



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7**

CERTIFICATION TEST REPORT

FOR

60 GHz WIRELESS HIGH DEFINITION (HD) SOURCE

MODEL NUMBER: EAX5296T

FCC ID: BEJEAX5296

IC: 2703L-EAX5296

REPORT NUMBER: 09U12438-1, Revision A

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Prepared for

LG ELECTRONICS INC.

642 JINPYUNG - DONG

GUMI-CITY, GYUNGBUK 730 - 727, KOREA

Prepared by

COMPLIANCE CERTIFICATION SERVICES

47173 BENICIA STREET

FREMONT, CA 94538, U.S.A.

TEL: (510) 771-1000

FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	3/30/2009	As Issued	M. Heckrotte
A	4/19/2009	Corrected antenna gain used for power calculation	M. Heckrotte

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS INC.
642 JINPYUNG - DONG
GUMI-CITY, GYUNGBUK 730 - 727, KOREA

EUT DESCRIPTION: 60 GHz WIRELESS HIGH DEFINITION (HD) SOURCE

MODEL: EAX5296T

SERIAL NUMBERS: 02239

DATE TESTED: MARCH 16-20, 2009

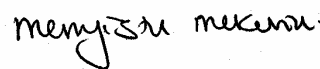
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 13	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



MICHAEL HECKROTTE
DIRECTOR OF ENGINEERING
COMPLIANCE CERTIFICATION SERVICES

MENGISTU MEKURIA
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented in ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC KDB 200443 Millimeter Wave Test Procedure, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WirelessHD Source radio module that is installed inside an HDTV control box. It is designed to operate as part of a Wireless Video Audio Network (WVAN) in the 57 to 64 GHz band. The EUT sends High Definition Audio/Video to a WirelessHD Sink radio module installed inside an HDTV.

The EUT transmits and receives control and management signals on one of three Low Rate Physical (LRP) channels from 60.32 to 60.64 GHz. The integral LRP transmit/receive antenna is a scanning beam-steering array with a maximum gain of 13 dBi.

The EUT transmits High Definition Audio/Video data on a single High Rate Physical (HRP) channel at 60.48 GHz. The integral HRP transmit antenna is an adaptive beam-steering array with a maximum gain of 17 dBi.

The LRP modulation is BPSK. The HRP modulation can be either QPSK or 16-QAM. Three system data rates are implemented: QPSK at 0.952 Gb/s (Quarter Rate), QPSK at 1.904 Gb/s (Half Rate) and 16-QAM at 3.807 Gb/s (Full Rate).

5.2. OUTPUT POWER

The antenna is integral thus radiated measurements are made. The EIRP was measured at the worst-case condition, thus the EIRP measurement conditions correspond to the maximum EUT antenna gain. Therefore the maximum antenna gain is used to calculate the Peak Output Power.

The highest peak output power for LRP is 12.3 dBm (17 mW).

The peak output power for HRP is 16.8 dBm (47.9 mW).

5.3. WORST-CASE CONFIGURATION AND MODE

Two units, the control box with a WirelessHD Source, and television set with a WirelessHD Sink, are configured to form a WVAN. All transmitters and receivers in this WVAN operate simultaneously.

To facilitate LRP measurements the EUT was maintained in the WVAN setup phase by turning on the Source while the Sink remained powered down. The highest level was measured on the LRP Mid Channel.

During normal operation of the WVAN, with HRP established and active, the bandwidth of the LRP signal (for all three LRP channels) falls entirely within the bandwidth of the HRP signal. Thus the LRP signal in this mode is inherently and simultaneously measured with the HRP signal. The LRP was set to the Mid Channel during all measurements of HRP, based on the worst-case of the LRP measurements during the WVAN setup phase.

Preliminary measurements were performed at all three data rates (Full, Half and Quarter). The highest level was measured in the Quarter Rate mode. All final measurements were performed with the system set to the Quarter Rate mode.

Preliminary measurements were performed with the HRP antenna beam set to various orientations, then aligning the measurement receiver to find the maximum level. The orientation with the highest radiated level was with the main lobe of the beam normal (perpendicular) to the plane of the antenna array. All final in-band HRP measurements were performed with the main lobe oriented and locked in the direction normal to the plane of the antenna array.

Preliminary measurements were performed by placing the measurement receiver at various orientations of the LRP antenna beam, then aligning the measurement receiver to find the maximum level. All orientations yielded similar levels. All final in-band LRP measurements were performed with the measurement receiver directly in front of and normal to the plane of the antenna array.

5.4. MODIFICATIONS

To pass radiated emission limits at 24.192 GHz, shielding is added to the circuit board around the antenna array.

6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
47" LCD Television	LG	47LH85-UC	605KGC00001	BEJ47LH85UC
Control Box (Host)	LG	ASW1000-UA	902KGCC00001	BEJASW1000UA

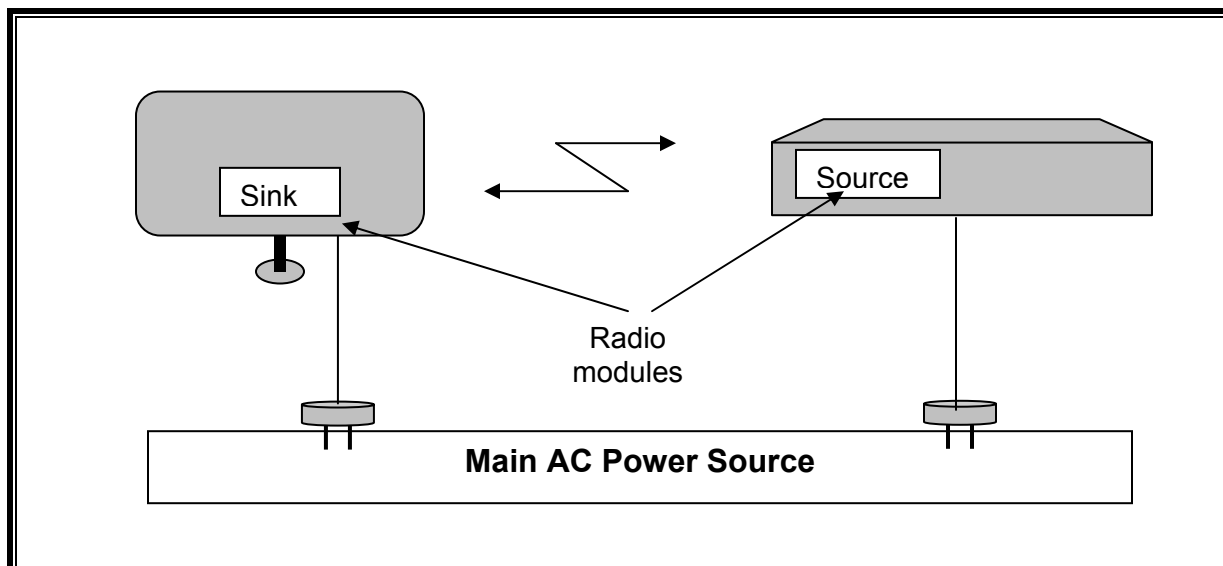
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	AC	Un-Shielded	2.0 m	N/A

TEST SETUP

High Definition Audio / Video in the 1080p format was sent from the control box to the Television via the wireless link. A laptop computer was utilized to vary the radio configuration and antenna beam orientation for testing purposes. This computer was not connected during measurements.

SETUP DIAGRAM FOR TESTS



7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	11/14/200
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	1/14/2010
Preamp, 1000MHz	Sonoma	310N	N02891	3/31/2009
Antenna, Horn, 18 GHz	EMCO	3115	C00783	4/22/2009
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	8/5/2009
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	1/29/2010
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	4/29/2009
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	2/3/2010
Harmonic Mixer, 50 GHz	Agilent / HP	11970Q	C00769	5/9/2009
Harmonic Mixer, 75 GHz	Agilent / HP	11970V	C00768	12/1/2009
Harmonic Mixer, 110 GHz	Agilent / HP	11970W	C00770	12/1/2009
Harmonic Mixer, 140 GHz	OML	M08HWA	C00868	CNR
Harmonic Mixer, 220 GHz	OML	M05HWA	C00867	CNR
Mixer Diplexer for HP	OML	DPL.313B	N02429	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	5/13/2009

8. APPLICABLE LIMITS AND TEST RESULTS

8.1. 6 dB BANDWIDTH

APPLICABLE RULE

§15.255 (e) (1) For the purposes of this paragraph (e)(1), emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g. for frequency hopping devices).

LIMIT

None; for reporting purposes only.

