

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C AND INDUSTRY CANADA RSS 210 REQUIREMENT

OF

Product Name: Phablet
Brand Name: HP
Model No.: HSTNH-F606
Model Difference: N/A
FCC ID: B94HHF606
IC: 3905A-HHF606
Report No.: ER/2016/40054
Issue Date: May 25, 2016
FCC Rule §15.225
IC Rule Part: RSS-210 issue 8 Dec.2010 Annex 2
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VERIFICATION OF COMPLIANCE

Applicant (FCC): HP Inc.
3390 East Harmony Road Fort Collins, Colorado 80528 United States

Applicant (IC): HP Inc.
16399 W Bernardo Dr. San Diego CA 92127-1801 USA

Product Name: Phablet

Brand Name: HP

Model No.: HSTNH-F606

Model Difference: N/A

FCC ID: B94HHF606

IC: 3905A-HHF606

File Number: ER/2016/40054

Date of test: Apr. 20, 2016 ~ May 20, 2016

Date of EUT Received: Apr. 20, 2016

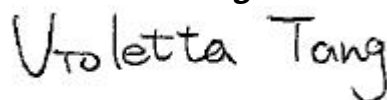
We hereby certify that:

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 C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

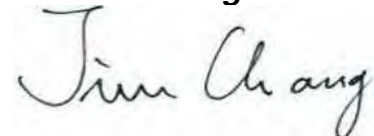
The test results of this report relate only to the tested sample identified in this report.

Test By:**Date:**

May 25, 2016

Tin Lin / Engineer**Prepared By:****Date:**

May 25, 2016

Violetta Tang / Clerk**Approved By:****Date:**

May 25, 2016

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
ER/2016/40054	Rev.00	Initial creation of document	May 25, 2016

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Phablet		
Brand Name:	HP		
Model No.:	HSTNH-F606		
Model Difference:	N/A		
Product SW/HW version:	V0.00.31 / 1.0		
Radio SW/HW version:	TH.2.0.c1-00260 / 1.0.0.0		
Test SW Version:	N/A		
RF power setting in TEST SW:	N/A		
USB Type-C Cable:	Model No.: 836233-001, Supplier: Luxshare-ICT		
Earphone:	Model No.: EH001, Supplier: 1MORE		
USB-C to VGA:	Model No.: KSC0021, Supplier: BIZLINK INTERNATIONAL CORP		
USB-C to HDMI:	Model No.: KSC0012, Supplier: BIZLINK INTERNATIONAL CORP		
USB-C to DP:	Model No.: KSC0044, Supplier: BIZLINK INTERNATIONAL CORP		
Wireless Charger:	Model No.: TPA-M601, Supplier: Merry Electronics Co Ltd		
Docking Station:	Model No.: HSTNH-F601, Supplier: HP Inc.		
Adapters for Docking Station:	1. Model No.: HSTNN-CA40, Supplier: Chicony Power Technology Co., LTd. 2. Model No.: HSTNN-LA40, Supplier: Lite-On Technology Corporation 3. Model No.: HSTNN-DA40, Supplier: DELTA ELECTRONICS INC 4. Model No.: HSTNN-AA44; Supplier: Acbel Polytech Inc.		
Power Supply:	3.85Vdc from Rechargeable Li-polymer Battery or 5.3V / 5.25V from AC/DC Adapter		
	Battery:	Model No.: HSTNH-F606-DP, Supplier: DYNAPACK INTERNATIONAL TECHNOLOGY CORP	
	Adapter:	1. Model No.: WAD005, Supplier: Acbel Polytech Inc. (10.6W, 5.3V) 2. Model No.: TPN-AA01, Supplier: Acbel Polytech Inc. (15W, 5.25V)	

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NFC:

Operating Frequency:	13.56MHz
Transmit Power:	< 123.90dBuV/m at 3m.
Number of Channels:	1
Antenna Type:	Loop Antenna
Modulation Type:	ASK

1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is Phablet, supporting GSM / WCDMA / LTE, Wi-Fi 802.11abgn/ac, Bluetooth, NFC and WPC / PMA features, and below is details of information.

Product Feature	
Product Name:	Phablet
Brand Name:	HP
Model No.:	HSTNH-F606
Model Difference:	N/A
FCC ID:	B94HHF606
IC :	3905A-HHF606
GSM Operating Band(s)	GSM 850/1900MHz
GPRS / EGPRS Multi Slot Class	GPRS Class 33
WCDMA Operating Band(s)	FDD Band II / IV / V
WCDMA Rel. Version	Rel.8
LTE Operating Band(s)	FCC Band 5: Part 22. / FCC Band 2: Part 24. FCC Band 4 / 7 / 12 / 17 / 30: Part 27.
LTE Rel. Version	Rel.11
Bluetooth Version	V4.1 dual mode + HS
Wi-Fi- Specification	802.11a/b/g/n/ac
NFC Specification	NFC
Wireless Charging	WPC / PMA

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.225

KDB648474 D03 Wireless Chargers Battery Cover

IC RSS 210 issue 8 Dec.2010 Annex 2

RSS-Gen. issue 4 Nov. 2014

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system (digital device) is compliance with FCC Subpart B is authorized under the certification procedure.

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

FCC Registration Numbers are: 509634

IC Registration Numbers are: 4260A-5

1.5 Special Accessories

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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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 placed on a turn table which is 0.8 m above ground plan. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plan. 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.

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission & Conducted Emission

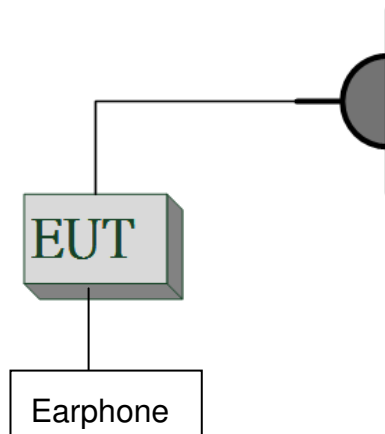


Fig. 2-2 AC Power Line Conducted Emission

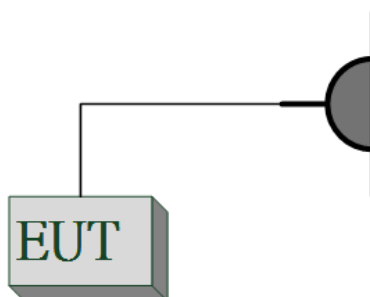


Table 2-1 Equipment Used in Tested System

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
2.	Earphone	HP	EH001	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules / IC Rules	Description Of Test	Result
§15.207 RSS-Gen § 8.8	AC Power Line Conducted Emission	Compliant
§15.225 (a)-(d) RSS210 Annex 2 A2.6	Radiated Emission	Compliant
§15.209 RSS-Gen § 8.9	Radiated Emission Limits, general requirement	Compliant
§15.225 (e) RSS-Gen § 8.11	Frequency Stability	Compliant
§2.1049 §15.215 (c) RSS-Gen § 6.6	99% & 20 dB OCCUPIED BANDWIDTH	Compliant
§15.203 RSS-Gen § 6.7, § 8.3	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Channel Details

1. The EUT stay in continuous transmitting mode.
2. The frequency 13.56 MHz is the default channel to test, where it is the only manipulative channel as this application supports.
3. Investigation has been done on all the possible configurations for searching the worst case.

Note: Additional emissions testing were performed per KDB 648474 D03 and the additional worst case emissions are reported herein and identified as WPC.

Per KDB 648474 D03, spurious emissions measurement data was also investigated with the wireless charging battery cover. The handset was placed on the representative charging pad under normal conditions and in a simulated call configuration.

RADIATED EMISSION TEST			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK
FREQUENCY STABILITY			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK
20dB BANDWIDTH			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK

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

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Frequency Stability	+/- 51.33 Hz
20 dB OCCUPIED BANDWIDTH	+/- 51.33 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz - 30MHz: +/- 2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB

Measurement uncertainty (Polarization : Horizontal)	9kHz - 30MHz: +/- 2.87dB
	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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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable:

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:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/04/2015	05/03/2016
LISN	SCHWARZBECK	NSLK 8127	8127-649	05/15/2015	05/14/2016
LISN	FCC	FCC-LISN-50/250 -25-2-01	4034	03/13/2016	03/12/2017
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2015	11/25/2016

6.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
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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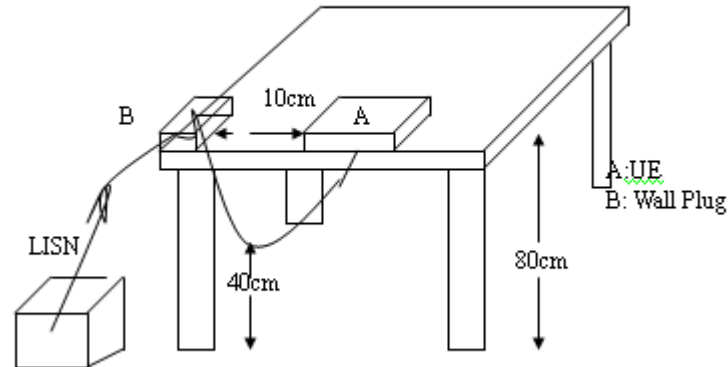
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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plan.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

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

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode	Test Date:	Apr. 28, 2016
Temperature:	20		

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Site: Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation
Note: Adapter: WAD005

Phase: N
Power: AC 120V/60Hz

Temperature: 20 °C
Humidity: 58 %

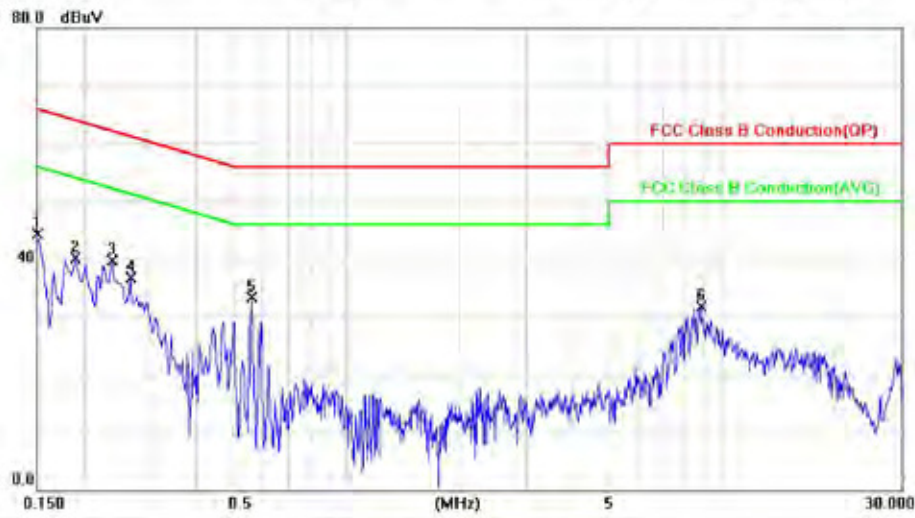
Conducted Emission

File: 40048

Data: #1

Date: 2016/4/28

Time: 下午 09:13:04



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1500	44.34	0.03	44.37	66.00	-21.63	peak	
2		0.1900	40.14	0.03	40.17	64.04	-23.87	peak	
3		0.2380	39.73	0.03	39.76	62.17	-22.41	peak	
4		0.2660	36.59	0.03	36.62	61.24	-24.62	peak	
5		0.5620	33.31	0.03	33.34	56.00	-22.66	peak	
6		8.7900	31.39	0.28	31.67	60.00	-28.33	peak	

