



**FCC TEST REPORT** 

Test report
On Behalf of
SHENZHEN Handscape Technology Co., Ltd.
For
HandyCase
Model No.: Handycase, Handycase for iphone

**FCC ID: 2APIY-HANDY** 

Prepared for: SHENZHEN Handscape Technology Co., Ltd.

3G, Building 6, Haiyun Road, Software Industry Base, Nanshan District,

Shenzhen, China

Prepared By: Shenzhen HUAK Testing Technology Co., Ltd.

1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street,

Bao'an District, Shenzhen City, China

Date of Test: Apr. 01, 2018 ~ Apr. 08, 2018

Date of Report: Apr. 08, 2018
Report Number: HK180321134-E



# **TEST RESULT CERTIFICATION**

Applicant's name:	SHENZHEN Handscape Technology Co., Ltd.
Address:	3G, Building 6, Haiyun Road, Software Industry Base, Nanshan District, Shenzhen, China
Manufacture's Name:	SHENZHEN Hua Ding Xing Technology Co., Ltd.
Address:	#23, the 3rd Industrial Park of Xia Villiage Gongming, Guangming District, Shenzhen, China
Product description	
Trade Mark:	HandyCase
Product name:	HandyCase
Model and/or type reference :	Handycase, Handycase for iphone
Standards:	FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.10: 2013
the Shenzhen HUAK Testing Teo of the material. Shenzhen HUA	
Date (s) of performance of tests	
Date of Issue	: Apr. 08, 2018
Test Result	: Pass
Testing Engine	eer : Gary Qian)
	(Galy Qlall)

Eden Hu)

Authorized Signatory: Jason 2Nou

**Technical Manager** 

(Jason Zhou)





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# 1. TEST SUMMARY

## 1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

# 1.2 TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai

Street, Bao'an District, Shenzhen City, China

## 1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2 Radiated emission expanded uncertainty(9kHz-30MHz) = 3.08dB, k=2 Radiated emission expanded uncertainty(30MHz-1000MHz) = 4.42dB, k=2 Radiated emission expanded uncertainty(Above 1GHz) = 4.06dB, k=2



# 2. GENERAL INFORMATION

# 2.1 GENERAL DESCRIPTION OF EUT

Equipment	HandyCase			
Model Name	Handycase			
Serial No.	Handycase for iphone			
Trade Mark	HandyCase			
Model Difference	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: Handycase.			
FCC ID	2APIY-HANDY			
Antenna Type	PCB Antenna			
Antenna Gain	0dBi			
BT Operation frequency	2402-2480MHz			
Number of Channels	40CH			
Modulation Type	GFSK			
Power Source	N/A			
Davier Dating	DC 5V for AC adapter with AC 120V/60Hz or			
Power Rating	DC 3.7V for battery			



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# 2.2 Carrier Frequency of Channels

	Channel List									
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)			
01	2402	11	2422	21	2442	31	2462			
02	2404	12	2424	22	2444	32	2464			
03	2406	13	2426	23	2446	33	2466			
04	2408	14	2428	24	2448	34	2468			
05	2410	15	2430	25	2450	35	2470			
06	2412	16	2432	26	2452	36	2472			
07	2414	17	2434	27	2454	37	2474			
08	2416	18	2436	28	2456	38	2476			
09	2418	19	2438	29	2458	39	2478			
10	2420	20	2440	30	2460	40	2480			

# 2.3 Operation of EUT during testing

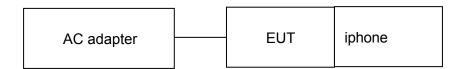
Operating Mode

The mode is used: Transmitting mode

Low Channel: 2402MHz Middle Channel: 2440MHz High Channel: 2480MHz

# 2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and Radiation



Operation of EUT during Above1GHz Radiation testing:

EUT	iphone
-----	--------



2.5 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2017	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2017	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 28, 2017	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2017	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2017	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 28, 2017	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 28, 2017	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 28, 2017	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2017	3 Year





