2/F., Garment Centre,
576 Castle Peak Road, Kowloon,
Hong Kong.

Telephone: (852) 2173 8888
Facsimile: (852) 2785 5487
www.intertek.com

TEST REPORT

Report No.: 19031146HKG-003

Wing Hing Electronics Industrial Ltd.

Application For Certification
(Original Grant)

FCC ID: 2AAOLWS200QI

Transmitter

Prepared and Checked by:	**Approved by:**
Signed On File Wong Cheuk Ho, Herbert Lead Engineer	Digitally signed by Terry Chan Location: Intertek Testing Services Hong Kong Ltd. Chan Chi Hung, Terry Manager Date: July 16, 2019

TEST REPORT

GENERAL INFORMATION

Grantee:	Wing Hing Electronics Industrial Ltd.
Grantee Address:	Room 1902-03, 19/F., Enterprise Square One, Tower 3, 9 Sheung Yuet Road, Kowloon Bay, Kowloon, Hong Kong
Contact Person:	Simon Chu
Tel:	27539515
Fax:	27539515
e-mail:	N/A
Brand Name:	WINEC / HANNLOMAX / SOUNDSTREAM
Model:	WS-200Qi
Additional Model:	WS-201Qi, WS-202Qi, CR-188Qi, CR-189Qi, CR-190Qi, CR-191Qi, CR-192Qi, CR-193Qi / HX-201Qi, HX-101CR, HX-102CR, HX-103CR, HX-104CR, HX-105CR, HX-106CR, HX-107CR, HX-108CR, HX-109CR, HX-110CR, HX-111CR, HX-112CR, HX-113CR, HX-114CR, HX-115CR, HX-116CR, HX-117CR, HX-118CR, HX-119CR, HX-120CR, HX-121CR, HX-122CR, HX-123CR, HX-124CR, HX-125CR, HX-126CR, HX-127CR, HX-127CR, HX-128CR, HX-129CR, HX-130CR, HX-500R, HX-501R, HX-502R, HX-503R, HX-505R , HX-506R, HX-507R, HX-508R, HX-509R, HX-510R, HX-301CD, HX-302CD, HX-303CD, HX-305CD, HX-306CD, HX-307CD, HX-308CD, HX-309CD, HX-310CD, HX-311CD, HX-312CD, HX-313CD, HX-314CD, HX-315CD, HX-316CD, HX-317CD, HX-318CD, HX-319CD, HX-320CD, HX-321CD, HX-322CD, HX-323CD, HX-324CD, HX-325CD, HX-326CD, HX-327CD, HX-328CD, HX-329CD, HX-330CD, HX-601K, HX-1079BT / ST-10G
Type of EUT:	Transceiver
Description of EUT:	Wooden Table with Qi Wireless Charging, USB Charging, and Bluetooth
Serial Number:	N/A
FCC ID:	2AAOLWS200QI
Date of Sample Submitted:	March 22, 2019
Date of Test:	March 22, 2019 to June 20, 2019
Report No.:	19031146HKG-003
Report Date:	July 16, 2019
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%
Conclusion:	Test was conducted by client submitted sample. The submitted sample as after modification complied with the 47 CFR Part 15 Certification.

TEST REPORT

SUMMARY OF TEST RESULT

Test Specification	Reference	Results
Radiated Emission Radiated Emission on the Bandedge	15.249, 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, 2017 Edition

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.

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1.0 GENERAL DESCRIPTION

1.1 Product Description

The Equipment Under Test (EUT) is Wooden Table with Qi Wireless charging, USB charging, and Bluetooth. The EUT operates at frequency range of 2402MHz to 2480MHz. There are total 79 channels with 1MHz channel spacing. The EUT can play wireless audio signal when paired with a Bluetooth device. The audio signal is then amplified and driving internal loudspeaker. The EUT is powered by a 9V AC/DC adaptor. The applicant declared that Bluetooth 4.0 BLE is not used in the product. The USB port is for charging only.

The EUT contains a Wireless Inductive battery Charger (112-205kHz Transmitter, Wireless Inductive battery Charger – WPT source). The EUT is powered by adaptor (Model: WHDOE-09035, Input: 100-240VAC 50/60Hz 0.55A, Output: 9VDC 3.5A).

