

# TEST REPORT

For

**Mobile Base Station**

In conformity with

**FCC Part24 (01 October, 2008)  
IC RSS-133 Issue5 (February 2009)**

**Model: RTR-500GSM**

**FCC ID/ IC Certification No: SRD10010 / 5558A-10010**

**Test Item: Mobile Base Station**

**Report No: RY0908Z03R1**

**Issue Date: 3 August, 2009**

**Prepared for**

T&D CORPORATION  
817-1, Shimadachi, Matsumoto, Nagano, Japan, 390-0852

**Prepared by**

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## Table of Contents

<b>1</b>	<b>General information .....</b>	<b>3</b>
1.1	Product description .....	3
1.2	Test(s) performed/ Summary of test result .....	3
1.3	Test facility .....	4
1.4	Measurement uncertainty .....	4
1.5	Description of essential requirements and test results.....	5
1.5.1	Transmitter requirements .....	5
1.5.2	Receiver requirements.....	5
1.5.3	AC Power Line Parameters.....	5
1.5.4	Normal test conditions .....	5
1.5.5	Extreme test conditions .....	5
1.6	Setup of equipment under test (EUT) .....	6
1.6.1	Test configuration of EUT .....	6
1.6.2	Operating condition: .....	6
1.6.3	Setup diagram of tested system:.....	7
1.7	Equipment modifications .....	7
1.8	Deviation from the standard.....	7
<b>2</b>	<b>Test procedure and result.....</b>	<b>8</b>
2.1	Transmitter requirements .....	8
2.1.1	Carrier Output Power (Conducted).....	8
2.1.2	Carrier Output Power (Radiated) .....	9
2.1.3	Frequency Stability (Temperature) .....	11
2.1.4	Frequency Stability (Voltage).....	13
2.1.5	Occupied Bandwidth.....	15
2.1.6	Transmitter Out of Band Spurious Emissions (Conducted).....	17
2.1.7	Transmitter Out of Band Spurious Emissions (Radiated).....	20
2.1.8	Band Edge Emissions.....	24
2.1.9	Transmitter AC Power Line Emission requirement.....	26
2.2	Receiver requirement .....	29
2.2.1	Receiver Spurious Emissions (Radiated).....	29
2.2.2	Receiver AC Power Line Emission requirement .....	32
2.3	Maximum Permissible Exposure (Exposure of Humans to RF Fields).....	34
<b>3</b>	<b>Test setup photographs.....</b>	<b>35</b>
<b>4</b>	<b>List of utilized test equipment/ calibration .....</b>	<b>37</b>

## History

Report No.	Issue Date	Revision Contents	Issued by
RY0908Z03R1	3 August, 2009	Initial Issue	K.Ohnishi

## 1 General information

### 1.1 Product description

Test item : Mobile Base Station  
Manufacturer : T&D CORPORATION  
Address : 817-1, Shimadachi, Matsumoto, Nagano, Japan 390-0852  
Model : RTR-500GSM  
FCC ID : SRD10010  
IC Certification No. : 5558A-10010  
Operating frequency range : TX 1850.2-1909.8 MHz (PCS1900)  
: RX 1930.2-1989.8 MHz (PCS1900)  
Type of Modulation : GMSK  
Receipt date of EUT : 19 June, 2009  
Nominal power voltages : 6.0 VDC (Battery)  
: 12.0 VDC (Ext. Power Connector)  
: 120 VAC (AC charger)  
Power Class : 1 (Maximum power 30dBm nominal)  
Antenna Type : Dipole Antenna (Detachable) Reverse SMA Connector  
Antenna Gain : 0 dBi (Manufacturer declared)  
Serial numbers : 3E9E0001

### 1.2 Test(s) performed/ Summary of test result

Applicable Standard(s) : FCC Part24 (01 October, 2008), RSS-133 Issue5 (February 2009)  
Test(s) started : 25 July, 2009  
Test(s) completed : 02 August, 2009  
Purpose of test(s) : Grant for Certification of FCC / IC  
Summary of test result : Complied

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.

The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.

Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer :   
K. Ohnishi (Engineer, EMC testing department)

Reviewer :   
T. Ikegami (Manager, EMC testing department)

### 1.3 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at RF Technologies Ltd., located in 472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 01, 2008.

The description of the test facilities has been filed under registration number 319924 at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Each registered facility number is as follows;

Test site (Semi-anechoic chamber 3m) R-2393

Test site (Shielded room) C-2617

Registered by Industry Canada (IC): The registered facility number is as follows

Test site No.1 (Semi-anechoic chamber 3m): 6974A-1

Accredited by **National Voluntary Laboratory Accreditation Program (NVLAP)** for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



NVLAP LAB CODE 200780-0

### 1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in “Guide to the expression of uncertainty in measurement (GUM)” published by ISO. The Lab’s uncertainty is determined by referring UKAS Publication LAB34: 2002 “The Expression of Uncertainty in EMC Testing” and CISPR16-4-2: 2003 “Uncertainty in EMC Measurements”.

The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

RF frequency:  $\pm 1 \times 10^{-7}$

RF power conducted:  $\pm 1.0$  dB

AC power line emission:  $\pm 1.9$  dB

Radiated emission (30 MHz - 1000 MHz):  $\pm 5.7$  dB

Radiated emission (1 GHz - 20 GHz):  $\pm 5.8$  dB

Temperature:  $\pm 1$  degree

Humidity:  $\pm 5$  %

## 1.5 Description of essential requirements and test results

An overview of radio requirements, as laid out in FCC Part24, RSS-133 are given below.

### 1.5.1 Transmitter requirements

Test Description	Section in this report	Applicable	Result
Carrier Output Power (Conducted)	2.1.1	Yes	Passed
Carrier Output Power (Radiated)	2.1.2	Yes	Passed
Frequency Stability (Temperature Variation)	2.1.3	Yes	Passed
Frequency Stability (Voltage Variation)	2.1.4	Yes	Passed
Occupied Bandwidth	2.1.5	Yes	Passed
Out of Band Emissions (Conducted)	2.1.6	Yes	Passed
Out of Band Emissions (Radiated)	2.1.7	Yes	Passed
Band Edge Emissions	2.1.8	Yes	Passed

### 1.5.2 Receiver requirements

Test Description	Section in this report	Applicable	Result
Spurious Radiated Emissions	2.2.1	Yes	Passed

### 1.5.3 AC Power Line Parameters

Test Description	Section in this report	Applicable	Result
AC power line Spurious Emissions (Idle mode)	2.3.1	Yes	Passed
AC power line Spurious Emissions (Traffic mode)	2.3.2	Yes	Passed

### 1.5.4 Normal test conditions

Temperature (*)	: +15 degC to +35 degC
Relative humidity (*)	: 20 % to 75 %
Supply voltage	: 6.0 VDC (Battery)
	: 12.0 VDC (Ext. Power Connector)
	: 120VAC (AC charger)
Measurement Frequency	: 1850.2 MHz (512ch), 1880.0 MHz (661ch), 1909.8 MHz (810ch)

\* When it is impracticable to carry out tests under these conditions, a note to this effect, stating the ambient temperature and relative humidity during the tests, must be stated separately.

### 1.5.5 Extreme test conditions

Temperature	: -10 °C (min) to +50 °C (max) (Manufacturer declaration)
Supply voltage	: 6.0 VDC (New battery)
	: 8.0 VDC (min) to 34.0 VDC (max) (Ext. Power Connector)
	: 102 VAC (min) to 138 VAC (max) (AC charger)

## 1.6 Setup of equipment under test (EUT)

### 1.6.1 Test configuration of EUT

#### Equipment(s) under test:

	Item	Manufacturer	Model No.	Serial No.	Remarks
A	Mobile Base Station	T&D CORPORATION	RTR-500GSM	3E9E0001	
B	Alkaline Battery	TOSHIBA	-	-	SIZE: AA (4pcs)

#### Support Equipment(s):

	Item	Manufacturer	Model No.	Serial No.
C	AC Adapter	T&D CORPORATION	AD-0605	-

#### Connected cable(s):

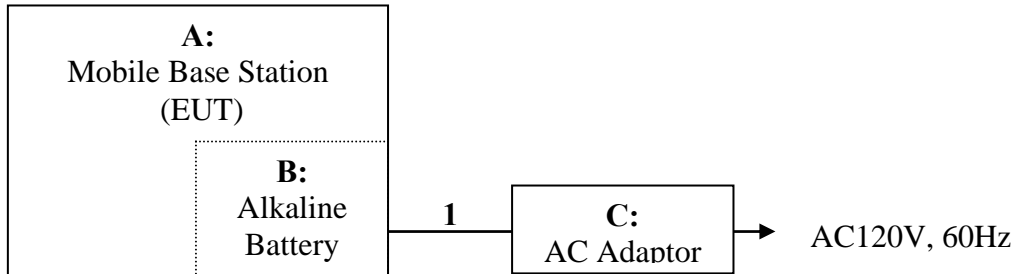
No.	Item	Identification (Manu.e.t.c)	Shielded YES / NO	Ferrite Core YES / NO	Connector Type Shielded YES / NO	Length (m)
1	DC power cable	T&D CORPORATION	No	No	No	1.85
2	DC power cable	T&D CORPORATION	No	No	No	2.00

### 1.6.2 Operating condition:

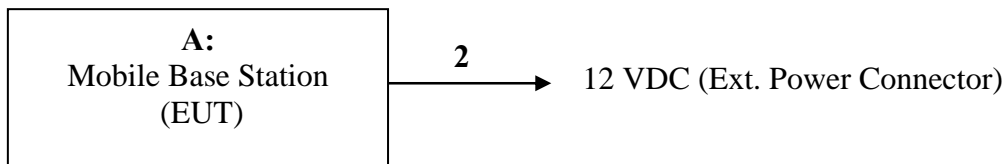
Traffic mode : EUT is connected with RF tester in Max power level. (Normal and GPRS mode)  
 Idle mode : EUT is under idle mode, no output power is transmitted.

