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RA-06-24579-3/A Ed. 0

FCC PERMISSIVE CHANGE
RADIO Measurement
Technical Report
Limited test

standard to apply:
FCC Part 15.247

Equipment under test:
Bluetooth Base VBASE B
I7780

FCC ID :
T8D-VBASE

Company:
INGENICO

DISTRIBUTION: M. GOBION **Company: INGENICO**

Number of pages: 14 including 3 annexes

Ed.	Date	Modified pages	Editing Name	Editing Visa	Verification Approval Name	Verification Approval Visa
0	12-Apr-07	Creation	M. DUMESNIL	M. D.	P. BONNENFANT	

Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.

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:	**Bluetooth Base VBASE B**
Reference / model:	I7780
Serial number:	not communicated
MANUFACTURER:	not communicated

COMPANY SUBMITTING THE PRODUCT:

Company:	INGENICO
Address:	10, rue du Golf Bât. M2 – Parc Innolin 33700 Mérignac FRANCE
Responsible:	M. GOBION
DATES OF TEST:	The 4th, april 2007
TESTING LOCATION:	EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE EMITECH ATLANTIQUE open area test site in LA POUEZE (49) FRANCE Registration Number by FCC: 101696/FRN: 0006 6490 08
TESTED BY:	M. DUMESNIL
TUTOR:	P. BONNENFANT

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1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: Bluetooth Base VBASE B I7780 in accordance with normative reference.

The VBASE B base is an evolution of VBASE A base. Minor modifications were carried out. This document presents only limited test on the spurious emissions.

2. PRODUCT DESCRIPTION

ITU Emission code:	1M00F7D
Class:	A (commercial, industrial or business environment)
Utilization:	payment base with Bluetooth functions
Antenna type:	incorporated antenna
Operating frequency range:	from 2402 MHz to 2480 MHz
Number of channels:	79
Channel spacing:	1MHz
Frequency generation:	Synthetizer
Modulation:	Frequency Hopping Spread Spectrum (FHSS)
Power source:	115 Va.c. (mains, adaptater), 18 Vd.c. (input E.S.T.)

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

The standards and testing methods related throughout this report are those listed below.
They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

FCC Part 15 (2006)	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.
Public Notice DA 00-705	Filing and Measurement Guideline for Frequency Hopping Spread Spectrum Systems.

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 203: antenna requirement
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 15.203	ANTENNA REQUIREMENT				X	*Note 1*
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS				X	*Note 1*
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				*Note 3*
FCC Part 15.247	OPERATION WITHIN THE BAND 2400-2483.5 MHz					
	(a) (1) *hopping systems*				X	*Note 1*
	(a) (1) (i) 902 – 928 MHz			X		
	(a) (1) (ii) 5725 – 5850 MHz			X		
	(a) (1) (iii) 2400 – 2483.5 MHz				X	*Note 1*
	(a) (2) *digital modulation techniques*			X		
	(b) *max output power*	X				*Note 4*
	(c) *operation with directional antenna gains > 6 dBi*			X		*Note 2*
	(d) *intentional radiator*	X				
	(e) *peak power spectral density*			X		
	(f) *hybrid system*			X		
	(g)			X		
	(h)				X	
	(i) *RF exposure compliance*				X	*Note 5*
	BAND EDGE COMPLIANCE				X	*Note 1*

NAp: Not Applicable NAs: Not Asked

Note 1: See report RA-06-24579-1/A Ed 0

Note 2: the antenna gain is less than 6 dBi.

Note 3: see FCC part 15.247 (d).

Note 4: conducted measurement is not possible (integral antenna), so we used the radiated method in open field.

Note 5: 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).

Conclusion:

The sample of Bluetooth Base VBASE B I7780 submitted to the limited tests complies with the regulations of the standard FCC Part 15 in accordance with the limits or criteria defined in this report.

7. 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
Antenna RGA60	Electrometrics	1204
Open site	EMITECH	1274
Power source FI6303DS	Française d'instrumentation	4363

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.
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.

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, not modulated.