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode	Test Date:	May 03, 2016
Temperature:	20		

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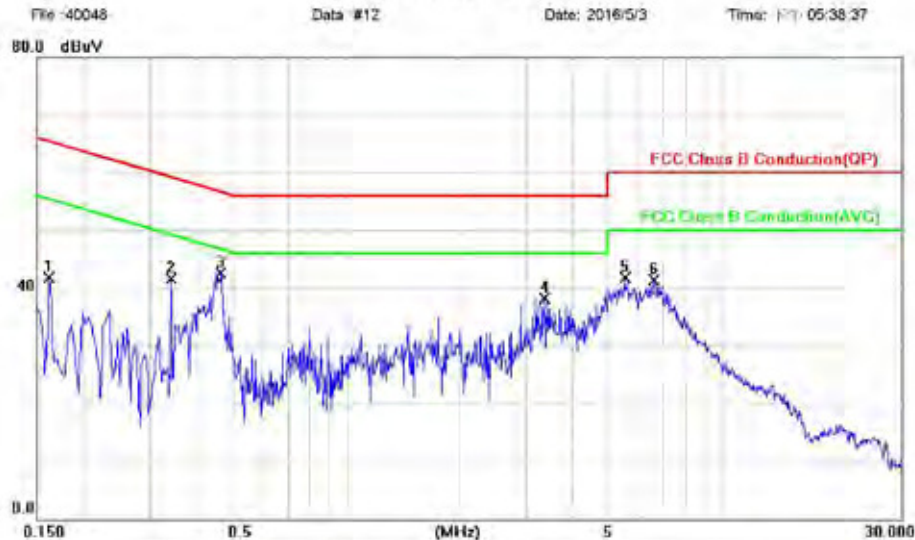
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Site: Conduction Room Phase: **N** Temperature: 20 °C
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 58 %
Mode: Operation
Note: Adapter: TPN-AA01

Conducted Emission



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	41.65	0.03	41.68	65.36	-23.68	peak	
2		0.3420	41.42	0.03	41.45	59.15	-17.70	peak	
3	*	0.4660	42.56	0.03	42.59	56.58	-13.99	peak	
4		3.3700	38.01	0.13	38.14	56.00	-17.86	peak	
5		5.5140	41.45	0.22	41.67	60.00	-18.33	peak	
6		6.6020	40.98	0.24	41.22	60.00	-18.78	peak	

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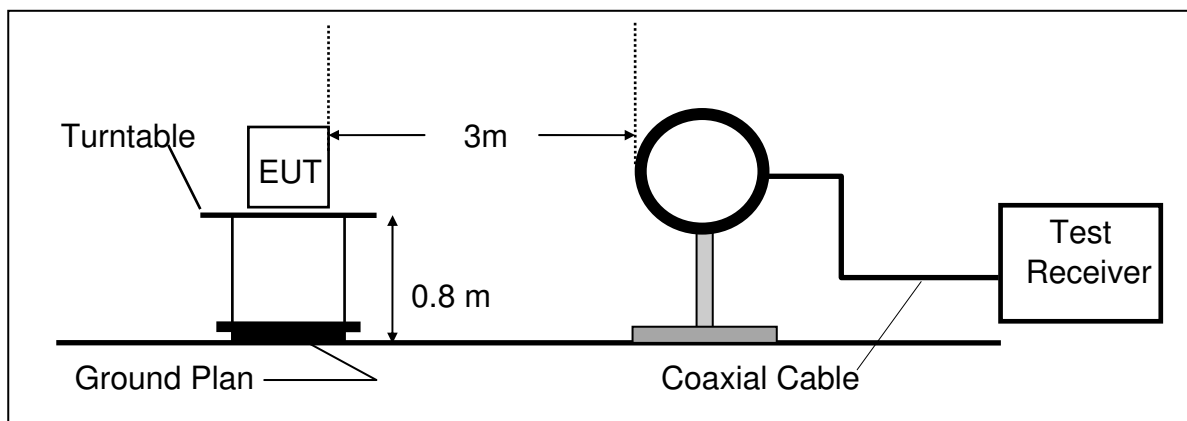
7 RADIATED TEST ITEMS

7.1 Measurement Procedure

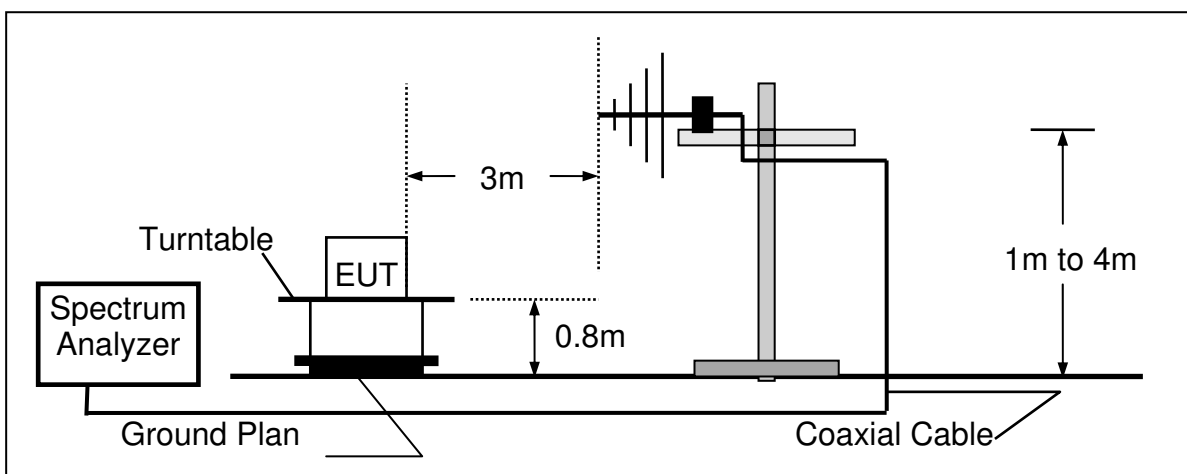
1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on a turn table which is 0.8m above ground plan.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission.
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. Repeat above procedures until all default test channel measured were complete

7.2 Test SET-UP

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



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



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7.3 Measurement Equipment Used

SGS SAC-III					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/11/2015	05/10/2016
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/28/2016	01/27/2017
Loop Antenna	ETS.LINDGREN	6502	148045	09/07/2015	09/06/2016
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/14/2015	12/13/2016
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/10/2015	08/09/2016
Pre-Amplifier	Agilent	8447D	2944A07676	01/02/2016	01/01/2017
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/02/2016	01/01/2017
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2016	01/01/2017
3m Site NSA	SGS	966 chamber	N/A	07/02/2015	07/01/2016
Low Loss Cable	Huber Suhner	966 TX	1	01/02/2016	01/01/2017

Note: N.C.R refers to Not Calibrated Required.

SGS SAC-III					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/10/2016	05/09/2017

Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.

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7.4 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	

The limit of the emission level is expressed in dBuV/m, which converts $20 \cdot \log(\mu\text{V/m})$

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

Factor(dB) = Antenna Factor(dBuV/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.

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7.5 Field Strength of Fundamental Emissions and Mask Measurement

7.5.1 Standard Applicable

Limit:

Rules and specifications	CFR 47 Part 15 section 15.225(a)-(d)		
Frequency of Emission (MHz)	Field Strength (μV/m) at 30m	Field Strength (dBμV/m) at 30m	Field Strength (dBμV/m) at 3m
1.705~13.110	30	29.5	69.5
13.110~13.410	106	40.5	80.5
13.410~13.553	334	50.5	90.47
13.553~13.567	15848	84	123.9
13.567~13.710	334	50.5	90.47
13.710~14.010	106	40.5	80.5
14.010~30.00	30	29.5	69.5

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 124.00dBuV/m by offsetting the distance extrapolation factor as measurement distance is taken place at 3 meters.

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

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

1. Emission level in dBuV/m = $20 \log(\mu\text{V/m})$
2. Distance extrapolation factor = $40 \log(\text{required distance}/\text{test distance}) \text{ (dB)}$
3. The lower limit shall apply at the transition frequencies.
4. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.

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Radiated Mask for RSS 210 Annex 2 A2.6

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

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

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

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

Note: WPC wireless charging functions are implemented in field strength of spurious radiation measurement.

