TEST REPORT

Report No.: 14100264HKG-001

Philips Consumer Luminaires

Application
For
Certification
(Original Grant)
(FCC ID: R2WMMGEN131152)
(IC: 135AG-MMGEN131152)

Transceiver

Prepared and Checked by:

Signed On File
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Approved by:

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Koo Wai Ip
Location: Intertek
Testing Services Hong
Kong Ltd.

Koo Wai Ip
Assistant Supervisor
Date: March 19, 2015

GENERAL INFORMATION

Grantee:	Philips Consumer Luminaires
Grantee Address:	Satenrozen 13, B-2550 Kontich, Belgium
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Manufacturer:	Philips Consumer Luminaires
Manufacturer Address:	Satenrozen 13, B-2550 Kontich, Belgium
Brand Name:	Philips
Model:	31152
Type of EUT:	Transceiver
Description of EUT:	Pendant Light
Serial Number:	N/A
FCC ID / IC:	R2WMMGEN131152 / 135AG-MMGEN131152
Date of Sample Submitted:	October 08, 2014
Date of Test:	October 08, 2014 to November 26, 2014
Report No.:	14100264HKG-001
Report Date:	March 19, 2015
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 8.8	Pass
Radiated Emission Radiated Emission on the Bandedge	15.249, 15.209 / RSS-210 A2.9, RSS-210 2.5	Pass
Radiated Emission in Restricted Bands	15.205 / RSS-210 2.2	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2013 Edition
RSS-210 Issue 8, December 2010
RSS-Gen Issue 4, December 2014

Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the pervisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Table of Contents

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a Hue Tone Luminaries. The EUT can operate while connected and controlled by a Zigbee Remote (Provided by Applicant) via Zigbee radio link. The EUT can only support Zigbee. The Zigbee portion occupies frequency range of 2405MHz to 2480MHz (15 channels with channel spacing of 5MHz). The EUT is powered by 120VAC 60Hz.

Antenna Type: Internal, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is a single application for certification of a transceiver.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in an 3m Chamber. Preliminary scans were performed in the 3m Chamber only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

1.4 Test Facility

The 3m Chamber and conducted measurement facility used to collect the radiated data is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been placed on file with the FCC and IC.

2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device was powered by 120VAC 60Hz.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it transmits the RF signal continuously.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

2.5 Support Equipment List and Description

1. Zigbee remote (Provided by Applicant)

3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG - AV

where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF

where FS = Field Strength in dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
RR = 18.0 dBµV
LF = 9.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 7440 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 8.4 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 568.5 kHz

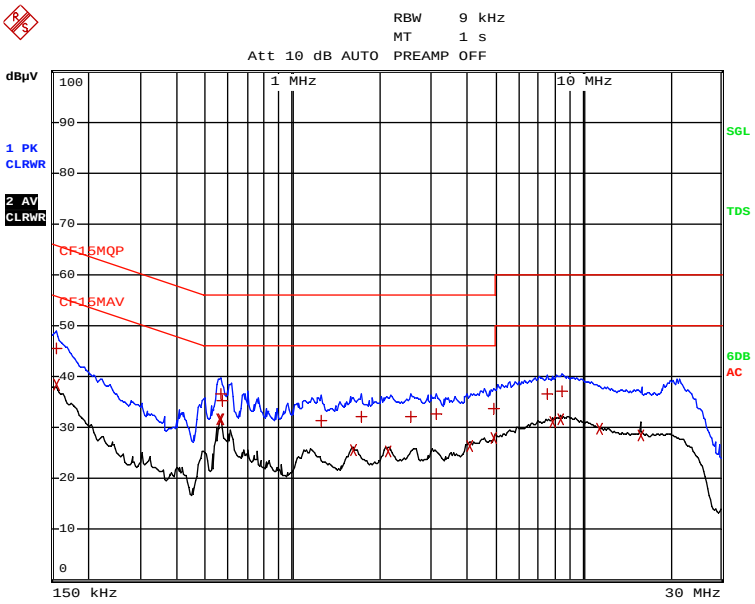
For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photo.pdf.

3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 14.25 dB

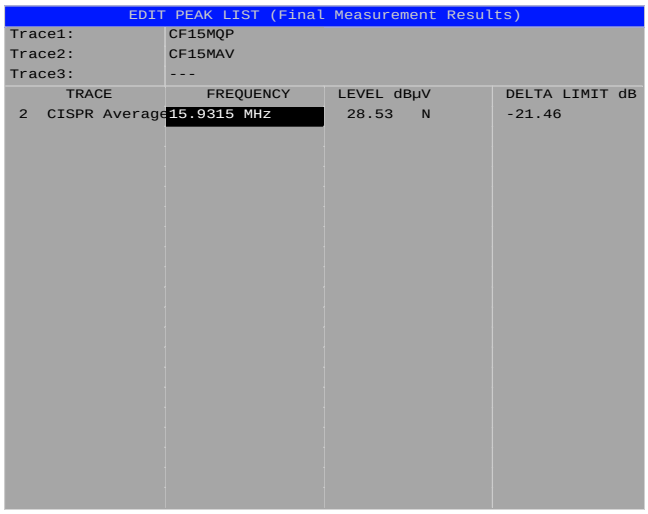
Worst-Case Operating Mode: Transmitting (ZigBee)



EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	154.5 kHz	45.54	N	-20.21
2	CISPR Average	154.5 kHz	38.56	N	-17.18
1	Quasi Peak	564 kHz	36.61	L1	-19.38
2	CISPR Average	564 kHz	31.68	L1	-14.31
2	CISPR Average	568.5 kHz	31.74	L1	-14.25
1	Quasi Peak	573 kHz	35.21	L1	-20.79
1	Quasi Peak	1.2525 MHz	31.38	L1	-24.61
2	CISPR Average	1.6215 MHz	25.47	L1	-20.52
1	Quasi Peak	1.725 MHz	32.18	L1	-23.81
2	CISPR Average	2.1435 MHz	25.35	N	-20.64
1	Quasi Peak	2.562 MHz	32.16	L1	-23.83
1	Quasi Peak	3.147 MHz	32.73	N	-23.26
2	CISPR Average	4.1055 MHz	26.24	N	-19.75
1	Quasi Peak	4.9605 MHz	33.85	N	-22.14
2	CISPR Average	4.9875 MHz	27.89	N	-18.10
1	Quasi Peak	7.5255 MHz	36.57	N	-23.42
2	CISPR Average	7.935 MHz	31.12	N	-18.88
2	CISPR Average	8.4435 MHz	31.75	N	-18.24
1	Quasi Peak	8.466 MHz	37.04	N	-22.95
2	CISPR Average	11.3865 MHz	29.77	N	-20.22



EDIT PEAK LIST (Final Measurement Results)

Trace1:	CF15MQP
Trace2:	CF15MAV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2 CISPR Average	15.9315 MHz	28.53	N	-21.46

Note: Measurement Uncertainty is ±4.2dB at a level of confidence of 95%.

Applicant: Philips Consumer Luminaires Date of Test: November 26, 2014
Model: 31152 (Chipset 1)
Worst-Case Operating Mode: Transmitting (ZigBee)

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2405.000	108.1	33	29.4	104.5	23.4	81.1	94.0	-12.9
H	***4810.000***	***63.1***	***33***	***34.9***	***65.0***	***23.4***	***41.6***	***54.0***	***-12.4***
H	7215.000	60.4	33	37.9	65.3	23.4	41.9	54.0	-12.1
H	9620.000	49.1	33	40.4	56.5	23.4	33.1	54.0	-20.9
H	***12025.000***	***51.4***	***33***	***40.5***	***58.9***	***23.4***	***35.5***	***54.0***	***-18.5***
H	14430.000	53.4	33	40.0	60.4	23.4	37.0	54.0	-17.0

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2405.000	108.1	33	29.4	104.5	114.0	-9.5
H	***4810.000***	***63.1***	***33***	***34.9***	***65.0***	***74.0***	***-9.0***
H	7215.000	60.4	33	37.9	65.3	74.0	-8.7
H	9620.000	49.1	33	40.4	56.5	74.0	-17.5
H	***12025.000***	***51.4***	***33***	***40.5***	***58.9***	***74.0***	***-15.1***
H	14430.000	53.4	33	40.0	60.4	74.0	-13.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Applicant: Philips Consumer Luminaires Date of Test: November 26, 2014
Model: 31152 (Chipset 1)
Worst-Case Operating Mode: Transmitting (ZigBee)

Table 2

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	108.0	33	29.4	104.4	23.4	81.0	94.0	-13.0
H	***4880.000***	***63.3***	***33***	***34.9***	***65.2***	***23.4***	***41.8***	***54.0***	***-12.2***
H	***7320.000***	***60.5***	***33***	***37.9***	***65.4***	***23.4***	***42.0***	***54.0***	***-12.0***
H	9760.000	49.3	33	40.4	56.7	23.4	33.3	54.0	-20.7
H	***12200.000***	***51.1***	***33***	***40.5***	***58.6***	***23.4***	***35.2***	***54.0***	***-18.8***
H	14640.000	54.6	33	38.4	60.0	23.4	36.6	54.0	-17.4

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	108.0	33	29.4	104.4	114.0	-9.6
H	***4880.000***	***63.3***	***33***	***34.9***	***65.2***	***74.0***	***-8.8***
H	***7320.000***	***60.5***	***33***	***37.9***	***65.4***	***74.0***	***-8.6***
H	9760.000	49.3	33	40.4	56.7	74.0	-17.3
H	***12200.000***	***51.1***	***33***	***40.5***	***58.6***	***74.0***	***-15.4***
H	14640.000	54.6	33	38.4	60.0	74.0	-14.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Applicant: Philips Consumer Luminaires Date of Test: November 26, 2014
Model: 31152 (Chipset 1)
Worst-Case Operating Mode: Transmitting (ZigBee)

Table 3

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	108.4	33	29.4	104.8	23.4	81.4	94.0	-12.6
H	***4960.000***	***63.5***	***33***	***34.9***	***65.4***	***23.4***	***42.0***	***54.0***	***-12.0***
H	***7440.000***	***60.7***	***33***	***37.9***	***65.6***	***23.4***	***42.2***	***54.0***	***-11.8***
H	9920.000	48.7	33	40.4	56.1	23.4	32.7	54.0	-21.3
H	***12400.000***	***51.2***	***33***	***40.5***	***58.7***	***23.4***	***35.3***	***54.0***	***-18.7***
H	14880.000	54.9	33	38.4	60.3	23.4	36.9	54.0	-17.1