CONDUCTED EMISSIONS TEST

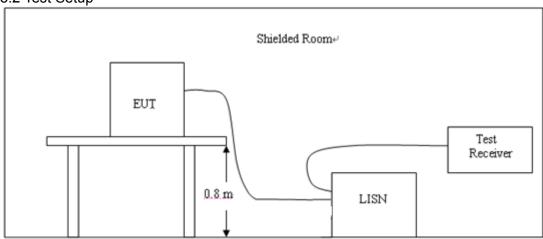
### 3.1 Conducted Power Line Emission Limit

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Eroguenev	Maximum RF Line Voltage (dBμV)						
Frequency (MHz)	CLAS	SS A	CLASS B				
(11112)	Q.P.	Ave.	Q.P.	Ave.			
0.15 - 0.50	79	66	66-56*	56-46*			
0.50 - 5.00	73	60	56	46			
5.00 - 30.0	73	60	60	50			

\* Decreasing linearly with the logarithm of the frequency
For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

### 3.2 Test Setup



### 3.3 Test Procedure

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

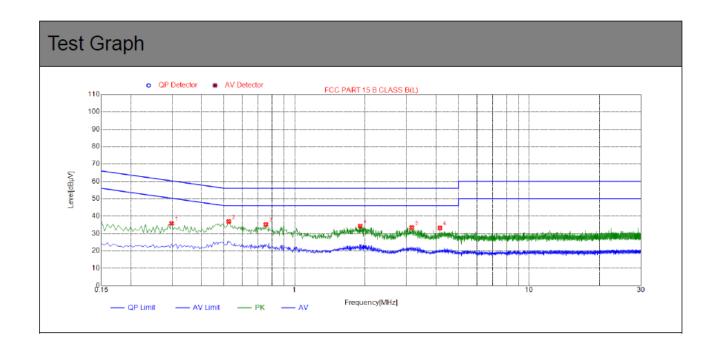
### 3.4 Test Result

#### **PASS**

All the test modes completed for test.



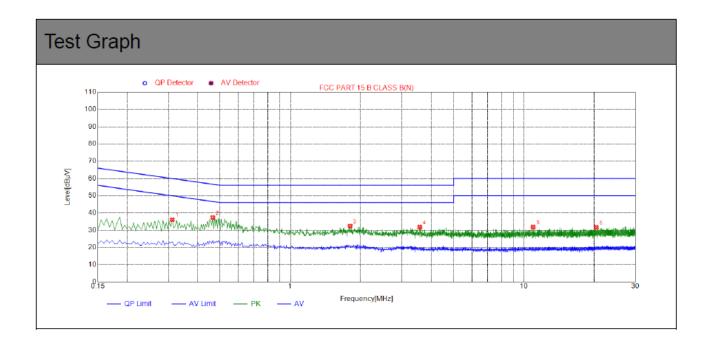
Test Specification: Line



NO.	Freq.	Level	Factor	Limit	Margin	Detector
110.	[MHz]	[dBµV]	[dB]	[dBµ∨]	[dB]	Detector
1	0.2985	35.81	10.04	60.52	24.71	PK
2	0.5235	36.86	10.04	56.00	19.14	PK
3	0.7530	35.18	10.06	56.00	20.82	PK
4	1.9050	34.23	10.14	56.00	21.77	PK
5	3.1605	33.40	10.23	56.00	22.60	PK
6	4.1640	33.15	10.25	56.00	22.85	PK



Test Specification: Neutral



NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.3120	36.10	10.05	60.04	23.94	PK
2	0.4650	37.35	10.04	56.92	19.57	PK
3	1.8015	32.42	10.14	56.00	23.58	PK
4	3.5790	31.78	10.25	56.00	24.22	PK
5	10.9455	31.80	10.02	60.00	28.20	PK
6	20.4045	31.70	10.12	60.00	28.30	PK



