FCC Test Report

Equipment	:	TransferJet compatible adapter
Brand Name	:	TOSHIBA
Model No.	:	TJM35420LT
FCC ID	:	ZVZ420L1TJ
Standard	:	47 CFR FCC Part 15.517
Operating Band	:	4470 MHz
FCC Classification	:	UWB
Applicant	:	Toshiba Corporation, Semiconductor & Storage Products Co., Memory Div., Memory Application Engineering Dept. 2-5-1, Kasama, Sakae-Ku, Yakohama, 247-8585, Japan
Manufacturer	:	GOOD WAY TECHNOLOGY CO.,LTD. 3F, No. 135, Ln. 235, Baociao Rd., Sindian Dist., New Taipei City 231, Taiwan, R.O.C

The product sample received on Oct. 30, 2014 and completely tested on Dec. 30, 2014. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 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:

Vic Hsiao / Supervisor

Testing Laboratory
1190

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Summary of Test Result

Conformance Test Specifications					
Report Clause	**Ref. Std. Clause**	**Description**	**Measured**	**Limit**	**Result**
1.1.2	15.203	Antenna Requirement	Mechanism complied	FCC 15.203	Complied
1.1.6	15.517(a)	Operational Restriction	Informed the applicant	15.517(a)	Complied
1.1.7	15.517(f)	Labeling Requirements	Informed the applicant	15.517(a)	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.1658860MHz 43.18 (Margin 21.98dB) - QP 31.19 (Margin 23.97dB) - AV	FCC 15.207	Complied
3.2	15.517(b)	UWB Bandwidth	720MHz	≥ 500MHz	Complied
3.3	15.517(e)	Peak Emissions within a 50 MHz Bandwidth	-29.47 dBm/50MHz	≤ 0 dBm/50MHz	Complied
3.4	15.517(c) /15.517(d)	Radiated Emissions	[dBuV]: 961.200MHz -76.97(Margin 1.67dB)- RMS	UWB Emissions: FCC 15.517(c) GPS Emissions: FCC 15.517(d) Digital Emissions: FCC 15.209	Complied

Revision History

Report No.	Version	Description	Issued Date
FR4O3047	Rev. 01	Initial issue of report	Jan. 13, 2015

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information						
Frequency Range (GHz)	**Mode**	**Ch. Freq. (GHz)**	**Channel Number**	**Transmit Chains (N_{TX})**	**Peak Power (dBm/50MHz) EIRP**	**Avg Power (dBm/MHz) EIRP**
4.2-4.8	TransferJet	4.47	1	1	-29.47	-71.23
Note 1: TransferJet uses π/2-shift Binary Phase-shift Keying						

1.1.2 Antenna Information

Antenna Category			
☒	Integral antenna (antenna permanently attached)		
	☐	Temporary RF connector provided	
	☒	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.	
☐	External antenna (dedicated antennas)		
	☐	Single power level with corresponding antenna(s).	
	☐	Multiple power level and corresponding antenna(s).	
	☐	RF connector provided	
		☐	Unique antenna connector. (e.g., MMCX, U.FL, IPX, and RP-SMA, RP-N type…)
		☐	Standard antenna connector. (e.g., SMA, N, BNC, and TNC type…)

Antenna General Information			
No.	**Ant. Cat.**	**Ant. Type**	**Gain (dBi)**
1	Integral	PCB	1.1

1.1.3 Type of EUT

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

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☐ Operated normally mode for worst duty cycle	
☒ Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	**Power Duty Factor [dB] – (10 log 1/x)**
☒ 100%	0

1.1.5 EUT Operational Condition

Supply Voltage	☐ AC mains (Host PC)	☒ DC	
Type of DC Source	☐ Internal DC supply	☒ External DC from system	☐ Battery

1.1.6 Operational Restriction

Operation Restriction	Informed the applicant	Not applicable	User Manual Informed	Passed
☒ Indoor UWB devices & Fixed indoor infrastructure				
Must be capable of operation only indoors. The necessity to operate with a fixed indoor infrastructure. [A transmitter that had been connected to the AC power lines and operates solely through the AC mains. Or The device under test operates solely through USB port of a PC. It is not intended to operate from any other power source and be considered sufficient to demonstrate a fixed indoor infrastructure]	☒	☐	☒	☒
☒ Emissions from equipment				
The emissions from equipment operated shall not be intentionally directed outside of the building in which the equipment is located, such as through a window or a doorway, to perform an outside function, such as the detection of persons about to enter a building. [The applicant has been informed of this requirement.]	☒	☐	☐	☒
☒ Outdoor mounted antennas				
The use of outdoor mounted antennas, e.g., antennas mounted on the outside of a building or on a telephone pole, or any other outdoors infrastructure is prohibited. [The applicant has been informed without any outdoor mounted antennas.]	☒	☐	☐	☒
☒ Field disturbance sensors install				
Field disturbance sensors installed inside of metal or underground storage tanks are considered to operate indoors provided the emissions are directed towards the ground. [Not applicable for this client.]	☒	☒	☐	☒
☒ A communications system shall transmit only				
A communications system shall transmit only when the intentional radiator is sending information to an associated receiver. [The applicant has been informed of this requirement and is clearly stated on the user manual.]	☒	☐	☒	☒

1.1.7 Labeling and Instruction Manual Requirements

UWB systems operating under the provisions of this section shall bear the following or similar statement in a conspicuous location on the device or in the instruction manual supplied with the device.
"This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties."

In addition to the above requirements, a UWB device subject to certification shall be labeled as followed in a conspicuous location on the device:
"This device complied with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."
(1) Where a device is constructed in two or more sections connected by wires
and marketed together, the statement specified directly above this section is required to be affixed only to the main control unit.
(2) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

The users' manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.2 Support Equipment

Support Equipment - RF Conducted				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5520	DoC

Support Equipment - AC Conduction and Radiated Emission				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5530	DoC

1.3 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 C63.10-2009
- FCC KDB 393764

1.4 Testing Location Information

Testing Location					
☒	HWA YA	ADD :	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.		
		TEL :	886-3-327-3456	FAX :	886-3-327-0973

Test Condition	Test Site No.	Test Engineer	Test Environment
AC Conduction	CO04-HY	Zeus	21°C / 45%
RF Conducted	TH01-HY	Candy	22°C / 64%
Radiated Emission	03CH03-HY	Allen	25.4°C / 54%

1.5 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		±2.2 dB
Emission bandwidth		±1.4 %
Emissions, conducted	9 – 150 kHz	±0.3 dB
	0.15 – 30 MHz	±0.4 dB
	30 – 1000 MHz	±0.5 dB
	1 – 18 GHz	±0.6 dB
	18 – 40 GHz	±0.8 dB
	40 – 200 GHz	N/A
Emissions, radiated	9 – 150 kHz	±2.4 dB
	0.15 – 30 MHz	±2.2 dB
	30 – 1000 MHz	±2.5 dB
	1 – 18 GHz	±3.5 dB
	18 – 40 GHz	±3.8 dB
	40 – 200 GHz	N/A
Temperature		±0.8 °C
Humidity		±3 %
DC and low frequency voltages		±3 %
Time		±1.4 %
Duty Cycle		±1.4 %

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing		
Mode	**Transmit Chains (N_{TX})**	**Data Rate**
TransferJet	1	560Mbps

2.2 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration	
Mode	**Test Channel Frequencies (MHz)**
TransferJet	4470-(F1)

2.3 The Worse Case Power Setting Parameter

The Worst Case Power Setting Parameter	
Test Software Version	DOS
Mode	**Test Frequency (MHz)**
	4470
TransferJet	default

2.4 The Worst Case Measurement Configuration

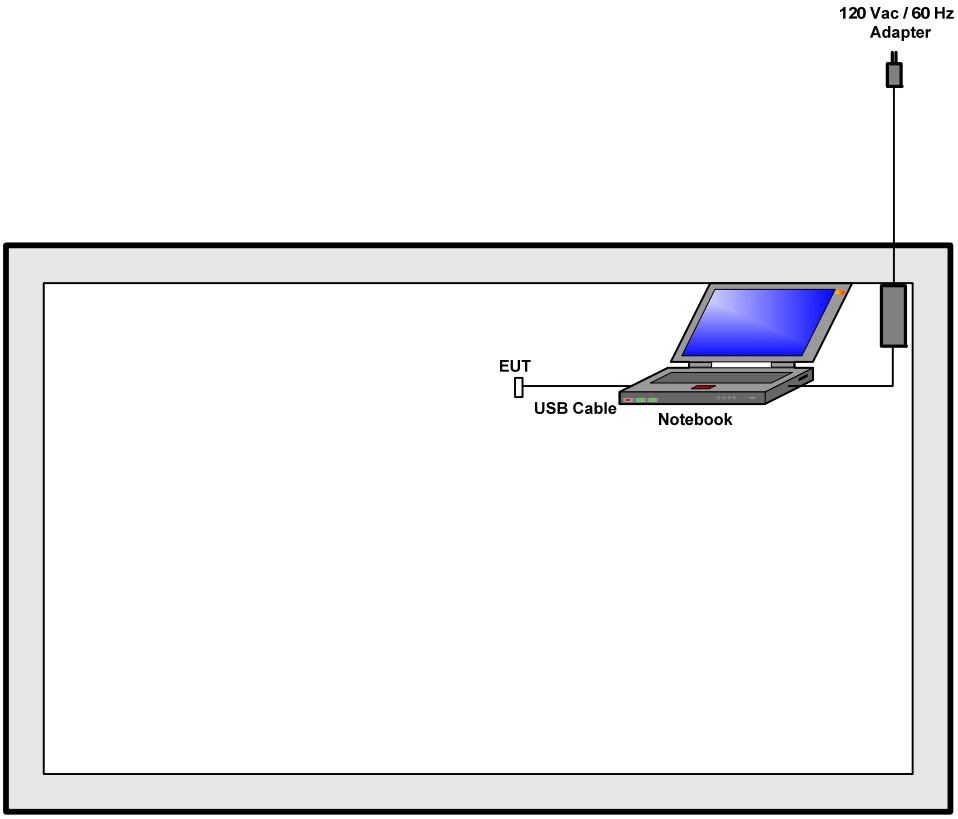
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	System host & transmit

The Worst Case Mode for Following Conformance Tests	
Tests Item	Conducted Emissions, UWB Bandwidth
Test Condition	Conducted measurement at transmit chains
Mode	TransferJet

