FCC RADIO TEST REPORT

FCC ID	:	Z8H89FT0058
Equipment	:	Wireless Access Point
Brand Name	:	Cambium Networks
Model Name	:	REG-XV3-8
Applicant	:	Cambium Networks Inc. 3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA
Manufacturer	:	Cambium Networks, Ltd. Ashburton, TQ13 7UP, UK
Standard	:	47 CFR FCC Part 15.247

The product was received on Sep. 23, 2019, and testing was started from Sep. 26, 2019 and completed on Feb. 07, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
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Photographs of EUT v01

History of this test report

Report No.	Version	Description	Issued Date
FR912418-02AC	01	Initial issue of report	Feb. 28, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

1. The test configuration, test mode and test software were written in this test report are declared by the manufacturer.
2. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen
Report Producer: Cindy Peng

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	LE	2402-2480	0-39 [40]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-LE(1Mbps)	1.0	1TX

Note:
- Bluetooth LE uses a GFSK modulation.
- BWch is the nominal channel bandwidth.
- Nss-Min is the minimum number of spatial streams.
- Nant is the number of outputs. e.g., 2(2, 3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

1.1.2 Antenna Information

For Antenna Gain:

Radio	Ant.	Port	Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Function
1	1	1	ANGeei	120G00000325A	PIFA	I-PEX	5.13	WLAN 2.4GHz (DBS mode)
	2	2	ANGeei	120G00000325A	PIFA	I-PEX	5.13	
	3	3	ANGeei	120G00000325A	PIFA	I-PEX	5.13	
	4	4	ANGeei	120G00000325A	PIFA	I-PEX	5.13	

Radio	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)				Function
		DBS mode	SBS mode					DBS mode		SBS mode		
								5GHz Band 1	5GHz Band 4	5GHz Band 1	5GHz Band 4	
2	5	1	1	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	-	6.70	WLAN 5GHz (DBS mode or SBS mode)
	6	2	2	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	-	6.70	
	7	3	3	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	-	6.70	
	8	4	4	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	-	6.70	
3	9	5	1	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	6.19	-	
	10	6	2	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	6.19	-	
	11	7	3	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	6.19	-	
	12	8	4	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.70	6.19	-	

Radio	Ant.	Port	Brand	Model Name	Type	Connector	Antenna Gain (dBi)		Function
							2.4GHz	5GHz	
4	13	1	ANGeei	120G00000325A	PIFA	I-PEX	5.08	6.27	WLAN 2.4GHz/ 5GHz (Scan Radio)

Radio	Ant.	Port	Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Function
5	14	1	WIESON	GT128V007S-001	PIFA	I-PEX	4.90	Bluetooth

For Composite Gain:

Radio	Ant.	Port	Composite Gain (dBi)		Function
			Beamforming mode		
1	1~4	1~4	9.25		WLAN 2.4GHz (DBS mode)
Radio	Ant.	Port	Composite Gain (dBi)		Function
			5GHz Band 1	5GHz Band 4	
			Beamforming mode	Beamforming mode	
2+3	5~12	1~8	11.66	11.41	WLAN 5GHz (DBS mode)
Radio	Ant.	Port	Composite Gain (dBi)		Function
			Beamforming mode		
2	5~8	1~4	8.79		WLAN 5GHz Band 4 (SBS mode)
3	9~12	1~4	9.58		WLAN 5GHz Band 1 (SBS mode)

Note1: The above information was declared by manufacturer.
Note2: The EUT has fourteen antennas.
Note3: The non-beamforming mode follows 10log(N) and beamforming mode follows composie gain for directional gain.

<DBS mode>

Radio	Ant.	Port	WLAN 2.4GHz function
1	1~4	1~4	IEEE 802.11b/g/n/VHT/ax mode (4TX/4RX): Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.
Radio	**Ant.**	**Port**	**WLAN 5GHz Band 1, 4 functions**
2	5~8	1~4	IEEE 802.11a/n/ac/ax mode (8TX/8RX): Port 1, Port 2, Port 3, Port 4, Port 5, Port 6, Port 7 and Port 8 could transmit/receive simultaneously.
3	9~12	5~8	

<SBS mode>

Radio	Ant.	Port	WLAN 5GHz High Band function
2	5~8	1~4	IEEE 802.11a/n/ac/ax mode (4TX/4RX): Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.
Radio	**Ant.**	**Port**	**WLAN 5GHz Low Band function**
3	9~12	1~4	IEEE 802.11a/n/ac/ax mode (4TX/4RX): Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

<Scan Radio>

Radio	Ant.	Port	WLAN 2.4GHz function
4	13	1	IEEE 802.11b/g/n/VHT mode (1TX/1RX): Only Port 1 can be used as transmitting/receiving.
Radio	**Ant.**	**Port**	**WLAN 5GHz Band 1, 4 functions**
4	13	1	IEEE 802.11a/n/ac mode (1TX/1RX): Only Port 1 can be used as transmitting/receiving.

<Bluetooth Radio>

Radio	Ant.	Port	Bluetooth function (1TX/1RX)
5	14	1	Only Port 1 can be used as transmitting/receiving.

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	0.675	1.71	443.75u	3k

Note:
- DC is Duty Cycle.
- DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

EUT Power Type	From power adapter or PoE			
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	QRCT			
Support Mode	☒	LE 1M PHY: 1 Mb/s		
	☐	LE Coded PHY (S=2): 500 Kb/s		
	☐	LE Coded PHY (S=8): 125 Kb/s		
	☐	LE 2M PHY: 2 Mb/s		

Note: The above information was declared by manufacturer.

1.2 Applicable Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 558074 D01 v05r02
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location							
☐	HWA YA	ADD	:	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)			
		TEL	:	886-3-327-3456	FAX	:	886-3-327-0973
☒	JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.			
		TEL	:	886-3-656-9065	FAX	:	886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-CB	Owen Hsu	23.6~24.9°C / 55~58%	Oct. 22, 2019~Feb. 07, 2020
Radiated below 1GHz	03CH05-CB	KJ Huang	23.7~25.5°C / 60~63%	Sep. 26, 2019~Oct. 24, 2019
Radiated above 1GHz	03CH06-CB	Eason Chen	23~24.8°C / 50~55%	Oct. 14, 2019~Jan. 16, 2020
AC Conduction for mode 1~mode 3	CO01-CB	Peter Wu	24~25°C / 60~62%	Dec. 02, 2019
AC Conduction for mode 4~mode 6	CO01-CB	Max Lin	24~25°C / 60~62%	Dec. 02, 2019

Test site Designation No. TW0006 with FCC.
Test site registered number IC 4086D with Industry Canada.

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Conducted Emission	2.4 dB	Confidence levels of 95%
Output Power Measurement	1.5 dB	Confidence levels of 95%
Power Density Measurement	2.4 dB	Confidence levels of 95%
Bandwidth Measurement	2%	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	8
2440MHz	8
2480MHz	8

2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	Normal Link
1	Normal Link with Adapter-DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio
2	Normal Link with Adapter-DBS Mode (2.4GHz) + SBS Mode (5GHz low band) + SBS Mode (5GHz high band)+ Scan Radio (5GHz) + Bluetooth Radio
Mode 1 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow this same test mode.	
3	Normal Link with PoE-DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio
4	Normal Link with Adapter-DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (2.4GHz) + Bluetooth Radio
5	Normal Link with Adapter-DBS Mode (2.4GHz) + SBS Mode (5GHz low band) + SBS Mode (5GHz high band)+ Scan Radio (2.4GHz) + Bluetooth Radio
Mode 5 has been evaluated to be the worst case among Mode 4~5, thus measurement for Mode 6 will follow this same test mode.	
6	Normal Link with PoE- DBS Mode (2.4GHz) + SBS Mode (5GHz low band) + SBS Mode (5GHz high band) + Scan Radio (2.4GHz) + Bluetooth Radio
For operating mode 1 is the worst case and it was record in this test report.	

The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link
1	Normal Link with Adapter-DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio-EUT in Z axis
2	Normal Link with Adapter-DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio-EUT in Y axis
Mode 2 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow this same test mode.	
3	Normal Link with Adapter-DBS Mode (2.4GHz) + SBS Mode (5GHz low band) + SBS Mode (5GHz high band)+ Scan Radio (5GHz) + Bluetooth Radio-EUT in Y axis
Mode 2 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4 will follow this same test mode.	
4	Normal Link with PoE-DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio-EUT in Y axis
5	Normal Link with Adapter-DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio-EUT in Y axis
6	Normal Link with Adapter-DBS Mode (2.4GHz) + SBS Mode (5GHz low band) + SBS Mode (5GHz high band)+ Scan Radio (2.4GHz) + Bluetooth Radio -EUT in Y axis
Mode 6 has been evaluated to be the worst case among Mode 5~6, thus measurement for Mode 7 will follow this same test mode.	
7	Normal Link with PoE-DBS Mode (2.4GHz) + SBS Mode (5GHz low band) + SBS Mode (5GHz high band)+ Scan Radio (2.4GHz) + Bluetooth Radio -EUT in Y axis
For operating mode 2 is the worst case and it was record in this test report.	
Operating Mode > 1GHz	CTX
The EUT was performed at Y axis and Z axis position for Emissions in Restricted Frequency Bands above 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.	
1	EUT Y axis

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Operating Mode	
1	DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (2.4GHz) + Bluetooth Radio
2	DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio
3	SBS Mode (5GHz low band) + SBS Mode (5GHz high band) + DBS Mode (2.4GHz) + Scan Radio (2.4GHz) + Bluetooth Radio
4	SBS Mode (5GHz low band) + SBS Mode (5GHz high band) + DBS Mode (2.4GHz) + Scan Radio (5GHz) + Bluetooth Radio
Refer to Sporton Test Report No.: FA912418-02 for Co-location RF Exposure Evaluation.	

Note: For EUT + PoE, the PoE is for measurement only, would not be marketed.

