



(FCC) TEST REPORT

Report No. : BVT-RH-FCR-250002

Applicant

- Name : T.I.T ENG CO., Ltd.
- Address : 7th FL., SHINDO BLDG. 10 GARAK-DONG, SONGPA-GU SEOUL, KOREA

Test Item

- Product Name : CARD LAMINATOR
- Model Name : NL200

Manufacturer

- Name : T.I.T ENG CO., Ltd.
- Address : 7th FL., SHINDO BLDG. 10 GARAK-DONG, SONGPA-GU SEOUL, KOREA

Date of Test : 2025.08.21

Test Method Used : FCC CFR 47, Part 15. Subpart C-15.225

Test Result : ☒ Pass ☐ Fail

Note : None

This test report is not related to KOLAS accreditation

Affirmation

Tested by

Name : Jung, Ho-Cheol (Signature)

Technical Manager

Name : Choo, Kwang-Yeol (Signature)

2025 . 08 . 22 .

Bureau Veritas CPS Korea Tech Limited

Revision History of test report

Date	Report No.	Revision Histoty
2025.08.22	BVT-RH-FCR-250002	Initial issue

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1. Information of Testing Laboratory

Legal Name and address

Bureau Veritas CPS Korea Tech Limited

(Annyeong-dong) 26, 28, 30, Seja-ro 406beon-gil, Hwaseong-si, Gyeonggi-do, 18326, Republic of Korea

Website: <http://www.bvcpskoreatech.co.kr>

Test location and address

☒ Hwaseong

(Annyeong-dong) 26, 28, 30, Seja-ro 406beon-gil, Hwaseong-si, Gyeonggi-do, 18326, Republic of Korea

Tel: 82-31-222-4251

☐ Suwon

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Registration information

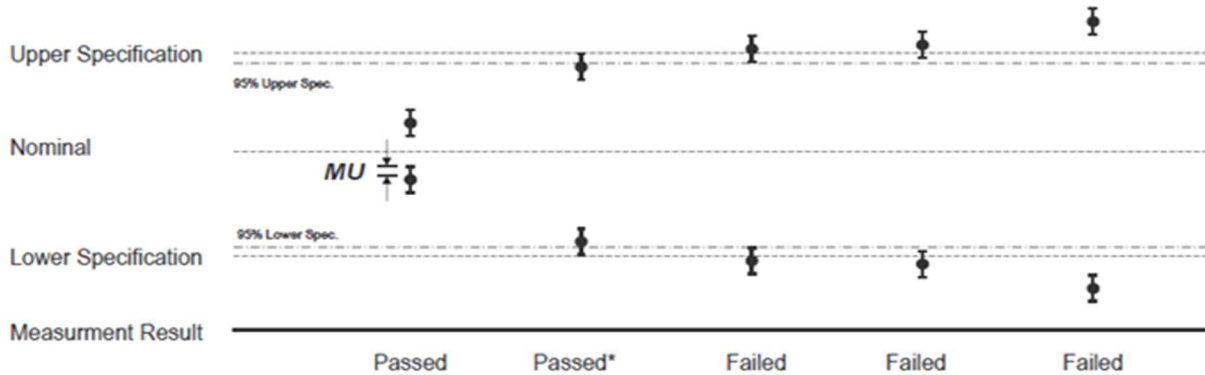
- KOLAS No.: KT232
- RRA No.: KR0041
- A2LA No.: 4068.02, 4068.03
- FCC Designation No.: KR0041
- ISED Designation No.: KR0041
- VCCI Membership No.: 2005
- VCCI Registration No.: R-14202 / C-14685 / G-10834 / T-12225,
C-20065 / G-20088 / G-20089 / R-20092 / R-20093 / T-20066

2 Summary of Test Results

The EUT has been tested according to the following specifications

Applied Standard : FCC Part 15, Subpart C 15.225					
FCC Part Section(s)	Test Description	Limit	Test Condition	Test Result	Reference
15.225(e)	Carrier frequency tolerance	Within in (\pm) 0.01 % or (\pm) 1 356 Hz	Conducted	PASS	Section 4.1
15.225(a) ~ (d)	Field strength of radiated emission	15.225(a) ~ (d)	Radiated	PASS	Section 4.2
15.203, 15.247	Antenna requirement	FCC 15.203	-	PASS	Section 4.3
15.207	AC Conducted emission	< FCC 15.207 limits	AC Line Conducted	PASS	Section 4.4
2.1049	20 dB bandwidth measurement	-	Conducted	PASS	Section 4.5

2.1 Decision Rules for Statement of Conformity



QUA-52 Decision Rule(QA Document) was applied.

Step 1) : Reference Check, Daily Check, Peripheral device Check

Step 2) : Re-test Procedure (Repeat the test maximum 3 times, Different Test Engineer)

- 1) If the original test results are subject to retesting and the judgement is unclear, the retest is carried out.
- 2) If the result of the first retest is the same as the initial test, the judgement is made based on the value.
- 3) If the result of the first retest differ from the results of the initial test, the second re-test is carried out.
- 4) After completion of the second retest, the average of the three test results is determined as the final result. However, if the deviation of the three test values is more than 5 % of the reference value, the technical manager should review the reproducibility of the test from the beginning.

