

## FCC Test Report

**Report No.:** RFBGPU-WTW-P22020418

**FCC ID:** 2AAFMRLP0001

**Test Model:** RLP0001

**Received Date:** 2022/2/16

**Test Date:** 2022/4/13 ~ 2022/5/19

**Issued Date:** 2022/5/31

**Applicant:** CORSAIR MEMORY, Inc.

**Address:** 115 North McCarthy Blvd, Milpitas, CA 95035, USA

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**FCC Registration /  
Designation Number:** 198487 / TW2021



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### Release Control Record

Issue No.	Description	Date Issued
RFBGPU-WTW-P22020418	Original release.	2022/5/31

## 1 Certificate of Conformity

**Product:** Laptop

**Brand:** CORSAIR

**Test Model:** RLP0001

**Sample Status:** Engineering sample

**Applicant:** CORSAIR MEMORY, Inc.

**Test Date:** 2022/4/13 ~ 2022/5/19

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.249)  
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 RF characteristics under the conditions specified in this report.

**Prepared by :**



**Date:** 2022/5/31

Jessica Cheng / Senior Specialist

**Approved by :**



**Date:** 2022/5/31

Jeremy Lin / Project Engineer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -7.82dB at 0.19687MHz.
15.215	Channel Bandwidth Measurement	PASS	Meet the requirement of limit.
15.209 15.249 15.249 (d)	Radiated Emission and Bandedge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.0dB at 200.62MHz.
15.203	Antenna Requirement	PASS	No antenna connector is used.

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	3.00 dB
Conducted Emissions	9kHz ~ 40GHz	2.63 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.62 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.41 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Laptop
Brand	CORSAIR
Test Model	RLP0001
Status of EUT	Engineering sample
Power Supply Rating	19.5Vdc from Adapter
Modulation Type	GFSK
Operating Frequency	2402MHz ~ 2478MHz
Number of Channel	77
Field Strength	87.3 dBuV/m (3m)
Antenna Type	Slot antenna with 5.46dBi gain
Antenna Connector	N/A
Accessory Device	Refer to note as below
Data Cable Supplied	N/A

Note:

1. The EUT uses following accessory.

AC Adapter		
Brand	Model	Specification
FSP	FSP230-AJAS3	AC Input: 100-240V, 3A, 50-60Hz (3pin, 1.5m) DC Output: 19.5V, 11.8A, 230W (1.2m, w/o core)

2. The EUT contains WiFi module as below:

Contains WLAN+BT Combo Module
FCC ID: 2AQ68RLP0003

3. 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.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

### 3.2 Description of Test Modes

77 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	21	2423	42	2444	63	2465
1	2403	22	2424	43	2445	64	2466
2	2404	23	2425	44	2446	65	2467
3	2405	24	2426	45	2447	66	2468
4	2406	25	2427	46	2448	67	2469
5	2407	26	2428	47	2449	68	2470
6	2408	27	2429	48	2450	69	2471
7	2409	28	2430	49	2451	70	2472
8	2410	29	2431	50	2452	71	2473
9	2411	30	2432	51	2453	72	2474
10	2412	31	2433	52	2454	73	2475
11	2413	32	2434	53	2455	74	2476
12	2414	33	2435	54	2456	75	2477
13	2415	34	2436	55	2457	76	2478
14	2416	35	2437	56	2458		
15	2417	36	2438	57	2459		
16	2418	37	2439	58	2460		
17	2419	38	2440	59	2461		
18	2420	39	2441	60	2462		
19	2421	40	2442	61	2463		
20	2422	41	2443	62	2464		

