

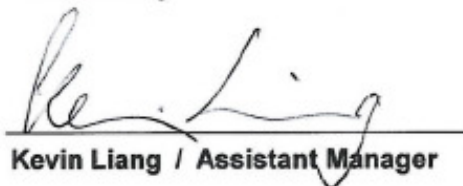
# FCC Test Report

Equipment : Mini PC  
Brand Name : **BIOSTAR**  
Model No. : RACING XXXX , IDEQ XXXX ( X=A-Z ,a-z,0-9 or BLANK )  
FCC ID : I27IZ83APBSR01000  
Standard : 47 CFR FCC Part 15.247  
RF Specification : Bluetooth BR/EDR  
Operating Band : 2400 MHz – 2483.5 MHz  
FCC Classification : DSS  
Applicant /  
Manufacturer : **Biostar Microtech Int'l Corp**  
2F. No. 108-2 Min Chuan Road, Hsin Tien District, New  
Taipei City 231, Taiwan, R.O.C.

The product sample received on Aug. 31, 2016 and completely tested on Sep. 29, 2016.. We, SPORTON, 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 test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Kevin Liang / Assistant Manager





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**Appendix I. Test Result of AC Power-line Conducted Emissions**

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**Appendix B. Test Result of Hopping Number & Dwell Time**

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**Appendix F. Test Photos**

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SUMMARY OF TEST RESULT

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.29MHz 32.49 (Margin 27.97dB) - QP 31.88 (Margin 18.58dB) - AV	FCC 15.207	Complied
3.2	15.247(a)	20dB Bandwidth	Refer as Appendix A	N/A	Complied
3.2	15.247(a)	Carrier Frequency Separation (ChS)	Refer as Appendix A	ChS $\geq$ BW <sub>20dB</sub> x2/3.	Complied
3.3	15.247(a)	Number of Hopping Frequencies (N)	Refer as Appendix B	N $\geq$ 15	Complied
3.4	15.247(a)	Time of Occupancy (Dwell Time)	Refer as Appendix B	0.4 s within 0.4 x N	Complied
3.5	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Refer as Appendix C	Power [dBm] BR:21 EDR:21	Complied
3.6	15.247(d)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2399.556MHz:42.05dB Restricted Bands: [dBuV/m at 3m]: 2485.920 MHz 59.50(Margin 14.50 dB) - PK 29.40(Margin 24.60 dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.7	15.247(d)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 33.880 MHz 35.72 (Margin 4.28 dB) - PK	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

Band	Mode	BWch (MHz)	Channel Number	Nss-Min	Nant
2.4G	BT-BR	1	0-78[79]	1	1
2.4G	BT-EDR2	1	0-78[79]	1	1
2.4G	BT-EDR3	1	0-78[79]	1	1

Note:

- ♦ 2.4G is the 2.4GHz Band (2.4-2.4835GHz)
- ♦ Bluetooth BR uses a GFSK (1Mbps)
- ♦ Bluetooth EDR uses a combination of  $\pi/4$ -DQPSK (2Mbps) and 8DPSK (3Mbps)
- ♦ BWch is the channel separation
- ♦ 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

Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input checked="" type="checkbox"/>	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
<input type="checkbox"/>	External antenna (dedicated antennas)
<input type="checkbox"/>	Single power level with corresponding antenna(s).
<input type="checkbox"/>	Multiple power level and corresponding antenna(s).

Antenna General Information		
Ant. Cat.	Ant. Type	Gain (dBi)
Integral	PIFA	2.29



1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	<input checked="" type="checkbox"/> Production ; <input type="checkbox"/> Pre-Production ; <input type="checkbox"/> Prototype
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.:
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.:
<input type="checkbox"/>	Other:

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input checked="" type="checkbox"/> Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)
<input checked="" type="checkbox"/> 78.50% - test mode single channel-BR-1Mbps	1.05
<input checked="" type="checkbox"/> 75.50% - test mode single channel-EDR-2Mbps	1.22
<input checked="" type="checkbox"/> 78.60% - test mode single channel-EDR-3Mbps	1.05
Bluetooth ACL packets can be 1, 3, or 5 time slots. The DH1 packet can cover a single time slot. The DH3 packet can cover up to 3 time slots. The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle.	

1.1.5 EUT Operational Condition

Supply Voltage	<input checked="" type="checkbox"/> AC mains	<input type="checkbox"/> DC	
Type of DC Source	<input checked="" type="checkbox"/> External AC adapter	<input type="checkbox"/> From Host System	<input type="checkbox"/> Battery



### 1.2 Testing Applied 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 Public Notice DA 00-705

### 1.3 Testing Location Information

Testing Location							
<input checked="" type="checkbox"/>	HWA YA	ADD	:	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.			
		TEL	:	886-3-327-3456	FAX	:	886-3-327-0973
Test Site Registration Number: FCC 553509							
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date			
AC Conduction	CO04-HY	Ryan	23°C / 58%	22/09/2016			
RF Conducted	TH01-HY	Ryan	24.5°C / 65%	21/09/2016			
Radiated Emission	03CH09-HY	Thor	24.3°C / 55.4%	29/09/2016			



### 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))

Measurement Uncertainty		
Test Item		Uncertainty
AC power-line conducted emissions		±2.3 dB
Emission bandwidth, 6dB bandwidth		±0.5%
RF output power, conducted		±0.1 dB
Power density, conducted		±0.5 dB
Unwanted emissions, conducted	±0.4 dB	±0.4 dB
	±0.4 dB	±0.4 dB
	±0.6 dB	±0.6 dB
	±0.5 dB	±0.5 dB
	±0.5 dB	±0.5 dB
	N/A	N/A
All emissions, radiated	±2.5 dB	±2.5 dB
	±2.3 dB	±2.3 dB
	±2.6 dB	±2.6 dB
	±3.6 dB	±3.6 dB
	±3.8 dB	±3.8 dB
	N/A	N/A
Temperature		±0.8 °C
Humidity		±5 %
DC and low frequency voltages		±0.9%
Time		±1.4 %
Duty Cycle		±0.5 %

## 2 Test Configuration of EUT

### 2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing					
Bluetooth Mode	Transmit Chains (N <sub>TX</sub> )	Data Rate	Modulation Mode	RF Output Power (dBm)	Worst Mode
BR	1	1 Mbps	BR-1Mbps	5.15	EDR-3Mbps
EDR	1	2 Mbps	EDR-2Mbps	5.71	
EDR	1	3 Mbps	EDR-3Mbps	6.01	
Note 1: Bluetooth BR uses a combination of GFSK (1Mbps). Note 2: Bluetooth EDR uses a combination of $\pi/4$ -DQPSK (2Mbps) and 8DPSK (3Mbps). Note 3: Modulation modes consist below configuration: FHSS BR-1Mbps: GFSK (1Mbps), EDR-2Mbps: $\pi/4$ -DQPSK (2Mbps), EDR-3Mbps: 8DPSK(3Mbps) Note 4: RF output power specifies that Maximum Peak Conducted Output Power.					




### 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter			
Test Software	CMD		
Modulation Mode	2402 MHz	2440 MHz	2480 MHz
BR,1Mbps	default	default	default
EDR,2Mbps	default	default	default
EDR,3Mbps	default	default	default

### 2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	AC power-line conducted emissions
<b>Condition</b>	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
<b>Operating Mode</b>	Operating Mode Description
<b>1</b>	Adapter Mode

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	RF Output Power, 20dB Bandwidth, Carrier Frequency Separation (ChS) Number of Hopping Frequencies (N), Time of Occupancy (Dwell Time)
<b>Test Condition</b>	Conducted measurement at transmit chains
<b>Modulation Mode</b>	BR-1Mbps, EDR-2Mbps, EDR-3Mbps

The Worst Case Mode for Following Conformance Tests			
<b>Tests Item</b>	Emission Bandwidth, Fundamental Emissions, Radiated Unwanted Emissions		
<b>Test Condition</b>	Radiated measurement		
<b>User Position</b>	<input type="checkbox"/> EUT will be placed in fixed position.		
	<input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions.		
	<input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
<b>Operating Mode</b>	Operating Mode Description		
<b>1</b>	Adapter Mode		
<b>Modulation Mode</b>	BR-1Mbps, EDR-2Mbps ,EDR-3Mbps		
<b>Orthogonal Planes of EUT</b>	<b>X Plane</b>	<b>Y Plane</b>	<b>Z Plane</b>
			
<b>Worst Planes of EUT</b>	V		

## 2.4 Accessories and Support Equipment

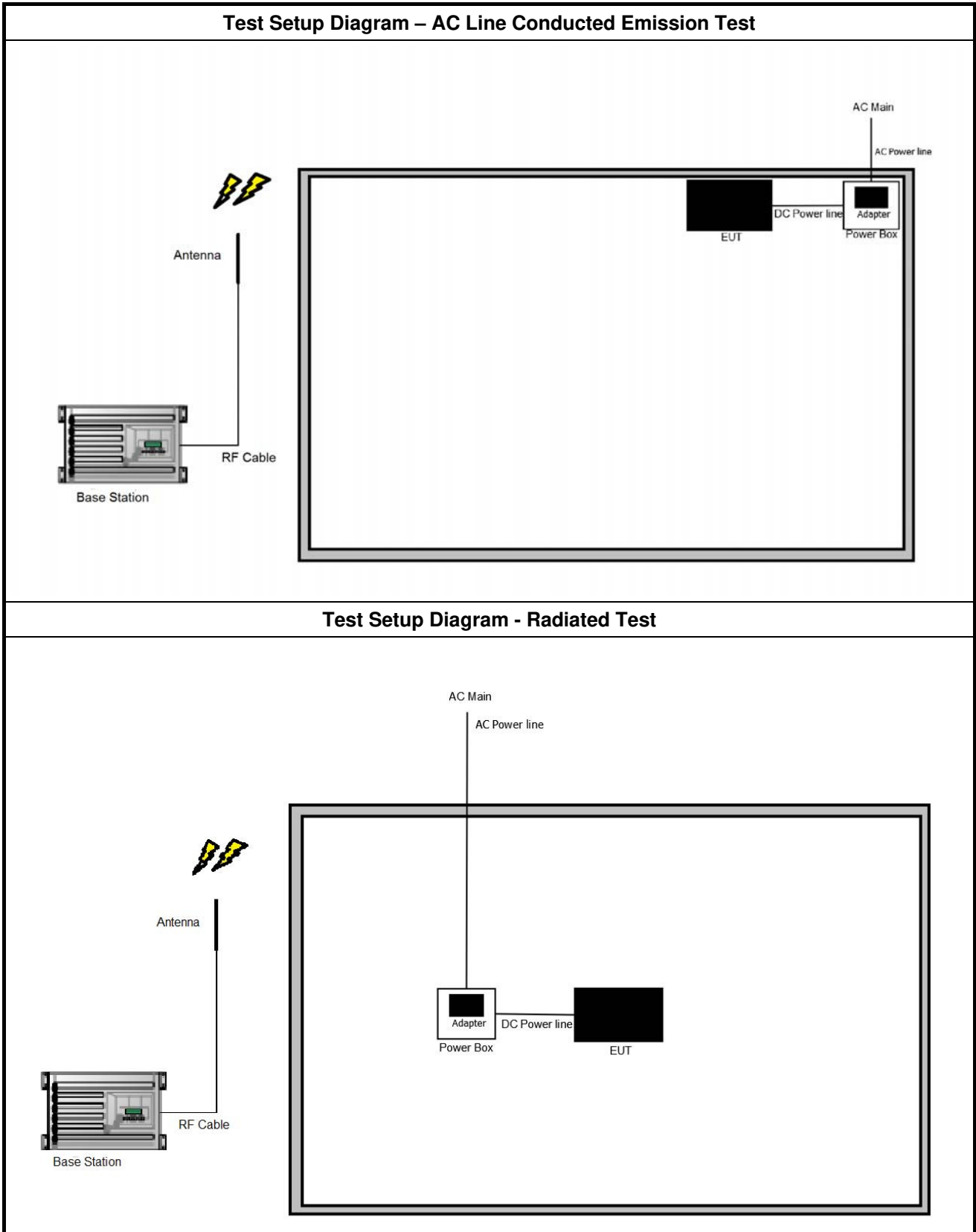
Accessories				
AC Adapter	Brand Name	PHIHONG	Model Name	PSAA20R-050L6
	Power Rating	I/P: 100 - 240 Vac, 800 mA, O/P: 5 Vdc, 4000 mA		
	Power Cord	1 meter, non-shielded cable, w/o ferrite core		
Audio Cable	Signal Line	0.2 meter, non-shielded cable, with w/o ferrite core		

Reminder: Regarding to more detail and other information, please refer to user manual.

Support Equipment - RF Conducted			
No.	Equipment	Brand Name	Model Name
1	Monitor	DELL	-

Support Equipment - Radiated Emission			
No.	Equipment	Brand Name	Model Name
-	-	-	-

## 2.5 Test Setup Diagram



### 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.

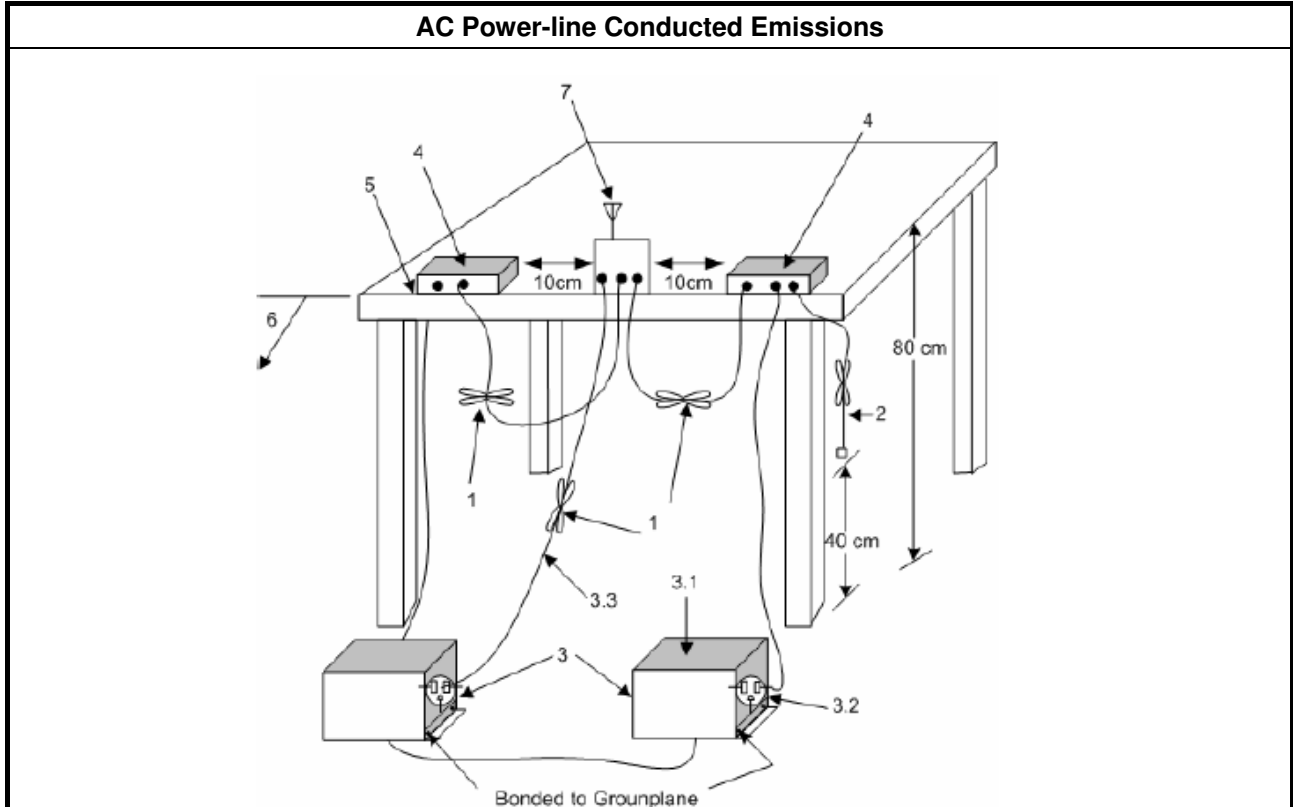
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix I

### 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	
<input checked="" type="checkbox"/>	2400-2483.5 MHz Band:
<input type="checkbox"/>	$N \geq 75$ and ChS $\geq$ MAX (20 dB bandwidth, 25 kHz).
<input checked="" type="checkbox"/>	$N \geq 15$ and ChS $\geq$ MAX (20 dB bandwidth x 2/3, 25 kHz).
<b>N:</b> Number of Hopping Frequencies; <b>ChS:</b> Hopping Channel Separation	

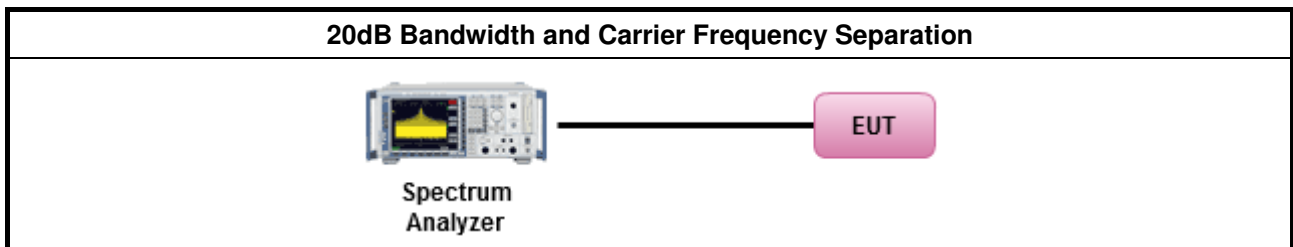
#### 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as 15.247(a), clause 6.9.2 for 20 dB bandwidth measurement.
<input checked="" type="checkbox"/>	Refer as 15.247(a), clause 7.8.2 for carrier frequency separation measurement.
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

#### 3.2.4 Test Setup



#### 3.2.5 Test Result of 20dB Bandwidth and Carrier Frequency Separation

Refer as Appendix A

### 3.3 Number of Hopping Frequencies

#### 3.3.1 Number of Hopping Frequencies Limit

Number of Hopping Frequencies Limit for Frequency Hopping Systems	
<input checked="" type="checkbox"/>	2400-2483.5 MHz Band:
<input type="checkbox"/>	$N \geq 75$ and ChS $\geq$ MAX (20 dB bandwidth, 25 kHz).
<input checked="" type="checkbox"/>	$N \geq 15$ and ChS $\geq$ MAX (20 dB bandwidth x 2/3, 25 kHz).
<b>N:</b> Number of Hopping Frequencies; <b>ChS:</b> Hopping Channel Separation	

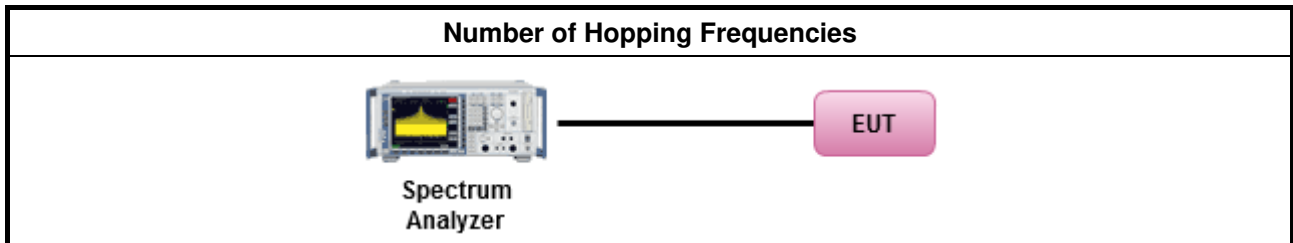
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 7.8.3 for number of hopping frequencies measurement.
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

#### 3.3.4 Test Setup



#### 3.3.5 Test Result of Number of Hopping Frequencies

Refer as Appendix B

### 3.4 Time of Occupancy (Dwell Time)

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

Time of Occupancy (Dwell Time) Limit for Frequency Hopping Systems
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band: Dwell time $\leq 0.4$ second within $0.4 \times N$
N: Number of Hopping Frequencies