2.2 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 Items	Frequency Range	Expanded Uncertainty $U = kU_c (k = 2)$
Radiated Spurious Emissions	1 GHz Below	5.06
	1 GHz Above	5.00
Measurement Items		Expanded Uncertainty $U = kU_c (k = 2)$
Conducted	0.009 MHz – 0.15 MHz	3.54
	0.15 MHz – 30 MHz	3.16

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k = 2$.

3 General Information

3.1 General Description of EUT

Equipment Class	Low Power Communication Device Transmitter (DXX)
Product name	CARD LAMINATOR
FCC ID	XTNNL200-N
Model	NL200
Additional model name	-
Power Supply	AC 220 V
Modulation Type	ASK
Transfer Rate	-
Operating Frequency	13.56 MHz
Output Power	38.32 dB μ V/m @ 30 meter
Antenna Type	Internal PCB antenna
Antenna Gain	-
H/W Version	TIT-DUAL Laminator MAIN REV 4.4
S/W Version	V037

3.2 Tested sample and Tested companion device information

Type	Model	Note
Notebook	15U480	S/N: 803QCJZ560140
Adapter	A13-040N3A	S/N: A040R066L

3.3 Description of Test Mode

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics.

Test Mode		Tested Frequency (MHz)		
TM 1	RFID(UP Ant)	13.56	-	-
TM 2	RFID(LO Ant)	13.56		
TM 3				

3.4 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

3.5 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.6 General Description of Applied Standards

Generally the tests were performed according to the specifications of the standard, it must comply with the requirements of the following standards.

FCC CFR 47 Part 15, Subpart C (§15.225)
ANSI C63.10-2013

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

3.7 Test Equipment

Test Equipment is traceable to the National Institute of Standards and Technology (NIST). Measurement antenna used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSV30	104029	2026.08.12
EMI Test Receiver	Rohde & Schwarz	ESI	837514/004	2026.08.06
Signal Generator	Rohde & Schwarz	SMB100A	179628	2026.01.09
Loop Antenna	Schwarzbeck	FMZB1513	#374	2027.02.11
BiconiLog Antenna(R)	ETS-LINDGREN	3142C	35880	2026.10.17
AMPLIFIER(C_3)	TESTEK	TK-PA01S	200141-L	2026.08.12
SLIDAC	Myoung sung Ele.	None	0207-4	2026.01.06

3.8 Used Test Cable

Manufacturer	Model No.	Serial No.	Spec	Next Cal. Date
SUHNER	SUCOFLEX 126E	MY2202/26E	9 kHz ~ 26.5 GHz(1 M)	2025.12.01
SUHNER	SUCOFLEX 126E	MY2203/26E	9 kHz ~ 26.5 GHz(1 M)	2025.12.01

4 Test Results

4.1 Carrier Frequency tolerance

4.1.1 Standard Applicable [FCC §15.225(e)]

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency Over a temperature variation of - 20 degrees to + 50 degrees C at normal supply voltage, and for a variation In the primary supply from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

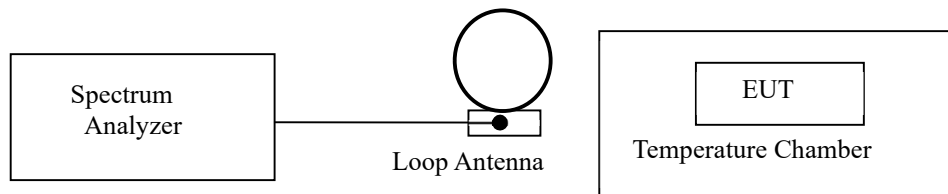
4.1.2 Test Environment conditions

- Ambient temperature : (20 - 22) °C • Relative Humidity : (52 - 54) % R.H.

4.1.3 Measurement Procedure

Before measurements are made the equipment shall have reached thermal balance in the Test chamber period. and then it is normal operating for about 15 minutes after thermal balance has been reached. For tests at the extreme temperature, the equipment shall be left in the test chamber until thermal balance is attained, then the standby or receive condition for a period of a few minute after which the equipment shall meet the specified requirements. The test data sheet recorded measured value by frequency counter.

4.1.4 Test setup



■ TM 1

Frequency (13.56 MHz)		Measured frequency [Hz]	Frequency Tolerance	
			%	Hz
T _{NOM} + 20 °C	V _{NOM} 220 Vac	13 561 042	0.007 6	1 042
	V _{MIN} 198 Vac	13 561 035	0.007 6	1 035
	V _{MAX} 242 Vac	13 561 048	0.007 7	1 048
T _{MIN} - 10 °C	V _{NOM} 220 Vac	13 561 127	0.008 3	1 127
T _{MAX} + 50 °C	V _{NOM} 220 Vac	13 561 024	0.007 5	1 024
Limit		Within in (±) 0.01 % or (±) 1 356 Hz		
Max. Tolerance		0.008 3 %, (±) 1 127 Hz		
Result		Compliance		

