

FCC Radio Test Report

Equipment : 60GHz Wireless HD RX module

Brand Name : AzureWave

Model No. : AW-WH064R

FCC ID : TLZ-WH064R

Standard : 47 CFR FCC Part 15.255

Applicant : AzureWave Technologies, Inc.
8F., No.94, Baozhong Rd., Xindian, Taipei,
Taiwan 231

Manufacturer : AzureWave Technologies, Inc.
8F., No.94, Baozhong Rd., Xindian, Taipei,
Taiwan 231

The product sample received on May 08, 2013 and completely tested on Jun. 15, 2013. 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.


Sam Chen
SPORTON INTERNATIONAL INC.



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SUMMARY OF TEST RESULT

Standard Requirements and Conformance Test Specifications				
Report Clause	Ref. Std. Clause	Description	Result	Remark
3.1	FCC 15.207	AC Power Conducted Emissions	Complied	-
3.2	FCC 15.255(e)	Occupied Bandwidth	Complied	-
3.3	FCC 15.255(b)(1)	EIRP Power and Power Density	Complied	-
3.4	FCC 15.255(e)	Peak Conducted Power	Complied	-
3.5	FCC 15.255(c)	Transmitter Spurious Emissions	Complied	-
3.6	FCC 15.255(f)	Frequency Stability	Complied	-
3.7	FCC 15.255(d)	Publicly-accessible Coordination Channel	Complied	-
3.8	FCC 15.255(a),(h)	Operation Restriction and Group Installation	Complied	-
3.9	FCC 15.255(i)	Transmitter Identification	Complied	-



SPORTON INTERNATIONAL INC.
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FCC ID: TLZ-WH064R

1 General Description

1.1 Information

1.1.1 The Channel Plan(s)

The Channel Plan(s)	
Low-rate PHY (LRP) Band	Channel 2 LRP: 60.16-60.80 GHz Channel 3 LRP: 62.32-62.96 GHz
LRP Channel List	Channel 2 LRP: 60.16-60.80 GHz: 60.16 + n x 0.16 (n=0, 1, 2, 3, 4) GHz Channel 3 LRP: 62.32-62.96 GHz: 62.32 + n x 0.16 (n=0, 1, 2, 3, 4) GHz

1.1.2 Transmit Operating Modes

The Different Transmit Operating Modes	
☒	Operating mode 1: Smart Antenna Systems - with beam forming
☐	Operating mode 2: Smart Antenna Systems - without beam forming
☐	Operating mode 3: Single Antenna Equipment

1.1.3 Antenna Information

Antenna Information		
☐	Equipment placed on the market without antennas	
☒	Integral antenna	
Integral antenna gain	16	dBi for LRP
	☐	Temporary RF connector provided
	☒	No temporary RF connector provided
☐	External antenna (dedicated antennas)	
	☐	Single power level with corresponding antenna(s)
	☐	Multiple power settings and corresponding antenna(s)

1.1.4 Power Levels

Worst Power Levels for LRP				
Applicable power levels	☐ Conducted ☒ EIRP			
Antenna gain	16 dBi			
Frequency (GHz)	Highest setting (P_{high}): (dBm)			
	Modulation	Data Rate (Mb/s)	AV Power	Peak Power
62.64	BPSK	20.337	25.95	31.21

1.1.5 Extreme Operating

The Extreme Operating Temperature Range that Apply to the Equipment				
☒ -20 °C to +50 °C				
☐ 0 °C to +40 °C				
☐ Other:				
EUT Power Type	From Host System			
Supply Voltage	☐ AC	State AC voltage	V	
Supply Voltage	☒ DC	State DC voltage	5	V

1.1.6 Equipment Use Condition

Equipment Use Condition	
☐	Fixed field disturbance sensors at 61-61.5GHz
☐	Except fixed field disturbance sensors at 61-61.5GHz
☒	Except fixed field disturbance sensors



1.2 Additional Information Provided by the Submitter

1.2.1 Modulation

Modulation	
The LRP modulation is BPSK / data rate is 20.337 Mb/s.	
Can the transmitter operate un-modulated:	☒ Yes ☐ No

1.2.2 Duty Cycle

Duty Cycle			Duty Cycle Factor
The transmitter is intended for	LRP	32.74 %	4.85



1.3 Accessories

N/A

1.4 Support Equipment

For AC Power Conducted Emissions

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	AC adaptor	D-Link	AMS47-0501000FU	N/A
2	LCD Monitor	DELL	U2410	DoC
3	DVD Player	Pioneer	DV-600AV-S	N/A
4	60GHz Wireless HD TX module	AzureWave	AW-WH064T	TLZ-WH064T
5	Test Fixture	AzureWave	3065-V05	N/A
6	Test Fixture	AzureWave	3065-V05	N/A

Radiated Emission (Below 1GHz)

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	AC adaptor	DVE	DSA-6E-05 CH050100	N/A
2	LCD TV	SONY	KLV-32U300A	DoC
3	PS3	SONY	CHCH-20074	N/A
4	60GHz Wireless HD TX module	AzureWave	AW-WH064T	TLZ-WH064T
5	Test Fixture	AzureWave	3065-V05	N/A
6	Test Fixture	AzureWave	3065-V05	N/A

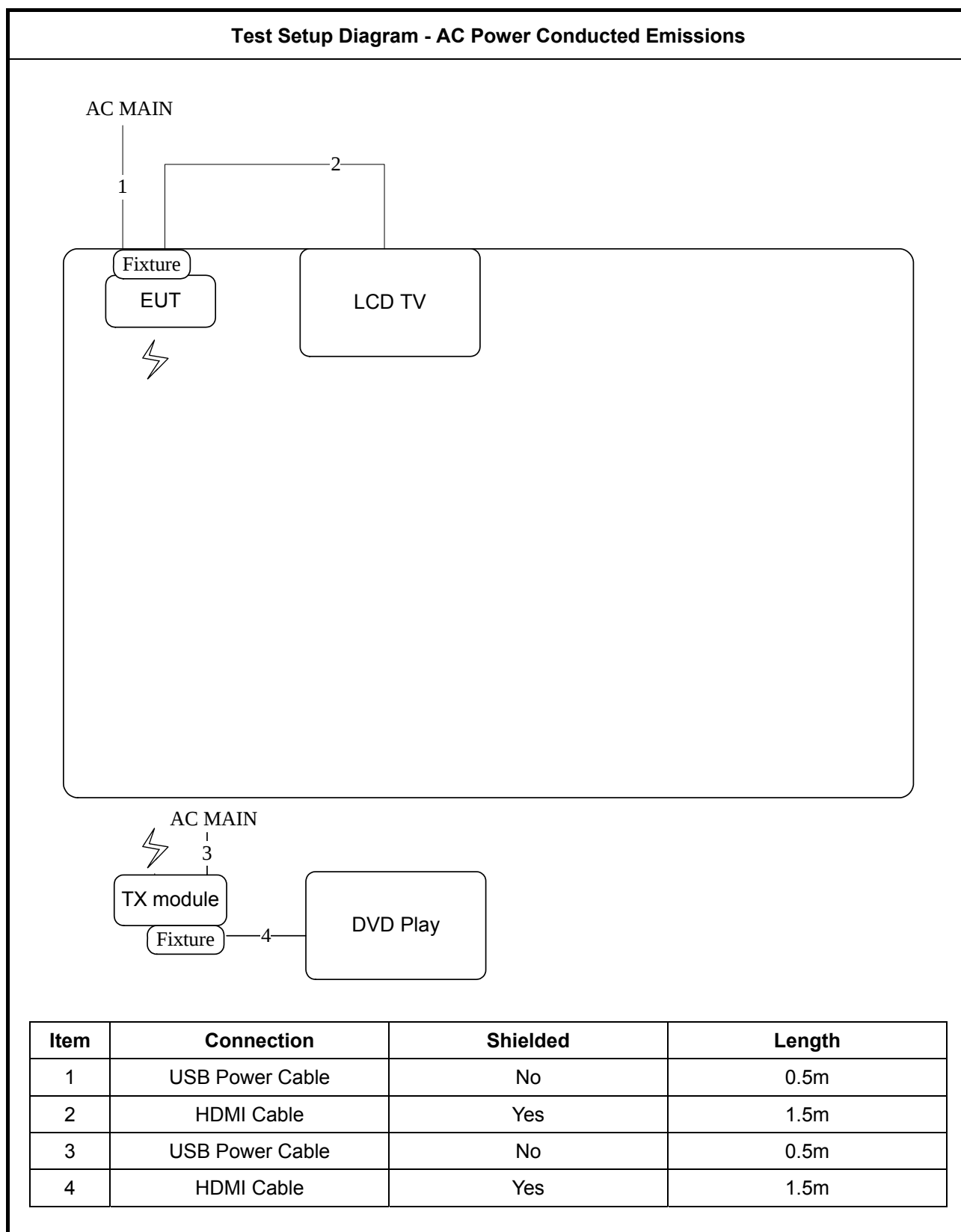
**Radiated Emission (Above 1GHz) & RF Conducted**

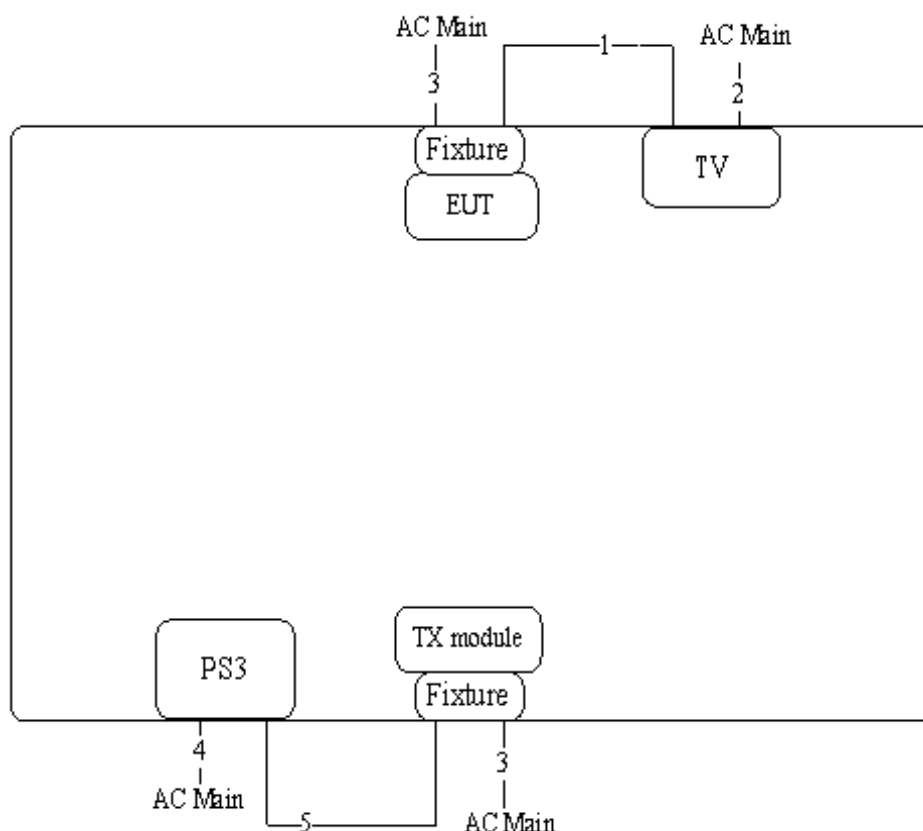
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	D420	E2KWM3945ABG
2	LCD TV	SONY	KLV-32U300A	DoC
3	PS3	SONY	CHCH-20074	N/A
4	60GHz Wireless HD TX module	AzureWave	AW-WH064T	TLZ-WH064T
5	Test Fixture	AzureWave	3064-V03	N/A
6	Test Fixture	AzureWave	3064-V03	N/A

1.5 EUT Operation during Test

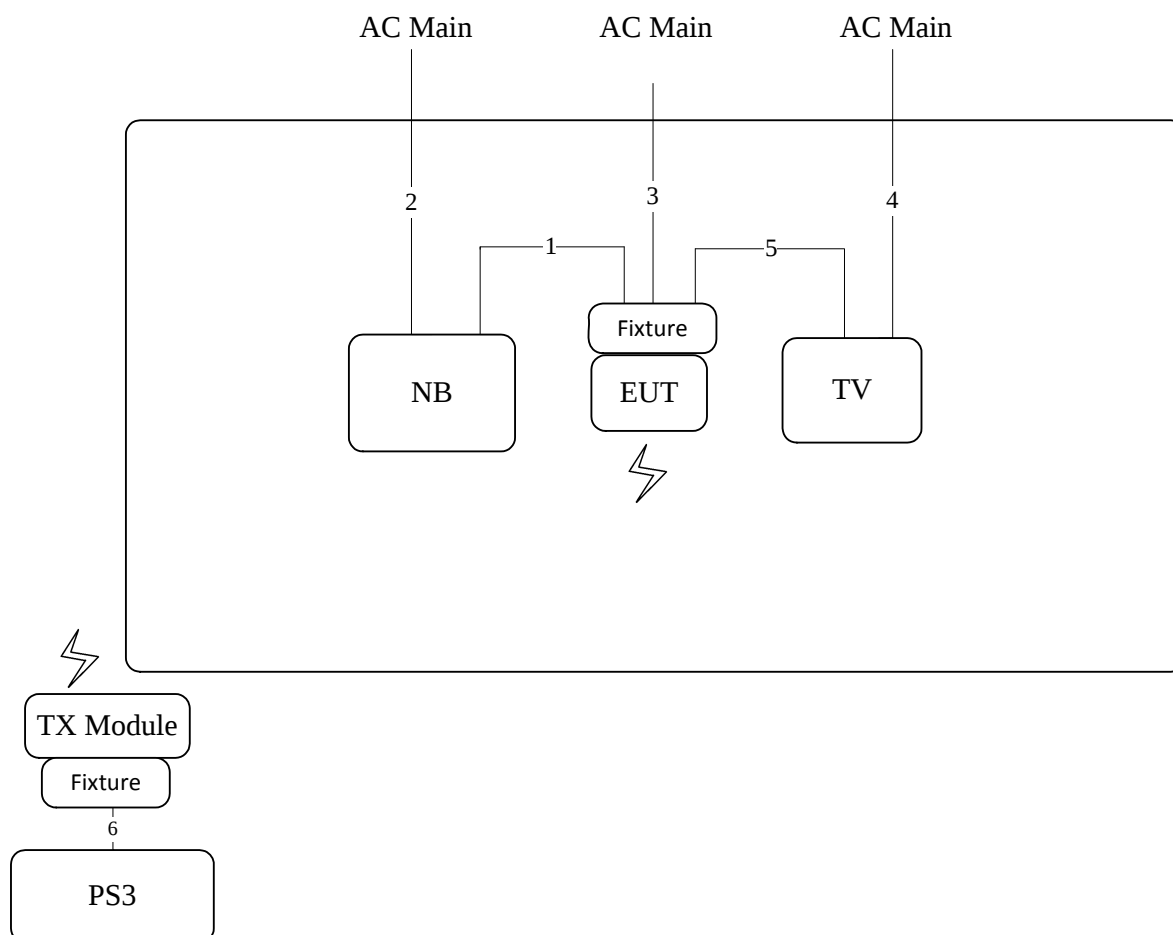
High Definition Audio / Video in the 1080p format was sent from the TX device to the receiver via the wireless link. A Blu-Ray player furnished HD A/V to the TX device. The receiver furnished HD A/V to the television. The television was placed outside the chamber. A laptop computer with test software was utilized to vary the radio configuration and antenna beam orientation for testing purposes. This computer was not connected during measurements. For Extreme environmental tests, an external Variable DC power supply was utilized in place of the AC/DC adapter to furnish power to the EUT.

