



FCC Radio Test Report

Equipment : WirelessHD Transmitter
Brand Name : EPSON
Model No. : WIT4S-G0
FCC ID : BKMAE-WIT4SG0
Standard : 47 CFR FCC Part 15.255
Applicant : SEIKO EPSON CORPORATION
3-3-5 Owa Suwa-shi Nagano-Ken 392-8502,
Japan
Manufacturer : SEIKO EPSON CORPORATION Toyoshina
office
6925 Tazawa, Toyoshina Azumino-shi, Nagano
399-8285 Japan

The product sample received on May 27, 2016 and completely tested on Jun. 21, 2016. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013, 47 CFR FCC Part 15.255 and Millimeter Wave Test Procedures 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	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(a),(h)	Operation Restriction and Group Installation	Complied	-

Revision History

[illegible]

1 General Description

1.1 Information

1.1.1 The Channel Plan(s)

Frequency Range	57-64 GHz
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
Middle-rate PHY (MRP) Band	Channel 2 MRP: 60.48 GHz Channel 3 MRP: 62.64 GHz
High-rate PHY (HRP) Band	Channel 2 HRP: 60.48 GHz Channel 3 HRP: 62.64 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	6	dBi for LRP	16
	16	dBi for MRP	16
	16	dBi for HRP	
	☐ 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	6 dBi		
Frequency (GHz)	Highest setting (P_{high}): (dBm)		
	Modulation	AV Power	Peak Power
60.48	BPSK	24.32	30.43

Worst Power Levels for MRP			
Applicable power levels	☐ Conducted ☒ EIRP		
Antenna gain	16 dBi		
Frequency (GHz)	Highest setting (P_{high}): (dBm)		
	Modulation	AV Power	Peak Power
60.48	QPSK	33.30	33.82

Worst Power Levels for HRP			
Applicable power levels	☐ Conducted ☒ EIRP		
Integral antenna gain	16 dBi		
Frequency (GHz)	Highest setting (P_{high}): (dBm)		
	Modulation	AV Power	Peak Power
60.48	QPSK	27.52	30.53

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 power adapter		
Supply Voltage	☒ AC	State AC voltage	120 V
Supply Voltage	☐ DC	State DC voltage	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

1.1.7 User Condition

Intended Operation
☒ Indoor only
☐ Outdoor only

1.2 Additional Information Provided by the Submitter

1.2.1 Modulation

Modulation	
The LRP modulation is BPSK.	
The MRP modulation is QPSK.	
The HRP modulation is QPSK, 16-QAM.	
Can the transmitter operate un-modulated:	☒ Yes ☐ No

1.2.2 Duty Cycle

Duty Cycle			Duty Cycle Factor
The transmitter is intended for	LRP	24.49%	6.11
	MRP	88.69%	0.52
	HRP	95.68%	0.19

1.3 Accessories

Accessories					
No.	Equipment Name	Brand Name	Model Name	Rating	Remark
1	Adapter	PHIHONG	PSAC30U-120L6	INPUT: 100-240V ~ 0.8A, 50-60Hz OUTPUT: 12V, 2.5A	DC cable Non-shielded, 1.5m
Others					
Power line*1: Non-shielded, 1.8m HDMI cable*1, Shielded, 2.0m					



1.4 Support Equipment

Test Site: CO01-CB

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	LCD Projector (Rx Device)	ESPON	H829B	DoC
2	NB	DELL	E6430	DoC
3	Debug Board	N/A	N/A	N/A
4	DVD Player	SONY	BDP-S6500	Doc
5	Mouse	HP	FM100	DoC
6	Earphone	e-Power	S90W	N/A

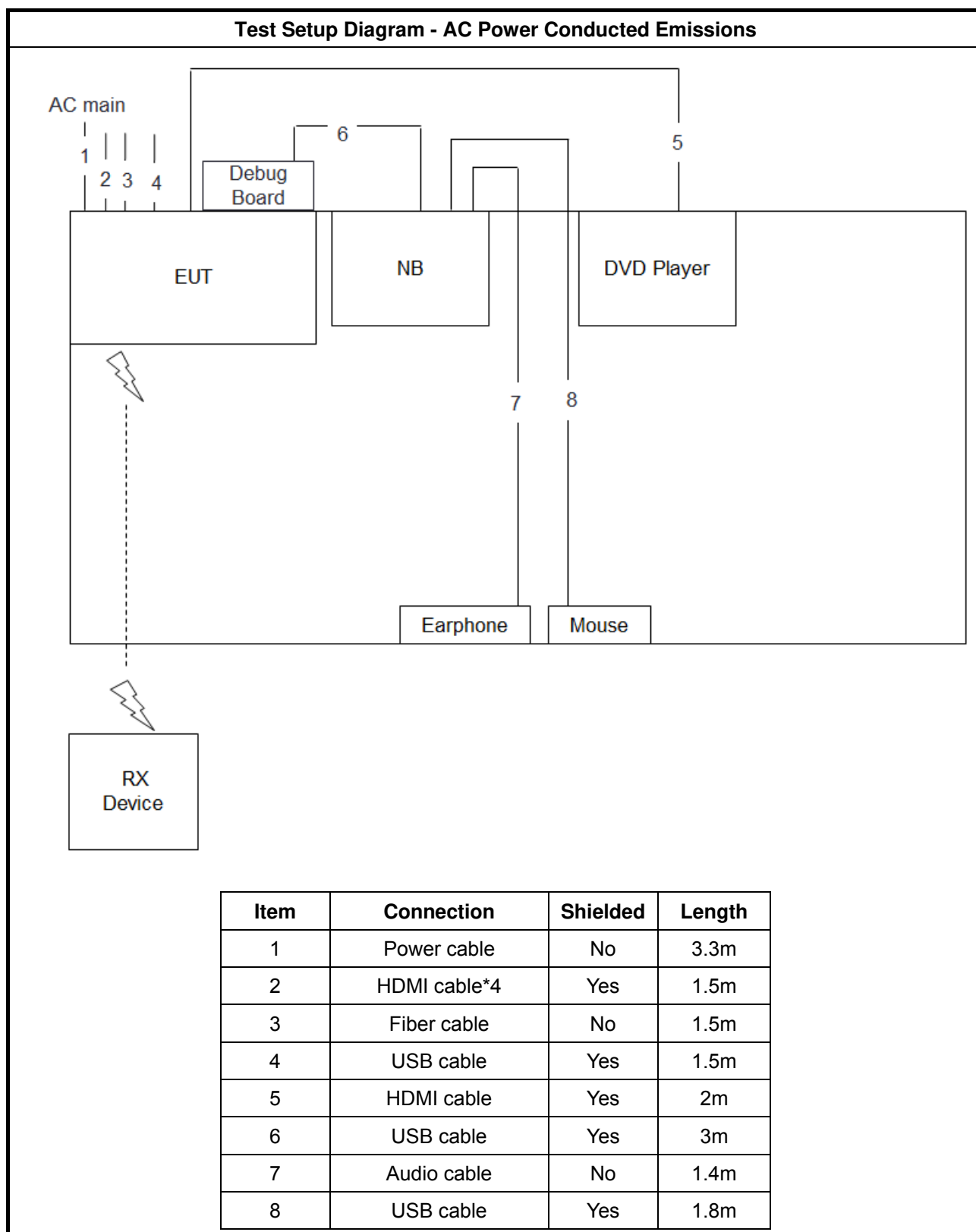
Test Site: 03CH01-CB and TH01-CB

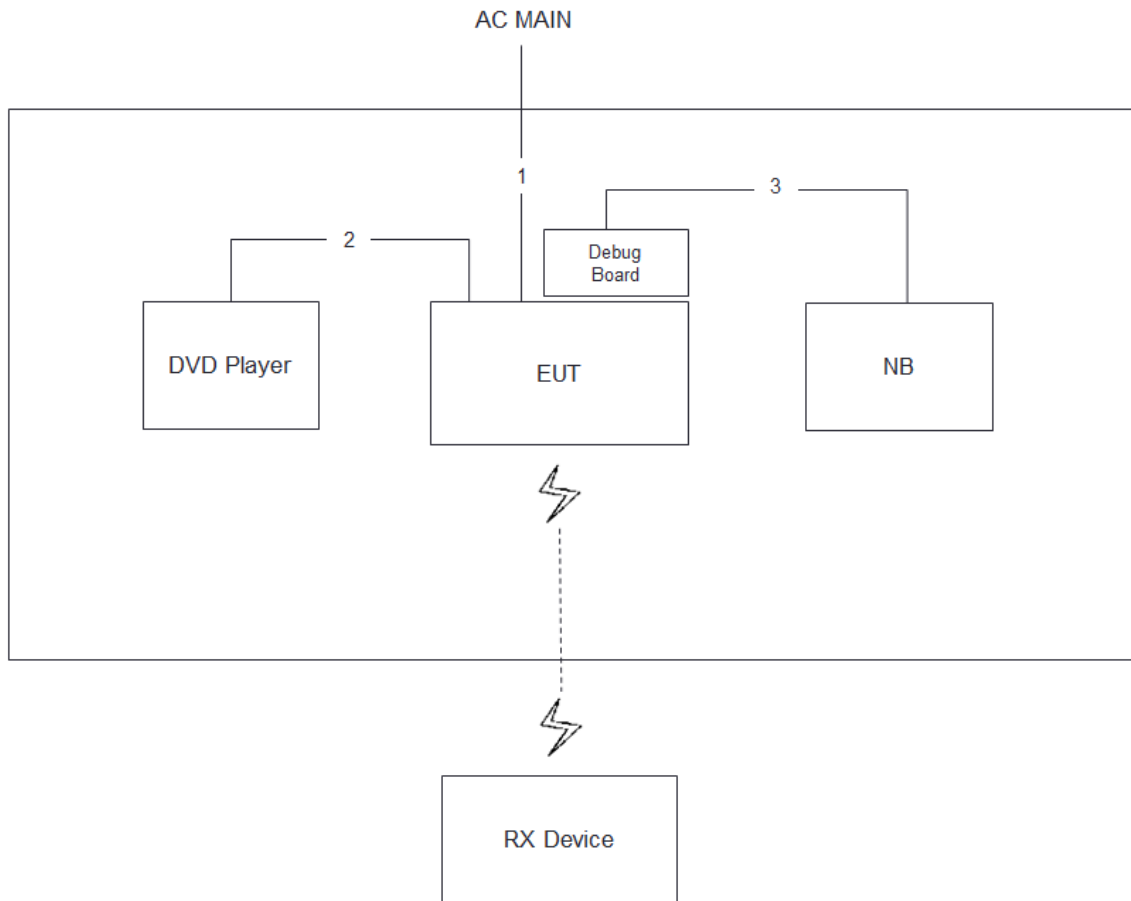
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	NB	DELL	E4300	DoC
2	DVD Player	SONY	BDP-S6500	DoC
3	LCD Projector (Rx Device)	ESPON	H829B	DoC
4	Debug Board	N/A	N/A	N/A

1.5 EUT Operation during Test

High Definition Audio / Video in the 1080p format was sent from the transmitter device to the receiver device via the wireless link.

1.6 Test Setup Diagram



Test Setup Diagram - Transmitter Spurious Emissions


Item	Connection	Shielded	Length
1	Power cable	No	3.3m
2	HDMI cable	Yes	2m
3	USB cable	Yes	1.5m

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 C63.10-2013 Section 9. "Procedures for testing millimeter-wave systems"

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 : 886-3-327-0973
☒	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 Site No.		
CO01-CB	03CH01-CB	TH01-CB

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 2 MRP: 60.48	-	60.48	-
Channel 2 HRP: 60.48	-	60.48	-
Channel 3 LRP: 62.32-62.96	62.32	62.64	62.96
Channel 3 MRP: 62.64	-	62.64	-
Channel 3 HRP: 62.64	-	62.64	-

2.2 Conformance Tests and Related Test Frequencies

Test Item	Test Frequencies (GHz)		
	Channel Plan 2&3		
	LRP	MRP	HRP
AC Power Conducted Emissions	Normal Link		
Occupied Bandwidth	60.16, 60.48, 60.80 & 62.32, 62.64, 62.96	60.48 & 62.64	60.48 & 62.64
EIRP Power	60.16, 60.48, 60.80 & 62.32, 62.64, 62.96	60.48 & 62.64	60.48 & 62.64
Peak Conducted Power	60.16, 60.48, 60.80 & 62.32, 62.64, 62.96	60.48 & 62.64	60.48 & 62.64
Transmitter Spurious Emissions (below 1 GHz)	Normal Link		
Transmitter Spurious Emissions (1 GHz-40 GHz)	-	-	60.48 & 62.64
Transmitter Spurious Emissions (above 40 GHz)	60.48 & 62.64	60.48 & 62.64	60.48 & 62.64
Frequency Stability	Un-Modulation		

Note: The product (EUT) is only designed as transmitter device function.

