EMI TEST REPORT

Test Report No. : 12969247H-A-R1

Applicant	:	**Mitsubishi Electric Corporation Kyoto works**
Type of Equipment	:	**LED UNIT**
Model No.	:	**VS-12NP160F** **VS-12NP160FD**
FCC ID	:	**2APT9DWVS-12NP160**
Test regulation	:	**FCC Part 15 Subpart B: 2019 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 12969247H-A. 12969247H-A is replaced with this report.

Date of test: September 7 and 8, 2019

Representative test engineer:
Hiroyuki Furutaka
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.: 12969247H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12969247H-A	September 30, 2019	-	-
1	12969247H-A-R1	October 9, 2019	P. 6	Correction of model number (Radiated emission) from VS-12NP180F to VS-12NP160F
1	12969247H-A-R1	October 9, 2019	P. 6	Correction of Worst margin of VS-12NP160FD
1	12969247H-A-R1	October 9, 2019	P. 15, 18 of original test report	Deletion of test data.
1	12969247H-A-R1	October 9, 2019	P. 26, 28 of original test report	Deletion of Test setup photo.

Reference: Abbreviations (Including words undescribed in this report)

AAN	Asymmetric Artificial Network
AC	Alternating Current
AM	Amplitude Modulation
AMN	Artificial Mains Network
Amp, AMP	Amplifier
ANSI	American National Standards Institute
Ant, ANT	Antenna
AP	Access Point
ASK	Amplitude Shift Keying
Atten., ATT	Attenuator
AV	Average
BPSK	Binary Phase-Shift Keying
BR	Bluetooth Basic Rate
BT	Bluetooth
BT LE	Bluetooth Low Energy
BW	BandWidth
C.F	Correction Factor
Cal Int	Calibration Interval
CAV	CISPR AV
CCK	Complementary Code Keying
CDN	Coupling Decoupling Network
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
Corr.	Correction
CPE	Customer premise equipment
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
DET	Detector
D-factor	Distance factor
Dmax	maximum absolute voltage change during an observation period
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
EDR	Enhanced Data Rate
e.i.r.p., EIRP	Equivalent Isotropically Radiated Power
EM clamp	Electromagnetic clamp
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EMS	ElectroMagnetic Susceptibility
EN	European Norm
e.r.p., ERP	Effective Radiated Power
EU	European Union
EUT	Equipment Under Test
Fac.	Factor
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
Freq.	Frequency
FSK	Frequency Shift Keying
Fund	Fundamental
FWD	Forward
GFSK	Gaussian Frequency-Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hori.	Horizontal
ICES	Interference-Causing Equipment Standard
I/O	Input/Output
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
ILAC	International Laboratory Accreditation Conference
ISED	Innovation, Science and Economic Development Canada
ISN	Impedance Stabilization Network
ISO	International Organization for Standardization
JAB	Japan Accreditation Board
LAN	Local Area Network
LCL	Longitudinal Conversion Loss
LIMS	Laboratory Information Management System
LISN	Line Impedance Stabilization Network
MRA	Mutual Recognition Arrangement
N/A	Not Applicable
NIST	National Institute of Standards and Technology
NS	No signal detect.
NSA	Normalized Site Attenuation
NVLAP	National Voluntary Laboratory Accreditation Program
OBW	Occupied Band Width
OFDM	Orthogonal Frequency Division Multiplexing
PK	Peak
P_{LT}	long-term flicker severity
POHC(A)	Partial Odd Harmonic Current
Pol., Pola.	Polarization
PR-ASK	Phase Reversal ASK
P_{ST}	short-term flicker severity
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadri-Phase Shift Keying
r.m.s., RMS	Root Mean Square
RBW	Resolution Band Width
RE	Radio Equipment
REV	Reverse
RF	Radio Frequency
RFID	Radio Frequency Identifier
RSS	Radio Standards Specifications
Rx	Receiving
SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
S/N	Signal to Noise ratio
SA, S/A	Spectrum Analyzer
SG	Signal Generator
SVSWR	Site-Voltage Standing Wave Ratio
THC(A)	Total Harmonic Current
THD(%)	Total Harmonic Distortion
TR	Test Receiver
Tx	Transmitting
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN
xDSL	Generic term for all types of DSL technology (DSL: Digital Subscriber Line)

CONTENTS **PAGE**

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. FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the 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 above 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-12NP160F VS-12NP160FD
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 48 V
Receipt Date of Sample	:	September 3, 2019
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-12NP160F and VS-12NP160FD (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 6 models in the LED UNITs, VS-12NP160F, VS-12NP160F1, VS-12NP160FH, VS-12NP160FH1, VS-12NP160FD, VS-12NP160FD1.
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-12NP160F and VS-12NP160FD.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification	:	FCC Part 15 Subpart B FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result	Remarks
Conducted emission	ANSI C63.4: 2014 7. AC power - line conducted emission measurements	Class A	N/A	VS-12NP160F 10.49 dB 0.16566 MHz, N, Power Unit (A side) VS-12NP160FD 9.49 dB 0.16479 MHz, N, Power Unit (A side)	Complied a)	*1)
Radiated emission	ANSI C63.4: 2014 8. Radiated emission measurements	Class A	N/A	VS-12NP160F 3.41 dB 62.394 MHz, Vertical VS-12NP160FD 5.56 dB 394.590 MHz, Vertical	Complied# b)	*2)
*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 (+/-)
3 m	30 MHz to 200 MHz	(Horizontal)	4.8 dB
		(Vertical)	5.0 dB
	200 MHz to 1000 MHz	(Horizontal)	5.2 dB
		(Vertical)	6.3 dB
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
3 m	1 GHz to 6 GHz		5.0 dB
	6 GHz to 18 GHz		5.3 dB
1 m	10 GHz to 26.5 GHz		5.8 dB
	26.5 GHz to 40 GHz		5.8 dB
10 m	1 GHz to 18 GHz		5.2 dB

