

FCC Test Report (Spot Check)

Report No.: RF180102C33C-37

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. 22 ~ 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

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



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Release Control Record

Issue No.	Description	Date Issued
RF180102C33C-37	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. 22 ~ Jul. 19, 2018

Standards: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's 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 E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit.
15.407(g)	Frequency Stability	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	30MHz ~ 200MHz	3.63 dB
	200MHz ~ 1000MHz	3.64 dB
	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	16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 150Mbps
Operating Frequency	5180~5240MHz, 5260~5320MHz, 5500~5700MHz, 5745~5825MHz
Number of Channel	5180~5240MHz: 802.11a, 802.11n (HT20): 4 802.11n (HT40): 2 5260~5320MHz: 802.11a, 802.11n (HT20): 4 802.11n (HT40): 2 5500~5700MHz: 802.11a, 802.11n (HT20): 11 802.11n (HT40): 5 5745~5825MHz: 802.11a, 802.11n (HT20): 5 802.11n (HT40): 2
Output Power	5180~5240MHz: 41.210mW 5260~5320MHz: 40.179mW 5500~5700MHz: 42.855mW 5745~5825MHz: 45.604mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
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 provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function
802.11a	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX

- The EUT with follow antennas 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
	3.59	5.15~5.25GHz	PIFA	Metal shrapnel	1.7	30cm
	3.51	5.25~5.35GHz	PIFA	Metal shrapnel	1.7	30cm
	4.13	5.47~5.725GHz	PIFA	Metal shrapnel	1.7	30cm
	2.91	5.725~5.850GHz	PIFA	Metal shrapnel	1.7	30cm

- 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.

6. 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.

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

3.2 Description of Test Modes

5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

5260~5320MHz:

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

5500~5700MHz:

11 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz		

5 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz		

5745~5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

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
 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	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11n (HT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11n (HT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11n (HT40)		102 to 134	102, 110, 134	OFDM	13.5
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	6.5
	802.11n (HT40)		151 to 159	151, 159	OFDM	13.5

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 of test signal is $\geq 98\%$, duty factor is not required.

Duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11a: Duty cycle = $1.348/1.584 = 0.851$, Duty factor = $10 * \log(1/0.851) = 0.70$

802.11n (HT20): Duty cycle = $1.276/1.476 = 0.864$, Duty factor = $10 * \log(1/0.864) = 0.63$

802.11n (HT40): Duty cycle = $0.628/0.828 = 0.758$, Duty factor = $10 * \log(1/0.758) = 1.20$



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).

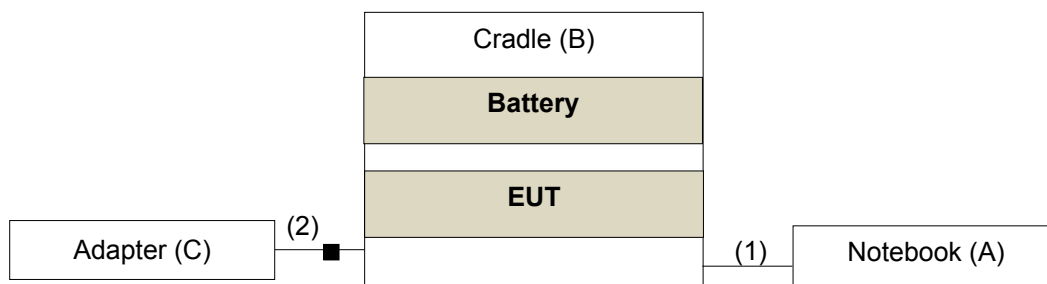
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	0.5	Y	0	-
2.	DC cable	1	1.2	N	1	Provided by manufacturer

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 E (15.407)

KDB 789033 D02 General UNII Test Procedure New Rules v02r01

ANSI C63.10:2013

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

4 Test Types and Results

4.1 Transmit Power Measurement

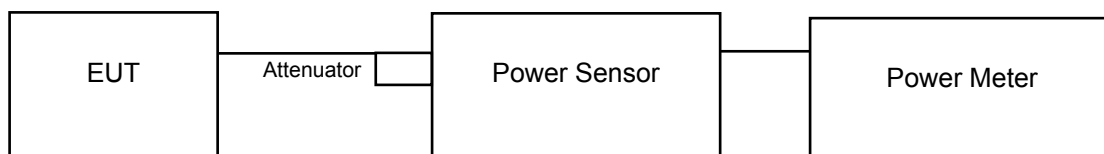
4.1.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p \leq 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Mobile and Portable client device	250mW (24 dBm)
U-NII-2A		√	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C		√	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3		√	1 Watt (30 dBm)

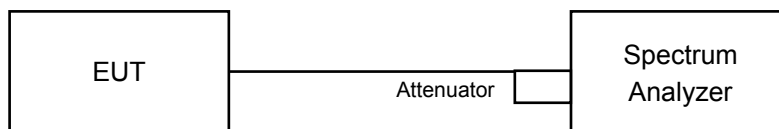
*B is the 26 dB emission bandwidth in megahertz

4.1.2 Test Setup

For Power Output
 802.11a, 802.11n (HT20), 802.11n (HT40)



For 26dB and Occupied Bandwidth



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

For Average Power Measurement

For 802.11a, 802.11n (HT20), 802.11n (HT40)

Method PM is 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.

