

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Applicant: Quanta Computer Inc.
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
33377, Taiwan

Product Name: 7 inch POS Terminal

Brand Name: Quanta, CASTLES

Model No.: KI1, SATURN7000

Model Difference: Marketing Purpose

Report Number: E2/2018/70101

FCC ID HFS-KI1

FCC Rule Part Part 15.225

Issue Date: Oct. 24, 2018

Date of Test: Aug. 08, 2018 ~ Oct. 19, 2018

Date of EUT Received: Aug. 08, 2018

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 of FCC Rules Part 15.225.

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

Tested By:

Vito Pei

Vito Pei / Sr. Engineer

Approved By:

Jim Chang

Jim Chang / Manager



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/70101	Rev.00	Initial creation of document	All	Oct. 24, 2018	Elle Chang

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	7 inch POS Terminal	
Brand Name:	Quanta, CASTLES	
Model No.:	KI1, SATURN7000	
Model Difference:	Marketing Purpose	
Hardware Version:	B2	
Software Version:	01.000	
Power Supply:	3.8V from Rechargeable Li-ion Battery or 5V from AC/DC Adapter	
	Battery:	Model no.: KI1 Supplier: Ningbo Veken Battery Co., Ltd.
	Adapter:	Model No.: CYSF12G-050200U, Supplier: JIANGSU CHENYANG ELECTRON Co., LTD

RFID:

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

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1.2 Test Methodology

FCC Part 15, Subpart C §15.225

ANSI C63.10:2013

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

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd.,
Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Number and Designation number are: 735305 / TW0002

1.4 Special Accessories

There is no special accessory used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

1.6 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*9m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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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

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions (Not apply in the report)

The EUT is a placed on as turn table which is 0.8m above ground plane. 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 §15.107. 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 a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m above the reference 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 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.

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2.4 Limitation

(1) Conducted Emission

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

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.		

(2) Radiated Emission

- The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- 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.
- 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.
- 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 as below.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
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= $20 \log (\mu\text{V}/\text{m})$
: 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor = $40 \log (\text{required distance}/ \text{test distance})$ (dB);
4. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.
Ex. $20 \log (30)+40 \log (30 / 3)=69.54 \text{ dBuV} / \text{m}$
5. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of §15.205.
6. The general radiated emission limits in §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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2.5 Configuration of Tested System

Fig. 2-1 Emission test set up configuration

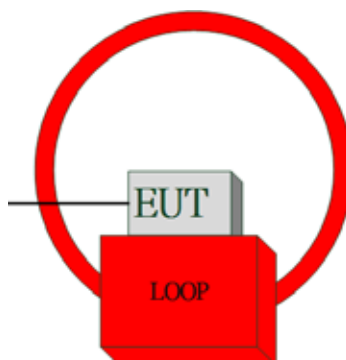


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	NFC Test software	Tera Term	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3634A	MY53180030	N/A	Unshielded

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3 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)	99% & 20 dB OCCUPIED BANDWIDTH	Compliant
§15.203	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

The EUT stay in continuous transmitting mode. The frequency 13.56MHz 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), the worst case E1 position was reported.

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

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5 MEASUREMENT UNCERTAINTY

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:

Measurement uncertainty (Polarization : Vertical)	9kHz - 30MHz: +/- 2.3dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB

Measurement uncertainty (Polarization : Horizontal)	9kHz - 30MHz: +/- 2.3dB
	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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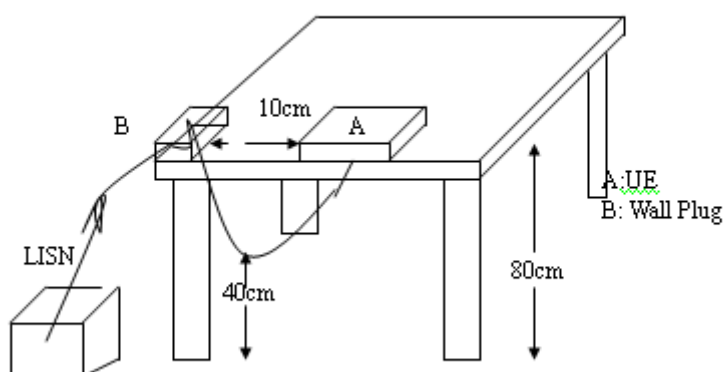
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6 CONDUCTED EMISSIONS TEST

6.1 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. Sweep frequency starting from 150 kHz to 30 MHz for phase L1.
4. Repeating the measurement as lists above for phase neutral.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	TESEQ	NNB 51	36076	2018/02/14	2019/02/13
EMI Test Receiver	R&S	ESCI	101300	2017/11/02	2018/11/01