2.3 Far Field Boundary Calculations

The far-field boundary is given as:

$$\text{far field} = (2 * L^2) / \lambda$$

where:

L = Largest Antenna Dimension, including the reflector, in meters

λ = wavelength in meters

Far Field (m)				
Frequency (GHz)	L (m)	Lambda (m)	d(Far Field) (m)	d(Far Field) (cm)
60.16	0.02	0.0049867	0.160	16.04
60.48	0.02	0.0049603	0.161	16.13
60.80	0.02	0.0049342	0.162	16.21
62.32	0.02	0.0048139	0.166	16.62
62.64	0.02	0.0047893	0.167	16.70
62.96	0.02	0.0047649	0.168	16.79

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 6.2.3.2).
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 6.2.3.2).
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.

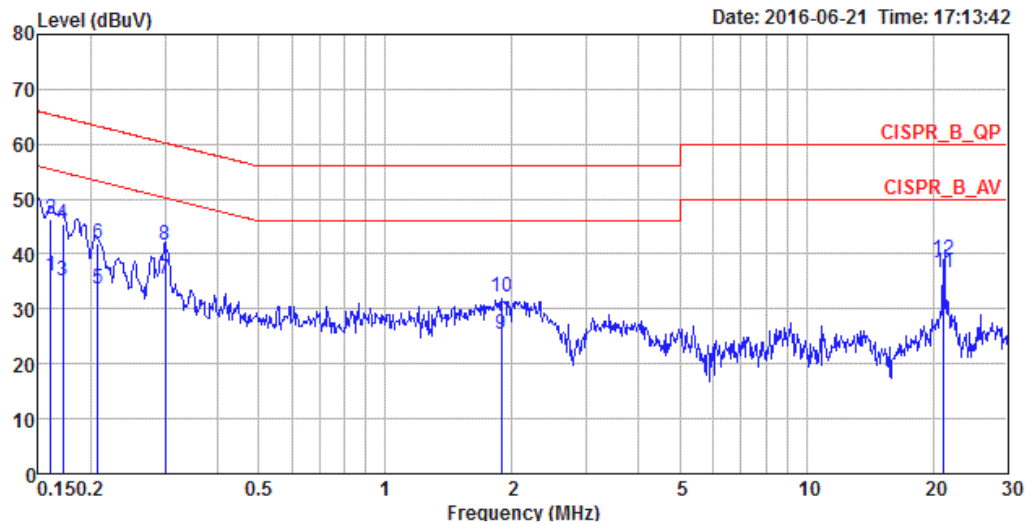
NOTE 2: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit, see ANSI C63.4, clause 10.1.8.1.



FCC Radio Test Report

Report No. : FR652716

Temp	24°C	Humidity	59%
Test Engineer	GN Hou	Phase	Line
Configuration	Normal Link		



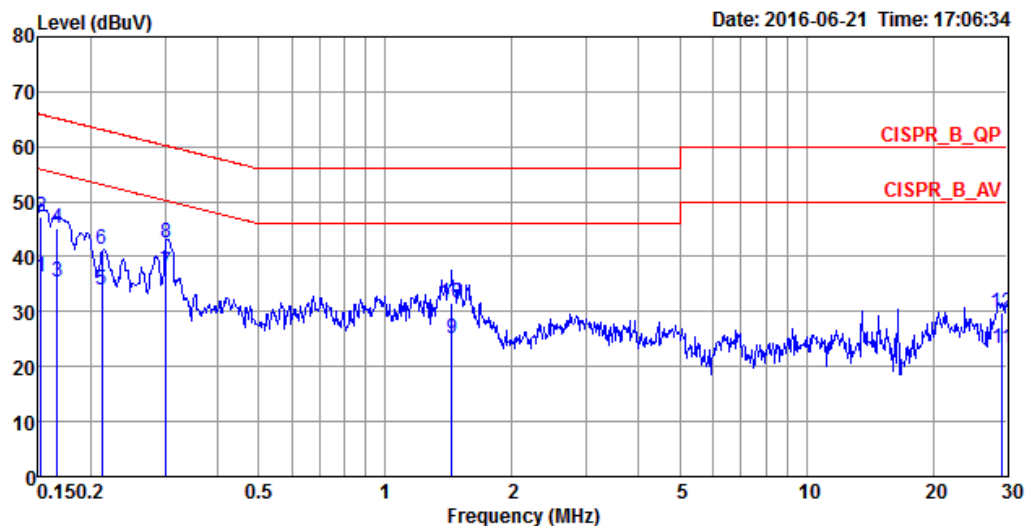
	Freq	Level	Over	Limit	Read	LISN	Cable	Pol/Phase	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.1609	35.91	-19.51	55.42	25.72	10.02	0.17	LINE	Average
2	0.1609	46.48	-18.94	65.42	36.29	10.02	0.17	LINE	QP
3	0.1712	35.13	-19.77	54.90	24.94	10.02	0.17	LINE	Average
4	0.1712	45.39	-19.51	64.90	35.20	10.02	0.17	LINE	QP
5	0.2076	33.61	-19.69	53.30	23.51	9.92	0.18	LINE	Average
6	0.2076	41.91	-21.39	63.30	31.81	9.92	0.18	LINE	QP
7	0.3005	35.35	-14.88	50.23	25.34	9.92	0.09	LINE	Average
8	0.3005	41.59	-18.64	60.23	31.58	9.92	0.09	LINE	QP
9	1.8879	25.50	-20.50	46.00	15.42	9.96	0.12	LINE	Average
10	1.8879	32.14	-23.86	56.00	22.06	9.96	0.12	LINE	QP
11	21.1682	36.65	-13.35	50.00	26.06	10.34	0.25	LINE	Average
12	21.1682	39.05	-20.95	60.00	28.46	10.34	0.25	LINE	QP



FCC Radio Test Report

Report No. : FR652716

Temp	24°C	Humidity	59%
Test Engineer	GN Hou	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over	Limit	Read	LISN	Cable	Pol/Phase	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.1524	36.35	-19.52	55.87	26.17	10.02	0.16	NEUTRAL	Average
2	0.1524	47.38	-18.49	65.87	37.20	10.02	0.16	NEUTRAL	QP
3	0.1664	35.29	-19.85	55.14	25.10	10.02	0.17	NEUTRAL	Average
4	0.1664	45.13	-20.01	65.14	34.94	10.02	0.17	NEUTRAL	QP
5	0.2125	33.89	-19.22	53.11	23.80	9.92	0.17	NEUTRAL	Average
6	0.2125	41.30	-21.81	63.11	31.21	9.92	0.17	NEUTRAL	QP
7	0.3015	37.08	-13.12	50.20	27.08	9.92	0.08	NEUTRAL	Average
8	0.3015	42.45	-17.75	60.20	32.45	9.92	0.08	NEUTRAL	QP
9	1.4409	25.02	-20.98	46.00	14.69	9.95	0.38	NEUTRAL	Average
10	1.4409	31.67	-24.33	56.00	21.34	9.95	0.38	NEUTRAL	QP
11	29.2157	23.23	-26.77	50.00	12.37	10.55	0.31	NEUTRAL	Average
12	29.2157	29.70	-30.30	60.00	18.84	10.55	0.31	NEUTRAL	QP

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.

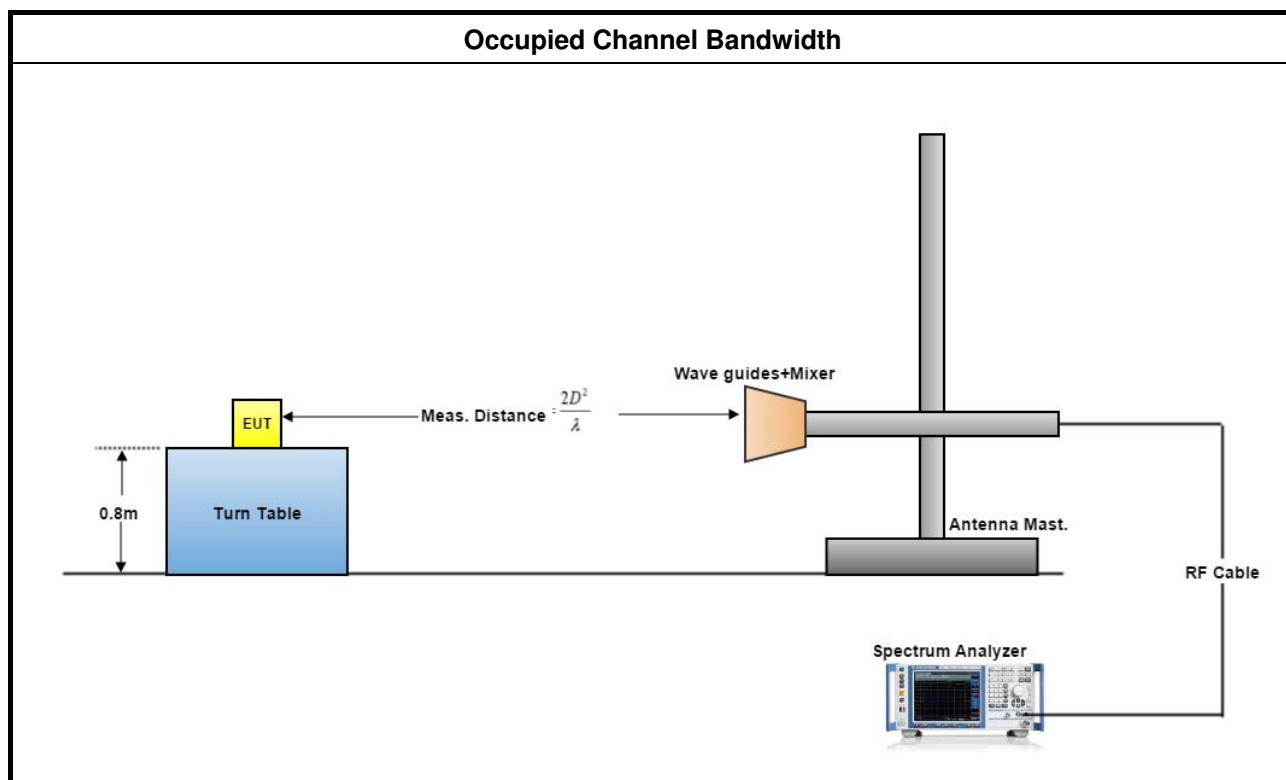
3.2.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clauses 6.9.2.

3.2.4 Test Setup

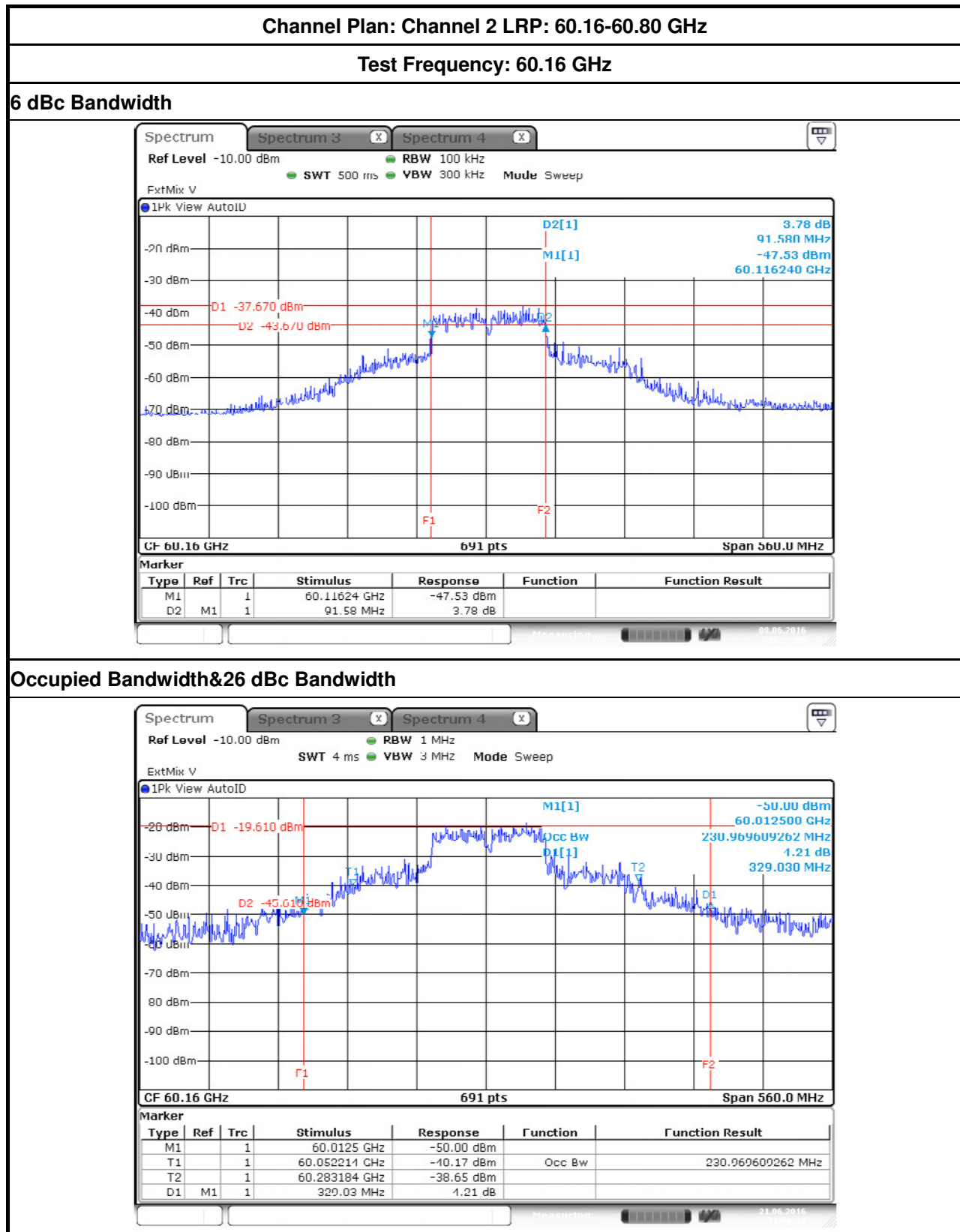


3.2.5 Test Result of Occupied Bandwidth

Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clause 6.9.2
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 5.11 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 15, observe and record with plotted graphs or photographs the worst-case (i.e., widest) occupied bandwidth produced by these different modulation sources.	

