

# FCC Test Report

## (Spot Check)

**Report No.:** RF180102C33C-42

**FCC ID:** PZWBHT1800QG

**Original FCC ID:** PZWBHT1700BQL

**Model:** BHT-1800QWBG-3

**Series Model:** BHT-1800QWBG-1, BHT-1800QWBG-2 (Refer to item 3.1 for the more details)

**Received Date:** Jan. 02, 2018

**Test Date:** Jan. 22 ~ Jul. 19, 2018

**Issued Date:** Jul. 31, 2018

**Applicant:** DENSO WAVE INCORPORATED

**Address:** 1, Yoshiike, Kusagi, Agui-cho, Chita-gun, Aichi, 470-2297 Japan

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

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

**Test Location:** No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

**FCC Registration/ Designation Number:** 788550 / TW0003



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This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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### Release Control Record

Issue No.	Description	Date Issued
RF180102C33C-42	Original release	Jul. 31, 2018

## 1 Certificate of Conformity

**Product:** Barcode Handy Terminal, 2D Code Handy Terminal

**Brand:** DENSO

**Model:** BHT-1800QWBG-3

**Series Model:** BHT-1800QWBG-1, BHT-1800QWBG-2 (Refer to item 3.1 for the more details)

**Sample Status:** Engineering sample

**Applicant:** DENSO WAVE INCORPORATED

**Test Date:** Jan. 23 ~ Jul. 19, 2018

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

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 :** Pettie Chen, **Date:** Jul. 31, 2018

Pettie Chen / Senior Specialist

**Approved by :** Bruce Chen, **Date:** Jul. 31, 2018

Bruce Chen / Project Engineer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
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)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.

**Note:**

If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

### 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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	3.63 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.64 dB
	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.19 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Barcode Handy Terminal, 2D Code Handy Terminal
Brand	DENSO
Model	BHT-1800QWBG-3
Series Model	BHT-1800QWBG-1, BHT-1800QWBG-2
Model Difference	Refer to Note
Status of EUT	Engineering sample
Power Supply Rating	3.85 Vdc (battery) 12Vdc (Cradle)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	1/2/3Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	79
Output Power	2.767mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot-check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit.

2. All models are listed as below.

Model Name	base module	CPU	Software	LCD	WLAN / WWAN / NFC					
			OS	5"	WLAN	GPS	LTE	LTE Antenna type	Docomo IoT	NFC
BHT-1800QWBG-3	5inch WLAN/BT+LTE(USA)	MSM8909	Android	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	USA	<input type="radio"/>	<input type="radio"/>
BHT-1800QWBG-1	5inch WLAN/BT+LTE(USA)	MSM8909	Android	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	USA	<input type="radio"/>	
BHT-1800QWBG-2	5inch WLAN/BT+LTE(USA)	MSM8909	Android	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	USA	<input type="radio"/>	

Model Name	Audio					Sensor	Charge	Reading		
	speaker	Main MIC	Sub MIC	Receiver	Ear phone	IR Reader	wireless charge	2D	Camera (rear)	Camera (front)
BHT-1800QWBG-3	<input type="radio"/>									
BHT-1800QWBG-1	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>						
BHT-1800QWBG-2	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					

\*Model: BHT-1800QWBG-3 was chosen for the final tests.

\*NFC Limited module (include WPC) (Brand: DENSO, Model: DWI003, FCC ID: PZWDWI003) collocated in EUT (model: BHT-1800QWBG-3).

3. The EUT with follow antenna gain is listed as table below.

Brand	Antenna Gain(dBi) Including cable loss	Frequency range (MHz to MHz)	Antenna Type	Connector Type	Cable Loss(dB) (External only)	Cable Length (External only)
WHAYU	2.39	2.4~2.4835GHz	PIFA	Metal shrapnel	1	30cm

4. The EUT consumes power from the following battery.

Battery (For BHT-1800 Used)	
Brand	DENSO
Model	BT-180LA
Rating	2900mAh, 3.85Vdc, 11.165Wh

5. The client provides the following cradles for tests. (Support unit only)

LAN Cradle (For BHT-1800 Used) (Support unit)	
Brand	DENSO
Model	CU-BL-18
Output Power	12Vdc, 4.16A, 50W

USB Cradle (For BHT-1800 Used) (Support unit)	
Brand	DENSO
Model	CU-BU1-18
Output Power	12Vdc, 4.16A, 50W

Adapter for cradle (Support unit)	
Brand	FSP GROUP INC.
Model	FSP050-DBAE1
Input Power	100-240Vac, 1.5A, 50/60Hz
Output Power	12Vdc, 4.16A, 50W
Power Line	1.2m non-shielded DC cable with 1 core attached on adapter

\*After pre-testing, USB cradle is the worst case for the final tests.

