

Test Report



INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C and INDUSTRY CANADA REQUIREMENTS

Equipment Under Test:	RFID reader unit
Type/ Model:	PlanID
Customer / Manufacturer:	Planmeca Oy Asentajankatu 6 FI-00880 Helsinki
FCC Rule Part:	15.207: 2014 15.209: 2014
IC Rule Part:	RSS-210, Issue 8, 2010 RSS-GEN Issue 4, 2014

Date: 20 January 2017

Issued by:

Pekka Kälviäinen
Testing Engineer

Date: 20 January 2017

Checked by:

Janne Nyman
Compliance Specialist

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Equipment Under Test (EUT)

Product: HF RFID reader unit
Model/type: PlanID
Serial: -
FCC ID: YIIPID001
IC: 9050A-PID001

Classification of the device

Fixed device	<input checked="" type="checkbox"/>
Mobile Device (Human body distance > 20cm)	<input type="checkbox"/>
Portable Device (Human body distance < 20cm)	<input type="checkbox"/>

Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing

Ratings and declarations, HF

Operating Frequency Range (OFR): 13.56 MHz
Channels: 1 transmit channel
Effective radiated or conducted power: -
Modulation: -
Antenna: integral, type: PCB loop antenna

Power Supply

Operating voltage: 24 VDC
Operating voltage AC/DC power supply 115 V 60 Hz
type: Mascot type 9920, s/n: 3707:

Cables

Cable: power / data cable AC power	Length: 3m 2m	Type: unshielded cable unshielded cable
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Samples

Samples: EUT1

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SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.209, RSS-210, RSS-GEN	Radiated Emissions 9 kHz to 1 GHz	PASS
§15.207, RSS-GEN	Conducted emissions 150 kHz – 30 MHz	PASS
§15.225	Frequency Stability	PASS

EUT Test Conditions during Testing

Configuration of the EUT was made to correspond to the actual assembling conditions as far as possible. During radiated spurious emissions test the EUT was tested DC powered and during conducted emissions the EUT was connected to AC/DC power supply.

Table 1. Normal and extreme test conditions

Test conditions:		Temperature [°C]:	Voltage [V]:	Frequency [Hz]:
Normal		20 - 25	24	DC
Extreme	Minimum	0	20	
	Maximum	40	32	

Test Facility

<input type="checkbox"/> Testing Location / address: FCC registration number: 90598	SGS Fimko Ltd Särkinenmentie 3 FI-00210, HELSINKI FINLAND
<input checked="" type="checkbox"/> Testing Location / address: FCC registration number: 178986 Industry Canada registration number: 8708A-2	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND

Conducted Emissions In The Frequency Range 150 kHz - 30 MHz.

Standard: ANSI C63.10 (2013)
Tested by: PKA
Date: 30.12.2016
Temperature: 22 °C
Humidity: 32 % RH
Measurement uncertainty: ± 2.9 dB Level of confidence 95 % (k = 2)

FCC Rule: 15.207 (a)

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with 4.5 kHz steps and a resolution bandwidth of 9 kHz. Measurements were carried out with peak and average detectors.

During the test the EUT was powered from the separate power supply through the LISN.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