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	108.4	33	29.4	104.8	114.0	-9.2
H	**4960.000**	**63.5**	**33**	**34.9**	**65.4**	**74.0**	**-8.6**
H	**7440.000**	**60.7**	**33**	**37.9**	**65.6**	**74.0**	**-8.4**
H	9920.000	48.7	33	40.4	56.1	74.0	-17.9
H	**12400.000**	**51.2**	**33**	**40.5**	**58.7**	**74.0**	**-15.3**
H	14880.000	54.9	33	38.4	60.3	74.0	-13.7

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Applicant: Philips Consumer Luminaires Date of Test: November 26, 2014
Model: 31155 (Chipset 2)
Worst-Case Operating Mode: Transmitting (ZigBee)

Table 4

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2405.000	108.1	33	29.4	104.5	23.4	81.1	94.0	-12.9
H	***4810.000***	***62.1***	***33***	***34.9***	***64.0***	***23.4***	***40.6***	***54.0***	***-13.4***
H	7215.000	60.3	33	37.9	65.2	23.4	41.8	54.0	-12.2
H	9620.000	48.8	33	40.4	56.2	23.4	32.8	54.0	-21.2
H	***12025.000***	***51.2***	***33***	***40.5***	***58.7***	***23.4***	***35.3***	***54.0***	***-18.7***
H	14430.000	53.4	33	40.0	60.4	23.4	37.0	54.0	-17.0

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2405.000	108.1	33	29.4	104.5	114.0	-9.5
H	***4810.000***	***62.1***	***33***	***34.9***	***64.0***	***74.0***	***-10.0***
H	7215.000	60.3	33	37.9	65.2	74.0	-8.8
H	9620.000	48.8	33	40.4	56.2	74.0	-17.8
H	***12025.000***	***51.2***	***33***	***40.5***	***58.7***	***74.0***	***-15.3***
H	14430.000	53.4	33	40.0	60.4	74.0	-13.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Applicant: Philips Consumer Luminaires Date of Test: November 26, 2014
Model: 31152 (Chipset 2)
Worst-Case Operating Mode: Transmitting (ZigBee)

Table 5

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	108.1	33	29.4	104.5	23.4	81.1	94.0	-12.9
H	***4880.000***	***63.4***	***33***	***34.9***	***65.3***	***23.4***	***41.9***	***54.0***	***-12.1***
H	***7320.000***	***60.6***	***33***	***37.9***	***65.5***	***23.4***	***42.1***	***54.0***	***-11.9***
H	9760.000	48.7	33	40.4	56.1	23.4	32.7	54.0	-21.3
H	***12200.000***	***50.9***	***33***	***40.5***	***58.4***	***23.4***	***35.0***	***54.0***	***-19.0***
H	14640.000	54.5	33	38.4	59.9	23.4	36.5	54.0	-17.5

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	108.1	33	29.4	104.5	114.0	-9.5
H	***4880.000***	***63.4***	***33***	***34.9***	***65.3***	***74.0***	***-8.7***
H	***7320.000***	***60.6***	***33***	***37.9***	***65.5***	***74.0***	***-8.5***
H	9760.000	48.7	33	40.4	56.1	74.0	-17.9
H	***12200.000***	***50.9***	***33***	***40.5***	***58.4***	***74.0***	***-15.6***
H	14640.000	54.5	33	38.4	59.9	74.0	-14.1

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Applicant: Philips Consumer Luminaires Date of Test: November 26, 2014
Model: 31152 (Chipset 2)
Worst-Case Operating Mode: Transmitting (ZigBee)

Table 6

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	108.3	33	29.4	104.7	23.4	81.3	94.0	-12.7
H	***4960.000***	***63.4***	***33***	***34.9***	***65.3***	***23.4***	***41.9***	***54.0***	***-12.1***
H	***7440.000***	***60.5***	***33***	***37.9***	***65.4***	***23.4***	***42.0***	***54.0***	***-12.0***
H	9920.000	49.1	33	40.4	56.5	23.4	33.1	54.0	-20.9
H	***12400.000***	***51.3***	***33***	***40.5***	***58.8***	***23.4***	***35.4***	***54.0***	***-18.6***
H	14880.000	55.0	33	38.4	60.4	23.4	37.0	54.0	-17.0

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	108.3	33	29.4	104.7	114.0	-9.3
H	***4960.000***	***63.4***	***33***	***34.9***	***65.3***	***74.0***	***-8.7***
H	***7440.000***	***60.5***	***33***	***37.9***	***65.4***	***74.0***	***-8.6***
H	9920.000	49.1	33	40.4	56.5	74.0	-17.5
H	***12400.000***	***51.3***	***33***	***40.5***	***58.8***	***74.0***	***-15.2***
H	14880.000	55.0	33	38.4	60.4	74.0	-13.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Applicant: Philips Consumer Luminaires Date of Test: November 26, 2014
Model: 31152
Worst-Case Operating Mode: Power On with Zigbee TX

Table 7

Radiated Emissions
Pursuant to FCC Part 15 Section 15.209 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	52.010	31.4	16	11.0	26.4	40.0	-13.6
V	70.090	34.8	16	7.0	25.8	40.0	-14.2
V	***127.746***	***32.6***	***16***	***14.0***	***30.6***	***43.5***	***-12.9***
H	150.537	36.4	16	14.0	34.4	43.5	-9.1
H	195.136	32.6	16	16.0	32.6	43.5	-10.9
H	366.823	25.0	16	24.0	33.0	46.0	-13.0
V	424.342	26.0	16	25.0	35.0	46.0	-11.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 Product Labelling

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 Technical Specifications

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States and Canada.

