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TEST REPORT

Report No.: 20101108HKG-003

Application For Original Grant of 47 CFR Part 15 Certification
Single New of RSS-210 Issue 10 Equipment Certification

DECT 6.0 Cordless Telephone with Bluetooth - Base Unit

FCC ID: EW780-2313-00
IC: 1135B-80231300

Prepared and Checked by:	**Approved by:**
Signed On File Leung Chiu Kuen, Stanley Engineer	Intertek Testing Services Hong Kong Ltd. Tang Kwan Mo, Jess Lead Engineer Date: January 04, 2021

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TEST REPORT

GENERAL INFORMATION

Grantee:	VTech Telecommunications Ltd.
Grantee Address:	23/F., Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road, Tai Po, Hong Kong.
FCC Specification Standard:	FCC Part 15, October 1, 2019 Edition
FCC ID:	EW780-2313-00
FCC Model(s):	IS8121, IS8121-2, IS8121-3, IS8121-4, IS8121-5, IS812Z-XY, IS8102, IS8102-XY
IC Specification Standard:	RSS-210 Issue 10, December 2019 RSS-Gen Issue 5, April 2018
IC:	1135B-80231300
HVIN	35-201456BS
VTech Model(s):	IS8121, S8121-2, IS8121-3, IS8121-4, IS8121-5
PMN	IS8121/IS8121-2/IS8121-3/IS8121-4/IS8121-5
Type of EUT:	Transceiver
Description of EUT:	DECT 6.0 Cordless Telephone with Bluetooth - Base Unit
Serial Number:	N/A
Sample Receipt Date:	October 29, 2020
Date of Test:	October 29, 2020 to December 18, 2020
Report Date:	January 04, 2021
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 / RSS-210 Issue 10 Certification.

TEST REPORT

TABLE OF CONTENTS

TEST REPORT

1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-210/ RSS-Gen#/ RSS-310^ Section	Results	Details See Section
Antenna Requirement	15.203	6.8#	Pass	2.1
Security Code Information	15.214(d)	7.4	Pass	2.1
Radiated Emission Radiated Emission on the Bandedge	15.249(a), 209, & 109 15.249(d)	B10(a) B10(b)	Pass Pass	4.2 4.3
Radiated Emission in Restricted Bands	15.205	7.1	Pass	4.2
AC Power Line Conducted Emission	15.207 & 15.107	8.8#	Pass	4.4

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB 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 expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standards:

FCC Part 15, October 1, 2019 Edition
RSS-210 Issue 10, December 2019
RSS-Gen Issue 5, April 2018

TEST REPORT

2.0 GENERAL DESCRIPTION

2.1 Product Description

The IS8121 (35-201456BS) is a DECT 6.0 Cordless Telephone with Bluetooth - Base Unit. It operates at frequency range of 2402MHz to 2480MHz. The Base Unit is powered by an AC adaptor 100-120VAC 60Hz 150mA.

The Bluetooth antenna used in base unit is integral, and the test sample is a prototype.

For FCC, the Model(s): IS8121-2, IS8121-3, IS8121-4, IS8121-5, IS812Z-XY, IS8102 and IS8102-XY are the same as the Model: IS8121 in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure as declared by client. The only differences between these models are model number, color, number of handsets and chargers, and package type to be sold for marketing purpose as declared by client. Suffix ("X,Y, Z" in IS812ZZ-XY and IS8102-XY) indicates different packaging material, different number of handsets and chargers, and different color of enclosure as declared by client.

The circuit description is saved with filename: descri.pdf.

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2014) and ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in Radiated Emission Test Sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.3 Test Facility

The radiated emission test sites and conducted measurement facility used to collect the radiated data and conducted data are 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 fully placed on file with the FCC and IC No. 2042H.

TEST REPORT

3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit continuously mode to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The Base Unit was powered by a 100-120 60Hz 150mA to 6.0VDC 400mA adaptor.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the 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. If the base unit attached to peripherals, they were connected and operational to simulate typical use. The handset was remotely located as far from the antenna and the base as possible to ensure full power transmission from the base. Else, the base was wired to transmit full power.

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 1 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter was performed 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 to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitry used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 Limits.

The DECT module was put into transmission mode when taking radiated emission data for determining worst-case spurious emission.

All different type of adaptors have been tested, and the worst case data is included in this report.

TEST REPORT

3.1 Justification - Cont'd

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 section 4.2.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was 625µs. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and 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 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

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

All relevant operation modes have been tested, and the worst case data was included in this report.