Equipment	Brand Name	Model Name	FCC ID
PoE	Cambium	P060V04	N/A

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

Accessories					
No.	**Equipment Name**	**Brand Name**	**Model Name**	**Rating**	**Remark**
1	Adapter	CWT	KPL-040F-VI	INPUT: 100-240V, 50/60Hz, 1.7A OUTPUT: 12V, 3.33A, 40W	With the cable: Non-shielded, 1.3m
No.	**Others**				
2	Wall-mounted rack*1				
3	Power cable*1: Non-shielded, 2m				

2.5 Support Equipment

For AC Conduction:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Flash disk3.0	Transcend	JetFlash-700	N/A
B	5G LAN PC	DELL	T3400	N/A
C	2.4G NB	DELL	E6430	N/A
D	5G NB	DELL	E6430	N/A
E	1G LAN NB	DELL	E6430	N/A
G	Scan Radio NB	DELL	E6430	N/A

For Radiated (below 1GHz):

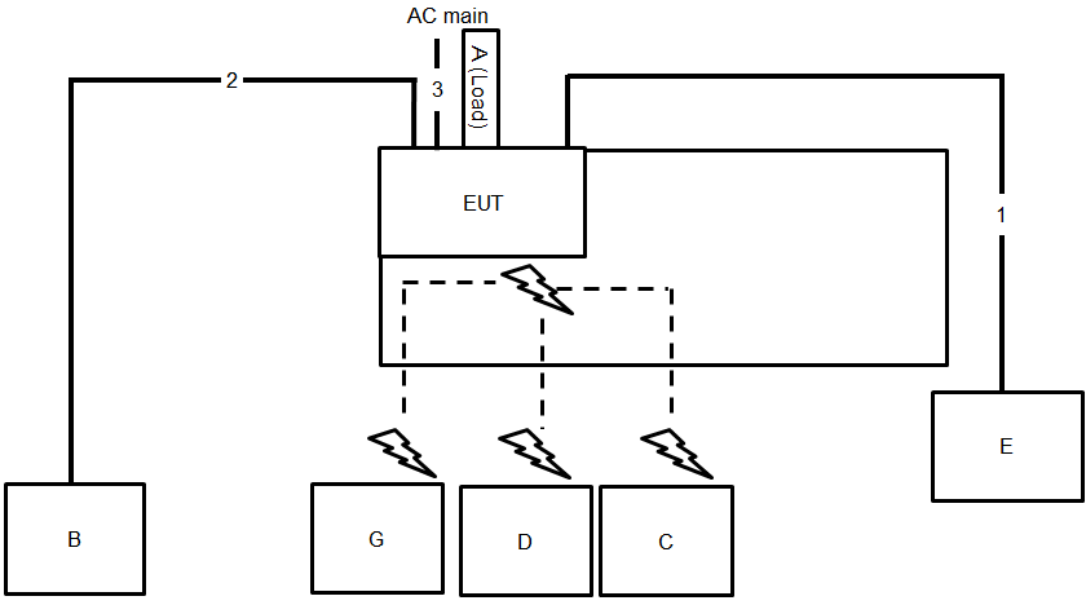
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Flash disk3.0	Transcend	JetFlash-700	N/A
B	Notebook	DELL	E4300	N/A
C	Notebook	DELL	E4300	N/A
D	Notebook	DELL	E4300	N/A
E	Notebook	DELL	E4300	N/A
F	PC	DELL	OPTIPLEX 380	N/A

For Radiated (above 1GHz) and RF Conducted:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	NB	DELL	E4300	N/A

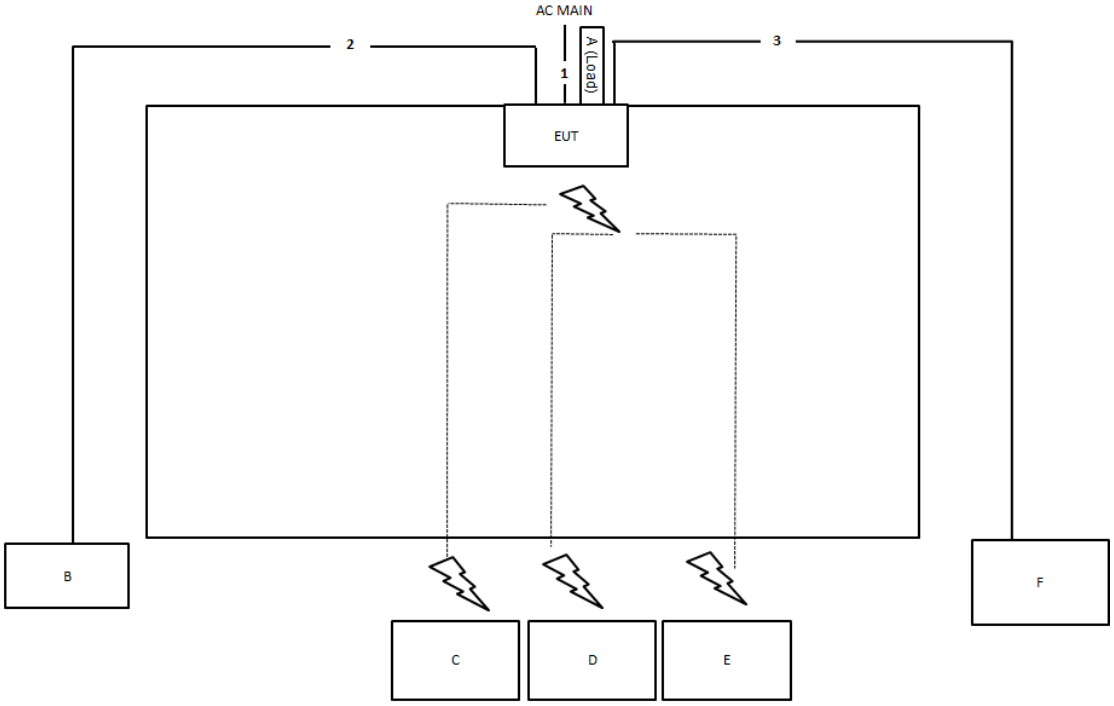
2.6 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



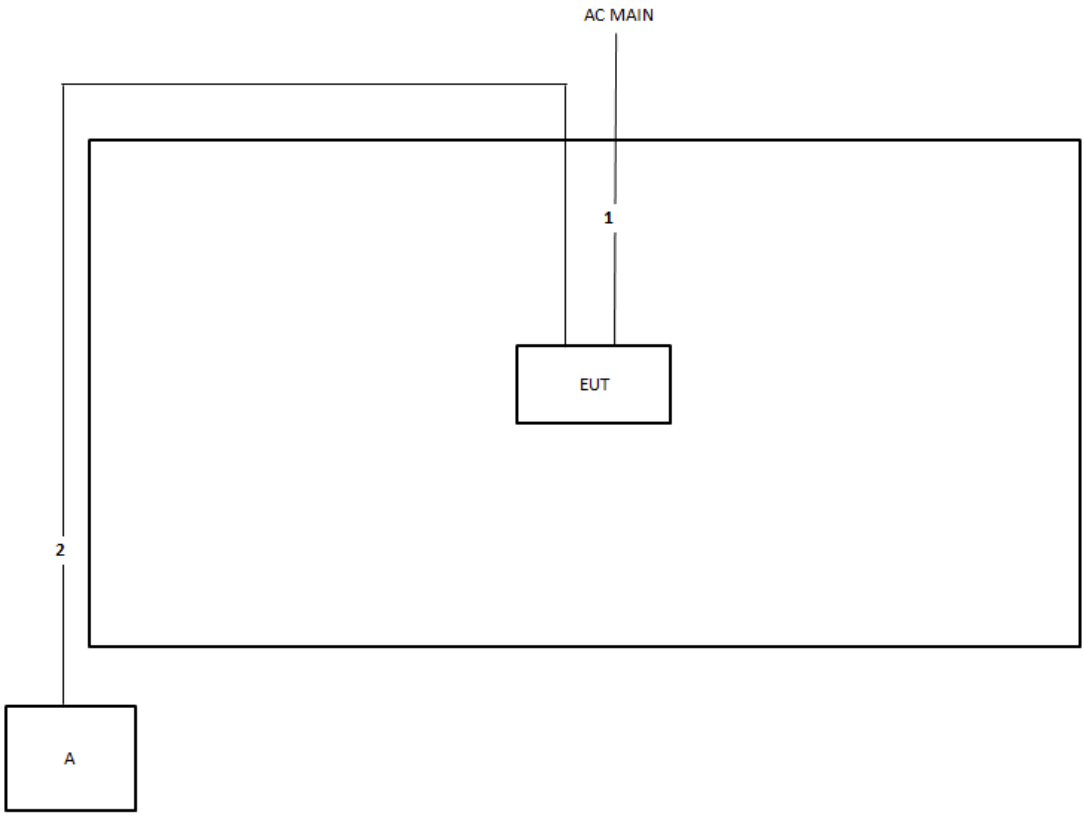
Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	RJ-45 cable	No	10m
3	Power cable	No	3.3m

Test Setup Diagram - Radiated Test < 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	3.3m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m

Test Setup Diagram - Radiated Test > 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	3.3m
2	RJ-45 cable	No	10m

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

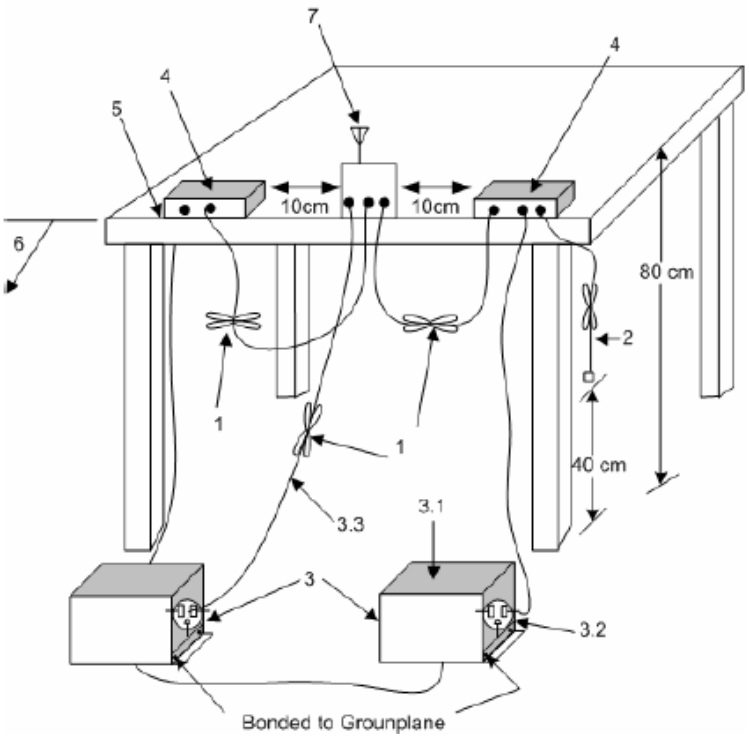
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
3.1—All other equipment powered from additional LISN(s).
3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
3.3—LISN at least 80 cm from nearest part of EUT chassis.
4—Non-EUT components of EUT system being tested.
5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
▪ 6 dB bandwidth ≥ 500 kHz.

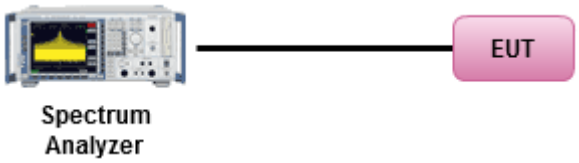
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method	
▪ For the emission bandwidth shall be measured using one of the options below:	
	☒ Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.
	☐ Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.
	☐ Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth


3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit		
	▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)	
	▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)$ dBm	
	▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm	
	▪ Smart antenna system (SAS):	
		- Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		- Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		- Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3 + 8$dB dBm
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, **G_{TX}** = the maximum transmitting antenna directional gain in dBi.		

