ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT CLASS II PC REPORT

OF

Product Name:	**Tablet**
Brand Name:	**HP**
Model No.:	**HSTNH-K12C**
Model Difference:	**N/A**
FCC ID:	**VOB-P1640**
Report No.:	**E2/2014/30010**
Issue Date:	**Apr. 01, 2014**
FCC Rule Part:	**§15.247, Cat: DTS**
Prepared for:	**NVIDIA CORPORATION** **2701 San Tomas Expressway Santa Clara California 95050 United States**
Prepared by:	**SGS Taiwan Ltd.** **Electronics & Communication Laboratory** **No.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan 333**

Testing Laboratory
0513

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VERIFICATION OF COMPLIANCE

Applicant:	NVIDIA CORPORATION 2701 San Tomas Expressway Santa Clara California 95050 United States
Product Name:	Tablet
Brand Name:	HP
Model No.:	HSTNH-K12C
Model Difference:	N/A
File Number:	E2/2014/30010
FCC ID:	VOB-P1640
Date of test:	Mar. 13, 2014 ~ Mar. 30, 2014
Date of EUT Received:	Mar. 13, 2014

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

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Prepared By:	Tiffany Kao	***Date***	Apr. 01, 2014
	Tiffany Kao / Clerk		
Approved By:	Jim Chang	***Date***	Apr. 01, 2014
	Jim Chang / Supervisor		

Version

Version No.	Date	Description
00	Apr. 01, 2014	Initial creation of document

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	Tablet	
Brand Name:	HP	
Model No.:	HSTNH-K12C	
Model difference:	N/A	
Hardware Version:	P1640 A04 066803e804000000	
Software Version:	flaxen-eng 4.4 KRT16M eng.ericz.20140107.105332 test-keys	
Class II Permissive change:	1. The non-transmitter components/functions is being modified to improve the holistic performance relevant to un-intentional radiator part 2. Bluetooth Low Energy Mode is being enabled via software/firmware update	
Power Supply:	3.7Vdc from Li-ion battery or 5.0Vdc by AC/DC adapter	
	Battery:	Model:32102102, Supplier: YOKU ENERGY (ZHANGZHOU) CO., LTD
	Adapter:	Model: W12-010N3A(US), Supplier: Chicony

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Peak)	Modulation Technology
11b/g	2412-2462	11	b: 17.68dBm g: 20.83dBm	DSSS OFDM
11n (2.4GHz)	HT20 2412-2462	11	n: 20.65 dBm	OFDM
11n (2.4GHz)	HT40 2422-2452	11	n: 18.38 dBm	OFDM
Antenna Designation:			PIFA Antenna, 3.45dBi	
Modulation type			CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM	
Transition Rate:			802.11 b: 1/2/5.5/11 Mbps; 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_20MHz: 13.5 – 135Mbps	

This report applies for WLAN, and complies with FCC rule part 15C.

IEEE 802.11n Spec:

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Datarate(Mbps)			
									800nsGI		400nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bite per single carrier
NCBPS	Number of coded bite per symbol
NDBPS	Number of data bite per symbol
GI	Guard interval

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: VOB-P1640** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B under the DoC procedure.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4:2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with Apr 2013 KDB558074 D01 V03 for compliance to FCC 47CFR 15.247 requirements.

1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 2, Keji 1st Rd., Guishan Township, Taoyuan Country, 33383 which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009. FCC Registration Number is: 990257. Canada Registration Number: 4620A-4.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the general criterion in Section 7.1 of ANSI C63.4:2009.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz, and the measurement procedure 7.3 in ANSI 63.4:2009 is followed to carry out the test. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and of ANSI C63.4:2009,

2.4 Configuration of Tested System

Fig. 2-1 Radiated Emission & Conducted (Antenna Port) Configuration

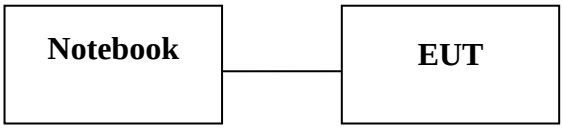


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Notebook	Lenovo	L430	R9-YYG88	Shield	Un-Shield
2.	Software	Android ADB Command	N/A	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	N/A
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	N/A
§15.247(d)	100 KHz Bandwidth Of Frequency Band Edges	N/A
§15.247(d)	Spurious Emission	Compliant
§15.247(e)	Peak Power Density	N/A
§15.203	Antenna Requirement	N/A

4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.
Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

802.11 b mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 1Mbps lowest data rate are chosen for full testing.

