Toulouse, 11 June 2007

O/Réf. E7965-RTCM

RTCM TEST REPORT OF
406 MHz EPIRB

MANUFACTURER : MARTEC

BEACON MODEL: KANNAD AUTO/AUTO GPS

Written : 11 June 2007
By: Gérard PEYROU
Visa :

Approved : 15 June 2007
By: Paul Eric DUPUIS
Visa :

Quality Control : 15 June 2007
By: André LOUIT
Visa :

Distribution :

-	Mr Stephane JINCHELEAU	MARTEC .	(2 copies)
-	ITS/ES (RLS)	INTESPACE.	(1 copy)

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CHAPTER 1

ADMINISTRATION, GENERAL COMMENTS AND SUMMARY OF TESTS

1.1 GENERAL COMMENTS

This document reports the procedures and results of additional certification tests on 406-MHz SARSAT beacons. Theses test complete the certification tests performed to the first semester 2006 and reported in the Intespace Document : E6668-RTCM. The tests were conducted for the United States Coast Guard (USCG) by INTESPACE (ITS)

1.2 ADMINISTRATION

1.2.1 WORK ORDER

Manufacturer : MARTEC Serpe-Iesm.
Address : ZI DES Cinq Chemins 56520 GUIDEL FRANCE
Represented by : Mr Stephane JINCHELEAU

1.2.2 INTESPACE TEST CENTER
The test operations have been conducted by : Mr Gérard PEYROU

1.2.3 SCHEDULE

Start of test : 12 March 2007
End of test : 30 May 2007

1.2.4 WORK REFERENCE : **E7965-RTCM**

1.2.5 EQUIPEMENT UNDER TEST

The results from this test report concern only the equipement here after referenced :

Equipement Under Test (EUT)	Model	Beacon serial number	Float free system auto-release mechanism	Comments
UUT6	Kannad Auto / Auto.GPS	61592	Container Martec Kannad Auto P/N 5104373	- Normal EPIRB fitted for complete RTCM Test Sequence and 406 MHz electrical tests

Note 1 : The UUT6 beacon is same unit that has been performed in 2006

Note 2 : The name of the EPIRB project is “TOPAZE”.

Note 3 : The KANNAD Auto GPS model is the most complete and the most representative of EPIRB’s models

1.3 TEST FACILITIES

- ARGOS – COSPAS/SARSAT Certification Test Bench
- INTESPACE Enviromental Test Equipements
- Toulouse CNES MCC

1.4 STANDARDS AND TEST PROCEDURES APPLICABLES

- **COSPAS-SARSAT standards** :

- "C/S T. 001- Issue 3 - Revision 7 – November 2005 "
- "C/S T. 007- Issue 1 – October 2006" (Test 1 to 11 of C/S F.1 Table)

- **RTCM Recommended Standards** for 406 MHz Satellite Emergency Position-Indicating Radiobeacons (EPIRBs) - Version 2.1 - June 20, 2002- (A10, A12 and A13 Tests)

- INTESPACE Radiobeacon Test Procedures

1.5 TEST SEQUENCE

SERIES OF TESTS :		(RTCM item)
1	- Spurious Emission Test	(A 10.0)
2	- Cospas-Sarsat C/S T.007 (Test 1 to Test 11)	(A 12.0)
3	- Operational Life, Strobe Light and Self Tests	(A 13.0)

1.6 RESULTS

See following pages Summary of Test results and following chapters Test Result Reports (data and graphs)

General remark :
Regarding *the issue of the measurement results performed on the certification test bench, due to the numbering of the computer data sheets, the beacon serial number alters from one curve to the other although the same beacon is concerned.*

SUMMARY OF TESTS

			TEST RESULTS			
PARAMÈTRES TO BE MEASURED DURING TESTS	**RANGE OF SPECIFICATION**	**UNITS**	**T min. (± 3 °C) (-20 °C)**	**T amb. (± 3 °C) (22 °C)**	**T max. (± 3 °C) (55°C)**	**COMMENTS**
1. SPURIOUS EMISSION TEST (A10.0)						**Chapter 2** **and Chapter 3 (C/S T.A. Tests Results)**
• 406 MHz	Figure 2-1	√ (attach graphs)	√	√	√	
• 121.5 MHz	Figure 2-5	√ (attach graphs)	√	√	√	14-16 March 2007
2. COSPAS-SARSAT TYPE APPROVAL TESTS (A12.0) Test 1 to Test 11 of C/S Table F.1	C-S Certificate (attach test report)	√	√	√	√	**Chapter 3** 14-23 March 2007 & 18-24 April 2007

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. (± 3 °C) (- 20 °C)	T amb. (± 3 °C) (+20 °C)	T max. (± 3 °C) (+55 °C)	
4-1. .OPERATIONAL LIFE, STROBE LIGHT AND SELF TESTS (A13.0)						**Chapter 4**
Operational Life Results after 48 hours (A13.1)						18-24 April 2007
• Frequency						Results after 48 hours
* Nominal Carrier	406.028 ± 0.001	MHz	406.027798			
* Short-term stability	≤ 0.002	parts/ million in 100 ms	< 0.0001			(C/S Oper. Life Test at min Temp. Chapter 13)
• Medium term stability :						
* Mean slope	≤ 0.001	parts/ million /min	< 0.0001			
* Residual variation	≤ 0.003	parts/ million	< 0.0002			
• RF output power	35-39	dBm	36.7			
• Strobe flash rate	20-30	/min	22			
• Auxiliary radio-locating Peak Envelope output Power	14-20	dBm	19.6			

	Manufacturer : MARTEC. **B e a c o n M o d e l : Kannad** **Auto/Auto GPS/Manual/Manual** **GPS/Manual+/Manual+ GPS**	**INTESPACE Reference** **E7965-RTCM**

PARAMÈTRES TO BE MEASURED DURING TESTS	**RANGE OF SPECIFICATION**	**UNITS**	**TEST RESULTS**			**COMMENTS**
			T min. (± 3 °C) (- 20 °C)	**T amb. (± 3 °C) (22 °C)**	**T max. (± 3 °C) (55 °C)**	
4-2. STROBE LIGHT TEST (A13.2)						**Chapter 4 and Chapter 3** (C/S Elec. & Funct Test at min, amb, and max Temp.) 14-23 March 2007 & 18-24 April 2007
• Flash rate	20-30	/min	22	22	22	
• Effective intensity	0.75	Cd	0.81	0.83	0.89	
• Pulse duration	10^{-6} to 1	S	0.035	0.032	0.03	
• Visibility		√	√	√	√	

CHAPTER 2

SPURIOUS EMISSIONS TEST

2.1 TEST SPECIFICATIONS AND PROGRAMME

Following Section A10.0 of RTCM Recommended Standards for 406 MHz Satellite EPIRBs (Version 2.1 June 20, 2002) :

• Perform the spurious and harmonic emissions measurements for the 406 MHz and 121.5 MHz signals at the minimum, maximum, and ambient temperatures .

• Control, respectively, that measurements not ecxeed the limits given in Figure 2-1(406 MHz Spectrum Mask) and Figure 2-5 (121.5 MHz Spectrum Mask)

Note : These tests are performed during the COSPAS-SARSAT Type Approval tests (chapter 3)

2.2 EQUIPMENT UNDER TEST

Beacon Unit : UUT 6
Name : MARTEC
Type : KANNAD Auto / Auto GPS
Number : 61592(06)

2.3 TEST SITE

Toulouse Space Center (CST) - INTESPACE Laboratory.

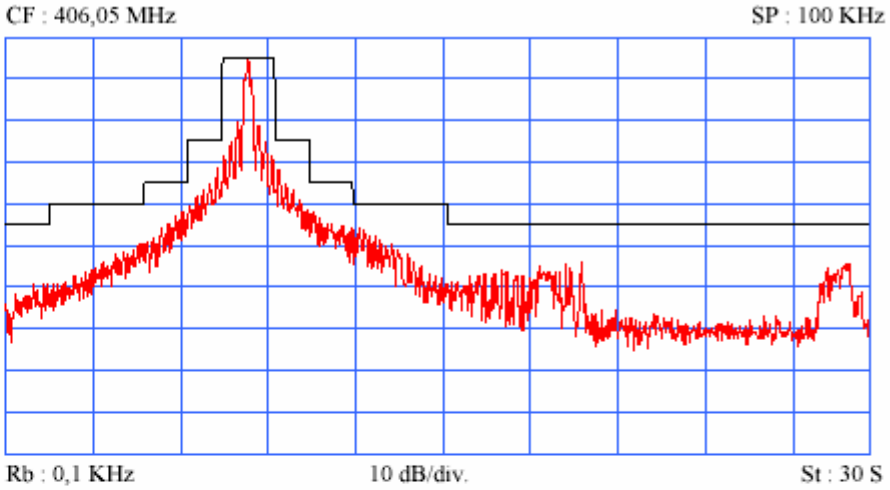
2.4 TEST EQUIPMENT

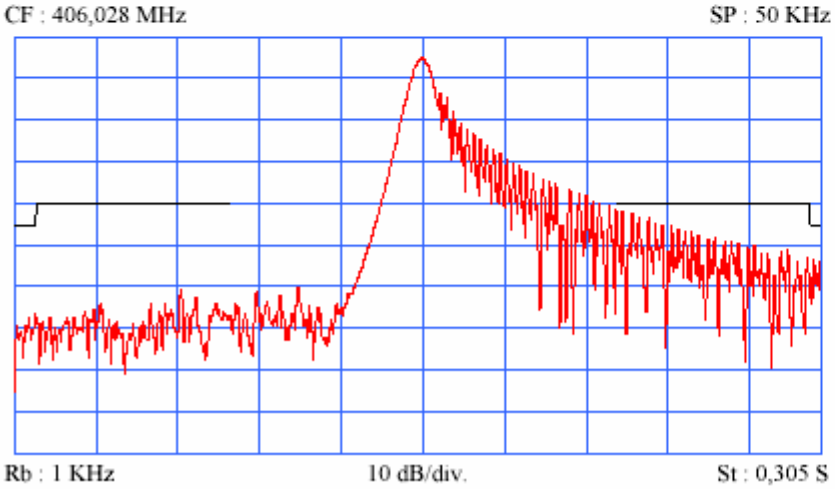
• Climatic chamber : CLIMATS F.C.H. – Type: Austral 137H60/1,5E - S/N: S4880.
• Argos - Cospas/Sarsat Test Bench

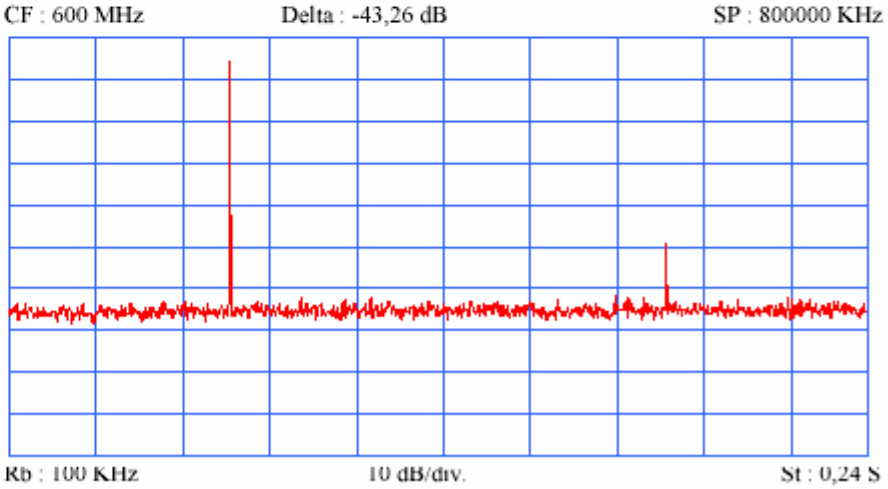
2.5. RESULTS

The graphs of spurious and harmonic measurements for the 406 MHz and 121.5 MHz signals are reported next pages :

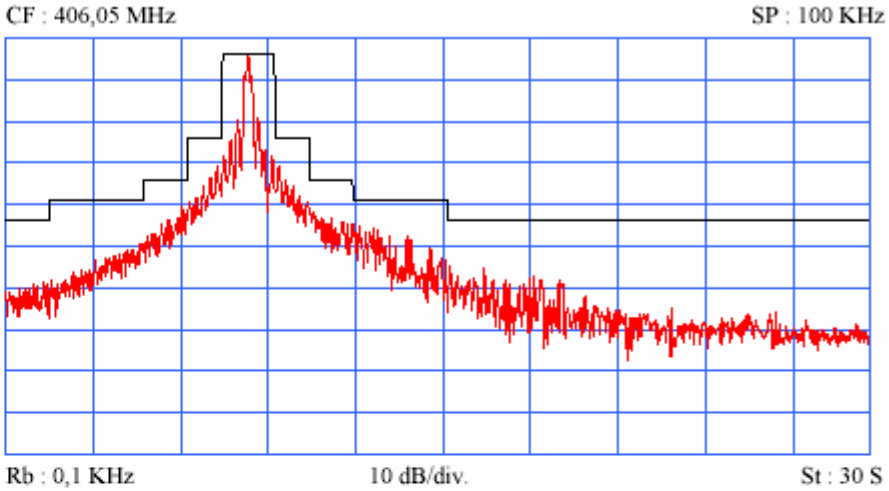
MARTEC
KANNAD AUTO/MANUAL/MANUAL+
61592 UUT6
Certification nominale
406 MHz
-20 °C