The Model(s): WS-201Qi, WS-202Qi, CR-188Qi, CR-189Qi, CR-190Qi, CR-191Qi, CR-192Qi, CR-193Qi, HX-201Qi, HX-101CR, HX-102CR, HX-103CR, HX-104CR, HX-105CR, HX-106CR, HX-107CR, HX-108CR, HX-109CR, HX-110CR, HX-111CR, HX-112CR, HX-113CR, HX-114CR, HX-115CR, HX-116CR, HX-117CR, HX-118CR, HX-119CR, HX-120CR, HX-121CR, HX-122CR, HX-123CR, HX-124CR, HX-125CR, HX-126CR, HX-127CR, HX-127CR, HX-128CR, HX-129CR, HX-130CR, HX-500R, HX-501R, HX-502R, HX-503R, HX-505R , HX-506R, HX-507R, HX-508R, HX-509R, HX-510R, HX-301CD, HX-302CD, HX-303CD, HX-305CD, HX-306CD, HX-307CD, HX-308CD, HX-309CD, HX-310CD, HX-311CD, HX-312CD, HX-313CD, HX-314CD, HX-315CD, HX-316CD, HX-317CD, HX-318CD, HX-319CD, HX-320CD, HX-321CD, HX-322CD, HX-323CD, HX-324CD, HX-325CD, HX-326CD, HX-327CD, HX-328CD, HX-329CD, HX-330CD, HX-601K, HX-1079BT and ST-10G are the same as the Model: WS-200Qi in hardware aspect. The difference in model number represents different brand name.

- Model: WS-200Qi, WS-201Qi, WS-202Qi, CR-188Qi, CR-189Qi, CR-190Qi, CR-191Qi, CR-192Qi and CR-193Qi: Brand Name: WINEC;
- Models: HX-201Qi, HX-101CR, HX-102CR, HX-103CR, HX-104CR, HX-105CR, HX-106CR, HX-107CR, HX-108CR, HX-109CR, HX-110CR, HX-111CR, HX-112CR, HX-113CR, HX-114CR, HX-115CR, HX-116CR, HX-117CR, HX-118CR, HX-119CR, HX-120CR, HX-121CR, HX-122CR, HX-123CR, HX-124CR, HX-125CR, HX-126CR, HX-127CR, HX-127CR, HX-128CR, HX-129CR, HX-130CR, HX-500R, HX-501R, HX-502R, HX-503R, HX-505R , HX-506R, HX-507R, HX-508R, HX-509R, HX-510R, HX-301CD, HX-302CD, HX-303CD, HX-305CD, HX-306CD, HX-307CD, HX-308CD, HX-309CD, HX-310CD, HX-311CD, HX-312CD, HX-313CD, HX-314CD, HX-315CD, HX-316CD, HX-317CD, HX-318CD, HX-319CD, HX-320CD, HX-321CD, HX-322CD, HX-323CD, HX-324CD, HX-325CD, HX-326CD, HX-327CD, HX-328CD, HX-329CD, HX-330CD, HX-601K and HX-1079BT: Brand Name: HANNLOMAX;
- Model: ST-10G: Brand Name: SOUNDSTREAM

The representative model WS-200Qi was selected to test.

Antenna Type: Internal, Integral

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

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1.2 Related Submittal(s) Grants

This is a single application for certification of a transmitter.

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. 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 C63.10 (2013).

The device was powered by 120VAC.

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.

2.5 Support Equipment List and Description

1) 1 x smartphone for wireless charging
2) 1 x smartphone for audio input
3) 1 x 5-ohm USB loading with cable of 0.8 meter long
4) 1 x audio cable of 2m long
   (Provided by Intertek)
5) Adaptor with ferrite
   Model: WHDOE-09035
   Input: 100-240VAC 0.45A 50/60Hz
   Output: 9VDC 3.5A
   (Provided by applicant)

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 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
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

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

TEST REPORT

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 211.590 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 5.0 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.168 MHz