Test results

EUT1 + AC/DC power supply

Conducted Emission Mains FCC Part 15 Class B with ENV216

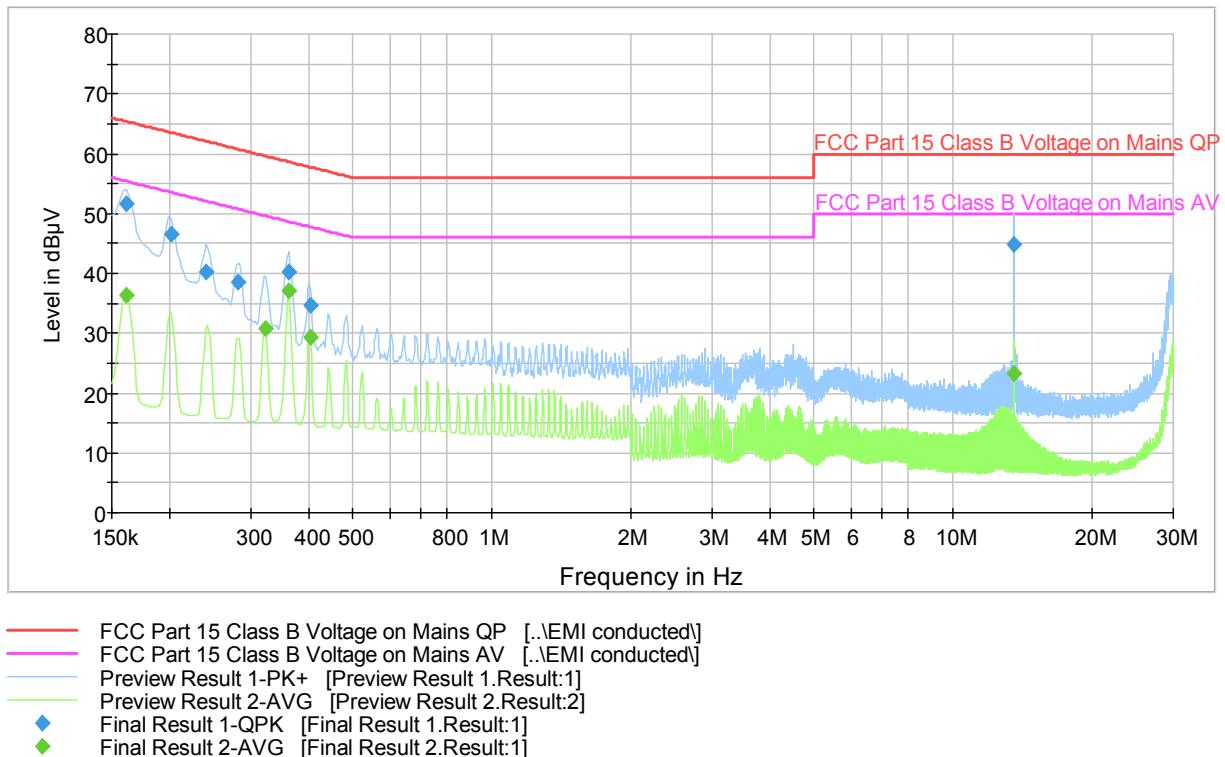


Figure 1. The measured curves with peak- and average detector.

Table 2. Final Quasipeak results.

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.161000	51.6	1000.0	9.000	On	L1	10.2	13.8	65.4	-
0.202000	46.6	1000.0	9.000	On	N	10.1	16.9	63.5	-
0.239500	40.1	1000.0	9.000	On	N	10.2	22.0	62.1	-
0.281250	38.5	1000.0	9.000	On	N	10.2	22.2	60.8	-
0.363250	40.2	1000.0	9.000	On	N	10.2	18.4	58.7	-
0.403500	34.7	1000.0	9.000	On	N	10.3	23.1	57.8	-
13.561250	44.9	1000.0	9.000	On	L1	10.4	15.1	60.0	-

Table 3. Final Average results.

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.161000	36.3	1000.0	9.000	On	N	10.1	19.1	55.4	-
0.322750	30.8	1000.0	9.000	On	N	10.2	18.9	49.6	-
0.363000	37.1	1000.0	9.000	On	N	10.2	11.5	48.7	-
0.403500	29.3	1000.0	9.000	On	N	10.3	18.5	47.8	-
13.559500	23.2	1000.0	9.000	On	L1	10.4	26.8	50.0	-

Radiated Emissions 9 kHz to 1 GHz

Standard: ANSI C63.10 (2009)
Tested by: PKA
Date: 21.-22.12.2016
Temperature: 22 °C
Humidity: 34 % RH
Measurement uncertainty ± 4.51 dB Level of confidence 95 % (k = 2)

