

FCC Test Report

EQUIPMENT : 3.65GHz MIMO miniPCI Radio
BRAND NAME : Dbii
MODEL NO. : F36N-PRO
FCC ID : VKV-F36N
STANDARD : 47 CFR FCC Part 90
APPLICANT : Dbii Networks Limited
201 Oak Ave, #D Carlsbad, CA 92008 United States
MANUFACTURER : Dbii Networks
16F-3, No. 482, Sec. 5, Zhongxiao E. Rd., Xinyi District, Taipei 11083 Taiwan

The product sample received on Sep. 28, 2011 and completely tested on Oct. 19, 2011. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI/TIA-603-D-2010 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.

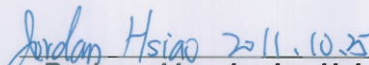

Reviewed by: Jordan Hsiao



TABLE OF CONTENTS

1	GENERAL DESCRIPTION	5
1.1	Product Information	5
1.2	Accessories and Support Equipment	8
1.3	EMI Suppression Device(s)/Modifications	8
1.4	Testing Applied Standards	8
1.5	Testing Information	9
1.6	Measurement Uncertainty	9
2	TEST CONFIGURATION	10
2.1	Worst Case Modulation Configuration	10
2.2	Test Frequencies Configuration	10
2.3	Worst Case Power Setting Parameter	11
2.4	The Worst Case RF Conducted Test Configuration	11
2.5	The Worst Case Radiated Test (Above 1GHz) Configuration	12
2.6	Worst Case Radiated Test (Below 1GHz) Configuration	13
2.7	Worst Case AC Line Conducted Test Configuration	13
2.8	Test Setup Diagram	14
3	TRANSMITTER TEST RESULT	17
3.1	AC Line Conducted Emissions	17
3.2	Occupied Bandwidth	21
3.3	EIRP Power and EIRP Power Density	24
3.4	Transmitter Radiated Spurious Emissions	32
3.5	Transmitter Conducted Spurious Emissions	53
3.6	Spectrum Mask Emissions	63
3.7	Frequency Tolerance	68
4	MAXIMUM PERMISSIBLE EXPOSURE	70
4.1	Maximum Permissible Exposure	70
5	TEST EQUIPMENT AND CALIBRATION DATA	72
6	CERTIFICATION OF TAF ACCREDITATION	74
APPENDIX A. TEST PHOTOS		75
APPENDIX B. PHOTOGRAPHS OF EUT		79

SUMMARY OF TEST RESULT

Conformance Test Specifications					
Report Clause	FCC Rule	Description	Measured	Limit	Result
3.1	15.107	AC Line Conducted Emissions	Average level: 44.45dBuV under 11.55dB	FCC 15.207 limits	Complied
3.2	2.1049	Occupied Bandwidth (Maximum for each channel bandwidth)	5MHz: 5.35MHz 10MHz: 10.27MHz 20MHz: 17.77MHz	Information only	Complied
3.3	90.1321	EIRP Power (Maximum for each channel bandwidth)	5MHz: 35.45dBm 10MHz: 35.89dBm 20MHz: 35.64dBm	5MHz: 37dBm 10MHz: 40dBm 20MHz: 43dBm	Complied
3.3	90.1321	EIRP Power Density (Maximum for each channel bandwidth)	5MHz: 29.85dBm/MHz 10MHz: 27.34dBm/MHz 20MHz: 24.08dBm/MHz	30dBm/MHz	Complied
3.4	90.1321	Transmitter Radiated Spurious Emissions	69.54dBuV/m margin 12.66dB	-13dBm/MHz or 82.2 dBuV/m @ 3m	Complied
3.5	2.1051	Transmitter Conducted Spurious Emissions	-52.75dBm margin 36.75dB	-16dBm/1MHz @ single port	Complied
-	2.1033	Emission Types	D1D	Information only	Complied
3.6	90.210	Spectrum Mask Emissions	Device complies with spectral mask – refer to test data	Mask B	Complied
3.7	90.213	Frequency Tolerance	5.90 ppm	To be specified in the station authorization	Complied
4	2.1091	Maximum Permissible Exposure	0.7726 mW/cm ²	1 mW/cm ²	Complied



SPORTON INTERNATIONAL INC.
TEL : 886-2-2696-2468
FAX : 886-2-2696-2255

1 General Description

1.1 Product Information

1.1.1 Test Specification Information

RF General Information					
Frequency Range (MHz)	Modulaton	Ch. Frequency (MHz)	Channel Number	Channel Bandwidth (MHz)	Designation of Emission
3650-3700	OFDM	3653.4-3668.4	1-4	5	5M35D1D
3650-3700	OFDM	3658.4-3668.4	1-3	10	10M27D1D
3650-3700	OFDM	3663.4	1	20	17M77D1D
Note 1: Modulation and Coding Scheme (MCS) index value include 0 – 7.					

Modulation Code Scheme			
Modulation Type	MCS	Modulation	Coding Rate
OFDM	0	BPSK	1/2
OFDM	1	BPSK	3/4
OFDM	2	QPSK	1/2
OFDM	3	QPSK	3/4
OFDM	4	16-QAM	1/2
OFDM	5	16-QAM	3/4
OFDM	6	16-QAM	2/3
OFDM	7	64-QAM	3/4

Transmitter Outputs & Receiver Inputs Information

Worst Case Mode Abbreviations	Transmitter Outputs	Receiver Inputs	Transmitter Output Signals	Conducted Output Power (dBm)	EIRP - Output Power (dBm)	Co-location
OFDM-2TX-5	2 (CDD)	2	Correlated	20.44	35.45	N/A
OFDM-2TX-10	2 (CDD)	2	Correlated	20.88	35.89	N/A
OFDM-2TX-20	2 (CDD)	2	Correlated	20.63	35.64	N/A

Note 1: CDD - Cyclic Delay Diversity (CDD) modes (e.g., legacy modes in 802.11n devices). In CDD modes, the same digital data is carried by each transmit antenna, but with different cyclic delays.

Note 2: STBC - Space Time Block Codes (STBC) for which different digital data is carried by each transmit antenna during any symbol period.

Note 3: SM - Spatial Multiplexing MIMO (SM-MIMO), for which independent data streams are sent to each transmit antenna.

Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other.

Note 5: Worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.

EUT Contention Protocols
☒ **Restricted Contention Protocols:**

Restricted contention protocols can prevent co-frequency interference only to radio equipment that uses the same or similar protocols. The IEEE 802.16 standard is an example of a restricted contention protocol. Equipment incorporating such a protocol relies on scheduling so as to avoid interference among multiple transmitters using the same protocol.

☐ **Unrestricted Contention Protocols:**

Unrestricted contention protocols can prevent co-frequency interference to radio equipment that uses dissimilar contention protocols. The IEEE 802.11 standard is an example of an unrestricted contention protocol. Equipment incorporating such a protocol listens to the channel before transmitting. If the equipment senses that another radio is operating co-channel, it will not transmit, thereby avoiding co-channel interference to equipment using similar or dissimilar contention-based protocols.

Note 1: Refer as FCC KDB628591 D01 V12R01 TCB Exclusion List: radio equipment operating in the 3650 MHz band using unrestricted contention based protocol (Part 90 Subpart Z).

Note 2: 3650-3675 MHz for Restricted Protocol, and 3650-3700 MHz for Unrestricted Protocol.

1.1.2 Antenna Information

Antenna Information						
Ant. No.	Power Setting	Category	Type	Brand	Model	Gain (dBi)
1	1	Integral	Panel (Patch)	NSA	N/A	12

Antenna Directional Gain					
Ant. No.	Modulation	Transmitter Outputs Signals Correlated	Transmitter Outputs (N)	Antenna Gain Combination (dBi)	Directional Gain (dBi)
1	OFDM	Correlated	2	12, 12	15.01
Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows - Any transmit signals are correlated, Directional Gain = $G_{ANT} + 10 \log(N)$ dBi - All transmit signals are completely uncorrelated, Directional Gain = G_{ANT} Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows: - Any transmit signals are correlated, Directional Gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N]$ dBi - All transmit signals are completely uncorrelated, Directional Gain = $10 \log[(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10}) / N]$ dBi					

1.1.3 Presentation of Equipment

Presentation of Equipment	
EUT Serial No.	N/A ☐ Production ☒ Pre-Production ☐ Engineering
☒ Stand-alone	
☐ Combined (EUT where the radio part is fully integrated within another device)	
☐ Plug-in radio (EUT intended for a variety of host systems)	
☐ Other:	

1.1.4 EUT Operational Condition

Supply Voltage	☐ AC mains	☒ DC	
Type of DC Source	☐ Internal DC supply	☒ External DC adapter	☐ Battery
Operational Voltage	☒ Vnom (110 V)	☒ Vmax (126.5 V)	☒ Vmin (93.5 V)
Operational Climatic	☒ Tnom (0°C)	☒ Tmax (50°C)	☒ Tmin (-30°C)

1.2 Accessories and Support Equipment

Accessories				
No.	Equipment	Brand Name	Model Name	Serial No.
1	-	-	-	-

Support Equipment				
No.	Equipment	Brand Name	Model Name	Serial No.
1	Notebook	DELL	D400	NB-P
2	Mouse	Logitech	AMS0706W	MO-A
3	Modem	ACEEX	DM1414	MD-E
4	Power Supply	GWINSTEK	GPC-50300	-

1.3 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing.

- None

1.4 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 90
- ANSI/TIA-603-D-2010
- FCC KDB 965270
- FCC KDB 662911
- FCC KDB 412172

1.5 Testing Information

Testing Location			
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055	
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085	
Test Condition		Test Site No.	Test Engineer
RF Conducted		TH01-CB	Allen Liu
Radiated Emission		03CH01-CB	Magic Lai
AC Conducted Emission		CO01-CB	Sin Chang
			Test Environment
			24.3°C / 58%
			24.5°C / 57%
			24°C / 54%

1.6 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	Limit
AC Line Conducted Emissions		±2.26 dB	N/A
Occupied Bandwidth		±8.5×10 ⁻⁸ Hz	N/A
EIRP Power		±0.53 dB	N/A
EIRP Power Density		±0.53 dB	N/A
Transmitter Radiated Spurious Emissions	30 – 1000 MHz	±2.28 dB	N/A
	1 – 18 GHz	±2.59 dB	N/A
	18 – 40 GHz	±2.37 dB	N/A
	40 – 200 GHz	N/A	N/A
Transmitter Conducted Spurious Emissions	30 – 1000 MHz	±0.51 dB	N/A
	1 – 18 GHz	±0.67 dB	N/A
	18 – 40 GHz	±0.83 dB	N/A
	40 – 60 GHz	N/A	N/A
Spectrum Mask Emissions		±0.67 dB	N/A
Frequency Tolerance		±8.5×10 ⁻⁸ Hz	N/A
Maximum Permissible Exposure		±0.53 dB	N/A

2 Test Configuration

2.1 Worst Case Modulation Configuration

The Worst Case Modulation Configuration					
Worst Case Mode Abbreviations	Frequency Range (MHz)	Modulation	Number of Transmitter Outputs	Channel Bandwidth (MHz)	Data Rate or MCS
OFDM-2TX-5	3650-3700	OFDM	2TX	5	MCS0
OFDM-2TX-10	3650-3700	OFDM	2TX	10	MCS0
OFDM-2TX-20	3650-3700	OFDM	2TX	20	MCS0
Note 1: If the equipment supports different modulations and/or data rates, comparison measurements of RF output power across all modulations and/or data rates need to be performed to define the worst case modulation/data rate which has to be used for the conformance testing. Note 2: nTX, n is the number of Transmitter Outputs (e.g. 3TX – three transmitter outputs). Note 3: Modulation and Coding Scheme (MCS) index value include 0 – 7.					

2.2 Test Frequencies Configuration

Test Frequencies Configuration			
Worst Case Mode Abbreviations	Frequency Range (GHz)	Modulation	Test Frequencies (MHz) – FX (Frequencies Abbreviations)
OFDM-2TX-5	3650-3700	OFDM	3653.4-(F1), 3663.4-(F2), 3668.4-(F3)
OFDM-2TX-10	3650-3700	OFDM	3658.4-(F1), 3663.4-(F2), 3668.4-(F3)
OFDM-2TX-20	3650-3700	OFDM	3663.4-(F2), only one channel.
Note 1: The measurement shall be repeated at the lowest (F1), the middle(F2), and the highest (F3) frequency of the stated frequency range.			

2.3 Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter					
Ant. No.	Power Setting	Worst Case Mode Abbreviations	Frequency (MHz)	Power Parameter	Data Rate or MCS
1	1	OFDM-2TX-5	3653.4	14	MCS0
1	1	OFDM-2TX-5	3663.4	14	MCS0
1	1	OFDM-2TX-5	3668.4	14	MCS0
1	1	OFDM-2TX-10	3658.4	15	MCS0
1	1	OFDM-2TX-10	3663.4	21	MCS0
1	1	OFDM-2TX-10	3668.4	13.5	MCS0
1	1	OFDM-2TX-20	3663.4	14.5	MCS0
Note 1: If the equipment supports different modulations and/or data rates, comparison measurements of RF output power across all modulations and/or data rates need to be performed to define the worst case modulation/data rate which has to be used for the conformance testing. Note 2: If the equipment supports different power settings for different antennas installation, each power setting shall be performed for the conformance testing.					

2.4 The Worst Case RF Conducted Test Configuration

The Worst Case RF Conducted Test Configuration			
Ant. No.	Power Setting	Worst Case Mode Abbreviations	Test Frequencies (FX)
1	1	OFDM-2TX-5	F1, F2, F3
1	1	OFDM-2TX-10	F1, F2, F3
1	1	OFDM-2TX-20	F2
Maximum RF Conducted Power Setting			1
Note 1: If the equipment supports different modulations and/or data rates, comparison measurements of RF output power across all modulations and/or data rates need to be performed to define the worst case modulation/data rate which has to be used for the conformance testing. Note 2: If the equipment supports different power settings for different antennas, each power setting shall be performed for the conformance testing.			

2.5 The Worst Case Radiated Test (Above 1GHz) Configuration

The Worst Case Radiated Test (Above 1GHz) Configuration			
Ant. No.	Power Setting	Worst Case Mode Abbreviations	Test Channel Frequencies (FX)
1	1	OFDM-2TX-5	F1, F2, F3
1	1	OFDM-2TX-10	F1, F2, F3
1	1	OFDM-2TX-20	F2

Note 1: Radiated test shall be measured while the EUT is situated in three orthogonal planes (if appropriate, i.e., hand-held or body-worn battery-powered devices) and antenna ports (if EUT with antenna diversity function).

Note 2: If EUT is consist of multiple antennas assembly (regardless of spatial multiplexing MIMO), the radiated test should be performed with highest antenna gain of each antenna type.

2.6 Worst Case Radiated Test (Below 1GHz) Configuration

Worst Case Radiated Emission (Below 1GHz) Configuration					
Test Mode	Ant. No.	Power Setting	Operating Mode	Worst Case Modulation Abbreviations	Test Frequencies (FX)
1	1	1	CTX	OFDM-2TX-5	F2
2	1	1	CTX	OFDM-2TX-10	F2
3	1	1	CTX	OFDM-2TX-20	F2

Note 1: Radiated emissions shall be performed while the EUT is situated in three orthogonal planes (if appropriate, i.e., hand-held or body-worn battery-powered devices) and antenna ports (if EUT with antenna diversity function).

Note 2: Radiated emissions (below 1GHz) from digital circuitry contained within the transmitter and that the emissions are not intended to be radiated from the transmitter's antenna or radiated associated digital devices. Therefore different modulation and channel bandwidth mode shall not be influence radiated emissions (below 1GHz). If EUT could be used with different operating functions (e.g. AC or DC power source types.), Radiated emissions (below 1GHz) shall be performed each operating modes.

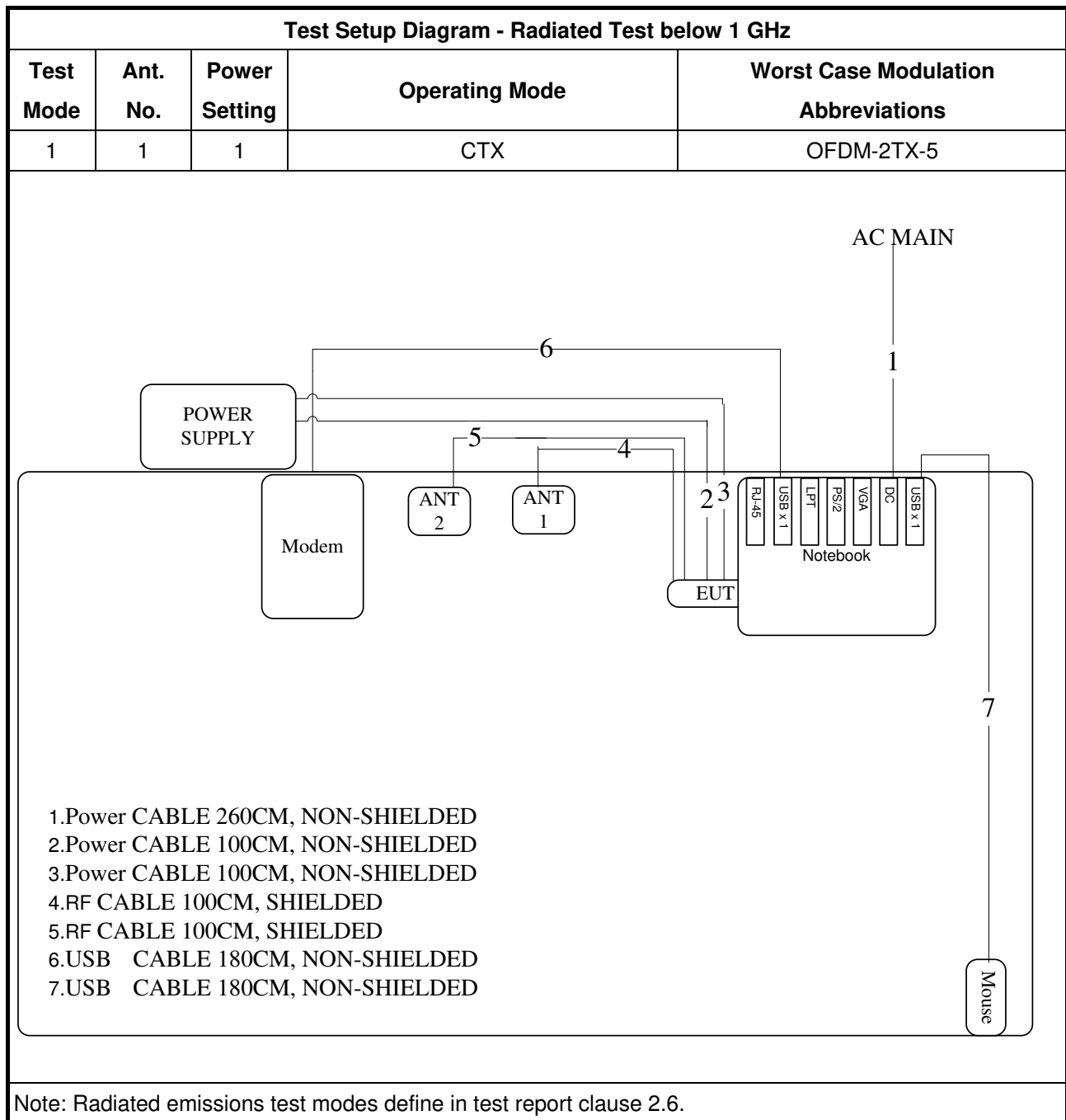
2.7 Worst Case AC Line Conducted Test Configuration

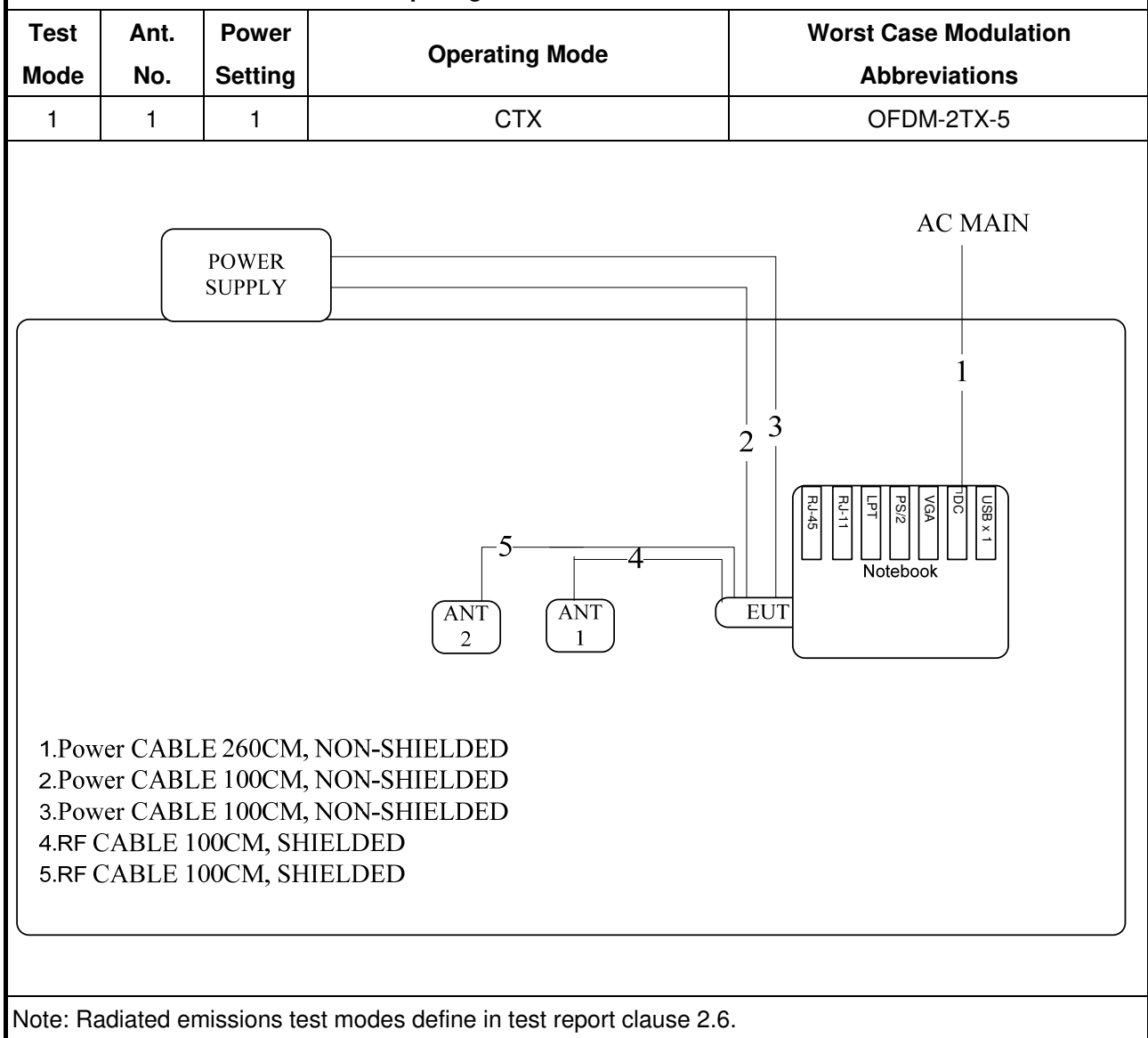
Worst AC Line Conducted Test Configuration					
Test Mode	Ant. No.	Power Setting	Operating Mode	Worst Case Modulation Abbreviations	Test Frequencies (FX)
1	1	1	CTX	OFDM-2TX-5	F2

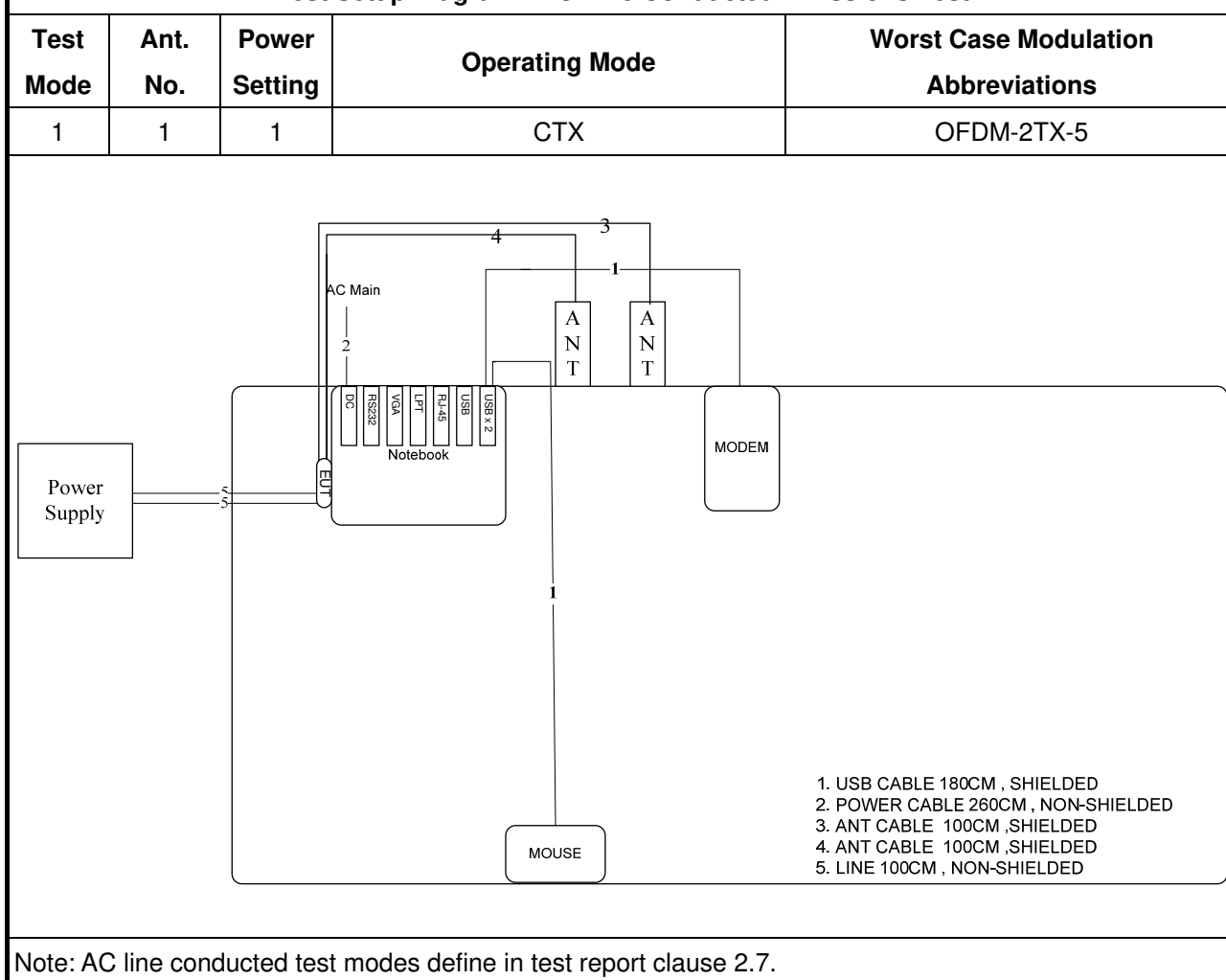
Note 1: AC line conducted emissions are from common mode current, different modulation mode could not be influence AC line conducted emissions. If EUT could be used for different operating functions (e.g. AC or DC power source types.), AC line conducted emissions shall be performed each operating modes.