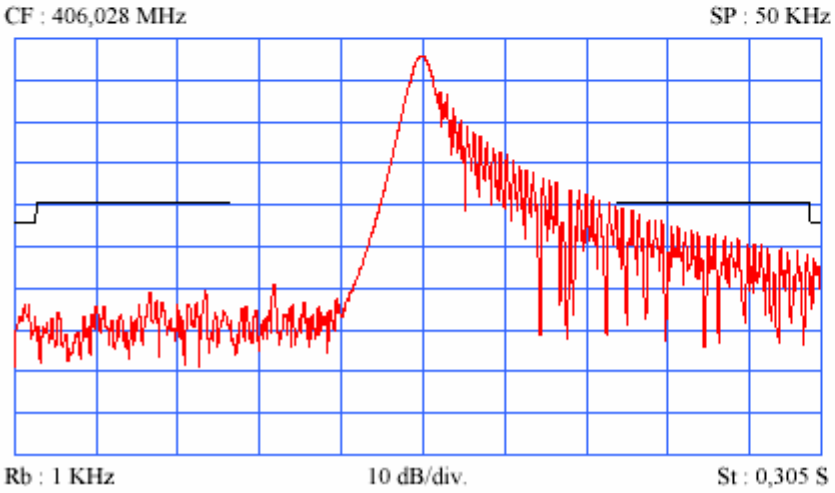


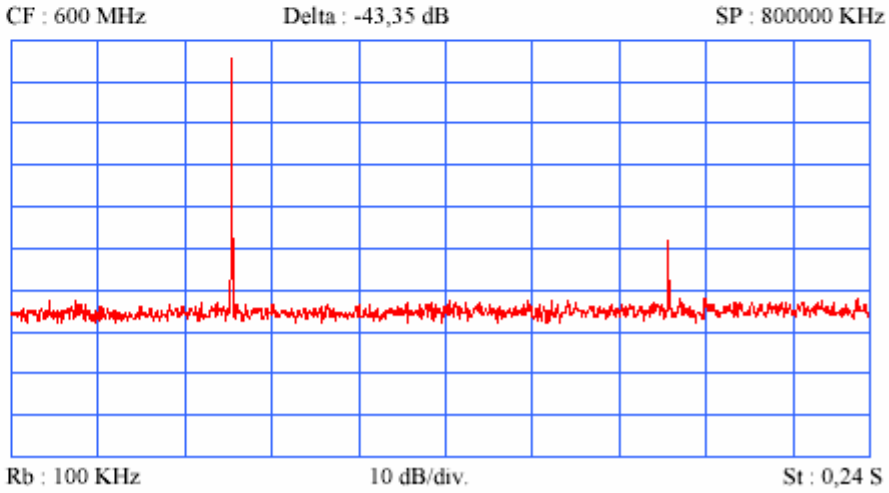




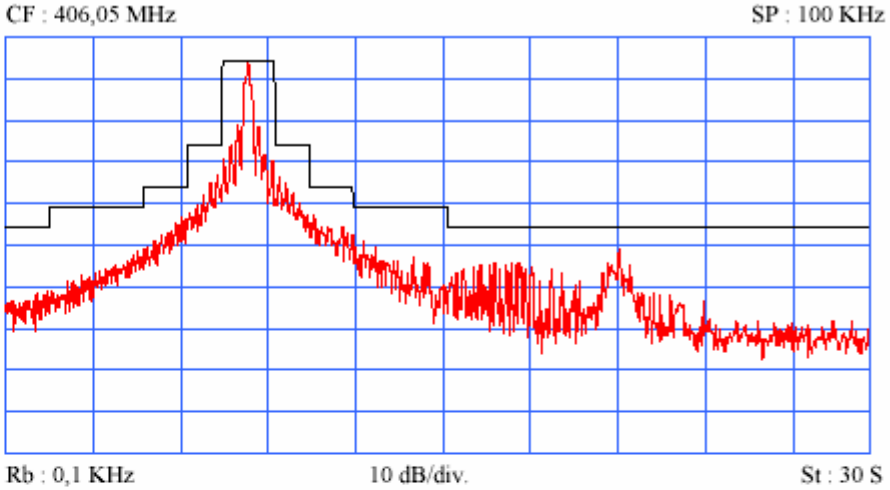
MARTEC
KANNAD AUTO/MANUAL/MANUAL+
61592 UUT6
Certification nominale
406 MHz
22 °C

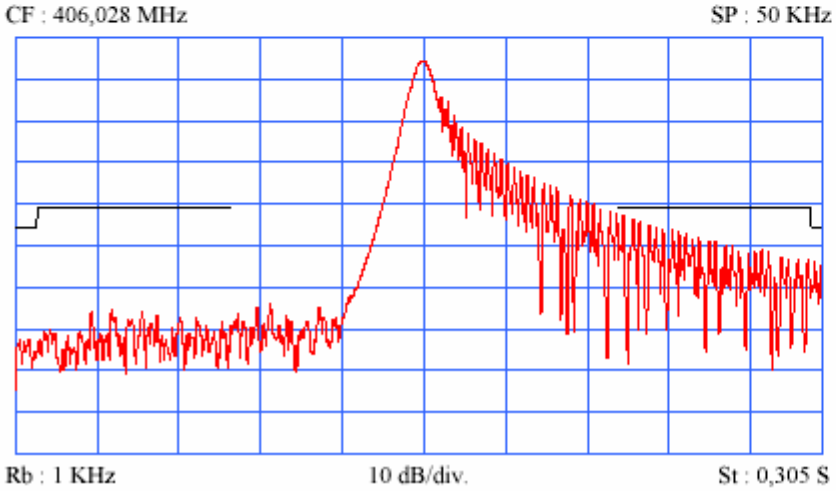


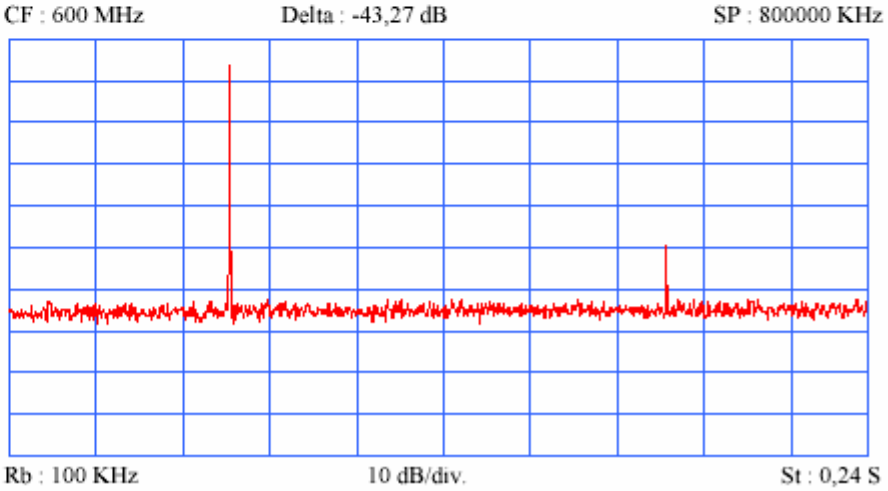




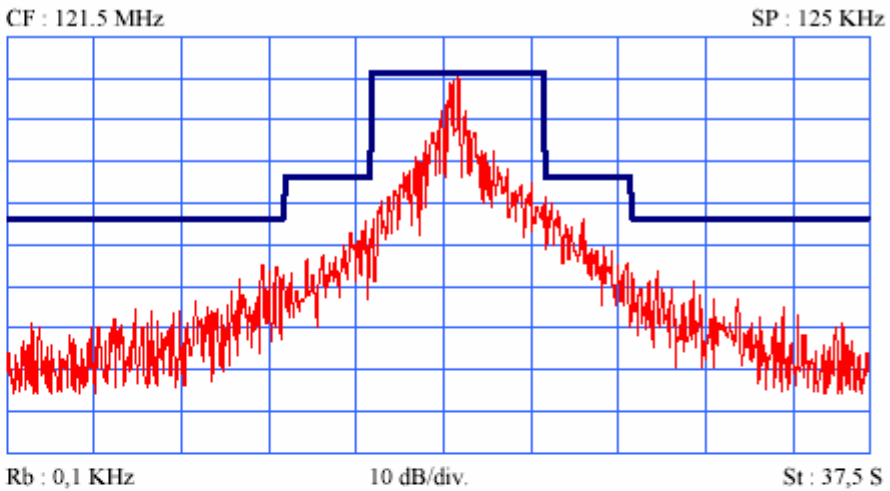
MARTEC
KANNAD AUTO/MANUAL/MANUAL+
61592 UUT6
Certification nominale
406 MHz
55 °C

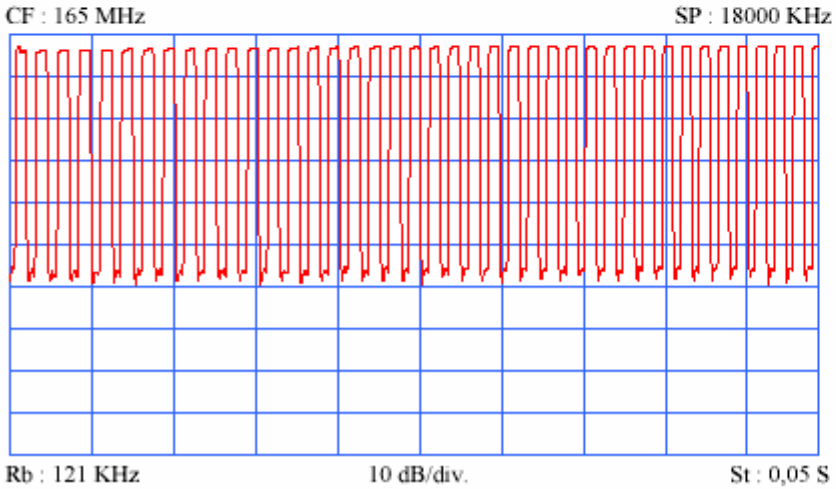


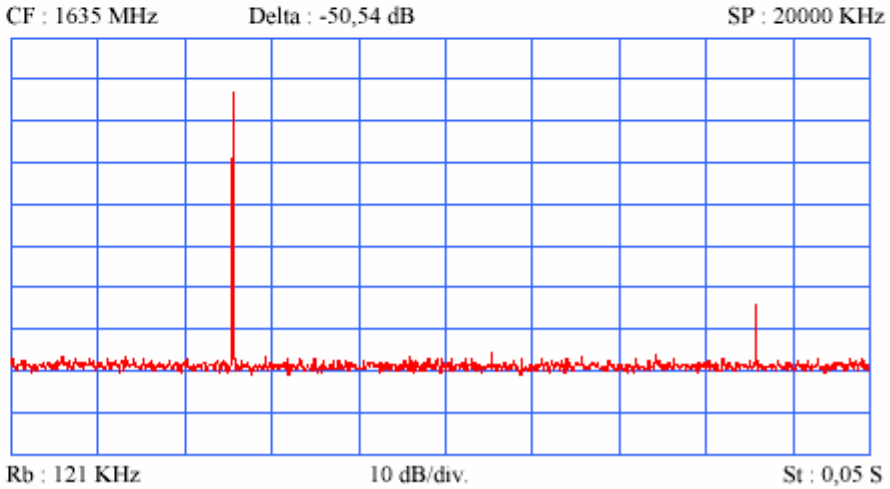




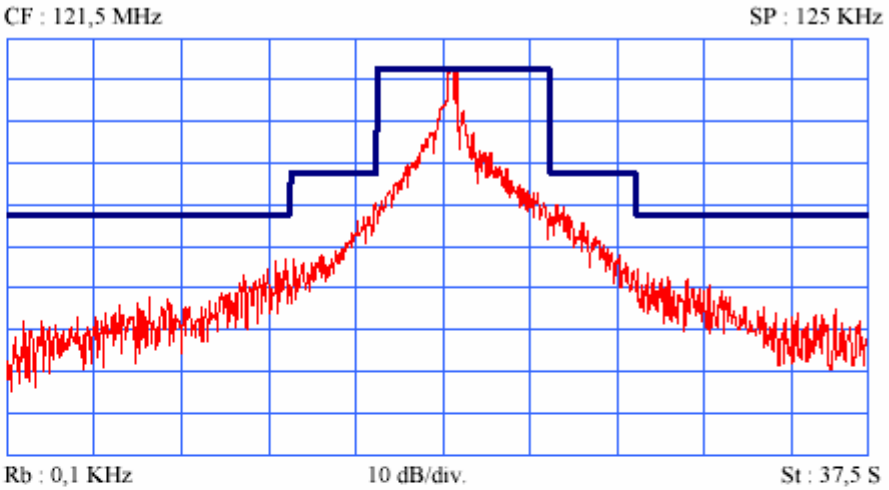
MARTEC
KANNAD AUTO/MANUAL/MANUAL+
61592 UUT6
Certification nominale
121,5 MHz
-20 °C

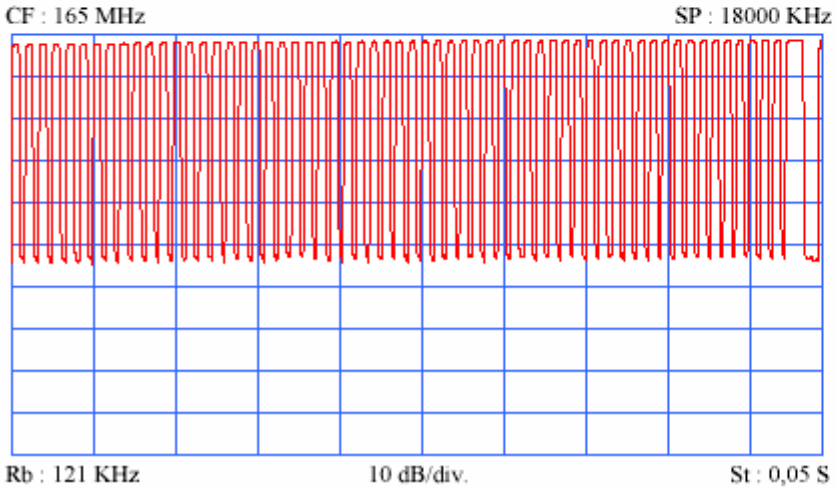


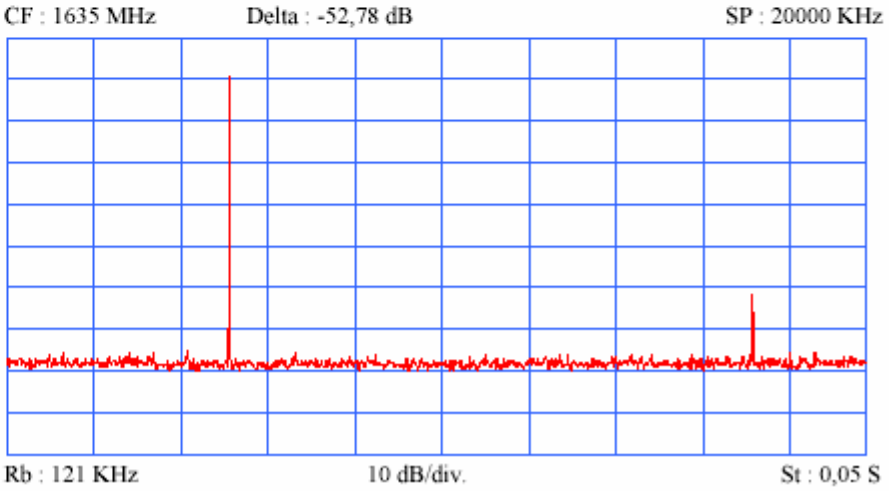




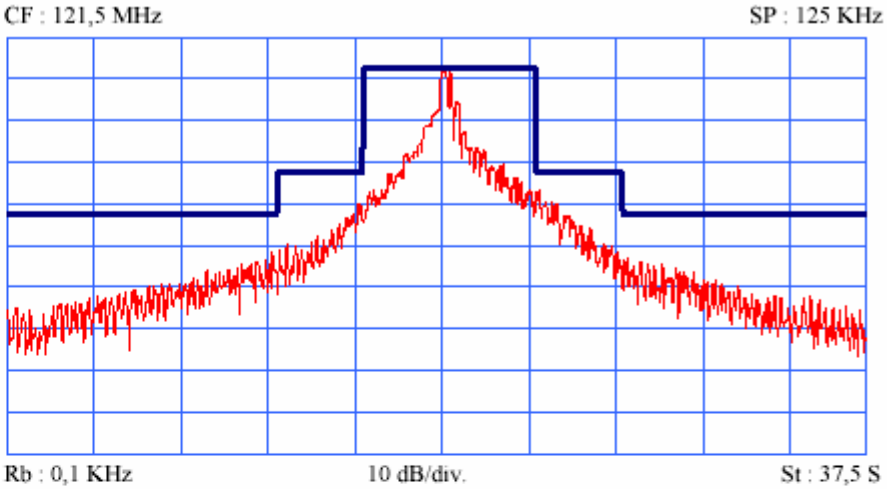
MARTEC
KANNAD AUTO/MANUAL/MANUAL+
61592 UUT6
Certification nominale
121,5 MHz
22 °C

