



TEST REPORT

Report Number : A-004-15-C

Date of Issue: 7 October 2015

FCC Rules and Regulations Part 15 Subpart C Intentional Radiators.

This test report is to certify that the device was tested according to the requirements of the above.
The results of this report should not be construed to imply compliance of devices other than the sample tested.
Without the laboratory approval by the documents, this report should not be copied in part.

1. Applicant

Company Name : Panasonic Corporation
Mailing Address : 1-15, Matsuo-cho, Kadoma-shi, Osaka, Japan

2. Identification of Tested Device

Type of Device : Transmitter
FCC ID : ACJ-LB-DF81
Device Name : Data Archiver
Model Number : LB-DF81
Serial Number : Sample1
Trade Name : Panasonic
Type of Test : ☐ Production ☒ Pre-production ☐ Prototype

3. Test Items

AC Power Line Conducted Emission Measurement	☒ Pass	☐ Fail	☐ N/A
Radiated Emission (The Frequency Range of 9kHz to 30MHz)	☒ Pass	☐ Fail	☐ N/A
Radiated Emission (The Frequency Range of above 30MHz)	☒ Pass	☐ Fail	☐ N/A
20dB Bandwidth Measurement	☒ Pass	☐ Fail	☐ N/A
Frequency Tolerance of Carrier Signal	☒ Pass	☐ Fail	☐ N/A

Refer the below reason(s) with respect to the decision and justification not to test.

(*1) EUT Specifications (*2) Request of Applicant (*3) According to Test Plan

KEC Electronic Industry Development Center Testing Division
3-2-2, Hikari-dai, Seika-cho, Soraku-gun, Kyoto 619-0237 Japan

Test Engineer(s)

Naoki Norimoto

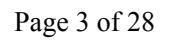


Approved by

Ikuya Minematsu / Group Manager

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1. LABORATORY INFORMATION

1.1. Laboratory Accreditation

The KEC has been accredited by the following organizations based on their criteria for testing laboratory (ISO/IEC 17025).

- (1) Japan Accreditation Board for Conformity Assessment (JAB) : Accreditation Number: RTL02810
(2) Voluntary EMC Laboratory Accreditation Center Inc. (VLAC) : Accreditation Number: VLAC-005

1.2. Test Facility

All tests described in this report were performed by:

Name: KEC Electronic Industry Development Center
Testing Division

Address: 3-2-2, Hikari-dai, Seika-cho, Soraku-gun, Kyoto 619-0237 Japan

Anechoic Chamber : ☒ No.1 ☐ No.2 ☐ No.3 ☐ No.6 ☐ No.7
☐ No.8 ☐ No.9 ☐ No.10 ☐ No.11 ☐ No.12
Shielded Room : ☐ No.1 ☐ No.7 ☐ No.8 ☒ No.9 ☐ No.10
Harmonic Current Meas. Room : ☐

1.3. Measurement Uncertainty

The result of a measurement is only an approximation or estimate of the value of a specific quantity.
And thus the measurand is complete only when a statement of uncertainty is given.
KEC quotes Measurement Uncertainty (U) as follows.

Peak Conducted Output Power	+/- 1.0 dB
Power Density	+/- 0.4 dB
Emission Bandwidth / Occupied Bandwidth	+/- 3.5 %
Dwell Time	+/- 2.4 %
Hopping Sequence	+/- 2.4 %
Spurious Emissions at Frequency Range from 9kHz up to 26.5GHz (Conducted Measurement)	+1.3 / -1.5 dB
Spurious Emissions at Frequency Range from 26.5GHz up to 40GHz (Conducted Measurement)	+1.4 / -1.6 dB
Spurious Emissions at Frequency Range from 9kHz up to 30MHz 60cm Loop Antenna method	+3.7 / -4.4 dB
Spurious Emissions at Frequency Range from 30MHz up to 300MHz 3m method	+3.4 / -3.3 dB
Spurious Emissions at Frequency Range from 300MHz up to 1GHz 3m method	+3.4 / -3.6 dB
Spurious Emissions at Frequency Range from 30MHz up to 300MHz 10m method	+3.2 / -3.9 dB
Spurious Emissions at Frequency Range from 300MHz up to 1GHz 10m method	+3.6 / -4.5 dB
Spurious Emissions at Frequency Range from 30MHz up to 1GHz 10m method (Hybrid Antenna used measurement)	+4.1 / -4.4 dB
Spurious Emissions at Frequency Range from 1GHz up to 6GHz 3m method	+4.7 / -6.2 dB
Spurious Emissions at Frequency Range from 6GHz up to 26.5GHz 3m method	+4.5 / -5.0 dB
Frequency Tolerance of Carrier Signal	1.0×10 ⁻⁷

Expiration Date : 2015/9/30

The above values are calculated as Expanded Uncertainty (k=2 [95%]).

[Note]

If the measured result is below the specification limit and a margin is less than the above measurement uncertainty, it is impossible to determine compliance at a level of confidence of 95%. However, the measured result indicates high probability that the tested device complies with the specification limit.

2. GENERAL INFORMATION

2.1. Product Description

(1) Technical Specifications

- Maximum data size : 547.2TB
- Maximum transfer rate : 18MB/s
- Number of Installed Drive System : 1 drive system(12 drive units)
- Medium : 1.2 TB recordable magazine
- Number of magazine drawers : 10 drawers(Left and right)
- Maximum number of magazines : Up to 76

(2) Maximum Oscillators Frequency

- OPTICAL PICK UP HFM : 370±20MHz

(3) Radio Specifications

- Tx Operating Frequency : 13.56MHz

(4) Software Version

- ASPI : 1.29
- TERATERM : 4.77

(5) Firmware Version

: 0.8.10

(6) Interface and Provide Terminal

- CONTROL PORT : Changer control/Magazine drawer monitoring
- SAS PORT : Host interface

(7) Rated Power Supply

: AC100-277V, 50/60Hz
(Test for AC277V, 60Hz)

3. TESTED SYSTEM

3.1. Reference Rule and Specification

(1) Reference Rule and Regulation	: FCC Rule Part 15 Subpart C, Section 15.225 Operation within the band 13.110-14.010 MHz ☒ Section 15.205 ☒ Section 15.207 ☒ Section 15.209 ☒ Section 15.215 ☒ Section 15.225
(2) Test Procedure	: ANSI C63.4-2009

3.2. Date of Test

Receipt of Test Sample : 22 August 2015
Condition of Test Sample : ☒ Damage is not found on the set.
☐ Damage is found on the set. (Details are described in this report)

Test Completed on : 3 September 2015
Condition of Test Sample : ☒ Damage is not found on the set.
☐ Damage is found on the set. (Details are described in this report)

3.3. Deviation of Standard

☒ without deviation, ☐ with deviation (details are found inside of this report)

