



JAPAN RADIO LAW RADIO EQUIPMENT REGULATIONS

**Notice 88 of Ordinance Concerning Technical Regulations Conformity Certification
of Specified Radio Equipment**

CARRIER SENSE TEST REPORT

FOR

MULTIMEDIA DEVICE WITH BT/BLE AND 2.4GHz AND 5GHz WLAN RADIOS

MODEL NUMBER: NC2-6A5

REPORT NUMBER: 15U20917-E54

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Prepared for

GOOGLE

**1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW, CA 94043, U.S.A.**

Prepared by

UL VERIFICATION SERVICES INC.

**47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.**

TEL: (510) 771-1000

FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GOOGLE
1600 AMPHITEATRE PARKWAY
MOUNTAIN VIEW, CA 94043, U.S.A.

EUT DESCRIPTION: MULTIMEDIA DEVICE WITH BT/BLE AND 2.4GHz AND 5GHz
WLAN RADIOS

MODEL: NC2-6A5

SERIAL NUMBER: 00286015513F01YF

DATE TESTED: SEPTEMBER 29, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
JAPAN RADIO LAW RADIO EQUIPMENT REGULATIONS Notice 88 of Ordinance Concerning Technical Regulations Conformity Certification of Specified Radio Equipment, Carrier Sense Test	Pass

UL Verification Services Inc. 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 UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

Tested By:



CONAN CHEUNG
PROJECT LEAD
UL Verification Services Inc.



DOUG ANDERSON
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with JAPAN RADIO LAW RADIO EQUIPMENT REGULATIONS, Notice 88 of Ordinance Concerning Technical Regulations Conformity Certification of Specified Radio Equipment.

3. FACILITIES AND ACCREDITATION

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

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

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
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

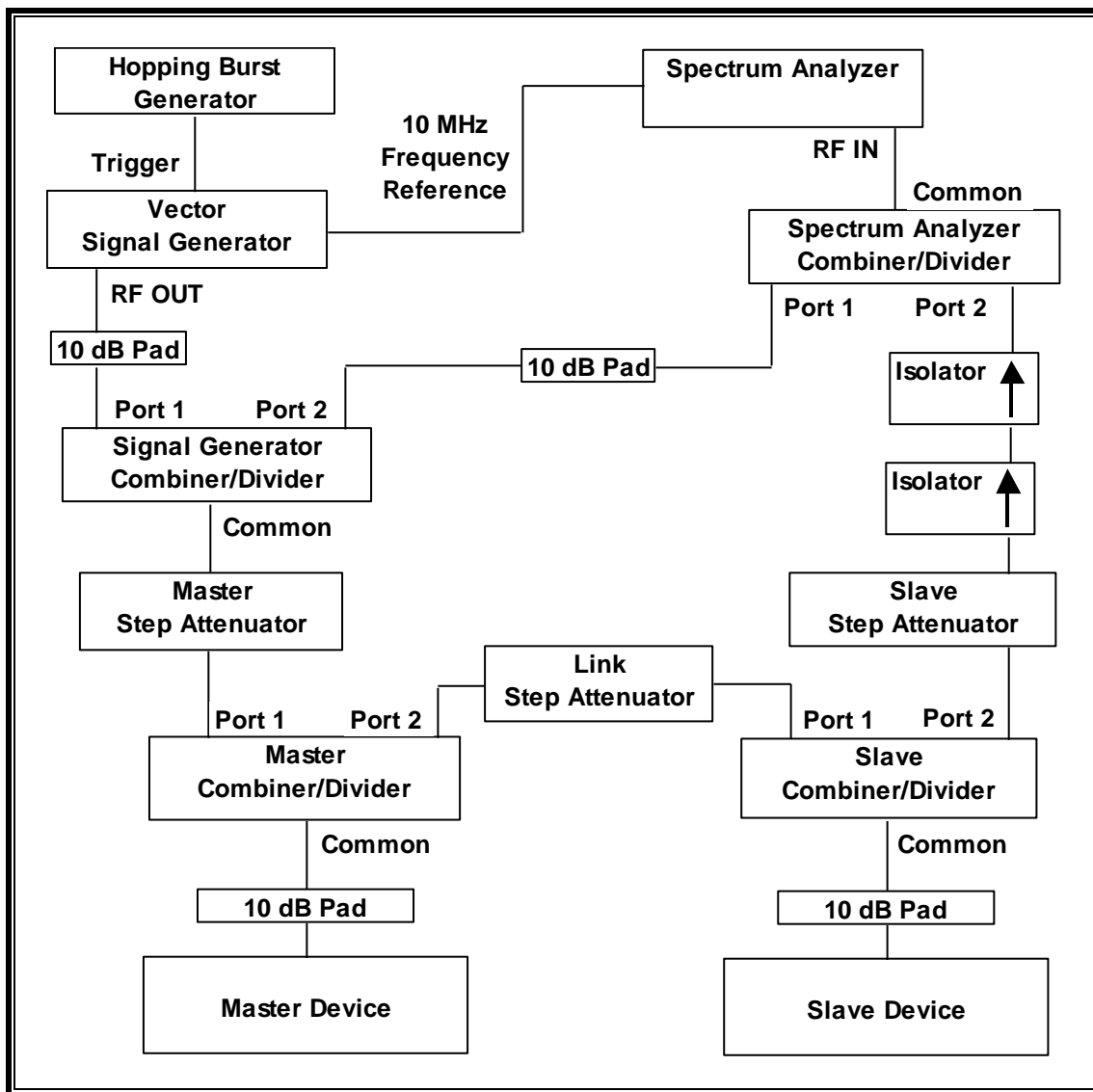
Uncertainty figures are valid to a confidence level of 95%.