6.4 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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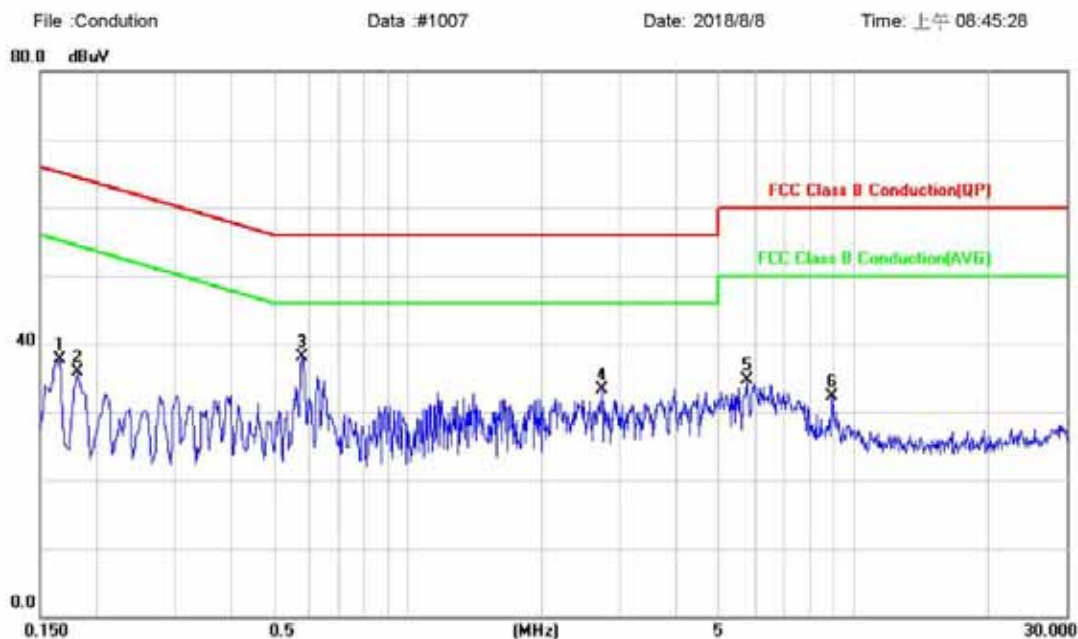
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Site : Conduction Room Phase: **L1** Temperature: 23 °C
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 69 %
Mode:
Note:

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1660	18.02	19.68	37.70	65.16	-27.46	peak	
2		0.1820	16.23	19.70	35.93	64.39	-28.46	peak	
3 *		0.5820	18.00	20.16	38.16	56.00	-17.84	peak	
4		2.7220	12.87	20.43	33.30	56.00	-22.70	peak	
5		5.7540	14.63	19.98	34.61	60.00	-25.39	peak	
6		8.9380	12.40	19.96	32.36	60.00	-27.64	peak	

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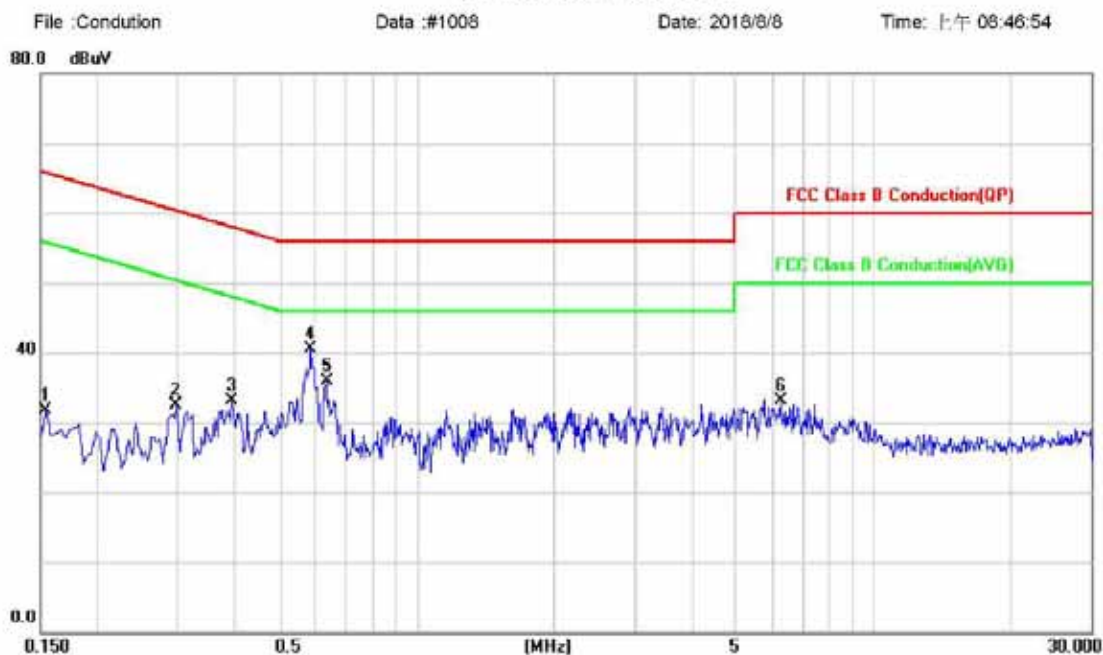
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Site : Conduction Room Phase: **N** Temperature: 23 °C
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 69 %
Mode:
Note:

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1540	12.09	19.65	31.74	65.78	-34.04	peak	
2		0.2980	12.54	19.88	32.42	60.30	-27.88	peak	
3		0.3940	13.02	20.04	33.06	57.98	-24.92	peak	
4 *		0.5860	20.42	20.15	40.57	56.00	-15.43	peak	
5		0.6340	15.71	20.11	35.82	56.00	-20.18	peak	
6		6.2820	13.15	19.96	33.11	60.00	-26.89	peak	

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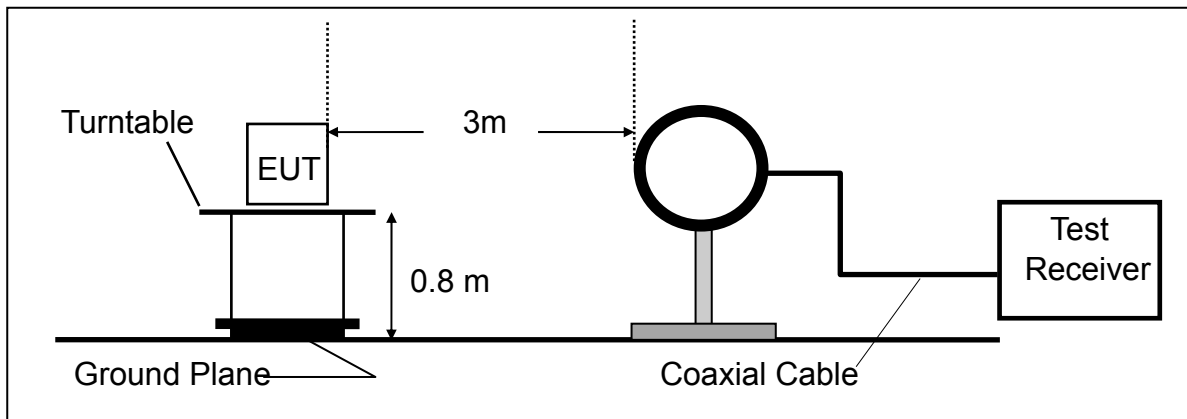
7 RADIATED EMISSION TEST