1.6 Test Setup Diagram



Test Setup Diagram - Transmitter Spurious Emissions below 40 GHz


Item	Connection	Shielded	Length
1	HDMI Cable	No	1.2m
2	Power Cable	No	2.8m
3	Power Cable	No	1.2m
4	Power Cable	No	1.8m
5	HDMI Cable	No	1.2m

Test Setup Diagram - Transmitter Spurious Emissions above 40 GHz


Item	Connection	Shielded	Length
1	USB Cable	No	0.8m
2	Power Cable	No	2.6m
3	Power Cable	No	1.2m
4	Power Cable	No	1.8m
5	HDMI Cable	No	1.2m
6	HDMI Cable	No	1.2m

1.7 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 15.255
- ♦ ANSI C63.10-2009
- ♦ KDB200443

1.8 Testing Location

Testing Location			
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055	
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085	
Test Condition	Test Site No.	Test Engineer	Test Environment
AC Conducted Emission	CO01-CB	Parody Lin	25°C / 56%
Radiated Emission	03CH01-CB	Sean Ku	24°C / 64%
RF Conducted	TH01-CB	Sean Ku	24°C / 64%

2 Test Configuration of Equipment under Test

2.1 Test Channel Frequencies

Nominal Channel Bandwidth			
Channel Plan (GHz)	Low Channel (GHz)	Middle Channel (GHz)	High Channel (GHz)
Channel 2 LRP: 60.16-60.80	60.16	60.48	60.80
Channel 3 LRP: 62.32-62.96	62.32	62.64	62.96

2.2 Conformance Tests and Related Test Frequencies

Test Item	Test Frequencies (GHz) Channel Plan 2&3
	LRP
AC Power Conducted Emissions	Normal Link
Occupied Bandwidth	60.16, 60.48, 60.80 & 62.32, 62.64, 62.96
EIRP Power and Power Density	60.16, 60.48, 60.80 & 62.32, 62.64, 62.96
Peak Conducted Power	60.16, 60.48, 60.80 & 62.32, 62.64, 62.96
Transmitter Spurious Emissions (below 40 GHz)	Normal Link
Transmitter Spurious Emissions (above 40 GHz)	60.48 & 62.64
Frequency Stability	Un-Modulation

AC Power Conducted Emissions

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long (see ANSI C63.10, clause 6.2.3.1).
2. I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m (see ANSI C63.10, clause 6.2.2).
3. EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 ohm loads. LISN can be placed on top of, or immediately beneath, reference ground plane (see ANSI C63.10, clauses 6.2.2 and 6.2.3).
 - 3.1. All other equipment powered from additional LISN(s).
 - 3.2. A multiple-outlet strip can be used for multiple power cords of non-EUT equipment.
 - 3.3. LISN at least 80 cm from nearest part of EUT chassis.
4. Non-EUT components of EUT system being tested.
5. Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop (see ANSI C63.10, clause 6.2.3.1).
6. Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane (see ANSI C63.10, clause 6.2.2 for options).
7. Antenna may be integral or detachable. If detachable, the antenna shall be attached for this test.

3.1.5 Test Result of AC Power Conducted Emissions

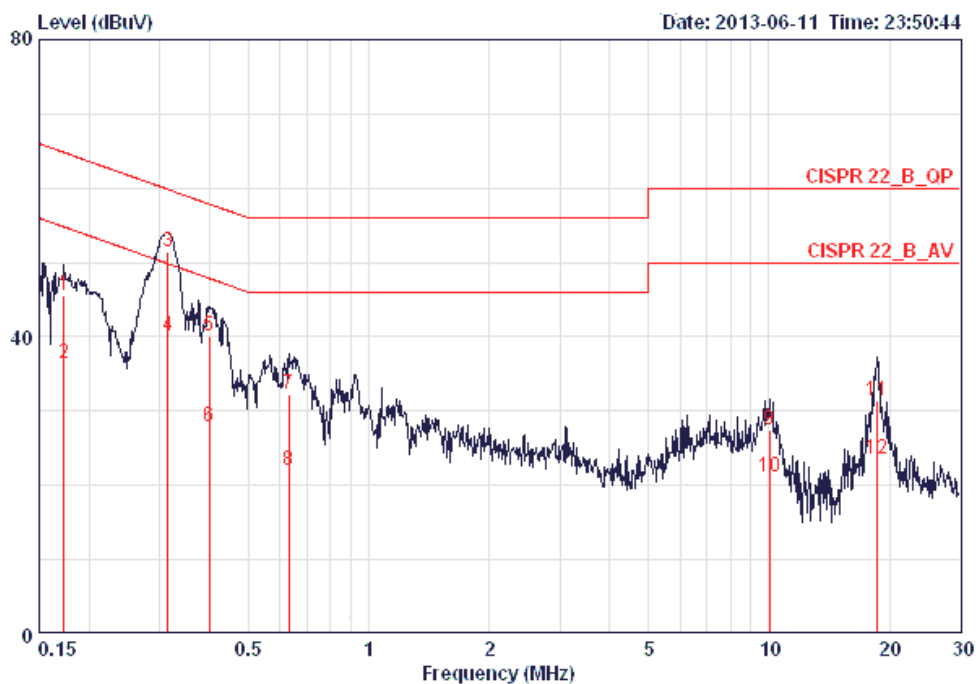
Test Conditions see ANSI C63.10, clause 5.11

Test Setup see ANSI C63.10, clause 6.2.3

NOTE 1: If equipment having different channel plan and nominal channel bandwidth modes (see test report clause 1.1.1), the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes. If equipment having different transmit operating modes (see test report clause 1.1.2), the measurements are uninfluenced by different transmit operating modes, may not need to be repeated for all the operating modes. Similar, if the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.12 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worse case combination to be used for the conformance testing.

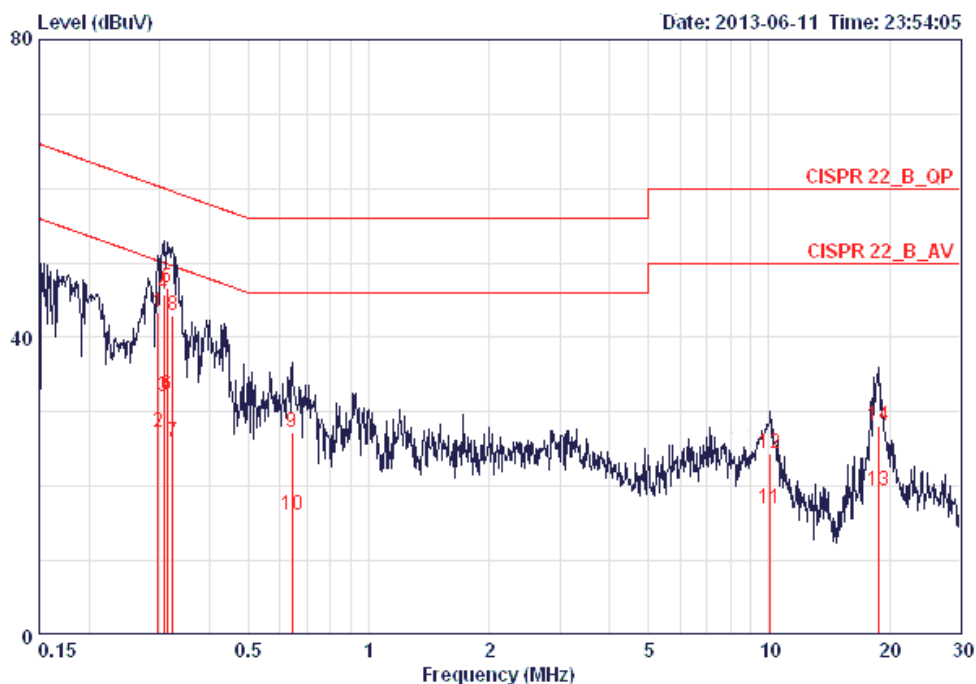
NOTE 2: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit, see ANSI C63.4, clause 10.1.8.1.

Temp	25°C	Humidity	56%
Test Engineer	Parody Lin	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.17307	45.66	-19.15	64.81	45.31	0.16	0.19	LINE	QP
2	0.17307	36.35	-18.46	54.81	36.00	0.16	0.19	LINE	AVERAGE
3	0.31495	51.35	-8.49	59.84	51.00	0.15	0.20	LINE	QP
4	0.31495	40.19	-9.65	49.84	39.84	0.15	0.20	LINE	AVERAGE
5	0.39974	40.10	-17.76	57.86	39.75	0.15	0.20	LINE	QP
6	0.39974	27.81	-20.05	47.86	27.46	0.15	0.20	LINE	AVERAGE
7	0.63048	32.31	-23.69	56.00	31.95	0.16	0.20	LINE	QP
8	0.63048	21.94	-24.06	46.00	21.58	0.16	0.20	LINE	AVERAGE
9	10.019	27.55	-32.45	60.00	26.86	0.34	0.35	LINE	QP
10	10.019	21.12	-28.88	50.00	20.43	0.34	0.35	LINE	AVERAGE
11	18.622	31.30	-28.70	60.00	30.35	0.46	0.49	LINE	QP
12	18.622	23.54	-26.46	50.00	22.59	0.46	0.49	LINE	AVERAGE

Temp	25°C	Humidity	56%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.29712	43.48	-16.84	60.32	43.20	0.08	0.20	NEUTRAL	QP
2	0.29712	27.15	-23.17	50.32	26.87	0.08	0.20	NEUTRAL	AVERAGE
3	0.30671	32.14	-17.92	50.06	31.86	0.08	0.20	NEUTRAL	AVERAGE
4	0.30671	45.78	-14.28	60.06	45.50	0.08	0.20	NEUTRAL	QP
5 ③	0.31328	46.67	-13.21	59.88	46.39	0.08	0.20	NEUTRAL	QP
6	0.31328	32.19	-17.69	49.88	31.91	0.08	0.20	NEUTRAL	AVERAGE
7	0.32340	25.97	-23.65	49.62	25.69	0.08	0.20	NEUTRAL	AVERAGE
8	0.32340	42.94	-16.68	59.62	42.66	0.08	0.20	NEUTRAL	QP
9	0.64398	27.16	-28.84	56.00	26.88	0.08	0.20	NEUTRAL	QP
10	0.64398	16.09	-29.91	46.00	15.81	0.08	0.20	NEUTRAL	AVERAGE
11	10.072	16.95	-33.05	50.00	16.36	0.24	0.35	NEUTRAL	AVERAGE
12	10.072	24.46	-35.54	60.00	23.87	0.24	0.35	NEUTRAL	QP
13	18.721	19.40	-30.60	50.00	18.54	0.37	0.49	NEUTRAL	AVERAGE
14	18.721	28.20	-31.80	60.00	27.34	0.37	0.49	NEUTRAL	QP

Measurement uncertainty: 2.4 dB

3.2 Occupied Bandwidth

3.2.1 Limit of Occupied Bandwidth

6dBc Bandwidth (see Note 1)	None
26dBc Bandwidth	None
99% Occupied Bandwidth (see Note 2)	None

NOTE 1: The 6dBc bandwidth is the frequency bandwidth of the signal power at the -6 dBc points when measured with a 100 kHz resolution bandwidth. These measurements shall also be performed at normal test conditions.

NOTE 2: The 99% occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth when resolution bandwidth should be approximately 1 % to 5 % of the occupied bandwidth (OBW). These measurements shall also be performed at normal test conditions.

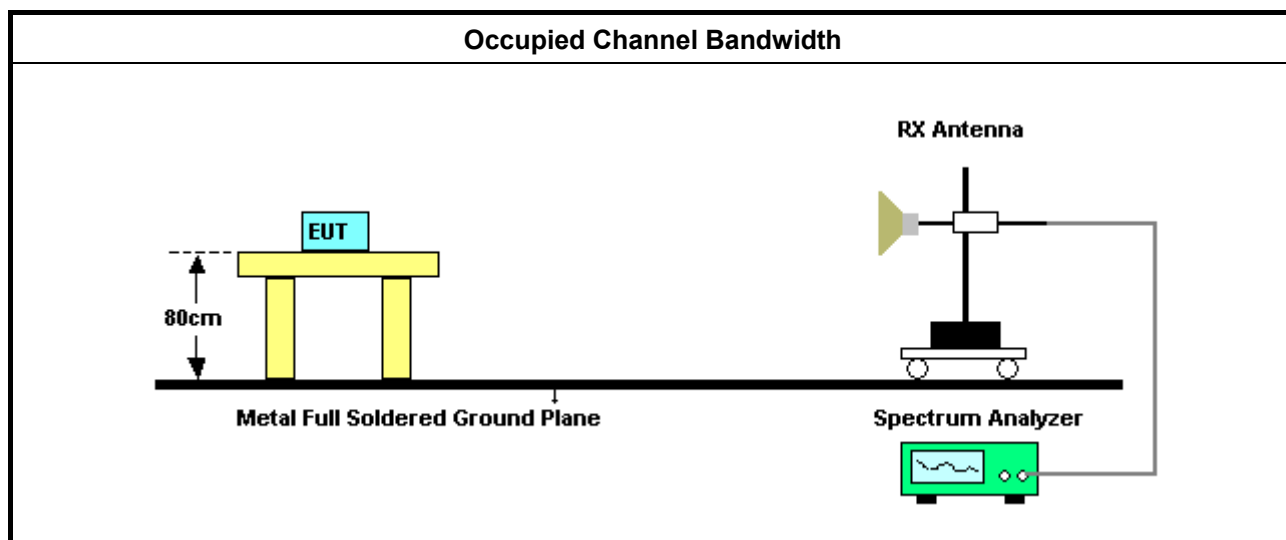
3.2.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.9.1 and 7.8.5.