5. CARRIER SENSE

5.1. OVERVIEW

5.1.1. TEST AND MEASUREMENT SYSTEM

CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



5.1.2. 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	Serial Number	Cal Authority	Cal Date
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	US51350187	Agilent/HP	06/01/15
Signal Generator, MXG X-Series RF Vector	Agilent	N5172B	MY51350337	Agilent/HP	02/17/15

5.1.3. TEST ROOM ENVIRONMENT

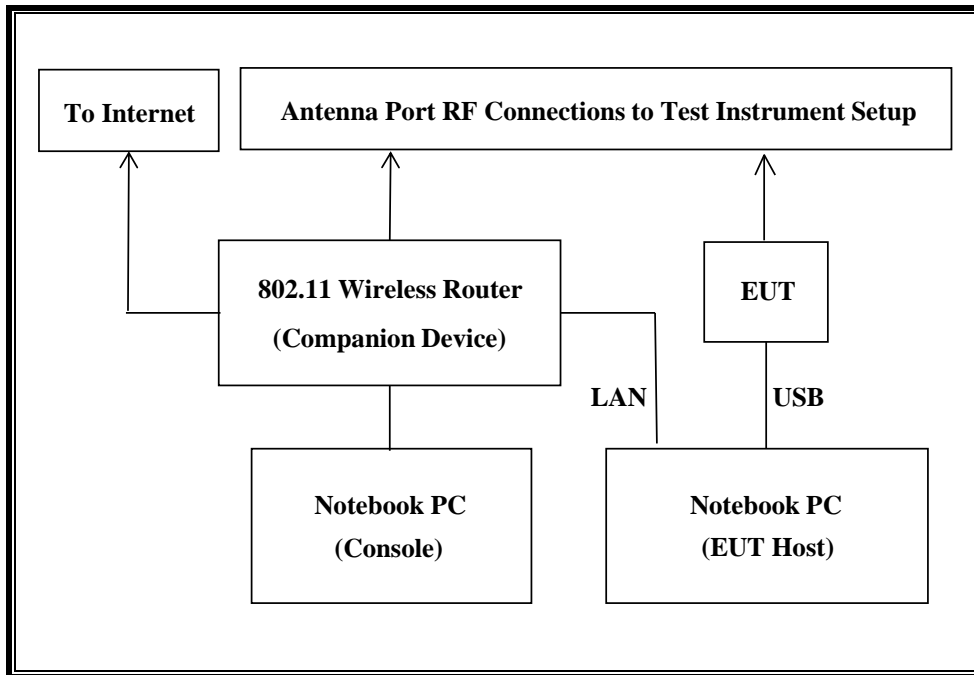
The test room temperature and humidity shall be maintained within normal temperature of 5~35°C and normal humidity 45~85% (relative humidity) according to JIS Z 8703.

