

RF TEST REPORT

Test Equipment : Scan Tool
Model Name : TPCI-II
Variant Model Name : TPCI-II(P)
FCC ID : TMGGITTPCI2
Date of receipt : 2023-12-18
Test Duration : 2024-01-11 ~ 2024-01-26
Date of issue : 2024-01-29

Applicant : G.I.T CO.,LTD
87, Macheon-ro, Songpa-gu, Seoul, 05655
Republic of Korea

Test Laboratory : Lab-T, Inc.
2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu
Yongin-si, Gyeonggi-do 17036, Korea(Republic of)

Test Specification : FCC Part 15 Subpart C 15.205, 15.209

Test Result : Pass

The above equipment was tested by Lab-T Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.
This test report shall not be reproduced except in full, without the written approval of Lab-T, Inc
This test report is not related to KOLAS.

Tested by:



Engineer
NamHyoung Kwon

Reviewed by:



Technical Manager
SangHoon Yu

CONTENTS

1. Revision History	3
2. Information.....	4
2.1 Applicant Information.....	4
2.2 Test Laboratory Information	4
2.3 Test Site.....	4
3. Information about Test Equipment	5
3.1 Equipment Information	5
3.2 Antenna Information	5
3.3 Test Frequency.....	5
3.4 Tested Companion Device Information	5
4. Test Report.....	6
4.1 Summary	6
4.2 Measurement Uncertainty	6
4.3 Transmitter Requirements.....	7
4.3.1 Antenna Requirement.....	7
4.3.2 Spurious Emission, Band Edge, and Restricted Bands	8
4.3.3 Conducted Emission	13
APPENDIX I	15

1. Revision History

Test Report No.	Date	Description
TRRFCC24-0001	2024-01-29	Initial issue

2. Information

2.1 Applicant Information

Applicant Name	G.I.T CO.,LTD
Address	87, Macheon-ro, Songpa-gu, Seoul, 05655, Republic of Korea
Telephone No.	+82 2 2189 5405
Person in charge	JI HYUNG RYU / jhryu@gitauto.com
Manufacturer	G.I.T CO.,LTD
Address	87, Macheon-ro, Songpa-gu, Seoul, 05655, Republic of Korea

2.2 Test Laboratory Information

Corporate Name	Lab-T, Inc.
Representative	Duke (Jongyoung) Kim
Address	2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Telephone	+82-31-322-6767
Fax	+82-31-322-6768
E-mail	info@lab-t.net
FCC Designation No.	KR0159
FCC Registration No.	133186
IC Site Registration No.	22000

2.3 Test Site

Test Site	Used	Address
Building L	<input checked="" type="checkbox"/>	2182-40 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Building T	<input checked="" type="checkbox"/>	2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Building A	<input type="checkbox"/>	2182-44 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)

3. Information about Test Equipment

3.1 Equipment Information

Equipment Type	Scan Tool
Model Name	TPCI-II
Variant Model Name	TPCI-II(P)
Frequency Range	125 kHz Transmitter / 315 MHz, 433.92 MHz Receiver
Modulation Type	ASK, FSK
Power Supply	DC 3.6 V
H/W Version	1.0(AZ)
S/W Version	5.15

Note 1 : The above EUT information was declared by the manufacturer.

Note 2 : The base model supports both internal and external antennas, and the variant model supports only internal antenna.(for variant model, the external antenna connector on the mainboard is removed)

3.2 Antenna Information

Type	Model No.	Gain	Note
Loop coil antenna	-	-	Internal antenna
External antenna	-	-	External antenna

Note 1 : After testing each of the antennas, the worst result was reported.

