

FCC Test Report

Equipment : GRAPHICS TABLET COMPUTER
Brand Name : Wacom
Model No. : DTH-W1320
FCC ID : HV4DTHW1320
Standard : 47 CFR FCC Part 15.247
RF Spec. : Wifi 2.4G
Frequency : 2400 MHz – 2483.5 MHz
FCC Classification : DTS
Applicant / Manufacturer : Wacom Co., Ltd.
2-510-1 Toyonodai, Kazo-shi, Saitama 349-1148 Japan

The product sample received on Jul. 13, 2016 and completely tested on Sep. 22, 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:

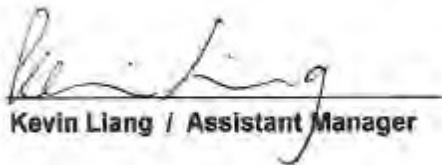

Kevin Liang / Assistant Manager





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

Appendix A. Test Result of Emission Bandwidth

Appendix B. Test Result of Maximum Conducted Output Power

Appendix C. Test Result of Power Spectral Density

Appendix D. Test Result of Transmitter Radiated Bandedge Emissions

Appendix E. Transmitter Radiated Unwanted Emissions

Appendix F. Test Photos

Appendix G. Photographs of EUT



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]: 0.1703400MHz 56.12 (Margin 8.82dB) - QP 39.80 (Margin 15.14dB) - AV	FCC 15.203	Complied
3.2	15.247(a)	DTS Bandwidth	Refer as Appendix A	≥500kHz	Complied
3.3	15.247(b)	Fundamental Emission Output Power	Refer as Appendix B	Power [dBm]:30	Complied
3.4	15.247(e)	Power Spectral Density	Refer as Appendix C	PSD [dBm/3kHz]:8	Complied
3.5	15.247(d)	Test Result of Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2399.760 MHz: 25.96 dB Restricted Bands [dBuV/m at 3m]: 2486.80 MHz 55.76 (Margin 18.24 dB) - PK 44.16 (Margin 9.84 dB) - AV	Non-Restricted Bands:> 20 dBc Bands: FCC 15.209	Complied
3.6	15.247(d)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 2483.600MHz 52.87 (Margin 1.13 dB) - AV 60.26 (Margin 13.74 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	11b	20	1-11[11]	1	2
2.4G	11g	20	1-11[11]	1	2
2.4G	HT20	20	1-11[11]	1,(M0-15)	2
2.4G	HT40	40	3-9[7]	1,(M0-15)	2

Note:

- ♦ 2.4G is the 2.4GHz Band (2.4-2.4835GHz).
- ♦ 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- ♦ 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- ♦ BWch is the nominal channel bandwidth.
- ♦ Nss-Min is the minimum number of spatial streams.
- ♦ Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

1.1.2 Antenna Information

Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input checked="" type="checkbox"/>	Temporary RF connector provided
<input 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).

No.	Ant. Cat.	Ant. Type	Gain (dBi)
1	Integral	PIFA	1.31
2	Integral	PIFA	0.91



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 Mode Test 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"/> 97.6% - IEEE 802.11b	0.11
<input checked="" type="checkbox"/> 97.7% - IEEE 802.11g	0.1
<input checked="" type="checkbox"/> 97.8% - IEEE 802.11n (HT20)	0.1
<input checked="" type="checkbox"/> 95.5% - IEEE 802.11n (HT40)	0.2

1.1.5 EUT Operational Condition

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

1.1.6 EUT Operate Information

Items	Description	
Beamforming Function	<input type="checkbox"/> With beamforming	<input checked="" type="checkbox"/> Without beamforming
Operate Condition	<input checked="" type="checkbox"/> Point-to-multipoint (P2M)	<input type="checkbox"/> Point-to-point (P2P)



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
- ◆ KDB 558074 D01 v03r05
- ◆ KDB 662911 D01 v02r01

1.3 Testing Location Information

Testing Location				
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.		
		TEL : 886-3-327-3456	FAX : 886-3-327-0973	
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Ryan	22°C / 54%	09/08/2016
RF Conducted	TH01-HY	Gary	21°C / 61%	22/09/2016
Radiated	03CH03-HY	Jeff	20.5°C / 52%	16/08/2016

Test site registered number [553509] 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))

Measurement Uncertainty		
Test Item		Uncertainty
AC power-line conducted emissions		±2.3 dB
Emission bandwidth, 6dB bandwidth		±0.6 %
RF output power, conducted		±0.1 dB
Power density, conducted		±0.6 dB
Unwanted emissions, conducted	9 – 150 kHz	±0.4 dB
	0.15 – 30 MHz	±0.4 dB
	30 – 1000 MHz	±0.6 dB
	1 – 18 GHz	±0.5 dB
	18 – 40 GHz	±0.5 dB
	40 – 200 GHz	N/A
All emissions, radiated	9 – 150 kHz	±2.5 dB
	0.15 – 30 MHz	±2.3 dB
	30 – 1000 MHz	±2.6 dB
	1 – 18 GHz	±3.6 dB
	18 – 40 GHz	±3.8 dB
	40 – 200 GHz	N/A
Temperature		±0.8 °C
Humidity		±5 %
DC and low frequency voltages		±0.9%
Time		±1.4 %
Duty Cycle		±0.6 %

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing			
Modulation Mode	Transmit Chains (N _{TX})	Data Rate / MCS	Worst Data Rate / MCS
11b	2	1-11 Mbps	1 Mbps
11g	2	6-54 Mbps	6 Mbps
HT20	2	MCS 0-15	MCS 0
HT40	2	MCS 0-15	MCS 0

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). The EUT support HT20 and HT40. Worst modulation mode of Guard Interval (GI) is 800ns.
 Note 2: Modulation modes consist below configuration:
 11b: IEEE 802.11b, 11g: IEEE 802.11g, HT20/HT40: IEEE 802.11n

2.2 Test Channel Mode

Test Software Version	DRTU V1.8.3
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Band	Mode	BWch (MHz)	Nss-Min	Nant	Ch. (MHz)	Range	Power Setting
2.4G	11b	20	1	2	2412	L	11.5
2.4G	11b	20	1	2	2437	M	11.5
2.4G	11b	20	1	2	2462	H	11.5
2.4G	11g	20	1	2	2412	L	10.75
2.4G	11g	20	1	2	2437	M	10.625
2.4G	11g	20	1	2	2462	H	10.75
2.4G	HT20	20	1,(M0)	2	2412	L	10.75
2.4G	HT20	20	1,(M0)	2	2437	M	10.75
2.4G	HT20	20	1,(M0)	2	2462	H	10.875
2.4G	HT40	40	1,(M0)	2	2422	L	11.25
2.4G	HT40	40	1,(M0)	2	2437	M	11.25
2.4G	HT40	40	1,(M0)	2	2452	H	11.125

Abbreviation Explanation




Band	Mode	BWch (MHz)	Nss-Min	Nant	Ch. (MHz)	Range	Test Cond.	Abbreviation
2.4G	HT20	20	1,(M0-15)	2	2412	L	TN,VN	2.4G;HT20;20;1,(M0-15);2;2412;L;TN,VN
2.4G	HT40	40	1,(M0-15)	2	2437	M	TN,VN	2.4G;HT40;40;1,(M0-15);2;2437;M;TN,VN

Note:
 ♦ Test range channel consist of L (Low Ch.), M (Middle Ch.), H (High Ch.), S (Single Ch).

2.3 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 Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	HT40 2437MHz, Adapter with charging mode

The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth, Fundamental Emission Output Power, Power Spectral Density
Test Condition	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Non-restricted Frequency Bands 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.		
User Position	<input type="checkbox"/> EUT will be placed in fixed position.		
	<input type="checkbox"/> EUT will be placed in mobile position and operating multiple positions.		
	<input checked="" type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
Operating Mode < 1GHz	<input checked="" type="checkbox"/> 1. HT40 2437MHz, Adapter with charging mode		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT			V

2.4 Accessories and Support Equipment

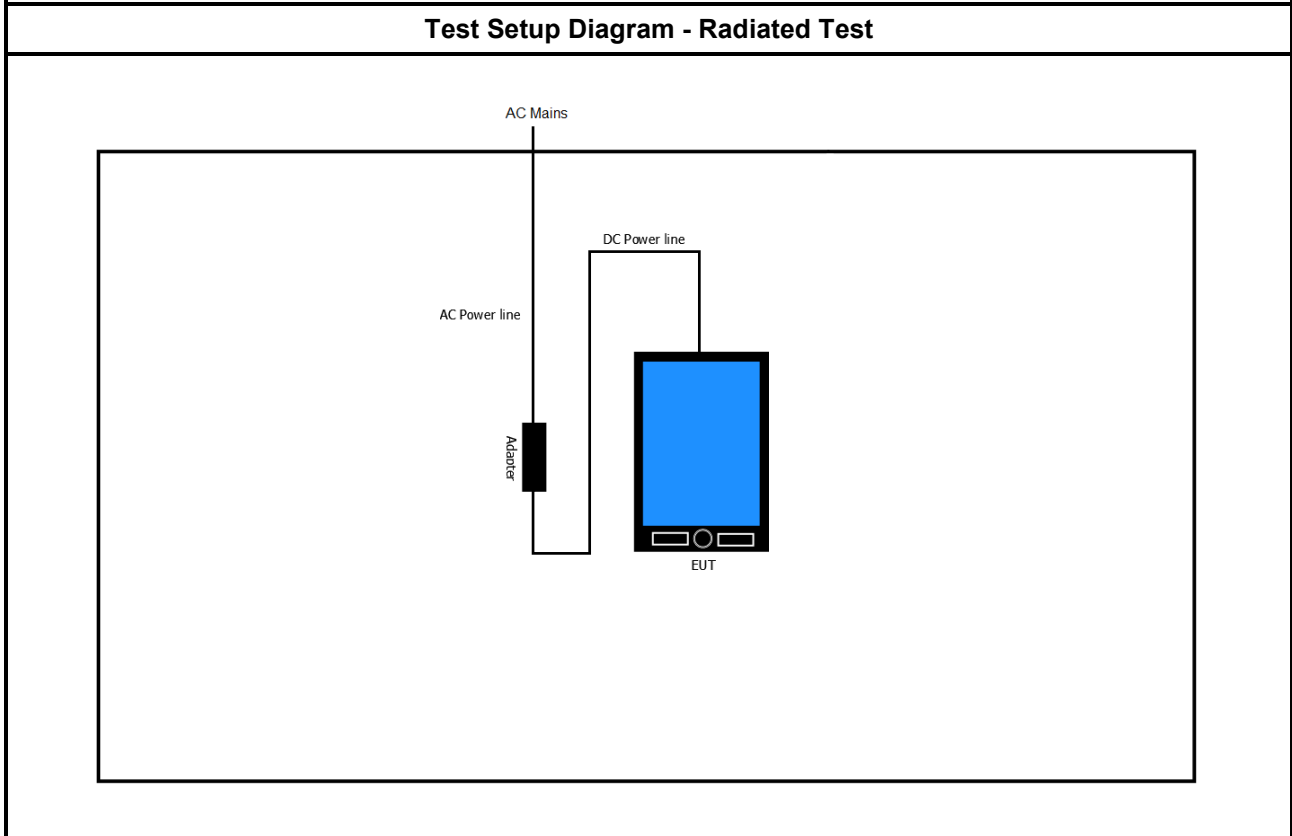
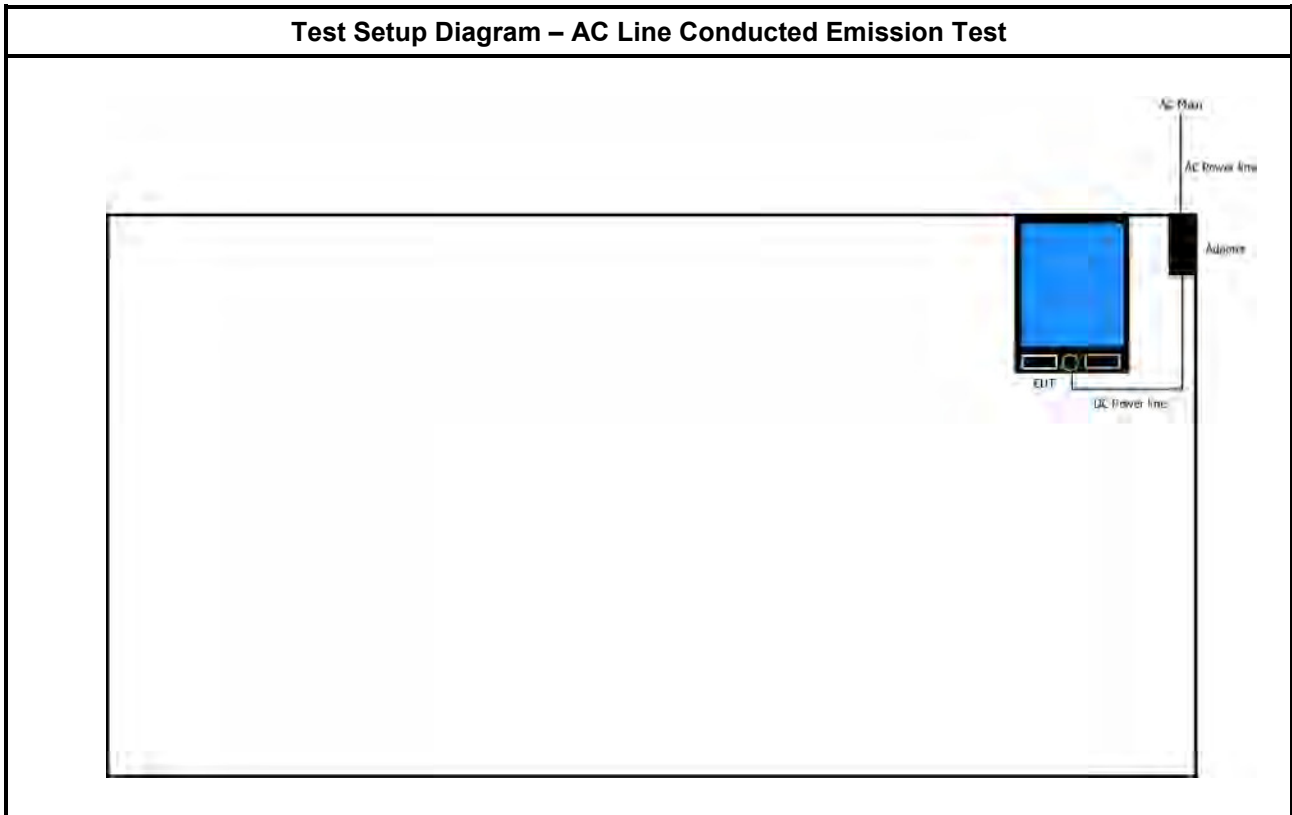
Accessories				
AC Adapter	Brand Name	DELTA	Model Name	ADP-100PB B
	Power Rating	I/P: 100 - 240Vac, 1.8A, O/P: 5V/3A or 20V/5A		
Touch Pen	Brand Name	Wacom	Model Name	KP-504E
WLAN/BT Module	Brand Name	Intel	Model Name	8260NGW
GPS chip	Brand Name	BROADCOM	Model Name	BCM4752IFBG

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

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

Support Equipment - AC Conduction and Radiated Emission			
No.	Equipment	Brand Name	Model Name
1	-	-	-

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.

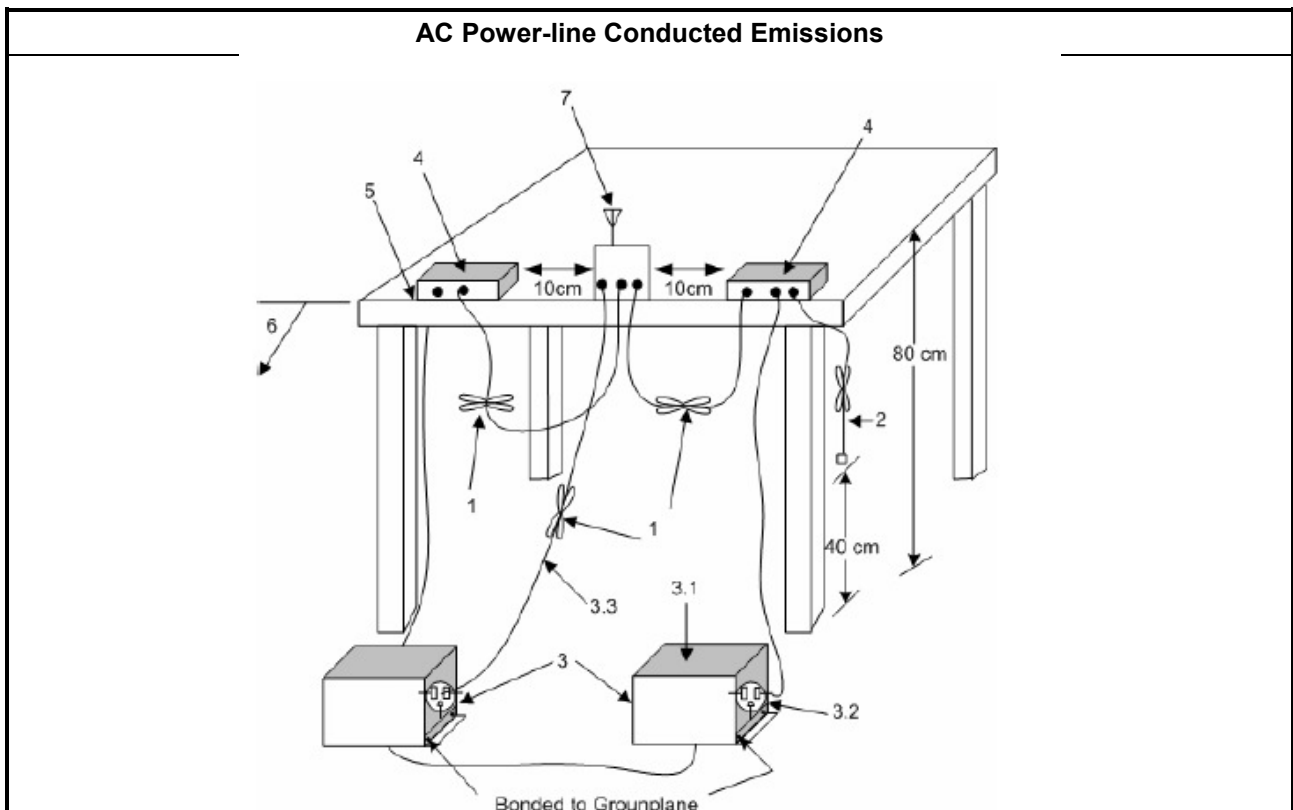
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

Test Method
<ul style="list-style-type: none"> 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 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

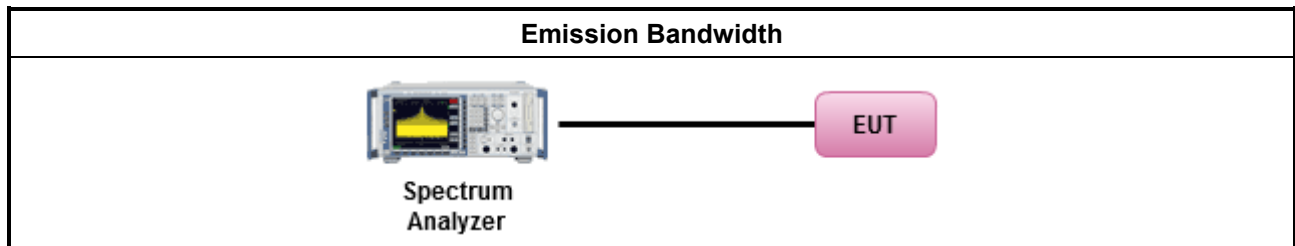
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
▪	For the emission bandwidth shall be measured using one of the options below:
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix A

3.3 Fundamental Emission Output Power

3.3.1 Fundamental Emission Output Power Limit

Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit	
<ul style="list-style-type: none"> ▪ 2400-2483.5 MHz Band: 	
	<ul style="list-style-type: none"> ▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS):
	<ul style="list-style-type: none"> - Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dB dBm
e.i.r.p. Power Limit:	
<ul style="list-style-type: none"> ▪ 2400-2483.5 MHz Band 	
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS)
	<ul style="list-style-type: none"> - Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ dBm
<p>P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi. P_{eirp} = e.i.r.p. Power in dBm.</p>	

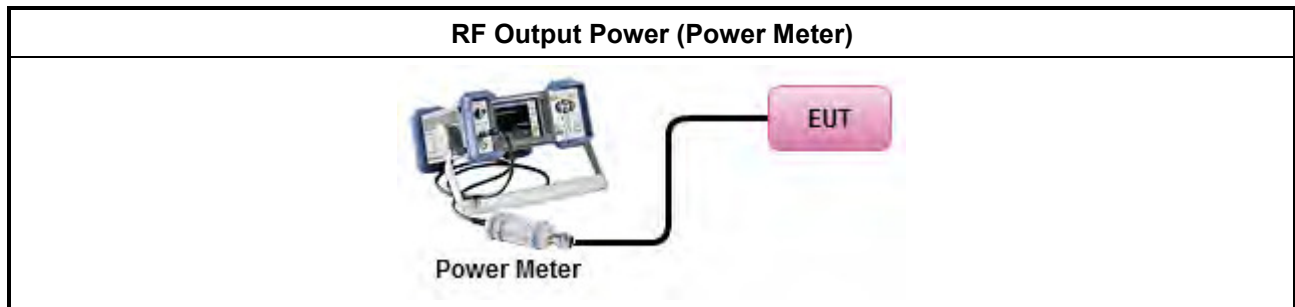
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> ▪ Maximum Peak Conducted Output Power 	
<input type="checkbox"/>	Refer as KDB 558074, clause 9.1.1 Option 1 (RBW ≥ EBW method).
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 9.1.2 Option 2 (peak power meter for VBW ≥ DTS BW)
<ul style="list-style-type: none"> ▪ Maximum Conducted Output Power 	
[duty cycle ≥ 98% or external video / power trigger]	
<input type="checkbox"/>	Refer as KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
<input type="checkbox"/>	Refer as KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
duty cycle < 98% and average over on/off periods with duty factor	
<input type="checkbox"/>	Refer as KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
<input type="checkbox"/>	Refer as KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
RF power meter and average over on/off periods with duty factor or gated trigger	
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 9.2.3 Method AVGPM (using an RF average power meter).
<ul style="list-style-type: none"> ▪ For conducted measurement. 	
<ul style="list-style-type: none"> ▪ If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them. 	
<ul style="list-style-type: none"> ▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$ 	

3.3.4 Test Setup



3.3.5 Test Result of Maximum Peak Conducted Output Power

Refer as Appendix B

3.3.6 Test Result of Maximum Average Conducted Output Power

Refer as Appendix B

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
<ul style="list-style-type: none"> ▪ Power Spectral Density (PSD) \leq 8 dBm/3kHz

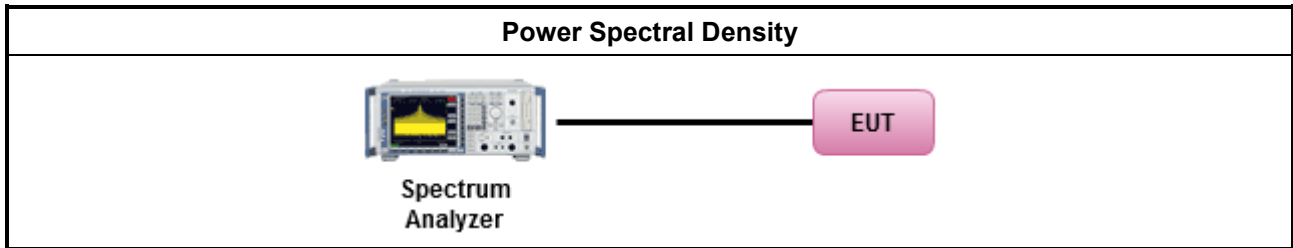
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method						
<ul style="list-style-type: none"> ▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option). 						
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz; Detector=peak). duty cycle \geq 98%						
<input type="checkbox"/> Refer as KDB 558074, clause 10.5 Method AVGPSD-2 (spectral trace averaging). duty cycle $<$ 98%						
<input type="checkbox"/> Refer as KDB 558074, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)						
<ul style="list-style-type: none"> ▪ For conducted measurement. <ul style="list-style-type: none"> ▪ If The EUT supports multiple transmit chains using options given below: <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 20px; text-align: center;"><input checked="" type="checkbox"/></td> <td>Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N_{TX} output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.</td> </tr> </tbody> </table> 	<input checked="" type="checkbox"/>	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N _{TX} output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.	<input type="checkbox"/>	Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,	<input type="checkbox"/>	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.
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<input type="checkbox"/>	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.					

3.4.4 Test Setup

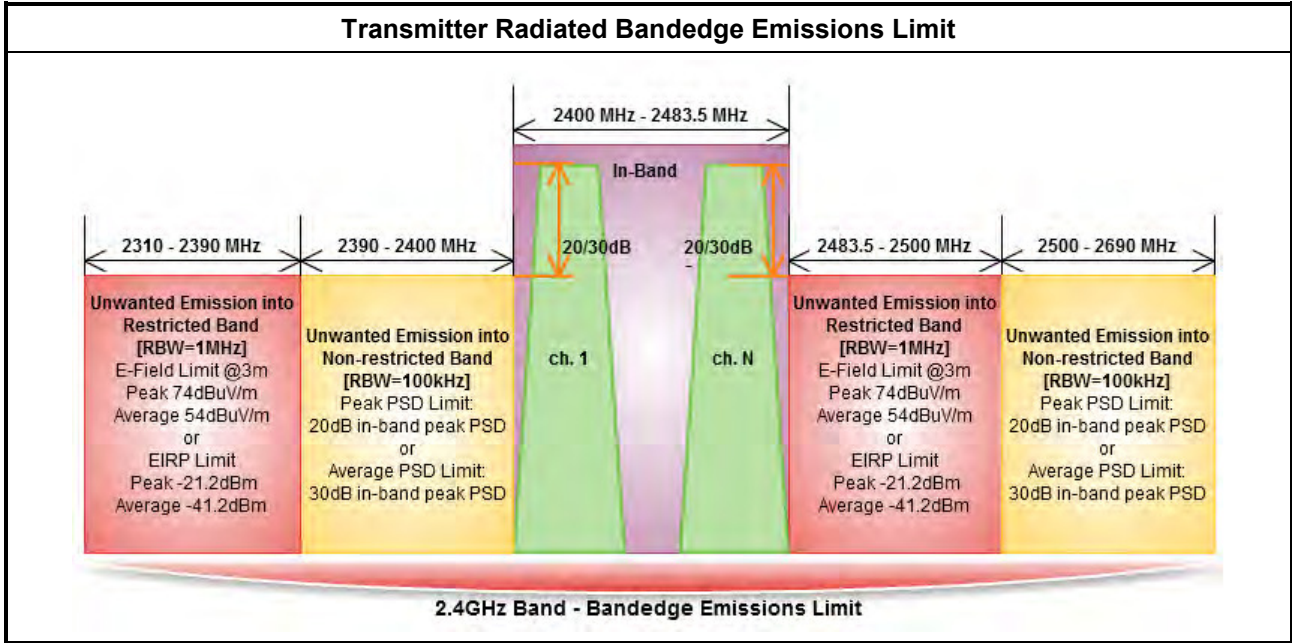


3.4.5 Test Result of Power Spectral Density

Refer as Appendix C

3.5 Transmitter Radiated Bandedge Emissions

3.5.1 Transmitter Radiated Bandedge Emissions Limit



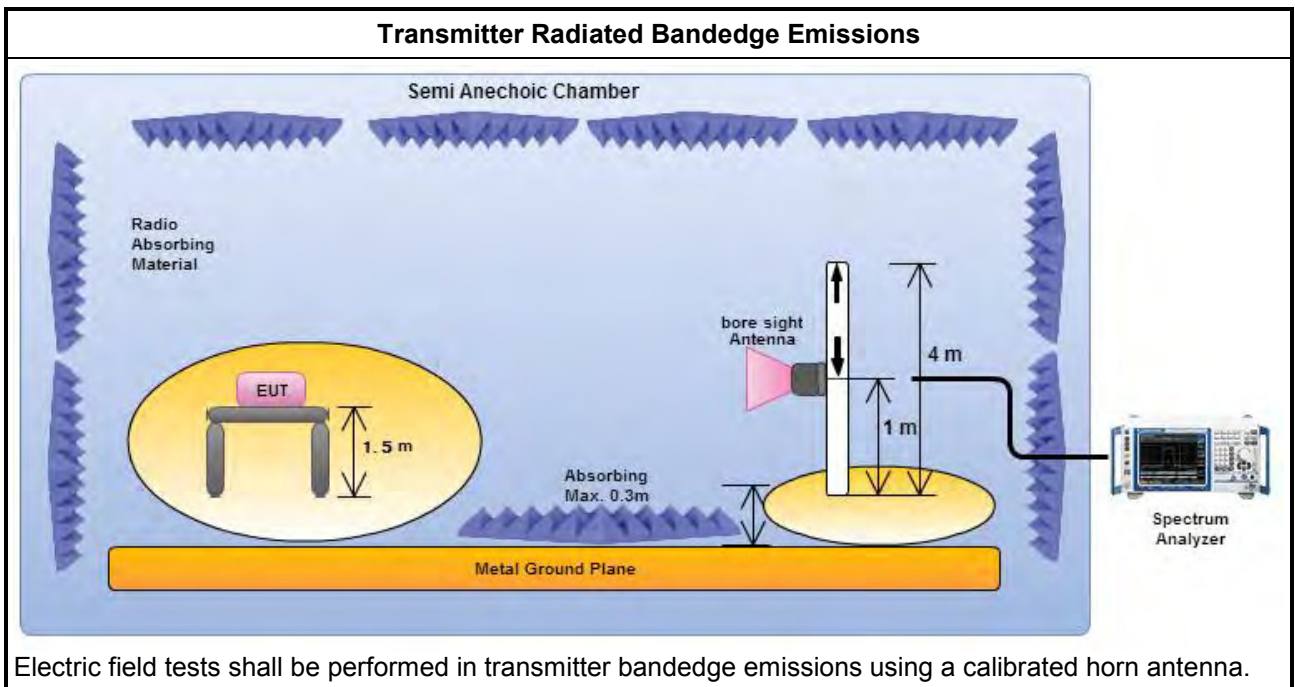
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	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"/>	Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.
<input type="checkbox"/>	Refer as KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle \geq 98%)
<input type="checkbox"/>	Refer as KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW \geq 1/T).
<input 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 KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/>	For the transmitter bandedge emissions shall be measured using following options below:
<input type="checkbox"/>	Refer as KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
<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"/>	For radiated measurement, refer as KDB 558074, clause 12.2.7 and ANSI C63.10, clause 6.6. Test distance is 3m.