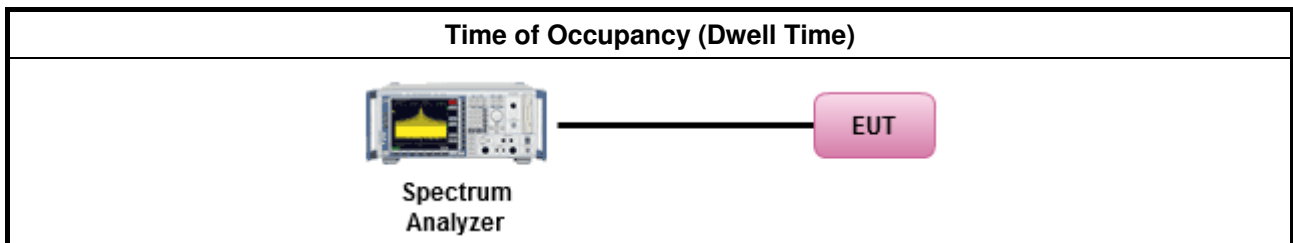
#### 3.4.2 Measuring Instruments

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

#### 3.4.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> Refer as 15.247(a), clause 7.8.4 for dwell time measurement.
<input checked="" type="checkbox"/> 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.
<input checked="" type="checkbox"/> The DH1 packet can cover a single time slot. A maximum length packet has duration of 1 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is $1/1600$ seconds, or 0.625ms. DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds.
<input checked="" type="checkbox"/> The DH3 packet can cover up to 3 time slots. A maximum length packet has duration of 3 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is $3/1600$ seconds, or 1.875ms. DH3 Packet permit maximum $1600 / 79 / 4 = 5.06$ hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds.
<input checked="" type="checkbox"/> 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 (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds
<input checked="" type="checkbox"/> For conducted measurement.
<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

#### 3.4.4 Test Setup



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

Refer as Appendix B

### 3.5 RF Output Power

#### 3.5.1 RF Output Power Limit

RF Output Power Limit for Frequency Hopping Systems	
<b>Maximum Peak Conducted Output Power Limit</b>	
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band:	
<input type="checkbox"/>	For Hopping Channel: $N \geq 75$
<input type="checkbox"/>	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
<input type="checkbox"/>	If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
<input checked="" type="checkbox"/>	For Hopping Channel: $N \geq 15$
<input checked="" type="checkbox"/>	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 21$ dBm (0.125 W)
<input type="checkbox"/>	If $G_{TX} > 6$ dBi, then $P_{Out} = 21 - (G_{TX} - 6)$ dBm
<b>e.i.r.p. Power Limit:</b>	
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band:	
<input type="checkbox"/>	For Hopping Channel: $N \geq 75 - P_{eirp} \leq 36$ dBm (4 W)
<input checked="" type="checkbox"/>	For Hopping Channel: $N \geq 15 - P_{eirp} \leq 27$ dBm (0.5 W)
$G_{TX}$ = the maximum transmitting antenna directional gain in dBi. $P_{eirp}$ = e.i.r.p. Power in dBm. <b>N</b> : Number of Hopping Frequencies <b>ChS</b> : Hopping Channel Separation	

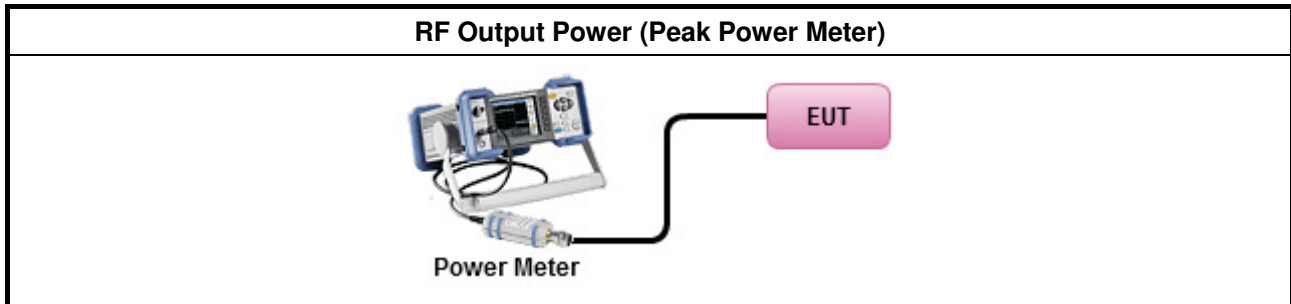
#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Maximum Peak Conducted Output Power
<input type="checkbox"/>	Refer as FCC DA 00-0705, spectrum analyzer for peak power.
<input checked="" type="checkbox"/>	Refer as FCC DA 00-0705, peak power meter for peak power.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 11.9.1.3) for peak power meter.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 11.9.1.1) for spectrum analyzer - (RBW $\geq$ EBW).
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

### 3.5.4 Test Setup



### 3.5.5 Test Result of Maximum Peak Conducted Output Power

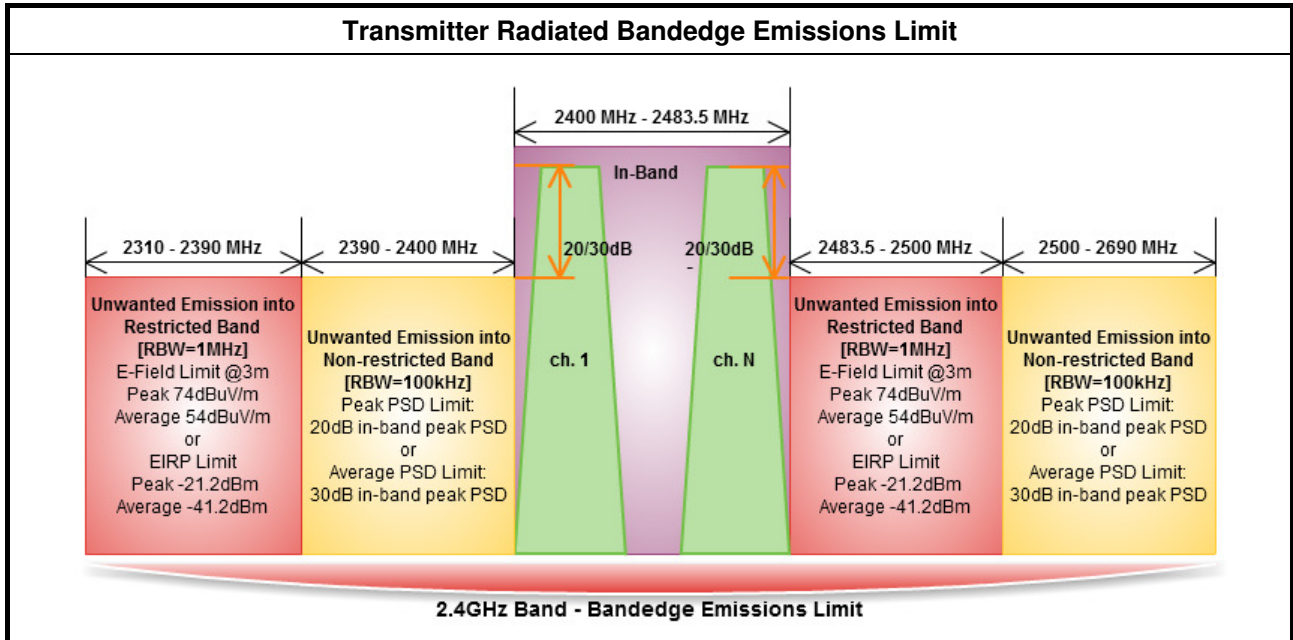
Refer as Appendix C

### 3.5.6 Test Result of Maximum Average Conducted Output Power

Refer as Appendix C

### 3.6 Transmitter Radiated Bandedge Emissions

#### 3.6.1 Transmitter Radiated Bandedge Emissions Limit



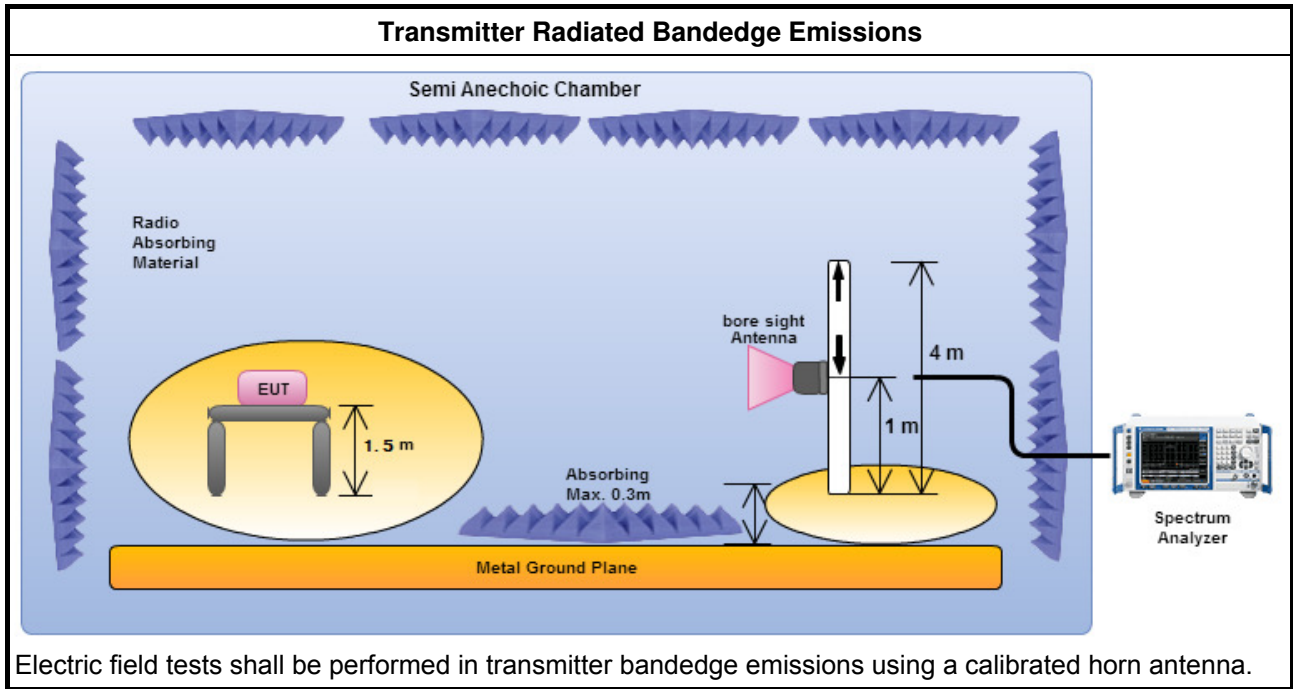
#### 3.6.2 Measuring Instruments

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

#### 3.6.3 Test Procedures

Test Method – General Information	
<input checked="" type="checkbox"/>	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.10 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
<input checked="" type="checkbox"/>	For the transmitter unwanted emissions shall be measured using following options below:
<input checked="" type="checkbox"/>	For unwanted emissions into non-restricted bands. 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.
<input checked="" type="checkbox"/>	For unwanted emissions into restricted bands.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). $VBW \geq 1/T$ , where T is pulse time.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
<input checked="" type="checkbox"/>	For the transmitter bandedge emissions shall be measured using following options below:
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.10 for band-edge testing.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 7.8.6 for band-edge testing into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.6 for radiated emissions and test distance is 3m.

### 3.6.4 Test Setup



### 3.6.5 Test Result of Transmitter Radiated Bandedge Emissions

Refer as Appendix D

### 3.7 Transmitter Radiated Unwanted Emissions

#### 3.7.1 Transmitter Radiated Unwanted Emissions 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 below 30 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.

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

#### 3.7.2 Measuring Instruments

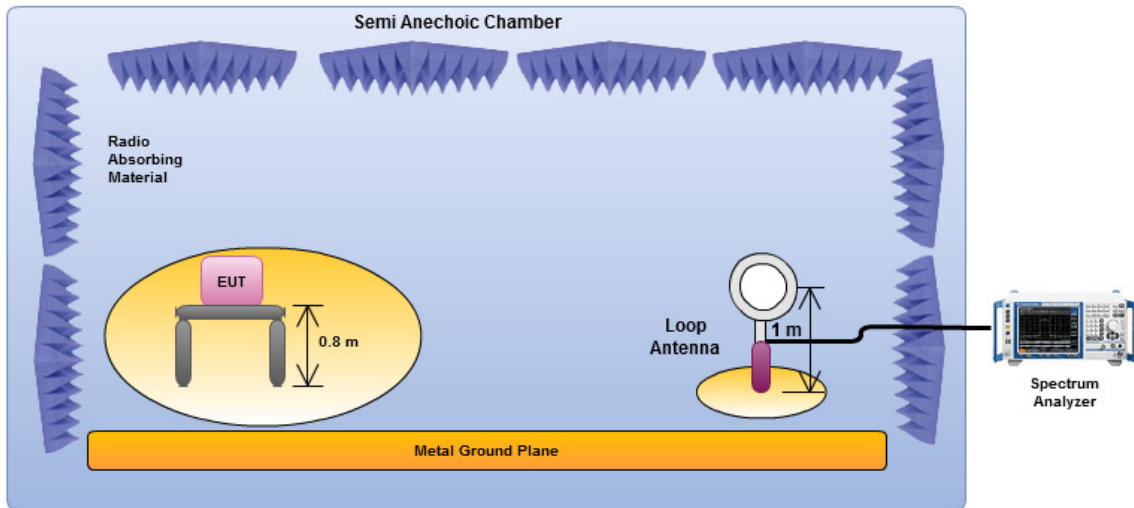
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

Test Method – General Information	
<input checked="" type="checkbox"/>	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).
<input checked="" type="checkbox"/>	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
<input checked="" type="checkbox"/>	For the transmitter unwanted emissions shall be measured using following options below:
<input checked="" type="checkbox"/>	Refer as FCC DA 00-0705, for spurious radiated emissions. The dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{dwell time}/100 \text{ ms})$
<input type="checkbox"/>	For unwanted emissions into non-restricted bands. 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.
<input checked="" type="checkbox"/>	For unwanted emissions into restricted bands.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). $VBW \geq 1/T$ , where T is pulse time.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
<input checked="" type="checkbox"/>	For radiated measurement.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.
<input checked="" type="checkbox"/>	The any unwanted emissions level shall not exceed the fundamental emission level.
<input checked="" type="checkbox"/>	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

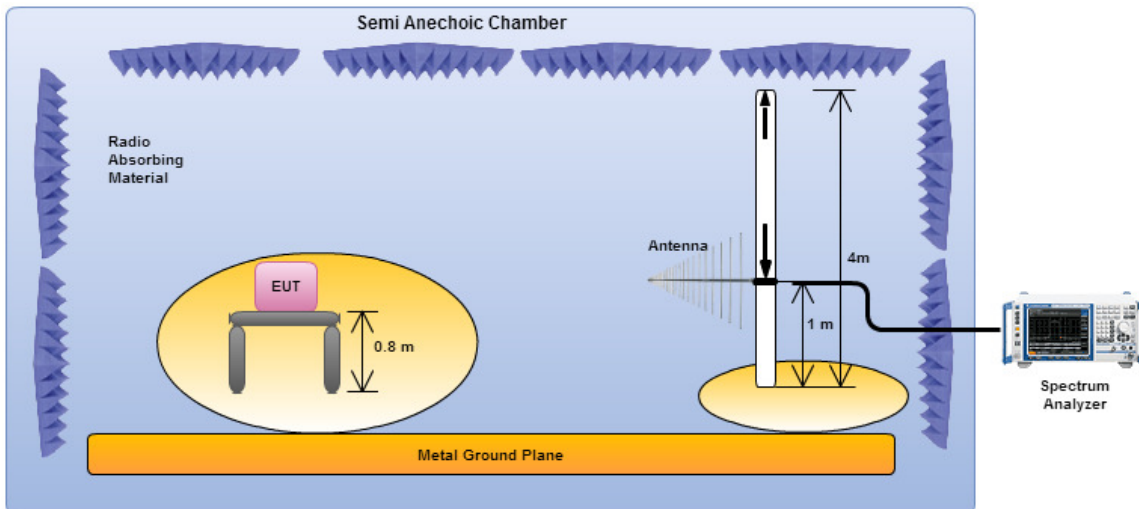
### 3.7.4 Test Setup

#### Transmitter Spurious and Out of Band Emissions (9 kHz - 30 MHz)

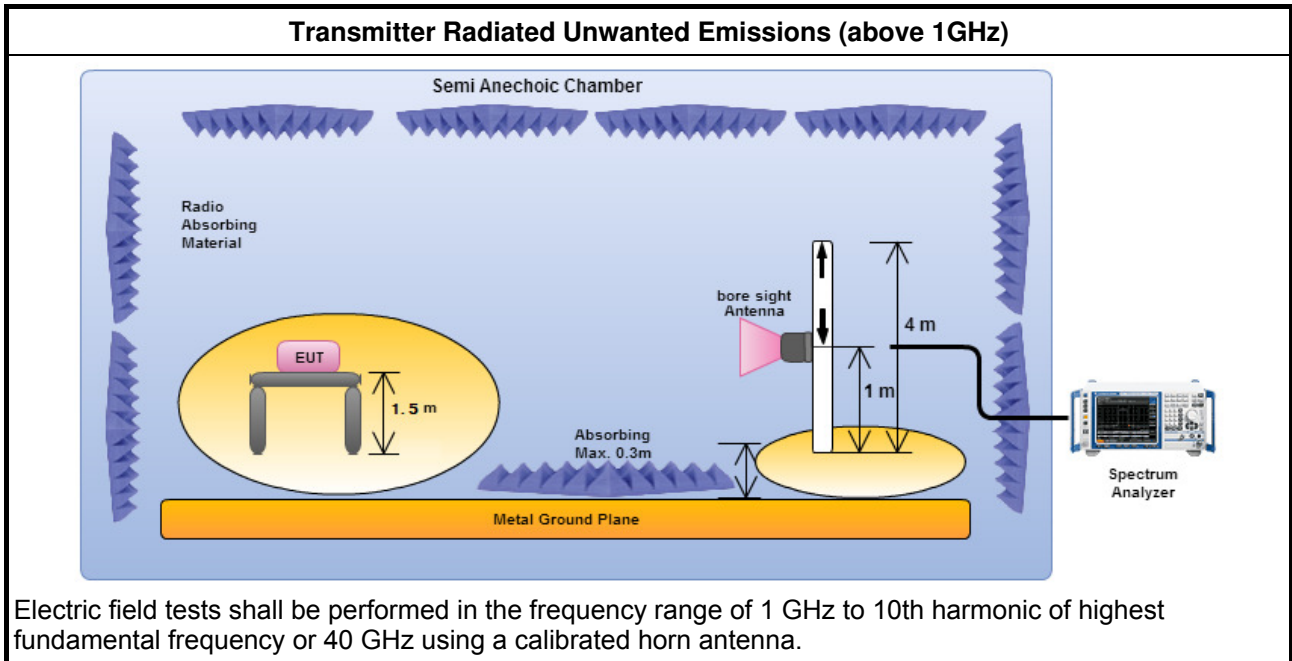


Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna.

#### Transmitter Radiated Unwanted Emissions (below 1GHz)



Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna.



