FCC ID: E522K0A0540 IC: 1059B-2K0A0540



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Auftraggeber:Kyocera Mita CorporClient:2-28 1-Chome Tamats	<b>ation</b> ukuri, Chuo-ku, Osaka 540-8585, Japan		
Gegenstand der Prüfung: RFID Module			
Bezeichnung: 2K0A0540 Identification:	Serien-Nr.: Engineering Samples		
Wareneingangs-Nr.: PT0214004465-1 Receipt No.:	Eingangsdatum: 2010-09-27 Date of Receipt:		
Prüfort:TÜV Rheinland Japan Ltd OTesting Location:4-25-2 Kita-Yamata, Tsuzuki-kita-Yamata, Tsuzuki-kita-Yamata-Yamata-Yamata-Yamata-Yamata-Yamata-Yamata-Yamata-Yamata-Yamata-Yamata-Yama	<b>Global Technology Assessment Center</b> J, Yokohama 224-0021, Japan		
Prüfgrundlage:FCC 47 CFR Part 15, Subpart C, STest Specification:ANSI C63.4-2003	Section 15.225 (October 1, 2009)		
RSS-210 (Issue 7): 2007 RSS-Gen (Issue 2): 2007			
Prüfergebnis:Der Prüfgegenstand entspricTest Result:The test item passed the test s	ht oben genannter Prüfgrundlage(n). Decification(s).		
Prüflaboratorium:TÜV Rheinland Japan Ltd OTesting Laboratory:4-25-2 Kita-Yamata, Tsuzuki-kita	<b>Global Technology Assessment Center</b> J, Yokohama 224-0021, Japan		
geprüft/ tested by:	controlliert/ reviewed by:		
2010-11-29 T. Sauter / Inspector 2	المعادية من المحافظ (مريد من مريد) 1010-11-29 T. Cheung / Reviewer		
DatumName/StellungUnterschriftIDateName/PositionSignatureI	Datum Name/Stellung Unterschrift Date Name/Position Signature		
<b>Sonstiges</b> <i>I Other Aspects:</i> This test report deals only with the intentional radiator portion of the tested product.			
Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations: P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested		
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmu auszugsweise vervielfältigt werden. Dieser Bericht be This test report relates to the a.m. test sample. Without perm duplicated in extracts. This test report does not entitle	ster und darf ohne Genehmigung der Prüfstelle nicht erechtigt nicht zur Verwendung eines Prüfzeichens. ission of the test center this test report is not permitted to be to carry any safety mark on this or similar products.		



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3.2.2 ANTENNA REQUIRE RESULT: PASS	EMENTS, FCC 15.203, FCC 15.204	AND RSS-GEN 7.1.4
5.1.1 FREQUENCY STABI GEN 7.2.4 RESULT: PASS	ILITY, FCC 15.225(E), RSS-210 A2.	6, RSS-GEN 4.7 AND RSS-
6.1.1 20DB BANDWIDTH RESULT: PASS	, FCC 15.215(c)	
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# 1. General Remarks

The tested RFID module was evaluated under the relevant FCC and IC requirements in order to apply for a Limited Modular Approval.

The RFID module is intended for use with the printers 205c and 255c by Kyocera Mita. These two printers have an identical construction. Their only difference is the printing speed, which is set by the internal software.

Testing was performed in two configurations: the RFID module tested in stand-alone basis (only connected to a test jig) and while inserted into a printer. The printer 255c was selected as representative model for testing purpose.

# 1.1 Complementary Materials

All attachments are integral parts of this test report.

This applies especially to the following document:

(1) Photographs of Test Setup by TÜV Rheinland Japan Ltd.



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# 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.



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# 2.2 List of Test and Measurement Instruments

