FCC Test Report

Report No.:	RFBAOZ-WTW-P24080124-1
FCC ID:	RRK-AAAC2361
Test Model:	220-4463B
Received Date:	2024/8/7
Test Date:	2024/11/7 ~ 2024/11/8
Issued Date:	2024/12/2
Applicant:	Alpha Networks Inc.
Address:	No. 8, Li-Hsin 7th Rd., Hsinchu Science Park, Hsinchu 300094, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RFBAOZ-WTW-P24080124-1	Original Release	2024/12/2

1 Certificate of Conformity

Product:	Arming Station Pro
Brand:	AVIGILON
Test Model:	220-4463B
Sample Status:	Engineering sample
Applicant:	Alpha Networks Inc.
Test Date:	2024/11/7 ~ 2024/11/8
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.209) ANSI C63.10-2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Phoenix Huang , **Date:** 2024/12/2

Phoenix Huang / Specialist

Approved by : Wen Yu , **Date:** 2024/12/2

Wen Yu / Assistant Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.209)			
FCC Clause	**Test Item**	**Result**	**Remarks**
15.207	Conducted emission test	Pass	Meet the requirement of limit. Minimum passing margin is -2.76 dB at 0.38828 MHz.
15.209	Radiated emission test	Pass	Meet the requirement of limit. Minimum passing margin is -2.1 dB at 40.69 MHz.
2.202	Bandwidth Measurement	-	Reference only.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	**Frequency**	**Expanded Uncertainty (k=2) (±)**
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	1.9 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.1 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Arming Station Pro
Brand	AVIGILON
Test Model	220-4463B
Status of EUT	Engineering sample
Power Supply Rating	48 Vdc from POE
Modulation Type	ASK
Operating Frequency	125 kHz
Field Strength Of Fundamental	-9.98 dBuV/m (Average) at 300 meters
Accessory	N/A

Note:

1. There are NFC and RFID technology used for the EUT.
2. Simultaneously transmission combination.

Combination	Technology	
1	NFC	RFID
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

3. The EUT has below DDR could be chosen as following table:

No.	Vender	Vender Part number	ALPHA Part number
Main source	SKHYNIX	H5AN8G6NDJR-XNC	155651216G05G
2nd source (No.1)	MICRON	MT40A512M16TB-062E:R	155651216G06G
2nd source (No.2)	SKHYNIX	H5AG36EXNDX017N	155651216G01G

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna NO.	Antenna Type
NFC	printed antenna
RFID	wire loop antenna

Due to radiated measurements are made and the antenna gain is already accounted for this device, so provide an antenna datasheet and/or antenna measurement report is not required. The antenna dimensions and pictures (include antenna wire length if have) are stated in EUT photo exhibit.

3.3 Description of Test Modes

1 channel is provided to this EUT:

Channel	Frequency (kHz)
1	125

3.3.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE<1G	PLC	BW	
-	√	√	√	-

Where **RE<1G:** Radiated Emission below 1 GHz **PLC:** Power Line Conducted Emission
BW: 20dB Bandwidth

Note: The DDR memory has the following sources: Main source/ 2nd source (No.1)/ 2nd source (No.2). Pre-scan these sources of DDR and the worst case found in Main source DDR and its data was recorded in this report.

Radiated Emission Test (9 kHz ~ 30 MHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

Available Channel	Tested Channel
1	1

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

Available Channel	Tested Channel
1	1

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

Available Channel	Tested Channel
1	1

Bandwidth Measurement:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

Available Channel	Tested Channel
1	1

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE<1G	22~23 °C, 71~73 % RH	120 Vac, 60 Hz (System)	Andy Ho
PLC	24 °C, 76 % RH	120 Vac, 60 Hz (System)	Andy Ho
BW	25 °C, 60 % RH	48 Vdc	Willy Lin

3.4 Description of Support Units

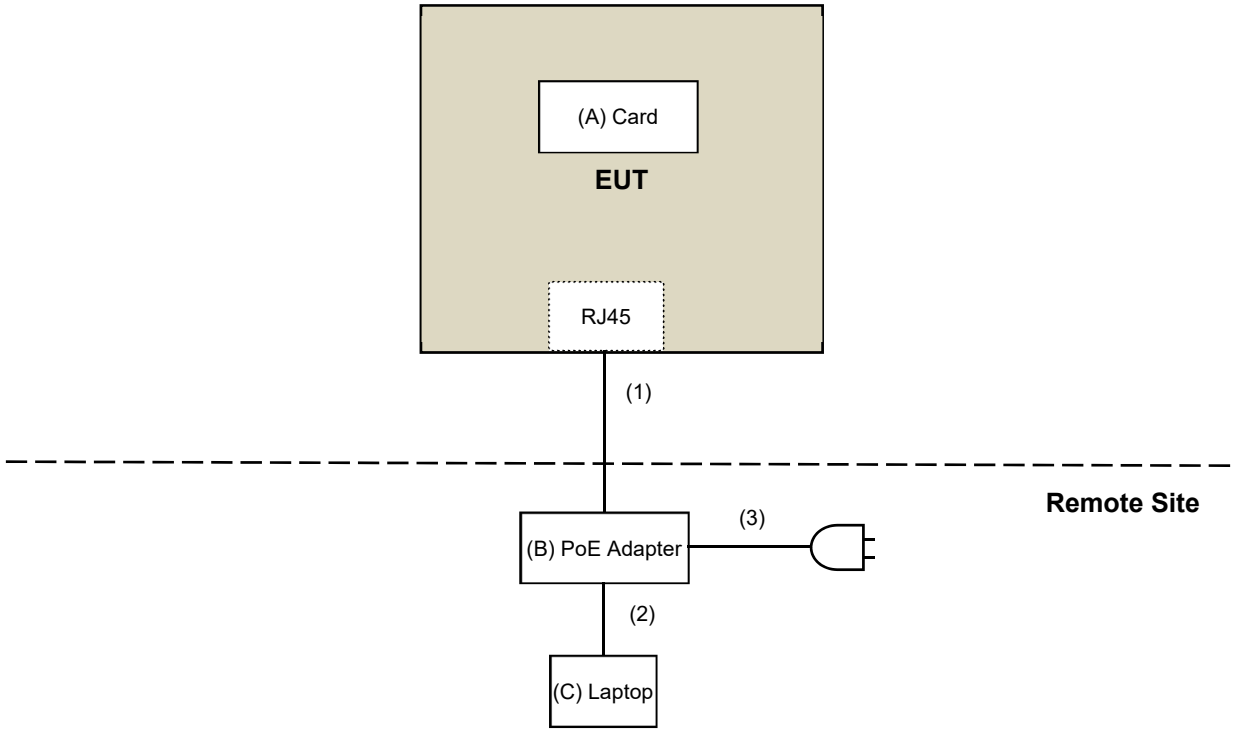
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Card	Alpha	N/A	N/A	N/A	Supplied by applicant
B	PoE Adapter	PHIH0NG	POE29U-560	N/A	N/A	Supplied by applicant
C	Laptop	Lenovo	20U5S01X00 L14	PF-1ANPYA	N/A	Supplied by applicant

