

APPLICATION FOR CERTIFICATION

On Behalf of

Intel Corporation

Notebook

Models No.: HSBUB-SDS

FCC ID: RMXHSBUB-SDS

IC: 1000V-HSBUBSDS

Brand: Intel

Prepared for : Intel Corporation  
2200 Mission College Blvd.  
Santa Clara, CA 95054-1549, USA

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## TEST REPORT CERTIFICATION

Applicant : Intel Corporation  
 EUT Description : Notebook  
**FCC ID** : **RMXHSBUB-SDS**  
**IC** : **1000V-HSBUBSDS**  
 (A) Model No. : HSBUB-SDS  
 (B) Serial No. : N/A  
 (C) Power Supply : DC 19V or DC 20V  
 (D) Test Voltage : AC 120V, 60Hz (Via AC Adapter)

### Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C, Oct 2012  
 (FCC CFR 47 Part 15C, §15.207, §15.209, §15.215, and §15.225)  
 ANSI C63.4:2003

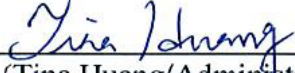
Industry Canada Rules and Regulations RSS-Gen (Issue 3), December 2010 and  
 RSS-210 (Issue 8), December 2010

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 Subpart C and Canada RSS-Gen, RSS-210 limits.

The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC Part 15 and Industry Canada RSS-Gen, RSS-210 standards.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : Feb. 01 ~ 04, 2013      Date of Report : Feb. 06, 2013

Producer :   
 (Tina Huang/Administrator)

Signatory :   
 (Leon Liu/Deputy General Manager)

## 1. SUMMARY OF MEASUREMENTS AND RESULTS

<b>FCC Part Section</b>	<b>RSS Section</b>	<b>Test description</b>	<b>Result</b>
15.207	RSS-Gen [7.2.2]	Powerline Conducted Emission 150kHz – 30MHz	<b>PASS</b>
15.225 (a)(b)(c)	RSS-210 [A2.6]	In-Band Emission	<b>PASS</b>
15.225 (d) 15.209	RSS-210 [A2.6]	Out-of-Band Emission	<b>PASS</b>
15.215	N/A	20dB Bandwidth	<b>PASS</b>
15.225 (e)	RSS-210 [A2.6]	Frequency Stability Tolerance	<b>PASS</b>

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

Product	Notebook
Model Number	HSBUB-SDS
Serial Number	N/A
Brand Name	Intel
Applicant	Intel Corporation 2200 Mission College Blvd, Santa Clara, CA 95054-1549, USA
Mini HDMI Dongle	Cable: Non-Shielded, Detachable, 0.18m
HDMI Cable	Non-Shielded, Detachable, 1.8m
FCC ID	RMXHSBUB-SDS
IC	1000V-HSBUBSDS
Fundamental Range	<p>802.11b/g: 2412MHz ~ 2462MHz</p> <p>802.11a: 5180MHz ~ 5240MHz (UNII Band I) and          5260MHz ~ 5320MHz (UNII Band II) and          5500MHz ~ 5700MHz (UNII Band III) and          5745MHz ~ 5825MHz (UNII Band IV)          5250MHz ~ 5350MHz, 5470MHz ~ 5725MHz          (DFS Function, Slave/no In service monitor, no Ad-Hoc mode)</p> <p>802.11n-HT20: 2412MHz ~ 2462MHz and          5180MHz ~ 5240MHz (UNII Band I) and          5260MHz ~ 5320MHz (UNII Band II) and          5500MHz ~ 5700MHz (UNII Band III) and          5745MHz ~ 5825MHz (UNII Band IV)          5250MHz ~ 5350MHz, 5470MHz ~ 5725MHz          (DFS Function, Slave/no In service monitor, no Ad-Hoc mode)</p> <p>802.11n-HT40: 2422MHz ~ 2452MHz and          5190MHz ~ 5230MHz (UNII Band I) and          5270MHz ~ 5310MHz (UNII Band II) and          5510MHz ~ 5670MHz (UNII Band III) and          5755MHz ~ 5795MHz (UNII Band IV)          5250MHz ~ 5350MHz, 5470MHz ~ 5725MHz          (DFS Function, Slave/no In service monitor, no Ad-Hoc mode)</p> <p>BT and BT Low Energy: 2402MHz ~ 2480MHz</p>

Fundamental Range	<p>GPRS/EGPRS 850: UL: 824MHz to 849MHz DL: 869MHz to 894MHz</p> <p>GPRS/EGPRS 1900: UL: 1850MHz to 1910MHz DL: 1930MHz to 1990MHz</p> <p>WCDMA Band: Band II: UL: 1850MHz to 1910MHz; DL: 1930MHz to 1990MHz</p> <p>Band IV: UL: 1710MHz to 1755MHz; DL: 2110MHz to 2115MHz</p> <p>Band V: UL: 824MHz to 849MHz; DL: 869MHz to 894MHz</p> <p>NFC: 13.56MHz</p>
Frequency Channel	<p>802.11b/g: 11 channels</p> <p>802.11a: UNII Band I: 4channels UNII Band II: 4 channels UNII Band III: 8 channels UNII Band IV: 4 channels</p> <p>802.11n-HT20: 2.4GHz: 11 channels 2.4G UNI Band I: 4channels UNII Band II: 4 channels UNII Band III: 8 channels UNII Band IV: 4 channels</p> <p>802.11n-HT40: 2.4GHz: 7 channels UNII Band I: 2channels UNII Band II: 2 channels UNII Band III: 5 channels UNII Band IV: 3 channels</p> <p>Bluetooth: 79 channels (GFSK, <math>\pi/4</math>DQPSK, 8-DPSK) 40 channels (Low Energy)</p> <p>GPRS/EGPRS 850: CH 128- CH 251 GPRS/EGPRS 1900: CH 512-CH 810</p> <p>WCDMA Band: Band II: UL: CH 9262-CH9538; DL: CH 9662-CH9938</p> <p>Band IV: UL: CH 1312-CH1513; DL: CH 1537-CH1738</p> <p>Band V: UL: CH 4132-CH4233; DL: CH 4357-CH4458</p> <p>NFC: 1 Channel</p>
Radio Technology	<p>802.11b: DSSS Modulation (DBPSK/DQPSK/CCK)</p> <p>802.11g: OFDM Modulation (BPSK/QPSK/16QAM/64QAM)</p> <p>802.11a: OFDM Modulation (BPSK/QPSK/16QAM/64QAM)</p> <p>802.11n: OFDM Modulation (MIMO) (BPSK/QPSK/16QAM/64QAM)</p> <p>Bluetooth: FHSS (GFSK, <math>\pi/4</math>DQPSK, 8-DPSK) DSSS (Low Energy)</p>
Data Services	<p>GSM:DL 14.4kbps/UL 14.4kbps</p> <p>GPRS: DL 85.6kbps/UL 85.6kbps</p> <p>EGPRS:DL 236.8kbps/UL 236.8kbps</p> <p>WCDMA CS: DL 64kbps/UL 64kbps</p> <p>WCDMA PS: DL 384kbps/UL 384kbps</p> <p>HSPA+:DL 21.6Mbps/UL 5.76Mbps</p>

