

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name: izooca bridge

Brand Name: izooca

Model No.: 00638

Model Difference: N/A

FCC ID: 2AFGM00638

Report No.: E2/2015/70013

Issue Date: Aug. 05, 2015

FCC Rule Part: §15.225

Prepared for: Azooca Inc
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SGS Taiwan Ltd.

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VERIFICATION OF COMPLIANCE

Applicant: Azoooca Inc
368 S. Cheryl Lane , City of Industry, CA 91789

Product Name: izoooca bridge

Brand Name: izoooca

Model No.: 00638

Model Difference: N/A

FCC ID: 2AFGM00638

Report Number: E2/2015/70013

Date of test: Jul. 15, 2015 ~ Aug. 05, 2015

Date of EUT Received: Jul. 15, 2015

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:

Jerry Lu

Date:

Aug. 05, 2015

Jerry Lu / Engineer

Prepared By:

Allen Tsai

Date:

Aug. 05, 2015

Allen Tsai / Engineer

Approved By

Jim Chang

Date:

Aug. 05, 2015

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2015/70013	Rev.00	Initial creation of document	Aug. 05, 2015

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1 GENERAL INFORMATION

1.1 Product Description

2 General:

Product Name:	izooca bridge	
Brand Name:	izooca	
Model No.:	00638	
Model Difference:	N/A	
Product SW/HW version:	V1.32 / V2R1	
Radio SW/HW version:	N/A	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
Micro USB Cable:	Model No.: USB AM TO MICRO B Supplier: Future Technology	
RFID Tag	Model No.: RFD0106 Supplier: Li-Hong	
Power Supply:	3.8Vdc from Rechargeable Li-polymer Battery or 5Vdc from USB Port.	
	Battery:	Model No.: ICR18650-22F, Supplier: SAMSUNG.

RFID:

Operating Frequency:	13.56MHz
Transmit Power:	< 123.90dBuV/m at 3m.
Number of Channels:	1
Antenna Type:	Loop Antenna
Modulation Type:	ISO15693

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2.1 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is Izooca bridge supporting Bluetooth with RFID features, and below is details of information

Product Feature	
Product Name:	izooca bridge
Brand Name:	izooca
Model No.:	00638
Model Difference:	N/A
FCC ID:	2AFGM00638
Bluetooth Version	V4.0 single mode
RFID Specification	RFID

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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2.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.225

ANSI C63.10:2013

All test items have been performed and record as per the above standards.

The composite system (digital device) is compliance with FCC Subpart B is authorized under the certification procedure.

2.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd.,
Guishan District, Taoyuan City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 628985

Canada Registration Number: 4620A-5.

2.4 Special Accessories

There is no special accessory used while test was conducted.

2.5 Equipment Modifications

There was no modification incorporated into the EUT.

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3 SYSTEM TEST CONFIGURATION

3.1 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.

3.2 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.

3.3 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 30MHz. 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.

3.4 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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3.5 Configuration of Tested System

Fig. 2-1 Radiated Emission & Conducted Emission at antenna port



Fig. 2-2 AC Power Line Conducted Emission

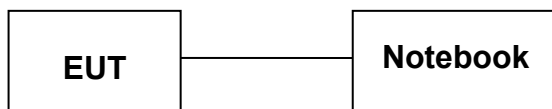


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	RFID Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L430	R9-YYG88	shielded	Un-shielded

4 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§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 Bandwidth	Compliant
§15.203	Antenna Requirement	Compliant

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5 DESCRIPTION OF TEST MODES

5.1 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.

RADIATED EMISSION TEST			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
RFID	1	1	ISO15693
FREQUENCY STABILITY			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
RFID	1	1	ISO15693
20dB BANDWIDTH			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
RFID	1	1	ISO15693

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

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6 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)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB

Measurement uncertainty (Polarization : Horizontal)	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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7 CONDUCTED EMISSION TEST

7.1 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(μV)	
	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.		

7.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	01/06/2015	01/07/2016
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

7.3 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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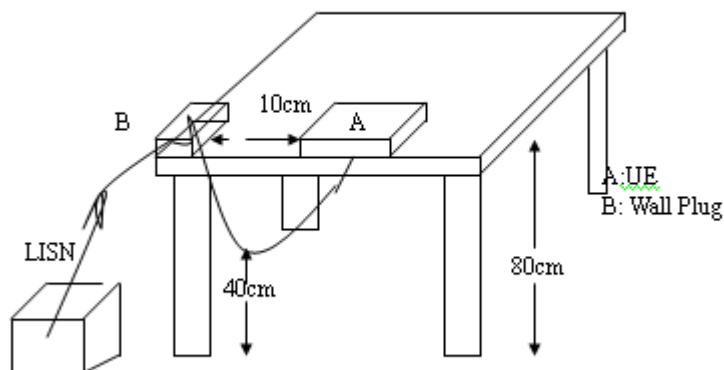
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7.4 Test SET-UP (Block Diagram of Configuration)



7.5 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.

