FCC Radio Test Report

Equipment	:	**802.11 a/n PCIe Module**
Brand Name	:	**Proxim**
Model No.	:	**XB92HPW**
FCC ID	:	**HZB-XB92WFR**
Standard	:	**47 CFR FCC Part 95**
Frequency Range	:	**5850 MHz – 5925 MHz**
FCC Classification	:	**TNB**
Applicant	:	**Proxim Wireless Corporation** **1561 Buckeye Drive, Milpitas, CA 95035, USA**
Manufacturer	:	**Proxim Wireless Corporation** **1561 Buckeye Drive, Milpitas, CA 95035, USA**

The product sample received on Apr. 29, 2013 and completely tested on Feb. 13, 2014. 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.

Sam Chen
SPORTON INTERNATIONAL INC.

Table of Contents

Summary of Test Result

Conformance Test Specifications					
Report Clause	**Ref. Std. Clause**	**Description**	**Measured**	**Limit**	**Result**
3.1	15.107	AC Power-line Conducted Emissions	[dBuV]: 0.18640MHz 36.45 (Margin 17.74dB) - AV 54.99 (Margin 9.20dB) - QP	FCC 15.107 Class B	Complied
-	95.631	Emission Types	D1D (OFDM - BPSK,QPSK, 16QAM, 64QAM)	ASTM E2213-03	Complied
1.1.1	95.637	Modulation Standard	DSRC for IEEE 802.11p	ASTM E2213-03	Complied
3.2	95.633	Emission Bandwidth	Bandwidth [MHz] 10M:8.32 20M:16.56	Information only	Complied
3.3	95.639	Maximum Transmitter Power	Power [dBm] Power Class B: 5860-5920MHz(10M): 9.92 5875-5905MHz(20M): 6.96	ASTM E2213-03 8.9.1 Power [dBm] 5860-5920MHz(10M): 10 5875-5905MHz(20M): 10	Complied
3.3	95.639	Effective Isotropic Radiated Power (EIRP)	EIRP [dBm] Power Class B 5860-5920MHz(10M): 25.92 5875-5905MHz(20M): 22.96	ASTM E2213-03 8.9.1 EIRP [dBm] 5860-5920MHz(10M): 33 5875-5905MHz(20M): 23	Complied
3.4	95.635	Transmit Spectrum Mask	Device complies with spectral mask – refer to test data Mask Class B	ASTM E2213-03 8.9.2	Complied
3.5	2.1051	Transmitter Conducted Unwanted Emissions	30MHz-40GHz Band [dBm]: 4934.30MHz: -28.26 (Margin 3.26dB)	ASTM E2213-03 8.9.2 30MHz-40GHz Bands: =< -25 dBm	Complied
3.6	2.1053	Transmitter Radiated Unwanted Emissions	9kHz-40GHz Band [dBuV/m at 3m]: 55.22MHz: -47.13 (Margin 22.13dB)	ASTM E2213-03 8.9.2 9kHz-40GHz Bands: =< -25 dBm e.i.r.p. [70.2 dBuV/m at 3m]	Complied
3.7	2.1055	Frequency Stability	11.14 ppm	ASTM E2213-03 8.9.4 ±10 [ppm]	Complied

Revision History

Report No.	Version	Description	Issued Date
FL342910-03AB	Rev. 01	Initial issue of report	Feb. 27, 2014

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information			
Frequency Range (MHz)	**IEEE Std. 802.11**	**Ch. Frequency (MHz)**	**Channel Number**
5850-5925	p (10MHz)	5860-5920	172-184 [7]
5850-5925	p (20MHz)	5875-5905	175-181 [2]
Note 1: IEEE Std. 802.11p-2010 modulation consists of BPSK, QPSK, 16QAM and 64QAM and multiple channel space [5MHz, 10MHz and 20MHz]. Then EUT support 10MHz and 20MHz channel space. Note 2: RF output power specifies that Conducted Output Power.			

1.1.2 Antenna Information

Ant.	Brand	Model No.	Type	Connector
1	MARS	MA-WA55-30	Panel	N Type
2	MARS	MA-WB55-20	Sector	N Type
3	MARS	MA-WO55-10NH	Omni	N Type
4	Grand-Tek	GTT-AC-05-001	Panel	MMCX type

Ant.	Ant. Gain (dBi)		Cable Loss (dB)		Attenuator (dB)	Test Gain (dBi)	
	5850-5925MHz	5150-5250/ 5725-5850MHz	5850-5925MHz	5150-5250/ 5725-5850MHz		5850-5925MHz	5150-5250/ 5725-5850MHz
1	29	30	2	2	12	15	16
2	20	20	2	2	10	8	8
3	10	10	2	2	0	8	8
4	16	16	0	0	0	16	16

Ant.	Support Function of Ant.			
	Part 90M DSRC-RSU	Part 95L DSRC-OBU	5150~5250 MHz (Band 1)	5725~5850 MHz (Band 4)
1	V	X	X	V(P to P) (P to M)
2	V	X	X	V(P to P) (P to M)
3	V	V	V	V(P to M)
4	V	V	X	V(P to P) (P to M)

Note: 1. Ant. 1: 12dB attenuator was added in front of antenna port due to simulate the real cable use.

2. Ant. 2: 10dB attenuator was added in front of antenna port due to simulate the real cable use.

3. Only the highest gain antenna (Ant.4) was selected to test and record in the report.

4. The EUT has total antennas amounted to four sets.

Chain 1 and Chain 2 could transmit/receive simultaneously.

1.1.3 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)**
☒ 100.00% - IEEE 802.11p (10M)	0
☒ 100.00% - IEEE 802.11p (20M)	0

1.1.4 EUT Operational Condition

EUT Power Type	From Host System		
Test Voltage	☒ Vnom (110 V)	☒ Vmax (126.5 V)	☒ Vmin (93.5 V)
Test Climatic	☒ Tnom (20°C)	☒ Tmax (60°C)	☒ Tmin (-40°C)

1.2 Accessories

N/A

1.3 Support Equipment

For Test Site No: CO01-CB

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E6430	DoC
2	Fixture	Bplus Technology Co., Ltd.	PE3B	N/A
3	Power Supply	Advanced	LPS-305	DoC

For Test Site No: 03CH01-CB

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E6430	DoC
2	Fixture	Bplus Technology Co., Ltd.	PE3B	N/A
3	Power Supply	Gwinstek	GPC-6030D	N/A

For Test Site No: TH01-CB

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	M1330	E2KWM3945ABG
2	Fixture	Bplus Technology Co., Ltd.	PE3B	N/A
3	Power Supply	MOTECH	DR 2001	N/A

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 95
- ANSI/TIA-603-D-2010
- FCC KDB 971168
- FCC KDB 662911
- FCC KDB 412172

1.5 Testing Location 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 : 886-3-327-0973	
☒	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.**
AC Conduction			CO01-CB
RF Conducted			TH01-CB
Radiated Emission			03CH01-CB

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing		
Modulation Mode	**Data Rate**	**Worst Data Rate**
802.11p-10M	3-27 Mbps	3 Mbps
802.11p-20M	6-54 Mbps	6 Mbps
Note 1: Modulation modes consist of below configuration: 802.11p-10M: 802.11p10MHz bandwidth, 802.11p-20M: 802.11p 20MHz bandwidth		

2.2 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration	
Modulation Mode	**Test Channel Frequencies (MHz)**
802.11p-10M	5860, 5890, 5920
802.11p-20M	5875, 5905

2.3 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter					
Test Software Version	Atheros Radio Test <ART> Revision 0.9 BUILD #27 ART_11n				
Modulation Mode	**Test Frequency (MHz)**				
	NCB: 10MHz			**NCB: 20MHz**	
	5860	**5890**	**5920**	**5875**	**5905**
802.11p-10M	4.5	4.5	5	-	-
802.11p-20M	-	-	-	2.5	2.5

2.4 EUT Operation during Test

During the test, “ART Revision 0.9 BUILD #27 ART_11n” under WIN XP was executed the test program to control the EUT continuously transmit/receive RF signal.

2.5 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Test Condition	AC power-line conducted measurement for line and neutral
Test Mode	CTX
1	EUT+Ant.4

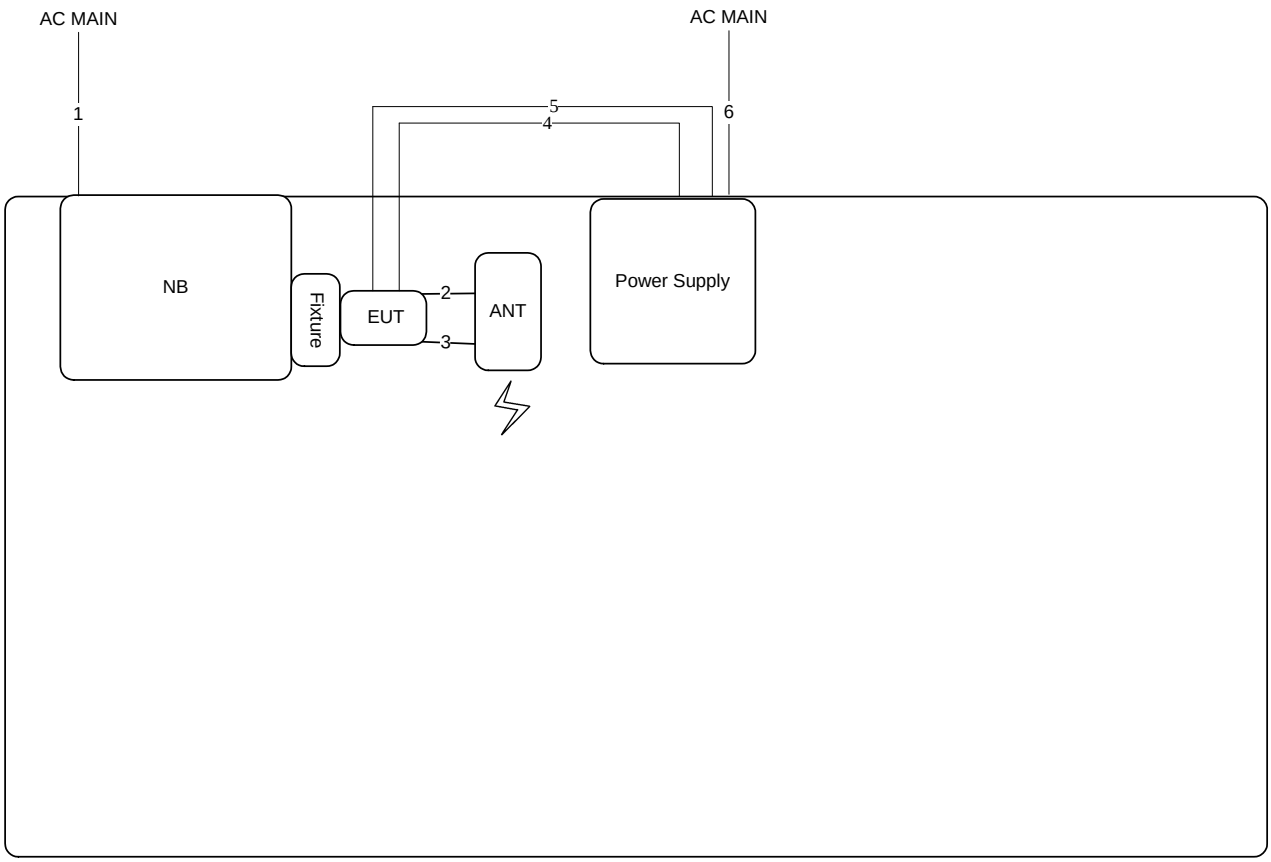
The Worst Case Mode for Following Conformance Tests	
Tests Item	Emission Bandwidth
Test Condition	Radiated measurement
Modulation Mode	802.11p-10M, 802.11p-20M

The Worst Case Mode for Following Conformance Tests	
Tests Item	Maximum Transmitter Power Effective Isotropic Radiated Power (EIRP) Transmit Spectrum Mask Transmitter Conducted Unwanted Emissions Frequency Stability
Test Condition	Conducted measurement at transmit chains
Modulation Mode	802.11p-10M, 802.11p-20M

The Worst Case Mode for Following Conformance Tests	
Tests Item	Transmitter Radiated Unwanted Emissions
Test Condition	Radiated measurement
Test Mode	CTX
1	EUT+Ant.4
Modulation Mode	802.11p-10M, 802.11p-20M

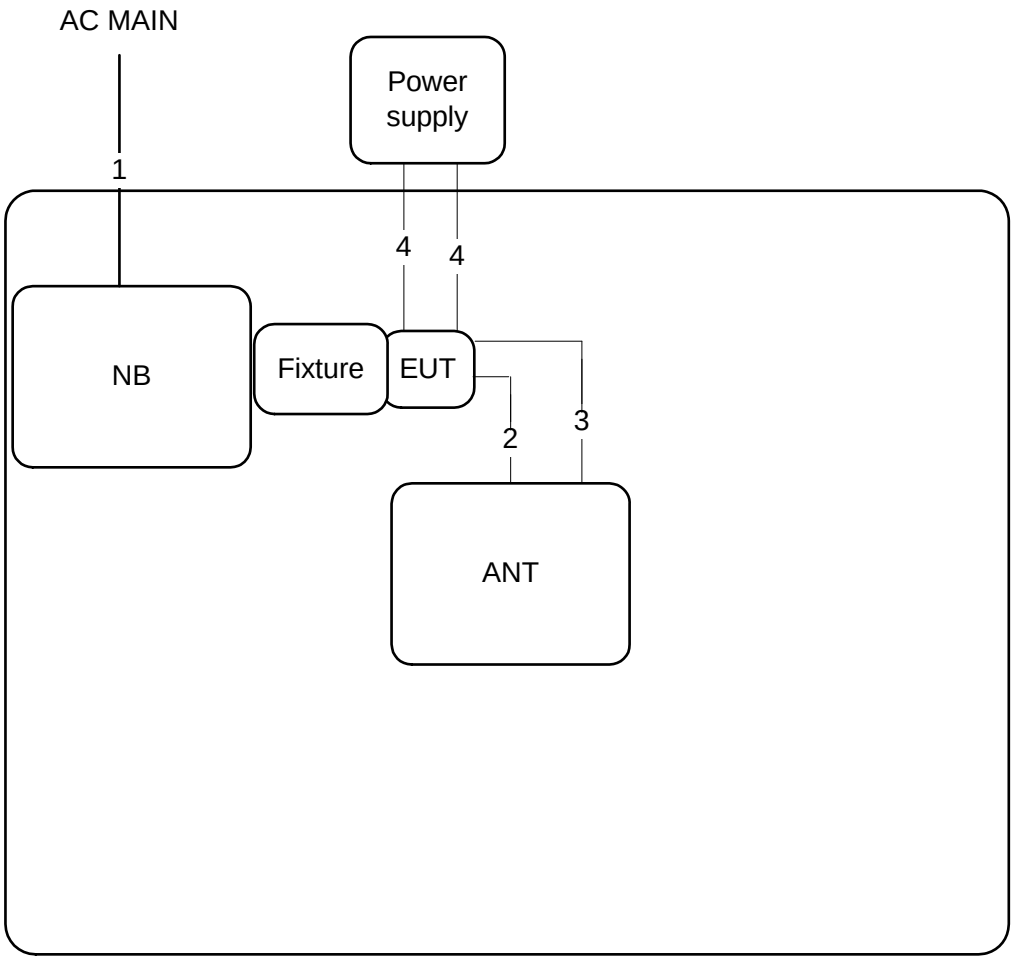
2.6 Test Setup Diagram

Test Setup Diagram – AC power-line conducted emissions Test



Item	Connection	Shield	Length(m)	Remark
1	Power cable	No	2.6m	-
2	ANT cable	Yes	0.11m	-
3	ANT cable	Yes	0.11m	-
4	Power cable	No	1.5 m	-
5	Power cable	No	1.5 m	-
6	Power cable	No	1.8 m	-

Test Setup Diagram – Radiated Test



Item	Connection	Shield	Length(m)	Remark
1	Power cable	No	2.6m	-
2	ANT cable	Yes	0.11m	-
3	ANT cable	Yes	0.11m	-
4	DC Power cable*2	No	1.5m	-

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 [Class B]		
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

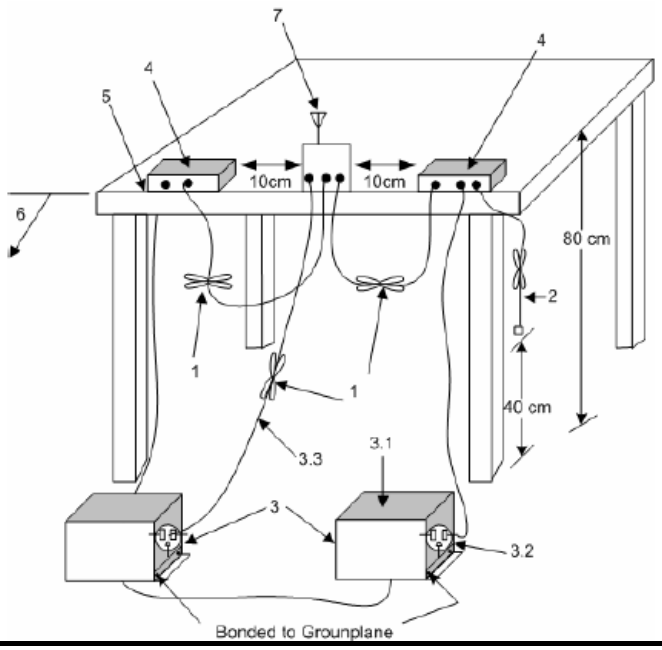
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI/TIA-603-D-2010, clause 2.1.3 for AC power-line conducted emissions.