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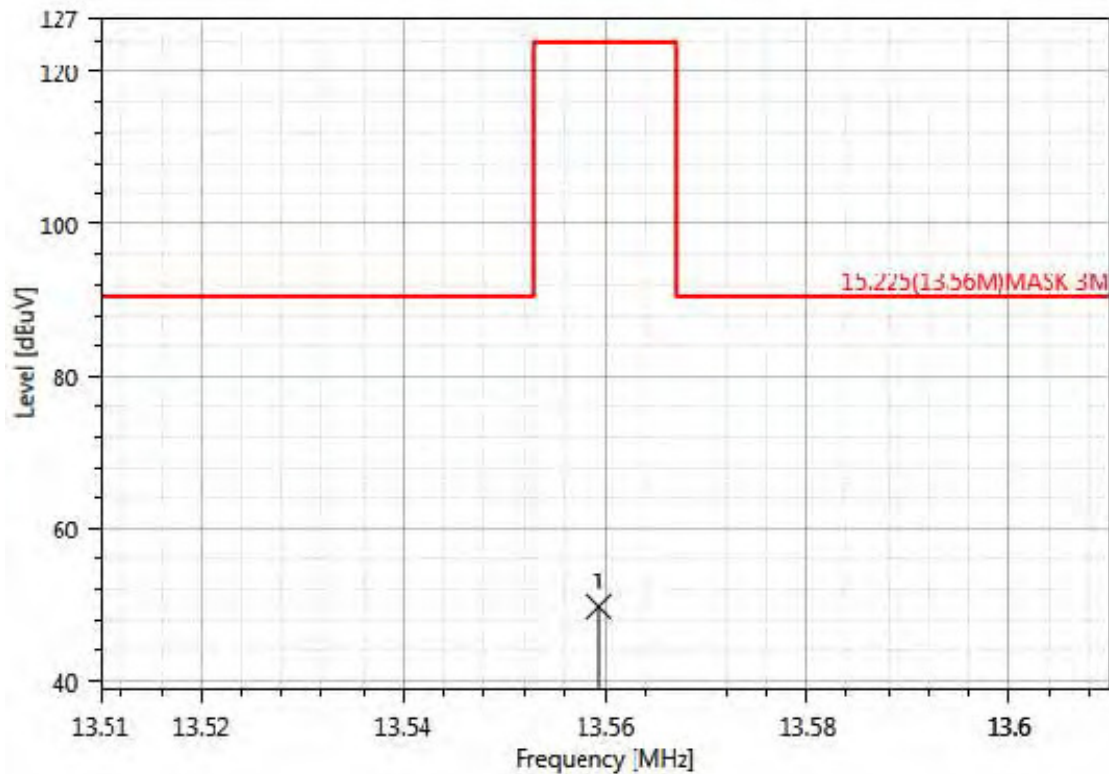
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7.5.2 Field Strength of Fundamental Emission Measurement Result

Operation Mode :	RFID	Test Date :	04/27/2016 15:46:28
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Main	Test Engineer :	Edward
EUT Pol. :	H Plan	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
MHz	F/H/E/S	Mode	Leading Level	FS	dB	@3m	dB
		QP/AV/PK	dBμV/m	dBμV/m		dBuV/m	
13.56	F	Peak	49.71	38.27	11.44	123.90	-74.19

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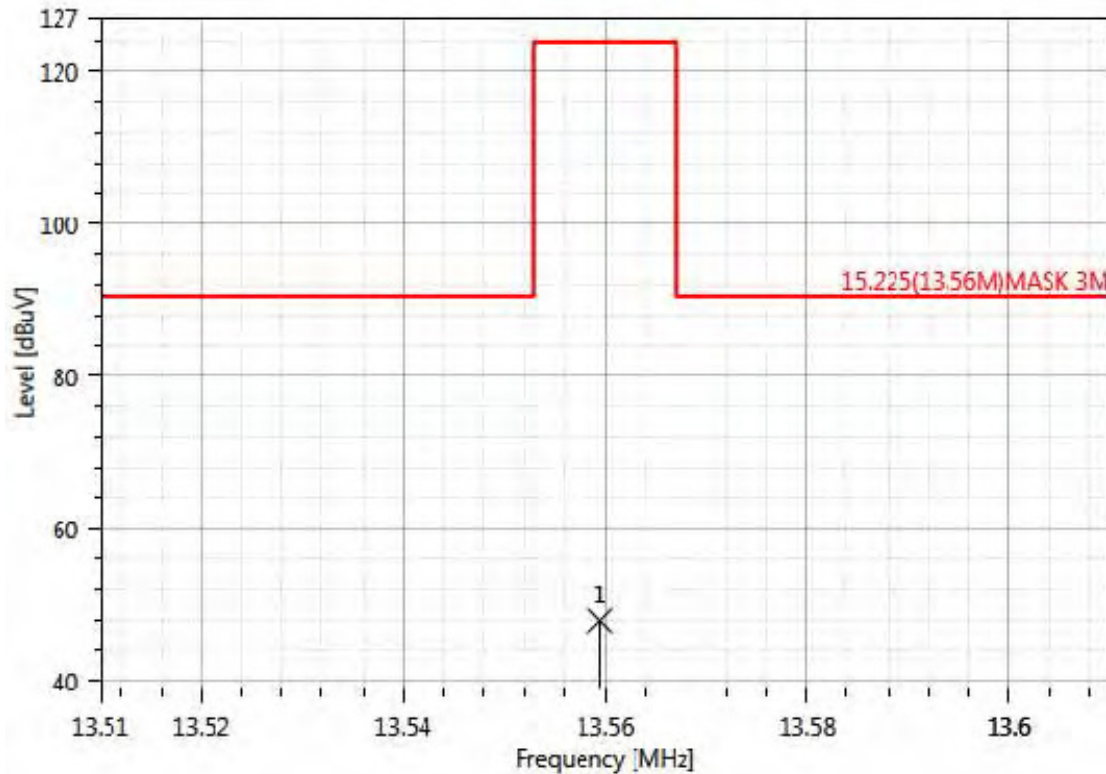
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Operation Mode :	RFID	Test Date :	04/27/2016 15:46:10
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Main	Test Engineer :	Edward
EUT Pol. :	H Plan	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
MHz	F/H/E/S	Mode	Leading Level	FS	dB	@3m	dB
		QP/AV/PK	dBμV/m	dBμV/m		dBuV/m	
13.56	F	Peak	47.91	36.48	11.44	123.90	-75.99

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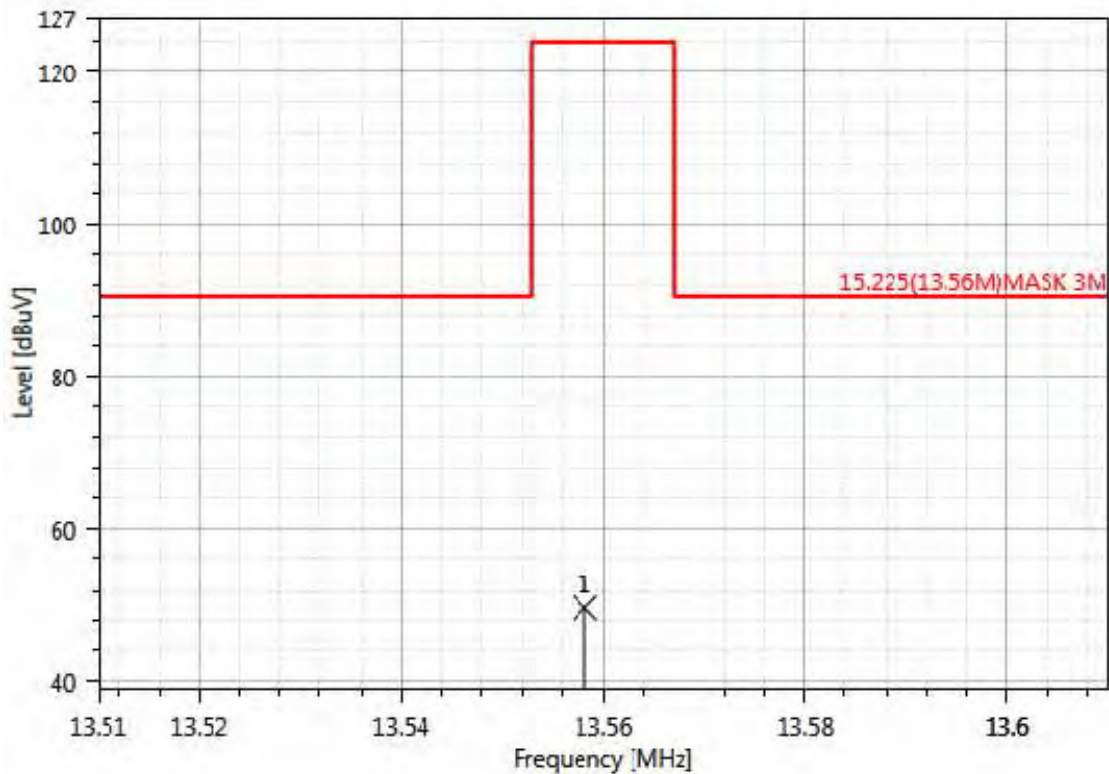
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*Wireless Charging Mode

Operation Mode :	RFID	Test Date :	05/20/2016 11:25:48
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Main	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	FS	dB	@3m	dB
		QP/AV/PK	dBuV/m	dBuV/m		dBuV/m	
13.56	F	Peak	49.55	38.11	11.44	123.90	-74.35

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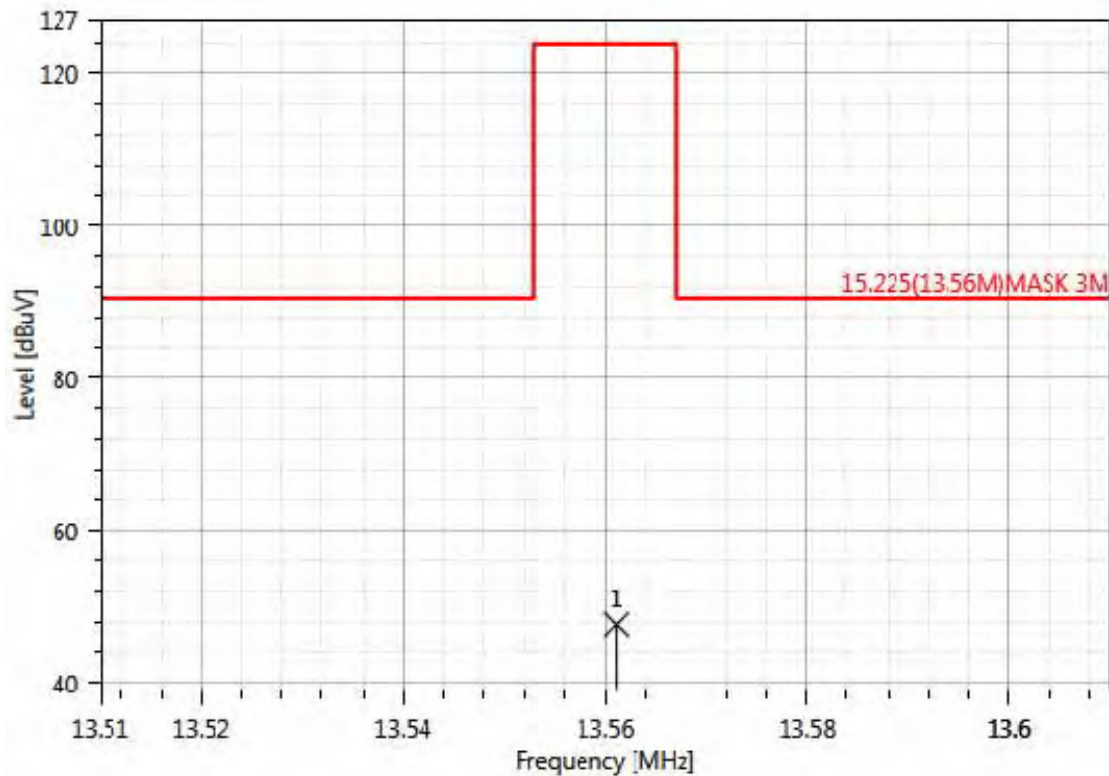
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Operation Mode :	RFID	Test Date :	05/20/2016 11:25:56
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Main	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
13.56	F	Peak	47.70	36.26	11.44	123.90	-76.20

