

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT OF

Product Name: Mobile Phone
Brand Name: FUJITSU
Model No.: F-03K
Model Different: N/A
FCC ID: VQK-F03K
Report No.: ER/2017/B0023
Issue Date: Dec. 08, 2017
FCC Rule Part: §15.225
Prepared for: Fujitsu Limited
1-1, Kamikodanaka 4-chome, Nakahara-ku,
Kawasaki 211-8588, Japan
Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.134, Wu Kung Road, New Taipei Industrial
Park, Wuku District, New Taipei City, Taiwan
24803



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VERIFICATION OF COMPLIANCE

Applicant: Fujitsu Limited
1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588,
Japan

Product Name: Mobile Phone

Brand Name: FUJITSU

Model No.: F-03K

Model Difference: N/A

FCC ID: VQK-F03K

File Number: ER/2017/B0023

Date of test: Nov. 01, 2017 ~ Dec. 08, 2017

Date of EUT Received: Nov. 01, 2017

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2014 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.225.

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

Test By:

Marcus Tseng

Date:

Dec. 08, 2017

Marcus Tseng / Engineer

Prepared By:

Yuri Tsai

Date:

Dec. 08, 2017

Yuri Tsai / Clerk

Approved By

Jim Chang

Date:

Dec. 08, 2017

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
ER/2017/B0023	Rev.00	Initial creation of document	Dec. 08, 2017

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Mobile Phone	
Brand Name:	FUJITSU	
Model No.:	F-03K	
Model Difference:	N/A	
Hardware Version:	V2.1.0	
Software Version:	V00R014Ne	
Cradle:	Model No.: F46, Supplier: FUJITSU LIMITED	
Power Supply:	3.8Vdc from Rechargeable Li-ion Battery or 5Vdc from AC/DC Adapter / Cradle	
	Battery:	Model No.: F35, Supplier: FUJITSU CONNECTED TECHNOLOGIES LIMITED
	Adapter :	Model No.: FMV-AC346, Supplier: FUJITSU LIMITED

NFC:

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

This report complies with FCC regulatory radio rule with respect to RFID that operates on 13.56MHz.

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1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is supporting below features.

Product Feature	
GSM Operating Band(s)	GSM 850/1900MHz
GPRS Multi Slot Class	GPRS Class 11
WCDMA Operating Band(s)	FDD Band V
WCDMA Rel. Version	Rel.9
Bluetooth Version	V4.2 dual mode
Wi-Fi Specification	802.11 a/b/g/n/ac
NFC Specification	NFC

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

1.3 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..

1.4 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 / TW0001

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

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 $\xi 15.205$ and RSS-Gen 7.2.5 Table 3.
6. The general radiated emission limits in $\xi 15.209$ and RSS-Gen 7.2.5 Table 5 and Table 6 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 Configuration of Tested System

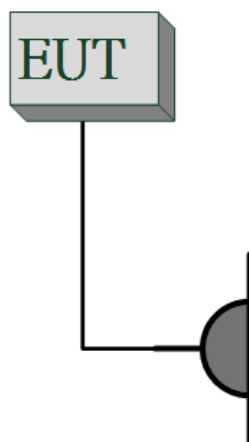


Table 2-1 Equipment Used in Tested System

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

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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)	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) for Bluetooth Transmitter for channel Low, Mid and High the worst case E1 position was reported.

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

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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	9kHz - 30MHz: +/- 2.3dB
-------------------------	-------------------------

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.

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.

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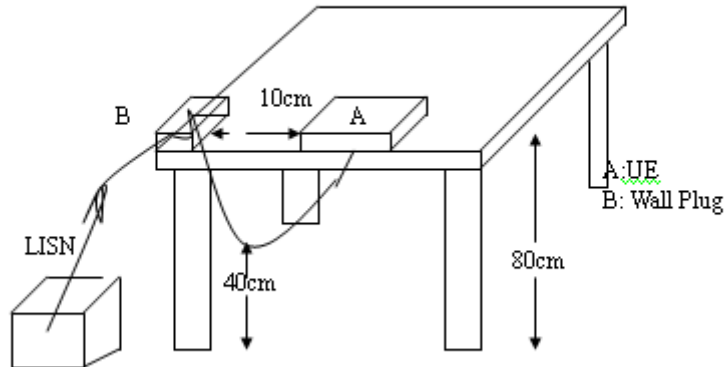
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6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESC17	100760	05/11/2017	05/10/2018
LISN	SCHWARZBECK	NSLK 8127	8127-649	05/22/2017	05/21/2018
LISN	MESS TEC	FCC-LISN-50/25 0-25-2-01	4034	03/19/2017	03/18/2018
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2017	11/25/2018