3.4. Test Mode

Test items	Test mode	Test frequency
AC Power Line Conducted Emission	Continuous transmission	13.56MHz
Radiated Emission (9kHz to 30MHz)		
Radiated Emission (above 30MHz)		
20dB Emission Bandwidth		
Frequency Tolerance of Carrier Signal		

[Note]

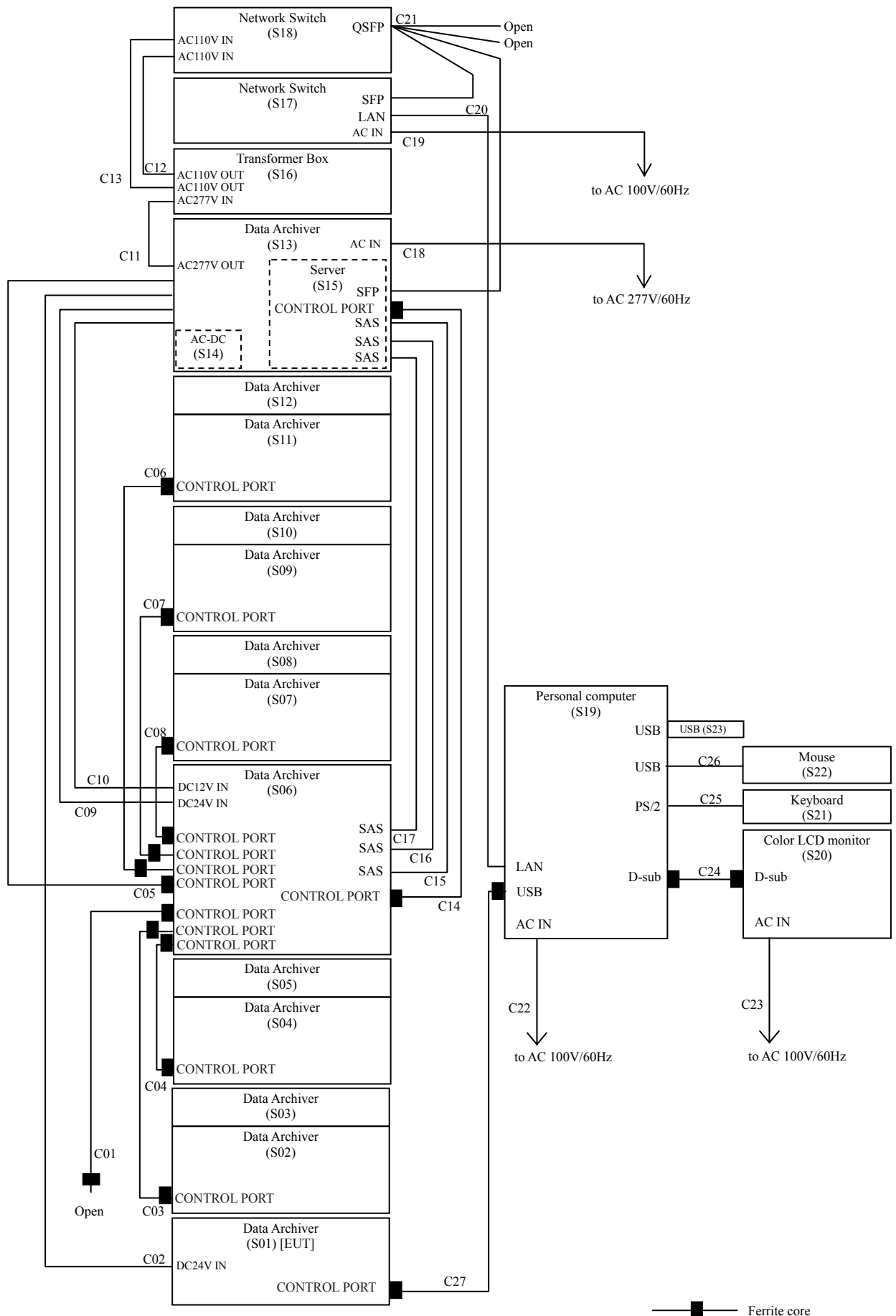
- (1) The test program was prepared by applicant.
- (2) The test modes were confirmed with and without tag, and the test was made without tag that was worst condition.

Extreme test condition	
Temperature	-20 deg C to 50 deg C
Voltage	AC 235.45V to 300V

[Note]

- The upper limit of the product specification is 300V and this product doesn't work with above AC 300 V. Therefore, the Limit of the Extreme test condition was set at + 8% (300V).
- Temperature extreme test was measured only in the radio part for the device is large.

3.5. Block Diagram of Test System



3.6. List of Test System

No.	Device Name	Model Number	Serial Number	Trade Name	Note
S01	Data Archiver	LB-DF81	Sample1	Panasonic	EUT (Bottom Module)
S02	Data Archiver	LB-XC82	Sample1	Panasonic	(Control Unit)
S03	Data Archiver	LB-XH82	Sample1	Panasonic	(Extension Unit)
S04	Data Archiver	LB-XC82	Sample2	Panasonic	(Control Unit)
S05	Data Archiver	LB-XH82	Sample2	Panasonic	(Extension Unit)
S06	Data Archiver	LB-DF80	Sample1	Panasonic	(Base Module)
S07	Data Archiver	LB-XC82	Sample3	Panasonic	(Control Unit)
S08	Data Archiver	LB-XH82	Sample3	Panasonic	(Extension Unit)
S09	Data Archiver	LB-XC82	Sample4	Panasonic	(Control Unit)
S10	Data Archiver	LB-XH82	Sample4	Panasonic	(Extension Unit)
S11	Data Archiver	LB-XC82	Sample5	Panasonic	(Control Unit)
S12	Data Archiver	LB-XH82	Sample5	Panasonic	(Extension Unit)
S13	Data Archiver	LB-DF83	Sample1	Panasonic	(Server Bay)
S14	AC-DC CONVERTER	PFE3000-12-069RA	0003	Bel Power Solutions	
S15	Server	Leopard ORV2	432C33800020	QUANTA COMPUTER INC.	
S16	Transformer Box	DPST-900CBA	62006	DELTA ELECTRONICS, INC.	
S17	Network Switch	XS708E	3GW43C72801DD	NETGEAR	
S18	Network Switch	Wedge-AC-F	FP2FB6632000A	FACEBOOK	
S19	Personal computer	1622A052200569	702571-24200	Diginnos	
S20	Color LCD monitor	RDT17 II VM	56005923NJ	MITSUBISHI	
S21	Keyboard	KB-2650P	102050086295	-	
S22	Mouse	AM-1510-U	0099453	-	
S23	USB	UHYBS-008GH	-	TOSHIBA	

[Note]

