RADIO TEST REPORT

Test Report No.: 10042776Y-B-R1

Applicant	:	**Japan Radio Co., Ltd.**
Type of Equipment	:	**Handy Search**
Model No.	:	**NJJ-200**
FCC ID	:	**CKENJJ-200**
Test regulation	:	**FCC Part15 Subpart F: 2013**
Test result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. This report is a revised version of 10042776Y-B. 10042776Y-B is replaced with this report

Date of test:

August 6 and 26, 2013

Representative test engineer:

Makoto Toyoda
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Tsuyoshi Katsuda
Leader of WiSE Japan,
UL Verification Service

UL Japan, Inc.
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108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN
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REVISION HISTORY

Original Test Report No.: 10042776Y-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10042776Y-B	September 24, 2013	-	-
1	10042776Y-B-R1	January 28, 2014	All pages	-

UL Japan, Inc.
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CONTENTS

Section 1 : Customer information

Company Name	:	Japan Radio Co., Ltd.
Address	:	1-1, Shimorenjaku 5 Chome Mitaka-shi, Tokyo, 181-8510, Japan
Telephone Number	:	+81-422-45-9791
Contact Person	:	Hiroshi Iida
Telephone and Facsimile Number of Contact Person	:	TEL: +81-422-45-9102 FAX: +81-422-45-9956

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

2.1 Identification of E.U.T.

Type of Equipment	:	Handy Search
Model No.	:	NJJ-200
Serial No.	:	CS003
Rating	:	DC 7.4V (Rating range: 8.4 V to 6 V), 2.75 W
Country of Mass-production	:	Japan
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.
Receipt Date of Sample	:	August 6, 2013

2.2 Product description

Model: NJJ-200 (referred to as the EUT in this report) is a Handy Search.

Equipment type	:	Transceiver
Frequency of operation	:	600 to 3400 MHz Center frequency: 2000MHz (used only 1ch)
Clock frequency	:	100 MHz (Max)
Effective Bandwidth (not 10dB Bandwidth)	:	2800 MHz
Type of modulation	:	Pulse
Antenna type	:	λ/2 Dipole antenna
Antenna connector type	:	No connector
Antenna gain	:	-9.23dBi at 600MHz (Lowest of frequency range) -4.47dBi at 2000MHz (Middle of frequency range) 3.09dBi at 3400MHz (Highest of frequency range)
Operation temperature range	:	0 – 50 deg. C
Duty cycle	:	0.006 %

FCC 15.31 (e)
The EUT is only battery operated equipment.
EUT was used a new battery during the tests, therefore, the equipment complies power supply regulation.

FCC 15.203
The EUT does not have antenna connector. Therefore the equipment complies with the requirement.

NJJ-200 does not have data port in the radio terminal.

Section 3 : Test specification, procedures and results

3.1 Test specification

Test Specification : FCC Part 15 Subpart F: 2013, final revised on June 11, 2013 and effective July 11, 2013

Title : Subpart F Ultra-Wideband Operation
Section 15.509 Technical requirements for ground penetrating radars and wall imaging systems.

3.2 Procedures & Results

This EUT is Ground penetrating radar (GPR) system. (Clause 15.509 of FCC Part 15 Subpart F)

Item	Test Procedure	Specification	Deviation	Worst Margin	Results
Conducted Emission	ANSI C63.4:2003	FCC 15.505(a) FCC 15.207	N/A *1)	N/A	N/A
UWB Bandwidth	ANSI C63.4:2003 FCC 15.503 (a)	FCC 15.503 (d) FCC 15.509 (a)	N/A	-	Complied
Transmitter Timeout	ANSI C63.4:2003	FCC 15.509 (c)	N/A	-	Complied
Radiated Emission	ANSI C63.4:2003 FCC 15.521 (d)	15.509 (d) (e) FCC 15.209	N/A	13.5dB (1165.50MHz, Horizontal)	Complied
Peak level of the Emission	ANSI C63.4:2003 FCC 15.521 (e) (g)	FCC 15.509 (f)	N/A	44.8dB (1868.36 MHz, Vertical)	Complied

*1) The test is not applicable since the EUT does not have AC ports.
* These tests were also referred to FCC OET KDB No.393764, "Frequently Asked Questions (FAQ) Regarding Ultra wide Band Compliance Measurements".
Note: UL Japan's EMI Work Procedures No. 13-EM-W0420

