



Zacta

TEST REPORT

Report number : Z071C-13159

Issue date : May 23, 2013

The device, as described herewith, was tested pursuant to applicable test procedure and complies with the requirements of;

FCC Part24 Subpart E

The test results are traceable to the international or national standards.

Applicant	: KYOCERA Corporation
Equipment under test (EUT)	: Mobile Phone
Model number	: YAKF-1
FCC ID	: JOYYAKF-1

Date of test : May 5, 8, 9, 17, 2013
Test place : TÜV SÜD Zacta Ltd. Yonezawa Testing Center
4149-7 Hachimanpara 5-chome
Yonezawa-shi Yamagata 992-1128 Japan
Phone: +81-238-28-2880 Fax: +81-238-28-2888
Test results : Complied

The results in this report are applicable only to the equipment tested.
This report shall not be re-produced except in full without the written approval of TÜV SÜD Zacta Ltd.
This test report must not be used by client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Tested by : Chiaki Kanno
Chiaki Kanno

Authorized by : Hiroaki Suzuki
Hiroaki Suzuki
Manager of EMC Technical Department



Table of contents

	Page
1. Summary of Test	4
1.1 Purpose of test	4
1.2 Standards	4
1.3 List of applied test to the EUT	4
1.4 Modification to the EUT by laboratory	4
2. Equipment Under Test	5
2.1 General Description of equipment	5
2.2 EUT information	5
2.3 Variation of the family model(s)	6
2.4 Description of Test mode	6
3. Configuration of equipment	7
3.1 Equipment(s) used	7
3.2 System configuration	7
4. Conducted Output Power	8
4.1 Measurement procedure	8
4.2 Measurement result	8
5. Equivalent Isotropic Radiated Power	9
5.1 Measurement procedure	9
5.2 Calculation method	9
5.3 Limit	9
5.4 Test data	10
6. Peak to Average Ratio	11
6.1 Measurement procedure	11
6.2 Limit	11
6.3 Measurement result	11
6.4 Trace data	12
7. Occupied Bandwidth	13
7.1 Measurement procedure	13
7.2 Limit	13
7.3 Measurement result	13
7.4 Trace data	14
8. Band Edge Spurious and Harmonic at Antenna Terminals	15
8.1 Measurement procedure	15
8.2 Limit	15
8.3 Measurement result	15
8.4 Trace data	16
9. Radiated Emissions and Harmonic Emissions	20
9.1 Measurement procedure	20
9.2 Calculation method	20
9.3 Limit	20
9.4 Test data	21
10. Frequency Stability	22
10.1 Measurement procedure	22



Zacta

10.2 Limit.....	22
10.3 Measurement result.....	23
11. Antenna requirement.....	24
12. Uncertainty of measurement.....	25
13. Laboratory description	26
Appendix A. Test equipment	27

1. Summary of Test

1.1 Purpose of test

It is the original test in order to verify conformance to FCC Part 24 Subpart E.

1.2 Standards

CFR47 FCC Part 24 Subpart E

1.2.1 Test Methods

ANSI/TIA/EIA-603-C-2004

1.2.2 Deviation from standards

None

1.3 List of applied test to the EUT

Test items Section	Test items	Condition	Result
2.1046	Conducted Output Power	Conducted	PASS
24.232(c)	Effective Radiated Power Equivalent Isotropic Radiated Power	Radiated	PASS
24.232(d)	Peak to Average Ratio	Conducted	PASS
24.238(a) 2.1049	Occupied Bandwidth	Conducted	PASS
24.238(a) 2.1051	Band Edge Spurious and Harmonic at Antenna Terminal	Conducted	PASS
24.238(a) 2.1053	Radiated emissions and Harmonic Emissions	Radiated	PASS
24.235 2.1055	Frequency Stability	Conducted	PASS

1.3.1 Test set up

Table-Top

1.4 Modification to the EUT by laboratory

None



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2. Equipment Under Test

2.1 General Description of equipment

EUT is the Mobile Phone.

2.2 EUT information

Applicant : KYOCERA Corporation
Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa,
Japan
Phone: +81-45-943-6253 Fax: +81-45-943-6314

Equipment under test : Mobile Phone

Trade name : Kyocera

Model number : YAKF-1

Serial number : N/A

EUT condition : Pre-Production

Max. frequency : 1.5GHz

Power ratings : Battery: DC 3.8V

Size : (W) 134 × (D) 66 × (H) 10.9 mm

Environment : Indoor and Outdoor use

Terminal limitation : -20°C to 60°C

RF Specification
<GSM>

Equipment type : Transceiver

Frequency of Operation : Up Link: 1850.2-1909.8MHz
Down Link: 1930.2-1989.8MHz

Modulation type : GMSK

Emission designator : 246KGXW

Output power : 0.98W EIRP (29.9dBm)

Antenna type : Internal antenna

Antenna gain : 0dBi

2.3 Variation of the family model(s)

Not applicable

2.4 Description of Test mode

The EUT had been tested under operating condition.
There are three channels have been tested as following:

Band	Channel	Frequency
GSM1900	512	1850.2MHz
	661	1880.0MHz
	810	1909.8MHz

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.

The worst emission was found in X axis and the worst case recorded.



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3. Configuration of equipment

3.1 Equipment(s) used

No.	Equipment	Company	Model No.	Serial No.	FCC ID / DoC	Comment
1	Mobile Phone	KYOCERA	YAKF-1	N/A	JOYYAKF-1	EUT

3.2 System configuration

1. Mobile Phone
(EUT)

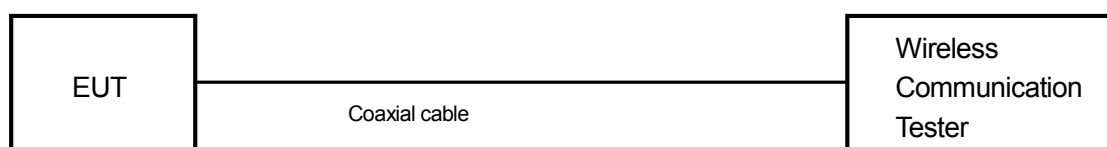
Note1: Numbers assigned to equipment or cables on this diagram correspond to the list in "3.1 Equipment(s) used".