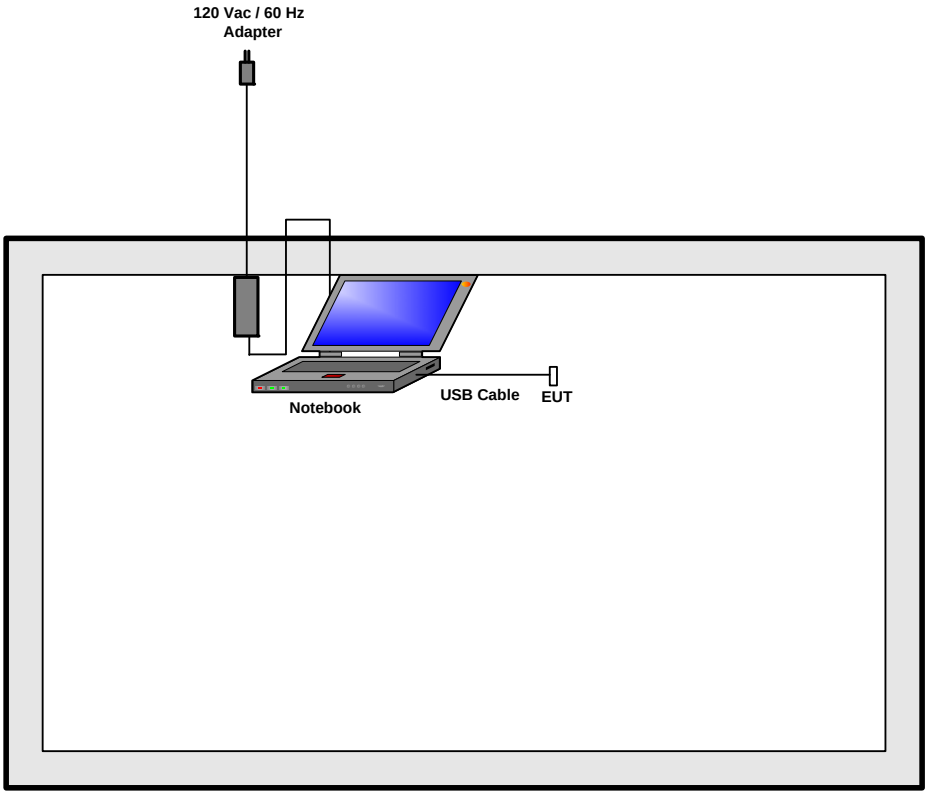
The Worst Case Mode for Following Conformance Tests			
Tests Item	UWB Bandwidth, Peak Emissions within a 50 MHz Bandwidth, Radiated Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
User Position	☐ EUT will be placed in fixed position.		
	☒ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes.		
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed three orthogonal planes.		
Operating Mode below 960MHz	1. System host & transmit		
Mode	TransferJet		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
Worst Planes of EUT	**V**		

2.5 Test Setup Diagram

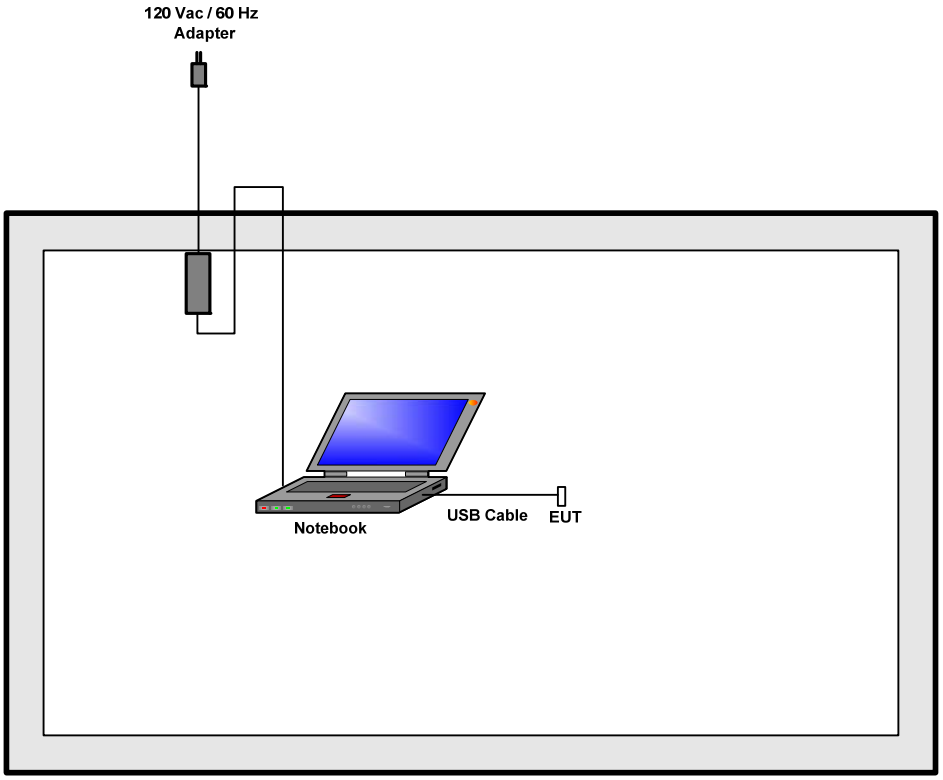
Test Setup Diagram – AC Line Conducted Emission Test



Test Setup Diagram - Radiated Test (30MHz~1GHz)



Test Setup Diagram - Radiated Test (3GHz to 5GHz / 1 GHz to 18 GHz)



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

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

3.1.2 Measuring Instruments

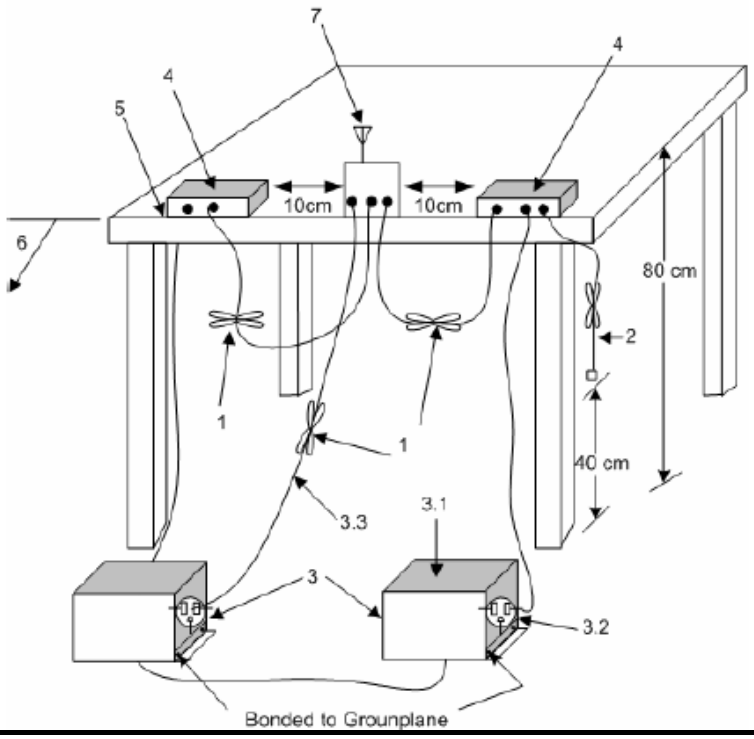
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

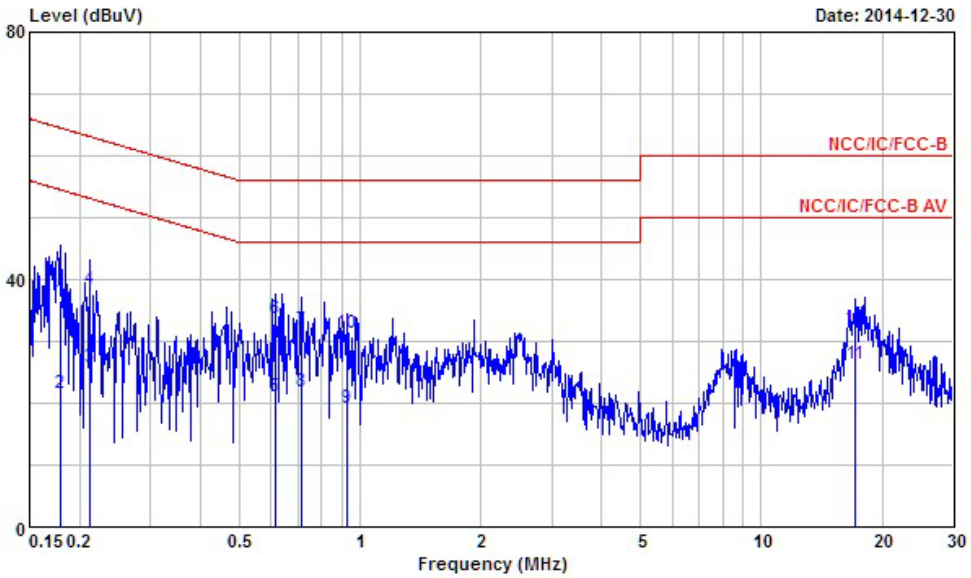
3.1.4 Test Setup

AC Power-line Conducted Emissions



3.1.5 Test Result of AC Power-line Conducted Emissions

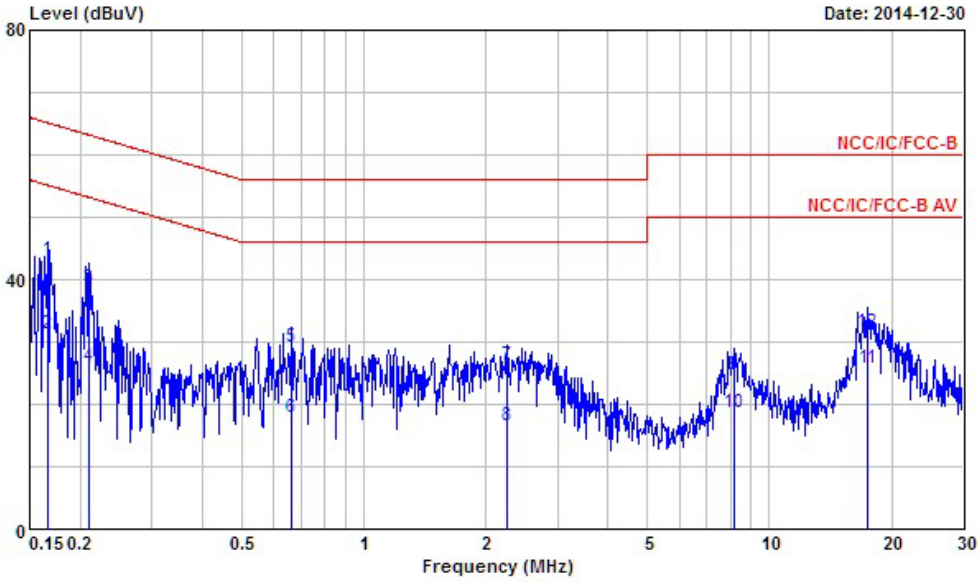
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	System host & transmit		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1796080	36.47	-28.03	64.50	36.01	0.02	0.44	QP
2	0.1796080	21.56	-32.94	54.50	21.10	0.02	0.44	Average
3	0.2116700	25.81	-27.33	53.14	25.28	0.02	0.51	Average
4	0.2116700	38.49	-24.65	63.14	37.96	0.02	0.51	QP
5	0.6139960	21.02	-24.98	46.00	20.29	0.04	0.69	Average
6	0.6139960	33.61	-22.39	56.00	32.88	0.04	0.69	QP
7	0.7121870	31.87	-24.13	56.00	31.10	0.04	0.73	QP
8	0.7121870	21.90	-24.10	46.00	21.13	0.04	0.73	Average
9	0.9282090	19.31	-26.69	46.00	18.48	0.05	0.78	Average
10	0.9282090	31.21	-24.79	56.00	30.38	0.05	0.78	QP
11	17.200	26.24	-23.76	50.00	25.20	0.29	0.75	Average
12	17.200	32.13	-27.87	60.00	31.09	0.29	0.75	QP

