

TEST REPORT

Applicant : TSE Co., Ltd
Address : 1-3-11 Fujimi, Sayama-shi, Saitma-ken 350-1306 Japan
Products : LET Communication checker
Model No. : E3000-20-01
Serial No. : Not indicated on EUT
Test Standard : FCC Rules and Regulations Title 47 CFR Part 15
Test Results : **Passed**
Date of Receipt : November 4, 2021
Date of Test : November 12, 2021



VLAC
 Lab Accreditation
 VLAC-001-5



Kazuyuki Makimoto

Manager

Japan Quality Assurance Organization

SAFETY & EMC CENTER

Testing Dept.

EMC Testing Div.

4-4-4, Minamiosawa, Hachioji-shi, Tokyo 192-0364, Japan

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- The test results in this test report was made by using the measuring instruments which are traceable to national standards of measurement in accordance with ISO/IEC 17025.
 - The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
 - The test results presented in this report relate only to the offered test sample.
 - The contents for the equipment under test (EUT) such as identification information in clause 2 and 6 of this report were provided by the applicant. JQA is not responsible for the test results affected by the incorrect information.
 - The contents for the equipment under test (EUT) such as identification information in this test report are provided by the applicant. Discrepancies for these contents can affect the validity of results.
 - The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
 - This test report shall not be reproduced except in full without the written approval of JQA.
 - VLAC does not approve, certify or warrant the product by this test report.

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REVISION HISTORY

File No.	Contents	Issue Date
400-210106-3	Initial Issue	November 25, 2021

1 Summary of Test Results

Applied Standard : FCC Rules and Regulations Title 47 CFR Part 15

Item	Standard (Procedure)	Result	Note
Mains Terminal Disturbance Voltage	ANSI C63.4-2014	PASS	-
Electromagnetic Radiation Disturbance	ANSI C63.4-2014	PASS	-

In the approval of test results,

- Determining compliance with the limits in this report was based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty (MIU).
- The expanded MIUs for the CISPR measurement methods determined by JQA are less than U_{CISPR} according to CISPR 16-4-2.
- No deviations were employed from the applied standard.
- The installation place test of the permanent installation large ME equipment or the large ME system was not carried out.
- No measures were taken to reduce the influence of the surroundings.
- No modifications were conducted by JQA to achieve compliance to the limitations.

Reviewed by

Kazuyuki Makimoto / Manager
Safety & EMC Center
Testing Dept. EMC Testing Div.



Tested by

Hideki Kajiwara / Manager
Safety & EMC Center
Testing Dept. EMC Testing Div.



2 Description of the Equipment Under Test (EUT)

2.1 General Information

Manufacturer	TSE Co., Ltd 1-3-11 Fujimi, Sayama-shi, Saitma-ken 350-1306 Japan	
Products	LET Communication checker	
Model No.	E3000-20-01	
Serial No.	Not indicated on EUT	
Product Type	Prototype	
Date of Manufacture	No information	
Power Rating	15 VDC Supplied by AC Adapter (Model No. A2613, Input: 100-240 VAC 50-60 Hz, Output: 15 VDC, Anker)	
EUT Grounding	None	
Classification / Category	RF emissions	Class B Equipment
EUT Highest Frequency Used / Generated	≤ 108 MHz	

3 Test Location

Japan Quality Assurance Organization
 SAFETY & EMC CENTER
 Testing Dept.
 EMC Testing Div.
 4-4-4, Minamiosawa, Hachioji-shi, Tokyo 192-0364, Japan

4 Accreditation of Test Laboratory

JQA is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility of Testing Division is registered by the following bodies .

Test Facility	Accreditation or Registration		Expiry Date
	Body	Code/Number	
Safety & EMC Center	VLAC	VLAC-001-5	March 30, 2022
	VCCI	A-0001	March 30, 2022
	FCC	JP5192	March 30, 2022
	Conformity assessment body for Japan electrical appliances and material by METI		February 22, 2022

5 Measurement Uncertainty

Measurement Item	Frequency	Uncertainty (<i>U</i>)
Mains Terminal Disturbance Voltage	150 kHz – 30 MHz	± 2.9 dB
Electromagnetic Radiation Disturbance	30 MHz – 200 MHz	± 4.6 dB
	200 MHz – 1000 MHz	± 4.5 dB
	1 GHz – 6 GHz	± 4.2 dB

The reported expanded uncertainty of measurement, *U* is described with using the coverage factor *k* = 2, to give a level of confidence of approximately 95 %.

