EMI TEST REPORT

Test Report No. : 12572108H-A-R1

Applicant	:	**Mitsubishi Electric Corporation Kyoto works**
Type of Equipment	:	**LED UNIT**
Model No.	:	**VS-12NP180F** **VS-12NP180FD**
FCC ID	:	**2APT9DWVS-12NP180**
Test regulation	:	**FCC Part 15 Subpart B: 2018 Class A**
Test Result	:	**Complied (Refer to Section 3.2)**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 12572108H-A. 12572108H-A is replaced with this report.

Date of test: December 17 and 18, 2018

Representative test engineer:
Masaya Minami
Engineer
Consumer Technology Division

Approved by:
Satofumi Matsuyama
Engineer
Consumer Technology Division

NVLAP TESTING
NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://japan.ul.com/resources/emc_accredited/

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No.: 12572108H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12572108H-A	January 10, 2019	-	-
1	12572108H-A-R1	January 22, 2019	P.1	Correction of note No.8.
1	12572108H-A-R1	January 22, 2019	P.4	SECTION 1: Addition of note.
1	12572108H-A-R1	January 22, 2019	P.4	SECTION 2.1: Addition of note for Receipt Date of Sample.
1	12572108H-A-R1	January 22, 2019	P. 8, 9	- Correction of Configuration and peripherals - Addition of Non-Standard Ferrite Core information

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SECTION 1: Customer information

Company Name	:	Mitsubishi Electric Corporation Kyoto works
Address	:	1 Zusho Baba Nagaokakyo Kyoto, 617-8550 Japan
Telephone Number	:	+81-75-958-3120
Facsimile Number	:	+81-75-958-3728
Contact Person	:	Haruo Kobayashi

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No. on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

* The laboratory is exempted from liability of any test results affected from the information in SECTION 2 and 4.

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	LED UNIT
Model No.	:	VS-12NP180F VS-12NP180FD
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	AC 100 V - 120 V, 50 / 60 Hz AC 220 V - 240 V, 50 / 60 Hz
Receipt Date of Sample (Information from test lab.)	:	December 13, 2018
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: VS-12NP180F and VS-12NP180FD (referred to as the EUT in this report) are LED UNITs.

Feature of EUT:
Clock frequency(ies) in the system : 148.5 MHz (max.)

There are 12 models in the LED UNITs, VS-12NP180F, VS-12NP180F1, VS-12NP180R, VS-12NP180R1, VS-12NP180FH, VS-12NP180FH1, VS-12NP180RH, VS-12NP180RH1, VS-12NP180FD, VS-12NP180FD1, VS-12NP180RD, VS-12NP180RD1.
They have only minor mechanical difference that does not affect the EMC performance.
Under such condition, the EMC performance has been evaluated with the representative models, VS-12NP180F and VS-12NP180FD.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification	:	FCC Part 15 Subpart B
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2014 7. AC power - line conducted emission measurements	Class A	N/A	VS-12NP180F **[QP]** 20.3 dB 0.19274 MHz, L, Mode 1 **[AV]** 11.4 dB 0.19274 MHz, L, Mode 1 VS-12NP180FD **[QP]** 21.6 dB 0.19528 MHz, N, Mode 1 **[AV]** 13.5 dB 0.19528 MHz, N, Mode 1	Complied a)
Radiated emission	ANSI C63.4: 2014 8. Radiated emission measurements	Class A	N/A	VS-12NP180F 2.1 dB 55.766 MHz, Vertical, Mode 1 VS-12NP180FD 4.0 dB 55.366 MHz, Vertical, Mode 1	Complied# b)
*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420. a) Refer to APPENDIX 1 (data of Conducted emission) b) Refer to APPENDIX 1 (data of Radiated emission)					
Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.					

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k = 2$.

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.8 dB
	0.15 MHz to 30 MHz	3.4 dB

Radiated emission

Measurement distance	Frequency range		Uncertainty (+/-)
10 m	30 MHz to 200 MHz	(Horizontal)	4.8 dB
		(Vertical)	4.9 dB
	200 MHz to 1000 MHz	(Horizontal)	5.0 dB
		(Vertical)	5.0 dB
10 m	1 GHz to 18 GHz		5.2 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