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

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	System host & transmit		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.1658860	43.18	-21.98	65.16	42.76	0.03	0.39	QP
2	0.1658860	31.19	-23.97	55.16	30.77	0.03	0.39	Average
3	0.2094380	38.64	-24.59	63.23	38.10	0.03	0.51	QP
4	0.2094380	26.13	-27.10	53.23	25.59	0.03	0.51	Average
5	0.6612710	29.28	-26.72	56.00	28.52	0.05	0.71	QP
6	0.6612710	17.87	-28.13	46.00	17.11	0.05	0.71	Average
7	2.250	26.25	-29.75	56.00	25.39	0.08	0.78	QP
8	2.250	16.55	-29.45	46.00	15.69	0.08	0.78	Average
9	8.150	24.71	-35.29	60.00	23.76	0.17	0.78	QP
10	8.150	18.60	-31.40	50.00	17.65	0.17	0.78	Average
11	17.470	25.68	-24.32	50.00	24.64	0.29	0.75	Average
12	17.470	31.60	-28.40	60.00	30.56	0.29	0.75	QP

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

3.2 UWB bandwidth

3.2.1 UWB bandwidth Limit

UWB bandwidth Limit
Systems using digital modulation techniques:
☒ UWB bandwidth ≥ 500 MHz or Fractional bandwidth ≥ 0.2; Fractional bandwidth = $2(f_H - f_L)/(f_H + f_L)$

3.2.2 Measuring Instruments

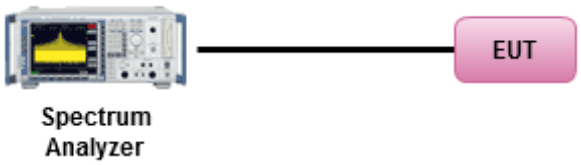
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

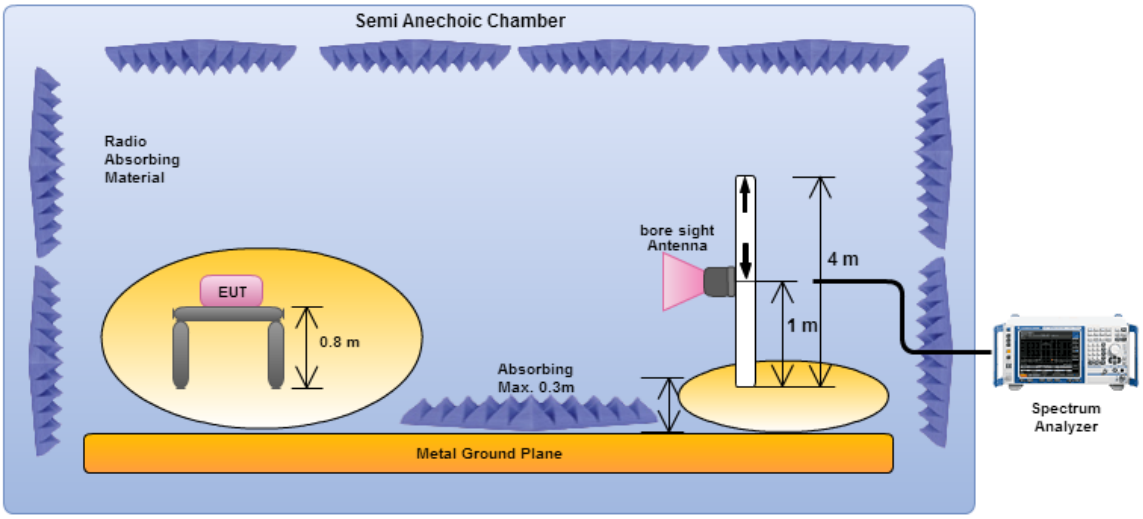
Test Method	
☒ For the UWB bandwidth shall be measured using one of the options below:	
	☒ Refer as ANSI C63.10, clause 6.9.1 and clause 7.10.1 for UWB bandwidth testing.
	☒ Refer as IC RSS-Gen, clause 4.6.4 for UWB bandwidth.

3.2.4 Test Setup

UWB Bandwidth



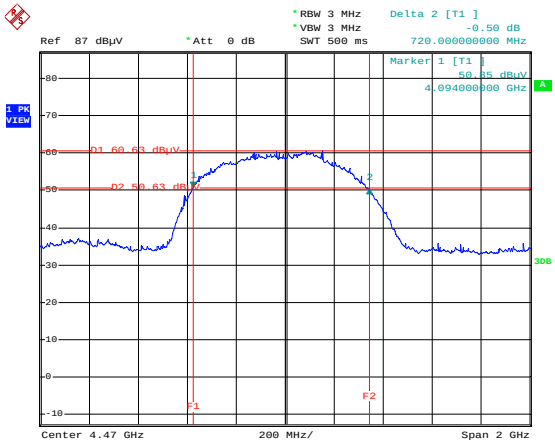
UWB Bandwidth - Test Distance: 3m



3.2.5 Test Result of UWB Bandwidth

UWB Bandwidth Result				
Condition		UWB Bandwidth (MHz)		
Mode	Freq. (MHz)	F_L	F_H	UWB Bandwidth
TransferJet	4470	4094	4814	720
Limit				500
Result				Complied
Note 1: N_{TX} = Number of Transmit Chains				

Worst Emission Bandwidth Plots



Date: 24.DEC.2014 02:28:36

3.3 Peak Emissions within a 50 MHz Bandwidth

3.3.1 Peak Emissions within a 50 MHz Bandwidth Limit

Peak Emissions within a 50 MHz Bandwidth Limit
P_{eirp} = 0 dBm/50MHz

3.3.2 Measuring Instruments

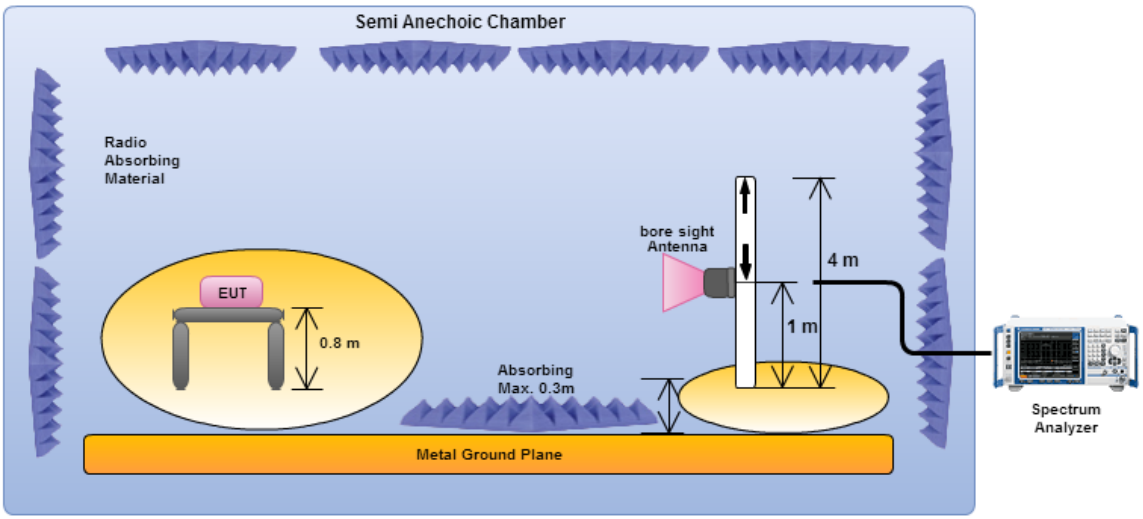
Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method		
☒	Peak Emissions within a 50 MHz Bandwidth	
	☒	Refer as ANSI C63.10, clause 7.10.3 for radiated measurement procedure testing.
	☒	Refer as ANSI C63.10, clause 7.10.3.1 for measurement distance is 3m. In some cases, it may be necessary to measure the radiated UWB emissions at a closer distance to obtain enough signal and margin to overcome the measurement system noise floor. Distance extrapolation factor = 20 log (test distance [3 m]/specific distance [3 m]) (dB)
	☒	Refer as ANSI C63.10, clause 7.10.3.3 for peak detector procedure testing.
	☒	Refer as ANSI C63.10, clause 7.10.3.5 for bandwidth conversion of peak power. $EIRP_{50MHz}$ = $EIRP3_{MHz}$ – 20 log(3MHz/50MHz)
☒	For radiated measurement.	
	☒	Refer as KDB 412172, clause 2.2 following eirp can be used radiated test configuration.
	☒	Refer as KDB 412172, clause 5 following eirp can be directly determined using the field strength.
	☐	Refer as KDB 412172, clause 6 following eirp can be used signal/antenna substitution techniques.
	☐	Refer as RSS-Gen, clause 4.8 for power measurement.

3.3.4 Test Setup

Peak Emissions



3.3.5 Test Result of Peak Emissions within a 50 MHz Bandwidth

Peak Emissions within a 50 MHz Bandwidth Result								
Mode	**Freq. (MHz)**	**E-Field [dBuV/m]**	**BWCF [dB]**	**$ERIP3_{MHz}$ [dBm]**	**$ERIP_{50MHz}$ [dBm]**	**$EIRP_{50MHz}$ Limit [dBm]**	**Margin [dB]**	**Pol [H/V]**
TransferJet	4470	41.29	-24.44	-53.91	-29.47	0	-29.47	H

Note 1: EIRP [dBm] = E-Field [dBuV/m] - 95.2
Note 2: Bandwidth Correction Factor (BWCF) = 20 log (3MHz/50MHz).
Note 3: $EIRP_{50MHz}$ = $EIRP3_{MHz}$ – BWCF; $EIRP3_{MHz}$ = EIRP PSD/3MHz; $EIRP_{50MHz}$ = EIRP PSD/50MHz.
Note 4: Measurement worst emissions of receive antenna polarization.

