



RC-032-PTE-10-106054-1-A

"Ce rapport annule et remplace le rapport d'essais N° RC-032-PTE-10-106054-1-A Edition 0"

E.M.C. TESTS REPORT

According to the standard:
FCC Part 15 édition 2009

Equipment under test:
Payment terminal RP01

Company:
INGENICO

FCC Listed: 910 701

Distribution: Mr LUC

(Company: INGENICO)

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NAME OF THE EQUIPMENT UNDER TEST (E.U.T.) : Payment terminal RP01

Serial number : 102855C40000868

FCC ID number : XKB-ISC250CL

Part number : -

Software Version : -

MANUFACTURER'S NAME : INGENICO

APPLICANT'S ADDRESS:

Company : INGENICO

Address : 11, rue Curie
92150 SURESNES
FRANCE

Person present during the tests : Mr LUC

Responsible : Mr LUC

DATES OF TESTS : 13 and 14/12/2010

TESTS LOCATIONS : EMITECH Laboratory at Montigny-le-Bretonneux (78) et Open area test site at Aunainville (28) - FRANCE

TESTS SUPERVISOR : -

TESTS OPERATOR : B. PELLERIN

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1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment «**Payment terminal RP01**» (denominated hereafter E.U.T.: equipment under test) according to document listed below.

2. REFERENCE DOCUMENT

FCC part 15 : 2009

Code of federal regulations

Title 47- Telecommunication Chapter 1- Federal Communication Commission

Part 15- Radio frequency devices Subpart B- Unintentional Radiators

Limits and methods of measurement of radio disturbance

Characteristic of information technology equipment.

3. EQUIPMENT UNDER TEST CONFIGURATION

Equipment under test (E.U.T.) description:

Payment terminal with RFID function.

Cycle and operating mode during emission tests:

In EMC test software configuration with continuous emission at 13.56 MHz.

Equipment modifications applied during tests: No

4. SUMMARY OF TESTS RESULTS

Tests designation	Results satisfying?	Comments
Intentional radiated emissions in the band 13.553 - 13.567 MHz	YES	Section 15.225 (a)
Unintentional radiated emissions in the band 9 kHz - 30 MHz	YES	Sections 15.209 and 15.225 (b), (c) and (d)
Unintentional radiated emissions in the band 30 MHz - 2 GHz	YES	Section 15.209
Conducted emission	YES	Section 15.207
Frequency drift	YES	Section 15.225 (e)

N.P.: Not Performed.

N.A.: Not Applicable.

Sample subject to the test complies with prescriptions of the standard:

- FCC part 15 : 2009

According to limits, specified in this tests report.

To declare or not compliance with the specification, it has not been given explicit account of the uncertainty associated with result(s).

5. INTENTIONAL RADIATED EMISSIONS IN THE BAND 13.553 MHz – 13.567 MHz

Standard: FCC PART 15 Edition 2009

Section: 15.225 (a)

Equipment under test arrangement

Category of equipment: Table-top equipment

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal reference ground plane.

Antenna height is 1 m above the ground plane.

For each frequency corresponding to an emission, EUT carried out a rotation through 360° with the aid of the turntable, with the aim to find the maximum of signal.

The test antenna is oriented in all orientations. Only the highest level is recorded.

Test configuration photographs:

Frequency range: 13.553 MHz - 13.567 MHz

Detection mode: Quasi-peak.

Resolution bandwidth: 9 kHz

Measurement distance: 3 meters.

Limit:

Frequency range (MHz)	Frequency field strength		Frequency measurement distance (meters)
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	
13.593 – 13.567	15848	84	30

Limit in $\text{dB}\mu\text{V/m}$ can be extrapolated at other measurement distance using 40 dB / decade.

Operating mode during the test: EUT is in permanent transmission.

Instrumentation test list:

CATEGORY	BRAND	TYPE	N ^R EMITECH
AC Power supply	SECAS	CF1000 50/60	2102
Autocontrôle	EMITECH	Autocontrôle champ mg	5363
Cable	-	N-2m	4359
Cable	-	N-8m	8019
Loop antenna	Rohde et Schwarz	HFH2-Z2	315
Open site	Emitech	Aunainville	187
Power supply	Emitech	HZ-9	3198
RSIL	Fischer	CCI	253
RSIL	Fischer	CCI	710

Results:

FREQUENCY (MHz)	ANTENNA ORIENTATION	AZIMUTH (degrees)	MEASUREMENT ($\text{dB}\mu\text{V/m}$)	LIMIT ($\text{dB}\mu\text{V/m}$) (1)	MARGIN (dB)
13.5611	Perpendicular	180	55.7	124	68.3

(1) Limit extrapolated at 3 meters measurement distance.