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement

**RE<1G**: Radiated Emission below 1GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

**NOTE**: EUT can be used in the X axis only, therefore positioned on X- axis as a representative test condition.

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

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 76	0, 38, 76	GFSK

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

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 76	76	GFSK

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

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 76	76	GFSK

#### **Antenna Port Conducted Measurement:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 76	0, 38, 76	GFSK

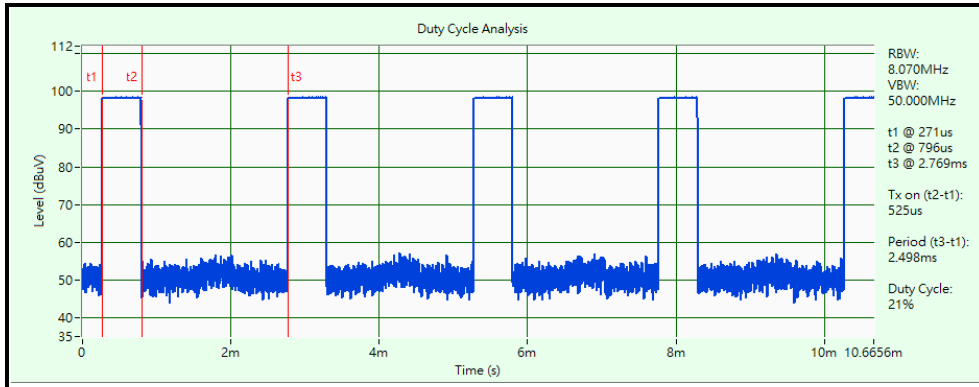
#### **Test Condition:**

Applicable To	Environmental Conditions	Input Power	Tested By
<b>RE<math>\geq</math>1G</b>	23deg. C, 67%RH	120Vac, 60Hz	Jed Wu
<b>RE&lt;1G</b>	23deg. C, 67%RH	120Vac, 60Hz	Jed Wu
<b>PLC</b>	25deg. C, 75%RH	120Vac, 60Hz	Ian Chang
<b>APCM</b>	25deg. C, 76%RH	120Vac, 60Hz	Dalen Dai



### 3.3 Duty Cycle of Test Signal

Duty cycle correction factor =  $20 \log(\text{Duty cycle}) = 20 \log(0.21) = -13.5\text{dB}$

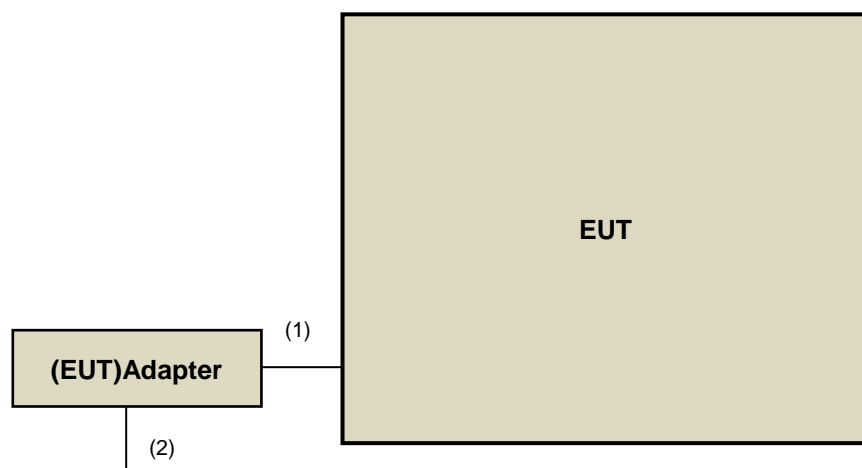


### 3.4 Description of Support Units

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	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.2	Y	0	Supplied by applicant
2.	AC power cable	1	1.5	N	0	Supplied by applicant

#### 3.4.1 Configuration of System under Test



Under Table

### 3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.249)**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

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

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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

#### NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) =  $20 \log$  Emission level (uV/m).
3. 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.