7.6 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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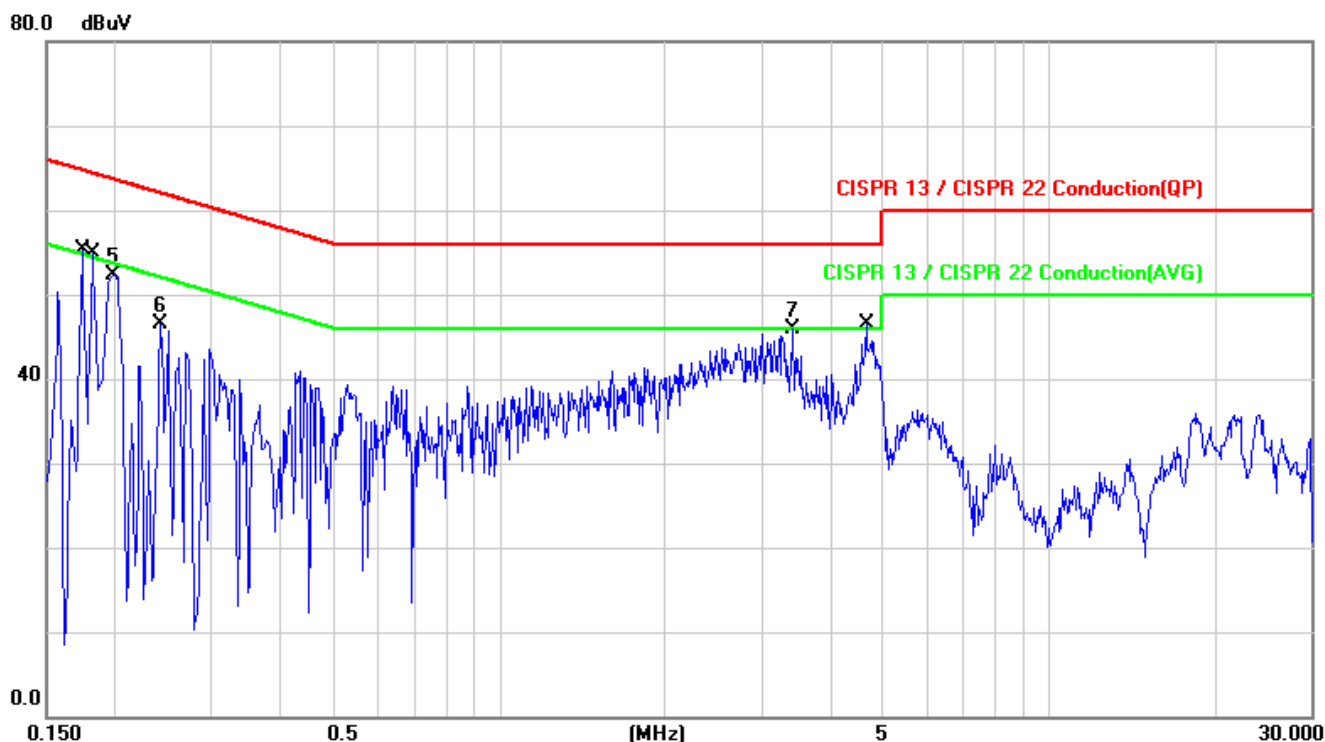
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Jun. 31, 2015
Temperature:	25	Humidity:	56 %	Test By:	Ashton
Model No.:				Phase:	L1



No.	Mk.	Freq. (MHz)	Reading dBuV	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1		0.1740	51.40	0.08	51.48	64.77	-13.29	QP	
2		0.1740	33.20	0.08	33.28	54.77	-21.49	AVG	
3		0.1820	52.10	0.08	52.18	64.39	-12.21	QP	
4		0.1820	38.10	0.08	38.18	54.39	-16.21	AVG	
5		0.1980	52.30	0.07	52.37	63.69	-11.32	peak	
6		0.2420	46.47	0.09	46.56	62.03	-15.47	peak	
7	*	3.4300	45.30	0.60	45.90	56.00	-10.10	peak	
8		4.6660	40.30	0.62	40.92	56.00	-15.08	QP	
9		4.6660	32.40	0.62	33.02	46.00	-12.98	AVG	

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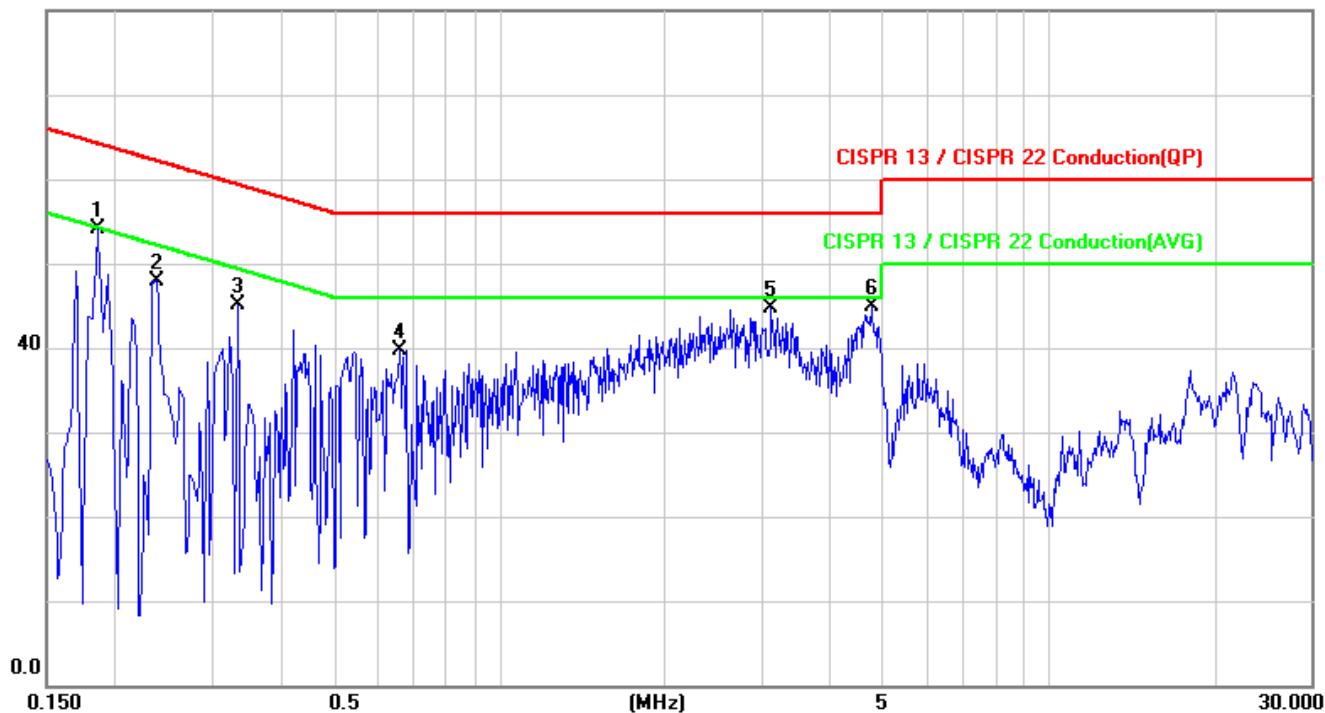
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Operation Mode:	Operation mode			Test Date:	Jun. 31, 2015
Temperature:	25	Humidity:	56 %	Test By:	Ashton
Model No.:				Phase:	N