Observation during the test:

The equipment complies with the requirements of the standard FCC PART 15.225 Edition 2009.

6. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 9 KHz – 30 MHz

Standard: FCC PART 15: 2009

Section: 15.209 / 15.225

Equipment under test arrangement

Category of equipment: Table-top equipment

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal reference ground plane.

Antenna height is 1 m.

For each frequency corresponding to an emission, EUT carried out a rotation through 360° with the aid of the turntable, with the aim to find the maximum of signal.

The test antenna is oriented in all orientations. Only the highest level is recorded.

Test configuration photographs:

Frequency range: 9 kHz - 30 MHz.

Detection mode: Quasi-peak except frequency bands 9-90 kHz and 110-490 kHz (average).

Resolution bandwidth: 200 Hz from 9 kHz to 150 kHz.
9 kHz from 150 kHz to 30 MHz

Measurement distance: 3 meters.

Limit:

Frequency range (MHz)	Frequency field strength ($\mu\text{V/m}$)	Frequency 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

Frequency range (MHz)	Frequency field strength ($\mu\text{V/m}$)	Frequency field strength ($\text{dB}\mu\text{V/m}$)	Frequency measurement distance (meters)
13.410-13.553 13.567-13.710	334	50.5	30
13.110-13.410 13.710-14.010	106	40.50	30

Limit in $\text{dB}\mu\text{V/m}$ can be extrapolated at other measurement distance using 40 dB / decade.

Instrumentation test list:

CATEGORY	BRAND	TYPE	N ^R EMITECH
AC Power supply	SECAS	CF1000 50/60	2102
Autocontrôle	EMITECH	Autocontrôle champ mg	5363
Cable	-	N-2m	4359
Cable	-	N-8m	8019
Loop antenna	Rohde et Schwarz	HFH2-Z2	315
Open site	Emitech	Aunainville	187
Power supply	Emitech	HZ-9	3198
RSIL	Fischer	CCI	253
RSIL	Fischer	CCI	710

Results:

Frequency	Antenna orientation	Azimuth (degrees)	Measurement ($\text{dB}\mu\text{V/m}$)	Limit ($\text{dB}\mu\text{V/m}$) (1)	Margin (dB)
13.7070	⊥	180	28.2	80.5	52.3
13.5290	⊥	180	28.6	80.5	51.6
27.1181	⊥	180	31.2	69.5	38.3

(1) Limit extrapolated at 3 meters measurement distance.

Observation during the test:

The equipment complies with the requirements of the standard FCC PART 15.209: 2009.

7. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHz – 2 GHz

Standard: FCC PART 15: 2009

Section: 15.209

Equipment under test arrangement:

Category of equipment: Table-top equipment

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal reference ground plane.

For maximum meter reading at each frequency, the antenna height is adjusted between 1 m and 4 m above the ground plane. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization. The frequency azimuth and antenna height are presented in the tables on the next pages.

Test configuration photographs:



Frequency range: 30 MHz - 2 GHz

Detection mode: Quasi-peak

Resolution bandwidth: 120 kHz

Measurement distance: 3 meters

Limit: The EUT must satisfy requirements of the section 15.209 as shown in table below.

Frequency range (MHz)	Limit		Frequency measurement distance (meters)
	($\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)	
30 to 88	100	40.0	3
88 to 216	150	43.5	3
216 to 960	200	46.0	3
960 to 2000	500	54.0	3

Instrumentation test list:

CATEGORY	BRAND	TYPE	N ^R EMITECH
Antenna	Schwarzbeck	UHALP 9108	3106
Biconical antenna	Schwarzbeck	VHA 9103	0317
Cable	-	N-8m	8019
Cable	-	N-8m	8020
Open Area Test Site	Emitech	Aunainville	187
Power supply	SECAS	CF 1000 50/60	2102
Receiver	Rohde & Schwarz	ESVP	1057
RSIL	Fischer	CCI	253
RSIL	Fischer	CCI	710

Observation during the test:

The equipment complies with the requirements of the standard FCC PART 15.209: 2009.