#### 4.1.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Pre_Amplifier EMCI	EMC001340	980269	2021/6/29	2022/6/28
LOOP ANTENNA EMCI	LPA600	270	2021/9/2	2023/9/1
Pre_Amplifier HP	8447D	2432A03504	2022/2/17	2023/2/16
Bi_Log Antenna Schwarzbeck	VULB 9168	137	2021/10/27	2022/10/26
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2021/7/13	2022/7/12
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2021/5/6	2022/5/5
Coupling/Dcoupling Network Schwarzbeck	CDNE-M3	00091	2021/5/6	2022/5/5
Spectrum Analyzer Agilent	E4446A	MY51100009	2021/6/29	2022/6/28
Spectrum Analyzer KEYSIGHT	N9030A	MY54490260	2021/7/23	2022/7/22
Test Receiver Agilent	N9038A	MY51210137	2021/6/16	2022/6/15
Spectrum Analyzer R&S	FSV40	101544	2021/5/24	2022/5/23
Spectrum Analyzer R&S	FSV40	101042	2021/9/9	2022/9/8
Pre-amplifier HP	8449B	3008A01201	2022/2/17	2023/2/16
Pre_Amplifier EMCI	EMC0126545	980076	2022/2/17	2023/2/16
Horn Antenna ETS-Lindgren	3117-PA	00215857	2021/11/14	2022/11/13
Horn Antenna EMCO	3115	00028257	2021/11/14	2022/11/13
Horn Antenna EMCO	3115	00027024	2021/11/14	2022/11/13
Pre-amplifier (18GHz-40GHz) EMCI	EMC184045B	980175	2021/9/4	2022/9/3
Pre_Amplifier EMCI	EMC184045B	980235	2022/2/17	2023/2/16
Horn Antenna Schwarzbeck	BBHA 9170	212	2021/10/13	2022/10/12
RF Coaxial Cable HUBER SUHNER	SF-102	Cable-CH6-01	2021/7/8	2022/7/7
RF Coaxial Cable EM	EM102-KMKM-3.5+1M	EM102-KMKM-3.5+1M-01	2021/7/8	2022/7/7
BandPass Filter MICRO-TRONICS	BRM17690	005	2021/5/28	2022/5/27
Notch filter MICRO-TRONICS	BRC50703-01	010	2021/5/28	2022/5/27
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	2021/5/28	2022/5/27
RF Coaxial Cable WOKEN	WC01	Cable-CH10-03	2021/7/8	2022/7/7
RF Coaxial Cable Rosnol	K1K50-UP0279-K1K50-3000	Cable-CH10(3m)-04	2021/7/8	2022/7/7
Boresight antenna tower fixture BV	BAF-02	6	NA	NA
Turn Table ADT	TT100	0306	NA	NA
Tower ADT	AT100	0306	NA	NA
Software BVADT	Radiated_V8.7.08	NA	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Linkou 966 Chamber 6 (CH 6).
4. Tested Date: 2022/4/13

#### 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:**

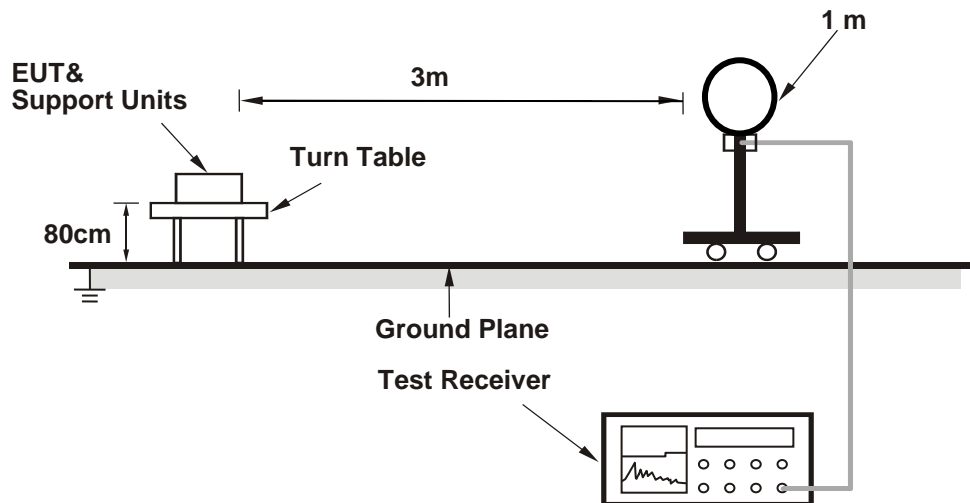
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection at frequency above 1GHz. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty factor. The duty factor refer to Chapter 3.3 of this report.
3. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

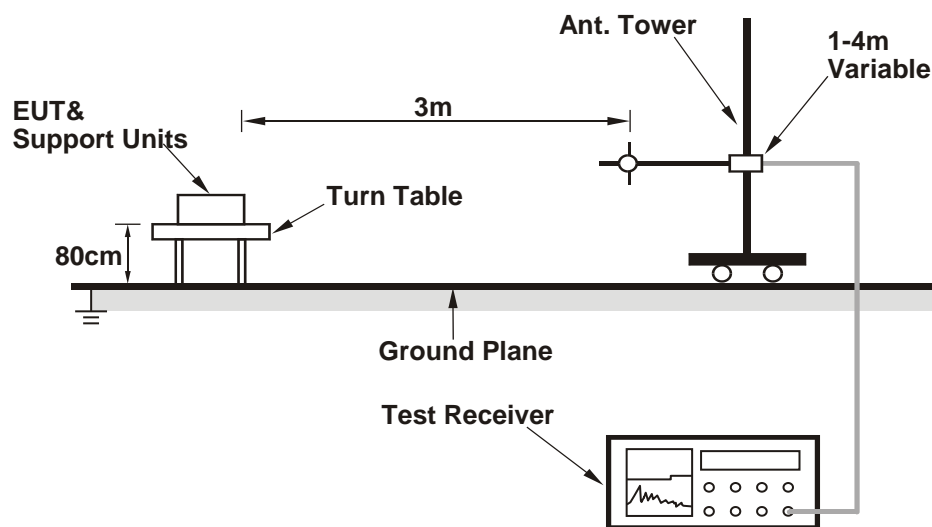
No deviation.