80.0 dBuV



No.	Mk.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1	*	0.1860	53.90	0.13	54.03	64.21	-10.18	peak	
2		0.2380	47.68	0.15	47.83	62.17	-14.34	peak	
3		0.3340	44.99	0.19	45.18	59.35	-14.17	peak	
4		0.6580	39.43	0.33	39.76	56.00	-16.24	peak	
5		3.1340	43.99	0.65	44.64	56.00	-11.36	peak	
6		4.7540	44.16	0.67	44.83	56.00	-11.17	peak	

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8 RADIATED TEST ITEMS

8.1 Measurement Procedure

1. Configure the EUT according to ANSI C63.10 2013
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

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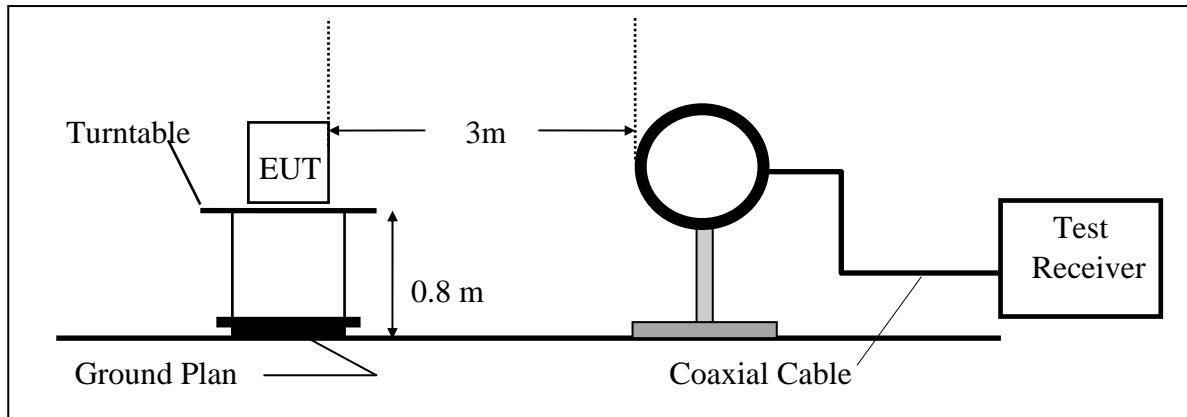
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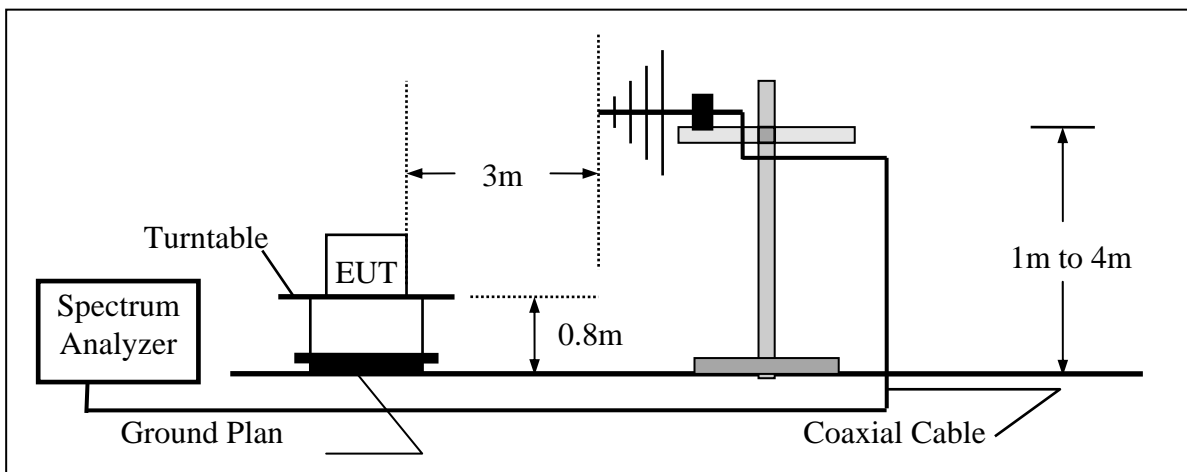
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8.2 Test SET-UP

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



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



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8.3 Measurement Equipment Used

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2015	05/03/2016
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	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.

8.4 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 $20 \cdot \log(\mu V/m)$

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.

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8.5 Field Strength of Fundamental Emissions and Mask Measurement

8.5.1 Standard Applicable

Limit:

Rules and specifiactions	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

Note:

1. Emission level in dB $\mu\text{V}/\text{m}$ = 20 log ($\mu\text{V}/\text{m}$)
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.