8.0 Miscellaneous Information

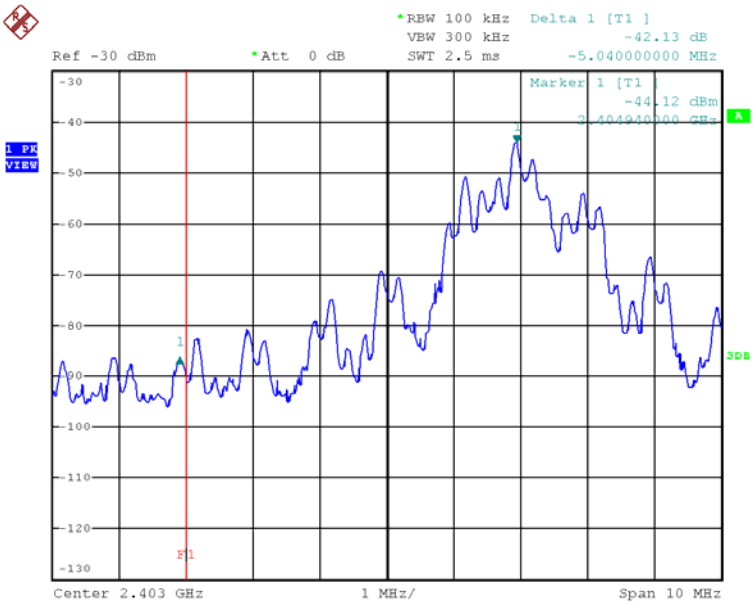
The miscellaneous information includes details of the test procedure and measured bandwidth / calculation of factor such as pulse desensitization and averaging factor.

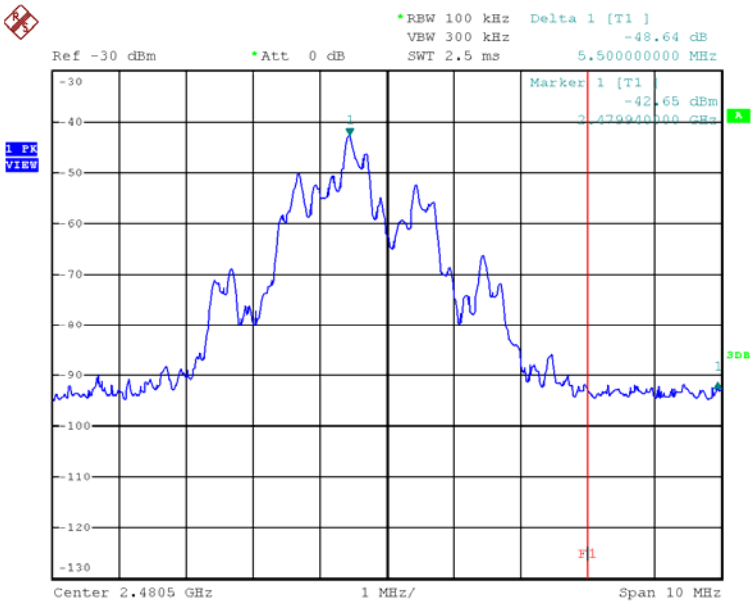
8.1 Measured Bandwidth

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2009) for frequency being measured.

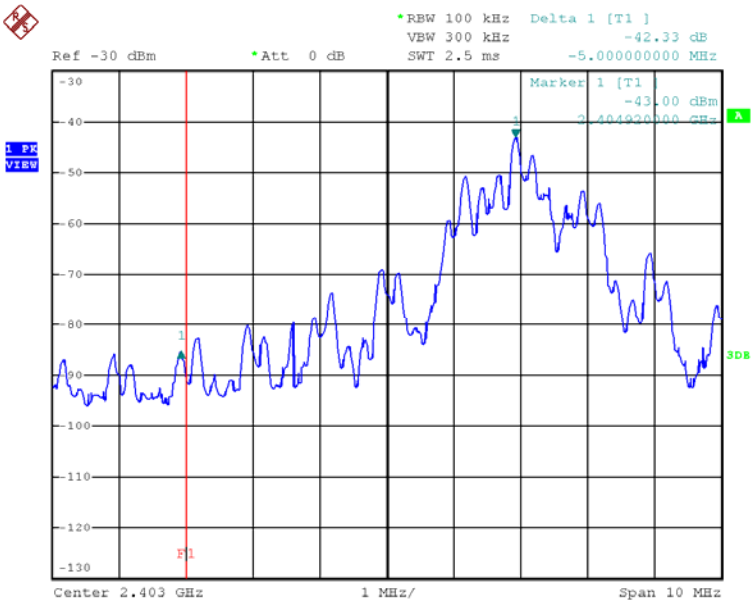
Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209 / RSS-210 2.5, whichever is the lesser attenuation, which meet the requirement of part 15.249(d) / RSS-210 A2.9.

