

TEST REPORT

Report No.: 20100359HKG-003

BBPOS International Limited

Application For Certification
(Original Grant)

FCC ID: 2AB7X-QB33

Transceiver

Prepared and Checked by:

Approved by:

Signed On File
Wong Cheuk Ho, Herbert
Lead Engineer

Wong Kwok Yeung, Kenneth
Senior Lead Engineer
Date: November 30, 2020

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TEST REPORT

GENERAL INFORMATION

Grantee:	BBPOS International Limited
Grantee Address:	Suite 1903-04, 19/F., Tower 2, Nina Tower, No. 8 Yeung Uk Road, Tsuen Wan, N.T., Hong Kong.
Contact Person:	Adrian Kwan
Tel:	+852 31582585
Fax:	+852 31582585
e-mail:	Adrian.kwan@bbpos.com
Manufacturer:	BBPOS International Limited
Manufacturer Address:	Suite 1903-04, 19/F., Tower 2, Nina Tower, No. 8 Yeung Uk Road, Tsuen Wan, N.T., Hong Kong.
Brand Name:	Intuit
Model:	QB33
Type of EUT:	Transceiver
Description of EUT:	Intuit Node
Serial Number:	N/A
FCC ID / IC:	2AB7X-QB33
Date of Sample Submitted:	October 14, 2020
Date of Test:	October 14, 2020 to November 26, 2020
Report No.:	20100359HKG-003
Report Date:	November 30, 2020
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 Certification.

TEST REPORT

SUMMARY OF TEST RESULT

Test Specification	Reference	Results
Transmitter Field Strength Frequency Stability	15.225	Pass
Radiated Emission Radiated Emission on the Bandedge	15.209	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, 2019 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.

TEST REPORT

TABLE OF CONTENTS

1.0	GENERAL DESCRIPTION	5
1.1	Product Description	5
1.2	Related Submittal(s) Grants	5
1.3	Test Methodology	5
1.4	Test Facility	5
2.0	SYSTEM TEST CONFIGURATION.....	6
2.1	Justification.....	6
2.2	EUT Exercising Software.....	6
2.3	Special Accessories	6
2.4	Measurement Uncertainty.....	6
2.5	Support Equipment List and Description.....	6
3.0	EMISSION RESULTS.....	7
3.1	Field Strength Calculation	7
3.2	Radiated Emission Configuration Photograph.....	8
3.3	Radiated Emission Data	8
3.4	Conducted Emission Configuration Photograph	8
3.5	Conducted Emission Data	8
3.6	Frequency Stability	14
4.0	EQUIPMENT PHOTOGRAPHS	15
5.0	PRODUCT LABELLING.....	15
6.0	TECHNICAL SPECIFICATIONS	15
7.0	INSTRUCTION MANUAL.....	15
8.0	MISCELLANEOUS INFORMATION	16
8.1	Measured Bandwidth	16
8.2	Discussion of Pulse Desensitization.....	17
8.3	Calculation of Average Factor	17
8.4	Emissions Test Procedures.....	17
9.0	CONFIDENTIALITY REQUEST	21
10.0	EQUIPMENT LIST.....	21

TEST REPORT

1.0 GENERAL DESCRIPTION

1.1 Product Description

The Equipment Under Test (EUT) is a Node Reader (CHB80) which is a Bluetooth controlled mobile POS device. It supports reading EMV smart credit card and NFC credit card. It can be paired with smartphone and operated by mobile APP through Bluetooth. The EMV smart card interface is for reading EMV smart credit card data. The 13.56MHz NFC reader is for reading NFC credit card. The EUT can support both Bluetooth 3.0 and Bluetooth 4.0 BLE. Bluetooth 3.0 occupies in a frequency range of 2402MHz to 2480MHz (79 channels with channel spacing of 1MHz) while Bluetooth 4.0 BLE occupies in a frequency range of 2402MHz to 2480MHz (40 channels with channel spacing of 2MHz). The EUT is powered by 3.7V internal rechargeable battery. The internal battery can be charged by USB-C socket (5VDC) or wireless charger. The EUT contains a wireless charging receiver for this charging purpose. The USB-C port in EUT is for this charging purpose and does not contain PC connectivity.

