

FCC Test Report (Spot Check)

Report No.: RF180102C33C-36

FCC ID: PZWBHT1700QG

Original FCC ID: PZWBHT1700BQL

Model: BHT-1700QWBG-2

Series Model: BHT-1700QWBG-1 (Refer to item 3.1 for the more details)

Received Date: Jan. 02, 2018

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

Issued Date: Jul. 31, 2018

Applicant: DENSO WAVE INCORPORATED

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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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Release Control Record

Issue No.	Description	Date Issued
RF180102C33C-36	Original release	Jul. 31, 2018

1 Certificate of Conformity

Product: Barcode Handy Terminal, 2D Code Handy Terminal

Brand: DENSO

Model: BHT-1700QWBG-2

Series Model: BHT-1700QWBG-1 (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:** Jun. 06, 2018
Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Jun. 06, 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(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.

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	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~ 1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 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-1700QWBG-2
Series Model	BHT-1700QWBG-1
Model Difference	Refer to Note
Sample Status	Engineering sample
Power Supply Rating	3.7Vdc (battery) 12Vdc (Cradle)
Modulation Type	GFSK
Transfer Rate	1Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	40
Channel Spacing	2MHz
Output Power	2.213mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Data Cable Supplied	NA

Note:

- 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.
- All models are listed as below.

Model Name	base module	CPU	Software	LCD	WLAN / WWAN / NFC						
			OS	4"	WLAN	GPS	LTE	LTE Antenna type	Docomo IoT	NFC	
BHT-1700QWBG-2	4inch WLAN/BT+LTE(USA)	MSM8909	Android	○	○	○	○	○	USA	○	○
BHT-1700QWBG-1	4inch WLAN/BT+LTE(USA)	MSM8909	Android	○	○	○	○	○	USA	○	○

Model Name	Audio				Sensor	Reading		keyboard
	speaker	Main MIC	Sub MIC	Receiver	IR Reader	2D	Camera (rear)	10Key
BHT-1700QWBG-2	○	○	○	○	○	○	○	○
BHT-1700QWBG-1	○	○	○	○	○	○	○	○

*Model: BHT-1700QWBG-2 was chosen for the final tests.

*NFC Limited module (Brand: DENSO, Model: DWI002, FCC ID: PZWDWI002) collocated in EUT (model: BHT-1700QWBG-2).

- 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	2.27	2.4~2.4835GHz	PIFA	Metal shrapnel	1	30cm

4. The EUT consumes power from the following battery.

Battery 1 (For BHT-1700 Used)	
Brand	DENSO
Model	BT-110LA
Rating	2300mAh, 3.7Vdc, 8.5Wh

Battery 2 (For BHT-1700 Used)	
Brand	DENSO
Model	BT-110L
Rating	3450mAh, 3.7Vdc, 12.8Wh

*After pre-testing, battery 1 was the worst case for the final tests.

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

LAN Cradle (For BHT-1700 Used) (Support unit)	
Brand	DENSO
Model	CU-BL-17
Output Power	12Vdc, 4.16A, 50W

USB Cradle (For BHT-1700 Used) (Support unit)	
Brand	DENSO
Model	CU-BU1-17
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 was the worst case for the final tests.

3.2 Description of Test Modes

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	-	-	-	√	Power from battery
B	-	-	-	-	Power from Cradle

Where **RE≥1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

Note: "-" means no effect.

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.

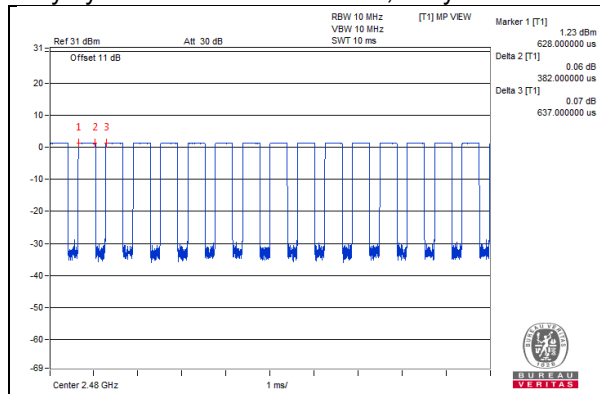
EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
A	0 to 39	0, 19, 39	GFSK	1