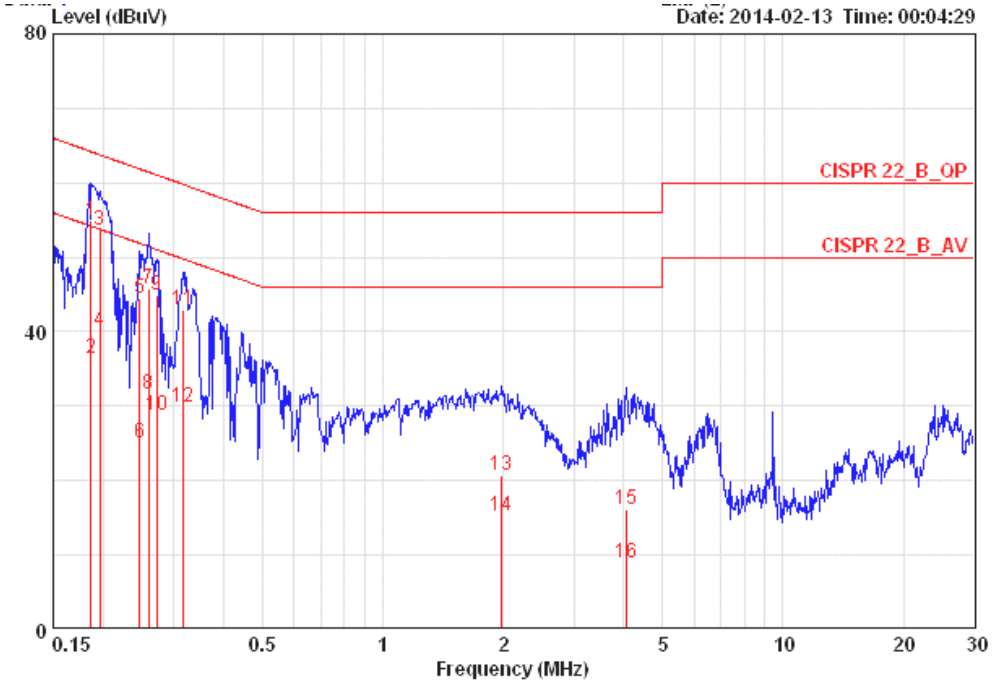
3.1.4 Test Setup

AC Power-line Conducted Emissions



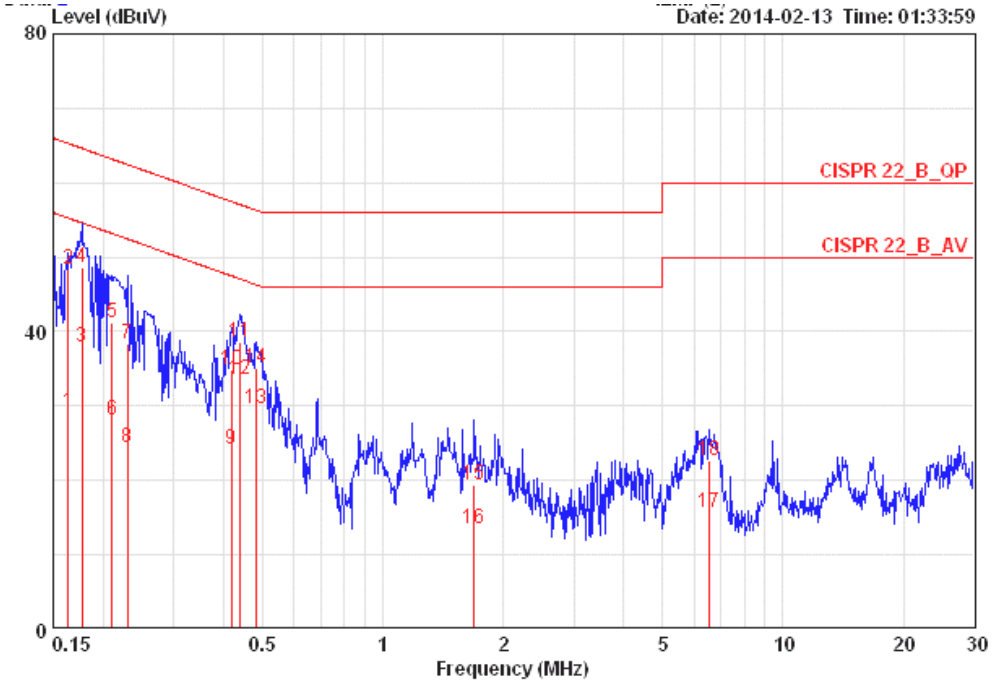
3.1.5 Test Result of AC Power-line Conducted Emissions

Temp	25°C	Humidity	49%
Test Engineer	Ryo Fan	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1 @	0.18640	54.99	-9.20	64.20	0.15	54.65	0.19	LINE	QP
2	0.18640	36.45	-17.74	54.20	0.15	36.11	0.19	LINE	AVERAGE
3 @	0.19654	53.73	-10.03	63.76	0.15	53.38	0.20	LINE	QP
4 @	0.19654	40.15	-13.61	53.76	0.15	39.80	0.20	LINE	AVERAGE
5	0.24682	44.36	-17.50	61.86	0.15	44.01	0.20	LINE	QP
6	0.24682	25.14	-26.72	51.86	0.15	24.79	0.20	LINE	AVERAGE
7	0.26026	45.73	-15.69	61.42	0.15	45.38	0.20	LINE	QP
8	0.26026	31.58	-19.84	51.42	0.15	31.23	0.20	LINE	AVERAGE
9	0.27152	44.91	-16.16	61.07	0.15	44.56	0.20	LINE	QP
10	0.27152	28.70	-22.37	51.07	0.15	28.35	0.20	LINE	AVERAGE
11	0.31662	43.01	-16.79	59.80	0.15	42.66	0.20	LINE	QP
12	0.31662	29.92	-19.88	49.80	0.15	29.57	0.20	LINE	AVERAGE
13	1.980	20.62	-35.38	56.00	0.19	20.20	0.23	LINE	QP
14	1.980	15.31	-30.69	46.00	0.19	14.89	0.23	LINE	AVERAGE
15	4.070	16.02	-39.98	56.00	0.28	15.44	0.30	LINE	QP
16	4.070	8.93	-37.07	46.00	0.28	8.35	0.30	LINE	AVERAGE

Temp	25°C	Humidity	49%
Test Engineer	Ryo Fan	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.16327	29.28	-26.02	55.30	0.07	29.02	0.19	NEUTRAL	AVERAGE
2	0.16327	48.48	-16.82	65.30	0.07	48.22	0.19	NEUTRAL	QP
3	0.17678	38.02	-16.61	54.64	0.07	37.76	0.19	NEUTRAL	AVERAGE
4	0.17678	48.61	-16.02	64.64	0.07	48.35	0.19	NEUTRAL	QP
5	0.21055	41.22	-21.96	63.18	0.07	40.95	0.20	NEUTRAL	QP
6	0.21055	28.10	-25.08	53.18	0.07	27.83	0.20	NEUTRAL	AVERAGE
7	0.23040	38.47	-23.97	62.44	0.07	38.20	0.20	NEUTRAL	QP
8	0.23040	24.34	-28.10	52.44	0.07	24.07	0.20	NEUTRAL	AVERAGE
9	0.41927	24.12	-23.34	47.46	0.07	23.85	0.20	NEUTRAL	AVERAGE
10	0.41927	34.78	-22.68	57.46	0.07	34.51	0.20	NEUTRAL	QP
11	0.43742	38.53	-18.58	57.11	0.07	38.26	0.20	NEUTRAL	QP
12 @	0.43742	33.48	-13.63	47.11	0.07	33.21	0.20	NEUTRAL	AVERAGE
13	0.48119	29.71	-16.61	46.32	0.07	29.44	0.20	NEUTRAL	AVERAGE
14	0.48119	35.05	-21.27	56.32	0.07	34.78	0.20	NEUTRAL	QP
15	1.689	19.38	-36.62	56.00	0.10	19.06	0.22	NEUTRAL	QP
16	1.689	13.51	-32.49	46.00	0.10	13.19	0.22	NEUTRAL	AVERAGE
17	6.557	15.71	-34.29	50.00	0.19	15.21	0.31	NEUTRAL	AVERAGE
18	6.557	22.61	-37.39	60.00	0.19	22.11	0.31	NEUTRAL	QP

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

Emission Bandwidth Limit
N/A. Information only
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 onditions.

3.2.2 Measuring Instruments

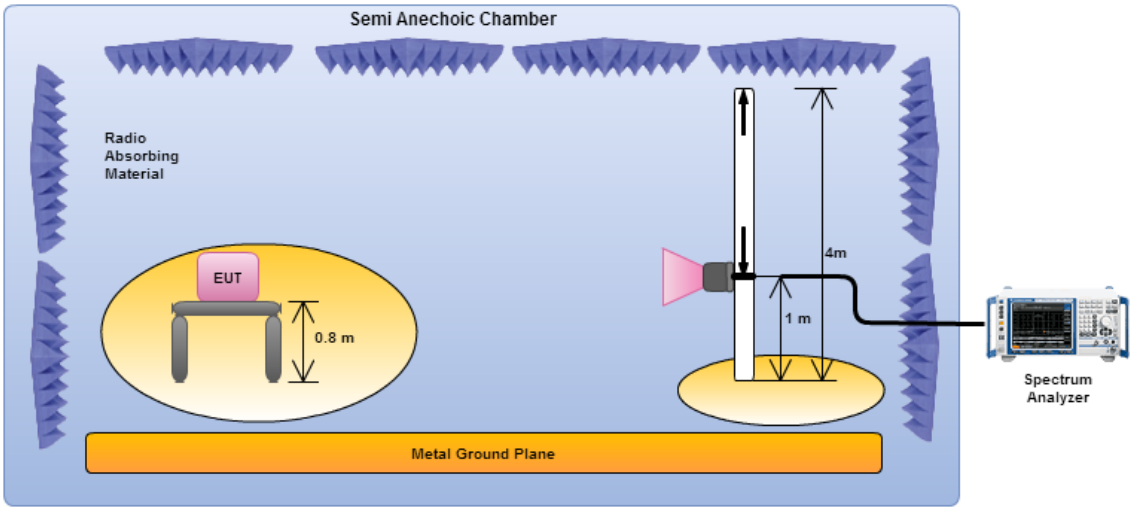
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method			
☒	For the emission bandwidth shall be measured using one of the options below:		
	☒	Refer as ANSI/TIA-603-D, clause 1.3.4.4 for test bandwidth.	
	☐	Refer as KDB 971168, clause 3 for signal bandwidth.	
	☐	Refer as IC RSS-Gen, clause 6.4.1 for occupied bandwidth.	
	☐	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.	
☐	For conducted measurement.		
	☐	If EUT supports multiple transmit chains using options given below:	
		☐	Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs).
		☐	Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.
☒	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.		

3.2.4 Test Setup

Emission Bandwidth



3.2.5 Test Result of Emission Bandwidth

Temperature	23°C	**Humidity**	63%
Test Engineer	Wen Chao		

Configuration 802.11p-10M / Tx1+Tx2

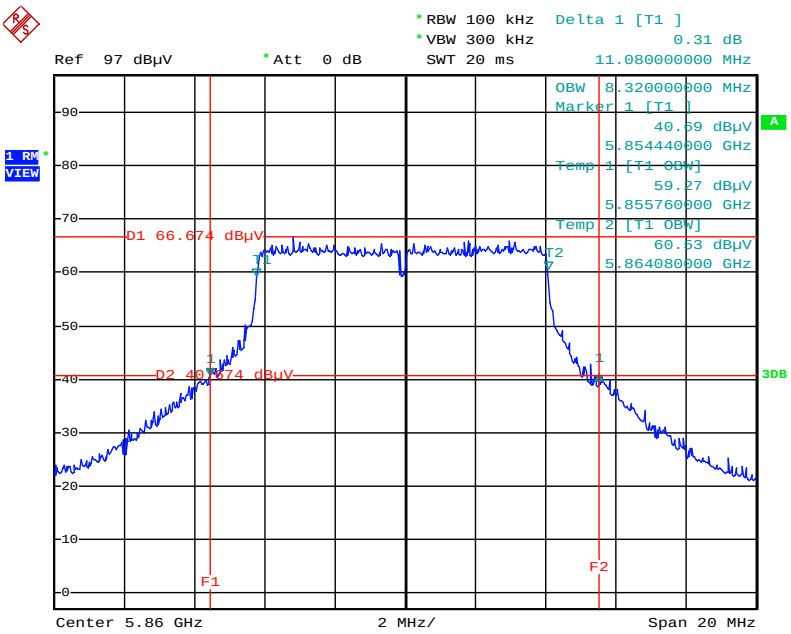
Emission Bandwidth Result		
Frequency (MHz)	**26dB Bandwidth (MHz)**	**99% Occupied Bandwidth (MHz)**
5860	11.08	8.32
5890	11.08	8.32
5920	11.04	8.32

Configuration 802.11p-20M / Tx1+Tx2

Emission Bandwidth Result		
Frequency (MHz)	**26dB Bandwidth (MHz)**	**99% Occupied Bandwidth (MHz)**
5875	20.16	16.56
5905	20.88	16.56

3.2.6 Test Plots of Emission Bandwidth

Modulation Mode	Test Chain	Freq. (MHz)
802.11p-10M	Tx1+Tx2	5860



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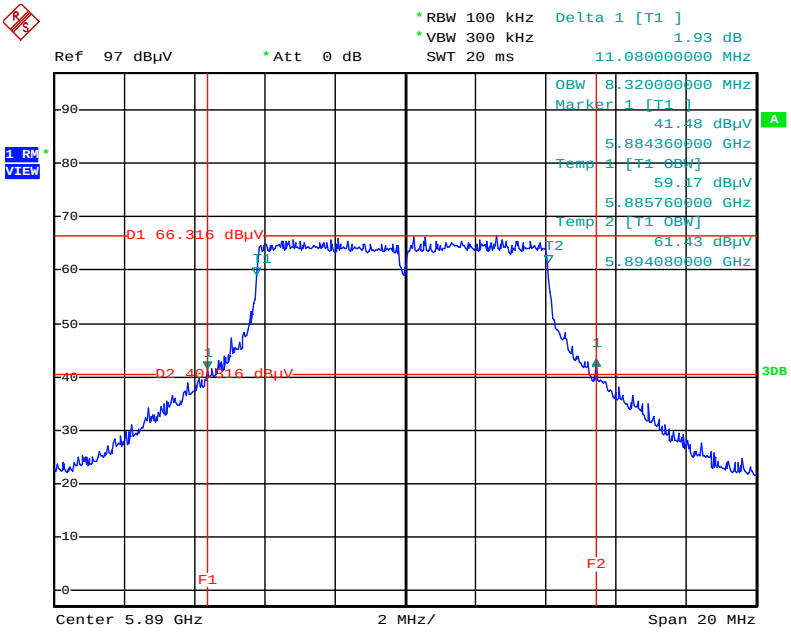
Modulation Mode	Test Chain	Freq. (MHz)
802.11p-10M	Tx1+Tx2	5890



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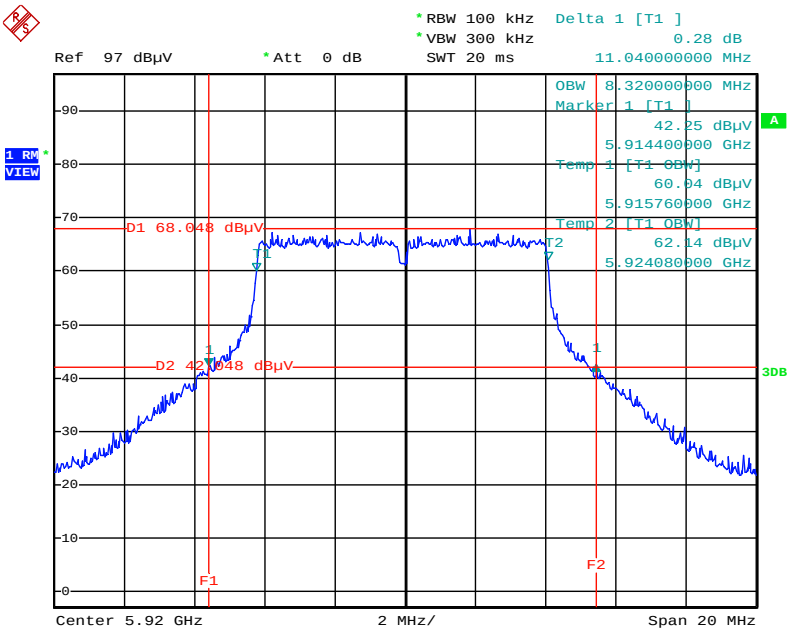
Modulation Mode	Test Chain	Freq. (MHz)
802.11p-10M	Tx1+Tx2	5920



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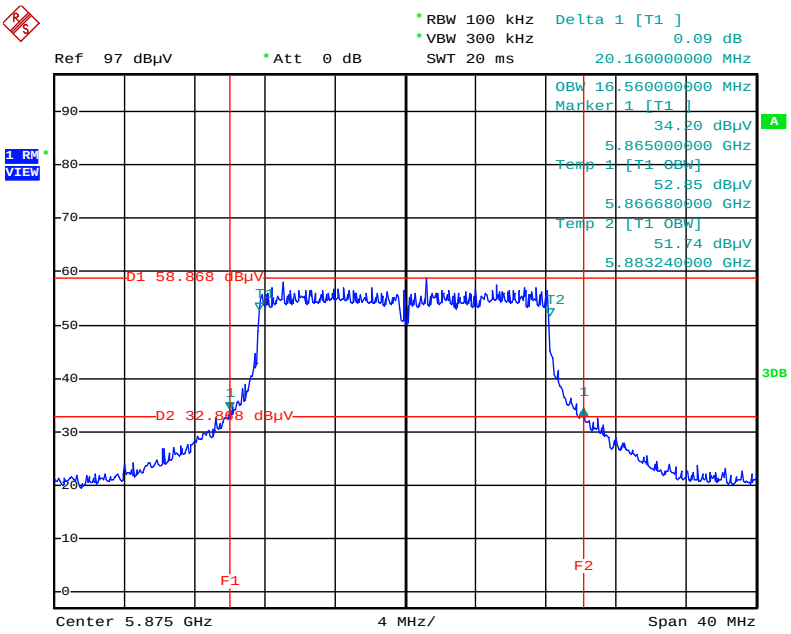
Modulation Mode	Test Chain	Freq. (MHz)
802.11p-20M	Tx1+Tx2	5875



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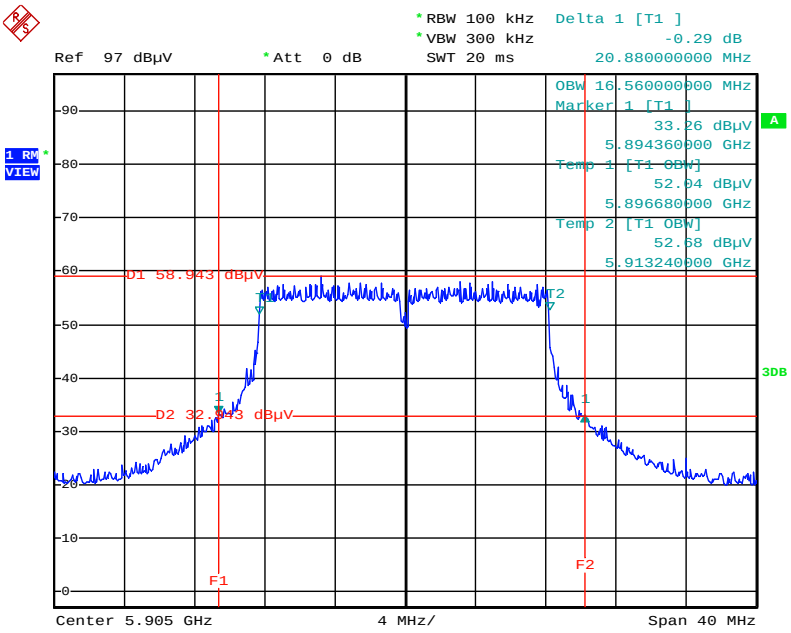
Modulation Mode	Test Chain	Freq. (MHz)
802.11p-20M	Tx1+Tx2	5905



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3.3 Maximum Transmitter Power

3.3.1 Maximum Transmitter Power Limit

5850–5925 MHz Band				
Portable DSRCS-OBUs is 1.0 mW, other as following as:				
Frequency Range	**Channel**	**BW: 5/10MHz**	**Cond. Power**	**EIRP Power**
5855-5865	172	5860 MHz	28.8 dBm	33 dBm
5865-5875	174	5870 MHz	28.8 dBm	33 dBm
5875-5885	176	5880 MHz	28.8 dBm	33 dBm
5885-5895	178	5890 MHz	28.8 dBm	33 dBm
5895-5905	180	5900 MHz	20 dBm	23 dBm
5905-5915	182	5910 MHz	20 dBm	23 dBm
5915-5925	184	5920 MHz	28.8 dBm	33 dBm
Frequency Range	**Channel**	**BW:20MHz**	**Cond. Power**	**EIRP Power**
5855-5865	175	5875 MHz	20 dBm	23 dBm
5865-5875	181	5905 MHz	20 dBm	23 dBm
Note 1: Conducted power could overcome limits but EIRP power shall under limits Note 2: Refer as ASTM E2213-03 Clause 8.9.1, FCC Part 95.639 & FCC ET Docket No. 98-95.				