7.1 Measurement Procedure

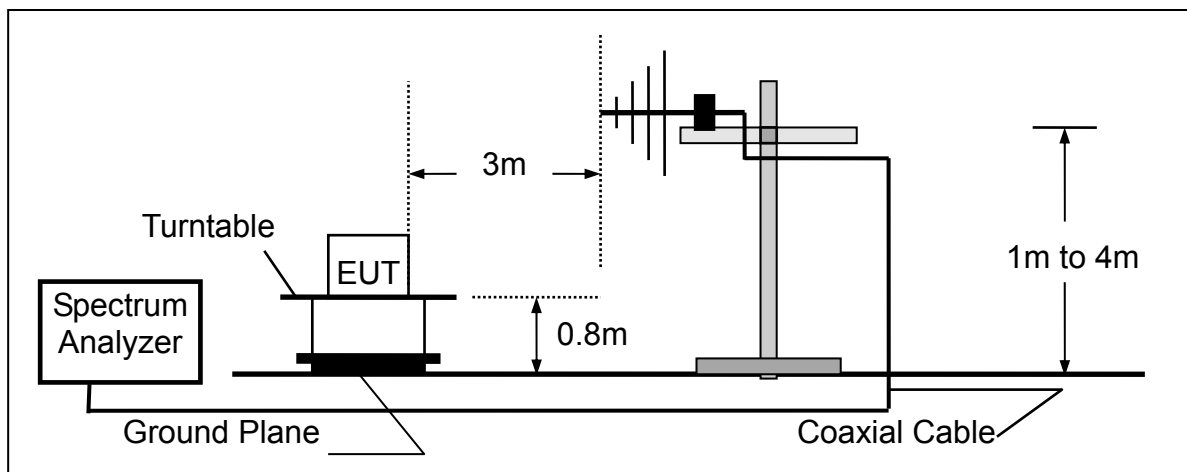
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

7.2 Test SET-UP (Block Diagram of Configuration)

(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 966 Chamber No.C					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Broadband Antenna	TESEQ	CBL 6112D	35243	2017/11/10	2018/11/09
Loop Antenna	ETS.LINDGR EN	6502	148045	2017/09/26	2018/09/25
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/04/10
Pre-Amplifier	EMC Instruments	EMC330	980096	2017/12/26	2018/12/25
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	2017/12/26	2018/12/25

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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	

7.5 Field Strength of Fundamental Emission

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.

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

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

Note:

$$\text{Actual FS(dBuV/m)} = \text{Spectrum. Reading level(dBuV)} + \text{Factor(dB)}$$

$$\text{Factor(dB)} = \text{Antenna Factor(dBuV/m)} + \text{Cable Loss(dB)} - \text{Pre_Amplifier Gain(dB)}$$

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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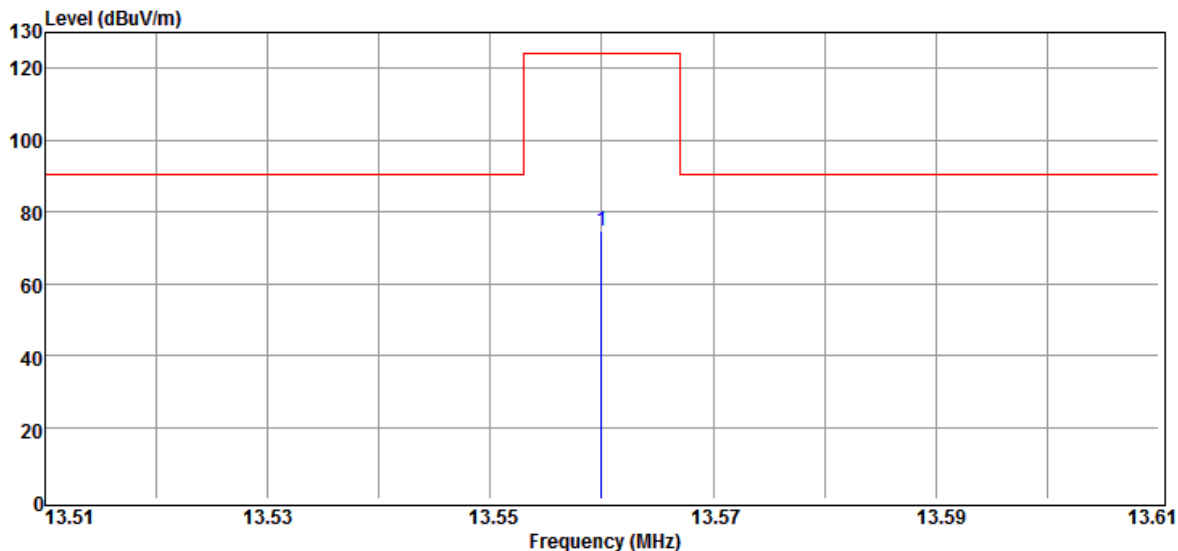
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Operation Mode	:NFC	Test Date	:2018-08-27
Test Mode	:Main CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
13.56	Peak	62.55	11.99	74.54	124.00	-49.46

