Test Certificate

A sample of the following product received on April 9, 2018 and tested on April 12, 20, 26, 27 and May 4, 2018 complied with the applicable requirements of,

- **Subpart B of Part 15 of FCC Rules for Class B digital devices**
- **Innovation, Science and Economic Development Canada Interference Causing Equipment Standard ICES-003, "Information Technology Equipment (ITE) – Limits and methods of measurement", Issue 6, dated January 2016 (Class B)**
- **VCCI-CISPR 32:2016 "Technical Requirements" for multimedia equipment (Class B)**
- **EN 55022:2010, "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class B)**
- **CISPR 22:2008 "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class B)**
- **AS/NZS CISPR 32:2015 "Electromagnetic compatibility of multimedia equipment – Emission requirements" (Class B)**
- **EN 55032:2015/AC:2016, "Electromagnetic compatibility of multimedia equipment – Emissions requirements"**
- **CISPR 32:2012, "Electromagnetic compatibility of multimedia equipment – Emissions requirements"**
- **EN 55024:2010 "Information technology equipment – Immunity characteristics, Limits and method of measurement."**
- **CISPR 24:2010 +A1:2015 "Information technology equipment – Immunity characteristics, Limits and method of measurement."**
- **TCVN 7189:2009 "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class B)**

given the measurement uncertainties detailed in National Technical Systems report FR-069580.01-GL Rev 3.

Fitbit, Inc.
Models FB409 and FB410

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EMC Test Report

Class B Information Technology Equipment
Class B Digital Device

FCC Part 15
Innovation, Science and Economic Development Canada ICES-003, Issue 6
VCCI–CISPR 32:2016
EN 55022:2010
CISPR 22:2008
AS/NZS CISPR 32:2015
TCVN 7189:2009
EN 55032:2015/AC:2016
CISPR 32:2012
EN 55024:2010
CISPR 24:2010 +A1:2015

Models: FB409 and FB410

COMPANY:	Fitbit, Inc. 199 Fremont Street, 14th Floor San Francisco, CA 94105
TEST SITE(S):	National Technical Systems 41039 Boyce Road Fremont, CA. 94538-2435
PROJECT NUMBER:	PR069580
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REISSUE DATE:	July 27, 2018
FINAL TEST DATES:	April 12, 20, 26, 27 and May 4, 2018
TOTAL NUMBER OF PAGES:	104

A2LA ACCREDITED
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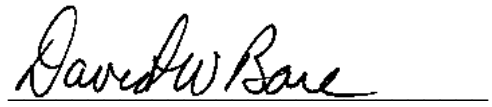
VALIDATING SIGNATORIES

PROGRAM MGR



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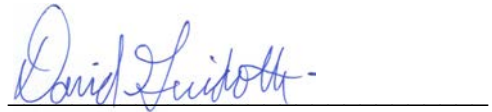

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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	May 25, 2018	First release	
1	June 4, 2018	Revised report to update EN 55032:2012 to EN 55032:2015/AC:2016	David Guidotti
2	July 11, 2018	Revised report to remove detailed photographs	David Guidotti
3	July 27, 2018	Added serial numbers of additional samples that were used during testing on page 14 and added additional test data	David Guidotti

TABLE OF CONTENTS

SCOPE

Governments and standards organizations around the world have published requirements regarding the electromagnetic compatibility (EMC) of electronic equipment. Testing has been performed on the Fitbit, Inc. model FB409 and FB410, pursuant to the following standards.

Standard	Title	Standard Date
FCC Part 15, Subpart B	Radio Frequency Devices	October 2017 as Amended
ICES-003, Issue 6	Information Technology Equipment (Including Digital Apparatus) - Limits and Methods of Measurement	January 2016
VCCI-CISPR 32	Technical Requirements	2016
CISPR 22	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement	2008
AS/NZS CISPR 32	Electromagnetic compatibility of multimedia equipment – Emission requirements	2015
EN 55022	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement	2010
EN 55032	Electromagnetic compatibility of multimedia equipment – Emission requirements	2015/AC 2016
CISPR 32	Electromagnetic compatibility of multimedia equipment – Emission requirements	2012
TCVN 7189	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement	2009

All measurements and evaluations have been in accordance with these specifications, test procedures, and measurement guidelines as outlined in National Technical Systems test procedures, and in accordance with the standards referenced therein (refer to Appendix G). National Technical Systems is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

OBJECTIVE

The objective of Fitbit, Inc. is to:

- declare conformity with the essential requirements of the EMC directive 2014/30/EU using the harmonized standard(s) referenced in this report;
- declare conformity with the electromagnetic compatibility (EMC) regulatory arrangement of the Australian Communications and Media Authority (ACMA);
- verify compliance with FCC and Canada's requirements for digital devices;
- verify compliance to the Japanese VCCI requirements for Multimedia Equipment;
- verify compliance to the Vietnamese requirements for Information Technology Equipment

STATEMENT OF COMPLIANCE

The tested samples of Fitbit, Inc. models FB409 and FB410 complied with the applicable requirements of:

Standard/Regulation	Equipment Type/Class	Standard Date
Subpart B of Part 15 of the FCC Rules (CFR title 47)	B	2017 as amended
ICES-003, Issue 6	B	2016
VCCI-CISPR 32	B	2016
EN 55022	Class B	2010
CISPR 22 Edition 6	Class B	2008
AS/NZS CISPR 32	Class B	2015
TCVN 7189	Class B	2009
EN 55032	Class B	2015/AC:2016
CISPR 32	Class B	2012
EN55024	-	2010
CISPR 24	-	2010 +A1:2015

This report is suitable for demonstrating compliance with the EMC requirements in Australia and New Zealand. Refer to Appendix F for more details.

As specified in Section 15.101 of FCC Part 15, unintentional radiators shall be authorized prior to the initiation of marketing. Based on the description of the EUT, the following criteria per Section 15.101 of FCC Part 15 were applied to the EUT:

Type of device	**Equipment authorization required**
Other Class B digital devices & peripherals	SDoC or Certification

Prior to November 2, 2018, Verification and Declaration of Conformity (DoC) authorizations may still be used as applicable. Supplier's Declaration of Conformity (SDoC) authorization procedures must be used after November 2, 2018 instead of Verification and Declaration of Conformity.

The test results recorded herein are based on a single type test of the Fitbit, Inc. models FB409 and FB410 and therefore apply only to the tested sample(s). The samples were selected and prepared by Ricky Wang of Fitbit, Inc.

Maintenance of compliance is the responsibility of the company. Any modification of the product that could result in increased emissions or susceptibility should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different enclosure, different line filter or power supply, harnessing and/or interface cable changes, etc.).

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

INFORMATION TECHNOLOGY EQUIPMENT EMISSIONS TEST RESULTS

The following emissions tests were performed on the Fitbit, Inc. models FB409 and FB410. The measurements were extracted from the data recorded during testing and represent the highest-amplitude emissions relative to the specification limits. The complete test data is provided in the appendices of this report.

CONDUCTED EMISSIONS (MAINS PORT)

Frequency Range Operating Voltage	Standard/Section	Requirement	Measurement Margin	Status
0.15-30 MHz, 110V, 60Hz FB409	FCC § 15.107(a) CISPR 22 Table 2 EN 55022 Table 2 AS/NZS CISPR 32 TCVN 7189 Table 2 (Class B)	0.15-0.5 MHz: 66-56 dBµV QP 56-46 dBµV Av 0.5-5.0 MHz: 56 dBµV QP 46 dBµV Av 5.0-30.0 MHz: 60 dBµV QP 50 dBµV Av	41.6 dBµV @ 0.48 MHz (-14.6 dB)	Complied
0.15-30 MHz, 220V, 60Hz FB409			37.3 dBµV @ 0.49 MHz (-18.8 dB)	Complied
0.15-30 MHz, 110V, 60Hz FB410			33.1 dBµV @ 0.40 MHz (-24.6 dB)	Complied
0.15-30 MHz, 220 V, 60 Hz FB410			35.5 dBµV @ 0.48 MHz (-20.7 dB)	Complied

CONDUCTED EMISSIONS (TELECOMMUNICATIONS PORTS)

Testing was not performed as the EUT does not have any telecommunication ports.

RADIATED EMISSIONS

Frequency Range	Standard/Section	Requirement	Measurement Margin	Status
30-1000 MHz 220V, 60Hz FB410	EN 55022 Table 6 CISPR 22 Table 6 FCC §15.109(g) AS/NZS CISPR 32 TCVN 7189 Table 6 Class B	30-230 MHz, 30 dBµV/m 230-1000 MHz, 37 dBµV/m (10 m limit)	18.0 dBµV/m @ 30.53 MHz (-12.0 dB)	Complied
30-1000 MHz 110V, 60Hz FB410			18.2 dBµV/m @ 30.56 MHz (-11.8 dB)	Complied
30-1000 MHz 220V, 60Hz FB409			17.5 dBµV/m @ 31.29 MHz (-12.5 dB)	Complied
30-1000 MHz 110V, 60Hz FB409			17.6 dBµV/m @ 30.68 MHz (-12.4 dB)	Complied
1000-6000 MHz NFC (EN)	EN 55022 Table 8 CISPR 22 Table 8 TCVN 7189 Table8 (Free-Space Measurement) Class B	1-3 GHz 50 dBµV/m Av 70 dBµV/m Pk 3-6 GHz 54 dBµV/m Av 74 dBµV/m Pk (3 m limit)	28.3 dBµV/m @ 3152.0 MHz (Margin: -21.7 dB)	Complied
1000-6000 MHz NFC (FCC)			32.0 dBµV/m @ 5432.6 MHz (Margin: -22.0 dB)	Complied
1000-6000 MHz 220V Non NFC			35.6 dBµV/m @ 2448.1 MHz (-18.4 dB)	Complied
1000-6000 MHz 110V Non NFC			35.9 dBµV/m @ 2448.1 MHz (-14.1 dB)	Complied
6000-25000 MHz	FCC §15.109(a) Class B	54.0 dBµV/m Av 74.0 dBµV/m Pk (3 m limit)	No emissions above measurement noise floor.	Complied

MULTIMEDIA EQUIPMENT EMISSIONS TEST RESULTS

The following emissions tests were performed on the Fitbit, Inc. models FB409 and FB410. The measurements were extracted from the data recorded during testing and represent the highest-amplitude emissions relative to the specification limits. The complete test data is provided in the appendices of this report.

CONDUCTED EMISSIONS (AC MAINS POWER PORTS)

Frequency Range Operating Voltage	Standard/Section	Requirement	Measurement Margin	Status
0.15-30 MHz, 110V, 60Hz FB409	EN 55032 CISPR 32 VCCI-CISPR 32 Table A.10 TEC India (Class B)	0.15-0.5 MHz: 66-56 dBµV QP 56-46 dBµV Av 0.5-5.0 MHz: 56 dBµV QP 46 dBµV Av 5.0-30.0 MHz: 60 dBµV QP 50 dBµV Av	41.6 dBµV @ 0.48 MHz (-14.6 dB)	Complied
0.15-30 MHz, 220V, 60Hz FB409			37.3 dBµV @ 0.49 MHz (-18.8 dB)	Complied
0.15-30 MHz, 110V, 60Hz FB410			33.1 dBµV @ 0.40 MHz (-24.6 dB)	Complied
0.15-30 MHz, 220 V, 60 Hz FB410			35.5 dBµV @ 0.48 MHz (-20.7 dB)	Complied

ASYMMETRIC MODE CONDUCTED EMISSIONS (FROM CLASS B EQUIPMENT)

Testing was not performed as the EUT does not have any telecommunication ports..

CONDUCTED DIFFERENTIAL VOLTAGE EMISSIONS (FROM CLASS B EQUIPMENT)

Applicable to:

1. TV broadcast receiver tuner ports with an accessible connector
2. RF modulator output ports
3. FM broadcast receiver tuner ports with an accessible connector

Testing was not performed as the EUT does not have any of the above ports.

RADIATED EMISSIONS

Frequency Range	Standard/Section	Requirement	Measurement Margin	Status
30-1000 MHz 220V FB410	EN 55032 CISPR 32 VCCI-CISPR 32 Table A.4 (Class B)	30-230 MHz, 40 dBµV/m 230-1000 MHz, 47 dBµV/m (10 m limit)	18.0 dBµV/m @ 30.53 MHz (-12.0 dB)	Complied
30-1000 MHz 110V FB410			18.2 dBµV/m @ 30.56 MHz (-11.8 dB)	Complied
30-1000 MHz 220V FB409			17.5 dBµV/m @ 31.29 MHz (-12.5 dB)	Complied
30-1000 MHz 110V FB409			17.6 dBµV/m @ 30.68 MHz (-12.4 dB)	Complied
1000-6000 MHz NFC	EN 55032 CISPR 32 VCCI-CISPR 32 Table A.5 (Class B)	1-3 GHz 50 dBµV/m Av 70 dBµV/m Pk 3-6 GHz 54 dBµV/m Av 74 dBµV/m Pk (3 m limit)	28.3 dBµV/m @ 3152.0 MHz (Margin: -21.7 dB)	Complied
1000-6000 MHz Non-NFC			35.6 dBµV/m @ 2448.1 MHz (-14.4 dB)	Complied

INFORMATION TECHNOLOGY EQUIPMENT IMMUNITY TEST RESULTS

The following tests were performed on the Fitbit, Inc. models FB409 and FB410. The results are based upon performance criteria defined by the company and as detailed in this test report.

IMMUNITY (ENCLOSURE PORT)

Test	Basic Standard	Level		Criterion		Status
		Required	Tested	Req.	Met	
Power Frequency Magnetic Field	EN 61000-4-8 IEC 61000-4-8	3A/m 60 Hz	N/A – the manufacturer stated that the EUT does not contain devices susceptible to magnetic fields (such as CRT monitors, Hall elements, electrodynamic microphones, magnetic field sensors, etc.)			
Radio-Frequency Electromagnetic Field, Amplitude Modulated	EN 61000-4-3 IEC 61000-4-3	80-1000 MHz 3 V/m 80% AM (1 kHz)	80-1000 MHz 3 V/m	A	A	Complied
Electrostatic Discharge	EN 61000-4-2 IEC 61000-4-2	4 kV CD 8 kV AD	4 kV CD 8 kV AD	B	A	Complied

IMMUNITY (SIGNAL PORTS AND TELECOMMUNICATIONS PORTS)

Test	Basic Standard	Level		Criterion		Status
		Required	Tested	Req.	Met	
Radio-Frequency Continuous Conducted	EN 61000-4-6 IEC 61000-4-6	0.15-80 MHz, 3 Vrms 80% AM (1 kHz)	N/A – there are no cables which according to the manufacturer's specification support communication on cable lengths greater than 3 m			
Surges	EN 61000-4-5 IEC 61000-4-5	1.5 kV 10/700 µs	N/A – there are no ports which according to the manufacturer's specification may connect directly to outdoor cables			
		4.0 kV 10/700 µs				
Electrical Fast Transients	EN 61000-4-4 IEC 61000-4-4	0.5 kV	N/A – there are no cables which according to the manufacturer's specification support communication on cable lengths greater than 3 m			

IMMUNITY (INPUT DC POWER PORTS)

Test	Basic Standard	Level		Criterion		Status
		Required	Tested	Req.	Met	
Radio-Frequency Continuous Conducted	EN 61000-4-6 IEC 61000-4-6	0.15-80 MHz, 3 Vrms 80% AM (1 kHz)	N/A – the EUT cannot be used with the charger connected.			
Surges	EN 61000-4-5 IEC 61000-4-5	0.5 kV 1.2/50 µs				
Electrical Fast Transients	EN 61000-4-4 IEC 61000-4-4	0.5 kV 5/50 ns 5 kHz				

IMMUNITY (INPUT AC POWER PORTS)

Test	Basic Standard	Level		Criterion		Status
		Required	Tested	Req.	Met	
EFT, AC Power Port	EN 61000-4-4 IEC 61000-4-4	1.0 kV	N/A – the EUT cannot be used with the charger connected.			
Surge, AC Power Port	EN 61000-4-5 IEC 61000-4-5	1 kV DM, 2 kV CM 1.2/50 µs				
RF, conducted continuous, AC Power Port	EN 61000-4-6 IEC 61000-4-6	0.15-80 MHz, 3 Vrms 80% AM 1 kHz				
Voltage Dips and Interrupts (50 Hz)	EN 61000-4-11 IEC 61000-4-11	>95%, 0.5 cycles 30%, 25 cycles >95%, 250 cycles				
Voltage Dips and Interrupts (60 Hz)	EN 61000-4-11 IEC 61000-4-11	>95%, 0.5 cycles 30%, 30 cycles >95%, 300 cycles				

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below were calculated using the approach described in CISPR 16-4-2 using a coverage factor of k=2, which gives a level of confidence of approximately 95%. The levels were found to be below levels of CISPR and therefore no adjustment of the data for measurement uncertainty is required.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions	dBuV or dBuA	150 kHz – 30 MHz	± 2.2 dB
Radiated Electric Field	dBuV/m	30-1000 MHz	± 3.6 dB
		1000-40,000 MHz	± 6.0 dB
Radiated Immunity	V/m	80-10,000 MHz	- 26.3%, + 29.97%
ESD	KV	N/A	± 8.6%

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Fitbit, Inc. models FB409 and FB410 are wrist-worn activity trackers, which send data about activity to the user via a Bluetooth Low Energy (BLE) link. Model FB410 also has an NFC transceiver. They are powered by an internal, rechargeable battery. The EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 3.85 VDC.

The samples were received on April 9, 2018 and tested on April 12, 20, 26, 27 and May 4, 2018. The following samples of the EUT were tested:

Company	Model	Description	Serial Number
Fitbit, Inc.	FB409	Wireless Activity Tracker	B2-E-271
	FB410		B2-D-102
	FB409		B2-B-289
	FB410		B2-SAT2-279A-C43

HIGHEST EUT INTERNAL FREQUENCY SOURCE

The highest internal frequency source (F_x) of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. The highest internal frequency source determines the frequency range of test for radiated emissions.

The highest internal frequency source of the EUT was declared to be 32 MHz.

Based on the declared highest internal frequency source, the upper frequency range of measurement for the current project were:

FCC Part 15, Subpart B

Highest Internal Frequency Source (MHz)	Upper Frequency Range of Measurement (MHz)	Applicability
Below 1.705	30	
1.705 – 108	1000	X
108 – 500	2000	
500 – 1000	5000	
Above 1000	5th harmonic of the highest internal source or 40 GHz, whichever is lower	

CISPR 22 (and related standards)

Highest Internal Source (MHz)	Upper Frequency Range of Measurement (MHz)	Applicability
1.705 – 108	1000	X
108 – 500	2000	
500 – 1000	5000	
Above 1000	5th harmonic of the highest internal source or 6 GHz, whichever is lower	

CISPR 32 (and related standards)

Highest Internal Source (MHz)	Upper Frequency Range of Measurement (MHz)	Applicability
1.705 – 108	1000	X
108 – 500	2000	
500 – 1000	5000	
Above 1000	5th harmonic of the highest internal source or 6 GHz, whichever is lower	

ENCLOSURE

The EUT enclosure measures approximately 24 by 2.5 by 1.3 centimeters. It is primarily constructed of metal and plastic.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at National Technical Systems.

