FCC RF Test Report

APPLICANT	**:**	**Zebra Technologies Corporation**
EQUIPMENT	**:**	**Touch computer**
BRAND NAME	**:**	**Zebra**
MODEL NAME	**:**	**TC700K**
FCC ID	**:**	**UZ7TC700K**
STANDARD	**:**	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	**:**	**(DTS) Digital Transmission System**

The product was received on Aug. 12, 2016 and testing was completed on Dec. 27, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR672834-04B	Rev. 01	Initial issue of report	Jan. 05, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
3.2	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.3	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Zebra Technologies Corporation

1 Zebra Plaza Holtsville, NY 11742

1.2 Manufacturer

Wistron Corporation

21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih Dist, New Taipei City 221,Taiwan R.O.C.

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Touch computer
Brand Name	Zebra
Model Name	TC700K
FCC ID	UZ7TC700K
EUT supports Radios application	NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	DV
SW Version	Android version 6.0.1
FW Version	91-12.04.4-MG-00
MFD	08NOV16
EUT Stage	Engineering sample

Specification of Accessories				
AC Adapter	**Brand Name**	Zebra	**Part Number**	PWR-BUA5V16W0WW
Snap-On USB/Charge Cable	**Brand Name**	Symbol	**Part Number**	CBL-TC7X-USB1-01
Snap-On Charging Cable Cup	**Brand Name**	Symbol	**Part Number**	CHG-TC7X-CBL1-01
Battery	**Brand Name**	Zebra	**Part Number**	BT-000318-01
Earphone 1	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTVP-01
Earphone 2	**Brand Name**	Zebra	**Part Number**	HS2100-OTH
Earphone 3	**Brand Name**	Zebra	**Part Number**	HS3100-OTH
Snap-on 3.5MM Audio Jack Adapter	**Brand Name**	Symbol	**Part Number**	ADP-TC7X-AUD35-01
3.5mm Jack 43"(1.1m) Standard Cable	**Brand Name**	Zebra	**Part Number**	CBL-HS2100-3MS1-01
Soft Holster	**Brand Name**	Zebra	**Part Number**	SG-TC7X-HLSTR1-01
Rigid Holster	**Brand Name**	Zebra	**Part Number**	SG-TC7X-RHLSTR1-01
Power Cord	**Brand Name**	LOROM	**Part Number**	50-16000-182R
Cable line	**Brand Name**	Zebra	**Part Number**	CBL-DC-383A1-01

1.4 Re-use of Measured Data

1.4.1 Introduction Section

The part 15C test data for Bluetooth (equipment class: DTS) of UZ7TC700K (model: TC700K) is referenced from UZ7TC75EK (model: TC75EK).

The applicant takes full responsibility that the test data as referenced in section 1.4.4 below represent compliance for UZ7TC700K (model: TC700K).

1.4.2 Difference Section

UZ7TC700K is a variant version of UZ7TC75EK by changing hardware in UZ7TC75GK.

Detailed information is available in the appendix B - Product Equality Declaration.

1.4.3 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, WLAN conducted power and PSD spot check has been performed on FCC ID: UZ7TC700K (model: TC700K) for certain parameters. The test results are significantly consistent with its parent model FCC ID: UZ7TC75EK (model: TC75EK).

1.4.4 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test/RF Exposure	Report Title/Section
DTS	UZ7TC75EK	Part15C (FR672834B)	All sections applicable

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH02-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

The RF output power was recorded in the following table:

Channel	Frequency	Bluetooth – LE RF Average Output Power (dBm)
		Data Rate / Modulation
		GFSK
		1Mbps
Duty Cycle (%)		61.78
Ch00	2402MHz	1.24 dBm
Ch19	2440MHz	**3.04 dBm**
Ch39	2480MHz	1.64 dBm

Channel	Frequency	Bluetooth – LE RF Peak Output Power (dBm)
		Data Rate / Modulation
		GFSK
		1Mbps
Ch00	2402MHz	2.25 dBm
Ch19	2440MHz	**3.79 dBm**
Ch39	2480MHz	2.72 dBm

2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	**Data Rate / Modulation**
	Bluetooth – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps

2.3 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 Peak Output Power Measurement

3.1.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

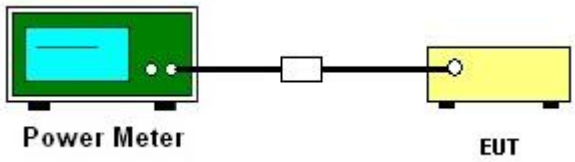
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of Peak Output Power

Test data refers to Appendix A.

3.2 Power Spectral Density Measurement

3.2.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

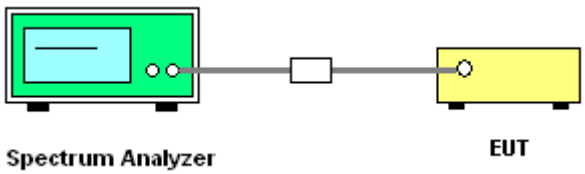
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.2.4 Test Setup

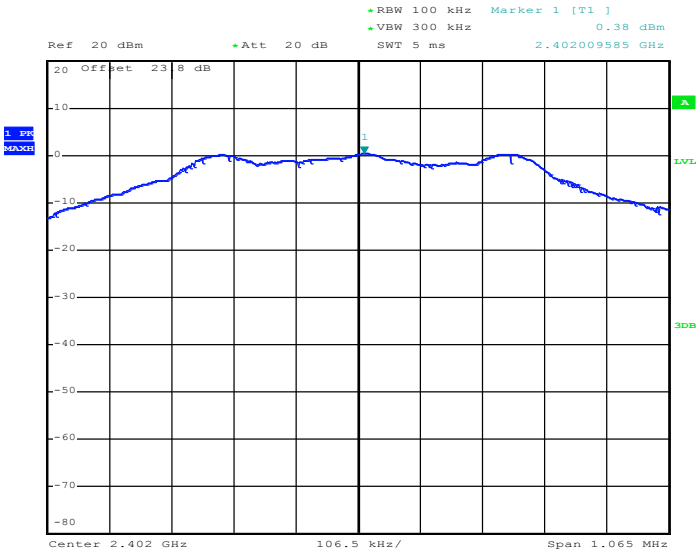


3.2.5 Test Result of Power Spectral Density

Test data refers to Appendix A.

3.2.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on Channel 00



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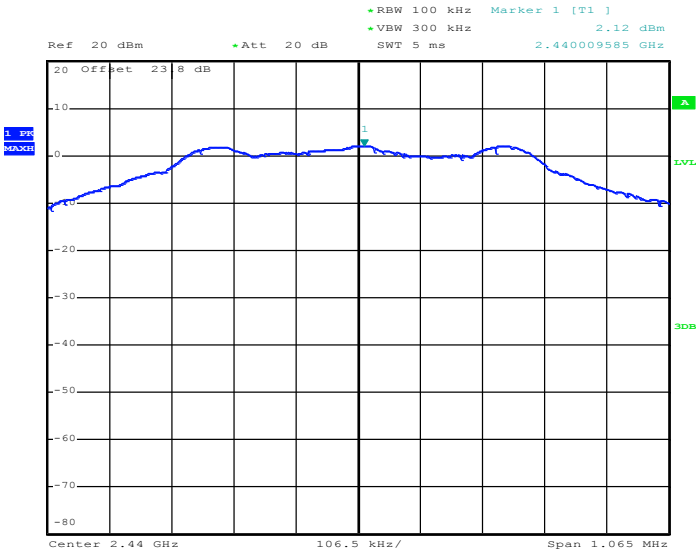
PSD 100kHz Plot on Channel 19



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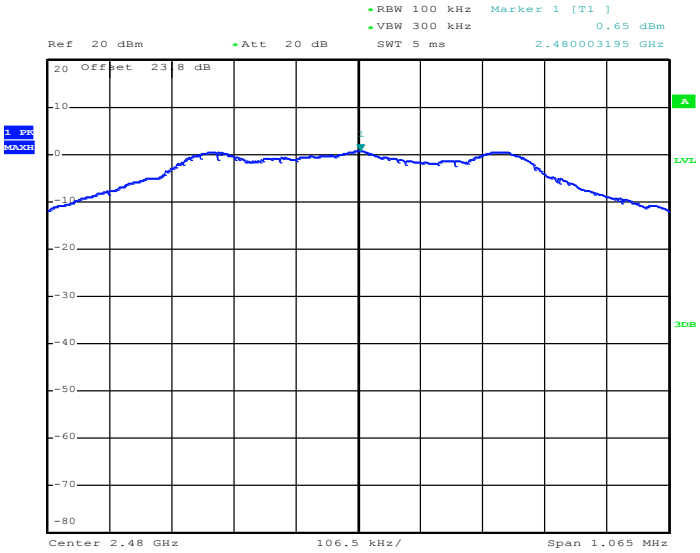
PSD 100kHz Plot on Channel 39



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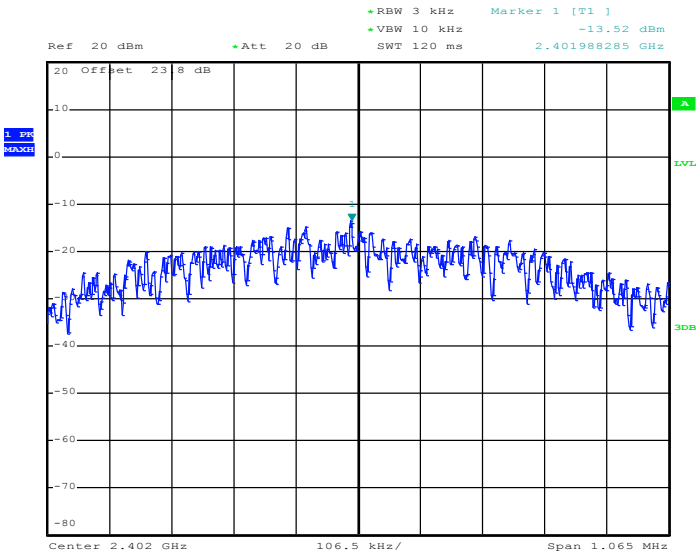
3.2.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on Channel 00



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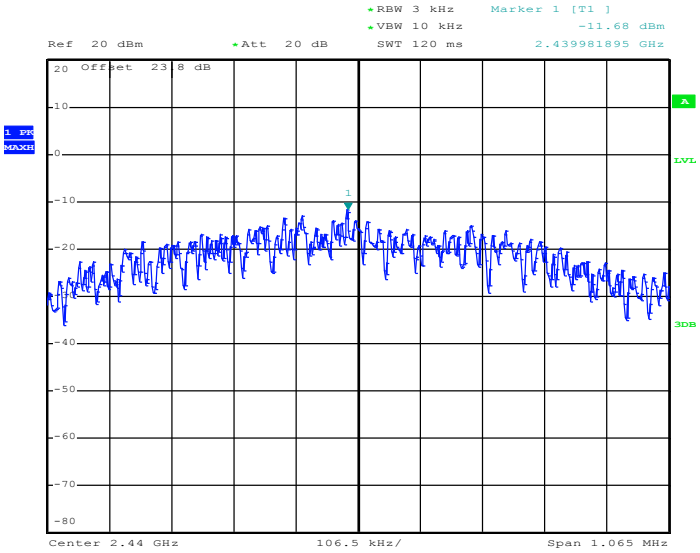
PSD 3kHz Plot on Channel 19



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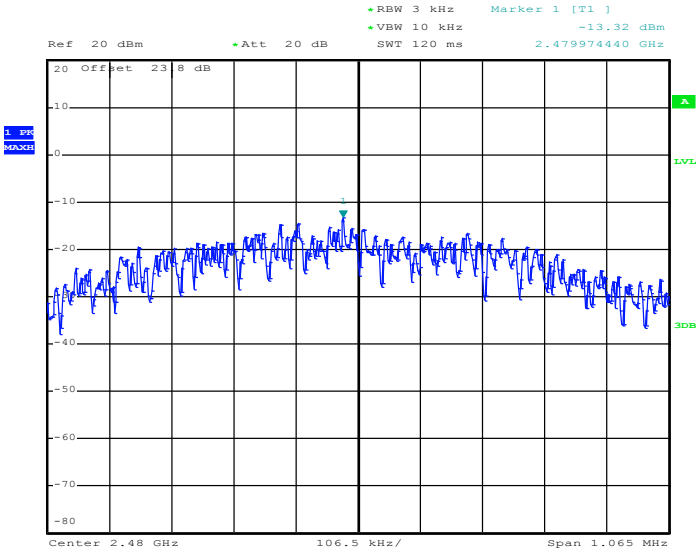
PSD 3kHz Plot on Channel 39



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3.3 Antenna Requirements

3.3.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.3.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Dec. 26, 2016	Dec. 27, 2016	Dec. 25, 2017	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Dec. 26, 2016	Dec. 27, 2016	Dec. 25, 2017	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 17, 2016	Dec. 27, 2016	Jun. 16, 2017	Conducted (TH02-HY)

Appendix A. Conducted Test Results

Report Number : FR672834-04B

Bluetooth Low Energy

Test Engineer:	Kenny Chen	Temperature:	21~25	°C
Test Date:	2016/12/27	Relative Humidity:	51~54	%

TEST RESULTS DATA
Peak Power Table

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	2.25	30.00	2.50	4.75	36.00	Pass
BLE	1Mbps	1	19	2440	3.79	30.00	2.50	6.29	36.00	Pass
BLE	1Mbps	1	39	2480	2.72	30.00	2.50	5.22	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.09	1.24
BLE	1Mbps	1	19	2440	2.09	3.04
BLE	1Mbps	1	39	2480	2.09	1.64

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	0.38	-13.52	2.50	8.00	Pass
BLE	1Mbps	1	19	2440	2.12	-11.68	2.50	8.00	Pass
BLE	1Mbps	1	39	2480	0.65	-13.32	2.50	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 20dBc limit.

Appendix B. Product Equality Declaration

1. CPU change, pin to pin capability see attached power point
2. Remove below components
   (1) WWAN Multi-band PA
   (2) LTE B2/4/5/12/13/17/25/26 TRX components
   (3) WCDMA B1/2/4/5/8 TRX components
   (4) GSM 850/900/1800/1900 TRX components
   (5) CDMA BC0/1/10 TRX components
   (6) WWAN Primary Antenna switch
   (7) Antenna tuner
   (8) DC/DC converter for WWAN PA
   (9) GPS RX components
   (10) WWAN Diversity Antenna switch
   (11) LTE B2/4/5/12/13/17/25/26 DRX components
   (12) WCDMA B1/2/4/5/8 DRX components
   (13) CDMA BC0/1/10 DRX components
   (14) RF Transceiver components
3. Remove WAN/GPS components (bottom of device).
4. Keep DIV/GPS/ Main antenna (top of device).
5. No layout change

Appendix C. Original Report

Please refer to Sporton report number FR672834B as below.

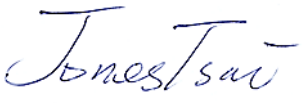
FCC RF Test Report

APPLICANT	:	**Zebra Technologies Corporation**
EQUIPMENT	:	**Touch computer**
BRAND NAME	:	**Zebra**
MODEL NAME	:	**TC75EK**
FCC ID	:	**UZ7TC75EK**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DTS) Digital Transmission System**

The product was received on Jul. 28, 2016 and testing was completed on Sep. 20, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR672834B	Rev. 01	Initial issue of report	Sep. 29, 2016
FR672834B	Rev. 02	Revising the specification of accessories.	Oct. 04, 2016
FR672834B	Rev. 03	Revising the Adapter information in specification of accessories.	Oct. 07, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.42 dB at 79.140 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 3.10 dB at 0.758 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Zebra Technologies Corporation
1 Zebra Plaza Holtsville, NY 11742

1.2 Manufacturer

Wistron Corporation
21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih Dist, New Taipei City 221, Taiwan R.O.C.