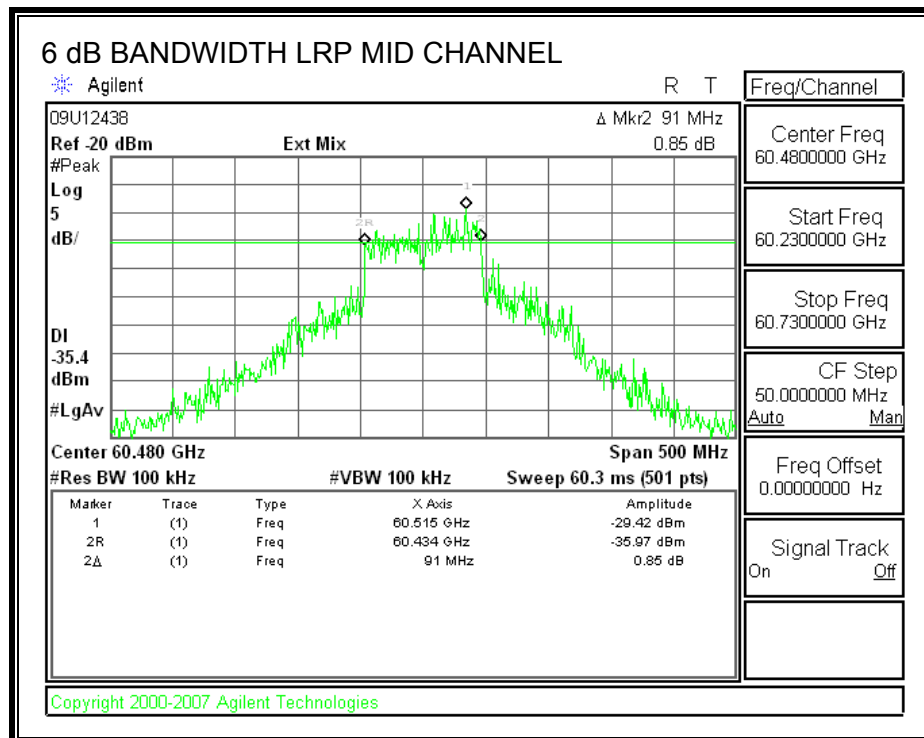
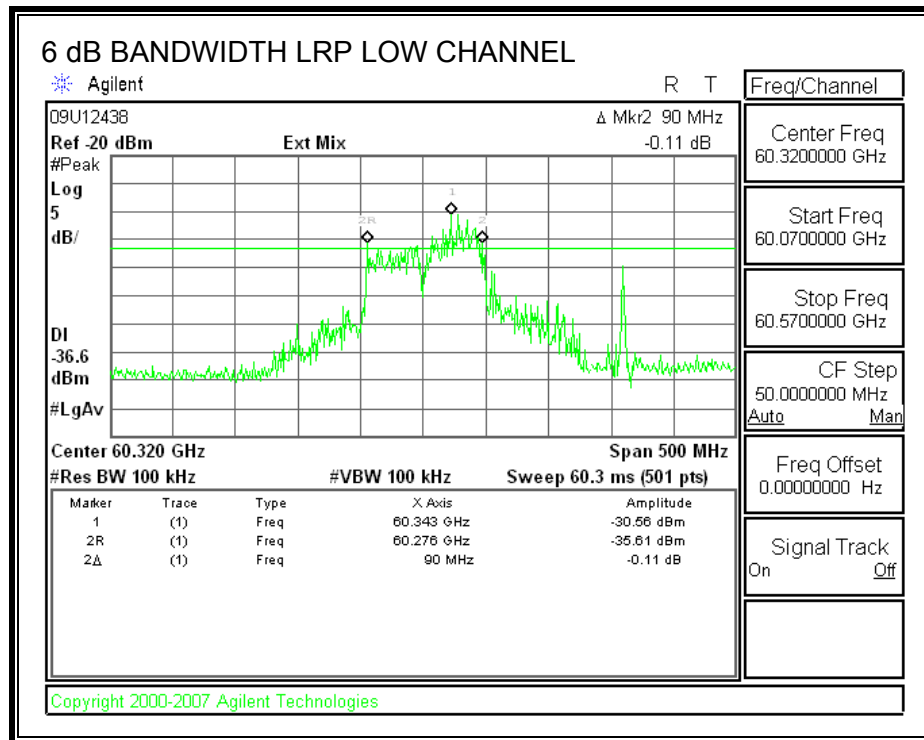
TEST PROCEDURE

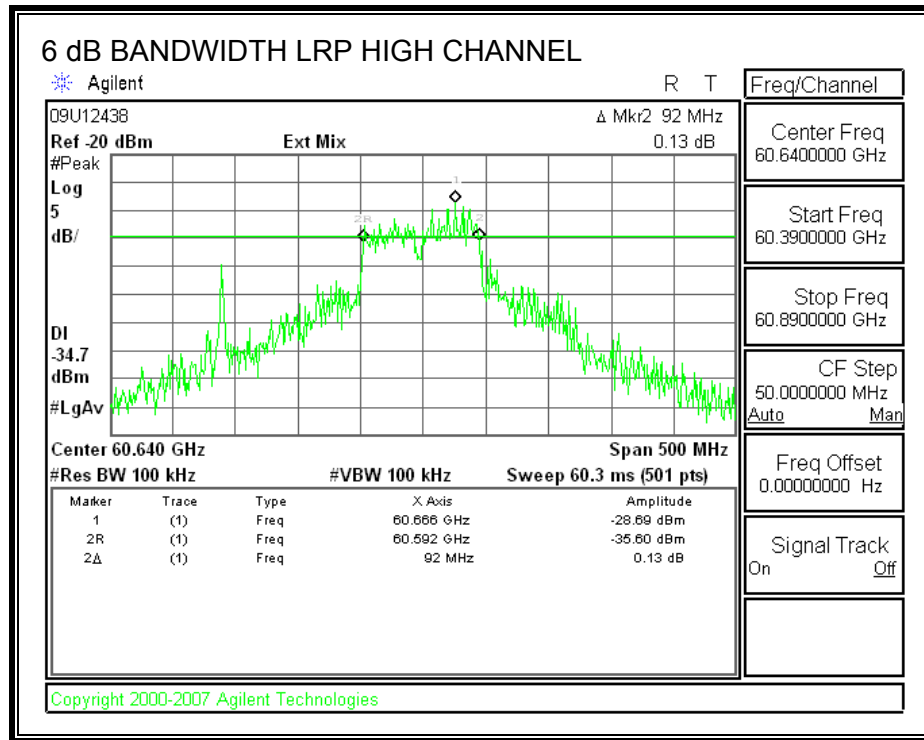
The spectrum analyzer and external mixer are set up to measure the radiated output of the transmitter.

LRP RESULTS

Channel	Frequency (GHz)	6 dB Bandwidth (MHz)
Low	60.32	90.00
Mid	60.48	91.00
High	60.64	92.00

6 dB BANDWIDTH

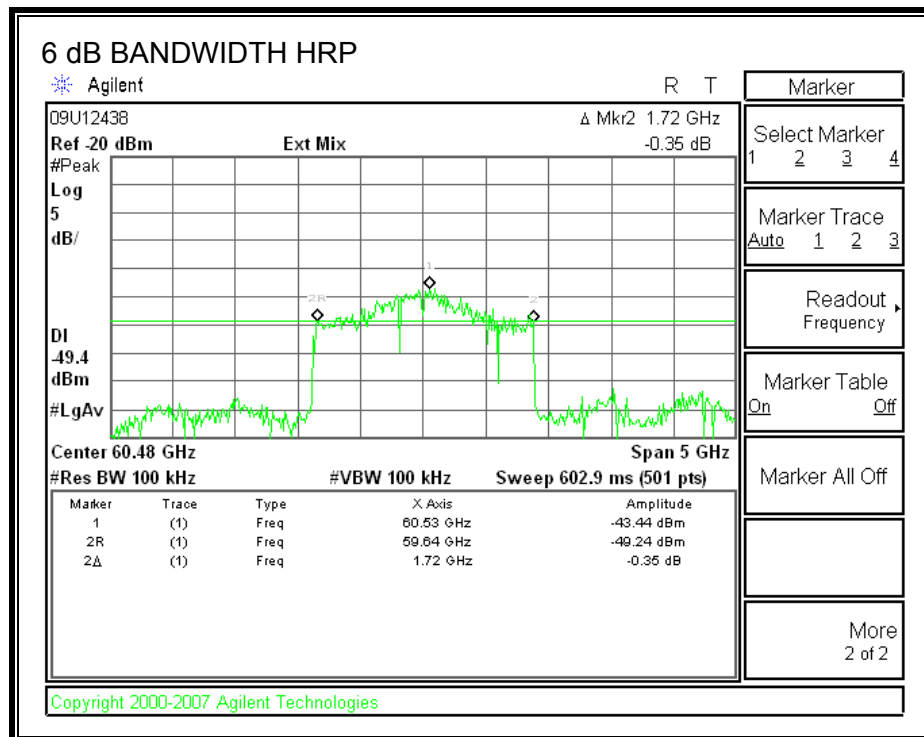




HRP RESULTS

Channel	Frequency (GHz)	6 dB Bandwidth (GHz)
HRP	60.48	1.72

6 dB BANDWIDTH



8.2. 26 dB BANDWIDTH

APPLICABLE RULE

§ 15.403 (c) as referenced by FCC KDB Publication 200443, Millimeter Wave Test Procedures

LIMIT

None; for reporting purposes only.