3.5 Test Location

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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

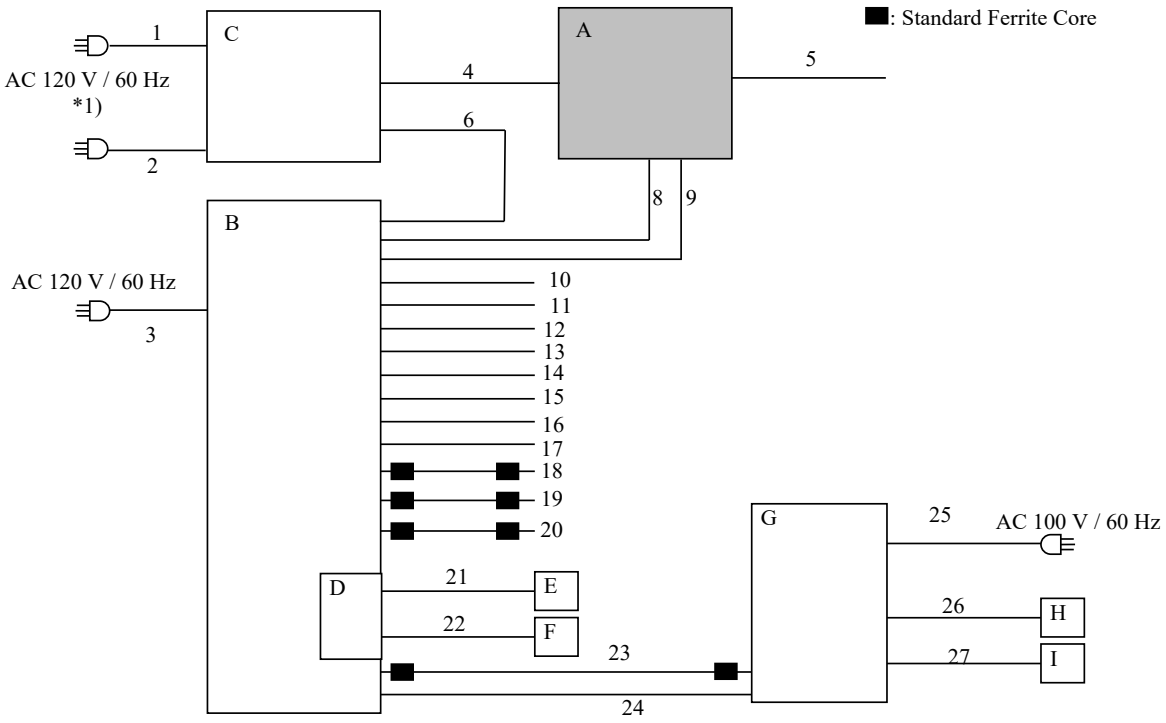
4.1 Operating modes

The mode(s) : 1. DVI Input 1

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

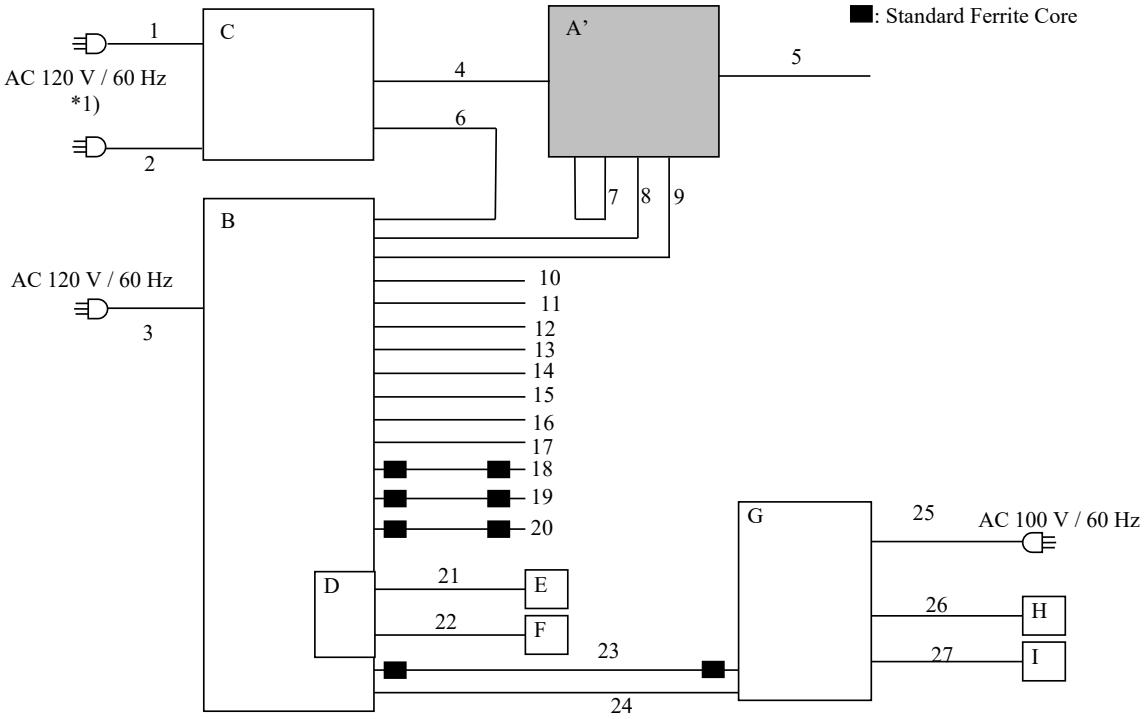
4.2 Configuration and peripherals

VS-12NP160F



*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 POWER UNIT since AC power of LED UNIT is supplied from POWER UNIT.

VS-12NP160FD



*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 POWER UNIT since AC power of LED UNIT is supplied from POWER UNIT.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	LED UNIT	VS-12NP160F	05M0006	Mitsubishi Electric Corporation Kyoto works	EUT
A'	LED UNIT	VS-12NP160FD	05M0004	Mitsubishi Electric Corporation Kyoto works	EUT
B	CONTROL UNIT	VC-NP1000	6001047	Mitsubishi Electric Corporation Kyoto works	-
C	POWER UNIT	S-NP15PWR	6001143	Mitsubishi Electric Corporation Kyoto works	-
D	OPS PC	DS-280	KSA2496510	ADVANTECH	-
E	Keyboard	KU-1156	BDMJA0CGA5X1HQ	Hewlett-Packard Company	-
F	Mouse	600554-002	FCGLK0D5B2RGHP	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	3.0	Unshielded	Unshielded	-
2	AC Power Cable	3.0	Unshielded	Unshielded	-
3	AC Power Cable	3.0	Unshielded	Unshielded	-
4	DC Power Cable	2.2	Unshielded	Unshielded	
5	DC Power Cable	1.0	Unshielded	Unshielded	
6	LAN Cable	3.0	Unhielded	Unhielded	-