3.4 Radiated Emissions

3.4.1 Radiated Emissions Limit

Radiated Emissions below 960MHz and Emissions from Digital Circuitry 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.

Radiated Emissions above 960MHz Limit	
Frequency Range (MHz)	**EIRP (dBm)**
960-1610	-75.3
1610-1990	-53.3
1990-3100	-51.3
3100-10600	-41.3
10600 above	-51.3

Radiated Emissions in GPS Bands Limit	
Frequency Range (MHz)	**EIRP (dBm)**
1164-1240	-85.3
1559-1610	-85.3

3.4.2 Measuring Instruments

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

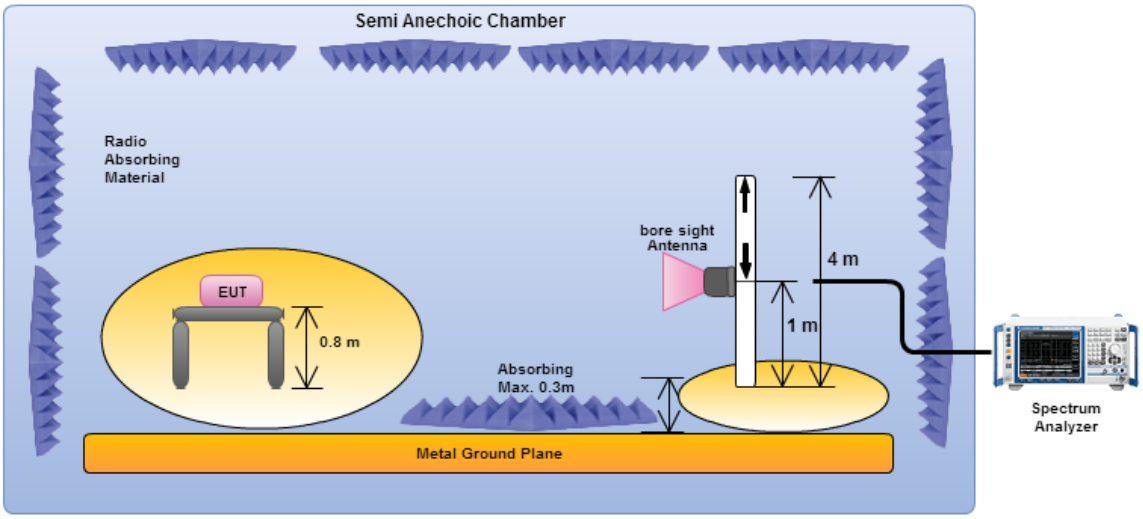
3.4.3 Test Procedures

Test Method for Radiated Emissions above 960MHz		
☒	Radiated Emissions above 960MHz	
	☒	Refer as ANSI C63.10, clause 7.10.3 for radiated measurement procedure testing.
	☒	Refer as ANSI C63.10, clause 7.10.3.1 for measurement distance is 3m. In some cases, it may be necessary to measure the radiated UWB emissions at a closer distance to obtain enough signal and margin to overcome the measurement system noise floor. Distance extrapolation factor = 20 log (test distance [3 m]/specific distance [3 m]) (dB)
	☒	Refer as ANSI C63.10, clause 7.10.3.3 for rms detector procedure testing.
	☒	Refer as ANSI C63.10, clause 7.10.3.6 for evaluating AVG-PSD (RBW=1MHz).
	☒	Refer as ANSI C63.10, clause 7.10.3.9 for evaluating AVG-PSD in GPS Band (RBW≥1kHz).
☒	For radiated measurement.	
	☒	Refer as KDB 412172, clause 2.2 following eirp can be used radiated test configuration.
	☒	Refer as KDB 412172, clause 5 following eirp can be directly determined using the field strength.
	☐	Refer as KDB 412172, clause 6 following eirp can be used signal/antenna substitution techniques.
	☐	Refer as RSS-Gen, clause 4.8 for power measurement.

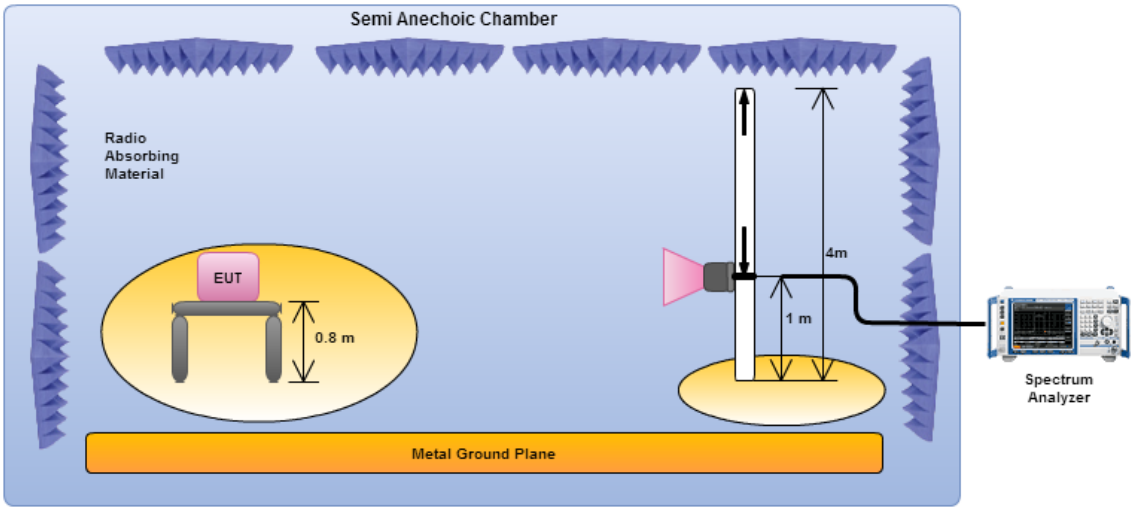
Test Method for Radiated Emissions below 960MHz and Emissions from Digital Circuitry		
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing 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).	
☒	For the transmitter unwanted emissions shall be measured using following options below:	
	☒	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW) – Duty cycle ≥ 100%.
	☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions. Adjusted by a “duty cycle correction factor”, derived from 20log (dwell time/100 ms). Average emission = peak emission + 20 log (duty cycle).
	☒	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
☒	For radiated measurement.	
	☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
	☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
	☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz to 18 GHz and test distance is 3m.
	☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 18 GHz and test distance is 1m.
☒	The any unwanted emissions level shall not exceed the fundamental emission level.	

3.4.4 Test Setup

Radiated Emissions above 960MHz



Radiated Emissions below 960MHz and Emissions from Digital Circuitry



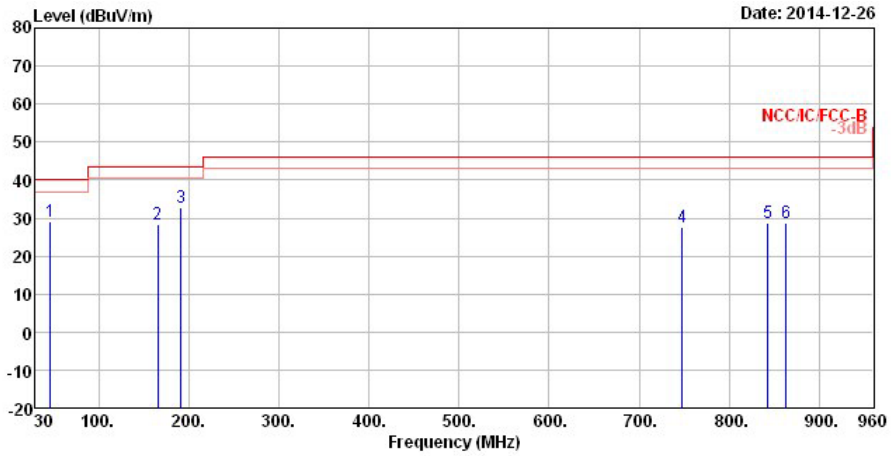
Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

3.4.5 Radiated Emissions (Below 30MHz)

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

3.4.6 Radiated Emissions (30MHz - 960MHz)

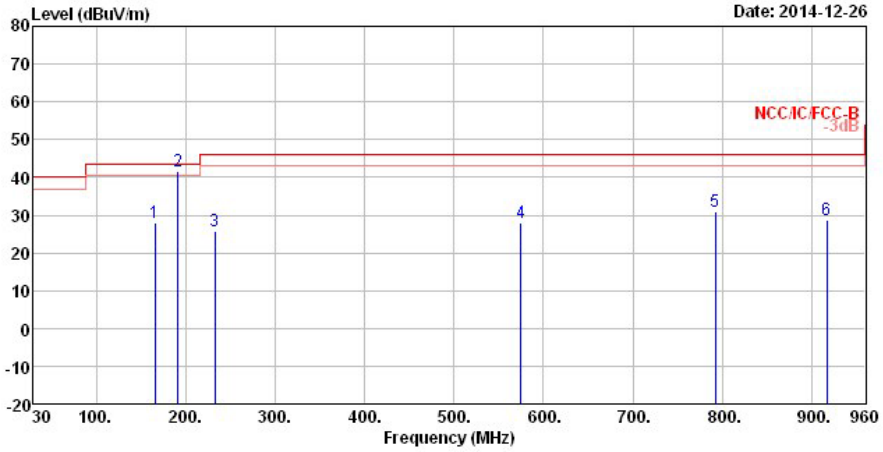
Radiated Emissions (30MHz – 960MHz)			
Operating Mode	1	**Polarization**	V
Operating Function	System host & transmit		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	46.740	29.10	-10.90	40.00	45.73	9.65	1.10	27.38	Peak	---	---
2	165.780	28.23	-15.27	43.50	43.39	9.87	2.12	27.15	Peak	---	---
3	191.820	32.87	-10.63	43.50	48.60	9.13	2.28	27.14	Peak	---	---
4	747.960	27.68	-18.32	46.00	31.18	19.55	4.66	27.71	Peak	---	---
5	842.820	28.59	-17.41	46.00	30.92	20.22	4.93	27.48	Peak	---	---
6	863.280	28.79	-17.21	46.00	30.78	20.42	5.00	27.41	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)

Radiated Emissions (30MHz – 960MHz)			
Operating Mode	1	**Polarization**	H
Operating Function	System host & transmit		