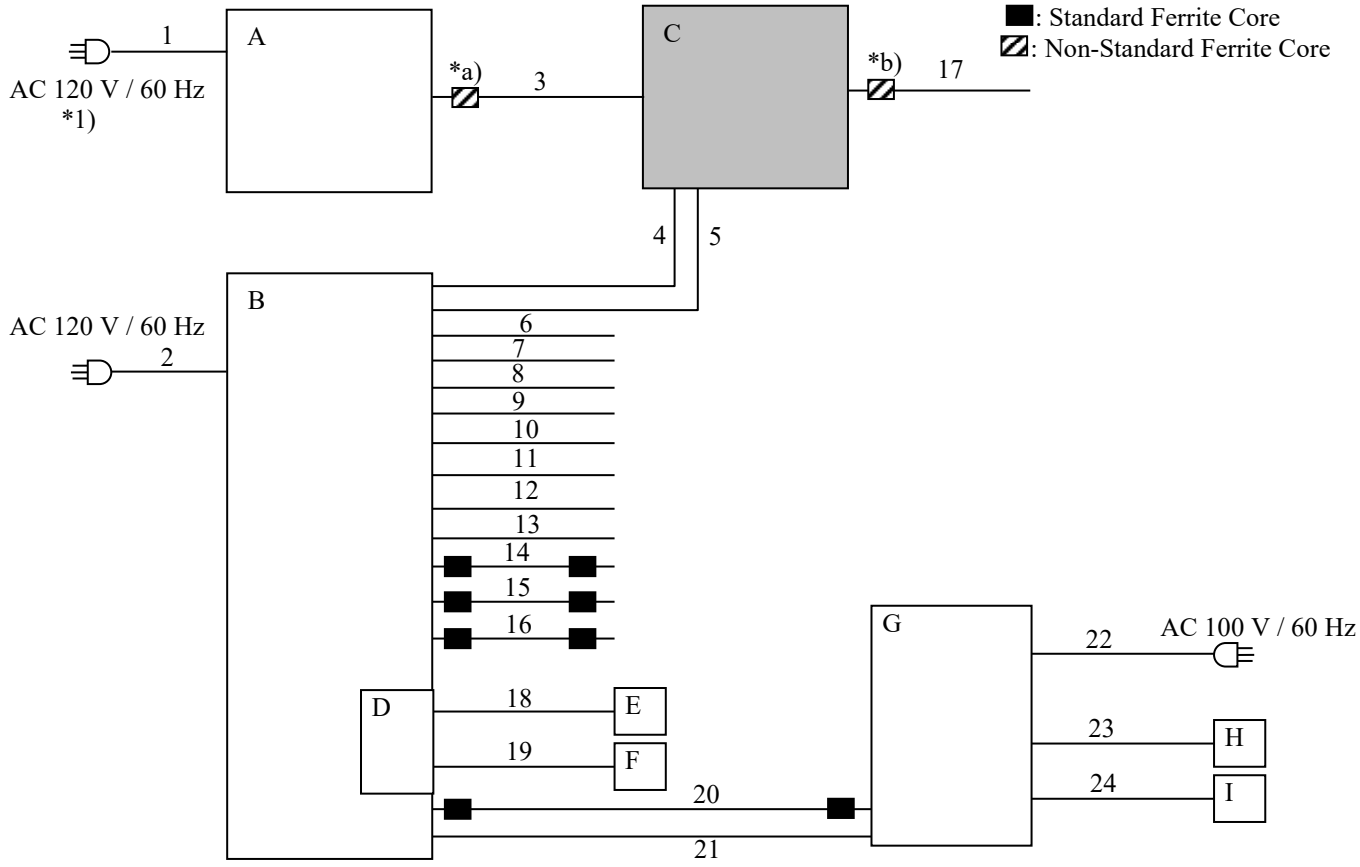
4.1 Operating modes

The mode(s) : 1. DVI Input 1

Justification : The system was configured in typical fashion (as a user would normally use it) for testing.