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

Kind of Equipment	Kind of Equipment Manufacturer		Serial Number	Equipment ID	Calibrated until	
For Antenna Port Conducted Emission						
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	2011-02	
Temperature Chamber	Voetsch	VT 4018	585660250 90010	BT-8012	2011-08	
For AC Power Line Cor	nducted Emission					
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2010-12	
LISN	Rohde & Schwarz	ENV216	100276	RF-0016	2011-06	
LISN	Schwarzbeck Mess-Electronik	NSLK 8128 (4X32/50A)	8128-239	RF-0017	2011-05	
For Radiated Emission						
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	2011-02	
RF Selector (10m)	Toyo Corporation	NS4900	0703-182	RF-0029	2011-05	
3dB Attenuator 500hm	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	
Biconical Antenna, 30- 300MHz	EMCO	3110B	9603-2379	RF-0207	2011-02	
Trilog Antenna, 30- 1000MHz Schwarzbeck		VULB9168	0245	RF-0019	2011-05	
Constant Voltage Constant Frequency Stabilizers						
CVCF (Shielded Room)	NF Corporation	ESU2000S	9075612	RF-0210	N/A	
CVCF Booster (Shielded Room)	NF Corporation	ESU2000B	9074403	RF-0211	N/A	
CVCF (10m chamber)	NF Corporation	ESU2000S	9075612	RF-0212	N/A	
CVCF Booster (10m chamber)	NF Corporation	ESU2000B	9074403	RF-0213	N/A	



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# 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	±4.0dB
	above 30MHz	±4.7dB



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# 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
FCC classification:	DXX
Emission designator:	A1D
Rated voltage: Rated current: Protection class:	DC3.3V ± 15% 100mA III
Test voltage:	Refer to each test item.

#### Table 3: List of Cables used for Testing, Configuration with Test Jig

No.	Interface	Cable Length for Testing, Shielding	Interface Classification
1.	4-wire flat cable [EUT <-> Test Jig]	0.4m, un-shielded for radiated measurements, 1m, shielded for other 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

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# Table 4: List of Cables used for Testing, Configuration with Printer

No.	Interface	Cable Length for Testing, Shielding	Interface Classification
1.	AC Mains	2.5m, un-shielded	AC Power Port
2.	USB	1m, shielded	Signal Port
3.	Ethernet	1m, un-shielded	Signal Port

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

#### RESULT:

The maximum carrier output field level for the EUT was 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

PASS

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





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### **3.3 Independent Operation Modes**

The EUT was fully tested on a stand-alone basis (only attached to a test jig). Fundamental and in-band radiated emission measurements as well as radiated and AC power line conducted spurious emission measurements were performed additionally with the EUT installed into a host (printer). The test system was configured in both cases in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worstcase behavior of the test setup has been carried out as prescribed in ANSI C63.4:2003.

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
- C. Continuously transmitting (Tx) mode, unmodulated signal

Note:

The EUT is a transceiver. In modes A and B, transmitter and receiver are both active.

In the configuration where the EUT is used in a printer, operation of the RFID module is performed in both modes A and B at the same time (read/write mode).

# 3.4 Clock Frequencies

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



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# 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 Port Conducted Measurements



Notes:

The test jig was used to supply the EUT with DC voltage.

For antenna conducted measurements, the tested antenna was replaced by a  $50\Omega$  antenna connector.

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







Note:

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

# Figure 3: Setup for Radiated and AC Power Line Conducted Emission Measurements, Configuration with Printer



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

# 4.3 Test Software

No software was used for testing.

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Produkte Products



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### 4.4 Special Accessories and Auxiliary Equipment

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

- 1. Product: Test Jig Kyocera Mita Manufacturer: Unspecified Model: AC 100-120V Rated Voltage: Input Current: Unspecified Frequency: 50/60Hz Serial Number: Unspecified 2. Product: Printer Manufacturer: Kyocera Mita Model: 255c Rated Voltage: AC 120V Input Current: Unspecified Frequency: 60Hz Serial Number: SPL0909640
- 3. Product:Laptop ComputerManufacturer:IBMModel:ThinkPad X60sRated Voltage:DC 20VInput Current:3.5ASerial Number:LV-D3639 06/08
- 4. Product: AC Adapter for Laptop Computer Manufacturer: Lenovo
  Model: 65W 20V
  Rated Voltage: AC 100-240V
  Input Current: 1.5A
  Frequency: 50/60Hz
  Serial Number: 11S92P1156Z1ZBGFG7T4R5
- 5. Product: Mouse Manufacturer: Elecom Model: M-N2USV Rated Voltage: DC 5V Input Current: Unspecified Serial Number: 40602928



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<ol> <li>Product: Manufacturer: Model: Rated Voltage: Input Power: Frequency: Serial Number:</li> </ol>	Ethernet Hub Buffalo Giga Switching Hub, LSW3-GT-5NS(D1) AC 100V 5W 50/60Hz 16485784211186	

# 4.5 Countermeasures to achieve EMC Compliance

No additional measures were employed to achieve compliance.