Data Transfer Rate	802.11b: 1/2/5.5/11Mbps 802.11a/g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps Bluetooth: 1/2/3Mbps
Date of Receipt of Sample	Dec. 18, 2012
Date of Test	Feb. 01 ~ 04, 2013
<p>Note: This EUT has 2.4GHz (WLAN, BT and Low Energy), 5GHz, GPRS/EGPRS, WCDMA and NFC function. See below for related test reports based on radio functionality.</p> <ol style="list-style-type: none"> <li>1. The 2.4GHz (WLAN and Low Energy) &amp; 5.8GHz (UNII Band IV) function has been test in other report of EM-F1020109.</li> <li>2. The 2.4GHz (BT) function has been test in other report of EM-F1020099.</li> <li>3. The 5GHz (UNII Band II, III &amp; IV) function has been test in other report of EM-F1020110.</li> <li>4. The DFS function has been test in other report of EM-F1020111.</li> </ol>	

## 2.2. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Peak Gain	
			Frequency	Max Gain
Project Name: Harris Beach  WLAN Antenna (Main)  Part Number: 1556570	TE Connectivity	PIFA	2400MHz	1.24dBi
			2442MHz	0.63dBi
			2484MHz	1.93dBi
			5150MHz	0.74dBi
			5250MHz	0.64dBi
			5350MHz	0.24dBi
			5470MHz	-0.54dBi
			5600MHz	-0.20dBi
			5725MHz	-0.55dBi
			5785MHz	0.84dBi
			5800MHz	0.03dBi
			5850MHz	-0.29dBi
Project Name: Harris Beach  WLAN/BT Antenna (AUX)  Part Number: 1556568	TE Connectivity	PIFA	2400MHz	0.75dBi
			2442MHz	1.39dBi
			2484MHz	1.82dBi
			5150MHz	1.79dBi
			5250MHz	0.79dBi
			5350MHz	1.27dBi
			5470MHz	0.72dBi
			5600MHz	0.36dBi
			5725MHz	1.31dBi
			5785MHz	1.86dBi
			5800MHz	3.04dBi
			5850MHz	2.45dBi



Antenna Part Number	Manufacture	Antenna Type	Peak Gain	
			Frequency (TX)	Max Gain
Project Name: Harris Beach  WWAN Antenna (Main)  Part Number: 1556567	TE Connectivity	PIFA	704MHz	-2.04dBi
			710MHz	-1.57dBi
			716MHz	-1.45dBi
			777MHz	-2.31dBi
			782MHz	-2.22dBi
			787MHz	-2.61dBi
			832MHz	-2.42dBi
			847MHz	-3.26dBi
			862MHz	-3.20dBi
			824MHz	-3.44dBi
			836MHz	-4.03dBi
			849MHz	-3.89dBi
			880MHz	-2.79dBi
			900MHz	-2.71dBi
			915MHz	-3.08dBi
			1710MHz	-4.09dBi
			1750MHz	-3.34dBi
			1785MHz	-3.77dBi
			1710MHz	-3.69dBi
			1732MHz	-3.43dBi
			1755MHz	-3.34dBi
			1850MHz	-3.88dBi
			1880MHz	-2.86dBi
1910MHz	-2.97dBi			
1920MHz	-3.30dBi			
1950MHz	-3.28dBi			
1980MHz	-2.86dBi			
2500MHz	-1.90dBi			
2535MHz	-2.29dBi			
2570MHz	-2.08dBi			

Antenna Part Number	Manufacture	Antenna Type	Peak Gain (dBi)	
			Frequency (RX)	Max Gain
Project Name: Harris Beach  WWAN Antenna (AUX)  Part Number: 1556569	TE Connectivity	PIFA	1575MHz	-3.67dBi
			1602MHz	-3.71dBi

## 2.3. Description of Key Component Lists

### 2.3.1. For the All Component Lists

Item	Supplier	Description	Character
System	Microsoft	Windows 8	---
Main Board	Flex	832-FIG-ITLH-G71865-400	PCBA for NB should not be listed separately
LCD Panel	Chimei Innolux Corp	N133HSE-EXX	13.3 inches TFT Type
CPU	Intel	---	Up to 3.3GHz
Graphics	Intel	Intel® HD Graphics with DX11	---
Memory	Samsung	---	4GB
SSD	Samsung	#1 MZ-C***** #2 MZ-D***** #3 MZ-E***** #4 MZ-N***** (* can be 0-9, A-Z, blank, slash or dash for different market purpose)	128GB
Keyboard	Kunshan YingHui Precision Electronic Co.	YH-BH12LCxx (xx=01 for US language; 02 for SP language)	--
Battery Pack	Getac Technology Corp	HB FFRD	7.5V, 7100 mAh, 53.25Whr
Web Camera	CHICONY Electronics Co., Ltd.	CKFCF01	---
WLAN+BT Combo Module	Broadcom	AW-NB136	IEEE 802.11a/b/g+ 2X2 n Bluetooth 4.0+Low Energy
WWAN	Huawei	MU736	WCDMA/HSDPA/HSUPA /HSPA GSM/GPRS/EDGE, GPS/A-GPS
WWAN Antenna	Main	TE Connectivity Ltd.	1556567
	AUX		1556569
WiFi/BT Antenna	Main	TE Connectivity Ltd.	1556570
	AUX		1556568
AC Adapter #1	Chicony	A12-045N2A	I/P: 100-240V~, 1.3A 50-60Hz O/P: 19V, 2.37A
	DC Power Cord: Non-Shielded, Undetached, 1.0m AC Power Cord: Non-Shielded, Detached, 1.8m		
AC Adapter #2	Delta	ADP-45BE AA	I/P: 100-240V~, 1.3A 50-60Hz O/P: 20V, 2.25A
	DC Power Cord: Non-Shielded, Undetached, 1.0m AC Power Cord: Non-Shielded, Detached, 1.8m		

Remark: For a more detailed features description, please refer to the manufacturer's specifications or the user manual.

## 2.3.2. For the EUT Test Configuration

<b>Configuration</b>	<b>SKU #1</b>
System	Microsoft, Windows 8
Main Board	Flex, 832-FIG-ITLH-G71865-400
LCD Panel	Chimei Innolux Corp., N133HSE-EXX
CPU	Intel, i7-4650U
Graphics	Intel, Intel® HD Graphics with DX11
Memory	Samsung, K4E8E304EB-EGCE, 4GB
SSD	Samsung, MZNTD128HAGM
Keyboard	YH-BH12LC01
Battery Pack	Getac Technology Corp, M/N HB FFRD
Web Camera	CHICONY Electronics Co., Ltd., CKFCF01
WLAN+BT Combo Module	Broadcom, M/N AW-NB136
WWAN	Huawei, M/N MU736
WLAN/BT Antenna	Main: TE Connectivity Ltd., 1556570 AUX: TE Connectivity Ltd., 1556570
WWAN Antenna	Main: TE Connectivity Ltd., 1556567 AUX: TE Connectivity Ltd., 1556569
AC Adapter	Chicony, M/N A12-045N2A
Resolution	1920*1080