4.2 Configuration and peripherals

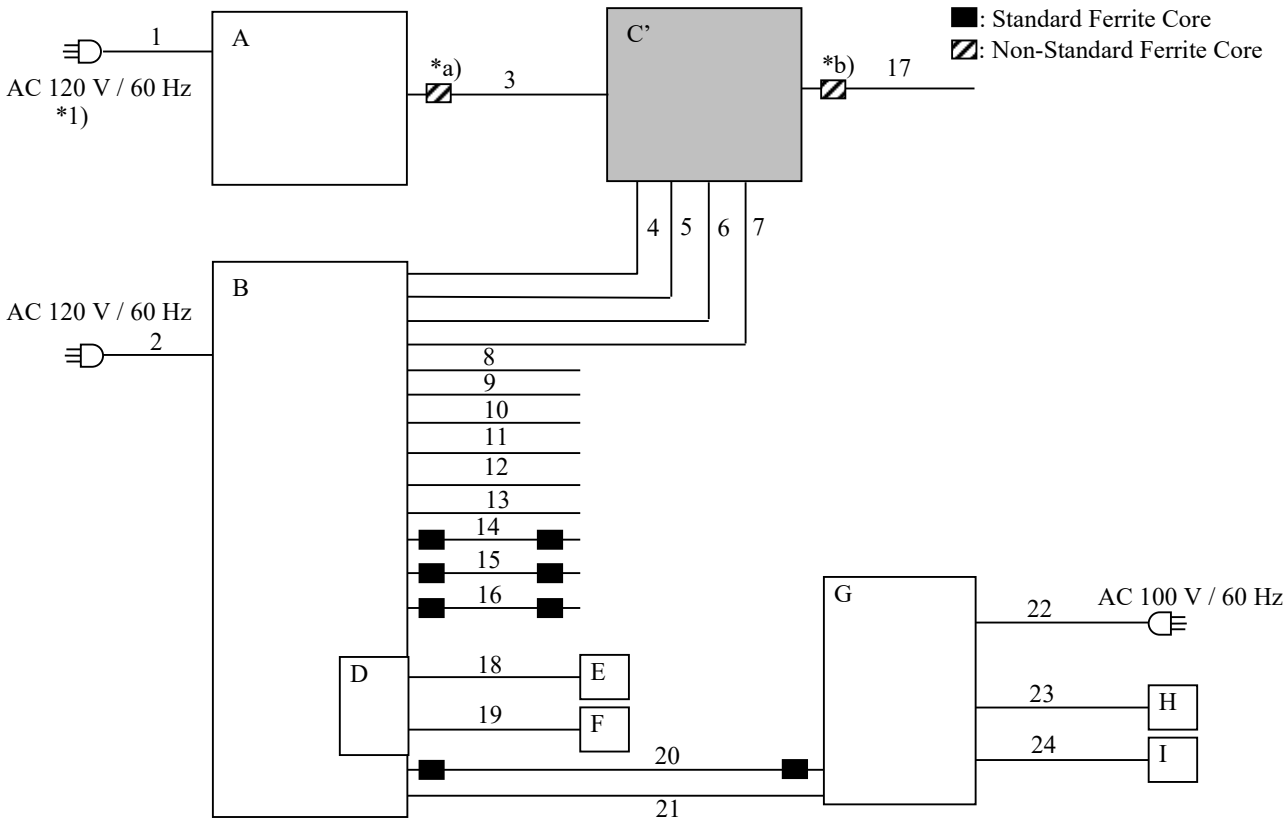
VS-12NP180F



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.
*1) Conducted emission test was performed on AC input port of ADAPTER since AC power of LED UNIT is supplied from ADAPTER.

<Notes for Ferrite cores>
*a) 1 Ferrite Core, Model No. NFT-10 (Manufacturer: TKK), 12 cm from Item A, 1 turn
*b) 1 Ferrite Core, Model No. NFT-10 (Manufacturer: TKK), 12 cm from Item C, 1 turn

VS-12NP180FD



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.
*1) Conducted emission test was performed on AC input port of ADAPTER since AC power of LED UNIT is supplied from ADAPTER.

<Notes for Ferrite cores>
*a) 1 Ferrite Core, Model No. NFT-10 (Manufacturer: TKK), 12 cm from Item A, 1 turn
*b) 1 Ferrite Core, Model No. NFT-10 (Manufacturer: TKK), 12 cm from Item C', 1 turn

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	ADAPTER	S-NP18ACS	0000009	Mitsubishi Electric Corporation Kyoto works	-
B	CONTROL UNIT	VC-NP1000	6001047	Mitsubishi Electric Corporation Kyoto works	-
C	LED UNIT	VS-12NP180F	0800008	Mitsubishi Electric Corporation Kyoto works	EUT
C'	LED UNIT	VS-12NP180FD	0800002	Mitsubishi Electric Corporation Kyoto works	EUT
D	OPS PC	DS280GB1701E-T	KSE0090252	ADVANTECH CO LTD	-
E	Keyboard	KU-1156	BDMJA0CGA	Hewlett-Packard Company	-
F	Mouse	265988-007	F5320B0N3WJ0066	Hewlett-Packard Company	-
G	PC	EW315AV	JPA74805VW	Hewlett-Packard Company	-
H	Keyboard	KB-0316	BC3480CGAV5354	Hewlett-Packard Company	-
I	Mouse	334684-003	F93AA0AN3V301BB	Hewlett-Packard Company	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Power Cable	2.9	Unshielded	Unshielded	3 wires
2	AC Power Cable	2.9	Unshielded	Unshielded	3 wires
3	AC Power Cable	0.8	Unshielded	Unshielded	3 wires
4	LAN Cable	2.0	Shielded	Shielded	-
5	LAN Cable	2.0	Shielded	Shielded	-
6	LAN Cable	2.0	Shielded	Shielded	-
7	LAN Cable	2.0	Shielded	Shielded	-
8	LAN Cable	2.0	Shielded	Shielded	-
9	LAN Cable	2.0	Shielded	Shielded	-
10	LAN Cable	2.0	Shielded	Shielded	-
11	LAN Cable	2.0	Shielded	Shielded	-
12	LAN Cable	2.0	Shielded	Shielded	-
13	LAN Cable	2.0	Shielded	Shielded	-
14	Control Cable	2.9	Shielded	Shielded	-
15	Control Cable	2.9	Shielded	Shielded	-
16	DVI Cable	1.9	Shielded	Shielded	-
17	AC Power Cable	0.8	Unshielded	UnsShielded	3 wires
18	Keyboard Cable	1.7	Shielded	Shielded	-
19	Mouse Cable	1.8	Shielded	Shielded	-
20	DVI Cable	1.9	Shielded	Shielded	-
21	LAN Cable	1.9	Unshielded	Unshielded	-
22	AC Power Cable	1.9	Unshielded	Unshielded	3 wires
23	Keyboard Cable	1.7	Shielded	Shielded	-
24	Mouse Cable	1.7	Shielded	Shielded	-

