



FCC Radio Test Report

Equipment : LCD Projector
Brand Name : EPSON
Model No. : H714A
FCC ID : BKMAE-H714RX
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 Dec. 07, 2015 and completely tested on Jan. 13, 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	-



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: 60.16275-60.79725 GHz Channel 3 LRP: 62.32275-62.95725 GHz
LRP Channel List	Channel 2 LRP: 60.16275-60.79725 GHz: 60.16275 +n x 0.158625 (n=0, 1, 2, 3, 4) GHz Channel 3 LRP: 62.32275-62.95725 GHz: 62.32275 +n x 0.158625 (n=0, 1, 2, 3, 4) GHz

1.1.2 Transmit Operating Modes

The Different Transmit Operating Modes	
<input checked="" type="checkbox"/>	Operating mode 1: Smart Antenna Systems - with beam forming
<input type="checkbox"/>	Operating mode 2: Smart Antenna Systems - without beam forming
<input type="checkbox"/>	Operating mode 3: Single Antenna Equipment

1.1.3 Antenna Information

Antenna Information	
<input type="checkbox"/>	Equipment placed on the market without antennas
<input checked="" type="checkbox"/>	Integral antenna
Integral antenna gain	6 dBi for LRP
	<input type="checkbox"/> Temporary RF connector provided
	<input checked="" type="checkbox"/> No temporary RF connector provided
<input type="checkbox"/>	External antenna (dedicated antennas)
	<input type="checkbox"/> Single power level with corresponding antenna(s)
	<input type="checkbox"/> Multiple power settings and corresponding antenna(s)



1.1.4 Power Levels

Worst Power Levels for LRP			
Applicable power levels	<input type="checkbox"/> Conducted <input checked="" type="checkbox"/> EIRP		
Antenna gain	6 dBi		
Frequency (GHz)	Highest setting (P _{high}): (dBm)		
	Modulation	AV Power	Peak Power
62.64	BPSK	25.04	31.86

1.1.5 Extreme Operating

The Extreme Operating Temperature Range that Apply to the Equipment	
<input checked="" type="checkbox"/> -20 °C to +50 °C	
<input type="checkbox"/> 0 °C to +40 °C	
<input type="checkbox"/> Other:	
EUT Power Type	From internal power supply
Supply Voltage	<input checked="" type="checkbox"/> AC State AC voltage 120 V
Supply Voltage	<input type="checkbox"/> DC State DC voltage V

1.1.6 Equipment Use Condition

Equipment Use Condition
<input type="checkbox"/> Fixed field disturbance sensors at 61-61.5GHz
<input type="checkbox"/> Except fixed field disturbance sensors at 61-61.5GHz
<input checked="" type="checkbox"/> Except fixed field disturbance sensors

1.1.7 User Condition

Intended Operation
<input checked="" type="checkbox"/> Indoor only
<input type="checkbox"/> Outdoor only



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:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

1.2.2 Duty Cycle

Duty Cycle			Duty Cycle Factor
The transmitter is intended for	LRP	4.95 %	13.05



1.3 Accessories

Accessories	
Remote controller*1	
Power cable*1: Non-shielded, 3m	
HDMI cable*1: Shielded, 2m	

1.4 Support Equipment

Test Site: CO01-CB

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	WirelessHD Transmitter (TX device)	EPSON	WiT4-G0	BKMAE-WiT4G0
2	Notebook	DELL	E4300	DoC
3	Debug board	N/A	N/A	N/A
4	Flash disk	Silicon	I-Series	DoC

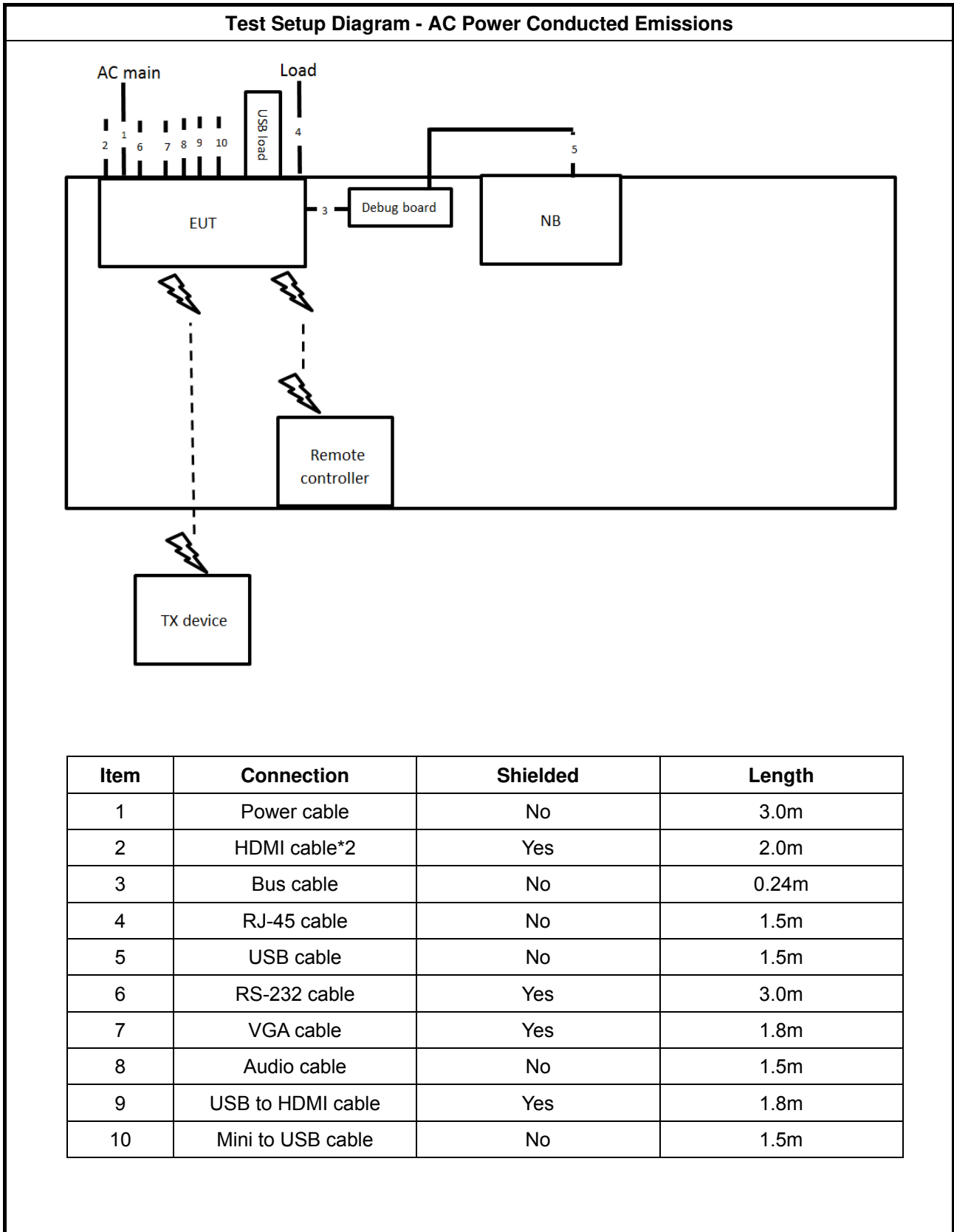
Test Site: 03CH01-CB and TH01-CB

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E4300	DoC
2	WirelessHD Transmitter (TX device)	EPSON	WiT4-G0	BKMAE-WiT4G0