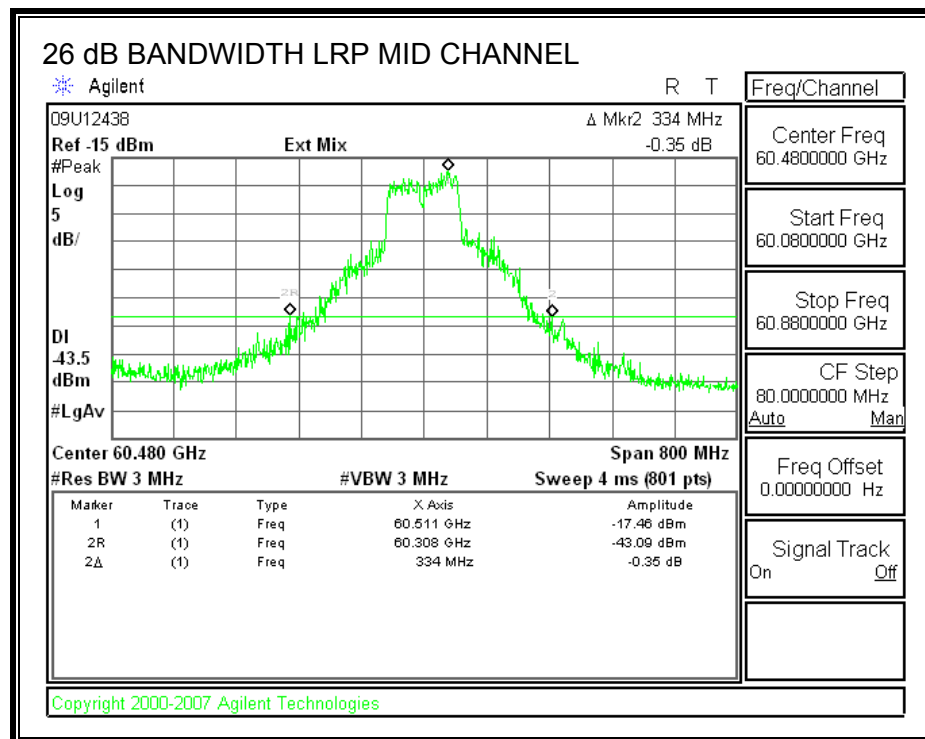
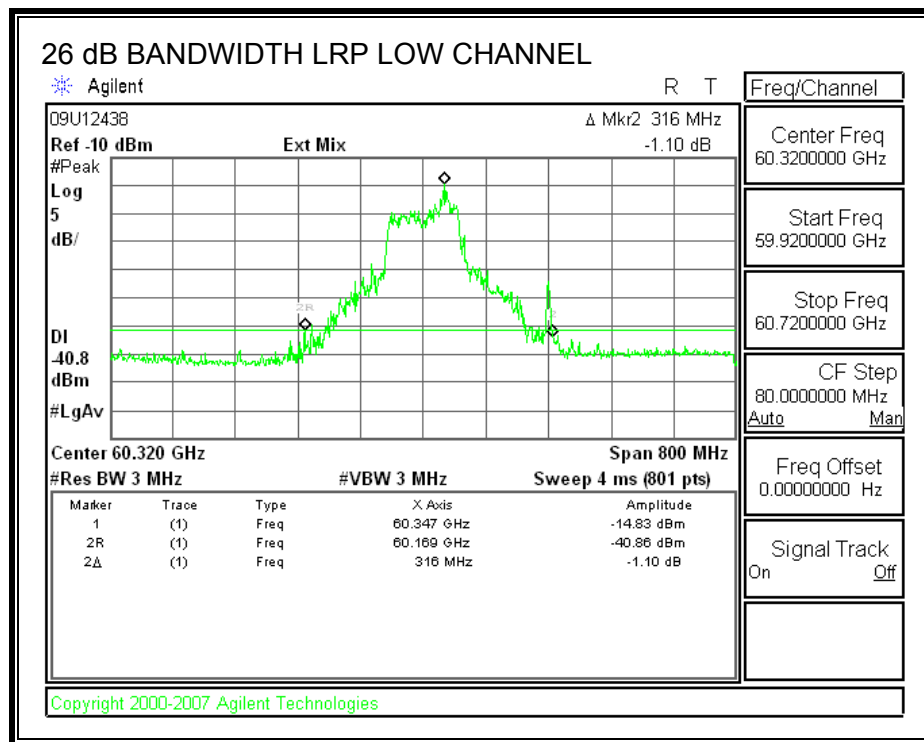
TEST PROCEDURE

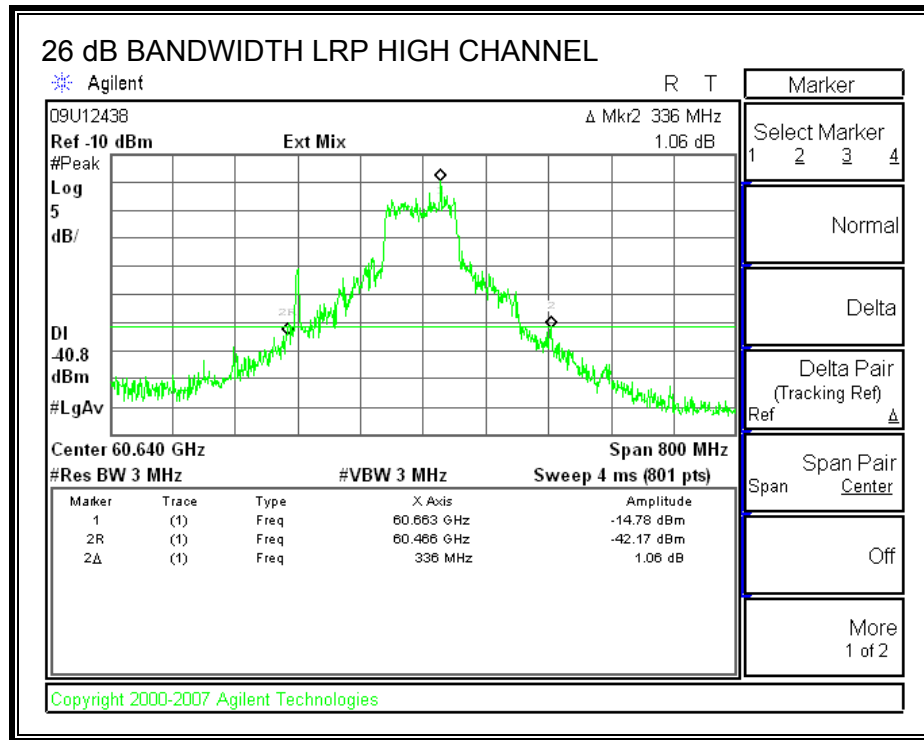
The spectrum analyzer and external mixer are set up to measure the radiated output of the transmitter.