#### 4.1.5 Test Setup

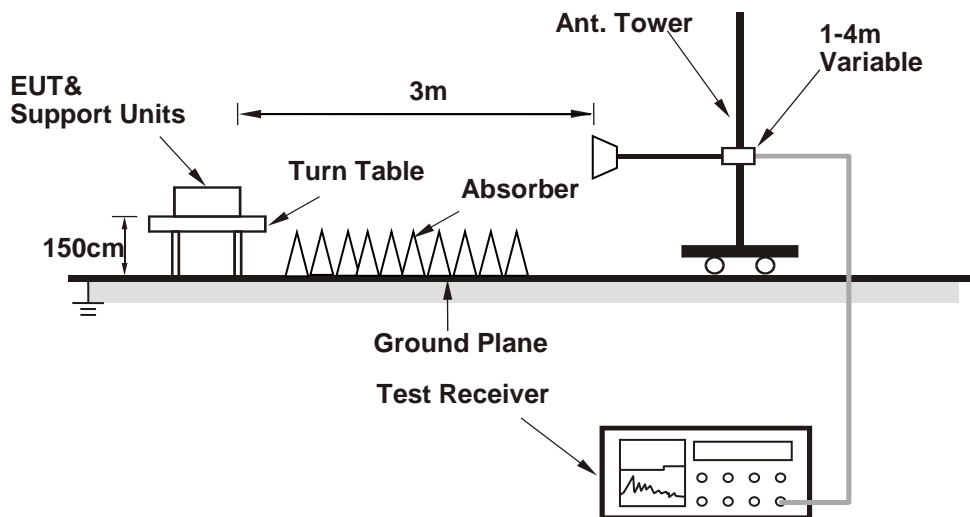
##### For Radiated emission below 30MHz



##### 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

Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 Test Results

##### ABOVE 1GHz DATA

<b>RF Mode</b>	TX GFSK	<b>Channel</b>	CH 0 : 2402 MHz
<b>Frequency Range</b>	Above 1GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB=1MHz,VB=3MHz(RMS)

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	2390.00	52.0 PK	74.0	-22.0	3.78 H	141	54.3	-2.3
2	2390.00	39.2 AV	54.0	-14.8	3.78 H	141	41.5	-2.3
3	2400.00	56.4 PK	74.0	-17.6	3.78 H	141	58.7	-2.3
4	2400.00	42.9 AV	54.0	-11.1	3.78 H	141	45.2	-2.3
5	*2402.00	90.5 PK	114.0	-23.5	3.78 H	141	92.8	-2.3
6	*2402.00	77.0 AV	94.0	-17.0	3.78 H	141	79.3	-2.3
7	4804.00	45.7 PK	74.0	-28.3	2.31 H	169	40.2	5.5
8	4804.00	32.2 AV	54.0	-21.8	2.31 H	169	26.7	5.5
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	2390.00	55.3 PK	74.0	-18.7	2.88 V	10	57.6	-2.3
2	2390.00	43.9 AV	54.0	-10.1	2.88 V	10	46.2	-2.3
3	2400.00	62.7 PK	74.0	-11.3	2.88 V	10	65.0	-2.3
4	2400.00	49.2 AV	54.0	-4.8	2.88 V	10	51.5	-2.3
5	*2402.00	98.5 PK	114.0	-15.5	2.88 V	10	100.8	-2.3
6	*2402.00	85.0 AV	94.0	-9.0	2.88 V	10	87.3	-2.3
7	4804.00	47.1 PK	74.0	-26.9	2.26 V	317	41.6	5.5
8	4804.00	33.6 AV	54.0	-20.4	2.26 V	317	28.1	5.5

#### 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.
5. " \* ": Fundamental frequency.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula: 20 log(Duty cycle) = 20 log(0.21) = -13.5dB