802.11 g mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 6Mbps lowest data rate are chosen for full testing.

802.11 n_20MHz mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 6.5Mbps lowest data rate are chosen for full testing.

802.11 n_40MHz: Lowest (2422MHz), Mid(2437MHz) and high (2452MHz) with 13.5 Mbps highest data rate are chosen for above testing.

The output power of all test mode, and all test default channel is re-measured to ensure output power of the emission remains identical to the original authorization, as per KDB178919.

Partial test of the Worst-Case channel of the worst case mode on radiated spurious emission is revisited, and re-measured. The test result reveals that there exists no occurrence of the degradation upon the change of non-transmitter components, and the product of the given application remains compliant.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case E2 position was tested as resulted in pre-scanned measurement with respect to 2.4GHz.

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55dB (for Spectrum) +/- 1.42 dB (for Power Meter)
6dB Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Peak Power Density	+/- 1.55 dB
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC=+/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : **Vertical**)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : **Horizontal**)	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6 CONDUCTED EMISSION TEST

6.1 Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	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
Note 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.		

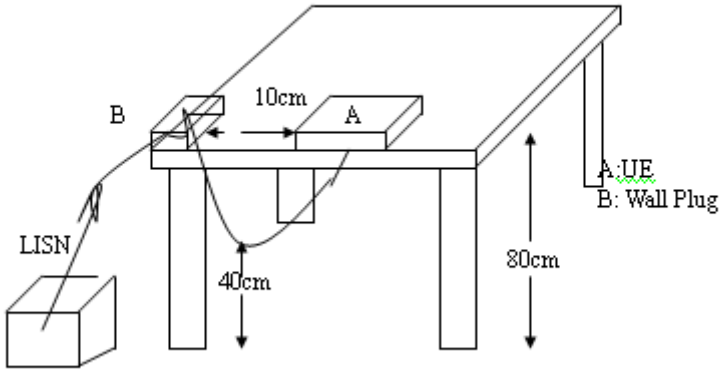
6.2 Measurement Equipment Used:

SGS Conducted Emission Test Site No.A					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EMI Test Receiver	R&S	ESCI 3	101311	06/27/2013	06/26/2014
Coaxial Cables	N/A	N30N30-1042-150 cm	N/A	02/07/2014	02/06/2015
LISN	Schwarzbeck	NSLK 8127	8127-648	06/17/2013	06/16/2014
LISN	Rolf-Heine	NNB-2/16Z	99012	08/18/2013	08/17/2014

6.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4:2009.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

6.6 Measurement Result:

N/A

7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

According to §15.247 (b)

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

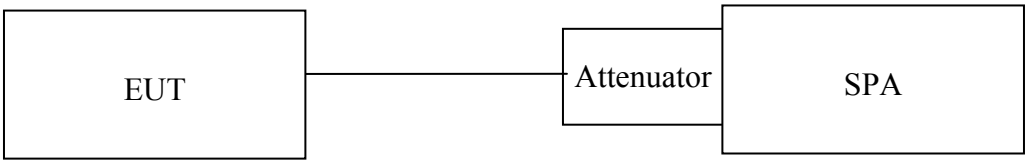
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.2 Measurement Equipment Used:

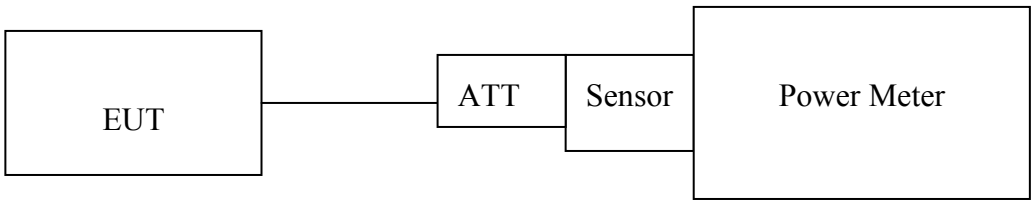
SGS Conducted Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/26/2013	10/25/2014
Power Meter	Anritsu	ML2496A	1326001	06/28/2013	06/27/2014
Power Sensor	Anritsu	MA2411B	1315048	06/28/2013	06/27/2014
Power Sensor	Anritsu	MA2411B	1315049	06/28/2013	06/27/2014
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	HY-144	01/06/2014	01/05/2015
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	HY-145	01/06/2014	01/05/2015
Coaxial Cable 80cm	WOKEN	00100A1F1A185C	HY-143	01/06/2014	01/05/2015
DC Block	Mini-Circuits	BLK-18-S+	HY-146	01/06/2014	01/05/2015
DC Block	PASTERNACK	PE8210	HY-147	01/06/2014	01/05/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-019	01/06/2014	01/05/2015
Splitter	WOKEN	-	DOM35LW1A2	01/06/2014	01/05/2015
Attenuator	Mini-Circuits	BW-S10W2+	HY-148	01/06/2014	01/05/2015
Attenuator	WOKEN	218FS-10	HY-149	01/06/2014	01/05/2015
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/20/2013	06/19/2014
DC Power Supply	HOLA	DP-3003	D707003S	N.C.R.	N.C.R.
DC Power Supply	DHA	DPS-3003	9411005787	N.C.R.	N.C.R.
DC Power Supply	Agilent	E3640A	MY53140006	N.C.R.	N.C.R.

7.3 Test Set-up:

Spectrum:



Power Meter:



7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (**Peak power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector =peak, Sweep = Auto. Setting on spectrum is adjusted based on the mandatory procedure in 9.1.2 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.1.3 in KDB558074 is followed.
   (**Avg. power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector =Avg., Trace avg =100, Sweep = Auto, Setting on spectrum is adjusted based on the mandatory procedure in 9.2.2.4 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.2.3, option 3 in KDB558074 is followed.
3. Record the max. Reading as observed from Spectrum or Power Meter.
4. Repeat above procedures until all frequency of interest measured was complete.

Formula:

Duty Cycle = Ton / (Ton+Toff)

Test Procedure:

Set span = 0, RBW = 1MHz, VBW = 3MHz, Detector = Peak

Duty Cycle:

	Duty Cycle	Duty Factor (dBm)
802.11b	0.99	0.0
802.11g	0.99	0.0
802.11n_20 (2.4G)	0.99	0.0
802.11n_40 (2.4G)	0.99	0.0

7.5 Measurement Result:

802.11b

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		1	
1	2412	17.45	1 Watt = 30 dBm
6	2437	**17.68**	1 Watt = 30 dBm
11	2462	17.61	1 Watt = 30 dBm

802.11g

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		6	
1	2412	12.45	1 Watt = 30 dBm
6	2437	**20.83**	1 Watt = 30 dBm
11	2462	12.35	1 Watt = 30 dBm

802.11n_20M

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS0	
1	2412	13.87	1 Watt = 30 dBm
6	2437	**20.65**	1 Watt = 30 dBm
11	2462	16.20	1 Watt = 30 dBm

802.11n_40M

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS0	
3	2422	15.56	1 Watt = 30 dBm
6	2437	**18.38**	1 Watt = 30 dBm
9	2452	15.06	1 Watt = 30 dBm

**** Note: The duty cycle factor is compensated back to obtain the maximum value of the measurement in average.***

8 6dB BANDWIDTH

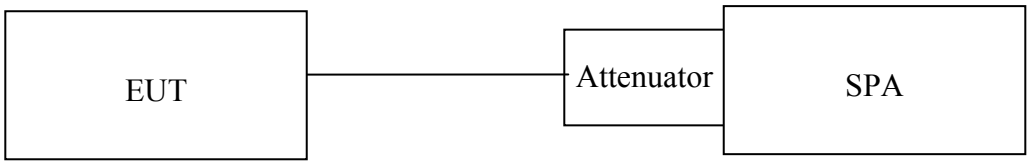
8.1 Standard Applicable:

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz,2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