5850–5925 MHz Band	
DSRC Device Classes and Transmit Power Levels	
Device Class	**Maximum Device Output Power (dBm)**
A	0
B	10
C	20
D	28.8 or more

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
☒	Maximum Transmitter Power
	☒ Refer as ANSI/TIA-603-D, clause 3.2.1 for power meter measurement.
	☐ Refer as KDB 971168, clause 4 average power over the fundamental signal bandwidth.
☒	Effective Isotropic Radiated Power (EIRP)
	☒ Refer as KDB 412172, clause 1.3.2 following as power approach. e.i.r.p.= P_T+G_T.
	☐ Refer as KDB 412172, clause 1.3.1 following as field strength approach. e.i.r.p.= $(E \times d)^2 / 30$.
☒	For conducted measurement.
	☒ If The EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
☐	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.

3.3.4 Test Setup

RF Output Power

3.3.5 Test Result of Maximum Transmitter Power

Temperature	23°C	Humidity	63%
Test Engineer	Wen Chao	Test Date	Feb. 05, 2014

Configuration 802.11p-10M / Tx1+Tx2

Maximum Transmitter Power Result							
Frequency (MHz)	Conducted Output Power (dBm)		Total Conducted Output Power (dBm)	Total Conducted EIRP Power (dBm)	Conducted Output Power Limit (dBm)	Conducted EIRP Power Limit (dBm)	Result
	Tx1	Tx2					
5860	6.42	6.32	9.38	25.38	10	33	Complied
5890	6.63	6.73	9.69	25.69	10	33	Complied
5920	6.88	6.93	9.92	25.92	10	33	Complied

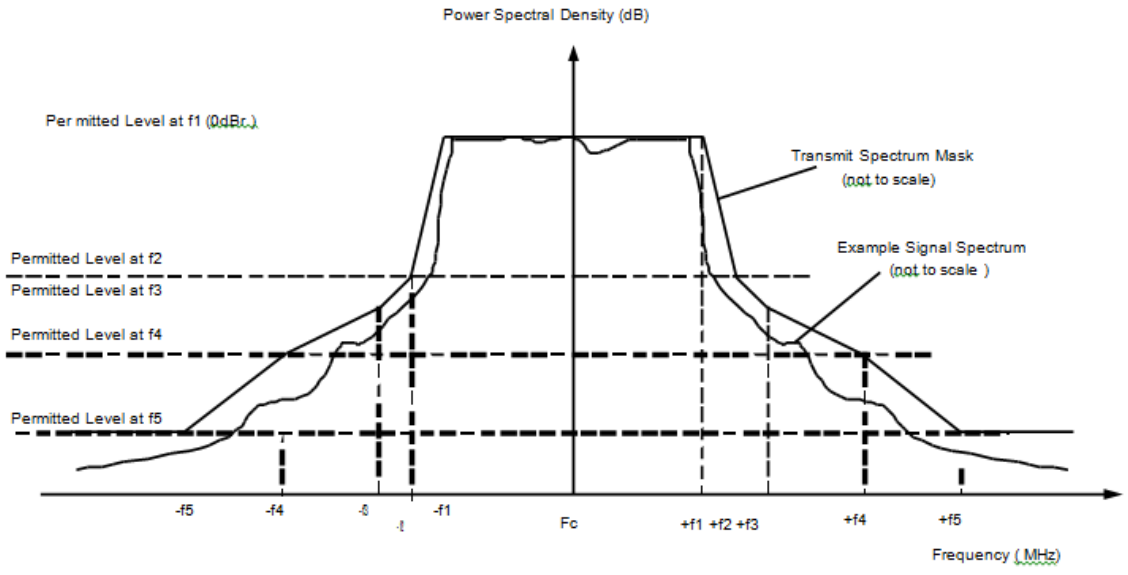
Configuration 802.11p-20M / Tx1+Tx2

Maximum Transmitter Power Result							
Frequency (MHz)	Conducted Output Power (dBm)		Total Conducted Output Power (dBm)	Total Conducted EIRP Power (dBm)	Conducted Output Power Limit (dBm)	Conducted EIRP Power Limit (dBm)	Result
	Tx1	Tx2					
5875	4.49	3.33	6.96	22.96	10	23	Complied
5905	4.18	3.61	6.91	22.91	10	23	Complied

3.4 Transmit Spectrum Mask

3.4.1 Transmit Spectrum Mask Limit

5850–5925 MHz Band					
Portable DSRCS-OBUs is 1.0 mW, other as following as:					
STA transmit power classification	**Maximum STA transmit power (mW)**		**Maximum permitted EIRP (dBm)**		
A	1		23		
B	10		23		
C	100		33		
D	760		33 for non-government / 44.8 for government		
STA transmit power classification	**± 4.5 MHz offset (±f1)**	**± 5.0 MHz offset (±f2)**	**± 5.5 MHz offset (±f3)**	**± 10 MHz offset (±f4)**	**± 15 MHz offset (±f5)**
Class A	0	–10	–20	-28	–40
Class B	0	–16	–20	-28	–40
Class C	0	–26	–32	-40	–50
Class D	0	–35	–45	-55	–65



Note 1: Refer as ASTM E2213-03 Clause 8.9.2.

3.4.2 Measuring Instruments

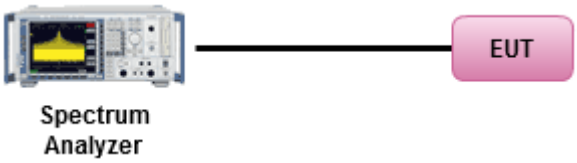
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method	
☒	The 0 dBr level is the maximum power spectral density measured in the channel. The measurements of transmit spectral density are made using 100 kHz resolution bandwidth and 30 kHz video bandwidth.
☒	For conducted measurement.
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.

3.4.4 Test Setup

Transmit Spectrum Mask

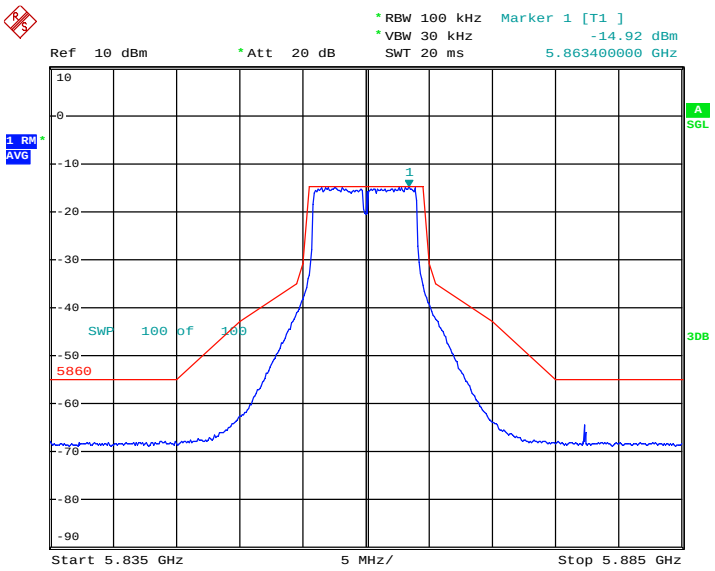


3.4.5 Test Result of Transmit Spectrum Mask

Temperature	23°C	Humidity	63%
Test Engineer	Wen Chao		

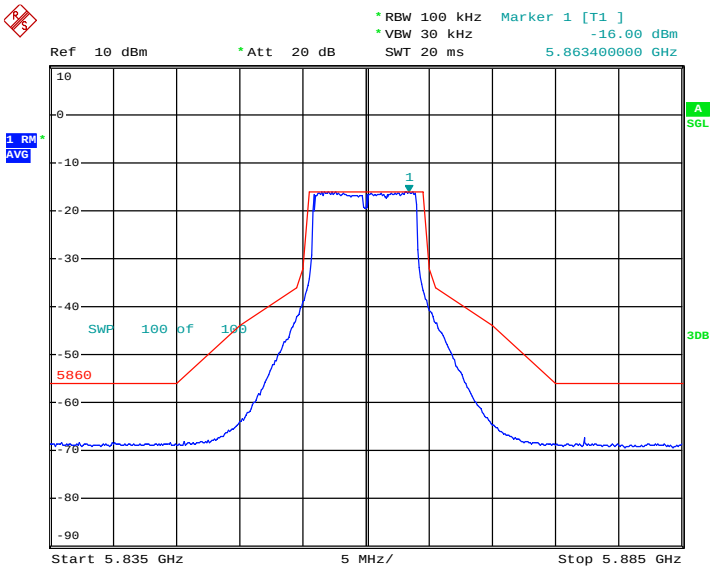
Transmit Spectrum Mask Result

Modulation Mode	Test Chain	Freq. (MHz)	Mask	Result
802.11p-10M	Tx1	5860	Under Spectral Mask	Complied



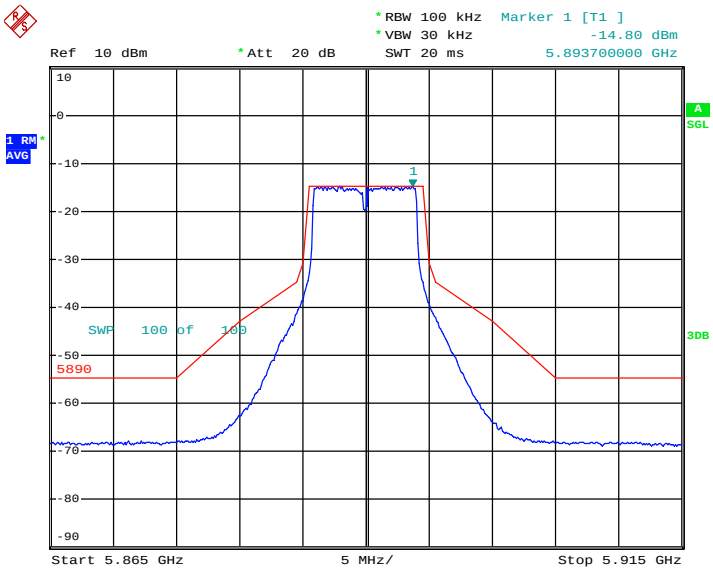
Date: 6.FEB.2014 12:57:18

Modulation Mode	Test Chain	Freq. (MHz)	Mask	Result
802.11p-10M	Tx2	5860	Under Spectral Mask	Complied



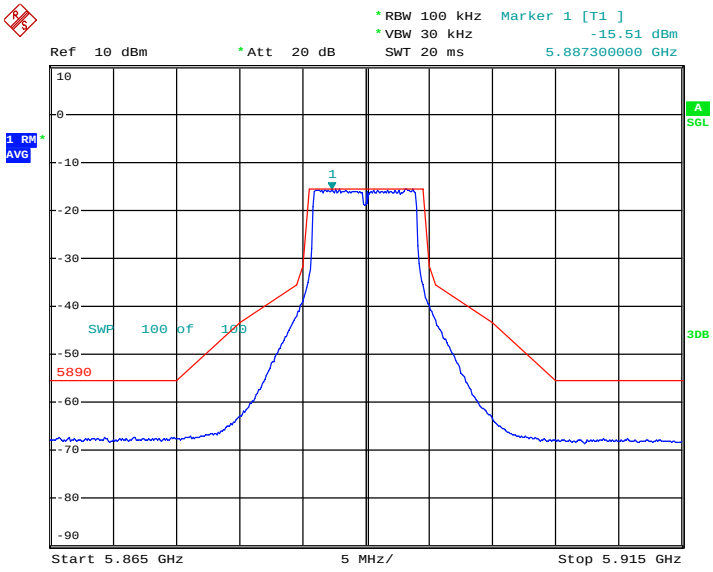
Date: 6.FEB.2014 12:56:28

Transmit Spectrum Mask Result				
Modulation Mode	**Test Chain**	**Freq. (MHz)**	**Mask**	**Result**
802.11p-10M	Tx1	5890	Under Spectral Mask	Complied



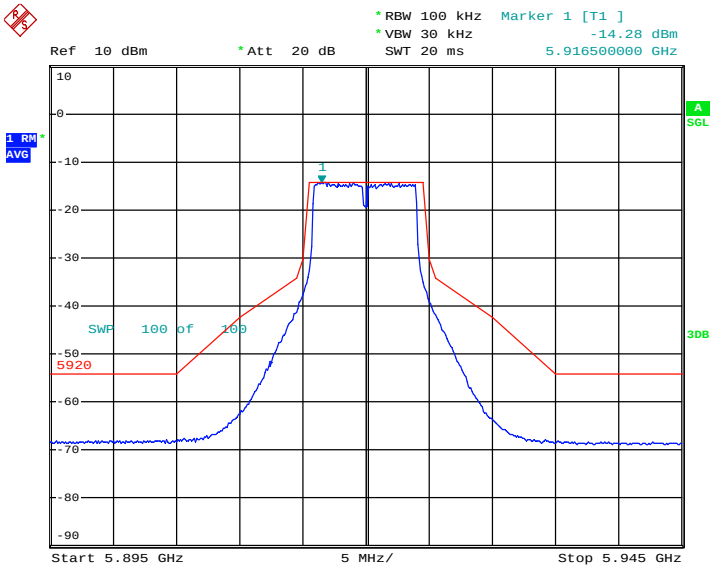
Date: 6.FEB.2014 12:58:01

Modulation Mode	Test Chain	Freq. (MHz)	Mask	Result
802.11p-10M	Tx2	5890	Under Spectral Mask	Complied



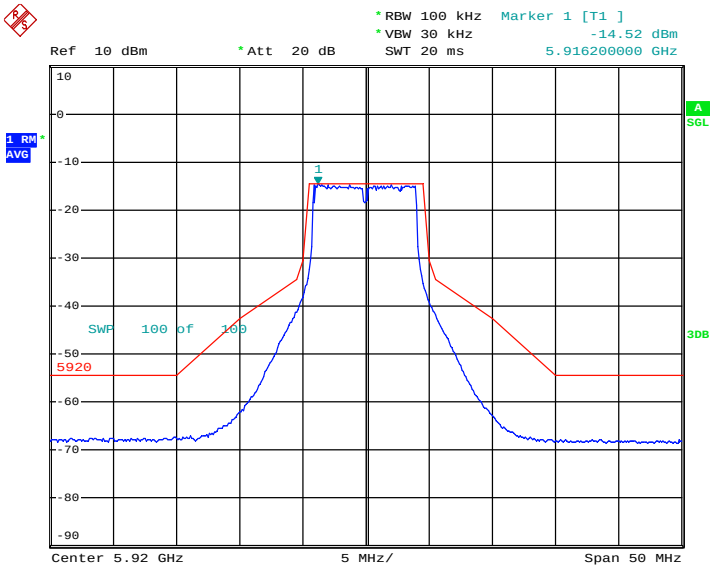
Date: 6.FEB.2014 12:58:52

Transmit Spectrum Mask Result				
Modulation Mode	**Test Chain**	**Freq. (MHz)**	**Mask**	**Result**
802.11p-10M	Tx1	5920	Under Spectral Mask	Complied



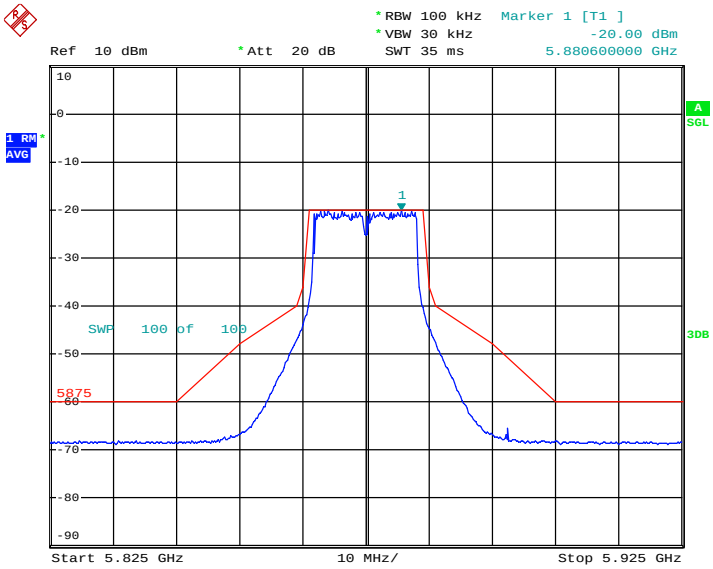
Date: 6.FEB.2014 13:00:34

Modulation Mode	**Test Chain**	**Freq. (MHz)**	**Mask**	**Result**
802.11p-10M	Tx2	5920	Under Spectral Mask	Complied



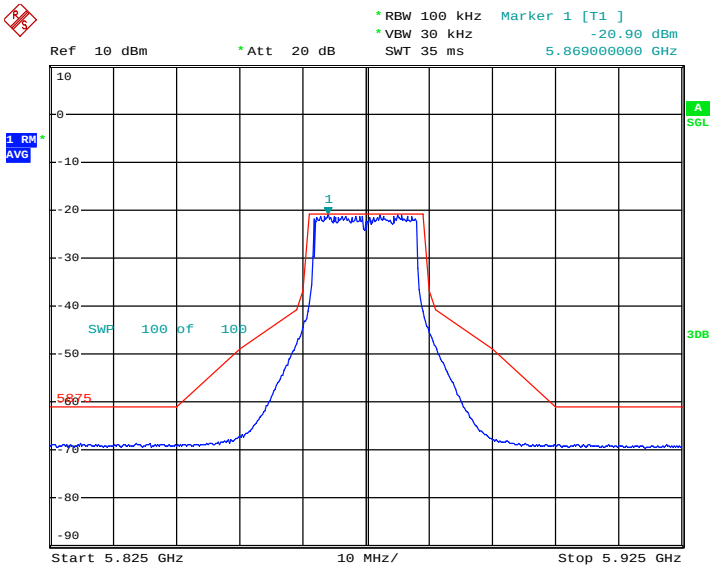
Date: 6.FEB.2014 12:59:48

Transmit Spectrum Mask Result				
Modulation Mode	**Test Chain**	**Freq. (MHz)**	**Mask**	**Result**
802.11p-20M	Tx1	5875	Under Spectral Mask	Complied