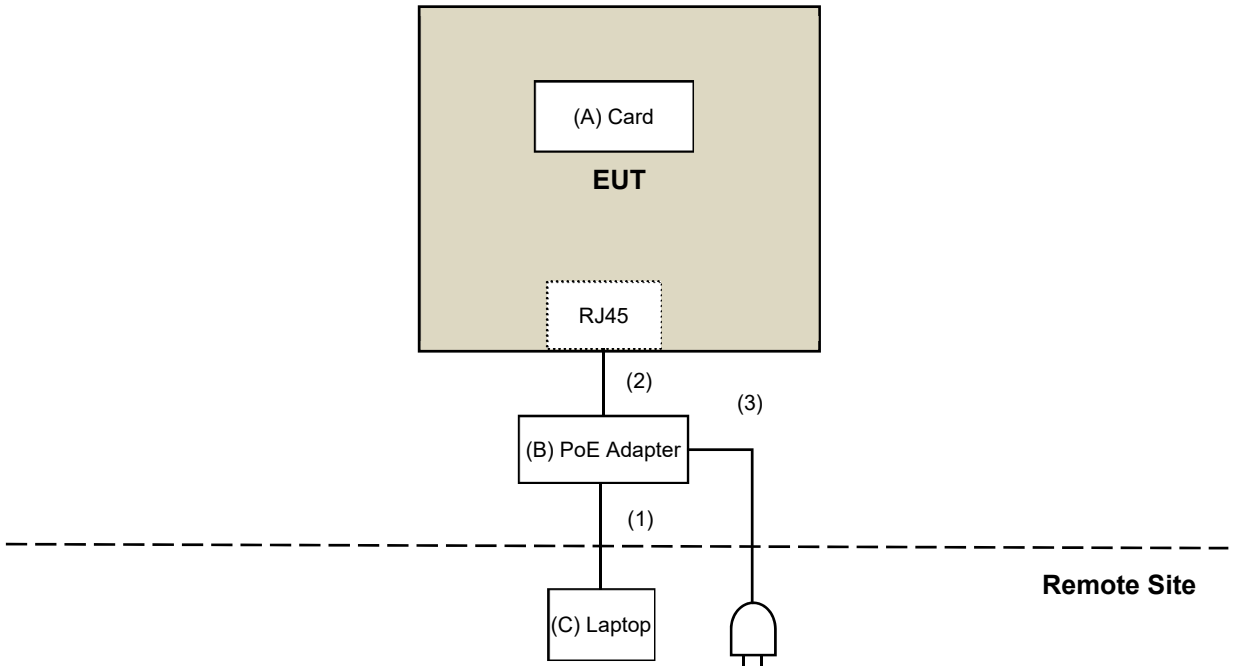
ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	RJ45 Cable	1	10	No	0	Provided by Lab
2	RJ45 Cable	1	1	No	0	Provided by Lab
3	AC Cable	1	1.8	No	0	Supplied by applicant

3.4.1 Configuration of System under Test

For Radiated Emission Test:



For Conducted Emission Test:



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.209)
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

For Frequency below 30 MHz

Frequency (MHz)	Field Strength (dBuV/m)		Measurement Distance (meters)
	uV/m	dBuV/m	
0.009 – 0.490	2400 / F (kHz)	48.52-13.80	300
0.490 – 1.705	24000 / F (kHz)	33.80-22.97	30
1.705 – 30.0	30	29.54	30

For Frequency between 30-1000 MHz

Frequency (MHz)	Class A (at 10m)		Class B (at 3m)	
	uV/m	dBuV/m	uV/m	dBuV/m
30-88	90	39.1	100	40.0
88-216	150	43.5	150	43.5
216-960	210	46.4	200	46.0
Above 960	300	49.5	500	54.0

4.1.2 Test Instruments

For Radiated Emissions below 30 MHz:

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	N/A	N/A
EMI Test Receiver R&S	ESR7	102026	2024/3/25	2025/3/24
Loop Antenna TESEQ	HLA 6121	63620	2024/10/17	2025/10/16
Preamplifier EMCI	EMC001340	980142	2024/2/19	2025/2/18
PXA Signal Analyzer Keysight	N9030B	MY57141948	2024/5/20	2025/5/19
RF Coaxial Cable JYEBAO	5D-FB	LOOPCAB-001	2024/2/19	2025/2/18
		LOOPCAB-002	2024/2/19	2025/2/18
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Tested Date: 2024/11/7

For Radiated Emissions above 30 MHz:

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-0842	2024/10/8	2025/10/7
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	N/A	N/A
EMI Test Receiver R&S	ESR7	102026	2024/3/25	2025/3/24
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	2024/3/30	2025/3/29
Loop Antenna TESEQ	HLA 6121	63620	2024/10/17	2025/10/16
Preamplifier EMCI	EMC330N	980538	2024/3/30	2025/3/29
	EMC001340	980142	2024/2/19	2025/2/18
PXA Signal Analyzer Keysight	N9030B	MY57141948	2024/5/20	2025/5/19
RF Coaxial Cable JYEBAO	5D-FB	LOOPCAB-001	2024/2/19	2025/2/18
		LOOPCAB-002	2024/2/19	2025/2/18
RF Coaxial Cable PEWC	8D	966-5-1	2024/3/30	2025/3/29
		966-5-2	2024/3/30	2025/3/29
		966-5-3	2024/3/30	2025/3/29
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Tested Date: 2024/11/7

4.1.3 Test Procedures

For Radiated emission below 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters 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. Parallel, perpendicular, and ground-parallel 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.
4. ANSI C63.4 OATs and Chamber Correlation Justification
   - Base on ANSI C63.4 section 5.4.2 & RSS-Gen issue 5 section 6.5: measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
   - Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

For Radiated emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters 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.