**3.7.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)**

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

**3.7.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)**

Refer as Appendix E



## 4 Test Equipment and Calibration Data

### Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR-3	102051	9KHz ~ 3.6GHz	19/04/2016	18/04/2017
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	26/01/2016	25/01/2017
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	30/10/2015	29/10/2016
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	NCR	NCR
Bluetooth Tester	ROHDE&SCHWARZ	CBT	100959	Bluetooth Station	02/03/2016	01/03/2017

NCR : Non-Calibration Require

### Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9KHz~40GHz	16/02/2016	15/02/ 2017
Power Sensor	Anritsu	MA2411B	917017	300MHz ~ 40GHz	04/02/2016	03/02/2017
Power Meter	Anritsu	ML2495A	949003	300MHz ~ 40GHz	04/02/2016	03/02/2017
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	21/07/2016	20/07/2017
Bluetooth Tester	ROHDE&SCHWARZ	CBT	100959	Bluetooth station	02/03/2016	01/03/2017

### Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	30MHz ~ 1GHz 3m	25/04/2016	24/04/2017
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz ~ 18GHz 3m	30/06/2016	29/06/2017
Amplifier	EMC	EMC9135	980232	9kHz ~ 1.0GHz	29/01/2016	28/01/2017
Amplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	11/04/2016	10/04/2017
Spectrum	KEYSIGHT	N9010A	MY54200885	10Hz ~ 44GHz	04/07/2016	03/07/2017
Bilog Antenna & 5dB Attenuator	TESEQ & MTJ	CBL 6111D & MTJ6102	35418	30MHz ~ 1GHz	31/03/2016	30/03/2017
Horn Antenna	SCHWARZBECK	BBHA 9120D	BBHA 9120D 1534	1GHz ~ 18GHz	22/04/2016	21/04/2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170614	18GHz ~ 40GHz	04/01/2016	03/01/2017
Bluetooth Tester	ROHDE&SCHWARZ	CBT	100959	Bluetooth Station	02/03/2016	01/03/2017

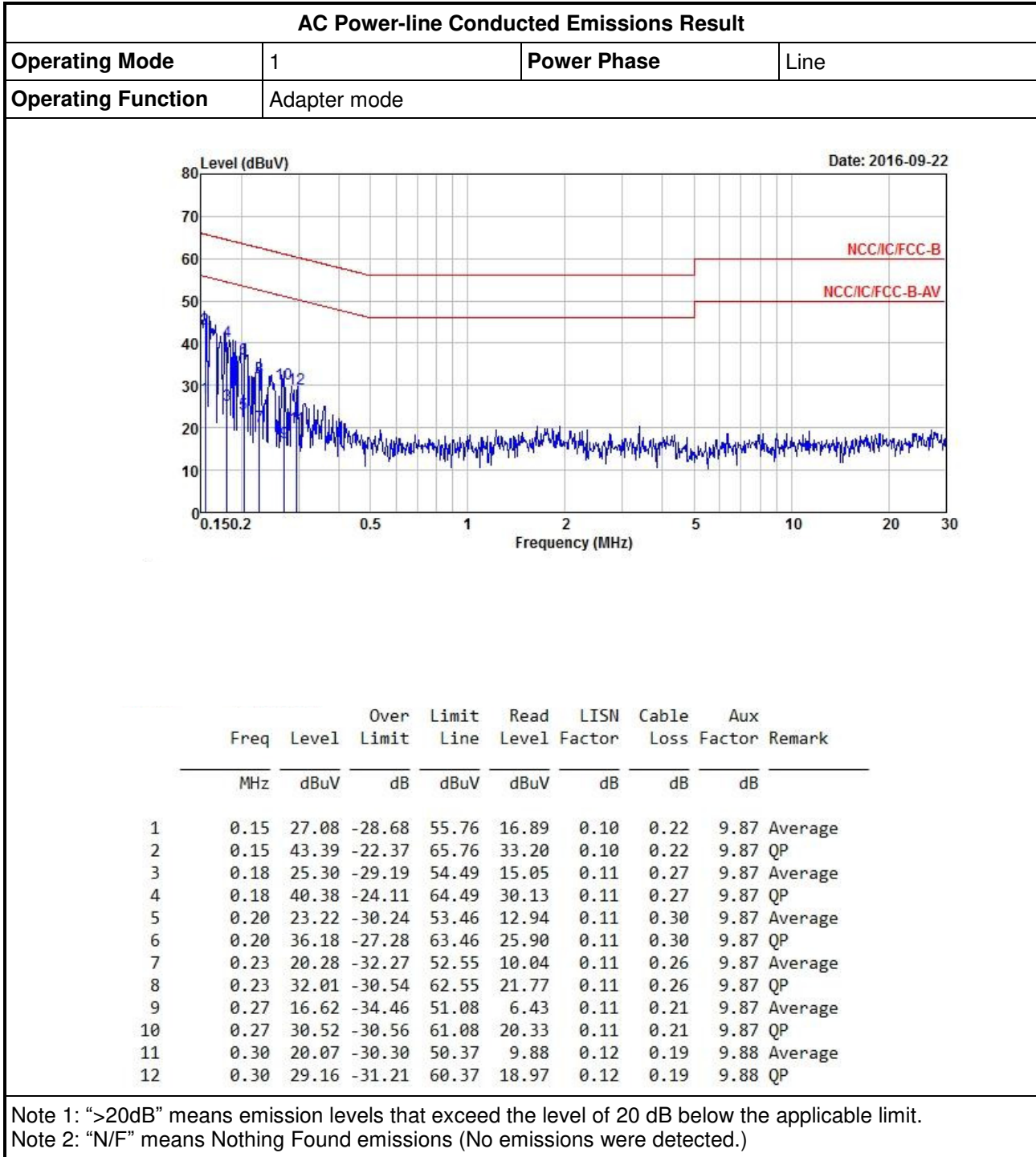


# AC Power-line Conducted Emissions

Appendix I

AC Power-line Conducted Emissions Result									
Operating Mode	1			Power Phase	Neutral				
Operating Function	Adapter mode								
<div style="display: flex; justify-content: space-between;"> <div> <p style="font-size: small;">Date: 2016-09-22</p> </div> </div>									
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Aux Factor	Remark
	MHz	dBUV	dB	dBUV	dBUV	dB	dB	dB	
1	0.16	25.76	-29.93	55.69	15.55	0.11	0.23	9.87	Average
2	0.16	43.28	-22.41	65.69	33.07	0.11	0.23	9.87	QP
3	0.18	23.58	-30.97	54.55	13.33	0.11	0.27	9.87	Average
4	0.18	40.22	-24.33	64.55	29.97	0.11	0.27	9.87	QP
5	0.20	21.56	-31.96	53.52	11.28	0.11	0.30	9.87	Average
6	0.20	36.68	-26.84	63.52	26.40	0.11	0.30	9.87	QP
7	0.22	21.27	-31.38	52.65	11.02	0.11	0.27	9.87	Average
8	0.22	32.59	-30.06	62.65	22.34	0.11	0.27	9.87	QP
9	0.27	21.75	-29.29	51.04	11.56	0.11	0.21	9.87	Average
10	0.27	29.82	-31.22	61.04	19.63	0.11	0.21	9.87	QP
11	0.29	31.88	-18.58	50.46	21.69	0.12	0.19	9.88	Average
12	0.29	32.49	-27.97	60.46	22.30	0.12	0.19	9.88	QP

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.)



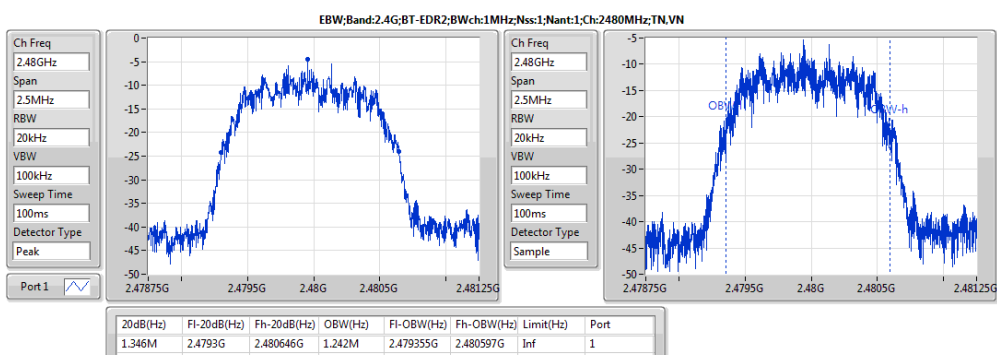
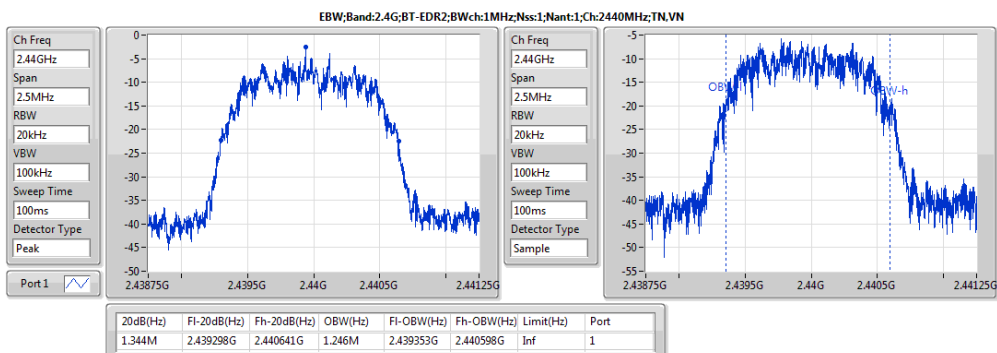
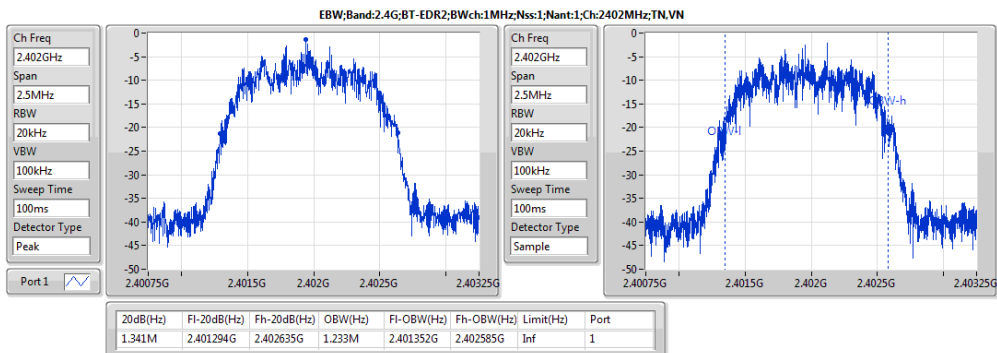
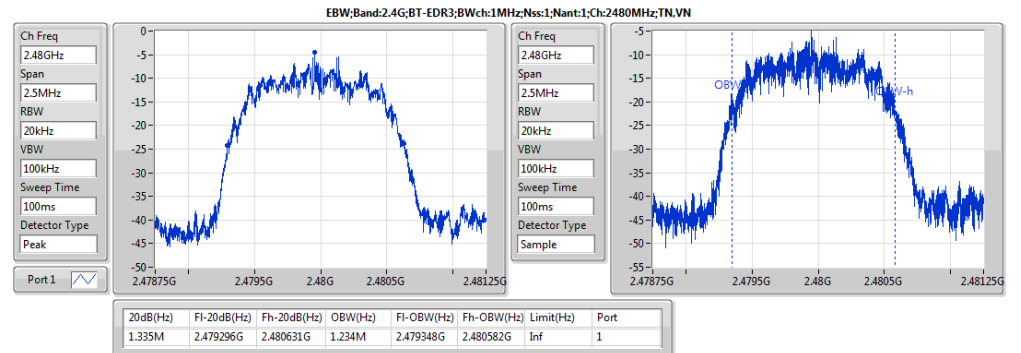
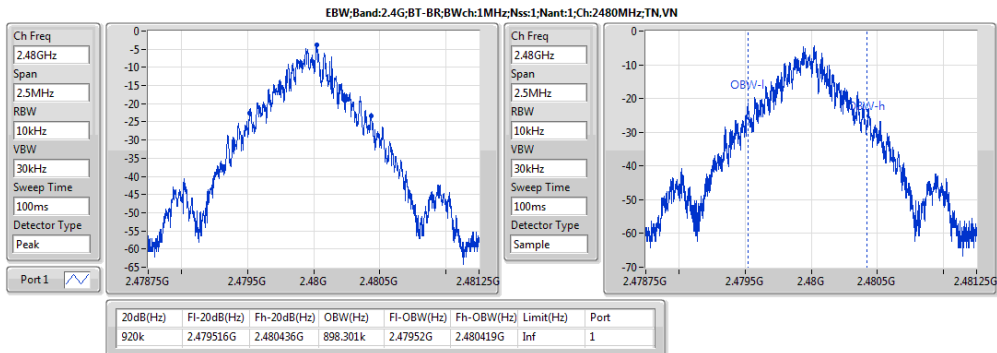
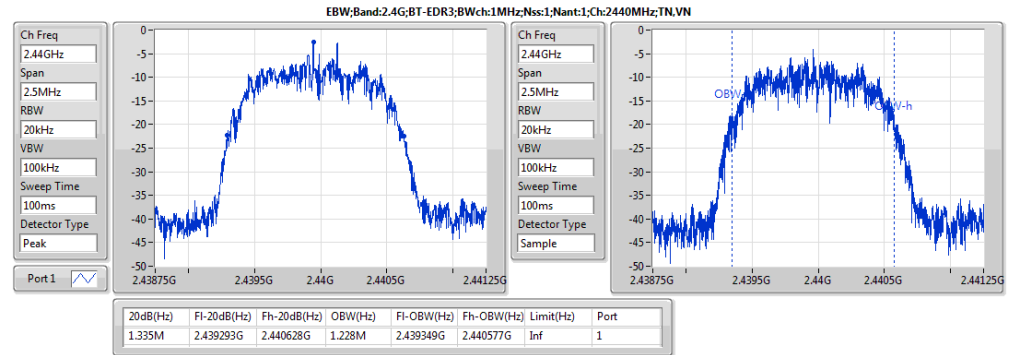
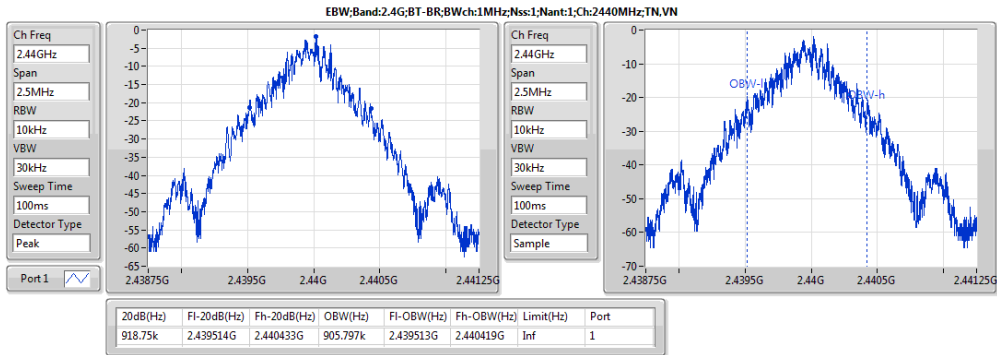
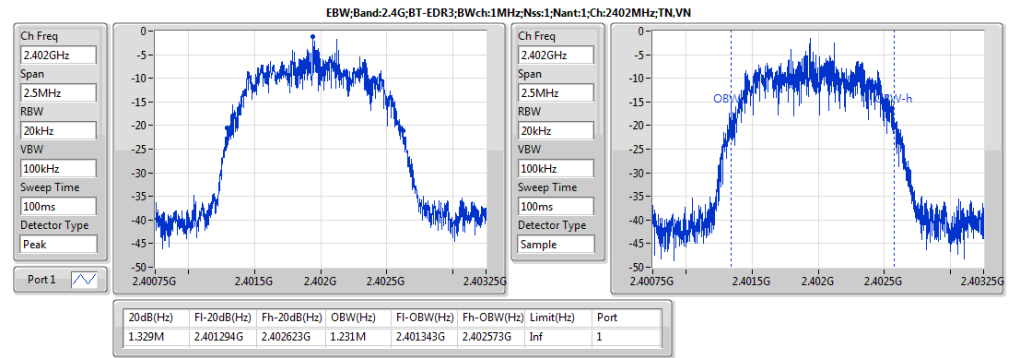
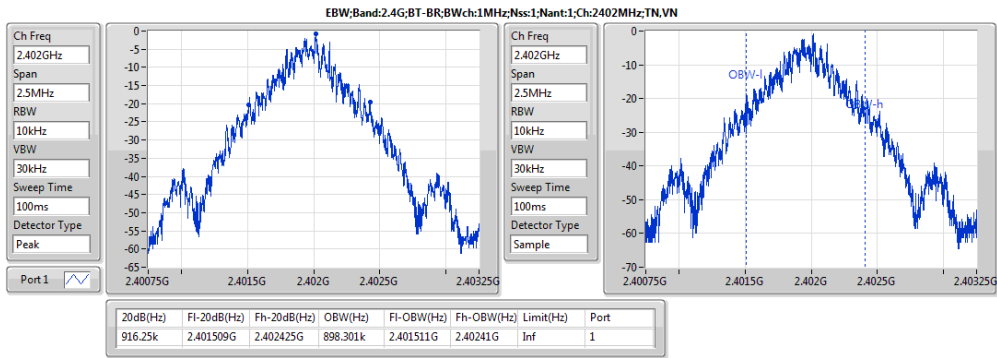


Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4G;BT-BR;1;1;1	920k	905.797k	906kF1D	916.25k	898.301k
2.4G;BT-EDR2;1;1;1	1.346M	1.246M	1M25G1D	1.341M	1.233M
2.4G;BT-EDR3;1;1;1	1.335M	1.234M	1M23G1D	1.329M	1.228M

**Result**

Mode	Result	Limit	P1-N dB (Hz)	P1-OBW (Hz)
2.4G;BT-BR;1;1;1;2402;L;TN,VN	Pass	Inf	916.25k	898.301k
2.4G;BT-BR;1;1;1;2440;M;TN,VN	Pass	Inf	918.75k	905.797k
2.4G;BT-BR;1;1;1;2480;H;TN,VN	Pass	Inf	920k	898.301k
2.4G;BT-EDR2;1;1;1;2402;L;TN,VN	Pass	Inf	1.341M	1.233M
2.4G;BT-EDR2;1;1;1;2440;M;TN,VN	Pass	Inf	1.344M	1.246M
2.4G;BT-EDR2;1;1;1;2480;H;TN,VN	Pass	Inf	1.346M	1.242M
2.4G;BT-EDR3;1;1;1;2402;L;TN,VN	Pass	Inf	1.329M	1.231M
2.4G;BT-EDR3;1;1;1;2440;M;TN,VN	Pass	Inf	1.335M	1.228M
2.4G;BT-EDR3;1;1;1;2480;H;TN,VN	Pass	Inf	1.335M	1.234M





Summary

Mode	Max-Space (Hz)	Min-Space (Hz)
2.4G;BT-BR;1;1;1	1.002M	930k
2.4G;BT-EDR2;1;1;1	1.0005M	997.5k
2.4G;BT-EDR3;1;1;1	1.0005M	984k