For 26dB Bandwidth

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

For Occupied Bandwidth

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to Sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given 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)

Power Output:

802.11a

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
36	5180	41.210	16.15	24.00	Pass
40	5200	40.551	16.08	24.00	Pass
48	5240	39.537	15.97	24.00	Pass
52	5260	40.179	16.04	24.00	Pass
60	5300	39.902	16.01	24.00	Pass
64	5320	40.087	16.03	24.00	Pass
100	5500	42.170	16.25	24.00	Pass
116	5580	42.855	16.32	24.00	Pass
140	5700	33.651	15.27	24.00	Pass
149	5745	45.604	16.59	30.00	Pass
157	5785	43.752	16.41	30.00	Pass
165	5825	42.170	16.25	30.00	Pass

Note:

For U-NII-2A, U-NII-2C Band:

1. $11\text{dBm} + 10\log(40.37) = 27.06\text{ dBm} > 24\text{dBm}$
2. $11\text{dBm} + 10\log(41.33) = 27.16\text{ dBm} > 24\text{dBm}$
3. $11\text{dBm} + 10\log(43.10) = 27.34\text{ dBm} > 24\text{dBm}$
4. $11\text{dBm} + 10\log(41.02) = 27.13\text{ dBm} > 24\text{dBm}$
5. $11\text{dBm} + 10\log(42.77) = 27.31\text{ dBm} > 24\text{dBm}$
6. $11\text{dBm} + 10\log(41.85) = 27.22\text{ dBm} > 24\text{dBm}$

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
36	5180	30.339	14.82	24.00	Pass
40	5200	30.974	14.91	24.00	Pass
48	5240	30.903	14.90	24.00	Pass
52	5260	32.434	15.11	24.00	Pass
60	5300	31.477	14.98	24.00	Pass
64	5320	30.974	14.91	24.00	Pass
100	5500	34.119	15.33	24.00	Pass
116	5580	34.435	15.37	24.00	Pass
140	5700	23.550	13.72	24.00	Pass
149	5745	34.356	15.36	30.00	Pass
157	5785	34.514	15.38	30.00	Pass
165	5825	31.842	15.03	30.00	Pass

Note:

For U-NII-2A, U-NII-2C Band:

1. $11\text{dBm} + 10\log(40.49) = 27.07\text{ dBm} > 24\text{dBm}$
2. $11\text{dBm} + 10\log(40.87) = 27.11\text{ dBm} > 24\text{dBm}$
3. $11\text{dBm} + 10\log(39.91) = 27.01\text{ dBm} > 24\text{dBm}$
4. $11\text{dBm} + 10\log(42.95) = 27.33\text{ dBm} > 24\text{dBm}$
5. $11\text{dBm} + 10\log(43.97) = 27.43\text{ dBm} > 24\text{dBm}$
6. $11\text{dBm} + 10\log(45.90) = 27.62\text{ dBm} > 24\text{dBm}$

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
38	5190	25.942	14.14	24.00	Pass
46	5230	26.303	14.20	24.00	Pass
54	5270	26.242	14.19	24.00	Pass
62	5310	18.621	12.70	24.00	Pass
102	5510	15.596	11.93	24.00	Pass
110	5550	28.184	14.50	24.00	Pass
134	5670	28.249	14.51	24.00	Pass
151	5755	30.061	14.78	30.00	Pass
159	5795	28.840	14.60	30.00	Pass

Note:

For U-NII-2A, U-NII-2C Band:

1. $11\text{dBm} + 10\log(74.64) = 29.73\text{ dBm} > 24\text{dBm}$
2. $11\text{dBm} + 10\log(63.52) = 29.03\text{ dBm} > 24\text{dBm}$
3. $11\text{dBm} + 10\log(62.88) = 28.99\text{ dBm} > 24\text{dBm}$
4. $11\text{dBm} + 10\log(89.00) = 30.49\text{ dBm} > 24\text{dBm}$
5. $11\text{dBm} + 10\log(83.58) = 30.22\text{ dBm} > 24\text{dBm}$

PZWBHT1700QG (new)

Power Output:

802.11a

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
36	5180	39.902	16.01	24.00	Pass
40	5200	39.628	15.98	24.00	Pass
48	5240	38.637	15.87	24.00	Pass
52	5260	38.548	15.86	24.00	Pass
60	5300	38.548	15.86	24.00	Pass
64	5320	38.994	15.91	24.00	Pass
100	5500	40.832	16.11	24.00	Pass
116	5580	41.591	16.19	24.00	Pass
140	5700	31.989	15.05	24.00	Pass
149	5745	44.875	16.52	30.00	Pass
157	5785	42.658	16.30	30.00	Pass
165	5825	41.4	16.17	30.00	Pass

Note:

For U-NII-2A, U-NII-2C Band:

1. $11\text{dBm} + 10\log(40.37) = 27.06\text{ dBm} > 24\text{dBm}$
2. $11\text{dBm} + 10\log(41.33) = 27.16\text{ dBm} > 24\text{dBm}$
3. $11\text{dBm} + 10\log(43.10) = 27.34\text{ dBm} > 24\text{dBm}$
4. $11\text{dBm} + 10\log(41.02) = 27.13\text{ dBm} > 24\text{dBm}$
5. $11\text{dBm} + 10\log(42.77) = 27.31\text{ dBm} > 24\text{dBm}$
6. $11\text{dBm} + 10\log(41.85) = 27.22\text{ dBm} > 24\text{dBm}$

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
36	5180	29.785	14.74	24.00	Pass
40	5200	29.923	14.76	24.00	Pass
48	5240	29.854	14.75	24.00	Pass
52	5260	31.477	14.98	24.00	Pass
60	5300	29.992	14.77	24.00	Pass
64	5320	29.923	14.76	24.00	Pass
100	5500	33.189	15.21	24.00	Pass
116	5580	33.651	15.27	24.00	Pass
140	5700	22.387	13.50	24.00	Pass
149	5745	33.266	15.22	30.00	Pass
157	5785	33.42	15.24	30.00	Pass
165	5825	31.117	14.93	30.00	Pass

Note:

For U-NII-2A, U-NII-2C Band:

1. $11\text{dBm} + 10\log(40.49) = 27.07\text{ dBm} > 24\text{dBm}$
2. $11\text{dBm} + 10\log(40.87) = 27.11\text{ dBm} > 24\text{dBm}$
3. $11\text{dBm} + 10\log(39.91) = 27.01\text{ dBm} > 24\text{dBm}$
4. $11\text{dBm} + 10\log(42.95) = 27.33\text{ dBm} > 24\text{dBm}$
5. $11\text{dBm} + 10\log(43.97) = 27.43\text{ dBm} > 24\text{dBm}$
6. $11\text{dBm} + 10\log(45.90) = 27.62\text{ dBm} > 24\text{dBm}$

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
38	5190	24.491	13.89	24.00	Pass
46	5230	25.41	14.05	24.00	Pass
54	5270	25.527	14.07	24.00	Pass
62	5310	17.906	12.53	24.00	Pass
102	5510	14.825	11.71	24.00	Pass
110	5550	27.102	14.33	24.00	Pass
134	5670	27.669	14.42	24.00	Pass
151	5755	29.309	14.67	30.00	Pass
159	5795	28.054	14.48	30.00	Pass

Note:

For U-NII-2A, U-NII-2C Band:

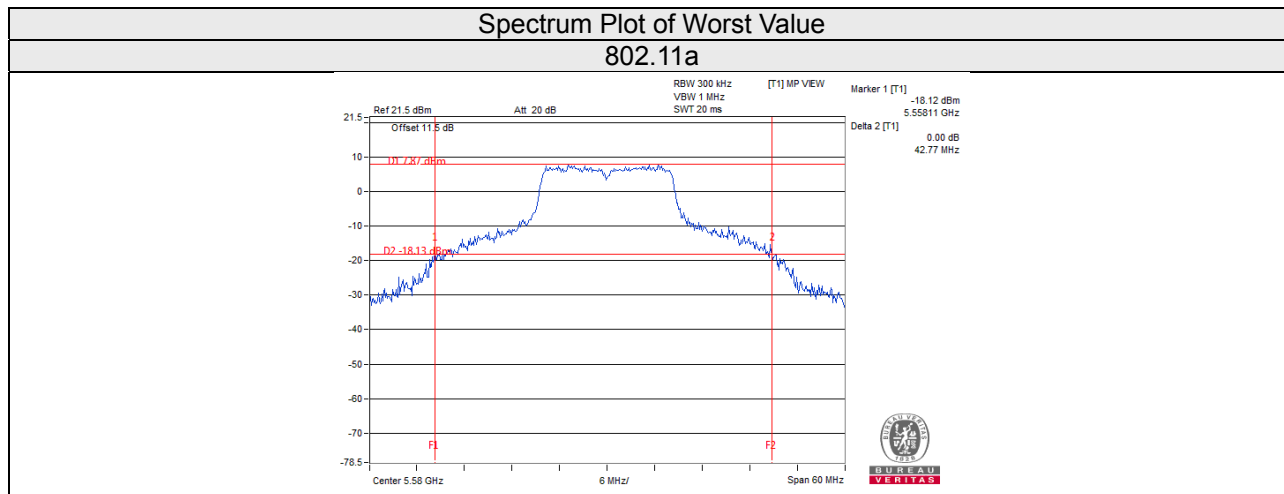
1. $11\text{dBm} + 10\log(74.64) = 29.73\text{ dBm} > 24\text{dBm}$
2. $11\text{dBm} + 10\log(63.52) = 29.03\text{ dBm} > 24\text{dBm}$
3. $11\text{dBm} + 10\log(62.88) = 28.99\text{ dBm} > 24\text{dBm}$
4. $11\text{dBm} + 10\log(89.00) = 30.49\text{ dBm} > 24\text{dBm}$
5. $11\text{dBm} + 10\log(83.58) = 30.22\text{ dBm} > 24\text{dBm}$

