

Report No.: FR862827AC



# FCC RADIO TEST REPORT

FCC ID

: 2AHKM-HIVE2200

Equipment

: 2x2 DBCC WiFi Extender

**Brand Name** 

: hitron

**Model Name** 

: HIXE12AWR

Applicant

: Hitron Technologies Inc.

No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,

Hsinchu 30078, Taiwan

Manufacturer

: Hitron Technologies Inc.

No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,

Hsinchu 30078, Taiwan

Standard

: 47 CFR FCC Part 15.247

The product was received on Jul. 25, 2018, and testing was started from Oct. 05, 2018 and completed on Oct. 31, 2018. 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: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB Ver1.0

Page Number

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Issued Date

: Nov. 12, 2018

Report Version : 01

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**Appendix H. Test Photos** 

Photographs of EUT v01

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# History of this test report

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Report No.	Version	Description	Issued Date
FR862827AC	01	Initial issue of report	Nov. 12, 2018

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# **Summary of Test Result**

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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)	20dB Bandwidth	PASS	-
3.2	15.247(a)	Carrier Frequency Separation	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(a)	Number of Hopping Frequencies and Hopping Band edge	PASS	-
3.5	15.247(a)	Time of Occupancy (Dwell Time)	PASS	-
3.6	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.7	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Reviewed by: Sam Chen Report Producer: Viola Huang

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# 1 General Description

#### 1.1 Information

#### 1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Version	Ch. Frequency (MHz)	Channel Number
2400-2483.5	BR / EDR	2402-2480	0-78 [79]

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Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-BR(1Mbps)	1	1TX
2.4-2.4835GHz	BT-EDR(2Mbps)	1	1TX
2.4-2.4835GHz	BT-EDR(3Mbps)	1	1TX

#### Note:

- Bluetooth BR uses a GFSK (1Mbps).
- Bluetooth EDR uses a combination of  $\pi/4$ -DQPSK (2Mbps) and 8DPSK (3Mbps).
- Bluetooth BR/EDR uses as a system using FHSS 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.

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#### 1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	P/N	Antenna Type	Connector	Gain (dBi)
1	1	Ethertronics	XE1v2	-	PCB Antenna	I-PEX	
2	2	Ethertronics	XE1v2	-	PCB Antenna	I-PEX	Note
3	1	PSA	-	RFECA3216060A1T	CERAMIC Antenna	N/A	

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#### Note 1:

Ant.	Port		Gain	(dBi)	
74114.	WLAN 2.4G		WLAN 5G Band 1	WLAN 5G Band 4	ВТ
1	1	4.4	4.8	5.5	-
2	2	3.1	3.8	3.8	-
3	1	-	-	-	2.09

Note 2: The EUT has three antennas.

#### <For 2.4GHz Band>

#### For IEEE 802.11b/g/n mode (2TX/2RX)

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

#### <For 5GHz Band>

#### For IEEE 802.11a/n/ac mode (2TX/2RX)

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

#### <For Bluetooth>

#### For BT function (1TX/1RX)

Only Port 1 can be used as transmitting/receiving antenna.

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# 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-BR(1Mbps)	0.795	0.996	2.928m	1k
BT-EDR(2Mbps)	0.758	1.203	2.957m	1k
BT-EDR(3Mbps)	0.754	1.226	2.957m	1k

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#### Note:

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

## 1.1.4 EUT Operational Condition

EUT Power Type	Internal power supply
<b>Test Software Version</b>	Telnet(v.25.1)

# 1.1.5 Table for EUT support type

Function	support type		
AP Router	Master		
Extender	Master + Slave		
Mesh	Master + Slave		

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# 1.2 Testing Applied Standards

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

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- 47 CFR FCC Part 15
- FCC Public Notice DA 00-705

# 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			
$\boxtimes$	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	Paul Chen	25°C / 65%	Oct. 16, 2018~Oct. 22, 2018
Radiated below 1GHz	03CH01-CB	Welson Chen	22°C / 54%	Oct. 24, 2018
Radiated above 1GHz	03CH01-CB	Welson Chen	22°C / 54%	Oct. 16, 2018
AC Conduction	CO01-CB	GN Hou	23°C / 59%	Oct. 31, 2018

Test site Designation No. TW0006 with FCC.

# 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)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%
Output Power Measurement	1.33 dB	Confidence levels of 95%
Bandwidth Measurement	9.74 x10 <sup>-8</sup>	Confidence levels of 95%

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Test site registered number IC 4086D with Industry Canada.

# 2 Test Configuration of EUT

# 2.1 Test Channel Mode

Mode	PowerSetting
BT-BR(1Mbps)	-
2402MHz	8
2440MHz	8
2480MHz	8
BT-EDR(2Mbps)	-
2402MHz	8
2440MHz	8
2480MHz	8
BT-EDR(3Mbps)	-
2402MHz	8
2440MHz	8
2480MHz	8

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# 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	1 CTX-BT

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The Worst Case Mode for Following Conformance Tests	
Tests Item	20dB Bandwidth Carrier Frequency Separation Maximum Conducted Output Power Number of Hopping Frequencies Hopping Bandedge Time of Occupancy (Dwell Time) 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	The EUT was performed at Y axis and Z axis position for Radiated emission above 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.	
1	CTX - EUT in Y axis-BT	
Operating Mode > 1GHz	The EUT was performed at Y axis and Z axis position for Radiated emission test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.	
1	EUT in Y axis	

Note: All the specification of test configurations and test modes were based on customer's request.

# 2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 2.4 Accessories

N/A

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# 2.5 Support Equipment

For Test Site No: CO01-CB

N/A

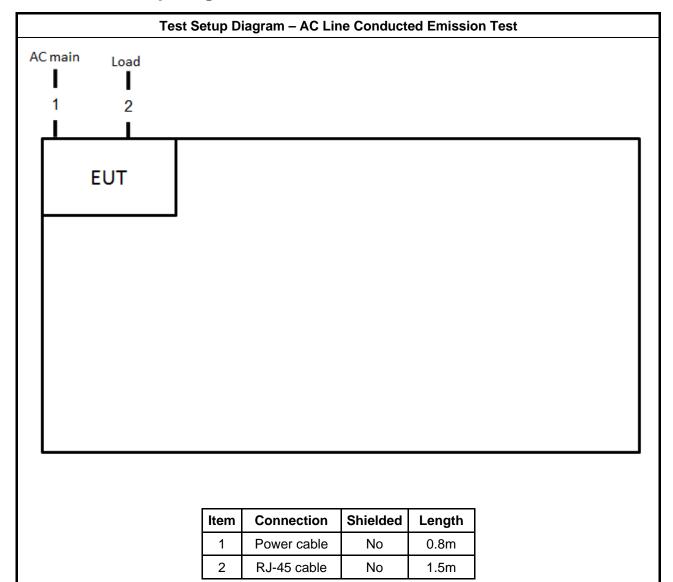
For Test Site No: 03CH01-CB and TH01-CB

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

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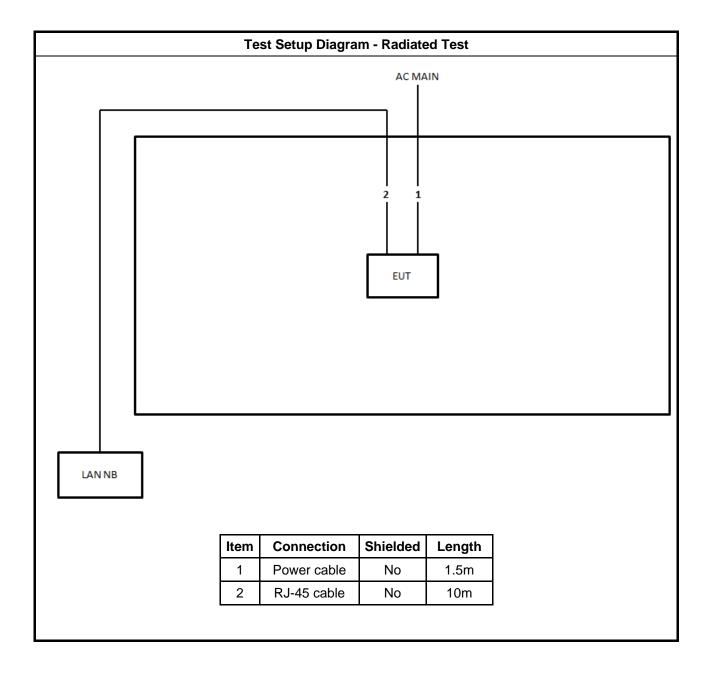
# 2.6 Test Setup Diagram



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## 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	of the frequency.	

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### 3.1.2 Measuring Instruments

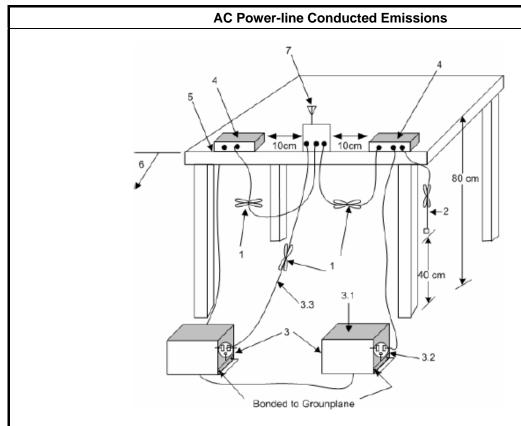
Refer a test equipment and calibration data table in this test report.

#### 3.1.3 Test Procedures

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

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### 3.1.4 Test Setup



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.

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- 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  $\Omega$  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

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## 3.2 20dB Bandwidth and Carrier Frequency Separation

## 3.2.1 20dB Bandwidth and Carrier Frequency Separation Limit

	20dB Bandwidth and Carrier Frequency Separation Limit for Frequency Hopping Systems		
•	902-928 MHz Band:		
	<ul> <li>N ≥50 and ChS ≥ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth≤ 250 kHz.</li> </ul>		
	■ 50 >N≥25 and ChS ≥ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth>250 kHz.		
•	2400-2483.5 MHz Band:		
	<ul> <li>N ≥75 and ChS ≥ MAX (20 dB bandwidth, 25 kHz).</li> </ul>		
	<ul> <li>75&gt;N ≥ 15 and ChS ≥ MAX (20 dB bandwidth 2/3,25 kHz).</li> </ul>		
•	■ 5725-5850 MHz Band:		
	N ≥ 75 and ChS ≥ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth≤ 1 MHz.		
N:N	N:Number of Hopping Frequencies; ChS: Hopping Channel Separation		

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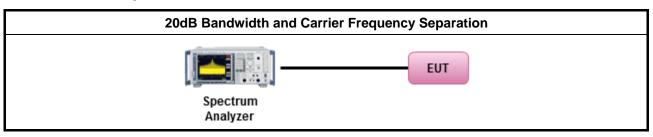
#### 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

# Test Method Refer as ANSI C63.10-2013, clause 6.9.1 for 20 dB bandwidth measurement. Refer as ANSI C63.10-2013, clause 7.8.2 for carrier frequency separation measurement.

#### 3.2.4 Test Setup



#### 3.2.5 Test Result of 20dB Bandwidth

Refer as Appendix B

#### 3.2.6 Test Result of Carrier Frequency Separation

Refer as Appendix B

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# 3.3 Maximum Conducted Output Power

## 3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
■ 902-928 MHz Band:	
■ N ≥50; Power 30dBm; EIRP 36dBm	
■ 50 >N≥ 25; Power 24dBm; EIRP 30dBm	
■ 2400-2483.5 MHz Band:	
■ N ≥ 75; Power 30dBm; EIRP 36dBm	
■ 75 >N ≥ 15; Power 21dBm; EIRP 27dBm	
■ 5725-5850 MHz Band:	
■ N ≥ 75; Power 30dBm; EIRP 36dBm	
N:Number of Hopping Frequencies	

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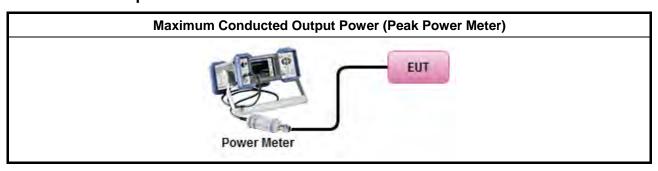
## 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

	Test Method
-	Refer as ANSI C63.10-2013, clause 7.8.5 for output power measurement.

#### 3.3.4 Test Setup



## 3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

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# 3.4 Number of Hopping Frequencies and Hopping Bandedge

#### 3.4.1 Number of Hopping Frequencies Limit

Number of Hopping Frequencies Limit			
•	902-928 MHz Band:		
	<ul> <li>N ≥50 and ChS ≥ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth≤ 250 kHz.</li> </ul>		
	■ 50 >N≥ 25 and ChS ≥ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth>250 kHz.		
■ 2400-2483.5 MHz Band:			
	N ≥ 75 and ChS ≥ MAX (20 dB bandwidth, 25 kHz).		
	■ 75 >N ≥ 15 and ChS ≥ MAX (20 dB bandwidth 2/3,25 kHz).		
■ 5725-5850 MHz Band:			
	<ul> <li>N ≥ 75 and ChS ≥ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth≤ 1 MHz.</li> </ul>		
N:N	N:Number of Hopping Frequencies; ChS: Hopping Channel Separation		

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#### 3.4.2 Hopping Bandedge Limit

Refer clause 3.6.1 and clause 3.7.1

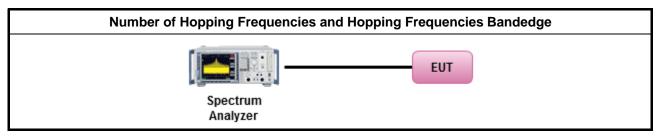
#### 3.4.3 Measuring Instruments

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

#### 3.4.4 Test Procedures

# Test Method ■ Refer as ANSI C63.10-2013, clause 7.8.3 for number of hopping frequencies measurement. ■ Refer as ANSI C63.10-2013, clause 7.8.6 for hopping frequencies Bandedge measurement.

