 13, 2024	Apr. 21, 2025	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Feb. 23, 2024	May 13, 2024	Feb. 22, 2025	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	Oct. 02, 2023	May 13, 2024	Oct. 01, 2024	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4 MY24971/4 MY15682/4	30MHz to 18GHz	Feb. 21, 2024	May 13, 2024	Feb. 20, 2025	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4 MY24971/4	9kHz to 30MHz	Feb. 21, 2024	May 13, 2024	Feb. 20, 2025	Radiation (03CH07-HY)
Controller	EMEC	EM1000	N/A	Control Ant Mast	N/A	May 13, 2024	N/A	Radiation (03CH07-HY)
Controller	MF	MF-7802	N/A	Control Turn table	N/A	May 13, 2024	N/A	Radiation (03CH07-HY)
Antenna Mast	EMEC	AM-BS-4500E	N/A	Boresight mast 1M~4M	N/A	May 13, 2024	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	May 13, 2024	N/A	Radiation (03CH07-HY)
Software	Audix	E3	N/A	N/A	N/A	May 13, 2024	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB2495	N/A	Mar. 01, 2024	May 13, 2024	Feb. 28, 2025	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 20, 2023	Jun. 20, 2024	Sep. 19, 2024	Near Feld (TH03-HY)
Temperature & Humidity Cabinet	ESPEC	LHU-113	1012005860	-20°C ~85°C	Dec. 13, 2023	Jun. 20, 2024	Dec. 12, 2024	Near Feld (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890001	1V~20V 0.5A~4A	Sep. 12, 2023	Jun. 20, 2024	Sep. 11, 2024	Near Feld (TH03-HY)
Hygrometer	TECPEL	DTM-303B	TP200886	N/A	Mar. 14, 2024	Jun. 20, 2024	Mar. 13, 2025	Near Feld (TH03-HY)