(1) : Accessory of EUT

3.7. List of Cables

No.	Cable Name	Shielded (Y/N)	Length (m)	Note	
C01	Control Cable	Y	3.0	With two ferrite cores (1-turn)	(2)
C02	DC24V Power Cord	Y	2.0		(1)
C03	Control Cable	Y	3.0	With two ferrite cores (1-turn)	(2)
C04	Control Cable	Y	3.0	With two ferrite cores (1-turn)	(2)
C05	Control Cable	Y	1.8	With one ferrite cores (1-turn)	(1)
C06	Control Cable	Y	3.0	With two ferrite cores (1-turn)	(2)
C07	Control Cable	Y	3.0	With two ferrite cores (1-turn)	(2)
C08	Control Cable	Y	3.0	With two ferrite cores (1-turn)	(2)
C09	DC24V Power Cord	Y	2.0		(1)
C10	DC12V Power Cord	Y	1.9		(1)
C11	AC277V Power Cord	Y	0.6		(3)
C12	AC110V Power Cord	N	0.9		(3)
C13	AC110V Power Cord	N	0.9		(3)
C14	Control Cable	Y	3.0	With two ferrite cores (1-turn)	(2)
C15	MiniSAS Cable	Y	3.0		
C16	MiniSAS Cable	Y	3.0		
C17	MiniSAS Cable	Y	3.0		
C18	AC Power Cord	Y	2.7		(3)
C19	AC Power Cord	N	2.5		(3)
C20	LAN Cable	Y	5.0		
C21	QSFP+x1/SFP+x4 Network Cable	Y	1.0		
C22	AC Power Cord	N	1.8		(3)
C23	AC Power Cord	N	1.9		(3)
C24	D-sub Cable	Y	1.8	With two ferrite core (1-turn)	
C25	PS/2 Cable	Y	1.4		(1)
C26	USB Cable	Y	1.3		(1)
C27	Control Cable	Y	3.0	With two ferrite cores (1-turn)	

[Note]

- (1) : Undetachable cable type
- (2) : Accessories cable of EUT
- (3) : 3-wires type, earth plug is grounded
- (4) : 2-wires type

4. AC POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1. Test Procedure

- (1) The EUT is placed in accordance with ANSI C63.4-2009.
- (2) The EUT is activated as to simulate an actual operation.
- (3) Connect the EUT's AC power cord to one Line Impedance Stabilization Network (LISN).
- (4) Any other power cord of other equipment is connected to a LISN different from the LISN used for the EUT.
- (5) Connect the spectrum analyzer (*1) to the measuring port of the LISN for the EUT, using a calibrated coaxial cable.
- (6) To find out the maximum emission of the configuration of the EUT System, the operation mode and the position of the cables are changed, then preliminary conducted measurement are performed.
- (7) The spectrums are scanned from 150kHz to 30MHz and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.
- (8) The test receiver (*2) is connected to the LISN for the EUT, and the six highest emissions minimum recorded above are measured.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency range : 150kHz – 30MHz
Resolution bandwidth : 10kHz
Video bandwidth : 1MHz
Detector function : Peak mode

(*2) Test Receiver Set Up Conditions

Detector function : Quasi – Peak / Average (if necessary)
IF bandwidth : 10kHz

4.2. Test Software List

KEC No.	Software Name	Version	Manufacture
TF-088	TEPTO Conducted emission automatic measurement	2.3.0320	TSJ
TF-110	Junction sheet	1.6H	KEC



4.3. Test Results

Measured Frequency (MHz)	LISN Factor (dB)	Meter Reading				Maximum RF Voltage		Limit		Margin for Limit	
		Q-Peak		Average		Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dB)	Average (dB)
		Va (dBμV)	Vb (dBμV)	Va (dBμV)	Vb (dBμV)						
13.560	10.8	29.4	36.0	19.4	23.4	46.8	34.2	60.0	50.0	13.2	15.8
27.120	11.3	12.0	15.2	3.4	6.7	26.5	18.0	60.0	50.0	33.5	32.0

• The emissions from the IT Device (Other than the emissions from the LB-DF81)

Measured Frequency (MHz)	LISN Factor (dB)	Meter Reading				Maximum RF Voltage		Limit		Margin for Limit	
		Q-Peak		Average		Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dB)	Average (dB)
		Va (dBμV)	Vb (dBμV)	Va (dBμV)	Vb (dBμV)						
0.151	10.3	49.3	48.5	48.4	46.8	59.6	58.7	79.0	66.0	19.4	7.3
0.455	10.3	49.0	49.0	47.5	47.8	59.3	58.1	79.0	66.0	19.7	7.9
0.605	10.3	32.7	26.9	31.3	25.1	43.0	41.6	73.0	60.0	30.0	18.4
0.758	10.3	49.1	48.6	47.5	46.7	59.4	57.8	73.0	60.0	13.6	2.2
0.909	10.3	34.1	23.8	30.2	28.2	44.4	40.5	73.0	60.0	28.6	19.5
1.059	10.3	48.6	47.5	46.0	45.0	58.9	56.3	73.0	60.0	14.1	3.7
1.239	10.3	38.3	38.1	37.3	37.2	48.6	47.6	73.0	60.0	24.4	12.4
1.303	10.3	34.6	34.4	33.0	33.0	44.9	43.3	73.0	60.0	28.1	16.7
1.361	10.3	46.7	45.2	43.1	41.5	57.0	53.4	73.0	60.0	16.0	6.6
1.434	10.3	35.1	35.1	32.1	31.7	45.4	42.4	73.0	60.0	27.6	17.6
1.501	10.4	34.1	33.5	32.9	32.4	44.5	43.3	73.0	60.0	28.5	16.7
1.665	10.4	45.1	43.6	40.1	39.0	55.5	50.5	73.0	60.0	17.5	9.5
1.962	10.4	43.2	43.0	36.4	35.2	53.6	46.8	73.0	60.0	19.4	13.2
2.114	10.4	34.4	32.6	29.0	28.0	44.8	39.4	73.0	60.0	28.2	20.6
2.271	10.4	40.1	42.5	33.6	35.9	52.9	46.3	73.0	60.0	20.1	13.7
2.571	10.4	34.2	41.4	26.9	33.6	51.8	44.0	73.0	60.0	21.2	16.0
2.880	10.4	31.4	38.0	24.1	30.0	48.4	40.4	73.0	60.0	24.6	19.6
3.175	10.4	31.4	34.1	23.4	25.4	44.5	35.8	73.0	60.0	28.5	24.2
3.486	10.4	34.1	31.6	25.9	23.0	44.5	36.3	73.0	60.0	28.5	23.7
3.796	10.5	35.5	29.8	24.0	20.0	46.0	34.5	73.0	60.0	27.0	25.5
4.092	10.5	35.2	24.7	26.3	16.0	45.7	36.8	73.0	60.0	27.3	23.2
4.386	10.5	34.3	26.9	24.6	16.4	44.8	35.1	73.0	60.0	28.2	24.9
4.693	10.5	29.7	32.7	20.1	22.9	43.2	33.4	73.0	60.0	29.8	26.6
4.991	10.5	23.3	34.4	13.2	23.5	44.9	34.0	73.0	60.0	28.1	26.0
10.766	10.7	21.4	38.2	13.5	36.0	48.9	46.7	73.0	60.0	24.1	13.3
13.485	10.8	35.4	44.1	24.8	31.6	54.9	42.4	73.0	60.0	18.1	17.6

