

RA-05-24076-1/A Ed. 0

**FCC CERTIFICATION
Radio Measurement
Technical Report**

**standard to apply:
RSS-210**

**Equipment under test:
PAYMENT TERMINAL
C-ZAM / SMASH**

I C : 2662A-41377S1

**Company:
TELESINCRO / INGENICO**

TRANSMIT TO: Mr CAZOU

Company: TELESINCRO / INGENICO

Number of pages: 31 including 5 annexes

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			Name	Visa	Name	Visa
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This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

PRODUCT: PAYMENT TERMINAL

Reference / model: C-ZAM / SMASH

Serial number: ADD1164

MANUFACTURER: BANKSYS (Belgium)

COMPANY SUBMITTING THE PRODUCT:

Company: TELESINCRO / INGENICO

Address: 10, rue du Golf
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33700 MERIGNAC
FRANCE

Responsible: Mr CAZOU

DATE(S) OF TEST: 13 May 2005

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE
EMITECH laboratory at MONTIGNY LE BRETONNEUX (78)
FRANCE

Registration Number by FCC: 101696/FRN: 0006 6490 08

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TESTED BY: L. BERTHAUD

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1.INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment:
PAYMENT TERMINAL C-ZAM - SMASH in accordance with normative reference.

2.PRODUCT DESCRIPTION

ITU Emission code: 1M00F7D

Category: I

Utilization: banking payment terminal

Antenna type: incorporated antenna

Antenna gain: unknown

Operating frequency range: I.S.M. band from 2400 MHz to 2483.5 MHz

No of channels: 79

Channel spacing: 1 MHz

Frequency generation: ☒ SAW Resonator ☐ Crystal ☒ Synthesizer

Modulation: Frequency Hopping Spread Spectrum
☒ Amplitude ☐ Digital ☒ Frequency ☐ Phase

Power source: Ni – Mh batteries (5×1.2 V)

Power level, frequency range and channels characteristics are not user adjustable.

The details pictures of the product and the circuit boards are joined with this file.

3.NORMATIVE REFERENCE

FCC Part 15 (2004)	Code of Federal Regulations Title 47 - Telecommunication Chapter 1 - Federal Communications Commission Part 15 - Radio frequency devices Subpart C - Intentional Radiators
RSS 210 Issue 5 (2001)	Low Power Licence - Exempt Radiocommunication Devices (All Frequency Bands)
RSS 210 Issue 5 (2002)	Amendment Section 6.2.2 (o)

4.TEST METHODOLOGY

Radio performance tests procedures given in RSS 210:

Paragraph 6.2.: Non-Momentarily Operated Devices
Paragraph 6.2.2 (o): 902-928 MHz; 2400-2483.5 MHz; 5725-5850 MHz

ANSI C63.4 (01)	Methods of measurement of Radio-Noise Emissions from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
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5. TESTS AND CONCLUSIONS

Test Procedure RSS 210	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
§ 6.2.2 (o)						
a) a 1)	Separated channel	X				Note 6
a 2)	902 - 928 MHz band			X		
a 3)	Average time of occupancy on any frequency, and output power	X				Note 4
b)	DSSS			X		
c)	Hybrid System			X		
d) d 1)	Spectral density	X				Note 1
d 2)				X		
d 3)				X		Note 1
e) e 1)	Spurious transmitter	X				
e 2)				X		
e 3) Sections 2 to 5	§ 5.9 Emission bandwidth	X				Note 3
Sections 6.3 to 6.6	§ 6.3 Restricted band			X		
	§ 6.4 Frequency stability			X		
	§ 6.5 Pulsed Operation			X		
	§ 6.6 Transmitter AC Wire line			X		
Sections 7 to 7.5	§ 7.1 Receiver Categories	X				category II
	§ 7.2 Receiver Spurious Conducted			X		
	§ 7.3 Receiver Spurious Radiated	X				
	§ 7.4 Receiver AC Wire line			X		
	§ 7.5 Scanner Receiver			X		
Section 9	§ 9 AC Wire line Conducted Measurement			X		
Section 10	§ 10 Antenna Conducted			X		
Section 11	§ 11 RF field Measurement Method					RF field conversion
Section 13	§ 13 Near field Measurement			X		Note 5
Section 14	§ 14 Exposure of human RF field	X				Note 2

NAp: Not Applicable

NAs: Not Asked

Note 1: RSS-210 certification the spectral density is less than 50 mW/MHz, indoor use only, not weatherproof equipment, (for information only, the amendment of November 30, 2002 applies), the system does not employ digital modulation.

Note 2: see certificate of conformity from requerant.

Note 3: the 20 dB bandwidth is the 99 % emission bandwidth, measured with the hopping stopped (see annex 2). We used the special function "occupied power bandwidth" from the spectrum analyzer which used the same methodology in the standard.

Channel 1 bandwidth = 747 kHz

Channel 44 bandwidth = 749 kHz

Channel 80 bandwidth = 771 kHz

Note 4: This system use at least 75 hopping frequencies, the maximum 20 dB bandwidth of the hopping channel is less than 1 MHz, this system use more than 15 non-overlapping channels.

The timing by channel is 210 μ s (see annex 3). During 79 channels $\times$ 0.4 s (RSS 210) = 31.6 s, any channel is used 326 times, then $326 \times 210 \mu$ s = 68.5 ms, thus the average time of occupancy on any channel is less than 400 ms within a period of 0.4 s multiplied by the number of hopping channels employed, in normal operating mode.

Note 5: not any spurious below 30 MHz.

Note 6: the carrier frequencies are separated by 1 MHz (see annex 1).

Conclusion:

The sample of PAYMENT TERMINAL C-ZAM - SMASH submitted to the tests complies with the regulations of the standard RSS 210 in accordance with the limits or criteria defined in this report.