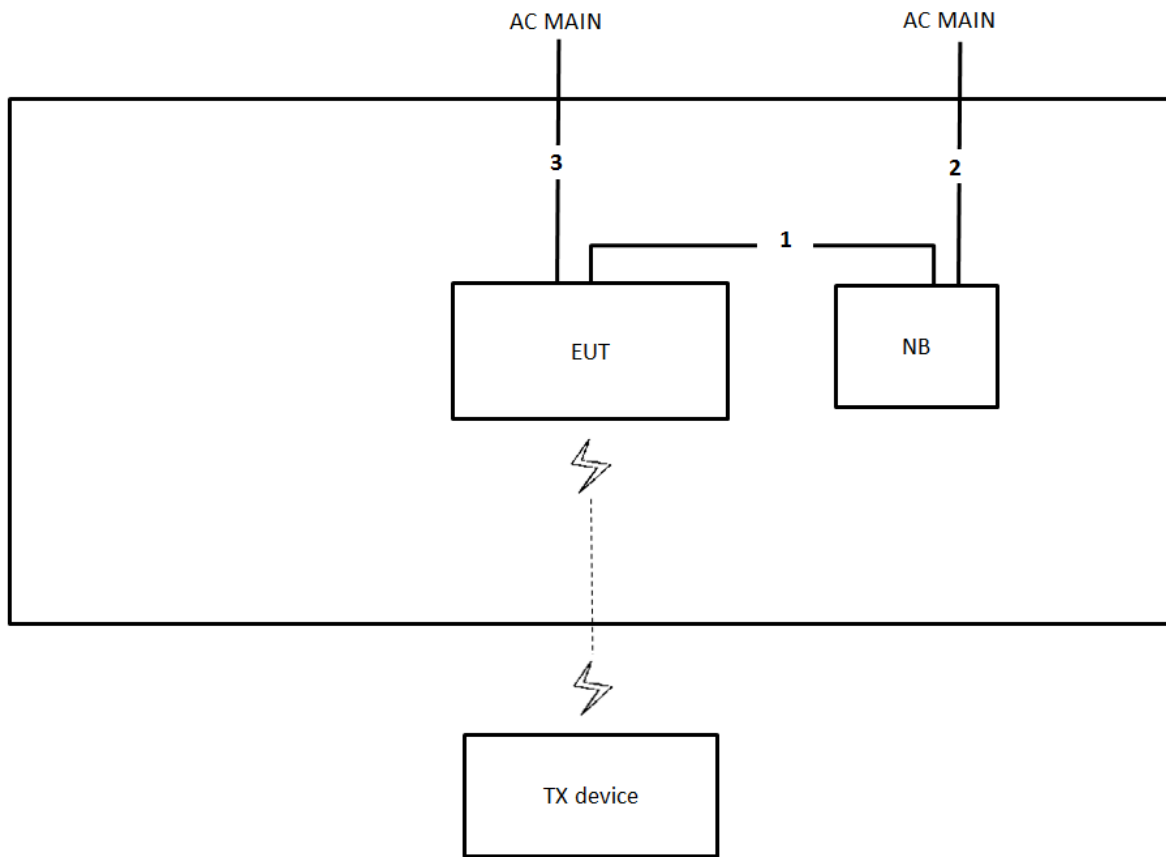
1.5 EUT Operation during Test

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	USB cable	No	1.5m
2	Power cable	No	2.6m
3	Power cable	No	3.0m



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		
<input type="checkbox"/>	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
<input checked="" type="checkbox"/>	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: 60.16275-60.79725	60.16275	60.48	60.79725
Channel 3 LRP: 62.32275-62.95725	62.32275	62.64	62.95725

2.2 Conformance Tests and Related Test Frequencies

Test Item	Test Frequencies (GHz)
	Channel Plan 2&3
	LRP
AC Power Conducted Emissions	CTX
Occupied Bandwidth	60.16275, 60.48, 60.79725 & 62.32275, 62.64, 62.95725
EIRP Power	60.16275, 60.48, 60.79725 & 62.32275, 62.64, 62.95725
Peak Conducted Power	60.16275, 60.48, 60.79725 & 62.32275, 62.64, 62.95725
Transmitter Spurious Emissions (below 1 GHz)	CTX
Transmitter Spurious Emissions (1 GHz-40 GHz)	60.48 & 62.64
Transmitter Spurious Emissions (above 40 GHz)	60.48 & 62.64
Frequency Stability	Un-Modulation



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)
60.16275	0.02	0.0049865	0.160	16.04
60.48	0.02	0.0049603	0.161	16.13
60.79725	0.02	0.0049344	0.162	16.21
62.32275	0.02	0.0048137	0.166	16.62
62.64	0.02	0.0047893	0.167	16.70
62.95725	0.02	0.0047651	0.168	16.79



AC Power Conducted Emissions

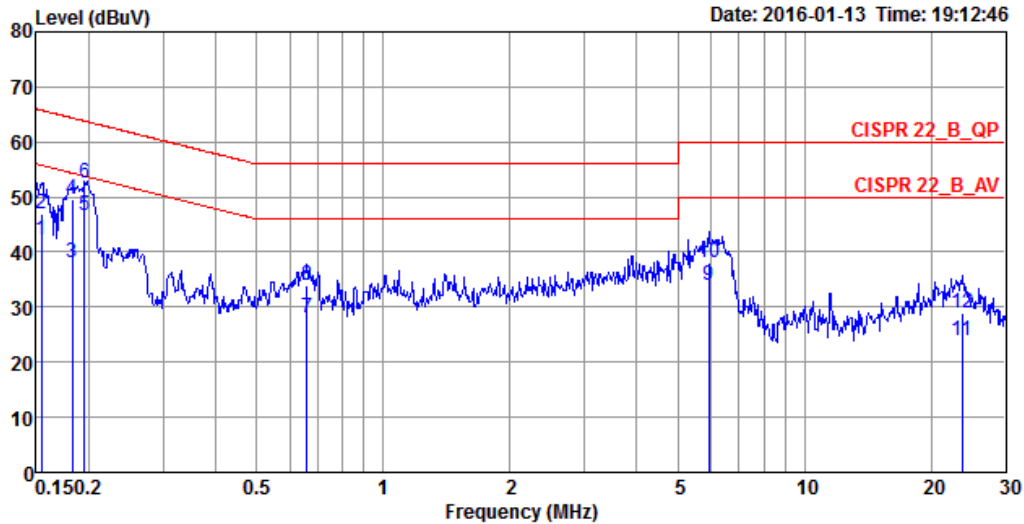
1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long (see ANSI C63.10, clause 6.2.3.2).
2. I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may 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
<p>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.</p> <p>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.</p>	



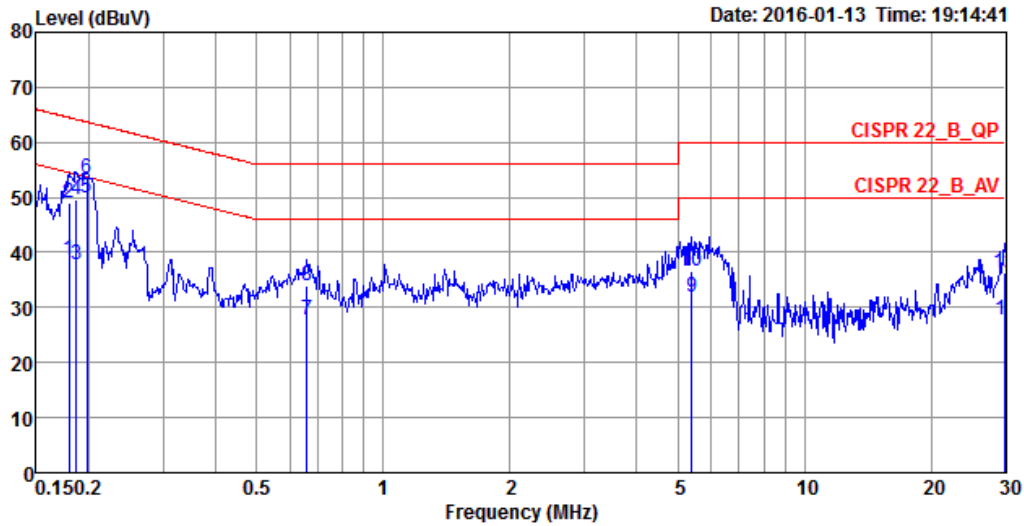
Temp	23°C	Humidity	59%
Test Engineer	Deven Huang	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1540	42.25	-13.53	55.78	32.30	9.93	0.02	LINE	Average
2	0.1540	46.93	-18.85	65.78	36.98	9.93	0.02	LINE	QP
3	0.1825	38.12	-16.25	54.37	28.17	9.93	0.02	LINE	Average
4	0.1825	49.55	-14.82	64.37	39.60	9.93	0.02	LINE	QP
5	0.1955	46.67	-7.13	53.80	36.72	9.93	0.02	LINE	Average
6	0.1955	52.43	-11.37	63.80	42.48	9.93	0.02	LINE	QP
7	0.6578	27.91	-18.09	46.00	17.92	9.95	0.04	LINE	Average
8	0.6578	33.98	-22.02	56.00	23.99	9.95	0.04	LINE	QP
9	5.9293	33.96	-16.04	50.00	23.74	10.09	0.13	LINE	Average
10	5.9293	38.13	-21.87	60.00	27.91	10.09	0.13	LINE	QP
11	23.6361	24.06	-25.94	50.00	13.25	10.54	0.27	LINE	Average
12	23.6361	28.97	-31.03	60.00	18.16	10.54	0.27	LINE	QP



Temp	23°C	Humidity	59%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1796	38.65	-15.85	54.50	28.84	9.79	0.02	NEUTRAL	Average
2	0.1796	49.01	-15.49	64.50	39.20	9.79	0.02	NEUTRAL	QP
3	0.1864	37.92	-16.28	54.20	28.11	9.79	0.02	NEUTRAL	Average
4	0.1864	49.71	-14.49	64.20	39.90	9.79	0.02	NEUTRAL	QP
5	0.1976	50.02	-3.69	53.71	40.21	9.79	0.02	NEUTRAL	Average
6	0.1976	53.39	-10.32	63.71	43.58	9.79	0.02	NEUTRAL	QP
7	0.6578	27.68	-18.32	46.00	17.84	9.80	0.04	NEUTRAL	Average
8	0.6578	33.83	-22.17	56.00	23.99	9.80	0.04	NEUTRAL	QP
9	5.3900	31.97	-18.03	50.00	21.95	9.91	0.11	NEUTRAL	Average
10	5.3900	36.56	-23.44	60.00	26.54	9.91	0.11	NEUTRAL	QP
11	30.0000	27.86	-22.14	50.00	17.23	10.35	0.28	NEUTRAL	Average
12	30.0000	36.45	-23.55	60.00	25.82	10.35	0.28	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.