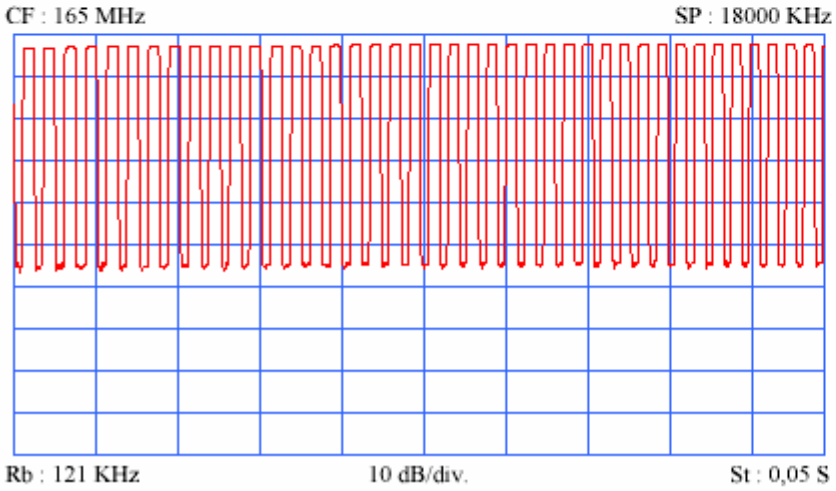


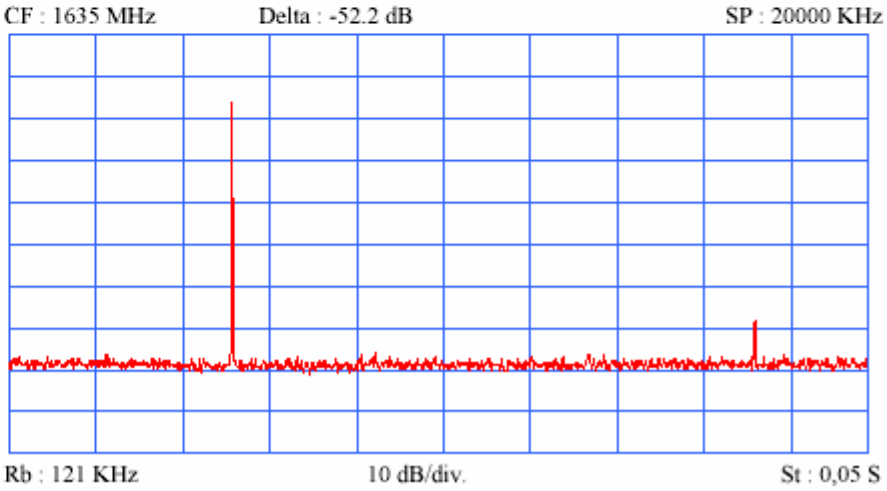




MARTEC
KANNAD AUTO/MANUAL/MANUAL+
61592 UUT6
Certification nominale
121,5 MHz
55 °C







CHAPTER 3

COMPLEMENTARY COSPAS - SARSAT TYPE APPROVAL TESTS REPORT (Test 1 to Test 11 of C/S Table F.1)

1 - ADMINISRATION

1.1. WORK ORDER

Manufacturer : MARTEC
Address : ZI des Cinq Chemins
56520 GUIDEL FRANCE

Represented by : Mr S. JINCHELEAU

1.2. INTESPACE TEST CENTER

The test operations have been conducted by : G. PEYROU

1.3. SCHEDULE

Start of test: 12 March 2007
End of test : 30 May 2007

1.4. WORK REFERENCE : **E7965-RTCM**

1.5. EQUIPMENT UNDER TEST

The results from this test report concern only the equipment here after referenced :

- Commercial designation :
- Model : KANNAD AUTO/AUTO GPS
- Sérial number: 61592 UUT6

2 - TEST FACILITIES

- ARGOS - COSPAS/SARSAT Certification Test Bench.

3 - STANDARDS AND TEST PROCEDURES APPLICABLE

COSPAS-SARSAT standards :

- "C/S T. 001- Issue 3 - Revision 7 - November 2005 "
- "C/S T. 007- Issue 4 - Revision 1 - October 2006"

INTESPACE Radio Beacon Test Procédures :

- " COSPAS-SARSAT Certification Test"	Réf. ITS : 572 AP/QA
- " 406 MHz Caracteristic Antenna Test "	Réf. ITS : 566 AP/QA
- " Radio Beacon Test Report "	Réf. ITS : 579 AP/QA-f

Note : The beacon unit is only submited to the C/S T.007 environmental test (Test 1 to Test 11 of Table F.1

4 - RESULTS

See the following pages :
- Application form for a COSPAS-SARSAT 406 MHz beacon Type Approval Certificate (C/S Annex G),
- Summary of 406 MHz beacon test results
- Test results : data and graphs

ANNEX G

APPLICATION FOR A COSPAS - SARSAT 406 MHz
BEACON TYPE APPROVAL CERTIFICATE

G.1 INFORMATION PROVIDED BY THE BEACON MANUFACTUREUR

Beacon Manufacturer and Beacon Model

Beacon manufacturer	MARTEC Serpe-Iesm
Beacon model	KANNAD AUTO / AUTO GPS / MANUAL / MANUAL GPS / MANUAL + / MANUAL + GPS

Beacon type and operational configurations

Beacon type	Beacon used while	Tick where appropriate
EPIRB	Floating in water or on deck or in a safety raft	X
PLB	On ground and above ground	
	On ground and above ground and floating in water	
ELT survival	On ground and above ground	
	On ground and above ground and floating in water	
ELT auto fixed	Fixed ELT with aircraft external antenna	
ELT auto portable	In aircraft with an external antenna	
	On ground, above ground, or in a safety raft with an integrated antenna	
ELT auto deployable	Deployable ELT with attached antenna	
Other (specify)		

Beacon characteristics

Characteristic	Specification
Operating temperature range	-20 °C / +55°C
Operating lifetime	48 hours
Battery chemistry	Lithium
Battery cell size and number of cells	DL123 / 16
Battery manufacturer	DURACELL
Battery pack manufacturer and part number	Williamson , WILPA1388 (see § 8.3)
Oscillator type (e.g. OCXO, MCXO, TCXO)	TCXO (see § 10)
Oscillator manufacturer	C-MAC (see § 10)
Oscillator part name and number	E3279 / PN = 0134421
Oscillator satisfies long-term frequency stability requirements (Yes or No)	YES (see § 10)
Antenna type (Integrated or External)	Integrated
Antenna manufacturer	MARTEC
Antenna part name and number	K1801113
Navigation device type (Internal, external or none)	Internal (for all GPS versions)
Features in beacon that prevent degradation to 406 MHz signal or beacon lifetime resulting from a failure of navigation device or failure to acquire position data (Yes, No, or N/A)	YES (see § 2.4 2)
Features in beacon that ensures erroneous position data is not encoded into the beacon message (Yes, No or N/A)	NO
Navigation device capable of supporting global coverage (Yes, No or N/A)	YES
For internal navigation devices - geodetic reference system (WGS84 or GTRF) - GNSS receiver cold start forced at every beacon activation (Yes or No) - Navigation device manufacturer - Navigation device model name and part number - GNSS system supported (e.g. GPS, GLONASS, Galileo)	See § 2.4 WGS84 YES FASTRAX uPatch100 GPS

Characteristic	Specification
For external navigation devices - Data protocol for GNSS receiver to beacon interface - Physical interface for beacon to navigation device - Electrical interface for beacon to navigation device - Navigation device model and manufacturer (if beacon designed to use specific devices)	NOT APPLICABLE
Self-test mode characteristics - self-test has separate switch position (Yes or No) - Self-test switch automatically returns to normal position when released (Yes or No) - Self-test activation can cause an operational mode transmission (Yes or No) - Self-test causes a single beacon self-test message burst only regardless of how long the self-test activation mechanism applied (Yes or No) - Results of self-test indicated by (e.g. Pass / Fail indicator Light, Strobe light, etc.) - Self-test can be activated from beacon remote activation points (Yes or No) - Self-test performs an internal check and indicates that RF power emitted at 406 MHz and 121.5 MHz if beacon includes a 121.5 MHz homer (Yes or No) - Self-test transmits a signal(s) other than at 406 MHz (Yes & details or No) - Self-test can be activated directly at beacon (Yes or No) - List of items checked by self-test - Self-test transmission burst duration (440 or 520 ms) - Self-test format bit ("0" or "1")	 YES YES NO YES Pass / fail indicator light NO YES NO YES Battery voltage RF power at 406 MHz Phase locked loop 440ms for version without GPS 520ms for versions with GPS 0 for versions without GPS 1 for versions with GPS
Beacon includes a homer transmitter (if yes identify frequency of transmission) - Homer transmit power - Homer duty cycle - Duty cycle of homer swept tone	121.5 MHz ±3kHz 50mW ± 3dB PERP 100 % 50 %
Beacon includes a strobe light (Yes or No) - Strobe light intensity - Strobe light flash rate	YES 0.75 Candela min 20 flashes per minute
Beacon transmission repetition period satisfies C/S T 001 requirement that two beacon's repetition periods are not synchronised closer than a few seconds over 5 minute period, and the time intervals between transmissions are randomly distributer on the interval 47.5 to 52.5 seconds (Yes or No)	YES (see § 11.5)
Other ancillary devices (e.g. voice transceiver). List details on a separate sheet if insufficient space to describe	NO
Beacon includes automatic activation mechanism (Yes or No)	YES for AUTO and MANUAL+ versions

G.2 INFORMATION PROVIDED BY THE COSPAS-SARSAT ACEPTED TEST FACILITY

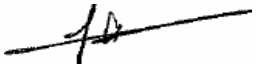
Name and Location of Beacon Test Facility: INTESPACE

Date of submission for Testing: 12 March 2007

Applicable C/S Standards:

Document	Issue	Revision
C/S T.001	3	7
C/S T.007	4	

I hereby confirm that the 406 MHz beacon described above has been successfully tested in accordance with the COSPAS-SARSAT 406 MHz Beacon Type Approval Standard (C/S T.007 : Test 1 to Test 11 of Table F.1) and complies with the Specification for Cospas-Sarsat 406 MHz Distress Beacons (C/S T.001) as demonstrated in the attached report.

Dated : 5 June 2007 Signed : 

Gérard PEYROU
Intespace Distress Beacon Test Responsible

PARAMÈTRES TO BE MEASURED DURING TESTS		RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
				$T_{min.}$ -20°C (±3)	$T_{amb.}$ 22°C (±3)	$T_{max.}$ 55°C (±3)	
1 - POWER OUTPUT							
o transmitter power output		35 - 39	dBm	36,6	37,0	37,4	
o Power output rise time		< 5	ms	0,35	0,47	0,52	Graphs p, 20, 23 and 26
o power output 1 ms before burst		< -10 dBm	√ *	√	√	√	Graphs pages 14 to 16
2 - DIGITAL MESSAGE	Bits number						Data and graphs pages 17 to 26
o bit sync	1-15	15 bits "1"	√	√	√	√	
o frame sync	16-24	9 bits (000101111)	√	√	√	√	
o format flag	25	1 bit	√	1	1	1	
o protocol flag	26	1 bit	√	0	0	0	
o identification/position code	27-85	59 bits	√	√	√	√	
o BCH code	86-106	21 bits	√	√	√	√	
o emerg. code/nat. use/supplem. data	107-112	6 bits	data bits	110111	110111	110111	
o additional data/BCH (if applicable)	113-144	32 bits	√	√	√	√	
o position error (if applicable)		< 5	km	0,076 km	0,076 km	0,076 km	

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ -20°C (±3)	$T_{amb.}$ 22°C (±3)	$T_{max.}$ 55°C (±3)	
3 - DIGITAL MESSAGE GENERATOR						Data and graphs pages 17 to 26
o repetition rate T_R :						
average T_R =	48,5 - 51,5	seconds	50,2	50,1	50,2	
minimum T_R =	$47,5 \leq T_R \leq 48,0$	seconds	47,7	47,7	47,6	
maximum T_R =	$52,0 \leq T_R \leq 52,5$	seconds	52,3	52,1	53,3	
standard deviation =	0,5 - 2,0		1,61	1,33	1,55	
o bit rate						
minimum f_b =	396	bits/sec.	400,32	400,34	400,33	
maximum f_b =	404	bits/sec.	400,35	400,36	400,36	
o total transmission time :						
short message =	435.6 - 444.4	ms				
long message =	514.8 - 525.2	ms	520,63	520,60	520,62	
o unmodulated carrier						
minimum T_1 =	158,4	ms	160,64	160,63	160,64	
maximum T_1 =	161,6	ms	160,65	160,63	160,64	Self Test burst at 11 sec
o first burst delay	> 47,5	seconds		> 68,5		+ 47,5 sec min for first normal burst

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ -20°C (±3)	$T_{amb.}$ 22°C (±3)	$T_{max.}$ 55°C (±3)	
4 - MODULATION						Data and graphs
o biphase-L		√	√	√	√	pages 17 to 26
o rise time	50 - 250	microsec.	80	90	90	
o fall time	50 - 250	microsec.	80	80	80	
o phase deviation : positive	+ (1.0 to 1.2)	radians	+ 1,11	+ 1,11	+ 1,11	
o phase deviation : negative	- (1.0 to 1.2)	radians	- 1,10	- 1,11	- 1,10	
o symmetry measurement	≤ 0.05		4,0E-03	4,0E-06	4,0E-03	
5 - 406 MHz TRANSMITTED FREQUENCY						Data pages 18, 21 and 24
o nominal value	as specified in C/S T.001 and C/S T.012	MHz	406,0278191	406,0278182	406,0278226	
o short term stability	≤ 2 x 10^{-9}	/100 ms	9,65E-11	4,79E-11	9,48E-11	
o medium term stability						
. slope	(-1 to +1) x 10^{-9}	/minute	-3,85E-11	-3,21E-11	-1,78E-11	
. residual frequency variation	≤ 3 x 10^{-9}		2,71E-10	9,15E-11	4,01E-10	
6 - SPURIOUS EMISSION [1] (into 50 ohms) o in-band (406.0 - 406.1 MHz)	C/S T.001 mask	√	√	√	√	See graphs pages 27 to 30

[1] Include spectral plots of the 406,0-406,1 MHz band, showing the transmit signal and emission mask as defined in C/S T.001.