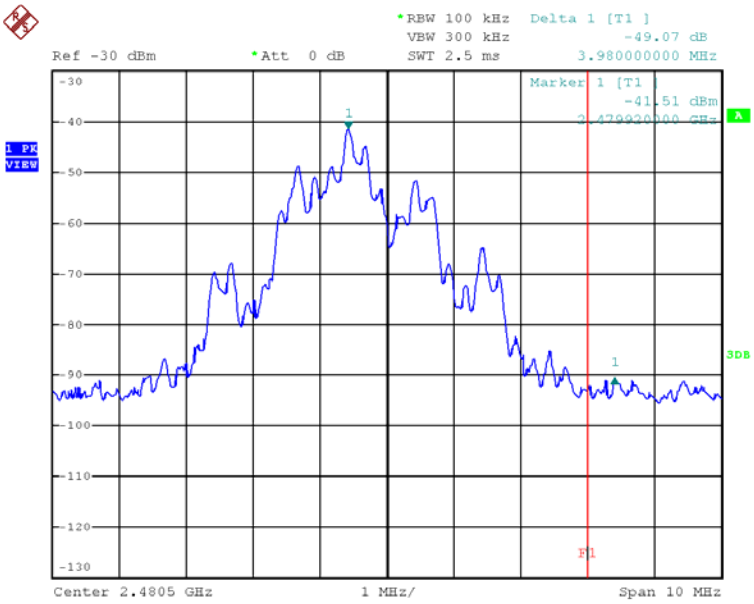
Peak Measurement (ZigBee) - Chipset 1





Peak Measurement (ZigBee) - Chipset 2





Peak Measurement (ZigBee)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Chipset 1 :

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=104.5 dBµV/m - 42.1 dB
=62.4 dBµV/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=81.1 dBµV/m - 42.1 dB
=39.0 dBµV/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=104.8 dBµV/m - 48.6 dB
=56.2 dBµV/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=81.4 dBµV/m - 48.6 dB
=32.8 dBµV/m

Chipset 2

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=103.5 dBµV/m - 42.3 dB
=61.2 dBµV/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=80.1 dBµV/m - 42.3 dB
=37.8 dBµV/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=104.7 dBµV/m - 49.1 dB
=55.6 dBµV/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=81.3 dBµV/m - 49.1 dB
=32.2 dBµV/m

The resultant field strength meets the general radiated emission limit in Section 15.209 / RSS-210 2.5, which does not exceed 74 dBµV/m (Peak Limit) and 54 dBµV/m (Average Limit).

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 200μs for a digital "1" bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 3MHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

The duty cycle is simply the on-time divided by the period:

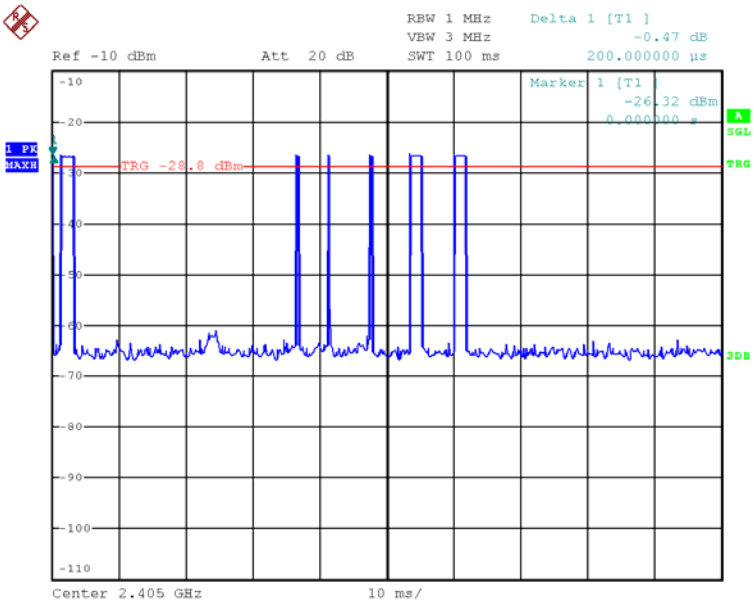
The duration of one cycle = 100ms

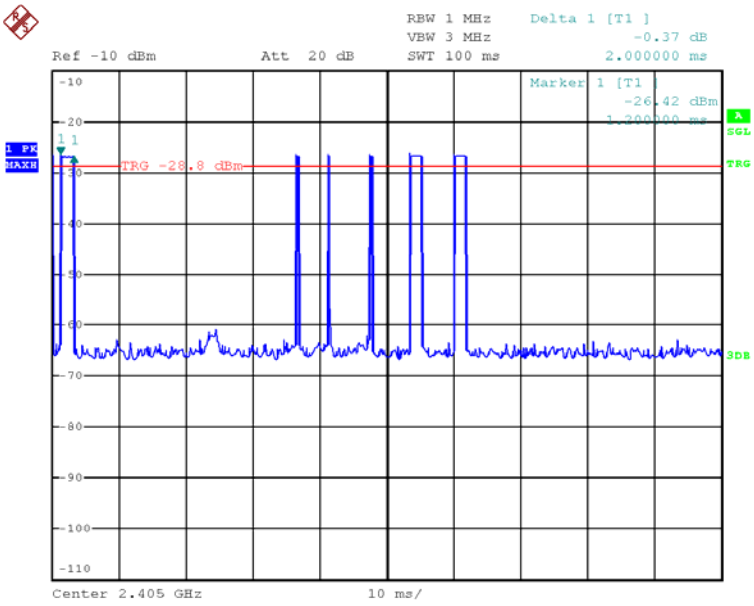
Effective period of the cycle = 6.8ms

DC = 6.8ms / 100ms = 0.068

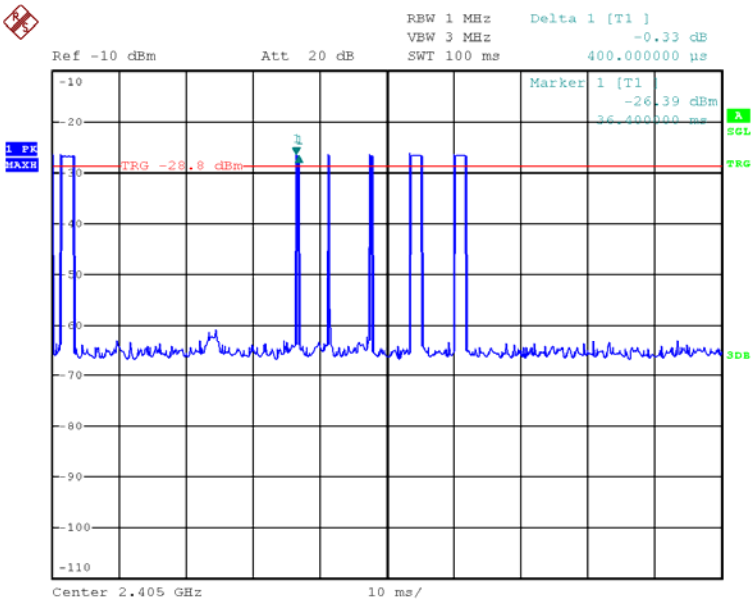
Therefore, the averaging factor is found by 20log 0.068 = -23.4dB.

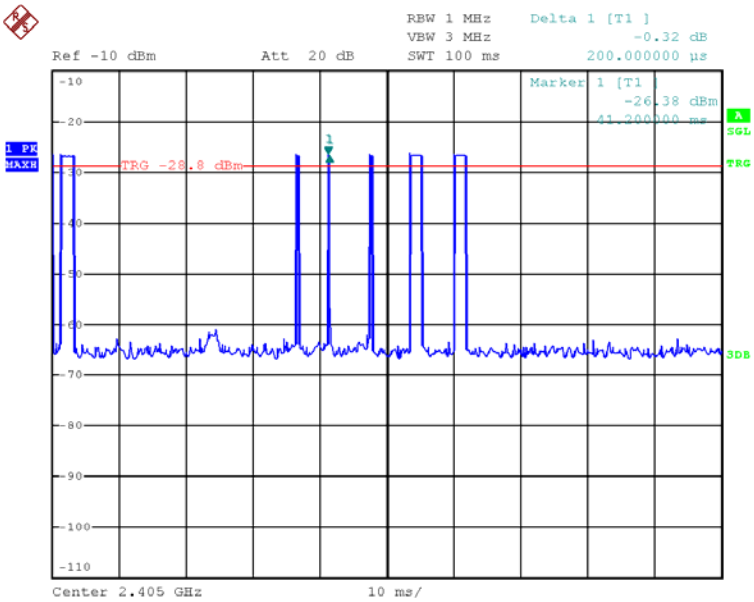
Average Factor occurred at Normal operation



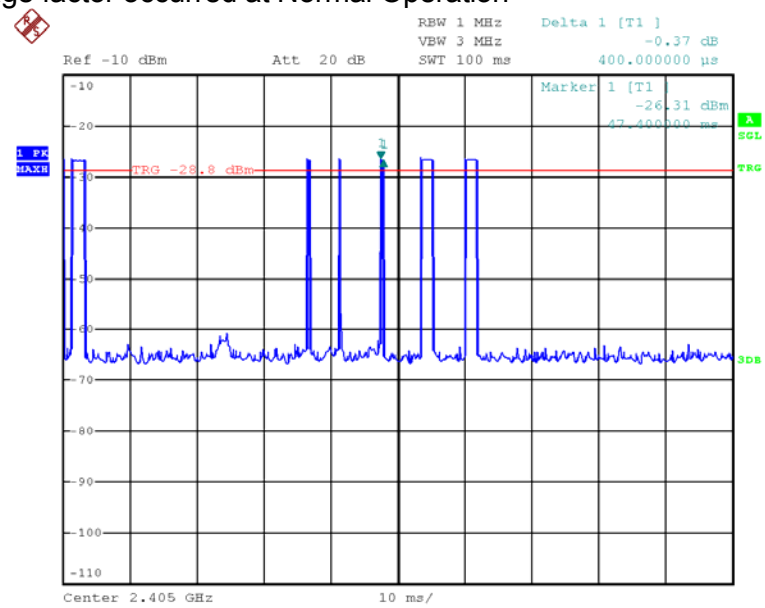


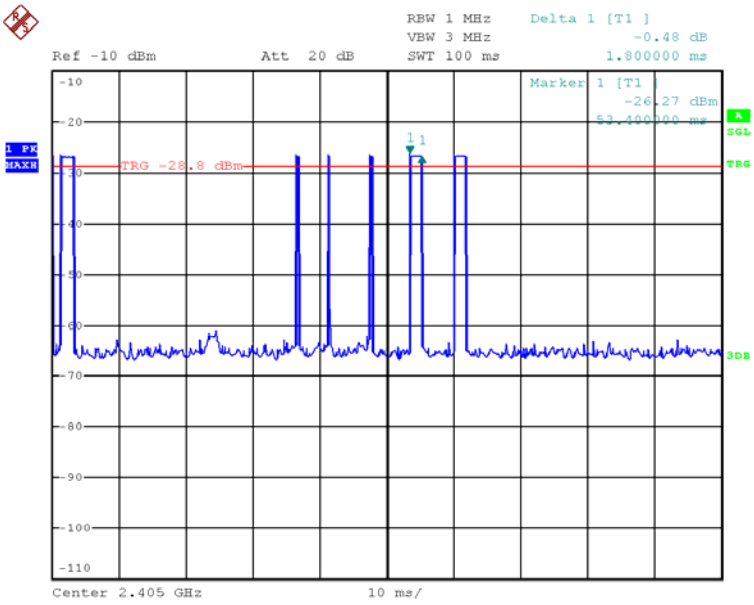
Average Factor occurred at Normal Operation