6. 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 Description of Test Modes

79 channels are provided to this EUT:

Channel	Freq. (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		

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE $<$ 1G	PLC	APCM	
A	-	-	-	✓	Power from battery
B	-	-	-	-	Power from Cradle

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

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

#### 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 TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

#### Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
APCM	25deg. C, 60%RH	120Vac, 60Hz	Chris Lin

### 3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

#### 3.3.1 Configuration of System under Test

Test Mode A



### 3.4 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 (15.247)

#### KDB 558074 D01 15.247 Meas Guidance v05

ANSI C63.10-2013

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

## 4 Test Types and Results

### 4.1 Number of Hopping Frequency Used

#### 4.1.1 Limits of Hopping Frequency Used Measurement

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

#### 4.1.2 Test Setup



#### 4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018

#### 4.1.4 Test Procedure

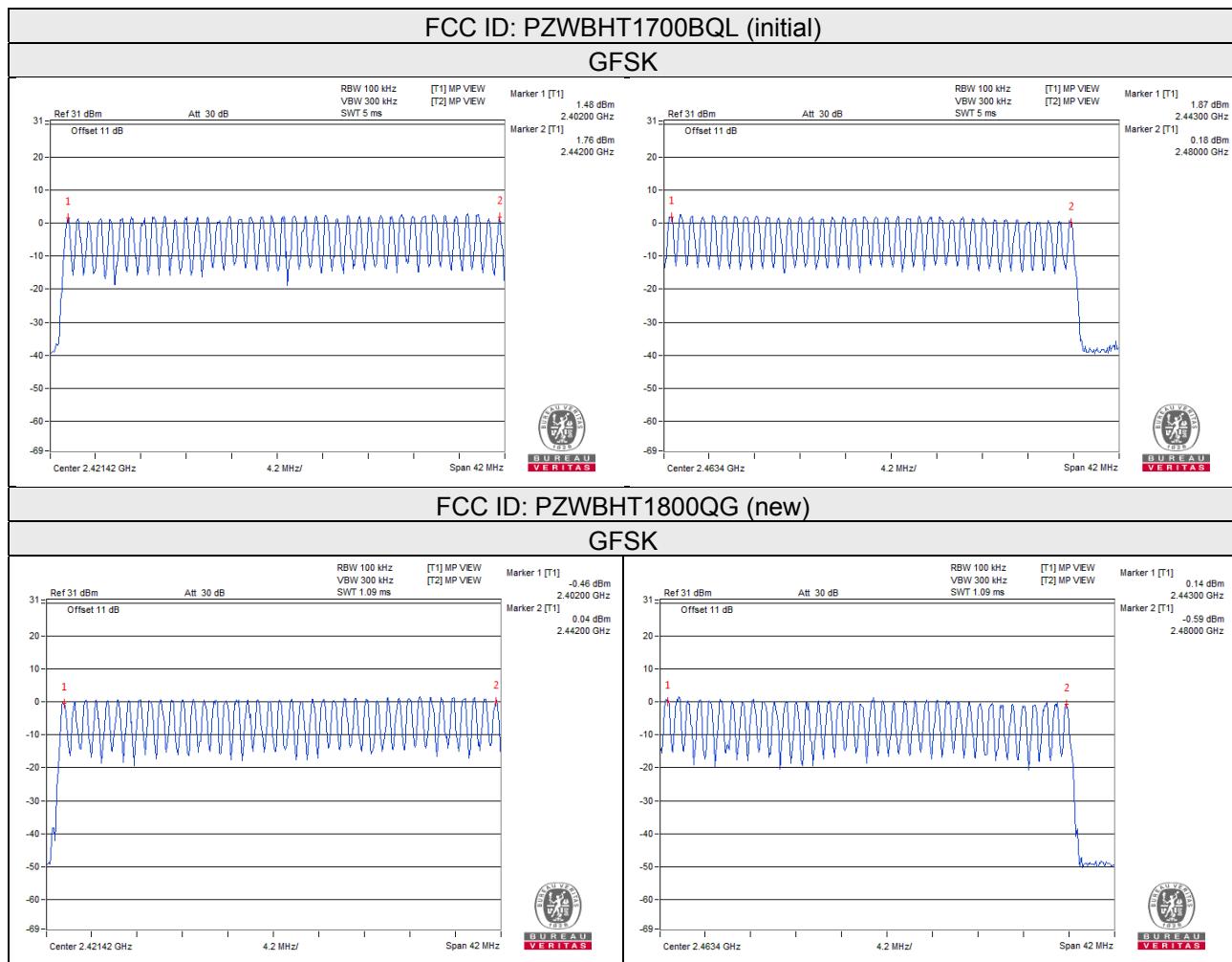
- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make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

#### 4.1.5 Deviation from Test Standard

No deviation.

#### 4.1.6 Test Results

There are 79 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.



## 4.2 Dwell Time on Each Channel

### 4.2.1 Limits of Dwell Time on Each Channel Measurement

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.

### 4.2.2 Test Setup



### 4.2.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

### 4.2.4 Test Procedures

- 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. Adjust the center frequency of SA on any frequency to be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.

### 4.2.5 Deviation from Test Standard

No deviation.