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

3.5 Conducted Emission Data

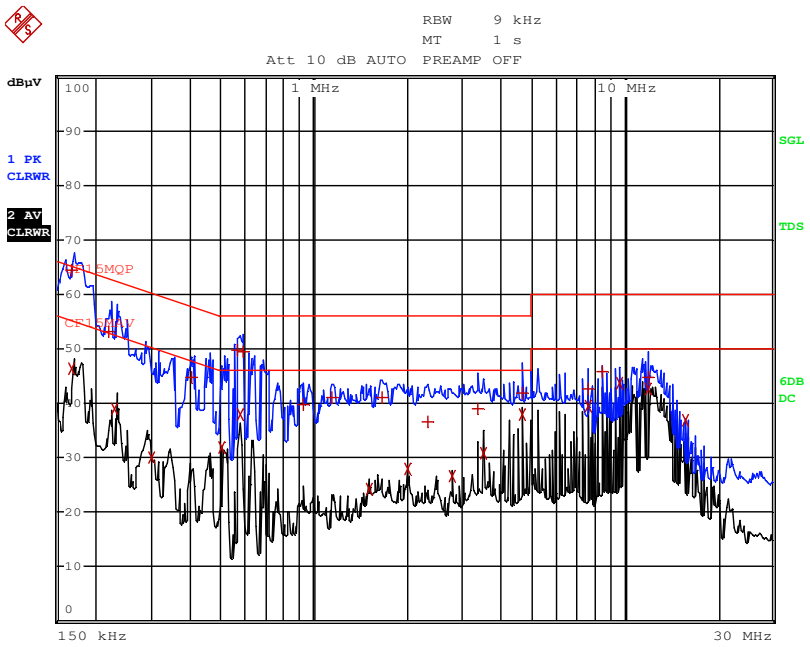
For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 0.6 dB

TEST REPORT

CONDUCTED EMISSION

Model: WS-200Qi
Date of Test: June 20, 2019
Worst-Case Operating Mode: Bluetooth Audio Playing, Wireless Charging and USB Charging



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EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	168 kHz	64.44	N	-0.61
2	CISPR Average	168 kHz	46.22	N	-8.83
1	Quasi Peak	222 kHz	53.21	N	-9.52
2	CISPR Average	231 kHz	39.03	N	-13.37
2	CISPR Average	298.5 kHz	29.93	N	-20.34
1	Quasi Peak	402 kHz	44.74	N	-13.06
2	CISPR Average	505.5 kHz	31.78	N	-14.22
1	Quasi Peak	564 kHz	49.71	N	-6.28
2	CISPR Average	577.5 kHz	37.83	N	-8.16
1	Quasi Peak	591 kHz	49.50	N	-6.49
1	Quasi Peak	928.5 kHz	39.67	L1	-16.32
1	Quasi Peak	1.1445 MHz	41.04	N	-14.96
2	CISPR Average	1.5 MHz	24.25	N	-21.74
1	Quasi Peak	1.6575 MHz	41.08	N	-14.91
2	CISPR Average	2.0175 MHz	27.83	L1	-18.16
1	Quasi Peak	2.319 MHz	36.60	N	-19.39
2	CISPR Average	2.787 MHz	26.68	L1	-19.31
1	Quasi Peak	3.372 MHz	38.91	N	-17.08
2	CISPR Average	3.5205 MHz	30.75	L1	-15.25
2	CISPR Average	4.695 MHz	38.03	L1	-7.96

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	4.695 MHz	41.80	N	-14.19
2	CISPR Average	7.629 MHz	39.59	N	-10.41
1	Quasi Peak	7.629 MHz	42.52	L1	-17.47
1	Quasi Peak	8.5065 MHz	45.80	N	-14.19
2	CISPR Average	9.681 MHz	43.59	N	-6.40
2	CISPR Average	11.8815 MHz	42.77	N	-7.23
1	Quasi Peak	11.8815 MHz	44.70	N	-15.29
2	CISPR Average	15.693 MHz	36.87	N	-13.12

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

TEST REPORT

RADIATED EMISSIONS

Model: WS-200Qi
Date of Test: June 20, 2019
Worst-Case Operating Mode: Transmitting

Table 1
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 - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2402.000	92.0	33	29.4	88.4	94.0	-5.6
V	4804.000	36.3	33	34.9	38.2	54.0	-15.8
H	7206.000	25.9	33	37.9	30.8	54.0	-23.2
H	9608.000	25.0	33	40.4	32.4	54.0	-21.6
H	12010.000	28.9	33	40.5	36.4	54.0	-17.6
V	14412.000	31.0	33	40.0	38.0	54.0	-16.0

