FCC PART 15, SUBPART C
ISED RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

Zebra Technologies Corporation

3 Overlook Point
Lincolnshire, IL 60069, USA

FCC ID: I28-RFIDM6EMTT
IC: 3798B-RFIDM6EMTT

Report Type: Class II Permissive Change		**Model:** UHF RFID Module
Prepared By	Zhao Zhao Test Engineer	
Report Number	R1903291-247	
Report Date	2019-05-21	
Reviewed By	Xiao Lin RF Lead	
Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162, Fax: (408) 732 9164		

ACCREDITED
CERTIFICATE #3297.02

* This test report may contain data and test methods that are not covered by BACL's scope of accreditation as of the test report date shown above. These items are marked within the test report text with an asterisk "*"

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1903291-247	Class II Permissive Change Report	2019-05-21

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report was prepared on behalf of *Zebra Technologies Corporation*, and their product model: *M6e-MicroTT*, *FCC ID: I28-RFIDM6EMTT*, *IC: 3798B-RFIDM6EMTT,* or the "EUT" as referred to in this report. The EUT is an UHF RFID radio module operates in 902-928 MHz.

1.2 Objective

This report is prepared on behalf of *Zebra Technologies Corporation,* in accordance with FCC CFR47 §15.247 and ISED RSS-247 Issue 2, February 2017.

The objective is to determine compliance with FCC Part 15.247 and ISED RSS-247 Issue 2 rules to allow radio colocation with multiple radio modules installed in host products, Model: ZT411 and ZT421. The following three radio modules are installed in the host,

Model Number	M6e-MicroTT (EUT)
FCC ID	I28-RFIDM6EMTT
IC	3798B-RFIDM6EMTT
Radio Type	UHF RFID
Operating Frequency	902MHz – 928MHz
Modulation	ASK
Channel Spacing	500KHz
PCB Array Antenna Gain	-36 dBi
RF Output power	0.647W

Model Number	ZQ3BT
FCC ID	I28-ZBRZQ3BT
IC	3798B-ZBRZQ3BT
Radio Type	Bluetooth Ver4.0+EDR
Operating Frequency	2402MHz - 2480MHz
Modulation	FHSS (BDR/EDR); GFSK (LE)
Channel Spacing	1MHz (BDR, EDR); 2MHz (LE)
Chip Type Antenna Gain	1.69 dBi
RF Output power	0.0052W (BDR/EDR); 0.0029 (LE)

Model Number	WYSBHVGXG
FCC ID	I28MD-FXLAN11AC
IC	3798B-FXLAN11AC
Radio Type	WLAN-ac/bt
Operating Frequency	2402MHz – 2480MHz, 2412MHz – 2462MHz 5180MHz – 5240MHz, 5260MHz – 5320MHz 5500MHz – 5700MHz, 5745MHz – 5825MHz
Modulation	FHSS (BDR/EDR); GFSK (LE); DSSS, OFDM (WLAN)
Channel Spacing	1MHz (BDR, EDR); 2MHz (LE) 5MHz (2.4G); 20MHz (5G); 40MHz (5G) ; 80MHz (5G)
Omnidirectional Antenna Gain	3 dBi (2.4G)5 dBi (5G);
RF Output power	0.007W (BDR/EDR); 0.0106W (LE) 0.0475W (2.4G WLAN); 0.0157W (UNII-1); 0.0162W (UNII-2); 0.0248W (UNII-2E); 0.0149W (UNII-3)

The radio co-location combinations[1] in both ZT411 and ZT421 are listed below,

1. EUT + ZQ3BT
2. EUT + WYSBHVGXG (2.4 GHz Wi-Fi, 5 GHz Wi-Fi, and Bluetooth do not transmit simultaneously[2])

Note 1: *Zebra Technologies Corporation* declares that the Bluetooth module, Model: ZQ3BT and WLAN module, Model: WYSBHVGXG cannot transmit simultaneously.

Note 2: *Zebra Technologies Corporation* declares that the WLAN module (FCC ID: I28MD-FXLAN11AC) cannot transmit Bluetooth and Wi-Fi signal simultaneously.

AC line conducted emissions tests were performed for both hosts because of the different power supply units. The radiated spurious emissions tests were performed only for ZT411 due to the similarity of the hosts. Please refer to the Appendix E Declaration of Similarity for details.

1.3 Related Submittal(s)/Grant(s)

Radio module, Model Number: ZQ3BT, FCC ID: I28-ZBRZQ3BT, IC: 3798B-ZBRZQ3BT, was certified as Limited Modular Approval. Class II Permissive Change for this radio module with host device: ZT411 and ZT421 is filed in a separate application. Standalone EMC and RF Exposure evaluation for the radio module with the new host device is covered in the CIIPC application.

1.4 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) and FCC KDB 789033 D02 General U-NII Test Procedures New Rules v02r01: Guidelines For Compliance Testing of Usnlicensed National Information Infrastructure (U-NII).

1.5 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 ° C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.6 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.7 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3279.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment

[including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)

- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISED) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 558074 D01 DTS Meas Guidance v05r02 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The software "Toolbox v1.83" was used to transmit signal for all the modules. The software was provided by *Zebra Technologies, Corp.* and verified by Zhao Zhao to comply with the standard requirements being tested against.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Local Support Equipment

None

2.5 Support Equipment

Manufacturer	Description	Model	Serial Number
HP	Laptop	ZBOOK 14u G5	5CG90125FX

2.6 Interface Ports and Cabling

Cable Descriptions	Length (m)	From	To
USB to USB-B	1.5	Laptop	EUT

3 Summary of Test Results

Results reported relate only to the product tested.

FCC and ISED Rules	Description of Test	Results
FCC §15.207 ISED RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
FCC §2.1091, §15.247(i) ISED RSS-102	RF Exposure	Compliant
FCC §2.1053, §15.205, §15.209, §15.247 (d) ISED RSS-247 §5.5 RSS-Gen §8.9 and §8.10	Radiated Spurious Emissions	Compliant

4 FCC §15.247(f) §2.1091 & ISED RSS-102 - RF Exposure

4.1 Applicable Standards

According to FCC §2.1091 (Mobile Devices) RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Note: f = frequency in MHz
* = Plane-wave equivalent power density

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 Test Results

For transmission with RFID 900 MHz, WLAN and Bluetooth 2.4 GHz, and WLAN 5 GHz Radios

RFID 900 MHz Radio (FCC ID: I28-RFIDM6EMTT)

Maximum peak output power at antenna input terminal (dBm):	28.11
Maximum peak output power at antenna input terminal (mW):	647.14
Prediction distance (cm):	20
Predication frequency (MHz):	902.75
Maximum Antenna Gain, typical (dBi):	-36
Maximum Antenna Gain (numeric):	0.00025
Power density of prediction frequency at prediction distance (mW/cm^2):	0.000032
FCC limit (mW/cm^2):	0.602

WLAN 2.4 GHz Radio (FCC ID: I28MD-FXLAN11AC)

Maximum peak output power at antenna input terminal (dBm):	16.77
Maximum peak output power at antenna input terminal (mW):	47.53
Prediction distance (cm):	20
Predication frequency (MHz):	2412
Maximum Antenna Gain, typical (dBi):	3
Maximum Antenna Gain (numeric):	2.00
Power density of prediction frequency at prediction distance (mW/cm^2):	0.019
FCC limit (mW/cm^2):	1.00

WLAN 5 GHz Radio (FCC ID: I28MD-FXLAN11AC)

Maximum peak output power at antenna input terminal (dBm):	14.76
Maximum peak output power at antenna input terminal (mW):	29.92
Prediction distance (cm):	20
Predication frequency (MHz):	5550
Maximum Antenna Gain, typical (dBi):	5
Maximum Antenna Gain (numeric):	3.16
Power density of prediction frequency at prediction distance (mW/cm^2):	0.019
FCC limit (mW/cm^2):	1.0

Classic Bluetooth Radio (FCC ID: I28-ZBRZQ3BT)

Maximum peak output power at antenna input terminal (dBm):	7.40
Maximum peak output power at antenna input terminal (mW):	5.50
Prediction distance (cm):	20
Predication frequency (MHz):	2402
Maximum Antenna Gain, typical (dBi):	1.69
Maximum Antenna Gain (numeric):	1.48
Power density of prediction frequency at prediction distance (mW/cm^2):	0.0016
FCC limit (mW/cm^2):	1.0

For colocation of RFID and WLAN 2.4G:
MPE ratio sum: (0.000032/0.602) + (0.019/1.0) = 0.019053<1.0

For colocation of RFID and WLAN 5G:
MPE ratio sum: (0.000032/0.602) + (0.019/1.0) = 0.019053<1.0

For colocation of RFID and Classic Bluetooth:
MPE ratio sum: (0.000032/0.602) + (0.0016/1.0) = 0.001653<1.0

Note: Please refer to SIEMIC reports: FCC_RF_SL13110101-ZBR-051_RFID, FCC_RF_SL15072901-ZBR-024_UNII Rev. 2.0, FCC_RF_SL15072901-ZBR-024_DTS_2.4G Rev.2.0 and FCC IC_RF_SL17060501-ZBR-021_DSS_Rec 2.0.

Results

For the different combination of transmitters, a separation distance of 20 cm complies with the MPE simultaneous transmission limit of ≤ 1.0.

4.4 According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

4.5 RF exposure evaluation exemption for IC

RFID

28.11 + (-36) dBi = -7.89 dBm < $1.31\times10^{-2}f^{0.6834}$ = 1.371 W = 31.370 dBm

2.4 GHz Wi-Fi

16.77 + 3.0 dBi = 19.77 dBm < $1.31\times10^{-2}f^{0.6834}$ = 2.684 W = 34.288 dBm

Classic Bluetooth

7.40 + 1.69 dBi = 9.09 dBm < $1.31\times10^{-2}f^{0.6834}$ = 2.676 W = 34.275 dBm

5 GHz Wi-Fi

14.76 + 5.0 dBi = 19.76 dBm < $1.31\times10^{-2}f^{0.6834}$ = 4.744 W = 36.761 dBm

Therefore the RF exposure is not required.

