

## E.M.C. TEST REPORT

According to the standard(s):

Draft ETSI EN 301 489-1 : 2017 V2.2.0

Equipment under test:

Antenna 951 003 001

Company:

HIRSCHMANN CAR COMMUNICATION S.A.S. FRANCE

Diffusion: Mr BOURION

(Company: HIRSCHMANN CAR COMMUNICATION S.A.S. FRANCE)

Number of pages: 23 without appendix

Ed.	Date	Modified page(s)	Technical verification	
			Quality approval	Visa
0	23/11/2017	Creation	A.ALVAREZ	

*Certain services reported in this document are not covered by the accreditation. They are identified by the symbol (\*).*

*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.*



## History of changes

Edition	Date	Page or §	Changes description
00	23/11/2017	All	Creation

*NAME OF THE EQUIPMENT  
UNDER TEST (E.U.T.)* : Antenna 951 003 001

*Serial number* : GNSS 15253-2051

*P/N* : Not communicated

*Software version* : None

*MANUFACTURER'S NAME* : HIRSCHMANN CAR COMMUNICATION S.A.S. FRANCE

*APPLICANT'S ADDRESS:*

*Company* : HIRSCHMANN CAR COMMUNICATION S.A.S. FRANCE

*Address* : 84, Bd de la mission Marchand  
92400 Courbevoie  
France

*Person(s) present during the  
tests* : No representative for company has been at test.

*Responsible* : Mr BOURION

*DATE(S) OF TESTS* : From 28th June to 11th August 2017

*TESTS LOCATION(S)* : EMITECH Toulouse laboratory in Toulouse (31) - France

*TESTS OPERATOR(S)* : F. ALLENO / A. ALVAREZ

CONTENTS
----------

1. INTRODUCTION	5
2. REFERENCE DOCUMENT(S)	5
3. EQUIPMENT UNDER TEST CONFIGURATION SCHEME	5
4. SUMMARY OF TEST RESULTS	7
5. CONDUCTED EMISSION	8
6. RADIATED ELECTRIC FIELD MEASUREMENT	11
7. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY (*)	14
8. IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS (*)	19
APPENDIX	22

### 1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment **Antenna 951 003 001** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed below.

The product is considered exclusively as Ancillary equipment for vehicular use

### 2. REFERENCE DOCUMENT(S)

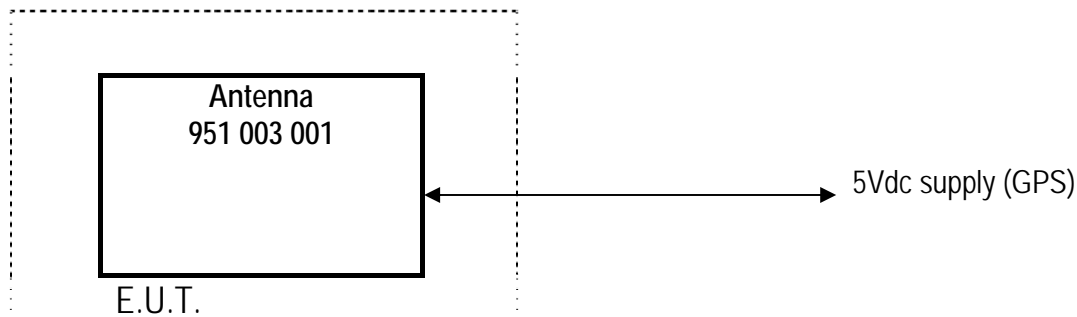
Draft ETSI EN 301 489-1 Ed. 2017 V2.2.0

ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements;

Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

### 3. EQUIPMENT UNDER TEST CONFIGURATION SCHEME

Equipment under test (E.U.T.) description: Supplied antenna for Radio and/or DAB and/or GPS applications in vehicle



Equipment control procedure during immunity tests: Check of consumption on each power supply

Susceptibility criteria during a continuous disturbance: Maximal variation admitted GPS 20-35mA

Susceptibility criteria during a transitory disturbance: Self-recoverable degradation allowed

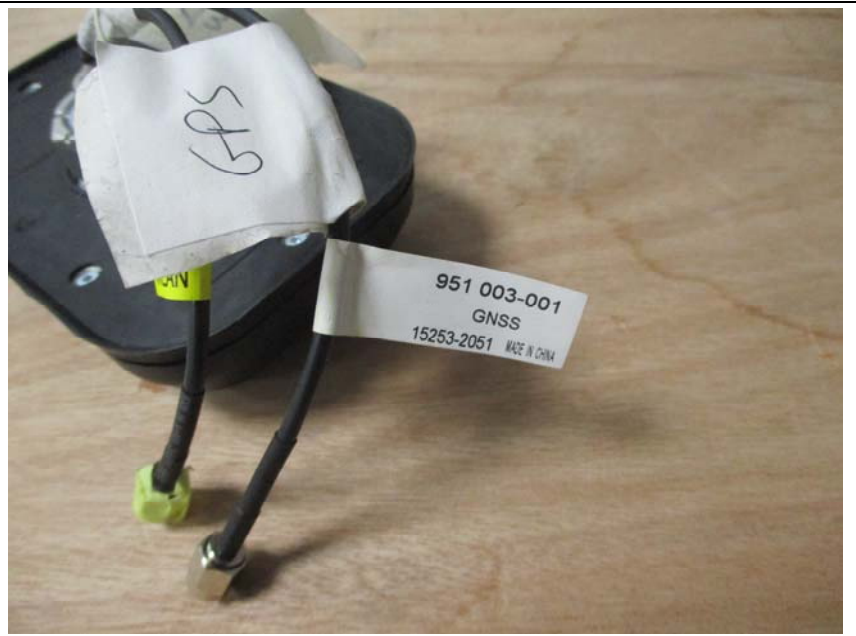
Cycle and operating mode during emission tests: Supplied with its nominal voltage through BIAS-Tee and 50 Ohms load on each antenna port

Equipment modifications applied during tests: No

E.U.T. photograph(s)



Marking plate



**4. SUMMARY OF TEST RESULTS**

Tests designation	Results satisfying?	Comments
<b>EMISSION</b>		
Harmonics current emission	N.A.	DC supplied
Measurement of voltage fluctuation and flicker	N.A.	DC supplied
Conducted emission	YES	Class B
Radiated electric field measurement	YES	Class B
<b>IMMUNITY</b>		
Electrostatic discharges immunity	N.A.	Vehicular environment
Radiated, radio-frequency, electromagnetic field immunity (*)	YES	
Electrical fast transient/burst immunity	N.A.	Vehicular environment
Surge immunity	N.A.	Vehicular environment
Immunity to conducted disturbances, induced by radio-frequency fields (*)	YES	
Voltage dips and short interruptions immunity	N.A.	Vehicular environment
Immunity to transient and surge in a vehicular environment (*)	N.A.	5Vdc supplied

N.P.: Not Performed.