1000003		
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5. Test Result Antenna Po	ts of Conducted Meas ort	surements at
5.1.1 Frequency Sta and RSS-Gen	bility, FCC 15.225(e), RSS- 7.2.4	210 A2.6, RSS-Gen 4.7
RESULT:		Pass
Date of testing:	2010-09-27	
Ambient temperature: Relative humidity: Atmospheric pressure:	25°C 47% 1018hPa	
Low test voltage: Normal test voltage: High test voltage:	DC 2.805V DC 3.3V DC 3.795V	
Lowest test temperature: Normal test temperature Highest test temperature	-20°C 20°C : 50°C	
Requirements: The frequency tolerance operating frequency ove voltage, and for a variation supply voltage at a temp	of the carrier signal shall be ma r a temperature variation of -20° on in the primary supply voltage f erature of 20°C.	intained within ± 0.01% of the °C to +50°C at normal supply from 85% to 115% of the rated
Test procedure: ANSI C63.4-2003 and R	SS-Gen 4.7	
The ELIT was placed ins	ide a temperature chamber and s	et to operation mode C

The EUT was placed inside a temperature chamber and set to operation mode C (continuous unmodulated transmitter signal). The frequency of the carrier signal was measured with a spectrum analyzer.

Measurements were performed for every 10°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  $20^{\circ}$ C for a variation of ± 15% of the input voltage. Since the EUT does not incorporate a voltage regulator, voltage variation measurements were performed on the EUT power supply.



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#### Table 5: Frequency Stability at 50°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560143	0.00105	0.01	Pass
2	13.56	13.560139	0.00103	0.01	Pass
5	13.56	13.560139	0.00103	0.01	Pass
10	13.56	13.560139	0.00103	0.01	Pass

#### Table 6: Frequency Stability at 40°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560193	0.00142	0.01	Pass
2	13.56	13.560189	0.00139	0.01	Pass
5	13.56	13.560185	0.00136	0.01	Pass
10	13.56	13.560185	0.00136	0.01	Pass

#### Table 7: Frequency Stability at 30°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560244	0.00180	0.01	Pass
2	13.56	13.560240	0.00177	0.01	Pass
5	13.56	13.560240	0.00177	0.01	Pass
10	13.56	13.560240	0.00177	0.01	Pass

## Table 8: Frequency Stability at 20°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560294	0.00217	0.01	Pass
2	13.56	13.560290	0.00214	0.01	Pass
5	13.56	13.560290	0.00214	0.01	Pass
10	13.56	13.560290	0.00214	0.01	Pass

#### Table 9: Frequency Stability at 10°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560332	0.00245	0.01	Pass
2	13.56	13.560332	0.00245	0.01	Pass
5	13.56	13.560332	0.00245	0.01	Pass
10	13.56	13.560332	0.00245	0.01	Pass



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#### Table 10: Frequency Stability at 0°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560361	0.00266	0.01	Pass
2	13.56	13.560361	0.00266	0.01	Pass
5	13.56	13.560361	0.00266	0.01	Pass
10	13.56	13.560361	0.00266	0.01	Pass

#### Table 11: Frequency Stability at -10°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560361	0.00266	0.01	Pass
2	13.56	13.560361	0.00266	0.01	Pass
5	13.56	13.560366	0.00270	0.01	Pass
10	13.56	13.560361	0.00266	0.01	Pass

#### Table 12: Frequency Stability at -20°C, DC 3.3V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560336	0.00248	0.01	Pass
2	13.56	13.560336	0.00248	0.01	Pass
5	13.56	13.560336	0.00248	0.01	Pass
10	13.56	13.560336	0.00248	0.01	Pass

#### Table 13: Frequency Stability at 20°C, DC 2.805V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560214	0.00158	0.01	Pass
2	13.56	13.560214	0.00158	0.01	Pass
5	13.56	13.560214	0.00158	0.01	Pass
10	13.56	13.560214	0.00158	0.01	Pass

#### Table 14: Frequency Stability at 20°C, DC 3.795V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.560332	0.00245	0.01	Pass
2	13.56	13.560328	0.00242	0.01	Pass
5	13.56	13.560328	0.00242	0.01	Pass
10	13.56	13.560328	0.00242	0.01	Pass



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6. Test Result	ts of Radiated Measur	rements
6.1 Radiated Em	ission of Transmitter	
6.1.1 20dB Bandwic	Ith, FCC 15.215(c)	
RESULT:		Pass
Date of testing:	2010-09-29	
Ambient temperature: Relative humidity: Atmospheric pressure:	24°C 41% 1011hPa	
Requirements:		
The 20dB bandwidth of t designated in the rule se	he emission shall be contained wit ction under which the equipment is	thin the frequency band s operated.
In the present case, the the 20dB bandwidth sho	frequency band is from 13.110MH; uld be maintained within this frequ	z to 14.010MHz, therefore ency band.
Test procedure:		

ANSI C63.4-2003

The EUT was placed on a nonconductive turntable 0.8m above the ground plane and set to operation mode A. Measurements were made at 3m distance with a loop antenna connected to a spectrum analyzer.