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ -20°C (±3)	$T_{amb.}$ 22°C (±3)	$T_{max.}$ 55°C (±3)	
7 - 406 MHz VSWR CHECK after open circuit, short cicuit, then while VSWR is 3:1, measure :						See data and graphs pages 31 to 37
o nominal transmitted frequency	as specified in C/S T.001	MHz	406,0280562	406,0280379	406,0280595	
o Modulation :						
- rise time	50 - 250	microsec.	179,6	169,7	169,7	
- fall time	50 - 250	microsec.	169,7	149,7	179,6	
- phase deviation : positive	+ (1.0 to 1.2)	radians	1,13	1,12	1,11	
- phase deviation : negative	- (1.0 to 1.2)	radians	-1,09	-1,11	-1,11	
- symmetry measurement	≤ 0.05	√	8,0E-03	4,0E-03	4,0E-03	
- digital message	must be correct	√	√	√	√	
8 - SELF-TEST MODE (if applicable)						Data pages 38 to 40
o frame sync	9 bits (011010000)	√	√	√	√	
o format flag	1/0	bit	1	1	1	
o single radiated burst	≤ 440 /520 (+1%)	ms		520,06		
o default position data (if applicable)	must be correct	√				
o description provided		√				
o design data provided on protection against repetitive self-test mode transmissions	protection provided	√				Manufacturer doc. Annex A
o single burst verification	one burst	√				
o provides for beacon 15 Hex ID	correct	√				Data page 39
o 121,5 MHz RF power (if applicable)	self-test checks that RF power emitted	√				
o 406 MHz RF power	self-test checks that RF power emitted	√				

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS
9 - THERMAL SHOCK[1] (30° C change)				Data and graphs pages 41 to 48
o Soak temperature :		°C	Tsoak = -31,5	
o Measurement temperature :		°C	TMeas = -0,8	
the following parameters are to be met within 15 minutes of beacon and maintained for 2 hours				
o Transmitted frequency :				
- nominal value	as specified in C/S T.001 and C/S T.012	MHz	406,0278366 / 406,0278416	
- short term stability	≤ 2 x 10^{-9}	/100 ms	< 1,1E-10	
- medium term stability :				
. slope	(-2 to +2) x 10^{-9}	/minute	-7E-10 / 4E-11	
. residual frequency variation	≤ 3 x 10^{-9}		<8E-10	
o Transmitted power output	35 - 39	dBm	37,4 / 37,5	
o Digital message	must be corect	√	√	

1 Attach graphs depicting test results.

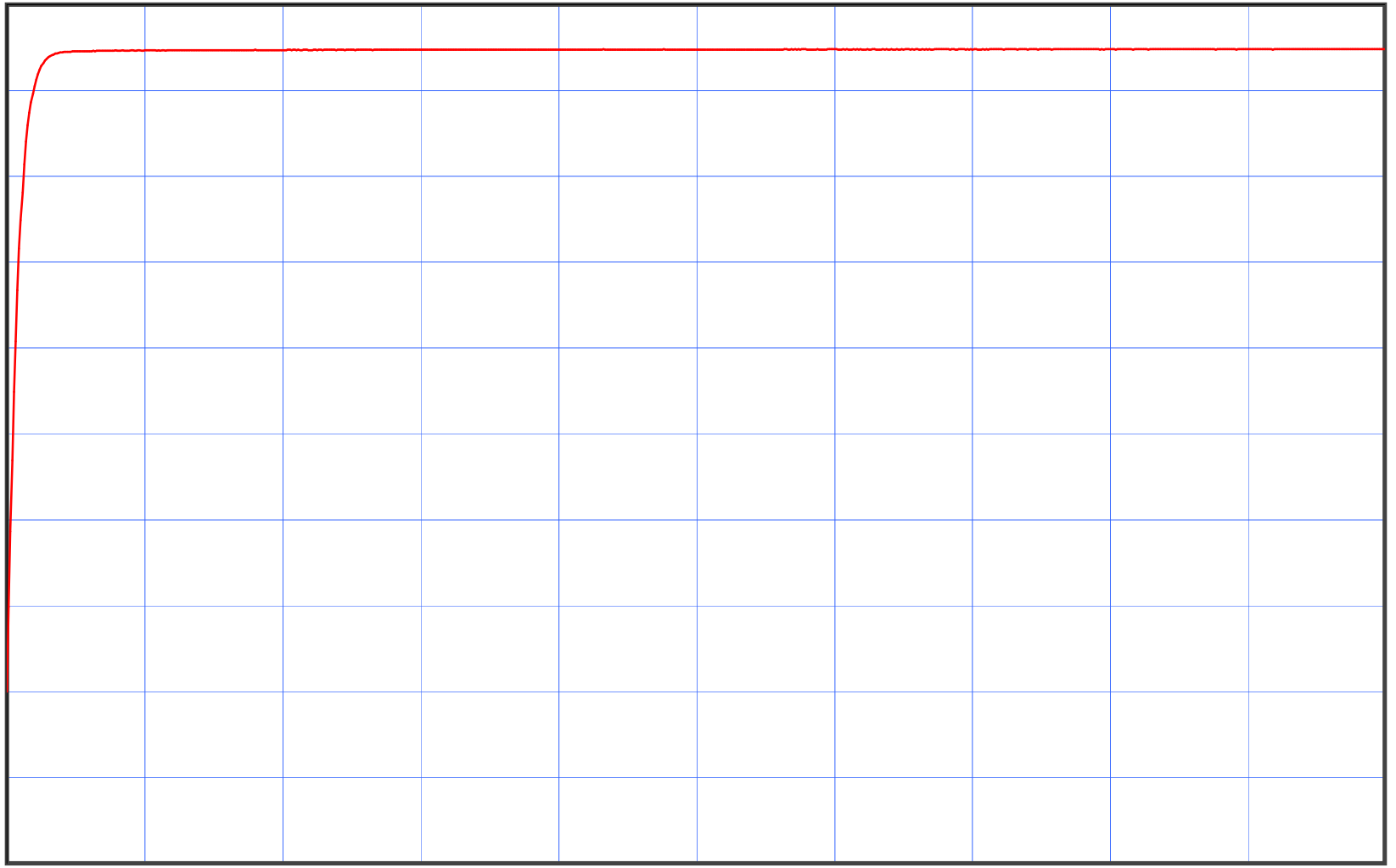
PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS
10 - OPERATING LIFETIME AT MINIMUM TEMPERATURE[1]				Data and graphs pages 49 to 62
o Duration	> 24	hours	78 hours at Tmin = -20 °C	
o Transmitted frequency :				
- nominal value	as specified in C/S T.001 and C/S T.012	MHz	406,027844 / 406,027862	
- short term stability	≤ 2 x 10^{-9}	/100 ms	< 1,5E-09	before 78 hours of valid opera
- medium term stability				lifetime at temperature minim
. slope	(-1 to +1) x 10^{-9}	/minute	-8E-10 / 6,4E-10	
. residual frequency variation	≤ 3 x 10^{-9}		< 2E-10	
o Transmitted power output	35 - 39	dBm	35 / 36,7	
o Digital message	must be corect	√	√	
11 - TEMPERATURE GRADIENT (5° C/hr)[1]				Data and graphs pages 63 to 72
o Transmitted frequency :				
- nominal value	as specified in C/S T.001 and C/S T.012	MHz	406,02783 / 406,027861	
- short term stability	≤ 2 x 10^{-9}	/100 ms	< 3,5E-10	
- medium term stability				
. Slope (A to B, C+15 to D, and E+15 to F)	(-1 to +1) x 10^{-9}	/minute	-6,6E-10 / 5,1E-10	
. Slope (B to C+15, and D to E+15)	(-2 to +2) x 10^{-9}	/minute		
. residual frequency variation	≤ 3 x 10^{-9}		< 2,4E-09	
o Transmitted power output	35 - 39	dBm	35,8 / 36,7	
o Digital message	must be corect	√	√	

1 Attach graphs depicting test results.

TRANSMITTER OUTPUT POWER RISE TIME TEST RESULT ON MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
(1 ms before 10 % of the burst)
at -20° C, 22° C and 55° C

Output Power Risetime at -20°C

CF : 406,028 MHz **Output Power Risetime (1 ms before the burst) : 35,85 dBm** **SP : 0 KHz**



Rb : 1 KHz **10 dB/div.** **St : 0,05 S**

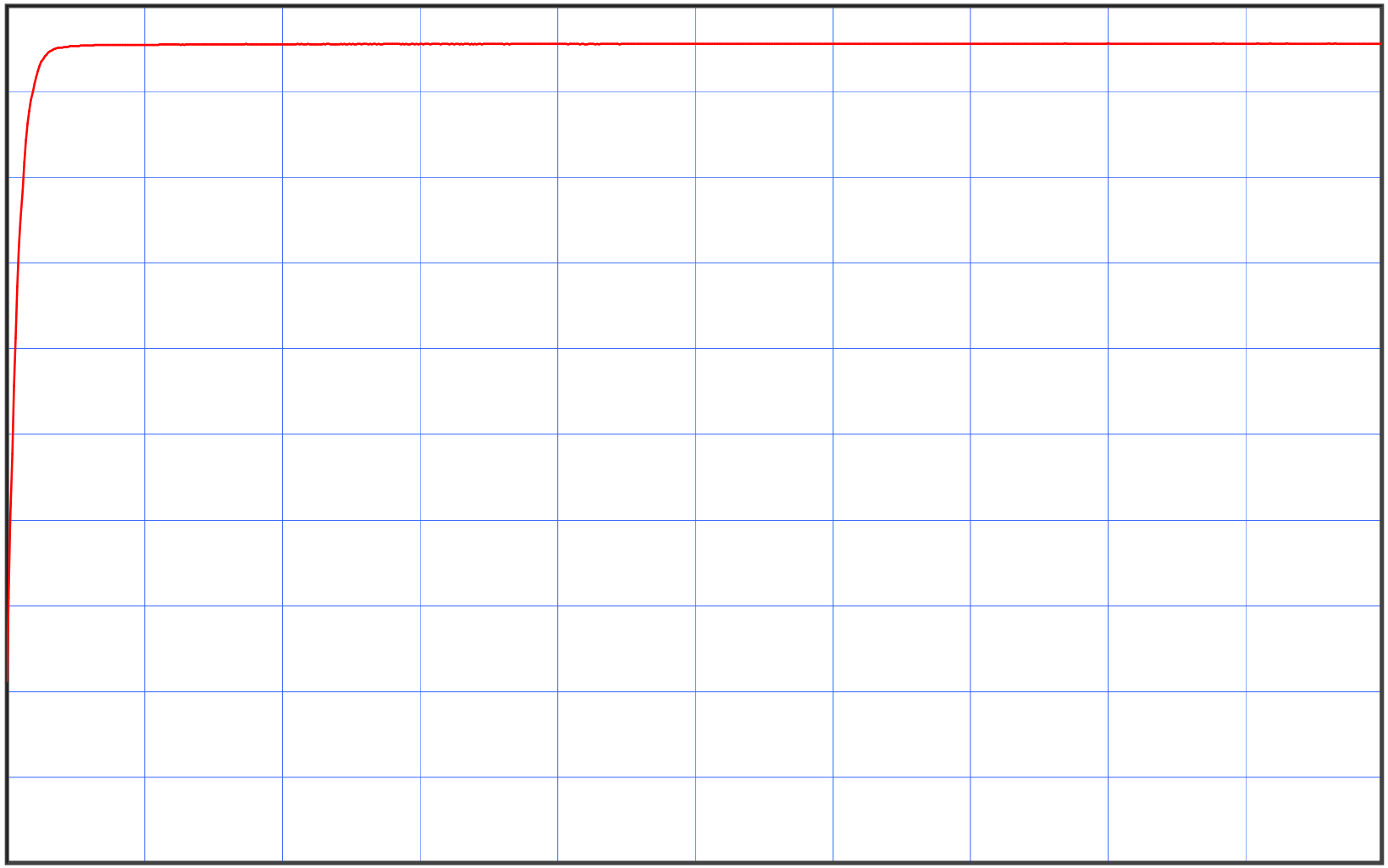
Output Power Risetime at 22°C

CF : 406,028 MHz **Output Power Risetime (1 ms before the burst) : 34,84 dBm** **SP : 0 KHz**

Rb : 1 KHz **10 dB/div.** **St : 0,05 S**

Output Power Risetime at 55°C

CF : 406,028 MHz **Output Power Risetime (1 ms before the burst) : 36,58 dBm** **SP : 0 KHz**



Rb : 1 KHz **10 dB/div.** **St : 0,05 S**

CERTIFICATION TEST RESULTS ON
MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
at -20° C, 22° C and 55° C