## 1.6.3 Setup diagram of tested system:

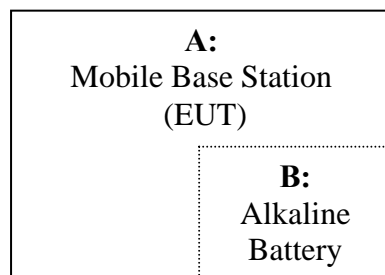
[Configuration I]



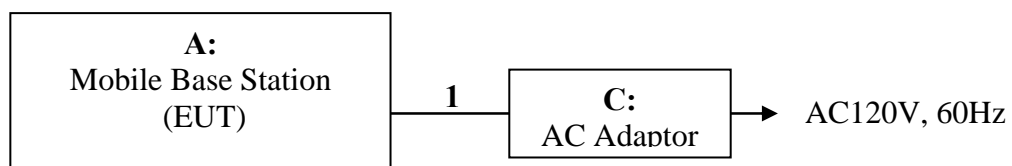
[Configuration II]



[Configuration III]



[Configuration IV]



## 1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

## 1.8 Deviation from the standard

No deviations from the standards described in clause 1.2.

## 2 Test procedure and result

### 2.1 Transmitter requirements

#### 2.1.1 Carrier Output Power (Conducted)

##### Reference Standard

FCC: Part24.232, 2.0146

IC : RSS133 Issue5 Sec6.4, SRSP-510 Issue4 Sec5.1.2

##### Test Conditions

Date: 29 July, 2009  
 Ambient Temperature: 25 degC  
 Relative humidity: 65 %  
 Test Voltage: 120 VAC (AC charger)

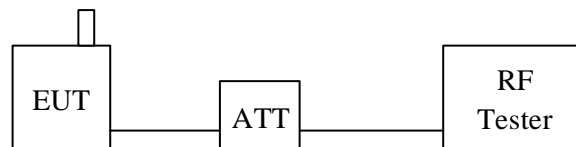
##### Test Sample

Configuration I

##### Test Method

- a) EUT is connected to RF tester with pseudo random data modulation and set to maximum output power level.
- b) The peak output power is measured with RF tester (CMU200 etc.).

##### Test Setup



##### Test Data

Channel	Frequency (MHz)	Output Power (dBm)		Limit (dBm)	Result
		Normal	GPRS		
Bottom (512ch)	1850.2	29.6	29.7	33.0	Pass
Middle (661ch)	1880.0	29.7	29.6	33.0	Pass
Top (810ch)	1909.8	29.5	29.5	33.0	Pass

##### Test Equipment Used

Equipment name	RFT ID No.
RF tester	RC02

##### Test Result

The EUT met the requirements of the standard for this test.

EUT can employ a power control function that output power can be controlled from +30dBm to +0dBm (nominal) by 2dB step. So EUT meet the requirement of Part24.232(c).



## 2.1.2 Carrier Output Power (Radiated)

### Reference Standard

FCC: Part24.232, 2.0146

IC : RSS133 Issue5 Sec6.4, SRSP-510 Issue4 Sec5.1.2

### Test Conditions

Date: 28 July, 2009  
Ambient Temperature: 25 degC  
Relative humidity: 65 %  
Test Voltage: 120 VAC (AC charger)

### Test Sample

Configuration I

### Test Method

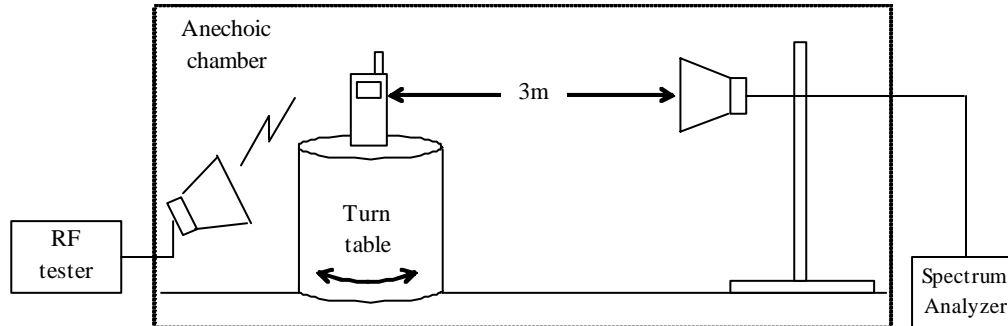
Substitution method is used for this test.

- a) EUT is set on non-conducting turntable and the output power is set to the maximum level.
- b) As a receive antenna, Horn antenna is used for high frequency range (above 1GHz), and Biological antenna is used for low frequency range (30MHz to 1GHz).
- c) Maximum peak power is measured by a spectrum analyzer (SA) in below conditions.
  - Turntable is rotated 360 degrees.
  - The height of receive antenna is changed from 1m to 4m.
  - Receive antenna polarization is set to vertical and horizontal.
  - This maximum peak power is recorded.
  - During this measurement, receive antenna is adjusted the direction to keep the EUT within the beamwidth of receive antenna.
- d) Reference antenna is replaced with EUT, and connected with signal generator (SG).  
SG output power is adjusted to get same level as the recorded maximum radiated EUT power by SA.
- e) Radiated output power (Pout) is calculated with adjusted SG output (Psg) [dBm], reference antenna gain (Gref) [dBi] and cable loss between SG and reference antenna (Lcab) [dB].

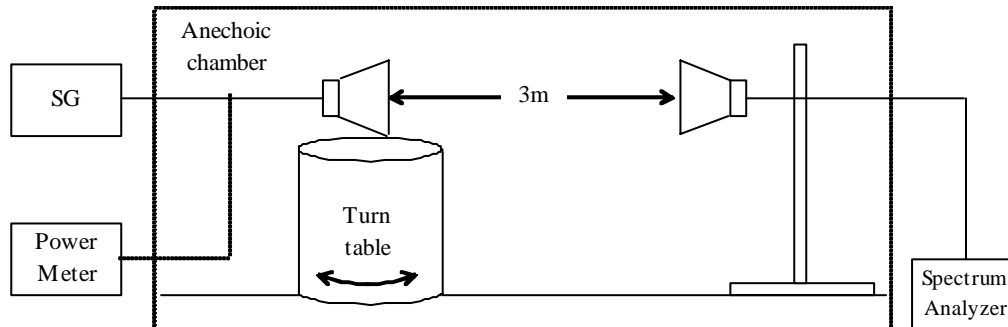
$$P_{out} [\text{dBm e.i.r.p}] = P_{sg} + G_{ref} + L_{cab}$$

## Test Setup

[Measurement]



[Substitution]



## Test Data

Channel	Frequency (MHz)	Output Power(dBm e.i.r.p)		Limit (dBm e.i.r.p)	Result
		Normal	GPRS		
Bottom (512ch)	1850.2	32.5	32.9	33.0	Pass
Middle (661ch)	1880.0	32.4	32.5	33.0	Pass
Top (810ch)	1909.8	31.4	32.1	33.0	Pass

## Test Equipment Used

Equipment name	RFT ID No.
Spectrum Analyzer	TR06
Receive Antenna	DH02
Reference Antenna	DH01
Signal Generator	SG05
Power Meter	PM03
RF tester	RC02

## Test Result

The EUT met the requirements of the standard for this test.

### 2.1.3

## Frequency Stability (Temperature)

### Reference Standard

FCC: Part24.235, 2.1055  
IC : RSS133 Issue5 Sec6.3

### Test Conditions

Date: 28 July, 2009  
Ambient Temperature: 25 degC  
Relative humidity: 65 %  
Test Voltage: 120 VAC (AC Charger)

### Test Sample

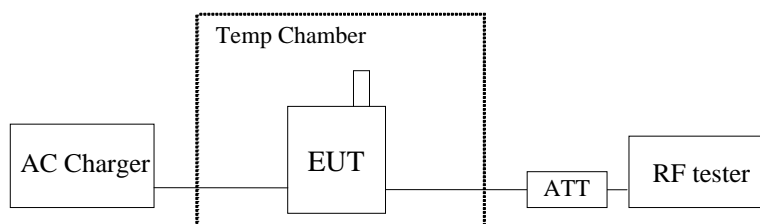
Configuration I

### Test Method

To measure the carrier frequency, “Frequency error measurement” function of RF tester is used.

- a) EUT is hold about 30 minutes under measurement temperature condition.
- b) EUT is powered on with nominal voltage.
- c) EUT is connected to RF tester with Max transmit power level.
- d) Frequency error is measured by RF tester. Process b) to d) must be finished within 2 minutes to prevent EUT warming.
- e) Process a) to d) is repeated at 10deg increments from -10 to +50degC.

