FCC TEST REPORT

FOR

Toshiba Power Systems Inspection Services Co., Ltd.

RF 2.4G USB Dongle

Test Model: TMRCD200RX

Prepared for	:	Toshiba Power Systems Inspection Services Co., Ltd.
Address	:	8, Shinsugita-cho, Isogo-ku, Yokohama 235-8523, Japan
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd
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Date of receipt of test sample	:	May 08, 2015
Number of tested samples	:	1
Serial number	:	TMRCD200-000001
Date of Test	:	May 08, 2015 - May 23, 2015
Date of Report	:	May 23, 2015

FCC TEST REPORT

FCC CFR 47 PART 15 C(15.249): 2015

Report Reference No.	**:**	**LCS1505080421E**
Date of Issue.....	:	May 23, 2015
Testing Laboratory Name.....	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	**:**	**Toshiba Power Systems Inspection Services Co., Ltd.**
Address.....	:	8, Shinsugita-cho, Isogo-ku, Yokohama 235-8523, Japan
Test Specification		
Standard.....	:	FCC CFR 47 PART 15 C(15.249): 2015 / ANSI C63.10: 2009
Test Report Form No.....	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

Test Item Description.....	**:**	**RF 2.4G USB Dongle**
Trade Mark.....	:	TOSHIBA
Test Model.....	:	TMRCD200RX
Ratings.....	:	DC 5V
Result	**:**	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Leo Lee/ File administrators	Glin Lu/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS1505080421E	May 23, 2015 Date of issue

Test Model.....	: TMRCD200RX
EUT.....	: RF 2.4G USB Dongle
Applicant.....	**: Toshiba Power Systems Inspection Services Co., Ltd.**
Address.....	: 8, Shinsugita-cho, Isogo-ku, Yokohama 235-8523, Japan
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: KING WINS TECHNOLOGY CO.,LTD.**
Address.....	: 2F., NO.1 Jian 1 St Rd., Zhonghe Dist., New Taipei City Taiwan
Telephone.....	: /
Fax.....	: /
Factory.....	**: KING WINS TECHNOLOGY CO.,LTD.**
Address.....	: 2F., NO.1 Jian 1 St Rd., Zhonghe Dist., New Taipei City Taiwan
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	RF 2.4G USB Dongle
Test Model	:	TMRCD200RX
Hardware Version	:	MA143_RX V1.1
Software Version	:	MA143_RX[F6E6]
Power Supply	:	DC 5V
Frequency Range	:	2404.00MHz-2480.00MHz
Modulation Technology	:	GFSK
Channel Number	:	65 Channels
Channel Spacing	:	See more details at section 1.7
Antenna Description	:	PCB Antenna, -3.0dBi(Max.)

1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Lenovo	Notebook	B470	WB05067151	DOC
Lenovo	AC/DC ADAPTER	ADP-90DD B	36001941	VOC

1.3. External I/O

I/O Port Description	Quantity	Cable
USB Port	1	N/A

1.4. Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
Industry Canada Registration Number. is 9642A-1.
VCCI Registration Number. is C-4260 and R-3804.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001

1.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	3.10dB	(1)
		30MHz~200MHz	2.96dB	(1)
		200MHz~1000MHz	3.10dB	(1)
		1GHz~26.5GHz	4.00dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	1.63dB	(1)
Power disturbance	:	30MHz~300MHz	1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description Of Test Modes

Channel List:

Channel No.	Channel Frequency (MHz)	Channel No.	Channel Frequency (MHz)
1	2404	34	2443
2	2405	35	2444
3	2406	36	2445
4	2407	37	2446
5	2408	38	2450
6	2409	39	2451
7	2410	40	2452
8	2411	41	2453
9	2412	42	2454
10	2413	43	2455
11	2414	44	2456
12	2418	45	2457
13	2419	46	2458
14	2420	47	2459
15	2421	48	2460
16	2422	49	2461
17	2423	50	2462
18	2424	51	2466
19	2425	52	2467
20	2426	53	2468
21	2427	54	2469
22	2428	55	2470
23	2429	56	2471
24	2430	57	2472
25	2434	58	2473
26	2435	59	2474
27	2436	60	2475
28	2437	61	2476
29	2438	62	2477
30	2439	63	2478
31	2440	64	2479
32	2441	65	2480
33	2442	--	--

The EUT operates in the unlicensed ISM band at 2.4GHz. The following operating modes were applied for the related test items.
The EUT received DC 5V power from the laptop.
All test modes were tested, only the result of the worst case was recorded in the report.

The EUT was set to transmit at 100% duty cycle. It was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane.

Mode of Operations	Transmitting Frequency (MHz)
GFSK	2404
	2440
	2480
For Conducted Emission	
Test Mode	TX Mode
For Radiated Emission	
Test Mode	TX Mode

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, that was determined to be TX-2404MHz.

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be TX-2404MHz.