6. OUTPUT POWER TRANSMITTER**Standard:** RSS-210**Test procedure:** § 6.2.2 (o) a3)**Test equipment:**

TYPE	BRAND	EMITECH NUMBER
Spectrum analyzer FSEM 30	Rohde & Schwarz	1244
Diode detector OD20004A	Omniyig	2469
Oscilloscope THS 720	Tektronix	0940
Antenna RGA60	Electrometrics	1938
Antenna RGA60	Electrometrics	1204
Open site	EMITECH	1274
Radio frequency generator SME06	Rohde & Schwarz	1669
High pass filter HPM11630	Micro-tronics	1673
Low noise amplifier 1 to 18 GHz	ALC	2648
Power sensor 80401A	Gigatronics	3182
Power meter 8541B	Gigatronics	3479

Test set up:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

We use for this measure outdoor test site, by substitution method. The measuring distance between the equipment and the test antenna is 3 m. The antenna have been oriented in the two polarizations, we have recorded only highest level.

In first the spectrum analyzer is replaced by a diode detector which is connected to the vertical channel of an oscilloscope.

The equipment under test is substituted by a signal generator with a calibrated double ridged guide antenna, and its level adjusted such that the deviation of the Y-trace of the oscilloscope.

The output power level of the signal generator is measured with a calibrated RF power meter.

Then a measurement of the electro-magnetic field is realized, with a resolution bandwidth and video bandwidth adjusted at 1 MHz.

Distance of antenna: 3 meters**Antenna height:** 1 to 4 meters**Antenna polarization:** vertical and horizontal**Equipment under test operating condition:**

The equipment is in continuous transmission mode at the highest power level which the transmitter is intended to operate (hopping mode).

The equipment is fitted with an internal antenna, without connector.

Results:

Ambient temperature (°C): 19.5
 Relative humidity (%): 68

Power source: 6 Vd.c.

Sample N° 1

		Peak Output Power radiated at these frequencies (W): from 2402 MHz to 2480 MHz	Limits (W)
Normal test conditions	Nominal power source (V): 6	114.82×10^{-3}	1*

Polarization of test antenna: vertical (height: 190 cm)

Position of equipment: flat position (azimuth: 190 degrees)

* the frequency hopping systems use at least 75 hopping channel.

Test conclusion:

RESPECTED STANDARD

7.SPECTRAL DENSITY TRANSMITTER**Standard:** RSS-210**Test procedure:** § 6.2.2 (o) d1)**Test equipment used:**

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSEM 30	Rohde & Schwarz	1244
Open site	Emitech	1274
Radiofrequency generator SME06	Rohde & Schwarz	1669
Antenna RGA-60	Electrometrics	1938
Antenna RGA-60	Electrometrics	1204
Power source	TTI	2148

Measured condition:

The Spread Spectrum (SS) bandwidth = channel bandwidth multiplied by number of distinct frequencies in the hopset.

The Spectral density = transmitter output power in milliwatt at antenna divided by the Spread Spectrum (SS).

Test operating condition of the equipment:

Antenna gain (relative to an isotropic antenna): unknown (integral antenna).

The transceiver is blocked in transmit mode hopping.

Results:

Ambient temperature (°C): 19.5

Relative humidity (%): 68

Power source: 6 Vd.c.

Sample n° 1

Transmitter output power = 114.82 mW

Spread Spectrum = 747 kHz (minimum) × 79 channels = 59.01 MHz

	Spectral density at frequency: 2402 MHz to 2480 MHz
Normal test conditions	1.95 mW/MHz
Limits	50 mW/MHz

Test conclusion:

RESPECTED STANDARD

8.RADIATED EMISSION TRANSMITTER**Standard:** RSS-210**Test procedure:** § 6.2.2 (o) e1)**Test equipment:**

TYPE	BRAND	EMITECH NUMBER
Test receiver ESVS 10	Rohde & Schwarz	1219
Spectrum analyzer FSEM 30	Rohde & Schwarz	1244
Biconical antenna HP 11966C	Hewlett Packard	728
Log periodic antenna HL 223	Rohde & Schwarz	1999
Open site	Emitech	1274
Antenna RGA-60	Electrometrics	1204
Low-noise amplifier	Microwave DB	1922
High pass filter HP12/3200-5AA	Filtek	

Test set up:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m above a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

Frequency range: from 30 MHz to harmonic 5 ($F_{\text{carrier}} \leq 10 \text{ GHz}$)

Detection mode: Quasi-peak ($F < 1 \text{ GHz}$)
Average ($F > 1 \text{ GHz}$)

Distance of antenna: 3 meters**Antenna height:** 1 to 4 meters**Antenna polarization:** vertical and horizontal**Equipment under test operating condition:**

The equipment is blocked in continuous transmission mode.

Results:

Ambient temperature (°C): 19.5

Relative humidity (%): 68

Power source: we used for power source a mains adaptor (provided by the applicant) which gives 6.6 Vd.c. to the equipment.

The lowest field strength channel is 110.4 dB μ V/m at 3 m, then the limit is 20 dB below or the levels specified in table 3 (RSS 210), whichever is less stringent.

Central Channel Emission

FREQUENCIES (MHz)	RBW (kHz)	Detector QP: Quasi-peak A: Average	Polarization H: Horizontal V: Vertical	Field strength (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
282.23	120	QP	V	30.4	90.4	60
310.47	120	QP	H	27.2	90.4	63.2
479.80	120	QP	H	27.5	90.4	62.9
508.03	120	QP	H	26.8	90.4	63.6
678.23	120	QP	V	28.2	90.4	62.2
987.84	120	QP	H	29.4	90.4	61

Test conclusion:

RESPECTED STANDARD

9.RADIATED EMISSION RECEIVER**Standard:** RSS-210**Test procedure:** § 6.2.2 (o) e3) section 7 § 7.3**Test equipment:**

TYPE	BRAND	EMITECH NUMBER
Test receiver ESVS 10	Rohde & Schwarz	1219
Spectrum analyzer FSEM 30	Rohde & Schwarz	1244
Biconical antenna HP 11966C	Hewlett Packard	728
Log periodic antenna HL 223	Rohde & Schwarz	1999
Open site	Emitech	1274
Antenna RGA-60	Electrometrics	1204
Low-noise amplifier	Microwave DB	1922
High pass filter HP12/3200-5AA	Filtek	

Test set up:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

Frequency range: from 30 MHz to harmonic 5 ($F_{\text{carrier}} \leq 10 \text{ GHz}$)

Detector: Quasi-peak ($F < 1 \text{ GHz}$)
Average ($F > 1 \text{ GHz}$)

Distance of antenna: 3 meters**Antenna height:** 1 to 4 meters**Antenna polarization:** vertical and horizontal**Equipment under test operating condition:**

The reception mode corresponds at the standby mode of the transmitter.