3.3 Addition to standard

Item	Test Procedure	Specification	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 RSS-Gen 4.6.1	RSS-Gen 4.6.1	-	N/A

* Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

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

		Open area test site			Shielded room			
		No.1	No.2	No.3	No.1	No.2	No.3	No.7
		(±)	(±)	(±)	(±)	(±)	(±)	(±)
Radiated disturbance								
3 m	9 kHz - 30 MHz	3.4 dB	4.4 dB	3.7 dB	-	-	-	-
	30 MHz - 300 MHz	5.0 dB	5.1 dB	5.0 dB	-	-	-	-
	300 MHz - 1000 MHz	5.1 dB	5.2 dB	5.1 dB	-	-	-	-
	1 GHz - 18 GHz	5.9 dB	6.0 dB	5.7 dB	-	-	-	-
0.5 m	1 GHz - 18 GHz	-	6.0 dB	-	-	-	-	-
	18 GHz – 26.5 GHz	-	5.6 dB	-	-	-	-	-

Bandwidth Measurement uncertainty (with a 95% confidence level) for this test was (±) 9.6 %.

Radiated emission test

The data listed in this test report has enough margin, more than site margin.

3.5 Test Location

UL Japan, Inc. Yokowa EMC Lab.
108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN
Telephone : +81 596 39 1485
Facsimile : +81 596 39 0232

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 open area test site	90412	2973A-1	-	40 x 18	-
No.2 open area test site	90411	2973A-2	-	20 x 18	-
No.3 open area test site	90412	2973A-3	-	20 x 18	-
No.1 shielded room	-	-	5.5 x 6.4 x 2.7	5.5 x 6.4	-
No.2 shielded room	-	-	4.5 x 3.6 x 2.7	4.5 x 3.6	-
No.3 shielded room	-	-	3.6 x 7.2 x 2.4	3.6 x 7.2	-
No.4 shielded room	-	-	5.5 x 5.0 x 2.4	4.35 x 3.35	-
No.5 shielded room	-	-	5.5 x 4.3 x 2.5	5.54 x 3.0	-
No.6 shielded room	-	-	5.2 x 3.2 x 2.9	5.2 x 3.2	-
No.7 shielded room	-	-	9.3 x 3.4 x 2.7	9.3 x 3.4	-
No.1 EMS lab. (Full-anechoic chamber)	-	-	5.0 x 8.0 x 3.5	-	-
No.2 EMS lab. (Full-anechoic chamber)	-	-	4.0 x 7.0 x 3.5	-	-

3.6 Test setup, Data of Radio & Test instruments

Refer to Appendix 1 to 3.

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

4.1 Justification

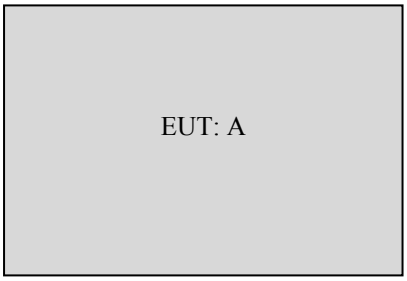
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use

Test item	Operating mode
Except Transmitter Time Out	UWB Continuous transmitting
Transmitter Time Out	Normal operation

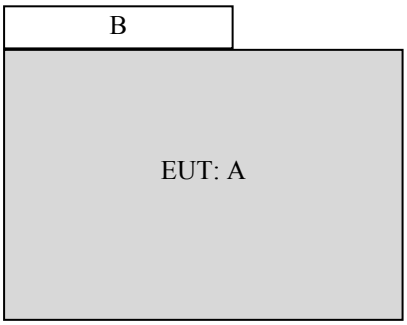
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration of tested system

【UWB Continuous transmitting】



【Normal operation】



* Setup was taken into consideration and test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remarks)
A	Handy Search	NJJ-200	SC003	Japan Radio Co., Ltd.	CKENJJ-200
B	Smartphone	SH-10D	358666041787629	SHARP	APYHRO00173

Section 5 : UWB bandwidth & Occupied bandwidth (99%)

5.1 Operating environment

This test was carried out in open area test site.
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a dry sand pit of nominal size, 2.0 m by 2.0m by 0.5 m (depth).
Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

EUT position : Floor standing

5.4 Test procedure

The bandwidth was measured the desired carrier frequency from EUT by horn antenna connected to the spectrum analyzer.