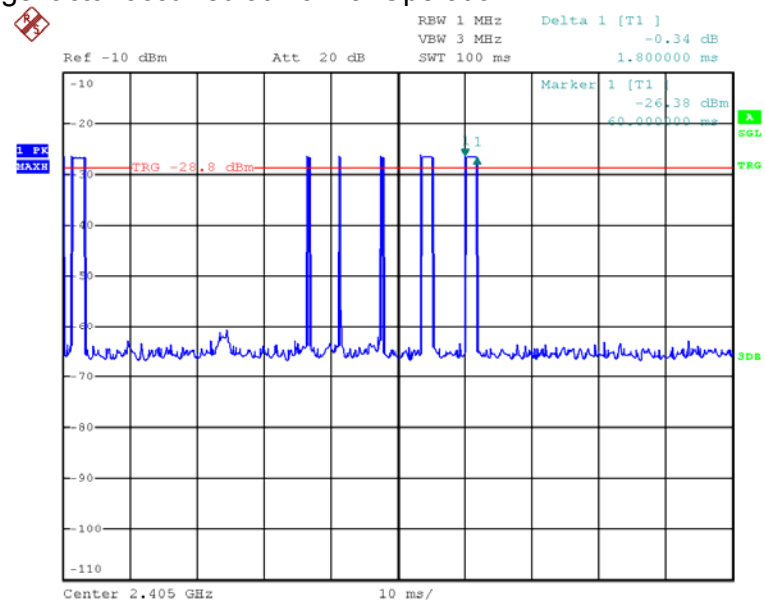


Average factor occurred at Normal Operation





Average factor occurred at Normal Operation



8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

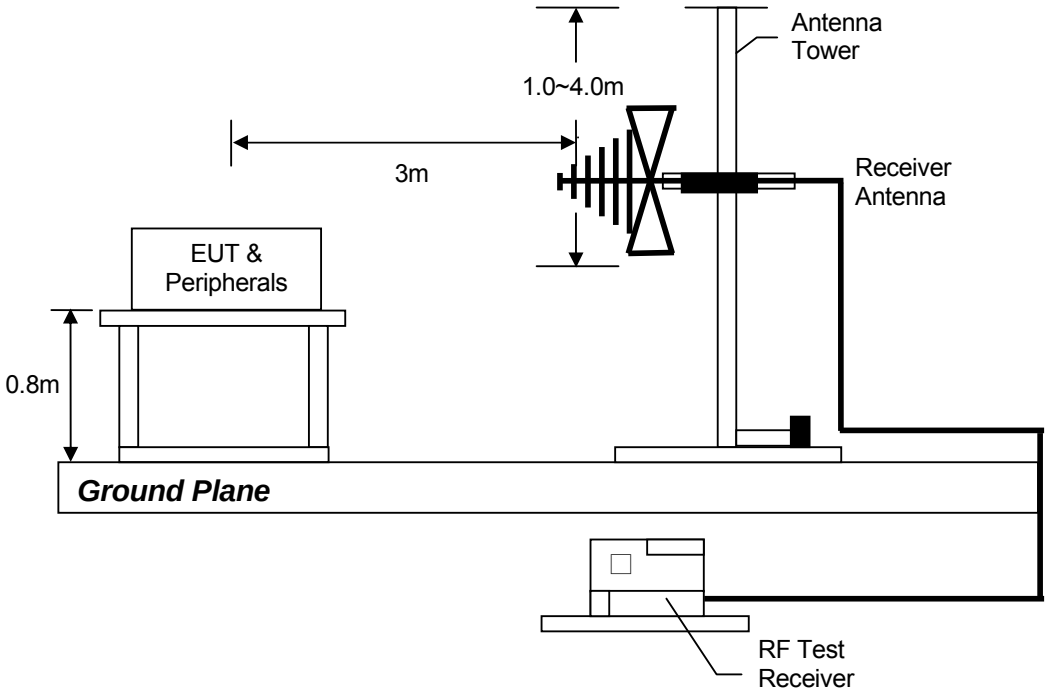
Conducted measurements were made as described in ANSI C63.4 (2009).

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 3 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

8.4.1 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.

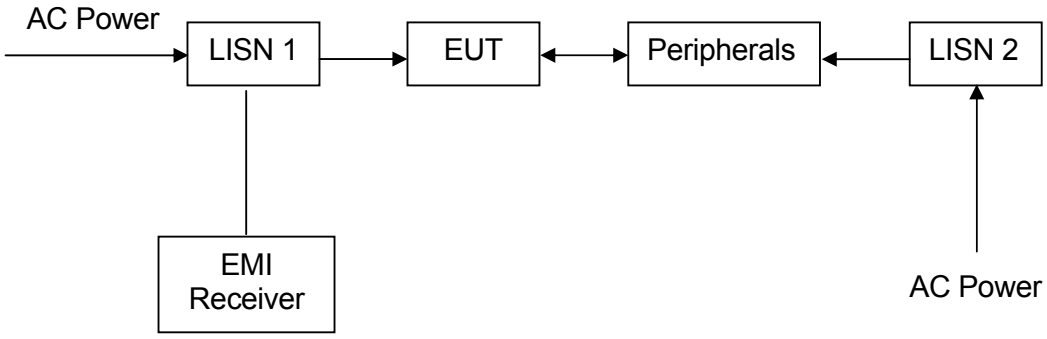


8.4.2 Conducted Emission Test Procedures

For tabletop equipment, the EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table. For floor-standing equipment, the EUT and all cables were insulated, if required, from the ground plane by up to 12 mm of insulating material. The EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were moved to find the maximum emission.