2.8 Test Setup Diagram

For the purposes of this test report, if EUT's support equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless EUT's support equipment could possible influence the test results. EUT setups describe the combination of EUT and EUT's support equipment used for testing.



Test Setup Diagram - Radiated Test above 1 GHz


Test Setup Diagram - AC Line Conducted Emissions Test


3 Transmitter Test Result

3.1 AC Line Conducted Emissions

3.1.1 Limit of AC Line Conducted Emissions

AC 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: Refer as FCC 15.107 limits. * Decreases with the logarithm of the frequency.

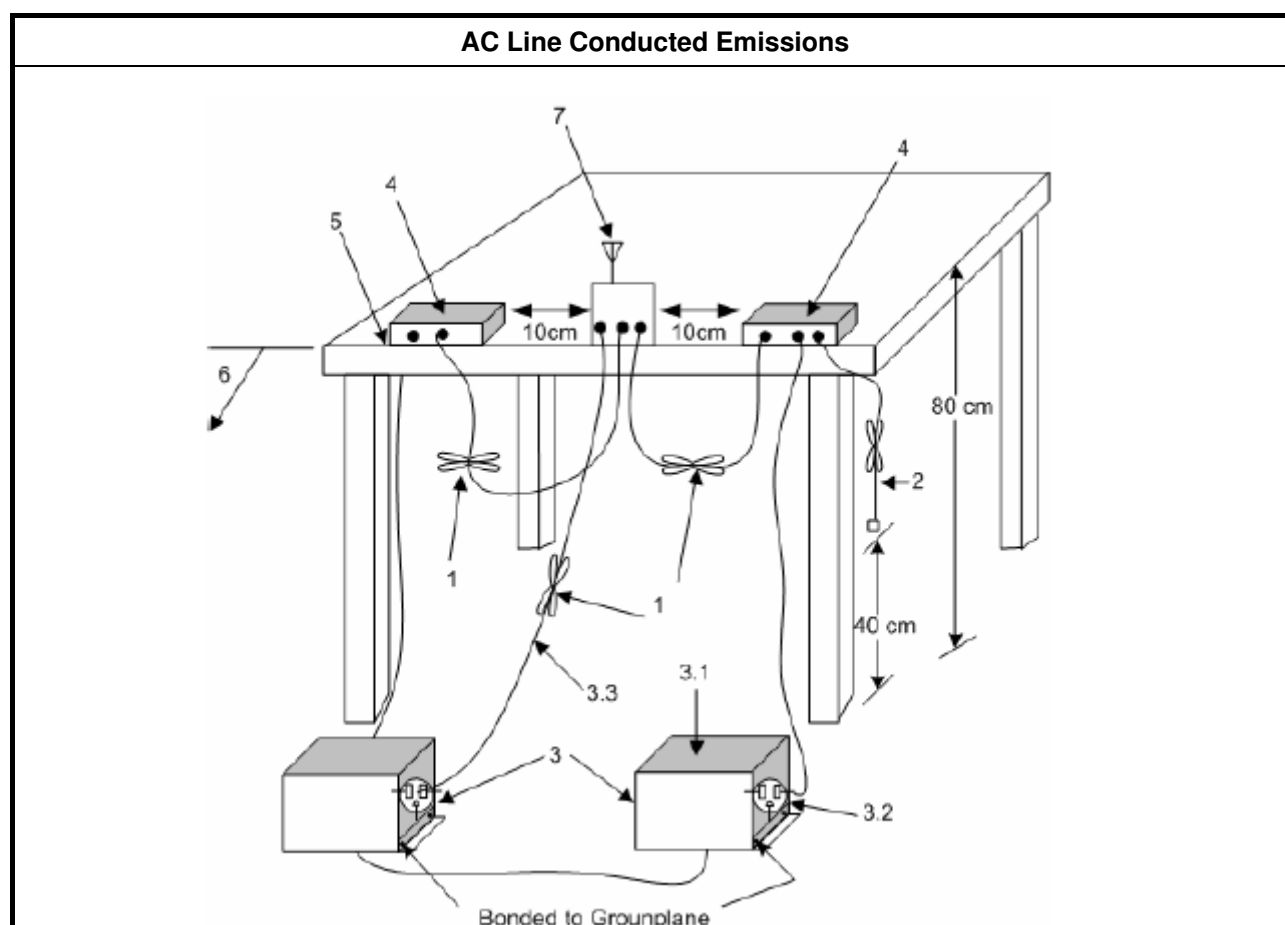
3.1.2 Measuring Instruments

Refer test equipment and calibration data list in test report clause 5.

3.1.3 Test Procedures

Method of measurement: Refer as ANSI/TIA-603-D-2010, clause 2.1.3.

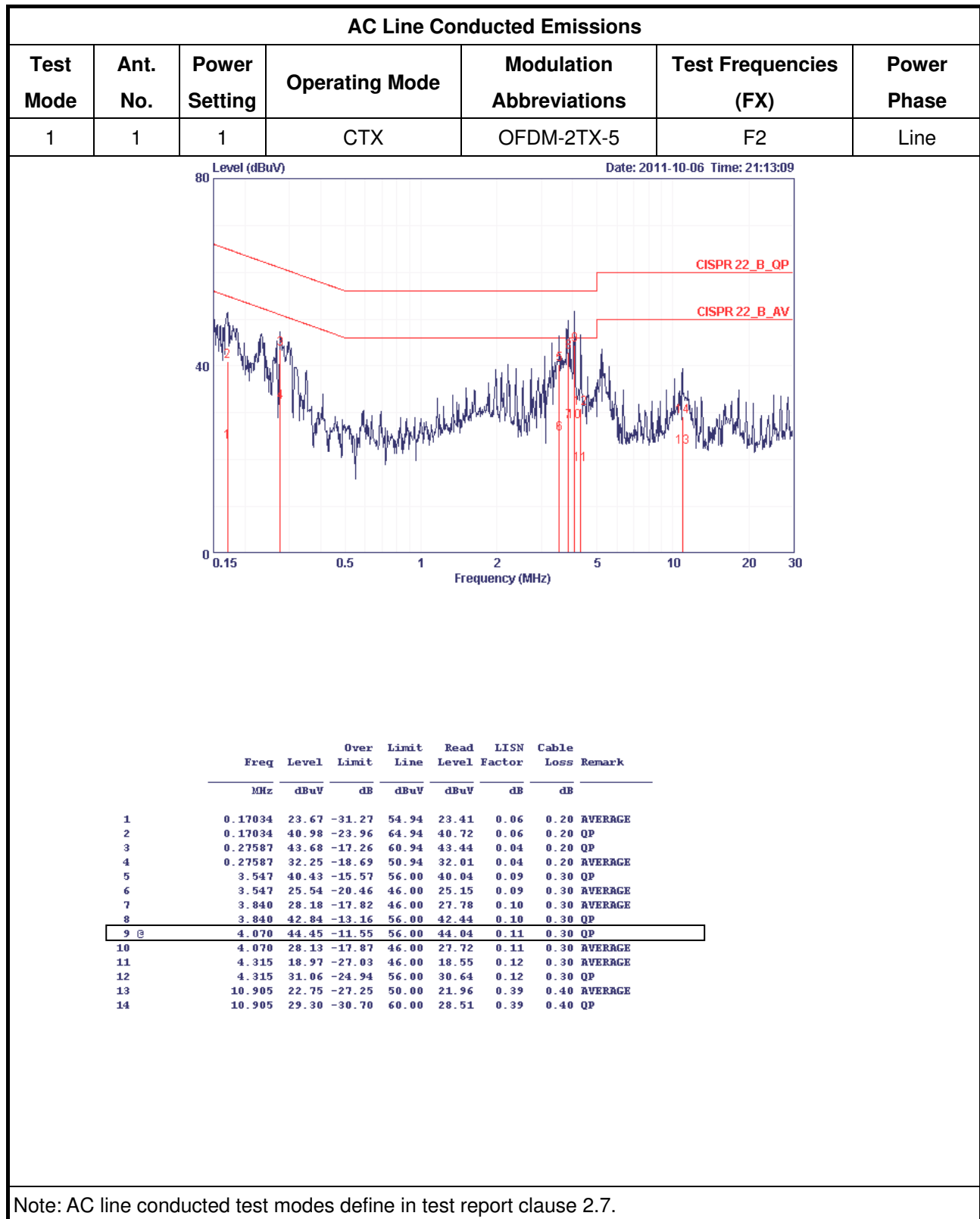
3.1.4 Test Setup



AC Line Conducted Emissions

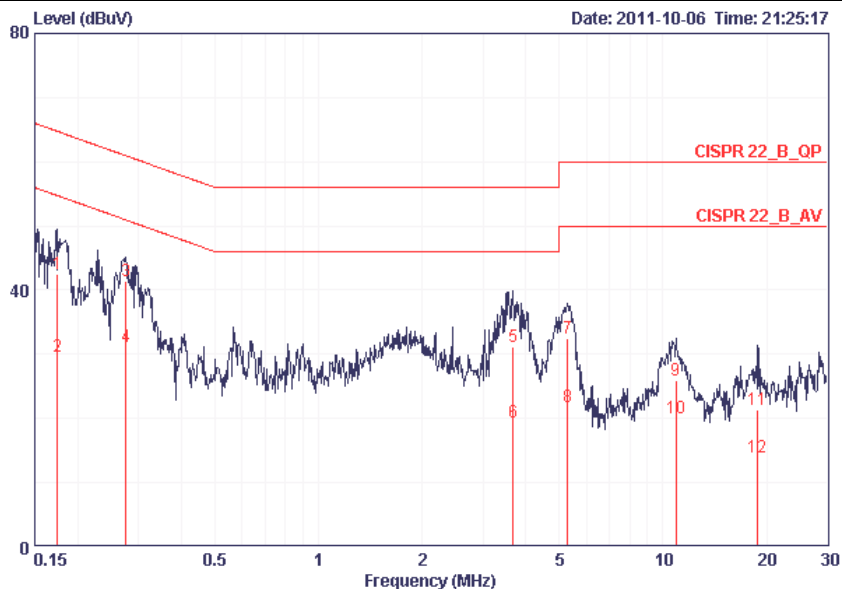
- ♦ Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
- ♦ I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using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

3.1.5 Test Result of AC Line Conducted Emissions



AC Line Conducted Emissions

Test Mode	Ant. No.	Power Setting	Operating Mode	Modulation Abbreviations	Test Frequencies (FX)	Power Phase
1	1	1	CTX	OFDM-2TX-5	F2	Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.17491	42.53	-22.19	64.72	42.24	0.09	0.20	QP
2	0.17491	29.57	-25.15	54.72	29.28	0.09	0.20	AVERAGE
3	0.27587	41.48	-19.46	60.94	41.20	0.08	0.20	QP
4	0.27587	31.21	-19.73	50.94	30.93	0.08	0.20	AVERAGE
5	3.681	31.18	-24.82	56.00	30.75	0.13	0.30	QP
6	3.681	19.45	-26.55	46.00	19.02	0.13	0.30	AVERAGE
7	5.277	32.51	-27.49	60.00	31.99	0.22	0.30	QP
8	5.277	21.75	-28.25	50.00	21.23	0.22	0.30	AVERAGE
9	10.905	25.93	-34.07	60.00	25.10	0.43	0.40	QP
10	10.905	19.96	-30.04	50.00	19.13	0.43	0.40	AVERAGE
11	18.820	21.47	-38.53	60.00	20.21	0.76	0.50	QP
12	18.820	14.04	-35.96	50.00	12.78	0.76	0.50	AVERAGE

Note: AC line conducted test modes define in test report clause 2.7.

3.2 Occupied Bandwidth

3.2.1 Limit of Occupied Bandwidth

99% Occupied Bandwidth	None
Note 1: The 99% occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth when resolution bandwidth should be approximately 1 % to 5 % of the occupied bandwidth (OBW). These measurements shall also be performed at normal test conditions.	

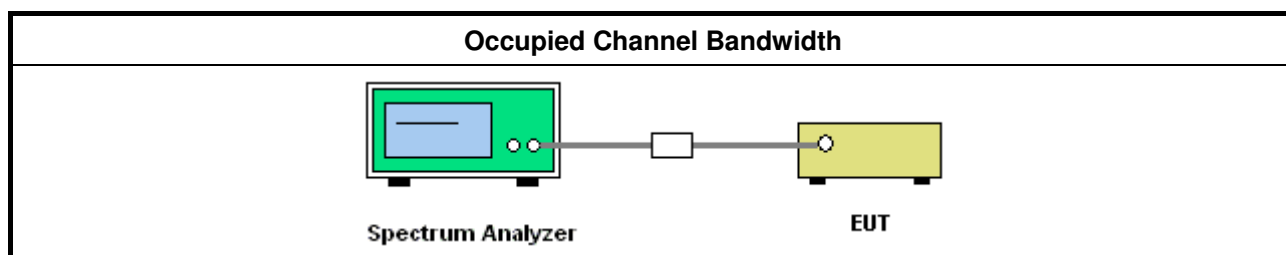
3.2.2 Measuring Instruments

Refer test equipment and calibration data list in test report clause 5.

3.2.3 Test Procedures

Method of measurement: Refer as ANSI/TIA-603-D-2010, clauses 1.3.4.4. In case of conducted measurements on smart antenna systems (equipment with multiple transmits chains) measurements need only to be performed on one of the active transmit chains (antenna outputs).

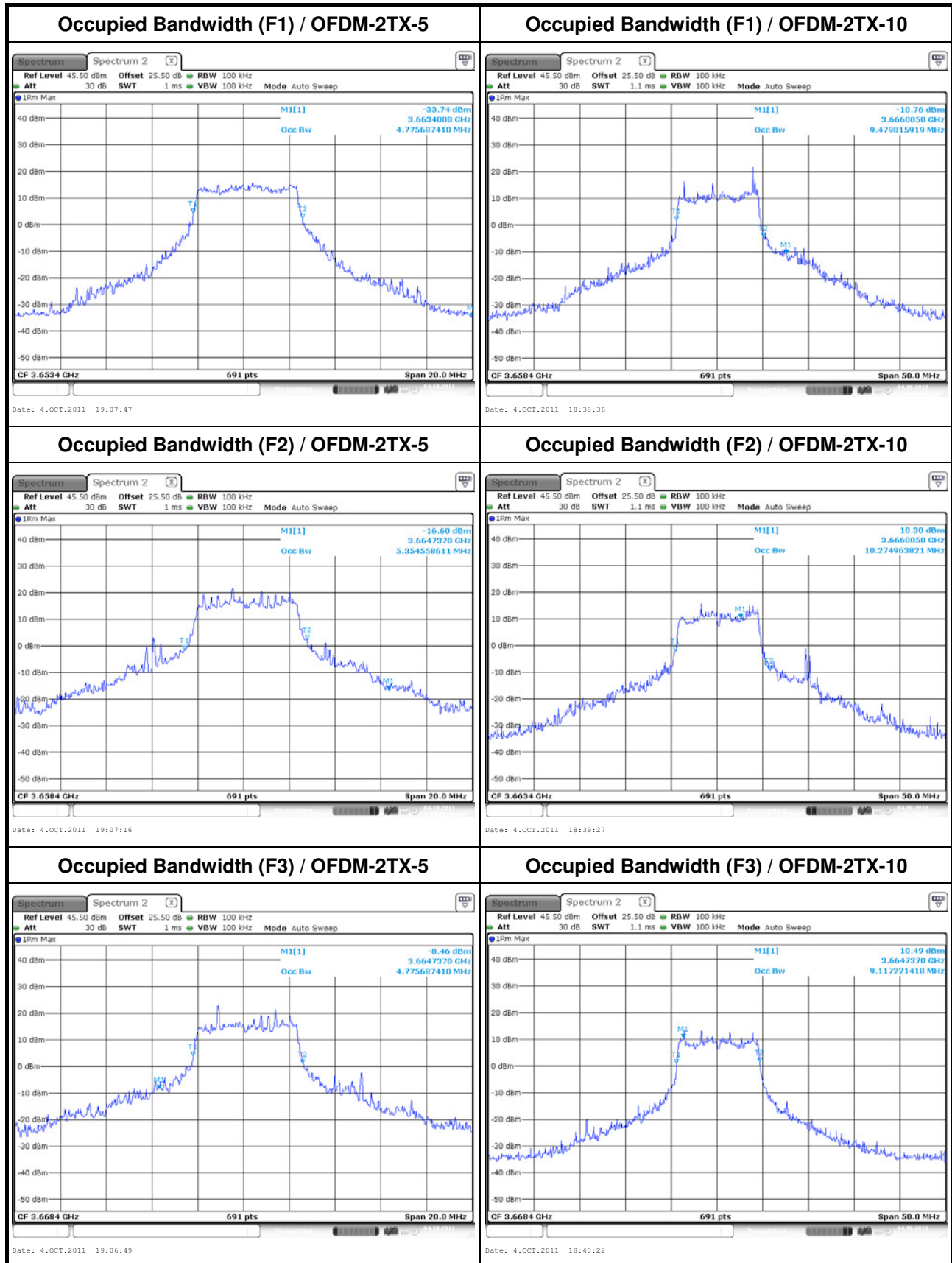
3.2.4 Test Setup



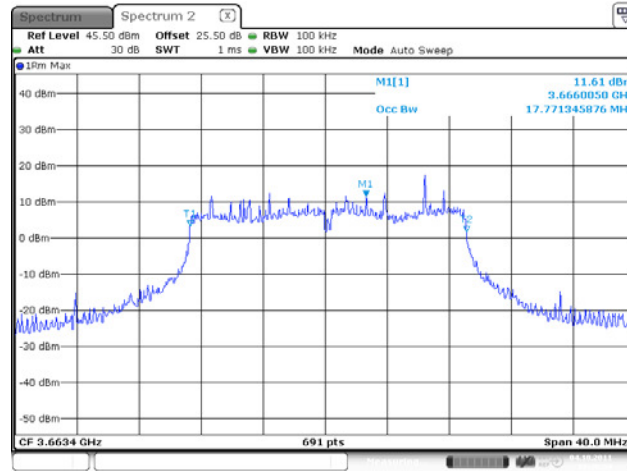
3.2.5 Test Result of Occupied Bandwidth

Occupied Bandwidth – Power Setting 1 (Ant No. 1)			
Worst Case Mode Abbreviations	Test Frequencies (FX)	Occupied Bandwidth (MHz)	Limit (MHz)
OFDM-2TX-5	F1	4.77	N/A
OFDM-2TX-5	F2	5.35	N/A
OFDM-2TX-5	F3	4.77	N/A
OFDM-2TX-10	F1	9.47	N/A
OFDM-2TX-10	F2	10.27	N/A
OFDM-2TX-10	F3	9.11	N/A
OFDM-2TX-20	F2	17.77	N/A
Test Result		Complied	
Note 1: antenna no. and power setting define in test report clause 1.1.2 and 2.3.			
Note 2: worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.			
Note 3: worst case RF conducted test define in test report clause 2.4.			

3.2.6 Occupied Bandwidth Plots for Power Setting 1 (Ant No. 1)



Occupied Bandwidth (F2) / OFDM-2TX-20



Date: 4.OCT.2011 18:36:54

3.3 EIRP Power and EIRP Power Density

3.3.1 Limit of EIRP Power and EIRP Power Density

Frequency Band	Channel Bandwidth	EIRP Power	EIRP Power Density
3650-3700 MHz	5 MHz	5 W (37 dBm)	1 W/MHz (30 dBm/MHz)
3650-3700 MHz	10 MHz	10 W (40 dBm)	1 W/MHz (30 dBm/MHz)
3650-3700 MHz	20 MHz	20 W (43 dBm)	1 W/MHz (30 dBm/MHz)

Note: For the applicable limit, see FCC 90.1321(a)

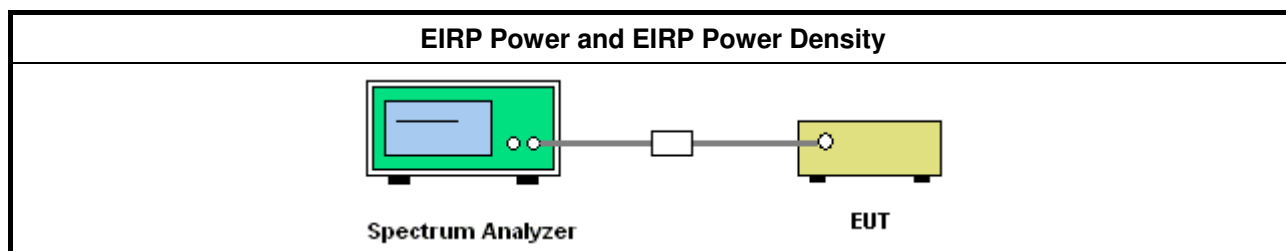
3.3.2 Measuring Instruments

Refer test equipment and calibration data list in test report clause 5.

3.3.3 Test Procedures

Method of measurement:
☒ Refer as FCC KDB 965270, band power and power density for spectrum analyzer measurement.
☒ Refer as FCC KDB 412172, EIRP power by conducted power adding the effective antenna gain.
☒ Refer as FCC KDB 662911, In-band power measurements must be tested using techniques that measure and sum the spectra across the transmitter outputs. In-band power and In-band power density measurements must be tested using techniques (1) or (2). (1) Measure and sum the spectra across the transmitter outputs. (2) Measure and add 10 log(N) dB.
☐ Refer as ANSI/TIA-603-D-2010, clause 3.2.1 for power meter measurement.