**[Note]**

- (1) LISN Factor includes the cable loss and attenuator loss.
- (2) The measurement of emissions from IT Device applied for FCC Part 15 Subpart B Class A limit. (FCC Part 15 Subpart B Section 15.107(b))
See next page, the radio device power off spectrum chart.
- (3) Test Condition : Continuous transmission (non- terminated)

[Calculation method]

Maximum RF Voltage (dB μ V)

= Meter Reading (at maximum level of Va or Vb) (dB μ V) + LISN Factor (dB)

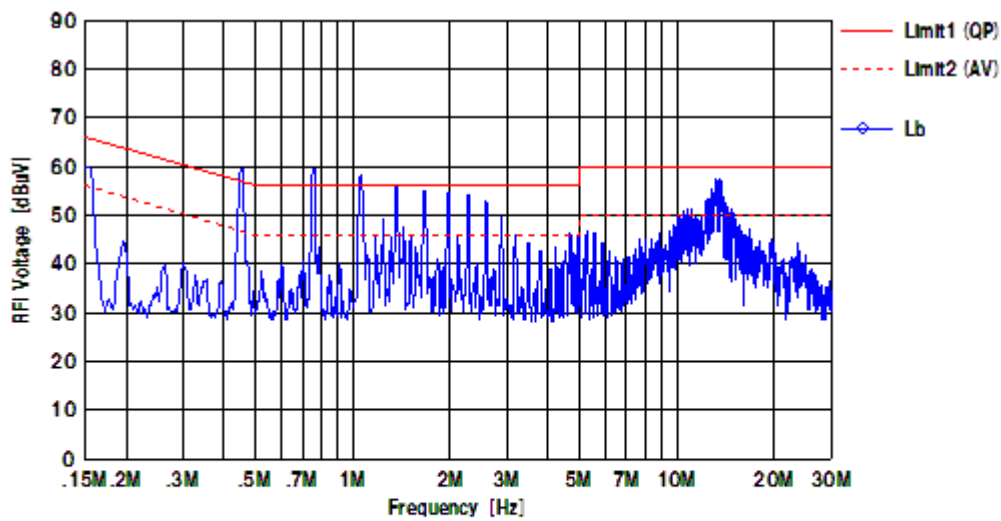
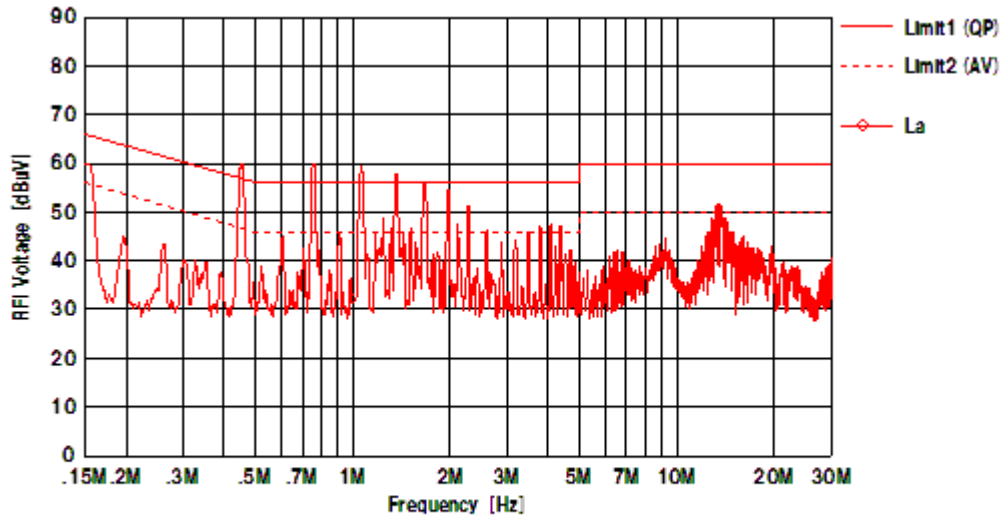
At the next page, the result of exploratory conducted emission measurement by using the spectrum analyzer is shown by the spectrum chart.

Tested Date	Environment	
	Temperature	Humidity
1 September 2015	22 °C	59 %

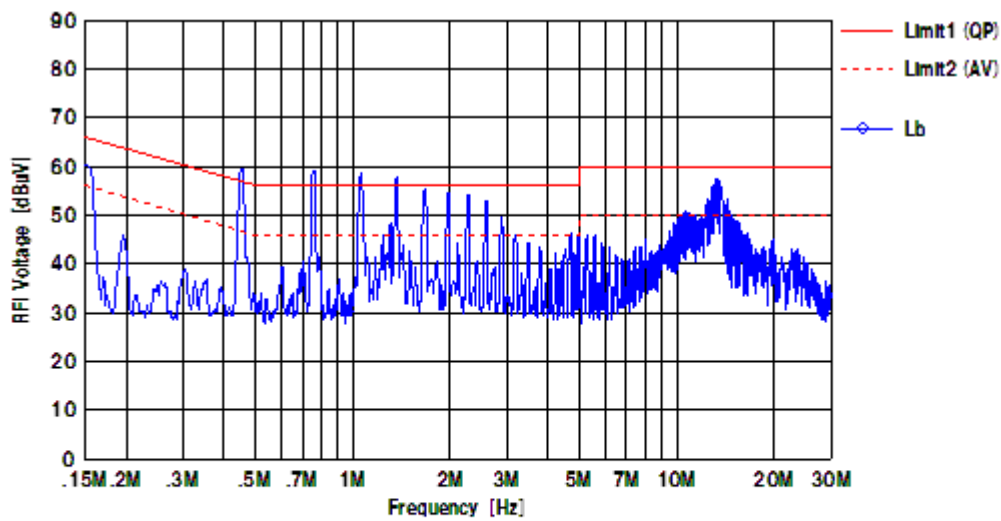
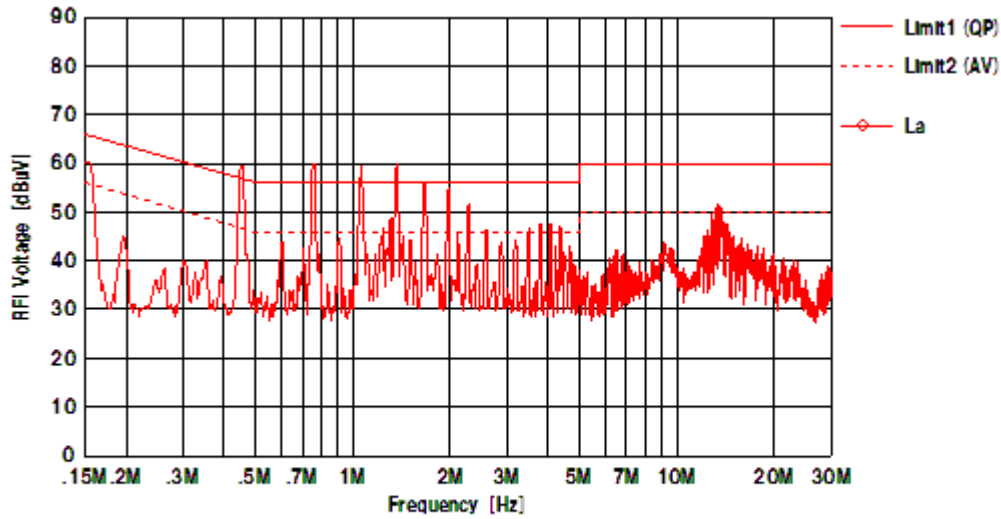


