

Gudeng Equipment Co., Ltd.

TEST REPORT

Model:

GD-BAR01

REPORT NUMBER

230100203THC-001

ISSUE DATE

Mar. 24, 2023

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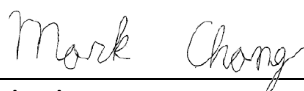
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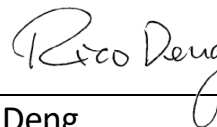


Radio Spectrum TEST REPORT

Applicant:	Gudeng Equipment Co., Ltd. 8F-5, No. 2, Sec. 4, Zhongyang Rd., Tucheng Dist., New Taipei City 236041, Taiwan
Product:	Barcode Reader
Model No.:	GD-BAR01
FCC ID:	2A926GD-BAR-01
Test Method/ Standard:	47 CFR FCC Part 15.209
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan

Mark Chang
Engineer



Rico Deng
Reviewer

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Revision History

Report No.	Issue Date	Revision Summary
230100203THC-001	Mar. 24, 2023	Original report

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Summary of Test Data

Test Requirement	Applicable Rule	Result
Radiated Emission test	15.209	Pass
Conducted Emission test	15.207	Pass
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	Barcode Reader
Model No.:	GD-BAR01
Operating Frequency:	134.2 kHz
Rated Power:	AC 220V
Power Cord:	N/A
Sample receiving date:	2023/01/18
Sample condition:	Workable
Test Date(s):	2023/01/31 ~ 2023/02/04

1.2 Antenna description

For Antenna 1 ~ Antenna 2

Antenna Type : Coil antenna
Connector Type : PH

2. Test specifications

2.1 Test standard

The EUT was performed according to the requirement in FCC Part 15 Subpart C Section 15.209.

2.2 Operation mode

The EUT connected to Notebook LAN Port, remote the system and click “RFID Read”.

