Panasonic System Networks Evaluation Technology Co., Ltd. EMC Center

EMC TEST REPORT

REPORT NUMBER	:	ERJ13-19037R00FR
APPLICANT	:	Panasonic Corporation
PRODUCT	:	Base Unit for SIP Cordless Phone
MODEL NUMBER	:	KX-TGP700
STANDARD	:	FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators ICES-003 Issue 6

Issue Date: December 9, 2019

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SECTION 1. GENERAL INFORMATION

1.1 Testing Laboratory

Name:	Panasonic System Networks Evaluation Technology Co., Ltd. EMC Center
Address:	1-62, 4-chome, Minoshima Hakata-ku, Fukuoka 812-8531, Japan
TEL:	092-477-3267 (+81-92-477-3267)
FAX:	092-477-1587 (+81-92-477-1587)
Test Site	Panasonic System Networks Evaluation Technology Co., Ltd. Fukuoka Site
Address:	1-62, 4-chome, Minoshima Hakata-ku, Fukuoka 812-8531, Japan

1.2 Detail of Applicant

Name:	Panasonic Corporation
Address:	1-62, 4-chome, Minoshima Hakata-ku, Fukuoka 812-8531, Japan
TEL:	050-3380-2671(+81-50-3380-2671)

1.3 Information about Test Item

Kind of Test Item:	Base Unit for SIP Cordless Phone
Model Number:	KX-TGP700
Trade Mark:	Panasonic
Type of Test Item:	Table-top, Wall hanging
Condition of Test Item:	Pre-Production
Serial Number:	S11CA000008
Rated Voltage/Frequency:	AC 100 V - AC 240 V 50 Hz / 60 Hz
Highest frequency (*Note 1):	600 MHz
Test Item Received Date:	August 30, 2019
Test Date:	September 1-2, 2019

*Note 1: Highest frequency generated or used in the devices on which the device operates or tunes.

1.4 Regulation

Emission:	47 CFR Part 15 - Digital Devices Subpart A - General Subpart B - Unintentional Radiators (Class B) ICES-003 Issue 6 Section 6 Class B

1.5 Test Procedure

General:	PSNET-EMC Procedure (EDC02), ANSI C63.4-2014 Section 6
ITE Measurement:	PSNET Procedure (EDX34), ANSI C63.4-2014 Section 11
Radiated Emission:	PSNET Procedure (EDX01,EDY01/02), ANSI C63.4-2014 Section 8 PSNET Procedure (EDX39), ICES-003 Issue 6 Section 5 (a)(ii), Section 5 (b)(ii)
Conducted Emission	PSNET Procedure (EDX02, EDY03), ANSI C63.4-2014 Section 7 PSNET Procedure (EDX39), ICES-003 Issue 6 Section 3 (b)

1.6 Notes

The results in this report apply only to the sample(s) tested.

The instruments used for the measurements were traceable to the national standards and foreign national standards laboratories.

SECTION 2. SUMMARY OF RESULTS

2.1 General Remarks

The EUT under the test configuration (as shown section 4) was tested according to the requirements of the Regulation as shown section 1.4.

The worst margin of test results was as follows:

Test Item	Worst Margin	Frequency	Polarity	Detector	Reference
Radiated Emission 30 MHz - 1000 MHz	4.1 dB	799.486 MHz	Horizontal	Quasi-peak	Page 5
Radiated Emission 1 GHz - 6 GHz	25.7 dB	2121.225 MHz	Horizontal	Average	Page 6
	27.5 dB	2121.225 MHz	Horizontal	Peak	Page 6
Conducted Emission	11.2 dB	0.33100 MHz	---	Quasi-peak	Page 7
	9.9 dB	0.33100 MHz	---	Average	Page 7

*Used Test Site up to 1 GHz:

■Fukuoka No.1 Site (D=1.5 m Turn Table), ☐ADOX No.2 Site (D=3.0 m Turn Table)

■Measurement Distance 3.0 m, ☐ADOX Site, Class A, Measurement Distance 10 m

*Used Test Site above 1 GHz:

■Fukuoka No.1 Site (D=1.5 m Turn Table), ☐ADOX No.2 Site (D=3.0 m Turn Table)

■Measurement Distance 3.0 m

2.2 Final Judgment

The EUT fulfills the test requirements of the regulation as shown section 1.4.