3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method		
▪ Maximum Peak Conducted Output Power		
	☐	Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).
	☐	Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).
▪ Maximum Conducted Output Power		
	[duty cycle ≥ 98% or external video / power trigger]	
	☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.
	☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)
	duty cycle < 98% and average over on/off periods with duty factor	
	☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.
	☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)
	☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3
	☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)
	Measurement using a power meter (PM)	
	☐	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).
	☒	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using an gate RF average power meter).

▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)

3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
▪ Power Spectral Density (PSD)≤8 dBm/3kHz

3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

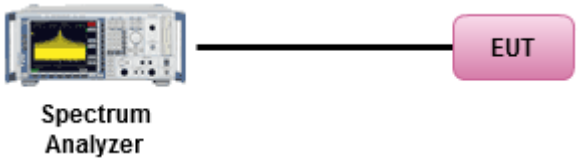
3.4.3 Test Procedures

Test Method		
▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).		
	☒ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.2 Method PKPSD.	
	[duty cycle ≥ 98% or external video / power trigger]	
	☐ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.3 Method AVGPSD-1.	
	☐ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.5 Method AVGPSD-2.	
	☐ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.7 Method AVGPSD-3.	
	duty cycle < 98% and average over on/off periods with duty factor	
	☐ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.4 Method AVGPSD-1A. (alternative).	
	☐ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.6 Method AVGPSD-2A. (alternative)	
	☐ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.8 Method AVGPSD-3A. (alternative)	
▪ For conducted measurement.		
	▪ If The EUT supports multiple transmit chains using options given below:	
		☐ Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
		☐ Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,

		☐ Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.

3.4.4 Test Setup

Power Spectral Density



3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dBc)**
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

3.5.2 Measuring Instruments

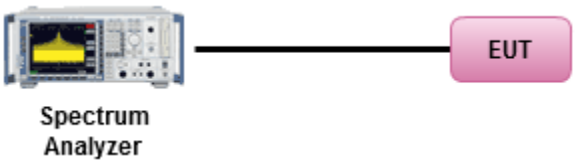
Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method
▪ Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.

3.5.4 Test Setup

Emissions in Non-restricted Frequency Bands



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB / decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

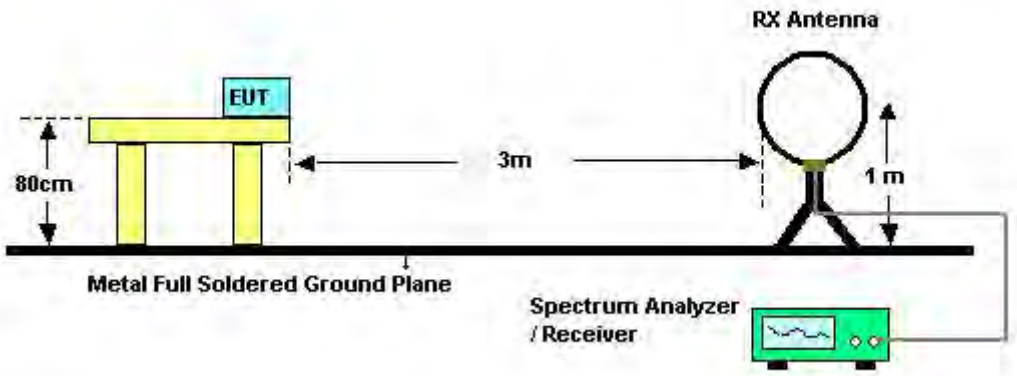
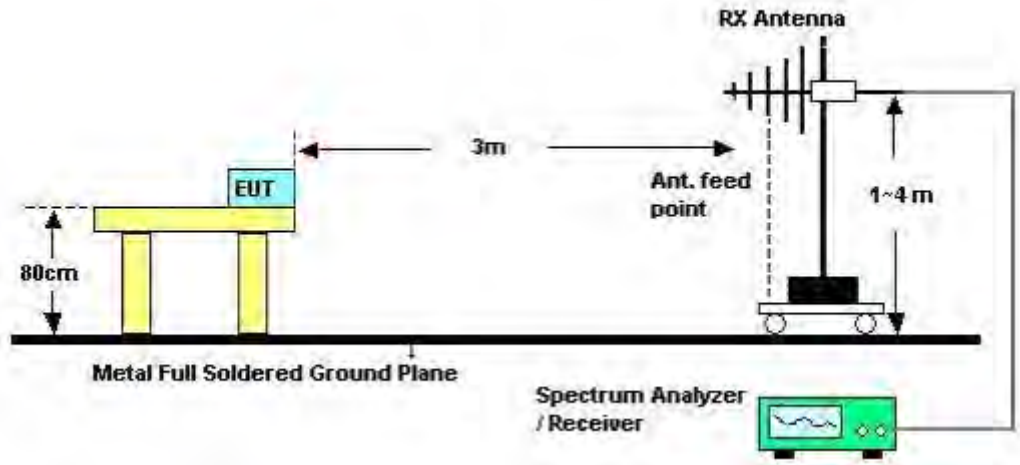
3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

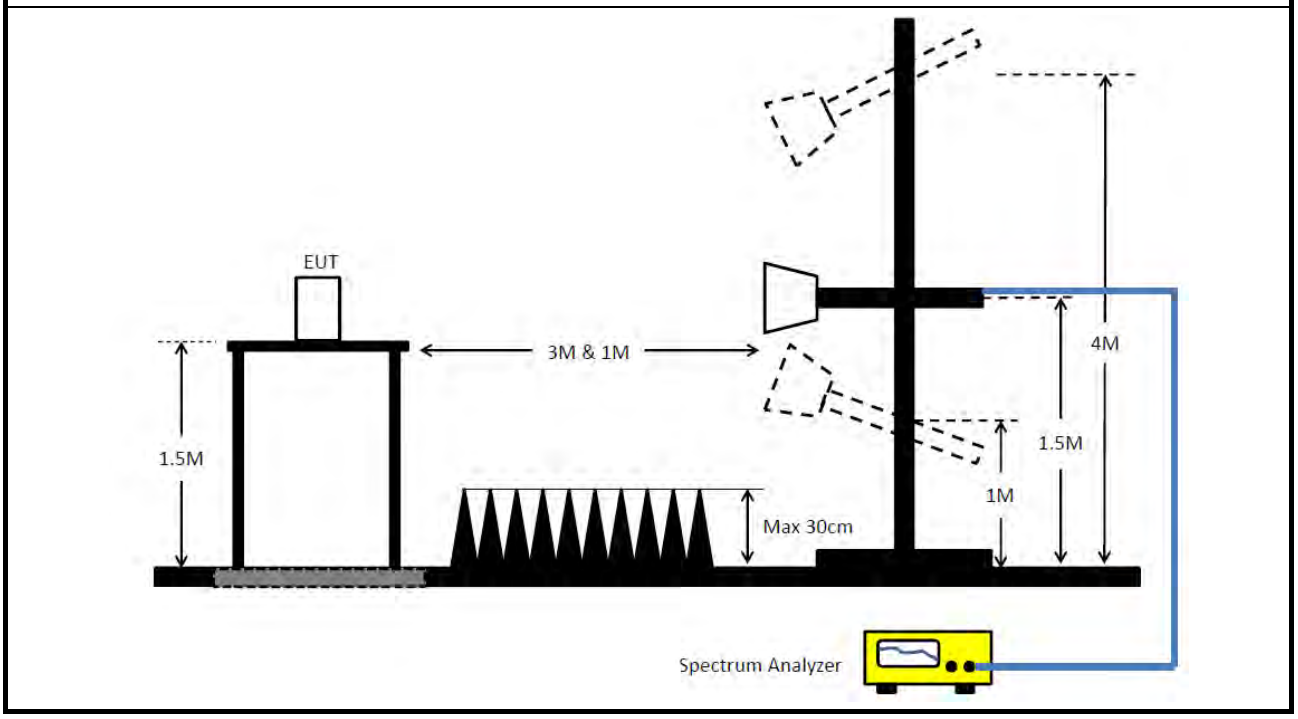
3.6.3 Test Procedures

Test Method			
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].			
▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.			
▪ For the transmitter unwanted emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.		
		☐	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle ≥98%).
		☐	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
		☒	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).
		☐	Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
		☒	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074 clause 8.7 & c63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.		
	▪ Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.		
	▪ Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).		
	▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB		
	▪ For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.		

3.6.4 Test Setup

Emissions in Restricted Frequency Bands
9kHz ~30MHz

30MHz~1GHz


Above 1GHz



3.6.5 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.6.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10 harmonic or 40 GHz, whichever is appropriate.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 28, 2019	Jan. 29, 2020	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 24, 2018	Dec. 23, 2019	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Jan. 11, 2019	Jan. 10, 2020	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 21, 2019	May 20, 2020	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESE & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 28, 2019	Mar. 27, 2020	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	May 01, 2019	Apr. 30, 2020	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Aug. 15, 2019	Aug. 14, 2020	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	LOW Cable-04+23	30MHz~1GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	LOW Cable-04+23	30MHz~1GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1292	1GHz~18GHz	Jul. 17, 2019	Jul. 16, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 12, 2019	Jun. 11, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	May 08, 2019	May 07, 2020	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 03, 2018	Oct. 02, 2019	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 21, 2019	Oct. 20, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05	1GHz~18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05	1GHz~18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05+24	1GHz~18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05+24	1GHz~18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)

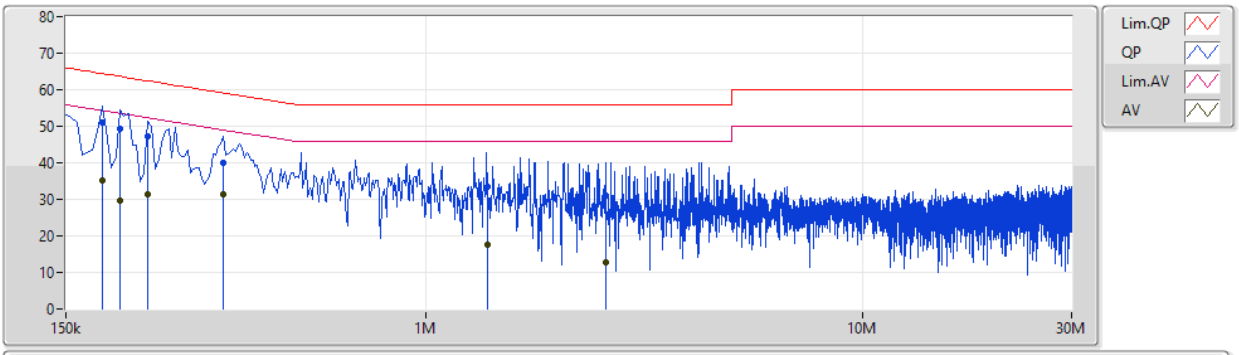
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Feb. 25, 2019	Feb. 24, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-28	1 GHz –26.5 GHz	Nov. 19, 2018	Nov. 18, 2019	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	1126203	300MHz~40GHz	Sep. 11, 2019	Sep. 10, 2020	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1210004	300MHz~40GHz	Sep. 11, 2019	Sep. 10, 2020	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	Normal Link		