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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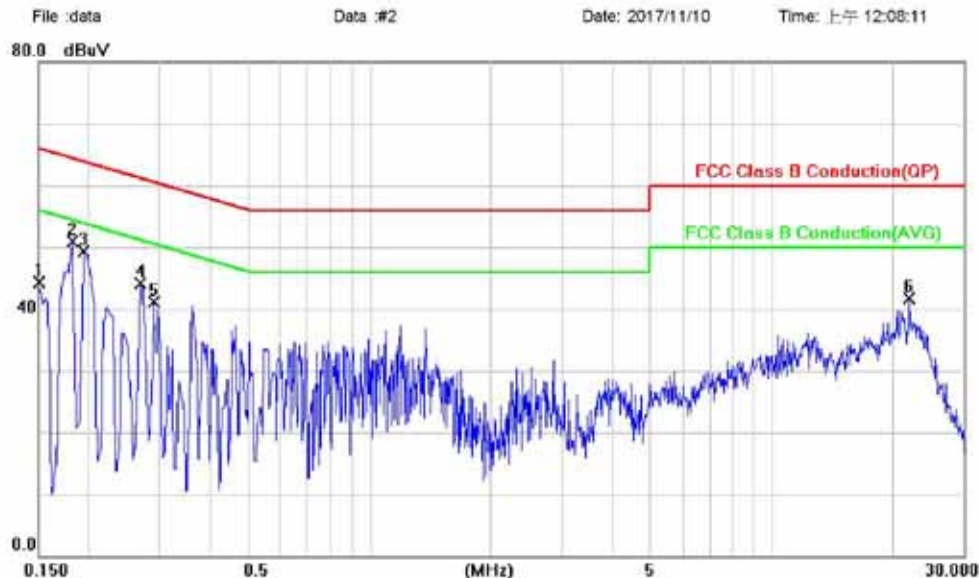
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test By:	Tin
-----------------	----------------	----------	-----

Site: Conduction Room	Phase: L1	Temperature: 20 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 58 %
Mode: Operation		
Note: Adapter:FMW-AC346		

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	44.14	0.07	44.21	66.00	-21.79	peak	
2 *		0.1820	50.74	0.07	50.81	64.39	-13.58	peak	
3		0.1940	49.31	0.07	49.38	63.86	-14.48	peak	
4		0.2700	44.00	0.07	44.07	61.12	-17.05	peak	
5		0.2900	41.13	0.07	41.20	60.52	-19.32	peak	
6		21.9660	41.10	0.53	41.63	60.00	-18.37	peak	

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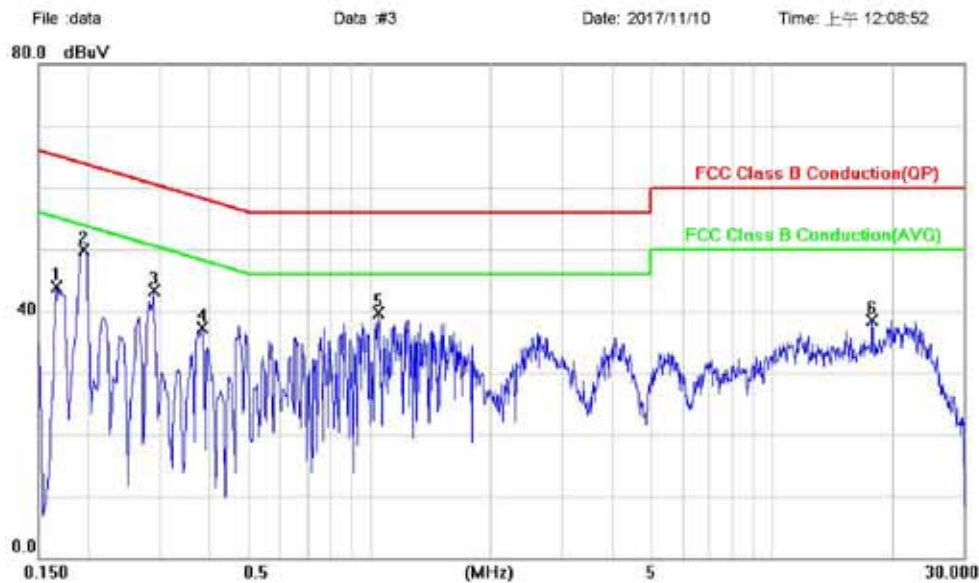
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Site: Conduction Room Phase: **N** Temperature: 20 °C
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 58 %
Mode: Operation
Note: Adapter:FMW-AC346

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1660	43.84	0.07	43.91	65.16	-21.25	peak	
2 *		0.1940	49.93	0.07	50.00	63.86	-13.86	peak	
3		0.2900	43.22	0.07	43.29	60.52	-17.23	peak	
4		0.3820	37.29	0.08	37.37	58.24	-20.87	peak	
5		1.0540	39.61	0.09	39.70	56.00	-16.30	peak	
6		17.8380	38.00	0.47	38.47	60.00	-21.53	peak	

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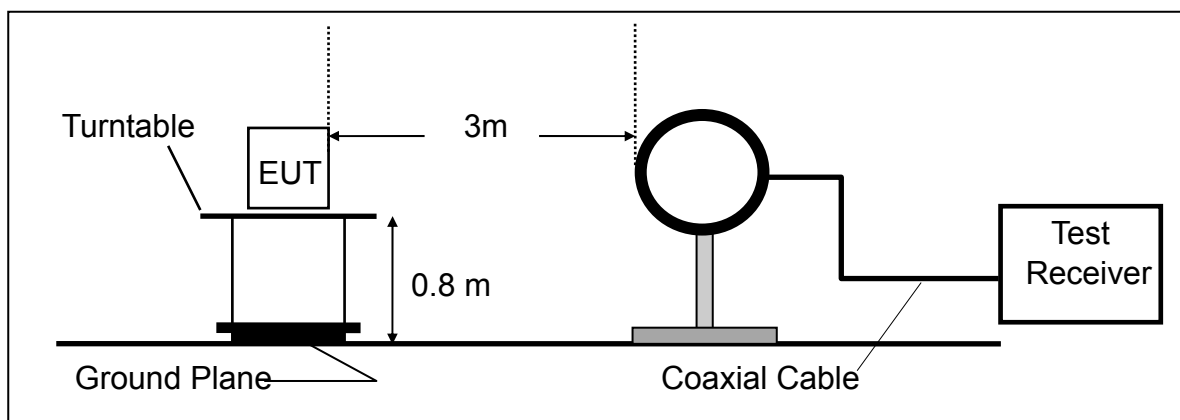
7 RADIATED EMISSION TEST