3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

TEST REPORT

3.3 Radiated Emission Test Setup

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

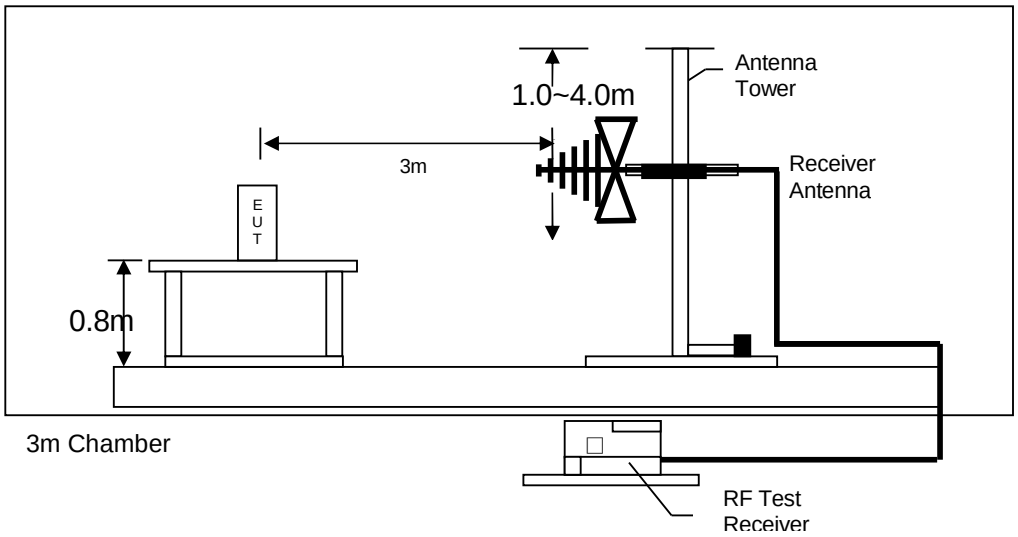


Figure 3.3.1 Test setup of radiated emissions up to 1GHz

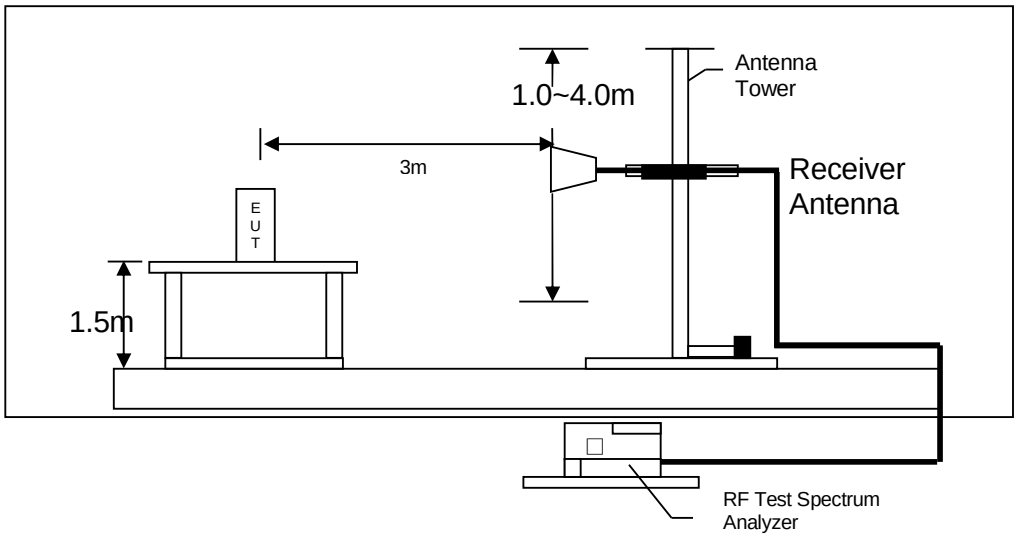


Figure 3.3.2 Test setup of radiated emissions above 1GHz

TEST REPORT

3.4 Conducted Emission Test Setup

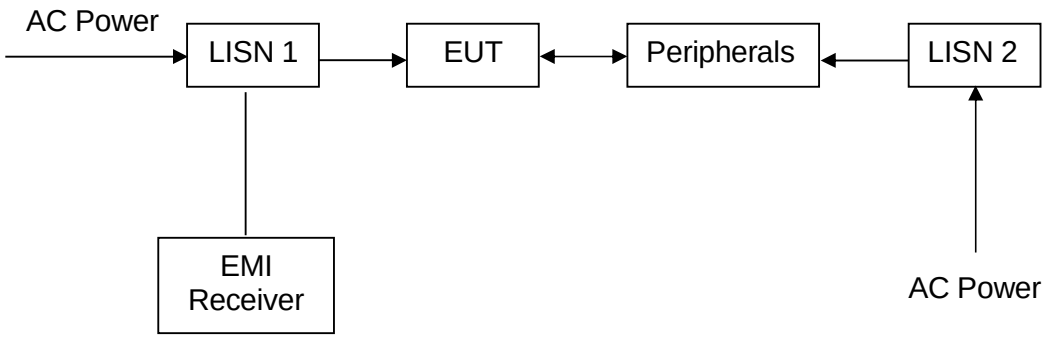


Figure 3.4.1

TEST REPORT

3.5 Details of EUT and Description of Accessories

Details of EUT:

An AC adaptor (provided with the unit) was used to power the device. Their description are listed below.

(1) An AC adaptor (100-120VAC 60Hz 150mA to 6.0VDC 400mA, Model: S003AKU0600040, Brand: Ten Pao) (Supplied by Client)
(2) An AC adaptor (100-120VAC 60Hz 150mA to 6.0VDC 400mA, Model: VT05UUS06040, Brand: VTPL) (Supplied by Client)
(3) An AC adaptor (100-120VAC 60Hz 150mA to 6.0VDC 400mA, Model: A318 -060040W-US1, Brand: Ao Hai) (Supplied by Client)

Description of Accessories:

(1) Telecommunication cable with RJ11C connectors (1m, unshielded), terminated (Supplied by Intertek)
(2) Handset (Model: IS8121, FCC ID: EW780-2313-00) (Supplied by Client)

3.6 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, Cl 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. The values of the Measurement uncertainty for radiated emission test, AC line conducted emission test and RF conducted test, frequency stability and timing jitter are ± 5.3dB, ± 4.2dB, ±1dB, ±23Hz, 0.1µs respectively.

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.

TEST REPORT

4.0 TEST 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.

4.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + 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
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflects the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD +AV

Example
Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

TEST REPORT

4.2 Radiated Emissions

4.2.1 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at