3.3 Test Frequency

Test Mode	Test Frequency[MHz]
ASK	0.125

3.4 Tested Companion Device Information

Type	Manufacturer	Model	Note.
Laptop	DELL	P63F	Used radiated emission and AC conducted emission
Laptop Adapter	DELL	LA45NM140	Used radiated emission and AC conducted emission

4. Test Report

4.1 Summary

FCC Part 15			
FCC Rule	Parameter	Clause	Status
Transmitter Requirements			
15.203	Antenna Requirement	5.8	C
15.205(a) 15.209(a)	Spurious Emission, Band Edge and Restricted Bands	6.4 6.5	C
15.207(a)	Conducted Emissions	6.2	C
Note 1: C = Comply N/C = Not Comply N/T = Not Tested N/A = Not Applicable			

* The general test methods used to test this device is ANSI C63.10:2020

4.2 Measurement Uncertainty

Mesurement Items	Expanded Uncertainty	
Radiated Spurious Emissions (30 MHz under)	4.06 dB	(The confidence level is about 95 %, $k=2$)
Radiated Spurious Emissions (30 MHz ~ 1 GHz)	4.84 dB	(The confidence level is about 95 %, $k=2$)
Conducted Emission	2.52 dB	(The confidence level is about 95 %, $k=2$)

4.3 Transmitter Requirements

4.3.1 Antenna Requirement

4.3.1.1 Regulation

According to §15.203 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.

4.3.1.2 Result

Comply

(The transmitter has Internal loop coil antenna and special connector type external antenna.)

4.3.2 Spurious Emission, Band Edge, and Restricted Bands

4.3.2.1 Regulation

According to §15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency [MHz]	Field Strength [microvolts/meter]	Measurement Distance [meters]
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating 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, e.g., §§15.231 and 15.241.

According to §15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 - 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 - 4 400	Above 38.6
13.36 - 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurement

4.3.2.2 Measurement Procedure

4.3.2.2.1 Radiated Spurious Emissions

- 1) The preliminary and final radiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m anechoic chamber. The EUT was tested at a distance 3 meters.
- 2) The EUT was placed on the top of the 0.8 m height or 1.5 m height non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
- 3) The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1 000 MHz using the TRILOG broadband antenna
- 4) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

- Note 1 : The resolution bandwidth of test receiver/spectrum analyzer is 200 Hz for Quasi-peak detection (QP) at frequency below 150 kHz.
- Note 2 : The resolution bandwidth of test receiver/spectrum analyzer is 9 kHz for Quasi-peak detection (QP) at frequency 150 kHz to 30 MHz
- Note 3 : The resolution bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
- Note 4 : The 0.8 m height is for below 1 GHz testing, Measured distance : 3 m

4.3.2.3 Result

Comply (Measurement data : Refer to the next page)

4.3.2.4 Measurement Data

Test mode : 9 kHz ~ 30 MHz Internal antenna

Frequency [MHz]	Detector	Note 1	Pol. [V/H]	Reading [dBμV]	Ant Factor [dB]	Cable Loss [dB]	Result at 3m [dBμV/m]	Result at 300m [dBμV/m]	Limit at 300m [dBμV/m]	Margin [dB]
0.125	QP	F	H	48.40	11.70	0.10	60.20	-19.80	25.67	45.47
0.125	QP	F	V	42.20	11.70	0.10	54.00	-26.00	25.67	51.67
Spurious	Not detected	S	-	-	-	-	-	-	-	-

Frequency [MHz]	Detector	Note 1	Pol. [V/H]	Reading [dBμV]	Ant Factor [dB]	Cable Loss [dB]	Result at 3m [dBμV/m]	Result at 30m [dBμV/m]	Limit at 30m [dBμV/m]	Margin [dB]
Spurious	Not detected	S	-	-	-	-	-	-	-	-

Test mode : 9 kHz ~ 30 MHz External antenna

Frequency [MHz]	Detector	Note 1	Pol. [V/H]	Reading [dBμV]	Ant Factor [dB]	Cable Loss [dB]	Result at 3m [dBμV/m]	Result at 300m [dBμV/m]	Limit at 300m [dBμV/m]	Margin [dB]
0.125	QP	F	H	49.80	11.70	0.10	61.60	-18.40	25.67	44.07
0.125	QP	F	V	43.00	11.70	0.10	54.80	-25.20	25.67	50.87
Spurious	Not detected	S	-	-	-	-	-	-	-	-