02/12/2019

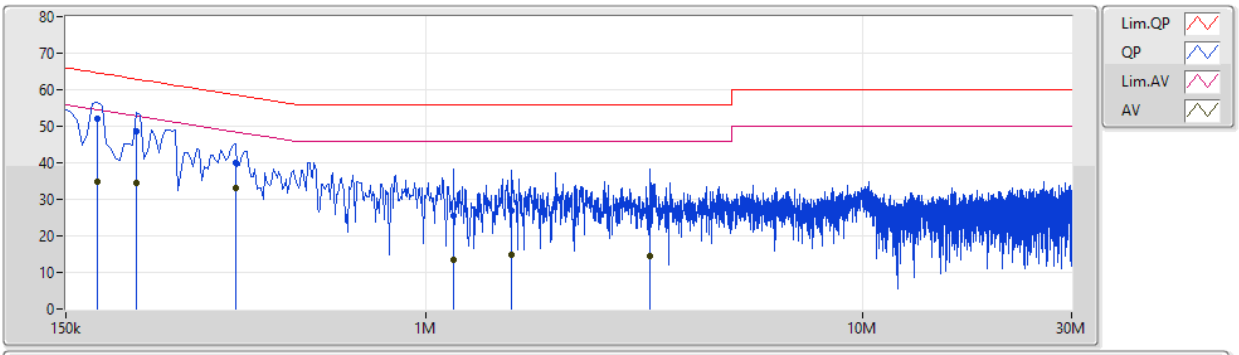


Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	AF	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	181.5k	50.87	64.41	-13.54	9.91	Line	"Worst"	40.96	0.06	0.06	9.79
AV	181.5k	35.05	54.41	-19.36	9.91	Line	-	25.14	0.06	0.06	9.79
QP	199.5k	49.24	63.63	-14.39	9.91	Line	-	39.33	0.06	0.06	9.79
AV	199.5k	29.79	53.63	-23.84	9.91	Line	-	19.88	0.06	0.06	9.79
QP	231k	47.23	62.41	-15.18	9.91	Line	-	37.32	0.06	0.06	9.79
AV	231k	31.49	52.41	-20.92	9.91	Line	-	21.58	0.06	0.06	9.79
QP	343.5k	39.96	59.12	-19.16	9.93	Line	-	30.03	0.06	0.06	9.81
AV	343.5k	31.43	49.12	-17.69	9.93	Line	-	21.50	0.06	0.06	9.81
QP	1.379M	33.29	56.00	-22.71	10.00	Line	-	23.29	0.08	0.10	9.82
AV	1.379M	17.66	46.00	-28.34	10.00	Line	-	7.66	0.08	0.10	9.82
QP	2.58M	31.12	56.00	-24.88	10.06	Line	-	21.06	0.10	0.14	9.82
AV	2.58M	12.89	46.00	-33.11	10.06	Line	-	2.83	0.10	0.14	9.82

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	Normal Link		

02/12/2019



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	AF	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	177k	51.91	64.62	-12.71	9.89	Neutral	"Worst"	42.02	0.04	0.06	9.79
AV	177k	34.97	54.62	-19.65	9.89	Neutral	-	25.08	0.04	0.06	9.79
QP	217.5k	48.57	62.92	-14.35	9.89	Neutral	-	38.68	0.04	0.06	9.79
AV	217.5k	34.53	52.92	-18.39	9.89	Neutral	-	24.64	0.04	0.06	9.79
QP	366k	40.15	58.60	-18.45	9.91	Neutral	-	30.24	0.04	0.06	9.81
AV	366k	32.94	48.60	-15.66	9.91	Neutral	-	23.03	0.04	0.06	9.81
QP	1.158M	25.49	56.00	-30.51	9.98	Neutral	-	15.51	0.06	0.10	9.82
AV	1.158M	13.42	46.00	-32.58	9.98	Neutral	-	3.44	0.06	0.10	9.82
QP	1.572M	26.96	56.00	-29.04	10.01	Neutral	-	16.95	0.07	0.11	9.83
AV	1.572M	15.00	46.00	-31.00	10.01	Neutral	-	4.99	0.07	0.11	9.83
QP	3.255M	25.72	56.00	-30.28	10.07	Neutral	-	15.65	0.09	0.16	9.82
AV	3.255M	14.37	46.00	-31.63	10.07	Neutral	-	4.30	0.09	0.16	9.82

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	702.5k	1.029M	1M03F1D	693.75k	1.024M

Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

Result

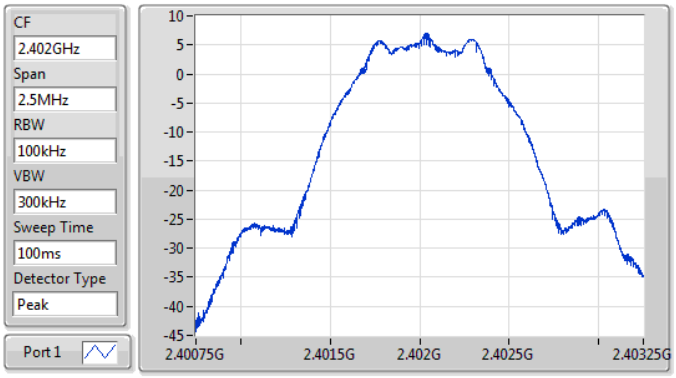
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	702.5k	1.024M
2440MHz	Pass	500k	696.25k	1.029M
2480MHz	Pass	500k	693.75k	1.029M

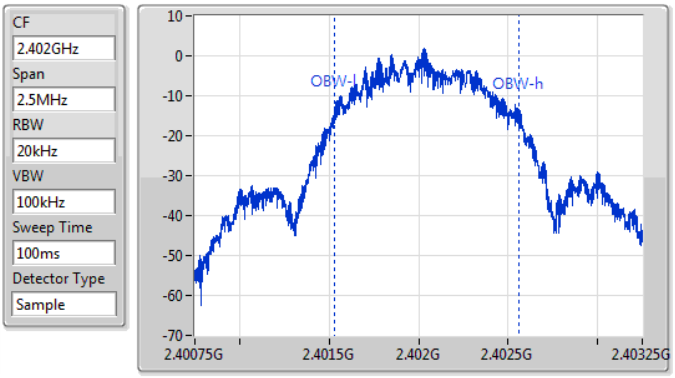
Port X-N dB = Port **X** 6dB down bandwidth; **Port X-OBW** = Port **X** 99% occupied bandwidth;

BT-LE(1Mbps) EBW

2402MHz

02/11/2019



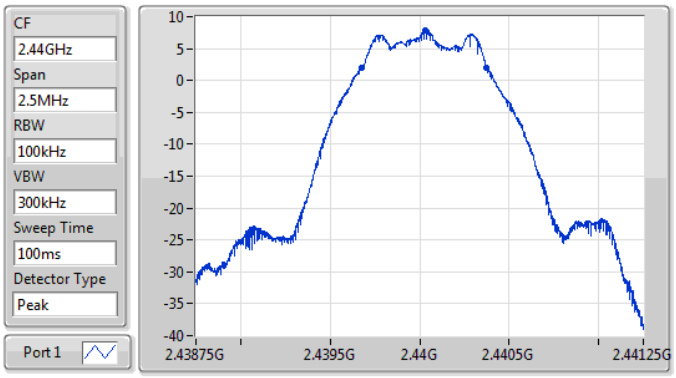


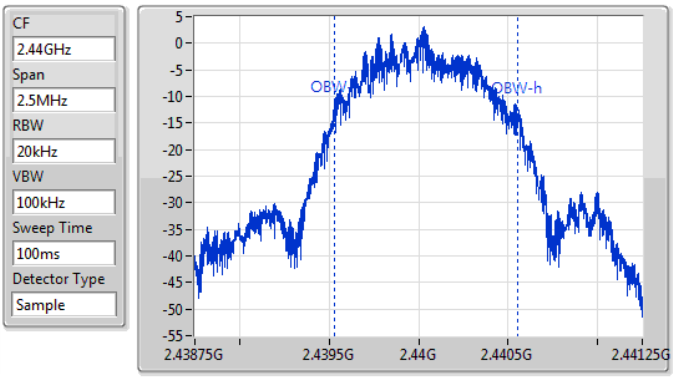
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
702.5k	2.401684G	2.402386G	1.024M	2.401533G	2.402557G	500k	1

BT-LE(1Mbps) EBW

2440MHz

02/11/2019



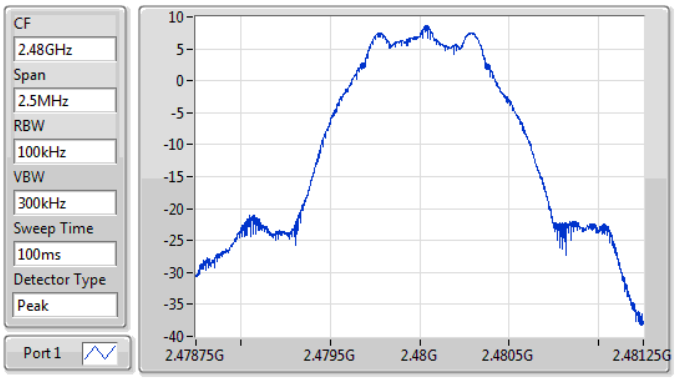


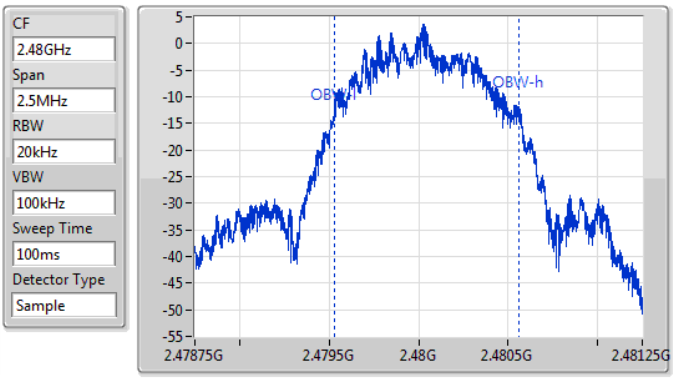
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
696.25k	2.439679G	2.440375G	1.029M	2.439526G	2.440556G	500k	1

BT-LE(1Mbps) **EBW**

2480MHz

02/11/2019





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
693.75k	2.479685G	2.480379G	1.029M	2.479529G	2.480558G	500k	1

Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	8.29	0.00675

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	4.90	6.68	30.00
2440MHz	Pass	4.90	7.94	30.00
2480MHz	Pass	4.90	8.29	30.00

DG = Directional Gain; **Port X** = Port X output power

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-6.65

RBW=3 kHz.