414.734 MHz

The worst case radiated emission configuration photographs are saved with filename: config photos.pdf

4.2.2 Radiated Emission Data

The data in tables 1-6 list the significant emission frequencies, the limit and the margin of compliance. Test setup is shown in section 3.3 Figure 3.3.1 and 3.3.2.

Judgement -

Passed by 1.3 dB margin

TEST REPORT

RADIATED EMISSION DATA

Mode: TX-Channel 00 with Adaptor Ao Hai

Table 1, Base Unit

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	2402.000	93.7	33	29.4	90.1	24	66.1	94.0	-27.9
H	4804.000	40.8	33	34.9	42.7	24	18.7	54.0	-35.3
V	7206.000	37.7	33	37.9	42.6	24	18.6	54.0	-35.4
V	9608.000	38.6	33	40.4	46.0	24	22.0	54.0	-32.0
V	12010.000	40.0	33	40.5	47.5	24	23.5	54.0	-30.5
V	14412.000	41.9	33	40.0	48.9	24	24.9	54.0	-29.1

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	2402.000	93.7	33	29.4	90.1	114.0	-23.9
H	4804.000	40.8	33	34.9	42.7	74.0	-31.3
V	7206.000	37.7	33	37.9	42.6	74.0	-31.4
V	9608.000	38.6	33	40.4	46.0	74.0	-28.0
V	12010.000	40.0	33	40.5	47.5	74.0	-26.5
V	14412.000	41.9	33	40.0	48.9	74.0	-25.1

NOTES:

1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission 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-Gen Section 8.9.

TEST REPORT

Mode: TX-Channel 39 with Adaptor Ao Hai

Table 2, Base Unit

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	2442.000	96.8	33	29.4	93.2	24	69.2	94.0	-24.8
V	4884.000	44.8	33	34.9	46.7	24	22.7	54.0	-31.3
H	7326.000	38.9	33	37.9	43.8	24	19.8	54.0	-34.2
V	9768.000	37.5	33	40.4	44.9	24	20.9	54.0	-33.1
H	12210.000	39.7	33	40.5	47.2	24	23.2	54.0	-30.8
H	14652.000	43.1	33	38.4	48.5	24	24.5	54.0	-29.5

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	2442.000	96.8	33	29.4	93.2	114.0	-20.8
V	4884.000	44.8	33	34.9	46.7	74.0	-27.3
H	7326.000	38.9	33	37.9	43.8	74.0	-30.2
V	9768.000	37.5	33	40.4	44.9	74.0	-29.1
H	12210.000	39.7	33	40.5	47.2	74.0	-26.8
H	14652.000	43.1	33	38.4	48.5	74.0	-25.5

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission 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-Gen Section 8.9.