7	LAN Cable	2.0	Shielded	Shielded	Model: VS-12NP160FD only
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	LAN Cable	2.0	Shielded	Shielded	-
15	LAN Cable	2.0	Shielded	Shielded	-
16	LAN Cable	2.0	Shielded	Shielded	-
17	LAN Cable	2.0	Shielded	Shielded	-
18	Control Cable	5.0	Shielded	Shielded	-
19	Control Cable	5.0	Shielded	Shielded	-
20	DVI Cable	1.5	Shielded	Shielded	-
21	Keyboard Cable	1.7	Shielded	Shielded	-
22	Mouse Cable	1.8	Shielded	Shielded	-
23	DVI Cable	1.5	Shielded	Shielded	-
24	LAN Cable	1.9	Unshielded	Unshielded	-
25	AC Power Cable	1.9	Unshielded	Unshielded	-
26	Keyboard Cable	1.7	Shielded	Shielded	-
27	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

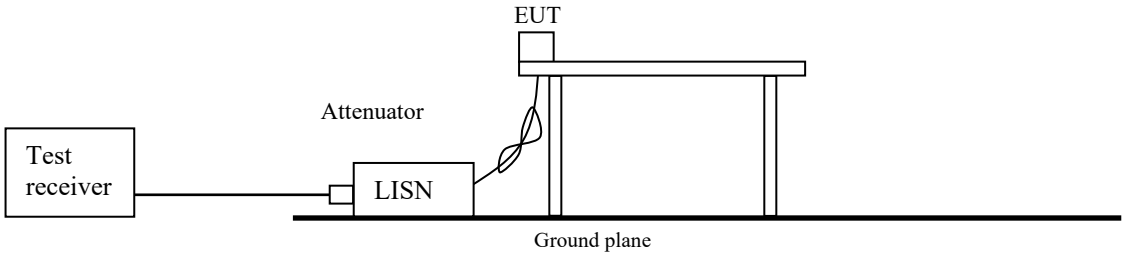
EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop 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: September 7 and 8, 2019 Test engineer: Hiroyuki Furutaka

SECTION 6: Radiated Emission

6.1 Operating environment

Test place: No.1 and 3 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 (Below 1 GHz) / 3 m (Above 1 GHz)
EUT position : Table top
EUT operation mode : See Clause 4.1

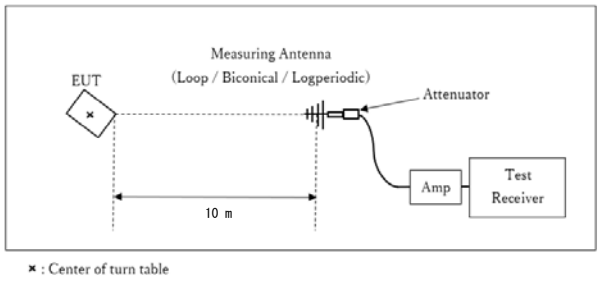
6.4 Test procedure

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

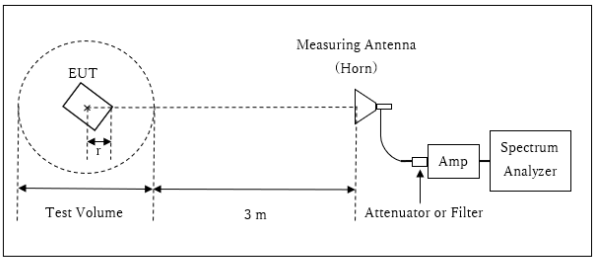
Below 1 GHz



× : 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 (3.10 m / 10.0 m) = -10.17 dB
* Test Distance: (3 + Test Volume /2) - r = 3.10 m