<b>RF Mode</b>	TX GFSK	<b>Channel</b>	CH 38 : 2440 MHz
<b>Frequency Range</b>	Above 1GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB=1MHz,VB=3MHz(RMS)

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	*2440.00	91.2 PK	114.0	-22.8	3.58 H	166	93.4	-2.2
2	*2440.00	77.7 AV	94.0	-16.3	3.58 H	166	79.9	-2.2
3	4880.00	46.4 PK	74.0	-27.6	2.40 H	149	40.8	5.6
4	4880.00	32.9 AV	54.0	-21.1	2.40 H	149	27.3	5.6
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	*2440.00	99.4 PK	114.0	-14.6	2.84 V	7	101.6	-2.2
2	*2440.00	85.9 AV	94.0	-8.1	2.84 V	7	88.1	-2.2
3	4880.00	47.4 PK	74.0	-26.6	2.36 V	309	41.8	5.6
4	4880.00	33.9 AV	54.0	-20.1	2.36 V	309	28.3	5.6

**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.
5. " \* ": Fundamental frequency.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula: 20 log(Duty cycle) = 20 log(0.21) = -13.5dB

<b>RF Mode</b>	TX GFSK	<b>Channel</b>	CH 76 : 2478 MHz
<b>Frequency Range</b>	Above 1GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB=1MHz,VB=3MHz(RMS)

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	*2478.00	92.7 PK	114.0	-21.3	3.95 H	142	94.8	-2.1
2	*2478.00	79.2 AV	94.0	-14.8	3.95 H	142	81.3	-2.1
3	2483.50	57.7 PK	74.0	-16.3	3.95 H	142	59.8	-2.1
4	2483.50	44.2 AV	54.0	-9.8	3.95 H	142	46.3	-2.1
5	4956.00	47.2 PK	74.0	-26.8	2.26 H	155	41.5	5.7
6	4956.00	33.7 AV	54.0	-20.3	2.26 H	155	28.0	5.7
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	*2478.00	100.8 PK	114.0	-13.2	2.72 V	346	102.9	-2.1
2	*2478.00	87.3 AV	94.0	-6.7	2.72 V	346	89.4	-2.1
3	2483.50	64.2 PK	74.0	-9.8	2.72 V	346	66.3	-2.1
4	2483.50	50.7 AV	54.0	-3.3	2.72 V	346	52.8	-2.1
5	4956.00	48.0 PK	74.0	-26.0	2.15 V	320	42.3	5.7
6	4956.00	34.5 AV	54.0	-19.5	2.15 V	320	28.8	5.7

**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.
5. " \* ": Fundamental frequency.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula: 20 log(Duty cycle) = 20 log(0.21) = -13.5dB

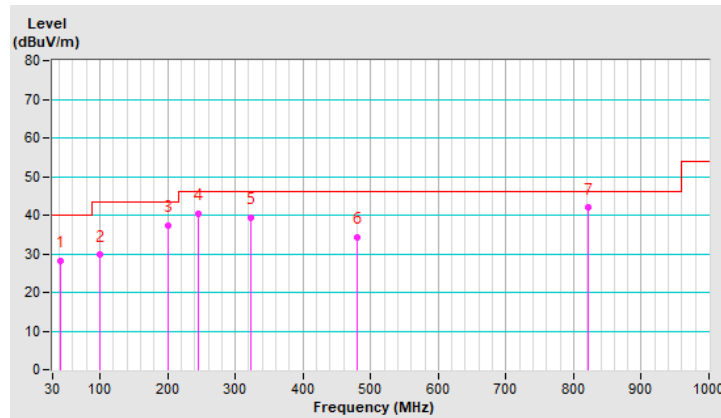
## BELOW 1GHz WORST-CASE DATA

RF Mode	TX GFSK	Channel	CH 76 : 2478 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz

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	41.46	28.3 QP	40.0	-11.7	2.41 H	162	37.3	-9.0
2	99.52	29.7 QP	43.5	-13.8	2.36 H	115	42.6	-12.9
3	200.58	37.3 QP	43.5	-6.2	1.18 H	194	47.8	-10.5
4	244.48	40.4 QP	46.0	-5.6	1.96 H	158	48.6	-8.2
5	322.44	39.4 QP	46.0	-6.6	2.48 H	154	44.5	-5.1
6	480.89	34.4 QP	46.0	-11.6	2.17 H	153	36.1	-1.7
7	821.34	41.9 QP	46.0	-4.1	1.42 H	118	36.4	5.5

### 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 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

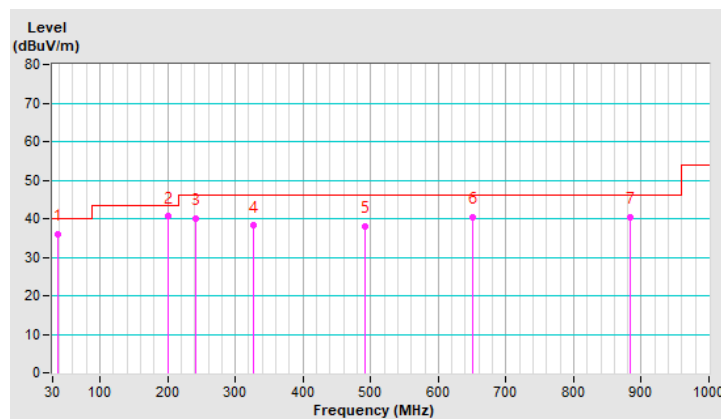


RF Mode	TX GFSK	Channel	CH 76 : 2478 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz

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	38.44	36.0 QP	40.0	-4.0	2.36 V	113	45.4	-9.4
2	200.62	40.5 QP	43.5	-3.0	1.08 V	148	51.0	-10.5
3	242.28	40.1 QP	46.0	-5.9	1.57 V	191	48.4	-8.3
4	326.82	38.2 QP	46.0	-7.8	2.25 V	342	43.2	-5.0
5	491.24	37.9 QP	46.0	-8.1	1.45 V	15	39.4	-1.5
6	650.17	40.5 QP	46.0	-5.5	2.05 V	298	38.4	2.1
7	882.78	40.4 QP	46.0	-5.6	1.78 V	303	34.1	6.3

**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 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: 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	ESR3	102412	2022/1/22	2023/1/21
LISN Schwarzbeck	NSLK 8128	8128-244	2021/11/11	2022/11/10
LISN Schwarzbeck	NNLK8129	8129229	2021/5/20	2022/5/19
DC LISN Schwarzbeck	NNLK 8121	8121-808	2021/4/18	2022/4/17
LISN Schwarzbeck	NNLK 8121	8121-731	2021/4/28	2022/4/27
LISN R&S	ENV216	101196	2021/4/26	2022/4/25
LISN R&S	ESH3-Z5	100220	2021/11/25	2022/11/24
LISN R&S	ESH3-Z6	844950/018	2021/7/25	2022/7/24
DC LISN R&S	ESH3-Z6	100219	2021/7/25	2022/7/24
High Voltage Probe Schwarzbeck	TK9420	00982	2021/12/24	2022/12/23
RF Coaxial Cable Commate	5D-FB	Cable-CO5-01	2022/1/28	2023/1/27
Attenuator STI	STI02-2200-10	NO.4	2021/9/3	2022/9/2
50 Ohms Terminator LYNICS	0900510	E1-01-305	2022/2/9	2023/2/8
Isolation Transformer Erika Fiedler	D-65396	017	2021/9/9	2022/9/8
Software BVADT	Cond_V7.3.7.4	NA	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 Linkou Conduction5

3. Tested Date: 2022/4/14

#### 4.2.3 Test Procedures

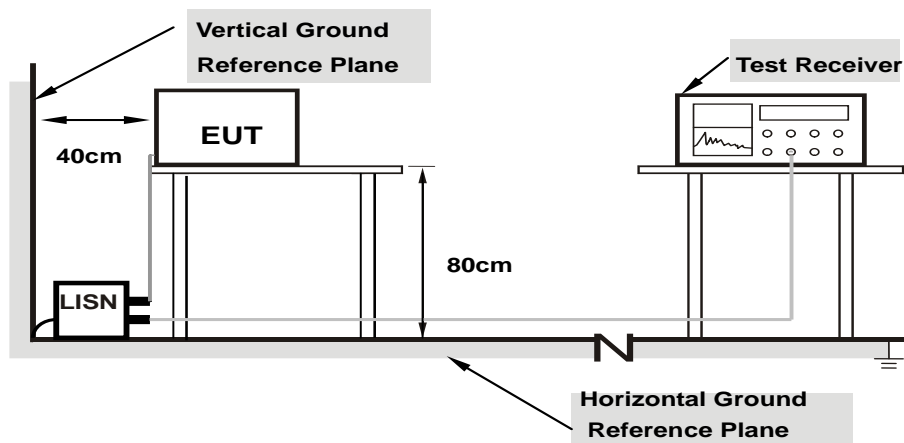
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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 Condition

Set the EUT under transmission condition continuously at specific channel frequency.

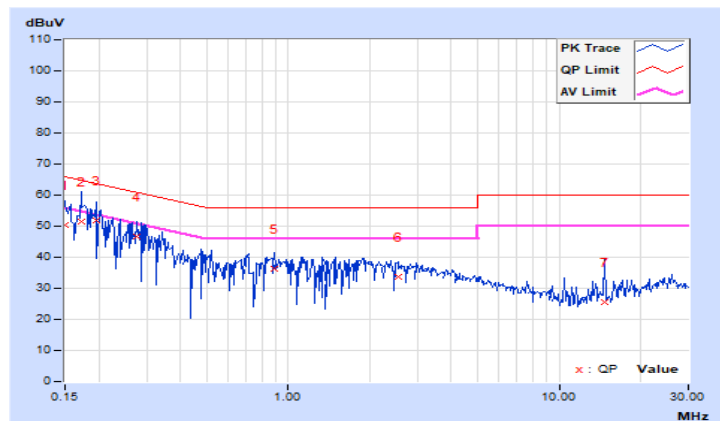
#### 4.2.7 Test Results

<b>RF Mode</b>	TX GFSK	<b>Channel</b>	CH 76 : 2478 MHz
<b>Frequency Range</b>	150 kHz ~ 30 MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz

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	0.15000	9.87	40.51	23.87	50.38	33.74	66.00	56.00	-15.62	-22.26
2	0.17344	9.87	41.55	29.03	51.42	38.90	64.79	54.79	-13.37	-15.89
3	0.19687	9.87	42.16	28.93	52.03	38.80	63.74	53.74	-11.71	-14.94
4	0.27500	9.88	36.90	25.35	46.78	35.23	60.97	50.97	-14.19	-15.74
5	0.88828	9.91	26.32	11.70	36.23	21.61	56.00	46.00	-19.77	-24.39
6	2.55078	9.97	23.89	10.39	33.86	20.36	56.00	46.00	-22.14	-25.64
7	14.67188	10.33	15.37	7.16	25.70	17.49	60.00	50.00	-34.30	-32.51

#### 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

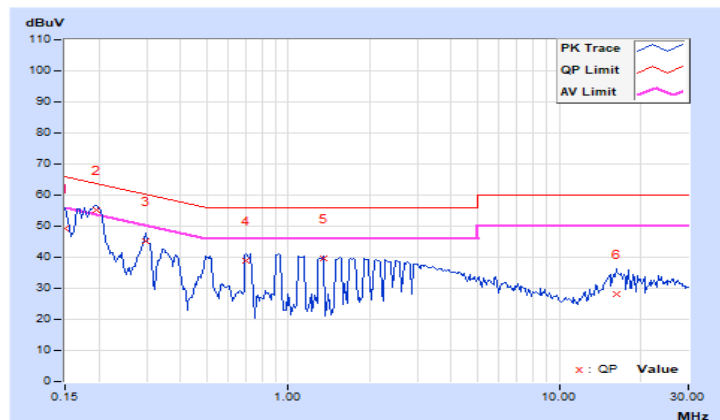


RF Mode	TX GFSK	Channel	CH 76 : 2478 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz

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	0.15000	9.88	39.40	16.02	49.28	25.90	66.00	56.00	-16.72	-30.10
2	0.19687	9.88	45.23	36.04	55.11	45.92	63.74	53.74	-8.63	-7.82
3	0.29844	9.89	35.20	26.45	45.09	36.34	60.29	50.29	-15.20	-13.95
4	0.70078	9.92	28.89	19.29	38.81	29.21	56.00	46.00	-17.19	-16.79
5	1.35547	9.95	29.52	17.28	39.47	27.23	56.00	46.00	-16.53	-18.77
6	16.26172	10.38	17.73	8.33	28.11	18.71	60.00	50.00	-31.89	-31.29

**Remarks:**

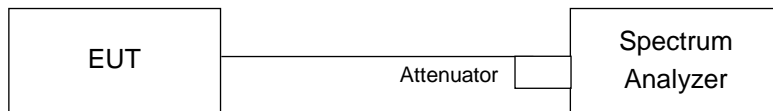
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value