ENVIRONMENT CONDITION

Parameter	Value
Temperature	24.5 °C
Humidity	48 %

5.1.1. CONDUCTED METHOD EUT TEST SETUP

CONDUCTED METHOD EUT TEST SETUP DIAGRAM



SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter (EUT)	Google	S005BBU0500100	No Serial Number	DoC
Notebook PC (EUT Host)	Dell	PP18L	25834527901	DoC
AC Adapter (Host PC)	Lite On Technologies	LA65NS0-00	CN-0DF263-71615-6AAC-38D4	DoC
802.11ac Dual Band Gigabit Router	ASUSTek Computer, Inc.	RT-AC68U	E3IA0H02357	MSQ-RTAC68U
AC Adapter	Enertronix, Inc.	EXA1206UH	No Serial Number	DoC
Notebook PC (Console)	Lenovo	Type 20B7-S0A200	PF-02JN9J 14/06	DoC
AC Adapter (Console PC)	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS9 74594A9	DoC

5.1.2. DESCRIPTION OF EUT

The EUT is a Slave Device.

Testing in the 2.4 GHz band was performed at channel center frequencies of 2422 MHz and 2462 MHz with nominal channel bandwidth of 40 MHz.

The EUT does not support channel frequency 2484 MHz in the 2.4 GHz band.

Two nominal channel bandwidths of 20 MHz and 40 MHz is/are implemented in the 2.4 GHz band.

Testing in the 5 GHz band was performed with a nominal channel bandwidth of 20 MHz at channel center frequencies of 5180 MHz, 5240 MHz, 5320 MHz, 5500 MHz and 5700 MHz.

Three nominal channel bandwidths are implemented in the 5 GHz band: 20 MHz, 40 MHz and 80 MHz.

The only antenna assembly utilized with the EUT has a minimum gain of 1.2 dBi in the 2.4 GHz band and -2.4 dBi in the 5 GHz bands.

The EUT uses one transmitter/receiver chains connected to a 50-ohm coaxial antenna port. All antenna ports are connected to the test system via a power divider to perform conducted tests.

WLAN traffic was generated by transferring a data stream from the EUT to the controller/server PC using iPerf version 2.0.5 software package.

The software installed in the EUT is revision P28.

6. CARRIER SENSE TEST RESULTS

LIMIT

For the 2.4 GHz Band:

The Carrier Sense level shall be declared by the client.

For the 5 GHz Bands:

The transmitter must turn off in the presence of a CW signal or modulated signal, at a level according to the following equation:

$$P(\text{dBm}) = 22.79 + Gr - 20\log(F)$$

Where,

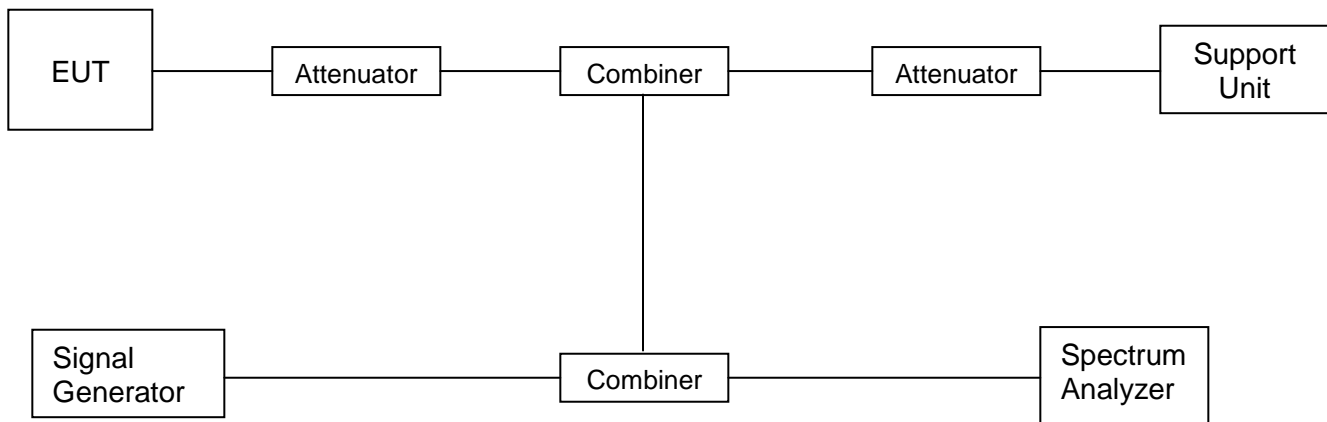
P is the power in dBm at the input port of the EUT.