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.9 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: September 7, 2019 Test engineer: Hiroyuki Furutaka
Date: September 8, 2019 Test engineer: Takafumi Noguchi

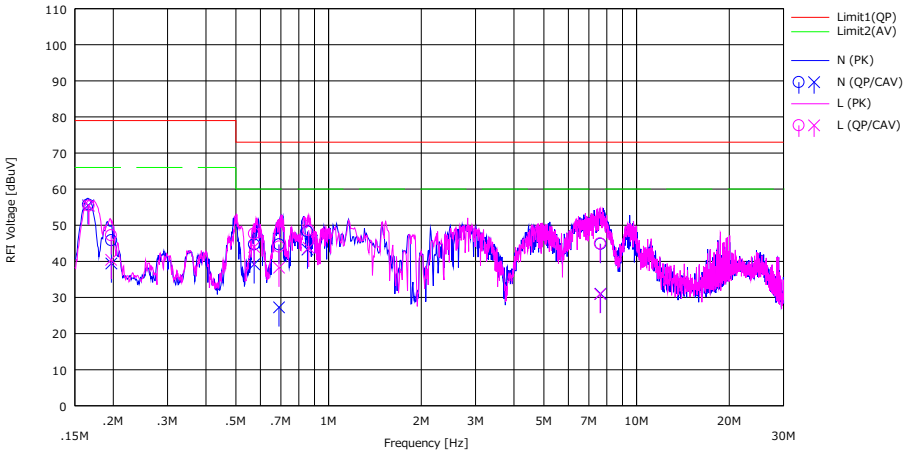
APPENDIX 1: Test data

Conducted Emission

(Model: VS-12NP160F (Power Unit: A Side))

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	September 8, 2019
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.107)_Class A



No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		(QP)	(CAV)			(QP)	(CAV)	(QP)	(AV)	(QP)	(AV)		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.16566	42.50	42.30	0.06	13.15	55.71	55.51	79.00	66.00	23.29	10.49	N	
2	0.19698	32.60	26.20	0.07	13.15	45.82	39.42	79.00	66.00	33.18	26.58	N	
3	0.57282	31.40	25.90	0.07	13.19	44.66	39.16	73.00	60.00	28.34	20.84	N	
4	0.69027	31.40	14.00	0.07	13.20	44.67	27.27	73.00	60.00	28.33	32.73	N	
5	0.85383	35.00	30.00	0.06	13.22	48.28	43.28	73.00	60.00	24.72	16.72	N	
6	7.63738	31.10	17.30	0.21	13.53	44.84	31.04	73.00	60.00	28.16	28.96	N	
7	0.16653	42.20	42.20	0.06	13.15	55.41	55.41	79.00	66.00	23.59	10.59	L	
8	0.19678	34.00	27.20	0.07	13.15	47.22	40.42	79.00	66.00	31.78	25.58	L	
9	0.57282	34.40	30.70	0.07	13.19	47.66	43.96	73.00	60.00	25.34	16.04	L	
10	0.69027	30.80	25.00	0.07	13.20	44.07	38.27	73.00	60.00	28.93	21.73	L	
11	0.86166	35.40	30.50	0.06	13.22	48.68	43.78	73.00	60.00	24.32	16.22	L	
12	7.61017	31.20	17.20	0.21	13.53	44.94	30.94	73.00	60.00	28.06	29.06	L	

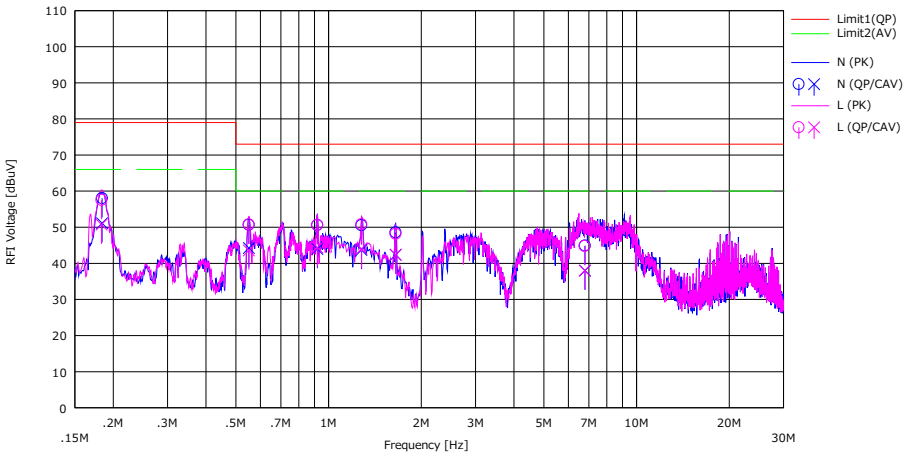
CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN FACTOR + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Conducted Emission