SUPPORT EQUIPMENT

No local support equipment was used during testing.

The following equipment was used as remote support equipment for testing:

Configuration #1 (Emissions)

Company	Model	Description	Serial Number
Choetech	Qualcomm Quickcharge 30	USB charger	NA
Lenovo	ThinkPad	Laptop	-

Configuration #2 (Immunity)

Company	Model	Description	Serial Number	FCC ID
Appe Inc.	MacBook Pro	Laptop	-	-
Lenovo	ThinkPad	Laptop	-	-
Vivo	VivoPay 4800	Tag reader	CA1352A546	Q55VIVOPAY4800

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Configuration #1 (Emissions)

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
AC\DC adapter In	Mains	Power Adapter	-	-
AC\DC adapter Out	EUT	USB cable	Shielded	0.4

Configuration #1 (Additional on Support Equipment)

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
USB/ Lenovo Laptop	EUT Programmer	USB	Shielded	0.7
Power/ Lenovo Laptop	AC/DC adapter/ACMains	2Wire	Unshielded	1

Configuration #2 (Immunity)

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
AC\DC adapter In	Mains	Power Adapter	-	-
AC\DC adapter Out	EUT	USB cable	Shielded	0.4

Configuration #2 (Additional on Support Equipment)

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
USB/ Apple Laptop	BLE Dongle	USB	Shielded	0.7
USB/ Lenovo Laptop	EUT Programmer	USB	Shielded	0.7
Power/ Apple Laptop	AC/DC adapter/ACMains	Power cable	Unshielded	1.5
Power/ Lenovo Laptop	AC/DC adapter/ACMains	2Wire	Unshielded	1

EUT OPERATION

During emissions testing, the BLE radio was continuously transmitting on channel 17 (2440 MHz) at maximum power (setting 4); the NFC radio was continuously transmitting (13.56 MHz) at maximum power.

During immunity testing the EUT was in either transmit or receive mode.
BLE - In transmit mode, the EUT was configured to receive/transmit data from a dongle which was connected to a remote laptop.
NFC - the EUT NFC mode was verified to be operational before and after testing.
In standby mode, the EUT was configured in a receive only mode on channel 17.
For standby mode, a spectrum analyzer with field probe was used to monitor the 2400-2483.5MHz band.

The performance criteria applied during immunity testing were:

Performance criteria for continuous phenomena:
Transmit mode:
For BLE - During and after testing the EUT shall continue to transmit and receive data from the local dongle. There shall be no errors reported by the monitoring software.
For NFC - The NFC was verified to be operational before and after each test by placing the watch close to the VIVOpay reader which plays a quick audio tone.
Receive mode:
During and after testing there shall be no transmissions from the EUT.

Performance criteria for transient phenomena:
Transmit mode:
For BLE - After testing the EUT shall continue to transmit and receive data from the local dongle.
For NFC - The NFC was verified to be operational before and after each test by placing the watch close to the VIVOpay reader which plays a quick audio tone.
Receive mode:
During and after testing, there should be no transmissions from the EUT.

EMISSIONS TESTING

RADIATED AND CONDUCTED EMISSIONS

Final test measurements were taken at the National Technical Systems Anechoic Chambers listed below. The test sites contain separate areas for radiated and conducted emissions testing. The sites conform to the requirements of ANSI C63.4-2014 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz* and CISPR 16-1-4:2017 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are registered with the VCCI and are on file with the FCC and Industry Canada.

Site	Registration Numbers			Location
	VCCI	FCC	Canada	
Chamber 3	Member 1211 Facility Registration A-0169	A2LA accredited	IC 2845B-3	41039 Boyce Road Fremont, CA 94538-2435

RADIATED EMISSIONS CONSIDERATIONS

Radiated emissions measurements were made with the EUT powered from a supply voltage within the expected tolerances of each nominal operating voltage/frequency for each geographical regions covered by the scope of the standards referenced in this report.

EMISSIONS MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1:2015 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7 GHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000 MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

Measurements for radiated and conducted emissions are converted to the field strength at an antenna or voltage developed at the LISN (or ISN) measurement port, which is then compared directly with the appropriate specification limit under software control of the test receivers and spectrum analyzers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically. The software used for measurements is NTS EMI Test Software (rev 2.10).

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted emission measurements utilize a 50 µH Line Impedance Stabilization Network (LISN) as the measurement point. The LISN used may also contain an additional 250 µH inductor. This network provides for calibrated radio-frequency noise measurements by the design of the internal low-pass and high-pass filters on the EUT and measurement ports, respectively.

IMPEDANCE STABILIZATION NETWORK (ISN)

Telecommunication port conducted emission measurements utilize an Impedance Stabilization Network with a 150-ohm termination impedance and specific longitudinal conversion loss as the voltage monitoring point. This network provides for calibrated radio-frequency noise measurements by the design of the internal circuitry on the EUT and measurement ports, respectively. For current measurements, a current probe with a uniform frequency response and less than 1-ohm insertion impedance is used.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high-amplitude transient events.

ANTENNAS

A bilog antenna or combination of biconical and log periodic antennas are used to cover the range from 30 MHz to 1000 MHz. Narrowband tuned dipole antennas may be used over the entire 30 to 1000 MHz frequency range for precision measurements of field strength. Above 1000 MHz, horn antennas are used. The antenna calibration factors are included in site factors that are programmed into the test receivers or data collection software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor drive to vary the antenna height.

ANSI C63.4, CISPR 22, and CISPR 32 specify that the test height above ground for table-mounted devices shall be 80 centimeters. Floor-mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material up to 12-mm thick if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

EMISSIONS TEST PROCEDURES

EUT AND CABLE PLACEMENT

The standards require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst-case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, CISPR 22, and CISPR 32, and the worst-case orientation is used for final measurements.

RADIATED EMISSIONS

General

FCC Part 15 references the test methods of ANSI C63.4-2014 (American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz) for emissions measurements. Radiated emissions measurements are performed in two phases, preliminary scan and final maximization.

Preliminary Scan

A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one or more of these with the antenna polarized vertically and one or more of these are performed with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied as necessary to determine the highest emission relative to the limit.

Note that for the frequency range of 1-6 GHz in the “free space” test environment, CISPR 22 and CISPR 32 allows the antenna to be set at a fixed height equal to the center height of the EUT, except for cases where additional scans are necessary with the antenna height adjusted up and down to ensure the measurement antenna illuminates the entire height of the EUT. However, in cases where a single “free space” test is performed in the 1-6 GHz frequency to simultaneously meet the requirements of FCC Part 15 (ANSI C63.4-2014 test methods) and CISPR 22, the antenna height is by default varied since required by ANSI C63.4.

In the frequency range of 30-1000 MHz, a speaker (with demodulation) is provided in the receiver to aid in discriminating between EUT and ambient emissions if required. Other possible methods for discriminating between EUT and ambient emissions involve scanning with near-field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final Maximization

During final maximization, the highest-amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth that results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions that have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

Final measurements in the frequency range of 30-1000 MHz are made using a quasi-peak detector and compared to the quasi-peak limit. Final measurements above 1 GHz are made using average and peak detectors and compared to the average and peak limits respectively.

When testing above 1 GHz, the receive antenna is restricted to a maximum height of 2.5 m. Maximum emissions are found within this restricted range because emission levels decrease over distance and as the antenna is raised above 2.5 m, the distance from the EUT increases. As a result of the increased measurement distance, at antenna heights above 2.5 m, lower emission levels are measured as compared to emissions levels measured at antenna heights at 2.5 m and below. Final measurements are captured at 3 meters test distance except in cases where a closer test distance is required due to noise-floor considerations of the test-and-measurement equipment.

For measurements above 1 GHz every effort is made to ensure the EUT remains within the cone of radiation of the measurement antenna (i.e. 3 dB beam-width of the antenna). This may include rotating the product and/or angling the measurement antenna.

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB
D_m = Measurement Distance in meters
D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m
F_d = Distance Factor in dB
R_c = Corrected Reading in dBuV/m
L_s = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

IMMUNITY TESTING

GENERAL INFORMATION

Final tests were performed at the National Technical Systems Test Sites located at41039 Boyce Road, Fremont, CA 94538-2435. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent CENELEC and IEC standards.

All immunity tests were performed with the host system operating from an AC source voltage within the operating ranges specified for the product, meeting the requirement detailed in EN 55024 / CISPR 24 section 6.1.

IMMUNITY MEASUREMENT INSTRUMENTATION

ELECTROSTATIC DISCHARGE TEST SYSTEM

An ESD generator is used for all testing. It is capable of applying electrostatic discharges in both contact discharge mode to 8 kV and air discharge mode to 16.5 kV in both positive and negative polarities in accordance with the IEC/EN 61000-4-2 basic EMC publication.

ELECTROMAGNETIC FIELD TEST SYSTEM

A signal generator and power amplifiers are used to provide a signal at the appropriate power and frequency to an antenna to obtain the required electromagnetic field at the position of the EUT in accordance with the IEC/EN 61000-4-3 basic EMC publication.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

IMMUNITY TEST PROCEDURES

EQUIPMENT PLACEMENT

IEC 61000-4-2 specifies that a floor-standing EUT shall be placed on an insulating support 5 - 15 centimeters above a ground plane and that all cables be isolated from the ground plane by 0.5 ± 0.05 millimeter thick insulating material.
For tabletop equipment, the EUT shall be placed a table 0.8 ± 0.08 meters high with a 1.6 ± 0.02 by 0.8 ± 0.02 meter metal sheet placed on the table and connected to the ground plane via a metal strap with two 470-kΩ resistors in series. The EUT and attached cables shall be isolated from this metal sheet by 0.5 ± 0.05 millimeter thick insulating material. During the tests, the EUT and cables were positioned over a ground reference plane in conformance with this requirement.

IEC 61000-4-3 specifies that a tabletop EUT shall be placed on a non-conducting table 80 centimeters high and that floor-mounted equipment should be mounted on non-conductive supports 0.05 to 0.15 m high or may be placed on an 80 centimeter high platform, if practicable. During the IEC 61000-4-3 tests, the EUT was positioned in a shielded anechoic test chamber on an insulating support in conformance with this requirement. The anechoic materials are used to reduce reflections from the internal surfaces of the chamber.

APPLICATION OF ELECTROSTATIC DISCHARGES

The points of application of the test discharges directly to the EUT are determined after consideration of the parts of the EUT that are accessible to the operator during normal operation. Contact and air discharges are applied to the EUT, contact discharges to conducting surfaces and air-gap discharges to insulating surfaces. Contact discharges are also applied to the coupling planes to simulate nearby ESD events.

APPLICATION OF ELECTROMAGNETIC FIELD

The electromagnetic field is established at the front edge of the EUT.

The frequency range is swept through the frequency range of the test using a power level necessary to obtain the required field strength at the EUT. The field is amplitude modulated using a 1 kHz sine wave to a depth of 80% for the swept frequency test in accordance with the applicable basic standard(s).

The test is repeated with each of the four sides of the EUT facing the field-generating antenna. For small, portable products the test is also performed with the top and bottom sides of the EUT facing the antenna.

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radiated Emissions, 30 - 1,000 MHz, 12-Apr-18					
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1538	2/10/2018	2/10/2019
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2237	6/27/2016	6/27/2018
Com-Power	Preamplifier, 30-1000 MHz	PA-103	2465	9/6/2017	9/6/2018
ESD, 20-Apr-18					
National Technical Systems	ESD, Vertical Plane, 19-3/4 x 19-3/4	ESD, VP, 19-3/4 x 19-3/4	610		N/A
Teseq Schaffner	ESD Gun (Red), 100pF-1500 ohm & 150pF-330 ohm tips	NSG-438	3010	10/30/2017	10/30/2018
Radiated Immunity, 80 - 1,000 MHz, 26&27-Apr-18					
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	1/10/2018	1/10/2019
Werlatone	Directional Coupler, 0.1-1000 MHz, 40dB, 500w	C6021	1533		N/A
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1539	10/30/2017	10/30/2018
ETS Lindgren	Biconilog Antenna 26 MHz - 3 GHz, Radiated Immunity Only	3140B	1775		N/A
Amplifier Research	Amplifier, 250W, 80-1000 MHz	250A1000	1809		N/A
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	2152	6/27/2017	6/27/2018
ETS Lindgren	Field Probe, RF, 10 MHz - 40 GHz	HI-6053	2202	1/8/2018	1/8/2019
HP Agilent Keysight	Function / Arbitrary waveform generator 80 MHz	33250A	3257	6/22/2017	6/22/2018
Radiated Immunity, 80 - 1,000 MHz, 4-May-18					
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	1/10/2018	1/10/2019
Werlatone	Directional Coupler, 0.1-1000 MHz, 40dB, 500w	C6021	1533		N/A
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1539	10/30/2017	10/30/2018
ETS Lindgren	Biconilog Antenna 26 MHz - 3 GHz, Radiated Immunity Only	3140B	1775		N/A
Amplifier Research	Amplifier, 250W, 80-1000 MHz	250A1000	1809		N/A
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	2152	6/27/2017	6/27/2018
ETS Lindgren	Field Probe, RF, 10 MHz - 40 GHz	HI-6053	2202	1/8/2018	1/8/2019
HP Agilent Keysight	Function / Arbitrary waveform generator 80 MHz	33250A	3257	6/22/2017	6/22/2018
Radiated Immunity, 1,000 - 6,000 MHz, 04-May-18					
National Technical Systems	Radiated Immunity Playback (rev 7.21)	N/A	0		N/A
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	1/10/2018	1/10/2019
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1539	10/30/2017	10/30/2018

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Purple). Used for Chamber 6	3115	1779		N/A
Amplifier Research	Amplifier, 25w, 0.8-4.2GHz	25S1G4AM3	1805		N/A
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	2152	6/27/2017	6/27/2018
Advanced Technical Materials	Directional Coupler, 1.0-11.0GHz, 35dB, 50w	CHP223G-35FNF	2320		N/A
HP Agilent Keysight	Function / Arbitrary waveform generator 80 MHz	33250A	3257	6/22/2017	6/22/2018
Amplifier Research	Amplifier, 15W, 4.2 to 18 GHz	15T4G18M1	2065		N/A
Conducted Emissions - AC Power Ports, 12-Apr-18					
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	8/8/2017	8/8/2018
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	1/8/2018	1/8/2019
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESI 40	2493	3/22/2018	3/22/2019
Radiated Emissions, 1000 - 25,000 MHz, 23-Jul-18					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
EMCO	Antenna, Horn, 1-18GHz	3115	868	7/9/2018	7/9/2020
HP / Miteq	SA40 P Head HF preAmplifier, 18-40 GHz (w/2415)	TTA1840-45-5P-HG-S	1772	9/14/2017	N/A
A. H. Systems	System Horn, 18-40GHz	SAS-574, p/n: 2581	2161	7/21/2017	7/21/2019
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	8/30/2017	8/30/2018
Hewlett Packard	Spectrum Analyzer (SA40) Purple 9 kHz - 40 GHz,	8564E (84125C)	2415	2/16/2018	2/16/2019
Radiated Emissions, 1,000 - 25,000 MHz, 24-Jul-18					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	9/8/2017	9/8/2018
Hewlett Packard	Spectrum Analyzer (SA40) Blue 9 kHz - 40 GHz	8564E (84125C)	1393	12/8/2017	12/8/2018
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/18/2017	8/18/2018
Micro-Tronics	Band Reject Filter, 2400-2500 MHz 18GHz	BRM50702-02	2238	5/1/2018	5/1/2019
EMCO	Antenna, Horn, 1-18 GHz	3115	2870	8/24/2017	8/24/2019

Appendix B Test Data

Client:	Fitbit, Inc.	Job Number:	JD105947
Product	FB409	T-Log Number:	T106007
System Configuration:	-	Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Coordinator:	-
Emissions Standard(s):	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Fitbit, Inc.

Product

FB409

Date of Last Test: 4/20/2018

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Conducted Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/12/2018
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Config. Used: 1
Config Change: None
EUT Voltage: See Individual Runs

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

Temperature: 22.4 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,110V/60Hz	Class B	Pass	41.6 dBµV @ 0.48 MHz(-14.6 dB)
2	CE, AC Power,220V/60Hz	Class B	Pass	37.3 dBµV @ 0.49 MHz(-18.8 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

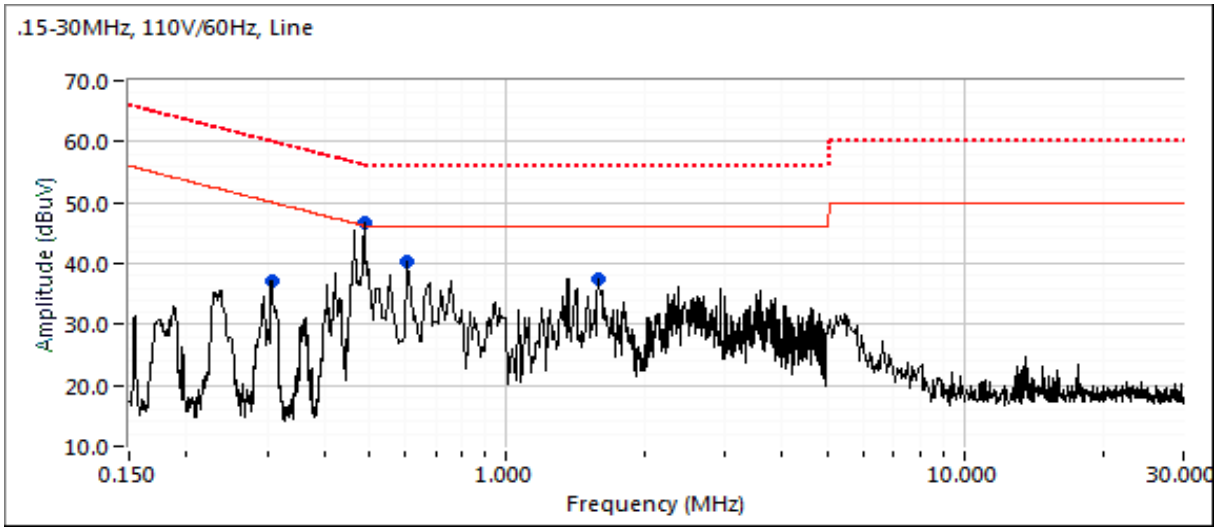
Sample S/N: B2-B-289
Driver: 1.5.9615
Antenna: Internal

