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TEST REPORT

Report No.:	CQASZ20200800924E-01
Applicant:	Shenzhen jumei Technology Co., Ltd
Address of Applicant:	Six Floor Xingguangbao Industrial park Huaning Road Dalang Longhua Shenzhen
Equipment Under Test (E	UT):
EUT Name:	SMART BAND
Model No.:	F13, F22, F26, F30, F37, F57, F67, F87, F97, F107, F207
Test Model No.:	F22
Brand Name:	N/A
FCC ID:	2AXEV-F22
Standards:	47 CFR Part 15, Subpart C
Date of Receipt:	2020-08-25
Date of Test:	2020-08-25 to 2020-09-07
Date of Issue:	2020-09-09
Test Result:	PASS*

In the configuration tested, the EUT complied with the standards specified above

Tiny You)

Reviewed By:

Tested By:

(Sheek Luo)

Sheek, Luo

Approved By:

(Jack Ai)



The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20200800924E-01	Rev.01	Initial report	2020-09-09



2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	N/A
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS

N/A: When the EUT charging, BLE will not work , So Not Applicable

Model No.: F13, F22, F26, F30, F37, F57, F67, F87, F97, F107, F207

Only the model F22 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance, pack and model name.



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4 General Information

4.1 Client Information

Applicant:	Shenzhen jumei Technology Co., Ltd
Address of Applicant:	Six Floor Xingguangbao Industrial park Huaning Road Dalang Longhua Shenzhen
Manufacturer:	Shenzhen jumei Technology Co., Ltd
Address of Manufacturer:	Six Floor Xingguangbao Industrial park Huaning Road Dalang Longhua Shenzhen

4.2 General Description of EUT

Product Name:	SMART BAND
Model No.:	F13, F22, F26, F30, F37, F57, F67, F87, F97, F107, F207
Test Model No.:	F22
Trade Mark:	N/A
Hardware Version:	MOY.M60105.03
Software Version:	MOY-YCL2-1.8.0
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V4.2
Modulation Type:	GFSK
Transfer Rate:	1Mbps
Number of Channel:	40
Product Type:	Mobile Portable Fix Location
Test Software of EUT:	Serial port setting (manufacturer declare)
Antenna Type:	Ceramic antenna
Antenna Gain:	2 dBi
EUT Power Supply:	lithium battery:DC3.7V, Charge by DC5V



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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel (CH0)	2402MHz
The middle channel (CH19)	2440MHz
The highest channel (CH39)	2480MHz



4.3 Additional Instructions

EUT Test Software Settings:					
Mode:	☐Special software is used. ⊠Through engineering command into the engineering mode. engineering command: *#*#3646633#*#*				
EUT Power level:	Class2 (Power level is built-in set para selected)	Class2 (Power level is built-in set parameters and cannot be changed and selected)			
Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.					
Mode	Mode Channel Frequency(MHz)				
	CH0 2402				
GFSK	CH19 2440				
	CH39 2480				

Run Software:

<u>File Edit View Tools Help</u>		
👝 🔛 🔚 🚾 🕂 — 🔰		
Serial Port Setting Port USE-SER(COM4) • Baudrate 19200 • Data Bits 8 • Parity None • Stop Bits 1 • Flow Type None •)4 0E 04 0A 1E 20 0C	
Receive Setting Text Hex Auto Feed Line Display Send Display Time	Ø1 1E 20 63 80 25 90	
Send Setting Text Loop 1000 Trains	See	nd Ctrl + En



4.4 Test Environment

Operating Environment	Operating Environment:			
Radiated Emissions:				
Temperature:	25.3 °C			
Humidity:	55 % RH			
Atmospheric Pressure:	1009mbar			
RF Conducted Test Rec	ord:			
Temperature:	25.8 °C			
Humidity:	54 % RH			
Atmospheric Pressure:	1009mbar			
Test mode:				
Transmitting mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT. Note: In the process of transmitting of EUT, the duty cycle >98%.			

4.5 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
PC	Lenovo	ThinkPad E450c	FCC ID and DOC	CQA

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
/	/	/	/	/



4.6 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	±5.12dB	(1)
2	Radiated Emission (Above 1GHz)	±4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	±3.34dB	(1)
4	Radio Frequency	3×10 ⁻⁸	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8°C	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	time	0.6 %.	(1)
14	Frequency Error	5.5 Hz	(1)

Hereafter the best measurement capability for CQA laboratory is reported:

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



4.7 Test Location

Shenzhen Huaxia Testing Technology Co., Ltd,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.8 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS (No. CNAS L5785)

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.9 Deviation from Standards

None.

4.10Other Information Requested by the Customer

None.



4.11 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2019/10/25	2020/10/24
Spectrum analyzer	R&S	FSU26	CQA-038	2019/10/25	2020/10/24
Preamplifier	MITEQ	AMF-6D-02001800-29- 20P	CQA-036	2019/10/25	2020/10/24
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2019/10/21	2020/10/20
Bilog Antenna	R&S	HL562	CQA-011	2019/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2019/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2019/9/25	2020/9/24
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2019/9/26	2020/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2019/9/26	2020/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2019/9/26	2020/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2019/9/26	2020/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2019/9/26	2020/9/25

Note:

The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.



5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C Section 15.203 /247(c)

15.203 requirement:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is Ceramic antenna. The best case gain of the antenna is 2 dBi.



