STC Test Report

Date: 2015-11-26

No.: DM120818

Applicant: Ewig Industries Macao Commercial Offshore Limited
Avenida Da Praia Grande No.619, EDF. Comercial Si Toi L6, Macau

Manufacturer: Dong Guan Q&S Electronic Manufacturing Company Limited
Yin Shan Industrial District, Fu Gang Village, Xiang Mang West Road, Qing Xi Town, Dongguan City, Guang Dong Province, China

Description of Sample(s): Submitted sample(s) said to be

Product:	Gateway
Brand Name:	EWIG
Model Number:	GRP009
FCC ID:	N9ZGRP009

Date Sample(s) Received: 2015-08-26

Date Tested: 2015-09-01 to 2015-11-25

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 and ANSI C63.10:2013 for FCC Certification.

Conclusion(s): The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remark(s): ---

LONG Yun Jian, Along
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
STC (Dongguan) Company Limited

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CONTENT:

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1.0 General Details

1.1 Test Laboratory

STC (Dongguan) Company Limited
EMC Laboratory
68 Fumin Nan Road, Dalang, Dongguan, Guangdong, China

Telephone: (86 769) 81119888
Fax: (86 769) 81116222

1.2 Equipment Under Test [EUT]
Description of Sample(s)

Product:	Gateway
Manufacturer:	Dong Guan Q&S Electronic Manufacturing Company Limited Yin Shan Industrial District, Fu Gang Village, Xiang Mang West Road, Qing Xi Town, Dongguan City, Guang Dong Province, China
Brand Name:	EWIG
Model Number:	GRP009
Rating:	Input: 100-240Va.c. 50/60Hz 0.3A; Output: 5.0Vd.c. 1.0A.

The AC/DC adaptor was provided by the applicant with following details:
Brand name: N/A; Model no.: GQ07-050100-AC

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Zigbee Gateway of Ewig Industries Macao Commercial Offshore Limited. the transmission signal is digital modulated with channel frequency range 2405-2475MHz. The EUT consists of 2 antennae (Ant 0 and Ant 1), r.f. signal will only be transmitted from either Ant 0 or Ant 1 according to the reception condition.
Measurement has been carried out on both antennae terminal, the worst case test results is recorded in this test report.

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1.3 Date of Order

2015-08-26

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2015-09-01 to 2015-11-25

1.6 Country of Origin

China

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 Regulations and ANSI C63.10:2013for FCC Certification.
According FCC KDB 558074 DTS Measurement Guidance, Duty cycle ≧98%.
The device was realized by test software.

2.2 Test Standards and Results Summary Tables

EMISSION
Results Summary

Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Output Power of Fundamental Emissions	FCC 47CFR 15.247(b)(3)	ANSI C63.10:2013	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐	☐
Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A	☒	☐	☐
Power Spectral Density	FCC 47CFR 15.247(e)	N/A	N/A	☒	☐	☐
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	N/A	N/A	☒	☐	☐
Band Edge Emissions	FCC 47CFR 15.247(d)	N/A	N/A	☒	☐	☐
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	☒	☐	☐

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Output Power

Test Requirement:	FCC 47CFR 15.247(b)(3)
Test Method:	N/A
Test Date:	2015-09-01
Mode of Operation:	Tx mode

Test Method:

The RF output of the EUT was connected to the peak power sensor, and the level measured by the peak power sensor will be displayed on the computer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in W.

Test Setup:

Note: a temporary antenna connector was soldered to the RF output.

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Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt (30dBm)

ANT 0

Results of Tx Mode GFSK (2405MHz to 2475MHz) : Pass (Tx Unit)
Maximum conducted output power

Channel	Frequency(MHz)	Output Power(Watt)
Low	2405	0.1112
Middle	2440	0.1064
High	2475	0.1021

ANT 1

Results of Tx Mode GFSK (2405MHz to 2475MHz) : Pass (Tx Unit)
Maximum conducted output power

Channel	Frequency(MHz)	Output Power(Watt)
Low	2405	0.1021
Middle	2440	0.0993
High	2475	0.1014

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB
1GHz to 26GHz 1.7dB

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3.1.2 Radiated Emissions

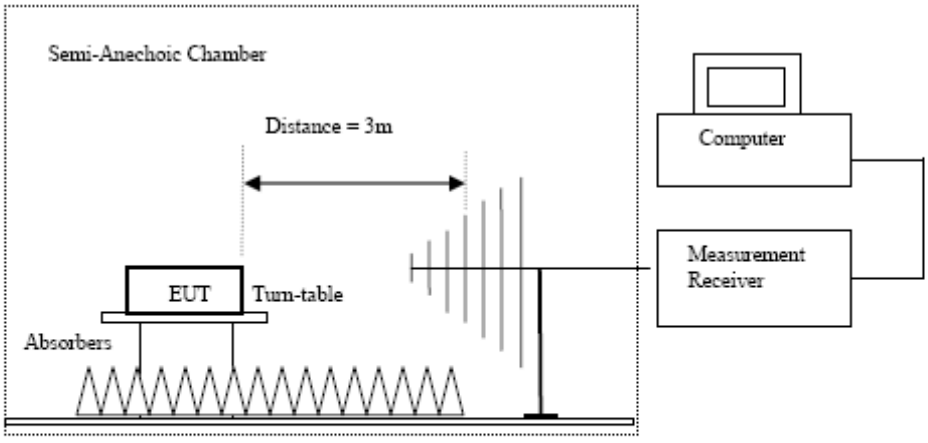
Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.10:2013
Test Date:	2015-09-02 to 2015-11-25
Mode of Operation:	Tx mode (Ant 0, worst case)

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-anechoic chamber located on the G/F of "STC (Dongguan) Company Limited" with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

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Limits for Radiated Emissions [FCC 47 CFR 15.247 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Tx mode (2405.0 MHz) (GFSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength dBμV/m	Limit dBμV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2405.0 MHz) (GFSK) (1GHz-26GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
4810.0	18.2	41.5	59.7	74.0	14.3	Vertical
4810.0	15.1	42.4	57.5	74.0	16.5	Horizontal
7215.0	12.5	45.1	57.6	74.0	16.4	Vertical
7215.0	8.8	46.2	55.0	74.0	19.0	Horizontal
9620.0	9.5	48	57.5	74.0	16.5	Vertical
9620.0	9.6	48.8	58.4	74.0	15.6	Horizontal
12025.0	7.3	51.5	58.8	74.0	15.2	Vertical
12025.0	5.2	52.4	57.6	74.0	16.4	Horizontal

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Result of Tx mode (2405.0 MHz) (GFSK) (1GHz-26GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4810.0	5.3	41.5	46.8	54.0	7.2	Vertical
4810.0	2.3	42.4	44.7	54.0	9.3	Horizontal
7215.0	-0.3	45.1	44.8	54.0	9.2	Vertical
7215.0	-4.0	46.2	42.2	54.0	11.8	Horizontal
9620.0	-3.1	48.0	44.9	54.0	9.1	Vertical
9620.0	-2.5	48.8	46.3	54.0	7.7	Horizontal
12025.0	-5.2	51.5	46.3	54.0	7.7	Vertical
12025.0	-7.3	52.4	45.1	54.0	8.9	Horizontal

Result of Tx mode (2440.0 MHz) (GFSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength dBµV/m	Limit dBµV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2440.0 MHz) (GFSK) (1GHz-26GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
4880.0	20.2	41.6	61.8	74.0	12.2	Vertical
4880.0	17.9	42.5	60.4	74.0	13.6	Horizontal
7320.0	16.3	45.2	61.5	74.0	12.5	Vertical
7320.0	12.3	46.3	58.6	74.0	15.4	Horizontal
9760.0	13.0	48.1	61.1	74.0	12.9	Vertical
9760.0	12.7	48.9	61.6	74.0	12.4	Horizontal
12200.0	8.9	51.6	60.5	74.0	13.5	Vertical
12200.0	6.8	52.5	59.3	74.0	14.7	Horizontal

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Result of Tx mode (2440.0 MHz) (GFSK) (1GHz-26GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4880.0	8.0	41.6	49.6	54.0	4.4	Vertical
4880.0	5.7	42.5	48.2	54.0	5.8	Horizontal
7320.0	3.9	45.2	49.1	54.0	4.9	Vertical
7320.0	-0.4	46.3	45.9	54.0	8.1	Horizontal
9760.0	0.2	48.1	48.3	54.0	5.7	Vertical
9760.0	0.0	48.9	48.9	54.0	5.1	Horizontal
12200.0	-3.8	51.6	47.8	54.0	6.2	Vertical
12200.0	-5.7	52.5	46.8	54.0	7.2	Horizontal

