
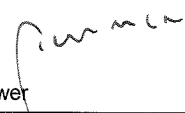


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<i>Test Report No.:</i>			
<b>Auftraggeber:</b> <b>Kyocera Mita Corporation</b>			
<i>Client:</i> 2-28 1-Chome, Tamatsukuri, Chuo-ku, Osaka 540 Japan			
<b>Gegenstand der Prüfung:</b> <b>RFID Module</b>			
<i>Test Item:</i>			
<b>Bezeichnung:</b> <b>2K3A0512</b>	<b>Serien-Nr.:</b>	<b>Engineering Sample</b>	
<i>Identification:</i>	<i>Serial No.:</i>		
<b>Wareneingangs-Nr.:</b> <b>PT0214002176-1</b>	<b>Eingangsdatum:</b> <b>2010-07-23</b>		
<i>Receipt No.:</i> <b>PT0214002176-2</b>	<i>Date of Receipt:</i> <b>2010-08-27</b>		
<b>Prüfört:</b> <b>TÜV Rheinland Japan Ltd. - Global Technology Assessment Center</b>			
<i>Testing Location:</i> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
<b>Prüfgrundlage:</b> <b>FCC 47 CFR Part 15, Subpart C, Section 15.225 (October 1, 2009)</b>			
<i>Test Specification:</i> ANSI C63.4-2003			
	RSS-210 (Issue 7): 2007		
	RSS-Gen (Issue 2): 2007		
<b>Prüfergebnis:</b> <b>Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).</b>			
<i>Test Result:</i> <i>The test item passed the test specification(s).</i>			
<b>Prüflaboratorium:</b> <b>TÜV Rheinland Japan Ltd. - Global Technology Assessment Center</b>			
<i>Testing Laboratory:</i> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
<b>geprüft/ tested by:</b>		<b>kontrolliert/ reviewed by:</b>	
			
2010-09-21	Y. Sasaki / Inspector	2010-09-21	T. Cheung / Reviewer
<b>Datum</b>	<b>Name/Stellung</b>	<b>Unterschrift</b>	
<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>	
			<b>Datum</b>
			<b>Name/Stellung</b>
			<b>Unterschrift</b>
			<i>Date</i>
			<i>Name/Position</i>
			<i>Signature</i>
<b>Sonstiges / Other Aspects:</b>			
This test report deals only with the intentional radiator portion of the tested product.			
This test was performed to apply limited modular approval.			
<b>Abkürzungen:</b>	<b>P(ass) = entspricht Prüfgrundlage</b>	<b>Abbreviations:</b>	<b>P(ass) = passed</b>
	<b>F(ail) = entspricht nicht Prüfgrundlage</b>		<b>F(ail) = failed</b>
	<b>N/A = nicht anwendbar</b>		<b>N/A = not applicable</b>
	<b>N/T = nicht getestet</b>		<b>N/T = not tested</b>
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>			
<i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>			

## TEST SUMMARY

**3.2.1 VOLTAGE REQUIREMENTS, FCC 15.31(E)**

*RESULT: PASS*

**3.2.2 ANTENNA REQUIREMENTS, FCC 15.203, FCC 15.204 AND RSS-GEN 7.1.4**

*RESULT: PASS*

**5.1.1 FREQUENCY STABILITY, FCC 15.225(E), RSS-210 A2.6, RSS-GEN 4.7 AND RSS-GEN 7.2.4**

*RESULT: PASS*

**5.1.2 20dB BANDWIDTH, FCC 15.215(C)**

*RESULT: PASS*

**5.1.3 99% BANDWIDTH, RSS-GEN 4.6.1**

*RESULT: PASS*

**6.1.1 AC POWER LINE CONDUCTED EMISSION OF TRANSMITTER, FCC 15.207 AND RSS-GEN 7.2.2**

*RESULT: PASS*

**6.2.1 AC POWER LINE CONDUCTED EMISSION OF RECEIVER, RSS-GEN 7.2.2**

*RESULT: N/A*

**7.1.1 FUNDAMENTAL EMISSION AND (IN BAND) RADIATED EMISSION, FCC 15.225(A)(B)(C), RSS-210 A2.6**

*RESULT: PASS*

**7.1.2 RADIATED SPURIOUS EMISSION OF TRANSMITTER BELOW 30MHz (OUT OF BAND), FCC 15.225(D), FCC 15.205, FCC 15.209, RSS-210 A2.6 AND RSS-GEN 7.2.1**

*RESULT: PASS*

**7.1.3 RADIATED SPURIOUS EMISSION OF TRANSMITTER ABOVE 30MHz (OUT OF BAND), FCC 15.225(D), FCC 15.205, FCC 15.209, RSS-210 A2.6 AND RSS-GEN 7.2.1**

*RESULT: PASS*

**7.2.1 RADIATED SPURIOUS EMISSION OF RECEIVER, RSS-210 2.6 AND RSS-GEN 7.2.3.2**

*RESULT: N/A*

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## 1. General Remarks

This module was evaluated under the relevant FCC and IC standards.