TEST REPORT

Mode: TX-Channel 78 with Adaptor Ao Hai

Table 3, Base Unit

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	98.3	33	29.4	94.7	24	70.7	94.0	-23.3
H	4960.000	46.3	33	34.9	48.2	24	24.2	54.0	-29.8
H	7440.000	39.0	33	37.9	43.9	24	19.9	54.0	-34.1
H	9920.000	38.1	33	40.4	45.5	24	21.5	54.0	-32.5
V	12400.000	39.4	33	40.5	46.9	24	22.9	54.0	-31.2
V	14880.000	41.2	33	38.4	46.6	24	22.6	54.0	-31.4

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	2480.000	98.3	33	29.4	94.7	114.0	-19.3
H	4960.000	46.3	33	34.9	48.2	74.0	-25.8
H	7440.000	39.0	33	37.9	43.9	74.0	-30.1
H	9920.000	38.1	33	40.4	45.5	74.0	-28.5
V	12400.000	39.4	33	40.5	46.9	74.0	-27.2
V	14880.000	41.2	33	38.4	46.6	74.0	-27.4

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission 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-Gen Section 8.9.

TEST REPORT

Mode: Ringing and Charging with Adaptor Ten Pao

Table 4, Base Unit

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	55.469	38.6	16	11.0	33.6	40.0	-6.4
H	317.988	31.4	16	23.0	38.4	46.0	-7.6
V	414.716	35.3	16	25.0	44.3	46.0	-1.7
H	622.090	30.2	16	29.0	43.2	46.0	-2.8
V	725.781	26.2	16	30.0	40.2	46.0	-5.8
V	829.497	27.0	16	31.0	42.0	46.0	-4.0
V	963.438	29.0	16	33.0	46.0	54.0	-8.0

NOTES:
1. Peak detector is used for the emission measurement.
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 value in the margin column shows emission 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-Gen Section 8.9.
6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

Mode: Ringing and Charging with Adaptor VTPL

Table 5, Base Unit

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	47.181	39.5	16	11.0	34.5	40.0	-5.5
V	110.069	36.9	16	14.0	34.9	43.5	-8.6
V	129.203	37.3	16	14.0	35.3	43.5	-8.2
V	414.746	29.7	16	25.0	38.7	46.0	-7.3
H	518.388	32.6	16	27.0	43.6	46.0	-2.4
V	622.098	31.0	16	29.0	44.0	46.0	-2.0
V	933.213	25.5	16	33.0	42.5	46.0	-3.5
H	960.878	31.6	16	33.0	48.6	54.0	-5.4

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-Gen Section 8.9.
6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

Mode: Ringing and Charging with Adaptor Ao Hai

Table 6, Base Unit

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
H	414.734	35.7	16	25.0	44.7	46.0	-1.3
H	518.430	27.2	16	27.0	38.2	46.0	-7.8
V	622.309	27.1	16	29.0	40.1	46.0	-5.9
H	725.903	27.3	16	30.0	41.3	46.0	-4.7
V	897.747	24.8	16	32.0	40.8	46.0	-5.2
V	961.731	31.6	16	33.0	48.6	54.0	-5.4

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-Gen Section 8.9.
6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

4.2.3 Transmitter Duty Cycle Calculation

Based on the Bluetooth Specification Version 2.0 / 2.1 + EDR, the transmitter ON time for each timeslot of Bluetooth is 625µs. DH5 has the maximum duty cycle, which consists of 5 continuous Tx slots and 1 Rx slot. Therefore one hopset take (5+1) x 625µs = 3.75ms. For one period for a pseudo-random hopping through at least 20 RF channels in adaptive mode (worst case), it take: 20 x 3.75ms = 75ms.

The dwell time for DH5 is 5 x 625us = 3.125ms

For the worst case calculation, there are two transmissions might occur in 100ms.