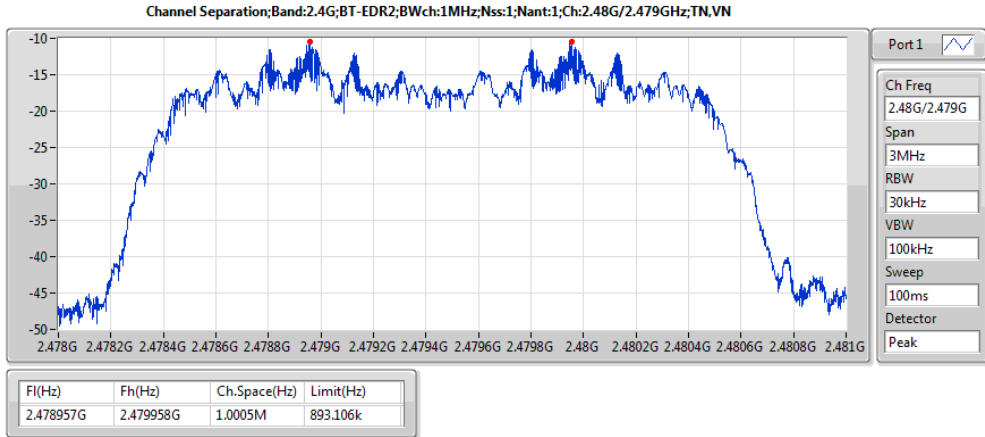
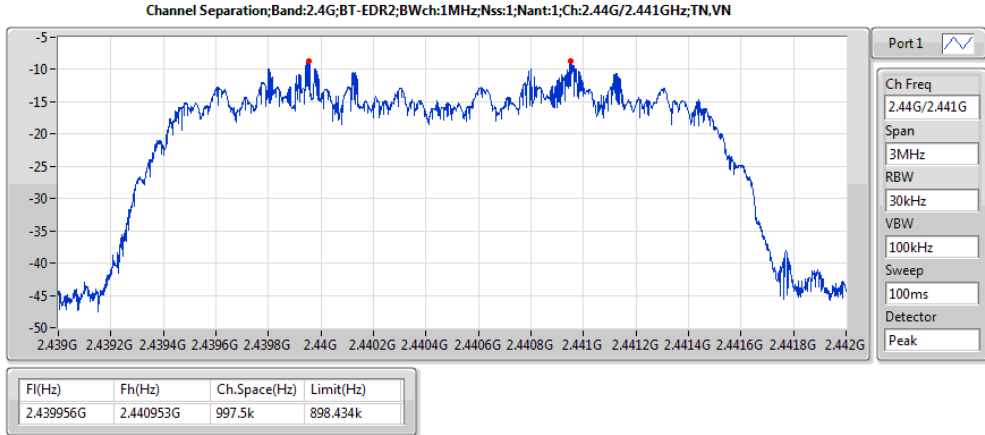
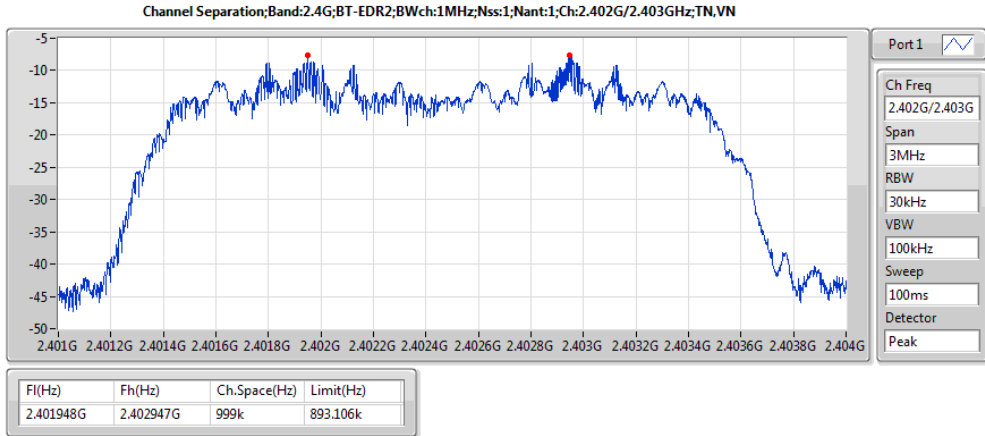
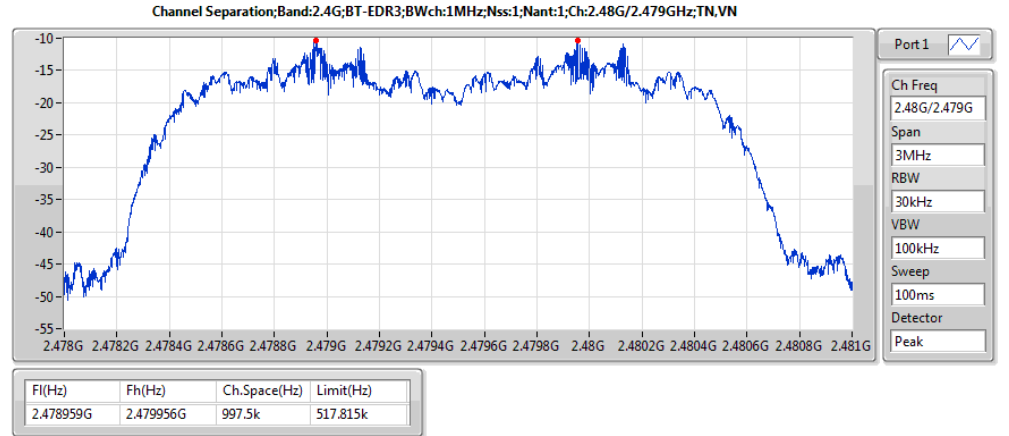
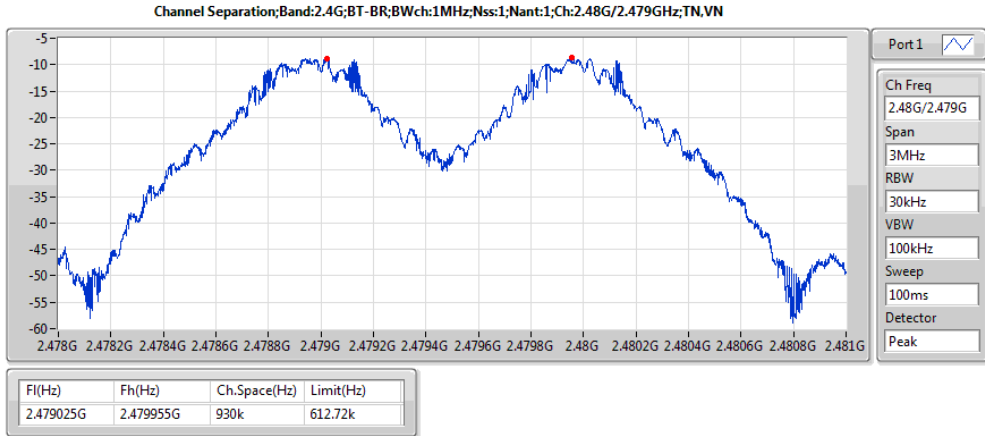
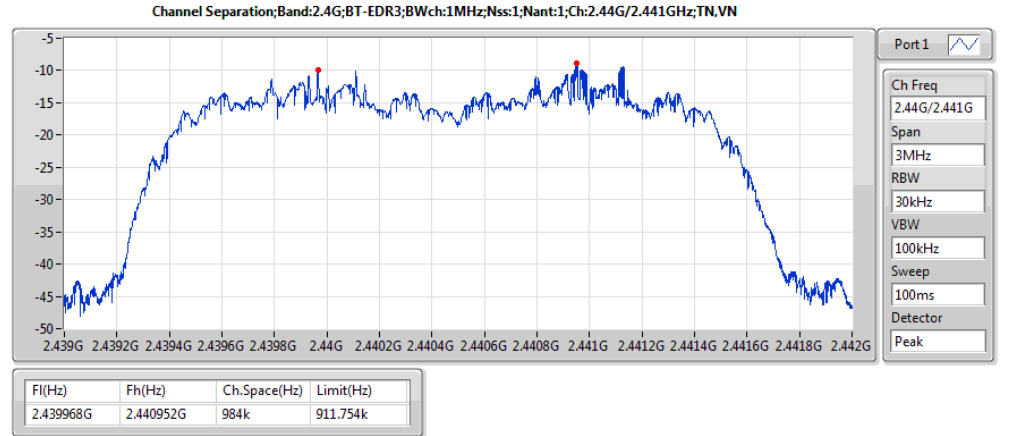
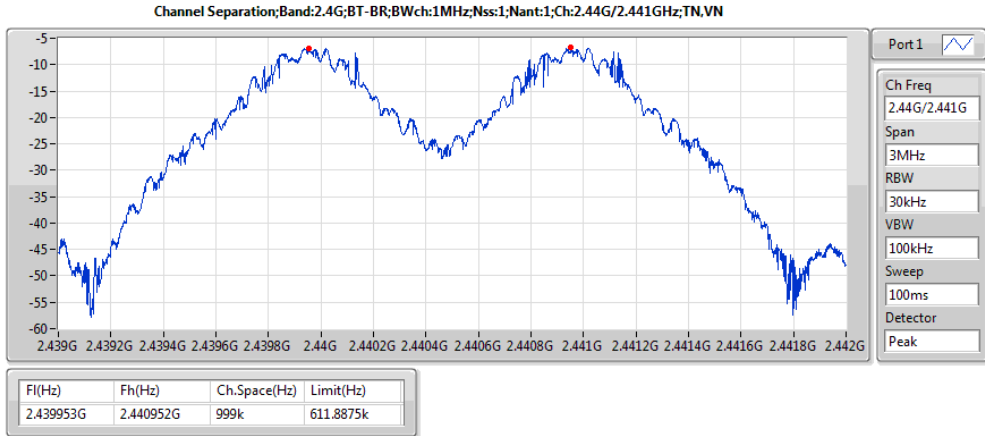
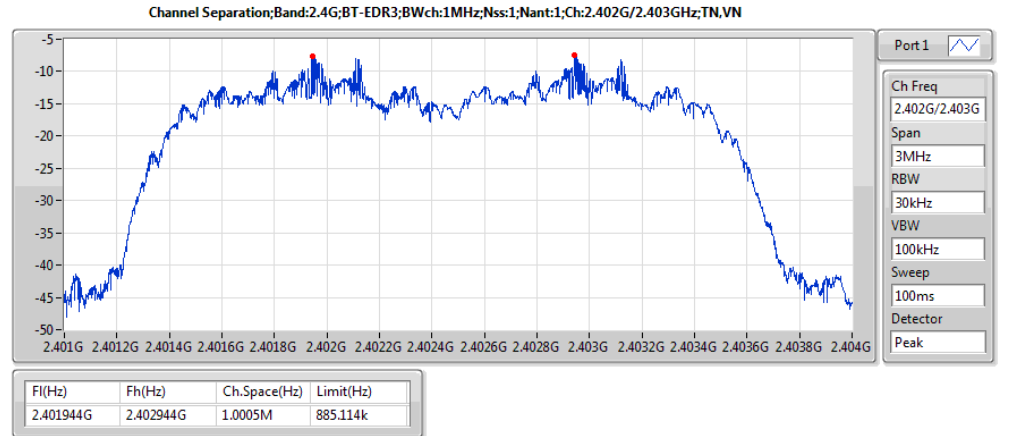
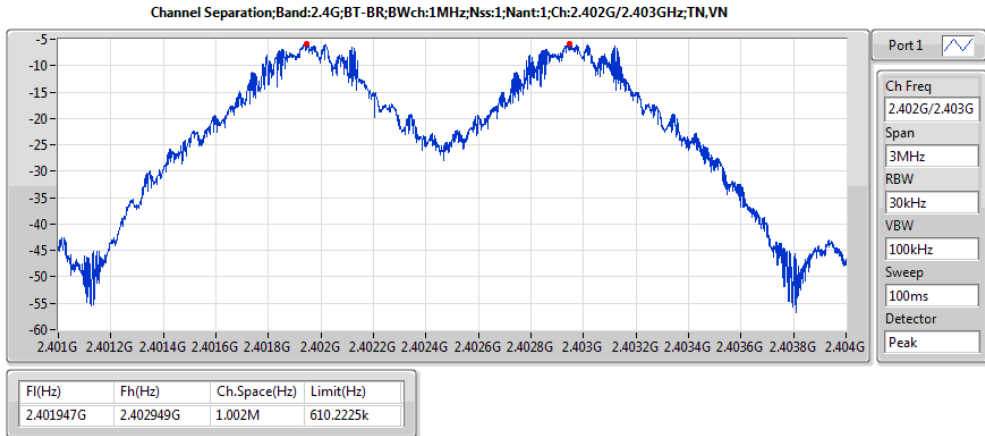


Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
2.4G;BT-BR;1;1;1;2402;L;TN,VN	Pass	2.401947G	2.402949G	1.002M	610.2225k
2.4G;BT-BR;1;1;1;2440;M;TN,VN	Pass	2.439953G	2.440952G	999k	611.8875k
2.4G;BT-BR;1;1;1;2480;H;TN,VN	Pass	2.479025G	2.479955G	930k	612.72k
2.4G;BT-EDR2;1;1;1;2402;L;TN,VN	Pass	2.401948G	2.402947G	999k	893.106k
2.4G;BT-EDR2;1;1;1;2440;M;TN,VN	Pass	2.439956G	2.440953G	997.5k	898.434k
2.4G;BT-EDR2;1;1;1;2480;H;TN,VN	Pass	2.478957G	2.479958G	1.0005M	893.106k
2.4G;BT-EDR3;1;1;1;2402;L;TN,VN	Pass	2.401944G	2.402944G	1.0005M	885.114k
2.4G;BT-EDR3;1;1;1;2440;M;TN,VN	Pass	2.439968G	2.440952G	984k	911.754k
2.4G;BT-EDR3;1;1;1;2480;H;TN,VN	Pass	2.478959G	2.479956G	997.5k	517.815k



# Channel Separation-DSS Result





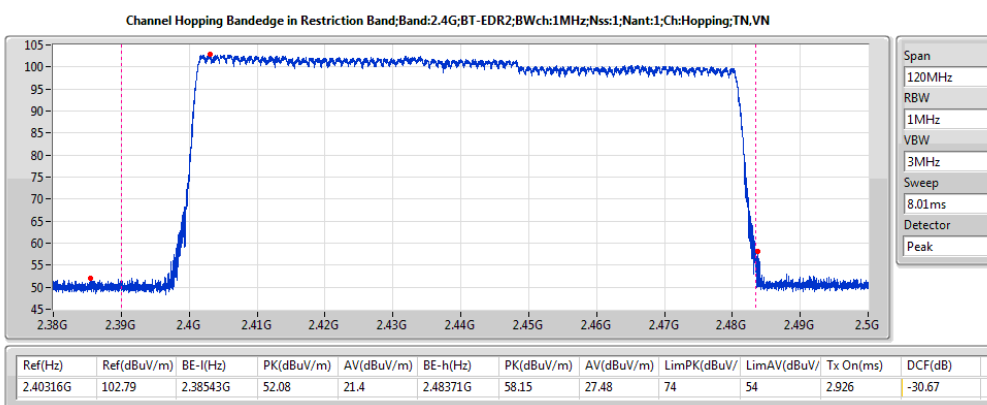
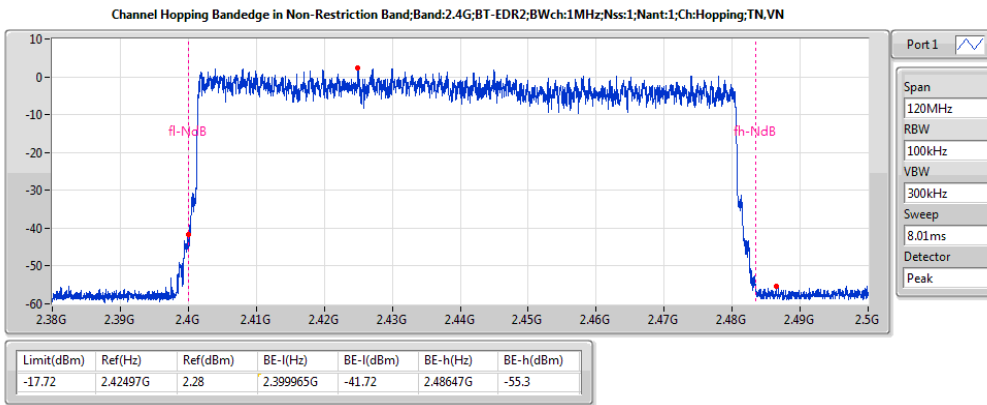
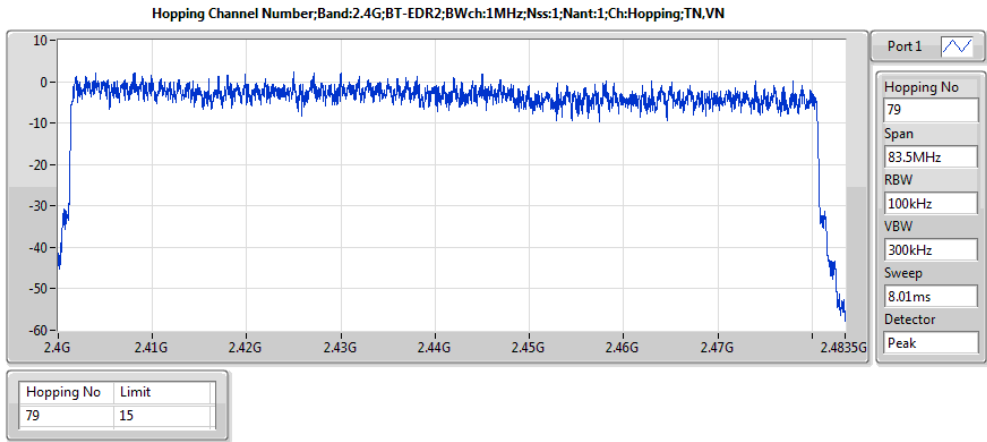
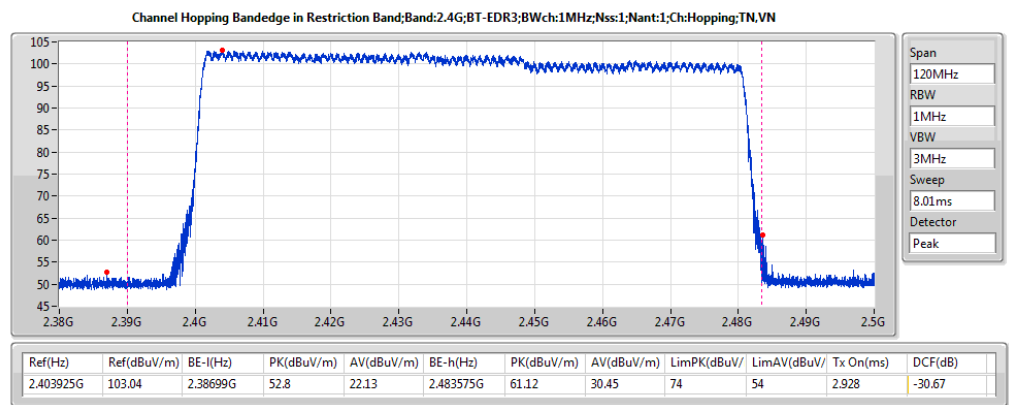
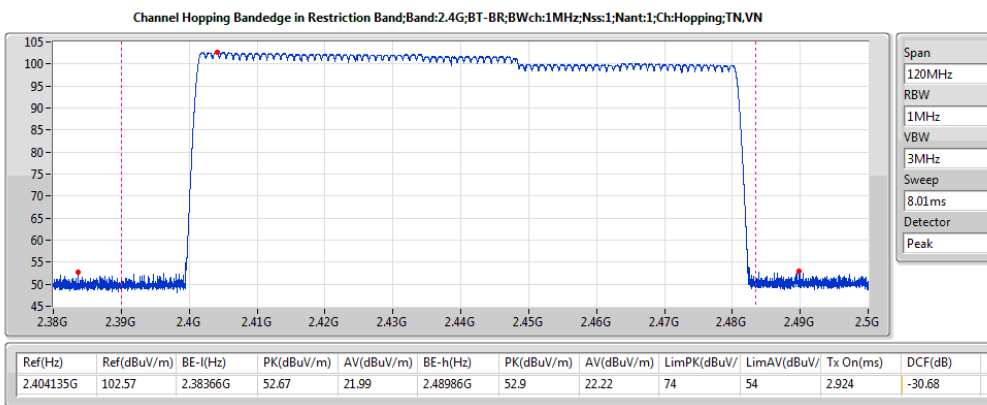
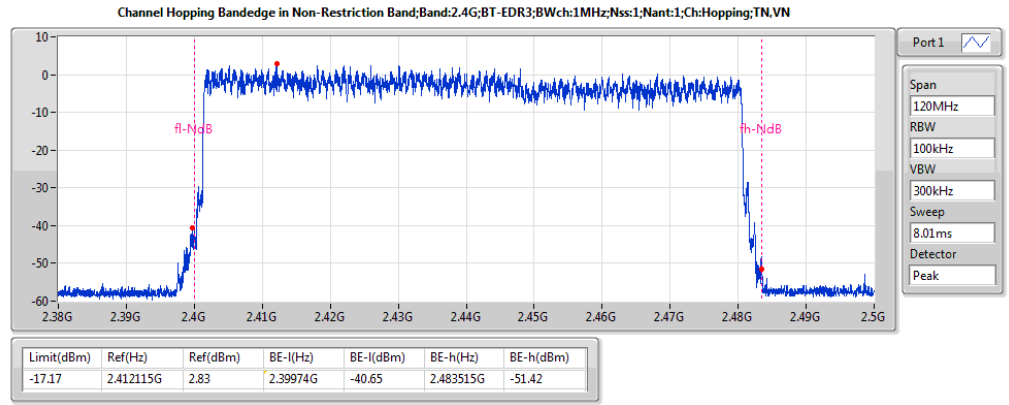
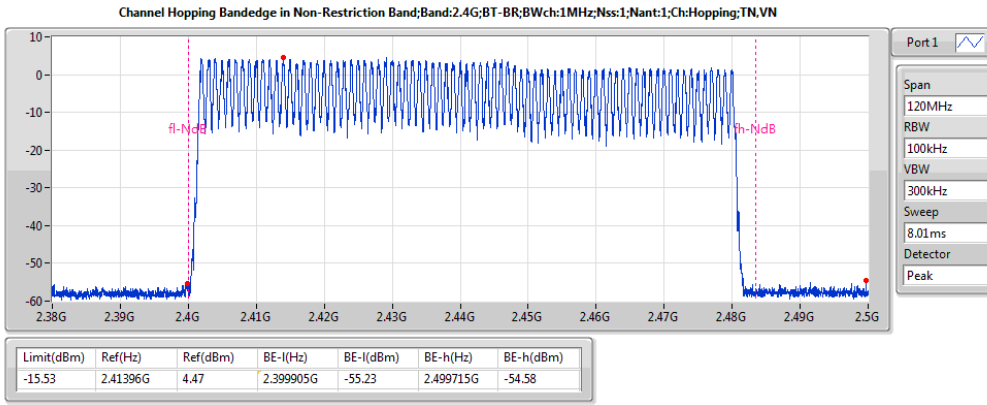
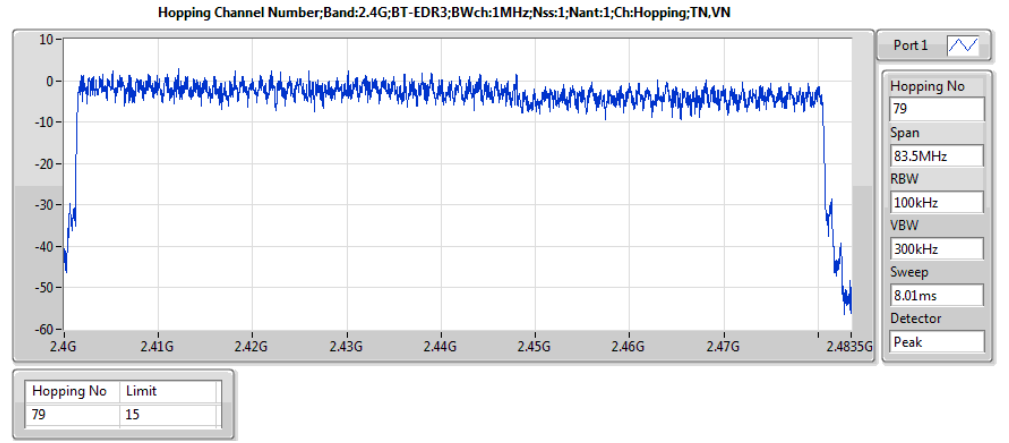
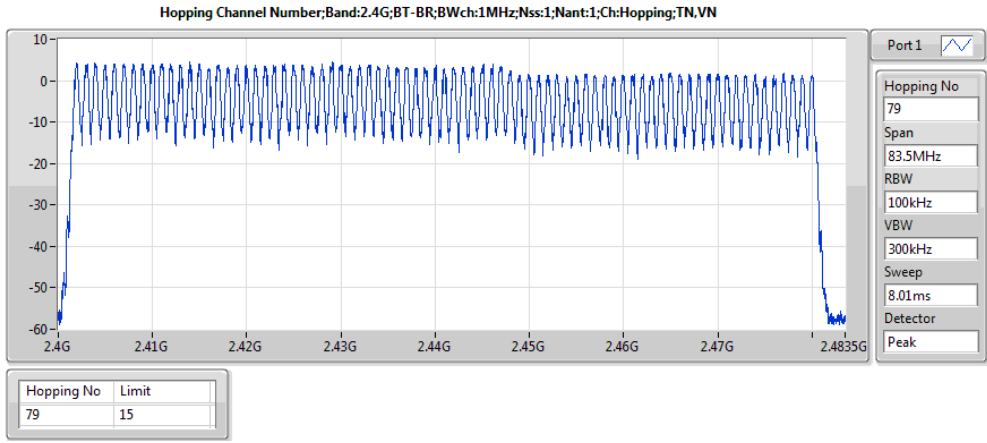
Summary