3.2.4 Test Setup



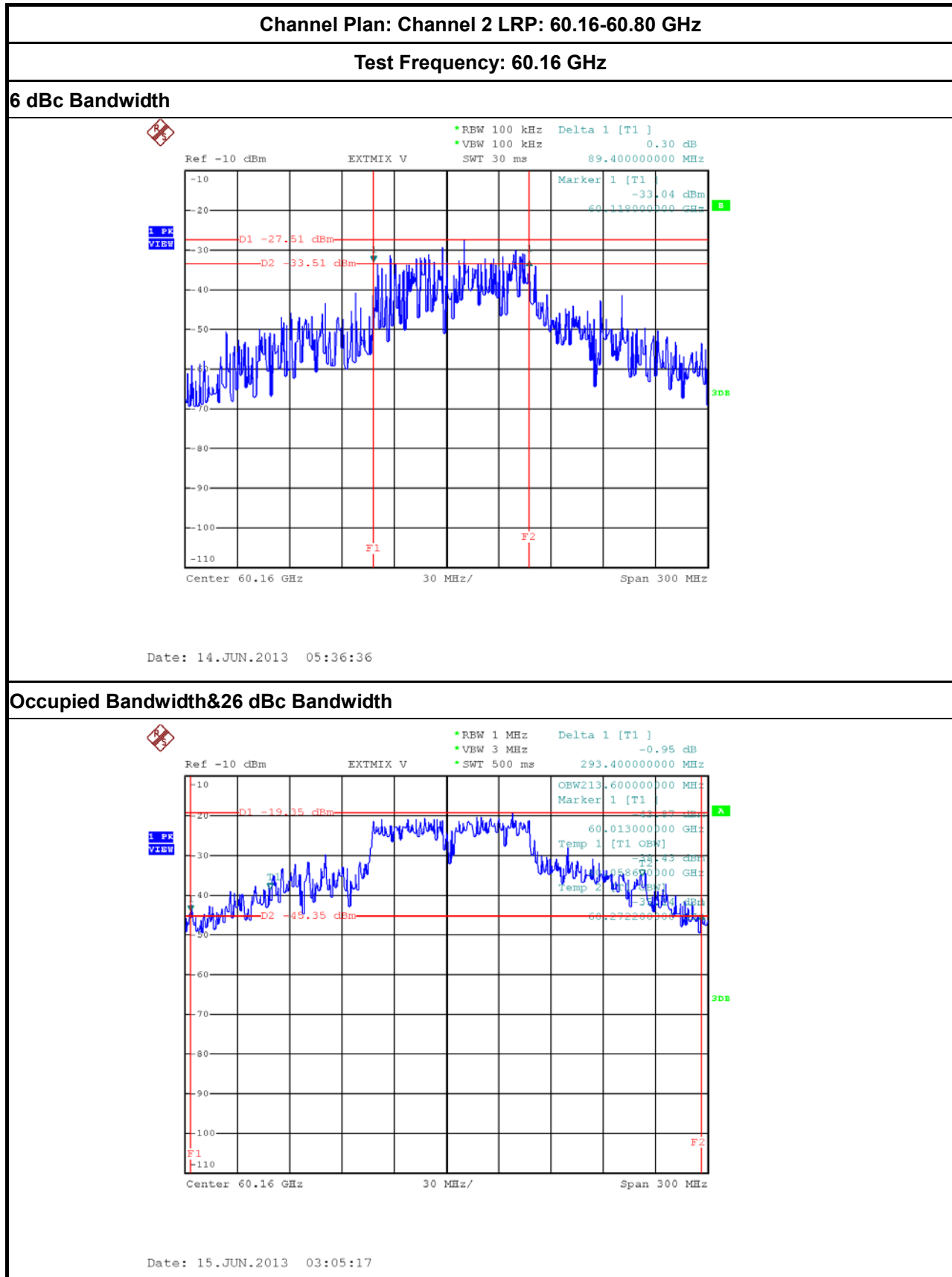
3.2.5 Test Result of Occupied Bandwidth

Test Conditions	see ANSI C63.10, clause 5.12
Test Setup	see ANSI C63.10, clause 7.8.5
NOTE: If equipment having different transmit operating modes (see test report clause 1.1.2), the measurements are uninfluenced by different transmit operating modes, may not need to be repeated for all the operating modes. Similar, if the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.12 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worse case combination to be used for the conformance testing. Refer as ANSI C63.10, clause 6.9.1, observe and record with plotted graphs or photographs the worst-case (i.e., widest) occupied bandwidth produced by these different modulation sources.	

Temp	24°C	Humidity	64%			
Test Engineer	Sean Ku					
Test Results						
Channel Plan (GHz)	Test Freq. (GHz)	6 dBc Bandwidth (MHz)	Occupied Bandwidth (MHz)	26 dBc Bandwidth (MHz)	Limit (MHz)	Margin (MHz)
Channel 2 LRP: 60.16-60.80	60.16	89.40	213.6000	293.4	N/A	N/A
	60.48	88.2	220.8000	297	N/A	N/A
	60.80	85.80	209.4000	291.0	N/A	N/A
Channel 3 LRP: 62.32-62.96	62.32	90.60	223.2000	296.4	N/A	N/A
	62.64	83.4	222.6000	294	N/A	N/A
	62.96	90.60	220.2000	293.4	N/A	N/A
Measurement uncertainty:	4.4335 dB					