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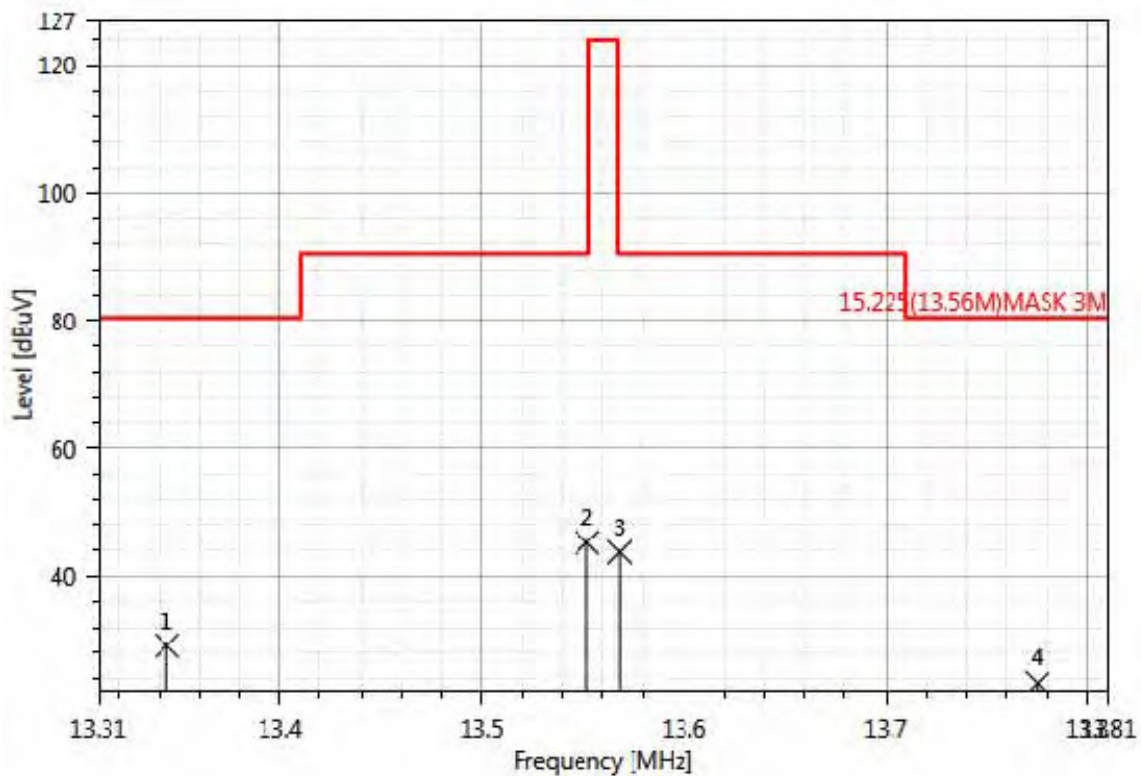
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7.5.3 Mask Measurement Result

Operation Mode :	RFID	Test Date :	04/27/2016 16:06:35
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Mask	Test Engineer :	Edward
EUT Pol. :	H Plan	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Leading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
13.34	S	Peak	29.15	17.72	11.43	80.50	-51.35
13.55	S	Peak	45.26	33.82	11.44	90.47	-45.21
13.57	S	Peak	43.76	32.32	11.44	90.47	-46.71
13.78	S	Peak	23.33	11.89	11.44	80.50	-57.17

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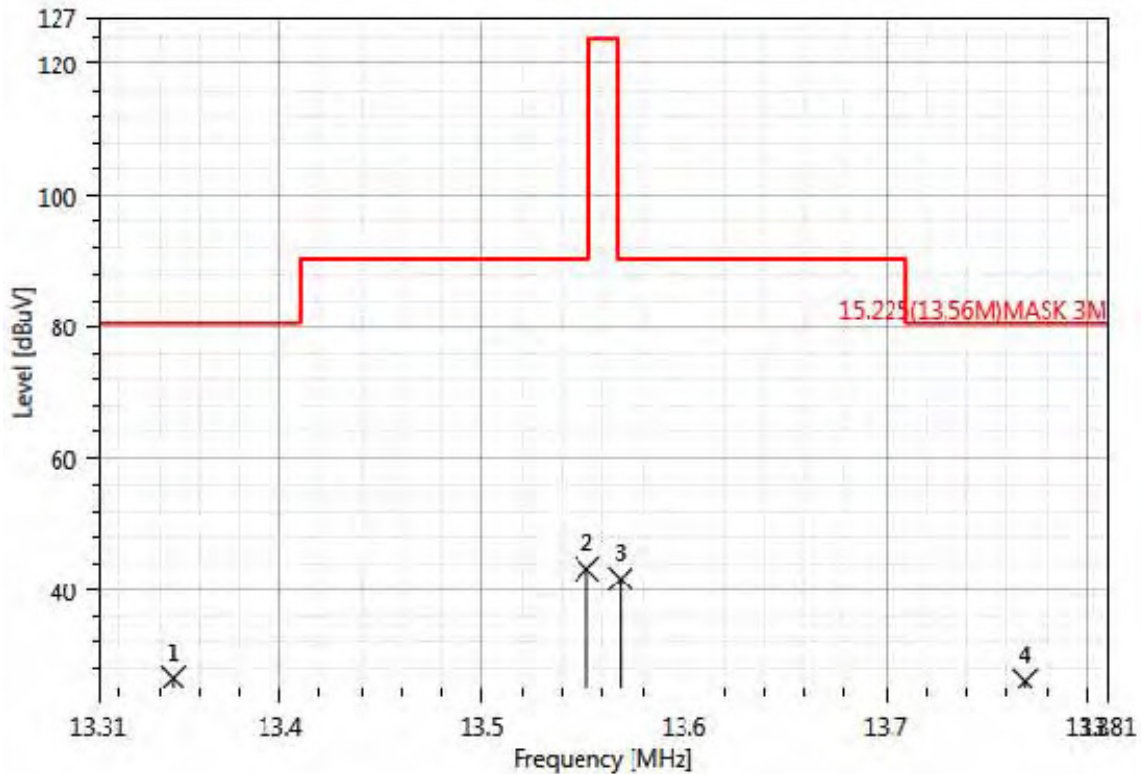
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Operation Mode :	RFID	Test Date :	04/27/2016 16:29:52
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Mask	Test Engineer :	Edward
EUT Pol. :	H Plan	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
MHz	F/H/E/S	Mode	Leading Level	FS	dB	@3m	dB
		QP/AV/PK	dBμV/m	dBμV/m		dBuV/m	
13.35	S	Peak	26.72	15.29	11.43	80.50	-53.78
13.55	S	Peak	43.26	31.82	11.44	90.47	-47.21
13.57	S	Peak	41.74	30.31	11.44	90.47	-48.73
13.77	S	Peak	26.26	14.82	11.44	80.50	-54.24

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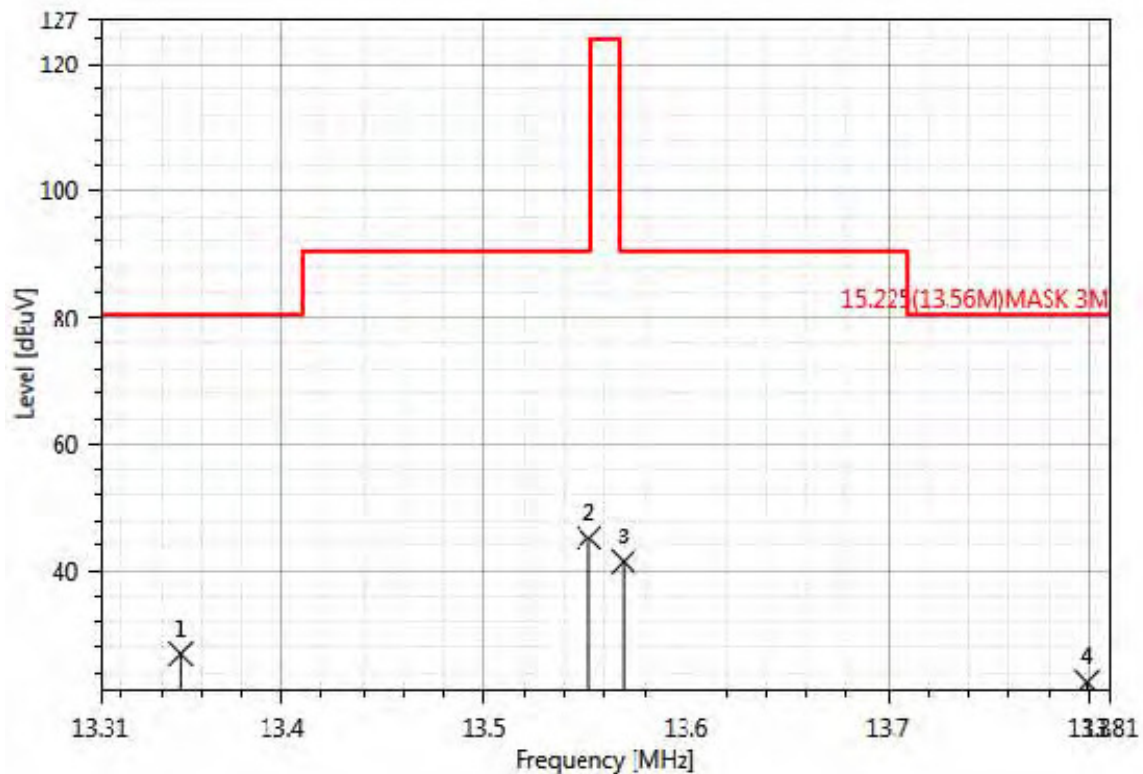
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* Wireless Charging Mode