Measurement was performed with a suitable span to encompass the peak of the fundamental and using the following settings: RBW = 1kHz, VBW = 3kHz.



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#### Table 15: 20dB Bandwidth Edge Frequencies

20dB Bandwidth Edge Side	Operating Frequency [MHz]	Edge Frequency [MHz]	Limit [MHz]	Margin [MHz]
Low	13.56	13.5585	13.1100	0.4485
High	13.56	13.5621	14.0100	0.4479

#### Table 16: 20dB Bandwidth

Operating	20dB Bandwidth
Frequency [MHz]	[kHz]
13.56	3.62

#### Figure 4: 20dB Bandwidth



20dB bandwidth, Mode A Date: 29.SEP.2010 09:57:31



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6.1.2 99% Bandwidth	, RSS-Gen 4.6.1	
Date of testing:	2010-09-29	
Ambient temperature: Relative humidity: Atmospheric pressure:	24°C 41% 1011hPa	
Requirements: The 99% bandwidth shall t	be reported according to RSS-Gen	4.6.1.

Test procedure:

RSS-Gen 4.6.1.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane and set to operation mode A. Measurements were made at 3m distance with a loop antenna connected to a spectrum analyzer.

The spectrum analyzer resolution bandwidth (100Hz) corresponded 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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#### Table 17: 99% Bandwidth, Mode A

Operating Frequency [MHz]	99% Bandwidth [kHz]
13.56	1.12

#### Figure 5: 99% Bandwidth, Mode A



99% bandwidth, Mode A Date: 29.SEP.2010 10:33:57 FCC ID: E522K0A0540 IC: 1059B-2K0A0540



Toducis							
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6.1.3 Fundamental a 15.225(a)(b)(c),	nd In-band Radiated Emis RSS-210 A2.6(a)(b)(c)	sion, FCC					
RESULT:		Pass					
Date of testing:	2010-09-28, 20	)10-11-17					
Ambient temperature: Relative humidity: Atmospheric pressure:	25, 23°C 62, 40% 1004, 1016hPa	3					
Frequency range: Measurement distance: Kind of test site:	13.110MHz – 1 3m Semi Anechoic	I4.010MHz Chamber					
Requirements:							
The emissions from the in in FCC 15.225(a)(b)(c) ar	ntentional radiator shall not excee nd RSS-210 A2.6(a)(b)(c).	ed the field strength specified					
Test procedure:							
ANSI C63.4-2003							
The EUT was placed on a configurations were inves the case where the EUT i the configuration in which case and final measurement	a nonconductive turntable 0.8m a tigated: the case where the EUT s inserted into a printer. Prechec the EUT is attached to the test j ent was performed in this configu	above the ground plane. Two is attached to a test jig and k measurements showed that jig corresponds to the worst uration in modes A and B.					
Before final measurement scanned to determine its test system, the associate order to ensure that maxin voltage was additionally v conditions (test voltages:	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 additionally varied with $\pm 15\%$ of the normal voltage to achieve worst case						
Final radiated emission m distance. At each measur was rotated around its axi	easurements were performed wi ed frequency, the EUT was rotat is in order to determine the emis	ith a loop antenna at 3m ted 360° and the loop antenna sion's maximum level.					
For frequencies between was set to 9 kHz, and the mode.	10MHz and 30MHz, the spectrum analyzer was operated in the CI	m analyzer's 6 dB bandwidth ISPR quasi-peak detection					
The highest emission ampreport. The 30m limits we factor.	plitudes relative to the appropriat re extrapolated to a 3m distance	te limit are recorded in this using a 40dB correction					



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#### Table 18: Fundamental Emission, Mode A

Freq.	EUT	Reading QP	Factor	Field QP	Limit QP	Margin	Test Voltage
[MHz]	Orientation	[dBuV]	[dB(1/m)]	[dBuV/m]	[dBuV/m]	[dB]	[V]
13.560	Y	19.6	20.3	39.9	124.0	84.1	3.795