2.3 Uncertainty

The measurements uncertainty, at time of test, and at least 95 % confidence, was estimated to be as follows:

Radiated Emission Measurements: +/- 3.84 dB (3 m) [30 MHz - 300 MHz],
+/- 4.66 dB (3 m) [300 MHz - 1000 MHz]
+/- 4.72 dB (3 m) [1 GHz - 6 GHz]

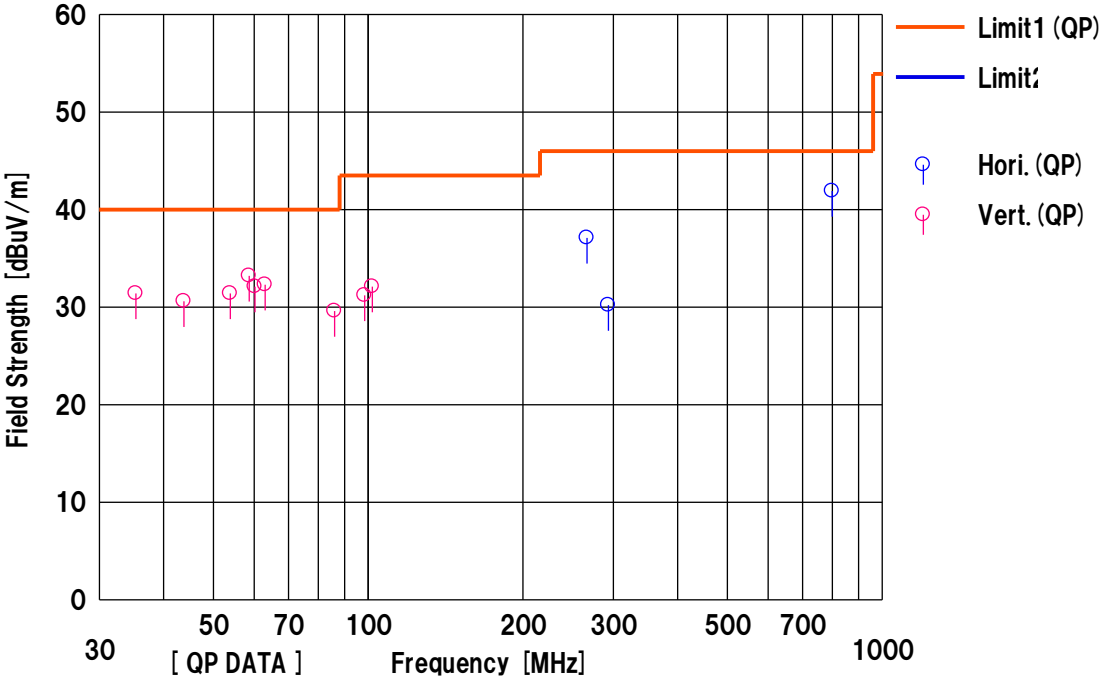
Conducted Emission Measurements: +/-2.38 dB [0.15 MHz - 30 MHz]

SECTION 3. TEST RESULTS

3.1 Radiated Emission 30 MHz - 1000 MHz

Model Name	: Base Unit for SIP Cordless Phone	Test condition of instruments	
Model No.	: KX-TGP700	Date	: 2019/09/01
Serial No.	: S11CA000008	Temperature	: 24 degree C
Operator	: E. Abe	Humidity	: 43 % 1016 hPa
Points	: 12	EUT Warm-up Time	: 30 minutes
Detector	: QP	Distance	: 3 m
RBW	:120 kHz	Test Mode	: Link, powered by AC adaptor
		Comment	: AC 120 V / 60 Hz

The measurement was conducted in the condition where maximum emission was detected by the preliminary test.
Level=Emission Level=Meter Reading+ Factor (Antenna + Cable + Preamp)
LIMIT: FCC Part 15 Class B (3 m)
: ICES-003 Class B (3 m)