Result of Tx mode (2475.0 MHz) (GFSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength dBµV/m	Limit dBµV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2475.0 MHz) (GFSK) (1GHz-26GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dBµV/m	E-Field Polarity
4950.0	18.9	41.4	60.3	74.0	13.7	Vertical
4950.0	15.7	42.7	58.4	74.0	15.6	Horizontal
7425.0	14.9	45.6	60.5	74.0	13.5	Vertical
7425.0	14.7	46.5	61.2	74.0	12.8	Horizontal
9900.0	11.5	48.6	60.1	74.0	13.9	Vertical
9900.0	11.1	49.7	60.8	74.0	13.2	Horizontal
12375.0	6.5	51.7	58.2	74.0	15.8	Vertical
12375.0	4.2	52.7	56.9	74.0	17.1	Horizontal

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Result of Tx mode (2475.0 MHz) (GFSK) (1GHz-26GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
4950.0	6.3	41.4	47.7	54.0	6.3	Vertical
4950.0	2.9	42.7	45.6	54.0	8.4	Horizontal
7425.0	2.3	45.6	47.9	54.0	6.1	Vertical
7425.0	2.2	46.5	48.7	54.0	5.3	Horizontal
9900.0	-1.1	48.6	47.5	54.0	6.5	Vertical
9900.0	-1.5	49.7	48.2	54.0	5.8	Horizontal
12375.0	-5.9	51.7	45.8	54.0	8.2	Vertical
12375.0	-8.2	52.7	44.5	54.0	9.5	Horizontal

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

* Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty (9kHz-30MHz): 2.0dB
(30MHz -1GHz): 4.9dB
(1GHz -6GHz): 4.02dB
(6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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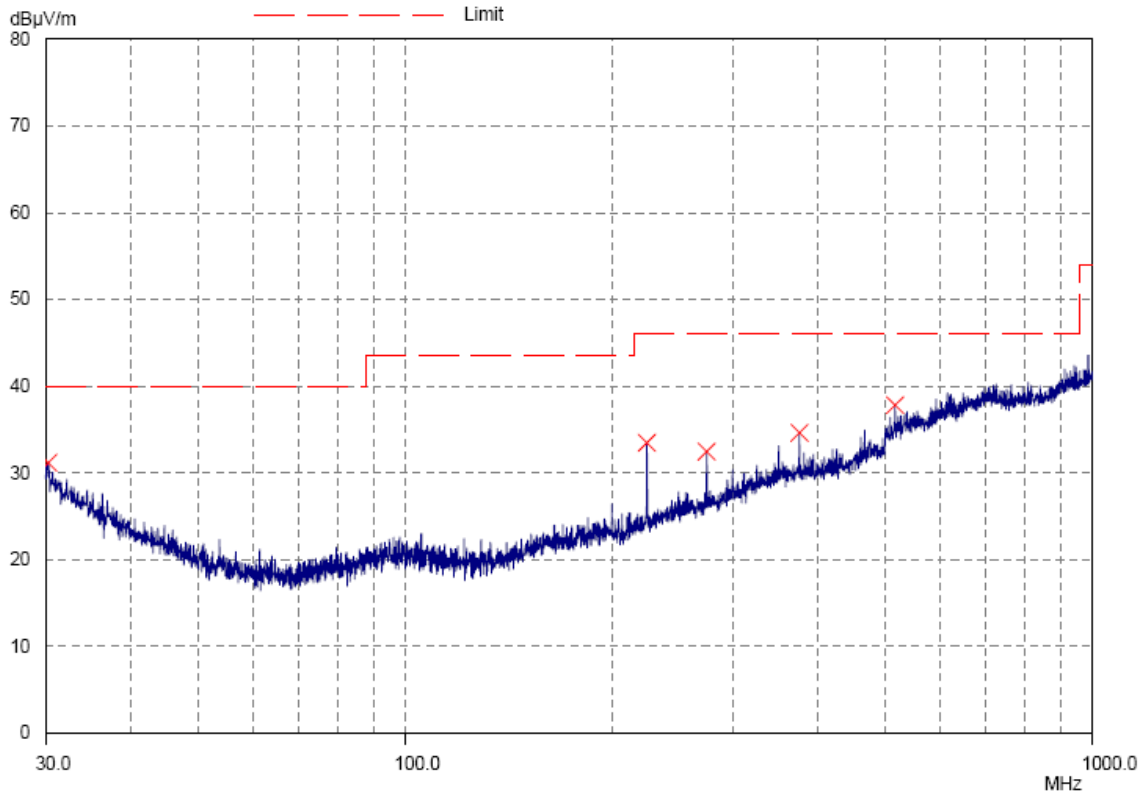
Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Tx + LAN mode (30MHz – 1GHz): Pass
Please refer to the following table for result details

Horizontal



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Result of Tx +LAN mode (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m dBµV/m	Limit @3m dBµV/m
30.3	Horizontal	31.2	40.0	36.3	100
225.0	Horizontal	33.5	46.0	47.3	200
275.0	Horizontal	32.5	46.0	42.2	200
375.1	Horizontal	34.6	46.0	53.7	200
517.1	Horizontal	37.8	46.0	77.6	200

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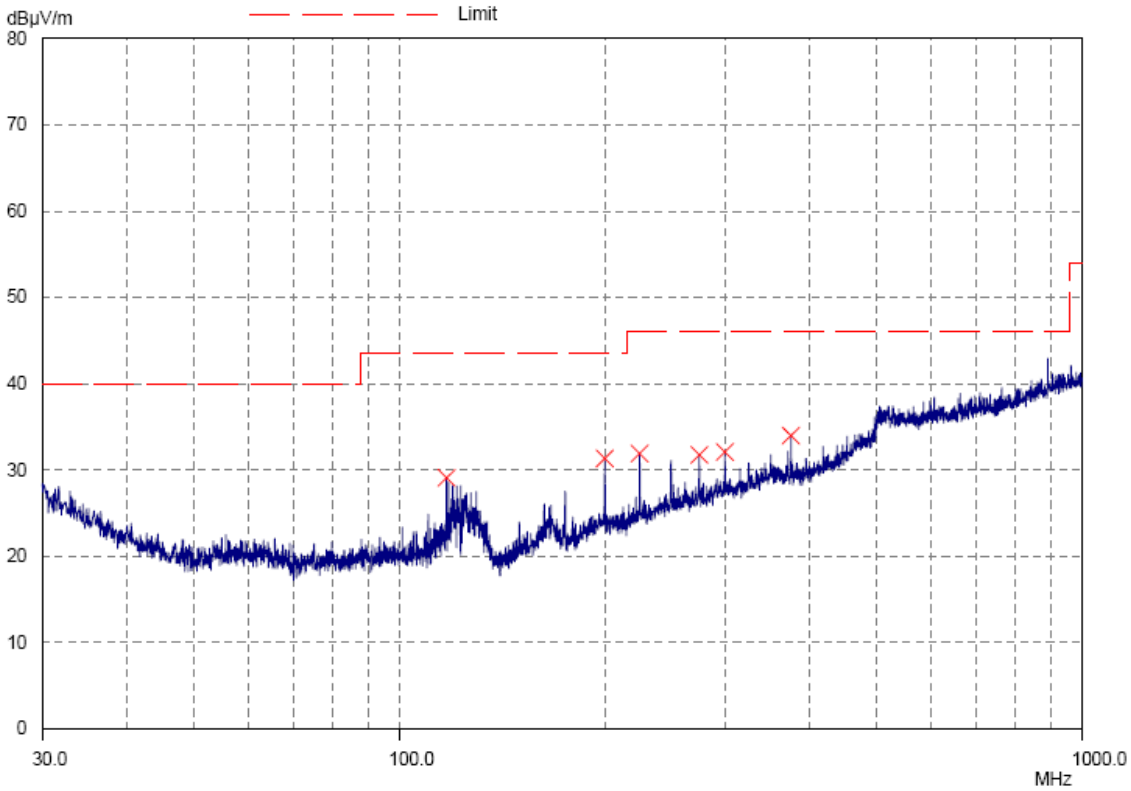
Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Tx+ LAN mode (30MHz – 1GHz): Pass
Please refer to the following table for result details

Vertical



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Result of Tx +LAN mode (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m dBµV/m	Limit @3m dBµV/m
117.3	Vertical	29.1	43.5	28.5	150
200.0	Vertical	31.3	43.5	36.7	150
225.0	Vertical	31.9	46.0	39.4	200
275.1	Vertical	31.8	46.0	38.9	200
299.9	Vertical	32.1	46.0	40.3	200
374.8	Vertical	34.0	46.0	50.1	200