Notes:

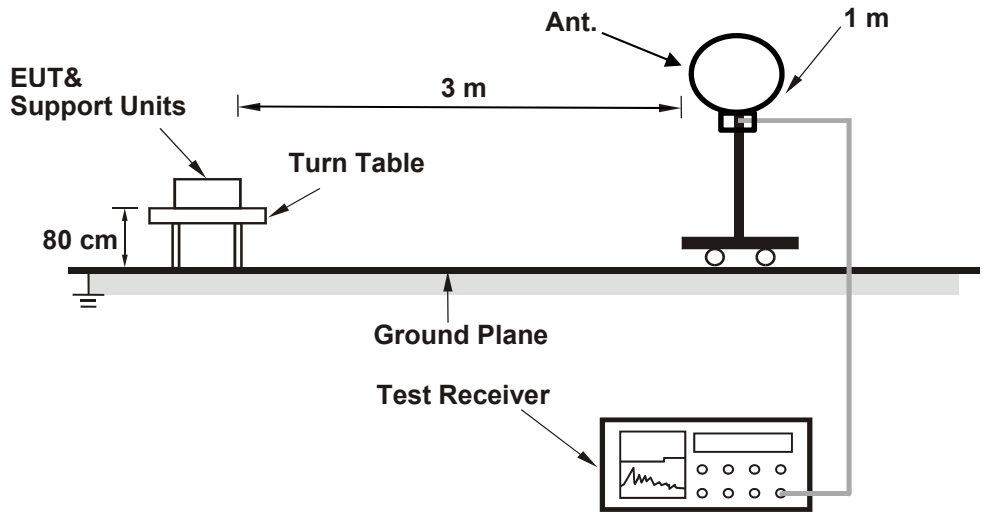
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

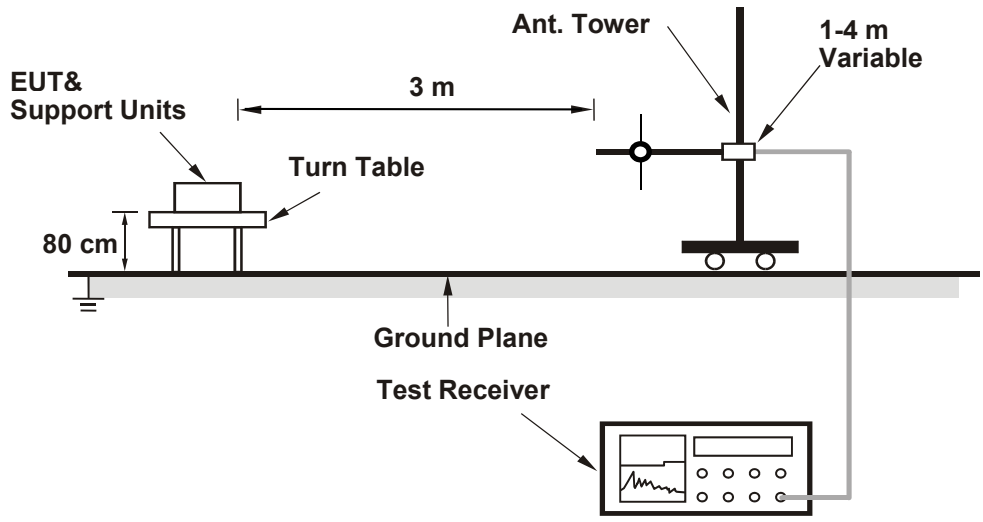
No deviation.

4.1.5 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



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

4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

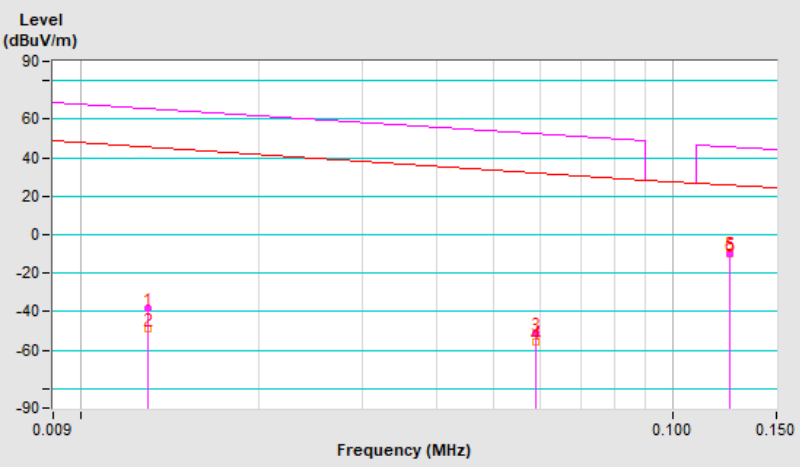
Below 30 MHz Data:

Frequency Range	9 kHz ~ 150 kHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 200 Hz

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.013	-38.36 PK	65.32	-103.68	1.00	118	24.14	-62.50
2	0.013	-49.02 AV	45.32	-94.34	1.00	118	13.48	-62.50
3	0.059	-51.45 PK	52.18	-103.63	1.00	159	11.05	-62.50
4	0.059	-55.96 AV	32.18	-88.14	1.00	159	6.54	-62.50
5	*0.125	-9.62 PK	45.66	-55.28	1.00	156	51.20	-60.82
6	*0.125	-9.98 AV	25.66	-35.64	1.00	341	50.84	-60.82

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.
   Distance factor@3 m = 40*log(3/300) = -80 dB