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)
V	2402.000	95.8	33	29.4	92.2	114.0	-21.8
V	4804.000	50.3	33	34.9	52.2	74.0	-21.8
H	7206.000	45.3	33	37.9	50.2	74.0	-23.8
H	9608.000	40.4	33	40.4	47.8	74.0	-26.2
H	12010.000	42.9	33	40.5	50.4	74.0	-23.6
V	14412.000	43.8	33	40.0	50.8	74.0	-23.2

NOTES:
1. Peak Detector Data unless otherwise stated.
2. Average detector is applied according to ANSI C63.10.
3. 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.
4. Negative sign in the column shows value below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
7. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

Model: WS-200Qi
Date of Test: June 20, 2019
Worst-Case Operating Mode: Transmitting

Table 2
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 - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2442.000	92.1	33	29.4	88.5	94.0	-5.5
V	***4884.000***	***36.7***	***33***	***34.9***	***38.6***	***54.0***	***-15.4***
H	7326.000	25.7	33	37.9	30.6	54.0	-23.4
H	9768.000	25.1	33	40.4	32.5	54.0	-21.5
H	***12210.000***	***28.7***	***33***	***40.5***	***36.2***	***54.0***	***-17.8***
V	14652.000	32.8	33	38.4	38.2	54.0	-15.8

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)
V	2442.000	96.0	33	29.4	92.4	114.0	-21.6
V	***4884.000***	***50.5***	***33***	***34.9***	***52.4***	***74.0***	***-21.6***
H	7326.000	45.5	33	37.9	50.4	74.0	-23.6
H	9768.000	40.7	33	40.4	48.1	74.0	-25.9
H	***12210.000***	***42.9***	***33***	***40.5***	***50.4***	***74.0***	***-23.6***
V	14652.000	45.8	33	38.4	51.2	74.0	-22.8

NOTES:
1. Peak Detector Data unless otherwise stated.
2. Average detector is applied according to ANSI C63.10.
3. 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.
4. Negative sign in the column shows value below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
7. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

Model: WS-200Qi
Date of Test: June 20, 2019
Worst-Case Operating Mode: Transmitting

Table 3
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 - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2480.000	92.2	33	29.4	88.6	94.0	-5.4
V	***4960.000***	***36.9***	***33***	***34.9***	***38.8***	***54.0***	***-15.2***
H	***7440.000***	***25.9***	***33***	***37.9***	***30.8***	***54.0***	***-23.2***
H	9920.000	25.2	33	40.4	32.6	54.0	-21.4
H	***12400.000***	***28.5***	***33***	***40.5***	***36.0***	***54.0***	***-18.0***
V	14880.000	32.8	33	38.4	38.2	54.0	-15.8

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)
V	2480.000	96.4	33	29.4	92.8	114.0	-21.2
V	***4960.000***	***50.9***	***33***	***34.9***	***52.8***	***74.0***	***-21.2***
H	***7440.000***	***45.3***	***33***	***37.9***	***50.2***	***74.0***	***-23.8***
H	9920.000	40.8	33	40.4	48.2	74.0	-25.8
H	***12400.000***	***42.7***	***33***	***40.5***	***50.2***	***74.0***	***-23.8***
V	14880.000	46.0	33	38.4	51.4	74.0	-22.6

NOTES:
1. Peak Detector Data unless otherwise stated.
2. Average detector is applied according to ANSI C63.10.
3. 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.
4. Negative sign in the column shows value below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
7. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

Model: WS-200Qi
Date of Test: June 20, 2019
Worst-Case Operating Mode: Bluetooth Audio Playing, Wireless Charging and USB Charging

Table 4
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	***37.918***	***36.4***	***16***	***10.0***	***30.4***	***40.0***	***-9.6***
V	47.182	37.6	16	11.0	32.6	40.0	-7.4
V	***73.872***	***40.8***	***16***	***6.0***	***30.8***	***40.0***	***-9.2***
V	***118.722***	***37.6***	***16***	***14.0***	***35.6***	***43.5***	***-7.9***
H	***158.088***	***38.4***	***16***	***16.0***	***38.4***	***43.5***	***-5.1***
H	211.590	37.5	16	17.0	38.5	43.5	-5.0
H	335.904	20.8	16	24.0	28.8	46.0	-17.2
V	417.194	21.2	16	25.0	30.2	46.0	-15.8
V	514.450	21.2	16	27.0	32.2	46.0	-13.8
H	698.725	22.0	16	30.0	36.0	46.0	-10.0

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. 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%.