Test site: Open area test site

Radiated emission: Electric field

Test distance: 3 m

Polarization: Vertical & horizontal

FREQUENCY (MHz)	POLARIZATION	ANTENNA HEIGHT (cm)	AZIMUTH (degrees)	MEASUREMENT (dB μ V/m)	LIMIT (dB μ V/m)	MARGIN (dB)
67.184	Vertical	169	180	26.2	40.0	13.8
68.823	Vertical	170	0	27.3	40.0	12.7
77.974	Vertical	400	170	26.9	40.0	13.1
86.598	Vertical	100	340	25.8	40.0	14.2
115.285	Vertical	100	340	24.5	43.5	19.0
116.677	Vertical	100	60	29.5	43.5	14.0
117.472	Vertical	100	60	29.6	43.5	13.9
119.110	Vertical	100	10	30.8	43.5	12.7
120.757	Vertical	100	300	30.2	43.5	13.3
122.405	Vertical	100	290	29.2	40.0	14.3
140.985	Vertical	100	300	28.1	40.0	15.4
146.450	Vertical	100	300	27.4	40.0	16.1
149.159	Vertical	100	350	27.8	40.0	15.7
216.788	Vertical	265	0	29.5	40.0	16.5
202.292	Horizontal	400	0	32.5	40.0	7.5
216.788	Horizontal	150	0	30.5	46.0	15.8