Results:

Ambient temperature (°C): 16

Relative humidity (%): 61

Power source: we used for power source a variac adaptor (provided by the applicant) which gives 6.6 Vd.c. to the equipment.

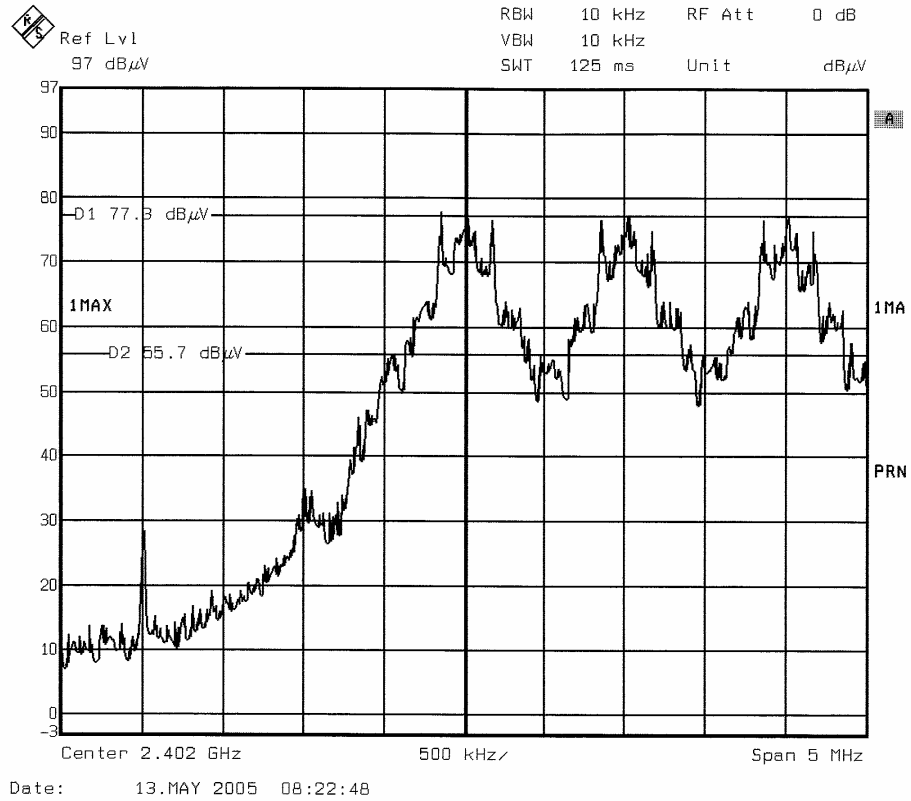
FREQUENCIES (MHz)	RBW (kHz)	Detector QP: Quasi-peak A: Average	Polarization H: Horizontal V: Vertical	Field strength (dBμV/m)	Limits (dBμV/m)	Margin (dB)
339.08	120	QP	H	31.5	46	14.5
471.77	120	QP	H	30.7	46	15.3
1920.04	1000	A	V	31.3	60	28.7
2112.09	1000	A	V	35.5	60	24.5
2176.09	1000	A	V	35.2	60	24.8
2240.08	1000	A	V	34.7	60	25.3

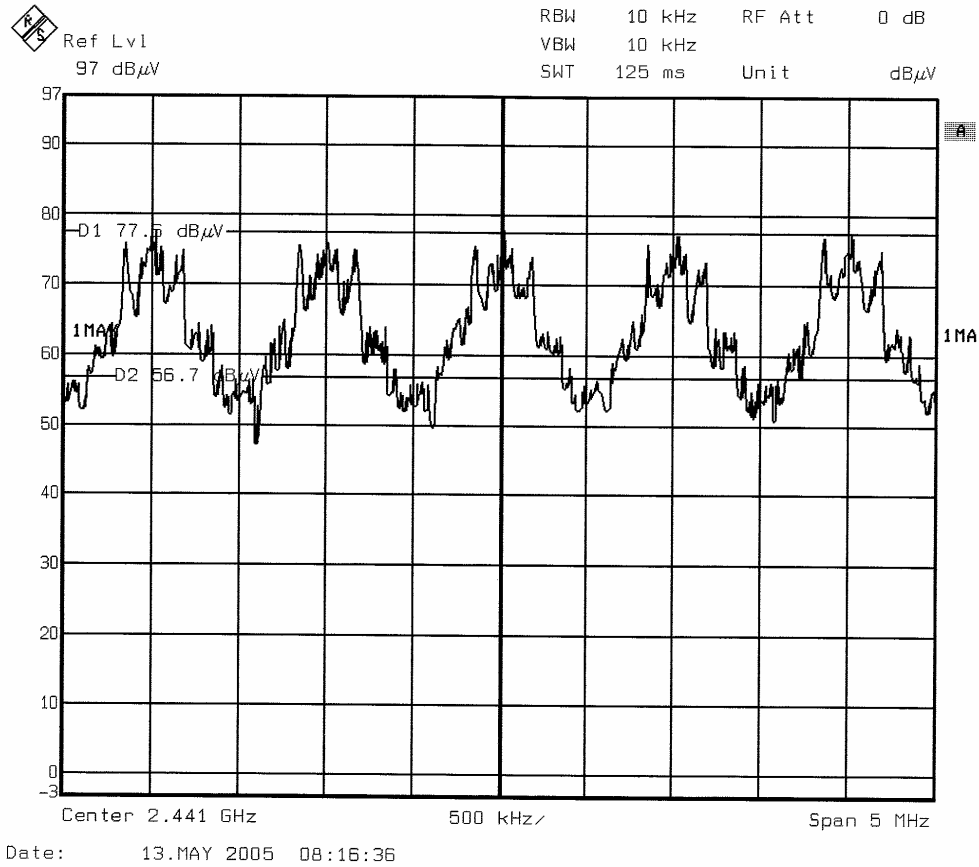
Test conclusion:

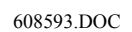
RESPECTED STANDARD

□□□ End of report, 5 annexes to be forwarded □□□

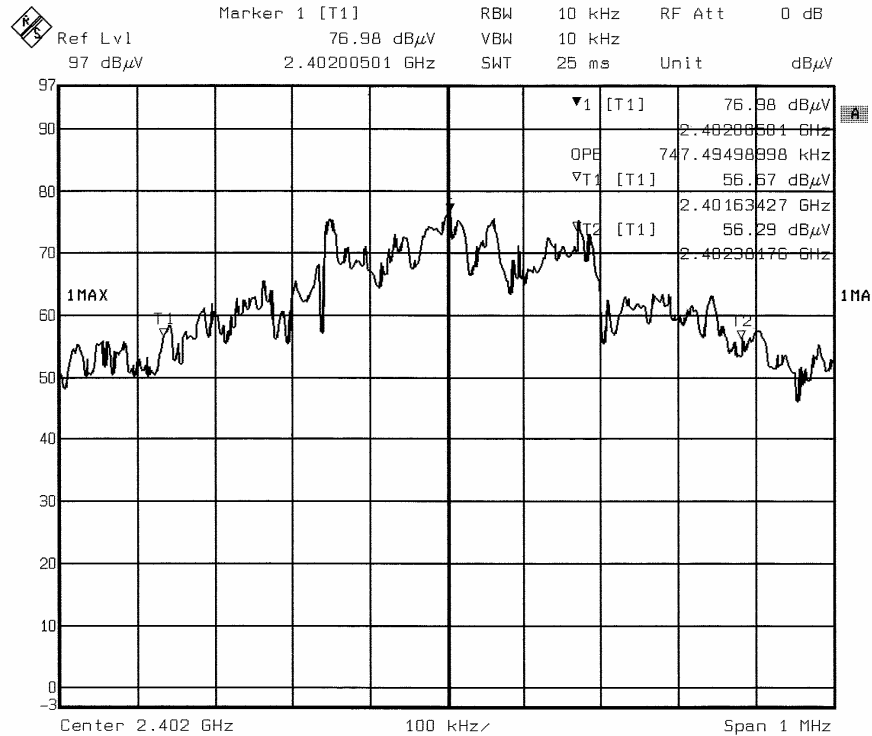