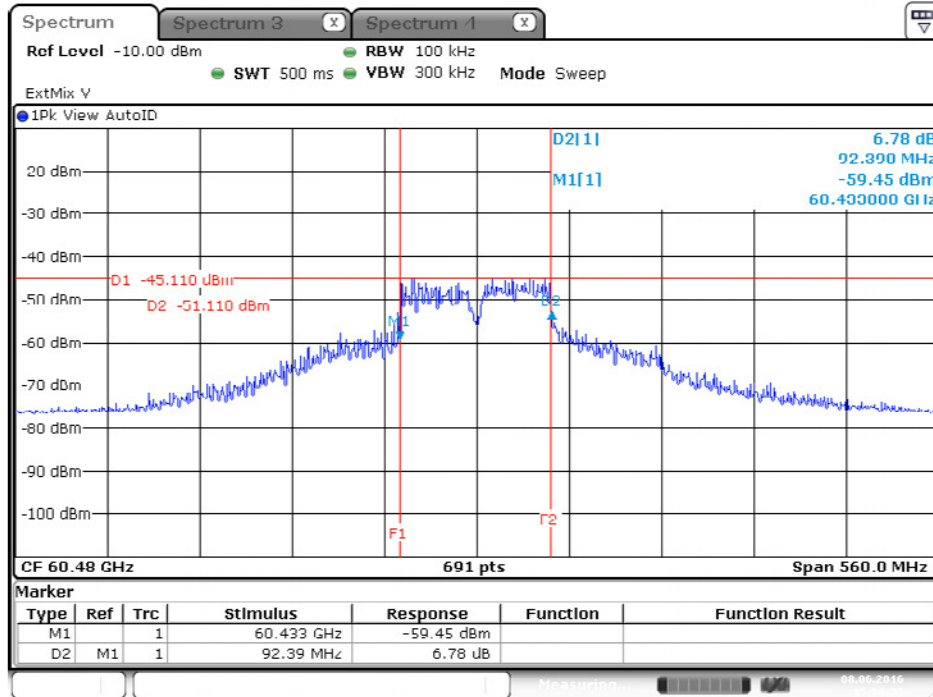
Temp	22°C		Humidity	54%	
Test Engineer	Lucas Huang				
Test Results					
Channel Plan (GHz)	Test Freq. (GHz)	6 dBc Bandwidth (MHz)	Occupied Bandwidth (MHz)	26 dBc Bandwidth (MHz)	Limit (MHz)
Channel 2 LRP: 60.16-60.80	60.16	91.58	230.97	329.03	N/A
	60.48	92.39	231.78	305.82	N/A
	60.80	91.58	222.05	276.47	N/A
Channel 2 MRP: 60.48	60.48	881.30	885.67	1315.50	N/A
Channel 2 HRP: 60.48	60.48	1765.60	1759.77	2031.80	N/A
Channel 3 LRP: 62.32-62.96	62.32	90.77	213.14	268.25	N/A
	62.64	90.77	218.81	270.80	N/A
	62.96	89.15	205.04	254.47	N/A
Channel 3 MRP: 62.64	62.64	868.30	981.19	1432.70	N/A
Channel 3 HRP: 62.64	62.64	1788.70	1875.54	2014.50	N/A