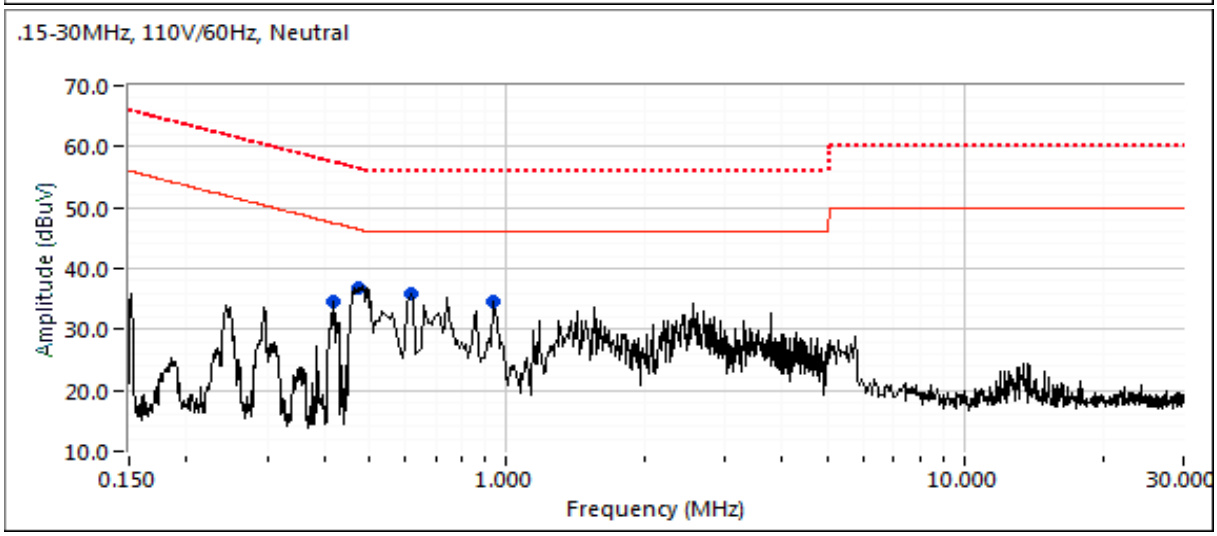
Notes:

EUT configured to transmit on channel 19 at power setting Max

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 110V/60Hz





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

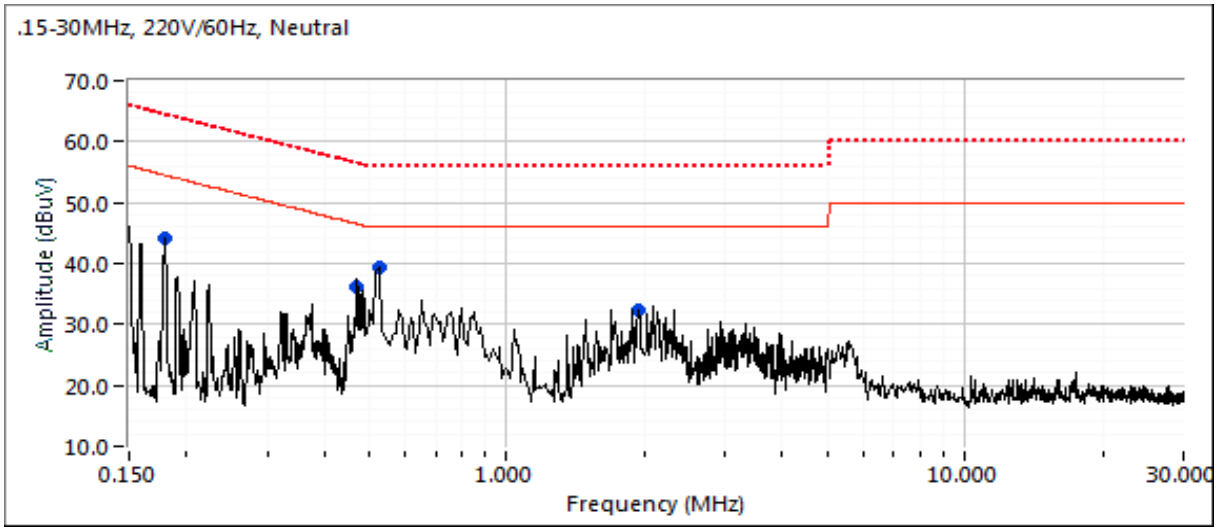
Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.308	37.2	Line 1	50.1	-12.9	Peak	
0.487	46.6	Line 1	46.2	0.4	Peak	
0.571	40.2	Line 1	46.0	-5.8	Peak	
1.541	37.5	Line 1	46.0	-8.5	Peak	
0.418	34.5	Neutral	47.5	-13.0	Peak	
0.479	36.9	Neutral	46.4	-9.5	Peak	
0.620	35.8	Neutral	46.0	-10.2	Peak	
0.921	34.6	Neutral	46.0	-11.4	Peak	

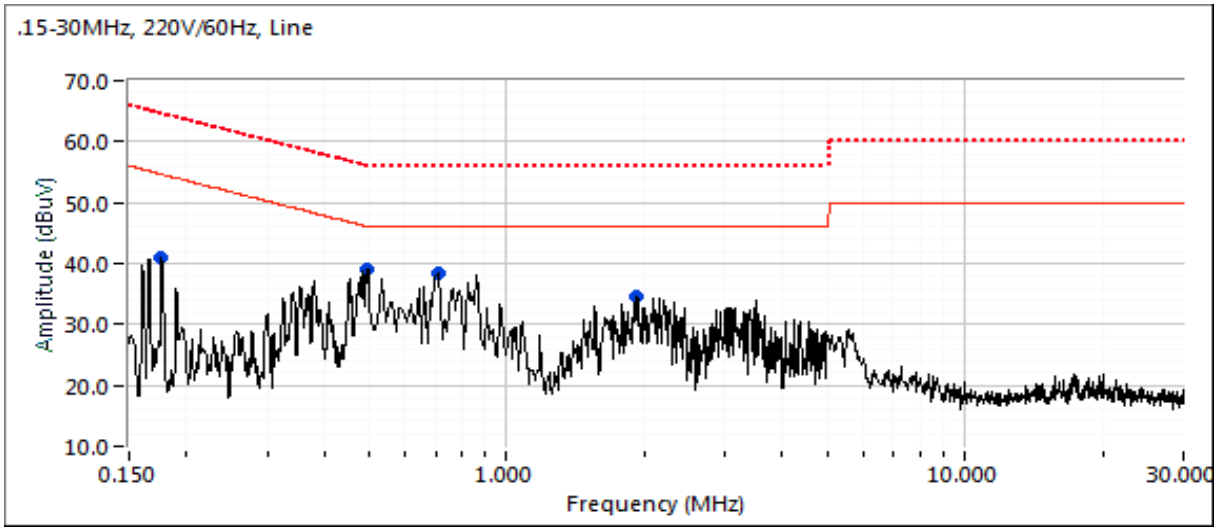
Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.487	41.6	Line 1	56.2	-14.6	QP	QP (1.00s)
0.479	38.1	Neutral	56.4	-18.3	QP	QP (1.00s)
0.487	26.3	Line 1	46.2	-19.9	AVG	AVG (0.10s)
0.479	25.0	Neutral	46.4	-21.4	AVG	AVG (0.10s)
0.571	30.4	Line 1	56.0	-25.6	QP	QP (1.00s)
1.541	30.3	Line 1	56.0	-25.7	QP	QP (1.00s)
0.619	29.3	Neutral	56.0	-26.7	QP	QP (1.00s)
0.418	30.6	Neutral	57.5	-26.9	QP	QP (1.00s)
0.921	27.8	Neutral	56.0	-28.2	QP	QP (1.00s)
0.308	30.8	Line 1	60.0	-29.2	QP	QP (1.00s)
0.418	18.0	Neutral	47.5	-29.5	AVG	AVG (0.10s)
1.541	15.9	Line 1	46.0	-30.1	AVG	AVG (0.10s)
0.921	15.7	Neutral	46.0	-30.3	AVG	AVG (0.10s)
0.619	14.2	Neutral	46.0	-31.8	AVG	AVG (0.10s)
0.308	18.0	Line 1	50.0	-32.0	AVG	AVG (0.10s)
0.571	14.0	Line 1	46.0	-32.0	AVG	AVG (0.10s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 220V/60Hz





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.183	44.1	Neutral	54.5	-10.4	Peak	
0.471	36.3	Neutral	46.5	-10.2	Peak	
0.540	39.4	Neutral	46.0	-6.6	Peak	
1.922	32.4	Neutral	46.0	-13.6	Peak	
0.177	41.1	Line 1	54.6	-13.5	Peak	
0.495	39.1	Line 1	46.1	-7.0	Peak	
0.709	38.5	Line 1	46.0	-7.5	Peak	
1.949	34.5	Line 1	46.0	-11.5	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.495	37.3	Line 1	56.1	-18.8	QP	QP (1.00s)
0.495	25.0	Line 1	46.1	-21.1	AVG	AVG (0.10s)
0.709	32.8	Line 1	56.0	-23.2	QP	QP (1.00s)
0.540	20.8	Neutral	46.0	-25.2	AVG	AVG (0.10s)
0.709	20.6	Line 1	46.0	-25.4	AVG	AVG (0.10s)
0.471	20.7	Neutral	46.5	-25.8	AVG	AVG (0.10s)
1.949	30.1	Line 1	56.0	-25.9	QP	QP (1.00s)
0.540	29.8	Neutral	56.0	-26.2	QP	QP (1.00s)
0.471	30.0	Neutral	56.5	-26.5	QP	QP (1.00s)
1.949	17.9	Line 1	46.0	-28.1	AVG	AVG (0.10s)
0.183	36.0	Neutral	64.3	-28.3	QP	QP (1.00s)
0.177	36.0	Line 1	64.6	-28.6	QP	QP (1.00s)
1.922	15.0	Neutral	46.0	-31.0	AVG	AVG (0.10s)
1.922	24.1	Neutral	56.0	-31.9	QP	QP (1.00s)
0.183	13.5	Neutral	54.3	-40.8	AVG	AVG (0.10s)
0.177	13.6	Line 1	54.6	-41.0	AVG	AVG (0.10s)

Client:	Fitbit, Inc.	Job Number:	JD105947
Product	FB410	T-Log Number:	T106007
System Configuration:	-	Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Coordinator:	-
Emissions Standard(s):	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Fitbit, Inc.

Product

FB410

Date of Last Test: 4/17/2018

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Conducted Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/12/2018
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Config. Used: 1
Config Change: None
EUT Voltage: See Individual Runs

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

Temperature: 22.4 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,110V/60Hz	Class B	Pass	33.1 dBµV @ 0.40 MHz(-24.6 dB)
2	CE, AC Power,220V/60Hz	Class B	Pass	35.5 dBµV @ 0.48 MHz(-20.7 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

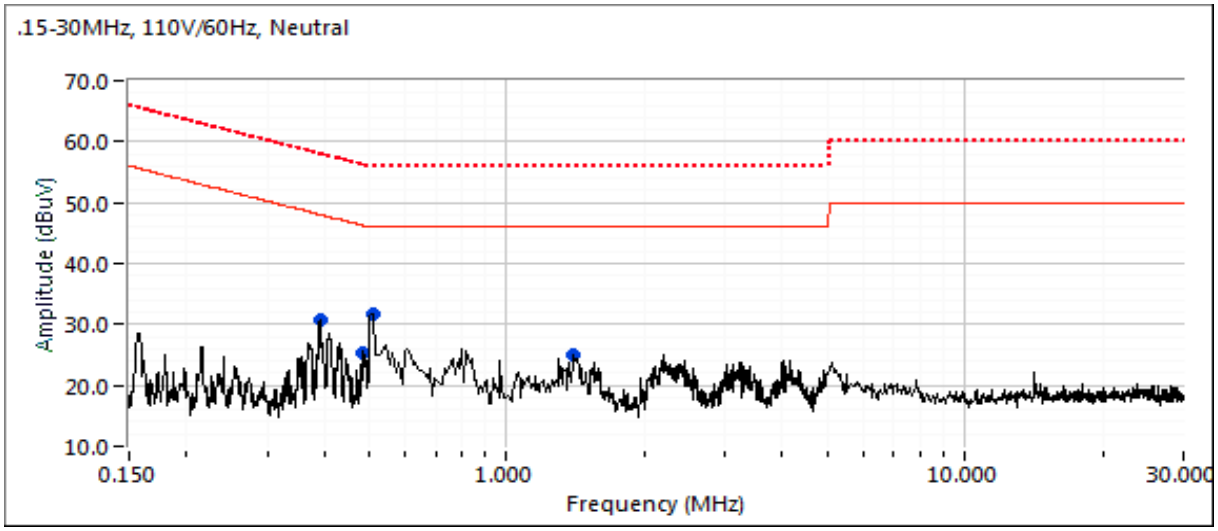
Sample S/N: B2-SAT2-279A-C43
Driver: 1.5.9615
Antenna: internal

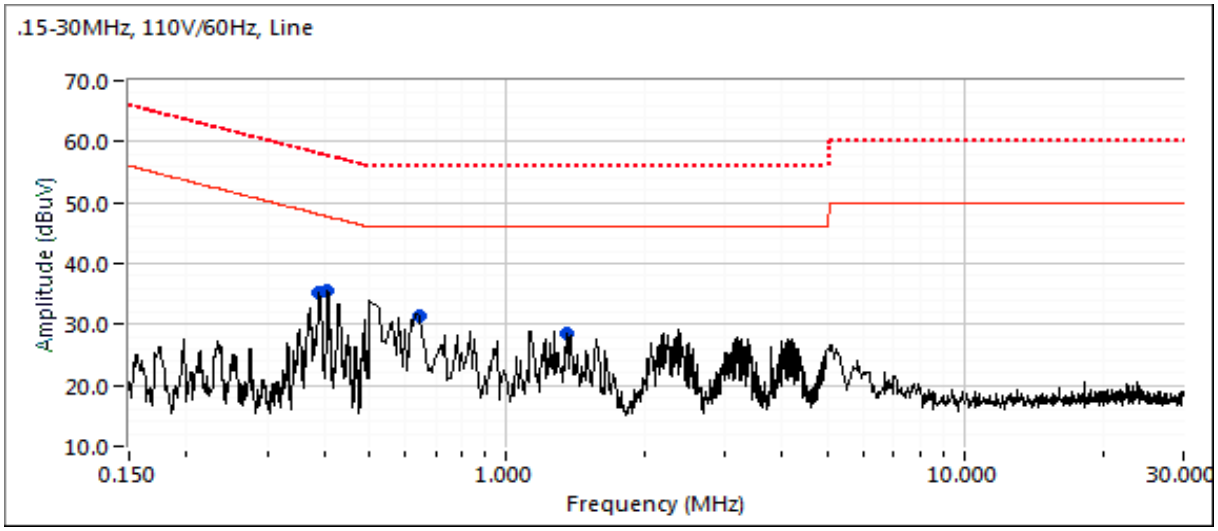
Notes:

EUT configured to transmit on channel 19 at power setting Max

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 110V/60Hz





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

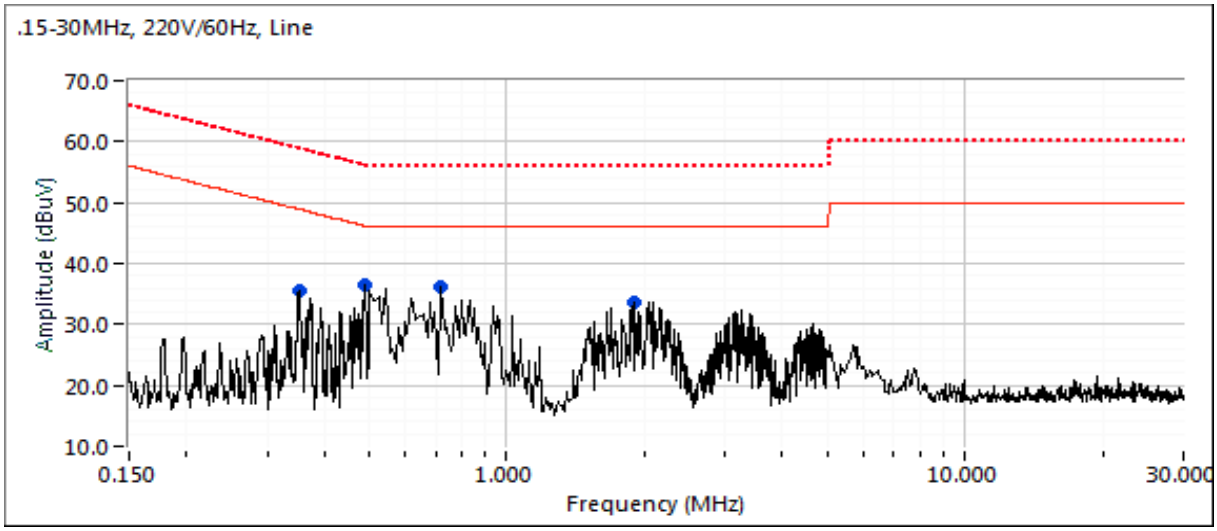
Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.388	30.8	Neutral	48.0	-17.2	Peak	
0.487	25.4	Neutral	46.2	-20.8	Peak	
0.522	31.6	Neutral	46.0	-14.4	Peak	
1.416	24.9	Neutral	46.0	-21.1	Peak	
0.389	35.3	Line 1	48.1	-12.8	Peak	
0.406	35.6	Line 1	47.7	-12.1	Peak	
0.602	31.5	Line 1	46.0	-14.5	Peak	
1.305	28.5	Line 1	46.0	-17.5	Peak	