2.3 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H	RJ-45 STP Cat.5 10m

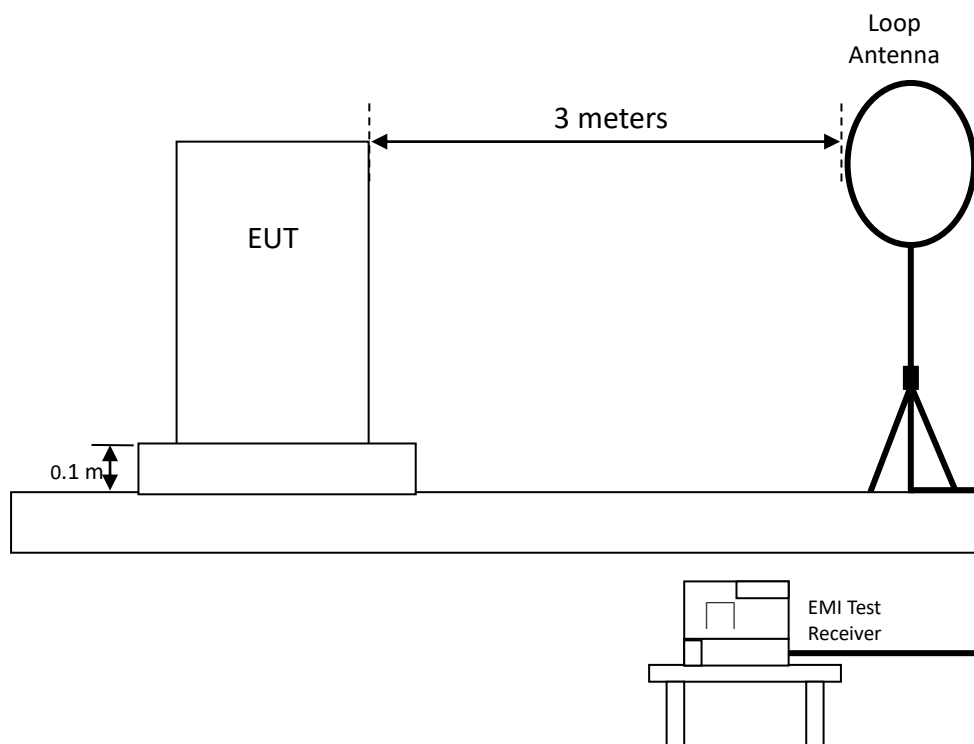
3. Radiated emission test FCC 15.209

3.1 Operating environment

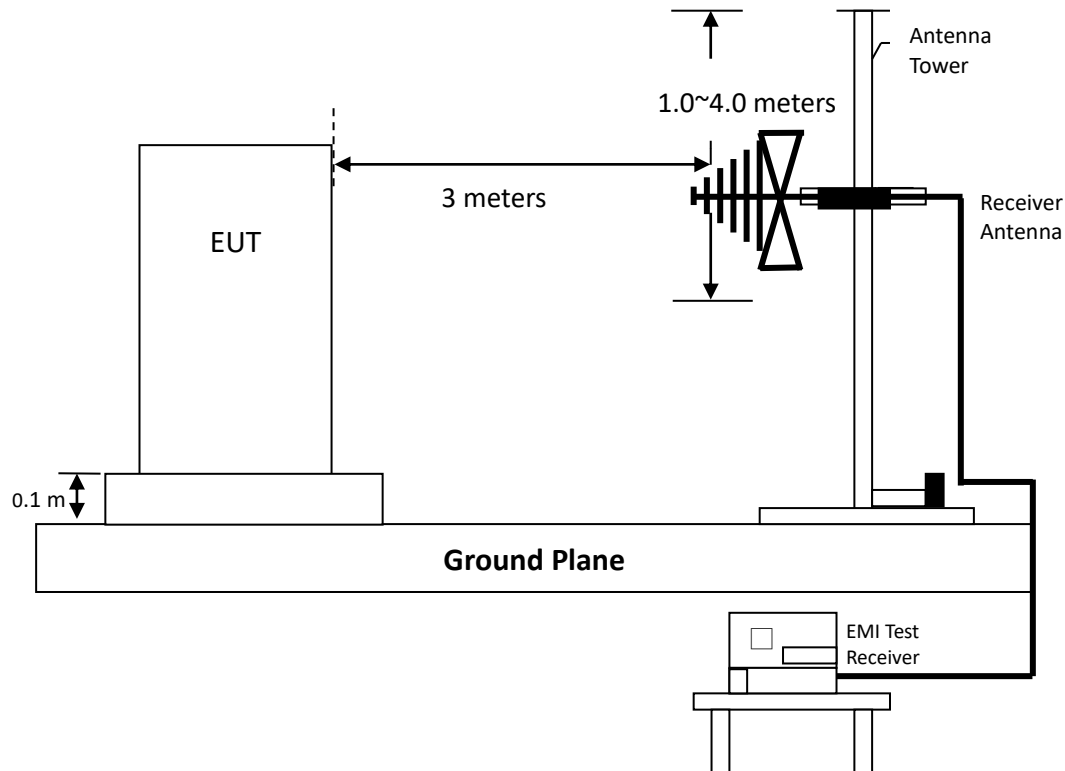
Temperature:	21	°C
Relative Humidity:	54	%

3.2 Test setup & procedure

Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

3.3 Radiated emission limit

3.3.1 General radiated emission limit

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

3.4 Radiated emission test data FCC 15.209

3.4.1 Measurement results: Fundamental emission

For ANT1 port

Antenna Polarization	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	134.200	QP	18.19	73.38	91.57	105.16	-13.59
Parallel	134.200	QP	18.19	68.49	86.68	105.16	-18.48
Ground-parallel	134.200	QP	18.19	62.81	81.00	105.16	-24.16

For ANT2 port

Antenna Polarization	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	134.200	QP	18.19	72.69	90.88	105.16	-14.28
Parallel	134.200	QP	18.19	66.89	85.08	105.16	-20.08
Ground-parallel	134.200	QP	18.19	59.56	77.75	105.16	-27.41