## 2.4. Tested Supporting System Details

### 2.4.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Monitor	DELL	U3011T	CN-0C34G2-74445-29I-031L	FCC DoC Approved
2.	USB 3.0 External HDD	BUFFALO	HD-LBU3	55292020409776	FCC DoC Approved
3.	USB Mouse	DELL	MS111-T	CN-0KW2YH-71616-282-0XYP	FCC DoC Approved
4.	Earphone	APPLE	N/A	N/A	N/A
5.	SD Card	ADATA	AD4GSDHC4-S	N/A	N/A
6.	SIM Card	Taiwan Mobile	0907 41 003894 5	N/A	N/A

### 2.4.2. Cable Lists

No.	Signal Cable Description Of The Above Support Units
1.	N/A
2.	USB Cable: Shielded, Detachable, 1.0m
3.	USB Cable: Shielded, Undetachable, 1.8m
4.	Earphone Cable: Non-Shielded, Detachable, 0.9m
5.	N/A
6.	N/A

- Note :
- Support Unit 1: Power Cord: Non-Shielded, Detachable, 1.8m
  - Support Unit 2 AC Adapter: BUFFALO, M/N: WA-18H12, S/N: 219019279;  
Cord: Non-Shielded, Undetachable, 1.5m
  - Support Unit 7 AC Adapter: D-Link, M/N: AM-91000A;  
Cord: Non-Shielded, Detachable, 1.8m

## 2.5. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**  
**EMC Department**  
 No. 53-11, Dingfu, Linkou Dist.,  
 New Taipei City 244, Taiwan, R.O.C.

Test Location & Facility (C7/AC) : **No. 7 Shielded Room**  
 No. 53-11, Dingfu, Linkou Dist.,  
 New Taipei City 244, Taiwan, R.O.C.

**Semi-Anechoic Chamber**  
 No. 53-11, Dingfu, Linkou Dist.,  
 New Taipei City 244, Taiwan, R.O.C.  
 May 11, 2012 File on  
 Federal Communication Commission  
 Registration Number: 90993

NVLAP Lab. Code : 200077-0

TAF Accreditation No : 1724

## 2.6. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	±1.73dB
Radiation Test (Distance: 3m)	9kHz~300MHz	±2.91dB
	30MHz~300MHz	±2.91dB
	300MHz~1000MHz	±2.94dB

Remark : Uncertainty =  $k_{uc}(y)$

Test Item	Uncertainty
20dB Bandwidth	± 0.2kHz
Frequency Stability	±0.78ppm

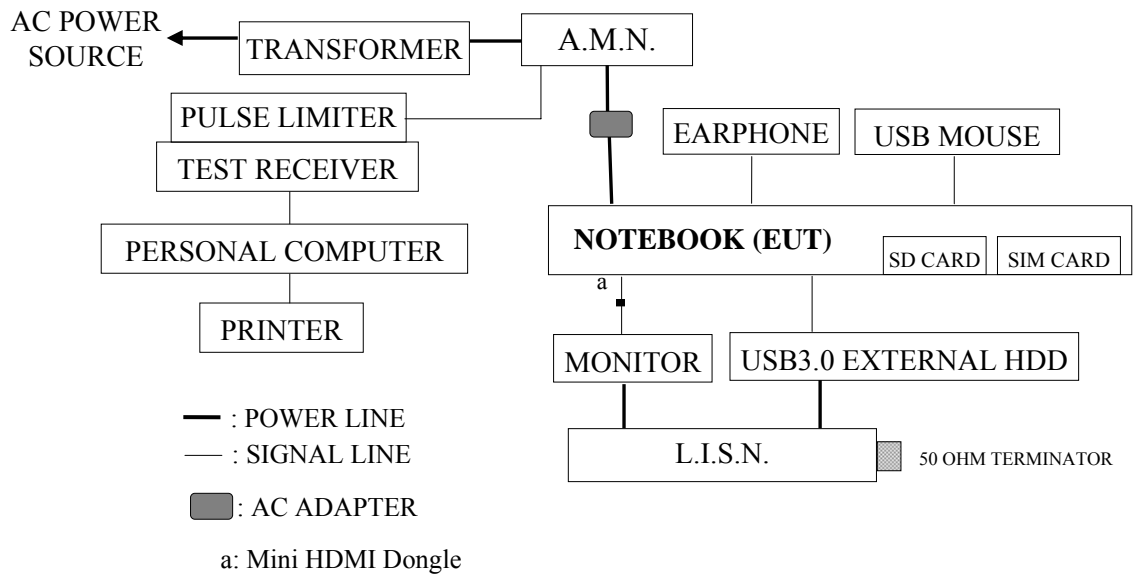
### 3. POWERLINE CONDUCTED EMISSION MEASUREMENT

#### 3.1. Test Equipment

The following test equipment were used during the power line conducted measurement: (No. 7 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESCI	101276	Apr. 30, 12'	Apr. 29, 13'
2.	A.M.N.	R&S	ESH2-Z5	100366	Mar. 26, 12'	Mar. 25, 13'
3.	Pulse Limiter	R&S	ESH3-Z2	101495	Mar. 26, 12'	Mar. 25, 13'

#### 3.2. Block Diagram of Test Setup



#### 3.3. Powerline Conducted Emission Limit (§15.207, RSS-Gen §7.2.2/Table 2)

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB $\mu$ V	56 ~ 46 dB $\mu$ V
500kHz ~ 5MHz	56 dB $\mu$ V	46 dB $\mu$ V
5MHz ~ 30MHz	60 dB $\mu$ V	50 dB $\mu$ V

Remark1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.: The lower limit applies at the band edges.

### 3.4. Operating Condition of EUT

- 3.4.1. Setup the **EUT (Notebook)** as shown on 2.2.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. The **EUT (Notebook)** was on transmitting function at work during all testing.

### 3.5. Test Procedure

The EUT link AC adapter was put on table which was above the ground by 80cm and power cord was connected to power mains through an Artificial Mains Network (A.M.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.) Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to FCC ANSI C63.4-2003 , RSS-Gen and RSS-210 during conducted measurement.

The bandwidth of the R & S Test Receiver ESCI was set at 10kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

### 3.6. Powerline Conducted Emission Measurement Results

**PASSED.** All emissions not reported below are too low against the prescribed limits.

The EUT was measured during this section testing and all the test results are listed in next pages.