3.2.5.1 Bandwidth Plots

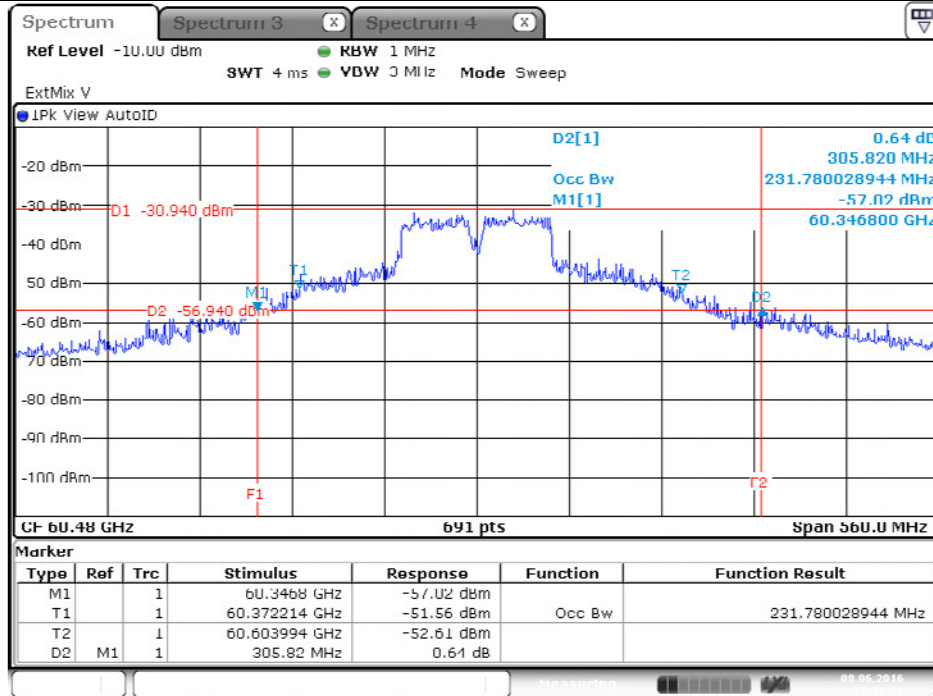


Test Frequency: 60.48 GHz

6 dBc Bandwidth

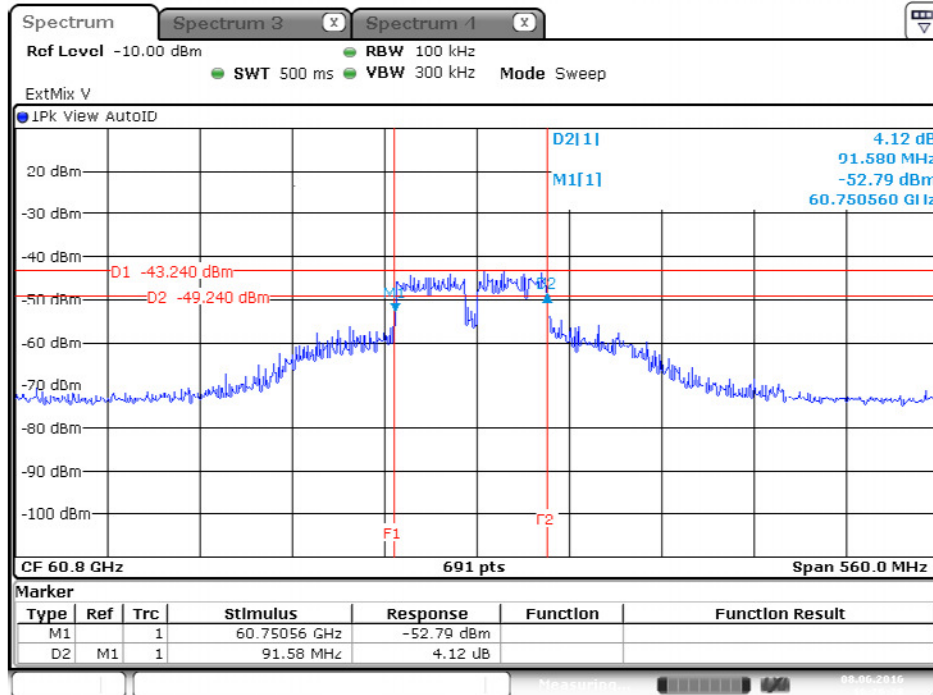


Occupied Bandwidth & 26 dBc Bandwidth



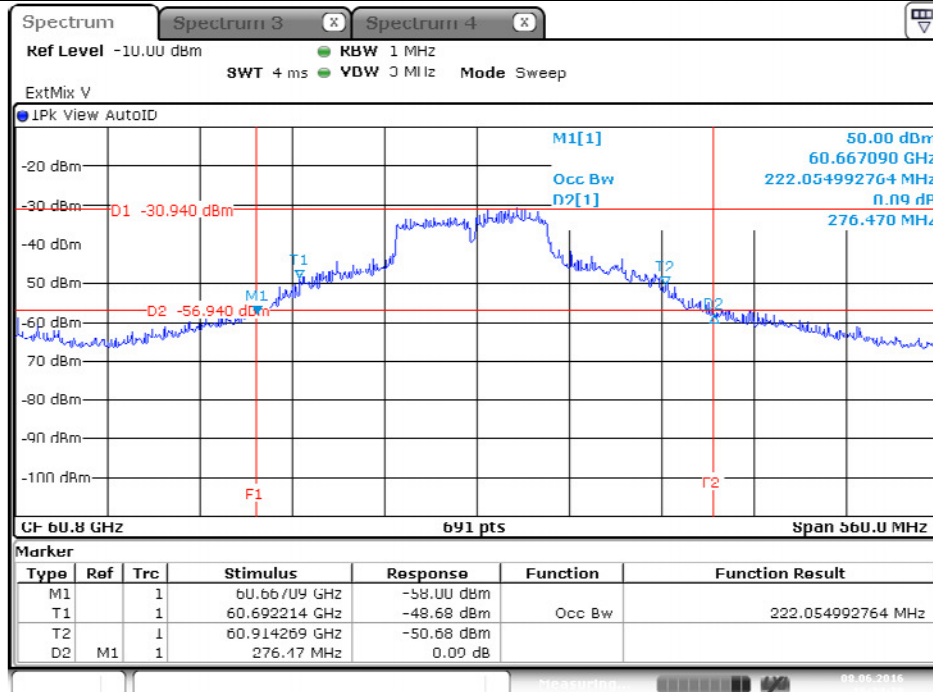
Test Frequency: 60.80 GHz

6 dBc Bandwidth



Date: 8.JUN.2016 16:26:28

Occupied Bandwidth&26 dBc Bandwidth

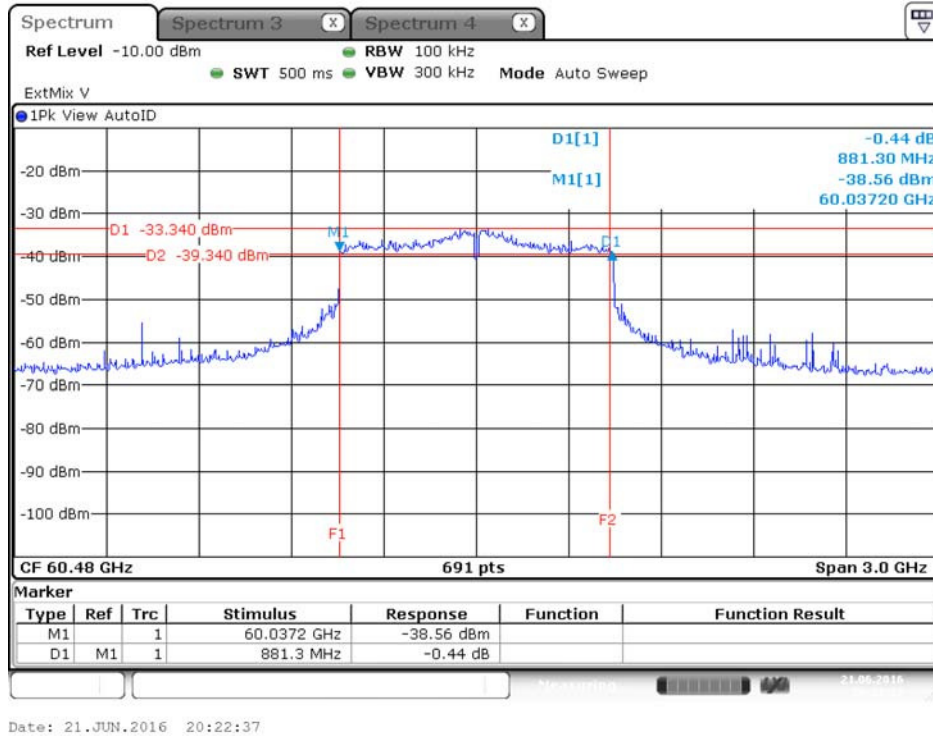


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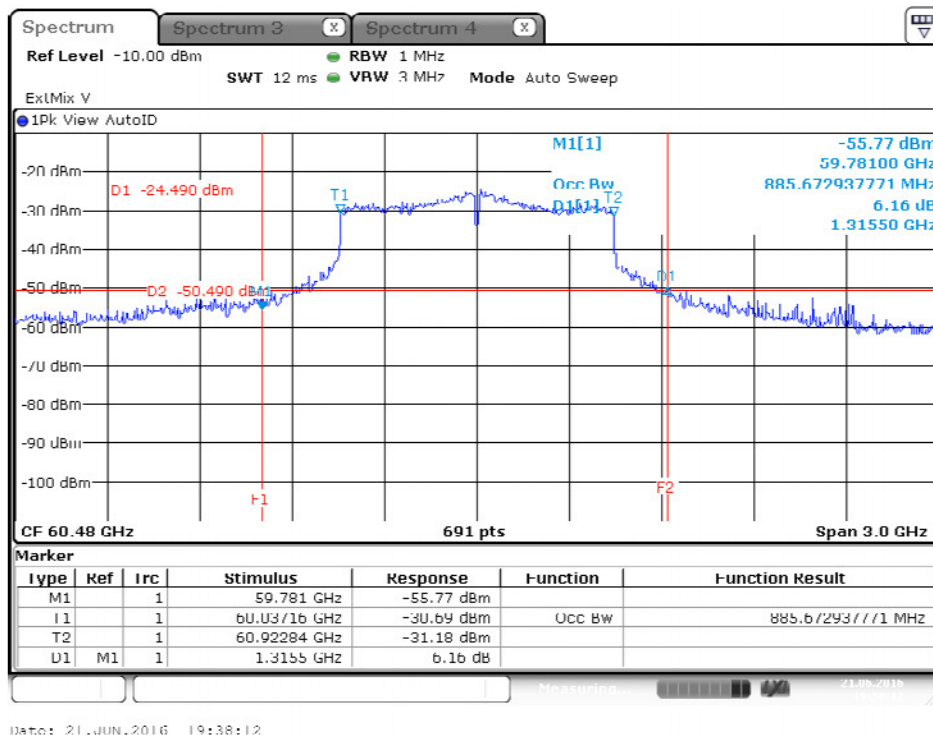
Channel Plan: Channel 2 MRP: 60.48 GHz

Test Frequency: 60.48 GHz

6 dBc Bandwidth



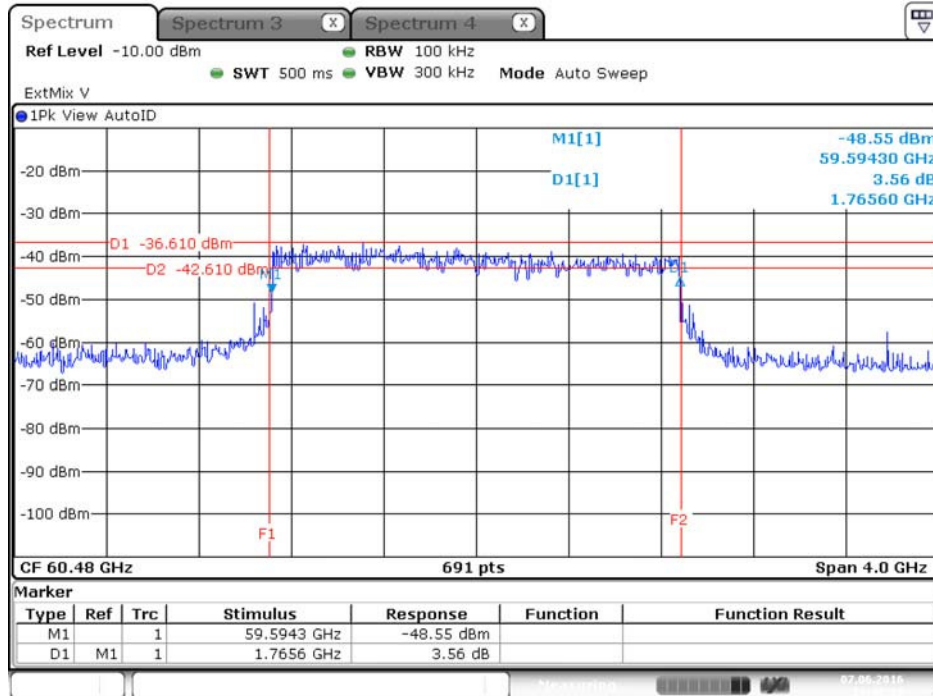
Occupied Bandwidth&26 dBc Bandwidth



Channel Plan: Channel 2 HRP: 60.48 GHz

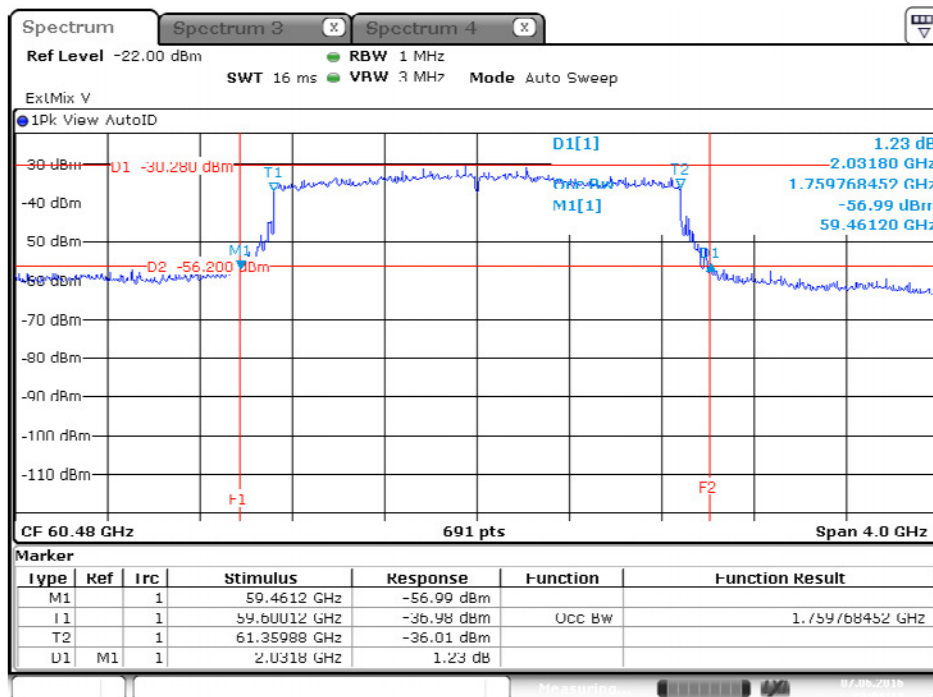
Test Frequency: 60.48 GHz

6 dBc Bandwidth



Date: 7.JUN.2016 19:47:19

Occupied Bandwidth&26 dBc Bandwidth

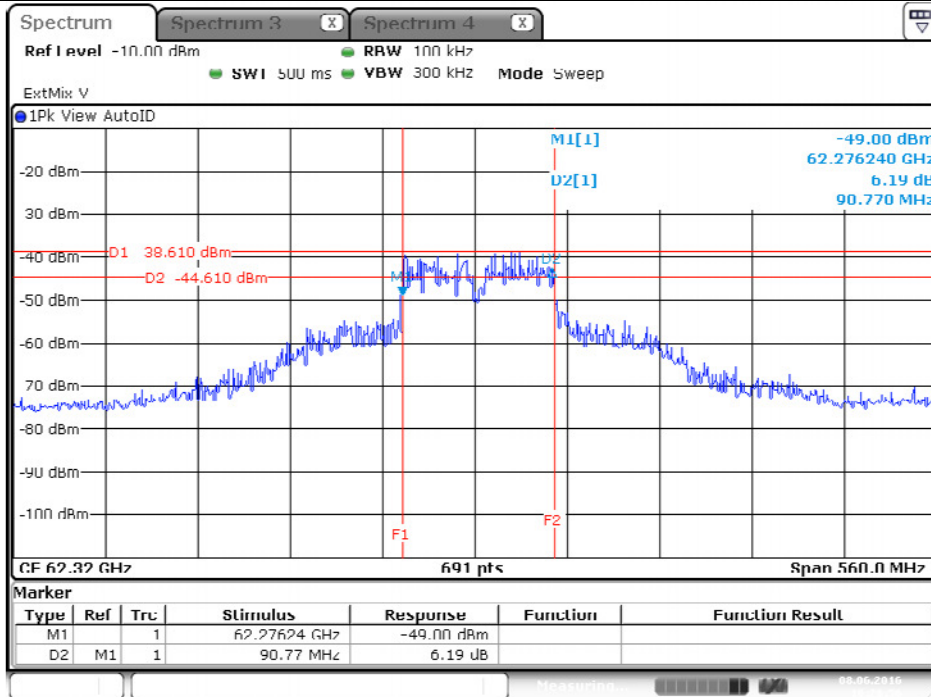


Date: 7.JUN.2016 20:08:13

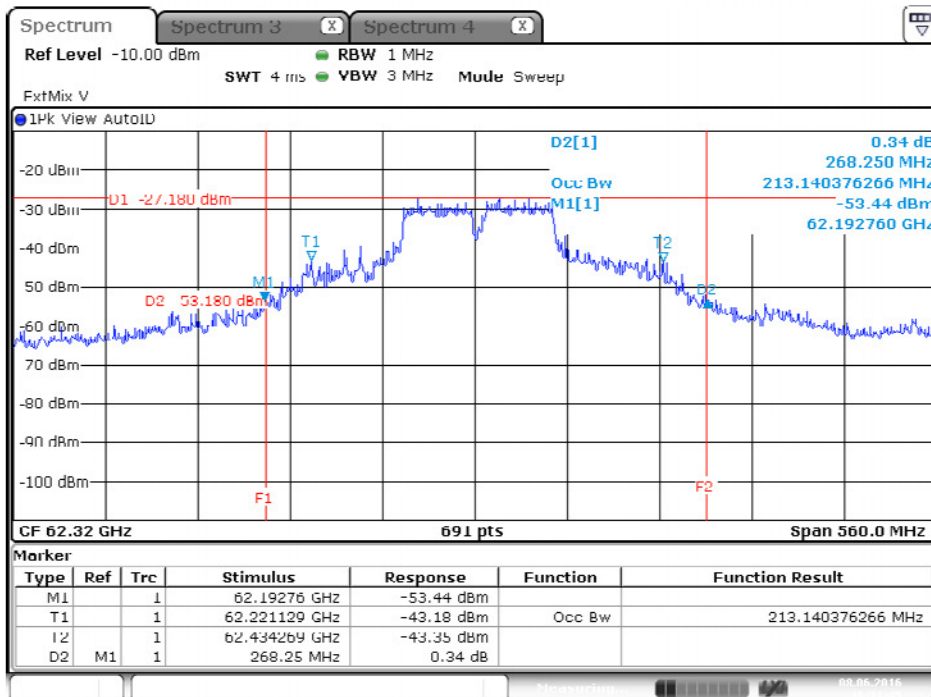
Channel Plan: Channel 3 LRP: 62.32-62.96 GHz