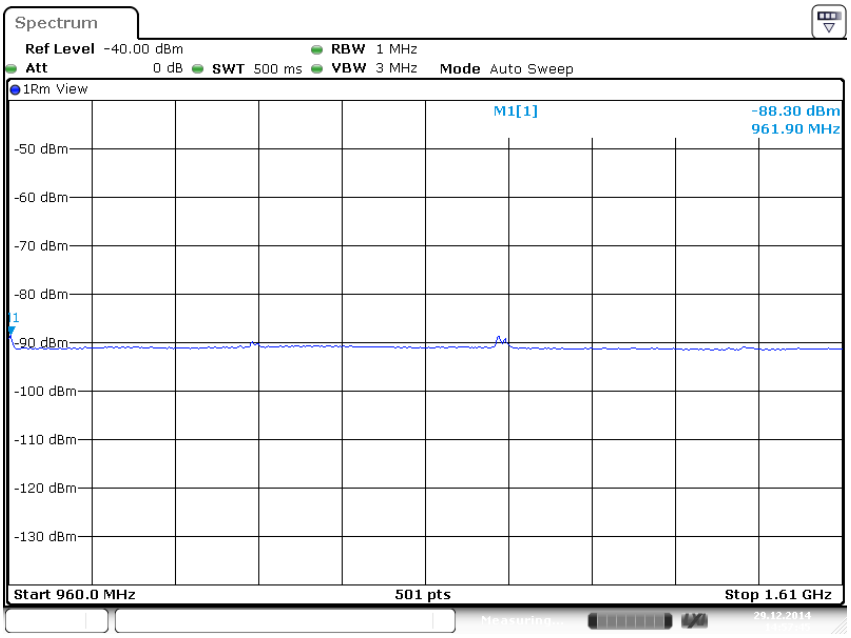


	Freq	Level	Over Limit	Limit Line	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	165.780	27.82	-15.68	43.50	42.98	9.87	2.12	27.15	Peak	---	---
2 !	191.820	41.72	-1.78	43.50	57.45	9.13	2.28	27.14	QP	---	---
3	232.740	25.87	-20.13	46.00	39.49	10.85	2.51	26.98	Peak	---	---
4	574.980	27.90	-18.10	46.00	33.46	18.21	4.04	27.81	Peak	---	---
5	792.600	31.04	-14.96	46.00	34.12	19.68	4.88	27.64	Peak	---	---
6	917.220	28.70	-17.30	46.00	30.17	20.61	5.24	27.32	Peak	---	---

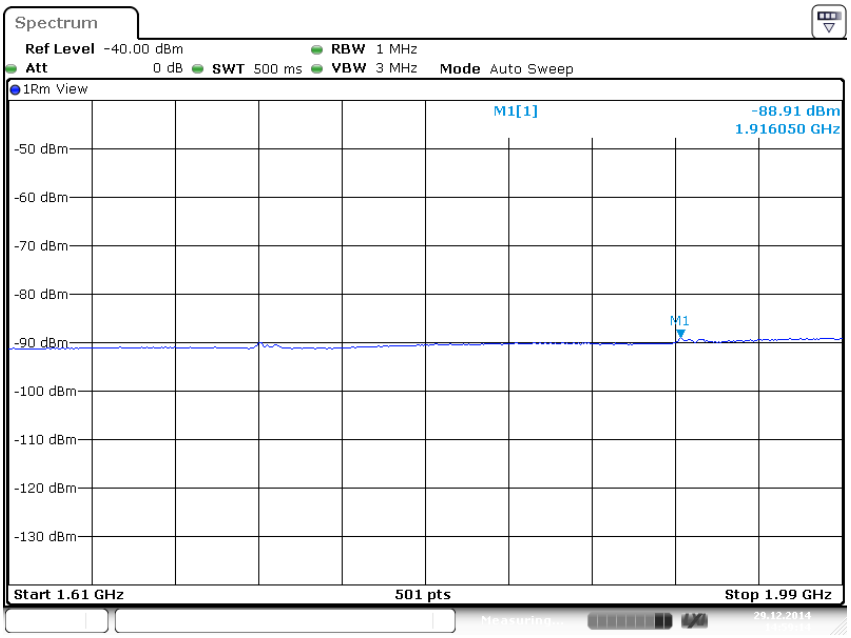
Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.4.7 Conducted Emissions from Antenna Port

Conducted Emissions from Antenna Port			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit		



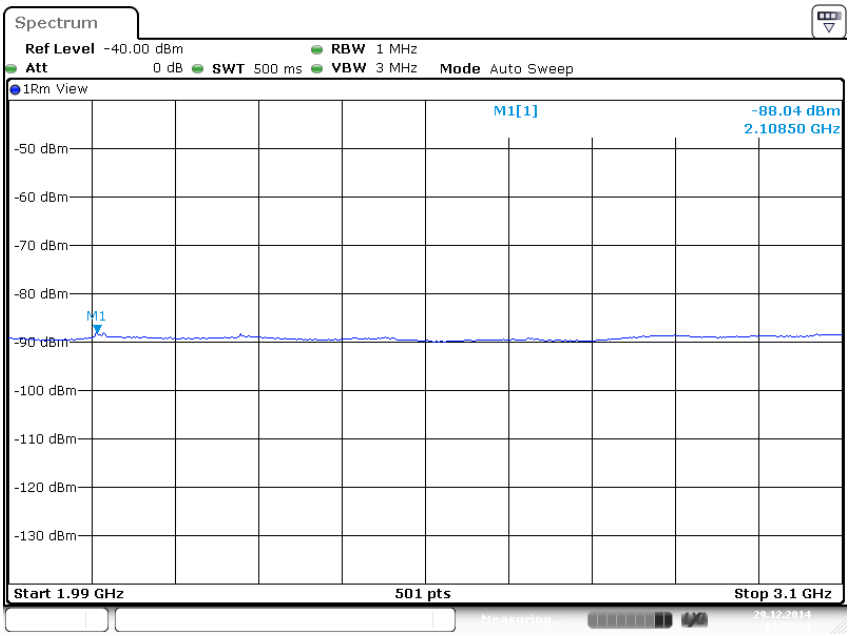
Date: 29.DEC.2014 14:57:46



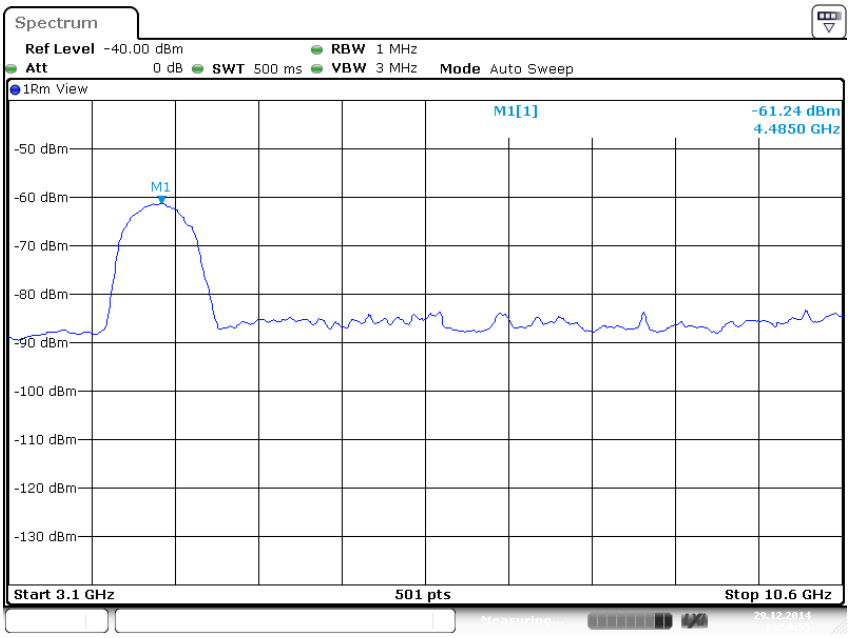
Date: 29.DEC.2014 14:59:15

Note 1: sweep time that there is no more than a 1 ms integration period over each measurement bin.

Conducted Emissions from Antenna Port			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit		



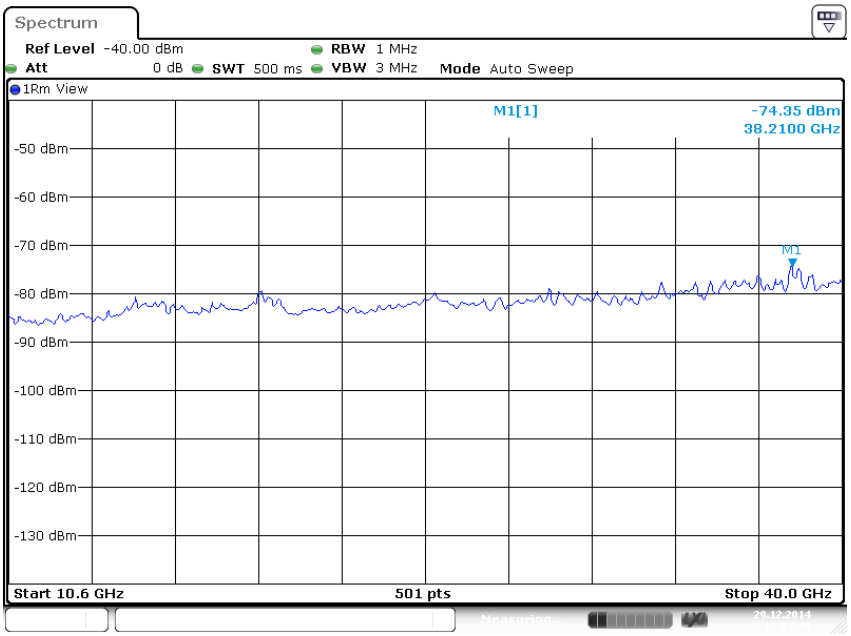
Date: 29.DEC.2014 14:59:35



Date: 29.DEC.2014 14:59:55

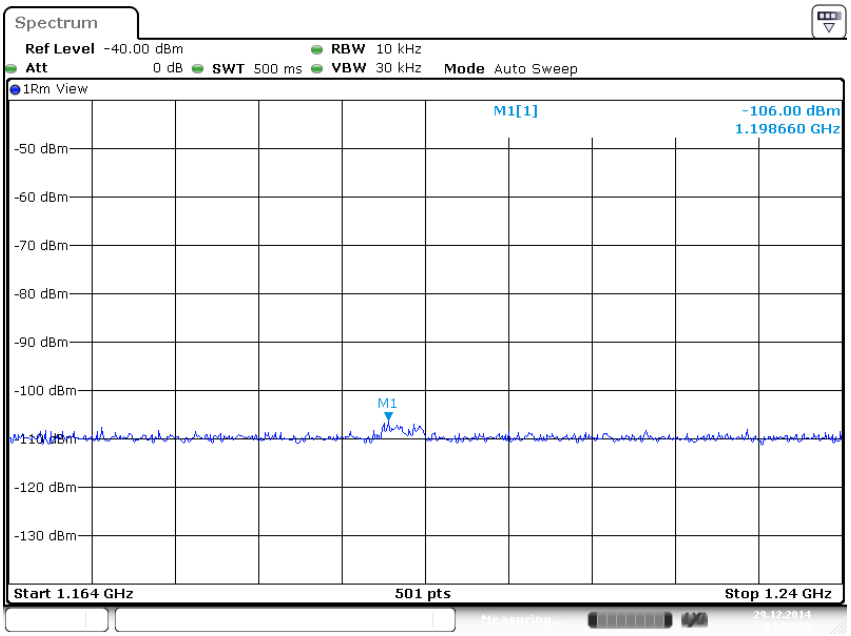
Note 1: sweep time that there is no more than a 1 ms integration period over each measurement bin.