6 Setup of EUT

6.1 Test Configuration

The EUT consists of :

Sign	Item	Manufacturer	Model No.	Serial No.
A	LET Communication checker	TSE Co., Ltd	E3000-20-01	Not indicated on EUT

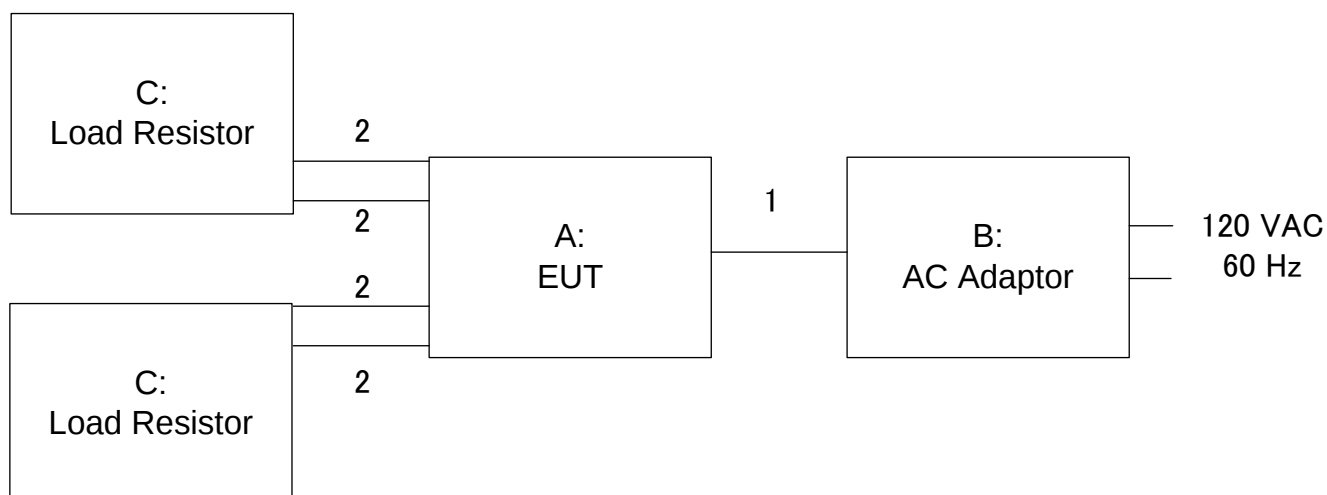
The AE used for testing :

Sign	Item	Manufacturer	Model No.	Serial No.
B	AC Adaptor (2pin Plug)	Anker Innovations Limited	A2613	AFZRQY1A20300452
C	Load Resistor	-	50W10ΩJ	-

The special hardware or software needed to perform the tests:

No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	USB cable	-	No	No	No	1.5
2	Output cable x 4	-	No	No	No	0.11

6.2 Test Arrangement (Drawings)



6.3 Operating Condition

Power Supply Voltage : 15 VDC
 (Model No. A2613, Input: 120 VAC 60 Hz, Output: 15 VDC, Anker)

Operating Mode
 EUT : Power ON

7 Test Item

7.1 Mains Terminal Disturbance Voltage

7.1.1 Test Site and Instruments

Name	Number of test site & instruments (Refer to Appendix A)
Shield Room	M-1
Test Receiver	R02
RF Cable	CB02
LISN	L03
High Pass Filter	F02
Software	SW01