Remarks:
Calculated measurement uncertainty (30MHz – 1GHz): 4.9dB
Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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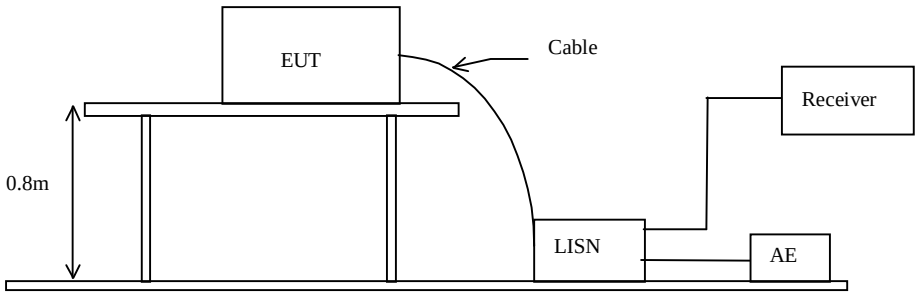
3.1.3 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10:2013
Test Date:	2015-09-02
Mode of Operation:	Tx +LAN mode
Test Voltage:	120Va.c. 60Hz

Test Method:

The test was performed in accordance with ANSI ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:



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Limit for Conducted Emissions (FCC 47 CFR 15.207):

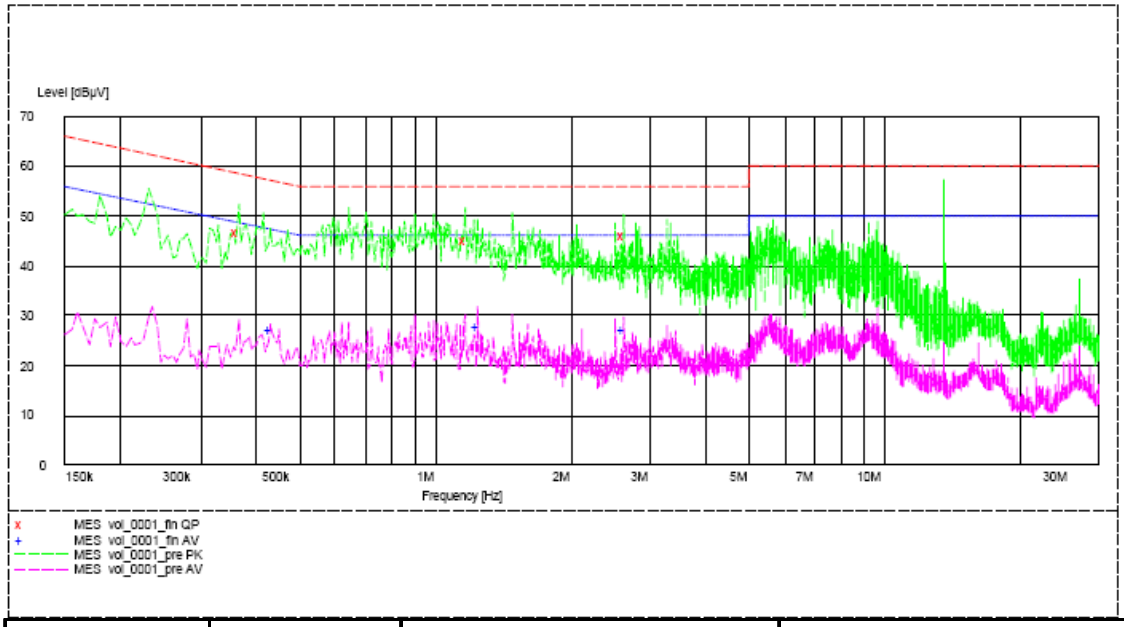
Frequency Range [MHz]	Quasi-Peak Limits [dBµV]	Average [dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Result of Tx +LAN mode (L): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Average Level dBµV	Average Limit dBµV
Live	0.365	46.6	59.0	-*-	-*-
Live	1.165	45.0	56.0	-*-	-*-
Live	2.640	46.1	56.0	-*-	-*-
Live	0.430	-*-	-*-	27.2	47.0
Live	1.245	-*-	-*-	27.8	46.0
Live	2.640	-*-	-*-	27.1	46.0

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Limit for Conducted Emissions (FCC 47 CFR 15.207):

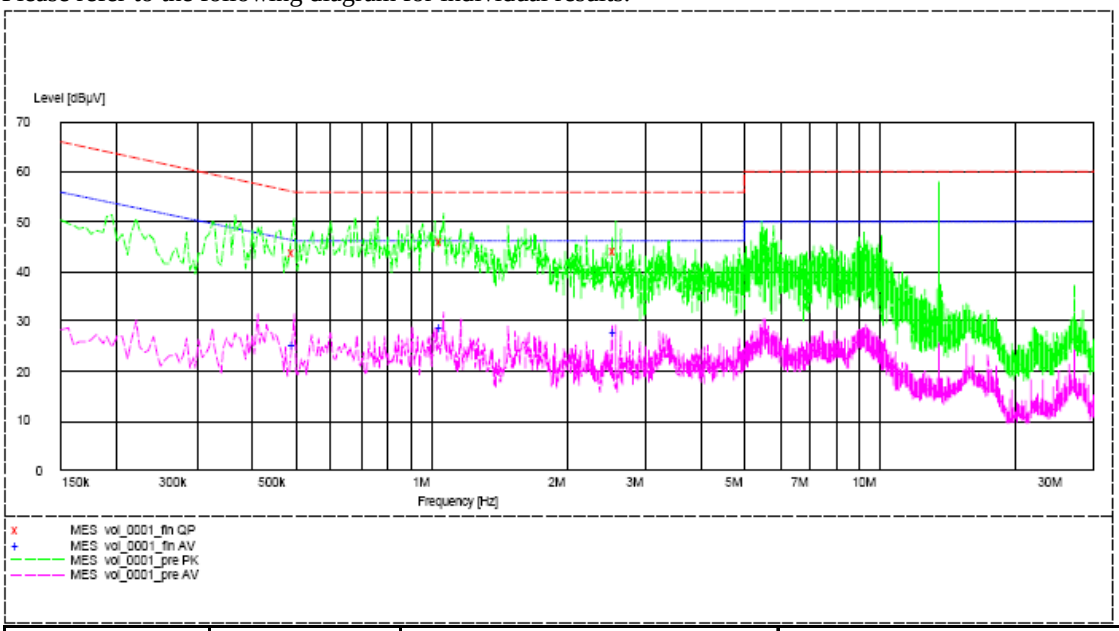
Frequency Range [MHz]	Quasi-Peak Limits [dBµV]	Average [dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Result of Tx +LAN mode (N): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Average Level dBµV	Average Limit dBµV
Neutral	0.495	44.1	56.0	-*-	-*-
Neutral	1.065	46.2	56.0	-*-	-*-
Neutral	2.580	44.5	56.0	-*-	-*-
Neutral	0.495	-*-	-*-	25.2	46.0
Neutral	1.065	-*-	-*-	28.9	46.0
Neutral	2.580	-*-	-*-	28.0	46.0

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.25dB

-*- Emission(s) that is far below the corresponding limit line.