3.3.4 Test Setup



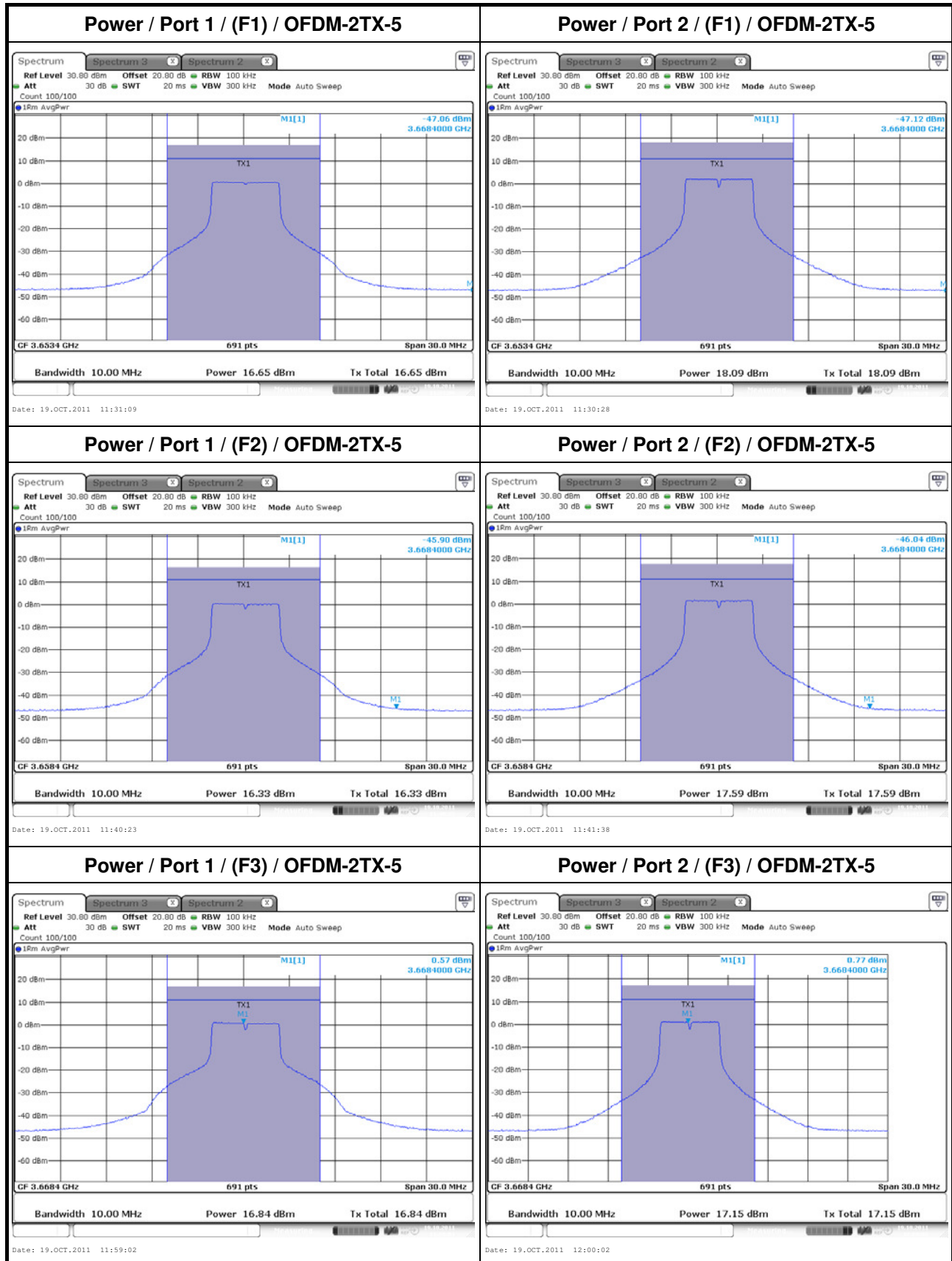
3.3.5 Test Result of EIRP Power

EIRP Power - Power Setting 1 (Ant No. 1)									
Worst Case Mode Abbreviations	Test Freq. (FX)	Conducted Power (dBm)					Dir. Gain (dBi)	EIRP Power (dBm)	Limit (dBm)
		Port 1	Port 2	Port 3	Port 4	Total			
OFDM-2TX-5	F1	16.65	18.09	N/A	N/A	20.44	15.01	35.45	37
OFDM-2TX-5	F2	16.33	17.59	N/A	N/A	20.02	15.01	35.03	37
OFDM-2TX-5	F3	16.84	17.15	N/A	N/A	20.01	15.01	35.02	37
OFDM-2TX-10	F1	17.24	18.42	N/A	N/A	20.88	15.01	35.89	40
OFDM-2TX-10	F2	16.72	18.46	N/A	N/A	20.69	15.01	35.70	40
OFDM-2TX-10	F3	16.38	17.04	N/A	N/A	19.73	15.01	34.74	40
OFDM-2TX-20	F2	16.92	18.23	N/A	N/A	20.63	15.01	35.64	43
Test Result								Complied	
Note 1: antenna no., directional gain and power setting define in test report clause 1.1.2 and 2.3.									
Note 2: worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.									
Note 3: worst case RF conducted test define in test report clause 2.4.									
Note 4: EUT have 2 transmitter outputs (port 1 - port 2).									

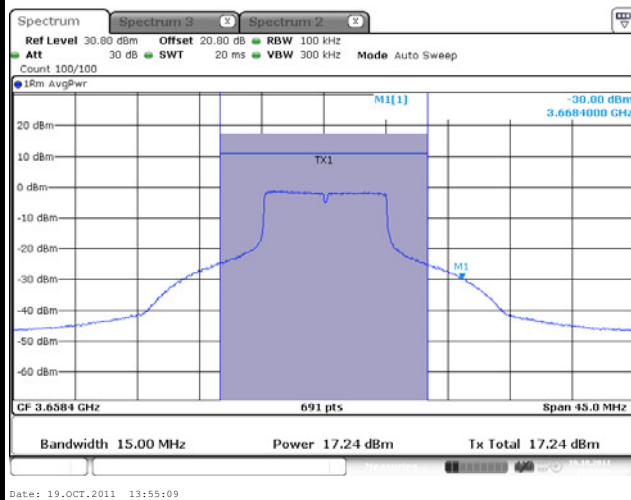
3.3.6 Test Result of EIRP Power Density

EIRP Power Density - Power Setting 1 (Ant No. 1)									
Worst Case Mode Abbreviations	Test Freq. (FX)	Conducted Power Density (dBm/MHz)					Dir. Gain (dBi)	EIRP PD (dBm/MHz)	Limit (dBm/MHz)
		Port 1	Port 2	Port 3	Port 4	Total			
OFDM-2TX-5	F1	11.14	12.15	N/A	N/A	14.68	15.01	29.69	30
OFDM-2TX-5	F2	11.01	11.95	N/A	N/A	14.52	15.01	29.53	30
OFDM-2TX-5	F3	11.55	12.09	N/A	N/A	14.84	15.01	29.85	30
OFDM-2TX-10	F1	9.00	9.62	N/A	N/A	12.33	15.01	27.34	30
OFDM-2TX-10	F2	8.57	9.79	N/A	N/A	12.23	15.01	27.24	30
OFDM-2TX-10	F3	8.40	8.43	N/A	N/A	11.43	15.01	26.44	30
OFDM-2TX-20	F2	5.82	6.29	N/A	N/A	9.07	15.01	24.08	30
Test Result								Complied	
Note 1: antenna no., directional gain and power setting define in test report clause 1.1.2 and 2.3.									
Note 2: worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.									
Note 3: worst case RF conducted test define in test report clause 2.4.									
Note 4: EUT have 2 transmitter outputs (port 1 - port 2).									

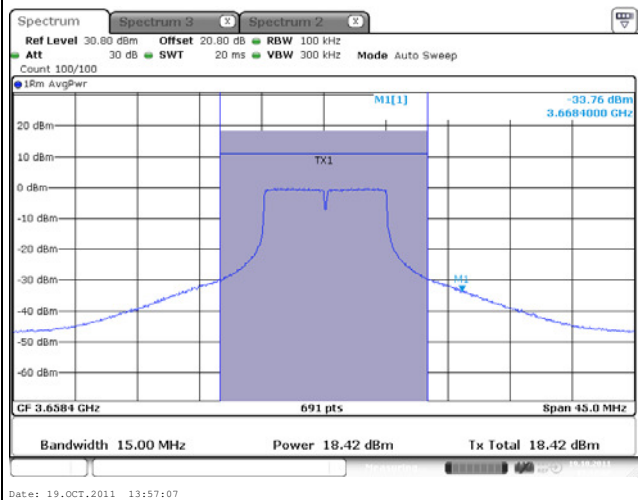
3.3.7 Conducted Power Plots for Power Setting 1 (Ant No. 1)



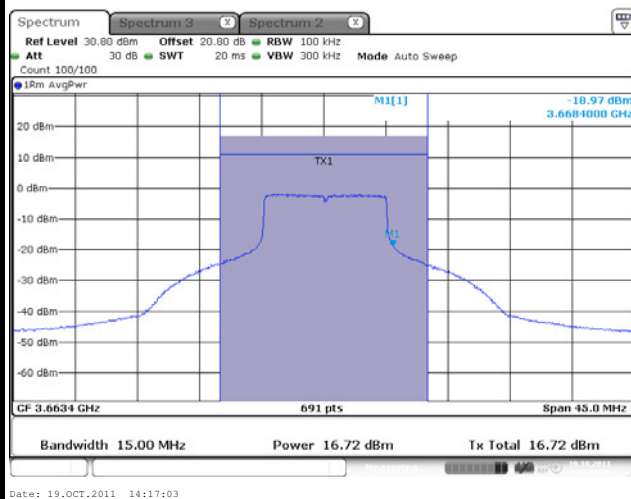
Power / Port 1 / (F1) / OFDM-2TX-10



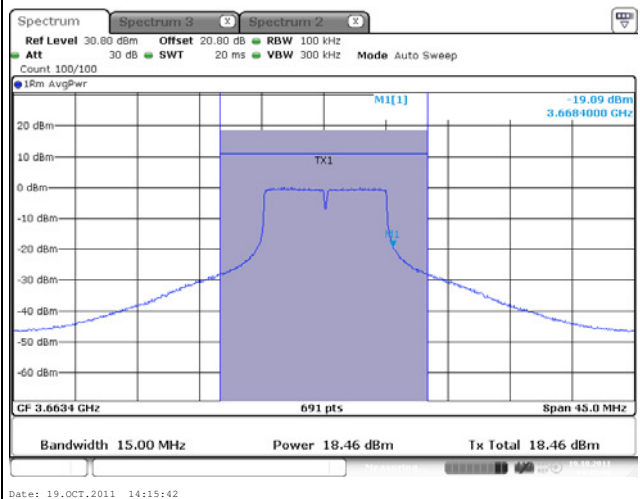
Power / Port 2 / (F1) / OFDM-2TX-10



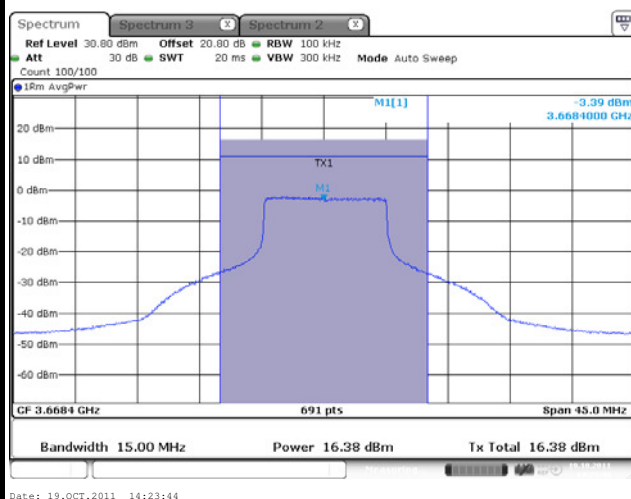
Power / Port 1 / (F2) / OFDM-2TX-10



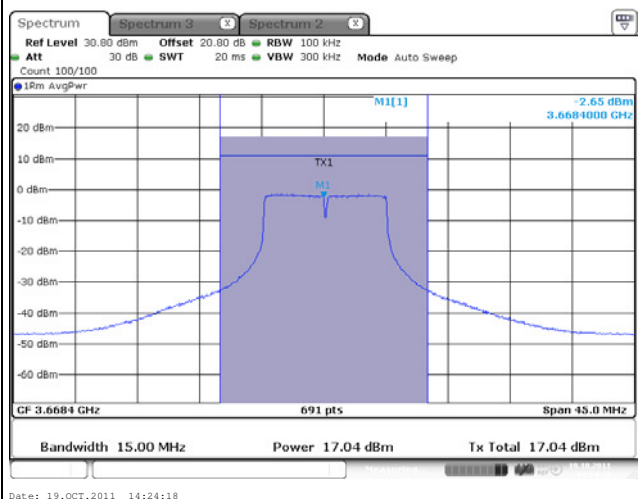
Power / Port 2 / (F2) / OFDM-2TX-10

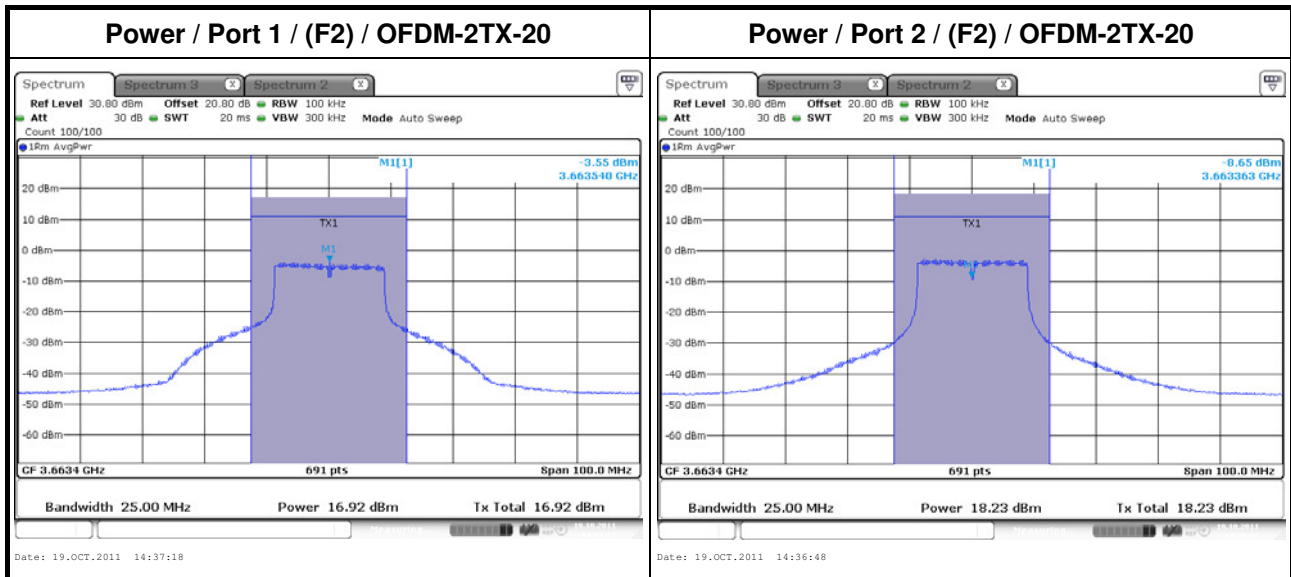


Power / Port 1 / (F3) / OFDM-2TX-10

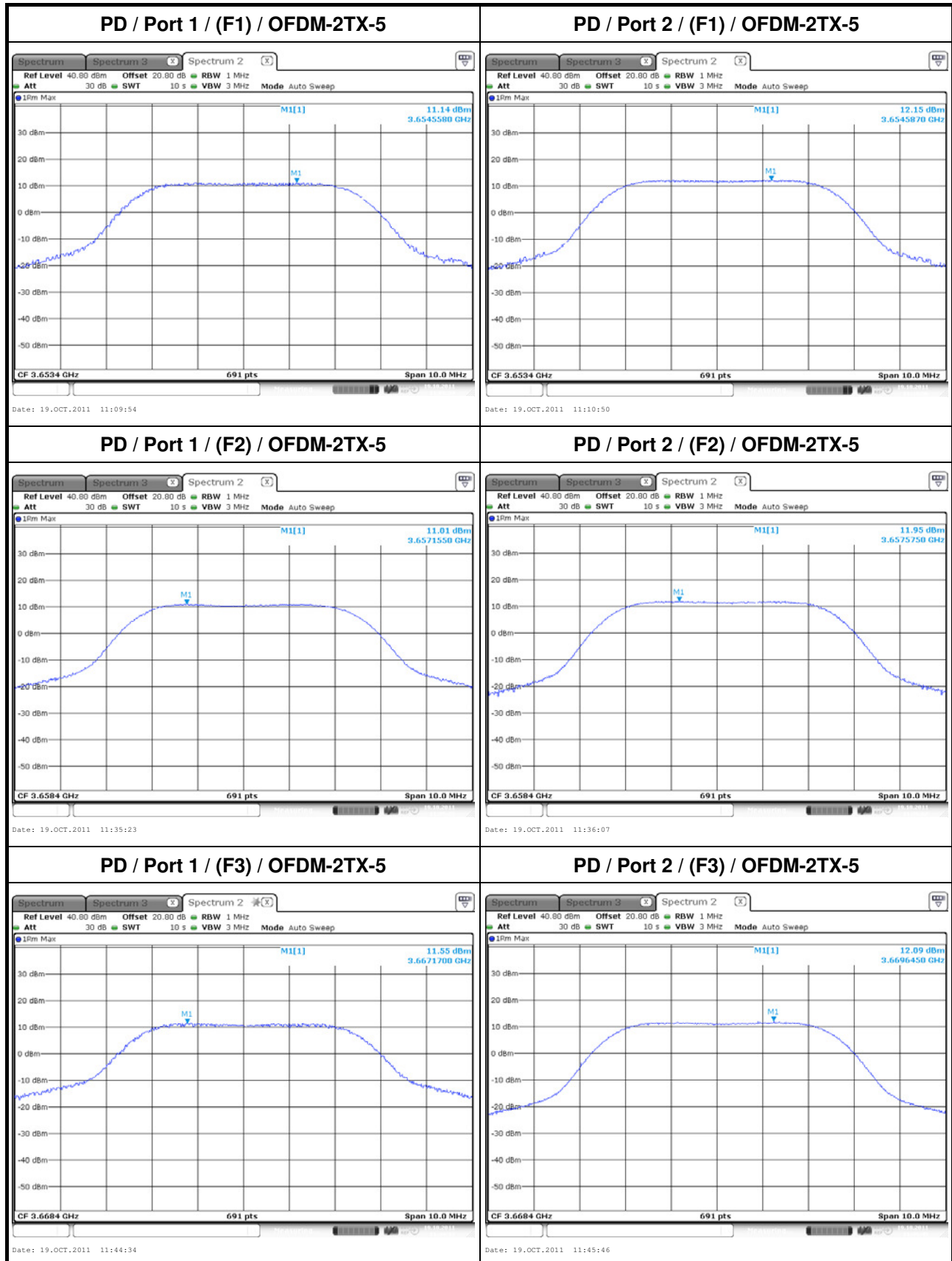


Power / Port 2 / (F3) / OFDM-2TX-10

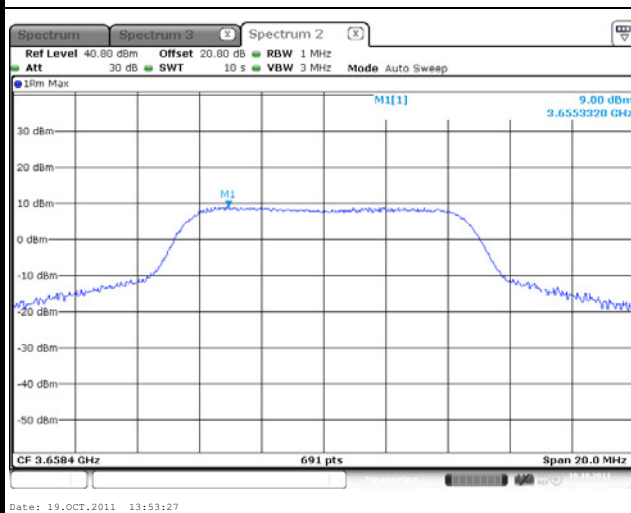




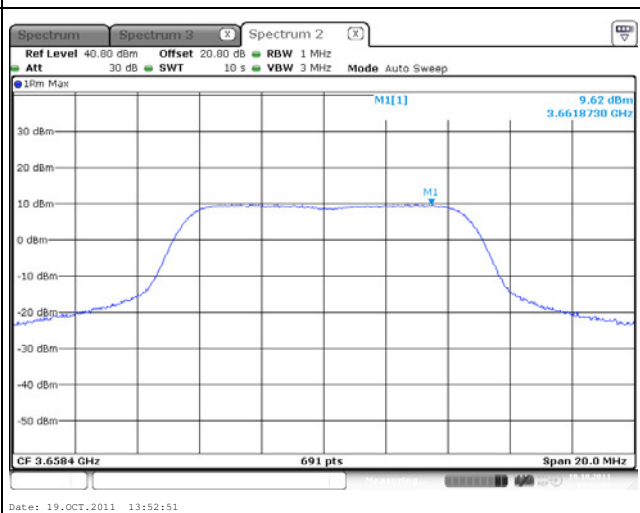
3.3.8 Conducted Power Density Plots for Power Setting 1 (Ant No. 1)