5. Measurement Uncertainty

Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

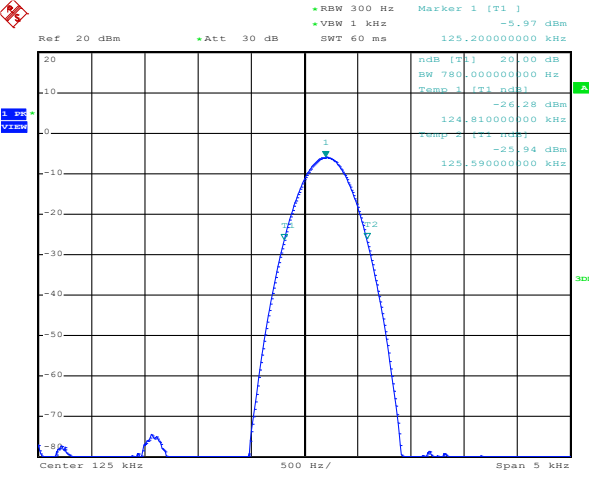
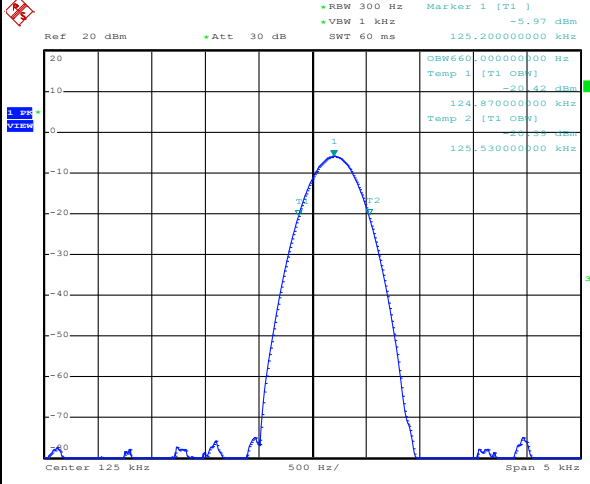
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.8 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.3 dB
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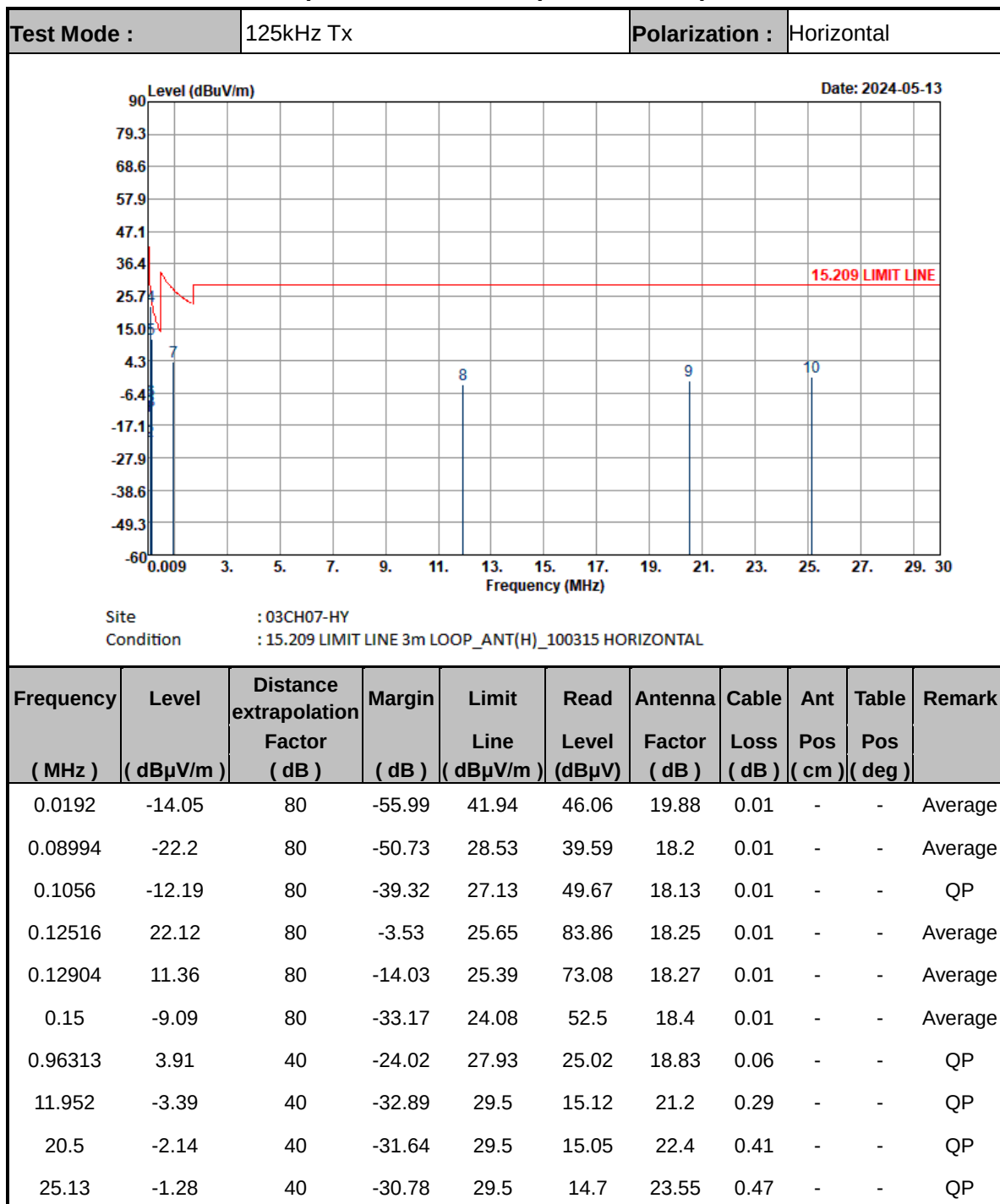
Appendix A. Test Results of RF Near Field Test Items