5.5 Results

Summary of the test results: Pass

Section 6 : Transmitter Timeout

6.1 Operating environment

This test was carried out in Shielded room.
Temperature : See data
Humidity : See data

6.2 Test configuration

The EUT was placed on a non-metallic platform 0.8 m above a reference ground plane.
Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

EUT position : Table top

6.4 Test procedure

The Transmitter Timeout was measured the desired carrier frequency from EUT by horn antenna connected to the spectrum analyzer.

EUT is equipped with an automatic switch for turn off the UWB signal.
Switch condition refer to below.

・Press the start button: turn on the UWB signal.

・Stop the movement of EUT: turn off the UWB signal.

Confirmed that stop the transmission of the UWB signal within 10 seconds of stop the movement of EUT.

6.5 Results

Summary of the test results: Pass

Section 7 : Radiated Emission and Peak level of the Emission

7.1 Operating environment

This test was carried out in open area test site.

Temperature : See data
Humidity : See data

7.2 Test configuration

EUT was placed on a dry sand pit of nominal size, 2.0 m by 2.0m by 0.5 m (depth).
Photographs of the set up are shown in Appendix 3.

7.3 Test conditions

Frequency range : 30 - 26500 MHz
Test distance : 3m (30-960 MHz),
0.5m (960 MHz-26500 MHz)
EUT position : Floor standing

7.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane at a distance of 3 m and 0.5 m. Pre check measurements were performed in shielded room with a search coil at 30-26500 MHz to distinguish disturbances of EUT from the ambient noise.
Measurements were performed with quasi-peak, RMS and Peak detector.
The measuring antenna height was varied between 1 and 4m and EUT was rotated every 45 degrees angle in order to obtain the maximum value of the electric field intensity.
The measurements were performed for vertical or horizontal antenna polarization or both as necessary.
The radiated emission measurements were made with the following detector function of the test receiver and spectrum analyzer.

		30-960 MHz (Test receiver)	960-26500 MHz (Spectrum analyzer)	
Detector Type:	:	QP	RMS	PK
IF Band width:	:	120 kHz	RBW 1MHz / VBW 1MHz *RBW 1kHz / VBW 1kHz *) 15.509 (e) only	RBW 3MHz / VBW 3 MHz

7.5 Results

Summary of the test results: Pass

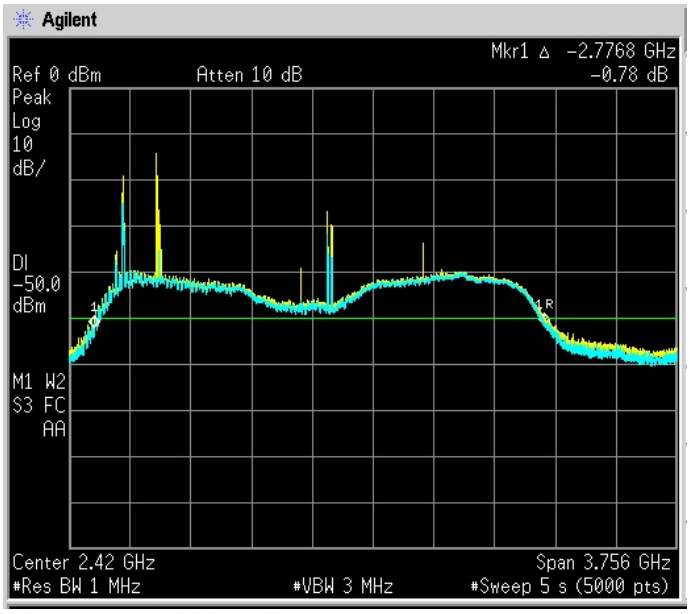
UWB bandwidth & Occupied bandwidth (Regulation: FCC 15.509(a))

