

## Supplemental “Transmit Simultaneously” Test Report

**Report No.:** RFBEMI-WTW-P21050741-3

**FCC ID:** NOIKBN418

**Test Model:** N418

**Received Date:** May 19, 2021

**Test Date:** July 21, 2021

**Issued Date:** Sep. 28, 2021

**Applicant:** NETRONIX, INC.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

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Taiwan

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan

**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

Issue No.	Description	Date Issued
RFBEMI-WTW-P21050741-3	Original release.	Sep. 28, 2021

## 1 Certificate of Conformity

**Product:** Electronic Display Device

**Brand:** Rakuten kobo

**Test Model:** N418

**Sample Status:** Engineering sample

**Applicant:** NETRONIX, INC.

**Test Date:** July 21, 2021

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

47 CFR FCC Part 15, Subpart E (Section 15.407)

ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**  , **Date:** Sep. 28, 2021  
Claire Kuan / Specialist

**Approved by :**  , **Date:** Sep. 28, 2021  
Clark Lin / Technical Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C, E (SECTION 15.247, 15.407)			
FCC Clause	Test Item	Result	Remarks
15.207 15.407(b)(8)	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -17.46 dB at 0.59580 MHz.
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i/ii)/8)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -10.8 dB at 900.05 MHz.

### Note:

Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.9 dB
Conducted emissions	-	2.5 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.1 dB
	18GHz ~ 40GHz	5.3 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Electronic Display Device
Brand	Rakuten kobo
Test Model	N418
Status of EUT	Engineering sample
Power Supply Rating	3.7 Vdc from battery or 5 Vdc from USB interface
Modulation Type	<b>WLAN:</b> CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM <b>BT-EDR:</b> GFSK, $\pi/4$ -DQPSK, 8DPSK <b>BT-LE:</b> GFSK
Modulation Technology	<b>WLAN:</b> DSSS, OFDM <b>BT-EDR:</b> FHSS <b>BT-LE:</b> DTS
Transfer Rate	<b>WLAN:</b> 802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to 150 Mbps <b>BT-EDR:</b> up to 3 Mbps <b>BT-LE:</b> up to 1 Mbps
Operating Frequency	<b>WLAN:</b> 2.412 ~ 2.462 GHz <b>BT-EDR:</b> 2.402 ~ 2.480 GHz <b>BT-LE:</b> 2.402 ~ 2.480 GHz
Number of Channel	<b>WLAN:</b> 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 <b>BT-EDR:</b> 79 <b>BT-LE:</b> 40
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Cable Supplied	USB Cable x1 (Shielded, 1.0m)

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

2. The antenna provided to the EUT, please refer to the following table:

Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type
2	2.4~2.4835GHz	CERAMIC ANTENNA	none

3. The EUT could be supplied with MicroSD card and following different models could be chosen:

No.	Model	Remark
1	SDSDQAB-032G-1	1 <sup>st</sup> source MicroSD
2	MKUS032G-CGZ1	2 <sup>nd</sup> source MicroSD

4. The EUT could be supplied with USB cable and following different models could be chosen:

Brand	Model	Material	Color	Signal Line
Yih Fone	SH-0422	PVC	Black	Shielded : Y , 1.0M , Core: N/A
	SH-0418	TPE		
	SH-0424	PVC	White	
	SH-0420	TPE		

Note: From the above models, model: SH-0422 was selected as representative model for the test and its data was recorded in this report.

5. The EUT was pre-tested under the following modes:

For AC Power Conducted Emission

Test Mode	Description
<b>Mode A</b>	<b>MicroSD Sandisk, Adapter Charge mode</b>
Mode B	MicroSD MK founder, Adapter Charge mode
Mode C	MicroSD Sandisk, Laptop Charge mode

Note: From the above modes, the worst case were found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

For Radiated Emission test

Test Mode	Description
<b>Mode D</b>	<b>EUT Y-Z plane, MicroSD Sandisk, Adapter Charge mode</b>
Mode E	EUT Y-Z plane, MicroSD MK founder, Adapter Charge mode
Mode F	EUT Y-Z plane, MicroSD Sandisk, Battery mode
<b>Mode G</b>	<b>EUT X-Z plane, MicroSD Sandisk, Adapter Charge mode</b>
Mode H	EUT X-Y plane, MicroSD Sandisk, Adapter Charge mode

Note: From the above modes, the below 1GHz worst case were found in **Mode D**. and the above 1GHz worst case were found in **Mode G**. Therefore only the test data of the mode was recorded in this report.