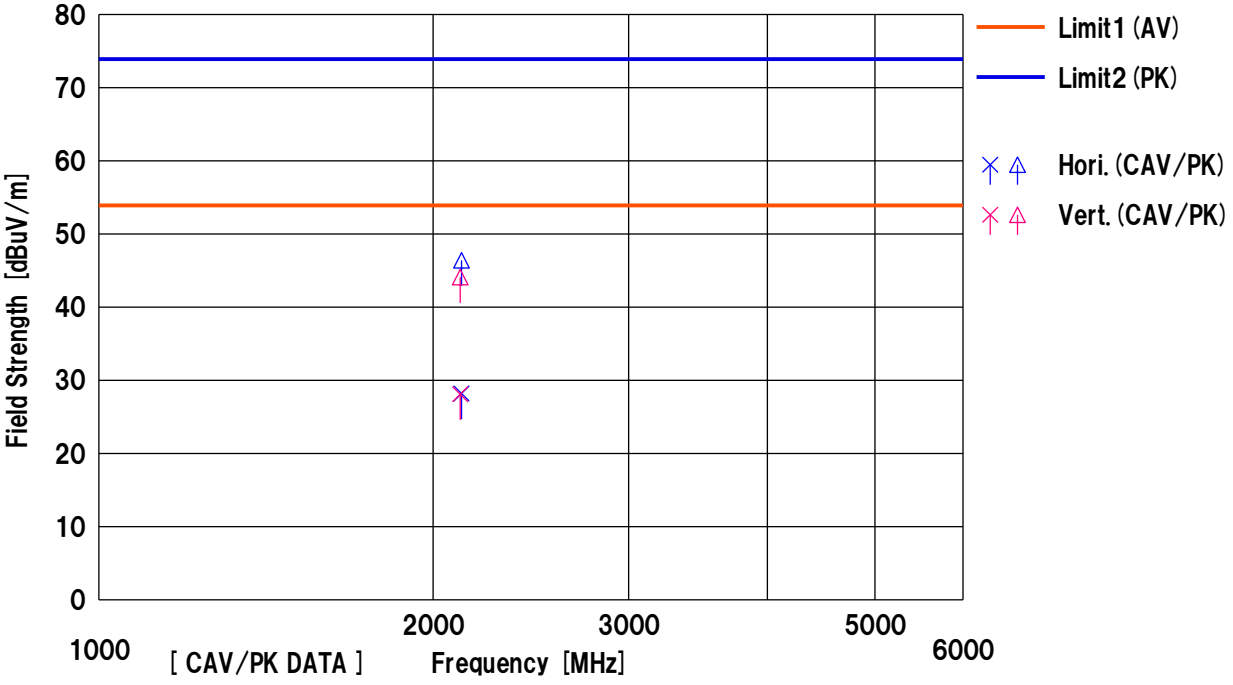


Frequency [MHz]	Meter Reading (QP) [dBuV]	Antenna (Factor) [dB/m]	Cable Loss [dB]	Pre-AMP Gain [dB]	Result (QP) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	pola	Height [cm]	Angle [deg]
266.501	37.9	24.0	2.7	27.5	37.1	46.0	8.9	Hori.	126	0
293.300	29.9	25.0	2.8	27.5	30.2	46.0	15.8	Hori.	113	188
799.486	40.7	24.0	5.4	28.2	41.9	46.0	4.1	Hori.	100	360
35.328	36.5	22.5	0.9	28.5	31.4	40.0	8.6	Vert.	100	360
43.814	38.7	19.4	1.0	28.5	30.6	40.0	9.4	Vert.	100	0
53.914	42.9	15.8	1.1	28.4	31.4	40.0	8.6	Vert.	100	115
58.701	46.3	14.2	1.1	28.4	33.2	40.0	6.8	Vert.	100	360
60.227	45.6	13.7	1.2	28.4	32.1	40.0	7.9	Vert.	100	360
63.023	46.4	13.1	1.2	28.4	32.3	40.0	7.7	Vert.	100	360
86.064	42.7	13.8	1.4	28.3	29.6	40.0	10.4	Vert.	100	360
98.449	42.0	16.0	1.5	28.3	31.2	43.5	12.3	Vert.	100	360
101.875	42.3	16.6	1.5	28.3	32.1	43.5	11.4	Vert.	100	99

3.2 Radiated Emission 1 GHz - 6 GHz

Model Name	: Base Unit for SIP Cordless Phone	Test condition of instruments	
Model No.	: KX-TGP700	Date	: 2019/09/02
Serial No.	: S11CA000008	Temperature	: 24 degree C
Operator	: E. Abe	Humidity	: 48 % 1015 hPa
Points	: 2	EUT Warm-up Time	: 30 minutes
Detector	: PK/AV	Distance	: 3 m
RBW	: 1 MHz	Test Mode	: Link, powered by AC adaptor
		Comment	: AC 120 V / 60 Hz