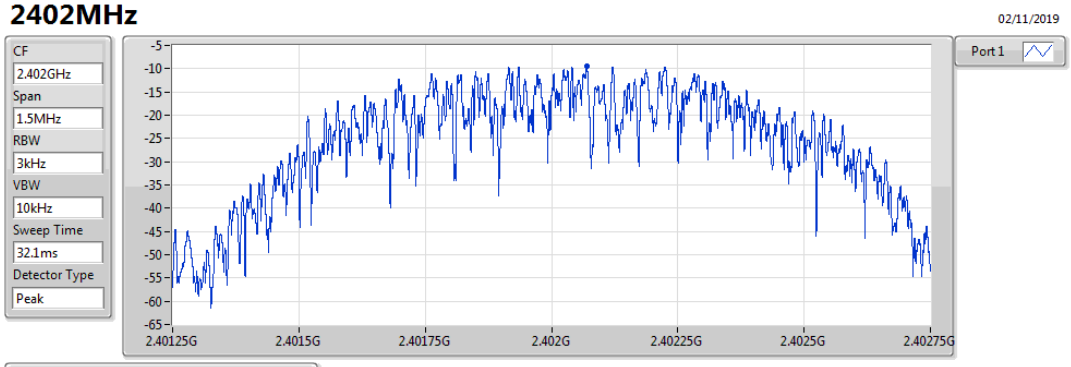
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	4.90	-9.57	8.00
2440MHz	Pass	4.90	-6.99	8.00
2480MHz	Pass	4.90	-6.65	8.00

DG = Directional Gain; RBW=3 kHz;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

BT-LE(1Mbps) **PSD**

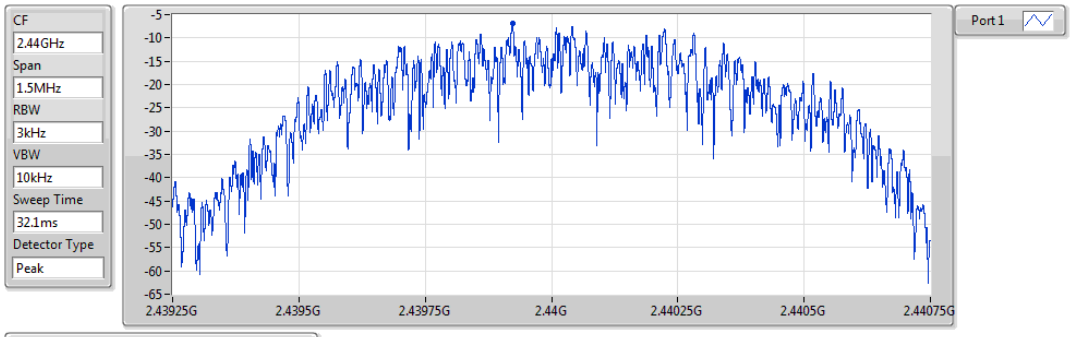
2402MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-9.57	-9.57	-9.57

BT-LE(1Mbps) **PSD**

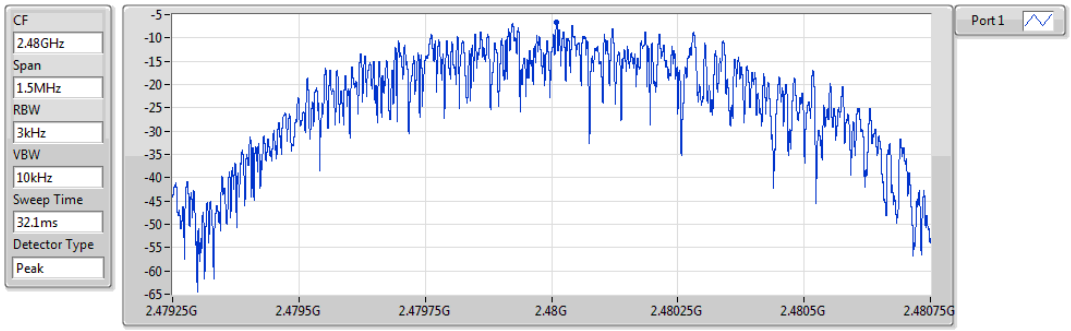
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.99	-6.99	-6.99

BT-LE(1Mbps) **PSD**

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.65	-6.65	-6.65

Summary

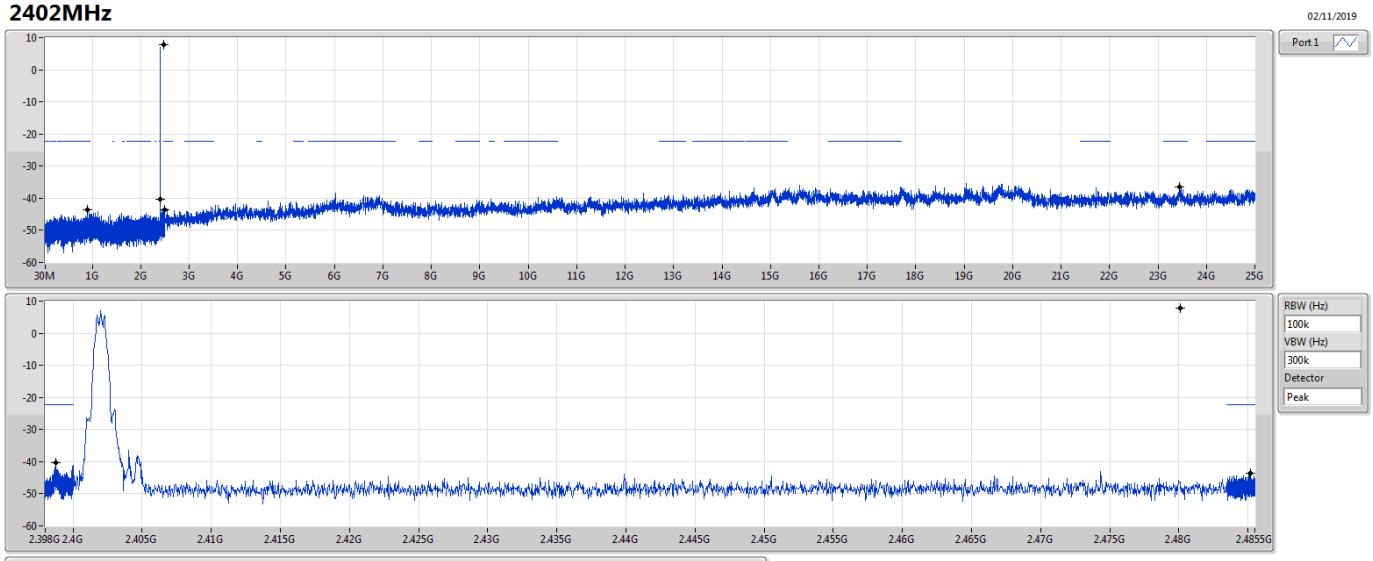
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.48008G	7.84	-22.16	528.46M	-43.48	2.39951G	-44.36	2.48453G	-43.33	15.33565G	-35.50	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.48008G	7.84	-22.16	892.54M	-43.64	2.39875G	-40.31	2.48521G	-43.58	23.43806G	-36.48	1
2440MHz	Pass	2.48008G	7.84	-22.16	528.46M	-43.48	2.39951G	-44.36	2.48453G	-43.33	15.33565G	-35.50	1
2480MHz	Pass	2.48008G	7.84	-22.16	858.5M	-45.30	2.39967G	-44.65	2.4837G	-43.19	17.67716G	-36.88	1

BT-LE(1Mbps) **CSE NdB**

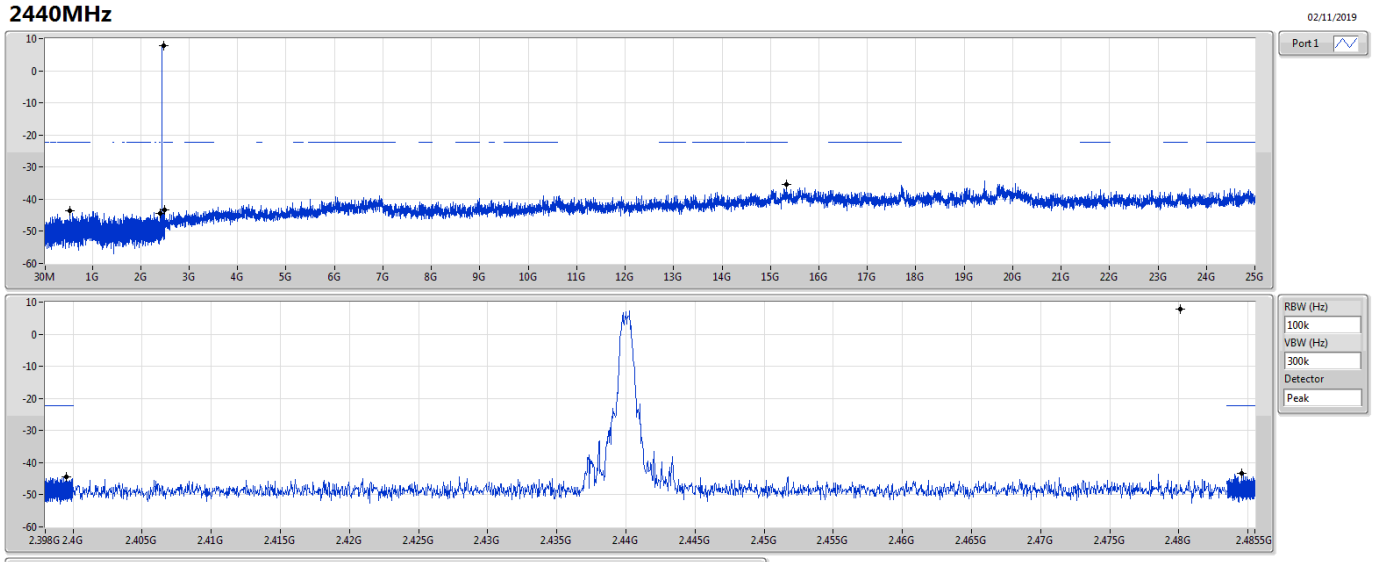
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.48008G	7.84	-22.16	892.54M	-43.64	2.39875G	-40.31	2.48521G	-43.58	23.43806G	-36.48	1