7.1 Measurement Procedure

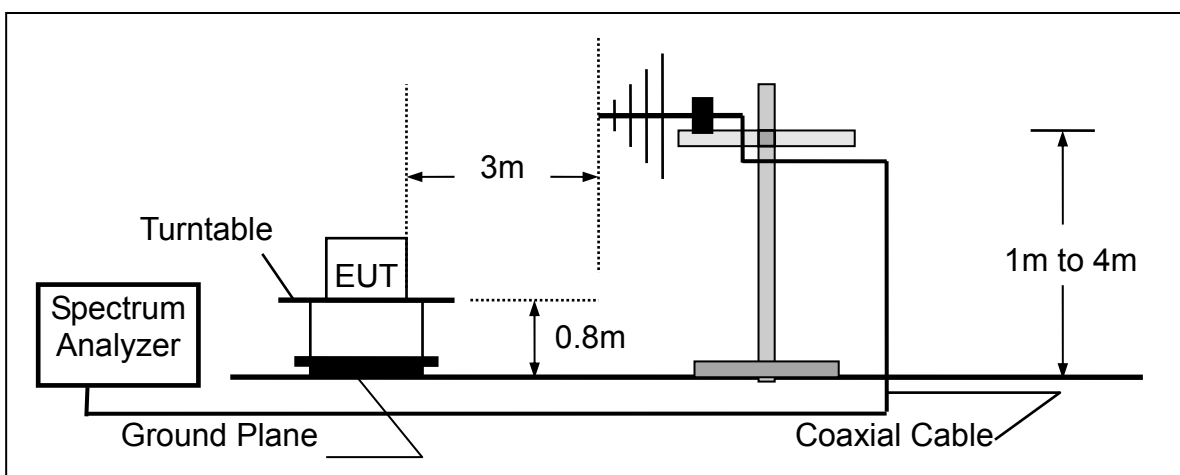
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

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
EMI Test Receiver	R&S	ESC17	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2017	09/19/2018
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/04/2017	08/03/2018
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2017	01/02/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/03/2017	01/02/2018
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	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018

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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:

Actual FS(dBuV/m) = Spectrum. 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.

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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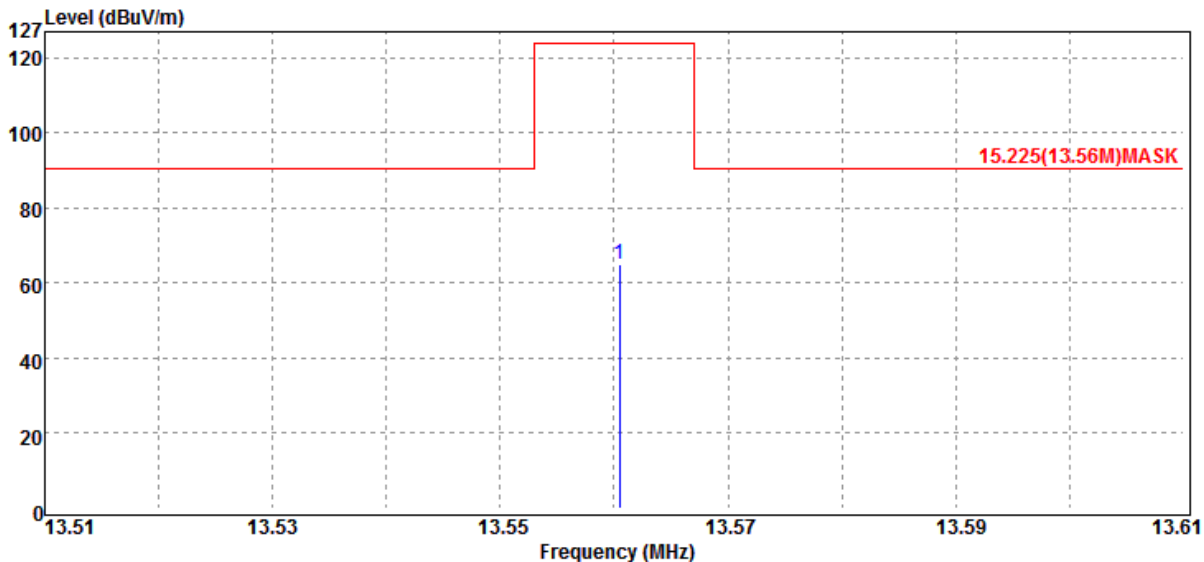
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Operation Band :NFC
Fundamental Frequency :13.56 MHz
Operation Mode : MAIN
EUT Pol. :E1 Plane

Test Date :2017-11-09
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
13.56	F		53.80	11.43	65.23	123.90	-58.67