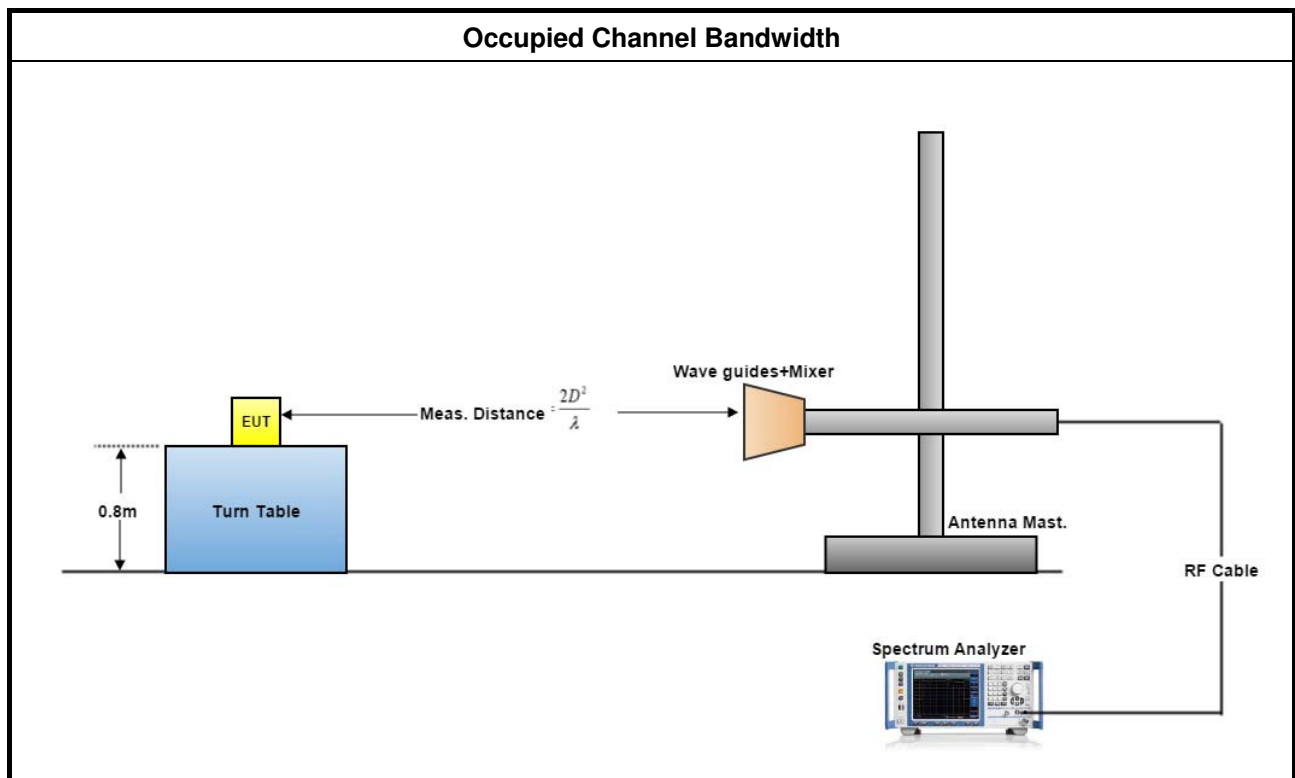
3.2.2 Measuring Instruments

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
<p>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.</p>	

Temp	20.5°C	Humidity	32%		
Test Engineer	Owen Hsu				
Test Results					
Channel Plan (GHz)	Test Freq. (GHz)	6 dBc Bandwidth (MHz)	Occupied Bandwidth (MHz)	26 dBc Bandwidth (MHz)	Limit (MHz)
Channel 2 LRP: 60.16275-60.79725	60.16275	90.40	163.00	220.00	N/A
	60.48	90.00	188.00	226.00	N/A
	60.79725	90.00	186.00	254.00	N/A
Channel 3 LRP: 62.32275-62.95725	62.32275	90.40	225.00	378.00	N/A
	62.64	90.40	240.00	305.00	N/A
	62.95725	88.00	289.00	435.00	N/A