BT-LE(1Mbps) **CSE NdB**

2440MHz

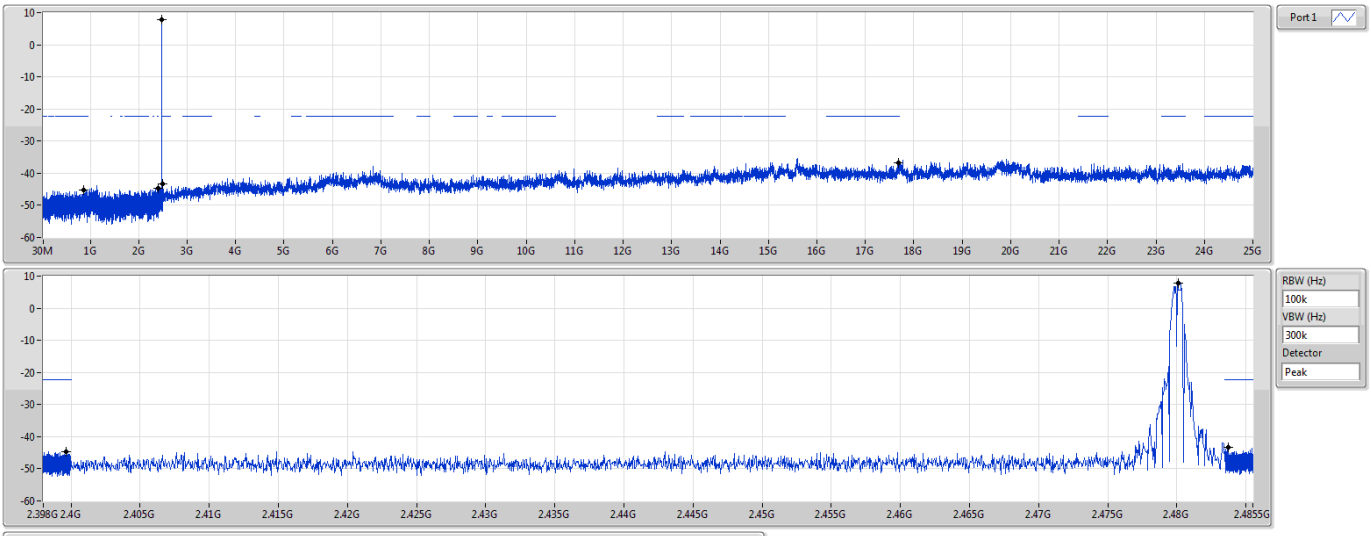


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.48008G	7.84	-22.16	528.46M	-43.48	2.39951G	-44.36	2.48453G	-43.33	15.33565G	-35.50	1

BT-LE(1Mbps) **CSE NdB**

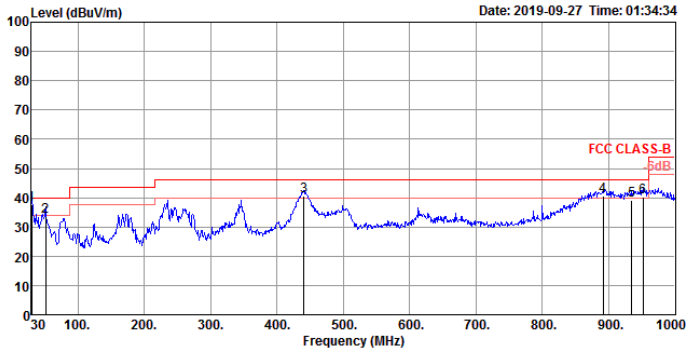
2480MHz

02/11/2019



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.48008G	7.84	-22.16	858.5M	-45.30	2.39967G	-44.65	2.4837G	-43.19	17.67716G	-36.88	1

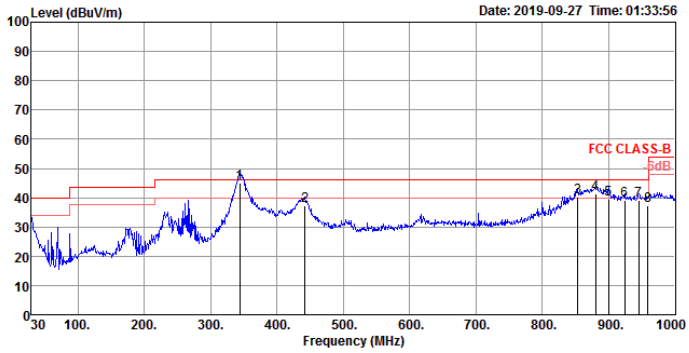
RSE below 1GHz Result			
Operating Mode	2	**Polarization**	Vertical
Operating Function	Normal Link		



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.00	37.51	40.00	-2.49	42.72	0.67	25.70	31.58	100	177	QP	VERTICAL
2	51.34	33.72	40.00	-6.28	50.06	0.92	14.50	31.76	100	1	QP	VERTICAL
3	440.31	40.47	46.00	-5.53	47.09	2.74	22.91	32.27	150	359	QP	VERTICAL
4	891.36	40.61	46.00	-5.39	41.37	4.03	27.62	32.41	125	193	QP	VERTICAL
5	935.01	39.15	46.00	-6.85	39.29	4.10	27.92	32.16	200	174	QP	VERTICAL
6	951.50	40.33	46.00	-5.67	40.27	4.11	28.02	32.07	150	284	QP	VERTICAL

Note 1: “>20dB” means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found emissions (No emissions were detected.)

RSE below 1GHz Result			
Operating Mode	2	**Polarization**	Horizontal
Operating Function	Normal Link		



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	344.28	45.14	46.00	-0.86	53.80	2.43	21.04	32.13	100	169	QP	HORIZONTAL
2	442.25	37.09	46.00	-8.91	43.69	2.75	22.92	32.27	100	360	QP	HORIZONTAL
3	853.53	40.21	46.00	-5.79	41.50	3.78	27.32	32.39	200	224	QP	HORIZONTAL
4	880.69	41.16	46.00	-4.84	42.05	3.96	27.55	32.40	200	218	QP	HORIZONTAL
5	900.09	39.47	46.00	-6.53	40.09	4.09	27.70	32.41	200	218	QP	HORIZONTAL
6	924.34	39.18	46.00	-6.82	39.45	4.10	27.86	32.23	100	186	QP	HORIZONTAL
7	945.68	39.21	46.00	-6.79	39.22	4.10	27.98	32.09	100	200	QP	HORIZONTAL
8	959.26	37.33	46.00	-8.67	37.22	4.12	28.06	32.07	100	205	QP	HORIZONTAL

Note 1: “>20dB” means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found emissions (No emissions were detected.)

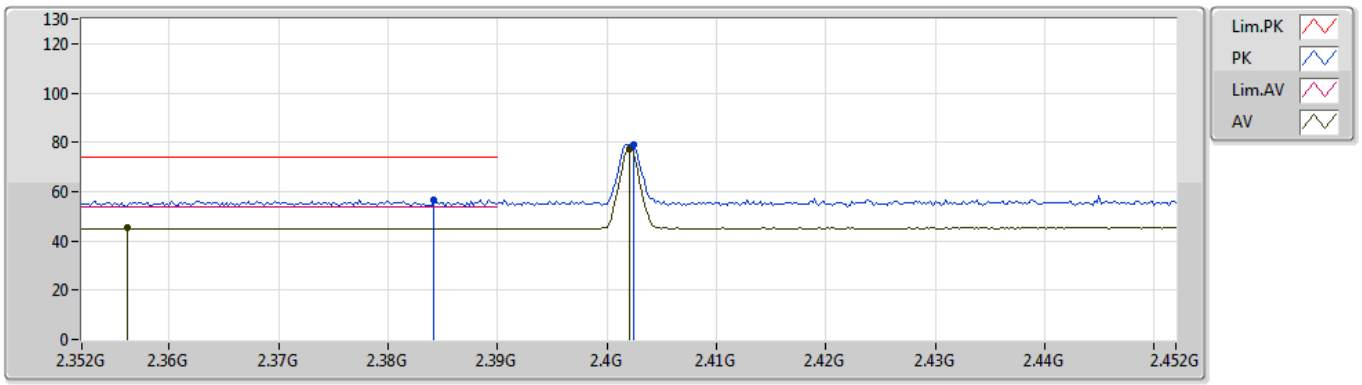
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.4982G	45.94	54.00	-8.06	32.58	3	Horizontal	18	1.16	-

BT-LE(1Mbps)

2402MHz_TX

01/11/2019



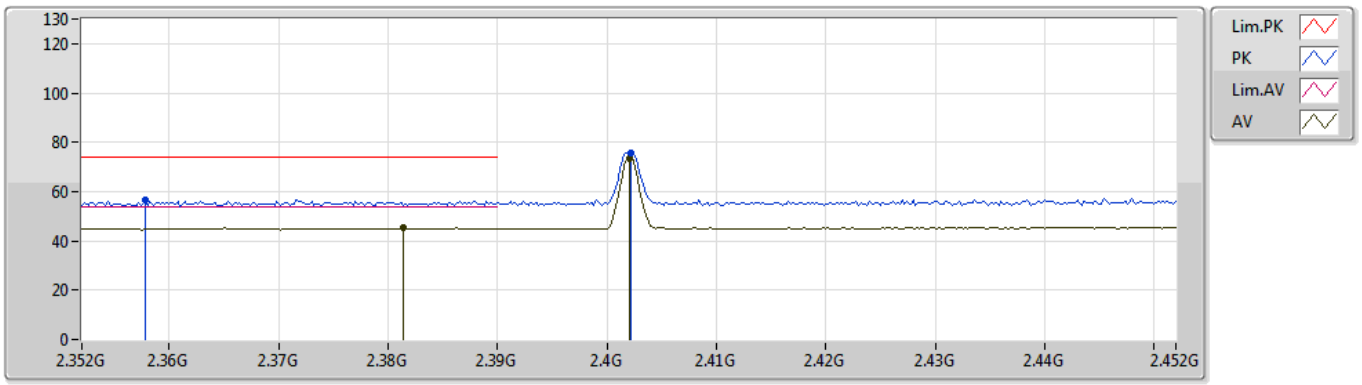
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	2.3842G	56.76	74.00	-17.24	31.88	3	Vertical	16	1.28	-	24.88
AV	2.3562G	45.17	54.00	-8.83	31.79	3	Vertical	16	1.28	-	13.38
PK	2.4024G	78.98	Inf	-Inf	31.95	3	Vertical	16	1.28	-	47.03
AV	2.402G	77.28	Inf	-Inf	31.95	3	Vertical	16	1.28	-	45.33

BT-LE(1Mbps)

