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FCC CERTIFICATION RADIO Measurement Technical Report

**standard to apply:
FCC Part 15.247**

**Equipment under test:
BLUETOOTH STEREO SPEAKER
“Parrot sound system (PSS)”**

**FCC ID :
RKXPSS**

**Company:
PARROT**

DISTRIBUTION: Mr GUERRAB

Company: PARROT

Number of pages: 32 including 4 Annexes

Ed.	Date	Modified pages	Editing		Verification Approval	
			Name	Visa	Name	Visa
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PRODUCT: BLUETOOTH STEREO SPEAKER

Reference / model: Parrot sound system (PSS)

Serial number: not communicated

MANUFACTURER: not communicated

COMPANY SUBMITTING THE PRODUCT:

Company: PARROT

Address: 174 Quai de Jemmapes
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FRANCE

Responsible: Mr GUERRAB

DATES OF TEST: 4 and 6 April 2006

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE
EMITECH ATLANTIQUE open area test site in LA POUEZE (49)
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Registration Number by FCC: 101696/FRN: 0006 6490 08

TESTED BY: L. BERTHAUD
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1.INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: BLUETOOTH STEREO SPEAKER "Parrot sound system (PSS) in accordance with normative reference.

2.PRODUCT DESCRIPTION

ITU Emission code: 1M00F7D

Class: B (residential environment)

Utilization: Bluetooth stereo speaker

Antenna type: internal antenna

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

Number of channels: 79

Channel spacing: 1 MHz

Frequency generation: ☐ SAW Resonator ☐ Crystal ☒ Synthetiser

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

Power source: 115 Va.c.

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 (2005) Code of Federal Regulations
Title 47 - Telecommunication
Chapter 1 - Federal Communications Commission
Part 15 - Radio frequency devices
Subpart C - Intentional Radiators

ANSI C63.4 (2003) Methods of Measurement of Radio-Noise Emissions from
Low-voltage Electrical and Electronics Equipment in the range
of 9 kHz to 40 GHz

4.TEST METHODOLOGY

Radio performance tests procedures given in part 15:

- Paragraph 33: frequency range of radiated measurements
- Paragraph 35: measurement detector functions and bandwidths
- Paragraph 205: restricted bands of operation
- Paragraph 207: conducted limits
- Paragraph 209: radiated emission limits; general requirements
- Paragraph 247: operation within the bands 2400-2483.5 MHz

5.ADD ATTACHMENTS FILES

- “Synoptic “***
- “Block diagram “***
- “External photos and Product labeling “***
- “Assembly of components “***
- “Internal photos “***
- “Layout pcb “***
- “Bil of materials “***
- “Schematics “***
- “Product description “***
- “User guide “***

6. TESTS AND CONCLUSIONS

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAP	NAs	
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				Note 8
FCC Part 15.207	CONDUCTED LIMITS	X				
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				Note 4
FCC Part 15.247	OPERATION WITHIN THE BAND 2400-2483.5 MHz					
	(a) (1) <i>hopping systems</i>	X				Note 1 & 2
	(a) (2) digital modulation techniques			X		
	(b) (1) <i>max output power</i>	X				Note 5
	(c) operation with directional antenna gains > 6 dBi			X		Note 3
	(d) <i>intentional radiator</i>	X				Note 8
	(e) <i>peak power spectral density</i>	X				Note 5
	(f) hybrid system			X		
	(g)	X				Note 6
	(h)	X				
	(i) RF exposure compliance	X				Note 7

NAP: Not Applicable

NAs: Not Asked

Note 1: see appendix 1, the frequency hopping system have hopping channel carrier frequencies separated by 1 MHz. The system hop to channel frequencies from a pseudo randomly ordered list of hopping frequencies. Each frequency is used equally on the average by the transmitter, and separated by a minimum of 20 dB bandwidth of the hopping channel.

Note 2: the frequency hopping system use more than 15 non-overlapping channels.

The timing by channel is 215 μ s.

During 79 channels $\times$ 0.4 s (part 15) = 31.6 s, any channel is used 120 times, then

$120 \times 215 \mu$ s = 25.8 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 (see annex 2).

Note 3: the antenna gain is less than 6 dBi

Note 4: see FCC part 15.247 (d).

Note 5: for information only, conducted measurement is not possible (integral antenna), so we used the substitution method in open field.

Note 6: audio application.

Note 7: this type of equipment uses less than 0.5 W of output power with a high signal transmitting duty factor (section 3 from Oet 65c).

Note 8: the equipment is tested with a ferrite (Würth, ref: 7427005) on the internal supply cable (see photo in annex 3).

Conclusion:

The sample of BLUETOOTH STEREO SPEAKER « Parrot sound system (PSS) submitted to the tests complies with the regulations of the standard FCC Part 15 in accordance with the limits or criteria defined in this report.

7.MEASUREMENT OF THE CONDUCTED DISTURBANCES**Standard:** FCC Part 15**Test procedure:** Paragraph 15.207**Limits:** Class**Test equipment:**

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESH3	1058
Pulse limiter	Rohde & Schwarz ESH3-Z2	976
Artificial main network	PMM L3-25	834
Spectrum analyzer	Rohde & Schwarz FSBS	3133
AC Power Supply ALT 2000	K. SERRAS	2441

Software used: BAT-EMC V 3.1.7.1**Test set up:**

The test unit is placed on a wooden table, 0.8 m over a horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane (see photo in annex 4).

Equipment under test operating condition:

The equipment is powered with the AC power operating voltage of 115 V / 60 Hz.