Results:

Ambient temperature (°C): 15.5
Relative humidity (%): 37

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): 18	74.09	4.64	28.78	107.51	16.909×10^{-3}

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): 18	73.74	4.64	28.78	107.16	15.599×10^{-3}

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): 18	72.58	4.64	28.78	106	11.943×10^{-3}

* $P = (E \times d)^2 / (30 \times Gp)$ with d = 3 m and Gp = 1

Test conclusion:

RESPECTED STANDARD

8. 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
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Antenna RGA-60	Electrometrics	1204
Low-noise amplifier 2 to 18 GHz	Microwave DB	1922
High pass filter HP12/3200-5AA	Filtek	
Power source	Française d'instrumentation	4363

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 ($F_{carrier} \leq 10$ GHz)

Bandwidth: 120 kHz (F < 1 GHz) or 100 kHz, following 15.205 or 15.247
1 MHz (F > 1 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, only the highest level is recorded.

Equipment under test operating condition:

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

Results:

Ambient temperature (°C): 15.5
Relative humidity (%): 37

Power source: 18 Vd.c.

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

FREQUENCIES (MHz)	Detector	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
4881.96	Avg	147	19	1000	V	42.94	53.98*	11.04
4881.96	Peak	147	19	1000	V	65	73.98	8.98
7322.92	Avg	247	113	1000	V	40.88	53.98*	13.1
7322.92	Peak	247	113	1000	V	56.01	73.98	17.97
9763.88	Peak	223	304	100	V	58.07	86.1	28.03

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

Applicable limits: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 106.1 dBµV/m on channel 1.
So the applicable limit is **86.1 dBµV/m**.
In addition, radiated emissions which fall in the restricted band, as defined in section 15.205 (a), must also comply with the radiated emission limits specified in section 15.209 (a) (see section 15.205 (c)).

TEST CONCLUSION:

RESPECTED STANDARD

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

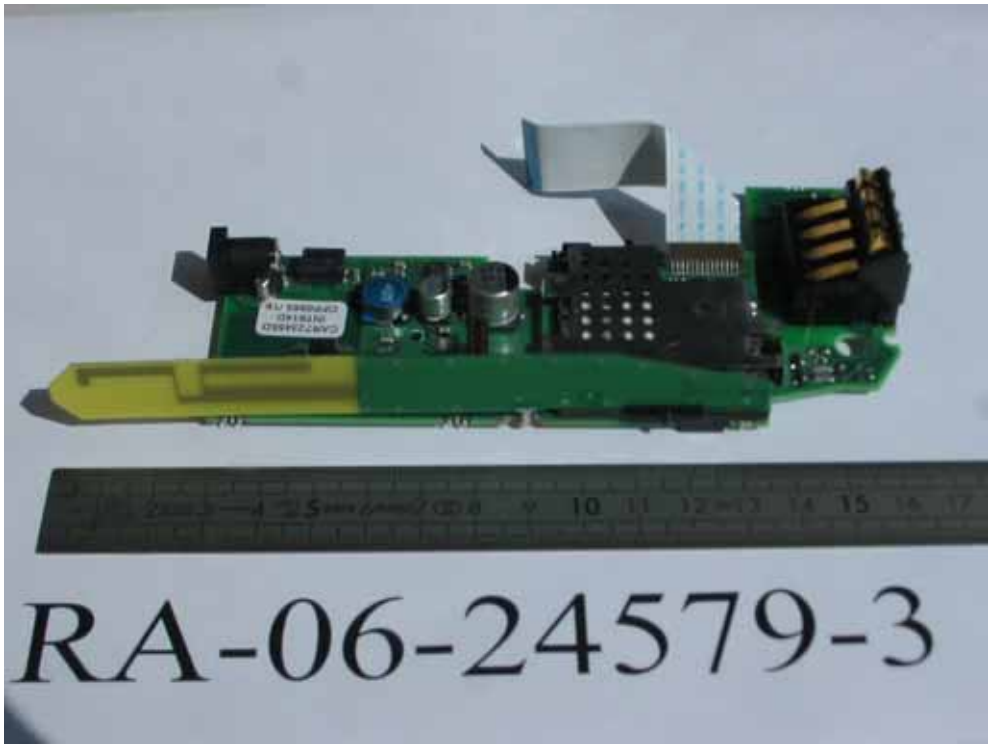
ANNEX 1: PHOTOS OF THE EQUIPMENT UNDER TEST

GENERAL VIEW

INTERNAL VIEW

RADIO MODULE

ANTENNA



ANNEX 2: TEST SET UP

RADIATED MEASUREMENT

ANNEX 3: PHOTOS OPEN AREA TEST SITE AND TEST SET UP

GENERAL VIEW