The measurement was conducted in the condition where maximum emission was detected by the preliminary test.
Level=Emission Level=Meter Reading+ Factor (Antenna + Cable + Preamp)
LIMIT: FCC Part 15 Class B (3 m)
: ICES-003 Class B (3 m)



Frequency [MHz]	Meter Reading (AV) [dBuV]	Meter Reading (PK) [dBuV]	Factor Antenna [dB/m]	Factor Loss [dB]	Factor Gain [dB]	Factor D	Result (AV) [dBuV/m]	Result (PK) [dBuV/m]	Limit (AV) [dBuV/m]	Limit (PK) [dBuV/m]	Margin (AV) [dB]	Margin (PK) [dB]	Pola.	Height [cm]	Angle [deg]
2121.225	37.8	56.0	28.1	8.0	47.7	1.9	28.2	46.4	53.9	73.9	25.7	27.5	Hori.	100	86
2115.820	37.9	53.9	28.0	8.0	47.7	1.9	28.1	44.1	53.9	73.9	25.8	29.8	Vert.	100	203

D: Distance Factor

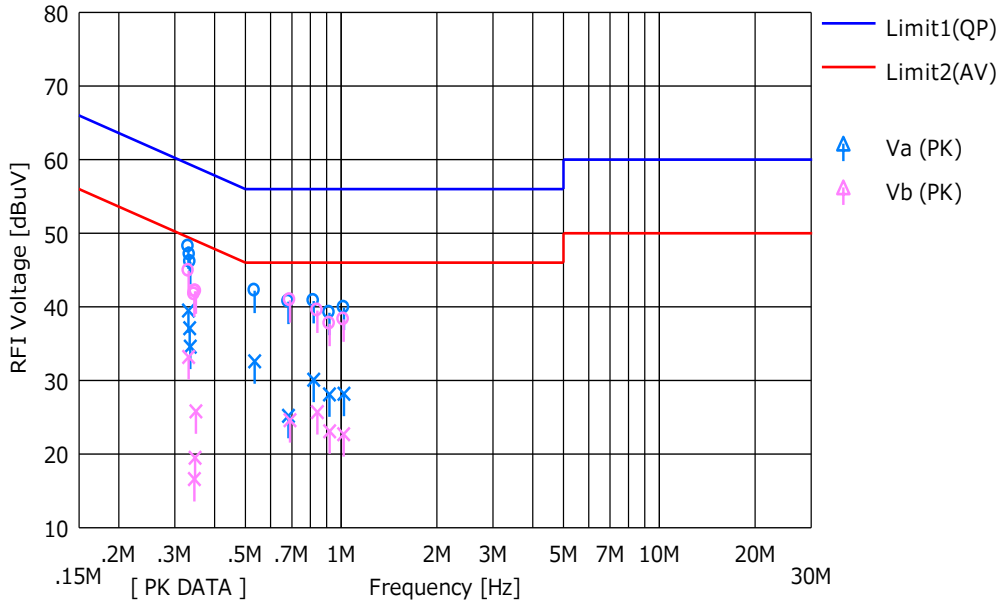
3.3 Conducted Emission

Model Name	: Base Unit for SIP Cordless Phone	Test condition of instruments	
Model No.	: KX-TGP700	Date	: 2019/09/02
Serial No.	: S11CA000008	Temperature	: 24 degree C
Operator	: E. Abe	Humidity	: 40 % 1015 hPa
Points	: 16	EUT Warm-up Time	: 30 minutes
Detector	: QP/AV		
RBW	: 9 kHz	Test Mode	: Link, powered by AC adaptor
		Comment	: AC 120 V / 60 Hz

The measurement was conducted in the condition where maximum emission was detected by the preliminary test.
Level=Emission Level=Meter Reading+ Factor (Cable + LISN)