Frequency range: 150 kHz - 30 MHz**Detection mode:** Peak / Average**Bandwidth:** 9 kHz

Results:

The first measurement is made with peak detector:

Curve N° 1: measurement on the Neutral with peak detector

Curve N° 2: measurement on the Line with peak detector

The frequencies which aren't 6 dB under the Average limit are analysed with Average detector.

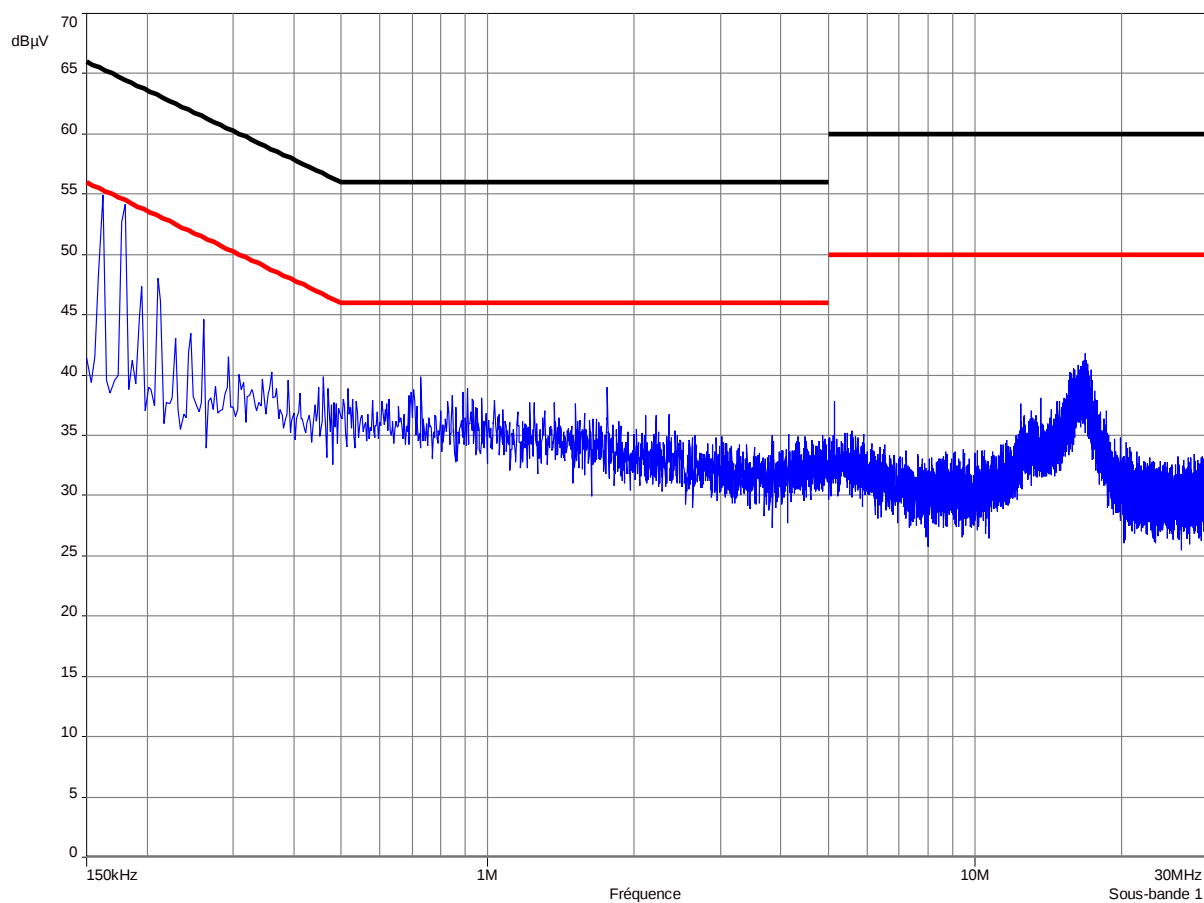
The results are noted in the following table.

Measurement with Average detector:

FREQUENCIES (MHz)	NEUTRAL (dB μ V)	LINE (dB μ V)	LIMITS (dB μ V)
0.162	27.7	21.5	55.4
0.177	27.5	20.5	54.6
0.192	-	22.0	53.8
0.195	23.0	-	53.8
0.209	-	24.9	53.2
0.211	23.4	-	53.1

CURVE N°: 1.