Test Results in Graph

Transmission of RFID : ON



LB-DF81 only P-OFF (other equipments are in a P-ON)



5. RADIATED EMISSION (The Frequency Range of 9kHz to 30MHz)

5.1. Test Procedure

- (1) The EUT is placed in accordance with ANSI C63.4-2009.
- (2) The EUT is activated as to simulate an actual operation.
- (3) To find out the maximum emission of the configuration of the EUT System, the operation mode and the position of the cables are changed, then preliminary radiated measurement are performed using the spectrum analyzer (*1) and the loop antenna.
- (4) The emissions recorded are measured at the specified distance using the loop antenna and the test receiver (*2).
- (5) If the emission level is low and not detected at the specified distance, compliance test is performed at a closer distance and judged from calculating field strength at specified distance by using the measured data at a closer distance.

[Note]

- (*1) Spectrum Analyzer Set Up Conditions
 - Frequency range : 9kHz – 150kHz / 150kHz – 30MHz
 - Resolution bandwidth : 300Hz / 10kHz
 - Detector function : Peak mode
- (*2) Test Receiver Set Up Conditions
 - Detector function : Quasi – Peak
 - IF bandwidth : 200Hz (9kHz – 150kHz)
 - : 10kHz (150kHz – 30MHz)



5.2. Test Results

1) Field Strength at 300m

Measured Frequency (MHz)	Antenna Factor (dB)	Meter Reading including 20dB Constant Antenna Factor (dBμV/m)	Maximum Field Strength at 3m (dBμV/m)	Conversion Factor 3m to 300m (dB)	Maximum Field Strength at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin for Limit (dB)
Peak measurement							
* 0.03872	0.1	49.3	49.4	-80.0	-30.6	35.8	66.4
* 0.04973	-0.2	80.2	80.0	-80.0	0.0	33.6	33.6
* 0.06505	-0.3	57.3	57.0	-80.0	-23.0	31.3	54.3
* 0.06904	-0.3	46.0	45.7	-80.0	-34.3	30.8	65.1
* 0.07039	-0.3	47.1	46.8	-80.0	-33.2	30.6	63.8
* 0.07746	-0.4	44.0	43.6	-80.0	-36.4	29.8	66.2
* 0.15037	-0.5	51.3	50.8	-80.0	-29.2	24.0	53.2
* 0.34301	-0.5	44.7	44.2	-80.0	-35.8	16.8	52.6
Quasi-Peak measurement							
* 0.09945	-0.5	41.1	40.6	-80.0	-39.4	27.6	67.0

2) Field Strength at 30m

Measured Frequency (MHz)	Antenna Factor (dB)	Meter Reading including 20dB Constant Antenna Factor (dBμV/m)	Maximum Field Strength at 3m (dBμV/m)	Conversion Factor 3m to 30m (dB)	Maximum Field Strength at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin for Limit (dB)
* 0.54736	-0.5	39.0	38.5	-40.0	-1.5	32.8	34.3
* 0.59728	-0.5	44.6	44.1	-40.0	4.1	32.0	27.9
13.11000	1.0	24.7	25.7	-40.0	-14.3	29.5	43.8
13.41000	1.0	25.7	26.7	-40.0	-13.3	40.5	53.8
13.55300	1.0	29.7	30.7	-40.0	-9.3	50.4	59.7
13.56000	1.0	44.6	45.6	-40.0	5.6	83.9	78.3
13.56700	1.0	30.9	31.9	-40.0	-8.1	50.4	58.5
13.71000	1.1	26.4	27.5	-40.0	-12.5	40.5	53.0
14.01000	1.1	26.4	27.5	-40.0	-12.5	29.5	42.0
27.12000	3.1	22.4	25.5	-40.0	-14.5	29.5	44.0

The following are data that operates only LB-DF81. (Other equipments are in a P-OFF.) Therefore, the frequencies of * mark are noise other than LB-DF81, and those results are comply with FCC Part 15 Section 15.209 (c).

1) Field Strength at 300m

Measured Frequency (MHz)	Antenna Factor (dB)	Meter Reading including 20dB Constant Antenna Factor (dBμV/m)	Maximum Field Strength at 3m (dBμV/m)	Conversion Factor 3m to 300m (dB)	Maximum Field Strength at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin for Limit (dB)
Peak measurement							
0.03872	0.1	<25.0	<25.1	-80.0	<-54.9	35.8	>90.7
0.04973	-0.2	<25.0	<24.8	-80.0	<-55.2	33.6	>88.8
0.06505	-0.3	42.9	42.6	-80.0	-37.4	31.3	68.7
0.06904	-0.3	<25.0	<24.7	-80.0	<-55.3	30.8	>86.1
0.07039	-0.3	<25.0	<24.7	-80.0	<-55.3	30.6	>85.9
0.07746	-0.4	<25.0	<24.6	-80.0	<-55.4	29.8	>85.2
0.15037	-0.5	<25.0	<24.5	-80.0	<-55.5	24.0	>79.5
0.34301	-0.5	<25.0	<24.5	-80.0	<-55.5	16.8	>72.3
Quasi-Peak measurement							
0.09945	-0.5	<25.0	<24.5	-80.0	<-55.5	27.6	>83.1

2) Field Strength at 30m

Measured Frequency (MHz)	Antenna Factor (dB)	Meter Reading including 20dB Constant Antenna Factor (dBμV/m)	Maximum Field Strength at 3m (dBμV/m)	Conversion Factor 3m to 30m (dB)	Maximum Field Strength at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin for Limit (dB)
0.54736	-0.5	<25.0	<24.5	-40.0	<-15.5	32.8	>48.3
0.59728	-0.5	<25.0	<24.5	-40.0	<-15.5	32.0	>47.5