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Touch computer
Brand Name	Zebra
Model Name	TC75EK
FCC ID	UZ7TC75EK
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE/NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	DV
SW Version	Android version 6.0.1
FW Version	91-10-01-MG-00
MFD	14JUL16
EUT Stage	Engineering sample

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Specification of Accessories				
AC Adapter	**Brand Name**	Zebra	**Part Number**	PWR-BUA5V16W0WW
Snap-On USB/Charge Cable	**Brand Name**	Symbol	**Part Number**	CBL-TC7X-USB1-01
Snap-On Charging Cable Cup	**Brand Name**	Symbol	**Part Number**	CHG-TC7X-CBL1-01
Battery	**Brand Name**	Zebra	**Part Number**	BT-000318-01
Earphone 1	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTVP-01
Earphone 2	**Brand Name**	Zebra	**Part Number**	HS2100-OTH
Earphone 3	**Brand Name**	Zebra	**Part Number**	HS3100-OTH
Snap-on 3.5MM Audio Nugget	**Brand Name**	Symbol	**Part Number**	ADP-TC7X-AUD35-01
3.5mm Jack 43"(1.1m) Standard Cable	**Brand Name**	Zebra	**Part Number**	CBL-HS2100-3MS1-01
Soft Holster	**Brand Name**	Zebra	**Part Number**	SG-TC7X-HLSTR1-01
Rigid Holster	**Brand Name**	Zebra	**Part Number**	SG-TC7X-RHLSTR1-01
Power Cord	**Brand Name**	LOROM	**Part Number**	50-16000-182R
Cable line	**Brand Name**	Zebra	**Part Number**	CBL-DC-383A1-01

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel(37 hopping + 3 advertising channel)
Maximum Output Power to Antenna	4.51 dBm (0.0028 W)
99% Occupied Bandwidth	1.06 MHz
Antenna Type / Gain	IFA Antenna type with gain 2.60 dBi
Type of Modulation	Bluetooth LE : GFSK

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	**Sporton Site No.**		
	TH02-HY	CO05-HY	03CH07-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

The RF output power was recorded in the following table:

Channel	Frequency	Bluetooth – LE RF Average Output Power (dBm)
		Data Rate / Modulation
		GFSK
		1Mbps
Duty Cycle (%)		62.18
Ch00	2402MHz	1.60 dBm
Ch19	2440MHz	3.20 dBm
Ch39	2480MHz	**3.48 dBm**

Channel	Frequency	Bluetooth – LE RF Peak Output Power (dBm)
		Data Rate / Modulation
		GFSK
		1Mbps
Ch00	2402MHz	3.02 dBm
Ch19	2440MHz	4.27 dBm
Ch39	2480MHz	**4.51 dBm**

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration. The worst position for each mode was recorded in the appendix of this test report. From all possible combinations.

b. AC power line Conducted Emission was tested under maximum output power.

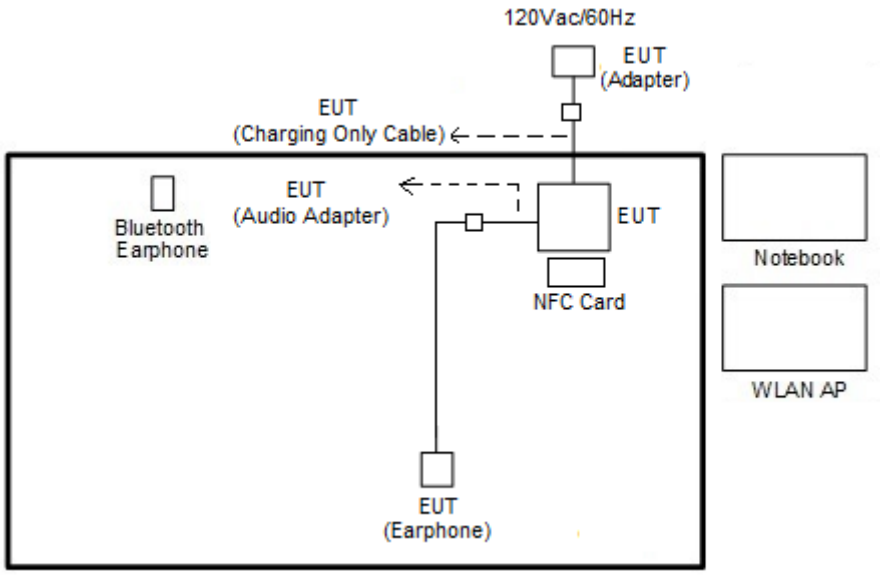
2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

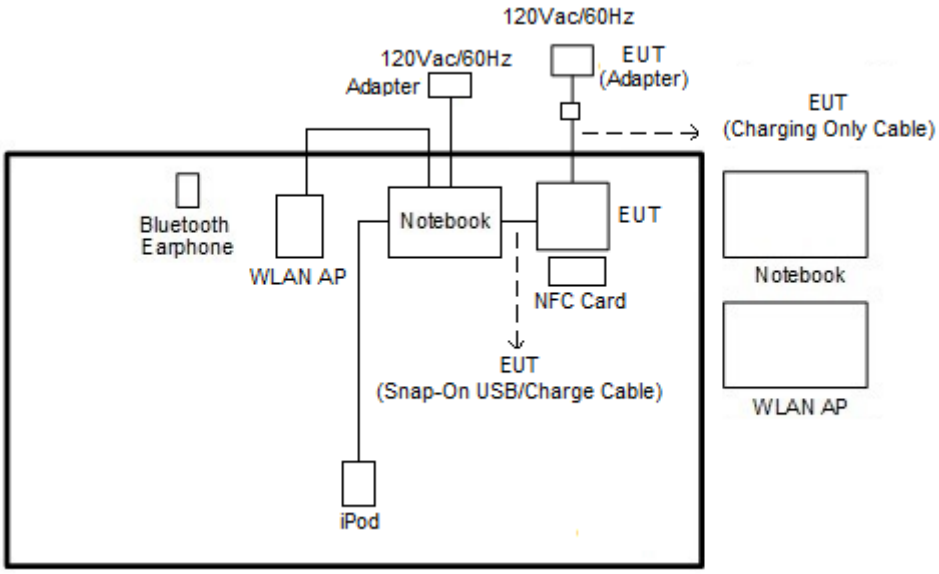
Summary table of Test Cases	
Test Item	**Data Rate / Modulation**
	Bluetooth – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1 :NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 1 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter Mode 2 :NFC Link + WLAN (5GHz) Link + Bluetooth Link with Earphone 3 + Snap on USB Cable Data Link with Notebook + Copy Data from Notebook to EDA (SD Card) + AC Adapter Mode 3 :NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 2 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter
Remark: All the radiated test cases were performance with Earphone 1, Adapter and USB Cable.	

2.3 Connection Diagram of Test System

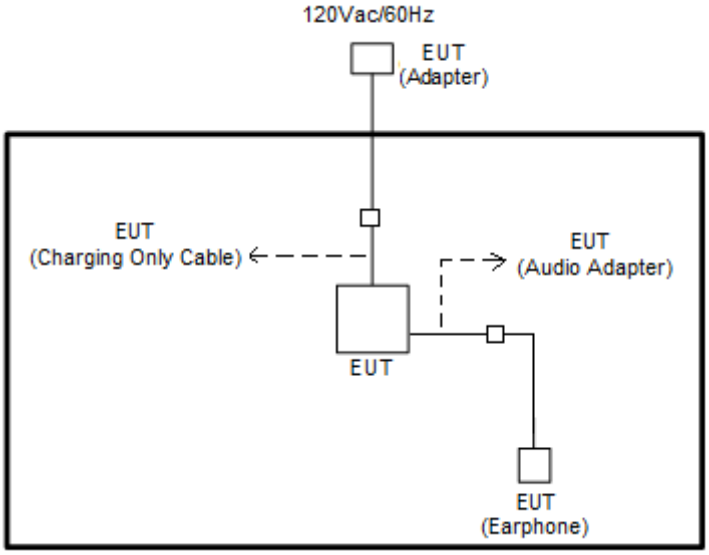
<AC Conducted Emission for charging mode>



<AC Conducted Emission for data link mode>



<For Fundamental Emissions and Mask and Radiated Emissions Measurement>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
3.	Notebook	DELL	P20G	FCC DoC/ Contains FCC ID: QDS-BRCM1051	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	Lenovo	M490S(E330)	QDS-BRCM1063	N/A	Unshielded, 1.8 m
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
7.	NFC Card	Metro Taipei	Easy Card	N/A	N/A	N/A
8.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A

2.5 EUT Operation Test Setup

For Bluetooth function, the RF utility, “Command” was installed in EUT which was programmed in order to make the EUT get into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

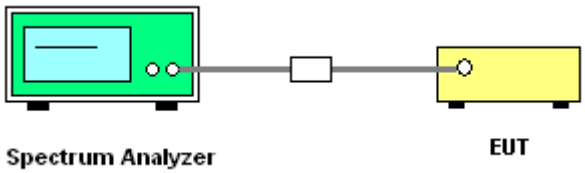
3.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30kHz and set the Video bandwidth (VBW) = 100kHz.
6. Measure and record the results in the test report.

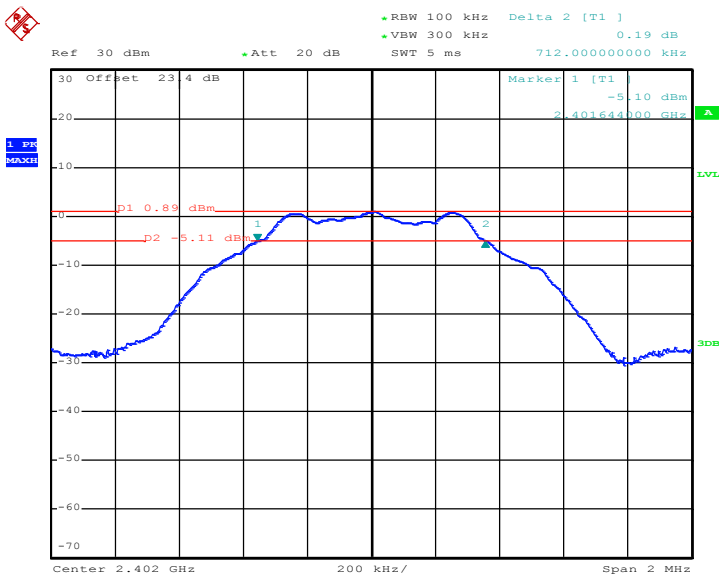
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

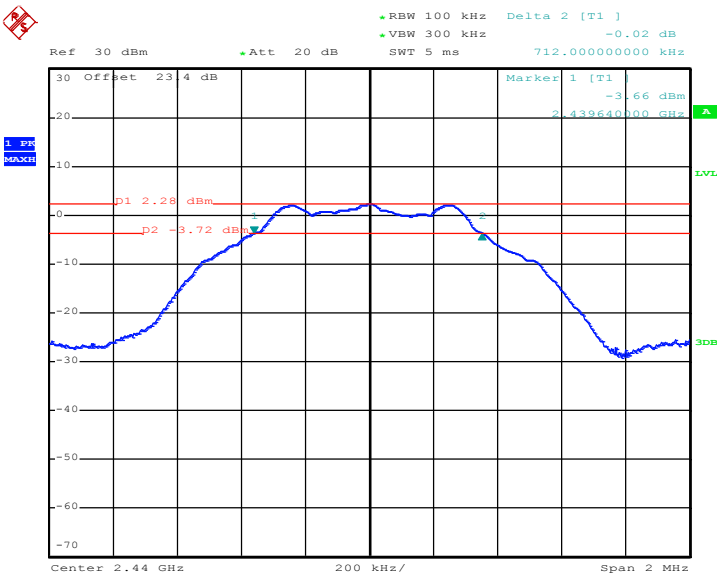
Test data refer to Appendix A.

6 dB Bandwidth Plot on Channel 00



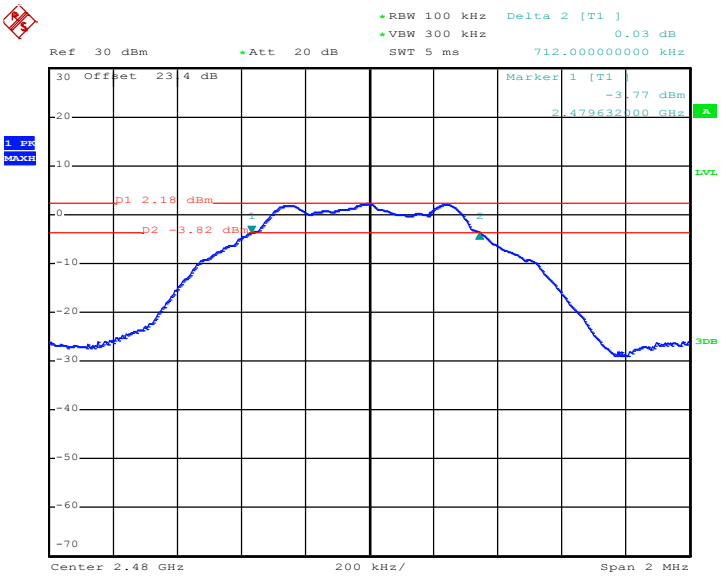
Date: 26.AUG.2016 22:04:24

6 dB Bandwidth Plot on Channel 19



Date: 26.AUG.2016 21:59:22

6 dB Bandwidth Plot on Channel 39

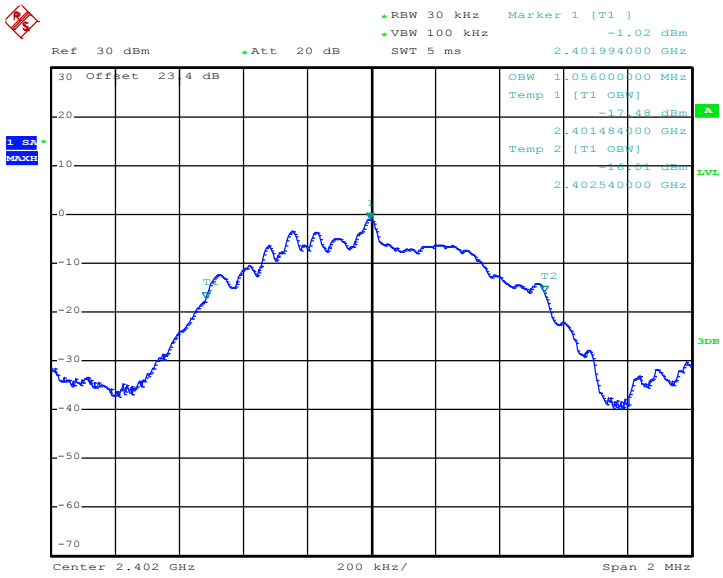


Date: 26.AUG.2016 21:53:05

3.1.6 Test Result of 99% Occupied Bandwidth

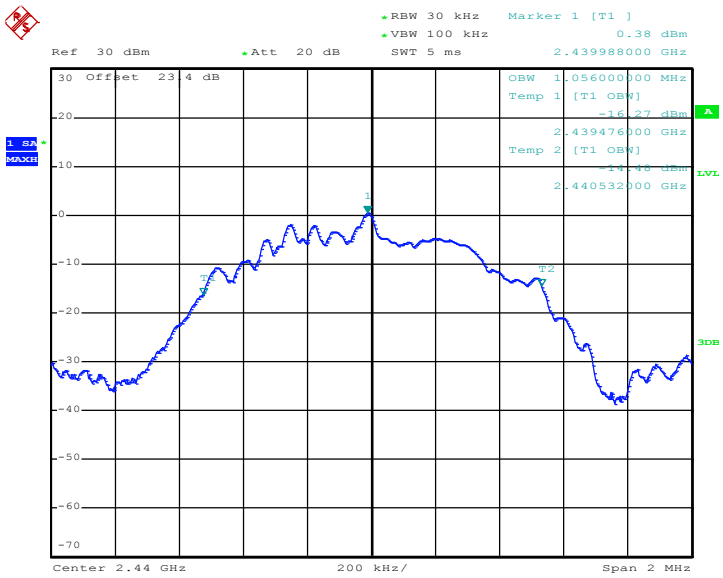
Test data refer to Appendix A.

99% Bandwidth Plot on Channel 00



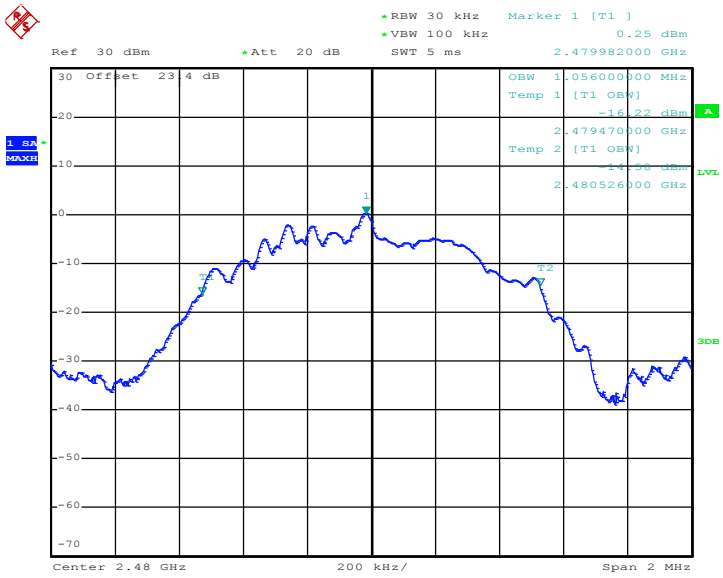
Date: 26.AUG.2016 22:06:50

99% Occupied Bandwidth Plot on Channel 19



Date: 26.AUG.2016 22:02:15

99% Occupied Bandwidth Plot on Channel 39



Date: 26.AUG.2016 21:55:54

Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

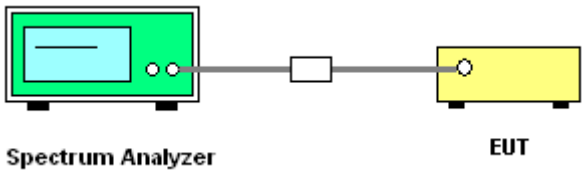
3.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test data refers to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

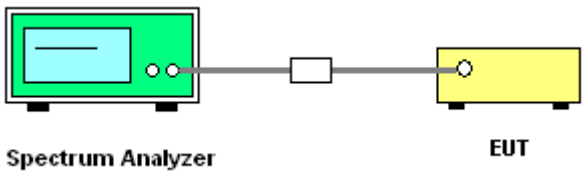
3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup

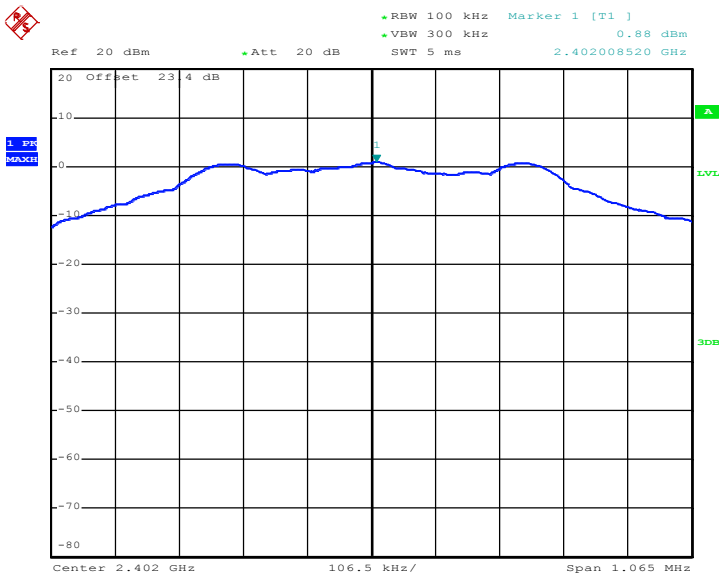


3.3.5 Test Result of Power Spectral Density

Test data refers to Appendix A.