N.A.: Not Applicable.

- **In emission:**

Sample subject to the test complies with prescriptions of the standard ETSI EN 301 489-1 Ed.2017 V2.2.0 according to limits specified in this test report.

- **In immunity:**

Although deviations of the method(s) were used during the tests, sample subject to the test can be considered as compliant with prescriptions of the standard ETSI EN 301 489-1 Ed.2017 V2.2.0 according to criteria specified in this test report.

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

**5. CONDUCTED EMISSION**

Standard: ETSI EN 301 489-1 2017 V2.2.0

Test method: EN 55032: 2015

Test configuration:

Tested cable(s)	Measure with	E.U.T. height
GPS supply 5Vdc (vehicular use - CISPR25 LISN)	L.I.S.N.	40cm

Frequency band	Configuration	Resolution bandwidth	Video bandwidth	Detection mode
150kHz-1MHz	Vehicular use - CISPR25 LISN	10kHz	30kHz	Peak
1MHz-10MHz	Vehicular use - CISPR25 LISN	10kHz	30kHz	Peak
10MHz-30MHz	Vehicular use - CISPR25 LISN	10kHz	30kHz	Peak

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Software	Nexio	BAT EMC v3.6.0.32	0000		
Cable	Huber + Suhner	N-2m	12897	29/04/2016	29/06/2018
Limiter	ELECTRo-Metrics	EM-7600-2	14538	11/05/2017	11/07/2018
Receiver	Rohde & Schwarz	ESMI	1841	01/04/2016	01/06/2018
LISN	EMITECH	5 $\mu$ H-100A	2996	26/11/2015	26/01/2018

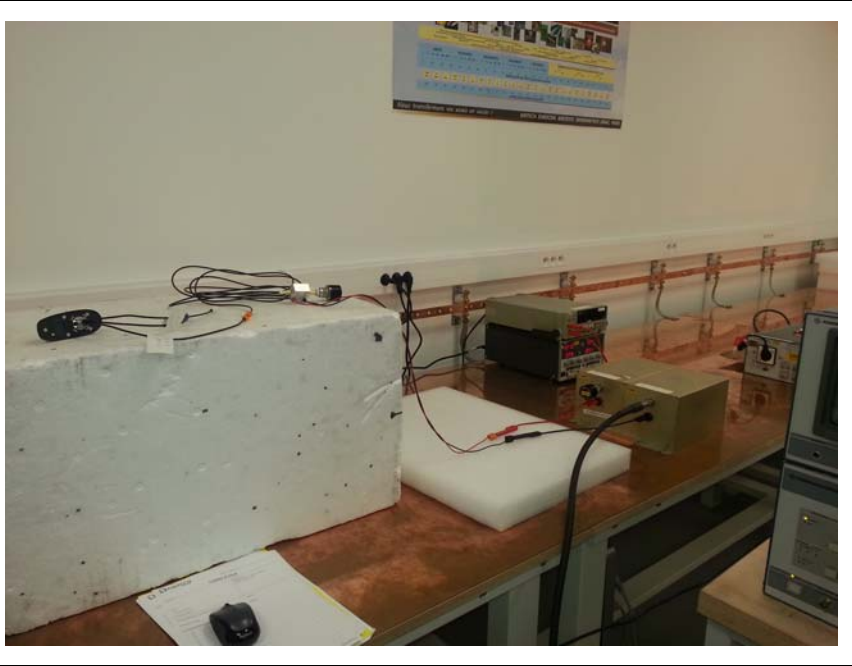
Blank cell: Permanent validity

Results: See Graph(s) hereafter.

Limits on the graphs are average and quasi-peak limits (upper limit).

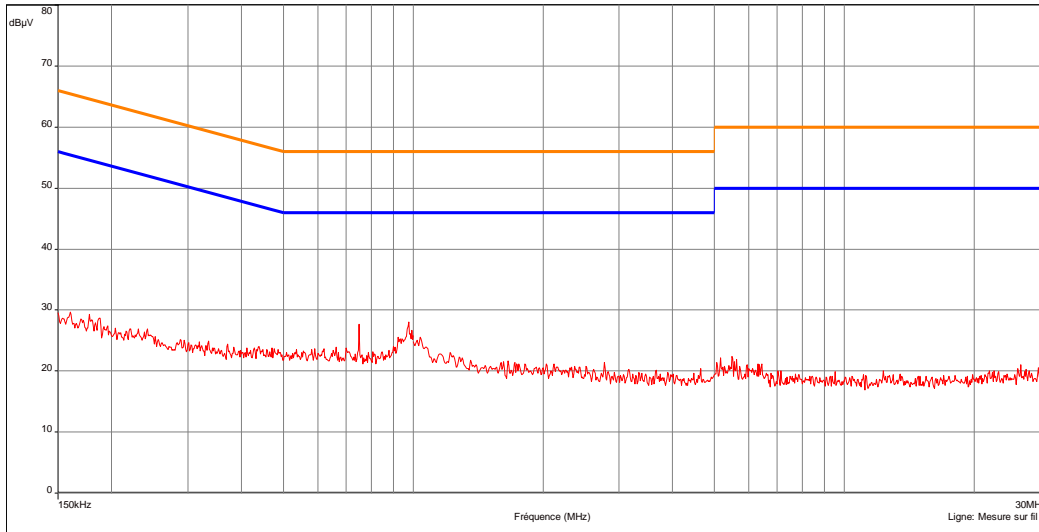


Conducted emissions



(Typical installation for conducted emissions)

**Conducted voltage emission (measurement)**
**EMI1651**
**GPS supply 5Vdc (vehicular use - CISPR25 LISN) – 29.1mA - with BIAS tee**