4. Conducted Output Power

4.1 Measurement procedure [FCC 2.1046]

The conducted output power was measured with a wireless communication tester connected to the antenna terminal. The wireless communication tester parameters were set to produce the maximum power from the EUT.

- Test configuration



4.2 Measurement result

Date : May 8, 2013
 Temperature : 22.0 [°C]
 Humidity : 46.0 [%]
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

Band	Channel	Frequency (MHz)	Test Result (dBm)				
			GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
PCS	512	1850.2	29.24	29.16	26.07	24.46	23.08
	661	1880.0	29.39	29.31	26.14	24.51	23.24
	810	1909.8	29.46	29.11	26.00	24.29	22.97

5. Equivalent Isotropic Radiated Power

5.1 Measurement procedure [FCC 24.232(c)]

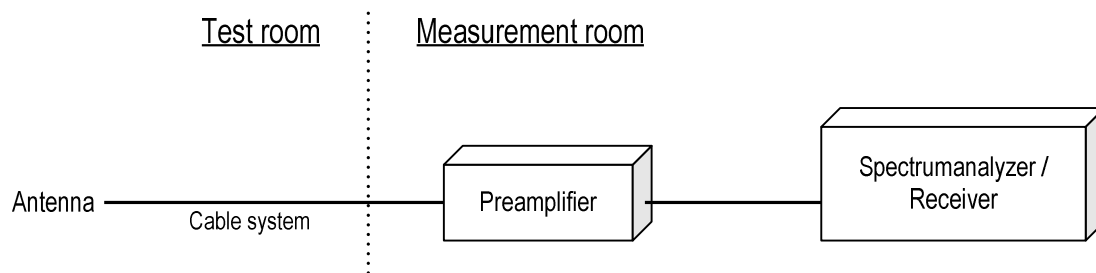
<Step 1>

The EUT and support equipment are placed on a 1 meter x 1.5 meter surface, 0.8 meter height FRP table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission. The bandwidth of the spectrum analyzer is set to 1MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission.

<Step 2>

The substitution antenna is replaced by the transmitter antenna (EUT). The frequency of the signal generator is adjusted to the measurement frequency. Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

- Test configuration



5.2 Calculation method

Result (EIRP) = S.G Reading – Cable loss + Antenna Gain
Margin = Limit – Result (EIRP)

5.3 Limit

2 W (33dBm)



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5.4 Test data

Date : May 17, 2013
 Temperature : 23.0 [°C]
 Humidity : 58.0 [%]
 Test place : 3m Semi-anechoic chamber

Test personnel :
 Tested by : Chiaki kanno

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1850.2	18.4	23.2	1.1	5.9	28.0	33.0	5.0
V	1880.0	18.4	25.0	1.1	6.0	29.9	33.0	3.1
V	1909.8	18.8	24.9	1.1	6.1	29.9	33.0	3.1

6. Peak to Average Ratio

6.1 Measurement procedure

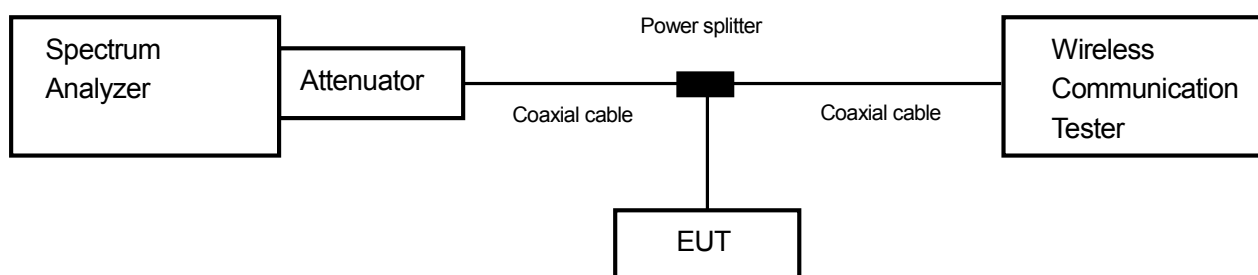
[FCC 24.232(d)]

The peak to average ratio was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

- RBW=1MHz, VBW=3MHz, Span=5MHz, Sweep=auto, Detector=Peak/average, Trace mode=Max hold

- Test configuration



6.2 Limit

13dB or less

6.3 Measurement result

Date : May 5, 2013
 Temperature : 22.0 [°C]
 Humidity : 46.0 [%]
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

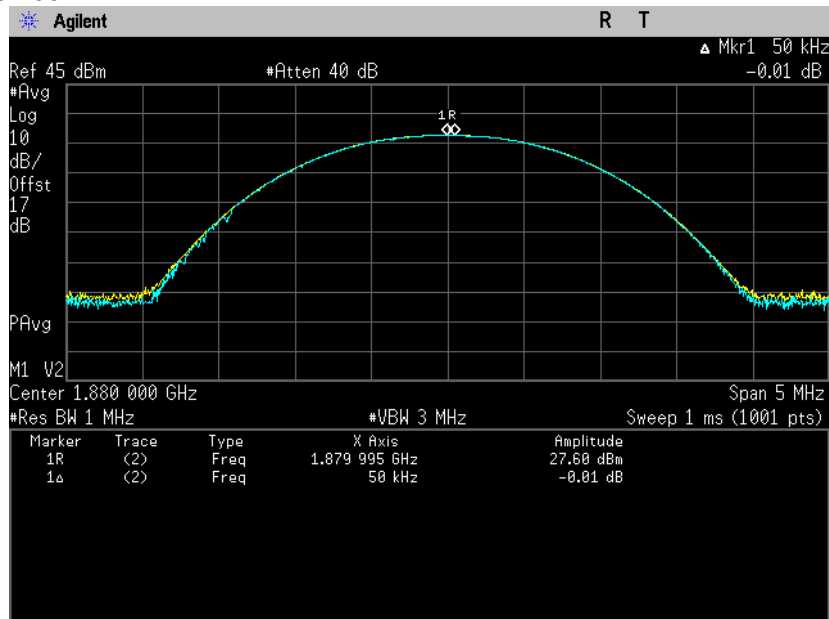
Mode	Channel	Frequency [MHz]	Peak to Average Power Ratio [dB]	Limit [dB]
GSM1900	661	1880	0.01	13