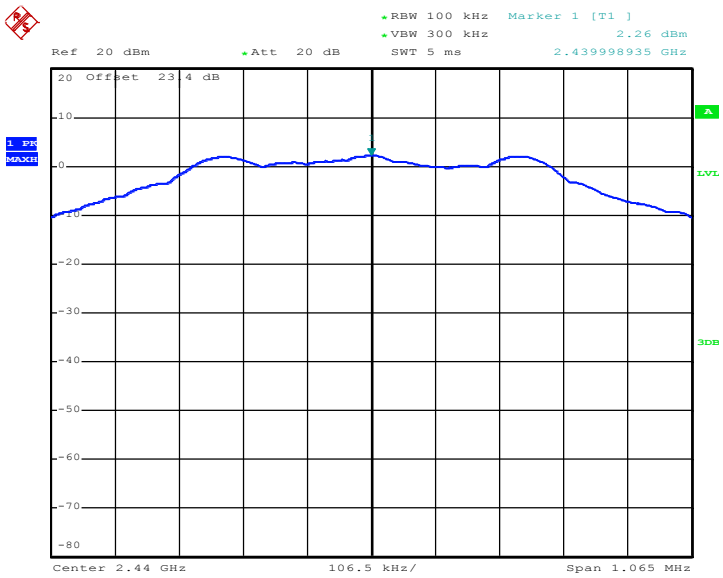
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on Channel 00



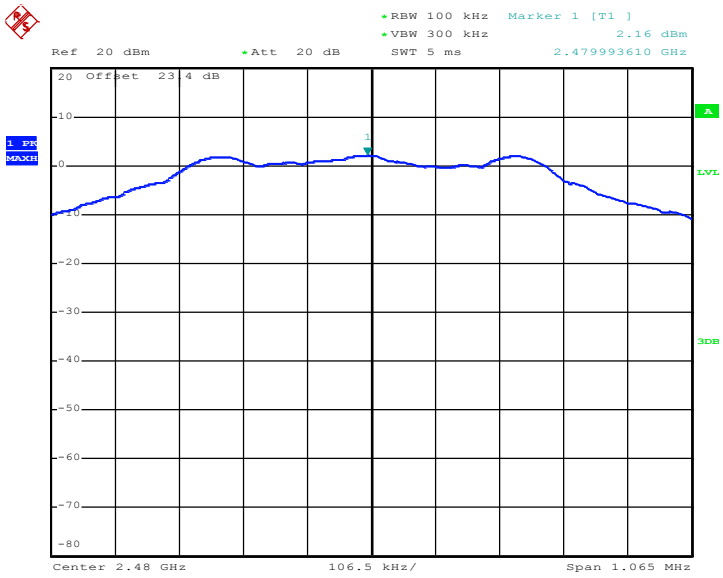
Date: 26.AUG.2016 22:05:18

PSD 100kHz Plot on Channel 19



Date: 26.AUG.2016 22:00:30

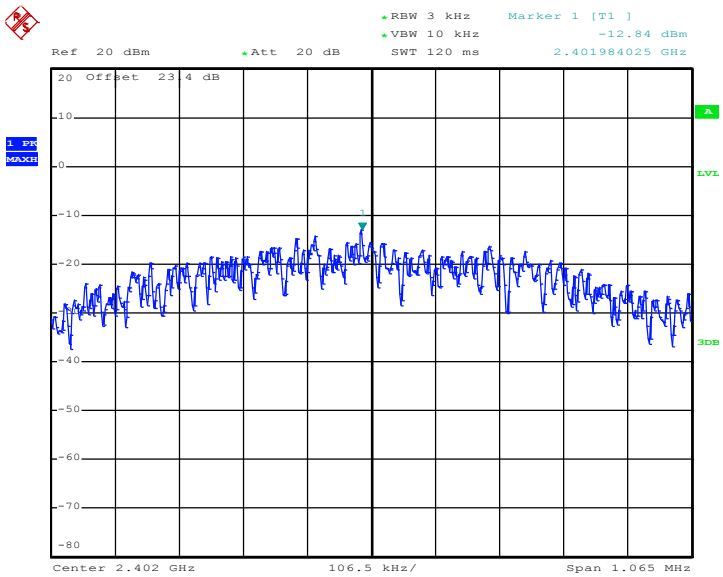
PSD 100kHz Plot on Channel 39



Date: 26.AUG.2016 21:54:05

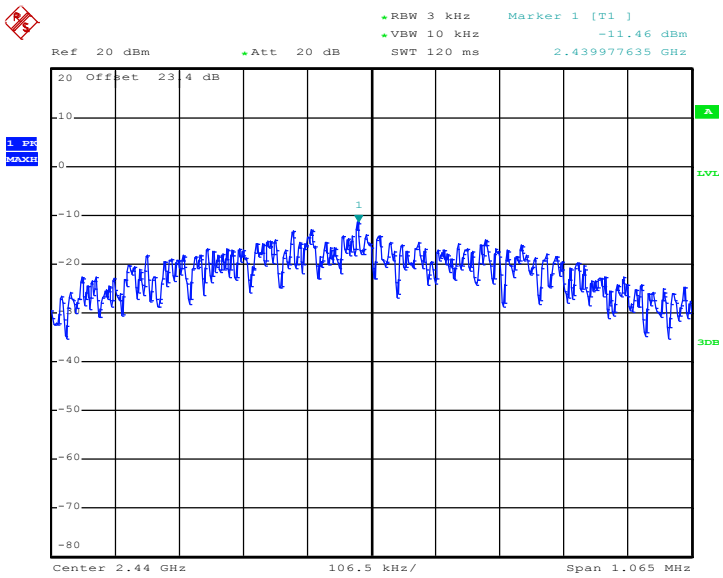
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on Channel 00



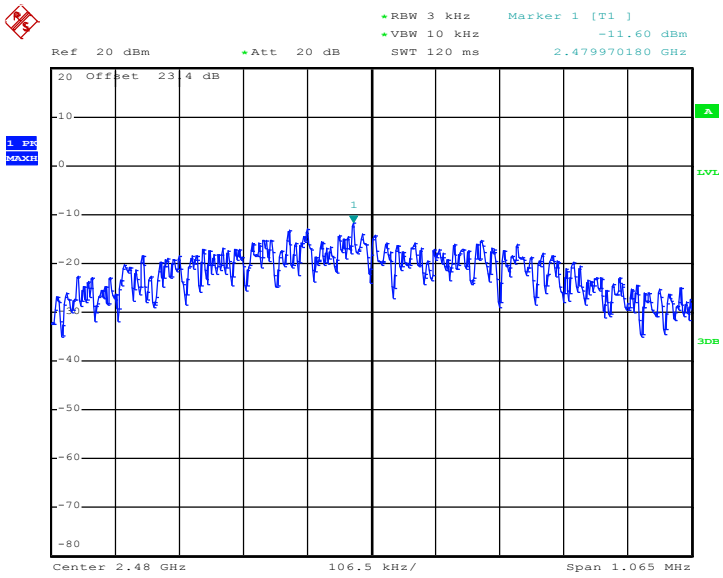
Date: 26.AUG.2016 22:04:58

PSD 3kHz Plot on Channel 19



Date: 26.AUG.2016 22:00:08

PSD 3kHz Plot on Channel 39



Date: 26.AUG.2016 21:53:45

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

3.4.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

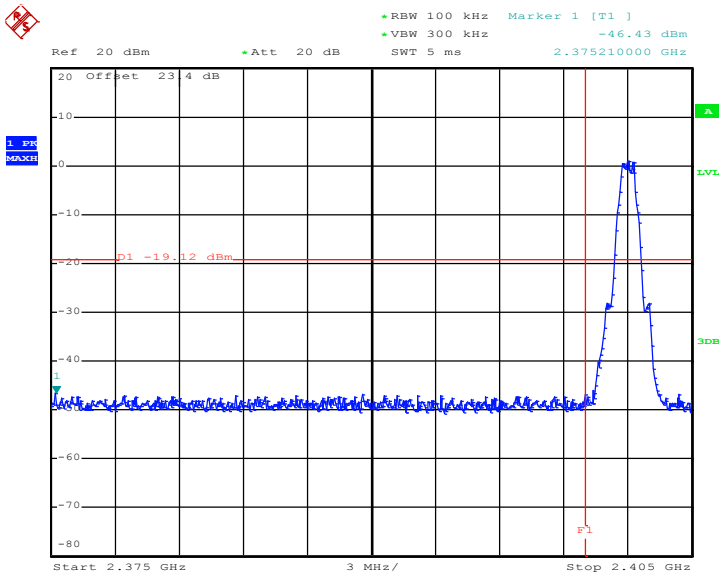
3.4.3 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

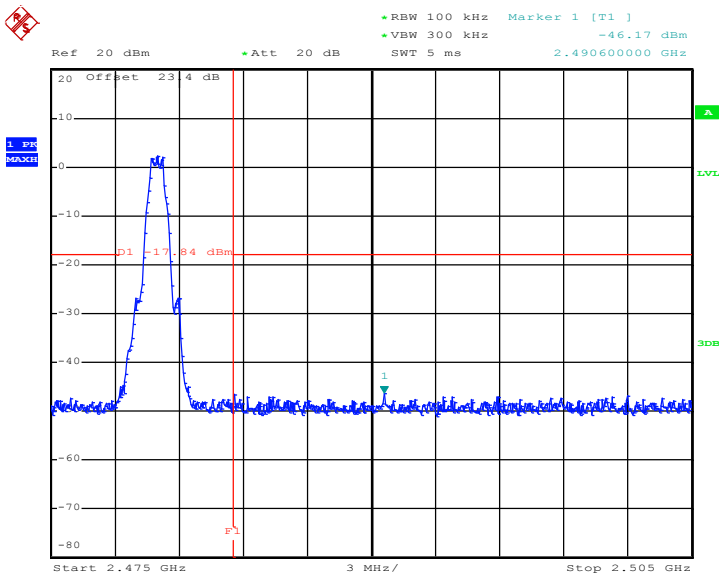
3.4.5 Test Result of Conducted Band Edges Plots

Low Band Edge Plot on Channel 00



Date: 26.AUG.2016 22:05:34

High Band Edge Plot on Channel 39

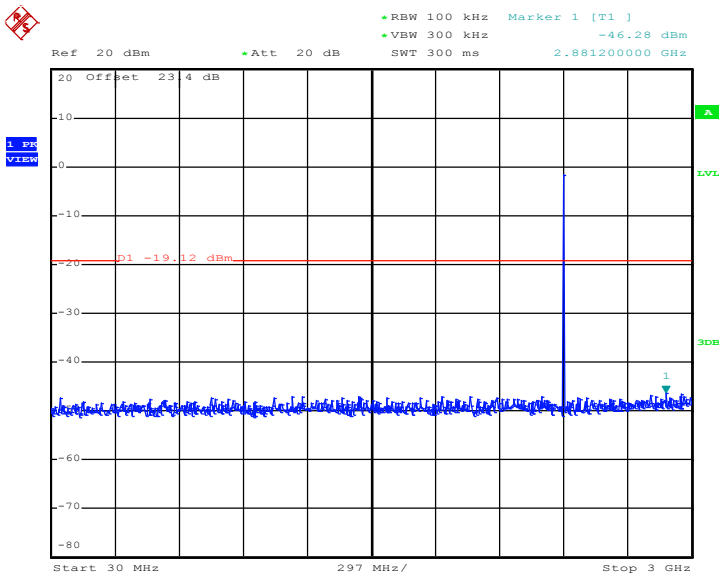


Date: 26.AUG.2016 21:54:26

3.4.6 Test Result of Conducted Spurious Emission Plots

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

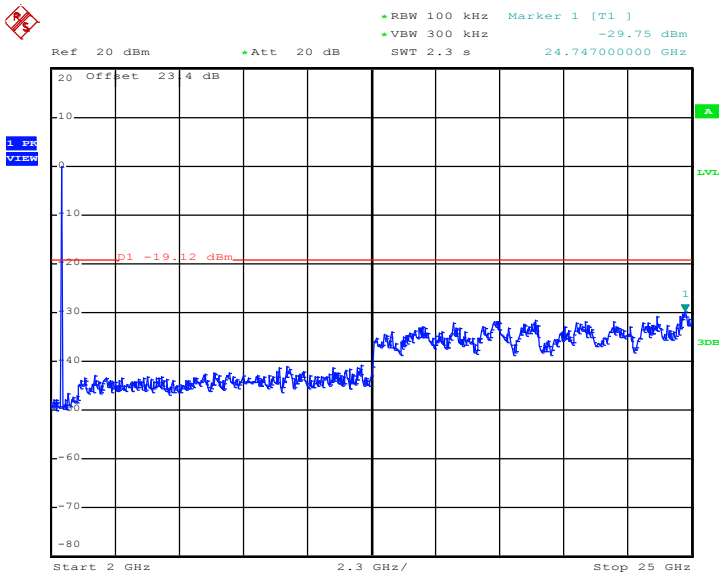
GFSK Channel 00



Date: 26.AUG.2016 22:05:47

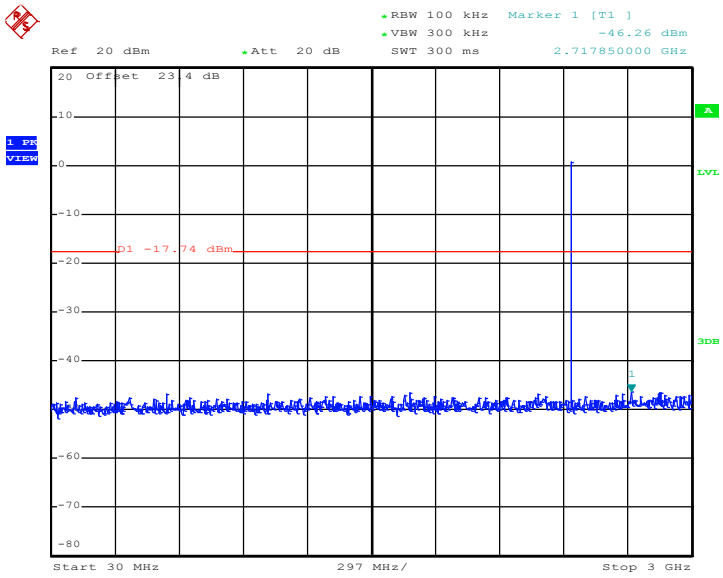
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 00