### Test Setup



**Test Data****Middle Channel (661ch, Nominal Freq.:1880.0MHz)**

Temperature (deg C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Result
-10	-53	-0.03	± 2.5	Passed
0	-55	-0.03	± 2.5	Passed
10	-58	-0.03	± 2.5	Passed
20	-63	-0.03	± 2.5	Passed
30	-58	-0.03	± 2.5	Passed
40	-50	-0.03	± 2.5	Passed
50	53	0.03	± 2.5	Passed

**Test Equipment Used**

Equipment name	RFT ID No.
RF tester	RC02

**Test Result**

The EUT met the requirements of the standard for this test

**2.1.4**

## Frequency Stability (Voltage)

### Reference Standard

FCC: Part24.235, 2.1055  
IC : RSS133 Issue5 Sec6.3

### Test Conditions

Date: 29 July, 2009  
Ambient Temperature: 23 degC  
Relative humidity: 49 %  
Test Voltage: 6.0 VDC (New battery)  
8.0 VDC (min) to 34.0 VDC (max) (Ext. Power Connector)  
102VAC (min) to 138 VAC (max) (AC charger)

### Test Sample

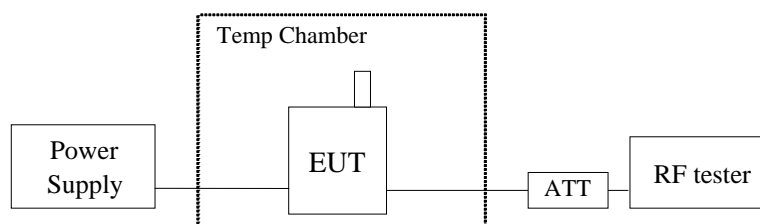
Configuration II, III, IV

### Test Method

To measure the carrier frequency, “Frequency error measurement” function of RF tester is used.

- a) EUT is powered on with nominal voltage. Temperature is 20degC.
- b) EUT is connected to RF tester with Max transmitter power level.
- c) Frequency error is measured by RF tester.
- d) Process a) to c) is repeated at minimum and maximum voltage condition.

### Test Setup



**Test Data****Middle Channel (661ch, Nominal Freq.:1880.0MHz)****New Battery (Configuration III)**

Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Result
6.0V	-53	-0.03	± 2.5	Passed

**Ext. Power Connector (Configuration II)**

Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Result
8.0	-45	-0.02	± 2.5	Passed
12.0	-56	-0.03	± 2.5	Passed
34.0	-45	-0.02	± 2.5	Passed

**AC Charger (Configuration IV)**

Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Result
102	-54	-0.03	± 2.5	Passed
120	-56	-0.03	± 2.5	Passed
138	-52	-0.03	± 2.5	Passed

**Test Equipment Used**

Equipment name	RFT ID No.
RF tester	RC02

**Test Result**

The EUT met the requirements of the standard for this test

## 2.1.5 Occupied Bandwidth

### Reference Standard

FCC: Part24.238

IC : RSS-Gen Issue2 Sec4.6.1

### Test Conditions

Date: 29 July, 2009  
 Ambient Temperature: 23 degC  
 Relative humidity: 49 %  
 Test Voltage: 120 VAC (AC charger)

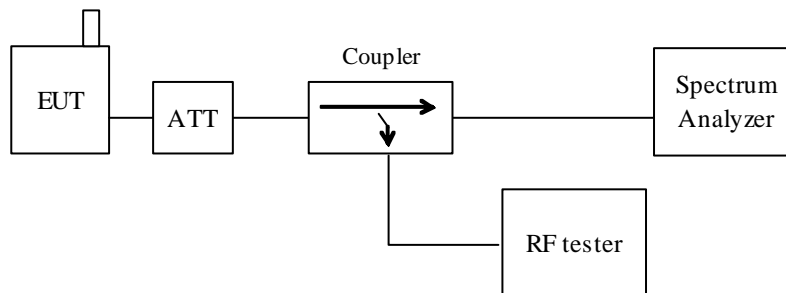
### Test Sample

Configuration I

### Test Method

- EUT is connected to RF tester with Max transmitter power level.
- 26dB bandwidth is measured by Spectrum Analyzer.
- 99% occupied bandwidth of transmitter spectrum is measured by Spectrum Analyzer.

### Test Setup



### Test Data

Channel	Frequency (MHz)	99% Bandwidth (kHz)	26dB Bandwidth (kHz)
Bottom (512ch)	1850.2	242	310
Middle (661ch)	1880.0	238	314
Top (810ch)	1909.8	244	312

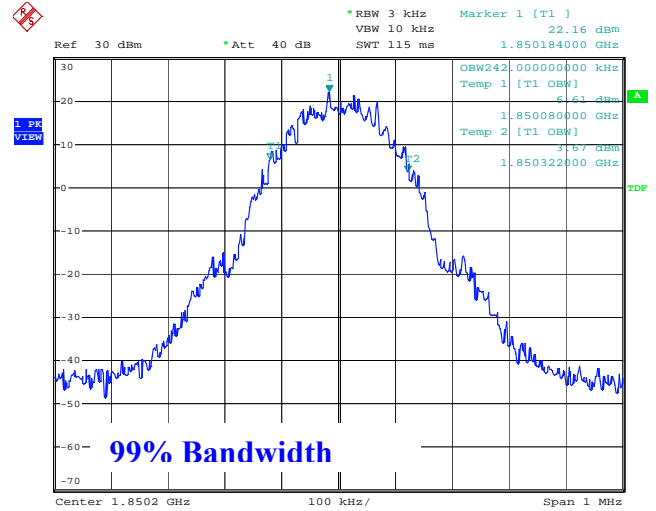
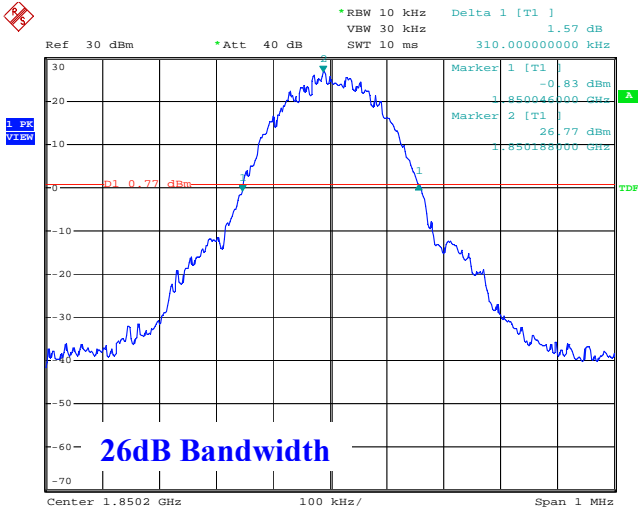
### Test Equipment Used

Equipment name	RFT ID No.
Spectrum Analyzer	SA06
RF tester	RC02

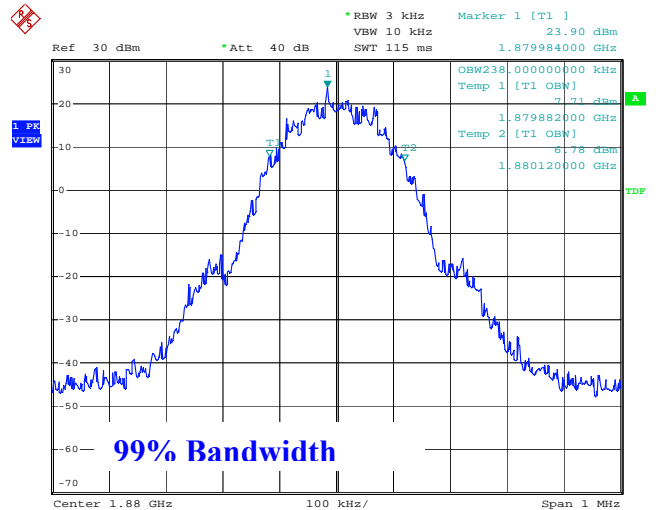
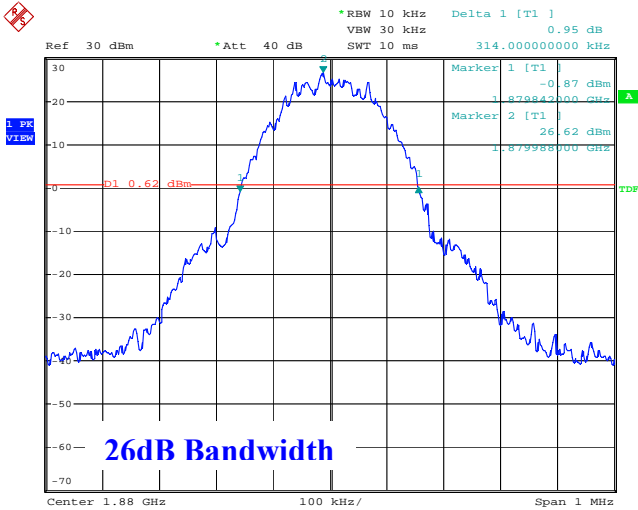
### Test Result

The EUT met the requirements of the standard for this test

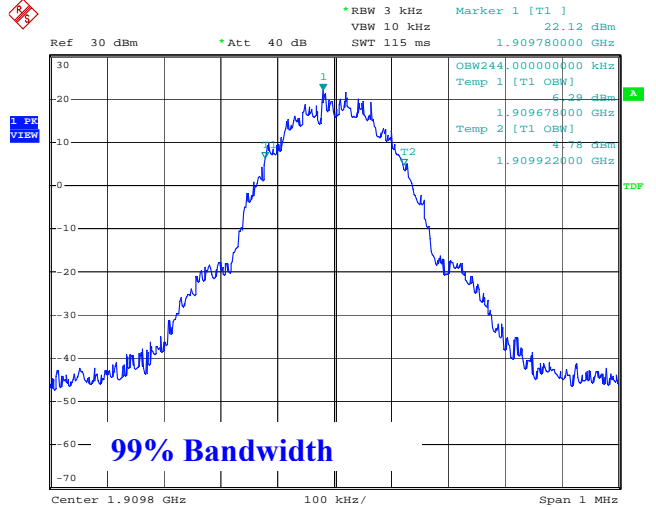
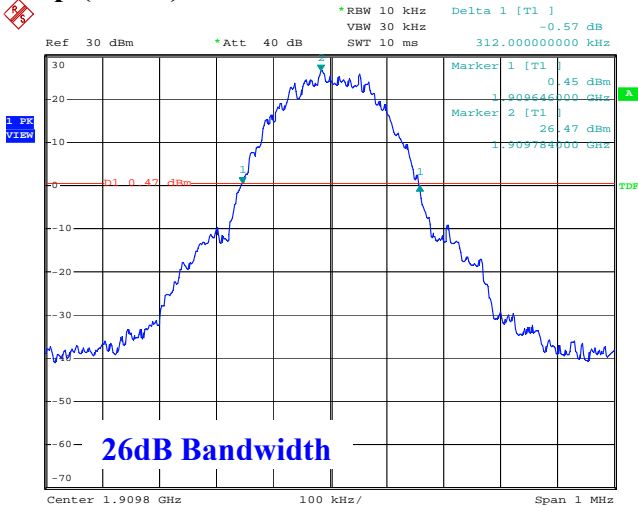
## Bottom (512ch)