Limit: FCC Part 15 Class B (QP), ICES-003 Class B (QP),

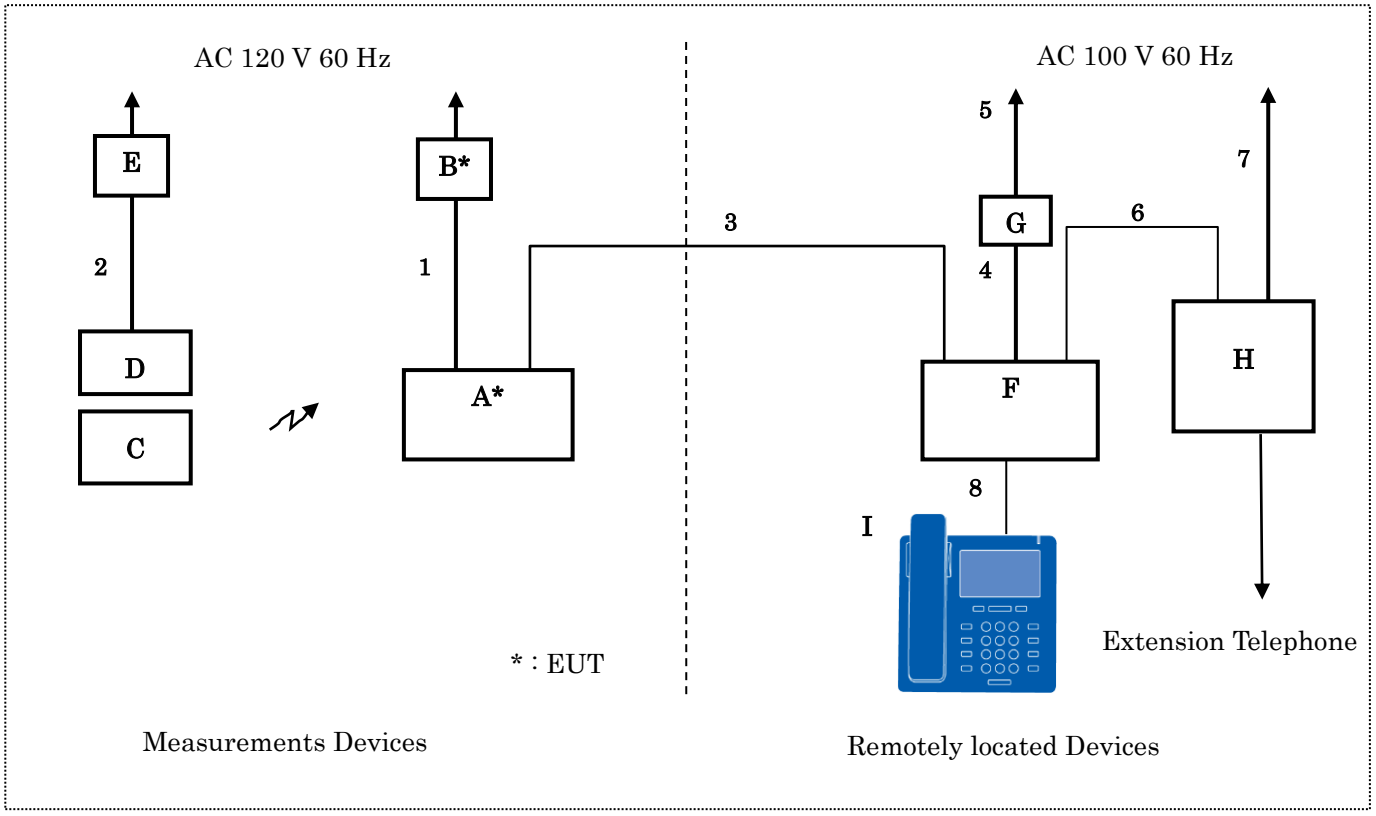
Limit: FCC Part 15 Class B (AV), ICES-003 Class B (AV)