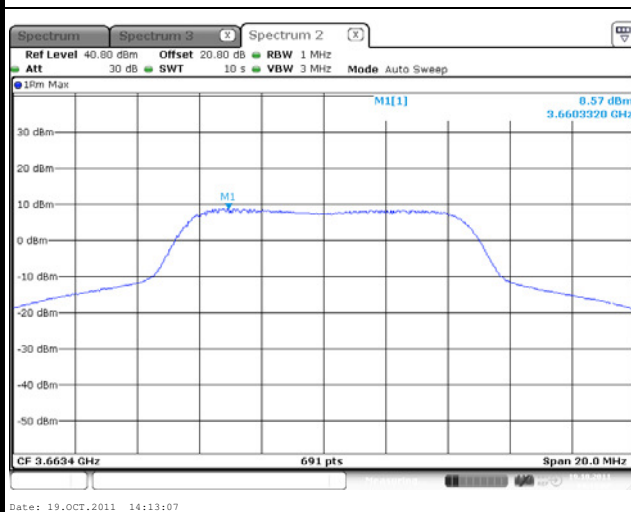
PD / Port 1 / (F1) / OFDM-2TX-10



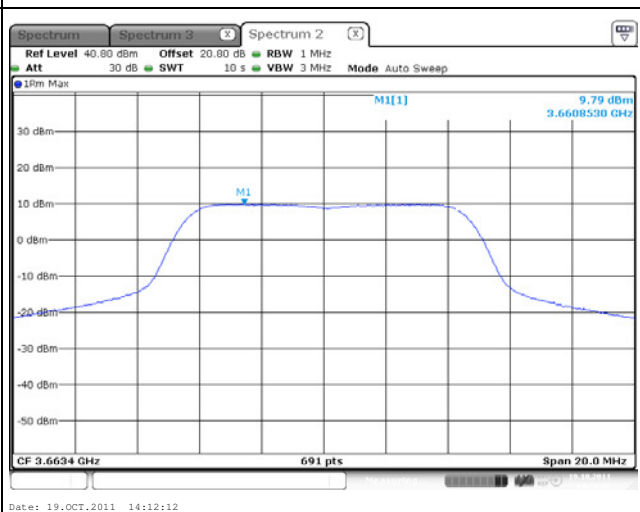
PD / Port 2 / (F1) / OFDM-2TX-10



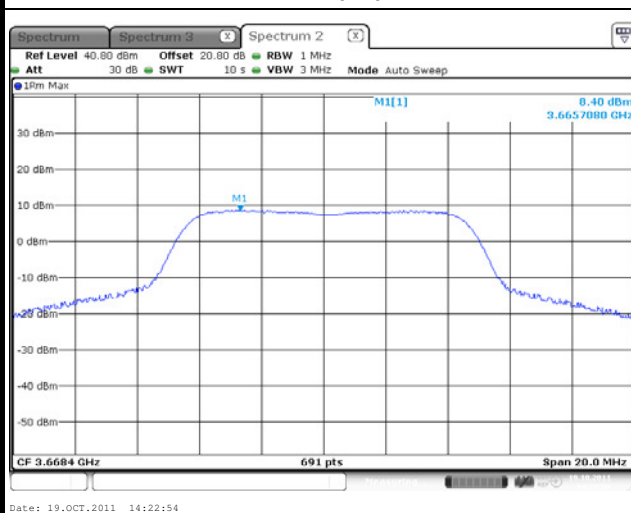
PD / Port 1 / (F2) / OFDM-2TX-10



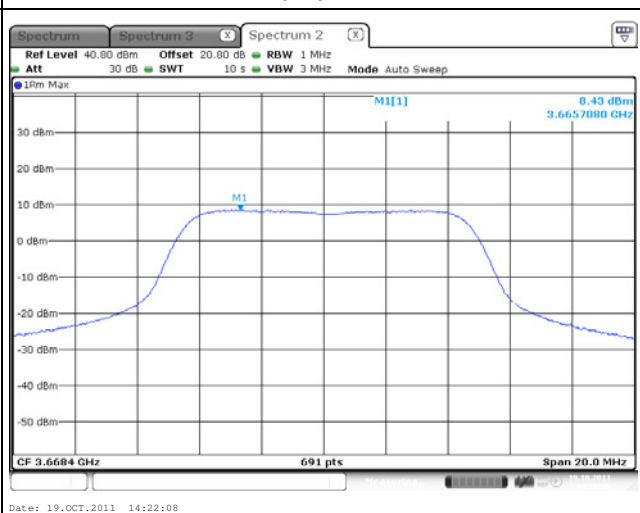
PD / Port 2 / (F2) / OFDM-2TX-10

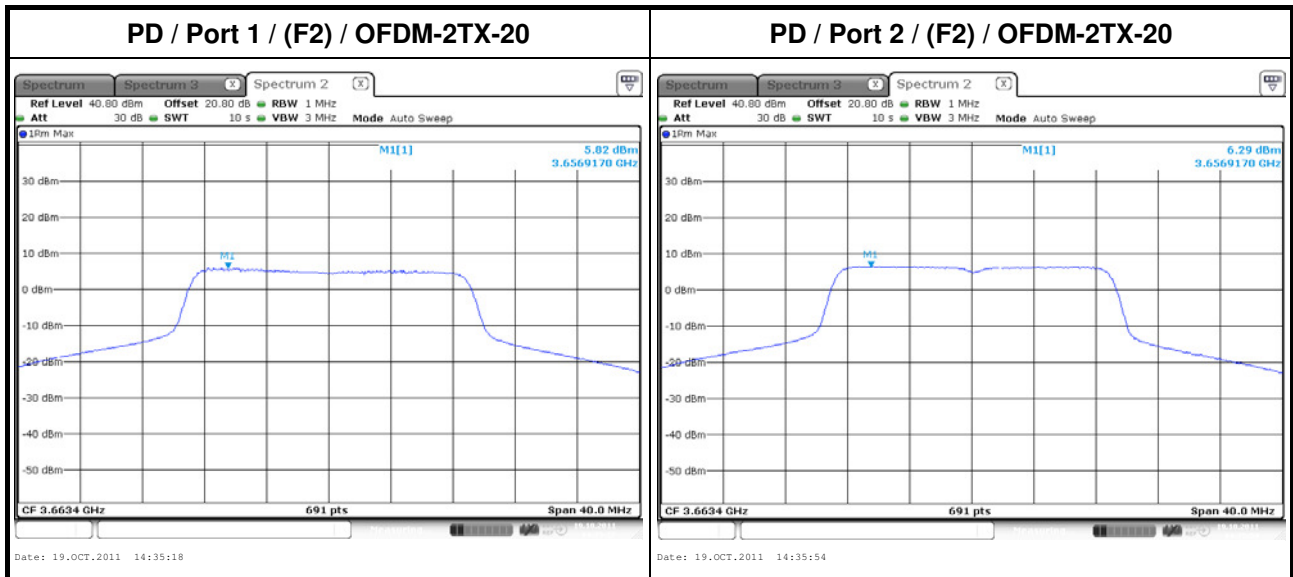


Power & PD / Port 1 / (F3) / OFDM-2TX-10



PD / Port 2 / (F3) / OFDM-2TX-10





3.4 Transmitter Radiated Spurious Emissions

3.4.1 Limit of Transmitter Radiated Spurious Emissions

Transmitter Radiated Spurious Emissions
The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB (-13dBm). Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.
Note: For the applicable limit, see FCC 90.1323

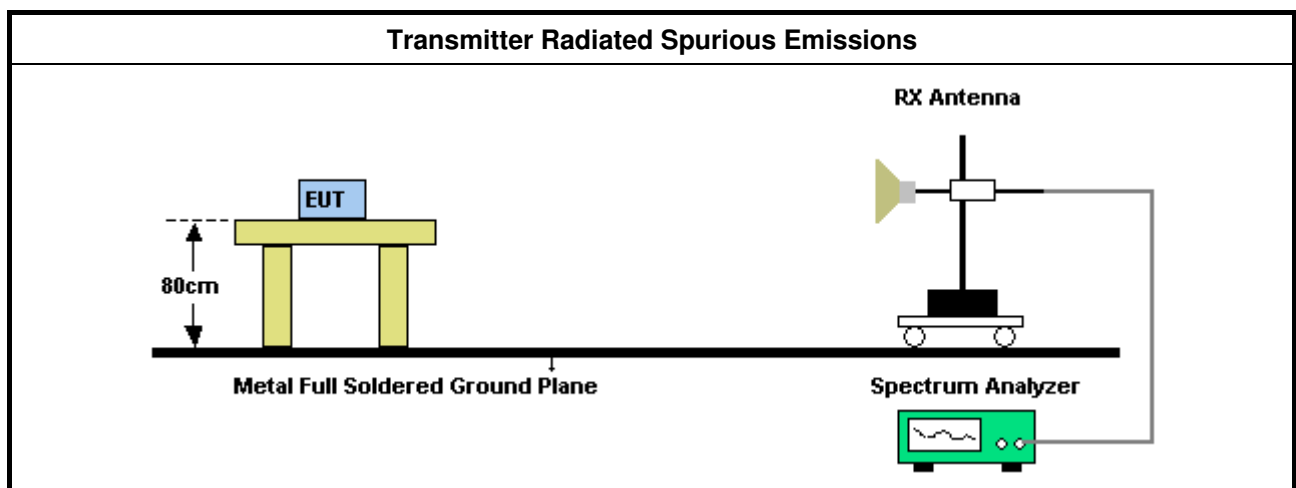
3.4.2 Measuring Instruments

Refer test equipment and calibration data list in test report clause 5.

3.4.3 Test Procedures

Method of measurement:
☒ Refer as ANSI/TIA-603-D-2010, clause 3.2.12 for radiated measurement.
☒ Refer as FCC KDB 412172, using the equation (1) converted test result from EIRP to E-field strength. Then $EIRP (dBm) = E\text{-field strength (dBuV/m at 3m)} - 95.2 \text{ dB}$
☒ In case a narrower measurement bandwidth was used, the following conversion formula has to be applied: (e.g. if reference bandwidth 1 MHz and measurement bandwidth 100 kHz, then measurement bandwidth conversion factor is 10 dB) $B = A + 10 \log (BW_{ref} / BW_{measured})$ • A is the value at the narrower measurement bandwidth; • B is the value referred to the reference bandwidth;

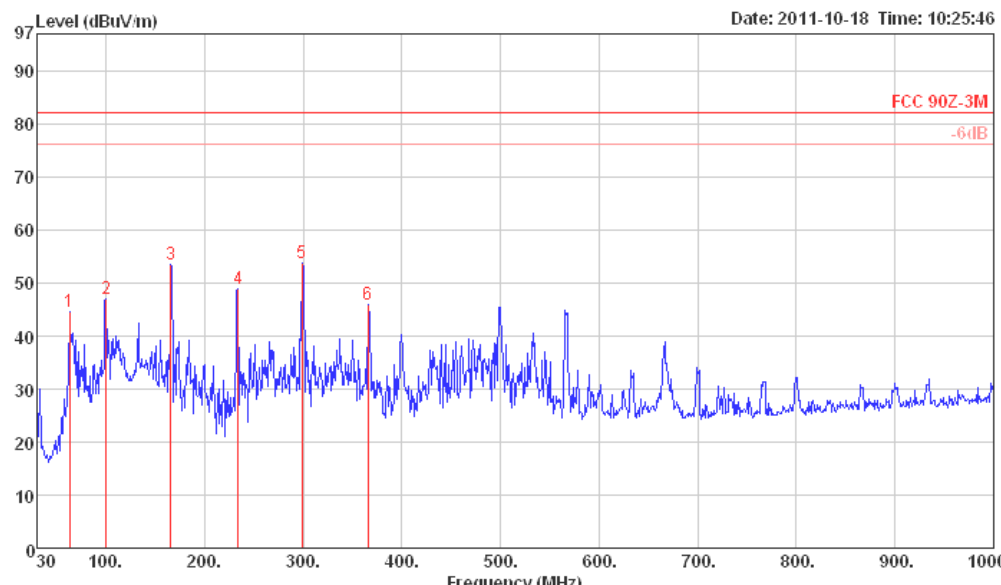
3.4.4 Test Setup



3.4.5 Test Result of Transmitter Radiated Spurious Emissions (Below 1GHz)

Transmitter Radiated Spurious Emissions (Below 1GHz)						
Test Mode	Ant. No.	Power Setting	Operating Mode	Modulation Abbreviations	Test Frequencies (FX)	Pol.
1	1	1	CTX	OFDM-2TX-5	F2	V

Level (dBuV/m) Date: 2011-10-18 Time: 10:25:46



Frequency (MHz)

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	62.98	44.50	82.20	-37.70	64.66	0.86	6.73	27.75	Peak
2	99.84	47.12	82.20	-35.08	62.53	1.20	10.99	27.60	Peak
3	165.80	53.57	82.20	-28.63	66.84	1.53	12.47	27.27	Peak
4	233.70	48.94	82.20	-33.26	62.59	1.83	11.55	27.03	Peak
5	298.69	53.82	82.20	-28.38	65.27	2.10	13.35	26.90	Peak
6	365.62	45.98	82.20	-36.22	55.97	2.23	15.14	27.36	Peak

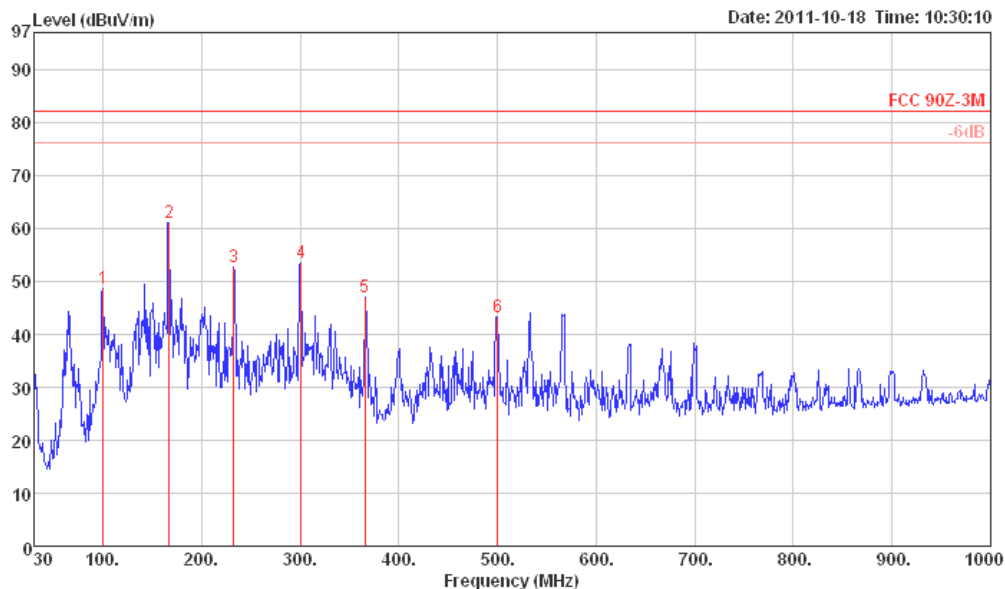
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Below 1GHz)

Test Mode	Ant. No.	Power Setting	Operating Mode	Modulation Abbreviations	Test Frequencies (FX)	Pol.
1	1	1	CTX	OFDM-2TX-5	F2	H



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Remark	Pol/Phase
1	99.84	48.59	82.20	-33.61	64.00	1.20	10.99	27.60	Peak	HORIZONTAL
2	166.77	61.02	82.20	-21.18	74.22	1.53	12.54	27.27	Peak	HORIZONTAL
3	232.73	52.69	82.20	-29.51	66.41	1.83	11.48	27.03	Peak	HORIZONTAL
4	300.63	53.60	82.20	-28.60	65.01	2.10	13.39	26.90	Peak	HORIZONTAL
5	365.62	47.02	82.20	-35.18	57.01	2.23	15.14	27.36	Peak	HORIZONTAL
6	500.45	43.14	82.20	-39.06	50.91	2.70	17.63	28.10	Peak	HORIZONTAL

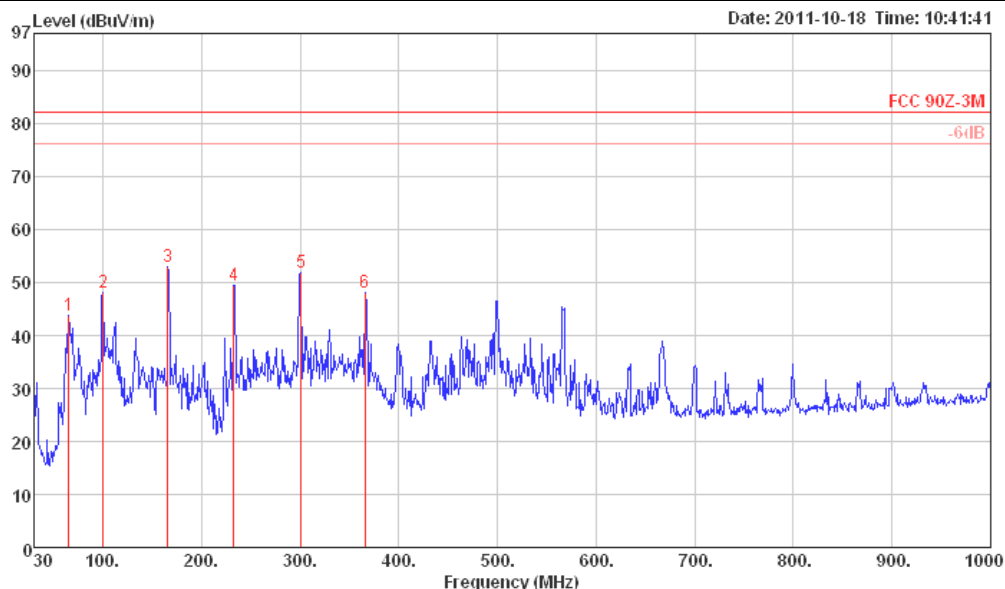
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Below 1GHz)

Test Mode	Ant. No.	Power Setting	Operating Mode	Modulation Abbreviations	Test Frequencies (FX)	Pol.
1	1	1	CTX	OFDM-2TX-10	F2	V



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	64.92	43.79	82.20	-38.41	63.93	0.90	6.70	27.74	Peak	VERTICAL
2	99.84	48.07	82.20	-34.13	63.48	1.20	10.99	27.60	Peak	VERTICAL
3	165.80	52.98	82.20	-29.22	66.25	1.53	12.47	27.27	Peak	VERTICAL
4	232.73	49.56	82.20	-32.64	63.28	1.83	11.48	27.03	Peak	VERTICAL
5	300.63	51.79	82.20	-30.41	63.20	2.10	13.39	26.90	Peak	VERTICAL
6	365.62	48.21	82.20	-33.99	58.20	2.23	15.14	27.36	Peak	VERTICAL

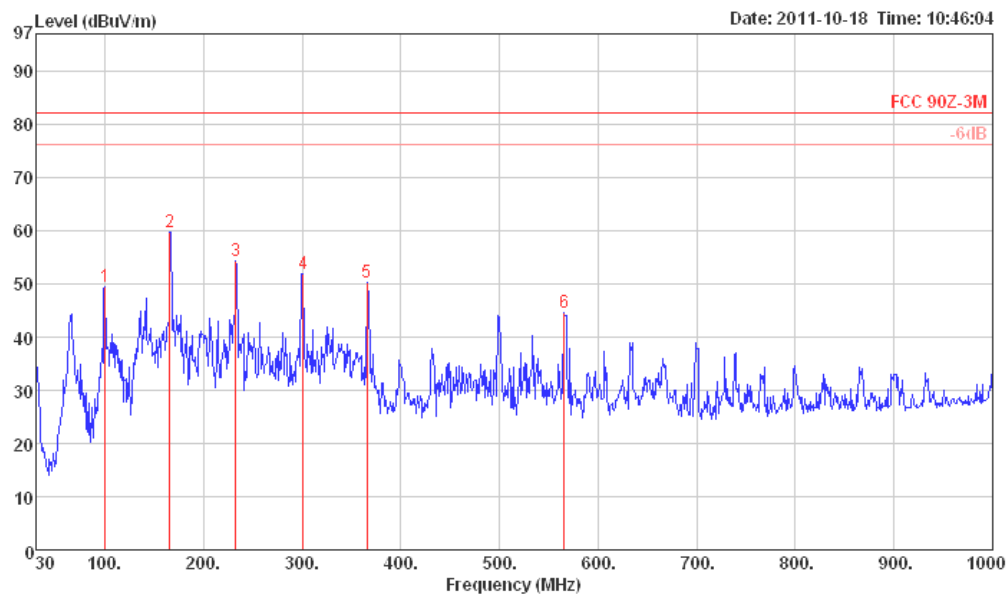
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Below 1GHz)

Test Mode	Ant. No.	Power Setting	Operating Mode	Modulation Abbreviations	Test Frequencies (FX)	Pol.
1	1	1	CTX	OFDM-2TX-10	F2	H



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark
			dBuV/m	dB	dBuV	dB	dB/m	dB	Pol/Phase
1	99.84	49.38	82.20	-32.82	64.79	1.20	10.99	27.60	Peak
2	165.80	59.78	82.20	-22.42	73.05	1.53	12.47	27.27	Peak
3	232.73	54.30	82.20	-27.90	68.02	1.83	11.48	27.03	Peak
4	300.63	51.95	82.20	-30.25	63.36	2.10	13.39	26.90	Peak
5	365.62	50.28	82.20	-31.92	60.27	2.23	15.14	27.36	Peak
6	565.44	44.59	82.20	-37.61	51.49	2.83	18.37	28.10	Peak

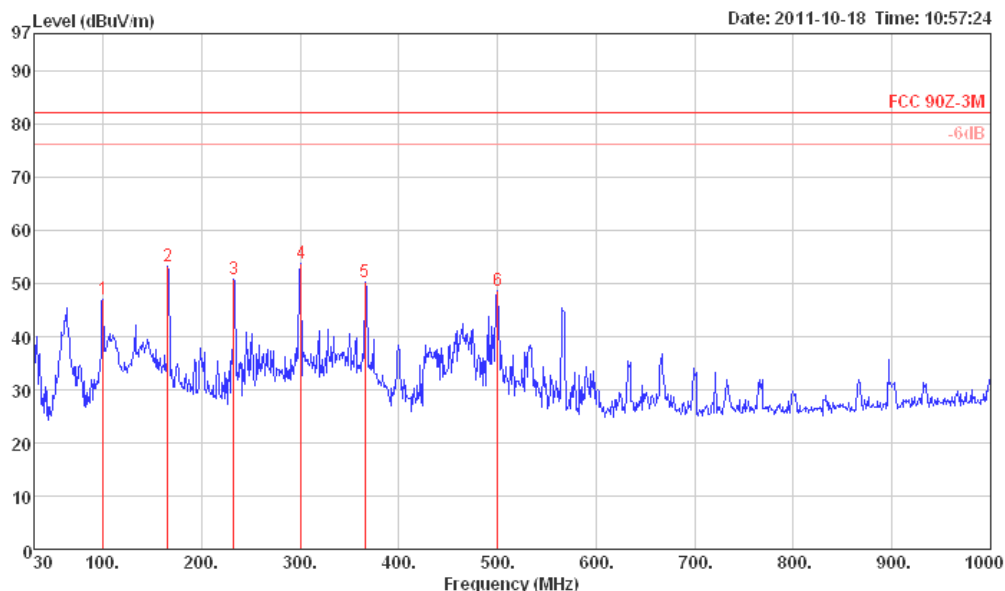
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Below 1GHz)

Test Mode	Ant. No.	Power Setting	Operating Mode	Modulation Abbreviations	Test Frequencies (FX)	Pol.
1	1	1	CTX	OFDM-2TX-20	F2	V



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase
1	99.84	47.14	82.20	-35.06	62.55	1.20	10.99	27.60	Peak	VERTICAL
2	165.80	53.36	82.20	-28.84	66.63	1.53	12.47	27.27	Peak	VERTICAL
3	232.73	50.86	82.20	-31.34	64.58	1.83	11.48	27.03	Peak	VERTICAL
4	300.63	53.79	82.20	-28.41	65.20	2.10	13.39	26.90	Peak	VERTICAL
5	365.62	50.13	82.20	-32.07	60.12	2.23	15.14	27.36	Peak	VERTICAL
6	500.45	48.52	82.20	-33.68	56.29	2.70	17.63	28.10	Peak	VERTICAL

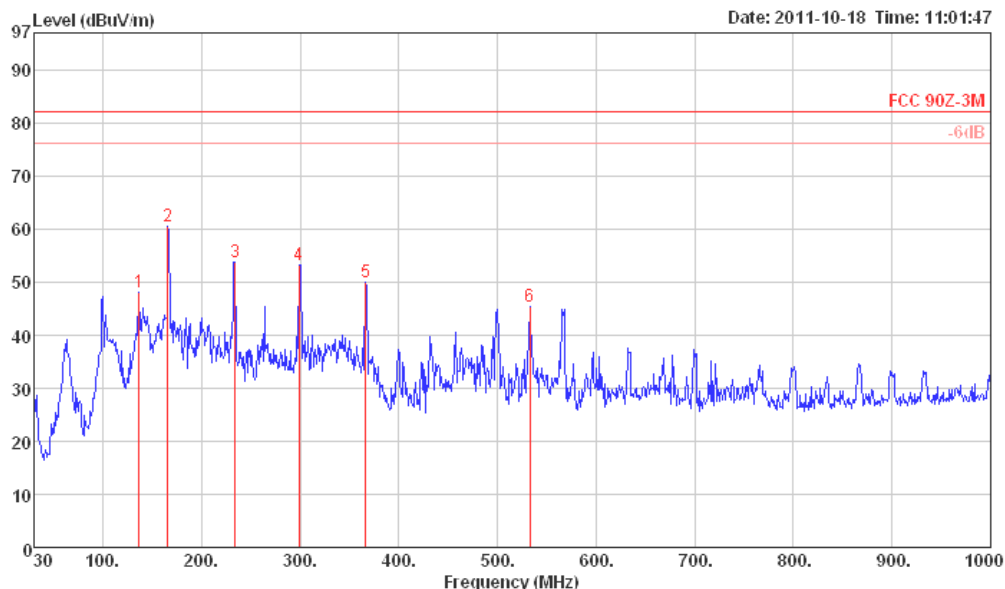
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Below 1GHz)

Test Mode	Ant. No.	Power Setting	Operating Mode	Modulation Abbreviations	Test Frequencies (FX)	Pol.
1	1	1	CTX	OFDM-2TX-20	F2	H