## 2. Test Sites

### 2.1 Test Facilities

TÜV Rheinland Japan Ltd. - Global Technology Assessment Center  
4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 299054.

The Industry Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under OATS filing number 3466B.

The test facility is accredited by VLAC (member of ILAC) under number VLAC-017 according to ISO/IEC 17025:2005. TÜV Rheinland Japan Ltd. is accredited by the Federal Communications Commission as a Conformity Assessment Body under Designation Number JP0017 and Test Firm Registration Number 386498.

## 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

Kind of Equipment	Manufacturer	Model Name	Serial Number	Equipment ID	Calibrated until
<b>For Antenna Port Conducted Emission</b>					
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2010-12
Temperature Chamber	Voetsch	VT 4018	585660250 90010	BT-8012	2011-08
<b>For AC Power Line Conducted Emission</b>					
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2010-12
LISN	Rohde & Schwarz	ENV216	100276	RF-0016	2011-06
<b>For Radiated Emission</b>					
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	2011-02
RF Selector (10m)	Toyo Corporation	NS4900	0703-182	RF-0029	2011-05
3dB Attenuator 50Ohm	Tamagawa Electronics Co., Ltd.	CFA-01	-	RF-0265	2011-05
Low Noise Pre-Amplifier	TSJ	MLA-10K01-B01-35	1370750	RF-0253	2010-11
Loop Antenna with power supply, 9kHz-30MHz	Rohde & Schwarz	HFH2-Z2	100139	RF-0048	2011-02
Trilog Antenna, 30-1000MHz	Schwarzbeck	VULB9168	0245	RF-0019	2011-05
<b>Constant Voltage Constant Frequency Stabilizers</b>					
CVCF (Shielded Room)	NF Corporation	ESU2000S	9075612	RF-0210	N/A
CVCF Booster (Shielded Room)	NF Corporation	ESU2000B	9074403	RF-0211	N/A

## 2.3 Measurement Uncertainty

**Table 2: Emission Measurement Uncertainty**

Measurement Type	Frequency	Uncertainty
AC Power Line Conducted Emission	150kHz - 30MHz	±3.0dB
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission	9kHz - 30MHz	±3.99dB
	30MHz - 1GHz	±4.8dB
	> 1GHz	±4.5dB

### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is an RFID reader-writer module intended to use with the dedicated multifunction printer and communicate with the tag on its toner cartridge by RFID protocol.

#### 3.2 System Details

Radio standard: ISO 15693  
 Specified output power: 0.2nW EIRP  
 Antenna gain: -53dBi  
 Antenna type: Loop antenna  
 Antenna mounting type: Printed  
 Frequency range: 13.56MHz  
 Number of channels: 1  
 Modulation type: ASK  
 FCC classification: DXX  
 Emission designator: A1D

Rated voltage: DC3.3V ± 15%  
 Rated current: 100mA  
 Protection class: III

Test voltage: Refer to each test item.

**Table 3: Interfaces present on the EUT**

No.	Interface	Cable Length for Testing, Shielding	Interface Classification
1.	4-wire flat cable [EUT <-> JIG]	0.2m, Un-Shielded	DC Power and Signal Port
2.	4-wire flat cable for antenna conducted test [EUT <-> JIG]	1m, Un-Shielded	DC Power and Signal Port
3.	BNC coaxial cable	1m, Shielded	Signal Port
4.	AC power line for JIG	2m, Un-Shielded	AC Power Port



### **3.2.1 Voltage Requirements, FCC 15.31(e)**

**RESULT:** **PASS**

The maximum carrier output field level for the EUT is measured between 85% and 115% of the nominal rated supply voltage. Hence it complies with the power supply requirements.

### **3.2.2 Antenna Requirements, FCC 15.203, FCC 15.204 and RSS-Gen 7.1.4**

**RESULT:** **PASS**

The EUT has a printed antenna together with the circuit. Hence it complies with the requirements.