8.4.3 Conducted Emission Test Setup



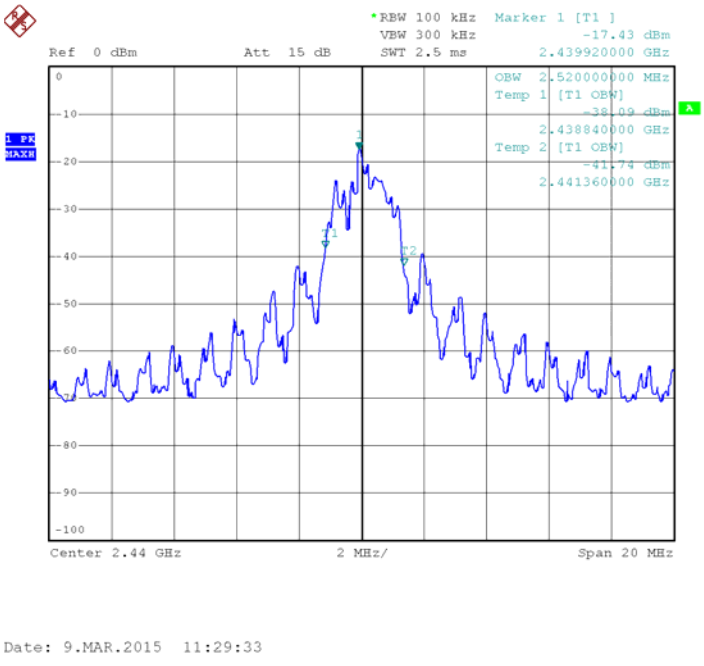
8.5 Occupied Bandwidth

Occupied Bandwidth Results: ZigBee (Chipset 1)

Bluetooth	Occupied Bandwidth (MHz)
Low Channel: 2405	2.48
Middle Channel: 2440	2.52
High Channel: 2480	2.36

The worst case is shown as below

Chipset 1

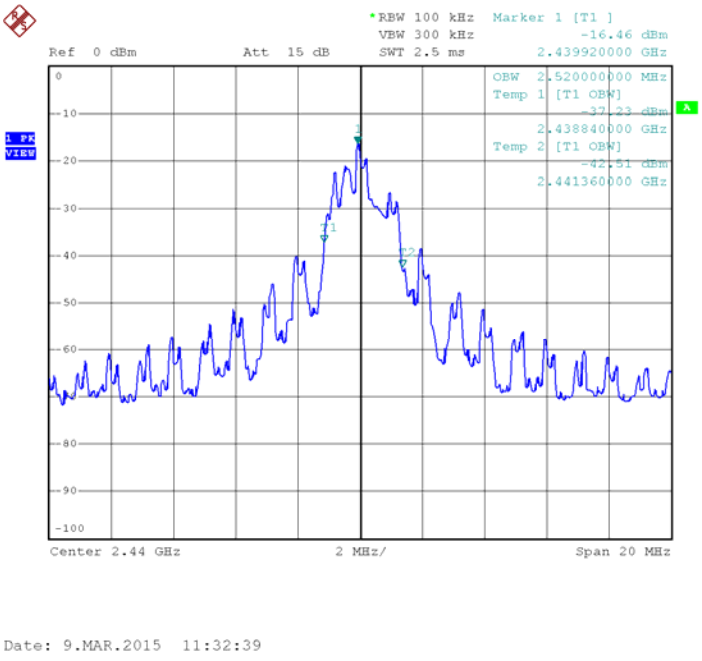


Occupied Bandwidth Results: ZigBee (Chipset 2)

Bluetooth	Occupied Bandwidth (MHz)
Low Channel: 2405	2.48
Middle Channel: 2440	2.52
High Channel: 2480	2.32

The worst case is shown as below

Chipset 2



9.0 Confidentiality Request

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.

10.0 Equipment List

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2666	EW-0571	EW-0572
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI7	3104C	3146
Calibration Date	Jun. 20, 2013	Nov. 01, 2013	Jun. 26, 2013
Calibration Due Date	Dec. 20, 2014	May 01, 2015	Dec. 26, 2014

Equipment	Spectrum Analyzer	Pyramidal Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-0905	EW-1015
Manufacturer	R&S	EMCO	EMCO
Model No.	FSP40	3160-09	3115
Calibration Date	May 08, 2014	Jan. 28, 2014	Oct. 28, 2014
Calibration Due Date	May 08, 2015	Jul. 28, 2015	Apr. 28, 2016

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2666	EW-2501
Manufacturer	R&S	R&S
Model No.	ESCI7	ENV-216
Calibration Date	Jun. 20, 2013	Dec. 25, 2013
Calibration Due Date	Dec. 20, 2014	Nov. 30, 2014

3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2329
Manufacturer	R&S
Model No.	FSP3
Calibration Date	Jun. 19, 2014
Calibration Due Date	Jun. 19, 2015

END OF TEST REPORT