LRP RESULTS

Channel	Frequency (GHz)	26 dB Bandwidth (MHz)
Low	60.32	316.00
Mid	60.48	334.00
High	60.64	336.00

26 dB BANDWIDTH

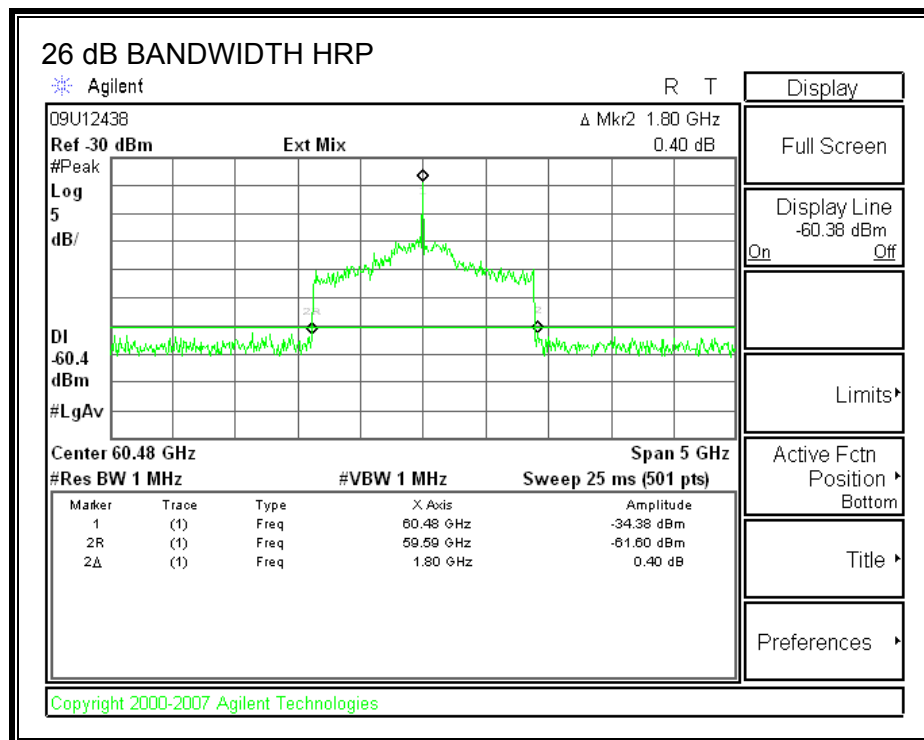




HRP RESULTS

Channel	Frequency (GHz)	26 dB Bandwidth (GHz)
HRP	60.48	1.8

26 dB BANDWIDTH



8.3. POWER DENSITY

LIMIT

§15.255 (b) Within the 57-64 GHz band, emission levels shall not exceed the following:

(1) For products other than fixed field disturbance sensors, the average power density of any emission, measured during the transmit interval, shall not exceed 9 uW/cm², as measured 3 meters from the radiating structure, and the peak power density of any emission shall not exceed 18 uW/cm², as measured 3 meters from the radiating structure.

(4) Peak power density shall be measured with an RF detector that has a detection bandwidth that encompasses the 57-64 GHz band and has a video bandwidth of at least 10 MHz, or using an equivalent measurement method.

(5) The average emission limits shall be calculated, based on the measured peak levels, over the actual time period during which transmission occurs.

Per FCC KDB Publication 200443, Millimeter Wave Test Procedures, If the emission under investigation is not pulsed, then the average levels may be measured by using a video filtering technique (i.e., VBW << RBW).

TEST PROCEDURE

Measurements are made at a distance greater than or equal to the far field boundary distance.

The peak power is measured by integrating the spectral envelope over the 26 dB EBW.

The measured power level is converted to EIRP using the Friis equation:

$$EIRP = P_T * G_T = (P_R / G_R) * (4 * \pi * D / \lambda)^2$$

where:

G_R is the gain of the receive measurement antenna

D is the measurement distance

λ is the wavelength

The EIRP is converted to Power Density using the equation:

$$P_D = EIRP / (4 * \pi * D_S^2)$$

where:

D_S is the specification distance

FAR FIELD BOUNDARY CALCULATIONS

The far-field boundary is given in FCC KDB Publication 200443 as:

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

where:

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

λ = wavelength in meters

Frequency (GHz)	L (m)	Lambda (m)	R (Far Field) (m)
60.48	0.025	0.0050	0.25

LRP POWER DENSITY RESULTS

PEAK POWER MEASUREMENTS

Note: The Peak Power Density complies with both the peak and average limits

LOW CHANNEL

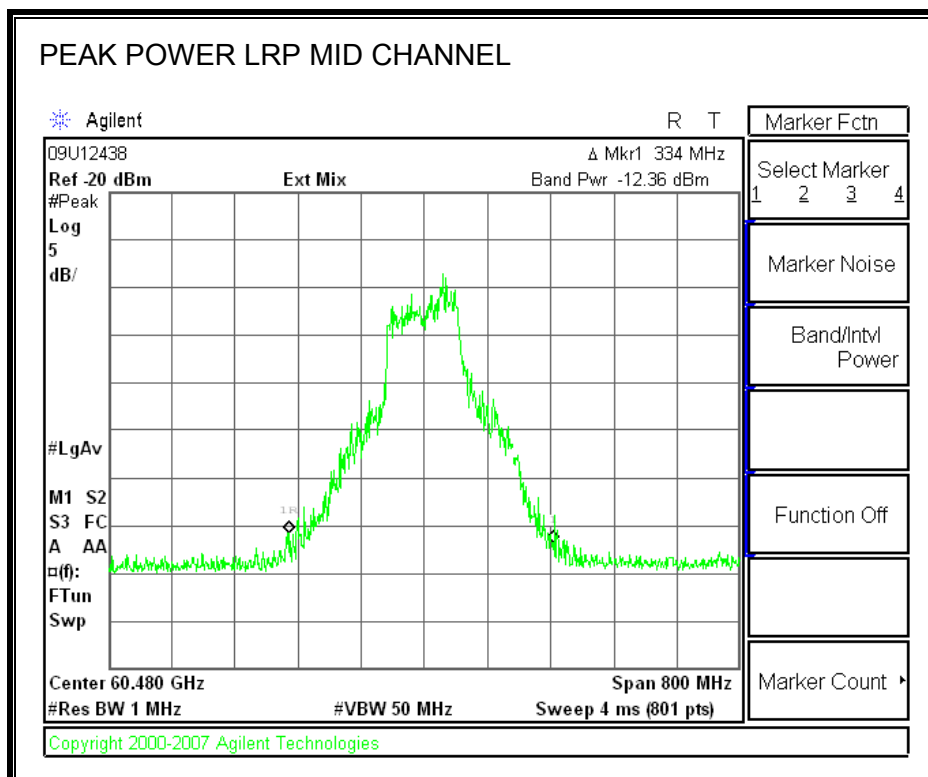
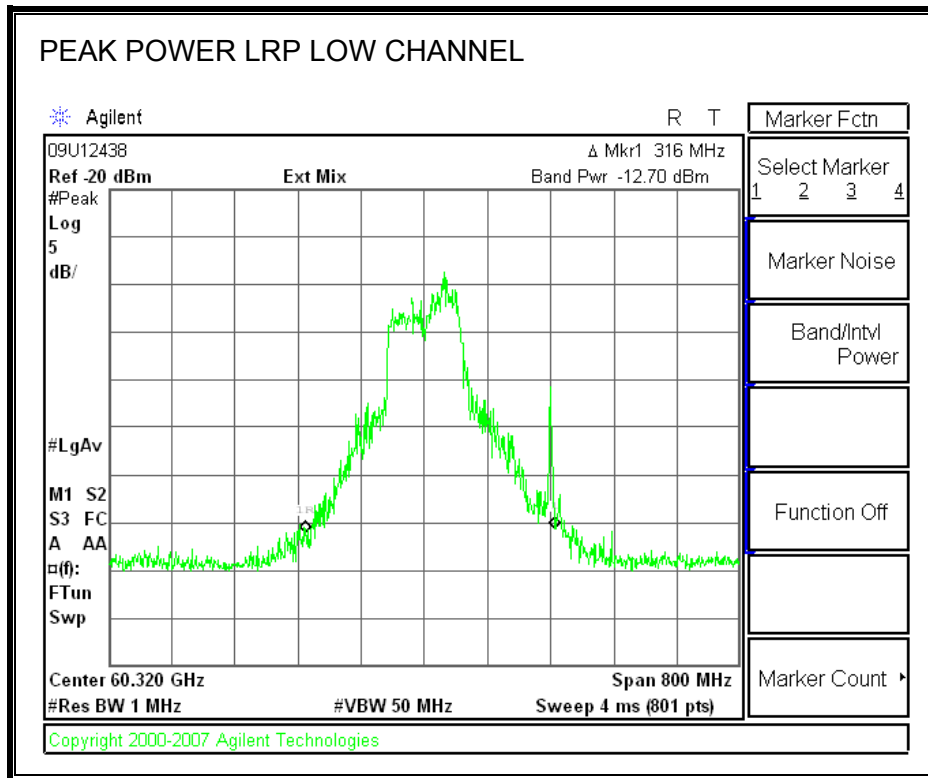
Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)		
60.32	0.30	-12.70	20.00	24.9		
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (uW/cm ²)	Peak Limit (uW/cm ²)	Average Limit (uW/cm ²)	
0.308	3.0	0.0027	0.27	18	9	