3.5.4 Test Setup





3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix D

3.6 Transmitter Radiated Unwanted Emissions

3.6.1 Transmitter in 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.

3.6.2 Measuring Instruments

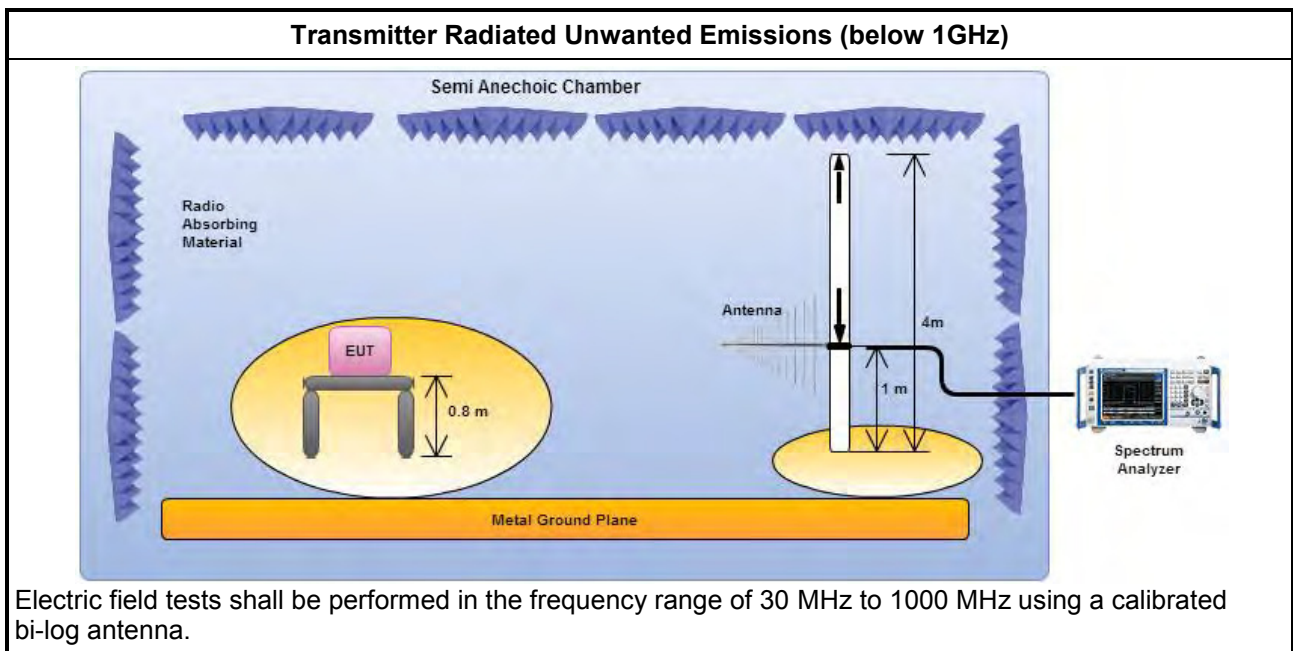
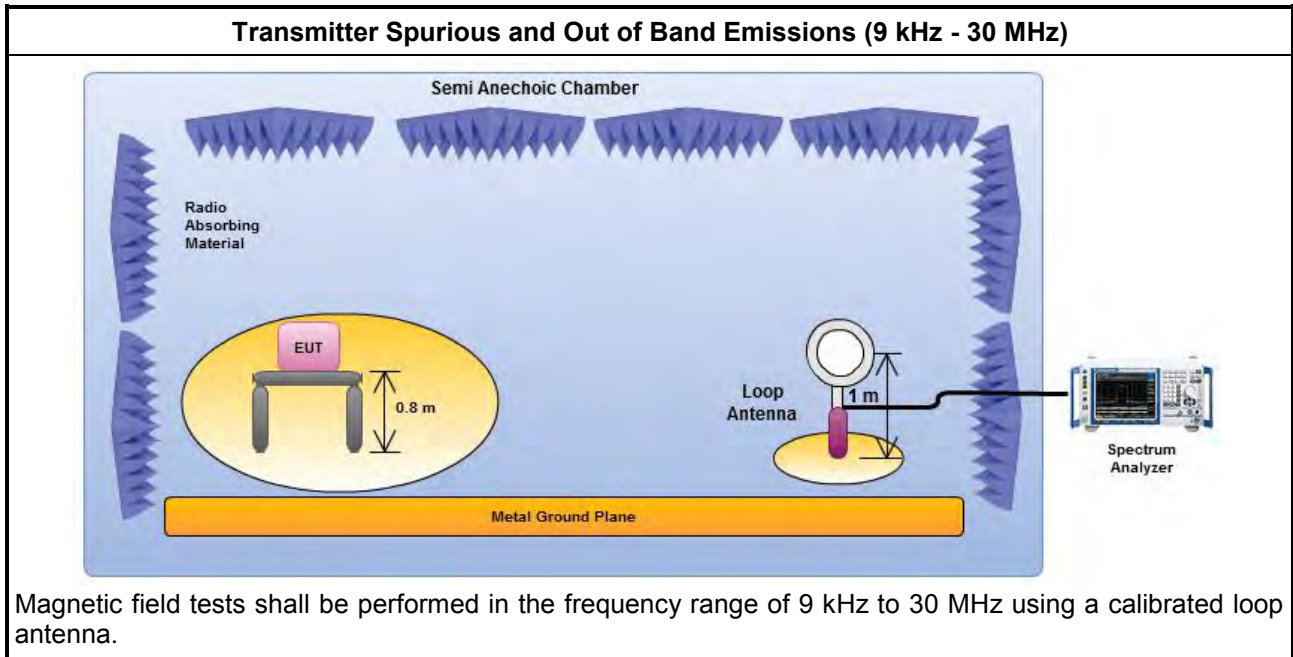
Refer a test equipment and calibration data table in this test report.

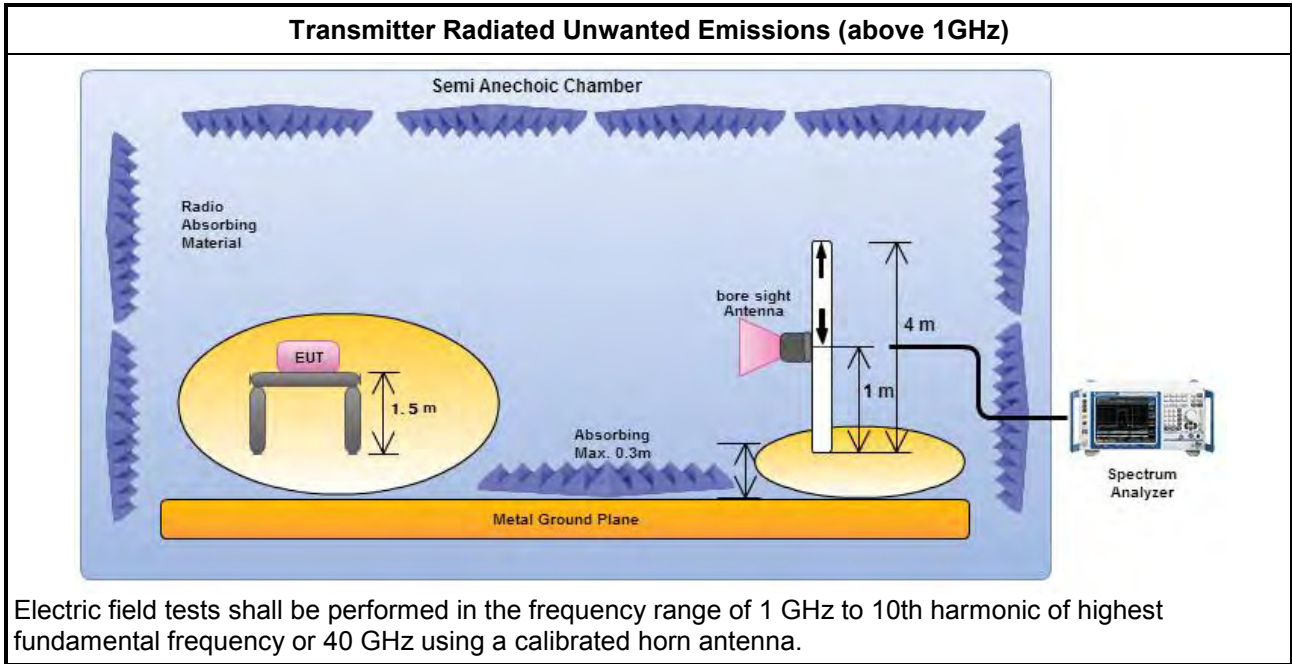


3.6.3 Test Procedures

Test Method	
<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 KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.
<input type="checkbox"/>	Refer as KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle \geq 98%)
<input type="checkbox"/>	Refer as KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW \geq 1/T).
<input 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 KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.
<input checked="" type="checkbox"/>	For radiated measurement, refer as KDB 558074, clause 12.2.7.
<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 30 dB below the permissible value has no need to be reported.

3.6.4 Test Setup





3.6.5 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.

3.6.6 Transmitter Radiated Unwanted Emissions

Refer as Appendix E



4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Last Cal.	Calibration Due Date
EMC Receiver	KEYSIGHT	N9038A	MY54130031	20 Hz ~ 8.4 GHz	14/04/2016	13/04/2017
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9 kHz ~ 30 MHz	26/01/2016	25/01/2017
LISN (Support Unit)	R&S	ENV216	101295	9 kHz ~ 30 MHz	04/11/2015	03/11/2016
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9 kHz ~ 30 MHz	30/10/2015	29/10/2016
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	NCR	NCR

NCR: No Calibration Require.

Instrument for Conducted Test

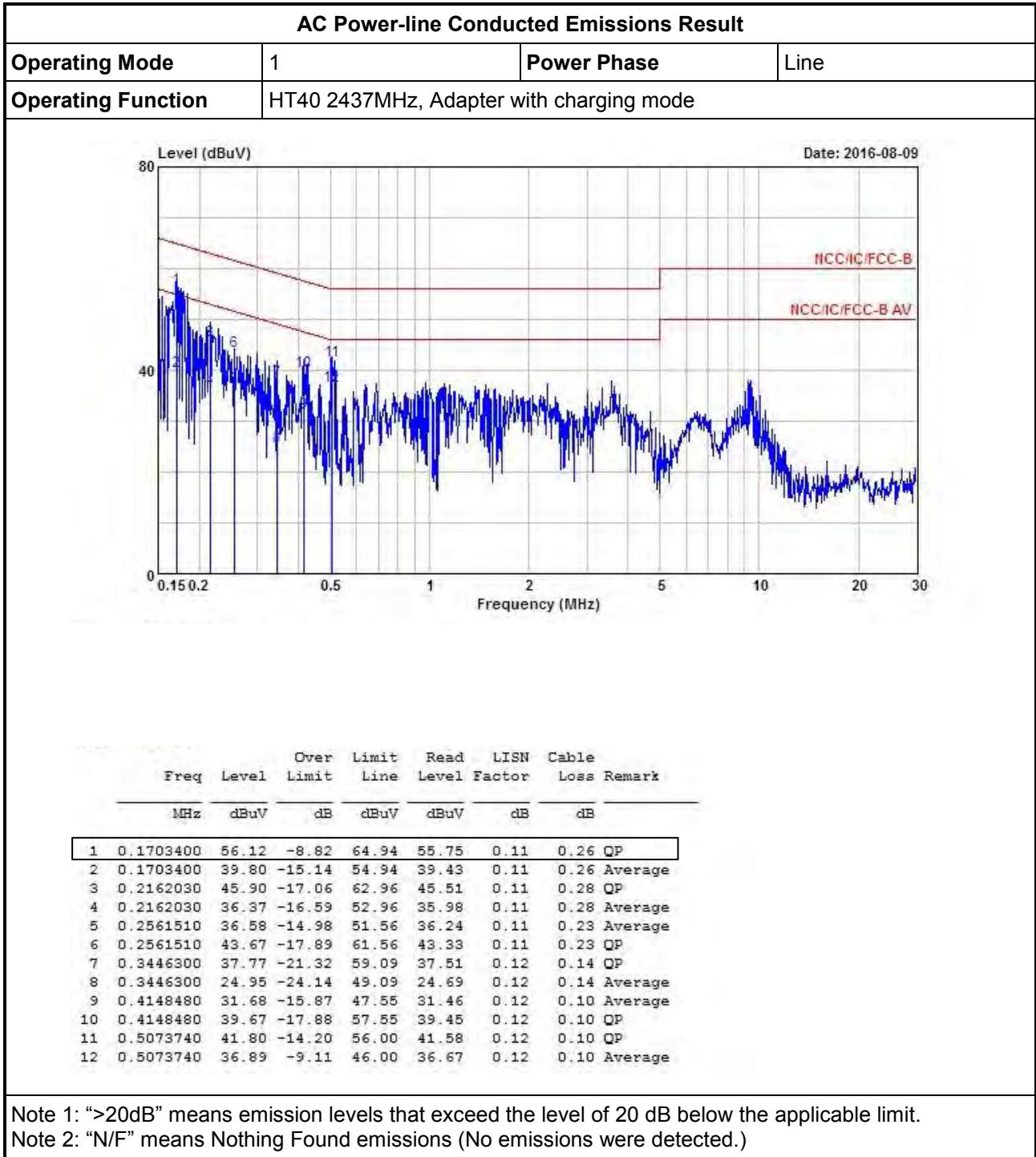
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Last Cal.	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9KHz~40GHz	16/02/2016	15/02/ 2017
Power Sensor	Anritsu	MA2411B	917017	300MHz ~ 40GHz	04/02/2016	03/02/2017
Power Meter	Anritsu	ML2495A	949003	300MHz ~ 40GHz	04/02/2016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

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Last Cal.	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz ~ 1 GHz 3m	28/11/2015	27/11/2016
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1 GHz ~ 18 GHz 3m	16/12/2015	15/12/ 2016
Amplifier	HP	8447D	2944A08033	10 kHz ~ 1.3 GHz	10/05//2016	09/05/2017
Amplifier	Agilent	8449B	3008A02120	1 GHz ~ 26.5 GHz	02/09/2015	01/09/ 2016
Spectrum	R&S	FSV40	101513	9 kHz ~ 40 GHz	16/02/ 2016	15/02/ 2017
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz ~ 1 GHz	18/09/ 2015	17/09/2016
Horn Antenna	SCHWARZBECK	BBHA9120D	1531	1 GHz ~ 18 GHz	22/04/ 2016	21/04/ 2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18 GHz ~ 40 GHz	29/01/ 2016	28/01/ 2017
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	02/02/2015	01/02/2017



AC Power-line Conducted Emissions Result																																																																																																																																	
Operating Mode	1	Power Phase	Neutral																																																																																																																														
Operating Function	HT40 2437MHz, Adapter with charging mode																																																																																																																																
<div style="text-align: right;">Date: 2016-08-09</div> <p>The graph displays the AC power-line conducted emissions. The y-axis represents the level in dBuV, ranging from 0 to 80. The x-axis represents the frequency in MHz, ranging from 0.15 to 30. Two red lines indicate the NCC/IC/FCC-B and NCC/IC/FCC-B AV limits. The blue line shows the measured emission levels, which generally stay below the limits, with some peaks around 0.15 to 0.5 MHz.</p>																																																																																																																																	
<table border="1"> <thead> <tr> <th></th> <th>Freq</th> <th>Level</th> <th>Over Limit</th> <th>Limit Line</th> <th>Read Level</th> <th>LISN Factor</th> <th>Cable Loss</th> <th>Remark</th> </tr> <tr> <th></th> <th>MHz</th> <th>dBuV</th> <th>dB</th> <th>dBuV</th> <th>dBuV</th> <th>dB</th> <th>dB</th> <th></th> </tr> </thead> <tbody> <tr><td>1</td><td>0.1532130</td><td>37.24</td><td>-18.58</td><td>55.82</td><td>36.92</td><td>0.10</td><td>0.22</td><td>Average</td></tr> <tr><td>2</td><td>0.1532130</td><td>51.37</td><td>-14.45</td><td>65.82</td><td>51.05</td><td>0.10</td><td>0.22</td><td>QP</td></tr> <tr><td>3</td><td>0.1873850</td><td>54.39</td><td>-9.76</td><td>64.15</td><td>54.00</td><td>0.11</td><td>0.28</td><td>QP</td></tr> <tr><td>4</td><td>0.1873850</td><td>43.45</td><td>-10.70</td><td>54.15</td><td>43.06</td><td>0.11</td><td>0.28</td><td>Average</td></tr> <tr><td>5</td><td>0.2353310</td><td>34.68</td><td>-17.58</td><td>52.26</td><td>34.32</td><td>0.11</td><td>0.25</td><td>Average</td></tr> <tr><td>6</td><td>0.2353310</td><td>47.72</td><td>-14.54</td><td>62.26</td><td>47.36</td><td>0.11</td><td>0.25</td><td>QP</td></tr> <tr><td>7</td><td>0.2758730</td><td>36.48</td><td>-14.46</td><td>50.94</td><td>36.16</td><td>0.11</td><td>0.21</td><td>Average</td></tr> <tr><td>8</td><td>0.2758730</td><td>44.65</td><td>-16.29</td><td>60.94</td><td>44.33</td><td>0.11</td><td>0.21</td><td>QP</td></tr> <tr><td>9</td><td>0.4686110</td><td>42.58</td><td>-13.96</td><td>56.54</td><td>42.36</td><td>0.12</td><td>0.10</td><td>QP</td></tr> <tr><td>10</td><td>0.4686110</td><td>36.77</td><td>-9.77</td><td>46.54</td><td>36.55</td><td>0.12</td><td>0.10</td><td>Average</td></tr> <tr><td>11</td><td>0.5640910</td><td>39.42</td><td>-16.58</td><td>56.00</td><td>39.20</td><td>0.12</td><td>0.10</td><td>QP</td></tr> <tr><td>12</td><td>0.5640910</td><td>31.28</td><td>-14.72</td><td>46.00</td><td>31.06</td><td>0.12</td><td>0.10</td><td>Average</td></tr> </tbody> </table>					Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark		MHz	dBuV	dB	dBuV	dBuV	dB	dB		1	0.1532130	37.24	-18.58	55.82	36.92	0.10	0.22	Average	2	0.1532130	51.37	-14.45	65.82	51.05	0.10	0.22	QP	3	0.1873850	54.39	-9.76	64.15	54.00	0.11	0.28	QP	4	0.1873850	43.45	-10.70	54.15	43.06	0.11	0.28	Average	5	0.2353310	34.68	-17.58	52.26	34.32	0.11	0.25	Average	6	0.2353310	47.72	-14.54	62.26	47.36	0.11	0.25	QP	7	0.2758730	36.48	-14.46	50.94	36.16	0.11	0.21	Average	8	0.2758730	44.65	-16.29	60.94	44.33	0.11	0.21	QP	9	0.4686110	42.58	-13.96	56.54	42.36	0.12	0.10	QP	10	0.4686110	36.77	-9.77	46.54	36.55	0.12	0.10	Average	11	0.5640910	39.42	-16.58	56.00	39.20	0.12	0.10	QP	12	0.5640910	31.28	-14.72	46.00	31.06	0.12	0.10	Average
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark																																																																																																																									
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<p>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.)</p>																																																																																																																																	



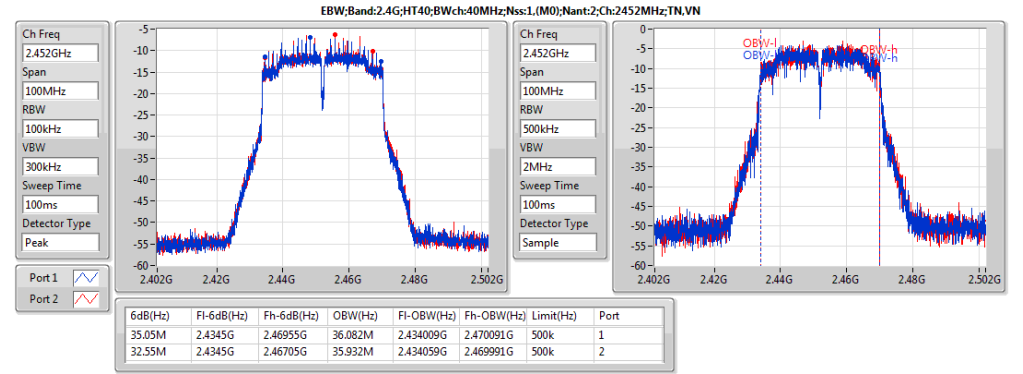
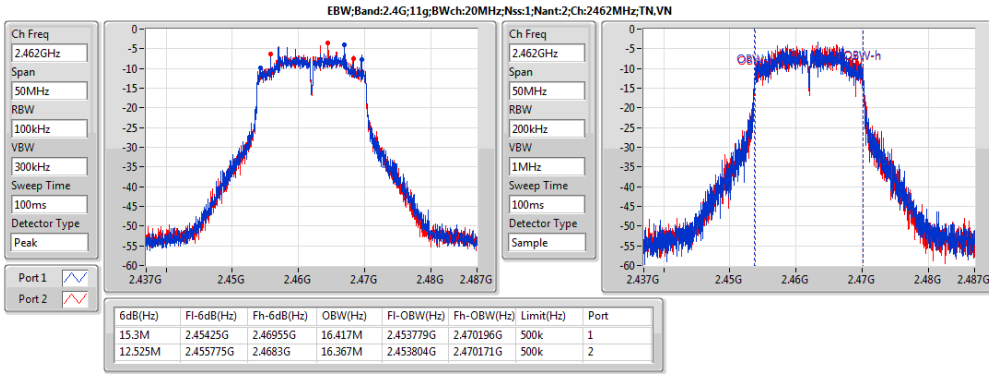
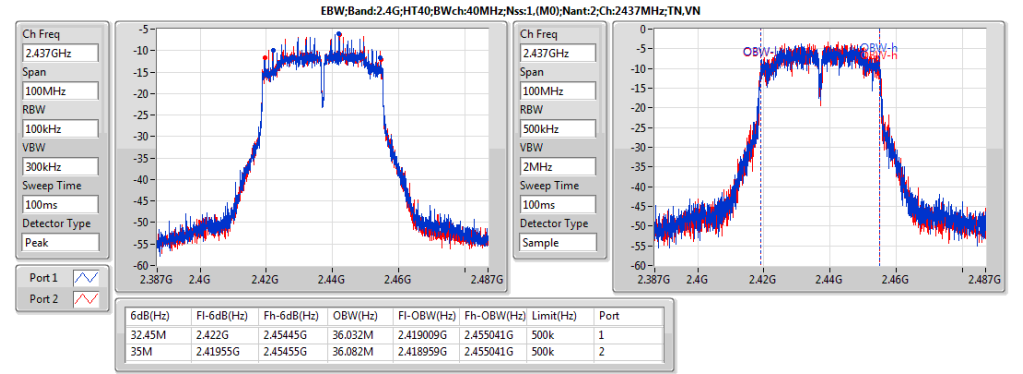
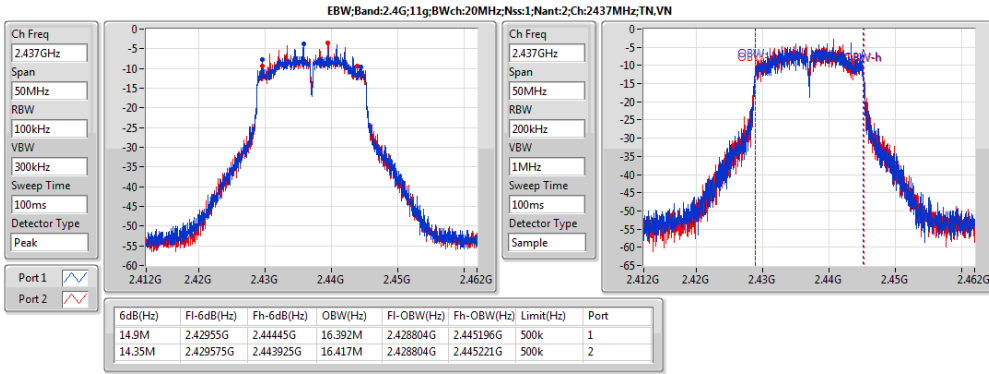
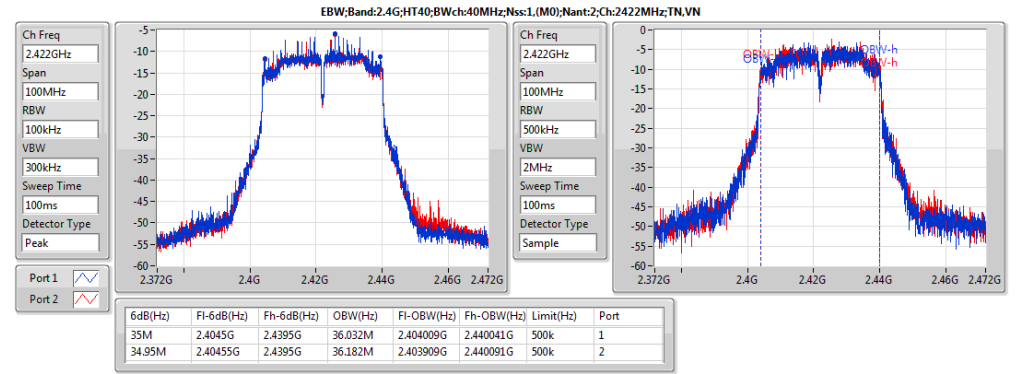
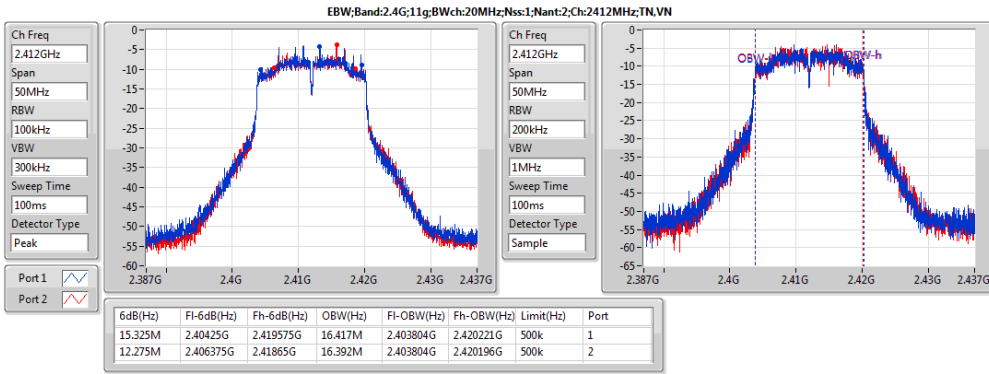
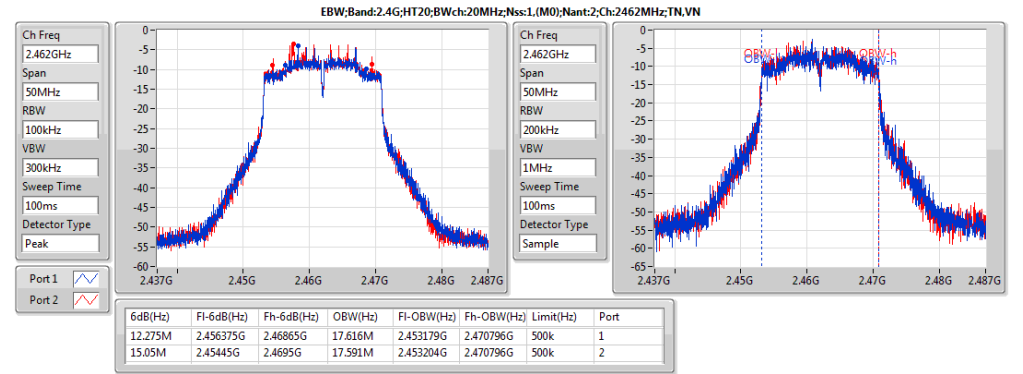
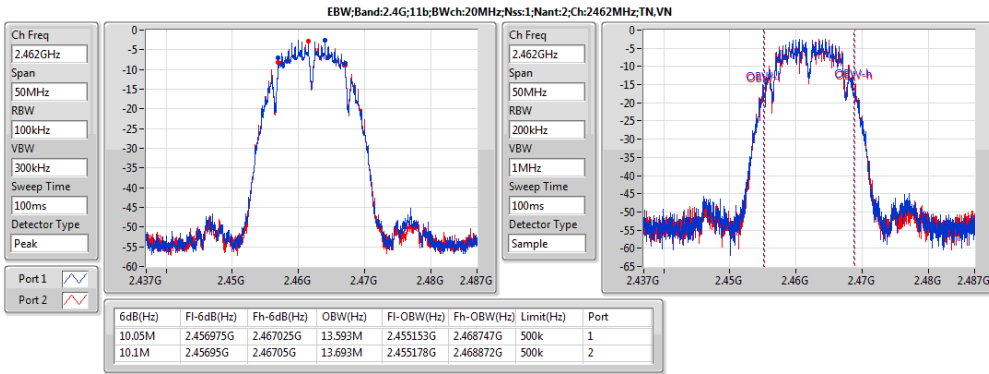
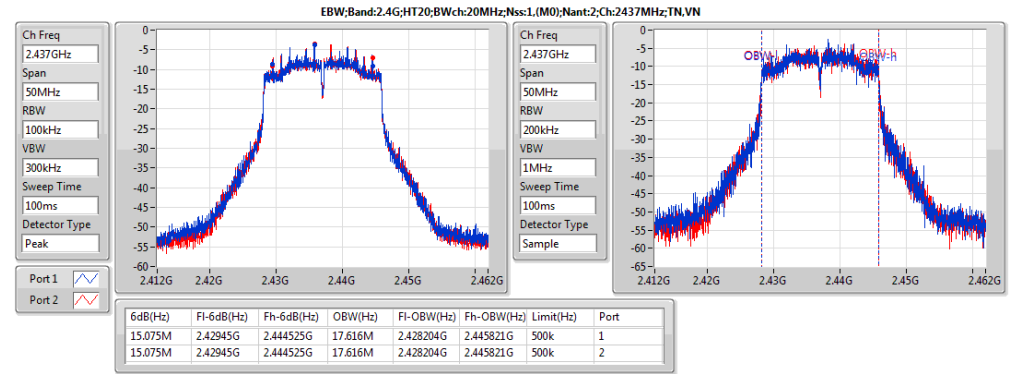
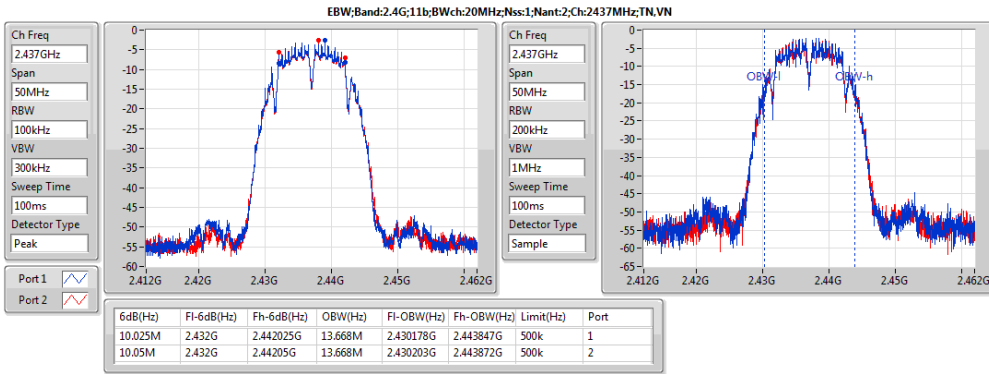
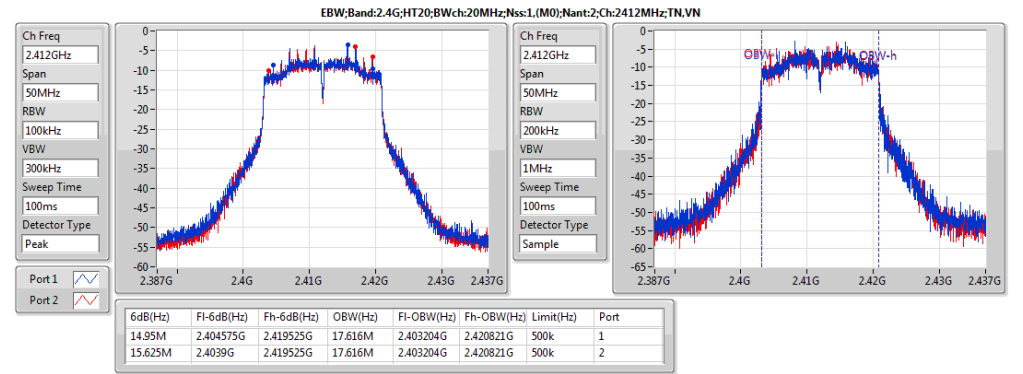
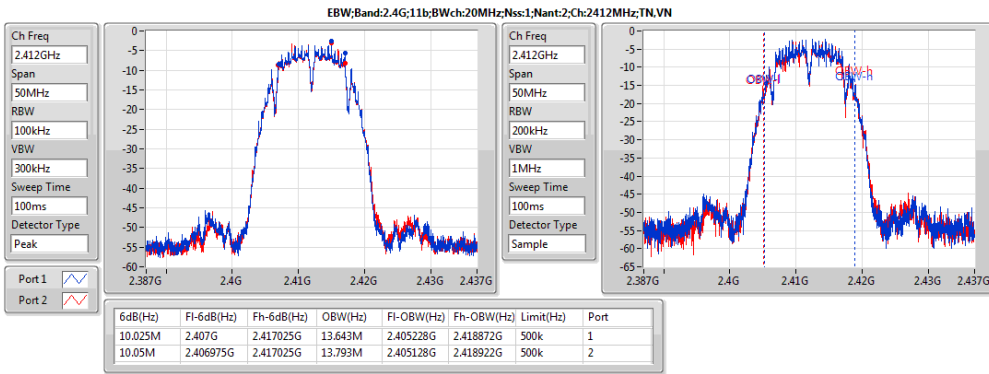


Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4G;11b;20;1;2	10.1M	13.793M	13M8G1D	10.025M	13.593M
2.4G;11g;20;1;2	15.325M	16.417M	16M4D1D	12.275M	16.367M
2.4G;HT20;20;1,(M0);2	15.625M	17.616M	17M6D1D	12.275M	17.591M
2.4G;HT40;40;1,(M0);2	35.05M	36.182M	36M2D1D	32.45M	35.932M

Result

Mode	Result	Limit	P1-N dB (Hz)	P1-OBW (Hz)	P2-N dB (Hz)	P2-OBW (Hz)
2.4G;11b;20;1;2;2412;L;TN,VN	Pass	500k	10.025M	13.643M	10.05M	13.793M
2.4G;11b;20;1;2;2437;M;TN,VN	Pass	500k	10.025M	13.668M	10.05M	13.668M
2.4G;11b;20;1;2;2462;H;TN,VN	Pass	500k	10.05M	13.593M	10.1M	13.693M
2.4G;11g;20;1;2;2412;L;TN,VN	Pass	500k	15.325M	16.417M	12.275M	16.392M
2.4G;11g;20;1;2;2437;M;TN,VN	Pass	500k	14.9M	16.392M	14.35M	16.417M
2.4G;11g;20;1;2;2462;H;TN,VN	Pass	500k	15.3M	16.417M	12.525M	16.367M
2.4G;HT20;20;1;(M0);2;2412;L;TN,VN	Pass	500k	14.95M	17.616M	15.625M	17.616M
2.4G;HT20;20;1;(M0);2;2437;M;TN,VN	Pass	500k	15.075M	17.616M	15.075M	17.616M
2.4G;HT20;20;1;(M0);2;2462;H;TN,VN	Pass	500k	12.275M	17.616M	15.05M	17.591M
2.4G;HT40;40;1;(M0);2;2422;L;TN,VN	Pass	500k	35M	36.032M	34.95M	36.182M
2.4G;HT40;40;1;(M0);2;2437;M;TN,VN	Pass	500k	32.45M	36.032M	35M	36.082M
2.4G;HT40;40;1;(M0);2;2452;H;TN,VN	Pass	500k	35.05M	36.082M	32.55M	35.932M





Summary

Mode	Sum (dBm)	Sum (W)	EIRP (dBm)	EIRP (W)
2.4G;11b;20;1;2	17.06	0.05082	18.37	0.06871
2.4G;11g;20;1;2	19.48	0.08872	20.79	0.11995
2.4G;HT20;20;1;(M0);2	19.45	0.0881	20.76	0.11912
2.4G;HT40;40;1;(M0);2	19.64	0.09204	20.95	0.12445



Result

Mode	Result	DG (dBi)	Sum (dBm)	Sum Lim. (dBm)	EIRP (dBm)	EIRP Lim. (dBm)	P1 (dBm)	P2 (dBm)
2.4G;11b;20;1;2;2412;L;TN,VN	Pass	1.31	17.06	30.00	18.37	36.00	14.21	13.88
2.4G;11b;20;1;2;2437;M;TN,VN	Pass	1.31	17.03	30.00	18.34	36.00	14.10	13.94
2.4G;11b;20;1;2;2462;H;TN,VN	Pass	1.31	16.92	30.00	18.23	36.00	13.99	13.83
2.4G;11g;20;1;2;2412;L;TN,VN	Pass	1.31	19.48	30.00	20.79	36.00	16.61	16.33
2.4G;11g;20;1;2;2437;M;TN,VN	Pass	1.31	19.39	30.00	20.70	36.00	16.51	16.24
2.4G;11g;20;1;2;2462;H;TN,VN	Pass	1.31	19.47	30.00	20.78	36.00	16.42	16.49
2.4G;HT20;20;1;(M0);2;2412;L;TN,VN	Pass	1.31	19.38	30.00	20.69	36.00	16.57	16.15
2.4G;HT20;20;1;(M0);2;2437;M;TN,VN	Pass	1.31	19.38	30.00	20.69	36.00	16.52	16.21
2.4G;HT20;20;1;(M0);2;2462;H;TN,VN	Pass	1.31	19.45	30.00	20.76	36.00	16.47	16.40
2.4G;HT40;40;1;(M0);2;2422;L;TN,VN	Pass	1.31	19.64	30.00	20.95	36.00	16.70	16.55
2.4G;HT40;40;1;(M0);2;2437;M;TN,VN	Pass	1.31	19.59	30.00	20.90	36.00	16.65	16.50
2.4G;HT40;40;1;(M0);2;2452;H;TN,VN	Pass	1.31	19.64	30.00	20.95	36.00	16.64	16.61



Summary

Mode	Sum (dBm)	Sum (W)	EIRP (dBm)	EIRP (W)
2.4G;11b;20;1;2	13.95	0.02483	15.26	0.03357
2.4G;11g;20;1;2	13.93	0.02472	15.24	0.03342
2.4G;HT20;20;1;(M0);2	13.93	0.02472	15.24	0.03342
2.4G;HT40;40;1;(M0);2	13.89	0.02449	15.20	0.03311



Result

Mode	Result	DG (dBi)	Sum (dBm)	Sum Lim. (dBm)	EIRP (dBm)	EIRP Lim. (dBm)	P1 (dBm)	P2 (dBm)
2.4G;11b;20;1;2;2412;L;TN,VN	Pass	1.31	13.95	30.00	15.26	36.00	11.13	10.75
2.4G;11b;20;1;2;2437;M;TN,VN	Pass	1.31	13.93	30.00	15.24	36.00	11.07	10.77
2.4G;11b;20;1;2;2462;H;TN,VN	Pass	1.31	13.93	30.00	15.24	36.00	10.98	10.85
2.4G;11g;20;1;2;2412;L;TN,VN	Pass	1.31	13.93	30.00	15.24	36.00	11.08	10.75
2.4G;11g;20;1;2;2437;M;TN,VN	Pass	1.31	13.86	30.00	15.17	36.00	10.96	10.74
2.4G;11g;20;1;2;2462;H;TN,VN	Pass	1.31	13.91	30.00	15.22	36.00	10.89	10.91
2.4G;HT20;20;1;(M0);2;2412;L;TN,VN	Pass	1.31	13.86	30.00	15.17	36.00	11.01	10.68
2.4G;HT20;20;1;(M0);2;2437;M;TN,VN	Pass	1.31	13.85	30.00	15.16	36.00	10.96	10.71
2.4G;HT20;20;1;(M0);2;2462;H;TN,VN	Pass	1.31	13.93	30.00	15.24	36.00	10.96	10.88
2.4G;HT40;40;1;(M0);2;2422;L;TN,VN	Pass	1.31	13.88	30.00	15.19	36.00	10.98	10.76
2.4G;HT40;40;1;(M0);2;2437;M;TN,VN	Pass	1.31	13.86	30.00	15.17	36.00	10.95	10.74
2.4G;HT40;40;1;(M0);2;2452;H;TN,VN	Pass	1.31	13.89	30.00	15.20	36.00	10.91	10.84

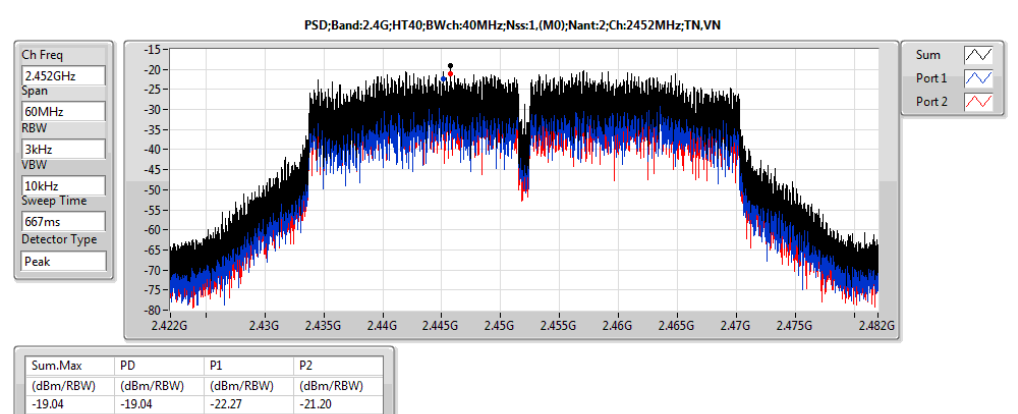
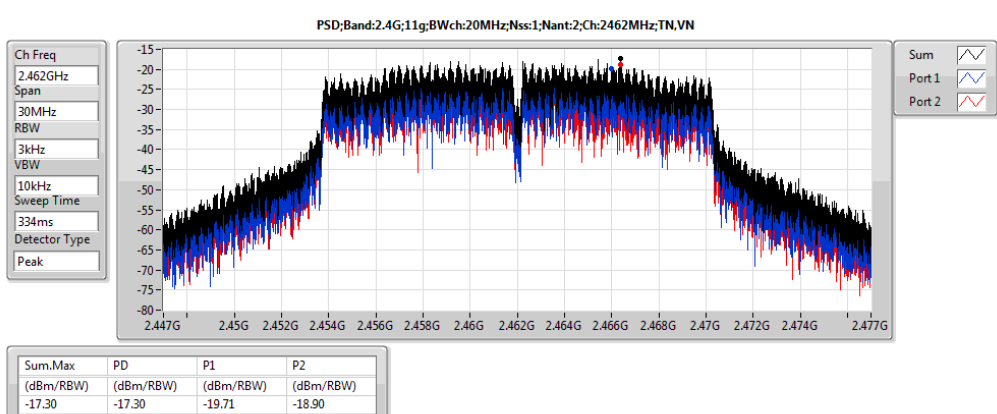
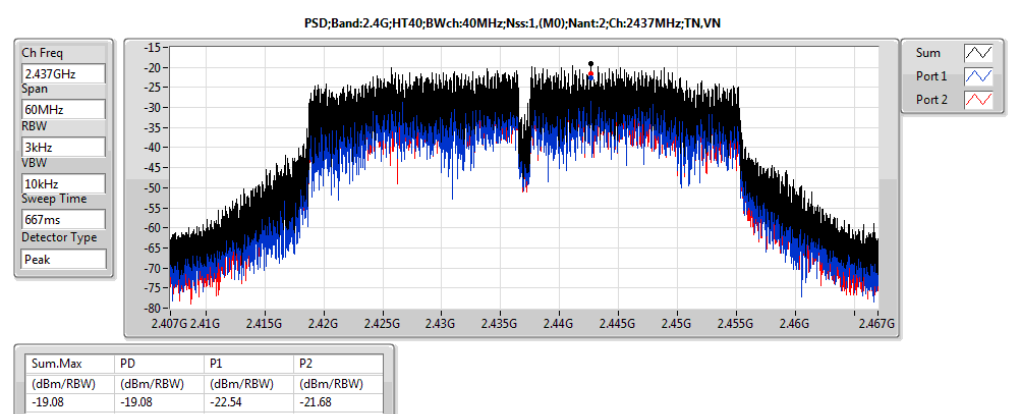
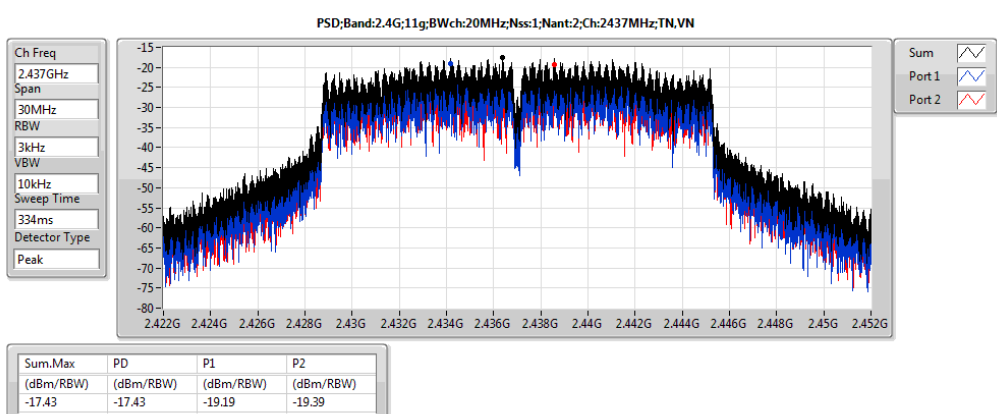
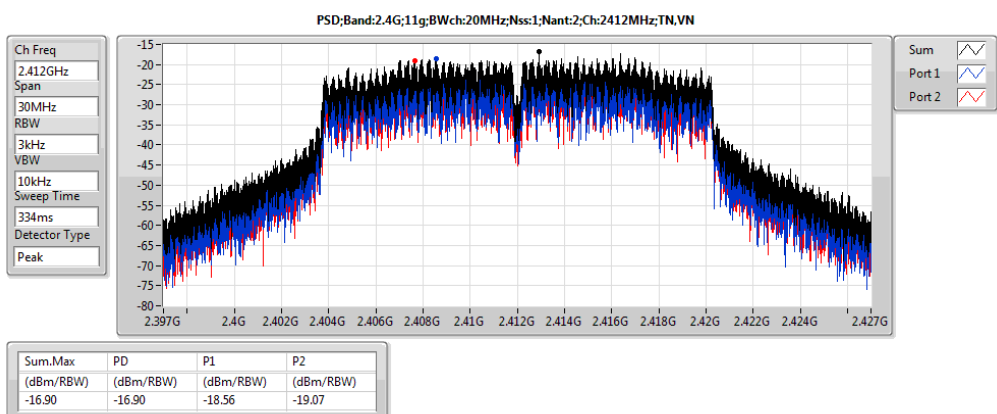
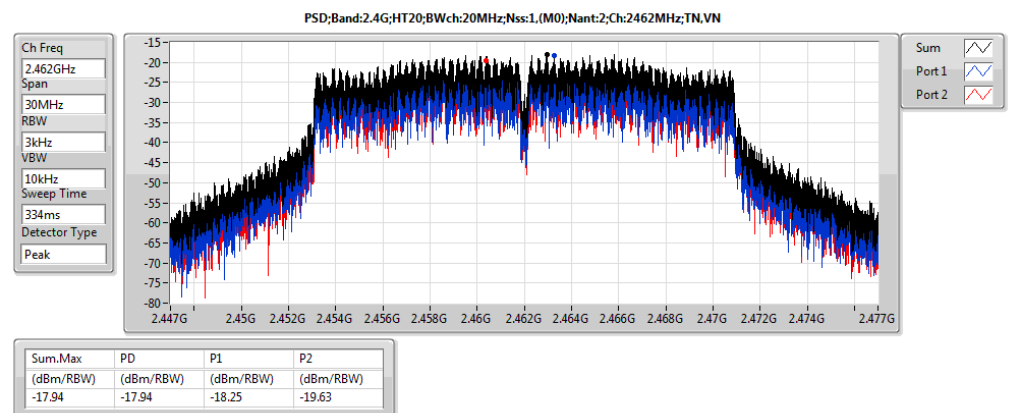
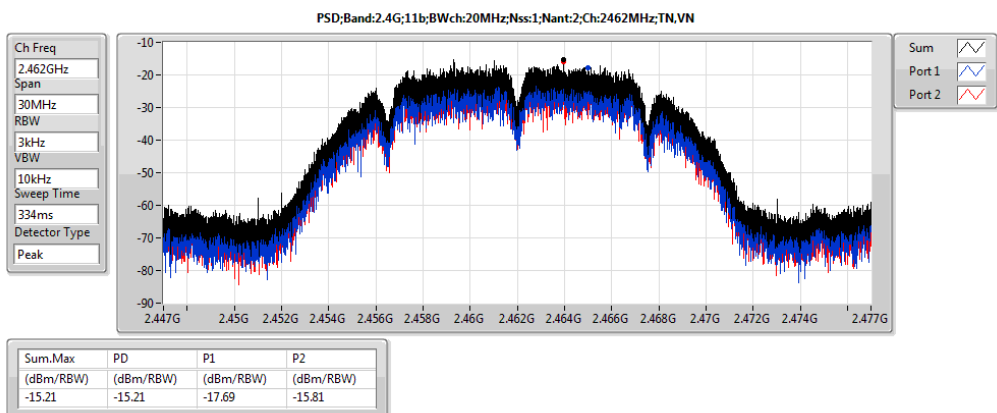
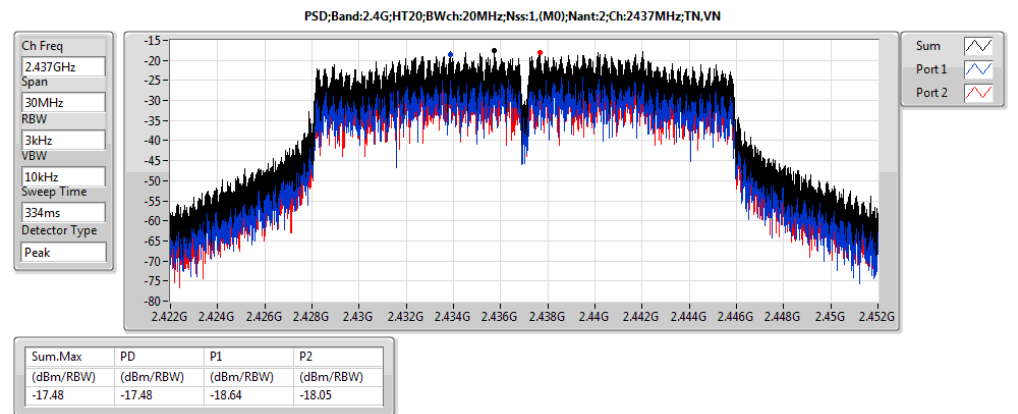
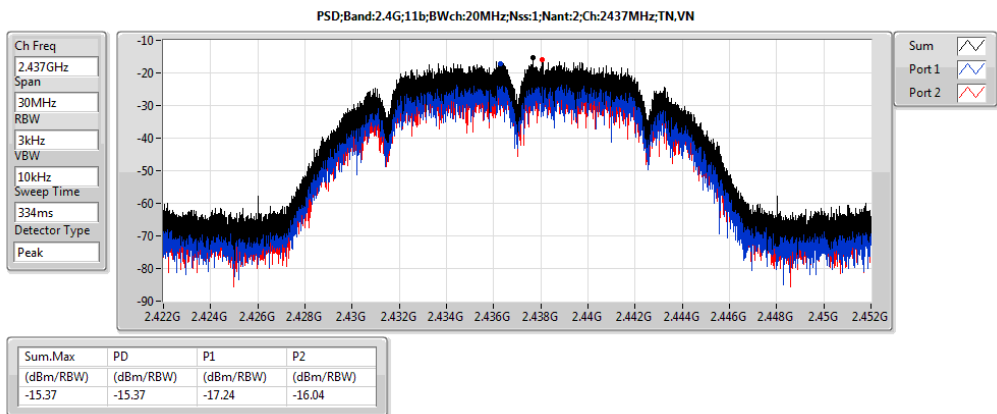
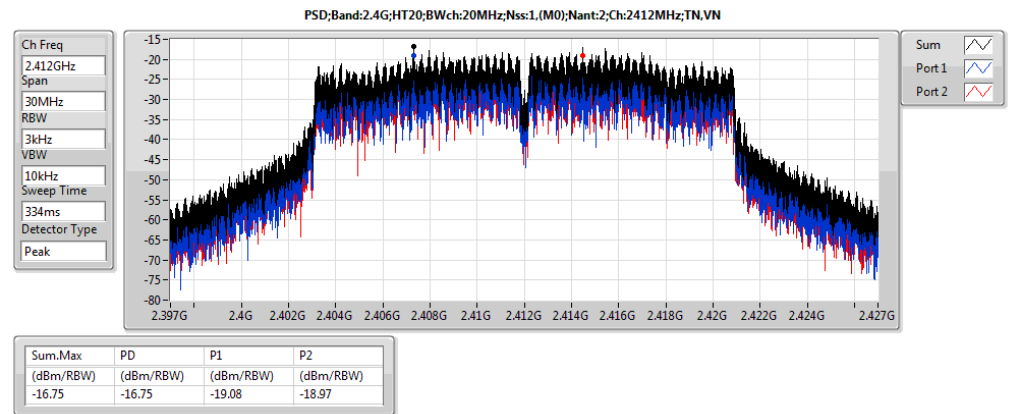
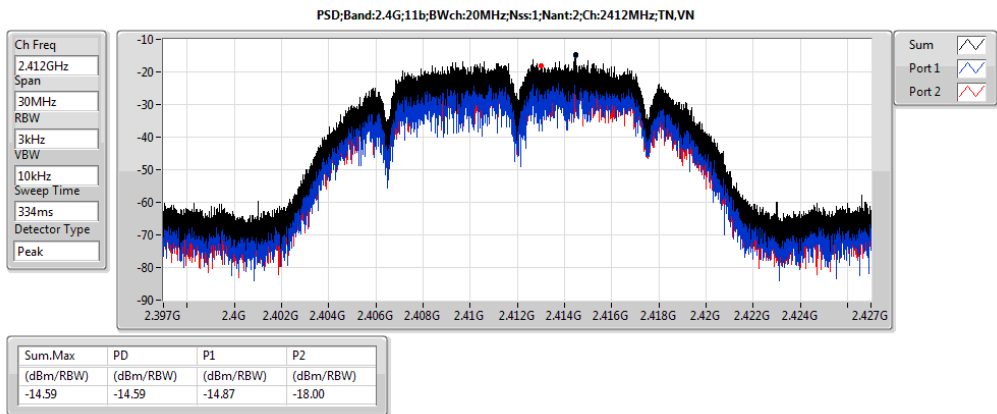