#### 3.4.5 Test Setup



#### 3.4.6 Test Result of Number of Hopping Frequencies

Refer as Appendix D

#### 3.4.7 Test Result of Number of Hopping Frequencies Bandedge

Refer as Appendix D

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# 3.5 Time of Occupancy (Dwell Time)

#### 3.5.1 Time of Occupancy (Dwell Time) Limit

	20dB Bandwidth and Carrier Frequency Separation Limit for Frequency Hopping Systems
•	902-928 MHz Band:
	■ N ≥50; 0.4s in 20s period
	■ 50 >N≥ 25; 0.4s in 10s period
•	2400-2483.5 MHz Band:
	<ul> <li>N ≥ 75; 0.4s in N x 0.4 period</li> </ul>
	■ 75 >N ≥ 15; 0.4s in N x 0.4 period
•	5725-5850 MHz Band:
	■ N ≥ 75; 0.4s in 30s period
N:N	Number of Hopping Frequencies

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#### 3.5.2 Measuring Instruments

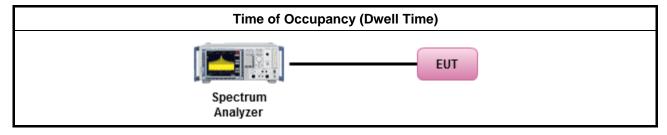
Refer a test equipment and calibration data table in this test report.

#### 3.5.3 Test Procedures

#### Test Method

- Refer as ANSI C63.10-2013, clause 7.8.4 for dwell time measurement.
- Bluetooth ACL packets can be 1, 3, or 5 time slots. Following as dwell time. Operate DH5 at maximum dwell time and maximum duty cycle.
  - The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms.DH5 Packet permit maximum 1600/79 / 6 = 3.37 hops per second in each channel.

#### 3.5.4 Test Setup



#### 3.5.5 Test Result of Time of Occupancy (Dwell Time)

Refer as Appendix E

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## 3.6 Emissions in Non-restricted Frequency Bands

#### 3.6.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit			
RF output power procedure	Limit (dB)		
Peak output power procedure	20		

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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.

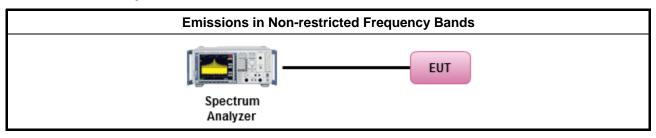
#### 3.6.2 Measuring Instruments

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

#### 3.6.3 Test Procedures

Test Method	
<ul> <li>Refer as ANSI C63.10-2013, clause 7.8.8 for unwanted emissions into non-restricted bands.</li> </ul>	

#### 3.6.4 Test Setup



#### 3.6.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix F

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# 3.7 Emissions in Restricted Frequency Bands

#### 3.7.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit							
Frequency Range (MHz) Field Strength (uV/m) Field Strength (dBuV/m) Measure Distance							
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				

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- 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.

#### 3.7.2 Measuring Instruments

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

#### 3.7.3 Test Procedures

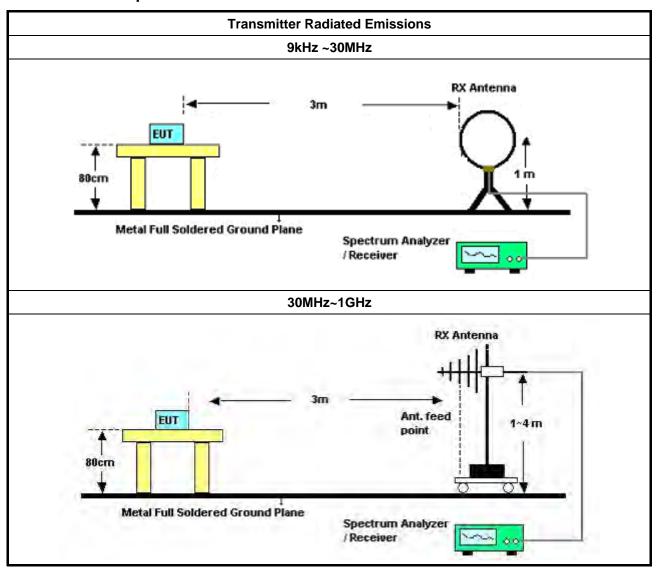
#### **Test Method**

- The average emission levels shall be measured in [hopping duty factor].
- Refer as ANSI C63.10; clause 6.9.2.2 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 ANSI C63.10, clause 4.1.4.2.1 QP value.
  - Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak.
  - Refer as ANSI C63.10, clause 4.1.4.2.4 average value of hopping pulsed emissions.

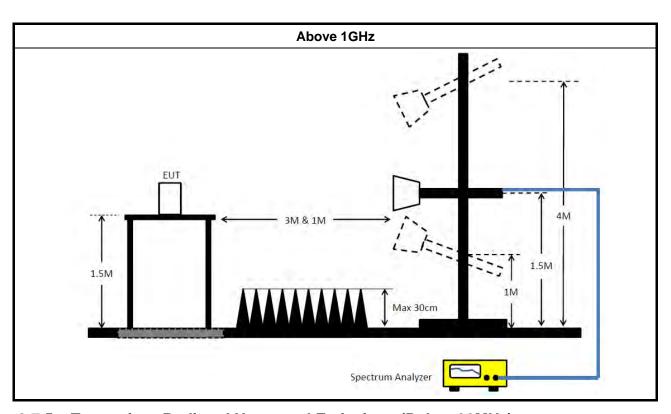
TEL: 886-3-656-9065 Page Number : 22 of 26
FAX: 886-3-656-9085 Issued Date : Nov. 12, 2018

#### Report No. : FR862827AC

## 3.7.4 Test Setup



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# 3.7.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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.

#### 3.7.6 Transmitter Radiated Unwanted Emissions

Refer as Appendix G

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# 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. 31, 2018	Jan. 30, 2019	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16 -2	04083	150kHz~100MHz	Dec. 20, 2017	Dec. 19, 2018	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 29, 2017	Dec. 28, 2018	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	150kHz ~ 30MHz	May 22, 2018	May 21, 2019	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 27, 2018	Aug. 26, 2019	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2018	Mar. 15, 2019	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 20, 2017	Nov. 19, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 28, 2018	Jun. 27, 2019	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2018	May 01, 2019	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 09, 2018	Jan. 08, 2019	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100354	9kHz ~ 2.75GHz	Dec. 08, 2017	Dec. 07, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)

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Report Version : 01

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 21, 2017	Dec. 20, 2018	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 20, 2017	Nov. 19, 2018	Conducted (TH01-CB)

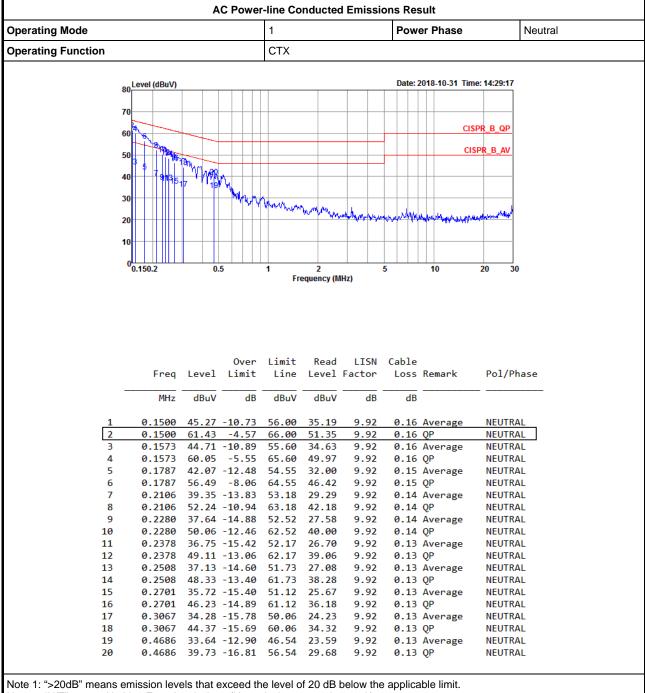
Report No.: FR862827AC

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

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

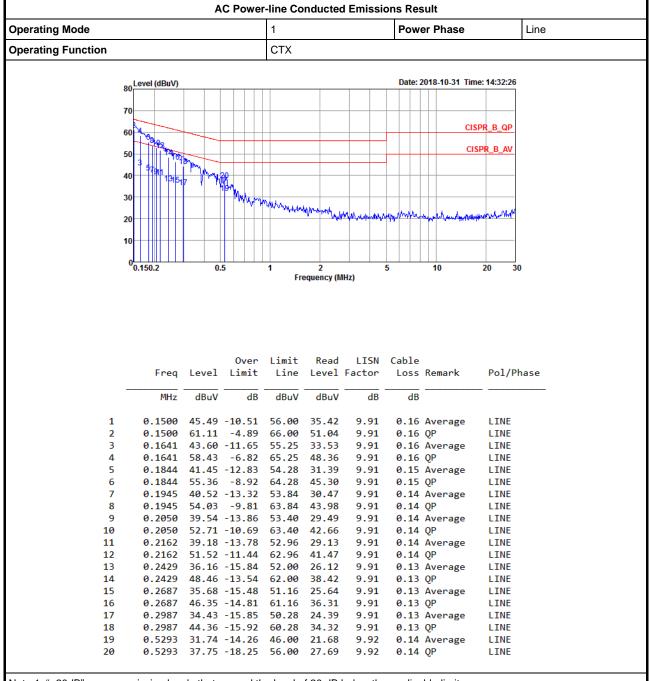
TEL: 886-3-656-9065 Page Number : 26 of 26
FAX: 886-3-656-9085 Issued Date : Nov. 12, 2018

#### AC Power-line Conducted Emissions Result



Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

#### AC Power-line Conducted Emissions Result



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.)



EBW-FS Result Appendix B.1

**Summary** 

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-BR(1Mbps)	922.5k	897.051k	897KF1D	921.25k	892.054k
BT-EDR(2Mbps)	1.311M	1.187M	1M19G1D	1.31M	1.187M
BT-EDR(3Mbps)	1.28M	1.188M	1M19G1D	1.268M	1.184M

Max-N dB = Maximum 20dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth; Min-N dB = Minimum 20dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth;

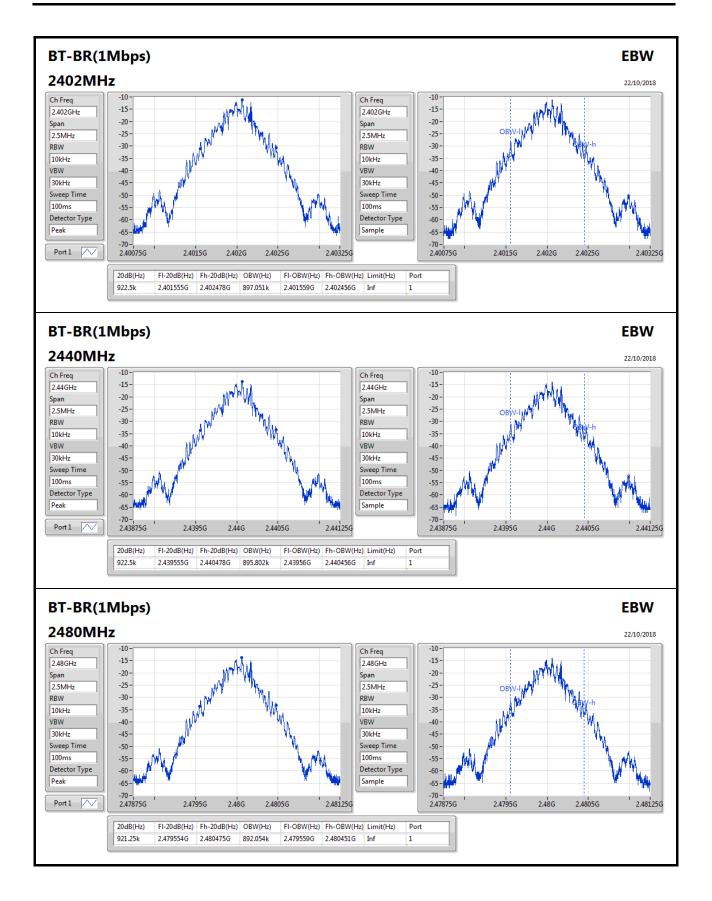
#### Result

Mode	Result	Limit	Port 1-N dB	Port 1-OBW
		(Hz)	(Hz)	(Hz)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	Inf	922.5k	897.051k
2440MHz	Pass	Inf	922.5k	895.802k
2480MHz	Pass	Inf	921.25k	892.054k
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.311M	1.187M
2440MHz	Pass	Inf	1.311M	1.187M
2480MHz	Pass	Inf	1.31M	1.187M
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.268M	1.186M
2440MHz	Pass	Inf	1.278M	1.184M
2480MHz	Pass	Inf	1.28M	1.188M