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.

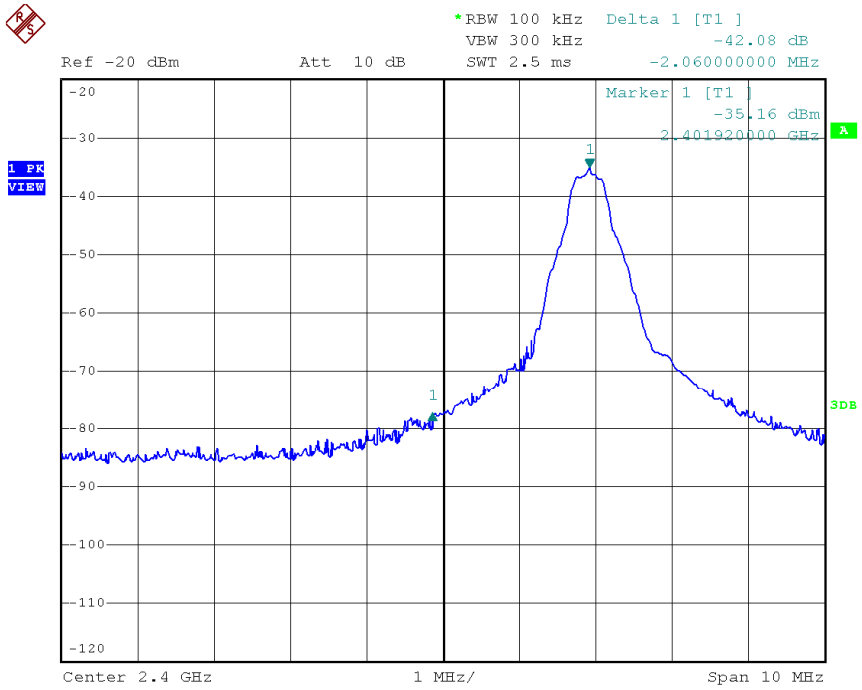
8.1 Radiated Emission on the Bandedge

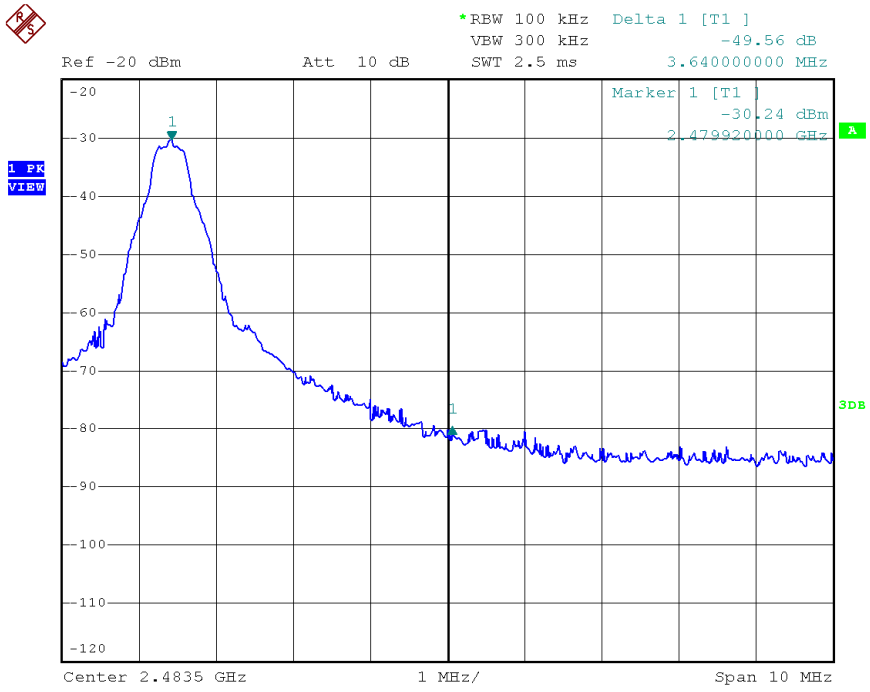
From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.10 (2013) 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).