EUT : Notebook      Model No. : HSBUB-SDS

Test Date: Dec. 25, 2012    Temperature: 25      Humidity: 52%

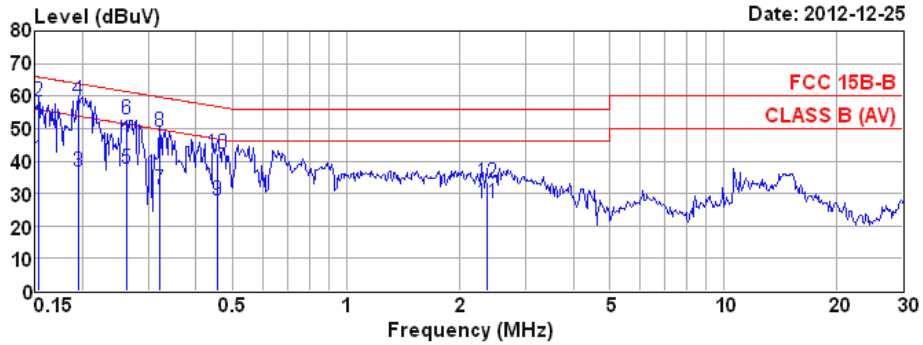
The details are as follows :

Mode	Reference Test Data	
	Neutral	Line
1.	# 4	# 3



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Data: 4 File: D:\test data\REPORT\IC1M1212XXX\IC1M1212198-C-D.EM6 (12)



Site no. : No.7 Shielded Room Data no. : 4  
 Dis. / Ant. : ENV4200 Ant. pol. : NEUTRAL  
 Limit : FCC 15B-B  
 Env. / Ins. : 25°C / 52% ESCI (1276) Engineer : Fate  
 EUT : HSBUB-SDS  
 Power Rating : 120Vac/60Hz  
 Test Mode : Operating

	Freq. (MHz)	AMN. Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.15	10.23	9.92	20.48	40.63	55.82	15.19	Average
2	0.15	10.23	9.92	38.10	58.25	65.82	7.57	QP
3	0.19	10.23	9.93	16.57	36.73	53.84	17.11	Average
4	0.19	10.23	9.93	38.65	58.81	63.84	5.03	QP
5	0.26	10.21	9.95	17.54	37.70	51.38	13.68	Average
6	0.26	10.21	9.95	32.62	52.78	61.38	8.60	QP
7	0.32	10.19	9.96	10.98	31.13	49.66	18.53	Average
8	0.32	10.19	9.96	28.89	49.04	59.66	10.62	QP
9	0.46	10.17	9.98	7.87	28.02	46.76	18.74	Average
10	0.46	10.17	9.98	22.28	42.43	56.76	14.33	QP
11	2.36	10.14	10.00	6.83	26.97	46.00	19.03	Average
12	2.36	10.14	10.00	13.29	33.43	56.00	22.57	QP

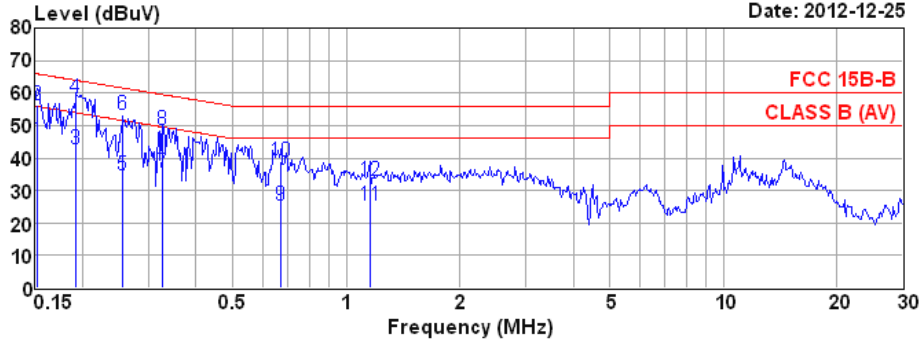
Remarks: 1. Emission Level= AMN Factor + Cable Loss + Reading.  
 2. If the average limit is met when using a quasi-peak detector the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.





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Data: 3 File: D:\test data\REPORT\IC1M1212XXX\IC1M1212198-C-D.EM6 (12) Date: 2012-12-25



Site no. : No.7 Shielded Room Data no. : 3  
 Dis. / Ant. : ENV4200 Ant. pol. : LINE  
 Limit : FCC 15B-B  
 Env. / Ins. : 25°C / 52% ESCI (1276) Engineer : Fate  
 EUT : HSBUB-SDS  
 Power Rating : 120Vac/60Hz  
 Test Mode : Operating

	Freq. (MHz)	AMN. Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.15	10.22	9.92	25.10	45.24	55.91	10.67	Average
2	0.15	10.22	9.92	36.25	56.39	65.91	9.52	QP
3	0.19	10.24	9.93	22.73	42.90	53.93	11.03	Average
4	0.19	10.24	9.93	38.38	58.55	63.93	5.38	QP
5	0.26	10.23	9.95	14.65	34.83	51.56	16.73	Average
6	0.26	10.23	9.95	33.06	53.24	61.56	8.32	QP
7	0.33	10.21	9.96	15.50	35.67	49.57	13.90	Average
8	0.33	10.21	9.96	28.65	48.82	59.57	10.75	QP
9	0.67	10.19	9.99	5.06	25.24	46.00	20.76	Average
10	0.67	10.19	9.99	18.76	38.94	56.00	17.06	QP
11	1.15	10.18	10.00	5.19	25.37	46.00	20.63	Average
12	1.15	10.18	10.00	12.71	32.89	56.00	23.11	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Reading.  
 2. If the average limit is met when using a quasi-peak detector the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

## 4. RADIATED SPURIOUS EMISSION MEASUREMENT (IN-BAND)

### 4.1. Test Equipment

The following test equipment was used during the radiated emission measurement:  
 (at Semi-Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 17, 12'	Oct. 16, 13'
2.	Test Receiver	R & S	ESCS30	100338	Jul. 04, 12'	Jul. 03, 13'
3.	Loop Antenna	R&S	HFH2-Z2	891847/27	Dec. 22, 11'	Dec. 21, 13'

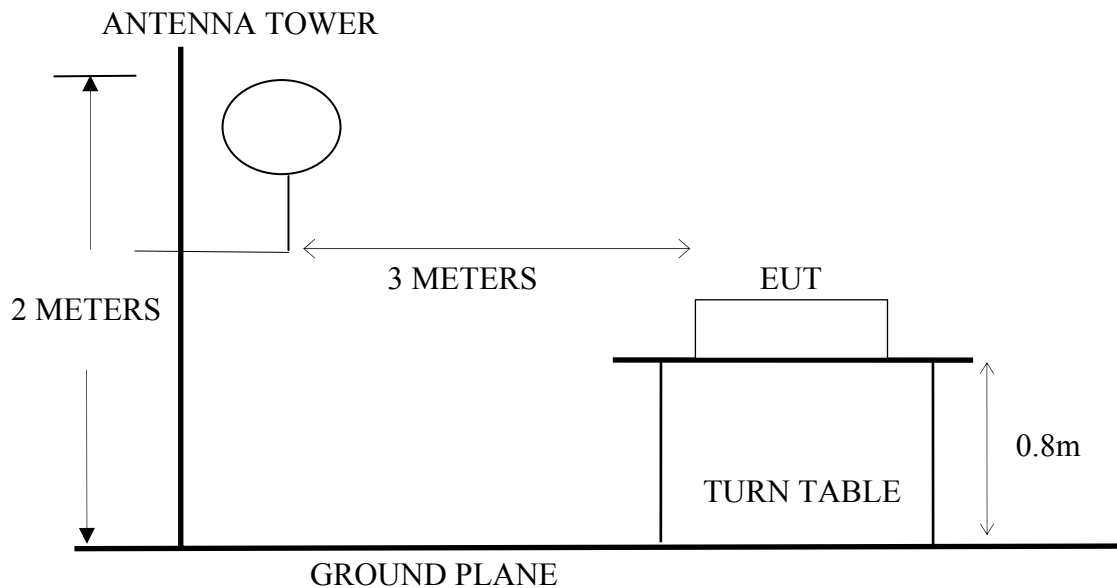
### 4.2. Block Diagram of Test Setup

#### 4.2.1. Block Diagram of connection between EUT and simulators



 : AC Adapter

#### 4.2.2. Semi-Anechoic Chamber (3m) Setup Diagram for 9kHz-30MHz



#### 4.3. IN-Band Radiated Spurious Emission Limit (§15.225(a)(b)(c), RSS-210 A2.6)

Fundamental Frequency (MHz)	Distance meter (m)	Limit	
		μV/m	dBμV/m
13.553-13.567	30	15848	84
	3	1584893	124
13.410 -13.553 and 13.567-13.710	30	334	50.50
	3	33381	90.50
13.110 -13.410 and 13.710-14.010	30	106	40.5
	3	10592	80.5