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**6.4 Trace data
[GSM 1900]**

Channel: 661



7. Occupied Bandwidth

7.1 Measurement procedure

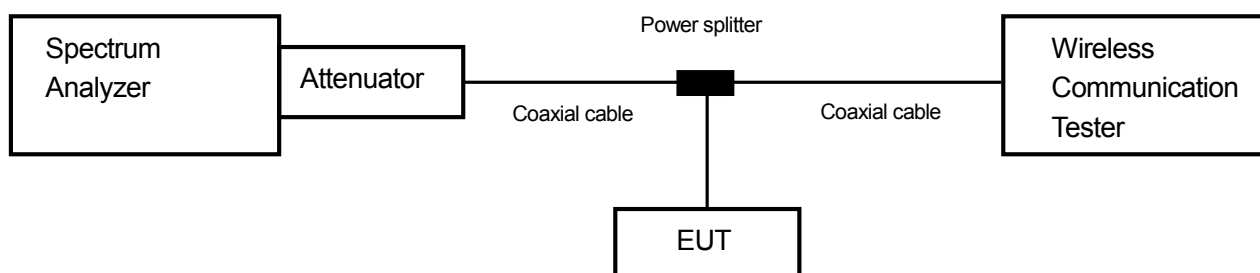
[FCC 24.238(a), 2.1049]

The Occupied bandwidth was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

- RBW=3kHz, VBW=9.1kHz, Span=1MHz, Sweep=auto, Detector=Peak, Trace mode=Max hold

- Test configuration



7.2 Limit

None

7.3 Measurement result

Date : May 8, 2013
 Temperature : 22.0 [°C]
 Humidity : 46.0 [%]
 Test place : Shielded room

Test personnel :

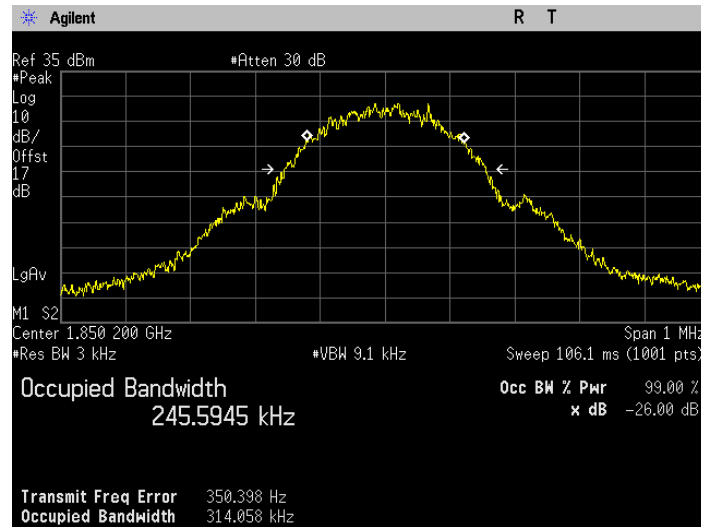
Tested by :

Chiaki Kanno

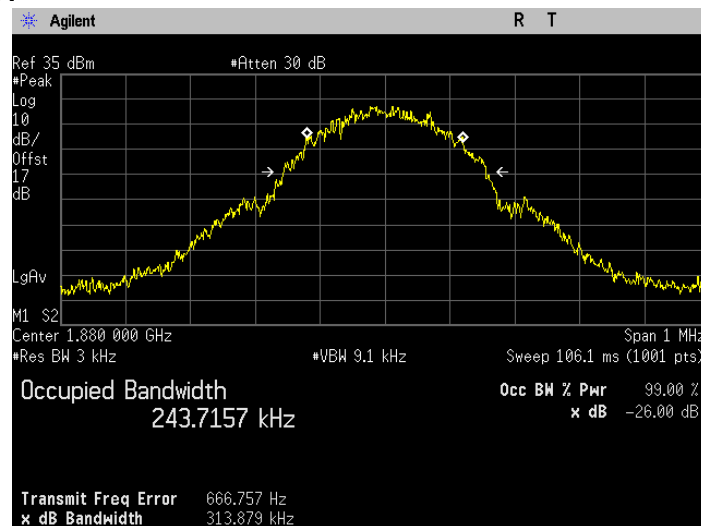
Band	Channel	Frequency (MHz)	Test Result (kHz)
GSM1900	512	1850.2	245.5945
	661	1880.0	243.7157
	810	1909.8	244.1262

7.4 Trace data
[GSM 1900]

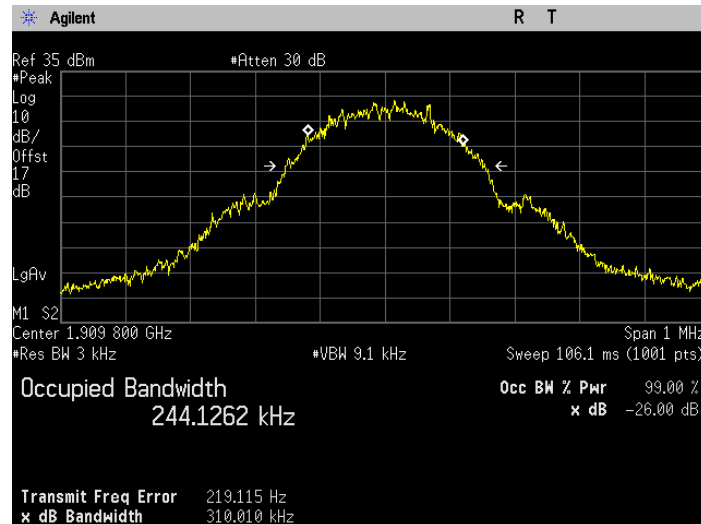
Channel: 512



Channel: 661



Channel: 810



8. Band Edge Spurious and Harmonic at Antenna Terminals

8.1 Measurement procedure [FCC 24.238(a), 2.1051]

The band edge spurious and harmonic was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;