8. CONDUCTED EMISSION

Standard: FCC Part 15 : 2009

Section: 15.107

Test configuration:

Tested cable(s)	Measure with	E.U.T. height
115 V – 60 Hz power supply	L.I.S.N.	80 cm

Frequency Band	Tested cable(s)	Resolution bandwidth	Video bandwidth	Detection mode
150 kHz - 1 MHz	115 V – 60 Hz power supply	10 kHz	30 kHz	Peak
1 MHz - 30 MHz	115 V – 60 Hz power supply	10 kHz	30 kHz	Peak

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH
Cable	-	N-2m	2812
Cable	-	N-2m	2814
Limiter	Hewlett Packard	11947A	1094
LISN	Rohde & Schwarz	ESH2-Z5	3290
QP Adapter	Hewlett Packard	HP 85650 A	0491
Receiver	Hewlett Packard	HP 8568 B	0019
Software	Nexio	BAT EMC v3.5.0.2	0000
Test enclosure	Emitech	JD	1804

Results:

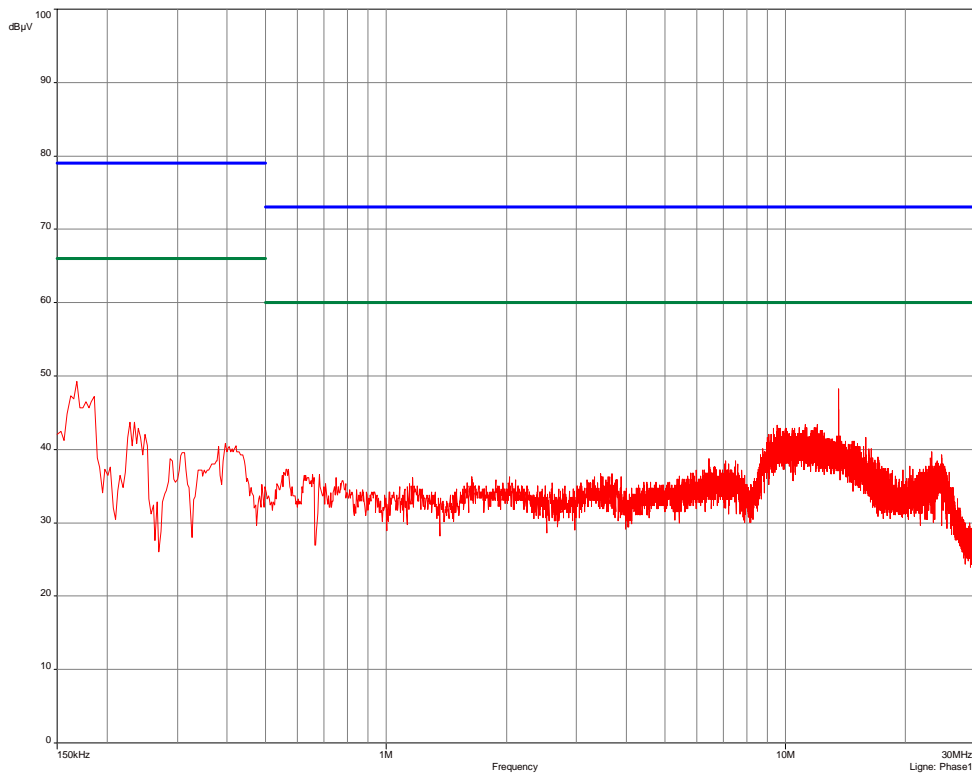
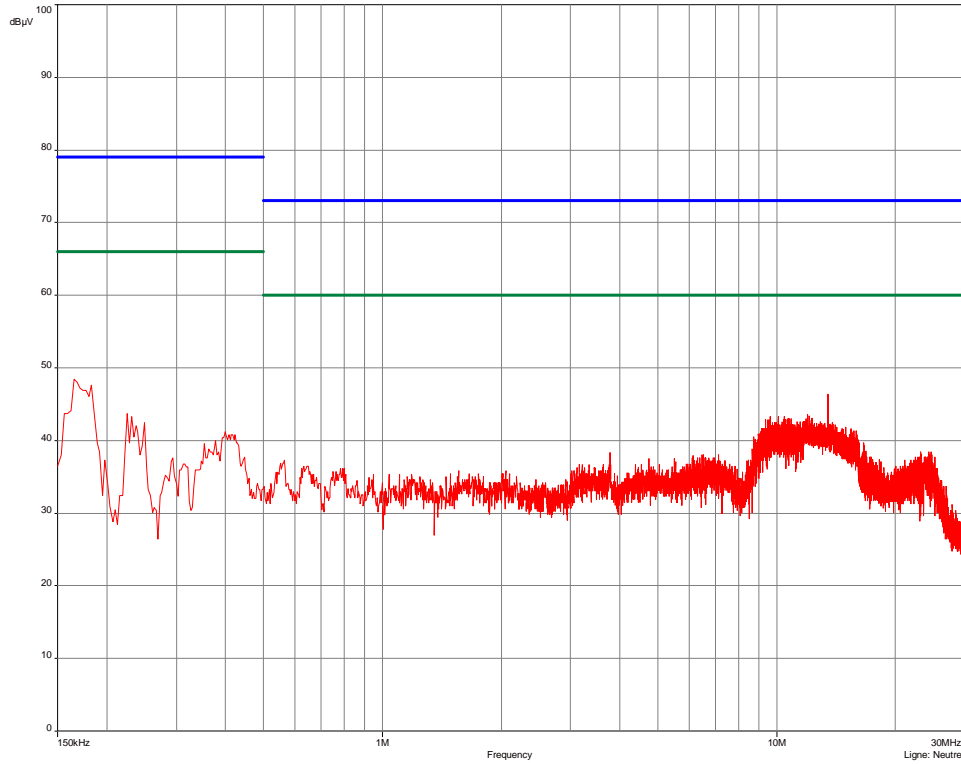
See curves hereafter. Limits on the curves are average limit (green) and quasi-peak limit (blue).