FCC ID: PZWBHT1700BQL (initial)

26dB Bandwidth:

802.11a

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)
116	5580	42.77

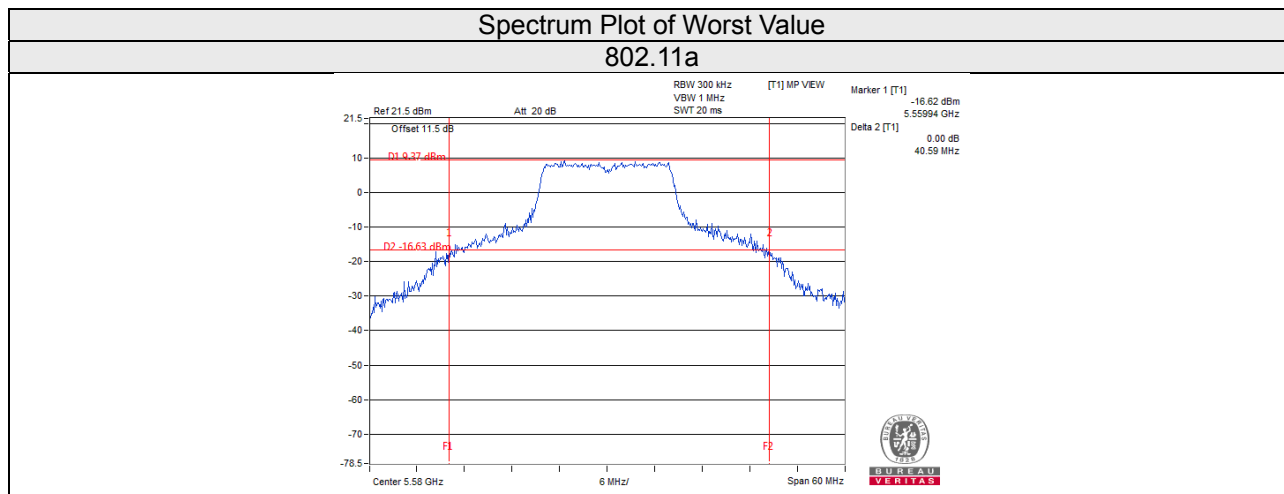


PZWBHT1700QG (new)

26dB Bandwidth:

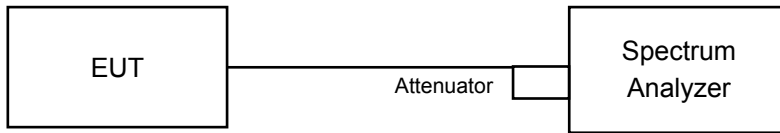
802.11a

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)
116	5580	40.59



4.2 Occupied Bandwidth Measurement

4.2.1 Test Setup



4.2.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.3 Test Procedure

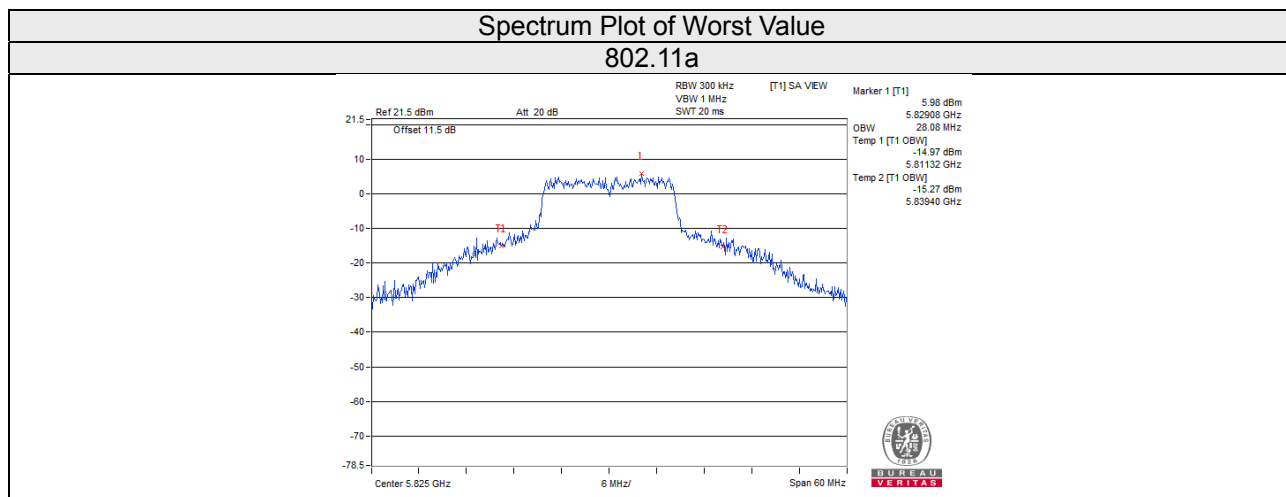
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.2.4 Test Result