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3.1.4 Power Spectral Density

Test Requirement:	FCC 47CFR 15.247(e)
Test Method:	ANSI C63.10:2013
Test Date:	2015-09-01
Mode of Operation:	Tx mode

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz , VBW= 10KHz , Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple , Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

Test Limit:

The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

Results of Tx ModeGFSK (Tx:2405MHz to 2475MHz) : Pass (Tx Unit)
Maximum power spectral density
ANT 0

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2405.0	5.82	**8dBm**
2440.0	6.03	**8dBm**
2475.0	5.97	**8dBm**

ANT 1

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2405.0	5.62	**8dBm**
2440.0	5.78	**8dBm**
2475.0	5.81	**8dBm**

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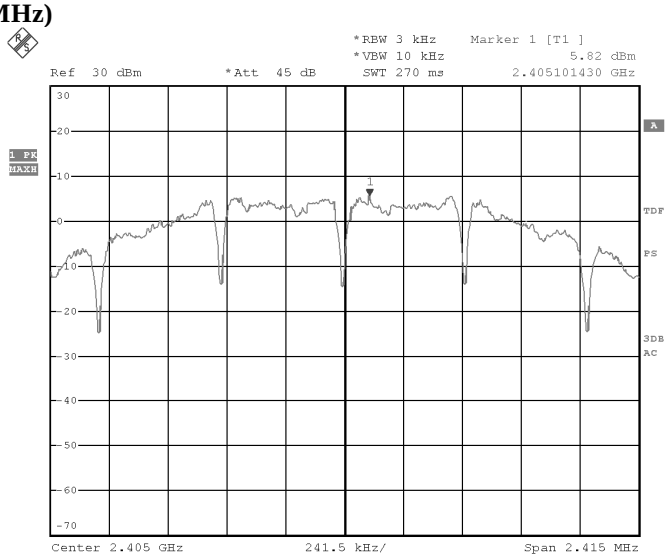
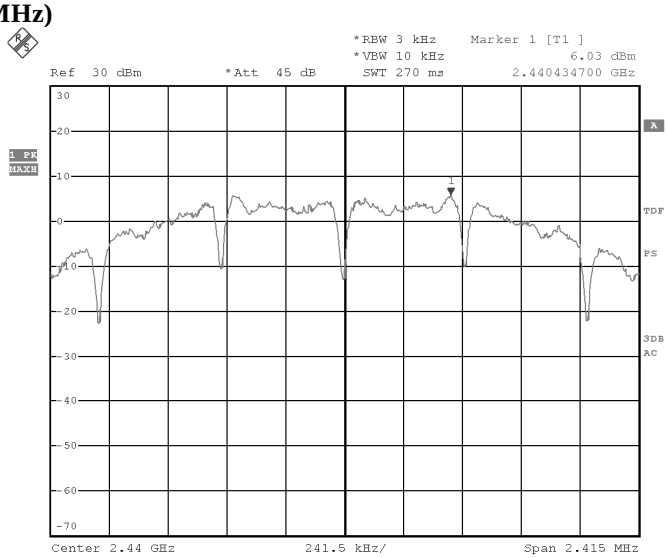
ANT 0
Tx mode GFSK (Tx: 2405MHz to 2475MHz)
CH 11 (2405.0 MHz)



BMP

Date: 1.SEP.2015 15:14:37

CH 18 (2440.0 MHz)



BMP

Date: 1.SEP.2015 15:07:31

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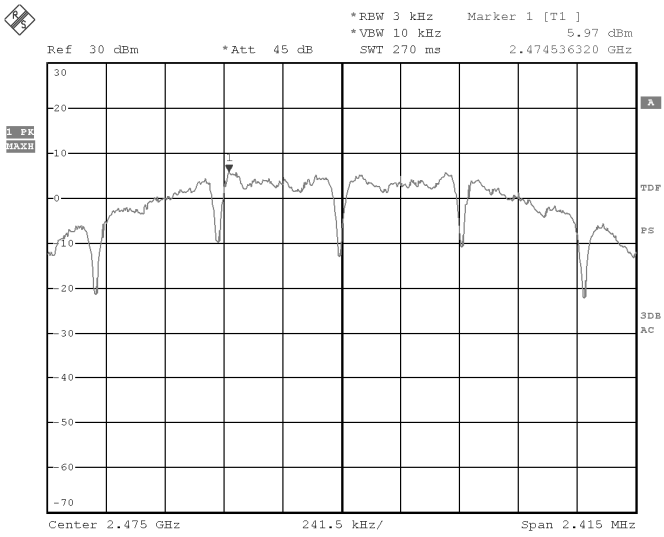
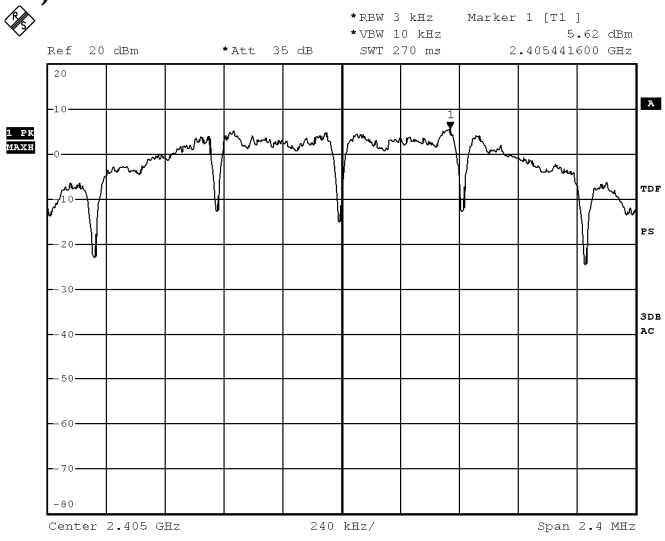
CH 25 (2475.0 MHz)



BMP

Date: 1.SEP.2015 15:34:30

ANT 1
Tx mode GFSK (Tx:2405MHz to 2475MHz)
CH 11 (2405.0 MHz)



BMP

Date: 1.SEP.2015 19:01:46

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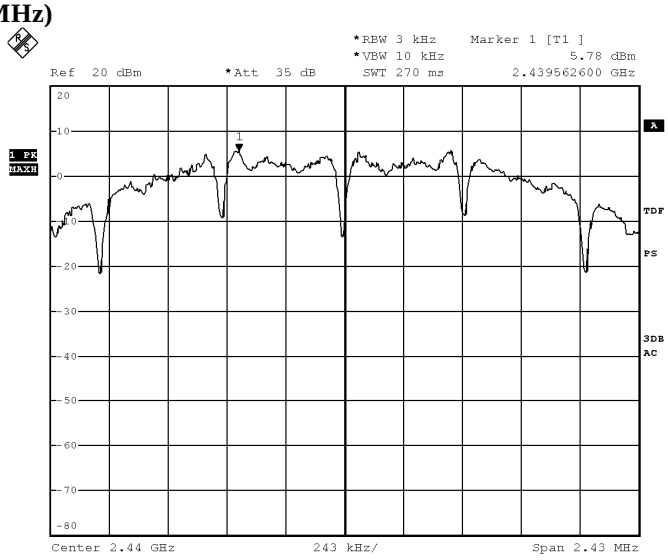
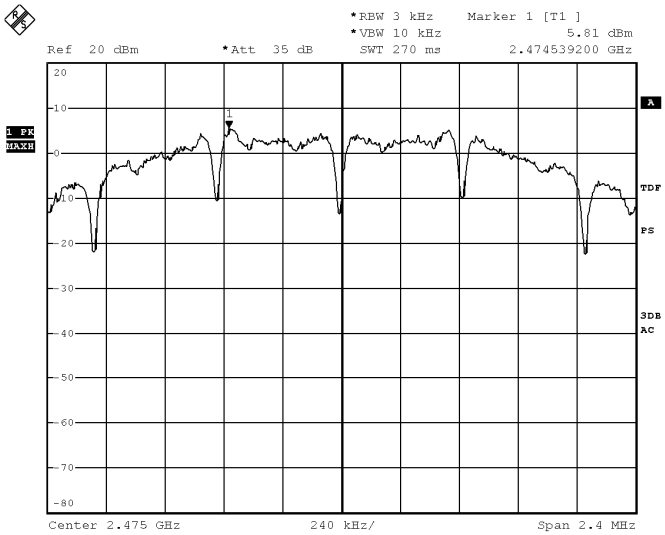
CH 18 (2440.0 MHz)



BMP

Date: 1.SEP.2015 18:59:19

CH 25 (2475.0 MHz)



BMP

Date: 1.SEP.2015 19:04:54

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3.1.5 6dB Spectrum Bandwidth Measurement