Curves 1 and 2

Payment terminal RP01

Conducted voltage emission (measurement): 115V-60Hz power supply in peak detection.

14/12/2010



Class: A of the standard

9. FREQUENCY DRIFT

Standard: FCC Part 15 Edition 2009

Section: 15.225 (e)

Test equipment used:

CATEGORY	BRAND	TYPE	Nr EMITECH
Climatic enclosure	Flonic Schlumberger	200P	2694
Load	Radiall	R404101000/50 Ohms	7989
Power supply	CHROMA	6415	5331

Measurement conditions:

Resolution bandwidth: 9 kHz

Video bandwidth: 30 kHz

Test operating conditions of the equipment:

The transmitter is in transmission with modulation.

Results:

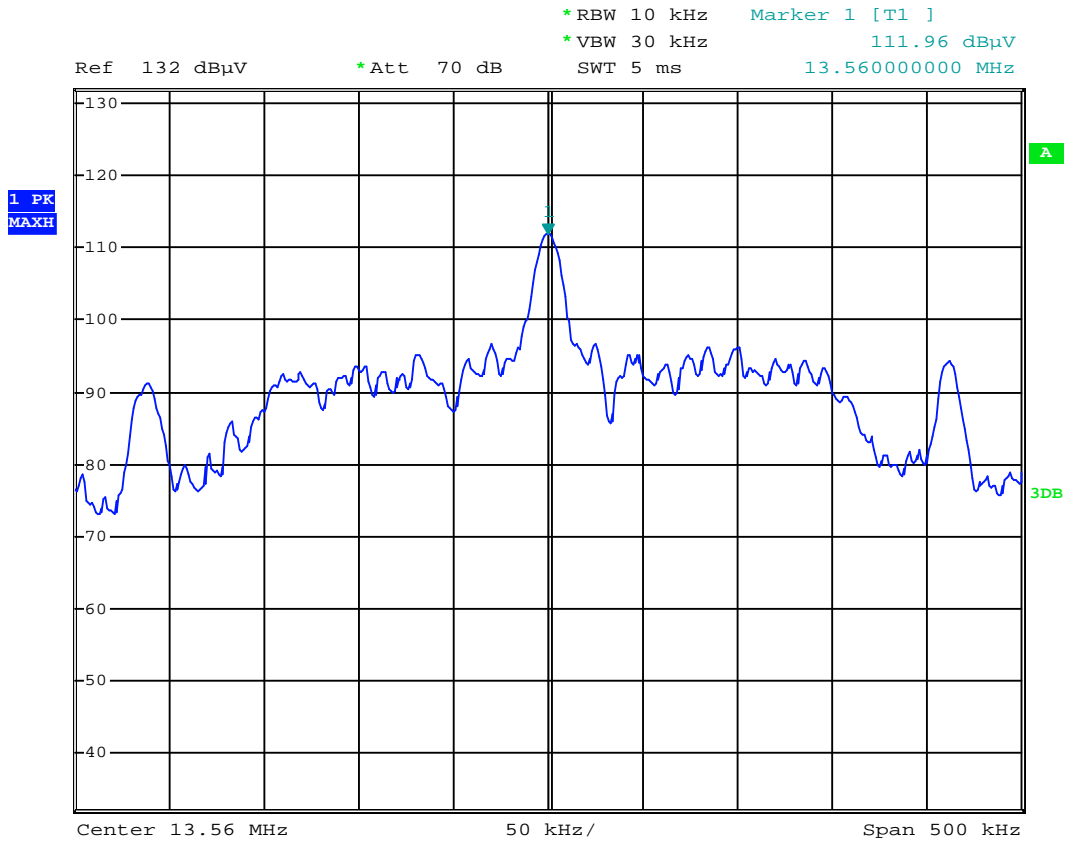
		F (MHz)	Deviation (kHz)	Curve	Limit (1)	
Normal test conditions	Nominal power source (110 V)	13.56000	-	3	± 1.356 kHz	
	Minimal power source (93.5 V)	13.56000	0.0	4		
	Maximal power source (126.6 V)	13.56000	0.0	5		
Extreme test conditions	Minimal temperature (- 20°C)	13.56000	0.0	6		
	Maximal temperature (+ 55°C)	13.56000	0.0	7		
		Temperature (+20°C) Humidity (50%)				
		Nominal power source (110 V)				

(1) ± 0.01 % of the operating frequency.