 EN 55022 : 10 alimentation - Classe:B - Moyenne/  
 EN 55022 : 10 alimentation - Classe:B - QCrête/  
 Mes.Peak (Mesure sur fil +)


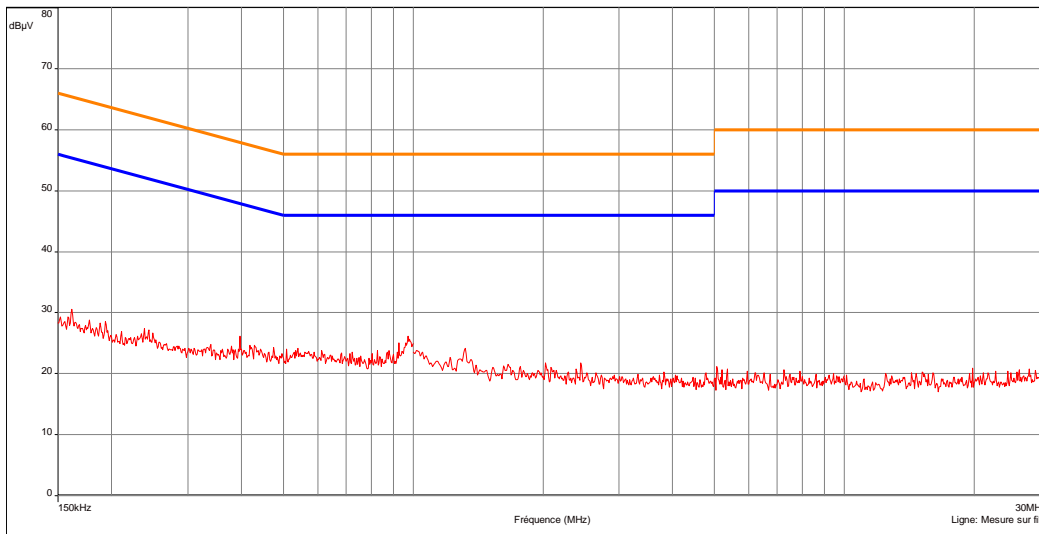
Date: 03/07/2017

Technician: AAL

Class: B of the standard

 Detection:  
 Peak

 Modification(s) during test:  
 No

 EN 55022 : 10 alimentation - Classe:B - Moyenne/  
 EN 55022 : 10 alimentation - Classe:B - QCrête/  
 Mes.Peak (Mesure sur fil -)


Maximal uncertainty: 3.38dB (k=2)

## 6. RADIATED ELECTRIC FIELD MEASUREMENT

**Standard:** ETSI EN 301 489-1 2017 V2.2.0

**Test method:** EN 55032: 2015

**Test configuration:** First measurement in peak detection is done with recording maximal value, antenna varying from 1m to 4m and table performing a complete rotation.

Then, when necessary, highest levels are measured in quasi-peak detection.

Frequency band	Configuration	Resolution bandwidth	Video bandwidth	E.U.T. height
30MHz-200MHz	Maximalization	100kHz	300kHz	80cm
200MHz-1GHz	Maximalization	100kHz	300kHz	80cm

**Test method deviation:** Radiated emission limits are specified at 10 meters. Measurement distance used during the test, subject of this report, is 3 meters. Then published results come from a theoretical conversion as described in the standard.