Summary

Mode	PD (dBm/RBW)	EIRP.PD (dBm/RBW)
2.4G;11b;20;1;2	-14.59	-10.47
2.4G;11g;20;1;2	-16.90	-12.78
2.4G;HT20;20;1;(M0);2	-16.75	-12.63
2.4G;HT40;40;1;(M0);2	-19.04	-14.92

Result

Mode	Result	Meas.RBW (Hz)	Lim.RBW (Hz)	BWCF (dB)	DG (dBi)	PD (dBm/RBW)	PD.Limit (dBm/RBW)	EIRP.PD (dBm/RBW)	EIRP.PD.Li m (dBm/RBW)	P1 (dBm/RBW)	P2 (dBm/RBW)
2.4G;11b;20;1;2;2412;L;TN,VN	Pass	3k	3k	0.00	4.12	-14.59	8.00	-10.47	Inf	-14.87	-18.00
2.4G;11b;20;1;2;2437;M;TN,VN	Pass	3k	3k	0.00	4.12	-15.37	8.00	-11.25	Inf	-17.24	-16.04
2.4G;11b;20;1;2;2462;H;TN,VN	Pass	3k	3k	0.00	4.12	-15.21	8.00	-11.09	Inf	-17.69	-15.81
2.4G;11g;20;1;2;2412;L;TN,VN	Pass	3k	3k	0.00	4.12	-16.90	8.00	-12.78	Inf	-18.56	-19.07
2.4G;11g;20;1;2;2437;M;TN,VN	Pass	3k	3k	0.00	4.12	-17.43	8.00	-13.31	Inf	-19.19	-19.39
2.4G;11g;20;1;2;2462;H;TN,VN	Pass	3k	3k	0.00	4.12	-17.30	8.00	-13.18	Inf	-19.71	-18.90
2.4G;HT20;20;1;(M0);2;2412;L;TN,VN	Pass	3k	3k	0.00	4.12	-16.75	8.00	-12.63	Inf	-19.08	-18.97
2.4G;HT20;20;1;(M0);2;2437;M;TN,VN	Pass	3k	3k	0.00	4.12	-17.48	8.00	-13.36	Inf	-18.64	-18.05
2.4G;HT20;20;1;(M0);2;2462;H;TN,VN	Pass	3k	3k	0.00	4.12	-17.94	8.00	-13.82	Inf	-18.25	-19.63
2.4G;HT40;40;1;(M0);2;2422;L;TN,VN	Pass	3k	3k	0.00	4.12	-19.58	8.00	-15.46	Inf	-22.29	-21.54
2.4G;HT40;40;1;(M0);2;2437;M;TN,VN	Pass	3k	3k	0.00	4.12	-19.08	8.00	-14.96	Inf	-22.54	-21.68
2.4G;HT40;40;1;(M0);2;2452;H;TN,VN	Pass	3k	3k	0.00	4.12	-19.04	8.00	-14.92	Inf	-22.27	-21.20





2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band)								
Modulation	N _{TX}	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	2	2412	106.45	2398.928	64.14	42.31	20	H
11b	2	2462	108.15	2523.200	59.70	48.45	20	H
11g	2	2412	104.83	2399.824	77.76	27.07	20	H
11g	2	2462	105.13	2525.400	59.86	45.27	20	H
HT20	2	2412	105.02	2399.600	78.22	26.80	20	H
HT20	2	2462	104.25	2519.600	60.49	43.76	20	H
HT40	2	2422	99.45	2399.760	73.49	25.96	20	H
HT40	2	2452	99.71	2544.080	60.44	39.27	20	H

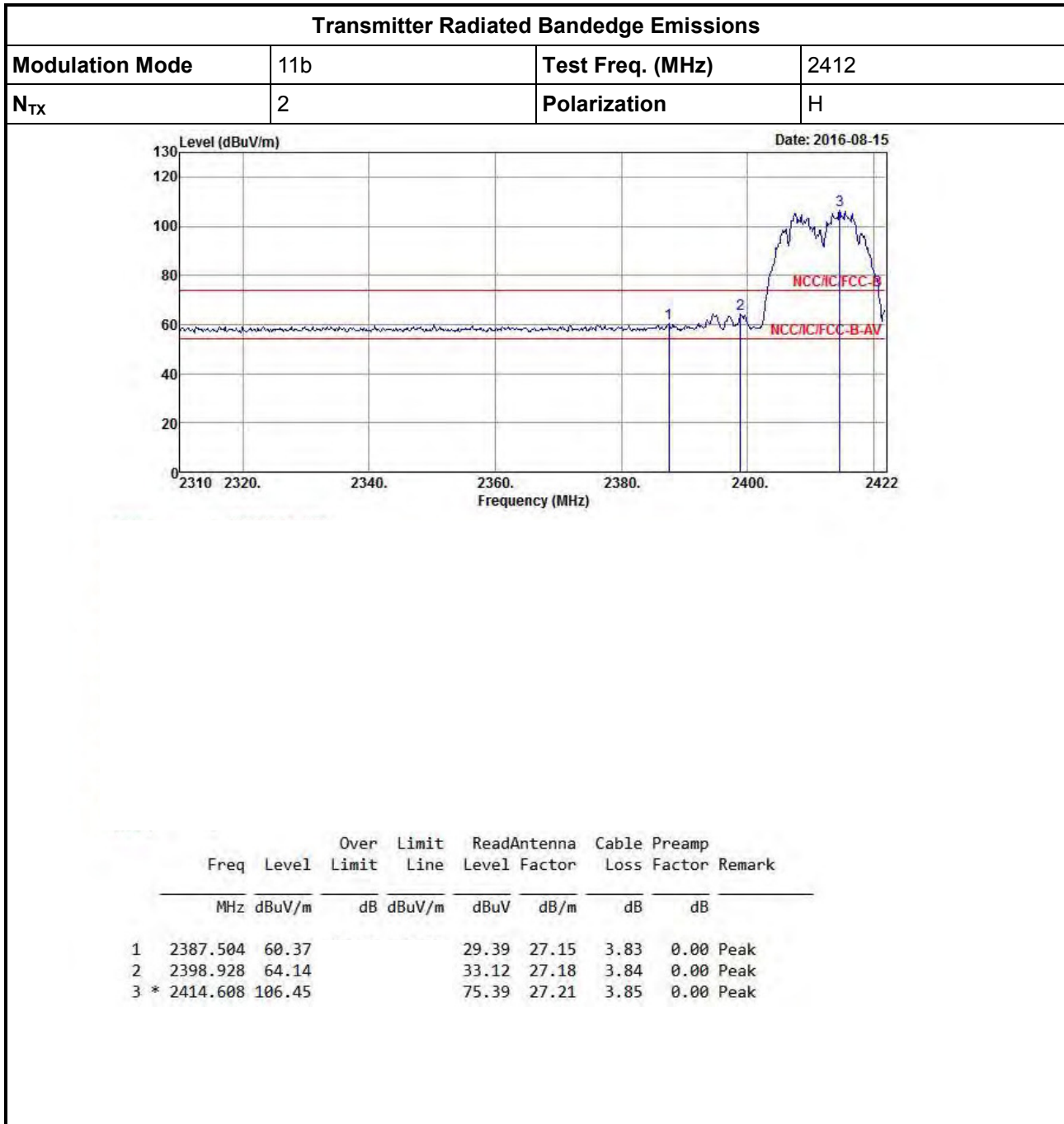
Note 1: Measurement worst emissions of receive antenna polarization

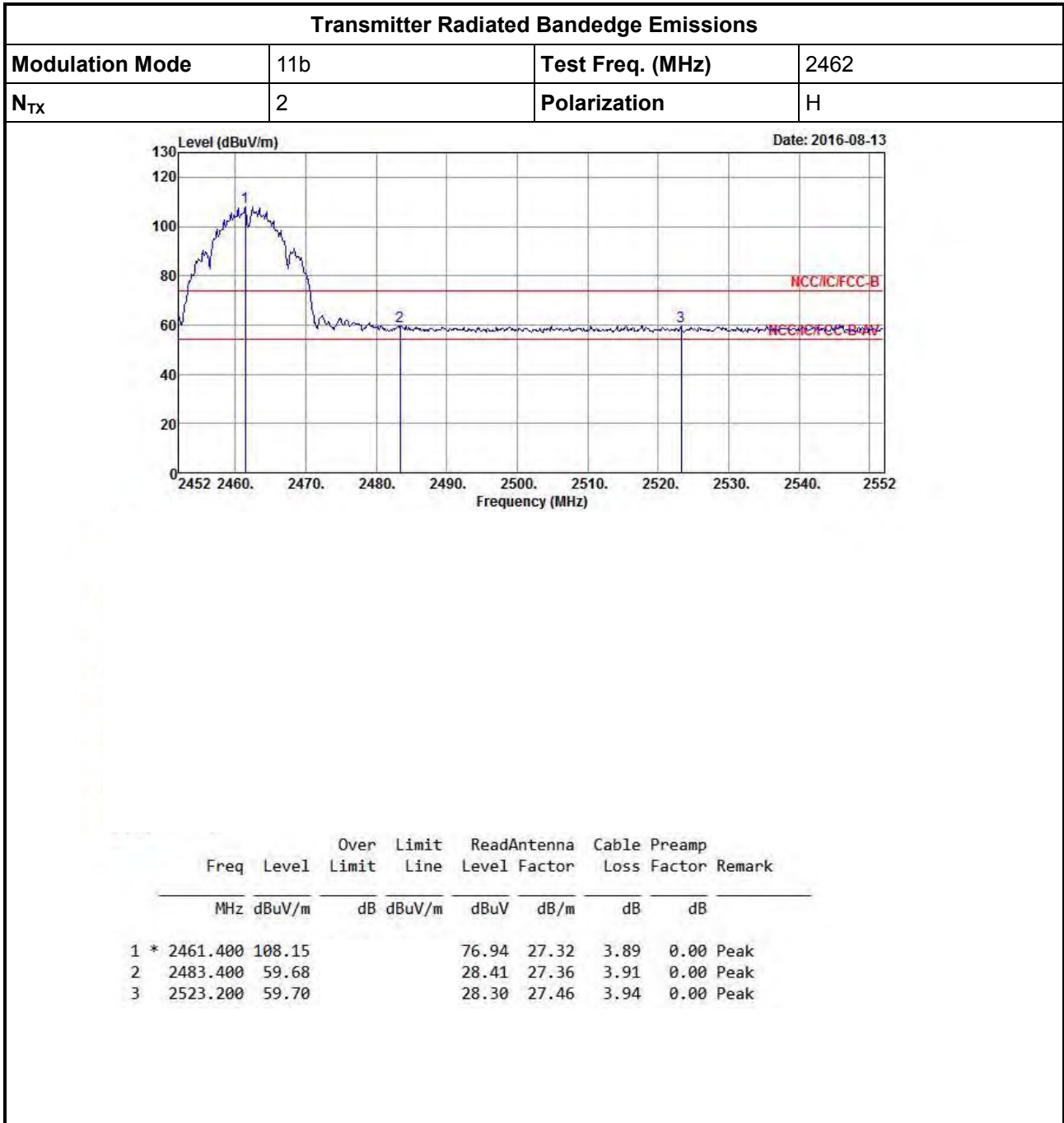
2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)										
Modulation Mode	N _{TX}	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
11b	2	2412	3	2388.176	60.99	74	2387.280	52.40	54	H
11b	2	2462	3	2483.600	60.26	74	2483.500	52.87	54	H
11g	2	2412	3	2389.968	71.68	74	2389.968	52.25	54	H
11g	2	2462	3	2483.800	72.20	74	2483.600	52.69	54	H
HT20	2	2412	3	2389.744	72.39	74	2389.968	52.61	54	H
HT20	2	2462	3	2484.200	71.57	74	2483.500	52.48	54	H
HT40	2	2422	3	2389.296	67.99	74	2389.464	52.71	54	H
HT40	2	2452	3	2484.080	66.80	74	2483.600	52.61	54	H

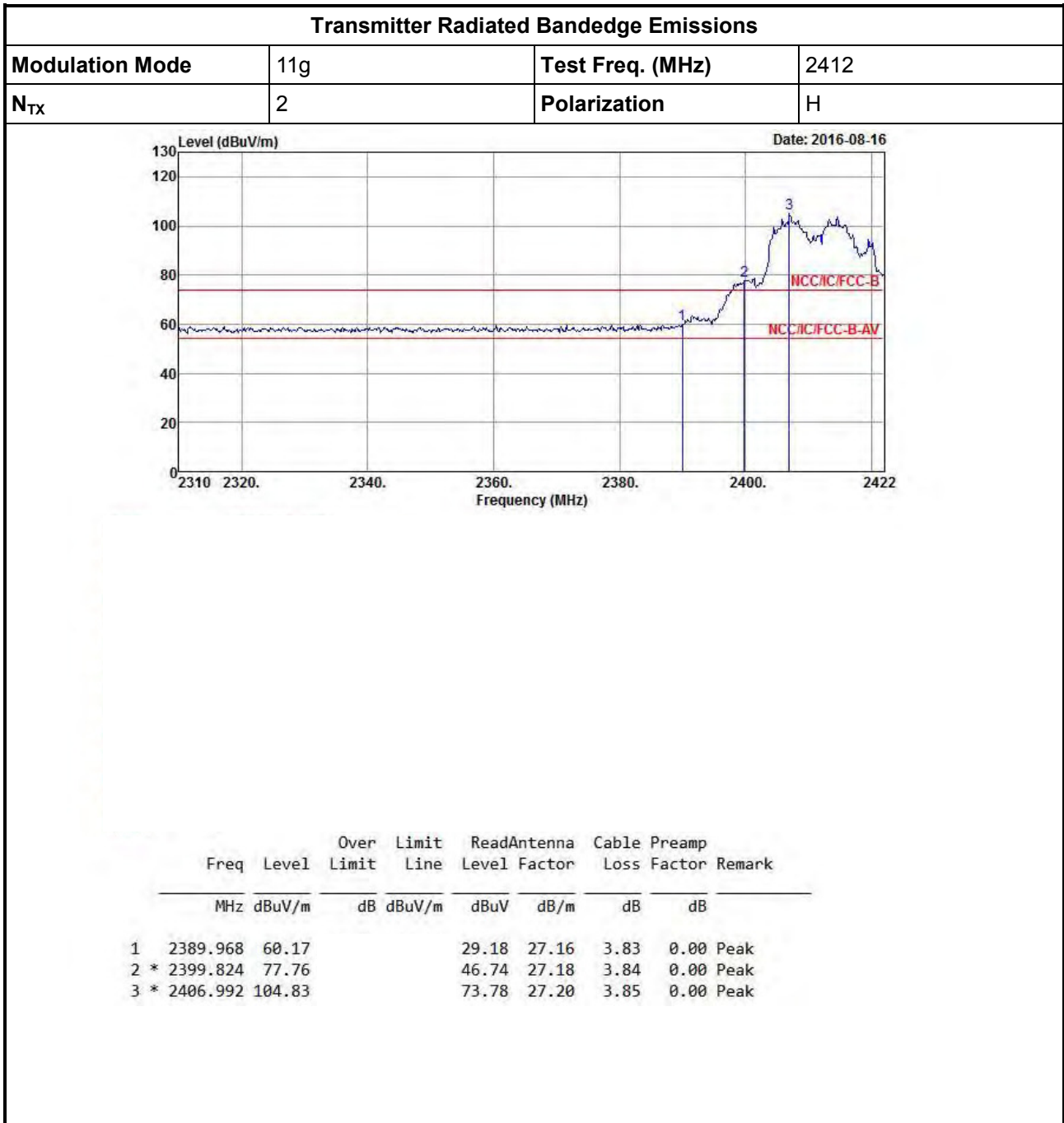
Note 1: Measurement worst emissions of receive antenna polarization.

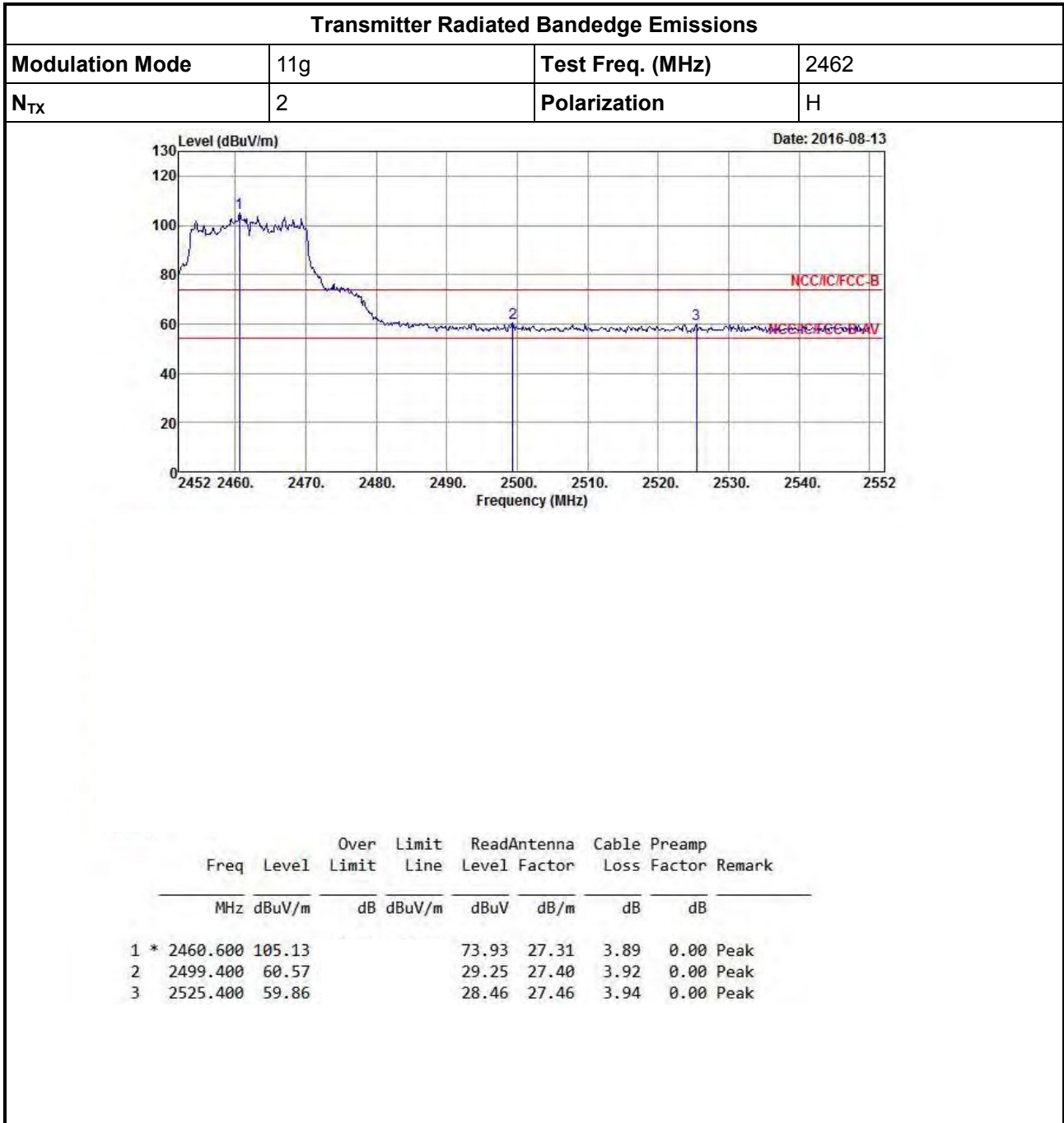


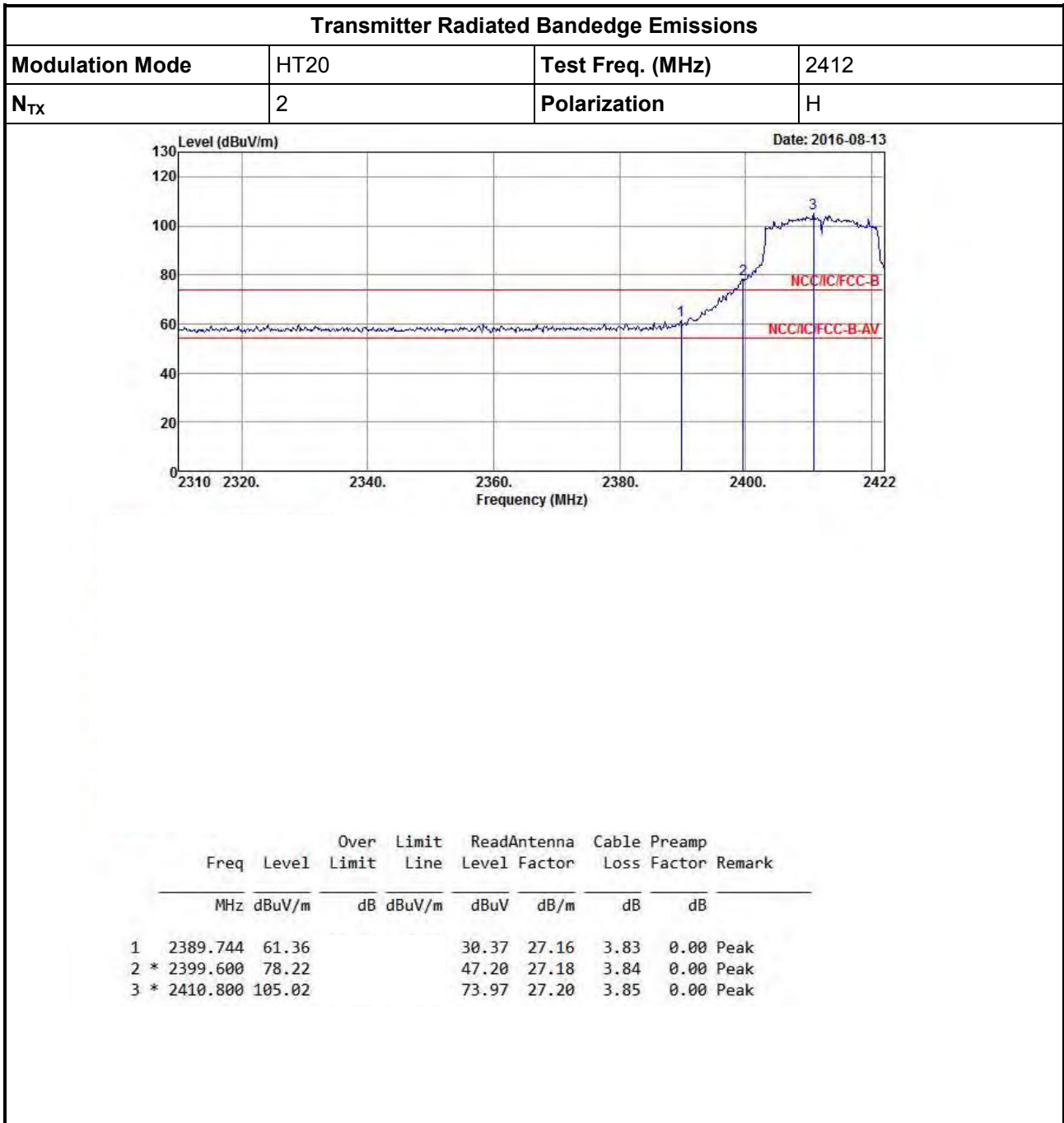
Transmitter Radiated Bandedge Emissions (Non-restricted Band)