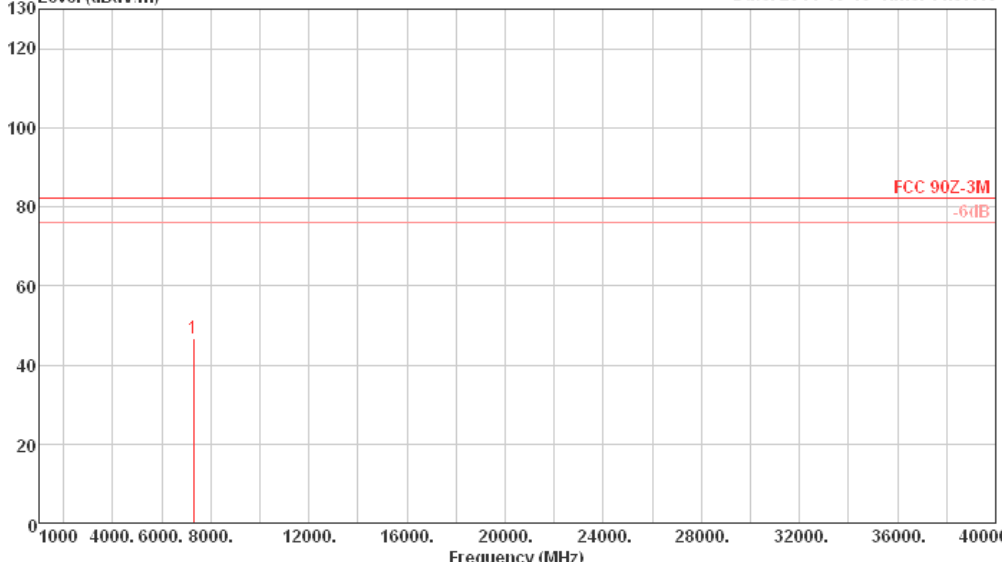
	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase
1	136.70	48.15	82.20	-34.05	61.87	1.37	12.32	27.41	Peak	HORIZONTAL
2	165.80	60.46	82.20	-21.74	73.73	1.53	12.47	27.27	Peak	HORIZONTAL
3	233.70	53.87	82.20	-28.33	67.52	1.83	11.55	27.03	Peak	HORIZONTAL
4	298.69	53.33	82.20	-28.87	64.78	2.10	13.35	26.90	Peak	HORIZONTAL
5	366.59	49.92	82.20	-32.28	59.89	2.23	15.17	27.37	Peak	HORIZONTAL
6	532.46	45.49	82.20	-36.71	52.83	2.76	18.00	28.10	Peak	HORIZONTAL

Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

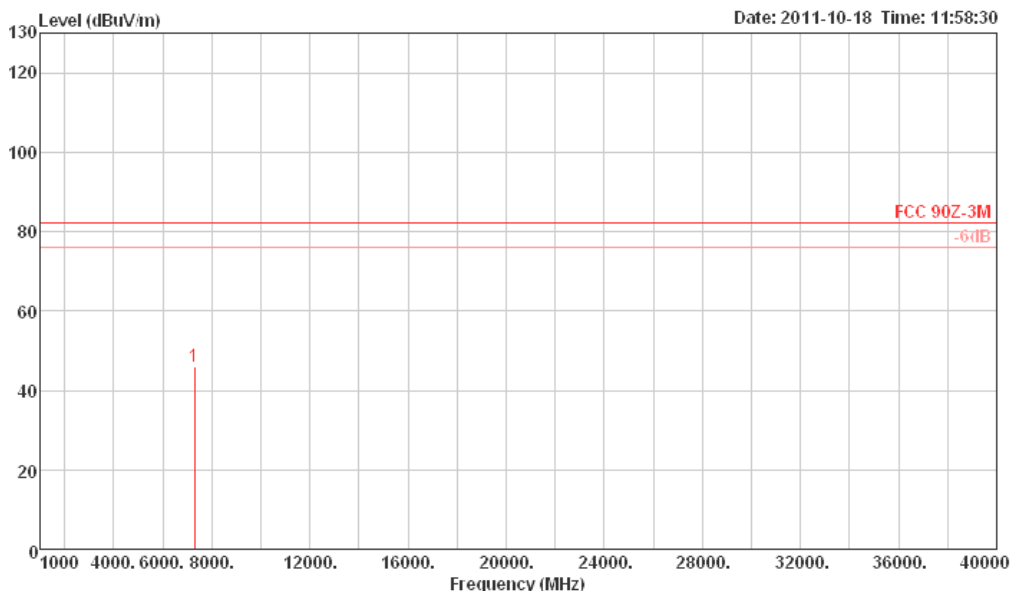
Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

3.4.6 Test Result of Transmitter Radiated Spurious Emissions (Above 1GHz)

Transmitter Radiated Spurious Emissions (Above 1GHz)																																											
Ant. No.	Power Setting	Modulation Abbreviations			Test Frequencies (FX)				Polarization																																		
1	1	OFDM-2TX-5			F1				V																																		
Level (dBuV/m) Date: 2011-10-18 Time: 11:57:48  Frequency (MHz) <table><tr><th></th><th>Freq</th><th>Level</th><th>Limit</th><th>Over</th><th>Read</th><th>Cable</th><th>Antenna</th><th>Preamp</th><th></th><th></th></tr><tr><th></th><th>MHz</th><th>dBuV/m</th><th>dBuV/m</th><th>dB</th><th>dBuV</th><th>Loss</th><th>Factor</th><th>Factor</th><th>Remark</th><th>Pol/Phase</th></tr><tr><td>1</td><td>7308.90</td><td>46.67</td><td>82.20</td><td>-35.53</td><td>40.23</td><td>5.36</td><td>36.51</td><td>35.43</td><td>Peak</td><td>VERTICAL</td></tr></table>												Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp				MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase	1	7308.90	46.67	82.20	-35.53	40.23	5.36	36.51	35.43	Peak	VERTICAL
	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp																																			
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase																																	
1	7308.90	46.67	82.20	-35.53	40.23	5.36	36.51	35.43	Peak	VERTICAL																																	
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit. Note 2: "N/F" means Nothing Found (No spurious emissions were detected.) Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)																																											

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-5	F1	H



	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	
1	7308.34	46.07	82.20	-36.13	39.63	5.36	36.51	35.43 Peak	HORIZONTAL

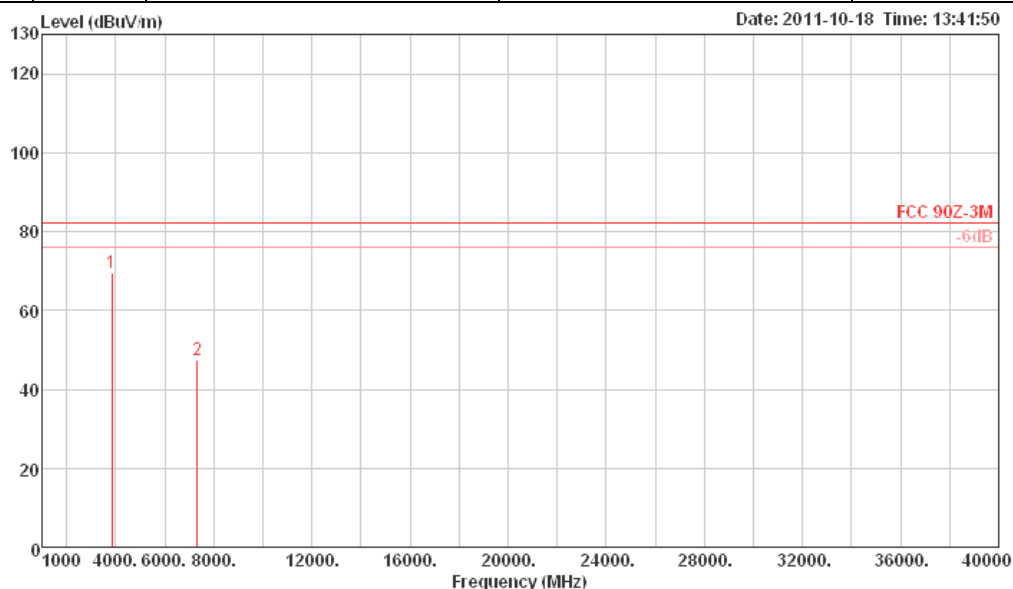
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-5	F2	V



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	3843.35	69.54	82.20	-12.66	69.24	3.36	32.14	35.20	Peak
2	7316.22	47.37	82.20	-34.83	40.92	5.37	36.51	35.43	Peak

1	3843.35	69.54	82.20	-12.66	69.24	3.36	32.14	35.20	Peak	VERTICAL
2	7316.22	47.37	82.20	-34.83	40.92	5.37	36.51	35.43	Peak	VERTICAL

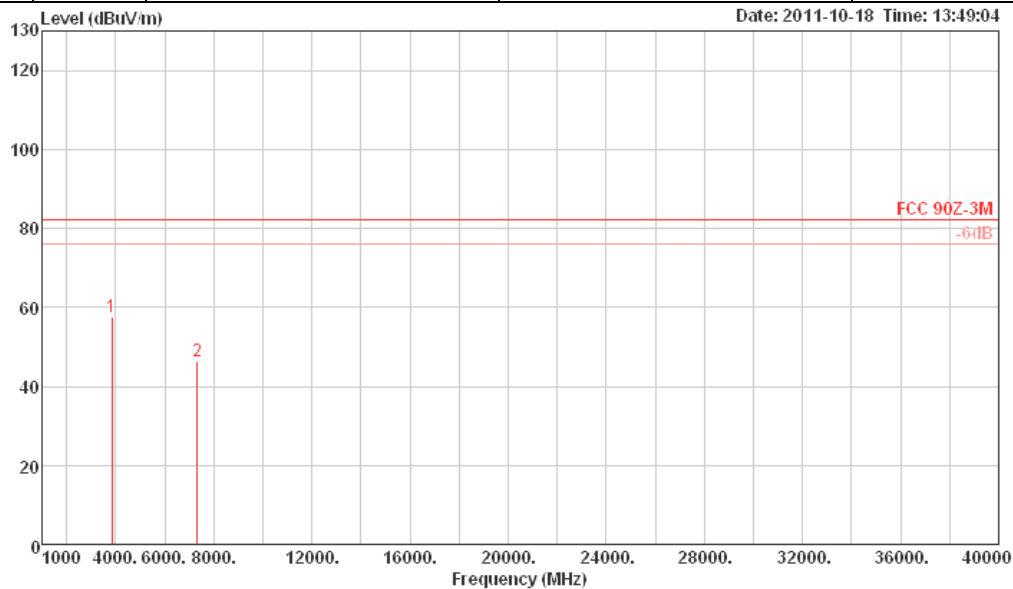
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-5	F2	H



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Pol/Phase
1	3843.40	57.53	82.20	-24.67	57.23	3.36	32.14	35.20	Peak HORIZONTAL
2	7316.77	46.19	82.20	-36.01	39.74	5.37	36.51	35.43	Peak HORIZONTAL

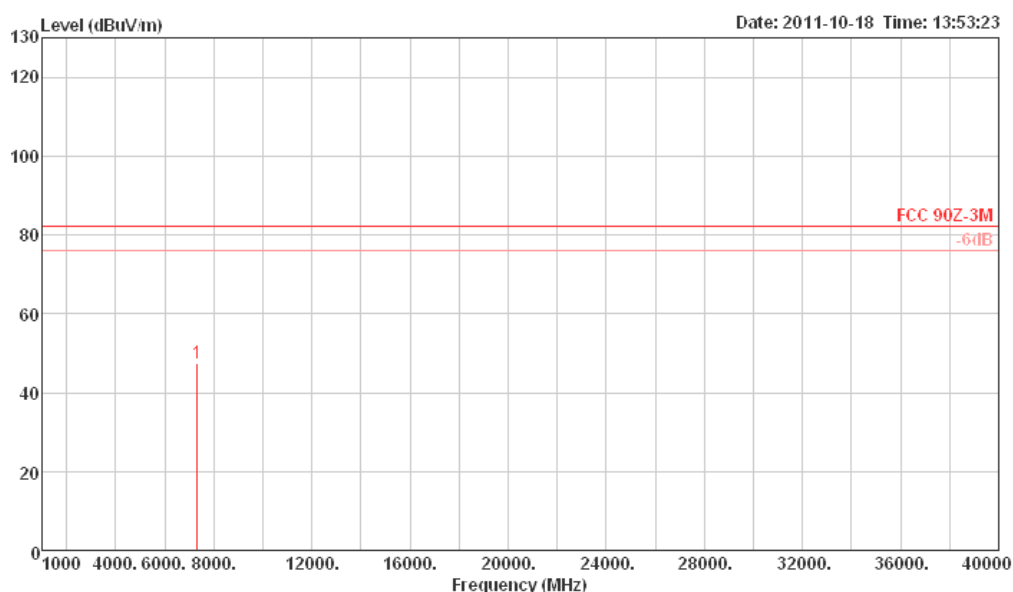
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-5	F3	V



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	7341.84	47.45	82.20	-34.75	40.95	5.38	36.56	35.44	Peak

VERTICAL

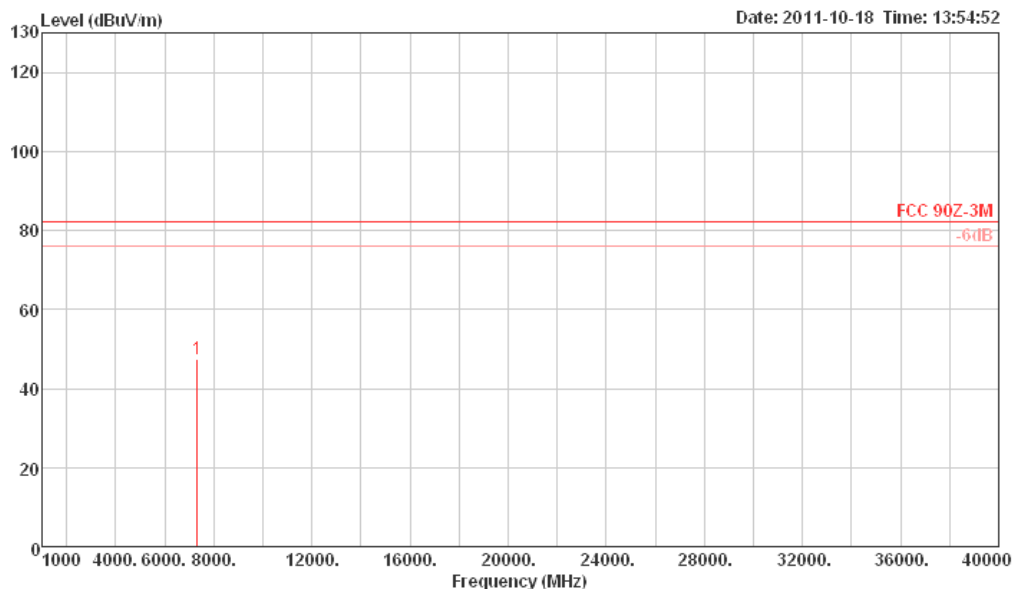
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-5	F3	H



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
1	7337.96	47.60	82.20	-34.60	41.13	5.38	36.53	35.44	Peak

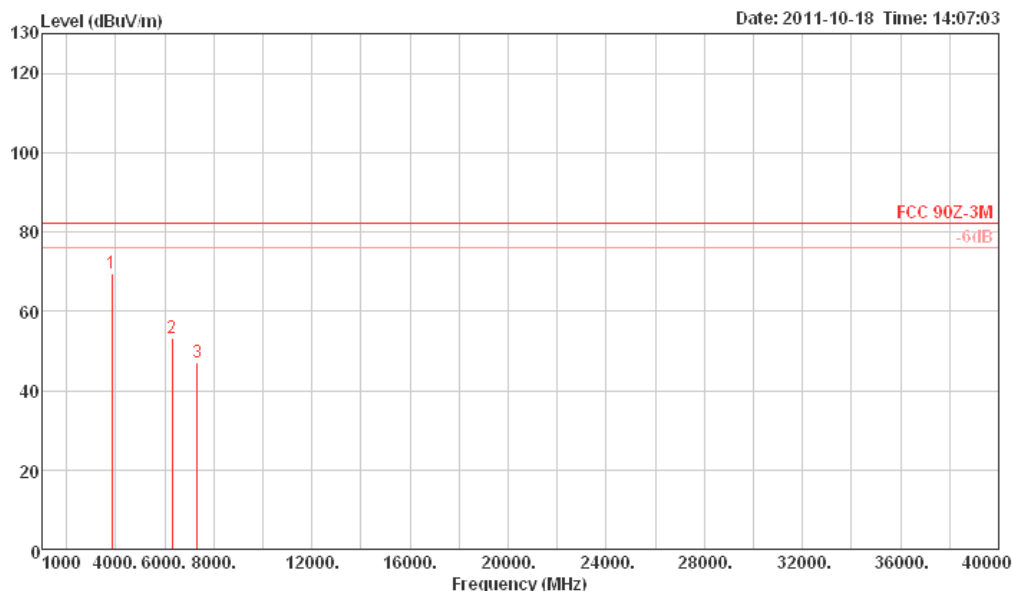
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-10	F1	V



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Remark	Pol/Phase
1	3843.32	69.48	82.20	-12.72	69.18	3.36	32.14	35.20	Peak	VERTICAL
2	6319.82	53.15	82.20	-29.05	48.70	4.68	35.03	35.26	Peak	VERTICAL
3	7318.29	46.92	82.20	-35.28	40.47	5.37	36.51	35.43	Peak	VERTICAL

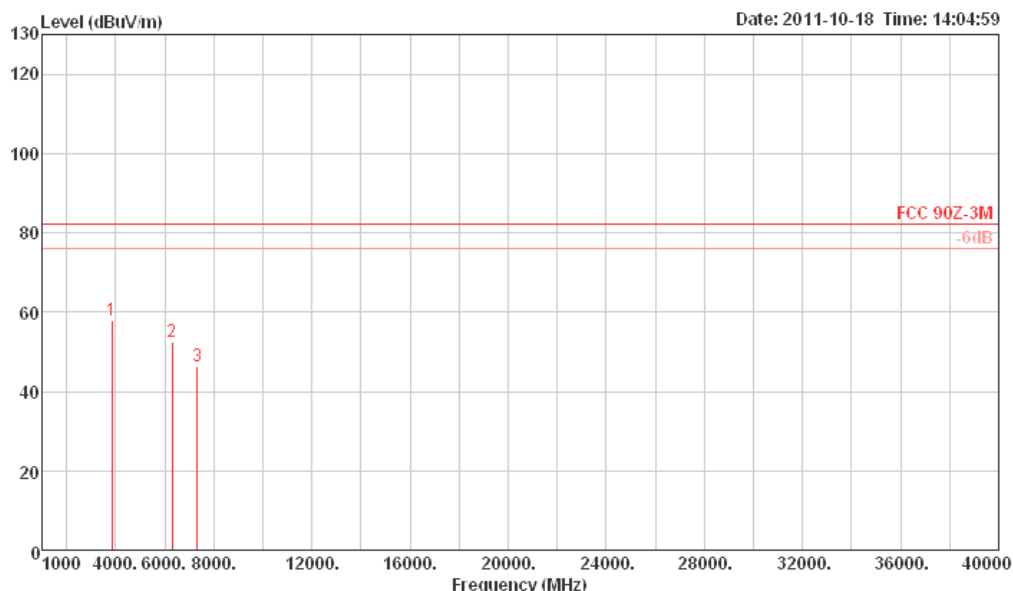
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-10	F1	H



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase
1	3843.32	57.89	82.20	-24.31	57.59	3.36	32.14	35.20	Peak	HORIZONTAL
2	6319.82	52.33	82.20	-29.87	47.88	4.68	35.03	35.26	Peak	HORIZONTAL
3	7319.23	46.38	82.20	-35.82	39.93	5.37	36.51	35.43	Peak	HORIZONTAL

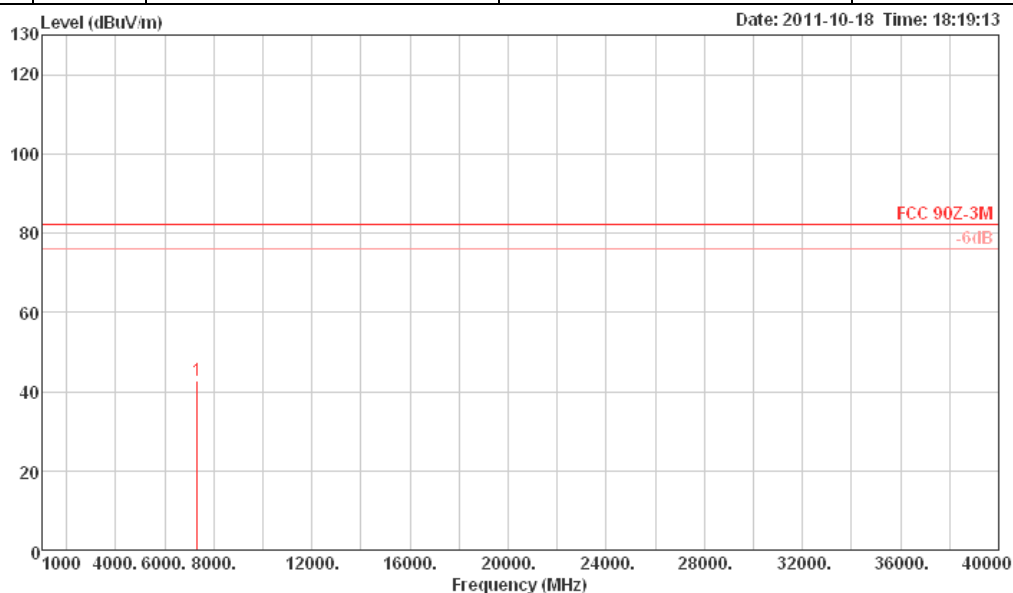
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-10	F2	V



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss Factor	Factor	Remark	Pol/Phase
1	7324.83	42.82	82.20	-39.38	36.35	5.37	36.53	35.43 Peak	VERTICAL

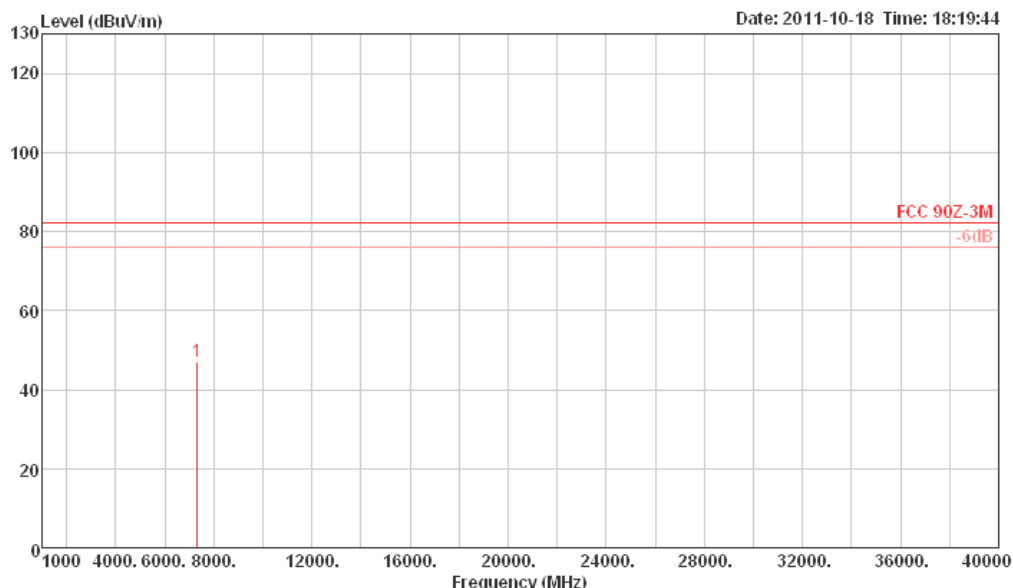
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-10	F2	H



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	7324.70	47.22	82.20	-34.98	40.75	5.37	36.53	35.43	Peak
									HORIZONTAL

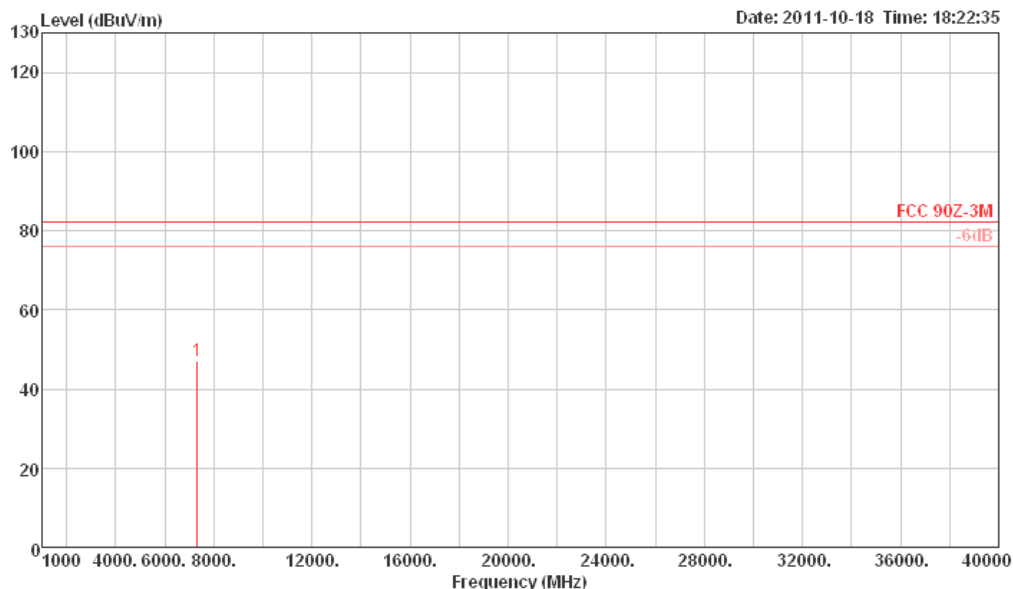
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-10	F3	V