Curve N°1: measurement on the neutral with peak detector



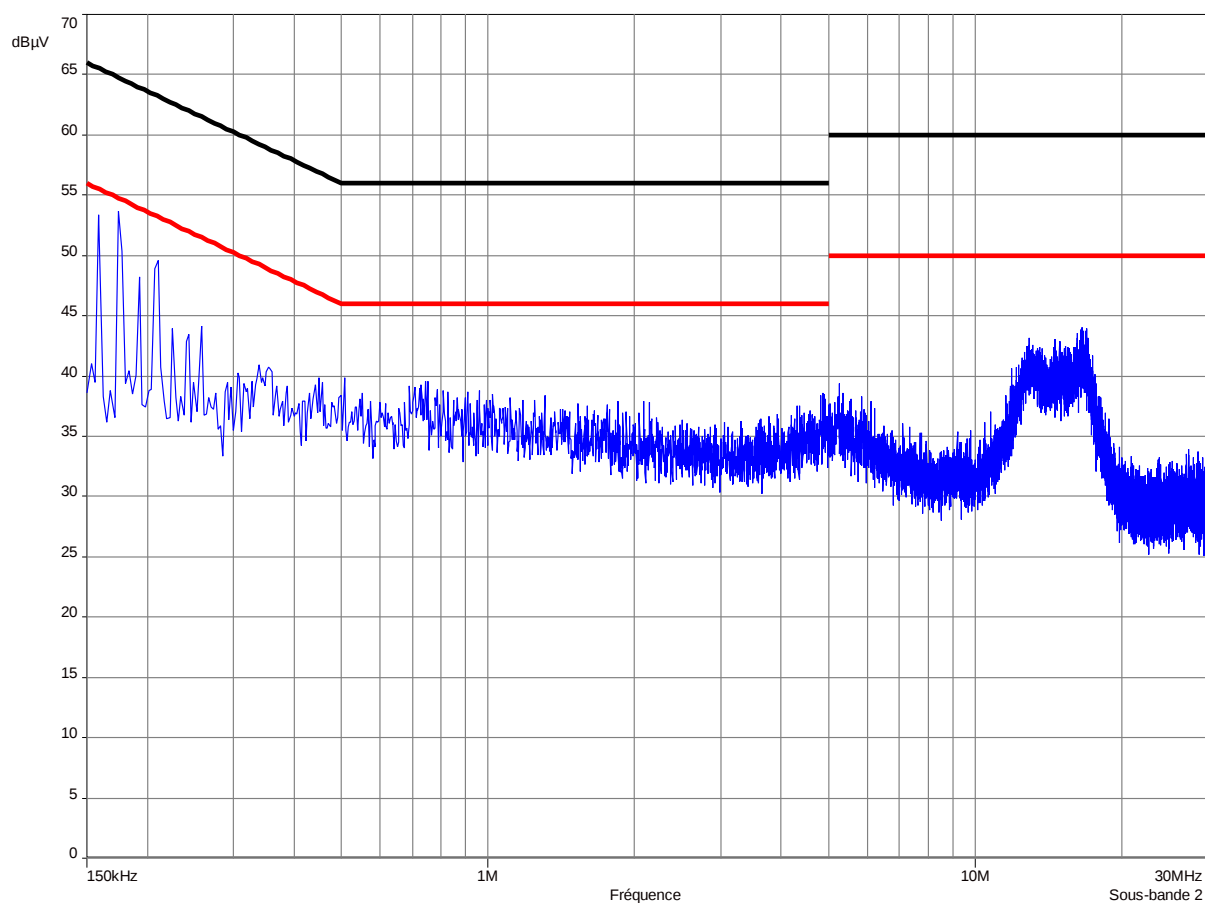
RBW filter: 10 kHz

VBW filter: 10 kHz

Sweep time: 500 ms/MHz

CURVE N°: 2.

Curve N°2: measurement on the line with peak detector



RBW filter: 10 kHz

VBW filter: 10 kHz

Sweep time: 500 ms/MHz

8. PEAK OUTPUT POWER

Standard: FCC Part 15

Test procedure: paragraph 15.247

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
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
Variac R213	Dereix	1419
Power meter 8541B	Gigatronics	3479
Power sensor 80401A	Gigatronics	3182

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 blocked in continuous transmission mode, modulated by internal data signal.

Results:

Ambient temperature (°C): 19

Relative humidity (%): 53

Polarization of test antenna: horizontal (height: 148 cm)

Position of equipment: use position (azimuth: 355 degrees)

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): 115	29.92×10^{-4}	1*

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

Sample n° 1 Channel 1 (2402 MHz)

		Level dBμV	Cable loss dB	Antenna factor dB	Electro-magnetic field (dBμV/m):	P* (W)
Normal test conditions	Nominal power source (V): 115	64.64	4.31	27.46	96.41	7.95×10^{-4}

Sample n° 1 Channel 40 (2441 MHz)

		Level dBμV	Cable loss dB	Antenna factor dB	Electro-magnetic field (dBμV/m):	P* (W)
Normal test conditions	Nominal power source (V): 115	65.99	4.31	27.46	96.76	10.86×10^{-4}

Sample n° 1 Channel 79 (2480 MHz)

		Level dBμV	Cable loss dB	Antenna factor dB	Electro-magnetic field (dBμV/m):	P* (W)
Normal test conditions	Nominal power source (V): 115	64.23	4.31	27.46	96	7.24×10^{-4}

* $P = (E \times d)^2 / 30 \cdot G_p$ with $d=3$ and $G_p = 1.65$ **Test conclusion:**

RESPECTED STANDARD

9. PEAK POWER DENSITY

Standard: FCC Part 15

Test procedure: paragraph 15.247

Test equipment used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Open site	Emitech	1274
Radiofrequency generator SME06	Rohde & Schwarz	1669
Antenna RGA-60	Electrometrics	1938
Antenna RGA-60	Electrometrics	1204
Power meter 8541B	Gigatronics	3479
Power sensor 80401A	Gigatronics	3182
Variac R213	Dereix	1419

Measured condition:

We used the same method of the peak output power, but the oscilloscope and the diode is replaced by a spectrum analyser used in combination with an RF power meter.

Resolution bandwidth: 3 kHz

Video bandwidth: 10 kHz

Test operating condition of the equipment:

The equipment is blocked in continuous transmission mode at the highest output power level which the transmitter is intended to operate, modulated by internal data signal.