Mode	Max-Hop No
2.4G;BT-BR;1;1;1	79
2.4G;BT-EDR2;1;1;1	79
2.4G;BT-EDR3;1;1;1	79



Result

Mode	Result	Hopping No	Limit
2.4G;BT-BR;1;1;1;2440;M;TN,VN	Pass	79	15
2.4G;BT-EDR2;1;1;1;2440;M;TN,VN	Pass	79	15
2.4G;BT-EDR3;1;1;1;2440;M;TN,VN	Pass	79	15





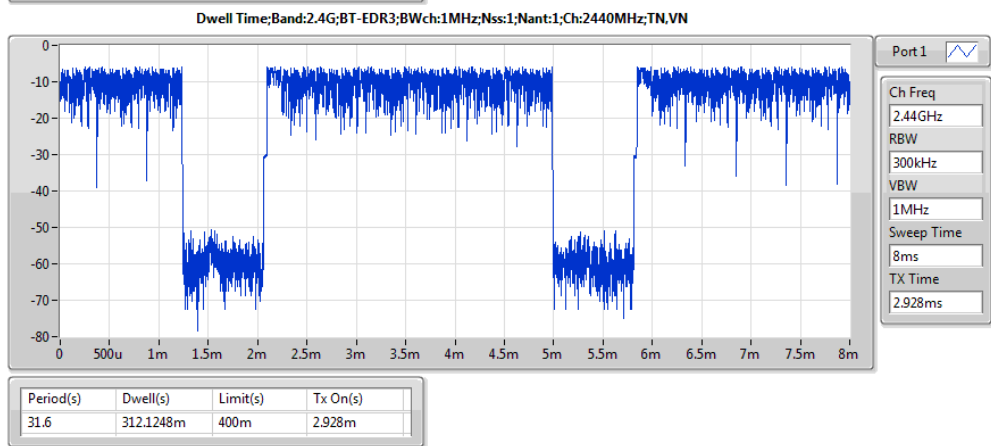
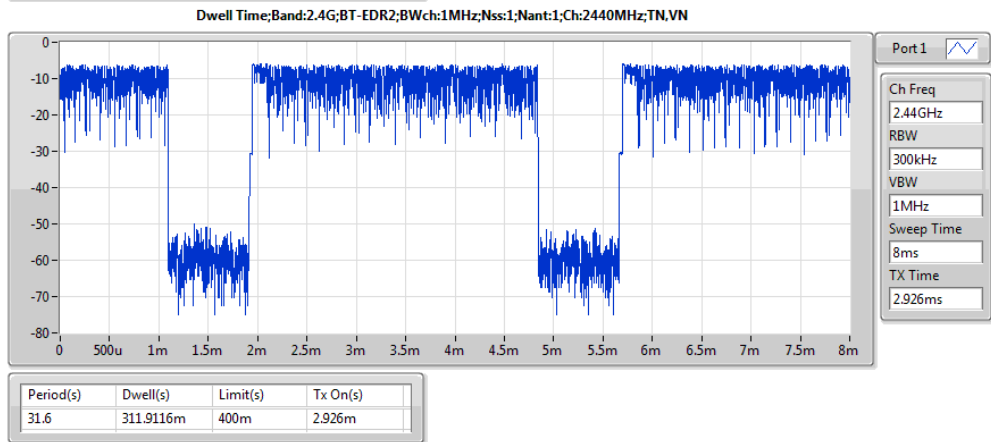
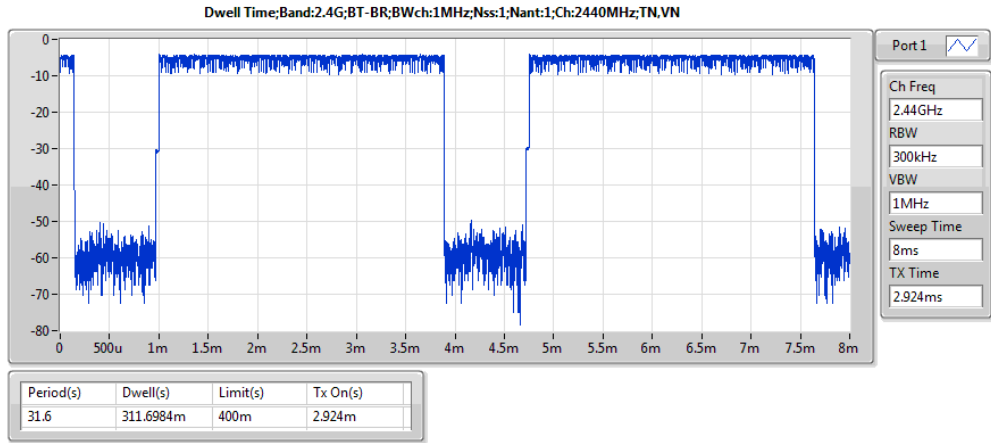
Summary

Mode	Max-Dwell (s)
2.4G;BT-BR;1;1;1	311.6984m
2.4G;BT-EDR2;1;1;1	311.9116m
2.4G;BT-EDR3;1;1;1	312.1248m



Result

Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (s)
2.4G;BT-BR;1;1;1;2440;M;TN,VN	Pass	31.6	311.6984m	400m	2.924m
2.4G;BT-EDR2;1;1;1;2440;M;TN,VN	Pass	31.6	311.9116m	400m	2.926m
2.4G;BT-EDR3;1;1;1;2440;M;TN,VN	Pass	31.6	312.1248m	400m	2.928m





Summary

Mode	Sum (dBm)	Sum (W)	EIRP (dBm)	EIRP (W)
2.4G;BT-BR;1;1;1	5.15	0.00327	7.44	0.00555
2.4G;BT-EDR2;1;1;1	5.71	0.00372	8.00	0.00631
2.4G;BT-EDR3;1;1;1	6.01	0.00399	8.30	0.00676



Result

Mode	Result	DG (dBi)	Sum (dBm)	Sum Lim. (dBm)	EIRP (dBm)	EIRP Lim. (dBm)	P1 (dBm)
2.4G;BT-BR;1;1;1;2402;L;TN,VN	Pass	2.29	5.15	30.00	7.44	36.00	5.15
2.4G;BT-BR;1;1;1;2440;M;TN,VN	Pass	2.29	4.24	30.00	6.53	36.00	4.24
2.4G;BT-BR;1;1;1;2480;H;TN,VN	Pass	2.29	2.31	30.00	4.60	36.00	2.31
2.4G;BT-EDR2;1;1;1;2402;L;TN,VN	Pass	2.29	5.71	30.00	8.00	36.00	5.71
2.4G;BT-EDR2;1;1;1;2440;M;TN,VN	Pass	2.29	4.69	30.00	6.98	36.00	4.69
2.4G;BT-EDR2;1;1;1;2480;H;TN,VN	Pass	2.29	2.91	30.00	5.20	36.00	2.91
2.4G;BT-EDR3;1;1;1;2402;L;TN,VN	Pass	2.29	6.01	30.00	8.30	36.00	6.01
2.4G;BT-EDR3;1;1;1;2440;M;TN,VN	Pass	2.29	5.00	30.00	7.29	36.00	5.00
2.4G;BT-EDR3;1;1;1;2480;H;TN,VN	Pass	2.29	3.21	30.00	5.50	36.00	3.21



Summary

Mode	Sum (dBm)	Sum (W)	EIRP (dBm)	EIRP (W)
2.4G;BT-BR;1;1;1	4.37	0.00274	6.66	0.00463
2.4G;BT-EDR2;1;1;1	2.77	0.00189	5.06	0.00321
2.4G;BT-EDR3;1;1;1	2.80	0.00191	5.09	0.00323



Result

Mode	Result	DG (dBi)	Sum (dBm)	Sum Lim. (dBm)	EIRP (dBm)	EIRP Lim. (dBm)	P1 (dBm)
2.4G;BT-BR;1;1;1;2402;L;TN,VN	Pass	2.29	4.37	30.00	6.66	36.00	4.37
2.4G;BT-BR;1;1;1;2440;M;TN,VN	Pass	2.29	3.55	30.00	5.84	36.00	3.55
2.4G;BT-BR;1;1;1;2480;H;TN,VN	Pass	2.29	1.42	30.00	3.71	36.00	1.42
2.4G;BT-EDR2;1;1;1;2402;L;TN,VN	Pass	2.29	2.77	30.00	5.06	36.00	2.77
2.4G;BT-EDR2;1;1;1;2440;M;TN,VN	Pass	2.29	1.67	30.00	3.96	36.00	1.67
2.4G;BT-EDR2;1;1;1;2480;H;TN,VN	Pass	2.29	-0.41	30.00	1.88	36.00	-0.41
2.4G;BT-EDR3;1;1;1;2402;L;TN,VN	Pass	2.29	2.80	30.00	5.09	36.00	2.80
2.4G;BT-EDR3;1;1;1;2440;M;TN,VN	Pass	2.29	1.69	30.00	3.98	36.00	1.69
2.4G;BT-EDR3;1;1;1;2480;H;TN,VN	Pass	2.29	-0.14	30.00	2.15	36.00	-0.14



## Transmitter Radiated Bandedge Emissions

## Appendix D

Transmitter Radiated Bandedge Emissions (Non-restricted Band)							
Modulation	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
BR-1Mbps	2402	99.82	2397.516	47.41	52.41	20	H
BR -1Mbps	2480	95.16	2539.840	48.13	47.03	20	H
EDR-2Mbps	2402	97.54	2399.760	54.54	43.00	20	H
EDR-2Mbps	2480	93.94	2540.960	48.09	45.85	20	H
EDR-3Mbps	2402	98.17	2399.556	56.12	42.05	20	H
EDR-3Mbps	2480	93.63	2529.280	48.55	45.08	20	H

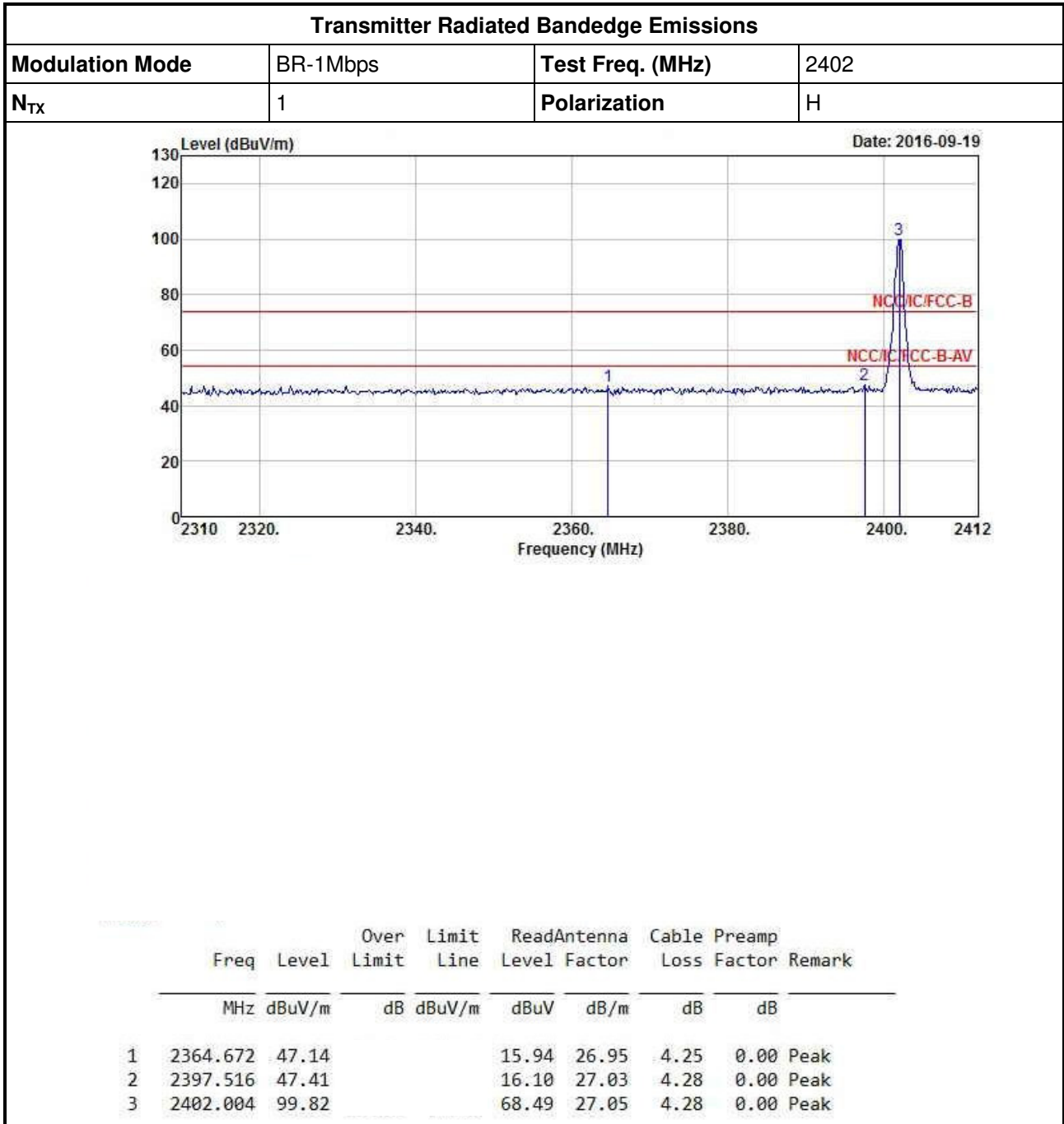
Note 1: Measurement worst emissions of receive antenna polarization

Transmitter Radiated Bandedge Emissions (Restricted Band)									
Modulation Mode	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
BR-1Mbps	2402	3	2370.996	58.36	74	2370.996	28.26	54	H
BR -1Mbps	2480	3	2488.640	58.52	74	2488.640	28.42	54	H
EDR-2Mbps	2402	3	2381.604	58.28	74	2381.604	28.18	54	H
EDR-2Mbps	2480	3	2497.600	59.31	74	2497.600	29.21	54	H
EDR-3Mbps	2402	3	2364.672	58.62	74	2364.672	28.52	54	H
EDR-3Mbps	2480	3	2485.920	59.50	74	2485.920	29.40	54	H

Note 1: Measurement worst emissions of receive antenna polarization.  
 Note 2: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., DH5 VBW≥1/3.125ms, VBW=1kHz