FCC ID: PZWBHT1700BQL (initial)

802.11a

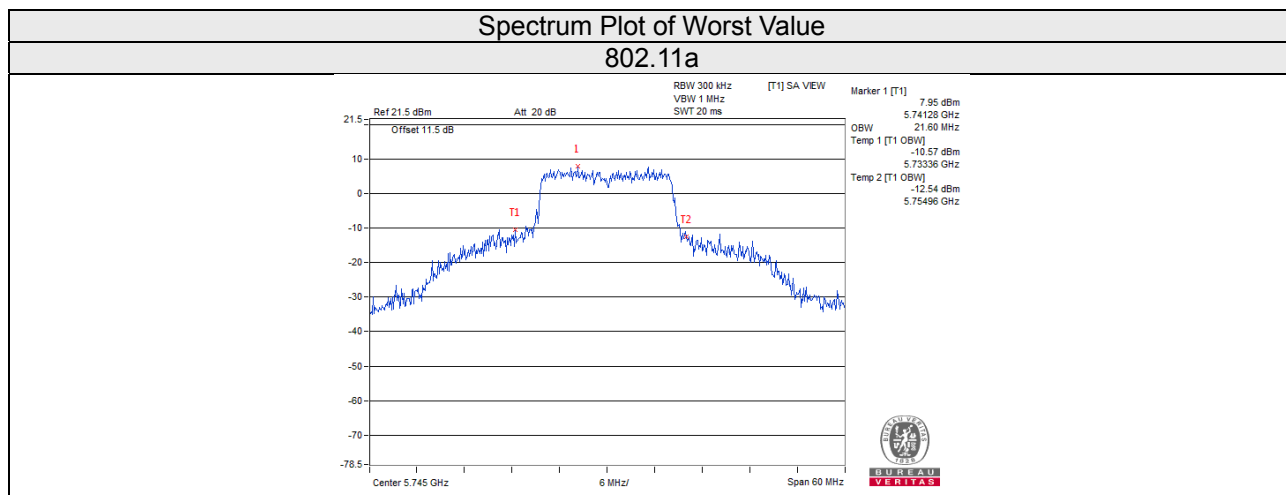
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
149	5745	26.88



PZWBHT1700QG (new)

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
149	5745	21.60

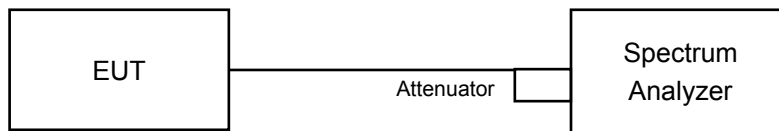


4.3 Peak Power Spectral Density Measurement

4.3.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	11dBm/ MHz
U-NII-2A		√	11dBm/ MHz
U-NII-2C		√	11dBm/ MHz
U-NII-3		√	30dBm/ 500kHz

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedures

For U-NII-1, U-NII-2A, U-NII-2C band:

Duty cycle of test signal is $\geq 98\%$

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value

Duty cycle of test signal is $< 98\%$

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add $10 \log (1/\text{duty cycle})$

For U-NII-3 band:

Duty cycle of test signal is $\geq 98\%$

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS.
- 3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- 4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500 \text{ kHz} / 300 \text{ kHz})$.
- 5) Sweep time = auto, trigger set to "free run".
- 6) Trace average at least 100 traces in power averaging mode.
- 7) Record the max value.

Duty cycle of test signal is $< 98\%$

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
- 3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- 4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500 \text{ kHz} / 300 \text{ kHz})$
- 5) Sweep time = auto, trigger set to "free run".
- 6) Trace average at least 100 traces in power averaging mode.
- 7) Record the max value and add $10 \log (1/\text{duty cycle})$

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

Same as 4.3.6.