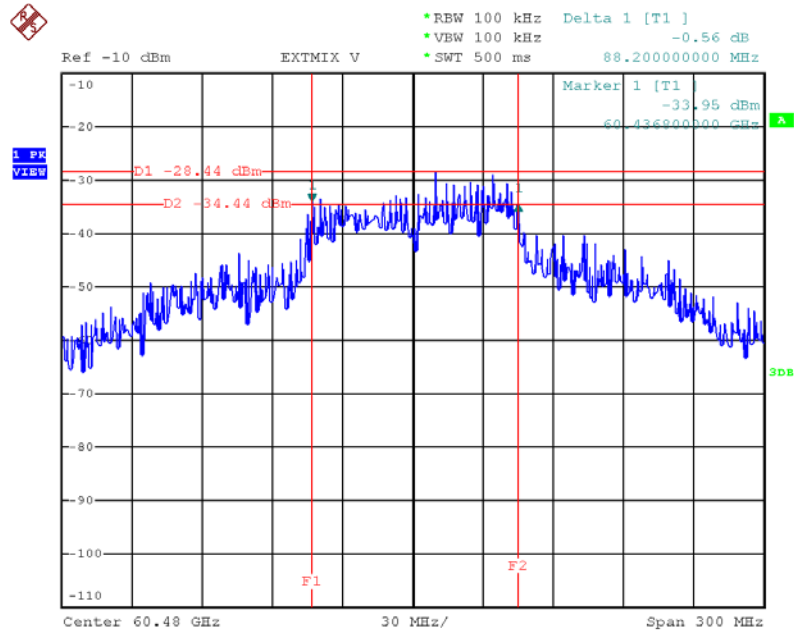


3.2.5.1 Bandwidth Plots



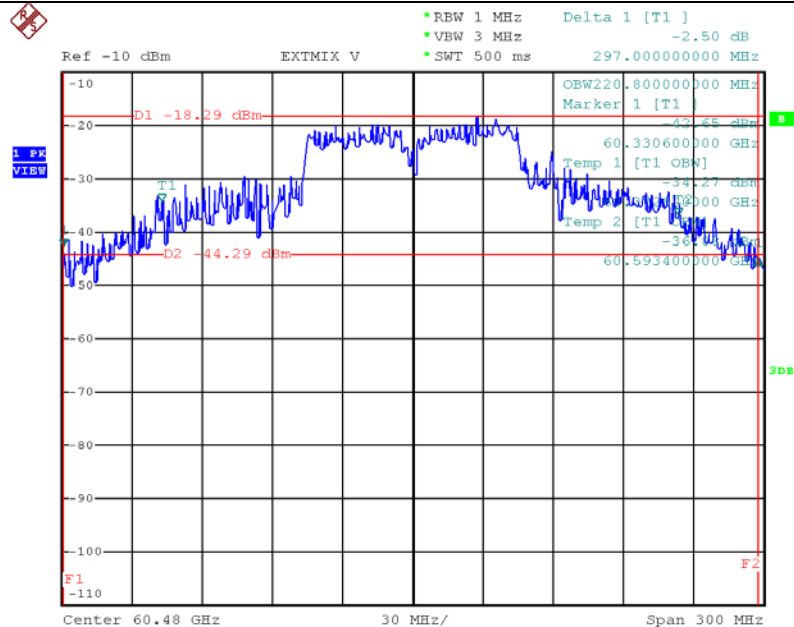
Test Frequency: 60.48 GHz

6 dBc Bandwidth



Date: 4.JUN.2013 04:03:07

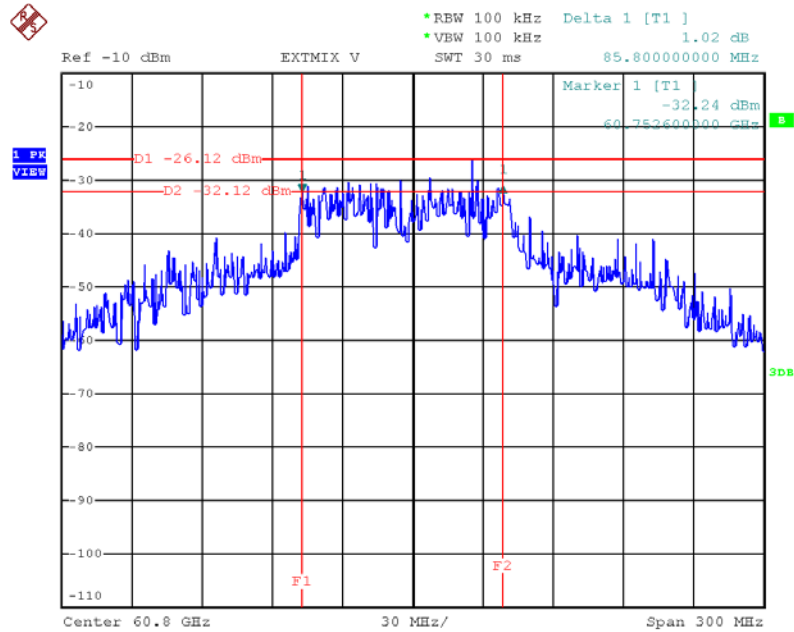
Occupied Bandwidth&26 dBc Bandwidth



Date: 5.JUN.2013 03:57:34

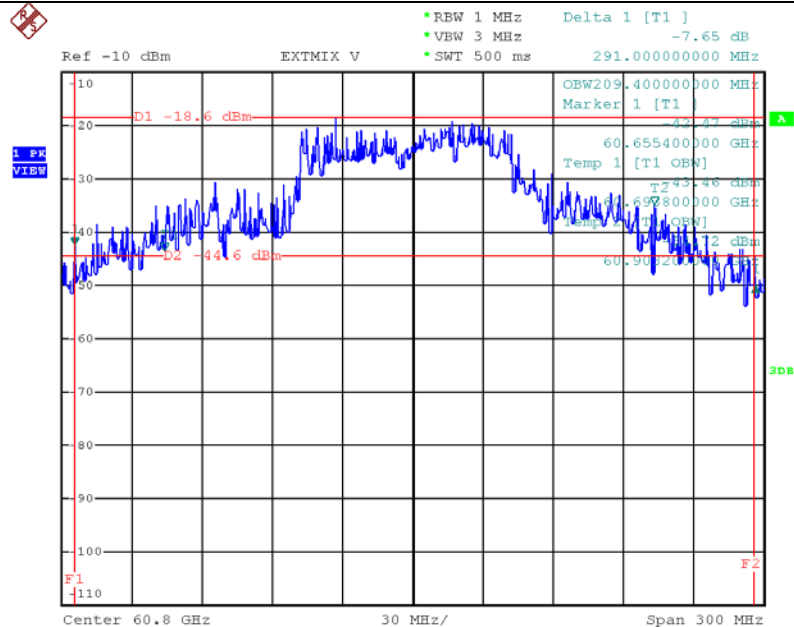
Test Frequency: 60.80 GHz

6 dBc Bandwidth



Date: 14.JUN.2013 05:43:22

Occupied Bandwidth&26 dBc Bandwidth

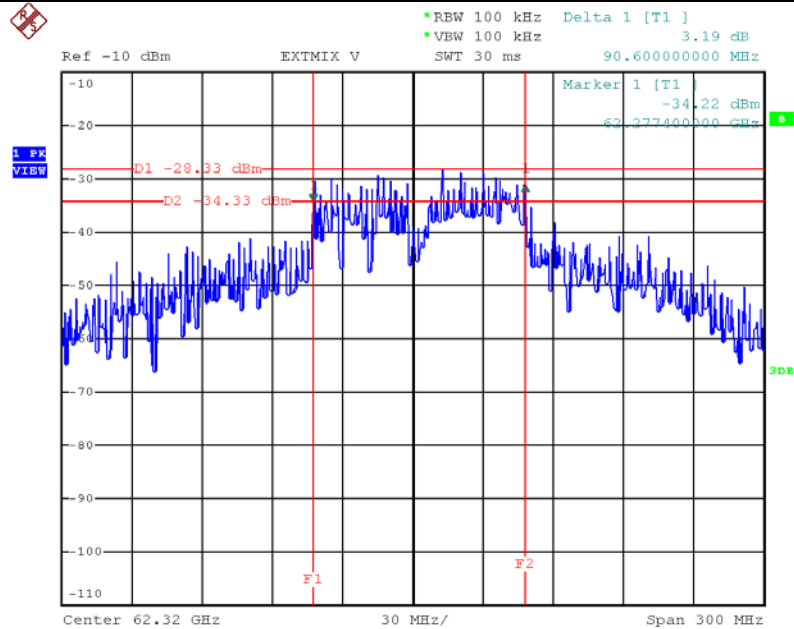


Date: 15.JUN.2013 03:14:25

Channel Plan: Channel 3 LRP: 62.32-62.96 GHz

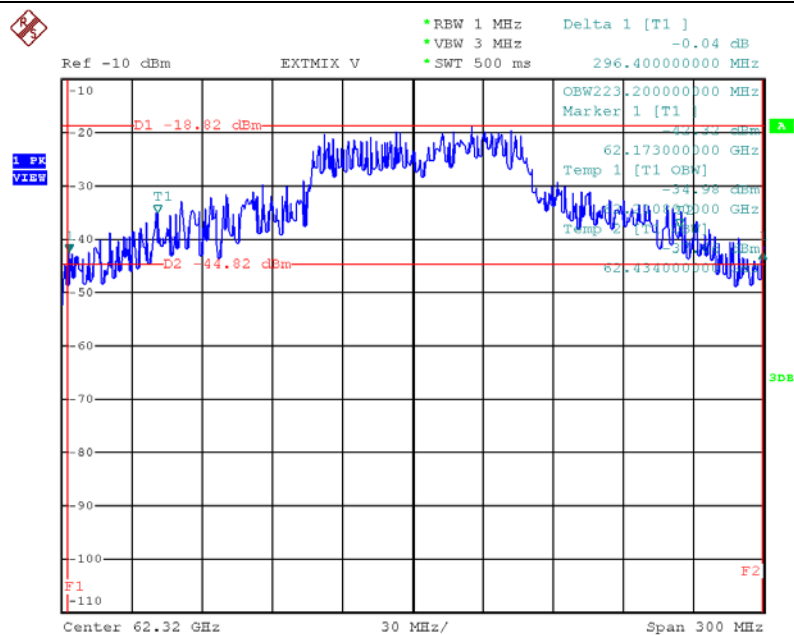
Test Frequency: 62.32 GHz

6 dBc Bandwidth



Date: 14.JUN.2013 05:29:06

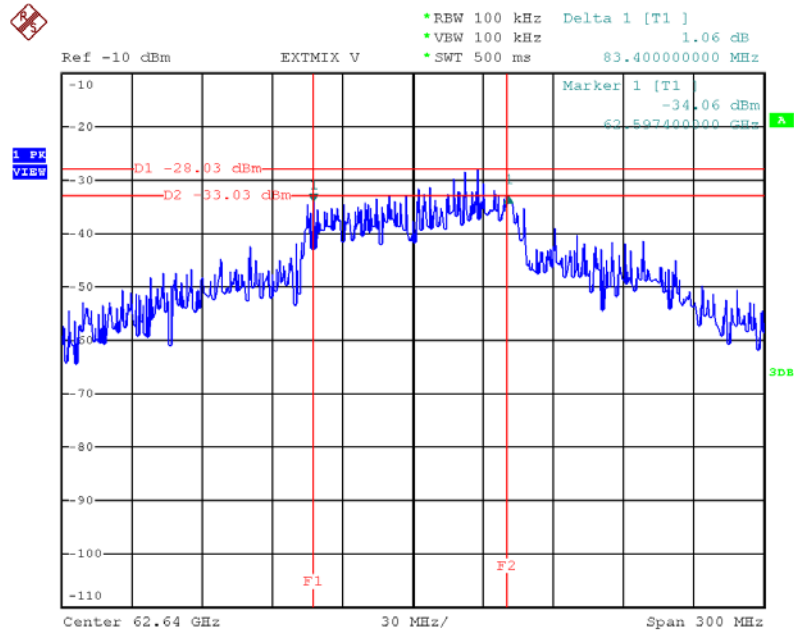
Occupied Bandwidth&26 dBc Bandwidth



Date: 15.JUN.2013 03:31:47

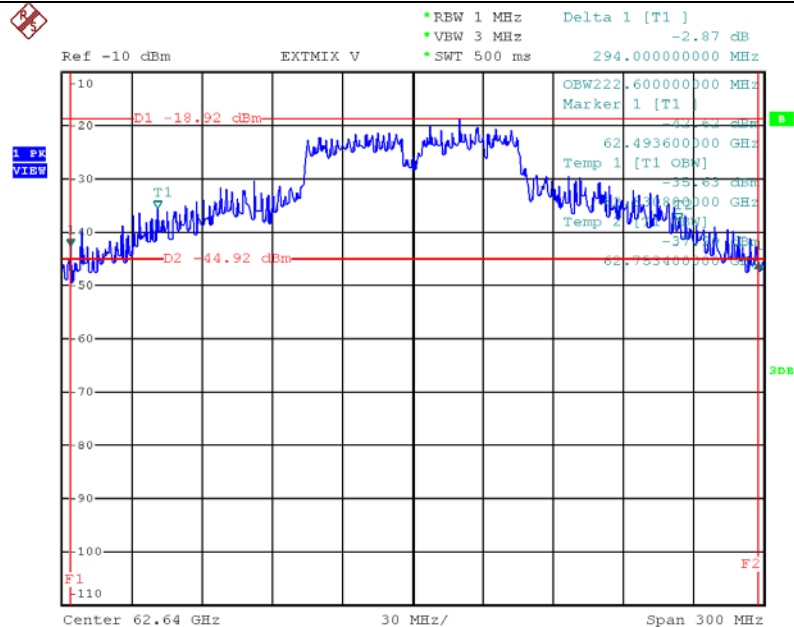
Test Frequency: 62.64 GHz

6 dBc Bandwidth



Date: 4.JUN.2013 03:49:55

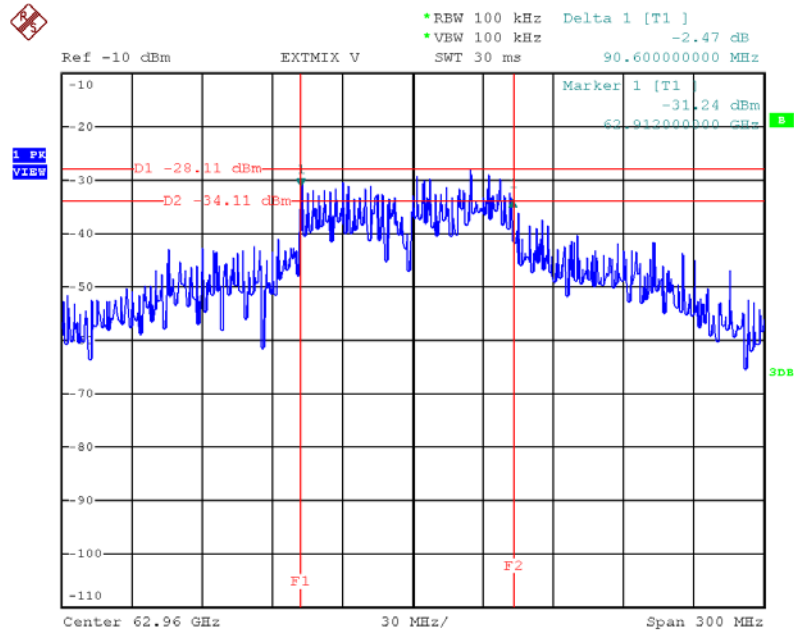
Occupied Bandwidth&26 dBc Bandwidth



Date: 5.JUN.2013 03:52:48

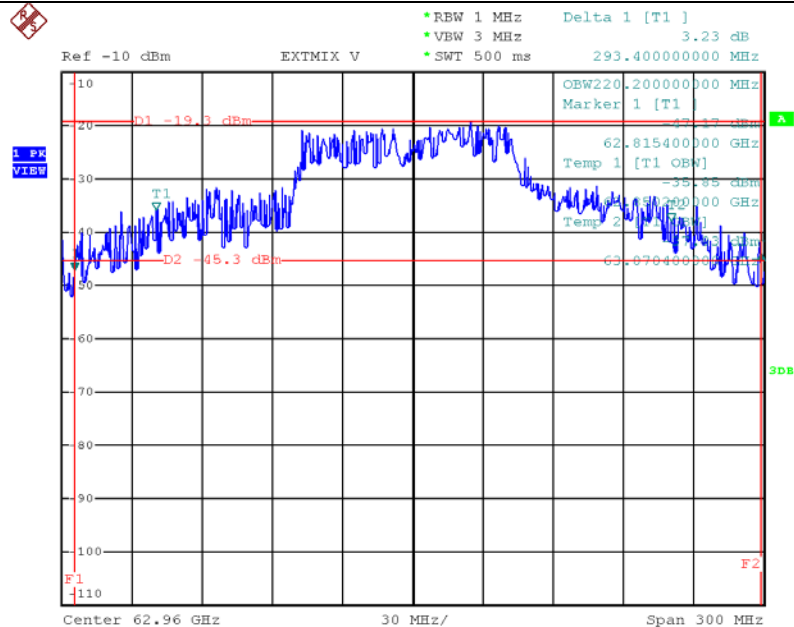
Test Frequency: 62.96 GHz

6 dBc Bandwidth



Date: 14.JUN.2013 05:22:06

Occupied Bandwidth&26 dBc Bandwidth



Date: 15.JUN.2013 03:24:11

3.3 EIRP Power and Power Density

3.3.1 Limit of EIRP Power and Power Density

Power Density Limit		
Use Condition	EIRP Average Power Density	EIRP Peak Power Density
Fixed field disturbance sensors at 61-61.5GHz	9 nW/cm ² equivalent 10.2 mW (10.08 dBm)	18 nW/cm ² equivalent 10.2 mW (13.09 dBm)
Except fixed field disturbance sensors at 61-61.5GHz	N/A	9 nW/cm ² equivalent 10.2 mW (10.08 dBm)
Except fixed field disturbance sensors	9 μW/cm ² equivalent 10W (40.08 dBm)	18 μW/cm ² equivalent 20W (43.08 dBm)

NOTE: For the applicable limit, see FCC 15.255 (b)

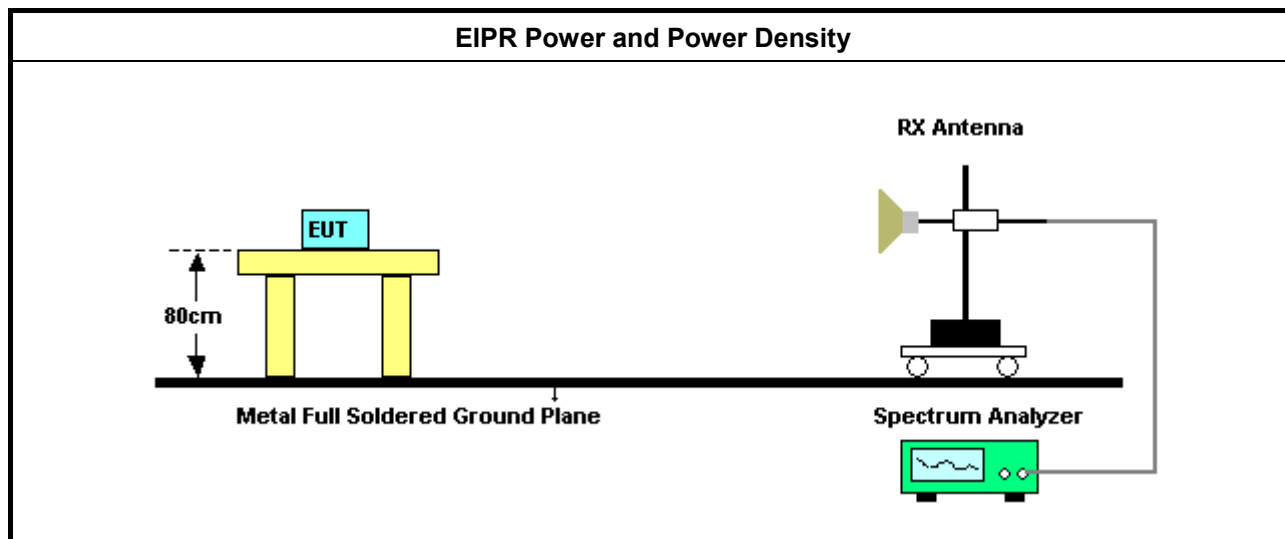
3.3.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.3.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 7.8.3 and 7.8.6.

3.3.4 Test Setup



3.3.5 Test Result of EIRP Power and Power Density

Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clause 7.8.6

NOTE: If the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.12 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worse case combination to be used for the conformance testing.

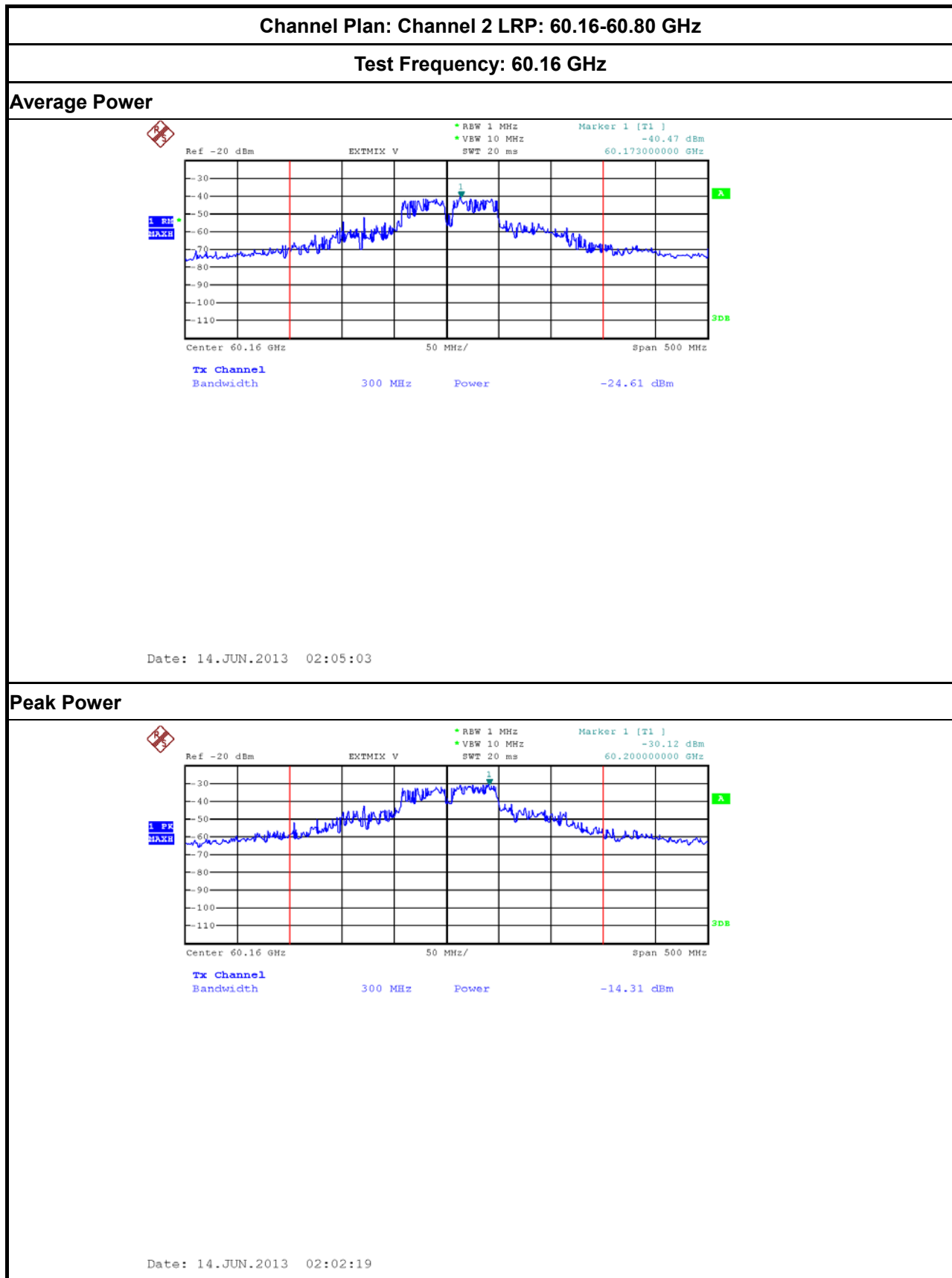


3.3.5.1 Test Result of EIRP Power

Temp	24°C			Humidity		64%			
Test Engineer	Sean Ku			Test Distance		1 m			
Test Results									
Channel Plan (GHz)	Test Freq. (GHz)	Measured Power (dBm)		EIRP (dBm)		EIRP Limit (dBm) (note 1)		Margin (dB)	
		AV	Peak	AV	Peak	AV	Peak	AV	Peak
Channel 2 LRP: 60.16-60.80	60.16	-24.61	-14.31	25.27	30.72	40.08	43.08	14.81	12.36
	60.48	-24.53	-14.28	25.39	30.79	40.08	43.08	14.69	12.29
	60.80	-24.47	-14.16	25.50	30.96	40.08	43.08	14.58	12.12
Channel 3 LRP: 62.32-62.96	62.32	-25.21	-14.55	24.97	30.78	40.08	43.08	15.11	12.30
	62.64	-24.28	-14.17	25.95	31.21	40.08	43.08	14.13	11.87
	62.96	-24.94	-14.88	25.33	30.54	40.08	43.08	14.75	12.54
Measurement uncertainty: 4.4335 dB									
The measured power level is converted to EIRP using the Friis equation:									
$EIRP = P_T * G_T = (P_R / G_R) * (4 * \pi * D / \lambda)^2$									
P_R = measured channel power									
G_R = 23 dBi, the gain of the receive measurement antenna									
D = The measurement distance									
λ = The wavelength.									
NOTE 1: For the applicable limit, see FCC 15.255 (b)									