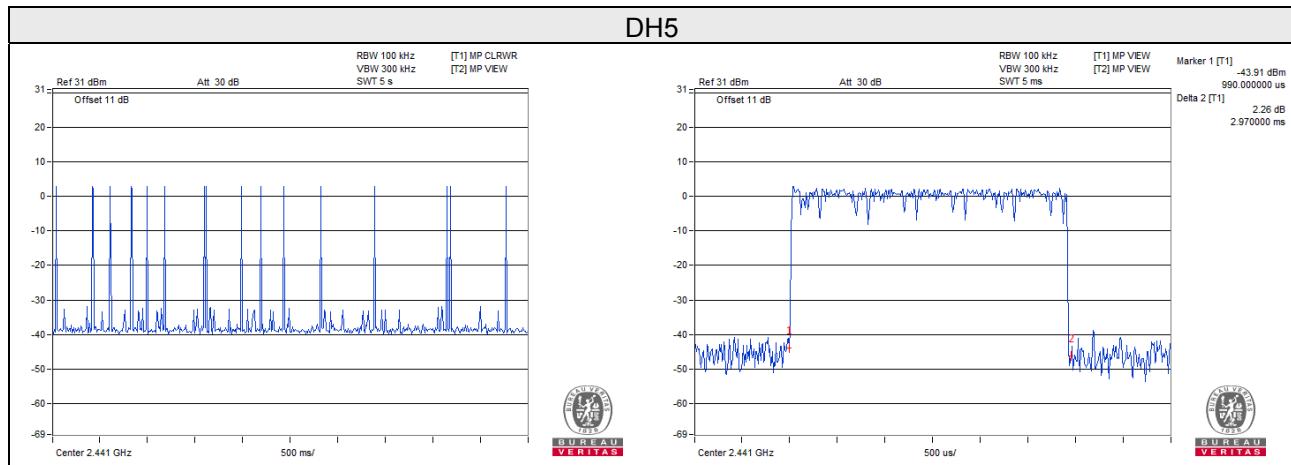
#### 4.2.6 Test Results

FCC ID: PZWBHT1700BQL (initial)

**GFSK**

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH5	16 (times / 5 sec) * 6.32 = 101.12 times	2.97	300.33	400

Note: Test plots of the transmitting time slot are shown as below.

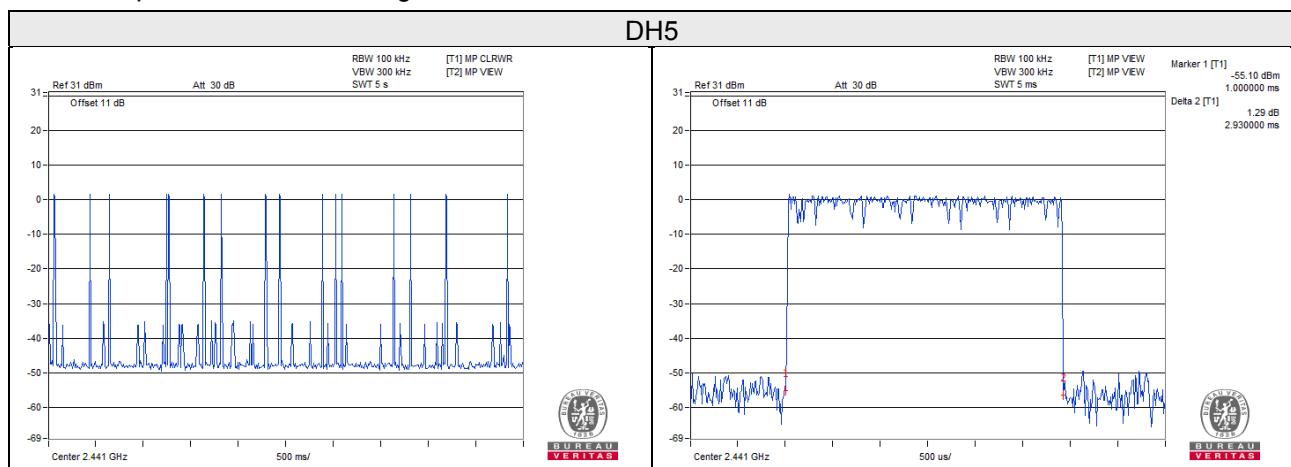


FCC ID: PZWBHT1800QG (new)

**GFSK**

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH5	16 (times / 5 sec) * 6.32 = 101.12 times	2.93	296.28	400

Note: Test plots of the transmitting time slot are shown as below.



### 4.3 Channel Bandwidth

#### 4.3.1 Limits of Channel Bandwidth Measurement

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

#### 4.3.4 Test Procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. 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.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

#### 4.3.5 Deviation from Test Standard

No deviation.