3.4.2 Measurement results: Frequencies equal to 9kHz - 30MHz

For ANT1 port

Antenna Polarization	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	0.018	AV	17.79	58.96	76.75	122.43	-45.68
Perpendicular	0.067	AV	18.74	51.97	70.71	111.06	-40.35
Perpendicular	0.155	AV	18.29	55.62	73.91	103.79	-29.88
Perpendicular	0.732	QP	19.08	42.63	61.71	70.32	-8.61
Perpendicular	0.941	QP	19.17	36.08	55.25	68.13	-12.88
Perpendicular	4.987	QP	19.49	28.33	47.82	69.54	-21.72
Parallel	0.021	AV	17.79	55.61	73.40	121.35	-47.95
Parallel	0.069	AV	18.74	48.48	67.22	110.81	-43.59
Parallel	0.198	AV	18.39	41.41	59.80	101.67	-41.87
Parallel	0.737	QP	19.08	38.49	57.57	70.26	-12.69
Parallel	0.957	QP	19.18	31.64	50.82	67.99	-17.17
Parallel	16.107	QP	21.96	23.73	45.69	69.54	-23.85
Ground-parallel	0.022	AV	17.79	59.22	77.01	120.95	-43.94
Ground-parallel	0.069	AV	18.74	45.72	64.46	110.87	-46.41
Ground-parallel	0.198	AV	18.39	42.02	60.41	101.69	-41.28
Ground-parallel	0.739	QP	19.08	32.63	51.71	70.23	-18.52
Ground-parallel	0.910	QP	19.15	26.53	45.68	68.42	-22.74
Ground-parallel	5.921	QP	19.75	34.02	53.77	69.54	-15.77

Remark: Corr. Factor = Antenna Factor + Cable Loss

For ANT2 port

Antenna Polarization	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	0.021	AV	17.79	59.32	77.11	121.35	-44.24
Perpendicular	0.069	AV	18.74	50.26	69.00	110.87	-41.87
Perpendicular	0.098	QP	18.09	47.86	65.95	107.74	-41.79
Perpendicular	0.734	QP	19.08	42.88	61.96	70.29	-8.33
Perpendicular	0.950	QP	19.17	35.41	54.58	68.05	-13.47
Perpendicular	7.081	QP	20.08	27.85	47.93	69.54	-21.61
Parallel	0.020	AV	17.79	55.80	73.59	121.56	-47.97
Parallel	0.069	AV	18.74	47.94	66.68	110.87	-44.19
Parallel	0.196	AV	18.39	42.69	61.08	101.78	-40.70
Parallel	0.723	QP	19.08	38.10	57.18	70.42	-13.24
Parallel	0.940	QP	19.17	31.00	50.17	68.15	-17.98
Parallel	5.893	QP	19.74	37.64	57.38	69.54	-12.16
Ground-parallel	0.019	AV	17.79	59.63	77.42	121.98	-44.56
Ground-parallel	0.068	AV	18.74	45.35	64.09	110.93	-46.84
Ground-parallel	0.236	AV	18.59	42.04	60.63	100.16	-39.53
Ground-parallel	0.716	QP	19.08	30.75	49.83	70.51	-20.68
Ground-parallel	2.327	QP	19.12	20.84	39.96	69.54	-29.58
Ground-parallel	5.921	QP	19.75	22.82	42.57	69.54	-26.97

Remark: Corr. Factor = Antenna Factor + Cable Loss

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3.4.3 Measurement results: Frequencies equal to 30MHz - 1GHz

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Horizontal	66.63	QP	14.05	15.00	29.05	40.00	-10.95
Horizontal	108.57	QP	20.70	12.16	32.86	43.50	-10.64
Horizontal	159.01	QP	21.07	10.97	32.04	43.50	-11.46
Horizontal	226.91	QP	20.43	15.48	35.91	46.00	-10.09
Horizontal	259.89	QP	22.99	14.67	37.66	46.00	-8.34
Horizontal	324.88	QP	24.42	14.12	38.54	46.00	-7.46