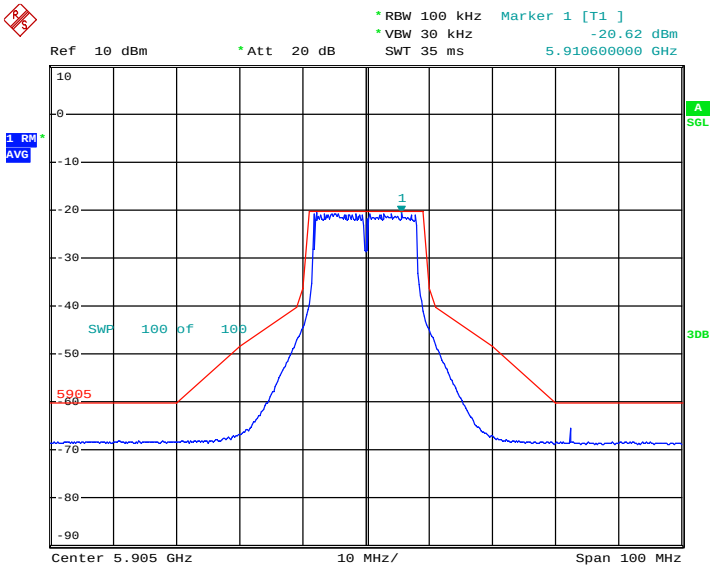
Date: 6.FEB.2014 12:40:53

Modulation Mode	**Test Chain**	**Freq. (MHz)**	**Mask**	**Result**
802.11p-20M	Tx2	5875	Under Spectral Mask	Complied



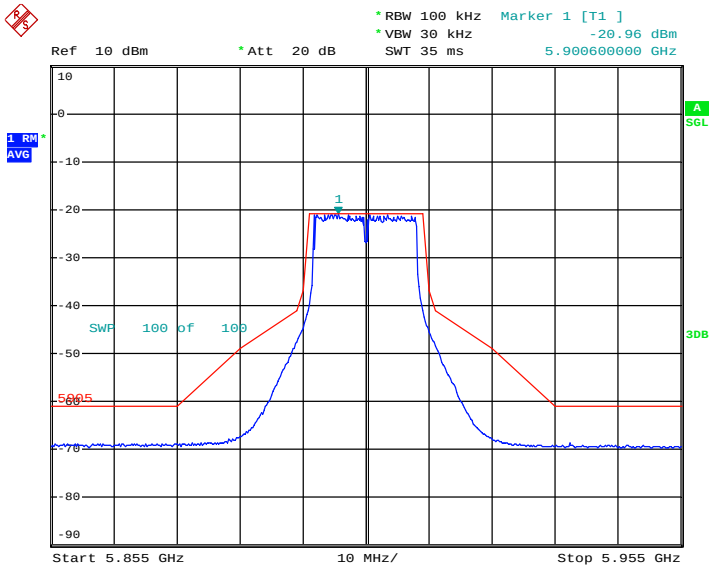
Date: 6.FEB.2014 12:39:43

Transmit Spectrum Mask Result				
Modulation Mode	**Test Chain**	**Freq. (MHz)**	**Mask**	**Result**
802.11p-20M	Tx1	5905	Under Spectral Mask	Complied



Date: 6.FEB.2014 12:32:58

Modulation Mode	Test Chain	Freq. (MHz)	Mask	Result
802.11p-20M	Tx2	5905	Under Spectral Mask	Complied



Date: 6.FEB.2014 12:42:47

3.5 Transmitter Conducted Unwanted Emissions

3.5.1 Transmitter Conducted Unwanted Emissions Limit

Transmitter Conducted Unwanted Emissions Limit
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 [55 + 10 log (P)] (-25dBm).
Note 1: Refer as ASTM E2213-03 Clause 8.9.2.

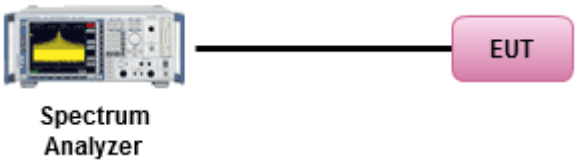
3.5.2 Measuring Instruments

Refer test equipment and calibration data list in test report.

3.5.3 Test Procedures

Test Method			
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.13 for conducted measurement.		
☐	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;		
☒	For conducted measurement.		
	☐	For conducted measurements on devices with single transmit chain.	
	☒	For conducted measurements on devices with multiple transmit chains using options given below:	
		☒	Option 1: measure and sum the spectra across the transmitter outputs.
		☐	Option 2: N transmitter outputs, then spurious emissions limits on each individual output. Measure and add 10 log (N) dB.

3.5.4 Test Setup

Transmitter Conducted Unwanted Emissions


3.5.5 Test Result of Transmitter Conducted Unwanted Emissions

Temperature	23°C	Humidity	63%
Test Engineer	Wen Chao		

Configuration 802.11p-10M / Tx1+Tx2

Transmitter Conducted Unwanted Emissions Result (Test Frequency Range: 30MHz~1GHz)					
Frequency (MHz)	Conducted Emission (dBm/MHz)		Total Conducted EIRP Emission (dBm/MHz)	EIRP Emission Limit (dBm)	Result
	Tx1	Tx2			
5860	-60.26	-60.22	-41.23	-25	Complied
5890	-60.07	-60.39	-41.22	-25	Complied
5920	-60.48	-60.73	-41.59	-25	Complied

Transmitter Conducted Unwanted Emissions Result (Test Frequency Range: 1GHz~40GHz)					
Frequency (MHz)	Conducted Emission (dBm/MHz)		Total Conducted EIRP Emission (dBm/MHz)	EIRP Emission Limit (dBm)	Result
	Tx1	Tx2			
5860	-48.51	-50.86	-30.52	-25	Complied
5890	-47.48	-51.22	-29.95	-25	Complied
5920	-45.95	-49.17	-28.26	-25	Complied

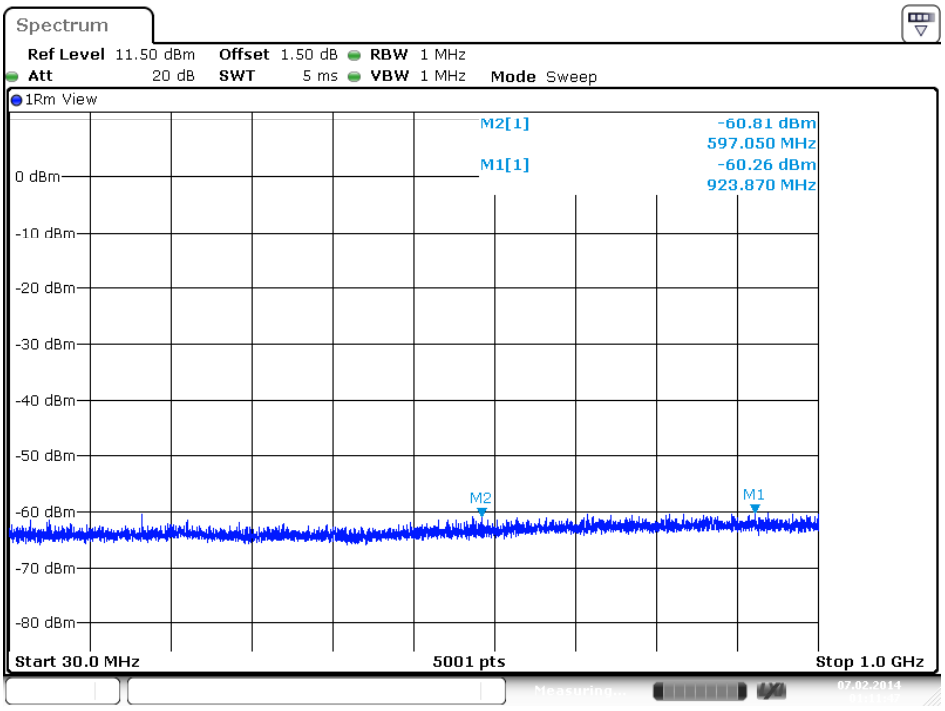
Configuration 802.11p-20M / Tx1+Tx2

Transmitter Conducted Unwanted Emissions Result (Test Frequency Range: 30MHz~1GHz)					
Frequency (MHz)	Conducted Emission (dBm/MHz)		Total Conducted EIRP Emission (dBm/MHz)	EIRP Emission Limit (dBm)	Result
	Tx1	Tx2			
5875	-59.88	-60.20	-41.03	-25	Complied
5905	-60.18	-60.48	-41.32	-25	Complied

Transmitter Conducted Unwanted Emissions Result (Test Frequency Range: 1GHz~40GHz)					
Frequency (MHz)	Conducted Emission (dBm/MHz)		Total Conducted EIRP Emission (dBm/MHz)	EIRP Emission Limit (dBm)	Result
	Tx1	Tx2			
5875	-52.16	-54.34	-34.10	-25	Complied
5905	-51.70	-53.45	-33.48	-25	Complied

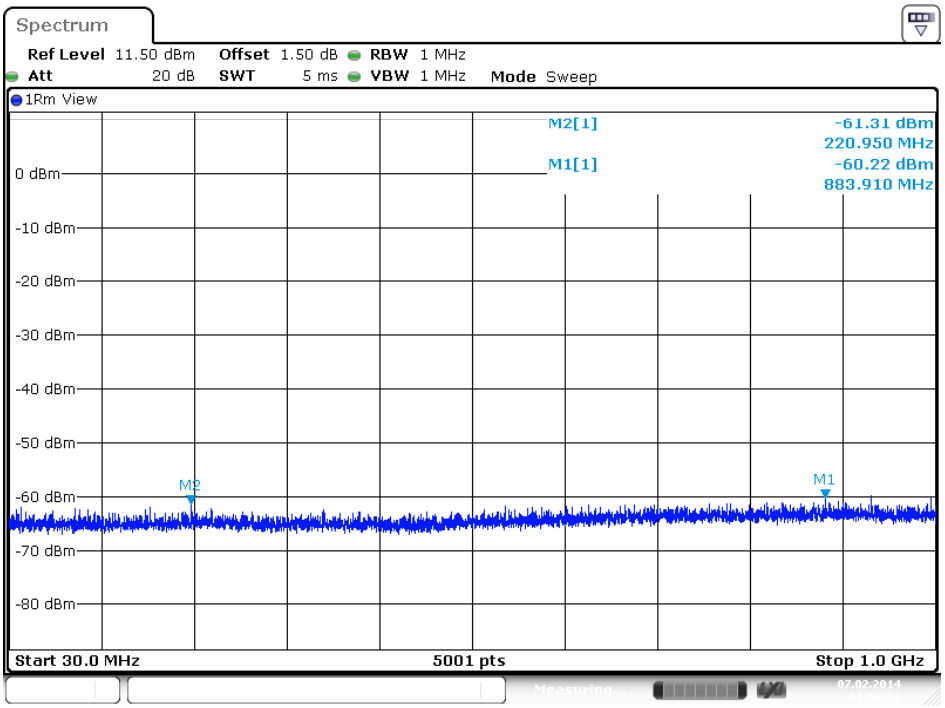
3.5.6 Test Plots of Transmitter Conducted Unwanted Emissions