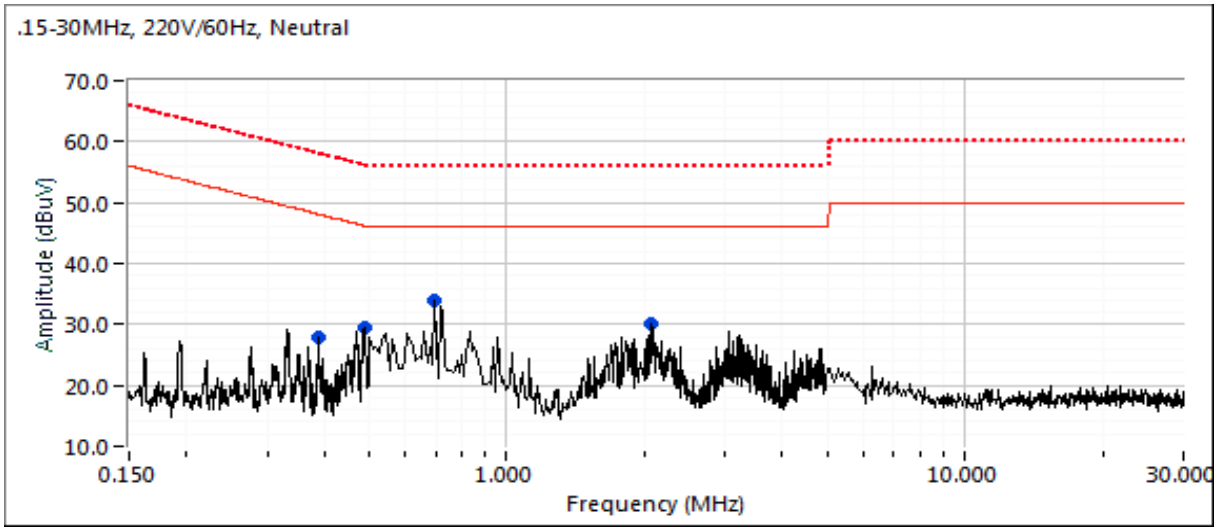
Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.406	33.1	Line 1	57.7	-24.6	QP	QP (1.00s)
0.406	21.6	Line 1	47.7	-26.1	AVG	AVG (0.10s)
0.389	21.9	Line 1	48.1	-26.2	AVG	AVG (0.10s)
0.389	31.8	Line 1	58.1	-26.3	QP	QP (1.00s)
0.602	28.3	Line 1	56.0	-27.7	QP	QP (1.00s)
0.388	19.8	Neutral	48.1	-28.3	AVG	AVG (0.10s)
0.602	17.7	Line 1	46.0	-28.3	AVG	AVG (0.10s)
0.522	16.6	Neutral	46.0	-29.4	AVG	AVG (0.10s)
0.522	25.7	Neutral	56.0	-30.3	QP	QP (1.00s)
0.487	15.6	Neutral	46.2	-30.6	AVG	AVG (0.10s)
0.388	26.5	Neutral	58.1	-31.6	QP	QP (1.00s)
0.487	24.2	Neutral	56.2	-32.0	QP	QP (1.00s)
1.305	21.6	Line 1	56.0	-34.4	QP	QP (1.00s)
1.416	10.5	Neutral	46.0	-35.5	AVG	AVG (0.10s)
1.416	19.2	Neutral	56.0	-36.8	QP	QP (1.00s)
1.305	8.9	Line 1	46.0	-37.1	AVG	AVG (0.10s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 220V/60Hz





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	FCC 15.247, 15.209 / RSS-247, RSS-210 / LP0002	Class:	-

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.352	35.6	Line 1	48.9	-13.3	Peak	
0.486	36.5	Line 1	46.2	-9.7	Peak	
0.698	36.1	Line 1	46.0	-9.9	Peak	
1.885	33.5	Line 1	46.0	-12.5	Peak	
0.392	27.9	Neutral	48.1	-20.2	Peak	
0.487	29.4	Neutral	46.2	-16.8	Peak	
0.700	34.0	Neutral	46.0	-12.0	Peak	
2.043	30.2	Neutral	46.0	-15.8	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.486	35.5	Line 1	56.2	-20.7	QP	QP (1.00s)
0.697	30.4	Line 1	56.0	-25.6	QP	QP (1.00s)
0.487	29.6	Neutral	56.2	-26.6	QP	QP (1.00s)
1.885	28.9	Line 1	56.0	-27.1	QP	QP (1.00s)
0.486	18.2	Line 1	46.2	-28.0	AVG	AVG (0.10s)
0.352	30.8	Line 1	58.9	-28.1	QP	QP (1.00s)
0.700	26.8	Neutral	56.0	-29.2	QP	QP (1.00s)
0.487	15.1	Neutral	46.2	-31.1	AVG	AVG (0.10s)
0.697	14.0	Line 1	46.0	-32.0	AVG	AVG (0.10s)
2.043	23.4	Neutral	56.0	-32.6	QP	QP (1.00s)
0.700	13.3	Neutral	46.0	-32.7	AVG	AVG (0.10s)
1.885	12.9	Line 1	46.0	-33.1	AVG	AVG (0.10s)
0.352	15.0	Line 1	48.9	-33.9	AVG	AVG (0.10s)
0.392	13.1	Neutral	48.0	-34.9	AVG	AVG (0.10s)
2.043	11.0	Neutral	46.0	-35.0	AVG	AVG (0.10s)
0.392	22.4	Neutral	58.0	-35.6	QP	QP (1.00s)

Client:	Fitbit, Inc.	Job Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
System Configuration:	-	Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Coordinator:	-
Emissions Standard(s):	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

EMC Test Data

For The

Fitbit, Inc.

Product

FB409 and FB410

Date of Last Test: 7/24/2018

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/12/2018
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3
Config. Used: 1
Config Change: None
EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 22.4 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class B	Eval	Refer to individual runs
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	18.0 dBµV/m @ 30.53 MHz (-12.0 dB)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

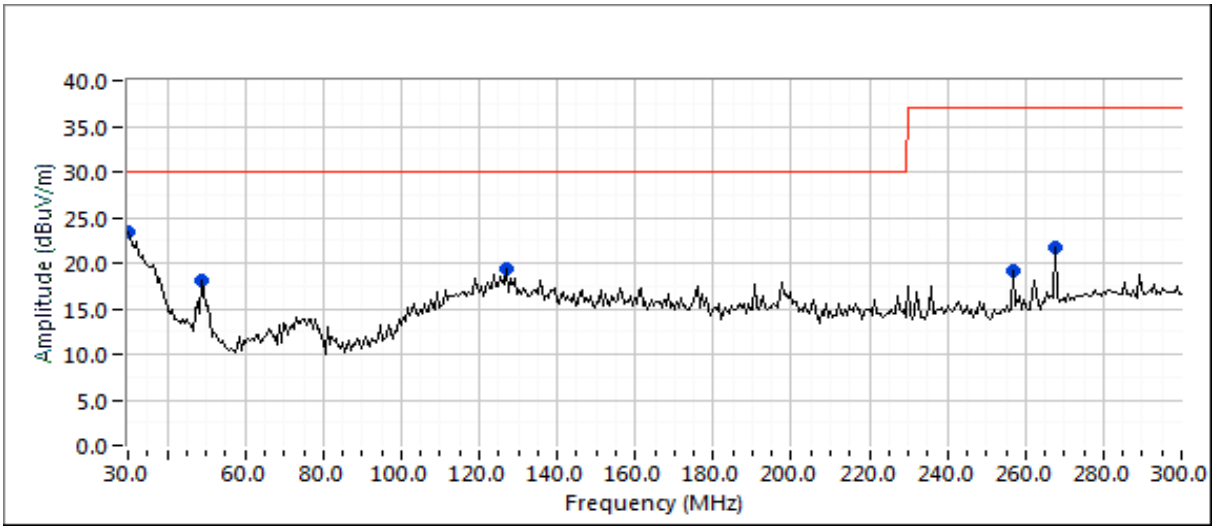
Sample S/N: B2-SAT2-279A-C43 (BLE+NFC)
Driver: 1.5.9615
Antenna: internal

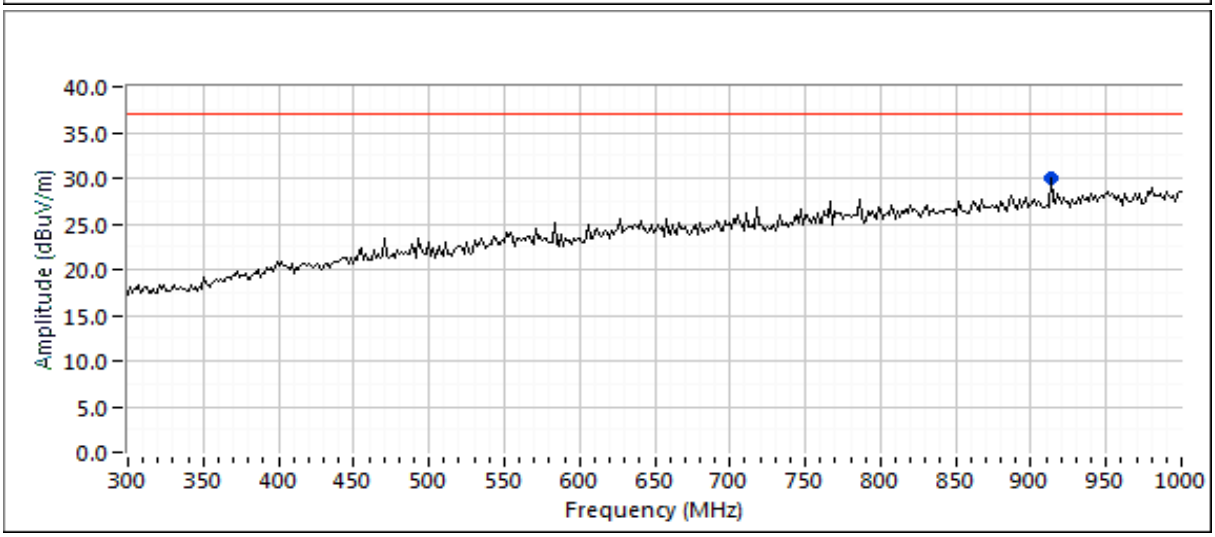
The EUT was configured to transmit for maximum power (setting 4) and transmit at 2440 MHz during emissions testing.

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.528	23.5	H	30.0	-6.5	Peak	255	4.0	
48.994	18.0	V	30.0	-12.0	Peak	22	1.0	
126.564	19.3	H	30.0	-10.7	Peak	190	1.5	
265.652	21.6	H	37.0	-15.4	Peak	352	3.0	
255.921	19.1	H	37.0	-17.9	Peak	360	3.0	
910.030	29.9	H	37.0	-7.1	Peak	302	2.5	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
48.994	12.8	V	30.0	-17.2	QP	24	1.0	QP (1.00s)
126.564	14.3	H	30.0	-15.7	QP	191	1.5	QP (1.00s)
30.528	18.0	H	30.0	-12.0	QP	256	4.0	QP (1.00s)
910.030	23.1	H	37.0	-13.9	QP	304	2.5	QP (1.00s)
265.652	12.2	H	37.0	-24.8	QP	353	3.0	QP (1.00s)
255.921	10.9	H	37.0	-26.1	QP	360	3.0	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #2: Maximized Readings From Run #1

Test Parameters for Maximized Reading(s)			
Frequency Range (MHz)	Test Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.528	18.0	H	30.0	-12.0	QP	256	4.0	QP (1.00s)
910.030	23.1	H	37.0	-13.9	QP	304	2.5	QP (1.00s)
126.564	14.3	H	30.0	-15.7	QP	191	1.5	QP (1.00s)
48.994	12.8	V	30.0	-17.2	QP	24	1.0	QP (1.00s)
265.652	12.2	H	37.0	-24.8	QP	353	3.0	QP (1.00s)
255.921	10.9	H	37.0	-26.1	QP	360	3.0	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/12/2018
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3
Config. Used: 1
Config Change: None
EUT Voltage: 110V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 22.4 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class B	Eval	Refer to individual runs
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	18.2 dBµV/m @ 30.56 MHz (-11.8 dB)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

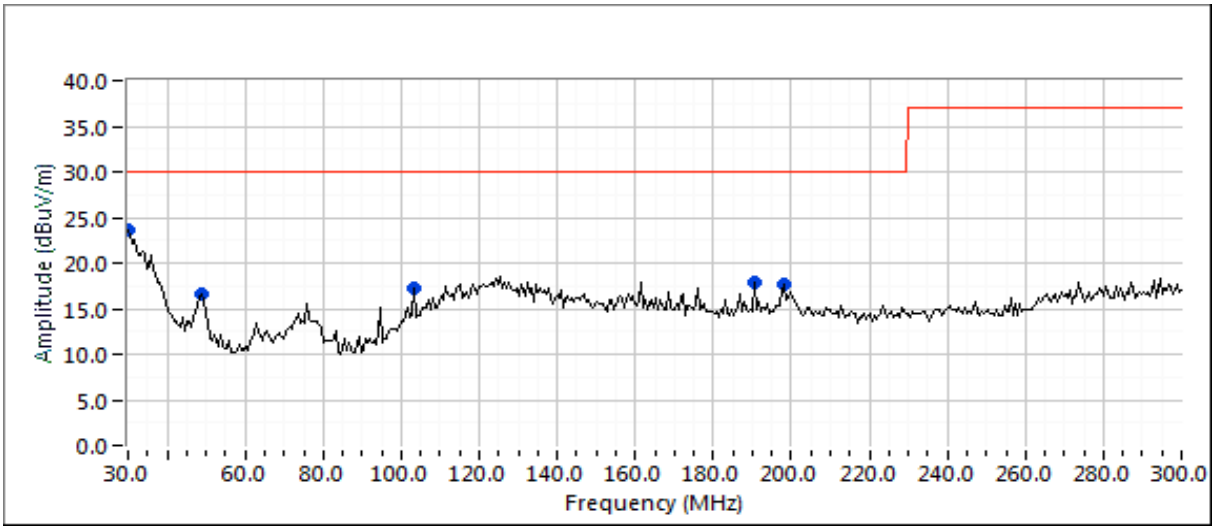
Sample S/N: B2-SAT2-279A-C43 (BLE+NFC)
Driver: 1.5.9615
Antenna: internal

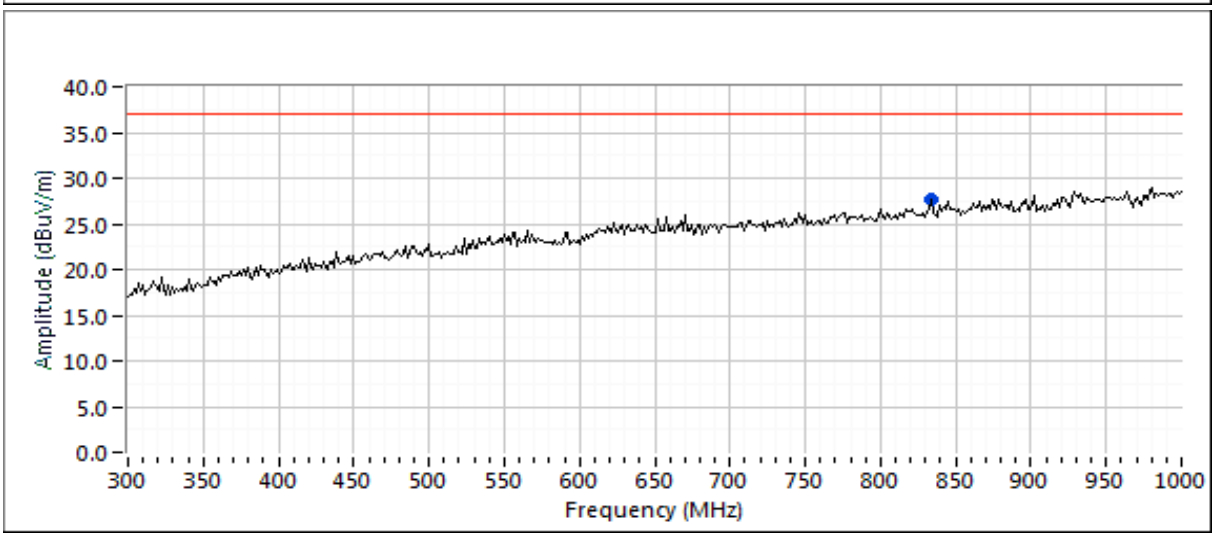
The EUT was configured to transmit for maximum power (setting 4) and transmit at 2440 MHz during emissions testing.

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	CNS 13438		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.558	23.7	V	30.0	-6.3	Peak	325	2.5	
47.427	16.5	V	30.0	-13.5	Peak	222	1.5	
102.834	17.2	V	30.0	-12.8	Peak	61	1.0	
190.420	17.9	V	30.0	-12.1	Peak	33	1.5	
197.745	17.6	V	30.0	-12.4	Peak	178	1.5	
831.820	27.6	H	37.0	-9.4	Peak	342	1.0	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	CNS 13438		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
831.820	22.3	H	37.0	-14.7	QP	340	1.0	QP (1.00s)
30.558	18.2	V	30.0	-11.8	QP	323	2.5	QP (1.00s)
47.427	8.9	V	30.0	-21.1	QP	220	1.5	QP (1.00s)
197.745	14.0	V	30.0	-16.0	QP	176	1.5	QP (1.00s)
102.834	12.4	V	30.0	-17.6	QP	60	1.0	QP (1.00s)
190.420	16.7	V	30.0	-13.3	QP	31	1.5	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #2: Maximized Readings From Run #1

Test Parameters for Maximized Reading(s)			
Frequency Range (MHz)	Test Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	CNS 13438		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.558	18.2	V	30.0	-11.8	QP	323	2.5	QP (1.00s)
190.420	16.7	V	30.0	-13.3	QP	31	1.5	QP (1.00s)
831.820	22.3	H	37.0	-14.7	QP	340	1.0	QP (1.00s)
197.745	14.0	V	30.0	-16.0	QP	176	1.5	QP (1.00s)
102.834	12.4	V	30.0	-17.6	QP	60	1.0	QP (1.00s)
47.427	8.9	V	30.0	-21.1	QP	220	1.5	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/12/2018
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3
Config. Used: 1
Config Change: None
EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 22.4 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class B	Eval	Refer to individual runs
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	17.5 dBµV/m @ 31.29 MHz (-12.5 dB)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

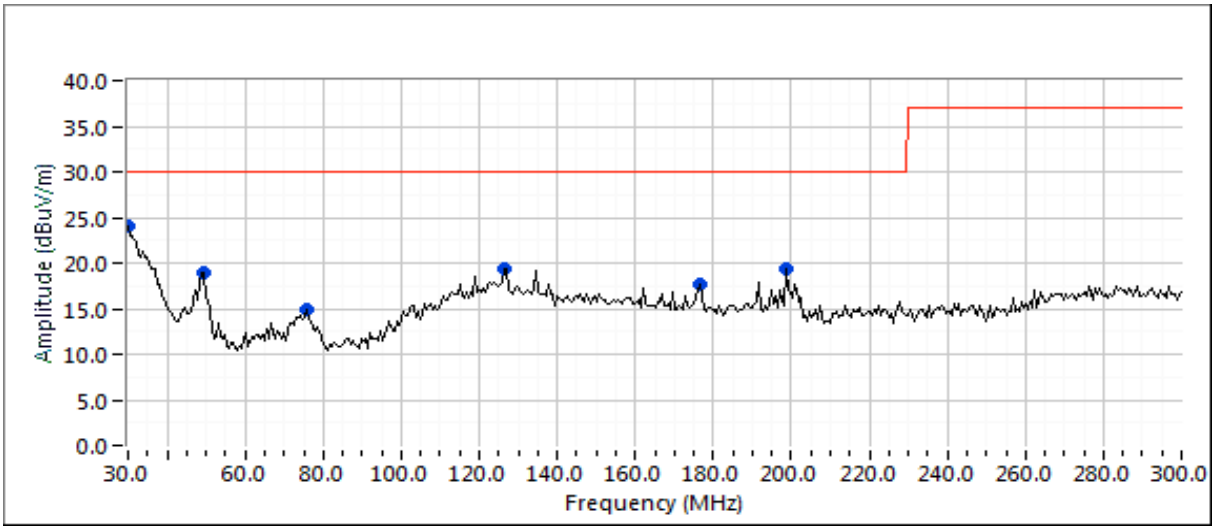
Sample S/N: B2-B-289
Driver: 1.5.9615
Antenna: Internal

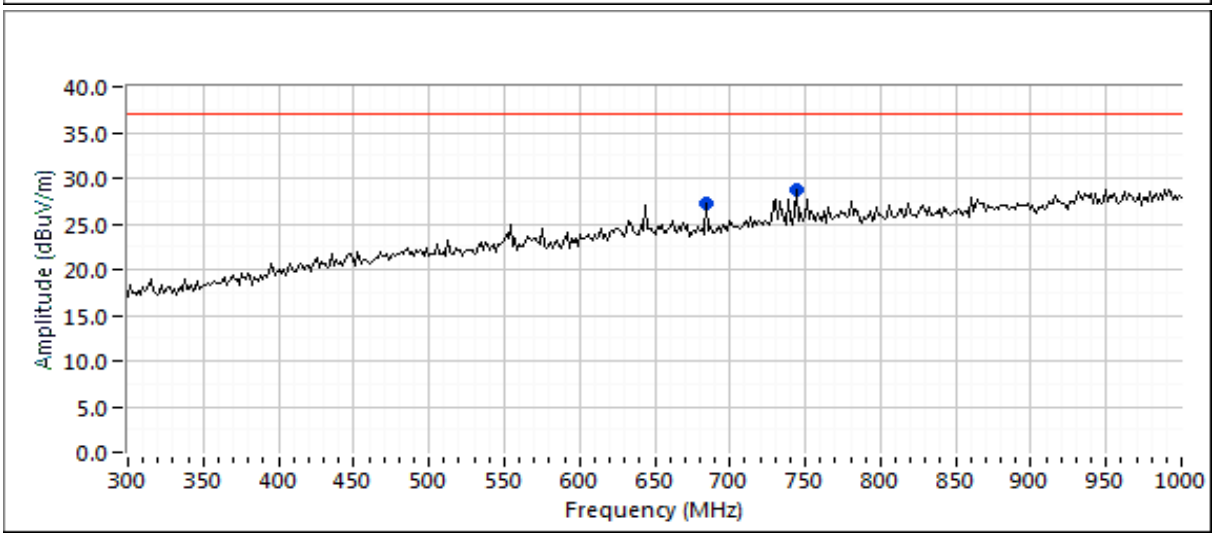
The EUT was configured to transmit for maximum power (setting 4) and transmit at 2440 MHz during emissions testing.