## **4 RADIATED EMISSION TEST**

## 4.1 Radiation Limit

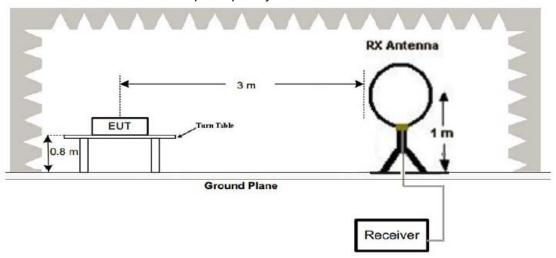
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency	Distance	Radiated	Radiated
(MHz)	(Meters)	(dBµV/m)	(μV/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

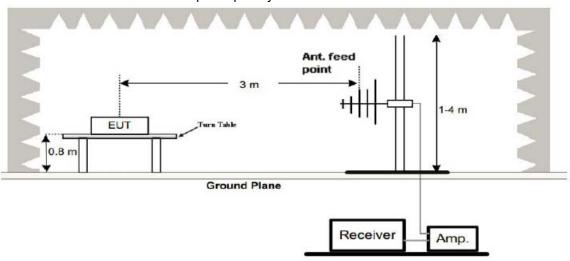
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

# 4.2 Test Setup

## (1) Radiated Emission Test-Up Frequency Below 30MHz

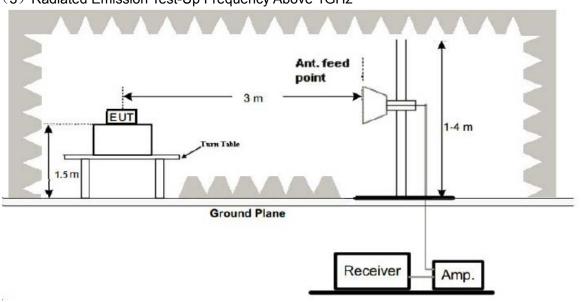


## (2) Radiated Emission Test-Up Frequency 30MHz~1GHz





(3) Radiated Emission Test-Up Frequency Above 1GHz



### 4.3 Test Procedure

- 1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Repeat above procedures until the measurements for all frequencies are complete.
- 7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

### Note:

For battery operated equipment, the equipment tests shall be performed using a new battery.

# 4.4 Test Result

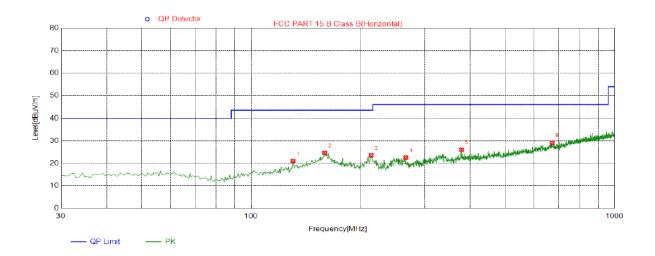
### **PASS**

All the test modes completed for test. The worst case of Radiated Emission is CH 2402; the test data of this mode was reported.



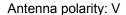
Below 1GHz Test Results:

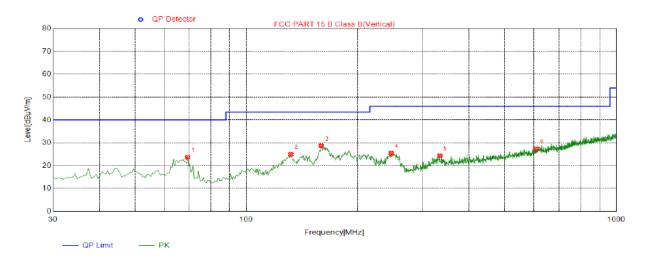
# Antenna polarity: H



NO.	Freq.	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	130.3950	21.03	-13.77	43.50	22.47	PK	100	323	Horizontal
2	159.0100	24.64	-9.31	43.50	18.86	PK	100	303	Horizontal
3	213.8150	23.60	-15.35	43.50	19.90	PK	100	108	Horizontal
4	266.1950	22.61	-14.41	46.00	23.39	PK	100	91	Horizontal
5	378.7150	26.10	-11.09	46.00	19.90	PK	100	250	Horizontal
6	672.6250	29.15	-4.21	46.00	16.85	PK	100	45	Horizontal







NO.	Freq.	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	69.2850	23.66	-17.66	40.00	16.34	PK	100	13	Vertical
2	131.8500	24.99	-13.57	43.50	18.51	PK	100	46	Vertical
3	159.4950	28.72	-9.22	43.50	14.78	PK	100	89	Vertical
4	246.7950	25.45	-14.51	46.00	20.55	PK	100	161	Vertical
5	334.0950	24.37	-11.94	46.00	21.63	PK	100	215	Vertical
6	607.1500	27.35	-5.67	46.00	18.65	PK	100	271	Vertical

### Remark:

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.