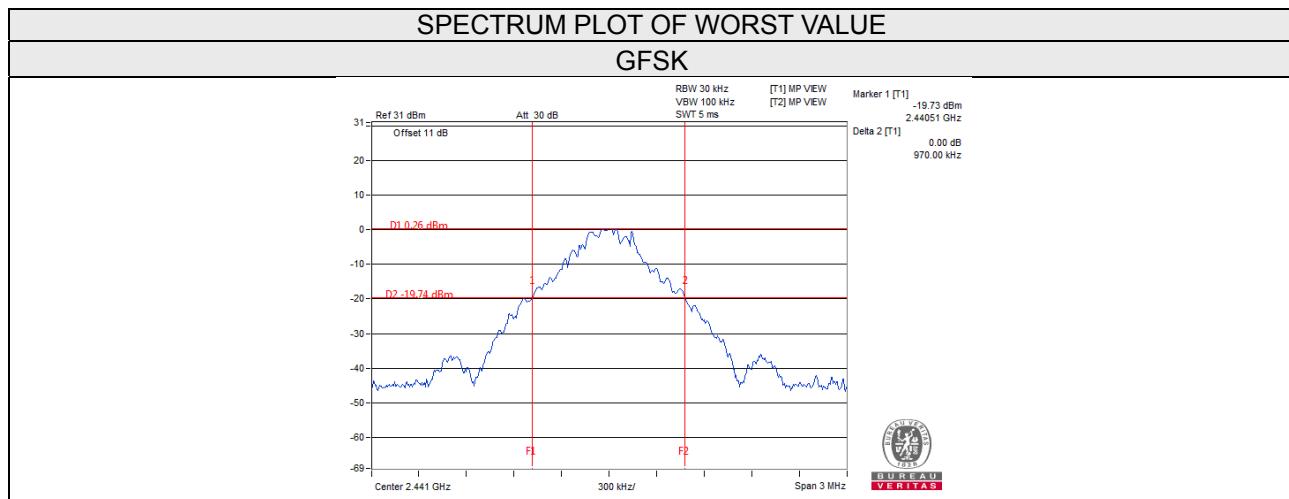
#### 4.3.6 EUT Operating Condition

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

#### 4.3.7 Test Results

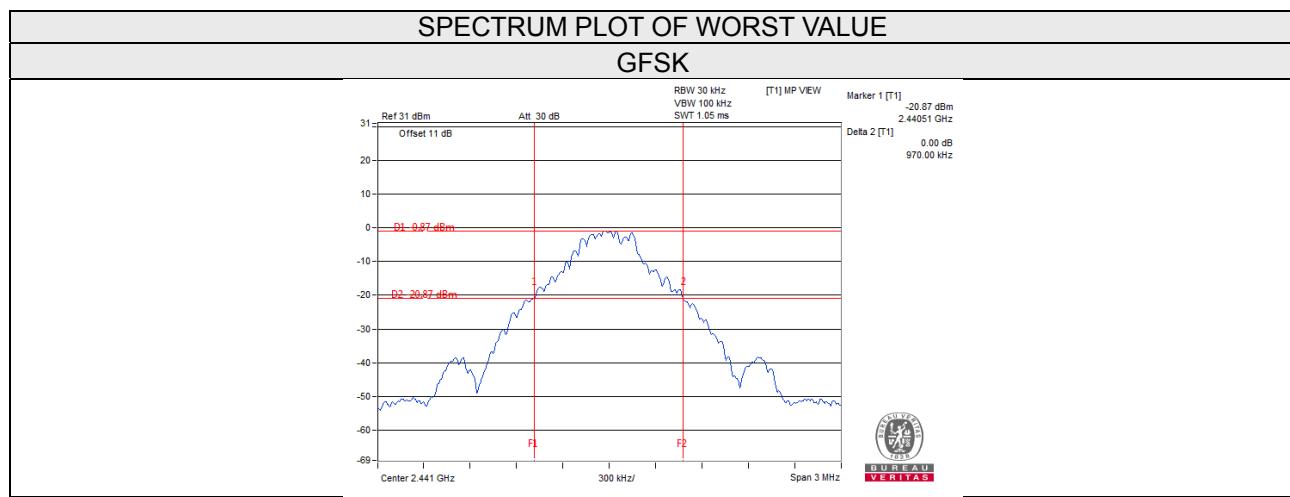
FCC ID: PZWBHT1700BQL

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
		GFSK
39	2441	0.97



FCC ID: PZWBHT1800QG

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
		GFSK
39	2441	0.97



## 4.4 Hopping Channel Separation

### 4.4.1 Limits of Hopping Channel Separation Measurement

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

### 4.4.2 Test Setup



### 4.4.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

### 4.4.4 Test Procedure

Measurement Procedure REF

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- c. By using the MaxHold function record the separation of two adjacent channels.
- d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