## Middle (661ch)



## Top (810ch)





## 2.1.6 Transmitter Out of Band Spurious Emissions (Conducted)

### Reference Standard

FCC: Part24.238

IC : RSS133 Issue5 Sec6.5

### Test Conditions

Date: 29 July, 2009  
Ambient Temperature: 23 degC  
Relative humidity: 49 %  
Test Voltage: 120 VAC (AC charger)

### Test Sample

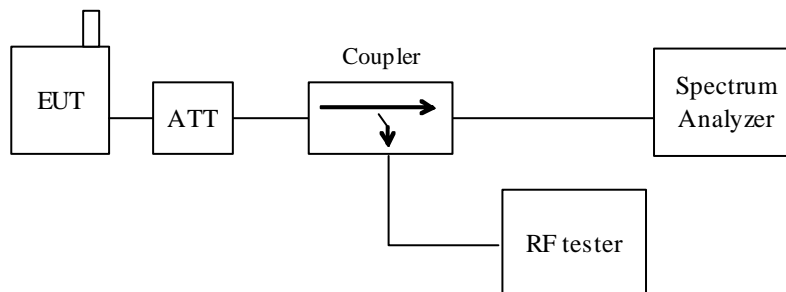
Configuration I

### Test Method

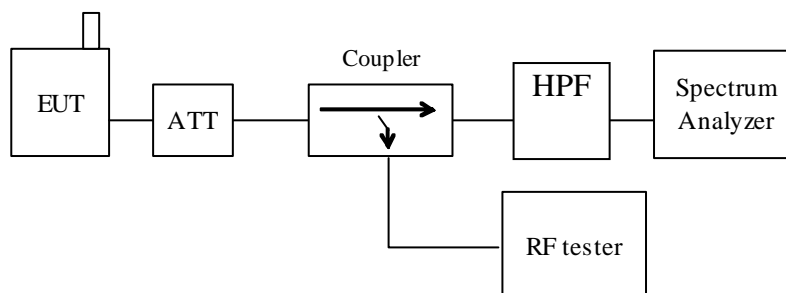
- EUT is connected to RF tester with Max transmitter power level.
- Out of band Spurious is measured by Spectrum Analyzer.
- Resolution band width of spectrum analyzer is set to 1MHz (above 1GHz) or 100 kHz (below 1GHz).

### Test Setup

30MHz to 3500MHz



above 3500MHz



## Test Equipment Used

Equipment name	RFT ID No.
Spectrum Analyzer	SA06
RF tester	RC02

## Test Result

The EUT met the requirements of the standard for this test.

## Test Data

### Bottom Channel (512ch, Nominal Freq.:1850.2MHz)

Measurement Frequency (MHz)	Measurement Bandwidth (MHz)	Emission Level (dBm)	Limit (dBm)	Result Pass/Fail
3700.4	1	-51.54	-13.00	Pass
5550.6	1	-56.60	-13.00	Pass
7400.8	1	-53.76	-13.00	Pass
9251.0	1	-53.63	-13.00	Pass
11101.2	1	-54.95	-13.00	Pass
12951.4	1	-55.78	-13.00	Pass
14801.6	1	-47.11	-13.00	Pass
16651.8	1	-46.76	-13.00	Pass
<b>18502.0</b>	<b>1</b>	<b>-45.86</b>	<b>-13.00</b>	<b>Pass</b>
7721.7	1	-53.39	-13.00	Pass

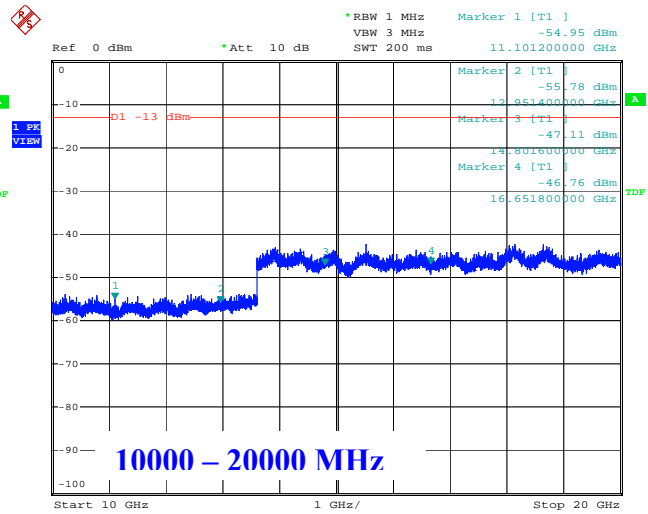
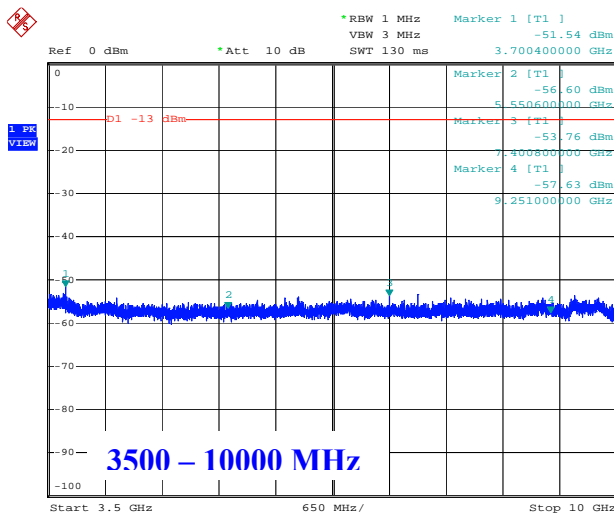
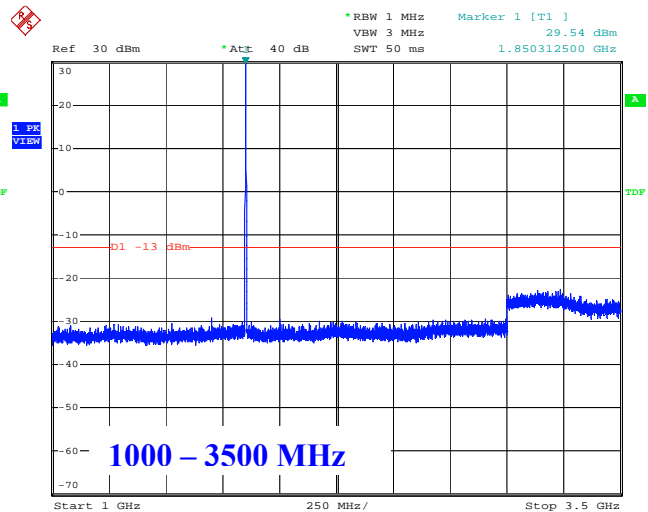
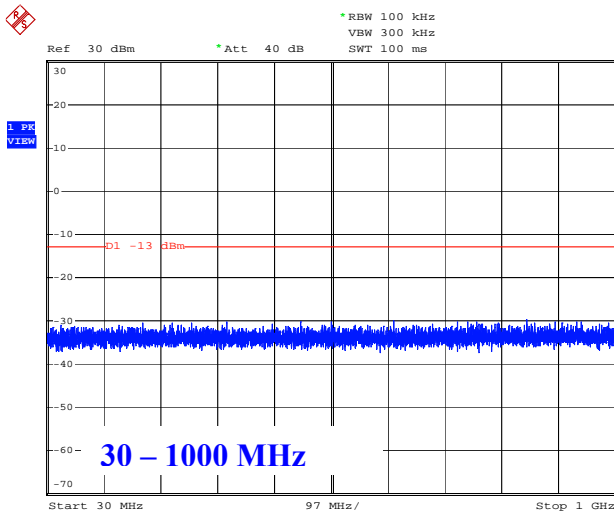
### Middle Channel (661ch, Nominal Freq.:1880.0MHz)

Measurement Frequency (MHz)	Measurement Bandwidth (MHz)	Emission Level (dBm)	Limit (dBm)	Result Pass/Fail
3760.0	1	-53.44	-13.00	Pass
5640.0	1	-56.35	-13.00	Pass
7520.0	1	-54.68	-13.00	Pass
9400.0	1	-59.15	-13.00	Pass
11280.0	1	-57.96	-13.00	Pass
13160.0	1	-56.82	-13.00	Pass
15040.0	1	-47.03	-13.00	Pass
16920.0	1	-47.68	-13.00	Pass
18800.0	1	-46.60	-13.00	Pass
7849.3	1	-52.02	-13.00	Pass