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 C63.10 (2013). 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 SAR, China. This test facility and site measurement data have been placed on file with the FCC.

TEST REPORT

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 C63.10 (2013).

The device was powered by a 3.7VDC internal rechargeable battery. The internal rechargeable battery can be charged by wireless charger or USB-C port. Both charging methods were tested.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, 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 report 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

Decision Rule for compliance: For FCC/IC standard, the measured value must be within the limits of applicable standard without accounting for the measurement uncertainty. For EN/IEC/HKTA/HKTC standard, conformity rules will be used as per standard directly excepted EN/IEC 61000-3-2, EN/IEC 61000-3-3, HKTA1004, HKCA1008, HKTA1019, HKTA1020, HKTA1041 and HKTA1044. For these excepted or not mentioned standards, CI 4.2.2 of ILAC-G8:09/2019 decision rules will be reference and guard band will be equal to our measurement uncertainty with 95% confidence level ($k=2$). In case, the measured value is within guard band region, undetermined decision will be used.

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.

2.5 Support Equipment List and Description

1. Wireless charger (Model: 66095, Input DC5V/2A; Output DC 5W) (provided by applicant)
2. USB cable of 2m long (for Wireless charging) (provided by applicant)
3. USB cable of 0.3m long (for USB charging) (provided by applicant)
4. Smart Credit Card with EMV chip and passive NFC tag (provided by applicant)
5. HP notebook computer (Adaptor Model: HSTNN-CA15) (provided by Intertek)
6. LAN cable of 2m long (with termination) (provided by Intertek)

TEST REPORT

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.

$$RA = 52.0 \text{ dB}\mu\text{V/m}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$AV = 5.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 18 + 9 = 27 \text{ dB}\mu\text{V/m}$$

$$RR = 18.0 \text{ dB}\mu\text{V}$$

$$LF = 9.0 \text{ dB}$$

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

TEST REPORT

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 67.802 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 1.4 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.681 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 13.3 dB

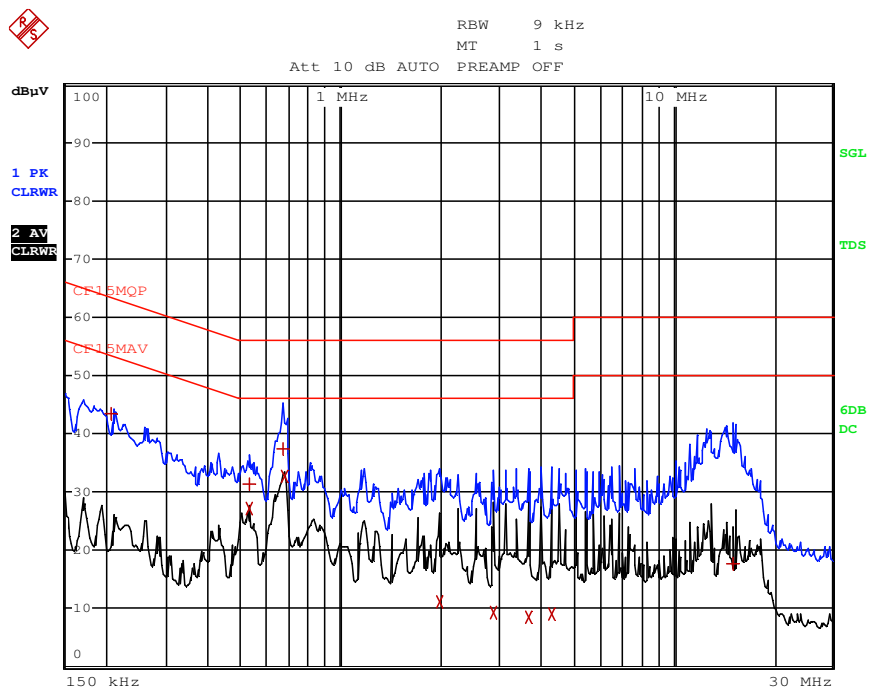
TEST REPORT

CONDUCTED EMISSION

Model: QB33

Date of Test: November 26, 2020

Worst-Case Operating Mode: Wireless Charging + Bluetooth + NFC



EDIT PEAK LIST (Final Measurement Results)

Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
	TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1	Quasi Peak	208.5 kHz	43.52 N	-19.74
2	CISPR Average	528 kHz	27.18 N	-18.81
1	Quasi Peak	532.5 kHz	31.27 N	-24.72
1	Quasi Peak	672 kHz	37.33 N	-18.66
2	CISPR Average	681 kHz	32.70 N	-13.29
2	CISPR Average	1.977 MHz	11.09 L1	-34.90
2	CISPR Average	2.868 MHz	9.20 L1	-36.79
2	CISPR Average	3.6915 MHz	8.40 L1	-37.59
2	CISPR Average	4.317 MHz	8.99 L1	-37.00
1	Quasi Peak	15.081 MHz	17.68 L1	-42.31

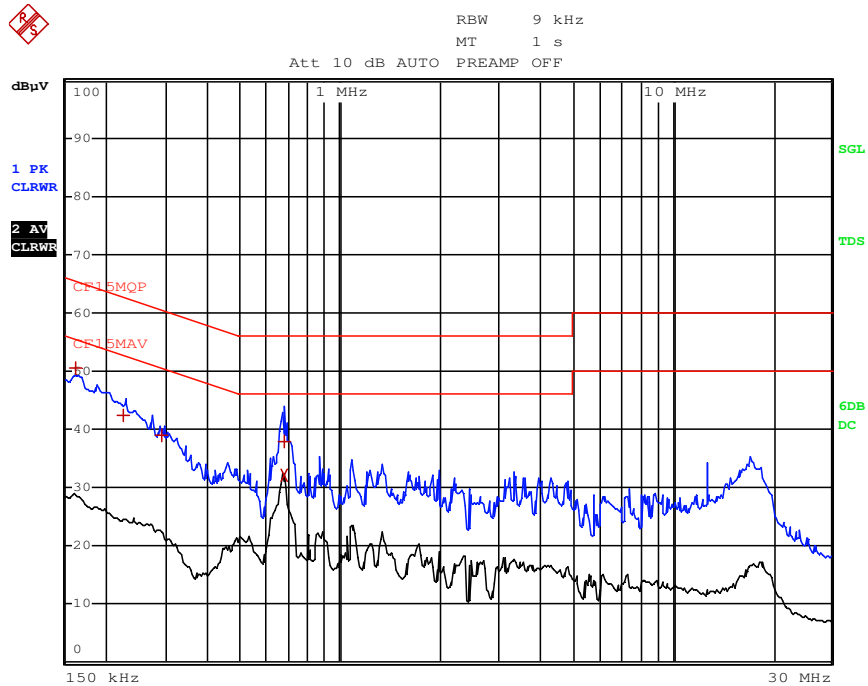
Note: Measurement Uncertainty is ± 4.2 dB at a level of confidence of 95%.