Test Requirement:	FCC 47CFR 15.247(a)(2)
Test Method:	ANSI C63.10:2013
Test Date:	2015-09-01
Mode of Operation:	Tx mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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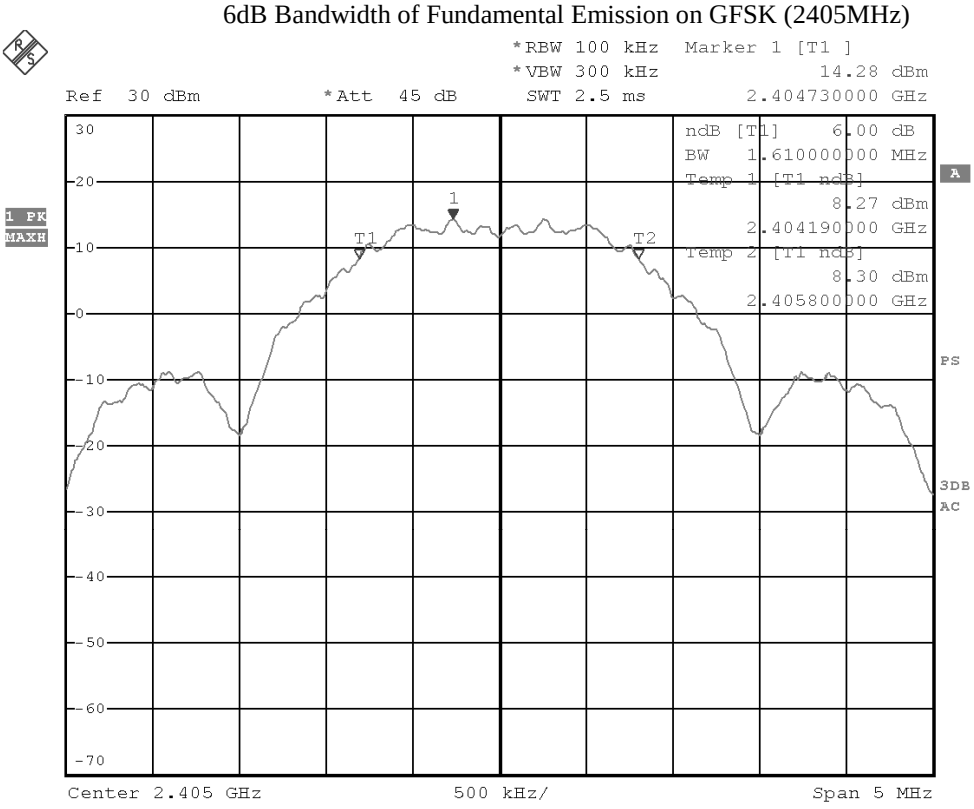
Limits for 6dB Spectrum Bandwidth Measurement:
ANT 0

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2405.0	1.61	> 500

6dB Bandwidth of Fundamental Emission on GFSK (2405MHz)



BMP

Date: 1.SEP.2015 14:49:20

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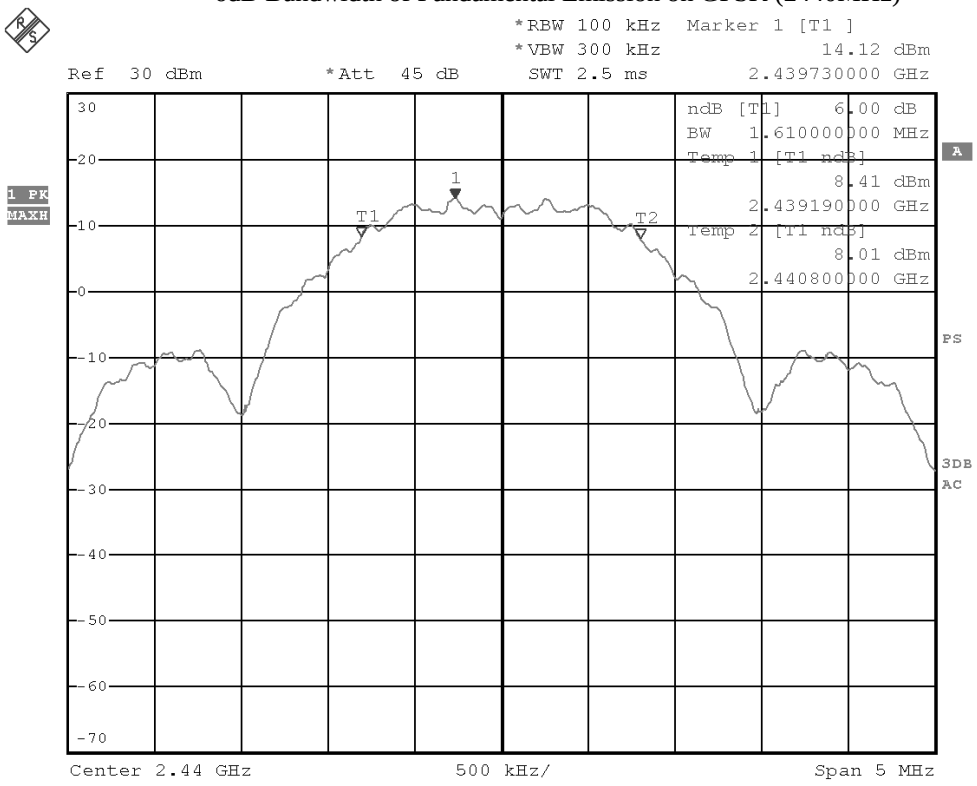
Limits for 6dB Spectrum Bandwidth Measurement:
ANT 0

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2440.0	1.61	> 500

6dB Bandwidth of Fundamental Emission on GFSK (2440MHz)



BMP

Date: 1.SEP.2015 14:51:13

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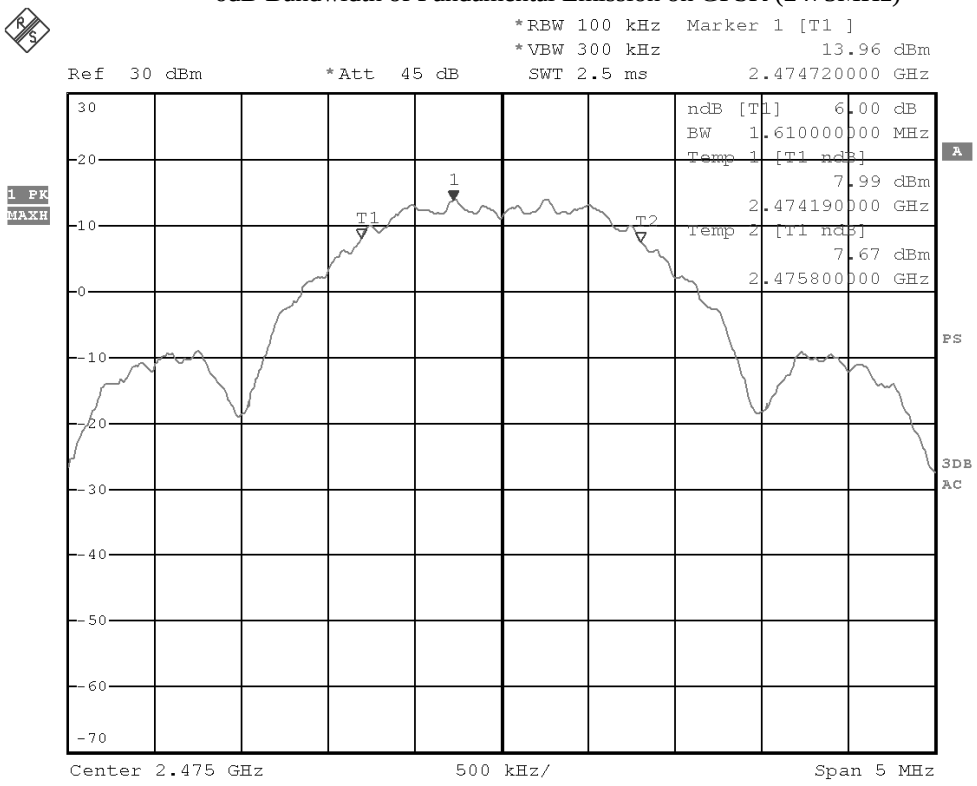
Limits for 6dB Spectrum Bandwidth Measurement:
ANT 0

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2475.0	1.61	> 500

6dB Bandwidth of Fundamental Emission on GFSK (2475MHz)