SECTION 5: Conducted Emission

5.1 Operating environment

Test place: No.3 semi anechoic chamber
Temperature: See data
Humidity: See data

5.2 Test configuration

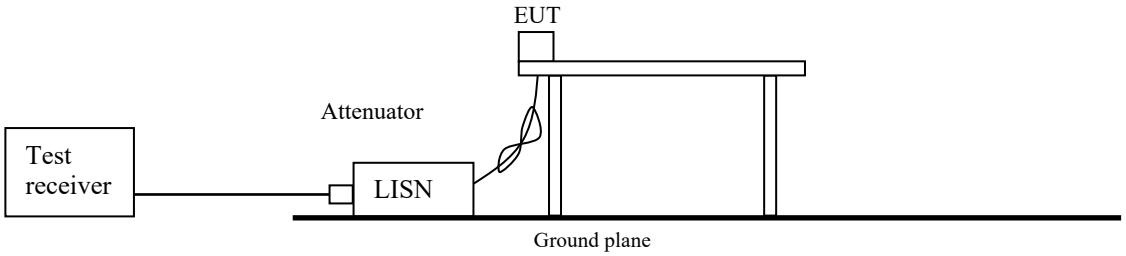
EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from the LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the other peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/AMN to the input power source. All unused 50 ohm connectors of the LISN/AMN were resistivity terminated in 50 ohm when not connected to the measuring equipment.
Photographs of the set up are shown in Appendix 3.

Frequency range : 0.15 MHz - 30 MHz
EUT position : Table top
EUT operation mode : See Clause 4.1

5.3 Test procedure

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a semi anechoic chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains network (AMN). An overview sweep with peak detection has been performed. The measurements have been performed with a quasi-peak detector and if required, with an average detector.
The conducted emission measurements were made with the following detector function of the test receiver.
Detector Type : Quasi-Peak and CISPR AV
IF Bandwidth : 9 kHz

Figure 1: Test Setup



5.4 Test result

Summary of the test results: Pass
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Date: December 18, 2018 Test engineer: Masaya Minami

SECTION 6: Radiated Emission

6.1 Operating environment

Test place: No.1 semi anechoic chamber
Temperature: See data
Humidity: See data

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The EUT was set on the edge of the tabletop.
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.
Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

Frequency range : 30 MHz - 200 MHz (Biconical antenna) / 200 MHz - 1000 MHz (Logperiodic antenna)
1000 MHz - 2000 MHz (Horn antenna)
Test distance : 10 m
EUT position : Table top
EUT operation mode : See Clause 4.1

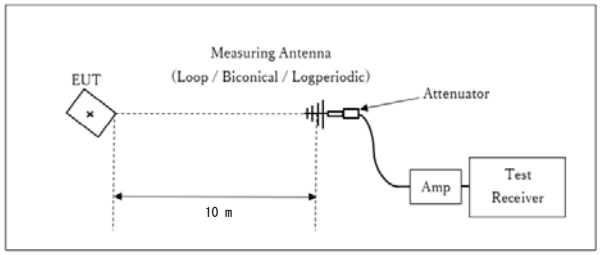
6.4 Test procedure

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver.
The radiated emission measurements were made with the following detector function of the Test Receiver.

Frequency	Below 1GHz	Above 1GHz *1)
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CISPR AV: BW 1 MHz

Figure 2: Test Setup

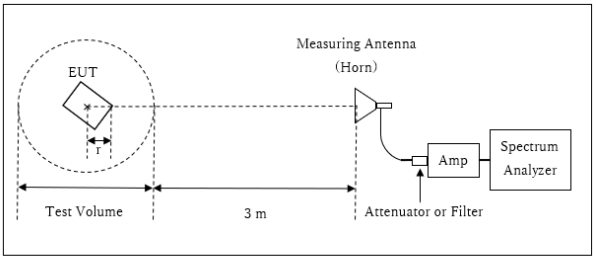
Below 1 GHz



× : Center of turn table

Test Distance: 10 m

1 GHz - 2 GHz



r : Radius of an outer periphery of EUT
× : Center of turn table

*1) Distance Factor: 20 x log (3.3 m / 10.0 m) = -9.63 dB
* Test Distance: (3 + Test Volume /2) - r = 3.3 m

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.7 m

The test was made on EUT at the normal use position.

6.5 Test result

Summary of the test results: Pass

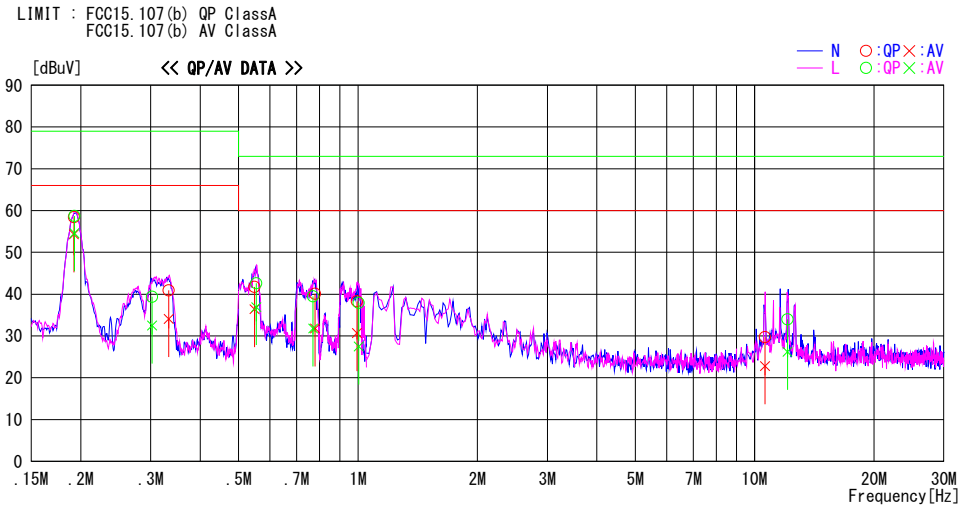
*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Date: December 17, 2018 Test engineer: Masaya Minami (Below 1 GHz)
Date: December 18, 2018 Test engineer: Toshifumi Yoneshige (Above 1 GHz)