Frequency [MHz]	Detector	Note 1	Pol. [V/H]	Reading [dBμV]	Ant Factor [dB]	Cable Loss [dB]	Result at 3m [dBμV/m]	Result at 30m [dBμV/m]	Limit at 30m [dBμV/m]	Margin [dB]
Spurious	Not detected	S	-	-	-	-	-	-	-	-

Note 1 : "F" : Fundamental, "S" : Spurious

Note 2 : Result : Reading + Ant factor + Cable loss

Note 3 : Result at 300m[dBμV/m] = Result at 3m[dBμV/m] - 40*log(300/3)[dBμV/m]

Result at 30m[dBμV/m] = Result at 3m[dBμV/m] - 40*log(30/3)[dBμV/m]

Not detected means peak measurement did not take place because it is more than 20dB difference in the limit

Test mode : 30 MHz ~ 1 GHz_ Internal antenna

Frequency [MHz]	Detector	Pol. [V/H]	Reading [dBμV]	Ant Factor [dB]	Loss [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]
64.556	QP	V	37.10	18.60	-29.10	26.60	40.00	13.40
64.678	QP	H	44.50	18.50	-29.10	33.90	40.00	6.10
67.102	QP	H	43.40	18.00	-29.00	32.40	40.00	7.60
140.942	QP	H	40.60	19.00	-27.90	31.70	43.50	11.80
155.976	QP	H	40.60	19.10	-27.80	31.90	43.50	11.60
251.882	QP	H	42.30	17.80	-27.00	33.10	46.00	12.90

Test mode : 30 MHz ~ 1 GHz_ External antenna

Frequency [MHz]	Detector	Pol. [V/H]	Reading [dBμV]	Ant Factor [dB]	Loss [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]
43.095	QP	H	45.20	19.60	-29.50	35.30	40.00	4.70
74.256	QP	H	39.40	16.10	-28.70	26.80	40.00	13.20
119.723	QP	H	44.60	16.80	-28.40	33.00	43.50	10.50