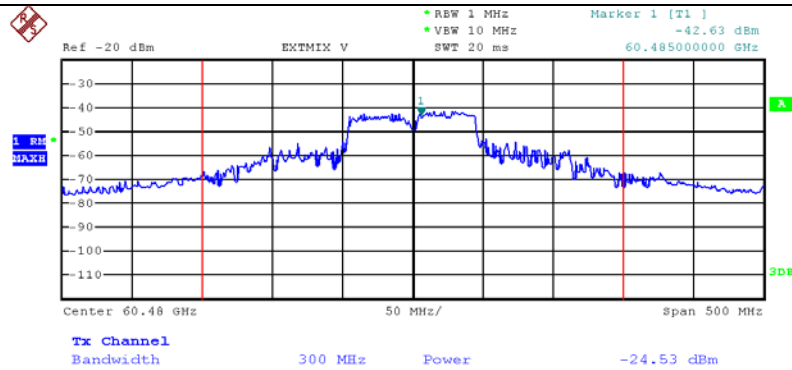


3.3.5.2 Measured Power Plots



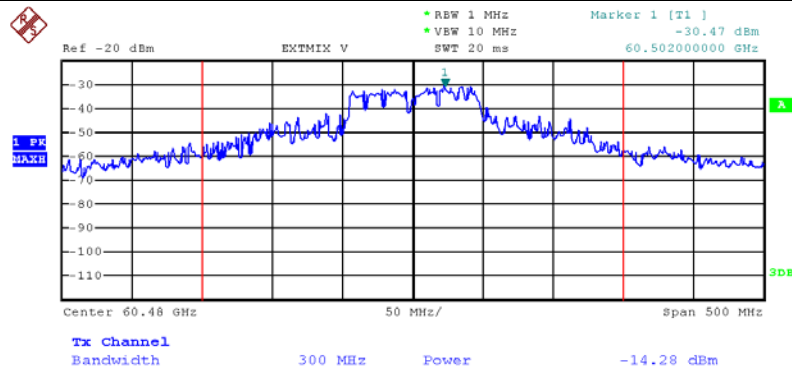
Test Frequency: 60.48 GHz

Average Power



Date: 14.JUN.2013 02:20:10

Peak Power

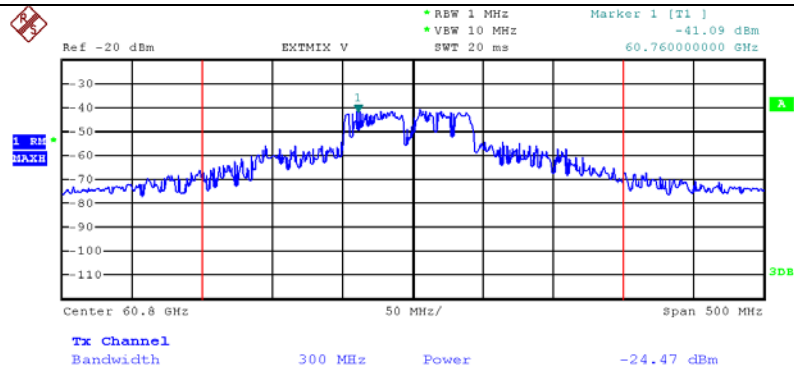


Date: 14.JUN.2013 02:26:37



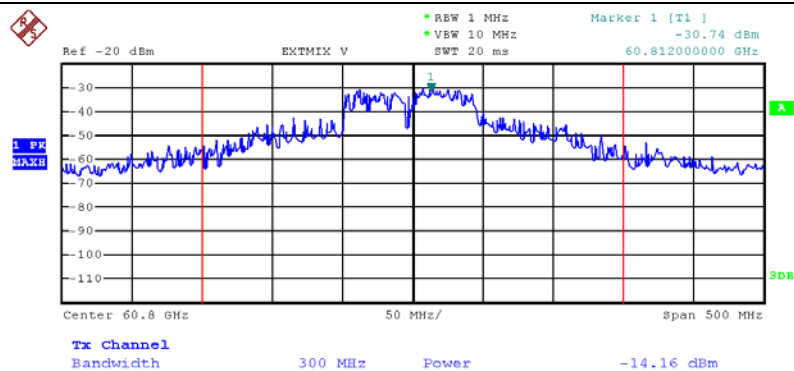
Test Frequency: 60.80 GHz

Average Power



Date: 14.JUN.2013 02:36:27

Peak Power



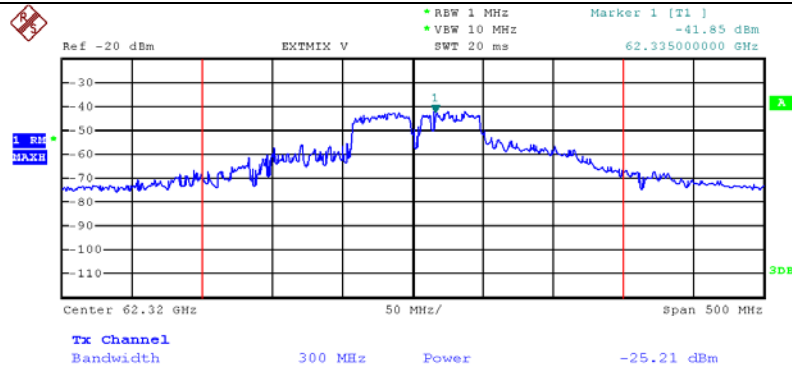
Date: 14.JUN.2013 02:38:18



Channel Plan: Channel 3 LRP: 62.32-62.96 GHz

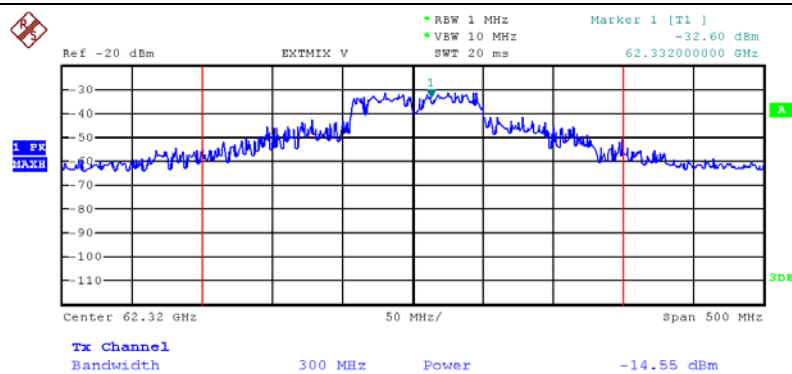
Test Frequency: 62.32 GHz

Average Power



Date: 14.JUN.2013 03:42:54

Peak Power

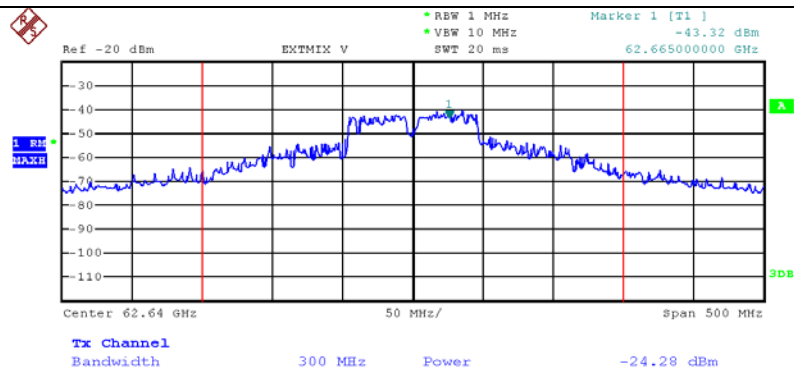


Date: 14.JUN.2013 03:45:21



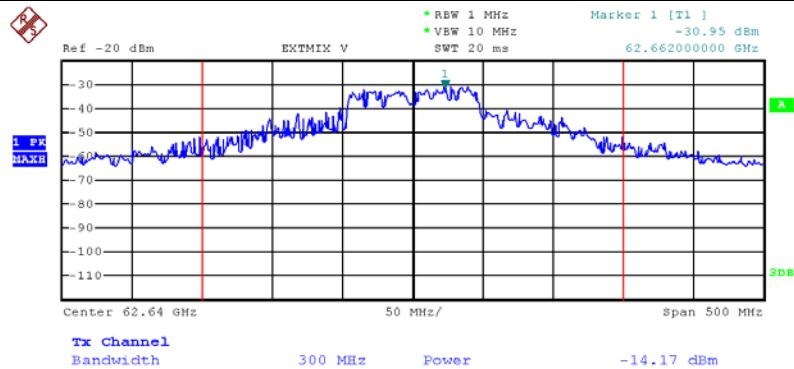
Test Frequency: 62.64 GHz

Average Power



Date: 14.JUN.2013 04:03:00

Peak Power

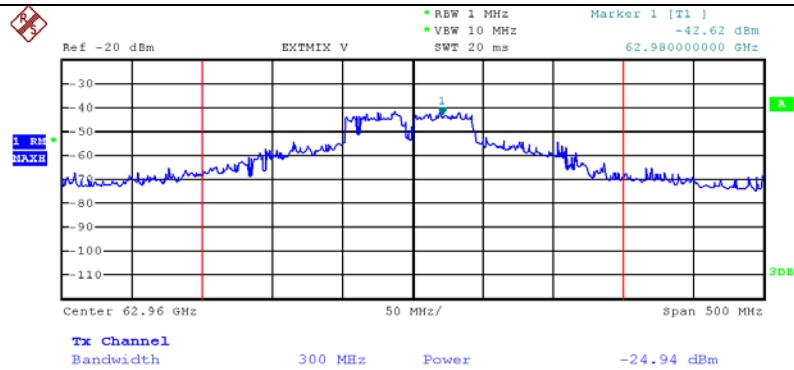


Date: 14.JUN.2013 03:48:58



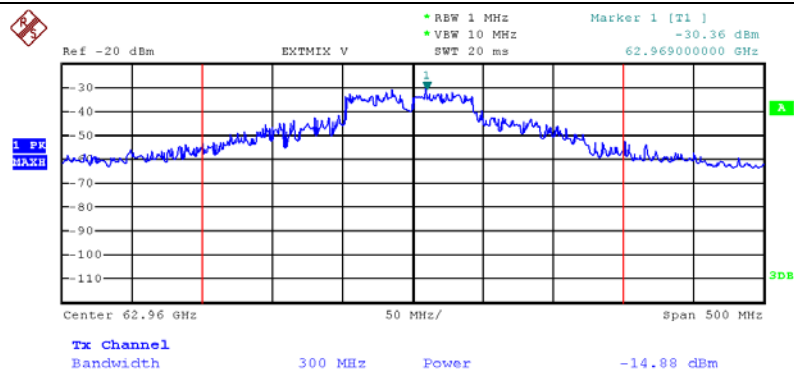
Test Frequency: 62.96 GHz

Average Power



Date: 14.JUN.2013 05:09:51

Peak Power



Date: 14.JUN.2013 04:57:14

3.3.5.3 Test Result of EIRP Power Density

Temp	24℃			Humidity	64%				
Test Engineer	Sean Ku			Test Distance	3 m				
Test Results									
Channel Plan (GHz)	Test Freq. (GHz)	EIRP Power (dBm) (note 1)		EIRP Power Density (μW/cm ²)		EIRP Power Density Limit (μW/cm ²)		Margin (μW/cm ²)	
		AV	Peak	AV	Peak	AV	Peak	AV	Peak
Channel 2 LRP: 60.16-60.80	60.16	25.27	30.72	0.297	1.043	9	18	8.703	16.957
	60.48	25.39	30.79	0.306	1.062	9	18	8.694	16.938
	60.80	25.50	30.96	0.314	1.103	9	18	8.686	16.897
Channel 3 LRP: 62.32-62.96	62.32	24.97	30.78	0.278	1.059	9	18	8.722	16.941
	62.64	25.95	31.21	0.348	1.168	9	18	8.652	16.832
	62.96	25.64	30.54	0.324	1.002	9	18	8.676	16.998
Measurement uncertainty: 4.4335 dB									
NOTE 1: The EIRP is converted to Power Density using the equation: $PD = EIRP / (4 * \pi * D_s^2)$ D _s = the specification distance									
NOTE 2: For the applicable limit, see FCC 15.255 (b)									
NOTE 3: AV is average power density.									