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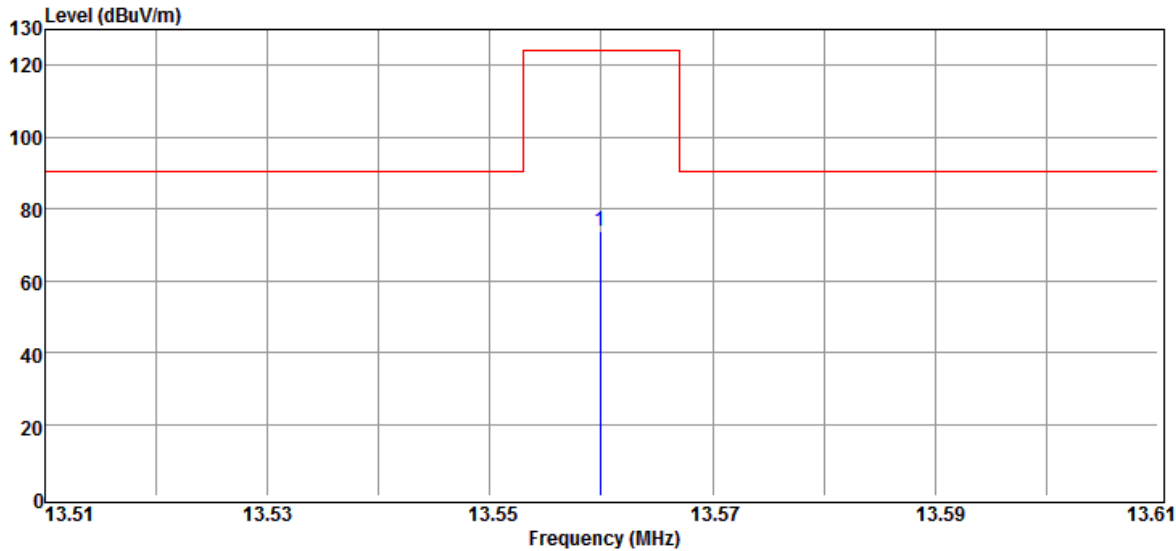
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Operation Mode	:NFC	Test Date	:2018-08-27
Test Mode	:Main CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
13.56	Peak	62.01	11.99	74.00	124.00	-50.00

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7.5.2 Radiated Mask

- (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 = $40 \cdot \log(30/3) = 40$ dB

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

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

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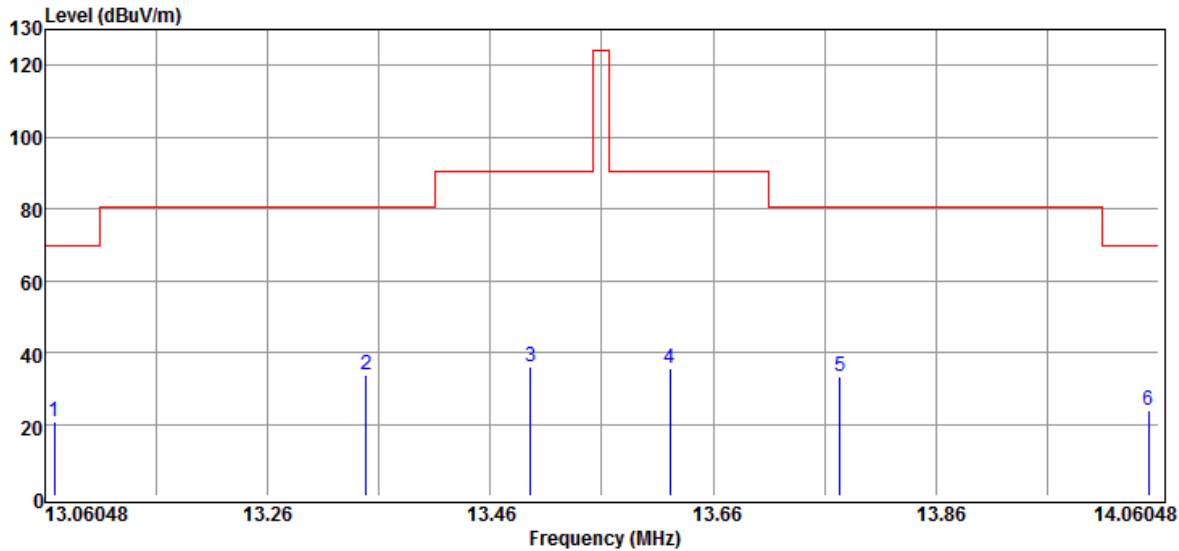
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Operation Mode	:NFC	Test Date	:2018-08-27
Test Mode	:Mask CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
13.07	Peak	8.58	12.02	20.60	69.54	-48.94
13.35	Peak	21.59	12.00	33.59	80.54	-46.95
13.50	Peak	24.02	12.00	36.02	90.47	-54.45
13.62	Peak	23.57	11.99	35.56	90.47	-54.91
13.77	Peak	21.44	11.98	33.42	80.50	-47.08
14.05	Peak	12.08	11.96	24.04	69.54	-45.50