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Vertical	30.96	QP	25.82	7.00	32.82	40.00	-7.18
Vertical	43.78	QP	20.85	13.20	34.05	40.00	-5.95
Vertical	53.29	QP	16.35	20.40	36.75	40.00	-3.25
Vertical	66.88	QP	14.05	23.00	37.05	40.00	-2.95
Vertical	517.91	QP	28.67	14.95	43.62	46.00	-2.38
Vertical	903.00	QP	32.01	13.66	45.67	46.00	-0.33

Remark: Corr. Factor = Antenna Factor + Cable Loss

4. Conducted emission FCC 15.207

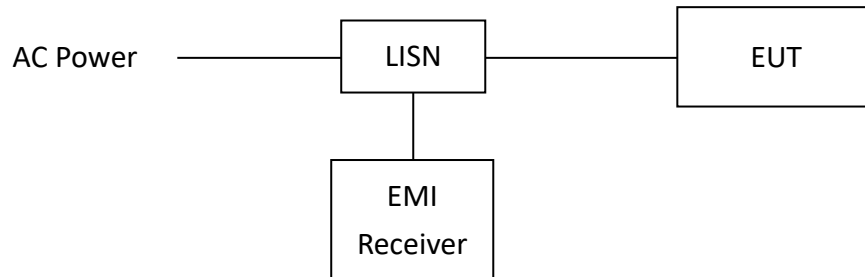
4.1 Measuring instrument setting

Receiver Function	Setting
Detector	QP
Start frequency	0.15MHz
Stop frequency	30MHz
IF bandwidth	9 kHz
Attenuation	10dB

4.2 Test Procedure

Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
Step 2	Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
Step 3	All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
Step 4	The frequency range from 150 kHz to 30MHz was searched.
Step 5	Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
Step 6	The measurement has to be done between each power line and ground at the power terminal.

4.3 Test Diagram

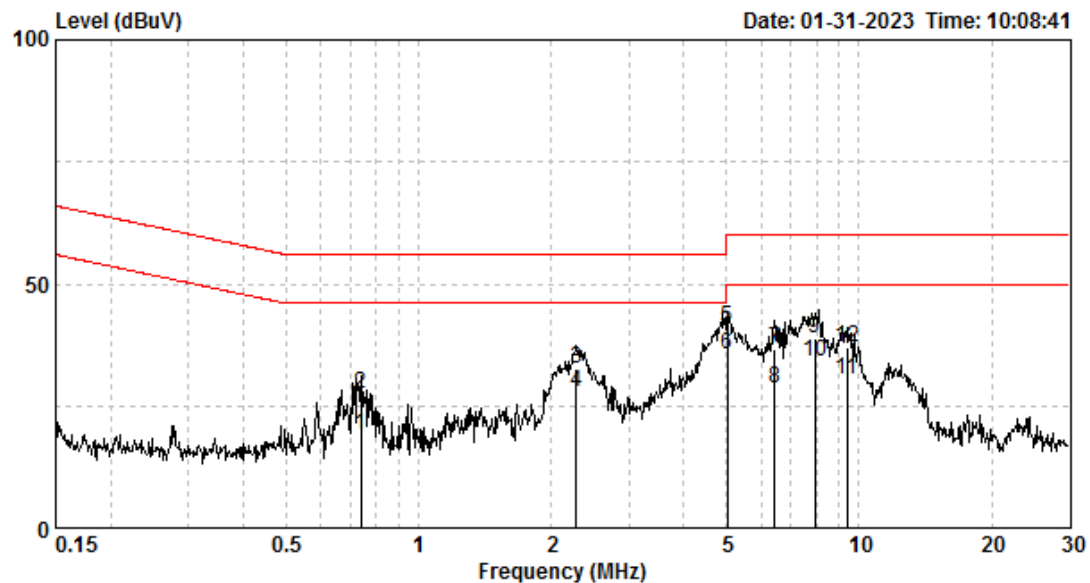


4.4 Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56	56 – 46
0.50~5.00	56	46
5.00~30.0	60	50