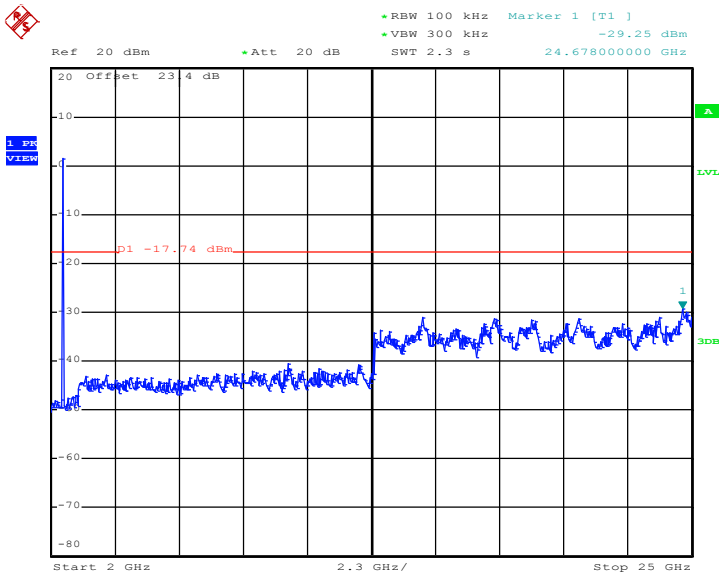
Date: 26.AUG.2016 22:05:55

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



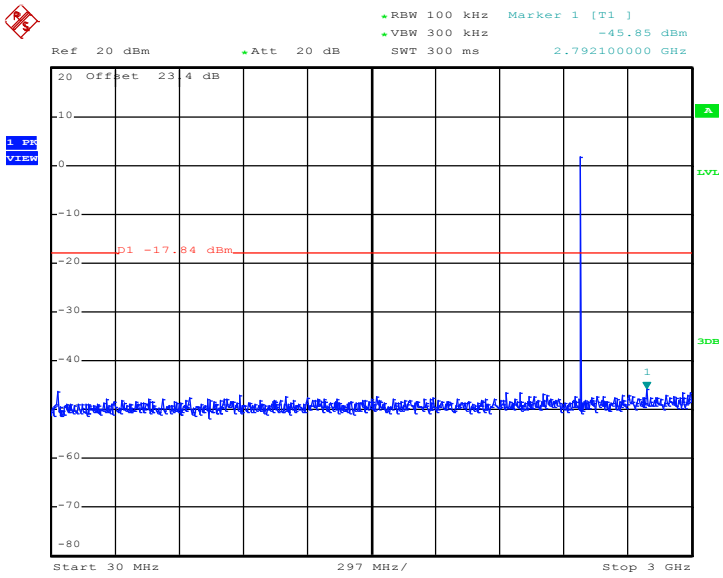
Date: 26.AUG.2016 22:01:24

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



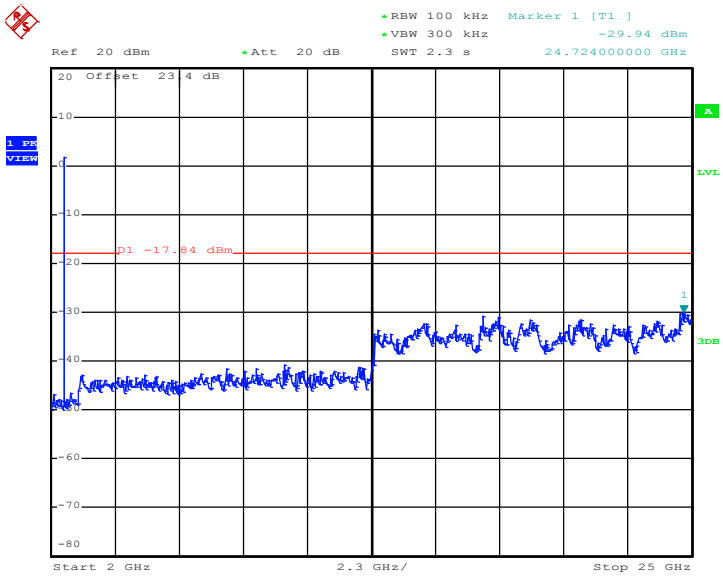
Date: 26.AUG.2016 22:01:32

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 26.AUG.2016 21:55:15

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 26.AUG.2016 21:55:24

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/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

3.5.2 Measuring Instruments

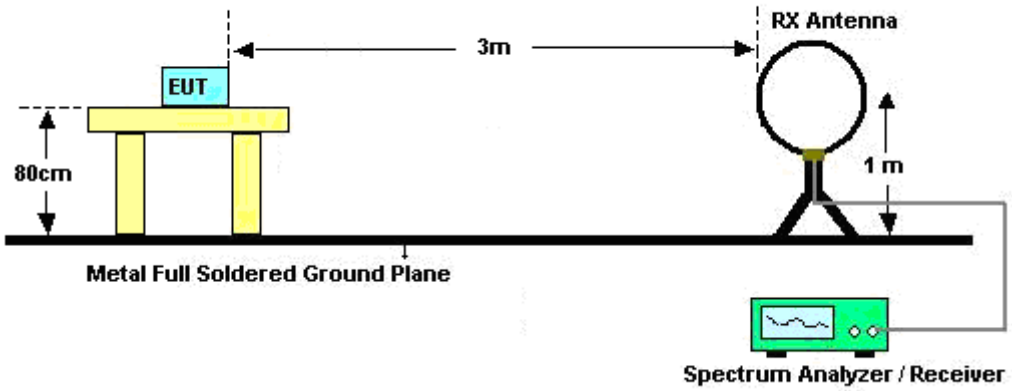
The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.5.3 Test Procedures

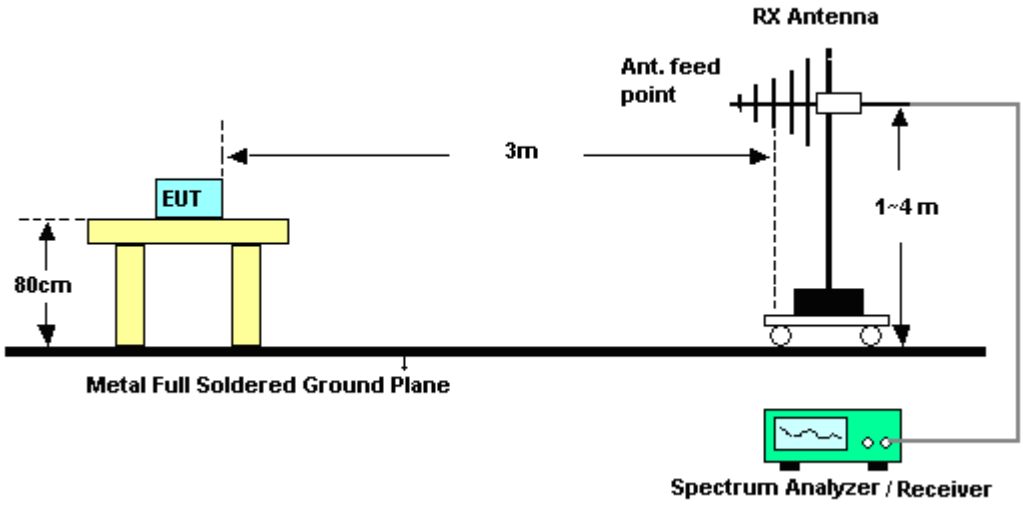
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

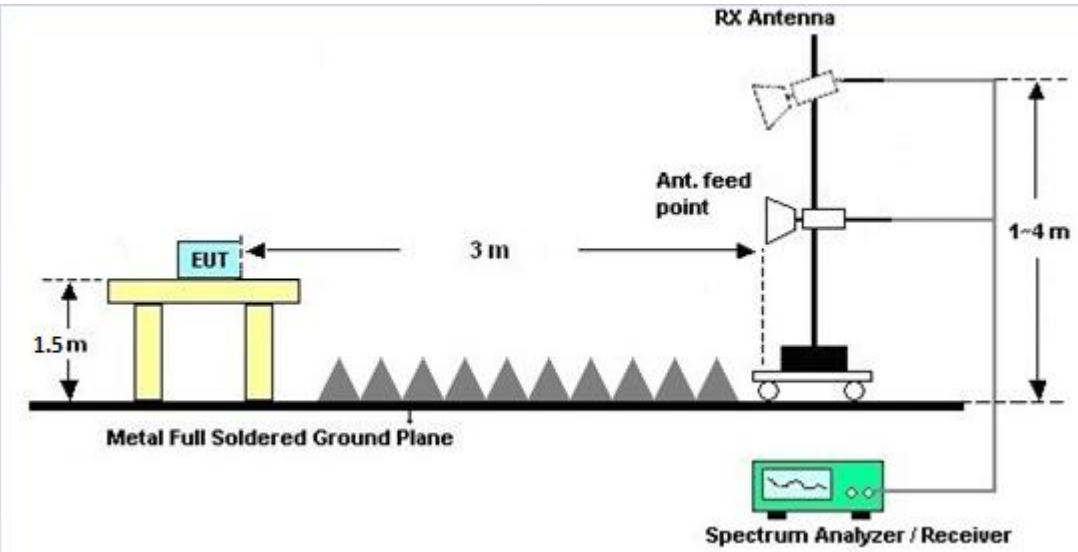
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment 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.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

For terminal test result, the testing follows FCC KDB 174176.

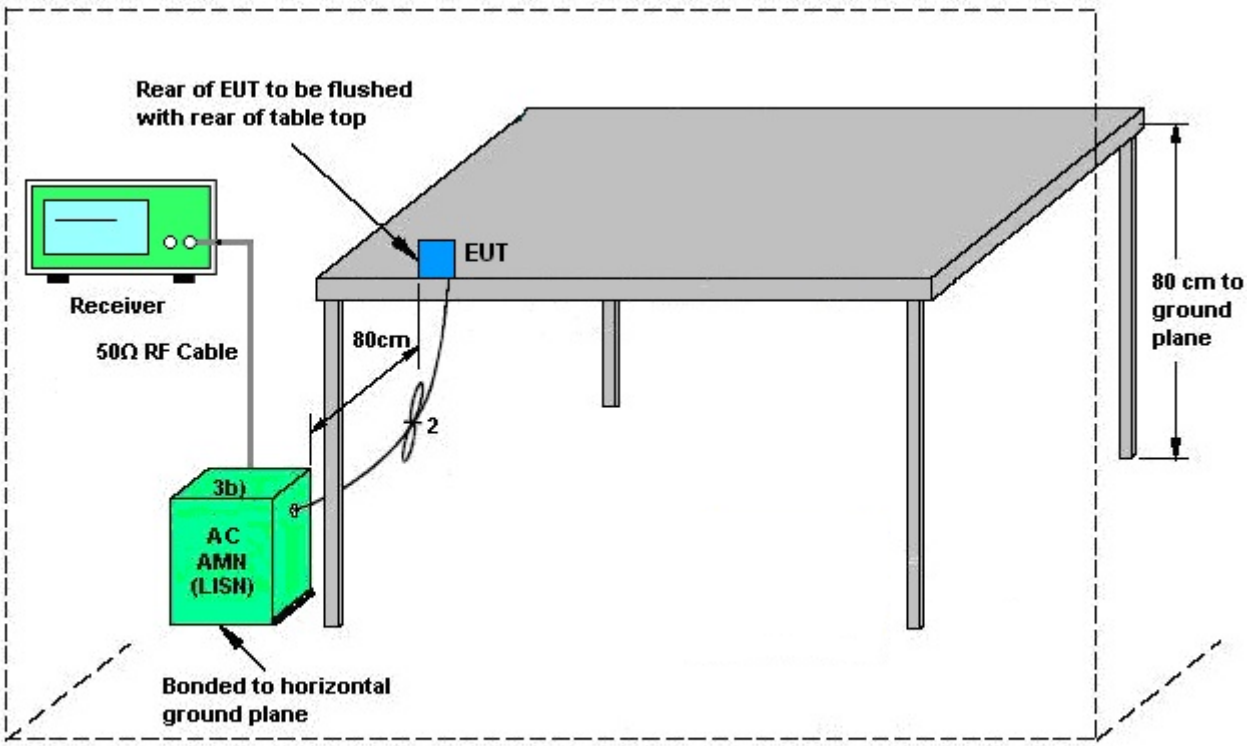
3.6.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.6.4 Test Setup

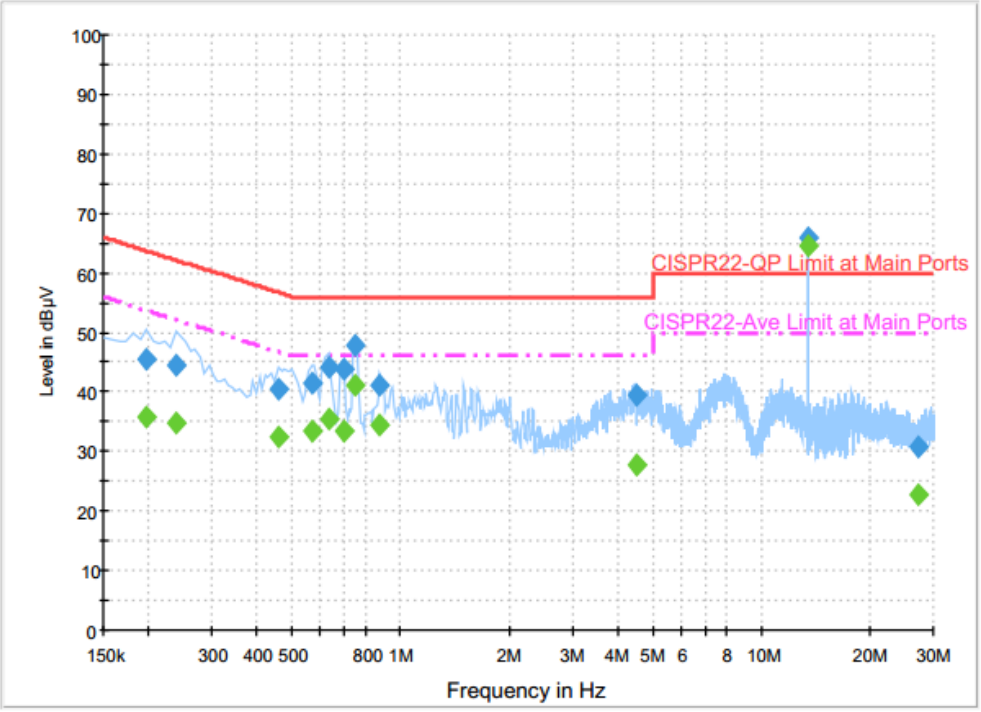


AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.6.5 Test Result of AC Conducted Emission

<Original test result with NFC antenna>

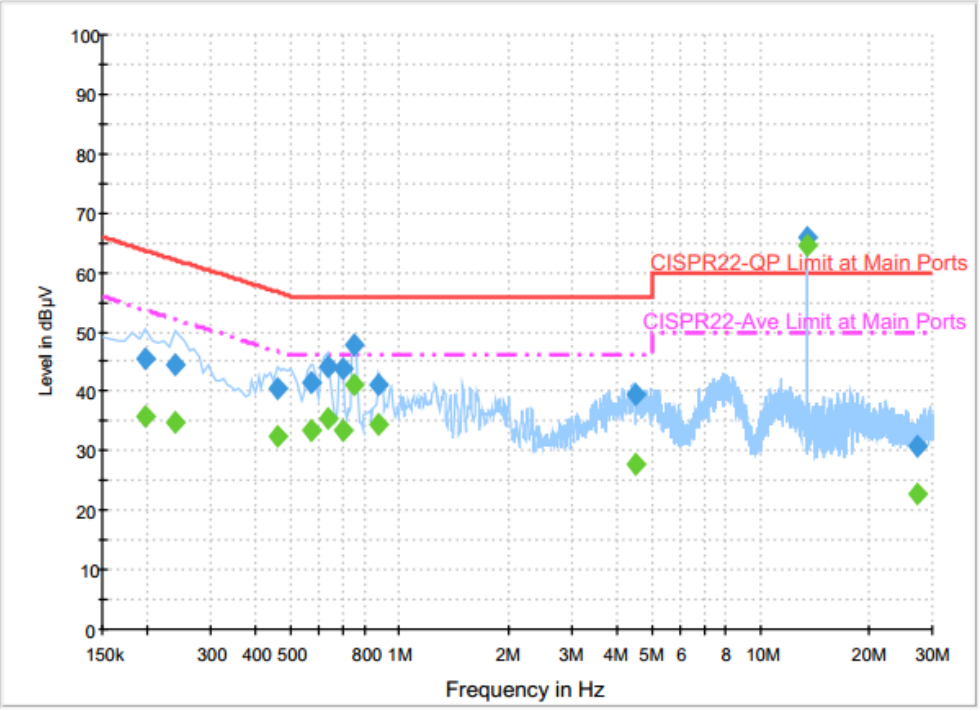
Test Mode :	Mode 1	**Temperature :**	22~24℃
Test Engineer :	Arthur Hsieh	**Relative Humidity :**	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 1 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.198000	45.5	Off	L1	19.6	18.2	63.7
0.238000	44.4	Off	L1	19.6	17.8	62.2
0.462000	40.5	Off	L1	19.6	16.2	56.7
0.566000	41.4	Off	L1	19.6	14.6	56.0
0.630000	44.1	Off	L1	19.6	11.9	56.0
0.694000	43.8	Off	L1	19.6	12.2	56.0
0.750000	48.0	Off	L1	19.6	8.0	56.0
0.878000	41.2	Off	L1	19.6	14.8	56.0
4.534000	39.3	Off	L1	19.7	16.7	56.0
13.558000	65.9	Off	L1	19.8	-5.9	60.0
27.118000	30.9	Off	L1	19.9	29.1	60.0