Results:

Ambient temperature (°C): 19
Relative humidity (%): 53

Power source (V): 115 Va.c. through a variac

Sample n° 1 Channel 1

	Peak power density at frequency: 2402 MHz
Normal test conditions	-7.98 dBm
Limits	+8 dBm

Sample n° 1 Channel 40

	Peak power density at frequency: 2441 MHz
Normal test conditions	-7.44 dBm
Limits	+8 dBm

Sample n° 1 Channel 79

	Peak power density at frequency: 2480 MHz
Normal test conditions	-10.2 dBm
Limits	+8 dBm

Test conclusion:

RESPECTED STANDARD

10. RADIATED EMISSION OF TRANSMITTER

Standard: FCC Part 15

Test procedure: paragraph 15.205
paragraph 15.209
paragraph 15.247

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver ESH3	Rohde & Schwarz	1058
Test receiver ESVS 10	Rohde & Schwarz	1219
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Loop antenna	EMCO	1406
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 2 to 18 GHz	Microwave DB	1922
High pass filter HP12/3200-5AA	Filtek	
Antenna WR42	IMC	1939
Low-noise amplifier 18 to 26 GHz	ALC	3036
Variac R213	Dereix	1419

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 9 kHz to harmonic 10 ($F_{\text{carrier}} \leq 10 \text{ GHz}$)

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

Bandwidth: 120 kHz ($F < 1 \text{ GHz}$) or 100 kHz, following 15.205 or 15.247
1 MHz ($F > 1 \text{ GHz}$) or 100 kHz, following 15.205 or 15.247

Distance of antenna: between 30 m and 3 m according the frequencies and the limits.

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

The equipment is blocked in continuous transmission mode, modulated by internal data signal.
The equipment is tested with a ferrite on the internal supply cable (2 passages at the centre).

Results:

Ambient temperature (°C): 16.5

Relative humidity (%): 45

Power source (V): 115 Va.c. through a variac

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

FREQUENCIES (MHz)	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBμV/m)	Limits (dBμV/m)	Margin (dB)
270.9	100	128	120	H	43.7	46 *	2.3
361.3	173	0	100	V	51.1	76.8	25.7
416	290	73	100	V	49	76.8	27.8

* restricted bands of operation in 15.205, this limit corresponding at the 15.209 section.

Applicable limits: 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the power produced by the equipment, in 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating. In addition radiated emissions which fall in the restricted band, as defined in section 15.205 (c), must also comply with the radiated emission limits specified in section 15.209 (a).

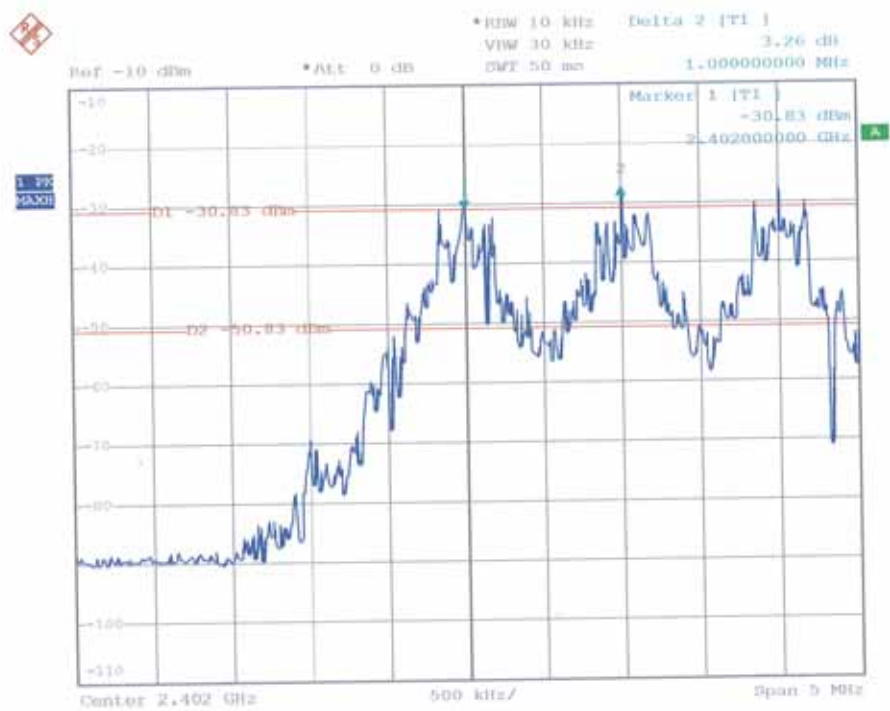
The highest level recorded in 100 kHz bandwidth is 96.8 dBμV/m on channel 40. So the applicable limit is 76.8 dBμV/m.

TEST CONCLUSION:

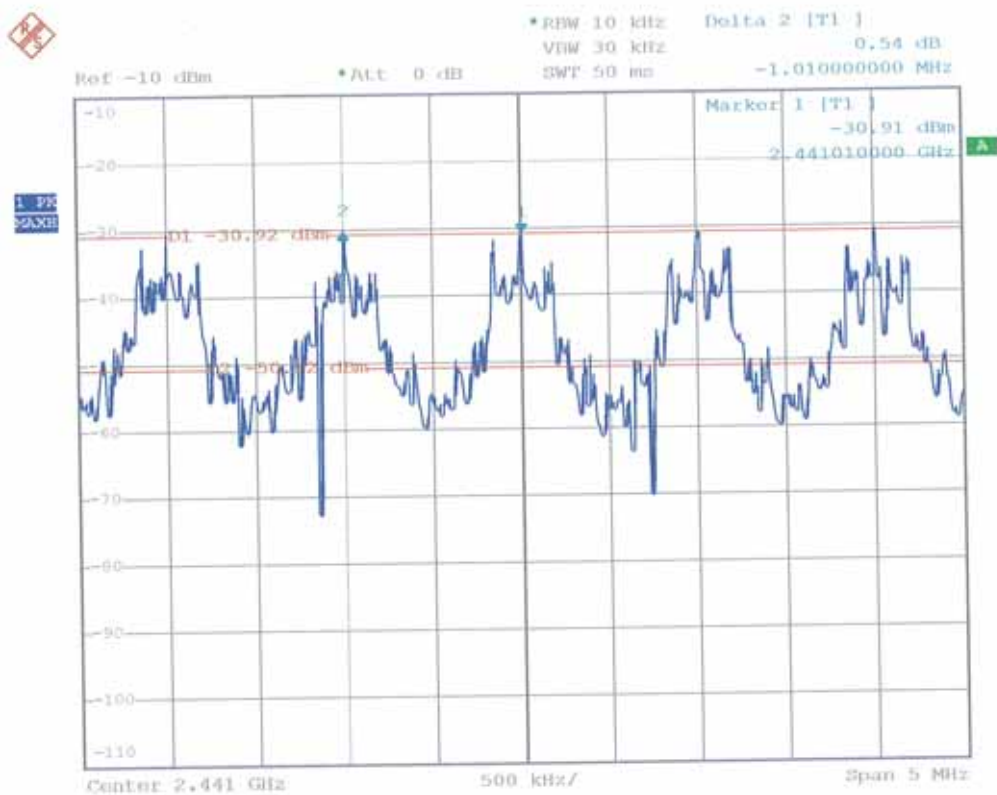
RESPECTED STANDARD

□□□ End of report, 4 annexes to be forwarded □□□

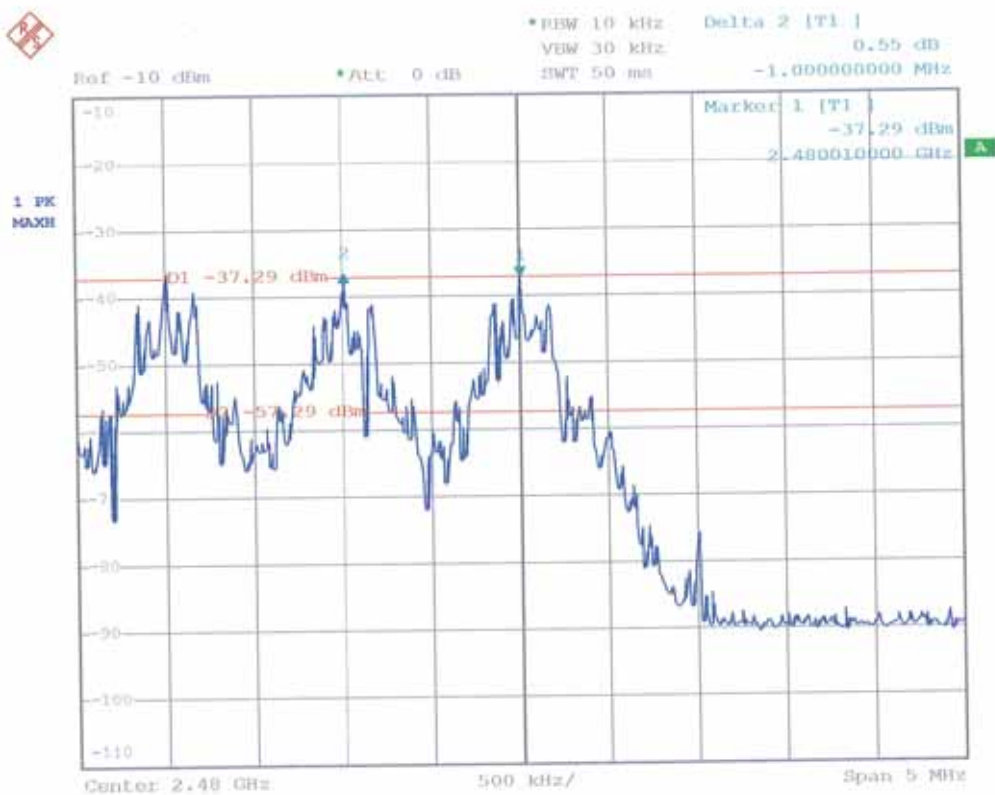