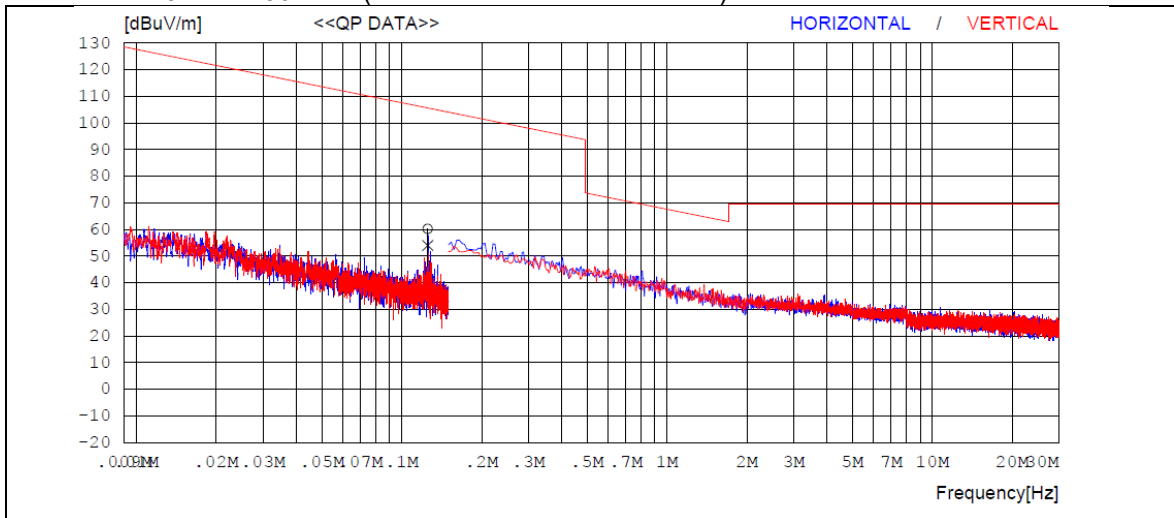
Note 1 : Loss : Cable loss - Amp gain

Note 2 : Result : Reading + Ant factor + Loss

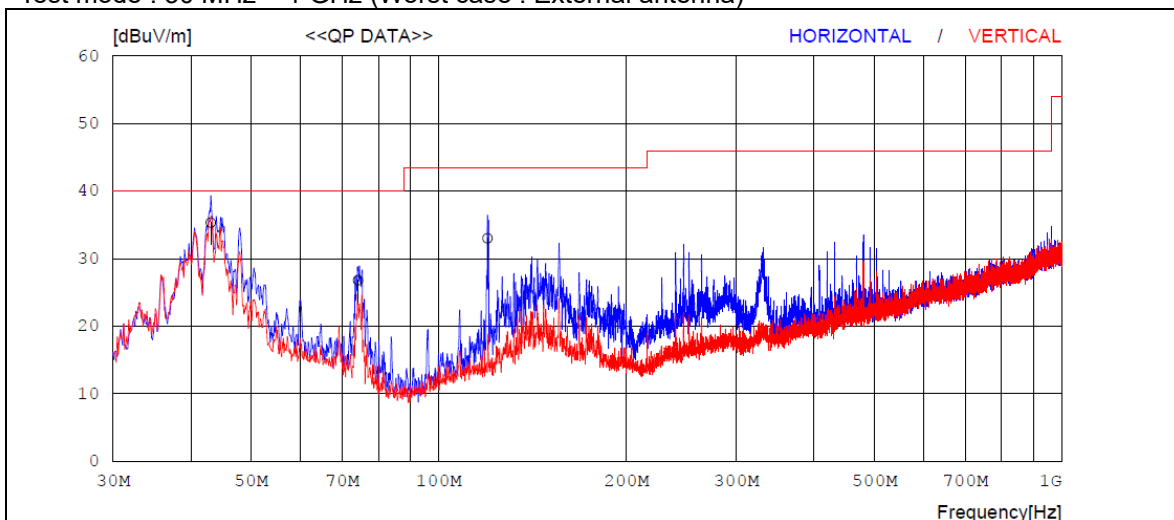
Note 3 : Not detected means peak measurement did not take place because it is more than 20dB difference in the limit

4.3.2.5 Measurement Plot

Test mode : 9 kHz ~ 30 MHz (Worst case : Internal antenna)



Test mode : 30 MHz ~ 1 GHz (Worst case : External antenna)



4.3.3 Conducted Emission

4.3.3.1 Regulation

According to §15.207(a) for an 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 frequency or frequencies, 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 Ω 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.

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.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