Frequency [MHz]	Line	Meter Reading (QP) [dBuV]	Meter Reading (AV) [dBuV]	Factor [dB]	Result (QP) [dBuV]	Result (AV) [dBuV]	Limit (QP) [dBuV]	Limit (AV) [dBuV]	Margin (QP) [dB]	Margin (AV) [dB]
0.33100	Va	37.7	29.0	10.5	48.2	39.5	59.4	49.4	11.2	9.9
0.33408	Va	36.6	26.6	10.5	47.1	37.1	59.3	49.3	12.2	12.2
0.33551	Va	35.6	24.1	10.5	46.1	34.6	59.3	49.3	13.2	14.7
0.53438	Va	31.8	22.2	10.4	42.2	32.6	56.0	46.0	13.8	13.4
0.68274	Va	30.2	14.7	10.5	40.7	25.2	56.0	46.0	15.3	20.8
0.81938	Va	30.3	19.6	10.5	40.8	30.1	56.0	46.0	15.2	15.9
0.91819	Va	28.7	17.6	10.5	39.2	28.1	56.0	46.0	16.8	17.9
1.01993	Va	29.4	17.7	10.5	39.9	28.2	56.0	46.0	16.1	17.8
0.33161	Vb	34.4	22.7	10.5	44.9	33.2	59.4	49.4	14.5	16.2
0.34560	Vb	31.2	6.1	10.5	41.7	16.6	59.1	49.1	17.4	32.5
0.34726	Vb	31.6	9.0	10.5	42.1	19.5	59.0	49.0	16.9	29.5
0.34950	Vb	31.6	15.3	10.5	42.1	25.8	59.0	49.0	16.9	23.2
0.69029	Vb	30.4	14.1	10.5	40.9	24.6	56.0	46.0	15.1	21.4
0.84168	Vb	29.0	15.2	10.5	39.5	25.7	56.0	46.0	16.5	20.3
0.91974	Vb	27.2	12.6	10.5	37.7	23.1	56.0	46.0	18.3	22.9
1.01800	Vb	27.8	12.2	10.5	38.3	22.7	56.0	46.0	17.7	23.3

SECTION 4. DESCRIPTION OF EUT

4.1 Construction of EUT



Symbol or number assigned to equipment or cables on this diagram is used on tables in section 4.2 and 4.3

4.2 EUT and Support Equipment Used

The EUT was supported by the following equipment during the test. Indication in the following left side column corresponds to section 4.1.

Symbol	Item	Model No.	[Manufacturer]	Serial No.	FCC ID
A	Base Unit for SIP Cordless Phone (EUT)	KX-TGP700	[Panasonic]	S11CA000008	---
B	AC Adapter for Base Unit (EUT)	PNLV236	[Panasonic]	IJ31EF4	---
C	SIP Cordless Handset	KX-TPA70	[Panasonic]	S11CA000002	---
D	Charger	PNLC1090ZA	[Panasonic]	S11CA000052	---
E	AC Adaptor for Charger	PQLV219	[Panasonic]	PU2017081400645	---
F	Hub	GS108PEv3	[NETGEAR]	3UJ1535500F2F	---
G	AC Adaptor for Hub	AD8190LF	[NETGEAR]	311504191031708KT	---
H	IP PBX	KX-NS1000	[Panasonic]	4EACJ002521	---
I	IP Proprietary Telephone	KX-NT630NE	[Panasonic]	S21CA000138	---

4.3 Cable(s) Used

The following cable(s) was used for the test. Indication number in the following left side column corresponds to section 4.1

No.	Name	Length	Shield/ Unshielded	Connector	Ferrite Core
1	DC Cable for Base Unit	1.8 m	Unshielded	Plastic	None
2	DC Cable for Charger	1.8 m	Unshielded	Plastic	None
3	LAN Cable	100 m	Unshielded	Plastic	None
4	DC Cable for PoE Hub	1.5 m	Unshielded	Plastic	None
5	AC Cable for PoE Hub (3 Wires)	2.0 m	Unshielded	Plastic	None
6	LAN Cable	0.9 m	Unshielded	Plastic	None
7	AC Cable (3 Wires)	1.8 m	Unshielded	Plastic	None
8	LAN Cable	1.5 m	Unshielded	Plastic	None

4.4 Operating Condition(s)

The EUT was operated under the following condition during the test.

Mode	Condition	Base Unit powered by
A	**Link**	**AC Adaptor**
B	Link	PoE
S1	Standby	AC Adaptor
S2	Standby	PoE

4.5 Any Deviations from, Additions to or Exclusions from the Test Method

No deviation

4.6 Modifications to EUT

No modification was performed by the test laboratory during the test.