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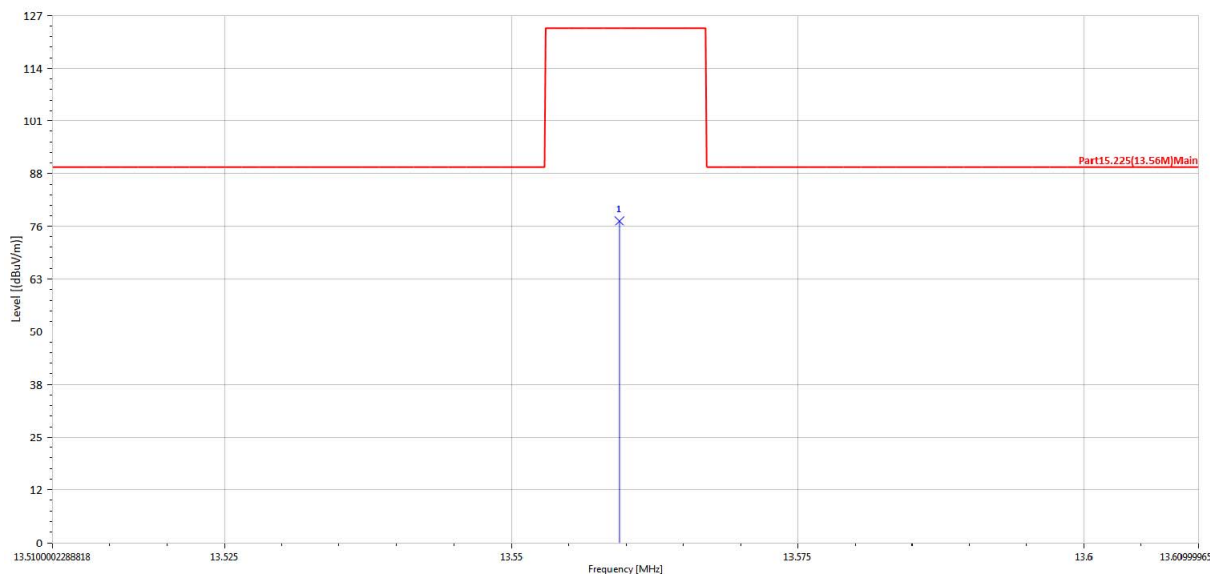
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8.5.2 Field Strength of Fundamental Emission Measurement Result

Operation Band	:RFID	Test Date	:2015-08-03
Fundamental Frequency	:13.56 MHz	Temp./Humi.	:24.3 deg_C/ 51 RH
Operation Mode	:MAIN	Engineer	:Ashton
EUT Pol.	:H Plan	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	dBuV	dB	dBuV/m	dBuV/m	dB
13.56	F	Peak	66.36	11.17	77.53	123.9	-46.37

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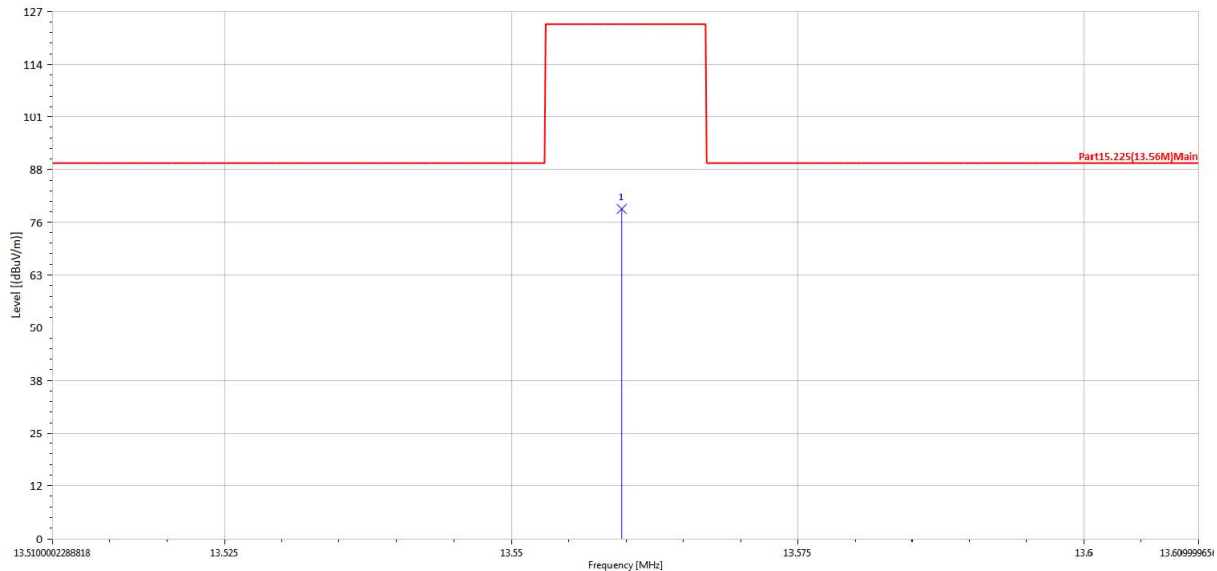
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Operation Band	:RFID	Test Date	:2015-08-03
Fundamental Frequency	:13.56 MHz	Temp./Humi.	:24.3 deg_C/ 51 RH
Operation Mode	:MAIN	Engineer	:Ashton
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL



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	68.34	11.17	79.51	123.9	-44.39

