

# TEST REPORT

## CERTIFICATE OF CONFORMITY

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

**Report No.:** RFBGDGE-WTW-P22050591-2

**FCC ID:** EHTPERS2

**Model No.:** 6930w

**Received Date:** 2022/5/18

**Test Date:** 2022/5/31 ~ 2022/6/23

**Issued Date:** Jul. 08, 2022

**Applicant:** Mitel Networks

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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**FCC Registration /** 788550 / TW0003

**Designation Number:**

**Approved by:** \_\_\_\_\_

*Jeremy Lin*

**Date:** \_\_\_\_\_

**Jul. 08, 2022**

Jeremy Lin / Project Engineer

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Prepared by : Gina Liu / Specialist



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## Table of Contents

<b>Release Control Record</b> .....	<b>4</b>
<b>1 Certificate</b> .....	<b>5</b>
<b>2 Summary of Test Results</b> .....	<b>6</b>
2.1 Measurement Uncertainty .....	6
2.2 Supplementary Information .....	6
<b>3 General Information</b> .....	<b>7</b>
3.1 General Description .....	7
3.2 Antenna Description of EUT .....	7
3.3 Channel List .....	8
3.4 Test Mode Applicability and Tested Channel Detail .....	9
3.5 Duty Cycle of Test Signal .....	9
3.6 Test Program Used and Operation Descriptions .....	10
3.7 Connection Diagram of EUT and Peripheral Devices .....	10
3.8 Configuration of Peripheral Devices and Cable Connections .....	10
<b>4 Test Instruments</b> .....	<b>12</b>
4.1 RF Output Power .....	12
4.2 Number of Hopping Frequency Used .....	12
4.3 Dwell Time on Each Channel .....	12
4.4 Hopping Channel Separation .....	12
4.5 20 dB Bandwidth .....	12
4.6 Conducted Out of Band Emissions .....	12
4.7 AC Power Conducted Emissions .....	13
4.8 Unwanted Emissions below 1 GHz .....	14
4.9 Unwanted Emissions above 1 GHz .....	15
<b>5 Limits of Test Items</b> .....	<b>16</b>
5.1 RF Output Power .....	16
5.2 Number of Hopping Frequency Used .....	16
5.3 Dwell Time on Each Channel .....	16
5.4 Hopping Channel Separation .....	16
5.5 20 dB Bandwidth .....	16
5.6 Conducted Out of Band Emissions .....	16
5.7 AC Power Conducted Emissions .....	16
5.8 Unwanted Emissions below 1 GHz .....	17
5.9 Unwanted Emissions above 1 GHz .....	17
<b>6 Test Arrangements</b> .....	<b>18</b>
6.1 RF Output Power .....	18
6.1.1 Test Setup .....	18
6.1.2 Test Procedure .....	18
6.2 Number of Hopping Frequency Used .....	18
6.2.1 Test Setup .....	18
6.2.2 Test Procedure .....	18
6.3 Dwell Time on Each Channel .....	19
6.3.1 Test Setup .....	19
6.3.2 Test Procedure .....	19
6.4 Hopping Channel Separation .....	19
6.4.1 Test Setup .....	19
6.4.2 Test Procedure .....	19
6.5 20 dB Bandwidth .....	20
6.5.1 Test Setup .....	20
6.5.2 Test Procedure .....	20
6.6 Conducted Out of Band Emissions .....	20
6.6.1 Test Setup .....	20
6.6.2 Test Procedure .....	20
6.7 AC Power Conducted Emissions .....	21



6.7.1	Test Setup .....	21
6.7.2	Test Procedure.....	21
6.8	Unwanted Emissions below 1 GHz .....	22
6.8.1	Test Setup .....	22
6.8.2	Test Procedure.....	23
6.9	Unwanted Emissions above 1 GHz.....	24
6.9.1	Test Setup .....	24
6.9.2	Test Procedure.....	24
<b>7</b>	<b>Test Results of Test Item .....</b>	<b>25</b>
7.1	RF Output Power.....	25
7.2	Number of Hopping Frequency Used.....	26
7.3	Dwell Time on Each Channel .....	27
7.4	Hopping Channel Separation .....	29
7.5	20 dB Bandwidth .....	30
7.6	Conducted Out of Band Emissions .....	31
7.7	AC Power Conducted Emissions .....	33
7.8	Unwanted Emissions below 1 GHz .....	37
7.9	Unwanted Emissions above 1 GHz.....	41
<b>8</b>	<b>Pictures of Test Arrangements .....</b>	<b>49</b>
<b>9</b>	<b>Information of the Testing Laboratories .....</b>	<b>50</b>



## Release Control Record

Issue No.	Description	Date Issued
RFBGDG-WTW-P22050591-2	Original release.	Jul. 08, 2022

## 1 Certificate

**Product:** IP Phone

**Brand:** Mitel

**Test Model:** 6930w

**Sample Status:** Engineering sample

**Applicant:** Mitel Networks

**Test Date:** 2022/5/31 ~ 2022/6/23

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

**Measurement** ANSI C63.10-2013

**procedure:** KDB 558074 D01 15.247 Meas Guidance v05r02

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.

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247 (a)(1)	RF Output Power	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	Hopping Channel Separation	Pass	Meet the requirement of limit.
15.247(a)(1)	20 dB Bandwidth	Pass	Refer to note 1
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -7.54 dB at 19.91800 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -7.2 dB at 455.83 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -8.5 dB at 2390.00 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

### Notes:

1. If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
2. 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	Specification	Expanded Uncertainty (k=2) (±)
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.79 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.79 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3 dB
	30 MHz ~ 1 GHz	3.6 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description

Product	IP Phone
Brand	Mitel
Test Model	6930w
FW Version	6.3.1.49
Status of EUT	Engineering sample
Power Supply Rating	48Vdc from adapter 56Vdc from POE
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	Up to 3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Output Power	2.805 mW (4.48 dBm)

Note:

1. The EUT uses the following devices.

Item	Brand	Model	Specification	Remark
Adapter	FSP	FSP030-DFMN3	I/P: 100-240Vac, 50-60Hz, 1.2A O/P: 48Vdc, 0.625A DC Cable: 1.78m power cable with one core attached on adapter	Support unit
Network Cable (RJ45)	NA	NA	2.1m non-shielded RJ45 cable without core	Accessory
PoE	Phihong	POE15M-1AF	I/P: 100-240Vac, 50-60Hz, 0.8A O/P: 56Vdc, 0.275A, 15.4W	Support unit

2. 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.

#### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna No.	Gain (dBi)			Antenna Type	Connector Type
	2400	2450	2500		
1	2.35	2.63	2.24	Chip	N/A

\* The above Antenna information refers to the manufacturer's antenna specifications, the laboratory shall not be held responsible.

### 3.3 Channel List

79 channels are provided for BT-EDR:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		



### 3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	EUT can be used in the following ways: X-axis / Z-axis. Pre-scan in these ways and find the worst case as a representative test condition.
Worst Case:	The worst case was found when positioned on X-plane.
EUT Configure Mode:	Mode A: EUT with Adapter Mode B: EUT with POE

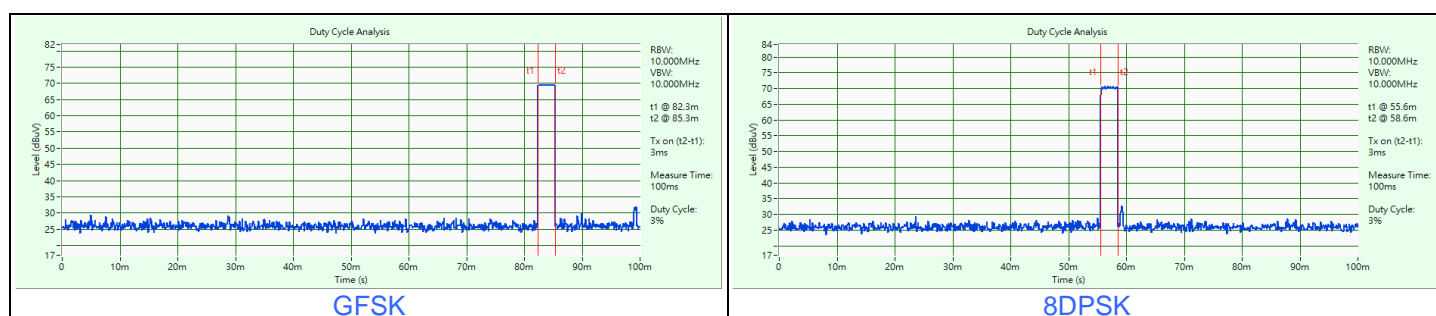
Following channel(s) was (were) selected for the final test as listed below:

EUT Configure Mode	Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
A, B	AC Power Conducted Emissions	GFSK	0	GFSK	DH5
A, B	Unwanted Emissions below 1 GHz	GFSK	0	GFSK	DH5
A	Unwanted Emissions above 1 GHz	GFSK	0, 39, 78	GFSK	DH5
		8DPSK	0, 39, 78	8DPSK	3DH5
A	RF Output Power	GFSK	0, 39, 78	GFSK	DH5
		8DPSK	0, 39, 78	8DPSK	3DH5
A	Hopping Channel Separation / 20 dB Bandwidth	GFSK	0, 39, 78	GFSK	DH5
		8DPSK	0, 39, 78	8DPSK	3DH5
A	Number of Hopping Frequency Used	GFSK	Hopping	GFSK	DH5
		8DPSK	Hopping	8DPSK	3DH5
A	Conducted Out of Band Emissions	GFSK	0, 78, Hopping	GFSK	DH5
		8DPSK	0, 78, Hopping	8DPSK	3DH5
A	Dwell Time on Each Channel	GFSK	Hopping	GFSK	DH5
		8DPSK	Hopping	8DPSK	3DH5