ANNEX 1: CHANNEL SEPARATION



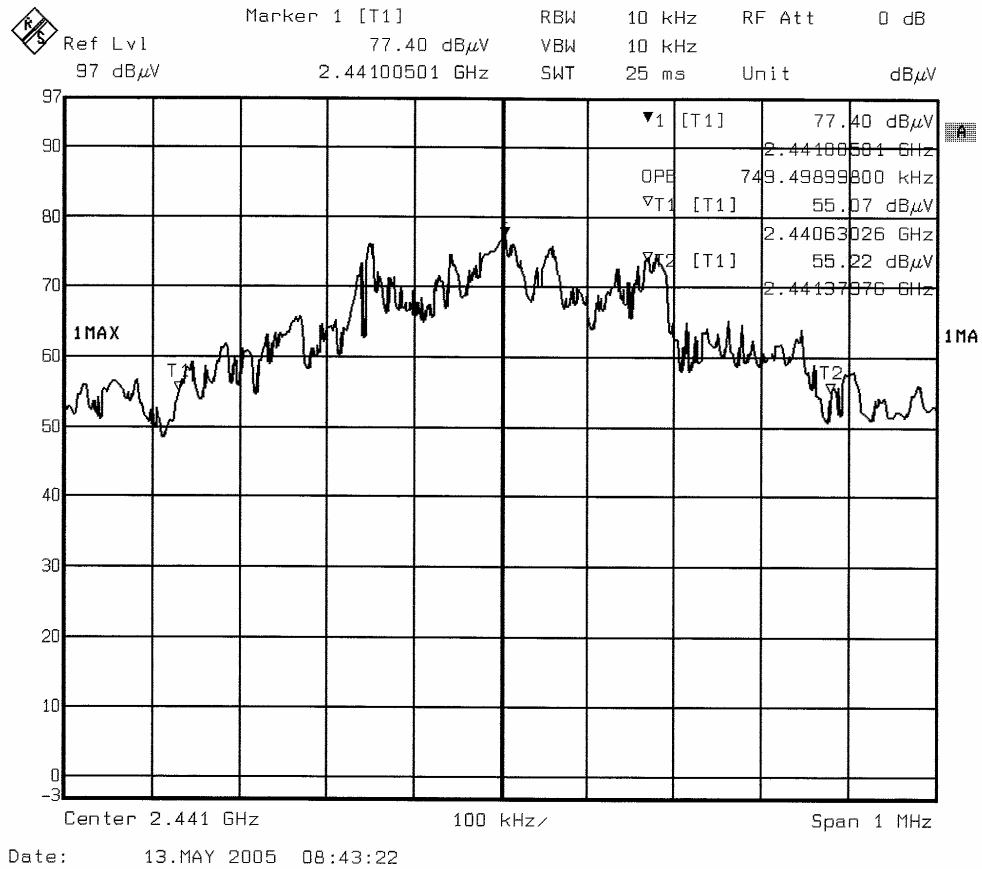


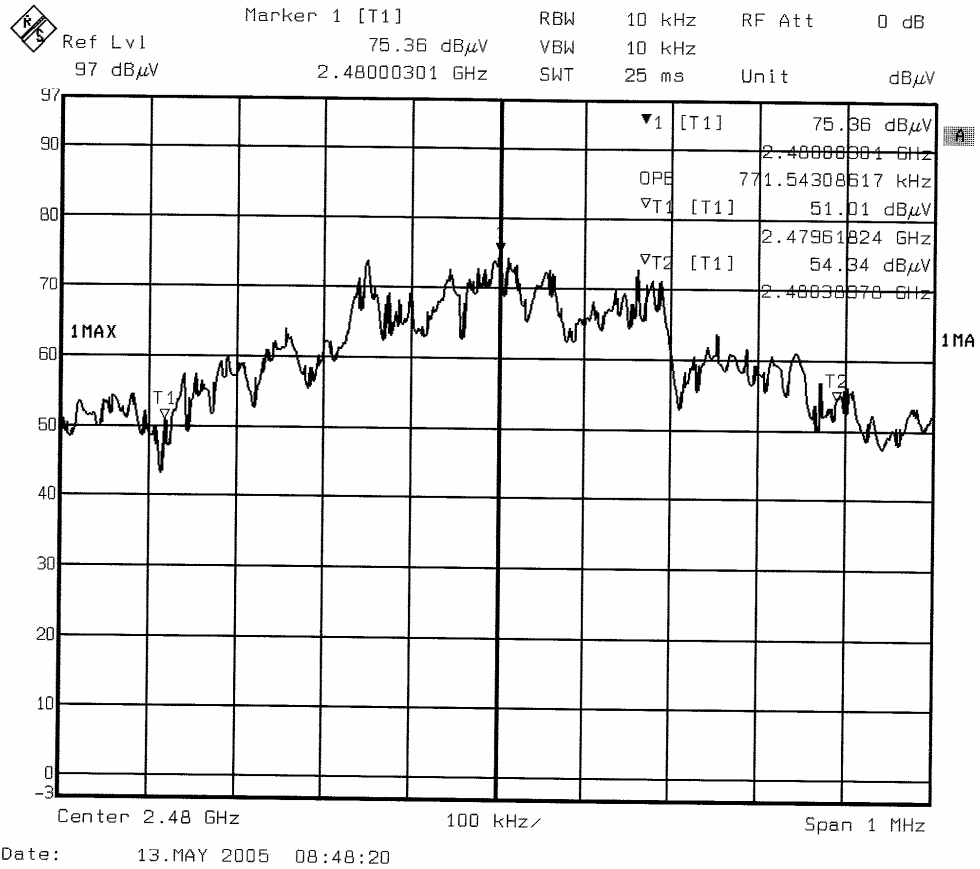


ANNEX 2: CHANNEL BANDWIDTH

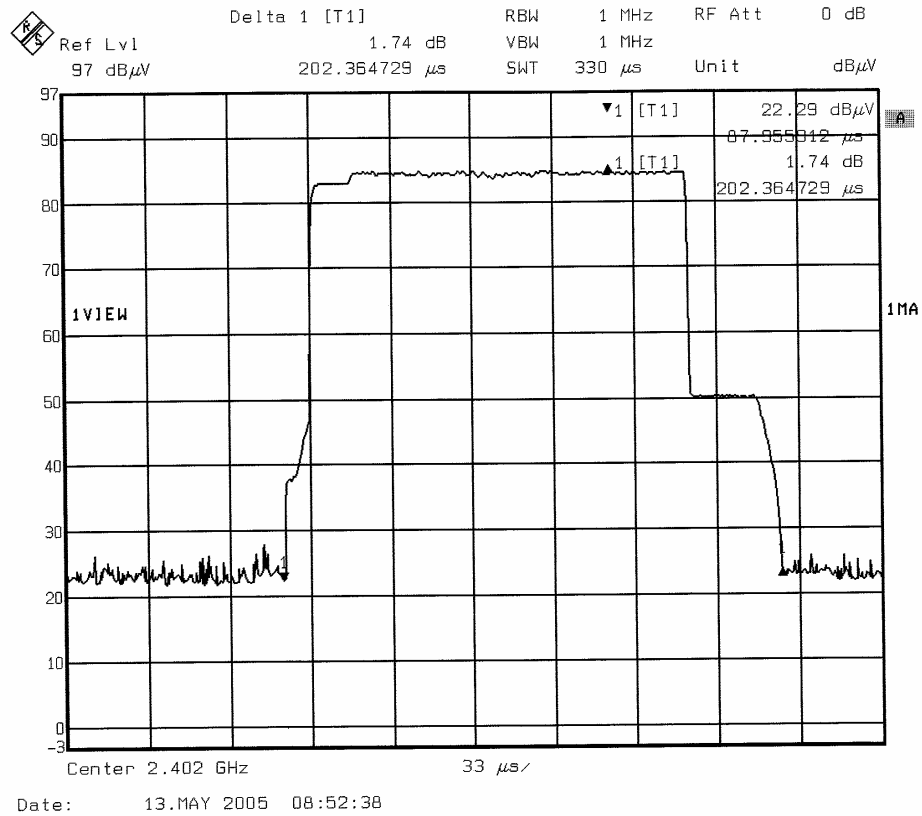


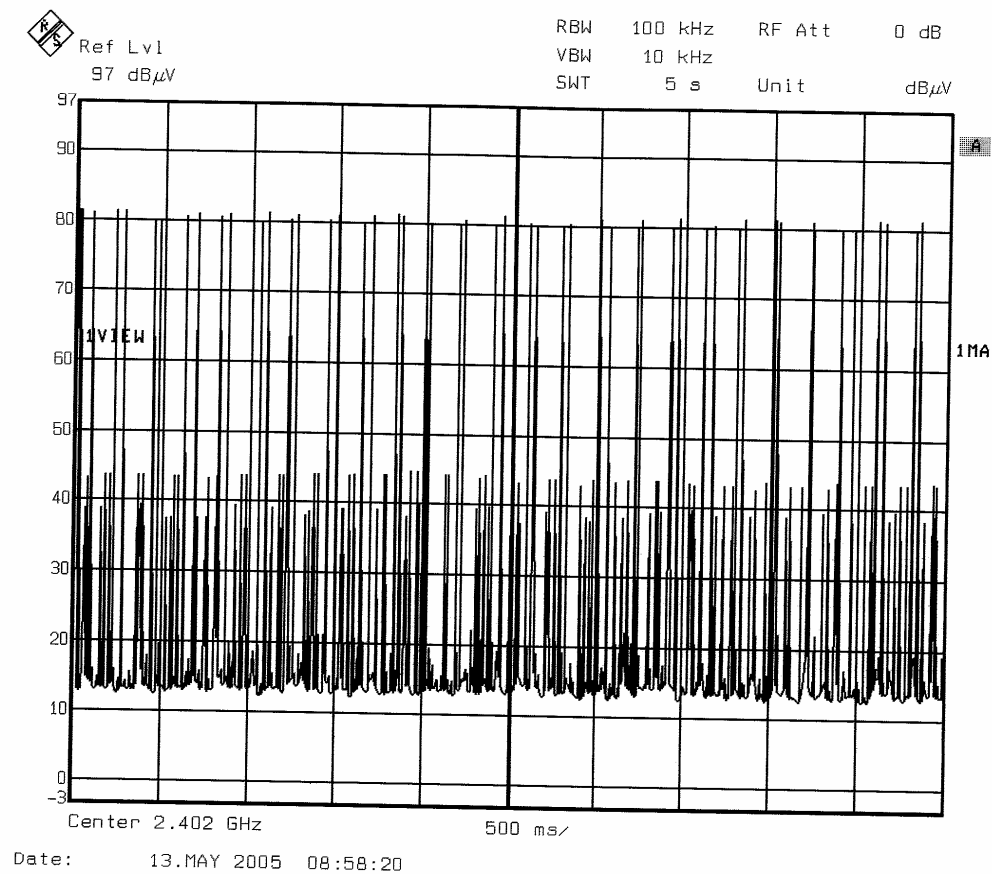
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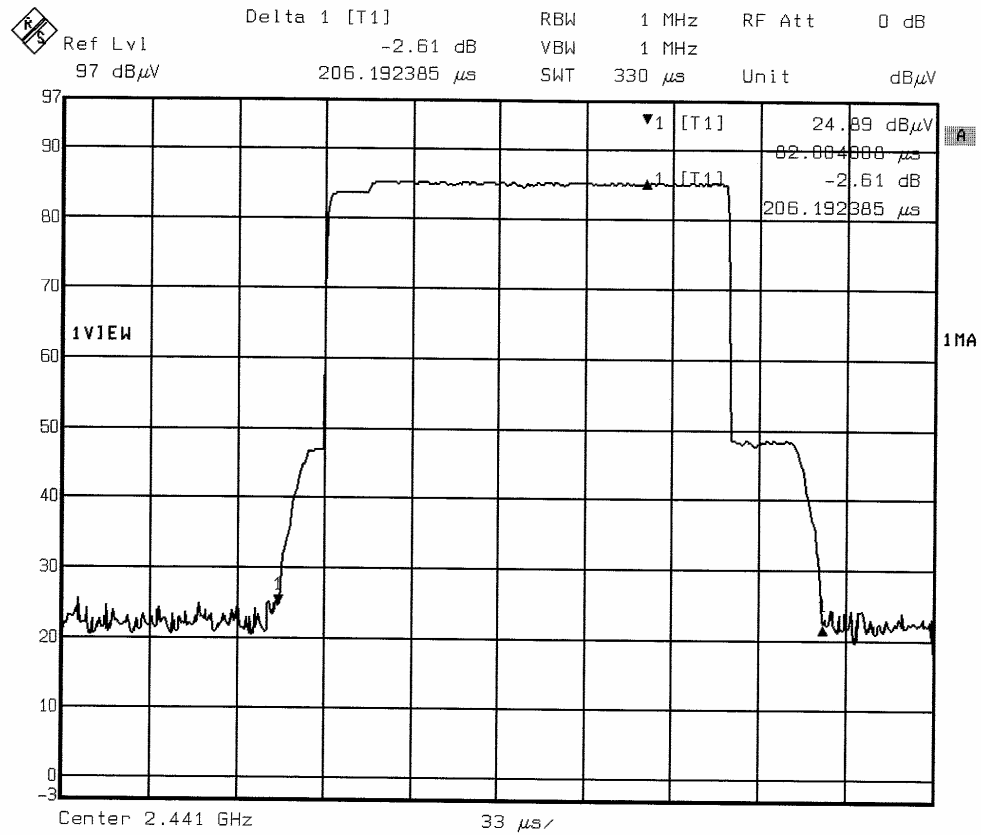