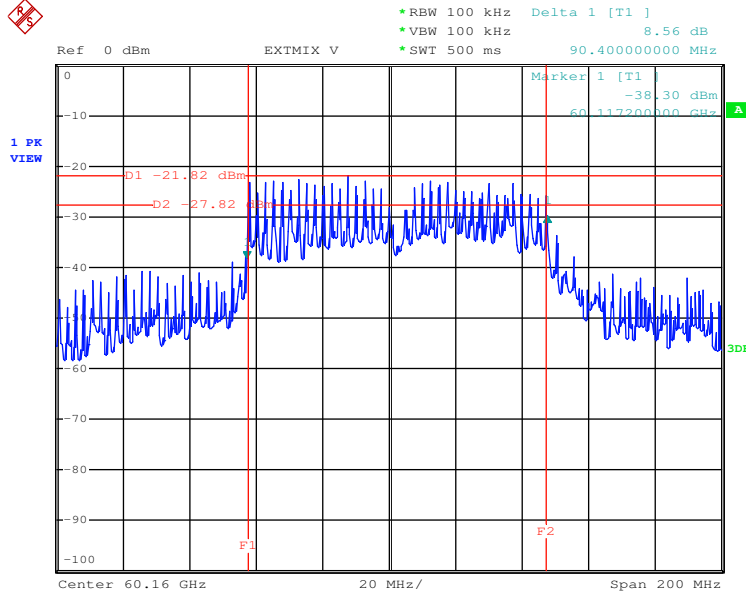


3.2.5.1 Bandwidth Plots

Channel Plan: Channel 2 LRP: 60.16275-60.79725 GHz

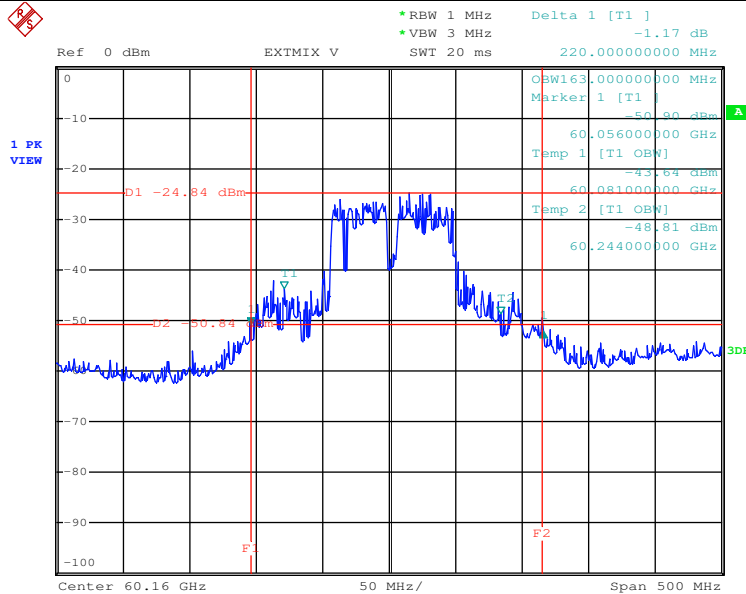
Test Frequency: 60.16275 GHz

6 dBc Bandwidth



Date: 18.DEC.2015 20:56:59

Occupied Bandwidth & 26 dBc Bandwidth

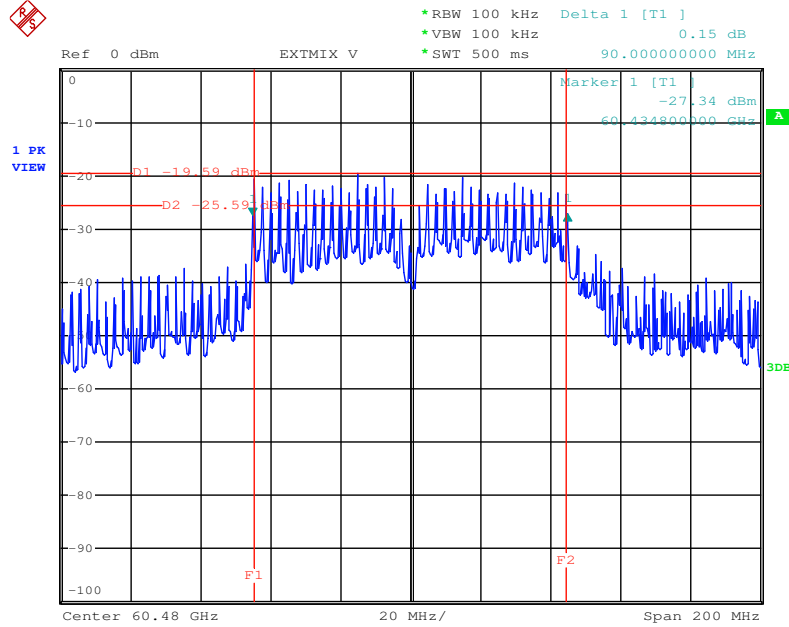


Date: 18.DEC.2015 17:39:33



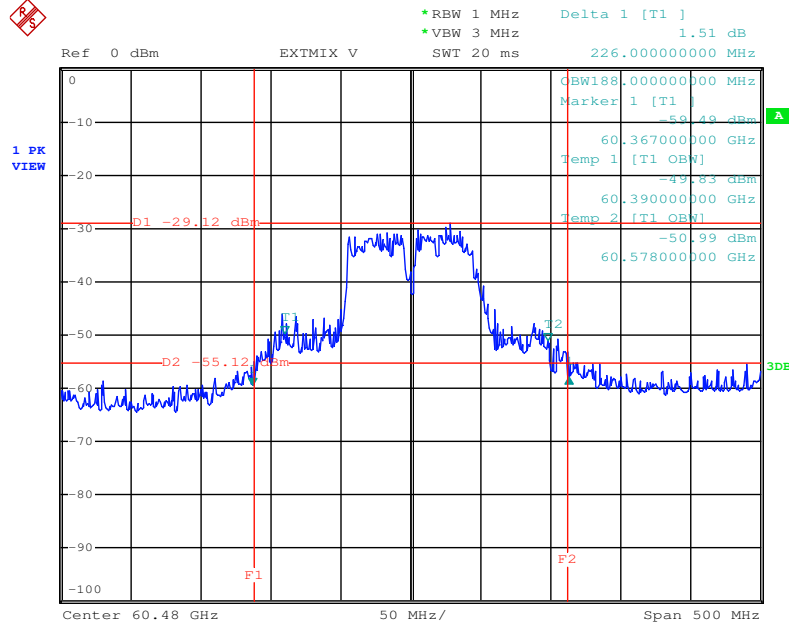
Test Frequency: 60.48 GHz

6 dBc Bandwidth



Date: 18.DEC.2015 18:44:52

Occupied Bandwidth&26 dBc Bandwidth

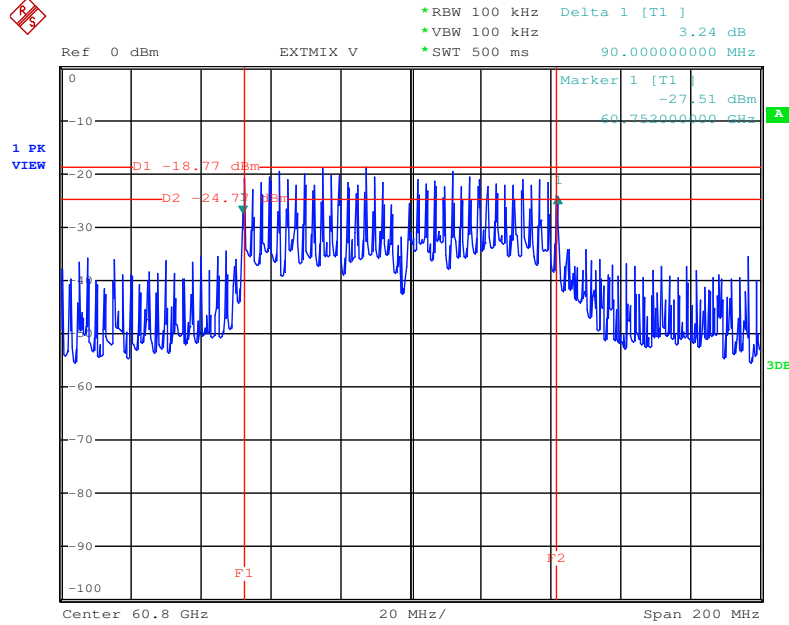


Date: 18.DEC.2015 18:09:50



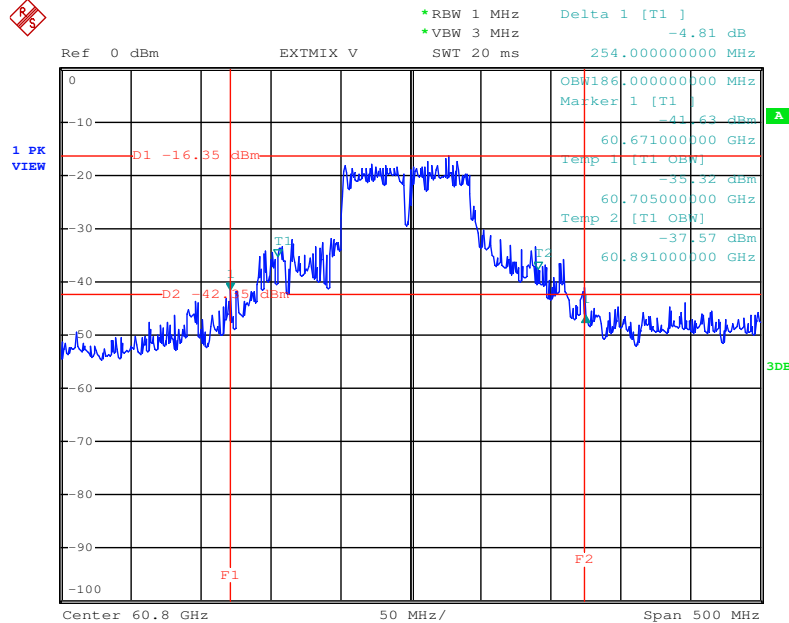
Test Frequency: 60.79725 GHz

6 dBc Bandwidth



Date: 18.DEC.2015 19:40:54

Occupied Bandwidth&26 dBc Bandwidth



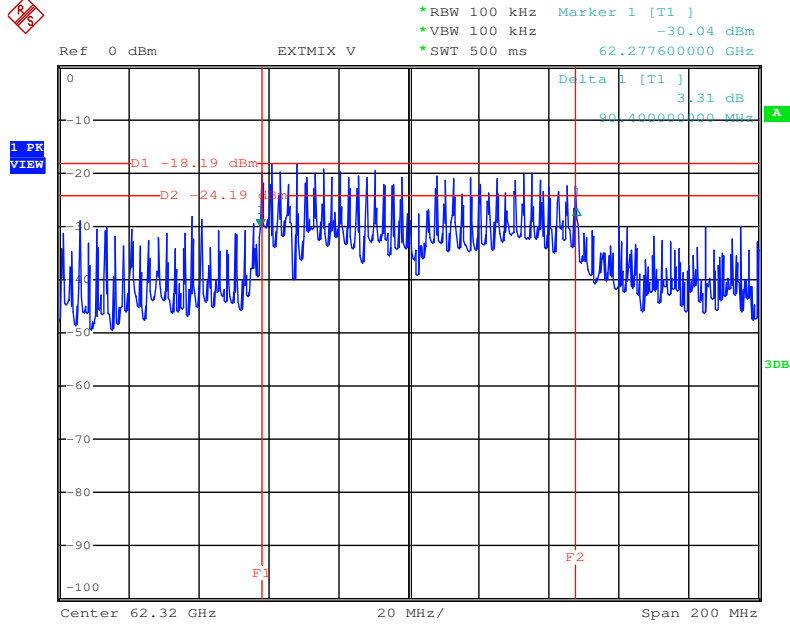
Date: 18.DEC.2015 20:04:06



Channel Plan: Channel 3 LRP: 62.32275-62.95725 GHz

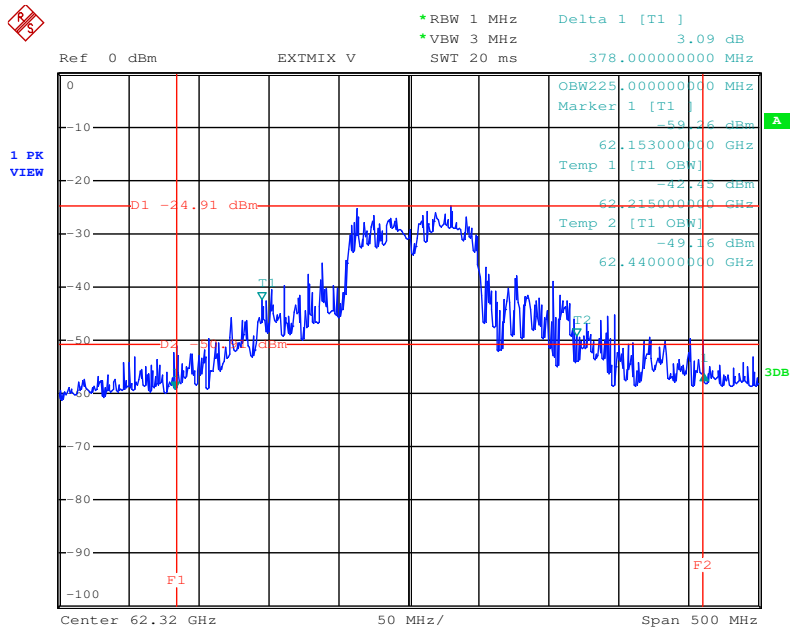
Test Frequency: 62.32275 GHz