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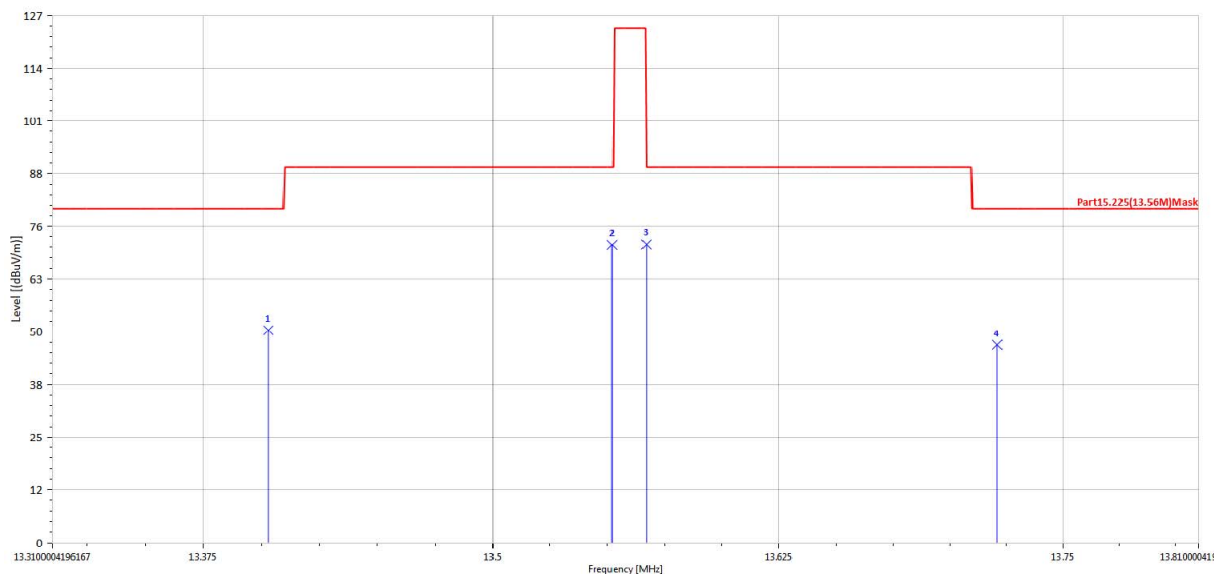
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8.5.3 Mask Measurement Result

Operation Band	:RFID	Test Date	:2015-08-03
Fundamental Frequency	:13.56 MHz	Temp./Humi.	:24.3 deg_C/ 51 RH
Operation Mode	:MASK	Engineer	:Ashton
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.40	S	Peak	39.98	11.17	51.15	80.5	-29.35
13.55	S	Peak	60.49	11.17	71.66	90.47	-18.81
13.57	S	Peak	60.59	11.16	71.75	90.47	-18.72
13.72	S	Peak	36.44	11.15	47.59	80.5	-32.91

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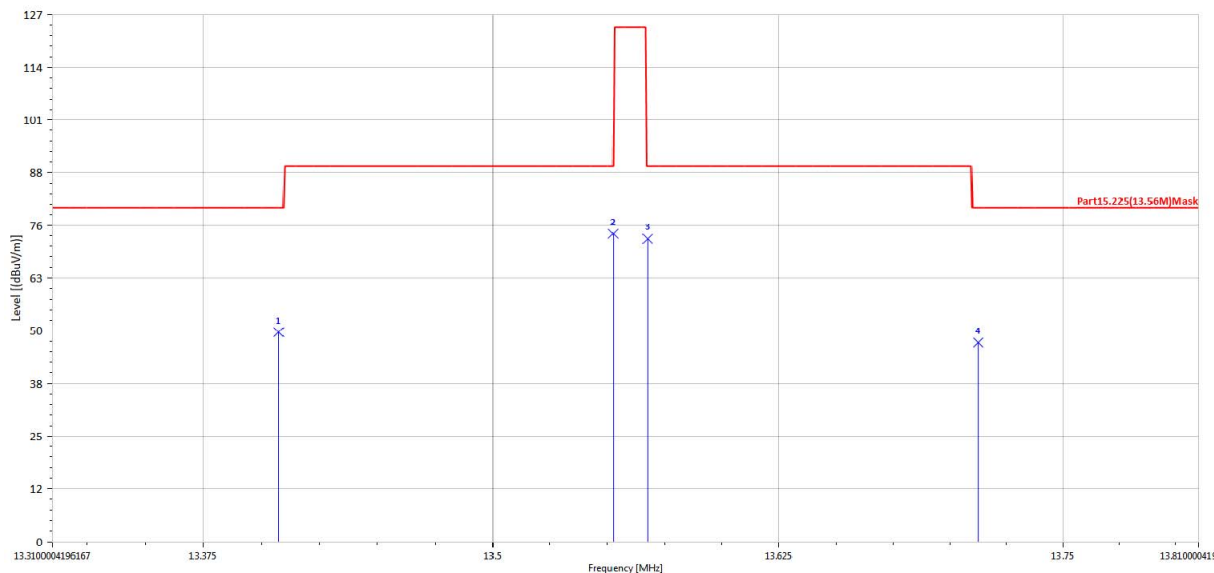
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Operation Band :RFID
Fundamental Frequency :13.56 MHz
Operation Mode :MASK
EUT Pol. :H Plan

Test Date :2015-08-03
Temp./Humi. :24.3 deg_C/ 51 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
13.41	S	Peak	39.28	11.17	50.45	80.5	-30.05
13.55	S	Peak	62.96	11.17	74.13	90.47	-16.34
13.57	S	Peak	61.73	11.16	72.89	90.47	-17.58
13.71	S	Peak	36.74	11.15	47.89	80.5	-32.61

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8.6 Radiated Emission Measurement

8.6.1 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.

