



<b>Prüfbericht - Nr.: 12607854 001</b> <i>Test Report No.:</i>			<b>Seite 1 von 33</b> <i>Page 1 of 33</i>		
<b>Auftraggeber:</b> <i>Client:</i>			<b>Kyocera Mita Corporation</b> 2-28 1-Chome Tamatsukuri, Chuo-ku, Osaka 540-8585, Japan		
<b>Gegenstand der Prüfung:</b> <i>Test Item:</i>			<b>RFID Module</b>		
<b>Bezeichnung:</b> <i>Identification:</i>		<b>2K9A0523</b>	<b>Serien-Nr.:</b> <i>Serial No.:</i>		<b>0-0500030, 0-0500035</b>
<b>Wareneingangs-Nr.:</b> <i>Receipt No.:</i>		<b>PT0214004465-1</b>	<b>Eingangsdatum:</b> <i>Date of Receipt:</i>		<b>2010-09-27</b>
<b>Prüfort:</b> <i>Testing Location:</i>		<b>TÜV Rheinland Japan Ltd. – Global Technology Assessment Center</b> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
<b>Prüfgrundlage:</b> <i>Test Specification:</i>		<b>[Health Protection]</b> <b>EN 50364:2001</b> <b>[Radio]</b> <b>EN 302 291-2 V1.1.1</b> <b>EN 302 291-1 V1.1.1</b>			
<b>Prüfergebnis:</b> <i>Test Result:</i>		<b>Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).</b> <i>The test item passed the test specification(s).</i>			
<b>Prüflaboratorium:</b> <i>Testing Laboratory:</i>		<b>TÜV Rheinland Japan Ltd. – Global Technology Assessment Center</b> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
<b>geprüft/ tested by:</b>			<b>kontrolliert/ reviewed by:</b>		
					
2010-12-08	T. Sauter / Inspector		2010-12-08	M. Zietz / Reviewer	
<b>Datum</b>	<b>Name/Stellung</b>	<b>Unterschrift</b>	<b>Datum</b>	<b>Name/Stellung</b>	<b>Unterschrift</b>
<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>	<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>
<b>Sonstiges / Other Aspects:</b> This test report is prepared for verification of compliance with harmonized standards within clause 3.1a (health requirements only) and 3.2 of R&TTE directive (1999/5/EC).					
<b>Abkürzungen:</b>			<b>Abbreviations:</b>		
P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet			P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested		
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. <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

**5.1.1 HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS***RESULT: PASS***6.1.1 RADIATED H-FIELD***RESULT: PASS***6.1.2 TRANSMITTER RADIATED SPURIOUS EMISSIONS BELOW 30MHz***RESULT: PASS***6.1.3 TRANSMITTER CONDUCTED SPURIOUS EMISSIONS ABOVE 30MHz***RESULT: N/A***6.1.4 TRANSMITTER RADIATED SPURIOUS EMISSIONS ABOVE 30MHz***RESULT: PASS***6.1.5 DUTY CYCLE***RESULT: PASS***6.2.1 RECEIVER RADIATED SPURIOUS EMISSIONS BELOW 30MHz***RESULT: N/A***6.2.2 TRANSMITTER CONDUCTED SPURIOUS EMISSIONS ABOVE 30MHz***RESULT: N/A***6.2.3 RECEIVER RADIATED SPURIOUS EMISSIONS ABOVE 30MHz***RESULT: N/A*

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## **1. General Remarks**

### **1.1 Complementary Materials**

All attachments are integral parts of this test report.

This applies especially to the following documents:

- (1) Test plan 12607854 A by TÜV Rheinland Japan Ltd.
- (2) Declaration from Applicant concerning EN 302 291-2 by Kyocera Mita Corporation

## 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.

### 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 Radio Testing</b>					
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	2011-02
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2010-12
3dB Attenuator	Hewlett Packard	8491A 3 dB	34742	RF-0286	2010-11
Low Noise Pre-Amplifier, 9kHz-1GHz	TSJ	MLA-10K01-B01-35	1336163	RF-0275	2010-11
RF Selector (10m)	Toyo Corporation	NS4900	0703-182	RF-0029	2011-05
Loop Antenna with power supply, 9kHz-30MHz	Rohde & Schwarz	HFH2-Z2	100139	RF-0048	2011-02
Trilog Antenna, 25-1000MHz (RX)	Schwarzbeck	VULB9168	0245	RF-0019	2011-05
Dipole Antenna, 28-60MHz (TX)	EMCO	3121C-DB1	6904-1170	RF-0371	2011-06
Dipole Antenna, 60-140MHz (TX)	EMCO	3121C-DB2	6904-1170	RF-0372	2011-06
Dipole Antenna, 140-400MHz (TX)	EMCO	3121C-DB3	6904-1170	RF-0373	2011-06
Dipole Antenna, 400-1000MHz (TX)	EMCO	3121C-DB4	6904-1170	RF-0374	2011-06
Signal Generator (9kHz - 1.1GHz)	Rohde & Schwarz	SML01	105325	RF-0073	2011-04
Temperature Chamber	Voetsch	VT 4018	585660250 90010	BT-8012	2011-08

## 2.3 Measurement Uncertainty

**Table 2: Emission Measurement Uncertainty**

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission	9kHz - 30MHz	±4.0dB
	30MHz - 1GHz	±4.8dB
	> 1GHz	±3.3dB

### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is an RFID reader-writer module intended to be used with a dedicated multifunction printer. It communicates with tags placed on the printer toner cartridges by RFID protocol.

The EUT has four antennas which cannot operate simultaneously. Only one antenna at a time is operable while the EUT is active.

#### 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  
Operation frequency band: Annex 9, band f (acc. to ERC Recommendation 70-03)

Rated voltage: DC 3.3V  $\pm$  15%  
Rated current: 100mA max  
Protection class: III

Test voltage: Refer to each test item.

Duty cycle for testing: 20%

**Table 3: List of Cables used for Testing**

No.	Interface	Cable Length for Testing, Shielding	Interface Classification
1.	4-wire flat cable [EUT <-> Test Jig]	0.4m, un-shielded for radiated measurements	DC Power and Signal Port
2.	BNC coaxial cable [EUT <-> Spectrum Analyzer] (for antenna port conducted measurements only)	1m, shielded	Signal Port
3.	AC Mains for Test Jig	2m, Un-Shielded	AC Power Port



### **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.

The basic operation modes are:

- A. Continuously writing mode (sending data to RFID tag) at 13.56MHz according to ISO 15693
- B. Continuously reading mode (reading signals from RFID tags) at 13.56MHz according to ISO 15693

Note:

The EUT is a transceiver (transmitter and receiver operate at the same time). Therefore receiver spurious emission measurements were not performed, since they are not required by EN 302 291-2 V1.1.1 for such equipment.

In addition, in modes A and B, transmitter and receiver are both active. The test items related to the transmitter parameters were thus tested in both modes A and B.

