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TEST REPORT

Report No.: 14030540HKG-002

LoopPay, Inc.

Application
For
Certification
(Original Grant)
(FCC ID: 2AB3L-LOOPMST0002)
Transceiver

Prepared and Checked by:

Approved by:

Signed On File
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Date: June 11, 2014

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Intertek Testing Services Hong Kong Ltd.

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GENERAL INFORMATION

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Manufacturer:	BBPOS Limited
Manufacturer Address:	Room 812, Grand City Plaza, 1 Sai Lau Road, Tsuen Wan, N.T., Hong Kong.
Brand Name:	Loop
Model:	LOOPMST0002
Type of EUT:	Transceiver
Description of EUT:	Loop ChargeCase
Serial Number:	N/A
FCC ID:	2AB3L-LOOPMST0002
Date of Sample Submitted:	March 13, 2014
Date of Test:	March 13, 2014 to May 22, 2014
Report No.:	14030540HKG-002
Report Date:	June 11, 2014
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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SUMMARY OF TEST RESULT

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Power Line Conducted Emissions	15.207	Pass
Radiated Emission Radiated Emission on the Bandedge	15.249	Pass
Radiated Emission in Restricted Bands	15.205	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2012 Edition

- Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the provisions 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.

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1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a 2.4GHz Bluetooth 4.0 Loop ChargeCase. The Bluetooth 4.0 BLE portion is operating between 2402MHz and 2480MHz (40 channels with 2MHz channel spacing). The EUT is powered by 1 x 3.7V rechargeable battery. It has a USB port (for charging only) charging the rechargeable battery. And It can charge iPhone when plug connector cable to iPhone and the case. When the EUT is switched ON, The corresponding Bluetooth device would be searched and connected to the EUT. After pairing, a “bit” sound will come out.

Install the corresponding app and load magstripe cards into EUT. Place the EUT close to the magstripe reader of any POS terminal and press the EUT button to make a payment. The EUT is controlled by the corresponding app over Bluetooth 4.0 BLE connection.

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 Open Area Test Site. Preliminary scans were performed in the Open Area Test Site 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 open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

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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 USB port or 3.7V rechargeable battery.

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 rear of unit shall be flushed with the rear of the table.

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.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

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2.5 Support Equipment List and Description

1. 1 x USB cable with length of 0.75m long
(Provided by Applicant)
2. iPhone 5
3. Lenovo Notebook (Model: T61; S/N: L3-CF468)
4. External 1394 HDD (Smart-drive HD3-SU2FW)
5. 1 x USB cable with length of 0.7 meter long
6. 1 x 1394 cable with length of 0.8 meter long with ferrite
7. Lenovo Notebook Adaptor with ferrite (100-240VAC to 20VDC 4.5A,
Model: 42T5274)
(Provided by Intertek)

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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 dB μ V/m
 RA = Receiver Amplitude (including preamplifier) in dB μ V
 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 dB μ V/m
 RR = RA - AG - AV in dB μ V
 LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V 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 27 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

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

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V/m})/20] = 22.4 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 33.975 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 6.5 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.15 MHz

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

3.5 Conducted Emission Data

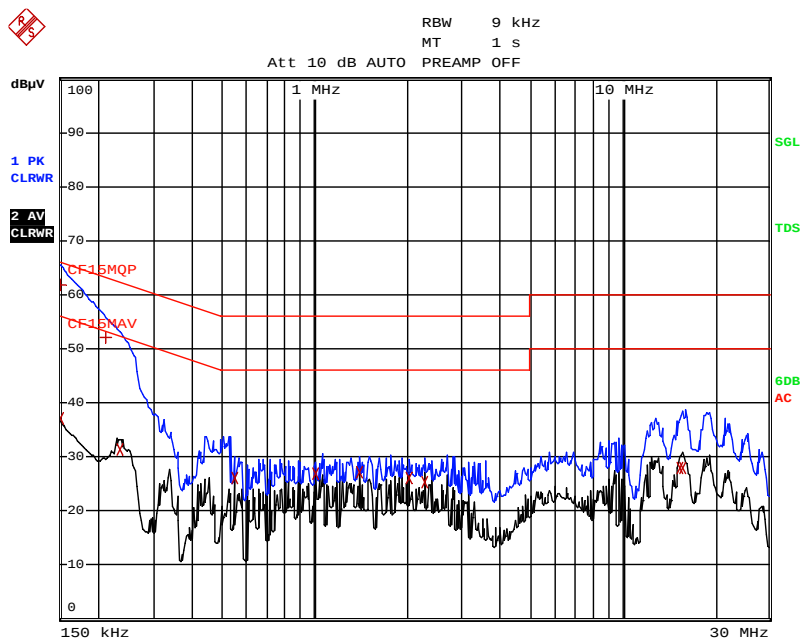
For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 4.06 dB