Remark : (1) Emission level (dBμV/m) = 20 log Emission level (μV/m)

(2)  $15848\mu\text{V/m} = 84\text{dB}\mu\text{V/m} = 84 + 40\log(30\text{m}/3\text{m}) = 124\text{dB}\mu\text{V/m}$   
 $334\mu\text{V/m} = 50.5\text{dB}\mu\text{V/m} = 50.5 + 40\log(30\text{m}/3\text{m}) = 90.5\text{dB}\mu\text{V/m}$   
 $106\mu\text{V/m} = 40.5\text{dB}\mu\text{V/m} = 40.5 + 40\log(30\text{m}/3\text{m}) = 80.5\text{dB}\mu\text{V/m}$

#### 4.4. Operating Condition of EUT

- 4.4.1. Set up the EUT (Notebook) and simulator as shown on 4.2.1.
- 4.4.2. To turn on the power of all equipments.
- 4.4.3. The EUT set to continuously transmit signals at 13.56MHz during all test time.

#### 4.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna fixed to 2meters to find out the maximum emission level. Loop antenna was used as a receiving antenna. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003, RSS-Gen and RSS-210 regulation.

The bandwidth of the R&S Test Receiver ESCS30 was set at 9kHz.

The frequency range from 30MHz to 1000MHz was checked with Peak detector and all final readings of measurement were with Quasi-Peak detector at open area test site.

#### 4.6. Radiated Emission Measurement Results

Test Date: Feb. 01, 2013    Temperature: 22    Humidity: 54%

Test Mode: 0 Degree

Frequency (MHz)	Test Result (dBuV/m) (3m)	Limit (dBuV/m) (3m)	Margin (dB)	Detector
13.560	28.12	90.50	62.38	QP
13.546	-- (Note 1)	50.50	--	QP
13.576	-- (Note 1)	50.50	--	QP

Note: 1. All emissions are lower than the ambient level cannot be measured.

Test Mode: 90 Degree

Frequency (MHz)	Test Result (dBuV/m) (3m)	Limit (dBuV/m) (3m)	Margin (dB)	Detector
13.560	38.00	90.50	52.50	QP
13.546	17.86	50.50	32.64	QP
13.576	16.42	50.50	34.08	QP

## 5. RADIATED SPURIOUS EMISSION MEASUREMENT (OUT-BAND)

### 5.1. Test Equipment

The following test equipment was used during the radiated emission measurement:  
 (at Semi-Anechoic Chamber)

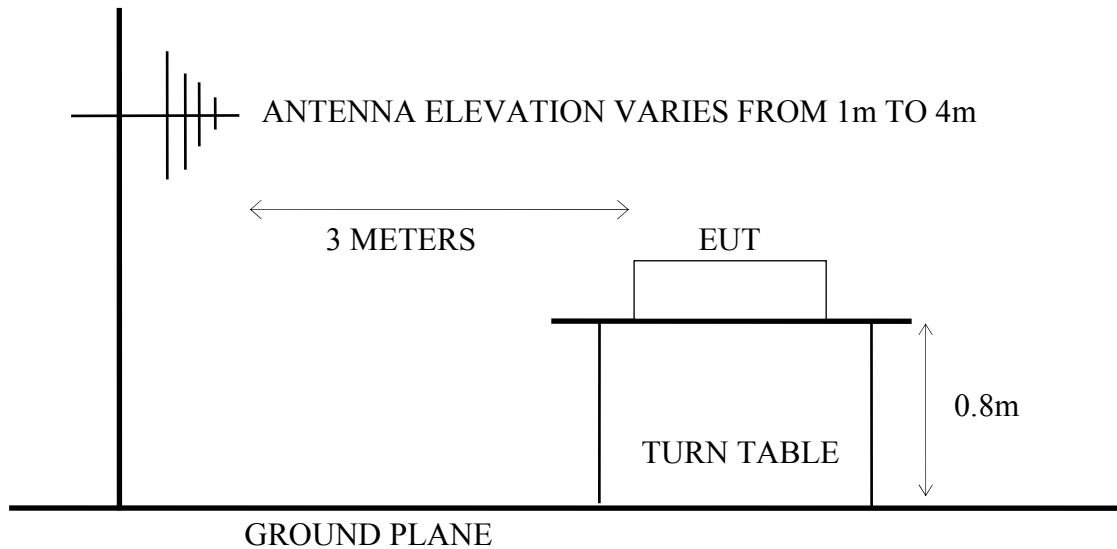
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 17, 12'	Oct. 16, 13'
2.	Test Receiver	R & S	ESCS30	100338	Jul. 04, 12'	Jul. 03, 13'
3.	Amplifier	HP	8447D	2944A06305	Feb. 13, 12'	Feb. 12, 13'
4.	Log Periodic Antenna	Schwarzbeck	UHALP 9108-A	0810	Mar. 03, 12'	Mar. 02, 13'
5.	Biconical Antenna	CHASE	VBA6106A	1264	Mar. 03, 12'	Mar. 02, 13'

### 5.2. Block Diagram of Test Setup

5.2.1. Block Diagram of connection between EUT and simulators same as section 4.2.1.

5.2.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000MHz

ANTENNA TOWER



### 5.3. Radiated Emission Limits [§15.209, §15.209(d), RSS-210 §2.7/Table 2, RSS-210 (A2.6)]

Frequency MHz	Distance Meters	Field Strengths Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
1.705 ~ 30.0	30 (3)	30 (2985)	29.5 (69.54)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

- Remark :
- (1) Emission level ( $\text{dB}\mu\text{V/m}$ ) = 20 log Emission level ( $\mu\text{V/m}$ )
  - (2) The tighter limit applies at the edge between two frequency bands.
  - (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
  - (4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).
  - (5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).
  - (6) The 3m limit apply relation:  $L2 = L1(d1/d2)$

### 5.4. Operating Condition of EUT

Same as powerline conducted emission measurement which is listed in 4.4. except the test set up replaced by section 5.2.

### 5.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003, RSS-Gen and RSS-210 regulation.

The bandwidth of the R&S Test Receiver ESCS30 was set at 120kHz.

The frequency range from 30MHz to 1000MHz was checked with Peak detector and all final readings of measurement were with Quasi-Peak detector at open area test site.

## 5.6. Radiated Emission Measurement Results

### **PASSED.**

All emissions not reported below are too low against the prescribed limits.