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	30MHz~1GHz	Tx1	5860



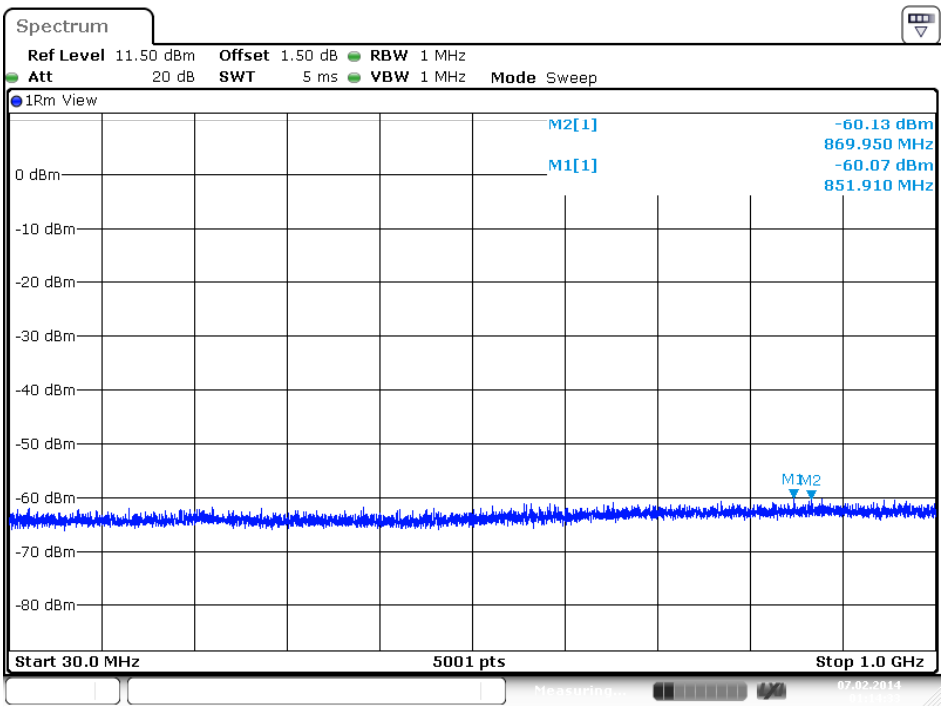
Date: 7.FEB.2014 01:11:47

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	30MHz~1GHz	Tx2	5860



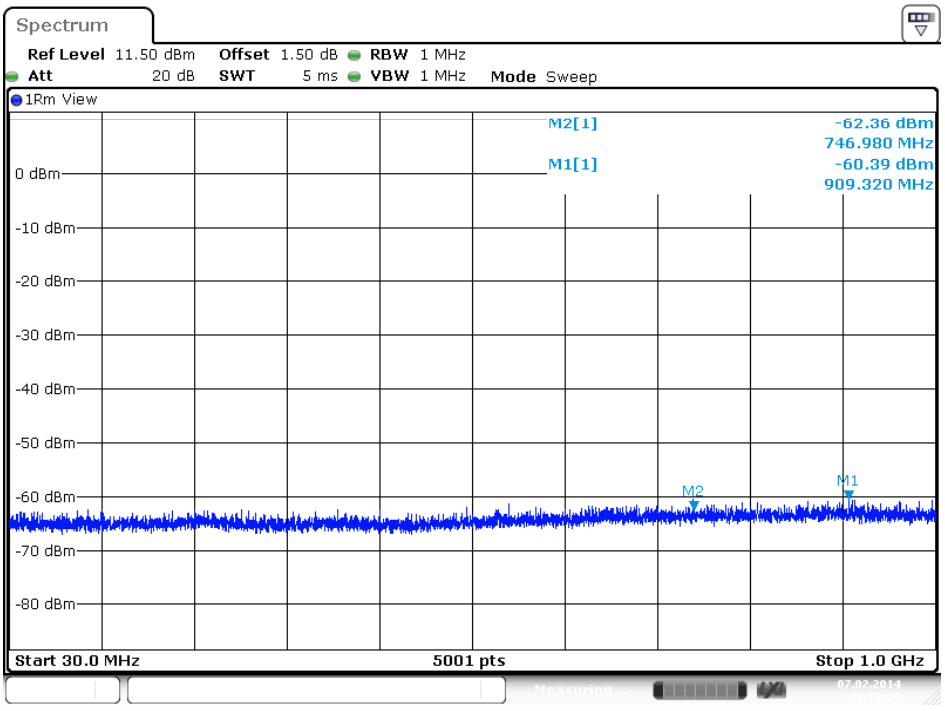
Date: 7.FEB.2014 01:09:56

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	30MHz~1GHz	Tx1	5890



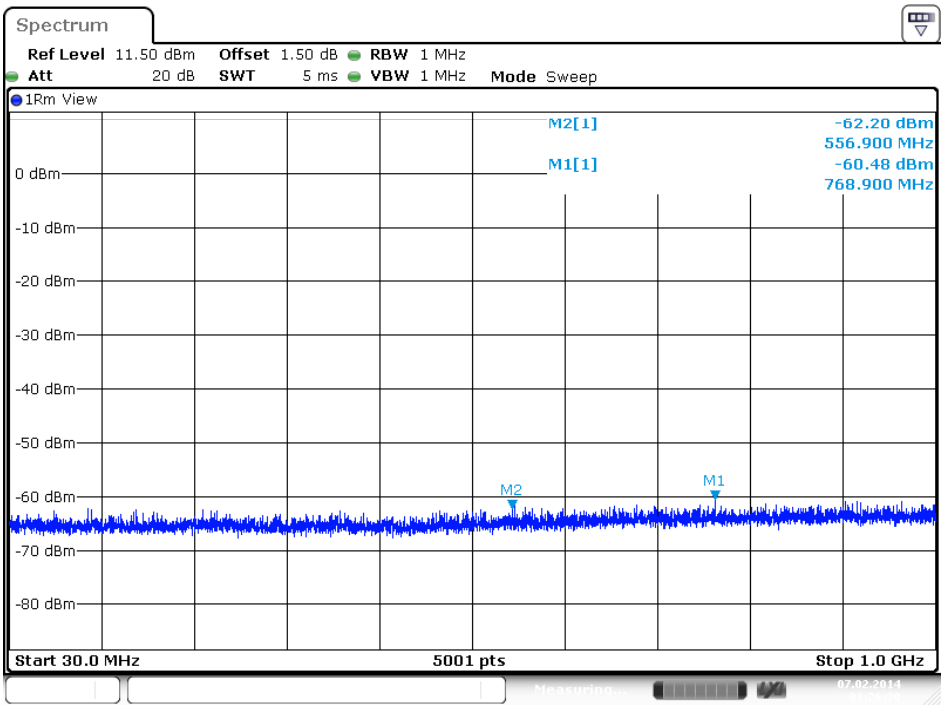
Date: 7.FEB.2014 01:14:33

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	30MHz~1GHz	Tx2	5890



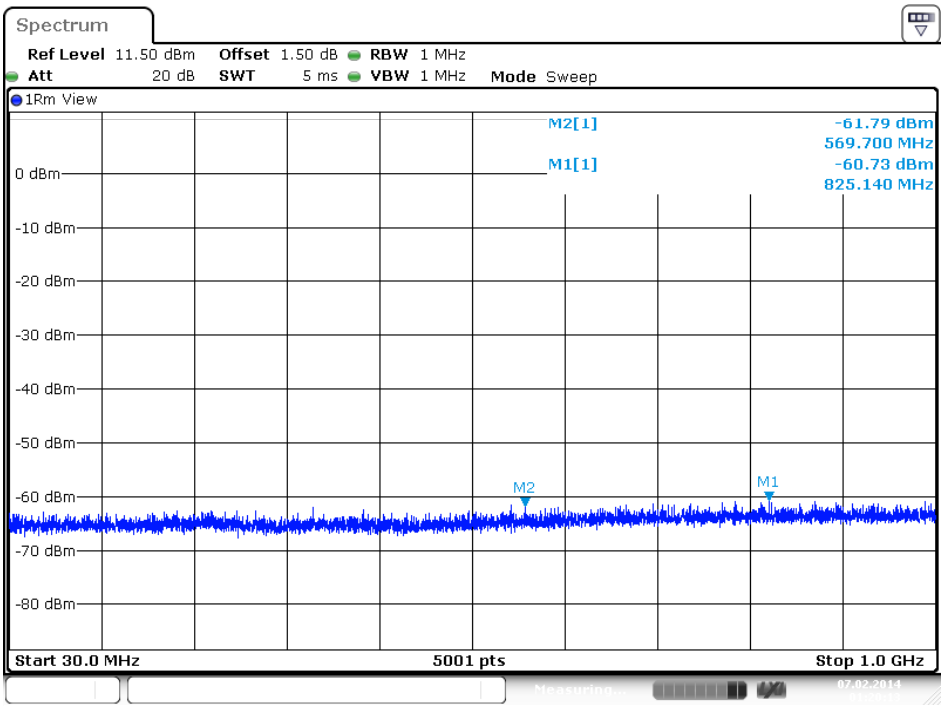
Date: 7.FEB.2014 01:18:29

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	30MHz~1GHz	Tx1	5920



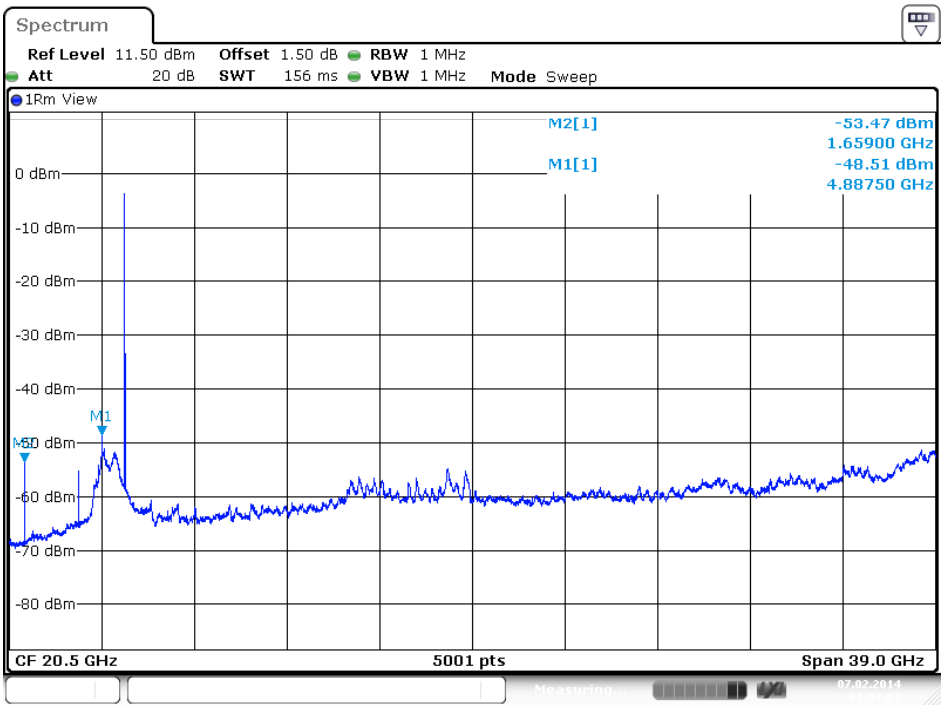
Date: 7.FEB.2014 01:26:20

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	30MHz~1GHz	Tx2	5920



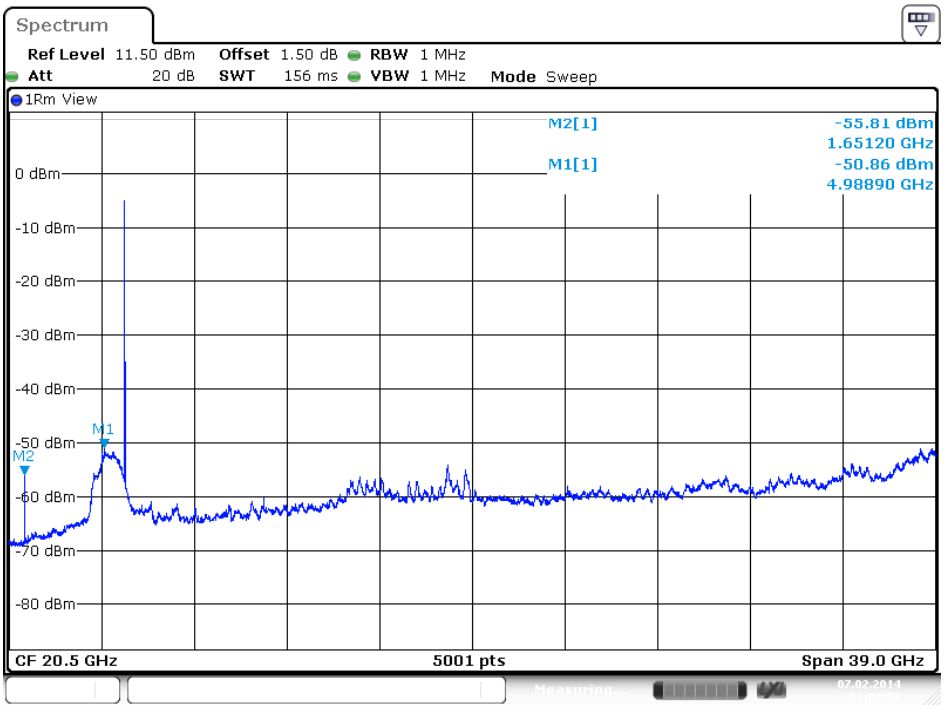
Date: 7.FEB.2014 01:20:14

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	1GHz~40GHz	Tx1	5860



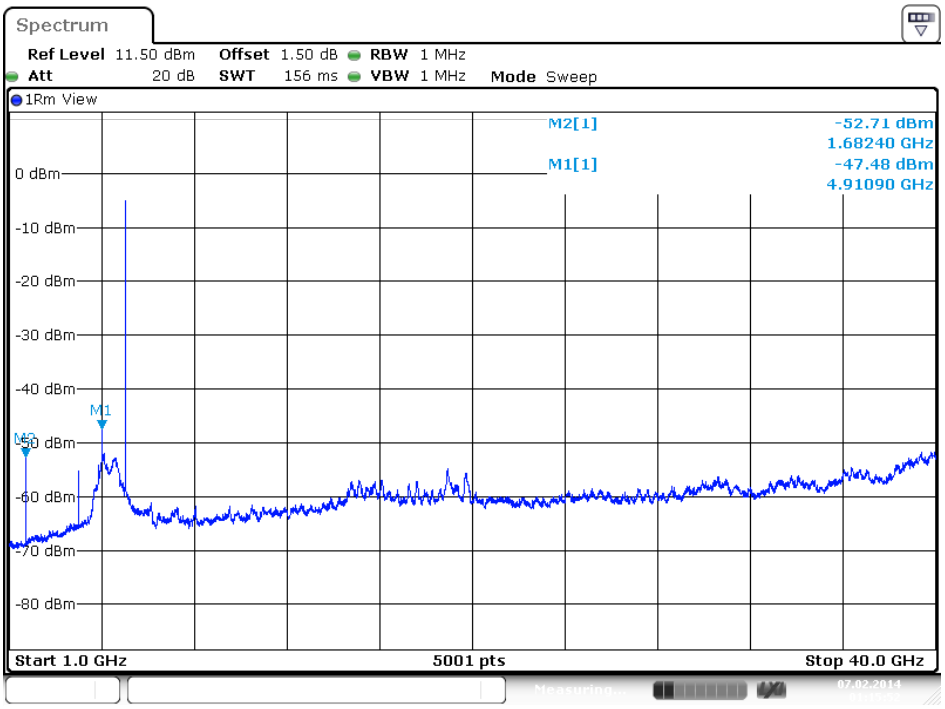
Date: 7.FEB.2014 01:07:07

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	1GHz~40GHz	Tx2	5860



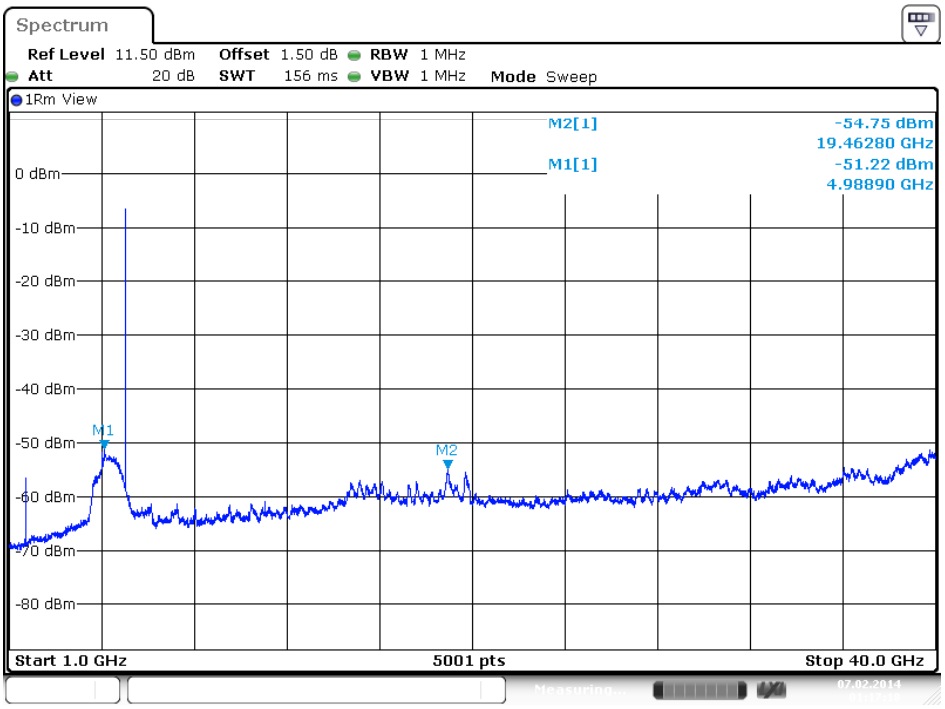
Date: 7.FEB.2014 01:08:54

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	1GHz~40GHz	Tx1	5890



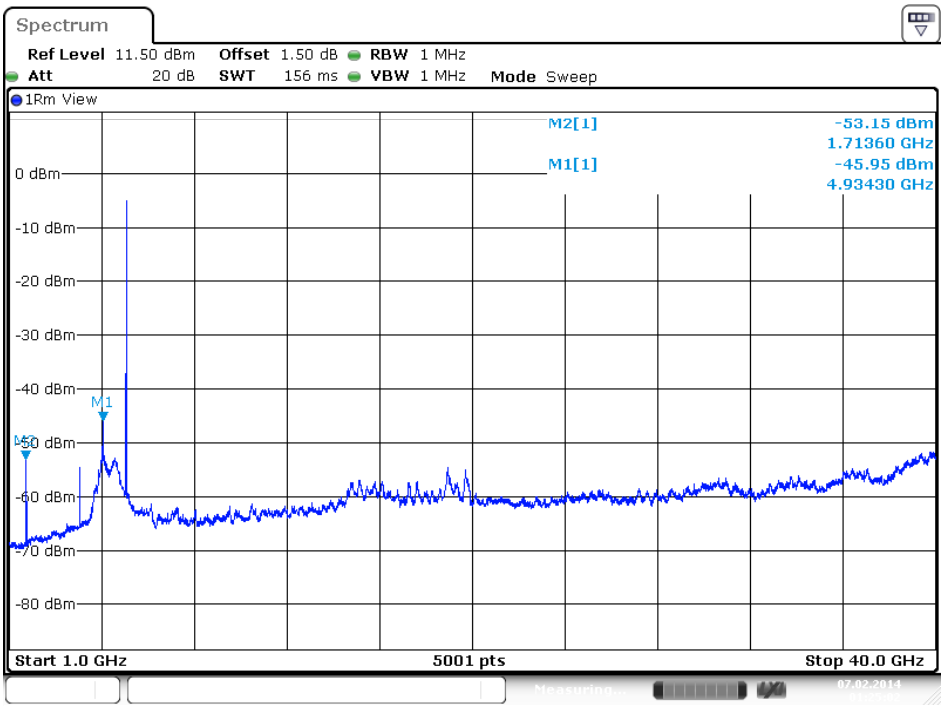
Date: 7.FEB.2014 01:15:52

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	1GHz~40GHz	Tx2	5890



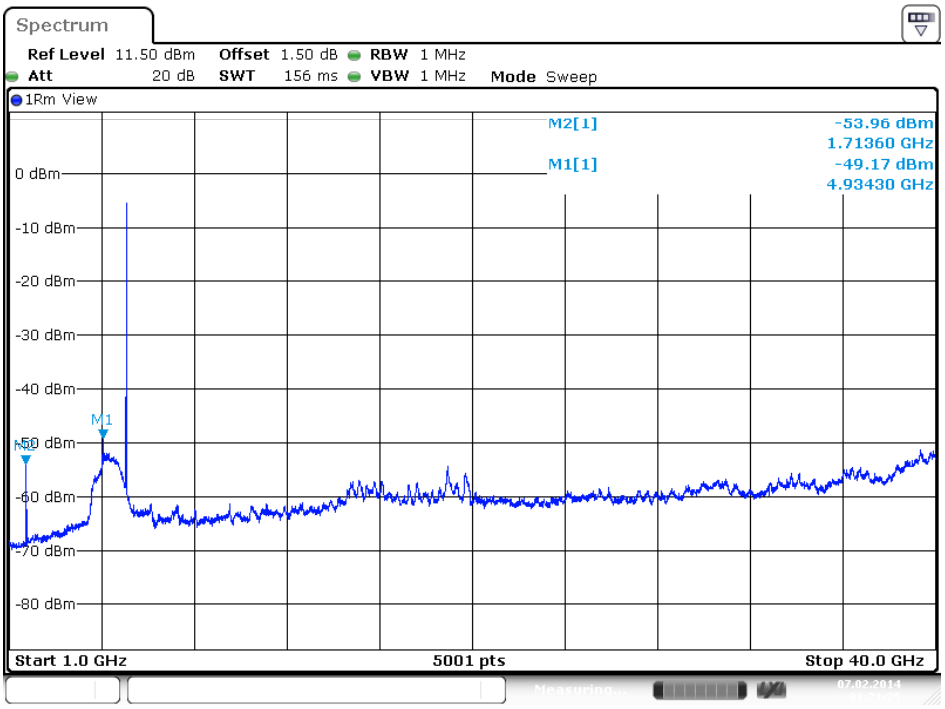
Date: 7.FEB.2014 01:17:19

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	1GHz~40GHz	Tx1	5920



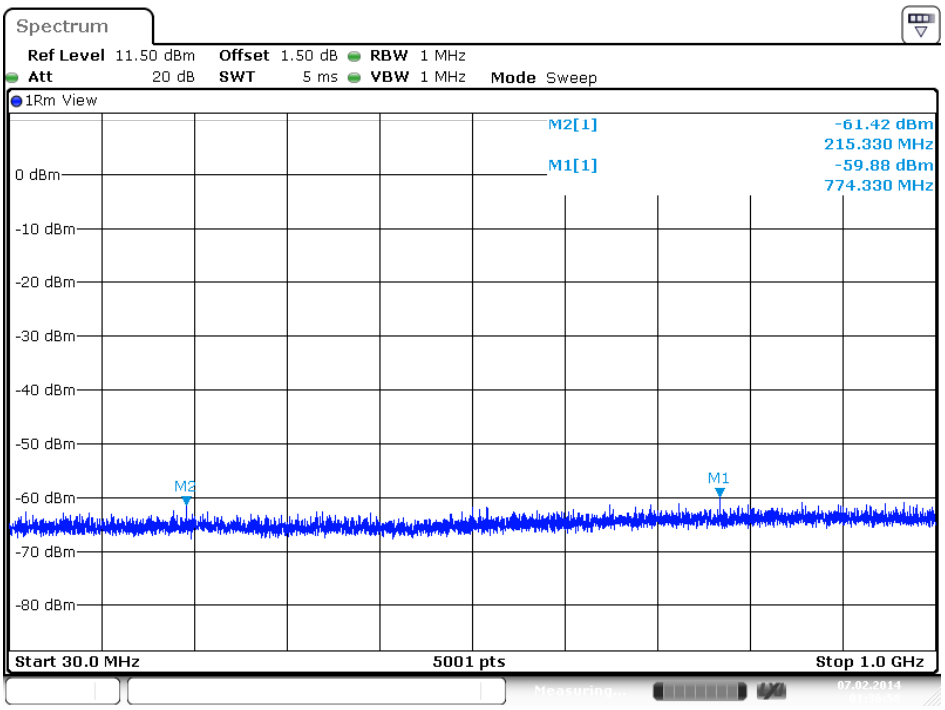
Date: 7.FEB.2014 01:25:03

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-10M	1GHz~40GHz	Tx2	5920



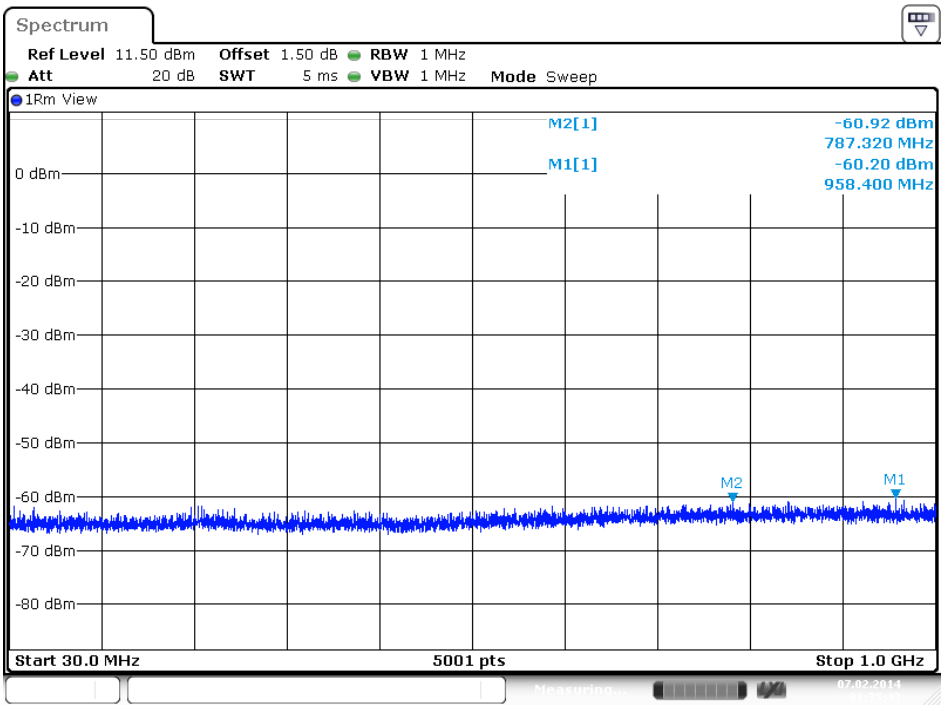
Date: 7.FEB.2014 01:21:26

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	30MHz~1GHz	Tx1	5875



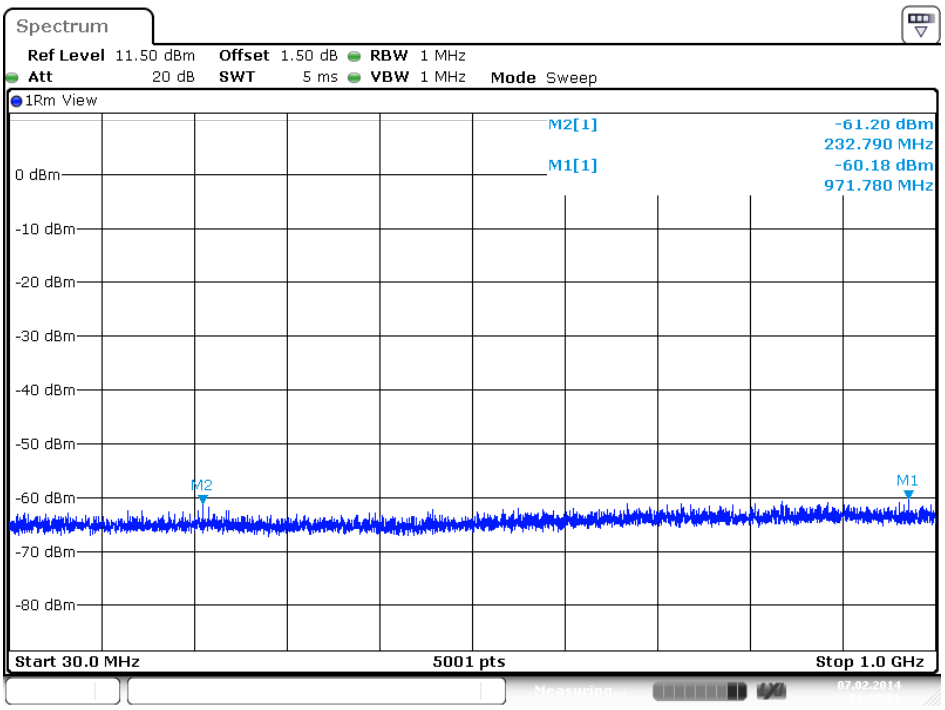