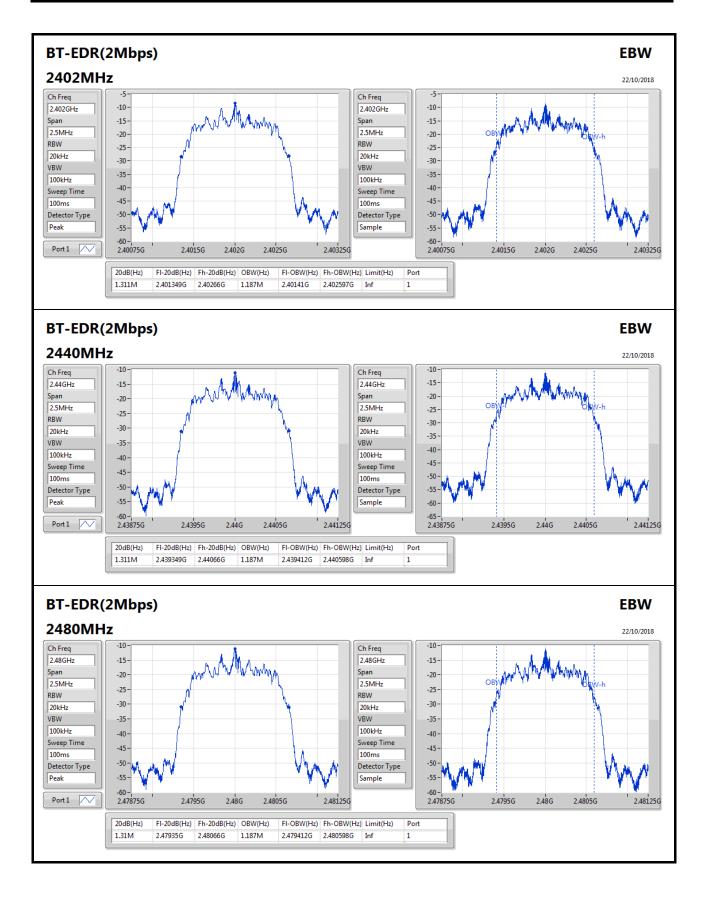
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Port X-N dB = Port X 20dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth;

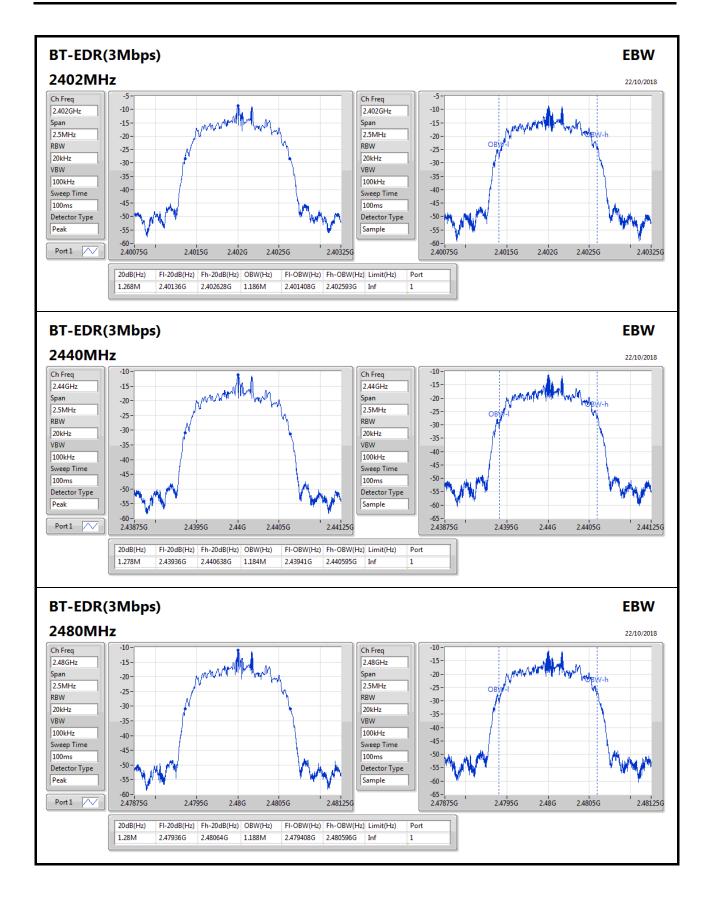














# Channel Separation-FS Result

Appendix B.2

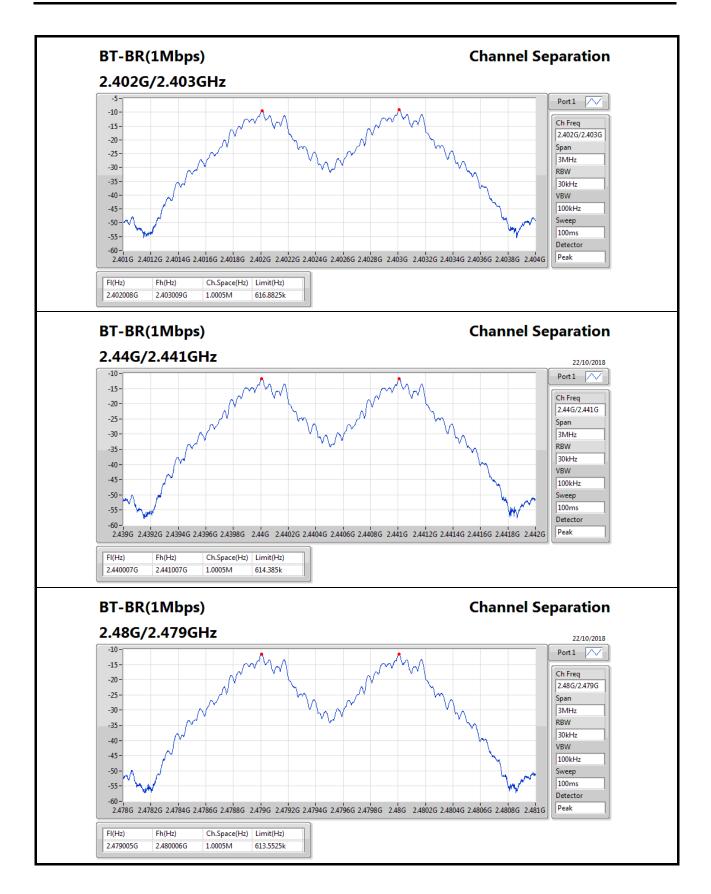
Summary

Mode	Max-Space	Min-Space
	(Hz)	(Hz)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	1.0005M	1.0005M
BT-EDR(2Mbps)	1.002M	1.0005M
BT-EDR(3Mbps)	1.002M	999k

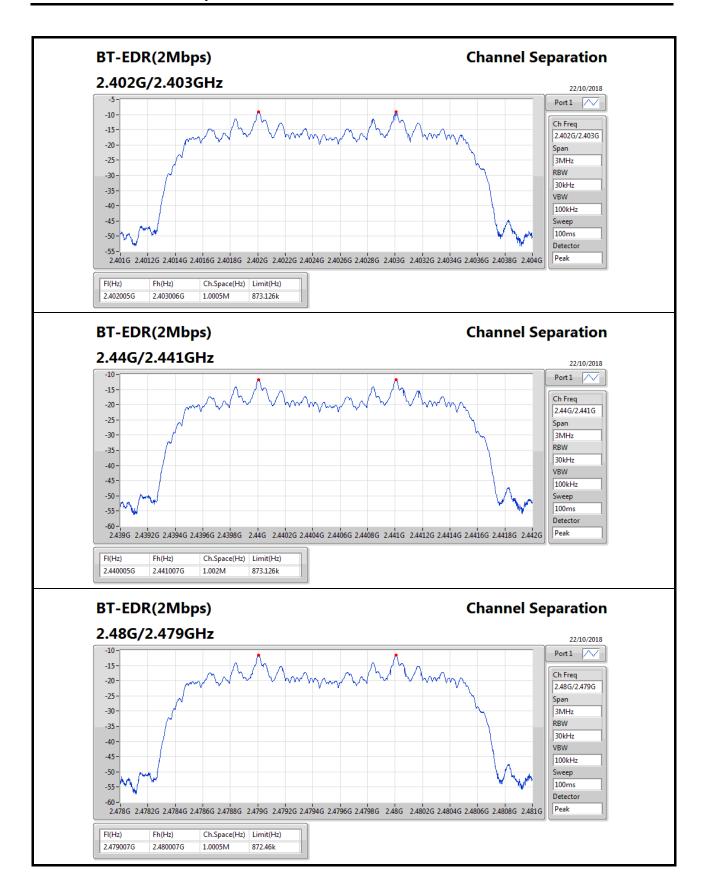
#### Result

Mode	Result	FI	Fh	Ch.Space	Limit
		(Hz)	(Hz)	(Hz)	(Hz)
BT-BR(1Mbps)	-	-	-	-	-
2402MHz	Pass	2.402008G	2.403009G	1.0005M	616.8825k
2440MHz	Pass	2.440007G	2.441007G	1.0005M	614.385k
2480MHz	Pass	2.479005G	2.480006G	1.0005M	613.5525k
BT-EDR(2Mbps)	-	-	-	-	-
2402MHz	Pass	2.402005G	2.403006G	1.0005M	873.126k
2440MHz	Pass	2.440005G	2.441007G	1.002M	873.126k
2480MHz	Pass	2.479007G	2.480007G	1.0005M	872.46k
BT-EDR(3Mbps)	-	-	-	-	-
2402MHz	Pass	2.402005G	2.403006G	1.0005M	844.488k
2440MHz	Pass	2.440004G	2.441006G	1.002M	851.148k
2480MHz	Pass	2.479008G	2.480007G	999k	852.48k

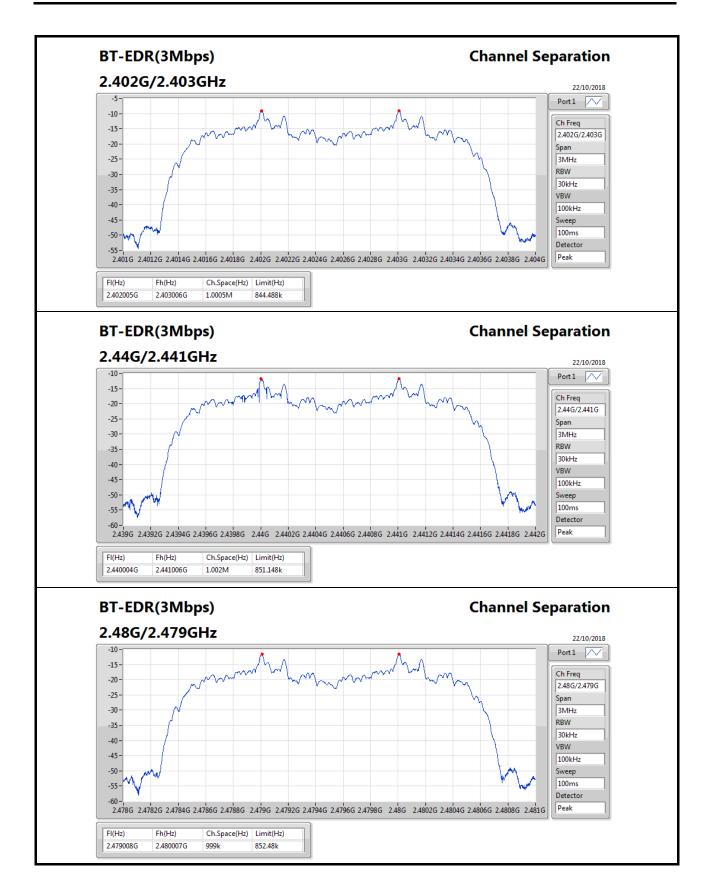


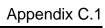














**Summary** 

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	-5.17	0.00030
BT-EDR(2Mbps)	-4.64	0.00034
BT-EDR(3Mbps)	-4.76	0.00033

Mode	Result	Gain	Power	Power Limit		
		(dBi)	(dBm)	(dBm)		
BT-BR(1Mbps)	-	-	-	-		
2402MHz	Pass	2.09	-5.17	21.00		
2440MHz	Pass	2.09	-7.98	21.00		
2480MHz	Pass	2.09	-7.46	21.00		
BT-EDR(2Mbps)	-	-	-	-		
2402MHz	Pass	2.09	-4.64	21.00		
2440MHz	Pass	2.09	-7.73	21.00		
2480MHz	Pass	2.09	-7.32	21.00		
BT-EDR(3Mbps)	-	-	-	-		
2402MHz	Pass	2.09	-4.76	21.00		
2440MHz	Pass	2.09	-7.57	21.00		
2480MHz	Pass	2.09	-7.21	21.00		



PKPower Result Appendix C.2

**Summary** 

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	-4.09	0.00039
BT-EDR(2Mbps)	-2.25	0.00060
BT-EDR(3Mbps)	-2.05	0.00062

Mode	Result	Gain	Power	Power Limit	
		(dBi)	(dBm)	(dBm)	
BT-BR(1Mbps)	-	-	-	-	
2402MHz	Pass	2.09	-4.09	21.00	
2440MHz	Pass	2.09	-6.25	21.00	
2480MHz	Pass	2.09	-5.88	21.00	
BT-EDR(2Mbps)	-	-	-	-	
2402MHz	Pass	2.09	-2.25	21.00	
2440MHz	Pass	2.09	-4.69	21.00	
2480MHz	Pass	2.09	-4.36	21.00	
BT-EDR(3Mbps)	-	-	-	-	
2402MHz	Pass	2.09	-2.05	21.00	
2440MHz	Pass	2.09	-4.38	21.00	
2480MHz	Pass	2.09	-4.15	21.00	