FCC Rule: 15.209

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

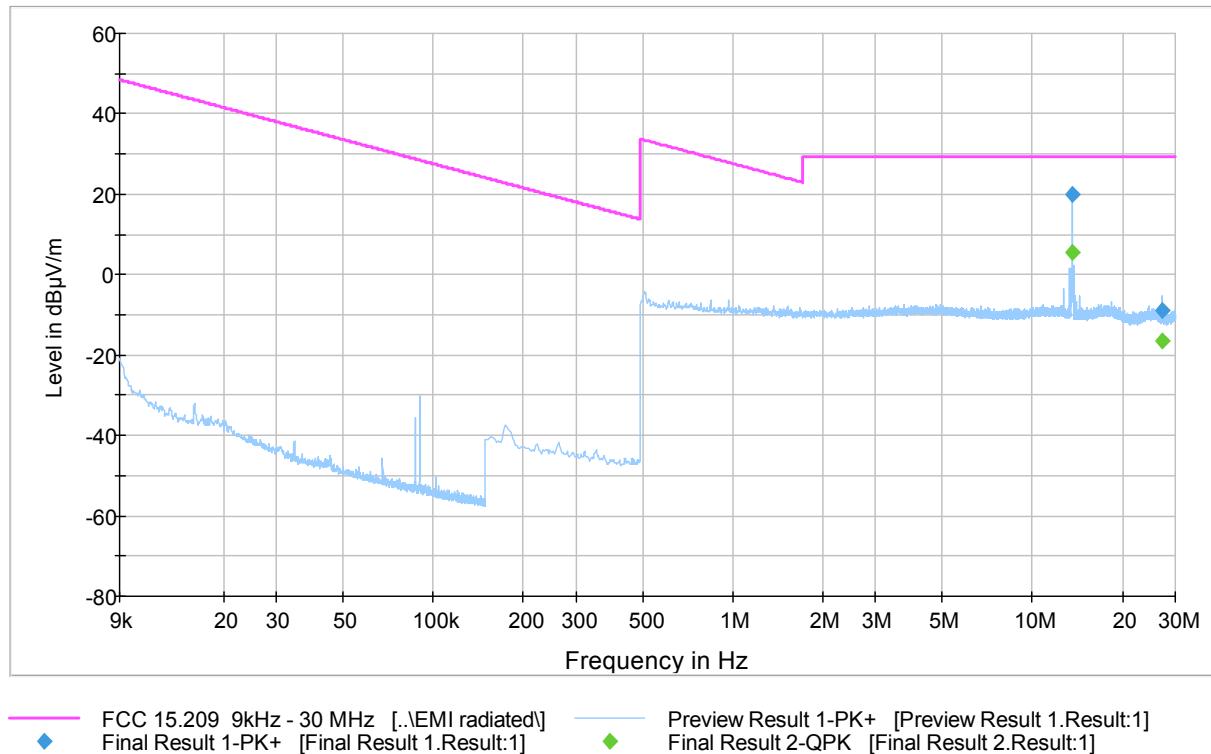
According to ANSI C63.10 (clause 5.3.2) and RSS-Gen (Clause 4.11) the measurements below 30 MHz can be performed at a closer distance than the EUT limit distance, the results shall be extrapolated to limit distance by using the square of an inverse linear distance extrapolation factor (40 dB/ decade). This method was used when performing measurements at a distance of 3 m instead of limit distances 300 m or 30 m.

The correction factor in the final result table contains the sum of the transducers (antenna + cables + distance). The result value is the measured value corrected with the correction factor.

Test results

EUT1

FCC Part 15 Class B (15.209) Spurious Emission 9 kHz - 30 MHz 3m

**Figure 2.** TX radiated emission 9 kHz to 30MHz.**Final measurements from the worst frequencies****Table 4.** The final results with Quasipeak detector.

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Angle (°)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
13.555000	5.4	1000.0	9.000	45.0	155.0	-19.7	24.1	29.5	-
27.115750	-16.6	1000.0	9.000	90.0	155.0	-19.6	46.1	29.5	*)

*) The level of the fundamental radiator is below general limit.

Table 5. Frequency stability test, extreme conditions.

Test conditions		Frequency MHz	deviation from nominal %	Result
Temperature	Voltage			
0 °C	20 VDC	13.5608791	0.00012	PASS
	32 VDC	13.5608752	0.00009	PASS
22 °C	24 VDC	13.5608627	nominal	-
40 °C	20 VDC	13.5608406	-0.00016	PASS
	32 VDC	13.5608416	-0.00016	PASS