Above 1 GHz Test Results: CH Low (2402MHz)

# Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type	
2402	112.39	-5.84	106.55	114	-7.45	peak	
2402	85.56	-5.84	79.72	94	-14.28	AVG	
4804	56.48	-3.64	52.84	74	-21.16	peak	
4804	46.61	-3.64	42.97	54	-11.03	AVG	
7206	55.83	-0.95	54.88	74	-19.12	peak	
7206	42.74	-0.95	41.79	54	-12.21	AVG	
Remark: Facto	Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

# Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2402	111.67	-5.84	105.83	114	-8.17	peak
2402	85.14	-5.84	79.3	94	-14.7	AVG
4804	56.75	-3.64	53.11	74	-20.89	peak
4804	45.29	-3.64	41.65	54	-12.35	AVG
7206	55.46	-0.95	54.51	74	-19.49	peak
7206	42.03	-0.95	41.08	54	-12.92	AVG



CH Middle (2440MHz)

# Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
2440	111.82	-5.71	106.11	114	-7.89	peak
2440	85.75	-5.71	80.04	94	-13.96	AVG
4880	55.44	-3.51	51.93	74	-22.07	peak
4880	45.39	-3.51	41.88	54	-12.12	AVG
7320	55.63	-0.82	54.81	74	-19.19	peak
7320	41.26	-0.82	40.44	54	-13.56	AVG
Remark: Facto	or = Antenna Fac	ctor + Cable Lo	ss – Pre-amplifier.		•	

# Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2440	110.48	-5.71	104.77	114	-9.23	peak
2440	85.34	-5.71	79.63	94	-14.37	AVG
4880	55.19	-3.51	51.68	74	-22.32	peak
4880	46.27	-3.51	42.76	54	-11.24	AVG
7320	54.85	-0.82	54.03	74	-19.97	peak
7320	40.62	-0.82	39.8	54	-14.2	AVG
Remark: Facto	or = Antenna Fac	tor + Cable Lo	ss – Pre-amplifier.			





# CH High (2480MHz)

### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
2480	109.55	-5.65	103.9	114	-10.1	peak
2480	83.49	-5.65	77.84	94	-16.16	AVG
4960	54.17	-3.43	50.74	74	-23.26	peak
4960	45.92	-3.43	42.49	54	-11.51	AVG
7440	53.64	-0.75	52.89	74	-21.11	peak
7440	39.51	-0.75	38.76	54	-15.24	AVG
	· –				•	•

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2480	108.63	-5.65	102.98	114	-11.02	peak
2480	83.41	-5.65	77.76	94	-16.24	AVG
4960	54.29	-3.43	50.86	74	-23.14	peak
4960	42.06	-3.43	38.63	54	-15.37	AVG
7440	52.34	-0.75	51.59	74	-22.41	peak
7440	38.77	-0.75	38.02	54	-15.98	AVG
			5	•	•	

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

### Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "--- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.





#### 5.1 Limits

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

## 5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

### 5.3 Test Result

#### **PASS**

Radiated Band Edge Test:

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2390	55.96	-5.81	50.15	74	-23.85	peak
2390	1	-5.81	1	54	1	AVG
2400	53.72	-5.84	47.88	74	-26.12	peak
2400	1	-5.84	1	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2390	56.18	-5.81	50.37	74	-23.63	peak
2390	1	-5.81	1	54	1	AVG
2400	54.05	-5.84	48.21	74	-25.79	peak
2400	1	-5.84	1	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier.