SECTION 6. TEST INSTRUMENTS LIST

6.1 Radiated Emission (30 MHz - 1000 MHz)

No.	Apparatus	Model No. (Manufacturer)	Specification	Calibration		Serial No.
				Date	Interval	
1*	Power Supply	4430, 4421 (NF)	50 Hz / 60 Hz 4 kVA 264 V	---	---	302261 305364
2*	Antenna	VHA9103/BBA9106 UHALP9108-A (Schwarzbeck)	30 MHz - 300 MHz 300 MHz - 1000 MHz	2018/05/29 2018/05/29	2 years 2 years	VHA91032274 0620
3*	Pre-Amplifier	8447D (hp)	0.1 MHz - 1.3 GHz	2019/01/07	1 year	2944A09179
4*	EMI Test Receiver	ESR26 (R&S)	CISPR 16-1-1 9 kHz - 26.5 GHz	2018/10/18	1 year	101243
5*	Personal Computer	OPTIPLEX 3060 (DELL)	---	---	---	5RMS0W2
6*	Measurement Software	TEPTO-DV-RE (tsj)	---	---	---	V.2.6.0208
7*	3 dB Attenuator	CFA-01 (TME)	3 dB DC - 1 GHz	2018/05/29	2 years	EMF-683
8*	6 dB Attenuator	MP721B (Anritsu)	6 dB DC - 12 GHz	2018/05/29	2 years	M45998
9*	SW Box	NS4903N (TOYO)	---	2019/04/11	1 year	EMF-372
10*	Cables	---	30 MHz - 1000 MHz	2019/04/11	1 year	EMF-524
11*	Semi-Anechoic Chamber	3 m method(NSA) (RIKEN)	30 MHz - 1000 MHz	2019/07/28	1 year	ELF-002

* Used for final test

6.2 Radiated Emission (1 GHz - 6 GHz)

No.	Apparatus	Model No. (Manufacturer)	Specification	Calibration		Serial No.
				Date	Interval	
1*	Power Supply	4430, 4421 (NF)	50 Hz / 60 Hz 4 kVA 264 V	---	---	302261 305364
2*	Antenna	3115 (EMCO)	1 GHz - 18 GHz	2019/02/15	2 years	00044715
3*	Pre-Amplifier	MLA-0118-J02 (tsj)	1 GHz - 18 GHz Gain＞45 dB	2018/10/23	1 year	19325
4*	EMI Test Receiver	ESR26 (R&S)	CISPR 16-1-1 9 kHz - 26.5 GHz	2018/10/18	1 year	101243
5*	Personal Computer	OPTIPLEX 3060 (DELL)	---	---	---	5RMS0W2
6*	Measurement Software	TEPTO-DV-RE (tsj)	---	---	---	V.2.6.0208
7*	Absorber	PFP30 (RIKEN)	---	---	---	---
8*	Cables	SUCOFLEX 102A (HUBER+SUHNER)	1 GHz - 6 GHz	2019/02/06	1 year	EMF-587
9*	SW Box	NS4903N (TOYO)	---	2019/02/06	1 year	EMF-372
10*	Band Rejection Filter (DECT 1.9 GHz)	BRC20053 (MICRO-TRONICS)	1 GHz - 5 GHz	2019/08/23	2 years	001 EMF-710
11*	Semi-Anechoic Chamber	3 m method(Svswr) (RIKEN)	1 GHz - 6 GHz	2019/05/18	1 year	ELF-002

* Used for final test

6.3 Conducted Emission

No.	Apparatus	Model No. (Manufacturer)	Specification	Calibration		Serial No.
				Date	Interval	
1*	Power Supply	ES040ES (NF)	50 Hz / 60 Hz 4 kVA 264 V	---	---	9244357
2*	Attenuator	6910.01.A (HUBER+SUHNER)	10 dB 0.15 MHz - 30 MHz	2018/12/11	2 years	EMF-051-3
3*	AMN	KNW-407 (Kyoritsu)	250 V / 15 A	2018/12/11	2 years	8-1345-4
4*	AMN	KNW-242C (Kyoritsu)	9 kHz - 30 MHz	2018/09/05	2 years	8-1312-2
5*	EMI Test Receiver	ESCI (R&S)	CISPR 16-1-1 9 kHz - 3 GHz	2019/02/07	1 year	100812
6*	Personal Computer	ProDesk 600 G2 SFF (hp)	---	---	---	JPH642HK9Q
7*	Measurement Software	TEPTO-DV/RE (tsj)	---	---	---	Ver.3.1.0029
8*	RF Fuse	MP612A (Anritsu)	---	2018/10/04	1 year	EMF-389
9*	Cable	---	0.15 MHz - 30 MHz	2018/10/04	1 year	EMF-532
10*	50 ohm Terminator	65 N-50-0-1/133 (SUHNER)	50 ohm	2019/07/30	2 years	EMF-658
11*	Shielded Room	--- (RIKEN)	0.15 MHz - 30 MHz	---	---	ELF-001

* Used for final test

SECTION 7. TEST PROCEDURE(s)

7.1 Radiated Emission

7.1.1 Measurement system

Equipment Set-up (Refer to section 4 and 5)

Tabletop Equipment

The EUT is placed on the table of size, 0.5 m(d) by 1.5 m(w), raised 0.8 m above the metal ground plane (turn table). The table is made of styrene foam.