## **3.3 Independent Operation Modes**

The EUT was tested on a stand-alone basis (only attached to the test jig) and the test system was configured in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4:2003. Testing was performed at the operating frequency (13.56MHz).

The basic operation modes are:

- A. Continuously writing mode, 13.56MHz (RFID) according to ISO 15693, communicating with tag
- B. Continuously reading mode, 13.56MHz (RFID) according to ISO 15693, communicating with tag
- C. Continuously transmitting (Tx) mode, Unmodulated

The EUT is a transceiver.

## **3.4 Clock Frequencies**

The highest clock frequency generated by the EUT is 13.56MHz.

## 4. Test Set-up and Operation Modes

### 4.1 Test Methodology

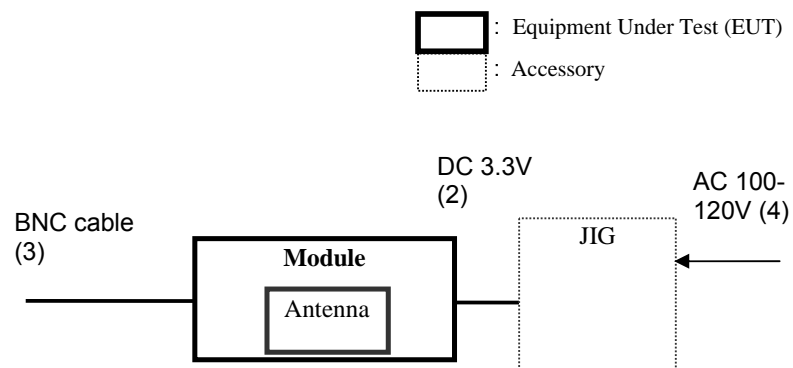
The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.33, 15.35, 15.205, 15.207, 15.209 and 15.225.

The test methods, which have been used, are based on ANSI C63.4-2003 and RSS-Gen (Issue 2).

For details, see under each test item.

### 4.2 Physical Configuration for Testing

Figure 1: Setup for antenna conducted measurement



#### Notes:

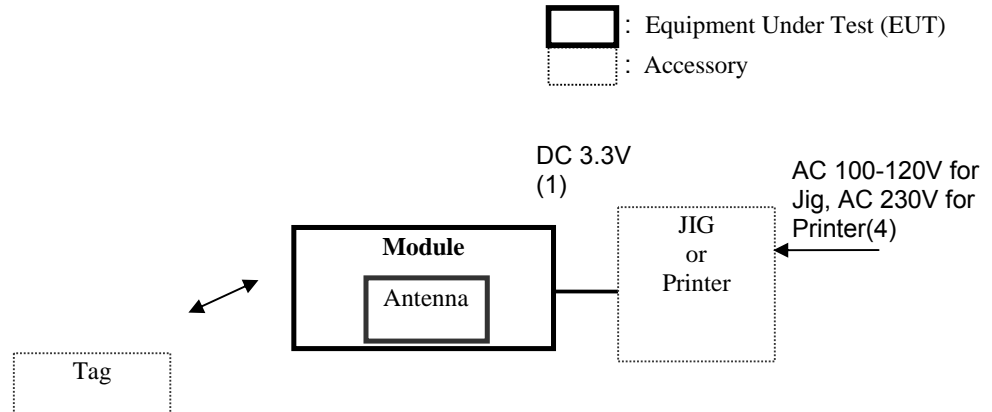
Set-up configuration for testing (orientation of the module and antenna) shall be the same as in the intended end-product.

JIG can change DC voltage supplying to the EUT.

For antenna conducted measurements, the antenna was replaced by a 50Ω antenna connector.

For more details, refer to section: Photographs of the Test Set-Up.

**Figure 2: Setup other than antenna conducted measurement**



**Notes:**

Set-up configuration for testing (orientation of the module and antenna) shall be the same as in the intended end-product.

JIG can change DC voltage supplying to the EUT.

When with Printer AC 230V is applied, since the customer could provide the printer only available by 230V. Printer used in this test is still assumed to be typical.

For more details, refer to section: Photographs of the Test Set-Up.

### **4.3 Test Software**

No software used for testing.

