

FCC Test Report

Product Name	RFID Module
Model No.	BIS M-403-057-002-02-SA1
FCC ID	2AGZY-BF-IDM05

Applicant	Balluff GmbH
Address	Schurwaldstrasse 9, 73765 Neuhausen a.d.F., Germany

Date of Receipt	Feb. 15, 2017
Issued Date	May 22, 2017
Report No.	1720291R-RFUSP17V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Test Report

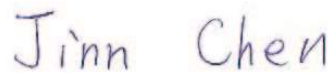
Issued Date: May 22, 2017

Report No.: 1720291R-RFUSP17V00



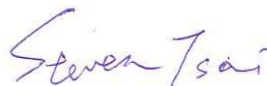
Product Name	RFID Module
Applicant	Balluff GmbH
Address	Schurwaldstrasse 9, 73765 Neuhausen a.d.F., Germany
Manufacturer	Balluff GmbH
Model No.	BIS M-403-057-002-02-SA1
FCC ID.	2AGZY-BF-IDM05
EUT Rated Voltage	DC 6~8V
EUT Test Voltage	DC 7V
Trade Name	BALLUFF
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2015 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Jinn Chen)

Tested By :



(Engineer / Steven Tsai)

Approved By :



(Director / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	4
1.1. EUT Description.....	4
1.2. Operational Description	5
1.3. Tested System Details.....	6
1.4. Configuration of tested System	6
1.5. EUT Exercise Software	6
1.6. Test Facility	7
1.7. List of Test Equipment	8
2. Conducted Emission.....	9
2.1. Test Setup	9
2.2. Limits	9
2.3. Test Procedure	10
2.4. Uncertainty	10
2.5. Test Result of Conducted Emission.....	11
3. Radiated Emission.....	13
3.1. Test Setup	13
3.2. Limits	14
3.3. Test Procedure	15
3.4. Uncertainty	15
3.5. Test Result of Radiated Emission.....	16
4. Band Edge	24
4.1. Test Setup	24
4.2. Limits	24
4.3. Test Procedure	25
4.4. Uncertainty	25
4.5. Test Result of Band Edge	26
5. Frequency Tolerance	27
5.1. Test Setup	27
5.2. Limits	27
5.3. Test Procedure	27
5.4. Uncertainty	27
5.5. Test Result of Frequency Stability.....	28
6. EMI Reduction Method During Compliance Testing	30
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	RFID Module
Trade Name	BALLUFF
Model No.	BIS M-403-057-002-02-SA1
FCC ID	2AGZY-BF-IDM05
Frequency Range	13.56MHz
Modulation	ASK
Antenna Type	Round

Frequency of Each Channel:

Channel	Frequency
Channel 1:	13.56 MHz

Note:

1. This device is an RFID Module with a built-in 13.56MHz transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.225
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
-----------	------------------

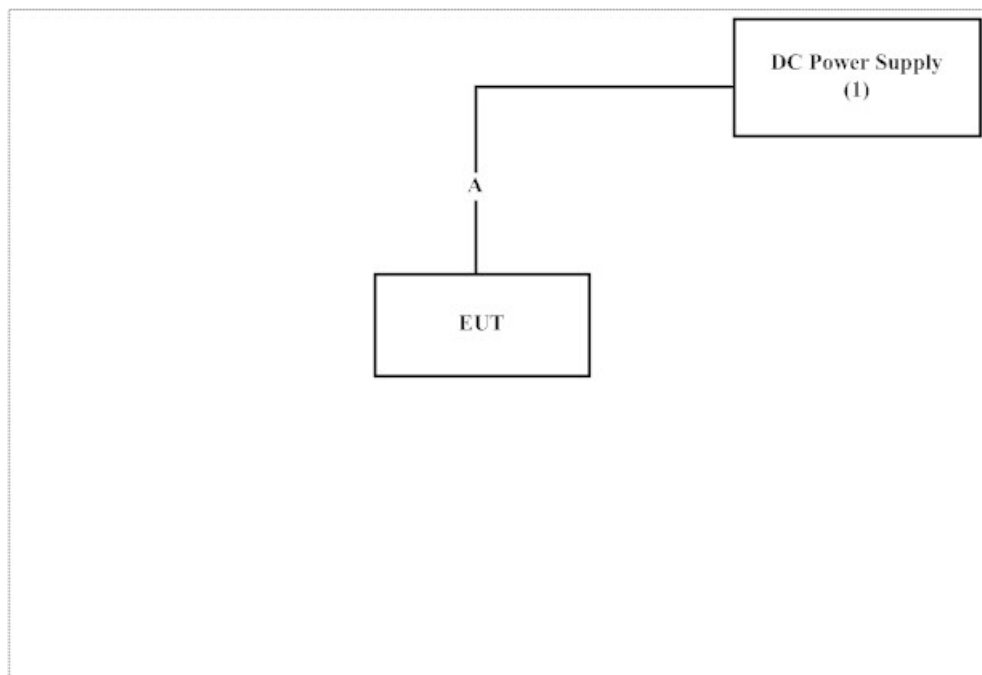
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
(1)	DC Power Supply	GWINSTEK	SPD-3606	N/A	Non-Shielded, 1.8m

	Signal Cable Type	Signal cable Description
A	Power Cable	Non-Shielded, 1.8m

1.4. Configuration of tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Turn on the power of all equipment.
- (3) Start the continuous transmitter.
- (4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: DEKRA Testing and Certification Co., Ltd.
Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW1014

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	161601	2017.01.06	2018.01.05
X	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
X	Two-Line V-Network	R&S	ENV216	101307	2017.03.17	2018.03.16
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2016.05.25	2017.05.24

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR3

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Temperature Chamber	KSON	THS-D4T-100	A0606	2016.03.04	2017.03.03
X	Spectrum Analyzer	R&S	FSV40	101146	2016.12.14	2017.12.13
	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek Conduction Test System V8.0.110

For Radiated measurements /ACB1

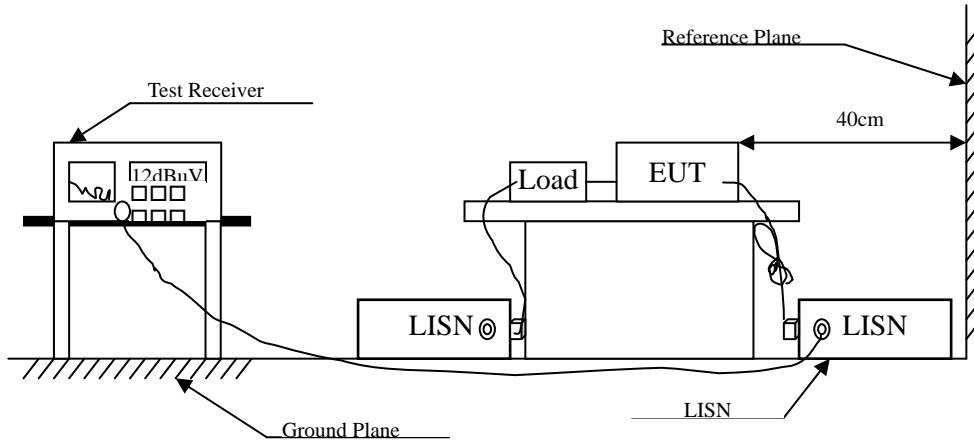
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.07.21	2017.07.20
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2016.05.06	2017.05.05
	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
	Horn Antenna	Com-Power	AH-840	101087	2016.05.03	2017.05.02
X	Pre-Amplifier	EMCI	EMC001330	980316	2016.04.27	2017.04.26
	Pre-Amplifier	EMCI	EMC051835SE	980311	2016.04.27	2017.04.26
	Pre-Amplifier	EMCI	EMC05820SE	980310	2016.04.28	2017.04.27
	Pre-Amplifier	EMCI	EMC184045SE	980314	2016.05.12	2017.05.11
	Filter	MICRO TRONICS	BRM50702	G251	2016.08.11	2017.08.10
	Filter	MICRO TRONICS	BRM50716	G188	2016.08.11	2017.08.10
X	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
X	Spectrum Analyzer	R&S	FSV40	101149	2016.12.14	2017.12.13
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2016.05.25	2017.05.24
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2016.08.11	2017.08.10

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56 ^(§§)	56-46 ^(§§)
0.50-5.0	56	46
5.0 - 30	60	50

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Uncertainty

±2.35dB

2.5. Test Result of Conducted Emission

Product : RFID Module
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Date : 2017/05/19
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V	Margin dB	Limit dB μ V
Line 1					
Quasi-Peak					
0.205	9.766	23.430	33.196	-31.233	64.429
0.267	9.752	16.940	26.692	-35.965	62.657
0.396	9.723	11.340	21.063	-37.908	58.971
0.517	9.726	16.030	25.756	-30.244	56.000
0.802	9.735	14.250	23.985	-32.015	56.000
23.951	10.038	36.570	46.608	-13.392	60.000
Average					
0.205	9.766	-0.350	9.416	-45.013	54.429
0.267	9.752	6.800	16.552	-36.105	52.657
0.396	9.723	7.280	17.003	-31.968	48.971
0.517	9.726	-0.190	9.536	-36.464	46.000
0.802	9.735	5.520	15.255	-30.745	46.000
23.951	10.038	34.930	44.968	-5.032	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : RFID Module
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Date : 2017/05/19
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V	Margin dB	Limit dB μ V
Line 2					
Quasi-Peak					
0.170	9.709	18.480	28.189	-37.240	65.429
0.361	9.751	25.510	35.261	-24.710	59.971
0.642	9.800	22.740	32.540	-23.460	56.000
2.287	9.761	11.540	21.301	-34.699	56.000
11.978	9.989	20.430	30.419	-29.581	60.000
23.951	10.208	35.290	45.498	-14.502	60.000
Average					
0.170	9.709	4.060	13.769	-41.660	55.429
0.361	9.751	1.940	11.691	-38.280	49.971
0.642	9.800	6.430	16.230	-29.770	46.000
2.287	9.761	10.740	20.501	-25.499	46.000
11.978	9.989	20.420	30.409	-19.591	50.000
23.951	10.208	33.550	43.758	-6.242	50.000

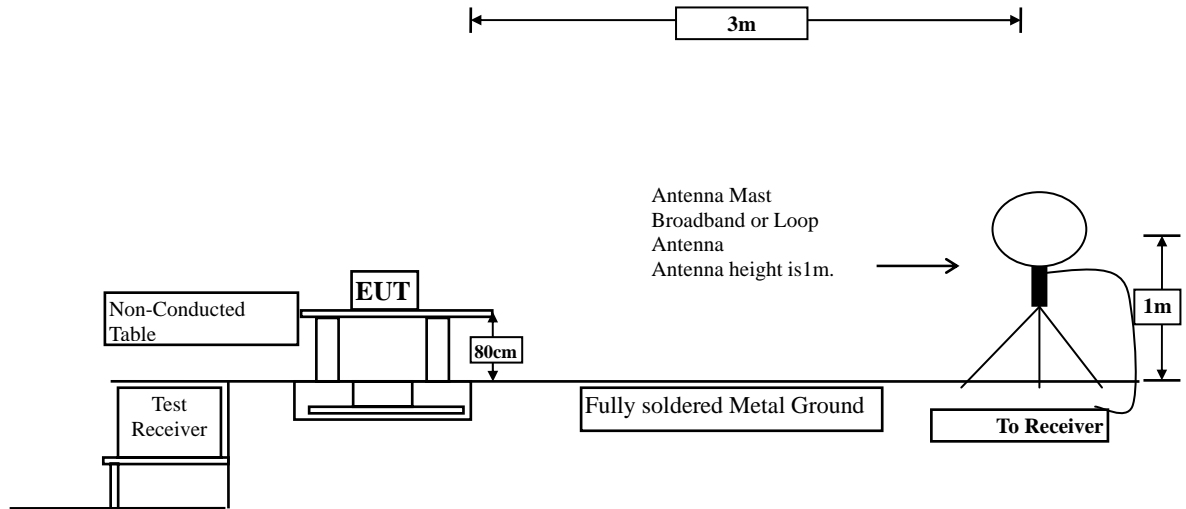
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

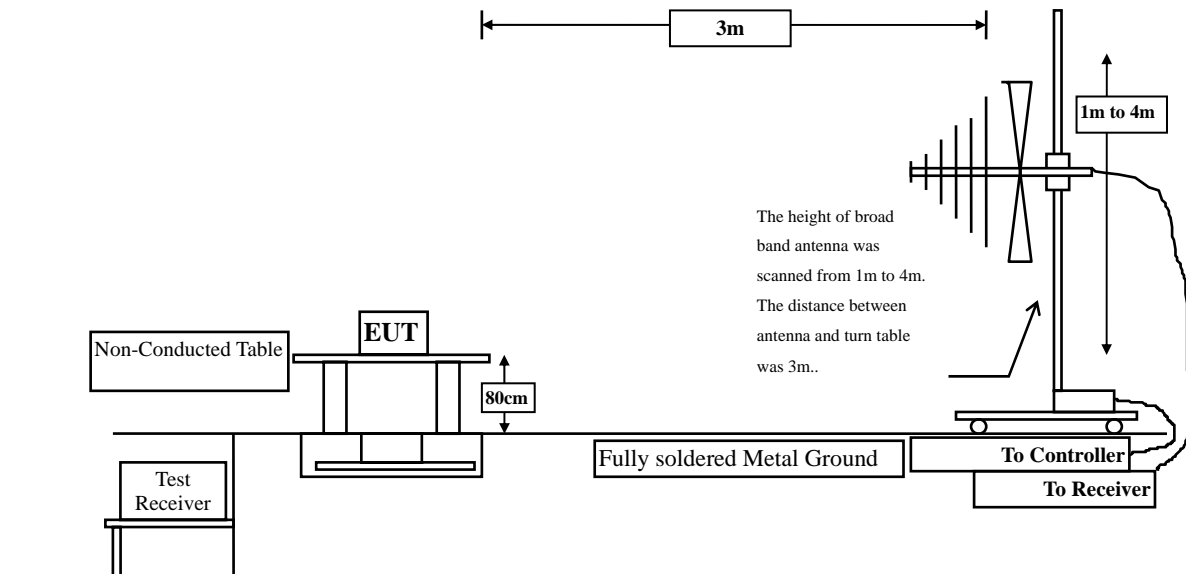
3. Radiated Emission

3.1. Test Setup

Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



3.2. Limits

➤ Fundamental electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.225 Limits				
Fundamental Frequency MHz	Field strength of fundamental			
	uV/m	Distance (meter)	dBuV/m	Distance (meter)
13.553 – 13.567	15848	30	124	3
13.410 – 13.553 and 13.567 – 13.710	334	30	90.50	3
13.110 – 13.410 and 13.710 – 14.010	106	30	80.50	3
Outside of the 13.110 – 14.010	See 15.209 Limits			

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an quasi-peak detector.

➤ Spurious electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
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

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

Fundamental electric field strength:

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum electric field strength.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna which is 1 meter above ground. All X-axis, Y-axis and Z-axis polarization of the antenna are set on measurement.

Spurious electric field strength:

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C6310: 2013 on radiated measurement.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz. The frequency range from 9kHz to 10th harmonics is checked.

3.4. Uncertainty

Horizontal polarization :

30-300MHz: $\pm 4.08\text{dB}$; 300M-1GHz: $\pm 3.86\text{dB}$; 1-18GHz: $\pm 3.77\text{dB}$; 18-40GHz: $\pm 3.98\text{dB}$

Vertical polarization :

30-300MHz: $\pm 4.81\text{dB}$; 300M-1GHz: $\pm 3.87\text{dB}$; 1-18GHz: $\pm 3.83\text{dB}$; 18-40GHz: $\pm 3.98\text{dB}$

3.5. Test Result of Radiated Emission

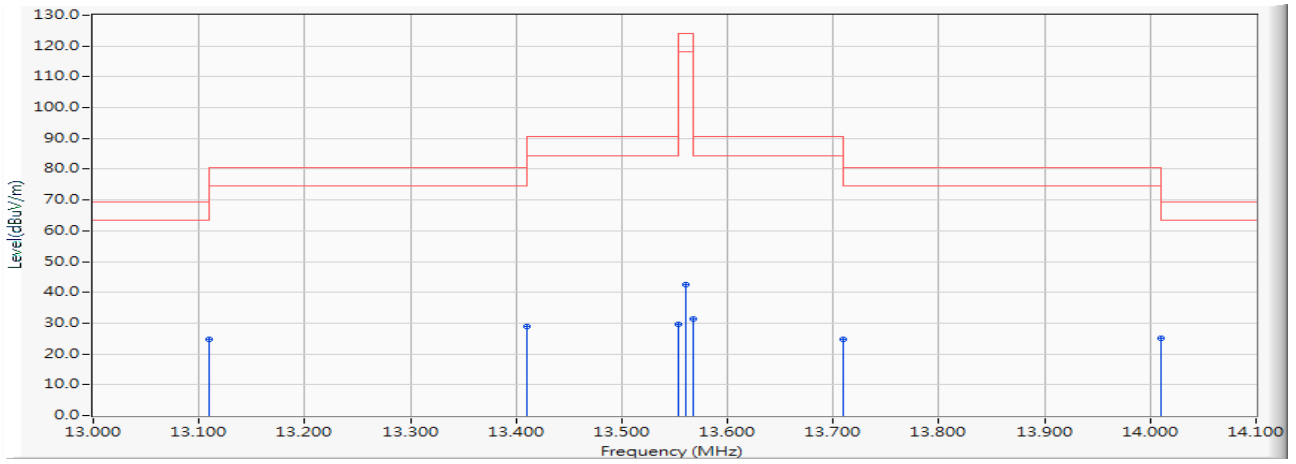
Product	:	RFID Module
Test Item	:	Fundamental Radiated Emission
Test Mode	:	Mode 1: Transmit
Test date	:	2017/05/19

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
X-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	4.800	24.820	-44.680	69.500
13.410	20.020	9.000	29.020	-51.480	80.500
13.553	20.020	9.700	29.720	-60.780	90.500
13.560	20.020	22.600	42.620	-81.380	124.000
13.567	20.020	11.400	31.420	-59.080	90.500
13.710	20.020	4.700	24.720	-55.780	80.500
14.010	20.020	4.900	24.920	-44.580	69.500
Vertical					
13.110	20.020	5.100	25.120	-44.380	69.500
13.410	20.020	6.000	26.020	-54.480	80.500
13.553	20.020	6.600	26.620	-63.880	90.500
13.560	20.020	16.300	36.320	-87.680	124.000
13.567	20.020	7.500	27.520	-62.980	90.500
13.710	20.020	5.100	25.120	-55.380	80.500
14.010	20.020	6.100	26.120	-43.380	69.500

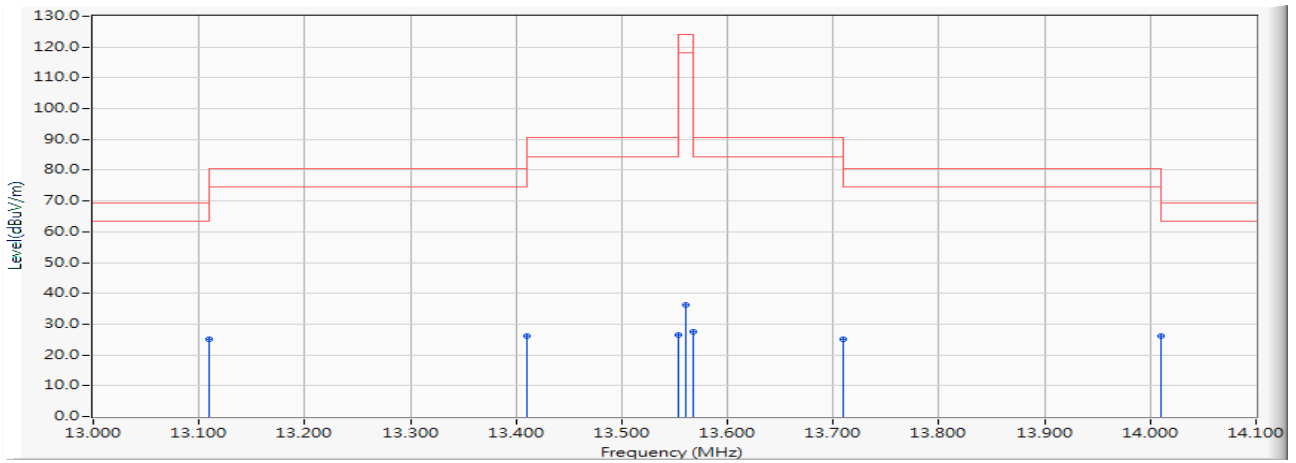
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. "■" means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



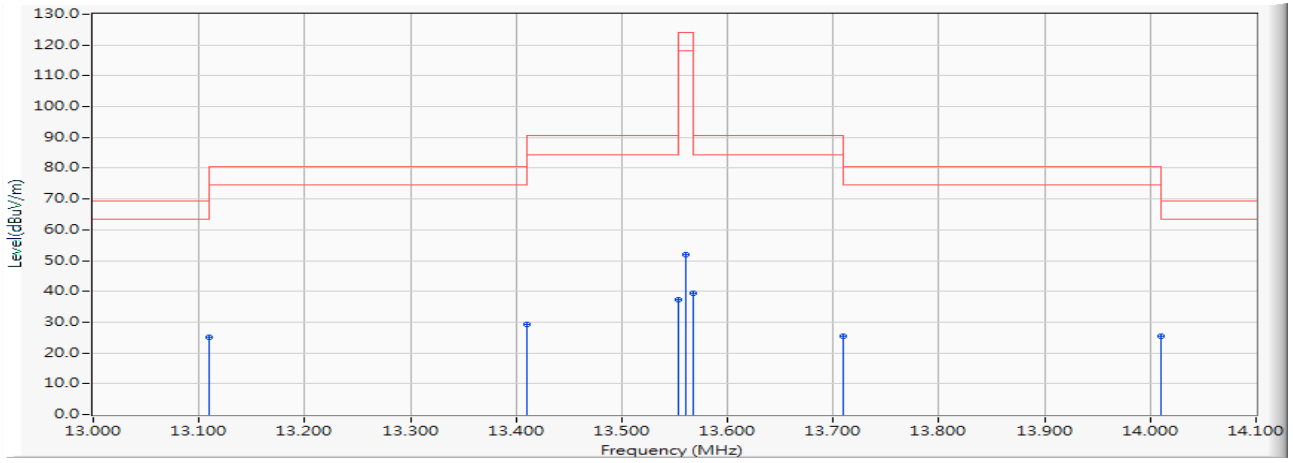
Product : RFID Module
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2017/05/19

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Y-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	5.000	25.020	-44.480	69.500
13.410	20.020	9.100	29.120	-51.380	80.500
13.553	20.020	17.100	37.120	-53.380	90.500
13.560	20.020	32.000	52.020	-71.980	124.000
13.567	20.020	19.400	39.420	-51.080	90.500
13.710	20.020	5.400	25.420	-55.080	80.500
14.010	20.020	5.300	25.320	-44.180	69.500
Vertical					
13.110	20.020	4.800	24.820	-44.680	69.500
13.410	20.020	6.100	26.120	-54.380	80.500
13.553	20.020	13.500	33.520	-56.980	90.500
13.560	20.020	27.900	47.920	-76.080	124.000
13.567	20.020	15.700	35.720	-54.780	90.500
13.710	20.020	4.700	24.720	-55.780	80.500
14.010	20.020	5.400	25.420	-44.080	69.500

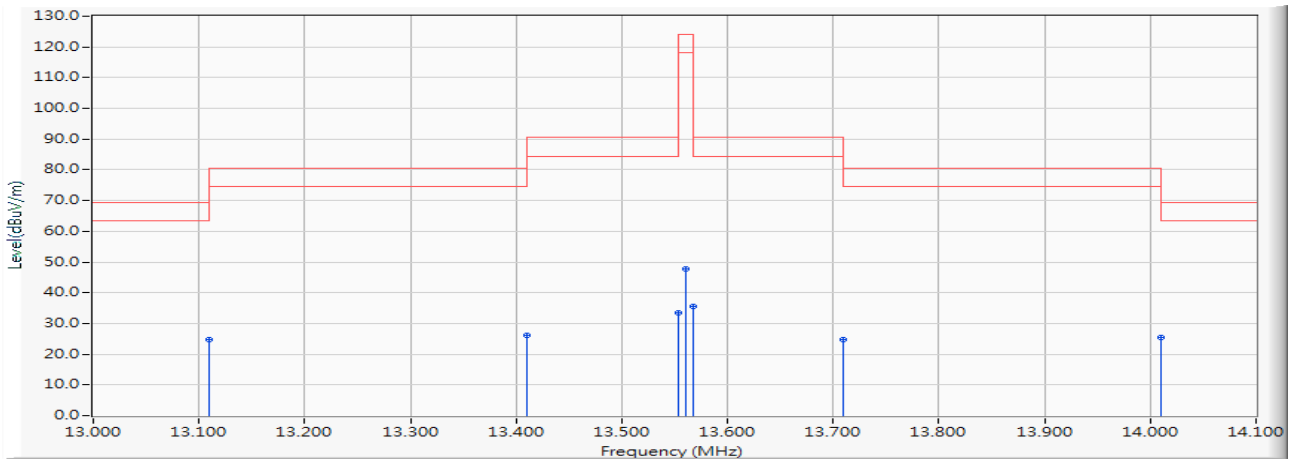
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. "■" means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



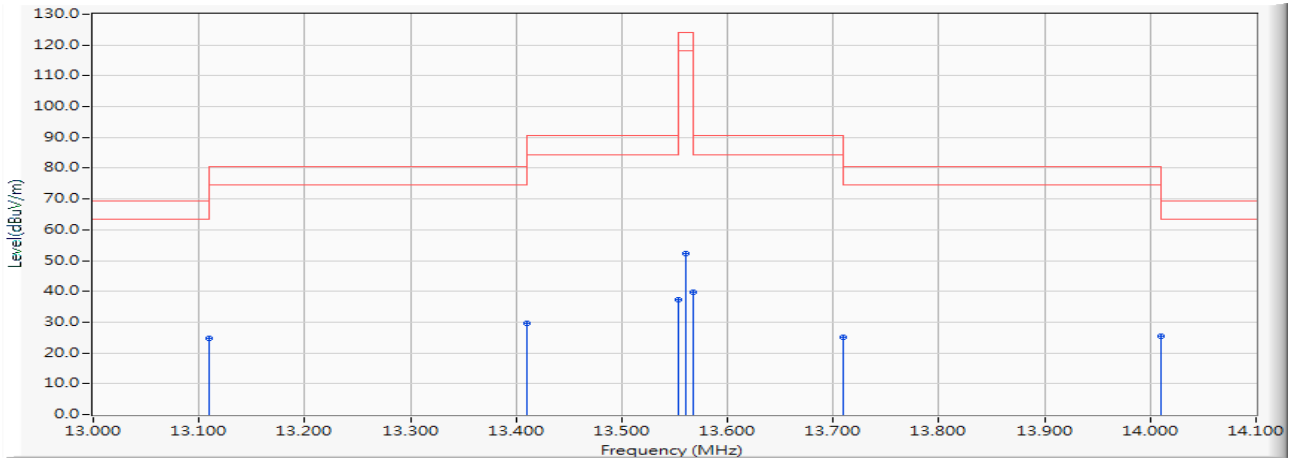
Product : RFID Module
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2017/05/19

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Z-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	4.800	24.820	-44.680	69.500
13.410	20.020	9.500	29.520	-50.980	80.500
13.553	20.020	17.200	37.220	-53.280	90.500
13.560	20.020	32.400	52.420	-71.580	124.000
13.567	20.020	19.700	39.720	-50.780	90.500
13.710	20.020	5.000	25.020	-55.480	80.500
14.010	20.020	5.400	25.420	-44.080	69.500
Vertical					
13.110	20.020	4.700	24.720	-44.780	69.500
13.410	20.020	5.700	25.720	-54.780	80.500
13.553	20.020	13.600	33.620	-56.880	90.500
13.560	20.020	28.100	48.120	-75.880	124.000
13.567	20.020	16.000	36.020	-54.480	90.500
13.710	20.020	5.300	25.320	-55.180	80.500
14.010	20.020	5.700	25.720	-43.780	69.500

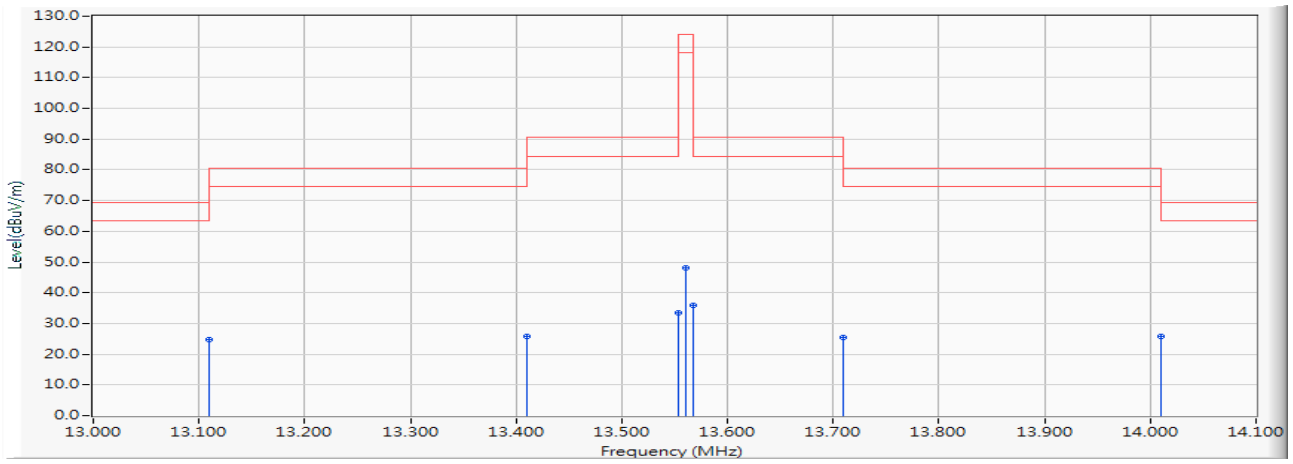
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. "■" means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



Product : RFID Module
 Test Item : General Radiated Emission Data (below 30MHz)
 Test Mode : Mode 1: Transmit
 Test date : 2017/05/19

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
27.120	20.191	32.200	52.391	-17.149	69.540
--					
Vertical					
27.120	20.191	13.900	34.091	-35.449	69.540
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “█” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : RFID Module
 Test Item : General Radiated Emission Data (above 30MHz)
 Test Mode : Mode 1: Transmit
 Test date : 2017/05/19

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
162.145	-10.681	30.229	19.548	-23.952	43.500
284.449	-10.425	38.622	28.197	-17.803	46.000
420.812	-7.099	39.642	32.543	-13.457	46.000
596.536	-3.408	31.182	27.774	-18.226	46.000
827.087	-0.336	42.072	41.736	-4.264	46.000
963.449	1.283	38.030	39.312	-14.688	54.000
Quasi-Peak					
Vertical					
110.130	-14.168	36.740	22.572	-20.928	43.500
297.101	-10.139	30.051	19.912	-26.088	46.000
533.275	-4.874	31.117	26.243	-19.757	46.000
746.957	-1.285	38.034	36.749	-9.251	46.000
881.913	0.320	32.886	33.207	-12.793	46.000
963.449	1.283	35.178	36.460	-17.540	54.000

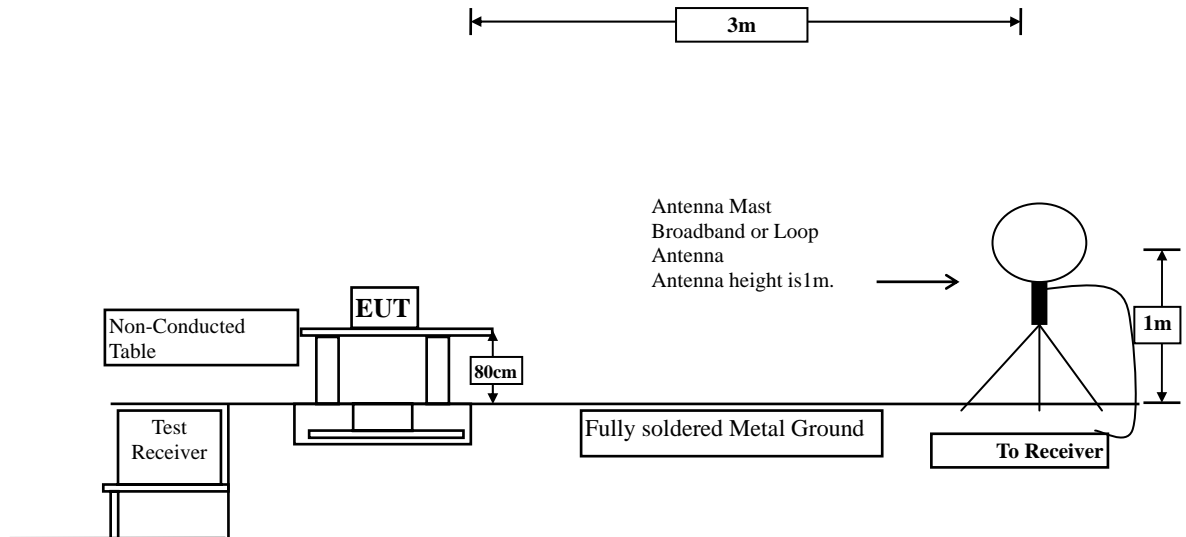
Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

4. Band Edge

4.1. Test Setup

Radiated Emission Under 30MHz



4.2. Limits

In any 9 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50 dB below that in the 9 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.3. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna which is 1 meter above ground.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.

4.4. Uncertainty

Horizontal polarization :

30-300MHz: ± 4.08 dB ; 300M-1GHz: ± 3.86 dB ; 1-18GHz: ± 3.77 dB ; 18-40GHz: ± 3.98 dB

Vertical polarization :

30-300MHz: ± 4.81 dB ; 300M-1GHz: ± 3.87 dB ; 1-18GHz : ± 3.83 dB ; 18-40GHz: ± 3.98 dB

4.5. Test Result of Band Edge

Product : RFID Module
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit
 Test date : 2017/05/19

RF Radiated Measurement

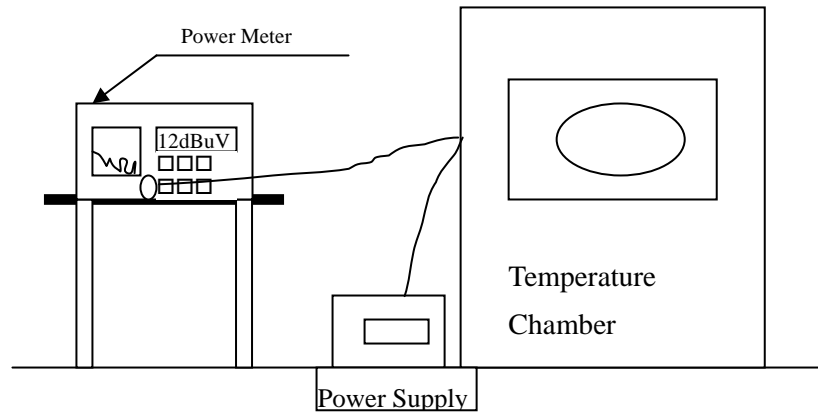
Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
13.110	20.020	4.900	24.920	-44.620	69.540
13.360	20.020	5.100	25.120	-44.420	69.540
13.410	20.020	9.600	29.620	-39.920	69.540
14.010	20.020	5.500	25.520	-44.020	69.540
Vertical					
13.110	20.020	4.800	24.820	-44.720	69.540
13.360	20.020	5.100	25.120	-44.420	69.540
13.410	20.020	6.400	26.420	-43.120	69.540
14.010	20.020	6.700	26.720	-42.820	69.540

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

5. Frequency Tolerance

5.1. Test Setup



5.2. Limits

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

5.3. Test Procedure

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.

5.4. Uncertainty

$\pm 279.2\text{Hz}$

5.5. Test Result of Frequency Stability

Product : RFID Module
 Test Item : Frequency Tolerance
 Test Mode : Mode 1: Transmit
 Test date : 2017/05/19

Temperature (°C)	Voltage (V)	Observe Time	Declared Frequency (MHz)	Read Frequency (MHz)	Tolerance (%)	Limit (%)
20	7	start	13.56	13.56021	0.001519	±0.01 %
		2mins	13.56	13.56021	0.001519	
		5mins	13.56	13.56021	0.001519	
		10mins	13.56	13.56021	0.001519	
20	9.2	start	13.56	13.56022	0.001652	±0.01 %
		2mins	13.56	13.56022	0.001652	
		5mins	13.56	13.56022	0.001652	
		10mins	13.56	13.56022	0.001652	
20	5.1	start	13.56	13.56012	0.000855	±0.01 %
		2mins	13.56	13.56012	0.000855	
		5mins	13.56	13.56012	0.000855	
		10mins	13.56	13.56012	0.000855	
50	7	start	13.56	13.56014	0.001003	±0.01 %
		2mins	13.56	13.56013	0.000937	
		5mins	13.56	13.56013	0.000937	
		10mins	13.56	13.56009	0.000693	
40	7	start	13.56	13.56018	0.001342	±0.01 %
		2mins	13.56	13.56015	0.001106	
		5mins	13.56	13.56015	0.001106	
		10mins	13.56	13.56016	0.001143	
30	7	start	13.56	13.56021	0.001578	±0.01 %
		2mins	13.56	13.56021	0.001578	
		5mins	13.56	13.56021	0.001578	
		10mins	13.56	13.56022	0.001593	

10	7	start	13.56	13.56034	0.002493	± 0.01 %
		2mins	13.56	13.56034	0.002507	
		5mins	13.56	13.56031	0.002308	
		10mins	13.56	13.56032	0.002367	
0	7	start	13.56	13.56040	0.002920	± 0.01 %
		2mins	13.56	13.56034	0.002507	
		5mins	13.56	13.56039	0.002883	
		10mins	13.56	13.56039	0.002883	
-10	7	start	13.56	13.56040	0.002965	± 0.01 %
		2mins	13.56	13.56040	0.002965	
		5mins	13.56	13.56042	0.003097	
		10mins	13.56	13.56039	0.002876	
-20	7	start	13.56	13.56044	0.003245	± 0.01 %
		2mins	13.56	13.56044	0.003245	
		5mins	13.56	13.56041	0.003024	
		10mins	13.56	13.56043	0.003171	

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.