Date: 7.FEB.2014 01:36:59

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	30MHz~1GHz	Tx2	5875



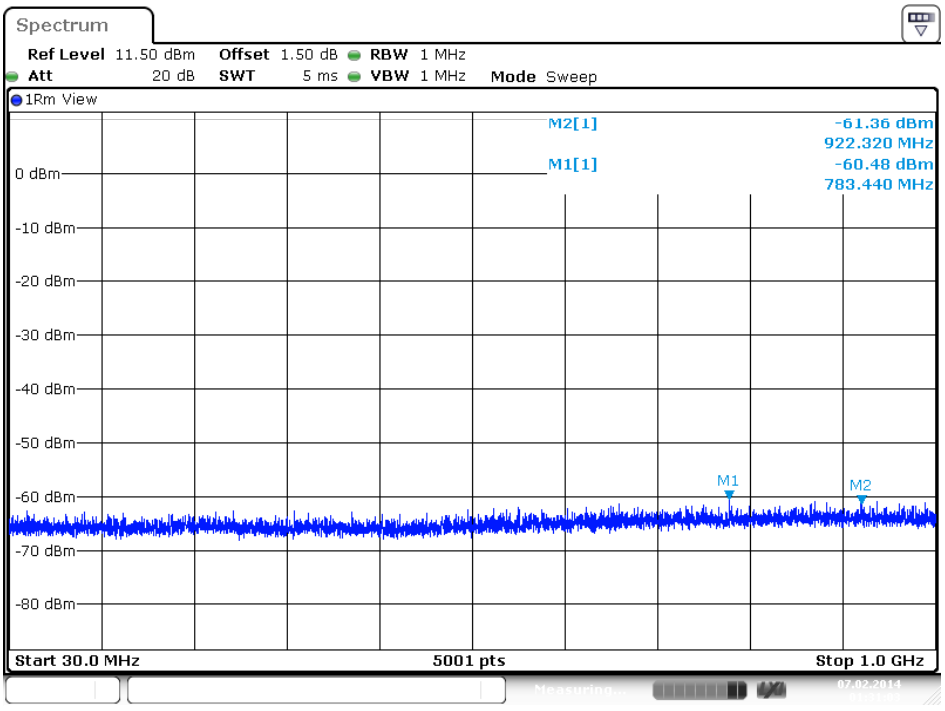
Date: 7.FEB.2014 01:35:44

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	30MHz~1GHz	Tx1	5905



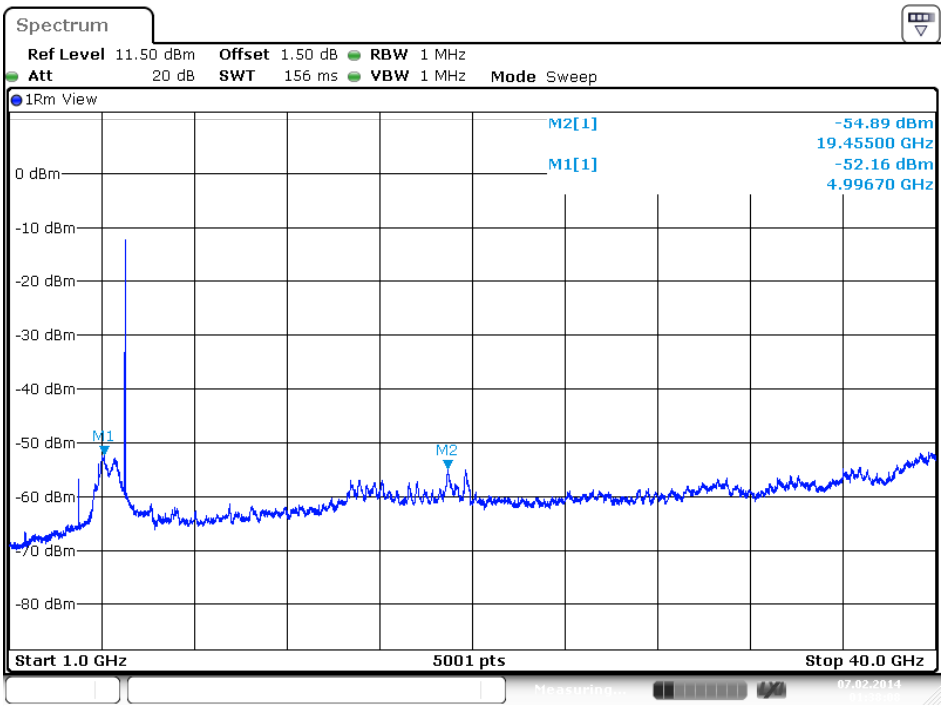
Date: 7.FEB.2014 01:29:51

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	30MHz~1GHz	Tx2	5905



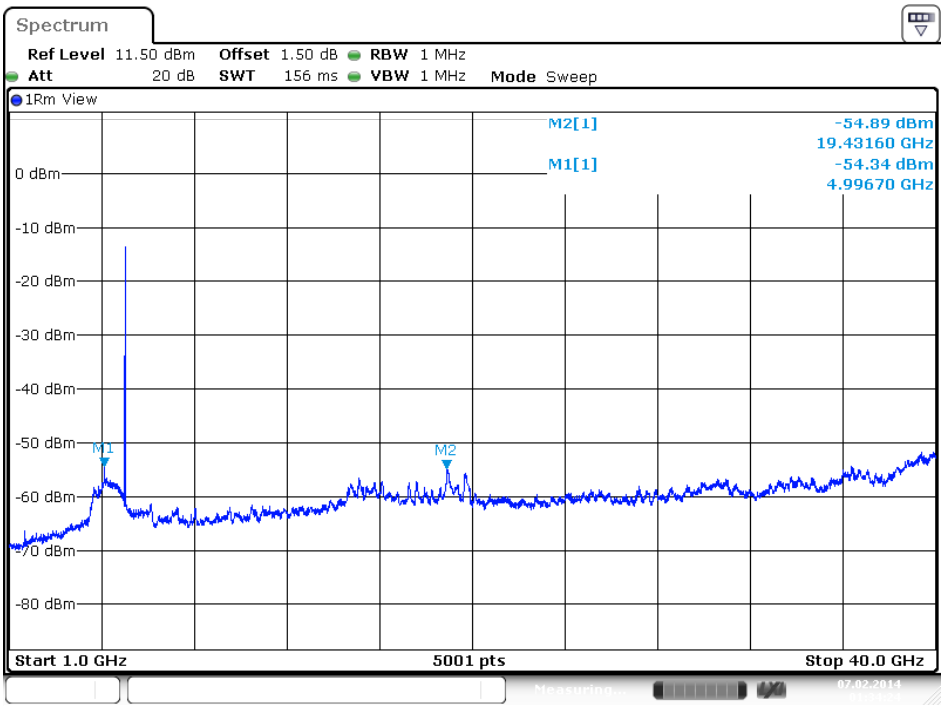
Date: 7.FEB.2014 01:31:04

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	1GHz~40GHz	Tx1	5875



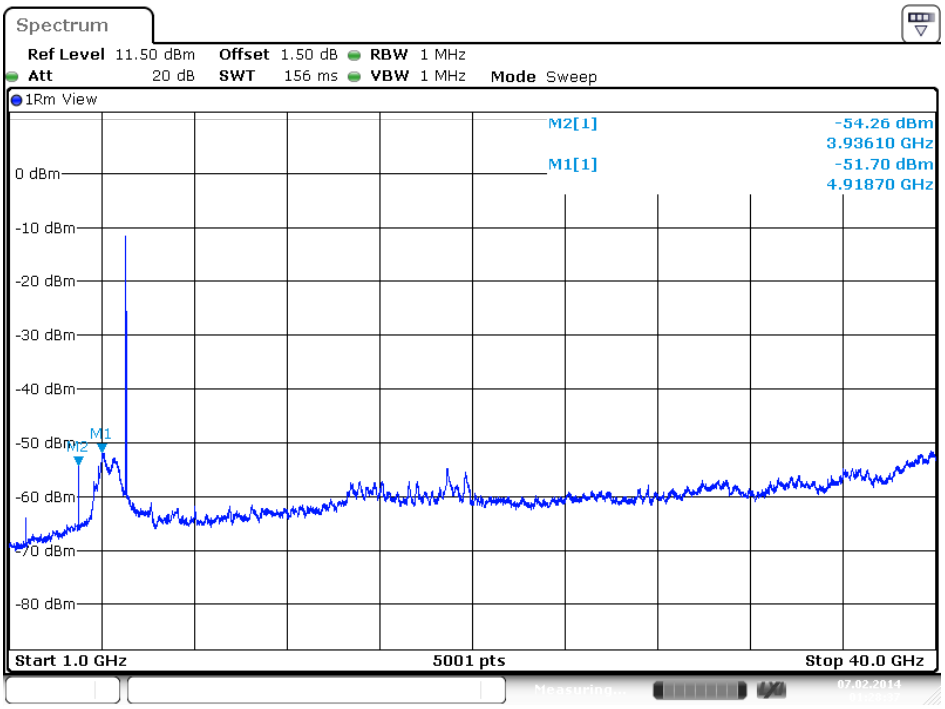
Date: 7.FEB.2014 01:38:09

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	1GHz~40GHz	Tx2	5875



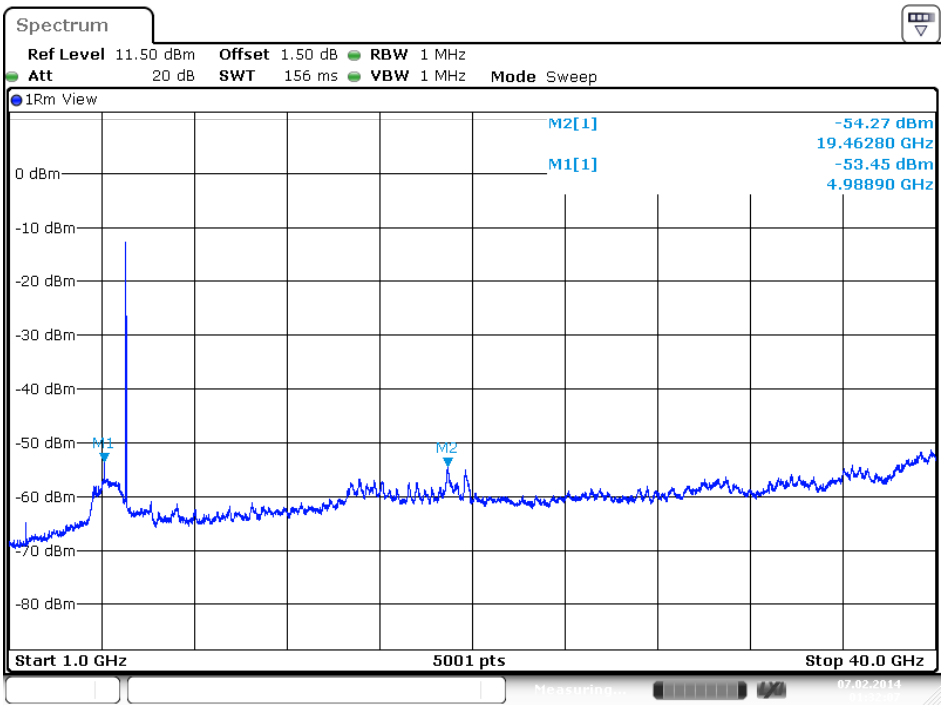
Date: 7.FEB.2014 01:34:25

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	1GHz~40GHz	Tx1	5905



Date: 7.FEB.2014 01:28:38

Modulation Mode	Test Frequency Range	Test Chain	Freq. (MHz)
802.11p-20M	1GHz~40GHz	Tx2	5905



Date: 7.FEB.2014 01:32:07

3.6 Transmitter Radiated Unwanted Emissions

3.6.1 Transmitter Radiated Unwanted Emissions Limit

Transmitter Radiated Unwanted Emissions Limit
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 [55 + 10 log (P)] (e.i.r.p. -25dBm [70.2 dBuV/m at 3m]).
Note 1: Refer as ASTM E2213-03 Clause 8.9.2.

3.6.2 Measuring Instruments

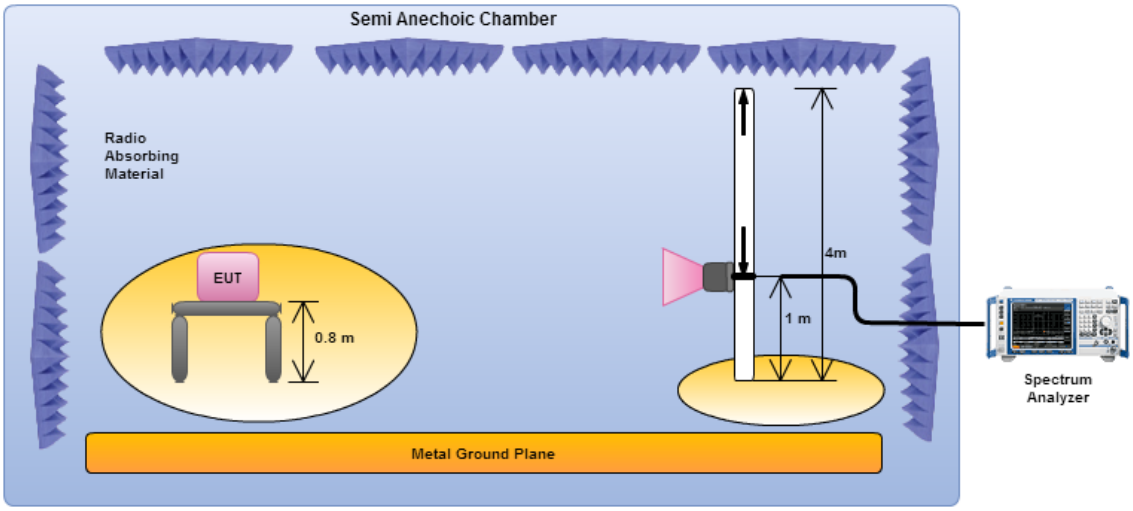
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method	
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.12 for radiated measurement.
☐	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;
☒	Effective Isotropic Radiated Power (EIRP)
☐	Refer as KDB 412172, clause 1.3.2 following as power approach. e.i.r.p.= P_T+G_T.
☒	Refer as KDB 412172, clause 1.3.1 following as field strength approach. e.i.r.p.= $(E \times d)^2 / 30$.
☐	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.