6. The EUT incorporates a SISO function:

MODULATION MODE	TX & RX CONFIGURATION	
<b>802.11b</b>	1TX	1RX
<b>802.11g</b>	1TX	1RX
<b>802.11n (HT20)</b>	1TX	1RX
<b>802.11n (HT40)</b>	1TX	1RX

7. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

8. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

### 3.1.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE $<$ 1G	PLC	OB	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement  
**RE $<$ 1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission  
**OB**: Conducted Out-Band Emission Measurement

#### **Radiated Emission Test (Above 1GHz):**

- The tested configurations represent the worst-case mode from all possible combinations by the maximum power.  
 Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11g +	1 to 11	6	OFDM	BPSK
BT-EDR	0 to 78	0	FHSS	GFSK

#### **Radiated Emission Test (Below 1GHz):**

- The tested configurations represent the worst-case mode from all possible combinations by the maximum power.  
 Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11g +	1 to 11	6	OFDM	BPSK
BT-EDR	0 to 78	0	FHSS	GFSK

#### **Power Line Conducted Emission Test:**

- The tested configurations represent the worst-case mode from all possible combinations by the maximum power.  
 Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11g +	1 to 11	6	OFDM	BPSK
BT-EDR	0 to 78	0	FHSS	GFSK



**Conducted Out-Band Emission Measurement:**

The tested configurations represent the worst-case mode from all possible combinations by the maximum power.

Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11g + BT-EDR	1 to 11	6	OFDM	BPSK
	0 to 78	0	FHSS	GFSK

**Test Condition:**

Applicable To	Environmental Conditions	Input Power (System)	Tested By
<b>RE<math>\geq</math>1G</b>	25deg. C, 67%RH	120Vac, 60Hz	Sampson Chen
<b>RE<math>&lt;</math>1G</b>	23deg. C, 68%RH	120Vac, 60Hz	Sampson Chen
<b>PLC</b>	25deg. C, 71%RH	120Vac, 60Hz	Sampson Chen
<b>OB</b>	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

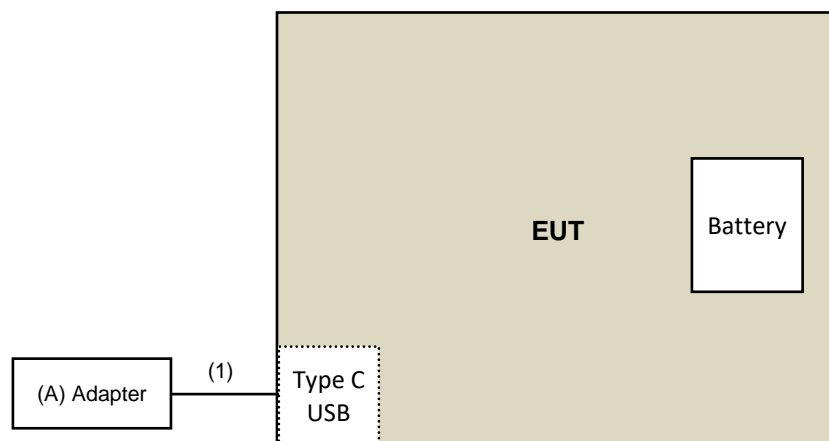
### 3.2 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Adapter	ASUS	NA	NA	NA	Provided by Lab

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB to Type C USB Cable	1	1	Yes	0	Supplied by client