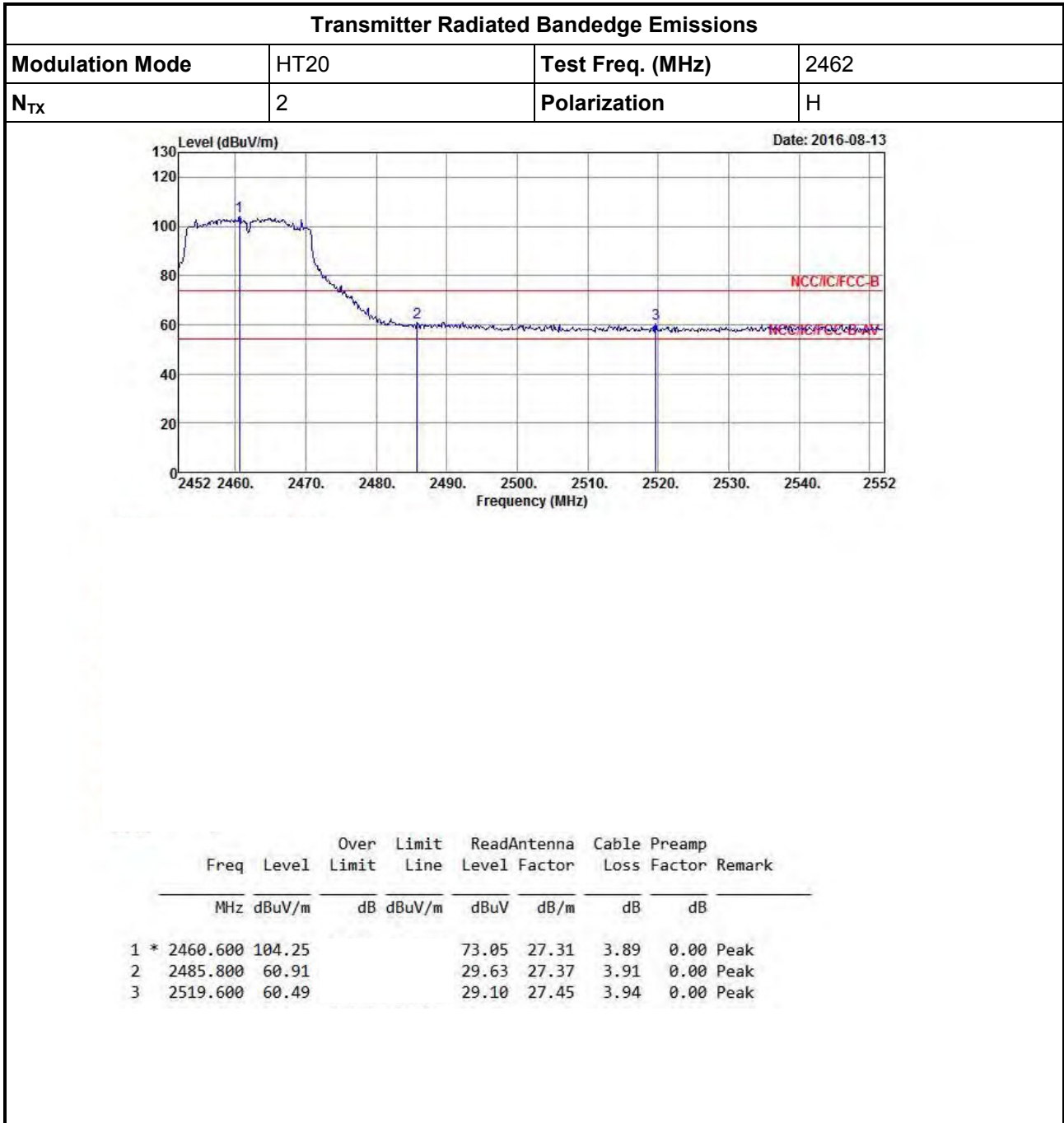


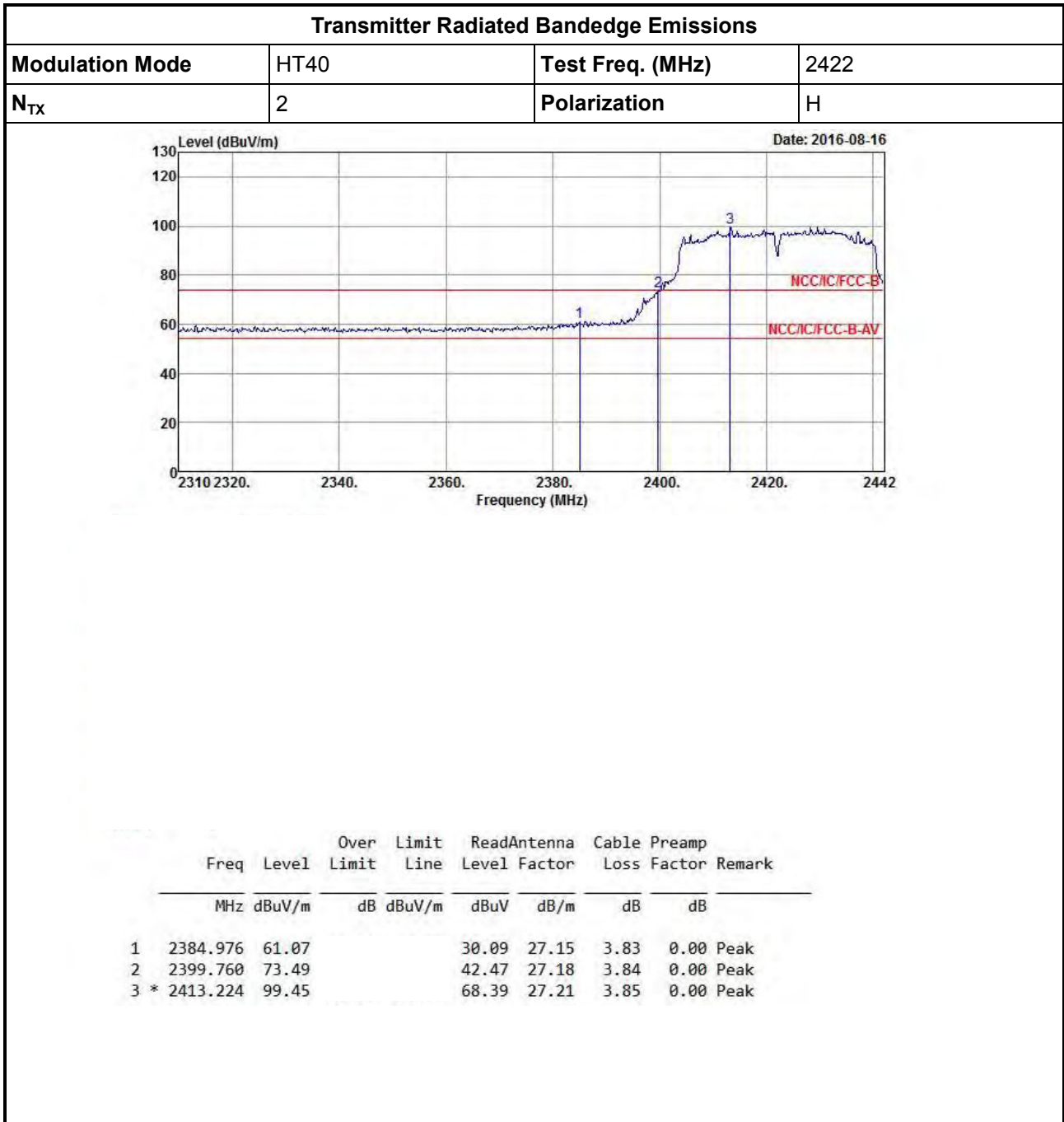


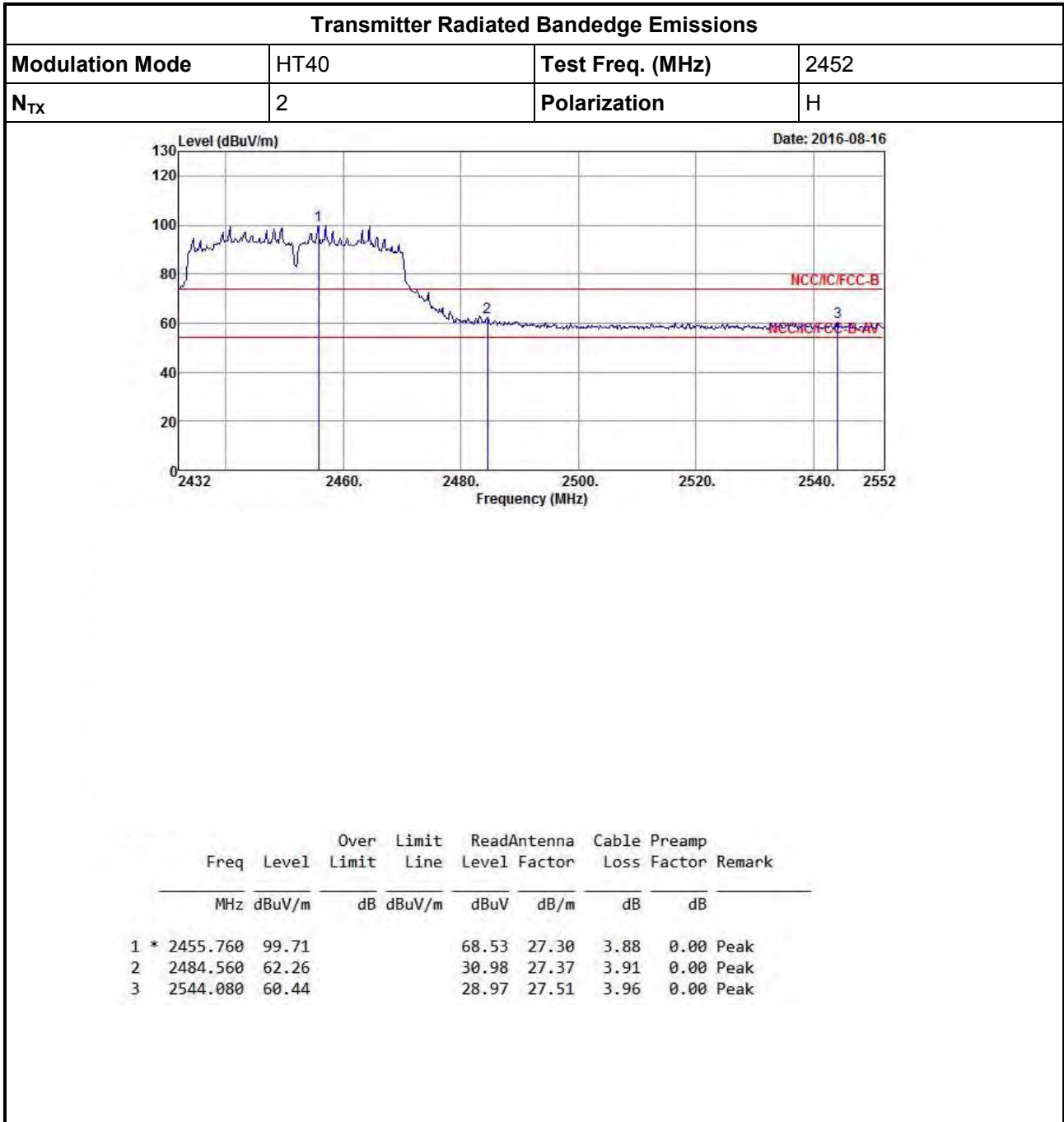






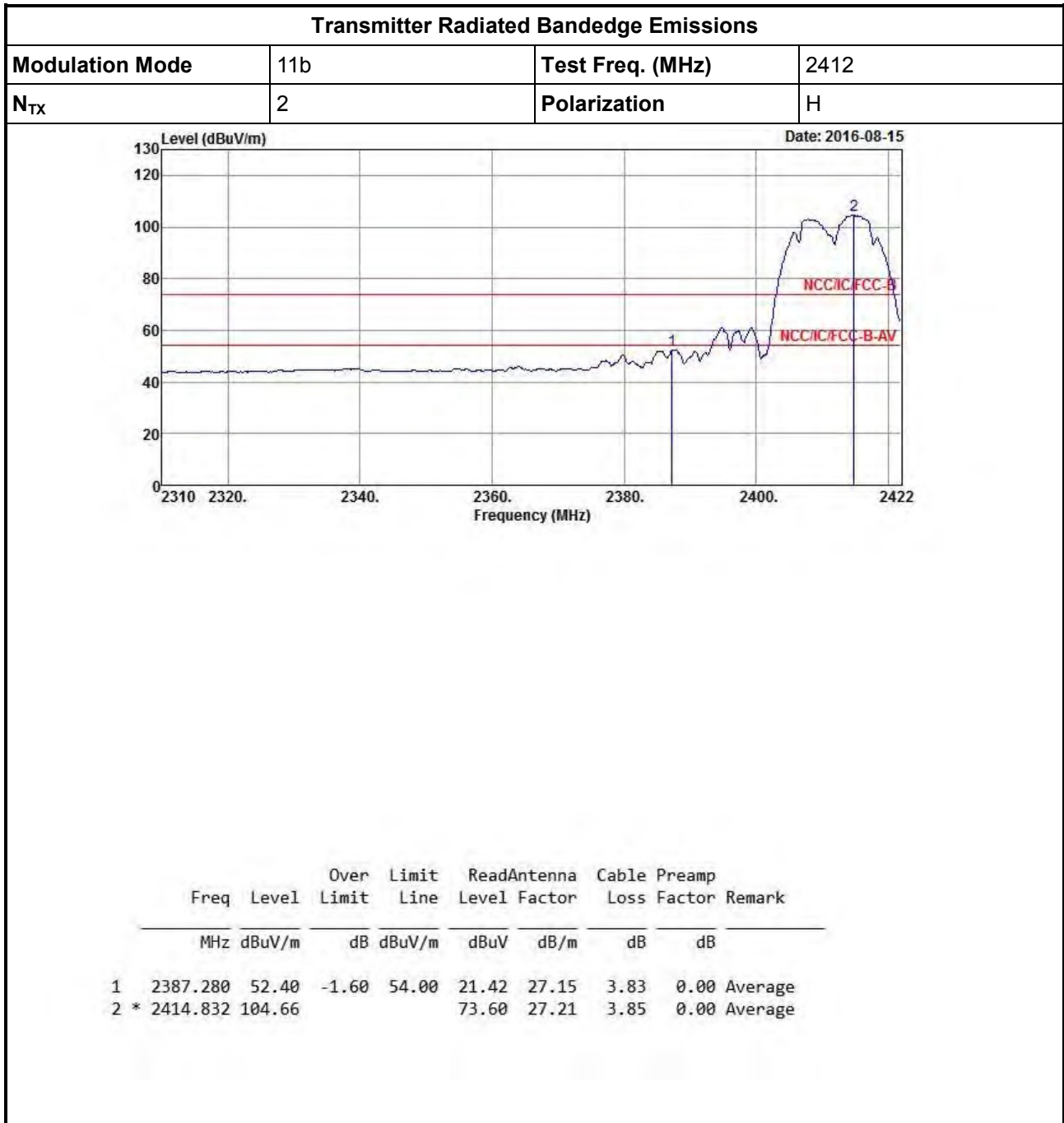


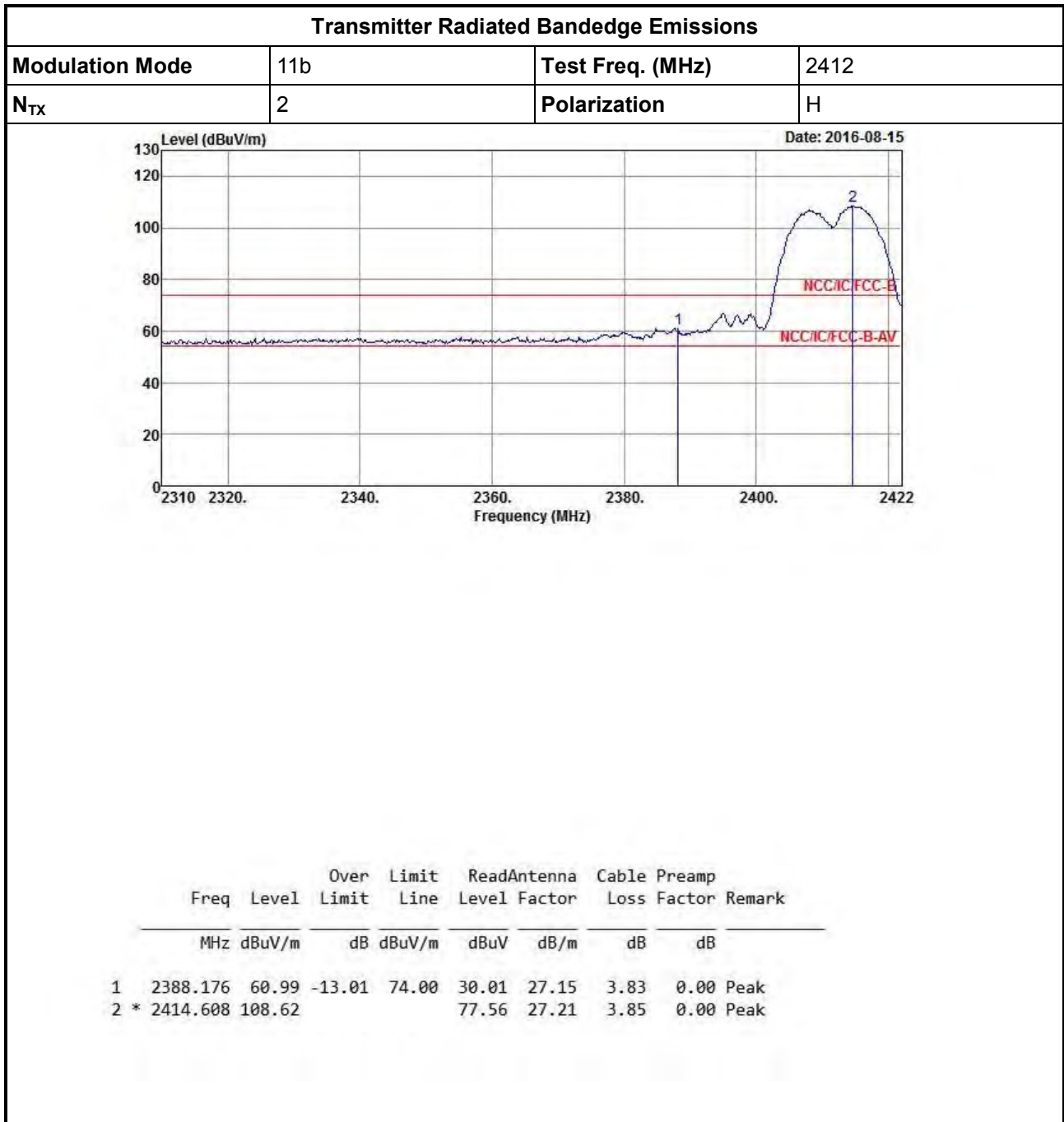


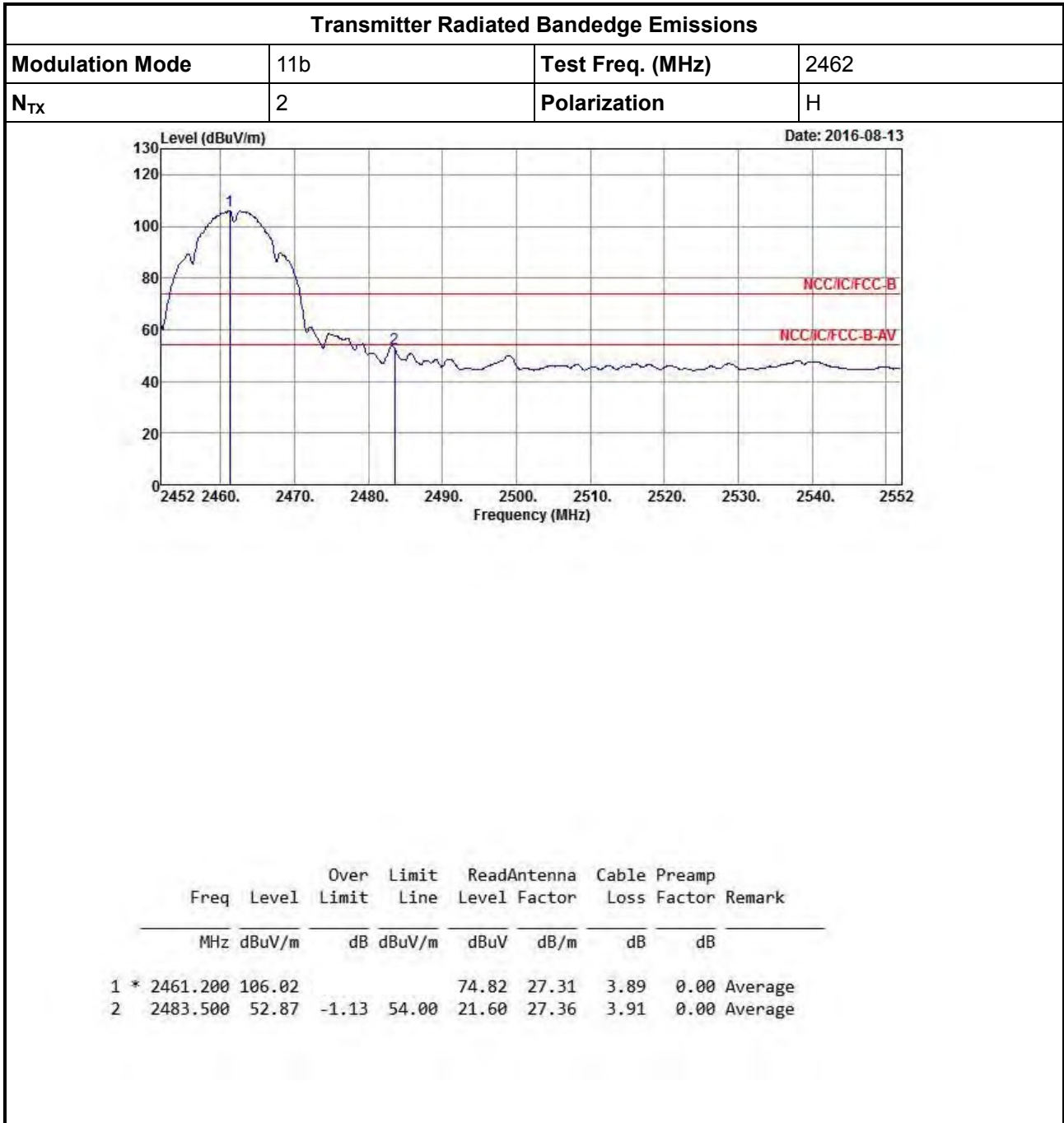


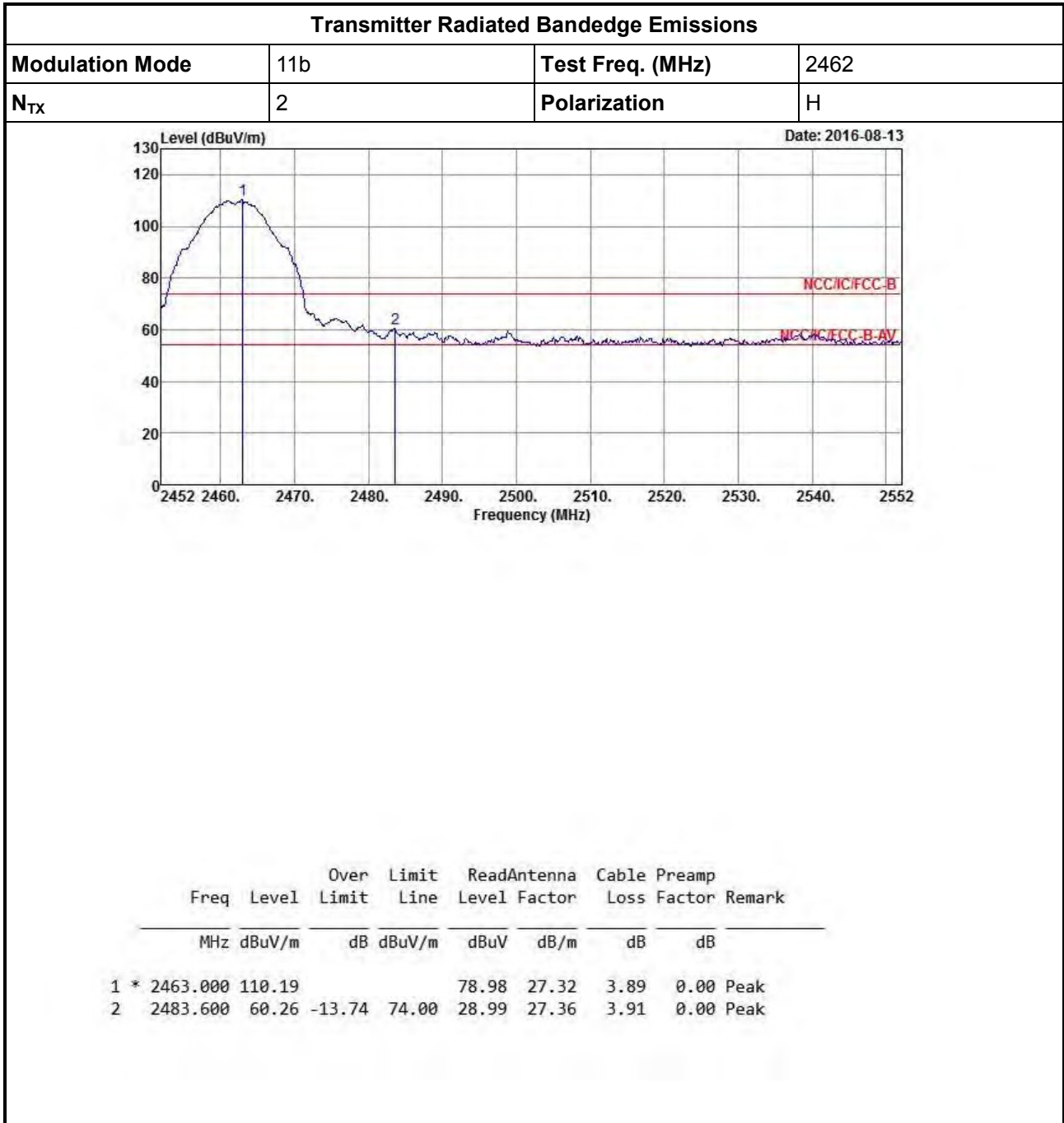


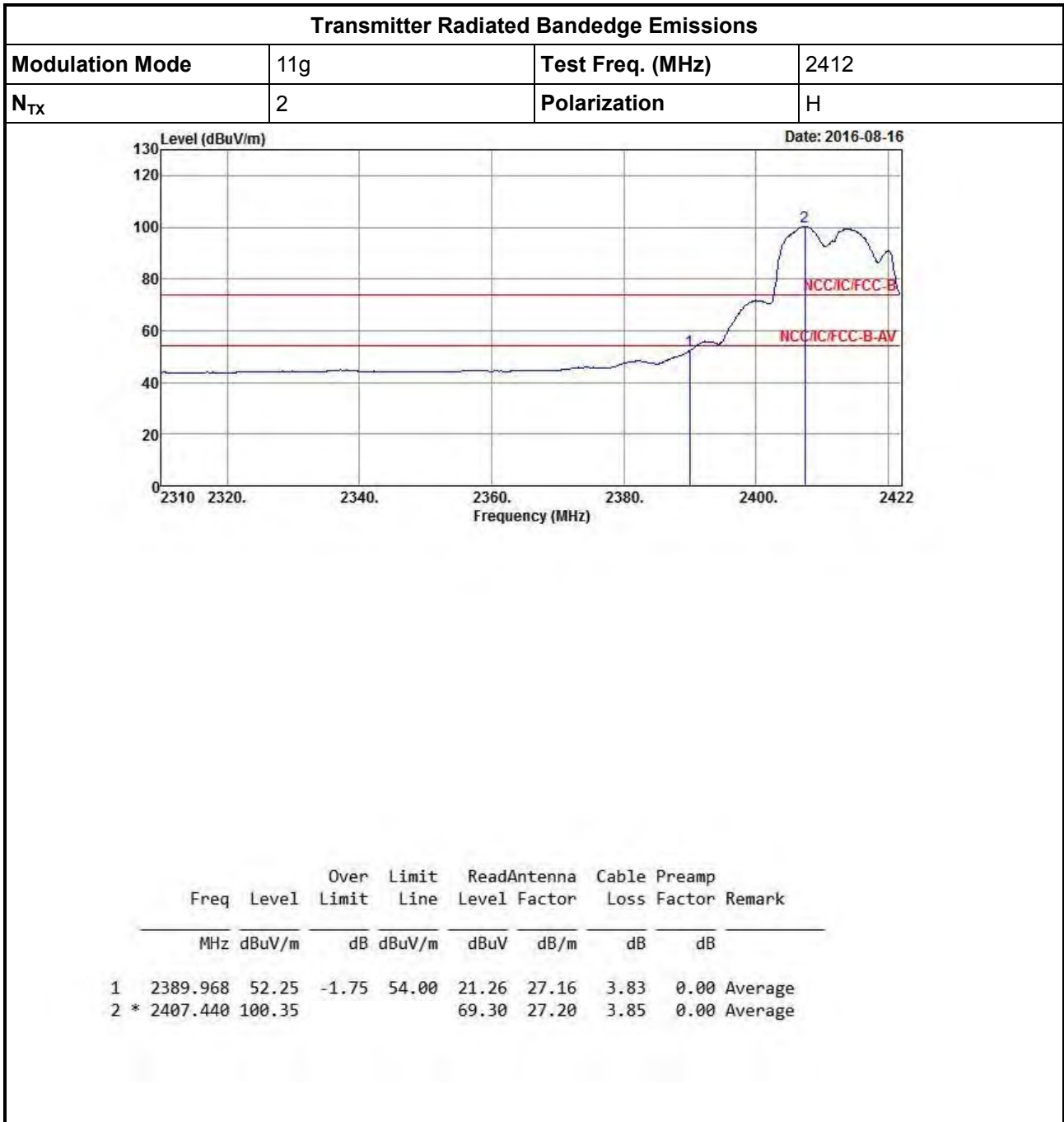
Transmitter Radiated Bandedge Emissions (Restricted Band)