### 3.5 Duty Cycle of Test Signal

**GFSK:** Duty cycle = 3 ms / 100 ms x 100% = 3.0%

**8DPSK:** Duty cycle = 3 ms / 100 ms x 100% = 3.0%

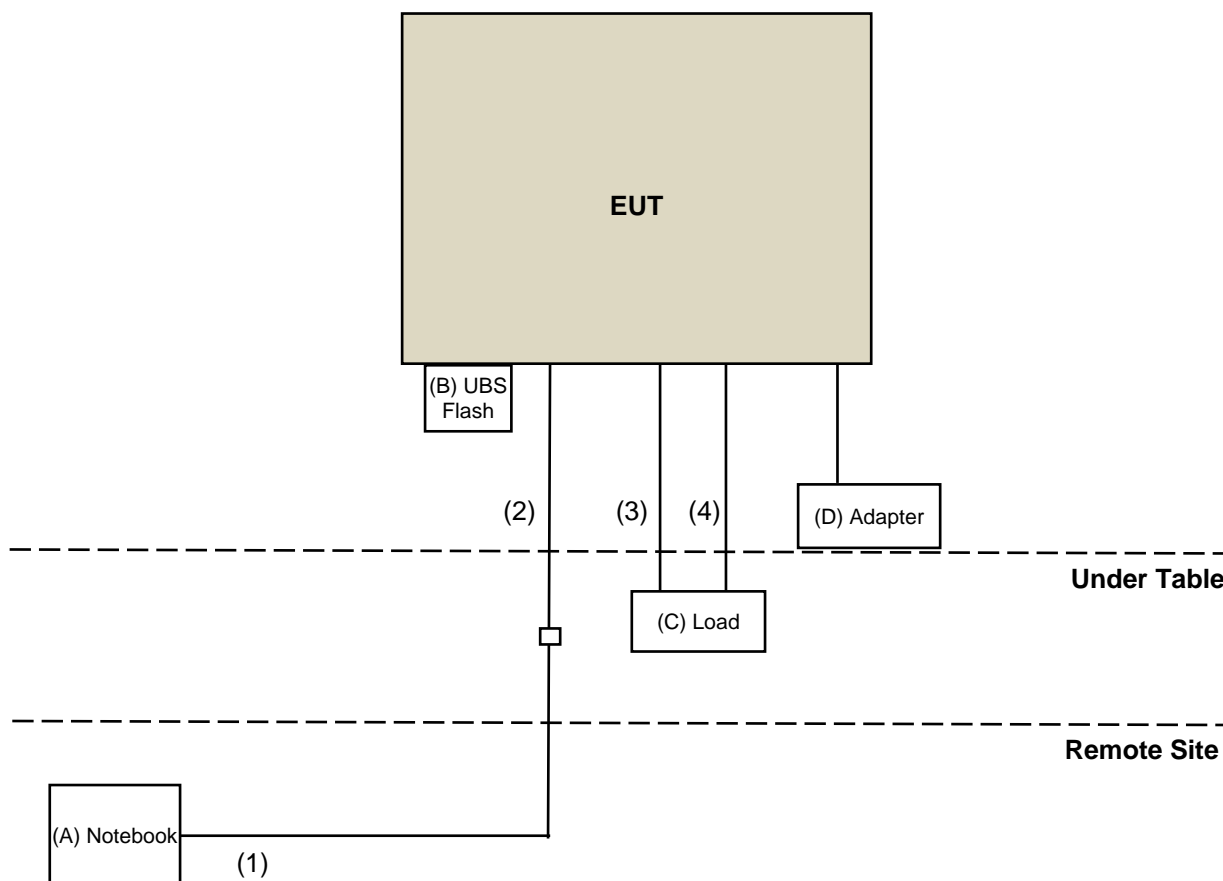


### 3.6 Test Program Used and Operation Descriptions

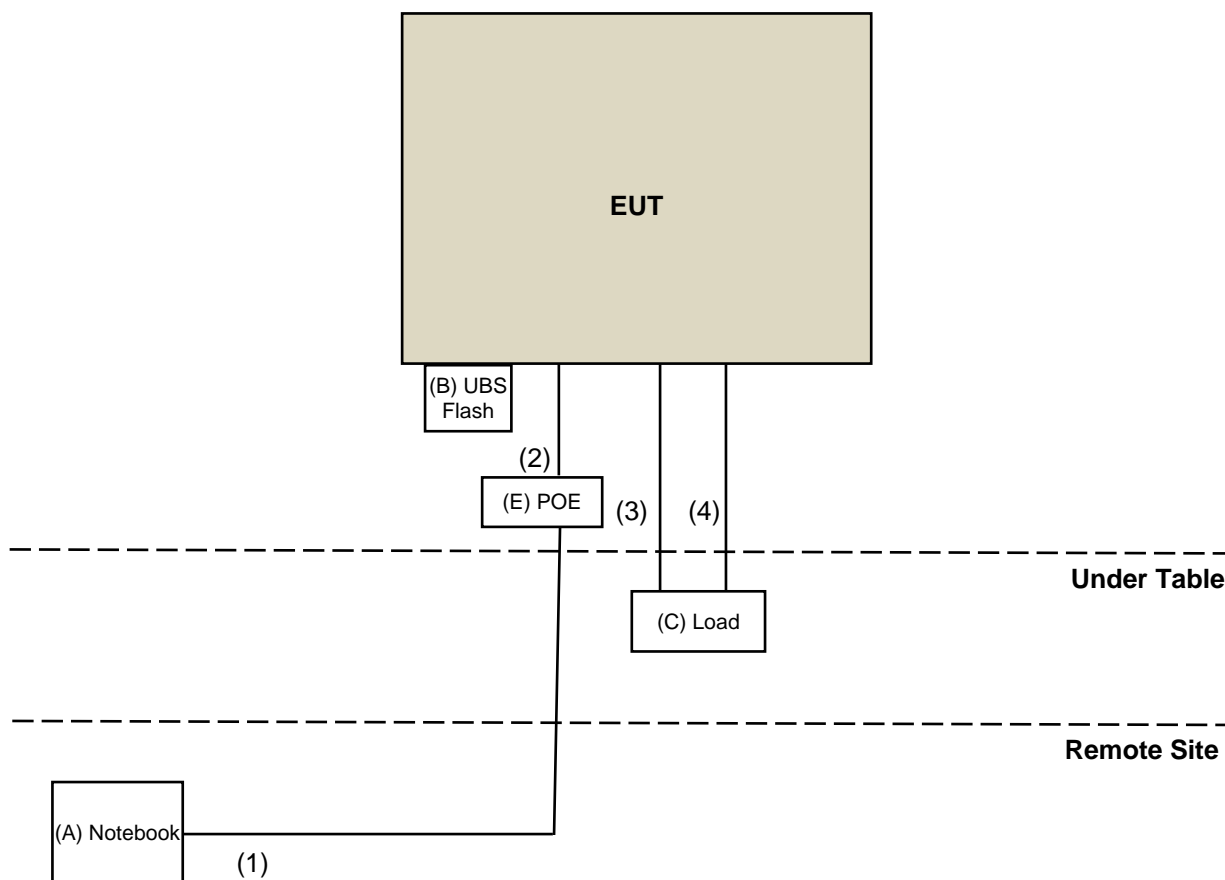
Controlling software Tera Term 4.71 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

### 3.7 Connection Diagram of EUT and Peripheral Devices

Mode A



Mode B



### 3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	14" Laptop	Lenovo	L440	R9-0GFJJK	N/A	Provided by Lab
B	UBS Flash	SanDisk	N/A	N/A	N/A	Provided by Lab
C	Load	N/A	N/A	N/A	N/A	Provided by Lab
D	Adapter	FSP	FSP030-DFMN3	N/A	N/A	Provided by client
E	POE	Phihong	POE15M-1AF	N/A	N/A	Provided by client

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	RJ-45 Cable	1	6	N	N	Provided by Lab
2	RJ-45 Cable	1	2.1	N	N	Supplied by applicant
3	RJ-45 Cable	1	2.1	N	N	Supplied by applicant
4	RJ-11 Cable	1	1.5	N	N	Provided by Lab

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	2022/1/18	2023/1/17
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	2021/7/12	2022/7/11
Wideband Power Sensor(N1923A) KEYSIGHT	N1923A	MY58020002	2022/1/17	2023/1/16

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2022/6/15

### 4.2 Number of Hopping Frequency Used

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	100979	2022/3/25	2023/3/24

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2022/6/15

### 4.3 Dwell Time on Each Channel

Refer to section 4.2 to get information of the instruments.

### 4.4 Hopping Channel Separation

Refer to section 4.2 to get information of the instruments.

### 4.5 20 dB Bandwidth

Refer to section 4.2 to get information of the instruments.

### 4.6 Conducted Out of Band Emissions

Refer to section 4.2 to get information of the instruments.

#### 4.7 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
DC LISN R&S	ESH3-Z6	100219	2021/7/25	2022/7/24
		844950/018	2021/7/25	2022/7/24
DC-LISN SCHWARZBECK MESS- ELETRONIK	NNBM 8126G	8126G-069	2021/11/10	2022/11/9
LISN R&S	ESH2-Z5	100100	2022/2/17	2023/2/16
	ESH3-Z5	100312	2021/9/17	2022/9/16
	ENV216	100071	2021/10/27	2022/10/26
RF Coaxial Cable WORKEN	5D-FB	Cable-cond2-01	2021/9/4	2022/9/3
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
Test Receiver R&S	ESR3	102783	2021/12/20	2022/12/19
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2021/8/20	2022/8/19

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2022/5/31-6/23

#### 4.8 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn BV ADT	AT100	AT93021705	N/A	N/A
Bi_Log Antenna Schwarbeck	VULB9168	9168-160	2021/10/28	2022/10/27
Loop Antenna TESEQ	HLA 6121	45745	2021/7/21	2022/7/20
Loop Antenna EMCI	EM-6879	269	2021/9/16	2022/9/15
Preamplifier Agilent	8447D	2944A10638	2022/5/14	2023/5/13
Pre-amplifier EMCI	EMC001340	980201	2021/9/15	2022/9/14
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2022/1/15	2023/1/14
RF Coaxial Cable WOKEN	8D-FB	Cable-CH9-01	2022/5/14	2023/5/13
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	2021/9/15	2022/9/14
Test Receiver Agilent	N9038A	MY51210203	2021/9/22	2022/9/21
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 4.
2. Tested Date: 2022/5/31-6/23

#### 4.9 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn BV ADT	AT100	AT93021705	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
Horn Antenna Schwarzbeck	9120D	9120D-1169	2021/11/14	2022/11/13
	BBHA 9170	BBHA9170241	2021/10/26	2022/10/25
Pre-Amplifier EMCI	EMC 184045	980116	2021/10/5	2022/10/4
Preamplifier Agilent	8449B	3008A02367	2022/2/16	2023/2/15
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	2022/1/15	2023/1/14
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	2022/1/15	2023/1/14
RF FLITER MICRO-TRONICS	BRM50716	060	2022/1/10	2023/1/9
	BRM17690	004	2022/1/10	2023/1/9
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101867	2022/1/7	2023/1/6
Test Receiver Agilent	N9038A	MY51210203	2021/9/22	2022/9/21
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 4.
2. Tested Date: 2022/6/10

## 5 Limits of Test Items

### 5.1 RF Output Power

The Maximum Output Power Measurement is 125 mW (21 dBm).

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  MHz for any  $N_{ANT}$ ;

Array Gain =  $5 \log(N_{ANT}/N_{SS})$  dB or 3 dB, whichever is less, for 20-MHz channel widths with  $N_{ANT} \geq 5$ .

For power measurements on all other devices: Array Gain =  $10 \log(N_{ANT}/N_{SS})$  dB.

### 5.2 Number of Hopping Frequency Used

At least 15 channels frequencies, and should be equally spaced.

### 5.3 Dwell Time on Each Channel

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 5.4 Hopping Channel Separation

At least 25 kHz or two-third of 20 dB hopping channel bandwidth (whichever is greater).

### 5.5 20 dB Bandwidth

Maximum bandwidth is not specified.

### 5.6 Conducted Out of Band Emissions

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

### 5.7 AC Power Conducted Emissions

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

Notes:

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 0.50 MHz.