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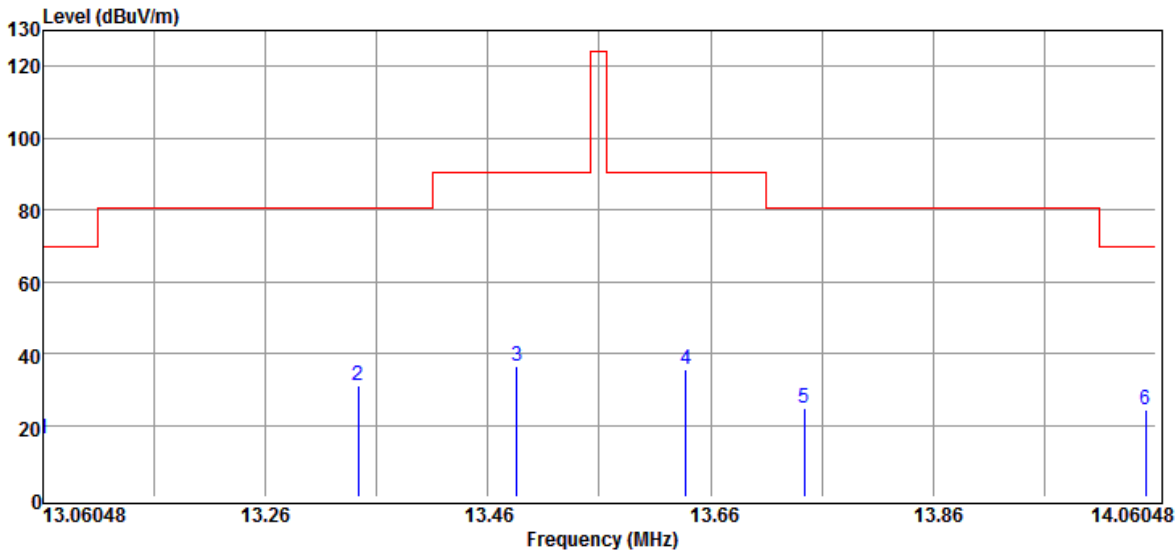
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Operation Mode	:NFC	Test Date	:2018-08-27
Test Mode	:Mask CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
13.06	Peak	4.05	12.02	16.07	69.54	-53.47
13.34	Peak	18.89	12.00	30.89	80.54	-49.65
13.49	Peak	24.38	11.99	36.37	90.47	-54.10
13.64	Peak	23.38	11.99	35.37	90.47	-55.10
13.74	Peak	12.67	11.98	24.65	80.50	-55.85
14.05	Peak	12.36	11.96	24.32	69.54	-45.22

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7.5.3 Radiated Emission –

Limit:

§15.225

(d) 30 microvolts/m (29.4 dBμV/m) at 30 m, outside the band 13.110-14.010 MHz.

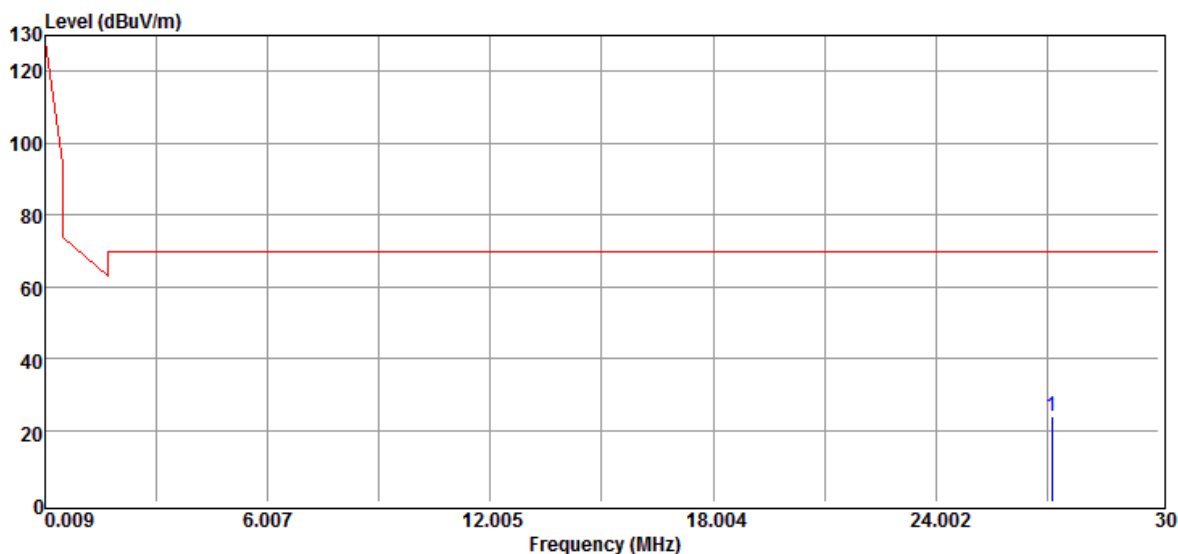
Limit is converted by adding the distance extrapolation factor as the measurement distance was taken place at 3m.

§RSS-210 A2.6

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

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

Operation Mode	:NFC	Test Date	:2018-08-27
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
27.12	Peak	13.84	10.21	24.05	69.54	-45.49

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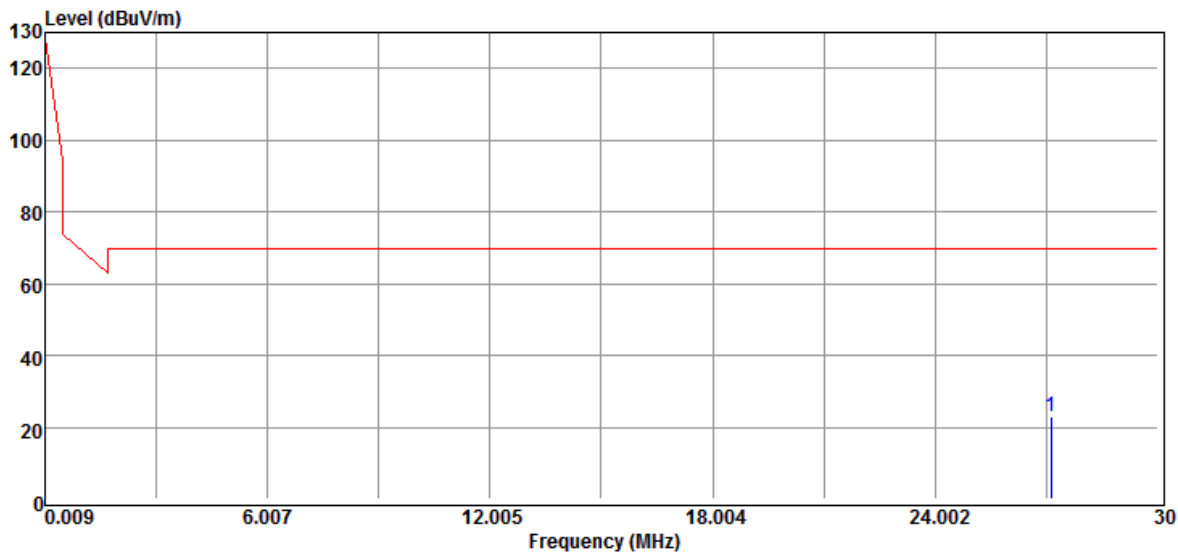
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Operation Mode	:NFC	Test Date	:2018-08-27
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
27.12	Peak	12.88	10.21	23.09	69.54	-46.45