Certification Test at -20°C Date of test : 14 March 2007

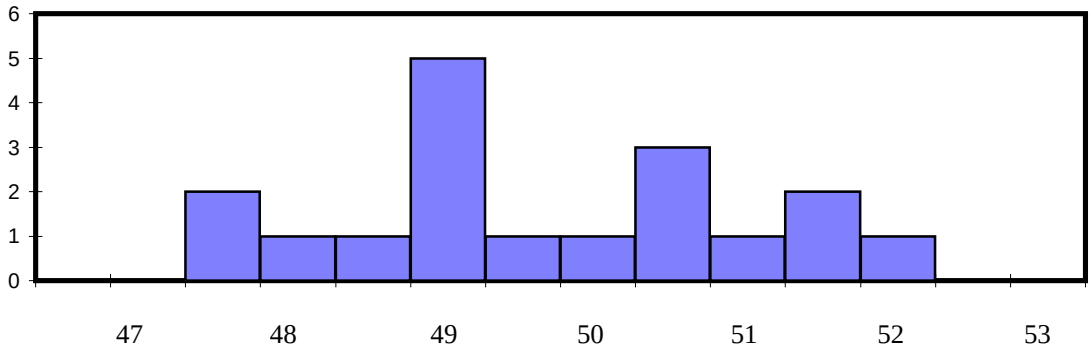
Manufacturer : MARTEC
Beacon Type : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

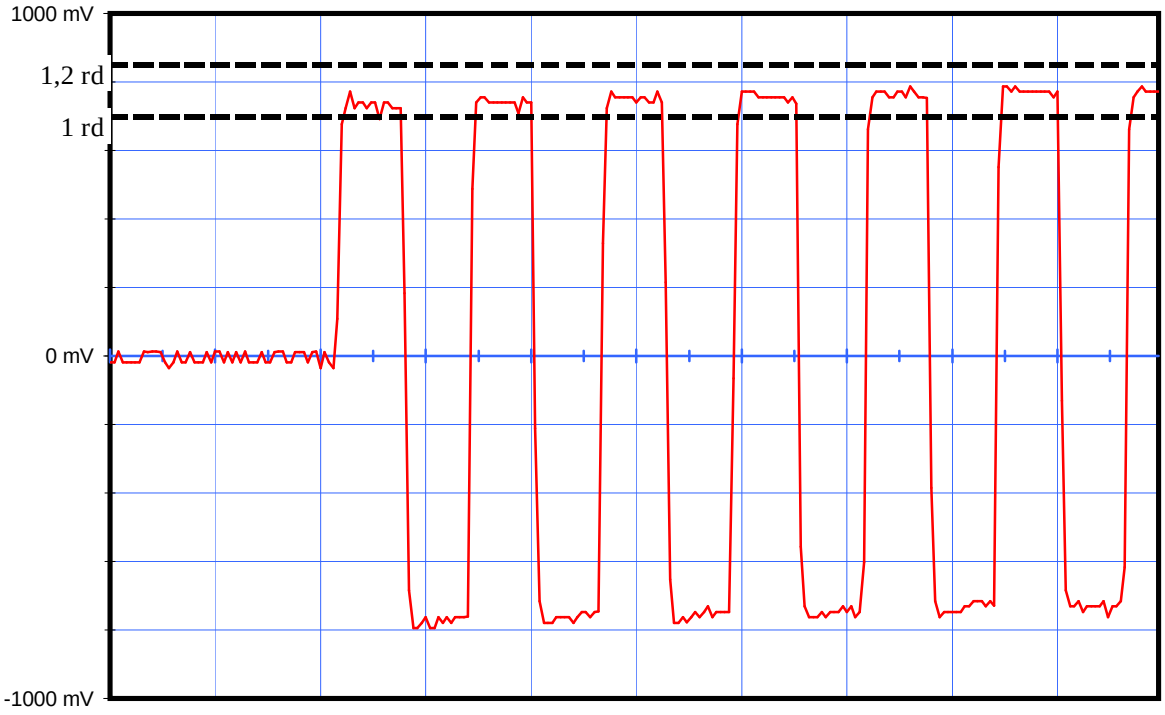
Message

Message received		FFFE2F8E3F2C260AE201775E7D770F2C0836	
Format Flag	25	1	
Protocol flag	26	0	
Ident./Position code	27-85	0	
Country Code/Country	27-36	227 / FRANCE	
Protocol Code : U/Std-Nat	37-39/37-40	1111	
Protocol Code Used	37-39/37-40	Test-National Location	
Identification Data	40-85/41-64/41-58		
Identification Used		61592	
Calculated BCH1	25-85	1D79F5	
Encoded BCH1	86-106	1D79F5	
Homing	112	1	
Em.cod/nat.use/supp.data	107-112	110111	
Encod pos data	111	1	Internal
Fixed Data "1"	108	1	OK
Calculated BCH2	107-132	836	
Encoded BCH2	133-144	836	
Latitude position		Nord 43° 33' 34"	
Longitude position		Est 1° 28' 44"	
Delta position		0,076 km	

Electrical and other parameters

CW preamble	ms 158,4 <	< 161,6	160,65
Total transmission time	ms 514,8 <	<525,2	520,63
Modulation frequency	Hz 396<	< 404	400,34
Phase deviation : total	rd	<=2,40	2,21
Phase deviation : positive	rd 1,00 <	< 1,20	1,11
Phase deviation : negative	rd -1,20 <	< -1,00	-1,10
Symmetry measurement	%	<=5 %	0,40
Nominal frequency : F2	Hz		406027819,11
Short term2			1,34E-10
Short term3			9,65E-11
Slope			-3,85E-11
Residual			2,71E-10
406 MHz power output	dBm		36,6
Homing frequency	MHz		121,50
121,5 MHz power output	dBm		19,0
Soak temperature	°C		-20,1
Extra feature			No



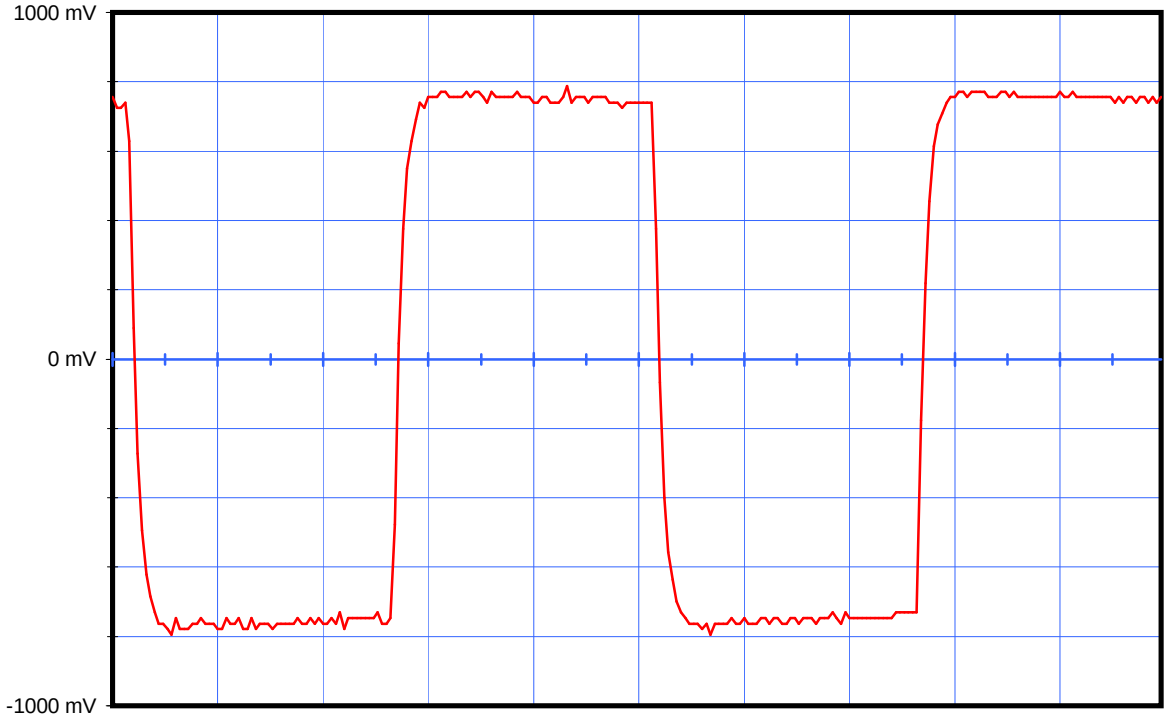


0 ms 10 ms 20 ms

Vmarker1 850 mv ==> 1,2 rd

2 ms/div.

Vmarker2 700 mv ==> 1 rd



8 ms 10,5 ms 13 ms

Duty Cycle : 0,004012024

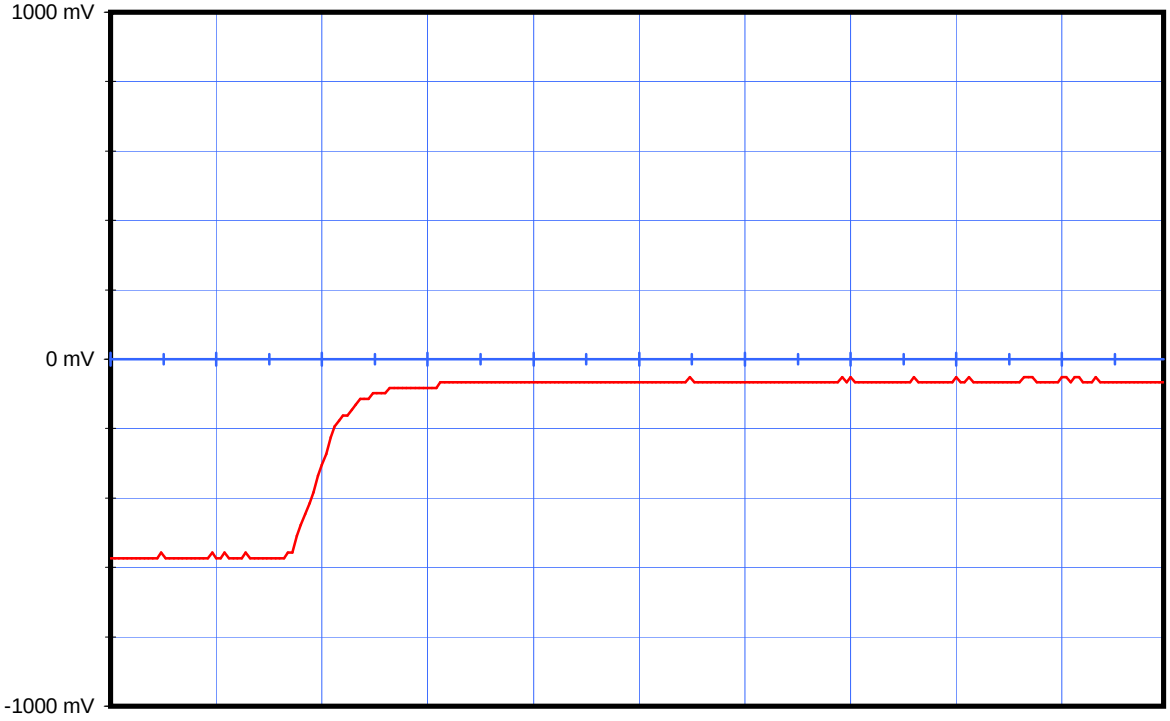
0,5 ms/div.

falltime(1)<= 79,8404 us

risetime(1)<= 79,8404 us

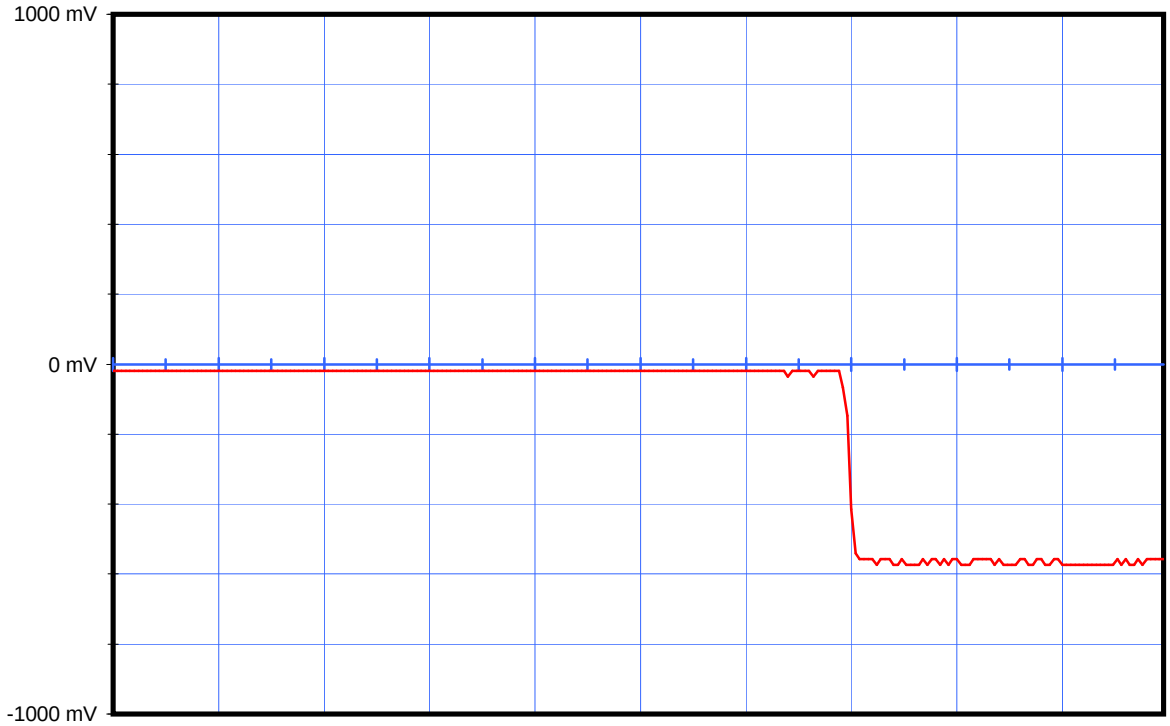
+width(1) 1,23753 ms

-widht(1) 1,2475 ms



-1 ms 1,5 ms 4 ms

risetime(1)<= 349,301 us 0,5 ms/div.



-3,5 ms -1 ms 1,5 ms

falltime(1)<= 59,8801 us 0,5 ms/div.