TEST REPORT

PEAK MEASUREMENT





TEST REPORT

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

=92.2 dBµV/m – 42.1 dB
=50.1 dBµV/m

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

=88.4 dBµV/m – 42.1 dB
=46.3 dBµV/m

Upper bandedge

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

=92.8 dBµV/m – 49.6 dB
=43.2 dBµV/m

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

=88.6 dBµV/m – 49.6 dB
=39.0 dBµV/m

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

TEST REPORT

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 625µs 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

N/A

TEST REPORT

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).

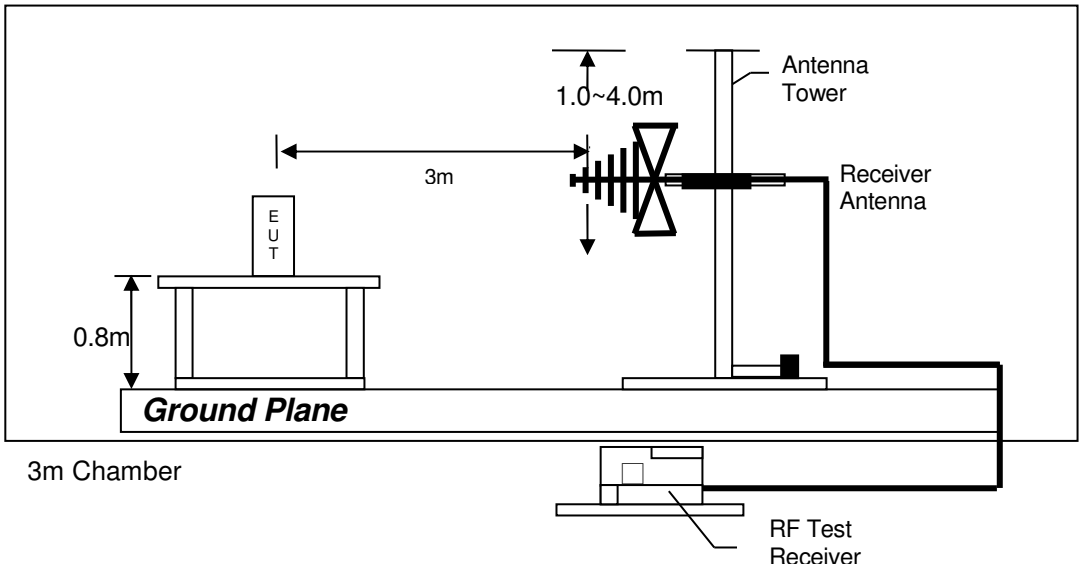
The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion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