Operation Mode: TX CH High (2480MHz)

Horizontal (Worst case)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2483.5	55.14	-5.65	49.49	74	-24.51	peak
2483.5	1	-5.65	1	54	1	AVG
Remark: Facto	or = Antenna Fac	rtor + Cable I o	ss _ Pre_amnlifier			

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

# Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2483.5	53.69	-5.65	48.04	74	-25.96	peak
2483.5	1	-5.65	1	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.



6 OCCUPIED BANDWIDTH MEASUREMENT

### 6.1 Test Setup

Same as Radiated Emission Measurement

## 6.2 Test Procedure

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Set EUT as normal operation.
- 3. Based on FCC Part15 C Section 15.249(a): RBW= 100KHz. VBW= 300 KHz, Span=3MHz.
- 4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

# 6.3 Measurement Equipment Used

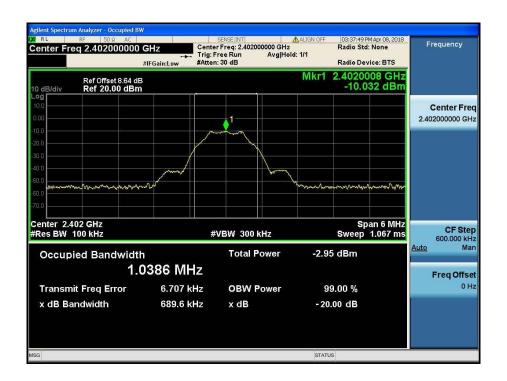
Same as Radiated Emission Measurement

## 6.4 Test Result

## **PASS**

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.0386	PASS
2440 MHz	1.0368	PASS
2480 MHz	1.0379	PASS

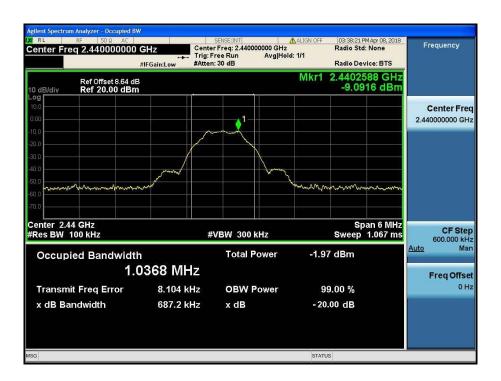
CH: 2402MHz



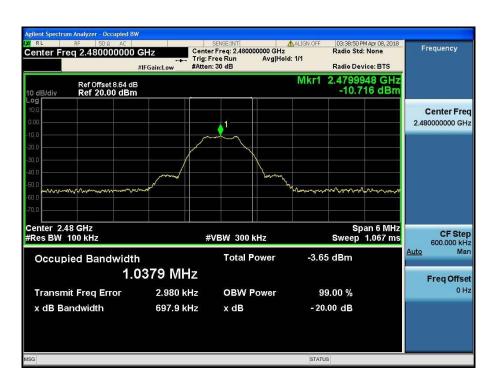




### CH: 2440MHz



### CH: 2480MHz







### 7 ANTENNA REQUIREMENT

### Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

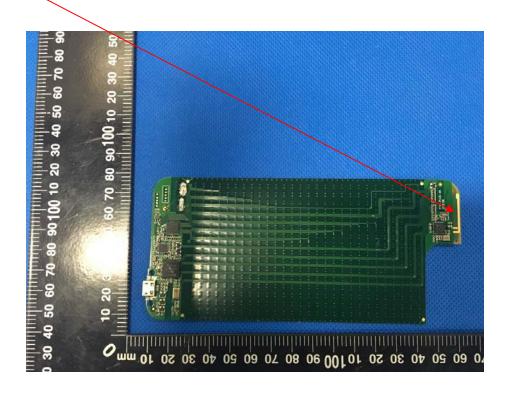
### Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

#### **Antenna Connected Construction**

The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 0dBi.

# **ANTENNA**





# 8 PHOTOGRAPH OF TEST

# 8.1 Conducted Emission





# 8.2 Radiated Emission