### 4.3 Channel Bandwidth

#### 4.3.1 Test Setup



#### 4.3.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Spectrum Analyzer R&S	FSV40	101544	2021/5/24	2022/5/23

- 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 LK - Oven  
 2. Tested Date: 2022/5/19

#### 4.3.3 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

#### 4.3.4 Deviation from Test Standard

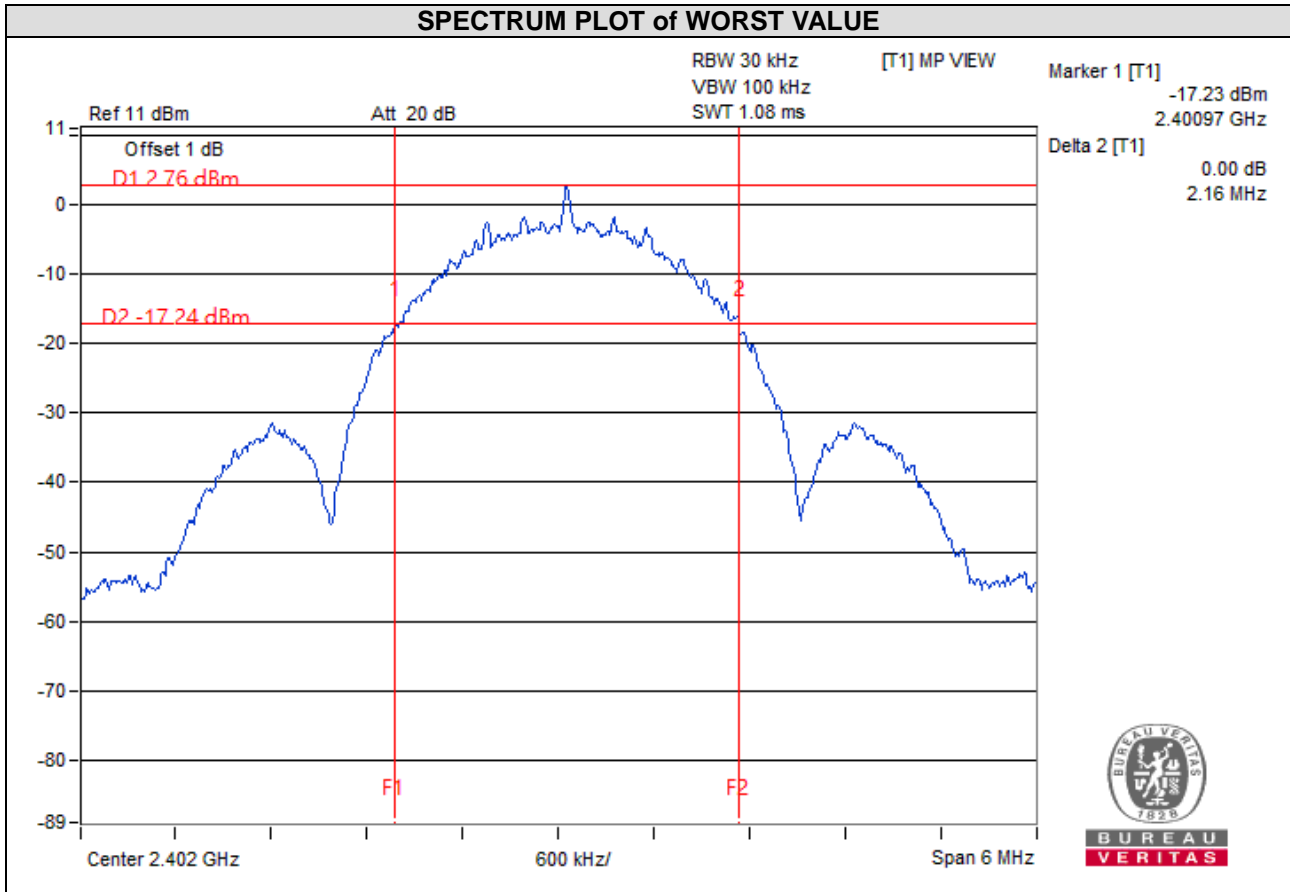
No deviation.

#### 4.3.5 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.3.6 Test Results

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	2.16
38	2440	2.14
76	2478	2.16



## 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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