### **4.4 Special Accessories and Auxiliary Equipment**

The product has been tested together with the following additional accessories:

1. Product: JIG  
Manufacturer: Kyocera Mita  
Model: unspecified  
Rated Voltage: AC 100-120V  
Input Current: unspecified  
Frequency: 50/60Hz  
Serial Number: unspecified
  
2. Product: Printer  
Manufacturer: Kyocera Mita  
Model: FS-6030MFP  
Rated Voltage: AC 230V  
Input Current: 5.8A  
Frequency: 50Hz  
Serial Number: unspecified

AC 230V is applied for the printer, since the customer could provide the printer only available by 230V. Printer used in this test is still assumed to be typical for the test purpose.

### **4.5 Countermeasures to achieve EMC Compliance**

No additional measures were employed to achieve compliance.

## 5. Test Results of Conducted Measurements at Antenna Port

### 5.1.1 Frequency Stability, FCC 15.225(e), RSS-210 A2.6, RSS-Gen 4.7 and RSS-Gen 7.2.4

**RESULT:** **PASS**

Date of testing: 2010-07-26

Ambient temperature: 25°C

Relative humidity: 46%

Atmospheric pressure: 1014hPa

Low test voltage: DC 2.805V

Normal test voltage: DC 3.3V

High test voltage: DC 3.795V

Low test temperature: -20°C

Normal test temperature: 20°C

High test temperature: 50°C

#### Requirements:

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  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  $20^{\circ}\text{C}$ .

The operating frequency of the EUT is 13.56MHz. Therefore, the measured frequency must be maintained within  $\pm 0.01\%$  of the operating frequency.

#### Test procedure:

ANSI C63.4-2003 and RSS-Gen 4.7

The EUT was placed inside a temperature chamber.

Measurements were performed for every  $10^{\circ}\text{C}$  inside the specified temperature interval.

Measurements started after the temperature was sufficiently stabilized and were performed at start-up of the EUT, and then after 2, 5 and 10 minutes.

This test was then repeated at a temperature of  $20^{\circ}\text{C}$  for a variation of  $\pm 15\%$  of the input voltage.

Operation mode is set to Mode C.

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**Table 4: Frequency Stability at 50°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560001	0.00001	0.01	Pass
2	13.56	13.560000	0.00000	0.01	Pass
5	13.56	13.559999	-0.00001	0.01	Pass
10	13.56	13.559999	-0.00001	0.01	Pass

**Table 5: Frequency Stability at 40°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560039	0.00029	0.01	Pass
2	13.56	13.560038	0.00028	0.01	Pass
5	13.56	13.560039	0.00029	0.01	Pass
10	13.56	13.560039	0.00029	0.01	Pass

**Table 6: Frequency Stability at 30°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560083	0.00061	0.01	Pass
2	13.56	13.560082	0.00060	0.01	Pass
5	13.56	13.560083	0.00061	0.01	Pass
10	13.56	13.560083	0.00061	0.01	Pass

**Table 7: Frequency Stability at 20°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560124	0.00091	0.01	Pass
2	13.56	13.560124	0.00091	0.01	Pass
5	13.56	13.560125	0.00092	0.01	Pass
10	13.56	13.560125	0.00092	0.01	Pass

**Table 8: Frequency Stability at 10°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560158	0.00117	0.01	Pass
2	13.56	13.560157	0.00116	0.01	Pass
5	13.56	13.560157	0.00116	0.01	Pass
10	13.56	13.560157	0.00116	0.01	Pass

**Table 9: Frequency Stability at 0°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560173	0.00127	0.01	Pass
2	13.56	13.560173	0.00127	0.01	Pass
5	13.56	13.560173	0.00127	0.01	Pass
10	13.56	13.560173	0.00127	0.01	Pass

**Table 10: Frequency Stability at -10°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560166	0.00122	0.01	Pass
2	13.56	13.560166	0.00122	0.01	Pass
5	13.56	13.560165	0.00121	0.01	Pass
10	13.56	13.560165	0.00121	0.01	Pass

**Table 11: Frequency Stability at -20°C, DC 3.3V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560123	0.00091	0.01	Pass
2	13.56	13.560125	0.00093	0.01	Pass
5	13.56	13.560127	0.00093	0.01	Pass
10	13.56	13.560127	0.00093	0.01	Pass

**Table 12: Frequency Stability at 20 °C, DC 2.805V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560087	0.00064	0.01	Pass
2	13.56	13.560087	0.00064	0.01	Pass
5	13.56	13.560087	0.00064	0.01	Pass
10	13.56	13.560087	0.00064	0.01	Pass

**Table 13: Frequency Stability at 20 °C, DC 3.795V**

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560155	0.00114	0.01	Pass
2	13.56	13.560153	0.00113	0.01	Pass
5	13.56	13.560152	0.00112	0.01	Pass
10	13.56	13.560151	0.00111	0.01	Pass

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### 5.1.2 20dB Bandwidth, FCC 15.215(c)

**RESULT:**

**PASS**

Date of testing: 2010-07-26

Ambient temperature: 25°C

Relative humidity: 46%

Atmospheric pressure: 1014hPa

#### Requirements:

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of FCC 47 CFR Part 15, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated.