5 FCC §15.207 & RSS-210 §8.8 - AC Line Conducted Emissions

5.1 Applicable Standards

As per FCC §15.207 and ISED RSS-Gen §8.8 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.
Note2: A linear average detector is required

5.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used were FCC §15.207 and ISED RSS-Gen §8.8 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

5.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cords of support equipment were connected to LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data were recorded in the peak, quasi-peak, and average detection mode. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

5.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL), the Attenuator Factor (Atten) to indicated Amplitude (Ai) reading. The basic equation is as follows:

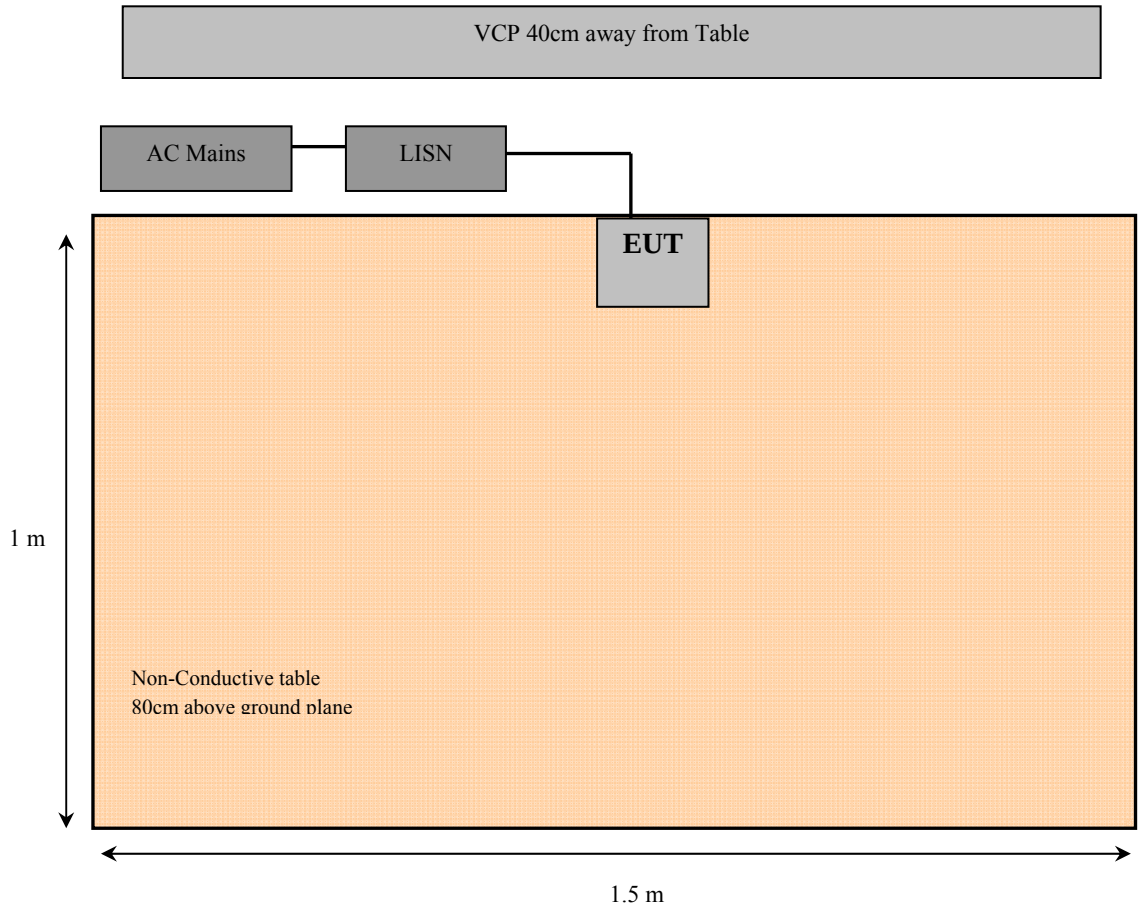
CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

5.5 Test Setup Block Diagram



5.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101963	2018-07-27	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150202	2019-02-25	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	N/R	N/A
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160132	2018-05-16	1 year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950.03	100338	2018-07-05	2 years

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

5.7 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	37 %
ATM Pressure:	101.6 kPa

The testing was performed by Zhao Zhao on 2019-05-02 in 5 meter chamber 3.

5.8 Summary of Test Results

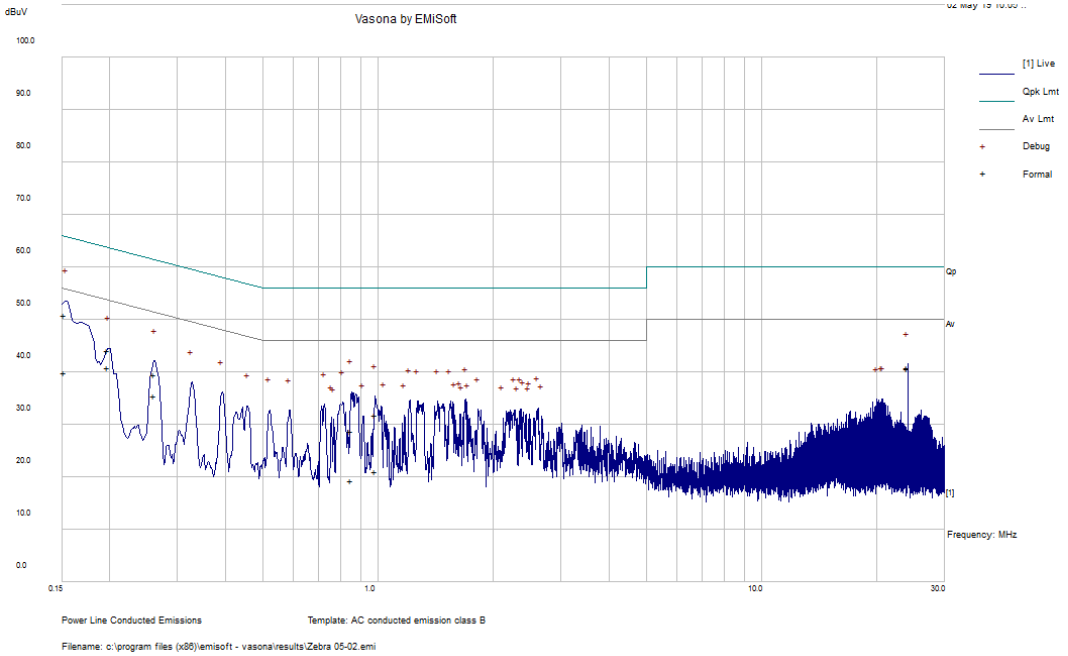
According to the recorded data in following table, the EUT complied with the FCC 15C and RSS-Gen standard's conducted emissions limits, with the margin reading of:

Connection: AC/DC Adapter Connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-6.82	24.002166	Line	0.15-30

5.9 Host Model: ZT411 Conducted Emissions Test Plots and Data

Colocation RFID and 2.4G Wi-Fi

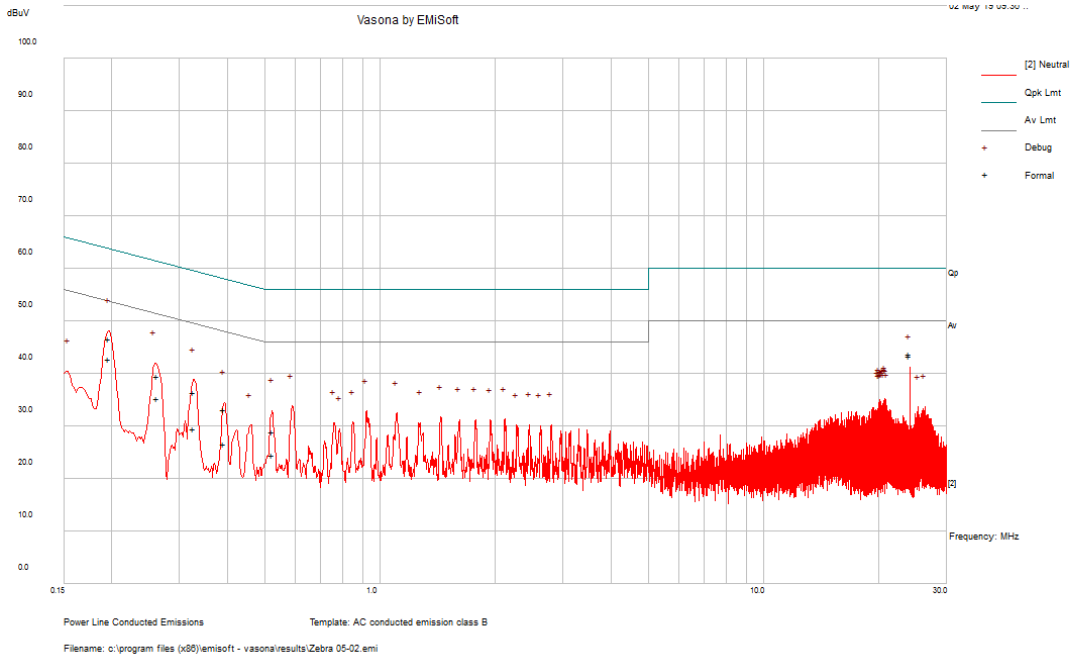
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.151769	50.81	Line	65.9	-15.09	QP
24.001248	40.61	Line	60	-19.39	QP
0.197603	44.07	Line	63.71	-19.64	QP
0.26085	39.6	Line	61.4	-21.8	QP
0.85006	28.84	Line	56	-27.16	QP
0.984191	31.86	Line	56	-24.14	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.151769	40.03	Line	55.9	-15.88	Ave.
24.001248	40.91	Line	50	-9.09	Ave.
0.197603	40.93	Line	53.71	-12.78	Ave.
0.26085	35.55	Line	51.4	-15.85	Ave.
0.85006	19.44	Line	46	-26.56	Ave.
0.984191	21.15	Line	46	-24.85	Ave.

120 V, 60 Hz – Neutral

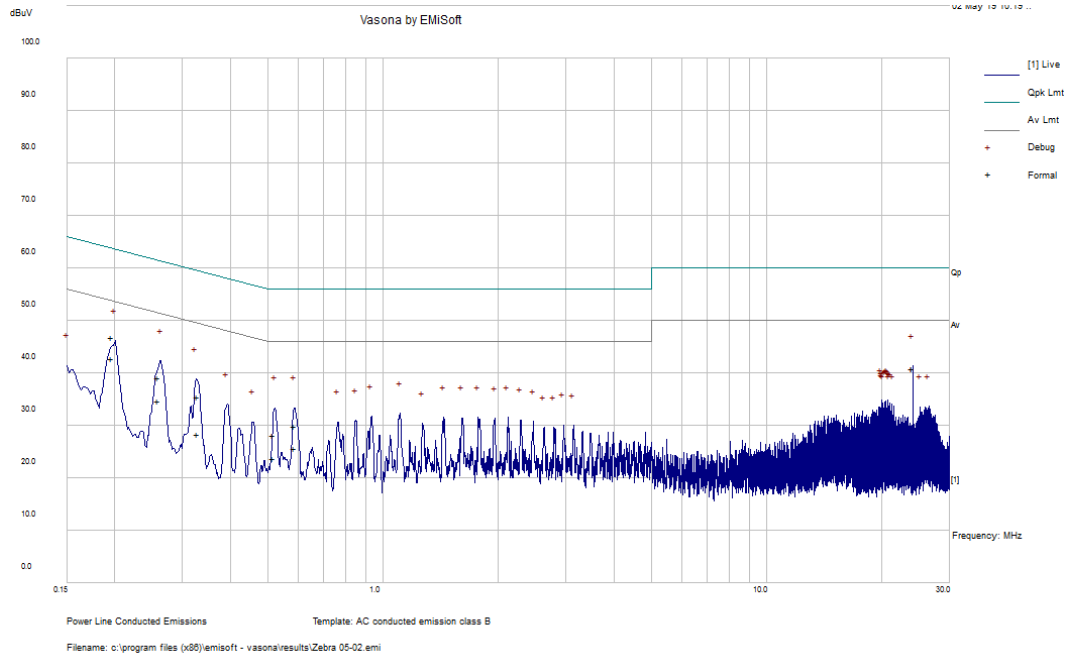


Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.195	46.68	Neutral	63.82	-17.14	QP
24.001068	40.49	Neutral	60	-19.51	QP
0.259963	39.37	Neutral	61.43	-22.06	QP
0.328771	34.82	Neutral	59.48	-24.66	QP
0.586395	30.69	Neutral	56	-25.31	QP
0.523208	32.31	Neutral	56	-23.69	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.195	42.73	Neutral	53.82	-11.09	Ave.
24.001068	40.84	Neutral	50	-9.16	Ave.
0.259963	35.32	Neutral	51.43	-16.12	Ave.
0.328771	28.87	Neutral	49.48	-20.61	Ave.
0.586395	24.46	Neutral	46	-21.54	Ave.
0.523208	26.53	Neutral	46	-19.47	Ave.