Operation Mode :	RFID	Test Date :	05/20/2016 11:26:54
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Mask	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
13.35	S	Peak	26.89	15.45	11.43	80.50	-53.61
13.55	S	Peak	45.26	33.82	11.44	90.47	-45.21
13.57	S	Peak	41.51	30.07	11.44	90.47	-48.96
13.80	S	Peak	22.57	11.13	11.44	80.50	-57.93

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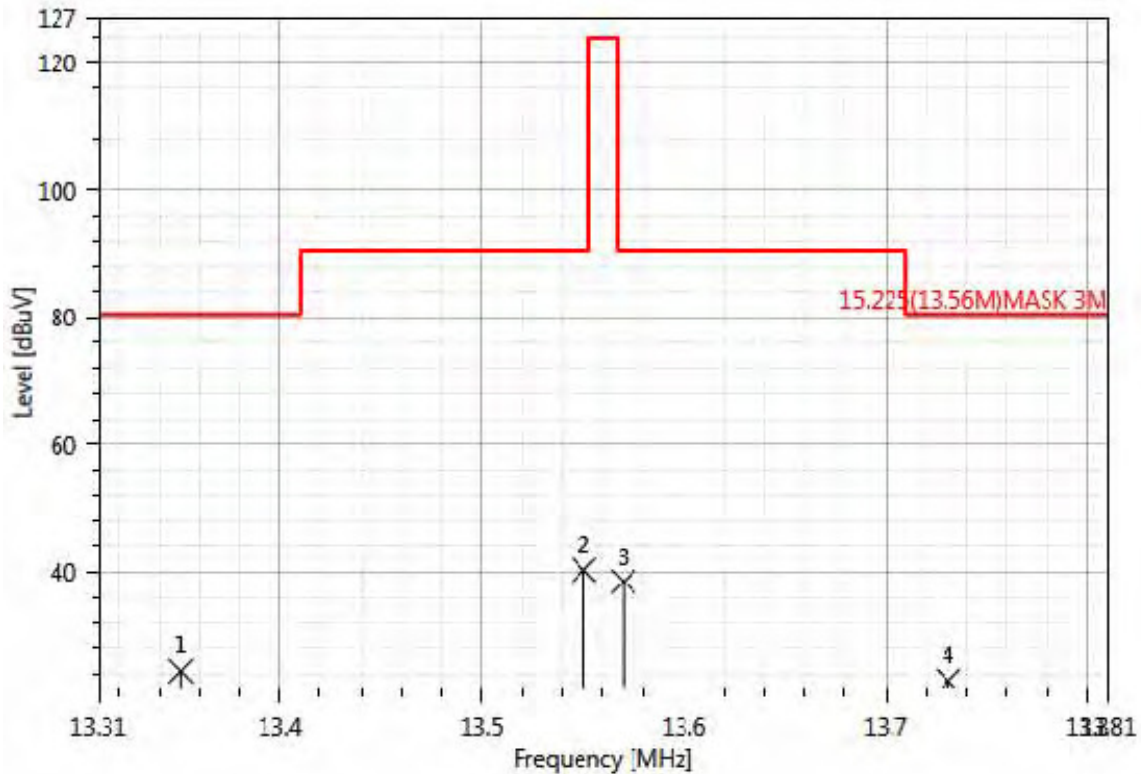
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Operation Mode :	RFID	Test Date :	05/20/2016 11:27:12
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Mask	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
13.35	S	Peak	24.41	12.97	11.43	80.50	-56.09
13.55	S	Peak	40.31	28.87	11.44	90.47	-50.16
13.57	S	Peak	38.46	27.02	11.44	90.47	-52.01
13.73	S	Peak	22.88	11.44	11.44	80.50	-57.62

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7.6 Radiated Emission Measurement

7.6.1 Standard Applicable

The field strength of any emission which appear outside of 13.553~13.567MHz Band shall not exceed the general radiated emissions limits.

Frequency (MHz)	Field strength (μV/m)	Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. Emission level in dBμV/m=20 log (μV/m)
2. Distance extrapolation factor = 40 log (required distance/ test distance) (dB)
3. The lower limit shall apply at the transition frequencies.
4. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.

According to § RSS-210 A2.6

(d) 30 microvolts/m (29.4 dBμV/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 to place at 3m.

$$a) 20 \cdot \log(30 \mu\text{V/m}) + 40\text{dB} = 69.54 \text{ dBuV/m}$$

Note: WPC wireless charging functions are implemented in field strength of spurious radiation measurement.

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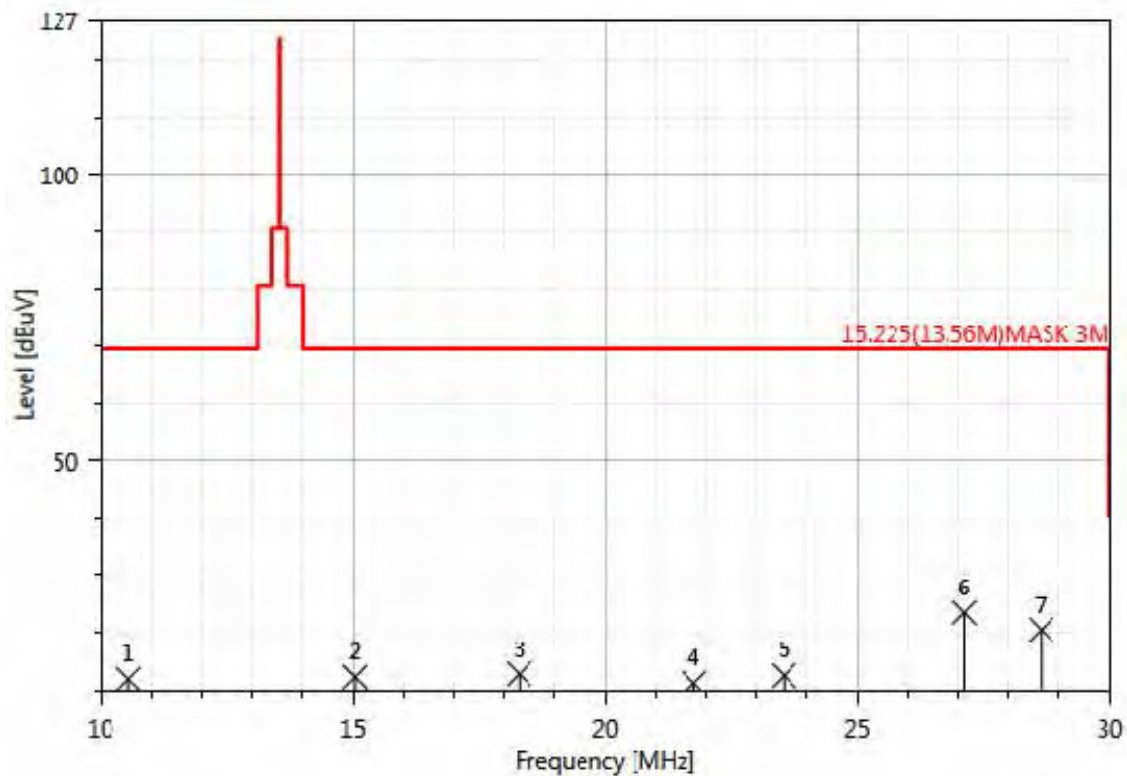
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Radiated Emission Measurement Result

Operation Mode :	RFID	Test Date :	04/27/2016 16:11:31
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Tx CH MID	Test Engineer :	Edward
EUT Pol. :	H Plan	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual leading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBμV/m	Margin dB
10.56	S	Peak	11.87	0.51	11.35	69.54	-57.67
15.04	S	Peak	12.21	0.74	11.47	69.54	-57.33
18.30	S	Peak	12.76	1.21	11.54	69.54	-56.78
21.76	S	Peak	11.15	0.10	11.05	69.54	-58.39
23.54	S	Peak	12.46	1.90	10.56	69.54	-57.08
27.12	H	Peak	23.43	13.73	9.70	69.54	-46.11
28.64	S	Peak	20.43	11.06	9.36	69.54	-49.11

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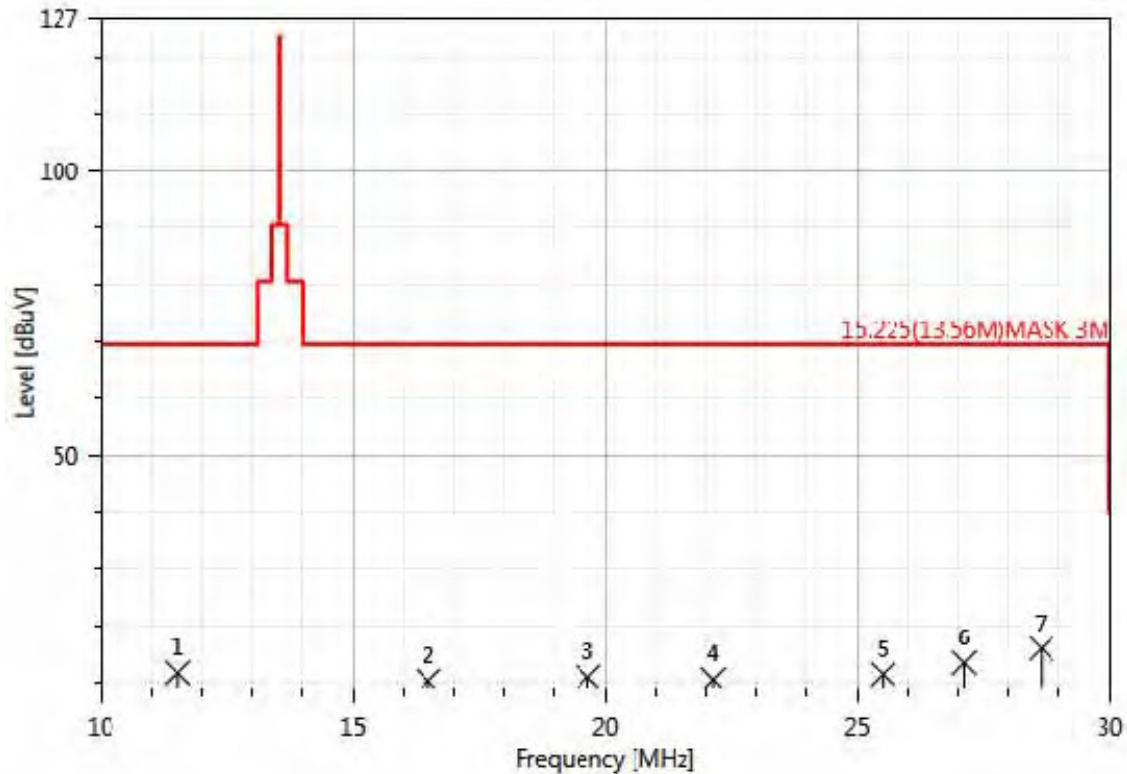
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Operation Mode : RFID Test Date : 04/27/2016 16:27:28
Fundamental Frequency : 13.56 MHz Temp. / Humi. : 19.2 deg_C/58RH
Operation Band : Tx CH MID Test Engineer : Edward
EUT Pol. : H Plan Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual leading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
11.54	S	Peak	11.71	0.33	11.38	69.54	-57.83
16.50	S	Peak	10.29	-1.21	11.50	69.54	-59.25
19.66	S	Peak	10.99	-0.58	11.57	69.54	-58.55
22.14	S	Peak	10.55	-0.39	10.94	69.54	-58.99
25.50	S	Peak	11.47	1.39	10.08	69.54	-58.07
27.12	H	Peak	13.45	3.75	9.70	69.54	-56.09
28.64	S	Peak	15.95	6.58	9.36	69.54	-53.59