#### 3.2.1 Configuration of System under Test



## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**Note:**

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK:74 (dBµV/m)	AV:54 (dBµV/m)
Frequency Band	Applicable To	EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBµV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	15.407(b)(4)(i)	PK: -27 (dBm/MHz) <sup>*1</sup> PK: 10 (dBm/MHz) <sup>*2</sup> PK: 15.6 (dBm/MHz) <sup>*3</sup> PK: 27 (dBm/MHz) <sup>*4</sup>	PK: 68.2(dBµV/m) <sup>*1</sup> PK: 105.2 (dBµV/m) <sup>*2</sup> PK: 110.8(dBµV/m) <sup>*3</sup> PK: 122.2 (dBµV/m) <sup>*4</sup>
5725~5850 MHz	15.407(b)(4)(i)	PK: -27 (dBm/MHz) <sup>*1</sup> PK: 10 (dBm/MHz) <sup>*2</sup> PK: 15.6 (dBm/MHz) <sup>*3</sup> PK: 27 (dBm/MHz) <sup>*4</sup>	PK: 68.2(dBµV/m) <sup>*1</sup> PK: 105.2 (dBµV/m) <sup>*2</sup> PK: 110.8(dBµV/m) <sup>*3</sup> PK: 122.2 (dBµV/m) <sup>*4</sup>

- <sup>\*1</sup> beyond 75 MHz or more above of the band edge.      <sup>\*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
- <sup>\*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.      <sup>\*4</sup> from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

**Note:**

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

## 4.1.2 Test Instruments

**For radiated emission test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESR3	102528	Mar. 02, 2021	Mar. 01, 2022
Spectrum Analyzer Keysight	N9030B	MY57141948	May 21, 2021	May 20, 2022
Pre-Amplifier EMCi	EMC001340	980142	May 24, 2021	May 23, 2022
Loop Antenna Electro-Metrics	EM-6879	264	Mar. 05, 2021	Mar. 04, 2022
RF Cable	5D-FB	LOOPCAB-001	Jan. 07, 2021	Jan. 06, 2022
RF Cable	5D-FB	LOOPCAB-002	Jan. 07, 2021	Jan. 06, 2022
Pre-Amplifier EMCi	EMC330N	980538	Apr. 26, 2021	Apr. 25, 2022
Trilog Broadband Antenna SCHWARZBECK	VULB9168	9168-0842	Nov. 03, 2020	Nov. 02, 2021
RF Cable	8D	966-5-1	Apr. 26, 2021	Apr. 25, 2022
RF Cable	8D	966-5-2	Apr. 26, 2021	Apr. 25, 2022
RF Cable	8D	966-5-3	Apr. 26, 2021	Apr. 25, 2022
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCi	EMC12630SE	980509	Apr. 26, 2021	Apr. 25, 2022
RF Cable EMCi	EMC104-SM-SM-1500	180503	Apr. 26, 2021	Apr. 25, 2022
RF Cable EMCi	EMC104-SM-SM-2000	180501	Apr. 26, 2021	Apr. 25, 2022
RF Cable EMCi	EMC104-SM-SM-6000	180506	Apr. 26, 2021	Apr. 25, 2022
Pre-Amplifier EMCi	EMC184045SE	980387	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC-KM-KM-4000	200214	Mar. 10, 2021	Mar. 09, 2022
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Tested Date: July 21, 2021

**For other test items:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101516	Mar. 08, 2021	Mar. 07, 2022
10dB Attenuator Woken	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: July 21, 2021

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

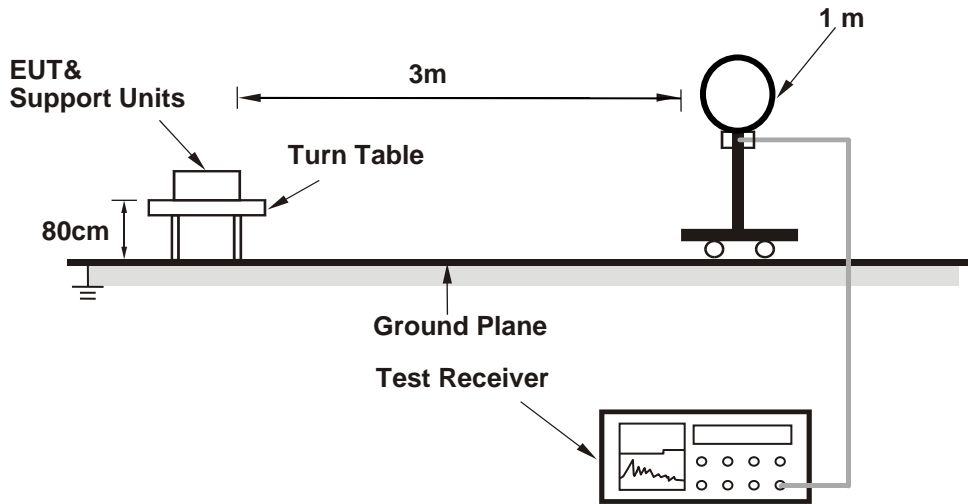
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