BMP

Date: 1.SEP.2015 14:42:38

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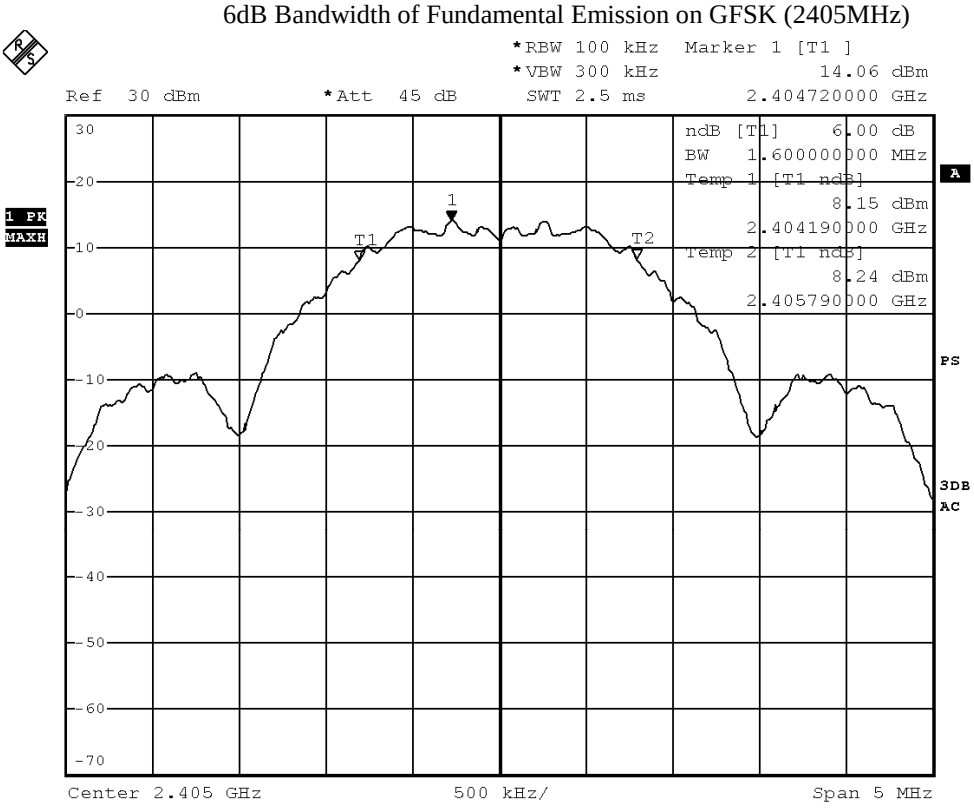
Limits for 6dB Spectrum Bandwidth Measurement:
ANT 1

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2405.0	1.60	> 500

6dB Bandwidth of Fundamental Emission on GFSK (2405MHz)



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Date: 1.SEP.2015 18:50:48

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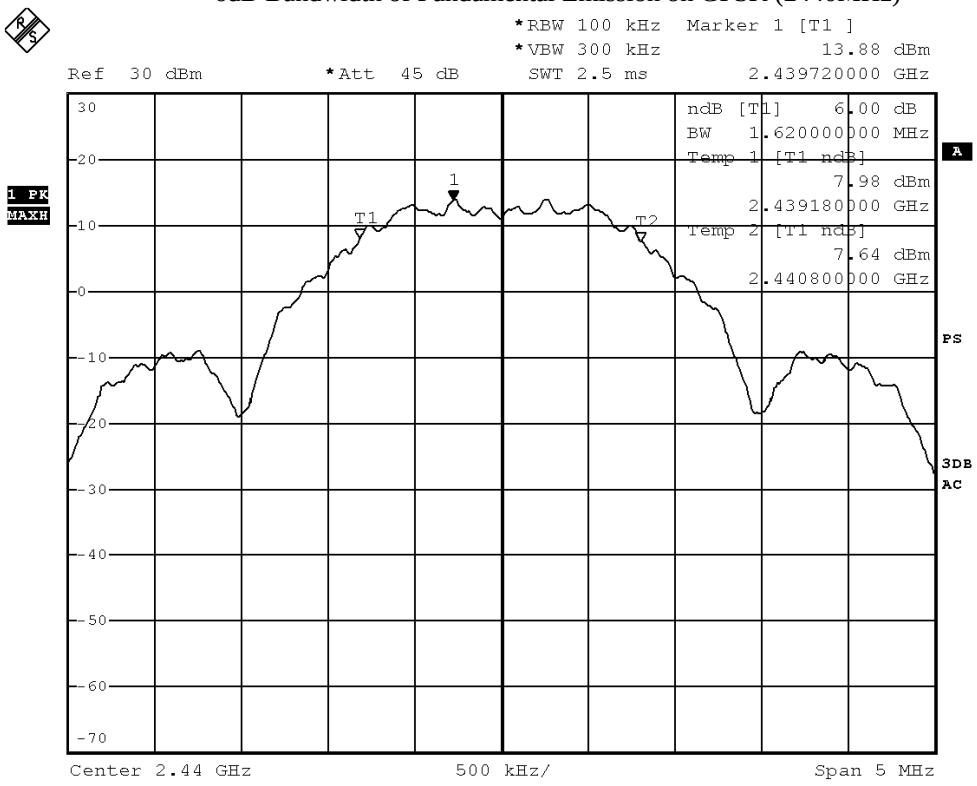
Limits for 6dB Spectrum Bandwidth Measurement:
ANT 1

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2440.0	1.62	> 500

6dB Bandwidth of Fundamental Emission on GFSK (2440MHz)



BMP

Date: 1.SEP.2015 18:49:31

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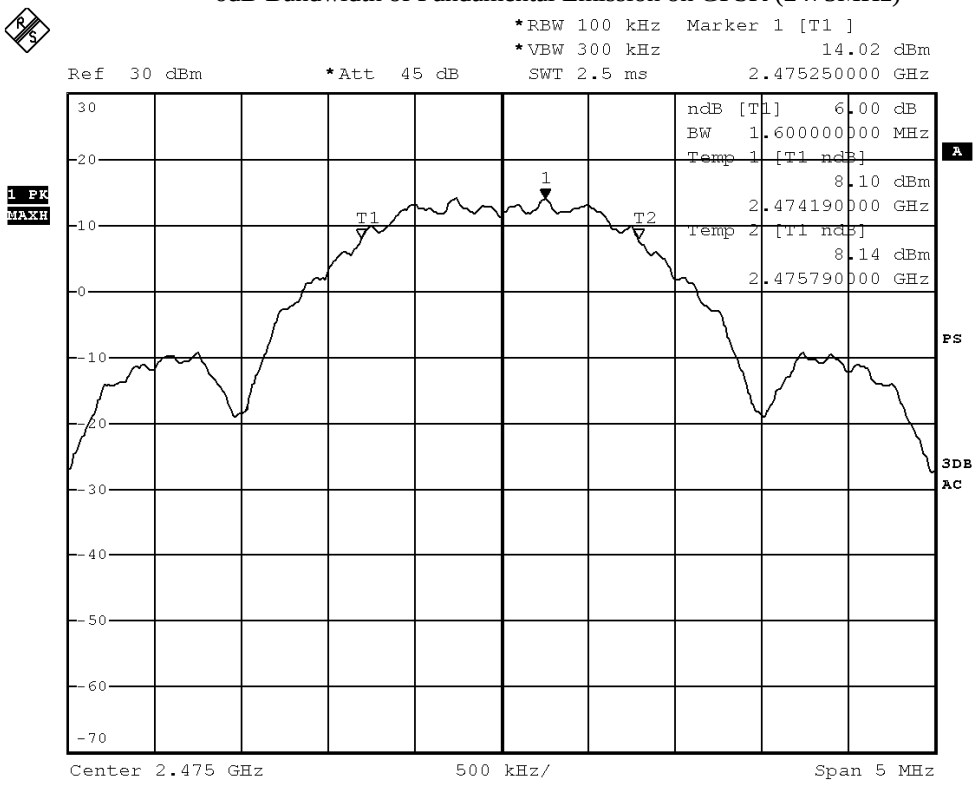
Limits for 6dB Spectrum Bandwidth Measurement:
ANT 1

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2475.0	1.60	> 500

6dB Bandwidth of Fundamental Emission on GFSK (2475MHz)



BMP

Date: 1.SEP.2015 18:46:36

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3.1.6 Band Edges Measurement

Test Requirement:	FCC 47CFR 15.247
Test Method:	ANSI C63.10:2013
Test Date:	2015-09-01
Mode of Operation:	Tx mode

Test Method:

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. The RBW are set to 100kHz and VBW are set to 300kHz for this measurement.

Test Setup:

As Test Setup of clause 3.1.2 in this test report.