■ TM 2

Frequency (13.56 MHz)		Measured frequency [Hz]	Frequency Tolerance	
			%	Hz
T _{NOM} + 20 °C	V _{NOM} 220 Vac	13 561 042	0.007 6	1 042
	V _{MIN} 198 Vac	13 561 033	0.007 6	1 033
	V _{MAX} 242 Vac	13 561 047	0.007 7	1 047
T _{MIN} - 10 °C	V _{NOM} 220 Vac	13 561 125	0.008 2	1 125
T _{MAX} + 50 °C	V _{NOM} 220 Vac	13 561 023	0.007 5	1 023
Limit		Within in (±) 0.01 % or (±) 1 356 Hz		
Max. Tolerance		0.008 2 %, (±) 1 125 Hz		
Result		Compliance		

4.2 Field strength of radiated emissions

4.2.1 Standard Applicable [FCC §15.225 (a) ~ (d)]

(a) The Field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 $\mu\text{V}/\text{m}$ at 30 meter

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 micro volts/meter at 30 meter

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 micro volts/meter at 30 meter

(d) The Field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed The general radiated emission limits in §15.209

Above required standard (a ~ c) and (d) is brief describe table as follows

§ 15.225 [(a) ~(c)] : Limit for in-band field strength

Frequency Band (MHz)	Limit		Measurement distance (meter)
	($\mu\text{V}/\text{m}$)	(dB $\mu\text{V}/\text{m}$)	
13.553 – 13.567	15,848	84.00	30
13.410 – 13.553 13.567 – 13.710	334	50.47	30
13.110 – 13.410 13.710 – 14.010	106	40.50	30

§15.209. limits for radiated emissions measurements

Frequency Band	Limit [$\mu\text{V}/\text{m}$]	Limit [dB $\mu\text{V}/\text{m}$]	Measurement distance (meter)	Detector
0.009 – 0.490	2 400/F (kHz)	-	300	
0.490 – 1.705	2 4000/F (kHz)	-	30	
1.705 – 30.0	30	29.54	30	Quasi peak
30 - 88	100 **	40.0	3	Quasi peak
88 - 216	150 **	43.5	3	Quasi peak
216 - 960	200 **	46.0	3	Quasi peak
Above 960	500	54.0	3	Peak & Average

** fundamental emissions from intentional radiators operation under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz, or 470-806 MHz. However, operation within these Frequency bands is permitted under other sections of this Part Section 15.231 and 15.241

§15.205. Restrict Band of Operation

Only spurious emissions are permitted in any of the frequency bands listed below ;

[MHz]	[MHz]	[MHz]	[GHz]
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505**	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	Above 38.6
13.36 - 13.41			

** Until February 1, 1999, this restricted band shall be 0.490-0.510

4.2.2 Test Environment conditions

- Ambient temperature : (20 - 22) °C • Relative Humidity : (52 - 54) % R.H.

4.2.3 Measurement Procedure

The measurements procedure of the transmitter radiated E-field is as following describe method.

The test is performed in a Shield chamber to determine the accurate frequencies, after maximum emissions level will be checked on a test chamber and measuring distance is 3 m from EUT to test antenna.

(The chamber is ensured that comply with at least 6 dB above the ambient noise level)

- ① The EUT was powered ON with continuously operating mode and placed on a 0.8 meter high non-conductive table on the reference ground plane.
- ② The test antenna was used on Horn antenna for above 1 GHz, and if the below 1 GHz, broad-band antenna and Loop antenna were used for below 30 MHz and it's antenna positioned in both the horizontal and vertical plane was location at EUT during the test for maximized the emission measurement.
- ③ The output of the test antenna will be connected to a measuring receiver, and it is set to tuned over the frequency range according to required standard
- ④ The measuring detector type of the measurement receiver is based on average value of measurement instrumentation employing a CISPR Quasi Peak detector according to required standard and for above 1 GHz, set the spectrum analyzer on a average and peak detector for the provisions in §15.35 and investigated frequency range is set the spectrum analyzer according to §15.33.
- ⑤ The fundamental frequency at which a relevant radiated signal component is detected, the test antenna will be raised and lowered through the specified range of heights in horizontal and vertical polarized orientation, until an maximum signal level is detected on the measuring receiver.
- ⑥ The transmitter is position x,y,z axis on rotating through 360 degrees, until the maximum signal level is detected by the measuring receiver.
- ⑦ The receiver is scanned from requested measuring frequency band and then the maximum meter reading is recorded. The radiated emissions were measured with required standard.

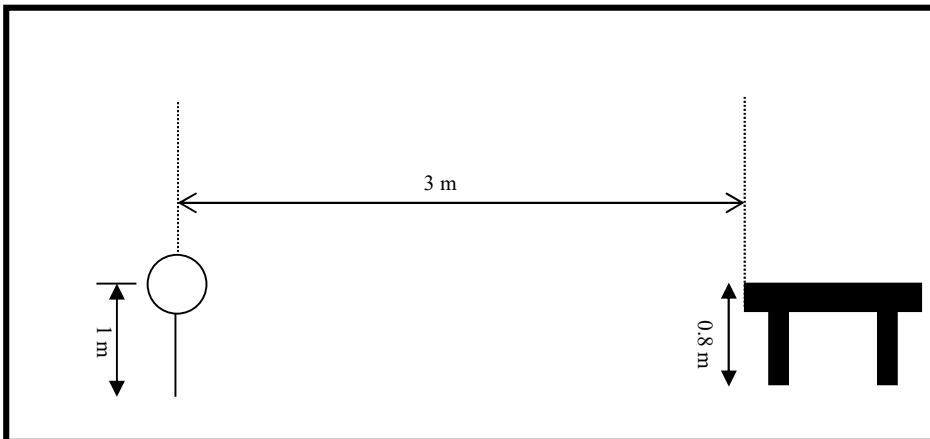
- The measurement results are obtained as described below:

Result(dB μ V/m) = Reading(dB μ V) + Antenna factor(dB/m) + CL(dB) + other applicable factor (dB)

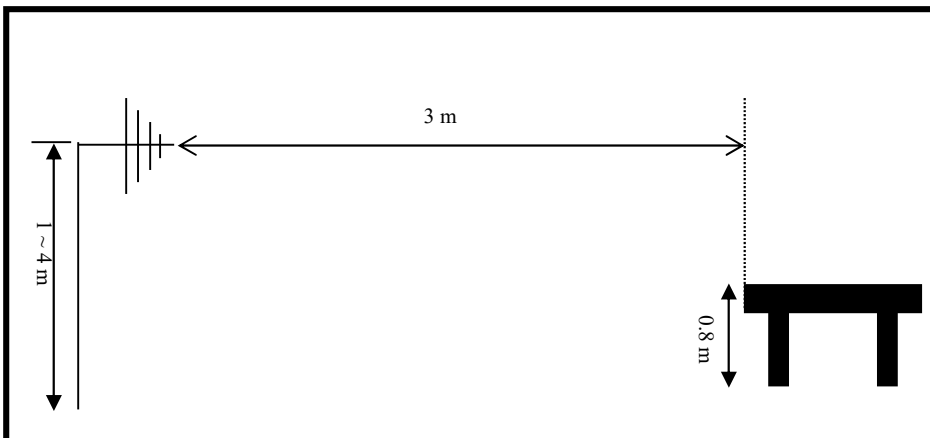
- According to §15.33 (a)(1), Frequency range of radiated measurement is performed the tenth harmonic.
- ※ if necessary, additionally receiver is adopted high-pass filter and preamp because lower radiated signal
- ※ The transmitter radiated spectrum was investigated from 9 kHz to 1 GHz

4.2.4 Test Configuration

Radiated emission setup, below 30 MHz



Radiated emission setup, below 1 000 MHz



4.2.5 Measurement Result

■ TM 1

■ IN-BAND

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Pstn (axis)	Antenna			CL (dB)	Pre AMP (dB)	Distn factor (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
				Height (m)	Pol. (H/V)	Fctr. (dB/m)							
13.561*	57.94	0	X	1	-	19.74	0.64	-	-40	38.32	84.00	45.68	Compliance
13.186	49.99	0	X	1	-	19.73	0.63	-	-40	30.35	40.50	10.15	Compliance
13.508	49.89	0	X	1	-	19.74	0.64	-	-40	30.27	50.47	20.20	Compliance
13.607	49.25	0	X	1	-	19.74	0.64	-	-40	29.63	50.47	20.84	Compliance
13.719	49.55	0	X	1	-	19.75	0.64	-	-40	29.94	40.50	10.56	Compliance

*It is fundamental frequency

Note1. above measured frequency have been done at 3 m distance and corrected according to required FCC 15.209. e)
 \therefore Extrapolation distance factor : $40\log(3/30) = -40$ dB If Measurement distance is 3 m and Mandatory requirement distance is 30 m at 30 MHz or less, extrapolation distance factor(dB) is 40 / decade = $40\log_{10}^{(MRD/MD)}$
 MRD is Mandatory requirement distance and MD is Measured distance

Note2. above measured frequencies is apply required standard FCC Part 15.225

Note3. All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.

Note4. All measurements were recorded using a quasi-peak detector.

Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver,
 Table (Deg) : Directional degree of Turn table, Pstn(axis) : Location axis of EUT
 Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor
 Cbl(dB) : Cable loss, Distn factor(dB) : distance correction factor [40 dB/decade as per § 15.31f (2)]
 Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) + Distn factor(dB)
 Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)

■ OUT- BAND

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
272.52	33.28	0	2.9	H	18.29	2.42	46.38	33.28	46.00	12.72	Compliance
320.33	34.54	0	2.5	H	19.48	2.60	46.38	34.54	46.00	11.46	Compliance
542.61	38.55	0	1.7	H	24.70	3.25	46.27	38.55	46.00	7.45	Compliance
693.91	36.08	0	1.5	H	27.03	3.79	46.11	36.08	46.00	9.92	Compliance
30.00	32.13	0	1.0	V	22.90	0.82	46.31	32.13	40.00	7.87	Compliance
108.54	28.55	0	1.0	V	13.16	1.49	46.52	28.55	43.50	14.95	Compliance
322.58	30.63	0	2.5	V	19.58	2.61	46.38	30.63	46.00	15.37	Compliance
646.82	39.44	0	2.9	V	26.45	3.54	46.12	39.44	46.00	6.56	Compliance

Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table
 Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB)
 Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB)
 Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)

■ TM 2

■ IN-BAND

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Pstn (axis)	Antenna			CL (dB)	Pre AMP (dB)	Distn factor (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
				Height (m)	Pol. (H/V)	Fctr. (dB/m)							
13.561*	51.14	0	X	1	-	19.74	0.64	-	-40	31.52	84.00	52.48	Compliance
13.226	49.17	0	X	1	-	19.73	0.63	-	-40	29.53	40.50	10.97	Compliance
13.510	49.10	0	X	1	-	19.74	0.64	-	-40	29.48	50.47	20.99	Compliance
13.629	49.19	0	X	1	-	19.75	0.64	-	-40	29.58	50.47	20.89	Compliance
13.809	48.53	0	X	1	-	19.75	0.64	-	-40	28.92	40.50	11.58	Compliance