In the case of this EUT, the frequency band is from 13.110MHz to 14.010MHz, therefore the 20dB bandwidth should be maintained within this frequency band.

#### Test procedure:

ANSI C63.4-2003

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 1kHz and the span to 10kHz.



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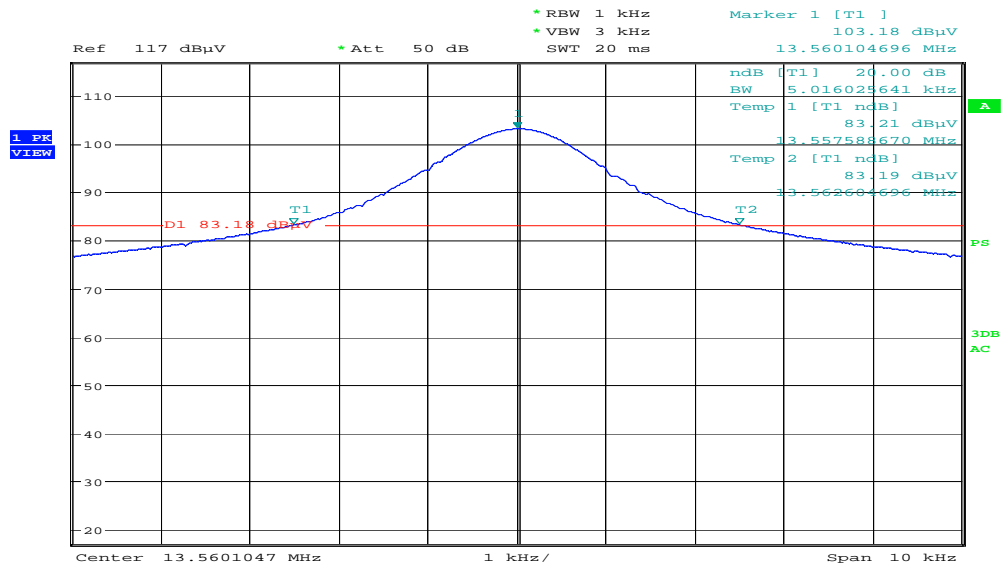
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**Table 14: 20dB Bandwidth, Mode A**

Operating Frequency [MHz]	20dB Bandwidth [kHz]	Result
13.56	5.02	Complies

**Figure 3: 20dB Bandwidth, Mode A**



20dB bandwidth  
 Date: 26.JUL.2010 15:00:45

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### 5.1.3 99% Bandwidth, RSS-Gen 4.6.1

**RESULT:**

**PASS**

Date of testing: 2010-07-26

Ambient temperature: 25°C

Relative humidity: 46%

Atmospheric pressure: 1014hPa

Requirements:

The 99% bandwidth shall be reported according to RSS-Gen 4.6.1.

Test procedure:

RSS-Gen 4.6.1.

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth (100Hz) was set to 1% of the span (10kHz). The 99% bandwidth was measured by using the OBW function of the analyzer with a 99% coverage setting.