TEST REPORT

Model: QB33

Date of Test: November 26, 2020

Worst-Case Operating Mode: USB Charging + Bluetooth + NFC



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA	LIMIT dB
1 Quasi Peak	163.5 kHz	50.49 N	-14.78	
1 Quasi Peak	226.5 kHz	42.41 L1	-20.15	
1 Quasi Peak	294 kHz	38.85 N	-21.55	
1 Quasi Peak	676.5 kHz	37.93 L1	-18.06	
2 CISPR Average	676.5 kHz	32.27 N	-13.72	

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

TEST REPORT

RADIATED EMISSIONS

Model: QB33

Date of Test: November 26, 2020

Worst-Case Operating Mode: NFC Transmitting

Table 1
Pursuant to FCC Part 15 Section 15.225 Requirement

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Distance Factor (-dB)	Calculated at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
O	13.560	54.7	0	10.8	65.5	40.0	25.5	84.0	-58.5
O	27.120	28.7	0	9.5	38.2	40.0	-1.8	29.5	-31.3

- NOTES:
1. Peak Detector Data unless otherwise stated.
 2. All measurements were made at 3 meters.
 3. Negative sign in the column shows value below limit.
 4. Loop antenna is used for the emissions below 30MHz.
 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 ± 5.3 dB at a level of confidence of 95%.

TEST REPORT

Model: QB33

Date of Test: November 26, 2020

Worst-Case Operating Mode: NFC Transmitting (Wireless Charging)

Table 1
Pursuant to FCC Part 15 Section 15.225 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	40.602	39.8	16	10.0	33.8	40.0	-6.2
H	67.802	46.6	16	8.0	38.6	40.0	-1.4
V	131.032	34.5	16	14.0	32.5	43.5	-11.0
V	176.246	33.0	16	19.0	36.0	43.5	-7.5
H	230.482	37.8	16	18.0	39.8	46.0	-6.2
V	447.542	26.0	16	26.0	36.0	46.0	-10.0

- NOTES:
1. Quasi-Peak Detector Data unless otherwise stated.
 2. All measurements were made at 3 meters.
 3. Negative sign in the column shows value below limit.
 4. Loop antenna is used for the emissions below 30MHz.
 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 ± 5.3 dB at a level of confidence of 95%.

TEST REPORT

Model: QB33

Date of Test: November 26, 2020

Worst-Case Operating Mode: NFC Transmitting (USB Charging)

Table 1
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)
H	40.602	36.8	16	10.0	30.8	40.0	-9.2
V	81.306	39.6	16	7.0	30.6	40.0	-9.4
H	67.802	45.2	16	8.0	37.2	40.0	-2.8
H	176.246	24.4	16	19.0	27.4	43.5	-16.1
V	474.616	31.2	16	26.0	41.2	46.0	-4.8
V	569.538	25.4	16	28.0	37.4	46.0	-8.6

- NOTES:
1. Quasi-Peak Detector Data unless otherwise stated.
 2. All measurements were made at 3 meters.
 3. Negative sign in the column shows value below limit.
 4. Loop antenna is used for the emissions below 30MHz.
 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 ± 5.3 dB at a level of confidence of 95%.

TEST REPORT

3.6 Frequency Stability

FCC Part 15 Section 15.225

Data Table
Frequency Deviation with Voltage Variation

Operating frequency		13.560MHz		
Test	Temperature	Measured frequency (MHz)	Frequency error (%)	Limit (%)
Voltage (V)	(°C)			
120	+ 50	13.560544	+0.0040	±0.01
	+ 40	13.560588	+0.0043	±0.01
	+ 30	13.560608	+0.0045	±0.01
	+ 20	13.560642	+0.0047	±0.01
	+ 10	13.560648	+0.0048	±0.01
	0	13.560656	+0.0048	±0.01
	- 10	13.560708	+0.0052	±0.01
	- 20	13.560712	+0.0053	±0.01

Nominal frequency		13.560MHz			
Temperature (°C)		Voltage	Frequency (MHz)	Frequency error (ppm)	Limit (ppm)
Humidity (%)					
20°C 50%		102	13.560644	47.5	100
20°C 50%		120	13.560642	47.3	100
20°C 50%		132	13.560640	47.2	100
Min -20C 0%		102	13.560714	52.7	100
Min -20C 0%		120	13.560712	52.5	100
Min -20C 0%		132	13.560708	52.2	100
Max 50C 50%		102	13.560545	40.2	100
Max 50C 50%		120	13.560544	40.1	100
Max 50C 50%		132	13.560542	40.0	100
					Result

The device is deemed to comply with requirement of FCC 15.225(e).