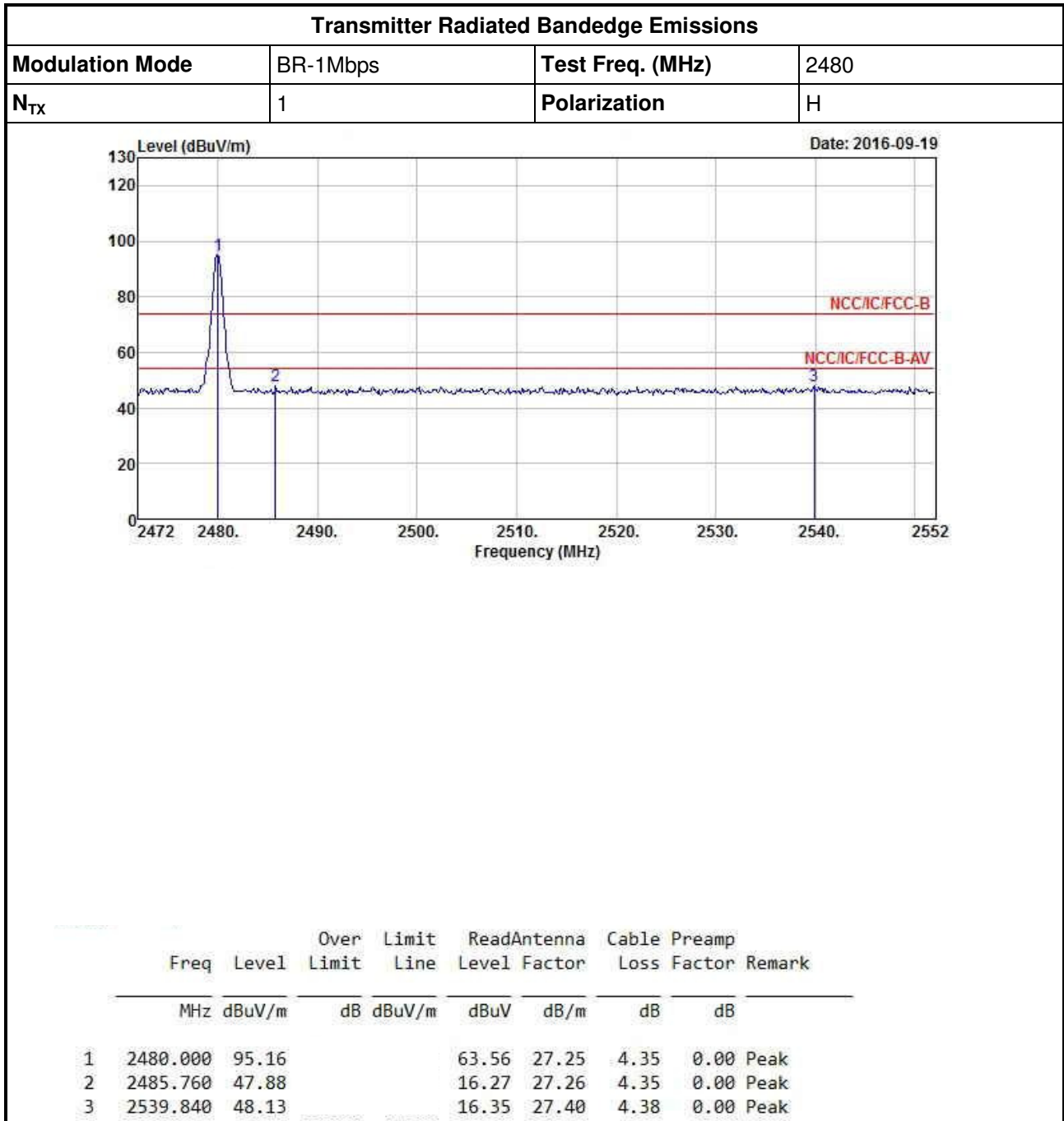
Transmitter Radiated Bandedge Emissions (Non-restricted Band)





# Transmitter Radiated Bandedge Emissions

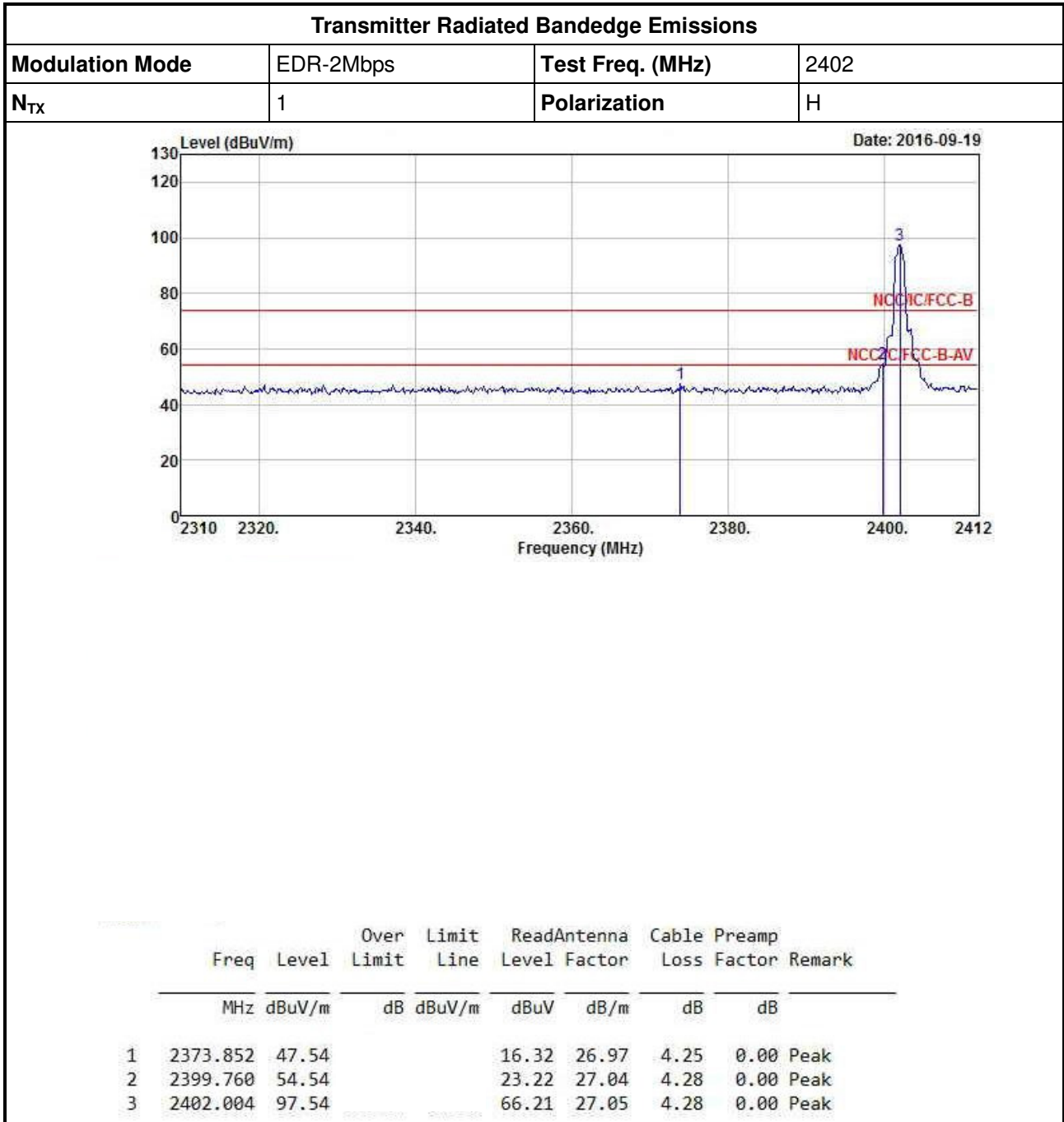
Appendix D





# Transmitter Radiated Bandedge Emissions

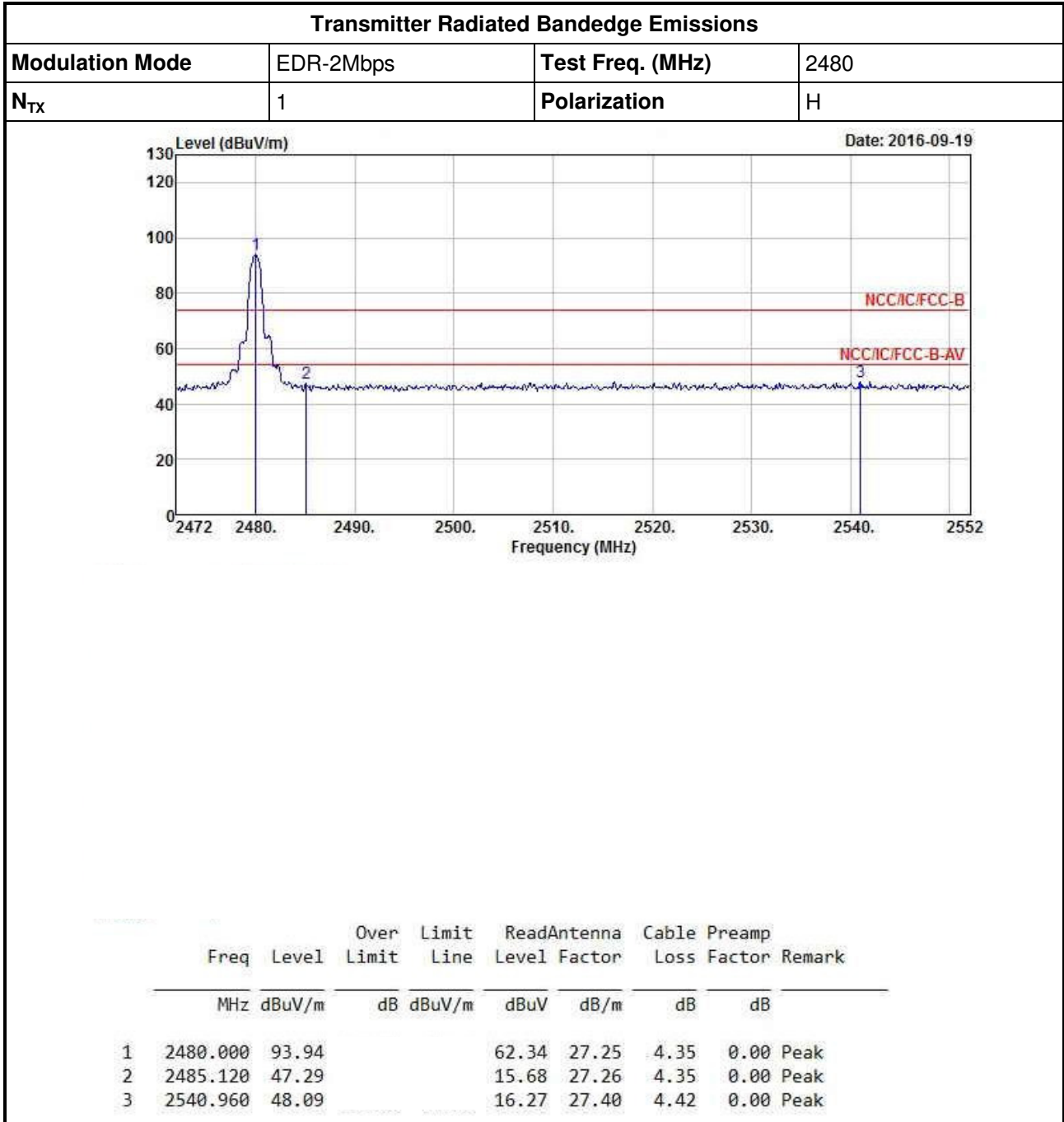
Appendix D





# Transmitter Radiated Bandedge Emissions

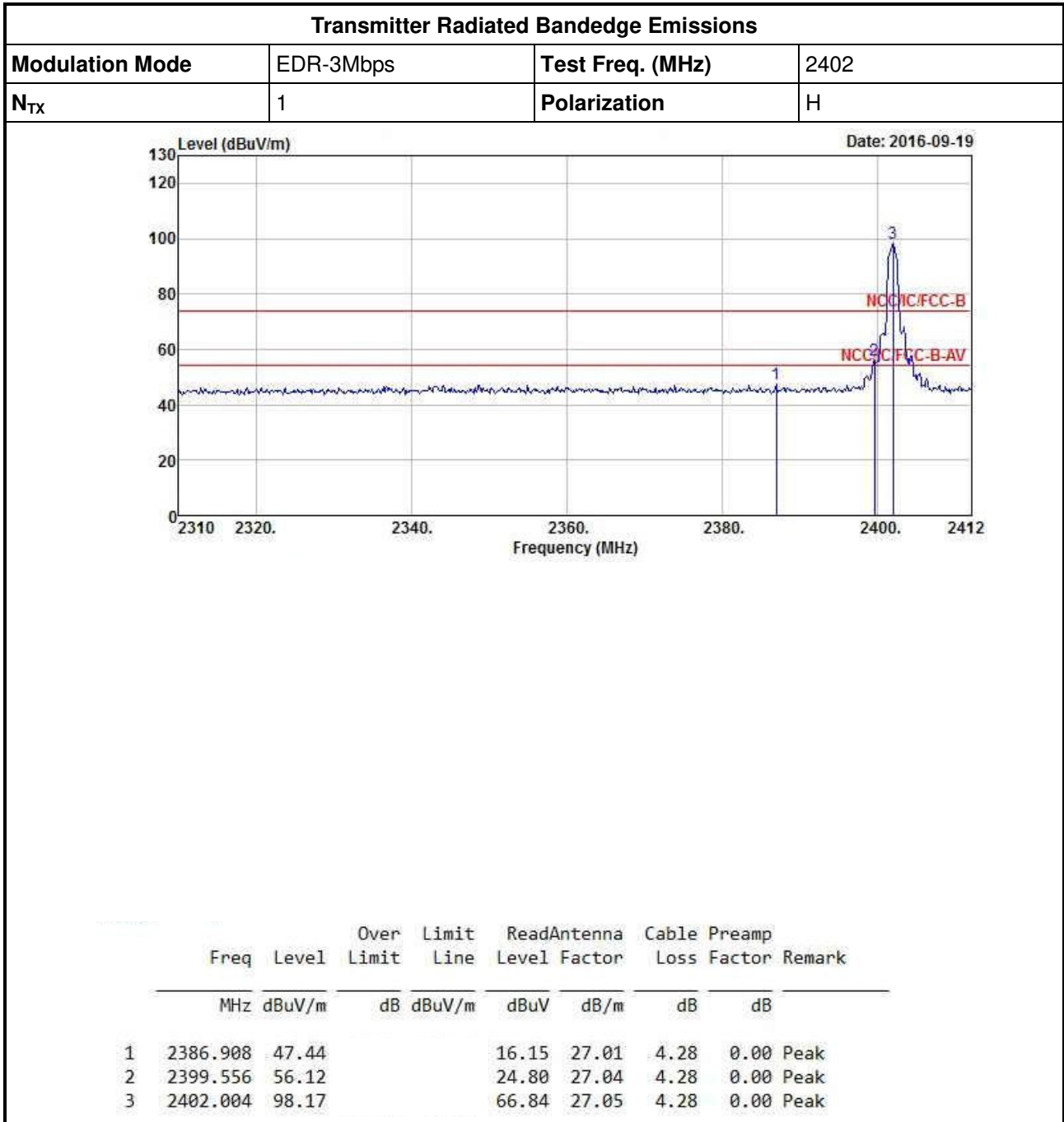
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# Transmitter Radiated Bandedge Emissions

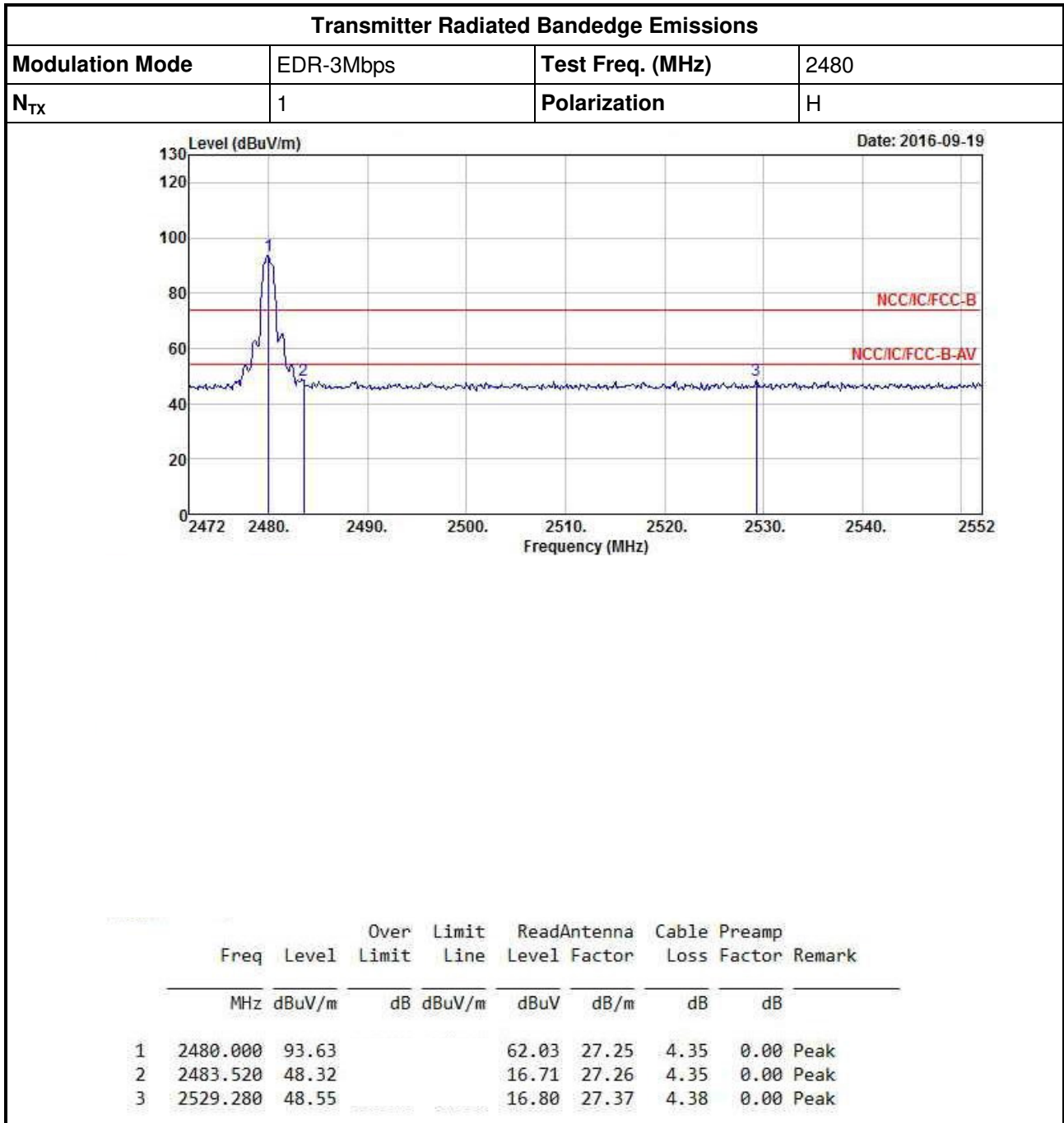
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# Transmitter Radiated Bandedge Emissions

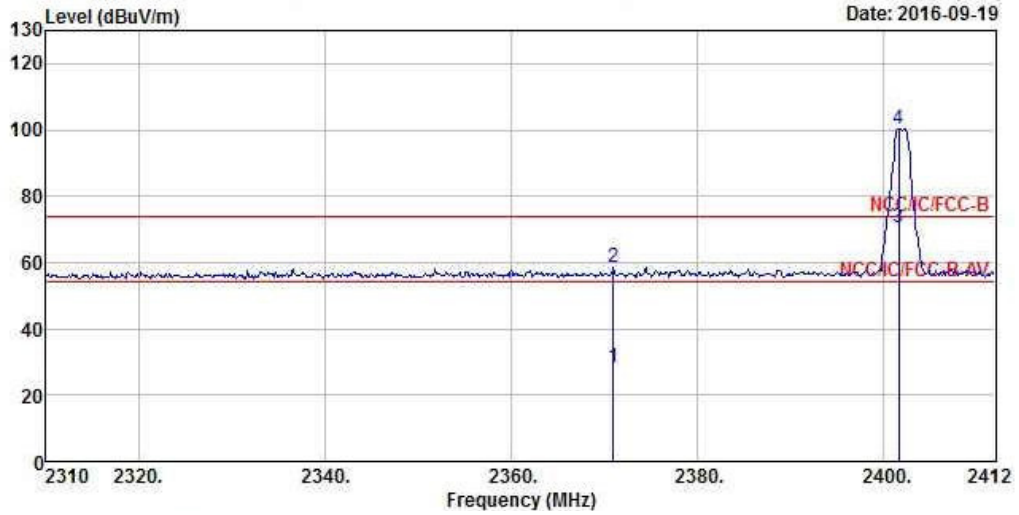
Appendix D





Transmitter Radiated Bandedge Emissions (Restricted Band)

Transmitter Radiated Bandedge Emissions			
Modulation Mode	BR-1Mbps	Test Freq. (MHz)	2402
N <sub>TX</sub>	1	Polarization	H