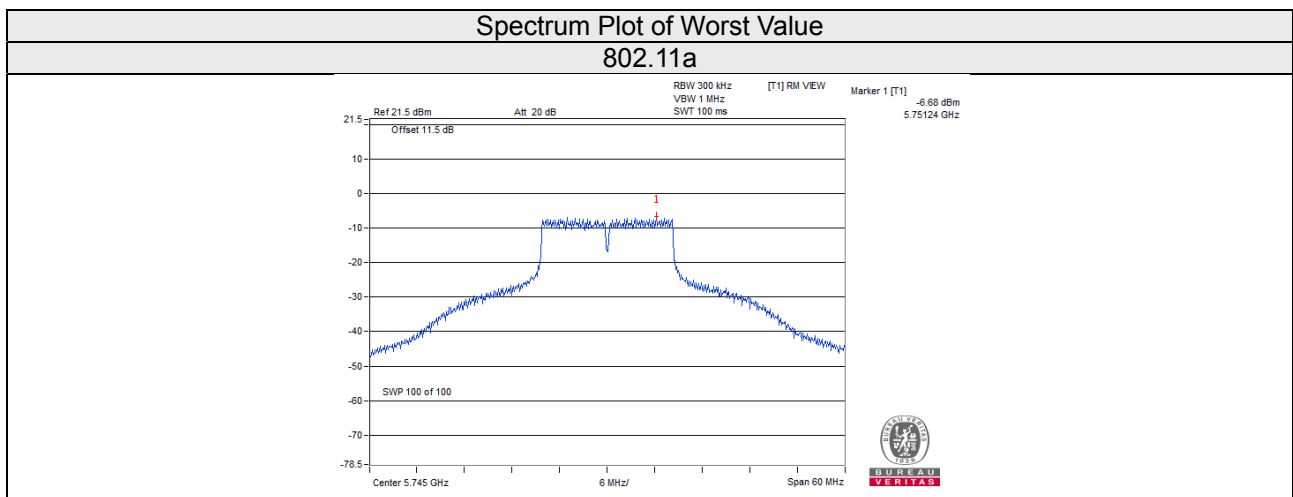
4.3.7 Test Results

FCC ID: PZWBHT1700BQL (initial)

802.11a

Chan.	Freq. (MHz)	PSD W/O Duty Factor		Duty factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass / Fail
		(dBm/300kHz)	(dBm/500kHz)				
149	5745	-6.68	-4.46	0.70	-3.76	30.00	Pass

NOTE: Refer to section 3.1 for duty cycle spectrum plot.

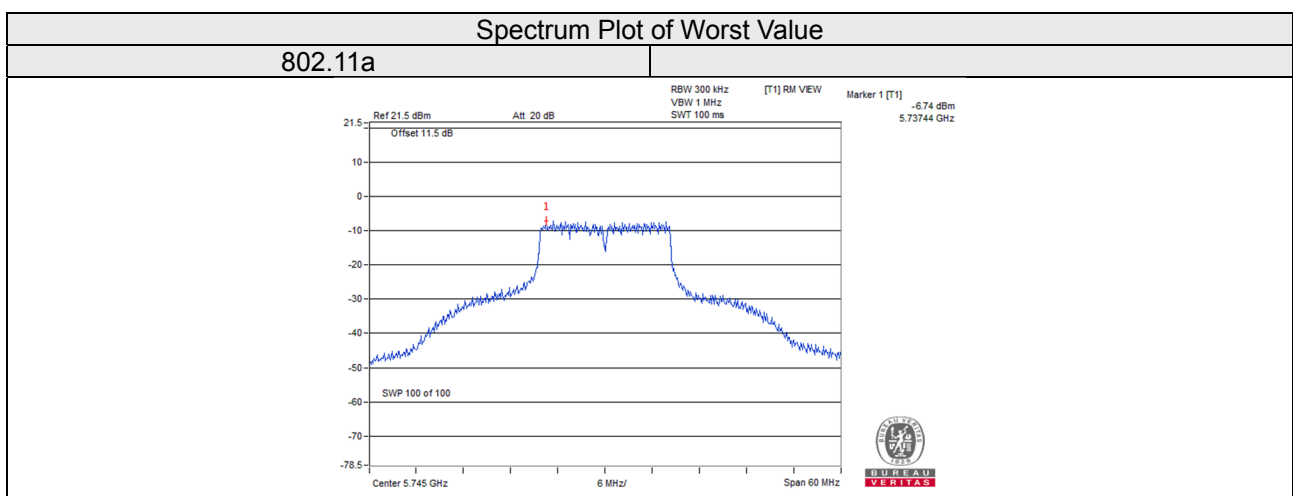


PZWBHT1700QG (new)

802.11a

Chan.	Freq. (MHz)	PSD W/O Duty Factor		Duty factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass / Fail
		(dBm/300kHz)	(dBm/500kHz)				
149	5745	-6.74	-4.52	0.70	-3.82	30.00	Pass

NOTE: Refer to section 3.1 for duty cycle spectrum plot.