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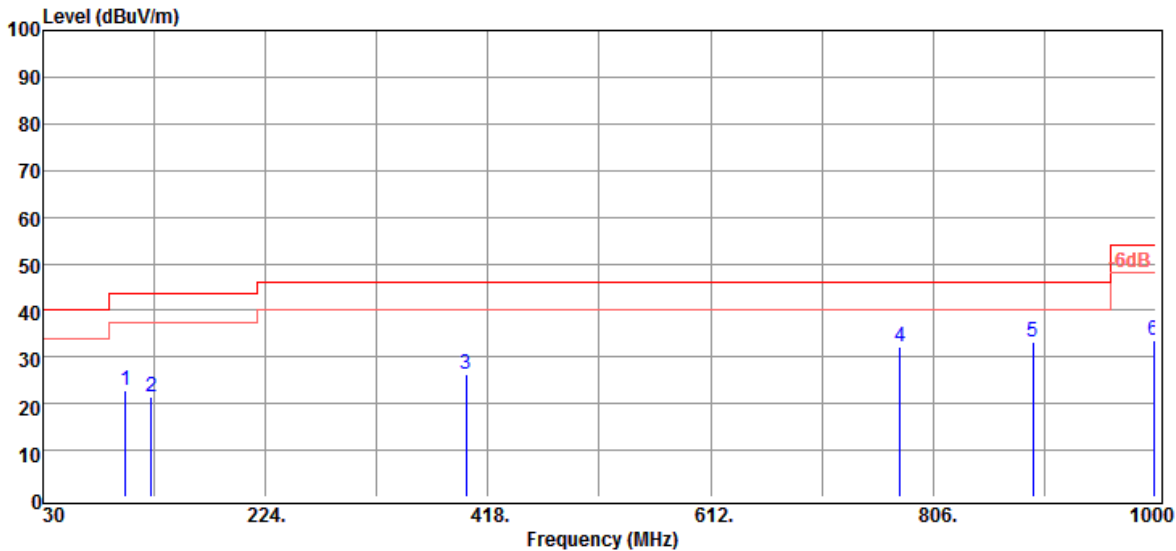
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Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
101.78	Peak	37.43	-14.49	22.94	43.50	-20.56
124.09	Peak	33.23	-11.84	21.39	43.50	-22.11
398.60	Peak	32.46	-6.07	26.39	46.00	-19.61
776.90	Peak	33.02	-0.80	32.22	46.00	-13.78
893.30	Peak	32.10	1.11	33.21	46.00	-12.79
998.06	Peak	30.37	3.25	33.62	54.00	-20.38

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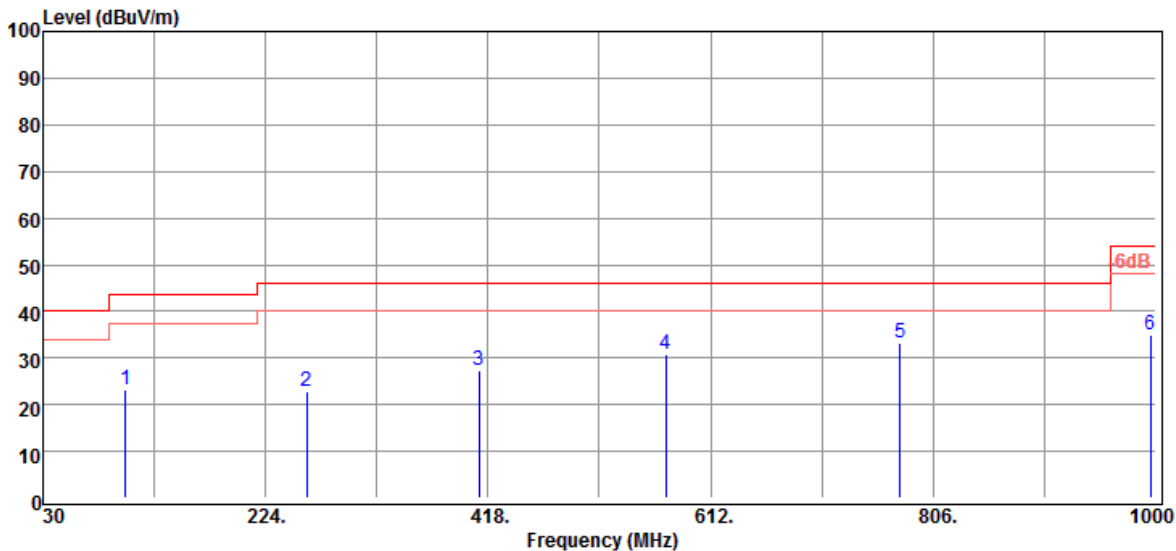
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Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:13.56 MHz	Engineer	:Enzo