*It is fundamental frequency

Note1. above measured frequency have been done at 3 m distance and corrected according to required FCC 15.209. e)
 \therefore Extrapolation distance factor : $40\log(3/30) = -40$ dB If Measurement distance is 3 m and Mandatory requirement distance is 30 m at 30 MHz or less, extrapolation distance factor(dB) is 40 / decade = $40\log_{10}^{(MRD/MD)}$
 MRD is Mandatory requirement distance and MD is Measured distance

Note2. above measured frequencies is apply required standard FCC Part 15.225

Note3. All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.

Note4. All measurements were recorded using a quasi-peak detector.

Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver,
 Table (Deg) : Directional degree of Turn table, Pstn(axis) : Location axis of EUT
 Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor
 Cbl(dB) : Cable loss, Distn factor(dB) : distance correction factor [40 dB/decade as per § 15.31f (2)]
 Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) + Distn factor(dB)
 Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)

■ OUT- BAND

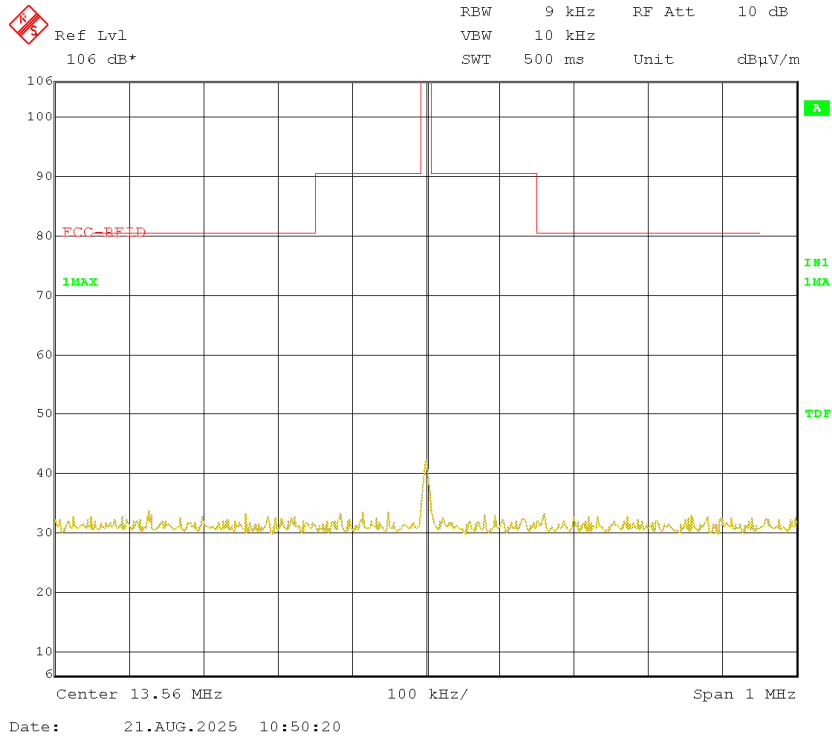
Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
190.44	27.23	0	3.3	H	15.41	1.98	46.48	27.23	46.00	16.27	Compliance
318.08	37.55	0	2.4	H	19.37	2.60	46.37	37.55	46.00	8.45	Compliance
723.79	37.56	0	1.6	H	27.49	3.82	46.12	37.56	46.00	8.44	Compliance
938.71	33.61	0	1.5	H	29.11	4.32	45.75	33.61	46.00	12.39	Compliance
30.85	34.47	0	1.0	V	22.43	0.83	46.32	34.47	46.00	5.53	Compliance
63.18	27.48	0	1.0	V	12.80	1.10	46.53	27.48	46.00	12.52	Compliance
104.79	27.53	0	1.3	V	13.35	1.46	46.52	27.53	46.00	15.97	Compliance
718.72	37.32	0	2.9	V	27.41	3.82	46.12	37.32	46.00	8.68	Compliance

Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table
 Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB)
 Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB)
 Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)