## Top Channel (810ch, Nominal Freq.:1909.8MHz)

Measurement Frequency (MHz)	Measurement Bandwidth (MHz)	Emission Level (dBm)	Limit (dBm)	Result Pass/Fail
3819.6	1	-57.08	-13.00	Pass
5729.4	1	-54.92	-13.00	Pass
7639.2	1	-58.75	-13.00	Pass
9549.0	1	-51.45	-13.00	Pass
11458.8	1	-58.41	-13.00	Pass
13368.6	1	-55.70	-13.00	Pass
15278.4	1	-47.08	-13.00	Pass
17188.2	1	-47.08	-13.00	Pass
19098.0	1	-46.26	-13.00	Pass
7959.0	1	-53.06	-13.00	Pass

## Graphical Data (512ch)



## 2.1.7 Transmitter Out of Band Spurious Emissions (Radiated)

### Reference Standard

FCC: Part24.238

IC : RSS133 Issue5 Sec6.5

### Test Conditions

Date: 26 July, 2009  
Ambient Temperature: 20 degC  
Relative humidity: 56 %  
Test Voltage: 120 VDC (AC charger)

### Test Sample

Configuration I

### Test Method

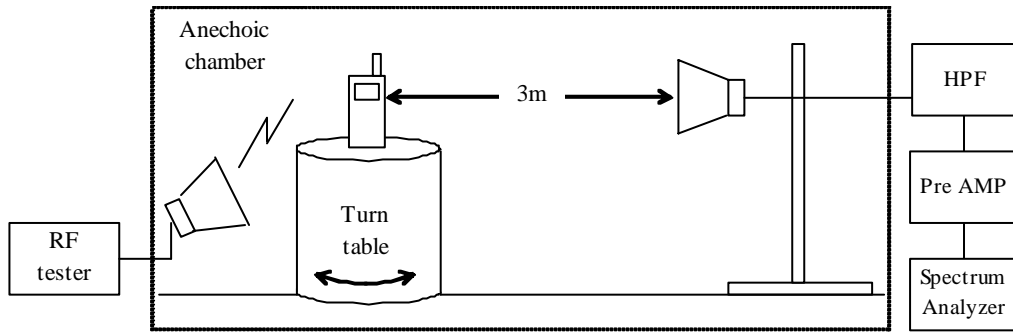
Substitution method is used for this test.

- a) EUT is set on non-conducting turntable and the output power is set to the maximum level.
- b) As a receive antenna, Horn antenna is used for high frequency range (above 1GHz), and Biological antenna is used for low frequency range (30MHz to 1GHz).
- c) The maximum level of each spurious emission is measured by a spectrum analyzer (SA) in below conditions.
  - Turntable is rotated 360 degrees.
  - The height of receive antenna is changed from 1m to 4m.
  - Receive antenna polarization is set to vertical and horizontal.
  - EUT was placed at three different orientations (X, Y and Z axis) in order to find the worst orientation.
  - This emission level is recorded.
  - During this measurement, receive antenna is adjusted the direction to keep the EUT within the beamwidth of receive antenna.
- d) Reference antenna is replaced with EUT, and connected with signal generator (SG). SG output power is adjusted to get same level as the recorded maximum radiated EUT power by SA.
- e) Radiated output power (Pout) is calculated with adjusted SG output (Psg) [dBm], reference antenna gain (Gref) [dBd] and cable loss between SG and reference antenna (Lcab) [dB].

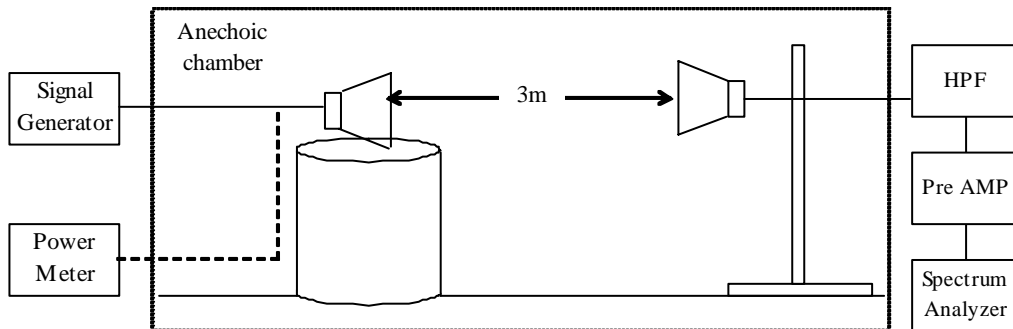
$$Pout [dBm e.r.p] = Psg + Gref + Lcab$$

## Test Setup

### [Measurement]



### [Substitution]



## Test Data

### Bottom Channel (512ch, Nominal Freq.:1850.2MHz)

Measurement Frequency (MHz)	Measurement Bandwidth (MHz)	Emission Level(dBm)		Limit (dBm)	Result Pass/Fail
		Vertical	Horizontal		
3700.4	1	-30.40	-26.37	-13.00	Pass
5550.6	1	-38.59	-38.43	-13.00	Pass
7400.8	1	-43.15	-42.43	-13.00	Pass
9251.0	1	-38.05	-39.05	-13.00	Pass
11101.2	1	-40.42	-39.60	-13.00	Pass
12951.4	1	-34.65	-33.32	-13.00	Pass
14801.6	1	< -39.24	< -39.26	-13.00	Pass
16651.8	1	< -32.75	< -32.77	-13.00	Pass
18502.0	1	< -37.80	< -37.72	-13.00	Pass
1702.3	1	-41.55	-36.49	-13.00	Pass
1998.1	1	-35.83	-38.90	-13.00	Pass

### Middle Channel (661ch, Nominal Freq.:1880.0MHz)

Measurement Frequency (MHz)	Measurement Bandwidth (MHz)	Emission Level(dBm)		Limit (dBm)	Result Pass/Fail
		Vertical	Horizontal		
3760.0	1	-31.01	-26.85	-13.00	Pass
5640.0	1	-38.68	-39.86	-13.00	Pass
7520.0	1	-42.96	-41.84	-13.00	Pass
9400.0	1	-39.01	-39.55	-13.00	Pass
11280.0	1	-38.57	-38.05	-13.00	Pass
13160.0	1	-34.82	-34.59	-13.00	Pass
15040.0	1	< -36.81	< -36.63	-13.00	Pass
16920.0	1	< -31.38	< -31.58	-13.00	Pass
18800.0	1	< -40.80	< -40.89	-13.00	Pass
1729.6	1	-40.33	-35.36	-13.00	Pass
2030.5	1	-35.63	-36.89	-13.00	Pass

**Top Channel (810ch, Nominal Freq.:1909.8MHz)**

Measurement Frequency (MHz)	Measurement Bandwidth (MHz)	Emission Level(dBm)		Limit (dBm)	Result Pass/Fail
		Vertical	Horizontal		
<b>3819.6</b>	<b>1</b>	-28.61	<b>-26.11</b>	<b>-13.00</b>	<b>Pass</b>
5729.4	1	-37.16	-37.21	-13.00	Pass
7639.2	1	-41.59	-41.86	-13.00	Pass
9549.0	1	-38.06	-39.15	-13.00	Pass
11458.8	1	-36.52	< -36.05	-13.00	Pass
13368.6	1	-36.60	< -36.46	-13.00	Pass
15278.4	1	< -36.93	< -37.36	-13.00	Pass
17188.2	1	< -31.93	< -31.91	-13.00	Pass
19098.0	1	< -41.23	< -40.79	-13.00	Pass
1757.0	1	-39.53	-35.52	-13.00	Pass
2062.6	1	-36.20	-37.43	-13.00	Pass

**Test Equipment Used**

Equipment name	RFT ID No.
Spectrum Analyzer	TR06
Receive Antenna	DH02, SH01
Reference Antenna	DH01, SH02
Signal Generator	SG05
Power Meter	PM03
RF tester	RC03

**Test Result**

The EUT met the requirements of the standard for this test.

## 2.1.8 Band Edge Emissions

### Reference Standard

FCC: Part24.238

IC : RSS133 Issue5 Sec6.5

### Test Conditions

Date: 29 July, 2009  
 Ambient Temperature: 23 degC  
 Relative humidity: 49 %  
 Test Voltage: 120 VAC (AC charger)

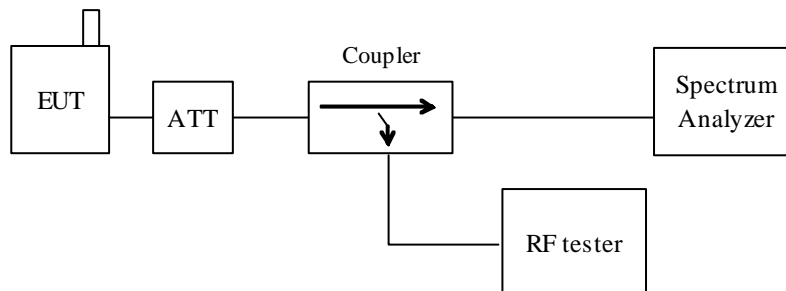
### Test Sample

Configuration I

### Test Method

- EUT is connected to RF tester with Max transmitter power level.
- Lower band edge level is measured in bottom channel transmission.
- Higher band edge level is measured in top channel transmission.
- 1% of band width is used for resolution band width for spectrum analyzer.