TEST REPORT

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.

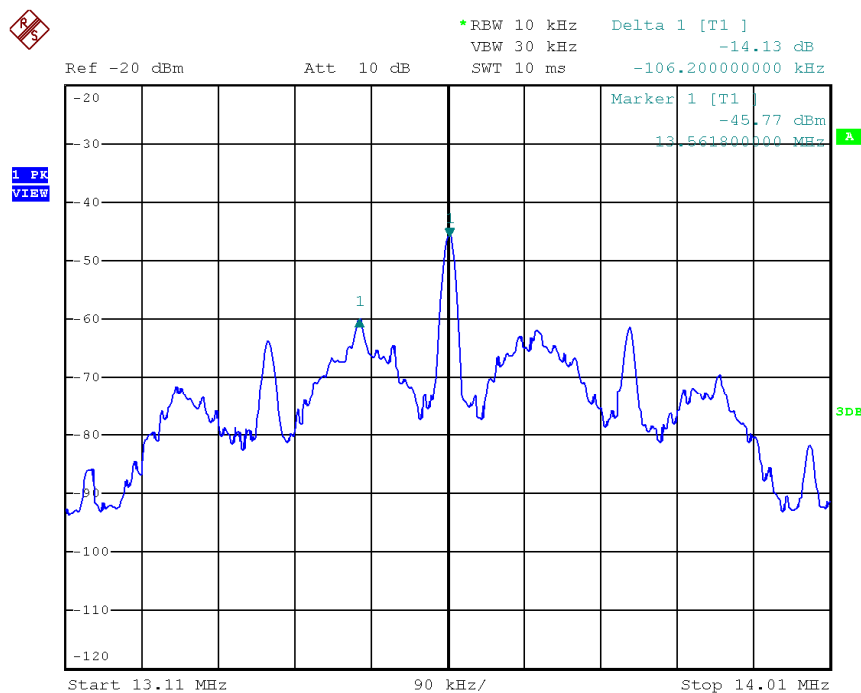
TEST REPORT

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 Measured Bandwidth

The plot shows the fundamental emission is confined in the specified band. The emission of the fundamental is 25.5 dB μ V/m and the worst case of sideband emission is 14.1dB lower than the fundamental emission, which is below the limit of 50.5 dB μ V/m in the range of (13.410-13.553MHz) and (13.710-14.010MHz) and the limit of 40.5 dB μ V/m in the frequency range of (13.110-14.410MHz) and (13.710-14.010MHz). In the frequency range from 13.110-14.010MHz, we cannot find any emission higher than the fundamental emission. Therefore, they meet the requirement of Section 15.225(a), (b), (c), & (d).



TEST REPORT

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. Since the transmitter transmits the RF signal continuously.

8.3 Calculation of Average Factor

The average factor is not applicable for this device as the transmitted signal is a continuously signal.

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 0.8m in height above the ground plane for emission measurement at or below 1GHz and 1.5m in height above the ground plane for emission measurement above 1GHz. 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.

TEST REPORT

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 C63.10 (2013).