Gr is the RX antenna gain in dBi

F is the frequency in MHz

PROCEDURE

A radiated link is established between EUT and a support unit. A spectrum analyzer and signal generator are connected to the EUT by conducted means through the use of SMA cables, attenuators and combiners as follows:



Traffic is transmitted from EUT to the support unit.

The signal generator is tuned to the same frequency of transmission that the EUT is using or with certain offset, the spectrum analyzer is tuned to the frequency of transmission with the following settings:

Span: 50MHz

RBW: 1MHz

VBW: 1MHz

Sweep Time: AUTO (Minimum time to ensure measurement accuracy.)

Sweep Mode: Continuous Sweep

Detection Mode: Positive Peak

Step1: Link was established between EUT and support unit.

Step2: Signal generator was turned ON.

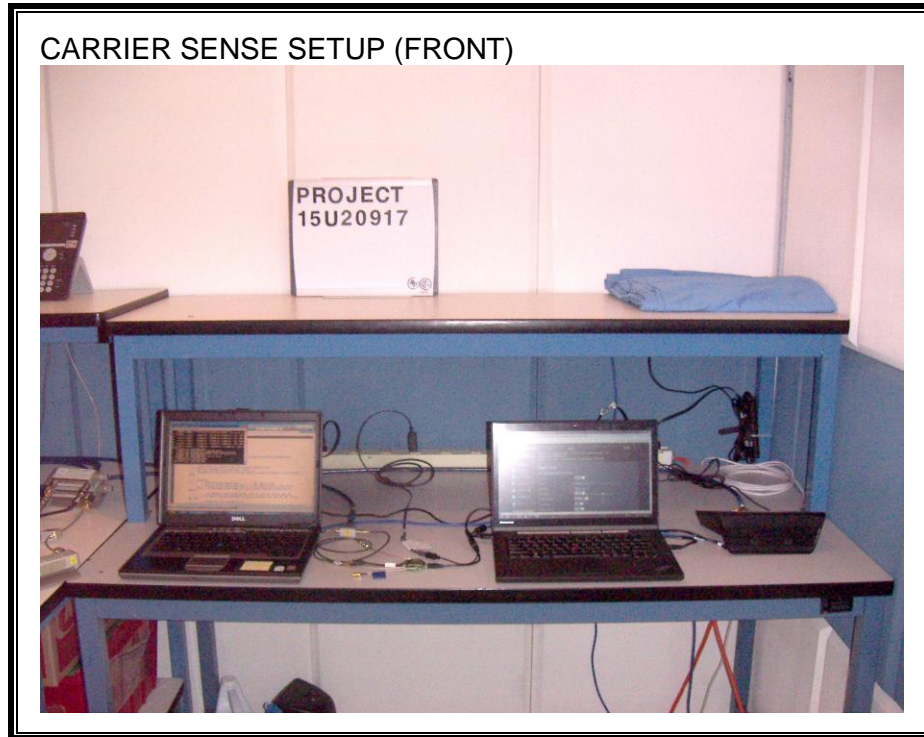
Step3: The link, file transmission and any beacons were verified to stop when the signal generator is turned ON.

RESULT

PASS.

7. SET UP PHOTOS

7.1. CARRIER SENSE MEASUREMENT SETUP





END OF REPORT