ANNEX 1: CHANNEL SEPARATION



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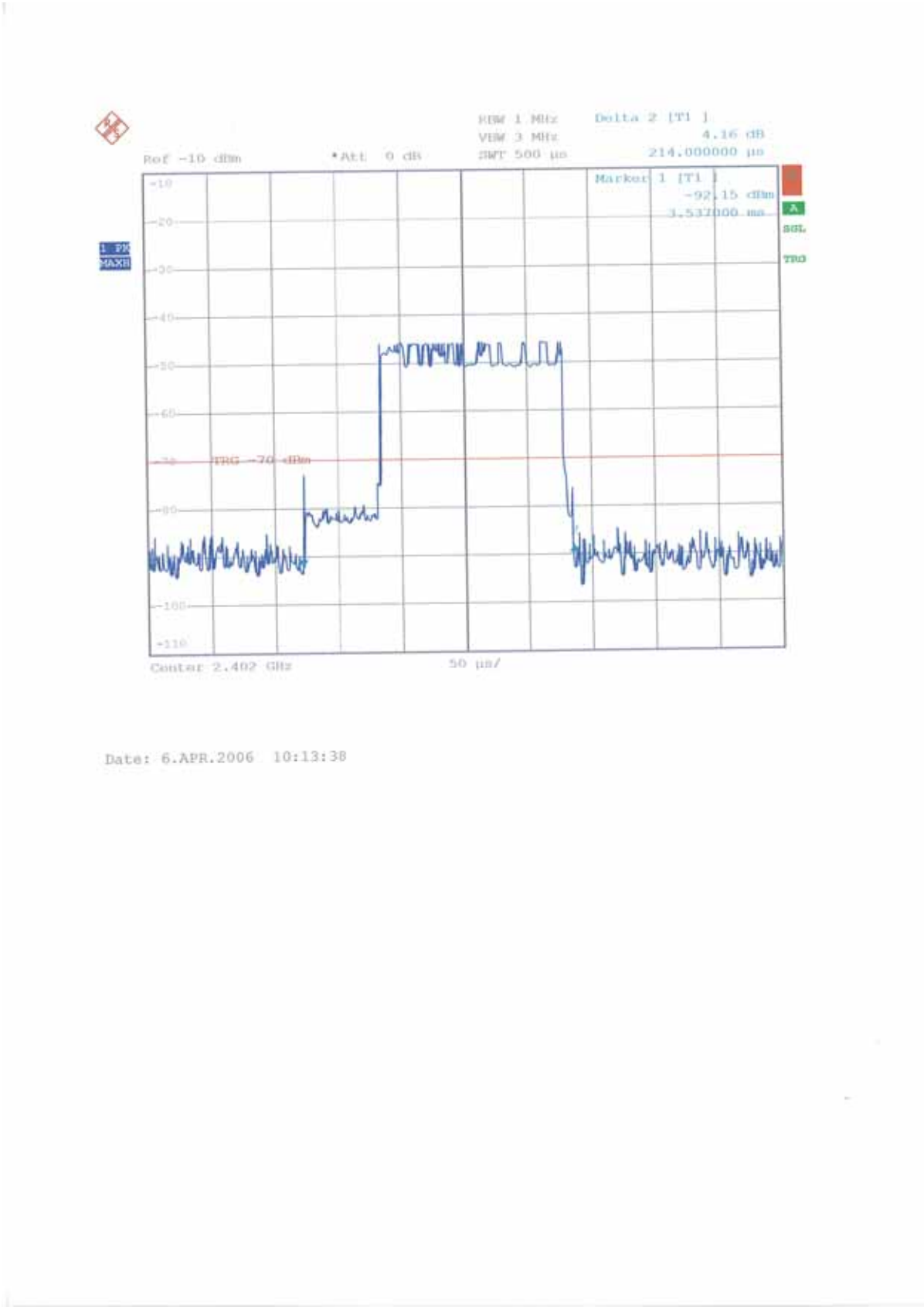