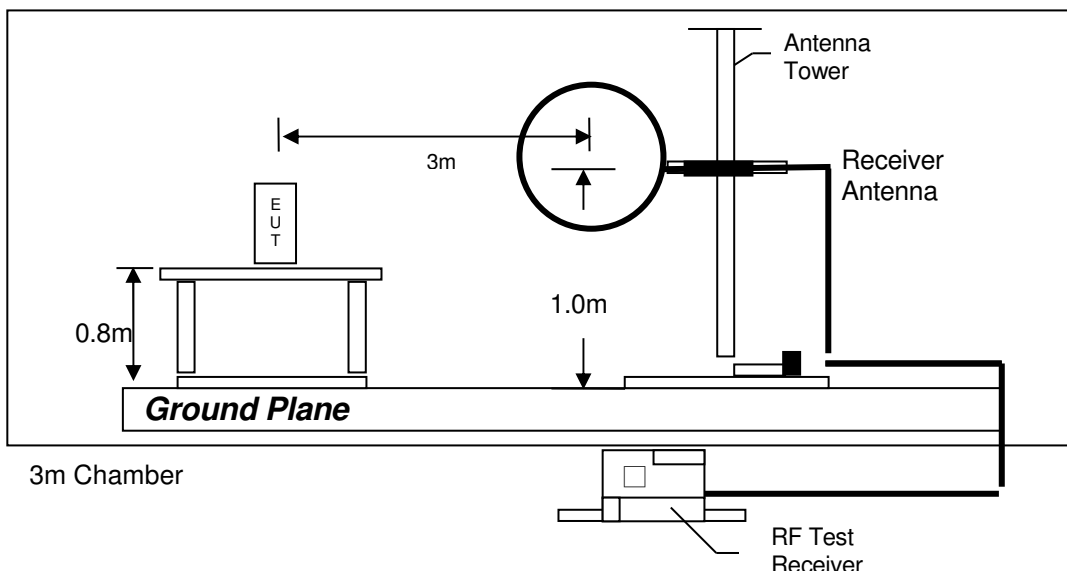
The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion 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.