Test Condition:

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

3.3 Duty Cycle of Test Signal

Duty cycle = $0.382/0.637=0.614$, Duty factor = $10 * \log(1/0.614) = 2.22$



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	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	81A4	YD02TWF5	PPD-QCNFA435	-
B.	Cradle	DENSO	CU-BU1-17	NA	NA	Provided by manufacturer
C.	Adapter	FSP GROUP INC.	FSP050-DBAE1	NA	NA	Provided by manufacturer

Note: All power cords of the above support units are non-shielded (1.8m).

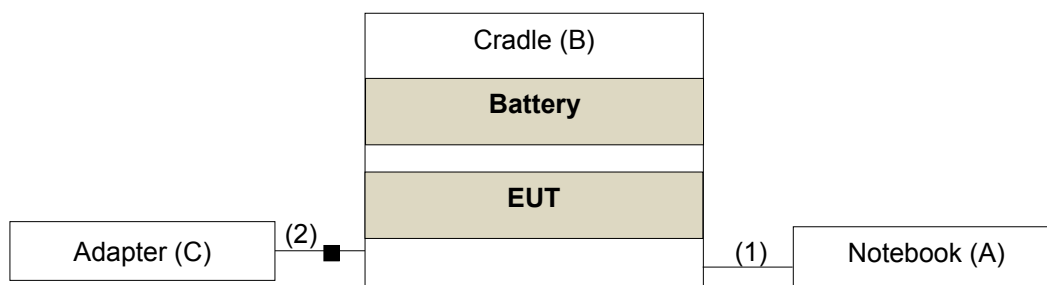
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	0.5	Y	0	-
2.	DC cable	1	1.2	N	1	Provided by manufacturer

3.4.1 Configuration of System under Test

Test Mode A



Test Mode B



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 (15.247)

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.

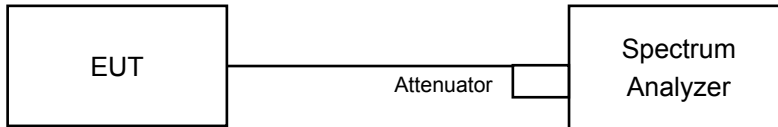
4 Test Types and Results

4.1 6dB Bandwidth Measurement

4.1.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.1.5 Deviation from Test Standard

No deviation.