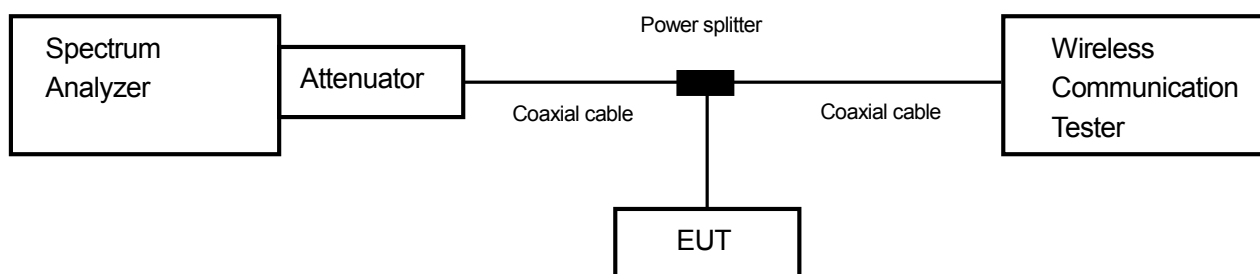
<Band Edge>

- RBW=3kHz, VBW=9.1kHz, Span=1MHz, Sweep=auto, Detector=Peak, Trace mode=Max hold

<Spurious Emissions>

- RBW=1MHz, VBW=3MHz, Span=Arbitrary setting, Sweep=auto, Detector=Peak, Trace mode=Max hold

- Test configuration



8.2 Limit

-13dBm or less

8.3 Measurement result

Date : May 8, 2013
 Temperature : 22.0 [°C]
 Humidity : 46.0 [%]
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

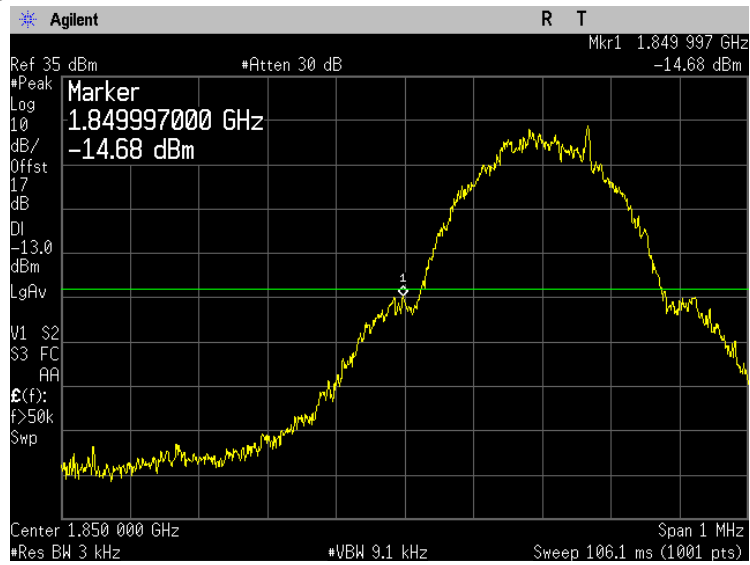
Band	Channel	Frequency [MHz]	Limit [dB]	Results	Results
GSM 1900	512	1850.2	-13	See the trace data	PASS
	661	1880.0	-13	See the trace data	PASS
	810	1909.8	-13	See the trace data	PASS



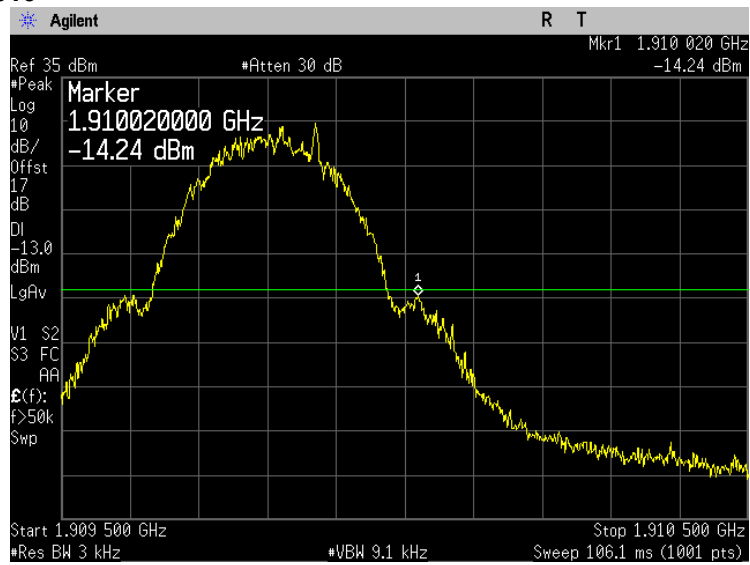
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8.4 Trace data
[GSM 1900]
(Band Edge)