The operation modes mentioned for each test item in the attached test plan 12607854 A should thus be corrected according to the above considerations.

Since the EUT is not operated in stand-by mode in normal use, measurements in stand-by mode were not performed.

### **3.4 Clock Frequencies**

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

### **3.5 Noise Suppressing Parts**

Nothing mentioned explicitly.

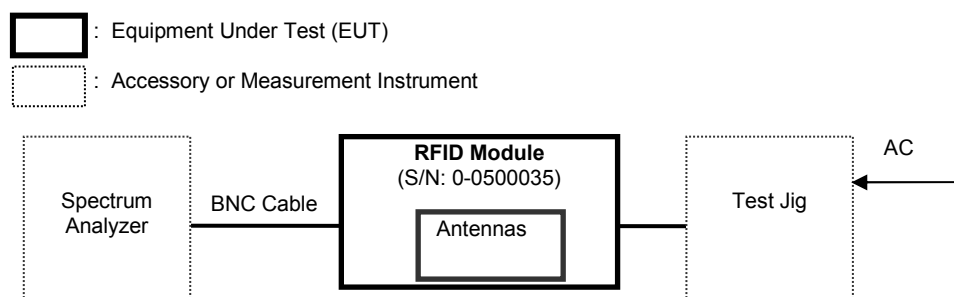
## 4. Test Set-up and Operation Modes

### 4.1 Test Methodology

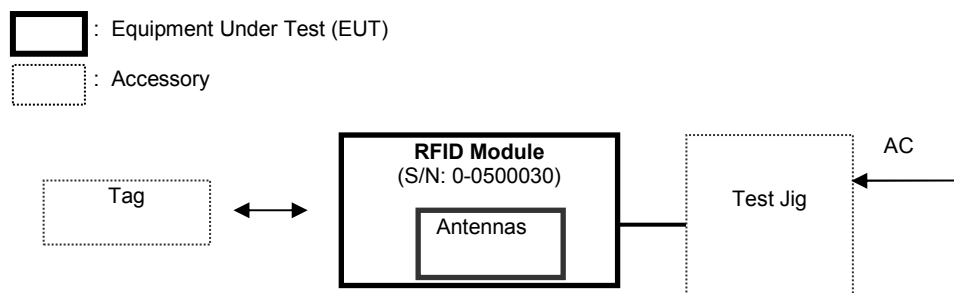
**Radio:** The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Physical Configuration for Testing

**Figure 1: Setup for Antenna Port Conducted Measurements**



**Figure 2: Setup for Radiated Emission Measurements**



**Notes:**

The test jig was used to supply the EUT with DC voltage. In addition, it can select the antenna used and the operation mode.

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

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

### **4.3 Test Software**

No software used for the testing.

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

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

- |                |              |
|----------------|--------------|
| 1. Product:    | Test Jig     |
| Manufacturer:  | Kyocera Mita |
| Rated Voltage: | AC 100-120V  |
| Frequency:     | 50/60Hz      |

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

No additional measures were employed to achieve compliance.

## 5. Test Results HEALTH PROTECTION

### 5.1.1 Human Exposure to Electromagnetic Fields

**RESULT:****PASS**

Date of testing: 2010-09-27, 2010-09-28

Ambient temperature: 25, 25°C

Relative humidity: 47, 62%

Atmospheric pressure: 1018, 1004hPa

Test procedure: EN 50364:2001

Low test voltage: DC 2.97V

Normal test voltage: DC 3.3V

High test voltage: DC 3.63V

Low test temperature: -20°C

Normal test temperature: 25°C

High test temperature: 55°C

Test mode applied: A, B

**Compliance criteria:**

According to EN 50364:2001, clause 5.1.1, the basic reference level of the H-field is 0.073A/m (97.27dBuA/m) rms for a device operating at 13.56MHz. The EUT complies with the standard requirements if the highest H-field at the minimum distance considered between the transmitting portion of the equipment and the user is less than the basic reference level.

**Measurement values:**

The minimum distance considered between the transmitting portion of the equipment and the user is 20cm.

The highest H-field level was measured as -10.2dBuA/m QP at a distance of 3m. This corresponds to a field level of 6.2dBuA/m QP at 20cm. (Field level at 20cm was calculated using the formulae given in EN 300 330-1 V1.3.1, annex J, section C.)

Refer to the test item Radiated H-Field here below for details on the measurement method and the test results.

**Verdict:**

Since the highest H-field level (QP) at 20cm is less than basic reference level (rms), it can be assumed that the compliance criteria are met.

## 6. Test Results RADIO

### 6.1 Transmitter Parameters

#### 6.1.1 Radiated H-Field

**RESULT:****PASS**

Date of testing:	2010-09-27, 2010-09-28
Ambient temperature:	25, 25°C
Relative humidity:	47, 62%
Atmospheric pressure:	1018, 1004hPa
Reference standard:	EN 302 291-2 V1.1.1, clause 4.2.1.1
Test procedure:	EN 302 291-1 V1.1.1, clause 7.1.1.2
Low test voltage:	DC 2.97V
Normal test voltage:	DC 3.3V
High test voltage:	DC 3.63V
Low test temperature:	-20°C
Normal test temperature:	25°C
High test temperature:	55°C
Test mode applied:	A, B

**Note:**

The carrier level was first measured at the antenna port in a conducted way at normal and extreme conditions while the EUT was inserted into a temperature chamber. The measurement was performed with a receiver using a quasi-peak detector. Deviations of the carrier level at extreme conditions from the level at normal conditions were recorded.

The EUT was then placed in a semi-anechoic chamber on a turntable 1.5m above the ground plane. The carrier H-field was measured in a radiated way under normal and extreme voltage conditions at normal temperature.

Measurements were made at a 3m distance with a loop antenna connected to a receiver operating in the CISPR quasi-peak detection mode. The receiver's 6 dB bandwidth was set to 9kHz.

Before final measurement of the H-field level was performed, the EUT orientations (X, Y, Z) were varied to find the orientation for which the highest emission is obtained, the EUT was rotated 360° and the loop antenna was rotated around its axis in order to determine the emission's maximum level.

Further precheck were performed to determine which antenna produced the highest carrier output level. Final measurement was performed using the antenna corresponding to the worst case antenna. Antenna 3 was selected as the worst case as it showed the highest field level.

The carrier H-field at 3m corresponding to extreme temperature conditions was calculated from the H-field level at 3m distance measured at normal temperature conditions and from the level offset found earlier at extreme conditions. The results for the radiated H-field at 3m distance under normal and extreme conditions were extrapolated to 10m and compared to the relevant limit.

Maximum level was obtained when the EUT was operated in mode A. Refer to the shaded row in the table below.