***Note: Using a temporary antenna connector for the EUT when the conducted measurements are performed.

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10: 2009, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions

According to the requirements in Section 6.2 of ANSI C63.10: 2009, AC power-line conducted emissions shall be measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table and the turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10: 2009

3. CONNECTION DIAGRAM OF TEST SYSTEM

3.1. Justification

The system was configured for testing in a continuous transmit condition.

3.2. EUT Exercise Software

N/A

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	Compliant
§15.205(a), §15.209(a), §15.249(a), §15.249(c)	Radiated Emissions Measurement	Compliant
§15.249	Band Edges Measurement	Compliant
§15.249, §15.215	20 dB Bandwidth	Compliant

5. ANTENNA REQUIREMENT

5.1. Standard Applicable

According to §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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

5.2. Antenna Connected Construction

The antenna used for transmitting is permanently attached and no consideration of replacement. Please see EUT photo for details.

Result: Compliance.

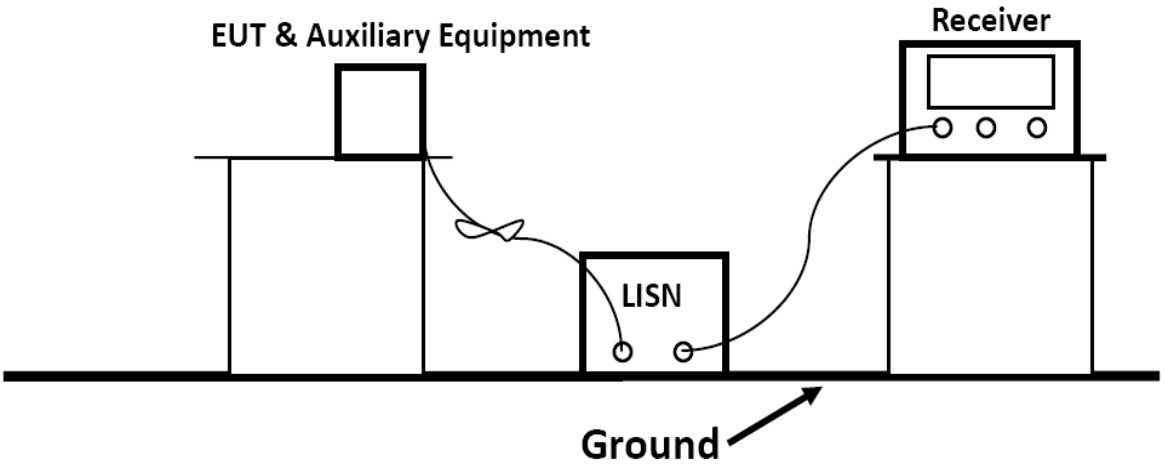
6. LINE CONDUCTED EMISSIONS

6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range(MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

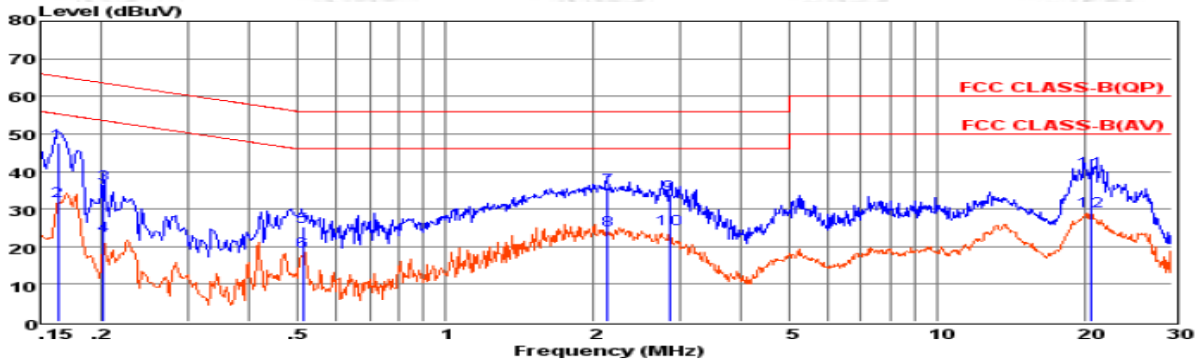
6.2 Block Diagram of Test Setup



6.3 Test Results

PASS.

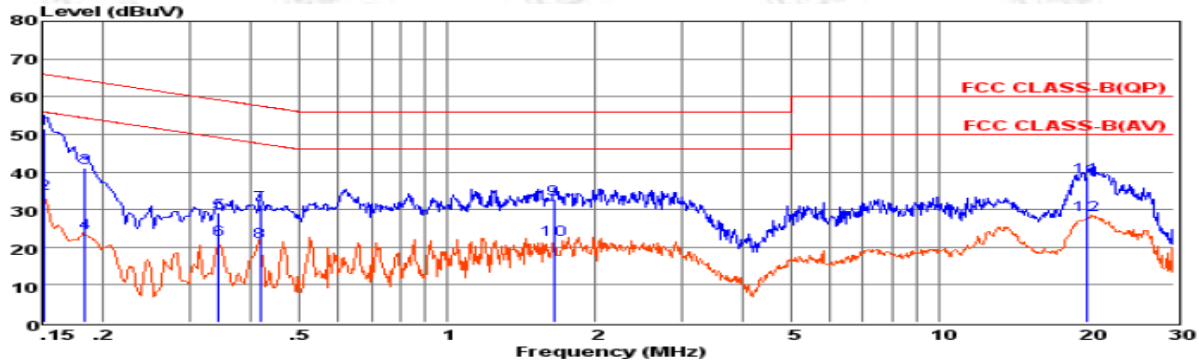
The test data please refer to following page.