### Test Setup



### Test Data

#### Bottom Band Edge

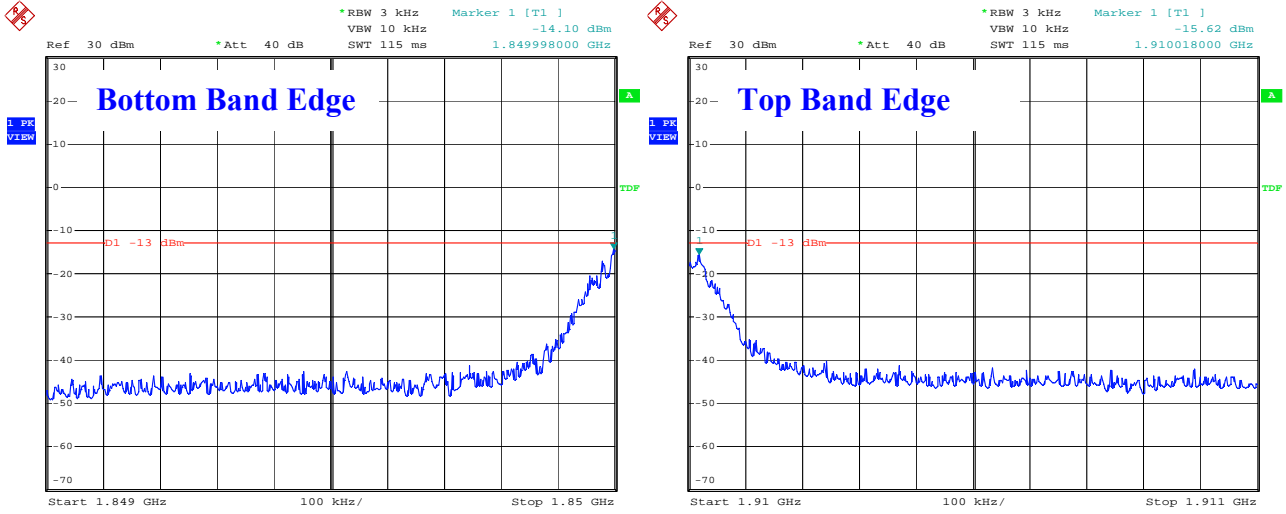
Measured Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Result
1850.0	-14.10	-13	Passed

#### Top Band Edge

Measured Frequency (MHz)	Peak Level	Limit	Result
1910.0	-15.62	-13	Passed



## Graphical Data



## Test Equipment Used

Equipment name	RFT ID No.
Spectrum Analyzer	SA06
RF tester	RC02

## Test Result

The EUT met the requirements of the standard for this test.

## 2.1.9 Transmitter AC Power Line Emission requirement

### Reference Standard

FCC: Part15.207

IC : RSS-Gen Issue2 Sec7.2.2

### Test Conditions

Date: 27 July, 2009  
 Ambient Temperature: 20 degC  
 Relative humidity: 60 %  
 Test Voltage: 120 VAC (AC charger)

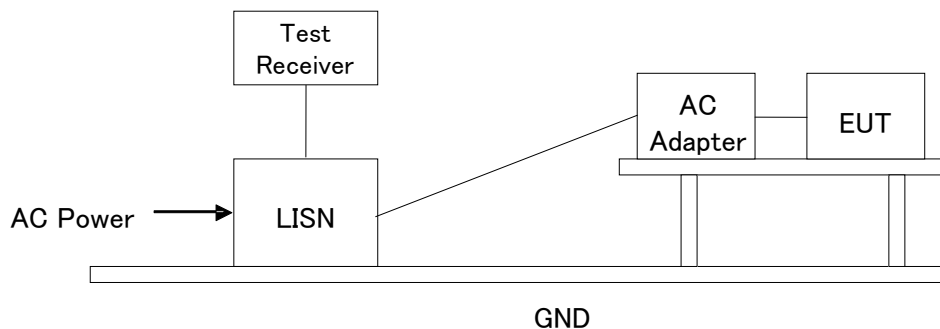
### Test Sample

Configuration I

### Test Method

- a) EUT is connected to RF tester with Max transmitter power level.
- b) AC power is supplied to AC charger through LISN.
- c) AC charger is connected to EUT.
- d) AC Line conducted emission is measured by EMI receiver.

### Test Setup



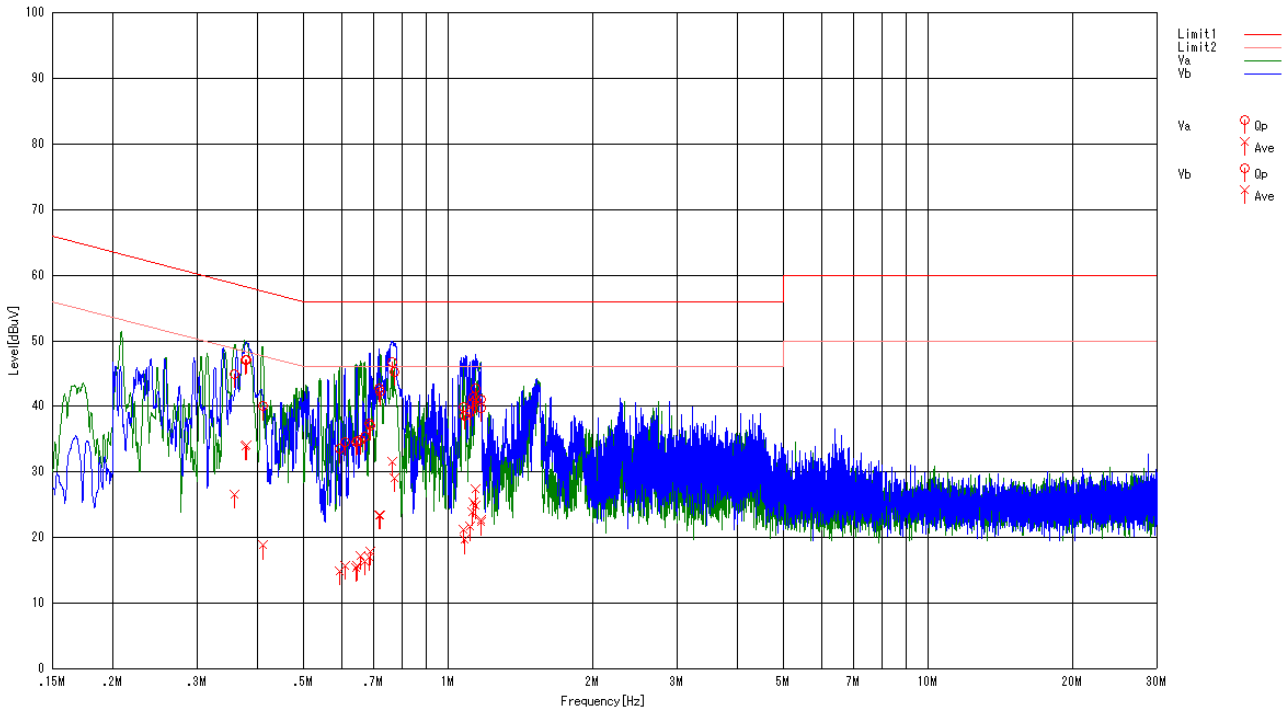
### Limit

Frequency (MHz)	Limit QP (dBuV)	Limit AV (dBuV)
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

## Test Data

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.359	44.6	26.2	0.3	44.9	26.5	58.8	48.8	13.9	22.3	Va
2	0.378	46.7	33.6	0.3	47.0	33.9	58.3	48.3	11.3	14.4	Va
3	0.380	46.8	33.7	0.3	47.1	34.0	58.3	48.3	11.2	14.3	Vb
4	0.410	39.8	18.6	0.2	40.0	18.8	57.6	47.6	17.6	28.8	Va
5	0.592	33.3	14.7	0.2	33.5	14.9	56.0	46.0	22.5	31.1	Va
6	0.608	34.4	15.5	0.2	34.6	15.7	56.0	46.0	21.4	30.3	Vb
7	0.643	34.4	15.1	0.2	34.6	15.3	56.0	46.0	21.4	30.7	Va
8	0.644	34.5	15.4	0.2	34.7	15.6	56.0	46.0	21.3	30.4	Vb
9	0.656	34.6	17.0	0.2	34.8	17.2	56.0	46.0	21.2	28.8	Va
10	0.670	35.2	16.2	0.2	35.4	16.4	56.0	46.0	20.6	29.6	Va
11	0.685	37.2	16.8	0.2	37.4	17.0	56.0	46.0	18.6	29.0	Vb
12	0.686	36.8	17.6	0.2	37.0	17.8	56.0	46.0	19.0	28.2	Va
13	0.716	42.5	23.1	0.3	42.8	23.4	56.0	46.0	13.2	22.6	Vb
14	0.721	42.0	23.1	0.3	42.3	23.4	56.0	46.0	13.7	22.6	Va
<b>15</b>	<b>0.763</b>	<b>46.5</b>	<b>31.2</b>	<b>0.3</b>	<b>46.8</b>	<b>31.5</b>	<b>56.0</b>	<b>46.0</b>	<b>9.2</b>	<b>14.5</b>	<b>Vb</b>
16	0.772	45.0	28.8	0.3	45.3	29.1	56.0	46.0	10.7	16.9	Va
17	1.074	39.6	20.9	0.3	39.9	21.2	56.0	46.0	16.1	24.8	Vb
18	1.078	38.3	19.3	0.3	38.6	19.6	56.0	46.0	17.4	26.4	Va
19	1.108	38.8	21.3	0.3	39.1	21.6	56.0	46.0	16.9	24.4	Vb
20	1.123	40.3	23.6	0.3	40.6	23.9	56.0	46.0	15.4	22.1	Vb
21	1.129	41.1	25.0	0.3	41.4	25.3	56.0	46.0	14.6	20.7	Vb
22	1.136	40.8	24.6	0.3	41.1	24.9	56.0	46.0	14.9	21.1	Va
23	1.140	42.4	27.0	0.3	42.7	27.3	56.0	46.0	13.3	18.7	Vb
24	1.167	40.7	22.3	0.3	41.0	22.6	56.0	46.0	15.0	23.4	Va
25	1.169	39.5	22.1	0.3	39.8	22.4	56.0	46.0	16.2	23.6	Vb