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Worst-Case Operating Mode: Transmitting (Bluetooth)

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	150 kHz	61.93 L1		-4.06
2 CISPR Average	150 kHz	37.16 L1		-18.83
1 Quasi Peak	213 kHz	52.09 L1		-10.99
2 CISPR Average	235.5 kHz	31.28 N		-20.96
2 CISPR Average	546 kHz	26.12 N		-19.87
2 CISPR Average	1.0005 MHz	26.86 L1		-19.13
2 CISPR Average	1.401 MHz	27.10 N		-18.89
2 CISPR Average	2.0355 MHz	26.13 L1		-19.86
2 CISPR Average	2.292 MHz	25.35 L1		-20.64
2 CISPR Average	15.355 MHz	28.00 N		-21.99
2 CISPR Average	15.72 MHz	27.99 L1		-22.00



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Applicant: LoopPay, Inc.

Date of Test: May 22, 2014

Model: LOOPMST0002

Worst-Case Operating Mode: Transmitting (Bluetooth 4.0 BLE)

Table 1

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polarization	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)
V	2402.000	91.9	33	29.4	88.3	50.2	38.1	94.0	-55.9
V	4804.000	62.1	33	34.9	64.0	50.2	13.8	54.0	-40.2
V	7206.000	48.3	33	37.9	53.2	50.2	3.0	54.0	-51.0
V	9608.000	49.1	33	40.4	56.5	50.2	6.3	54.0	-47.7
V	12010.000	50.9	33	40.5	58.4	50.2	8.2	54.0	-45.8
V	14412.000	53.0	33	40.0	60.0	50.2	9.8	54.0	-44.2

Polarization	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)
V	2402.000	91.9	33	29.4	88.3	114.0	-25.7
V	4804.000	62.1	33	34.9	64.0	74.0	-10.0
V	7206.000	48.3	33	37.9	53.2	74.0	-20.8
V	9608.000	49.1	33	40.4	56.5	74.0	-17.5
V	12010.000	50.9	33	40.5	58.4	74.0	-15.6
V	14412.000	53.0	33	40.0	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.

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Applicant: LoopPay, Inc.

Date of Test: May 22, 2014

Model: LOOPMST0002

Worst-Case Operating Mode: Transmitting (Bluetooth 4.0 BLE)

Table 2

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polarization	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)
V	2440.000	91.8	33	29.4	88.2	50.2	38.0	94.0	-56.0
V	4880.000	61.6	33	34.9	63.5	50.2	13.3	54.0	-40.7
V	7320.000	48.3	33	37.9	53.2	50.2	3.0	54.0	-51.0
V	9760.000	48.7	33	40.4	56.1	50.2	5.9	54.0	-48.1
V	12200.000	51.2	33	40.5	58.7	50.2	8.5	54.0	-45.5
V	14640.000	54.9	33	38.4	60.3	50.2	10.1	54.0	-43.9

Polarization	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)
V	2440.000	91.8	33	29.4	88.2	114.0	-25.8
V	4880.000	61.6	33	34.9	63.5	74.0	-10.5
V	7320.000	48.3	33	37.9	53.2	74.0	-20.8
V	9760.000	48.7	33	40.4	56.1	74.0	-17.9
V	12200.000	51.2	33	40.5	58.7	74.0	-15.3
V	14640.000	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.

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Applicant: LoopPay, Inc.