4.2.6 Test plot

■ TM 1

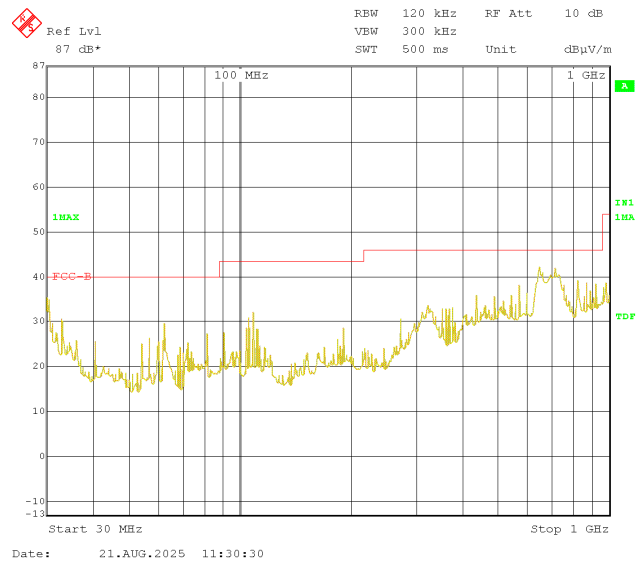
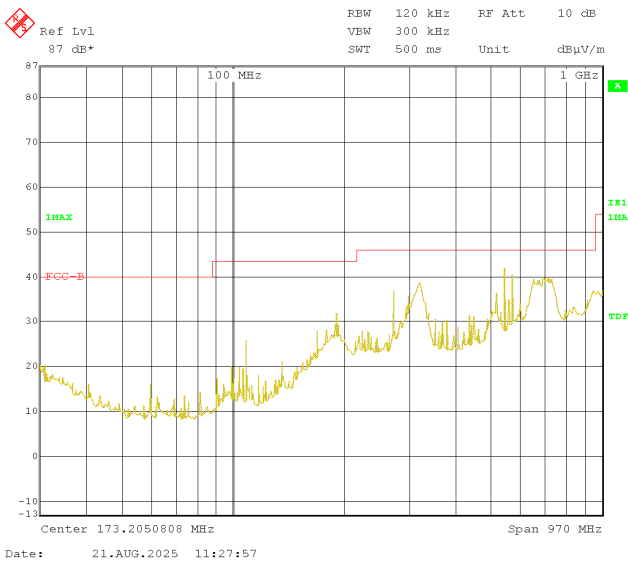
■ Fundamental frequency level & ≤ 30 MHz spectrum mask



■ OUT- BAND Spurious

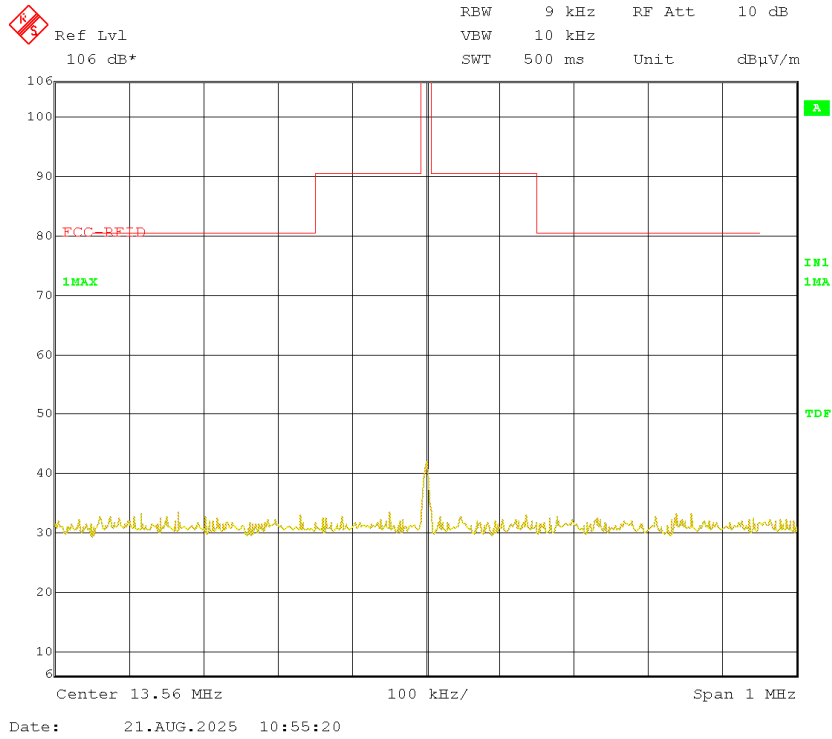
Horizontal

Vertical



■ TM 2

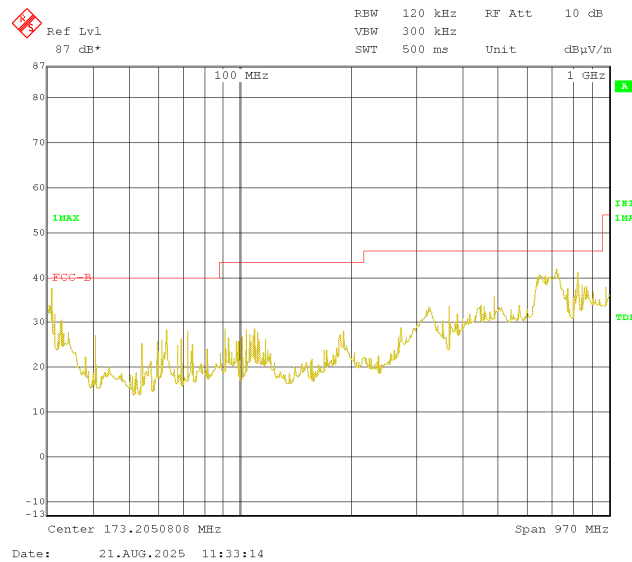
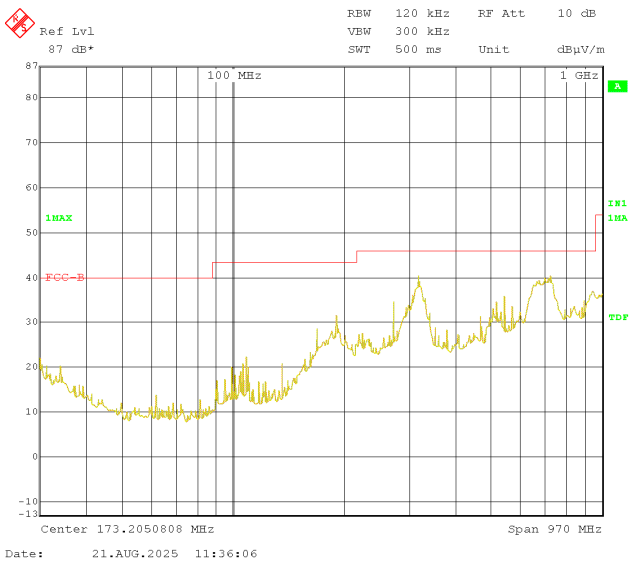
■ Fundamental frequency level & ≤ 30 MHz spectrum mask