Therefore,

Duty Cycle (DC) = Maximum On time in 100ms/100ms
= 3.125ms x 2 /100ms
= 0.0625

Average Factor (AF) of Bluetooth in dB = $20 \log_{10} (0.0625)$
= -24.0dB

TEST REPORT

4.3 Radiated Emission on the Bandedge

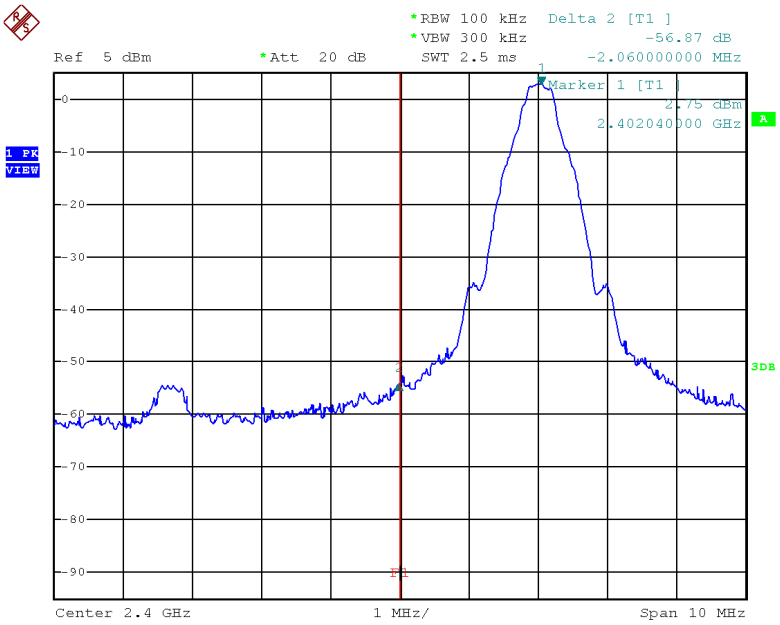
From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz and 2483.5MHz). In case of emissions up to two standard bandwidths away from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2014) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50 dB below the level of the fundamental or to the general radiated emission limits in FCC Part 15 Section 15.209 / Table 4 of RSS-Gen, whichever is the lesser attenuation, which meet the requirement of FCC Part 15 Section 15.249(d) / RSS-210 B10(b).

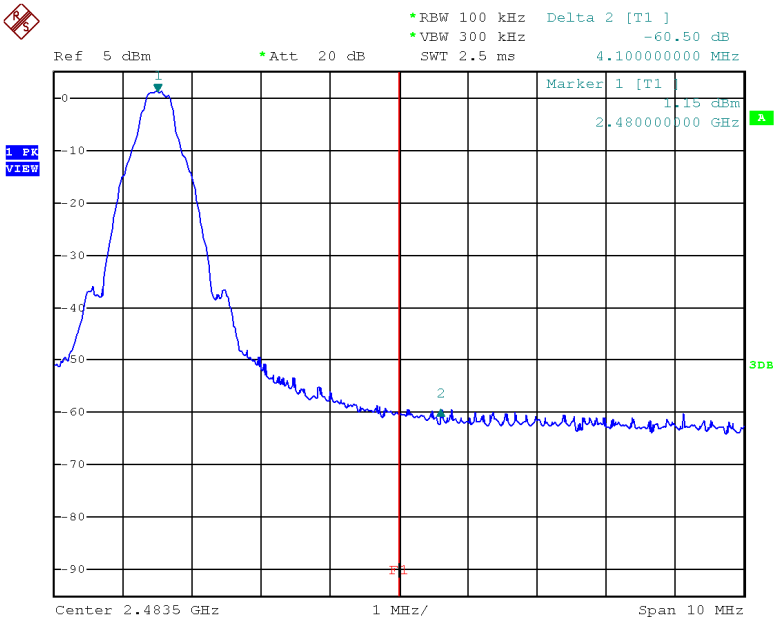
The plots of radiated emission on the bandedge are saved as below.

TEST REPORT

BASE UNIT WITH BLUETOOTH PORTION, LOWEST CHANNEL



BASE UNIT WITH BLUETOOTH PORTION, HIGHEST CHANNEL



TEST REPORT

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

Resultant Field Strength = Fundamental Emissions - Delta from the plot

Resultant field strength for the lowest and/or highest channel(s), with corresponding average values are calculated as follows:

Channel	Fundamental Emission (dBµV/m)	Delta from the Plot (dB)	Resultant Field Strength (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)
Lowest	66.1	56.87	9.23	54	-44.77
Highest	70.7	60.50	10.2	54	-43.80

Channel	Fundamental Emission (dBµV/m)	Delta from the Plot (dB)	Resultant Field Strength (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)
Lowest	90.1	56.87	33.23	74	-40.77
Highest	94.7	60.50	34.2	74	-39.80

The resultant field strength meets the general radiated emission limit in Table 4 of RSS-Gen, which does not exceed 74dBµV/m for peak limit and also 54dBµV/m for average limit.