Date of Test: May 22, 2014

Model: LOOPMST0002

Worst-Case Operating Mode: Transmitting (Bluetooth 4.0 BLE)

Table 3

Radiated Emissions Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polarization	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)
V	2480.000	92.8	33	29.4	89.2	50.2	39.0	94.0	-55.0
V	4960.000	57.1	33	34.9	59.0	50.2	8.8	54.0	-45.2
V	7440.000	49.0	33	37.9	53.9	50.2	3.7	54.0	-50.3
V	9920.000	48.9	33	40.4	56.3	50.2	6.1	54.0	-47.9
V	12400.000	50.9	33	40.5	58.4	50.2	8.2	54.0	-45.8
V	14880.000	54.7	33	38.4	60.1	50.2	9.9	54.0	-44.1

Polarization	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)
V	2480.000	92.8	33	29.4	89.2	114.0	-24.8
V	4960.000	57.1	33	34.9	59.0	74.0	-15.0
V	7440.000	49.0	33	37.9	53.9	74.0	-20.1
V	9920.000	48.9	33	40.4	56.3	74.0	-17.7
V	12400.000	50.9	33	40.5	58.4	74.0	-15.6
V	14880.000	54.7	33	38.4	60.1	74.0	-13.9

- 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.

INTERTEK TESTING SERVICES

Applicant: LoopPay, Inc.

Date of Test: May 22, 2014

Model: LOOPMST0002

Worst-Case Operating Mode: Transmitting (Bluetooth 4.0 BLE)

Table 4

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	33.975	39.5	16	10.0	33.5	40.0	-6.5
V	46.902	37.7	16	11.0	32.7	40.0	-7.3
V	53.800	38.0	16	11.0	33.0	40.0	-7.0
V	105.970	35.8	16	13.0	32.8	43.5	-10.7
V	156.480	34.5	16	16.0	34.5	43.5	-9.0
V	186.750	35.6	16	16.0	35.6	43.5	-7.9

NOTES: 1. Quasi-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. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205

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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.

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8.0 Miscellaneous Information

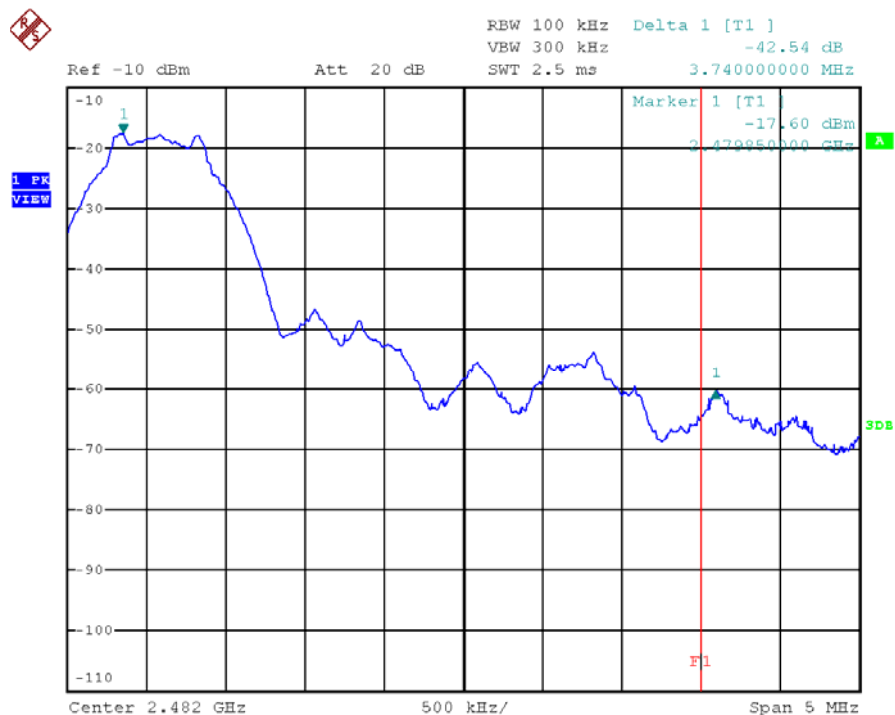
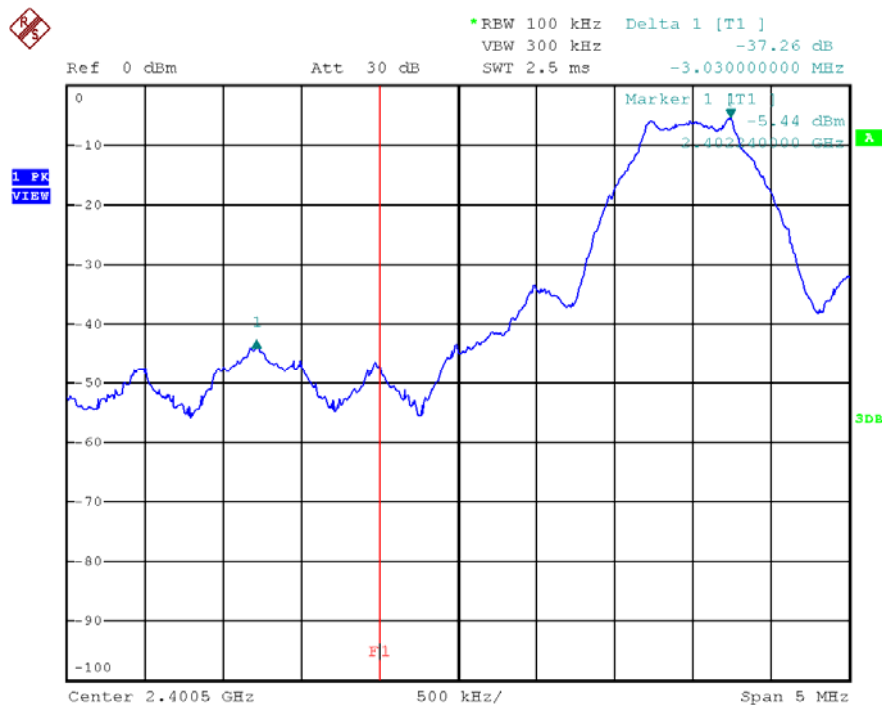
The miscellaneous information includes details of the test procedure and measured bandwidth / calculation of factor such as pulse desensitization and averaging factor (calculation and timing diagram).