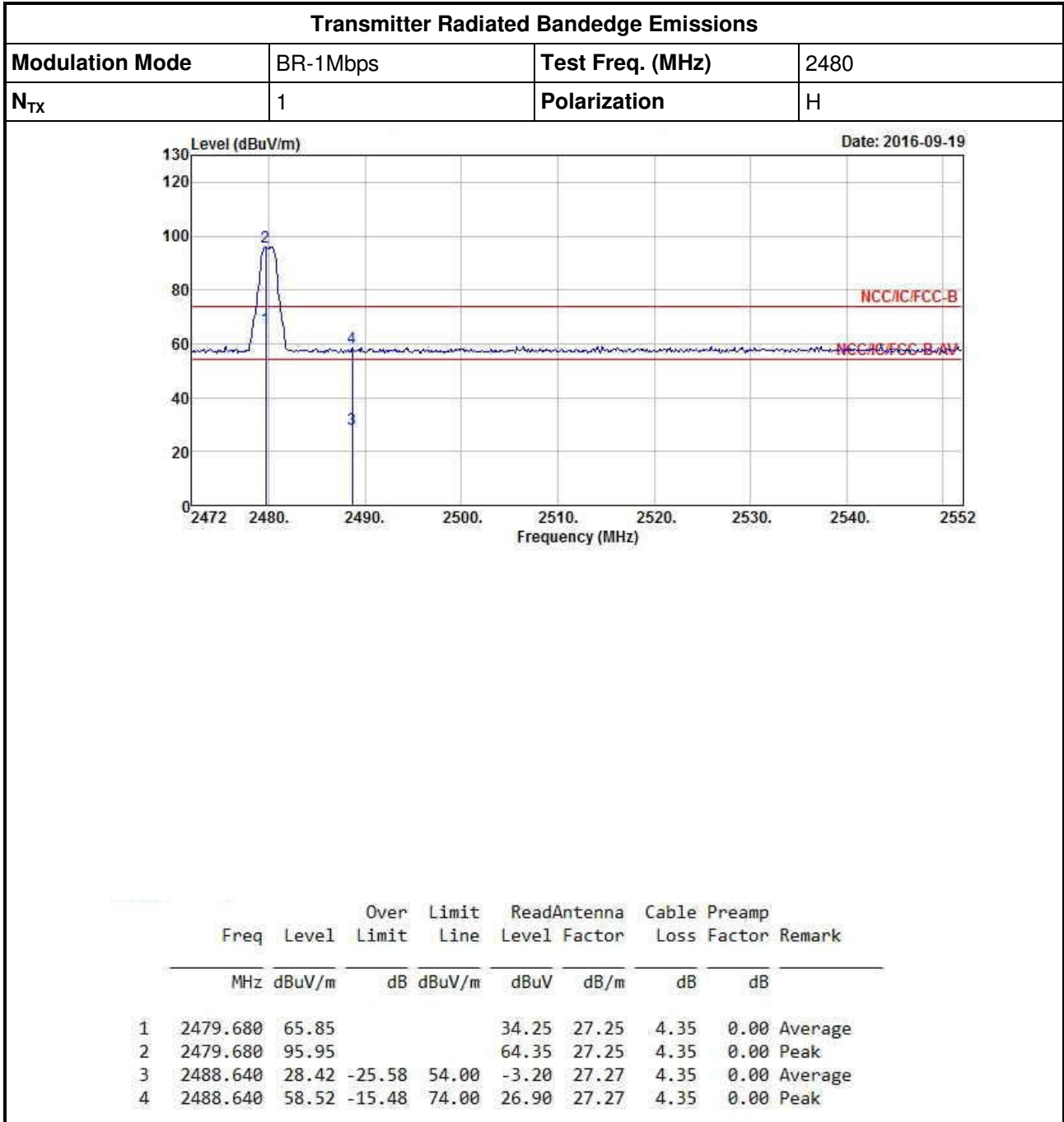


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2370.996	28.26	-25.74	54.00	-2.95	26.96	4.25	0.00	Average
2	2370.996	58.36	-15.64	74.00	27.15	26.96	4.25	0.00	Peak
3	2401.596	70.31			38.99	27.04	4.28	0.00	Average
4	2401.596	100.41			69.09	27.04	4.28	0.00	Peak



# Transmitter Radiated Bandedge Emissions

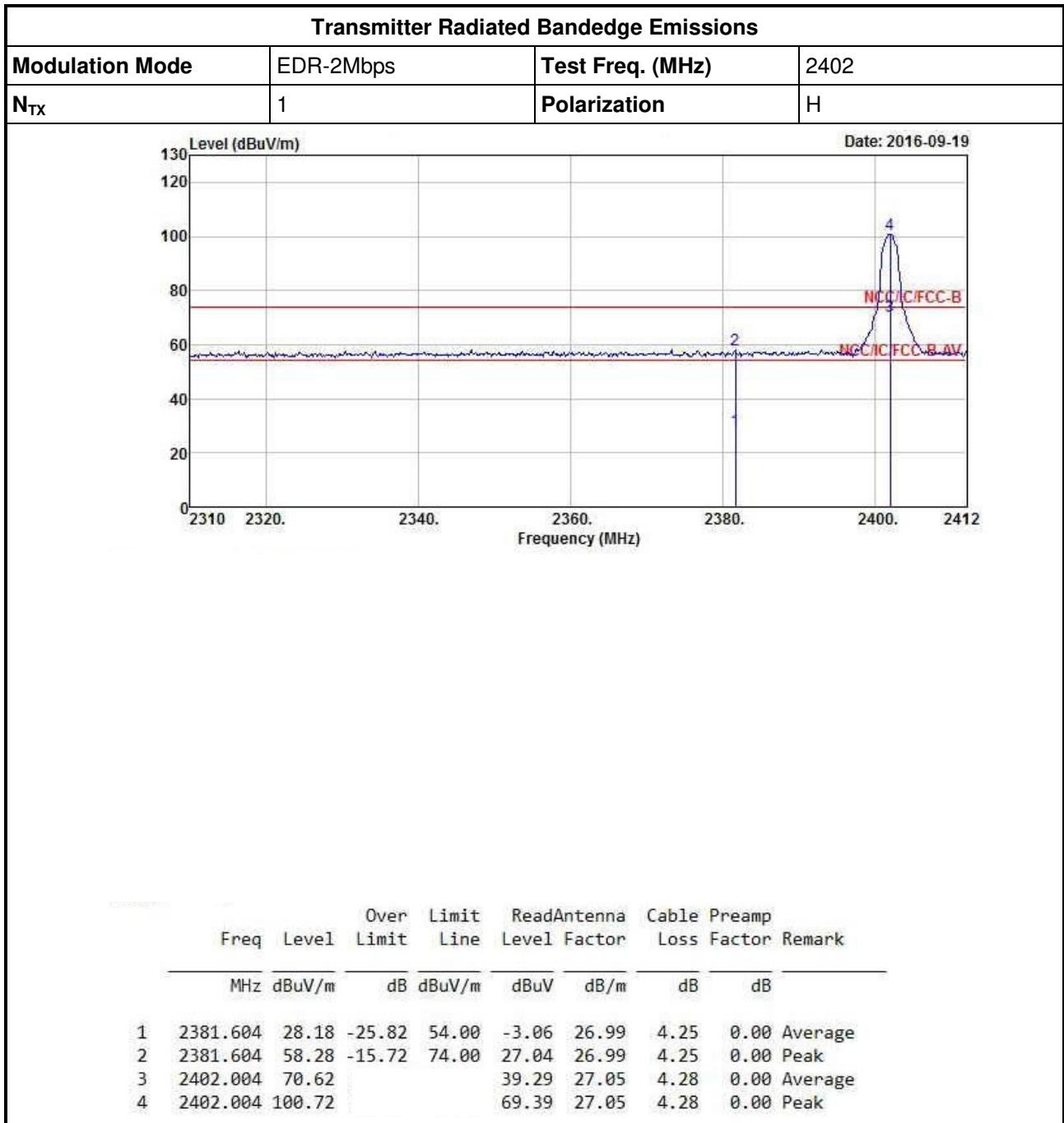
Appendix D





# Transmitter Radiated Bandedge Emissions

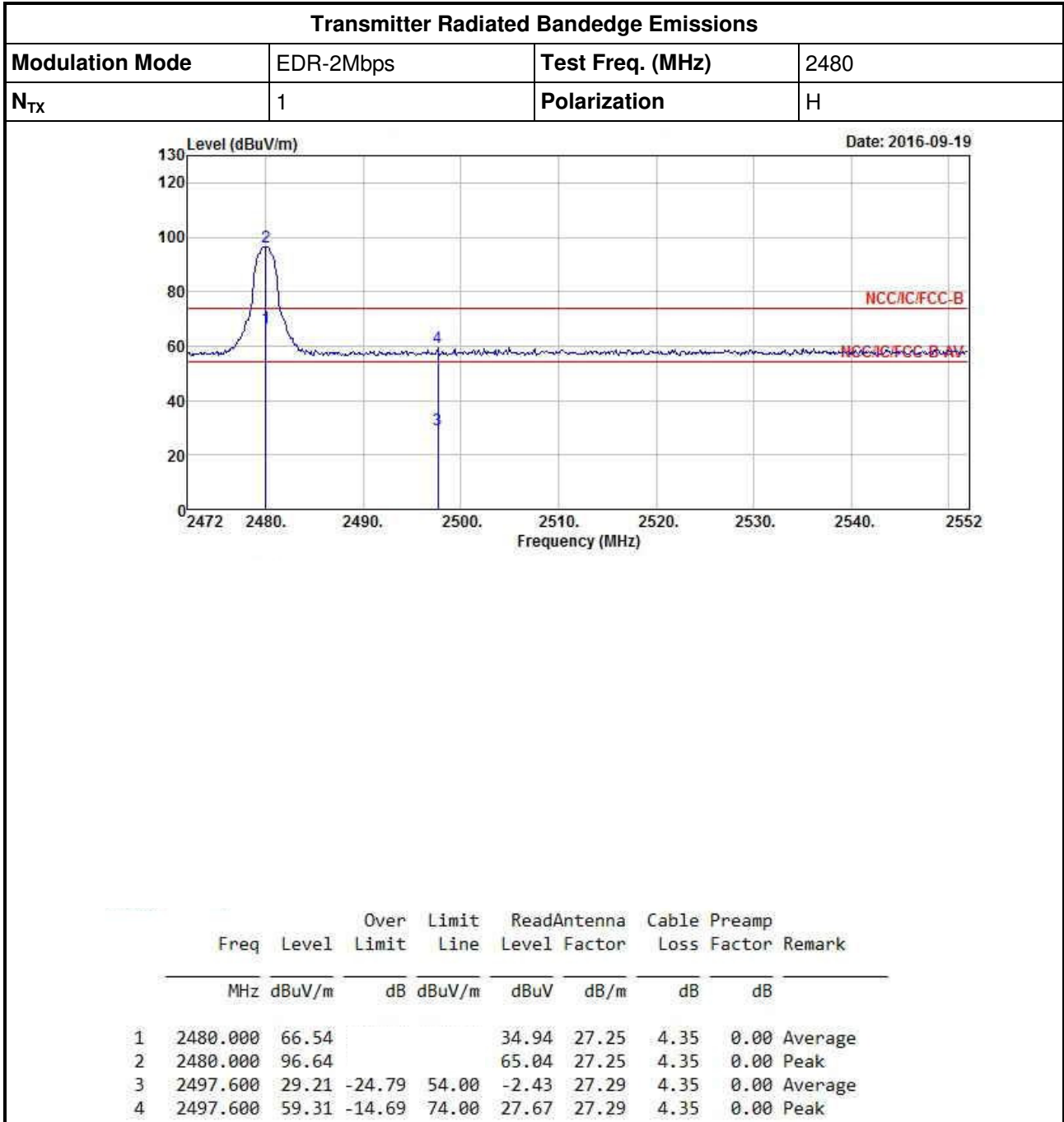
Appendix D





# Transmitter Radiated Bandedge Emissions

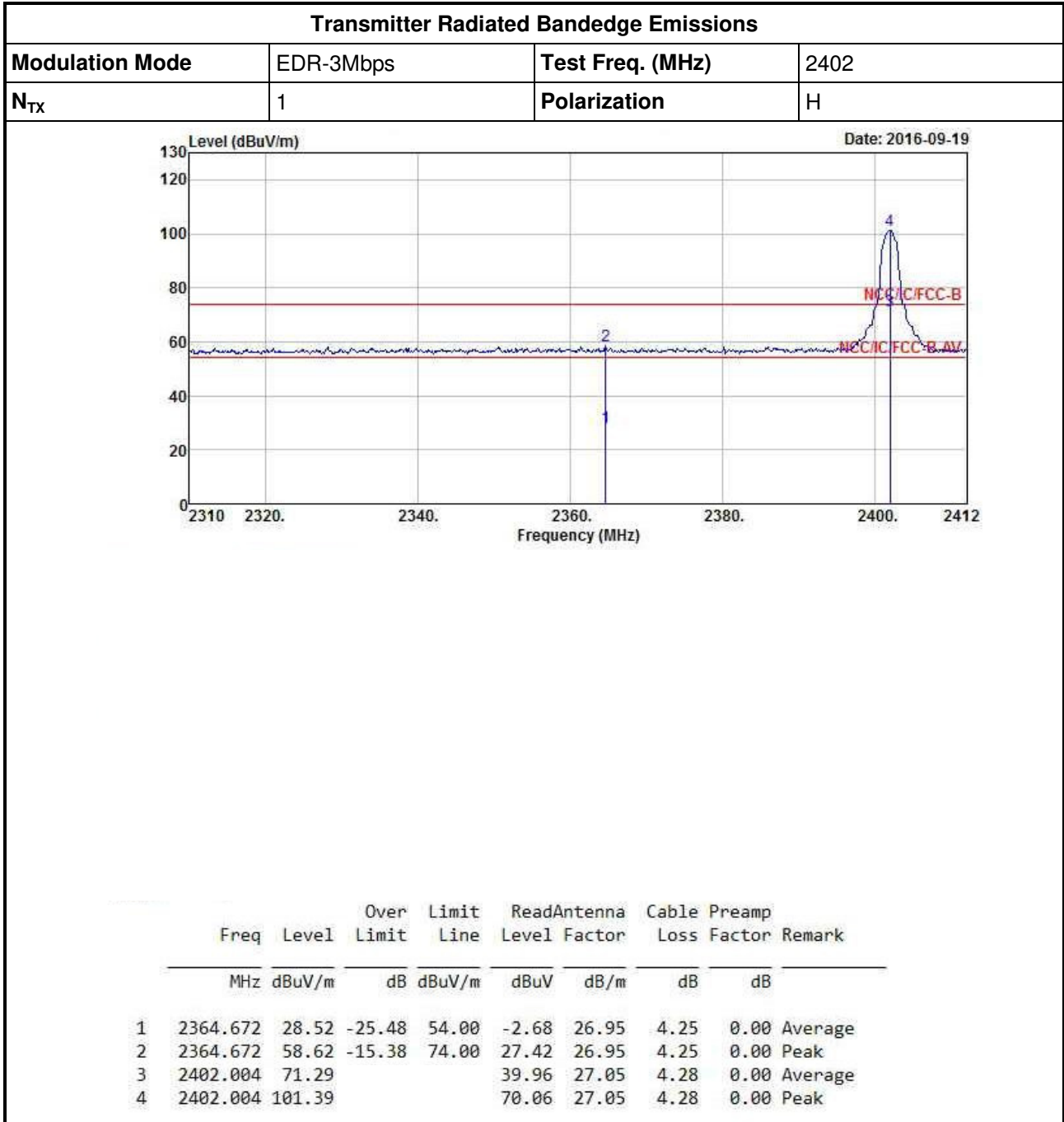
Appendix D





# Transmitter Radiated Bandedge Emissions

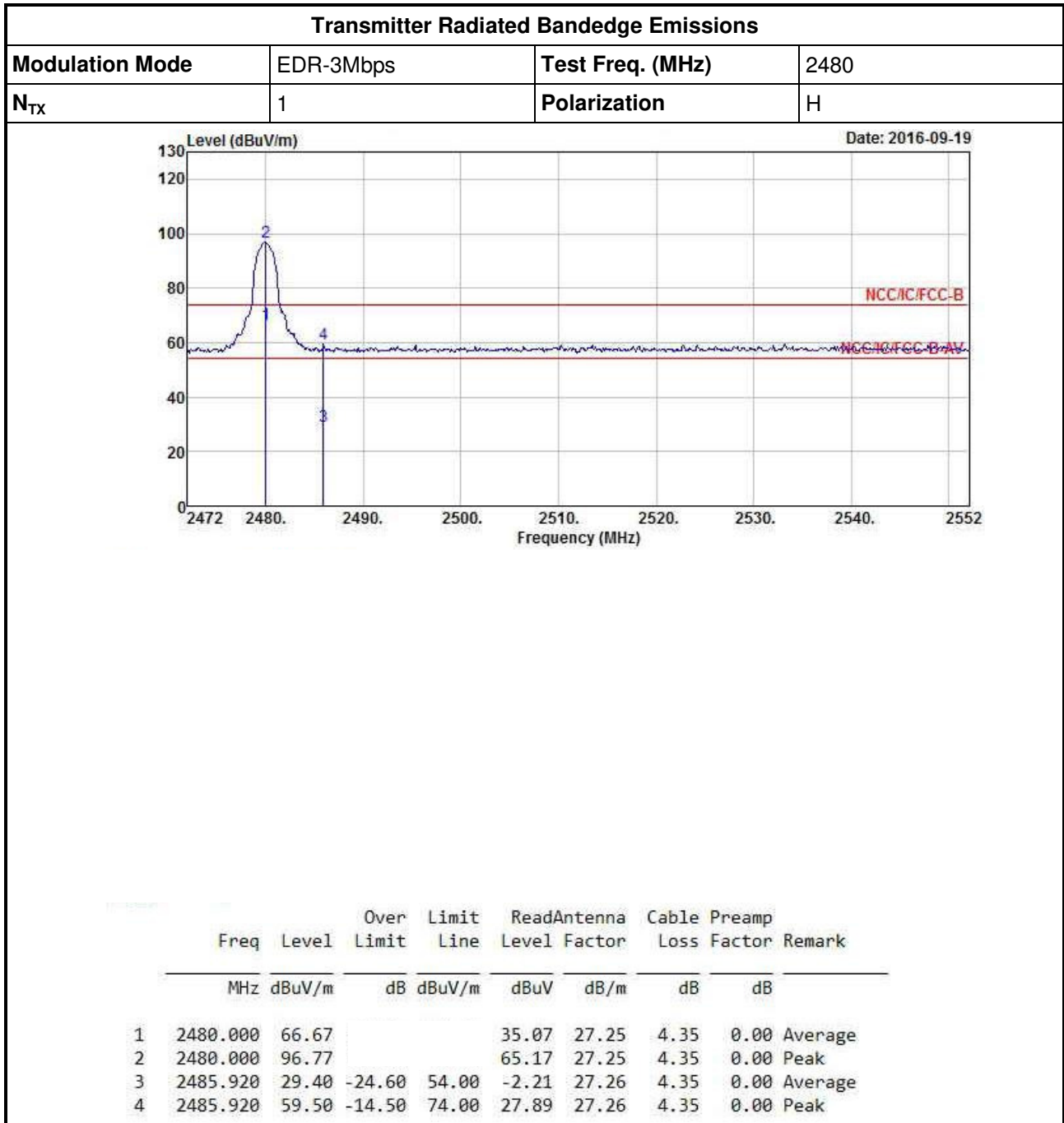
Appendix D





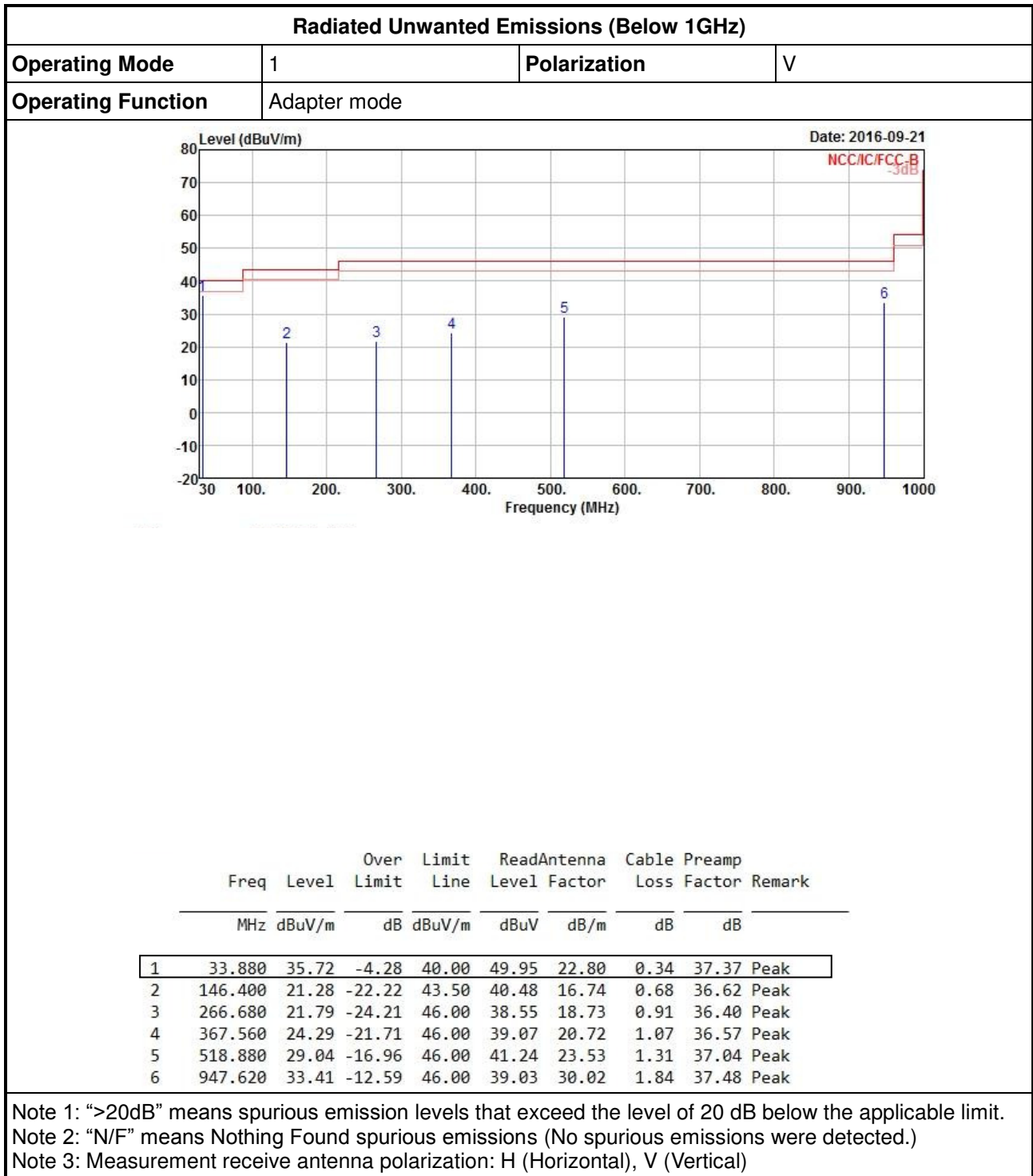
# Transmitter Radiated Bandedge Emissions