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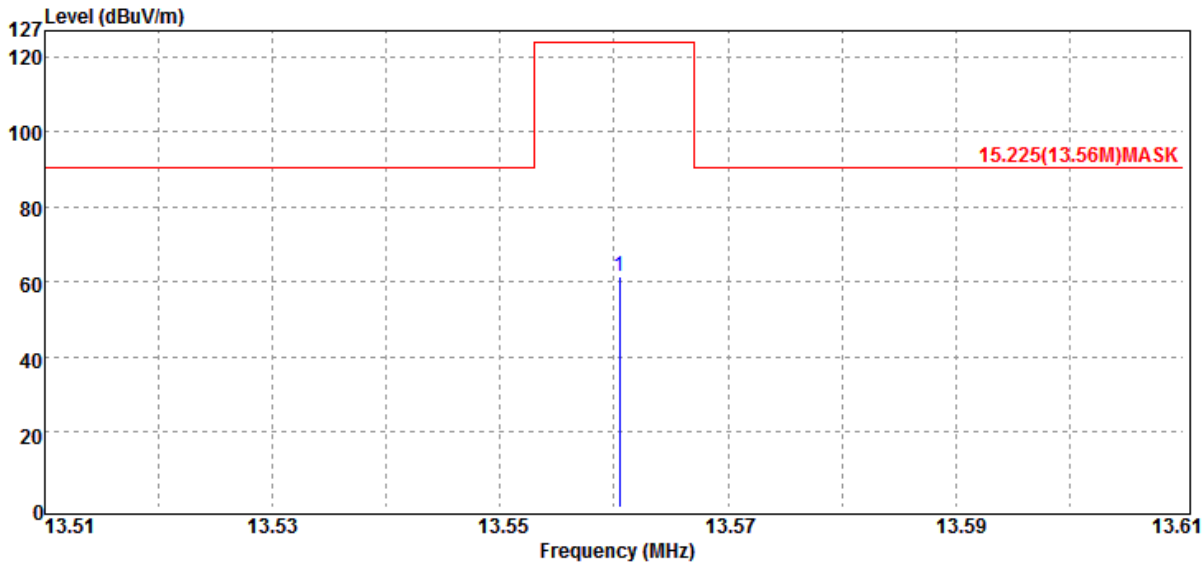
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Operation Band :NFC
Fundamental Frequency :13.56 MHz
Operation Mode :MAIN
EUT Pol. :E1 Plane

Test Date :2017-11-09
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
13.56	F		49.89	11.43	61.32	123.90	-62.58

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

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

- a) $20 \cdot \log(15848 \mu\text{V/m}) + 40 \text{ dB} = 124.00 \text{ dB}\mu\text{V/m}$
- 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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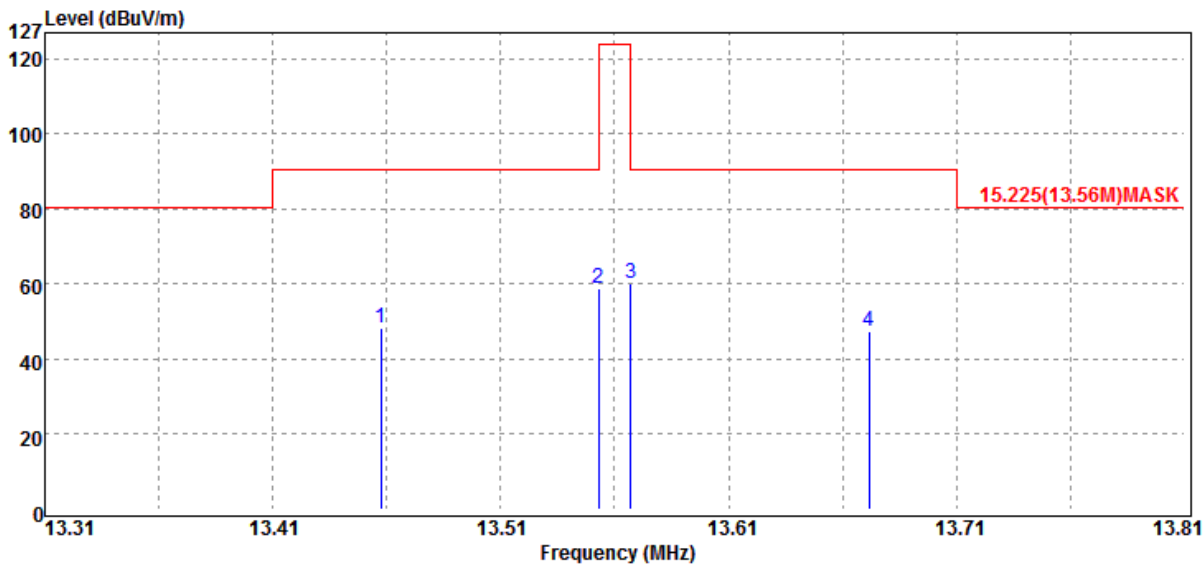
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Operation Band	:NFC	Test Date	:2017-11-09
Fundamental Frequency	:13.56 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:MASK	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
13.46	S	Peak	37.08	11.43	48.51	90.47	-41.96
13.55	S	Peak	47.54	11.43	58.97	90.47	-31.50
13.57	S	Peak	48.91	11.43	60.34	90.47	-30.13
13.67	S	Peak	36.09	11.44	47.53	90.47	-42.94

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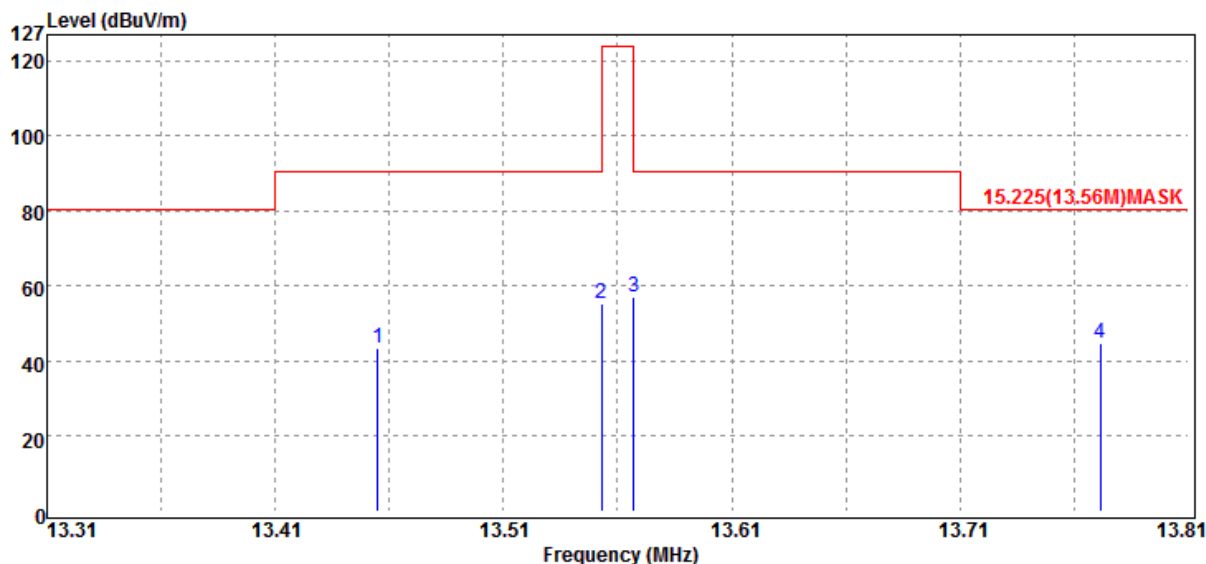
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www.tw.sgs.com

Member of SGS Group

Operation Band :NFC
Fundamental Frequency :13.56 MHz
Operation Mode :MASK
EUT Pol. :E1 Plane

Test Date :2017-11-09
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
13.46	S	Peak	32.05	11.43	43.48	90.47	-46.99
13.55	S	Peak	44.11	11.43	55.54	90.47	-34.93
13.57	S	Peak	45.50	11.43	56.93	90.47	-33.54
13.77	S	Peak	33.20	11.45	44.65	80.50	-35.85

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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.

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

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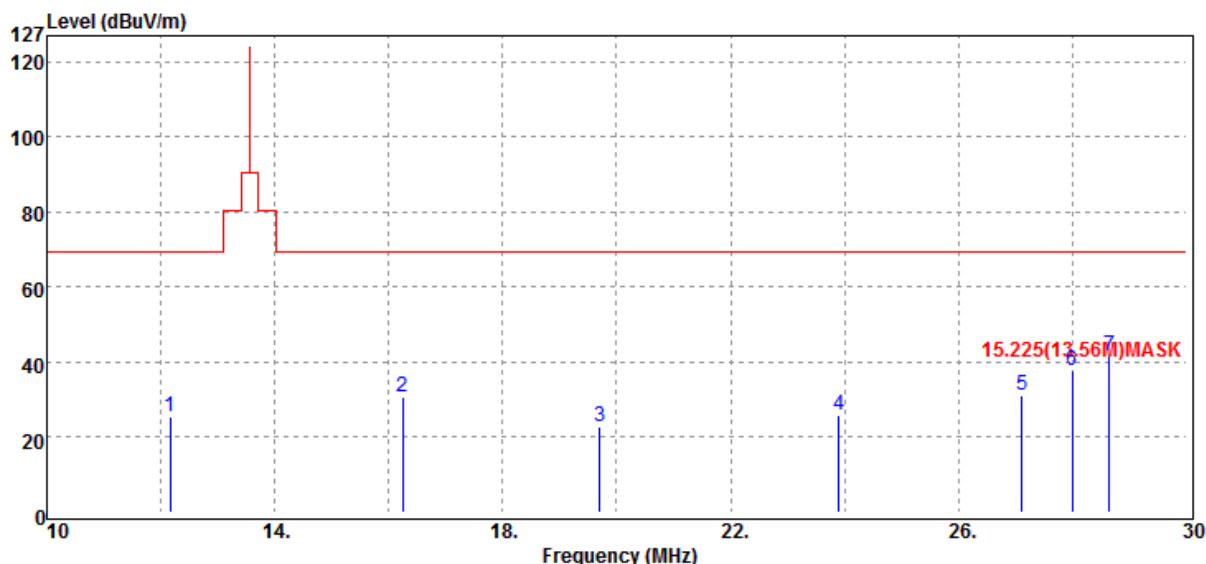
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Member of SGS Group

Operation Band :NFC
Fundamental Frequency :13.56 MHz
Operation Mode :TX
EUT Pol. :E1 Plane

Test Date :2017-11-09
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
12.16	S	Peak	14.19	11.40	25.59	69.54	-43.95
16.24	S	Peak	19.08	11.49	30.57	69.54	-38.97
19.70	S	Peak	11.15	11.58	22.73	69.54	-46.81
23.90	S	Peak	15.48	10.47	25.95	69.54	-43.59
27.12	H	Peak	21.35	9.70	31.05	69.54	-38.49
28.00	S	Peak	28.26	9.50	37.76	69.54	-31.78
28.64	S	Peak	32.17	9.37	41.54	69.54	-28.00

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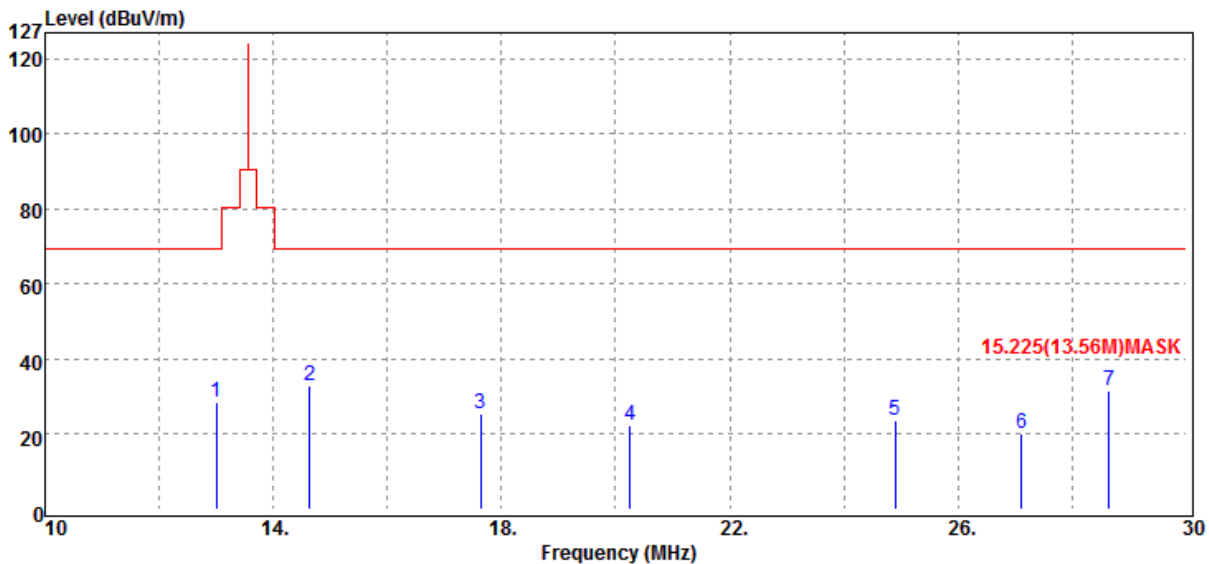
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Operation Band :NFC
Fundamental Frequency :13.56 MHz
Operation Mode :TX
EUT Pol. :E1 Plane

Test Date :2017-11-09
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
13.00	S	Peak	17.30	11.43	28.73	69.54	-40.81
14.64	S	Peak	21.69	11.45	33.14	69.54	-36.40
17.64	S	Peak	14.16	11.53	25.69	69.54	-43.85
20.26	S	Peak	11.03	11.50	22.53	69.54	-47.01
24.90	S	Peak	13.39	10.21	23.60	69.54	-45.94
27.12	H	Peak	10.41	9.70	20.11	69.54	-49.43
28.64	S	Peak	22.39	9.37	31.76	69.54	-37.78

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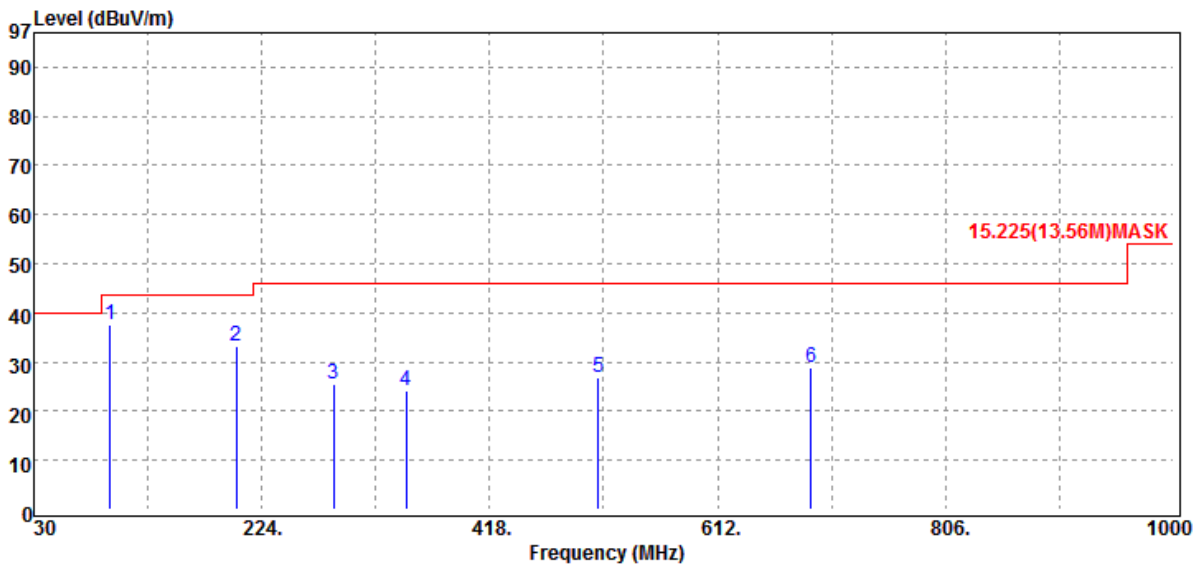
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Fundamental Frequency :13.56 MHz
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Test Date :2017-11-09
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
94.99	S	Peak	50.77	-13.14	37.63	43.50	-5.87
202.66	S	Peak	42.91	-9.70	33.21	43.50	-10.29
285.11	S	Peak	31.68	-6.24	25.44	46.00	-20.56
347.19	S	Peak	29.24	-4.95	24.29	46.00	-21.71
510.15	S	Peak	28.93	-2.19	26.74	46.00	-19.26
691.54	S	Peak	27.23	1.47	28.70	46.00	-17.30