2402MHz_TX

01/11/2019



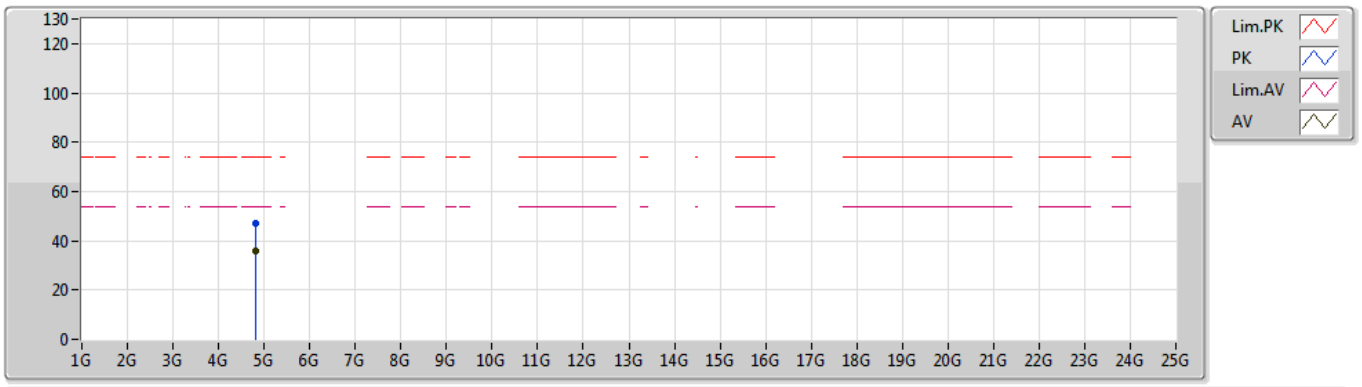
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	2.3578G	56.78	74.00	-17.22	31.79	3	Horizontal	313	1.15	-	24.99
AV	2.3814G	45.19	54.00	-8.81	31.87	3	Horizontal	313	1.15	-	13.32
PK	2.4022G	75.59	Inf	-Inf	31.95	3	Horizontal	313	1.15	-	43.64
AV	2.402G	73.68	Inf	-Inf	31.95	3	Horizontal	313	1.15	-	41.73

BT-LE(1Mbps)

2402MHz_TX

01/11/2019



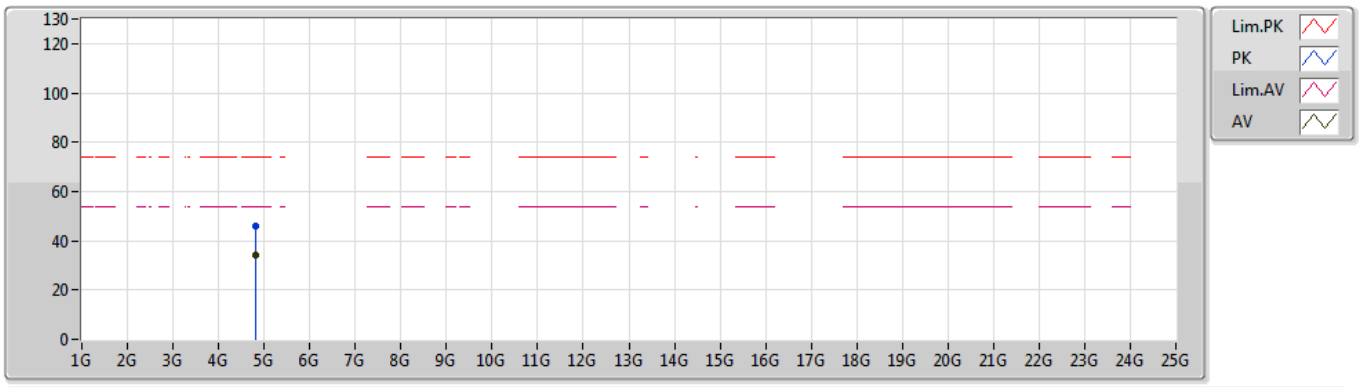
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	4.80372G	47.25	74.00	-26.75	4.20	3	Vertical	44	1.50	-	43.05
AV	4.80388G	35.81	54.00	-18.19	4.20	3	Vertical	44	1.50	-	31.61

BT-LE(1Mbps)

2402MHz_TX

01/11/2019



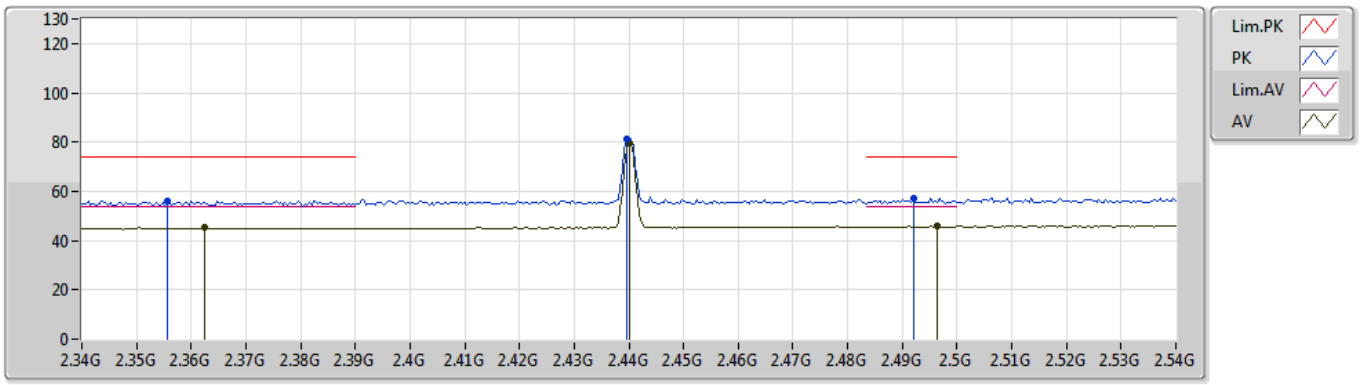
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	4.8036G	46.10	74.00	-27.90	4.20	3	Horizontal	222	1.86	-	41.90
AV	4.80432G	34.27	54.00	-19.73	4.20	3	Horizontal	222	1.86	-	30.07

BT-LE(1Mbps)

2440MHz_TX

01/11/2019



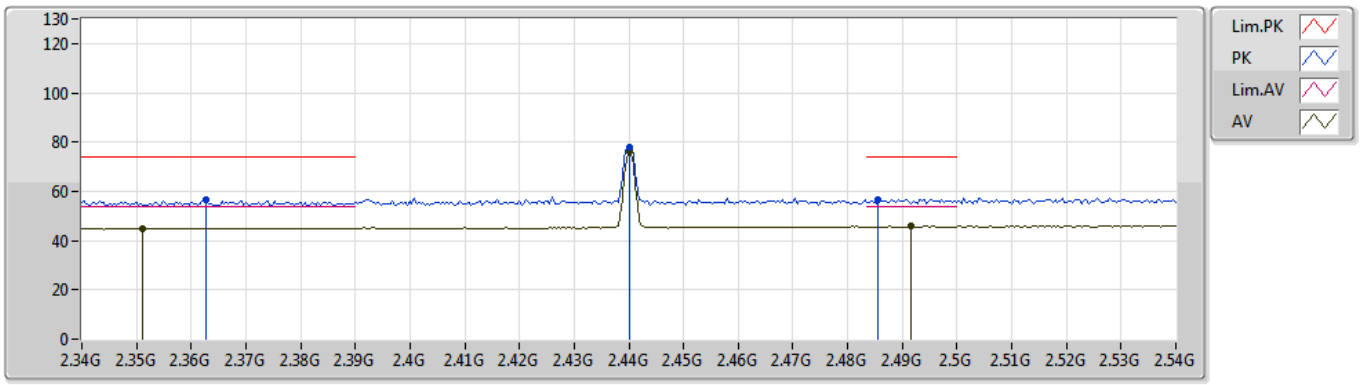
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	2.3556G	56.29	74.00	-17.71	31.79	3	Vertical	12	1.50	-	24.50
AV	2.3624G	45.15	54.00	-8.85	31.81	3	Vertical	12	1.50	-	13.34
PK	2.4396G	81.36	Inf	-Inf	32.20	3	Vertical	12	1.50	-	49.16
AV	2.44G	79.73	Inf	-Inf	32.20	3	Vertical	12	1.50	-	47.53
PK	2.492G	57.22	74.00	-16.78	32.54	3	Vertical	12	1.50	-	24.68
AV	2.4964G	45.78	54.00	-8.22	32.57	3	Vertical	12	1.50	-	13.21

BT-LE(1Mbps)

2440MHz_TX

01/11/2019



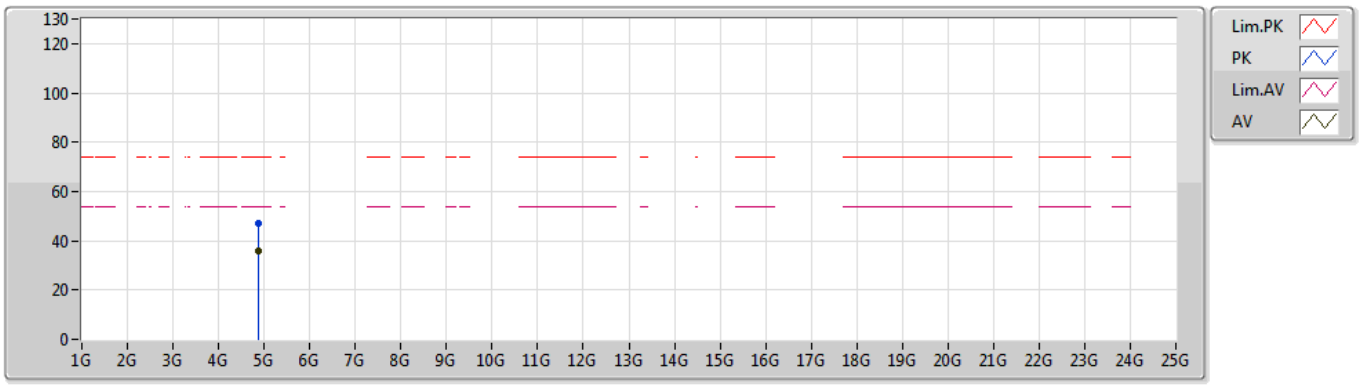
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	2.3628G	56.35	74.00	-17.65	31.81	3	Horizontal	314	1.25	-	24.54
AV	2.3512G	45.10	54.00	-8.90	31.77	3	Horizontal	314	1.25	-	13.33
PK	2.44G	77.83	Inf	-Inf	32.20	3	Horizontal	314	1.25	-	45.63
AV	2.44G	76.07	Inf	-Inf	32.20	3	Horizontal	314	1.25	-	43.87
PK	2.4856G	56.60	74.00	-17.40	32.49	3	Horizontal	314	1.25	-	24.11
AV	2.4916G	45.71	54.00	-8.29	32.54	3	Horizontal	314	1.25	-	13.17