[Note]

- (1) Antenna Factor includes the cable loss.
- (2) Measurement Distance : 3m
- (3) Conversion Factor : FCC Part 15 Subpart A Section 15.31(f) (2) is applied.
- (4) Although these tests were performed other than open field area test site, adequate comparison measurements were confirmed against 30 m open field are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

[Calculation method]

Maximum Field Strength (dB μ V/m) = Meter Reading (dB μ V/m) + Antenna Factor (dB) +
Conversion Factor (dB)

Tested Date	Environment	
	Temperature	Humidity
26 August 2015	21 °C	56 %

6. RADIATED EMISSION (The Frequency Range of above 30MHz)

6.1. Test Procedure

- (1) The EUT is placed in accordance with ANSI C63.4-2009.
- (2) The EUT is activated as to simulate an actual operation.
- (3) To find out the maximum emission of the configuration of the EUT System, the operation mode and the position of the cables are changed, then preliminary radiated measurement are performed using the spectrum analyzer (*1) and the broad band antenna.
- (4) The spectrums are scanned from 30MHz to 1GHz, and collect the highest emissions on the spectrum analyzer relative to the limits in the whole range.
In the frequency above 1GHz, it is performed using the spectrum analyzer (*2) and the horn antenna.
- (5) The highest emissions are measured at the specified distance using the test receiver (*3) and the broad band antenna or the tuned dipole. In the frequency above 1GHz, they are measured using the spectrum analyzer (*4) and the horn antenna.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency range : 30MHz – 1GHz
Resolution bandwidth : 100kHz
Detector function : Peak mode

(*2) Spectrum Analyzer Set Up Conditions (Pre-measurement)

Frequency range : 1GHz – Upper frequency of measurement range
Resolution bandwidth : 1MHz

(*3) Test Receiver Set Up Conditions

Detector function : Quasi – Peak
IF bandwidth : 120kHz

(*4) Spectrum Analyzer Set Up Conditions

Center Frequency : Measurement Frequency
Resolution bandwidth : 1MHz
Video bandwidth : 1MHz (Peak measurement)
10Hz or 30Hz (Average measurement)
Attenuator : 10dB
Y axis : Linear (Average measurement)

6.2. Test Software List

KEC No.	Software Name	Version	Manufacture
TF-059	TEPTO Radiated emission automatic measurement	2.3.0321	TSJ
TF-110	Junction sheet	1.6H	KEC

6.3. Test Results

Measured Frequency (MHz)	Corection Factor (dB)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
94.92	-8.8	41.2	36.1	32.4	43.5	11.1
135.60	-2.8	33.2	30.7	30.4	43.5	13.1
203.40	0.4	36.4	36.6	37.0	43.5	6.5
596.64	-0.7	38.6	31.5	37.9	46.0	8.1
650.88	0.2	38.4	29.2	38.6	46.0	7.4
678.00	0.6	38.1	35.2	38.7	46.0	7.3
705.12	1.1	39.8	35.1	40.9	46.0	5.1
732.24	1.7	38.6	34.5	40.3	46.0	5.7
759.36	2.3	34.6	35.6	37.9	46.0	8.1
800.04	3.1	34.7	32.0	37.8	46.0	8.2

[Note]

- (1) ☐ Antenna Factor includes the cable loss, attenuator loss and pre-amplifier gain.
☒ Antenna Factor includes the cable loss and attenuator loss.
Above 1000MHz, the antenna factor includes the cable loss and pre-amplifier gain.
- (2) * mark in Measured Frequency : Measured with the tuned dipole antenna.
no mark in Measured Frequency : Measured with the broadband antenna.
- (3) Upper Frequency : ☒ Transmitter Frequency (TX): TX < 10GHz
☐ 1GHz ☒ 10th harmonic of the highest frequency / ☐ Up to 40GHz
☐ Transmitter Frequency (TX): 10GHz ≤ TX < 30GHz
☐ 10th harmonic of the highest frequency / ☐ Up to 100GHz
☐ Transmitter Frequency (TX): 30GHz ≤ TX
☐ 10th harmonic of the highest frequency / ☐ Up to 200GHz
- (4) Measurement Distance : <below 1GHz> ☒ 3m ☐ 10m
<above 1GHz> ☐ 3m ☐ 10m
- (5) The other emissions were the noise from the IT devices, and it conforms to the FCC Part 15 Subpart B - Unintentional Radiators class A limit. (Test Report No.A-005-15-A)
See next page, the radio device power off spectrum chart.

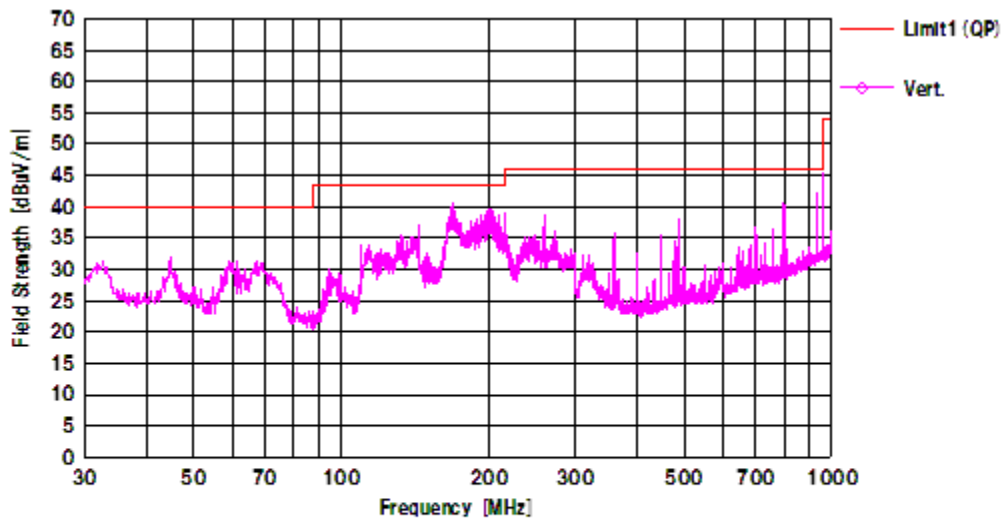
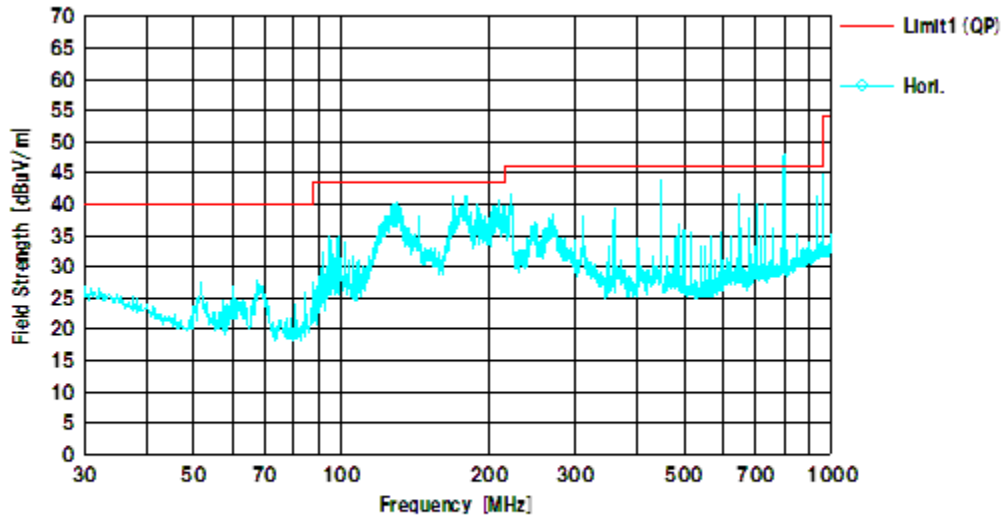
[Calculation method]