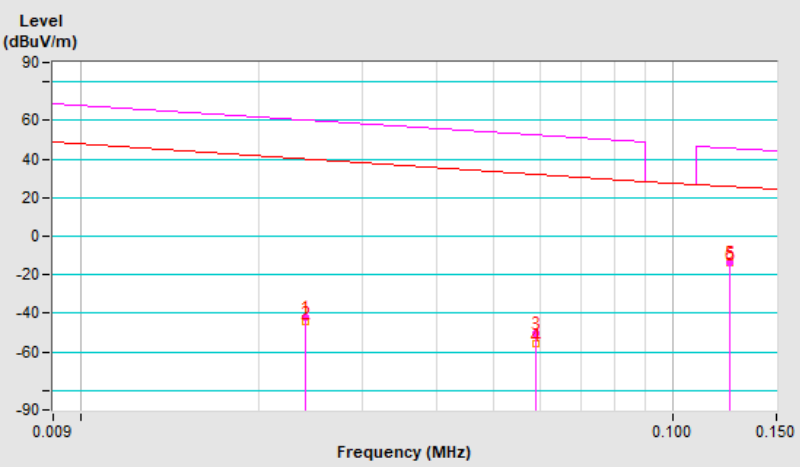


Frequency Range	9 kHz ~ 150 kHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 200 Hz

Antenna Polarity : Perpendicular								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.024	-41.70 PK	60.00	-101.70	1.00	106	20.80	-62.50
2	0.024	-44.37 AV	40.00	-84.37	1.00	106	18.13	-62.50
3	0.059	-50.03 PK	52.18	-102.21	1.00	279	12.47	-62.50
4	0.059	-56.04 AV	32.18	-88.22	1.00	279	6.46	-62.50
5	*0.125	-13.66 PK	45.66	-59.32	1.00	279	47.16	-60.82
6	*0.125	-13.84 AV	25.66	-39.50	1.00	279	46.98	-60.82

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.
   Distance factor@3 m = 40*log(3/300) = -80 dB

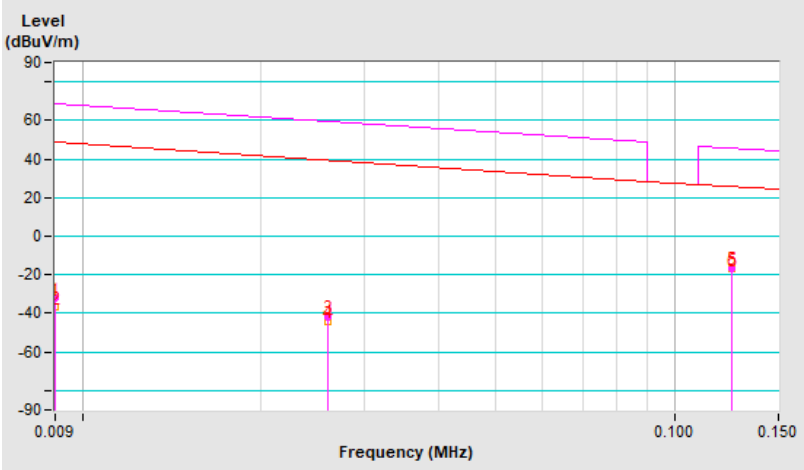


Frequency Range	9 kHz ~ 150 kHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 200 Hz

Antenna Polarity : Ground-parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.009	-32.38 PK	68.52	-100.90	1.00	161	47.62	-80.00
2	0.009	-36.86 AV	48.52	-85.38	1.00	161	43.14	-80.00
3	0.026	-41.98 PK	59.30	-101.28	1.00	114	20.52	-62.50
4	0.026	-44.09 AV	39.30	-83.39	1.00	114	18.41	-62.50
5	*0.125	-16.82 PK	45.66	-62.48	1.00	189	44.00	-60.82
6	*0.125	-16.87 AV	25.66	-42.53	1.00	189	43.95	-60.82

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.
   Distance factor@3 m = 40*log(3/300) = -80 dB

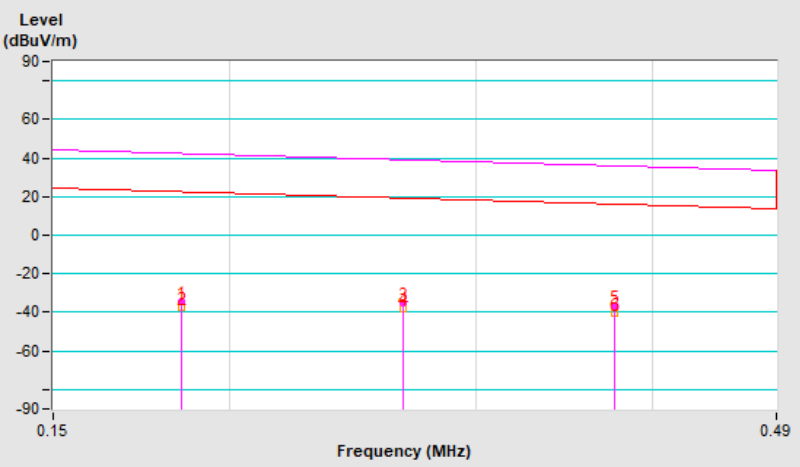


Frequency Range	150 kHz ~ 490 kHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 9 kHz

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.185	-34.68 PK	42.26	-76.94	1.00	127	25.73	-60.41
2	0.185	-37.45 AV	22.26	-59.71	1.00	127	22.96	-60.41
3	0.266	-35.41 PK	39.11	-74.52	1.00	134	24.96	-60.37
4	0.266	-38.16 AV	19.11	-57.27	1.00	134	22.21	-60.37
5	0.376	-36.68 PK	36.10	-72.78	1.00	110	23.80	-60.48
6	0.376	-40.73 AV	16.10	-56.83	1.00	110	19.75	-60.48

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.
   Distance factor@3 m = 40*log(3/300) = -80 dB

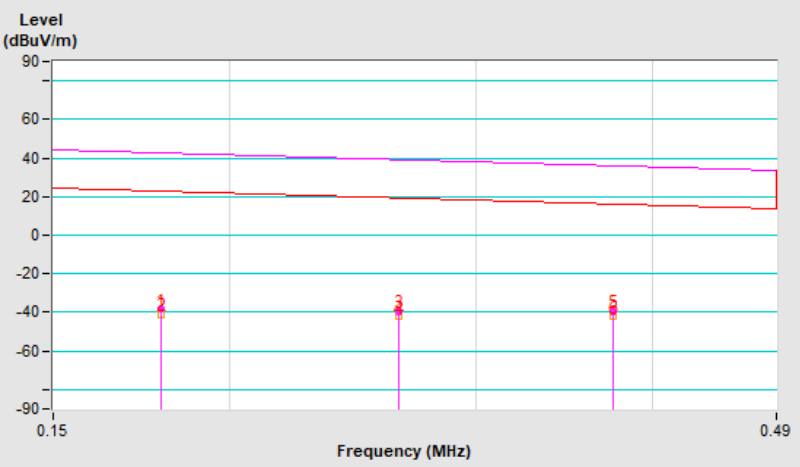


Frequency Range	150 kHz ~ 490 kHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 9 kHz