Channel: 512



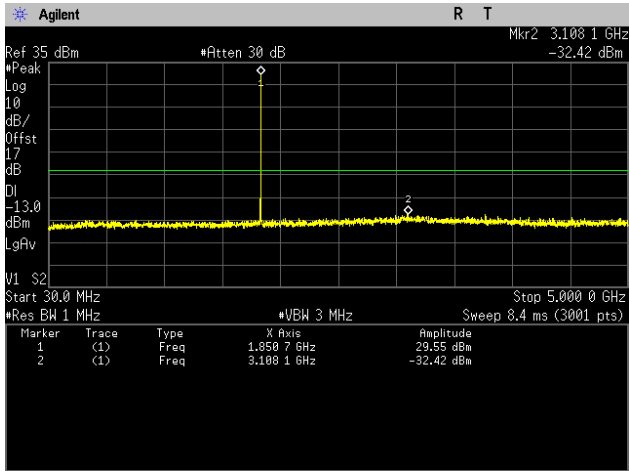
Channel: 810



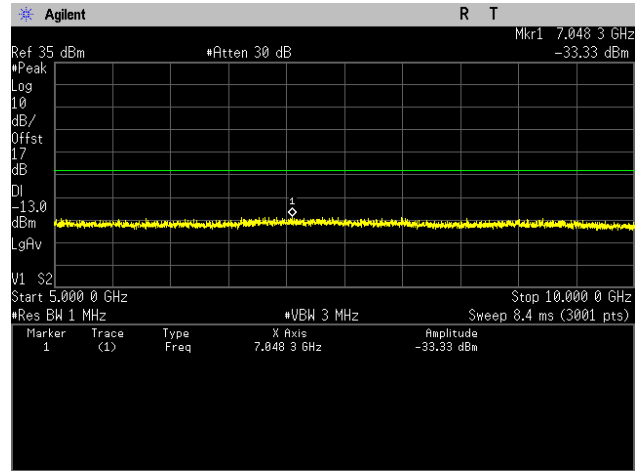


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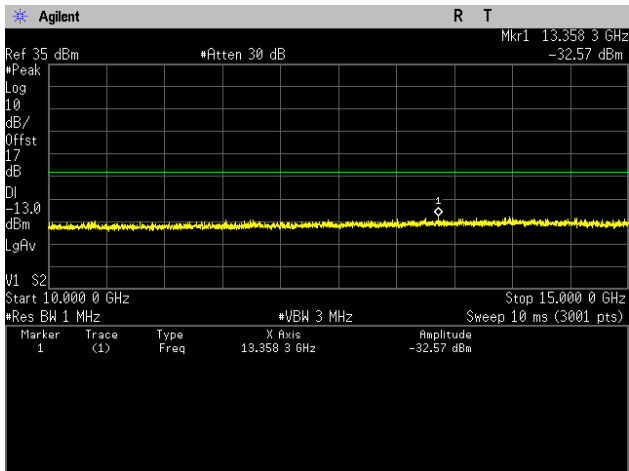
(Spurious Emissions)
Channel: 512
30MHz-5GHz



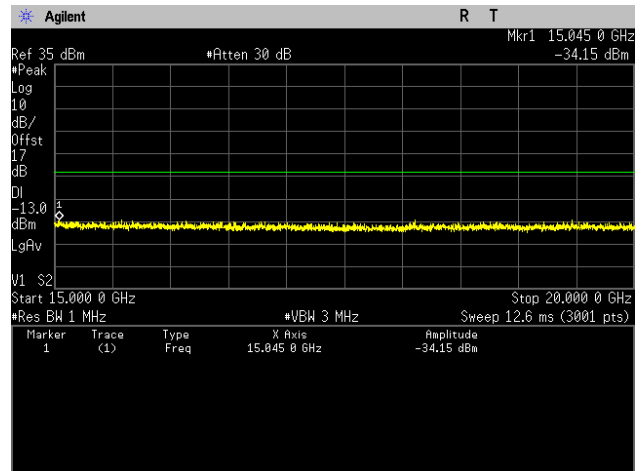
5GHz-10GHz



10GHz-15GHz



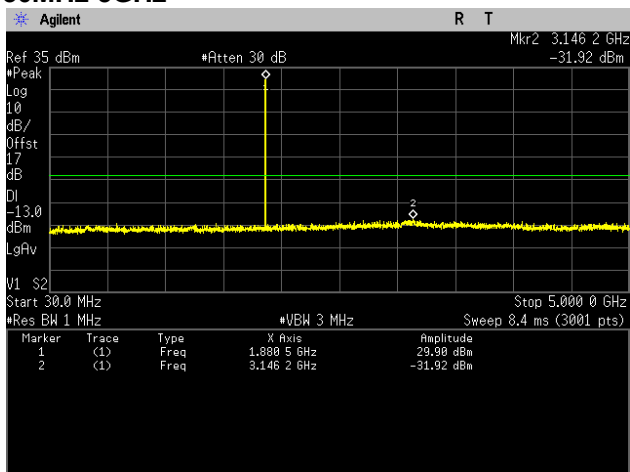
15GHz-20GHz



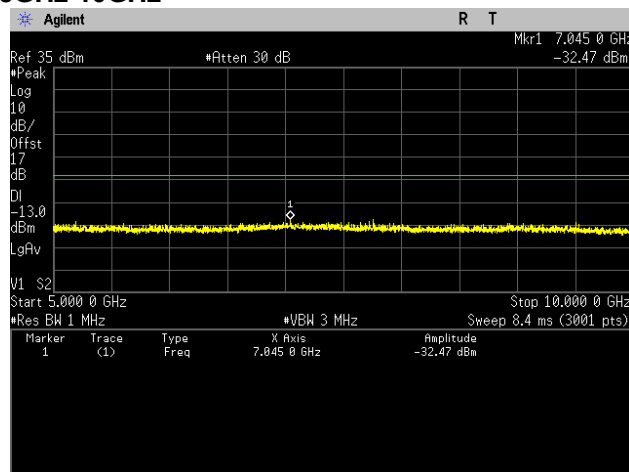


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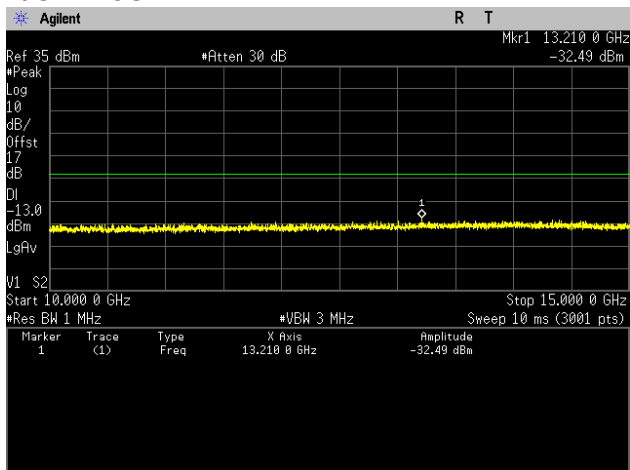
**Channel: 661
30MHz-5GHz**