# Hopping Channel and Bandedge-FS Result

Appendix D

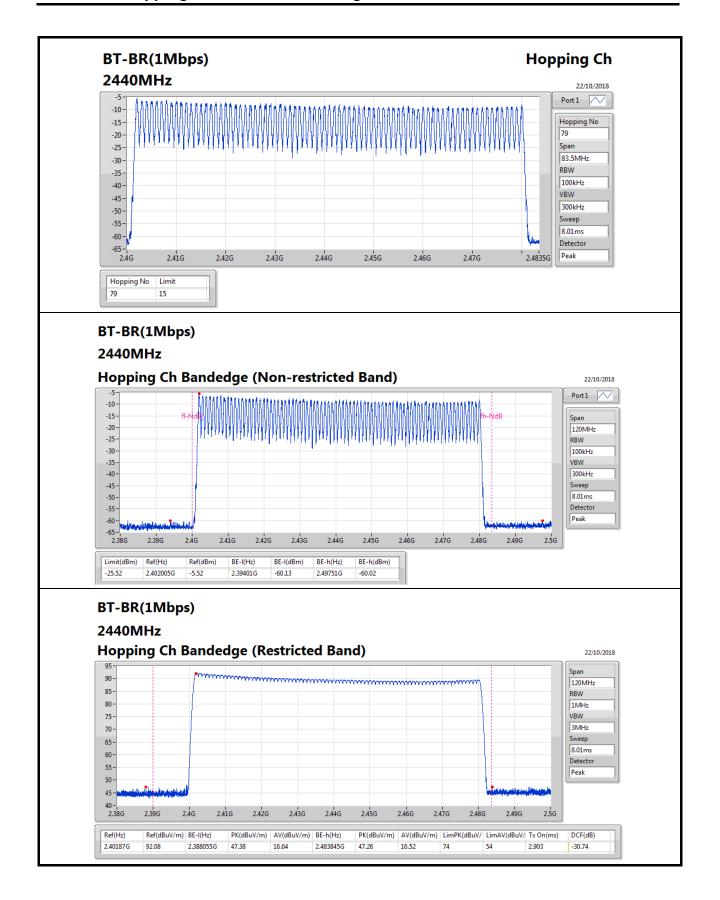
**Summary** 

Mode	Max-Hop No
2.4-2.4835GHz	-
BT-BR(1Mbps)	79
BT-EDR(2Mbps)	79
BT-EDR(3Mbps)	79

Mode	Result	Hopping No	Limit
BT-BR(1Mbps)	-	-	-
2440MHz	Pass	79	15
BT-EDR(2Mbps)	-	-	-
2440MHz	Pass	79	15
BT-EDR(3Mbps)	-	-	-
2440MHz	Pass	79	15

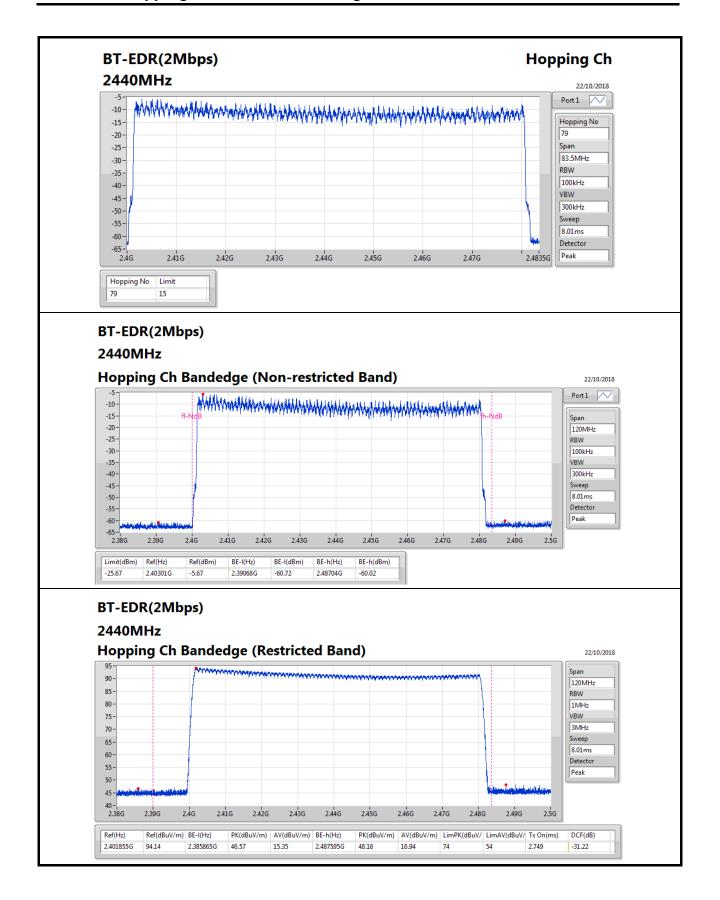
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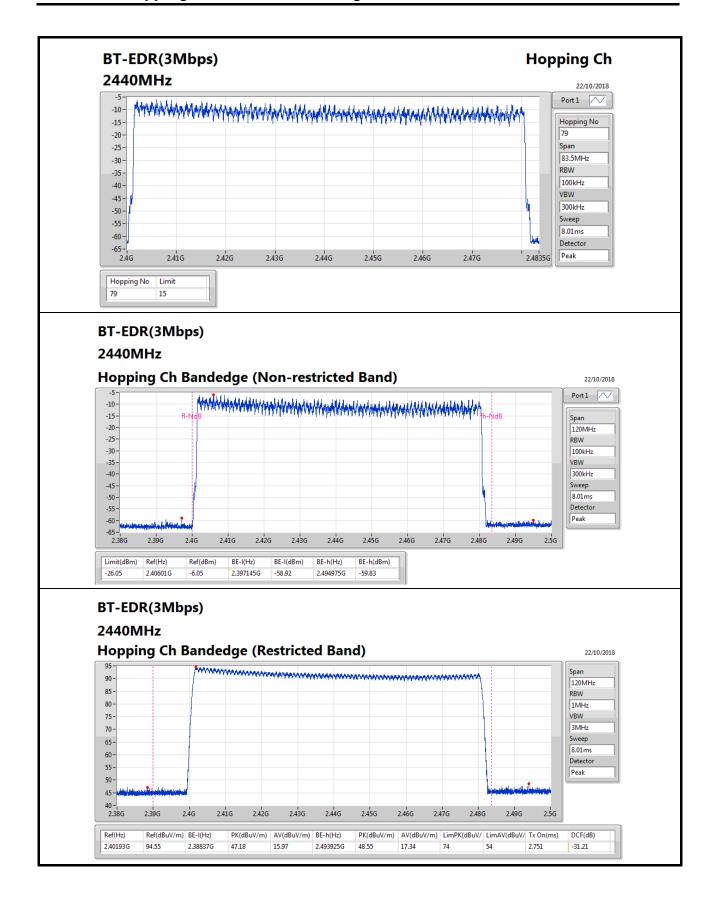
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## **Dwell Time-FS Result**

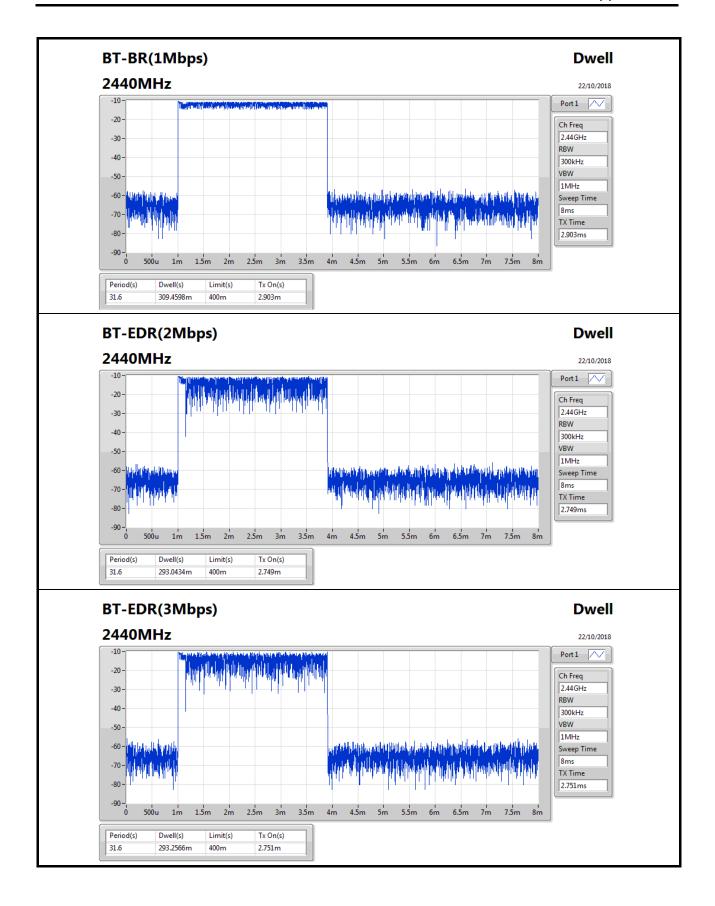
Appendix E

**Summary** 

Mode	Max-Dwell
	(s)
2.4-2.4835GHz	-
BT-BR(1Mbps)	309.4598m
BT-EDR(2Mbps)	293.0434m
BT-EDR(3Mbps)	293.2566m

Mode	Result	Period	Dwell	Limit	Tx On
		(s)	(s)	(s)	(s)
BT-BR(1Mbps)	-	-	-	-	-
2440MHz	Pass	31.6	309.4598m	400m	2.903m
BT-EDR(2Mbps)	-	-	-	-	-
2440MHz	Pass	31.6	293.0434m	400m	2.749m
BT-EDR(3Mbps)	-	-	-	-	-
2440MHz	Pass	31.6	293.2566m	400m	2.751m







## **CSE Non-restricted Band-FS Result**

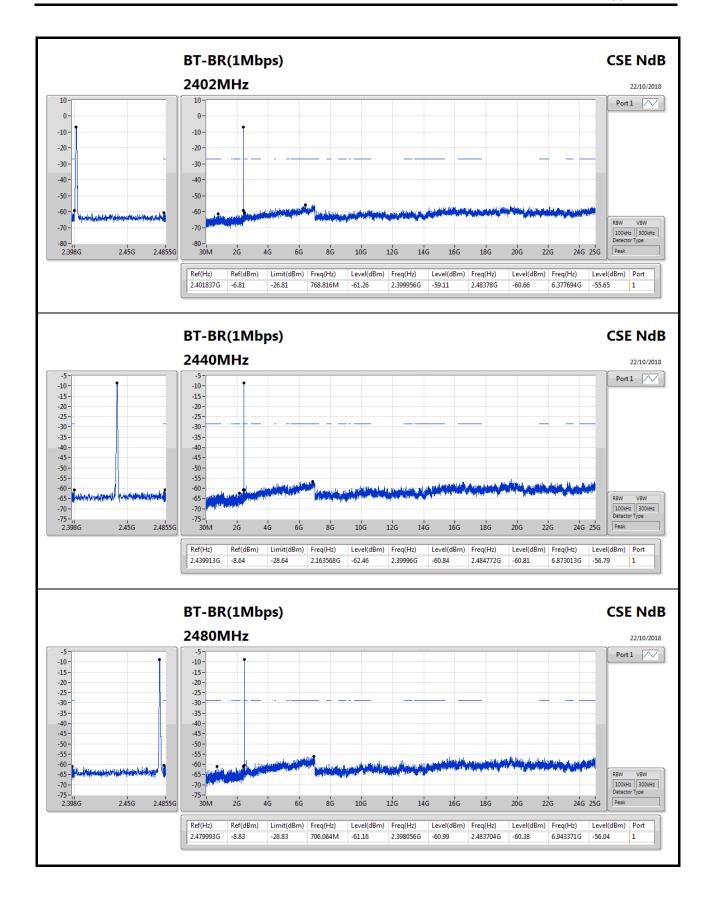
Appendix F

Summary

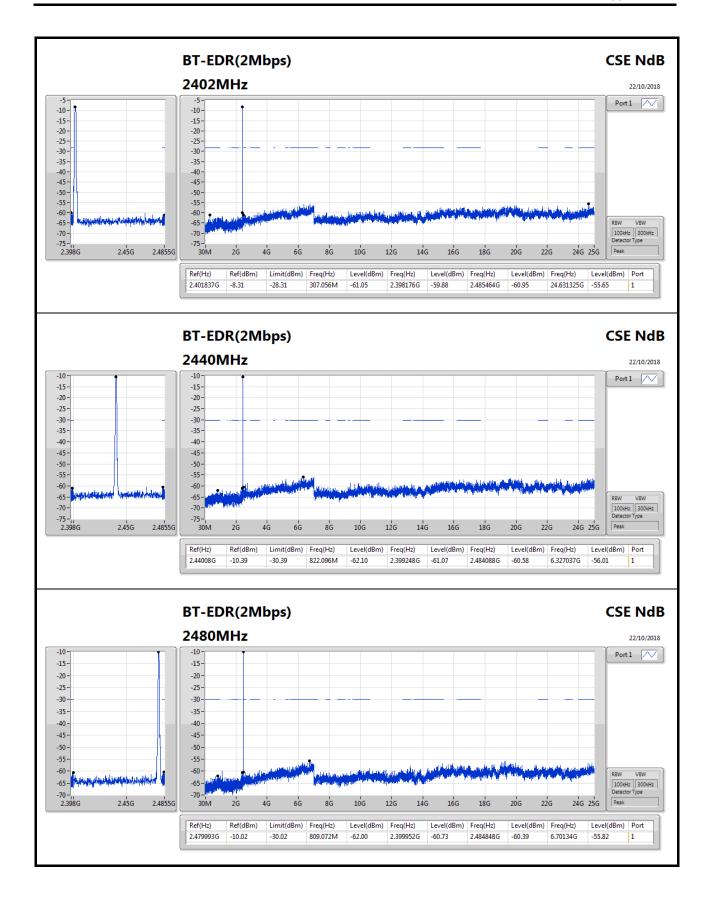
Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-BR(1Mbps)	Pass	2.479993G	-8.83	-28.83	706.064M	-61.16	2.398056G	-60.99	2.483704G	-60.38	6.943371G	-56.04	1
BT-EDR(2Mbps)	Pass	2.44008G	-10.39	-30.39	822.096M	-62.10	2.399248G	-61.07	2.484088G	-60.58	6.327037G	-56.01	1
BT-EDR(3Mbps)	Pass	2.439913G	-10.33	-30.33	2.308016G	-62.22	2.399472G	-61.68	2.48424G	-60.81	15.273736G	-55.42	1