Antenna Polarity : Perpendicular								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.179	-38.38 PK	42.55	-80.93	1.00	104	22.07	-60.45
2	0.179	-41.04 AV	22.55	-63.59	1.00	104	19.41	-60.45
3	0.264	-39.63 PK	39.17	-78.80	1.00	267	20.73	-60.36
4	0.264	-42.28 AV	19.17	-61.45	1.00	267	18.08	-60.36
5	0.375	-39.39 PK	36.12	-75.51	1.00	303	21.09	-60.48
6	0.375	-42.28 AV	16.12	-58.40	1.00	303	18.20	-60.48

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.
   Distance factor@3 m = 40*log(3/300) = -80 dB

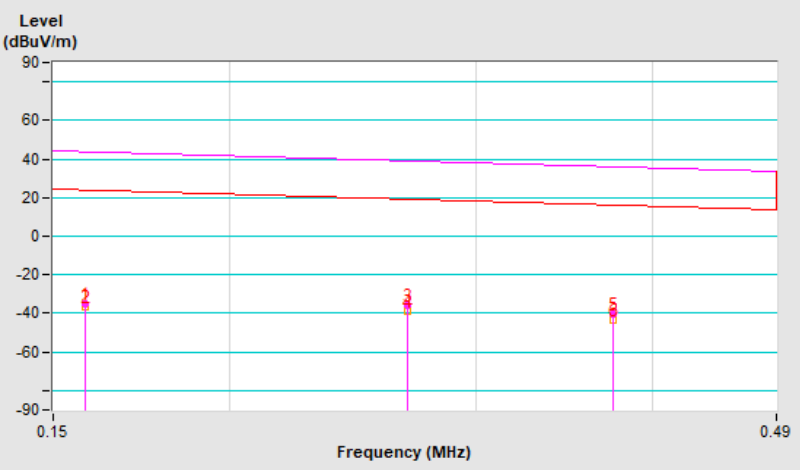


Frequency Range	150 kHz ~ 490 kHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 9 kHz

Antenna Polarity : Ground-parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.158	-34.98 PK	43.63	-78.61	1.00	305	25.61	-60.59
2	0.158	-36.23 AV	23.63	-59.86	1.00	305	24.36	-60.59
3	0.268	-35.64 PK	39.04	-74.68	1.00	284	24.73	-60.37
4	0.268	-38.79 AV	19.04	-57.83	1.00	284	21.58	-60.37
5	0.375	-40.42 PK	36.12	-76.54	1.00	178	20.06	-60.48
6	0.375	-43.19 AV	16.12	-59.31	1.00	178	17.29	-60.48

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.
   Distance factor@3 m = 40*log(3/300) = -80 dB

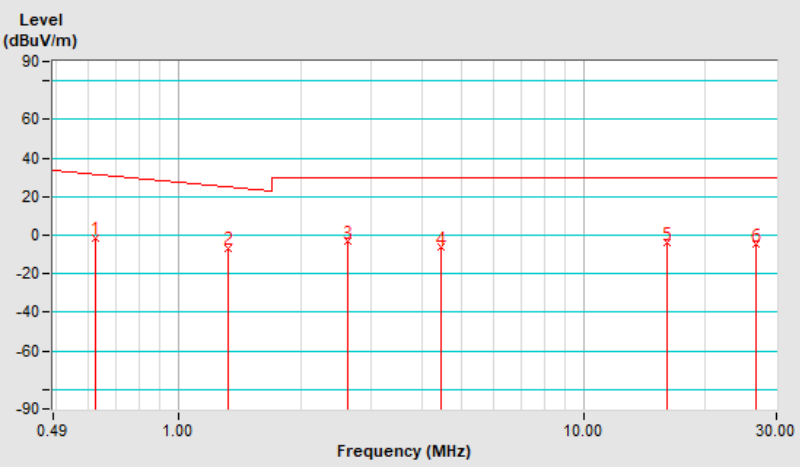


Frequency Range	490 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.624	-1.43 QP	31.70	-33.13	1.00	206	18.87	-20.30
2	1.326	-6.53 QP	25.15	-31.68	1.00	174	13.80	-20.33
3	2.610	-3.19 QP	29.54	-32.73	1.00	219	17.09	-20.28
4	4.439	-6.25 QP	29.54	-35.79	1.00	303	13.53	-19.78
5	16.129	-4.05 QP	29.54	-33.59	1.00	110	14.00	-18.05
6	26.605	-4.73 QP	29.54	-34.27	1.00	141	12.71	-17.44

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@3 m = 40*log(3/30) = -40 dB

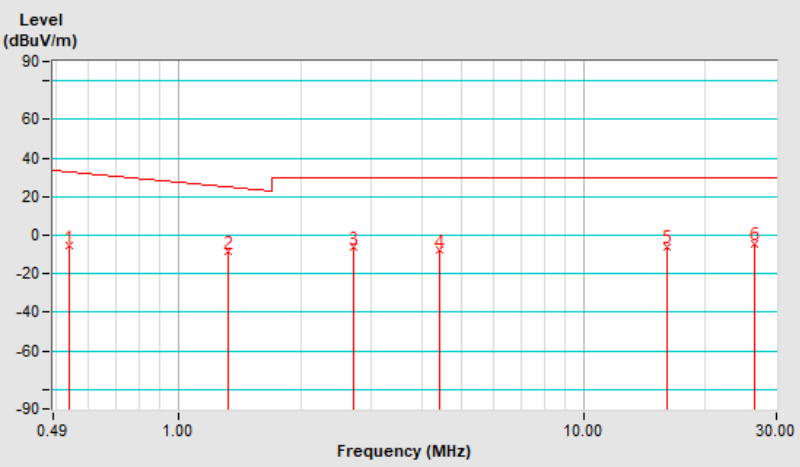


Frequency Range	490 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz

Antenna Polarity : Perpendicular								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.538	-5.61 QP	32.99	-38.60	1.00	147	14.69	-20.30
2	1.325	-8.54 QP	25.15	-33.69	1.00	305	11.79	-20.33
3	2.709	-6.28 QP	29.54	-35.82	1.00	106	13.98	-20.26
4	4.429	-7.88 QP	29.54	-37.42	1.00	147	11.89	-19.77
5	16.147	-5.76 QP	29.54	-35.30	1.00	264	12.28	-18.04
6	26.598	-4.41 QP	29.54	-33.95	1.00	141	13.03	-17.44