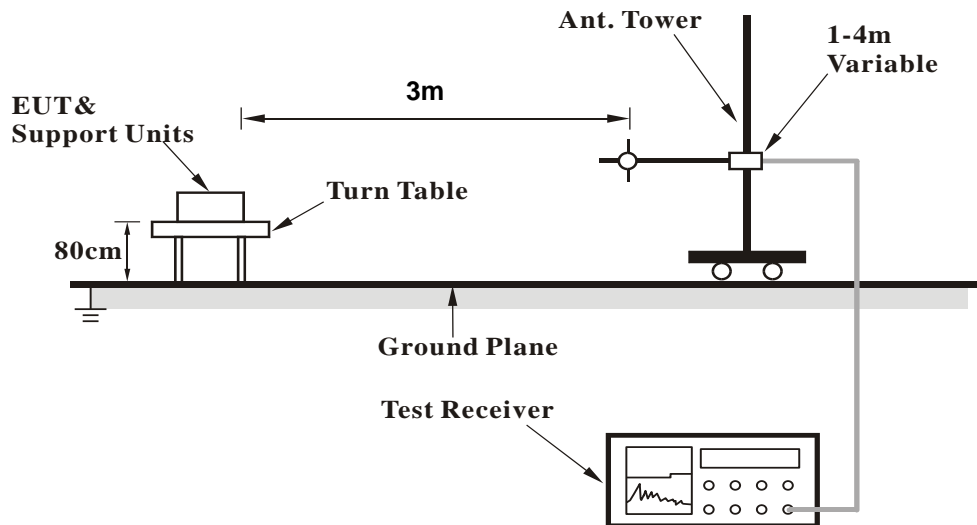
No deviation.

#### 4.1.5 Test Setup

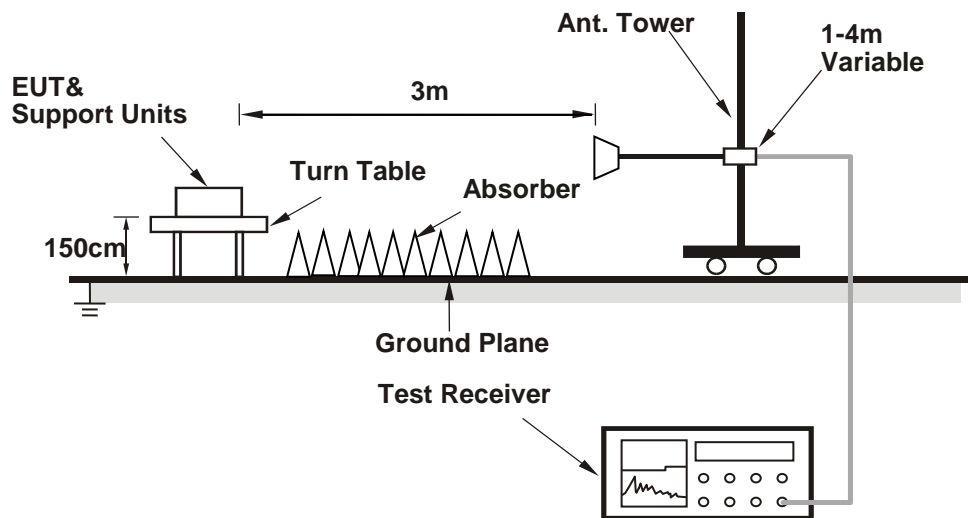
##### For Radiated emission below 30MHz



##### For Radiated emission 30MHz to 1GHz



### For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Controlling software (WIFI: HyperTerminal paste 2.4G command.txt command/BT: COMBO IC\_Realtek Bluetooth MP Kit Setup Package20210324(41296)) has been activated to set the EUT under transmission condition continuously at specific channel frequency.