## Graphical Data



## Test Equipment Used

Equipment name	RFT ID No.
EMI Receiver	TR04
LISN	LN06
RF tester	RC02

## Test Result

The EUT met the requirements of the standard for this test

## 2.2 Receiver requirement

### 2.2.1 Receiver Spurious Emissions (Radiated)

#### Reference Standard

FCC: Part15.109

IC : RSS133 Issue5 Sec6.6

#### Test Conditions

Date: 2 August, 2009  
Ambient Temperature: 21 degC  
Relative humidity: 57 %  
Test Voltage: 120 VAC (AC charger)

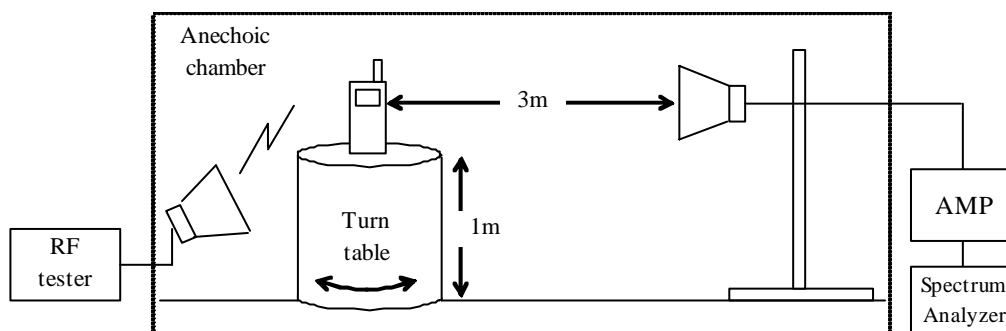
#### Test Sample

Configuration I

#### Test Method

- a) EUT is connected to RF tester with idle mode.
- b) Radiated receiver spurious emission is received by receive antenna.
- c) Turn table is rotated 360deg.
- d) Maximum level of each spurious is measured by spectrum analyzer.
- e) RBW of spectrum analyzer is set to 100kHz for 30 - 1000MHz, 1MHz for above 1GHz.
- f) Level is measured with QP detect for 30 - 1000MHz, Average detect for above 1GHz.
- g) EUT was placed at three different orientations (X, Y and Z axis) in order to find the worst orientation.

#### Test Setup



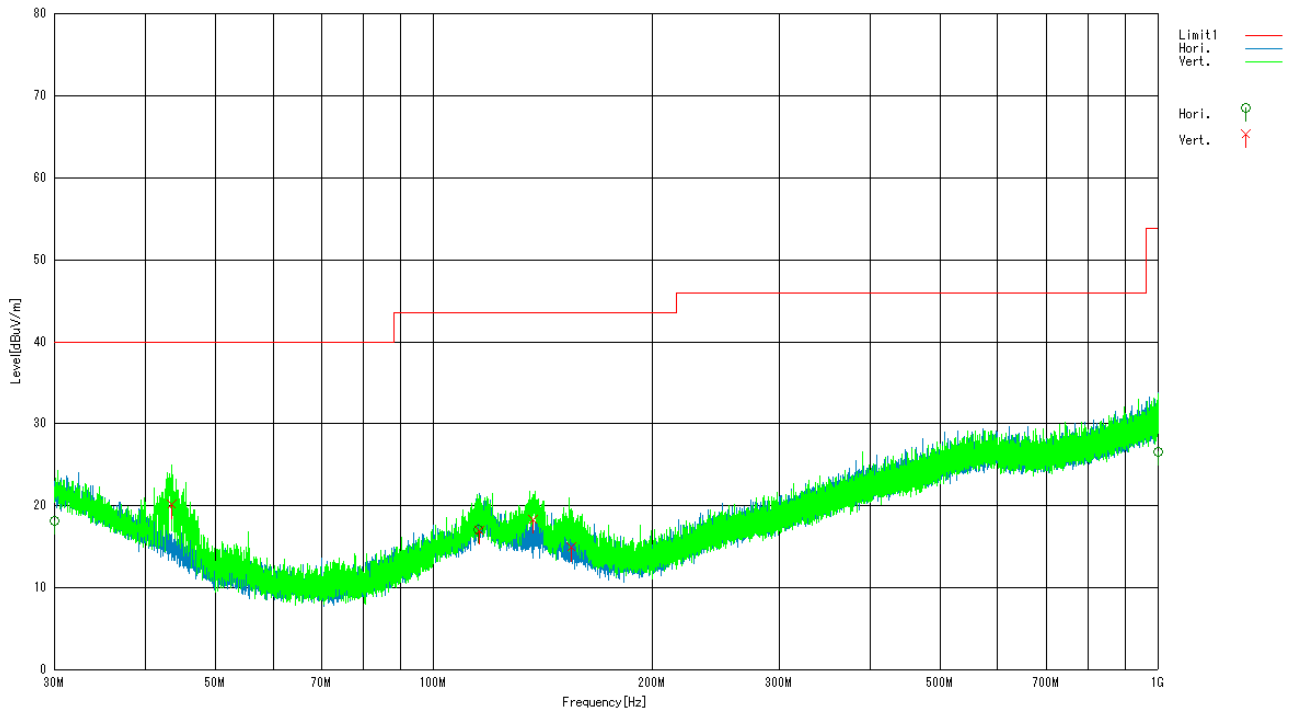
## Limit

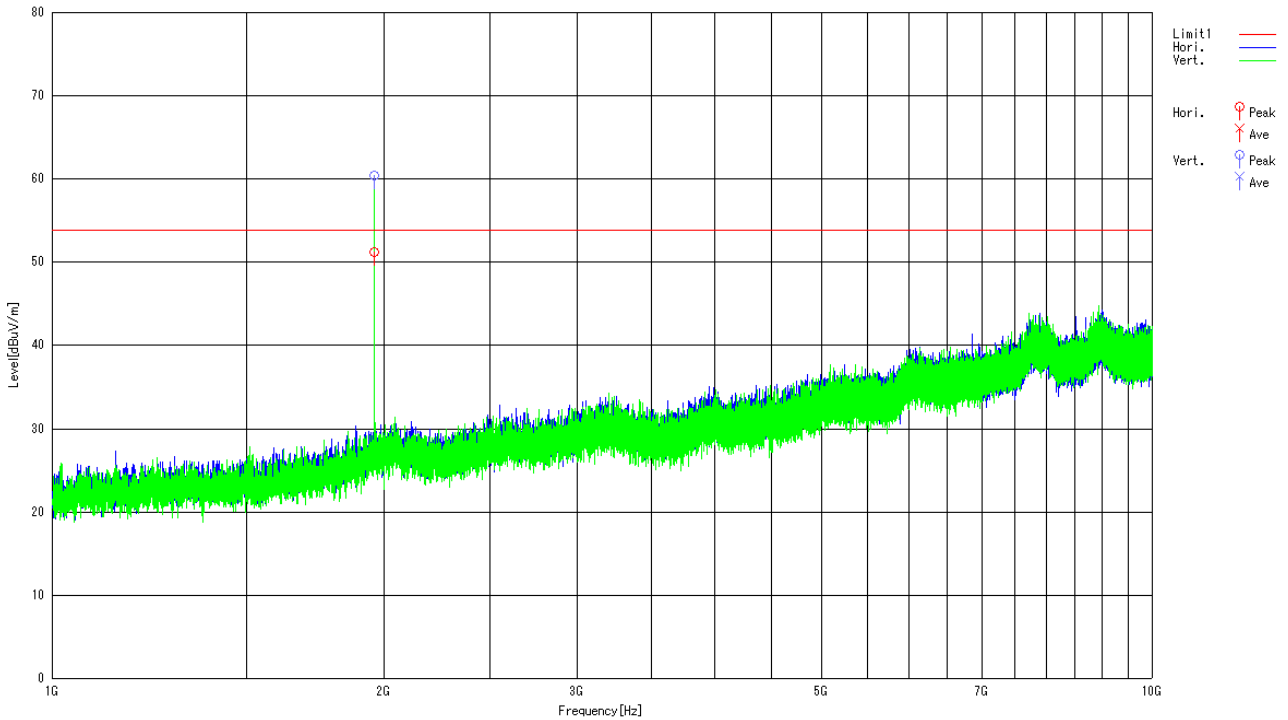
Frequency (MHz)	Distance (m)	Field strength (uV/m)	Field strength (dBuV/m)
30 - 88	3	100	40
88 - 216	3	150	43.5
216 - 960	3	200	46
above 960	3	500	53.9

## Test Data

No.	Frequency [MHz]	Reading [dBuV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna Polarization
1	30.000	22.3	18.3	7.3	29.7	18.2	40.0	21.8	Hori.
2	<b>43.418</b>	<b>31.0</b>	<b>11.3</b>	<b>7.5</b>	<b>29.7</b>	<b>20.1</b>	<b>40.0</b>	<b>19.9</b>	<b>Vert.</b>
3	115.000	26.3	11.8	8.6	29.6	17.1	43.5	26.4	Hori.
4	115.385	26.1	11.9	8.6	29.6	17.0	43.5	26.5	Vert.
5	136.800	27.6	11.3	8.9	29.5	18.3	43.5	25.2	Vert.
6	154.575	25.0	10.3	9.1	29.5	14.9	43.5	28.6	Vert.
7	1000.000	18.3	21.5	14.9	28.1	26.6	53.9	27.3	Hori.

## Graphical Data





Note: A spectrum @1960MHz is downlink signal from RF tester. This is used to set EUT in idle mode. This is not a spurious emission from EUT.

### Test Equipment Used

Equipment name	RFT ID No.
Spectrum Analyzer	TR06, TR04
Receive Antenna	DH02, BA04
Pre-AMP	PR12, PR03
RF tester	RC02

### Test Result

The EUT met the requirements of the standard for this test.