Note: Field QP = Reading QP + Factor

### Table 19: Fundamental Emission, Mode B

Freq.	EUT	Reading QP	Factor	Field QP	Limit QP	Margin	Test Voltage
[MHz]	Orientation	[dBuV]	[dB(1/m)]	[dBuV/m]	[dBuV/m]	[dB]	[V]
13.560	Y	18.8	20.3	39.1	124.0	84.9	3.795

Note: Field QP = Reading QP + Factor

#### Table 20: In-band Radiated Emission, Mode A

Freq. [MHz]	EUT Orientation	Reading QP [dBuV]	Factor [dB(1/m)]	Field QP [dBuV/m]	Limit QP [dBuV/m]	Margin [dB]	Test Voltage [V]
13.110	Y	6.1	20.3	26.4	69.5	43.1	3.795
13.410	Y	6.0	20.3	26.3	80.5	54.2	3.795
13.553	Y	7.6	20.3	27.9	90.5	62.6	3.795
13.567	Y	8.8	20.3	29.1	90.5	61.4	3.795
13.710	Y	5.9	20.3	26.2	80.5	54.3	3.795
14.010	Y	5.9	20.4	26.3	69.5	43.2	3.795

Note: Field QP = Reading QP + Factor

### Table 21: In-band Radiated Emission, Mode B

Freq. [MHz]	EUT Orientation	Reading QP [dBuV]	Factor [dB(1/m)]	Field QP [dBuV/m]	Limit QP [dBuV/m]	Margin [dB]	Test Voltage [V]
13.110	Y	6.0	20.3	26.3	69.5	43.2	3.795
13.410	Y	5.9	20.3	26.2	80.5	54.3	3.795
13.553	Y	7.3	20.3	27.6	90.5	62.9	3.795
13.567	Y	8.4	20.3	28.7	90.5	61.8	3.795
13.710	Y	5.8	20.3	26.1	80.5	54.4	3.795
14.010	Y	5.8	20.4	26.2	69.5	43.3	3.795



roducts		
<b>Prüfbericht - Nr.:</b> Test Report No.:	12607855 001	<b>Seite 25 von 35</b> Page 25 of 35
6.1.4 Out-of-Band R 30MHz, FCC 19 210 2.6	adiated Spurious Emission 5.225(d), FCC 15.209, RSS-2 <sup>,</sup>	of Transmitter below 10 A2.6(d) and RSS-
RESULT:		Pass
Date of testing:	2010-09-28, 2010	0-11-17
Ambient temperature: Relative humidity: Atmospheric pressure:	25, 23°C 62, 40% 1004, 1016hPa	
Frequency range: Measurement distance: Kind of test site:	9kHz – 30MHz 3m Semi Anechoic C	Chamber
Requirements: The emissions from the i in FCC 15.209(a), RSS-2	ntentional radiator shall not exceed 210 A2.6(d) and RSS-210 2.7.	I the field strength specified
Test procedure: ANSI C63.4-2003 and R	SS-Gen 4.9.	
The EUT was placed on configurations were inves to a test jig and the case measurements showed t corresponds to the worst configuration.	a nonconductive turntable 0.8m ab stigated in modes A and B: the case where the EUT is inserted into a pr hat the configuration in which the E case and final measurement was p	ove the ground plane. Two e where the EUT is attached rinter. Precheck EUT is attached to the test jig performed in this
Before final measuremer scanned to determine its test system, the associat order to ensure that max	Its of radiated emissions were performersion spectrum profile. The phy ed cabling and the EUT orientation imum emission amplitudes were at	ormed, the EUT was ysical arrangement of the (X, Y, Z) were varied in tained.

The spectrum was examined from 9kHz to 30MHz. Final radiated emission measurements were performed with a loop antenna at 3m distance. At each measured frequency, the EUT was rotated 360° and the loop antenna was rotated around its axis in order to determine the emission's maximum level.

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

The highest emission amplitudes relative to the appropriate limit are recorded in this report for the worst case operation mode (mode A). The 30m limit was extrapolated to a



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3m distance using a 40dB correction factor. Emissions other than those mentioned are small or not detectable.