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	7326.92	47.03	82.20	-35.17	40.56	5.37	36.53	35.43	Peak VERTICAL

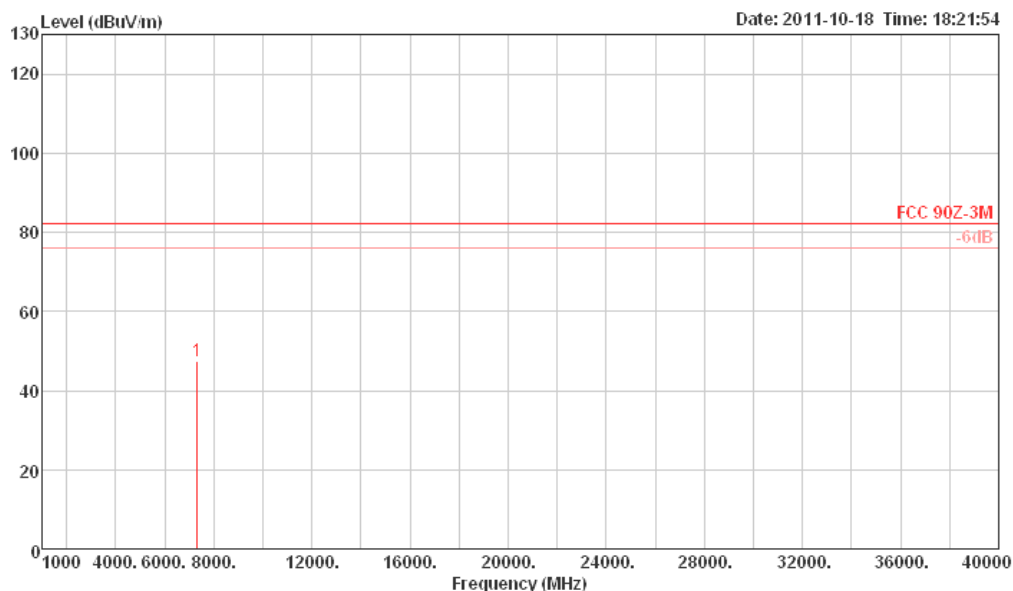
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-10	F3	H



Freq	Level	Limit	Over	Read	CableAntenna	Preamp			
MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase
1	7335.06	47.55	82.20	-34.65	41.09	5.37	36.53	35.44 Peak	HORIZONTAL

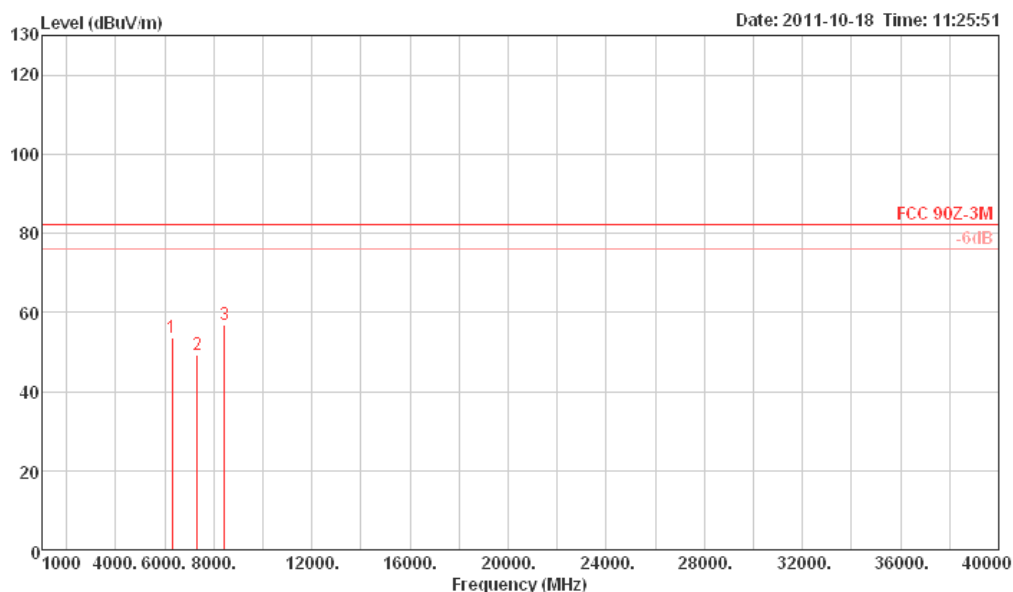
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-20	F2	V



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		
	MHz	dBuV/m	dBuV/m	Limit	Level	Loss	Factor	Factor	Remark	Pol/Phase
				dB	dBuV	dB	dB/m	dB		
1	6319.83	53.65	82.20	-28.55	49.20	4.68	35.03	35.26	Peak	VERTICAL
2	7327.72	49.35	82.20	-32.85	42.88	5.37	36.53	35.43	Peak	VERTICAL
3	8426.38	56.84	82.20	-25.36	48.73	6.18	37.43	35.50	Peak	VERTICAL

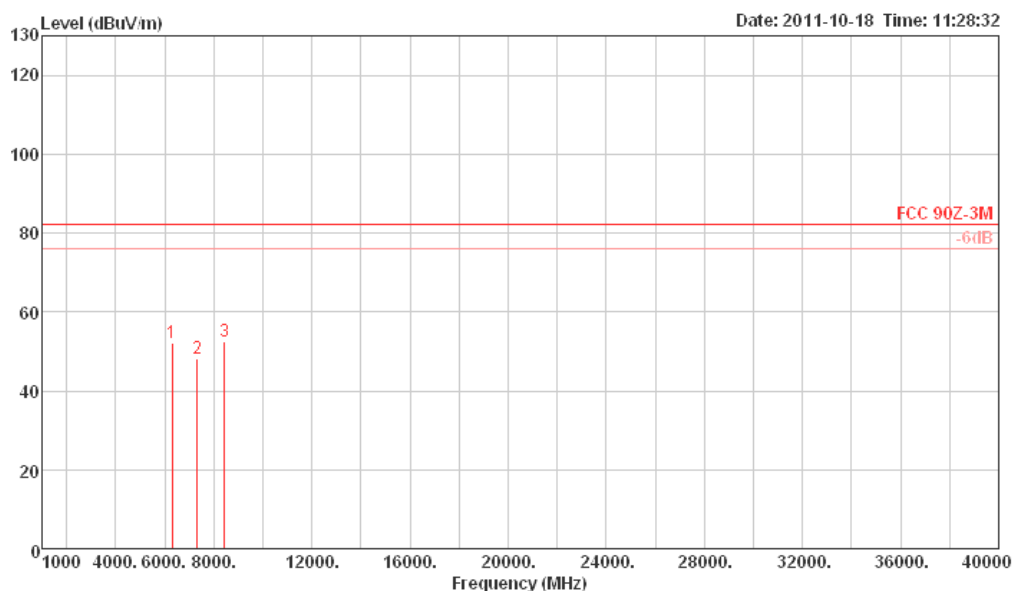
Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Spurious Emissions (Above 1GHz)

Ant. No.	Power Setting	Modulation Abbreviations	Test Frequencies (FX)	Polarization
1	1	OFDM-2TX-20	F2	H



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	Limit	Level	Loss	Factor	Factor	Remark
				dB	dBuV	dB	dB/m	dB	
1	6319.75	52.10	82.20	-30.10	47.65	4.68	35.03	35.26	Peak
2	7324.80	48.29	82.20	-33.91	41.82	5.37	36.53	35.43	Peak
3	8426.40	52.39	82.20	-29.81	44.28	6.18	37.43	35.50	Peak

HORIZONTAL

HORIZONTAL

HORIZONTAL

Note 1: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit.

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

Note 3: Receive antenna of polarization: H (Horizontal), V (Vertical)

3.5 Transmitter Conducted Spurious Emissions

3.5.1 Limit of Transmitter Conducted Spurious Emissions

Transmitter Conducted Spurious Emissions

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB (-13dBm). Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

NOTE: For the applicable limit, see FCC 90.1323

3.5.2 Measuring Instruments

Refer test equipment and calibration data list in test report clause 5.

3.5.3 Test Procedures

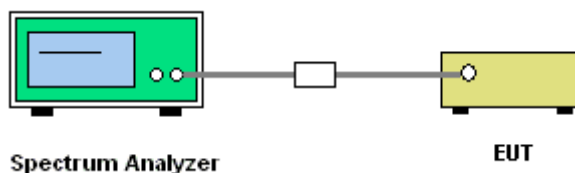
Method of measurement:

- ☒ Refer as ANSI/TIA-603-D-2010, clause 3.2.13 for conducted measurement.
- ☒ Refer as FCC KDB 662911, spurious emission measurements is absolute limits. Spurious emissions must be tested against absolute limits using techniques (1) or (2). (1) Measure and sum the spectra across the transmitter outputs. (2) Measure and add $10 \log (N)$ dB.
 - ☐ If using techniques (1), then measure and sum the spectra across the transmitter outputs.
 - ☒ If using techniques (2) and N transmitter outputs, then spurious emissions limits on each individual output. Measure and add $10 \log (N)$ dB.
- ☒ In case a narrower measurement bandwidth was used, the following conversion formula has to be applied: (e.g. if reference bandwidth 1 MHz and measurement bandwidth 100 kHz, then measurement bandwidth conversion factor is 10 dB)

$$B = A + 10 \log (BW_{ref} / BW_{measured})$$
 - A is the value at the narrower measurement bandwidth;
 - B is the value referred to the reference bandwidth;

3.5.4 Test Setup

Transmitter Conducted Spurious Emissions



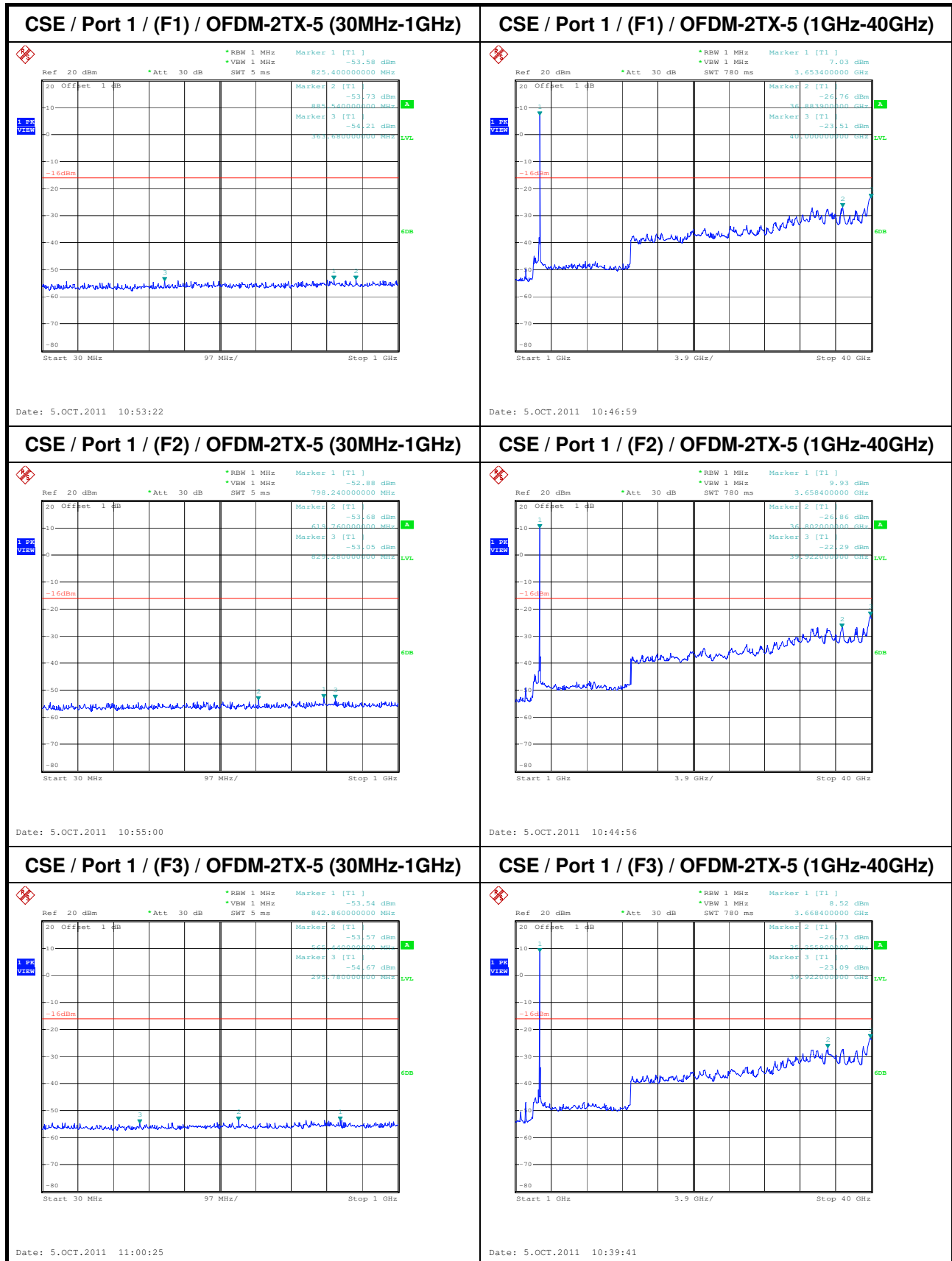
3.5.5 Test Result of Transmitter Conducted Spurious Emissions

Transmitter Conducted Spurious Emissions - Power Setting 1 (Ant No. 1)									
Worst Case Mode Abbreviations	Test Freq. (FX)	Conducted Spurious Emissions (dBm)					RBW Conversion Factor (dB)	Each Individual Output Factor (dB)	Limit (dBm)
		Port 1	Port 2	Port 3	Port 4	Total			
OFDM-2TX-5	F1	-53.58	-53.64	N/A	N/A	N/A	N/A	3.00	-16
OFDM-2TX-5	F2	-53.05	-53.36	N/A	N/A	N/A	N/A	3.00	-16
OFDM-2TX-5	F3	-53.54	-52.75	N/A	N/A	N/A	N/A	3.00	-16
OFDM-2TX-10	F1	-53.35	-53.64	N/A	N/A	N/A	N/A	3.00	-16
OFDM-2TX-10	F2	-53.30	-53.25	N/A	N/A	N/A	N/A	3.00	-16
OFDM-2TX-10	F3	-53.76	-53.67	N/A	N/A	N/A	N/A	3.00	-16
OFDM-2TX-20	F2	-54.18	-53.87	N/A	N/A	N/A	N/A	3.00	-16
Test Result		Complied							
Note 1: antenna no., directional gain and power setting define in test report clause 1.1.2 and 2.3.									
Note 2: worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.									
Note 3: worst case RF conducted test define in test report clause 2.4.									
Note 4: EUT have 2 transmitter outputs (port 1 - port 2).									
Note 5: Using techniques (2) and 2 transmitter outputs, then spurious emissions limits on each individual output = -16 dBm [-13 dBm – 10 log (2)].									

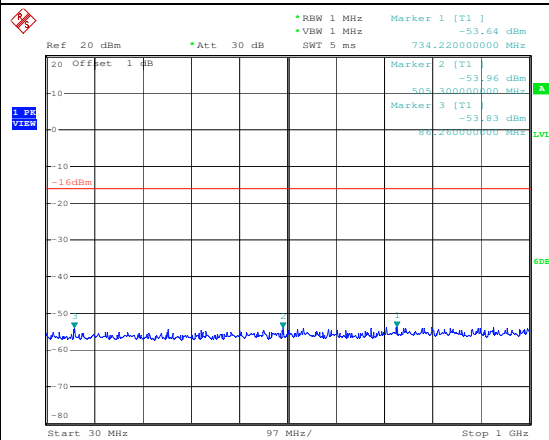
3.5.6 Test Result of Transmitter Bandedge Emissions

Transmitter Bandedge Emissions - Power Setting 1 (Ant No. 1)									
Worst Case Mode Abbreviations	Test Freq. (FX)	Bandedge Emissions (dBm)					RBW Conversion Factor (dB)	Each Individual Output Factor (dB)	Limit (dBm)
		Port 1	Port 2	Port 3	Port 4	Total			
OFDM-2TX-5	F1	-26.11	-26.28	N/A	N/A	N/A	10	3.00	-26
OFDM-2TX-5	F3	-37.95	-38.91	N/A	N/A	N/A	10	3.00	-26
OFDM-2TX-10	F1	-26.58	-32.14	N/A	N/A	N/A	10	3.00	-26
OFDM-2TX-10	F3	-26.28	-30.64	N/A	N/A	N/A	10	3.00	-26
OFDM-2TX-20	F2	-26.49	-31.35	N/A	N/A	N/A	10	3.00	-26
OFDM-2TX-20	F2	-26.22	-29.15	N/A	N/A	N/A	10	3.00	-26
Test Result		Complied							
Note 1: antenna no., directional gain and power setting define in test report clause 1.1.2 and 2.3.									
Note 2: worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.									
Note 3: worst case RF conducted test define in test report clause 2.4.									
Note 4: EUT have 2 transmitter outputs (port 1 - port 2).									
Note 5: Using techniques (2) and 2 transmitter outputs, then spurious emissions limits on each individual output = -16 dBm [-13 dBm – 10 log (2)]. Then -16dBm in 1 MHz (corrected by 10 log (100 kHz/1 MHz)) yields -26dBm in 100 kHz.									

3.5.7 Transmitter Conducted Spurious Emissions Plots for Power Setting 1 (Ant.1)

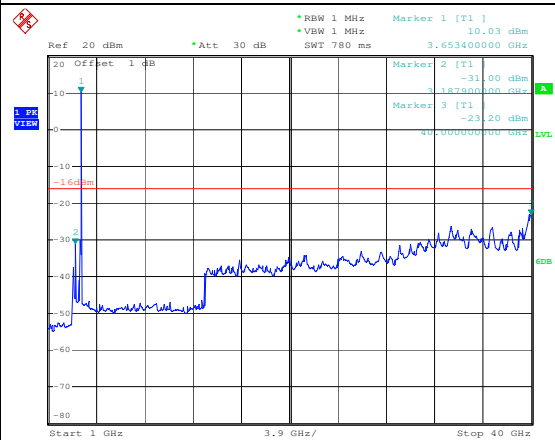


CSE / Port 2 / (F1) / OFDM-2TX-5 (30MHz-1GHz)



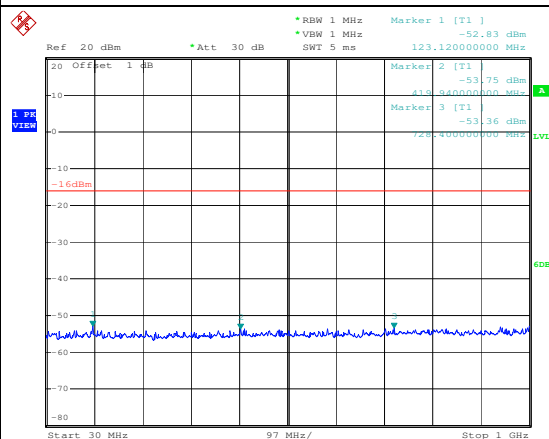
Date: 5.OCT.2011 10:51:36

CSE / Port 2 / (F1) / OFDM-2TX-5 (1GHz-40GHz)



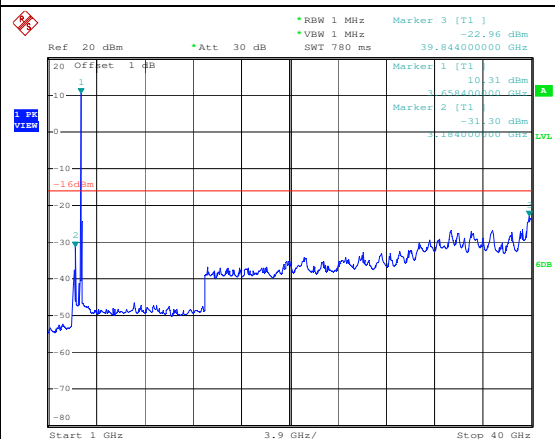
Date: 5.OCT.2011 10:49:12

CSE / Port 2 / (F2) / OFDM-2TX-5 (30MHz-1GHz)



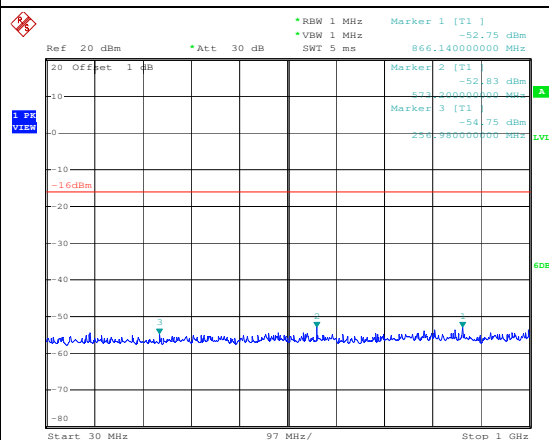
Date: 5.OCT.2011 10:57:48

CSE / Port 2 / (F2) / OFDM-2TX-5 (1GHz-40GHz)



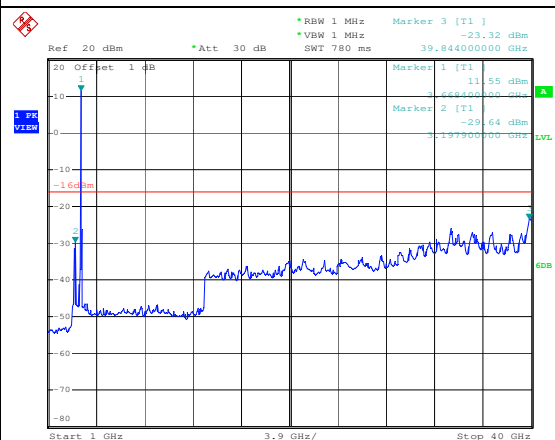
Date: 5.OCT.2011 10:43:24

CSE / Port 2 / (F3) / OFDM-2TX-5 (30MHz-1GHz)



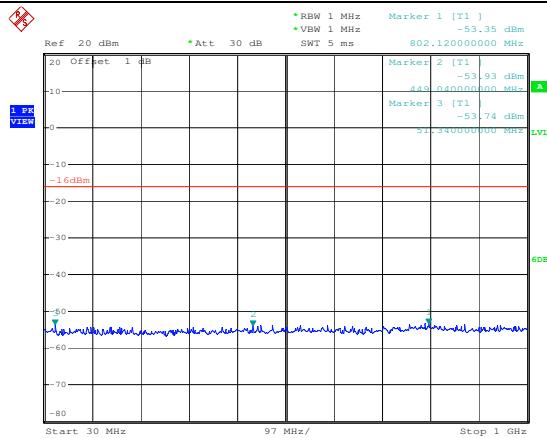
Date: 5.OCT.2011 10:59:06

CSE / Port 2 / (F3) / OFDM-2TX-5 (1GHz-40GHz)



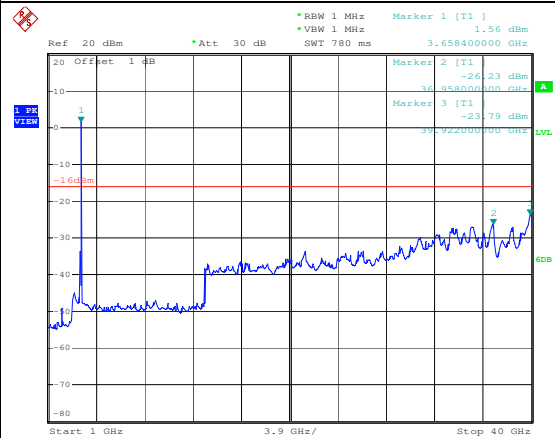
Date: 5.OCT.2011 10:41:37

CSE / Port 1 / (F1) / OFDM-2TX-10 (30MHz-1GHz)