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
mout	Result	(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	1 511
		(П2)	(ubili)	(ubiii)	(ПZ)	(ubiii)	(HZ)	(ubili)	(HZ)	(ubili)	(ПZ)	(ubili)	
BT-BR(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.401837G	-6.81	-26.81	768.816M	-61.26	2.399956G	-59.11	2.48378G	-60.66	6.377694G	-55.65	1
2440MHz	Pass	2.439913G	-8.64	-28.64	2.163568G	-62.46	2.39996G	-60.84	2.484772G	-60.81	6.873013G	-56.79	1
2480MHz	Pass	2.479993G	-8.83	-28.83	706.064M	-61.16	2.398056G	-60.99	2.483704G	-60.38	6.943371G	-56.04	1
BT-EDR(2Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.401837G	-8.31	-28.31	307.056M	-61.05	2.398176G	-59.88	2.485464G	-60.95	24.631325G	-55.65	1
2440MHz	Pass	2.44008G	-10.39	-30.39	822.096M	-62.10	2.399248G	-61.07	2.484088G	-60.58	6.327037G	-56.01	1
2480MHz	Pass	2.479993G	-10.02	-30.02	809.072M	-62.00	2.399952G	-60.73	2.484848G	-60.39	6.70134G	-55.82	1
BT-EDR(3Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.401837G	-7.36	-27.36	1.974128G	-60.18	2.399992G	-59.88	2.484772G	-60.62	6.833613G	-55.96	1
2440MHz	Pass	2.439913G	-10.33	-30.33	2.308016G	-62.22	2.399472G	-61.68	2.48424G	-60.81	15.273736G	-55.42	1
2480MHz	Pass	2.479993G	-10.07	-30.07	845.776M	-61.93	2.399212G	-61.59	2.485172G	-59.93	6.282008G	-56.53	1

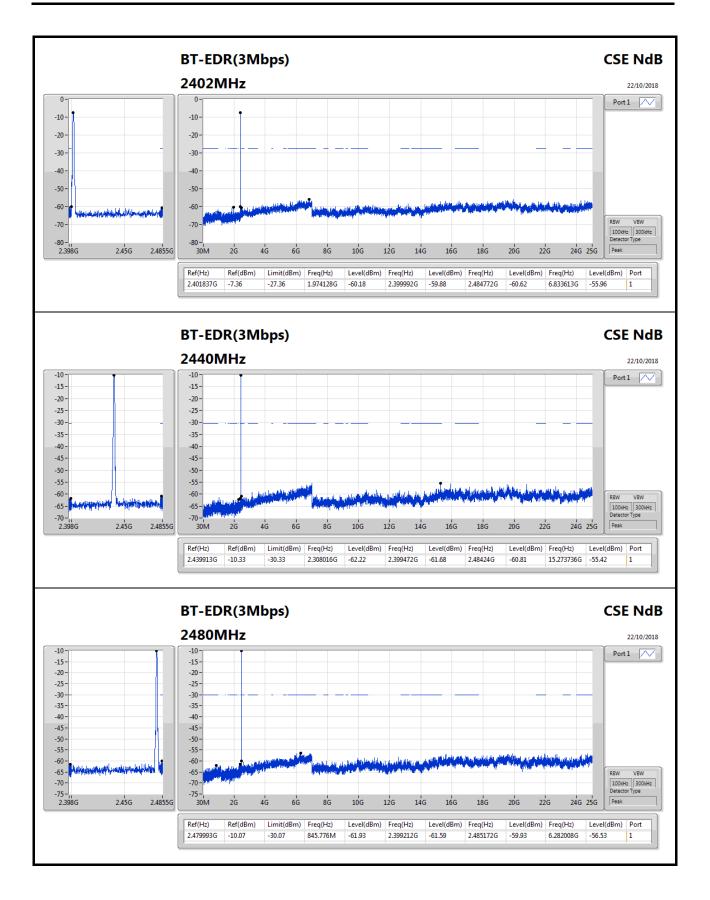






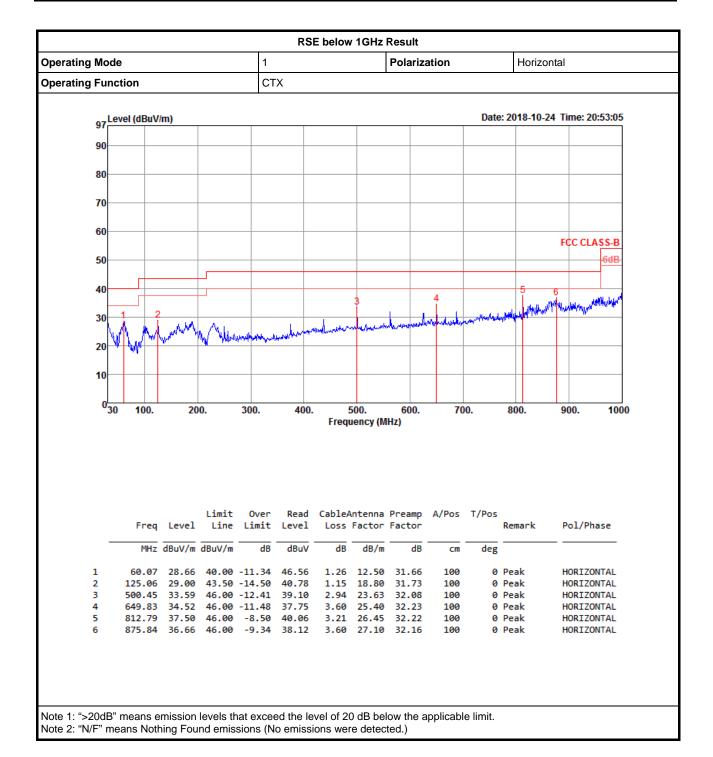




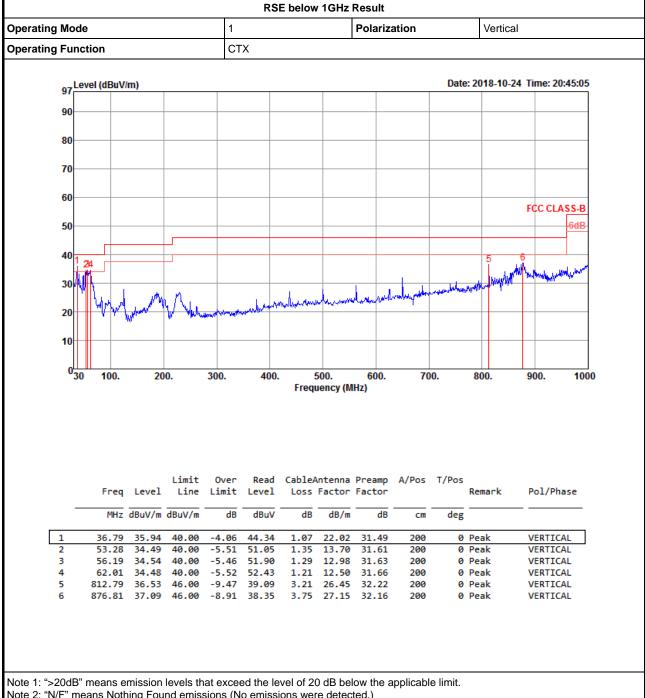




RSE below 1GHz Result







Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)



# RSE TX above 1GHz Result

Appendix G.2

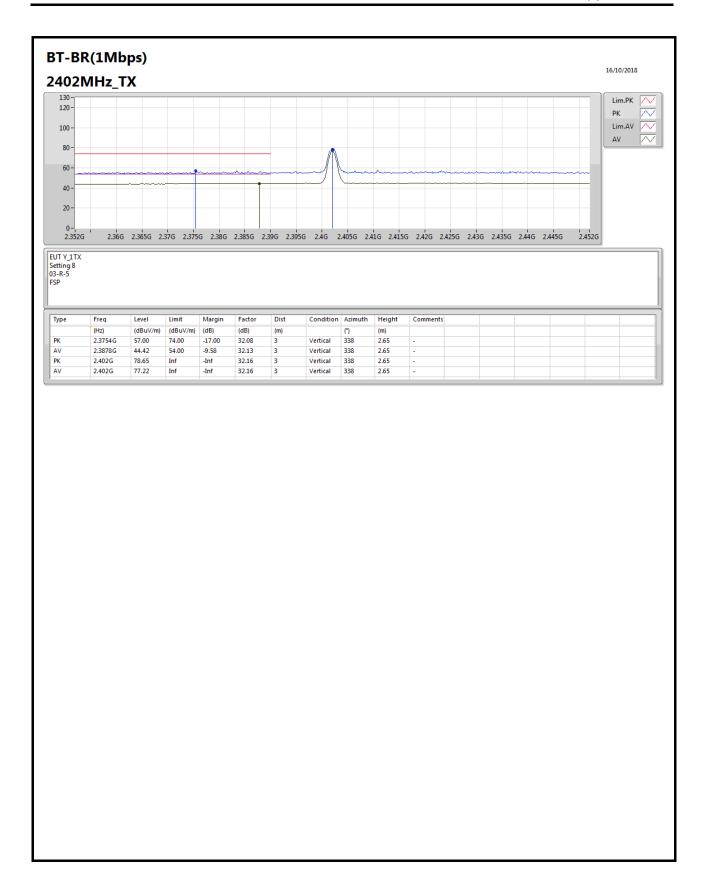
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**Summary** 

Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-BR(1Mbps)	Pass	AV	2.5G	45.12	54.00	-8.88	32.46	3	Horizontal	212	1.70	-

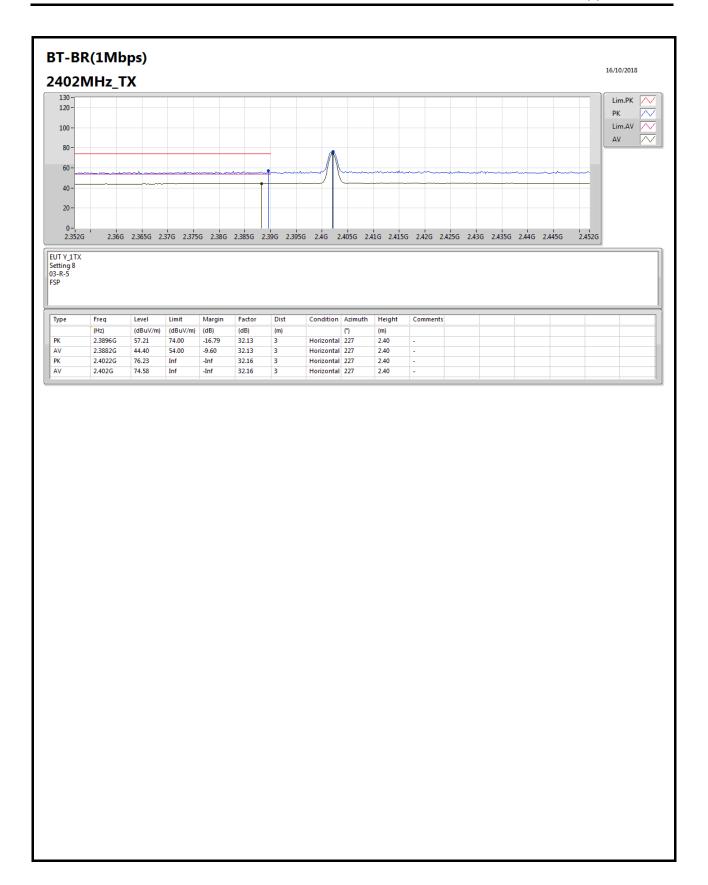
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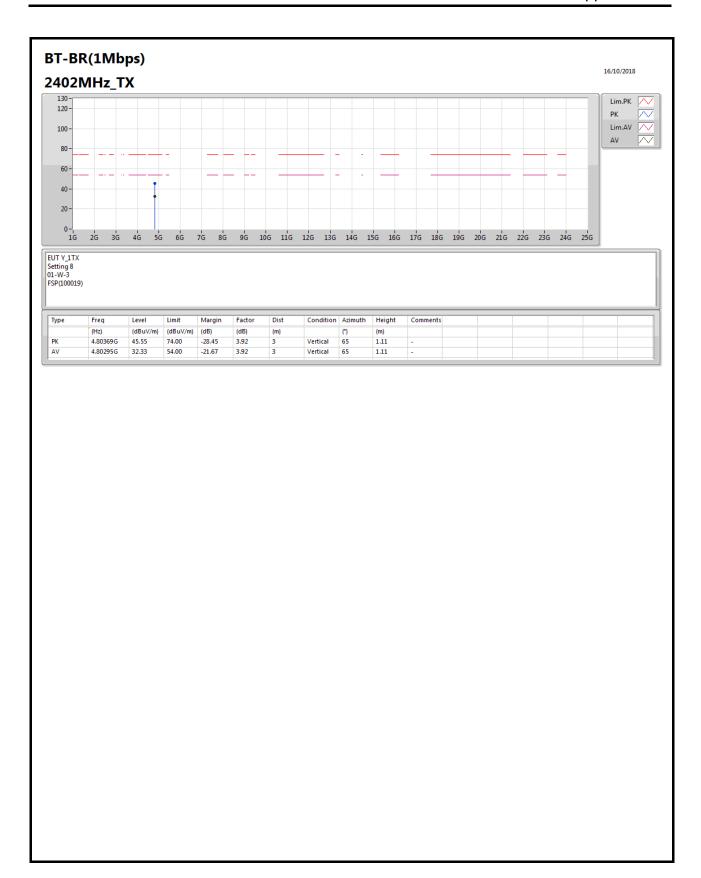