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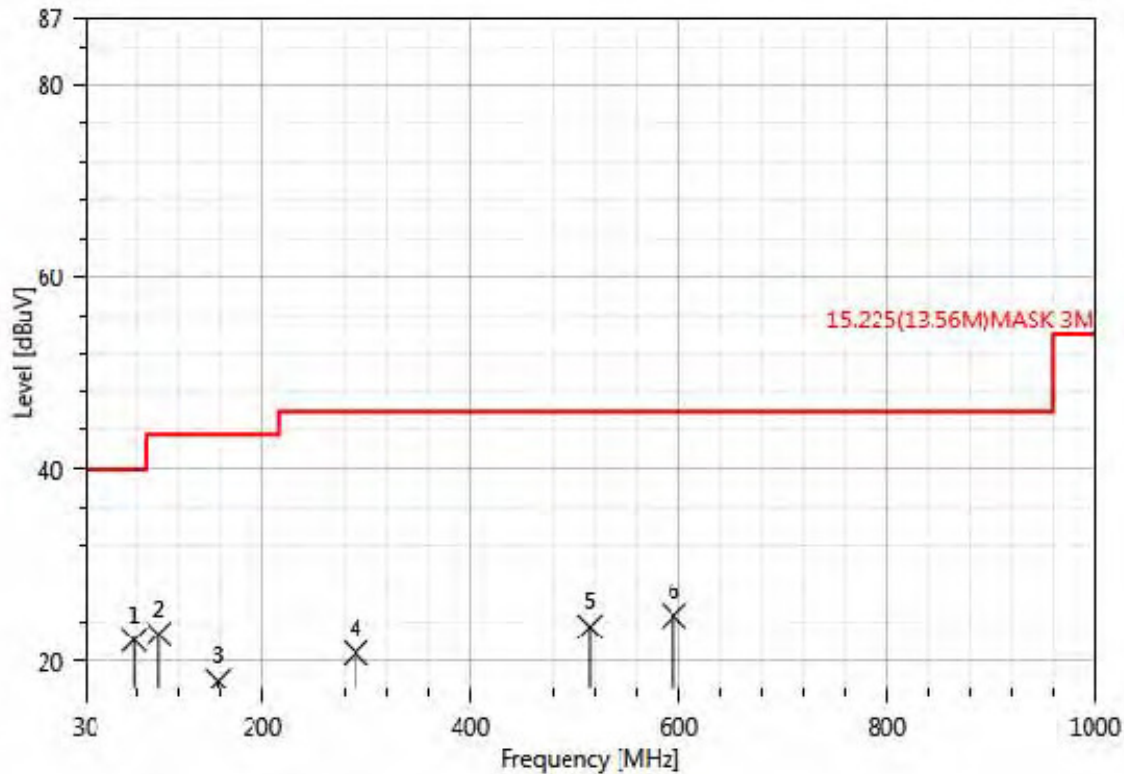
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Operation Mode :	RFID	Test Date :	04/27/2016 14:47:34
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Tx CH MID	Test Engineer :	Edward
EUT Pol. :	H Plan	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual leading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
76.56	S	Peak	22.14	33.78	-11.64	40.00	-17.86
100.81	S	Peak	22.75	35.29	-12.54	43.50	-20.75
158.04	S	Peak	17.90	25.35	-7.45	43.50	-25.60
289.96	S	Peak	20.77	26.85	-6.08	46.00	-25.23
515.00	S	Peak	23.52	25.46	-1.94	46.00	-22.48
595.51	S	Peak	24.66	24.62	0.04	46.00	-21.34

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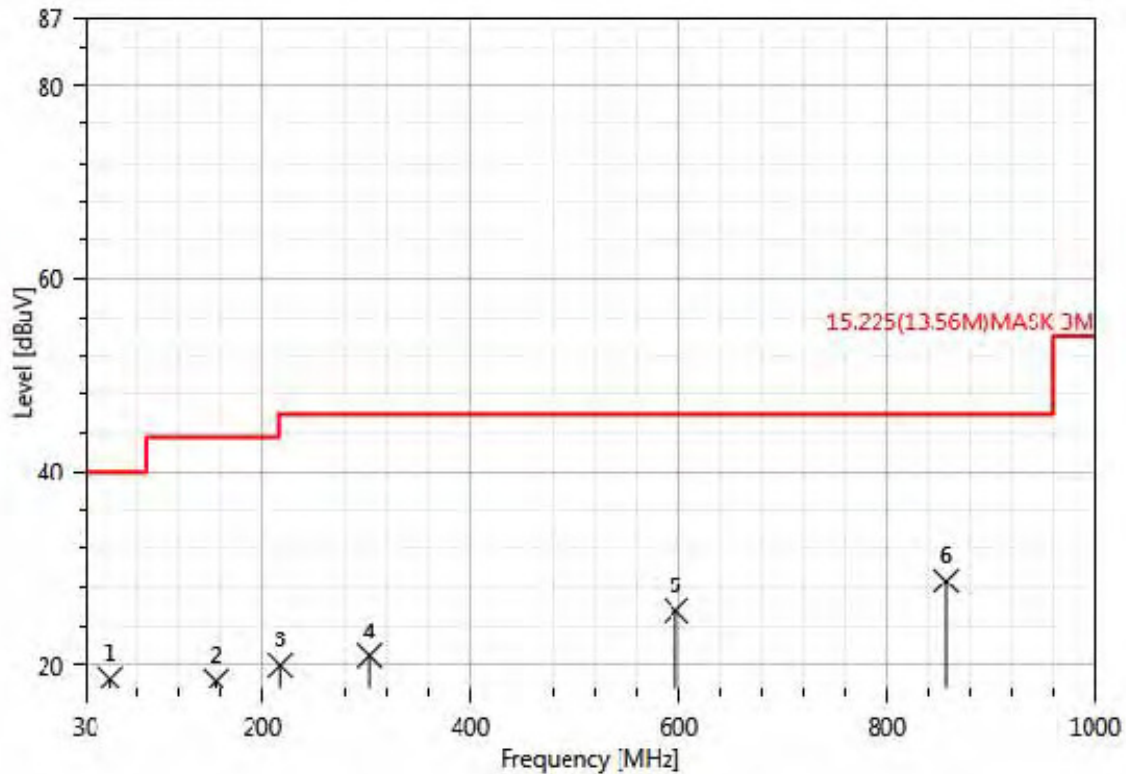
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Operation Mode :	RFID	Test Date :	04/27/2016 14:47:15
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Tx CH MID	Test Engineer :	Edward
EUT Pol. :	H Plan	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual leading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
54.25	S	Peak	18.54	26.36	-7.82	40.00	-21.46
156.10	S	Peak	18.34	25.94	-7.60	43.50	-25.16
217.21	S	Peak	19.93	29.32	-9.38	46.00	-26.07
303.54	S	Peak	20.90	26.68	-5.77	46.00	-25.10
597.45	S	Peak	25.60	25.79	-0.19	46.00	-20.40
857.41	S	Peak	28.67	24.15	4.52	46.00	-17.33

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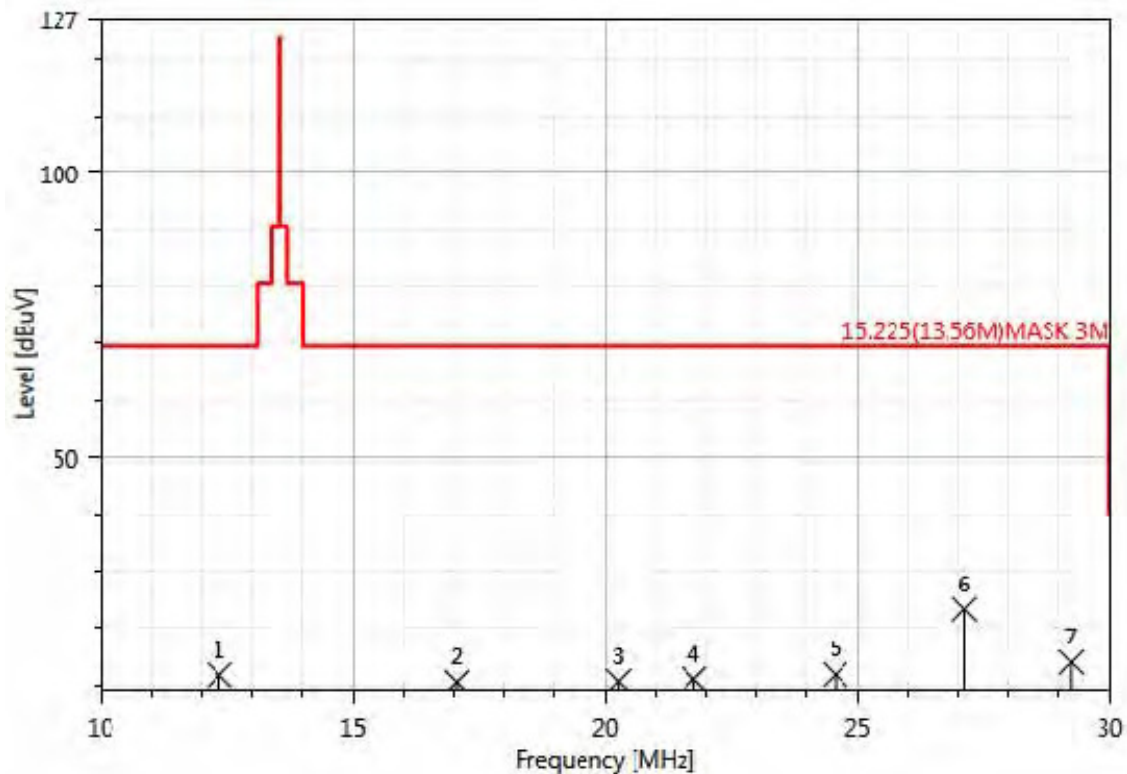
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* Wireless Charging Mode