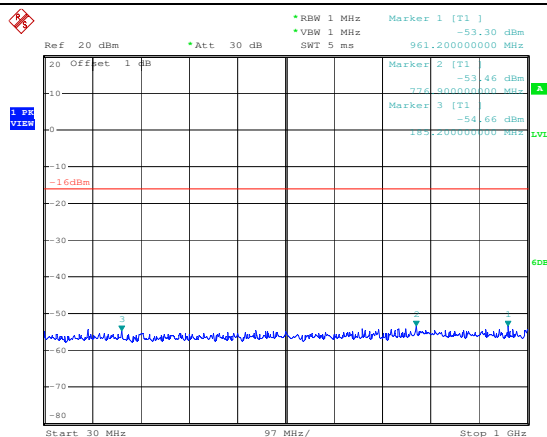
Date: 5.OCT.2011 11:05:32

CSE / Port 1 / (F1) / OFDM-2TX-10 (1GHz-40GHz)



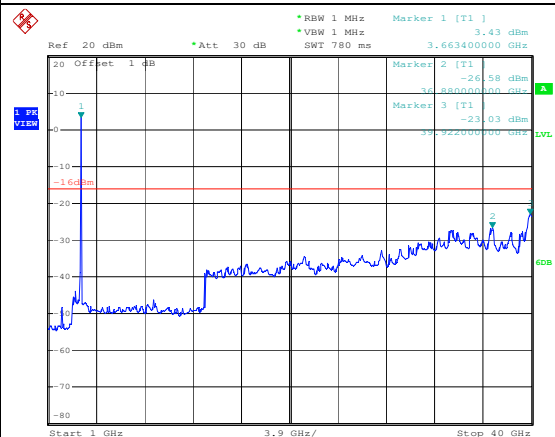
Date: 5.OCT.2011 11:08:03

CSE / Port 1 / (F2) / OFDM-2TX-10 (30MHz-1GHz)



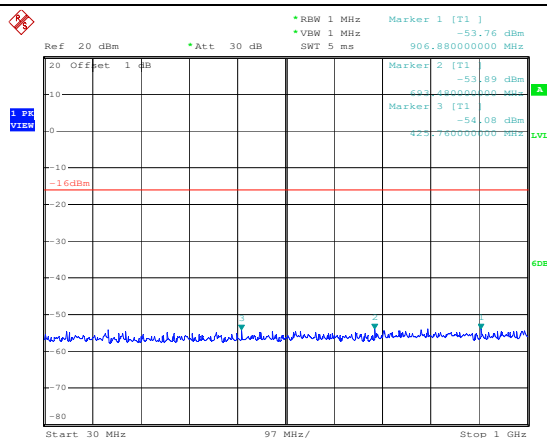
Date: 5.OCT.2011 11:17:15

CSE / Port 1 / (F2) / OFDM-2TX-10 (1GHz-40GHz)



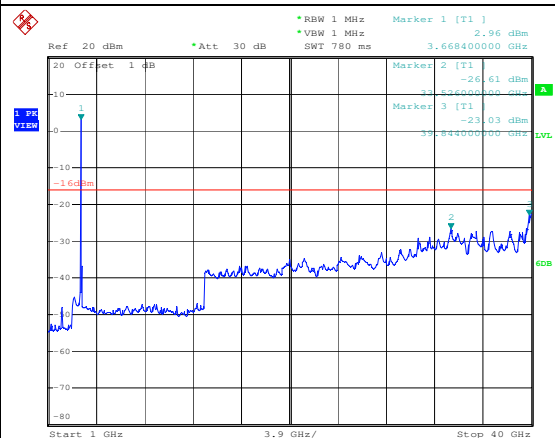
Date: 5.OCT.2011 11:18:20

CSE / Port 1 / (F3) / OFDM-2TX-10 (30MHz-1GHz)



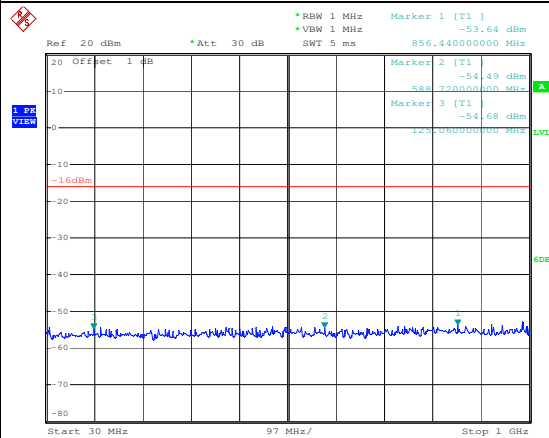
Date: 5.OCT.2011 11:21:45

CSE / Port 1 / (F3) / OFDM-2TX-10 (1GHz-40GHz)



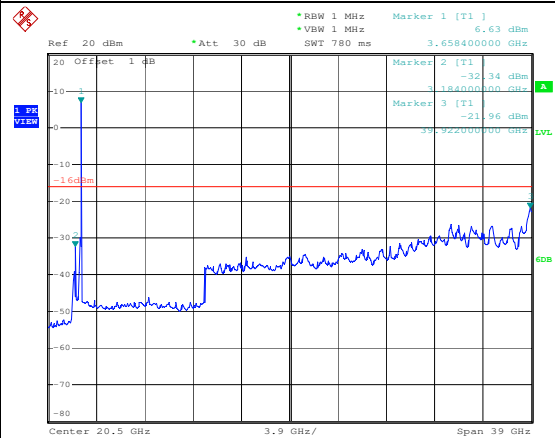
Date: 5.OCT.2011 11:20:56

CSE / Port 2 / (F1) / OFDM-2TX-10 (30MHz-1GHz)



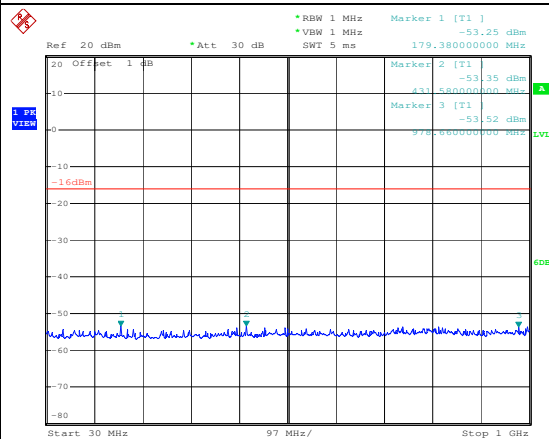
Date: 5.OCT.2011 11:13:03

CSE / Port 2 / (F1) / OFDM-2TX-10 (1GHz-40GHz)



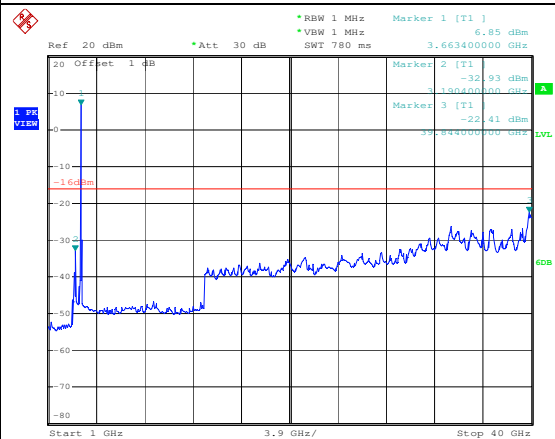
Date: 5.OCT.2011 11:12:04

CSE / Port 2 / (F2) / OFDM-2TX-10 (30MHz-1GHz)



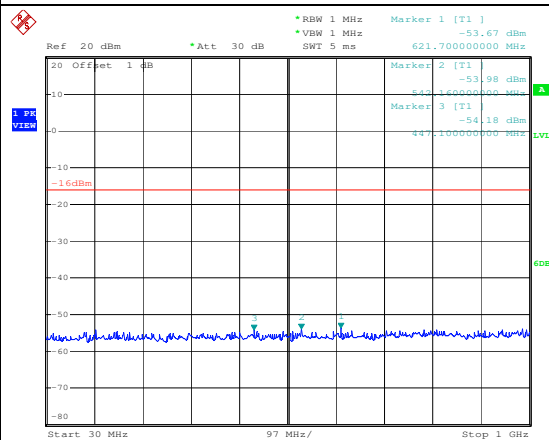
Date: 5.OCT.2011 11:15:45

CSE / Port 2 / (F2) / OFDM-2TX-10 (1GHz-40GHz)



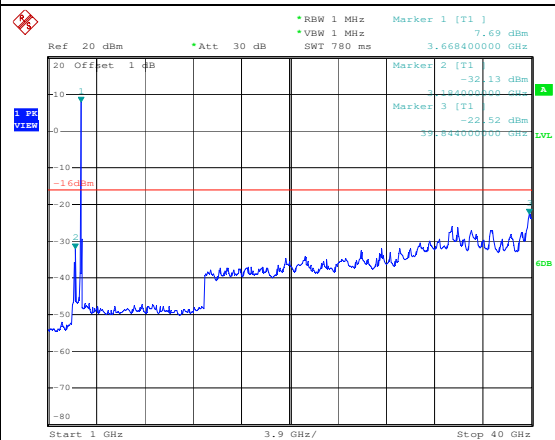
Date: 5.OCT.2011 11:14:22

CSE / Port 2 / (F3) / OFDM-2TX-10 (30MHz-1GHz)



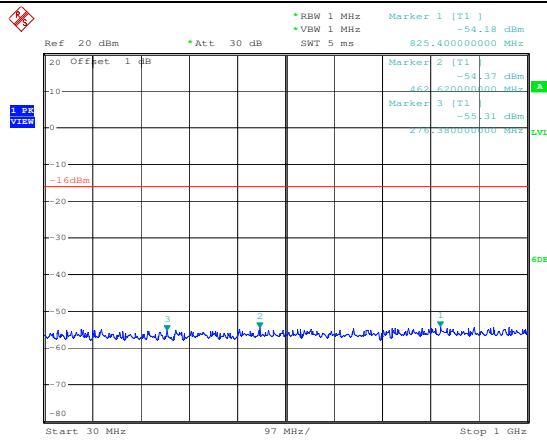
Date: 5.OCT.2011 11:23:14

CSE / Port 2 / (F3) / OFDM-2TX-10 (1GHz-40GHz)



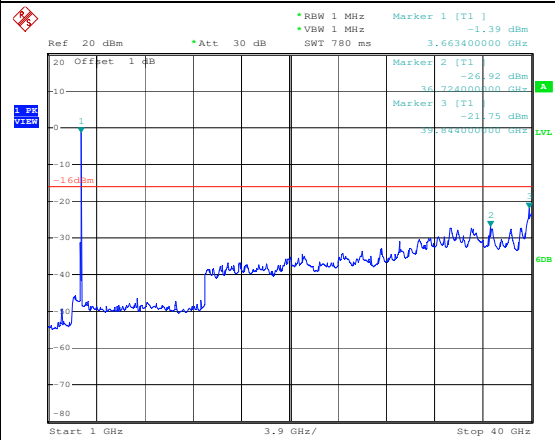
Date: 5.OCT.2011 11:24:32

CSE / Port 1 / (F2) / OFDM-2TX-20 (30MHz-1GHz)



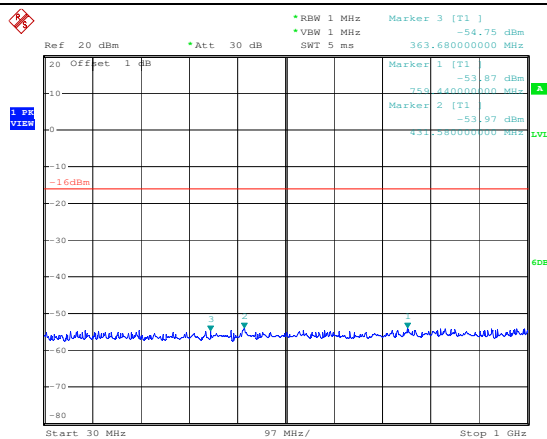
Date: 5.OCT.2011 11:30:10

CSE / Port 1 / (F2) / OFDM-2TX-20 (1GHz-40GHz)



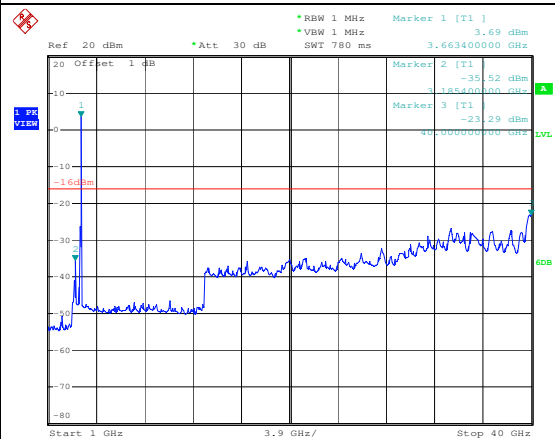
Date: 5.OCT.2011 11:31:19

CSE / Port 2 / (F2) / OFDM-2TX-20 (30MHz-1GHz)



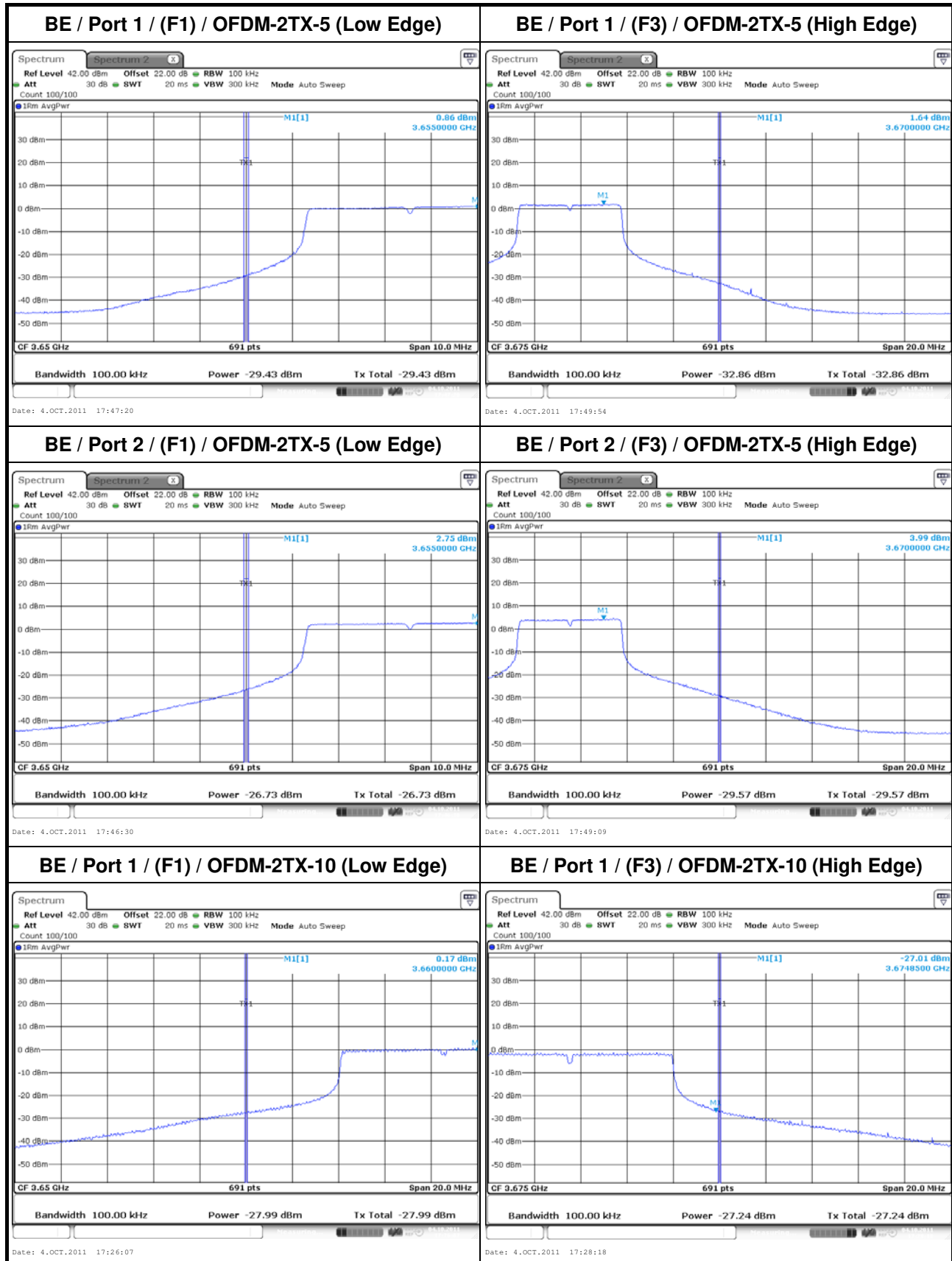
Date: 5.OCT.2011 11:28:48

CSE / Port 2 / (F2) / OFDM-2TX-20 (1GHz-40GHz)

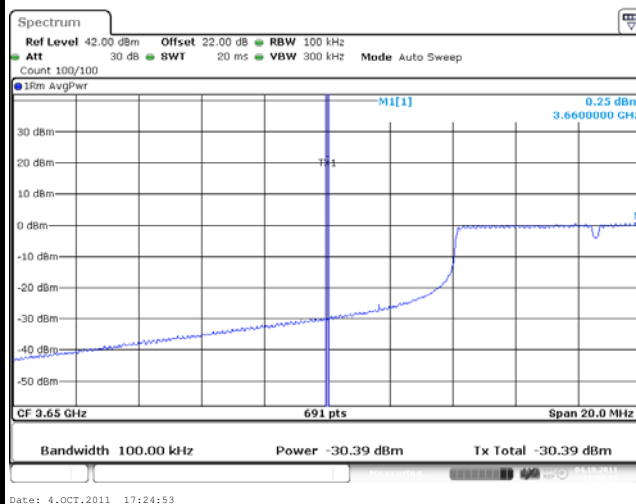


Date: 5.OCT.2011 11:27:55

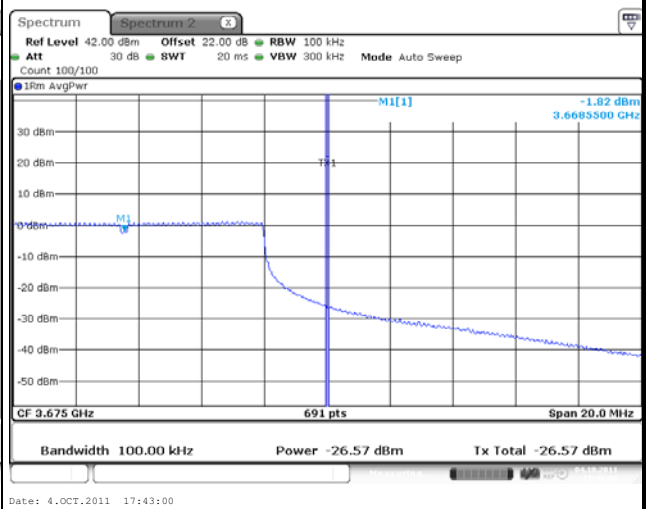
3.5.8 Transmitter Bandedge Emissions Plots for Power Setting 1 (Ant.1)



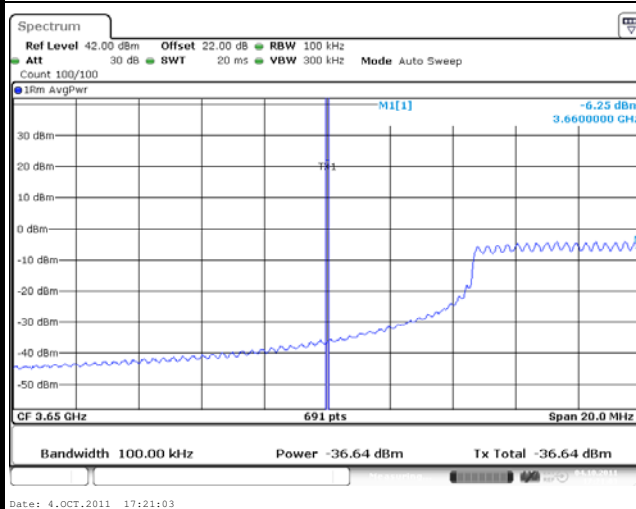
BE / Port 2 / (F1) / OFDM-2TX-10 (Low Edge)



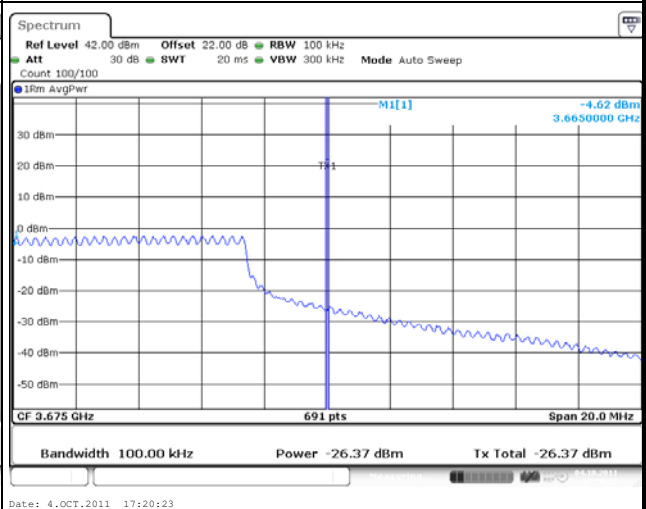
BE / Port 2 / (F3) / OFDM-2TX-10 (High Edge)



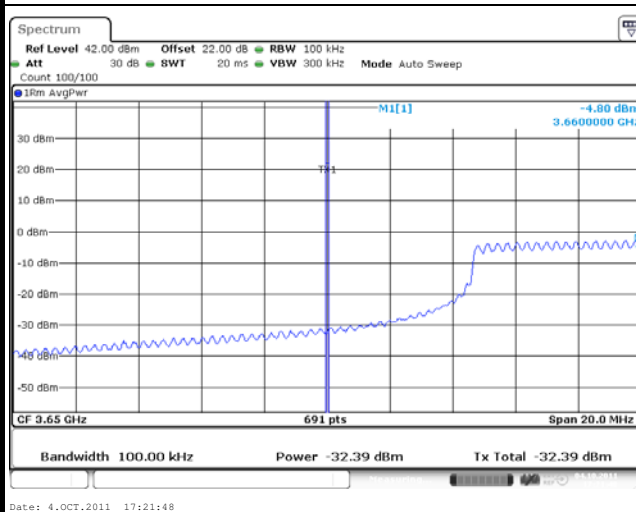
BE / Port 1 / (F2) / OFDM-2TX-20 (Low Edge)



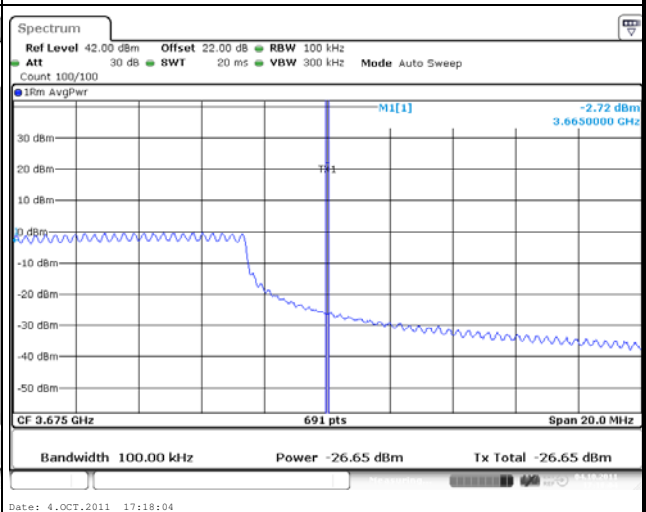
BE / Port 1 / (F2) / OFDM-2TX-20 (High Edge)



BE / Port 2 / (F2) / OFDM-2TX-20 (Low Edge)



BE / Port 2 / (F2) / OFDM-2TX-20 (High Edge)



3.6 Spectrum Mask Emissions

3.6.1 Limit of Spectrum Mask Emissions

Spectrum Mask Emissions (Mask B)	
Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:	
(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.	
(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.	
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.	
Note: For the applicable limit, see FCC 90.210	

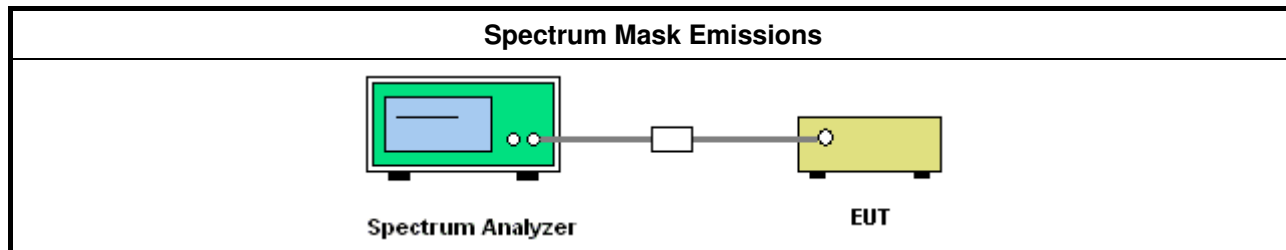
3.6.2 Measuring Instruments

Refer test equipment and calibration data list in test report clause 5.