**Table 4: H-Field, Carrier Maximum Field Strength at Normal and Extreme Conditions, Mode A**

Freq. [MHz]	Reading at 3m [dBuV]	Factor [dB(1/m)]	Field at 3m [dBuV/m]	Field at 3m [dBuA/m]	Field at 10m [dBuA/m]	Limit at 10m [dBuA/m]	Margin [dB]	Voltage	Temp.
13.56	19.8	20.3	40.1	-11.4	-33.4	25.0	58.4	Low	Low
13.56	20.5	20.3	40.8	-10.7	-32.7	25.0	57.7	Normal	Low
13.56	21.0	20.3	41.3	-10.2	-32.2	25.0	57.2	High	Low
13.56	19.7	20.3	40.0	-11.5	-33.5	25.0	58.5	Low	Normal
13.56	20.4	20.3	40.7	-10.8	-32.8	25.0	57.8	Normal	Normal
13.56	20.9	20.3	41.2	-10.3	-32.3	25.0	57.3	High	Normal
13.56	19.7	20.3	40.0	-11.5	-33.5	25.0	58.5	Low	High
13.56	20.4	20.3	40.7	-10.8	-32.8	25.0	57.8	Normal	High
13.56	21.0	20.3	41.3	-10.2	-32.2	25.0	57.2	High	High

**Table 5: H-Field, Carrier Maximum Field Strength at Normal and Extreme Conditions, Mode B**

Freq. [MHz]	Reading at 3m [dBuV]	Factor [dB(1/m)]	Field at 3m [dBuV/m]	Field at 3m [dBuA/m]	Field at 10m [dBuA/m]	Limit at 10m [dBuA/m]	Margin [dB]	Voltage	Temp.
13.56	18.9	20.3	39.2	-12.3	-34.3	25.0	59.3	Low	Low
13.56	19.6	20.3	39.9	-11.6	-33.6	25.0	58.6	Normal	Low
13.56	20.	20.3	40.4	-11.1	-33.1	25.0	58.1	High	Low
13.56	18.8	20.3	39.1	-12.4	-34.4	25.0	59.4	Low	Normal
13.56	19.5	20.3	39.8	-11.7	-33.7	25.0	58.7	Normal	Normal
13.56	20.0	20.3	40.3	-11.2	-33.2	25.0	58.2	High	Normal
13.56	18.8	20.3	39.1	-12.4	-34.4	25.0	59.4	Low	High
13.56	19.5	20.3	39.8	-11.7	-33.7	25.0	58.7	Normal	High
13.56	20.1	20.3	40.4	-11.1	-33.1	25.0	58.1	High	High

Notes: The above tables correspond to the EUT orientation Y.

The readings for extreme temperature conditions were calculated from the readings at 3m at extreme voltage and normal temperature conditions and from the carrier level offsets found for extreme temperature conditions.

Field at 3m [dBuV/m] = Reading at 3m [dBuV] + Factor [dB(1/m)]

Field at 3m [dBuA/m] = Field [dBuV/m] – 51.5dB (see EN 302 291-1 V1.1.1, clause 7.1.1.2)

Field at 10m [dBuA/m] = Field at 3m [dBuA/m] – 22dB (see EN 300 330-1 V1.7.1, clause F.2)

**Table 6: H-Field, Lower Sideband of Spectrum Mask at Normal and Extreme Conditions, Mode A**

Freq. [MHz]	Reading QP at 3m [dBuV]	Factor [dB(1/m)]	Field QP at 3m [dBuV/m]	Field QP at 3m [dBuA/m]	Field QP at 10m [dBuA/m]	Limit QP at 10m [dBuA/m]	Margin [dB]	Voltage	Temp.
12.56	2.7	20.3	23.0	-28.5	-50.5	-16.0	34.5	Low	Low
12.56	4.5	20.3	24.8	-26.7	-48.7	-16.0	32.7	Normal	Low
12.56	5.8	20.3	26.1	-25.4	-47.4	-16.0	31.4	High	Low
12.56	2.7	20.3	23.0	-28.5	-50.5	-16.0	34.5	Low	Normal
12.56	4.4	20.3	24.7	-26.8	-48.8	-16.0	32.8	Normal	Normal
12.56	5.7	20.3	26.0	-25.5	-47.5	-16.0	31.5	High	Normal
12.56	2.7	20.3	23.0	-28.5	-50.5	-16.0	34.5	Low	High
12.56	4.4	20.3	24.7	-26.8	-48.8	-16.0	32.8	Normal	High
12.56	5.8	20.3	26.1	-25.4	-47.4	-16.0	31.4	High	High
12.66	3.1	20.3	23.4	-28.1	-50.1	-16.0	34.1	Low	Low
12.66	4.9	20.3	25.2	-26.3	-48.3	-16.0	32.3	Normal	Low
12.66	6.2	20.3	26.5	-25.0	-47.0	-16.0	31.0	High	Low
12.66	3.1	20.3	23.4	-28.1	-50.1	-16.0	34.1	Low	Normal
12.66	4.8	20.3	25.1	-26.4	-48.4	-16.0	32.4	Normal	Normal
12.66	6.1	20.3	26.4	-25.1	-47.1	-16.0	31.1	High	Normal
12.66	3.1	20.3	23.4	-28.1	-50.1	-16.0	34.1	Low	High
12.66	4.8	20.3	25.1	-26.4	-48.4	-16.0	32.4	Normal	High
12.66	6.2	20.3	26.5	-25.0	-47.0	-16.0	31.0	High	High
13.11	3.2	20.3	23.5	-28.0	-50.0	-10.0	40.0	Low	Low
13.11	5.0	20.3	25.3	-26.2	-48.2	-10.0	38.2	Normal	Low
13.11	6.3	20.3	26.6	-24.9	-46.9	-10.0	36.9	High	Low
13.11	3.2	20.3	23.5	-28.0	-50.0	-10.0	40.0	Low	Normal
13.11	4.9	20.3	25.2	-26.3	-48.3	-10.0	38.3	Normal	Normal
13.11	6.2	20.3	26.5	-25.0	-47.0	-10.0	37.0	High	Normal
13.11	3.2	20.3	23.5	-28.0	-50.0	-10.0	40.0	Low	High
13.11	4.9	20.3	25.2	-26.3	-48.3	-10.0	38.3	Normal	High
13.11	6.3	20.3	26.6	-24.9	-46.9	-10.0	36.9	High	High
13.41	3.2	20.3	23.5	-28.0	-50.0	-3.5	46.5	Low	Low
13.41	5.0	20.3	25.3	-26.2	-48.2	-3.5	44.7	Normal	Low
13.41	6.3	20.3	26.6	-24.9	-46.9	-3.5	43.4	High	Low
13.41	3.2	20.3	23.5	-28.0	-50.0	-3.5	46.5	Low	Normal
13.41	4.9	20.3	25.2	-26.3	-48.3	-3.5	44.8	Normal	Normal
13.41	6.2	20.3	26.5	-25.0	-47.0	-3.5	43.5	High	Normal
13.41	3.2	20.3	23.5	-28.0	-50.0	-3.5	46.5	Low	High
13.41	4.9	20.3	25.2	-26.3	-48.3	-3.5	44.8	Normal	High
13.41	6.3	20.3	26.6	-24.9	-46.9	-3.5	43.4	High	High
13.553	5.9	20.3	26.2	-25.3	-47.3	9.0	56.3	Low	Low
13.553	7.7	20.3	28.0	-23.5	-45.5	9.0	54.5	Normal	Low
13.553	9.0	20.3	29.3	-22.2	-44.2	9.0	53.2	High	Low
13.553	5.9	20.3	26.2	-25.3	-47.3	9.0	56.3	Low	Normal
13.553	7.6	20.3	27.9	-23.6	-45.6	9.0	54.6	Normal	Normal
13.553	8.9	20.3	29.2	-22.3	-44.3	9.0	53.3	High	Normal
13.553	5.9	20.3	26.2	-25.3	-47.3	9.0	56.3	Low	High
13.553	7.6	20.3	27.9	-23.6	-45.6	9.0	54.6	Normal	High
13.553	9.0	20.3	29.3	-22.2	-44.2	9.0	53.2	High	High