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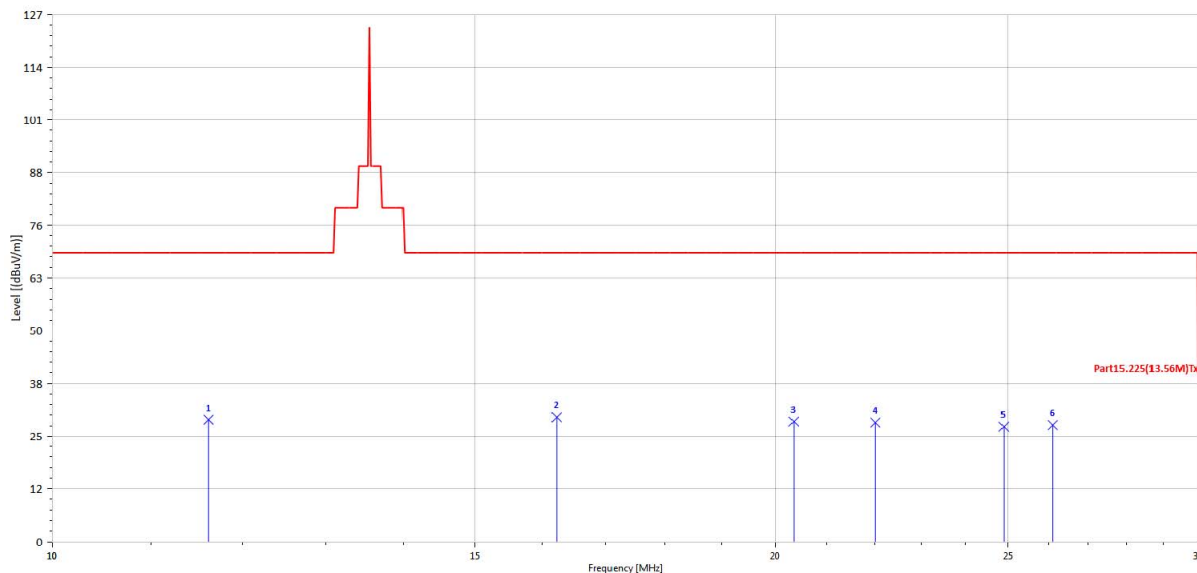
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8.6.2 Radiated Emission Measurement Result

Operation Band	:RFID	Test Date	:2015-08-03
Fundamental Frequency	:13.56 MHz	Temp./Humi.	:24.3 deg_C/ 51 RH
Operation Mode	:TX	Engineer	:Ashton
EUT Pol.	:H Plan	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
11.62	S	Peak	18.18	11.23	29.40	69.54	-40.14
16.22	S	Peak	18.90	11.09	29.99	69.54	-39.55
20.36	S	Peak	18.07	10.88	28.95	69.54	-40.59
22.02	S	Peak	18.13	10.59	28.71	69.54	-40.83
24.90	S	Peak	17.65	10.07	27.72	69.54	-41.82
26.10	S	Peak	18.27	9.84	28.11	69.54	-41.43

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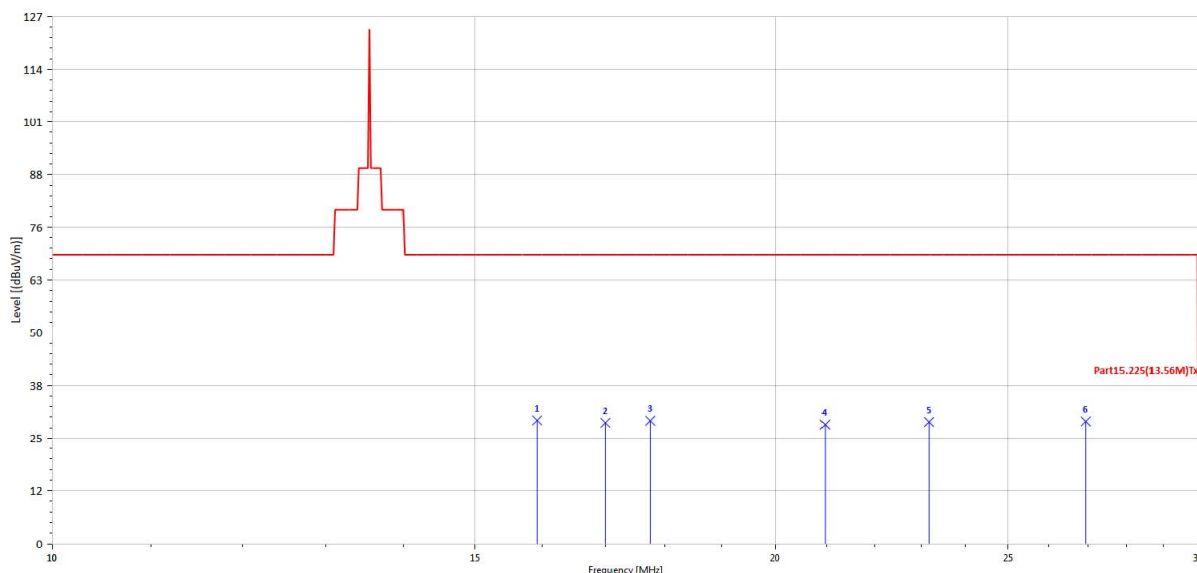
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Operation Band	:RFID	Test Date	:2015-08-03
Fundamental Frequency	:13.56 MHz	Temp./Humi.	:24.3 deg_C/ 51 RH
Operation Mode	:TX	Engineer	:Ashton
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL



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
15.92	S	Peak	18.62	11.10	29.72	69.54	-39.82
17.00	S	Peak	18.07	11.06	29.13	69.54	-40.41
17.74	S	Peak	18.57	11.04	29.61	69.54	-39.93
20.98	S	Peak	17.91	10.77	28.69	69.54	-40.85
23.18	S	Peak	18.95	10.38	29.33	69.54	-40.21
26.94	S	Peak	19.79	9.67	29.46	69.54	-40.08