Maximum Field Strength (dBμV/m)
= Meter Reading (at maximum level of Horizontal or Vertical) (dBμV) + Antenna Factor (dB/m)

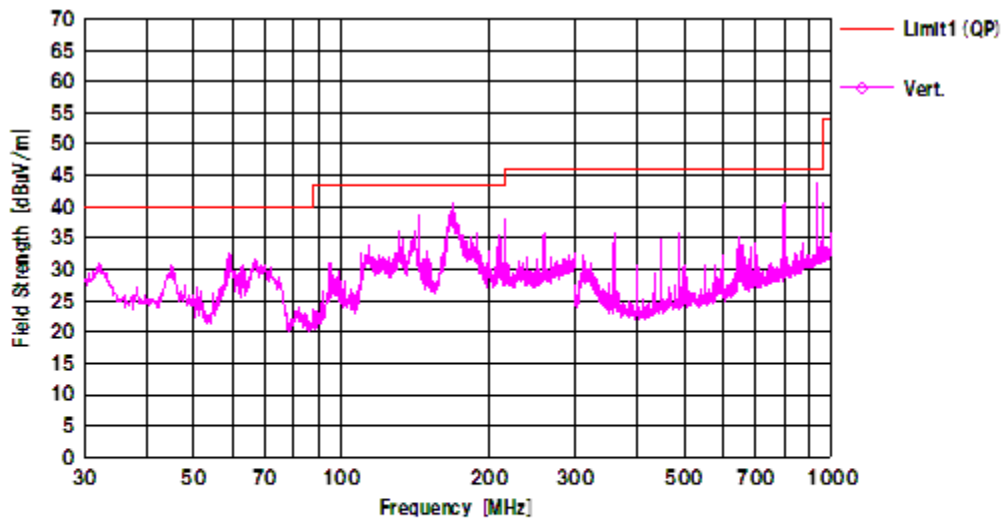
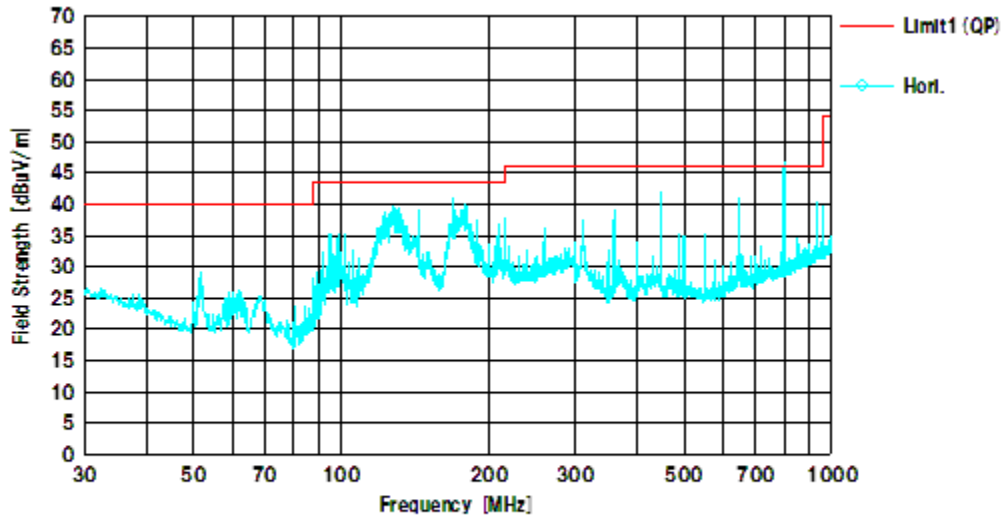
Tested Date	Environment	
	Temperature	Humidity
26 August 2015	21 °C	56 %

Test Results in Graph

Transmission of RFID : ON



LB-DF81 only P-OFF (other equipments are in a P-ON)



7. 20dB BANDWIDTH MEASUREMENT

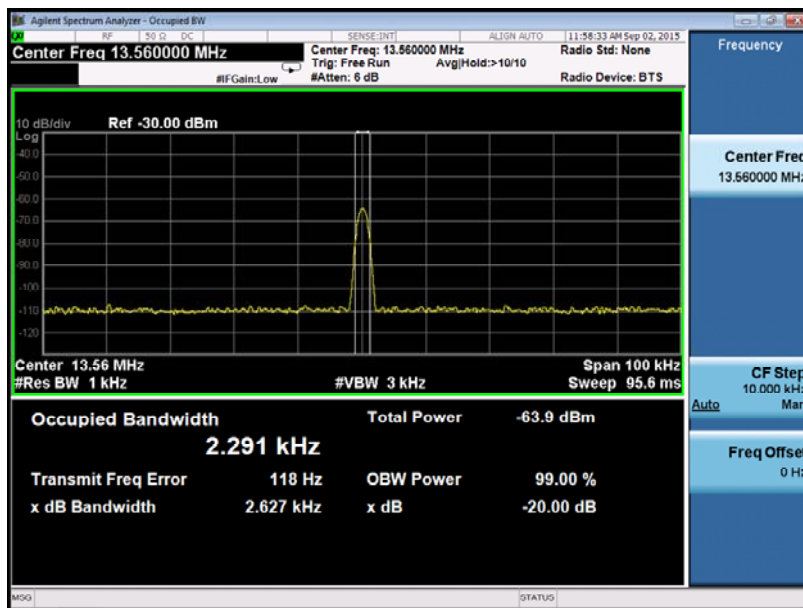
7.1. Test Procedure

- (1) Connect the EUT RF output port to spectrum analyzer (*1) via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
- (4) 20dB Bandwidth is measured using the function of spectrum analyzer.