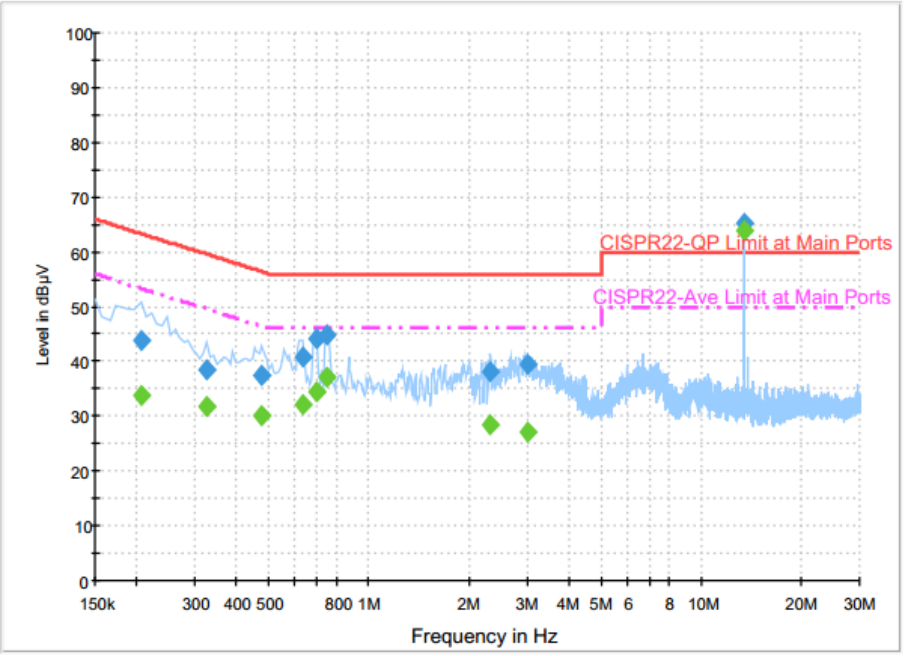
Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 1 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.198000	35.7	Off	L1	19.6	18.0	53.7
0.238000	34.7	Off	L1	19.6	17.5	52.2
0.462000	32.3	Off	L1	19.6	14.4	46.7
0.566000	33.4	Off	L1	19.6	12.6	46.0
0.630000	35.3	Off	L1	19.6	10.7	46.0
0.694000	33.6	Off	L1	19.6	12.4	46.0
0.750000	41.1	Off	L1	19.6	4.9	46.0
0.878000	34.4	Off	L1	19.6	11.6	46.0
4.534000	27.8	Off	L1	19.7	18.2	46.0
13.558000	64.6	Off	L1	19.8	-14.6	50.0
27.118000	22.6	Off	L1	19.9	27.4	50.0

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 1 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Quasi-Peak

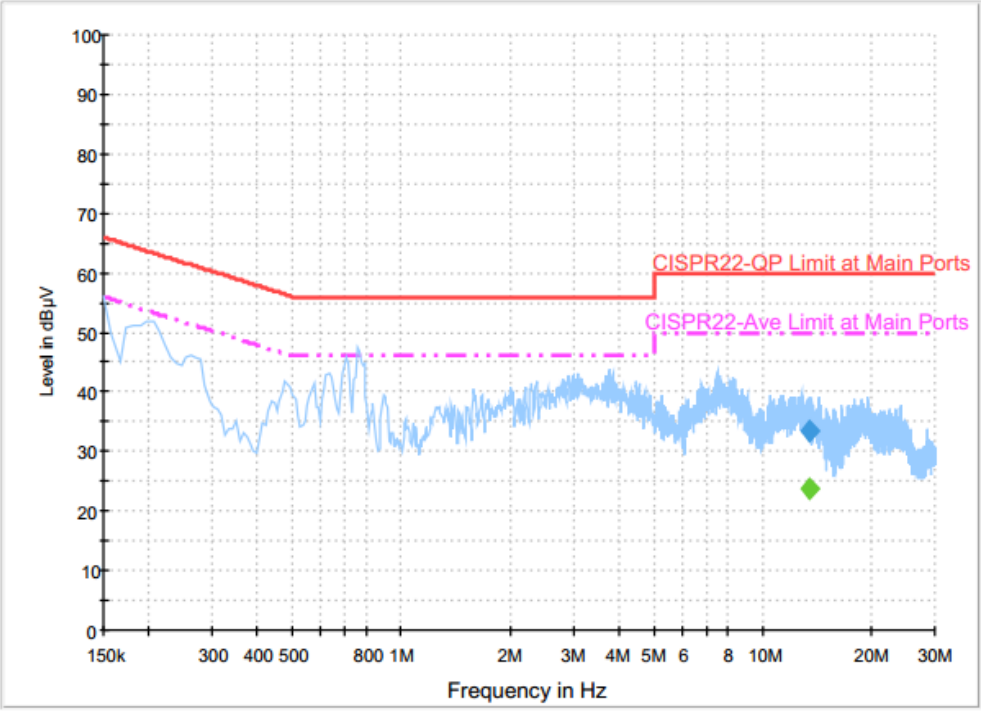
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	44.0	Off	N	19.6	19.4	63.4
0.326000	38.6	Off	N	19.6	21.0	59.6
0.478000	37.6	Off	N	19.6	18.8	56.4
0.630000	40.9	Off	N	19.6	15.1	56.0
0.694000	44.2	Off	N	19.6	11.8	56.0
0.750000	44.7	Off	N	19.6	11.3	56.0
2.326000	38.1	Off	N	18.6	17.9	56.0
3.022000	39.3	Off	N	19.5	16.7	56.0
13.558000	65.3	Off	N	19.8	-5.3	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	33.9	Off	N	19.6	19.5	53.4
0.326000	31.8	Off	N	19.6	17.8	49.6
0.478000	30.1	Off	N	19.6	16.3	46.4
0.630000	31.9	Off	N	19.6	14.1	46.0
0.694000	34.5	Off	N	19.6	11.5	46.0
0.750000	37.1	Off	N	19.6	8.9	46.0
2.326000	28.4	Off	N	18.6	17.6	46.0
3.022000	27.2	Off	N	19.5	18.8	46.0
13.558000	63.8	Off	N	19.8	-13.8	50.0

<Terminal test result with dummy load>

Test Mode :	Mode 1	**Temperature :**	22~24℃
Test Engineer :	Arthur Hsieh	**Relative Humidity :**	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 1 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



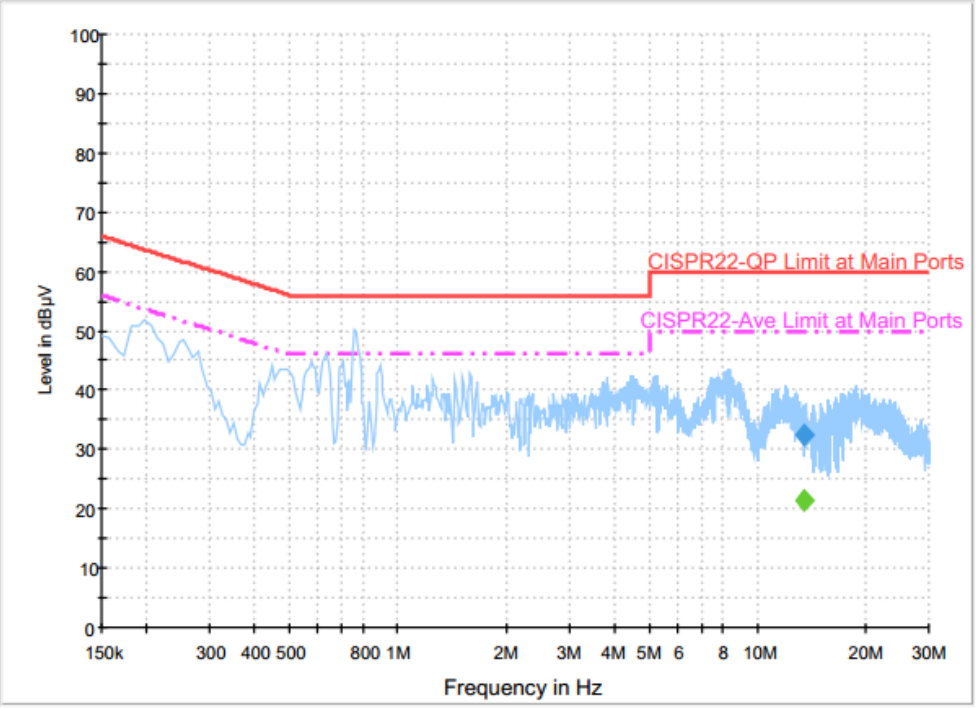
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	33.5	Off	L1	19.8	26.5	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	23.6	Off	L1	19.8	26.4	50.0

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 1 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Quasi-Peak

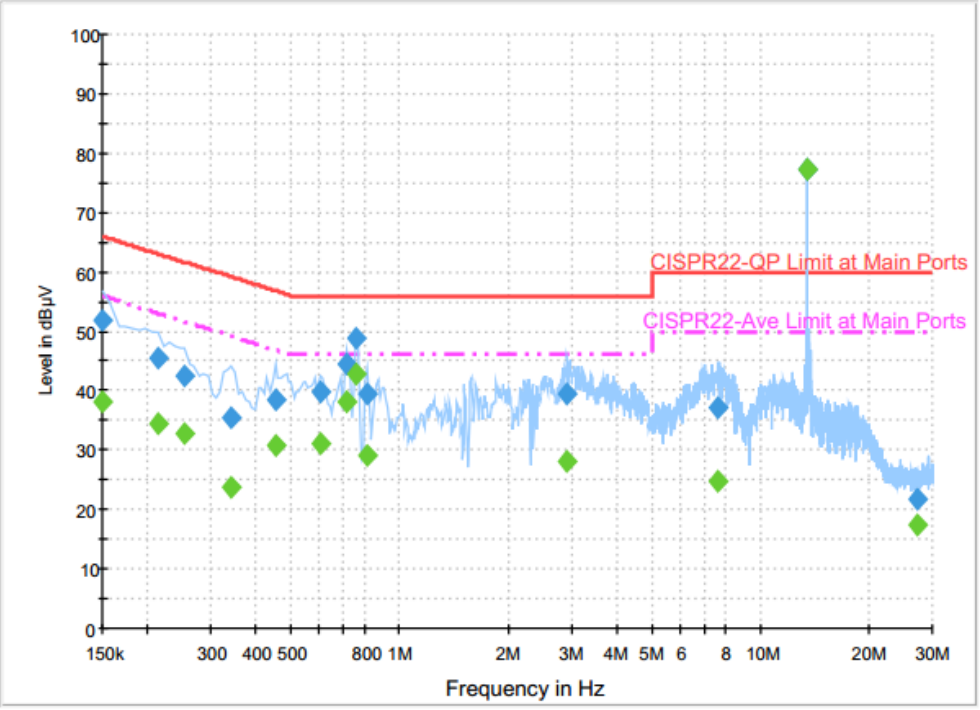
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	32.3	Off	N	19.8	27.7	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	21.5	Off	N	19.8	28.5	50.0

<Original test result with NFC antenna>

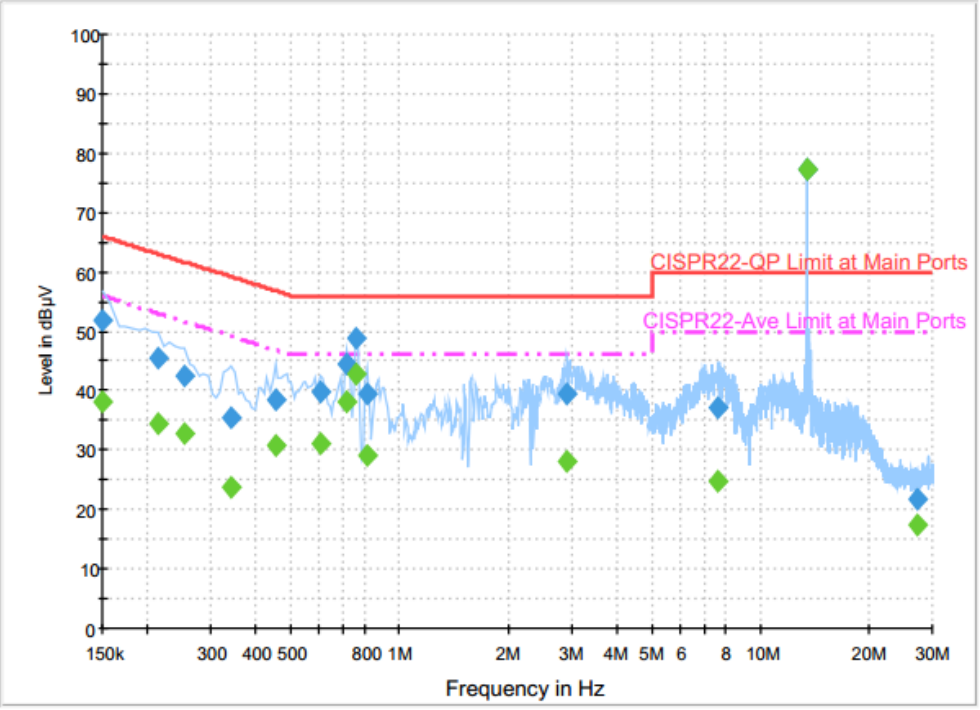
Test Mode :	Mode 2	**Temperature :**	22~24℃
Test Engineer :	Arthur Hsieh	**Relative Humidity :**	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	NFC Link + WLAN (5GHz) Link + Bluetooth Link with Earphone 3 + Snap on USB Cable Data Link with Notebook + Copy Data from Notebook to EDA (SD Card) + AC Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	51.9	Off	L1	19.6	14.1	66.0
0.214000	45.6	Off	L1	19.6	17.4	63.0
0.254000	42.6	Off	L1	19.6	19.0	61.6
0.342000	35.4	Off	L1	19.6	23.8	59.2
0.454000	38.5	Off	L1	19.6	18.3	56.8
0.606000	39.8	Off	L1	19.6	16.2	56.0
0.710000	44.4	Off	L1	19.6	11.6	56.0
0.758000	48.8	Off	L1	19.6	7.2	56.0
0.814000	39.6	Off	L1	19.6	16.4	56.0
2.918000	39.6	Off	L1	19.5	16.4	56.0
7.654000	37.2	Off	L1	19.7	22.8	60.0
13.558000	77.4	Off	L1	19.8	-17.4	60.0
27.118000	21.9	Off	L1	19.9	38.1	60.0

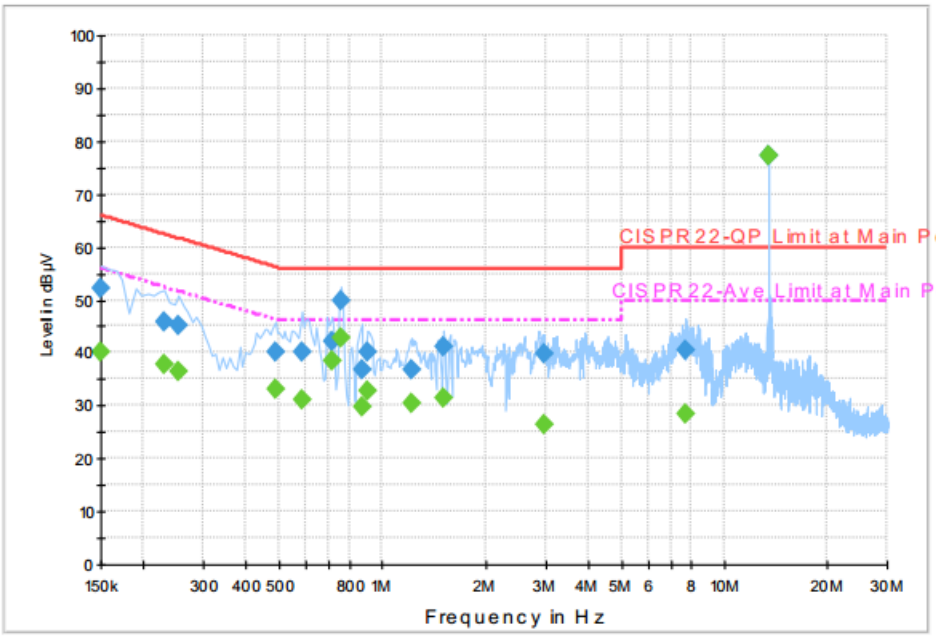
Test Mode :	Mode 2	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	NFC Link + WLAN (5GHz) Link + Bluetooth Link with Earphone 3 + Snap on USB Cable Data Link with Notebook + Copy Data from Notebook to EDA (SD Card) + AC Adapter		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	38.3	Off	L1	19.6	17.7	56.0
0.214000	34.5	Off	L1	19.6	18.5	53.0
0.254000	32.9	Off	L1	19.6	18.7	51.6
0.342000	23.8	Off	L1	19.6	25.4	49.2
0.454000	30.8	Off	L1	19.6	16.0	46.8
0.606000	31.1	Off	L1	19.6	14.9	46.0
0.710000	38.2	Off	L1	19.6	7.8	46.0
0.758000	42.9	Off	L1	19.6	3.1	46.0
0.814000	29.1	Off	L1	19.6	16.9	46.0
2.918000	28.1	Off	L1	19.5	17.9	46.0
7.654000	24.6	Off	L1	19.7	25.4	50.0
13.558000	77.1	Off	L1	19.8	-27.1	50.0
27.118000	17.3	Off	L1	19.9	32.7	50.0