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Band-edge Compliance of RF Conducted Emissions Measurement:

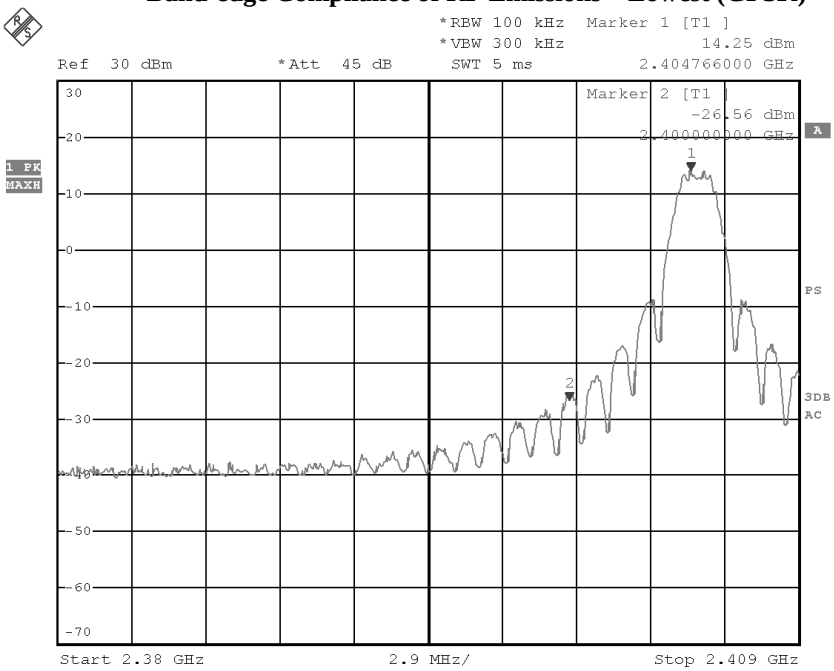
Limit：

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Worse test data

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 – Lowest Fundamental (2405)	40.81

Band-edge Compliance of RF Emissions – Lowest (GFSK)



BMP

Date: 1.SEP.2015 16:00:49

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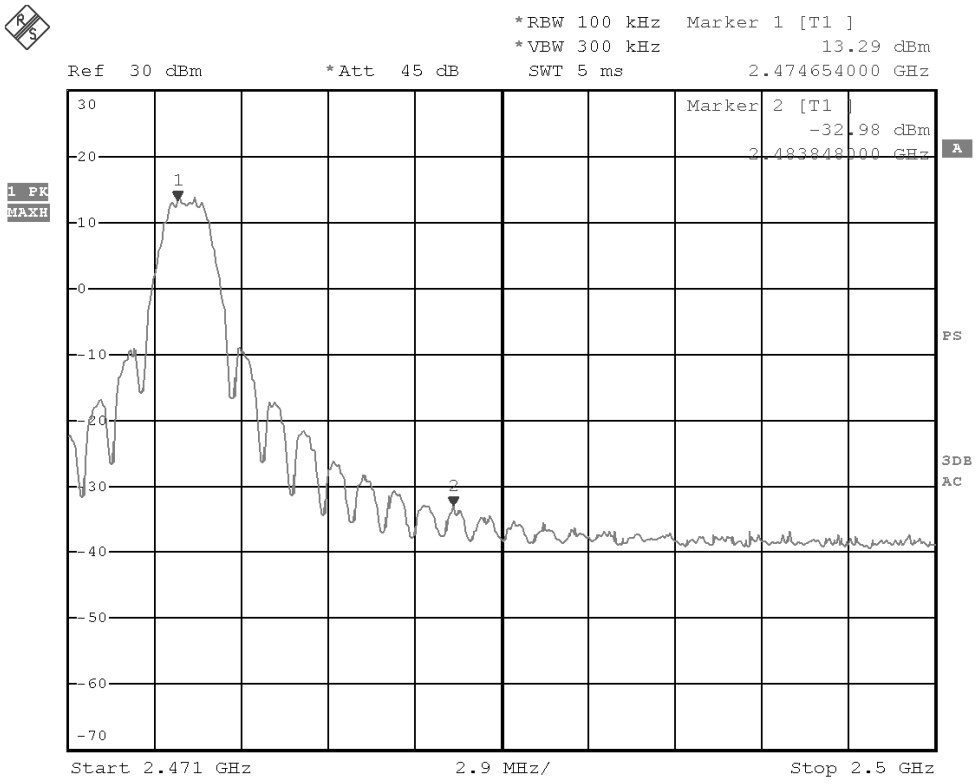
Band-edge Compliance of RF Conducted Emissions Measurement: (Worse test data)

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2483.5 - Highest Fundamental (2475)	46.27

Band-edge Compliance of RF Emissions – Highest (GFSK)



BMP

Date: 1.SEP.2015 15:58:31

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Band-edge Compliance of RF Radiated Emissions Measurement:

Limit：

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

Result：Band-edge Compliance of RF Radiated Emissions (Lowest)-GFSK (Worse test data)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2390.0	26.3	36.8	63.1	74.0	10.9	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2390.0	8.6	36.8	45.4	54.0	8.6	Vertical

Result：Band-edge Compliance of RF Radiated Emissions (Highest) -GFSK (Worse test data)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2483.5	32.1	36.4	68.5	74.0	5.5	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2483.5	13.9	36.4	50.3	54.0	3.7	Horizontal

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3.1.7 RF Exposure

Test Requirement:	FCC 47CFR 15.247(i)
Test Date:	2015-09-06
Mode of Operation:	**Tx** mode

Test Method:

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.

Test Results:

The EUT complied with the requirement(s) of this section.
EUT meets the requirements of these sections as proven through MPE calculation
The MPE calculation for EUT @ 20cm
Based on the highest P =111.2 mW

Pd = PG/ 4pi*R^2 = (111.2 x 2.0)/12.566* $(20)^2$
= (222.4)/12.566x 400= 222.4 /5026.4
= 0.044mW/cm^2

where:
*Pd = power density in mW/cm2
* G = Antenna numeric gain (2.0); Log G = g/10 (g = 3dBi).
* P = Conducted RF power to antenna (111.2 mW).
* R = Minimum allowable distance.(20 cm)

*The power density Pd = 0.044 mW/cm^2 is less than 1 mW/cm^2 (listed MPE limit)
*The SAR evaluation is not needed (this is a desk top device, R> 20 cm)
* The EUT(antenna) must be 0.2 meters away from the General Population.

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Appendix A

List of Measurement Equipment

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD004	LISN	ROHDE & SCHWARZ	ESH3-Z5	100102	2015.3.24	2016.03.24
EMD022	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS30	100314	2015.3.24	2016.03.24
EMD035	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI	100441	2015.3.24	2016.03.24
EMD036	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB 26	100388	2015.3.24	2016.03.24
EMD041	TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	100261	2015.3.24	2016.03.24
EMD061	BICONILOG ANTENNA	ETS.LINDGREN	3142C	00060439	2014.11.29	2016.11.29
EMD062	DOUBLE-RIDGED WAVEGUIDE (1GHZ – 18GHZ)	ETS.LINDGREN	3117	00075933	2014.11.15	2016.11.15
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	VIDEO CONTOL UNIT	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	MONITOR	VIEWSONIC	VA9036	Q8X064201876	N/A	N/A
EMD102	INTELLIGENT FREQUENCY	AINUO LNSTRUMENT CO., LTD	AN97005SS	79707454	N/A	N/A
EMD103	INTELLIGENT FREQUENCY	AINUO LNSTRUMENT CO., LTD	AN97005SS	79707455	N/A	N/A
EMD105	FACT-3 EMC CHAMBER	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD106	SHIELDING ROOM #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A
EMD111	POWER METER	ROHDE & SCHWARZ	NRVD	102051	2015.3.24	2016.03.24
	100V INSERTION UNIT	ROHDE & SCHWARZ	URV5-Z4	100464	2015.3.24	2016.03.24
EMD113	PRE-AMPLIFIER	ROHDE & SCHWARZ	N/A	1129588	2015.3.24	2016.03.24
EMD124	LOOP ANTENNA	ETS-LINDGREN	6502	00104905	2014.04.28	2016.04.28
EMD131	STANDARD GAIN HORN ANTENNA (18GHZ – 26.5GHZ)	CHENGDU AINFO LNC.	JXTxLB-42-15-C-KF	J2021100721001	2015.04.09	2017.04.09
RE01	RF CABLE	N/A	N/A	N/A	2015-9-28	2016.09.27
RE02	RF CABLE	N/A	N/A	N/A	2015-9-28	2016.09.27

Remarks:-

CM Corrective Maintenance
N/A Not Applicable
TBD To Be Determined

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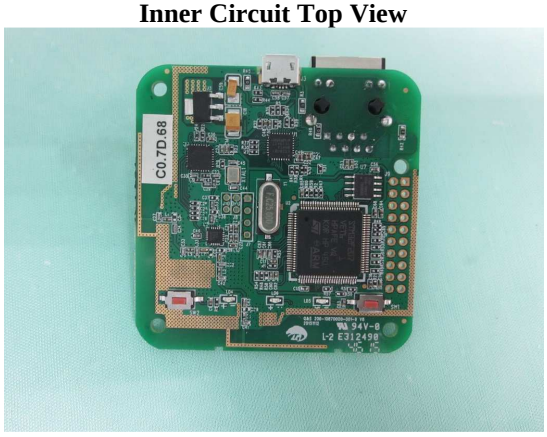
Appendix B