Colocation RFID and 5G Wi-Fi

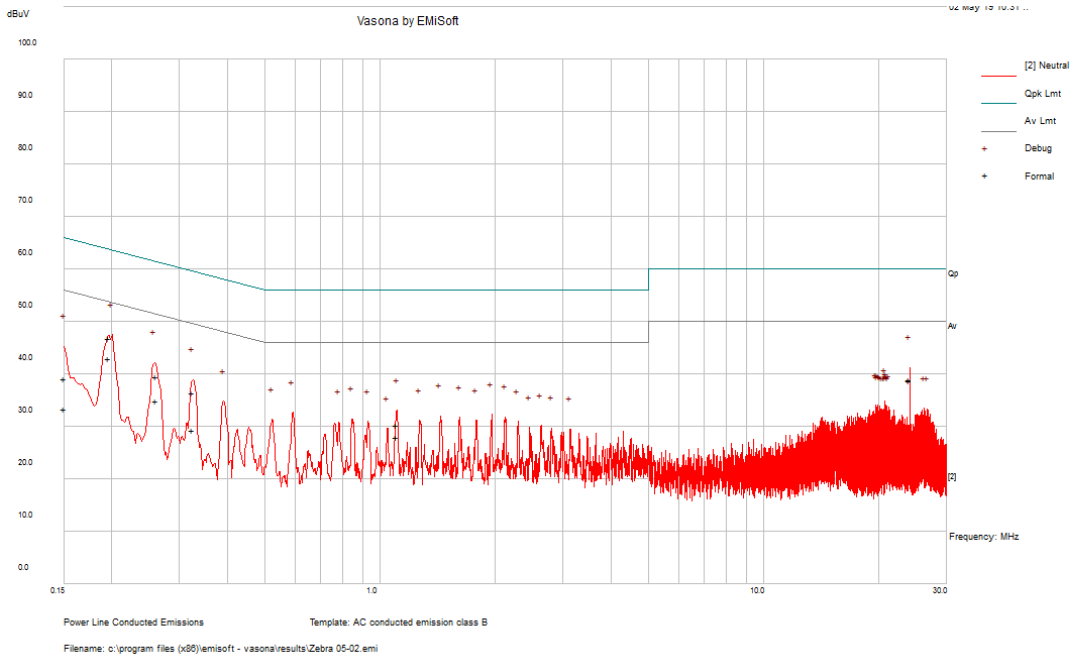
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.195941	46.82	Line	63.78	-16.97	QP
24.00087	40.92	Line	60	-19.08	QP
0.259872	39.2	Line	61.44	-22.24	QP
0.328453	35.6	Line	59.49	-23.89	QP
0.589029	29.94	Line	56	-26.06	QP
0.518708	28.3	Line	56	-27.7	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.195941	42.89	Line	53.78	-10.89	Ave.
24.00087	40.94	Line	50	-9.06	Ave.
0.259872	34.73	Line	51.44	-16.7	Ave.
0.328453	28.33	Line	49.49	-21.16	Ave.
0.589029	25.69	Line	46	-20.31	Ave.
0.518708	23.72	Line	46	-22.28	Ave.

120 V, 60 Hz – Neutral

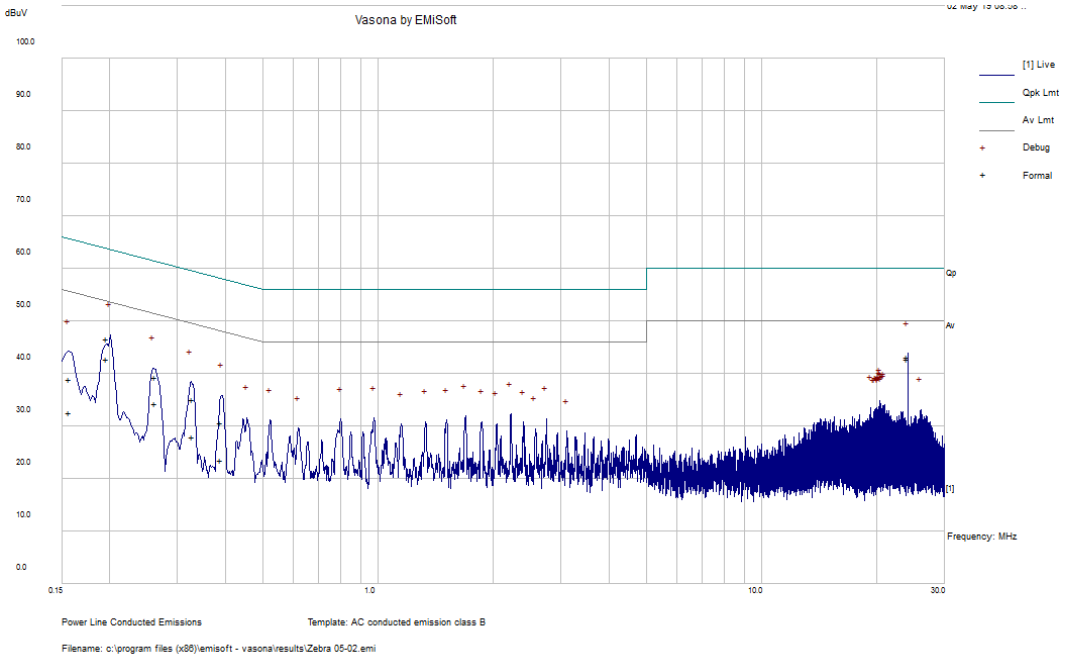


Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.195761	46.88	Neutral	63.79	-16.91	QP
24.003228	38.7	Neutral	60	-21.3	QP
0.261205	39.53	Neutral	61.39	-21.86	QP
0.325195	36.51	Neutral	59.57	-23.06	QP
0.150012	39.18	Neutral	66	-26.82	QP
1.105184	30.29	Neutral	56	-25.71	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.195761	42.95	Neutral	53.79	-10.83	Ave.
24.003228	38.97	Neutral	50	-11.03	Ave.
0.261205	35.01	Neutral	51.39	-16.38	Ave.
0.325195	29.35	Neutral	49.57	-20.22	Ave.
0.150012	33.33	Neutral	56	-22.66	Ave.
1.105184	28.1	Neutral	46	-17.9	Ave.

Colocation RFID and Classic Bluetooth

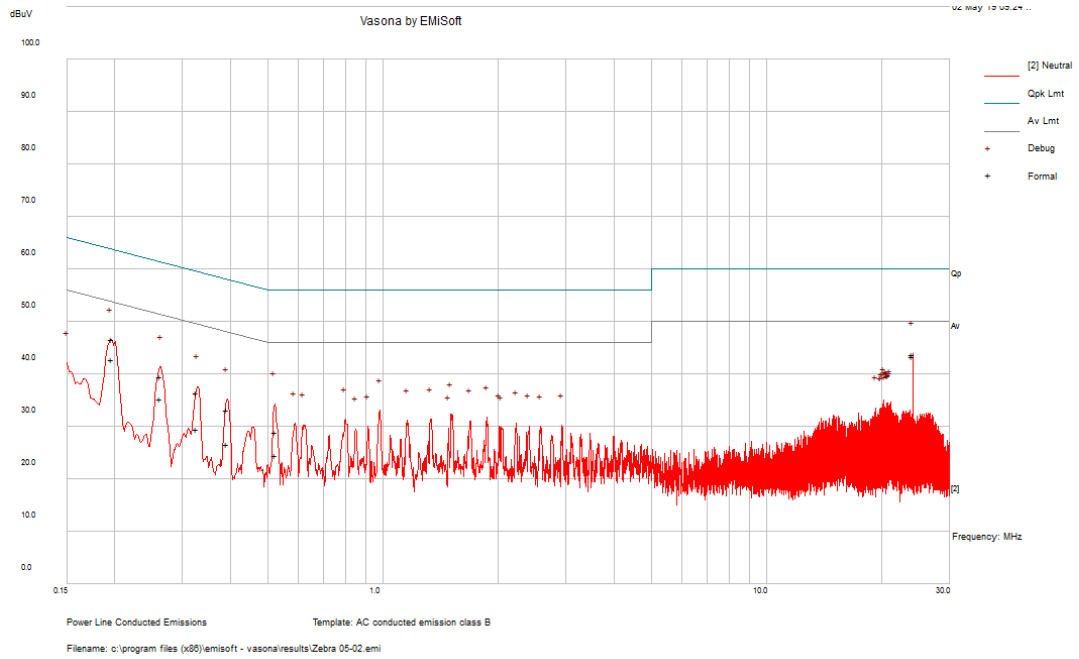
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
24.002166	42.87	Line	60	-17.13	QP
0.195887	46.69	Line	63.78	-17.09	QP
0.263251	39.43	Line	61.33	-21.9	QP
0.328867	35.19	Line	59.48	-24.29	QP
0.156875	38.88	Line	65.63	-26.75	QP
0.388303	30.67	Line	58.1	-27.43	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
24.002166	**43.18**	**Line**	**50**	**-6.82**	**Ave.**
0.195887	42.84	Line	53.78	-10.94	Ave.
0.263251	34.41	Line	51.33	-16.92	Ave.
0.328867	27.96	Line	49.48	-21.52	Ave.
0.156875	32.53	Line	55.63	-23.09	Ave.
0.388303	23.52	Line	48.1	-24.58	Ave.