## 5.8 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

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

Notes:

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

## 5.9 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Above 960	500	3

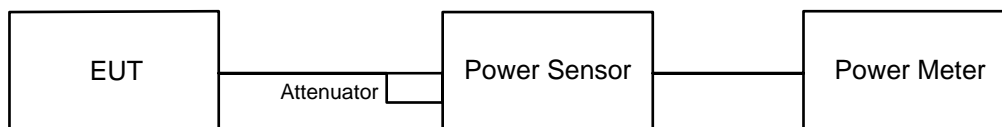
Notes:

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 1000 MHz, 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 20 dB under any condition of modulation.

## 6 Test Arrangements

### 6.1 RF Output Power

#### 6.1.1 Test Setup



#### 6.1.2 Test Procedure

##### Peak Power:

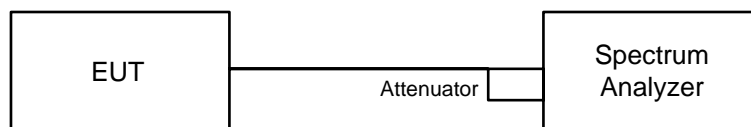
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

##### Average Power:

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 6.2 Number of Hopping Frequency Used

#### 6.2.1 Test Setup

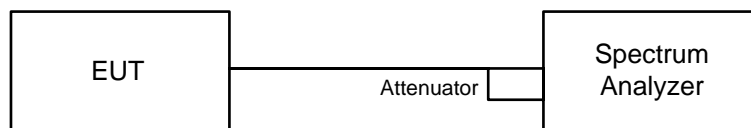


#### 6.2.2 Test Procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

## 6.3 Dwell Time on Each Channel

### 6.3.1 Test Setup

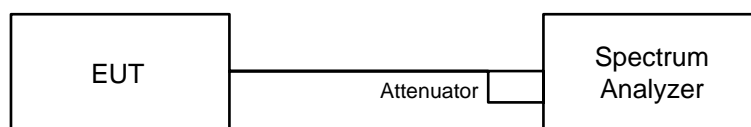


### 6.3.2 Test Procedure

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- Repeat above procedures until all different time-slot modes have been completed.

## 6.4 Hopping Channel Separation

### 6.4.1 Test Setup

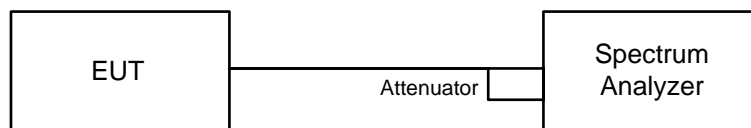


### 6.4.2 Test Procedure

- 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.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

## 6.5 20 dB Bandwidth

### 6.5.1 Test Setup



### 6.5.2 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 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

## 6.6 Conducted Out of Band Emissions

### 6.6.1 Test Setup



### 6.6.2 Test Procedure

#### MEASUREMENT PROCEDURE REF

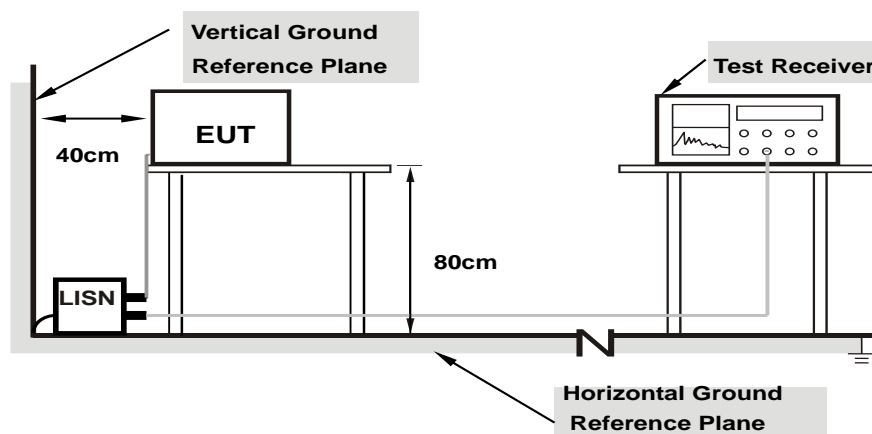
- Set the RBW = 100 kHz.
- Set the VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

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

## 6.7 AC Power Conducted Emissions

### 6.7.1 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).

### 6.7.2 Test Procedure

- 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/ 50 uH 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 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

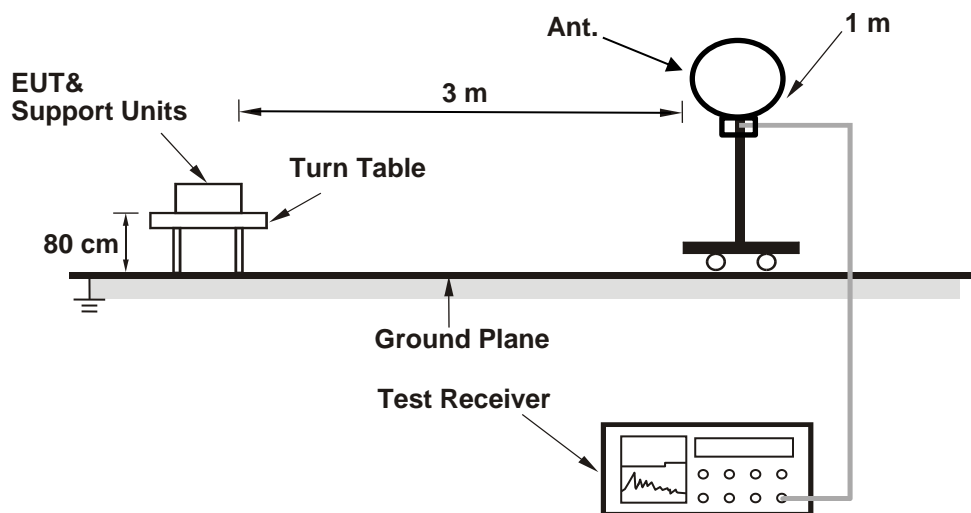
**Note:**

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

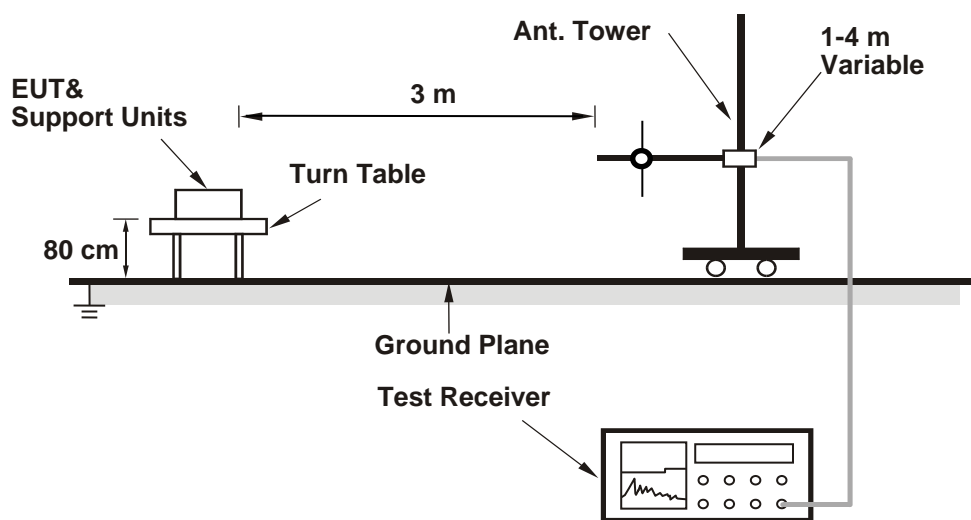
## 6.8 Unwanted Emissions below 1 GHz

### 6.8.1 Test Setup

#### For Radiated emission below 30 MHz



#### For Radiated emission above 30 MHz



## 6.8.2 Test Procedure

### For Radiated emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters 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. 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.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

### For Radiated emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters 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.

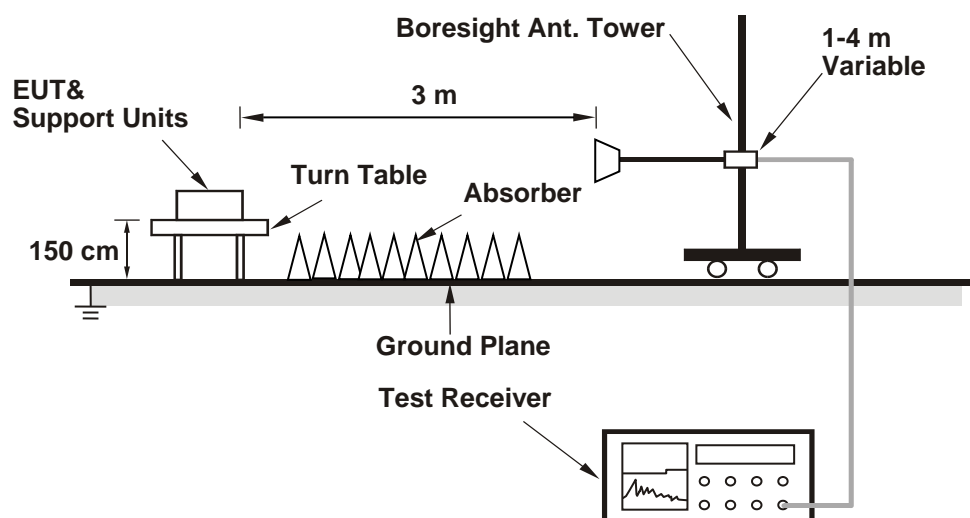
#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

## 6.9 Unwanted Emissions above 1 GHz

### 6.9.1 Test Setup

#### For Radiated emission above 1 GHz



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

### 6.9.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to peak and average detects 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.

#### Notes:

- 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 (AV) at frequency above 1 GHz.
- According to ANSI C63.10 section 6.6.4 and 4.1.4.2.2. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. For duty cycle correction factor values, see the Test Signal Duty Cycle section in this report.
- All modes of operation were investigated and the worst-case emissions are reported.



## 7 Test Results of Test Item

### 7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Jisyong Wang
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#### For Peak Power

##### GFSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	2.805	4.48	21	Pass
39	2441	2.588	4.13	21	Pass
78	2480	2.366	3.74	21	Pass

Note: The antenna gain is 2.63 dBi < 6 dBi, so the output power limit shall not be reduced.

##### 8DPSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	1.936	2.87	21	Pass
39	2441	1.786	2.52	21	Pass
78	2480	1.57	1.96	21	Pass

Note: The antenna gain is 2.63 dBi < 6 dBi, so the output power limit shall not be reduced.