8.1 Radiated Emission on the Bandedge

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, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

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Peak Measurement

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

Lower bandedge

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

$$= 88.3 \text{ dB}\mu\text{V/m} - 37.3 \text{ dB}$$

$$= 51.0 \text{ dB}\mu\text{V/m}$$

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

$$= 38.1 \text{ dB}\mu\text{V/m} - 37.3 \text{ dB}$$

$$= 0.8 \text{ dB}\mu\text{V/m}$$

Upper bandedge

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

$$= 89.2 \text{ dB}\mu\text{V/m} - 42.5 \text{ dB}$$

$$= 46.7 \text{ dB}\mu\text{V/m}$$

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

$$= 39.0 \text{ dB}\mu\text{V/m} - 42.5 \text{ dB}$$

$$= -3.5 \text{ dB}\mu\text{V/m}$$

The resultant field strength meets the general radiated emission limit in Section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

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8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 0.31ms for a digital "1" bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 1MHz, 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:

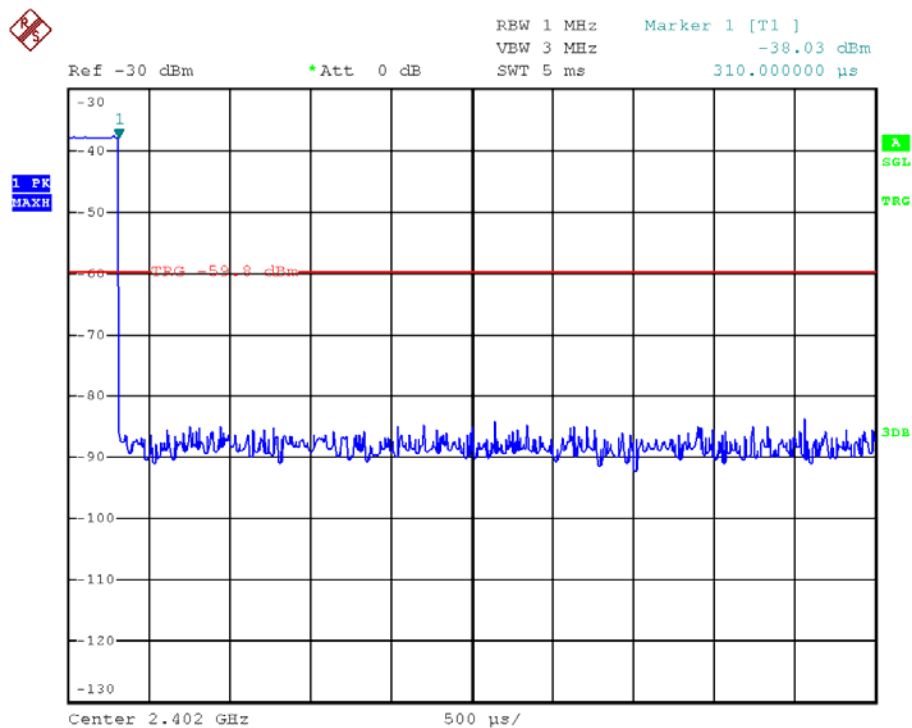