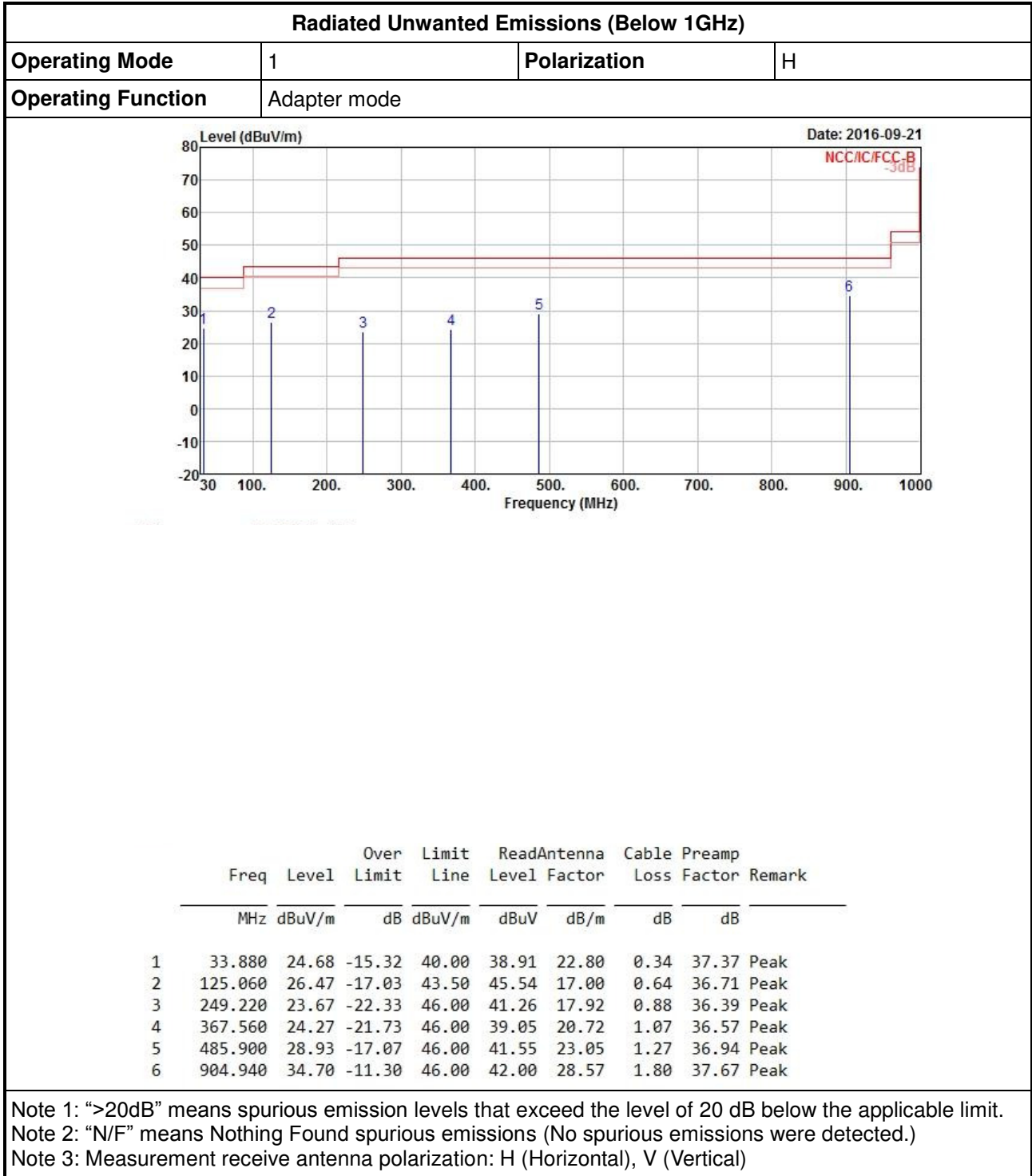
Appendix D





Transmitter Radiated Unwanted Emissions (Below 1GHz)

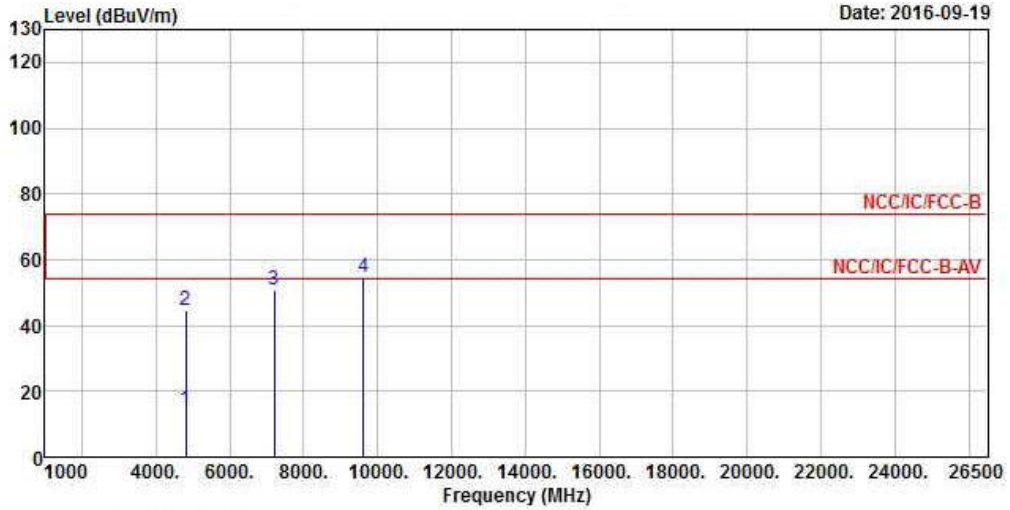






Transmitter Radiated Unwanted Emissions (Above 1GHz)

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	BR/EDR	Test Freq. (MHz)	2402
Operating Function	Transmit	Polarization	V



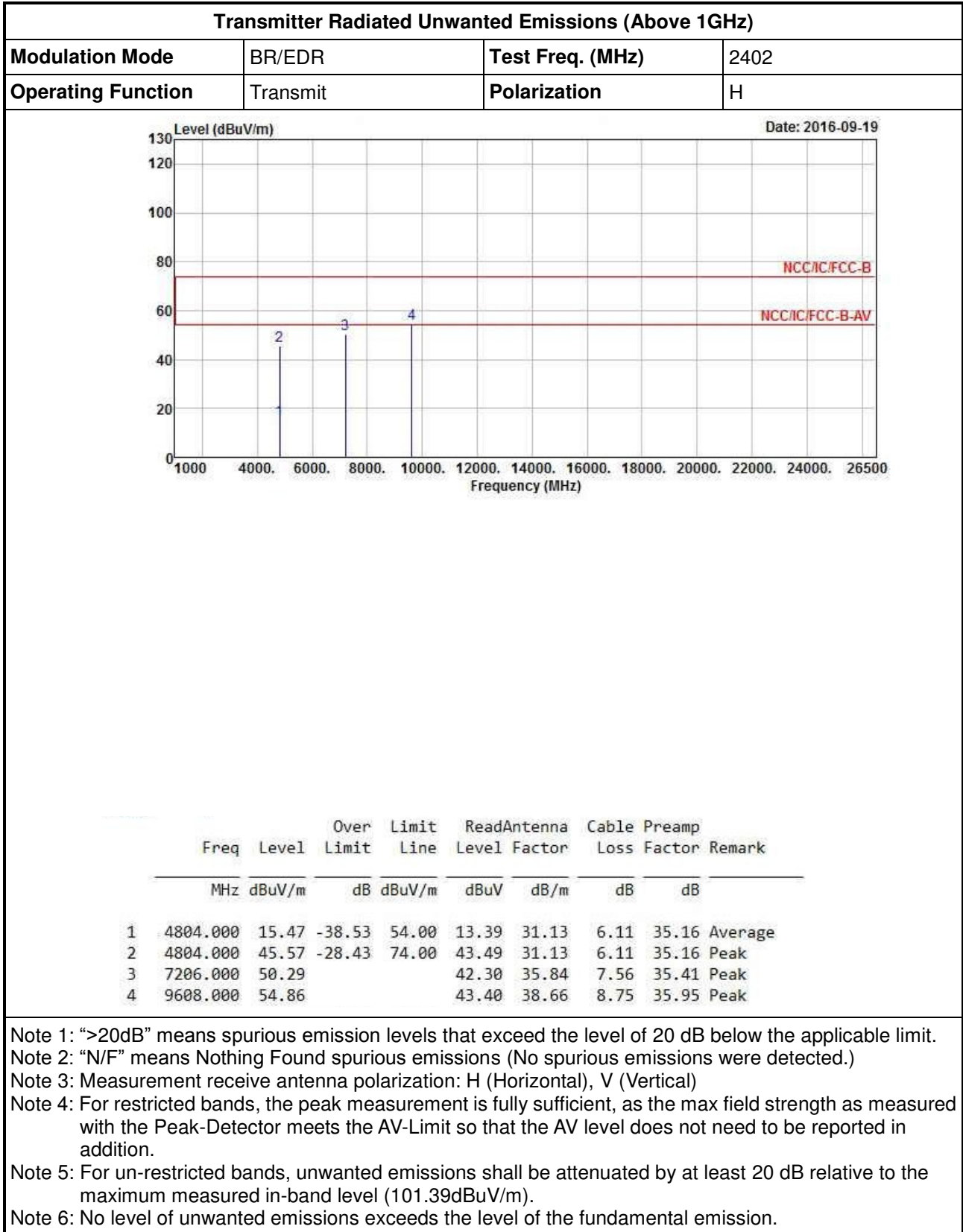
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4804.000	14.27	-39.73	54.00	12.19	31.13	6.11	35.16	Average
2	4804.000	44.37	-29.63	74.00	42.29	31.13	6.11	35.16	Peak
3	7206.000	50.73			42.74	35.84	7.56	35.41	Peak
4	9608.000	54.56			43.10	38.66	8.75	35.95	Peak

- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
- Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
- Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (101.39 dBuV/m).
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



# Transmitter Radiated Unwanted Emissions

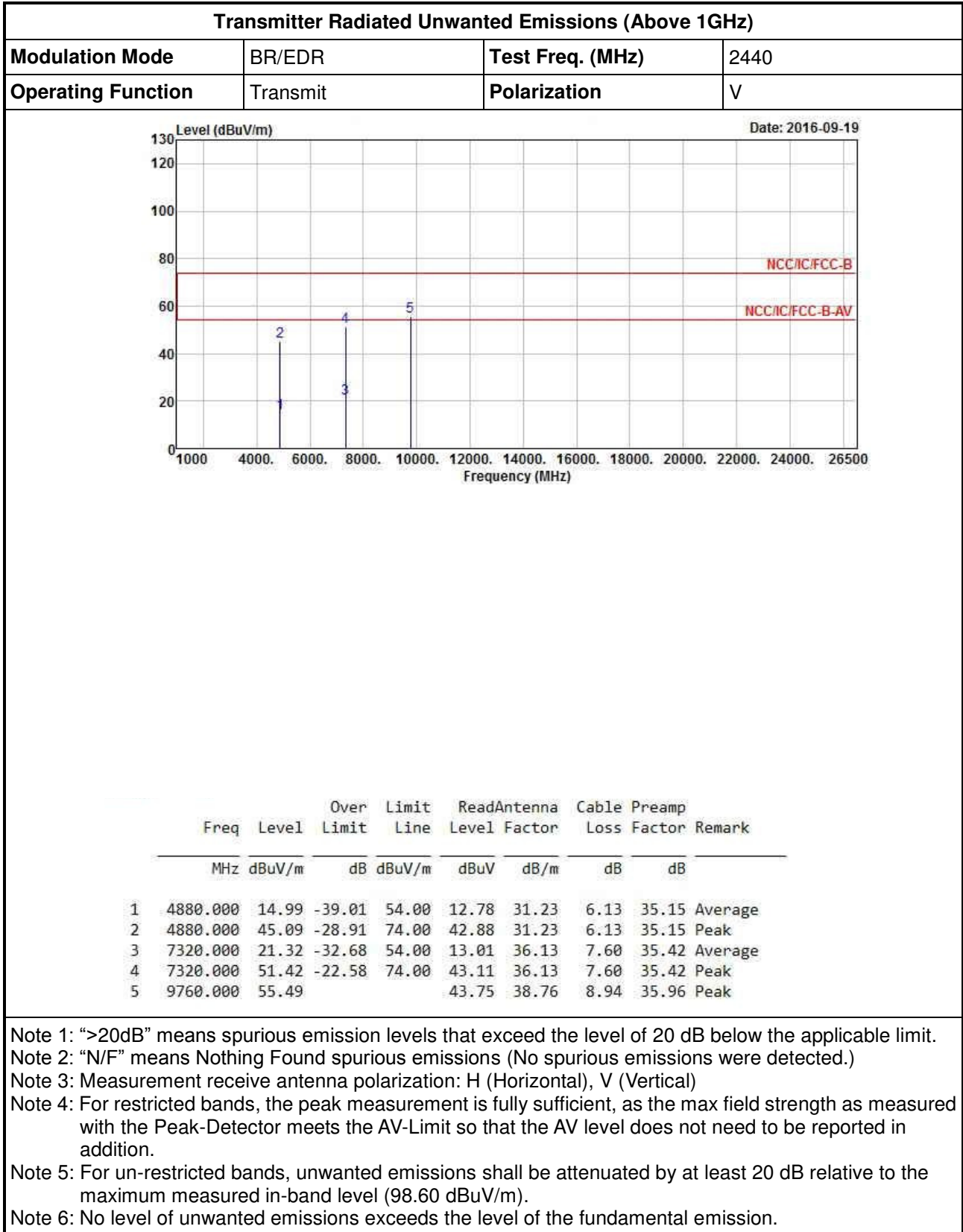
Appendix E





# Transmitter Radiated Unwanted Emissions

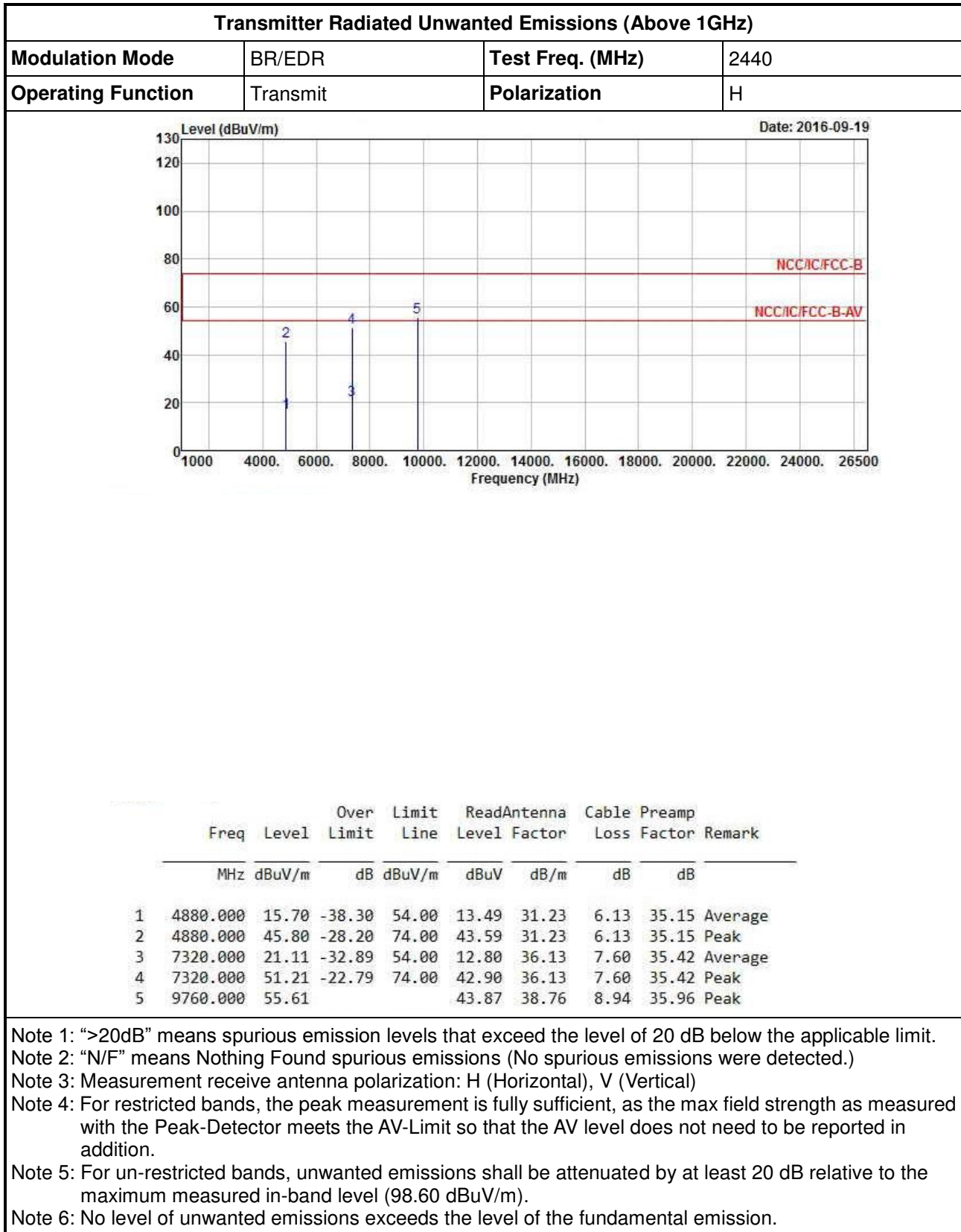
Appendix E





# Transmitter Radiated Unwanted Emissions

Appendix E





# Transmitter Radiated Unwanted Emissions

Appendix E