■ OUT- BAND Spurious

Horizontal

Vertical



4.3 Antenna requirement

4.3.1 Standard applicable [FCC §15.203]

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that user 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 broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

4.3.2 Antenna details

Frequency Band	Antenna Type	Gain [dBi]	Results
13.56 MHz	Internal PCB antenna	N/A	Compliance

4.4 AC Power Conducted emissions

4.4.1 Standard Applicable [FCC §15.207(a)]

For intentional radiator that is designed to be connected to the public utility(AC)power line, the radio frequency. Voltage that is conducted back onto the AC power line on any frequencies hopping mode within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line Impedance stabilization network(LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

§15.207 limits for AC line conducted emissions;

Frequency of Emission(MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

4.4.2 Test Environment conditions

• Ambient temperature : (20 ~ 22) °C • Relative Humidity : (52 ~ 54) % R.H.

4.4.3 Measurement Procedure

EUT was placed on a non- metallic table height of 0.8 m above the reference ground plane. Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the Maximum signal strength.

4.4.4 Used equipment

Equipment	Model No.	Serial No.	Manufacturer	Next cal date	Cal interval	Used
Test receiver	ESCS30	100111	Rohde & Schwarz	2026. 01. 06	1 year	<input checked="" type="checkbox"/>
Pulse Limiter	ESH3-Z2	100097	Rohde & Schwarz	2026. 01. 06	1 year	<input checked="" type="checkbox"/>
LISN	ESH2-Z5	100044	R&S	2026. 01. 06	1 year	<input checked="" type="checkbox"/>
	ESH3-Z5	100147	R&S	2026. 01. 06	1 year	<input checked="" type="checkbox"/>

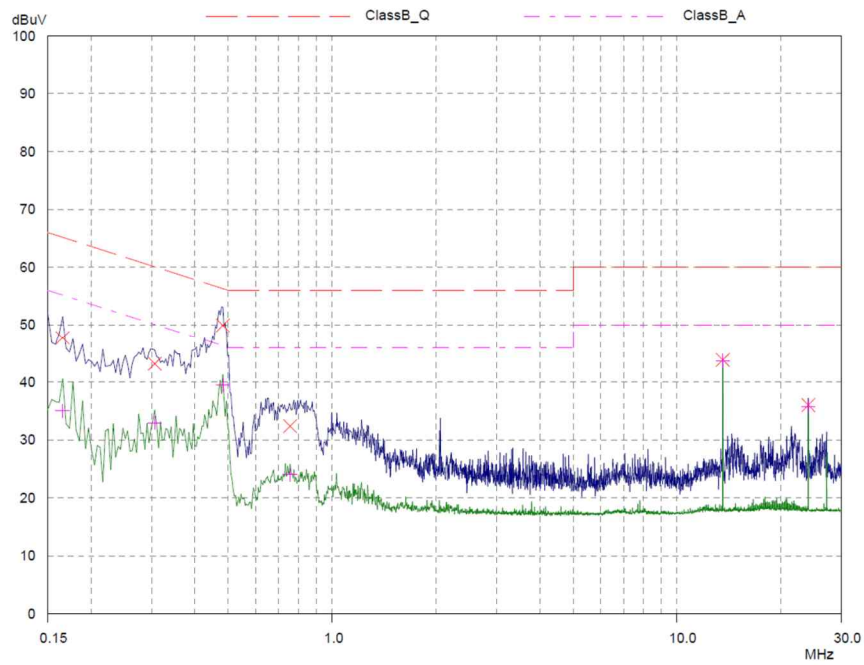
*Test Program: " ESXS-K1 V2.2"