8.2 Measurement Equipment Used:

SGS Conducted Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/26/2013	10/25/2014
Power Meter	Anritsu	ML2496A	1326001	06/28/2013	06/27/2014
Power Sensor	Anritsu	MA2411B	1315048	06/28/2013	06/27/2014
Power Sensor	Anritsu	MA2411B	1315049	06/28/2013	06/27/2014
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	HY-144	01/06/2014	01/05/2015
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	HY-145	01/06/2014	01/05/2015
Coaxial Cable 80cm	WOKEN	00100A1F1A185C	HY-143	01/06/2014	01/05/2015
DC Block	Mini-Circuits	BLK-18-S+	HY-146	01/06/2014	01/05/2015
DC Block	PASTERNACK	PE8210	HY-147	01/06/2014	01/05/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-019	01/06/2014	01/05/2015
Splitter	WOKEN	-	DOM35LW1A2	01/06/2014	01/05/2015
Attenuator	Mini-Circuits	BW-S10W2+	HY-148	01/06/2014	01/05/2015
Attenuator	WOKEN	218FS-10	HY-149	01/06/2014	01/05/2015
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/20/2013	06/19/2014
DC Power Supply	HOLA	DP-3003	D707003S	N.C.R.	N.C.R.
DC Power Supply	DHA	DPS-3003	9411005787	N.C.R.	N.C.R.
DC Power Supply	Agilent	E3640A	MY53140006	N.C.R.	N.C.R.

8.3 Test Set-up:



8.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto, the setting on spectrum is adjusted based on the procedure as guide in 8.1 option 1 of KDB558074.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency of interest measured was complete.

8.5 Measurement Result:

N/A

9 BAND EDGES MEASUREMENT

9.1 Standard Applicable:

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in15.209(a).

9.2 Measurement Equipment Used:

9.2.1 Conducted Emission at antenna port:

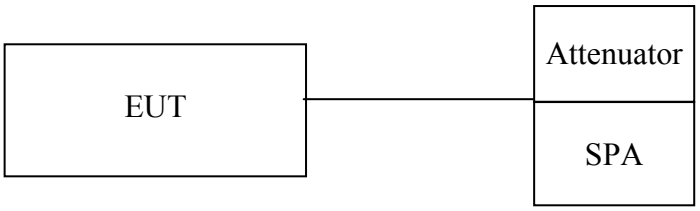
Refer to section 7.2 for details.

9.2.2 Radiated emission:

SGS SAC Chamber No.C					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Signal Analyzer	R&S	FSV 40	101493	01/07/2014	01/06/2015
EMI Test Receiver	R&S	ESCI 7	100950	01/11/2014	01/10/2015
Broadband Antenna	TESEQ	CBL 6112D	35240	01/17/2014	01/16/2015
Horn Antenna	ETS-Lindgren	3117	00143272	01/27/2014	01/26/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	01/22/014	01/21/2015
Horn Antenna	ETS-Lindgren	3160-10	00117783	01/22/2014	01/21/2015
Pre-Amplifier	R&S	SCU-18	10203	04/29/2013	04/28/2014
Pre-Amplifier	EM Electronics Corp.	EMC330	980096	01/24/2014	01/23/2015
Pre-Amplifier	EM Electronics Corp.	EMC184045	980135	01/24/2014	01/23/2015
Coaxial Cable	Huber+Suhner	SAC-C TX-30M-1GHz	TX1	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C TX-1-26.5GHz	TX2	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C RX-150k-30MHz	RX1	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C RX-30M-1GHz	RX2	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C RX-1-26.5GHz	RX3	04/22/2013	04/21/2014
Filter Bank	R&S	TS8996	SCIN.EMC.1023.12	04/22/2013	04/21/2014
Attenuator	WOKEN	218FS-10	HY-151	01/06/2014	01/05/2015
Controller	Chance Most	886	N/A	N.C.R.	N.C.R.
Antenna Master	Chance Most	N/A	N/A	N.C.R.	N.C.R.
Turn Table	Chance Most	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

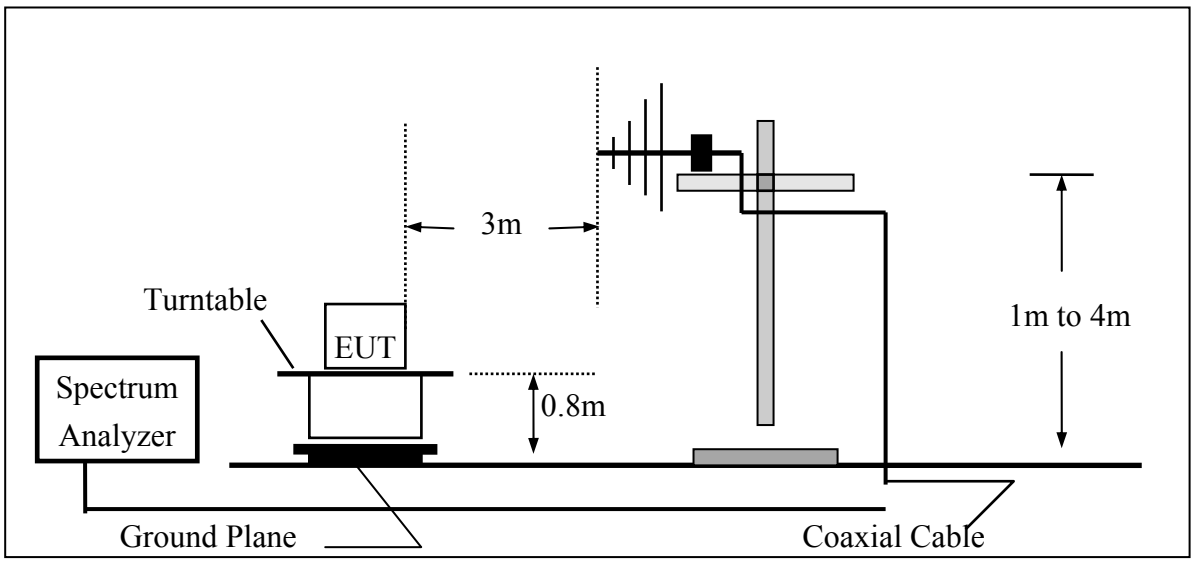
9.3 Test SET-UP:

9.3.1 Conducted Emission at antenna port:

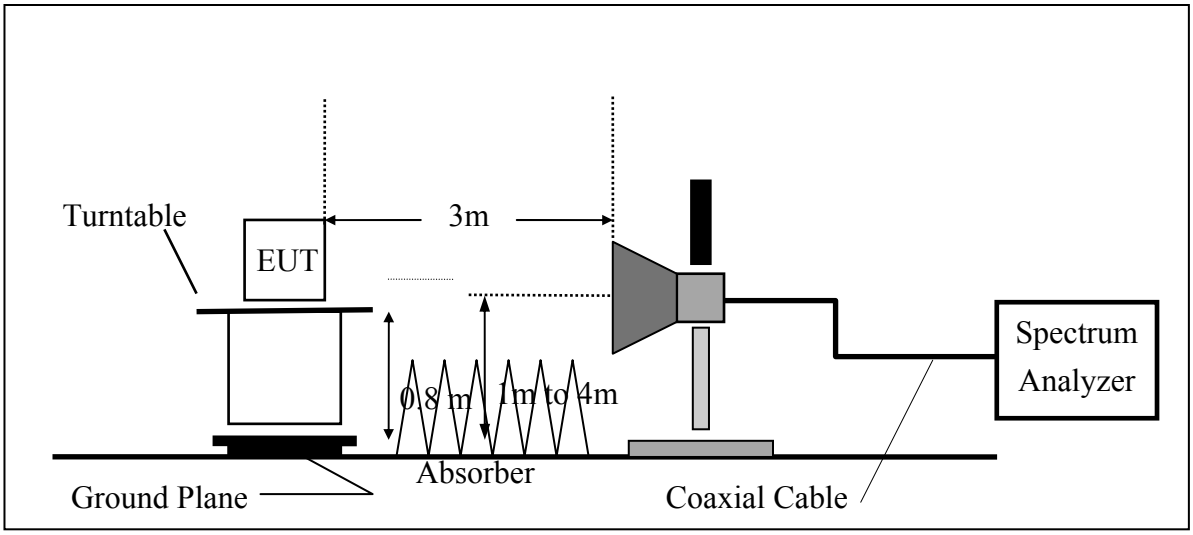


9.3.2 Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



9.4 Measurement Procedure:

Unwanted Emissions into Non-Restricted Frequency Bands, Measurement Procedure followed by 11.1 of KDB558074 D01

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
4. Set the spectrum analyzer as RBW, VBW=300KHz, Detector = Peak, Sweep = auto
5. Mark the highest reading of the emission as the reference level measurement.
6. Set DL as the limit = reading on marker 1 – 20dBm
7. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 KHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Unwanted Emission falling into Restricted Frequency Bands, Measurement Procedure followed by 12.1 of KDB558074 D01

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. On spectrum, following 8.1.2, and RBW = 1MHz, VBW = 3MHz, & Marker 2390MHz, and 2483.5MHz (Peak Measurement). Average Measurement: following 8.2 with the modification span to 1MHz, &RBW = 1MHz, VBW = 3MHz and peak marker function to obtain the highest reading on 2390, and 2483.5MHz.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete

9.5 Field Strength Calculation:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

9.6 Measurement Result:

Note: Refer to next page for tabular data sheets.

Radiated Emission:

(Unwanted Emissions into Restricted Frequency Bands): 802.11 b mode

Operation Band	:802.11 b	Test Date	:2014-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	53.27	3.14	56.40	74.00	-17.60
2390.00	Average	E	42.83	3.14	45.97	54.00	-8.03

Operation Band	:802.11 b	Test Date	:2014-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	51.18	3.14	54.31	74.00	-19.69
2390.00	Average	E	41.06	3.14	44.20	54.00	-9.80

Operation Band	:802.11 b	Test Date	:2014-03-30
Fundamental Frequency	:2462 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	E	53.55	3.35	56.91	74.00	-17.09
2483.50	Average	E	44.46	3.35	47.81	54.00	-6.19

Operation Band	:802.11 b	Test Date	:2014-03-30
Fundamental Frequency	:2462 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	E	53.24	3.35	56.59	74.00	-17.41
2483.50	Average	E	42.72	3.35	46.07	54.00	-7.93

(Unwanted Emissions into Restricted Frequency Bands): 802.11 g mode

Operation Band	:802.11 g	Test Date	:2014-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	46.43	3.14	49.57	74.00	-24.43
2390.00	Average	E	35.32	3.14	38.46	54.00	-15.54

Operation Band	:802.11 g	Test Date	:2014-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	45.35	3.14	48.49	74.00	-25.51
2390.00	Average	E	33.47	3.14	36.61	54.00	-17.39

Operation Band	:802.11 g	Test Date	:2014-03-30
Fundamental Frequency	:2462 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	E	60.95	3.35	64.30	74.00	-9.70
2483.50	Average	E	45.52	3.35	48.87	54.00	-5.13

Operation Band	:802.11 g	Test Date	:2014-03-30
Fundamental Frequency	:2462 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	E	56.91	3.35	60.26	74.00	-13.74
2483.50	Average	E	44.98	3.35	48.33	54.00	-5.67

(Unwanted Emissions into Restricted Frequency Bands): 802.11 n_20M mode

Operation Band	:802.11 n20M	Test Date	:2014-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	58.60	3.14	61.74	74.00	-12.26
2390.00	Average	E	45.11	3.14	48.25	54.00	-5.75

Operation Band	:802.11 n20M	Test Date	:2014-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	53.79	3.14	56.92	74.00	-17.08
2390.00	Average	E	42.56	3.14	45.70	54.00	-8.30

Operation Band	:802.11 n20M	Test Date	:2014-03-30
Fundamental Frequency	:2462 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	E	63.85	3.35	67.20	74.00	-6.80
2483.50	Average	E	46.45	3.35	49.80	54.00	-4.20

Operation Band	:802.11 n20M	Test Date	:2014-03-30
Fundamental Frequency	:2462 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	S	54.83	3.35	58.18	74.00	-15.82
2483.50	Average	S	45.24	3.35	48.59	54.00	-5.41

(Unwanted Emissions into Restricted Frequency Bands): 802.11 n_40M mode

Operation Band	:802.11 n40M	Test Date	:2014-03-30
Fundamental Frequency	:2422 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	64.04	3.14	67.17	74.00	-6.83
2390.00	Average	E	45.30	3.14	48.44	54.00	-5.56

Operation Band	:802.11 n40M	Test Date	:2014-03-30
Fundamental Frequency	:2422 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	Peak	E	59.78	3.14	62.92	74.00	-11.08
2390.00	Average	E	43.15	3.14	46.29	54.00	-7.71

Operation Band	:802.11 n40M	Test Date	:2014-03-30
Fundamental Frequency	:2452 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	E	64.24	3.35	67.60	74.00	-6.40
2483.50	Average	E	44.83	3.35	48.18	54.00	-5.82

Operation Band	:802.11 n40M	Test Date	:2014-03-30
Fundamental Frequency	:2452 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	Peak	E	56.73	3.35	60.08	74.00	-13.92
2483.50	Average	E	44.91	3.35	48.27	54.00	-5.73

10 SPURIOUS EMISSION TEST

10.1 Standard Applicable

According to §15.247(d),

Emission at antenna port:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Radiated Spurious Emission

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

10.2 Measurement Equipment Used:

10.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

10.2.2 Radiated emission:

Refer to section 9.2.2 for details.