Certification Test at 22°C Date of test : 14 March 2007

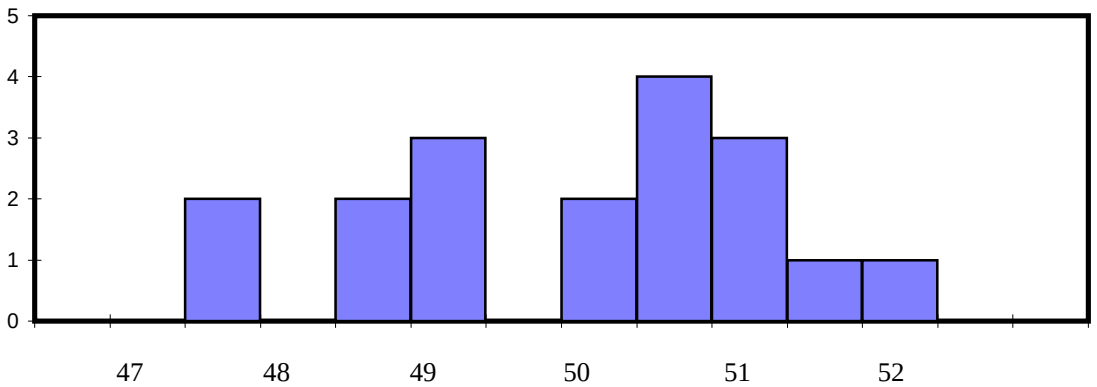
Manufacturer : MARTEC
Beacon Type : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Message

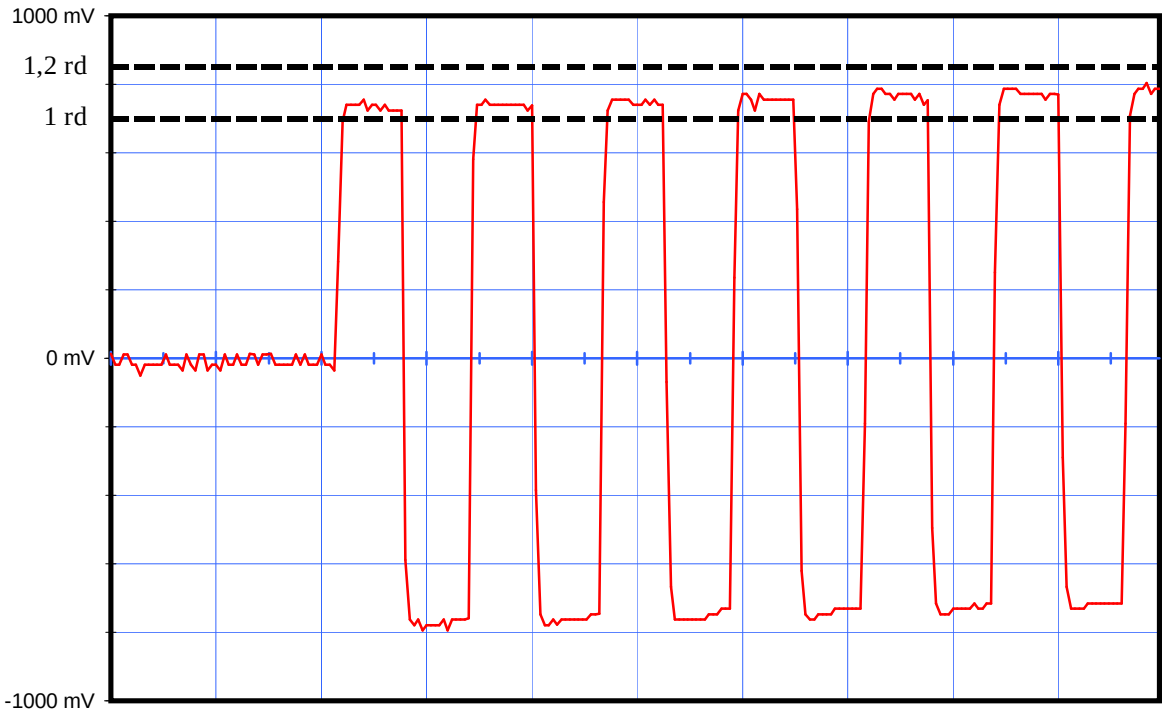
Message received		FFFE2F8E3F2C260AE201775E7D770F2C0836	
Format Flag	25	1	
Protocol flag	26	0	
Ident./Position code	27-85	0	
Country Code/Country	27-36	227 / FRANCE	
Protocol Code : U/Std-Nat	37-39/37-40	1111	
Protocol Code Used	37-39/37-40	Test-National Location	
Identification Data	40-85/41-64/41-58		
Identification Used		61592	
Calculated BCH1	25-85	1D79F5	
Encoded BCH1	86-106	1D79F5	
Homing	112	1	
Em.cod/nat.use/supp.data	107-112	110111	
Encod pos data	111	1	Internal
Fixed Data "1"	108	1	OK
Calculated BCH2	107-132	836	
Encoded BCH2	133-144	836	
Latitude position		Nord 43° 33' 34"	
Longitude position		Est 1° 28' 44"	
Delta position		0,076 km	

Electrical and other parameters

CW preamble	ms	158,4 <	< 161,6	160,63
Total transmission time	ms	514,8 <	<525,2	520,60
Modulation frequency	Hz	396<	< 404	400,35
Phase deviation : total	rd		<=2,40	2,21
Phase deviation : positive	rd	1,00 <	< 1,20	1,11
Phase deviation : negative	rd	-1,20 <	< -1,00	-1,11
Symmetry measurement	%		<=5 %	0,00
Nominal frequency : F2	Hz			406027818,24
Short term2				7,39E-11
Short term3				4,79E-11
Slope				-3,21E-11
Residual				9,15E-11
406 MHz power output	dBm			37,0
Homing frequency	MHz			121,50
121,5 MHz power output	dBm			18,0
Soak temperature	°C			23,7
Extra feature				No



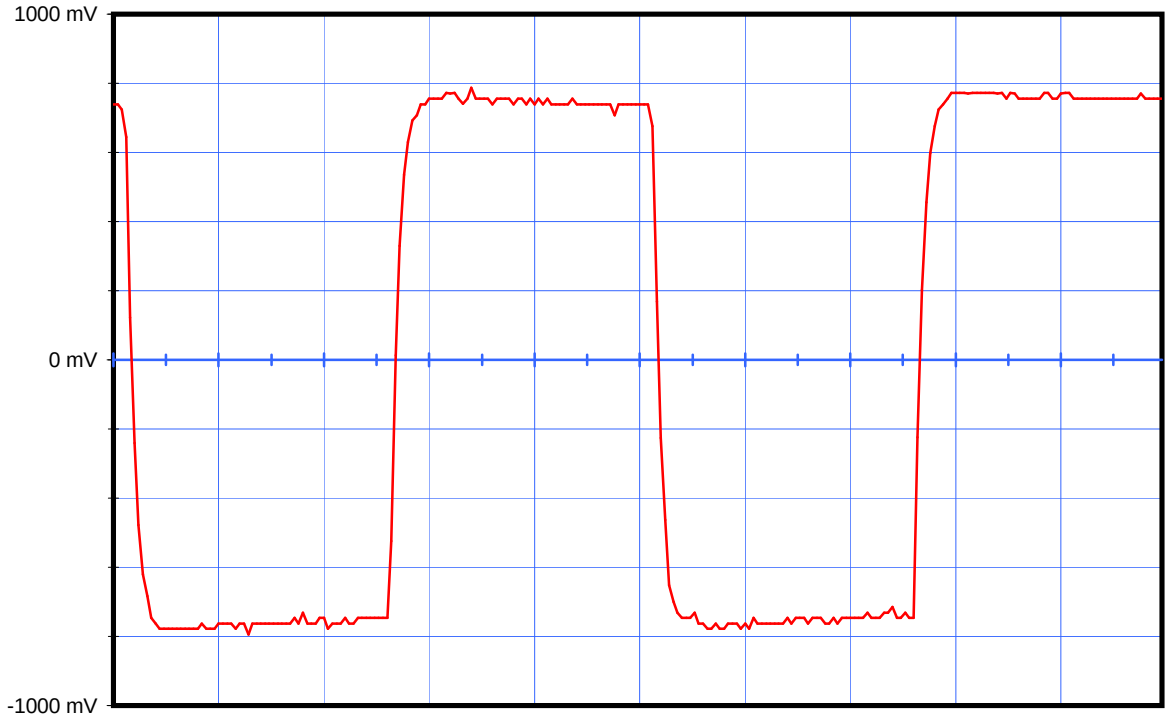
47 48 49 50 51 52



0 ms 10 ms 20 ms

Vmarker1 850 mv ==> 1,2 rd 2 ms/div.

Vmarker2 700 mv ==> 1 rd

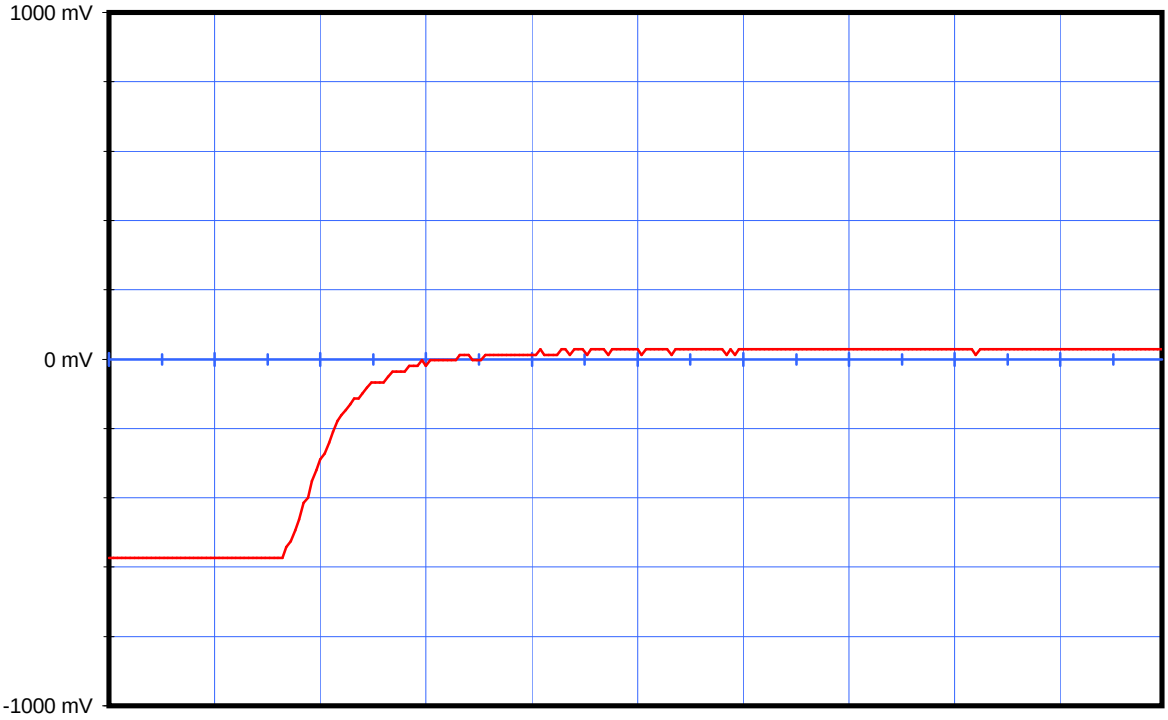


8 ms 10,5 ms 13 ms

Duty Cycle : 4,008E-06 0,5 ms/div.

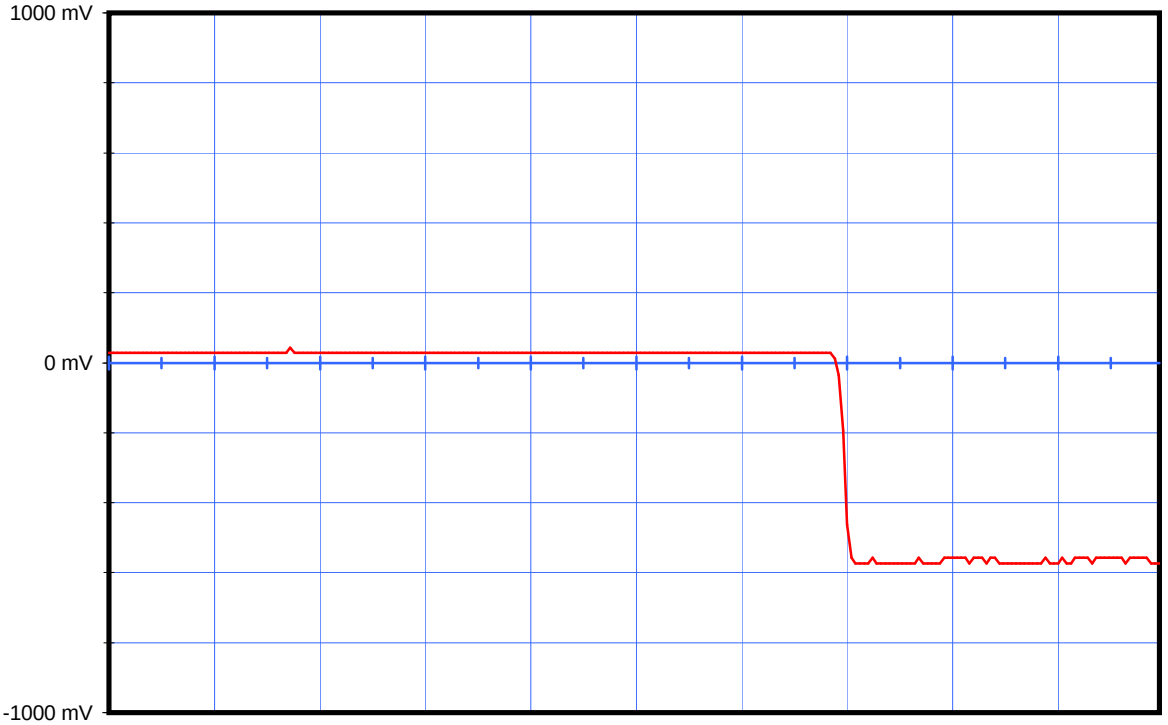
falltime(1)<= 79,8404 us risetime(1)<= 89,8205 us

+width(1) 1,24751 ms -widht(1) 1,2475 ms



-1 ms 1,5 ms 4 ms

risetime(1)<= 469,062 us 0,5 ms/div.



-3,5 ms -1 ms 1,5 ms

falltime(1)<= 49,9 us 0,5 ms/div.