6 dBc Bandwidth



Date: 18.DEC.2015 19:20:04

Occupied Bandwidth&26 dBc Bandwidth

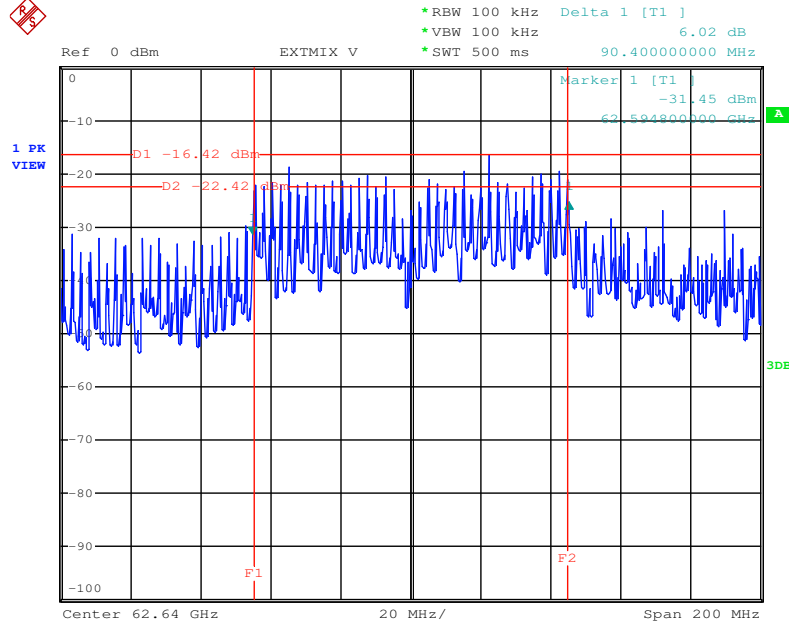


Date: 18.DEC.2015 17:48:07



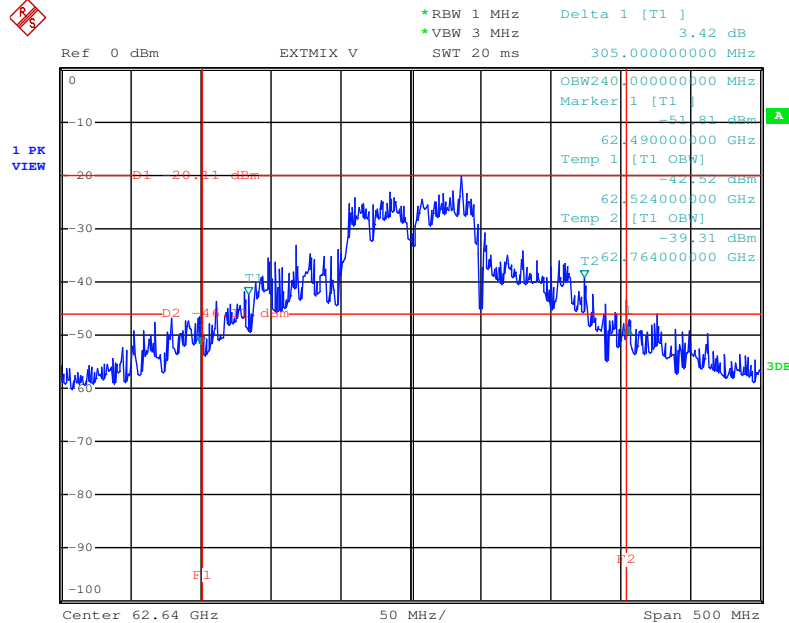
Test Frequency: 62.64 GHz

6 dBc Bandwidth



Date: 18.DEC.2015 20:36:59

Occupied Bandwidth&26 dBc Bandwidth

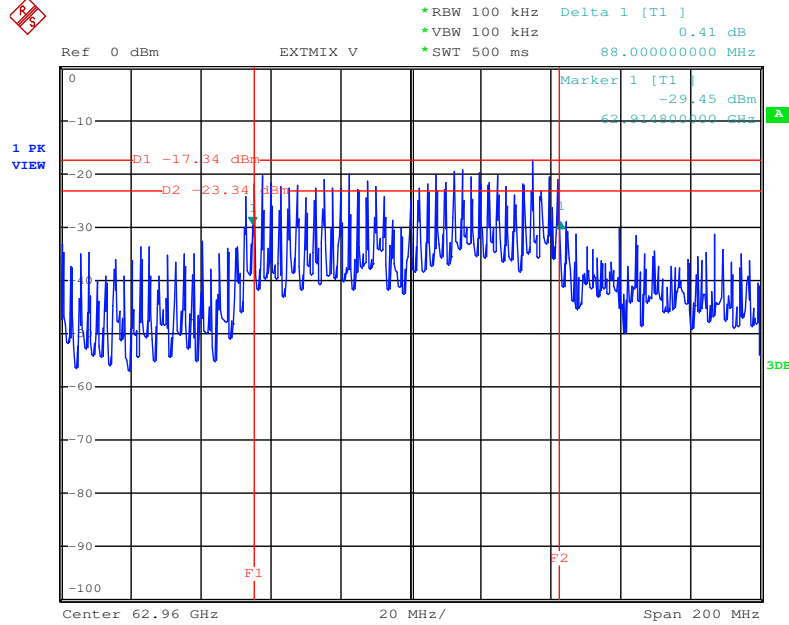


Date: 18.DEC.2015 18:13:35



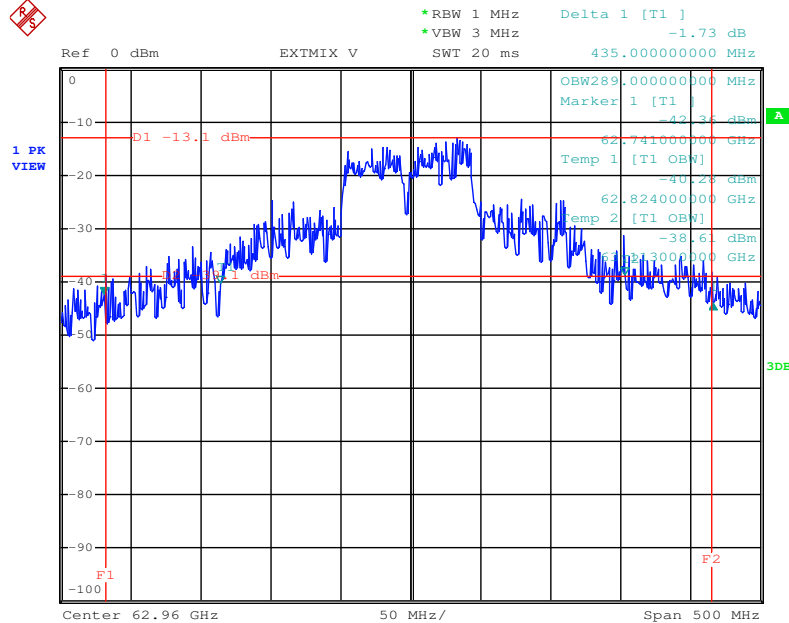
Test Frequency: 62.95725 GHz

6 dBc Bandwidth



Date: 18.DEC.2015 19:46:58

Occupied Bandwidth&26 dBc Bandwidth



Date: 18.DEC.2015 19:53:55

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

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

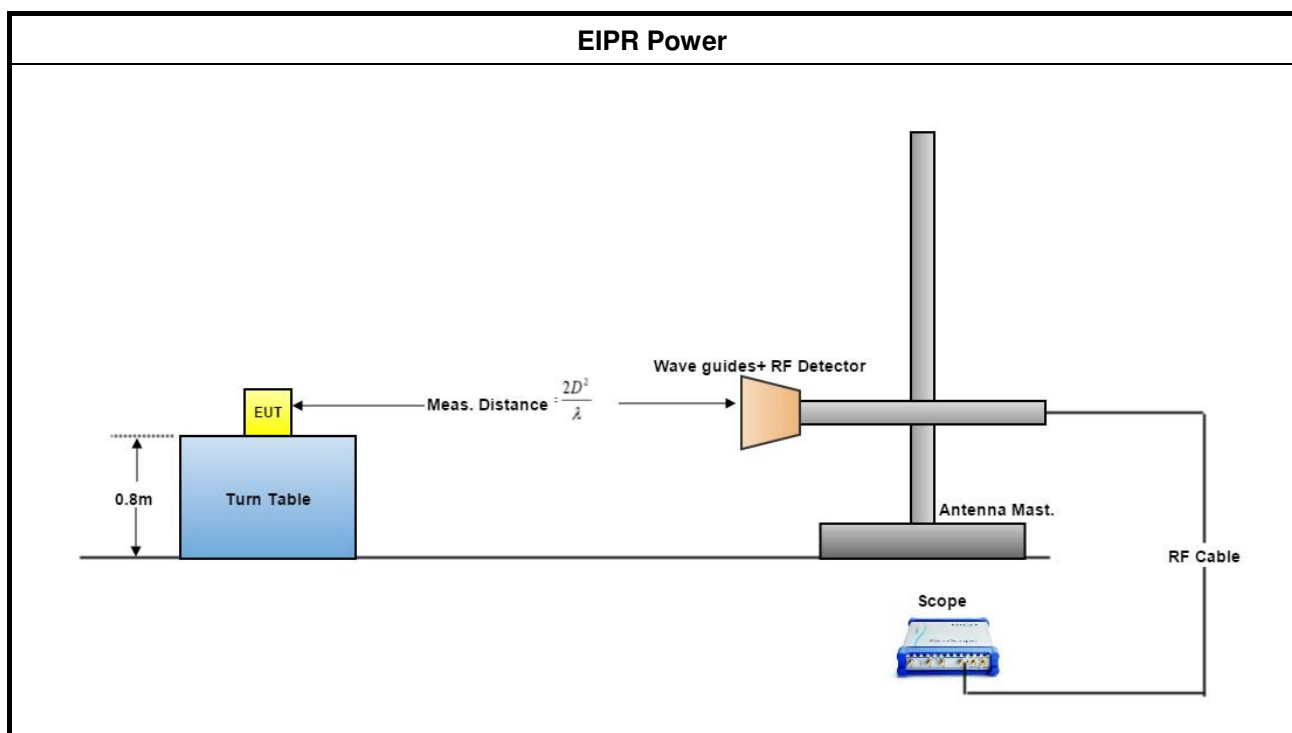
3.3.2 Measuring Instruments

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	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Distance	0.40 m
Test Date	Dec. 21, 2015		