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
101.78	Peak	37.62	-14.49	23.13	43.50	-20.37
259.89	Peak	32.87	-9.94	22.93	46.00	-23.07
410.24	Peak	33.30	-5.93	27.37	46.00	-18.63
573.20	Peak	34.05	-3.19	30.86	46.00	-15.14
776.90	Peak	33.91	-0.80	33.11	46.00	-12.89
995.15	Peak	31.82	3.17	34.99	54.00	-19.01

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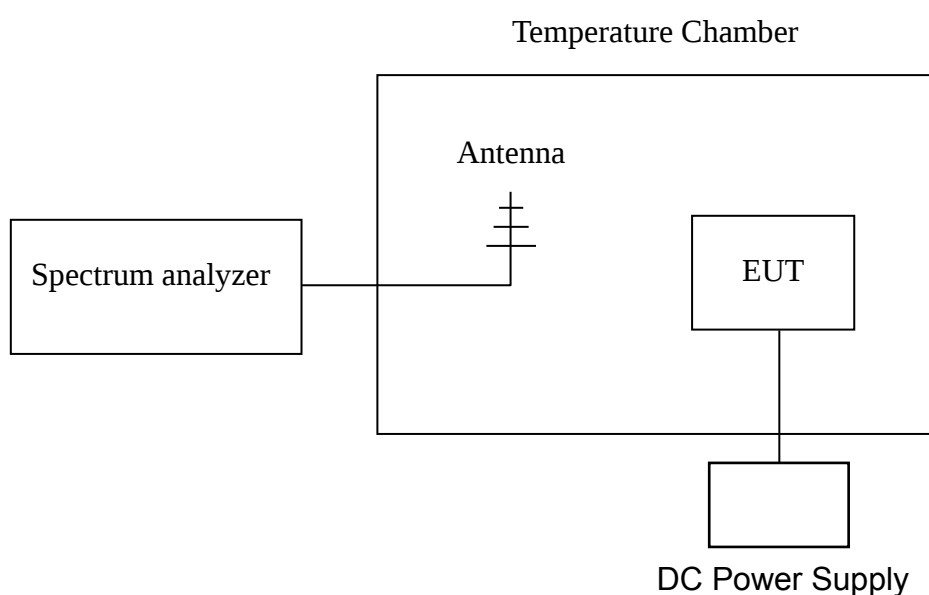
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8 FREQUENCY TOLERANCE

8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
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.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	2017/10/15	2018/10/24
Temperature Chamber	TERCHY	MHK-120LK	1020582	2018/07/10	2019/07/09
DC Power Supply	Agilent	E3640A	MY53140006	2018/04/29	2019/04/28
Loop Antenna	ETS-Lindgren	6502	00143303	2018/04/19	2019/04/18

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8.4 Measurement Results

Startup

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5	-20	13.5596	0.60000	+/- 1.356
5	-10	13.5596	0.60000	+/- 1.356
5	0	13.5597	0.50000	+/- 1.356
5	10	13.56	0.20000	+/- 1.356
5	20	13.5602	0.00000	+/- 1.356
5	30	13.5602	0.00000	+/- 1.356
5	40	13.5603	-0.10000	+/- 1.356
5	50	13.5604	-0.20000	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5.25	20	13.5603	-0.10000	+/- 1.356
5	20	13.5602	0.00000	+/- 1.356
4.75	20	13.5597	0.50000	+/- 1.356

2 minutes

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5	-20	13.5595	0.60000	+/- 1.356
5	-10	13.5596	0.50000	+/- 1.356
5	0	13.5597	0.40000	+/- 1.356
5	10	13.5598	0.30000	+/- 1.356
5	20	13.5601	0.00000	+/- 1.356
5	30	13.5602	-0.10000	+/- 1.356
5	40	13.5602	-0.10000	+/- 1.356
5	50	13.5605	-0.40000	+/- 1.356

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B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5.25	20	13.5603	-0.20000	+/- 1.356
5	20	13.5601	0.00000	+/- 1.356
2.7	20	13.5598	0.30000	+/- 1.356

5 minutes

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5	-20	13.5596	0.50000	+/- 1.356
5	-10	13.5596	0.50000	+/- 1.356
5	0	13.5597	0.40000	+/- 1.356
5	10	13.5598	0.30000	+/- 1.356
5	20	13.5601	0.00000	+/- 1.356
5	30	13.5603	-0.20000	+/- 1.356
5	40	13.5606	-0.50000	+/- 1.356
5	50	13.5607	-0.60000	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5.25	20	13.5604	-0.30000	+/- 1.356
5	20	13.5601	0.00000	+/- 1.356
4.75	20	13.5597	0.40000	+/- 1.356

10 minutes

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5	-20	13.5595	0.50000	+/- 1.356
5	-10	13.5596	0.40000	+/- 1.356
5	0	13.5596	0.40000	+/- 1.356
5	10	13.5599	0.10000	+/- 1.356
5	20	13.56	0.00000	+/- 1.356
5	30	13.5602	-0.20000	+/- 1.356
5	40	13.5606	-0.60000	+/- 1.356
5	50	13.5607	-0.70000	+/- 1.356

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B. Supply Voltage
Variation

Power Supply	Environment	Frequency	Delta (KHz)	Limit (KHz)
Vdc	Temperature ()	(MHz)		
5.25	20	13.5605	-0.50000	+/- 1.356
5	20	13.56	0.00000	+/- 1.356
4.75	20	13.5596	0.40000	+/- 1.356

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9 20 dB OCCUPIED BANDWIDTH MEASUREMENT

9.1 Standard Applicable:

§2.1049 & §15.215 (c)

9.2 Limit:

None

9.3 Test Set-up

Refer to section 6.2 in this report

9.4 Measurement Procedure

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 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

9.5 Measurement Equipment Used:

Refer to section 8.3 in this report

9.6 Measurement Result

	Operation range	Frequency (MHz)	Limit (MHz)
20dB BW (kHz)	Low	13.55885	>13.11
2.553	High	13.56110	<14.01