Photographs of EUT

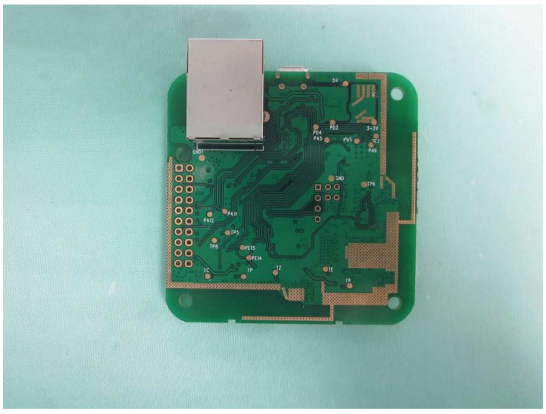
Front View of the product

Rear View of the product

Inner Circuit Top View



Inner Circuit Bottom View



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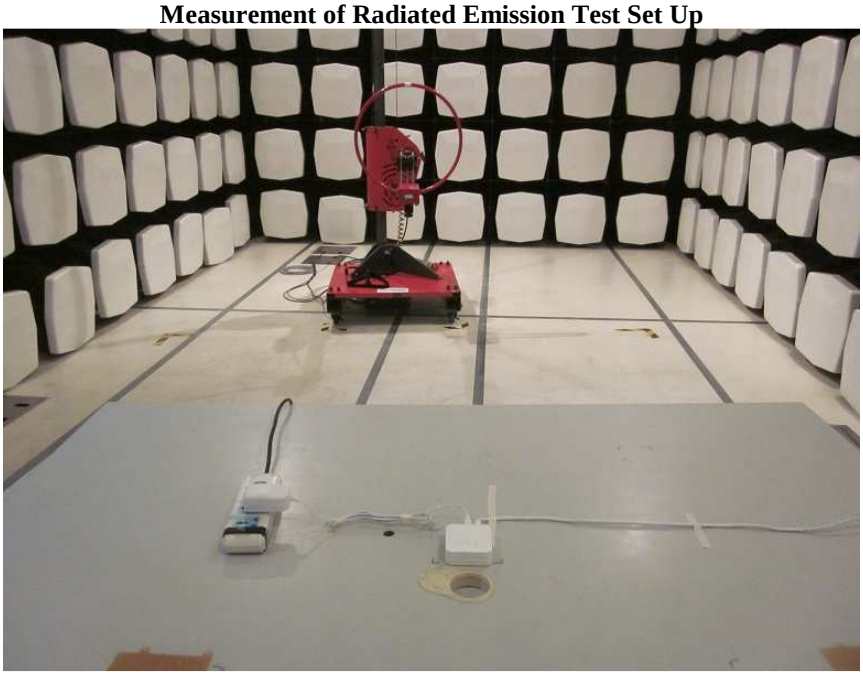
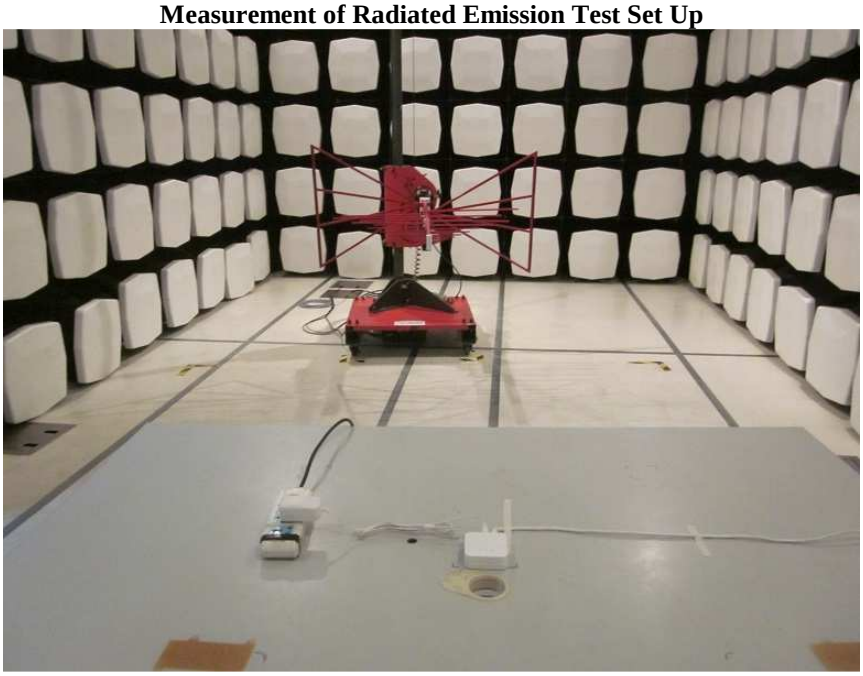
Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



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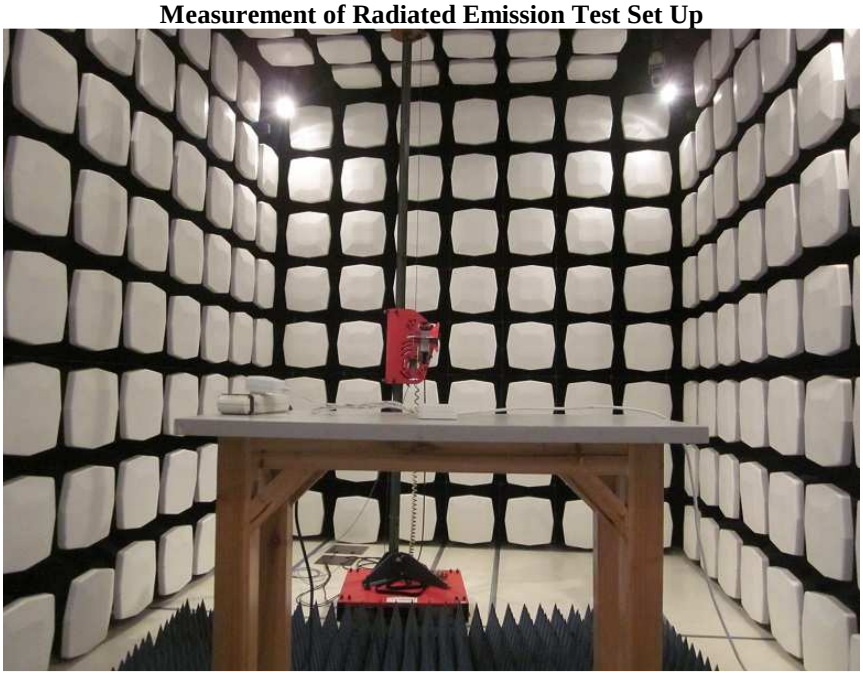
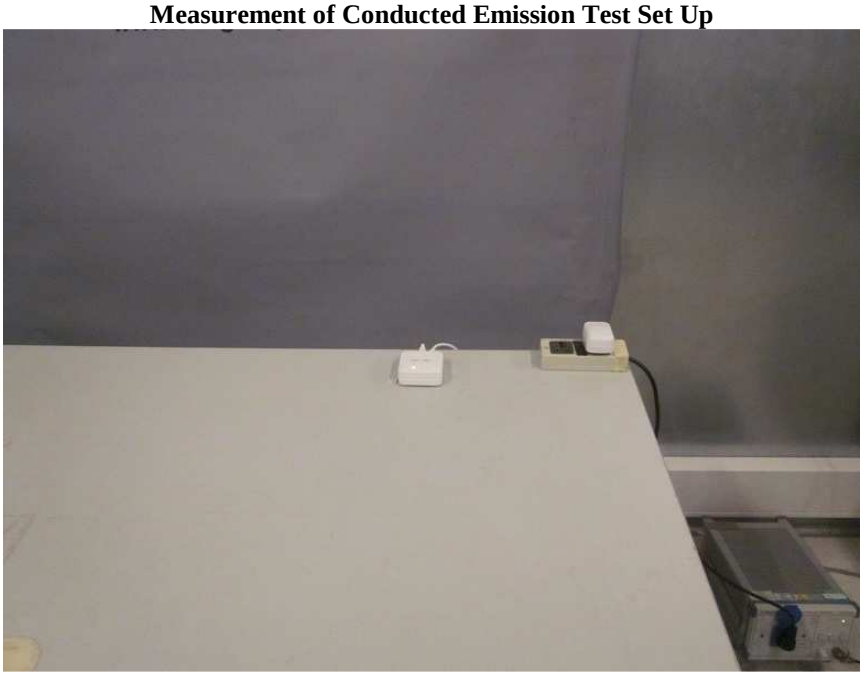
Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



******* End of Test Report *******

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