Certification Test at 55°C Date of test : 15 March 2007

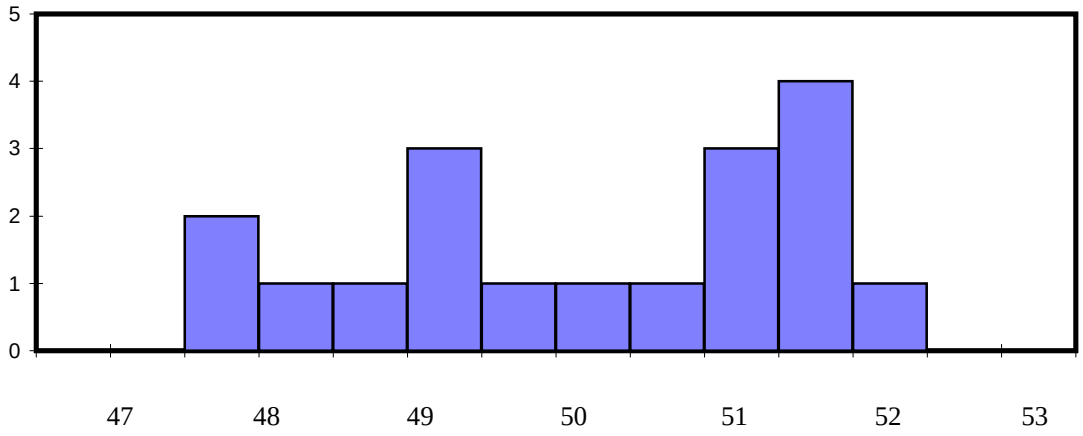
Manufacturer : MARTEC
Beacon Type : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

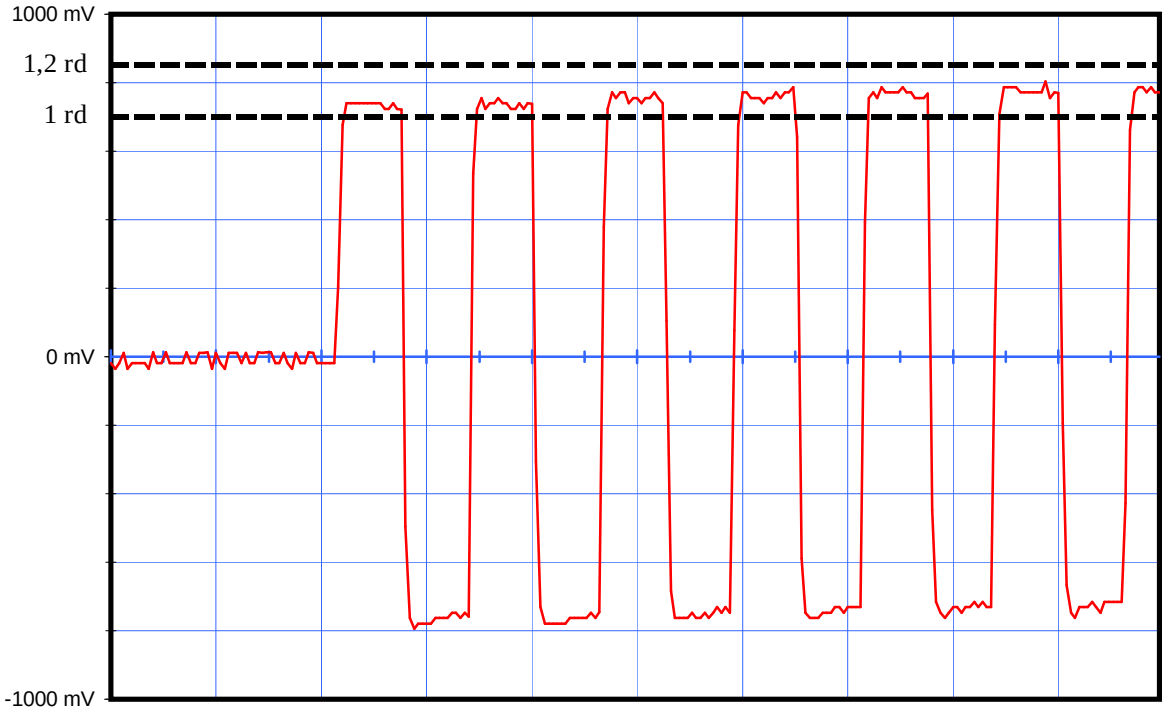
Message

Message received		FFFE2F8E3F2C260AE201775E7D770F2C0836	
Format Flag	25	1	
Protocol flag	26	0	
Ident./Position code	27-85	0	
Country Code/Country	27-36	227 / FRANCE	
Protocol Code : U/Std-Nat	37-39/37-40	1111	
Protocol Code Used	37-39/37-40	Test-National Location	
Identification Data	40-85/41-64/41-58		
Identification Used		61592	
Calculated BCH1	25-85	1D79F5	
Encoded BCH1	86-106	1D79F5	
Homing	112	1	
Em.cod/nat.use/supp.data	107-112	110111	
Encod pos data	111	1	Internal
Fixed Data "1"	108	1	OK
Calculated BCH2	107-132	836	
Encoded BCH2	133-144	836	
Latitude position		Nord 43° 33' 34"	
Longitude position		Est 1° 28' 44"	
Delta position		0,076 km	

Electrical and other parameters

CW preamble	ms 158,4 <	< 161,6	160,64
Total transmission time	ms 514,8 <	<525,2	520,62
Modulation frequency	Hz 396<	< 404	400,34
Phase deviation : total	rd	<=2,40	2,21
Phase deviation : positive	rd 1,00 <	< 1,20	1,11
Phase deviation : negative	rd -1,20 <	< -1,00	-1,10
Symmetry measurement	%	<=5 %	0,40
Nominal frequency : F2	Hz		406027822,57
Short term2			1,22E-10
Short term3			9,48E-11
Slope			-1,78E-11
Residual			4,01E-10
406 MHz power output	dBm		37,4
Homing frequency	MHz		121,50
121,5 MHz power output	dBm		19,1
Soak temperature	°C		54,7
Extra feature			No



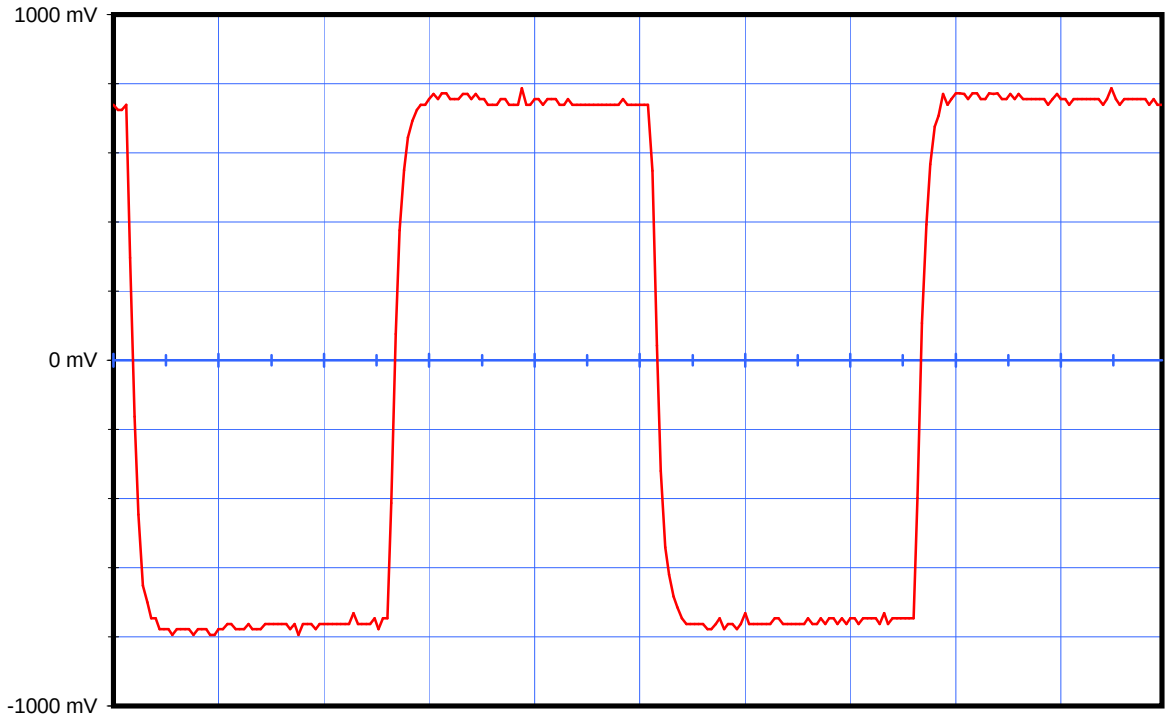


0 ms 10 ms 20 ms

Vmarker1 850 mv ==> 1,2 rd

2 ms/div.

Vmarker2 700 mv ==> 1 rd



8 ms 10,5 ms 13 ms

Duty Cycle : 0,004020072

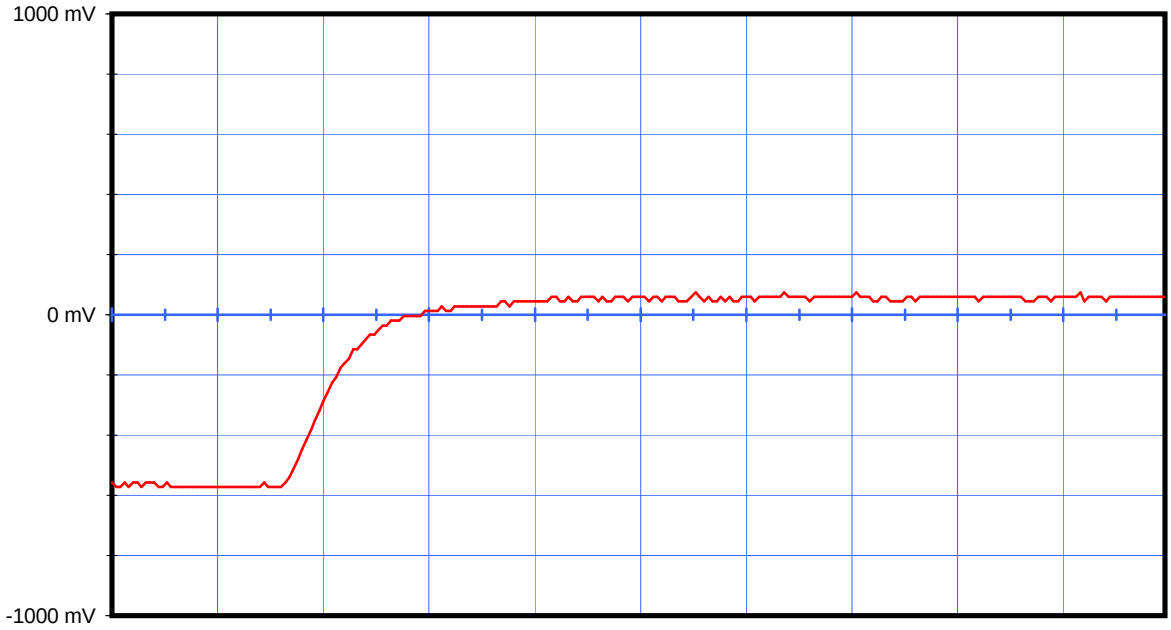
0,5 ms/div.

falltime(1)<= 79,8404 us

risetime(1)<= 89,8205 us

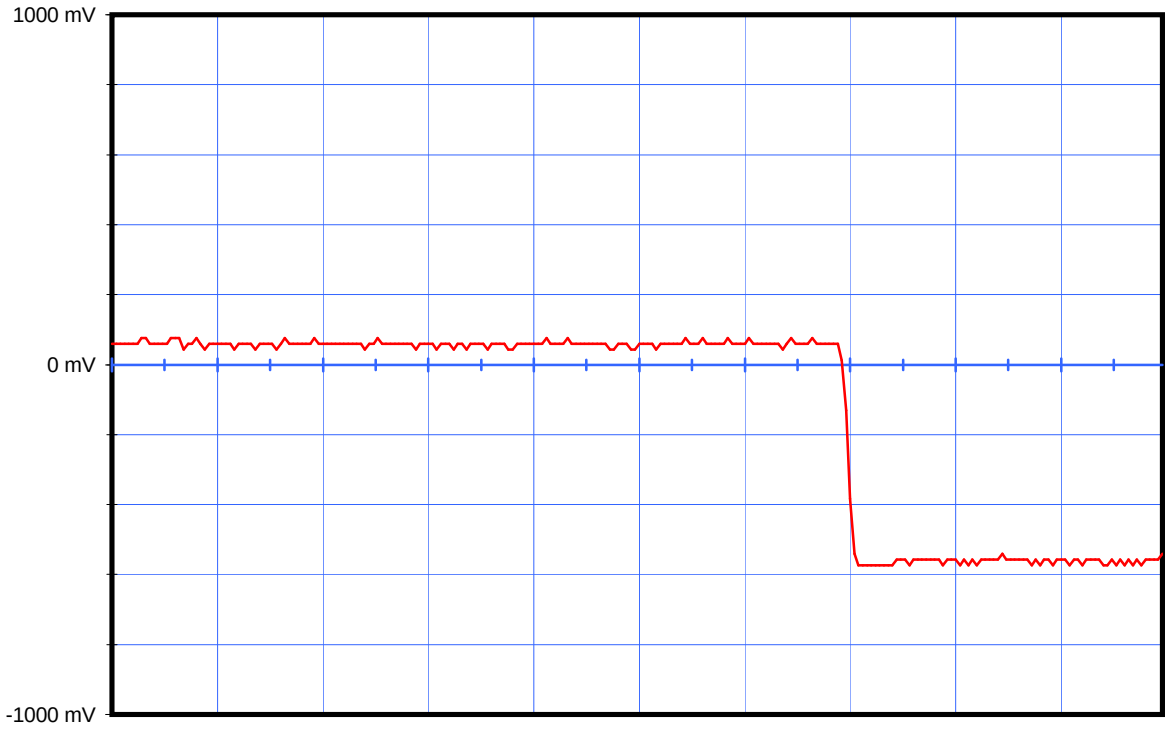
+width(1) 1,24751 ms

-widht(1) 1,23752 ms



-1 ms 1,5 ms 4 ms

risetime(1)<= 518,962 us 0,5 ms/div.