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@3 m = 40*log(3/30) = -40 dB

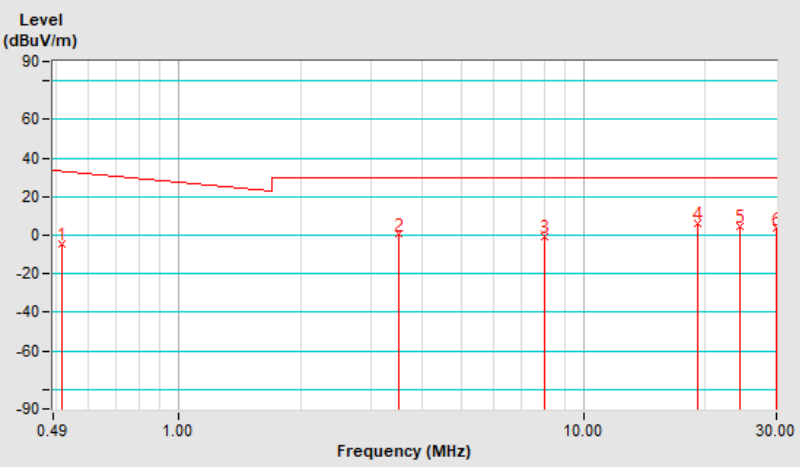


Frequency Range	490 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz

Antenna Polarity : Ground-parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.513	-4.59 QP	33.40	-37.99	1.00	214	15.71	-20.30
2	3.501	0.45 QP	29.54	-29.09	1.00	179	20.35	-19.90
3	8.011	-0.58 QP	29.54	-30.12	1.00	303	18.12	-18.70
4	19.188	6.09 QP	29.54	-23.45	1.00	294	23.37	-17.28
5	24.390	4.54 QP	29.54	-25.00	1.00	175	22.09	-17.55
6	29.981	3.57 QP	29.54	-25.97	1.00	313	20.67	-17.10

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@3 m = 40*log(3/30) = -40 dB



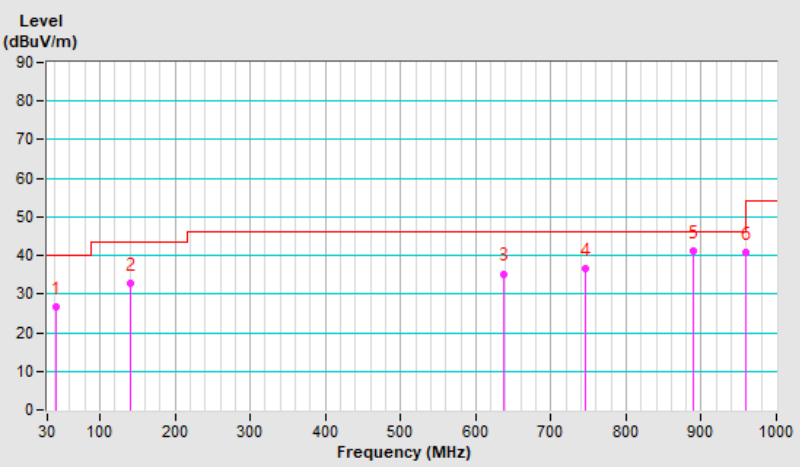
Below 1GHz Data:

RF Mode	RFID	Channel	CH 1：125 kHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.67	26.6 QP	40.0	-13.4	4.00 H	138	39.5	-12.9
2	141.19	32.8 QP	43.5	-10.7	2.00 H	253	45.5	-12.7
3	637.22	35.3 QP	46.0	-10.7	1.00 H	47	39.0	-3.7
4	745.67	36.6 QP	46.0	-9.4	2.00 H	22	38.8	-2.2
5	889.57	41.3 QP	46.0	-4.7	2.00 H	90	41.6	-0.3
6	959.99	40.6 QP	46.0	-5.4	1.00 H	0	39.1	1.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.

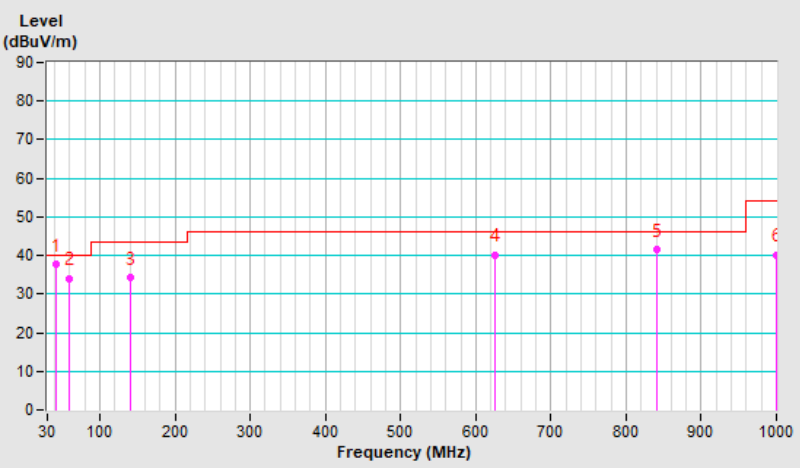


RF Mode	RFID	Channel	CH 1：125 kHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 69 % RH
Tested By	Weiwei Lo		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**40.69**	**37.9 QP**	**40.0**	**-2.1**	**1.00 V**	**73**	**50.8**	**-12.9**
2	59.78	34.1 QP	40.0	-5.9	1.50 V	360	47.3	-13.2
3	141.19	34.3 QP	43.5	-9.2	1.00 V	263	47.0	-12.7
4	624.97	40.2 QP	46.0	-5.8	1.50 V	360	44.1	-3.9
5	840.00	41.5 QP	46.0	-4.5	1.50 V	360	42.7	-1.2
6	999.98	40.2 QP	54.0	-13.8	1.00 V	360	39.2	1.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 Test Instruments

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance Telegartner	50 ohm	3	2024/11/1	2025/10/31
EMI Test Receiver R&S	ESCS 30	100375	2024/5/20	2025/5/19
Fixed Attenuator STI	STI02-2200-10	005	2024/2/19	2025/2/18
LISN R&S	ESH3-Z5	835239/001	2024/4/3	2025/4/2
		848773/004	2024/10/7	2025/10/6
RF Coaxial Cable JYEBAO	5D-FB	COCCAB-001	2024/2/19	2025/2/18
Software BVADT	BVADT_Cond_V7.3.7.4	N/A	N/A	N/A

Notes:

1. The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1
3. Tested Date: 2024/11/8

4.2.3 Test Procedures

a. The EUT was placed on a 0.8 meter to the top of table and 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.