Env. Ins: 24*/56%
EUT: RF 2.4G USB Dongle
M/N: TMRCD200RX
Power Rating: AC 120V/60Hz
Test Mode: TX-2404MHz
Operator: Leo
Memo:
Pol: NEUTRAL

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.16327	27.94	9.67	0.02	10.00	47.63	65.30	-17.67	QP
2	0.16328	12.45	9.67	0.02	10.00	32.14	55.30	-23.16	Average
3	0.20181	17.02	9.59	0.02	10.00	36.63	63.54	-26.91	QP
4	0.20182	3.16	9.59	0.02	10.00	22.77	53.54	-30.77	Average
5	0.51278	5.66	9.62	0.04	10.00	25.32	56.00	-30.68	QP
6	0.51279	-0.88	9.62	0.04	10.00	18.78	46.00	-27.22	Average
7	2.13259	16.07	9.63	0.05	10.00	35.75	56.00	-20.25	QP
8	2.13359	4.66	9.63	0.05	10.00	24.34	46.00	-21.66	Average
9	2.85407	14.21	9.64	0.06	10.00	33.91	56.00	-22.09	QP
10	2.85457	4.90	9.64	0.06	10.00	24.60	46.00	-21.40	Average
11	20.59435	20.13	9.87	0.12	10.00	40.12	60.00	-19.88	QP
12	20.59455	9.32	9.87	0.12	10.00	29.31	50.00	-20.69	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
EUT: RF 2.4G USB Dongle
M/N: TMRCD200RX
Power Rating: AC 120V/60Hz
Test Mode: TX-2404MHz
Operator: Leo
Memo:
Pol: LINE

	Freq	Reading	LisnFac	CabLos	Atten_Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.15160	31.77	9.57	0.02	10.00	51.36	65.91	-14.55	QP
2	0.15161	14.66	9.57	0.02	10.00	34.25	55.91	-21.66	Average
3	0.18346	21.32	9.61	0.02	10.00	40.95	64.33	-23.38	QP
4	0.18347	4.17	9.61	0.02	10.00	23.80	54.33	-30.53	Average
5	0.34281	9.56	9.62	0.03	10.00	29.21	59.13	-29.92	QP
6	0.34282	2.31	9.62	0.03	10.00	21.96	49.13	-27.17	Average
7	0.41705	11.48	9.62	0.04	10.00	31.14	57.51	-26.37	QP
8	0.41706	1.81	9.62	0.04	10.00	21.47	47.51	-26.04	Average
9	1.64497	13.11	9.64	0.05	10.00	32.80	56.00	-23.20	QP
10	1.64557	2.41	9.64	0.05	10.00	22.10	46.00	-23.90	Average
11	19.94996	18.67	9.76	0.12	10.00	38.55	60.00	-21.45	QP
12	19.95096	8.72	9.76	0.12	10.00	28.60	50.00	-21.40	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
2. The emission levels that are 20dB below the official limit are not reported.

Note: Pre-scan all modes and recorded the worst case results in this report.

7. RADIATED EMISSION MEASUREMENT

7.1. Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) and 15.249 limit in the table below has to be followed.

Fundamental Frequency	Field Strength of fundamental (millivolts/meter)	Field Strength of harmonics (microvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

7.2. Instruments Setting

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1000KHz / 1000KHz for peak

7.3. Test Procedure

1) Configure the EUT according to ANSI C63.10: 2009. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.

2) Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.

3) The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.

4) For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.

5) Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.

6) For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.