120 V, 60 Hz – Neutral



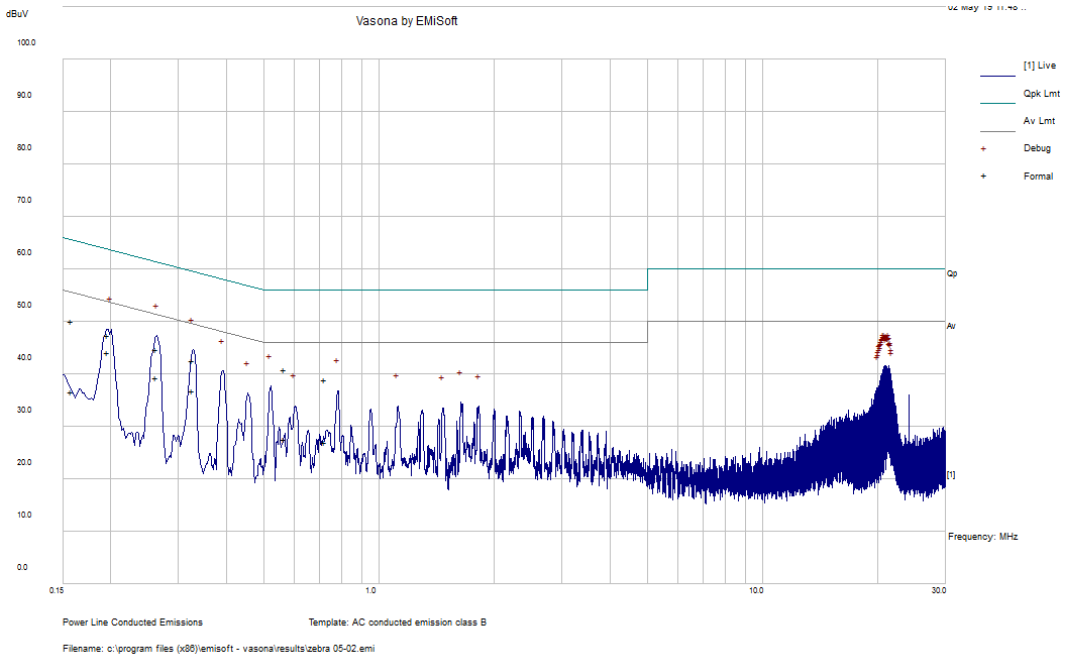
Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
24.001068	43.47	Neutral	60	-16.53	QP
0.196176	46.66	Neutral	63.77	-17.11	QP
0.261762	39.47	Neutral	61.38	-21.91	QP
0.524853	28.96	Neutral	56	-27.04	QP
0.326082	36.41	Neutral	59.55	-23.14	QP
0.390787	33.26	Neutral	58.05	-24.79	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
24.001068	43.79	Neutral	50	-6.21	Ave.
0.196176	42.9	Neutral	53.77	-10.87	Ave.
0.261762	35.27	Neutral	51.38	-16.11	Ave.
0.524853	24.63	Neutral	46	-21.37	Ave.
0.326082	29.46	Neutral	49.55	-20.09	Ave.
0.390787	26.66	Neutral	48.05	-21.39	Ave.

5.10 Host Model: ZT421 Conducted Emissions Test Plots and Data

Colocation RFID and 2.4G Wi-Fi

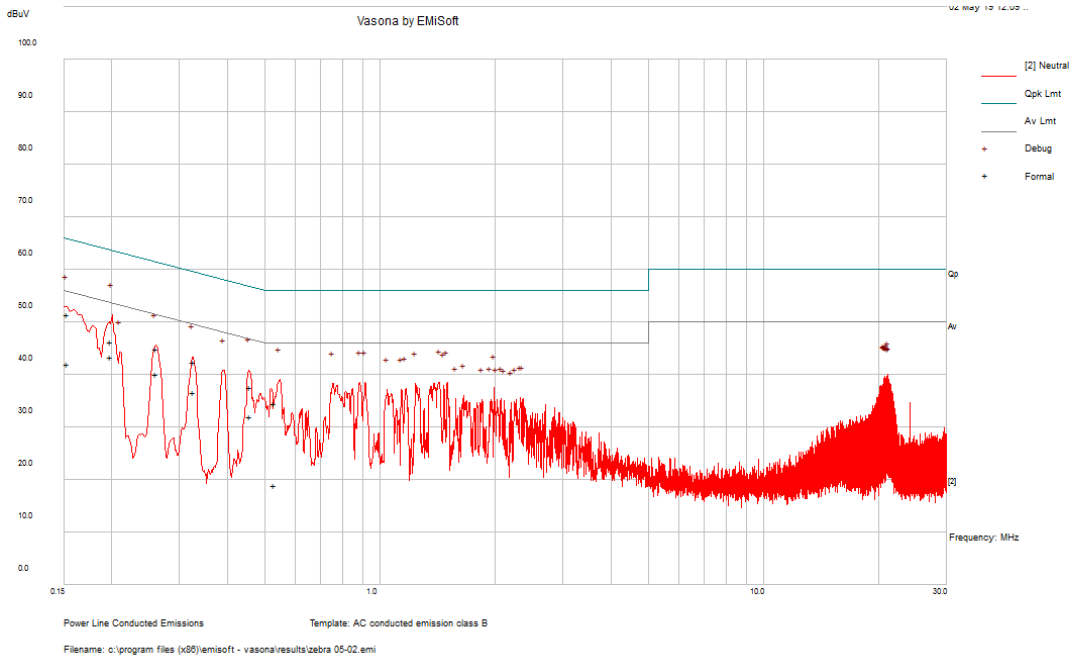
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.261204	45.4	Line	61.39	-16	QP
0.325315	42.58	Line	59.57	-16.99	QP
0.197453	47.05	Line	63.72	-16.67	QP
0.391784	39.65	Line	58.03	-18.37	QP
0.524241	33.54	Line	56	-22.46	QP
21.29228	37.16	Line	60	-22.84	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.261204	40.64	Line	51.39	-10.76	Ave.
0.325315	36.76	Line	49.57	-12.81	Ave.
0.197453	44.46	Line	53.72	-9.26	Ave.
0.391784	34.57	Line	48.03	-13.46	Ave.
0.524241	27.44	Line	46	-18.56	Ave.
21.29228	29.45	Line	50	-20.55	Ave.

120 V, 60 Hz – Neutral

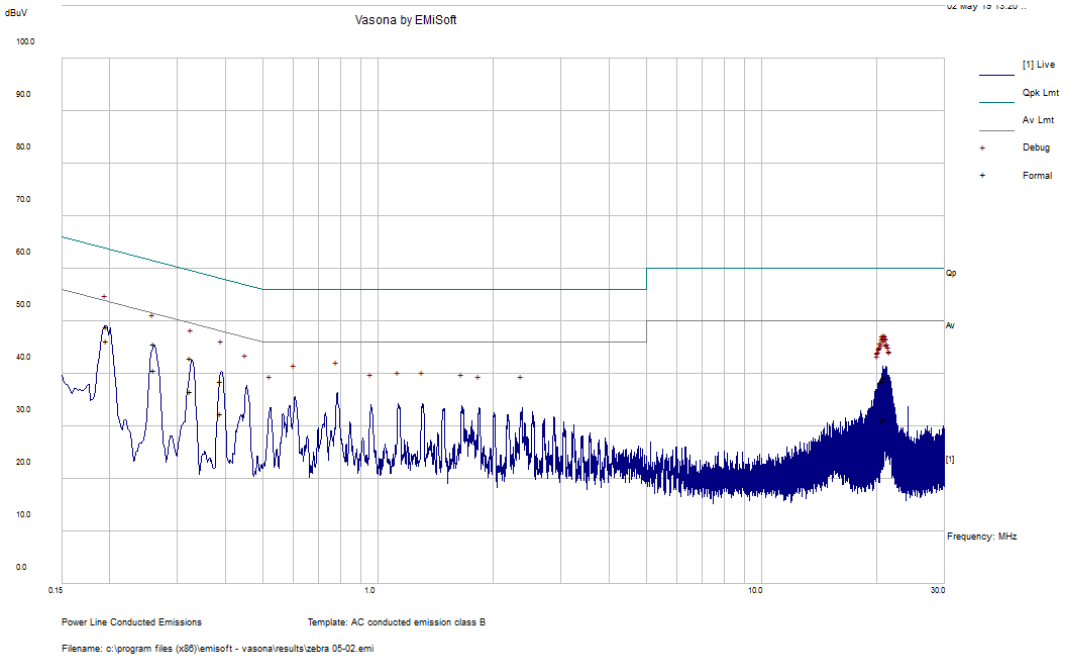


Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.198137	46.31	Neutral	63.69	-17.38	QP
0.152712	51.4	Neutral	65.85	-14.45	QP
0.261451	45.01	Neutral	61.39	-16.37	QP
0.457616	37.61	Neutral	56.74	-19.12	QP
0.326617	42.48	Neutral	59.54	-17.05	QP
0.529586	34.46	Neutral	56	-21.54	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.198137	43.45	Neutral	53.69	-10.23	Ave.
0.152712	42.03	Neutral	55.85	-13.82	Ave.
0.261451	40.12	Neutral	51.39	-11.27	Ave.
0.457616	32.08	Neutral	46.74	-14.66	Ave.
0.326617	36.58	Neutral	49.54	-12.95	Ave.
0.529586	19.03	Neutral	46	-26.97	Ave.

Colocation RFID and 5G Wi-Fi

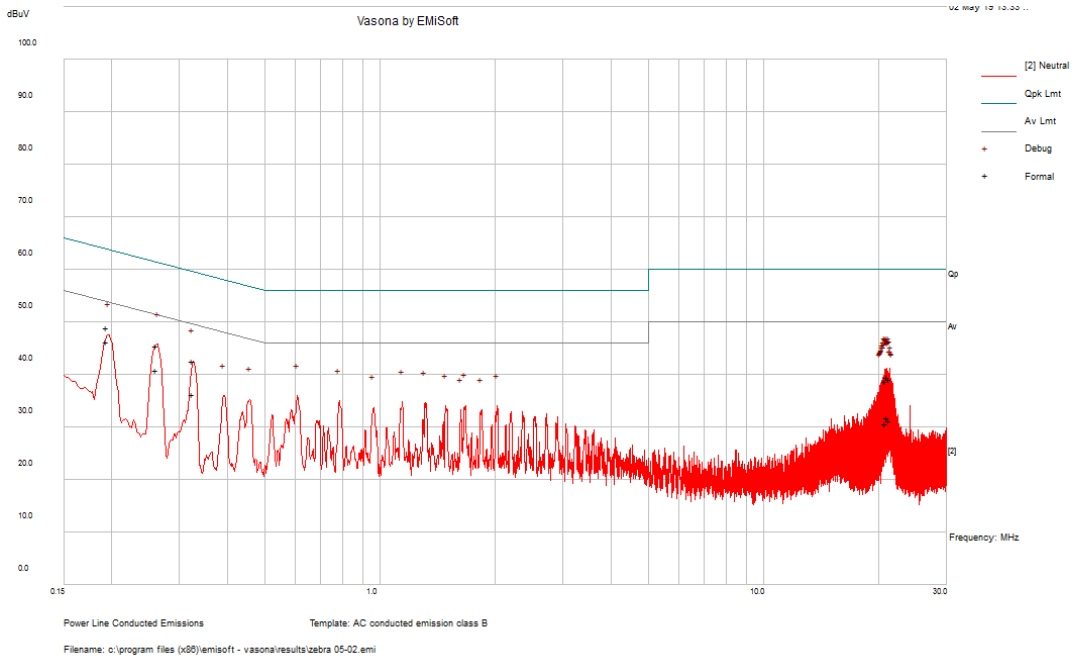
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.196086	48.94	Line	63.77	-14.84	QP
0.261559	45.65	Line	61.38	-15.73	QP
0.325459	42.92	Line	59.57	-16.65	QP
0.388328	38.61	Line	58.1	-19.49	QP
21.026198	39.35	Line	60	-20.65	QP
20.696282	38.64	Line	60	-21.36	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.196086	46.19	Line	53.77	-7.59	Ave.
0.261559	40.73	Line	51.38	-10.66	Ave.
0.325459	36.65	Line	49.57	-12.91	Ave.
0.388328	32.46	Line	48.1	-15.64	Ave.
21.026198	31.51	Line	50	-18.49	Ave.
20.696282	31.18	Line	50	-18.82	Ave.