Interconnecting Cables

The cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long, hanging in the middle between the ground plane and the table approximately.
The measurement is conducted the worst emissions condition.

Turn Table

The turn table is capable for EUT weight and rotatable 0 to 360 degree horizontally by remote control in the measurement room.

Antenna Mast

The antenna mast is attachable to all antennas described on section 6 and antenna height is adjustable 1 to 4 meters continuously by remote control at the measurement room, and antenna polarization is also changed by the remote control. Especially for 1 GHz to 40 GHz measurement antenna tilt angle is adjustable by remote control at the measurement room to keep the antenna in the “cone of radiation” of EUT.

Test Equipment (refer to section 6.1 and 6.2)

Test Facilities (30 MHz to 1 GHz)

The radiated emission test site is validated by measurements of the attenuation of signals propagated over the site and compared with theoretical attenuation of signals propagated over an ideal site. Horizontally and vertically polarized attenuation measurements are made over the frequency range of 30 MHz to 1 GHz. These measurements are made in accordance with the procedures of D.2 and/or D.3, as applicable of Annex D in the ANSI C63.4-2014 standard, and the results are normalized for comparison with the theoretical attenuation values.

Test Facilities (1 GHz to 40 GHz)

The test site complies with the S_{VSWR} requirements specified in 8.3.2 of CISPR 16-1-4:2010-04 over the frequency range of 1 GHz to 18 GHz, when tested in accordance with the site validation procedures requirements specified in 8.3.3 of CISPR 16-1-4:2010-04. Additionally, the RF absorbing materials used on the reference ground plane have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB (at normal incidence) at all frequencies from 1 GHz to 18 GHz.

7.1.2 Test Procedure

7.1.2.1 Preliminary Measurement

The EUT is tested on all operating conditions.

The spectrum analyzer is set max-hold mode and swept during turntable is rotated 0 to 360 degree and antenna is moving 1 to 4 meter height. Then spectrum chart is plotted out to detect the worst conditions in configuration, operating mode and/or ambient noise notation.

7.1.2.2 Final Measurement

The EUT is operated in the condition where maximum emission is detected by the preliminary test.

EMI Test Receiver is used for final measurement. The turntable azimuth (EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured. Especially for 1 GHz to 40 GHz measurement antenna tilt angle are adjusted to obtain the maximum field strength.

The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.

7.2 Conducted Emission

7.2.1 Measurement system

Equipment Set-up (Refer to section 4 and 5)

Tabletop Equipment

EUT is placed on EUT table of size, 1.0m(d) by 1.5m(w), raised 0.8m above the metal ground plane and 0.4 m from vertical metal plane.

Interconnecting Cables

Excess part of the interconnecting cables longer than 1 meter are bundled in the center.
Cables that hang closer than 40 cm to the ground plane are folded back and forth forming bundle 30 to 40 cm long, hanging approx. in the middle between ground plane and table.
The measurement was conducted the worst emissions condition.

AC Power Cord

AC power cord for the EUT is connected to one LISN which is placed on the ground plane. The LISN is placed in 80 cm from the nearest part of EUT chassis.
The excess power cable is bundled in the center, or shortened to appropriate length.
AC cables except from the EUT are connected second LISN.

LISN

The chassis of the LISN is placed on the metal ground plane maintaining the direct current resistance of less than or equal to 2.5m ohm. The lead to be tested is selectable by switch, and the terminals which are not connected to the EUT are terminated in 50 ohm resistor termination.

Test Equipment (refer to section 6.3)

7.2.2 Test Procedure

7.2.2.1 Preliminary Measurement

The EUT is tested on all operating conditions.
The spectrum analyzer is set max-hold mode and swept till no variation. Then spectrum chart is plotted out to detect the worst conditions in configuration and/or operating mode. All cables except for safety grounded are tested.

7.2.2.2 Final Measurement

The EUT is operated in the condition where maximum emission is detected by the preliminary test.
EMI Test Receiver is used for final measurement. The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.