#### For Average Power

##### GFSK

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	2.704	4.32
39	2441	2.489	3.96
78	2480	2.28	3.58

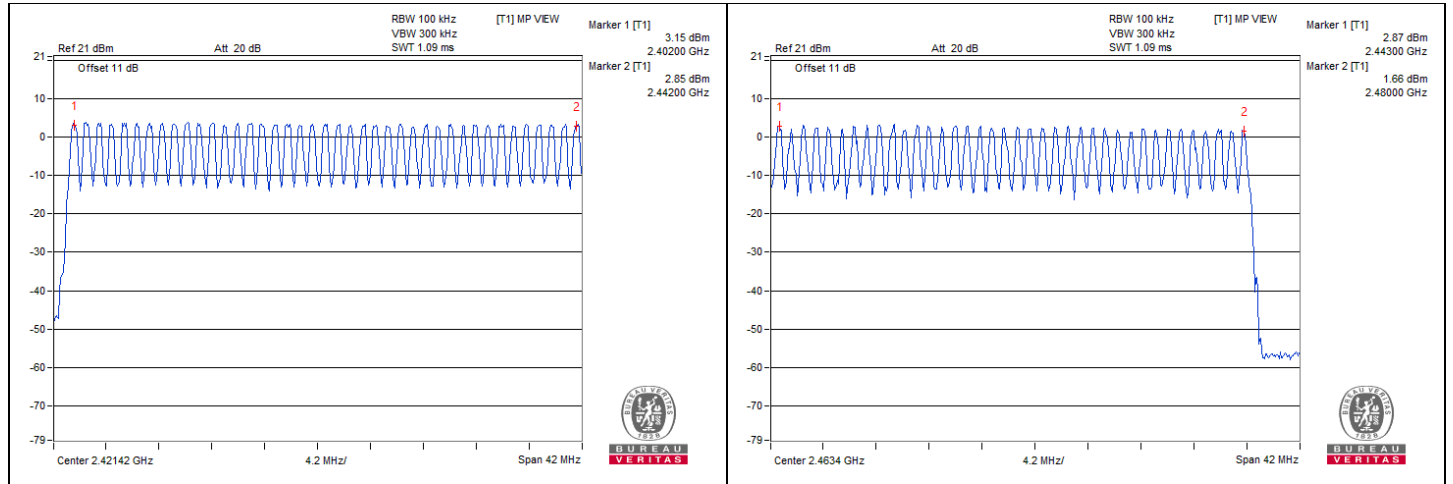
##### 8DPSK

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	1.892	2.77
39	2441	1.726	2.37
78	2480	1.531	1.85

## 7.2 Number of Hopping Frequency Used

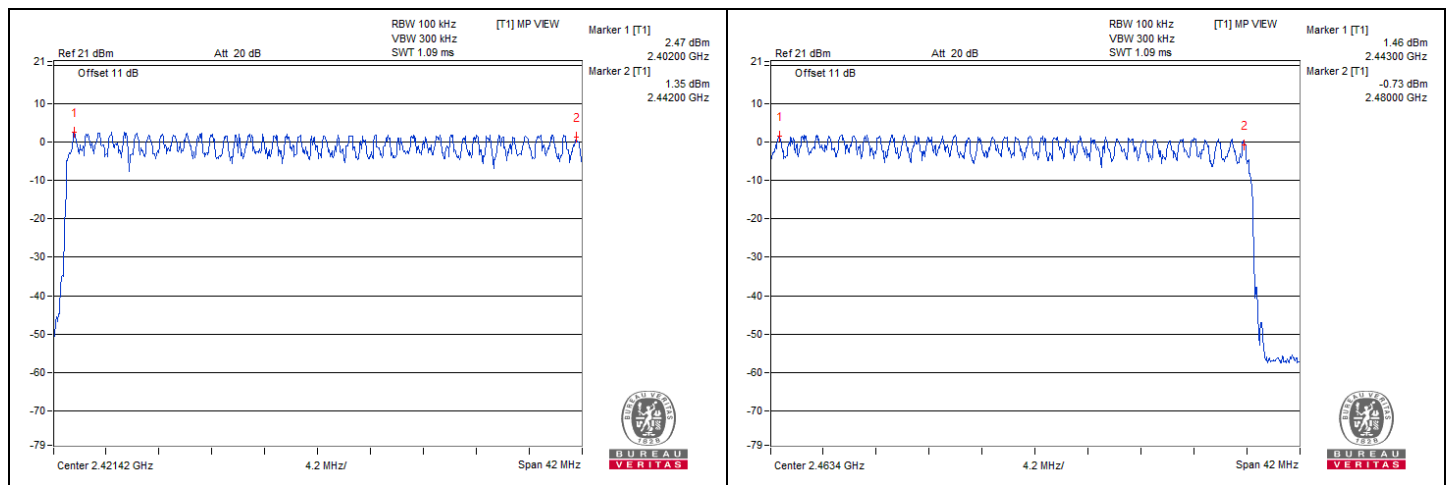
Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Jisyong Wang
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### GFSK



Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

### 8DPSK



Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

### 7.3 Dwell Time on Each Channel

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Jisyong Wang
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#### GFSK

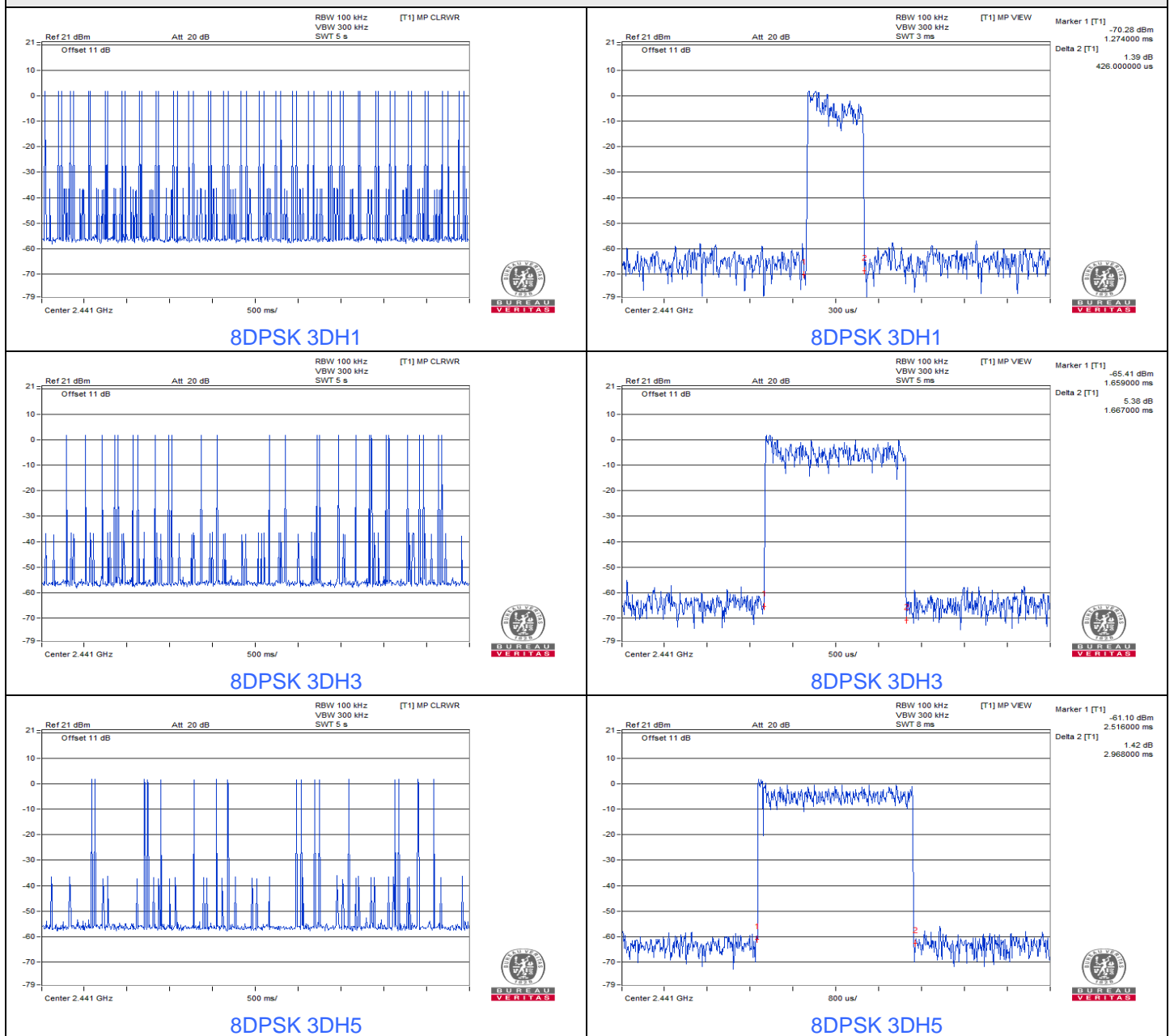
Mode	Number of transmission in 31.6 sec	Length of transmission time (msec)	Result (msec)	Limit (msec)	Test Result
DH1	50 (times / 5 sec) * 6.32 = 316 times	0.413	130.51	400	Pass
DH3	25 (times / 5 sec) * 6.32 = 158 times	1.667	263.39	400	Pass
DH5	16 (times / 5 sec) * 6.32 = 102 times	2.945	300.39	400	Pass



**8DPSK**

Mode	Number of transmission in 31.6 sec	Length of transmission time (msec)	Result (msec)	Limit (msec)	Test Result
3DH1	51 (times / 5 sec) * 6.32 = 323 times	0.426	137.6	400	Pass
3DH3	27 (times / 5 sec) * 6.32 = 171 times	1.667	285.06	400	Pass
3DH5	17 (times / 5 sec) * 6.32 = 108 times	2.968	320.54	400	Pass

**Spectrum plots of Dwell Time**



### 7.4 Hopping Channel Separation

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Jisyong Wang
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#### GFSK

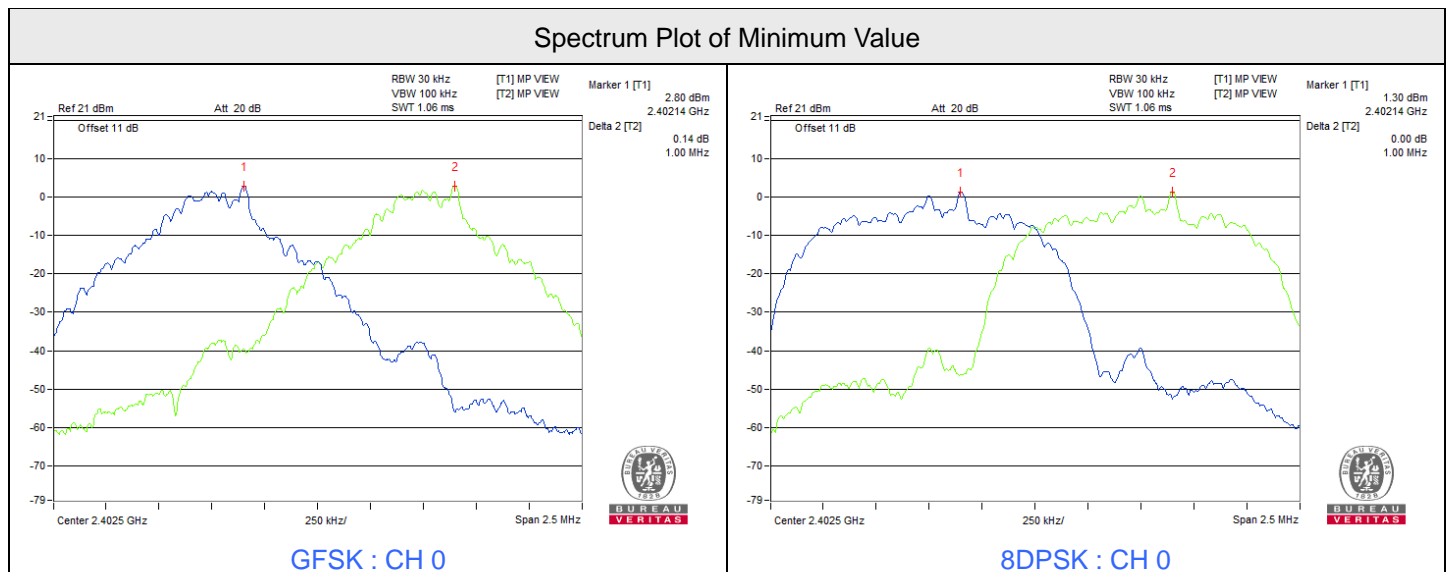
Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2402	1	0.68	Pass
39	2441	1	0.68	Pass
78	2480	1	0.68	Pass

Note: The minimum limit is two-third 20dB bandwidth.