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: 60.16275-60.79725	60.16275	473	38	-9.75	-30.54	139.54	118.75	26.88	19.14	43	40
	60.48	489	48	-8.82	-29.17	140.47	120.12	27.81	20.51	43	40
	60.79725	483	47	-9.09	-29.23	140.25	120.11	27.59	20.50	43	40
Channel 3 LRP: 62.32275-62.95725	62.32275	537	111	-5.21	-25.59	144.38	124.00	31.73	24.40	43	40
	62.64	553	113	-4.98	-24.85	144.61	124.74	31.96	25.14	43	40
	62.95725	521	112	-6.35	-24.91	143.29	124.73	30.63	25.12	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	20.5°C			Humidity	32%		
Test Engineer	Owen Hsu			Test Date	Dec. 21, 2015		
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)
Channel 2 LRP: 60.16275-60.79725	60.16275	26.78	6	20.78	119.702	90.00	450.00
	60.48	27.71	6	21.71	148.286	90.00	450.00
	60.79725	27.49	6	21.49	140.814	90.00	450.00
Channel 3 LRP: 62.32275-62.95725	62.32275	31.63	6	25.63	365.242	88.00	440.00
	62.64	31.86	6	25.86	385.107	90.40	452.00
	62.95725	30.53	6	24.53	283.772	88.00	440.00
<p>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.</p> <p>NOTE 2: For the 6dBc bandwidth, see test report clause 3.2.5.</p> <p>NOTE 3: For the applicable limit, see FCC 15.255(e)</p> <p>NOTE 5: For radiated emission measurements, calculate conducted transmitter output power P(cond)(dBm)</p> $P(\text{cond}) = \text{EIRP} - G(\text{dBi})$ <p>where:</p> <p>G(dBi) is gain of EUT antenna.</p>							

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)

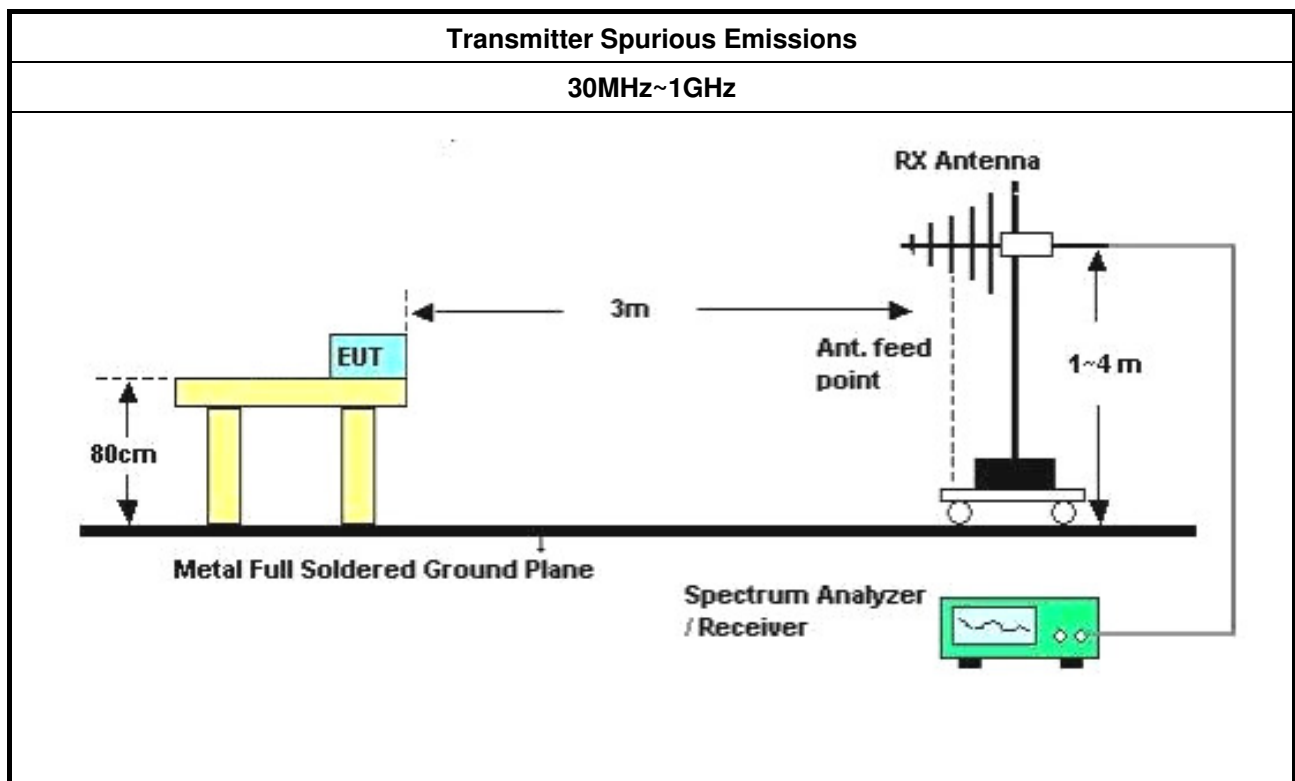
NOTE 2: Spurious emissions shall not exceed the level of the fundamental emission.