**Measuring distance:** 3 meters

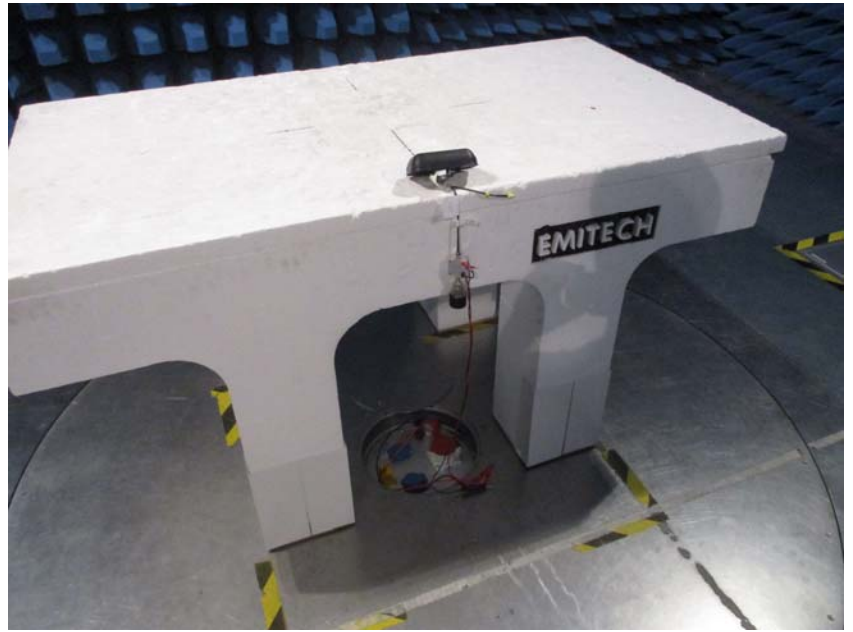
**Test equipment list:**

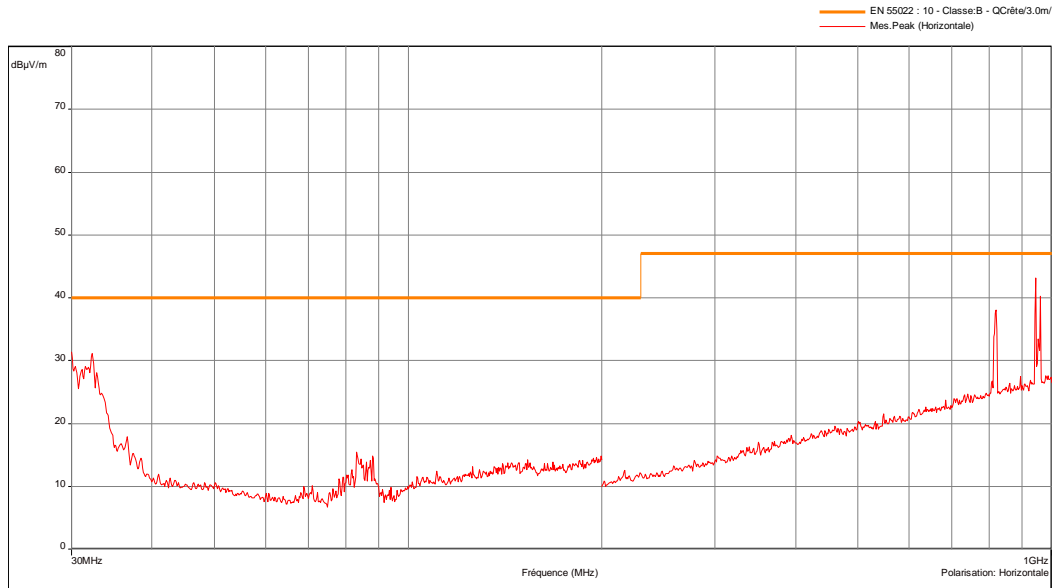
CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Software	Nexio	BAT EMC v3.6.0.32	0000		
Antenna	A.H. Systems	SAS 543	12057	15/03/2016	15/05/2019
Antenna	A.H. Systems	SAS 512-2	12058	15/03/2016	15/05/2019
Cable	SUCOFLEX	N-1,5m	11931	22/05/2017	22/07/2019
Cable	SUCOFLEX	N-1,5m	11932	22/05/2017	22/07/2019
Cable	SUCOFLEX	N-16m	11930	22/05/2017	22/07/2019
Preamplifier	Mini-circuits	ZFL-1000LN	11808	04/01/2017	04/03/2018
Receiver	Rohde & Schwarz	ESMI	1841	01/04/2016	01/06/2018

Blank cell: Permanent validity

**Results:** See Graph(s) hereafter.

Radiated electric field  
(initial position = 0°)

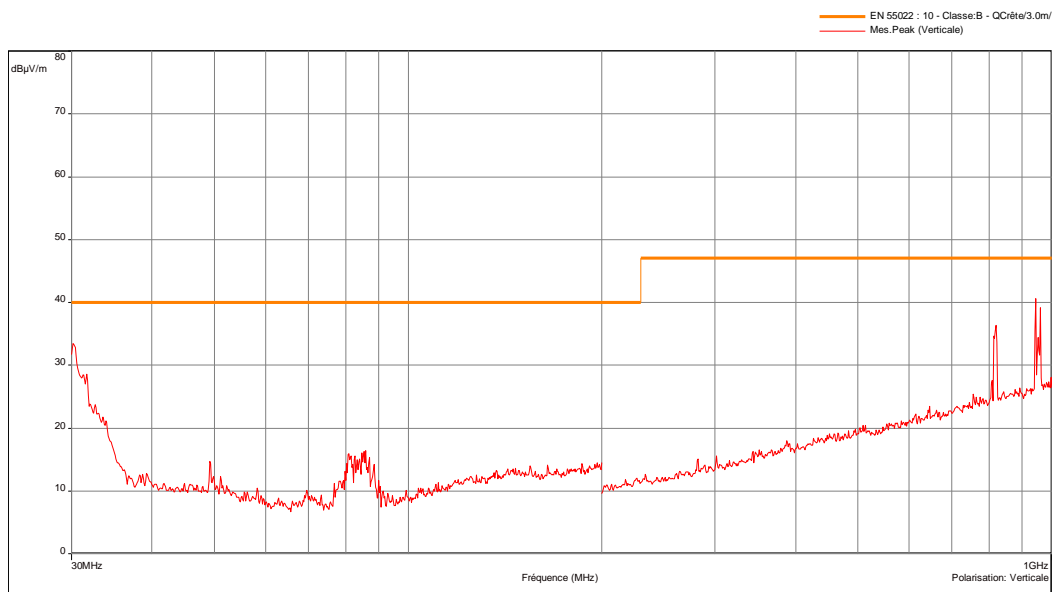


**Radiated electric emission (measurement)**
**EMI2783**
**Maximalization**

*Date:* 11/07/2017

*Technician:* F.ALLENO

*Class:* B of the standard

*Detection:*  
 Peak

*Modification(s) during test:*  
 No

**Maximal uncertainty: 4.85dB (k=2)**

**7. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY (\*)**

**Standard:** ETSI EN 301 489-1 2017 V2.2.0

**Test method:** EN 61000-4-3: 2006 / A1: 2008 / A2: 2010

**Test configuration:**

Tested side	Frequency band	E.U.T. height	Polarization	Level	Step
Axe X	80MHz-1GHz	80cm	Vertical	3 V/m	1%
Axe X	80MHz-1GHz	80cm	Horizontal	3 V/m	1%
Axe X	1GHz-2.5GHz	80cm	Vertical	3 V/m	1%
Axe X	1GHz-2.5GHz	80cm	Horizontal	3 V/m	1%
Axe X	2.5GHz-6GHz	80cm	Vertical	3 V/m	1%
Axe X	2.5GHz-6GHz	80cm	Horizontal	3 V/m	1%
Axe Z	80MHz-1GHz	80cm	Vertical	3 V/m	1%
Axe Z	80MHz-1GHz	80cm	Horizontal	3 V/m	1%
Axe Z	1GHz-2.5GHz	80cm	Vertical	3 V/m	1%
Axe Z	1GHz-2.5GHz	80cm	Horizontal	3 V/m	1%
Axe Z	2.5GHz-6GHz	80cm	Vertical	3 V/m	1%
Axe Z	2.5GHz-6GHz	80cm	Horizontal	3 V/m	1%

Polarization	Frequency range	Calibration(s) used during the test
Vertical	80MHz – 1GHz	CT1_V1 (06/2017_18V)
Horizontal		CT1_H1 (06/2017_18V)
Vertical	1GHz – 2.5GHz	CT1_V2 (06/2017_18V)
Horizontal		CT1_H2 (06/2017_18V)
Vertical	2.5GHz – 6GHz	CT1_V3 (06/2017_5.4V)
Horizontal		CT1_H3 (06/2017_5.4V)

Modulation	Duration
AM (80%, 1kHz)	2000ms

The test is performed on 2 sides (See photographs here below).

The equipment under test is set out in such a way that the side submitted to the test be located in homogeneous zone (1.5m x 1.5m) of the previously calibrated field. In compliance with the calibration, some anechoic panels are placed on the ground and antennas used are placed according to the calibration.