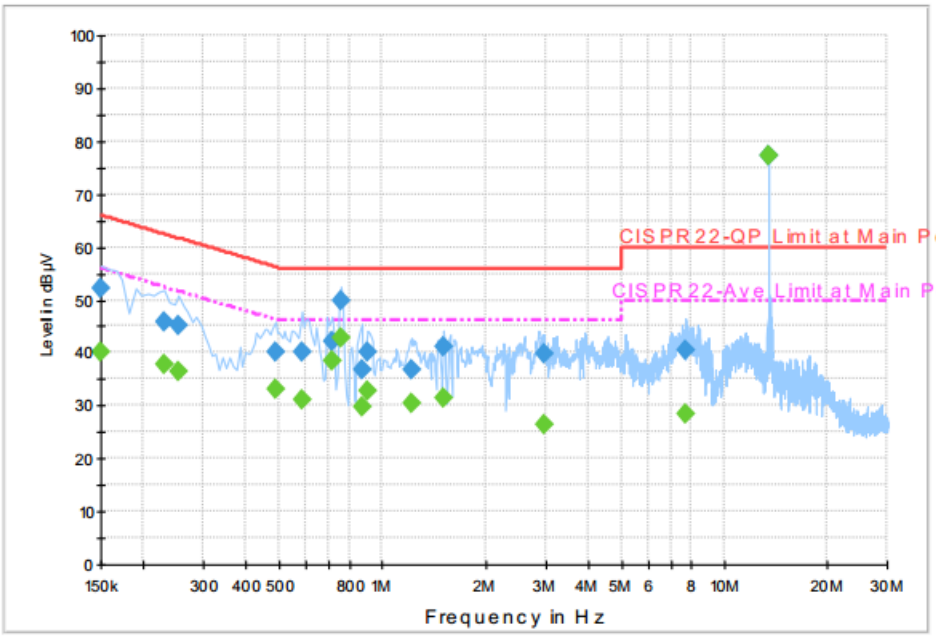
Test Mode :	Mode 2	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	NFC Link + WLAN (5GHz) Link + Bluetooth Link with Earphone 3 + Snap on USB Cable Data Link with Notebook + Copy Data from Notebook to EDA (SD Card) + AC Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	52.0	Off	N	19.6	14.0	66.0
0.230000	45.9	Off	N	19.6	16.5	62.4
0.254000	45.3	Off	N	19.6	16.3	61.6
0.486000	40.2	Off	N	19.6	16.0	56.2
0.582000	40.1	Off	N	19.6	15.9	56.0
0.710000	42.1	Off	N	19.6	13.9	56.0
0.758000	49.8	Off	N	19.6	6.2	56.0
0.870000	36.7	Off	N	19.6	19.3	56.0
0.910000	40.1	Off	N	19.6	15.9	56.0
1.214000	36.9	Off	N	19.6	19.1	56.0
1.510000	41.0	Off	N	19.6	15.0	56.0
2.974000	39.7	Off	N	19.5	16.3	56.0
7.734000	40.3	Off	N	19.7	19.7	60.0
13.558000	77.4	Off	N	19.8	-17.4	60.0

Test Mode :	Mode 2	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	NFC Link + WLAN (5GHz) Link + Bluetooth Link with Earphone 3 + Snap on USB Cable Data Link with Notebook + Copy Data from Notebook to EDA (SD Card) + AC Adapter		

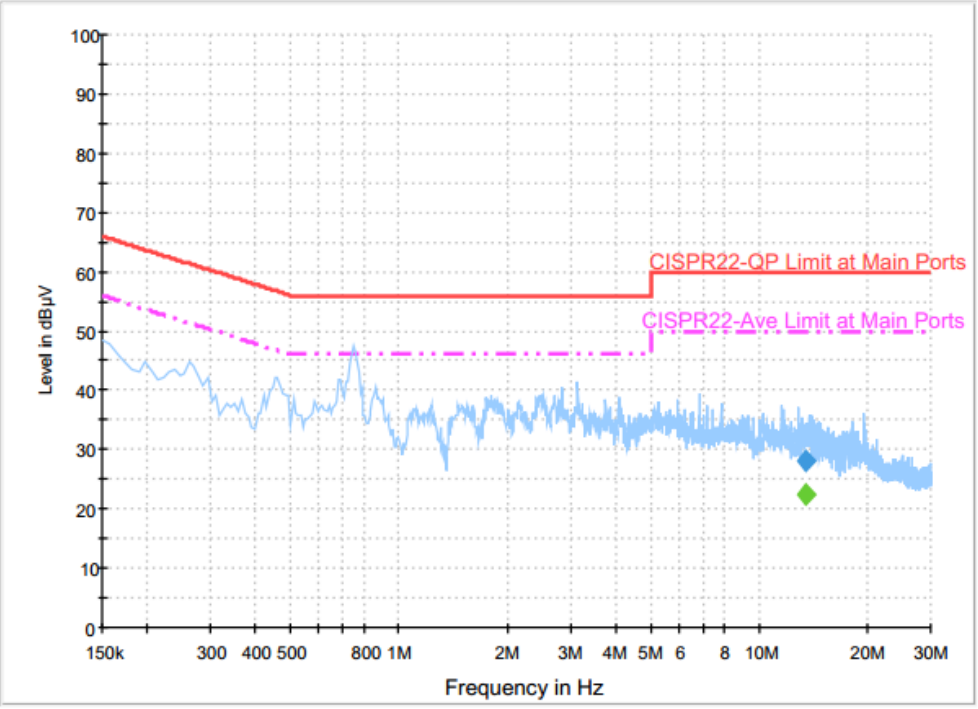


Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.1	Off	N	19.6	15.9	56.0
0.230000	37.7	Off	N	19.6	14.7	52.4
0.254000	36.3	Off	N	19.6	15.3	51.6
0.486000	33.1	Off	N	19.6	13.1	46.2
0.582000	31.0	Off	N	19.6	15.0	46.0
0.710000	38.3	Off	N	19.6	7.7	46.0
0.758000	42.8	Off	N	19.6	3.2	46.0
0.870000	29.8	Off	N	19.6	16.2	46.0
0.910000	32.7	Off	N	19.6	13.3	46.0
1.214000	30.3	Off	N	19.6	15.7	46.0
1.510000	31.4	Off	N	19.6	14.6	46.0
2.974000	26.4	Off	N	19.5	19.6	46.0
7.734000	28.3	Off	N	19.7	21.7	50.0
13.558000	77.2	Off	N	19.8	-27.2	50.0

<Terminal test result with dummy load>

Test Mode :	Mode 2	**Temperature :**	22~24℃
Test Engineer :	Arthur Hsieh	**Relative Humidity :**	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	NFC Link + WLAN (5GHz) Link + Bluetooth Link with Earphone 3 + Snap on USB Cable Data Link with Notebook + Copy Data from Notebook to EDA (SD Card) + AC Adapter		



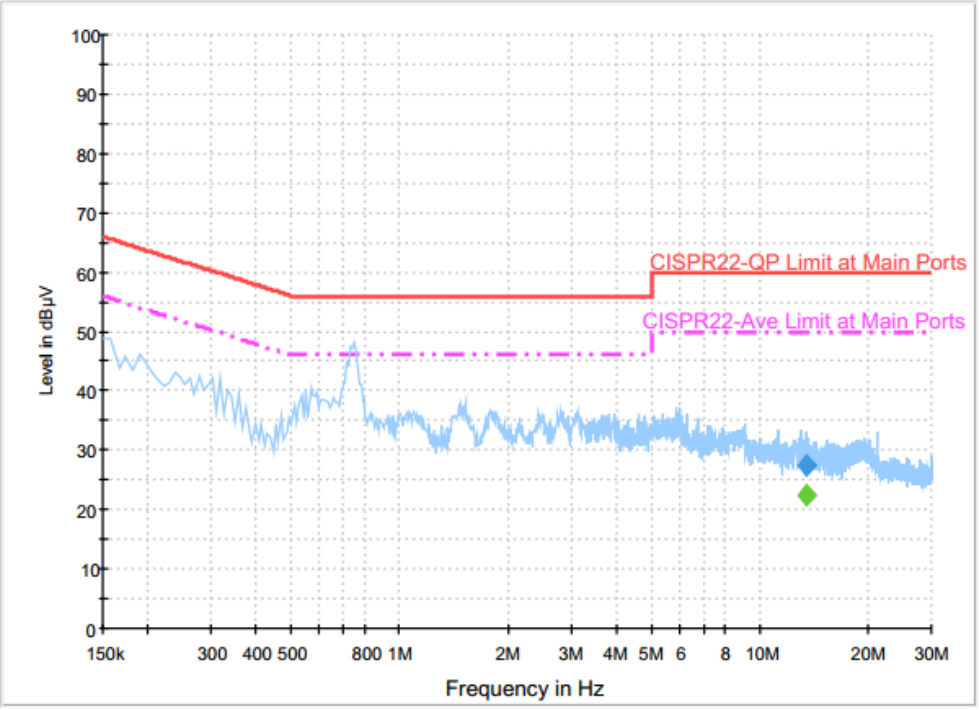
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	28.2	Off	L1	19.8	31.8	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	22.5	Off	L1	19.8	27.5	50.0

Test Mode :	Mode 2	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	NFC Link + WLAN (5GHz) Link + Bluetooth Link with Earphone 3 + Snap on USB Cable Data Link with Notebook + Copy Data from Notebook to EDA (SD Card) + AC Adapter		



Final Result : Quasi-Peak

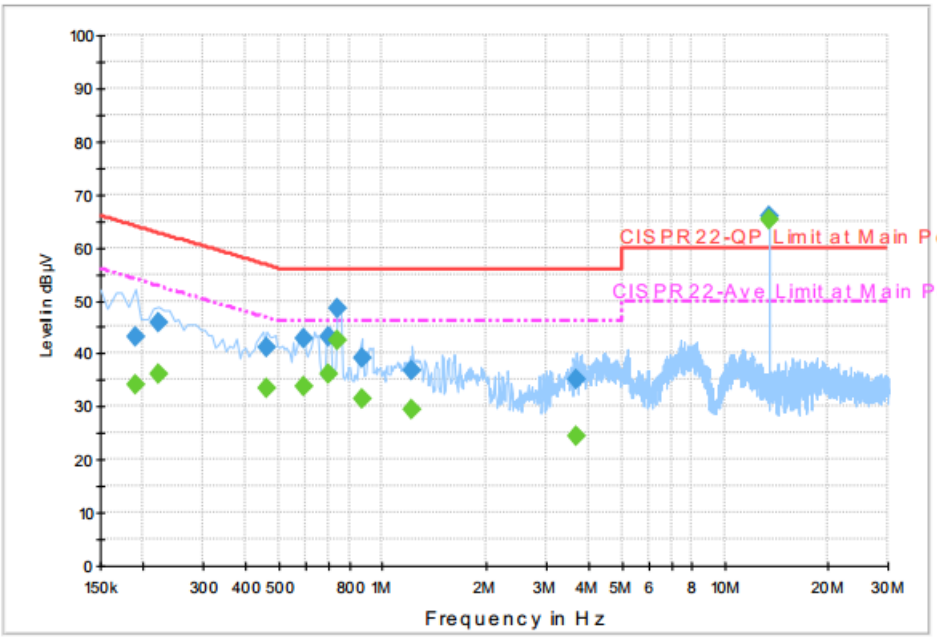
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	27.4	Off	N	19.8	32.6	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	22.4	Off	N	19.8	27.6	50.0

<Original test result with NFC antenna>

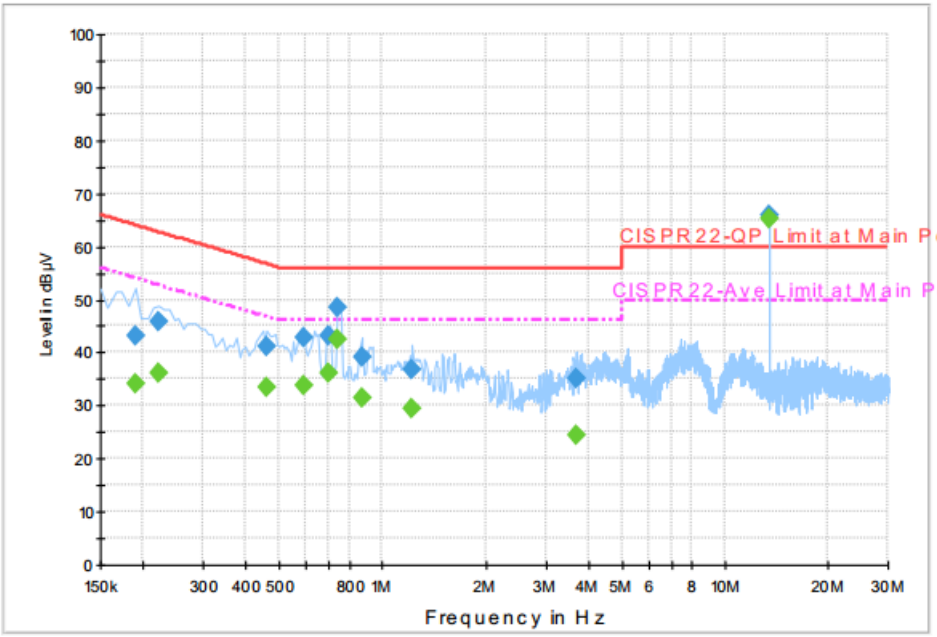
Test Mode :	Mode 3	**Temperature :**	22~24℃
Test Engineer :	Arthur Hsieh	**Relative Humidity :**	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 2 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	43.2	Off	L1	19.6	20.8	64.0
0.222000	45.8	Off	L1	19.6	16.9	62.7
0.462000	41.2	Off	L1	19.6	15.5	56.7
0.590000	42.7	Off	L1	19.6	13.3	56.0
0.694000	43.2	Off	L1	19.6	12.8	56.0
0.742000	48.5	Off	L1	19.6	7.5	56.0
0.870000	39.2	Off	L1	19.6	16.8	56.0
1.222000	36.6	Off	L1	19.6	19.4	56.0
3.702000	35.1	Off	L1	19.7	20.9	56.0
13.558000	65.8	Off	L1	19.8	-5.8	60.0

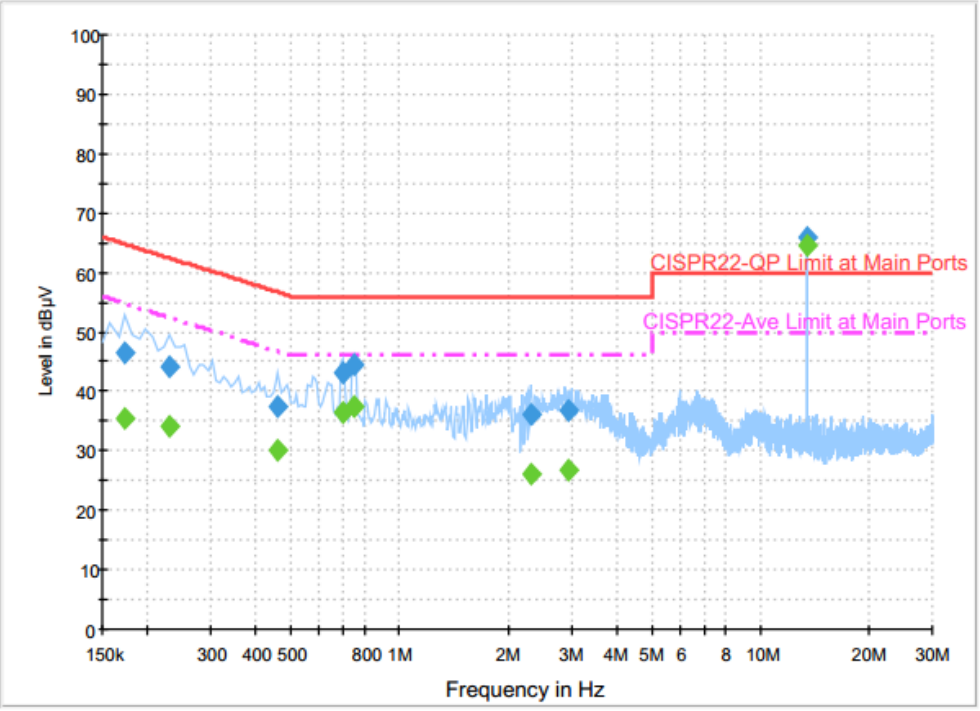
Test Mode :	Mode 3	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 2 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	34.0	Off	L1	19.6	20.0	54.0
0.222000	36.3	Off	L1	19.6	16.4	52.7
0.462000	33.3	Off	L1	19.6	13.4	46.7
0.590000	33.9	Off	L1	19.6	12.1	46.0
0.694000	36.2	Off	L1	19.6	9.8	46.0
0.742000	42.6	Off	L1	19.6	3.4	46.0
0.870000	31.4	Off	L1	19.6	14.6	46.0
1.222000	29.4	Off	L1	19.6	16.6	46.0
3.702000	24.3	Off	L1	19.7	21.7	46.0
13.558000	65.4	Off	L1	19.8	-15.4	50.0