Operation Mode :	RFID	Test Date :	05/20/2016 11:27:58
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Tx CH MID	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
12.36	S	Peak	11.84	0.43	11.41	69.54	-57.70
17.06	S	Peak	10.59	-0.92	11.51	69.54	-58.95
20.26	S	Peak	10.77	-0.73	11.50	69.54	-58.77
21.76	S	Peak	11.15	0.10	11.05	69.54	-58.39
24.56	S	Peak	11.92	1.62	10.30	69.54	-57.62
27.12	H	Peak	23.32	13.62	9.70	69.54	-46.22
29.24	S	Peak	14.03	4.79	9.23	69.54	-55.51

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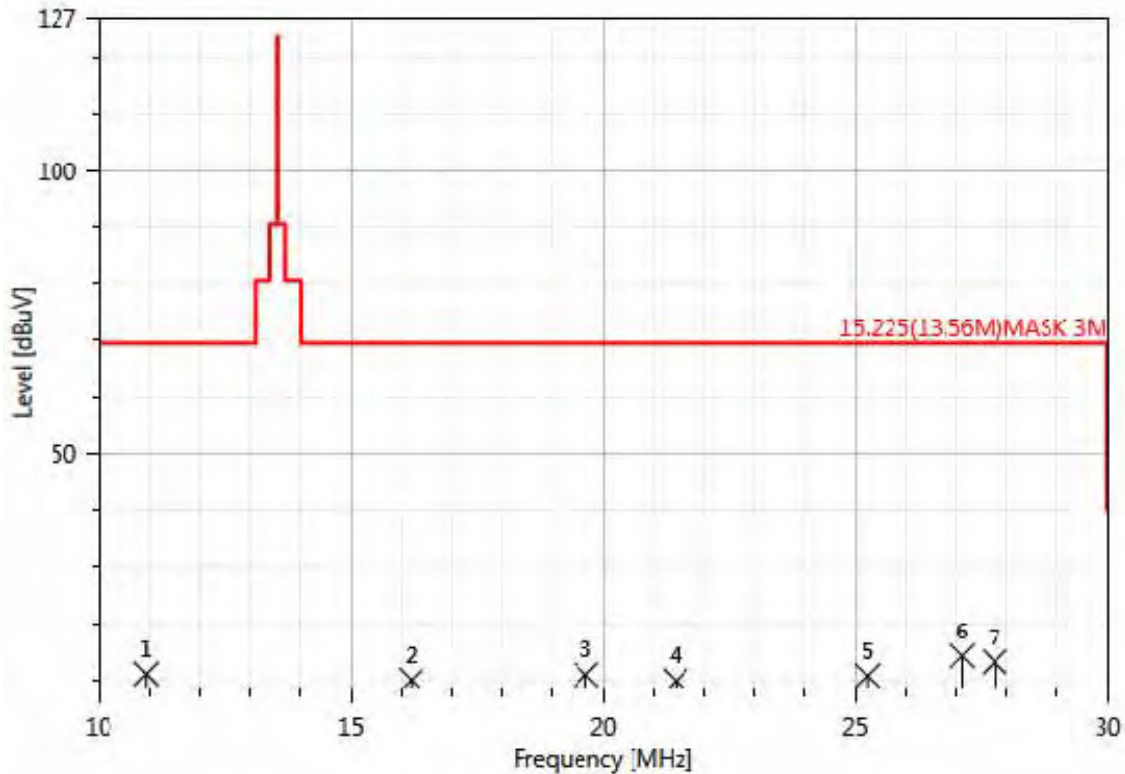
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Operation Mode :	RFID	Test Date :	05/20/2016 11:28:27
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Tx CH MID	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
10.94	S	Peak	11.14	-0.22	11.37	69.54	-58.40
16.20	S	Peak	10.11	-1.39	11.49	69.54	-59.43
19.66	S	Peak	10.99	-0.58	11.57	69.54	-58.55
21.44	S	Peak	9.92	-1.22	11.14	69.54	-59.62
25.24	S	Peak	10.82	0.68	10.14	69.54	-58.72
27.12	H	Peak	14.27	4.57	9.70	69.54	-55.27
27.76	S	Peak	13.24	3.68	9.56	69.54	-56.30

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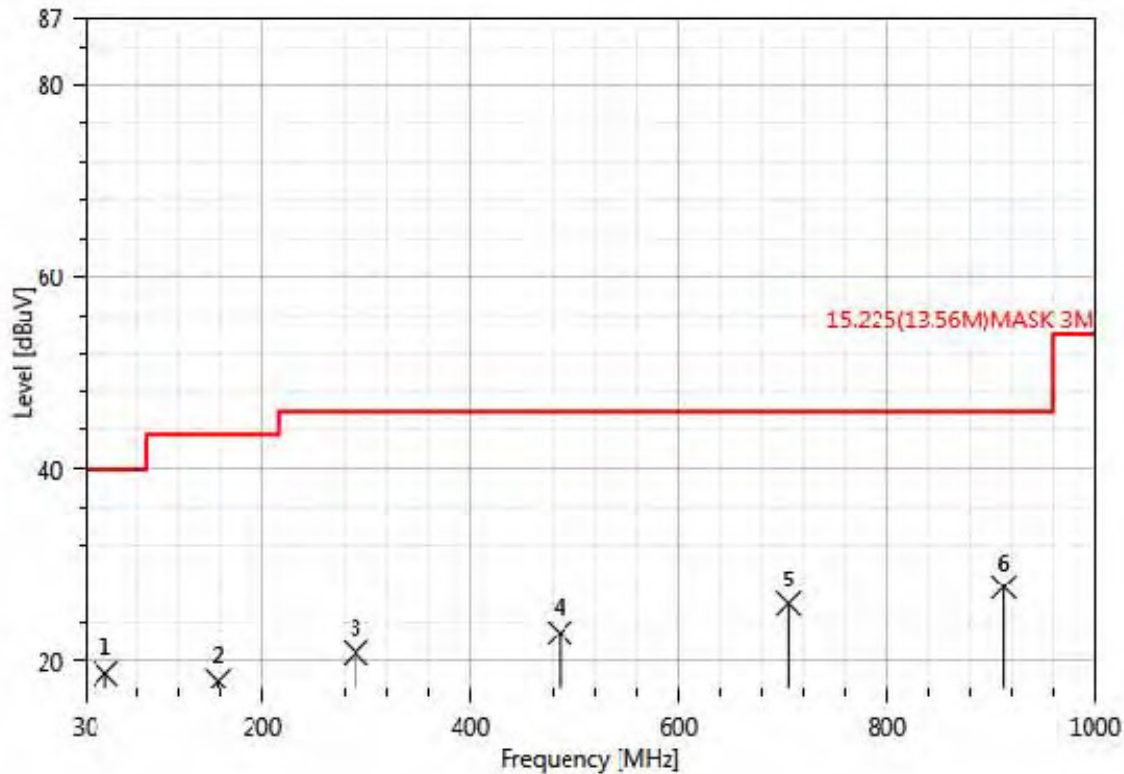
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Operation Mode :	RFID	Test Date :	05/20/2016 11:28:48
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Tx CH MID	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
49.40	S	Peak	18.67	26.41	-7.74	40.00	-21.33
158.04	S	Peak	17.90	25.35	-7.45	43.50	-25.60
289.96	S	Peak	20.77	26.85	-6.08	46.00	-25.23
485.90	S	Peak	22.87	25.20	-2.33	46.00	-23.13
706.09	S	Peak	25.93	24.60	1.33	46.00	-20.07
912.70	S	Peak	27.64	22.68	4.96	46.00	-18.36

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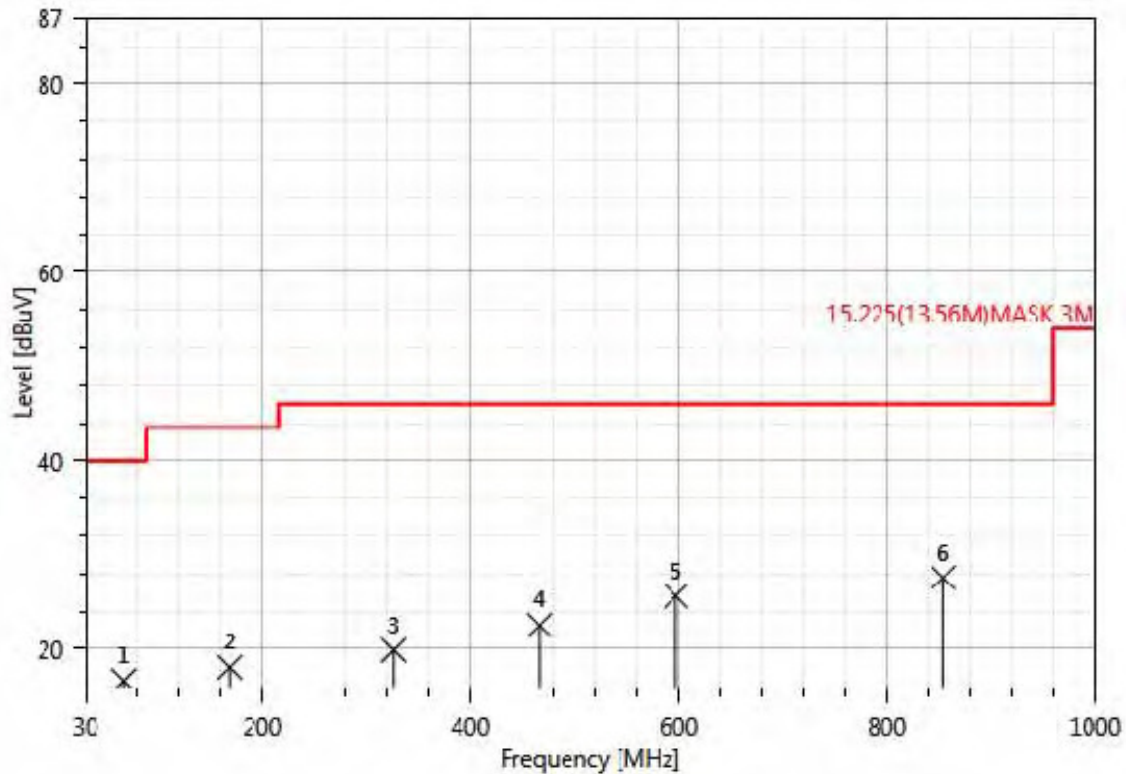
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Operation Mode :	RFID	Test Date :	05/20/2016 11:28:55
Fundamental Frequency :	13.56 MHz	Temp. / Humi. :	19.2 deg_C/58RH
Operation Band :	Tx CH MID	Test Engineer :	Edward
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
66.86	S	Peak	16.62	26.20	-9.58	40.00	-23.38
168.71	S	Peak	18.05	25.58	-7.53	43.50	-25.45
325.85	S	Peak	19.85	25.29	-5.43	46.00	-26.15
466.50	S	Peak	22.50	25.06	-2.56	46.00	-23.50
597.45	S	Peak	25.60	25.79	-0.19	46.00	-20.40
854.50	S	Peak	27.58	23.33	4.25	46.00	-18.42

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8 FREQUENCY STABILITY

8.1 Standard Applicable

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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.