Test Frequency: 62.32 GHz

6 dBc Bandwidth

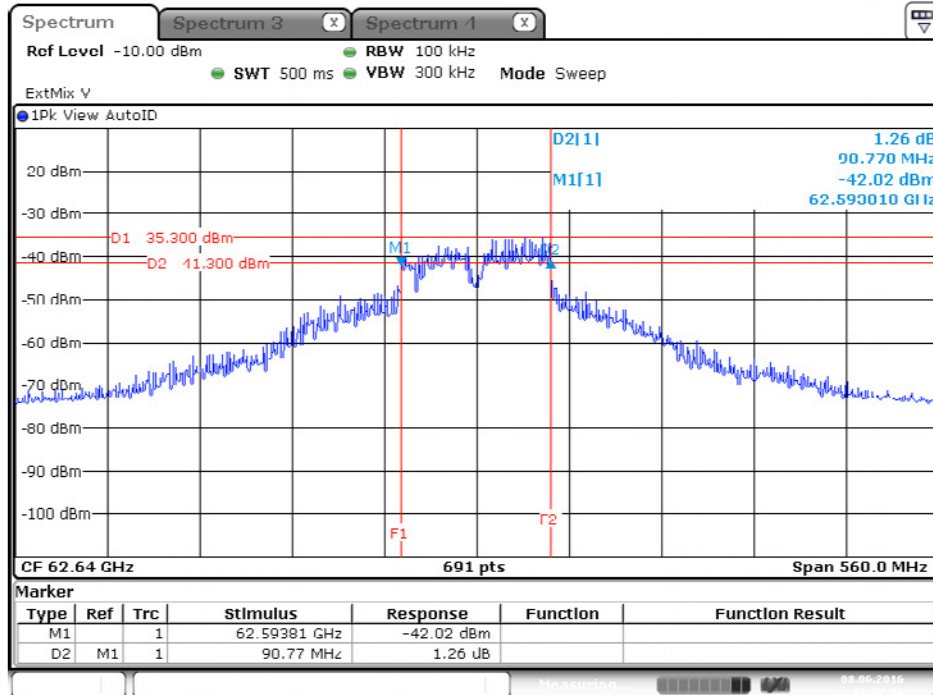


Occupied Bandwidth & 26 dBc Bandwidth



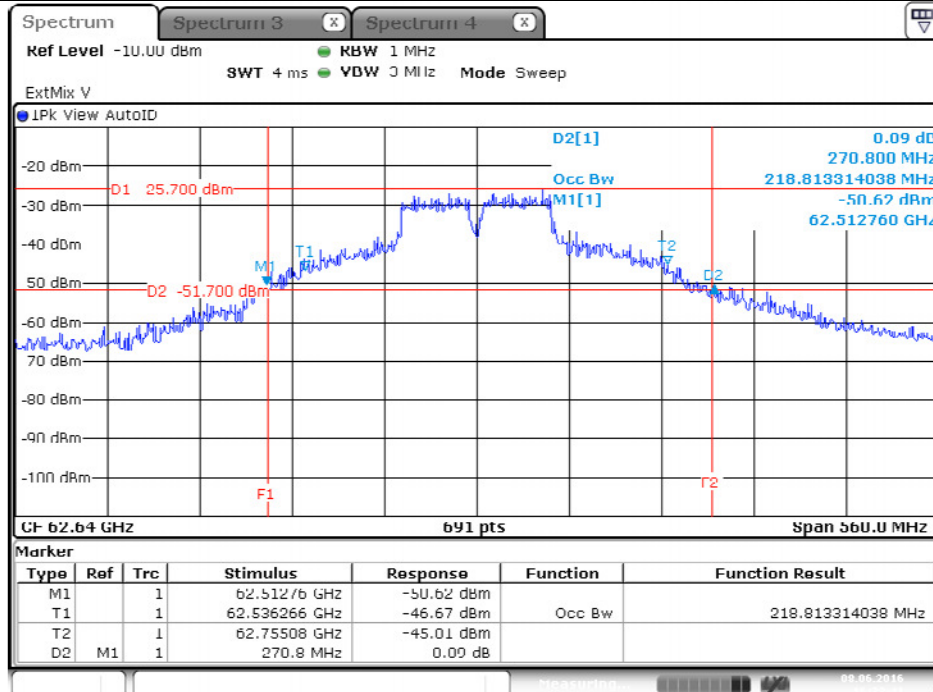
Test Frequency: 62.64 GHz

6 dBc Bandwidth



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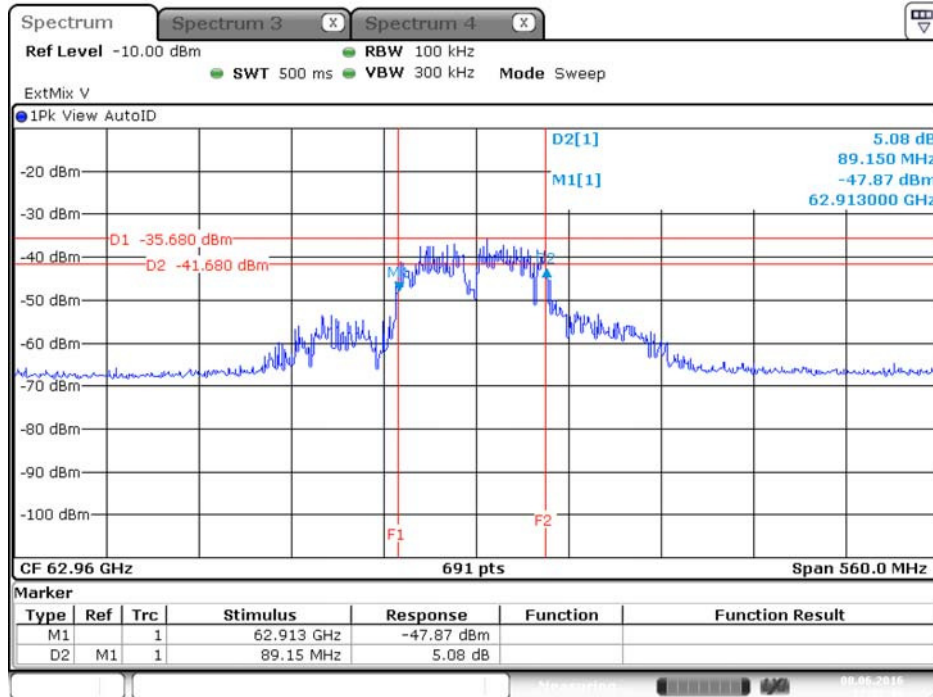
Occupied Bandwidth&26 dBc Bandwidth



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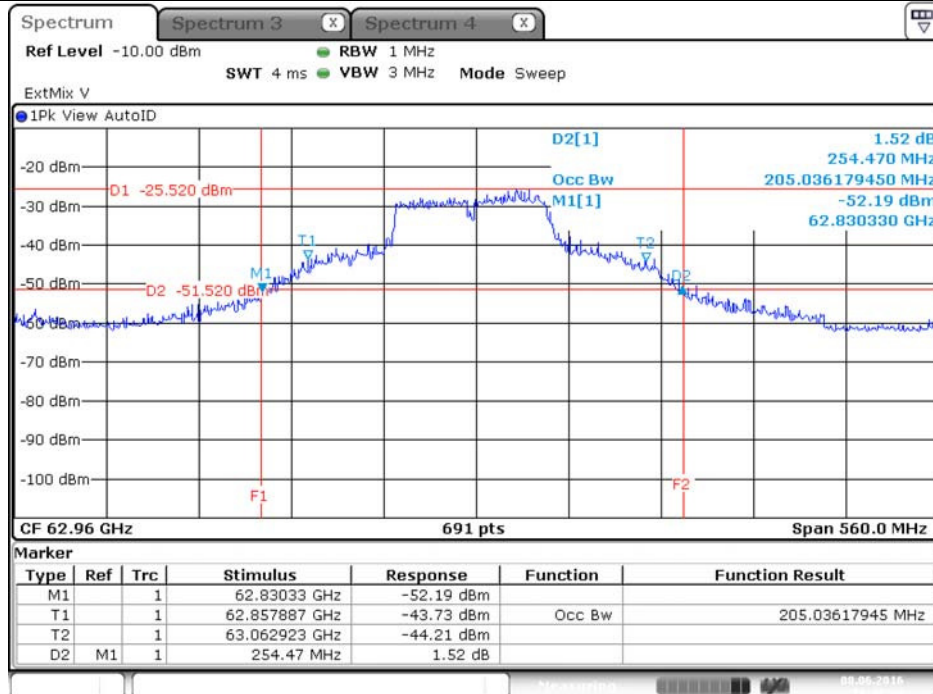
Test Frequency: 62.96 GHz