#### Table 22: Radiated Emission, Quasi-Peak Data, 9kHz – 30MHz, Mode A

Frequency	EUT	Reading QP	Factor	Level QP	Limit QP	Margin
[MHz]	Orientation	[dBuV]	[dB(1/m)]	[dBuV/m]	[dBuV/m]	[dB]
27.12	Y	4.3	21.9	26.2	69.5	43.3

Note: Level QP = Reading QP + Factor

FCC ID: E522K0A0540 IC: 1059B-2K0A0540



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6.1.5 Radiated Spuri 15.225(d), FCC 15.20	ous Emission of Transmit 9, RSS-210 A2.6(d) and RS	ter above 30MHz, FCC S-210 2.6
RESULT:		Pass
Date of testing:	2010-09-29, 20	10-11-18
Ambient temperature: Relative humidity: Atmospheric pressure:	24, 22°C 41, 43% 1011, 1015hPa	
Frequency range: Measurement distance: Kind of test site:	30MHz – 136MI 3m Semi Anechoic	Hz Chamber
Requirements:		
The emissions from the in in FCC 15.209(a), RSS-21	tentional radiator shall not excee I0 A2.6(d) and RSS-210 2.7.	d the field strength specified
Test procedure:		
ANSI C63.4-2003 and RS	S-Gen 4.9.	
The EUT was placed on a configurations were invest to a test jig and the case w were performed in both co	nonconductive turntable 0.8m al igated in modes A and B: the cas where the EUT is inserted into a p onfigurations.	bove the ground plane. Two se where the EUT is attached printer. Final measurements
Before final measurement scanned to determine its e test system and the assoc emission amplitudes were orientation (X, Y, Z) was a	s of radiated emissions were per emission spectrum profile. The pl iated cabling were varied in orde attained. In the configuration wit idditionally varied to achieve wor	formed, the EUT was nysical arrangement of the er to ensure that maximum th the test jig, the EUT st case conditions.
The spectrum was examir transmitter frequency (136 3m distance.	ned from 30MHz to the 10th harm MHz). Final radiated emission m	nonic of the fundamental neasurements were made at
At each frequency where a the antenna was raised ar maximum level. Measurer polarizations.	a spurious emission was found, t nd lowered from 1 to 4m in order nents were taken using both hori	he EUT was rotated 360° and to determine the emission's zontal and vertical antenna
The spectrum analyzer's 6 operated in the CISPR quarter	6 dB bandwidth was set to 120 kl asi-peak detection mode.	Hz and the analyzer was
The highest emission amp report for the worst case of Emissions other than thos	blitudes relative to the appropriate operation mode (mode A for confi e mentioned are small or not det	e limit were recorded in this iguration with test jig). ectable.



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Table 23: Radiated Emission, Quasi Peak Data, 30MHz - 136MHz, Horizontal and Vertical Antenna Orientations, Configuration with Test Jig, Mode A

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
57.36	X / V	43.8	-23.6	20.2	40.0	19.8	100	24

Note: Level QP = Reading QP + Factor

Table 24: Radiated Emission, Quasi Peak Data, 30MHz – 136MHz, Horizontal and Vertical Antenna Orientations, Configuration with Printer, Modes A & B

Freq. [MHz]	EUT Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
30.789	V	57.2	-23.3	33.9	40.0	6.1	104	89
33.153	V	57.9	-23.7	34.2	40.0	5.8	101	103
35.446	V	59.2	-24.1	35.1	40.0	4.9	101	174
36.387	V	61.1	-24.3	36.8	40.0	3.2 (*)	115	291
39.324	V	64.2	-25.0	39.2	40.0	0.8 (*)	100	235
60.608	Н	57.6	-27.2	30.4	40.0	9.6	237	272
64.227	Н	59.7	-27.3	32.4	40.0	7.6	252	295
66.690	V	59.2	-27.4	31.8	40.0	8.2	101	304
85.813	V	57.0	-26.5	30.5	40.0	9.5	101	167

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.



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# 6.2 Radiated Emission of Receiver

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

**RESULT:** 

N/A

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:

ANSI C63.4-2003 and RSS-Gen 4.10

The test was not performed, since the EUT has no receiver-only mode. Refer to the data for the radiated spurious emission of transmitter for the measurement results of the combined operation of transmitter and receiver.