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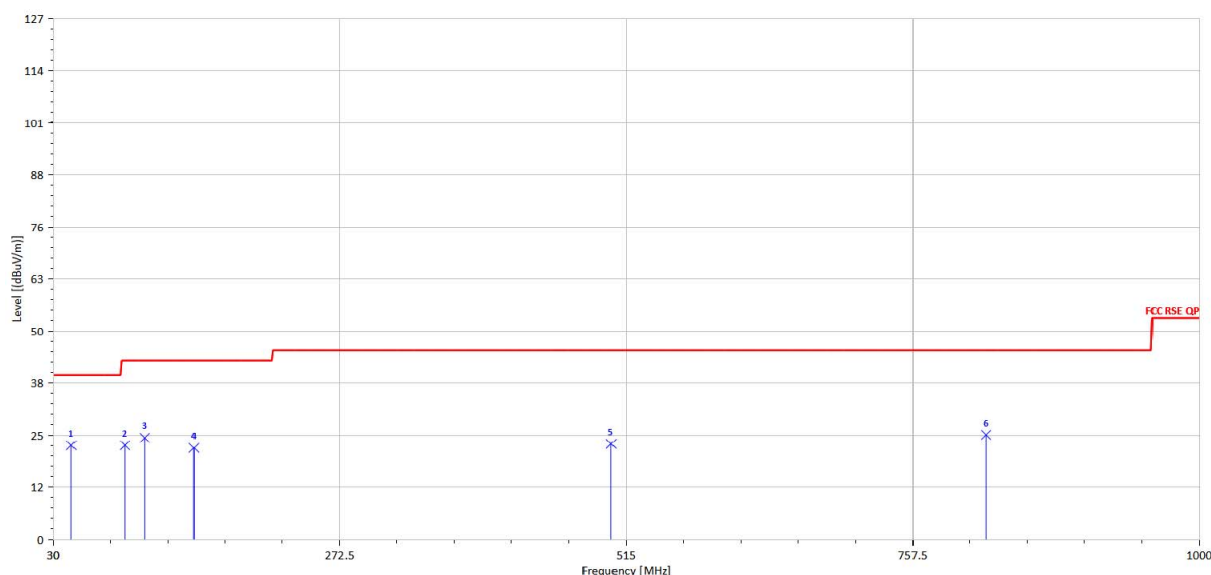
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Operation Band :RFID
 Fundamental Frequency :13.56 MHz
 Operation Mode :TX
 EUT Pol. :H Plan

Test Date :2015-08-03
 Temp./Humi. :24.3 deg_C/ 51 RH
 Engineer :Ashton
 Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
45.52	S	Peak	45.61	-22.75	22.86	40	-17.14
91.11	S	Peak	48.29	-25.42	22.87	43.5	-20.63
107.60	S	Peak	47.42	-22.68	24.74	43.5	-18.76
149.31	S	Peak	44.82	-22.61	22.20	43.5	-21.30
502.39	S	Peak	37.37	-14.14	23.23	46	-22.77
819.58	S	Peak	34.34	-8.86	25.48	46	-20.52

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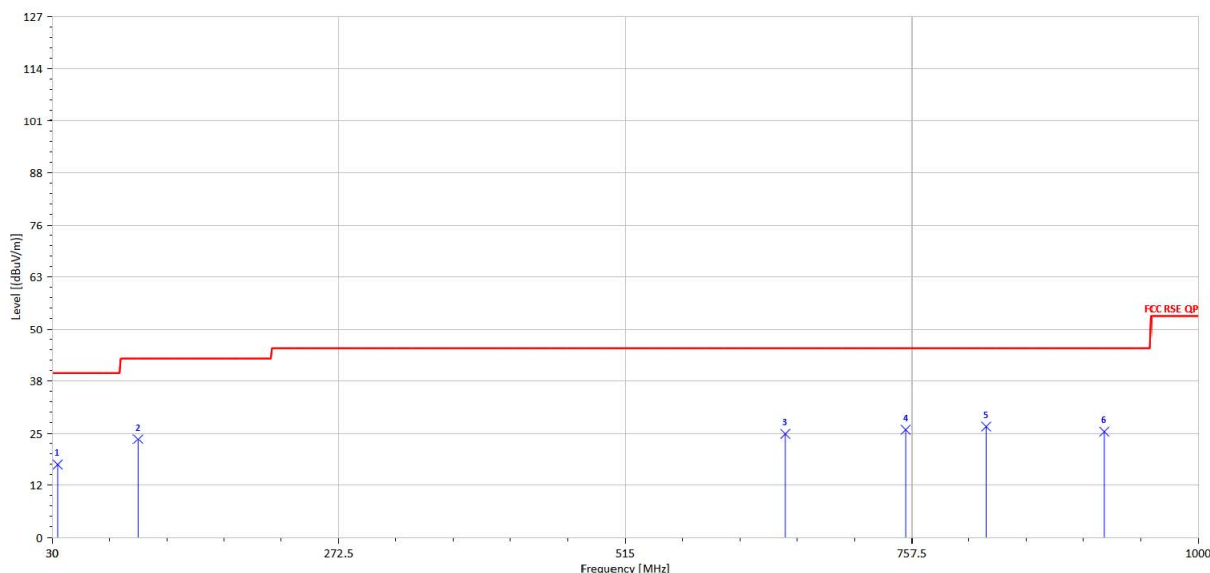
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Operation Band :RFID
Fundamental Frequency :13.56 MHz
Operation Mode :TX
EUT Pol. :H Plan

Test Date :2015-08-03
Temp./Humi. :24.3 deg_C/ 51 RH
Engineer :Ashton
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
34.85	S	Peak	33.39	-15.75	17.64	40	-22.36
102.75	S	Peak	47.29	-23.39	23.90	43.5	-19.60
650.80	S	Peak	36.54	-11.28	25.26	46	-20.74
752.65	S	Peak	36.08	-9.81	26.27	46	-19.73
820.55	S	Peak	35.90	-8.86	27.04	46	-18.96
920.46	S	Peak	33.44	-7.65	25.79	46	-20.21