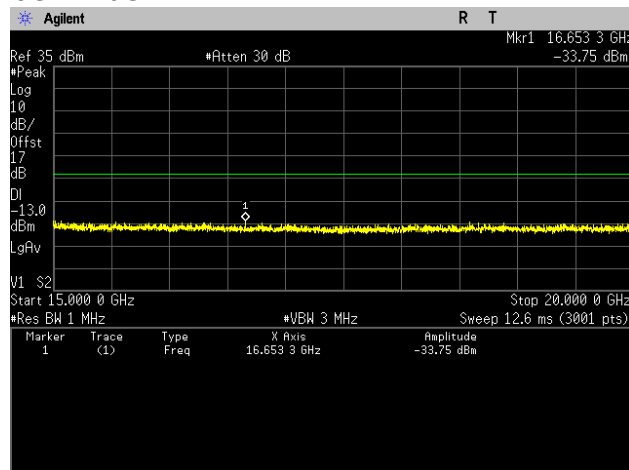
5GHz-10GHz



10GHz-15GHz



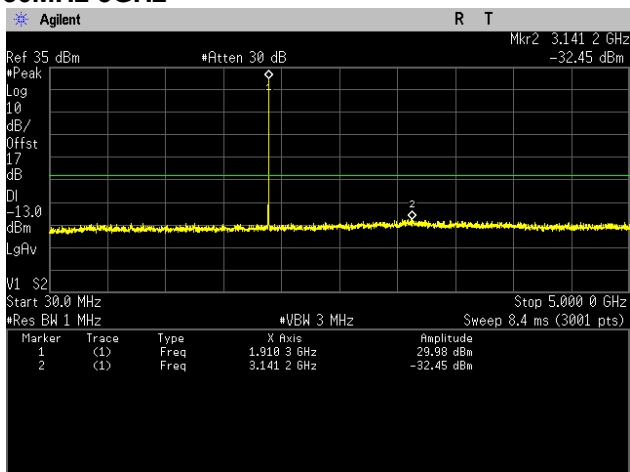
15GHz-20GHz



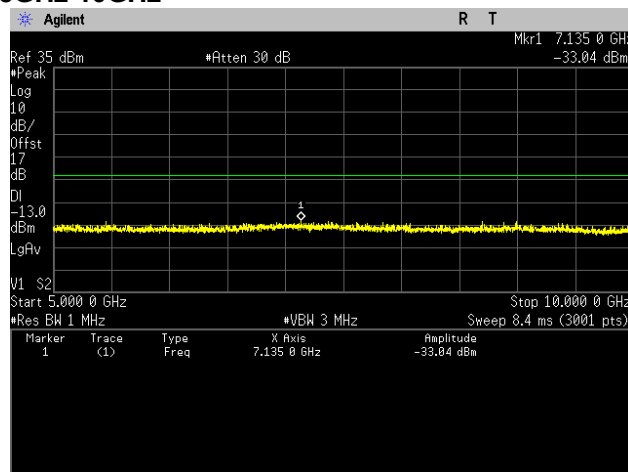


Zacta

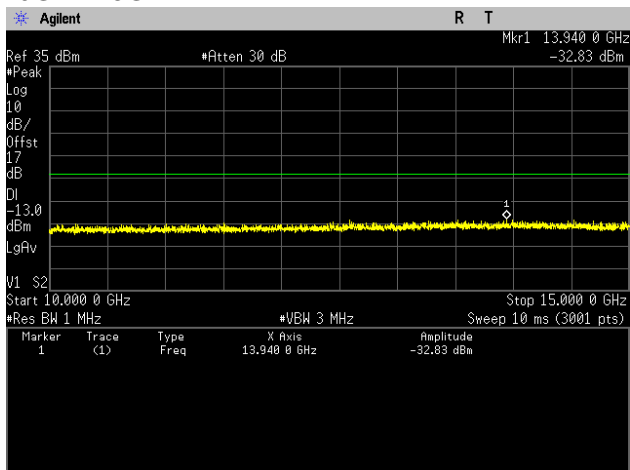
**Channel: 810
30MHz-5GHz**



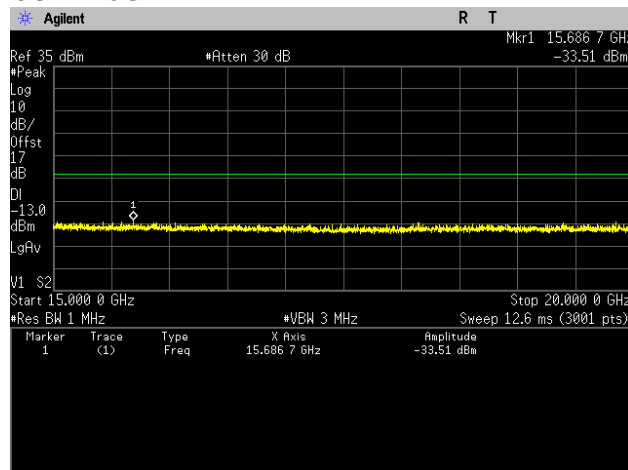
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz



9. Radiated Emissions and Harmonic Emissions

9.1 Measurement procedure [FCC 24.238(a), 2.1053]

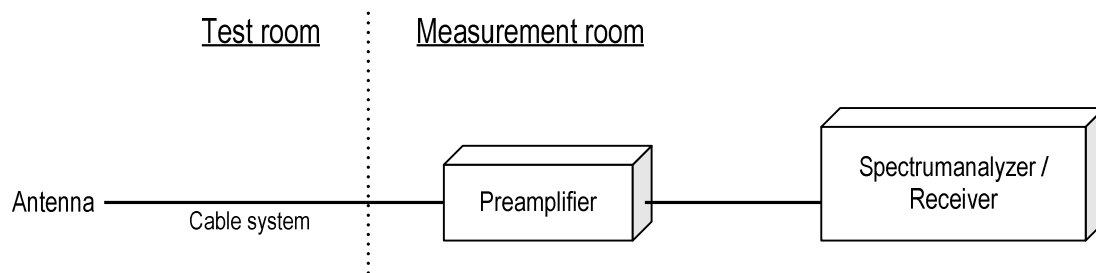
<Step 1>

The EUT and support equipment are placed on a 1 meter x 1.5 meter surface, 0.8 meter height FRP table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (TRILOG antenna and double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission. The bandwidth of the spectrum analyzer is set to 1MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission. The frequency is investigated up to 20GHz.