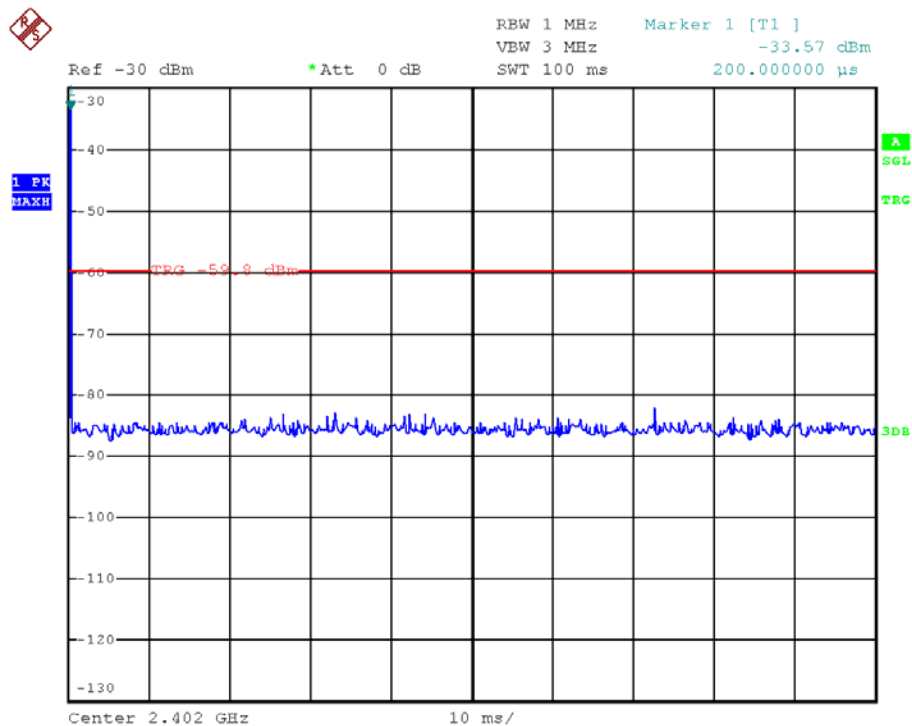
The duration of one cycle = 100ms

Effective period of the cycle = 0.31ms

$DC = 0.31 / 100 = 0.0031$

Therefore, the averaging factor is found by $20\log 0.0031 = -50.2\text{dB}$.

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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.

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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.

9.0 **Confidentiality Request**

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

INTERTEK TESTING SERVICES

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	Jun. 20, 2014	May 01, 2015	Dec. 26, 2014

Equipment	Spectrum Analyzer	Pyramidal Horn Antenna (18.0 - 26.5)GHz	Double Ridged Guide Antenna
Registration No.	EW-2466	EW-0905	EW-1015
Manufacturer	R&S	EMCO	EMCO
Model No.	FSP30	3160-09	3115
Calibration Date	Aug. 04, 2013	Jan. 28, 2014	Mar. 05, 2013
Calibration Due Date	Aug. 04, 2014	Jul. 28, 2015	Sep. 05, 2014

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2666	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI7	ENV-216
Calibration Date	Jun. 20, 2013	Oct. 17, 2013
Calibration Due Date	Jun. 20, 2014	Aug. 17, 2014

3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 28, 2013
Calibration Due Date	Oct. 28, 2014

END OF TEST REPORT