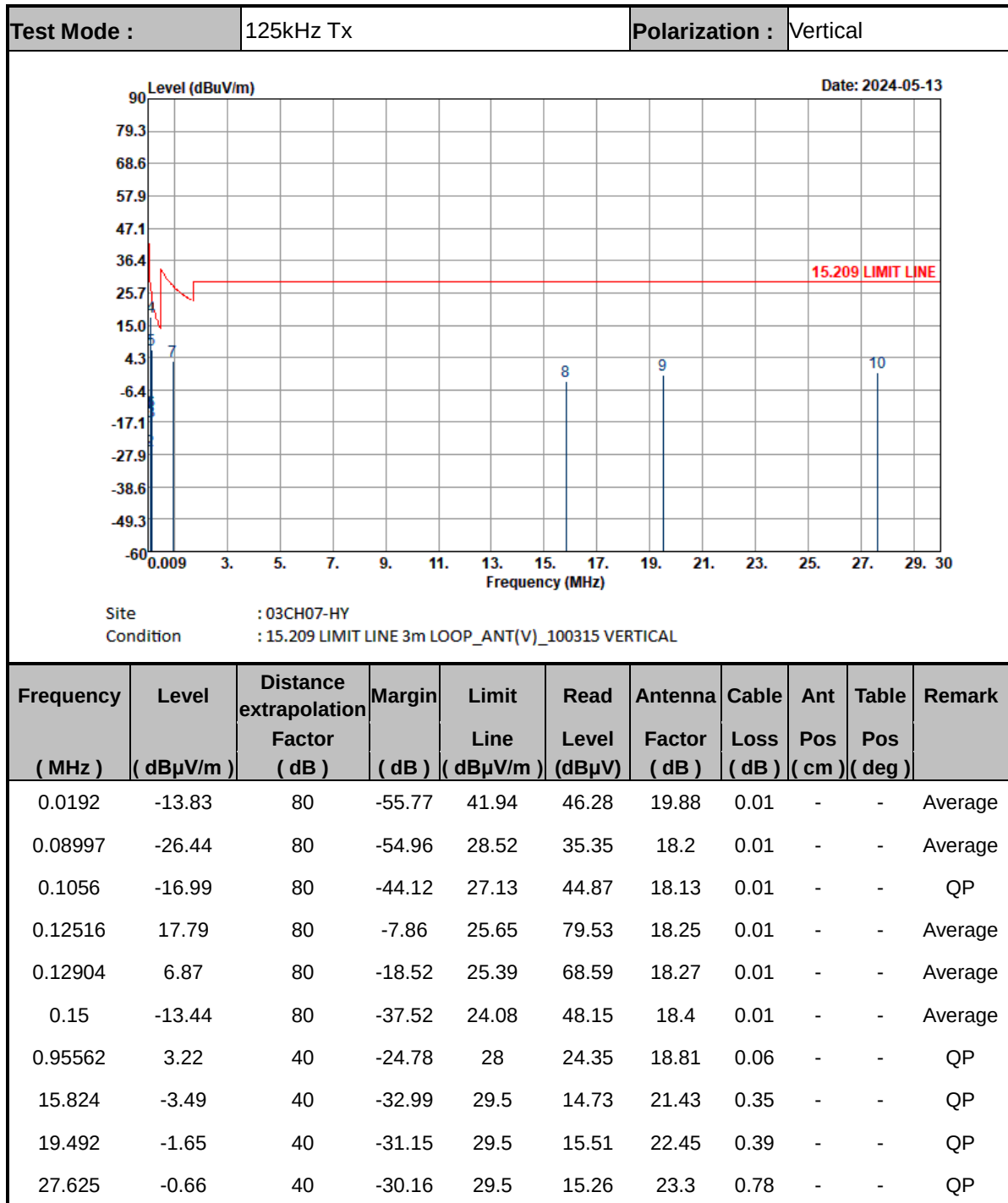
Test mode		125kHz	
 Ref 20 dBm Att 30 dB RBW 300 Hz Marker 1 [T1] -5.97 dBm VBW 1 kHz BW 780.000000 Hz Temp 1 [T1] ndb1 -26.28 dBm 124.81000000 kHz Temp 2 [T2] ndb1 -25.94 dBm 125.59000000 kHz Center 125 kHz 500 Hz/ Span 5 kHz Date: 20.JUN.2024 16:16:46		 Ref 20 dBm Att 30 dB RBW 300 Hz Marker 1 [T1] -5.97 dBm VBW 1 kHz BW 660.000000 Hz Temp 1 [T1] OBW -20.42 dBm 124.87000000 kHz Temp 2 [T2] OBW -20.39 dBm 125.53000000 kHz Center 125 kHz 500 Hz/ Span 5 kHz Date: 20.JUN.2024 16:16:18	
20dB Bandwidth (Hz)		780	99% Occupied BW (Hz)
			660