[Note]

- (*1) Spectrum Analyzer Set Up Conditions
- | | |
|----------------------|----------|
| Frequency Span | : 100kHz |
| Resolution bandwidth | : 1kHz |
| Video bandwidth | : 3kHz |
| Detector function | : Peak |
| x dB | : -20dB |

7.2. Test Results



Test Items	Result(kHz)
20dB Bandwidth	2.627
99% Occupied Bandwidth	2.291

Tested Date	Environment	
	Temperature	Humidity
2 September 2015	20 °C	48 %

8. FREQUENCY TOLERANCE OF CARRIER SIGNAL

8.1. Test Procedure

- (1) Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
- (4) The operating frequency measured by using frequency counter function of spectrum analyzer (*1) .
- (5) Frequency stability measurement was carried out from the high temperature to low temperature in order.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Center Frequency	: Equal to operating frequency of EUT
Resolution bandwidth	: 3 kHz
Video bandwidth	: 100 Hz
Sweep	: Auto
Function	: Frequency counter

8.2. Test Results

[Temperature : 50deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560093	0.093	0.0007	±0.01
after 2minutes	13.56	13.560096	0.096	0.0007	±0.01
after 5minutes	13.56	13.560096	0.096	0.0007	±0.01
after 10minutes	13.56	13.560097	0.097	0.0007	±0.01

[Temperature : 40deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560095	0.095	0.0007	±0.01
after 2minutes	13.56	13.560093	0.093	0.0007	±0.01
after 5minutes	13.56	13.560093	0.093	0.0007	±0.01
after 10minutes	13.56	13.560093	0.093	0.0007	±0.01

[Temperature : 30deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560108	0.108	0.0008	±0.01
after 2minutes	13.56	13.560104	0.104	0.0008	±0.01
after 5minutes	13.56	13.560103	0.103	0.0008	±0.01
after 10minutes	13.56	13.560103	0.103	0.0008	±0.01

[Temperature : 20deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560119	0.119	0.0009	±0.01
after 2minutes	13.56	13.560117	0.117	0.0009	±0.01
after 5minutes	13.56	13.560117	0.117	0.0009	±0.01
after 10minutes	13.56	13.560118	0.118	0.0009	±0.01

[Temperature : 10deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560131	0.131	0.0010	±0.01
after 2minutes	13.56	13.560130	0.130	0.0010	±0.01
after 5minutes	13.56	13.560130	0.130	0.0010	±0.01
after 10minutes	13.56	13.560130	0.130	0.0010	±0.01

[Temperature : 0deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560123	0.123	0.0009	±0.01
after 2minutes	13.56	13.560126	0.126	0.0009	±0.01
after 5minutes	13.56	13.560126	0.126	0.0009	±0.01
after 10minutes	13.56	13.560126	0.126	0.0009	±0.01

[Temperature : -10deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560098	0.098	0.0007	±0.01
after 2minutes	13.56	13.560107	0.107	0.0008	±0.01
after 5minutes	13.56	13.560108	0.108	0.0008	±0.01
after 10minutes	13.56	13.560108	0.108	0.0008	±0.01

[Temperature : -20deg.C]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560038	0.038	0.0003	±0.01
after 2minutes	13.56	13.560058	0.058	0.0004	±0.01
after 5minutes	13.56	13.560060	0.060	0.0004	±0.01
after 10minutes	13.56	13.560059	0.059	0.0004	±0.01

[Temperature : 20deg.C, Voltage : AC235.45V(85%)]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560120	0.120	0.0009	±0.01
after 2minutes	13.56	13.560116	0.116	0.0009	±0.01
after 5minutes	13.56	13.560116	0.116	0.0009	±0.01
after 10minutes	13.56	13.560116	0.116	0.0009	±0.01

[Temperature : 20deg.C, Voltage : AC300V(108%)]

Test Condition	Original Frequency (MHz)	Measured Frequency (MHz)	Tolerance (kHz)	Tolerance (%)	Limit (%)
startup	13.56	13.560120	0.120	0.0009	±0.01
after 2minutes	13.56	13.560116	0.116	0.0009	±0.01
after 5minutes	13.56	13.560116	0.116	0.0009	±0.01
after 10minutes	13.56	13.560116	0.116	0.0009	±0.01

[Calculation method]

Tolerance (kHz) = Result – Channel Frequency

Tolerance (%) = (Tolerance (kHz) / Channel Frequency (kHz)) × 10²

Tested Date	Environment	
	Temperature	Humidity
3 September 2015	20°C	50 %



9. TEST EQUIPMENT

• AC Power Line Conducted Emission Measurement

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-119	Fixed Attenuator	JFW	50HF-010N	2014/09	2015/09
AX-060	GP-IB Selector Unit	A·B·O	TM-220	2014/09	2015/09
FL-106	LISN	KYORITSU	KNW-407	2014/09	2015/09
FL-108	LISN	KYORITSU	KNW-242	2014/11	2015/09
FL-108-1	50Ω Terminator	STACK	T1302	2014/09	2015/09
FS-088	Test Receiver	ROHDE & SCHWARZ	ESHS10	2015/02	2016/02
FS-103	Test Receiver	Schwarzbeck	FCKL1528	2014/12	2015/12
SA-054	Spectrum Analyzer	Agilent	E4403B	2015/03	2016/03

• Radiated Emission (9kHz to 30MHz)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AN-074	Loop Antenna	ROHDE & SCHWARZ	HFH2-Z2	2015/04	2017/04
FS-088	Test Receiver	ROHDE & SCHWARZ	ESHS10	2015/02	2016/02
SA-060	Spectrum Analyzer	Agilent	N9010A	2015/06	2016/06

• Radiated Emission (above 30MHz)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-105	Pre-Amplifier	SONOMA	310N	2015/04	2016/04
AN-216	LPDA Antenna	Schwarzbeck	UHALP 9108A	2015/04	2016/04
AN-219	Biconical Antenna	Schwarzbeck	VHA9103/BBA9106	2015/04	2016/04
AT-115	Fixed Attenuator	JFW	50HF-006N	2015/04	2016/04
AT-156	Fixed Attenuator	Anritsu	MP721B	2015/04	2016/04
AX-064	RF Relay Matrix Unit	TSJ	RFM-E21	2015/03	2016/04
FS-079	Test Receiver	ROHDE & SCHWARZ	ESVD	2015/01	2015/11
SA-062	Test Receiver	Agilent Technologies	N9038A	2015/04	2016/04

• 20dB Bandwidth Measurement

• Frequency Tolerance of Carrier Signal

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2015/06	2016/04
SA-065	Spectrum Analyzer	Agilent	N9030A	2014/11	2015/11
SF-093	Temperature Chamber	ESPEC CORP.	SH-641	2015/07	2017/07

Note : (*1) We check the performance, before using this device.

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurements made by KEC are traceable to national standards of measurement or equivalent abroad.