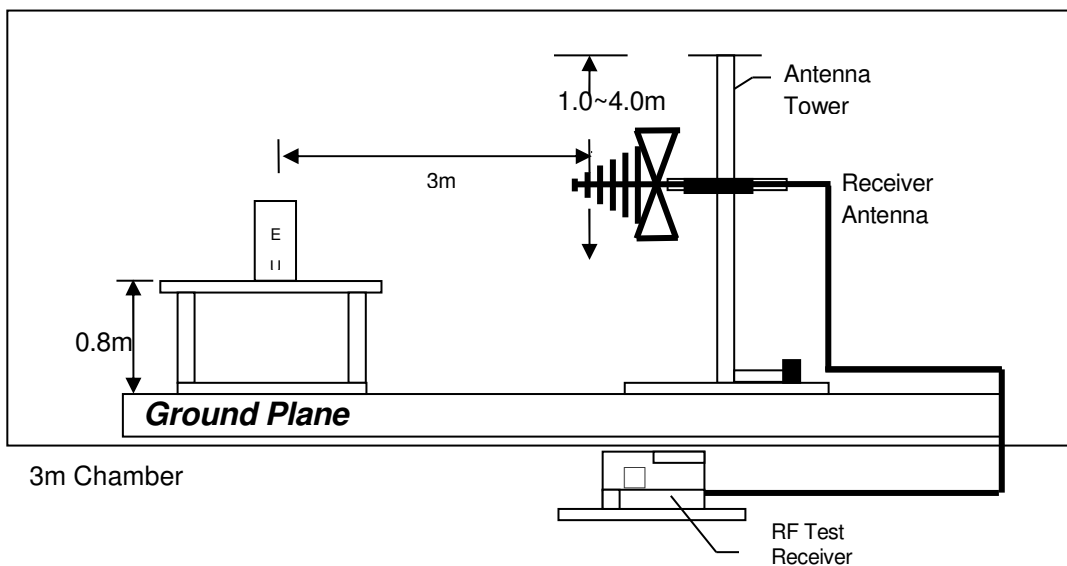
TEST REPORT

8.4.1 Radiated Emission Test Setup

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



Test setup of radiated emissions up to 30MHz



Test setup of radiated emissions above 1GHz

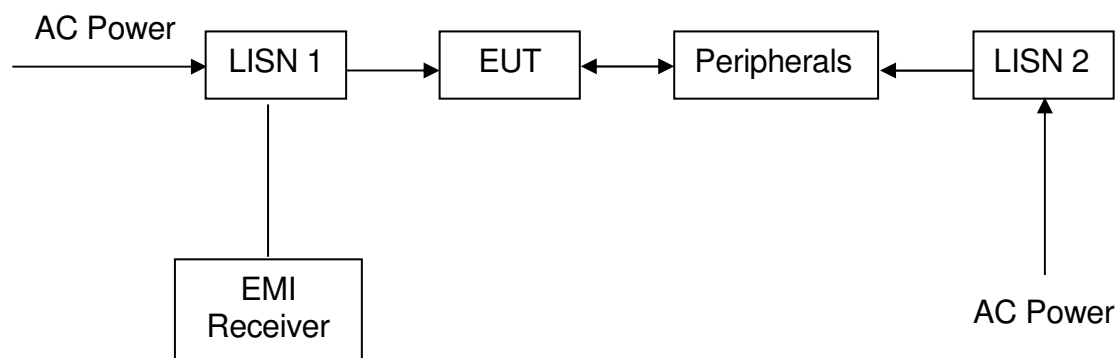
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8.4.2 Conducted Emission Test Procedures

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



TEST REPORT

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 (9kHz to 3GHz)	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-2500	EW-3281	EW-0571
Manufacturer	ROHDESCHWARZ	ROHDESCHWARZ	EMCO
Model No.	ESCI	FSV40	3104C
Calibration Date	January 09, 2020	March 04, 2020	July 23, 2019
Calibration Due Date	January 09, 2021	March 04, 2021	January 23, 2021

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	RF Cable 14m (1GHz to 26.5GHz)
Registration No.	EW-0447	EW-3415	EW-3151
Manufacturer	EMCO	EMCO	GREATBILLION
Model No.	3146	3115	SMA m/SHF5MPU /SMA m ra14m,26G
Calibration Date	September 25, 2019	June 07, 2019	March 04, 2020
Calibration Due Date	March 25, 2021	December 07, 2020	March 04, 2021

Equipment	Active Loop H-field (9kHz to 30MHz)	14m Double Shield RF Cable (20MHz To 6GHz)	Pyramidal Horn Antenna
Registration No.	EW-2313	EW-2074	EW-0905
Manufacturer	ELECTROMETRI	RADIALL	EMCO
Model No.	EM-6876	nm / RG142 / sma 14m	3160-09
Calibration Date	December 17, 2019	August 29, 2020	July 23, 2019
Calibration Due Date	June 17, 2021	August 29, 2021	January 23, 2021

TEST REPORT

2) Conducted Emissions Test

Equipment	RF Cable 80cm (RG142) (9kHz to 30MHz)	Artificial Mains Network	EMI Test Receiver (9kHz to 3GHz)
Registration No.	EW-2451	EW-2501	EW-2500
Manufacturer	RADIALL	ROHDESCHWARZ	ROHDESCHWARZ
Model No.	RF Cable 80cm (RG142) (9kHz to 30MHz)	ENV-216	ESCI
Calibration Date	December 08, 2019	September 15, 2020	January 09, 2020
Calibration Due Date	December 08, 2020	September 15, 2021	January 09, 2021

3) Bandedge Measurement

Equipment	RF Cable 80cm (RG142) (9kHz to 30MHz)	Spectrum Analyzer
Registration No.	EW-2451	EW-2466
Manufacturer	RADIALL	ROHDESCHWARZ
Model No.	RF Cable 80cm (RG142) (9kHz to 30MHz)	FSP30
Calibration Date	December 08, 2019	September 05, 2020
Calibration Due Date	December 08, 2020	September 05, 2021

4) Frequency Error Measurement

Equipment	Spectrum Analyzer	Temperature & Humidity Chamber
Registration No.	EW-2466	EW-2517
Manufacturer	ROHDESCHWARZ	KINGSON
Model No.	FSP30	KTHD-410TBS
Calibration Date	September 05, 2020	April 27, 2020
Calibration Due Date	September 05, 2021	March 31, 2021

END OF TEST REPORT