Conducted Emissions from Antenna Port			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit		

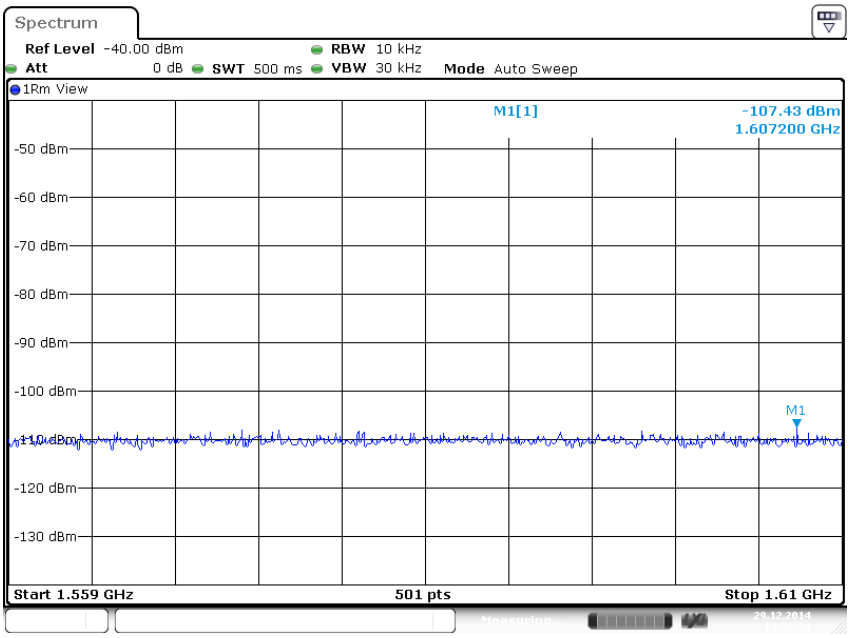


Note 1: sweep time that there is no more than a 1 ms integration period over each measurement bin.

Conducted Emissions from Antenna Port			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit		



Date: 29.DEC.2014 14:58:24

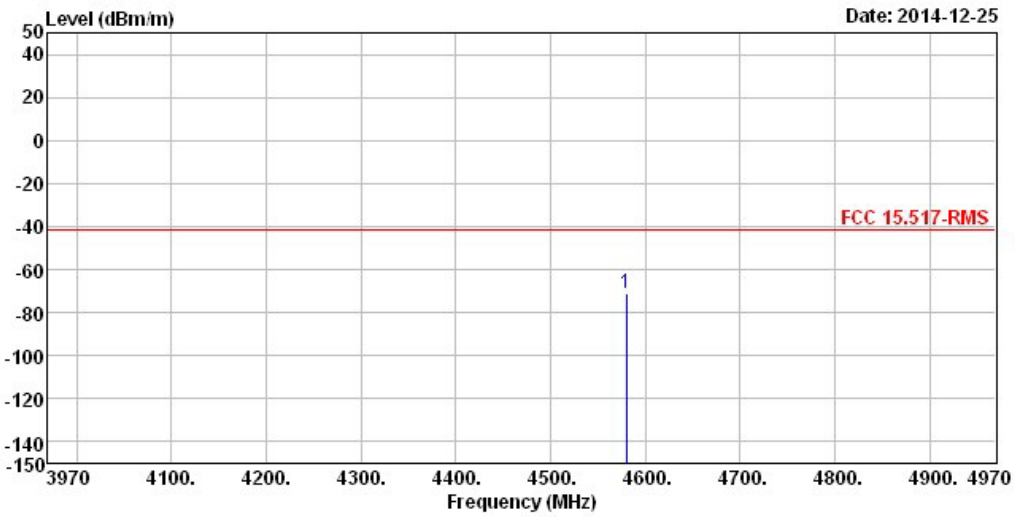


Date: 29.DEC.2014 14:58:54

Note 1: sweep time that there is no more than a 1 ms integration period over each measurement bin.

3.4.8 Radiated Emissions within UWB Bandwidth

Radiated Emissions within UWB Bandwidth			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H

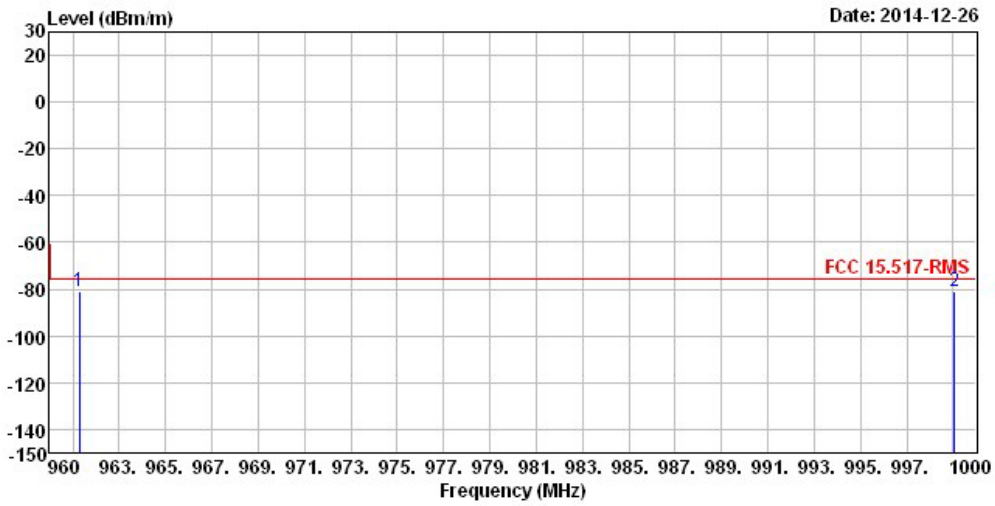


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	4580.000	-71.23	-29.93	-41.30	-75.94	32.84	4.38	32.51		---	---

Note 1: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 2: sweep time that there is no more than a 1 ms integration period over each measurement bin.

3.4.9 Radiated Emissions from Antenna

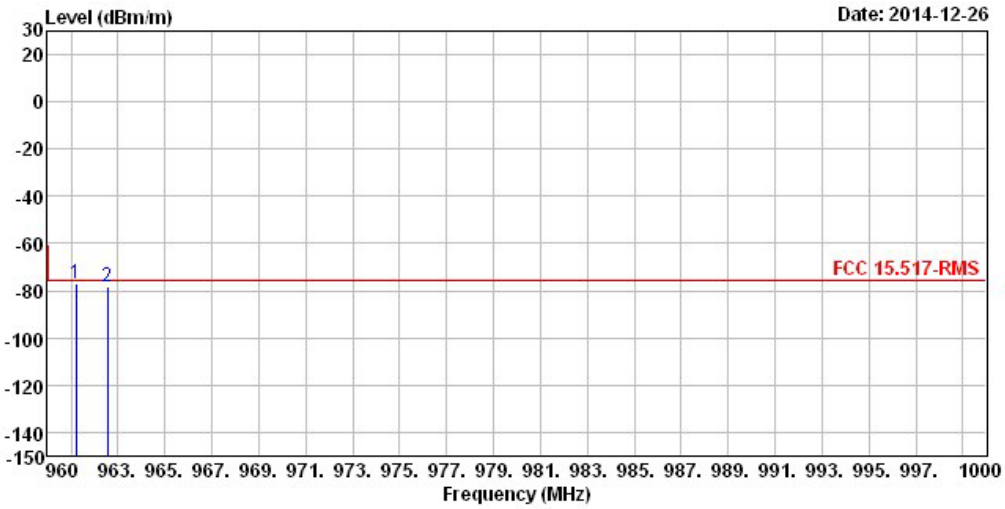
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	961.280	-80.61	-5.31	-75.30	-79.87	21.27	5.37	27.38		---	---
2	999.040	-80.82	-5.52	-75.30	-80.14	21.24	5.51	27.43		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

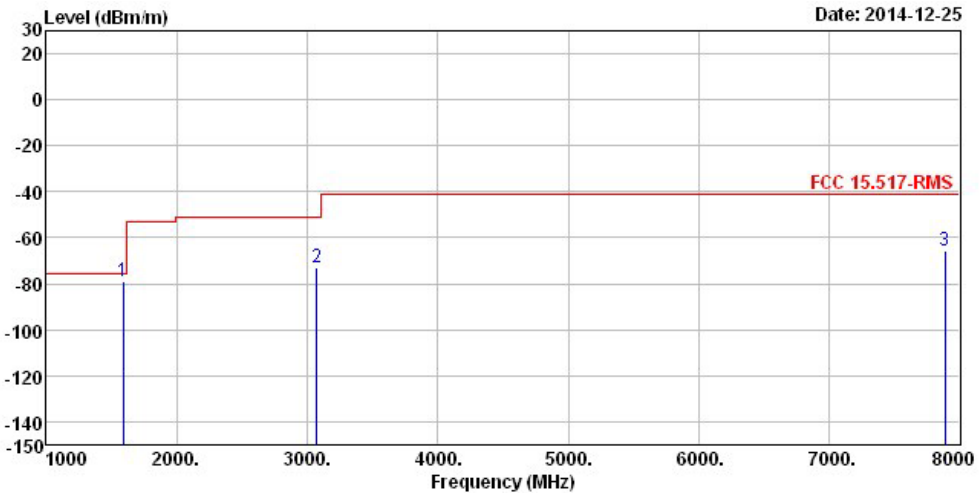
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	961.200	-76.97	-1.67	-75.30	-76.23	21.27	5.37	27.38		---	---
2	962.560	-78.15	-2.85	-75.30	-77.40	21.25	5.38	27.38		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