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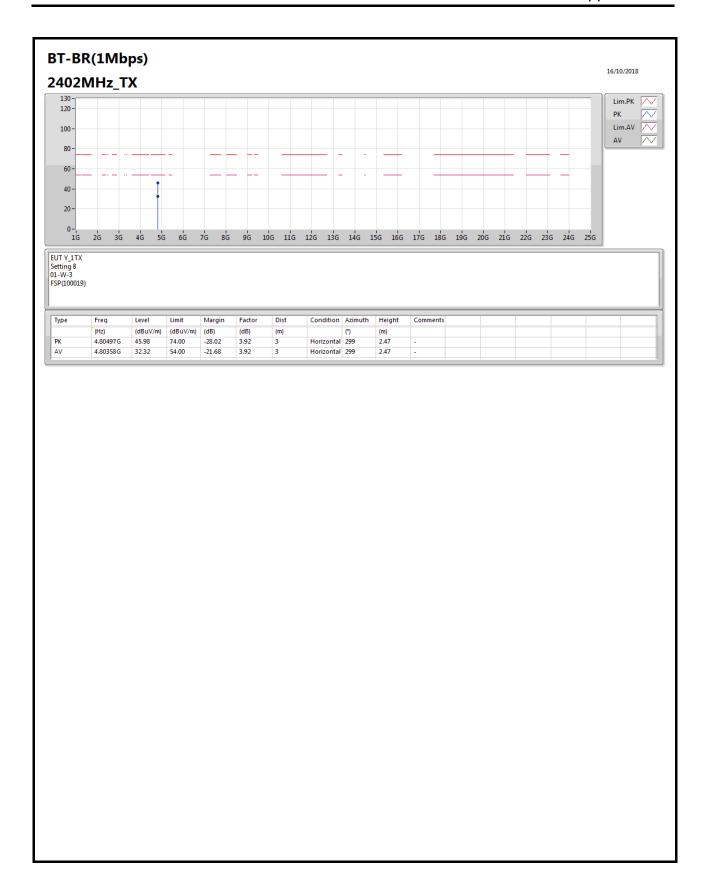




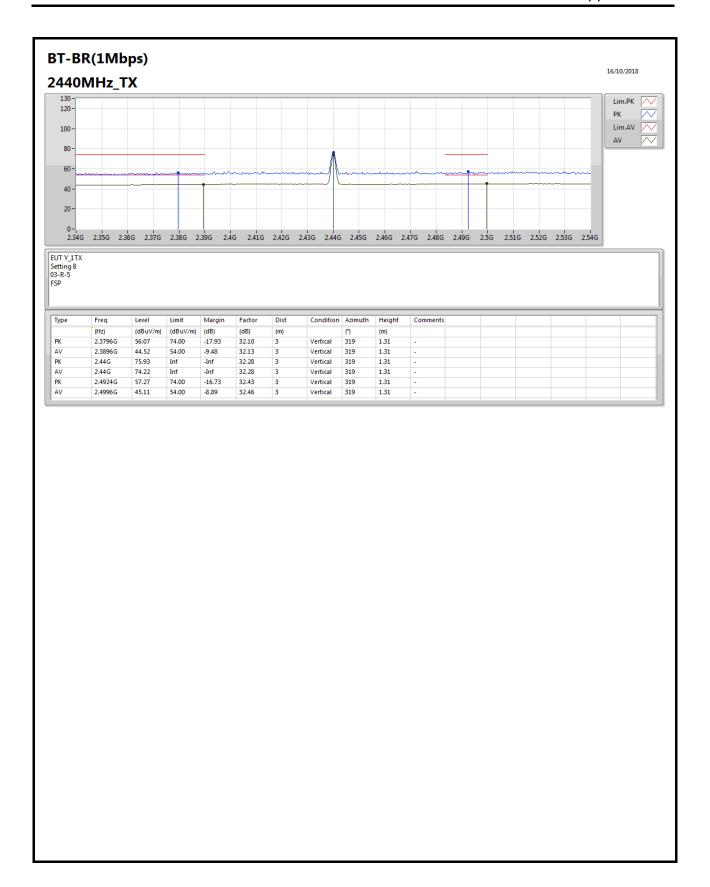
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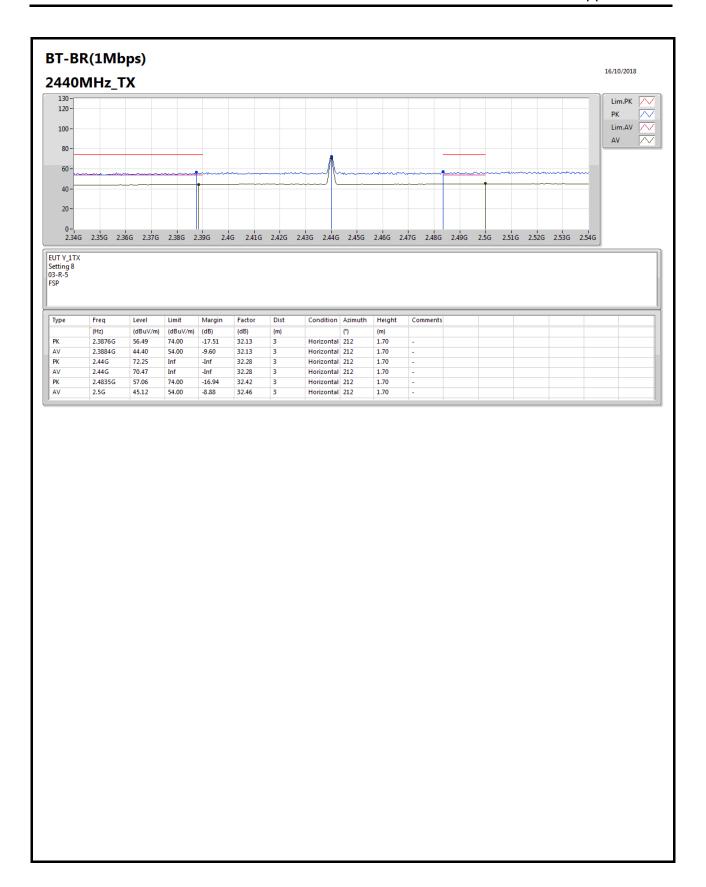
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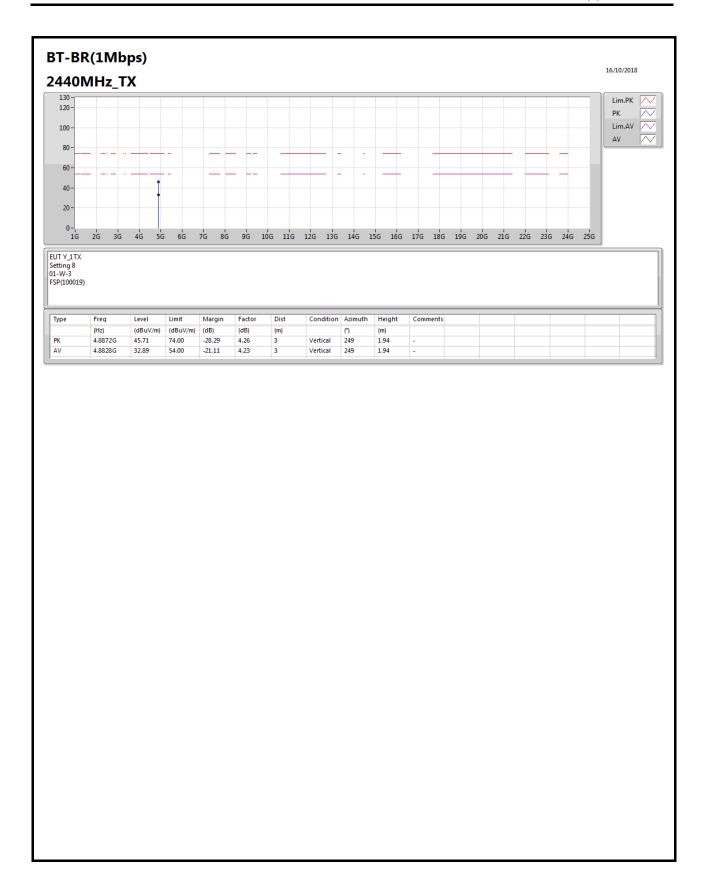


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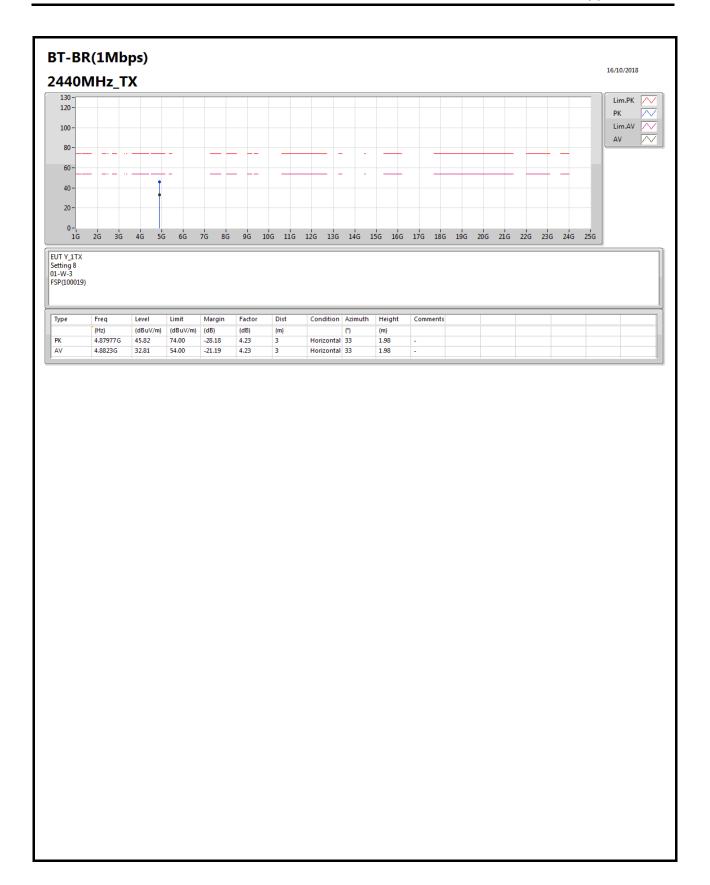
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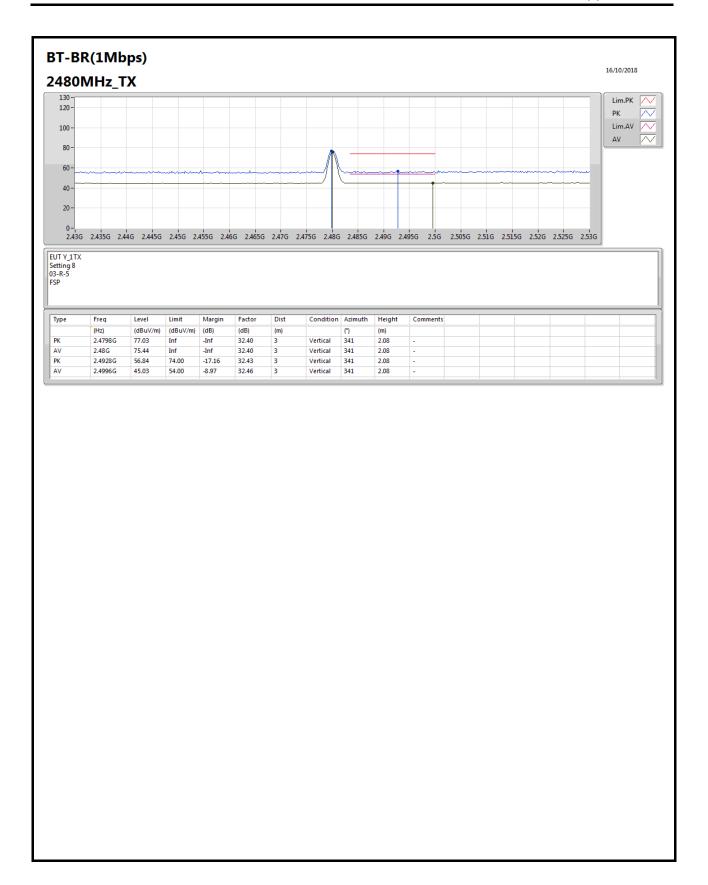


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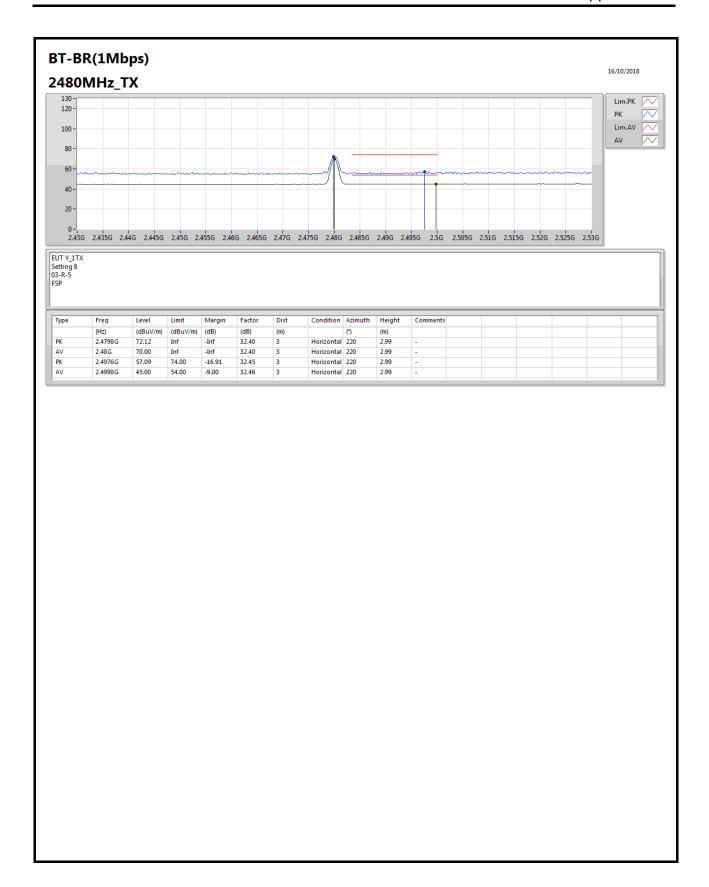