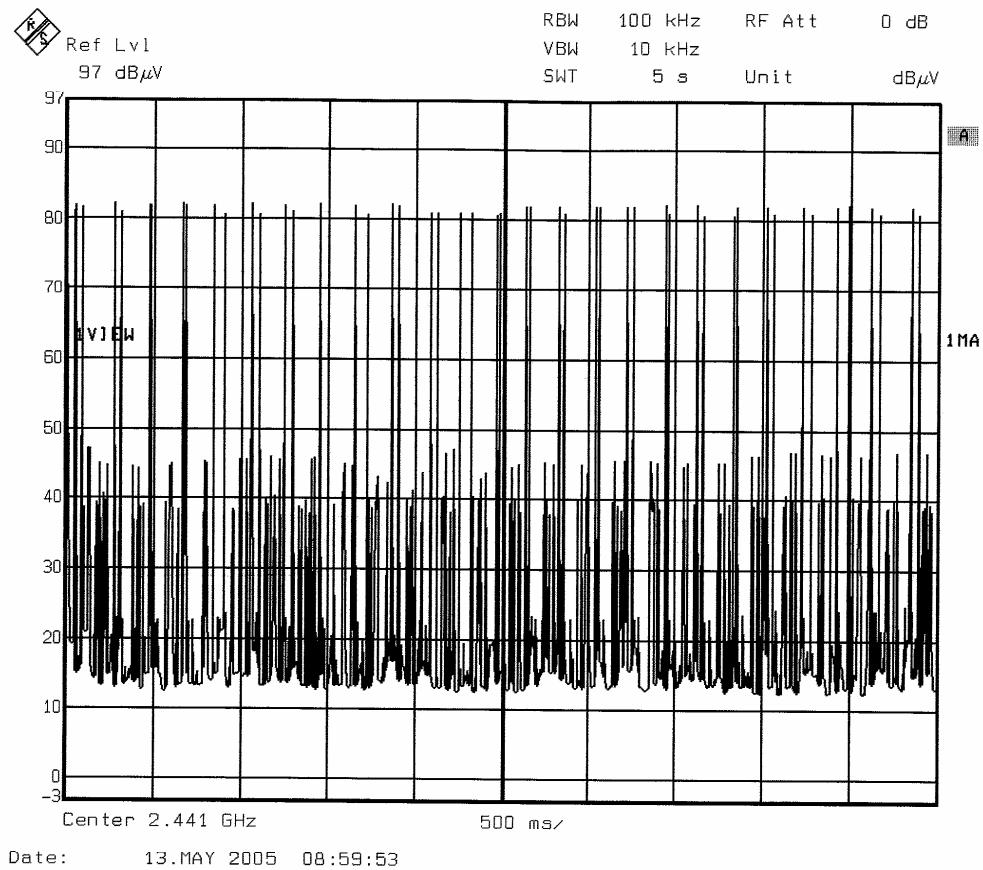


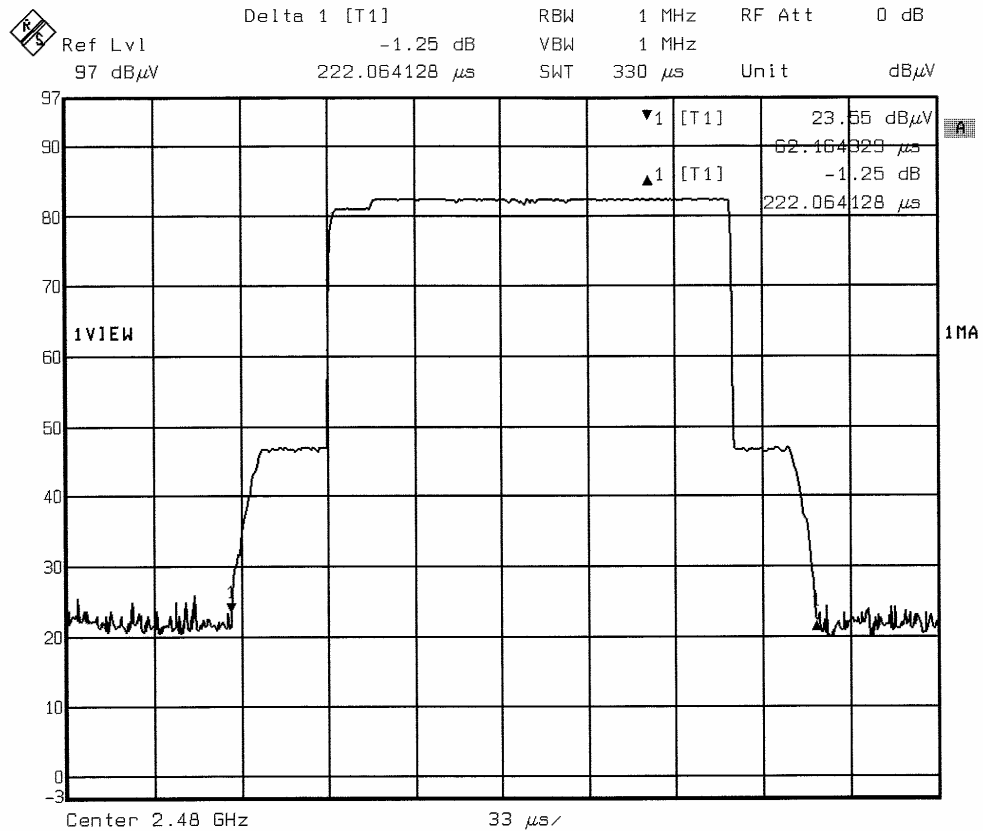
ANNEX 3: TIMING HOPPING AND TIMING CHANNEL