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8 FREQUENCY STABILITY

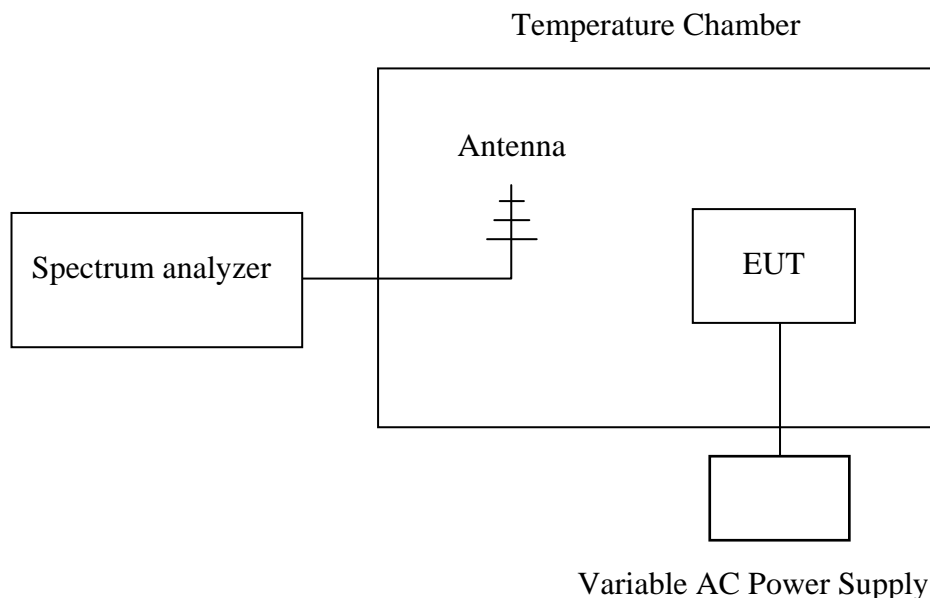
8.1 Standard Applicable

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.

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.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
Coaxial Cable 30cm	WOKEN	00100A1F1A 195C	RF01	12/19/2014	12/18/2015
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2015	05/03/2016
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015

8.5 Measurement Results

Refer to attached data chart.

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A. Temperature Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.8	-20	13.55983	0.00	+/- 1.356
3.8	-10	13.55983	0.00	+/- 1.356
3.8	0	13.55967	166.67	+/- 1.356
3.8	10	13.55983	0.00	+/- 1.356
3.8	20	13.55983	0.00	+/- 1.356
3.8	30	13.55983	0.00	+/- 1.356
3.8	40	13.55983	0.00	+/- 1.356
3.8	50	13.55983	0.00	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
4.2	20	13.55983	0.00	+/- 1.356
3.8	20	13.55983	0.00	+/- 1.356
3.2	20	13.55983	0.00	+/- 1.356

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9 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	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNAK	PE8210	RF29	12/19/2014	12/18/2015
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/19/2014	12/18/2015

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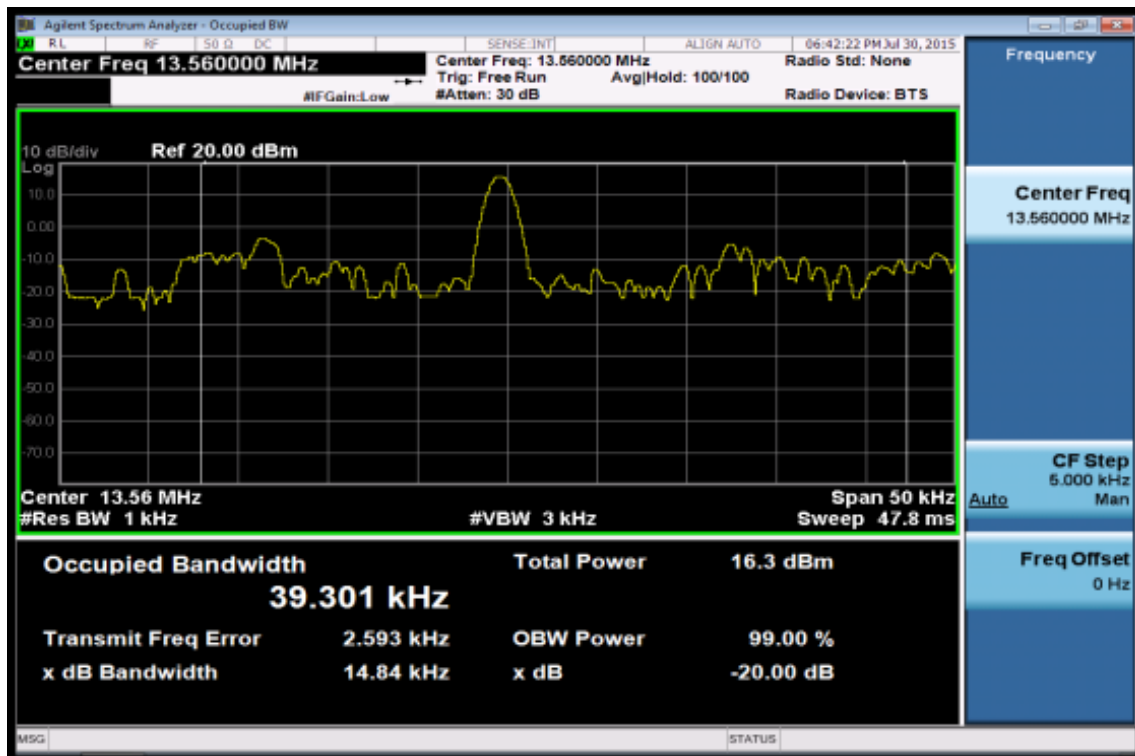
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9.6 20dB Bandwidth Measurement Result



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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.

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