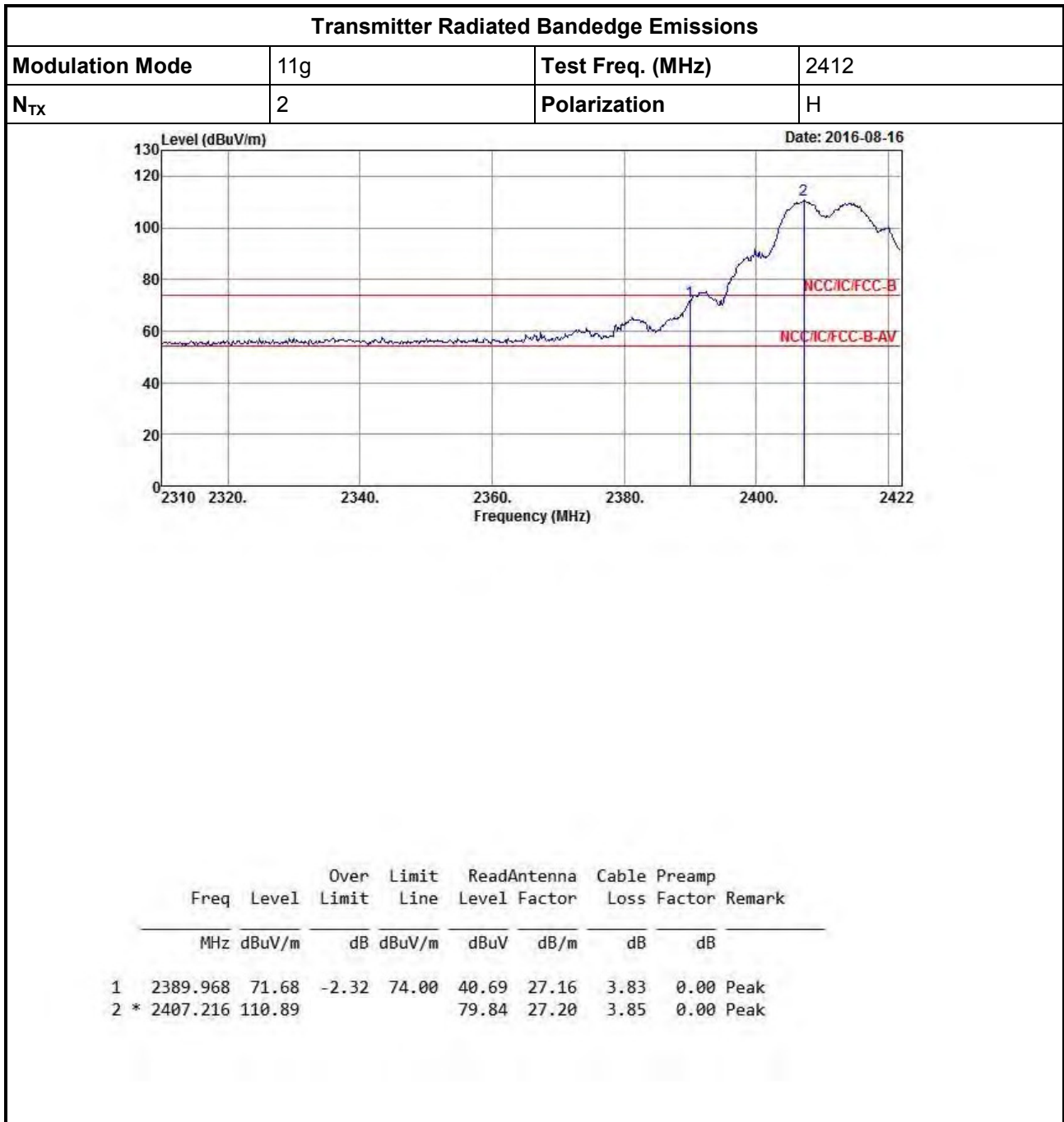


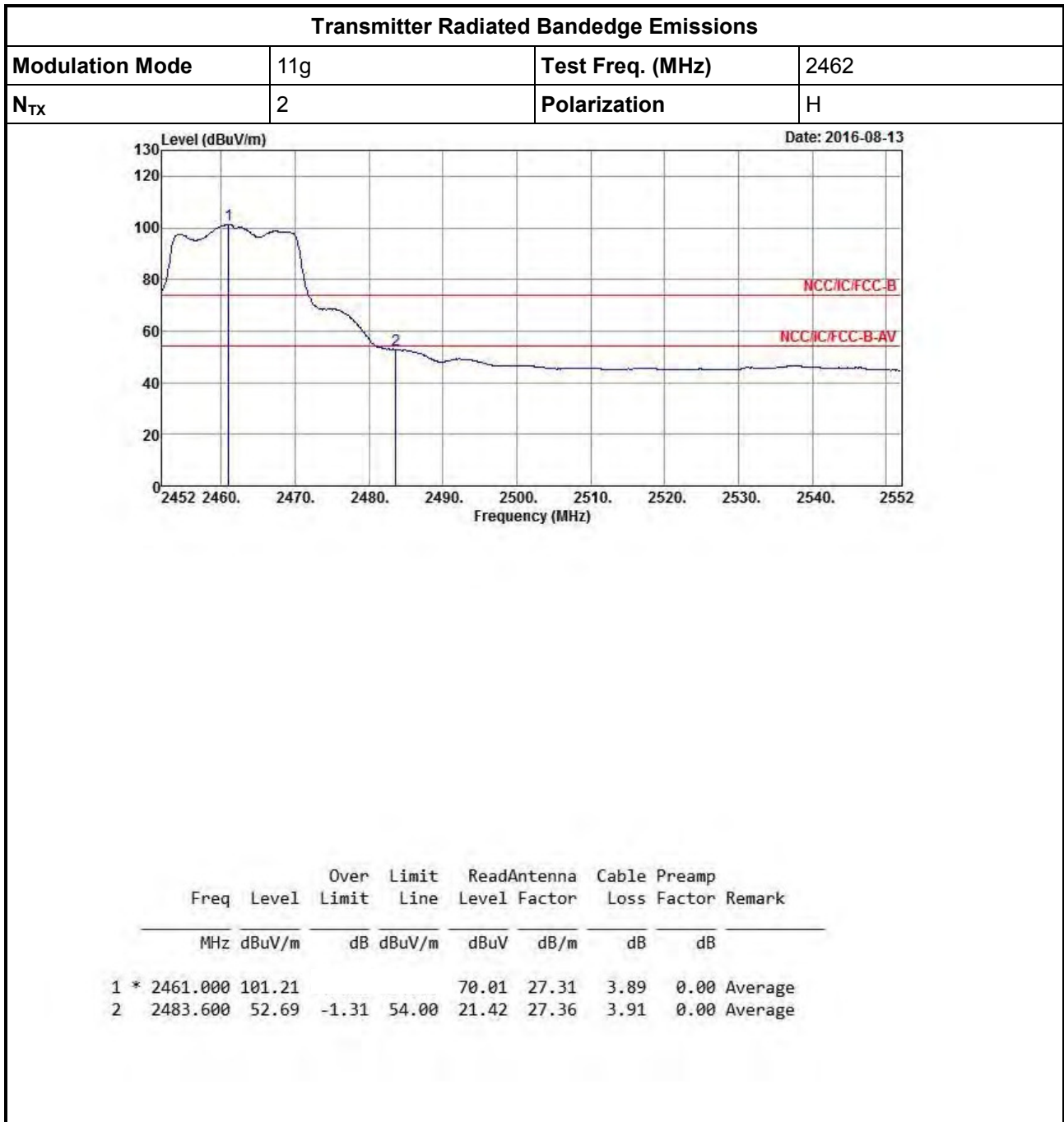


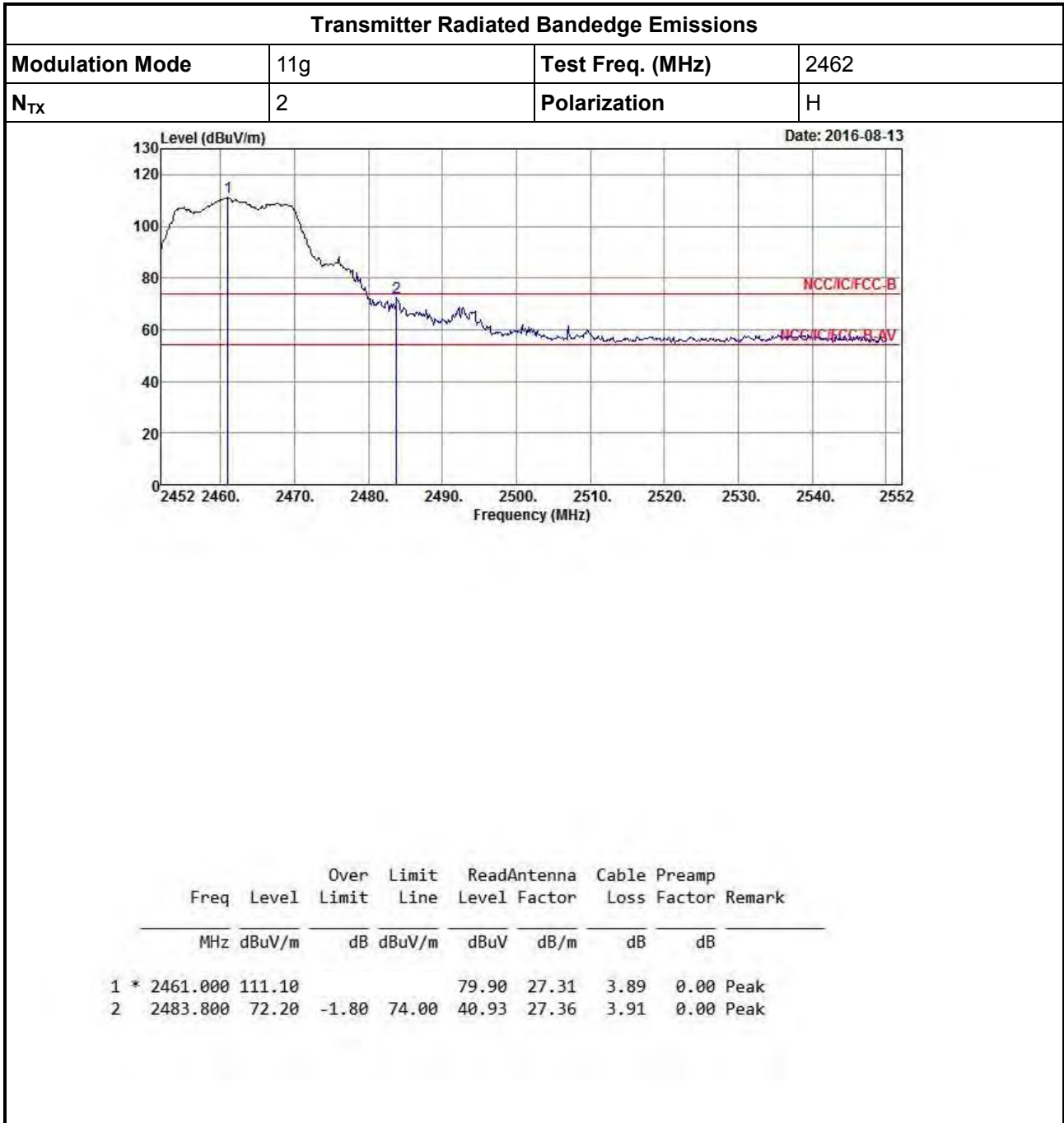


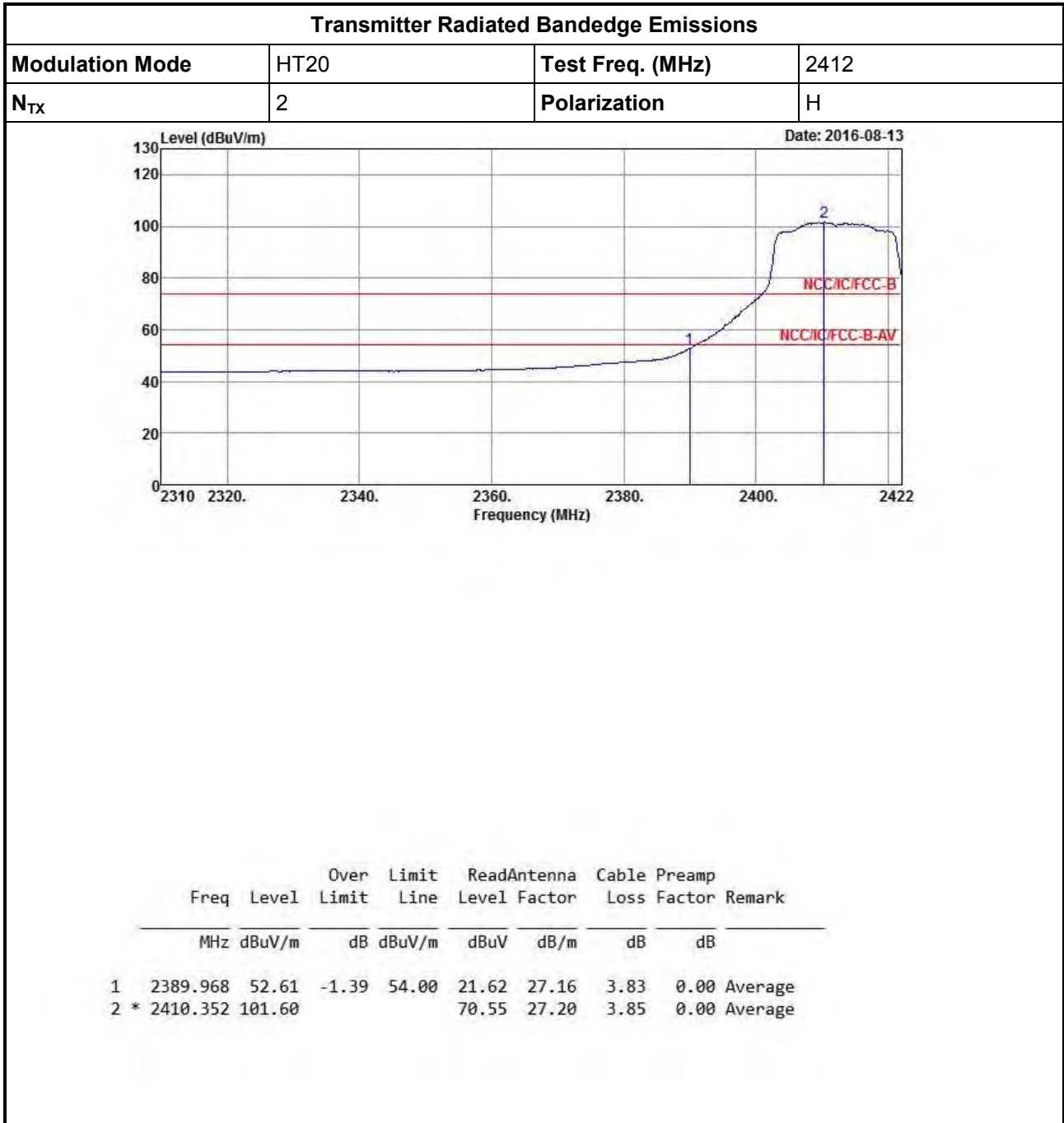


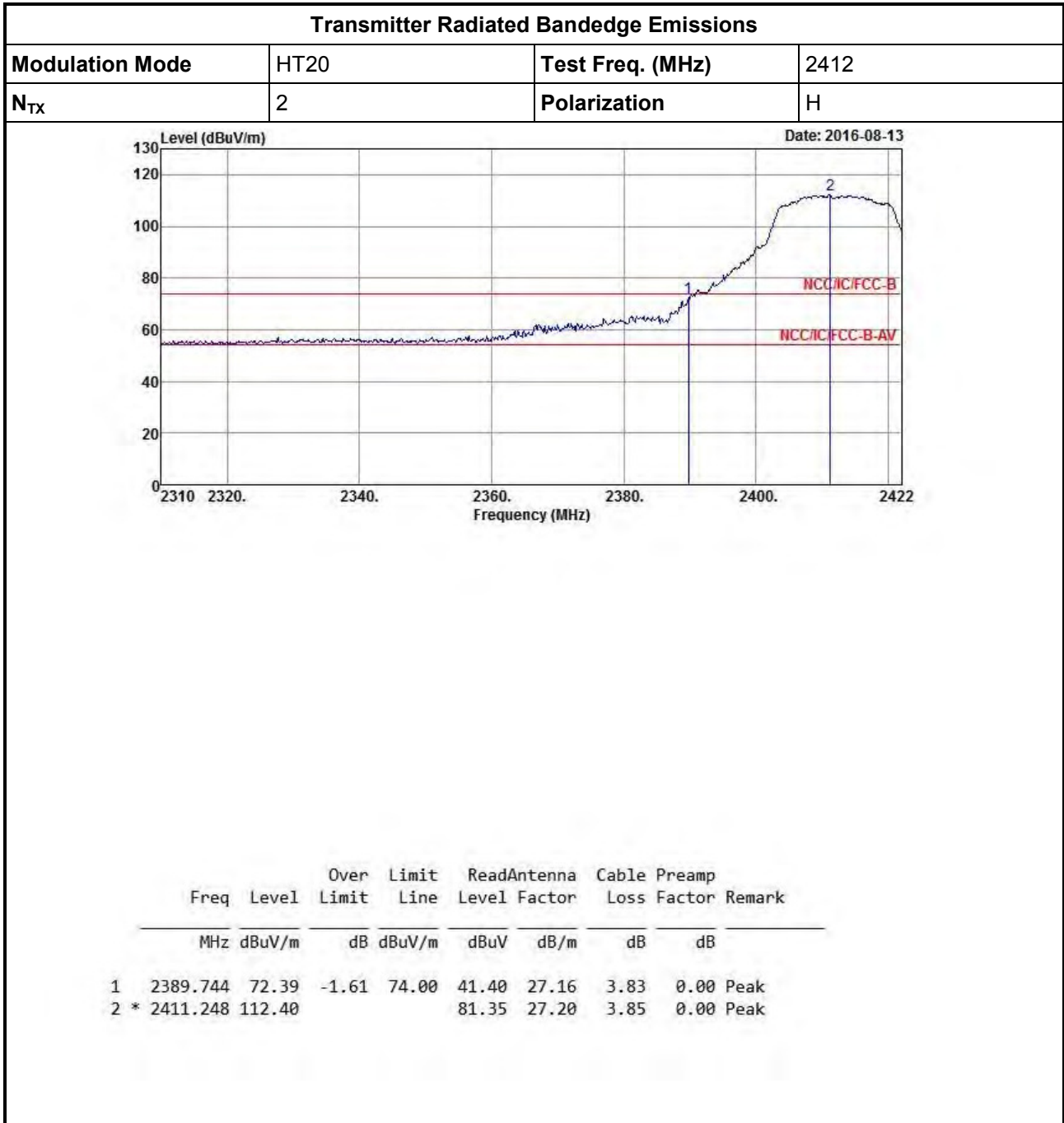


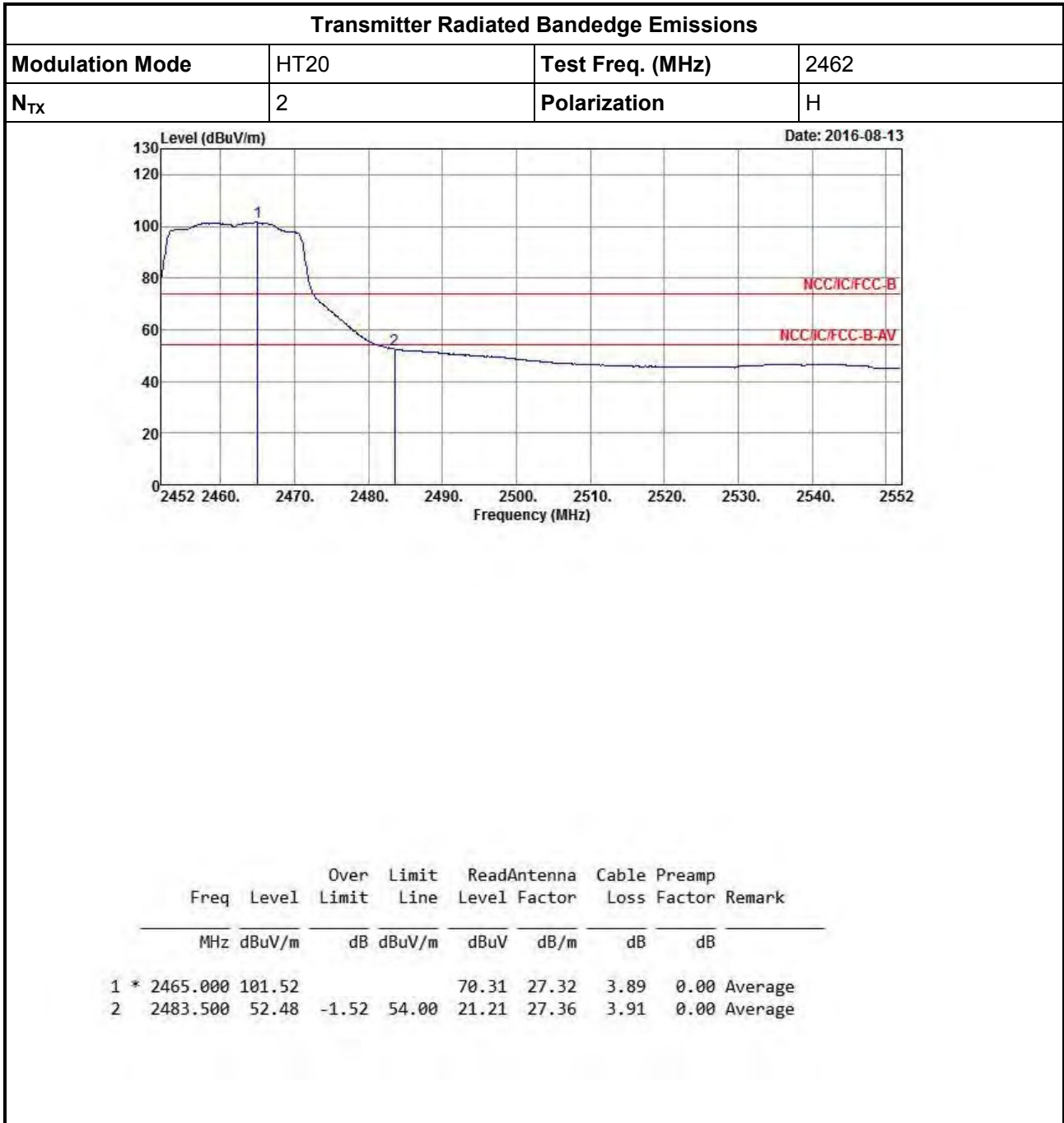


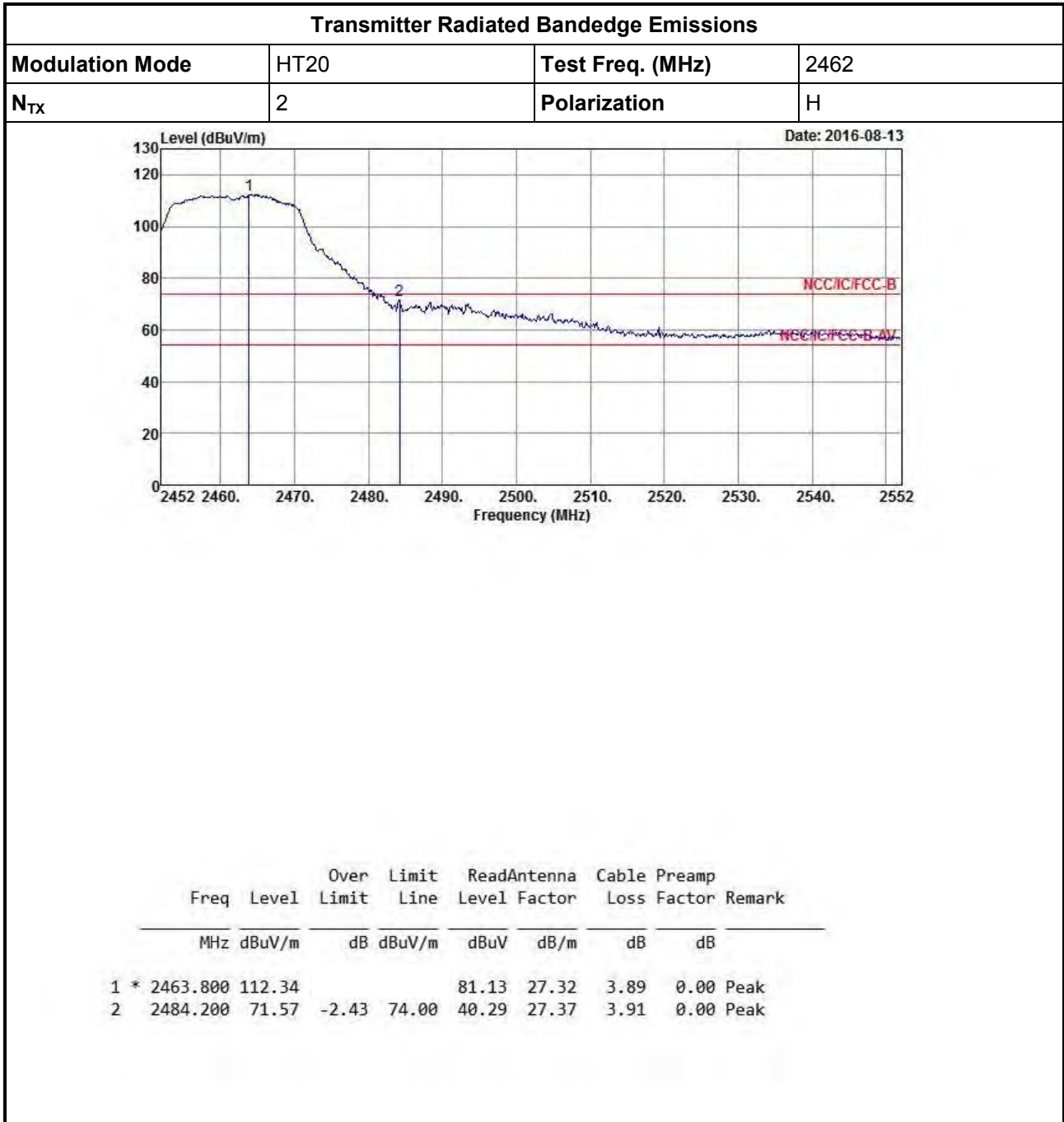


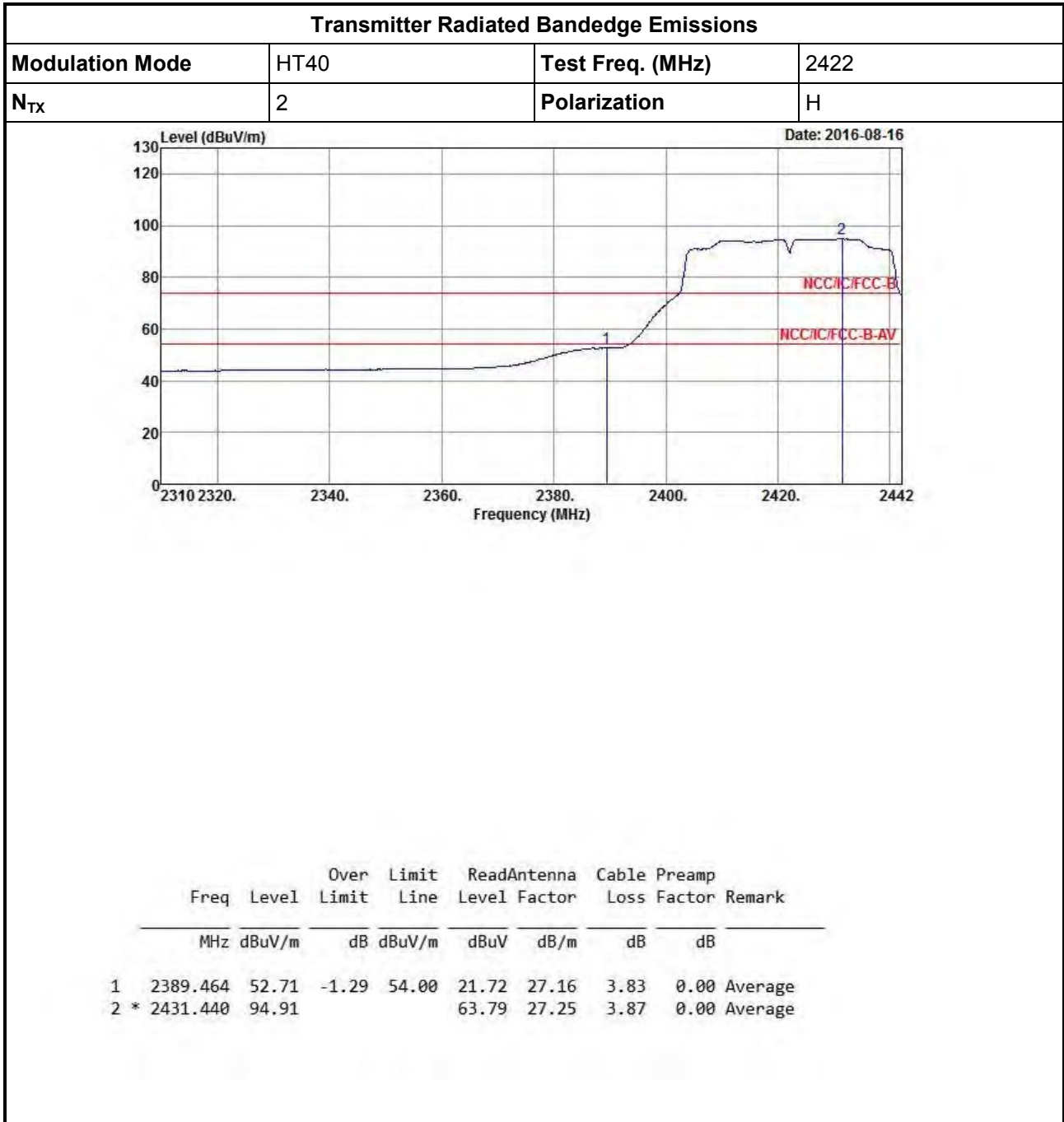


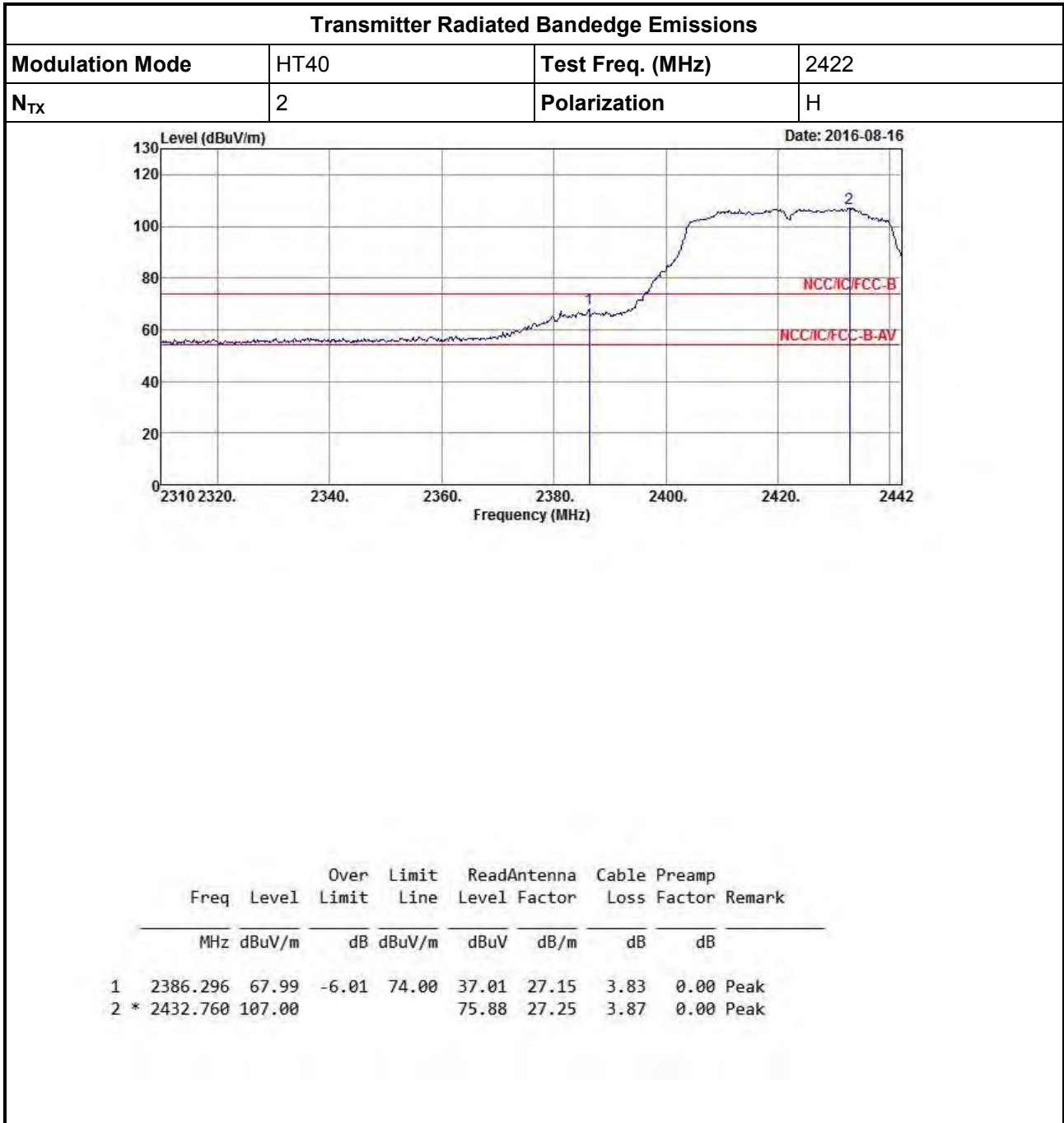


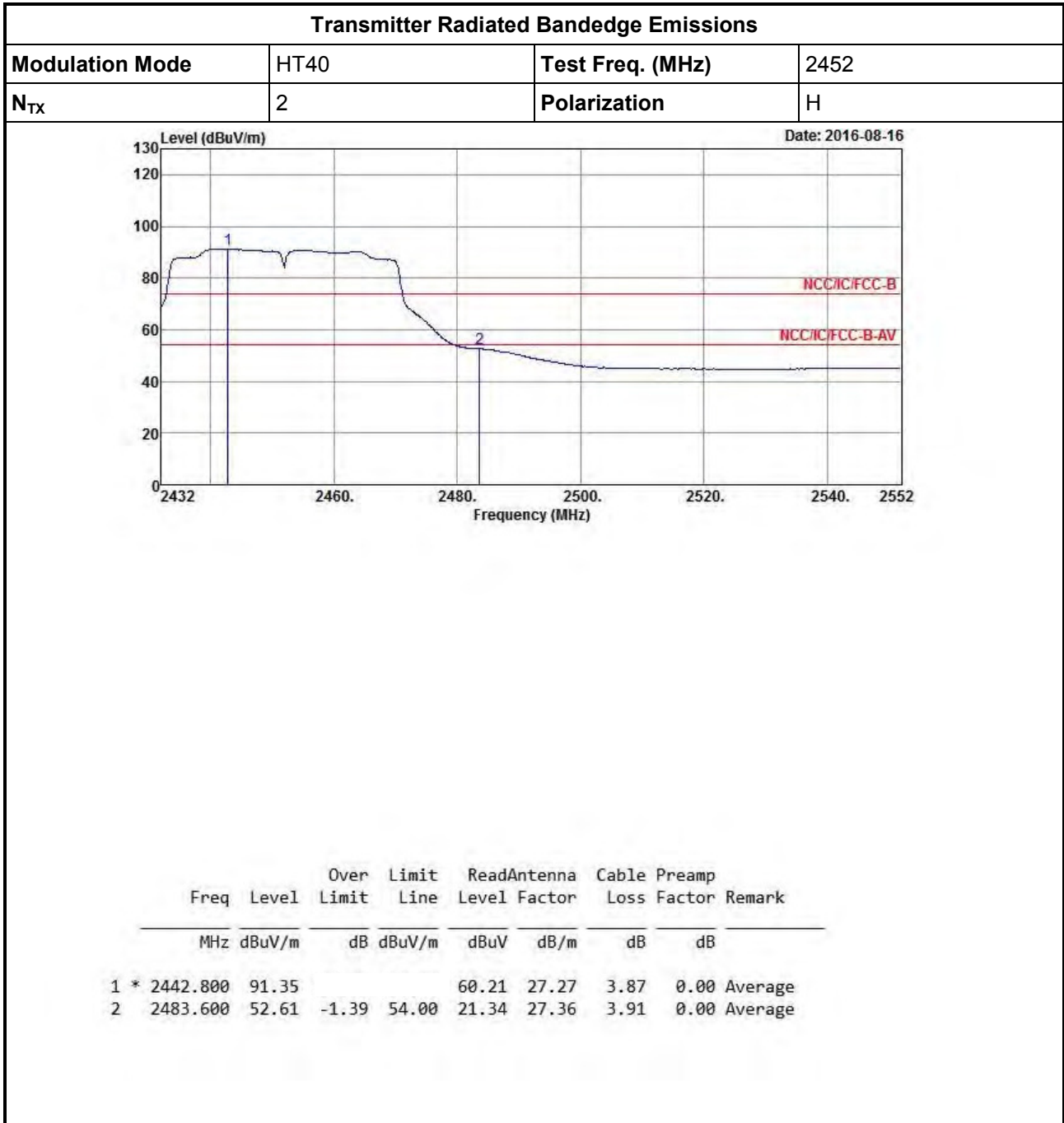


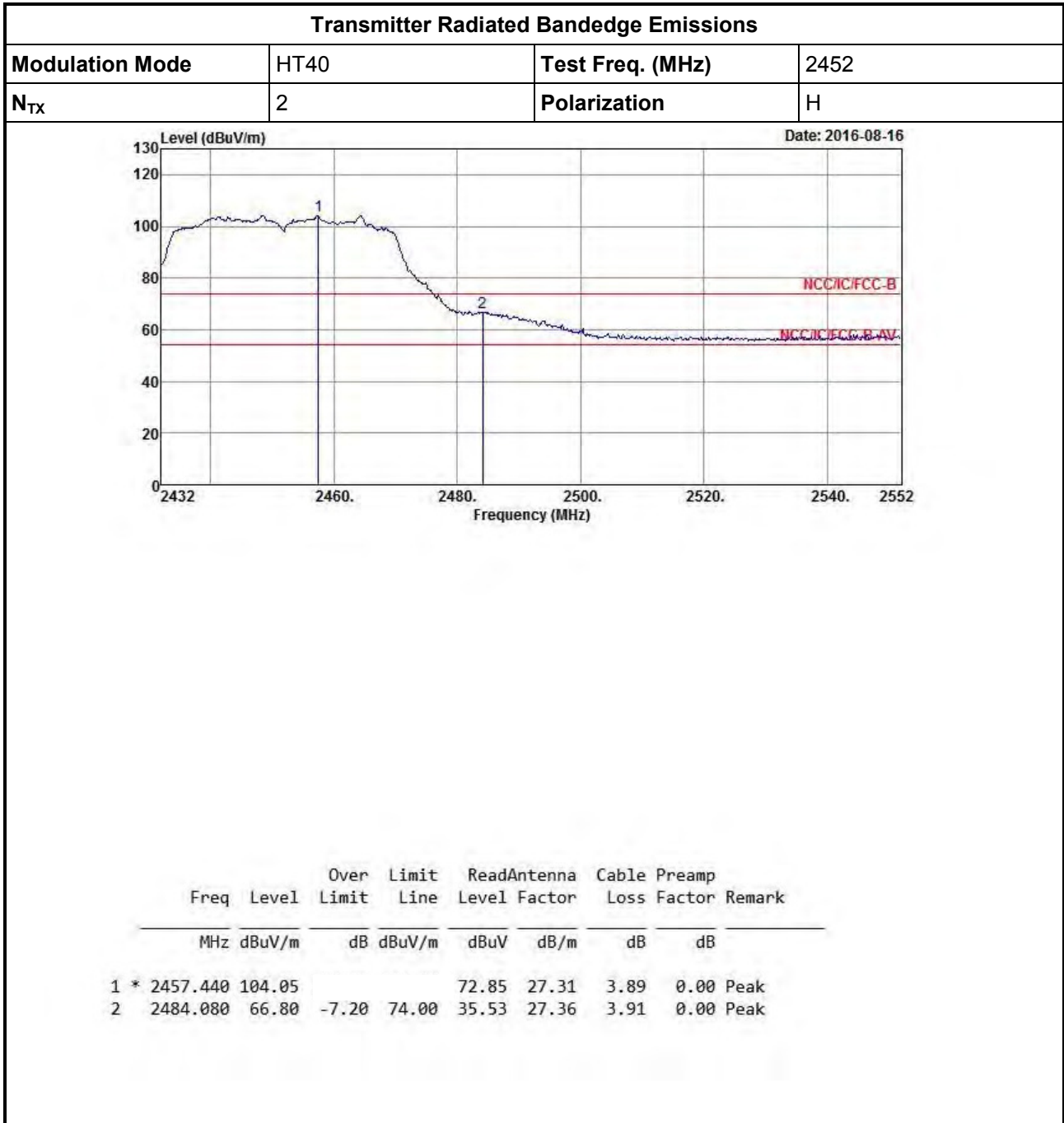








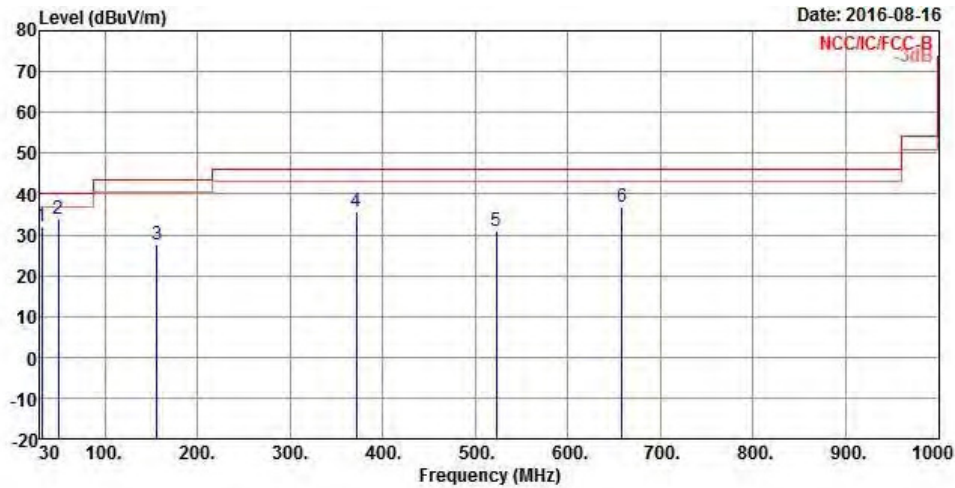






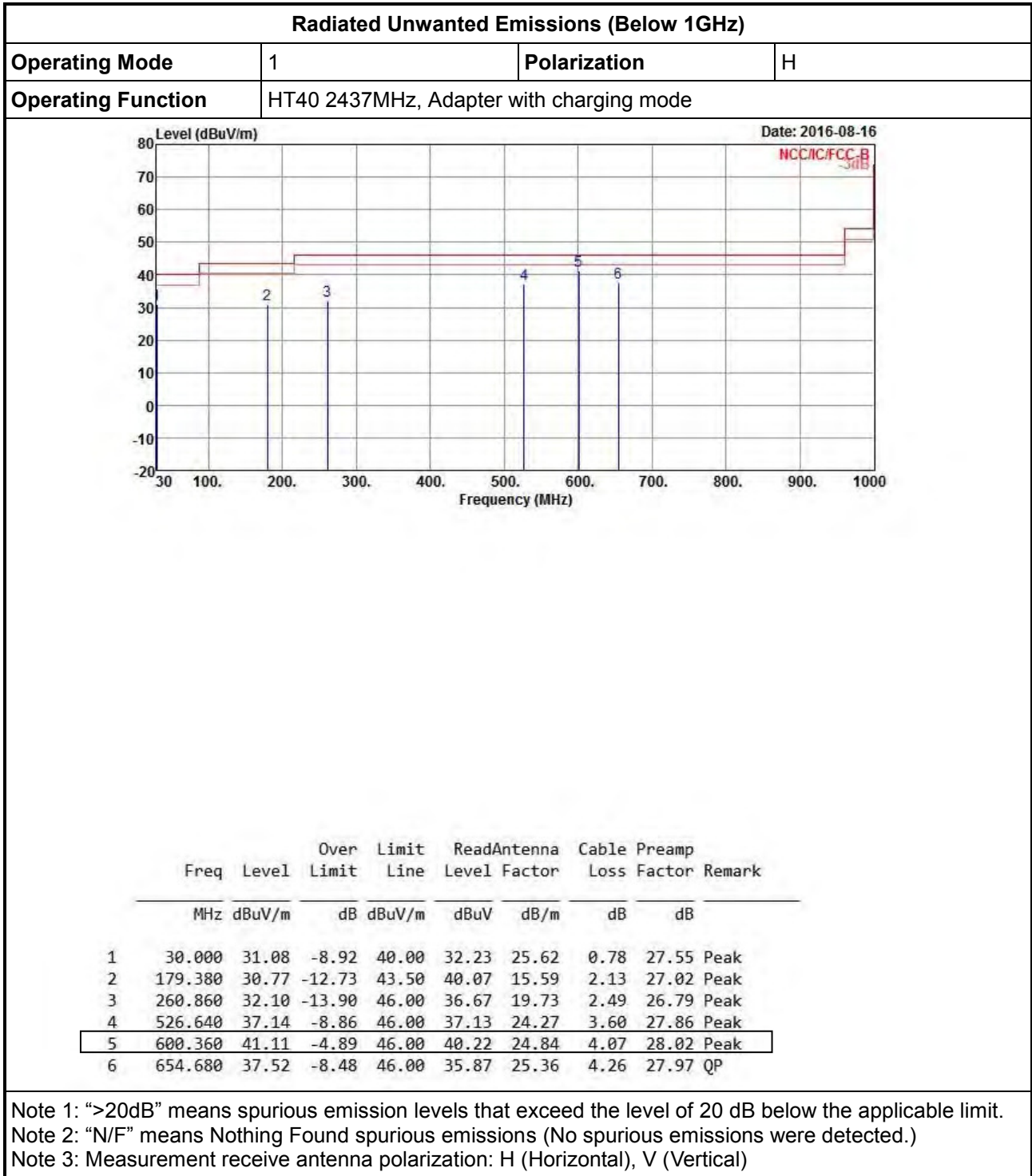
Transmitter Radiated Unwanted Emissions (Below 1GHz)

Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	1	Polarization	V
Operating Function	HT40 2437MHz, Adapter with charging mode		



	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	31.940	32.03	-7.97	40.00	34.37	24.41	0.80	27.55	Peak
2	49.400	33.78	-6.22	40.00	45.29	14.97	1.02	27.50	Peak