Measurement uncertainty: $\pm 1 \times 10^{-7}$

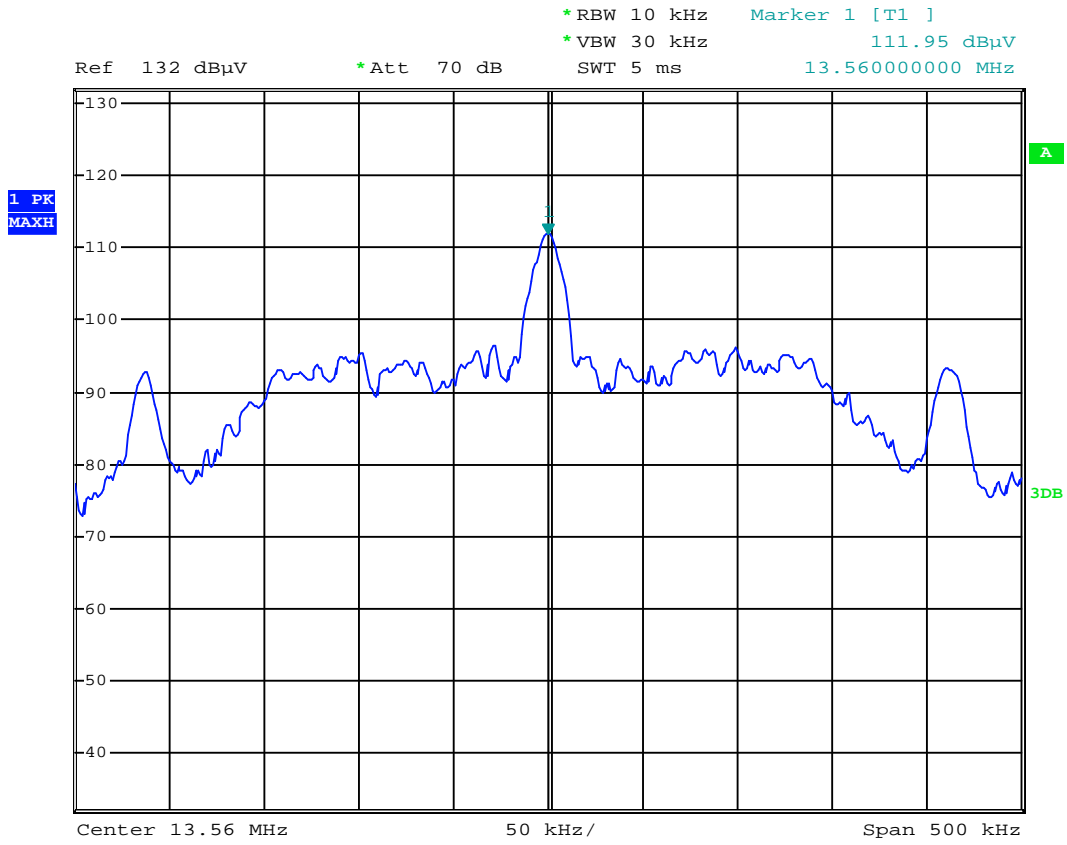
Test conclusion: Standard respected

Curve 3



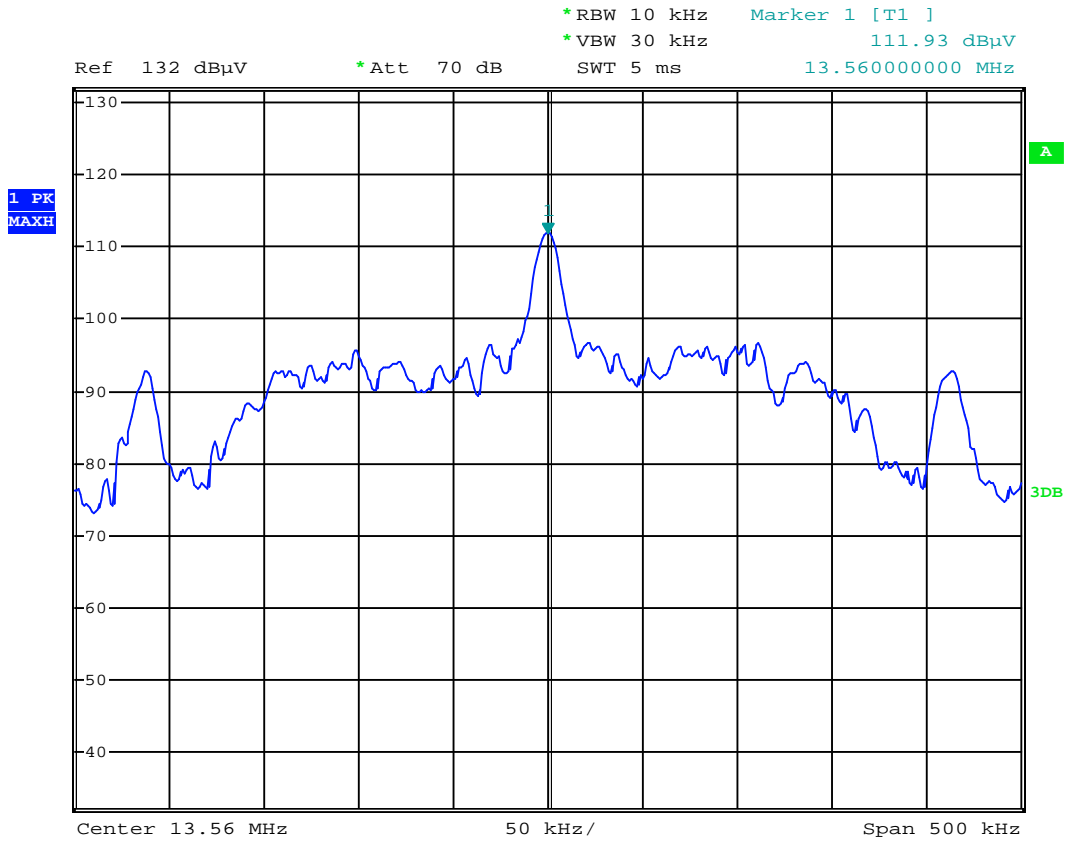
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Curve 4