BT-LE(1Mbps)

2440MHz_TX

01/11/2019



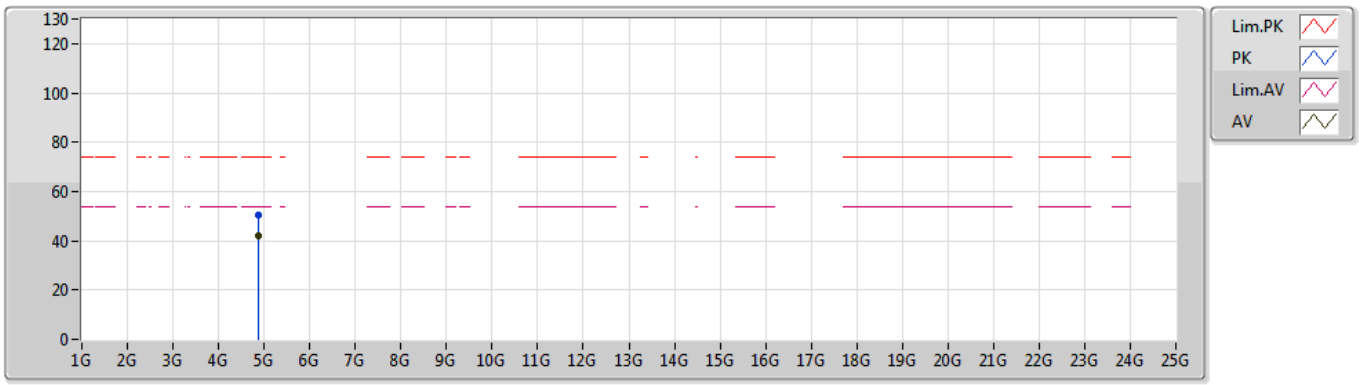
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	4.88032G	47.12	74.00	-26.88	4.36	3	Vertical	40	1.55	-	42.76
AV	4.88052G	35.90	54.00	-18.10	4.36	3	Vertical	40	1.55	-	31.54

BT-LE(1Mbps)

2440MHz_TX

01/11/2019



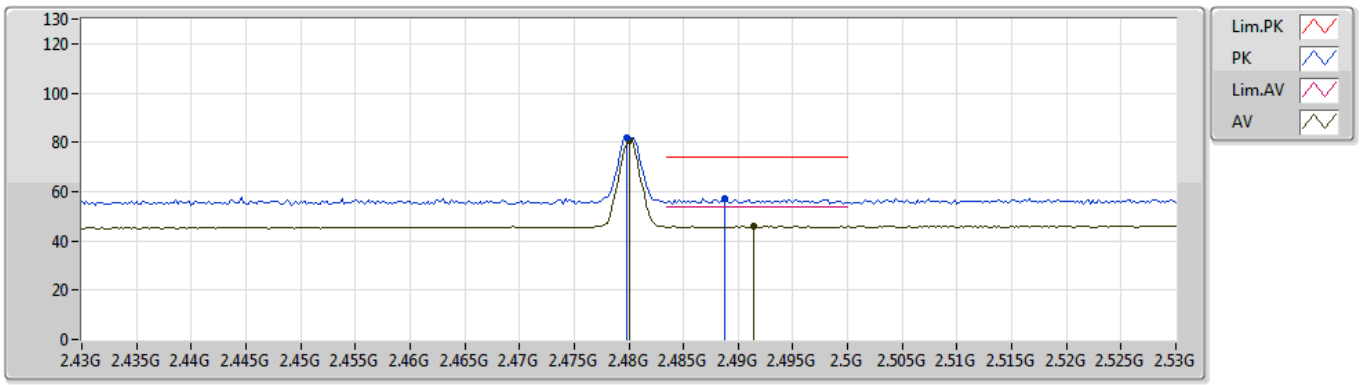
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	4.87956G	50.65	74.00	-23.35	4.36	3	Horizontal	62	2.15	-	46.29
AV	4.88012G	42.21	54.00	-11.79	4.36	3	Horizontal	62	2.15	-	37.85

BT-LE(1Mbps)

2480MHz_TX

01/11/2019



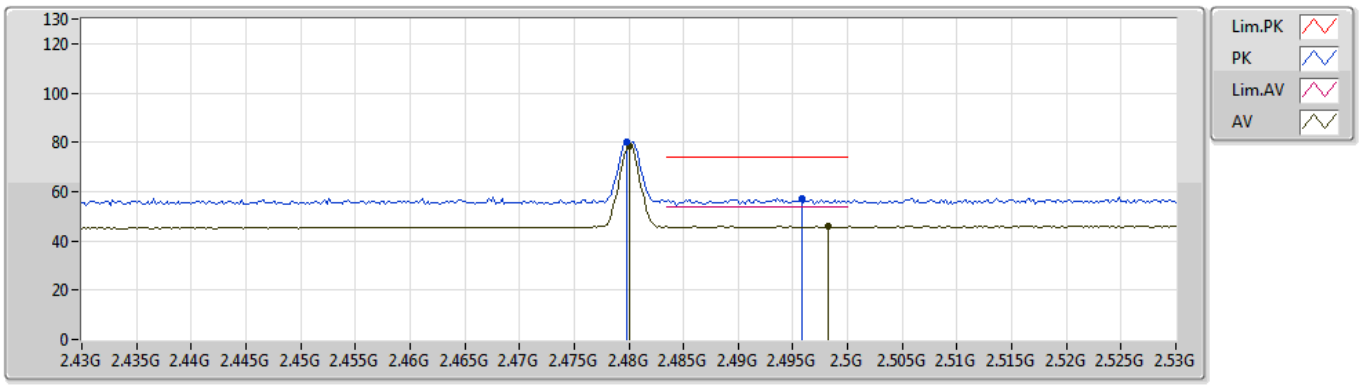
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	2.4798G	82.04	Inf	-Inf	32.46	3	Vertical	0	2.94	-	49.58
AV	2.48G	80.44	Inf	-Inf	32.46	3	Vertical	0	2.94	-	47.98
PK	2.4888G	57.35	74.00	-16.65	32.51	3	Vertical	0	2.94	-	24.84
AV	2.4914G	45.91	54.00	-8.09	32.54	3	Vertical	0	2.94	-	13.37

BT-LE(1Mbps)

2480MHz_TX

01/11/2019



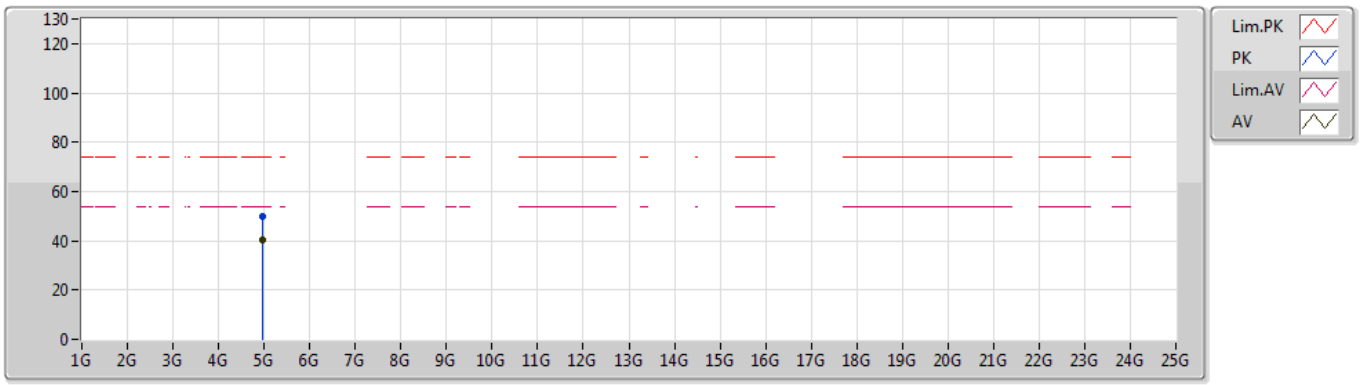
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	2.4798G	79.87	Inf	-Inf	32.46	3	Horizontal	18	1.16	-	47.41
AV	2.48G	78.21	Inf	-Inf	32.46	3	Horizontal	18	1.16	-	45.75
PK	2.4958G	57.20	74.00	-16.80	32.56	3	Horizontal	18	1.16	-	24.64
AV	2.4982G	45.94	54.00	-8.06	32.58	3	Horizontal	18	1.16	-	13.36

BT-LE(1Mbps)

2480MHz_TX

01/11/2019



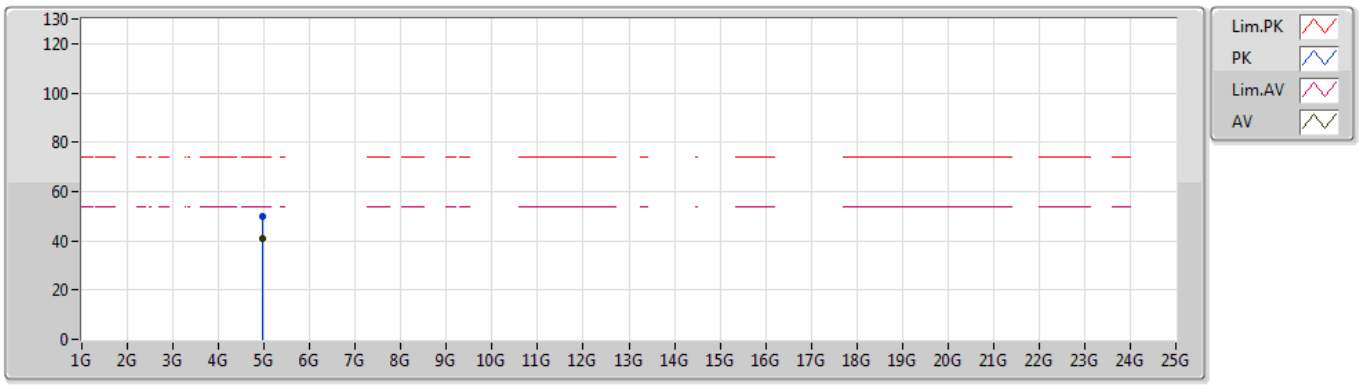
EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	4.95956G	49.98	74.00	-24.02	4.53	3	Vertical	21	1.00	-	45.45
AV	4.96004G	40.36	54.00	-13.64	4.53	3	Vertical	21	1.00	-	35.83

BT-LE(1Mbps)

2480MHz_TX

01/11/2019



EUT Y_1TX
Setting 8
04-B-4
FSP(100019)

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)
PK	4.95952G	50.15	74.00	-23.85	4.53	3	Horizontal	59	2.28	-	45.62
AV	4.96004G	41.14	54.00	-12.86	4.53	3	Horizontal	59	2.28	-	36.61