**Aptitude criteria:** §6 and §9.2.3 of the standard.

**Test method deviation:** Standard requires a test on 4 sides. However, a 2 side test can be sufficient to respect essential requirements of the European Directive. Due to small dimensions of the product, 2 axes have been tested (natural position and PCB facing the generating antenna).

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Amplifier	ETM	200SC	3035	23/04/2015	23/06/2017
Amplifier	Amplifier Research	250T1G3	4108	23/04/2015	23/06/2017
Amplifier	Prana	MT1400	12830	31/03/2016	31/05/2018
Antenna	Emco	3115	1053	16/03/2016	16/05/2019
Antenna	A.H. Systems	SAS-517	12009		
Cable	SUCOFLEX	N-1,5m	11931	22/05/2017	22/07/2019
Cable	SUCOFLEX	N-1,5m	11932	22/05/2017	22/07/2019
Cable	SUCOFLEX	N-16m	11930	22/05/2017	22/07/2019
Cable	MICRO-COAX	N-3m	11907	26/04/2017	26/06/2019
Coupler	Prana	80MHz-1GHz 60dB	12831	31/03/2016	31/05/2018
Coupler	ETM	40dB - 2.5GHz-8GHz	3457	23/04/2015	23/06/2017
Coupler	Amplifier Research	40dB - 1GHz-2.5GHz	4109	23/04/2015	23/06/2017
Power probe	Keysight	N1922A	12564	30/03/2017	30/05/2018
Synthesizer	Anritsu	MG3692A	3131	06/10/2016	06/12/2018
Synthesizer	Rohde & Schwarz	SME-03	11819	15/02/2017	15/04/2019
Wattmeter	Keysight	N1911A	12563	30/03/2017	30/05/2018

Blank cell: Permanent validity

Results:

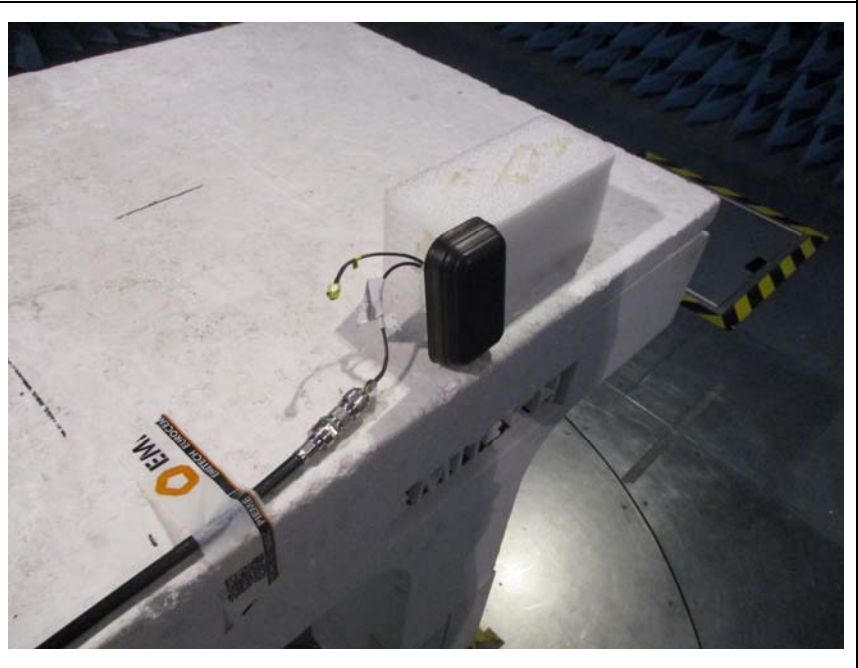
- Axe X : **Nothing to report**
- Axe Z : **Nothing to report**

Graphs of measured currents are given hereafter.