(Model: VS-12NP160F (Power Unit: B Side))

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	September 8, 2019
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.107)_Class A



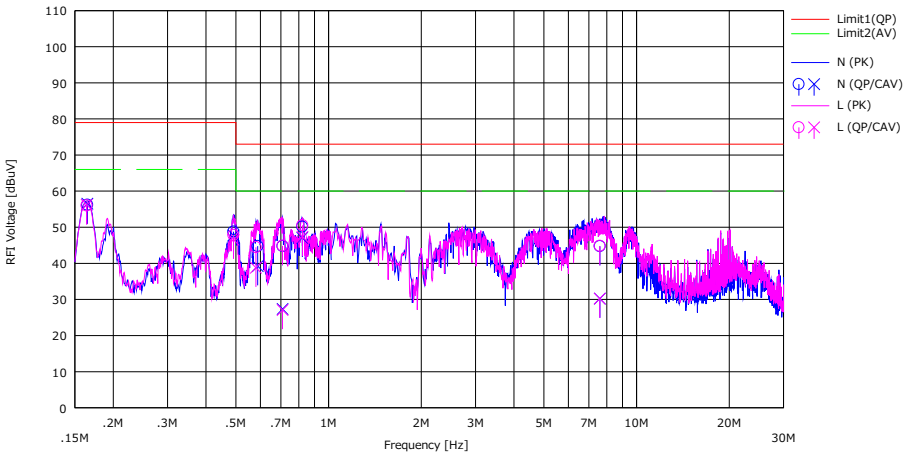
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈CAV〉			〈QP〉	〈CAV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.18393	44.80	37.90	0.07	13.15	58.02	51.12	79.00	66.00	20.98	14.88	N	
2	0.55107	37.40	31.00	0.07	13.19	50.66	44.26	73.00	60.00	22.34	15.74	N	
3	0.91908	37.30	30.70	0.06	13.22	50.58	43.98	73.00	60.00	22.42	16.02	N	
4	1.27931	37.20	30.40	0.07	13.25	50.52	43.72	73.00	60.00	22.48	16.28	N	
5	1.65118	35.20	29.00	0.09	13.27	48.56	42.36	73.00	60.00	24.44	17.64	N	
6	6.80005	31.20	24.30	0.19	13.50	44.89	37.99	73.00	60.00	28.11	22.01	N	
7	0.18306	44.30	37.50	0.07	13.15	57.52	50.72	79.00	66.00	21.48	15.28	L	
8	0.55107	37.50	30.30	0.07	13.19	50.76	43.56	73.00	60.00	22.24	16.44	L	
9	0.91908	37.30	31.10	0.06	13.22	50.58	44.38	73.00	60.00	22.42	15.62	L	
10	1.27931	37.50	30.70	0.07	13.25	50.82	44.02	73.00	60.00	22.18	15.98	L	
11	1.65118	34.80	29.00	0.09	13.27	48.16	42.36	73.00	60.00	24.84	17.64	L	
12	6.78480	31.10	24.30	0.19	13.50	44.79	37.99	73.00	60.00	28.21	22.01	L	

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

Conducted Emission
(Model: VS-12NP160FD (Power Unit: A Side))

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	September 8, 2019
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.107)_Class A



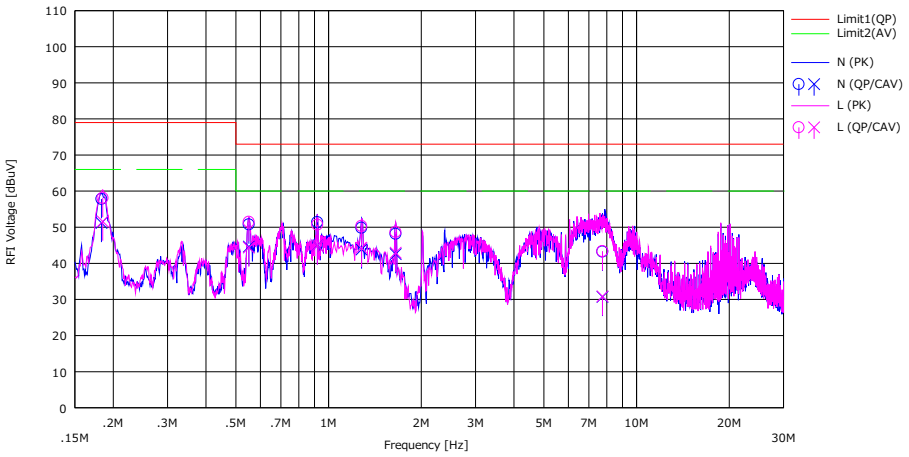
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈CAV〉			〈QP〉	〈CAV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.16479	43.00	43.30	0.06	13.15	56.21	56.51	79.00	66.00	22.79	9.49	N	
2	0.49104	35.50	34.50	0.07	13.18	48.75	47.75	79.00	66.00	30.25	18.25	N	
3	0.58874	31.50	26.00	0.07	13.19	44.76	39.26	73.00	60.00	28.24	20.74	N	
4	0.70854	31.50	14.10	0.07	13.20	44.77	27.37	73.00	60.00	28.23	32.63	N	
5	0.82164	36.90	33.80	0.06	13.21	50.17	47.07	73.00	60.00	22.83	12.93	N	
6	7.60110	31.00	16.50	0.21	13.53	44.74	30.24	73.00	60.00	28.26	29.76	N	
7	0.16392	42.80	43.00	0.06	13.15	56.01	56.21	79.00	66.00	22.99	9.79	L	
8	0.49104	34.60	33.30	0.07	13.18	47.85	46.55	79.00	66.00	31.15	19.45	L	
9	0.58065	31.20	25.50	0.07	13.19	44.46	38.76	73.00	60.00	28.54	21.24	L	
10	0.70854	31.60	13.80	0.07	13.20	44.87	27.07	73.00	60.00	28.13	32.93	L	
11	0.82251	37.30	34.10	0.06	13.21	50.57	47.37	73.00	60.00	22.43	12.63	L	
12	7.59203	31.10	16.50	0.21	13.53	44.84	30.24	73.00	60.00	28.16	29.76	L	