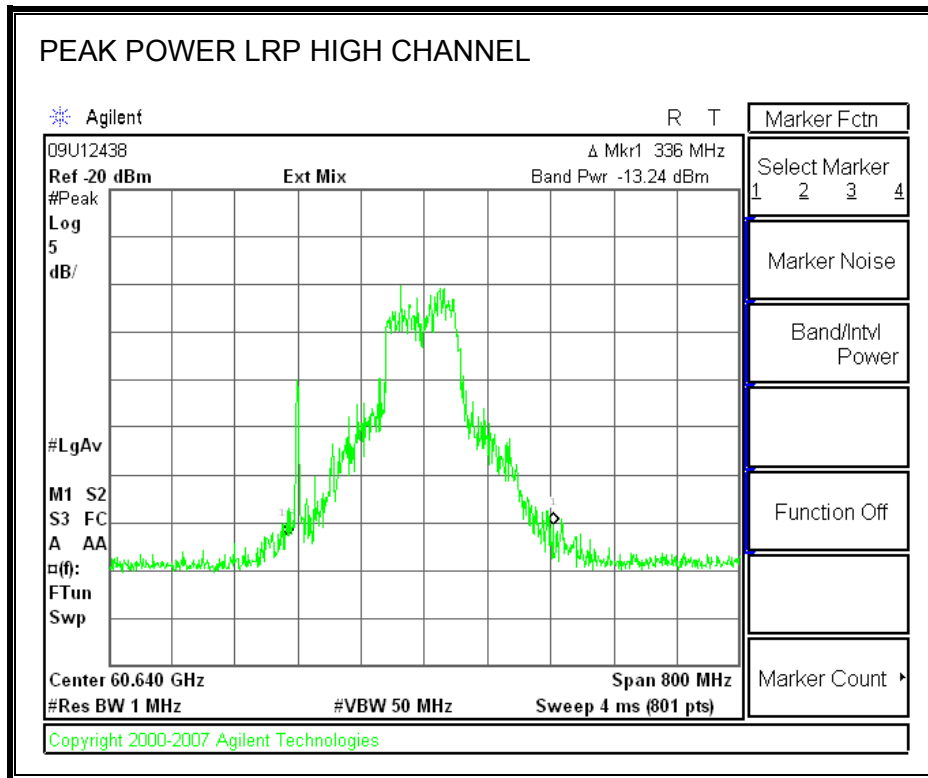
MID CHANNEL

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)		
60.48	0.30	-12.36	20.00	25.3		
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (uW/cm ²)	Peak Limit (uW/cm ²)	Average Limit (uW/cm ²)	
0.335	3.0	0.0030	0.30	18	9	

HIGH CHANNEL

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)		
60.64	0.30	-13.24	20.00	24.4		
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (uW/cm ²)	Peak Limit (uW/cm ²)	Average Limit (uW/cm ²)	
0.275	3.0	0.0024	0.24	18	9	



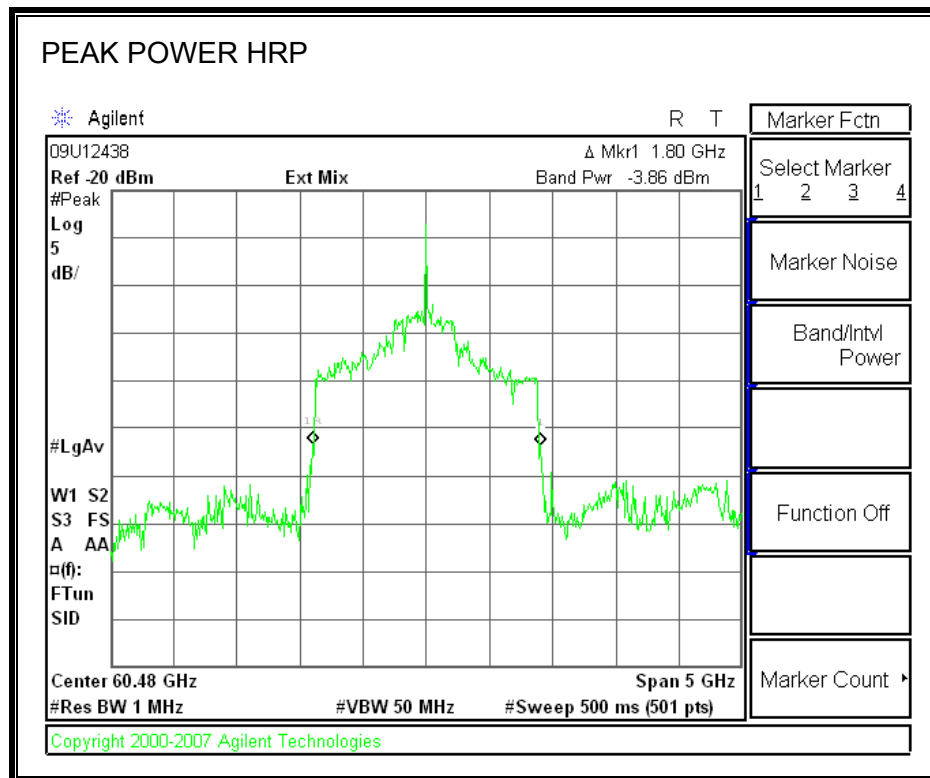


HRP POWER DENSITY RESULTS

PEAK POWER MEASUREMENTS

Note: The Peak Power Density complies with both the peak and average limits

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)	
60.48	0.30	-3.86	20.00	33.8	
EIRP (W)	Specification Distance (m)	Power Density (W/m^2)	Power Density (uW/cm^2)	Peak Limit (uW/cm^2)	Average Limit (uW/cm^2)
2.373	3.0	0.0210	2.10	18	9



8.4. PEAK OUTPUT POWER

LIMIT

§15.255 (e) Except as specified elsewhere in this paragraph (e), the total peak transmitter output power shall not exceed 500 mW.

§15.255 (e) (1) Transmitters with an emission bandwidth of less than 100 MHz must limit their peak transmitter output power to the product of 500 mW times their emission bandwidth divided by 100 MHz. For the purposes of this paragraph (e)(1), emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g. for frequency hopping devices).

§15.255 (e) (2) Peak transmitter output power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57–64 GHz band and that has a video bandwidth of at least 10 MHz, or using an equivalent measurement method.

§15.255 (e) (2) For purposes of demonstrating compliance with this paragraph (e), corrections to the transmitter output power may be made due to the antenna and circuit loss.

PROCEDURE

The EUT antenna gain is subtracted from the Peak EIRP.

LRP RESULTS

PEAK OUTPUT POWER

LOW CHANNEL

Frequency (GHz)	EIRP (dBm)	EUT Antenna Gain (dBi)	Output Power (dBm)	Output Power (mW)	6 dB Bandwidth (MHz)	Output Power Limit (mW)
60.32	24.9	13.00	11.90	15.5	90.0	450

MID CHANNEL

Frequency (GHz)	EIRP (dBm)	EUT Antenna Gain (dBi)	Output Power (dBm)	Output Power (mW)	6 dB Bandwidth (MHz)	Output Power Limit (mW)
60.48	25.3	13.00	12.30	17.0	91.0	455

HIGH CHANNEL

Frequency (GHz)	EIRP (dBm)	EUT Antenna Gain (dBi)	Output Power (dBm)	Output Power (mW)	6 dB Bandwidth (MHz)	Output Power Limit (mW)
60.64	24.4	13.00	11.40	13.8	92.0	460

HRP RESULTS

PEAK OUTPUT POWER

Frequency (GHz)	EIRP (dBm)	EUT Antenna Gain (dBi)	Output Power (dBm)	Output Power (mW)	6 dB Bandwidth (MHz)	Output Power Limit (mW)
60.48	33.8	17.00	16.80	47.9	1800	500

8.5. SPURIOUS EMISSIONS

LIMITS

§15.255 (c) (1) The power density of any emissions outside the 57–64 GHz band shall consist solely of spurious emissions.

§15.255 (c) (2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.

§15.255 (c) (3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm² at a distance of 3 meters.

§15.255 (c) (4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

§15.255 (d) Only spurious emissions and transmissions related to a 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.

Note to paragraph (d): The 57–57.05 GHz is reserved exclusively for a publicly-accessible coordination channel. The development of standards for this channel shall be performed pursuant to authorizations issued under part 5 of this chapter.

PROCEDURE FOR 30 MHz TO 40 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables.