3.6.4 Test Setup

Transmitter Radiated Unwanted Emissions

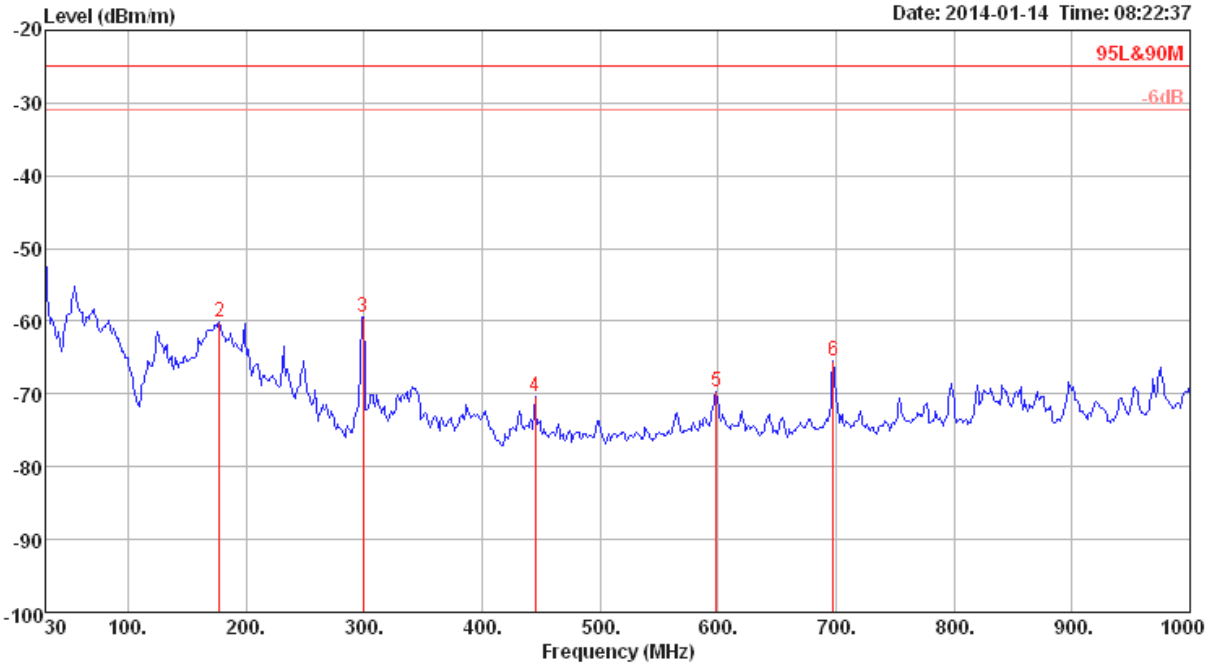


Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn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

3.6.5 Test Result of Transmitter Radiated Unwanted Emissions (30 MHz – 1GHz)

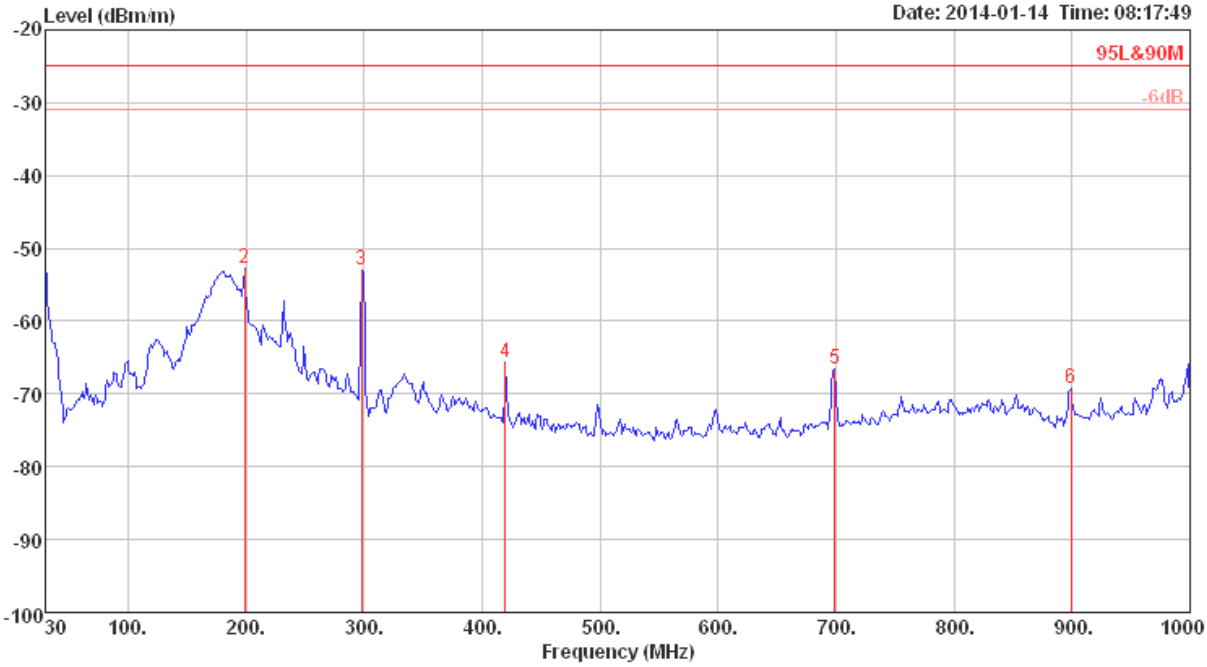
Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-10M	**Test Freq. (MHz)**	5860

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-50.89	-25.00	-25.89	-42.35	0.50	18.76	27.80	Peak	400	0	VERTICAL
2	177.44	-60.10	-25.00	-35.10	-47.61	1.59	13.13	27.21	Peak	400	0	VERTICAL
3	299.66	-59.33	-25.00	-34.33	-47.89	2.10	13.36	26.90	Peak	400	0	VERTICAL
4	445.16	-70.44	-25.00	-45.44	-61.95	2.57	16.77	27.83	Peak	400	0	VERTICAL
5	598.42	-69.60	-25.00	-44.60	-63.15	2.90	18.75	28.10	Peak	400	0	VERTICAL
6	697.36	-65.49	-25.00	-40.49	-59.88	3.31	19.08	28.00	Peak	400	0	VERTICAL

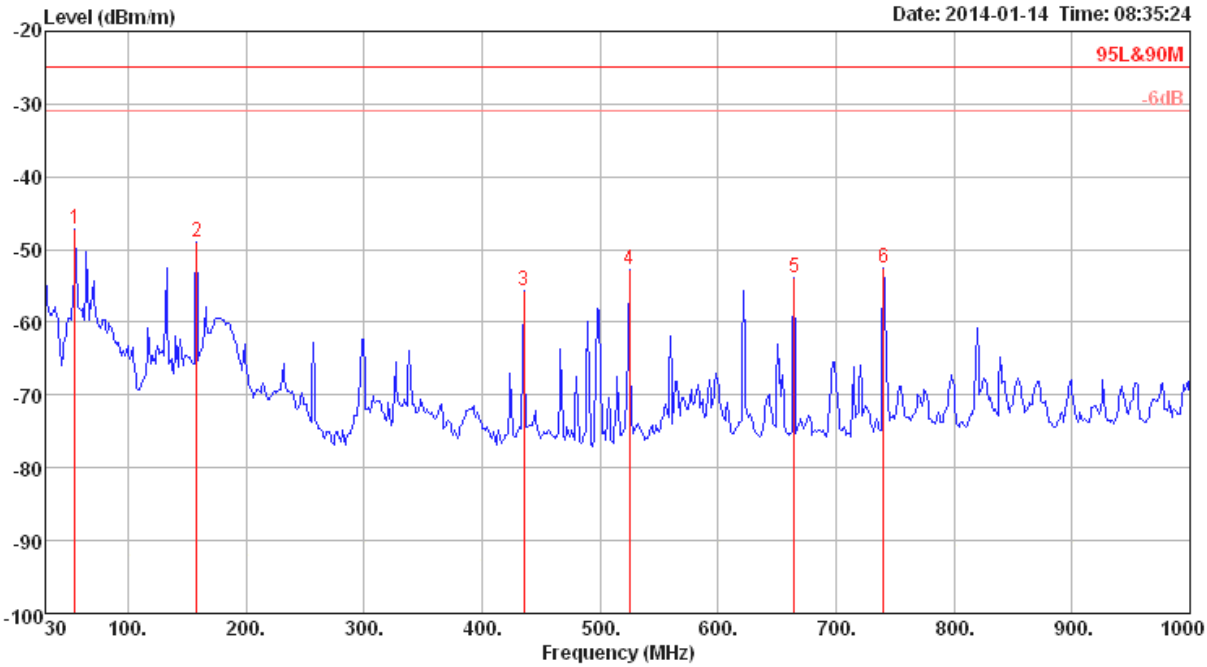
Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-52.16	-25.00	-27.16	-43.62	0.50	18.76	27.80	Peak	400	0	HORIZONTAL
2	198.78	-52.74	-25.00	-27.74	-36.57	1.69	9.25	27.11	Peak	400	0	HORIZONTAL
3	297.72	-53.09	-25.00	-28.09	-41.61	2.09	13.34	26.91	Peak	400	0	HORIZONTAL
4	419.94	-65.70	-25.00	-40.70	-56.80	2.42	16.38	27.70	Peak	400	0	HORIZONTAL
5	699.30	-66.55	-25.00	-41.55	-60.94	3.30	19.09	28.00	Peak	400	0	HORIZONTAL
6	899.12	-69.19	-25.00	-44.19	-65.91	3.60	20.52	27.40	Peak	400	0	HORIZONTAL

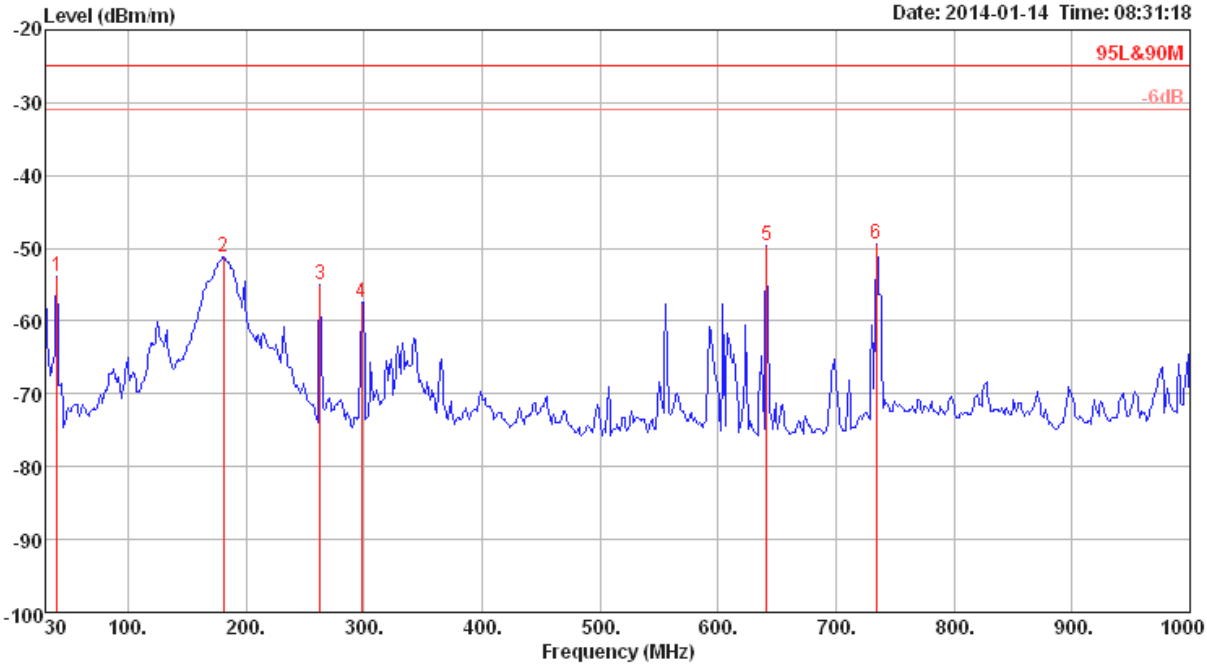
Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-10M	**Test Freq. (MHz)**	5890

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	55.22	-47.13	-25.00	-22.13	-27.80	0.80	7.65	27.78	Peak	100	0	VERTICAL
2	158.04	-48.94	-25.00	-23.94	-35.11	1.49	11.99	27.31	Peak	100	0	VERTICAL
3	435.46	-55.61	-25.00	-30.61	-46.96	2.51	16.62	27.78	Peak	100	0	VERTICAL
4	524.70	-52.87	-25.00	-27.87	-45.43	2.75	17.91	28.10	Peak	100	0	VERTICAL
5	664.38	-53.77	-25.00	-28.77	-48.15	3.44	18.98	28.04	Peak	100	0	VERTICAL
6	740.04	-52.46	-25.00	-27.46	-47.44	3.46	19.36	27.84	Peak	100	0	VERTICAL

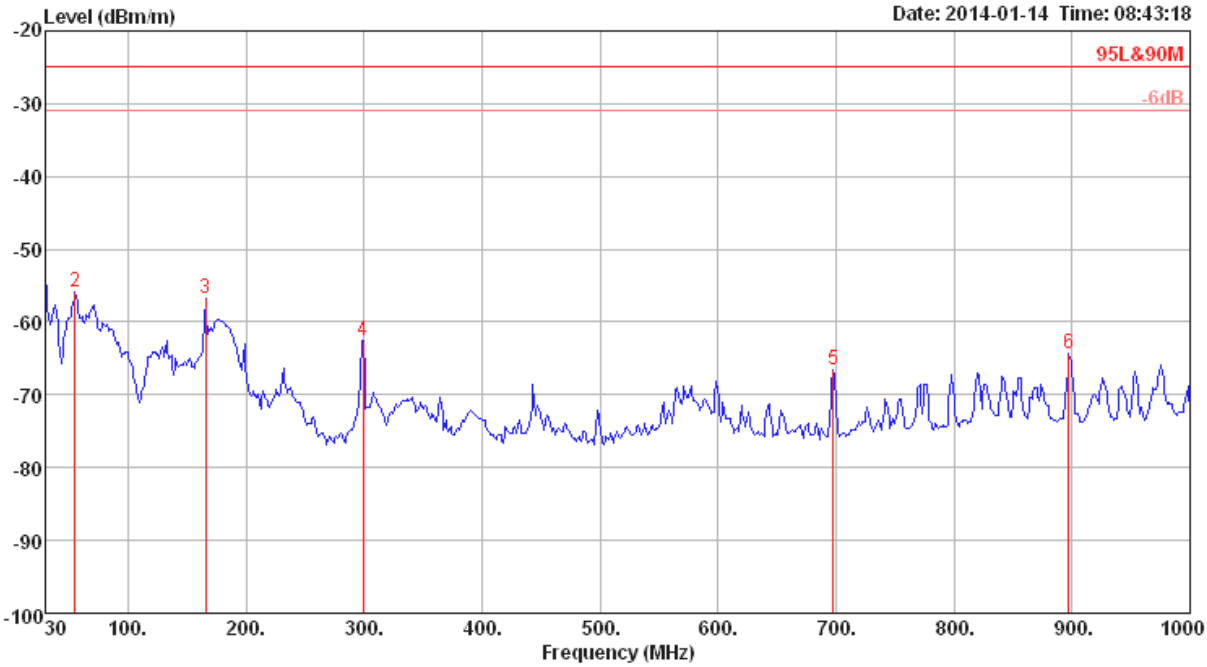
Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	39.70	-53.81	-25.00	-28.81	-39.82	0.70	13.11	27.80	Peak	400	0	HORIZONTAL
2	181.32	-51.11	-25.00	-26.11	-38.46	1.60	12.94	27.19	Peak	400	0	HORIZONTAL
3	262.80	-55.07	-25.00	-30.07	-42.97	1.95	12.92	26.97	Peak	400	0	HORIZONTAL
4	297.72	-57.43	-25.00	-32.43	-45.95	2.09	13.34	26.91	Peak	400	0	HORIZONTAL
5	641.10	-49.63	-25.00	-24.63	-43.62	3.15	18.90	28.06	Peak	400	0	HORIZONTAL
6	734.22	-49.32	-25.00	-24.32	-44.22	3.44	19.32	27.86	Peak	400	0	HORIZONTAL

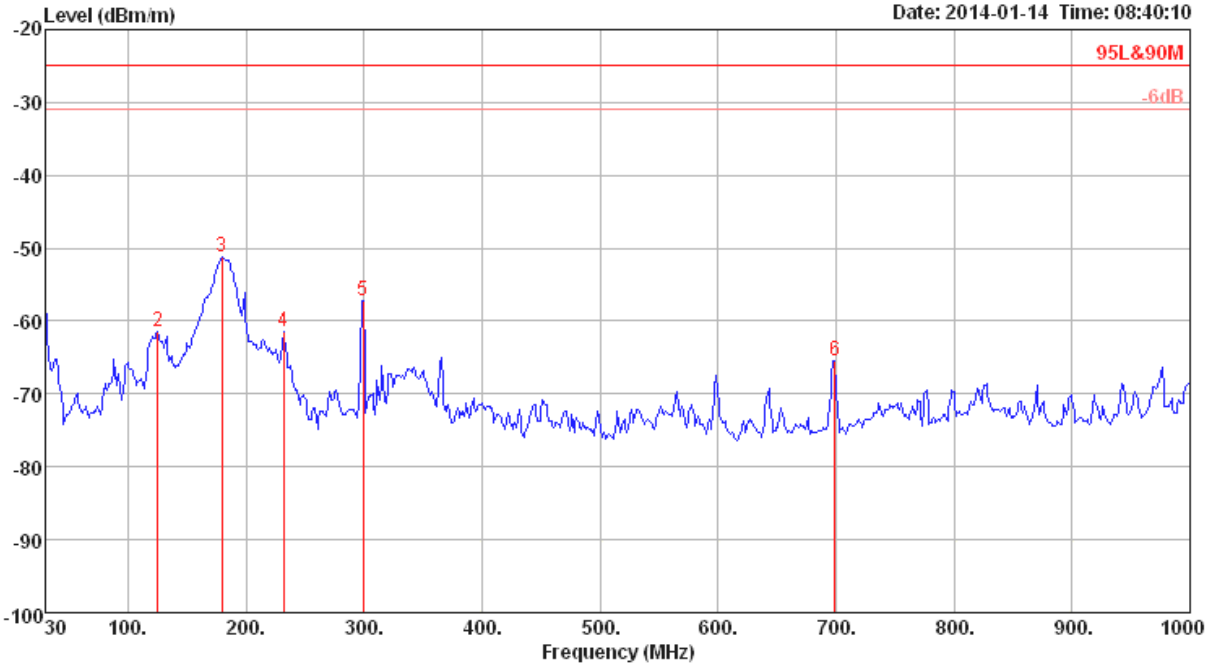
Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-10M	**Test Freq. (MHz)**	5920

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-53.89	-25.00	-28.89	-45.35	0.50	18.76	27.80	Peak	400	0	VERTICAL
2	55.22	-55.87	-25.00	-30.87	-36.54	0.80	7.65	27.78	Peak	400	0	VERTICAL
3	165.80	-56.69	-25.00	-31.69	-43.42	1.53	12.47	27.27	Peak	400	0	VERTICAL
4	299.66	-62.56	-25.00	-37.56	-51.12	2.10	13.36	26.90	Peak	400	0	VERTICAL
5	697.36	-66.68	-25.00	-41.68	-61.07	3.31	19.08	28.00	Peak	400	0	VERTICAL
6	897.18	-64.34	-25.00	-39.34	-61.03	3.59	20.51	27.41	Peak	400	0	VERTICAL