6 dBc Bandwidth



Date: 8.JUN.2016 17:32:41

Occupied Bandwidth&26 dBc Bandwidth



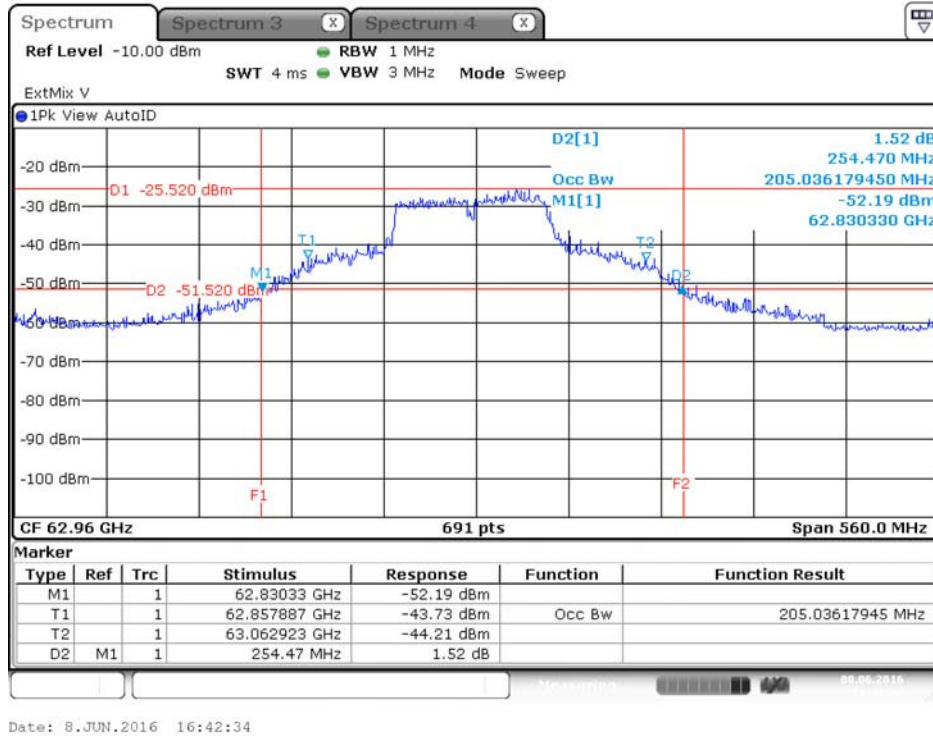
Date: 8.JUN.2016 16:42:34



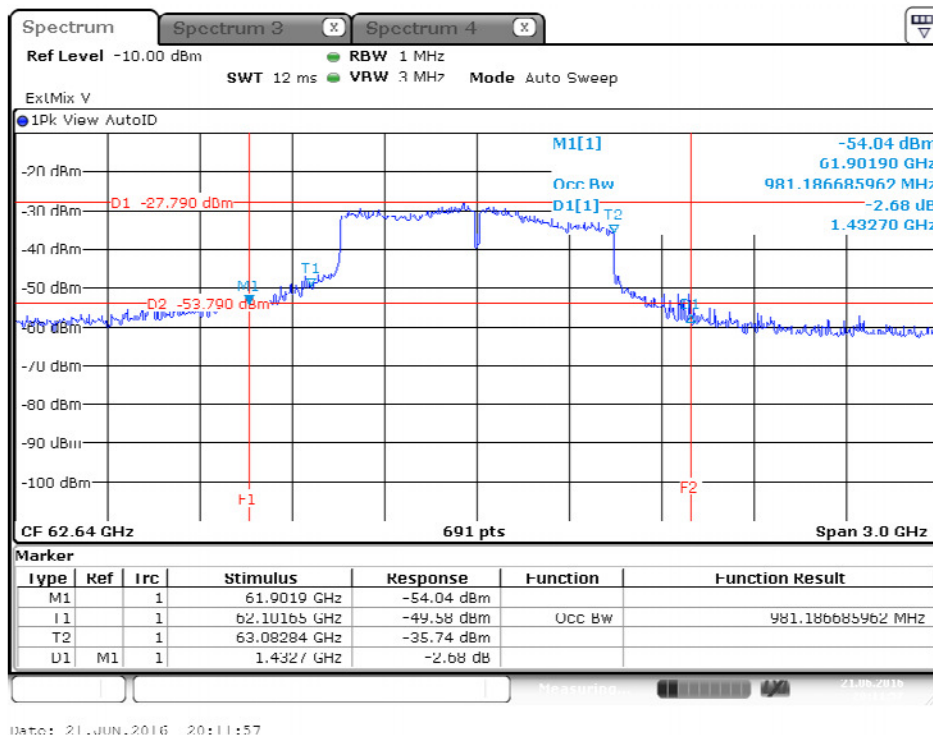
Channel Plan: Channel 3 MRP: 62.64 GHz

Test Frequency: 62.64 GHz

6 dBc Bandwidth



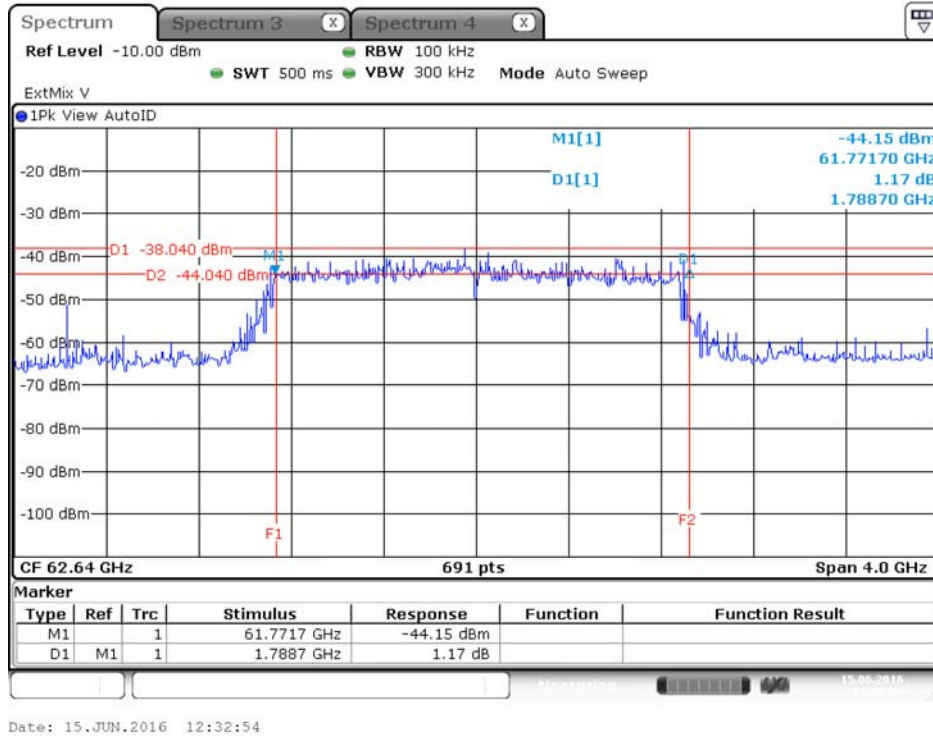
Occupied Bandwidth&26 dBc Bandwidth



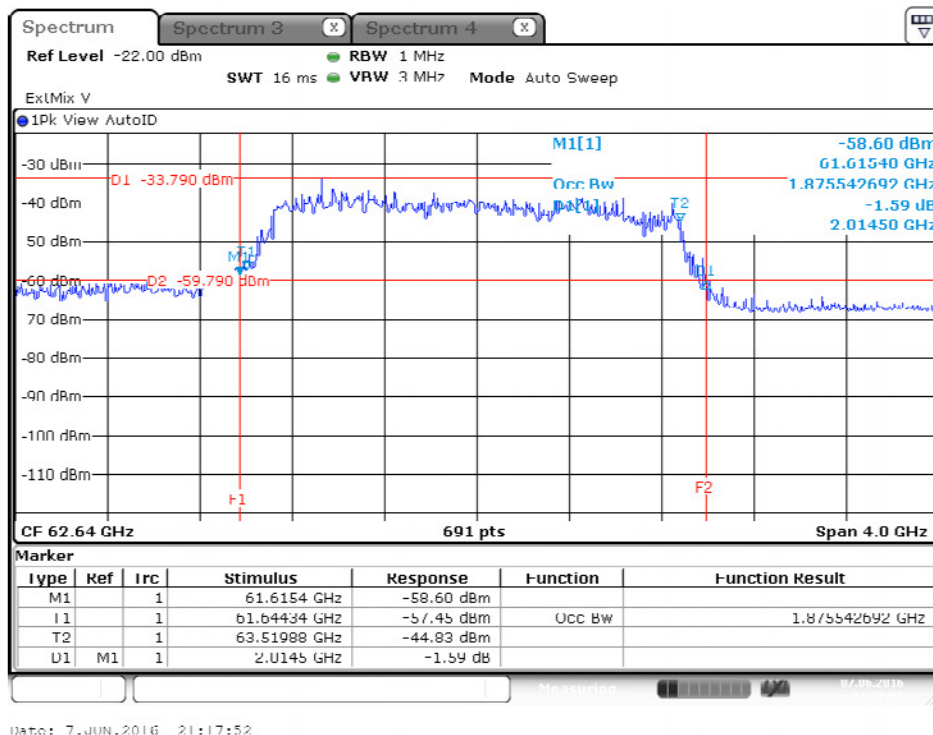
Channel Plan: Channel 3 HRP: 62.64 GHz

Test Frequency: 62.64 GHz

6 dBc Bandwidth



Occupied Bandwidth&26 dBc Bandwidth



3.3 EIRP Power

3.3.1 Limit of EIRP Power

EIRP Power Limit		
Use Condition	EIRP Average Power	EIRP Peak Power
Fixed field disturbance sensors at 61-61.5GHz	10 dBm	13 dBm
Except fixed field disturbance sensors at 61-61.5GHz	N/A	10 dBm
Except fixed field disturbance sensors(indoor)	40 dBm	43 dBm
Except fixed field disturbance sensors(outdoor)	82 dBm	85 dBm

Note 1: For outdoor device minus 2 dB for every dB that the antenna gain is less than 51 dBi.

Note 2: For the applicable limit, see FCC 15.255 (b)

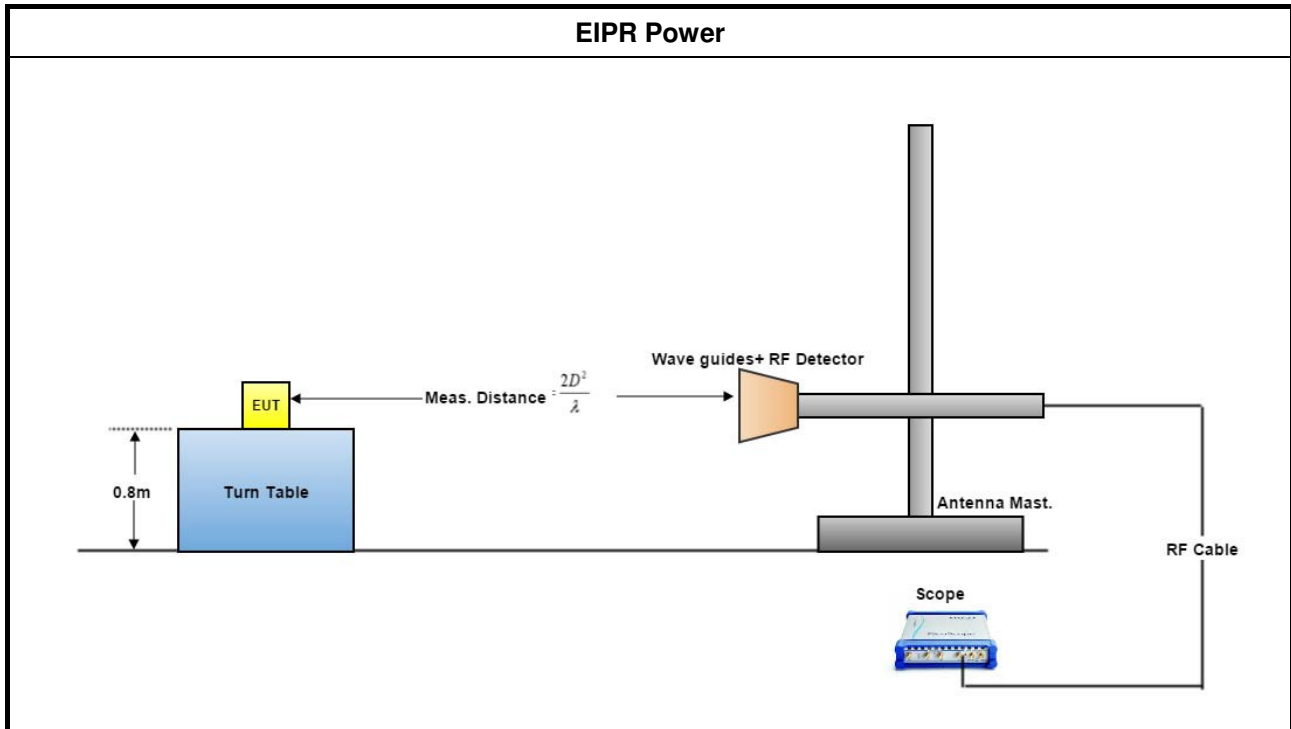
3.3.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.3.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013 clause 9.3 & 9.5.

3.3.4 Test Setup



3.3.5 Test Result of EIRP Power

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.11
NOTE: If the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.11 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 worst case combination to be used for the conformance testing.	

3.3.5.1 Test Result of EIRP Power

Temp	22°C					Humidity	54%				
Test Engineer	Lucas Huang					Test Distance	3 m				
Test Results											
Channel Plan (GHz)	Test Freq. (GHz)	DSO (mV)		Power Measured (dBm)		E _{Meas} (dBuV/m)		EIRP (dBm)		EIRP Limit (dBm) (note 1)	
		Peak	AV	Peak	AV	Peak	AV	Peak	AV	Peak	AV
Channel 2 LRP: 60.16-60.80	60.16	5.02	1.72	-25	-31.11	124.29	118.18	29.03	22.92	43	40
	60.48	6.30	2.11	-23.6	-29.71	125.69	119.58	30.43	24.32	43	40
	60.80	5.18	1.64	-25.3	-31.41	124.04	117.93	28.78	22.67	43	40
Channel 2 MRP: 60.48	60.48	14.57	9.30	-20.21	-20.73	129.08	128.56	33.82	33.30	43	40
Channel 2 HRP: 60.48	60.48	6.42	3.33	-23.5	-26.7	125.79	122.59	30.53	27.52	43	40
Channel 3 LRP: 62.32-62.96	62.32	4.38	1.34	-25.94	-32.05	123.65	117.54	28.40	22.29	43	40
	62.64	3.90	1.32	-26.13	-32.24	123.46	117.35	28.21	22.10	43	40
	62.96	3.30	1.29	-26.7	-32.81	122.94	116.83	27.68	21.57	43	40
Channel 3 MRP: 62.64	62.64	11.24	6.79	-21.09	-21.61	128.50	127.98	33.25	32.73	43	40
Channel 3 HRP: 62.64	62.64	5.16	2.82	-25.1	-27.9	124.49	121.69	29.24	26.63	43	40
The measured power level is converted to EIRP using the Friis equation: For radiated emissions, calculate the field strength (E) in dBμV/meter. $E = 126.8 - 20\log(\lambda) + P - G$ where: E : is the field strength of the emission at the measurement distance, in dBμV/m P : is the power measured at the output of the test antenna, in dBm λ : is the wavelength of the emission under investigation [300/fMHz], in m G : is the gain of the test antenna, in dBi For radiated emissions, calculate the EIRP (dBm). If the measurement was performed in the far field, calculate the EIRP. $EIRP = E\text{-meas} + 20\log(d\text{-meas}) - 104.7$ where: EIRP : is the equivalent isotopically radiated power, in dBm E-meas. : is the field strength of the emission at the measurement distance, in dBμV/m d-meas. : is the measurement distance, in m NOTE 1: For the applicable limit, see FCC 15.255 (b)											

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 (BW/100) (see note 2)
NOTE 1: For the applicable limit, see FCC 15.255(e)	
NOTE 2: BW= 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 C63.10-2013, clause 9.5

3.4.4 Test Result of Peak Conducted Power

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.11
NOTE: If the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.11 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 worst case combination to be used for the conformance testing.	

**3.4.4.1 Peak Conducted Power**

Temp	22℃			Humidity		54%	
Test Engineer	Lucas Huang						
Test Date	Jun. 07, 2016 ~ Jun. 22, 2016						
Test Results							
Channel Plan (GHz)	Test Freq. (GHz)	EIRP (dBm)	Max. Ant. Gain (dBi)	Peak Power (dBm) (note1)	Peak Power (mW)	6dBc BW (MHz) (note2)	Peak Power Limit (mW) (note3)
Channel 2 LRP: 60.16-60.80	60.16	29.03	6	23.03	201.013	91.58	457.90
	60.48	30.43	6	24.43	277.475	92.39	461.95
	60.80	28.78	6	22.78	189.586	91.58	457.90
Channel 2 MRP: 60.48	60.48	33.82	16	17.82	60.565	881.30	500.00
Channel 2 HRP: 60.48	60.48	30.53	16	14.53	28.394	1765.60	500.00
Channel 3 LRP: 62.32-62.96	62.32	28.40	6	22.40	173.661	89.15	445.75
	62.64	28.21	6	22.21	166.228	90.77	453.85
	62.96	27.68	6	21.68	147.275	89.15	445.75
Channel 3 MRP: 62.64	62.64	33.25	16	17.25	53.052	868.30	500.00
Channel 3 HRP: 62.64	62.64	29.24	16	13.24	21.072	1788.70	500.00
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)							
NOTE 4: For radiated emission measurements, calculate conducted transmitter output power P(cond)(dBm) P(cond) = EIRP - G(dBi) where: G(dBi) is gain of EUT antenna.							

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 1: For the applicable limit, see FCC 15.255(c)

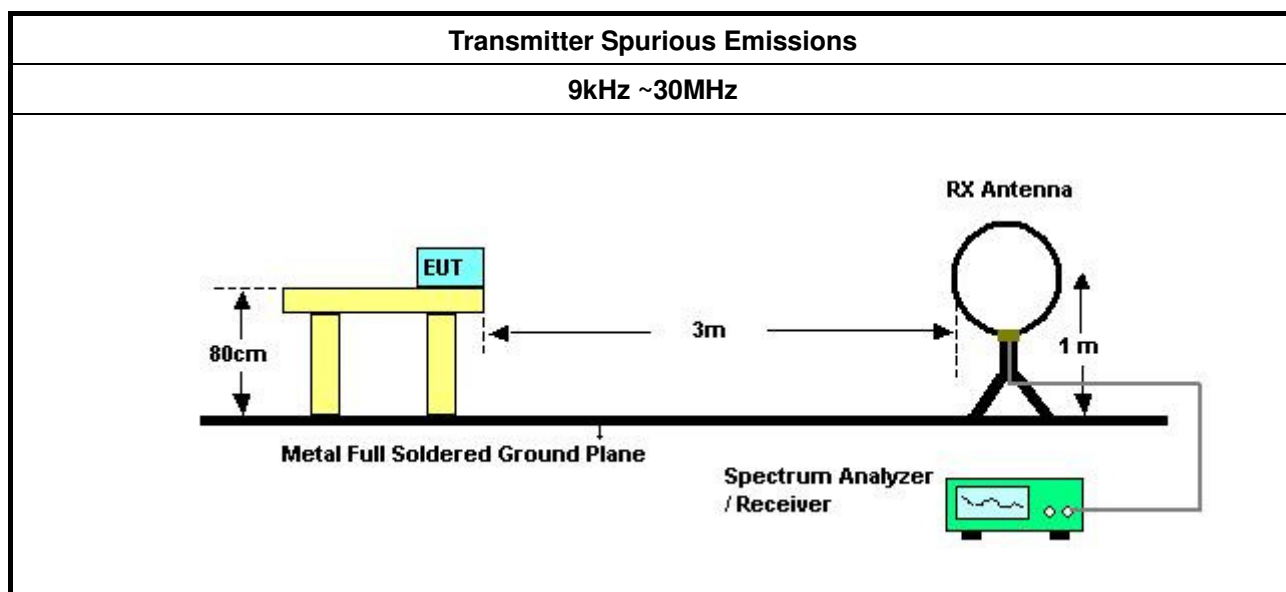
NOTE 2: Spurious emissions shall not exceed the level of the fundamental emission.