7.1.2 Test Method and Test Setup (Diagrammatic illustration)

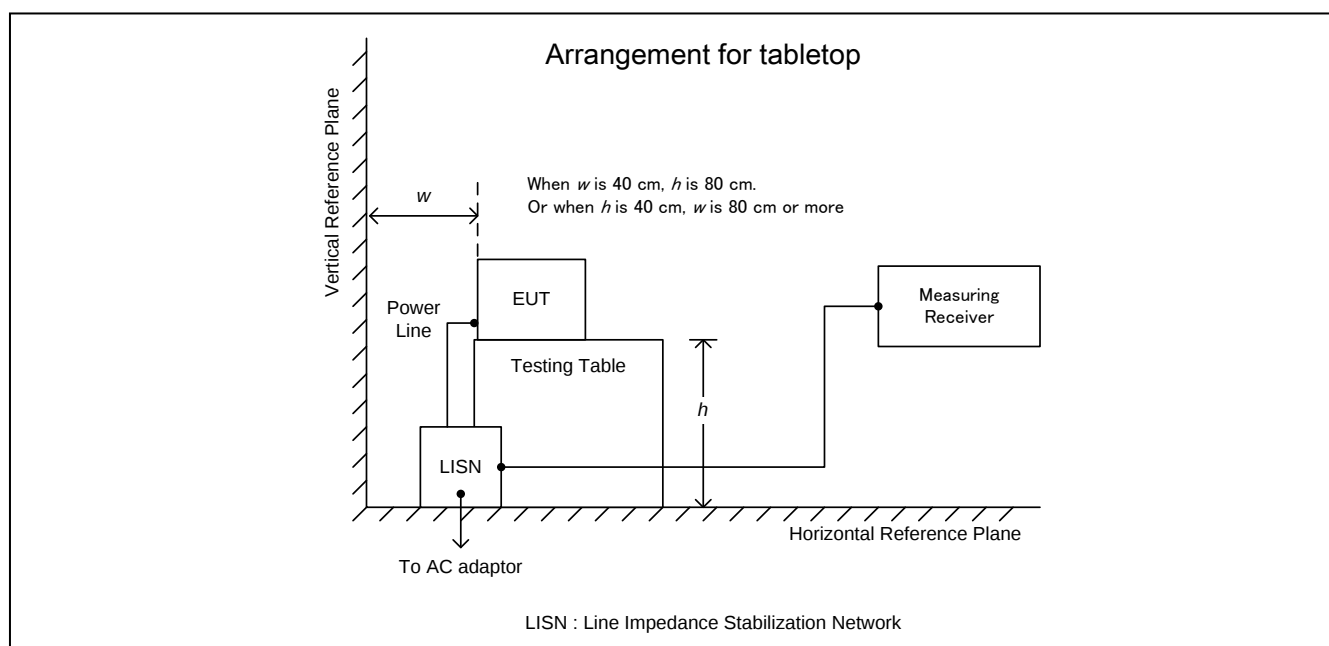
The pre-scan measurements were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for formal measurements.

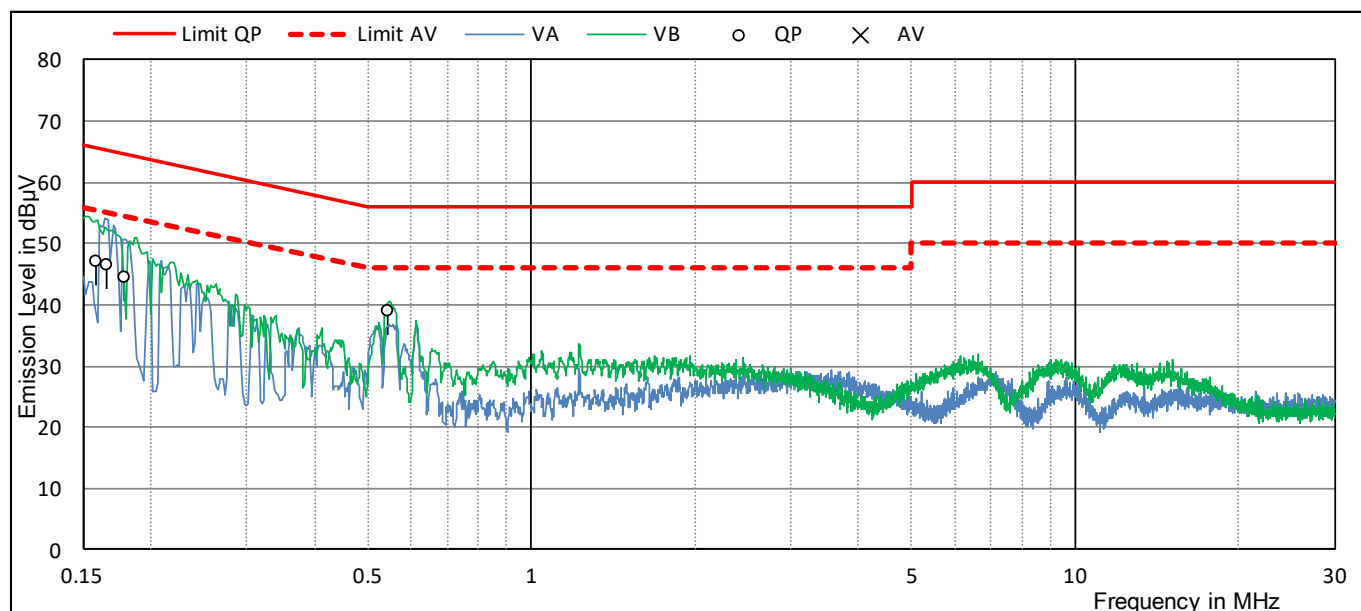
Discontinuous disturbance limit was calculated according to click rate.