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
31.286	24.1	V	30.0	-5.9	Peak	133	1.0	
49.397	18.9	V	30.0	-11.1	Peak	17	4.0	
76.126	14.8	V	30.0	-15.2	Peak	349	3.5	
126.560	19.3	H	30.0	-10.7	Peak	0	1.0	
176.490	17.6	V	30.0	-12.4	Peak	153	1.5	
198.554	19.3	V	30.0	-10.7	Peak	347	1.5	
744.745	28.8	H	37.0	-8.2	Peak	53	3.0	
684.492	27.3	H	37.0	-9.7	Peak	53	3.0	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
126.560	15.0	H	30.0	-15.0	QP	0	1.2	QP (1.00s)
49.397	8.3	V	30.0	-21.7	QP	18	1.0	QP (1.00s)
744.745	20.8	H	37.0	-16.2	QP	55	3.0	QP (1.00s)
684.492	20.0	H	37.0	-17.0	QP	52	3.0	QP (1.00s)
31.286	17.5	V	30.0	-12.5	QP	135	1.0	QP (1.00s)
176.490	14.1	V	30.0	-15.9	QP	154	1.5	QP (1.00s)
198.554	13.1	V	30.0	-16.9	QP	348	1.5	QP (1.00s)
76.126	8.7	V	30.0	-21.3	QP	348	3.5	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #2: Maximized Readings From Run #1

Test Parameters for Maximized Reading(s)			
Frequency Range (MHz)	Test Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
31.286	17.5	V	30.0	-12.5	QP	135	1.0	QP (1.00s)
126.560	15.0	H	30.0	-15.0	QP	0	1.2	QP (1.00s)
176.490	14.1	V	30.0	-15.9	QP	154	1.5	QP (1.00s)
744.745	20.8	H	37.0	-16.2	QP	55	3.0	QP (1.00s)
198.554	13.1	V	30.0	-16.9	QP	348	1.5	QP (1.00s)
684.492	20.0	H	37.0	-17.0	QP	52	3.0	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/12/2018
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3
Config. Used: 1
Config Change: None
EUT Voltage: 110V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 22.4 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class B	Eval	Refer to individual runs
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	17.6 dBµV/m @ 30.68 MHz (-12.4 dB)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

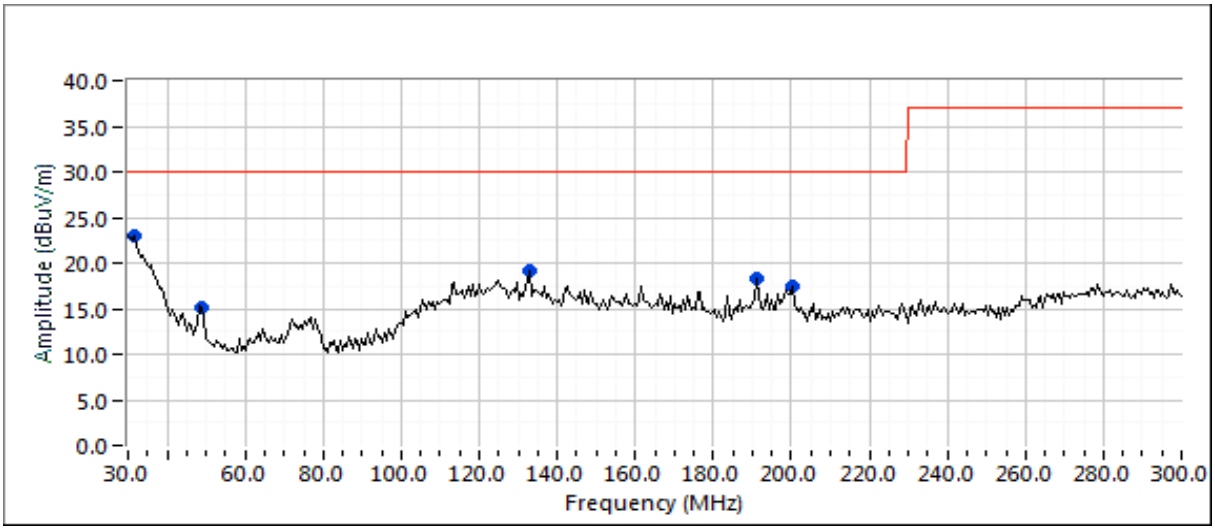
Sample S/N: B2-B-289
Driver: 1.5.9615
Antenna: Internal

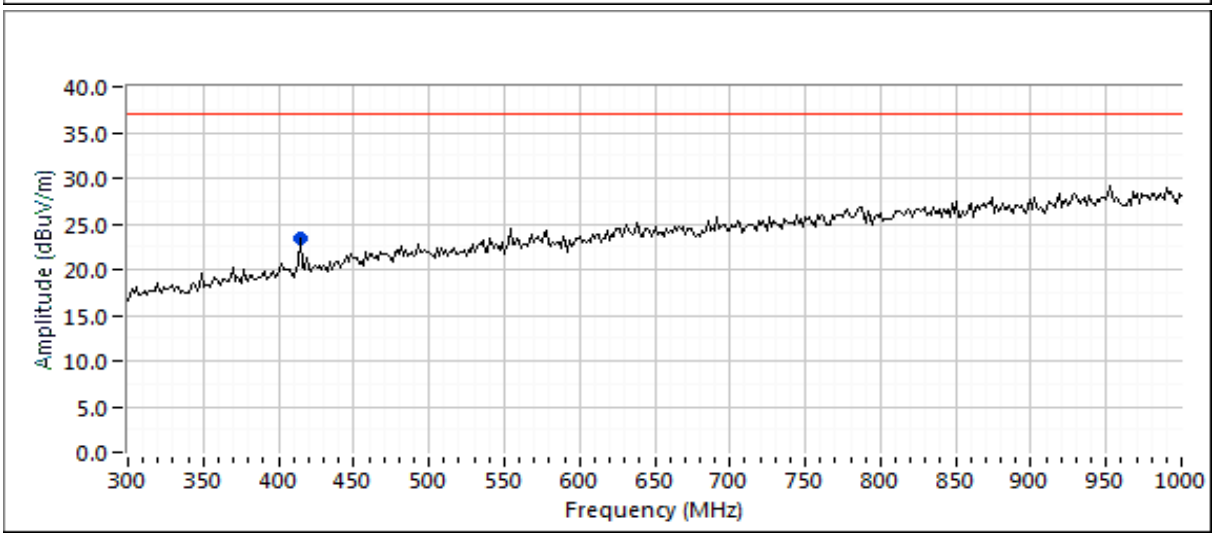
The EUT was configured to transmit for maximum power (setting 4) and transmit at 2440 MHz during emissions testing.

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	CNS 13438		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.675	22.9	V	30.0	-7.1	Peak	286	4.0	
46.934	15.1	V	30.0	-14.9	Peak	313	2.5	
131.062	19.1	V	30.0	-10.9	Peak	276	4.0	
190.632	18.3	V	30.0	-11.7	Peak	272	1.5	
200.246	17.5	H	30.0	-12.5	Peak	290	2.0	
416.702	23.4	H	37.0	-13.6	Peak	263	3.5	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	CNS 13438		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
46.934	7.5	V	30.0	-22.5	QP	311	2.5	QP (1.00s)
200.246	11.5	H	30.0	-18.5	QP	288	2.0	QP (1.00s)
30.675	17.6	V	30.0	-12.4	QP	285	4.0	QP (1.00s)
131.062	12.4	V	30.0	-17.6	QP	275	4.0	QP (1.00s)
190.632	11.2	V	30.0	-18.8	QP	271	1.5	QP (1.00s)
416.702	15.6	H	37.0	-21.4	QP	262	3.5	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #2: Maximized Readings From Run #1

Test Parameters for Maximized Reading(s)			
Frequency Range (MHz)	Test Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	CNS 13438		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.675	17.6	V	30.0	-12.4	QP	285	4.0	QP (1.00s)
131.062	12.4	V	30.0	-17.6	QP	275	4.0	QP (1.00s)
200.246	11.5	H	30.0	-18.5	QP	288	2.0	QP (1.00s)
190.632	11.2	V	30.0	-18.8	QP	271	1.5	QP (1.00s)
416.702	15.6	H	37.0	-21.4	QP	262	3.5	QP (1.00s)
46.934	7.5	V	30.0	-22.5	QP	311	2.5	QP (1.00s)

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/24/2018
Test Engineer: M. Birgani
Test Location: Fremont Chamber #7

Config. Used: 1
Config Change: NFC Mode
EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.
Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.
The test distance and extrapolation factor (if applicable) are detailed under each run description.
Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 23-25 °C
Rel. Humidity: 35-38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 1 - 6 GHz Maximized	EN 55022/32 Class B	Pass	28.3 dBµV/m @ 3152.0 MHz (Margin: -21.7 dB)
		FCC Class B	Pass	32.0 dBµV/m @ 5432.6 MHz (Margin: -22.0 dB)
2	Radiated Emissions 6 - 25 GHz Maximized	FCC Class B	Pass	All emissions were within the noise floor.

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

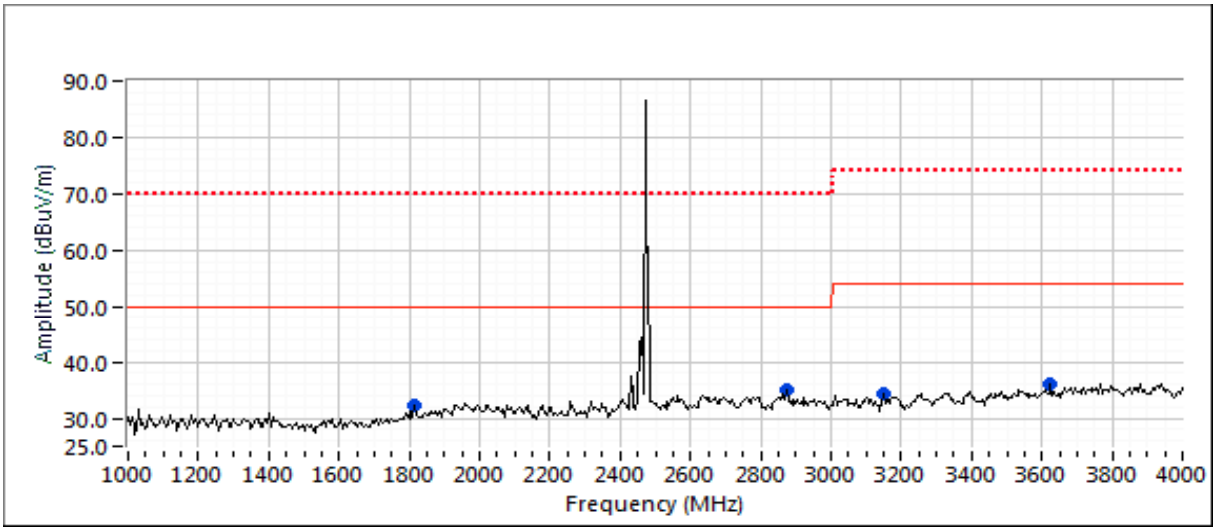
No deviations were made from the requirements of the standard.

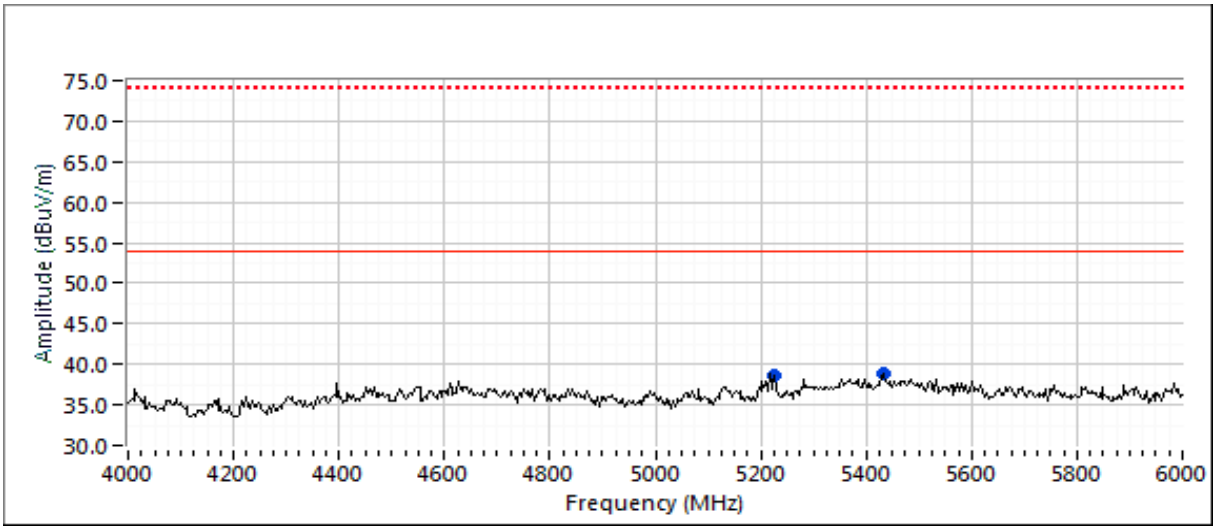
Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #1: Maximized Readings, 1000 - 6000 MHz. NFC sample, Tx mode, set to high channel

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
1000 - 6000	3	3	0.0

Single pre-scan covering both EN 55022/32 and FCC Part 15 requirements
Antenna height scan performed during pre-scan to satisfy FCC requirements





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #1: Maximized Readings, 1000 - 6000 MHz. NFC sample, Tx mode, set to high channel

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

EN 55022/32 limit used for pre-scan (i.e. worst case of EN 55022/32 and FCC)

Frequency	Level	Pol	EN 55022/32 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5431.270	38.9	H	54.0	-15.1	Peak	323	2.5	
5226.160	38.6	V	54.0	-15.4	Peak	350	1.6	
3629.130	36.2	V	54.0	-17.8	Peak	66	1.0	
2876.760	35.1	V	54.0	-18.9	Peak	351	1.9	
3151.800	34.4	H	54.0	-19.6	Peak	90	1.0	
1814.170	32.4	H	54.0	-21.6	Peak	174	1.6	Peak reading with average limit

Final peak and average readings (vs. EN 55022/32 limits)

All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	EN 55022/32 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
3151.980	28.3	H	50.0	-21.7	AVG	90	1.0	RB 1 MHz;VB 10 Hz;Peak
5432.600	32.0	H	54.0	-22.0	AVG	323	2.5	RB 1 MHz;VB 10 Hz;Peak
5227.330	31.9	V	54.0	-22.1	AVG	350	1.6	RB 1 MHz;VB 10 Hz;Peak
3629.820	29.5	V	54.0	-24.5	AVG	66	1.0	RB 1 MHz;VB 10 Hz;Peak
2876.872	25.4	H	50.0	-24.6	AVG	174	1.6	RB 1 MHz;VB 10 Hz;Peak
3151.570	40.3	H	70.0	-29.7	PK	90	1.0	RB 1 MHz;VB 3 MHz;Peak
5432.630	44.2	H	74.0	-29.8	PK	323	2.5	RB 1 MHz;VB 3 MHz;Peak
5226.650	43.2	V	74.0	-30.8	PK	350	1.6	RB 1 MHz;VB 3 MHz;Peak
2876.211	38.0	H	70.0	-32.0	PK	174	1.6	RB 1 MHz;VB 3 MHz;Peak
3629.470	41.9	V	74.0	-32.1	PK	66	1.0	RB 1 MHz;VB 3 MHz;Peak

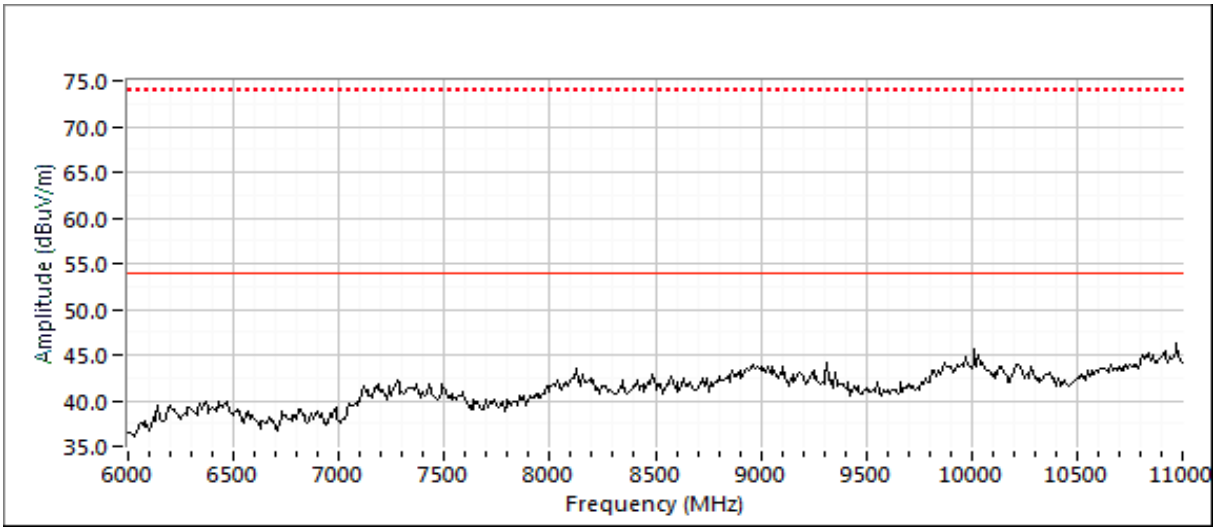
Final peak and average readings (vs. FCC limits)