PROCEDURE FOR 40 TO 200 GHz

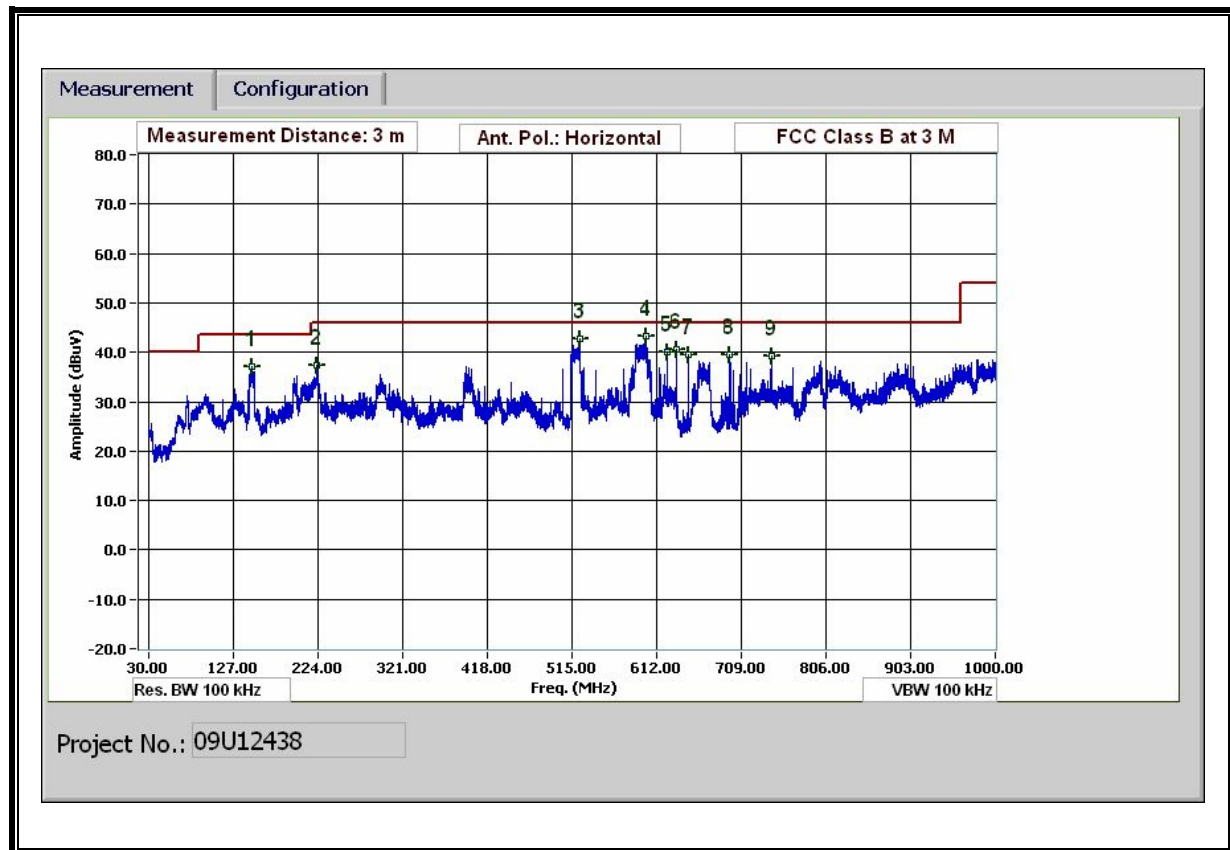
External harmonic mixers are utilized.

The antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations, at a maximum distance of 5 cm from the EUT.

A final test is made at any frequencies at which emissions are found. During this final scan, the antenna is kept no further from the EUT than the maximum distance calculated for each mixer band that yields a minimum system noise floor at least 6 dB below the spurious emissions limit.

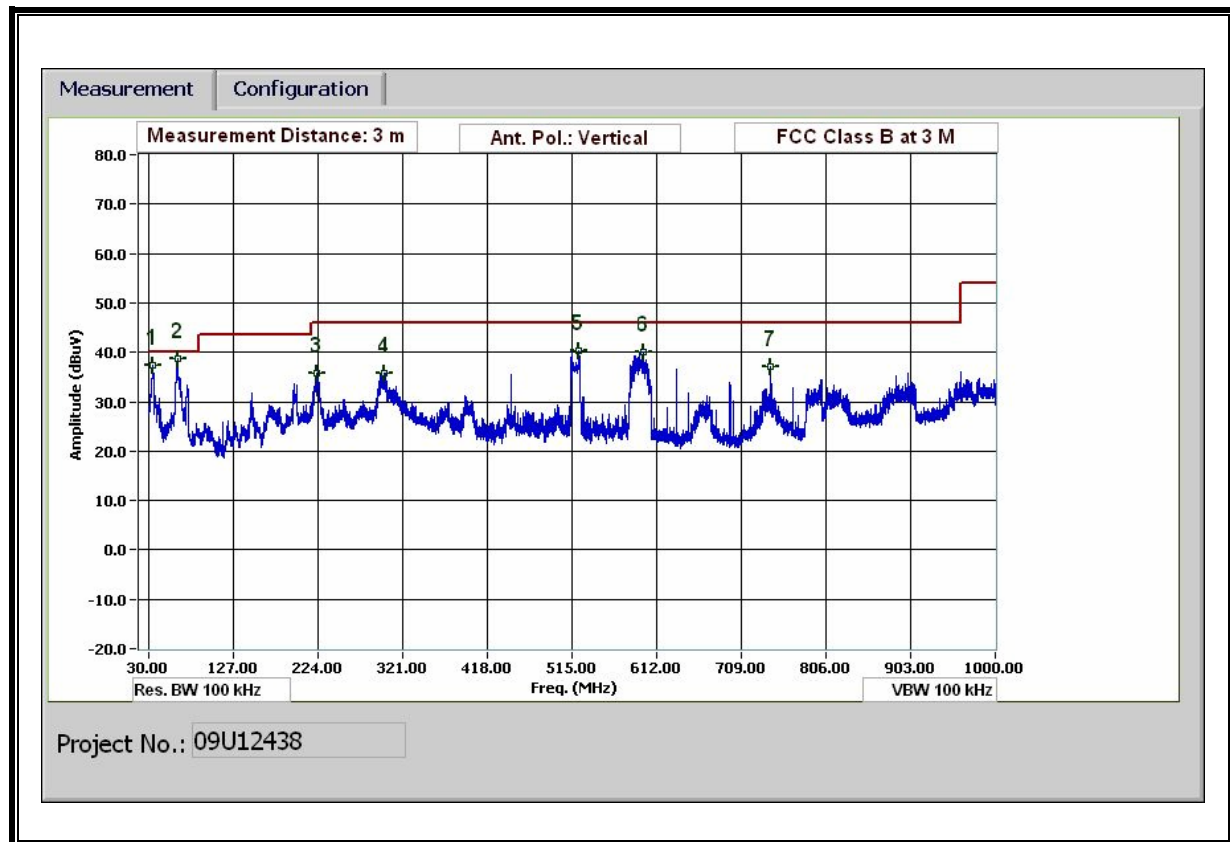
The power is measured, the EIRP is calculated, then the extrapolated power density at a 3 meter distance is calculated.

TX AND RX SPURIOUS EMISSION 30 TO 1000 MHz (HORIZONTAL PLOT)



Note: Measurements in this frequency range are made simultaneously on control box (Host) and Television (Support Equipment).

TX AND RX SPURIOUS EMISSION 30 TO 1000 MHz (VERTICAL PLOT)



Note: Measurements in this frequency range are made simultaneously on control box (Host) and Television (Support Equipment).