EUT : Notebook      Model No. : HSBUB-SDS

Test Date: Feb. 04, 2013    Temperature: 23      Humidity: 65 %

### **For Frequency Range 9kHz~30MHz:**

Test Mode: 0 Degree

Frequency (MHz)	Test Result (dBuV/m) (3m)	Limit (dBuV/m) (3m)	Margin (dB)	Detector
27.12	-- (Note 1)	69.54	--	QP
40.68	-- (Note 1)	40.00	--	QP

Note: 1. All emissions are lower than the ambient level cannot be measured.

Test Mode: 90 Degree

Frequency (MHz)	Test Result (dBuV/m) (3m)	Limit (dBuV/m) (3m)	Margin (dB)	Detector
27.12	-- (Note 1)	69.54	--	QP
40.68	-- (Note 1)	40.00	--	QP

Note: 1. All emissions are lower than the ambient level cannot be measured.

### **For Frequency Range 30MHz~1000MHz:**

The EUT was measured during this section testing and all the test results are listed in following page.

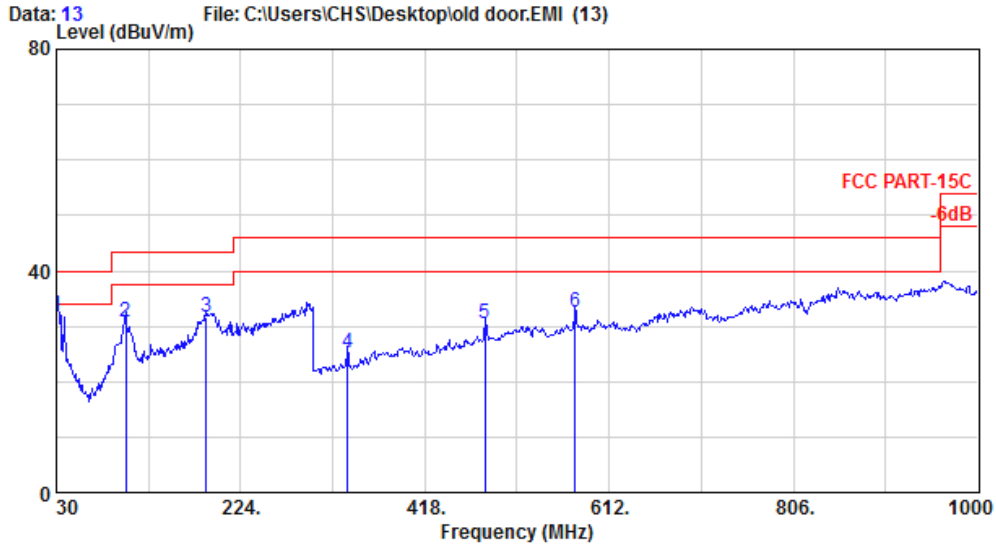
The details are as follows :

Mode	Reference Test Data	
	Horizontal	Vertical
1.	# 13	# 12

\* Above all final readings were measured with Quasi-Peak detector.



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Site no. : A/C Chamber Data no. : 13  
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL  
 Limit : FCC PART-15C  
 Env. / Ins. : E4446A 22°C/54% Henning Chang  
 EUT : HSBUB-SDS  
 Power Rating : 120Vac/60Hz  
 Test Mode : Operationg

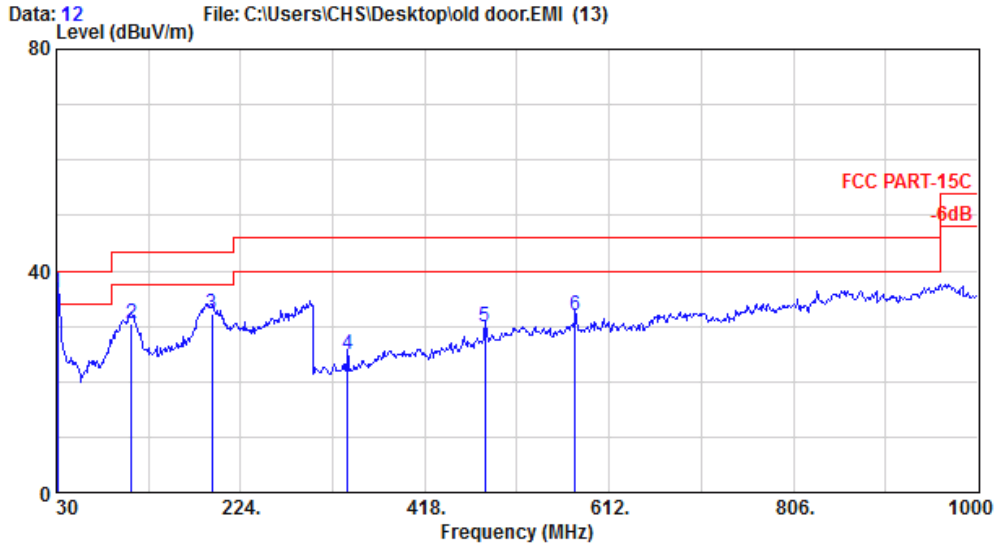
	Ant. Factor	Cable Loss	Reading	Emission Level	Limits	Margin	Remark
Freq. (MHz)	(dB/m)	(dB)	(dBµV)	(dBµV/m)	(dBµV/m)	(dB)	
1 30.000	24.86	1.10	6.09	32.05	40.00	7.95	QP
2 102.750	17.40	2.10	11.17	30.67	43.50	12.83	QP
3 188.110	21.43	2.90	7.42	31.75	43.50	11.75	QP
4 336.520	15.08	4.20	5.98	25.27	46.00	20.73	QP
5 481.050	18.74	6.10	5.75	30.59	46.00	15.41	QP
6 576.110	21.05	6.40	5.18	32.63	46.00	13.37	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.





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Site no. : A/C Chamber Data no. : 12  
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL  
 Limit : FCC PART-15C  
 Env. / Ins. : E4446A 22°C/54% Henning Chang  
 EUT : HSBUB-SDS  
 Power Rating : 120Vac/60Hz  
 Test Mode : Operationg

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission		Margin (dB)	Remark
				Level (dBµV/m)	Limits (dBµV/m)		
1	30.970	24.81	1.10	10.01	35.92	40.00	4.08 QP
2	109.540	18.13	2.20	10.09	30.42	43.50	13.08 QP
3	193.930	21.70	3.00	7.42	32.12	43.50	11.38 QP
4	336.520	15.08	4.20	5.54	24.83	46.00	21.17 QP
5	481.050	18.74	6.10	5.15	29.99	46.00	16.01 QP
6	576.110	21.05	6.40	4.40	31.85	46.00	14.15 QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

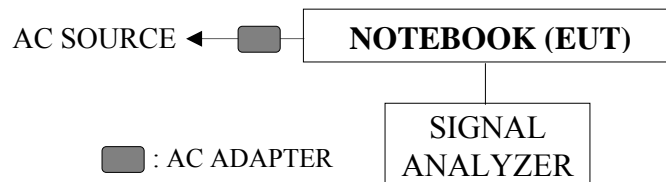
## 6. 20dB BANDWIDTH MEASUREMENT

### 6.1. Test Equipment

The following test equipment was used during the 20dB bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 17, 12'	Oct. 16, 13'

### 6.2. Block Diagram of Test Setup



### 6.3. Specification Limits [§15.215(c)]

The 20dB bandwidth shall be specified in operating frequency band.