3.4 Peak Conducted Power

3.4.1 Limit of Peak Conducted Power

Peak Conducted Power Limit	
6dBc Bandwidth	Peak Conducted Power (note 1)
> 100MHz	500mW
≤ 100MHz	500mW x (B/100) (see note 2)

NOTE 1: For the applicable limit, see FCC 15.255(e)
 NOTE 2: B= 6dB bandwidth (measured at RBW 100kHz)

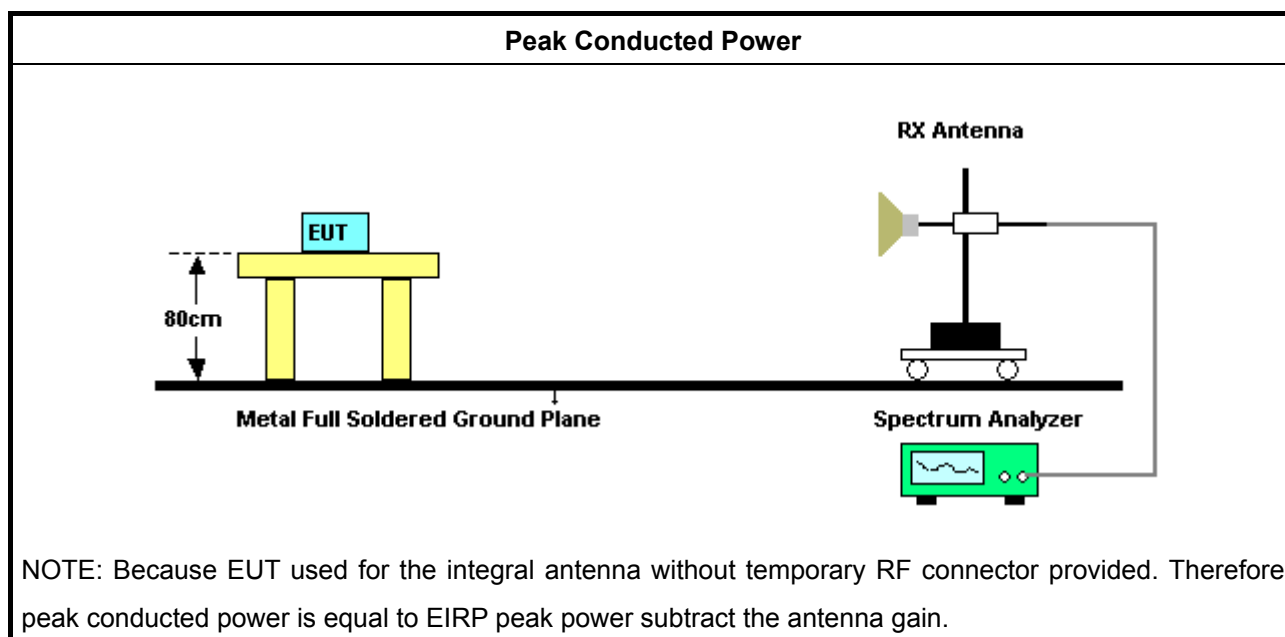
3.4.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.4.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 7.8.3 and 7.8.6.

3.4.4 Test Setup



3.4.5 Test Result of Peak Conducted Power

Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clause 7.8.6

NOTE: If the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.12 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worse case combination to be used for the conformance testing.

3.4.5.1 Peak Conducted Power

Temp	24℃		Humidity	64%				
Test Engineer	Sean Ku		Test Distance	1 m				
Test Date	Jun. 14, 2013							
Test Results								
Channel Plan (GHz)	Test Freq. (GHz)	EIRP (dBm)	Max. Ant. Gain	Peak Power (dBm) (note1)	Peak Power (mW)	6dBc BW (MHz) (note2)	Peak Power Limit (mW) (note3)	Margin (mW)
Channel 2 LRP: 60.16-60.80	60.16	30.72	16	14.72	29.634	89.4000	447.00	417.366
	60.48	30.79	16	14.79	30.158	88.2000	441.00	410.842
	60.80	30.96	16	14.96	31.332	85.8000	429.00	397.668
Channel 3 LRP: 62.32-62.96	62.32	30.78	16	14.78	30.091	90.6000	453.00	422.909
	62.64	31.21	16	15.21	33.180	83.4000	417.00	383.820
	62.96	30.54	16	14.54	28.465	90.6000	453.00	424.535
Measurement uncertainty: 4.4335 dB								
NOTE 1: Because EUT used for the integral antenna without temporary RF connector provided. Therefore peak conducted power is equal to EIRP power subtract the antenna gain.								
NOTE 2: For the 6dBc bandwidth, see test report clause 3.2.5.								
NOTE 3: For the applicable limit, see FCC 15.255(e)								

3.5 Transmitter Spurious Emissions

3.5.1 Limit of Transmitter Spurious Emissions

Frequency Range	Limit
Radiated emissions below 40 GHz	FCC 15.209
Radiated emissions above 40 GHz – 200GHz	90 pW/cm ² @ 3 m (Equivalent EIRP 102 μW, -9.91dBm)
NOTE: Spurious emissions shall not exceed the level of the fundamental emission.	

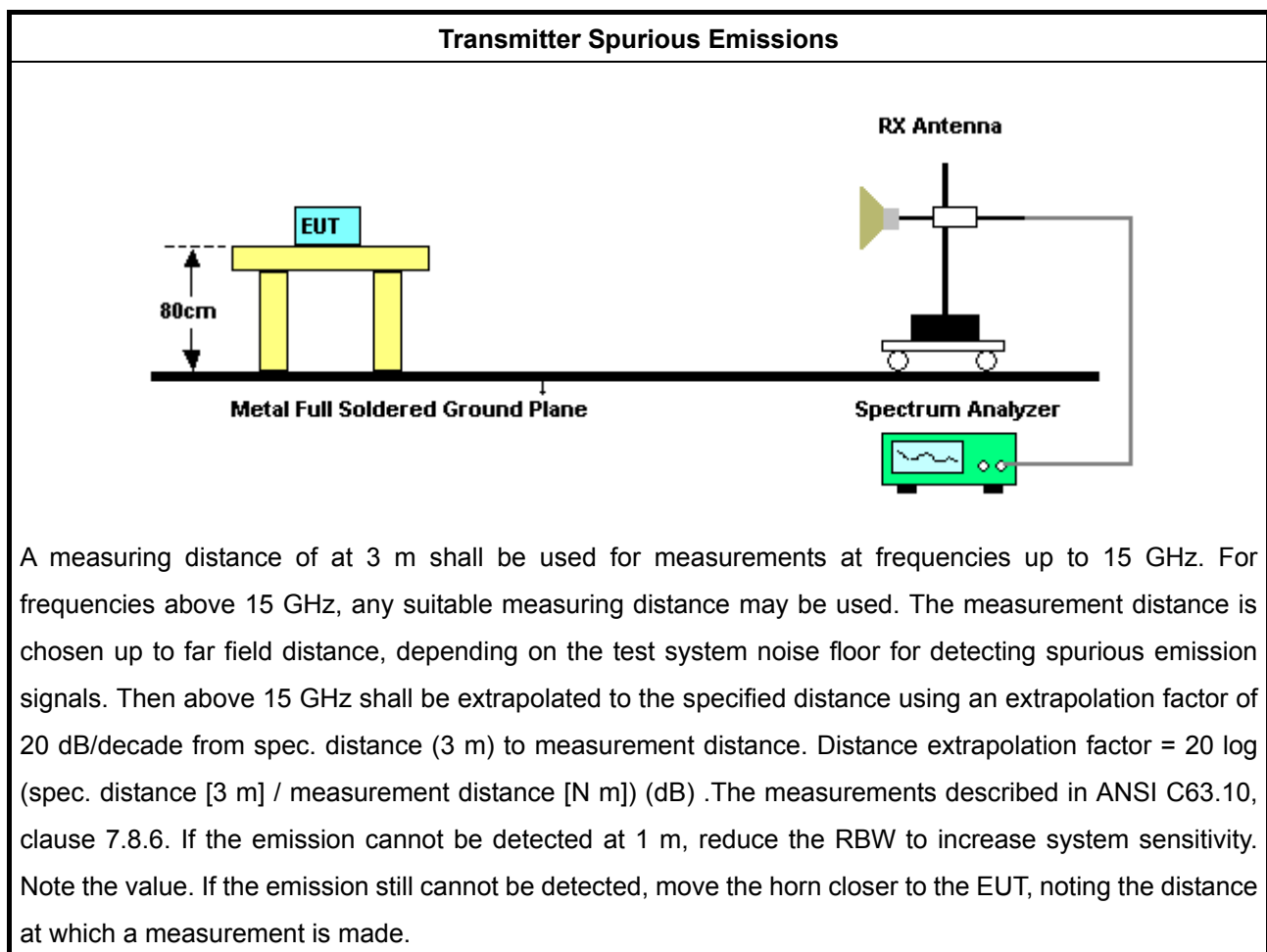
3.5.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.5.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.3, 6.4, 6.5, 6.6 and 7.8.6.

3.5.4 Test Setup



3.5.5 Test Result of Transmitter Spurious Emissions

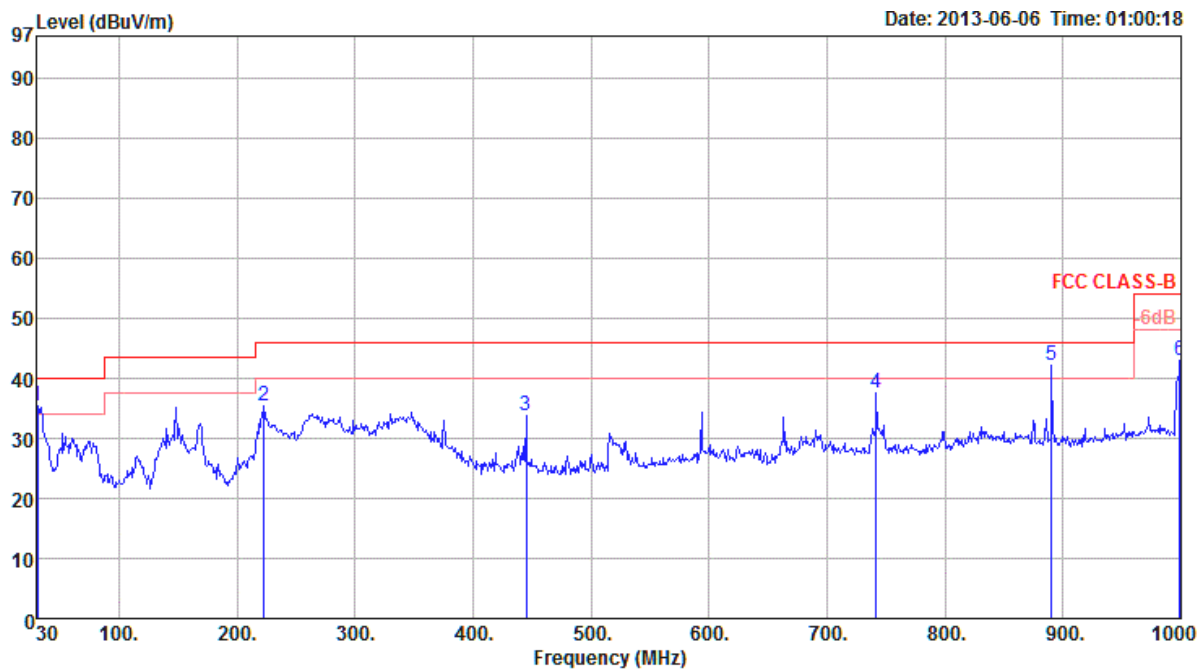
Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clauses 6.3, 6.4, 6.5, 6.6 and 7.8.6
NOTE: If equipment having different channel plan and nominal channel bandwidth modes (see test report clause 1.1.1), the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes.	



3.5.5.1 Test Result of Transmitter Spurious Emissions

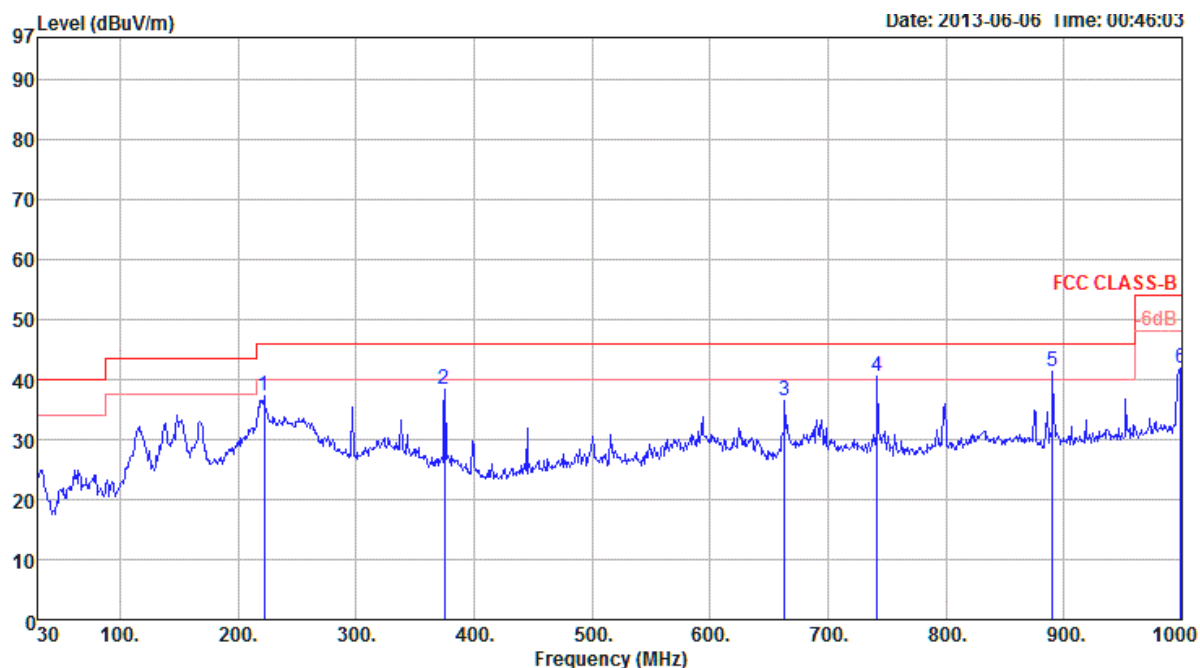
Temp	24°C	Humidity	64%
Test Engineer	Sean Ku	Test Distance	3 m
Test Range	30 MHz – 1000 MHz	Test Configuration	Normal Link

Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1	30.97	35.27	40.00	-4.73	43.10	0.85	27.98	19.30	Peak	0	400	VERTICAL
2	223.03	35.30	46.00	-10.70	49.31	2.27	27.09	10.81	Peak	0	400	VERTICAL
3	445.16	33.75	46.00	-12.25	41.34	3.22	27.76	16.95	Peak	0	400	VERTICAL
4	741.98	37.59	46.00	-8.41	40.33	4.20	27.11	20.17	Peak	0	400	VERTICAL
5	890.39	42.06	46.00	-3.94	42.90	4.56	26.84	21.44	Peak	0	400	VERTICAL
6	999.03	43.01	54.00	-10.99	42.21	4.84	26.23	22.19	Peak	0	400	VERTICAL

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1	222.06	37.36	46.00	-8.64	51.45	2.26	27.09	10.74	Peak	0	400	HORIZONTAL
2	375.32	38.25	46.00	-7.75	46.71	2.89	27.26	15.91	Peak	0	400	HORIZONTAL
3	663.41	36.43	46.00	-9.57	40.18	3.97	27.43	19.71	Peak	0	400	HORIZONTAL
4	741.98	40.62	46.00	-5.38	43.36	4.20	27.11	20.17	Peak	0	400	HORIZONTAL
5	890.39	41.39	46.00	-4.61	42.23	4.56	26.84	21.44	Peak	0	400	HORIZONTAL
6	999.03	41.80	54.00	-12.20	41.00	4.84	26.23	22.19	Peak	0	400	HORIZONTAL