TEST REPORT

4.4 AC Power Line Conducted Emission

[ ] Not applicable – EUT is only powered by battery for operation.

[×] EUT connects to AC power line. Emission Data is listed in following pages.

[ ] Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

Test setup is shown in section 3.4 Figure 3.4.1.

4.4.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

2.7195 MHz

The worst case line conducted configuration photographs are saved with filename: config photos.pdf.

4.4.2 AC Power Line Conducted Emission Data

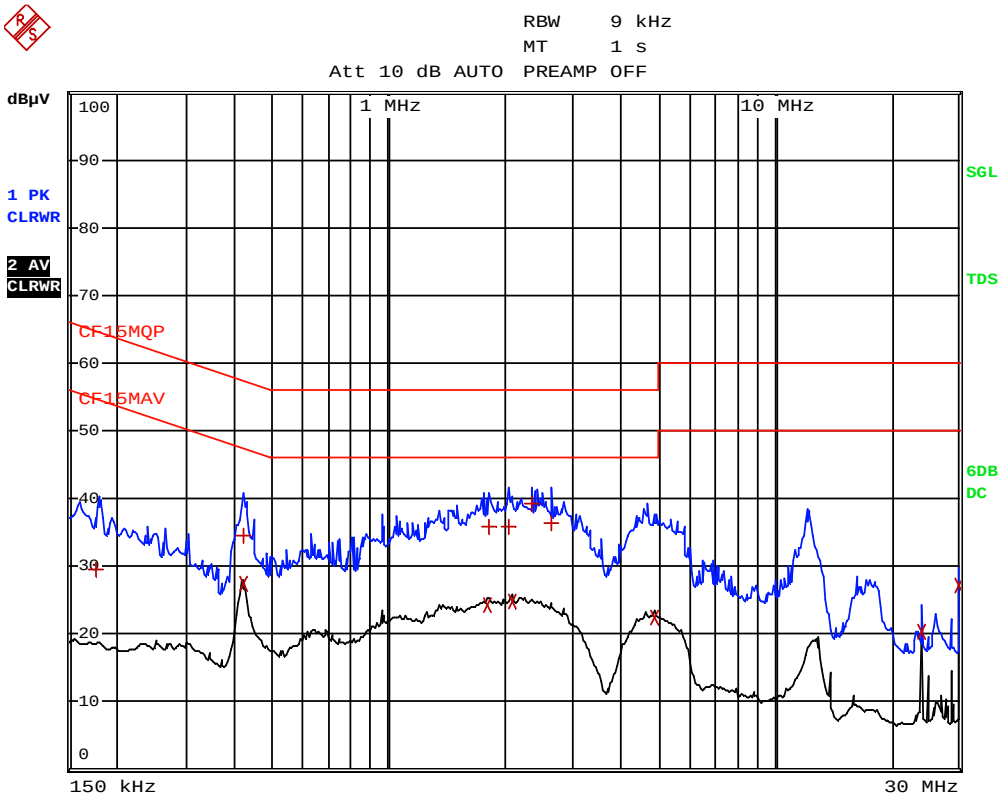
The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 7.63 dB margin compared with quasi-peak