3.6.3 Test Procedures

Method of measurement:	
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.11 for sideband measurement.
☐	Refer as FCC KDB 662911, emission mask measurements is absolute limits. Emission mask must be tested against absolute limits using techniques (1) or (2). (1) Measure and sum the spectra across the transmitter outputs. (2) Measure and add $10 \log (N)$ dB. ☐ If using techniques (1), then measure and sum the spectra across the transmitter outputs. ☐ If using techniques (2) and N transmitter outputs, then emission mask limits on each individual output. Measure and add $10 \log (N)$ dB.
☒	Refer as FCC KDB 662911, emission mask measurements is relative emission limits. When testing emission mask against relative emission limits, tests may be performed on each output individually without summing or adding $10 \log (N)$ if the measurements are made relative to the in-band emissions on the individual outputs.
☐	In case a narrower measurement bandwidth was used, the following conversion formula has to be applied: (e.g. if reference bandwidth 1 MHz and measurement bandwidth 100 kHz, then measurement bandwidth conversion factor is 10 dB) $B = A + 10 \log (BW_{ref} / BW_{measured})$ • A is the value at the narrower measurement bandwidth; • B is the value referred to the reference bandwidth;

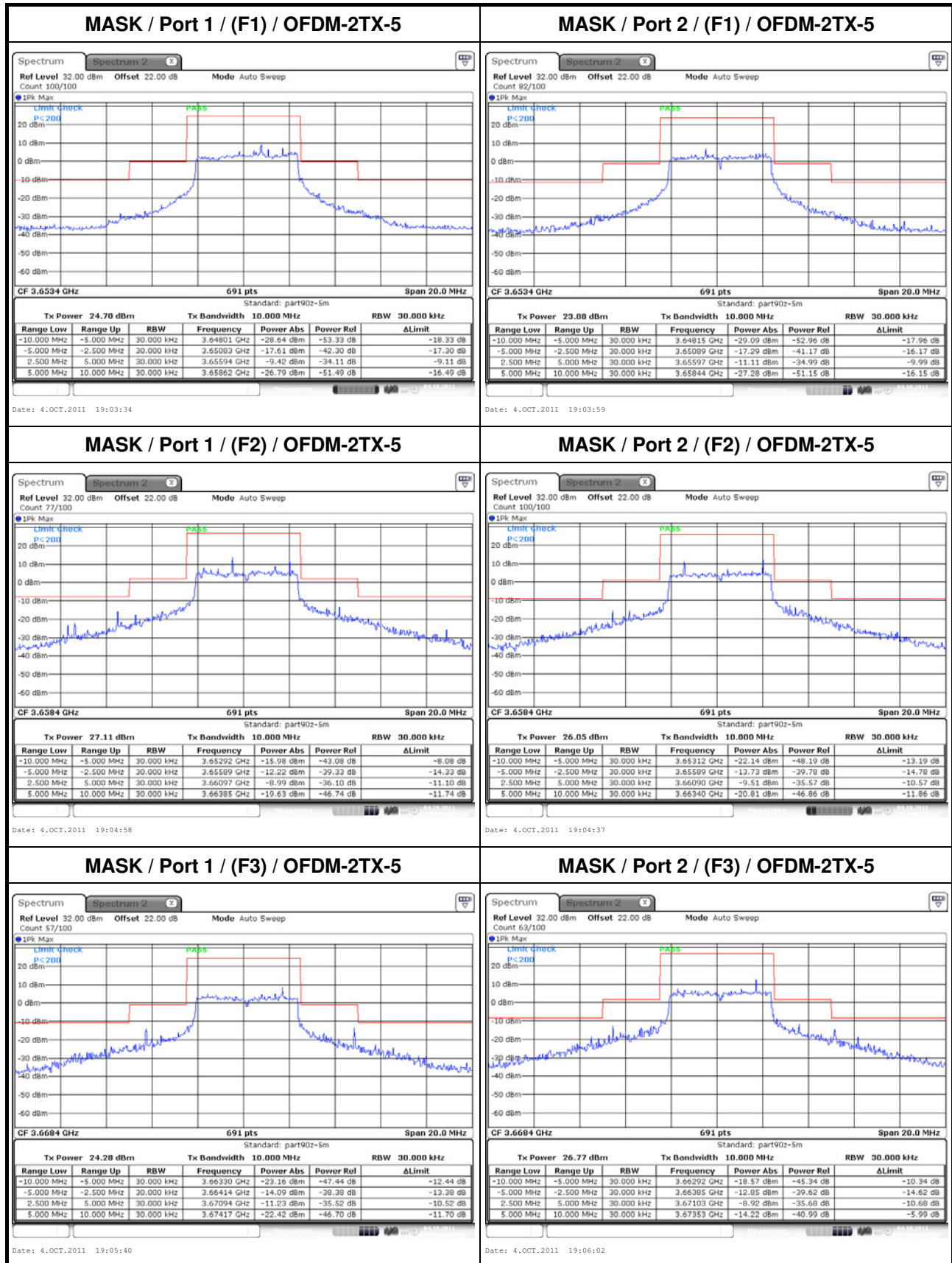
3.6.4 Test Setup



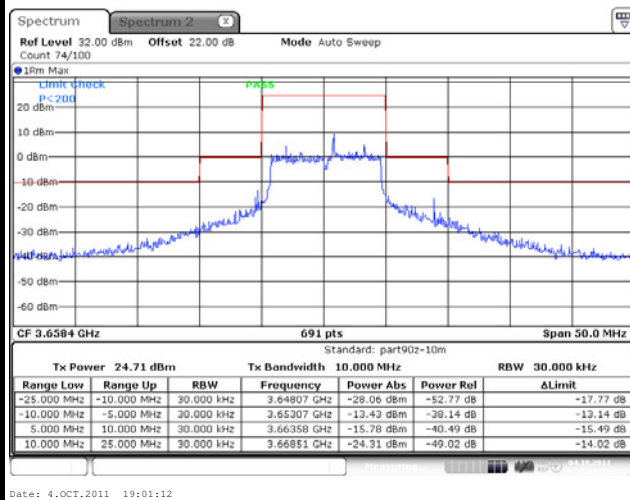
3.6.5 Test Result of Spectrum Mask Emissions

Spectrum Mask Emissions - Power Setting 1 (Ant No. 1)									
Worst Case Mode Abbreviations	Test Freq. (FX)	Spectrum Mask Emissions					RBW Conversion Factor (dB)	Each Individual Output Factor (dB)	Limit (FCC 90.210)
		Port 1	Port 2	Port 3	Port 4	Total			
OFDM-2TX-5	F1	Pass	Pass	N/A	N/A	N/A	N/A	N/A	B
OFDM-2TX-5	F2	Pass	Pass	N/A	N/A	N/A	N/A	N/A	B
OFDM-2TX-5	F3	Pass	Pass	N/A	N/A	N/A	N/A	N/A	B
OFDM-2TX-10	F1	Pass	Pass	N/A	N/A	N/A	N/A	N/A	B
OFDM-2TX-10	F2	Pass	Pass	N/A	N/A	N/A	N/A	N/A	B
OFDM-2TX-10	F3	Pass	Pass	N/A	N/A	N/A	N/A	N/A	B
OFDM-2TX-20	F2	Pass	Pass	N/A	N/A	N/A	N/A	N/A	B
Test Result		Complied							
Note 1: antenna no., directional gain and power setting define in test report clause 1.1.2 and 2.3.									
Note 2: worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.									
Note 3: worst case RF conducted test define in test report clause 2.4.									
Note 4: EUT have 2 transmitter outputs (port 1 - port 2).									
Note 5: Emission mask measurements is relative emission limits. When testing emission mask against relative emission limits, tests may be performed on each output individually without summing or adding 10 log (N).									

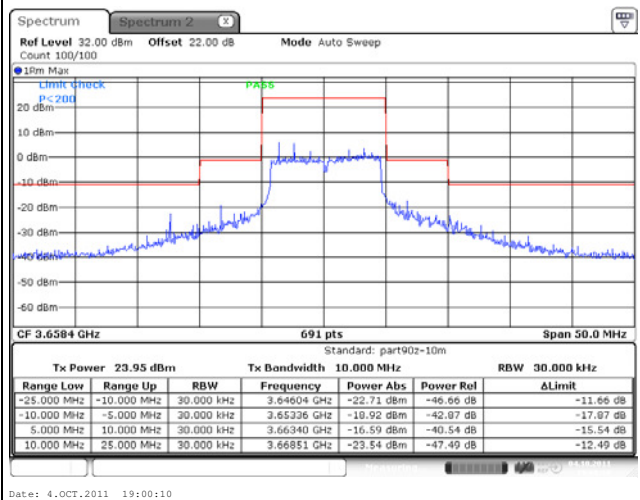
3.6.6 Spectrum Mask Emissions Plots for Power Setting 1 (Ant.1)



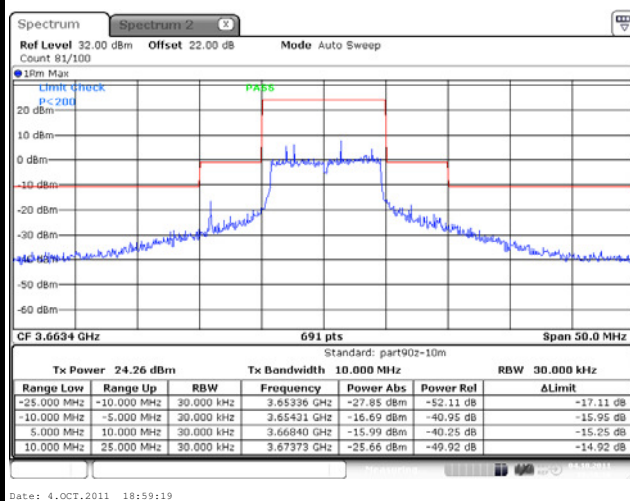
MASK / Port 1 / (F1) / OFDM-2TX-10



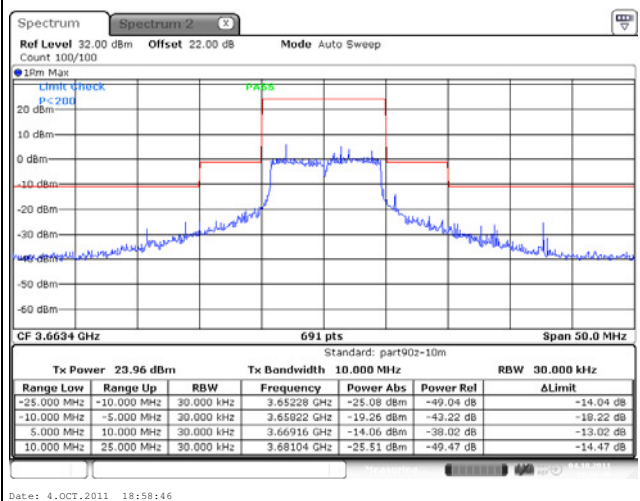
MASK / Port 2 / (F1) / OFDM-2TX-10



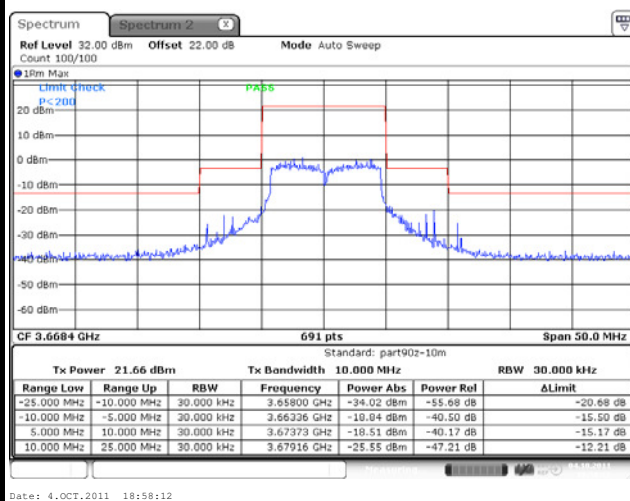
MASK / Port 1 / (F2) / OFDM-2TX-10



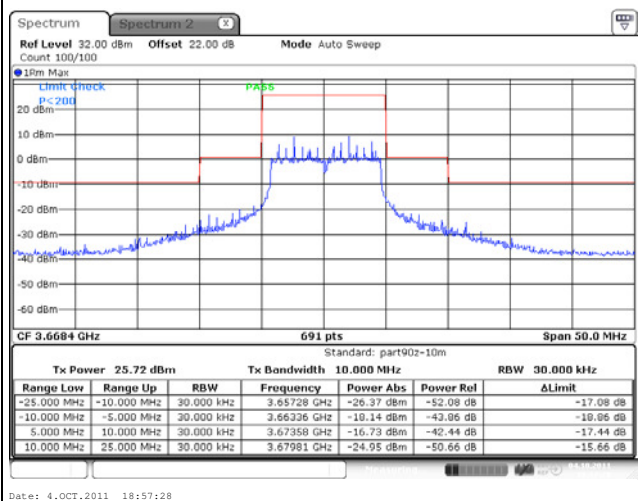
MASK / Port 2 / (F2) / OFDM-2TX-10

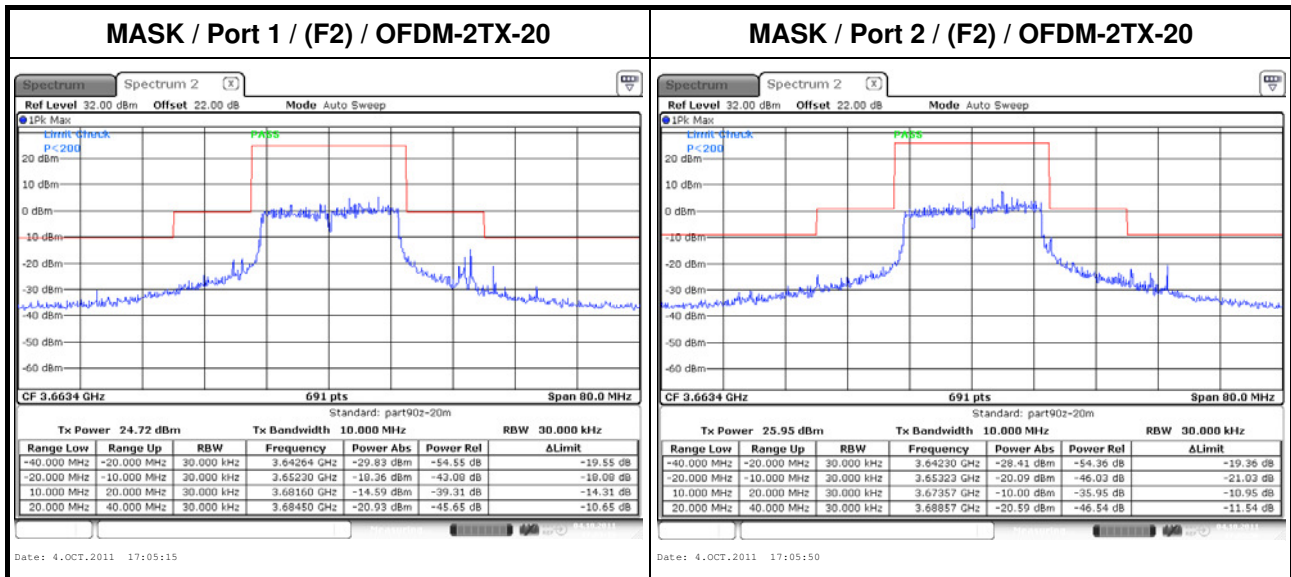


MASK / Port 1 / (F3) / OFDM-2TX-10



MASK / Port 2 / (F3) / OFDM-2TX-10





3.7 Frequency Tolerance

3.7.1 Limit of Frequency Tolerance

Frequency Tolerance	Limit
Refer as FCC 90.213	To be specified in the station authorization
Note: These measurements shall also be performed at normal and extreme test conditions.	

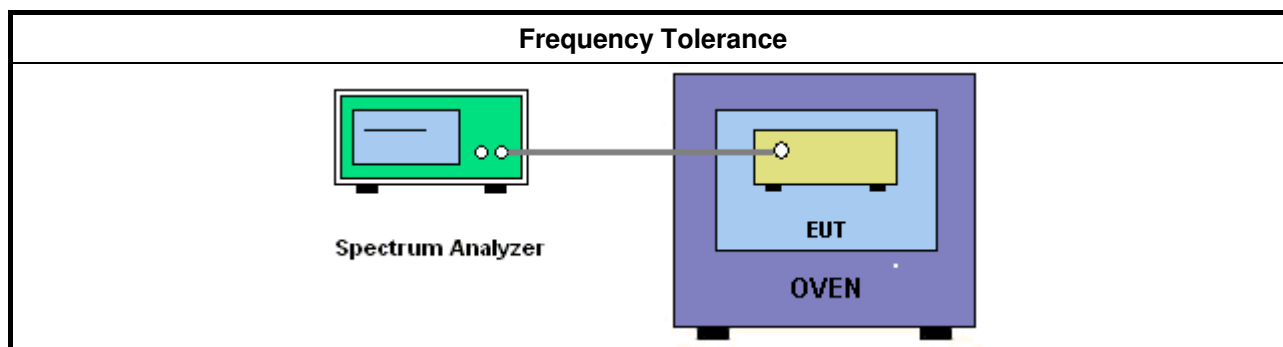
3.7.2 Measuring Instruments

Refer test equipment and calibration data list in test report clause 5.

3.7.3 Test Procedures

Method of measurement: Refer as ANSI/TIA-603-D-2010, clause 3.2.2.

3.7.4 Test Setup



3.7.5 Frequency Tolerance with Varying Supply Voltage

Temperature vs. Frequency Tolerance		
Test Date	Oct. 05, 2011	
Test Frequency		F2
Transmit Time (min)		10
Refer Frequency (MHz)		3663.4
20 °C	Vnom	3663.4053
20 °C	Vmin	3663.4053
20 °C	Vmax	3663.4053
Maximum Frequency Tolerance (ppm)		1.45
Frequency Tolerance limit		To be specified in the station authorization
Complied Limit		Complied
Test Date		Oct. 05, 2011
Note: EUT operational condition (normal and extreme) refer as test report clause 1.1.4.		

3.7.6 Frequency Tolerance with Respect to Ambient Temperature

Temperature vs. Frequency Tolerance		
Test Date	Oct. 05, 2011	
Test Frequency		F2
Transmit Time (min)		10
Refer Frequency (MHz)		3663.4
50 °C	Vnom	3663.4066
40 °C	Vnom	3663.4186
30 °C	Vnom	3663.4216
20 °C	Vnom	3663.4198
10 °C	Vnom	3663.4120
0 °C	Vnom	3663.4053
-10 °C	Vnom	3663.3964
-20 °C	Vnom	3663.3892
-30 °C	Vnom	3663.3856
Maximum Frequency Tolerance (ppm)		5.90
Frequency Tolerance limit		To be specified in the station authorization
Complied Limit		Complied
Note: EUT operational condition (normal and extreme) refer as test report clause 1.1.4.		

4 Maximum Permissible Exposure

4.1 Maximum Permissible Exposure

4.1.1 Limit of Maximum Permissible Exposure

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6
Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30
Note 1: f = frequency in MHz ; *Plane-wave equivalent power density				
Note 2: For the applicable limit, see FCC 1.1310				

4.1.2 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

E = Electric field (V/m)

G = EUT Antenna numeric gain (numeric)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

P = RF output power (W)

d = Separation distance between radiator and human body (m)

4.1.3 Result of Maximum Permissible Exposure

Maximum Permissible Exposure - Power Setting 1 (Ant No. 1)							
Worst Case Mode Abbreviations	Test Freq. (FX)	Total Cond. Power (dBm)	Dir. Gain (dBi)	EIRP Power (dBm)	User and EUT Min. Distance (cm)	Power Density (mW/cm ²)	Power Density Limit (mW/cm ²)
OFDM-2TX-5	F1	20.44	15.01	35.45	20	0.6982	1
OFDM-2TX-5	F2	20.02	15.01	35.03	20	0.6338	1
OFDM-2TX-5	F3	20.01	15.01	35.02	20	0.6323	1
OFDM-2TX-10	F1	20.88	15.01	35.89	20	0.7726	1
OFDM-2TX-10	F2	20.69	15.01	35.70	20	0.7395	1
OFDM-2TX-10	F3	19.73	15.01	34.74	20	0.5929	1
OFDM-2TX-20	F2	20.63	15.01	35.64	20	0.7294	1
Test Result						Complied	
Note 1: antenna no., directional gain and power setting define in test report clause 1.1.2 and 2.3.							
Note 2: worst case mode abbreviations and test frequency define in test report clause 2.1 and 2.2.							
Note 3: worst case RF conducted test define in test report clause 2.4.							
Note 4: EUT have 2 transmitter outputs (port 1 - port 2).							

5 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Until	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Sep. 14, 2011	Sep. 14, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Oct. 28, 2010	Oct. 28, 2011	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9K ~ 30MHz	Nov. 16, 2010	Nov. 16, 2011	Conduction (CO01-CB)
PULSE LIMITER	R&S	ESH3-Z2	100430	9K~30MHz	Jan. 04, 2011	Jan. 04, 2012	Conduction (CO01-CB)
COND Cable	-	Cable	-	0.15MHz~30M Hz	Dec. 04, 2010	Dec. 04, 2011	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Oct. 17, 2010	Oct. 17, 2011	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 22, 2010	Nov. 22, 2011	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Oct. 08, 2010	Oct. 08, 2011	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 17, 2010	Nov. 17, 2011	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2010	Nov. 23, 2011	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 29, 2011	Jul. 29, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP	100304	9kHz ~ 40GHz	Nov. 22, 2010	Nov. 22, 2011	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Mar. 22, 2011	Mar. 22, 2012	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Sep. 09, 2010*	Sep. 09, 2012*	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N/A	N/A	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N/A	N/A	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 17, 2010	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz - 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz - 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2010	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2010	Nov. 17, 2011	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP30	100023	9KHz~30GHz	Mar. 15, 2011	Mar. 15, 2012	Conducted (TH01-CB)
Spectrum analyzer	R&S	FSV30	101026	9KHz~30GHz	Jul. 27, 2011	Jul. 27, 2012	Conducted (TH01-CB)
EPM-P Series Power Meter	Agilent	E4416A	GB41291199	50MHz - 18GHz	Sep. 09, 2011	Sep. 09, 2012	Conducted (TH01-CB)
Peak an Avg Power Sensor	Agilent	E9327A	US40442088	50MHz - 18GHz	Sep. 09, 2011	Sep. 09, 2012	Conducted (TH01-CB)
Thermo-Hygro Meter	N/A	HC 520	#1	15~70 degree	Nov. 02, 2010	Nov. 02, 2011	Conducted (TH01-CB)
RF Power Divider	HP	11636A	00306	2GHz ~ 18GHz	N/A	N/A	Conducted (TH01-CB)
RF Power Splitter	Anaren	44100	1839	2GHz ~ 18GHz	N/A	N/A	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Until	Remark
RF Power Splitter	Anaren	42100	17930	2GHz ~ 18GHz	N/A	N/A	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-12	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-13	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 17, 2011	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 13, 2011	Sep. 13, 2010	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 08, 2011	Sep. 08, 2012	Conducted (TH01-CB)

6 Certification of TAF Accreditation



Certificate No. : L1190-110702

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Road, Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	: ISO/IEC 17025:2005
Accreditation Number	: 1190
Originally Accredited	: December 15, 2003
Effective Period	: January 10, 2010 to January 09, 2013
Accredited Scope	: Testing Field, see described in the Appendix
Specific Accreditation Program	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities



Jay-San Chen
President, Taiwan Accreditation Foundation
Date : July 02, 2011

P1, total 22 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix