

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

	OF		
Product Name:	PDA Phone		
Brand Name:	Sony		
Type No.:	PM-0732-BV		
Model Difference:	N/A		
FCC ID:	PY7PM-0732		
Report No.:	EH/2014/10051		
Issue Date:	Apr. 11, 2014		
FCC Rule Part:	§15.225		
Prepared for:	Sony Mobile Communications AB Nya Vattentornet 22188 Lund/SWEDEN		
Prepared by:	SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803		
Testing Labo rato ry 0513	<b>Note:</b> This report shall not be reproduced except in full, without the written approval of SGS Taiwan Ltd. This document may be altered or revised by SGS Taiwan Ltd. personnel only, and shall be noted in the revision section of the document.		

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## VERIFICATION OF COMPLIANCE

Applicant:	Sony Mobile Communications AB Nya Vattentornet 22188 Lund/SWEDEN
Product Name:	PDA Phone
Brand Name:	Sony
Type No.:	PM-0732-BV
Model Difference:	N/A
FCC ID:	PY7PM-0732
File Number:	EH/2014/10051
Date of test:	Jan. 27, 2014 ~ Apr. 07, 2014
Date of EUT Received:	Jan. 27, 2014

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. 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 & ANSI C63.10:2009 and 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 15.225.

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

Test By:	Marcus Tseng	Date:	Apr. 11, 2014
Prepared By:	Marcus Tseng/Engineer Uroletta Tang	Date:	Apr. 11, 2014
Approved By	Violetta Tang / Clerk Jim Chang	Date:	Apr. 11, 2014

Jim Chang / Supervisor

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# **Revision History**

Report Number	Revision	Description	Issue Date
EH/2014/10051	Rev.00	Initial creation of document	Apr. 11, 2014

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#### **GENERAL INFORMATION** 1

#### 1.1 **Product Description**

General:

Product Name:	PDA Phone		
Brand Name:	Sony		
Type No.:	PM-0732-	BV	
Model Difference:	N/A		
Data Cable (USB):	1.Model No.: EC450, Supplier: K-one Type No.: AI-0700, Length: 100 cm 2.Model No.: EC801, Supplier: Sony Type No.: AI-0401, Length: 100 cm		
Simple Hands-Free (SHF-White):	51	: MH410c, Supplier: Foster Electric	
Simple Hands-Free (SHF-Black):	Model No.: MH410c, Supplier: Foster Electric Type No.: CCA-0004017		
Car Charger:	Model No.: AN400, Supplier: Salcomp Type No.: CAA-0003013		
Hi-Fi Wireless Headset:	Model No.: MW600, Supplier: BALDA Type No.: DDA-0002029.B coupling with Simple Hands Free (Model No.: MH755, Supplier: BALDA Type No.: AG-0502)		
Hardware Version:	Α		
Software Version:	18.2.A.0.9		
	3.8Vdc		
	Battery:	Model No.: LIS1546ERPC, Supplier: Sony Type No.: N/A	
Power Supply:		1.Model No.: EP800, Supplier: Salcomp Type No.: CAA-0002016-US	
	Adapter:	2.Model No.: EP880, Supplier: Salcomp Type No.: AC-0400-US	

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Bluetooth BR+EDR:

Bluetooth Version:	V3.0+HS
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Transmit Power:	10.12dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	<= 0.4s
Antenna Designation:	PIFA Antenna, Gain: -1.34dBi

Bluetooth Low Energy:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	V4.0 Dual mode
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	1.79dBm (Peak)
Antenna Designation:	PIFA Antenna, Gain: -1.34dBi

NFC:

Operating Frequency:	13.56MHz
Transmit Power:	< 123dBuV/m at 3m.
Number of Channels:	1
Antenna Type:	Loop Antenna
Modulation Type:	ASK, BPSK

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### ANT Plus:

Operating Frequency:	2402 – 2480MHz
Transmit Power:	102.10dBuV/m
Number of Channels:	79
Antenna Type:	PIFA Antenna, Gain: -1.34dBi
Modulation Type:	GFSK

## WLAN 2.4GHz+5.7GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology
11b/g	2412-2462	11	b: 20.40dBm g: 21.93dBm	DSSS, OFDM
11n	HT20 2412-2462	11	HT20: 20.89dBm	OFDM
11a	5725-5850	5	a: 20.66dBm	
11n (5GHz)	HT20 5725-5850	5	HT20: 19.89dBm	OFDM
11n (5GHz)	HT40 5725-5850	2	HT40: 19.07dBm	
Antenna Designation:		PIFA Antenna, 2.4GHz Gain: -1.34dBi 5GHz Gain: 4.51dBi (5725MHz-5850MHz)		
Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM		
Transition Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 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 – 65.0Mbps 802.11 n_40MHz: 13.5 – 135.0Mbps		

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### WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg)	Modulation Technology
	5150~5250	4	13.98dBm	
11a	5250~5350	4	13.99dBm	OFDM
	5470~5725	8	13.99dBm	
	HT20 5150~5250	4	HT20: 11.49dBm	
11n	HT20 5250~5350	4	HT20: 11.49dBm	OFDM
	HT20 5470~5725	8	HT20: 11.48dBm	
	HT40 5150~5250	2	HT40: 10.48dBm	
11n	HT40 5250~5350	2	HT40: 10.46dBm	OFDM
	HT40 5470~5725	3	HT40: 10.49dBm	
Antenna Designation		PIFA Antenna,   5GHz Gain: -0.38dBi (5150MHz-5250MHz)   5GHz Gain: 0.10dBi (5250MHz-5350MHz)   5GHz Gain: 3.98dBi (5470MHz-5725MHz)		
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM		
Transition Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 65.0Mbps 802.11 n_40MHz: 13.5 – 135.0Mbps		

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GSM / WCDMA:

	Operating Frequency	Rated Power		
	GSM/GPRS 850, Class 33	GSM/GPRS 850, Class 33 824.2 MHz– 848.8 MHz		
	EDGE 850, Class 33	824.2 MHz- 848.8 MHz	27dBm	
Cellular Phone Standards Frequency	GSM/GPRS 1900 Class 33	1850.2MHz - 1909.8MHz	30dBm	
Range and Power.	EDGE 1900, Class 33	1850.2MHz - 1909.8MHz	26dBm	
	WCDMA/HSUPA/HSDPA /HSPA+ Band II	$1032.4101\Pi Z = 1907.0101\Pi Z$		
	WCDMA/HSUPA/HSDPA /HSPA+ Band V	826.4MHz - 846.6MHz	24dBm	
Type of Emission:	GSM 850: 249KGXW, GSM 1900: 255KGXW GPRS 850: 243KGXW, GPRS 1900: 254KGXW EDGE 850: 248KG7W, EDGE 1900: 251KG7W WCDMA Band II: 4M19F9W, WCDMA Band V: 4M18F9W HSDPA Band II: 4M18F9W, HSDPA Band V: 4M17F9W HSUPA Band II: 4M18F9W, HSUPA Band V: 4M18F9W			
IMEI:	004402146985134			

The report applied for NFC Standard.

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#### 1.2 **Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for FCC ID: **PY7PM-0732** filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

#### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:2009. & ANSI C63.10:2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

#### 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.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009. & ANSI C63.10:2009. FCC Registration Number is: 990257.

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.

#### **Special Accessories** 1.5

There is no special accessory used while test was conducted.

#### 1.6 **Equipment Modifications**

There was no modification incorporated into the EUT.

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#### **System Test Configuration** 2

#### **EUT Configuration** 2.1

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.

#### **Test Procedure** 2.3

## 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 & 6.2 ANSI 63.10:2009.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 & 6.2.2, and 6.2.3 in ANSI 63.10:2009 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, & Section 6.3, 6.4, 6.5, and 6.6 of ANSI 63.10:2009.

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#### Limitation 2.4

## (1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range	Limits dB (uV)				
MHz	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.					

## (2) Radiated Emission

- a. The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- b. Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- c. Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- d. The field strength of any emissions appearing outside of the 13.110-14.010 MHz shall not exceed the general radiated emission limits in section 15.209 (Intentional Radiators general limit) as below.

Frequency (MHz)	Field strength $\mu V/m$	Distance (m)	Field strength at 3m dBµV/m
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

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Remark: 1. Emission level in dBuV/m=20 log (uV/m)

- 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
- 3. Distance extrapolation factor =  $40 \log$  (required distance/ test distance) (dB);
- 4. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.  $Ex.20*\log(30)+40*\log(30/3) = 69.54$ dBuV/m
- 5. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of  $\xi$  15.205.
- 6. The general radiated emission limits in  $\xi$  15.209 apply for the spurious emission generate from UE, except for the fundamental emission where the respective section specifies otherwise.

## (3) Frequency Tolerance

The frequency tolerance of the carrier signal shall be maintained within +-0.01% of the operating frequency over a temperature variation of -20 degrees 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 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

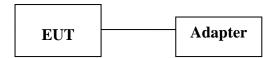
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#### **Configuration of Tested System** 2.5

## Fig. 2-1 Radiated Emission



## Fig. 2-2 Conducted (Antenna Port) Configuration



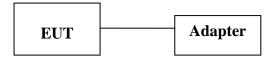
## **Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	NFC Test Software	N/A	N/A	N/A	N/A	N/A

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## Fig. 2-3 AC Power Line Conducted Emission



## **Table 2-2 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	<b>Power Cord</b>
1.	NFC Test Software	N/A	N/A	N/A	N/A	N/A

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#### 3 **Summary of Test Results**

FCC Rules	<b>Description Of Test</b>	Result
<b>§</b> 15.207	AC Power Line Conducted Emission	Compliant
§15.225 (a)-(d)	Radiated Emission	Compliant
§15.209	Radiated Emission Limits, general requirement	Compliant
§15.225 (e)	Frequency Stability	Compliant
§2.1049 §15.215 (c)	20 dB OCCUPIED BANDWIDTH	Compliant
§15.203	Antenna Requirement	Compliant

#### **Description of test modes** 4

The EUT stay in continuous transmitting mode. The frequency 13.56 MHz is the default channel to test, where it is the only manipulative channel as this application supports.

The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth Transmitter for channel Low, Mid and High the worst case E1 position was reported.

The data rate as the lowest supported is selected while tests are conducted.

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#### **MEASUREMENT UNCERTAINTY** 5

Test Items	Uncertainty	
AC Power Line Conducted Emission	+/- 2.586 dB	
Frequency Stability	+/- 123.36 Hz	
20 dB OCCUPIED BANDWIDTH	+/- 123.36 Hz	
Temperature	+/- 0.8 °C	
Humidity	+/- 4.7 %	
DC / AC Power Source	DC=+/- 1%, AC=+/- 0.2%	

Radiated Spurious Emission:

	30MHz - 180MHz: +/- 3.37dB		
Measurement uncertainty	180MHz -417MHz: +/- 3.19dB		
(Polarization : <b>Vertical</b> )	0.417GHz-1GHz: +/- 3.19dB		

Measurement uncertainty (Polarization : <b>Horizontal</b> )	30MHz - 167MHz: +/- 4.22dB		
	167MHz -500MHz: +/- 3.44dB		
	0.5GHz-1GHz: +/- 3.39dB		

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

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#### **Conducted Emissions Test** 6

## 6.1 Standard Applicable:

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

	Lir	nits	
Frequency range	dB(uV)		
MHz	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.

#### Measurement Equipment Used: **6.2**

Conducted Emission Test Site					
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
EMI Test Receiver	R&S	ESCI7	100760	05/27/2013	05/26/2014
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2013	03/22/2014
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2013	03/22/2014
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2013	11/25/2014

## 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 & ANSI C63.10:2009.

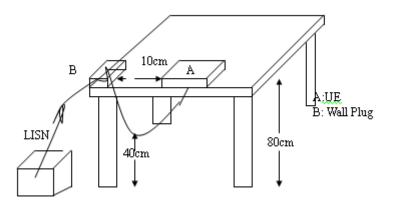
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.

3. The LISN was connected with 120Vac/60Hz power source.

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#### **Test SET-UP (Block Diagram of Configuration)** 6.4



#### 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:**

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closet to the limit

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained to the sample stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained to the sample state state of the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained to the sample state of the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained to the sample state of the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained to the sample state of the results of the results shown in this test report refer only of the sample state of the results and conditions.htm and, for This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sqs.com/terms and conditions.htm and, for This document is issued by the Company subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and a within the limits of the terms of its intervention only and within the limits of the terms of its intervention only and within the limits of the terms of terms of the terms of the terms of terms of the terms of terms of terms of terms of terms of electronic format documents, subject to Terma and Conductors at <u>www.sqs.com/terms</u> education is the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



Temperature: 26 °C

60%

Humidity:

## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Feb. 01, 2014
Temperature:	26	Humidity:	60 %	Test By:	Marcus
Model No.:	EP800				

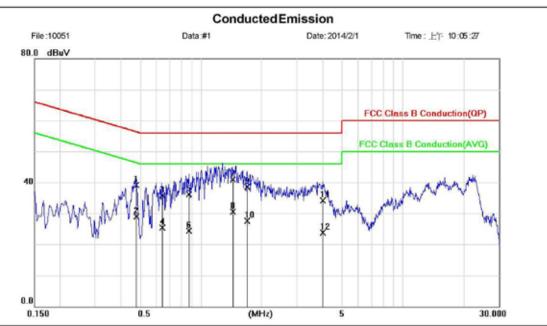
Phase:

L1

Power: AC 120V/60Hz

Site ConductionRoom Limit: FCC Class B Conduction(QP) Mode: Operation Mode

Note: PDA Phone



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBulV	dB	Detector	Comment
1		0.4773	38.90	0.16	39.06	56.39	-17.33	QP	
2		0.4773	28.80	0.16	28.96	46.39	-17.43	AVG	
3		0.6443	35.50	0.16	35.66	56.00	-20.34	QP	
4		0.6443	25.20	0.16	25.36	46.00	-20.64	AVG	
5		0.8740	36.00	0.17	36.17	56.00	-19.83	QP	
6		0.8740	24.20	0.17	24.37	46.00	-21.63	AVG	
7	•	1.4421	40.80	0.18	40.98	56.00	-15.02	QP	
8		1.4421	30.30	0.18	30.48	46.00	-15.52	AVG	
9		1.7020	38.40	0.19	38.59	56.00	-17.41	QP	
10		1.7020	27.30	0.19	27.49	46.00	-18.51	AVG	
11		4.0260	33.90	0.24	34.14	56.00	-21.86	QP	
12		4.0260	23.40	0.24	23.64	46.00	-22.36	AVG	

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台灣檢驗科技股份有限公司	t (886-2) 2299-3279	f (886-2) 2298-0488	www.tw.sgs.com

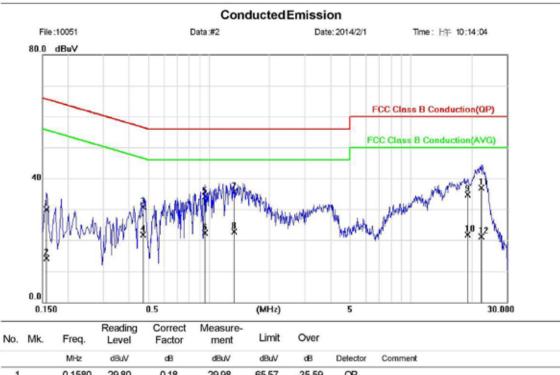


### Report No: EH/2014/10051 Issue Date: Apr. 11, 2014 Page: 22 of 45

Site ConductionRoom Limit: FCC Class B Conduction(QP) Mode: Operation Mode Note: PDA Phone

Phase: N AC 120V/60Hz Power:

Temperature: 25 C Humidity: 60%



1	0.1580	29.80	0.18	29.98	65.57	-35.59	QP	
2	0.1580	14.00	0.18	14.18	55.57	-41.39	AVG	
3	0.4740	30.50	0.19	30.69	56.44	-25.75	QP	
4	0.4740	21.50	0.19	21.69	46.44	-24.75	AVG	
5	0.9620	33.90	0.21	34.11	56.00	-21.89	QP	
6	0.9620	22.00	0.21	22.21	46.00	-23.79	AVG	
7 *	1.3380	35.20	0.21	35.41	56.00	-20.59	QP	
8	1.3380	22.50	0.21	22.71	46.00	-23.29	AVG	
9	19.1940	34.20	0.52	34.72	60.00	-25.28	QP	
10	19.1940	21.20	0.52	21.72	50.00	-28.28	AVG	
11	22.3940	36.40	0.54	36.94	60.00	-23.06	QP	
12	22.3940	20.50	0.54	21.04	50.00	-28.96	AVG	

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



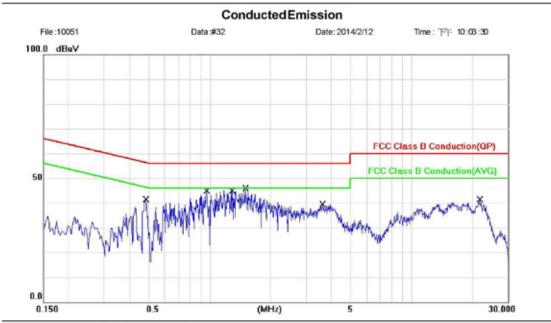
## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Feb. 12 2014
Temperature:	26	Humidity:	60 %	Test By:	Marcus
Model No.:	EP880	-			

Site ConductionRoom Limit: FCC Class B Conduction(QP) Mode: Operation Mode Note: PDA Phone

Phase: L1 Power: AC 120V/60Hz

Temperature: 26 °C Humidity: 60%



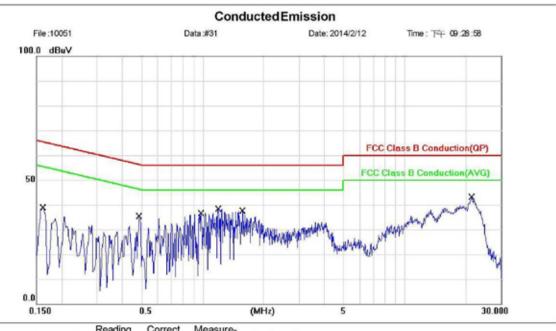
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4800	39.50	0.16	39.66	56.34	-16.68	QP	
2		0.4800	29.90	0.16	30.06	46.34	-16.28	AVG	
3		0.9651	39.90	0.17	40.07	56.00	-15.93	QP	
4		0.9651	29.80	0.17	29.97	46.00	-16.03	AVG	
5		1.2913	41.00	0.18	41.18	56.00	-14.82	QP	
6		1.2913	30.60	0.18	30.78	46.00	-15.22	AVG	
7	•	1.5052	41.10	0.19	41.29	56.00	-14.71	QP	
8		1.5052	30.20	0.19	30.39	46.00	-15.61	AVG	
9		3.6325	33.00	0.23	33.23	56.00	-22.77	QP	
10		3.6325	21.80	0.23	22.03	46.00	-23.97	AVG	
11		21.7740	34.30	0.42	34.72	60.00	-25.28	QP	
12		21.7740	22.40	0.42	22.82	50.00	-27.18	AVG	

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台灣檢驗科技股份有限公司	t (886-2) 2299-3279	f (886-2) 2298-0488	www.tw.sgs.com



Temperature: 26 'C Site ConductionRoom Phase: N Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60% Mode: Operation Mode Note: PDA Phone



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1623	35.20	0.18	35.38	65.35	-29.97	QP	
2		0.1623	20.60	0.18	20.78	55.35	-34.57	AVG	
3		0.4862	33.40	0.19	33.59	56.23	-22.64	QP	
4		0.4862	24.50	0.19	24.69	46.23	-21.54	AVG	
5		0.9723	35.10	0.21	35.31	56.00	-20.69	QP	
6		0.9723	22.50	0.21	22.71	46.00	-23.29	AVG	
7	•	1.1873	35.30	0.21	35.51	56.00	-20.49	QP	
8		1.1873	23.40	0.21	23.61	46.00	-22.39	AVG	
9		1.5636	34.30	0.23	34.53	56.00	-21.47	QP	
10		1.5636	21.90	0.23	22.13	46.00	-23.87	AVG	
11		21.4940	36.40	0.54	36.94	60.00	-23.06	QP	
12		21.4940	20.60	0.54	21.14	50.00	-28.86	AVG	

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



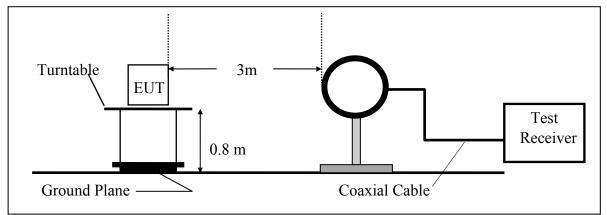
#### **Radiated Emission Test** 7

#### 7.1 **Measurement Procedure**

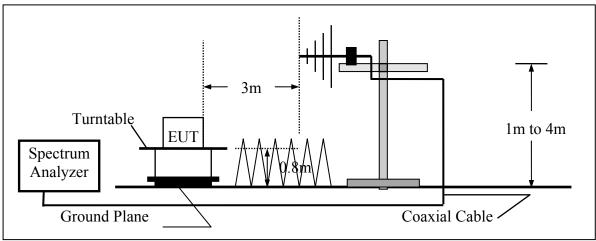
- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- And also, each emission was to be maximized by changing the polarization of receiving antenna 3. both horizontal and vertical.

#### 7.2 **Test SET-UP (Block Diagram of Configuration)**

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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## 7.3 Measurement Equipment Used:

	966 Chamber										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.						
ТҮРЕ		NUMBER	NUMBER	CAL.							
EMI Test Receiver	R&S	ESCI7	100760	05/27/2013	05/26/2014						
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014						
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	01/20/2014	01/19/2015						
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/02/2014	01/02/2015						
Loop Antenna	ETS.LINDGREN	6502	00148045	07/05/2013	07/04/2014						
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2014	01/02/2015						
Turn Table	HD	DT420	N/A	N.C.R	N.C.R						
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R						
Controller	HD	HD100	N/A	N.C.R	N.C.R						
Low Loss Cable	Huber Suhner	966_Rx	9	01/03/2014	01/02/2015						
3m Site NSA	SGS	966 chamber	N/A	07/15/2013	07/14/2014						

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#### **Field Strength Calculation** 7.4

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	

#### **Field Strength of Fundamental Emission** 7.5

## 7.5.1 Limit

Field strength of fundamental emissions limit:

The field strength of fundamental emissions shall not exceed 15848 micorvolts/meter at 30 meters. The Limit is converted to 123.90dBuV/m by offsetting the distance extrapolation factor as measurement distance is taken place at 3 meters.

Distance extrapolation =  $40 \times \log(30/3) = 40 \text{ dB}$ 

Limit is re-adjusted in terms of limit taken in 3m = 20 \*log (15848 uV/m) + 40 = 124.00 dBuV/m

## Note:

Actual FS ( $dB\mu V/m$ ) = Spectrum. Reading level ( $dB\mu V$ ) + Factor (dB)

Factor (dB) = Antenna Factor (dB $\mu$ V/m) + Cable Loss (dB) – Pre Amplifier Gain (dB)

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

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

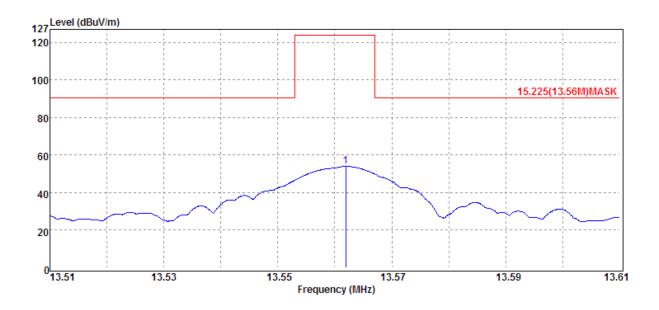
The trace on RE (radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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I		:NFC :13.56 MHz		Test Date Temp./Humi.			:2014-04-07 :19.2 deg_C/58RH		
Operation Mo	ode	:MAIN		Engineer		:Curry			
EUT Pol.		:E1 Plane		Measurement Antenna Pol.			:VERTICAL		
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin		
		Mode	Reading Level		FS	@3m			
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB		
13.56	F	Peak	42.27	11.72	53.99	123.90	-69.91		

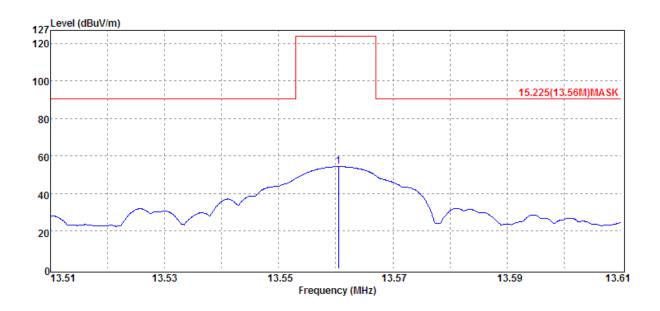


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Operation Band:NFCFundamental Frequency:13.56 MHzOperation Mode:MAIN			Test Date Temp./Humi.		:2014-04-07 :19.2 deg_C/58RH				
EUT Pol.	Jue	:E1 Plane		Engineer Measurement Antenna Pol.			:Curry :HORIZONTAL		
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin		
		Mode	Reading Level		FS	@3m			
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB		
13.56	F	Peak	42.66	11.72	54.38	123.90	-69.52		



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## 7.5.2 Radiated Mask

- (a) 15.848 millivolts/m (84 dB $\mu$ V/m) at 30 m, within the band 13.553-13.567 MHz.
- (b) 334 microvolts/m (50.5 dB $\mu$ V/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz.
- (c) 106 microvolts/m (40.5 dB $\mu$ V/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz.

Distance extrapolation =  $40 \times \log(30/3) = 40 \text{ dB}$ 

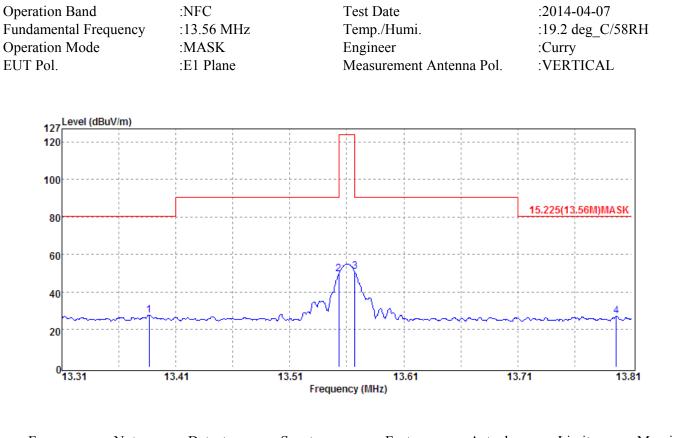
Limit is re-adjusted in terms of limit taken in 3m for the following frequency segment of the interest:

- a)  $20 * \log (15848 \text{uV/m}) + 40 \text{dB} = 124.00 \text{dBuV/m}$
- b)  $20 * \log(334 \text{uV/m}) + 40 \text{dB} = 90.47 \text{dBuV/m}$
- c)  $20*\log(106uV/m) + 40dB = 80.50dBuV/m$

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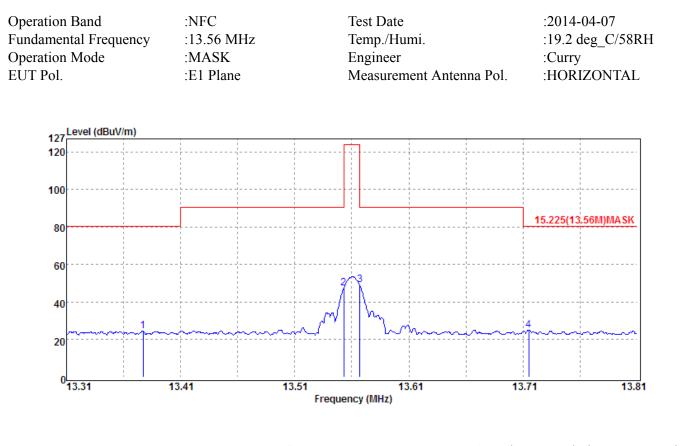


Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin	
		Mode	Reading Level		FS	@3m		
 MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
13.39	S	Peak	15.99	11.73	27.72	80.50	-52.78	
13.55	S	Peak	38.12	11.72	49.84	90.47	-40.63	
13.57	S	Peak	39.13	11.72	50.85	90.47	-39.62	
13.80	S	Peak	15.41	11.70	27.11	80.50	-53.39	

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



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	Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin	
			Mode	Reading Level		FS	@3m		
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
	13.38	S	Peak	12.84	11.73	24.57	80.50	-55.93	
	13.55	S	Peak	35.86	11.72	47.58	90.47	-42.89	
	13.57	S	Peak	37.31	11.72	49.03	90.47	-41.44	
	13.72	S	Peak	13.52	11.71	25.23	80.50	-55.27	

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## 7.5.3 Radiated Emission – General Requirement:

Limit:

- § 15.225
  - (d) 30 microvolts/m (29.4 dB $\mu$ V/m) at 30 m, outside the band 13.110-14.010 MHz.

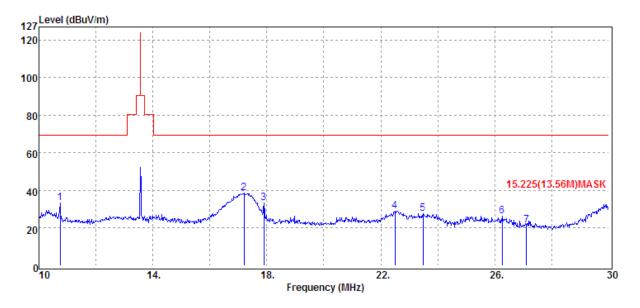
Limit is converted by adding the distance extrapolation factor as the measurement distance was taken place at 3m.

Operation Ban Fundamental I Operation Mod EUT Pol.	Frequency	:NFC :13.56 MHz :TX :E1 Plane	T E	Fest Date Femp./Humi. Engineer Measurement Ant	tenna Pol.	:2014-04-07 :19.2 deg_C/5 :Curry :VERTICAL	58RH
Freq.	Note	Detector Mode	Spectrum Reading Leve	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10.74	S	Peak	21.30	11.95	33.25	69.54	-36.29
17.20	S	Peak	27.32	11.48	38.80	69.54	-30.74
17.90	S	Peak	21.87	11.45	33.32	69.54	-36.22
22.50	S	Peak	18.55	10.64	29.19	69.54	-40.35
23.48	S	Peak	17.33	10.39	27.72	69.54	-41.82
26.26	S	Peak	16.62	9.73	26.35	69.54	-43.19
27.12	Н	Peak	11.98	9.53	21.51	69.54	-48.03

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



### **Measurement Plot**



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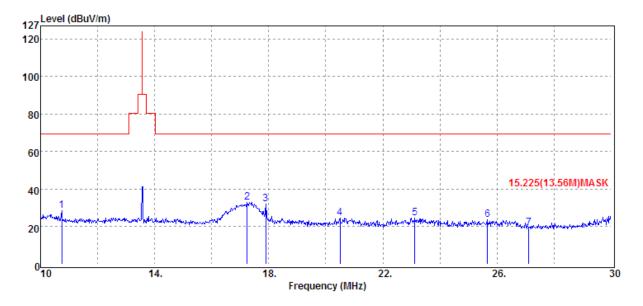
Report No: EH/2014/10051 Issue Date: Apr. 11, 2014 Page: 35 of 45

Operation Ban Fundamental I Operation Mo EUT Pol.	Frequency	:NFC :13.56 MHz :TX :E1 Plane	T E	Fest Date Femp./Humi. Engineer Measurement Ant	enna Pol.	:2014-04-07 :19.2 deg_C/5 :Curry :HORIZONTA	
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV∕m	dB
IVIIIZ	1/11/12/0	110/21/21	appr	đĐ	αρμι, μι	ubµ ( / m	<u>ub</u>
10.74	S	Peak	16.41	11.95	28.36	69.54	-41.18
17.24	S	Peak	21.55	11.48	33.03	69.54	-36.51
17.90	S	Peak	20.56	11.45	32.01	69.54	-37.53
20.50	S	Peak	13.38	11.19	24.57	69.54	-44.97
23.12	S	Peak	14.16	10.48	24.64	69.54	-44.90
25.66	S	Peak	13.74	9.86	23.60	69.54	-45.94
27.12	Н	Peak	10.01	9.53	19.54	69.54	-50.00

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### **Measurement Plot**



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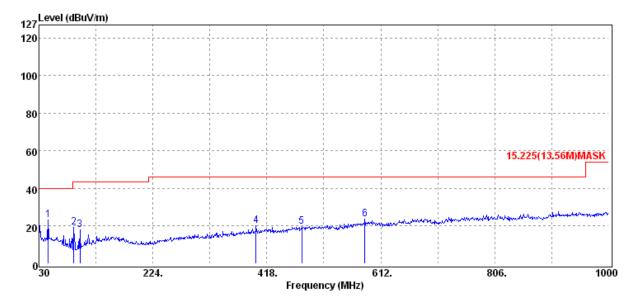
Report No: EH/2014/10051 Issue Date: Apr. 11, 2014 Page: 37 of 45

Operation Ban Fundamental F Operation Moo EUT Pol.	Frequency	:NFC :13.56 MHz :TX :E1 Plane	Te Er	est Date emp./Humi. ngineer easurement An	tenna Pol.	:2014-04-07 :19.2 deg_C/5 :Curry :VERTICAL	8RH
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
45.52	S	Peak	36.23	-13.07	23.16	40.00	-16.84
89.17	S	Peak	38.28	-18.86	19.42	43.50	-24.08
99.84	S	Peak	36.00	-17.86	18.14	43.50	-25.36
399.57	S	Peak	29.24	-9.18	20.06	46.00	-25.94
477.17	S	Peak	27.60	-7.79	19.81	46.00	-26.19
584.84	S	Peak	29.03	-5.17	23.86	46.00	-22.14

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### **Measurement Plot:**



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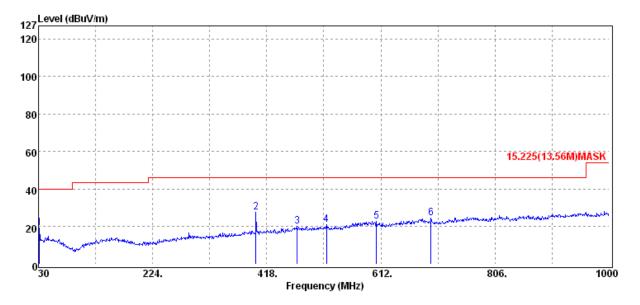
Report No: EH/2014/10051 Issue Date: Apr. 11, 2014 Page: 39 of 45

	Operation Band Fundamental F Operation Mod EUT Pol.	Frequency	:NFC :13.56 MHz :TX :E1 Plane	Ter En	st Date mp./Humi. gineer easurement An	itenna Pol.	:2014-04-07 :19.2 deg_C/5 :Curry :HORIZONT.	
Freq. Note Detector Spectrum Factor Actual Limit Margin	Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode Reading Level FS @3m			Mode	Reading Level		FS	@3m	
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
31.94 S Peak 33.31 -13.96 19.35 40.00 -20.65	31.94	S	Peak	33.31	-13.96	19.35	40.00	-20.65
399.57 S Peak 36.85 -9.18 27.67 46.00 -18.33	399.57	S	Peak	36.85	-9.18	27.67	46.00	-18.33
469.41 S Peak 27.97 -7.89 20.08 46.00 -25.92	469.41	S	Peak	27.97	-7.89	20.08	46.00	-25.92
519.85 S Peak 28.70 -7.42 21.28 46.00 -24.72	519.85	S	Peak	28.70	-7.42	21.28	46.00	-24.72
604.24 S Peak 28.55 -5.67 22.88 46.00 -23.12	604.24	S	Peak	28.55	-5.67	22.88	46.00	-23.12
697.36 S Peak 28.53 -3.98 24.55 46.00 -21.45	697.36	S	Peak	28.53	-3.98	24.55	46.00	-21.45

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### **Measurement Plot:**



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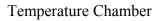


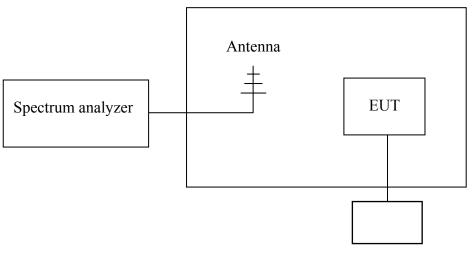
#### **Frequency Tolerance** 8

#### 8.1 **Measurement Procedure**

- The EUT was placed on a turn table which is 0.8m above ground plane. 1
- 2. Set EUT as normal operation
- 3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10kHz, Span = 100kHz.
- 4. Set SPA Max hold. Mark peak.

#### **Test SET-UP (Block Diagram of Configuration)** 8.2





Variable AC Power Supply

#### **Measurement Equipment Used:** 8.3

Conducted Emission Test Site							
EQUIPMENT	MED	MODEL	SERIAL	LAST	<b>CAL DUE.</b> 05/29/2014		
TYPE	MFR	NUMBER	NUMBER	CAL.	CAL DUE.		
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014		
Temperature Chamber	TERCHY	MHG-120LF	911009	05/06/2013	05/05/2014		
AC Power Supply	APW-105N	887592	All Power	N/A	N/A		

#### **Measurement Results** 8.4

Refer to attached data chart.

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## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (kHz)
Vdc	Temperature ( )	(MHz)	Della (HZ)	Linin (KHZ)
3.7	-20	13.56065	-149.00	+/- 1.356
3.7	-10	13.560615	-114.00	+/- 1.356
3.7	0	13.560597	-96.00	+/- 1.356
3.7	10	13.560582	-81.00	+/- 1.356
3.7	20	13.560501	0.00	+/- 1.356
3.7	30	13.560552	-51.00	+/- 1.356
3.7	40	13.560588	-87.00	+/- 1.356
3.7	50	13.560621	-120.00	+/- 1.356

## **B.** Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (kHz)
Vdc	Temperature ()	(MHz)	Dena (HZ)	LIIIII (KHZ)
4.2	20	13.560482	19.00	+/- 1.356
3.7	20	13.560501	0.00	+/- 1.356
3.2	20	13.560488	13.00	+/- 1.356

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#### **20 dB OCCUPIED BANDWIDTH MEASUREMENT** 9

#### 9.1 **Standard Applicable:**

§2.1049 & 15.215 (c)

#### 9.2 Limit:

None

#### Test Set-up 9.3

Refer to section 6.2 in this report

#### **Measurement Procedure** 9.4

20dB bandwidth

- 1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak mode.
- 2. 20dB Bandwidth the resolution bandwidth of 1 kHz and the video bandwidth of 1 kHz were used.
- 3. Measured the spectrum width with power higher than 20dB below carrier.

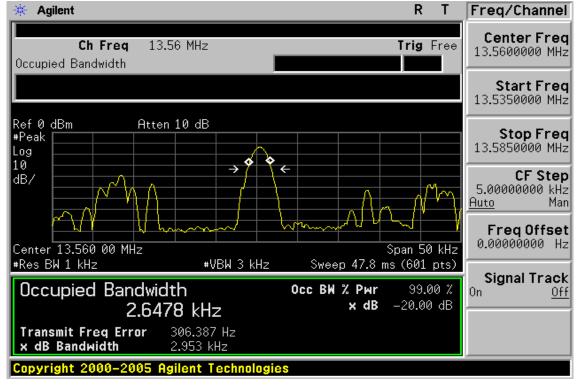
#### 9.5 **Measurement Equipment Used:**

Refer to section 8.3 in this report

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### -20dB Bandwidth



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## **10 ANTENNA REQUIREMENT**

## 10.1. Standard Applicable:

According to §15.203, Antenna requirement.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer.

For transmitters of RF output power of 10 milliwatts or less, only the portion of the antenna gain that is in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power to demonstrate compliance with the radiated power limits specified in the applicable standard. For transmitters of output power greater than 10 milliwatts, the total antenna gain shall be added to the measured RF output power to demonstrate compliance to the specified radiated power limits.

## 10.2. Antenna Connected Construction:

The antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ End of Report ~

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