Measurement uncertainty: 2.2869 dB

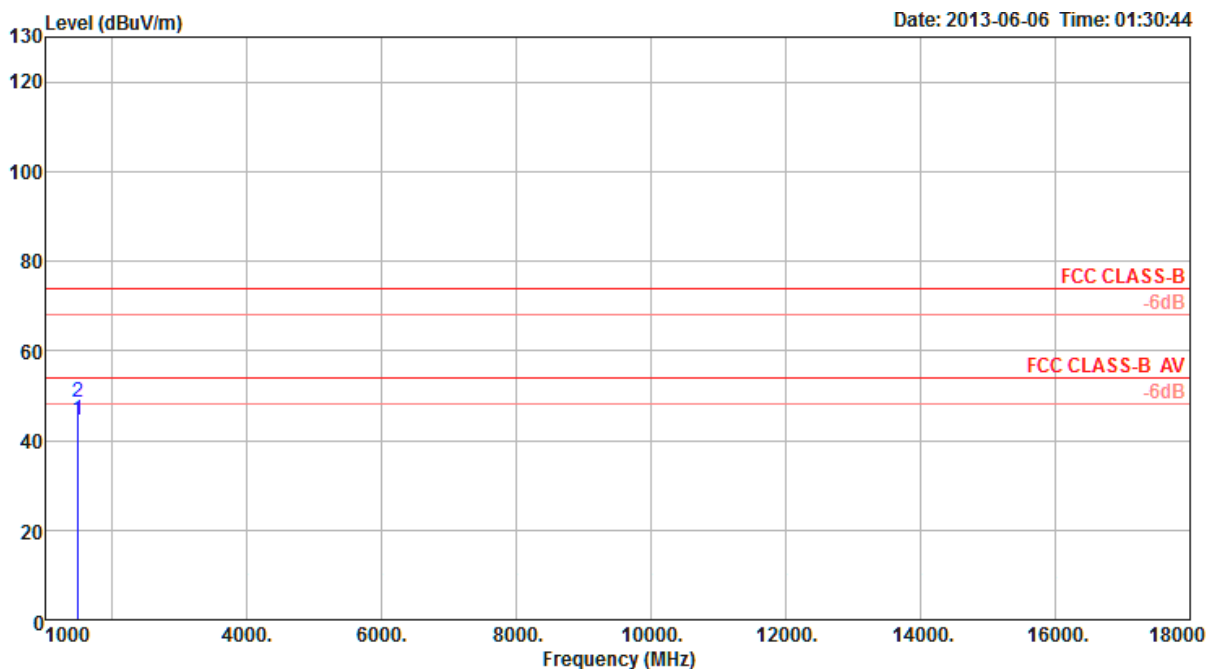


FCC Radio Test Report

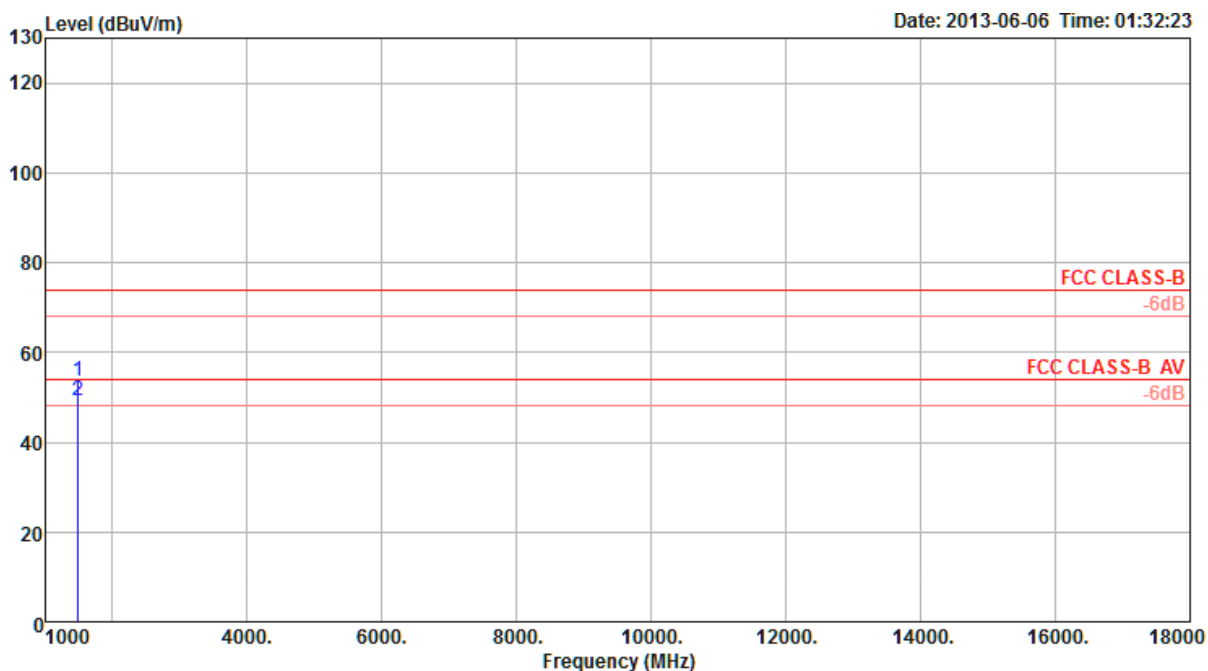
Report No. : FR350803

Temp	24°C	Humidity	64%
Test Engineer	Sean Ku	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Configuration	Normal Link

Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	1483.48	44.71	54.00	-9.29	52.22	2.24	35.09	25.34	Average	231	100	VERTICAL
2 p	1483.56	48.43	74.00	-25.57	55.94	2.24	35.09	25.34	Peak	231	100	VERTICAL

Horizontal


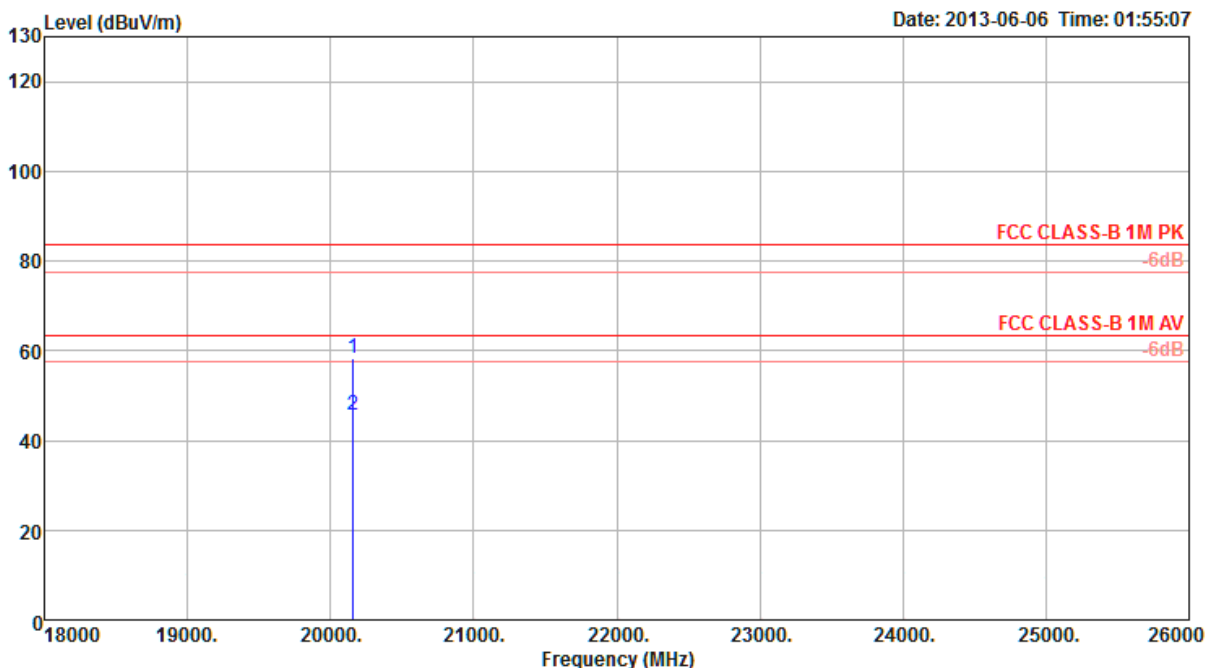
	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 p	1483.12	53.73	74.00	-20.27	61.24	2.24	35.09	25.34	Peak	2	100	HORIZONTAL
2 a	1483.54	49.14	54.00	-4.86	56.65	2.24	35.09	25.34	Average	2	100	HORIZONTAL

Measurement uncertainty: 2.593 dB



Temp	24°C	Humidity	64%
Test Engineer	Sean Ku	Test Distance	1 m
Test Range	18 GHz – 26 GHz	Test Configuration	Normal Link

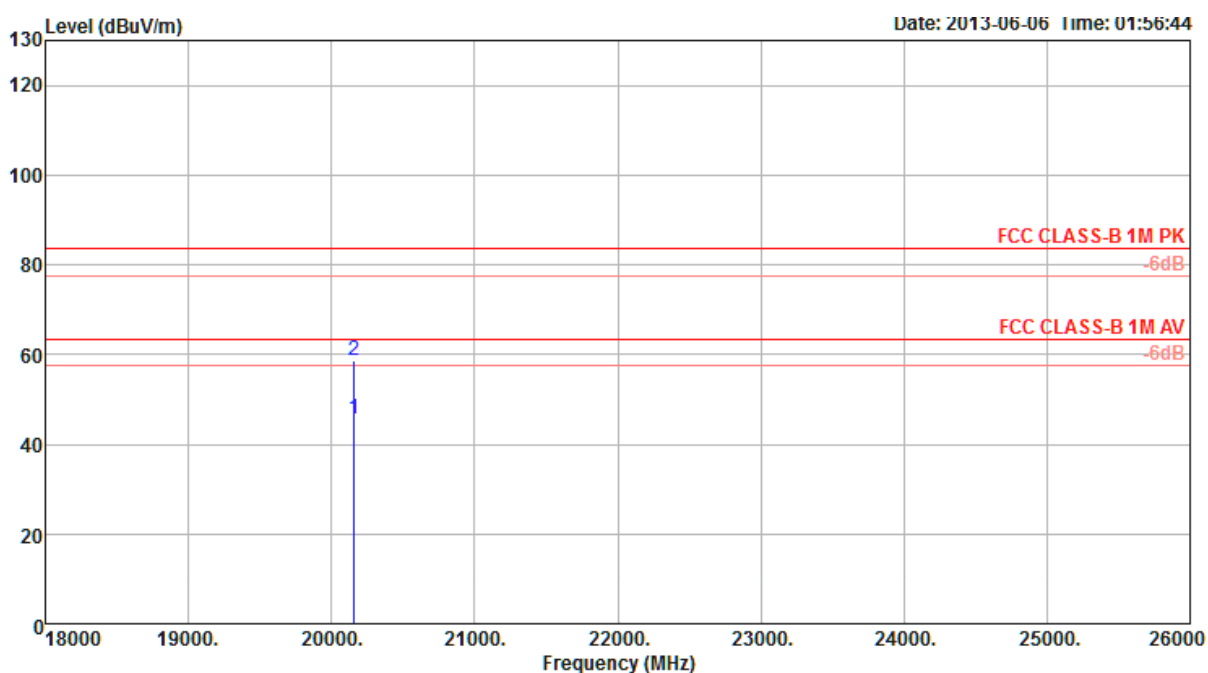
Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 p	20159.97	58.15	83.50	-25.35	46.87	8.75	34.73	37.26	Peak	209	100	VERTICAL
2 a	20160.03	45.58	63.50	-17.92	34.30	8.75	34.73	37.26	Average	209	100	VERTICAL



Horizontal



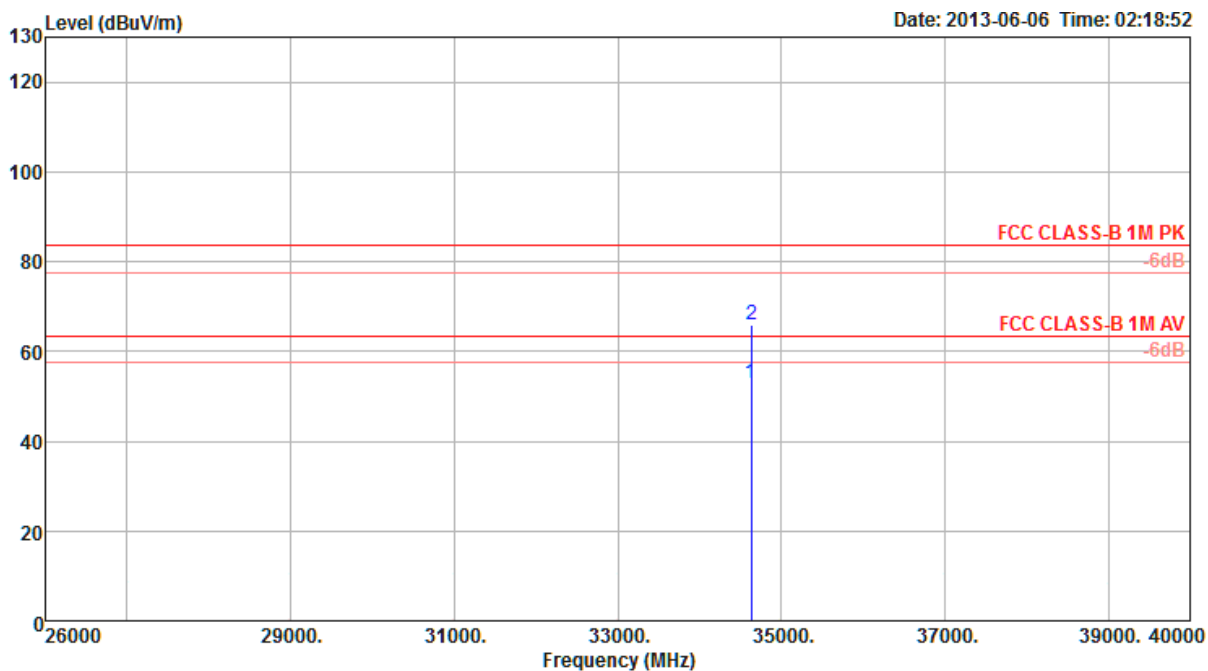
	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	Remark	deg	cm	
1 a	20160.33	45.58	63.50	-17.92	34.30	8.75	34.73	37.26	Average	197	100	HORIZONTAL
2 p	20160.81	58.63	83.50	-24.87	47.35	8.75	34.73	37.26	Peak	197	100	HORIZONTAL