**Table 7: H-Field, Lower Sideband of Spectrum Mask at Normal and Extreme Conditions, Mode B**

Freq. [MHz]	Reading QP at 3m [dBuV]	Factor [dB(1/m)]	Field QP at 3m [dBuV/m]	Field QP at 3m [dBuA/m]	Field QP at 10m [dBuA/m]	Limit QP at 10m [dBuA/m]	Margin [dB]	Voltage	Temp.
12.56	2.7	20.3	23.0	-28.5	-50.5	-16.0	34.5	Low	Low
12.56	4.5	20.3	24.8	-26.7	-48.7	-16.0	32.7	Normal	Low
12.56	5.8	20.3	26.1	-25.4	-47.4	-16.0	31.4	High	Low
12.56	2.7	20.3	23.0	-28.5	-50.5	-16.0	34.5	Low	Normal
12.56	4.4	20.3	24.7	-26.8	-48.8	-16.0	32.8	Normal	Normal
12.56	5.7	20.3	26.0	-25.5	-47.5	-16.0	31.5	High	Normal
12.56	2.7	20.3	23.0	-28.5	-50.5	-16.0	34.5	Low	High
12.56	4.4	20.3	24.7	-26.8	-48.8	-16.0	32.8	Normal	High
12.56	5.8	20.3	26.1	-25.4	-47.4	-16.0	31.4	High	High
12.66	3.1	20.3	23.4	-28.1	-50.1	-16.0	34.1	Low	Low
12.66	4.9	20.3	25.2	-26.3	-48.3	-16.0	32.3	Normal	Low
12.66	6.2	20.3	26.5	-25.0	-47.0	-16.0	31.0	High	Low
12.66	3.1	20.3	23.4	-28.1	-50.1	-16.0	34.1	Low	Normal
12.66	4.8	20.3	25.1	-26.4	-48.4	-16.0	32.4	Normal	Normal
12.66	6.1	20.3	26.4	-25.1	-47.1	-16.0	31.1	High	Normal
12.66	3.1	20.3	23.4	-28.1	-50.1	-16.0	34.1	Low	High
12.66	4.8	20.3	25.1	-26.4	-48.4	-16.0	32.4	Normal	High
12.66	6.2	20.3	26.5	-25.0	-47.0	-16.0	31.0	High	High
13.11	3.2	20.3	23.5	-28.0	-50.0	-10.0	40.0	Low	Low
13.11	5.0	20.3	25.3	-26.2	-48.2	-10.0	38.2	Normal	Low
13.11	6.3	20.3	26.6	-24.9	-46.9	-10.0	36.9	High	Low
13.11	3.2	20.3	23.5	-28.0	-50.0	-10.0	40.0	Low	Normal
13.11	4.9	20.3	25.2	-26.3	-48.3	-10.0	38.3	Normal	Normal
13.11	6.2	20.3	26.5	-25.0	-47.0	-10.0	37.0	High	Normal
13.11	3.2	20.3	23.5	-28.0	-50.0	-10.0	40.0	Low	High
13.11	4.9	20.3	25.2	-26.3	-48.3	-10.0	38.3	Normal	High
13.11	6.3	20.3	26.6	-24.9	-46.9	-10.0	36.9	High	High
13.41	3.2	20.3	23.5	-28.0	-50.0	-3.5	46.5	Low	Low
13.41	5.0	20.3	25.3	-26.2	-48.2	-3.5	44.7	Normal	Low
13.41	6.3	20.3	26.6	-24.9	-46.9	-3.5	43.4	High	Low
13.41	3.2	20.3	23.5	-28.0	-50.0	-3.5	46.5	Low	Normal
13.41	4.9	20.3	25.2	-26.3	-48.3	-3.5	44.8	Normal	Normal
13.41	6.2	20.3	26.5	-25.0	-47.0	-3.5	43.5	High	Normal
13.41	3.2	20.3	23.5	-28.0	-50.0	-3.5	46.5	Low	High
13.41	4.9	20.3	25.2	-26.3	-48.3	-3.5	44.8	Normal	High
13.41	6.3	20.3	26.6	-24.9	-46.9	-3.5	43.4	High	High
13.553	5.9	20.3	26.2	-25.3	-47.3	9.0	56.3	Low	Low
13.553	7.7	20.3	28.0	-23.5	-45.5	9.0	54.5	Normal	Low
13.553	9.0	20.3	29.3	-22.2	-44.2	9.0	53.2	High	Low
13.553	5.9	20.3	26.2	-25.3	-47.3	9.0	56.3	Low	Normal
13.553	7.6	20.3	27.9	-23.6	-45.6	9.0	54.6	Normal	Normal
13.553	8.9	20.3	29.2	-22.3	-44.3	9.0	53.3	High	Normal
13.553	5.9	20.3	26.2	-25.3	-47.3	9.0	56.3	Low	High
13.553	7.6	20.3	27.9	-23.6	-45.6	9.0	54.6	Normal	High
13.553	9.0	20.3	29.3	-22.2	-44.2	9.0	53.2	High	High