#### 4.1.7 Test Results

##### Above 1GHz Data:

<b>Frequency Range</b>	1GHz ~ 40GHz	<b>Detector Function</b>	Peak (PK) Average (AV)
------------------------	--------------	--------------------------	---------------------------

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	4804.00	49.6 PK	74.0	-24.4	1.54 H	10	47.8	1.8
2	4804.00	36.3 AV	54.0	-17.7	1.54 H	10	34.5	1.8
3	4874.00	47.5 PK	74.0	-26.5	1.75 H	33	45.8	1.7
4	4874.00	35.3 AV	54.0	-18.7	1.75 H	33	33.6	1.7
5	7311.00	40.9 PK	74.0	-33.1	1.50 H	342	33.7	7.2
6	7311.00	29.2 AV	54.0	-24.8	1.50 H	342	22.0	7.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	4804.00	48.5 PK	74.0	-25.5	1.90 V	48	46.7	1.8
2	4804.00	35.6 AV	54.0	-18.4	1.90 V	48	33.8	1.8
3	4874.00	46.6 PK	74.0	-27.4	1.41 V	322	44.9	1.7
4	4874.00	34.9 AV	54.0	-19.1	1.41 V	322	33.2	1.7
5	7311.00	40.6 PK	74.0	-33.4	1.66 V	66	33.4	7.2
6	7311.00	28.2 AV	54.0	-25.8	1.66 V	66	21.0	7.2

##### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

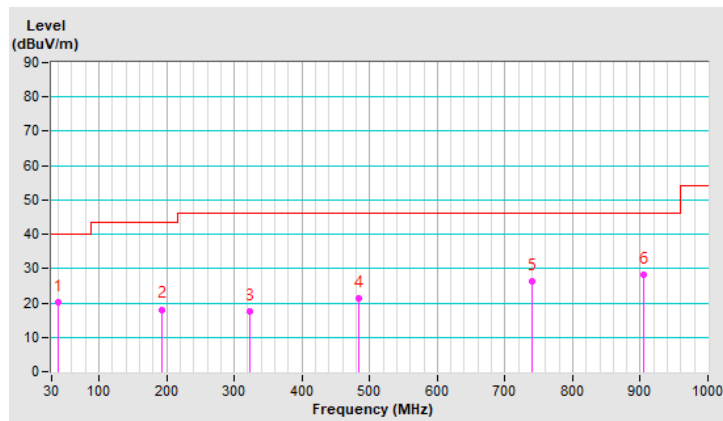
### Below 1GHz Data:

Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
-----------------	-------------	-------------------	-----------------

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.33	20.1 QP	40.0	-19.9	1.50 H	244	33.4	-13.3
2	193.05	18.1 QP	43.5	-25.4	2.00 H	6	34.0	-15.9
3	322.60	17.5 QP	46.0	-28.5	3.00 H	219	29.2	-11.7
4	484.05	21.5 QP	46.0	-24.5	3.00 H	5	29.3	-7.8
5	739.89	26.2 QP	46.0	-19.8	3.00 H	135	29.2	-3.0
6	904.12	28.2 QP	46.0	-17.8	3.00 H	337	29.4	-1.2