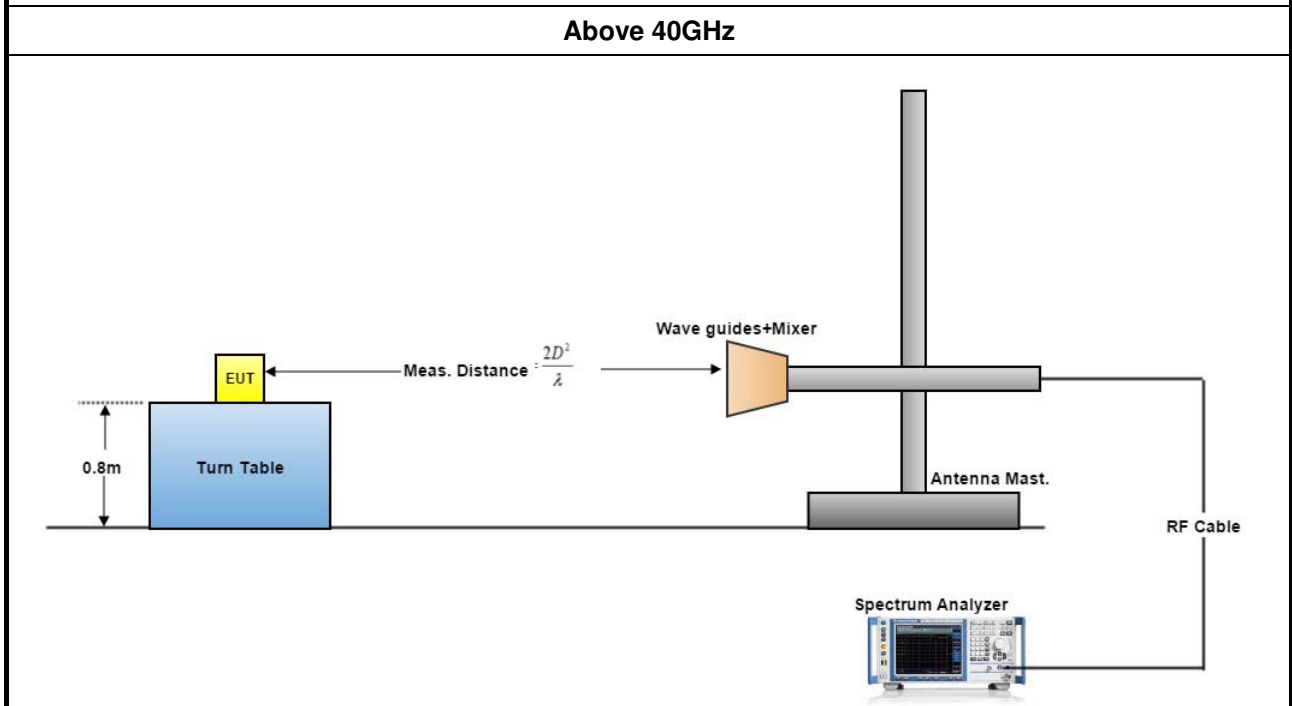
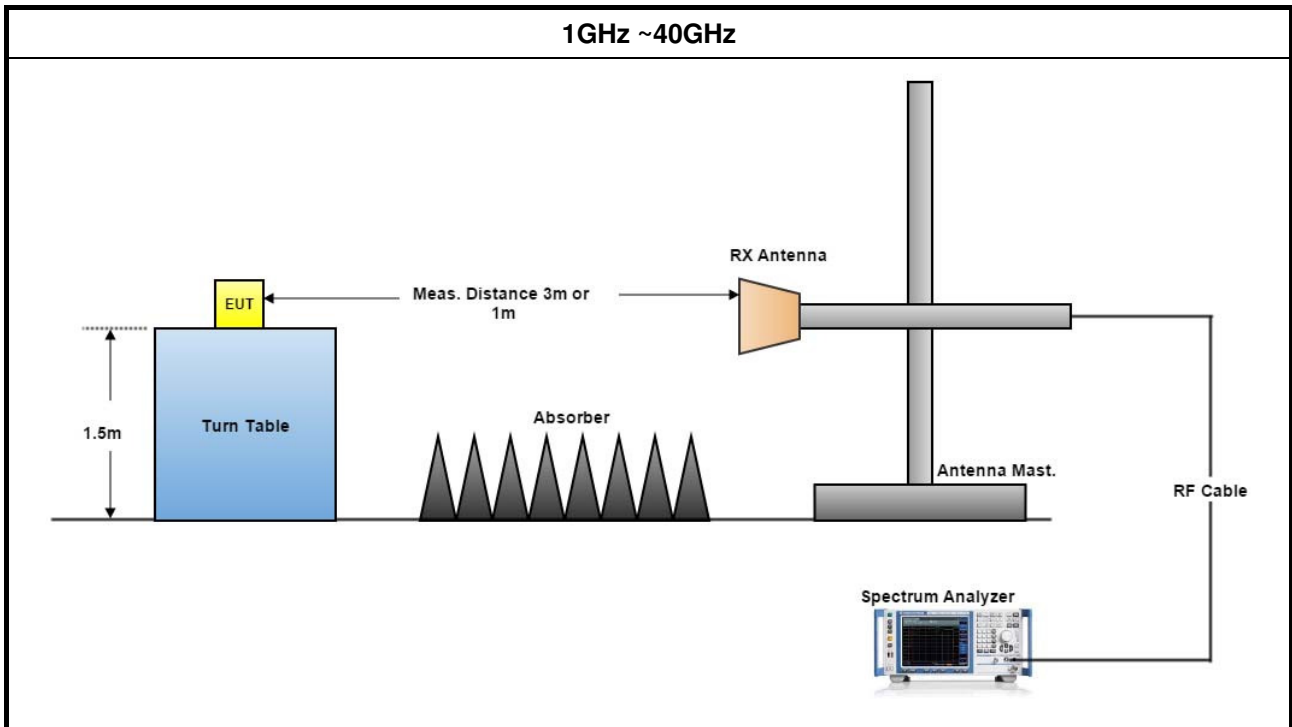
NOTE 3: publicly-accessible coordination channel, whose purpose is to coordinate operation between diverse transmitters with a view towards reducing the probability of interference throughout the 57-64 GHz band, are permitted in the 57-57.05 GHz band. The development of standards for this channel shall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





A measuring distance of at 3 m shall be used for measurements at frequencies up to 15 GHz. For frequencies above 15 GHz, any suitable measuring distance may be used. The measurement distance is chosen up to far field distance, depending on the test system noise floor for detecting spurious emission signals. Then above 15 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from spec. distance (3 m) to measurement distance. Distance extrapolation factor = 20 log (spec. distance [3 m] / measurement distance [N m]) (dB) .The measurements described in ANSI C63.10, clause 7.8.6. If the emission cannot be detected at 1 m, reduce the RBW to increase system sensitivity. Note the value. If the emission still cannot be detected, move the horn closer to the EUT, noting the distance at which a measurement is made.



3.5.4 Test Result of Transmitter Spurious Emissions

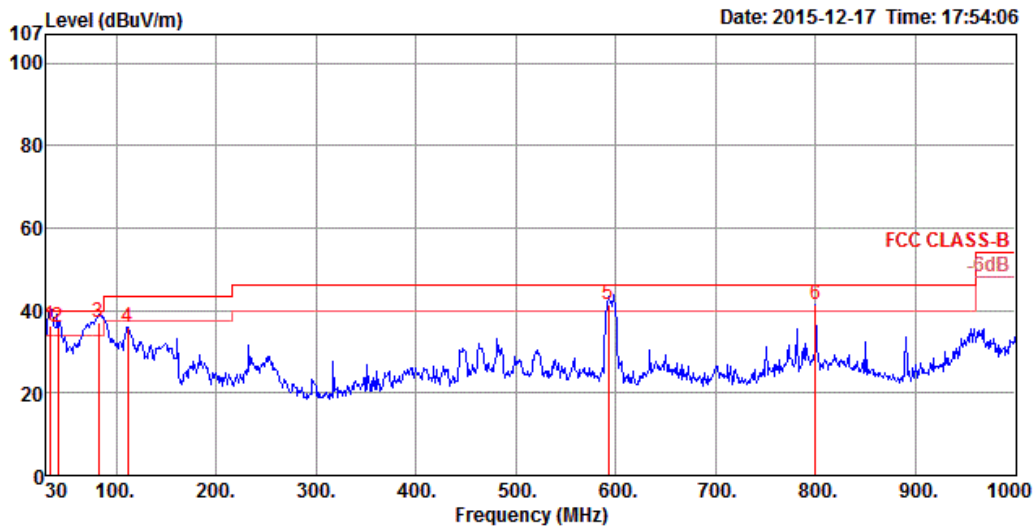
Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.12 ~ 9.13
NOTE: If equipment having different channel plan and nominal channel bandwidth modes (see test report clause 1.1.1), the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes.	



3.5.4.1 Test Result of Transmitter Spurious Emissions

Temp	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Distance	3 m
Test Range	30 MHz – 1000 MHz	Test Configuration	CTX

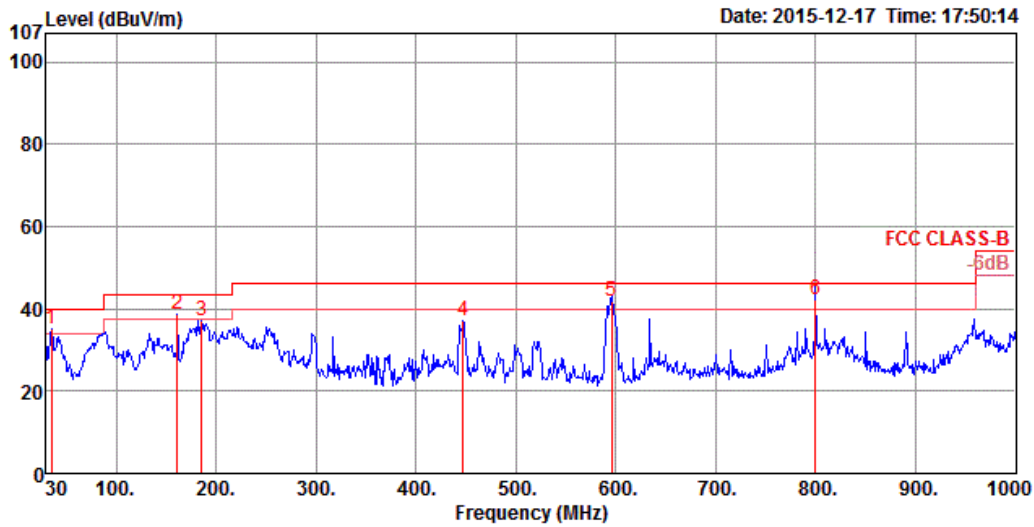
Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Remark
	MHz	dBUV/m	dBUV/m	dB	dBuV	dB	dB	dB/m	Pol/Phase	deg	cm	
1	33.88	36.36	40.00	-3.64	50.50	0.81	32.64	17.69	VERTICAL	0	100	QP
2	41.64	36.12	40.00	-3.88	54.72	0.95	32.63	13.08	VERTICAL	234	100	QP
3	82.38	37.29	40.00	-2.71	60.66	1.21	32.59	8.01	VERTICAL	184	100	QP
4	111.48	35.90	43.50	-7.60	54.79	1.33	32.57	12.35	VERTICAL	176	100	Peak
5	592.60	41.43	46.00	-4.57	52.33	2.82	32.68	18.96	VERTICAL	182	100	QP
6	800.18	41.44	46.00	-4.56	49.90	3.23	32.39	20.70	VERTICAL	0	100	Peak



Horizontal



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	34.85	35.02	40.00	-4.98	49.68	0.81	32.64	17.17	HORIZONTAL	299	200	Peak
2	160.95	38.71	43.50	-4.79	58.99	1.55	32.56	10.73	HORIZONTAL	199	200	Peak
3	185.20	37.21	43.50	-6.29	58.42	1.64	32.55	9.70	HORIZONTAL	180	150	Peak
4	447.10	37.07	46.00	-8.93	50.08	2.41	32.58	17.16	HORIZONTAL	254	200	Peak
5	595.51	41.99	46.00	-4.01	52.88	2.82	32.69	18.98	HORIZONTAL	282	150	QP
6	800.18	42.40	46.00	-3.60	50.86	3.23	32.39	20.70	HORIZONTAL	139	100	QP