Radiated electric field immunity

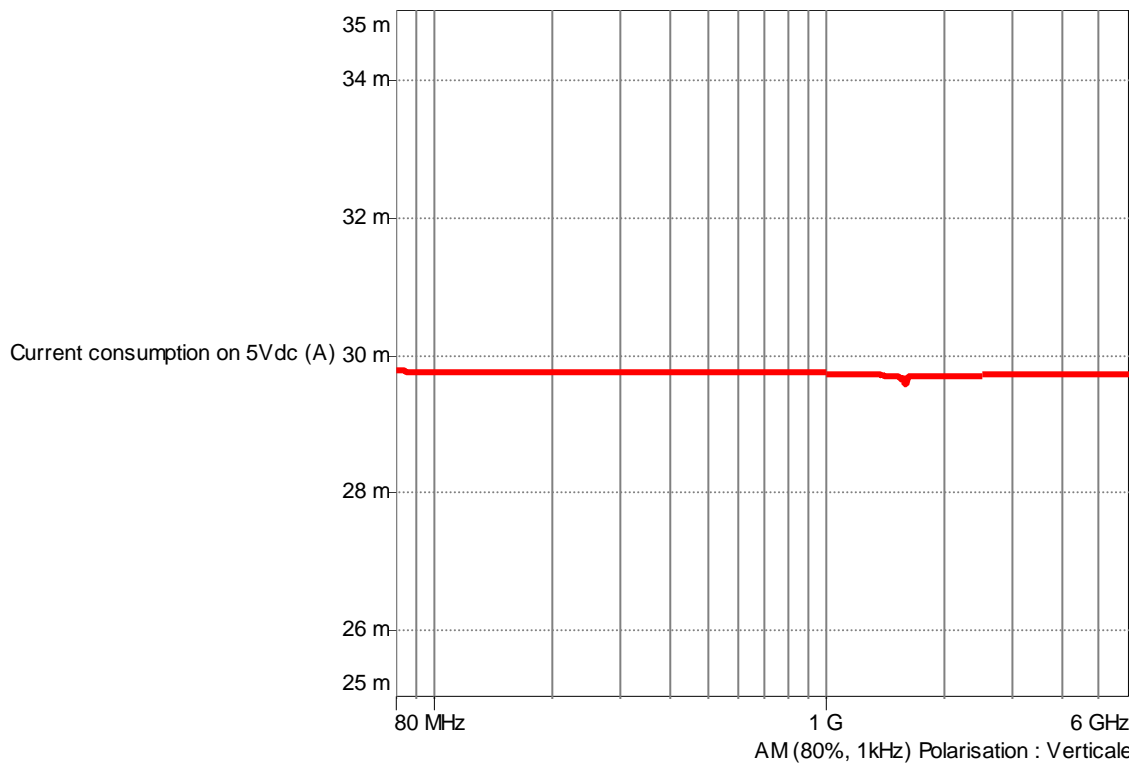
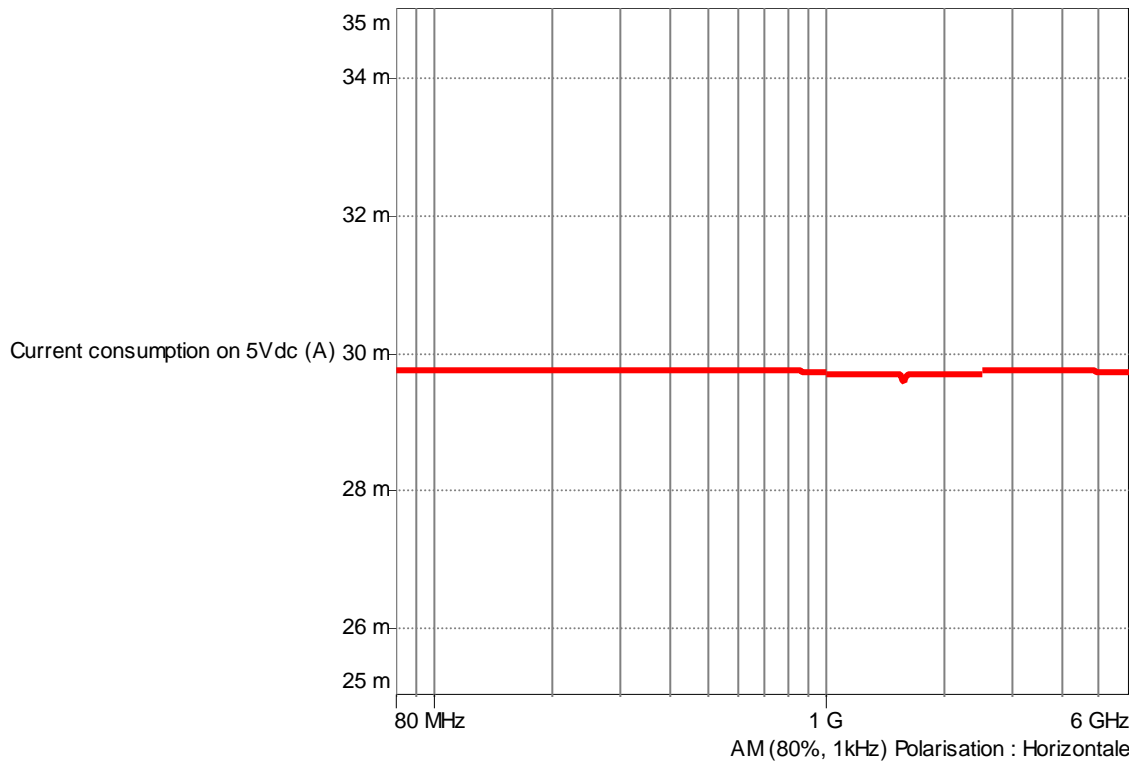


Radiated electric field immunity

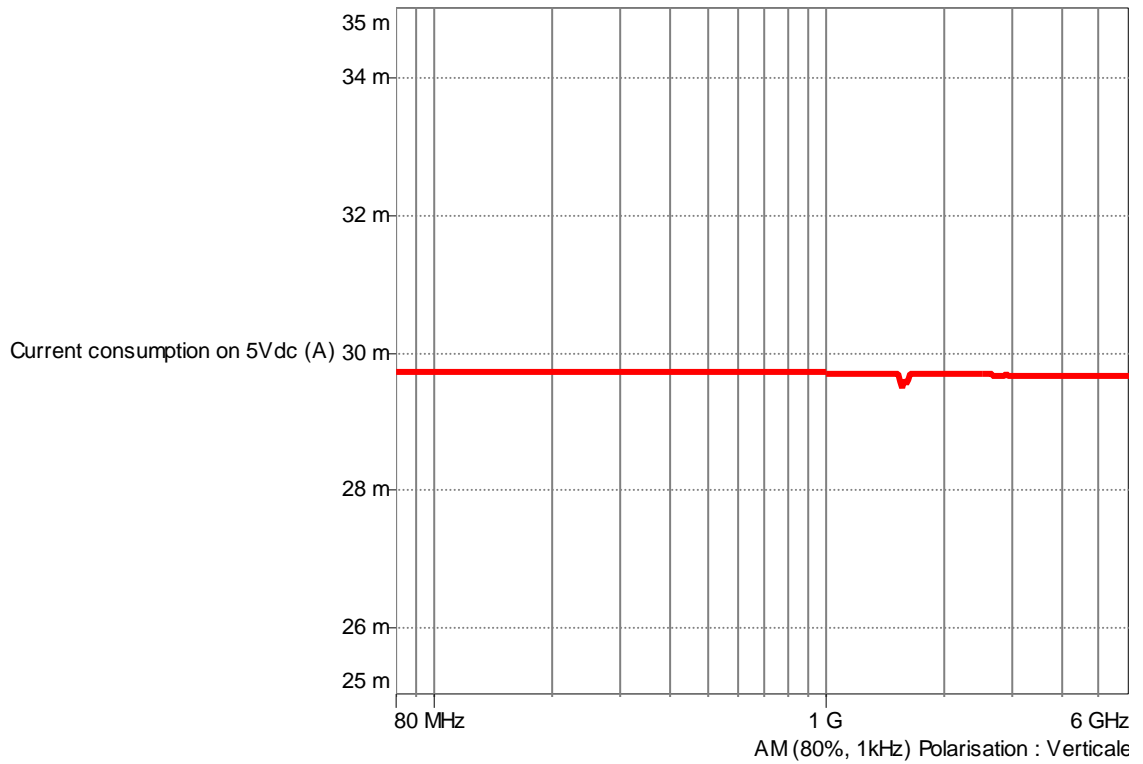
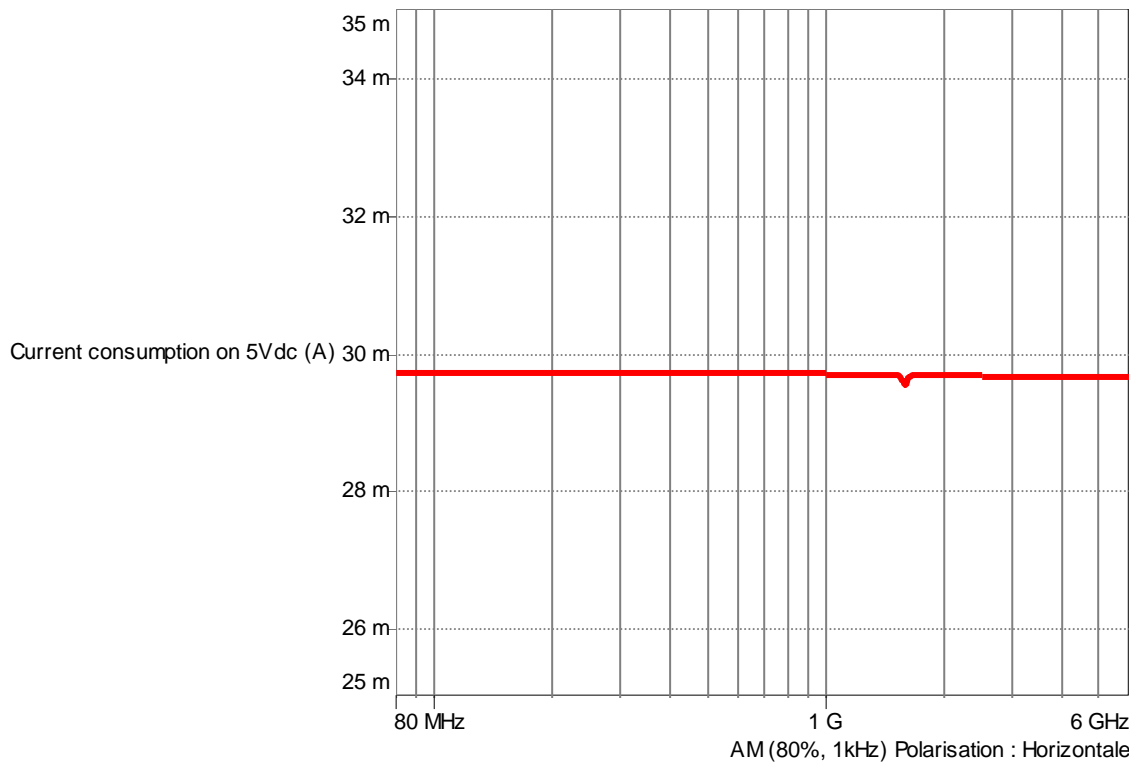