Test Mode :	Mode 3	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 2 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Quasi-Peak

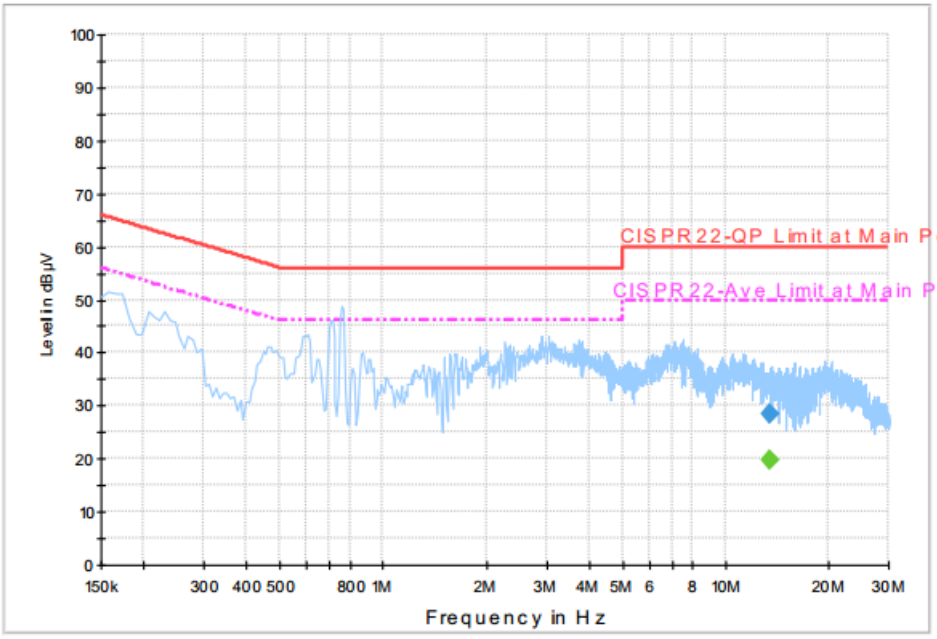
Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	46.5	Off	N	19.6	18.3	64.8
0.230000	44.2	Off	N	19.6	18.2	62.4
0.462000	37.5	Off	N	19.6	19.2	56.7
0.694000	43.2	Off	N	19.6	12.8	56.0
0.750000	44.4	Off	N	19.6	11.6	56.0
2.318000	36.2	Off	N	18.6	19.8	56.0
2.942000	36.9	Off	N	19.5	19.1	56.0
13.558000	66.0	Off	N	19.8	-6.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	35.4	Off	N	19.6	19.4	54.8
0.230000	34.0	Off	N	19.6	18.4	52.4
0.462000	30.2	Off	N	19.6	16.5	46.7
0.694000	36.5	Off	N	19.6	9.5	46.0
0.750000	37.5	Off	N	19.6	8.5	46.0
2.318000	25.9	Off	N	18.6	20.1	46.0
2.942000	26.9	Off	N	19.5	19.1	46.0
13.558000	64.7	Off	N	19.8	-14.7	50.0

<Terminal test result with dummy load>

Test Mode :	Mode 3	**Temperature :**	22~24℃
Test Engineer :	Arthur Hsieh	**Relative Humidity :**	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 2 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



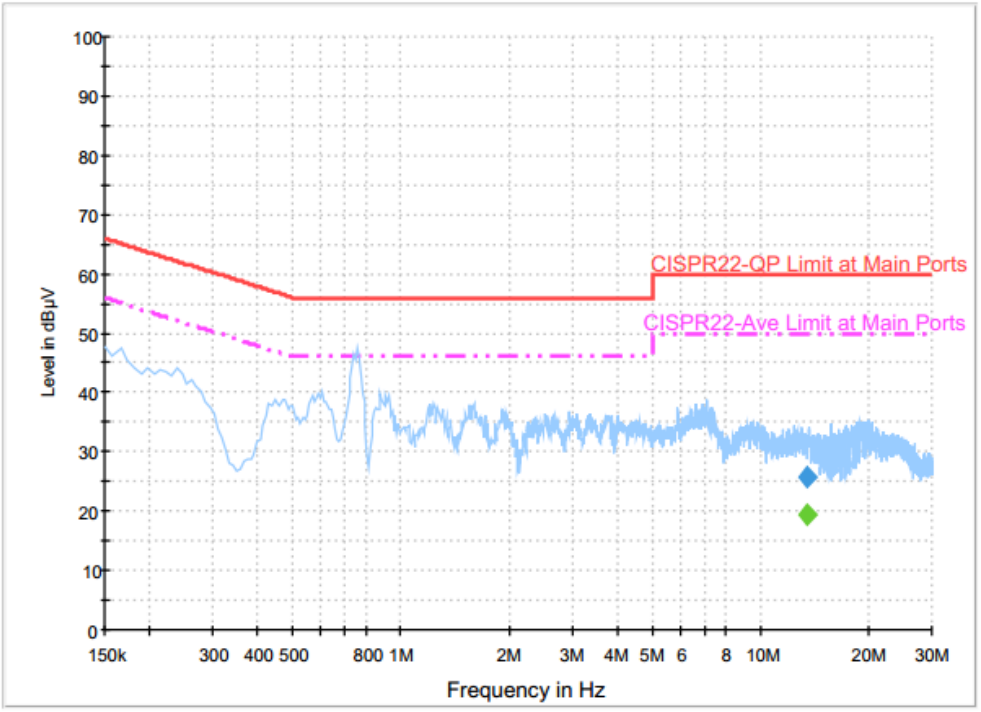
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	28.4	Off	L1	19.8	31.6	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	19.8	Off	L1	19.8	30.2	50.0

Test Mode :	Mode 3	Temperature :	22~24℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	NFC Link + WLAN (2.4GHz) Link + Bluetooth Link + Earphone 2 with Audio Adapter connect to EUT + Charging Only Cable + AC Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	25.8	Off	N	19.8	34.2	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	19.5	Off	N	19.8	30.5	50.0

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Jan. 08, 2016	Aug. 22, 2016 ~ Aug. 26, 2016	Jan. 07, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Jan. 07, 2016	Aug. 22, 2016 ~ Aug. 26, 2016	Jan. 06, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 23, 2015	Aug. 22, 2016 ~ Aug. 26, 2016	Nov. 22, 2016	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 06, 2016 ~ Sep. 20, 2016	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Sep. 06, 2016 ~ Sep. 20, 2016	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2015	Sep. 06, 2016 ~ Sep. 20, 2016	Dec. 01, 2016	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 14, 2015	Sep. 06, 2016 ~ Sep. 20, 2016	Dec. 13, 2016	Conduction (CO05-HY)
Bilog Antenna	TESEQ	CBL 6111D	35419	30MHz to 1GHz	Jan. 13, 2016	Aug. 23, 2016 ~ Sep. 09, 2016	Jan. 12, 2017	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2016	Aug. 23, 2016 ~ Sep. 09, 2016	Aug. 18, 2017	Radiation (03CH07-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY54130085	20Hz ~ 8.4GHz	Nov. 04, 2015	Aug. 23, 2016 ~ Sep. 09, 2016	Nov. 03, 2016	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Aug. 23, 2016 ~ Sep. 09, 2016	Sep. 01, 2017	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590075	1GHz ~ 18GHz	Apr. 15, 2016	Aug. 23, 2016 ~ Sep. 09, 2016	Apr. 14, 2017	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1GHz	Mar. 18, 2016	Aug. 23, 2016 ~ Sep. 09, 2016	Mar. 17, 2017	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Oct. 19, 2015	Aug. 23, 2016 ~ Sep. 09, 2016	Oct. 18, 2016	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Feb. 27, 2016	Aug. 23, 2016 ~ Sep. 09, 2016	Feb. 26, 2017	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Aug. 23, 2016 ~ Sep. 09, 2016	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Aug. 23, 2016 ~ Sep. 09, 2016	N/A	Radiation (03CH07-HY)
Preamplifier	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	Jun. 14, 2016	Aug. 23, 2016 ~ Sep. 09, 2016	Jun. 13, 2017	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 02, 2015	Aug. 23, 2016 ~ Sep. 09, 2016	Nov. 01, 2016	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.70**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.50**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.20**

Appendix A. Conducted Test Results

Report Number : FR672834B

Bluetooth Low Energy

Test Engineer:	An Wu and Tommy Lee	Temperature:	21~25	°C
Test Date:	2016/08/22~2016/08/26	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.06	0.71	0.50	Pass
BLE	1Mbps	1	19	2440	1.06	0.71	0.50	Pass
BLE	1Mbps	1	39	2480	1.06	0.71	0.50	Pass

TEST RESULTS DATA
Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	3.02	30.00	2.60	5.62	36.00	Pass
BLE	1Mbps	1	19	2440	4.27	30.00	2.60	6.87	36.00	Pass
BLE	1Mbps	1	39	2480	4.51	30.00	2.60	7.11	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.06	1.60
BLE	1Mbps	1	19	2440	2.06	3.20
BLE	1Mbps	1	39	2480	2.06	3.48

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	0.88	-12.84	2.60	8.00	Pass
BLE	1Mbps	1	19	2440	2.26	-11.46	2.60	8.00	Pass
BLE	1Mbps	1	39	2480	2.16	-11.60	2.60	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 20dBc limit.

Appendix B. Radiated Spurious Emission

Test Engineer :	Luke Chang, Jesse Wang, Derreck Chen and James Chiu	Temperature :	21~24°C
		Relative Humidity :	50~55%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		2355.15	55.13	-18.87	74	50.25	32.03	7.24	34.39	100	37	P	H
		2389.59	46.05	-7.95	54	40.99	32.08	7.31	34.33	100	37	A	H
	*	2402	98.03	-	-	92.95	32.08	7.31	34.31	100	37	P	H
	*	2402	97.5	-	-	92.42	32.08	7.31	34.31	100	37	A	H
													H
													H
		2370.27	55.43	-18.57	74	50.5	32.06	7.24	34.37	198	303	P	V
		2374.365	46.19	-7.81	54	41.25	32.06	7.24	34.36	198	303	A	V
	*	2402	98.43	-	-	93.35	32.08	7.31	34.31	198	303	P	V
	*	2402	97.82	-	-	92.74	32.08	7.31	34.31	198	303	A	V
													V
													V
BLE CH 19 2440MHz		2363.34	55.42	-18.58	74	50.53	32.03	7.24	34.38	100	53	P	H
		2386.16	46.09	-7.91	54	41.04	32.08	7.31	34.34	100	53	A	H
	*	2440	97.92	-	-	92.67	32.14	7.36	34.25	100	53	P	H
	*	2440	97.37	-	-	92.12	32.14	7.36	34.25	100	53	A	H
		2497.76	55.59	-18.41	74	50.14	32.2	7.4	34.15	100	53	P	H
		2488.66	46.57	-27.43	74	41.14	32.2	7.4	34.17	100	53	P	H
		2381.26	54.97	-19.03	74	49.95	32.06	7.31	34.35	198	304	P	V
		2370.06	46.09	-7.91	54	41.16	32.06	7.24	34.37	198	304	A	V
	*	2440	98.86	-	-	93.61	32.14	7.36	34.25	198	304	P	V
	*	2440	98.39	-	-	93.14	32.14	7.36	34.25	198	304	A	V
		2494.61	55.61	-18.39	74	50.17	32.2	7.4	34.16	198	304	P	V
		2497.69	46.69	-7.31	54	41.24	32.2	7.4	34.15	198	304	A	V

BLE CH 39 2480MHz	*	2480	97.24	-	-	91.84	32.18	7.4	34.18	100	55	P	H
	*	2480	96.64	-	-	91.24	32.18	7.4	34.18	100	55	A	H
		2486.16	56.33	-17.67	74	50.92	32.18	7.4	34.17	100	55	P	H
		2491.6	46.64	-7.36	54	41.2	32.2	7.4	34.16	100	55	A	H
													H
													H
	*	2480	98	-	-	92.6	32.18	7.4	34.18	208	312	P	V
	*	2480	97.26	-	-	91.86	32.18	7.4	34.18	208	312	A	V
		2491.92	55.41	-18.59	74	49.97	32.2	7.4	34.16	208	312	P	V
		2488.04	46.62	-7.38	54	41.19	32.2	7.4	34.17	208	312	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	40.31	-33.69	74	53.46	34.1	11.83	59.08	100	0	P	H
													H
													H
													H
		4804	40.2	-33.8	74	53.35	34.1	11.83	59.08	100	0	P	V
													V
													V
													V
BLE CH 19 2440MHz		4880	39.83	-34.17	74	53.14	34.1	11.53	58.94	100	0	P	H
		7320	40.71	-33.29	74	48.76	36.1	13.81	57.96	100	0	P	H
													H
													H
		4880	40.03	-33.97	74	53.34	34.1	11.53	58.94	100	0	P	V
		7320	39.87	-34.13	74	47.92	36.1	13.81	57.96	100	0	P	V
													V
													V
BLE CH 39 2480MHz		4960	40.95	-33.05	74	54.4	34.1	11.22	58.77	100	0	P	H
		7440	40.74	-33.26	74	48.65	36.17	14.05	58.13	100	0	P	H
													H
													H
		4960	40.54	-33.46	74	53.99	34.1	11.22	58.77	100	0	P	V
		7440	41.45	-32.55	74	49.36	36.17	14.05	58.13	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		84	28.55	-11.45	40	44.44	14.38	1.28	31.55	-	-	P	H
		157.98	37.36	-6.14	43.5	49.94	17.14	1.78	31.5	100	280	P	H
		259.5	30.49	-15.51	46	39.78	20	2.07	31.36	-	-	P	H
		305.6	30.75	-15.25	46	39.64	19.96	2.41	31.26	-	-	P	H
		735.4	30.2	-15.8	46	30.17	26.96	3.74	30.67	-	-	P	H
		966.4	34.42	-19.58	54	30.65	30.23	4.07	30.53	-	-	P	H
													H
													H
													H
													H
													H
													H
		79.14	34.58	-5.42	40	51.06	13.79	1.28	31.55	100	84	P	V
		116.4	34.86	-8.64	43.5	47.14	17.68	1.55	31.51	-	-	P	V
		224.94	29.66	-16.34	46	42.22	16.8	2.07	31.43	-	-	P	V
		323.8	29.63	-16.37	46	38	20.47	2.41	31.25	-	-	P	V
		673.8	29.36	-16.64	46	30.32	26.14	3.65	30.75	-	-	P	V
		990.9	33.6	-20.4	54	29.86	30.28	3.98	30.52	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBµV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBµV/m) – Limit Line(dBµV/m)

For Peak Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBµV) – 35.86 (dB)

= 55.45 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 55.45(dBµV/m) – 74(dBµV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBµV) – 35.86 (dB)

= 43.54 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 43.54(dBµV/m) – 54(dBµV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix C. Radiated Spurious Emission Plots

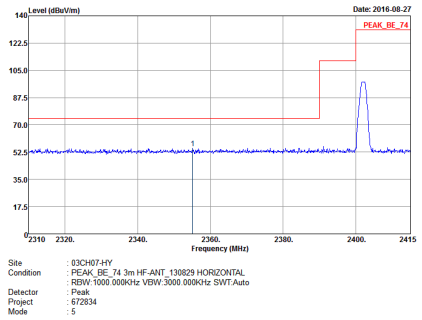
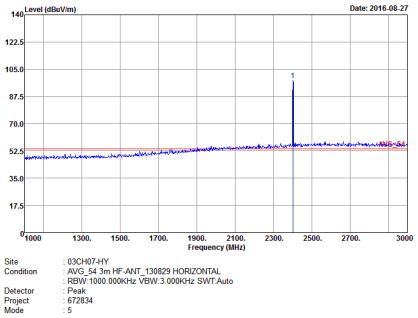
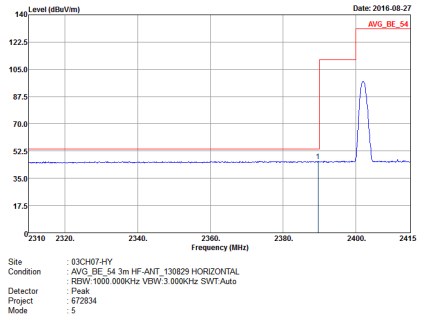
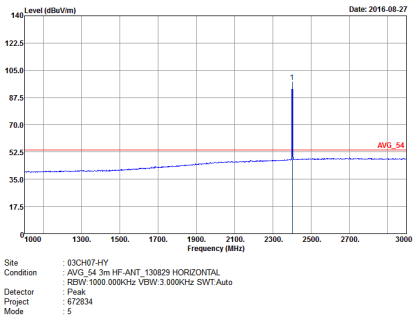
Test Engineer :	Luke Chang, Jesse Wang, Derreck Chen and James Chiu	**Temperature :**	21~24°C
		Relative Humidity :	50~55%