Remark: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

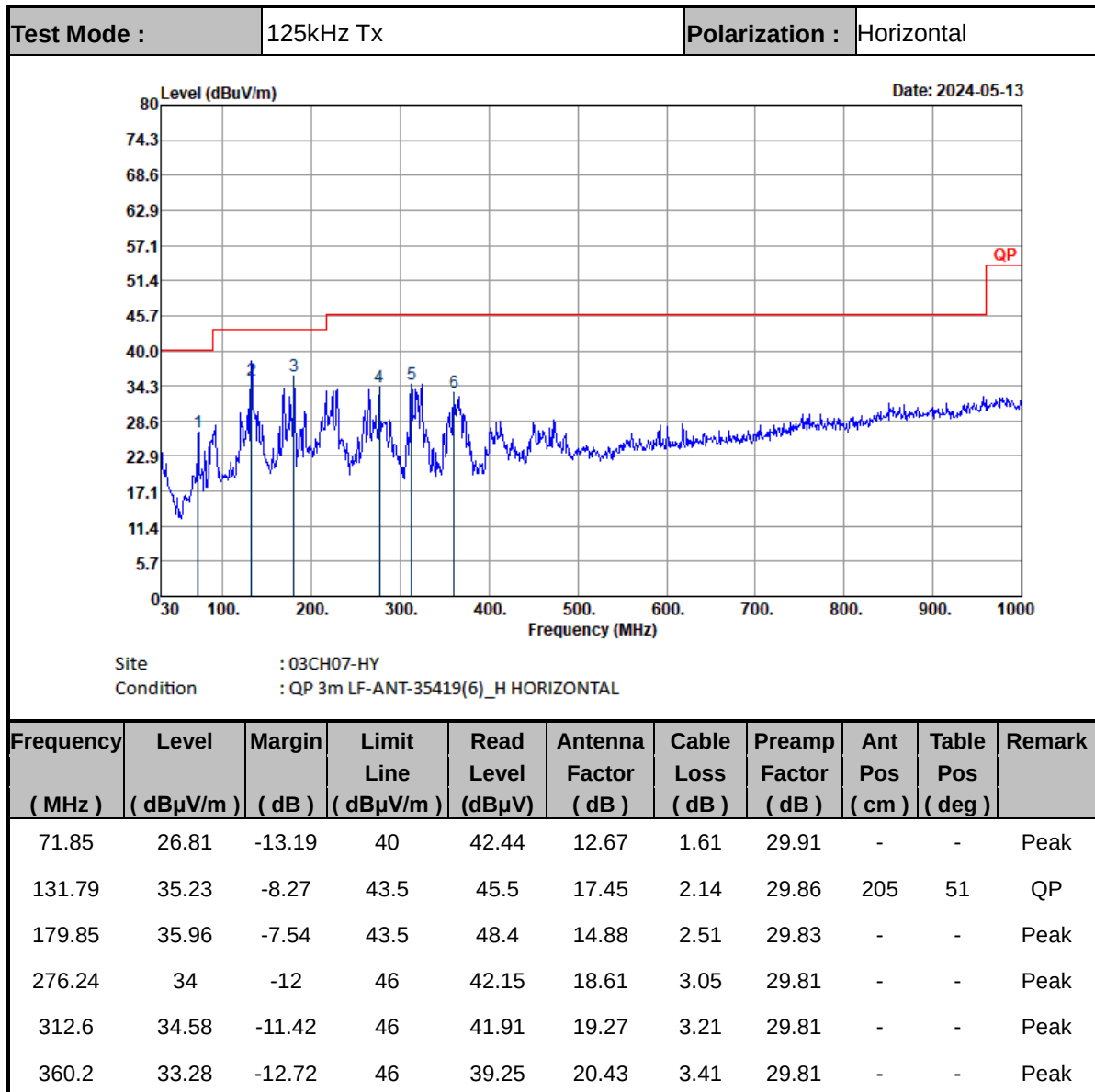
Appendix B. Test Results of Radiated Test Items