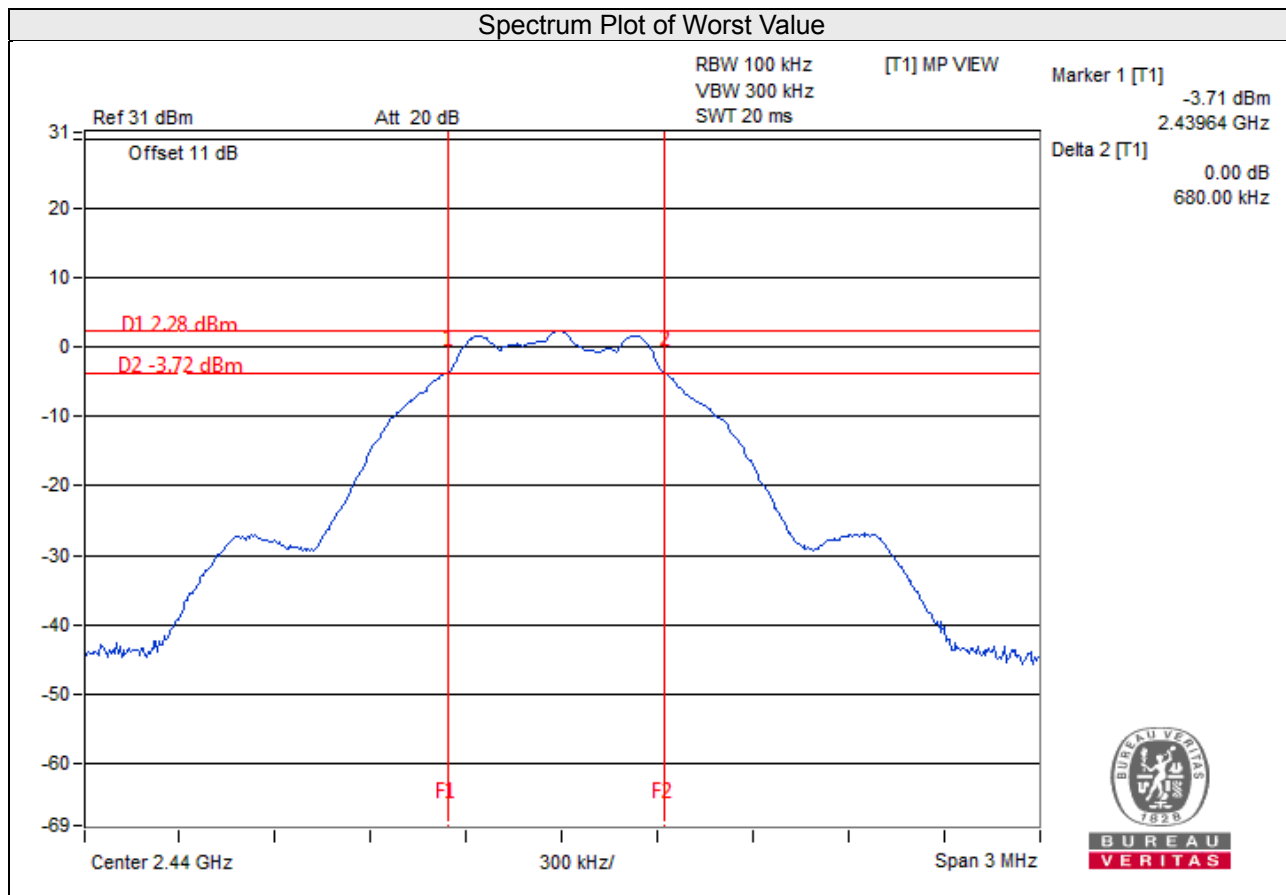
4.1.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.1.7 Test Result