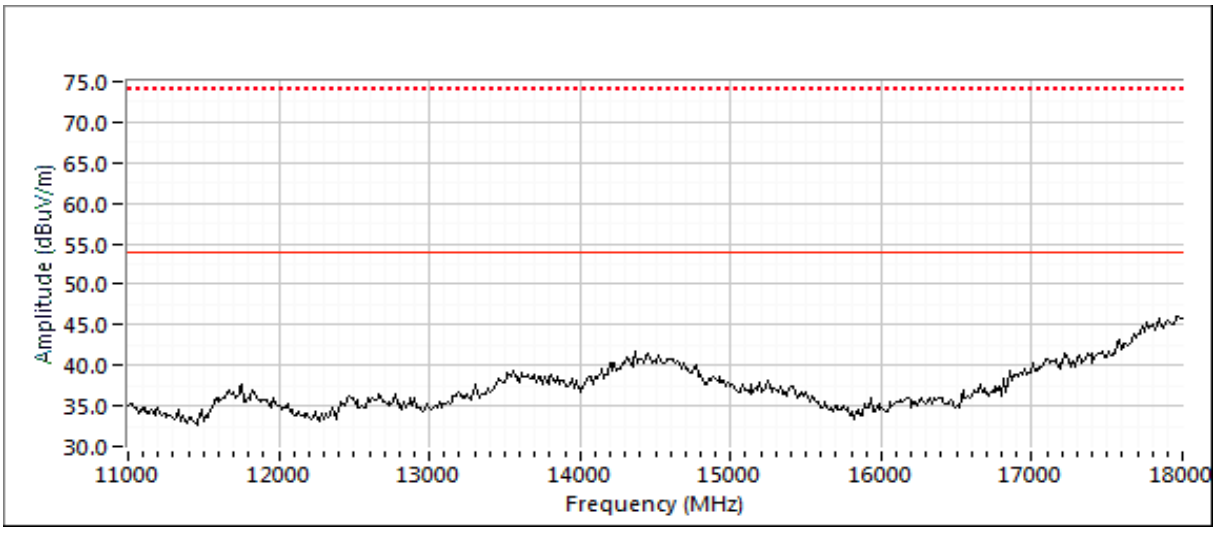
Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5432.600	32.0	H	54.0	-22.0	AVG	323	2.5	RB 1 MHz;VB 10 Hz;Peak
5227.330	31.9	V	54.0	-22.1	AVG	350	1.6	RB 1 MHz;VB 10 Hz;Peak
3629.820	29.5	V	54.0	-24.5	AVG	66	1.0	RB 1 MHz;VB 10 Hz;Peak
3151.980	28.3	H	54.0	-25.7	AVG	90	1.0	RB 1 MHz;VB 10 Hz;Peak
1814.550	25.4	H	54.0	-28.6	AVG	174	1.6	RB 1 MHz;VB 10 Hz;Peak
5432.630	44.2	H	74.0	-29.8	PK	323	2.5	RB 1 MHz;VB 3 MHz;Peak
5226.650	43.2	V	74.0	-30.8	PK	350	1.6	RB 1 MHz;VB 3 MHz;Peak
3629.470	41.9	V	74.0	-32.1	PK	66	1.0	RB 1 MHz;VB 3 MHz;Peak
3151.570	40.3	H	74.0	-33.7	PK	90	1.0	RB 1 MHz;VB 3 MHz;Peak
1814.420	38.0	H	74.0	-36.0	PK	174	1.6	RB 1 MHz;VB 3 MHz;Peak

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

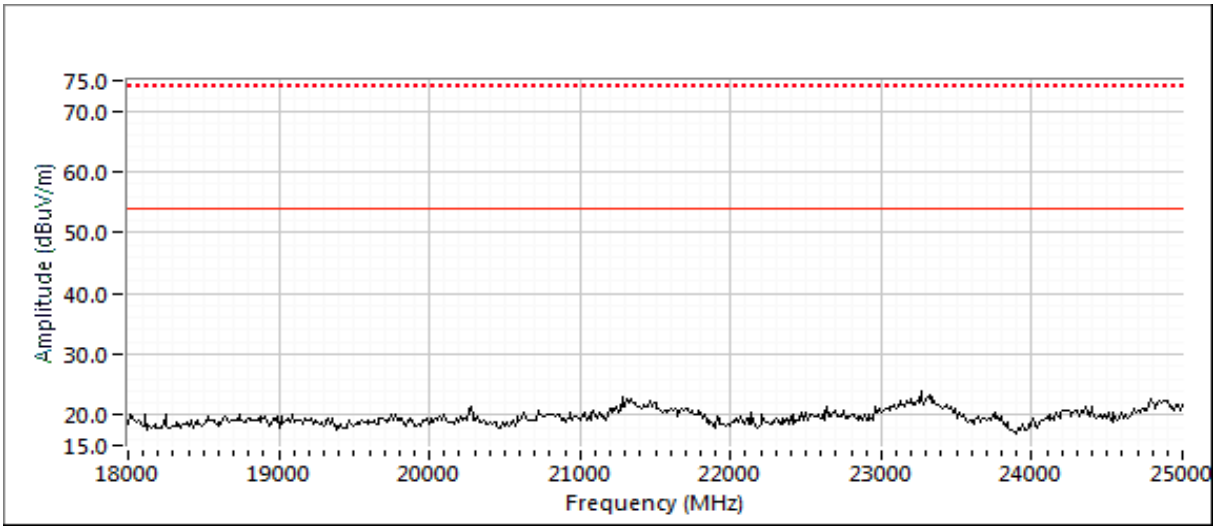
Run #2: Maximized Readings, 6000 - 25,000 MHz

Test Parameters for Preliminary Scan(s) (Class B Device)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
6000 - 11000	3	3	0.0
11000 - 18000	1	3	-9.5
18000 - 25000	0.3	3	-20.0





Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
All emission were withing the noise floor.								

Final peak and average readings (vs. FCC limits)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
All emission were withing the noise floor.								

Note 1:	For FCC testing above 1 GHz, the limit is based on an average measurement. In addition, the peak reading of any emission above 1 GHz can not exceed the average limit by more than 20 dB.

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/23/2018
Test Engineer: John Caizzi
Test Location: Fremont Chamber #7

Config. Used: 1
Config Change: none
EUT Voltage: 220V/60Hz & 110V / 60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.
Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.
The test distance and extrapolation factor (if applicable) are detailed under each run description.
Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 26 °C
Rel. Humidity: 36 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
3a (220V)	Radiated Emissions 1 - 6 GHz Maximized	EN 55022/32 Class B	Pass	35.6 dBµV/m @ 2448.1 MHz (-14.4 dB)
3b (220V)		FCC Class B	Pass	35.6 dBµV/m @ 2448.1 MHz (-18.4 dB)
4 (110V)		CNS 13438	Pass	35.9 dBµV/m @ 2448.1 MHz (-14.1 dB)
5	Radiated Emissions 6 - 25 GHz Maximized	FCC Class B	Pass	No emissions above measurement noise floor.

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

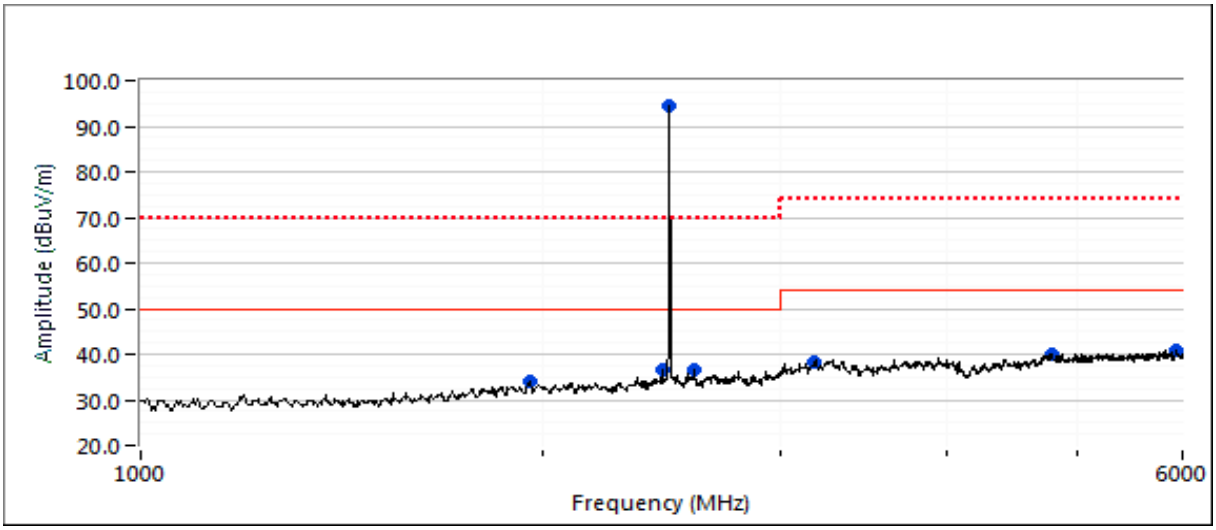
No deviations were made from the requirements of the standard.

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #3: Maximized Readings, 1000 - 6000 MHz. Non-NFC sample, Tx mode, set to high channel, 220V / 60Hz.

Single pre-scan covering both EN 55022/32 and FCC Part 15 requirements
Antenna height scan performed during pre-scan to satisfy FCC requirements

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
1000 - 6000	3	3	0.0



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)
EN 55022/32 limit used for pre-scan (i.e. worst case of EN 55022/32 and FCC)

Frequency	Level	Pol	EN 55022/32 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.330	*94.4*	*H*	*50.0*	*44.4*	*Peak*	*242*	*1.5*	*BLE, measured in radio tests.*
1956.670	*34.0*	*V*	*50.0*	*-16.0*	*Peak*	*208*	*2.0*	
2450.000	*36.4*	*H*	*50.0*	*-13.6*	*Peak*	*238*	*1.5*	
2590.000	*36.4*	*V*	*50.0*	*-13.6*	*Peak*	*247*	*1.5*	
3190.000	*38.5*	*V*	*54.0*	*-15.5*	*Peak*	*110*	*1.5*	
4795.000	*39.9*	*H*	*54.0*	*-14.1*	*Peak*	*311*	*1.5*	
5935.000	*40.7*	*V*	*54.0*	*-13.3*	*Peak*	*212*	*2.0*	

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Final peak and average readings (vs. EN 55022/32 limits)

All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	EN 55022/32 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1945.740	28.1	V	50.0	-21.9	AVG	208	2.0	
1990.670	40.1	V	70.0	-29.9	PK	208	2.0	
2448.100	35.6	H	50.0	-14.4	AVG	240	1.17	
2447.930	44.4	H	70.0	-25.6	PK	240	1.17	
2581.670	29.9	V	50.0	-20.1	AVG	216	1.71	
2583.670	41.5	V	70.0	-28.5	PK	216	1.71	
3192.470	32.4	V	54.0	-21.6	AVG	110	1.51	
3192.670	44.4	V	74.0	-29.6	PK	110	1.51	
4793.200	33.7	H	54.0	-20.3	AVG	311	1.49	
4791.000	45.9	H	74.0	-28.1	PK	311	1.49	
5949.730	33.6	V	54.0	-20.4	AVG	212	2.01	
5927.270	46.4	V	74.0	-27.6	PK	212	2.01	

MAXIMIZED final peak and average readings (vs. EN 55022/32 limits, including cable manipulation)

All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	EN 55022/32 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1945.740	28.1	V	50.0	-21.9	AVG	208	2.0	
1990.670	40.1	V	70.0	-29.9	PK	208	2.0	
2448.100	35.6	H	50.0	-14.4	AVG	240	1.17	
2447.930	44.4	H	70.0	-25.6	PK	240	1.17	
2581.670	29.9	V	50.0	-20.1	AVG	216	1.71	
2583.670	41.5	V	70.0	-28.5	PK	216	1.71	
3192.470	32.4	V	54.0	-21.6	AVG	110	1.51	
3192.670	44.4	V	74.0	-29.6	PK	110	1.51	
4793.200	33.7	H	54.0	-20.3	AVG	311	1.49	
4791.000	45.9	H	74.0	-28.1	PK	311	1.49	
5949.730	33.6	V	54.0	-20.4	AVG	212	2.01	
5927.270	46.4	V	74.0	-27.6	PK	212	2.01	

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Final peak and average readings (vs. FCC limits)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1945.740	28.1	V	54.0	-25.9	AVG	208	2.0	
1990.670	40.1	V	74.0	-33.9	PK	208	2.0	
2448.100	35.6	H	54.0	-18.4	AVG	240	1.17	
2447.930	44.4	H	74.0	-29.6	PK	240	1.17	
2581.670	29.9	V	54.0	-24.1	AVG	216	1.71	
2583.670	41.5	V	74.0	-32.5	PK	216	1.71	
3192.470	32.4	V	54.0	-21.6	AVG	110	1.51	
3192.670	44.4	V	74.0	-29.6	PK	110	1.51	
4793.200	33.7	H	54.0	-20.3	AVG	311	1.49	
4791.000	45.9	H	74.0	-28.1	PK	311	1.49	
5949.730	33.6	V	54.0	-20.4	AVG	212	2.01	
5927.270	46.4	V	74.0	-27.6	PK	212	2.01	

Note 1:	For FCC testing above 1 GHz, the limit is based on an average measurement. In addition, the peak reading of any emission above 1 GHz can not exceed the average limit by more than 20 dB.

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #4: Maximized Readings, 1000 - 6000 MHz. Non-NFC sample, Tx mode, set to high channel, 110V / 60Hz

Single pre-scan covering both EN 55022/32 and FCC Part 15 requirements
Antenna height scan performed during pre-scan to satisfy FCC requirements

Final peak and average readings (vs. EN 55022/32 limits)
All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	EN 55022/32 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1945.740	28.1	V	50.0	-21.9	AVG	208	2.0	
1990.670	40.1	V	70.0	-29.9	PK	208	2.0	
2448.100	35.9	H	50.0	-14.1	AVG	241	1.19	
2452.820	44.1	H	70.0	-25.9	PK	241	1.19	
2581.670	29.9	V	50.0	-20.1	AVG	216	1.71	
2583.670	41.5	V	70.0	-28.5	PK	216	1.71	
3192.470	32.4	V	54.0	-21.6	AVG	110	1.51	
3192.670	44.4	V	74.0	-29.6	PK	110	1.51	
4793.200	33.7	H	54.0	-20.3	AVG	311	1.49	
4791.000	45.9	H	74.0	-28.1	PK	311	1.49	
5949.730	33.6	V	54.0	-20.4	AVG	212	2.01	
5927.270	46.4	V	74.0	-27.6	PK	212	2.01	

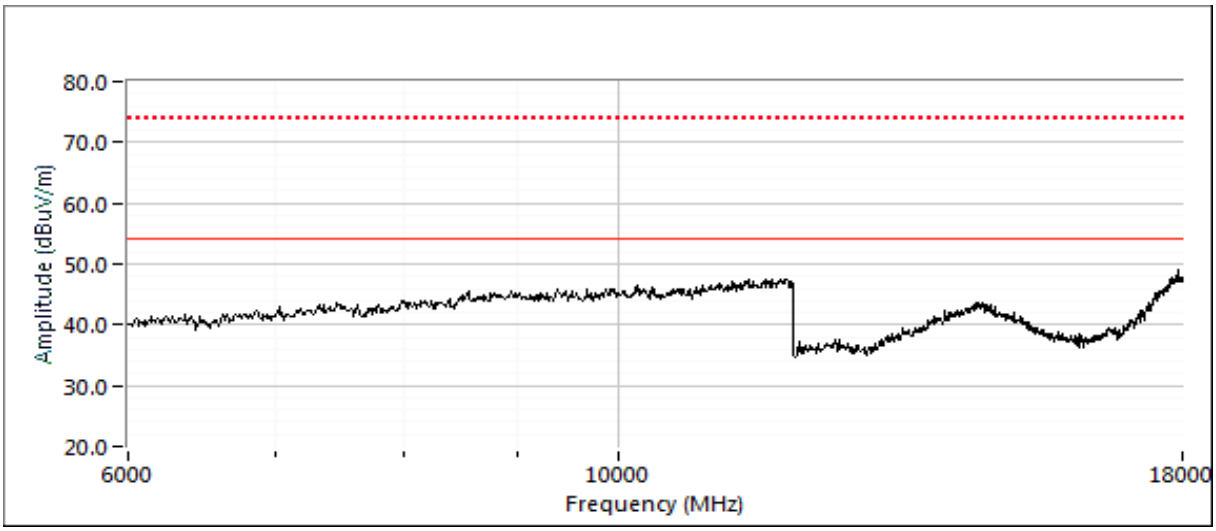
MAXIMIZED final peak and average readings (vs. EN 55022/32 limits, including cable manipulation)
All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	EN 55022/32 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1945.740	28.1	V	50.0	-21.9	AVG	208	2.0	
1990.670	40.1	V	70.0	-29.9	PK	208	2.0	
2448.100	35.9	H	50.0	-14.1	AVG	241	1.19	
2452.820	44.1	H	70.0	-25.9	PK	241	1.19	
2581.670	29.9	V	50.0	-20.1	AVG	216	1.71	
2583.670	41.5	V	70.0	-28.5	PK	216	1.71	
3192.470	32.4	V	54.0	-21.6	AVG	110	1.51	
3192.670	44.4	V	74.0	-29.6	PK	110	1.51	
4793.200	33.7	H	54.0	-20.3	AVG	311	1.49	
4791.000	45.9	H	74.0	-28.1	PK	311	1.49	
5949.730	33.6	V	54.0	-20.4	AVG	212	2.01	
5927.270	46.4	V	74.0	-27.6	PK	212	2.01	

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Run #5: Maximized Readings, 6000 - 25,000 MHz
Additional tests against FCC limits, above 6 GHz

Test Parameters for Preliminary Scan(s) (Class B Device)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
6000 - 12000	3	3	0.0
12000 - 18000	1	3	-9.5
18000 - 25000	0.3	3	-20.0



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	

Final peak and average readings (vs. FCC limits)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	

Client:	Fitbit, Inc.	PR Number:	JD105947
Model:	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Standard:	EN 55032, AS/NZ CISPR 22, VCCI-CISPR 32, KN32, CNS 13438	Class:	B

Note 1:	For FCC testing above 1 GHz, the limit is based on an average measurement. In addition, the peak reading of any emission above 1 GHz can not exceed the average limit by more than 20 dB.
Note 2	Scans made between 18 - 25 GHz with the measurement antenna moved around the EUT 30cm from the device indicated there were no significant emissions in this frequency range.
Note 3	As there were no emissions observed above 14 GHz during the preliminary scan, or the size of the EUT did not exceed 1.6m above the ground plane, additional measures were not required to ensure that the emissions from the EUT were maintained within the beam-width of the antenna during antenna height maximization.