Test Plan: Channel 2 LRP: 60.16275-60.79725

Temp	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Frequency (GHz)	60.48
Test Date	Dec. 17, 2015		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1200.01	37.89	54.00	-16.11	45.70	3.72	36.39	24.86	VERTICAL	225	155	Average
2	1200.27	43.34	74.00	-30.66	51.15	3.72	36.39	24.86	VERTICAL	225	155	Peak
3	11997.38	58.55	74.00	-15.45	42.80	11.95	35.20	39.00	VERTICAL	219	155	Peak
4	12002.20	45.72	54.00	-8.28	29.97	11.95	35.20	39.00	VERTICAL	219	155	Average

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1199.97	39.54	54.00	-14.46	47.35	3.72	36.39	24.86	HORIZONTAL	223	153	Average
2	1199.97	45.62	74.00	-28.38	53.43	3.72	36.39	24.86	HORIZONTAL	223	153	Peak
3	12002.54	59.02	74.00	-14.98	43.27	11.95	35.20	39.00	HORIZONTAL	220	155	Peak
4	12004.88	45.93	54.00	-8.07	30.18	11.95	35.20	39.00	HORIZONTAL	220	155	Average



Test Plan: Channel 3 LRP: 62.32275-62.95725

Temp	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Frequency (GHz)	62.64
Test Date	Dec. 17, 2015		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1199.93	36.38	54.00	-17.62	44.19	3.72	36.39	24.86	VERTICAL	201	151	Average
2	1200.15	43.60	74.00	-30.40	51.41	3.72	36.39	24.86	VERTICAL	201	151	Peak
3	11999.96	45.78	54.00	-8.22	30.03	11.95	35.20	39.00	VERTICAL	222	150	Average
4	12000.52	59.07	74.00	-14.93	43.32	11.95	35.20	39.00	VERTICAL	222	150	Peak

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1200.04	37.85	54.00	-16.15	45.66	3.72	36.39	24.86	HORIZONTAL	203	154	Average
2	1200.14	44.24	74.00	-29.76	52.05	3.72	36.39	24.86	HORIZONTAL	203	154	Peak
3	12003.32	58.82	74.00	-15.18	43.07	11.95	35.20	39.00	HORIZONTAL	222	149	Peak
4	12003.34	45.50	54.00	-8.50	29.75	11.95	35.20	39.00	HORIZONTAL	222	149	Average



Test Plan: Channel 2 LRP: 60.16275-60.79725

Temp	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Frequency (GHz)	60.48
Test Date	Dec. 17, 2015		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	22174.16	41.39	63.54	-22.15	45.98	9.00	51.85	38.26	VERTICAL	162	174	Average
2	22174.16	51.80	83.54	-31.74	56.39	9.00	51.85	38.26	VERTICAL	162	174	Peak

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	22174.91	41.69	63.54	-21.85	46.28	9.00	51.85	38.26	HORIZONTAL	144	183	Average
2	22174.91	50.84	83.54	-32.70	55.43	9.00	51.85	38.26	HORIZONTAL	144	183	Peak



Test Plan: Channel 3 LRP: 62.32275-62.95725

Temp	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Frequency (GHz)	62.64
Test Date	Dec. 17, 2015		

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	23265.00	42.71	63.54	-20.83	46.38	9.17	51.48	38.64	VERTICAL	210	176	Average
2	23265.00	52.09	83.54	-31.45	55.76	9.17	51.48	38.64	VERTICAL	210	176	Peak

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	23265.43	43.25	63.54	-20.29	46.92	9.17	51.48	38.64	HORIZONTAL	136	196	Average
2	23265.43	53.27	83.54	-30.27	56.94	9.17	51.48	38.64	HORIZONTAL	136	196	Peak



Temp	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Date	Dec. 21, 2015
Test Range	40GHz – 200GHz		

Test Plan: Channel 2 LRP: 60.16275-60.79725

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	23.6	1.00	40.80	-70.98
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m ²)	Limit (pW/cm ²)	Test Result
-29.93	3	8.9959	90.00	Complied

Test Plan: Channel 3 LRP: 62.32275-62.95725

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	23.6	1.00	41.20	-68.08
EIRP (dBm)	Specification Distance (m)	Power Density (pW/m ²)	Limit (pW/cm ²)	Test Result
-26.94	3	17.8862	90.00	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.	

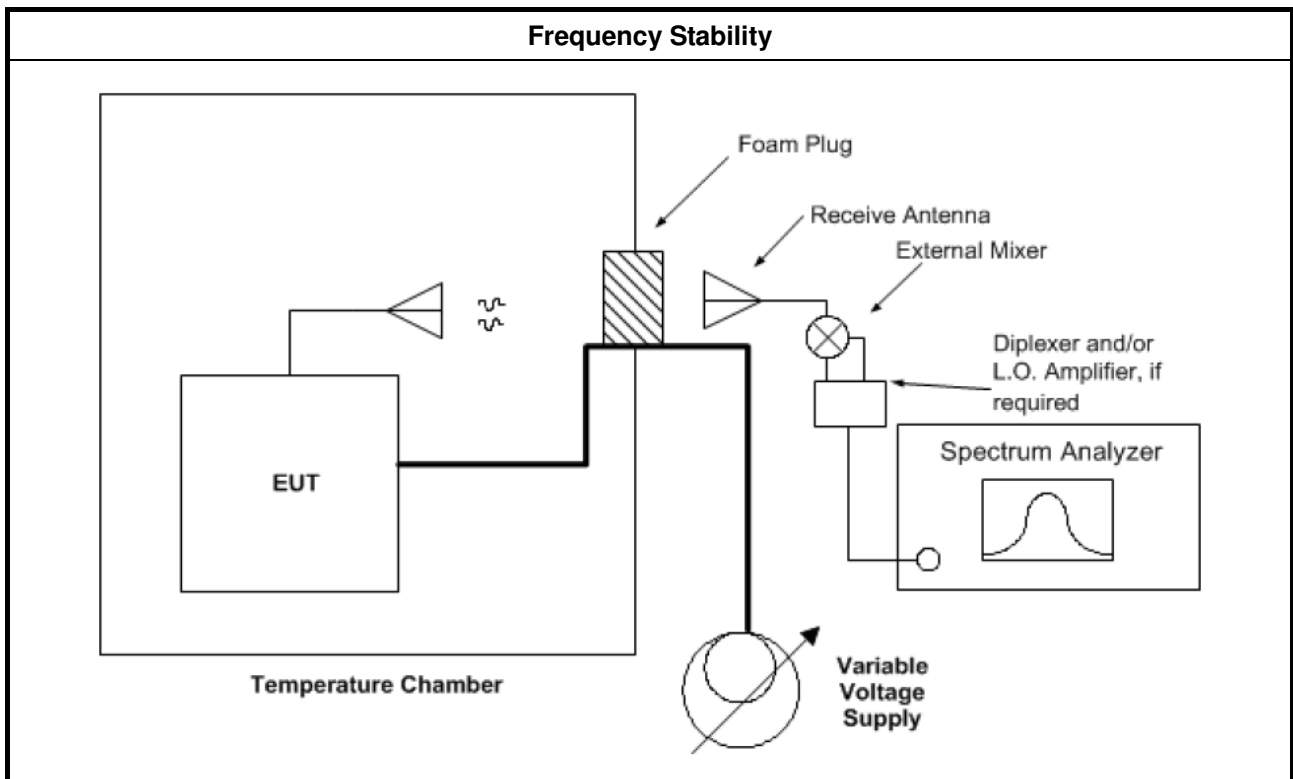
3.6.2 Measuring Instruments

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	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Date	Dec. 21, 2015
Test Results			
Test Temperature (°C)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
-20	60479.958	-42	within band
-10	60479.974	-26	within band
0	60479.982	-18	within band
10	60479.990	-10	within band
20	60480.000	Reference	within band
30	60480.014	14	within band
40	60480.022	22	within band
50	60480.038	24	within band
NOTE:			
1. For the applicable limit, see FCC 15.255(f).			
2. The manufacturer's specified temperature range of -20 to 50°C.			



3.6.5.2 Frequency Stability When Varying Supply Voltage

Frequency Stability When Varying Supply Voltage			
Temp	20.5°C	Humidity	32%
Test Engineer	Owen Hsu	Test Date	Dec. 21, 2015
Test Results			
Test Voltage: (Vac)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
102	60480.002	-14	within band
120	60480.016	Reference	within band
138	60480.028	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: <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• External phase-locking (Refer as FCC 15.255 (h))

3.7.2 Result of Operation Restriction

Manufacturer declares that EUT will not be used on aircraft or satellites. Then user manual will include a statement to caution EUT is not permitted for use 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 Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 16, 2015	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 13, 2015	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 25, 2015	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	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Feb.10, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	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)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
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. 02, 2015	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%