120 V, 60 Hz – Neutral

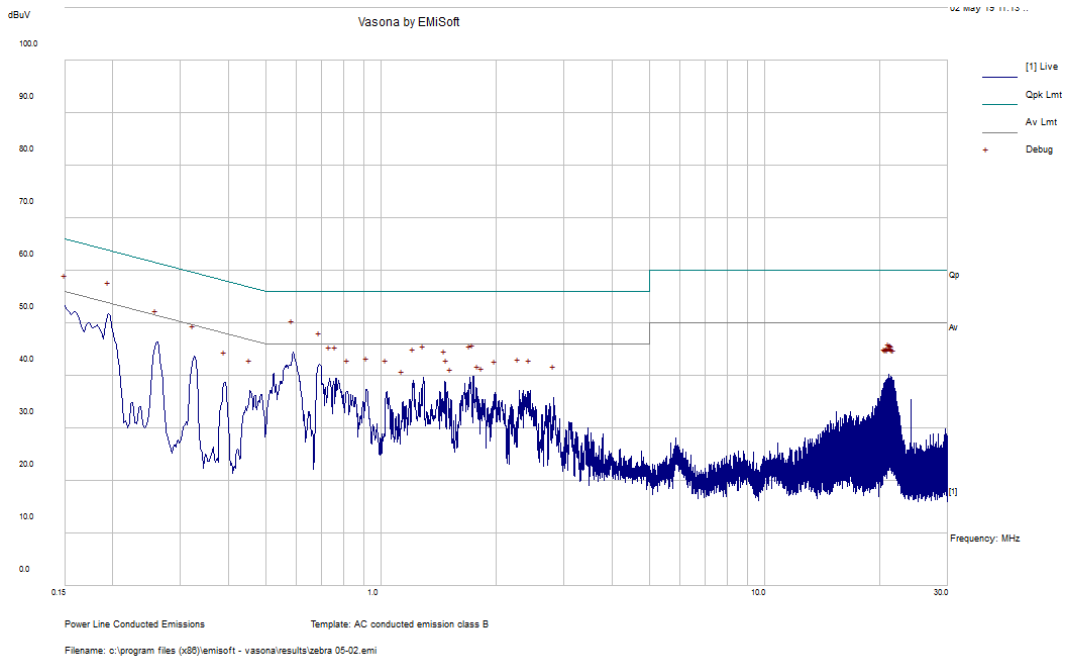


Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.26124	45.58	Neutral	61.39	-15.81	QP
0.194424	49.04	Neutral	63.85	-14.81	QP
0.324187	42.7	Neutral	59.6	-16.9	QP
20.956328	39.54	Neutral	60	-20.46	QP
21.280184	39.24	Neutral	60	-20.76	QP
20.693666	38.75	Neutral	60	-21.25	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.26124	40.89	Neutral	51.39	-10.5	Ave.
0.194424	46.24	Neutral	53.85	-7.6	Ave.
0.324187	36.27	Neutral	49.6	-13.33	Ave.
20.956328	31.78	Neutral	50	-18.22	Ave.
21.280184	31.37	Neutral	50	-18.63	Ave.
20.693666	30.73	Neutral	50	-19.27	Ave.

Colocation RFID and Classic Bluetooth

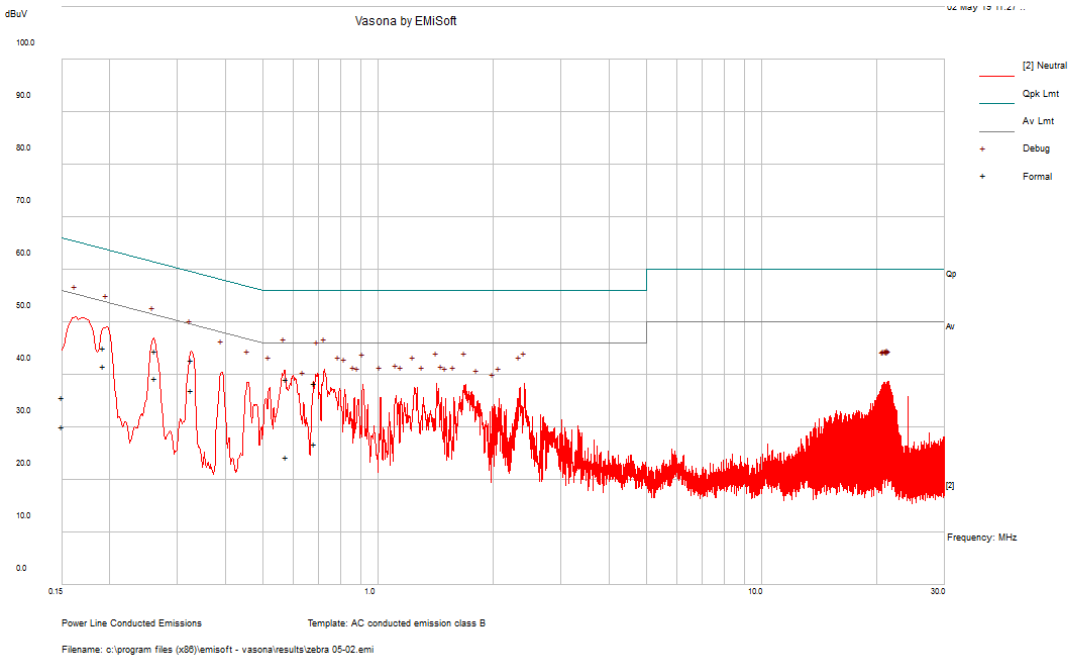
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.576837	39.21	Line	56	-16.79	QP
0.192306	45.1	Line	63.94	-18.84	QP
0.150322	35.79	Line	65.98	-30.19	QP
0.682931	38.47	Line	56	-17.53	QP
0.262063	44.51	Line	61.37	-16.85	QP
0.326113	42.86	Line	59.55	-16.69	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.576837	24.33	Line	46	-21.67	Ave.
0.192306	41.71	Line	53.94	-12.22	Ave.
0.150322	30.2	Line	55.98	-25.78	Ave.
0.682931	26.78	Line	46	-19.22	Ave.
0.262063	39.27	Line	51.37	-12.1	Ave.
0.326113	37.08	Line	49.55	-12.47	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.158199	50.2	Neutral	65.56	-15.35	QP
0.261739	44.72	Neutral	61.38	-16.65	QP
0.195828	47.38	Neutral	63.79	-16.4	QP
0.720956	38.88	Neutral	56	-17.12	QP
0.326617	42.62	Neutral	59.54	-16.92	QP
0.566732	40.87	Neutral	56	-15.13	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.158199	36.72	Neutral	55.56	-18.84	Ave.
0.261739	39.45	Neutral	51.38	-11.93	Ave.
0.195828	44.18	Neutral	53.79	-9.6	Ave.
0.720956	27.12	Neutral	46	-18.88	Ave.
0.326617	36.81	Neutral	49.54	-12.73	Ave.
0.566732	27.67	Neutral	46	-18.33	Ave.

6 FCC § 2.1053, § 15.205, §15.209 & §15.247(d) RSS-Gen §8.9 & §8.10 RSS-247 §5.5 Spurious Radiated Emissions

6.1 Applicable Standards

As per FCC §15.35(b): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

As per ISED RSS-Gen 8.9,

> Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (µv/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for license-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

As per ISED RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

6.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247, FCC 15.407 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

6.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT was set 3 meter away from the testing antenna, which was varied from 1-4 meter, and the EUT was placed on a turntable, which was 1.5 meter above the ground plane, the table was rotated for 360 degrees to find out the highest emission. The receiving antenna's polarity changed between horizontal and vertical.

The spectrum analyzer or receiver was set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz or 1/T / Sweep = Auto

6.4 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950.03	100338	2018-07-05	2 year
Agilent	Analyzer, Spectrum	E4446A	US44300386	2018-06-01	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Sciences	Antenna, Biconi-Log	JB1	A013105-3	2018-02-26	2 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2019-04-02	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-02	2017-12-15	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-01	2018-01-18	2 years
Agilent	Amplifier, Pre	8447D	2944A10187	2019-04-11	1 year
HP	Pre-Amplifier	8449B	3008A01978	2018-08-10	1year
A.H. Systems	Pre-Amplifer	PAM 1840V	170	2018-09-10	1 year
UTiFLEX	High Frequency Cable	223458-002	-	2018-09-05	1 year
UTiFLEX	High Frequency Cable	223458-002	-	2018-09-10	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
-	N-Type Cable	-	C00013	Each time[1]	N/A
-	N-Type Cable	-	C00014	Each time[1]	N/A
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Note[1]: cables included in the test set-up will be checked each time before testing.
***Statement of Traceability: BACL** attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

6.5 Test Location, Date, Personnel and Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	35-37 %
Barometric Pressure:	101.4-101.7 kPa

The testing was performed by Zhao Zhao from 2019-04-30 and 2019-05-01 in 5m3 chamber.