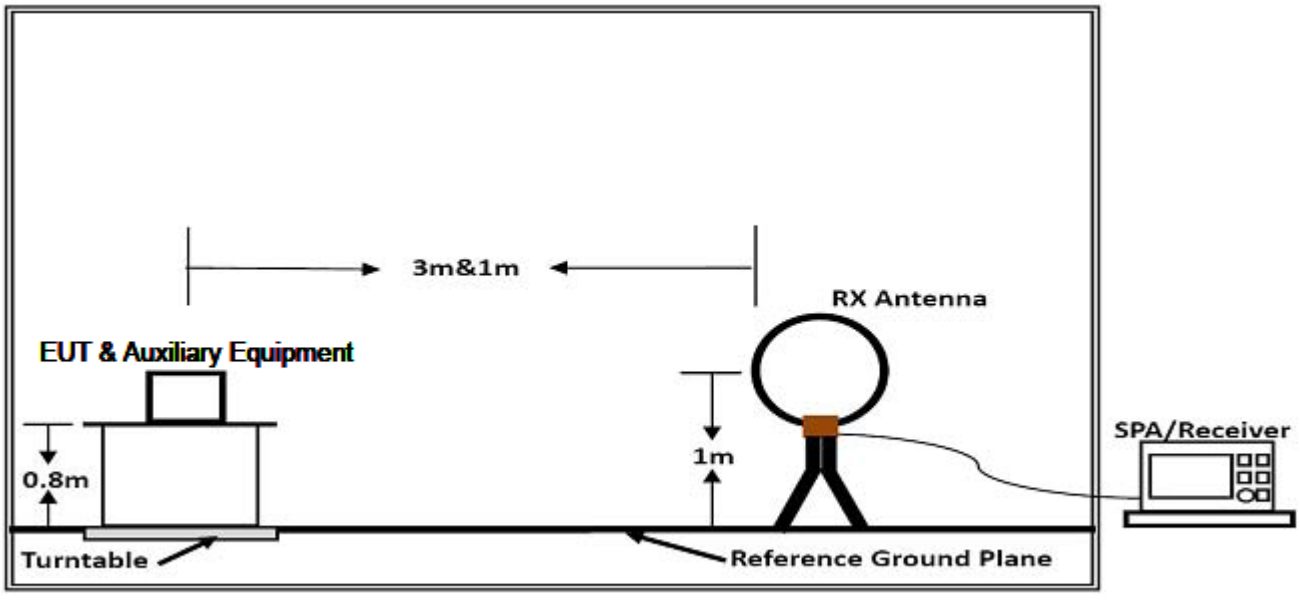
7) When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

8) If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.

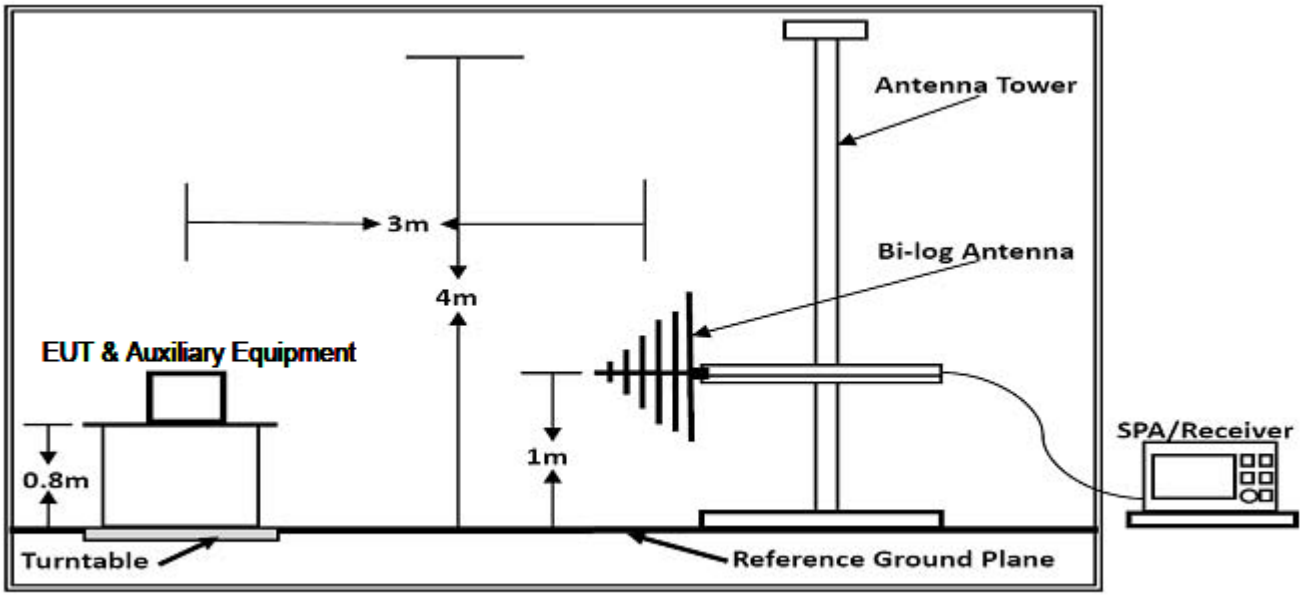
9) For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emission sat the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