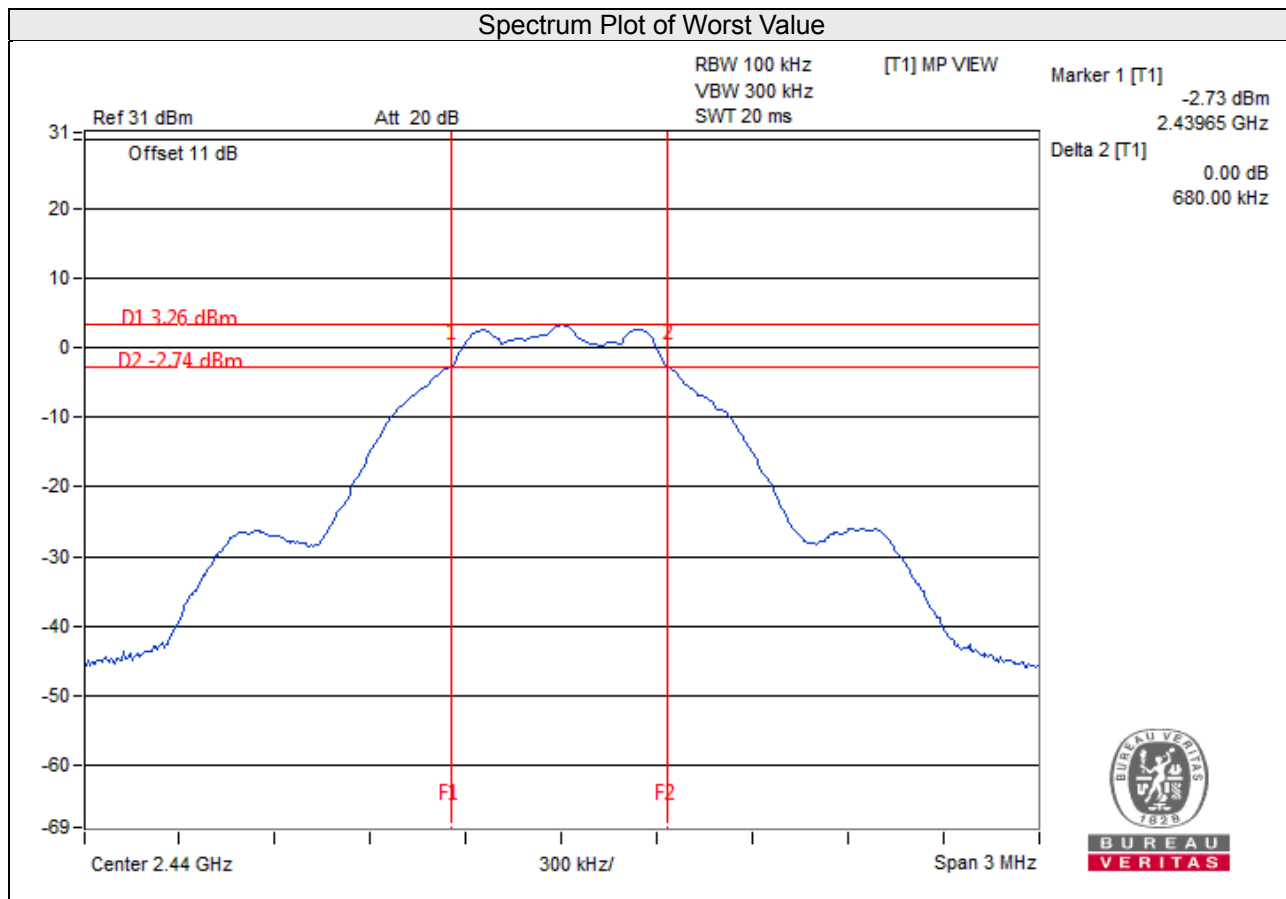
FCC ID: PZWBHT1700BQL (initial)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
19	2440	0.68	0.5	Pass



PZWBHT1700QG (new)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
19	2440	0.68	0.5	Pass

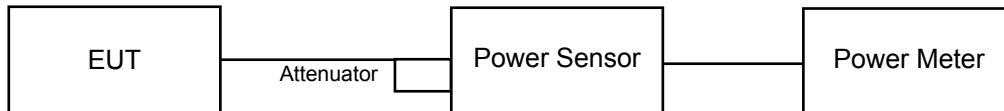


4.2 Conducted Output Power Measurement

4.2.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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 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.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

Same as Item 4.1.6.

4.2.7 Test Results

FCC ID: PZWBHT1700BQL (initial)

Peak Power

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	1.614	2.08	30	Pass
19	2440	2.213	3.45	30	Pass
39	2480	1.352	1.31	30	Pass

Average Power

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	1.552	1.91
19	2440	2.123	3.27
39	2480	1.294	1.12

PZWBHT1700QG (new)

Peak Power

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	1.60	2.04	30	Pass
19	2440	2.203	3.43	30	Pass
39	2480	1.34	1.27	30	Pass

Average Power

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	1.531	1.85
19	2440	2.113	3.25
39	2480	1.276	1.06

4.3 Power Spectral Density Measurement

4.3.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

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. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d. Set the VBW $\geq 3 \times \text{RBW}$.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.3.5 Deviation from Test Standard

No deviation.