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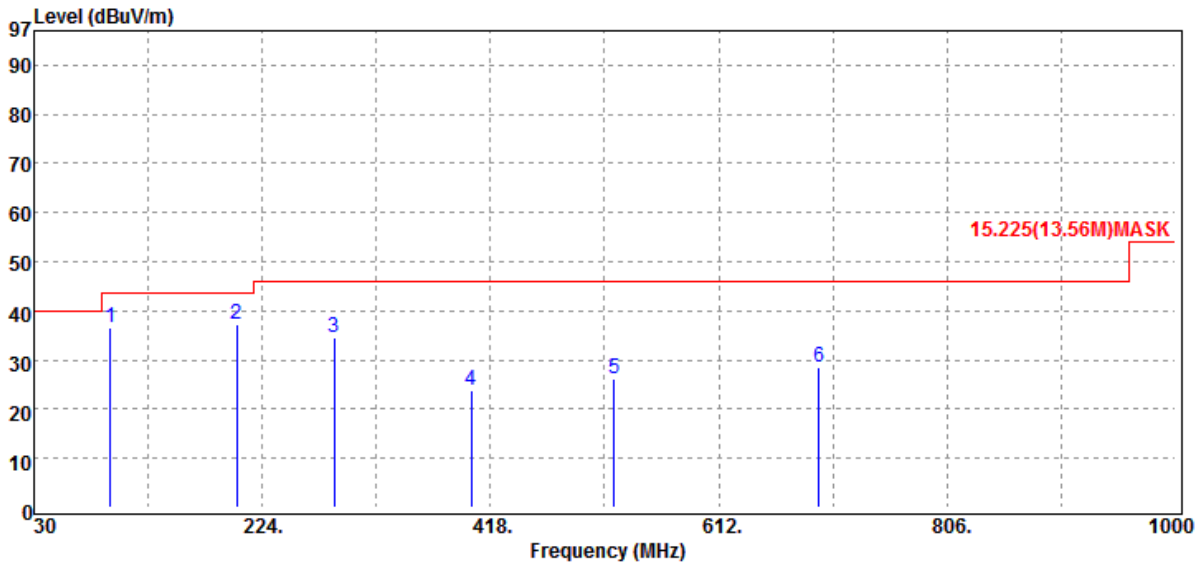
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Test Date :2017-11-09
Temp./Humi. :21 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
94.99	S	Peak	49.69	-13.14	36.55	43.50	-6.95
202.66	S	Peak	46.98	-9.70	37.28	43.50	-6.22
285.11	S	Peak	40.67	-6.24	34.43	46.00	-11.57
401.51	S	Peak	27.72	-3.95	23.77	46.00	-22.23
522.76	S	Peak	27.97	-1.66	26.31	46.00	-19.69
697.36	S	Peak	27.26	1.36	28.62	46.00	-17.38

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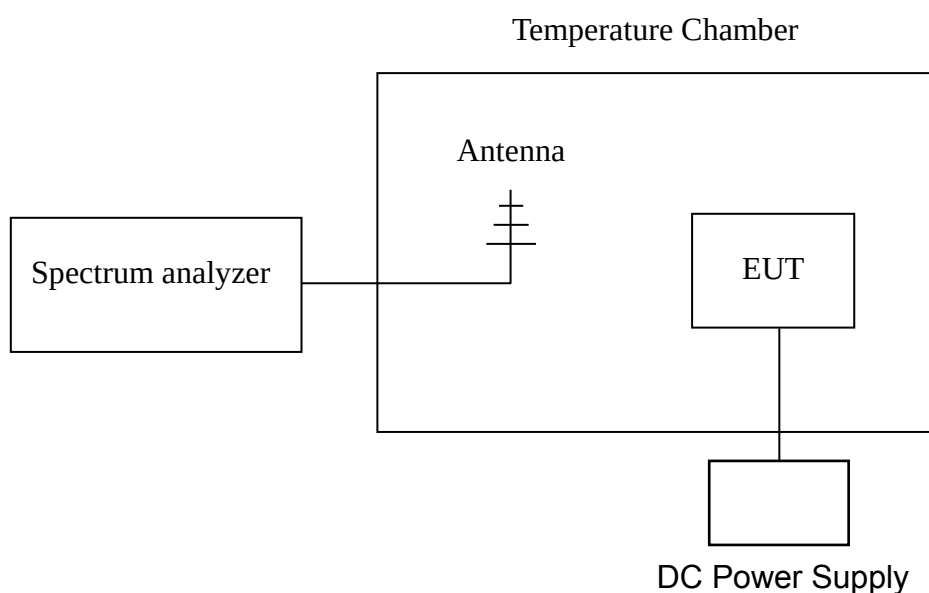
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8 FREQUENCY TOLERANCE

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.
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2017	09/19/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2017	11/20/2018

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8.4 Measurement Results

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.8	-20	13.55934945	650.55000	+/- 1.356
3.8	-10	13.55933328	666.72000	+/- 1.356
3.8	0	13.56012094	-120.94000	+/- 1.356
3.8	10	13.56028731	-287.31000	+/- 1.356
3.8	20	13.56	0.00000	+/- 1.356
3.8	30	13.56026372	-263.72000	+/- 1.356
3.8	40	13.56033392	-333.92000	+/- 1.356
3.8	50	13.56016321	-163.21000	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.2	20	13.56012934	-129.34000	+/- 1.356
3.8	20	13.56	0.00000	+/- 1.356
4.4	20	13.56012283	-122.83000	+/- 1.356