<Step 2>

The substitution antenna is replaced by the transmitter antenna (EUT). The frequency of the signal generator is adjusted to the measurement frequency. Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

- Test configuration



9.2 Calculation method

Result = S.G Reading – Cable loss + Antenna Gain

Margin = Limit – Result (EIRP)

9.3 Limit

-13dBm or less

9.4 Test data

Date : May 17, 2013
 Temperature : 23.0 [°C]
 Humidity : 58.0 [%]
 Test place : 3m Semi-anechoic chamber

Test personnel :

Tested by :

Chiaki Kanno

[GSM 1900] (Channel: 512)

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	3700.4	-49.7	-43.3	1.6	7.2	-37.7	-13.0	24.7
V	3700.4	-50.3	-42.2	1.6	7.2	-36.6	-13.0	23.6
H	5550.0	-54.4	-43.6	1.9	8.8	-36.8	-13.0	23.8
V	5550.0	-53.9	-44.3	1.9	8.8	-37.5	-13.0	24.5

(Channel: 661)

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	3760.2	-52.8	-46.1	1.6	7.1	-40.6	-13.0	27.6
V	3760.0	-50.1	-41.2	1.6	7.1	-35.7	-13.0	22.7
H	5640.0	-57.0	-47.3	2.0	9.1	-40.2	-13.0	27.2
V	5640.0	-54.2	-44.1	2.0	9.1	-37.0	-13.0	24.0

(Channel: 810)

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	3819.4	-50.6	-43.3	1.6	7.0	-37.9	-13.0	24.9
V	3819.7	-49.1	-40.1	1.6	7.0	-34.7	-13.0	21.7
H	5729.0	-52.6	-41.0	2.0	9.4	-33.6	-13.0	20.6
V	5729.0	-53.4	-43.1	2.0	9.4	-35.7	-13.0	22.7

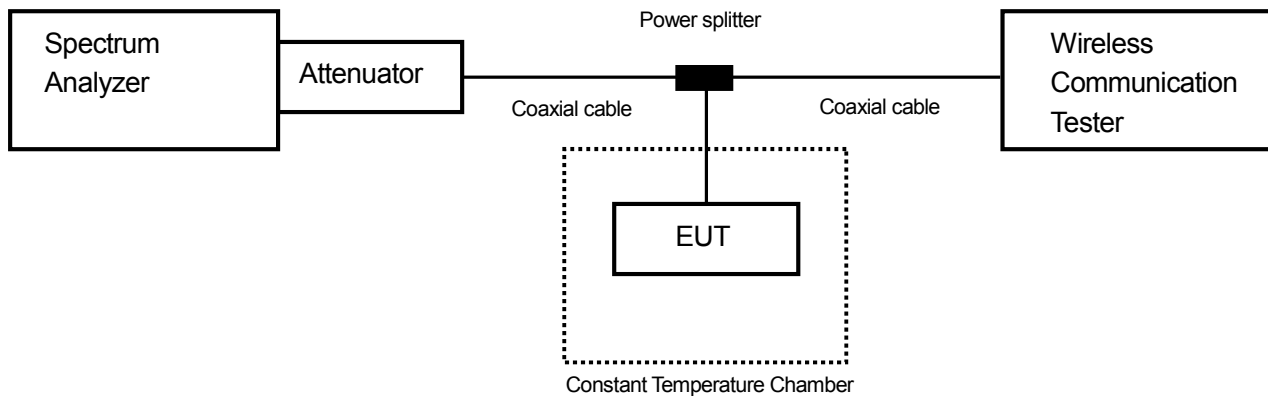
Note: No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.

10. Frequency Stability

10.1 Measurement procedure [FCC 24.235, 2.1055]

The EUT was placed inside of a constant temperature chamber as the temperature in the chamber was varied between -30°C and $+50^{\circ}\text{C}$. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each measurement. The frequency drift was measured with the normal Temperature and voltage tolerance and it is presented as the ppm unit.

- Test configuration



10.2 Limit

$\pm 2.5\text{ppm}$

10.3 Measurement result

Date : May 9, 2013
 Temperature : 25.0 [°C]
 Humidity : 48.0 [%]
 Test place : Shielded room

Test personnel

Tested by :

Chiaki Kanno

[GSM 1900]

(Channel: 661)

Limit: $\pm 0.00025\% = \pm 2.5\text{ppm}$					
Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [ppm]	Limit [ppm]	Result
3.80	25(Ref.)	1,879,999,974	0.000	± 2.5	PASS
	50	1,879,999,972	-0.001	± 2.5	PASS
	40	1,879,999,971	-0.002	± 2.5	PASS
	30	1,879,999,972	-0.001	± 2.5	PASS
	20	1,879,999,976	0.001	± 2.5	PASS
	10	1,879,999,975	0.001	± 2.5	PASS
	0	1,879,999,976	0.001	± 2.5	PASS
	-10	1,879,999,978	0.002	± 2.5	PASS
	-20	1,879,999,977	0.002	± 2.5	PASS
	-30	1,879,999,971	-0.002	± 2.5	PASS
3.23	25	1,879,999,972	-0.001	± 2.5	PASS
4.37	25	1,879,999,971	-0.002	± 2.5	PASS
3.20	25	1,879,999,974	0.000	± 2.5	PASS

Calculation;

$$\text{Frequency Tolerance (ppm)} = \frac{\text{Measurements Frequency (Hz)} - \text{Reference Frequency (Hz)}}{\text{Reference Frequency (Hz)}} \times 1000000$$



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11. Antenna requirement

According to FCC section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The antenna is a special antenna mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of FCC section 15.203.

12. Uncertainty of measurement

Expanded uncertainties stated are calculated with a coverage Factor $k=2$.