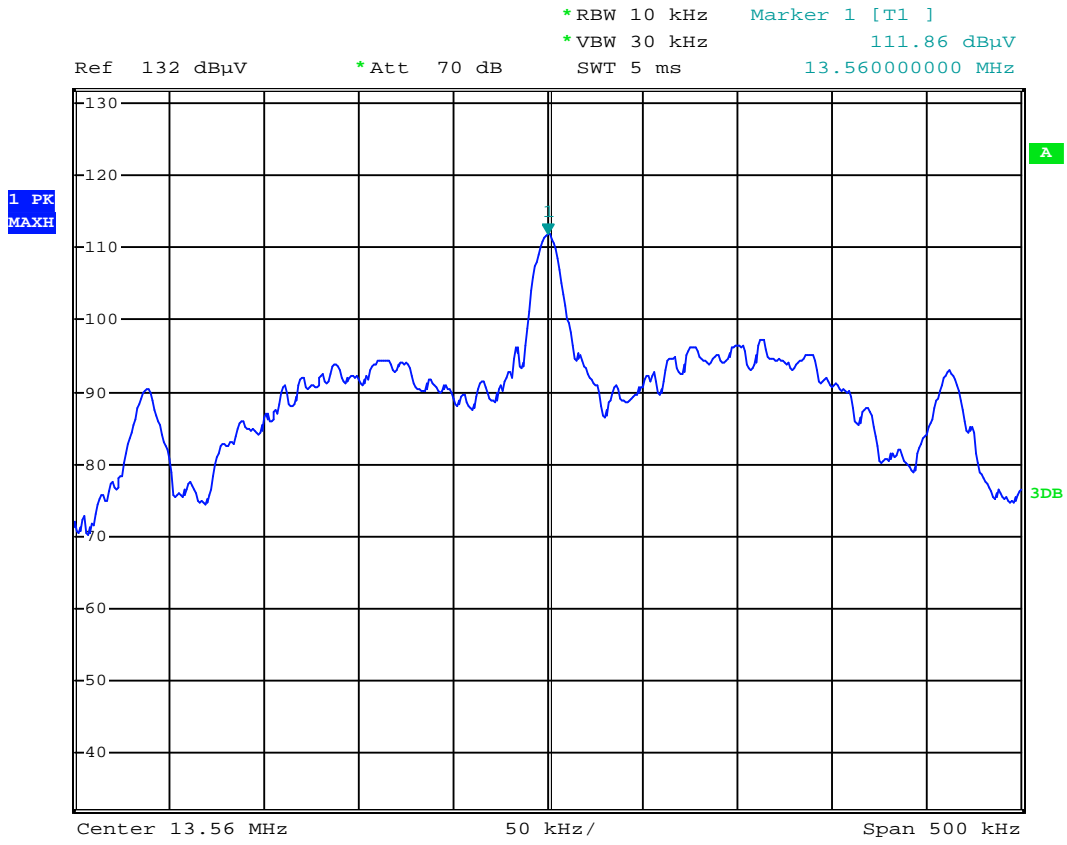
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Curve 5