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

Conducted Emission
(Model: VS-12NP160FD (Power Unit: B Side))

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	September 8, 2019
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.107)_Class A



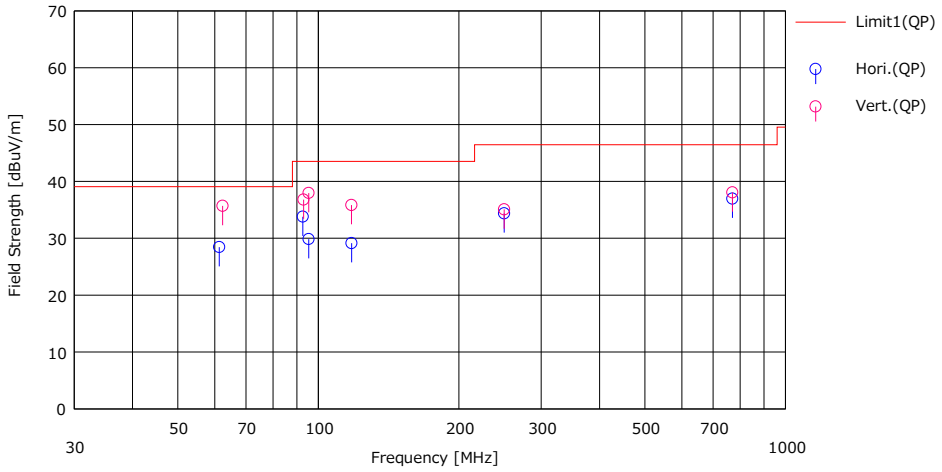
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈CAV〉			〈QP〉	〈CAV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.18306	44.60	38.00	0.07	13.15	57.82	51.22	79.00	66.00	21.18	14.78	N	
2	0.55107	37.50	31.40	0.07	13.19	50.76	44.66	73.00	60.00	22.24	15.34	N	
3	0.91908	38.10	31.70	0.06	13.22	51.38	44.98	73.00	60.00	21.62	15.02	N	
4	1.27931	36.50	30.50	0.07	13.25	49.82	43.82	73.00	60.00	23.18	16.18	N	
5	1.65118	34.80	29.20	0.09	13.27	48.16	42.56	73.00	60.00	24.84	17.44	N	
6	7.74622	29.50	17.00	0.21	13.53	43.24	30.74	73.00	60.00	29.76	29.26	N	
7	0.18480	44.90	38.40	0.07	13.15	58.12	51.62	79.00	66.00	20.88	14.38	L	
8	0.55107	38.20	31.10	0.07	13.19	51.46	44.36	73.00	60.00	21.54	15.64	L	
9	0.91908	37.40	31.60	0.06	13.22	50.68	44.88	73.00	60.00	22.32	15.12	L	
10	1.27931	37.00	31.00	0.07	13.25	50.32	44.32	73.00	60.00	22.68	15.68	L	
11	1.65118	35.30	29.60	0.09	13.27	48.66	42.96	73.00	60.00	24.34	17.04	L	
12	7.74622	29.60	17.10	0.21	13.53	43.34	30.84	73.00	60.00	29.66	29.16	L	

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

Radiated Emission
(Model:VS-12NP160F)

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	September 8, 2019
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takafumi Noguchi (Below 1 GHz)
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class A



No.	Freq.	Reading (QP)	Ant.Fac	Loss	Gain	Result (QP)	Limit (QP)	Margin (QP)	Pola.	Height	Angle	Ant. Type	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	61.366	52.00	7.44	7.98	38.97	28.45	39.10	10.65	Hori.	271	48	BA	
2	92.641	55.48	8.89	8.49	39.06	33.80	43.50	9.70	Hori.	400	263	BA	
3	95.359	51.10	9.29	8.53	39.06	29.86	43.50	13.64	Hori.	400	161	BA	
4	117.807	46.90	12.50	8.82	39.08	29.14	43.50	14.36	Hori.	400	152	BA	
5	250.012	51.30	11.80	10.27	39.00	34.37	46.40	12.03	Hori.	400	316	LA20	
6	769.934	41.00	20.39	13.94	38.36	36.97	46.40	9.43	Hori.	161	109	LA20	
7	62.394	59.40	7.27	8.00	38.98	35.69	39.10	3.41	Vert.	236	259	BA	
8	92.976	58.40	8.96	8.49	39.06	36.79	43.50	6.71	Vert.	100	56	BA	
9	95.363	59.20	9.29	8.53	39.06	37.96	43.50	5.54	Vert.	130	77	BA	
10	117.782	53.60	12.50	8.82	39.08	35.84	43.50	7.66	Vert.	100	64	BA	
11	250.019	52.00	11.80	10.27	39.00	35.07	46.40	11.33	Vert.	100	8	LA20	
12	769.934	42.10	20.39	13.94	38.36	38.07	46.40	8.33	Vert.	192	195	LA20	