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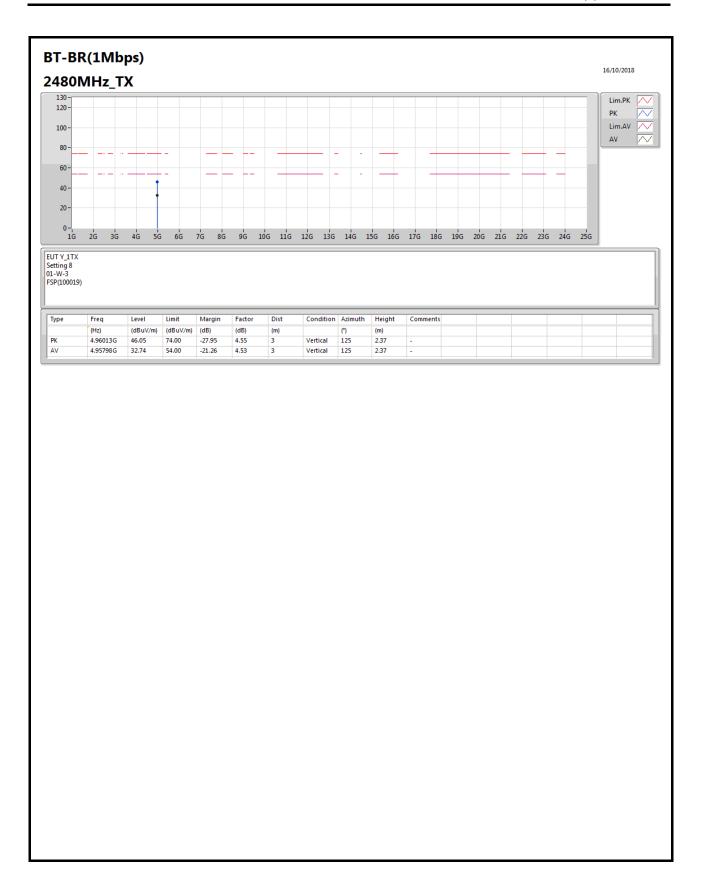


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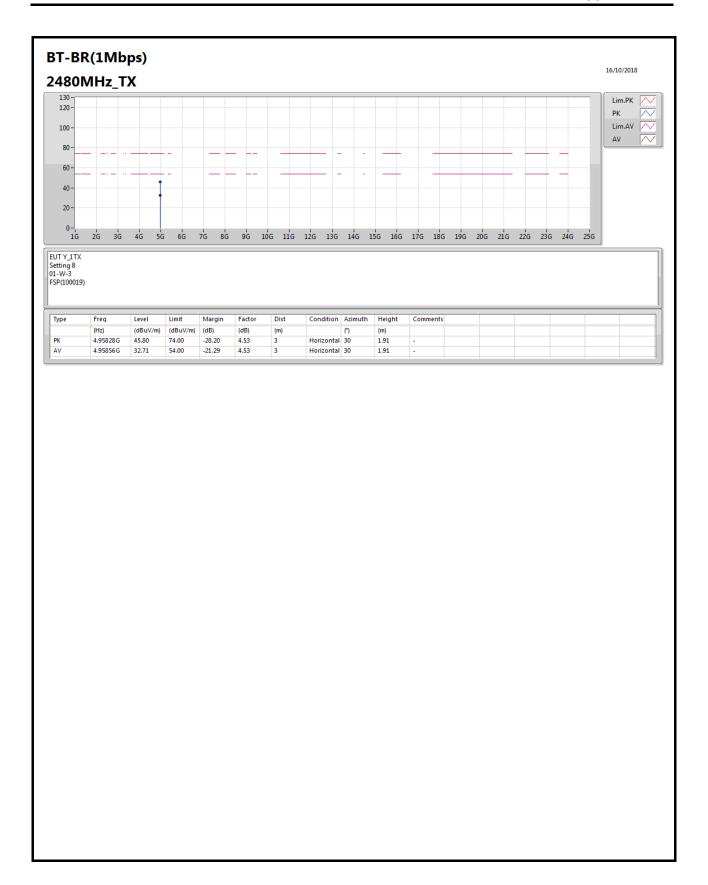
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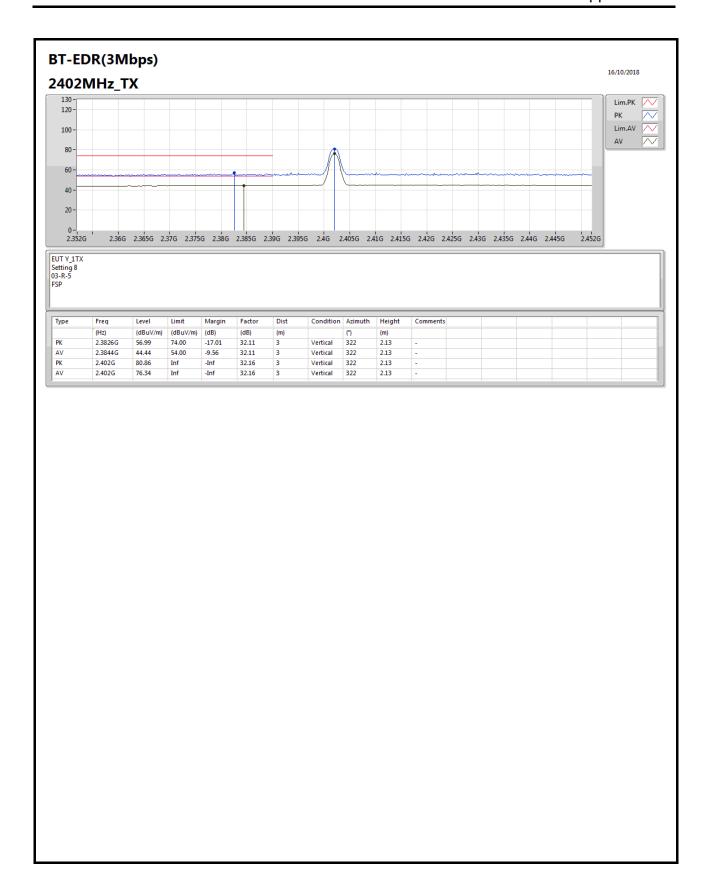


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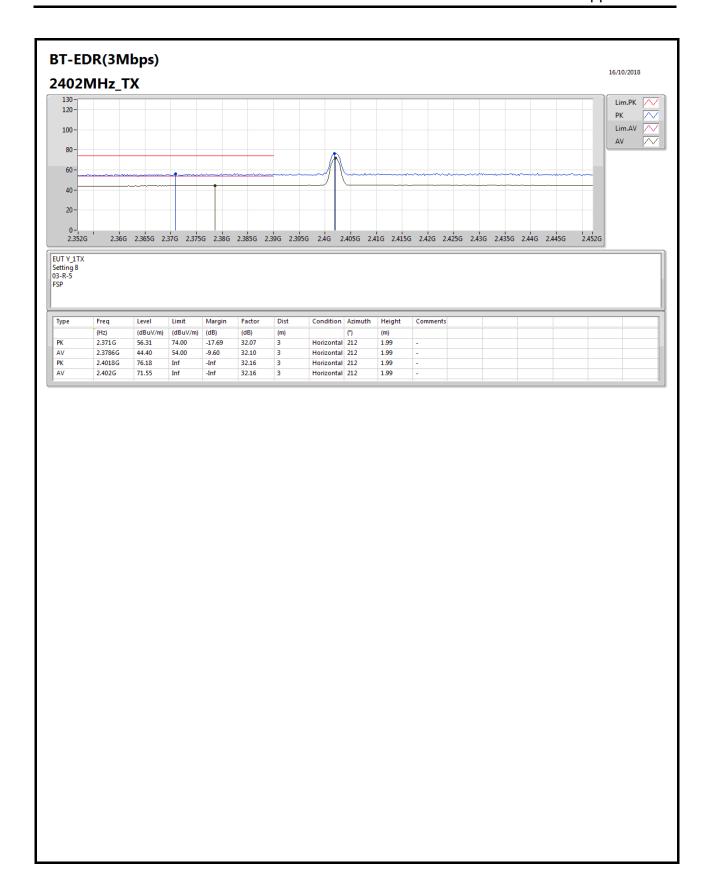