#### 8DPSK

Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2402	1	0.88	Pass
39	2441	1	0.88	Pass
78	2480	1	0.88	Pass

Note: The minimum limit is two-third 20dB bandwidth.





### 7.5 20 dB Bandwidth

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Jisyong Wang
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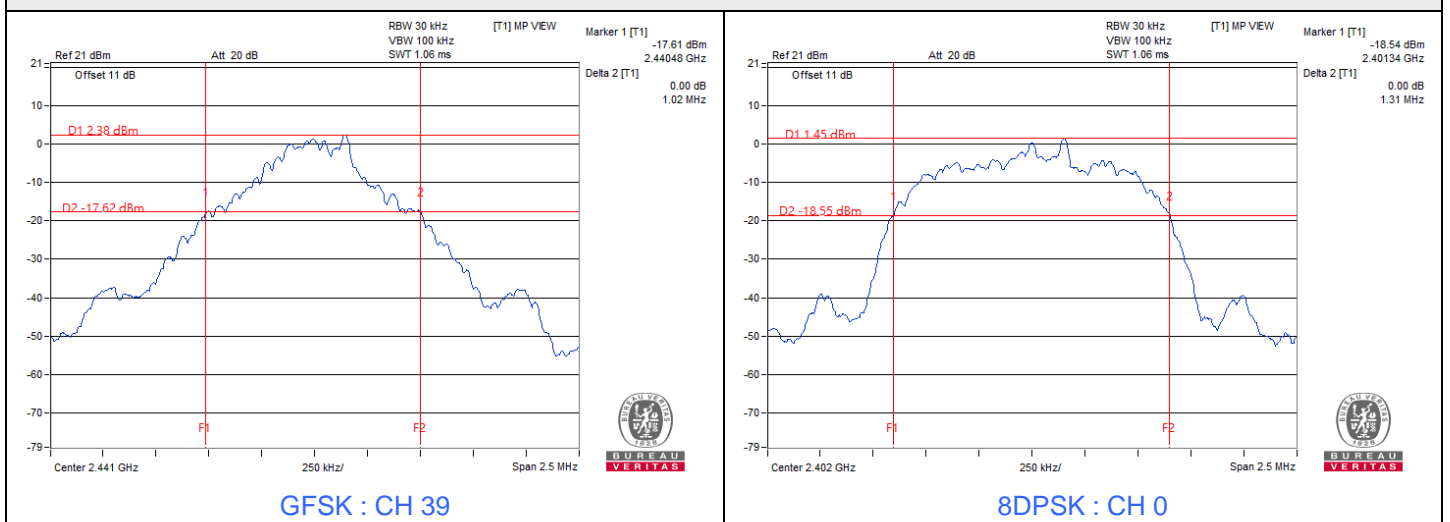
#### GFSK

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.01
39	2441	1.02
78	2480	1.01

#### 8DPSK

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.31
39	2441	1.31
78	2480	1.31

Spectrum Plot of Maximum Value



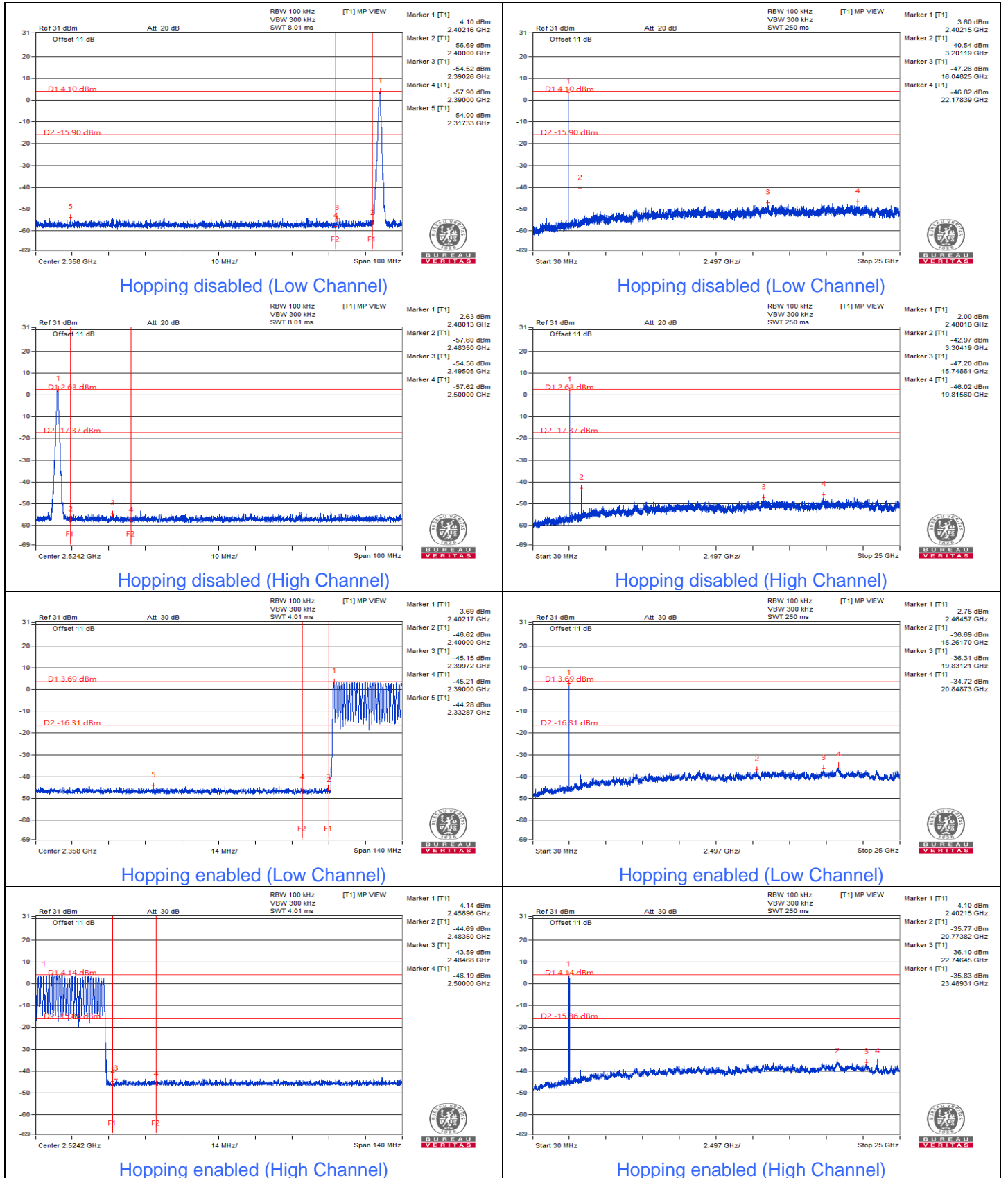


BUREAU VERITAS

### 7.6 Conducted Out of Band Emissions

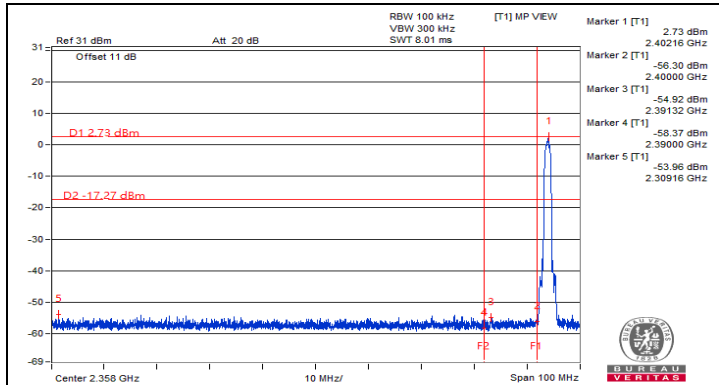
Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Jisyong Wang
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#### GFSK

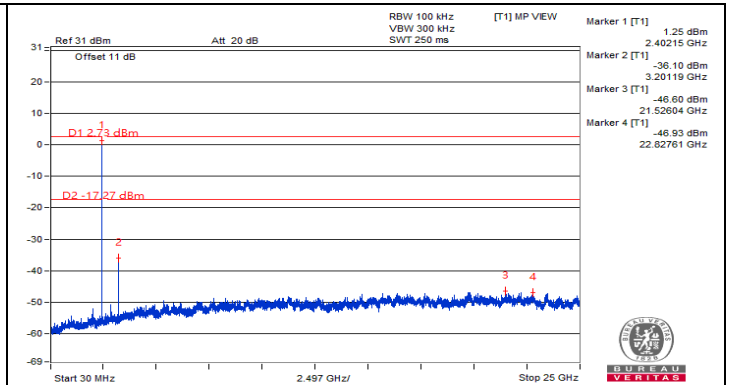




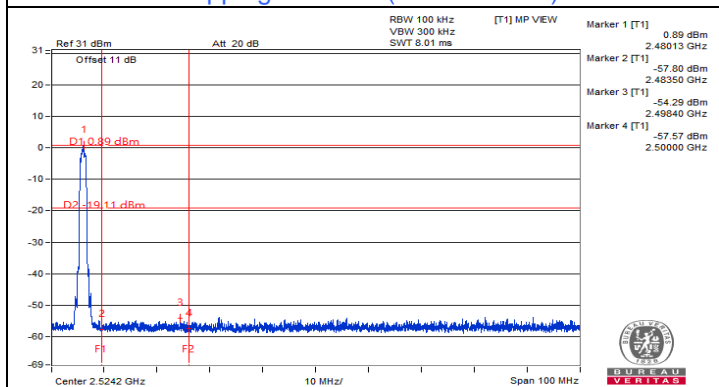
# 8DPSK



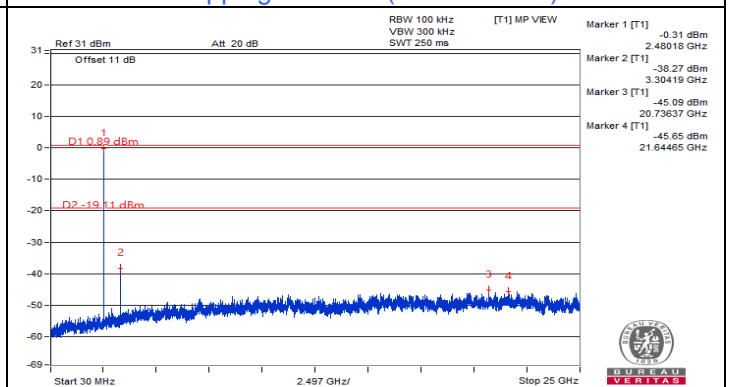
Hopping disabled (Low Channel)