**Table 8: H-Field, Upper Sideband of Spectrum Mask at Normal and Extreme Conditions, Mode A**

Freq. [MHz]	Reading QP at 3m [dBuV]	Factor [dB(1/m)]	Field QP at 3m [dBuV/m]	Field QP at 3m [dBuA/m]	Field QP at 10m [dBuA/m]	Limit QP at 10m [dBuA/m]	Margin [dB]	Voltage	Temp.
13.567	6.9	20.3	27.2	-24.3	-46.3	9.0	55.3	Low	Low
13.567	8.7	20.3	29.0	-22.5	-44.5	9.0	53.5	Normal	Low
13.567	10.0	20.3	30.3	-21.2	-43.2	9.0	52.2	High	Low
13.567	6.9	20.3	27.2	-24.3	-46.3	9.0	55.3	Low	Normal
13.567	8.6	20.3	28.9	-22.6	-44.6	9.0	53.6	Normal	Normal
13.567	9.9	20.3	30.2	-21.3	-43.3	9.0	52.3	High	Normal
13.567	6.9	20.3	27.2	-24.3	-46.3	9.0	55.3	Low	High
13.567	8.6	20.3	28.9	-22.6	-44.6	9.0	53.6	Normal	High
13.567	10.0	20.3	30.3	-21.2	-43.2	9.0	52.2	High	High
13.71	3.1	20.3	23.4	-28.1	-50.1	-3.5	46.6	Low	Low
13.71	4.9	20.3	25.2	-26.3	-48.3	-3.5	44.8	Normal	Low
13.71	6.2	20.3	26.5	-25.0	-47.0	-3.5	43.5	High	Low
13.71	3.1	20.3	23.4	-28.1	-50.1	-3.5	46.6	Low	Normal
13.71	4.8	20.3	25.1	-26.4	-48.4	-3.5	44.9	Normal	Normal
13.71	6.1	20.3	26.4	-25.1	-47.1	-3.5	43.6	High	Normal
13.71	3.1	20.3	23.4	-28.1	-50.1	-3.5	46.6	Low	High
13.71	4.8	20.3	25.1	-26.4	-48.4	-3.5	44.9	Normal	High
13.71	6.2	20.3	26.5	-25.0	-47.0	-3.5	43.5	High	High
14.01	3.0	20.3	23.3	-28.2	-50.2	-10.0	40.2	Low	Low
14.01	4.8	20.3	25.1	-26.4	-48.4	-10.0	38.4	Normal	Low
14.01	6.1	20.3	26.4	-25.1	-47.1	-10.0	37.1	High	Low
14.01	3.0	20.3	23.3	-28.2	-50.2	-10.0	40.2	Low	Normal
14.01	4.7	20.3	25.0	-26.5	-48.5	-10.0	38.5	Normal	Normal
14.01	6.0	20.3	26.3	-25.2	-47.2	-10.0	37.2	High	Normal
14.01	3.0	20.3	23.3	-28.2	-50.2	-10.0	40.2	Low	High
14.01	4.7	20.3	25.0	-26.5	-48.5	-10.0	38.5	Normal	High
14.01	6.1	20.3	26.4	-25.1	-47.1	-10.0	37.1	High	High
14.46	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	Low
14.46	4.7	20.3	25.0	-26.5	-48.5	-16.0	32.5	Normal	Low
14.46	6.0	20.3	26.3	-25.2	-47.2	-16.0	31.2	High	Low
14.46	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	Normal
14.46	4.6	20.3	24.9	-26.6	-48.6	-16.0	32.6	Normal	Normal
14.46	5.9	20.3	26.2	-25.3	-47.3	-16.0	31.3	High	Normal
14.46	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	High
14.46	4.6	20.3	24.9	-26.6	-48.6	-16.0	32.6	Normal	High
14.46	6.0	20.3	26.3	-25.2	-47.2	-16.0	31.2	High	High
14.56	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	Low
14.56	4.7	20.3	25.0	-26.5	-48.5	-16.0	32.5	Normal	Low
14.56	6.0	20.3	26.3	-25.2	-47.2	-16.0	31.2	High	Low
14.56	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	Normal
14.56	4.6	20.3	24.9	-26.6	-48.6	-16.0	32.6	Normal	Normal
14.56	5.9	20.3	26.2	-25.3	-47.3	-16.0	31.3	High	Normal
14.56	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	High
14.56	4.6	20.3	24.9	-26.6	-48.6	-16.0	32.6	Normal	High
14.56	6.0	20.3	26.3	-25.2	-47.2	-16.0	31.2	High	High

**Table 9: H-Field, Upper Sideband of Spectrum Mask at Normal and Extreme Conditions, Mode B**

Freq. [MHz]	Reading QP at 3m [dBuV]	Factor [dB(1/m)]	Field QP at 3m [dBuV/m]	Field QP at 3m [dBuA/m]	Field QP at 10m [dBuA/m]	Limit QP at 10m [dBuA/m]	Margin [dB]	Voltage	Temp.
13.567	6.3	20.3	26.6	-24.9	-46.9	9.0	55.9	Low	Low
13.567	8.1	20.3	28.4	-23.1	-45.1	9.0	54.1	Normal	Low
13.567	9.4	20.3	29.7	-21.8	-43.8	9.0	52.8	High	Low
13.567	6.3	20.3	26.6	-24.9	-46.9	9.0	55.9	Low	Normal
13.567	8.0	20.3	28.3	-23.2	-45.2	9.0	54.2	Normal	Normal
13.567	9.3	20.3	29.6	-21.9	-43.9	9.0	52.9	High	Normal
13.567	6.3	20.3	26.6	-24.9	-46.9	9.0	55.9	Low	High
13.567	8.0	20.3	28.3	-23.2	-45.2	9.0	54.2	Normal	High
13.567	9.4	20.3	29.7	-21.8	-43.8	9.0	52.8	High	High
13.71	3.1	20.3	23.4	-28.1	-50.1	-3.5	46.6	Low	Low
13.71	4.9	20.3	25.2	-26.3	-48.3	-3.5	44.8	Normal	Low
13.71	6.2	20.3	26.5	-25.0	-47.0	-3.5	43.5	High	Low
13.71	3.1	20.3	23.4	-28.1	-50.1	-3.5	46.6	Low	Normal
13.71	4.8	20.3	25.1	-26.4	-48.4	-3.5	44.9	Normal	Normal
13.71	6.1	20.3	26.4	-25.1	-47.1	-3.5	43.6	High	Normal
13.71	3.1	20.3	23.4	-28.1	-50.1	-3.5	46.6	Low	High
13.71	4.8	20.3	25.1	-26.4	-48.4	-3.5	44.9	Normal	High
13.71	6.2	20.3	26.5	-25.0	-47.0	-3.5	43.5	High	High
14.01	3.0	20.3	23.3	-28.2	-50.2	-10.0	40.2	Low	Low
14.01	4.8	20.3	25.1	-26.4	-48.4	-10.0	38.4	Normal	Low
14.01	6.1	20.3	26.4	-25.1	-47.1	-10.0	37.1	High	Low
14.01	3.0	20.3	23.3	-28.2	-50.2	-10.0	40.2	Low	Normal
14.01	4.7	20.3	25.0	-26.5	-48.5	-10.0	38.5	Normal	Normal
14.01	6.0	20.3	26.3	-25.2	-47.2	-10.0	37.2	High	Normal
14.01	3.0	20.3	23.3	-28.2	-50.2	-10.0	40.2	Low	High
14.01	4.7	20.3	25.0	-26.5	-48.5	-10.0	38.5	Normal	High
14.01	6.1	20.3	26.4	-25.1	-47.1	-10.0	37.1	High	High
14.46	3.0	20.3	23.3	-28.2	-50.2	-16.0	34.2	Low	Low
14.46	4.8	20.3	25.1	-26.4	-48.4	-16.0	32.4	Normal	Low
14.46	6.1	20.3	26.4	-25.1	-47.1	-16.0	31.1	High	Low
14.46	3.0	20.3	23.3	-28.2	-50.2	-16.0	34.2	Low	Normal
14.46	4.7	20.3	25.0	-26.5	-48.5	-16.0	32.5	Normal	Normal
14.46	6.0	20.3	26.3	-25.2	-47.2	-16.0	31.2	High	Normal
14.46	3.0	20.3	23.3	-28.2	-50.2	-16.0	34.2	Low	High
14.46	4.7	20.3	25.0	-26.5	-48.5	-16.0	32.5	Normal	High
14.46	6.1	20.3	26.4	-25.1	-47.1	-16.0	31.1	High	High
14.56	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	Low
14.56	4.7	20.3	25.0	-26.5	-48.5	-16.0	32.5	Normal	Low
14.56	6.0	20.3	26.3	-25.2	-47.2	-16.0	31.2	High	Low
14.56	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	Normal
14.56	4.6	20.3	24.9	-26.6	-48.6	-16.0	32.6	Normal	Normal
14.56	5.9	20.3	26.2	-25.3	-47.3	-16.0	31.3	High	Normal
14.56	2.9	20.3	23.2	-28.3	-50.3	-16.0	34.3	Low	High
14.56	4.6	20.3	24.9	-26.6	-48.6	-16.0	32.6	Normal	High
14.56	6.0	20.3	26.3	-25.2	-47.2	-16.0	31.2	High	High