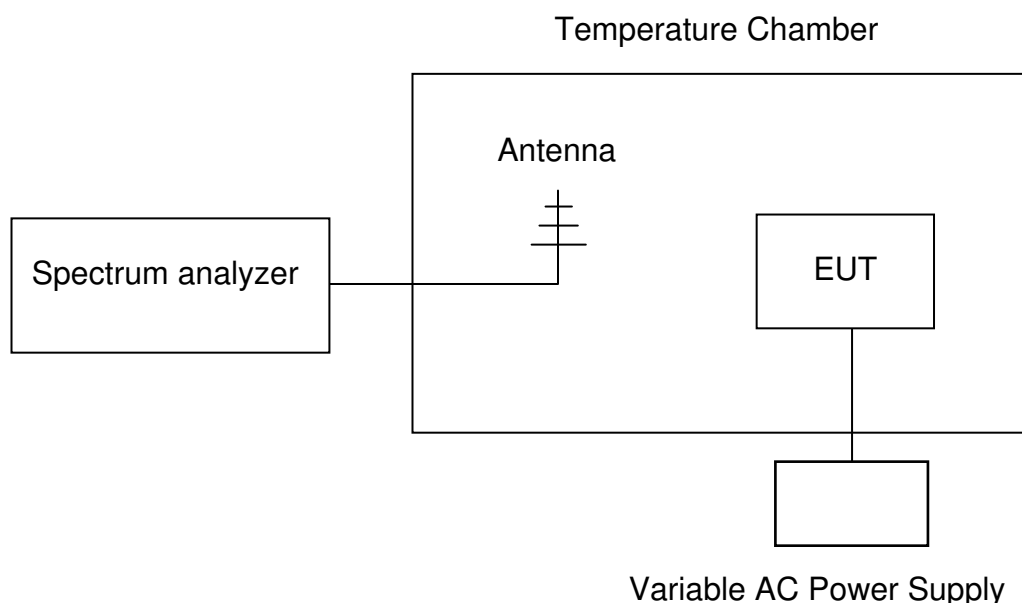
Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm).

For licence-exempt radio apparatus, the frequency stability shall be measured at temperatures of -20°C (-4°F), $+20^{\circ}\text{C}$ ($+68^{\circ}\text{F}$) and $+50^{\circ}\text{C}$ ($+122^{\circ}\text{F}$).

8.2 Measurement Procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.
7. Set spectrum Center Frequency = fundamental frequency, RBW, VBW= 10 kHz, Span =100 kHz, Detector =Max hold, Mark peak.

8.3 Test SET-UP



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8.4 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/09/2015	12/08/2016
Power Sensor	Anritsu	MA2411B	917032	12/09/2015	12/08/2016
Spectrum Analyzer	Agilent	N9010A	MY50420195	12/21/2015	12/20/2016
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017

8.5 Measurement Results

A. Temperature Variation

Power Supply
Vdc

Environment
Temperature
(

Frequency

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9 99% & 20 dB OCCUPIED BANDWIDTH MEASUREMENT

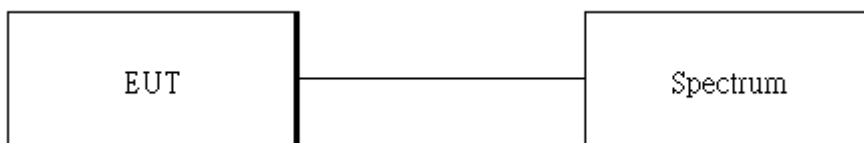
9.1 Standard Applicable:

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

9.2 Limit:

None

9.3 Test Set-up



9.4 Measurement Procedure

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 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

9.5 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY50420195	12/21/2015	12/20/2016
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017

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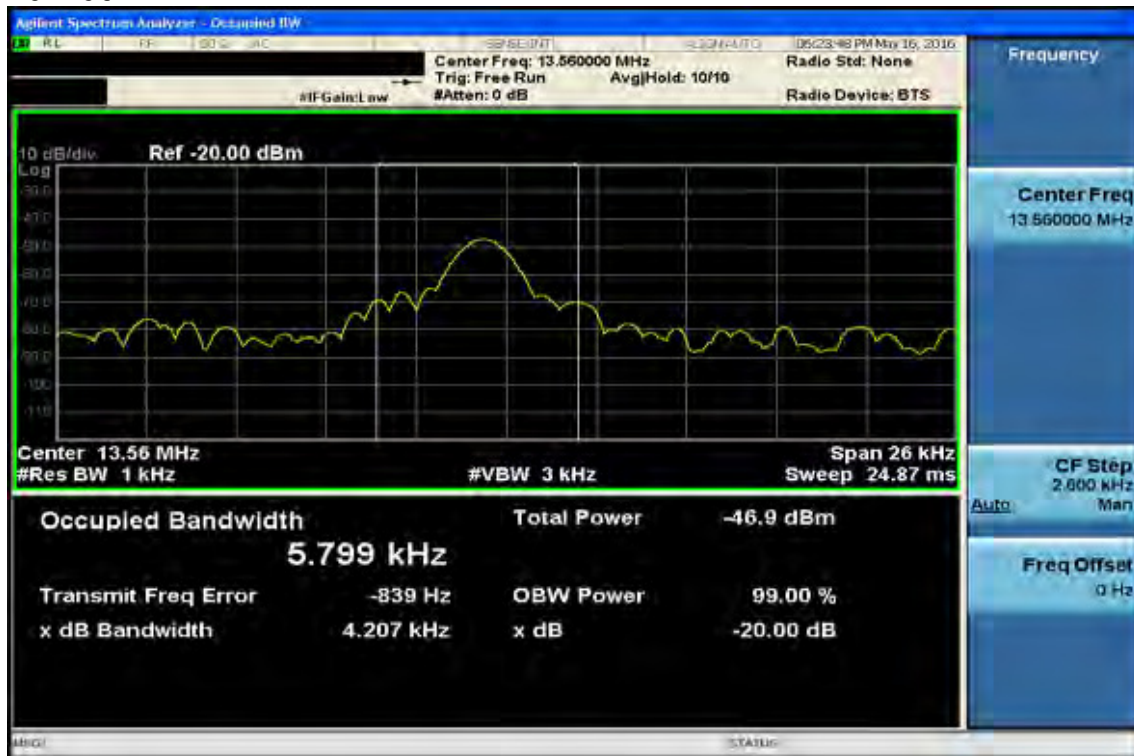
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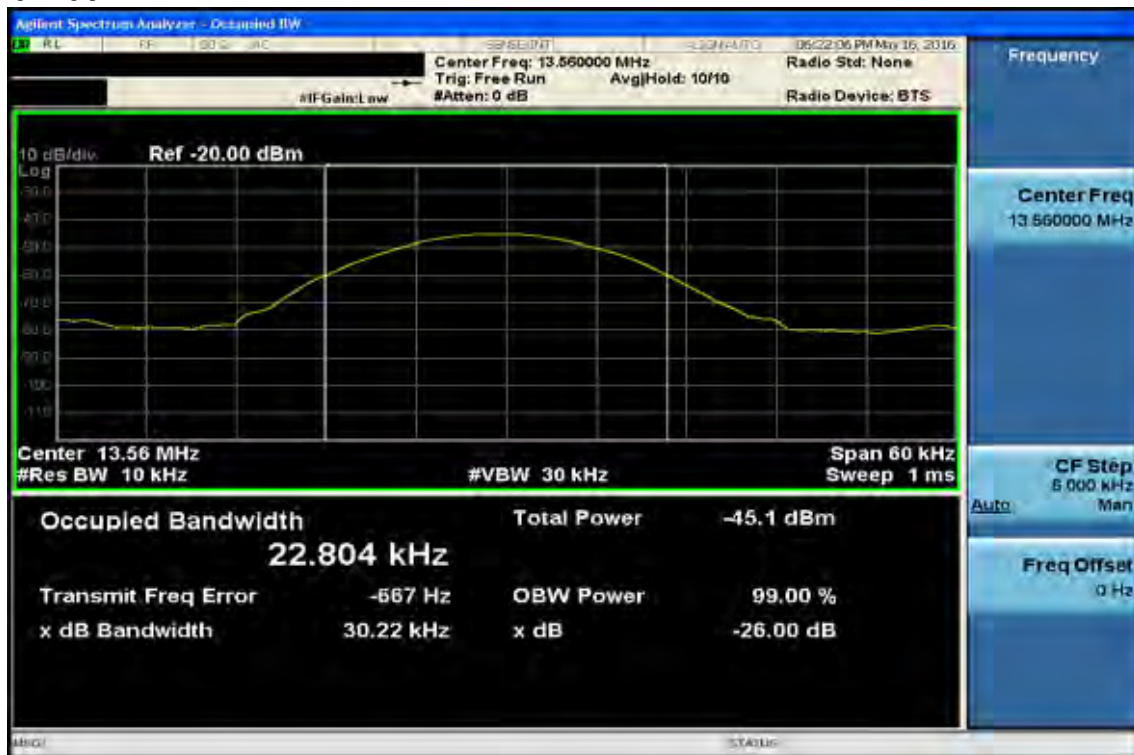
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9.6 Measurement Result

20dB Bandwidth



99% Bandwidth



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10 ANTENNA REQUIREMENT

10.1. Standard Applicable

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.

According to RSS-GEN 8.3

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. 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 a measurement or on data from the antenna manufacturer.

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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