10) In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

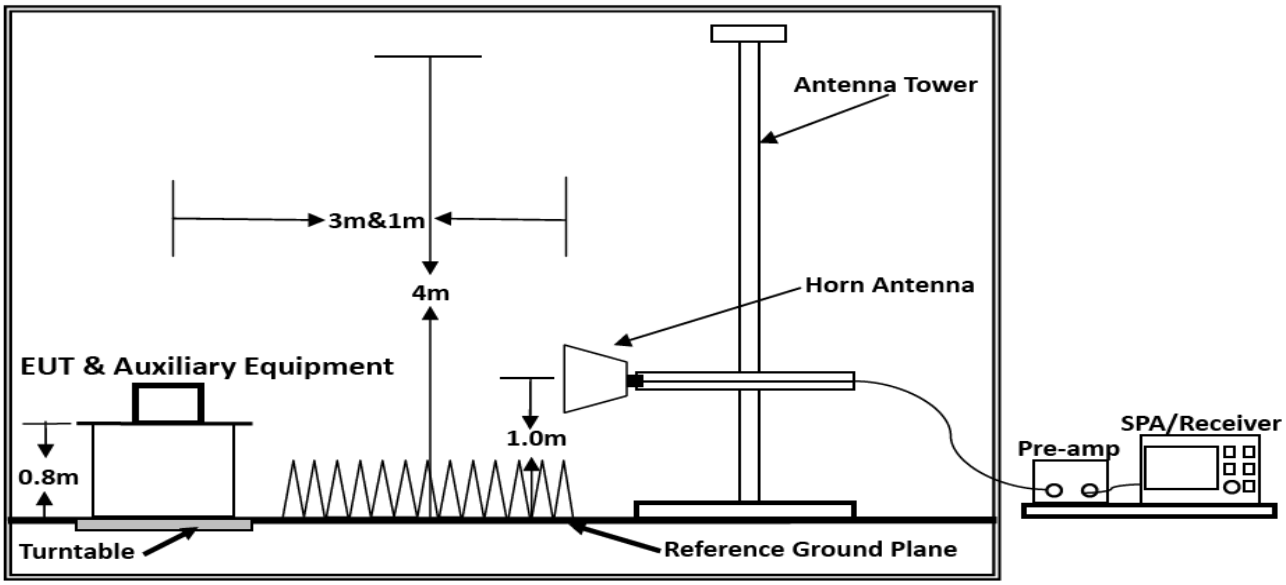
7.4. Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

7.5. Test Results

Results of Radiated Emissions (9kHz~30MHz)

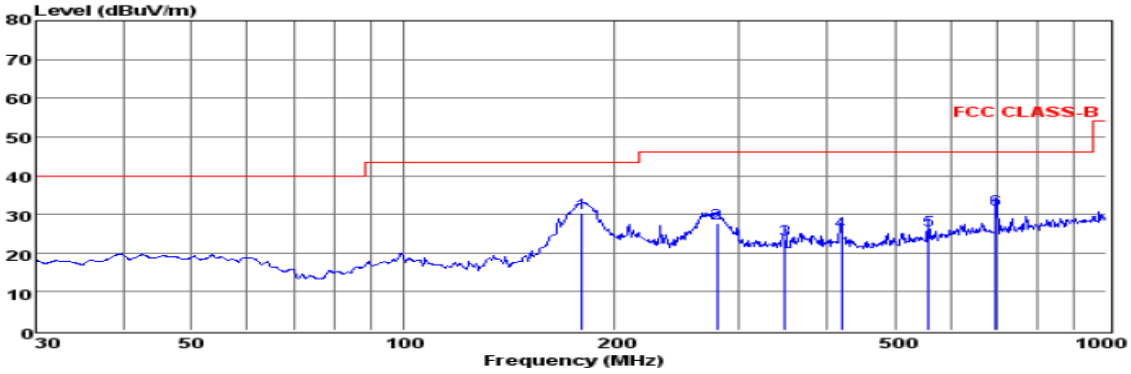
Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

The radiated emissions from 9kHz to 30MHz are at least 20dB below the official limit and no need to report.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

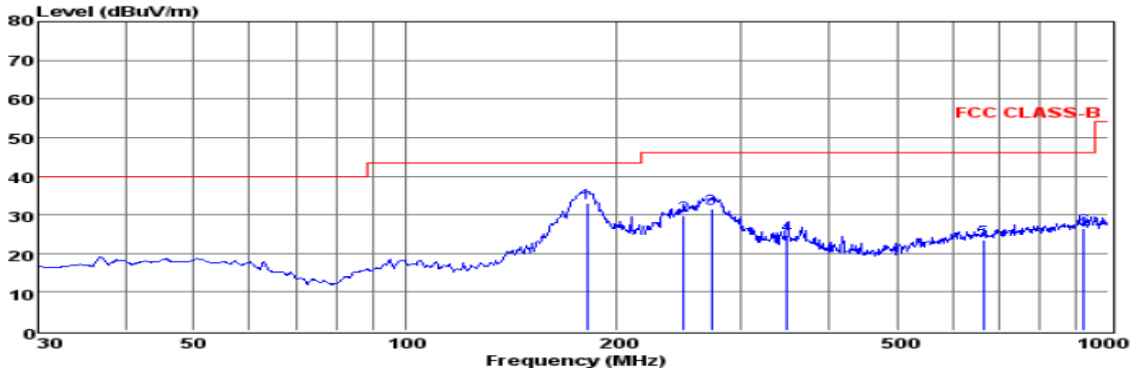
Results of Radiated Emissions (30MHz~1000MHz)