6.6 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.209, 15.247 and RSS-247 standards' radiated emissions limits, and had the worst margin of:

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Detector Mode**
-11.71	215.994	Horizontal	Quasi Peak

1-40 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Detector Mode**
-4.25	17978.983	Horizontal	Average

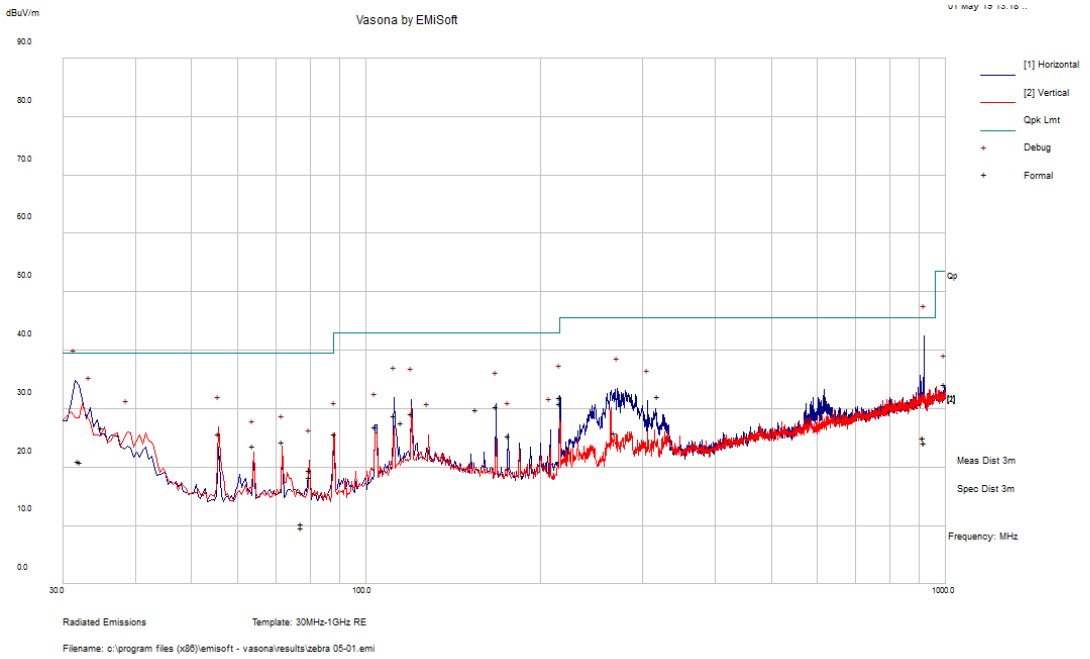
For co-location testing, omnidirectional Antenna was supply to module WYSBHVGXG (FCC ID: I28MD-FXLAN11AC, IC: 3798B-FXLAN11AC).

Please refer to the following table and plots for specific test result details.

6.7 Radiated Emissions Test Results Data

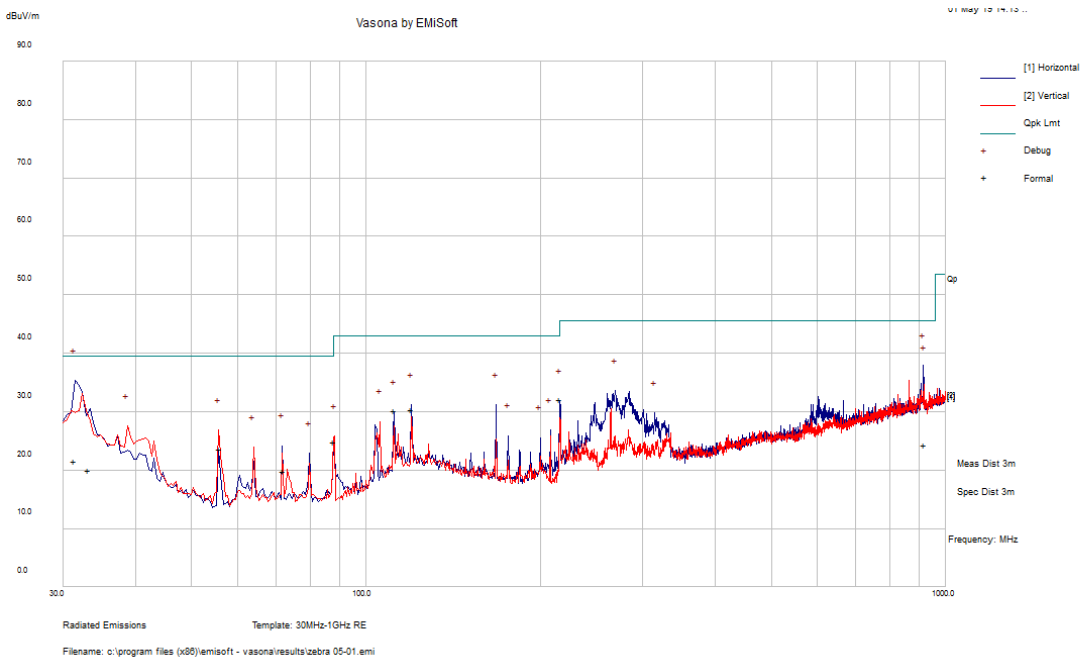
1) 30 MHz - 1 GHz Radio Co-location measured at 3 meters

ZT411 RFID and 2.4G Wi-Fi



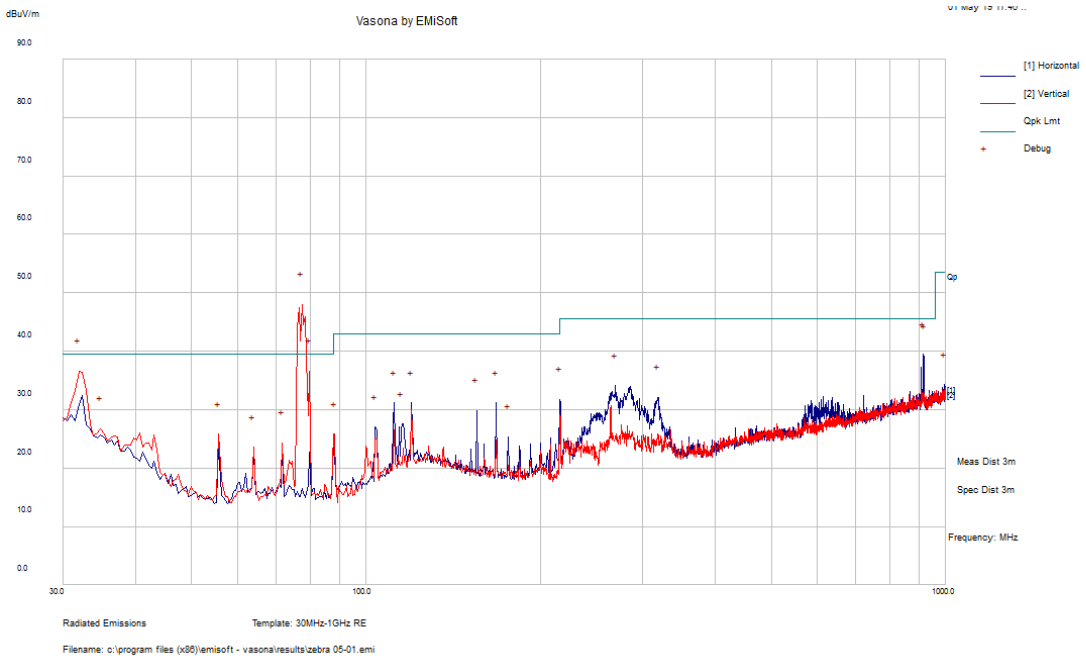
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
917.9995	24.28	263	H	187	45.5	-21.22	QP
31.336	21.6	252	H	227	39.5	-17.9	QP
33.16075	19.94	100	H	152	39.5	-19.56	QP
216.00325	32.09	140	H	271	45.5	-13.41	QP
112.01775	30.29	254	H	58	43	-12.71	QP
119.975	30.44	132	H	235	43	-12.56	QP

ZT411 RFID and 5G Wi-Fi



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
31.286	21.72	134	H	290	39.5	-17.78	QP
914.22425	25.1	205	H	13	45.5	-20.4	QP
917.3865	24.38	193	H	179	45.5	-21.12	QP
215.994	**31.29**	**142**	**H**	**281**	**43**	**-11.71**	**QP**
167.98	30.13	137	H	69	43	-12.87	QP
55.9535	22.12	133	V	349	39.5	-17.38	QP

ZT411 RFID and Classic Bluetooth

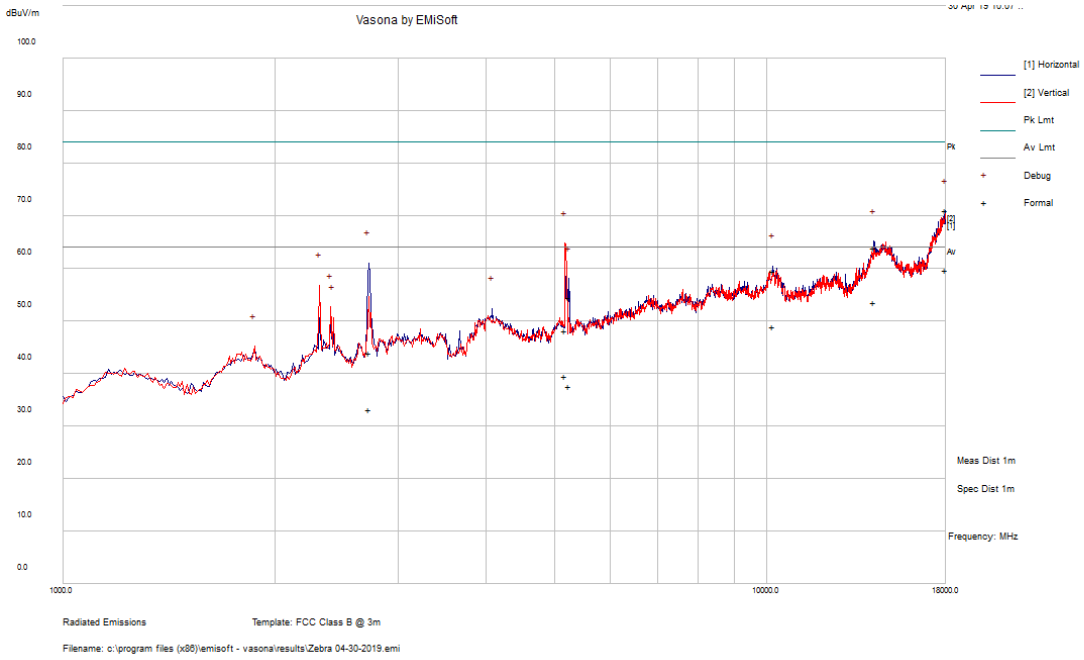


Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
77.531	9.64	229	V	306	39.5	-29.86	QP
77.39225	10.28	272	V	23	39.5	-29.22	QP
32.1335	20.89	204	V	323	39.5	-18.61	QP
31.86975	21.09	299	V	198	39.5	-18.41	QP
80.019	19.49	127	V	183	39.5	-20.01	QP
79.98025	18.36	210	V	30	39.5	-21.14	QP

Note: All measurement are performed with notch filters.