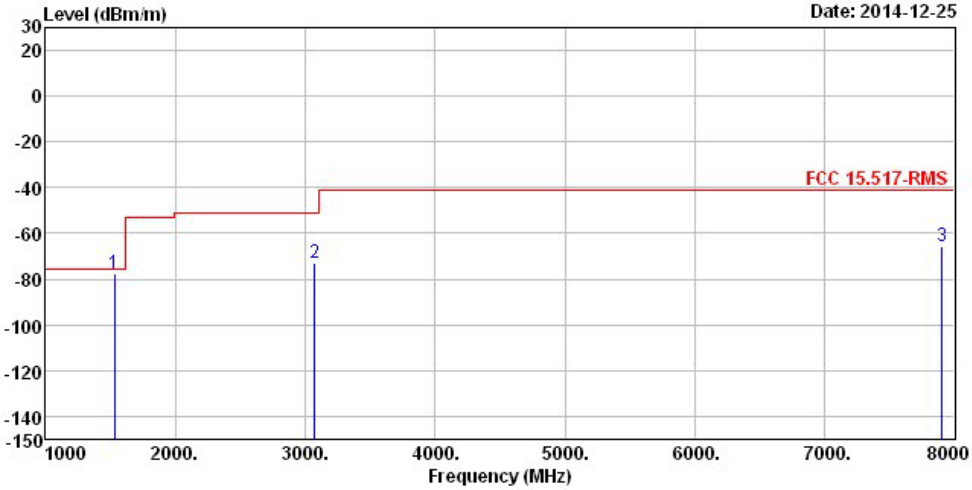
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	1588.000	-78.83	-3.53	-75.30	-74.33	25.78	2.57	32.85		---	---
2	3072.000	-73.26	-21.96	-51.30	-74.70	30.35	3.58	32.49		---	---
3	7888.000	-65.45	-24.15	-41.30	-75.55	36.98	5.97	32.85		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

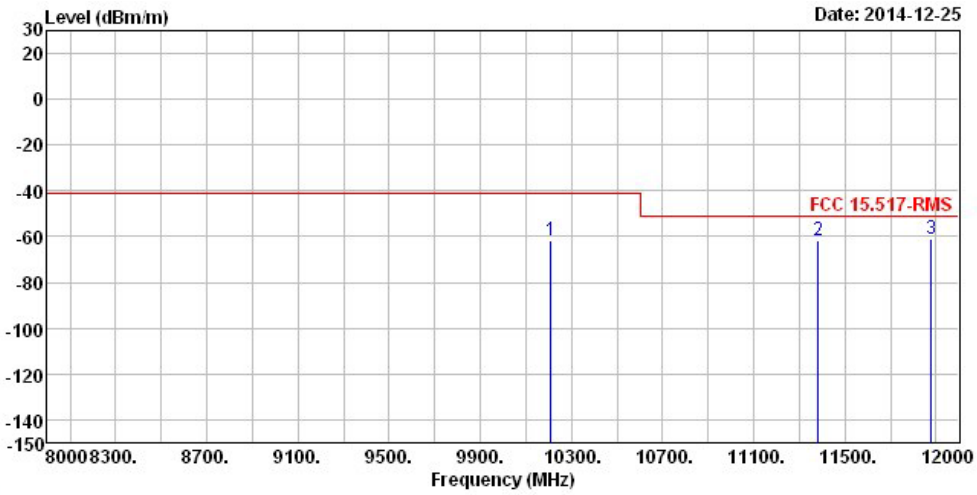
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	1532.000	-77.40	-2.10	-75.30	-72.51	25.46	2.54	32.89		---	---
2	3072.000	-72.85	-21.55	-51.30	-74.29	30.35	3.58	32.49		---	---
3	7902.000	-65.34	-24.04	-41.30	-75.46	37.00	5.97	32.85		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

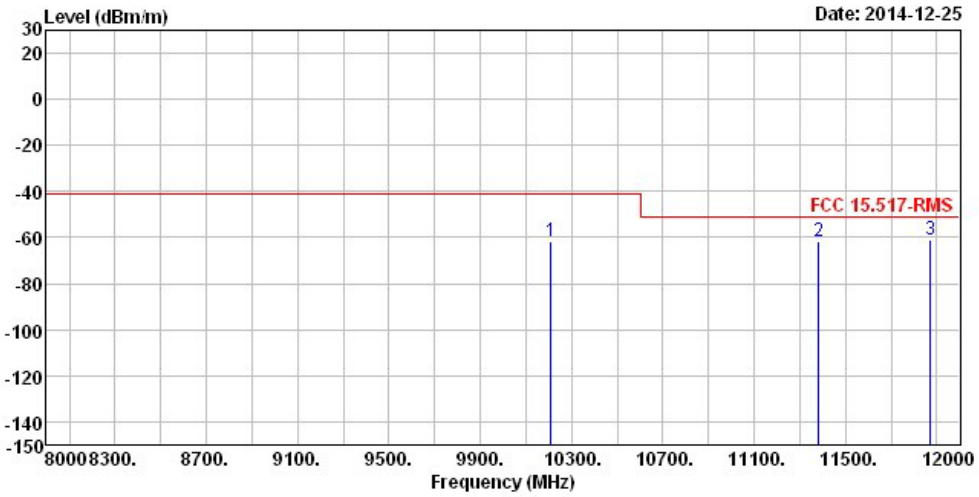
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	10208.000	-61.90	-20.60	-41.30	-74.87	39.00	6.91	32.94		---	---
2	11384.000	-61.52	-10.22	-51.30	-75.74	39.18	7.46	32.42		---	---
3	11880.000	-60.70	-9.40	-51.30	-75.47	39.53	7.67	32.43		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

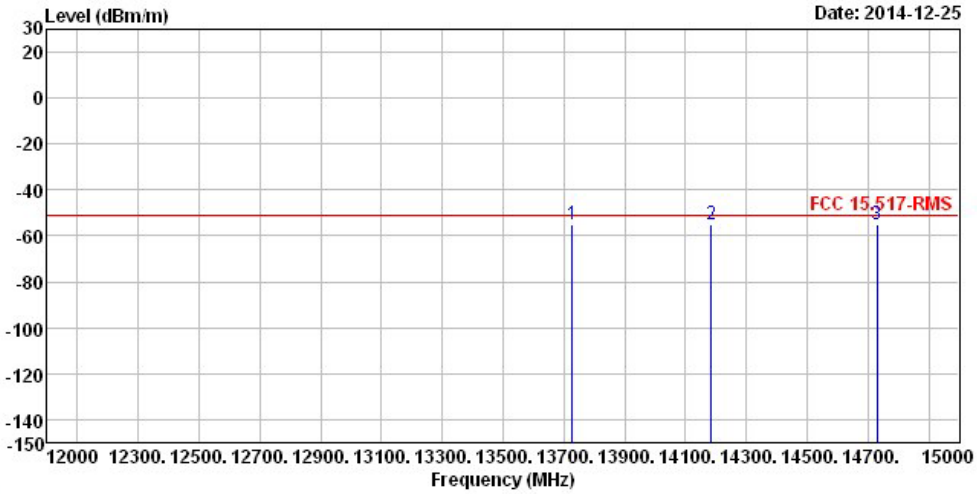
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	10208.000	-61.93	-20.63	-41.30	-74.90	39.00	6.91	32.94		---	---
2	11384.000	-61.54	-10.24	-51.30	-75.76	39.18	7.46	32.42		---	---
3	11872.000	-60.66	-9.36	-51.30	-75.43	39.53	7.67	32.43		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

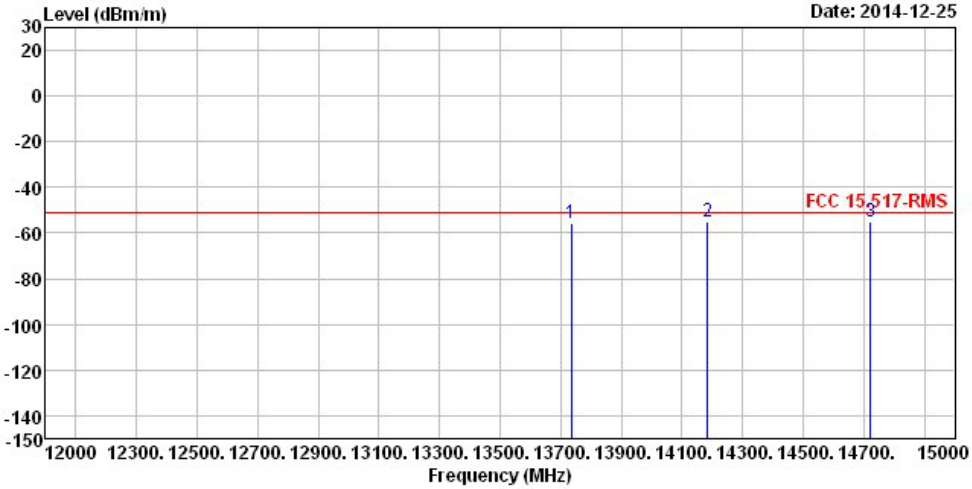
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	13728.000	-55.35	-4.05	-51.30	-73.87	41.05	8.25	30.78		---	---
2	14184.000	-54.97	-3.67	-51.30	-74.35	42.07	8.33	31.02		---	---
3	14730.000	-54.98	-3.68	-51.30	-73.64	41.66	8.50	31.50		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

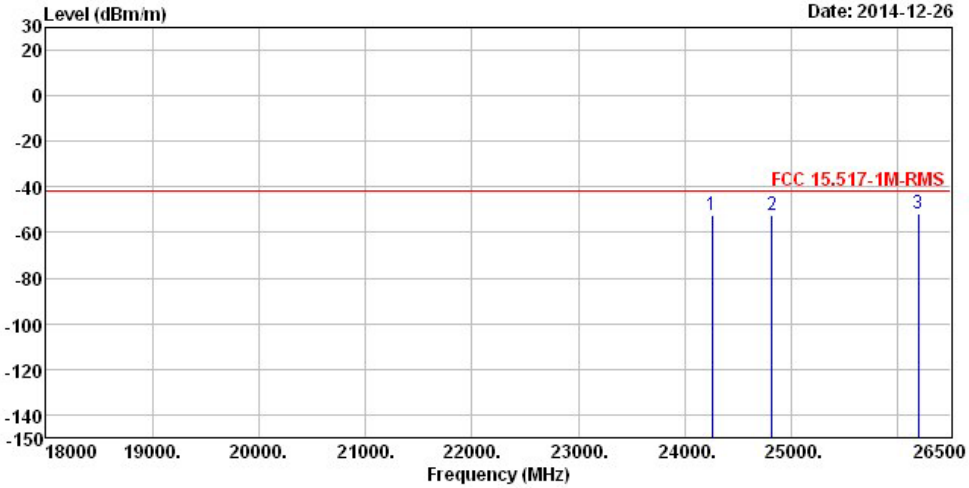
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	13734.000	-55.36	-4.06	-51.30	-73.88	41.05	8.25	30.78		---	---
2	14184.000	-54.83	-3.53	-51.30	-74.21	42.07	8.33	31.02		---	---
3	14724.000	-54.92	-3.62	-51.30	-73.64	41.72	8.50	31.50		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