### 4.4.5 Deviation from Test Standard

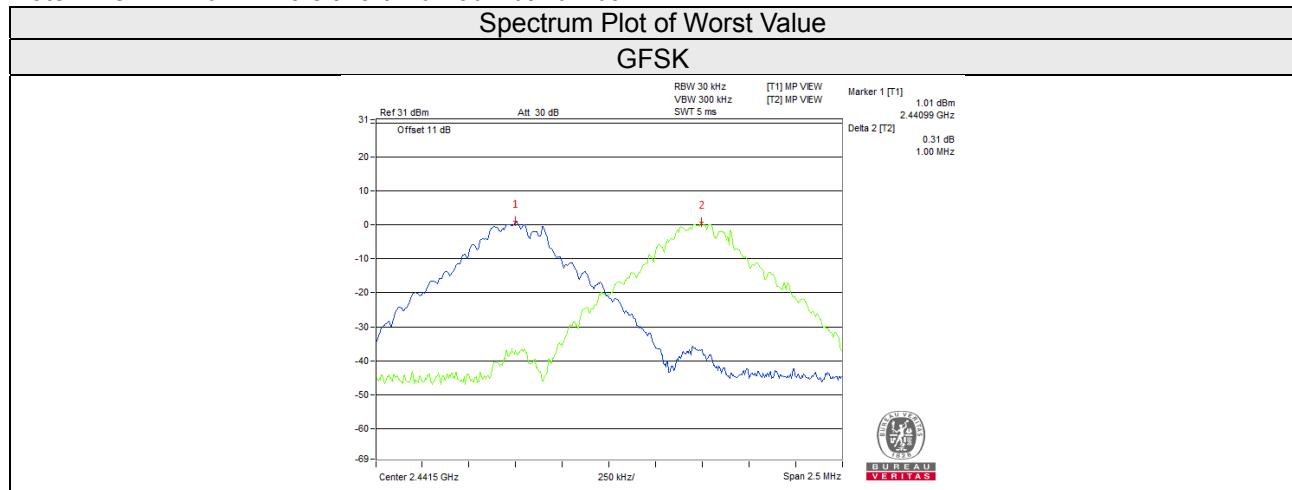
No deviation.

#### 4.4.6 Test Results

FCC ID: PZWBHT1700BQL

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
		GFSK	GFSK	GFSK	
39	2441	1.00	0.97	0.65	Pass

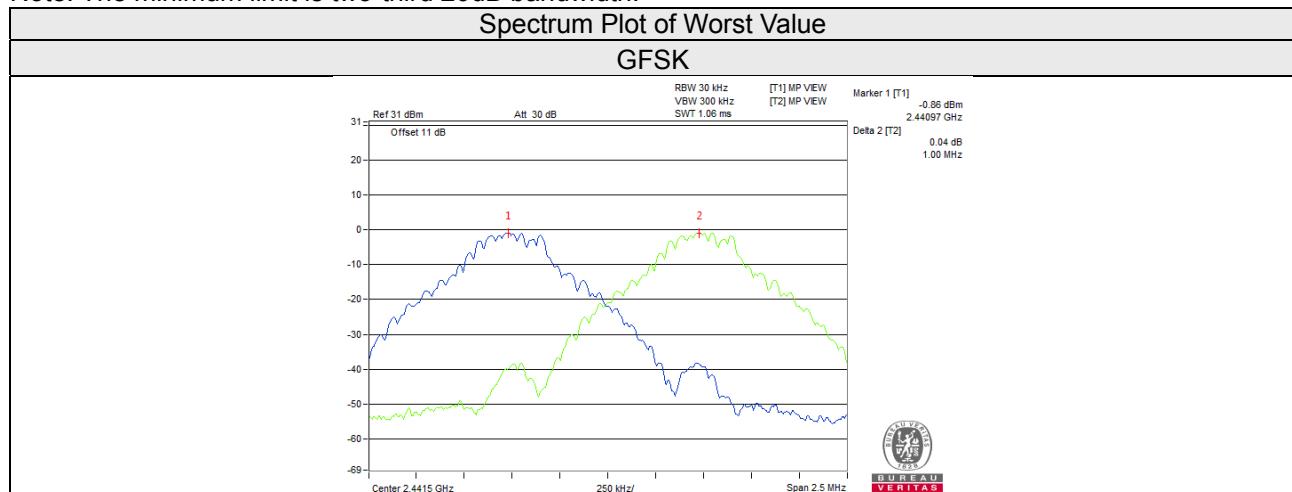
Note: The minimum limit is two-third 20dB bandwidth.



FCC ID: PZWBHT1800QG

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
		GFSK	GFSK	GFSK	
39	2441	1.00	0.97	0.65	Pass

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

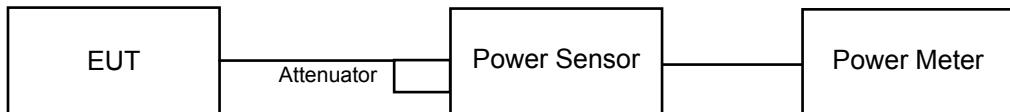


## 4.5 Maximum Output Power

### 4.5.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125mW.

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

### 4.5.4 Test Procedure

A 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.

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Condition

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

#### 4.5.7 Test Results

FCC ID: PZWBHT1700BQL (initial)

Peak Power

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	1.762	1.479	2.46	1.70	125	Pass
39	2441	2.415	2.767	3.83	4.42	125	Pass
78	2480	1.358	1.349	1.33	1.30	125	Pass

Average Power

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)			
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	1.563	0.953	1.94	-0.21		
39	2441	2.183	1.259	3.39	1.00		
78	2480	1.306	0.798	1.16	-0.98		

FCC ID: PZWBHT1800QG (new)

Peak Power

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	1.75	1.429	2.43	1.55	125	Pass
39	2441	2.323	2.679	3.66	4.28	125	Pass
78	2480	1.318	1.303	1.20	1.15	125	Pass

Average Power

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)			
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	1.442	0.9036	1.59	-0.44		
39	2441	2.065	1.175	3.15	0.70		
78	2480	1.236	0.7516	0.92	-1.24		

## 4.6 Conducted Out of Band Emission Measurement

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

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

### 4.6.2 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

### 4.6.3 Test Procedure

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 4.6.4 Deviation from Test Standard

No deviation.

### 4.6.5 EUT Operating Condition

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

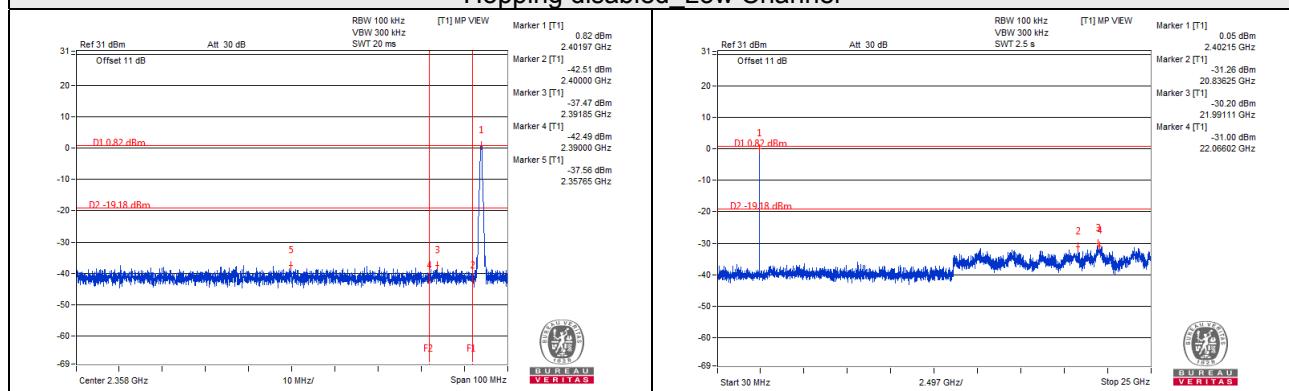
### 4.6.6 Test Results

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

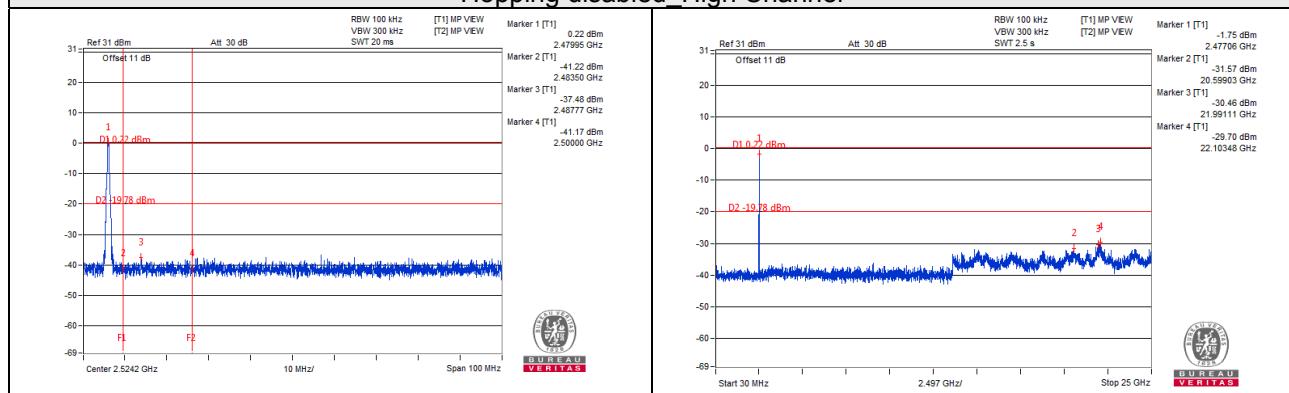
FCC ID: PZWBHT1700BQL (initial)