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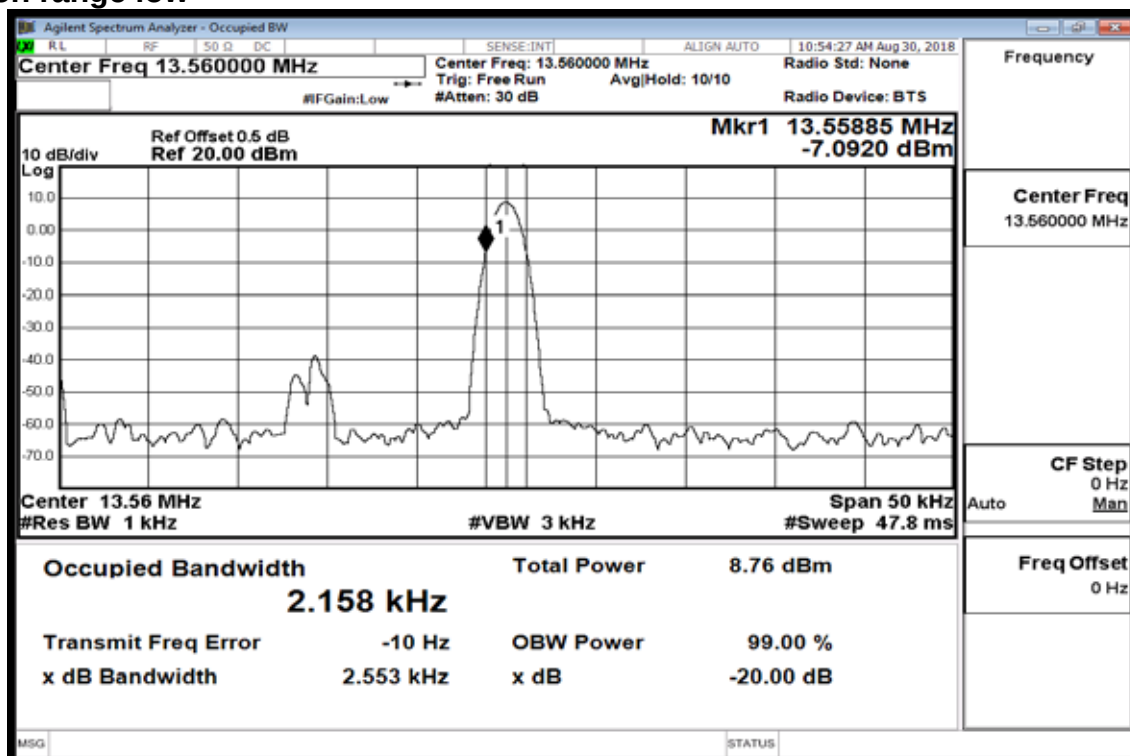
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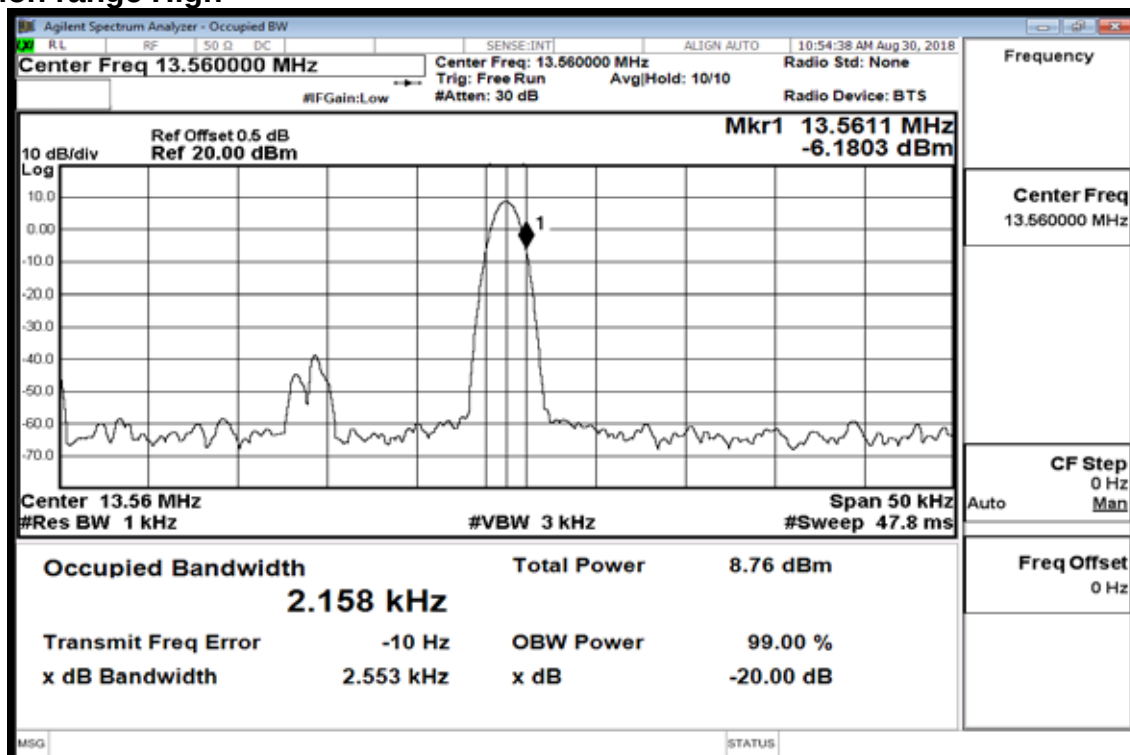
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Operation range low



Operation range High



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10 ANTENNA REQUIREMENT

10.1 Standard Applicable:

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

10.2 Antenna Connected Construction:

The antenna is designed with unique RF connector / as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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