APPENDIX 1: Test data

Conducted Emission
(VS-12NP180F)

Report No.	12572108H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	December 18, 2018
Temperature / Humidity	22 deg. C / 41 % RH
Engineer	Masaya Minami
Mode	Mode 1

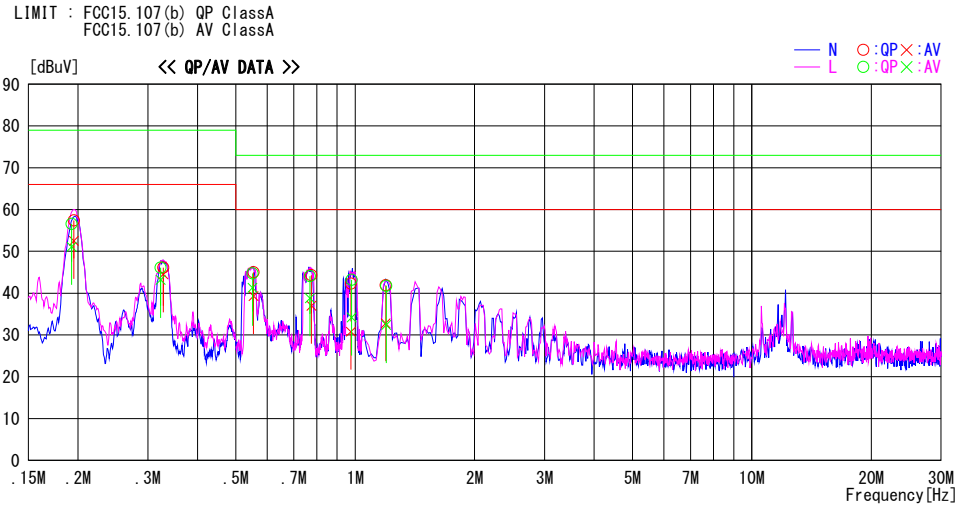


Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase
	QP	AV	Factor	QP	AV	QP	AV	QP	AV	
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
0.19214	45.1	41.0	13.3	58.4	54.3	79.0	66.0	20.6	11.7	N
0.33326	27.6	20.8	13.3	40.9	34.1	79.0	66.0	38.1	31.9	N
0.54826	28.4	23.1	13.3	41.7	36.4	73.0	60.0	31.3	23.6	N
0.77866	26.8	18.5	13.3	40.1	31.8	73.0	60.0	32.9	28.2	N
0.99371	25.0	17.4	13.3	38.3	30.7	73.0	60.0	34.7	29.3	N
10.62092	15.8	8.9	13.9	29.7	22.8	73.0	60.0	43.3	37.2	N
0.19274	45.4	41.3	13.3	58.7	54.6	79.0	66.0	20.3	11.4	L
0.30261	26.1	19.2	13.3	39.4	32.5	79.0	66.0	39.6	33.5	L
0.55385	29.3	23.6	13.3	42.6	36.9	73.0	60.0	30.4	23.1	L
0.77029	26.2	18.5	13.3	39.5	31.8	73.0	60.0	33.5	28.2	L
1.00442	24.6	14.2	13.3	37.9	27.5	73.0	60.0	35.1	32.5	L
12.09609	20.0	12.2	14.0	34.0	26.2	73.0	60.0	39.0	33.8	L

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Conducted Emission
(VS-12NP180FD)

Report No.	12572108H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	December 18, 2018
Temperature / Humidity	22 deg. C / 41 % RH
Engineer	Masaya Minami
Mode	Mode 1