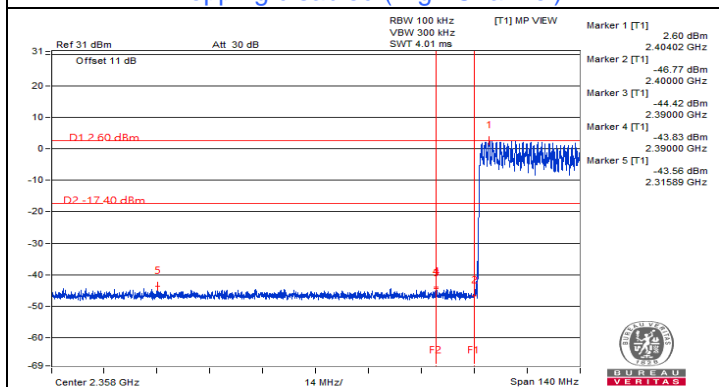
Hopping disabled (Low Channel)



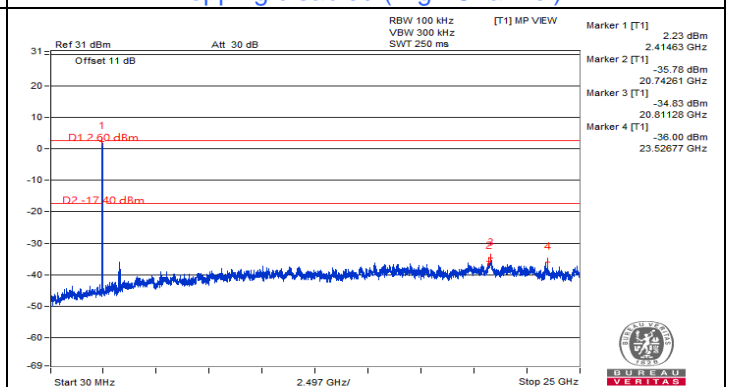
Hopping disabled (High Channel)



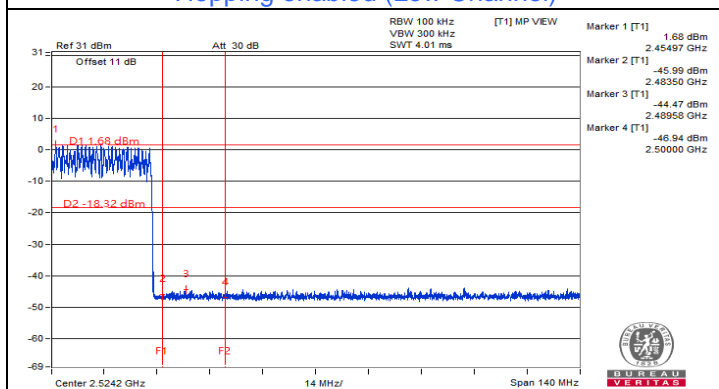
Hopping disabled (High Channel)



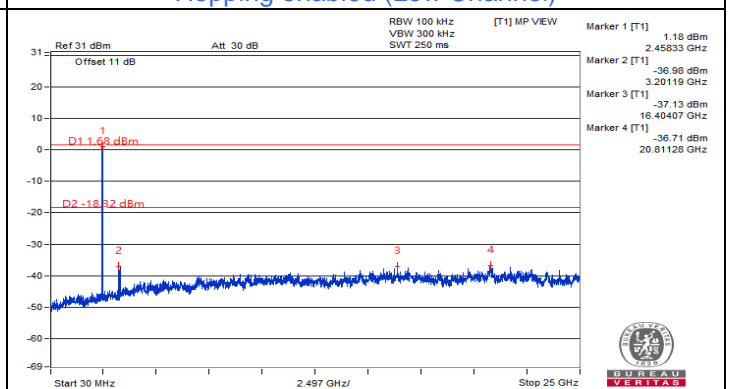
Hopping enabled (Low Channel)



Hopping enabled (Low Channel)



Hopping enabled (High Channel)



Hopping enabled (High Channel)



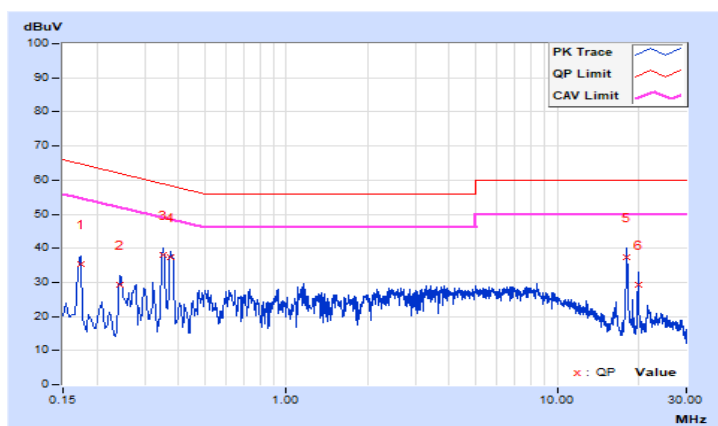
## 7.7 AC Power Conducted Emissions

RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Rex Wang	Test Mode	A

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	0.17384	10.14	25.06	8.34	35.20	18.48	64.77	54.77	-29.57	-36.29
2	0.24200	10.18	19.24	8.00	29.42	18.18	62.03	52.03	-32.61	-33.85
3	0.35000	10.22	27.69	26.63	37.91	36.85	58.96	48.96	-21.05	-12.11
4	0.37400	10.23	27.21	23.75	37.44	33.98	58.41	48.41	-20.97	-14.43
5	18.11400	10.58	26.91	21.02	37.49	31.60	60.00	50.00	-22.51	-18.40
6	19.91400	10.61	18.85	13.18	29.46	23.79	60.00	50.00	-30.54	-26.21

### 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

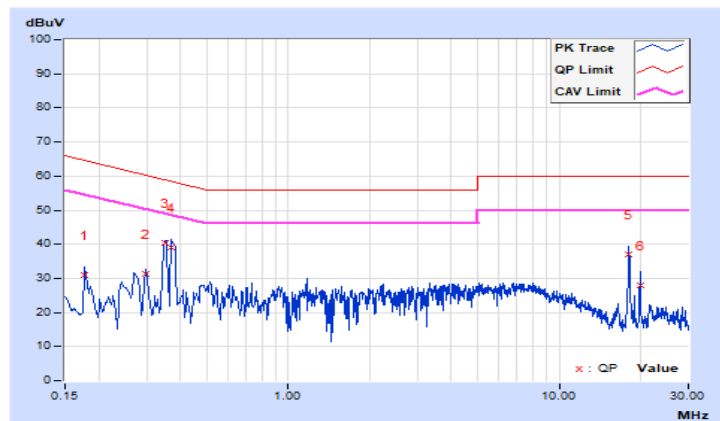


RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Rex Wang	Test Mode	A

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	0.17800	10.17	20.90	6.67	31.07	16.84	64.58	54.58	-33.51	-37.74
2	0.29800	10.22	20.99	17.14	31.21	27.36	60.30	50.30	-29.09	-22.94
3	0.35035	10.24	30.28	29.02	40.52	39.26	58.95	48.95	-18.43	-9.69
4	0.37000	10.25	28.91	18.32	39.16	28.57	58.50	48.50	-19.34	-19.93
5	18.11800	10.70	26.35	20.42	37.05	31.12	60.00	50.00	-22.95	-18.88
6	19.89000	10.75	17.34	11.37	28.09	22.12	60.00	50.00	-31.91	-27.88

**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

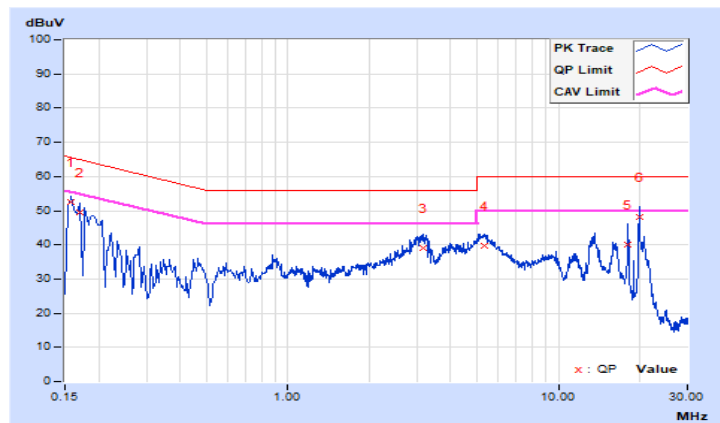


RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 72% RH
Tested By	Rex Wang	Test Mode	B

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	0.15800	10.13	42.29	24.60	52.42	34.73	65.57	55.57	-13.15	-20.84
2	0.17000	10.13	39.52	21.12	49.65	31.25	64.96	54.96	-15.31	-23.71
3	3.14600	10.24	28.90	19.08	39.14	29.32	56.00	46.00	-16.86	-16.68
4	5.30600	10.26	29.35	23.96	39.61	34.22	60.00	50.00	-20.39	-15.78
5	18.07400	10.37	29.79	23.70	40.16	34.07	60.00	50.00	-19.84	-15.93
6	19.91800	10.40	37.78	32.06	48.18	42.46	60.00	50.00	-11.82	-7.54

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

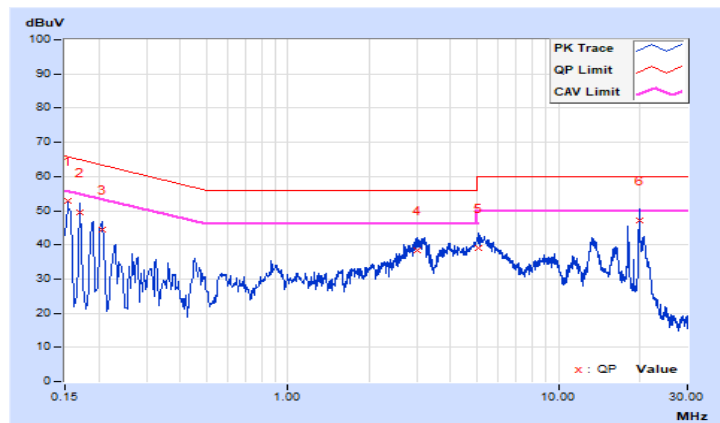


RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 72% RH
Tested By	Rex Wang	Test Mode	B

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	0.15400	10.14	42.79	25.33	52.93	35.47	65.78	55.78	-12.85	-20.31
2	0.17000	10.14	39.36	20.70	49.50	30.84	64.96	54.96	-15.46	-24.12
3	0.20577	10.15	34.14	16.17	44.29	26.32	63.37	53.37	-19.08	-27.05
4	3.01000	10.25	28.15	19.45	38.40	29.70	56.00	46.00	-17.60	-16.30
5	5.09000	10.28	28.93	23.68	39.21	33.96	60.00	50.00	-20.79	-16.04
6	19.90200	10.55	36.71	30.88	47.26	41.43	60.00	50.00	-12.74	-8.57