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

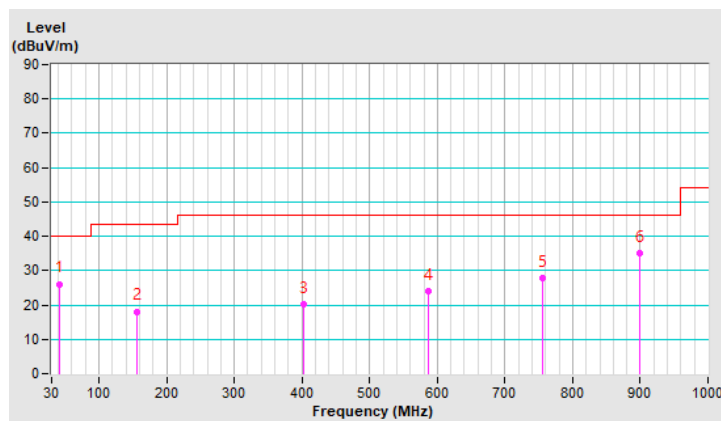


<b>Frequency Range</b>	9kHz ~ 1GHz	<b>Detector Function</b>	Quasi-Peak (QP)
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Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBUV)	Correction Factor (dB/m)
1	41.73	26.1 QP	40.0	-13.9	2.00 V	54	39.2	-13.1
2	156.05	18.1 QP	43.5	-25.4	1.00 V	311	30.8	-12.7
3	401.97	20.1 QP	46.0	-25.9	3.00 V	240	29.9	-9.8
4	587.05	24.1 QP	46.0	-21.9	2.00 V	295	29.8	-5.7
5	756.01	27.9 QP	46.0	-18.1	2.00 V	341	30.5	-2.6
<b>6</b>	<b>900.05</b>	<b>35.2 QP</b>	<b>46.0</b>	<b>-10.8</b>	<b>2.00 V</b>	<b>250</b>	<b>36.4</b>	<b>-1.2</b>

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 20, 2020	Oct. 19, 2021
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 27, 2020	Oct. 26, 2021
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 26, 2021	Mar. 25, 2022
50 ohms Terminator	50	3	Oct. 26, 2020	Oct. 25, 2021
RF Cable	5D-FB	COCCAB-001	Sep. 26, 2020	Sep. 25, 2021
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 29, 2020	Aug. 28, 2021
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: July 21, 2021

#### 4.2.3 Test Procedures

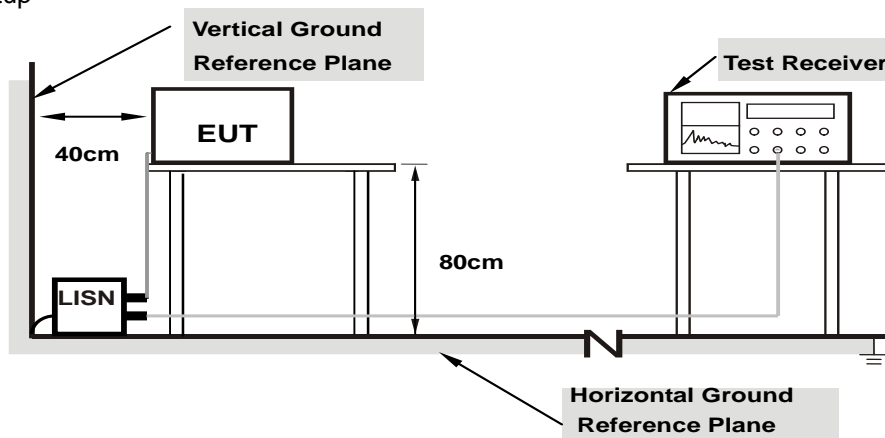
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**Note:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



**Note:** 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT Operating Conditions

Same as 4.1.6.

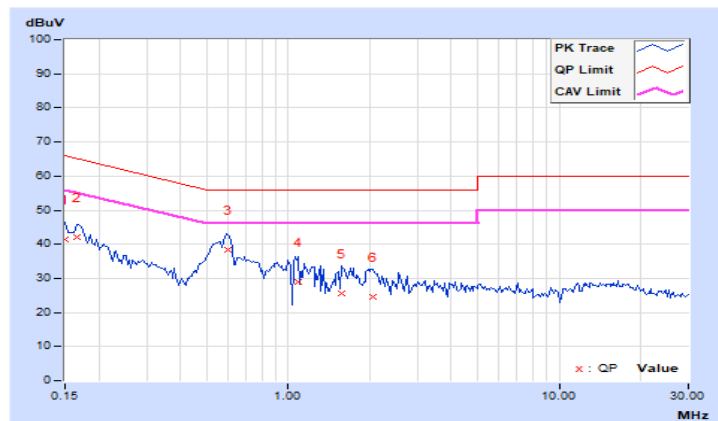
## 4.2.7 Test Results

<b>Frequency Range</b>	150kHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9kHz
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15023	9.97	31.57	19.57	41.54	29.54	65.99	55.99	-24.45	-26.45
2	0.16579	9.98	32.21	22.24	42.19	32.22	65.17	55.17	-22.98	-22.95
<b>3</b>	<b>0.59580</b>	<b>10.04</b>	<b>28.50</b>	<b>18.40</b>	<b>38.54</b>	<b>28.44</b>	<b>56.00</b>	<b>46.00</b>	<b>-17.46</b>	<b>-17.56</b>
4	1.08219	10.07	19.00	8.21	29.07	18.28	56.00	46.00	-26.93	-27.72
5	1.57389	10.10	15.60	5.57	25.70	15.67	56.00	46.00	-30.30	-30.33
6	2.06297	10.12	14.60	5.64	24.72	15.76	56.00	46.00	-31.28	-30.24

## Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

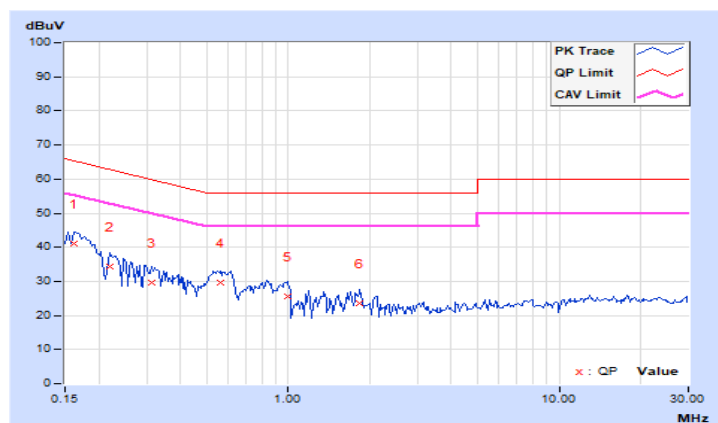


<b>Frequency Range</b>	150kHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9kHz
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16167	9.96	31.25	14.57	41.21	24.53	65.38	55.38	-24.17	-30.85
2	0.22073	10.00	24.43	10.23	34.43	20.23	62.79	52.79	-28.36	-32.56
3	0.31498	10.01	19.56	5.64	29.57	15.65	59.84	49.84	-30.27	-34.19
4	0.56051	10.03	19.45	8.64	29.48	18.67	56.00	46.00	-26.52	-27.33
5	0.99321	10.06	15.37	4.33	25.43	14.39	56.00	46.00	-30.57	-31.61
6	1.83537	10.12	13.52	4.34	23.64	14.46	56.00	46.00	-32.36	-31.54

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

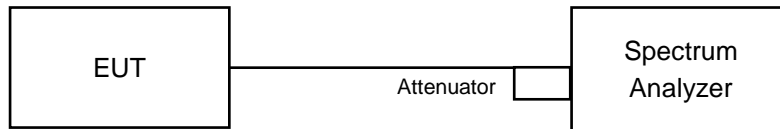


### 4.3 Conducted Out of Band Emission Measurement

#### 4.3.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedures

##### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

##### MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

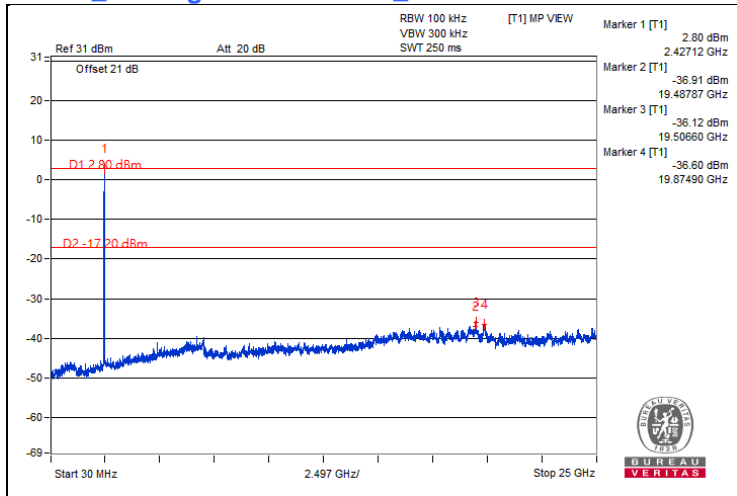
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

#### 4.3.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



## 2.4GHz\_802.11g CH6 + BT-EDR\_GFSK CH0



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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