FCC 15.225 limits of 0.01% with respect to temperature

FCC Part 15 Class B Spurious Emission 30-1000MHz 3m

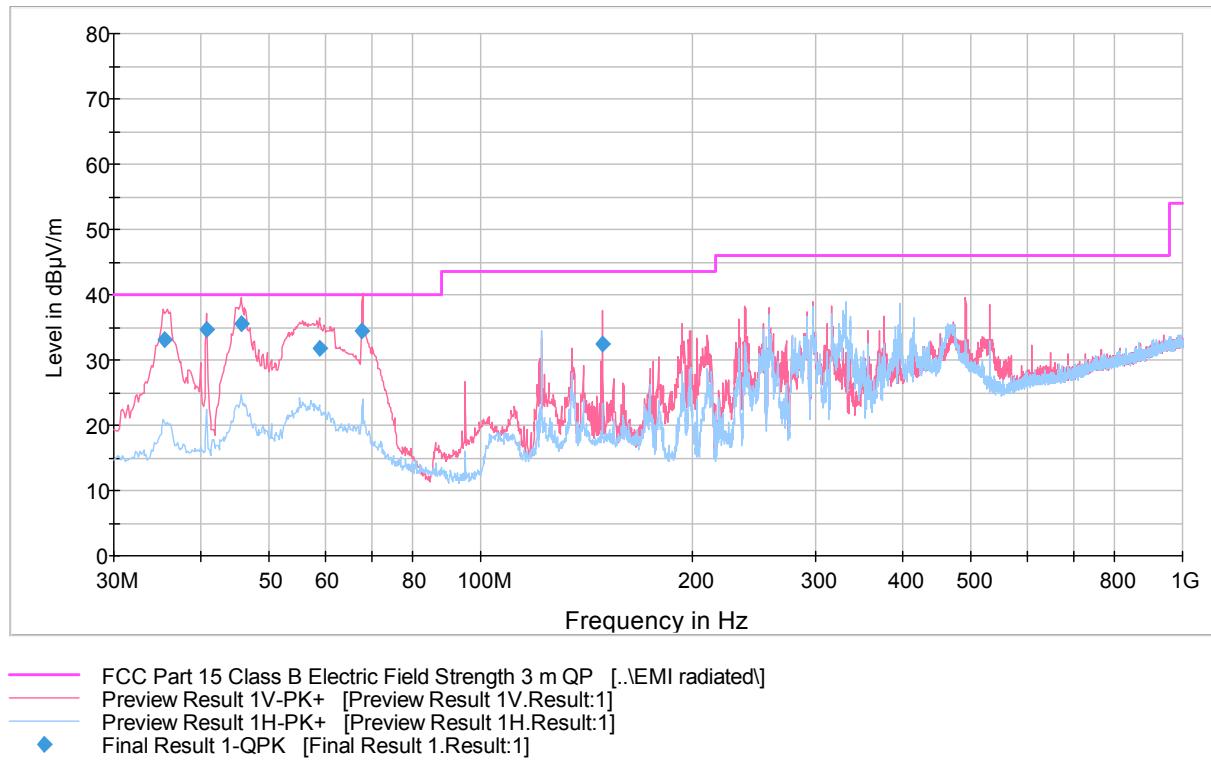


Figure 3. TX radiated emission 30 MHz to 1000 MHz.

Table 6. The final results with Quasipeak detector.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.485000	33.2	1000.0	120.000	100.0	V	83.0	13.4	6.8	40.0	-
40.685000	34.6	1000.0	120.000	100.0	V	319.0	14.1	5.4	40.0	-
45.605000	35.7	1000.0	120.000	100.0	V	145.0	14.5	4.3	40.0	-
58.875000	31.8	1000.0	120.000	100.0	V	178.0	14.0	8.2	40.0	-
67.795000	34.4	1000.0	120.000	242.0	V	265.0	12.8	5.6	40.0	-
149.155000	32.3	1000.0	120.000	100.0	V	73.0	14.6	11.2	43.5	-

TEST EQUIPMENT

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
POWER SUPPLY	CALIFORNIA INSTR.	5001 iX Series II	inv:7826	-	-
PREAMPLIFIER	CIAO	CA118-3123	inv:10278	2016-11-28	2017-11-28
DC-POWER SUPPLY	DELTA ELEKTRONIKA	SM 130-25D	sn:03494	-	-
ANTENNA (9 kHz-30 MHz)	ROHDE & SCHWARZ	HFH2-Z2	inv: 8013	2016-08-29	2017-08-29
ANTENNA	SCHWARZBECK	VULB 9168	inv:8911	2016-10-25	2018-10-25
PREAMPLIFIER	HEWLETT PACKARD	83017A (25 dB)	inv:5226	2016-02-03	2017-02-03
TURNTABLE	MATURO	DS430 UPGRADED	inv:10182	-	-
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	-	-
ANTENNA MAST	MATURO	TAM 4.0E	inv:10181	-	-
ATTENUATOR	PASTERNACK	PE 7004-4	inv:10126	-	-
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU 26	inv:8453	2016-06-10	2017-06-10
LISN	ROHDE & SCHWARZ	ENV216	inv:9611	2016-02-24	2017-02-24