NOTE 3: publicly-accessible coordination channel, whose purpose is to coordinate operation between diverse transmitters with a view towards reducing the probability of interference throughout the 57-64 GHz band, are permitted in the 57-57.05 GHz band. The development of standards for this channel shall be performed pursuant to authorizations issued under part 5 of this chapter.

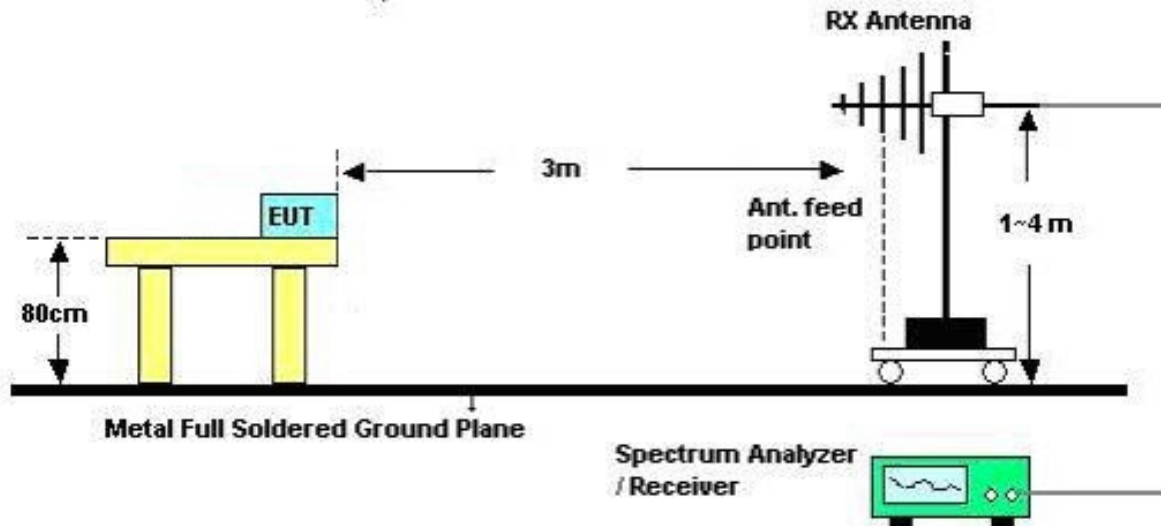
3.5.2 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clause 9.12

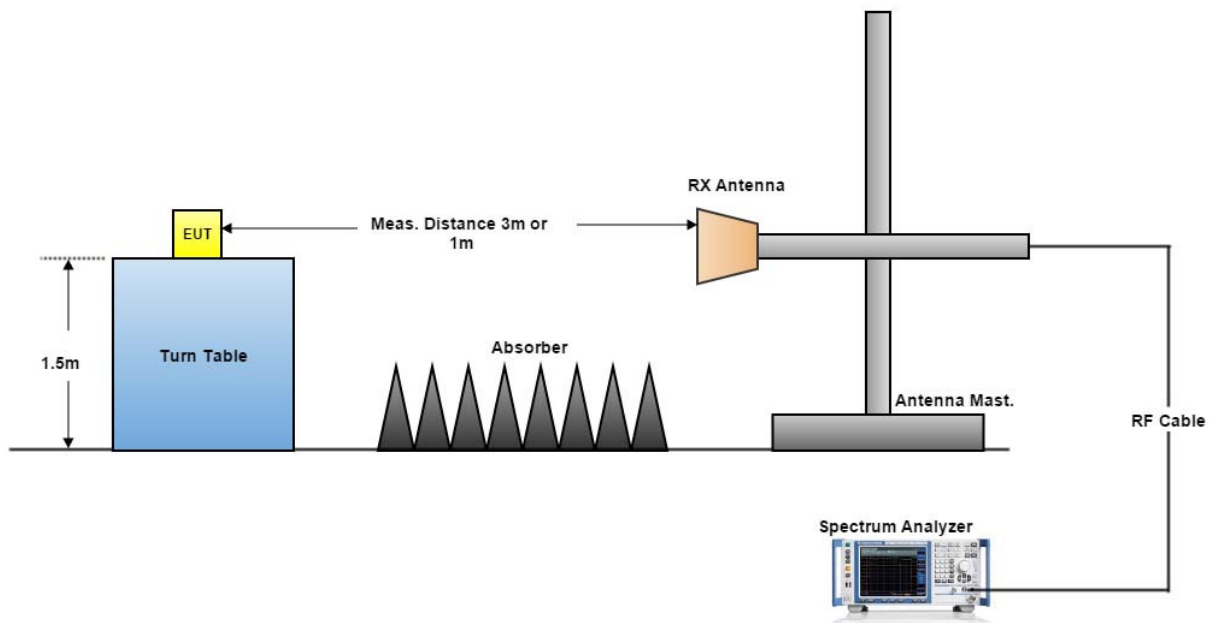
3.5.3 Test Setup

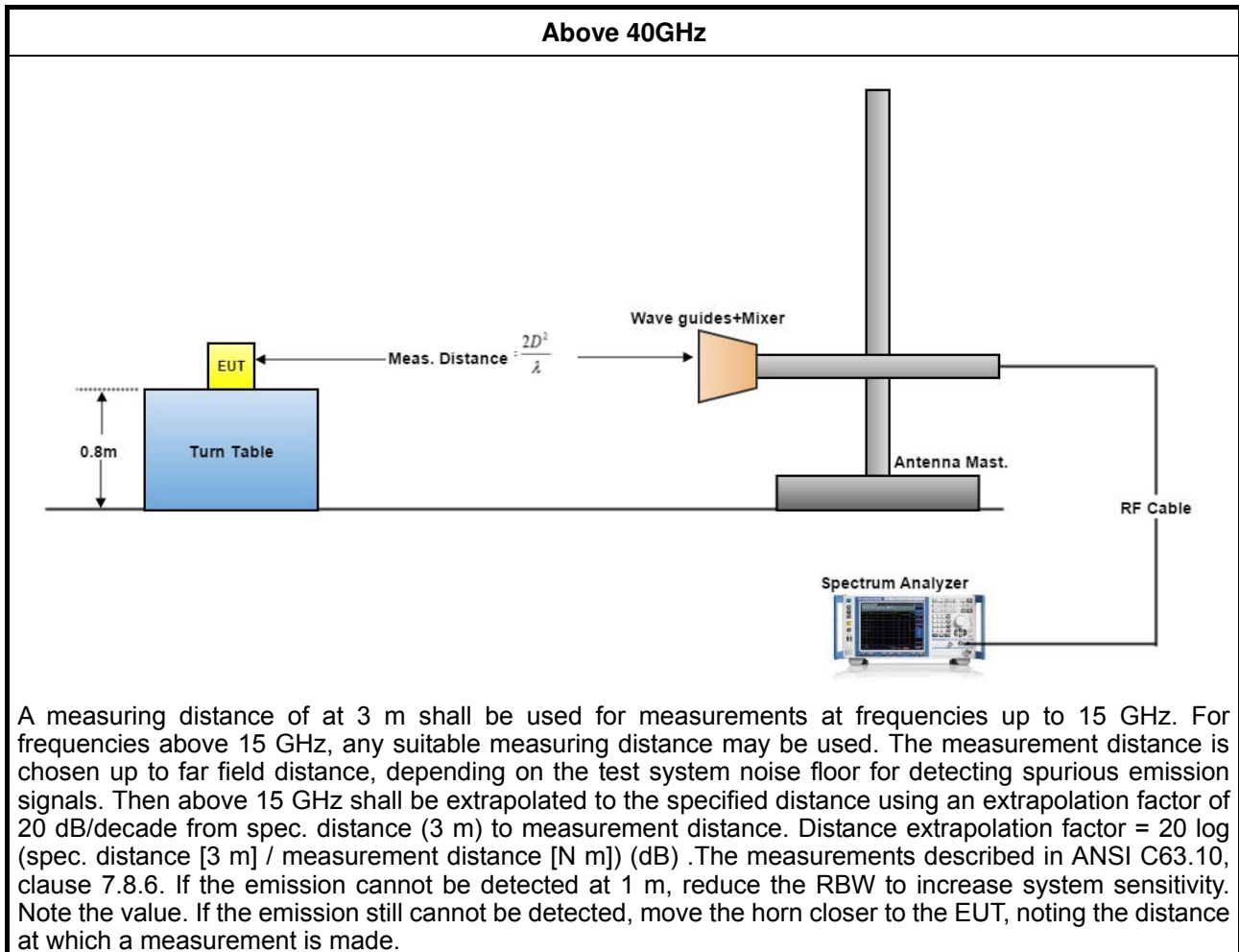


30MHz~1GHz



1GHz ~40GHz





3.5.4 Test Result of Transmitter Spurious Emissions

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.12 ~ 9.13
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.	

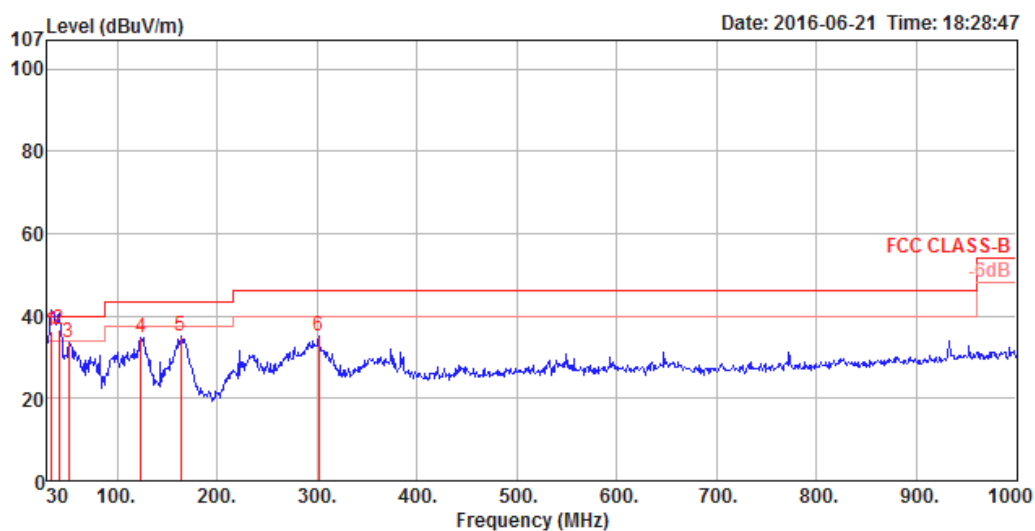
3.5.4.1 Test Result of Transmitter Spurious Emissions (Below 30MHz)

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

3.5.4.2 Test Result of Transmitter Spurious Emissions

Temp	22°C	Humidity	54%
Test Engineer	Stim Sung / Eason Chen	Test Distance	3 m
Test Range	30 MHz – 1000 MHz	Test Configuration	Normal Link