TEST REPORT

CONDUCTED EMISSION DATA

Worst Case: Talk with Adaptor Ten Pao



TEST REPORT

Worst Case: Talk with Adaptor Ten Pao

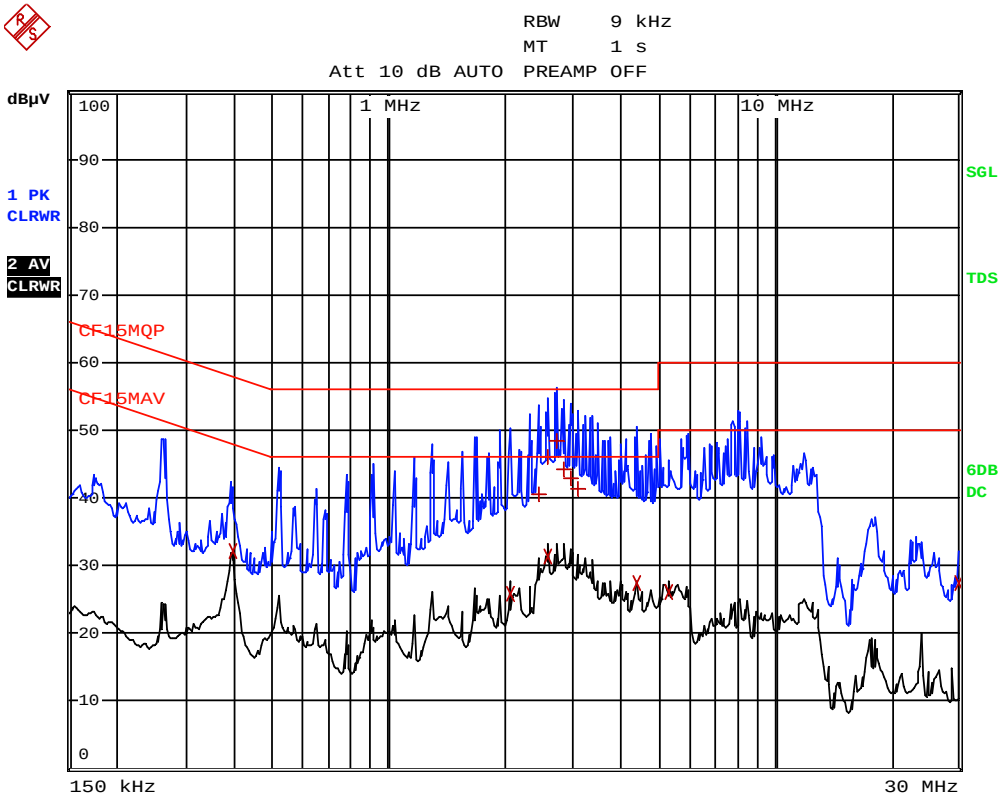
EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	177 kHz	29.56	L1	-35.06
1	Quasi Peak	420 kHz	34.49	L1	-22.95
2	CISPR Average	420 kHz	27.50	N	-19.94
2	CISPR Average	1.806 MHz	24.38	L1	-21.61
1	Quasi Peak	1.824 MHz	35.90	L1	-20.09
1	Quasi Peak	2.04 MHz	35.75	L1	-20.24
2	CISPR Average	2.085 MHz	24.90	L1	-21.09
1	Quasi Peak	2.364 MHz	39.34	N	-16.65
1	Quasi Peak	2.6475 MHz	36.41	N	-19.58
2	CISPR Average	4.911 MHz	22.40	L1	-23.60
2	CISPR Average	24 MHz	20.22	L1	-29.78
2	CISPR Average	29.9985 MHz	27.21	L1	-22.78

TEST REPORT

Worst Case: Talk with Adaptor VTPL



TEST REPORT

Worst Case: Talk with Adaptor VTPL

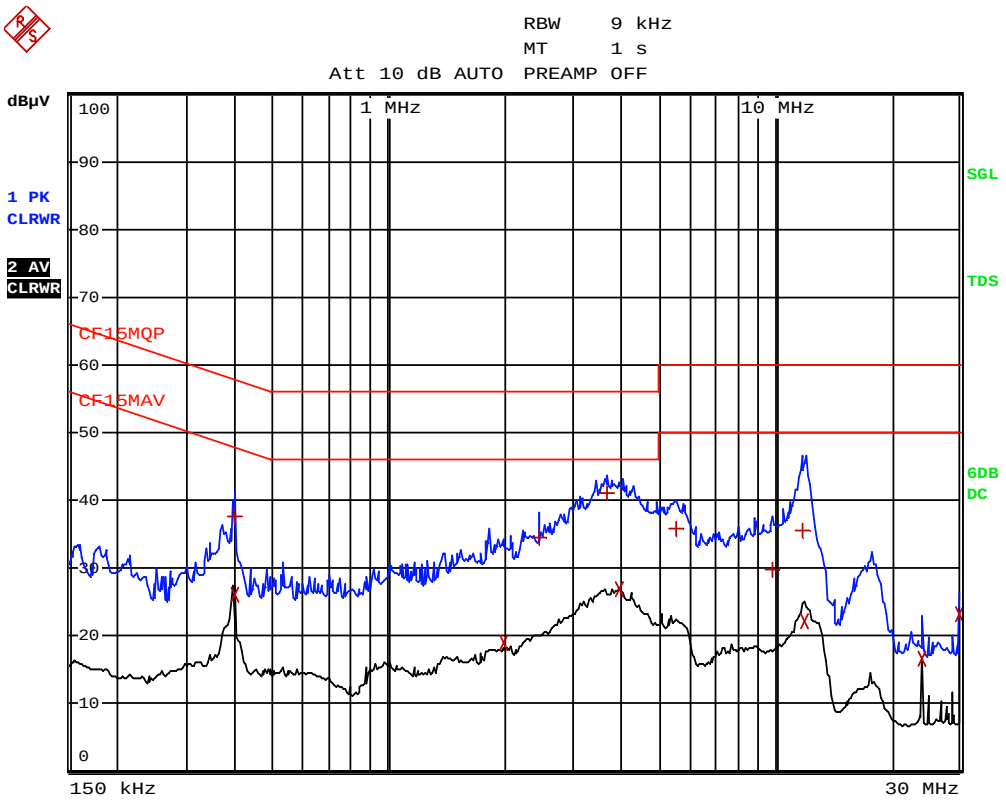
EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	CISPR Average	393 kHz	32.23	N	-15.76
2	CISPR Average	2.076 MHz	25.93	N	-20.06
1	Quasi Peak	2.4495 MHz	40.66	N	-15.33
1	Quasi Peak	2.5935 MHz	45.96	N	-10.03
2	CISPR Average	2.5935 MHz	31.48	L1	-14.51
1	Quasi Peak	2.7195 MHz	48.36	L1	-7.63
1	Quasi Peak	2.841 MHz	44.16	L1	-11.83
1	Quasi Peak	2.9625 MHz	43.03	N	-12.96
1	Quasi Peak	3.102 MHz	41.41	N	-14.58
2	CISPR Average	4.407 MHz	27.36	N	-18.63
2	CISPR Average	5.316 MHz	26.09	N	-23.90
2	CISPR Average	29.9985 MHz	27.51	L1	-22.48

TEST REPORT

Worst Case: Talk with Adaptor Ao Hai



TEST REPORT

Worst Case: Talk with Adaptor Ao Hai

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	397.5 kHz	37.53	N	-20.36
2	CISPR Average	397.5 kHz	26.09	N	-21.81
2	CISPR Average	1.9995 MHz	19.04	N	-26.95
1	Quasi Peak	2.463 MHz	34.47	L1	-21.52
1	Quasi Peak	3.687 MHz	41.04	L1	-14.95
2	CISPR Average	3.966 MHz	26.90	N	-19.09
1	Quasi Peak	5.586 MHz	35.87	N	-24.12
1	Quasi Peak	9.8115 MHz	29.68	N	-30.31
1	Quasi Peak	11.823 MHz	35.50	L1	-24.49
2	CISPR Average	11.9445 MHz	22.28	L1	-27.71
2	CISPR Average	24 MHz	16.75	N	-33.24
2	CISPR Average	29.9985 MHz	23.14	L1	-26.85

TEST REPORT

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-3156	EW-3281	EW-0571
Manufacturer	R&S	R&S	EMCO
Model No.	ESR26	FSP40	3104C
Calibration Date	September 30, 2020	March 04, 2020	July 23, 2019
Calibration Due Date	September 30, 2021	March 04, 2021	January 23, 2021

Equipment	Log Periodic Antenna	High Frequency Coaxial Cable Assembly (4 pcs)	Double Ridged Guide Antenna
Registration No.	EW-0447	EW-2107	EW-0194
Manufacturer	EMCO	RADIALL	EMCO
Model No.	3146	SMA(m)-SHF5MPU-SMA(m) R.A 14m	3115
Calibration Date	September 25, 2019	July 03, 2020	September 26, 2019
Calibration Due Date	May 25, 2021	July 03, 2021	March 26, 2021

Equipment	Pyramidal Horn Antenna (18.0 - 26.5)GHz
Registration No.	EW-0905
Manufacturer	EMCO
Model No.	3160-09
Calibration Date	July 23, 2019
Calibration Due Date	January 23, 2021

2) Conducted Emissions Test

Equipment	EMI Test Receiver	RF Cable 120cm (RG142) (9kHz to 30MHz)	LISN
Registration No.	EW-3156	EW-2453	EW-2501
Manufacturer	ROHDESCHWARZ	RADIALL	R&S
Model No.	ESR26	bnc m st / 142 / bnc m st 100c	ENV-216
Calibration Date	September 30, 2020	January 07, 2020	September 11, 2020
Calibration Due Date	September 30, 2021	January 07, 2021	September 11, 2021

3) Bandedge Measurement Test

Equipment	Spectrum Analyzer
Registration No.	EW-3281
Manufacturer	R&S
Model No.	FSP40
Calibration Date	March 04, 2020
Calibration Due Date	March 04, 2021

END OF TEST REPORT