2) 1–18 GHz Radio Co-location measured at 1 meter with host ZT411

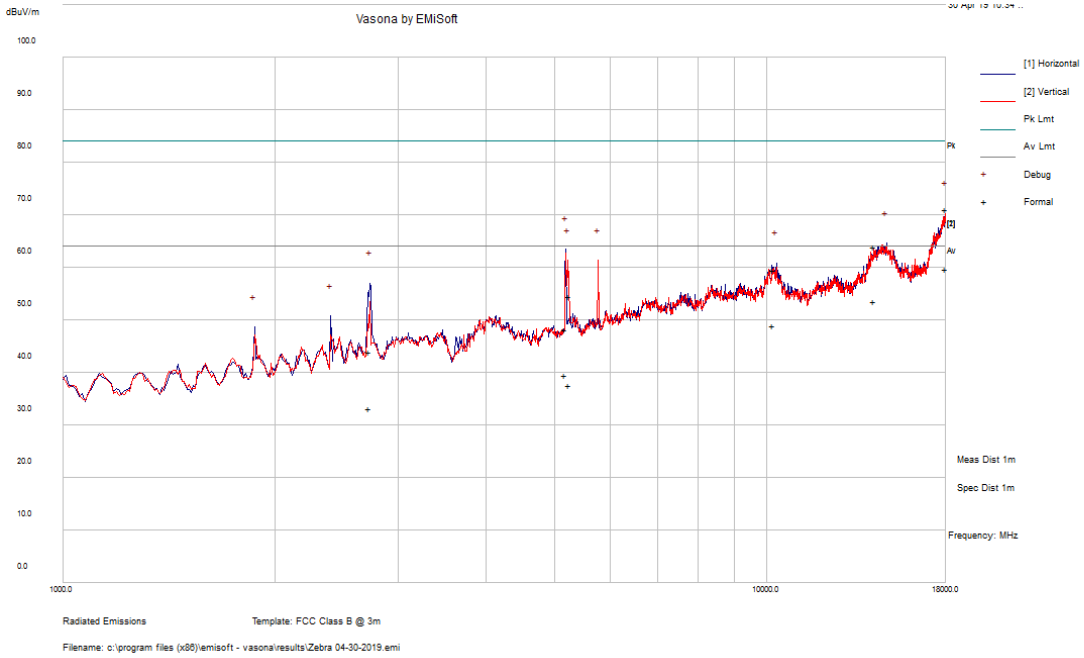
RFID and 2.4G Wi-Fi



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Polarity (H/V)	Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17978.983	71.01	H	272	101	84	-12.99	Peak
14240.028	63.98	H	179	334	84	-20.02	Peak
5175.2075	48.16	V	273	304	84	-35.84	Peak
2722.64	43.91	H	174	32	84	-40.09	Peak
10223.878	59.47	H	272	9	84	-24.53	Peak
5238.0175	54.49	H	225	216	84	-29.51	Peak

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Polarity (H/V)	Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17978.983	**59.75**	**H**	**272**	**101**	**64**	**-4.25**	**Ave**
14240.028	53.57	H	179	334	64	-10.43	Ave
5175.2075	39.52	V	273	304	64	-24.48	Ave
2722.64	33.15	H	174	32	64	-30.85	Ave
10223.878	48.99	H	272	9	64	-15.01	Ave
5238.0175	37.55	H	225	216	64	-26.45	Ave

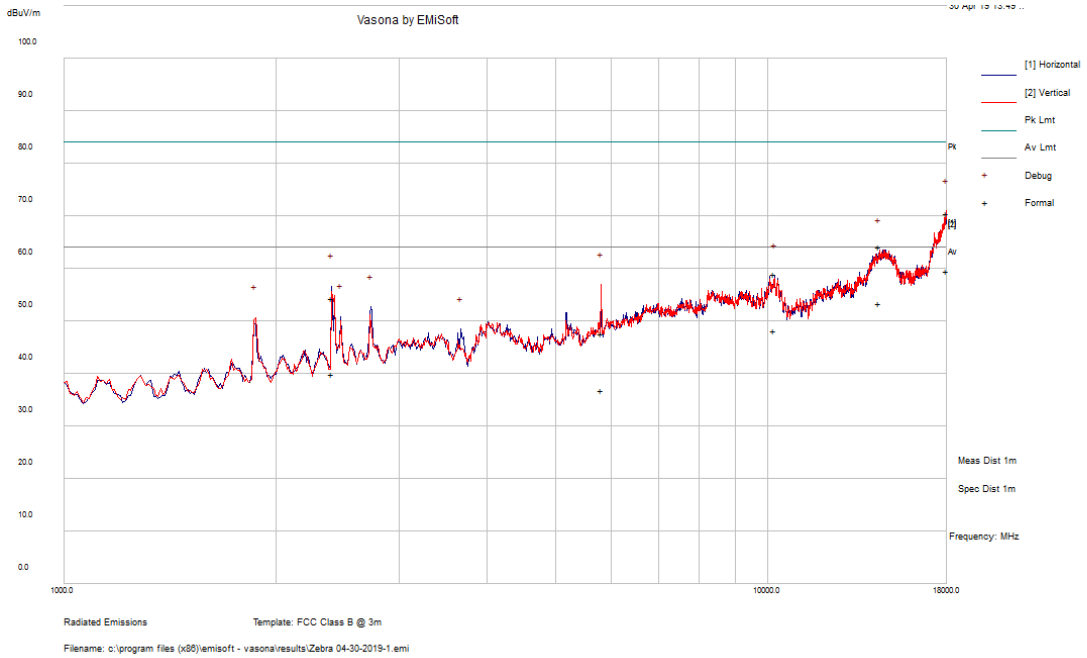
RFID and 5G Wi-Fi



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Polarity (H/V)	Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17987.995	69.87	V	231	17	84	-14.13	Peak
14823.195	63.52	H	242	228	84	-20.48	Peak
5184.69	47.96	H	131	336	84	-36.04	Peak
5770.09	49.11	V	218	177	84	-34.89	Peak
5229.4025	54.55	V	209	126	84	-29.45	Peak
10339.01	59.88	H	100	252	84	-24.12	Peak

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Polarity (H/V)	Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17987.995	59.56	V	231	17	64	-4.44	Ave
14823.195	53.4	H	242	228	64	-10.6	Ave
5184.69	38.37	H	131	336	64	-25.63	Ave
5770.09	38.21	V	218	177	64	-25.79	Ave
5229.4025	38.44	V	209	126	64	-25.56	Ave
10339.01	49.12	H	100	252	64	-14.88	Ave

RFID and Classic Bluetooth



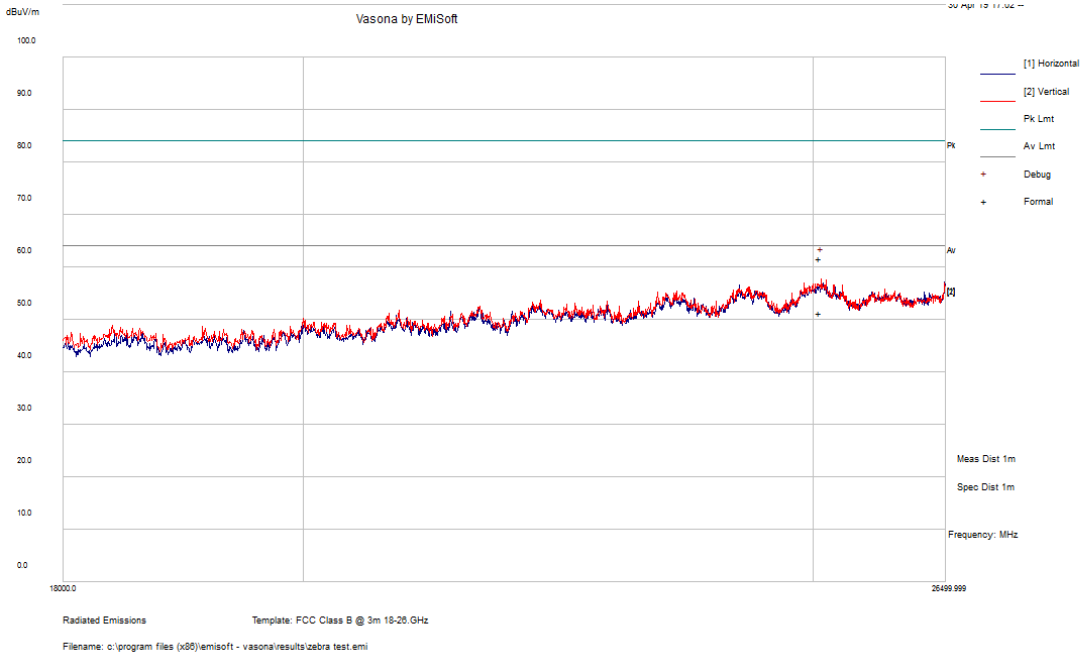
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Polarity (H/V)	Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17990.678	70.41	V	117	27	84	-13.59	Peak
14428.43	64.06	V	275	0	84	-19.94	Peak
10242.198	59.04	H	161	54	84	-24.96	Peak
5813.4675	47.71	V	273	169	84	-36.29	Peak
2401.8475	54.38	H	160	229	84	-29.62	Peak

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Polarity (H/V)	Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17990.678	59.5	V	117	27	64	-4.5	Ave
14428.43	53.33	V	275	0	64	-10.67	Ave
10242.198	48.12	H	161	54	64	-15.88	Ave
5813.4675	36.94	V	273	169	64	-27.06	Ave
2401.8475	39.98	H	160	229	64	-24.02	Ave

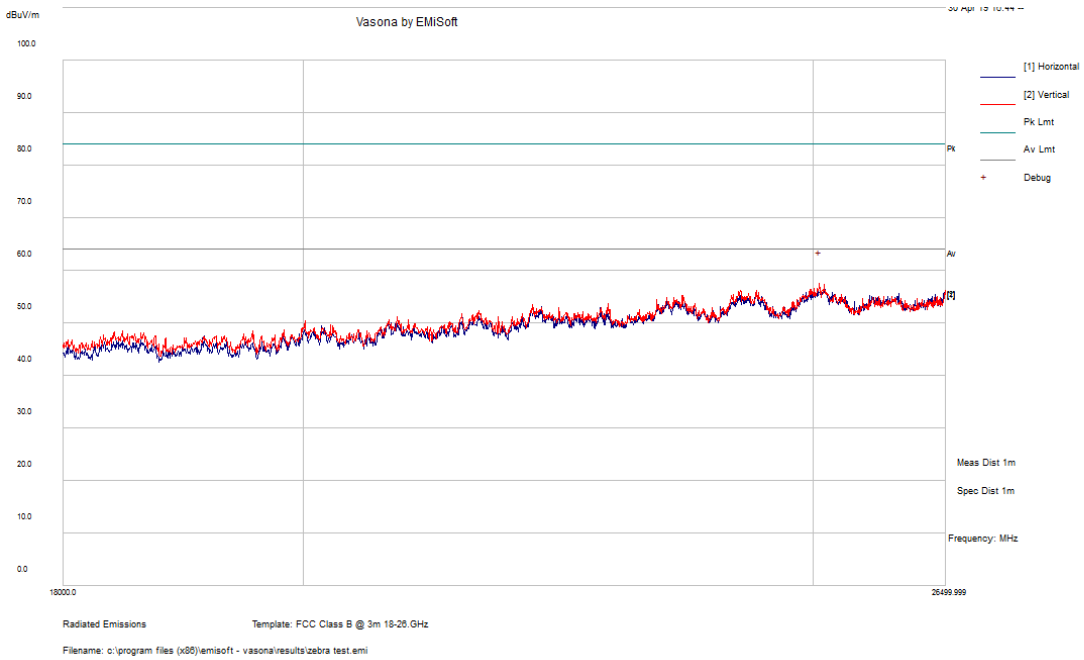
Note: All measurement are performed with notch filters.