### Monitoring – Axe X



### Monitoring – Axe Z



**8. IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS (\*)**

Standard: ETSI EN 301 489-1 2017 V2.2.0

Test method: EN 61000-4-6: 2014

Test configuration:

Tested cable(s)	Frequency band	50Ω load on:	Injection mode	Level	Step
GPS 5Vdc	150kHz-80MHz	-	pinceEM-12030E-(08/2016-10Vfem)	3 Vemf	1%

E.U.T. is set out at 10cm above the reference ground plane.

Modulation	Duration
AM (80%, 1kHz)	2000ms

- Aptitude criteria: §6 et §9.5.3 of the standard.

Test method deviation: EM clamp injection instead of use of CDN

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Software	Nexio	BAT EMC v3.6.0.32	0000		
Amplifier	RFPA	RF001220-25	9196	07/10/2016	07/12/2018
Attenuator	JFW	50FH-006-10	1413	04/01/2017	04/03/2019
Cable	SUCOFLEX	N-1,5m	11931	22/05/2017	22/07/2019
Cable	SUCOFLEX	N-1,5m	11932	22/05/2017	22/07/2019
Cable	SUCOFLEX	N-16m	11930	22/05/2017	22/07/2019
Cable	Huber + Suhner	N-5m	12896	28/04/2016	28/06/2018
Coupler	RFPA	RFC001400-40-600	3022	17/08/2016	17/10/2018
Injection clamp	TESEQ	KEMZ 801A	12030		
Synthesizer	Rohde & Schwarz	SME-03	11819	15/02/2017	15/04/2019
Wattmeter	Rohde & Schwarz	FSP	11820	28/04/2017	28/06/2019