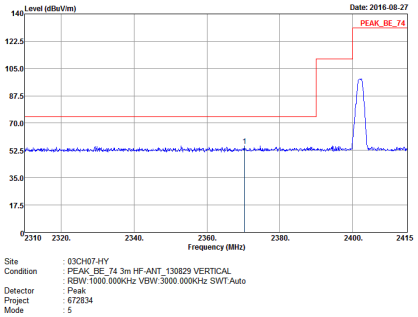
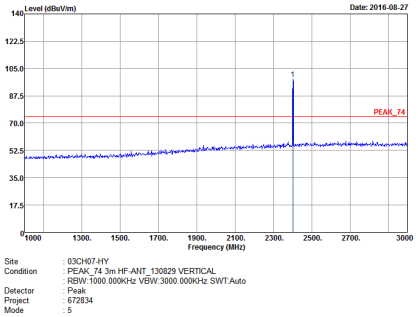
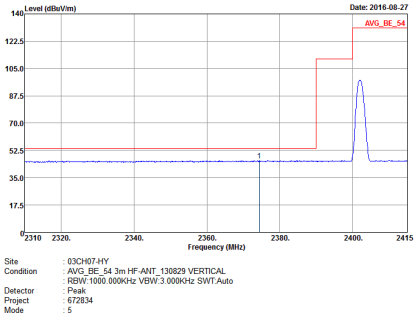
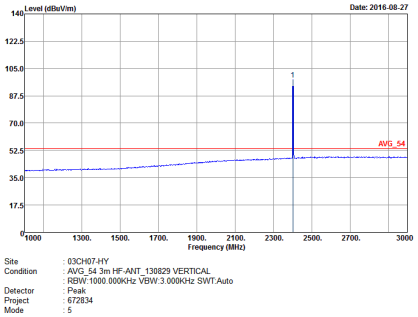
Note symbol

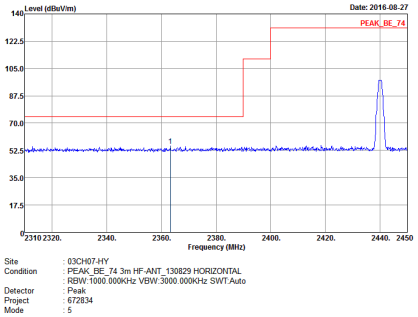
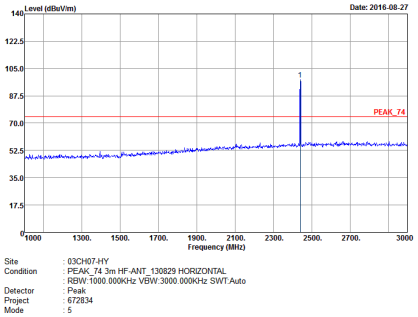
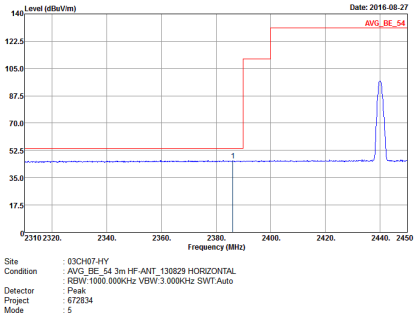
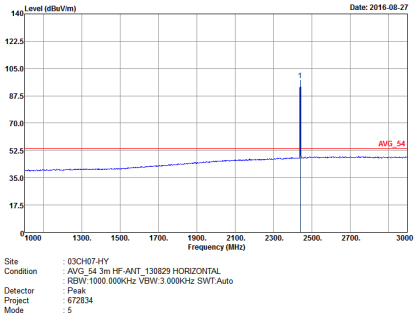
-L	**Low channel location**
-R	**High channel location**

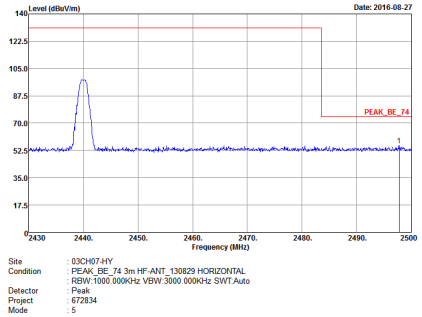
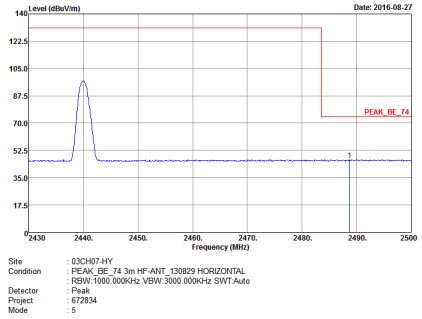
2.4GHz 2400~2483.5MHz

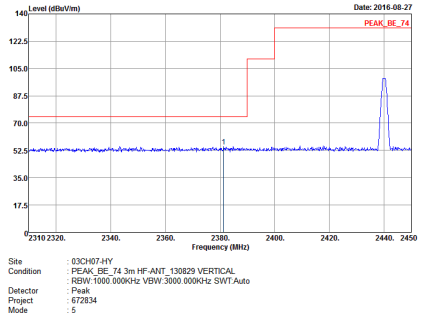
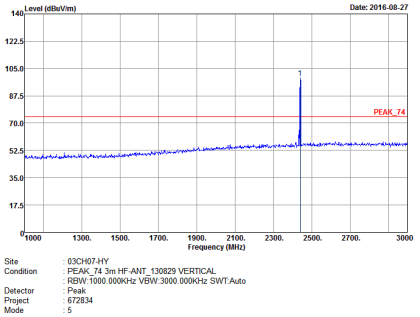
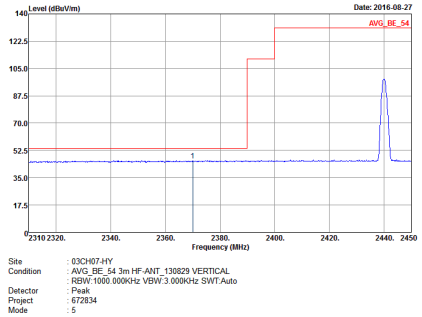
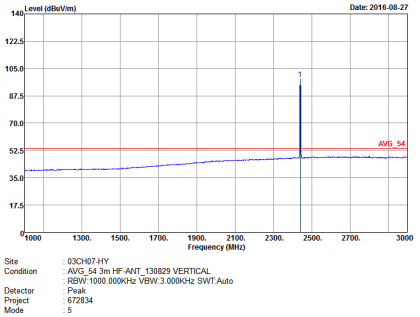
BLE (Band Edge @ 3m)

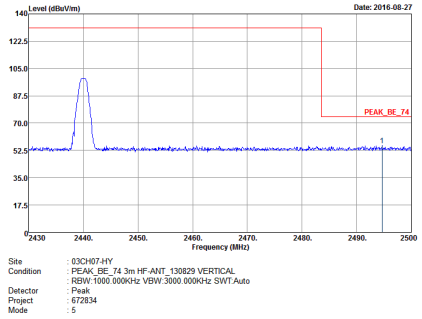
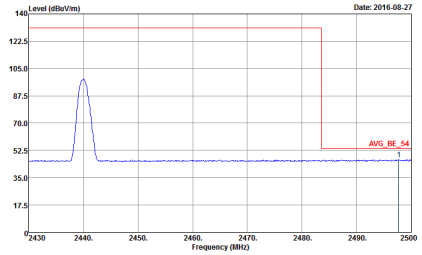
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

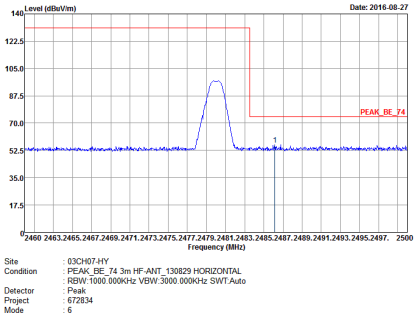
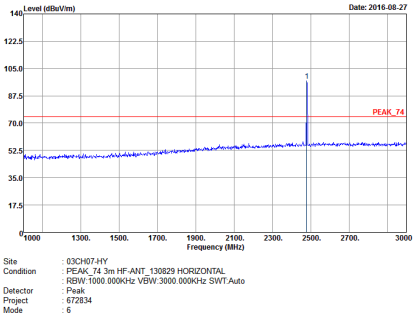
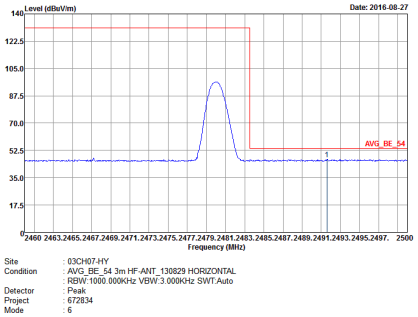
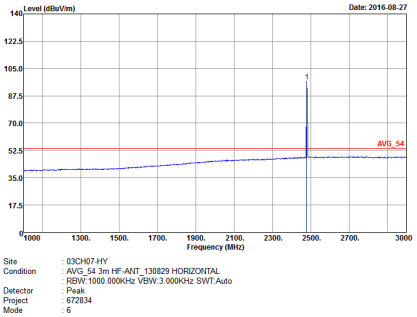
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_74 3m HF-ANT_130829 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 5	 Site : 03CH07-HY Condition : PEAK_74 3m HF-ANT_130829 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 5
Avg	 Site : 03CH07-HY Condition : AVG_BE_54 3m HF-ANT_130829 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 5	 Site : 03CH07-HY Condition : AVG_54 3m HF-ANT_130829 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 5

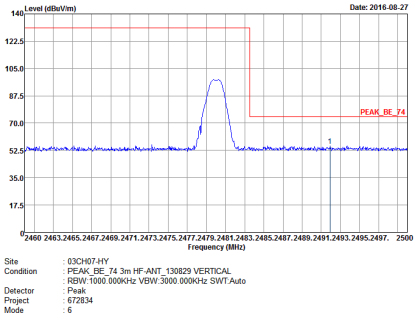
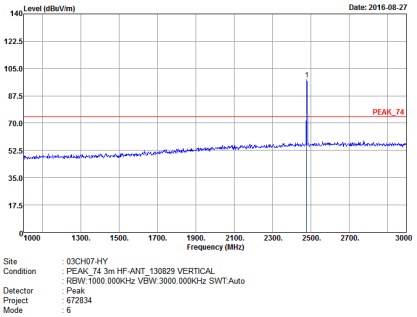
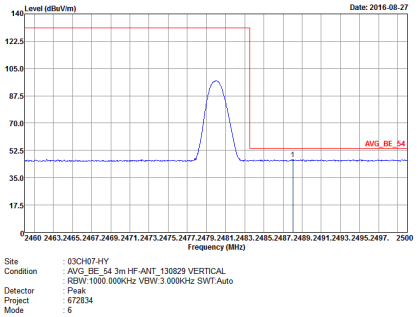
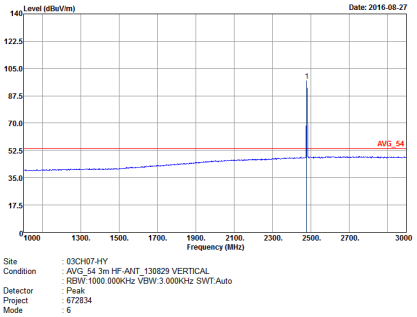
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

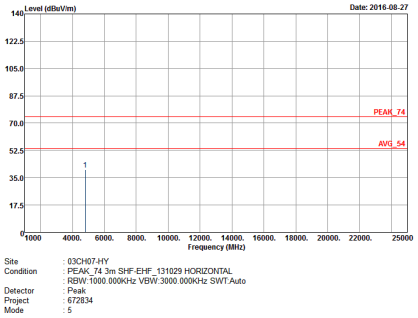
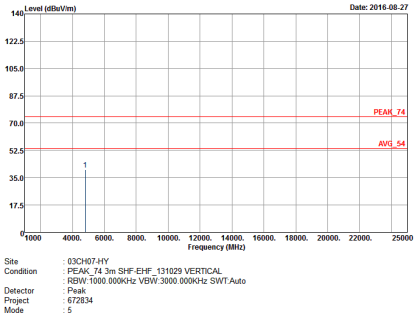
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_74 3m HF-ANT_130829 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 5	Left blank
Avg.	 Site : 03CH07-HY Condition : AVG_BE_54 3m HF-ANT_130829 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 5	Left blank

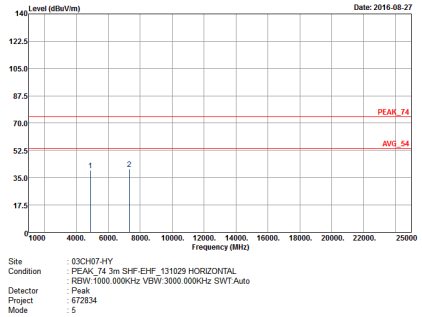
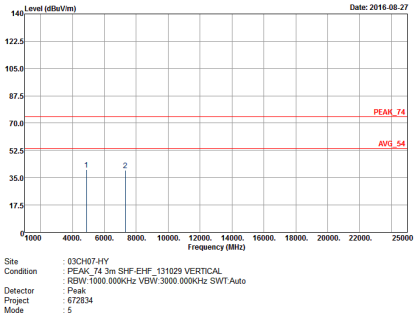
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

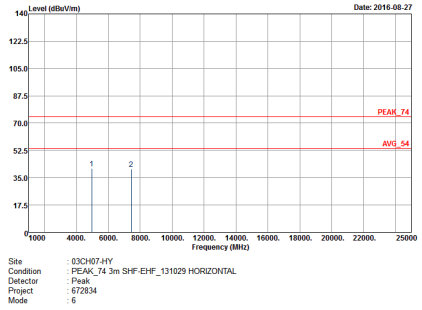
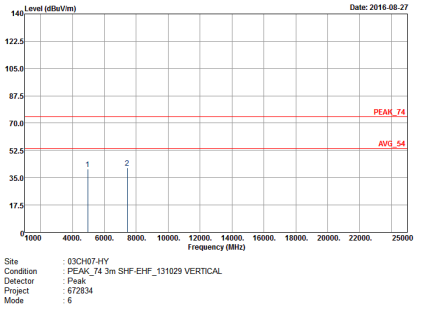
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_74 3m HF-ANT_130829 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 6	 Site : 03CH07-HY Condition : PEAK_74 3m HF-ANT_130829 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 6
Avg.	 Site : 03CH07-HY Condition : AVG_BE_54 3m HF-ANT_130829 VERTICAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 6	 Site : 03CH07-HY Condition : AVG_54 3m HF-ANT_130829 VERTICAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 672834 Mode : 6

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

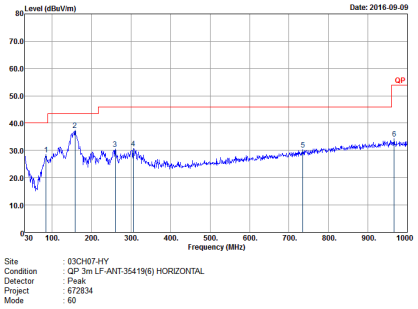
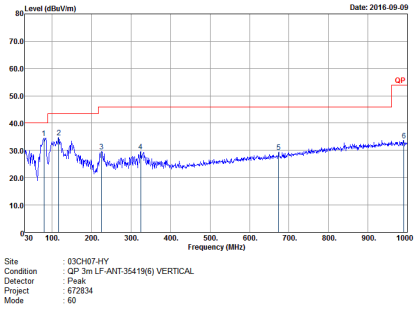
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Vertical
Peak Avg.		

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH19 2440MHz	
1	Horizontal	Vertical
Peak Avg.		

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak		

Emission below 1GHz

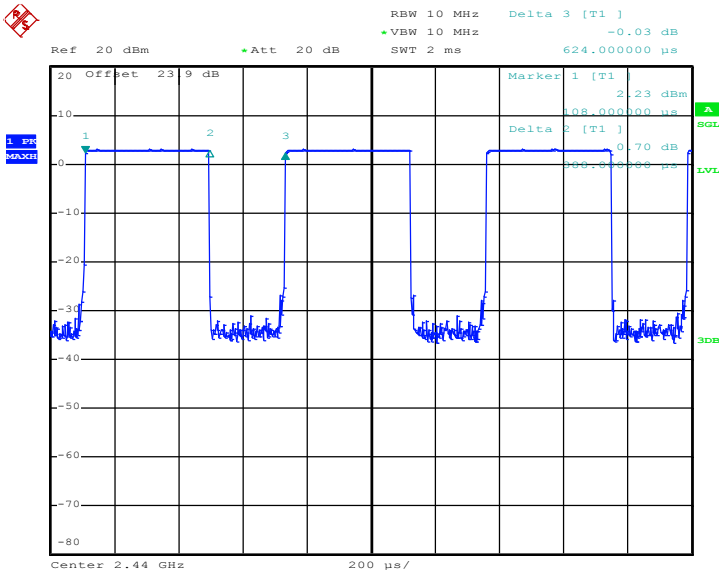
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
ANT	BLE LF	
1	Horizontal	Vertical
QP / Peak		

Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Bluetooth 4.1 – LE	62.179	388	2.58	3kHz

Bluetooth 4.1 – LE



Date: 19.AUG.2016 14:10:24