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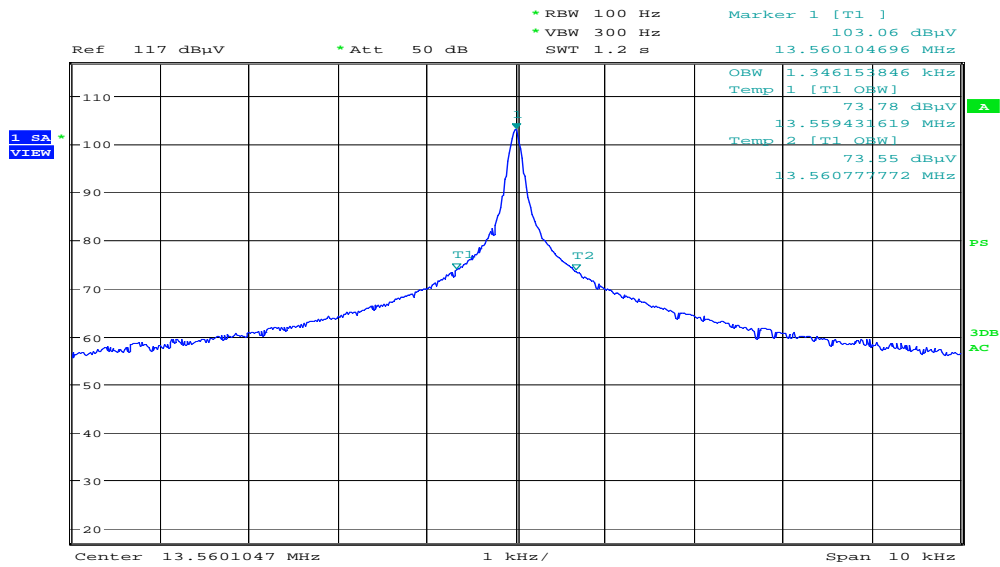
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**Table 15: 99% Bandwidth, Mode A**

Operating Frequency [MHz]	99% Bandwidth [kHz]
13.56	1.35

**Figure 4: 99% Bandwidth, Mode A**



99% bandwidth  
 Date: 26.JUL.2010 15:13:23

## **6. Test Results of AC Power Line Conducted Measurements**

### **6.1 AC Power Line Conducted Emission of Transmitter**

#### **6.1.1 AC Power Line Conducted Emission of Transmitter, FCC 15.207 and RSS-Gen 7.2.2**

**RESULT:** **PASS**

Date of testing:	2010-07-27	2010-08-30
Ambient temperature:	21°C	25°C
Relative humidity:	71%	72%
Atmospheric pressure:	1008hPa	1013hPa
Frequency range:	0.15 – 30MHz	
Kind of test site:	Shielded Room	

#### Requirements:

The AC power line conducted emission on any frequency within the band 150 kHz to 30MHz shall not exceed the limits specified in FCC 15.207 and RSS-Gen 7.2.2.

#### Test procedure:

ANSI C63.4-2003.

The EUT was placed on a wooden table raised 80cm above the reference ground plane. A vertical conducting plane of the screened room was located 40cm to the rear of the EUT. The AC input of Printer was connected to a Line Impedance Stabilization Network (LISN).

The physical arrangement of the test system and associated cabling was varied to determine the effect on the EUT's emissions in amplitude and frequency in order to ensure that maximum emission amplitudes were attained.

The measurements were performed with the spectrum analyzer operating in the CISPR quasi-peak and average detection modes. The analyzer's 6 dB bandwidth was set to 9kHz. No video filter less than 10 times the resolution bandwidth was used.

Disturbances other than those mentioned are small or not detectable.

**Table 16: AC Power Line Conducted Emission, Quasi Peak and Average Data, 0.15 - 30MHz, Phase N (N) and L1 (L), Mode A**

Freq. [MHz]	Phase	Reading QP [dBµV]	Reading AV [dBµV]	Factor [dB]	Level QP [dBµV]	Level AV [dBµV]	Limit QP [dBµV]	Limit AV [dBµV]	Margin QP [dB]	Margin AV [dB]
0.15037	N	36.1	11.7	9.6	45.7	21.3	66.0	56.0	20.3	34.7
0.15422	L1	35.6	11.6	9.6	45.2	21.2	65.8	55.8	20.6	34.6
0.27801	N	31.4	26.0	9.7	41.1	35.7	60.9	50.9	19.8	15.2
0.56077	N	20.5	12.9	9.7	30.2	22.6	56.0	46.0	25.8	23.4
13.56031	N	48.0	38.0	10.1	58.1	48.1	60.0	50.0	1.9(*)	1.9(*)
13.56066	L1	47.7	37.7	10.1	57.8	47.8	60.0	50.0	2.2(*)	2.3(*)
13.98158	N	25.2	2.4	10.1	35.3	12.5	60.0	50.0	24.7	37.5
13.98564	L1	26.0	2.9	10.1	36.1	13.0	60.0	50.0	23.9	37.0
17.79760	N	22.2	0.9	10.3	32.5	11.2	60.0	50.0	27.5	38.8
17.80105	L1	19.2	-0.6	10.2	29.4	9.6	60.0	50.0	30.6	40.4

Note: Level QP = Reading QP + Factor, Level AV = Reading AV + Factor

(\*) The measured result is below the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to determine compliance at a level of confidence of 95%. However, the measured result indicates a high probability that the tested product complies with the specification limit.