GFSK

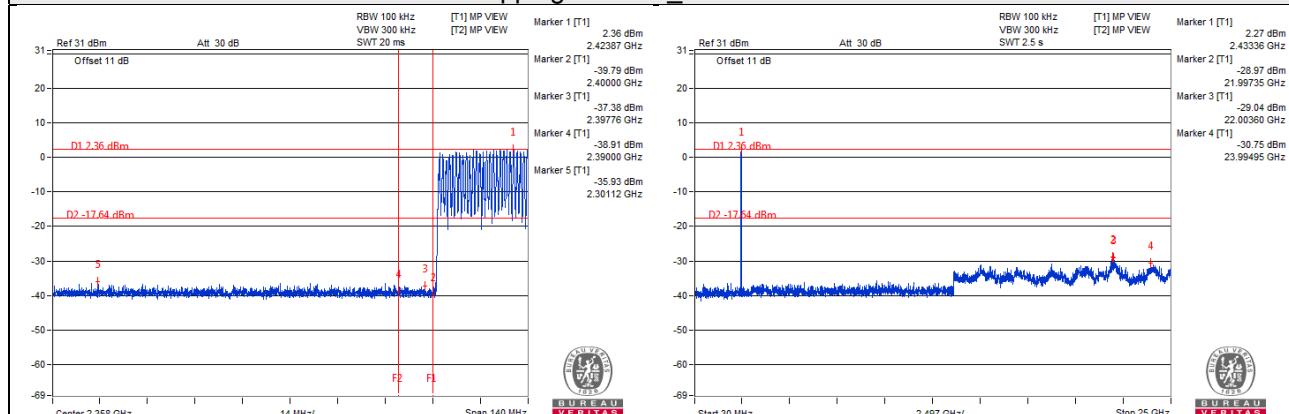
## Hopping disabled\_Low Channel



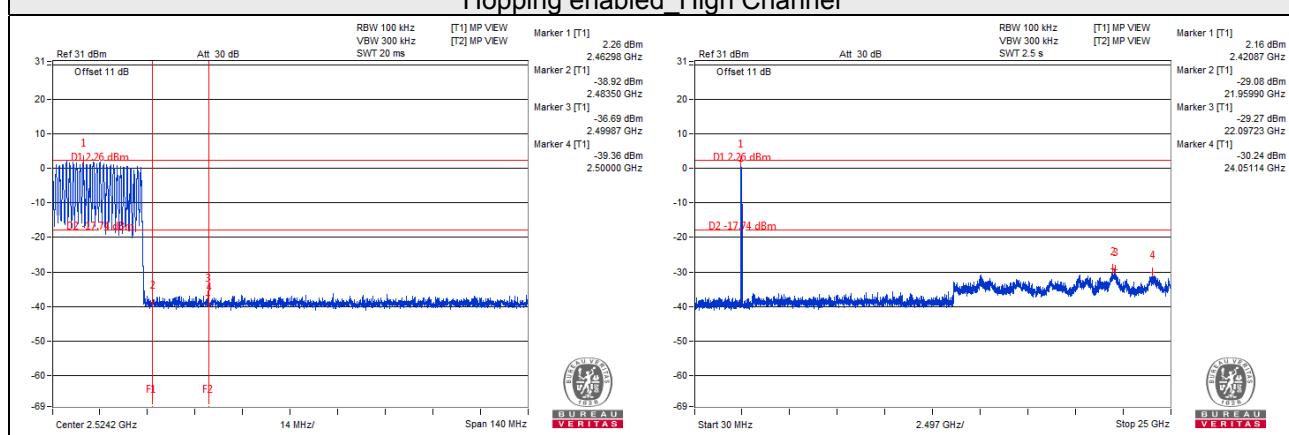
## Hopping disabled\_High Channel



## Hopping enabled\_Low Channel



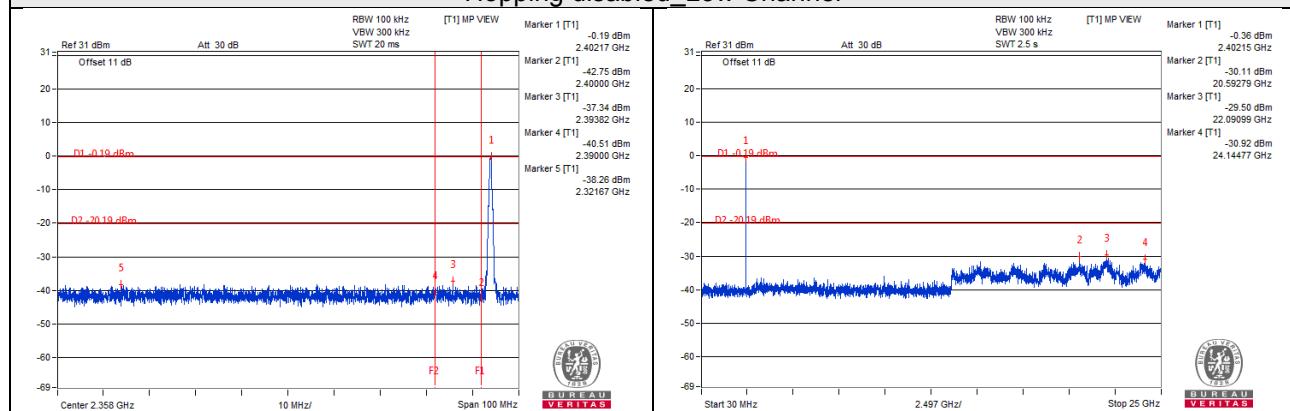
## Hopping enabled\_High Channel



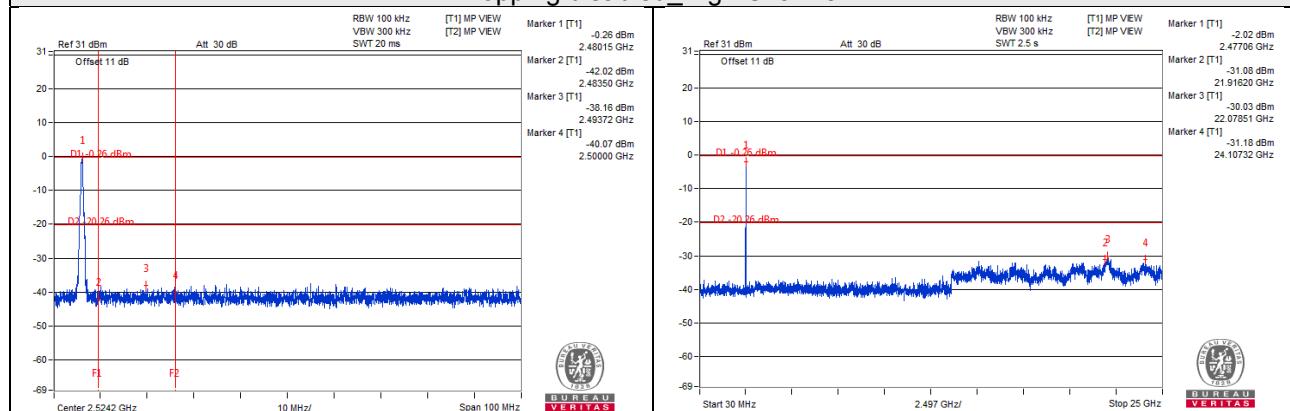
FCC ID: PZWBHT1800QG (new)

GFSK

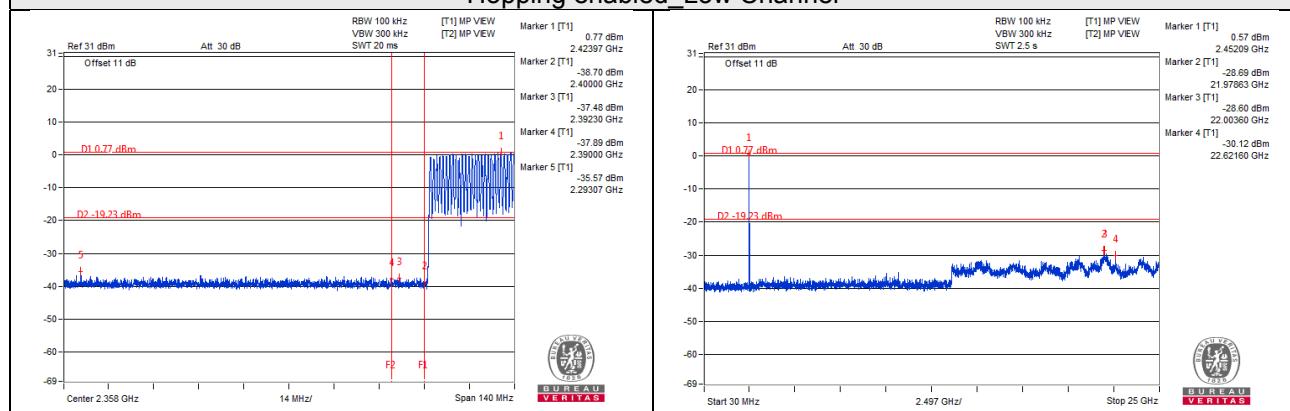
## Hopping disabled\_Low Channel



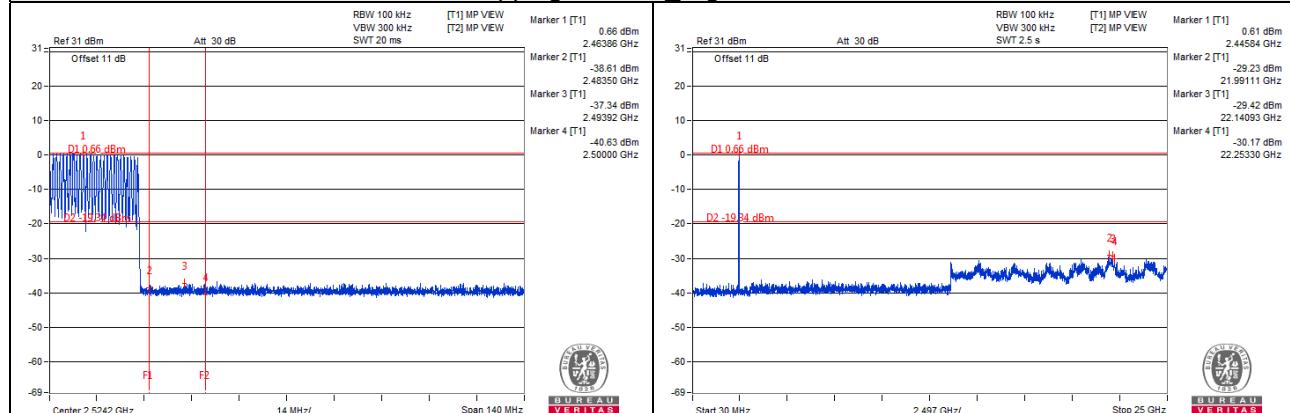
## Hopping disabled\_High Channel



## Hopping enabled\_Low Channel



## Hopping enabled\_High Channel



## 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 accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

### **Linko EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

### **Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-6668565

Fax: 886-3-6668323

### **Hwa Ya EMC/RF/Safety Lab**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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

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