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Electrostatic Discharge (EN 61000-4-2)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/20/2018
Test Engineer: Rafael Varelas
Test Location: FT Lab #3
Config. Used: 2
Config Change: None
EUT Voltage: 220V/60Hz

General Test Configuration

For tabletop equipment, the EUT and all local support equipment were located on a 0.5-mm thick insulating layer above a horizontal coupling plane, 80 cm above a ground reference plane.

Unless otherwise stated, ten discharges at each voltage, and polarity, were applied to each test point listed. Contact discharges (CD) were applied to coupling planes and conductive surfaces of the EUT. Air discharges (AD) were applied to any non-conductive surfaces of the EUT. The VCP was located on the tabletop for tabletop devices and 80cm above the ground plane for floor-standing equipment.

The determination as to the test point being a part of a conductive or non-conductive surface was based on the manufacturer's declaration.

Ambient Conditions:

Temperature: 22.4 °C
Relative Humidity: 38 %
Pressure: 1020 mb

Summary of Results - Electrostatic Discharges

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	Enclosure	4 kV CD 8 kV AD	4 kV CD 8 kV AD	B	A / Pass	Tx Mode Mode(BLE+NFC)
2	Enclosure	4 kV CD 8 kV AD	4 kV CD 8 kV AD	B	A / Pass	Standby Mode (BLE+NFC)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample S/N: B2-D-102 (BLE+NFC)

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #1: Electrostatic Discharge, Normal Mode

Indirect Discharges (To Coupling Planes)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Vertical Coupling Plane (VCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		
Horizontal Coupling Plane (HCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		

Direct Discharges (To the EUT)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Shell left side - left and right corners		x				x		
Shell right side - left and right corners		x				x		
shell bottom - left and right side		x				x		
Reset button		x				x		
Wristband lock		ND				ND		
Pin #1		ND				ND		
Pin #2		ND				ND		
Pin #3		ND				ND		
Air Discharge Mode	Level 1 2	Level 2 4	Level 3 8	Level 4 15	Level 1 2	Level 2 4	Level 3 8	Level 4 15
Display center	ND	ND	ND		ND	ND	ND	
Display right side and left side	ND	x	x		ND	x	x	
Left side band	ND	ND	ND		ND	ND	ND	
Rifgt side band	ND	ND	ND		ND	ND	ND	
Charge connector - left, right, top, and bottom sides	ND	ND	ND		ND	ND	ND	
USB connector	ND	ND	ND		ND	ND	ND	
Sensor	ND	ND	ND		ND	ND	ND	

Note: An "X" indicates that the unit continued to operate as intended. The BLE was configured to receive continuous data from a remote dongle and the NFC was verified for operation at the remote tag reader during and after testing. There were no data errors reported by the monitoring software for BLE mode.

Note: ND: No discharge was possible due to the lack of a discharge path to ground from the test point.
HCP: Horizontal Coupling Plane. VCP: Vertical Coupling Plane

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #2: Electrostatic Discharge, Standby Mode

Indirect Discharges (To Coupling Planes)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Vertical Coupling Plane (VCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		
Horizontal Coupling Plane (HCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		

Direct Discharges (To the EUT)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Shell left side - left and right corners		x				x		
Shell right side - left and right corners		x				x		
shell bottom - left and right side		x				x		
Reset button		x				x		
Wristband lock		ND				ND		
Pin #1		ND				ND		
Pin #2		ND				ND		
Pin #3		ND				ND		
Air Discharge Mode	Level 1 2	Level 2 4	Level 3 8	Level 4 15	Level 1 2	Level 2 4	Level 3 8	Level 4 15
Display	ND	ND	ND		ND	ND	ND	
Display right side and left side	ND	x	x		ND	x	x	
Left side band	ND	ND	ND		ND	ND	ND	
Rifgt side band	ND	ND	ND		ND	ND	ND	
Charge connector - left, right, top, and bottom sides	ND	ND	ND		ND	ND	ND	
USB connector	ND	ND	ND		ND	ND	ND	
Sensor	ND	ND	ND		ND	ND	ND	

Note: An "X" indicates that the unit continued to operate as intended. The EUT was monitored for any unintentional transmissions by a remote analyzer.

Note: ND: No discharge was possible due to the lack of a discharge path to ground from the test point.
HCP: Horizontal Coupling Plane. VCP: Vertical Coupling Plane

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Electrostatic Discharge (EN 61000-4-2)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/20/2018
Test Engineer: Rafael Varelas
Test Location: FT Lab #3
Config. Used: 2
Config Change: None
EUT Voltage: 220V/60Hz

General Test Configuration

For tabletop equipment, the EUT and all local support equipment were located on a 0.5-mm thick insulating layer above a horizontal coupling plane, 80 cm above a ground reference plane.

Unless otherwise stated, ten discharges at each voltage, and polarity, were applied to each test point listed. Contact discharges (CD) were applied to coupling planes and conductive surfaces of the EUT. Air discharges (AD) were applied to any non-conductive surfaces of the EUT. The VCP was located on the tabletop for tabletop devices and 80cm above the ground plane for floor-standing equipment.

The determination as to the test point being a part of a conductive or non-conductive surface was based on the manufacturer's declaration.

Ambient Conditions:

Temperature: 22.4 °C
Relative Humidity: 38 %
Pressure: 1020 mb

Summary of Results - Electrostatic Discharges

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	Enclosure	4 kV CD 8 kV AD	4 kV CD 8 kV AD	B	A / Pass	Tx Mode (BLE Mode)
2	Enclosure	4 kV CD 8 kV AD	4 kV CD 8 kV AD	B	A / Pass	Standby Mode

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample S/N: B2-E-271 (BLE)

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #1: Electrostatic Discharge, Normal Mode

Indirect Discharges (To Coupling Planes)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Vertical Coupling Plane (VCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		
Horizontal Coupling Plane (HCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		

Direct Discharges (To the EUT)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Shell left side - left and right corners		x				x		
Shell right side - left and right corners		x				x		
shell bottom - left and right side		x				x		
Reset button		x				x		
Wristband lock		ND				ND		
Pin #1		ND				ND		
Pin #2		ND				ND		
Pin #3		ND				ND		
Air Discharge Mode	Level 1 2	Level 2 4	Level 3 8	Level 4 15	Level 1 2	Level 2 4	Level 3 8	Level 4 15
Display center	ND	ND	ND		ND	ND	ND	
Display right side and left side	ND	x	x		ND	x	x	
Left side band	ND	ND	ND		ND	ND	ND	
Rifgt side band	ND	ND	ND		ND	ND	ND	
Charge connector - left, right, top, and bottom sides	ND	ND	ND		ND	ND	ND	
USB connector	ND	ND	ND		ND	ND	ND	
Sensor	ND	ND	ND		ND	ND	ND	

Note: An "X" indicates that the unit continued to operate as intended. The BLE was configured to receive continuous data from a remote dongle during and after testing. There were no data errors reported by the monitoring software for BLE mode.

Note: ND: No discharge was possible due to the lack of a discharge path to ground from the test point.
HCP: Horizontal Coupling Plane. VCP: Vertical Coupling Plane

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #2: Electrostatic Discharge, Standby Mode

Indirect Discharges (To Coupling Planes)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Vertical Coupling Plane (VCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		
Horizontal Coupling Plane (HCP) located 10cm from the front, rear, left and right sides of the EUT		x				x		

Direct Discharges (To the EUT)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Shell left side - left and right corners		x				x		
Shell right side - left and right corners		x				x		
shell bottom - left and right side		x				x		
Reset button		x				x		
Wristband lock		ND				ND		
Pin #1		ND				ND		
Pin #2		ND				ND		
Pin #3		ND				ND		
Air Discharge Mode	Level 1 2	Level 2 4	Level 3 8	Level 4 15	Level 1 2	Level 2 4	Level 3 8	Level 4 15
Display center	ND	ND	ND		ND	ND	ND	
Display right side and left side	ND	x	x		ND	x	x	
Left side band	ND	ND	ND		ND	ND	ND	
Rifgt side band	ND	ND	ND		ND	ND	ND	
Charge connector - left, right, top, and bottom sides	ND	ND	ND		ND	ND	ND	
USB connector	ND	ND	ND		ND	ND	ND	
Sensor	ND	ND	ND		ND	ND	ND	

Note: An "X" indicates that the unit continued to operate as intended. The EUT was monitored for any unintentional transmissions by a remote analyzer.

Note: ND: No discharge was possible due to the lack of a discharge path to ground from the test point.
HCP: Horizontal Coupling Plane. VCP: Vertical Coupling Plane

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Radiated Immunity (EN 61000-4-3)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/26, 4/27 & 5/4/2018 Config. Used: 2
Test Engineer: Rafael Varelas Config Change: None
Test Location: FT Chamber #6 EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and all local support equipment were located on a turntable in an anechoic chamber. All remote support equipment was located outside the chamber. Interface cabling to the remote support equipment was routed along the floor and, where possible, passed through ferrite clamps at the exit point from the chamber.

Unless otherwise noted, the "right side" of the EUT is considered the side on the right when standing behind the EUT and the "left side" of the EUT is considered the side on the left when standing behind the EUT.

Ambient Conditions:

Temperature: 22.5 °C
Rel. Humidity: 38 %

Summary of Results-Radiated Immunity

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
EN 55024:2010 Requirements						
1	Enclosure	80-1000 MHz 1kHz 80% AM 3 V/m	80-1000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
KN35 Requirements						
1	Enclosure	80-1000 MHz 1kHz 80% AM 3 V/m	80-1000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
1	Enclosure	Spot Frequencies 1kHz 80% AM 3 V/m	1800, 2600, 3500, 5000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

EN 301 489-1 V2.1.1 Requirements

1	Enclosure	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	A	A / Pass	Normal Mode (BLE+NFC)
2	Enclosure	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	A	A / Pass	Standby Mode

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample S/N: B2-D-102 (BLE+NFC)

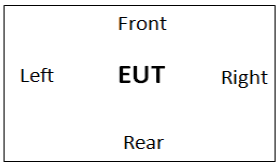
EMC Test Data

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #1: Radiated Immunity, 80-6000 MHz (EN61000-4-3), Tx Mode

Frequency:	80-1000 MHz	1-4.2 GHz	4.2-6 GHz
Step Size:	1 %	1 %	1 %
Dwell time:	2874 ms	2874 ms	2874 ms
Field Uniformity:	1.5m x 1.5m	1.0m x 1.0m	1.0m x 1.0m
Test Distance:	2m	1.25m	1.8m

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%



Frequency Range (MHz)	Level V/m	Front		Left Side		Rear		Right		Top		Bottom	
		Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	3	x	x	x	x	x	x	x	x	x	x	x	x
1000-4200	3	x	x	x	x	x	x	x	x	x	x	x	x
4200-6000	3	x	x	x	x	x	x	x	x	x	x	x	x
KN35 Spot Frequencies (Note 2)	3	x	x	x	x	x	x	x	x	x	x	x	x

Test files used for this run:

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\80-1000 MHz 12Vm (April 2016)\ were u

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz H 3Vm.crf

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz V 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\1-4.2 GHz (October 2017)\3 Vm\ were used:

Antenna 1.25 m from UFA, 1.25 m high 1000 MHz - 4200 MHz V 3Vm.crf

Antenna 1.25m from UFA, 1.25 m high 1000 MHz - 4200 MHz H 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\4.2 - 6.0 GHZ (Sept 2016)\3 Vm\ were used:

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz H 3Vm.crf

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz V 3Vm.crf

Note:	An "X" indicates that the unit continued to operate as intended. The BLE was configured to receive continuous data from a local dongle and the NFC was verified for operation at the local tag reader during and after testing. There were no data errors reported by the monitoring software for BLE mode.
Note 2:	Radiated Immunity Spot Tests at 1800, 2600, 3500 and 5000MHz (+/- 1%)
Note 3:	The following exclusion bands were used per EN 301 489-1:

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

EN 301 489-1 Exclusion Bands:

	Band		Bandwidth	Exclusion Band	
	Start (MHz)	Stop (MHz)	(MHz)	Start (MHz)	Stop (MHz)
Bluetooth	2400	2483.5	-	2280	2603.5

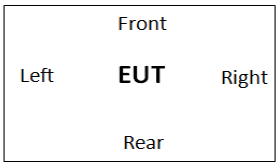
EMC Test Data

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #2: Radiated Immunity, 80-6000 MHz (EN61000-4-3), Standby Mode

Frequency:	80-1000 MHz	1-4.2 GHz	4.2-6 GHz
Step Size:	1 %	1 %	1 %
Dwell time:	2874 ms	2874 ms	2874 ms
Field Uniformity:	1.5m x 1.5m	1.0m x 1.0m	1.0m x 1.0m
Test Distance:	2m	1.25m	1.8m

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%



Frequency Range (MHz)	Level V/m	Front		Left Side		Rear		Right		Top		Bottom	
		Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	3	x	x	x	x	x	x	x	x	x	x	x	x
1000-4200	3	x	x	x	x	x	x	x	x	x	x	x	x
4200-6000	3	x	x	x	x	x	x	x	x	x	x	x	x

Test files used for this run:

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\80-1000 MHz 12Vm (April 2016)\ were u

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz H 3Vm.crf

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz V 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\1-4.2 GHz (October 2017)\3 Vm\ were used:

Antenna 1.25 m from UFA, 1.25 m high 1000 MHz - 4200 MHz V 3Vm.crf

Antenna 1.25m from UFA, 1.25 m high 1000 MHz - 4200 MHz H 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\4.2 - 6.0 GHZ (Sept 2016)\3 Vm\ were used:

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz H 3Vm.crf

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz V 3Vm.crf

Note:	An "X" indicates that the unit continued to operate as intended. The EUT was monitored for any unintentional transmissions by a remote analyzer.

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Radiated Immunity (EN 61000-4-3)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/27/2018, 5/4/18 Config. Used: 2
Test Engineer: Rafael Varelas, J.Caizzi Config Change: None
Test Location: FT Chamber #6 EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and all local support equipment were located on a turntable in an anechoic chamber. All remote support equipment was located outside the chamber. Interface cabling to the remote support equipment was routed along the floor and, where possible, passed through ferrite clamps at the exit point from the chamber.
Unless otherwise noted, the "right side" of the EUT is considered the side on the right when standing behind the EUT and the "left side" of the EUT is considered the side on the left when standing behind the EUT.

Ambient Conditions:

Temperature: 22.6 °C
Rel. Humidity: 41 %

Summary of Results-Radiated Immunity

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
EN 55024:2010 Requirements						
1	Enclosure	80-1000 MHz 1kHz 80% AM 3 V/m	80-1000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
KN35 Requirements						
1	Enclosure	80-1000 MHz 1kHz 80% AM 3 V/m	80-1000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
1	Enclosure	Spot Frequencies 1kHz 80% AM 3 V/m	1800, 2600, 3500, 5000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

EN 301 489-1 V2.1.1 Requirements

1	Enclosure	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	A	A / Pass	Normal Mode (BLE)
2	Enclosure	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	A	A / Pass	Standby Mode

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample S/N: B2-E-271 (BLE)

NTS

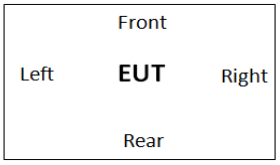
EMC Test Data

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #1: Radiated Immunity, 80-6000 MHz (EN61000-4-3), Tx Mode

Frequency:	80-1000 MHz	1-4.2 GHz	4.2-6 GHz
Step Size:	1 %	1 %	1 %
Dwell time:	2874 ms	2874 ms	2874 ms
Field Uniformity:	1.5m x 1.5m	1.0m x 1.0m	1.0m x 1.0m
Test Distance:	2m	1.25m	1.8m

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%



Frequency Range (MHz)	Level V/m	Front		Left Side		Rear		Right		Top		Bottom	
		Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	3	x	x	x	x	x	x	x	x	x	x	x	x
1000-4200	3	x	x	x	x	x	x	x	x	x	x	x	x
4200-6000	3	x	x	x	x	x	x	x	x	x	x	x	x
KN35 Spot Frequencies (Note 2)	3	x	x	x	x	x	x	x	x	x	x	x	x

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\80-1000 MHz 12Vm (April 2016)\ were used:

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz H 3Vm.crf
Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz V 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\1-4.2 GHz (October 2017)\3 Vm\ were used:

Antenna 1.25 m from UFA, 1.25 m high 1000 MHz - 4200 MHz V 3Vm.crf
Antenna 1.25m from UFA, 1.25 m high 1000 MHz - 4200 MHz H 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\4.2 - 6.0 GHZ (Sept 2016)\3 Vm\ were used:

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz H 3Vm.crf
1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz V 3Vm.crf

Note:	An "X" indicates that the unit continued to operate as intended. The BLE was configured to receive continuous data from a remote dongle and the NFC was verified for operation at the remote tag reader during and after testing. There were no data errors reported by the monitoring software for BLE mode.
Note 2:	Radiated Immunity Spot Tests at 1800, 2600, 3500 and 5000MHz (+/- 1%)
Note 3:	The following exclusion bands were used per EN 301 489-1:

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

EN 301 489-1 Exclusion Bands:

	Band		Bandwidth	Exclusion Band	
	Start (MHz)	Stop (MHz)	(MHz)	Start (MHz)	Stop (MHz)
Bluetooth	2400	2483.5	-	2280	2603.5

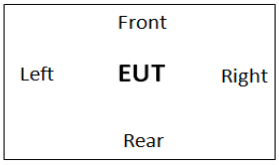
EMC Test Data

Client:	Fitbit, Inc.	PR Number:	JD105947
Product	FB409 and FB410	T-Log Number:	T106007
		Project Manager:	Deepa Shetty
Contact:	Ricky Wang	Project Engineer:	-
Immunity Standard(s):	EN 55024, KN35, EN/KN 301 489-1, -17	Environment:	Radio and ITE

Run #2: Radiated Immunity, 80-6000 MHz (EN61000-4-3), Standby Mode

Frequency:	80-1000 MHz	1-4.2 GHz	4.2-6 GHz
Step Size:	1 %	1 %	1 %
Dwell time:	2874 ms	2874 ms	2874 ms
Field Uniformity:	1.5m x 1.5m	1.0m x 1.0m	1.0m x 1.0m
Test Distance:	2m	1.25m	1.8m

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%



Frequency	Level	Front		Left Side		Rear		Right		Top		Bottom	
Range (MHz)	V/m	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	3	x	x	x	x	x	x	x	x	x	x	x	x
1000-4200	3	x	x	x	x	x	x	x	x	x	x	x	x
4200-6000	3	x	x	x	x	x	x	x	x	x	x	x	x

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\80-1000 MHz 12Vm (April 2016)\ were used:

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz H 3Vm.crf
Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz V 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\1-4.2 GHz (October 2017)\3 Vm\ were used:

Antenna 1.25 m from UFA, 1.25 m high 1000 MHz - 4200 MHz V 3Vm.crf
Antenna 1.25m from UFA, 1.25 m high 1000 MHz - 4200 MHz H 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\4.2 - 6.0 GHZ (Sept 2016)\3 Vm\ were used:

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz H 3Vm.crf
1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz V 3Vm.crf

Note 1	An "X" indicates that the unit continued to operate as intended. The EUT was monitored for any unintentional transmissions by a remote analyzer.