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Notes: The above tables correspond to the EUT orientation Y.

The readings for extreme conditions were calculated from the readings at 3m distance at normal temperature conditions and from the carrier level offsets found for extreme temperature conditions.

Field at 3m [dBuV/m] = Reading at 3m [dBuV] + Factor [dB(1/m)]

Field at 3m [dBuA/m] = Field at 3m [dBuV/m] – 51.5dB (see EN 302 291-1 V1.1.1, clause 7.1.1.2)

Field at 10m [dBuA/m] = Field at 3m [dBuA/m] – conversion factor (see EN 300 330-1 V1.7.1, clause F.2)

## 6.1.2 Transmitter Radiated Spurious Emissions below 30MHz

**RESULT:****PASS**

Date of testing:	2010-09-28
Ambient temperature:	25°C
Relative humidity:	62%
Atmospheric pressure:	1004hPa
Reference Standard:	EN 302 291-2 V1.1.1, clause 4.2.2.2
Test procedure:	EN 302 291-1 V1.1.1, clause 7.2.3.1
Frequency range:	9kHz – 30MHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber
Supply voltage during testing:	DC 3.3V
Test mode applied:	A, B

**Note:**

The EUT was placed on a non-conductive turntable 1.5m above the ground plane in a semi-anechoic chamber. The emission produced by the EUT was measured by a loop antenna connected to a test receiver.

Before final measurement of spurious emissions was performed, the EUT was scanned to determine its emission spectrum profile. The EUT orientations (X, Y, Z) were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 9kHz to 30MHz. At each frequency where a spurious emission was found, the EUT was rotated 360° and the measuring loop antenna was rotated around its vertical axis in order to determine the emission's maximum level.

For frequencies between 9kHz and 30MHz, measurements were performed with a receiver operating in the CISPR quasi-peak detection mode. The receiver's 6 dB bandwidth was set to 200Hz (below 150kHz) or 9kHz (above 150kHz).

Final measurement was performed in the operation mode and with the EUT antenna producing the highest spurious emission level. Mode A and antenna 3 were found to correspond to the worst case configuration.

Since the level of the measured spurious was very low, measurements were made at a 3m distance instead of 10m and the measurements were interpolated to 10m.

The highest emission amplitudes relative to the appropriate limit are reported here below. Emissions other than those mentioned are small or not detectable.

**Table 10: Radiated Spurious Emissions, Quasi-Peak Data, 9kHz – 30MHz, Mode A**

Freq. [MHz]	EUT Orient.	Reading at 3m [dBuV]	Factor [dB(1/m)]	Level at 3m [dBuV/m]	Level at 3m [dBuA/m]	Level at 10m [dBuA/m]	Limit at 10m [dBuA/m]	Margin [dB]
27.120	Y	4.4	21.9	26.3	-25.2	-38.5	-3.5	35.0

Notes: Level at 3m [dBuV/m] = Reading at 3m [dBuV] + Factor [dB(1/m)]

Level at 3m [dBuA/m] = Level at 3m [dBuV/m] – 51.5dB (see EN 302 291-1 V1.1.1, clause 7.2.3.1)

Level at 10m [dBuA/m] = Level at 3m [dBuA/m] – conversion factor (see EN 300 330-1 V1.7.1, clause F.2)

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*Page 23 of 33***6.1.3 Transmitter Conducted Spurious Emissions above 30MHz****RESULT:****N/A**

Reference Standard: EN 302 291-2 V1.1.1, clause 4.2.2.1  
Test procedure: EN 302 291-1 V1.1.1, clause 7.2.2.1

Frequency range: 9kHz – 30MHz

**Note:**

This test is not applicable, since the equipment incorporates an integral antenna.  
Transmitter spurious emissions above 30MHz were measured by a radiated method  
(see next test item).

**6.1.4 Transmitter Radiated Spurious Emissions above 30MHz****RESULT:****PASS**

Date of testing:	2010-10-01
Ambient temperature:	22°C
Relative humidity:	70%
Atmospheric pressure:	1016hPa
Reference standard:	EN 302 291-2 V1.1.1, clause 4.2.2.3
Test procedure:	EN 302 291-1 V1.1.1, clause 7.2.4.1
Frequency range:	30MHz – 1GHz
Measurement distance:	3m
Kind of test site:	Full Anechoic Chamber
Supply voltage during testing:	DC 3.3V
Test mode applied:	A, B

**Note:**

The EUT was placed on a styrene foam table in a full anechoic chamber. The power emitted by the EUT was measured by a test antenna connected to a test receiver.

Before final measurement of spurious emissions was performed, the EUT was scanned to determine its emission spectrum profile for both horizontal and vertical polarizations of the test antenna and for each EUT orientations (X, Y, Z).

At each frequency where a spurious emission was found, the EUT and the test antenna were set in the orientation for which the highest emission is obtained and the table was rotated in order to find the maximum emission angle. The spurious emission power was then recorded and the result was corrected by a substitution method factor.

This correction factor was obtained by replacing the EUT by a substitution antenna connected to a signal generator (SG). The factor was calculated based on the known SG output power, substitution antenna gain and reading of the spectrum analyzer.