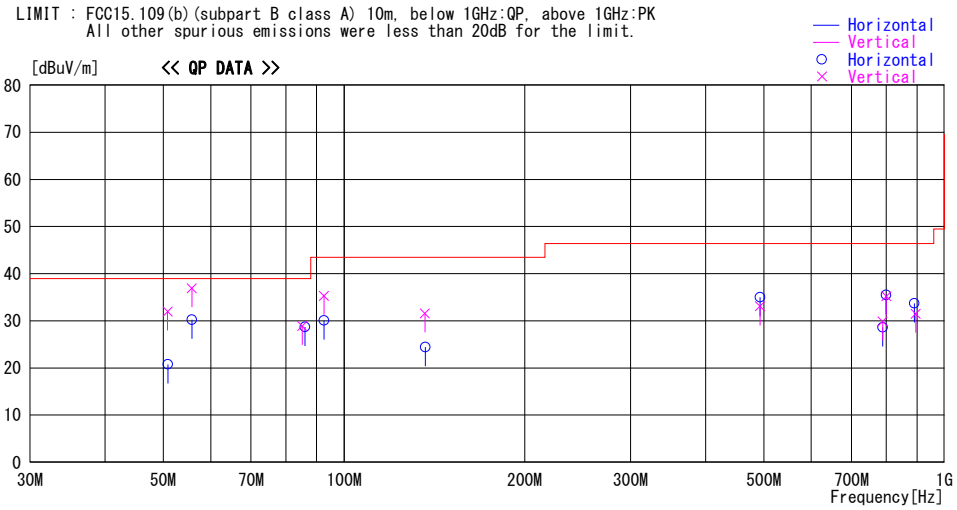


Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase
	QP	AV	Factor	QP	AV	QP	AV	QP	AV	
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
0.19528	44.1	39.2	13.3	57.4	52.5	79.0	66.0	21.6	13.5	N
0.32825	32.8	31.2	13.3	46.1	44.5	79.0	66.0	32.9	21.5	N
0.55385	31.7	26.0	13.3	45.0	39.3	73.0	60.0	28.0	20.7	N
0.77546	31.0	23.7	13.3	44.3	37.0	73.0	60.0	28.7	23.0	N
0.97484	29.0	17.5	13.3	42.3	30.8	73.0	60.0	30.7	29.2	N
1.19339	28.5	19.4	13.4	41.9	32.8	73.0	60.0	31.1	27.2	N
0.19279	43.3	37.8	13.3	56.6	51.1	79.0	66.0	22.4	14.9	L
0.32325	32.8	29.9	13.3	46.1	43.2	79.0	66.0	32.9	22.8	L
0.55085	31.4	28.0	13.3	44.7	41.3	73.0	60.0	28.3	18.7	L
0.76885	30.8	25.5	13.3	44.1	38.8	73.0	60.0	28.9	21.2	L
0.97908	29.9	20.9	13.3	43.2	34.2	73.0	60.0	29.8	25.8	L
1.19723	28.3	19.0	13.4	41.7	32.4	73.0	60.0	31.3	27.6	L

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Radiated Emission
(VS-12NP180F)

Report No.	12572108H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 17, 2018
Temperature / Humidity	20 deg. C / 39 % RH
Engineer	Masaya Minami (Below 1 GHz)
Mode	Mode 1



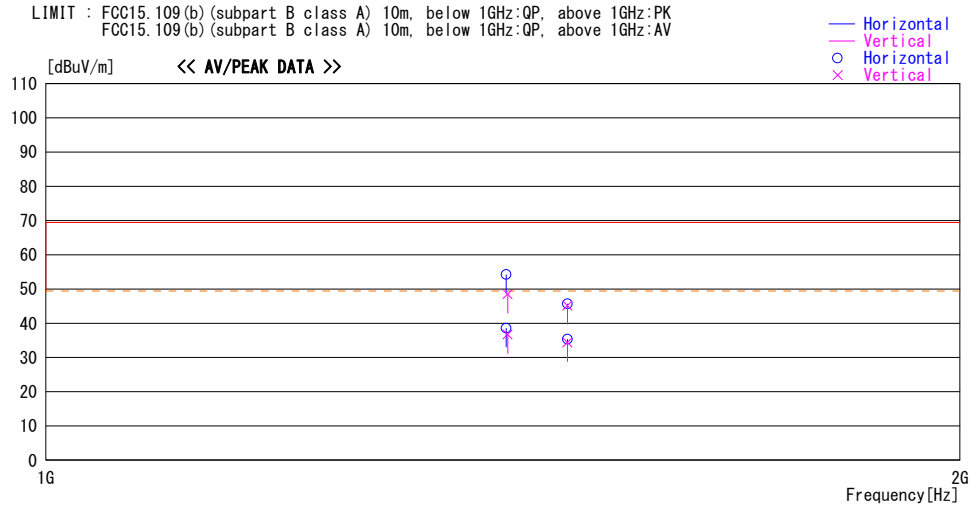
Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
50.835	52.5	QP	10.6	-31.1	32.0	0	100	Vert.	39.0	7.0
50.892	41.3	QP	10.6	-31.1	20.8	0	400	Hori.	39.0	18.2
55.760	52.3	QP	8.9	-31.0	30.2	0	400	Hori.	39.0	8.8
55.766	59.0	QP	8.9	-31.0	36.9	1	100	Vert.	39.0	2.1
86.035	51.5	QP	7.7	-30.5	28.7	0	400	Hori.	39.0	10.3
85.220	52.0	QP	7.5	-30.6	28.9	64	213	Vert.	39.0	10.1
92.635	51.7	QP	8.8	-30.4	30.1	1	400	Hori.	43.5	13.4
92.611	57.0	QP	8.7	-30.4	35.3	112	100	Vert.	43.5	8.2
136.341	47.5	QP	14.1	-30.0	31.6	234	100	Vert.	43.5	11.9
136.562	40.3	QP	14.1	-30.0	24.4	297	400	Hori.	43.5	19.1
492.800	43.6	QP	17.8	-26.4	35.0	213	162	Hori.	46.4	11.4
492.801	41.7	QP	17.8	-26.4	33.1	7	223	Vert.	46.4	13.3
788.930	32.1	QP	20.7	-24.2	28.6	142	151	Hori.	46.4	17.8
788.932	33.4	QP	20.7	-24.2	29.9	186	206	Vert.	46.4	16.5
800.000	38.8	QP	20.8	-24.1	35.5	210	100	Hori.	46.4	10.9
800.000	38.5	QP	20.8	-24.1	35.2	185	184	Vert.	46.4	11.2
891.000	35.2	QP	22.0	-23.5	33.7	150	262	Hori.	46.4	12.7
895.600	33.0	QP	22.0	-23.5	31.5	191	141	Vert.	46.4	14.9