Appendix C Product Labeling Requirements

The following information has been provided to clarify notification, equipment labeling requirements and information that must be included in the operator's manual. These requirements may be found in the standards/regulations listed in the scope of this report.

Label Location

The required label(s) must be in a *conspicuous location* on the product, which is defined as any location readily visible to the user of the device without the use of tools.

Label Attachment

The label(s) must be *permanently attached* to the product, which is defined as attached such that it can normally be expected to remain fastened to the equipment during the equipment's expected useful life. A paper gum label will generally not meet this condition.

United States Class B Label

> This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If the device is too small or for such use that it is not practicable to place the US label statement on it, the statement shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed

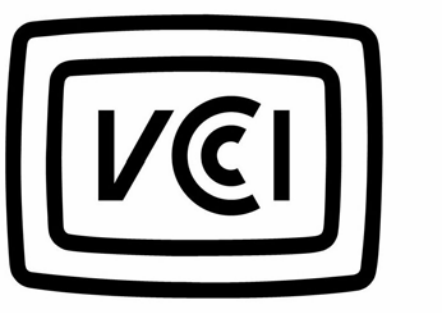
For FCC, a unique identifier shall appear on the product label. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification of each product sold.

United States Class B Label

> This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If the device is too small or for such use that it is not practicable to place the US label statement on it, the statement shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed

Japanese Class B Label



Industry Canada

For ICES-003 Issue 6, the product must be labeled with the following Innovation, Science and Economic Development Canada ICES-003 Compliance Label:

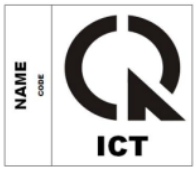
CAN ICES-3 (*)/NMB-3(*)

*Insert either "A" or "B" but not both to identify the applicable Class of ITE.

If the product is too small then the text may be placed in the manual with the approval of ISED Canada.

Vietnam

For TCVN 7189:2009, the product must be labeled with the following label which can be printed by the manufacturer. The label should also include the approval holder's name (brand of manufacturer can be accepted) and CODE (certificate number or code listed on the approval). The color of the label is not officially specified, but black is recommended. The minimum size of the label is not specified, but it must be clearly visible.



Appendix D User Manual Regulatory Statements

Where special accessories, such as shielded cables, are required in order to meet the emission limits, appropriate instructions regarding the need to use such accessories must be contained on the first page of text concerned with the installation of the device in the operator's manual.

A requirement by FCC regulations, and recommended for all regulatory markets, is a cautionary statement to the end user that changes or modifications to the device not expressly approved by you, the manufacturer, could void their right to operate the equipment.

United States Class B Manual Statement

> NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:
> -Reorient or relocate the receiving antenna.
> -Increase the separation between the equipment and the receiver.
> -Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
> -Consult the dealer or an experienced radio/TV technician for help.

Note: Additional information about corrective measures may also be provided to the user at the company's option.

The FCC has indicated that the radio interference statement be bound in the same manner as the operator's manual. Thus, a loose-leaf insert page in a bound or center-spine and stapled manual would not meet this condition.

Japanese Class B Manual Statement

> この装置は、クラスＢ機器です。この装置は、住宅環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

The English translation for the text is: *This is Class B equipment. Although this equipment is intended for use in residential environment, it could cause poor reception if used near a radio or television receiver. Please follow instructions in the instruction manual.*

Appendix E Additional Information for VCCI

The VCCI requires a notification for each product sold with the VCCI label. The “Report of Compliance” is submitted electronically on the VCCI web site https://www.vcci.jp/senyo/tekigou_kakunin/. Enter your registered email and password and click "OK". Then click "New report" to open the submission form. Fill all required information and click "CONFIRM" after making sure everything is filled properly. Click “Report” on the confirmation page. Further information may be found at: https://www.vcci.jp/english/member/tekigou_kakunin/manual.pdf

Appendix F Additional Information for Australia and New Zealand

In Australia, an application to use the RCM mark must be made by the importer of the product. The importer must hold a Declaration of Conformity and compliance folder, of which this report forms a part, for each product sold with a RCM mark. Information about the mark can be found at http://www.acma.gov.au/Industry/Suppliers/Supplier-resources/Supplier-overview/new-single-compliance-mark.

The European harmonized standards (EN) and international (CISPR/IEC) standards are acceptable for demonstrating compliance with the Australian/New Zealand compliance framework. This is explained in the document "Electromagnetic compatibility requirements for suppliers of electrical and electronic devices, vehicles and devices with internal combustion engines in Australia", dated March 2014. Follow the link for the booklet on the page http://acma.gov.au/Industry/Suppliers/Equipment-regulation/EMC-Electromagnetic-compatibility/emc-booklet-and-standard.

Follow the link below to the ACMA EMC information site and click on the link “list of EMC standards” which lists Australia, EN and international standards that are acceptable: http://www.acma.gov.au/theACMA/how-to-use-the-emc-standards-list

Appendix G Basic and Reference Standards

Subpart B of Part 15 of FCC Rules for digital devices.

FCC Part 15 Subpart B references the use of ANSI C63.4–2014: "*Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz*" for the purposes of evaluating the radiated and conducted emissions from digital devices.

Industry Canada Interference Causing Equipment Standard ICES-003 Issue 6, January 2016

ICES 003 refers to ANSI C63.4-2014 and Canadian Standards Association Standard CAN/CSA-CEI/IEC CISPR 22: 10, "*Information technology equipment - Radio disturbance characteristics - Limits and Methods of Measurement.*" This standard is an adoption of IEC CISPR 22:2008-09, sixth edition, with Canadian deviations.

VCCI Regulations For Information Technology Equipment, dated November 2016

The VCCI Rules for voluntary control measures of radio interference generated by Information Technology Equipment make reference to the following national and international standards for the purposes of making measurements. NTS's test procedures associated with measurements against VCCI rules use these standards in addition to the procedures laid out in the VCCI regulations.

Standard	Description / Title
VCCI-CISPR 32: 2016	"Technical Requirements" for multimedia equipment
CISPR 16-1-1:2010	Specification for radio disturbance and immunity measuring apparatus and method – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus.
CISPR 16-1-2:2003	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Measuring apparatus – Ancillary equipment – Conducted disturbances
CISPR 16-1-4:2010	Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radio disturbances
CISPR 16-2-3:2010	Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbance and immunity – Radiated disturbance measurements
CISPR 16-4-2:2011	Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements
IEC 61000-4-6:2008	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields
ANSI C63.5-2006	American National Standard for Electromagnetic Compatibility – Radiated Emission Measurements in Electromagnetic Interference (EMI) Control – Calibration of Antennas (9kHz to 40 GHz)

EN 55022:2010

EN 55022 references various international and European standards to be used when making the required measurements. The references all cite dated versions of the standards, therefore the editions cited are used.

International and EN equivalent standard	Description	Standard Used
CISPR 16-1-1:2006 +A1:2006 EN 55016-1-1:2007 +A1:2007	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus	CISPR 16-1-1 2006 +A1:2006 +A2:2007
CISPR 16-1-2:2003 +A1:2004 +A2:2006 EN 55016-1-2:2004 +A1:2005 +A2:2006	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	CISPR 16-1-2:2003 +A1:2004 +A2:2006
CISPR 16-1-4:2007 EN 55016-1-4: 2007	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances	CISPR 16-1-4:2007
CISPR 16-2-3:2003 +A1:2005 EN 55016-2-3:2004 +A1:2005	Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements	CISPR 16-2-3:2006
CISPR 16-4-2:2003 EN 55016-4-2 2004	Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling - Uncertainty in EMC measurements	CISPR 16-4-2:2003
Unless the international publication has been modified by common modifications, indicated by ***(mod)***, either the international or the EN standard may be used. Where the EN standard differs from the international standard then the EN version is used. For all of the standards listed above there are no common modifications therefore National Technical Systems makes use of the international version of all standards listed.		

CISPR 22:2008

CISPR 22 references various IEC basic standards to be used when making the required measurements. When the referenced standard is cited by version (date or revision) then that version is used except where noted. In instances where the standards are referenced without citing the version to be used, the current versions are used.

International and EN equivalent standard	Description	Standard Used
CISPR 16-1-1:2006 +A1:2006 +A2:2007 EN 55016-1-1:2007 +A1:2007 +A2:2008	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus	CISPR 16-1-1:2006 +A1:2006 +A2:2007
CISPR 16-1-2:2003 +A1:2004 +A2:2006 EN 55016-1-2 2004 + A1 2005	Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	CISPR 16-1-2:2003 +A1:2004 +A2:2006
CISPR 16-1-4:2007 EN 55016-1-4: 2007	Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances	CISPR 16-1-4:2007
CISPR 16-2-3:2006 EN 55016-2-3:2006	Specification for radio disturbance and immunity measuring apparatus and methods –Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements	CISPR 16-2-3:2006
CISPR 16-4-2 2003 EN 55016-4-2 2004	Specification for radio disturbance and immunity measuring apparatus and methods –Part 4-2: Uncertainties, statistics and limit modeling - Uncertainty in EMC measurements	CISPR 16-4-2 2003
Unless the international publication has been modified by common modifications, indicated by ***(mod)***, either the international or the EN standard may be used. Where the EN standard differs from the international standard then the EN version is used. For all of the standards listed above there are no common modifications therefore National Technical Systems makes use of the international version of all standards listed.		

EN 55032:2012 (CISPR 32:2012)

EN 55032 (CISPR 32) references various IEC basic standards to be used when making the required measurements. When the referenced standard is cited by version (date or revision) then that version is used except where noted. In instances where the standards are referenced without citing the version to be used, the current versions are used.

International and EN equivalent standard	Description	Standard Used
CISPR 16-1-1:2010 +A1:2010	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus	CISPR 16-1-1:2010 +A1:2010 +A2:2014
CISPR 16-1-2:2003 +A1:2004 +A2:2006	Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	CISPR 16-1-2:2003 +A1:2004 +A2:2006
CISPR 16-1-4:2010	Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements	CISPR 16-1-4:2010 +A1:2012
CISPR 16-2-1:2008 +A1:2010	Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements	CISPR 16-2-1:2008 +A1:2010
CISPR 16-2-3:2010	Specification for radio disturbance and immunity measuring apparatus and methods –Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements	CISPR 16-2-3:2010 +A1:2010
CISPR 16-4-2:2011	Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Measurement instrumentation uncertainty	CISPR 16-4-2:2011 +A1:2014
CISPR/TR 16-4-3:2004 +A1:2006	Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-3: Uncertainties, statistics and limit modeling – Statistical considerations in the determination of EMC compliance of mass-produced products	CISPR/TR 16-4-3:2004 +A1:2006
IEC 60050-161:1990	International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility	IEC 60050-161:1990
IEC 61000-4-6:2008	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields	IEC 61000-4-6:2008
ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories	ISO/IEC 17025:2005
IEEE Std 802.3	IEEE Standard for Information technology – Specific requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CMSA/CD) Access Method and PHysical Layer Specifications	IEEE Std 802.3
ANSI C63.5-2006	American National Standard (for) Electromagnetic Compatibility – Radiated Emission Measurements in Electromagnetic Interference (EMI) Control – Calibration of Antennas (9 kHz to 40 GHz)	ANSI C63.5-2006
Unless the international publication has been modified by common modifications, indicated by ***(mod)***, either the international or the EN standard may be used. Where the EN standard differs from the international standard then the EN version is used. For all of the standards listed above there are no common modifications therefore National Technical Systems makes use of the international version of all standards listed.		

TCVN 7189:2009

TCVN 7189 references various IEC basic standards and TCVN standards to be used when making the required measurements. When the referenced standard is cited by version (date or revision) then that version is used except where noted. In instances where the standards are referenced without citing the version to be used, the current versions are used.

TCVN and international equivalent standard	Description	Standard Used
IEC 60083:1997	Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC	IEC 60083:2009
TCVN 8241-4-6:2009 IEC 61000-4-6:2005	Section 6: Immunity to conducted disturbances, induced by radio-frequency fields	IEC 61000-4-6:2008
TCVN 6988:2006 CISPR 11:2004	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	CISPR 11:2010 +A1:2010
TCVN 7600:2006 IEC/CISPR 13:2003	Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and methods of measurement	CISPR 13:2001 +A1:2003 +A2:2006
TCVN 6989-1-1:2008 CISPR 16-1-1:2006	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus	CISPR 16-1-1:2006 +A1:2006 +A2:2007
CISPR 16-1-2:2003 +A1:2004	Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	CISPR 16-1-2:2003 +A1:2004 +A2:2006
CISPR 16-1-4:2007	Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances	CISPR 16-1-4:2007
CISPR 16-2-3:2006	Specification for radio disturbance and immunity measuring apparatus and methods –Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements	CISPR 16-2-3:2006
CISPR 16-4-2 2003	Specification for radio disturbance and immunity measuring apparatus and methods –Part 4-2: Uncertainties, statistics and limit modeling - Uncertainty in EMC measurements	CISPR 16-4-2 2003
Unless the international publication has been modified by common modifications, indicated by ***(mod)***, either the international or the TCVN standard may be used. Where the TCVN standard differs from the international standard then the TCVN version is used. For all of the standards listed above there are no common modifications therefore National Technical Systems makes use of the international version of all standards listed.		

EN 55024:2010

EN 55024 references various European standards to be used when making the required measurements. When the referenced standard is cited by version (date or revision) then that version is used except where noted. In instances where the standards are referenced without citing the version to be used, the current versions (or its international equivalent) are used.

Referenced standard	Description	Standard Used
IEC 60050-161:1990	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	IEC 60050-161:1990
IEC 60318-1:2009 EN 60318-1:2009	Electroacoustics - Simulators of human head and ear - Part 1: Ear simulator for the measurement of supra-aural and circumaural earphones	N/A (The EUT tested did not require the use of an ear simulator)
IEC 61000-4-2:2008 EN 61000-4-2:2009	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques -" Section 2: Electrostatic discharge immunity test	IEC 61000-4-2:2008 EN 61000-4-2:2009
IEC 61000-4-3:2006 +A1:2007 +A2:2010 EN 61000-4-3:2006 +A1:2008 +A2:2010	Section 3: Radiated, radio-frequency, electromagnetic field immunity test	IEC 61000-4-3:2006 A1:2007 A2:2010 EN 61000-4-3:2006 A1:2008 A2:2010
IEC 61000-4-4:2004 EN 61000-4-4:2004	Section 4: Electrical fast transient/burst immunity test	IEC 61000-4-4:2012 EN 61000-4-4:2102
IEC 61000-4-5: 2005 EN 61000-4-5 :2006	Section 5: Surge immunity test	IEC 61000-4-5:2005 EN 61000-4-5:2006
IEC 61000-4-6 :2008 EN 61000-4-6:2009	Section 6: Immunity to conducted disturbances, induced by radio-frequency fields	IEC 61000-4-6:2008 EN 61000-4-6:2009
IEC 61000-4-8 :2009 EN 61000-4-8:2010	Section 8: Power frequency magnetic field immunity test	IEC 61000-4-8 2009 EN 61000-4-8:2010
IEC 61000-4-11:2004 EN 61000-4-11:2004	Section 11: Voltage dips, short interruptions and voltage variations immunity tests	IEC 61000-4-11:2004 EN 61000-4-11:2004
CISPR 16-1-2:2003 A+1:2004 +A2:2006 EN 55016-1-2:2004 +A1:2005 +A2:2006	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	CISPR 16-1-2:2003 A+1:2004 +A2:2006 EN 55016-1-2:2004 +A1:2005 +A2:2006
CISPR 20:2006 EN 55020:2007	Sound and television broadcast receivers and associated equipment – Immunity characteristics - Limits and methods of measurement	CISPR 20:2006 EN 55020:2007
CISPR 22:2008 (mod) EN 55022 2010	Information technology equipment – Radio disturbance characteristics - Limits and methods of measurement	CISPR 22:2008 (mod) EN 55022 2010

CISPR 24:2010

CISPR 24 references various IEC basic standards to be used when making the required measurements. When the referenced standard is cited by version (date or revision) then that version is used except where noted. In instances where the standards are referenced without citing the version to be used, the current versions are used.

Referenced standard	Description	Standard Used
IEC 60050-161:1990	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	IEC 60050-161:1990
IEC 60318-1:2009	Electroacoustics - Simulators of human head and ear - Part 1: Ear simulator for the measurement of supra-aural and circumaural earphones	N/A (The EUT tested did not require the use of an ear simulator)
IEC 61000-4-2:2008	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques -" Section 2: Electrostatic discharge immunity test	IEC 61000-4-2:2008 EN 61000-4-2:2009
IEC 61000-4-3:2006 +A1:2007 +A2:2010	Section 3: Radiated, radio-frequency, electromagnetic field immunity test	IEC 61000-4-3:2006 +A1:2007 +A2:2010 EN 61000-4-3:2006 +A1:2008 +A2:2010
IEC 61000-4-4:2004	Section 4: Electrical fast transient/burst immunity test	IEC 61000-4-4:2012 EN 61000-4-4:2012
IEC 61000-4-5: 2005	Section 5: Surge immunity test	IEC 61000-4-5:2005 EN 61000-4-5:2006
IEC 61000-4-6 :2008	Section 6: Immunity to conducted disturbances, induced by radio-frequency fields	IEC 61000-4-6:2008 EN 61000-4-6:2009
IEC 61000-4-8 :2009	Section 8: Power frequency magnetic field immunity test	IEC 61000-4-8:2009 EN 61000-4-8:2010
IEC 61000-4-11:2004	Section 11: Voltage dips, short interruptions and voltage variations immunity tests	IEC 61000-4-11:2004 EN 61000-4-11:2004
CISPR 16-1-2:2003 +A1:2004 +A2:2006	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	CISPR 16-1-2:2003 +A1:2004 +A2:2006 EN 55016-1-2:2004 +A1:2005 +A2:2006
CISPR 20:2006	Sound and television broadcast receivers and associated equipment – Immunity characteristics - Limits and methods of measurement	CISPR 20:2006 EN 55020:2007
CISPR 22:2008	Information technology equipment – Radio disturbance characteristics - Limits and methods of measurement	CISPR 22:2008 (mod) EN 55022:2010

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