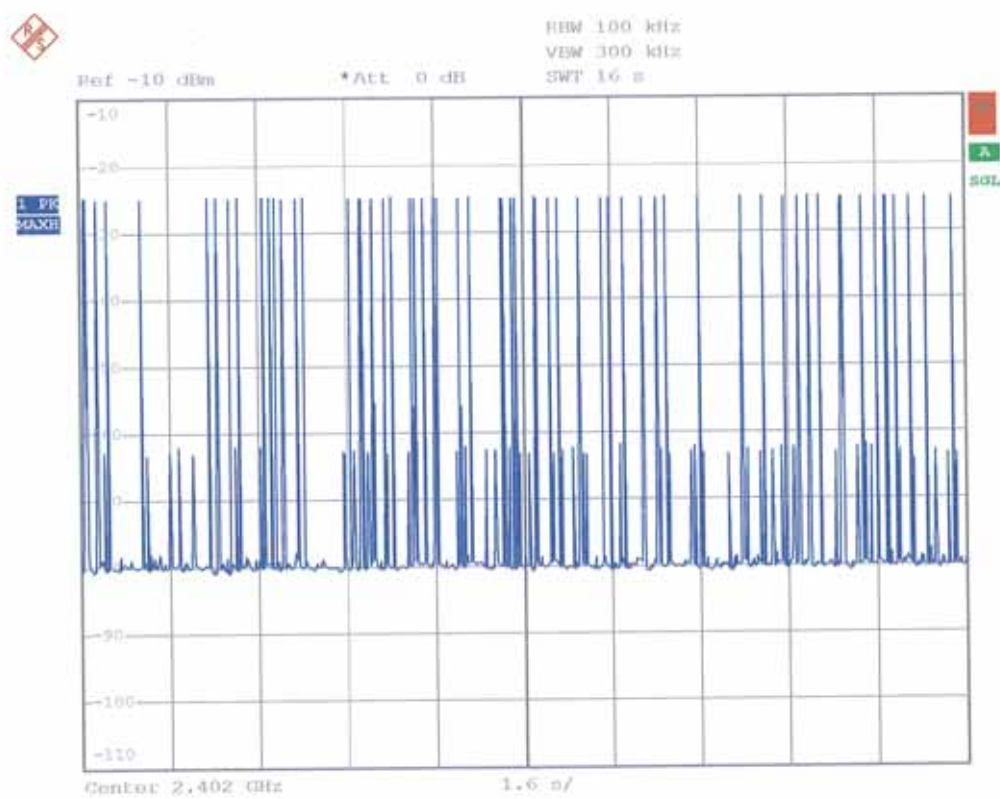
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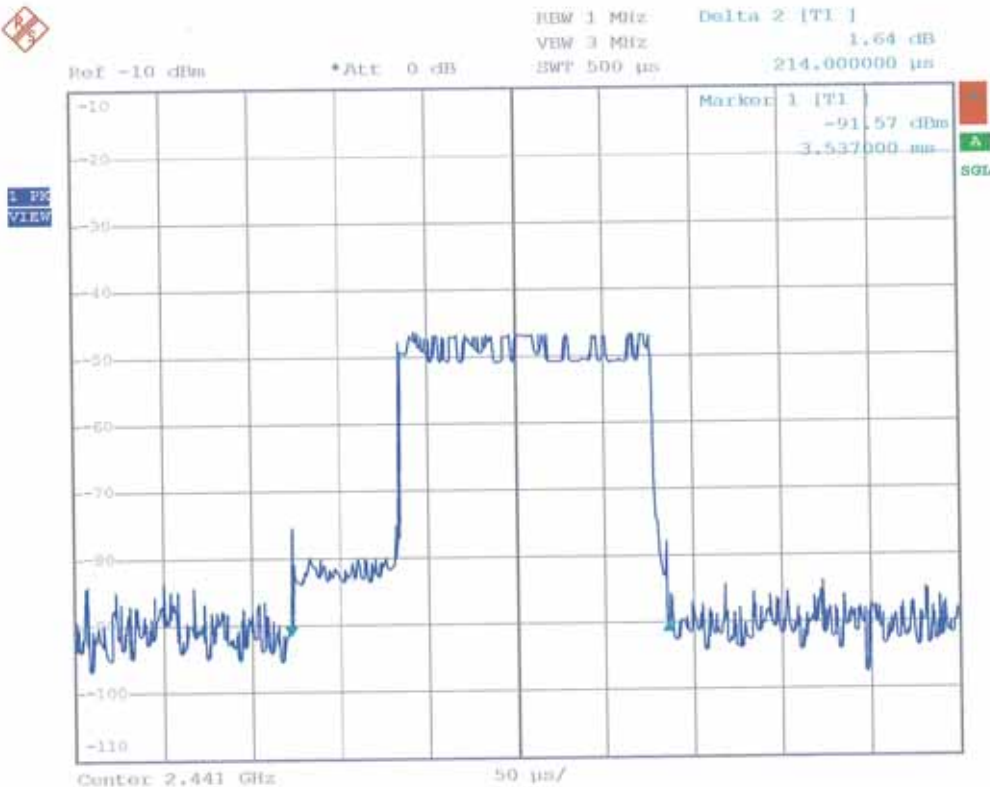
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ANNEX 2: AVERAGE TIME OF OCCUPANCY ON ANY FREQUENCY