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-200MHz: BICONICAL, 200-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

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Ise EMC Lab.
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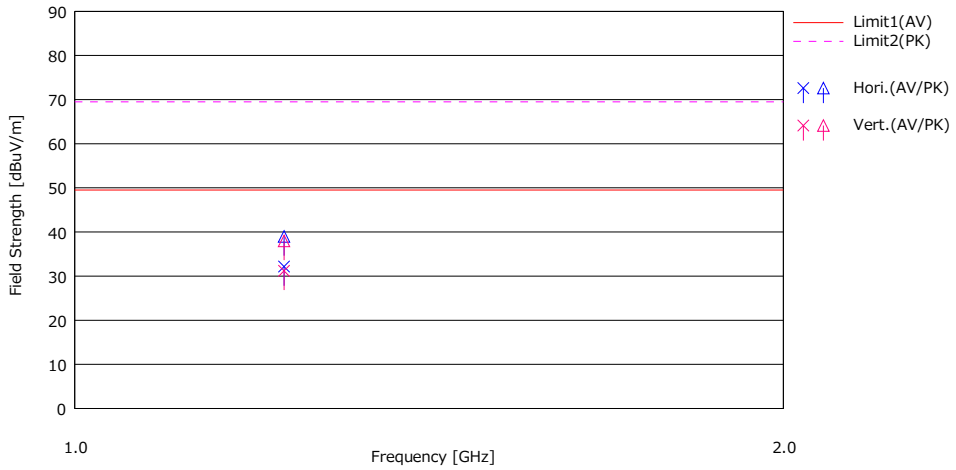
Radiated emission
(Model:VS-12NP160F)

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	September 7, 2019
Temperature / Humidity	22 deg. C / 60 % RH
Engineer	Hiroyuki Furutaka (Above 1 GHz)
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class A



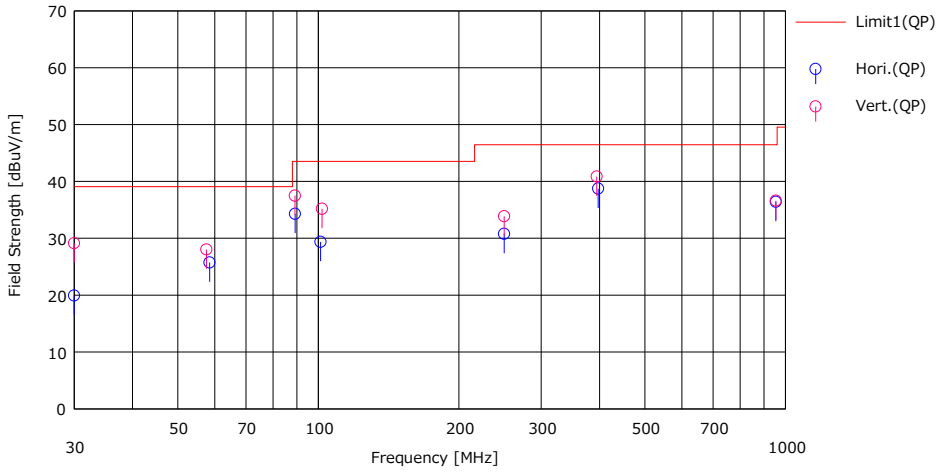
No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		〈AV〉	〈PK〉				〈AV〉	〈PK〉	〈AV〉	〈PK〉	〈AV〉	〈PK〉					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	1227.296	49.80	56.60	25.66	-8.47	34.80	32.19	38.99	49.50	69.50	17.31	30.51	Hori.	100	300	H20	
2	1227.296	48.80	55.60	25.66	-8.47	34.80	31.19	37.99	49.50	69.50	18.31	31.51	Vert.	100	30	H20	

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-200MHz: BICONICAL, 200-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + D-factor) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

Radiated Emission
(Model:VS-12NP160FD)

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	September 8, 2019
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takafumi Noguchi
	(Below 1 GHz)
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class A