## 2.2.2 Receiver AC Power Line Emission requirement

### Reference Standard

FCC: Part15.107

IC : RSS-Gen Issue2 Sec7.2.2

### Test Conditions

Date: 27 July, 2009  
 Ambient Temperature: 20 degC  
 Relative humidity: 60 %  
 Test Voltage: 120 VAC (AC charger)

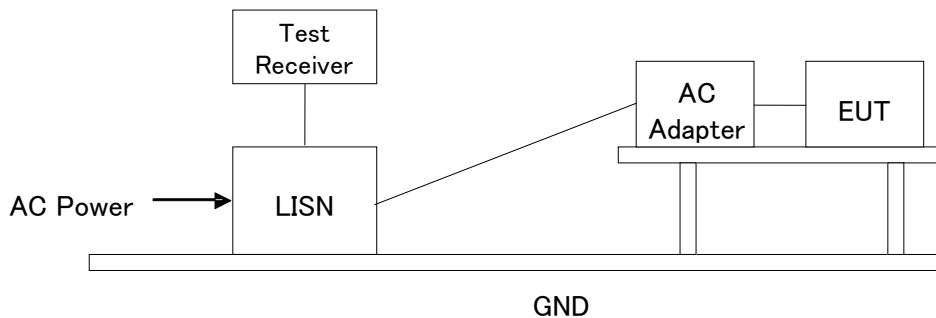
### Test Sample

Configuration I

### Test Method

- a) EUT is connected to RF tester with idle mode.
- b) AC power is supplied to AC charger through LISN.
- c) AC charger is connected to EUT.
- d) AC Line conducted emission is measured by EMI receiver.

### Test Setup



### Limit

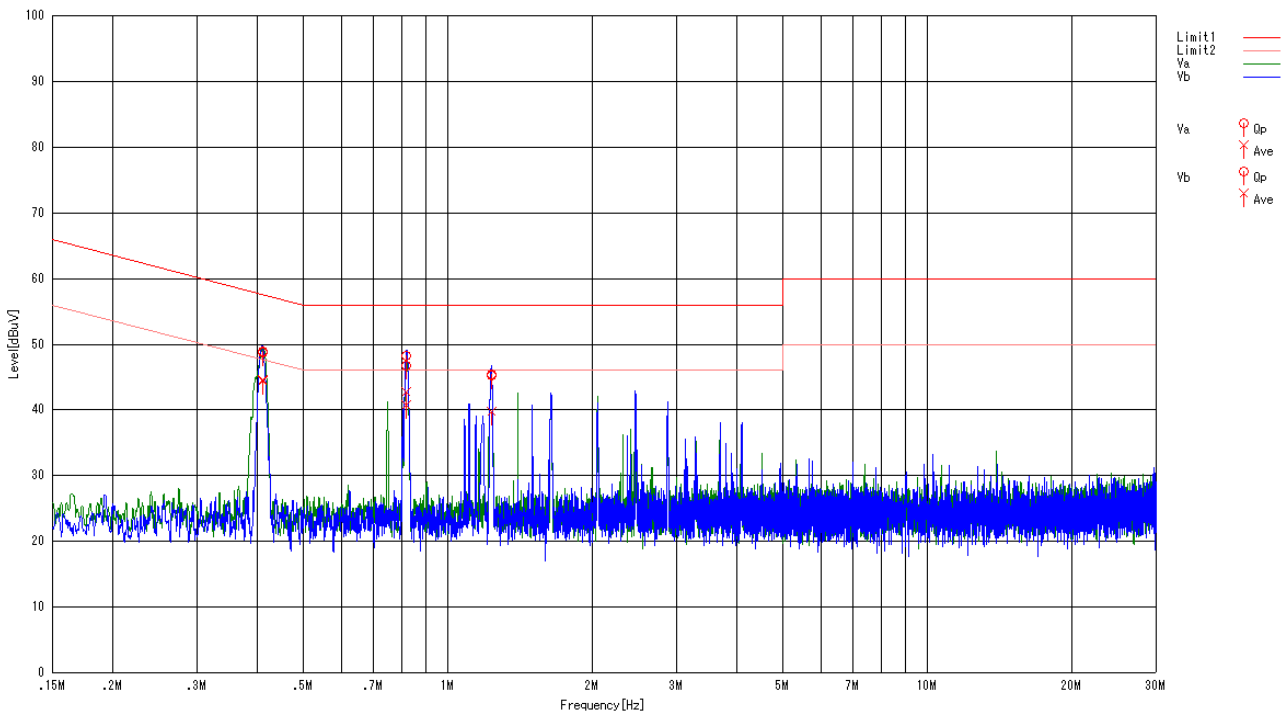
Frequency (MHz)	Limit QP (dBuV)	Limit AV (dBuV)
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50



## Test Data

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.410	48.6	44.3	0.2	48.8	44.5	57.6	47.6	8.8	3.1	Va
2	0.410	48.7	44.2	0.2	48.9	44.4	57.6	47.6	8.7	3.2	Vb
3	0.818	47.9	42.4	0.3	48.2	42.7	56.0	46.0	7.8	3.3	Vb
4	0.818	46.5	40.5	0.3	46.8	40.8	56.0	46.0	9.2	5.2	Va
5	1.231	45.0	39.3	0.4	45.4	39.7	56.0	46.0	10.6	6.3	Vb
6	1.231	44.9	39.3	0.4	45.3	39.7	56.0	46.0	10.7	6.3	Va

## Graphical Data



## Test Equipment Used

Equipment name	RFT ID No.
EMI Receiver	TR04
LISN	LN06
RF tester	RC03

## Test Result

The EUT met the requirements of the standard for this test

## 2.3 Maximum Permissible Exposure (Exposure of Humans to RF Fields)

### Limitation

15.247(i) systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

See 1.1307(b) (1) of this Chapter.

1.1310 The criteria of "General Population/ Uncontrolled Exposure" listed in the below table shall be used to evaluate the environmental impact of human exposure to radio-frequency radiation as specified in 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of 2.1093 of this chapter.

### Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

\*Plane-wave equivalent power density

NOTE 2: *General population/uncontrolled* exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

### The MPE distance calculations:

The Maximum Permissible Exposure (MPE) distance between the EUT's antenna and human body is calculated in accordance with FCC OET Bulletin 65 and Safety Code 6 of IC.

The MPE distance where the exposure level reaches the permitted exposure level can be calculated as below;

$$S = P * G / 4\pi R^2$$

Rearranging terms to calculate the MPE Distance

$$R = (P * G / 4\pi S)^{1/2}$$

Where:

**R = MPE Distance in cm**

**P = Power in dBm (1949.8 mW (1850.2 MHz), Refer to page 10 in this report)**

**G = Antenna Gain in numeric**

**(1 = 0dBi, Max. Antenna Gain)**

**S = Power Density Limit in mW/cm<sup>2</sup>**

**(1 mW/cm<sup>2</sup>, Max. permissible exposure limit above)**

Then MPE Distance is 12.46 cm. (< 30cm)

**Test results - Complied with requirement.**

## 4 List of utilized test equipment/ calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
AC01	Anechoic Chamber (1st test room)	JSE	203397C	-	2009/04/09	2010/04/30
BA04	Biological Antenna	SCHAFFNER	CA2855	2903	2009/01/06	2010/01/31
CL11	Antenna Cable for RE	RFT	-	-	2009/04/13	2010/04/30
CL23	RF Cable 0.5m	SUCOFLEX	SF104PE	48773/4PE	2009/06/25	2010/06/30
CL24	RF Cable 5.0m	SUCOFLEX	SF104PE	48775/4PE	2009/06/25	2010/06/30
CL26	RF Cable 2.0m	SUCOFLEX	SF104	274754/4	2009/06/25	2010/06/30
CL27	RF Cable 0.5m	SUCOFLEX	SF104	230286/4	2009/06/29	2010/06/30
LN06	LISN	Kyoritsu	KNW-407	8-1773-3	2009/05/26	2010/05/31
PL06	Pulse Limiter	PMM	PL-01	0000J10109	2009/01/05	2010/01/31
PR03	Pre. Amplifier	Anritsu	MH648A	M41984	2009/05/26	2010/05/31
PR12	Pre. Amplifier (1-26G)	Agilent Technologies	8449B	3008A02513	2009/01/13	2010/01/31
HPF1	High Pass Filter (3500MHz)	TOKIMEC	TF323DCA	603	2009/06/25	2010/06/30
BRF6	Band Reject Filter (GSM1900)	M-City	BRF1880-02	RF0006-02	2008/09/08	2009/09/30
TR04	Test Receiver (F/W : 3.82 SP1)	Rohde & Schwarz	ESCI	100447	2008/09/16	2009/09/30
TR06	Test Receiver (F/W : 3.93 SP2)	Rohde & Schwarz	ESU26	100002	2008/09/02	2009/09/01
DH01	DRG Horn Antenna	A.H. Systems	SAS-571	785	2008/01/31	2010/01/29
DH02	DRG Horn Antenna	A.H. Systems	SAS-200/571	239	2009/04/13	2011/04/30
RC02	Radio communication tester (F/W : V5.00)	Rohde & Schwarz	CMU200	105097	2008/09/17	2009/09/30
RC03	Radio communication tester (F/W : 10.20 #005)	Anritsu	MT8820B	6200636657	2009/06/26	2010/06/30
PM03	Power Meter	Anritsu	ML2438A	99070001	2009/07/21	2010/07/31
PU03	Power Sensor	Anritsu	MA2472A	990103	2009/07/21	2010/07/31
SG05	Signal Generator	Rohde & Schwarz	SMR20	100905	2009/06/18	2010/06/30

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.