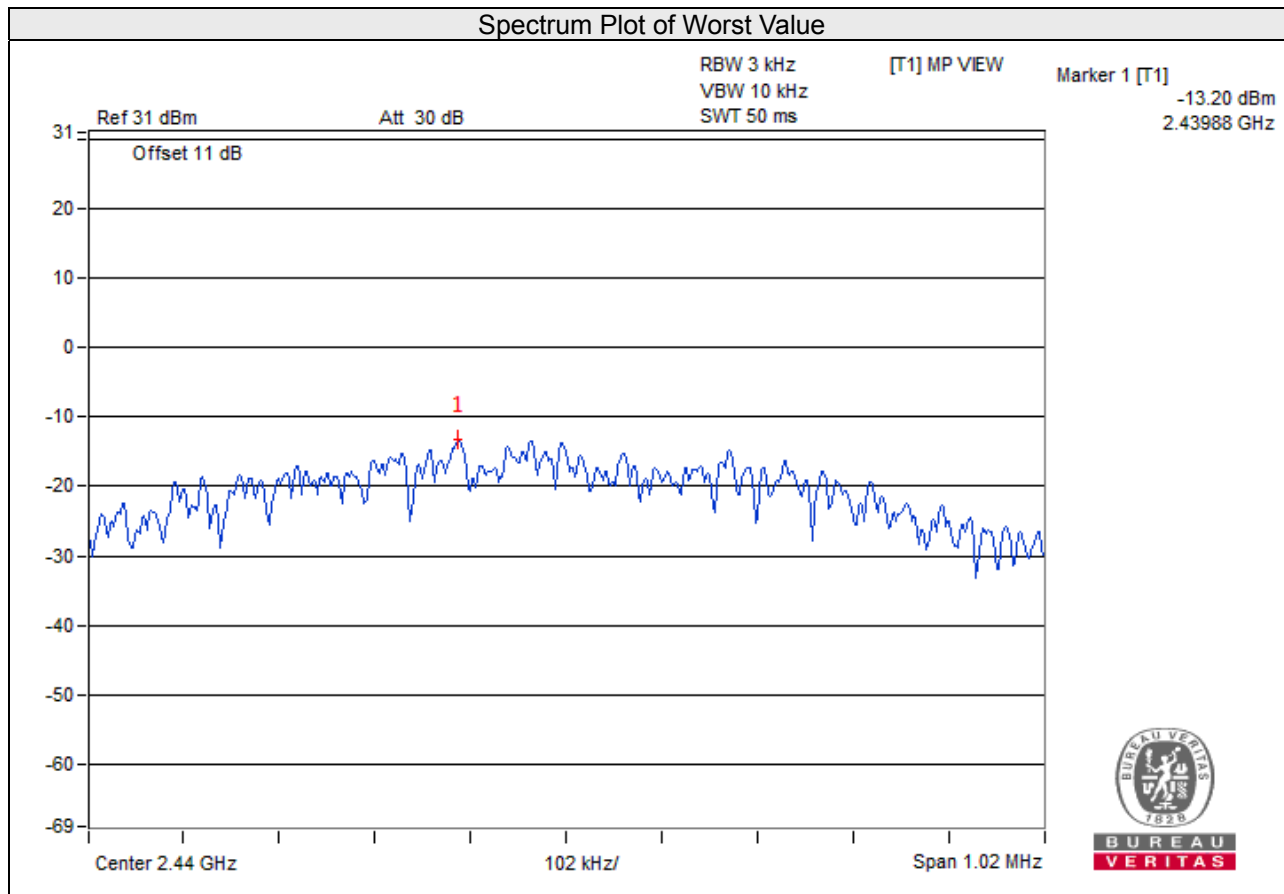
4.3.6 EUT Operating Condition

Same as Item 4.1.6

4.3.7 Test Results

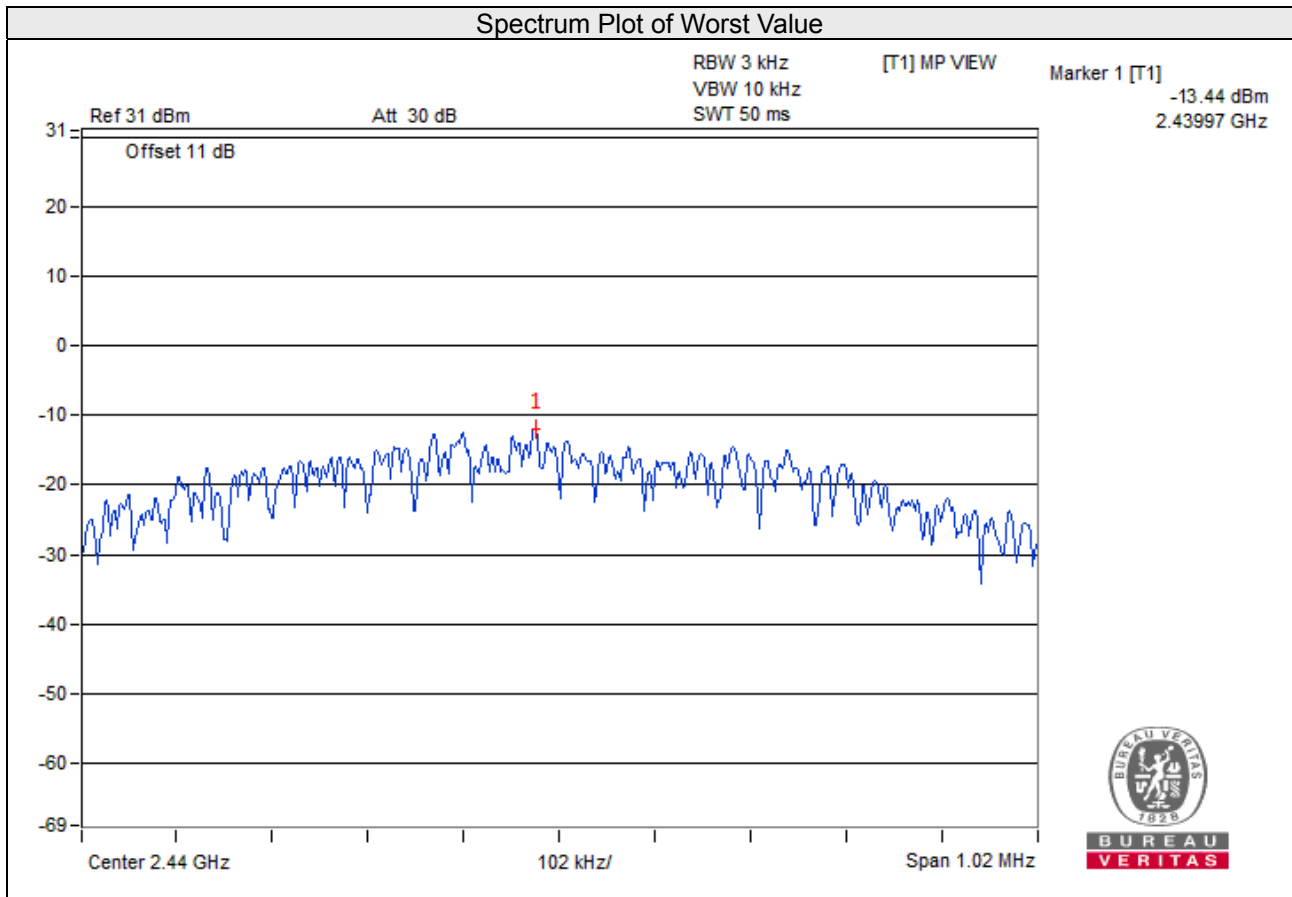
FCC ID: PZWBHT1700BQL (initial)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
19	2440	-13.20	8.00	Pass



PZWBHT1700QG (new)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
19	2440	-13.44	8.00	Pass

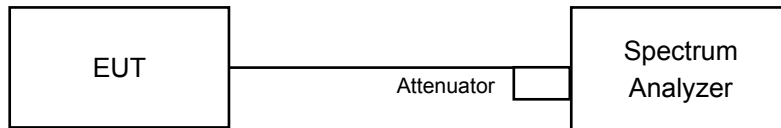


4.4 Conducted Out of Band Emission Measurement

4.4.1 Limits of Conducted Out of Band Emission Measurement

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

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

- 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 OOBE

- 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.

4.4.5 Deviation from Test Standard

No deviation.