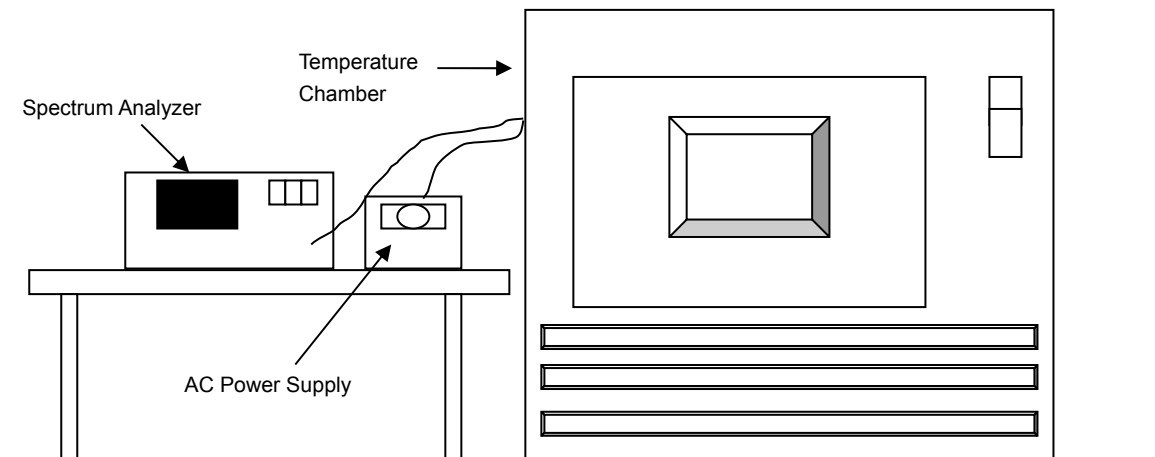


4.4 Frequency Stability

4.4.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.4.7 Test Results

FCC ID: PZWBHT1700BQL (initial)

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
50	120	5179.9880	Pass	5179.9880	Pass	5179.9850	Pass	5179.9860	Pass
40	120	5179.9918	Pass	5179.9906	Pass	5179.9922	Pass	5179.9880	Pass
30	120	5179.9876	Pass	5179.9898	Pass	5179.9900	Pass	5179.9902	Pass
20	120	5180.0115	Pass	5180.0139	Pass	5180.0132	Pass	5180.0136	Pass
10	120	5179.9819	Pass	5179.9821	Pass	5179.9811	Pass	5179.9831	Pass
0	120	5179.9769	Pass	5179.9788	Pass	5179.9782	Pass	5179.9795	Pass
-10	120	5180.0095	Pass	5180.0081	Pass	5180.0059	Pass	5180.0068	Pass
-20	120	5179.9958	Pass	5179.9959	Pass	5179.9952	Pass	5179.9955	Pass
-30	120	5179.9802	Pass	5179.9810	Pass	5179.9836	Pass	5179.9804	Pass

Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5180.0111	Pass	5180.0136	Pass	5180.0132	Pass	5180.0144	Pass
	120	5180.0115	Pass	5180.0139	Pass	5180.0132	Pass	5180.0136	Pass
	102	5180.0113	Pass	5180.0137	Pass	5180.0132	Pass	5180.0131	Pass

FCC ID: PZWBHT1700QG (new)

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
50	120	5180.0253	PASS	5180.0242	PASS	5180.027	PASS	5180.0237	PASS
40	120	5179.9896	PASS	5179.991	PASS	5179.9925	PASS	5179.9911	PASS
30	120	5180.0198	PASS	5180.0178	PASS	5180.018	PASS	5180.0208	PASS
20	120	5180.0138	PASS	5180.0128	PASS	5180.0095	PASS	5180.0096	PASS
10	120	5179.9878	PASS	5179.9875	PASS	5179.9909	PASS	5179.9874	PASS
0	120	5179.9748	PASS	5179.9748	PASS	5179.9775	PASS	5179.9766	PASS
-10	120	5180.0178	PASS	5180.02	PASS	5180.02	PASS	5180.0169	PASS
-20	120	5179.9752	PASS	5179.976	PASS	5179.9758	PASS	5179.9771	PASS
-30	120	5179.9897	PASS	5179.987	PASS	5179.9869	PASS	5179.9894	PASS

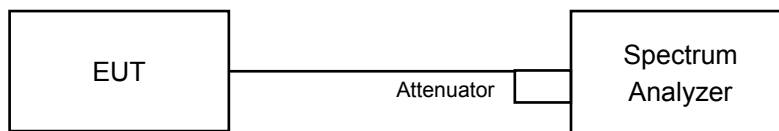
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5180.0132	PASS	5180.0135	PASS	5180.0088	PASS	5180.0089	PASS
	120	5180.0138	PASS	5180.0128	PASS	5180.0095	PASS	5180.0096	PASS
	102	5180.0133	PASS	5180.0129	PASS	5180.0088	PASS	5180.0088	PASS