Env./Ins: 24℃/56%
EUT: RF 2.4G USB Dongle
M/N: TMRCD200RX
Power Rating: DC 5V
Test Mode: TX-2404MHz
Operator: Leo
Memo:
pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	179.39	19.79	0.89	9.64	30.32	43.50	-13.18	QP
2	279.04	13.93	1.01	12.64	27.58	46.00	-18.42	QP
3	349.25	8.24	1.13	14.26	23.63	46.00	-22.37	QP
4	420.58	8.91	1.33	15.47	25.71	46.00	-20.29	QP
5	558.73	6.90	1.39	17.68	25.97	46.00	-20.03	QP
6	696.86	10.85	1.59	18.80	31.24	46.00	-14.76	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported



Env./Ins: 24℃/56%
EUT: RF 2.4G USB Dongle
M/N: TMRCD200RX
Power Rating: DC 5V
Test Mode: TX-2404MHz
Operator: Leo
Memo:
pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	181.28	22.44	0.89	9.79	33.12	43.50	-10.38	QP
2	248.55	16.57	1.02	12.07	29.66	46.00	-16.34	QP
3	272.28	17.93	1.04	12.43	31.40	46.00	-14.60	QP
4	349.25	9.29	1.13	14.26	24.68	46.00	-21.32	QP
5	663.47	3.10	1.67	18.68	23.45	46.00	-22.55	QP
6	922.52	3.15	1.99	21.24	26.38	46.00	-19.62	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

****Note: Pre-scan all mode and recorded the worst case results in this report (TX- 2404MHz).*

7.6. Results for Radiated Emissions (Above 1GHz)

Field Strength Of Fundamental (TX-2404MHz)						
Frequency (MHz)	Pol.	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Result
2404	H	83.16	78.61	114	94	Pass
2404	V	71.89	67.57	114	94	Pass

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4808.17	49.16	33.06	35.04	3.94	51.12	74	-22.88	Peak	Horizontal
4808.19	38.87	33.06	35.04	3.94	40.83	54	-13.17	Average	Horizontal
4808.17	45.63	33.06	35.04	3.94	47.59	74	-26.41	Peak	Vertical
4808.20	36.11	33.06	35.04	3.94	38.07	54	-15.93	Average	Vertical

Field Strength Of Fundamental (TX-2440MHz)						
Frequency (MHz)	Pol.	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Result
2440	H	78.65	73.47	114	94	Pass
2440	V	69.89	64.93	114	94	Pass

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4880.31	46.54	33.16	35.15	3.96	48.51	74	-25.49	Peak	Horizontal
4880.33	36.37	33.16	35.15	3.96	38.34	54	-15.66	Average	Horizontal
4880.30	43.15	33.16	35.15	3.96	45.12	74	-28.88	Peak	Vertical
4880.33	33.61	33.16	35.15	3.96	35.58	54	-18.42	Average	Vertical

Field Strength Of Fundamental (TX-2480MHz)						
Frequency (MHz)	Pol.	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Result
2480	H	81.38	76.65	114	94	Pass
2480	V	70.65	66.94	114	94	Pass

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4960.13	48.51	33.26	35.14	3.98	50.61	74	-23.39	Peak	Horizontal
4960.16	38.67	33.26	35.14	3.98	40.77	54	-13.23	Average	Horizontal
4960.13	44.07	33.26	35.14	3.98	46.17	74	-27.83	Peak	Vertical
4960.16	34.46	33.26	35.14	3.98	36.56	54	-17.44	Average	Vertical

Notes:

1. *Measuring frequencies from 9k~10th harmonic (ex. 26GHz), No emission found between lowest internal used/generated frequency to 30MHz.*
2. *Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 26GHz) were made with an instrument using Peak detector mode.*
3. *No emission was be recorded above 18GHz means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

7.7. Results for Band edge Testing (Radiated)

Only record the worst test case as following:

TX-2404MHz

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
2374.18	45.78	32.89	35.16	3.51	47.02	74	-26.98	Peak	Horizontal
2374.21	36.33	32.9	35.16	3.51	37.58	54	-16.42	Average	Horizontal
2390.00	51.34	32.92	35.16	3.54	52.64	74	-21.36	Peak	Horizontal
2389.99	41.83	32.92	35.16	3.54	43.13	54	-10.87	Average	Horizontal
2374.18	45.15	32.89	35.16	3.51	46.39	74	-27.61	Peak	Vertical
2374.20	35.41	32.9	35.16	3.51	36.66	54	-17.34	Average	Vertical
2390.00	49.78	32.92	35.16	3.54	51.08	74	-22.92	Peak	Vertical
2389.99	39.44	32.92	35.16	3.54	40.74	54	-13.26	Average	Vertical