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-200MHz: BICONICAL, 200-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE + ATT - GAIN(AMP))

Radiated emission

(VS-12NP180F)

Report No.	12572108H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 18, 2018
Temperature / Humidity	22 deg. C / 41 % RH
Engineer	Toshifumi Yoneshige (Above 1 GHz)
Mode	Mode 1



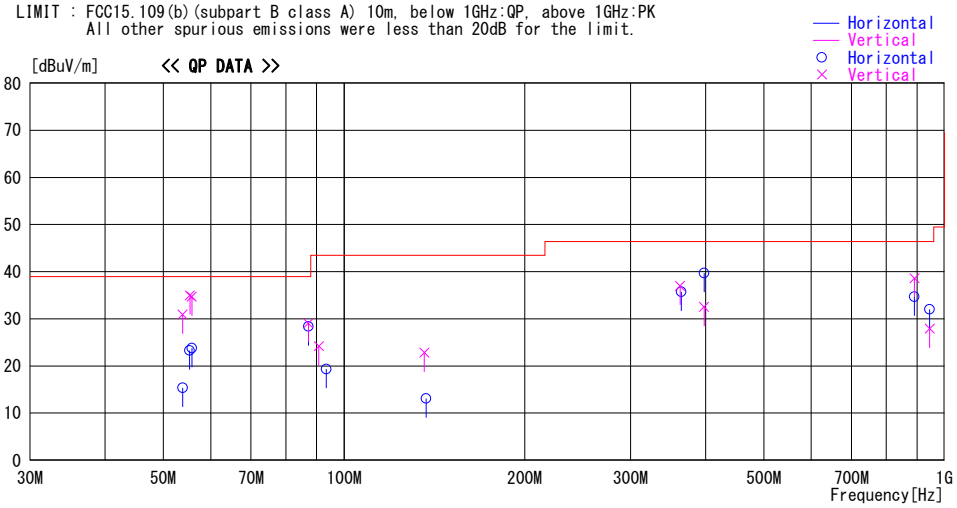
Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
1417.692	57.4	AV	25.9	-44.7	38.6	86	100	Hori.	49.5	10.9
1417.692	73.0	PK	25.9	-44.7	54.2	86	100	Hori.	69.5	15.3
1419.247	55.5	AV	25.9	-44.7	36.7	131	100	Vert.	49.5	12.8
1419.247	67.3	PK	25.9	-44.7	48.5	131	100	Vert.	69.5	21.0
1484.999	64.6	PK	25.2	-44.6	45.2	182	100	Vert.	69.5	24.3
1484.999	53.8	AV	25.2	-44.6	34.4	182	100	Vert.	49.5	15.1
1485.000	54.8	AV	25.2	-44.6	35.4	218	100	Hori.	49.5	14.1
1485.000	65.1	PK	25.2	-44.6	45.7	218	100	Hori.	69.5	23.8

CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE - GAIN(AMP) + D-factor)

Radiated Emission

(VS-12NP180FD)

Report No.	12572108H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 17, 2018
Temperature / Humidity	20 deg. C / 39 % RH
Engineer	Masaya Minami (Below 1 GHz)
Mode	Mode 1