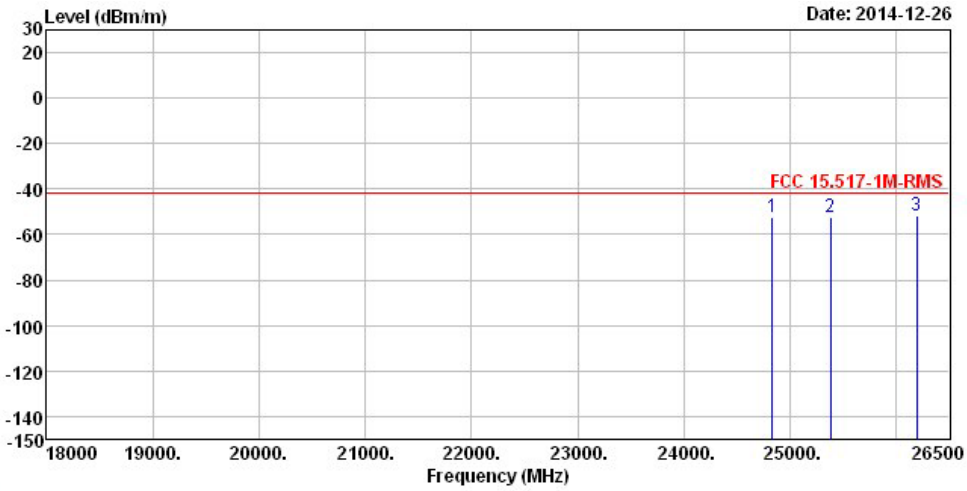
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	24256.000	-52.69	-10.93	-41.76	-70.44	39.25	10.47	31.97		---	---
2	24817.000	-52.57	-10.81	-41.76	-70.38	39.07	11.00	32.26		---	---
3	26194.000	-51.62	-9.86	-41.76	-71.60	39.58	11.08	30.68		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

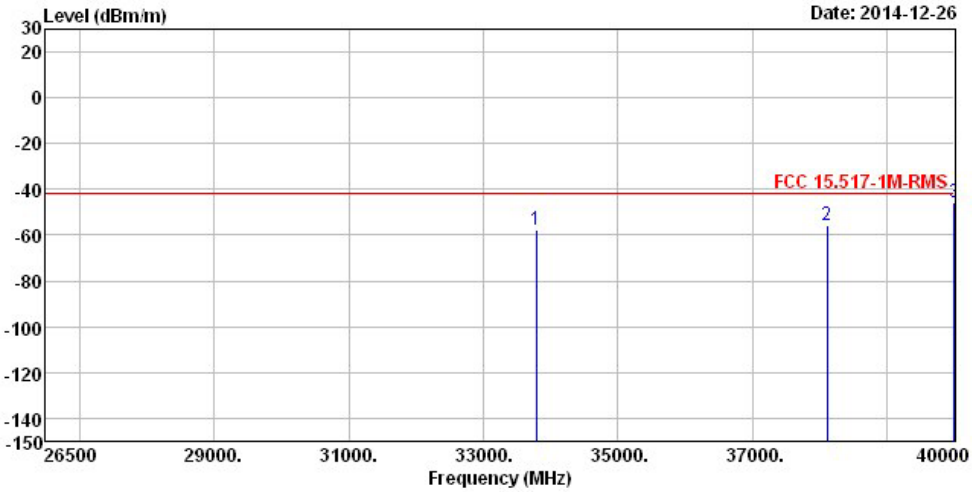
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	24834.000	-52.68	-10.92	-41.76	-70.50	39.07	11.00	32.25		---	---
2	25378.000	-52.65	-10.89	-41.76	-70.82	39.40	11.18	32.41		---	---
3	26194.000	-51.64	-9.88	-41.76	-71.62	39.58	11.08	30.68		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

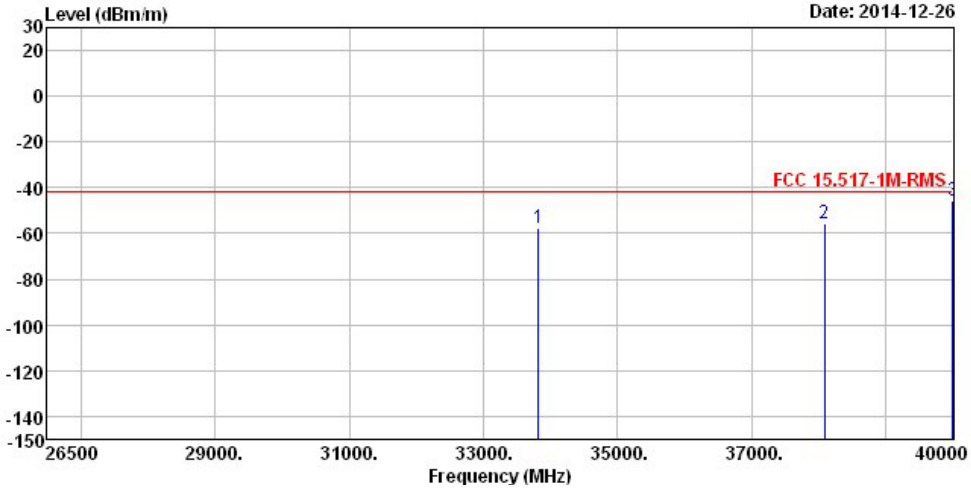
Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	33790.000	-57.82	-16.06	-41.76	-59.52	41.80	14.13	54.23		---	---
2	38110.000	-55.87	-14.11	-41.76	-60.19	43.87	14.53	54.08		---	---
3	40000.000	-45.64	-3.88	-41.76	-56.75	47.30	14.07	50.26		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

Radiated Emissions from Antenna			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H

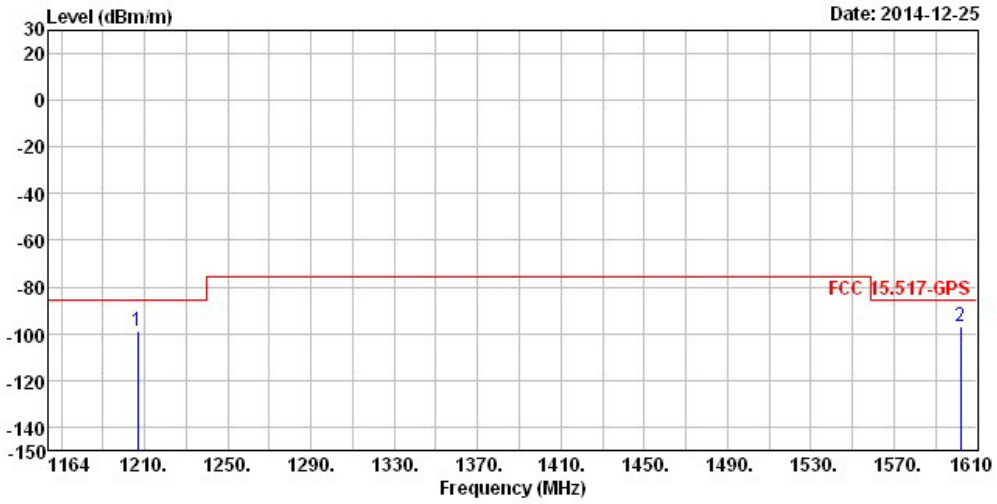


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	33817.000	-57.94	-16.18	-41.76	-59.64	41.80	14.13	54.23		---	---
2	38083.000	-55.92	-14.16	-41.76	-60.26	43.80	14.59	54.05		---	---
3	40000.000	-45.83	-4.07	-41.76	-56.94	47.30	14.07	50.26		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
Note 5: Measurements made with 1 MHz RBW/3MHz VBW (RMS detector) at 3m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 1~3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

3.4.10 Radiated Emissions within GPS Band

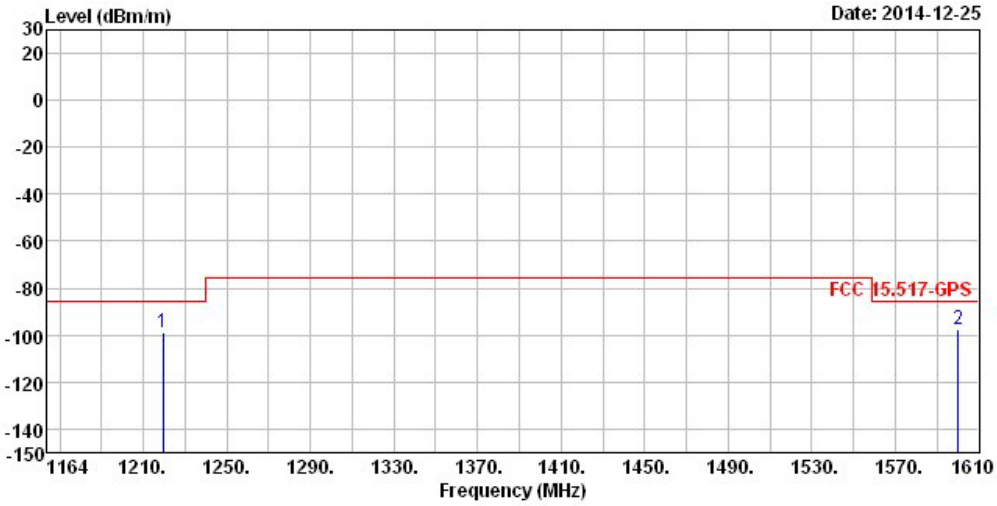
Radiated Emissions within GPS Band			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	1206.816	-98.68	-13.38	-85.30	-92.09	24.66	2.23	33.48		---	---
2	1601.972	-96.81	-11.51	-85.30	-92.32	25.78	2.57	32.84		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

Radiated Emissions within GPS Band			
Mode	TransferJet	**Test Freq. (MHz)**	4470
Operating Function	transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Remark	A/Pos	T/Pos
	MHz	dBm/m	dB	dBm/m	dBm	dB/m	dB	dB		cm	deg
1	1219.304	-98.88	-13.58	-85.30	-92.37	24.69	2.26	33.46		---	---
2	1600.188	-97.30	-12.00	-85.30	-92.81	25.78	2.57	32.84		---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: sweep time that there is no more than a 1 ms integration period over each measurement bin.
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz ~ 2.75GHz	Apr. 14. 2014	AC Conduction
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Jan. 22, 2014	AC Conduction
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	Oct. 31, 2014	AC Conduction
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	AC Conduction

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101013	9KHz~40GHz	Jan. 25, 2014	RF Conducted
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	30MHz ~ 26.5GHz	Dec. 04, 2014	RF Conducted

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Nov. 29, 2014	Radiation
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 05, 2014	Radiation
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Sep. 01, 2014	Radiation
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Mar. 27, 2014	Radiation
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 20, 2014	Radiation
Horn Antenna	ETS・LINDGREN	3115	6741	1GHz ~ 18GHz	Jun. 11, 2014	Radiation
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	Jan. 10, 2014	Radiation
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 15, 2014	Radiation
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 12, 2014	Radiation
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	EM	EM18G40G	060604	18GHz ~ 40GHz	Oct. 17.2013	Radiation
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9kHz ~ 30MHz	Jul. 28, 2014	Radiation

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