**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



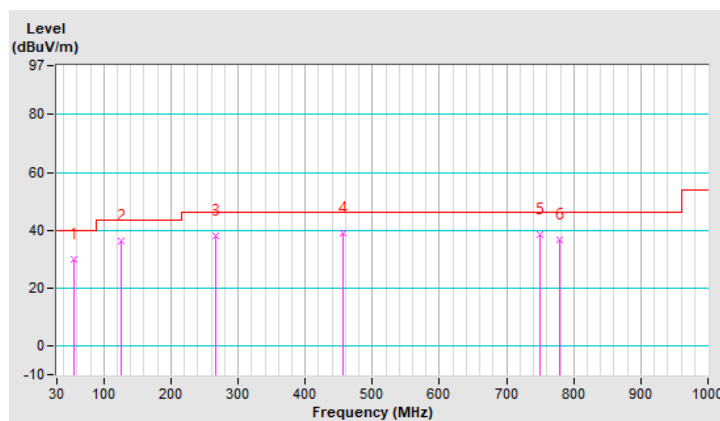
## 7.8 Unwanted Emissions below 1 GHz

RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Adair Peng	Test Mode	A

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	56.19	29.7 QP	40.0	-10.3	2.00 H	240	39.0	-9.3
2	125.06	36.2 QP	43.5	-7.3	2.00 H	312	46.9	-10.7
3	265.71	38.2 QP	46.0	-7.8	1.01 H	199	46.4	-8.2
4	<b>455.83</b>	<b>38.8 QP</b>	<b>46.0</b>	<b>-7.2</b>	<b>2.00 H</b>	<b>157</b>	<b>42.1</b>	<b>-3.3</b>
5	749.74	38.5 QP	46.0	-7.5	1.01 H	354	36.2	2.3
6	779.81	36.7 QP	46.0	-9.3	1.01 H	196	33.6	3.1

### 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.

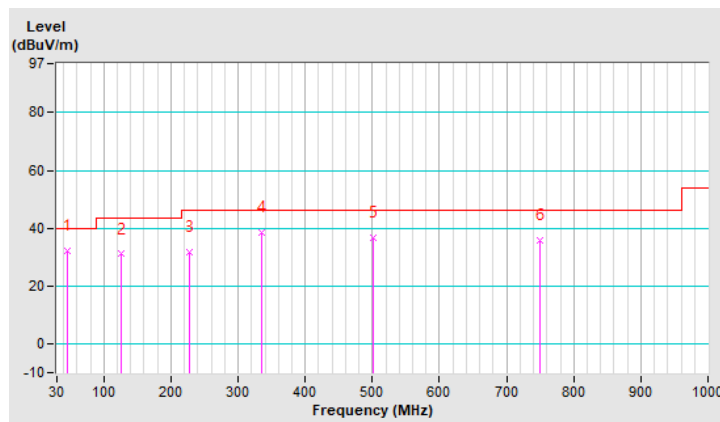


<b>RF Mode</b>	TX BT GFSK	<b>Channel</b>	CH 0 : 2402 MHz
<b>Frequency Range</b>	9 kHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	(QP) RB = 120kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 67% RH
<b>Tested By</b>	Adair Peng	<b>Test Mode</b>	A

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	45.52	32.1 QP	40.0	-7.9	1.00 V	2	41.3	-9.2
2	125.06	31.0 QP	43.5	-12.5	1.99 V	47	41.7	-10.7
3	227.88	31.8 QP	46.0	-14.2	1.00 V	32	42.8	-11.0
4	335.55	38.6 QP	46.0	-7.4	1.99 V	306	44.7	-6.1
5	500.45	36.6 QP	46.0	-9.4	1.00 V	288	39.1	-2.5
6	749.74	35.8 QP	46.0	-10.2	1.99 V	18	33.5	2.3

**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.

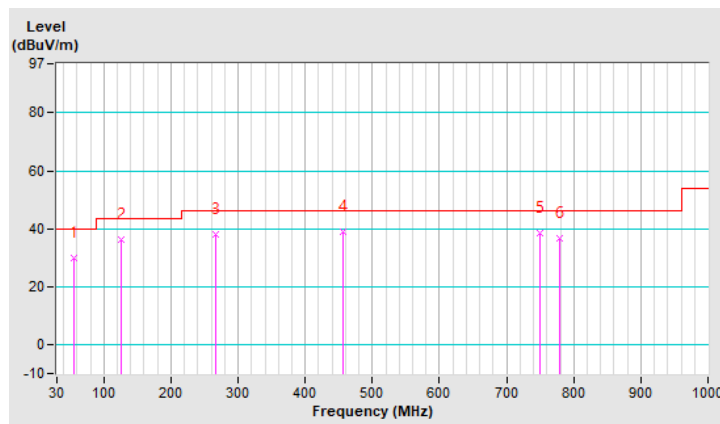


<b>RF Mode</b>	TX BT GFSK	<b>Channel</b>	CH 0 : 2402 MHz
<b>Frequency Range</b>	9 kHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	(QP) RB = 120kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 72% RH
<b>Tested By</b>	Vincent Chen	<b>Test Mode</b>	B

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	56.19	29.72 QP	40.00	-10.28	2.00 H	240	42.58	-12.86
2	125.06	36.22 QP	43.50	-7.28	2.00 H	312	50.13	-13.91
3	265.71	38.19 QP	46.00	-7.81	1.01 H	199	51.98	-13.79
4	455.83	38.77 QP	46.00	-7.23	2.00 H	157	45.93	-7.16
5	749.74	38.53 QP	46.00	-7.47	1.01 H	354	39.03	-0.50
6	779.81	36.70 QP	46.00	-9.30	1.01 H	196	36.65	0.05

**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.

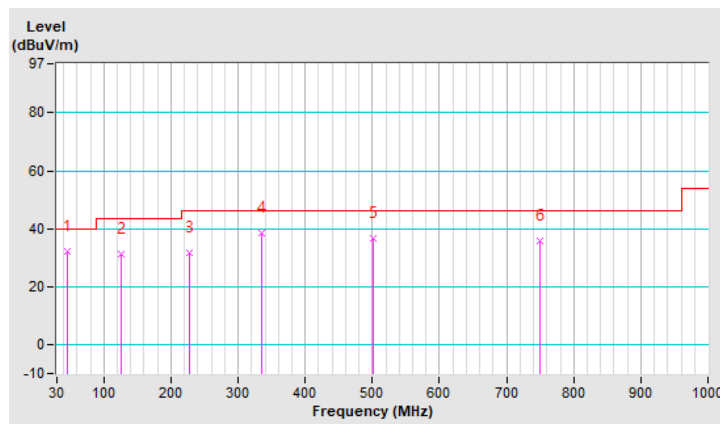


<b>RF Mode</b>	TX BT GFSK	<b>Channel</b>	CH 0 : 2402 MHz
<b>Frequency Range</b>	9 kHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	(QP) RB = 120kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 72% RH
<b>Tested By</b>	Vincent Chen	<b>Test Mode</b>	B

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	45.52	32.07 QP	40.00	-7.93	1.00 V	2	44.74	-12.67
2	125.06	31.04 QP	43.50	-12.46	1.99 V	47	44.95	-13.91
3	227.88	31.77 QP	46.00	-14.23	1.00 V	32	47.88	-16.11
4	335.55	38.57 QP	46.00	-7.43	1.99 V	306	49.25	-10.68
5	500.45	36.57 QP	46.00	-9.43	1.00 V	288	42.65	-6.08
6	749.74	35.78 QP	46.00	-10.22	1.99 V	18	36.28	-0.50

**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.





## 7.9 Unwanted Emissions above 1 GHz

<b>RF Mode</b>	TX BT GFSK	<b>Channel</b>	CH 0 : 2402 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 67% RH
<b>Tested By</b>	Adair Peng		

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	58.4 PK	74.0	-15.6	2.06 H	157	25.6	32.8
2	2390.00	45.3 AV	54.0	-8.7	2.06 H	157	12.5	32.8
3	*2402.00	103.6 PK			2.06 H	157	70.8	32.8
4	*2402.00	73.1 AV			2.06 H	157	40.3	32.8
5	4804.00	50.0 PK	74.0	-24.0	2.11 H	151	44.2	5.8
6	4804.00	19.5 AV	54.0	-34.5	2.11 H	151	13.7	5.8
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	58.2 PK	74.0	-15.8	3.04 V	84	25.4	32.8
2	2390.00	45.2 AV	54.0	-8.8	3.04 V	84	12.4	32.8
3	*2402.00	100.9 PK			3.04 V	84	68.1	32.8
4	*2402.00	70.4 AV			3.04 V	84	37.6	32.8
5	4804.00	48.3 PK	74.0	-25.7	3.04 V	82	42.5	5.8
6	4804.00	17.8 AV	54.0	-36.2	3.04 V	82	12.0	5.8

### Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.
- 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:  
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$

<b>RF Mode</b>	TX BT GFSK	<b>Channel</b>	CH 39 : 2441 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 67% RH
<b>Tested By</b>	Adair Peng		

**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	*2441.00	103.0 PK			2.01 H	154	70.2	32.8
2	*2441.00	72.5 AV			2.01 H	154	39.7	32.8
3	4882.00	48.8 PK	74.0	-25.2	2.09 H	150	43.3	5.5
4	4882.00	18.3 AV	54.0	-35.7	2.09 H	150	12.8	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	*2441.00	100.0 PK			3.03 V	82	67.2	32.8
2	*2441.00	69.5 AV			3.03 V	82	36.7	32.8
3	4882.00	47.5 PK	74.0	-26.5	3.08 V	80	42.0	5.5
4	4882.00	17.0 AV	54.0	-37.0	3.08 V	80	11.5	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, the limit was restricted at the RF Output Power.
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:  

$$20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$$



<b>RF Mode</b>	TX BT GFSK	<b>Channel</b>	CH 78 : 2480 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 67% RH
<b>Tested By</b>	Adair Peng		

**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	*2480.00	101.7 PK			2.20 H	154	68.8	32.9
2	*2480.00	71.2 AV			2.20 H	154	38.3	32.9
3	2483.50	51.8 PK	74.0	-22.2	2.20 H	154	53.3	-1.5
4	2483.50	21.3 AV	54.0	-32.7	2.20 H	154	22.8	-1.5
5	4960.00	48.2 PK	74.0	-25.8	2.10 H	151	42.5	5.7
6	4960.00	17.7 AV	54.0	-36.3	2.10 H	151	12.0	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	*2480.00	99.0 PK			3.07 V	85	66.1	32.9
2	*2480.00	68.5 AV			3.07 V	85	35.6	32.9
3	2483.50	51.5 PK	74.0	-22.5	3.07 V	85	53.0	-1.5
4	2483.50	21.0 AV	54.0	-33.0	3.07 V	85	22.5	-1.5
5	4960.00	46.8 PK	74.0	-27.2	3.12 V	80	41.1	5.7
6	4960.00	16.3 AV	54.0	-37.7	3.12 V	80	10.6	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, the limit was restricted at the RF Output Power.
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:  
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$