3	156.100	27.76	-15.74	43.50	36.31	16.62	1.96	27.13	Peak
4	371.440	35.89	-10.11	46.00	37.70	21.74	3.15	26.70	Peak
5	522.760	30.98	-15.02	46.00	31.03	24.20	3.60	27.85	Peak
6	658.560	36.94	-9.06	46.00	35.26	25.37	4.28	27.97	Peak

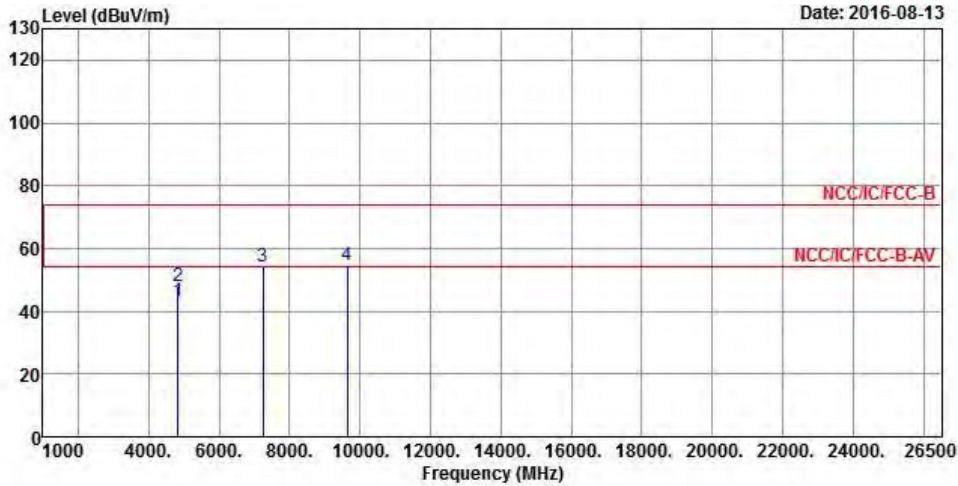
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)





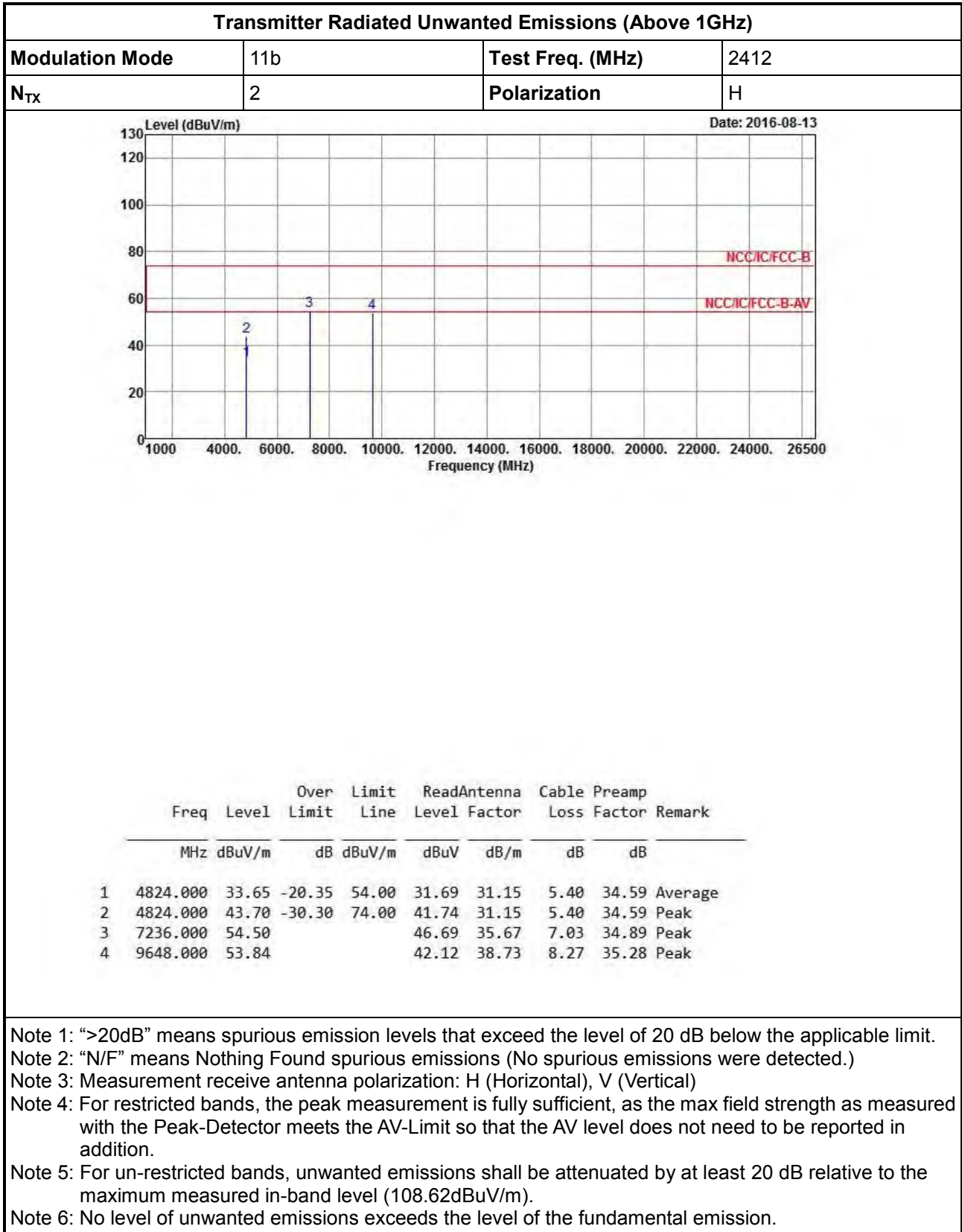
Transmitter Radiated Unwanted Emissions (Above 1GHz)

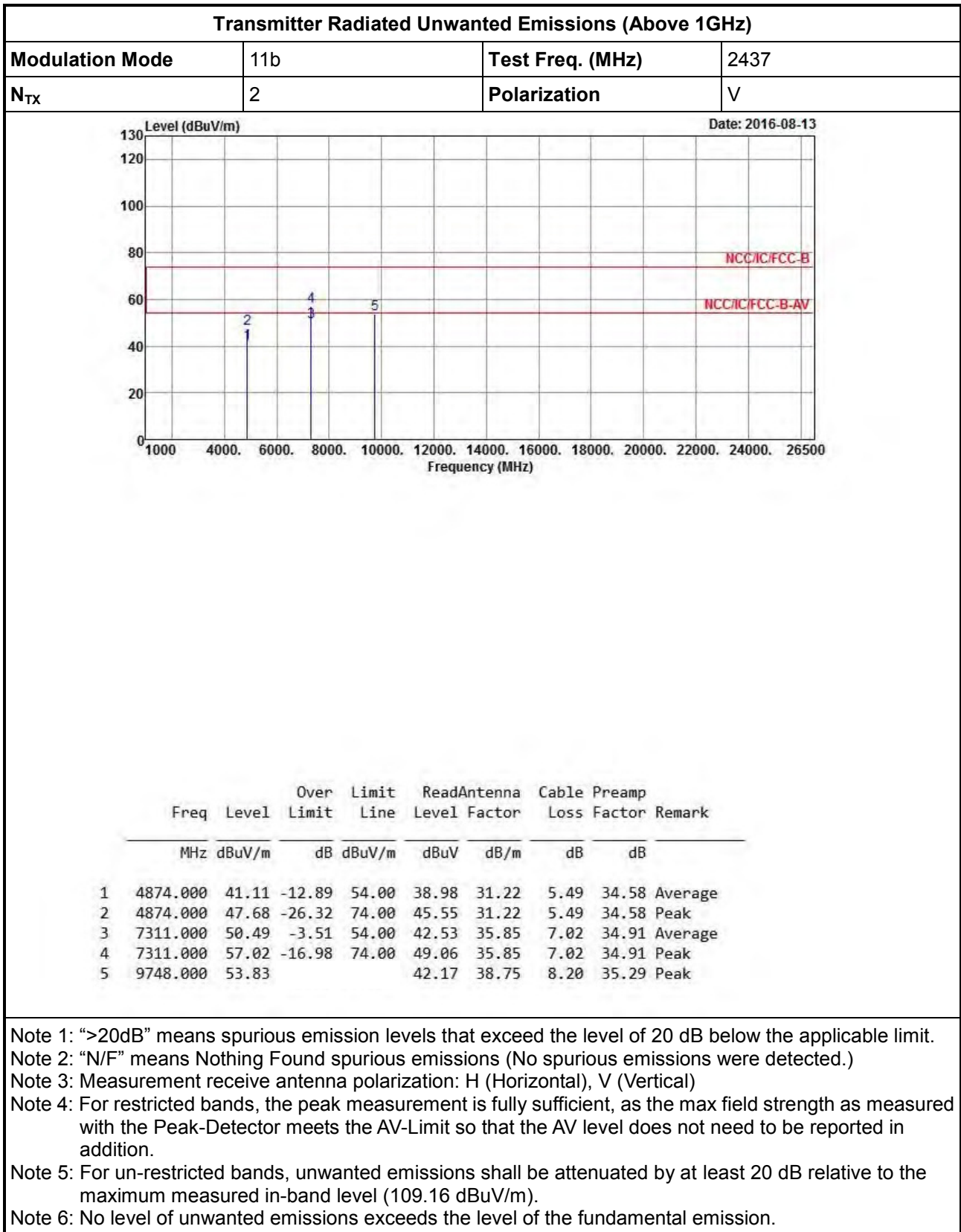
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	11b	Test Freq. (MHz)	2412
N _{TX}	2	Polarization	V



	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	4824.000	43.16	-10.84	54.00	41.20	31.15	5.40	34.59	Average
2	4824.000	47.87	-26.13	74.00	45.91	31.15	5.40	34.59	Peak
3	7236.000	54.29			46.48	35.67	7.03	34.89	Peak
4	9648.000	54.87			43.15	38.73	8.27	35.28	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 (108.62 dBuV/m).
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.