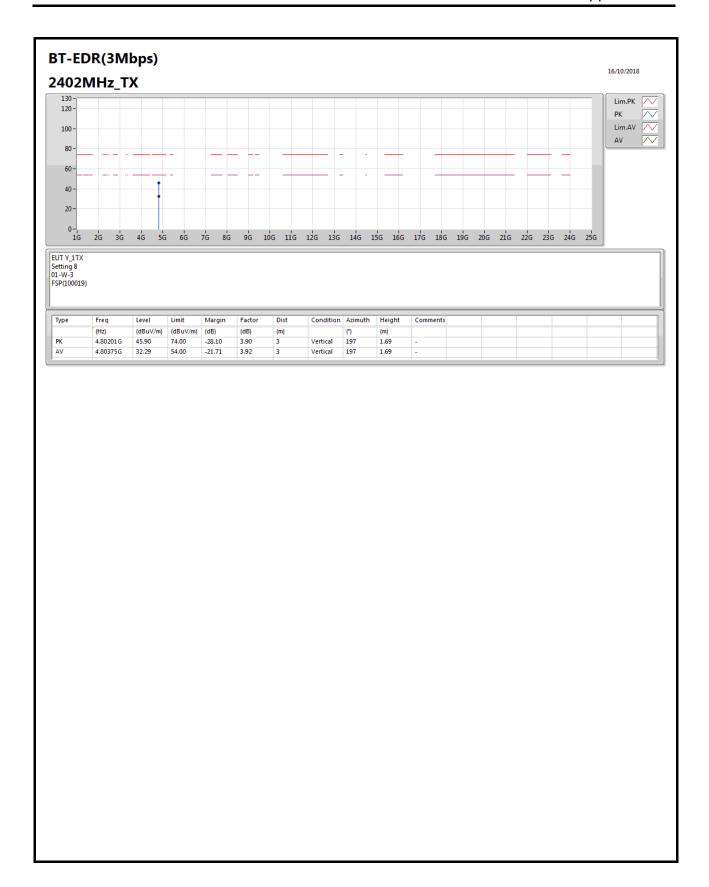
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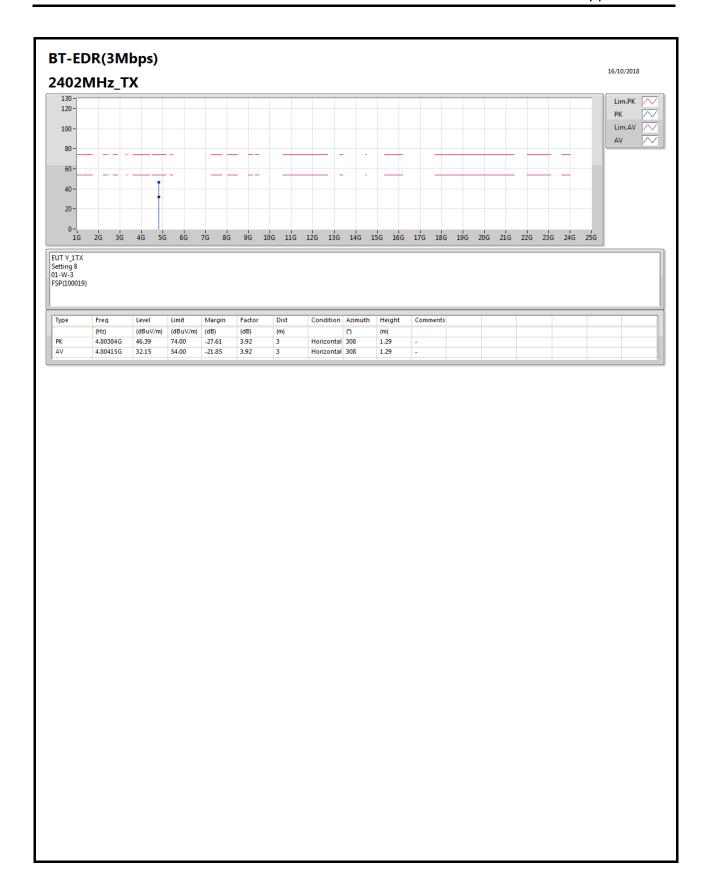
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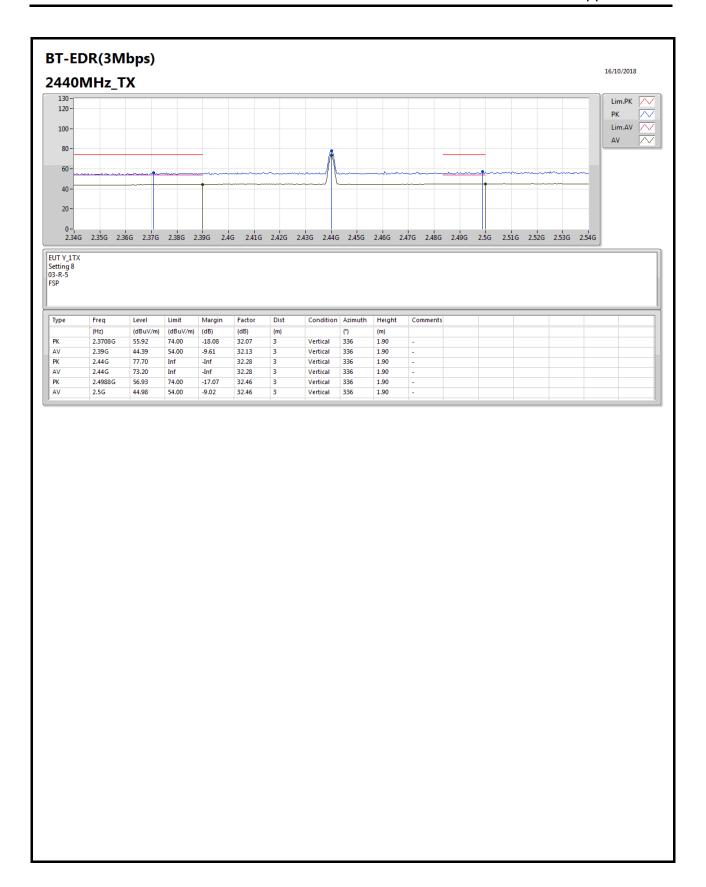
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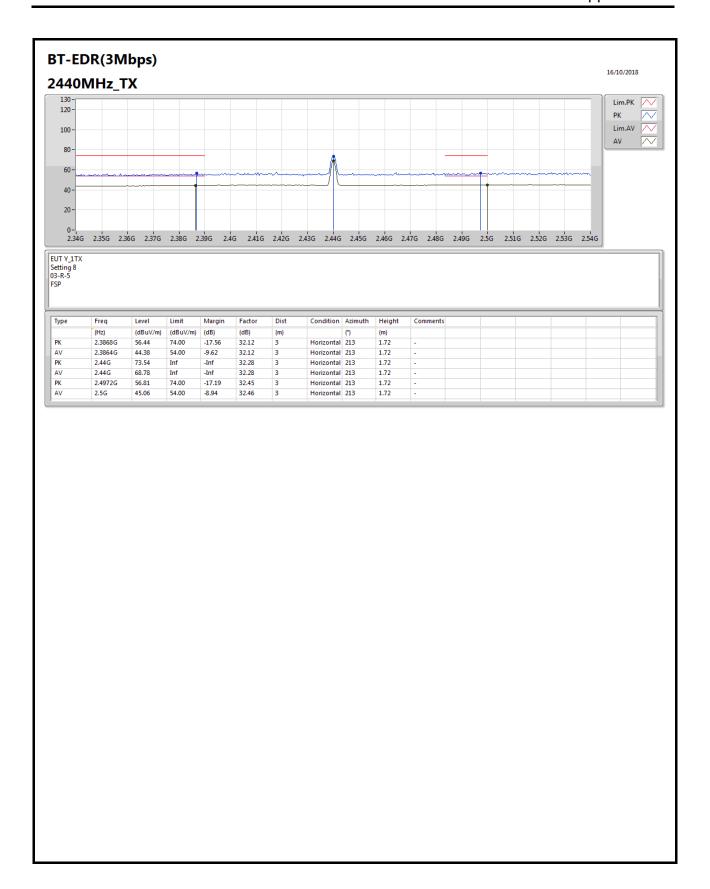
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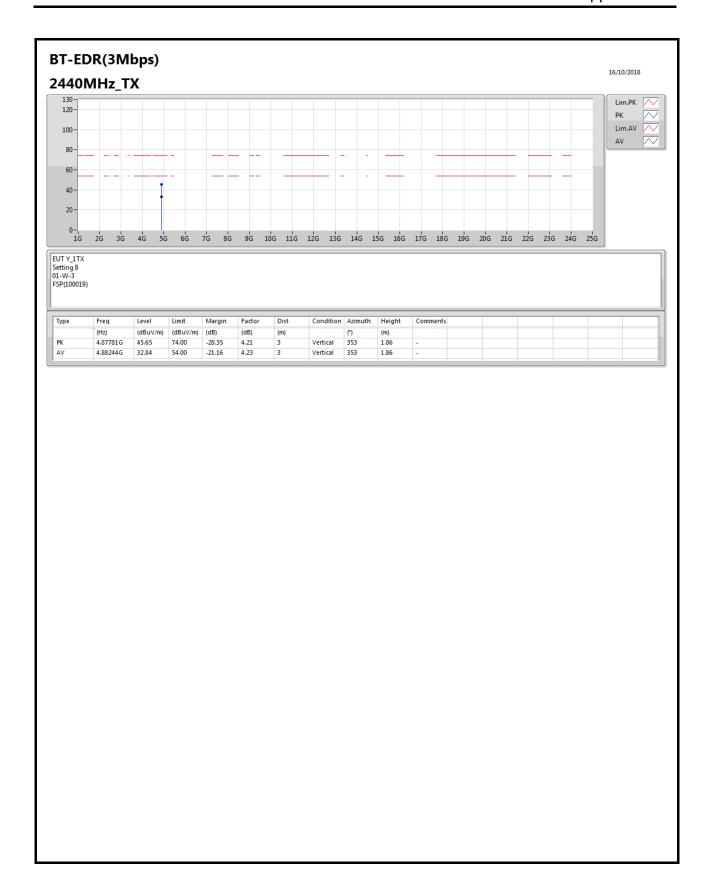
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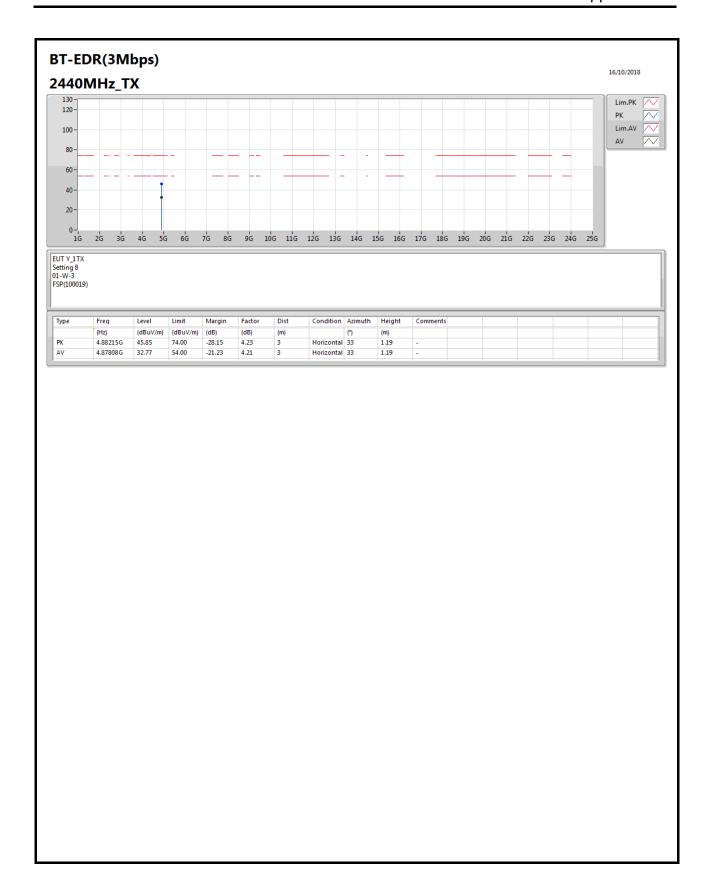
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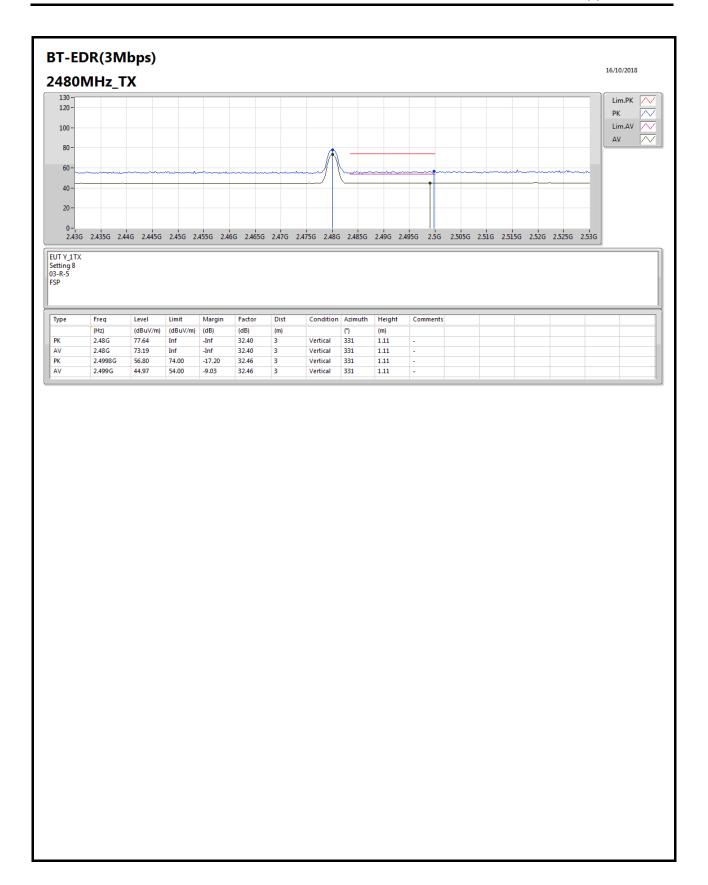
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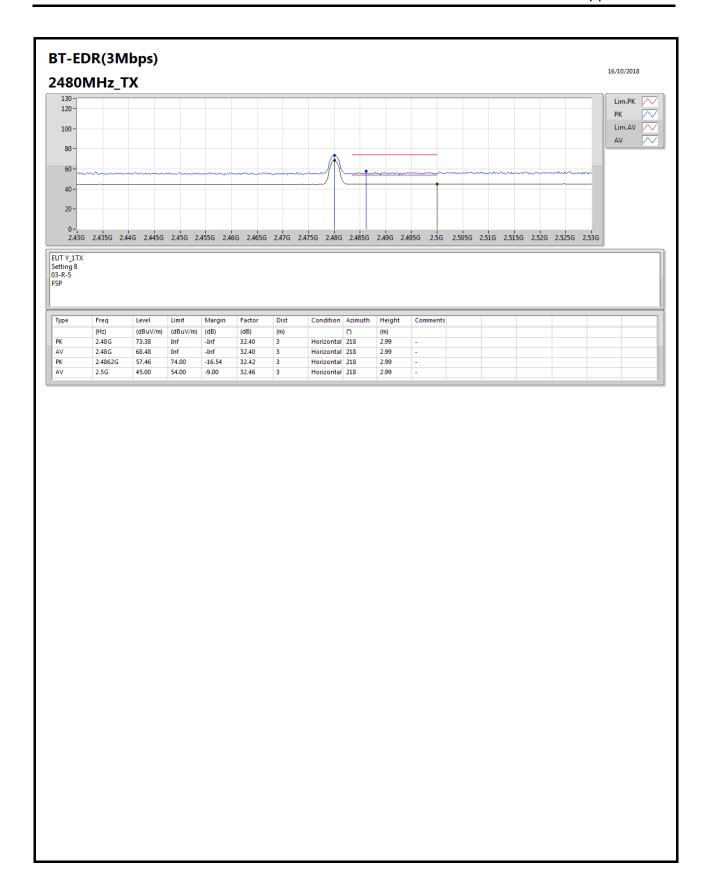
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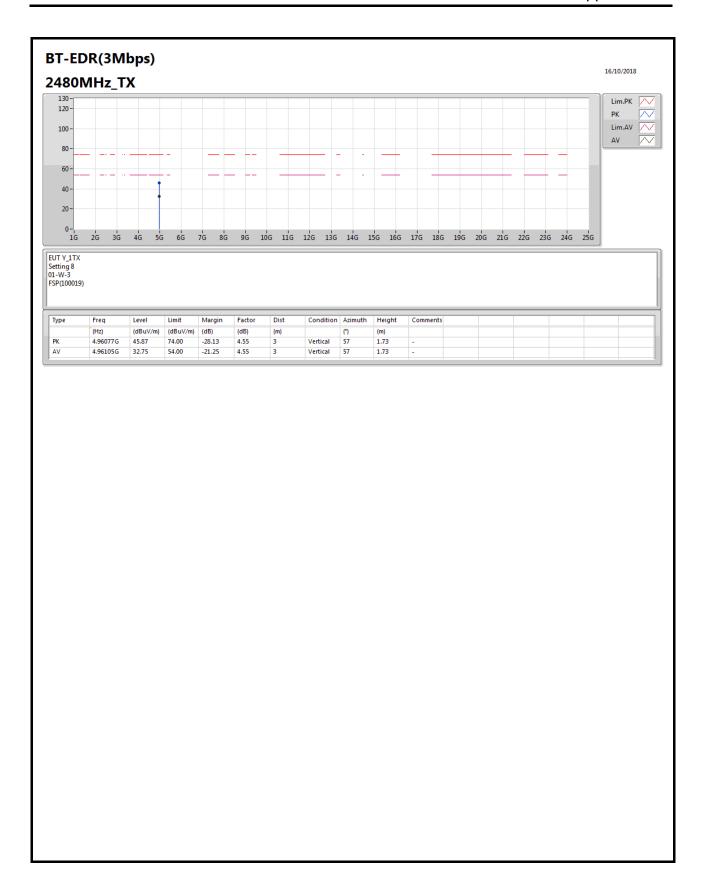
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