(Reference divisional instruction No. G34364003)



7.1.3 Test Data

Measurement Date	Ambient Temperature	Relative Humidity	Atmospheric pressure
November 12, 2021	20 °C	33 %	990 hPa



Frequency [MHz]	Terminal	Factor [dB]	Meter Reading [dBμV]		Limit [dBμV]		Emission Level [dBμV]		Margin [dB]	
			QP	AV	QP	AV	QP	AV	QP	AV
0.158	VA	22.3	25.0	-	65.6	55.6	47.3	-	18.3	-
0.158	VB	22.3	24.8	-	65.6	55.6	47.1	-	18.5	-
0.166	VA	22.1	24.5	-	65.2	55.2	46.6	-	18.6	-
0.166	VB	22.1	24.0	-	65.2	55.2	46.1	-	19.1	-
0.178	VA	21.8	22.7	-	64.6	54.6	44.5	-	20.1	-
0.178	VB	21.8	22.5	-	64.6	54.6	44.3	-	20.3	-
0.546	VA	21.1	14.8	-	56.0	46.0	35.9	-	20.1	-
0.546	VB	21.1	18.0	-	56.0	46.0	39.1	-	16.9	-

Note

- 1) The testing location: Shielded Room M-1
- 2) QP: Quasi-Peak, AV: Average
- 3) VA: One end & Ground, VB: Other end & Ground
- 4) The symbol of '<' means 'or less'.
- 5) The symbol of '>' means 'or greater'.
- 6) The symbol of '-' means 'Not applicable'.
- 7) Factor includes Artificial Mains Network factor, Hi-Pass Filter loss, Pulse Limiter loss and a cable loss.
- 8) A sample calculation was made at 0.546 MHz
 Factor + Meter Reading = 21.1 + 18.0 = 39.1

7.2 Radiated Emissions 30MHz – 1000 MHz

7.2.1 Test Site and Instruments

Name	Number of test site & instruments (Refer to Appendix A)
Anechoic Chamber	A-1
Test Receiver	R02
Log-periodic Antenna	AL04
Biconical Antenna	AB01
RF Cable	CN03
RF Cable	CS02
Software	SW01

7.2.2 Test Method and Test Setup (Diagrammatic illustration)

The preliminary tests are carried out according to test procedure.

The preliminary tests are performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT.