3) 18-26.5GHz Radio Co-location measured at 1 meter with host ZT411

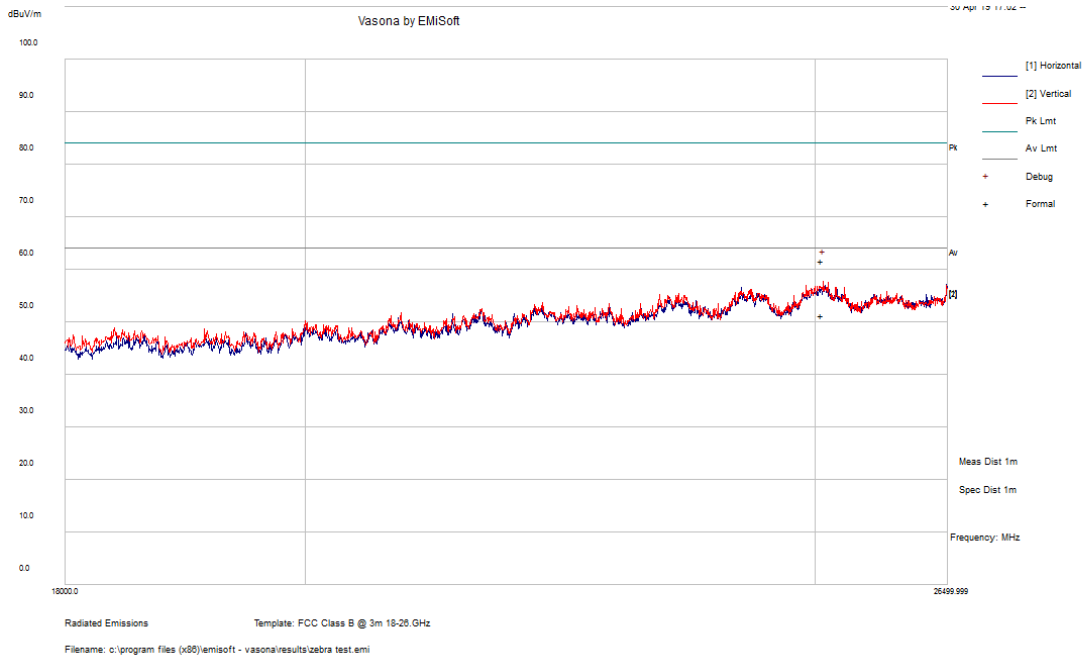
RFID and 2.4G Wi-Fi



RFID and 5G Wi-Fi

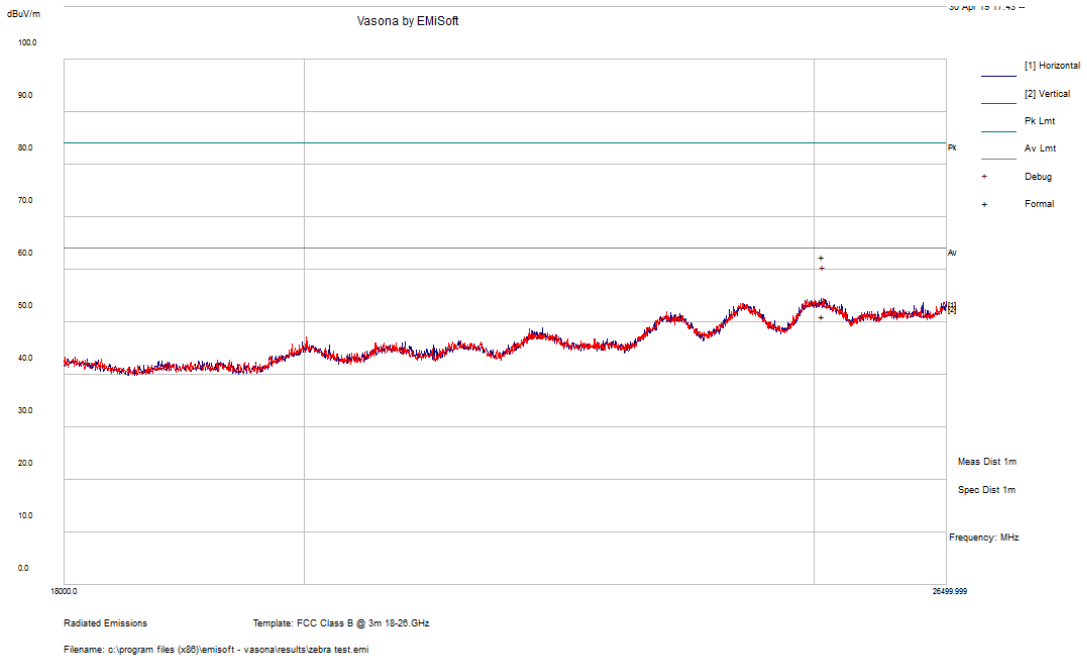


RFID and Classic Bluetooth



4) 26.5-40GHz Radio Co-location measured at 1 meter with host ZT411

RFID and 5G Wi-Fi



Note: All emissions above 18GHz are noise floor.

7 Appendix A - FCC & ISED Equipment Labeling Requirements

7.1 FCC ID Label Requirements

As per FCC §2.925,

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term FCC ID in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID: XXX123

Where: XXX—Grantee Code, 123—Equipment Product Code

As per FCC §15.19,

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

(3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the 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.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, "Contains FCC ID: XXXXXX"

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph 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. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

7.2 ISED Label Requirements

As per ISED RSP-100 Section 3.1, the certification number shall appear as follows:

IC: XXXXXX-YYYYYYYY

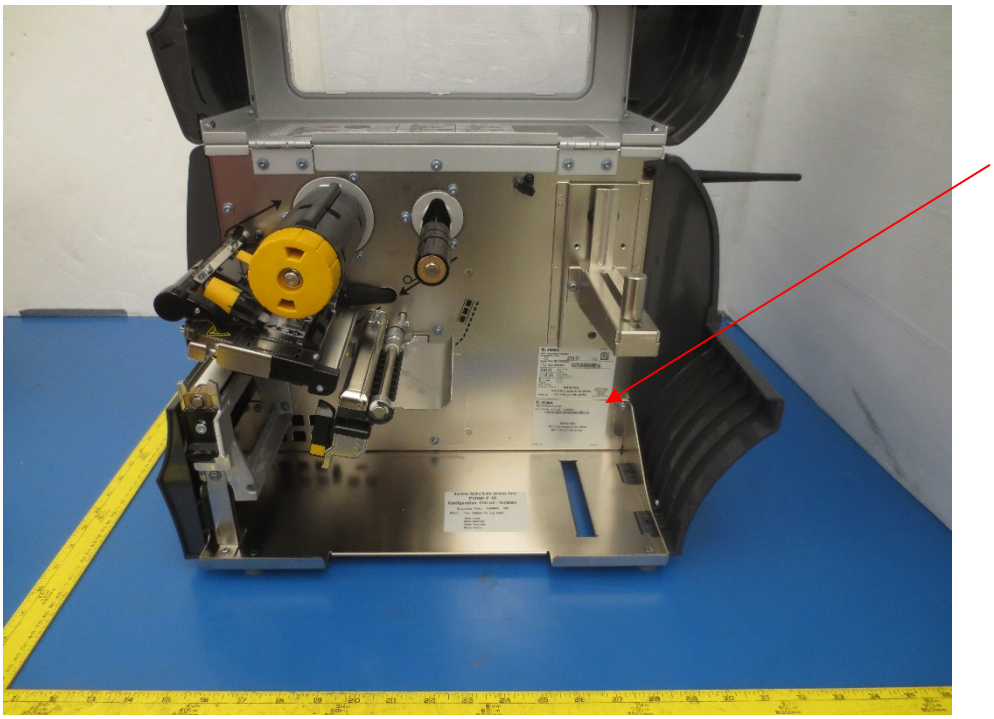
Where:

- The letters "IC:" indicate that this is an Innovation, Science and Economic Development Canada's certification number, but they are not part of the certification number. XXXXXXYYYYYYYYYY is the ISED certification number.
- XXXXXX is the CN assigned by Innovation, Science and Economic Development Canada. Newly assigned CNs will be made up of five numeric characters (e.g. "20001") whereas existing CNs may consist of up to five numeric characters followed by an alphabetic character (e.g. "21A" or "15589J").
- YYYYYYYYYY is the Unique Product Number (UPN) assigned by the applicant, made up of a maximum of 11 alphanumeric characters.

The CN and UPN are limited to capital alphabetic characters (A-Z) and numerals (0-9) only. The use of punctuation marks or other symbols, including "wildcard" characters, is not permitted.

7.3 Label Contents and Location

Host Label & location



8 Appendix B (Normative) - EUT Test Setup Photographs

Please refer to the attachment

9 Appendix C (Normative) – EUT Internal Photographs

Please refer to the attachment

10 Appendix D (Normative) – EUT Hosts Photographs

Please refer to the attachment

4 Appendix E (Normative) – EUT External Photographs

Please refer to the attachment

11 Appendix F (Informative) – Declaration of Similarity

Zebra Technologies
Corporation
3 Overlook Point
Lincolnshire, IL 60069

May 20, 2019

Declaration of Similarity

Zebra Technologies Corporation declares printer models ZT411 and ZT421 are similar such that both models:

- Have the same main control board, stepper motor, electronics enclosure, and user interface control panel.
- Have the same printing modes of thermal transfer or direct thermal.
- Have the same standard Bluetooth 4.x on the front panel, optional WLAN-ac/bt, and optional RFID radio modules.
- Have the same standard USB device port, ethernet 10/100, and RS-232, and dual USB host communication ports.
- Have Energy Star certification.
- Have similar power supplies with the same input ratings (100-240VAC, 50-60Hz), and same output voltages 22-, 5-, and40- VDC. The ZT411 uses a 200W power supply, and the ZT421 uses a 250W.

The main difference is the ZT411 is a 4-inch wide printer, and ZT421 is 6-inch wide.

Sincerely,

Jay Cadiz

Principal Compliance Engineer

Zebra Technologies Corporation

11 Appendix G (Normative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets A2LA R222 - *Specific Requirements EPA ENERGY STAR Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 2nd day of October 2018.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2020
Revised February 21, 2019

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---