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: MENGISTU MEKURIA
Date: 18/03/09
Project #: 09UI12438
Company: LG ELECTRIC
EUT Description: WIHD MODULES INSIDE TV AND CONTROL SET
EUT M/N: EAX5296T AND EAX6069R
Test Target: FCC CLASS B
Mode Oper: VIDEO TX/RX

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
34.792	3.0	51.7	18.1	0.5	32.7	0.0	0.0	37.7	40.0	-2.3	V	P	
63.168	3.0	64.3	8.0	0.7	32.6	0.0	0.0	40.3	40.0	0.3	V	P	
223.088	3.0	55.1	11.9	1.4	32.6	0.0	0.0	35.8	46.0	-10.2	V	P	
299.171	3.0	53.5	13.3	1.6	32.6	0.0	0.0	35.7	46.0	-10.3	V	P	
523.220	3.0	53.9	17.1	2.2	32.8	0.0	0.0	40.4	46.0	-5.6	V	P	
597.383	3.0	52.3	18.2	2.4	32.9	0.0	0.0	40.0	46.0	-6.0	V	P	
741.749	3.0	47.1	20.0	2.7	32.8	0.0	0.0	37.0	46.0	-9.0	V	P	
148.325	3.0	55.9	12.7	1.1	32.6	0.0	0.0	37.1	43.5	-6.4	H	P	
222.968	3.0	56.8	11.9	1.4	32.6	0.0	0.0	37.5	46.0	-8.5	H	P	
523.291	3.0	57.8	17.1	2.2	32.8	0.0	0.0	44.3	46.0	-1.7	H	P	
599.676	3.0	56.5	18.2	2.4	32.9	0.0	0.0	44.3	46.0	-1.7	H	P	
624.024	3.0	52.0	18.5	2.4	32.9	0.0	0.0	40.0	46.0	-6.0	H	P	
634.465	3.0	52.5	18.6	2.5	32.9	0.0	0.0	40.7	46.0	-5.3	H	P	
647.905	3.0	51.1	18.7	2.5	32.9	0.0	0.0	39.4	46.0	-6.6	H	P	
696.027	3.0	50.7	19.2	2.6	33.0	0.0	0.0	39.6	46.0	-6.4	H	P	
744.149	3.0	49.2	20.0	2.7	32.8	0.0	0.0	39.2	46.0	-6.8	H	P	
34.801	3.0	48.7	18.1	0.5	32.7	0.0	0.0	34.7	40.0	-5.3	V	QP	
63.139	3.0	61.0	8.0	0.7	32.6	0.0	0.0	37.1	40.0	-2.9	V	QP	
523.262	3.0	53.8	17.1	2.2	32.8	0.0	0.0	40.4	46.0	-5.6	H	QP	
599.719	3.0	52.7	18.2	2.4	32.9	0.0	0.0	40.5	46.0	-5.5	H	QP	

Note: No other emissions were detected above the system noise floor.

TX AND RX SPURIOUS EMISSIONS 1 TO 40 GHz VERTICAL AND HORIZONTAL DATA

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		LG ELECTRIC														
Project #:		09U12438														
Date:		18/03/09														
Test Engineer:		MENGITU MEKURIA														
Configuration:		WIRELESS LINK BETWEEN CONTROL BOX AND TV SET														
Mode:		VIDEO TX/RX														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T59; S/N: 3245 @3m			T145 Agilent 3008A0051			T88 Miteq 26-40GHz			T125; ARA 18-26GHz; S/N:1007			FCC 15.209				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz	
3' cable 22807700			12' cable 22807600			20' cable 22807500									Average Measurements RBW=1MHz, VBW=10Hz	
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
1.045	3.0	70.7	47.9	24.1	2.4	-36.1	0.0	0.0	61.1	38.3	74	54	-12.9	-15.7	V	
1.180	3.0	62.8	43.3	24.6	2.6	-36.0	0.0	0.0	54.0	34.4	74	54	-20.0	-19.6	V	
1.570	3.0	67.4	40.8	26.0	3.0	-35.7	0.0	0.0	60.7	34.1	74	54	-13.3	-19.9	V	
2.095	3.0	66.0	39.9	27.8	3.5	-35.3	0.0	0.0	62.0	35.9	74	54	-12.0	-18.1	V	
2.620	3.0	58.2	36.5	28.9	4.0	-35.1	0.0	0.0	56.0	34.2	74	54	-18.0	-19.8	V	
2.965	3.0	56.0	50.0	29.9	4.3	-35.2	0.0	0.0	55.0	49.0	74	54	-19.0	-5.0	V	
4.000	3.0	52.3	34.4	32.1	5.2	-34.7	0.0	0.0	54.9	36.9	74	54	-19.1	-17.1	V	
4.450	3.0	54.3	48.7	32.5	5.5	-34.8	0.0	0.0	57.5	51.9	74	54	-16.5	-2.1	V	
5.050	3.0	50.9	37.5	33.0	6.0	-34.8	0.0	0.0	55.0	41.6	74	54	-19.0	-12.4	V	
5.200	3.0	48.6	35.1	33.2	6.1	-34.8	0.0	0.0	53.1	39.6	74	54	-20.9	-14.4	V	
5.335	3.0	47.5	33.7	33.3	6.2	-34.8	0.0	0.0	52.1	38.3	74	54	-21.9	-15.7	V	
5.485	3.0	48.6	40.2	33.5	6.2	-34.9	0.0	0.0	53.4	45.0	74	54	-20.6	-9.0	V	
5.635	3.0	47.1	34.1	33.6	6.3	-35.0	0.0	0.0	52.0	39.0	74	54	-22.0	-15.0	V	
6.055	3.0	50.2	44.4	33.9	6.6	-34.9	0.0	0.0	55.8	50.0	74	54	-18.2	-4.0	V	
24.192	3.0	41.4	36.2	34.9	15.0	-32.6	0.0	0.0	58.7	53.5	74	54	-15.3	-0.5	V	
1.045	3.0	77.0	49.4	24.1	2.4	-36.1	0.0	0.0	67.4	39.8	74	54	-6.6	-14.2	H	
1.330	3.0	60.4	42.3	25.2	2.7	-35.9	0.0	0.0	52.4	34.3	74	54	-21.6	-19.7	H	
1.400	3.0	65.4	39.5	25.4	2.8	-35.8	0.0	0.0	57.8	31.9	74	54	-16.2	-22.1	H	
1.570	3.0	64.6	40.3	26.0	3.0	-35.7	0.0	0.0	57.9	33.7	74	54	-16.1	-20.3	H	
2.095	3.0	68.9	40.3	27.8	3.5	-35.3	0.0	0.0	64.9	36.3	74	54	-9.1	-17.7	H	
2.395	3.0	59.3	37.5	28.2	3.8	-35.1	0.0	0.0	56.3	34.4	74	54	-17.7	-19.6	H	
2.200	3.0	59.5	42.7	27.9	3.6	-35.2	0.0	0.0	55.8	39.1	74	54	-18.2	-14.9	H	
2.967	3.0	59.2	53.6	29.9	4.3	-35.2	0.0	0.0	58.2	52.7	74	54	-15.8	-1.3	H	
4.450	3.0	52.3	43.6	32.5	5.5	-34.8	0.0	0.0	55.5	46.7	74	54	-18.5	-7.3	H	
5.050	3.0	49.8	36.8	33.0	6.0	-34.8	0.0	0.0	53.9	40.9	74	54	-20.1	-13.1	H	
5.200	3.0	49.2	35.8	33.2	6.1	-34.8	0.0	0.0	53.6	40.3	74	54	-20.4	-13.7	H	
5.485	3.0	45.0	33.5	33.5	6.2	-34.9	0.0	0.0	49.8	38.3	74	54	-24.2	-15.7	H	
6.055	3.0	48.5	44.0	33.9	6.6	-34.9	0.0	0.0	54.1	49.6	74	54	-19.9	-4.4	H	
24.192	3.0	40.6	34.1	34.9	15.0	-32.6	0.0	0.0	57.9	51.4	74	54	-16.1	-2.6	H	
Rev. 11.10.08																
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit							
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit							
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit							
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit							
CL	Cable Loss			HPF	High Pass Filter											

TX AND RX SPURIOUS EMISSIONS 40 TO 200 GHz

PEAK MEASUREMENT

Note: The peak density is less than the average limit

Frequency (GHz)	Measurement Distance (m)	Peak Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
48.384	0.300	-66.31	20.00	-30.6
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
8.64E-07	3.0	7.64E-09	0.76	90

Frequency (GHz)	Measurement Distance (m)	Peak Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
49.77	0.300	-67.24	20.00	-31.3
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
7.38E-07	3.0	6.53E-09	0.65	90

Frequency (GHz)	Measurement Distance (m)	Peak Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
70.613	0.300	-53.87	20.00	-14.9
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
3.23E-05	3.0	2.85E-07	28.55	90

8.6. RECEIVER SPURIOUS EMISSIONS

LIMITS

The Rx spurious emission limits are the same as the Tx spurious emission limits. All emissions were measured with the transmitters and receivers operating simultaneously. The receiver spurious performance is documented by the transmit spurious results above.