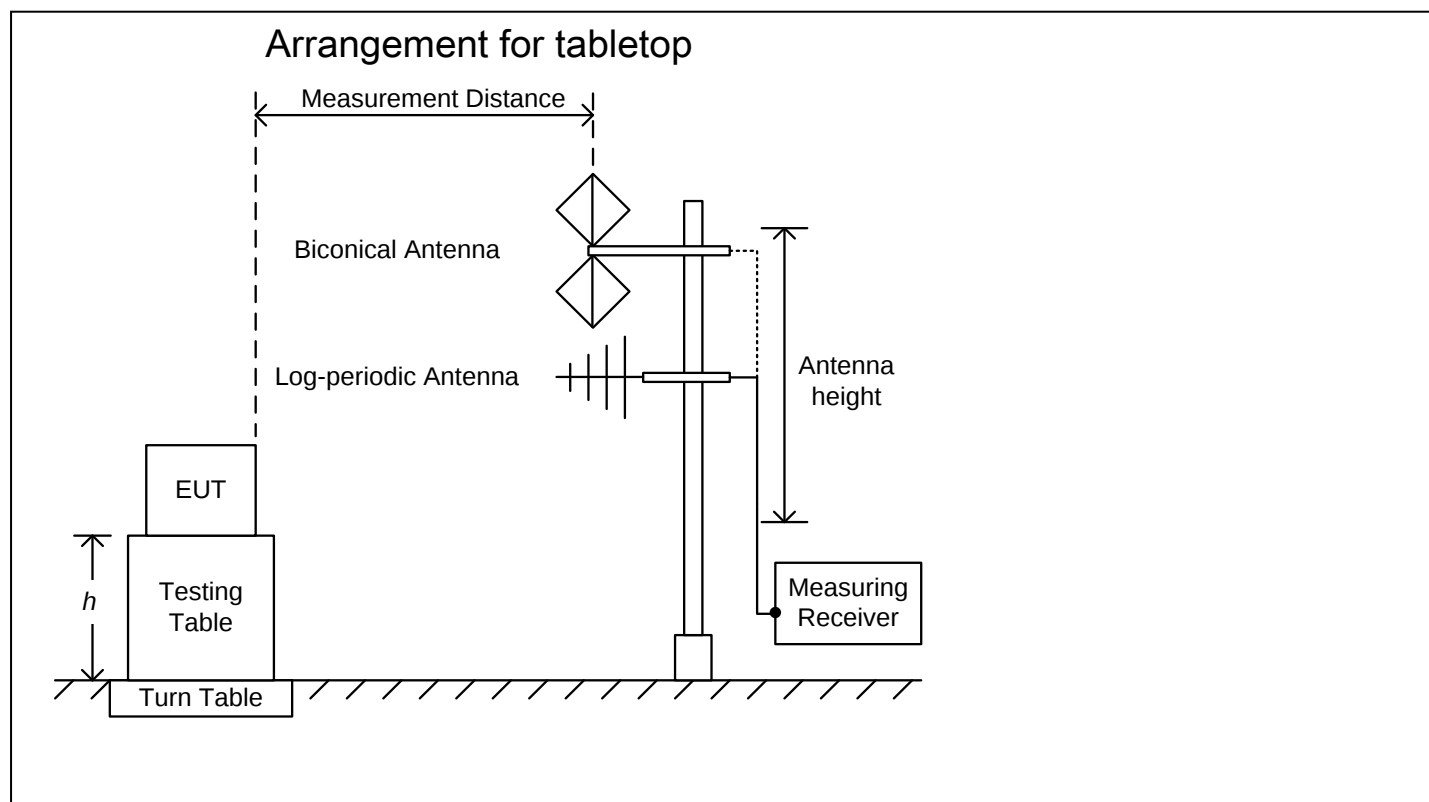
The EUT configuration, cable configuration and mode of operation are determined for producing the maximum level of emissions.

This configuration is used for finale tests.

(Reference divisional instruction No. G34364003)

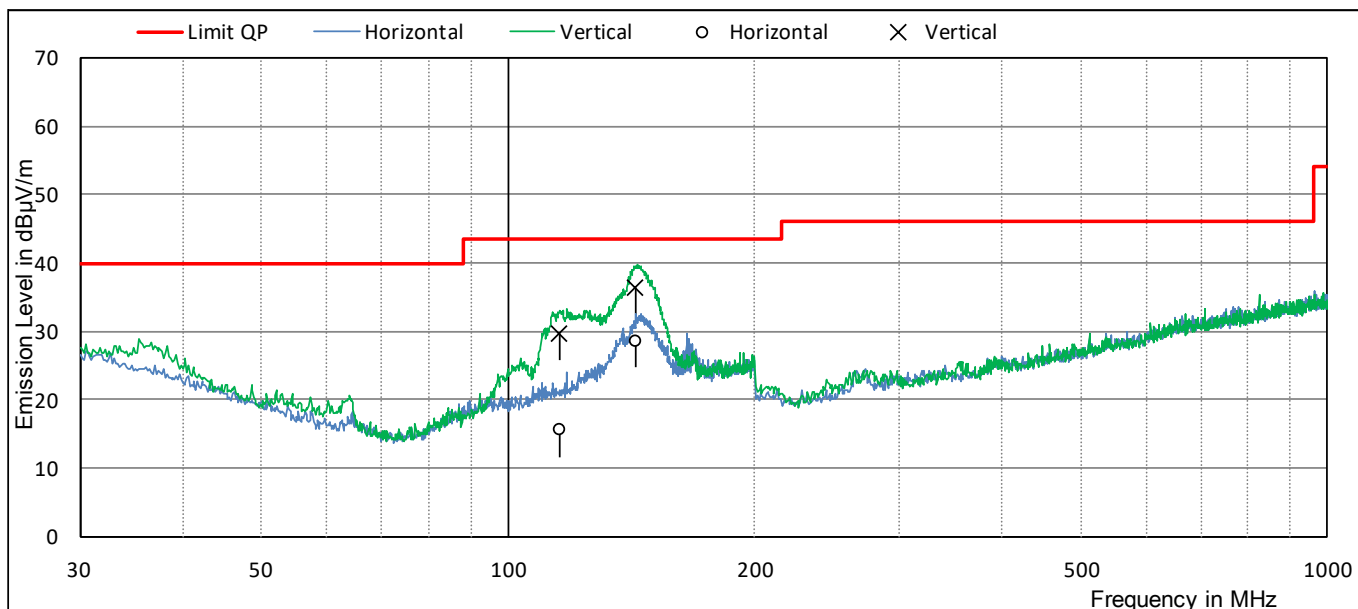
The test conditions are defined the following:

- Measurement Distance : 3 m
- Biconical Antenna : 30 - 200 MHz
- Log-periodic Antenna : 200 – 1000 MHz
- Antenna height : 1 - 4 m
- h : 0.8 m



7.2.3 Test Data

Measurement Date	Ambient Temperature	Relative Humidity	Atmospheric pressure
November 12, 2021	20 °C	33 %	990 hPa



Frequency [MHz]	Polarity	Factor [dB/m]	Meter Reading [dBμV]	Limit [dBμV/m] QP	Emission Level [dBμV/m]	Margin [dB]	Azimuth / Ant.Height
115.5	Hori.	16.2	- 0.6	43.5	15.6	27.9	306deg/3.09m
115.5	Vert.	16.2	13.5	43.5	29.7	13.8	189deg/1.00m
143.1	Hori.	18.4	10.3	43.5	28.7	14.8	282deg/2.24m
143.1	Vert.	18.4	18.1	43.5	36.5	7.0	245deg/1.00m

Note

- 1) The testing location: Anechoic Chamber A-1
- 2) QP: Quasi-Peak
- 3) The symbol of '<' means 'or less'.
- 4) The symbol of '>' means 'or greater'.
- 5) The symbol of '-' means 'Not applicable'.
- 6) Factor includes Antenna factor, and a cable loss.
- 7) A sample calculation was made at 143.1MHz
 Factor + Meter Reading = 18.4 + 18.1 = 36.5

Appendix A : Test Instruments

ID No.	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
A-1	Anechoic Chamber	-	TDK	-	2021/06	1 Year
M-1	Shield Room	-	TDK	-	-	-
S-1	Shield Room 1	-	TDK	-	-	-
S-2	Shield Room 2	-	TDK	-	-	-
R02	Test Receiver	ESCI	Rohde & Schwarz	100408	2020/12	1 Year
R04	Test Receiver	ESW44	Rohde & Schwarz	101602	2020/11	1 Year
CB01	RF Cable	RG223/U	HUBER+SUHNER	-	2021/04	1 Year
CB02	RF Cable	RG223/U	HUBER+SUHNER	-	2021/04	1 Year
CB03	RF Cable	RG223/U	Suhner	-	2021/10	1 Year
CB06	RF Cable	RG223/U	HUBER+SUHNER	-	2021/08	1 Year
CB07	RF Cable	3D-2V	-	-	2021/08	1 Year
CB08	RF Cable	3D-2V	-	-	2021/08	1 Year
CB09	RF Cable	3D-2V	-	-	2021/07	1 Year
CN03	RF Cable	MWX221	Junkosha Inc.	J12J100319-00 -D-2-9000	2021/09	1 Year
CN04	RF Cable	5D-2W	-	-	2021/07	1 Year
CS08	RF Cable	F130-S1S1-394	MEGA PHASE	20051	2021/09	1 Year
CS09	RF Cable	MWX315	Junkosha Inc.	J12J101305-00	2021/09	1 Year
CS10	RF Cable	MWX221	Junkosha Inc.	1004S138	2021/07	1 Year
CS11	RF Cable	MWX322	Junkosha Inc.	1810G009	2020/12	1 Year
CK01	RF Cable	KPS-1501-1181-K PS	INSULATED WIRE INC.	11292001	2021/10	1 Year
CK02	RF Cable	SUCOFLEX 102E	HUBER+SUHNER	6257/2E	2021/10	1 Year
CF01	RF Cable	G 04233 D-10	Suhner	-	2021/06	1 Year
PA00	AF Amplifier	P-500L	Accuphase	BOY806	-	1 Year
PA01	RF Amplifier	DBP-0102N533	DBS MICROWAVE INC.	012	2021/01	1 Year
PA02	RF Amplifier	WJ-6882-814	Watkins Johnson	0414	2021/01	1 Year
PA03	RF Amplifier	WJ-5315-556	Watkins Johnson	106	2021/01	1 Year
PA04	RF Amplifier	WJ-5320-307	Watkins Johnson	645	2021/01	1 Year
PA06	RF Amplifier	JS4-26004000-27- 8A	MITEQ	742322	2020/11	1 Year
PA07	RF Amplifier	MLA-100M26-B02	Techno Science Ja pan	2101509	2021/07	1 Year
L02	LISN	KNW-407	Kyoritsu	8-855-2	2021/05	1 Year
L03	LISN	KNW-407	Kyoritsu	8-1130-6	2021/10	1 Year
L04	LISN	KNW-242C	Kyoritsu	8-837-13	2021/08	1 Year
L06	LISN	KNW-243C	Kyoritsu	8-831-4	2021/10	1 Year
L07	ISN	ISN T8	TESEQ	42829	2021/03	1 Year
L08	ISN	ISN ST08	TESEQ	45106	2021/03	1 Year
L09	Artificial Mains Network	NNBM8125	Schwarzbeck Mess- Elektronik	81251823	2021/10	1 Year