## **6.2 AC Power Line Conducted Emission of Receiver**

### **6.2.1 AC Power Line Conducted Emission of Receiver, RSS-Gen 7.2.2**

**RESULT:** **N/A**

Frequency range: 0.15 – 30MHz

Requirements:

The AC power line on any frequency within the band 150 kHz to 30MHz shall not exceed the limits specified in RSS-Gen 7.2.2.

Test procedure:

RSS-Gen

The test was not performed, since the EUT has no receiver-only mode.

## 7. Test Results of Radiated Measurements

### 7.1 Radiated Emission of Transmitter

#### 7.1.1 Fundamental Emission and (in band) Radiated Emission, FCC 15.225(a)(b)(c), RSS-210 A2.6

**RESULT:** **PASS**

Date of testing:	2010-07-27
Ambient temperature:	21°C
Relative humidity:	71%
Atmospheric pressure:	1008hPa
Frequency range:	13.110MHz – 14.010MHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

#### Requirements:

The emissions from the intentional radiator shall not exceed the field strength specified in FCC 15.225(a)(b)(c) and RSS-210 A2.6.

#### Test procedure:

ANSI C63.4-2003

The EUT was placed on a nonconductive turntable 1.2m above the ground plane when with JIG and Printer. The EUT was placed in the dedicated place when with Printer. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the EUT orientation (X, Y, Z) were varied in order to ensure that maximum emission amplitudes were attained. The supplying voltage was varied with  $\pm 15\%$  of the normal voltage (DC 3.3V).

Final radiated emission measurements were made at 3m distance.

At each frequency where a emission was found, the EUT was rotated 360° and the loop antenna was rotated 180° in order to determine the emission's maximum level.

For frequencies between 10MHz and 30MHz, the spectrum analyzer's 6 dB bandwidth was set to 9 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode.

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The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable.

Test was performed with either JIG or Printer. Final measurement was performed for the worst case. JIG was selected as the worst case which showed the largest level.

**Table 17: Fundamental Emission, Y Orientation, Mode A**

Freq. [MHz]	Reading QP [dBuV/m]	Factor [dB]	Field QP [dBuV/m]	Limit QP [dBuV/m]	Margin [dB]	Voltage
13.560	27.1	20.3	47.4	124.0	76.6	Normal

Notes: Detector: quasi-peak, RBW = 9kHz

**Table 18: Fundamental Emission, Y Orientation, Mode B**

Freq. [MHz]	Reading QP [dBuV/m]	Factor [dB]	Field QP [dBuV/m]	Limit QP [dBuV/m]	Margin [dB]	Voltage
13.560	25.9	20.3	46.2	124.0	77.8	Normal

Notes: Detector: quasi-peak, RBW = 9kHz

**Table 19: In band Radiated Emission, Y Orientation, Mode A**

Freq. [MHz]	Reading QP [dBuV/m]	Factor [dB]	Field QP [dBuV/m]	Limit QP [dBuV/m]	Margin [dB]	Voltage
13.110	5.7	20.3	26.0	69.5	43.5	High
13.410	4.9	20.3	25.2	80.5	55.3	Low
13.553	12.0	20.3	32.3	90.5	58.2	Normal
13.567	14.5	20.3	34.8	90.5	55.7	Normal
13.710	4.9	20.3	25.2	80.5	55.3	Low
14.010	5.3	20.4	25.7	69.5	43.8	High

Notes: Detector: quasi-peak, RBW = 9kHz

**Table 20: In band Radiated Emission, Y Orientation, Mode B**

Freq. [MHz]	Reading QP [dBuV/m]	Factor [dB]	Field QP [dBuV/m]	Limit QP [dBuV/m]	Margin [dB]	Voltage
13.110	5.3	20.3	25.6	69.5	43.9	High
13.410	5.0	20.3	25.3	80.5	55.2	Low
13.553	11.2	20.3	31.5	90.5	59.0	Normal
13.567	13.7	20.3	34.0	90.5	56.5	Normal
13.710	4.9	20.3	25.2	80.5	55.3	Normal
14.010	5.1	20.4	25.5	69.5	44.0	High

Notes: Detector: quasi-peak, RBW = 9kHz



**7.1.2 Radiated Spurious Emission of Transmitter below 30MHz (Out of Band), FCC 15.225(d), FCC 15.205, FCC 15.209, RSS-210 A2.6 and RSS-Gen 7.2.1**

**RESULT:** **PASS**

Date of testing: 2010-07-28 2010-08-30

Ambient temperature: 21°C 20°C

Relative humidity: 71% 63%

Atmospheric pressure: 1008hPa 1013hPa

Frequency range: 9kHz – 30MHz

Measurement distance: 3m

Kind of test site: Semi Anechoic Chamber

**Requirements:**

The emissions from the intentional radiator shall not exceed the field strength specified in FCC 15.209(a) and RSS-210 2.7.