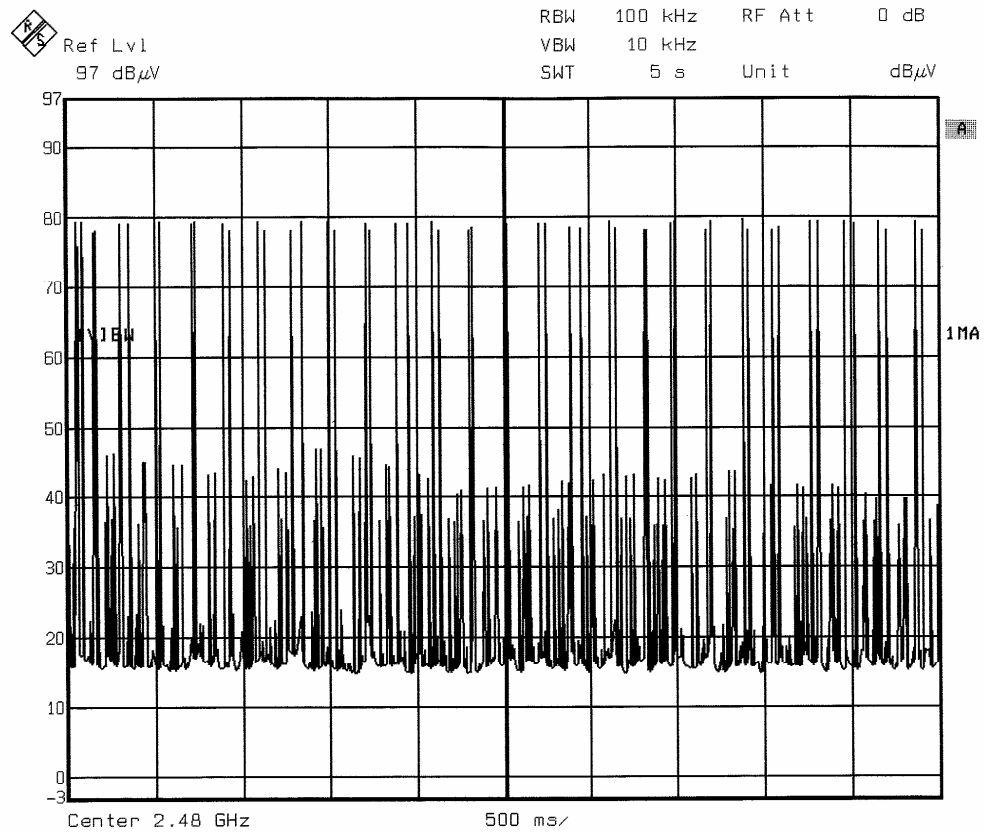








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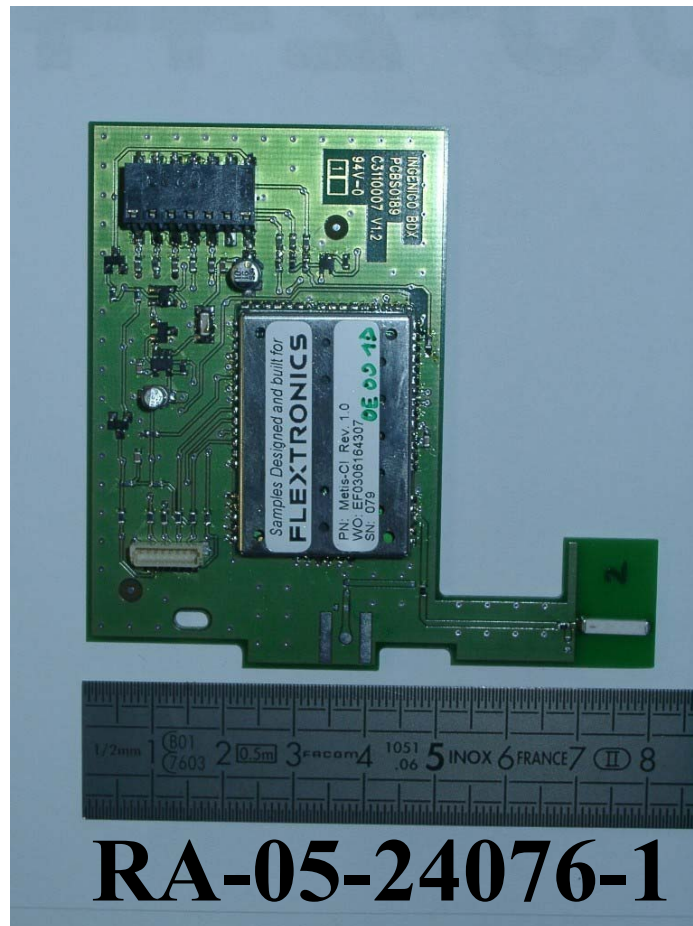
ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

GENERAL VIEW

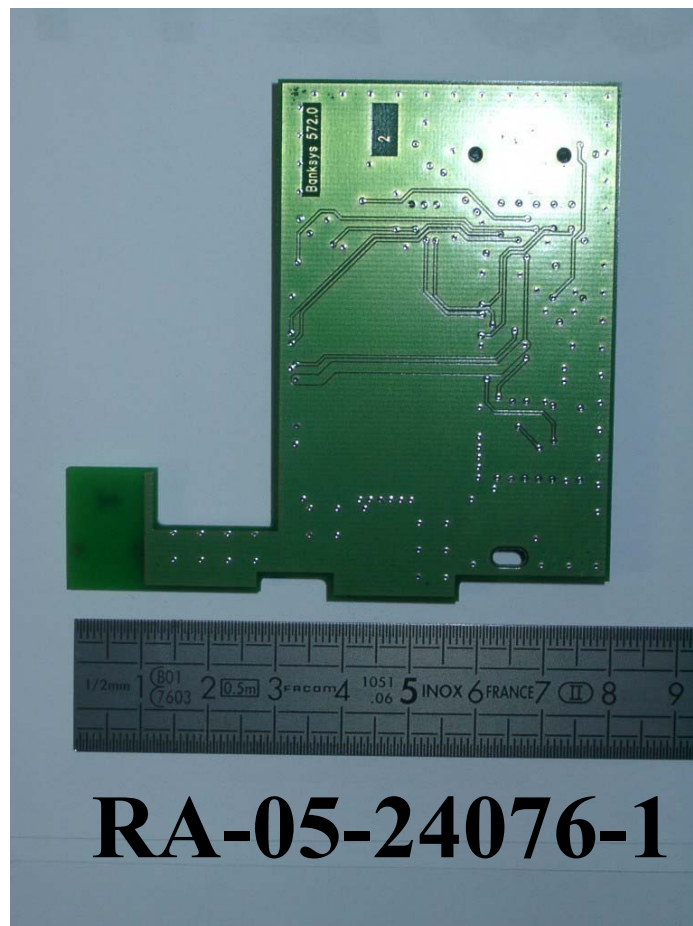


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Printed circuit board: face 1

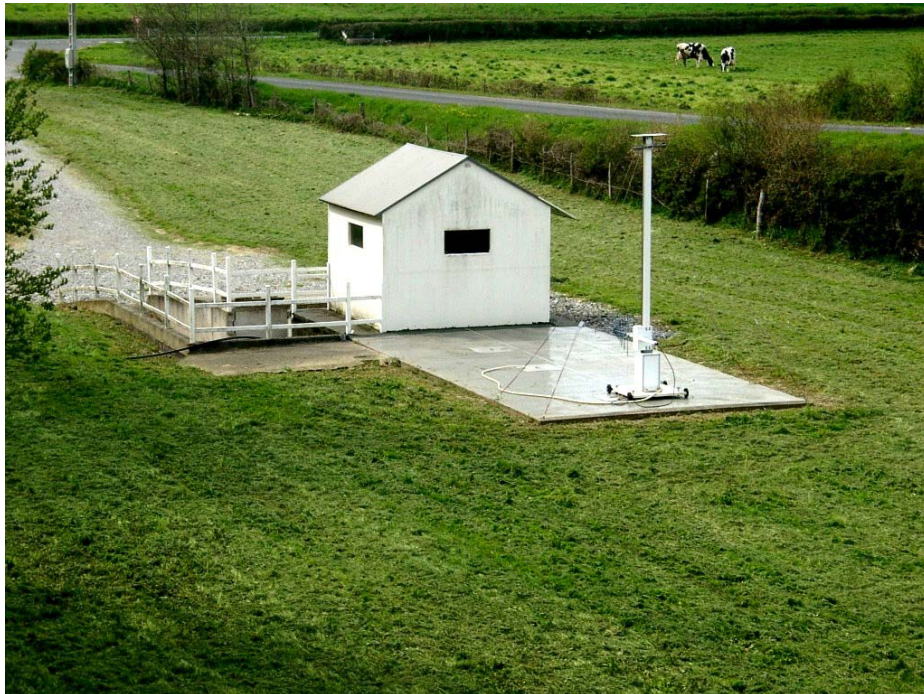


Printed circuit board: face 2



ANNEX 5: PHOTOS OPEN AREA TEST SITE AND TEST SET UP

OPEN AREA TEST SITE



TEST SITE SET UP