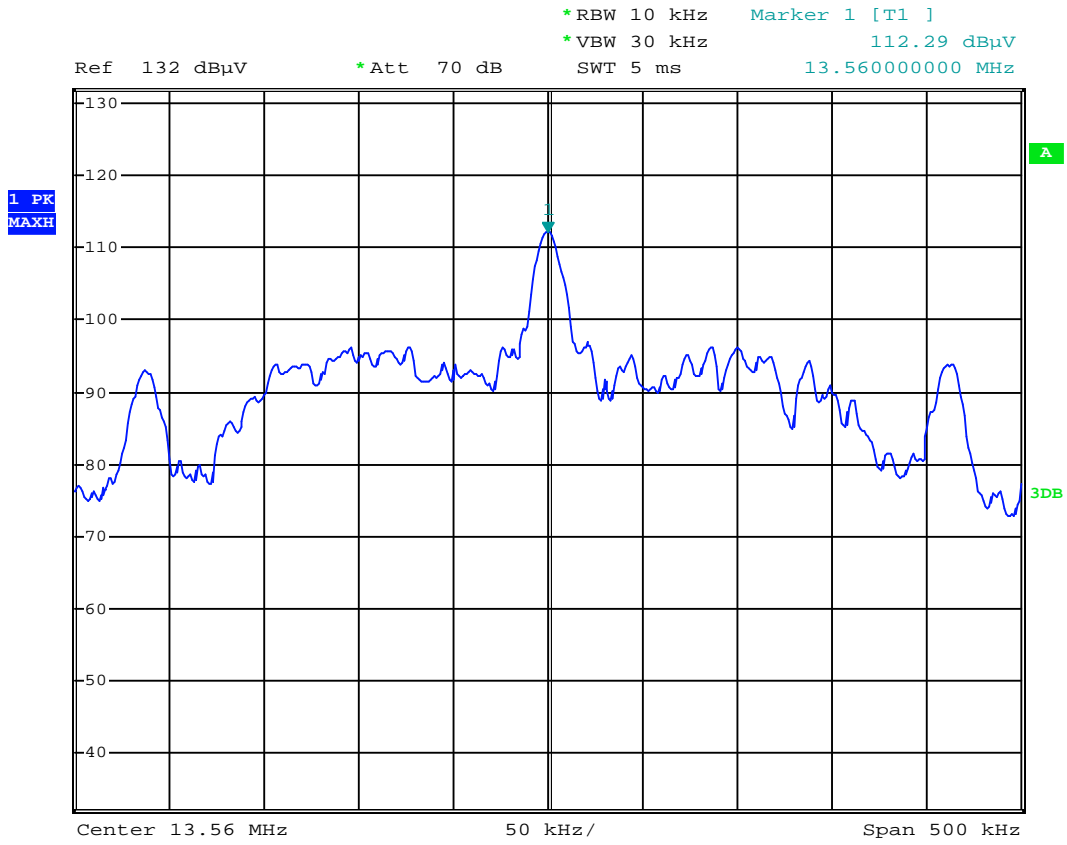
Date: 14.DEC.2010 13:59:48

Curve 6



Date: 14.DEC.2010 14:48:20

Curve 7



Date: 14.DEC.2010 16:36:56

□□□ End of report - 3 annexes to be forwarded □□□

ANNEX 1: PHOTOGRAPHIES

EQUIPMENT UNDER TEST (E.U.T.) PHOTOGRAPHIES

Payment Terminal RP01

E.U.T. Photography:



Conducted emission:



ANNEX 2: ANTENNA FACTORS, INSERTION LOSSES AND AMPLIFIER VALUES

BILL OF MATERIAL

The test antenna used for the radiated emission between 9 kHz and 30 MHz is the Loop antenna n°0315. Antenna factors are given in table 1.

The test antenna used for the radiated emission between 30 MHz and 200 MHz is the biconical antenna n°0317. Antenna factors are given in table 2.

The test antenna used for the radiated emission between 200 MHz and 1 GHz is the log-periodic antenna n°3106. Antenna factors are given in table 3.

The measuring receiver n°3198 used in the frequency range 9 kHz to 30 MHz.

The measuring receiver n°1057 used in the frequency range 30 MHz to 1 GHz has an integrated preamplifier.

The test cable used between 9 KHz and 30 MHz to connect the antennas to the receiver for measurements at a distance of 30 meters has losses given in table 4.

The test cable used between 30 MHz and 1 GHz to connect the antennas to the receiver for measurements at a distance of 3 meters has losses given in table 5.

Frequency (MHz)	Antenna factor (dB μ A/m)	Frequency (MHz)	Antenna factor (dB/m)
0.009	-24.8	10	-32.7
0.01	-25.4	15	-32.9
0.02	-28.8	20	-31.4
0.05	-31.0	25	-30.8
0.1	-31.6	30	-28.3
0.2	-31.8	-	-
0.5	-31.9	-	-
1	-31.9	-	-
2	-32.0	-	-
5	-32.2	-	-

TABLE 1 : LOOP ANTENNA

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
30	19.5	90	8.9
35	17.4	100	11.0
40	15.2	120	13.3
45	13.6	140	14.1
50	11.6	160	15.1
60	8.2	180	15.7
70	6.7	200	15.9
80	7.2	-	-

TABLE 2 : BICONICAL ANTENNA

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
200	23.4	700	21.0
300	14.8	800	21.4
400	16.6	900	21.7
500	18.4	1000	22.4
600	19.9	-	-

TABLE 3 : LOG-PERIODIC ANTENNA

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
0.009	0.0	2	-0.2
0.01	0.0	5	-0.5
0.02	+0.2	10	-0.7
0.05	+0.3	15	-1.2
0.1	+0.3	20	-1.4
0.2	+0.3	25	-1.6
0.5	+0.3	30	-1.8
1	+0.1		-

TABLE 4 : TEST CABLE FOR 3M MEASUREMENT INTO 9 kHz AND 30 MHz

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
30	0.8	160	2.0
35	0.9	180	2.2
40	1.0	200	2.3
45	1.1	300	2.8
50	1.1	400	3.3
60	1.2	500	3.7
70	1.3	600	4.0
80	1.4	700	4.3
90	1.5	800	4.7
100	1.6	900	5.0
120	1.7	1000	5.3
140	1.9	-	-

TABLE 5 : TEST CABLE FOR 3M MEASUREMENT INTO 30 MHz AND 1 GHz

ANNEX 3: CALIBRATION DATES

N° EMITECH	LAST CALIBRATION	CALIBRATION DUE DATE
0019	27/01/2010	27/01/2012
0187	20/08/2009	20/08/2011
0315	19/12/2010	19/12/2012
0317	17/08/2009	17/10/2013
0491	29/09/2009	29/09/2011
1057	27/11/2009	27/11/2011
2812	26/02/2010	26/02/2012
2814	26/02/2010	26/02/2012
2864	06/01/2009	06/01/2011
3106	09/03/2009	09/03/2013
3229	13/04/2010	13/04/2011
3374	04/03/2008	04/03/2012
4359	13/01/2010	13/01/2012
8019	26/11/2010	21/11/2012
8020	26/11/2010	26/11/2012