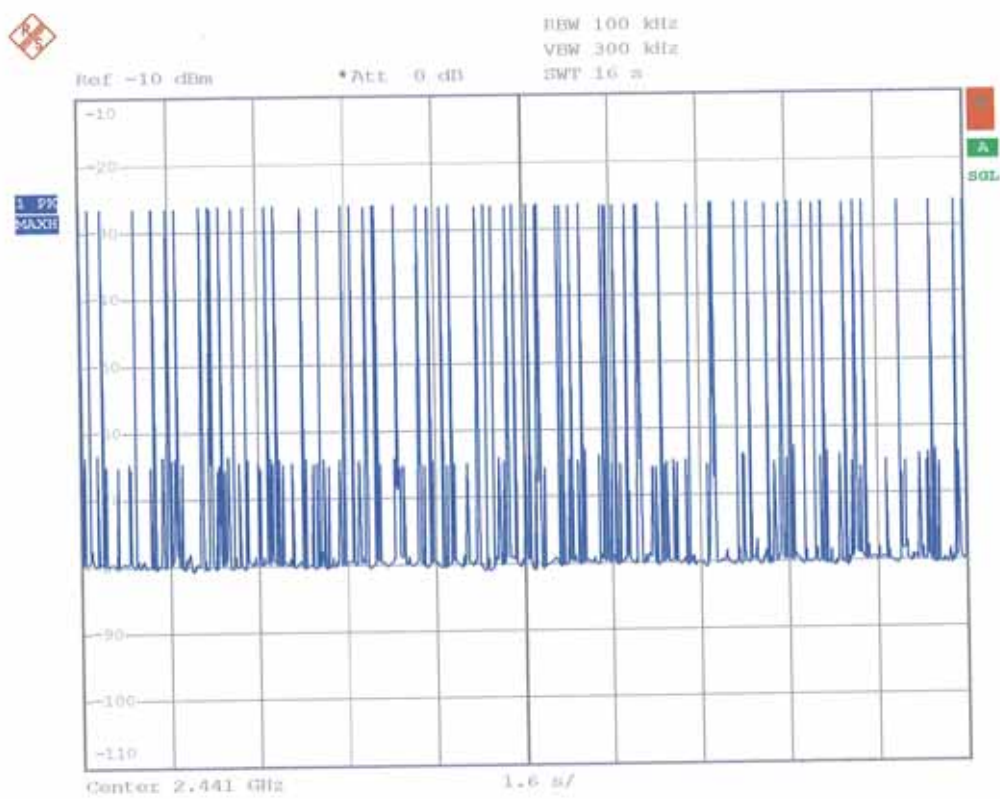




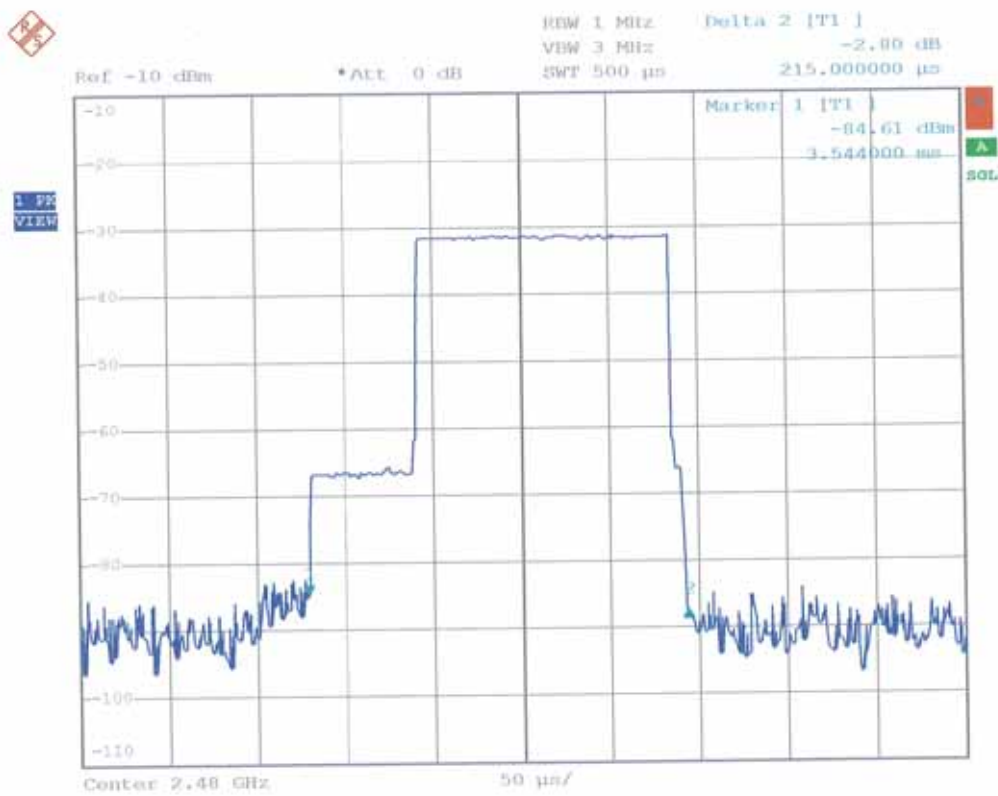
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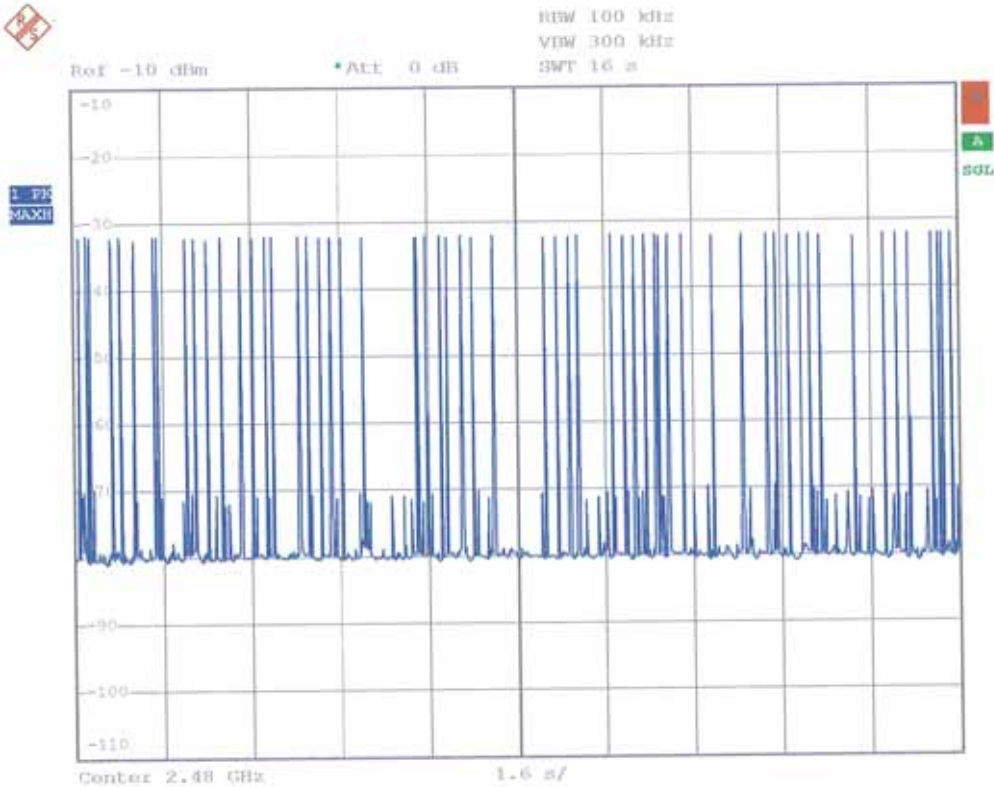
Date: 6.APR.2006 10:14:36



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Date: 6.APR.2006 10:18:33



Date: 6.APR.2006 10:20:27

ANNEX 3: PHOTOS OF THE EQUIPMENT UNDER TEST

GENERAL VIEW (front view)



GENERAL VIEW (rear view)

Printed circuit



Radio module



Supply board



Location of the ferrite