8.7. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207
IC RSS-GEN, Section 7.2.2

Frequency range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

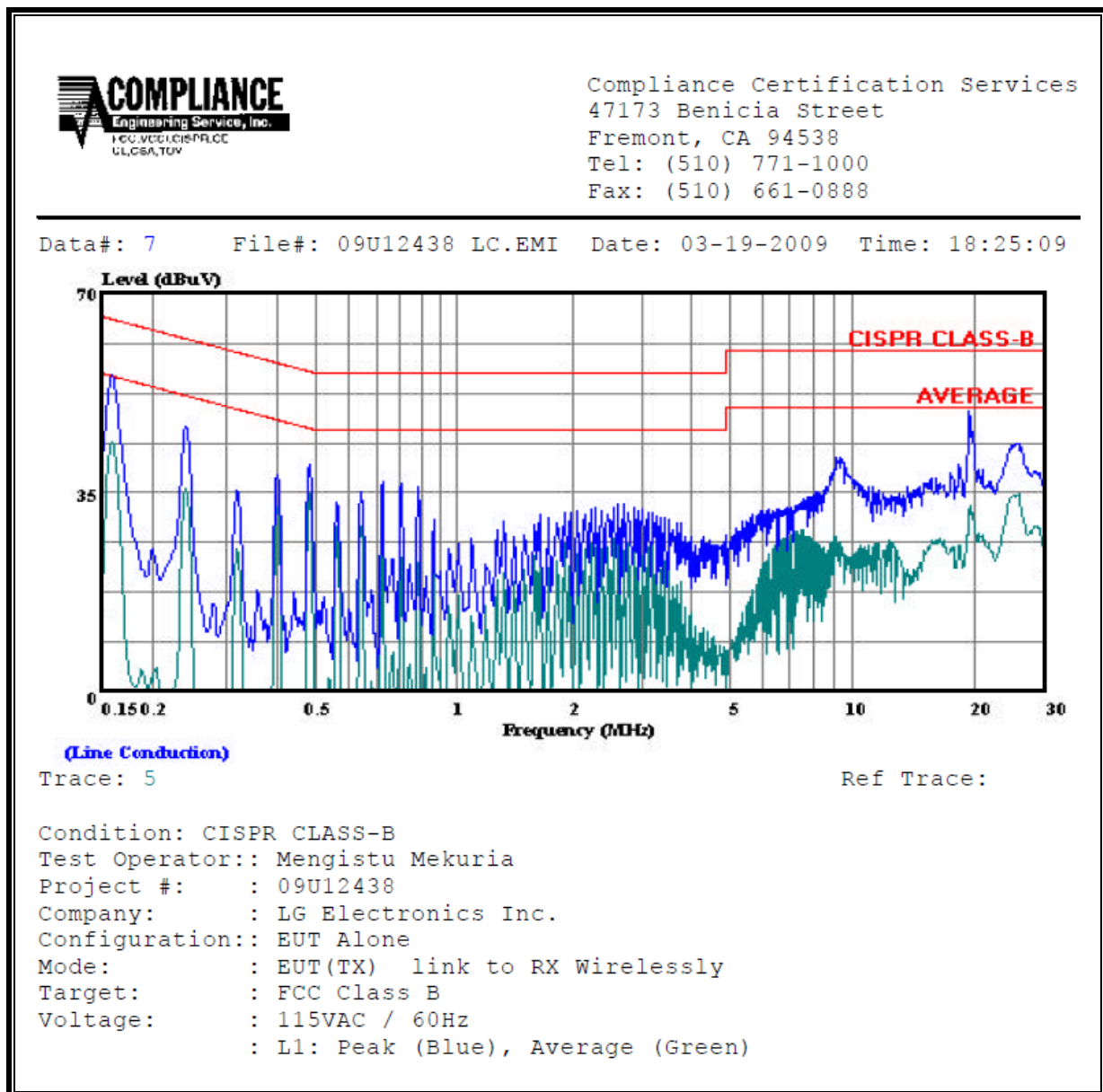
TEST PROCEDURE

ANSI C63.4

6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.16	55.66	--	44.05	0.00	65.52	55.52	-9.86	-11.47	L1
0.24	46.59	--	35.69	0.00	62.13	52.13	-15.54	-16.44	L1
19.53	49.29	--	32.75	0.00	60.00	50.00	-10.71	-17.25	L1
0.16	55.91	--	44.09	0.00	65.52	55.52	-9.61	-11.43	L2
0.24	46.85	--	35.97	0.00	62.13	52.13	-15.28	-16.16	L2
19.53	49.53	--	34.01	0.00	60.00	50.00	-10.47	-15.99	L2
6 Worst Data									

LINE 1 RESULTS

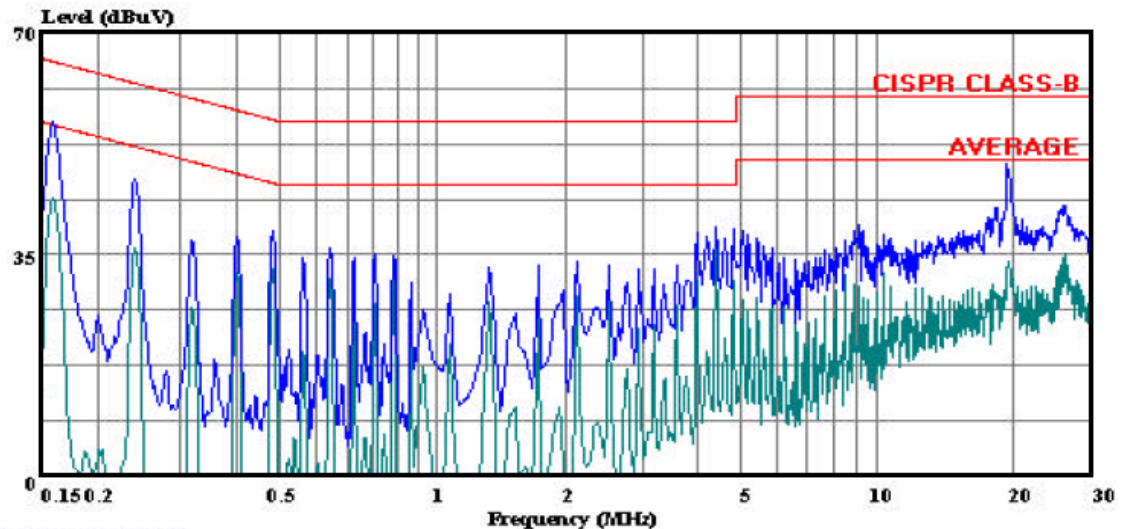


LINE 2 RESULTS



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: 09U12438 LC.EMI Date: 03-19-2009 Time: 18:34:30



(Line Conduction)

Trace: 12

Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 09U12438
Company: : LG Electronics Inc.
Configuration: EUT Alone
Mode: : EUT(TX) link to RX Wirelessly
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L2: Peak (Blue), Average (Green)

8.8. FREQUENCY STABILITY

LIMIT

§15.255 (f) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range - 20 to +50 degrees celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

TEST PROCEDURE

The radio module is placed in an environmental chamber, with power furnished by an adjustable source. The carrier frequency is counted at each condition and compared with the reference condition.

RESULTS

Reference Conditions: 115 VAC @ 20°C			
Power Supply (VAC)	Environment Temperature (°C)	Frequency	Delta
		(MHz)	(kHz)
115.00	40	60479.3421600	5.960
115.00	30	60479.3379210	1.721
115.00	20	60479.3362000	Reference
115.00	10	60479.3346700	-1.530
115.00	0	60479.3320670	-4.133
97.15	20	60479.3361300	-0.070
132.25	20	60479.3362300	0.030

Note: The EUT is intended for indoor use only with a manufacturer's specified temperature range of 0 to 40 °C.

8.9. GROUP INSTALLATION

LIMIT

§15.255 (h) Any transmitter that has received the necessary FCC equipment authorization under the rules of this chapter may be mounted in a group installation for simultaneous operation with one or more other transmitter(s) that have received the necessary FCC equipment authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

RESULTS

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.

8.10. TRANSMITTER IDENTIFICATION

LIMIT

§15.255 (i) For all transmissions that emanate from inside of a building, within any one second interval of signal transmission, each transmitter with a peak output power equal to or greater than 0.1 mW or a peak power density equal to or greater than 3 nW/cm², as measured 3 meters from the radiating structure, must transmit a transmitter identification at least once. Each application for equipment authorization for equipment that will be used inside of a building must declare that the equipment contains the required transmitter identification feature and must specify a method whereby interested parties can obtain sufficient information, at no cost, to enable them to fully detect and decode this transmitter identification information. Upon the completion of decoding, the transmitter identification data block must provide the following fields:

- (1) FCC Identifier, which shall be programmed at the factory.
- (2) Manufacturer's serial number, which shall be programmed at the factory.
- (3) Provision for at least 24 bytes of data relevant to the specific device, which shall be field programmable. The grantee must implement a method that makes it possible for users to specify and update this data. The recommended content of this field is information to assist in contacting the operator.

RESULTS

Not Applicable.

The EUT is part of a WVAN. All components of the WVAN are for indoor operation only. There are no outdoor units therefore no transmissions are directed outside the building.