ID No.	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
L10	Artificial Mains Network	NNBM8125	Schwarzbeck Mess-Elektronik	81251824	2021/10	1 Year
L11	High Impedance Probe	KNW-411	Kyoritsu	8-2071-2	2021/05	1 Year
L12	Artificial Hand	AH-1	ES Factory	001	2021/07	1 Year
L13	RF Current Probe	KTC-2504	Kyoritsu	8S-2916-1	2021/05	1 Year
L14	ISN	S751	TESEQ	50945	2021/09	1 Year
PL01	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	2021/04	1 Year
PL02	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	2021/04	1 Year
F01	High Pass Filter	KFL-009	Kyoritsu	8-1996-1	2021/04	1 Year
F02	High Pass Filter	KFL-009	Kyoritsu	8-2072-5	2021/04	1 Year
F03	Band Rejection Filter	BRM12294	MICRO-TRONICS	003	2021/10	1 Year
F04	High Pass Filter	F-100-4000-5-R	RLC ELECTRONIC S	0149	2021/10	1 Year
TM01	Termination(50)	-	Suhner	-	2021/01	1 Year
TM02	Termination(50)	-	Suhner	002	2021/01	1 Year
AB01	Biconical Antenna	BBA9106	Schwarzbeck	VHA91032399	2021/08	1 Year
AB02	Biconical Antenna	BBA9106	Schwarzbeck	VHA91032325	2021/07	1 Year
AL02	Log-periodic Antenna	UHALP9108A	Schwarzbeck	0666	2021/07	1 Year
AL03	Log-periodic Antenna	HL050	Rohde & Schwarz	100251	2021/03	1 Year
AL04	Log-periodic Antenna	VULP9118A	Schwarzbeck	00776	2021/08	1 Year
AH02	Horn Antenna	3160-09	ETS	00023883	2021/03	1 Year
AH03	Horn Antenna	3160-10	ETS	00026026	2021/03	1 Year
AH05	Double-Ridged Horn Antenna	3115	EMC Test Systems	6442	2021/06	1 Year
CL01	Absorbing Clamp	MDS21	Luthi	3974	2020/11	1 Year
MP01	Matching Pad	ZT-130	Tamagawa Electronics	1013366	2021/06	1 Year
MP03	Matching Pad	12N50/75B	Wiltron	93008	2021/06	1 Year
ATT06	Attenuation Pad	UFA-01	Tamagawa Electronics	-	2021/06	1 Year
ATT07	Attenuation Pad	1-10	Weinschel	AU1302	2021/06	1 Year
ATT08	Attenuation Pad	49-10-43	Weinschel	KA319	2021/08	1 Year
ATT09	Attenuation Pad	49-20-43	Weinschel	KK162	2021/08	1 Year
ATT10	Attenuation Pad	49-30-43	Weinschel	KJ988	2021/08	1 Year
N01	Combining Network	1870A	Weinschel	635A	2021/06	1 Year
SG01	DTV Multi Channel Generator	3545A	Eiden Co., Ltd.	JC118285	2021/04	1 Year
SG02	Function Generator	3325B	Hewlett Packard	2847A03284	2021/10	1 Year
SG05	Signal Generator	6061A	Gigatronics	5130593	2021/05	1 Year
SG06	Signal Generator	SMB100A	Rohde & Schwarz	105262	2020/12	1 Year
SG08	Vector Signal Generator	SMBV100A	Rohde & Schwarz	263032	2020/12	1 Year
SG10	Signal Generator	SMB100B	Rohde & Schwarz	101429	2021/01	1 Year
HA01	Harmonic/Flicker Analyzer	KHA1000	Kikusui	MH002292	2021/01	1 Year
RN01	Reference Impedance Network	LIN40MA-PCR-L	Kikusui	NC003432	2020/12	1 Year
2-A	ESD Tester	ESD-3000	EMC-PARTNER	069	2020/12	1 Year
3-A	Signal Generator	SML03	Rohde & Schwarz	102651	2021/06	1 Year