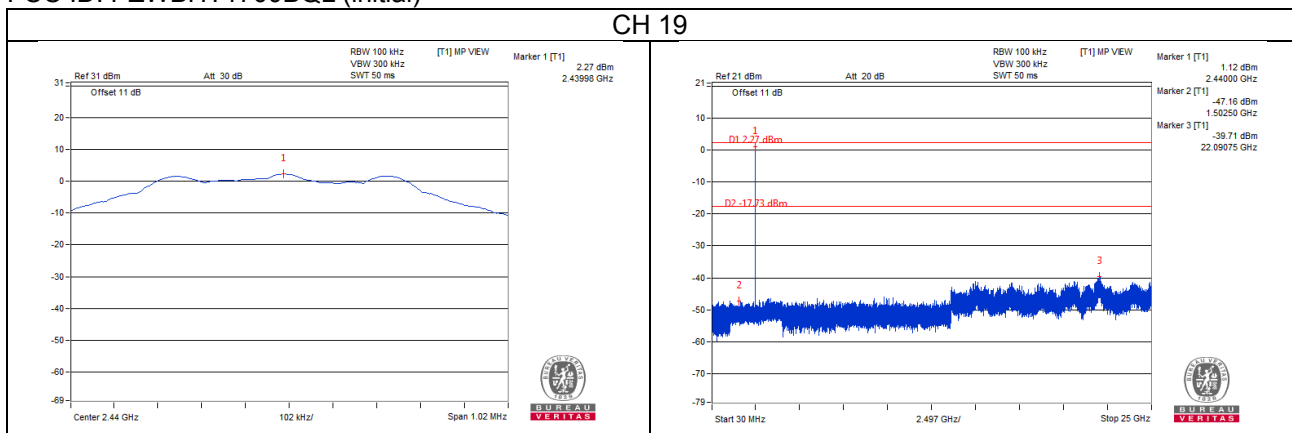
4.4.6 EUT Operating Condition

Same as Item 4.1.6

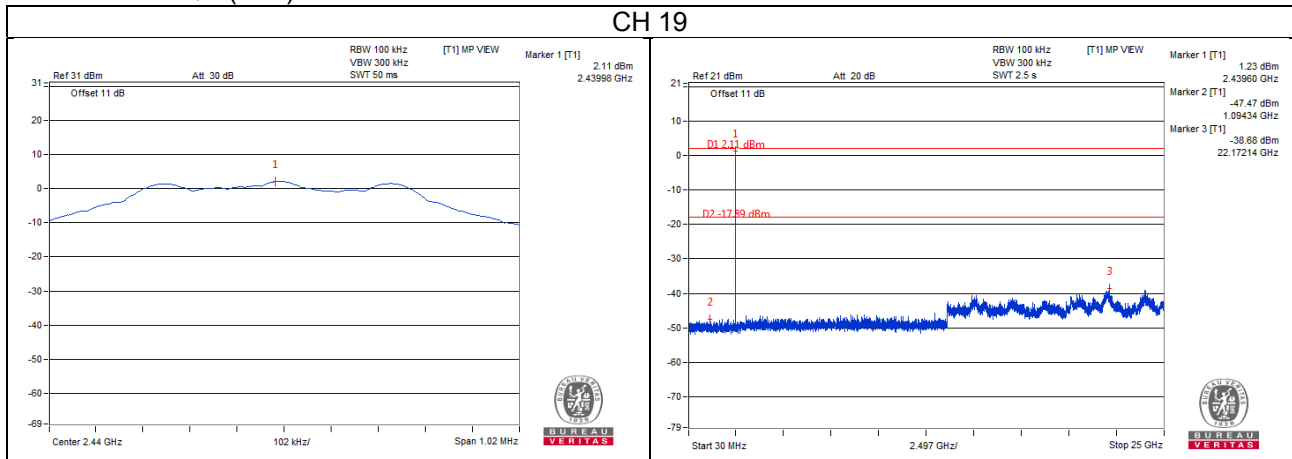
4.4.7 Test Results

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

FCC ID: PZWBHT1700BQL (initial)



PZWBHT1700QG (new)



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:

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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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