UL Japan, Inc. Yokowa No,2 Open area test site

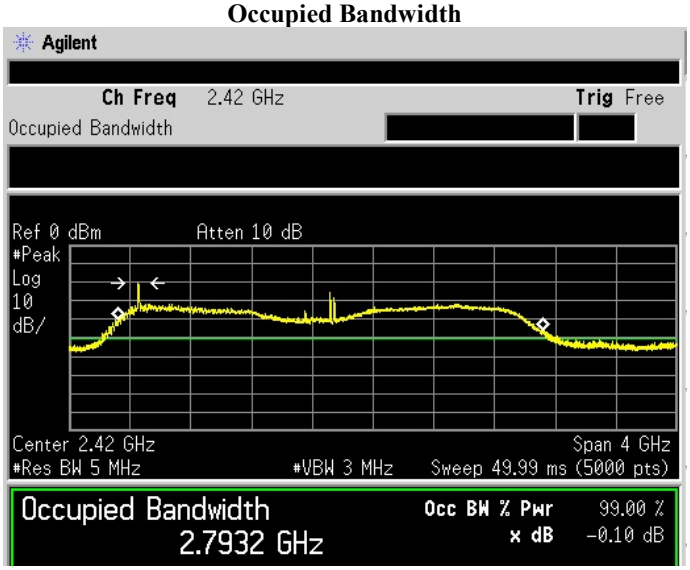
REPORT No. : 10042776Y-B-R1
REGULATION : FCC 15.509(a)
DATE : 2013/8/6
TEMP./HUMI : 27 deg.C / 55 % RH
POWER : DC7.4V
TEST MODE : UWB Continuous transmitting
Remarks : -
ENGINEER : Makoto Toyoda

10dB Bandwidth: 2776.8 MHz (LIMIT: UWB bandwidth < 10.6GHz, Fractional bandwidth >500MHz)
Occupied Bandwidth (99%) : 2793.2 MHz

10dB Bandwidth



Occupied Bandwidth



Result : Pass

Transmitter Timeout (Regulation: FCC 15.509(c))

UL Japan, Inc. Yokowa No,1 shielded room

REPORT No. : 10042776Y-B-R1
REGULATION : FCC 15.509(c)
DATE : 2013/8/26
TEMP./HUMI : 25 deg.C / 63 % RH
POWER : DC7.4V
TEST MODE : Normal Operation
Remarks : -
ENGINEER : Makoto Toyoda

Transmitter Timeout: 8.490 s (LIMIT: < 10 s)

Result : Pass

Data of Radiated Emission (Regulation: FCC 15.509(d))

UL Japan, Inc.
Yokowa No,2 Open area test site

Report No. : 10042776Y-B-R1
Regulation : FCC Part15F Section 15.509(d)
Test Distance : 3m, 0.5m
Date : 2013/8/6
Temperature : 27 deg.C
Humidity : 55 % RH
Engineer : Makoto Toyoda

Power : DC7.4V
Mode : UWB Continuous transmitting

Horizontal (RBW: 120kHz)

No.	FREQ [MHz]	READING [dBuV]	ANT Factor [dB]	AMP GAIN [dB]	CABLE LOSS [dB]	Att LOSS [dB]	RESULT 3m [dBuV/m]	LIMIT [dBuV]	MARGIN [dB]	Detector
1	34.05	22.6	16.7	29.8	1.3	5.9	16.7	40.0	23.3	QP
2	228.04	22.0	17.5	29.7	3.4	6.0	19.2	46.0	26.8	QP
3	386.41	22.2	16.6	29.7	4.6	2.9	16.6	46.0	29.4	QP
4	540.84	22.6	18.3	29.8	5.4	2.9	19.4	46.0	26.6	QP
5	650.66	23.4	19.5	29.7	5.9	2.9	22.0	46.0	24.0	QP
6	771.92	22.1	21.3	29.5	6.4	2.9	23.2	46.0	22.8	QP

Horizontal (RBW: 1MHz)

No.	FREQ [MHz]	READING [dBuV]	ANT Factor [dB]	AMP GAIN [dB]	CABLE LOSS [dB]	Distance Factor [dB]	RESULT 3m [dBuV/m]	RESULT EIRP [dBm]	LIMIT EIRP [dBm]	MARGIN [dB]	Detector
7	3540.50	39.6	28.5	36.5	3.1	15.6	19.1	-76.1	-41.3	34.8	RMS
8	5370.50	34.2	31.9	36.3	3.9	15.6	18.1	-77.1	-41.3	35.8	RMS
9	7068.82	34.4	35.9	36.4	4.5	15.6	22.8	-72.4	-41.3	31.1	RMS
10	8085.42	34.8	37.0	36.5	4.9	15.6	24.6	-70.6	-41.3	29.3	RMS

No1-6: 3.0m, No.7-10: 0.5m

Vertical (RBW: 120kHz)