<b>RF Mode</b>	TX BT 8DPSK	<b>Channel</b>	CH 0 : 2402 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 67% RH
<b>Tested By</b>	Adair Peng		

**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	57.6 PK	74.0	-16.4	2.74 H	140	24.8	32.8
2	<b>2390.00</b>	<b>45.5 AV</b>	<b>54.0</b>	<b>-8.5</b>	<b>2.74 H</b>	<b>140</b>	<b>12.7</b>	<b>32.8</b>
3	*2402.00	103.4 PK			2.74 H	140	70.6	32.8
4	*2402.00	72.9 AV			2.74 H	140	40.1	32.8
5	4804.00	48.0 PK	74.0	-26.0	2.73 H	140	42.2	5.8
6	4804.00	17.5 AV	54.0	-36.5	2.73 H	140	11.7	5.8

**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	57.4 PK	74.0	-16.6	3.08 V	85	24.6	32.8
2	2390.00	45.3 AV	54.0	-8.7	3.08 V	85	12.5	32.8
3	*2402.00	100.5 PK			3.08 V	85	67.7	32.8
4	*2402.00	70.0 AV			3.08 V	85	37.2	32.8
5	4804.00	47.6 PK	74.0	-26.4	3.11 V	86	41.8	5.8
6	4804.00	17.1 AV	54.0	-36.9	3.11 V	86	11.3	5.8

**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, the limit was restricted at the RF Output Power.
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:  
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$



<b>RF Mode</b>	TX BT 8DPSK	<b>Channel</b>	CH 39 : 2441 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 67% RH
<b>Tested By</b>	Adair Peng		

**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	*2441.00	103.8 PK			2.67 H	147	71.0	32.8
2	*2441.00	73.3 AV			2.67 H	147	40.5	32.8
3	4882.00	47.9 PK	74.0	-26.1	2.70 H	141	42.4	5.5
4	4882.00	17.4 AV	54.0	-36.6	2.70 H	141	11.9	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	*2441.00	101.1 PK			3.10 V	85	68.3	32.8
2	*2441.00	70.6 AV			3.10 V	85	37.8	32.8
3	4882.00	46.5 PK	74.0	-27.5	2.98 V	82	41.0	5.5
4	4882.00	16.0 AV	54.0	-38.0	2.98 V	82	10.5	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, the limit was restricted at the RF Output Power.
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:  
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$

<b>RF Mode</b>	TX BT 8DPSK	<b>Channel</b>	CH 78 : 2480 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 67% RH
<b>Tested By</b>	Adair Peng		

**Antenna Polarity & Test Distance : Horizontal at 3 m**

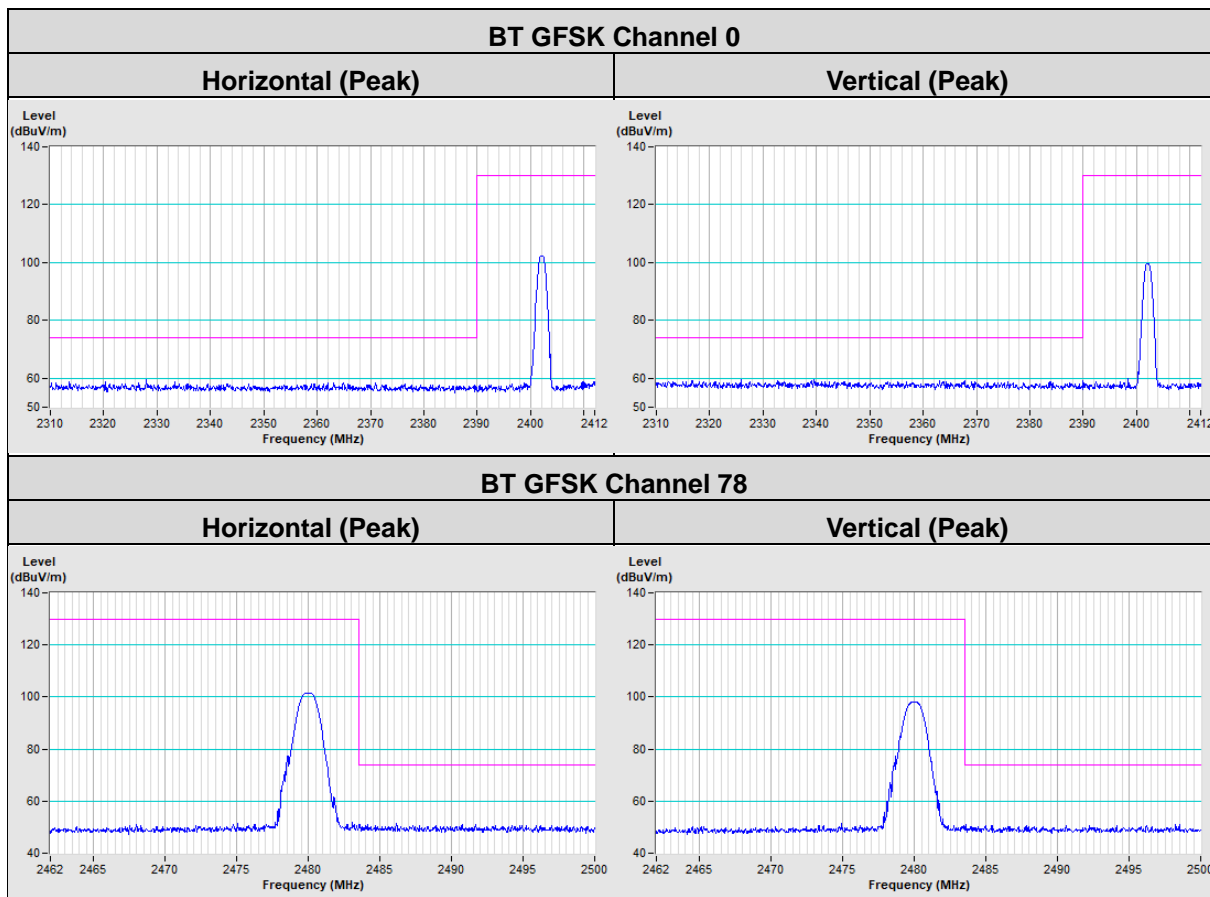
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	103.4 PK			3.02 H	135	70.5	32.9
2	*2480.00	72.9 AV			3.02 H	135	40.0	32.9
3	2483.50	51.6 PK	74.0	-22.4	3.02 H	135	53.1	-1.5
4	2483.50	21.1 AV	54.0	-32.9	3.02 H	135	22.6	-1.5
5	4960.00	47.7 PK	74.0	-26.3	2.82 H	141	42.0	5.7
6	4960.00	17.2 AV	54.0	-36.8	2.82 H	141	11.5	5.7

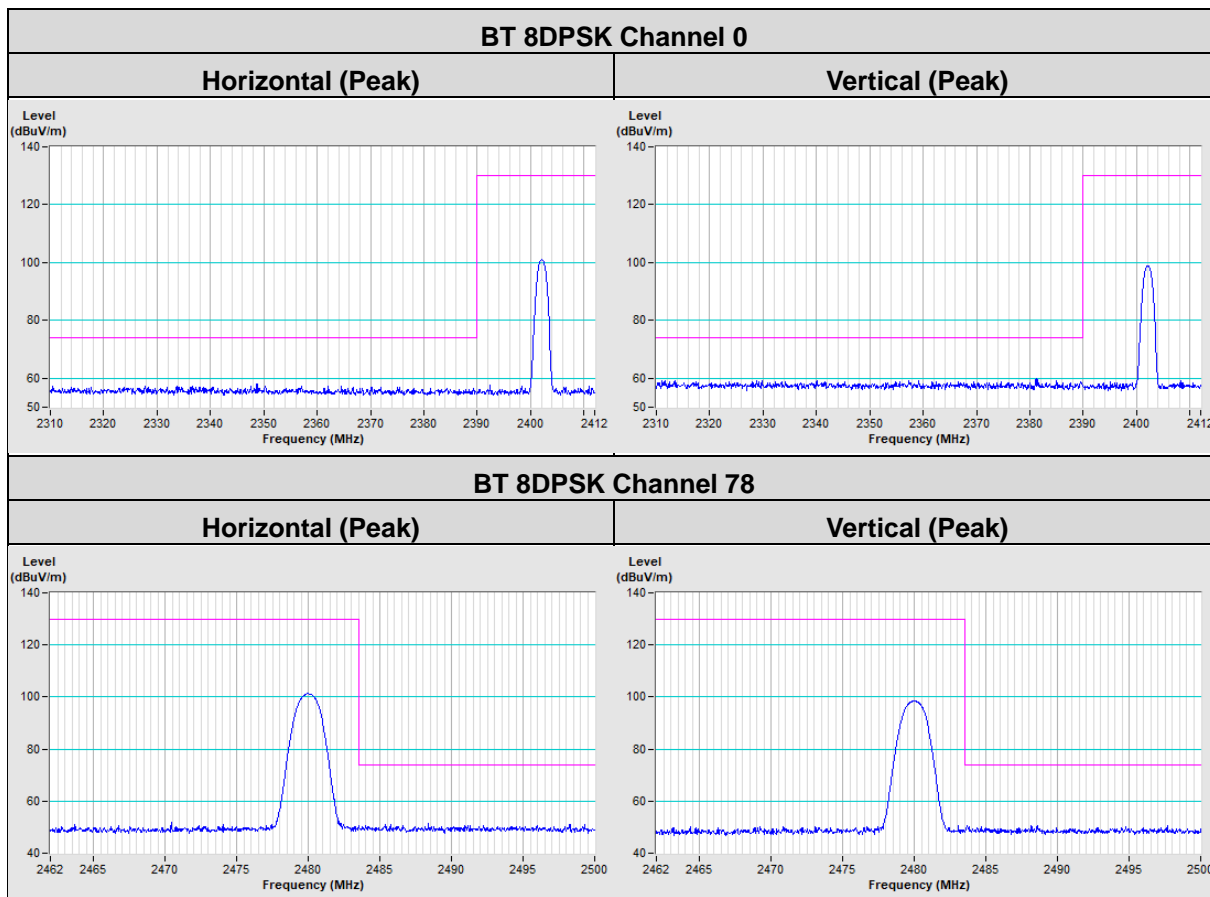
**Antenna Polarity & Test Distance : Vertical at 3 m**

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	*2480.00	100.4 PK			3.14 V	88	67.5	32.9
2	*2480.00	69.9 AV			3.14 V	88	37.0	32.9
3	2483.50	51.4 PK	74.0	-22.6	3.14 V	88	52.9	-1.5
4	2483.50	20.9 AV	54.0	-33.1	3.14 V	88	22.4	-1.5
5	4960.00	47.2 PK	74.0	-26.8	3.01 V	82	41.5	5.7
6	4960.00	16.7 AV	54.0	-37.3	3.01 V	82	11.0	5.7

**Remarks:**

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.
- 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:  
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$







## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 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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