ID No.	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
3-B	FAN Antenna	FAN-1	JQA	1	2021/04	1 Year
3-C	Log-periodic Antenna	VULP9118-E	Schwarzbeck	VULP9118-E-7 04	2021/04	1 Year
3-E	RF Power Amplifier	R122C	RF POWER LABS	092695-2	2021/04	1 Year
3-Q	RF Power Amplifier	BBA150-BC500	Rohde & Schwarz	103576	2021/04	1 Year
3-N	RF Power Amplifier	BBA150-D110E10 0	Rohde & Schwarz	103162	2021/04	1 Year
3-H	Field Probe	HI-6105USB-20	Laser Data Interface	00071885	2021/10	1 Year
3-I	Power Meter	NRVD	Rohde & Schwarz	101020	2021/04	1 Year
3-J	Insertion Unit	URV5-Z4	Rohde & Schwarz	100193	2021/04	1 Year
3-K	Dual Directional Coupler	C5086-10	Werlatone Inc.	67819	2021/04	1 Year
4-A	FAST TRANSIENT /BURST SIMULATOR	FNS-AX3-A16B	NOISE LABORATORY	FNS12Y1194	2020/11	1 Year
4-B	Coupling Clamp	15-00009A	NOISE LABORATORY	FNS1321206	2020/11	1 Year
5-A	Surge Generator	TRA2000	EMC-PARTNER	582	2021/10	1 Year
6-A	Signal Generator	SML01	Rohde & Schwarz	130500190	2021/07	1 Year
6-B	RF Amplifier	FLL-75	Frankonia	0040	2021/09	1 Year
6-C	Attenuator	8341-060	Bird Electronic	766	2021/09	1 Year
6-E	Coupling/Decoupling Network	FCC-801-M1-16	FCC	97-07	2021/07	1 Year
6-F	Coupling/Decoupling Network	FCC-801-M2-16	FCC	97-12	2021/07	1 Year
6-G	Coupling/Decoupling Network	TSCDN-M2-25A	TSJ(FCC)	06006	2021/07	1 Year
6-H	Coupling/Decoupling Network	FCC-801-M3-16	FCC	158	2021/07	1 Year
6-I	Coupling/Decoupling Network	TSCDN-M3-25A	TSJ(FCC)	06011	2021/07	1 Year
6-J	150-50 ohms Adaptor	FCC-150-50	FCC	380	2021/07	1 Year
6-K	150-50 ohms Adaptor	FCC-150-50	FCC	381	2021/07	1 Year
6-L	EM Clamp	EM101	Luthi	35196	2021/09	1 Year
6-M	BCI Probe	F-120-9A	FCC	509	2021/09	1 Year
8-A	Loop Coil	MF1000-1	EMC-PARTNER	097	2021/02	1 Year
11-A	Dip/Interruption Tester	PLINE1610	Haefely	083732-14	2021/04	1 Year
OS01	Digital Oscilloscope	TDS3052C	Tektronix, Inc.	C010708	2021/10	1 Year
TH01	Thermo-hygrometer	SK-L200TH II α	skSATO	026627	2021/06	1 Year

ID No.	Software	Version	Manufacturer
SW01	EMI Software	5.21.10	JQA Safety & EMC Center
SW02	Harmo Capture	3.6.1.0	Kikusui Electronics Corporation
SW03	IM5/RS	8.01.420	Toyo Corporation
SW06	IM5/CS	8.02.220	Toyo Corporation
SW10	Wavy	6.32	Kikusui Electronics Corporation
SW11	KES7100	2.93	Kikusui Electronics Corporation
SW12	TEPTO	4.3.0253	Techno Science Japan Co. Ltd.

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