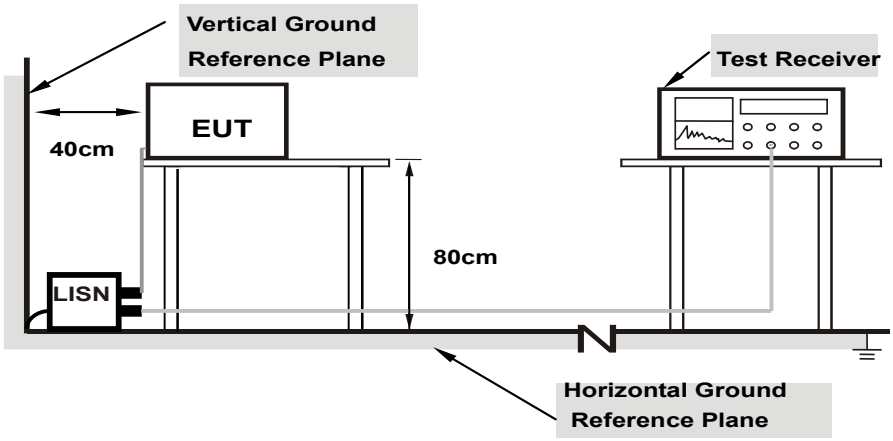
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

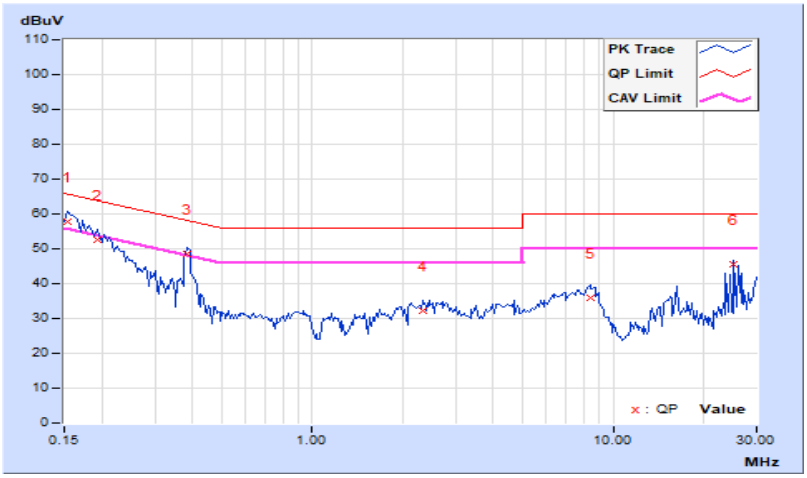
4.2.7 Test Results

RF Mode	RFID	Channel	CH 1：125 kHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.02	47.80	32.27	57.82	42.29	65.79	55.79	-7.97	-13.50
2	0.19297	10.02	42.52	24.68	52.54	34.70	63.91	53.91	-11.37	-19.21
3	0.38438	10.02	38.58	34.99	48.60	45.01	58.18	48.18	-9.58	-3.17
4	2.33203	10.11	22.06	16.35	32.17	26.46	56.00	46.00	-23.83	-19.54
5	8.37109	10.43	25.50	20.73	35.93	31.16	60.00	50.00	-24.07	-18.84
6	25.23828	11.34	34.06	32.82	45.40	44.16	60.00	50.00	-14.60	-5.84

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

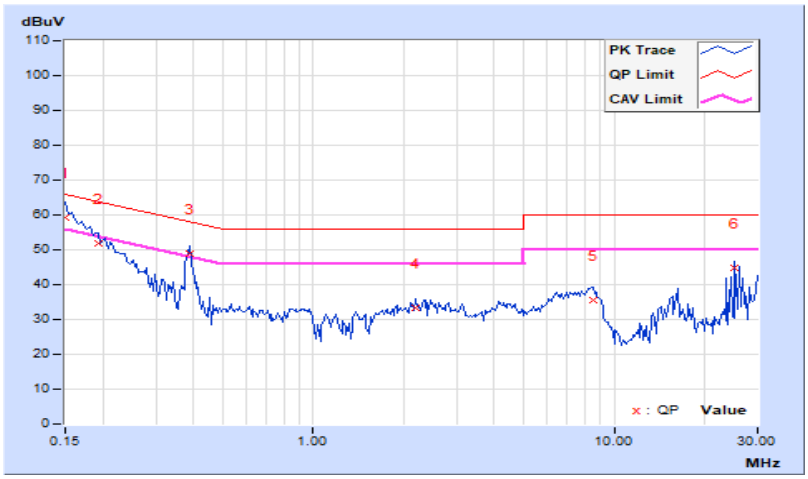


RF Mode	RFID	Channel	CH 1：125 kHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.00	49.13	31.73	59.13	41.73	66.00	56.00	-6.87	-14.27
2	0.19297	10.01	41.96	24.42	51.97	34.43	63.91	53.91	-11.94	-19.48
3	**0.38828**	**10.01**	**38.84**	**35.33**	**48.85**	**45.34**	**58.10**	**48.10**	**-9.25**	**-2.76**
4	2.17969	10.08	23.25	17.74	33.33	27.82	56.00	46.00	-22.67	-18.18
5	8.50781	10.35	25.27	20.42	35.62	30.77	60.00	50.00	-24.38	-19.23
6	25.23047	10.96	33.85	29.58	44.81	40.54	60.00	50.00	-15.19	-9.46