### 6.4. Operating Condition of EUT

Same as powerline conducted emission measurement which is listed in 4.4. except the test set up replaced by section 6.2.

### 6.5. Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via receiver antenna placed near the EUT while the EUT is operating in transmission mode.

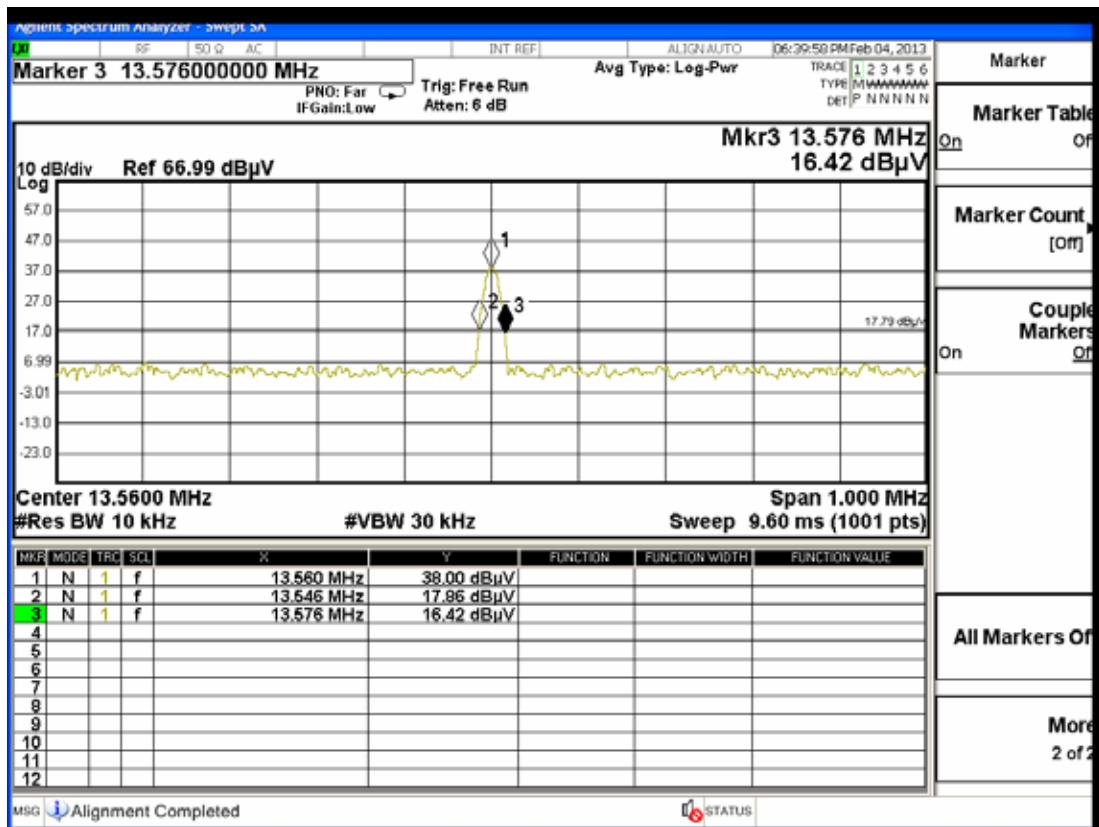
### 6.6. Test Results

**PASSED.** All the test results are attached in next pages.

Test Date: Feb. 04, 2013 Temperature: 25 Humidity: 66 %

No.	Test Frequency	20dB Bandwidth
1.	13.56MHz	30kHz

Note: Bandwidth=Mark 2-Mark 3=13.576MHz-13.546MHz=30kHz



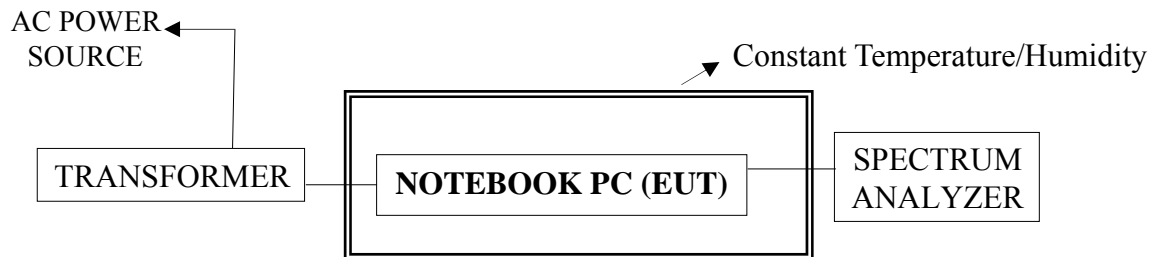
## 7. FREQUENCY STABILITY MEASUREMENT

### 7.1. Test Equipment

The following test equipment was used during the carrier frequency separation measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 17, 12'	Oct. 16, 13'
2.	Constant Temperature/ Humidity	Taichy	MHG-120LF	920538	Sep. 17, 12'	Sep. 16, 13'
3.	Transformer	TAILI	TL-220	N/A	N.C.R.	N.C.R.

### 7.2. Block Diagram of Test Setup



### 7.3. Specification Limits [§15.225(c), RSS-210 (A2.6)]

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of -20degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degree C.

### 7.4. Operating Condition of EUT

Same as powerline conducted emission measurement which is listed in 4.4. except the test set up replaced by section 7.2.

### 7.5. Test Procedure

The device operating in the 13.553-13.567MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20 degrees to +50 degree C at normal supply voltage.

## 7.6. Test Results

**PASSED.** All the test results are attached in next pages.

Test Date: Feb. 04, 2013    Temperature: 25    Humidity: 66 %

### Test Mode: 2 Minute

Temperature( )	-20	-10	0	10	20
Voltage	AC 120V	AC 120V	AC 120V	AC 120V	AC 126.5V
Frequency(MHz)	13.56030	13.56034	13.56039	13.56045	13.56050
Error (%)	0.00221	0.00251	0.00288	0.00332	0.00369

Temperature( )	20	30	40	50	20
Voltage	AC 102.0V	AC 120V	AC 120V	AC 120V	AC 120V
Frequency(MHz)	13.56050	13.56050	13.56052	13.56052	13.56052
Error (%)	0.00369	0.00369	0.00383	0.00383	0.00383

### Test Mode: 5 Minute

Temperature( )	-20	-10	0	10	20
Voltage	AC 120V	AC 120V	AC 120V	AC 120V	AC 126.5V
Frequency(MHz)	13.56024	13.56025	13.56030	13.56040	13.56050
Error (%)	0.00177	0.00184	0.00221	0.00295	0.00369

Temperature( )	20	30	40	50	20
Voltage	AC 102.0V	AC 120V	AC 120V	AC 120V	AC 120V
Frequency(MHz)	13.56051	13.56052	13.56053	13.56054	13.56051
Error (%)	0.00376	0.00383	0.00391	0.00398	0.00376