No.	Freq.	Reading (QP)	Ant.Fac	Loss	Gain	Result (QP)	Limit (QP)	Margin (QP)	Pola.	Height	Angle	Ant. Type	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	30.011	33.20	18.30	7.36	38.94	19.92	39.10	19.18	Hori.	179	162	BA	
2	58.505	48.60	8.18	7.93	38.97	25.74	39.10	13.36	Hori.	209	214	BA	
3	89.175	56.60	8.30	8.44	39.05	34.29	43.50	9.21	Hori.	400	231	BA	
4	101.095	49.60	10.23	8.61	39.07	29.37	43.50	14.13	Hori.	400	173	BA	
5	250.012	47.70	11.80	10.27	39.00	30.77	46.40	15.63	Hori.	291	336	LA20	
6	397.430	50.20	15.66	11.50	38.63	38.73	46.40	7.67	Hori.	154	354	LA20	
7	953.996	37.50	22.00	14.94	38.03	36.41	46.40	9.99	Hori.	256	212	LA20	
8	30.006	42.40	18.30	7.36	38.94	29.12	39.10	9.98	Vert.	100	187	BA	
9	57.596	50.60	8.47	7.92	38.96	28.03	39.10	11.07	Vert.	100	95	BA	
10	89.160	59.80	8.30	8.44	39.05	37.49	43.50	6.01	Vert.	156	60	BA	
11	101.814	55.30	10.34	8.62	39.07	35.19	43.50	8.31	Vert.	100	101	BA	
12	250.007	50.80	11.80	10.27	39.00	33.87	46.40	12.53	Vert.	100	345	LA20	
13	394.590	52.40	15.59	11.48	38.63	40.84	46.40	5.56	Vert.	386	9	LA20	
14	954.024	37.70	22.00	14.94	38.03	36.61	46.40	9.79	Vert.	155	101	LA20	

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-200MHz: BICONICAL, 200-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

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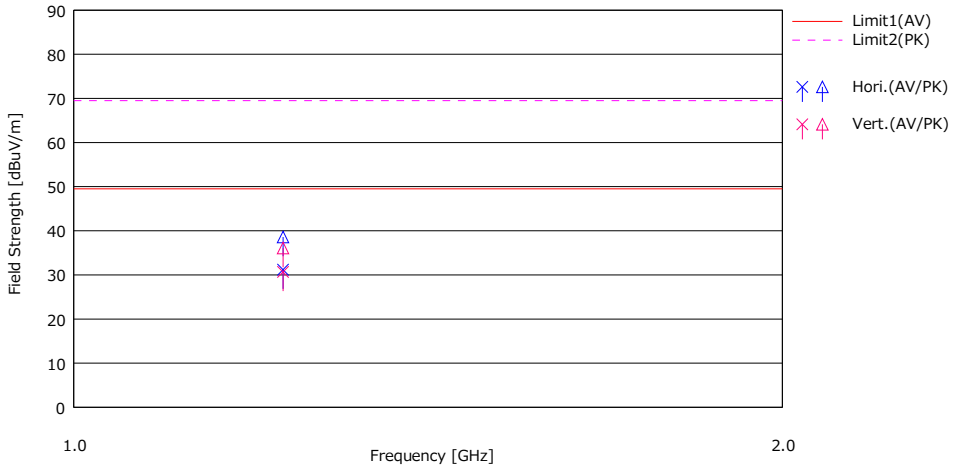
Radiated emission
(Model:VS-12NP160FD)

Report No.	12969247H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	September 7, 2019
Temperature / Humidity	22 deg. C / 60 % RH
Engineer	Hiroyuki Furutaka (Above 1 GHz)
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class A



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Polo.	Height	Angle	Ant. Type	Comment
		<AV>	<PK>				<AV>	<PK>	<AV>	<PK>	<AV>	<PK>					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	1227.302	48.80	56.20	25.66	-8.47	34.80	31.19	38.59	49.50	69.50	18.31	30.91	Hori.	100	300	H20	
2	1227.302	48.30	53.70	25.66	-8.47	34.80	30.69	36.09	49.50	69.50	18.81	33.41	Vert.	100	123	H20	

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-200MHz: BICONICAL, 200-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + D-factor) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

APPENDIX 2: Test instruments

EMI test equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	141580	MicroWave System Amplifier	AGILENT	83017A	MY39500779	03/05/2019	03/31/2020	12
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/27/2019	06/30/2020	12
RE	141507	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	05/10/2019	05/31/2020	12
RE	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/08/2019	04/30/2021	24
CE	141884	Spectrum Analyzer	AGILENT	E4448A	MY44020357	03/13/2019	03/31/2020	12
CE	141554	Thermo-Hygrometer	CUSTOM	CTH-180	1301	01/11/2019	01/31/2020	12
CE	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/02/2019	08/31/2020	12
CE	141925	Terminator	TME	CT-01	-	11/07/2018	11/30/2019	12
CE	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/26/2018	06/30/2020	24
CE	142183	Measure	KOMELON	KMC-36	-	-	-	-
CE	141358	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	07/05/2019	07/31/2020	12
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	07/05/2019	07/31/2020	12
CE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
CE	141532	DIGITAL HiTESTER	HIOKI	3805	51201197	01/29/2019	01/31/2020	12
CE	141216	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM14/ sucoform141-PE/ 421-010	-/00640	07/02/2019	07/31/2020	12
RE	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/ 1902S579(5m)	03/05/2019	03/31/2020	12
CE	141247	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/06/2018	12/31/2019	12
RE	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/05/2018	11/30/2019	12
RE	141198	Biconical Antenna	Schwarzbeck	VHA9103+BBA9106	2513	08/23/2019	08/31/2020	12
RE	141350	Coaxial Cable	Suhner/storm/Agilent/ TSJ	-	-	06/27/2019	06/30/2020	12
RE	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/20/2019	08/31/2020	12
RE	141264	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	9111B-189	08/23/2019	08/31/2020	12
RE	142226	Measure	KOMELON	KMC-36	-	-	-	-
RE	141585	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	02/08/2019	02/29/2020	12
RE	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/18/2018	06/30/2020	24
RE	141566	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	01/11/2019	01/31/2020	12
RE	178648	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-

***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