Products					
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7. Test Result Measureme	s of AC Power Line nts	Conducted			
7.1 AC Power Lir	ne Conducted Emissio	on of Transmitter			
7.1.1 AC Power Line and RSS-Gen 7	Conducted Emission of 7.2.2	Transmitter, FCC 15.207			
RESULT:		Pass			
Date of testing:	2010-09-30, 2	2010-11-17			
Ambient temperature: Relative humidity: Atmospheric pressure:	25, 24°C 61, 32% 1015, 1016hP	°a			
Frequency range: Kind of test site:	0.15 – 30MHz Shielded Rooi	<u>r</u> m			
Requirements:					
The AC power line condu 30MHz shall not exceed t	cted emission on any frequency he limits specified in FCC 15.20	y within the band 150 kHz to 07 and RSS-Gen 7.2.2.			
Test procedure:					
ANSI C63.4-2003.					
The EUT was placed on a A vertical conducting plan EUT. The AC input of the Network (LISN).	a wooden table raised 80cm able the of the screened room was loc EUT was connected to a Line I	ove the reference ground plane. cated 40cm to the rear of the mpedance Stabilization			
Two configurations were in attached to a test jig and measurements were performed to a test fig and the surements were performed to a test of the surement surement surement surement suremet at the suremet s	investigated in modes A and B: the case where the EUT is inse ormed in both configurations.	the case where the EUT is rted into a printer. Final			
The physical arrangemen determine the effect on th ensure that maximum em	t of the test system and associant of the test system and associant e EUT's emissions in amplitude in the system attained by the system a	ated cabling was varied to and frequency in order to d.			
The measurements were quasi-peak and average of 9kHz. No video filter less	performed with the spectrum ar detection modes. The analyzer's than 10 times the resolution ba	nalyzer operating in the CISPR s 6 dB bandwidth was set to ndwidth was used.			



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The highest emission amplitudes relative to the appropriate limit were recorded in this report for the worst case operation mode (mode B for configuration with test jig). Emissions other than those mentioned are small or not detectable.

# Table 25: AC Power Line Conducted Emission, Quasi Peak and Average Data, 0.15 - 30MHz, Phase N (N) and L1 (L), Configuration with Test Jig, Mode B

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]
0.15136	L1	36.3	11.7	9.6	45.9	21.3	65.9	55.9	20.0	34.6
0.15536	N	35.7	11.6	9.6	45.3	21.2	65.7	55.7	20.4	34.5
0.16210	N	34.6	10.9	9.6	44.2	20.5	65.4	55.4	21.2	34.9
0.18257	N	31.7	9.8	9.7	41.4	19.5	64.4	54.4	23.0	34.9
0.18769	L1	30.9	9.4	9.7	40.6	19.1	64.1	54.1	23.5	35.0
0.20591	N	28.7	8.6	9.7	38.4	18.3	63.4	53.4	25.0	35.1
0.28727	N	35.2	34.7	9.7	44.9	44.4	60.6	50.6	15.7	6.2
0.56296	N	21.7	11.6	9.7	31.4	21.3	56.0	46.0	24.6	24.7
0.57089	L1	22.3	19.2	9.7	32.0	28.9	56.0	46.0	24.0	17.1
2.81004	N	16.4	5.4	9.8	26.2	15.2	56.0	46.0	29.8	30.8
3.71685	N	22.1	17.6	9.8	31.9	27.4	56.0	46.0	24.1	18.6
3.71950	L1	21.0	16.8	9.8	30.8	26.6	56.0	46.0	25.2	19.4
13.56066	N	42.0	32.1	10.1	52.1	42.2	60.0	50.0	7.9	7.8
13.56096	L1	41.5	31.6	10.1	51.6	41.7	60.0	50.0	8.4	8.3
18.37112	N	18.4	-2.0	10.3	28.7	8.3	60.0	50.0	31.3	41.7
20.47498	L1	20.0	-2.5	10.2	30.2	7.7	60.0	50.0	29.8	42.3
20.76386	N	19.7	-1.3	10.3	30.0	9.0	60.0	50.0	30.0	41.0
23.82522	N	18.5	-2.7	10.4	28.9	7.7	60.0	50.0	31.1	42.3

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

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# Table 26: AC Power Line Conducted Emission, Quasi Peak and Average Data, 0.15 - 30MHz, Phase N (N) and L1 (L), Configuration with Printer, Modes A & B