4.5 Test Results

Phase:	L1
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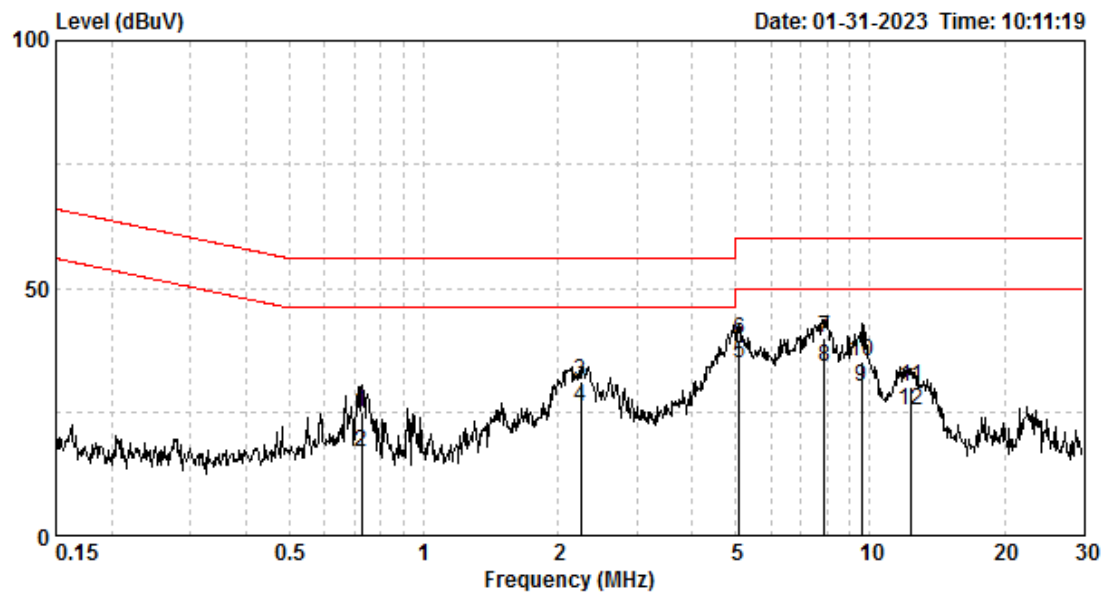
Test voltage :220(L-L)Vac / 60Hz
 Temp \ Relative Humidity:20 °C \ 53 %RH
 Atmospheric pressure :1009 hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB)	
									QP	AV
LINE	0.739	9.92	17.52	27.44	56.00	9.30	19.22	46.00	-28.56	-26.78
LINE	2.285	9.89	22.61	32.51	56.00	18.11	28.00	46.00	-23.49	-18.00
LINE	5.031	10.03	31.01	41.04	60.00	25.39	35.42	50.00	-18.96	-14.58
LINE	6.420	10.05	26.55	36.60	60.00	18.61	28.66	50.00	-23.40	-21.34
LINE	7.935	10.07	28.94	39.01	60.00	24.00	34.07	50.00	-20.99	-15.93
LINE	9.401	10.08	26.90	36.99	60.00	20.19	30.27	50.00	-23.01	-19.73

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

Phase:	L2
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Test voltage :220(L-L)Vac / 60Hz
Temp \ Relative Humidity:20 °C \ 53 %RH
Atmospheric pressure :1009 hPa