Please note that these results are not taken into account when determining compliance or non-compliance with test result.

Test item	Measurement uncertainty
Conducted emission at mains port	$\pm 3.0\text{dB}$
Radiated emission (9kHz – 30MHz)	$\pm 4.4\text{dB}$
Radiated emission (30MHz – 1000MHz)	$\pm 4.5\text{dB}$
Radiated emission (1000MHz – 26GHz)	$\pm 3.9\text{dB}$



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13. Laboratory description

1. Location:

TÜV SÜD Zacta Ltd. Yonezawa Testing Center
4149-7 Hachimanpara 5-chome Yonezawa-shi Yamagata 992-1128 Japan
Phone: +81-238-28-2880 Fax: +81-238-28-2888

2. Facility filing information:

1) NVLAP accreditation: NVLAP Lab. code: 200306-0

2) VLAC accreditation: Lab. code: VLAC-013

Site name	Radiated emission	Conducted emission for mains port	Conducted emission for telecom port	Radiated emission (CMAD)	Expiry Date
10m Semi-anechoic chamber	VLAC-013			VLAC-013	Jul. 3, 2013
3m Semi-anechoic chamber				-	
Shielded room No.1	-	VLAC-013		-	

3) FCC filing:

Site name	Registration Number	Expiry Date
Site 2	91065	Oct.31, 2014
Site 3		
10m Semi-anechoic chamber	540072	Jan. 9, 2016
3m Semi-anechoic chamber		
Shielded room No.1		

4) Industry Canada Oats site filing:

Site name	Sites on file: Oats 3m/10m	Expiry Date
Site 2	4224A-2	Jan. 23, 2015
Site 3	4224A-3	
3m Semi-anechoic chamber	4224A-4	
10m Semi-anechoic chamber	4224A-5	

5) VCCI site filing:

Site name	Radiated emission	Conducted emission for mains port	Expiry Date	Conducted emission for telecom port	Expiry Date
Site 2	R-137	C-133	Nov. 16, 2014	T-1221	Nov. 28, 2014
Site 3	R-138	C-134		T-1222	
10m Semi-anechoic chamber	R-2480	C-2722	Jul. 3, 2013	T-1474	Jul. 3, 2013
	G-81	-		-	-
3m Semi-anechoic chamber	R-2481	C-2723		T-1475	Jul. 3, 2013
	G-82	-		-	-
Shielded room No.1	-	C-2724		T-1476	Jul. 3, 2013

6) TÜV SÜD PS authorization:

Authorized as an EMC test laboratory

7) TÜV Rheinland authorization:

Authorized as an EMC test laboratory

Appendix A. Test equipment

[Antenna port conducted test]

Equipment	Company	Model No.	Serial No.	Cal. due	Cal. date
Spectrum analyzer	Agilent Technologies	E4440A	US40420937	Oct. 2013	Oct. 19, 2012
Microwave cable	RS	YH20_S1	N/A (S389)	Aug. 2013	Aug. 30, 2012
Microwave cable	SUHNER	SUCOFLEX104/1.5m	199121/4	Oct. 2013	Oct. 7, 2012
Microwave cable	SUHNER	SUCOFLEX104/1.5m	322086/4	Jul. 2013	Jul. 30, 2012
Attenuator	Weinschel	56-10	J4180	Nov. 2013	Nov. 12, 2012
Power splitter	ANRITSU	K240B	020205	Nov. 2013	Nov. 12, 2012
Wideband radio frequency tester	ROHDE&SCHWARZ	CMW500	126079	Jul. 2013	Jul. 20, 2012
Operation type temperature controlled bath	Espec	PL3KP	14016727	Dec. 2013	Dec. 27, 2012

Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ECSI	100764	Jul. 2013	Jul. 6, 2012
Preamplifier	ANRITSU	MH648A	M96057	Jun. 2013	Jun. 12, 2012
Loop antenna	ROHDE&SCHWARZ	HFH2-Z2	892246/010	Sep. 2013	Sep. 14, 2012
TRILOG Antenna	Schwarzbeck	VULB9160	9160-3218	May 2014	May 2, 2012
Attenuator	TME	CFA-01NPJ-6	N/A (S274)	Jun. 2013	Jun. 12, 2012
Spectrum analyzer	Agilent Technologies	E4447A	MY46180188	Mar. 2014	Mar. 8, 2013
Preamplifier	Agilent Technologies	8449B	3008A1008	Dec. 2013	Dec. 9, 2012
Double ridged guide antenna	EMCO	3115	4328	Jan. 2014	Jan. 21, 2013
Attenuator	AEROFLEX	40A-03	081217-20	Feb. 2014	Feb. 23, 2013
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170189	May 2015	May 2, 2013
Preamplifier	TSJ	MLA-1840-B03-35	1240332	May 2015	May 2, 2013
Double ridged guide antenna	EMCO	3115	00058532	Aug. 2013	Aug. 31, 2012
Signal generator	ROHDE&SCHWARZ	SMB100A	100341	Oct. 2013	Oct. 2, 2012
Signal generator	ROHDE&SCHWARZ	SMR27	839256/034	Jan. 2014	Jan. 30, 2013
Microwave cable	SUHNER	SUCOFLEX104/1.5m	199121/4	Oct. 2013	Oct. 7, 2012
Wideband radio frequency tester	ROHDE&SCHWARZ	CMW500	126079	Jul. 2013	Jul. 20, 2012
Microwave cable	SUHNER	SUCOFLEX104/9m	346316/4	Oct. 2013	Oct. 6, 2012
		SUCOFLEX104/1m	322084/4	Oct. 2013	Oct. 6, 2012
		SUCOFLEX104/1.5m	317226/4	Oct. 2013	Oct. 6, 2012
		SUCOFLEX104/7m	41625/6	Oct. 2013	Oct. 6, 2012
PC	DELL	DIMENSION E521	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/RE-AJ	0611193/V5.3.61	N/A	N/A
3m Semi-anechoic chamber	TOKIN	N/A	N/A (9002-NSA)	May 2013	May 19, 2012