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]
0.1505	L1	38.6	34.7	9.6	48.2	44.3	66.0	56.0	17.8	11.7
0.1506	N	38.2	34.3	9.6	47.8	43.9	66.0	56.0	18.2	12.1
0.1880	L1	36.4	30.6	9.7	46.1	40.3	64.1	54.1	18.0	13.8
0.1936	N	38.4	31.8	9.7	48.1	41.5	63.9	53.9	15.8	12.4
0.2452	N	32.9	26.6	9.7	42.6	36.3	61.9	51.9	19.3	15.6
0.2491	L1	33.1	27.2	9.7	42.8	36.9	61.8	51.8	19.0	14.9
0.2959	N	38.0	34.7	9.7	47.7	44.4	60.4	50.4	12.7	6.0
0.2972	L1	38.1	33.3	9.7	47.8	43.0	60.3	50.3	12.5	7.3
0.5449	L1	29.7	28.9	9.7	39.4	38.6	56.0	46.0	16.6	7.4
0.5451	N	30.2	29.4	9.7	39.9	39.1	56.0	46.0	16.1	6.9
0.6714	N	26.6	25.7	9.7	36.3	35.4	56.0	46.0	19.7	10.6
0.6718	L1	26.8	25.8	9.7	36.5	35.5	56.0	46.0	19.5	10.5
0.7692	L1	27.9	21.9	9.7	37.6	31.6	56.0	46.0	18.4	14.4
0.7712	N	25.8	19.0	9.7	35.5	28.7	56.0	46.0	20.5	17.3
1.1513	N	28.1	25.9	9.7	37.8	35.6	56.0	46.0	18.2	10.4
1.4402	L1	28.3	26.7	9.7	38.0	36.4	56.0	46.0	18.0	9.6
1.6335	L1	28.4	23.0	9.7	38.1	32.7	56.0	46.0	17.9	13.3
1.8214	L1	31.0	27.7	9.7	40.7	37.4	56.0	46.0	15.3	8.6
1.9199	N	29.0	27.7	9.7	38.7	37.4	56.0	46.0	17.3	8.6
2.1109	L1	29.0	23.8	9.8	38.8	33.6	56.0	46.0	17.2	12.4
2.3011	N	32.2	29.3	9.8	42.0	39.1	56.0	46.0	14.0	6.9
2.3993	L1	29.8	27.4	9.8	39.6	37.2	56.0	46.0	16.4	8.8
2.6842	L1	31.4	29.8	9.8	41.2	39.6	56.0	46.0	14.8	6.4
2.7828	L1	32.3	29.1	9.8	42.1	38.9	56.0	46.0	13.9	7.1
3.0716	N	31.0	27.9	9.8	40.8	37.7	56.0	46.0	15.2	8.3
3.2600	L1	31.7	26.1	9.8	41.5	35.9	56.0	46.0	14.5	10.1
3.5486	N	32.6	29.2	9.8	42.4	39.0	56.0	46.0	13.6	7.0
3.5500	L1	31.6	28.4	9.8	41.4	38.2	56.0	46.0	14.6	7.8
4.6012	Ν	26.2	23.5	9.8	36.0	33.3	56.0	46.0	20.0	12.7
4.6066	L1	25.2	21.6	9.8	35.0	31.4	56.0	46.0	21.0	14.6
6.0407	L1	29.4	25.8	9.9	39.3	35.7	60.0	50.0	20.7	14.3
6.2871	N	25.4	19.5	9.9	35.3	29.4	60.0	50.0	24.7	20.6
10.5484	N	38.6	38.3	10.1	48.7	48.4	60.0	50.0	11.3	1.6 (*)
10.7402	L1	37.6	36.8	10.1	47.7	46.9	60.0	50.0	12.3	3.1
17.2636	N	36.5	32.4	10.3	46.8	42.7	60.0	50.0	13.2	7.3
17.2647	L1	35.4	31.2	10.2	45.6	41.4	60.0	50.0	14.4	8.6
28.0966	L1	28.5	25.0	10.3	38.8	35.3	60.0	50.0	21.2	14.7
28.1149	N	31.3	27.0	10.5	41.8	37.5	60.0	50.0	18.2	12.5

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.





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# 7.2 AC Power Line Conducted Emission of Receiver

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

**RESULT**:

N/A

Requirements:

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

Test procedure:

ANSI C63.4-2003 and RSS-Gen 4.10

The test was not performed, since the EUT has no receiver-only mode. Refer to the data for the AC power line conducted emission of transmitter for the measurement results of the combined operation of transmitter and receiver.



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# 8. Photographs of the Test Setup

Refer to the attached document: Photographs of Test Setup

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# 11. Attachment: Photographs of Test Setup

10 pages following