**Test procedure:**

ANSI C63.4-2003 and RSS-Gen 4.9.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane when with Printer. The EUT was placed in the dedicated place when with Printer. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system and the associated cabling were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 9kHz to 30MHz. Final radiated emission measurements were made at 3m distance.

For frequencies between 9kHz and 150kHz, the spectrum analyzer's 6 dB bandwidth was set to 200Hz, and the analyzer was operated in the CISPR quasi-peak detection mode. For frequencies between 150kHz and 30MHz, the spectrum analyzer's 6 dB bandwidth was set to 9kHz, and the analyzer was operated in the CISPR quasi-peak detection mode.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable.

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**Table 21: Radiated Emission, Quasi-Peak Data, 9kHz – 30MHz, Mode A**

Frequency [MHz]	Reading QP [dBuV/m]	Factor [dB]	Level QP [dBuV/m]	Limit QP [dBuV/m]	Margin [dB]
27.12	6.3	21.9	28.2	69.5	41.3

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### 7.1.3 Radiated Spurious Emission of Transmitter above 30MHz (Out of Band), FCC 15.225(d), FCC 15.205, FCC 15.209, RSS-210 A2.6 and RSS-Gen 7.2.1

**RESULT:**

**PASS**

Date of testing:	2010-07-28
Ambient temperature:	21°C
Relative humidity:	71%
Atmospheric pressure:	1008hPa
Frequency range:	30MHz – 1000MHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

The emissions from the intentional radiator shall not exceed the field strength specified in FCC 15.209(a) and RSS-210 2.7.

Test procedure:

ANSI C63.4-2003 and RSS-Gen 4.9.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane when with Printer. The EUT was placed in the dedicated place when with Printer. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system and the associated cabling were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 30MHz to 1000MHz. Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

For frequencies between 30MHz and 1GHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable.

**Table 22: Radiated Emission, Quasi Peak Data, 30MHz – 1GHz, Horizontal and Vertical Antenna Orientations, Mode A**

Freq. [MHz]	EUT Orientation / Antenna Polarization	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
39.335	Z/V	56.4	-23.6	32.8	40.0	7.2	100	245
329.791	Z/V	60.7	-20.0	40.7	46.0	5.3	120	272
329.795	Z/H	56.8	-19.9	36.9	46.0	9.1	100	225
352.556	Z/V	59.5	-19.1	40.4	46.0	5.6	106	287
352.560	Z/H	56.7	-19.2	37.5	46.0	8.5	178	336
447.502	Z/V	53.1	-16.1	37.0	46.0	9.0	228	349
625.046	Z/H	50.2	-13.1	37.1	46.0	8.9	159	193
665.541	Z/V	52.0	-12.3	39.7	46.0	6.3	102	4
678.019	Z/H	48.9	-12.7	36.2	46.0	9.8	103	4
684.283	Z/V	50.1	-12.2	37.9	46.0	8.1	100	4
875.054	Z/V	52.3	-10.6	41.7	46.0	4.3(*)	161	74
875.076	Z/H	55.4	-10.3	45.1	46.0	0.9(*)	100	294

Note: Level QP = Reading QP + Factor

(\*) The measured result is below the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to determine compliance at a level of confidence of 95%. However, the measured result indicates a high probability that the tested product complies with the specification limit.

## 7.2 Radiated Emission of Receiver

### 7.2.1 Radiated Spurious Emission of Receiver, RSS-210 2.6 and RSS-Gen 7.2.3.2

**RESULT:** **N/A**

Frequency range: 30MHz – 1000MHz

Requirements:

The emissions from the unintentional radiator shall not exceed the field strength specified in RSS-210 Table 2 (and RSS-Gen Table 1).

Test procedure:

RSS-Gen 4.10

The test was not performed, since the EUT has no receiver-only mode.

## 8. Photographs of the Test Setup

Details refer to the attachment

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## 11. Attachment: Photographs of test setup

5 pages following