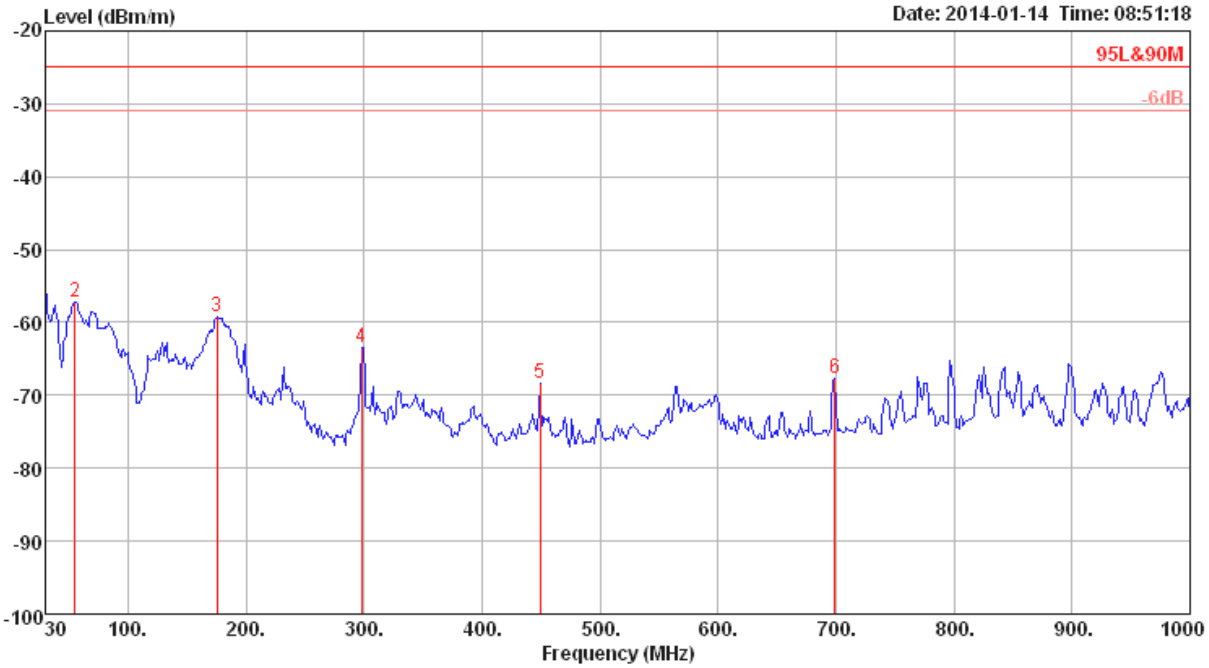
Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-57.70	-25.00	-32.70	-49.16	0.50	18.76	27.80	Peak	400	0	HORIZONTAL
2	125.06	-61.54	-25.00	-36.54	-47.52	1.25	12.21	27.48	Peak	400	0	HORIZONTAL
3	179.38	-51.12	-25.00	-26.12	-38.66	1.60	13.14	27.20	Peak	400	0	HORIZONTAL
4	231.76	-61.54	-25.00	-36.54	-47.74	1.83	11.41	27.04	Peak	400	0	HORIZONTAL
5	299.66	-57.18	-25.00	-32.18	-45.74	2.10	13.36	26.90	Peak	400	0	HORIZONTAL
6	699.30	-65.38	-25.00	-40.38	-59.77	3.30	19.09	28.00	Peak	400	0	HORIZONTAL

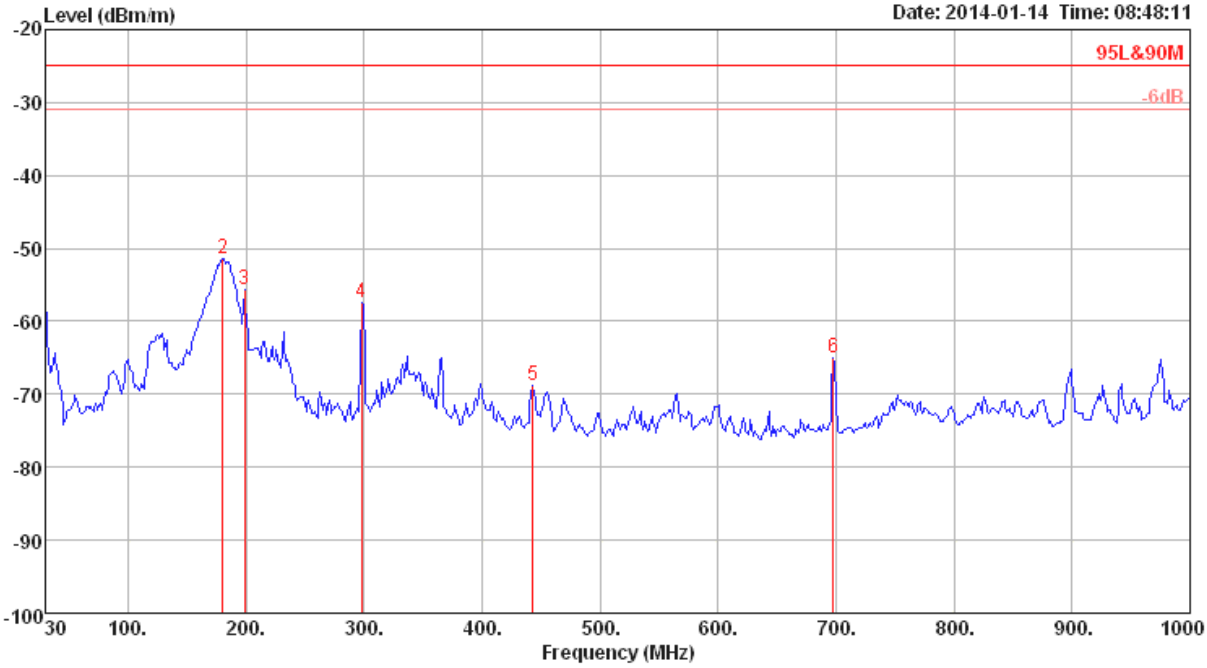
Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-20M	**Test Freq. (MHz)**	5875

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-54.92	-25.00	-29.92	-46.38	0.50	18.76	27.80	Peak	100	0	VERTICAL
2	55.22	-57.12	-25.00	-32.12	-37.79	0.80	7.65	27.78	Peak	100	0	VERTICAL
3	175.50	-59.26	-25.00	-34.26	-46.74	1.58	13.12	27.22	Peak	100	0	VERTICAL
4	297.72	-63.43	-25.00	-38.43	-51.95	2.09	13.34	26.91	Peak	100	0	VERTICAL
5	449.04	-68.35	-25.00	-43.35	-59.92	2.59	16.83	27.85	Peak	100	0	VERTICAL
6	699.30	-67.68	-25.00	-42.68	-62.07	3.30	19.09	28.00	Peak	100	0	VERTICAL

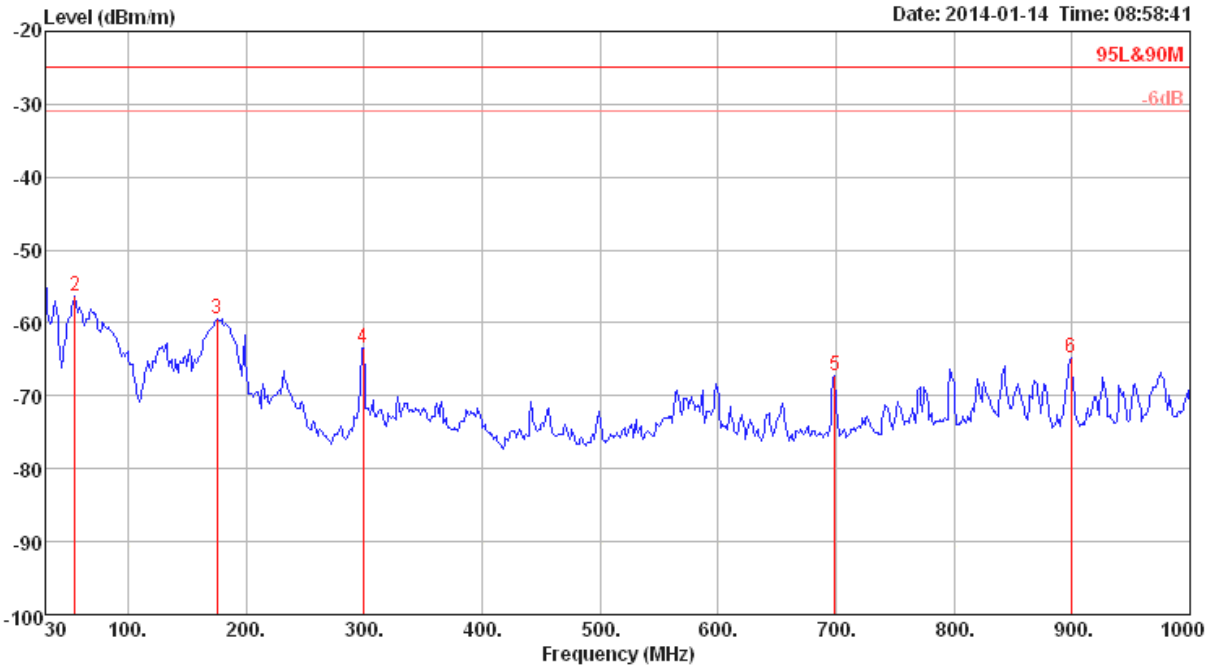
Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-57.51	-25.00	-32.51	-48.97	0.50	18.76	27.80	Peak	400	0	HORIZONTAL
2	180.35	-51.37	-25.00	-26.37	-38.91	1.60	13.14	27.20	Peak	400	0	HORIZONTAL
3	198.78	-55.63	-25.00	-30.63	-39.46	1.69	9.25	27.11	Peak	400	0	HORIZONTAL
4	297.72	-57.54	-25.00	-32.54	-46.06	2.09	13.34	26.91	Peak	400	0	HORIZONTAL
5	443.22	-68.70	-25.00	-43.70	-60.18	2.56	16.74	27.82	Peak	400	0	HORIZONTAL
6	697.36	-64.98	-25.00	-39.98	-59.37	3.31	19.08	28.00	Peak	400	0	HORIZONTAL

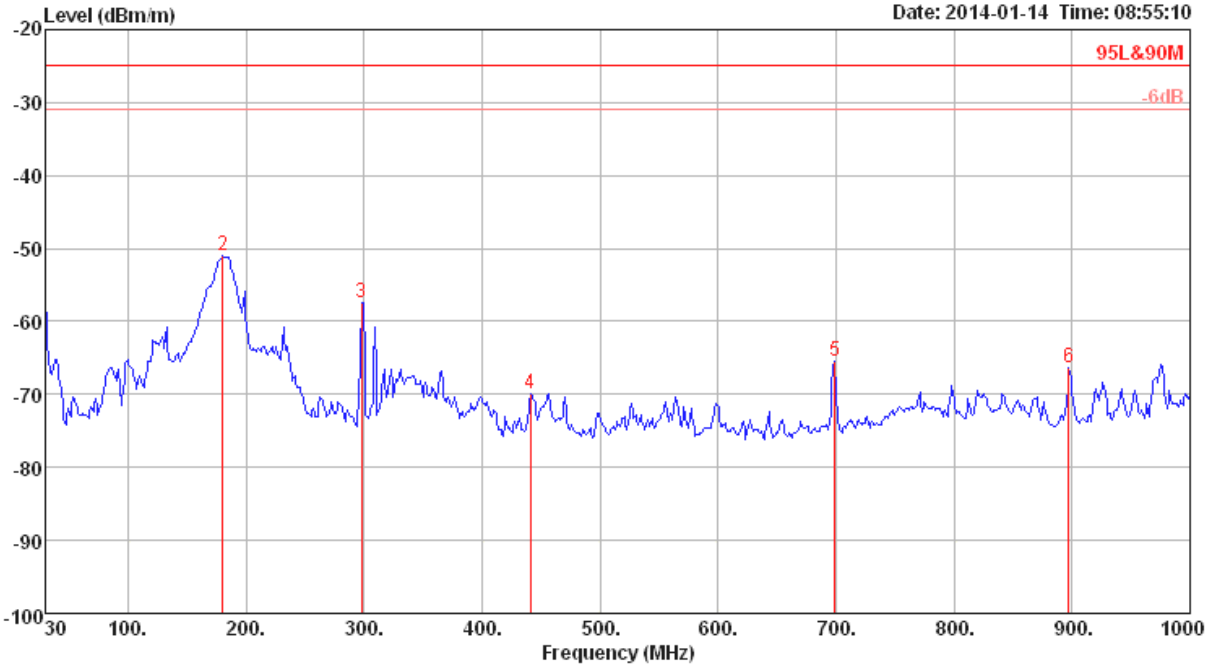
Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-20M	**Test Freq. (MHz)**	5905

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-53.79	-25.00	-28.79	-45.25	0.50	18.76	27.80	Peak	100	0	VERTICAL
2	55.22	-56.42	-25.00	-31.42	-37.09	0.80	7.65	27.78	Peak	100	0	VERTICAL
3	175.50	-59.36	-25.00	-34.36	-46.84	1.58	13.12	27.22	Peak	100	0	VERTICAL
4	299.66	-63.52	-25.00	-38.52	-52.08	2.10	13.36	26.90	Peak	100	0	VERTICAL
5	699.30	-67.31	-25.00	-42.31	-61.70	3.30	19.09	28.00	Peak	100	0	VERTICAL
6	899.12	-64.90	-25.00	-39.90	-61.62	3.60	20.52	27.40	Peak	100	0	VERTICAL

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	30.00	-57.25	-25.00	-32.25	-48.71	0.50	18.76	27.80	Peak	400	0	HORIZONTAL
2	180.35	-51.00	-25.00	-26.00	-38.54	1.60	13.14	27.20	Peak	400	0	HORIZONTAL
3	297.72	-57.49	-25.00	-32.49	-46.01	2.09	13.34	26.91	Peak	400	0	HORIZONTAL
4	441.28	-69.83	-25.00	-44.83	-61.29	2.55	16.71	27.80	Peak	400	0	HORIZONTAL
5	699.30	-65.49	-25.00	-40.49	-59.88	3.30	19.09	28.00	Peak	400	0	HORIZONTAL
6	897.18	-66.36	-25.00	-41.36	-63.05	3.59	20.51	27.41	Peak	400	0	HORIZONTAL

3.6.6 Test Result of Transmitter Radiated Unwanted Emissions (1GHz – 40GHz)

Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-10M	**Test Freq. (MHz)**	5860
Test Date	Jan. 14, 2014		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11718.88	-57.69	-25.00	-32.69	-71.34	9.29	39.42	35.06	Peak	100	27	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11719.12	-64.60	-25.00	-39.60	-78.25	9.29	39.42	35.06	Peak	100	272	HORIZONTAL

Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-10M	**Test Freq. (MHz)**	5890
Test Date	Jan. 15, 2014		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11781.89	-56.48	-25.00	-31.48	-70.14	9.31	39.39	35.04	Peak	134	349	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11779.23	-59.58	-25.00	-34.58	-73.24	9.31	39.39	35.04	Peak	105	52	HORIZONTAL

Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-10M	**Test Freq. (MHz)**	5920
Test Date	Jan. 15, 2014		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11837.72	-48.59	-25.00	-23.59	-62.25	9.32	39.37	35.03	Peak	158	18	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11839.33	-47.66	-25.00	-22.66	-61.32	9.32	39.37	35.03	Peak	126	320	HORIZONTAL

Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-20M	**Test Freq. (MHz)**	5875
Test Date	Jan. 15, 2014		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11756.38	-62.35	-25.00	-37.35	-76.00	9.30	39.40	35.05	Peak	100	109	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11747.63	-60.50	-25.00	-35.50	-74.15	9.30	39.40	35.05	Peak	100	346	HORIZONTAL

Temp	25°C	**Humidity**	56%
Test Engineer	YC Chen	**Test Chan**	Tx1+Tx2
Modulation Mode	802.11p-20M	**Test Freq. (MHz)**	5905
Test Date	Jan. 15, 2014		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11801.09	-61.63	-25.00	-36.63	-75.28	9.31	39.38	35.04	Peak	100	96	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBm/m	dBm/m	dB	dBm	dB	dB/m	dB		cm	deg	
1	11807.82	-60.59	-25.00	-35.59	-74.24	9.31	39.38	35.04	Peak	100	269	HORIZONTAL

3.7 Frequency Stability

3.7.1 Frequency Stability Limit

Frequency Stability Limit
ASTM E2213-03 Clause 8.9.4
☒ The transmitter center frequency stability shall be ± 10 ppm maximum for DSRC 5.9GHz band.
Note 1: These measurements shall also be performed at normal and extreme test conditions.

3.7.2 Measuring Instruments

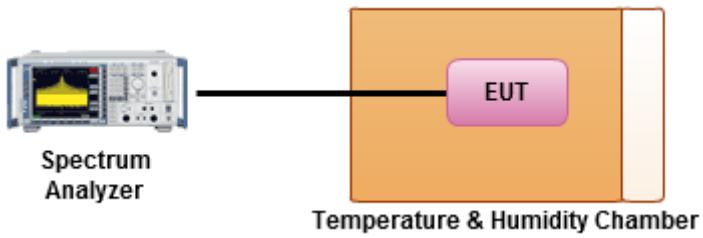
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

Test Method	
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.2 for frequency stability tests
	☒ Frequency stability with respect to ambient temperature
	☒ Frequency stability when varying supply voltage
☒	For conducted measurement.
	☒ For conducted measurements on devices with multiple transmit chains: Measurements need only to be performed on one of the active transmit chains (antenna outputs)
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.

3.7.4 Test Setup

Frequency Stability



3.7.5 Test Result of Frequency Stability

Temperature	23°C	Humidity	63%
Test Engineer	Wen Chao	Test Date	Feb. 05, 2014

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5890
126.5	5889.9346
110	5889.9346
93.5	5889.9344
Max. Deviation (MHz)	0.065600
Max. Deviation (ppm)	11.14

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(℃)	5890
-40	5889.9430
-30	5889.9432
-20	5889.9432
-10	5889.9344
0	5889.9344
10	5889.9346
20	5889.9346
30	5889.9348
40	5889.9348
50	5889.9350
60	5889.9350
Max. Deviation (MHz)	0.065600
Max. Deviation (ppm)	11.14

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9 kHz ~ 2.75 GHz	Apr. 12, 2013	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150 kHz ~ 100 MHz	Nov. 23, 2013	Conduction (CO01-CB)
Arifical Mains Network	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Nov. 23, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150 kHz ~ 30 MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	-	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Apr. 16, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Dec. 17, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 12, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Oct. 23, 2013	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 12, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 04, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)

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

"*" Calibration Interval of instruments listed above is two years.

NCR means Non-Calibration required.

5 Measurement Uncertainty

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1= AMN/LISN VSWR 2=	-0.080	dB	U-shaped	0.060
Combined standard uncertainty Uc(y)				1.2
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				2.4

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.173	dB	K=1	0.086
Cable loss	±0.174	dB	K=2	0.087
Antenna gain	±0.169	dB	K=2	0.084
Site imperfection	±0.433	dB	Triangular	0.214
Pre-amplifier gain	±0.366	dB	K=2	0.183
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.778
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.555

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.191	dB	K=1	0.095
Cable loss	±0.169	dB	K=2	0.084
Antenna gain	±0.191	dB	K=2	0.096
Site imperfection	±0.582	dB	Triangular	0.291
Pre-amplifier gain	±0.304	dB	K=2	0.152
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.839
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.678

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.186	dB	K=1	0.093
Cable loss	±0.167	dB	K=2	0.083
Antenna gain	±0.190	dB	K=2	0.095
Site imperfection	±0.488	dB	Triangular	0.244
Pre-amplifier gain	±0.269	dB	K=2	0.134
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.771
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.541