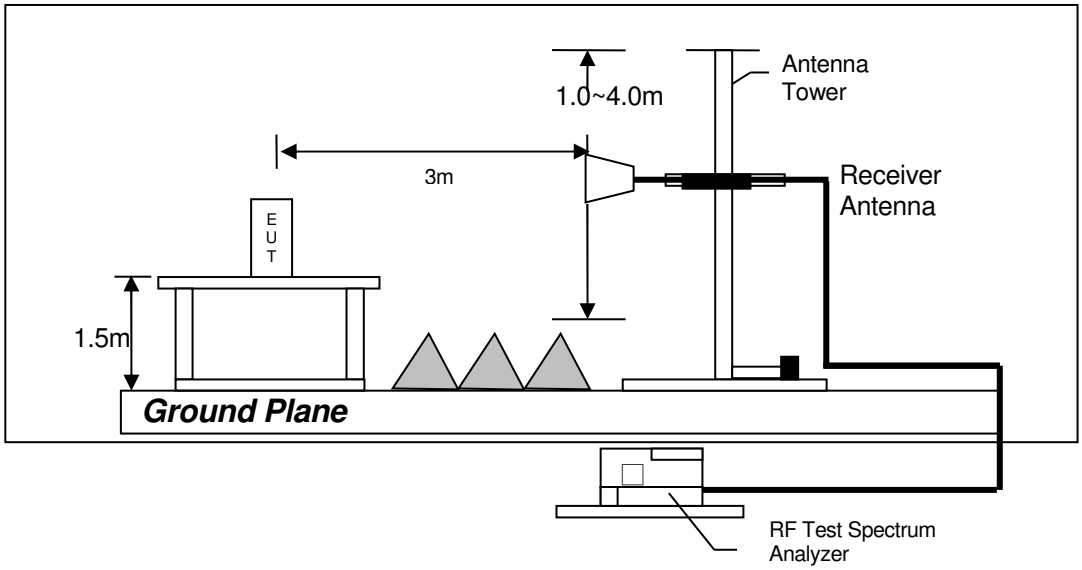
TEST REPORT

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 1GHz



Test setup of radiated emissions above 1GHz

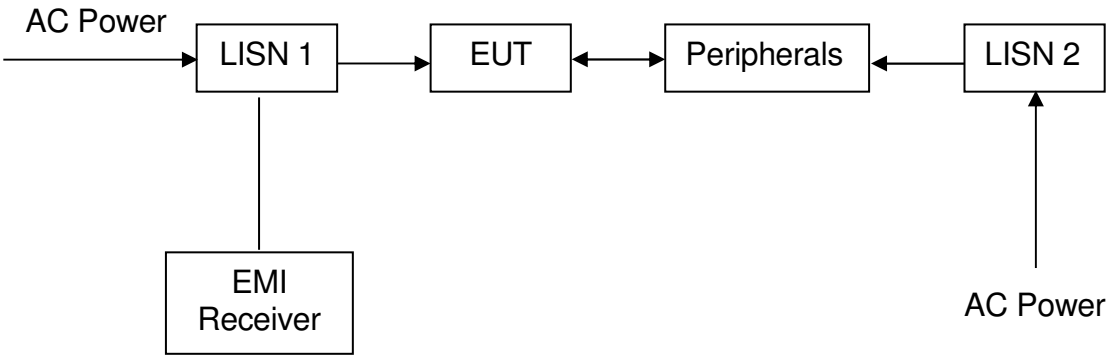
TEST REPORT

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	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-3156	EW-2425	EW-0571
Manufacturer	ROHDESCHWARZ	ROHDESCHWARZ	EMCO
Model No.	ESR26	FSP3	3104C
Calibration Date	November 18, 2018	August 17, 2018	February 27, 2018
Calibration Due Date	November 18, 2019	August 17, 2019	August 27, 2019

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	14m Double Shield RF Cable (20MHz - 6GHz)
Registration No.	EW-0447	EW-1133	EW-2074
Manufacturer	EMCO	EMCO	RADIALL
Model No.	3148	3115	Nm-RG142-
Calibration Date	January 17, 2018	November 29 2018	March 31, 2019
Calibration Due Date	July 17, 2019	May 29, 2020	March 31, 2020

Equipment	Active Loop H-field (9kHz to 30MHz)	RF Cable 14m (1GHz to 26.5GHz)	Horn Antenna (14GHz - 40GHz)
Registration No.	EW-2313	EW-2781	EW-1679
Manufacturer	ELECTROMETRI	GREATBILLION	SCHWARZBECK
Model No.	EM-6876	SMA m/SHF5MPU /SMA m ra14m,26G	BBHA9170
Calibration Date	March 08, 2018	October 27, 2018	September 25, 2018
Calibration Due Date	September 08, 2019	October 27, 2019	September 25, 2019

2) Conducted Emissions Test

Equipment	EMI Test Receiver	Artificial Mains Network	RF Cable 80cm (RG142) (9kHz to 30MHz)
Registration No.	EW-2666	EW-0192	EW-2451
Manufacturer	ROHDESCHWARZ	R&S	RADIALL
Model No.	ESCI7	ESH3-Z5	bnc m st / 142 / bnc m st 80cm
Calibration Date	August 28, 2018	March 11, 2019	November 03, 2018
Calibration Due Date	August 28, 2019	March 11, 2020	November 03, 2019

TEST REPORT

3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2425
Manufacturer	R&S
Model No.	FSP3
Calibration Date	August 17, 2018
Calibration Due Date	August 17, 2019

END OF TEST REPORT