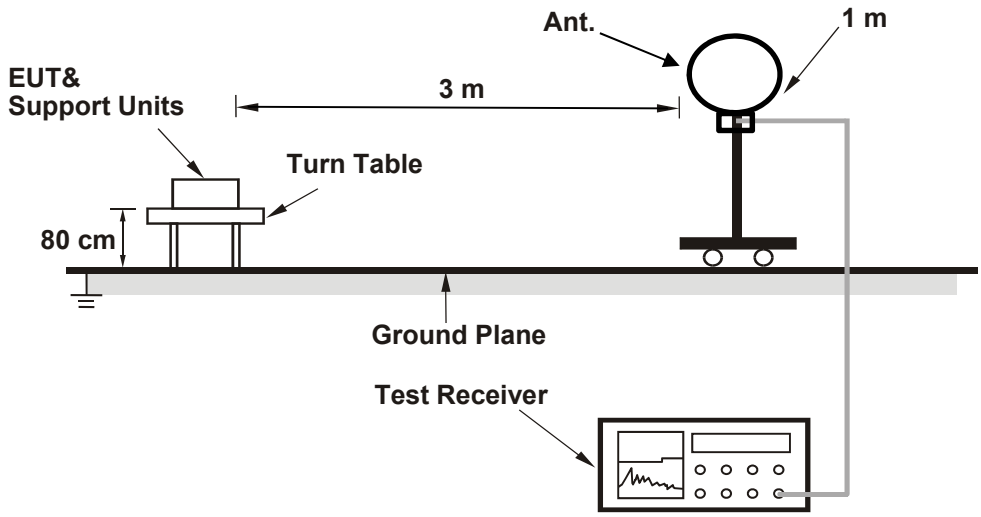
Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.3 20dB Bandwidth Measurement

4.3.1 Test Setup



4.3.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.3 Test Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters 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. Parallel, perpendicular, and ground-parallel 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-spectrum system was set to Peak Detect Function and Maximum Hold.
f. Set resolution bandwidth (RBW) = 1% to 5% of the OBW.
g. Set the video bandwidth (VBW) ≥ 3 x RBW.
h. Sweep = auto couple.
i. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

4.3.4 Deviation from Test Standard

No deviation.

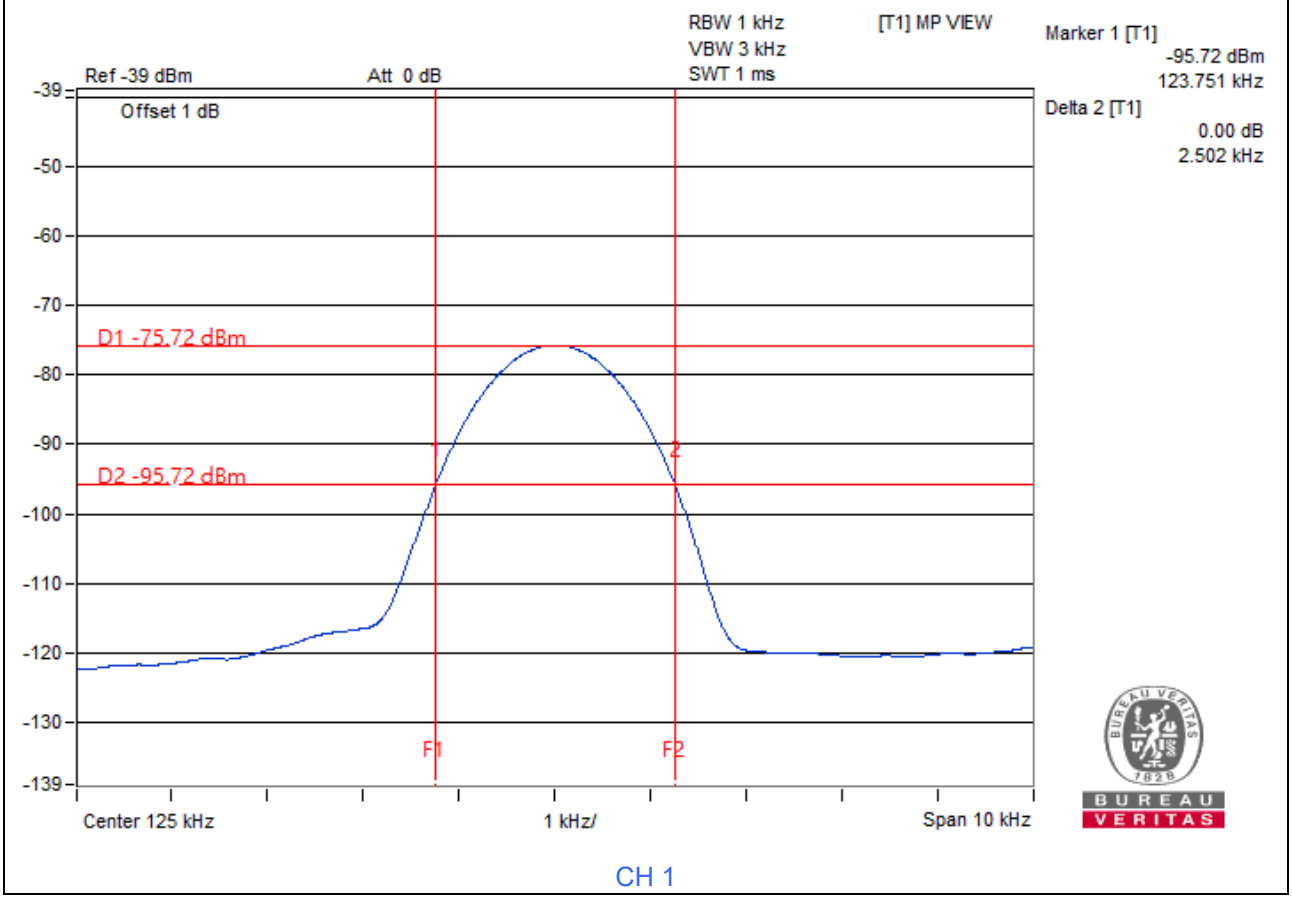
4.3.5 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously.

4.3.6 Test Results

Frequency (kHz)	20 dB Bandwidth (kHz)
125	2.502

Spectrum Plot



Note: The signal look like CW signal, so RBW can't be match 1~5 % OBW.

5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
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Web Site: http://ee.bureauveritas.com.tw

The address and road map of all our labs can be found in our web site also.

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