No.	FREQ [MHz]	READING [dBuV]	ANT Factor [dB]	AMP GAIN [dB]	CABLE LOSS [dB]	Att LOSS [dB]	RESULT 3m [dBuV/m]	LIMIT [dBuV]	MARGIN [dB]	Detector
1	34.05	24.4	16.7	29.8	1.3	5.9	18.5	40.0	21.5	QP
2	228.04	22.7	17.5	29.7	3.4	6.0	19.9	46.0	26.1	QP
3	386.41	22.2	16.6	29.7	4.6	2.9	16.6	46.0	29.4	QP
4	540.84	22.9	18.3	29.8	5.4	2.9	19.7	46.0	26.3	QP
5	650.66	23.2	19.5	29.7	5.9	2.9	21.8	46.0	24.2	QP
6	771.92	21.9	21.3	29.5	6.4	2.9	23.0	46.0	23.0	QP

Vertical (RBW: 1MHz)

No.	FREQ [MHz]	READING [dBuV]	ANT Factor [dB]	AMP GAIN [dB]	CABLE LOSS [dB]	Distance Factor [dB]	RESULT 3m [dBuV/m]	RESULT EIRP [dBm]	LIMIT EIRP [dBm]	MARGIN [dB]	Detector
7	3540.50	35.8	28.5	36.5	3.1	15.6	15.3	-79.9	-41.3	38.6	RMS
8	5370.50	34.0	31.9	36.3	3.9	15.6	17.9	-77.3	-41.3	36.0	RMS
9	7068.82	33.8	35.9	36.4	4.5	15.6	22.2	-73.0	-41.3	31.7	RMS
10	8085.42	34.4	37.0	36.5	4.9	15.6	24.2	-71.0	-41.3	29.7	RMS

No1-6: 3.0m, No.7-10: 0.5m

Sample Calculation :
RESULT(<1GHz)=Reading + ANT Factor - Amp Gain + Cable Loss + Att Loss
RESULT(>1GHz)=Reading + ANT Factor - Amp Gain + Cable Loss - Distance Factor
Distance Factor calculation 0.5m: 20*log (3.0[m]/0.5[m]) = 15.6[dB]
RESULT (EIRP) = RESULT (3m field strength) - 95.2

Data of Radiated Emission (Regulation: FCC 15.509(e))

UL Japan, Inc.
Yokowa No,2 Open area test site

Report No. : 10042776Y-B-R1
Regulation : FCC Part15F Section 15.509(e)
Test Distance : 0.5m
Date : 2013/8/6
Temperature : 27 deg.C
Humidity : 55 % RH
Engineer : Makoto Toyoda

Power : DC7.4V
Mode : UWB Continuous transmitting

Horizontal (RBW: 1kHz)

No.	FREQ	READING	ANT Factor	AMP GAIN	CABLE LOSS	Distance Factor	RESULT 3m	RESULT EIRP	LIMIT EIRP	MARGIN	Detector
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]	[dBm]	[dBm]	[dB]	
1	1165.50	32.8	24.7	37.3	1.8	15.6	6.4	-88.8	-75.3	13.5	RMS
2	1596.99	27.3	25.5	36.9	2.1	15.6	2.4	-92.8	-75.3	17.5	RMS

Vertical (RBW: 1kHz)

No.	FREQ	READING	ANT Factor	AMP GAIN	CABLE LOSS	Distance Factor	RESULT 3m	RESULT EIRP	LIMIT EIRP	MARGIN	Detector
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]	[dBm]	[dBm]	[dB]	
1	1165.50	27.3	24.7	37.3	1.8	15.6	0.9	-94.3	-75.3	19.0	RMS
2	1596.99	29.7	25.5	36.9	2.1	15.6	4.8	-90.4	-75.3	15.1	RMS

Sample Calculation :
RESULT=Reading + ANT Factor - Amp Gain + Cable Loss - Distance Factor
Distance Factor calculation: 20*log (3.0[m]/0.5[m]) = 15.6[dB]
RESULT (EIRP) = RESULT (3m field strength) - 95.2

Peak level of the Emission (Regulation: FCC 15.509(f))

UL Japan, Inc.
Yokowa No,2 Open area test site

Report No. : 10042776Y-B-R1
Regulation : FCC Part15F Section 15.509(f)
Test Distance : 0.5m
Date : 2013/8/6
Power : DC7.4V
Temperature : 27 deg.C
Mode : UWB Continuous transmitting
Humidity : 55 % RH
Engineer : Makoto Toyoda