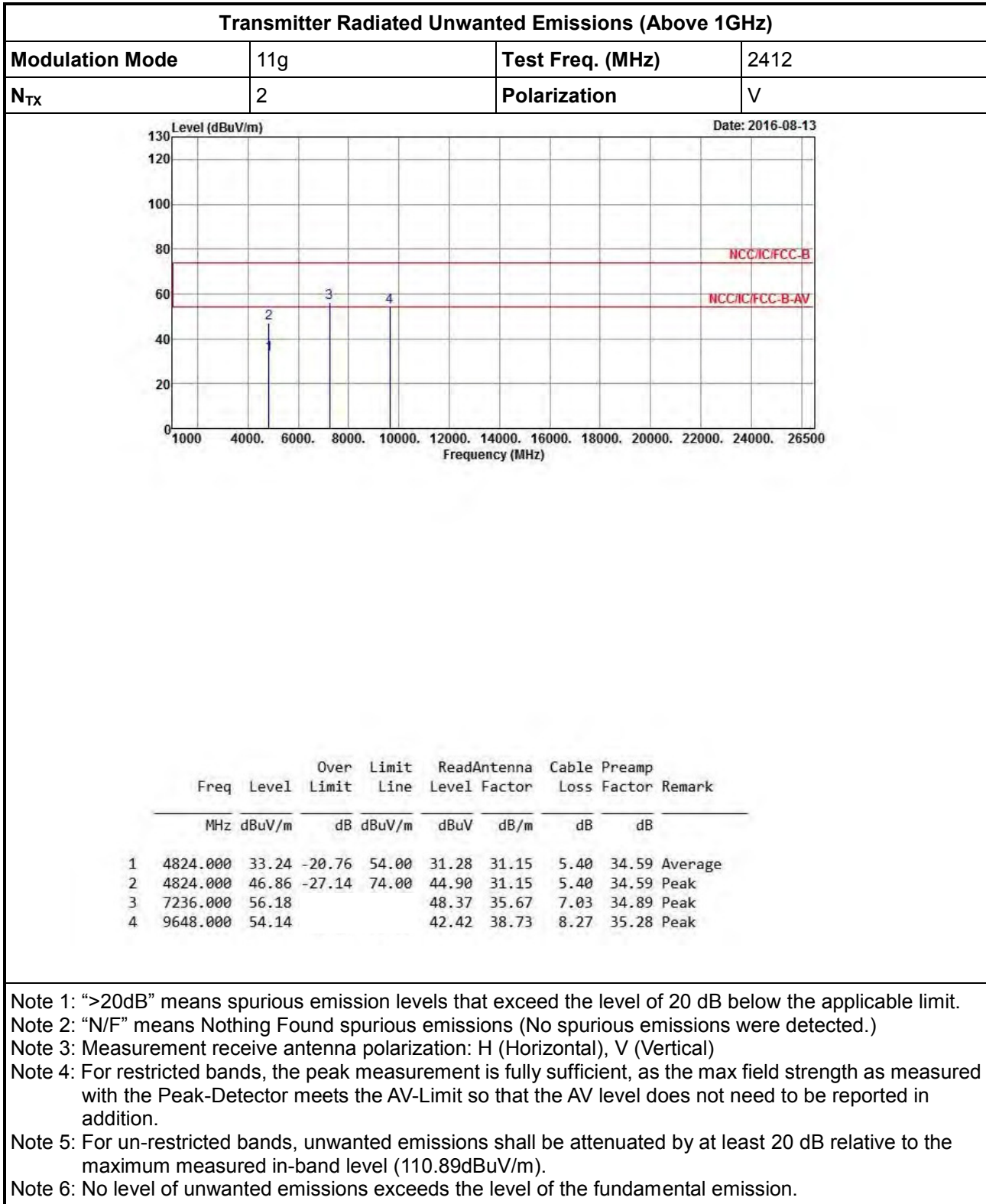
Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																		
Modulation Mode	11b	Test Freq. (MHz)	2437																																																															
N _{TX}	2	Polarization	H																																																															
<div style="display: flex; justify-content: space-between;"> <div> <p>Level (dBuV/m)</p> <p style="text-align: right;">Date: 2016-08-13</p> </div> </div>																																																																		
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N _{TX}	2	Polarization	H																																																						
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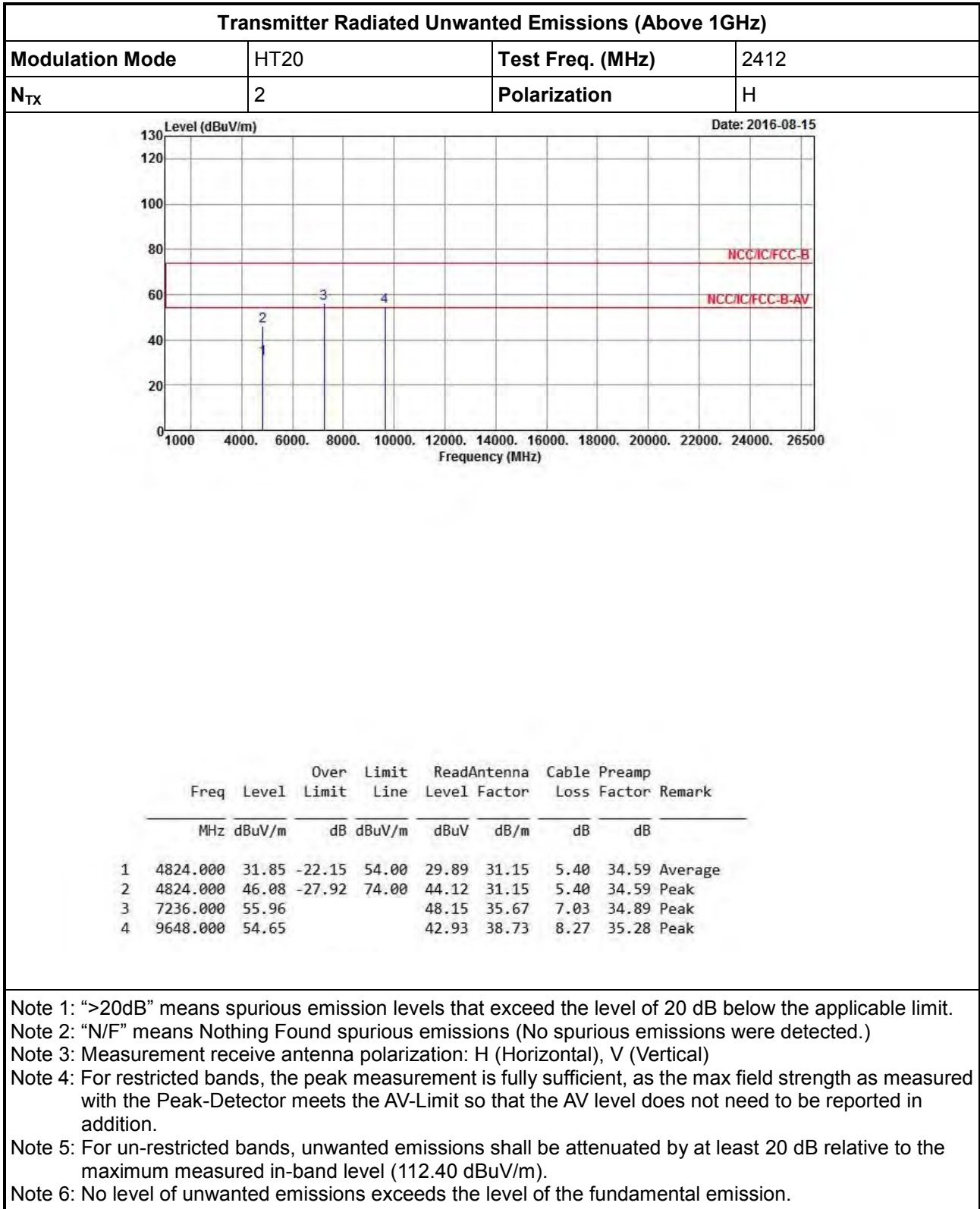
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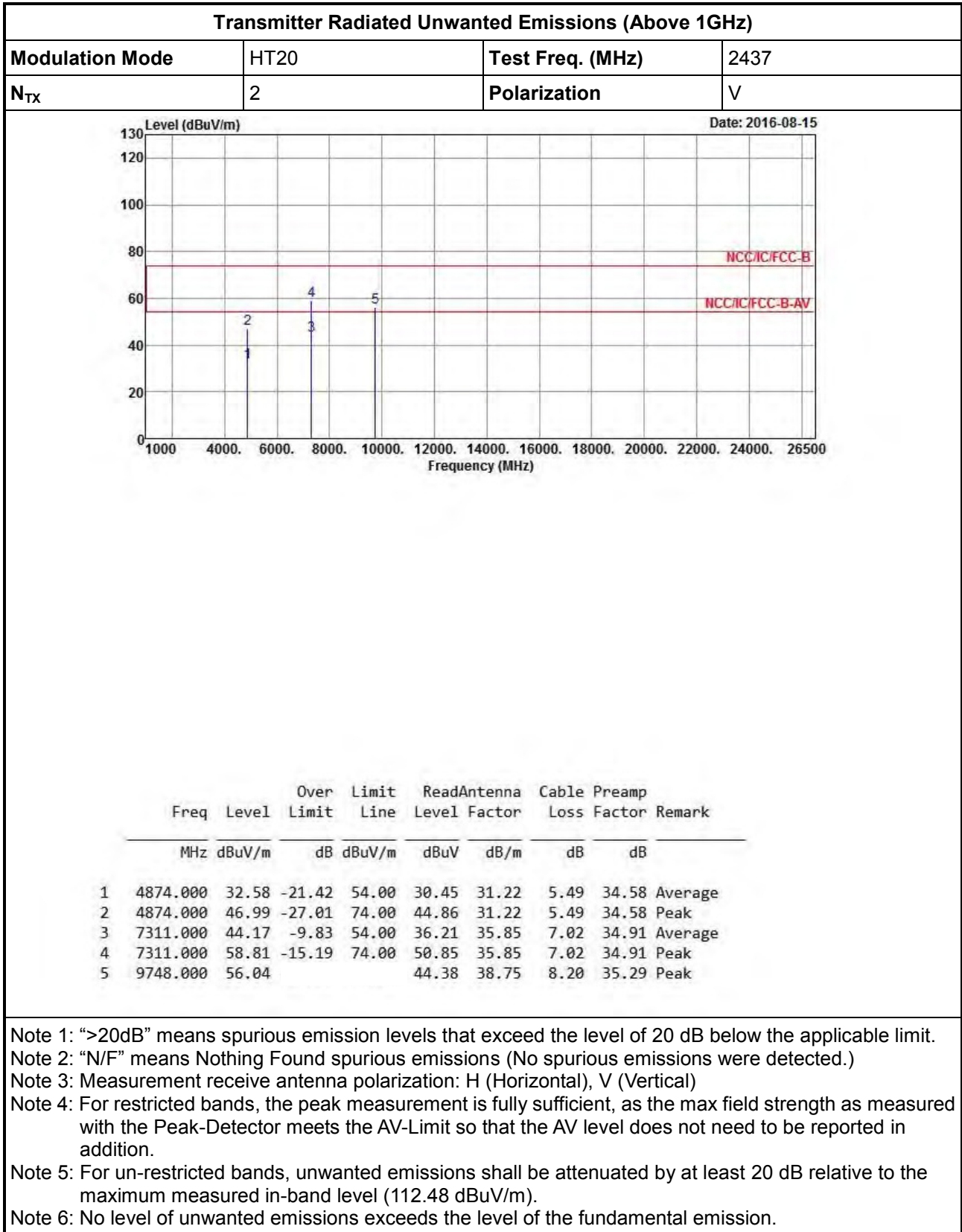


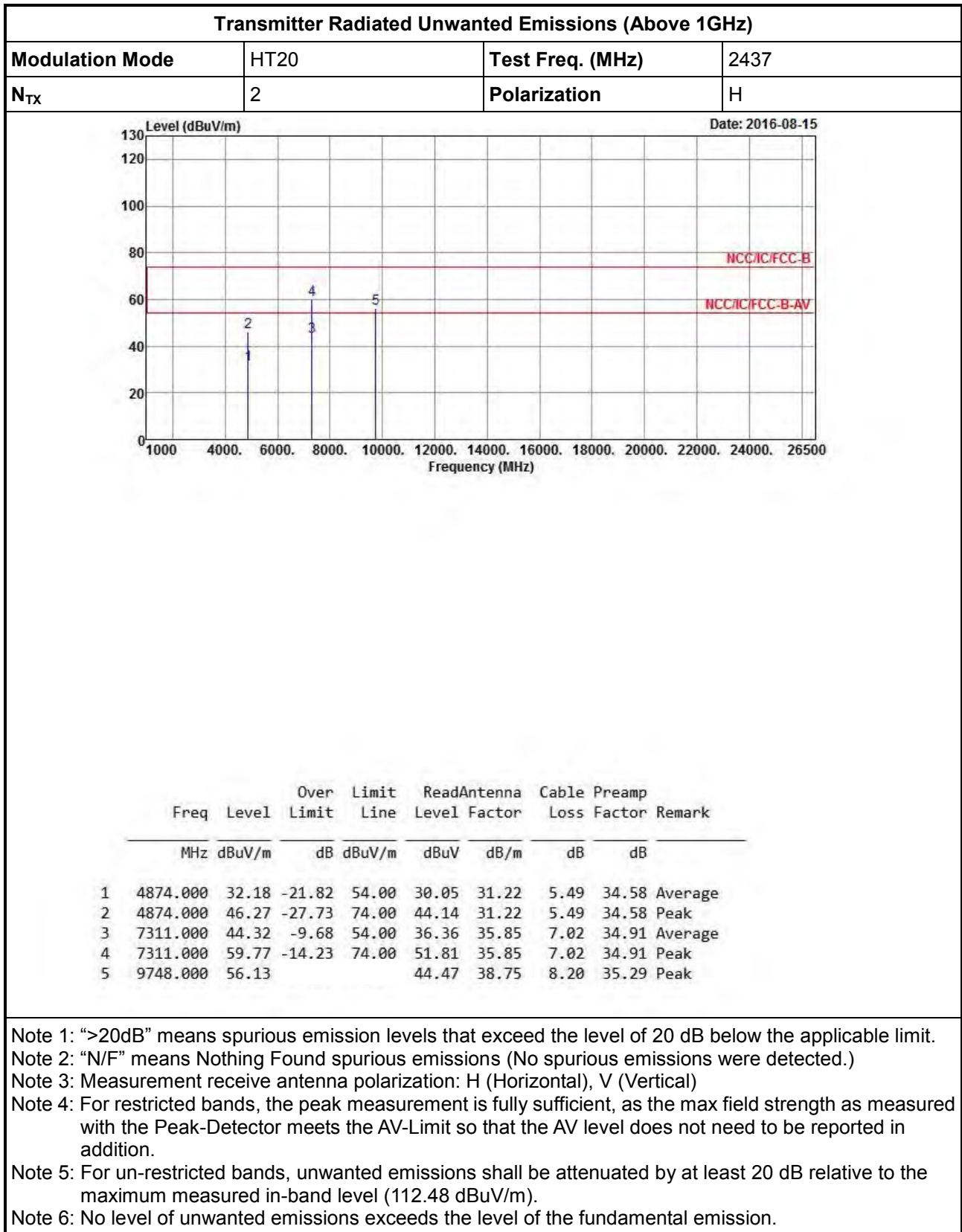
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Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																									
Modulation Mode	HT20	Test Freq. (MHz)	2412																																																						
N _{TX}	2	Polarization	V																																																						
<div style="display: flex; justify-content: space-between;"> Level (dBuV/m) Date: 2016-08-15 </div>																																																									
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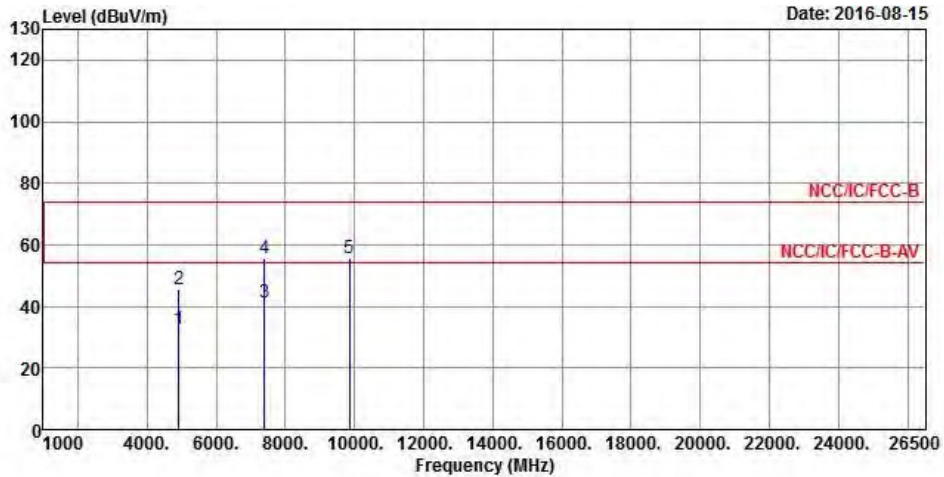






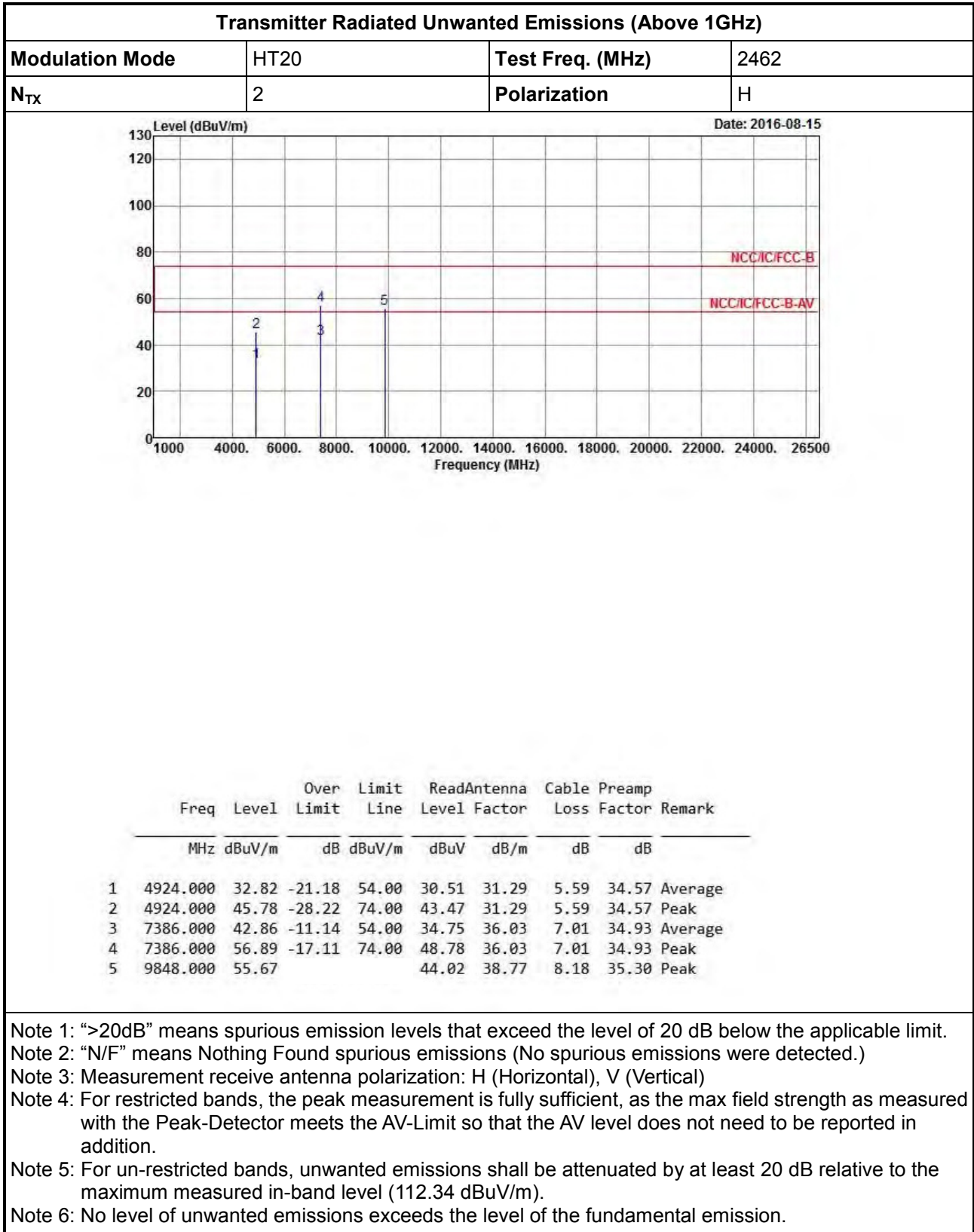


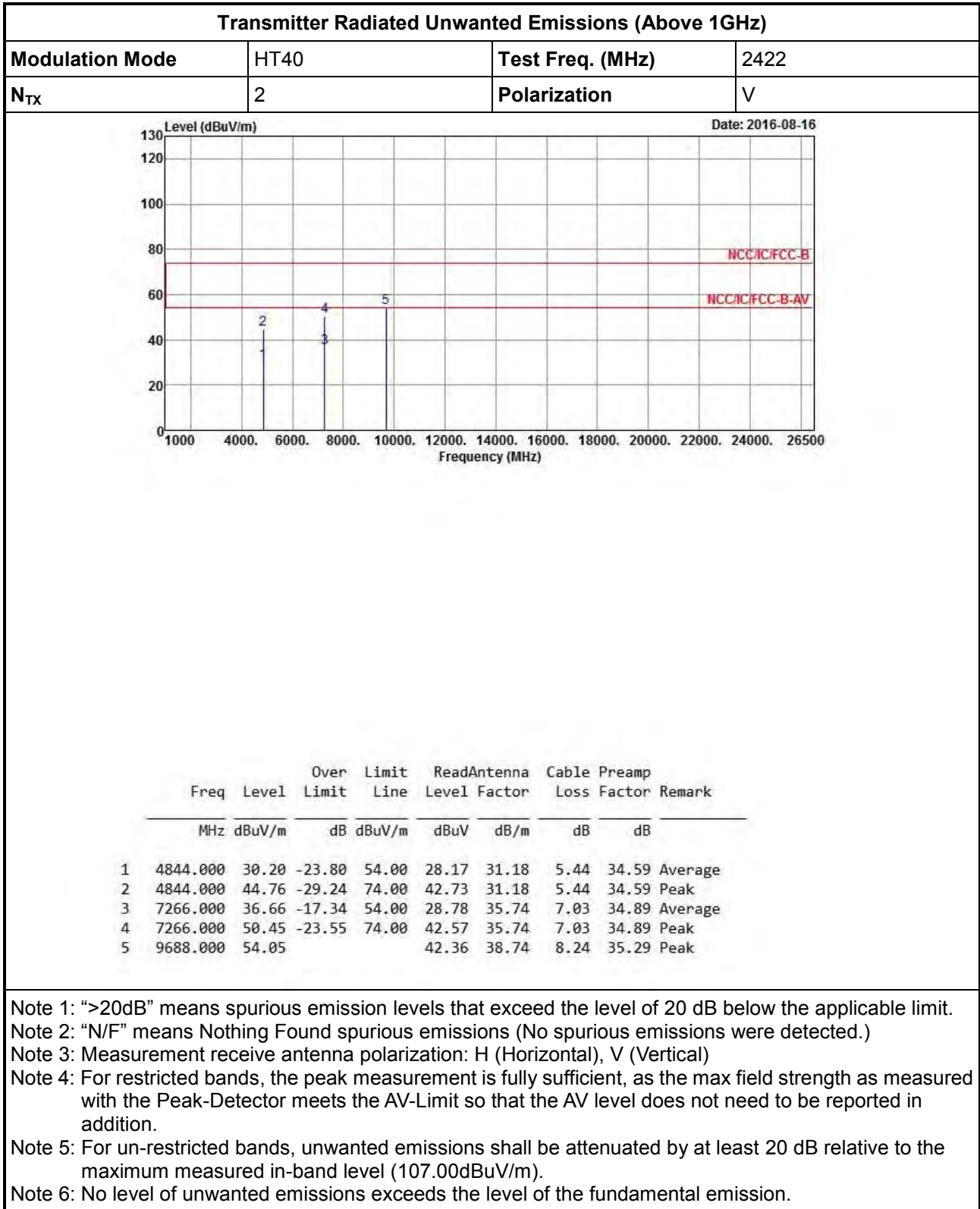
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT20	Test Freq. (MHz)	2462
N _{TX}	2	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB
1	4924.000	32.72	-21.28	54.00	30.41	31.29	5.59	34.57 Average
2	4924.000	45.81	-28.19	74.00	43.50	31.29	5.59	34.57 Peak
3	7386.000	41.43	-12.57	54.00	33.32	36.03	7.01	34.93 Average
4	7386.000	55.79	-18.21	74.00	47.68	36.03	7.01	34.93 Peak
5	9848.000	55.46			43.81	38.77	8.18	35.30 Peak

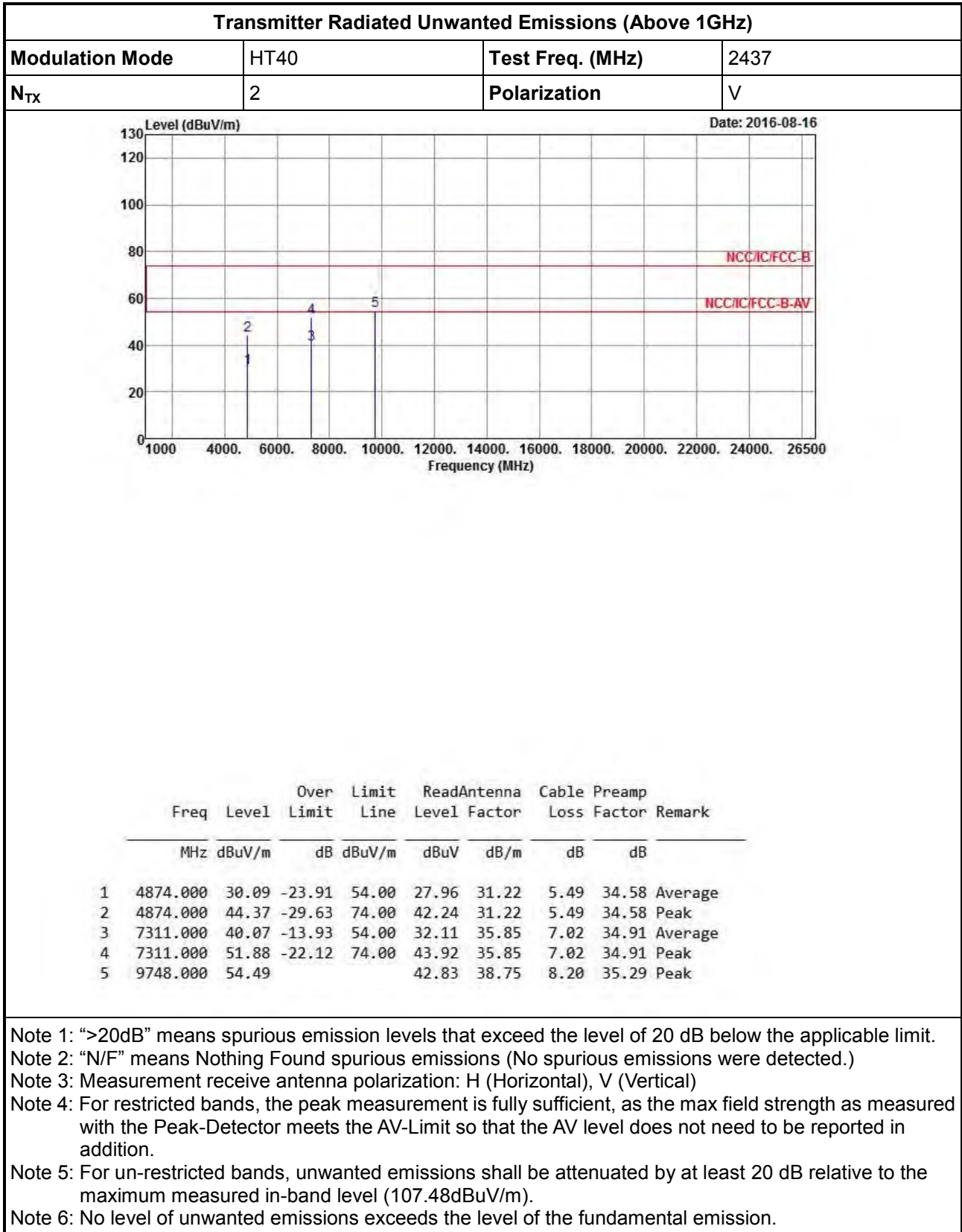
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- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.







Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																		
Modulation Mode	HT40	Test Freq. (MHz)	2422																																																															
N _{TX}	2	Polarization	H																																																															
<div style="display: flex; justify-content: space-between;"> Level (dBuV/m) Date: 2016-08-16 </div> <p style="text-align: center;">Frequency (MHz)</p>																																																																		
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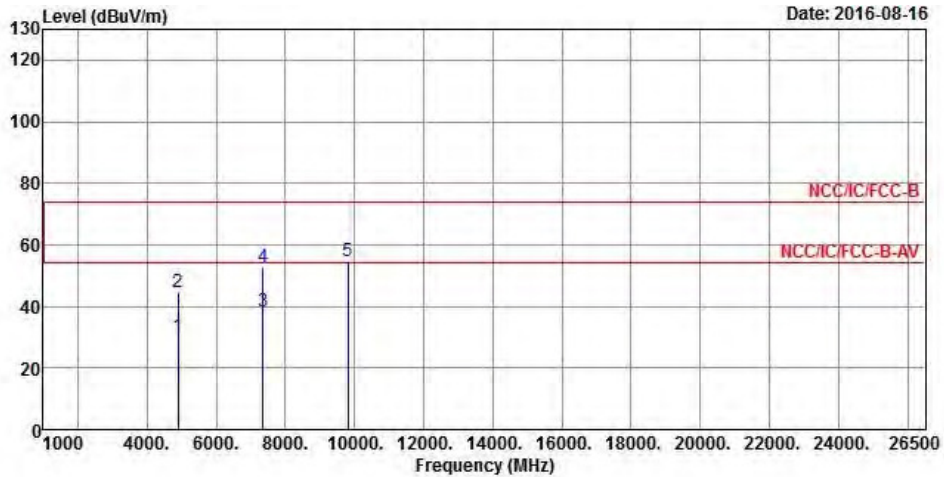




Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																		
Modulation Mode	HT40	Test Freq. (MHz)	2437																																																															
N _{TX}	2	Polarization	H																																																															
<div style="display: flex; justify-content: space-between;"> <div> <p>Level (dBuV/m)</p> <p style="text-align: right;">Date: 2016-08-16</p> </div> </div>																																																																		
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Freq</th> <th>Level</th> <th>Over Limit</th> <th>Limit Line</th> <th>ReadAntenna Level</th> <th>Cable Loss</th> <th>Preamp Factor</th> <th>Remark</th> </tr> <tr> <th></th> <th>MHz</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV/m</th> <th>dBuV</th> <th>dB/m</th> <th>dB</th> <th>dB</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4874.000</td> <td>30.24</td> <td>-23.76</td> <td>54.00</td> <td>28.11</td> <td>31.22</td> <td>5.49</td> <td>34.58 Average</td> </tr> <tr> <td>2</td> <td>4874.000</td> <td>44.25</td> <td>-29.75</td> <td>74.00</td> <td>42.12</td> <td>31.22</td> <td>5.49</td> <td>34.58 Peak</td> </tr> <tr> <td>3</td> <td>7311.000</td> <td>39.63</td> <td>-14.37</td> <td>54.00</td> <td>31.67</td> <td>35.85</td> <td>7.02</td> <td>34.91 Average</td> </tr> <tr> <td>4</td> <td>7311.000</td> <td>51.80</td> <td>-22.20</td> <td>74.00</td> <td>43.84</td> <td>35.85</td> <td>7.02</td> <td>34.91 Peak</td> </tr> <tr> <td>5</td> <td>9748.000</td> <td>54.55</td> <td></td> <td></td> <td>42.89</td> <td>38.75</td> <td>8.20</td> <td>35.29 Peak</td> </tr> </tbody> </table>					Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	1	4874.000	30.24	-23.76	54.00	28.11	31.22	5.49	34.58 Average	2	4874.000	44.25	-29.75	74.00	42.12	31.22	5.49	34.58 Peak	3	7311.000	39.63	-14.37	54.00	31.67	35.85	7.02	34.91 Average	4	7311.000	51.80	-22.20	74.00	43.84	35.85	7.02	34.91 Peak	5	9748.000	54.55			42.89	38.75	8.20	35.29 Peak
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Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	HT40	Test Freq. (MHz)	2452
N _{TX}	2	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	
1	4904.000	30.22	-23.78	54.00	27.97	31.27	5.55	34.57 Average
2	4904.000	44.52	-29.48	74.00	42.27	31.27	5.55	34.57 Peak
3	7356.000	38.36	-15.64	54.00	30.31	35.95	7.02	34.92 Average
4	7356.000	52.63	-21.37	74.00	44.58	35.95	7.02	34.92 Peak
5	9808.000	54.55			42.92	38.76	8.17	35.30 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 (104.05 dBuV/m).
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