### Test Mode: 10 Minute

Temperature( )	-20	-10	0	10	20
Voltage	AC 120V	AC 120V	AC 120V	AC 120V	AC 126.5V
Frequency(MHz)	13.56010	13.56020	13.56029	13.56380	13.56050
Error (%)	0.00074	0.00147	0.00214	0.02802	0.00369

Temperature( )	20	30	40	50	20
Voltage	AC 102.0V	AC 120V	AC 120V	AC 120V	AC 120V
Frequency(MHz)	13.56051	13.56054	13.56054	13.56055	13.56052
Error (%)	0.00376	0.00398	0.00398	0.00406	0.00383

## **8. DEVIATION TO TEST SPECIFICATIONS**

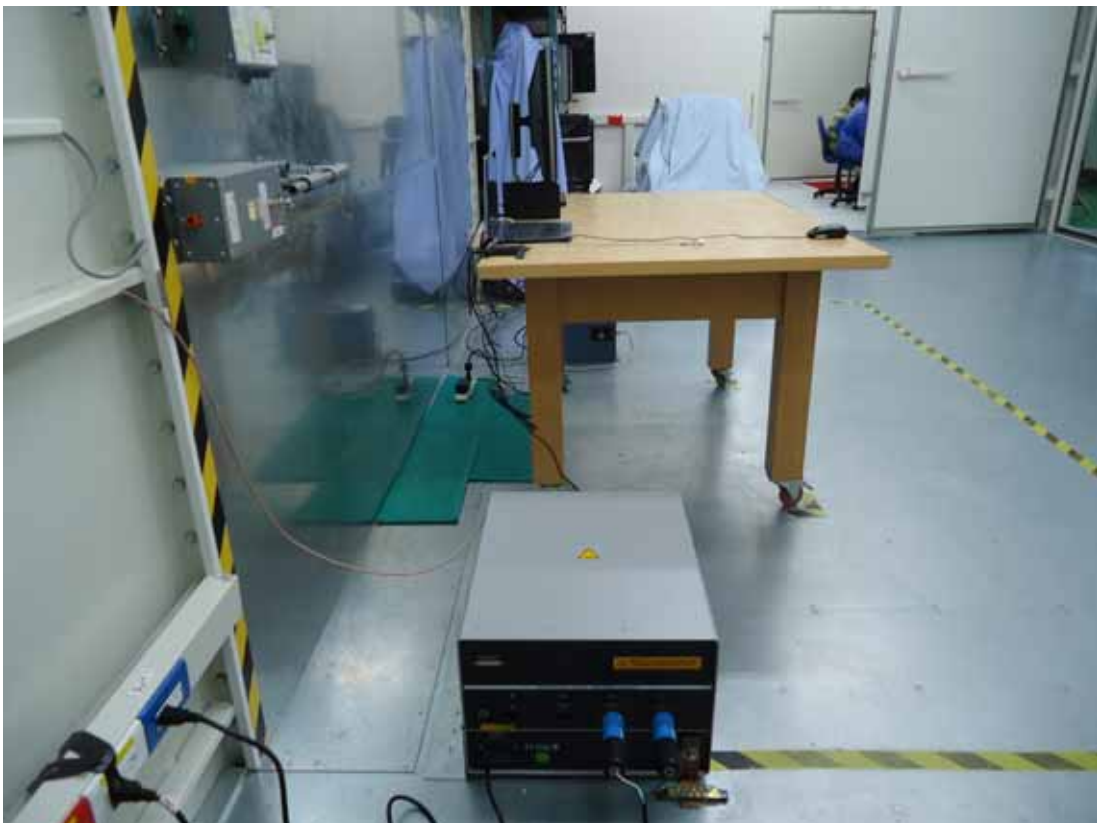
**【NONE】**

## 9. PHOTOGRAPHS

### 9.1. Photos of Conducted Disturbance Measurement



FRONT VIEW OF CONDUCTED MEASUREMENT



BACK VIEW OF CONDUCTED MEASUREMENT

## 9.2. Photos of Radiated Emission Measurement (IN-Band)



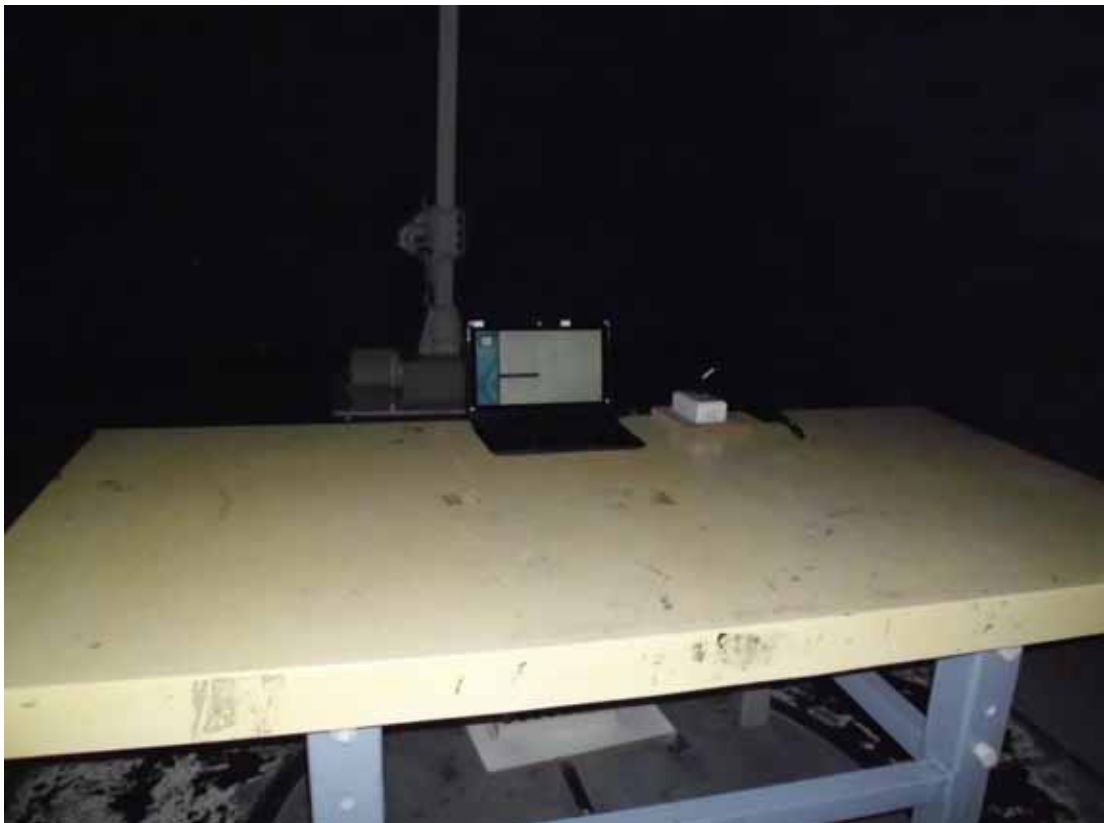


### 9.3. Photos of Radiated Emission Measurement (IN-Band)

#### 9.3.1. Frequency Range 9kHz-30MHz



#### 9.3.2. Frequency Range 30MHz-1GHz



#### 9.4. Photo of 20dB Bandwidth & Frequency Stability Measurement