5.2 Conducted Peak Output Power



Measurement Data

	GFSK mode					
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result			
Lowest	0.11	30.00	Pass			
Middle	0.76	30.00	Pass			
Highest	0.8	30.00	Pass			



Test plot as follows:









5.3 6dB Occupy Bandwidth



Measurement Data

GFSK mode						
Test channel	6dB Occupy Bandwidth (MHz)	Limit (MHz)	Result			
Lowest	0.716	≥0.5	Pass			
Middle	0.717	≥0.5	Pass			
Highest	0.722	≥0.5	Pass			



Test plot as follows:









5.4 Power Spectral Density



Measurement Data

	GFSK mode					
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result			
Lowest	-15.770	≤8.00	Pass			
Middle	-16.240	≤8.00	Pass			
Highest	-15.170	≤8.00	Pass			



Test plot as follows:









5.5 Band-edge for RF Conducted Emissions



GFSK mode				
Test channel	Frequency(MHz)	Emission Level(dBm)	Limit(dBm)	Result
Lowest	2400	-48.710	-20.54	Pass
Highest	2483.5	-59.400	-20.3	Pass



Test plot as follows:





5.6 Spurious RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)		
Test Method:	ANSI C63.10 2013		
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane		
	Remark: Offset=Cable loss+ attenuation factor.		
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.		
Test Mode:	Transmitting with GFSK modulation.		
Test Results:	Pass		



Test plot as follows:



















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Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.



5.7 Radiated Spurious Emission & Restricted bands

5.7.1 Spurious Emissions							
Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205						
Test Method:	ANSI C63.10 2013						
Test Site:	Measurement Distance	: 3n	n (Semi-Anech	noic Cham	ber)		
Receiver Setup:	Frequency		Detector	RBW	VBW	Remark	
	0.009MHz-0.090MH	z	Peak	10kHz	z 30kHz	Peak	
	0.009MHz-0.090MH	z	Average	10kHz	z 30kHz	Average	
	0.090MHz-0.110MH	z	Quasi-peak	10kHz	z 30kHz	Quasi-peak	
	0.110MHz-0.490MH	z	Peak	10kHz	z 30kHz	Peak	
	0.110MHz-0.490MH	z	Average	10kHz	z 30kHz	Average	
	0.490MHz -30MHz		Quasi-peak	10kHz	z 30kHz	Quasi-peak	
	30MHz-1GHz		Quasi-peak	100 kH	lz 300kHz	Quasi-peak	
			Peak	1MHz	3MHz	Peak	
	Above 1GHz		Peak	1MHz	: 10Hz	Average	
Limit:	Frequency		eld strength crovolt/meter)	Limit (dBuV/m)	Remark	Measuremen distance (m)	
	0.009MHz-0.490MHz	2	400/F(kHz)	-	-	300	
	0.490MHz-1.705MHz	24	1000/F(kHz)	-	-	30	
	1.705MHz-30MHz		30	-	-	30	
	30MHz-88MHz		100	40.0	Quasi-peak	3	
	88MHz-216MHz	88MHz-216MHz 150		43.5	Quasi-peak	3	
	216MHz-960MHz 200		200	46.0	Quasi-peak	3	
	960MHz-1GHz 500		500	54.0	Quasi-peak	3	
	Above 1GHz 500		500	54.0	Average	3	
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.						





	measurement.	
	 d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified 	
	Bandwidth with Maximum Hold Mode.	
	 f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel (2402MHz),the middle channel (2400HHz),the Highest channel (2480MHz) 	
	h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.	
	i. Repeat above procedures until all frequencies measured was complete.	
Exploratory Test Mode:	Transmitting with GFSK modulation. Transmitting mode.	
Final Test Mode:	Transmitting with GFSK modulation.	
	For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.	
Test Results:	Pass	



Radiated Emission below 1GHz					
30MHz~1GHz, the worst case					
Test mode: Transmitting mode Vertical					





5

6 pp

517.25

833.32

9.44

9.42

Shenzhen Huaxia Testing Technology Co., Ltd

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HORIZONTAL

HORIZONTAL

30MHz~1GHz, the worst case		
Test mode:	Transmitting mode	Horizontal



18.46 27.90 46.00 -18.10 Peak

23.97 33.39 46.00 -12.61 Peak



Transmitter Emission above 1GHz

Worse case mode:		GFSK		Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		H/V
2390	53.43	-9.2	44.23	74	-29.77	Peak	н
2400	56.45	-9.39	47.06	74	-26.94	Peak	н
4804	52.78	-4.33	48.45	74	-25.55	Peak	Н
7206	50.14	1.01	51.15	74	-22.85	Peak	Н
2390	53.22	-9.2	44.02	74	-29.98	Peak	v
2400	52.09	-9.39	42.70	74	-31.30	Peak	V
4804	54.11	-4.33	49.78	74	-24.22	Peak	V
7206	50.06	1.01	51.07	74	-22.93	Peak	V

Worse case mode:		GFSK		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		H/V
4880	52.60	-4.11	48.49	74	-25.51	peak	н
7320	48.78	1.51	50.29	74	-23.71	peak	н
4880	52.43	-4.11	48.32	74	-25.68	peak	V
7320	49.53	1.51	51.04	74	-22.96	peak	V

Worse case mode:		GFSK		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		H/V
2483.5	55.19	-9.29	45.90	74	-28.10	Peak	н
4960	52.32	-4.04	48.28	74	-25.72	Peak	н
7440	50.05	1.57	51.62	74	-22.38	Peak	н
2483.5	57.27	-9.29	47.98	74	-26.02	Peak	v
4960	50.15	-4.04	46.11	74	-27.89	Peak	V
7440	48.93	1.57	50.50	74	-23.50	Peak	V

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance above 10GHz and below 30MHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.



6 Photographs - EUT Test Setup

6.1 Radiated Spurious Emission









7 Photographs - EUT Constructional Details















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. The End