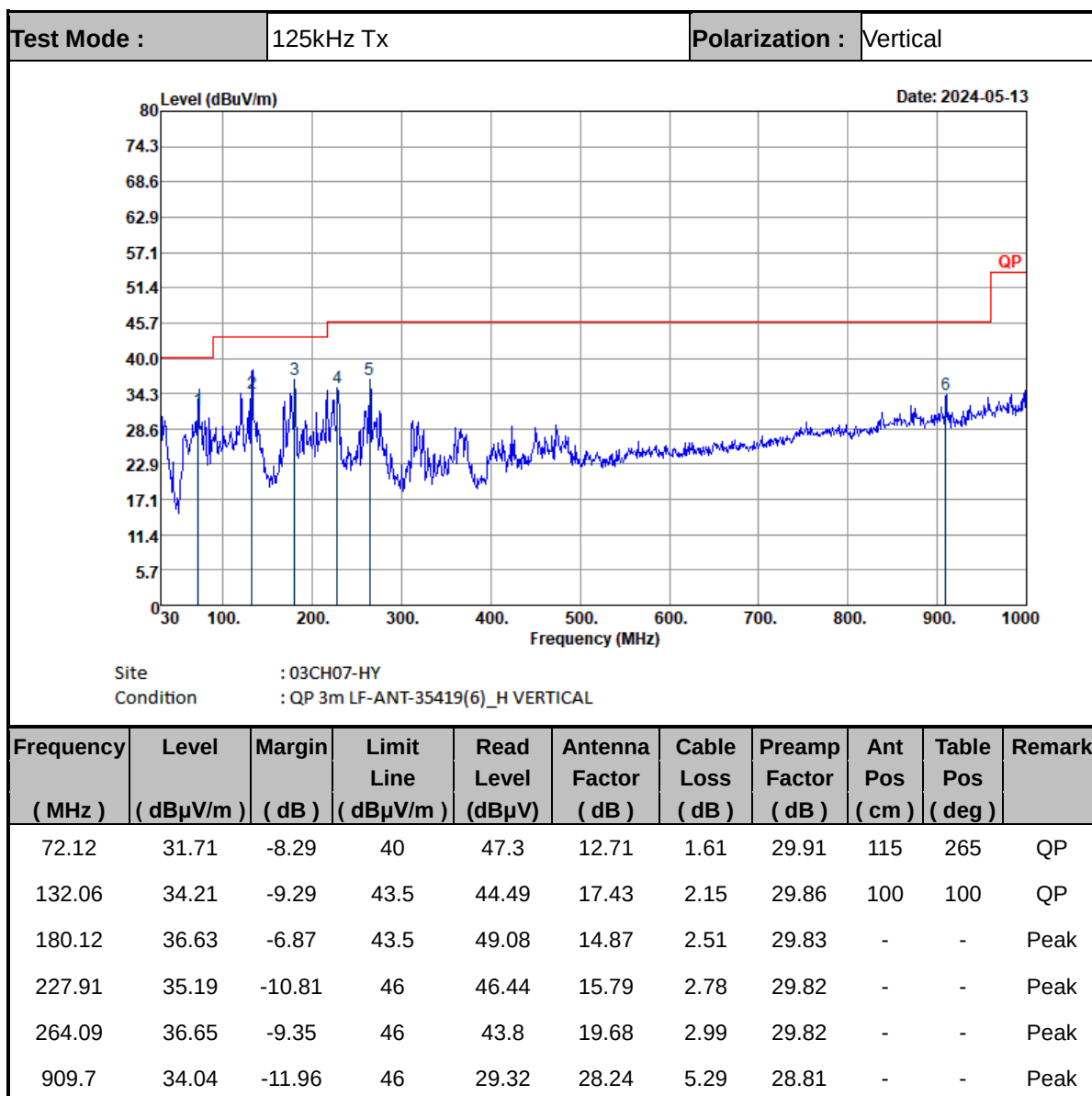
B1. Results of Radiated Spurious Emissions (9 kHz~30MHz)




Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
3. Level= Read Level + Antenna Factor + Cable loss - distance extrapolation factor.

B2. Results of Radiated Spurious Emissions (30MHz~1GHz)



Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.