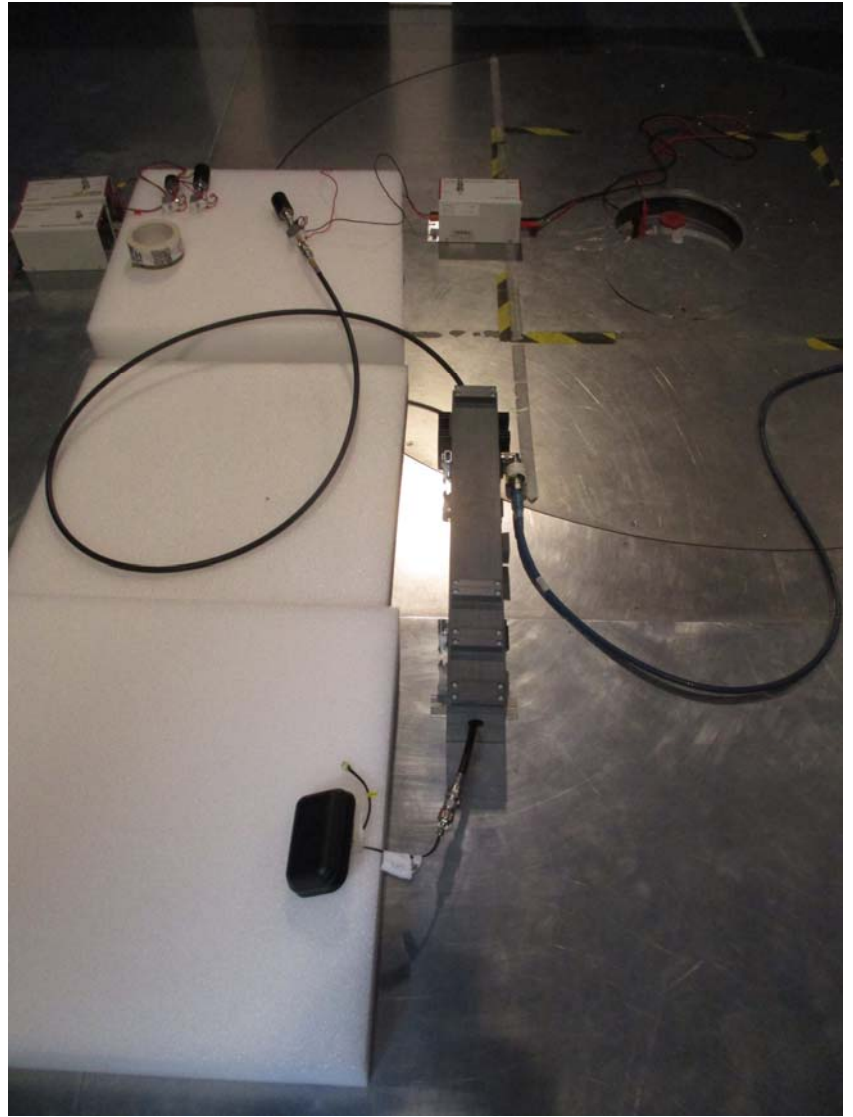
Blank cell: Permanent validity

Results:

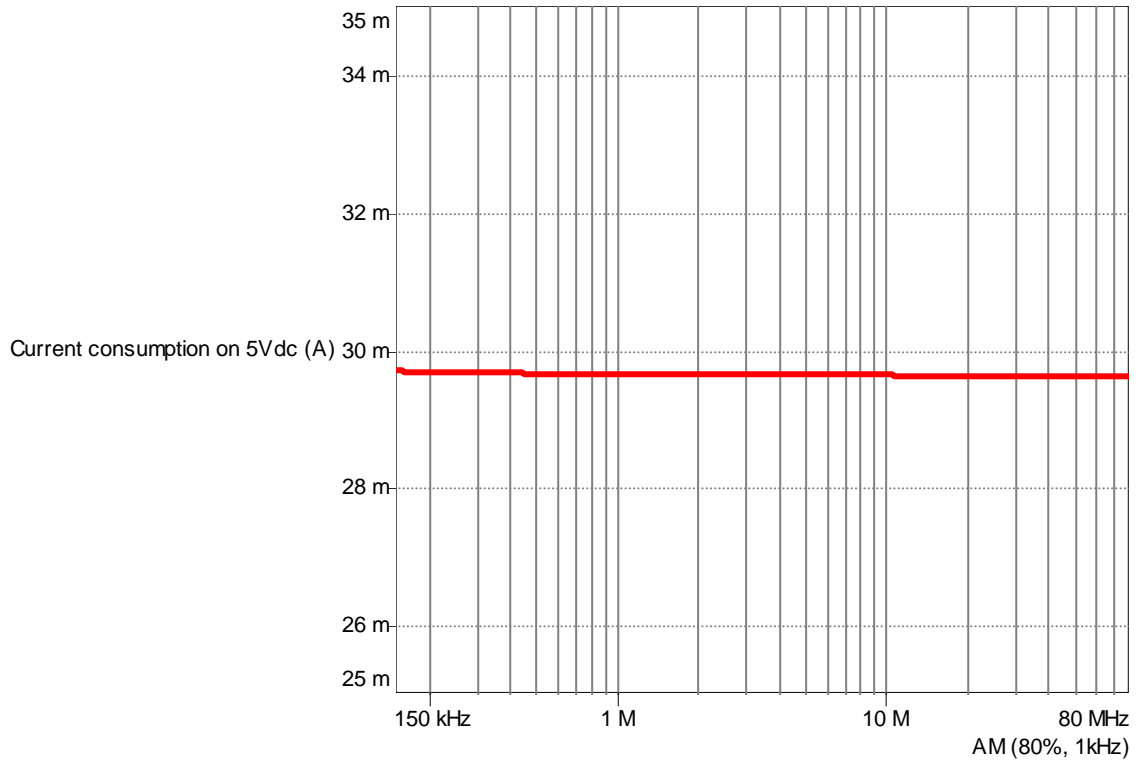
- GPS 5Vdc : **Nothing to report**

Graphs of measured currents are given hereafter.

RF conducted immunity



Monitoring – injection on 5Vdc GPS power supply



End of report – Annex to follow

# *APPENDIX*

---

Hirschmann reference tested	Customer's correlation	similar Hirschmann references	similar Customer's references
920 204 030	98 196 675 80	920 204 x30 920 204 x31	98 196 675 80 98 196 678 80
920 204 033	98 196 695 80	920 204 x32 920 204 x33	98 196 695 80 98 196 680 80
920 466 003	98 156 148 80	920 466 x03	98 156 148 80
920 204 121	96 665 675 80	920 204 x01 920 204 x02 920 204 x20 920 204 x21 920 204 x51 920 204 x52 920 204 x60 920 204 x61 920 204 x62	96 665 675 80 96 653 638 80 96 663 425 80 96 661 534 80 96 661 543 80 98 016 108 80
920 438 002	98 169 270 80	920 438 x02	98 169 270 80
920 204 041	96 664 528 80	920 204 x23 920 204 x24 920 204 x40 920 204 x41 920 204 x42 920 204 x43 920 204 x44 920 204 x45 920 204 x46 920 204 x22	96 664 527 80 96 664 528 80 98 040 580 80 98 040 581 80 96 785 417 80 96 785 418 80 96 665 612 80 98 105 478 80 98 105 479 80 98 104 931 80
920 063 017	96 657 807 80	920 253 xxx 920 265 xxx 920 063 xxx	96 661 015 80 96 661 017 80 96 661 018 80 96 738 445 80 96 661 015 80 96 610 457 80
920 385 011	98 085 142 80	920 385 x11 920 063 x20	98 085 142 80 98 085 141 80
920 251 001	96 740 629 80	920 251 xxx	96 740 631 80 96 740 629 80
920 268 001	96 740 634 80	920 268 x01	96 740 634 80
921 793 002	96 366 006 80	921 793 201 921 793 002	96 607 991 80 96 366 006 80
921 793 012	96 509 111 80	921 793 221 921 793 012	96 607 999 80 96 509 111 80
920 161 101		920 161 xxx	
951 016 001		951 016 xxx 951 014 xxx	
GPS M		607 010 700 607 010 711 607 010 721 607 010 766	
951 015 xxx		951 015 xxx	
951 011 xxx		951 011 xxx	
951 003 001		951 003 xxx	
921 793 201		6561GP	