10.3 Test SET-UP:

10.3.1 Conducted Emission at antenna port:

Refer to section 7.3 for details.

10.3.2 Radiated emission:

Refer to section 9.3.2 for details.

10.4 Measurement Procedure:

Radiated Emission:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
7. Repeat above procedures until all default test channel measured were complete.

Conducted Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 100K & VBW = 300K on Spectrum.
3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz, 18G to 40GHz (applicable if operation mode is 5GHz)
4. Via Software, combine 5 spans of frequency range into one plot
5. Repeat above procedures until all default test channel measured were complete.

10.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

10.6 Measurement Result:

Note: Refer to next page for tabular data sheets.

Radiated Spurious Emission Measurement Result (802.11b)

Operation Band	:802.11 b	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	47.11	0.41	47.51	74.00	-26.49
4874.00	Average	H	37.01	0.41	37.42	54.00	-16.58
7311.00	Peak	H	44.55	4.83	49.38	74.00	-24.62
7311.00	Average	H	35.09	4.83	39.92	54.00	-14.08
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 b	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	46.27	0.41	46.68	74.00	-27.32
4874.00	Average	H	34.81	0.41	35.22	54.00	-18.78
7311.00	Peak	H	43.64	4.83	48.47	74.00	-25.53
7311.00	Average	H	32.54	4.83	37.37	54.00	-16.63
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Radiated Spurious Emission Measurement Result (802.11g)

Operation Band	:802.11 g	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	51.01	0.41	51.43	74.00	-22.57
4874.00	Average	H	38.52	0.41	38.94	54.00	-15.06
7311.00	Peak	H	46.08	4.83	50.91	74.00	-23.09
7311.00	Average	H	35.38	4.83	40.21	54.00	-13.79
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 g	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	47.59	0.41	48.00	74.00	-26.00
4874.00	Average	H	37.22	0.41	37.63	54.00	-16.37
7311.00	Peak	H	45.00	4.83	49.83	74.00	-24.17
7311.00	Average	H	34.49	4.83	39.32	54.00	-14.68
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Radiated Spurious Emission Measurement Result (802.11n_20M)

Operation Band	:802.11 n20M	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	48.55	0.41	48.96	74.00	-25.04
4874.00	Average	H	35.90	0.41	36.31	54.00	-17.69
7311.00	Peak	H	44.58	4.83	49.41	74.00	-24.59
7311.00	Average	H	33.87	4.83	38.70	54.00	-15.30
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 n20M	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	47.37	0.41	47.78	74.00	-26.22
4874.00	Average	H	34.39	0.41	34.80	54.00	-19.20
7311.00	Peak	H	44.72	4.83	49.55	74.00	-24.45
7311.00	Average	H	33.45	4.83	38.28	54.00	-15.72
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Radiated Spurious Emission Measurement Result (802.11n_40M)

Operation Band	:802.11 n40M	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	45.92	0.41	46.33	74.00	-27.67
4874.00	Average	H	33.45	0.41	33.87	54.00	-20.13
7311.00	Peak	H	44.55	4.83	49.38	74.00	-24.62
7311.00	Average	H	30.19	4.83	35.02	54.00	-18.98
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 n40M	Test Date	:2014-03-30
Fundamental Frequency	:2437 MHz	Temp./Humi.	:22deg_C/52 RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBμV	dB	dBμV / m	dBμV / m	dB
4874.00	Peak	H	44.46	0.41	44.87	74.00	-29.13
4874.00	Average	H	32.26	0.41	32.67	54.00	-21.33
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

11 PEAK POWER SPECTRAL DENSITY

11.1 Standard Applicable:

According to §15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

11.2 Measurement Equipment Used:

Refer to section 7.2 for details.

11.3 Test Set-up:

Refer to section 7.3 for details. (Spectrum Option)

11.4 Measurement Procedure (following the measurement procedure 10.2 of KDB558074):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

11.5 Measurement Result:

N/A

12 ANTENNA REQUIREMENT

12.1 Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

12.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting is 3.45dBi for 2.4GHz. In addition, the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.