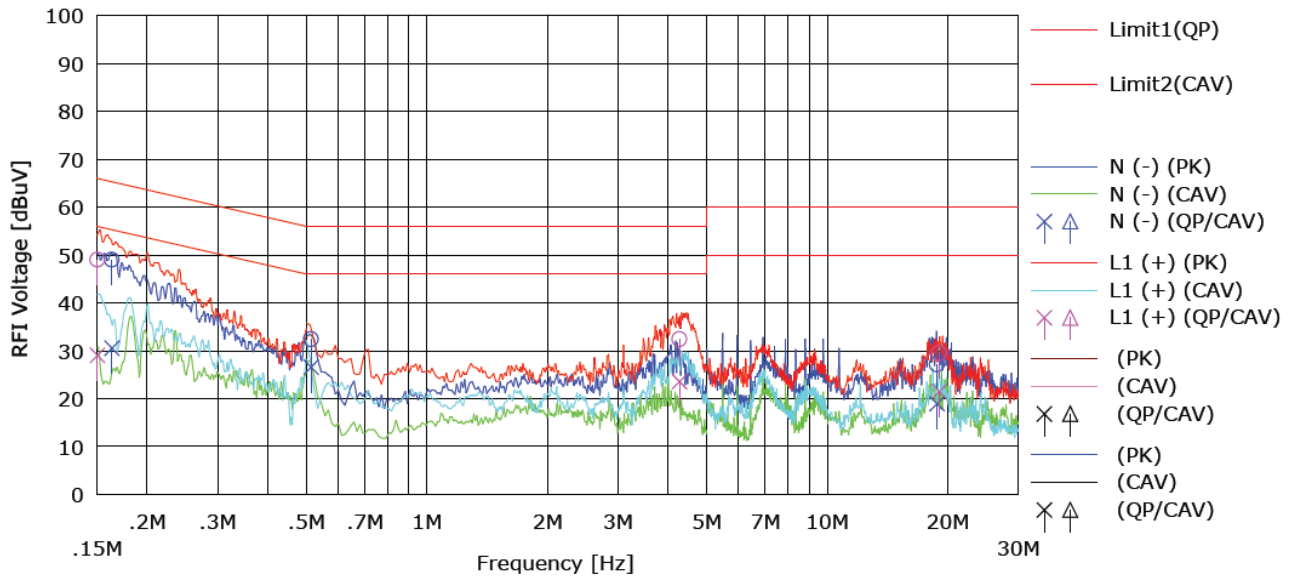
4.3.3.2 Measurement Procedure

- 1) The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5 m away from the side wall of the shielded room.
- 2) Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω /50 μ H LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
- 3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
- 4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
- 5) The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASIPeAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

4.3.3.3 Result

Comply (Measurement data : Refer to the next page)

4.3.3.4 Measurement Data (Worst case : External antenna)



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	CAV [dBuV]		QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	
1	0.16351	28.8	10.3	20.2	49.0	30.5	65.3	55.3	16.3	24.8	N (-)
2	0.51374	12.2	6.4	20.2	32.4	26.6	56.0	46.0	23.6	19.4	N (-)
3	18.79938	6.7	-1.5	20.4	27.1	18.9	60.0	50.0	32.9	31.1	N (-)
4	0.15031	29.0	9.0	20.0	49.0	29.0	66.0	56.0	17.0	27.0	L1 (+)
5	4.27064	12.3	3.5	20.1	32.4	23.6	56.0	46.0	23.6	22.4	L1 (+)
6	19.05262	9.1	1.1	20.4	29.5	21.5	60.0	50.0	30.5	28.5	L1 (+)

APPENDIX I

TEST EQUIPMENT USED FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

Equipment	Manufacturer	Model	Serial No.	Cal. Date (yy.mm.dd)	Next Cal.Date (yy.mm.dd)
Dynamic Measurement DC Source	HP	66332A	US37471465	2024-01-04	2025-01-04
EMI Test Receiver	ROHDE&SCHWARZ	ESU40	100445	2023-09-05	2024-09-05
Active Loop H-Field	ETS	6502	00150598	2023-06-27	2025-06-27
BiLog Antenna	Schwarzbeck	VULB9168	00821	2023-03-29	2024-03-29
ATTENUATOR	JFW	50F-006	6 dB-3	2023-04-13	2024-04-13
Preamplifier	TSJ	MLA-10k01-b01-27	1870367	2023-04-13	2024-04-13
Antenna Mast(10 m)	TOKIN	5977	-	-	-
Controller(10 m)	TOKIN	5909L	141909L-1	-	-
Turn Table(10 m)	TOKIN	5983-1.5	-	-	-
EMI Test Receiver	ROHDE&SCHWARZ	ESR7	101440	2023-09-05	2024-09-05
LISN	ROHDE&SCHWARZ	ENV216	101883	2023-04-12	2024-04-12
Pulse Limiter	Schwarzbeck	VTSD 9561-F	00189	2023-04-12	2024-04-12