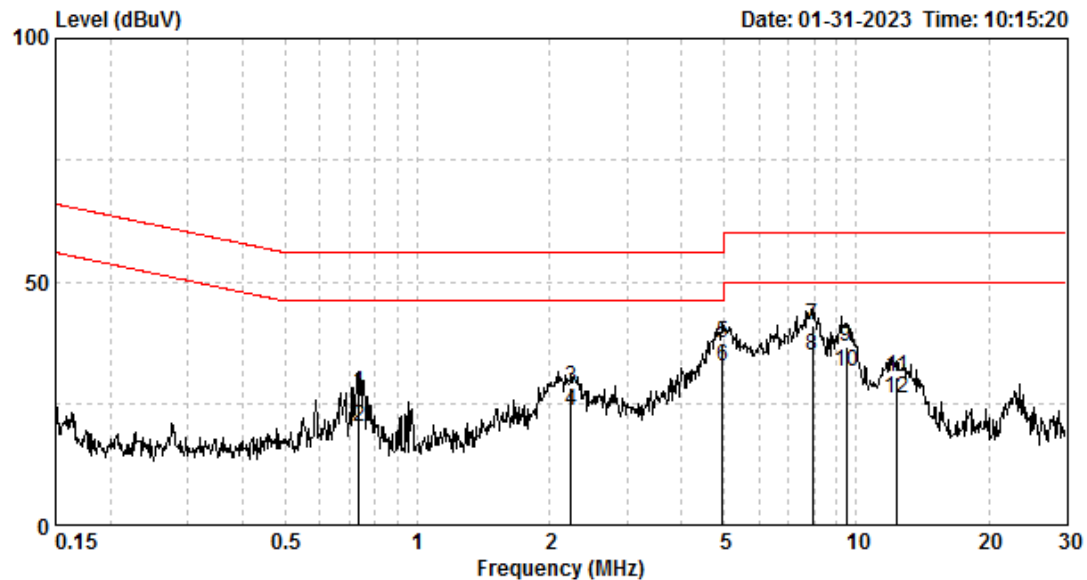
Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB)	
									QP	AV
LINE	0.727	9.90	14.97	24.87	56.00	6.95	16.84	46.00	-31.13	-29.16
LINE	2.249	9.87	21.30	31.17	56.00	16.24	26.11	46.00	-24.83	-19.89
LINE	5.085	10.02	29.36	39.38	60.00	24.70	34.73	50.00	-20.62	-15.27
LINE	7.893	10.06	29.88	39.94	60.00	24.02	34.08	50.00	-20.06	-15.92
LINE	9.552	10.08	25.14	35.22	60.00	20.08	30.15	50.00	-24.78	-19.85
LINE	12.384	10.09	20.01	30.09	60.00	15.12	25.21	50.00	-29.91	-24.79

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

TEST REPORT

Phase:	L3
--------	----



Test voltage :220(L-L)Vac / 60Hz
Temp \ Relative Humidity:20 °C \ 53 %RH
Atmospheric pressure :1009 hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB)	
									QP	AV
LINE	0.735	9.90	17.15	27.06	56.00	10.16	20.06	46.00	-28.94	-25.94
LINE	2.237	9.85	18.18	28.03	56.00	13.75	23.60	46.00	-27.97	-22.40
LINE	4.952	10.00	27.50	37.50	56.00	22.62	32.62	46.00	-18.50	-13.38
LINE	7.935	10.03	30.97	41.01	60.00	24.87	34.91	50.00	-18.99	-15.09
LINE	9.502	10.05	26.73	36.78	60.00	21.49	31.53	50.00	-23.22	-18.47
LINE	12.384	10.06	20.20	30.26	60.00	15.85	25.91	50.00	-29.74	-24.09

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESU40	100381	2022/05/16	2023/05/15
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-067	2022/04/13	2023/04/12
Bi-log Hybrid Antenna	ETC	MCTD2786	BL13S03017	2022/05/19	2023/05/18
966-1(A) Cable	SUHNER	SMA / SUCOFLEX 104	29510614	2022/04/08	2023/04/07
966-1(B) Cable	JUNFLON	SMA / J12J100880-00	AUG-26-08-001	2022/04/08	2023/04/07
966-1_3m Semi-Anechoic Chamber	966_1	CEM-966_1	N/A	2022/12/30	2023/12/29
Test software	Audix	e3	V4.20040112L	NCR	NCR
EMI Test Receiver	R&S	ESCI	100059	2022/10/24	2023/10/23
200A LISN	R&S	ENV4200	848411/012	2022/08/23	2023/08/22
CON-1 Cable	EMC Co.	EMCRG1420- NM-NM-1500	210215	2022/02/22	2023/02/21
Test software	Audix	e3	V4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2.0$.

Item	Uncertainty
Fundamental emission	4.32 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.70 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.16 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.02 dB
AC Power Line Conducted Emission	3.08 dB