Measurement uncertainty: 2.3749 dB



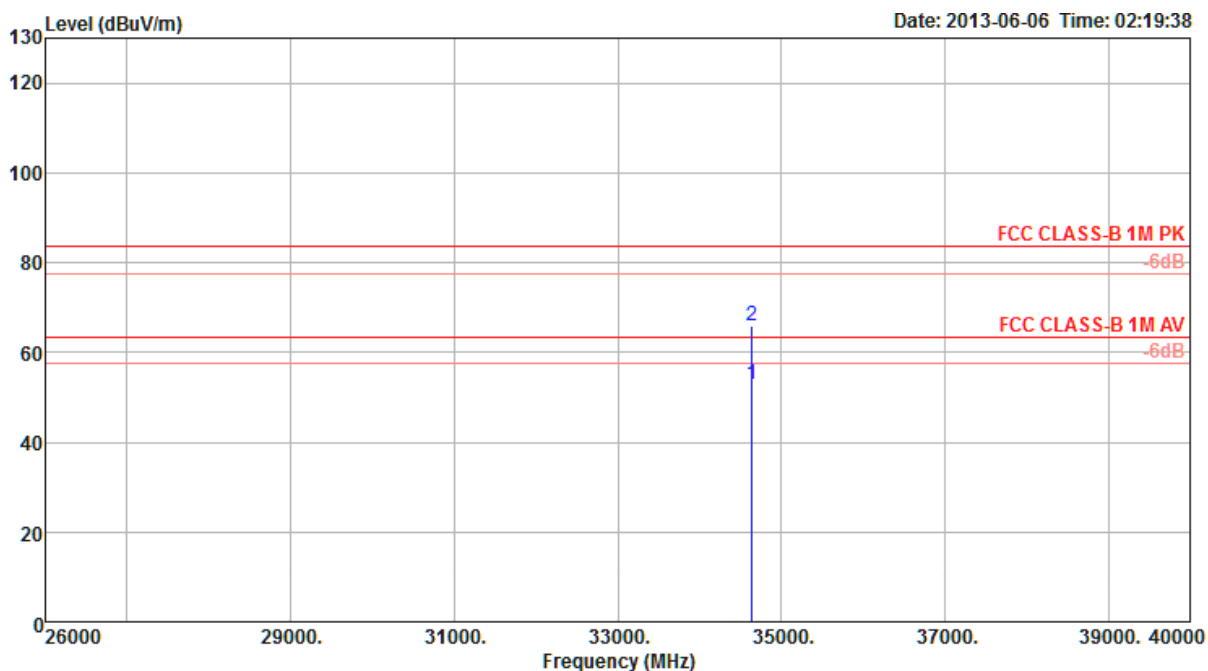
Temp	24°C	Humidity	64%
Test Engineer	Sean Ku	Test Distance	1 m
Test Range	26 GHz – 40 GHz	Test Configuration	Normal Link

Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	34638.27	52.91	63.50	-10.59	39.82	12.27	40.64	41.46	Average	126	100	VERTICAL
2 p	34638.82	65.84	83.50	-17.66	52.75	12.27	40.64	41.46	Peak	126	100	VERTICAL

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	34638.61	52.79	63.50	-10.71	39.70	12.27	40.64	41.46	Average	269	100	HORIZONTAL
2 p	34638.89	66.06	83.50	-17.44	52.97	12.27	40.64	41.46	Peak	269	100	HORIZONTAL

Measurement uncertainty: 2.3749 dB



Temp	24°C	Humidity	64%
Test Engineer	Sean Ku	Test Date	Jun. 14, 2013
Test Range	40GHz – 200GHz		

Frequency (GHz)	Measurement Distance (m)	Peak Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
40.934	0.5	-73.86	23	-38.20
EIRP (W)	Specification Distance (m)	Power Density (W/m²)	Power Density (pW/cm²)	Limit (pW/cm²)
1.51455E-07	3	1.34E-09	1.33916	90.00

Note: The peak density is less than the average limit.

Measurement uncertainty: 4.4335 dB

3.6 Frequency Stability

3.6.1 Limit of Frequency Stability

Frequency Stability	Limit
Refer as FCC 15.255(f)	within the frequency bands
Note: These measurements shall also be performed at normal and extreme test conditions.	

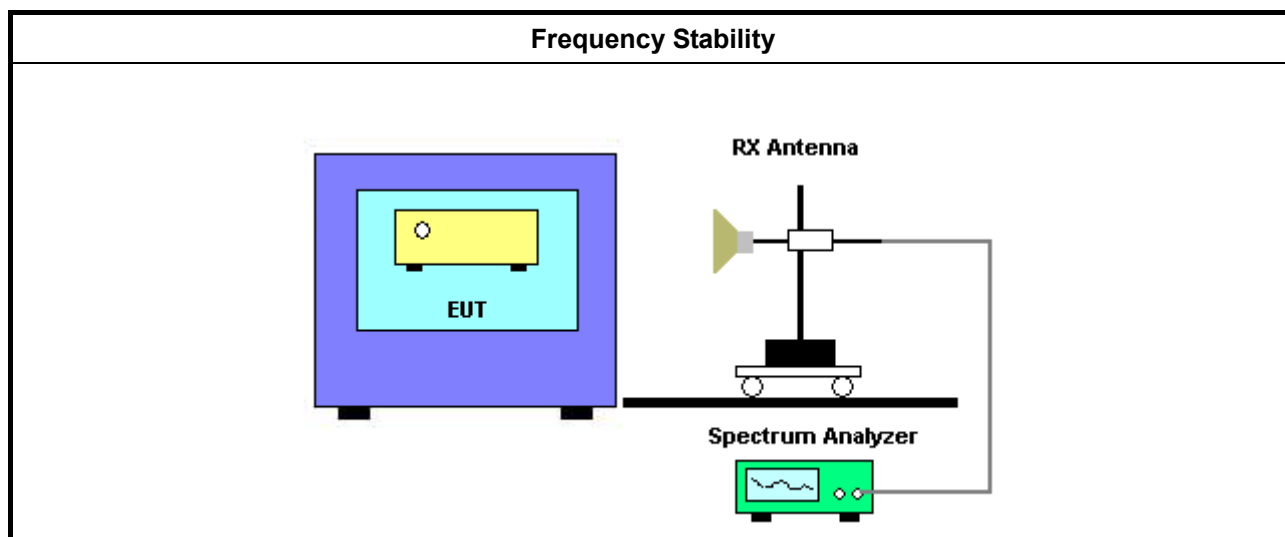
3.6.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.6.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.8 and 7.8.7.

3.6.4 Test Setup



3.6.5 Test Result of Frequency Stability

Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clauses 6.8 and 7.8.7
NOTE: If equipment having different channel plan and nominal channel bandwidth modes (see test report clause 1.1.1), the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes.	

3.6.5.1 Frequency Stability with Respect to Ambient Temperature

Frequency Stability with Respect to Ambient Temperature			
Temp	24°C	Humidity	64%
Test Engineer	Sean Ku	Test Date	Jun. 14, 2013
Test Results			
Test Temperature (°C)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
-20	60480.062	62	within band
-10	60480.066	66	within band
0	60480.078	-66	within band
10	60480.134	-10	within band
20	60480.144	Reference	within band
30	60480.156	12	within band
40	60480.178	34	within band
50	60480.199	43	within band
Measurement uncertainty: 4.4335 dB			
NOTE:			
1. For the applicable limit, see FCC 15.255(f).			
2. The EUT is intended for indoor use only with a manufacturer's specified temperature range of 0 to °C.			

**3.6.5.2 Frequency Stability When Varying Supply Voltage**

Frequency Stability When Varying Supply Voltage			
Temp	24°C	Humidity	64%
Test Engineer	Sean Ku	Test Date	Jun. 14, 2013
Test Results			
Test Voltage: (Vdc)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
4.25	60480.145	12	within band
5	60480.133	Reference	within band
5.75	60480.123	-10	within band
Measurement uncertainty: 4.4335 dB			
NOTE: For the applicable limit, see FCC 15.255(f).			

3.7 Publicly-accessible Coordination Channel

3.7.1 Limit of Publicly-accessible Coordination Channel

Frequency Range	Limit
57 GHz-57.05 GHz	No emissions appear in the range 57-57.05 GHz
NOTE: For the applicable limit, see FCC 15.255(d)	

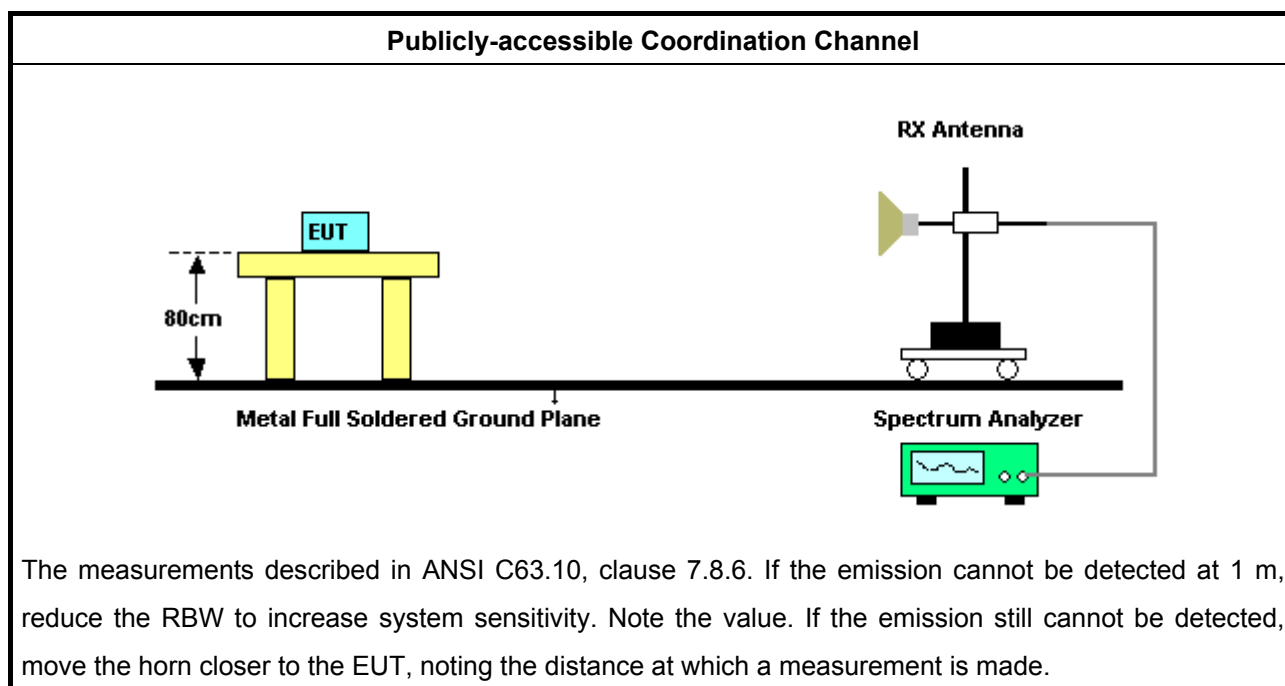
3.7.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.7.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.3, 6.4, 6.5, 6.6 and 7.8.6.

3.7.4 Test Setup



3.7.5 Test Result of Publicly-accessible Coordination Channel

Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clauses 6.3, 6.4, 6.5, 6.6 and 7.8.6
NOTE: If equipment having different channel plan and nominal channel bandwidth modes (see test report clause 1.1.1), the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes.	

**3.7.5.1.1 Radiated Testing**

Temp	24°C		Humidity	64%	
Test Engineer	Sean Ku		Test Distance	0.5 m	
Test Range	57 GHz - 57.05 GHz		Test Date	Jun. 14, 2013	
Test Results					
Test Range	Emission Frequency (MHz)	Emission Observed (dBm)	Limit (dBm)	Margin (dB)	Remark
57 GHz - 57.05 GHz	N/F	N/F	-9.91	N/F	-
Measurement uncertainty:		4.4335 dB			
NOTE 1: “N/F” means Nothing Found (No spurious emissions were detected.)					

3.8 Operation Restriction and Group Installation

3.8.1 Limit of Operation Restriction and Group Installation

Item	Limit
Operation Restriction	Operation is not permitted for the following products: • Equipment used on aircraft or satellites. (Refer as FCC 15.255 (a)) • Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation. (Refer as FCC 15.255 (a))
Group Installation	Operation is not permitted for the following products: • External phase-locking (Refer as FCC 15.255 (h))

3.8.2 Result of Operation Restriction

Manufacturer declares that EUT will not been used on aircraft or satellites. Then user manual will include a statement to caution EUT is not permitted for used on aircraft or satellites. EUT is a wireless video area network (WVAN) for the connection of consumer electronic (CE) audio and video devices.

3.8.3 Result of Group Installation

The frequency, amplitude and phase of the transmit signal are set within the EUT. There are no external phase-locking inputs or any other means of combining two or more units together to realize a beam-forming array.

3.9 Transmitter Identification

3.9.1 Limit of Transmitter Identification

Item	Limit
Transmitter Identification	Indoor use and transmitter emanate directed outside the building and peak power $\geq 0.1\text{mW}$ (EIRP) or $3\text{nW}/\text{cm}^2$, transmitter identification data block must provide the following fields: FCC ID, Serial Number, information at least 24 bytes data
NOTE: For the applicable limit, see FCC 15.255(i)	

3.9.2 Result of Transmitter Identification

EUT's application is the WirelessHD targets the wireless video area network (WVAN). All units of the WVAN are for indoor operation only. There are no outdoor units therefore no transmissions are directed outside the building. EUT is not applicable for transmitter Identification.



4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9kHz ~ 30MHz	Jun. 22, 2012	Conduction (CO01-CB)
Impulsbegrenzer Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz~30MHz	Feb. 21, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 04, 2012	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	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Apr. 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. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz ~ 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Oct. 08, 2012	TH01-CB
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 04, 2013	TH01-CB
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 19, 2012	TH01-CB
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 19, 2012	TH01-CB
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 19, 2012	TH01-CB
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 19, 2012	TH01-CB
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 19, 2012	TH01-CB
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Mar. 23, 2011**	TH01-CB
Mixer	OML	M15HW/A	V91113-1	50 ~ 75 GHz	Mar. 23, 2011**	TH01-CB
Diplexer	OML	DPL313B	N/A	40~200GHz	N.C.R	TH01-CB
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Mar. 23, 2011**	TH01-CB
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Mar. 23, 2011**	TH01-CB
Mixer	OML	M05HW/A	G91113-1	140 ~ 220 GHz	N.C.R	TH01-CB
Standard Horn Antenna	Custom Microwave	HO19R	U91113-A	40 ~ 60 GHz	N.C.R	TH01-CB
Standard Horn Antenna	Custom Microwave	HO15R	V91113-A	50 ~ 75 GHz	N.C.R	TH01-CB
Standard Horn Antenna	Custom Microwave	HO12R	E91113-A	60 ~ 90 GHz	N.C.R	TH01-CB
Standard Horn Antenna	Custom Microwave	HO08R	F91113-A	90 ~ 140 GHz	N.C.R	TH01-CB
Standard Horn Antenna	Custom Microwave	HO05R	G91113-A	140 ~ 220 GHz	N.C.R	TH01-CB

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

“*” Calibration Interval of instruments listed above is two years.

“***” Calibration Interval of instruments listed above is three years.

NCR means Non-Calibration required.