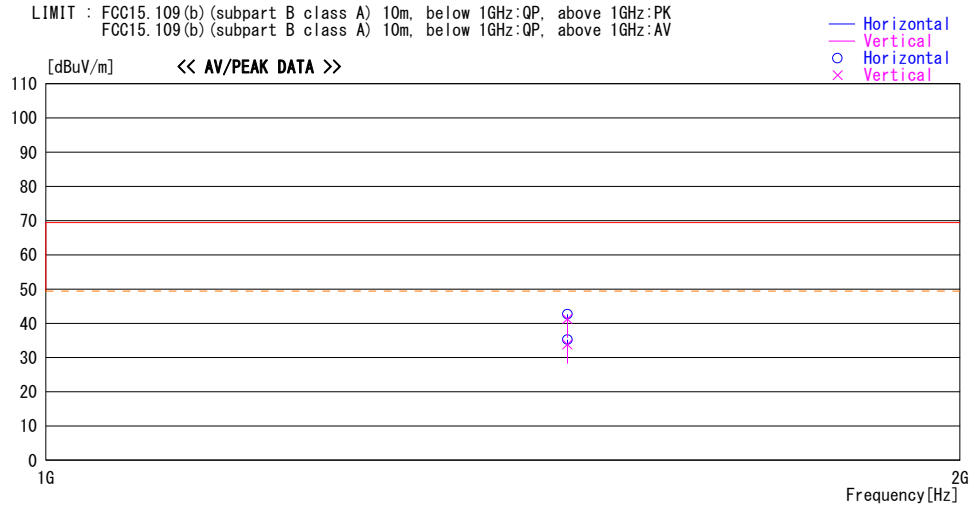
Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
53.848	52.5	QP	9.5	-31.1	30.9	0	100	Vert.	39.0	8.1
53.846	37.0	QP	9.5	-31.1	15.4	0	400	Hori.	39.0	23.6
55.336	45.3	QP	9.1	-31.1	23.3	0	400	Hori.	39.0	15.7
55.366	57.0	QP	9.1	-31.1	35.0	1	100	Vert.	39.0	4.0
55.774	56.8	QP	8.9	-31.0	34.7	4	100	Vert.	39.0	4.3
55.772	45.9	QP	8.9	-31.0	23.8	3	400	Hori.	39.0	15.2
87.224	51.7	QP	7.9	-30.5	29.1	85	100	Vert.	39.0	9.9
87.231	51.0	QP	7.9	-30.5	28.4	359	400	Hori.	39.0	10.6
90.789	46.3	QP	8.4	-30.5	24.2	72	100	Vert.	43.5	19.3
93.436	40.8	QP	8.9	-30.4	19.3	314	400	Hori.	43.5	24.2
136.023	38.8	QP	14.0	-30.0	22.8	0	100	Vert.	43.5	20.7
136.889	29.0	QP	14.1	-30.0	13.1	5	400	Hori.	43.5	30.4
362.693	49.4	QP	15.0	-27.4	37.0	334	100	Vert.	46.4	9.4
364.310	48.1	QP	15.0	-27.4	35.7	21	154	Hori.	46.4	10.7
397.800	44.1	QP	15.6	-27.2	32.5	314	256	Vert.	46.4	13.9
397.800	51.3	QP	15.6	-27.2	39.7	22	143	Hori.	46.4	6.7
891.000	36.2	QP	22.0	-23.5	34.7	133	100	Hori.	46.4	11.7
891.000	40.1	QP	22.0	-23.5	38.6	170	150	Vert.	46.4	7.8
945.000	33.1	QP	21.9	-23.0	32.0	130	100	Hori.	46.4	14.4
945.000	29.0	QP	21.9	-23.0	27.9	192	212	Vert.	46.4	18.5

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-200MHz: BICONICAL, 200-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE + ATT - GAIN(AMP))

Radiated emission

(VS-12NP180FD)

Report No.	12572108H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 18, 2018
Temperature / Humidity	22 deg. C / 41 % RH
Engineer	Toshifumi Yoneshige
	(Above 1 GHz)
Mode	Mode 1



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
1484.998	60.7	PK	25.2	-44.6	41.3	184	100	Vert.	69.5	28.2
1484.998	53.2	AV	25.2	-44.6	33.8	184	100	Vert.	49.5	15.7
1485.003	62.1	PK	25.2	-44.6	42.7	217	100	Hori.	69.5	26.8
1485.003	54.6	AV	25.2	-44.6	35.2	217	100	Hori.	49.5	14.3

CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE - GAIN(AMP) + D-factor)

APPENDIX 2: Test instruments

EMI test equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/05/2018	11/30/2019	12
RE	141566	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	01/24/2018	01/31/2019	12
RE	141350	Coaxial Cable	Suhner/storm/Agilent/ TSJ	-	-	06/04/2018	06/30/2019	12
RE	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/21/2018	08/31/2019	12
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/15/2018	06/30/2019	12
RE/CE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	141264	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-189	06/01/2018	06/30/2019	12
RE	142226	Measure	KOMELON	KMC-36	-	-	-	-
RE	141585	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	02/19/2018	02/28/2019	12
RE	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/18/2018	06/30/2020	24
CE	141247	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/06/2018	12/31/2019	12
CE	141216	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM14/ sucoform141-PE/ 421-010	-/00640	07/03/2018	07/31/2019	12
CE	141532	DIGITAL HiTESTER	HIOKI	3805	51201197	01/09/2018	01/31/2019	12
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	07/24/2018	07/31/2019	12
CE	141358	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	07/25/2018	07/31/2019	12
CE	142183	Measure	KOMELON	KMC-36	-	-	-	-
CE	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/26/2018	06/30/2020	24
CE	141927	Terminator	TME	CT-01	-	10/26/2018	10/31/2019	12
CE	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/06/2018	08/31/2019	12
CE	141554	Thermo-Hygrometer	CUSTOM	CTH-180	1301	01/24/2018	01/31/2019	12
RE	141994	AC1_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 10m	DA-06881	04/04/2018	04/30/2019	12
RE	141511	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	06/04/2018	06/30/2019	12
RE	141510	Horn Antenna 18-26.5GHz	EMCO	3160-09	1266	06/06/2018	06/30/2019	12
RE	141393	Microwave Cable	Junkosha	MWX221	1604S254(1 m) / 1608S088(5 m)	08/08/2018	08/31/2019	12
RE	141576	Pre Amplifier	AGILENT	8449B	3008A01671	02/16/2018	02/28/2019	12
RE	141198	Biconical Antenna	Schwarzbeck	BBA9106	2513	06/01/2018	06/30/2019	12

***Hyphens for Last Calibration Date, Calibration Due Date and Cal Int are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item:

CE: Conducted emission
RE: Radiated emission