For frequencies below 1GHz, final measurements were performed with a test receiver using a quasi-peak detector with a resolution bandwidth set to 120kHz.

Final measurement was performed in the operation mode and with the EUT antenna producing the highest spurious emission level. Mode A and antenna 2 were found to correspond to the worst case configuration.

The highest emission amplitudes relative to the appropriate limit are reported here below. Emissions other than those mentioned are small or not detectable.



**Table 11: Spurious Emissions, 30MHz – 1GHz, Mode A**

Frequency [MHz]	EUT / Antenna Orient.	Reading [dBm]	Factor [dB]	Spurious Level [dBm]	Limit [dBm]	Margin [dB]
488.17	Z / H	-62.40	-7.17	-69.57	-54.00	15.57
854.29	Z / H	-70.00	-2.02	-72.02	-54.00	18.02

Note: Spurious Power = Reading + Factor  
Factor = SG output power – SG cable loss + Substitution antenna gain (in dBd) – Associated reading (on spectrum analyzer)

### 6.1.5 Duty Cycle

**RESULT:****PASS**

Reference standard: EN 302 291-2 V1.1.1, clause 4.2.3  
Requirement: EN 302 291-1 V1.1.1, clause 7.3

The maximum duty cycle declared by the manufacturer is shown in the table here below.  
Refer to the attached document: Declaration from Applicant concerning EN 302 291-2  
by Kyocera Mita Corporation for more details.

**Table 12: Duty Cycle**

Declared Duty Cycle	Duty Cycle Class	Max. Duty Cycle Ratio
< 20%	4	Up to 100%

## 6.2 Receiver Parameters

### 6.2.1 Receiver Radiated Spurious Emissions below 30MHz

**RESULT:** N/A

Reference Standard: EN 302 291-2 V1.1.1, clause 4.3.1.1  
Test procedure: EN 302 291-1 V1.1.1, clause 8.2.2

Frequency range: 9kHz – 30MHz

Note:

This test is not applicable, since the equipment is a transceiver (transmitter and receiver operate at the same time).

### 6.2.2 Transmitter Conducted Spurious Emissions above 30MHz

**RESULT:** N/A

Reference Standard: EN 302 291-2 V1.1.1, clause 4.3.1.2  
Test procedure: EN 302 291-1 V1.1.1, clause 8.2.2

Frequency range: 30MHz – 1GHz

Note:

This test is not applicable, since the equipment is a transceiver (transmitter and receiver operate at the same time).

### 6.2.3 Receiver Radiated Spurious Emissions above 30MHz

**RESULT:** N/A

Reference standard: EN 302 291-2 V1.1.1, clause 4.3.1.2  
Test procedure: EN 302 291-1 V1.1.1, clause 8.2.2

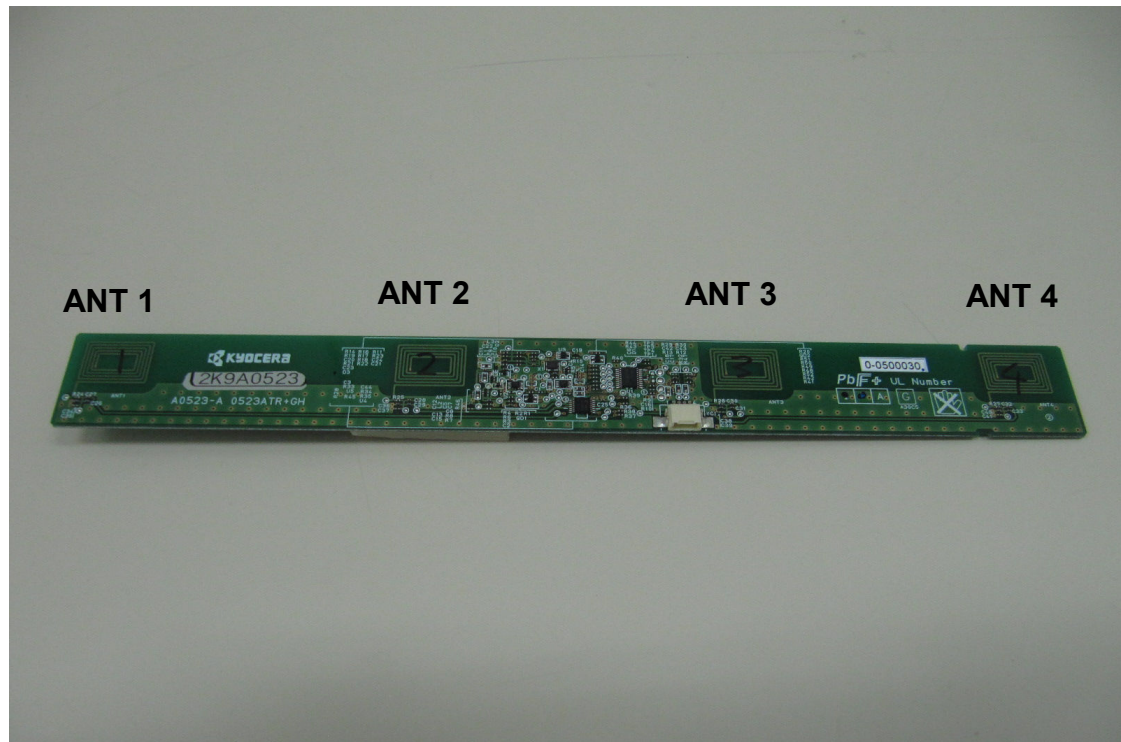
Frequency range: 30MHz – 1GHz

Note:

This test is not applicable, since the equipment is a transceiver (transmitter and receiver operate at the same time).

## 7. Photographs of the Test Setup

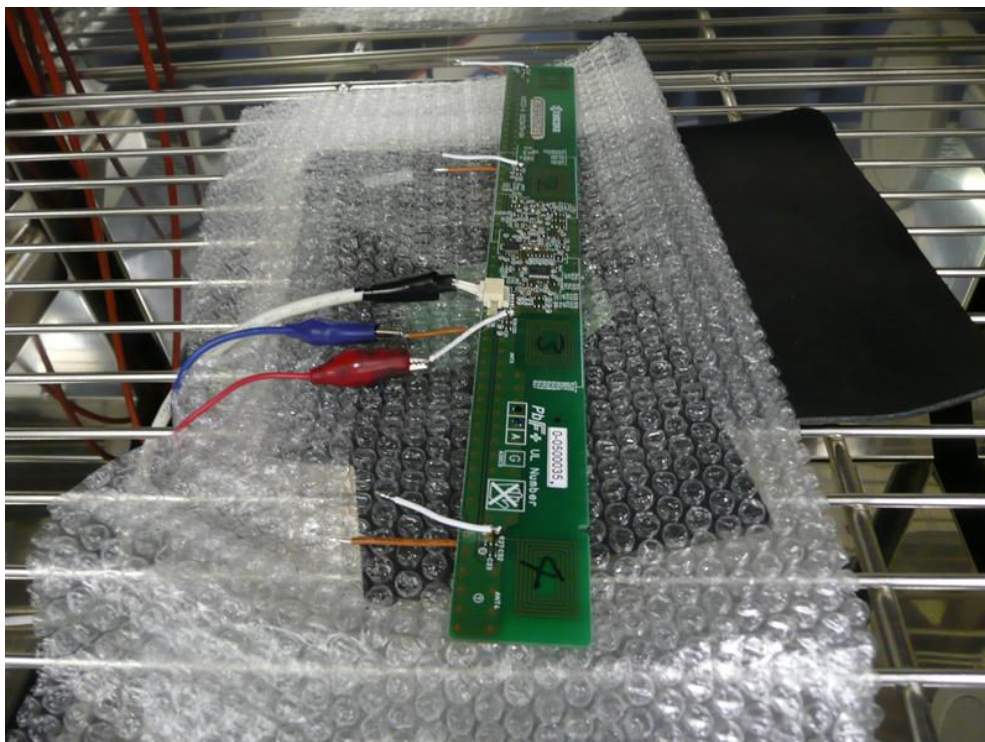
Photograph 1: EUT Overview



**Photograph 2: Set-up for Antenna Port Conducted Measurements, General View**



**Photograph 3: Set-up for Antenna Port Conducted Measurements, inside Temperature Chamber**





**Photograph 4: Set-up for Radiated Spurious Emissions below 30MHz**



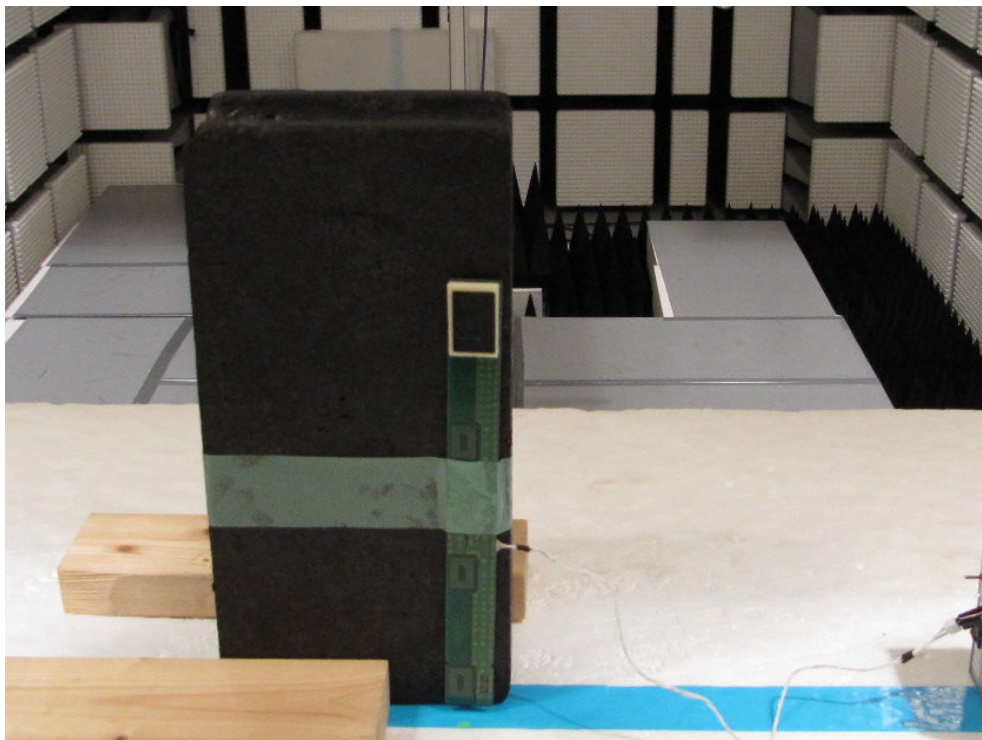
**Photograph 5: Set-up for Radiated Spurious Emissions above 30MHz**



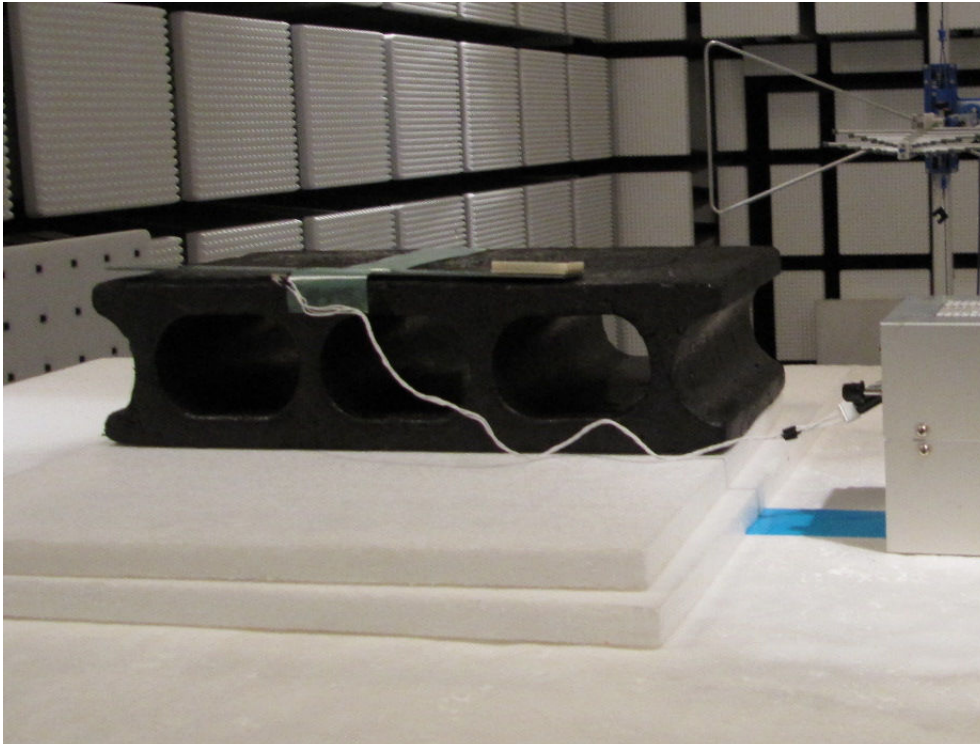
**Photograph 6: Set-up for Radiated Emissions, EUT Configuration X-Axis**



**Photograph 7: Set-up for Radiated Emissions, EUT Configuration Y-Axis**



**Photograph 8: Set-up for Radiated Emissions, EUT Configuration Z-Axis**





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## 11. Attachment: Test Plan 12607854 A by TÜV Rheinland Japan Ltd.

7 pages following

## 12. Attachment: Declaration from Applicant concerning EN 302 291-2

1 pages following