4.5 6dB Bandwidth Measurement

4.5.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

Measurement Procedure REF

- 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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

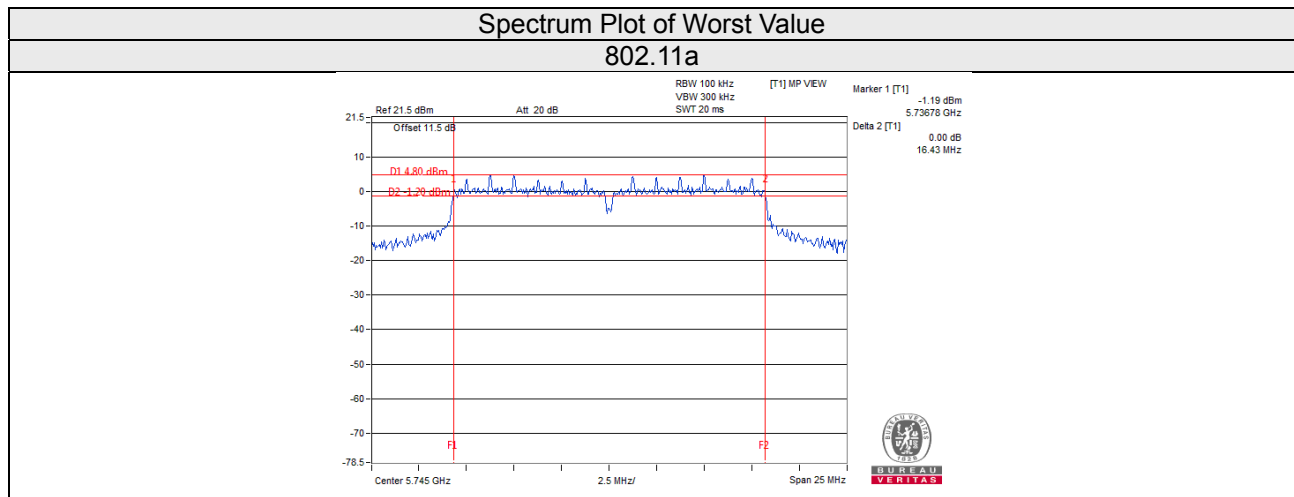
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

FCC ID: PZWBHT1700BQL (initial)

802.11a

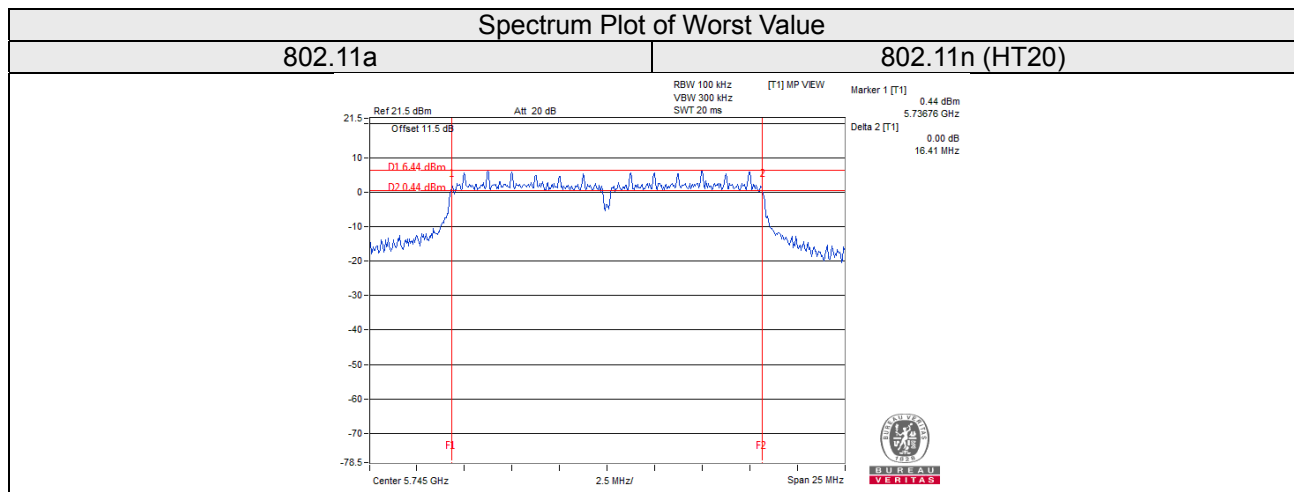
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	16.43	0.5	Pass



PZWBHT1700QG (new)

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	16.41	0.5	Pass



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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Web Site: 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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