Horizontal (RBW: 3MHz)

No.	FREQ	READING	ANT Factor	AMP GAIN	CABLE LOSS	Distance Factor	RESULT 3m	RESULT EIRP	LIMIT EIRP	MARGIN	Detector
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]	[dBm]	[dBm]	[dB]	
1	1868.36	45.5	26.6	36.7	2.3	15.6	22.1	-73.1	-24.4	48.7	Peak

Vertical (RBW: 3MHz)

No.	FREQ	READING	ANT Factor	AMP GAIN	CABLE LOSS	Distance Factor	RESULT 3m	RESULT EIRP	LIMIT EIRP	MARGIN	Detector
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]	[dBm]	[dBm]	[dB]	
1	1868.36	49.4	26.6	36.7	2.3	15.6	26.0	-69.2	-24.4	44.8	Peak

Sample Calculation :
RESULT=Reading + ANT Factor - Amp Gain + Cable Loss - Distance Factor
Distance Factor calculation: 20*log (3.0[m]/0.5[m]) = 15.6[dB]
RESULT (EIRP) = RESULT (3m field strength) - 95.2
RBW: 3MHz Limit= 20log(3/50) = -24.4

Test Report No :10042776Y-B-R1

APPENDIX 2
Test Instruments

Radio test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SA-11	Spectrum Analyzer	Advantest	R3273	110301212	RE	2013/05/24 * 12
AF-03	Pre Amplifier	Anritsu	MH648A	M97457	RE	2013/03/05 * 12
APATT12	Attenuator	Anritsu	MP721B	M48667	RE	2013/06/06 * 12
AT-02	Attenuator	Anritsu	MP721A	6200239014	RE	2013/07/18 * 12
BA-11	Biconical Antenna	Schwarzbeck	VHA 9106	VHA 91031421	RE	2013/02/15 * 12
LA-12	Logperiodic Antenna	Schwarzbeck	USLP9143	449	RE	2013/05/20 * 12
TR-10	Test Receiver	Rohde & Schwarz	ESCI	100768	RE	2012/09/21 * 12
CC-2ORC	Yokowa No.2 open coaxial(0.01-1000MHz)	UL Japan	CC-21,CC-22,CC-23,CC-24,CC-25,CC-26,CC-27,SW-21,SW-22	YO0201	RE	2013/01/16 * 12
YOATS-02(NSA)	Open area test site	JSE	3m、10m	2	RE	2013/05/01 * 12
CUST-YW-RE	Software for Radiated Emision	ULJ	-	-	RE	-
OS-10	Digital Humidity Indicator	SATO	PC-5000TRH	B-10	RE, BW	2013/04/25 * 12
DM-02	Tester	SANWA	PC500	7019227	RE, BW	2013/06/13 * 12
YJM-11	Measure	Rubber KOMBE	GW-3H99W	-	RE, BW	-
SC-02	Search Coil	UL Japan	-	-	RE	-
MHA-01	Horn Antenna 18-26.5GHz	EMCO	3160-09	1266	RE	2013/06/30 * 12
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE, BW	2013/05/13 * 12
MPA-01	Pre Amplifier	Agilent	8449B	3008A01671	RE, BW	2013/02/22 * 12
MCC-142	Microwave Cable	Junkosha	MWX221	1203S213(1m) / 1204S063(5m)	RE, BW	2013/04/19 * 12
MSA-06	Spectrum Analyzer	Agilent	E4407B	MY45107638	RE, BW	2013/04/05 * 12
SA-07	Spectrum Analyzer	Advantest	R3273	110401871	TT	2013/03/08 * 12
CC-C6	Microwave Cable	HOKKO	MWX315-06000NMSNMS/MWX315-01500NMSNMS	SEP-03-12-001 /1208-016	TT	2012/10/11 * 12
AF-04	Pre Amplifier	Hewlett Packard	8449B	3008A01207	TT	2013/07/18 * 12
HA-07	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-684	TT	2012/11/07 * 12
DM-01	Tester	SANWA	PC500	7019221	TT	2013/06/13 * 12
OS-05	Digital Humidity Indicator	SATO	PC-5000TRH	B-05	TT	2013/04/25 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards.
Test Item :
BW:UWB bandwidth
RE: Radiated Emission and Peak level of the Emission
TT: Transmitter Timeout