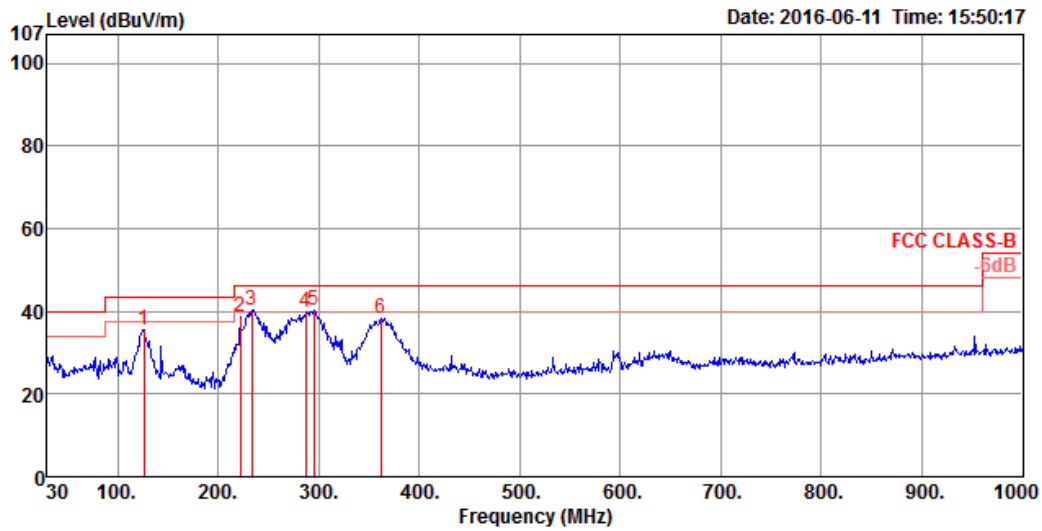
Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	Limit	Level	Loss	Factor	Factor	cm	deg	
1	33.88	36.47	40.00	-3.53	45.43	0.59	23.09	32.64	100	359 QP	VERTICAL
2	41.64	36.77	40.00	-3.23	50.27	0.65	18.48	32.63	125	171 QP	VERTICAL
3	51.34	33.45	40.00	-6.55	51.24	0.72	14.12	32.63	125	345 Peak	VERTICAL
4	124.09	34.89	43.50	-8.61	48.19	1.10	18.16	32.56	100	350 Peak	VERTICAL
5	163.86	35.00	43.50	-8.50	50.12	1.27	16.17	32.56	100	226 Peak	VERTICAL
6	301.60	35.06	46.00	-10.94	46.25	1.70	19.63	32.52	125	150 Peak	VERTICAL



Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	126.03	35.60	43.50	-7.90	48.92	1.10	18.14	32.56	125	262 Peak	HORIZONTAL
2	222.06	38.81	46.00	-7.19	53.62	1.47	16.26	32.54	125	24 Peak	HORIZONTAL
3	233.70	40.40	46.00	-5.60	54.34	1.50	17.10	32.54	125	181 Peak	HORIZONTAL
4	287.05	40.04	46.00	-5.96	51.56	1.66	19.34	32.52	100	330 Peak	HORIZONTAL
5	294.81	40.42	46.00	-5.58	51.76	1.68	19.50	32.52	125	24 Peak	HORIZONTAL
6	361.74	38.16	46.00	-7.84	47.54	1.87	21.28	32.53	100	356 Peak	HORIZONTAL



FCC Radio Test Report

Report No. : FR652716

Test Plan: Channel 2 HRP: 60.48

Temp	22°C	Humidity	54%
Test Engineer	Stim Sung / Eason Chen	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Freq. (GHz)	60.48
Test Date	Jun. 07, 2016 ~ Jun. 21, 2016		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1269.01	44.12	54.00	-9.88	49.26	3.08	24.86	33.08	196	80	Average	VERTICAL
2	1269.07	46.96	74.00	-27.04	52.10	3.08	24.86	33.08	196	80	Peak	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1269.00	48.85	74.00	-25.15	53.99	3.08	24.86	33.08	204	136	Peak	HORIZONTAL
2	1269.01	45.93	54.00	-8.07	51.07	3.08	24.86	33.08	204	136	Average	HORIZONTAL



FCC Radio Test Report

Report No. : FR652716

Temp	22°C	Humidity	54%
Test Engineer	Stim Sung / Eason Chen	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Freq. (GHz)	60.48
Test Date	Jun. 07, 2016 ~ Jun. 21, 2016		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	25908.69	46.00	83.54	-37.54	47.64	9.76	38.98	50.38	201	142	Peak	VERTICAL
2	25908.85	32.13	63.54	-31.41	33.77	9.76	38.98	50.38	201	142	Average	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	25903.04	44.73	83.54	-38.81	46.37	9.76	38.98	50.38	217	200	Peak	HORIZONTAL
2	25911.38	30.98	63.54	-32.56	32.62	9.76	38.98	50.38	217	200	Average	HORIZONTAL

**Test Plan: Channel 3 HRP: 62.64**

Temp	22°C	Humidity	54%
Test Engineer	Stim Sung / Eason Chen	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Freq. (GHz)	62.64
Test Date	Jun. 07, 2016 ~ Jun. 21, 2016		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1269.01	44.29	54.00	-9.71	49.43	3.08	24.86	33.08	187	93	Average	VERTICAL
2	1269.07	47.15	74.00	-26.85	52.29	3.08	24.86	33.08	187	93	Peak	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1269.00	48.98	74.00	-25.02	54.12	3.08	24.86	33.08	204	136	Peak	HORIZONTAL
2	1269.01	46.10	54.00	-7.90	51.24	3.08	24.86	33.08	204	136	Average	HORIZONTAL



FCC Radio Test Report

Report No. : FR652716

Temp	22°C	Humidity	54%
Test Engineer	Stim Sung / Eason Chen	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Freq. (GHz)	62.64
Test Date	Jun. 07, 2016 ~ Jun. 21, 2016		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	25923.08	32.11	63.54	-31.43	33.73	9.77	38.98	50.37	171	297	Average	VERTICAL
2	25926.86	45.95	83.54	-37.59	47.57	9.77	38.98	50.37	171	297	Peak	VERTICAL

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	25902.96	30.17	63.54	-33.37	31.81	9.76	38.98	50.38	187	51	Average	HORIZONTAL
2	25907.29	44.29	83.54	-39.25	45.93	9.76	38.98	50.38	187	51	Peak	HORIZONTAL



Temp	22°C	Humidity	54%
Test Engineer	Lucas Huang	Test Date	Jun. 07, 2016 ~ Jun. 21, 2016
Test Range	40GHz – 200GHz		

Test Plan: Channel 2 LRP: 60.16-60.80

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	23.6	0.50	40.22	-76.93
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m²)	Limit (pW/cm²)	Test Result
-42.02	3	0.555	90	Complied

Test Plan: Channel 2 MRP: 60.48

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	23.6	0.50	40.19	-70.95
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m²)	Limit (pW/cm²)	Test Result
-36.05	3	2.197	90	Complied

Test Plan: Channel 2 HRP: 60.48

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	23.6	0.50	40.99	-70.68
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m²)	Limit (pW/cm²)	Test Result
-35.61	3	2.432	90	Complied

**Test Plan: Channel 3 LRP: 62.32-62.96**

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	23.6	0.50	40.07	-76.84
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m ²)	Limit (pW/cm ²)	Test Result
-41.96	3	0.563	90	Complied

Test Plan: Channel 3 MRP: 62.64

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	23.6	0.50	42.42	-71.8
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m ²)	Limit (pW/cm ²)	Test Result
-36.43	3	2.013	90	Complied

Test Plan: Channel 3 HRP: 62.64

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	23.6	0.50	42.50	-72.5
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m ²)	Limit (pW/cm ²)	Test Result
-37.11	3	1.720	90	Complied

3.6 Frequency Stability

3.6.1 Limit of Frequency Stability

Frequency Stability	Limit
Refer as FCC 15.255(f) and ANSI C63.10-2013, clause 9.14	within the frequency bands
Note: These measurements shall also be performed at normal and extreme test conditions.	

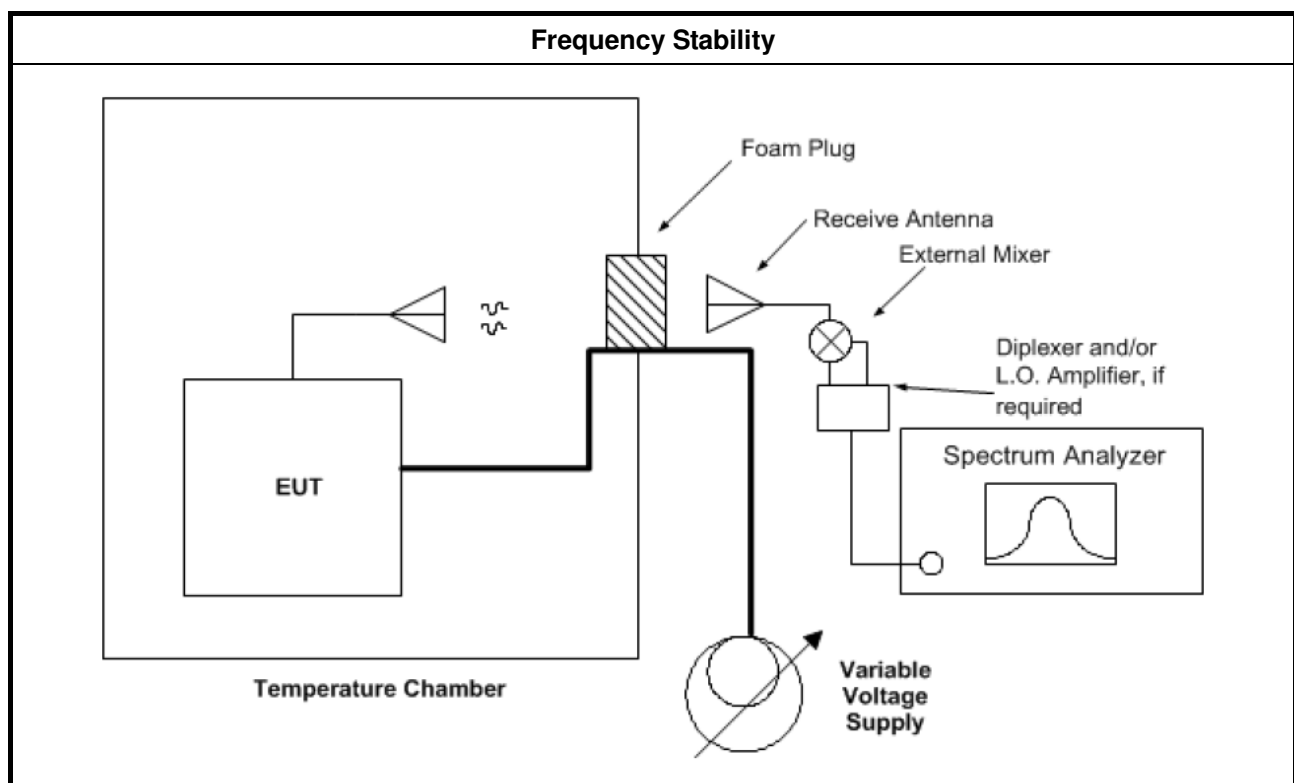
3.6.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.6.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clauses 9.14.

3.6.4 Test Setup



3.6.5 Test Result of Frequency Stability

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.14
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	22°C	Humidity	54%
Test Engineer	Lucas Huang	Test Date	Jun. 07, 2016 ~ Jun. 21, 2016
Test Results			
Test Temperature (°C)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
-20	60456.764	-36	Within band
-10	60456.788	-12	Within band
0	60456.789	-11	Within band
10	60456.790	-10	Within band
20	60456.800	Reference	Within band
30	60456.785	-15	Within band
40	60456.765	-35	Within band
50	60456.756	-29	Within band
NOTE: For the applicable limit, see FCC 15.255(f).			

**3.6.5.2 Frequency Stability When Varying Supply Voltage**

Frequency Stability When Varying Supply Voltage			
Temp	22°C	Humidity	54%
Test Engineer	Lucas Huang	Test Date	Jun. 07, 2016 ~ Jun. 21, 2016
Test Results			
Test Voltage: (Vdc)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
4.25	60456.746	-54	Within band
5	60456.800	Reference	Within band
5.75	60456.788	-12	Within band
NOTE: For the applicable limit, see FCC 15.255(f).			

3.7 Operation Restriction and Group Installation

3.7.1 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))

3.7.2 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.

3.7.3 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.

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 27, 2016	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-1 6-2	04083	150kHz ~ 100MHz	Dec. 08, 2015	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 23, 2015	Conduction (CO01-CB)
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 27, 2016	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 24, 2016	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep. 03, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170585	18GHz ~ 40GHz	Sep. 22, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Mar. 15, 2016	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 18, 2016	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 13, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 16, 2016	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)



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Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Sep. 09, 2015*	Radiation (03CH01-CB)
Mixer	OML	M15HW/A	V91113-1	50 ~ 75 GHz	Sep. 14, 2015*	Radiation (03CH01-CB)
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Sep. 17, 2015*	Radiation (03CH01-CB)
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Sep. 21, 2015*	Radiation (03CH01-CB)
Mixer	OML	M05HW/A	G91113-1	140 ~ 220 GHz	Sep. 24, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO19R	U91113-A	40 ~ 60 GHz	Sep. 09, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO15R	V91113-A	50 ~ 75 GHz	Sep. 14, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO12R	E91113-A	60 ~ 90 GHz	Sep. 17, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO08R	F91113-A	90 ~ 140 GHz	Sep. 21, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO05R	G91113-A	140 ~ 220 GHz	Sep. 24, 2015*	Radiation (03CH01-CB)
Pico Scope	Pico	Pico Scope 6402C	CX372/002	N/A	Jul. 06, 2015	Radiation (03CH01-CB)
RF Detector	millitech	DET-15-RPFW0	38	50 ~ 75 GHz	Oct. 31, 2015*	Radiation (03CH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2016	Conducted (TH01-CB)

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

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

N.C.R means Non-Calibration required.

5 Measurement Uncertainty

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Radiated Emission (40GHz ~ 220GHz)	4.7 dB	Confidence levels of 95%
Temperature	0.7°C	Confidence levels of 95%