TX-2480MHz

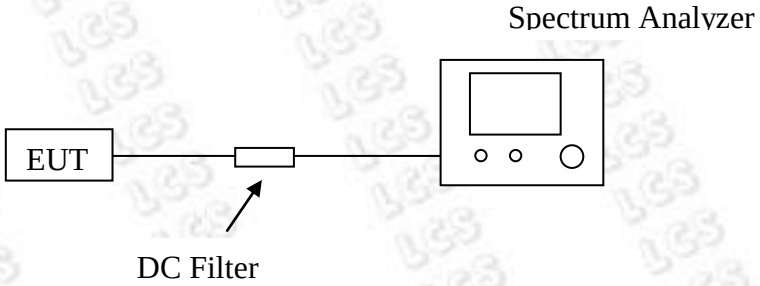
Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
2483.50	51.42	33.06	35.18	3.6	52.90	74	-21.10	Peak	Horizontal
2483.86	42.31	33.08	35.18	3.6	43.81	54	-10.19	Average	Horizontal
2484.31	49.75	33.08	35.18	3.62	51.27	74	-22.73	Peak	Horizontal
2484.33	39.49	33.08	35.18	3.62	41.01	54	-12.99	Average	Horizontal
2483.50	47.43	33.06	35.18	3.6	48.91	74	-25.09	Peak	Vertical
2483.51	36.61	33.08	35.18	3.6	38.11	54	-15.89	Average	Vertical
2484.31	47.55	33.08	35.18	3.62	49.07	74	-24.93	Peak	Vertical
2487.33	37.86	33.08	35.18	3.62	39.38	54	-14.62	Average	Vertical

8. 20 DB BANDWIDTH MEASUREMENT

8.1. Standard Applicable

According to §15.215

8.2. Block Diagram of Test Setup



8.3. Test Procedure

Use the following spectrum analyzer settings:

Span = 3MHz

RBW = 100KHz

VBW = 300KHz

Sweep = auto

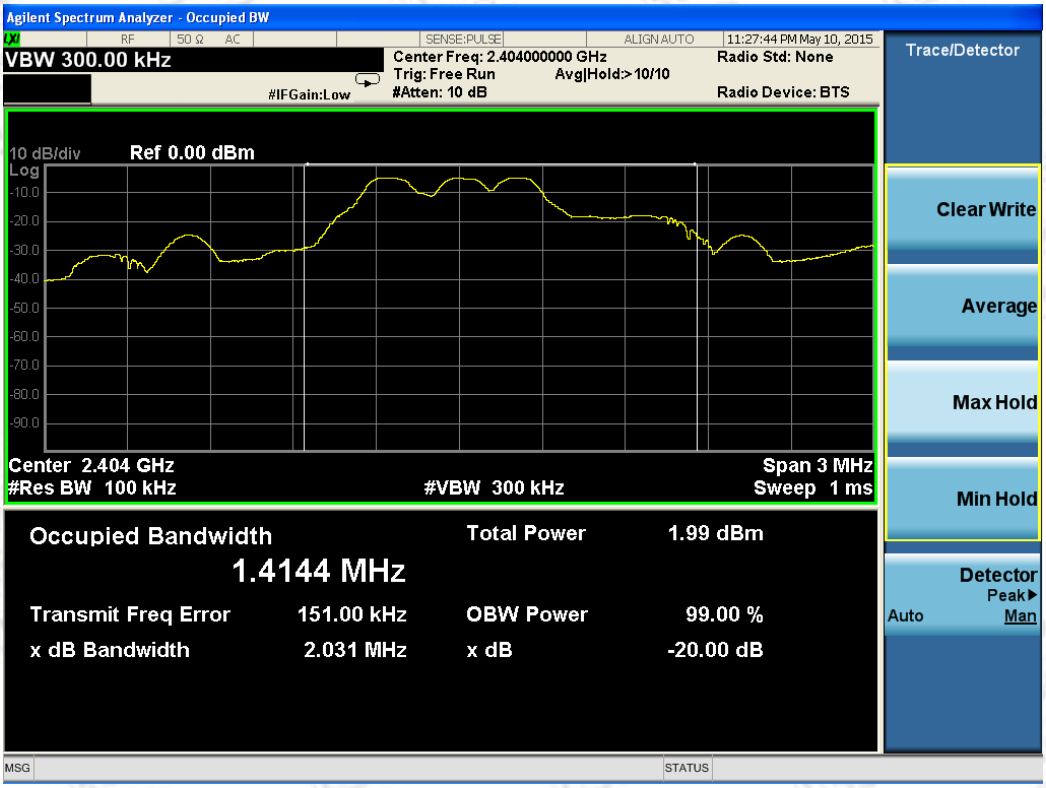
Detector function = peak

Trace = max hold

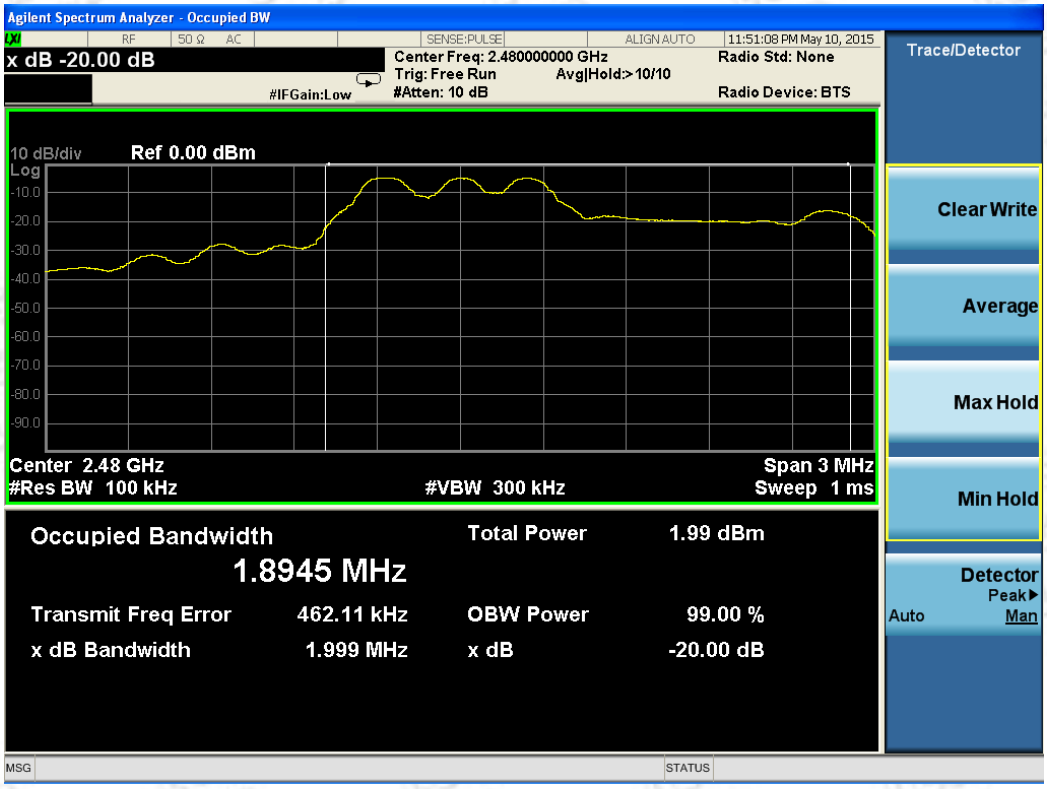
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

8.4. Test Results

Test Result Of 20dB Bandwidth Measurement		
Test Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
2404	2.031	Non-Specified
2440	1.818	
2480	1.999	




Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
10:59:07 PM May 10, 2015
VBW 300.00 kHz
Center Freq: 2.440000000 GHz
Trig: Free Run Avg|Hold:>10/10
#IFGain:Low
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Ref 0.00 dBm
Log
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Center 2.44 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
Occupied Bandwidth
1.6771 MHz
Total Power -5.61 dBm
Transmit Freq Error 391.02 kHz
OBW Power 99.00 %
x dB Bandwidth 1.818 MHz
x dB -20.00 dB
Clear Write
Average
Max Hold
Min Hold
Detector
Peak
Auto
Man
MSG
STATUS


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
11:51:08 PM May 10, 2015
x dB -20.00 dB
Center Freq: 2.480000000 GHz
Trig: Free Run Avg|Hold:>10/10
#IFGain:Low
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Ref 0.00 dBm
Log
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
Occupied Bandwidth
1.8945 MHz
Total Power 1.99 dBm
Transmit Freq Error 462.11 kHz
OBW Power 99.00 %
x dB Bandwidth 1.999 MHz
x dB -20.00 dB
Clear Write
Average
Max Hold
Min Hold
Detector
Peak
Auto
Man
MSG
STATUS

9. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	June 18,2014	June 17,2015
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	9kHz~40GHz	July 16,2014	July 15,2015
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18,2014	June 17,2015
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18,2014	June 17,2015
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18,2014	June 17,2015
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18,2014	June 17,2015
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-1GHz 3m	June 18,2014	June 17,2015
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHzz	June 18,2014	June 17,2015
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 16,2014	July 15,2015
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	July 16,2014	July 15,2015
Spectrum Analyzer	Agilent	E4407B	MY41440292	9k-26.5GHz	July 16,2014	July 15,2015
MAX Signal Analyzer	Agilent	N9020A	MY50510140	20Hz~26.5GHz	Oct. 27, 2014	Oct. 26, 2015
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18,2014	June 17,2015
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	30MHz-1GHz	June 10,2014	June 09,2015
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 10,2014	June 09,2015
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz-40GHz	June 10,2014	June 09,2015
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18,2014	June 17,2015
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 18,2014	June 17,2015
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18,2014	June 17,2015
RF CABLE-2m	JYE Bao	RG142	CB)35-2m	20MHz-1GHz	June 18,2014	June 17,2015
temporary antenna connector	LCS	LCS-RF-20150413	N/A	9KHz~40GHz Impedance: 50Ω Cable Loss: 0.5dB	N/A	N/A
Note: All equipment through GRGT EST calibration						

----------THE END OF REPORT----------