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A. Temperature Variation 2 minutes

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.8	-20	13.56003281	125.51000	+/- 1.356
3.8	-10	13.56011192	46.40000	+/- 1.356
3.8	0	13.56012961	28.71000	+/- 1.356
3.8	10	13.56020123	-42.91000	+/- 1.356
3.8	20	13.56015832	0.00000	+/- 1.356
3.8	30	13.56010293	55.39000	+/- 1.356
3.8	40	13.56033192	-173.60000	+/- 1.356
3.8	50	13.56023923	-80.91000	+/- 1.356

B. Supply Voltage Variation 2 minutes

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.2	20	13.56013916	19.16000	+/- 1.356
3.8	20	13.56015832	0.00000	+/- 1.356
4.4	20	13.56017309	-14.77000	+/- 1.356

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A. Temperature Variation 5 minutes

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.8	-20	13.56012918	-129.18000	+/- 1.356
3.8	-10	13.56032931	-329.31000	+/- 1.356
3.8	0	13.56004482	-44.82000	+/- 1.356
3.8	10	13.56014322	-143.21800	+/- 1.356
3.8	20	13.56	0.00000	+/- 1.356
3.8	30	13.55993391	66.09000	+/- 1.356
3.8	40	13.55995932	40.68000	+/- 1.356
3.8	50	13.56014932	-149.32000	+/- 1.356

B. Supply Voltage Variation 5 minutes

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.2	20	13.56005129	-51.29380	+/- 1.356
3.8	20	13.56	0.00000	+/- 1.356
4.4	20	13.56008431	-84.31230	+/- 1.356

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台灣檢驗科技股份有限公司

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A. Temperature Variation 10 minutes

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.8	-20	13.55937632	645.14700	+/- 1.356
3.8	-10	13.55973231	289.16100	+/- 1.356
3.8	0	13.56016692	-145.44900	+/- 1.356
3.8	10	13.56011139	-89.91900	+/- 1.356
3.8	20	13.56002147	0.00000	+/- 1.356
3.8	30	13.56013263	-111.16000	+/- 1.356
3.8	40	13.56029124	-269.76800	+/- 1.356
3.8	50	13.56029278	-271.30900	+/- 1.356

B. Supply Voltage Variation 10 minutes

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
Vdc	Temperature (°C)	(MHz)		
3.2	20	13.56014811	-116.64180	+/- 1.356
3.8	20	13.56003147	0.00000	+/- 1.356
4.4	20	13.56008893	-57.46110	+/- 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

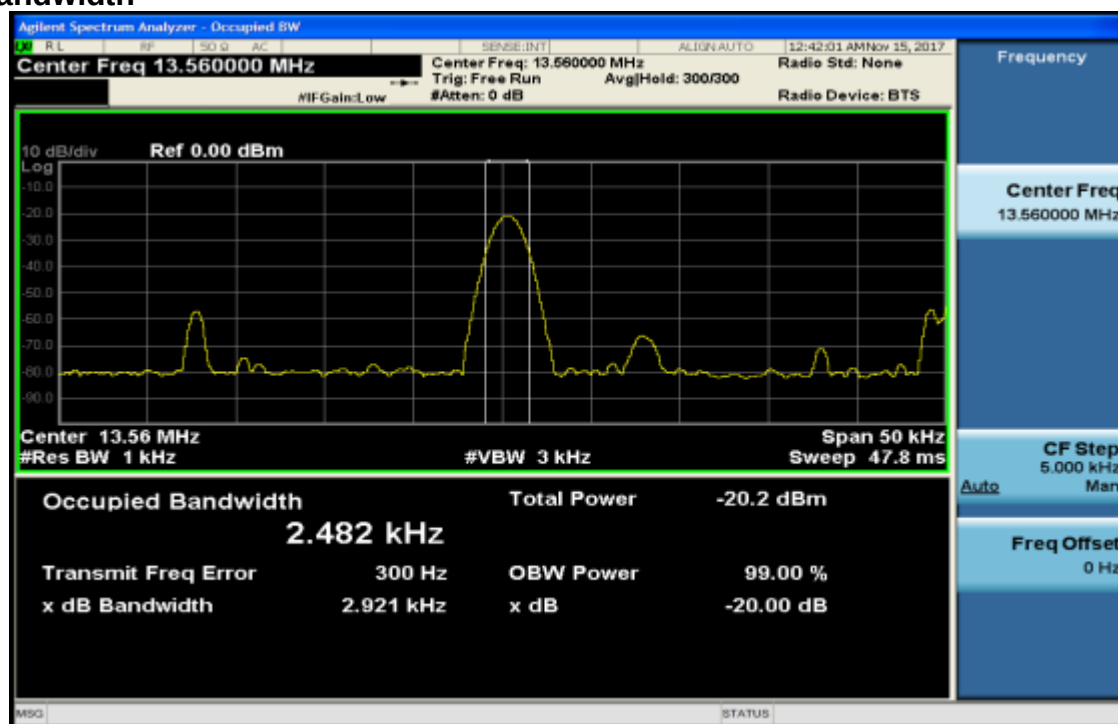
20dB bandwidth

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

9.5 Measurement Equipment Used:

Refer to section 6.3 in this report

-20dB Bandwidth



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10 ANTENNA REQUIREMENT

10.1 Standard Applicable:

According to §15.203, Antenna requirement.

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

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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