4.4.5 Measurement Result

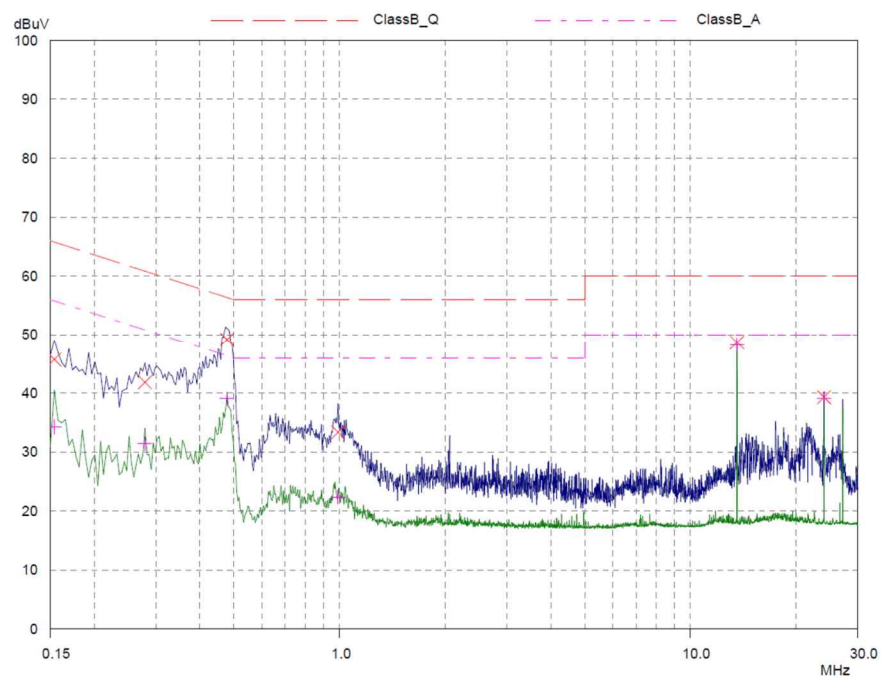
Freq. [MHz]	Factor [dB]		POL	QP			CISPR AV		
	LISN	CABLE +P/L		Limit [dB/μV]	Reading [dB/μV]	Result [dB/μV]	Limit [dB/μV]	Reading [dB/μV]	Result [dB/μV]
0.166	0.09	10.14	L	65.18	47.69	47.78	55.18	35.04	35.13
0.306	0.09	10.14	L	60.07	43.16	43.25	50.07	32.97	33.06
0.482	0.10	10.15	L	56.30	49.90	50.00	46.30	39.46	39.56
0.755	0.10	10.17	L	56.00	32.38	32.48	46.00	24.05	24.15
13.560	0.65	10.66	L	60.00	43.82	44.47	50.00	43.73	44.38
23.998	0.88	10.88	L	60.00	36.01	36.89	50.00	35.80	36.68
0.154	0.10	10.14	N	65.79	45.69	45.79	55.79	34.24	34.34
0.279	0.10	10.14	N	60.85	41.84	41.94	50.85	31.42	31.52
0.478	0.11	10.15	N	56.37	49.16	49.27	46.37	39.07	39.18
0.990	0.12	10.18	N	56.00	33.37	33.49	46.00	22.38	22.50
13.560	0.59	10.66	N	60.00	48.64	49.23	50.00	48.23	48.82
23.998	0.74	10.88	N	60.00	39.29	40.03	50.00	39.15	39.89

- * LISN: LISN insertion Loss, Cable: Cable Loss, P/L:pulse limiter factor
- * L: Line. Live, N: Line. Neutral
- * Reading: test receiver reading value (with cable loss & pulse limiter factor)
- * Result = LISN + Reading

Line. Live



Line. Neutral



4.5 20 dB bandwidth measurement

4.5.1 Standard applicable [FCC §2.1049]

The 20 dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

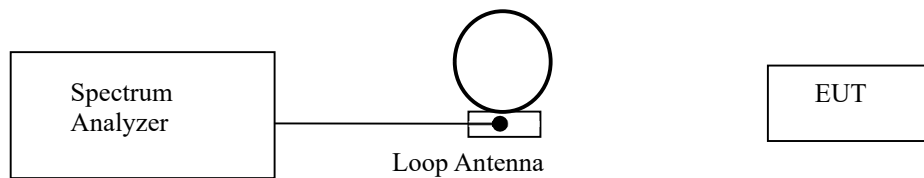
4.5.2 Test Environment conditions

- Ambient Temperature : (20 - 21) °C • Relative Humidity : (54 - 56) % R.H.

4.5.3 Measurement Procedure

Please refer 4.5.1

4.5.4 Test setup



4.5.5 Measurement Result

■ TM 1

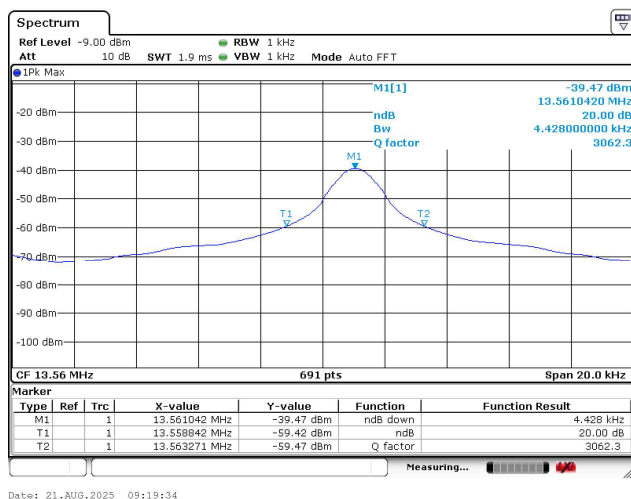
Frequency	20 dB bandwidth
13.56 MHz	4.43 kHz

■ TM 2

Frequency	20 dB bandwidth
13.56 MHz	4.98 kHz

4.5.6 Test plot

■ TM 1



■ TM 2