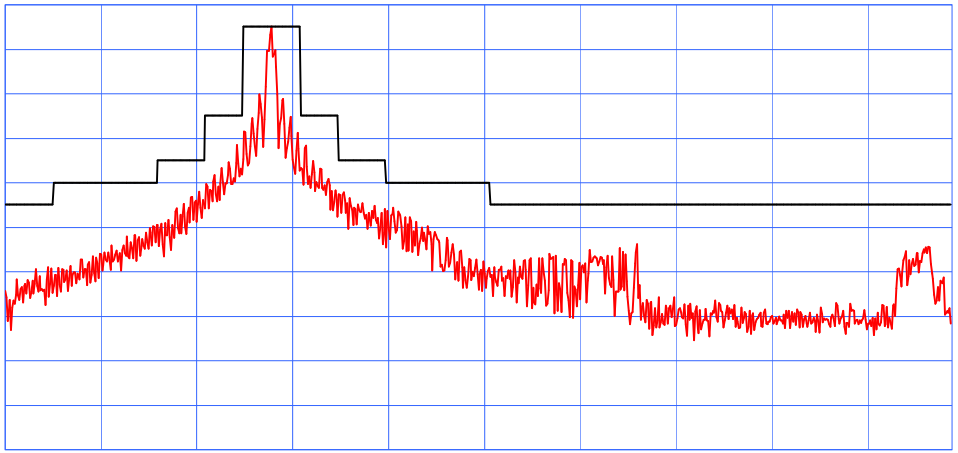
-3,5 ms -1 ms 1,5 ms

falltime(1)<= 59,8801 us 0,5 ms/div.

SPURIOUS EMISSIONS RESULTS
MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
at -20° C, 22° C and 55° C

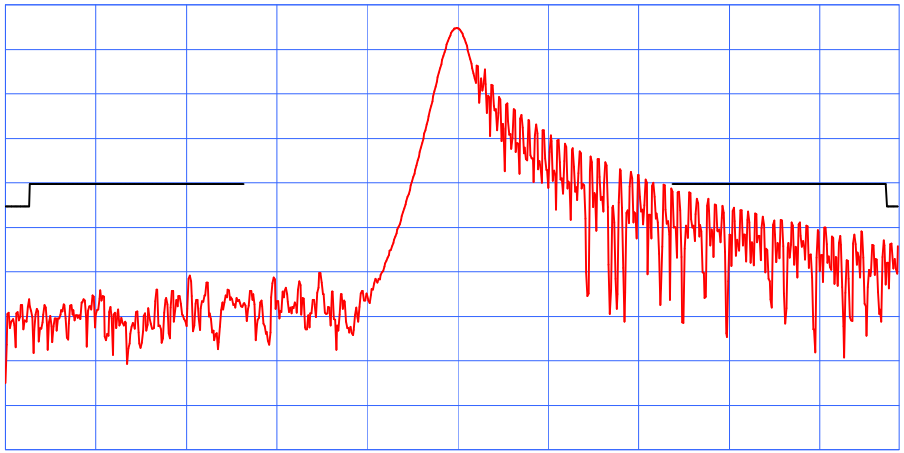
MARTEC
KANNAD AUTO/AUTO GPS
61592 UUT6
Certification nominale
406 MHz
-20 °C

CF : 406,05 MHz SP : 100 KHz



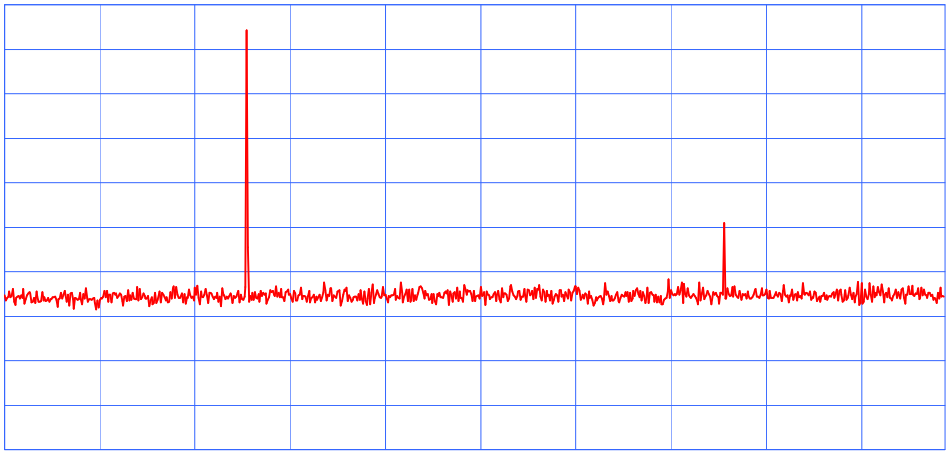
Rb : 0,1 KHz 10 dB/div. St : 30 S

CF : 406,028 MHz SP : 50 KHz



Rb : 1 KHz 10 dB/div. St : 0,305 S

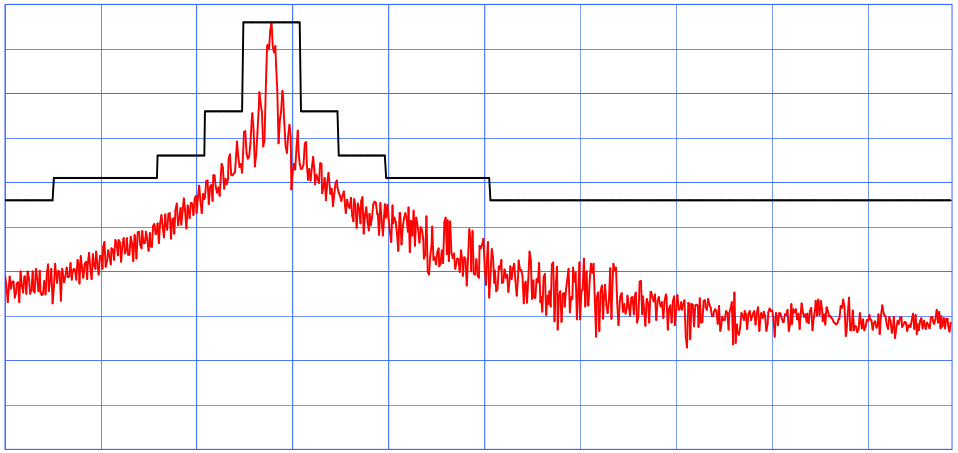
CF : 600 MHz Delta : -43,26 dB SP : 800000 KHz



Rb : 100 KHz 10 dB/div. St : 0,24 S

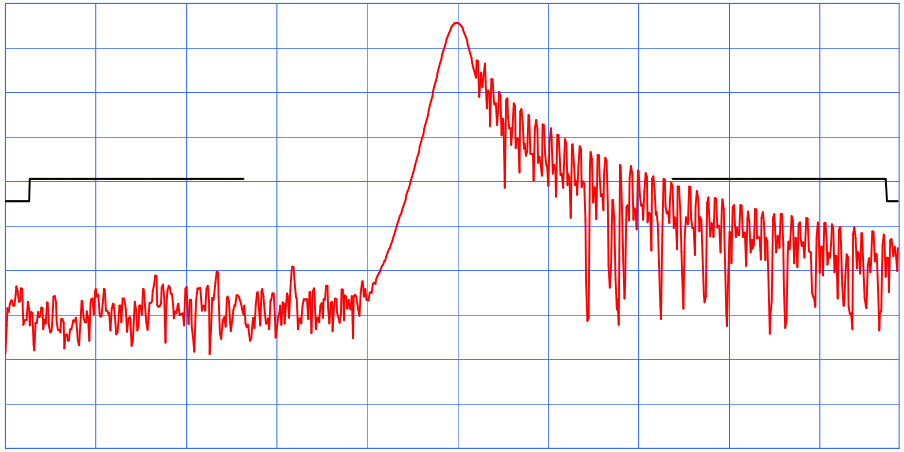
MARTEC
KANNAD AUTO/AUTO GPS
61592 UUT6
Certification nominale
406 MHz
22 °C

CF : 406,05 MHz SP : 100 KHz



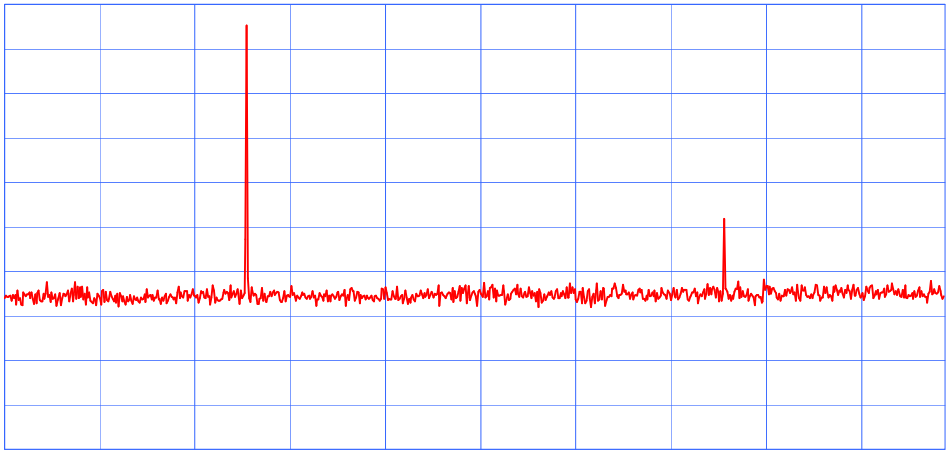
Rb : 0,1 KHz 10 dB/div. St : 30 S

CF : 406,028 MHz SP : 50 KHz



Rb : 1 KHz 10 dB/div. St : 0,305 S

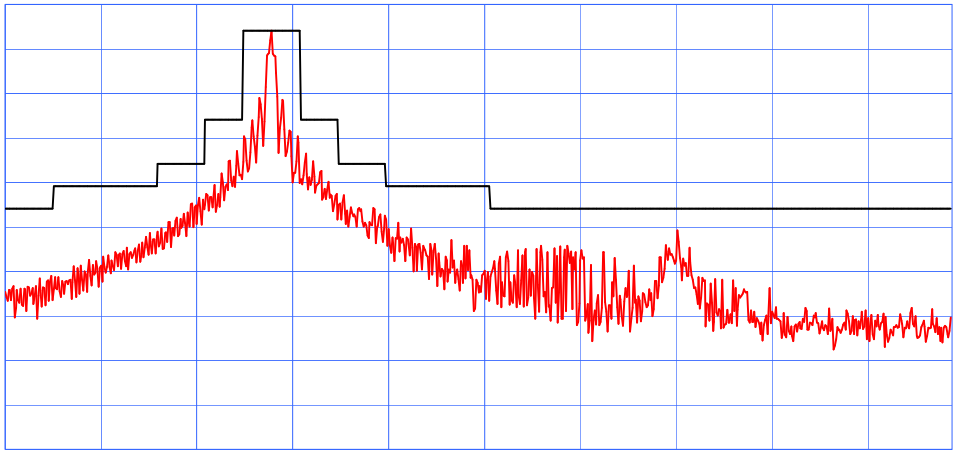
CF : 600 MHz Delta : -43,35 dB SP : 800000 KHz



Rb : 100 KHz 10 dB/div. St : 0,24 S

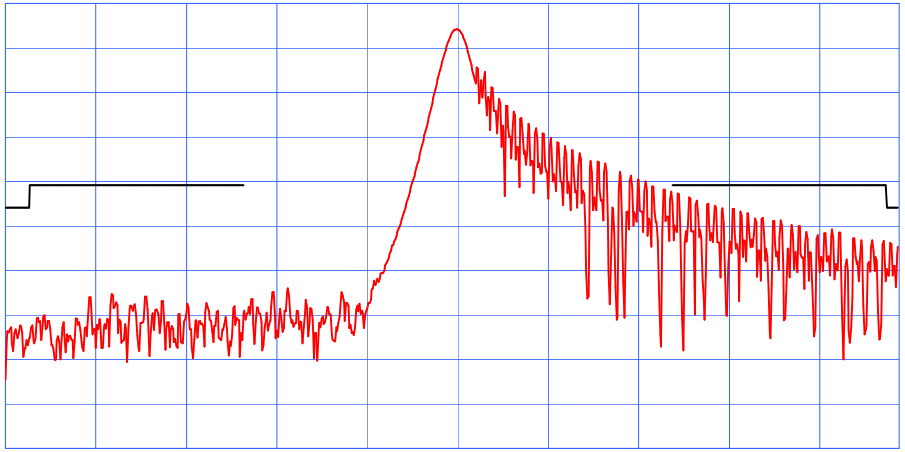
MARTEC
KANNAD AUTO/AUTO GPS
61592 UUT6
Certification nominale
406 MHz
55 °C

CF : 406,05 MHz SP : 100 KHz



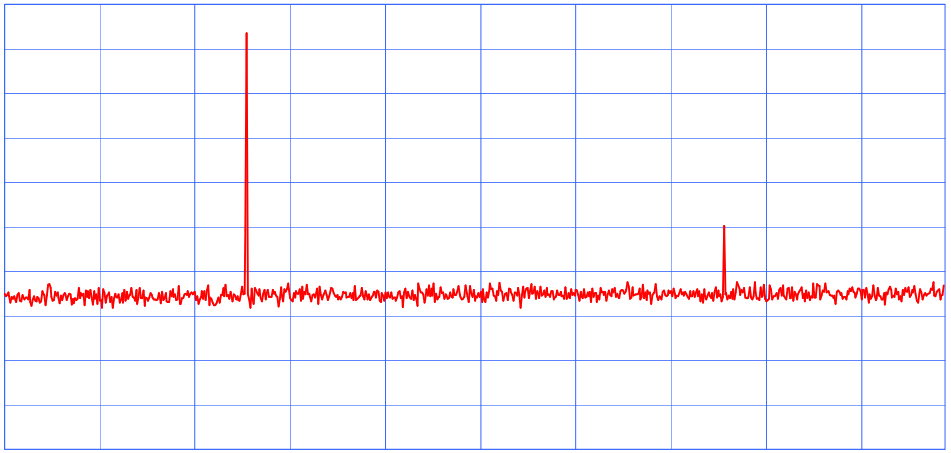
Rb : 0,1 KHz 10 dB/div. St : 30 S

CF : 406,028 MHz SP : 50 KHz



Rb : 1 KHz 10 dB/div. St : 0,305 S

CF : 600 MHz Delta : -43,27 dB SP : 800000 KHz



Rb : 100 KHz 10 dB/div. St : 0,24 S

406 MHz VSWR 3:1 TEST RESULTS ON
MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
at -20° C, 22° C and 55° C

Certification Test VSWR at -20°C Date of test : 16 March 2007

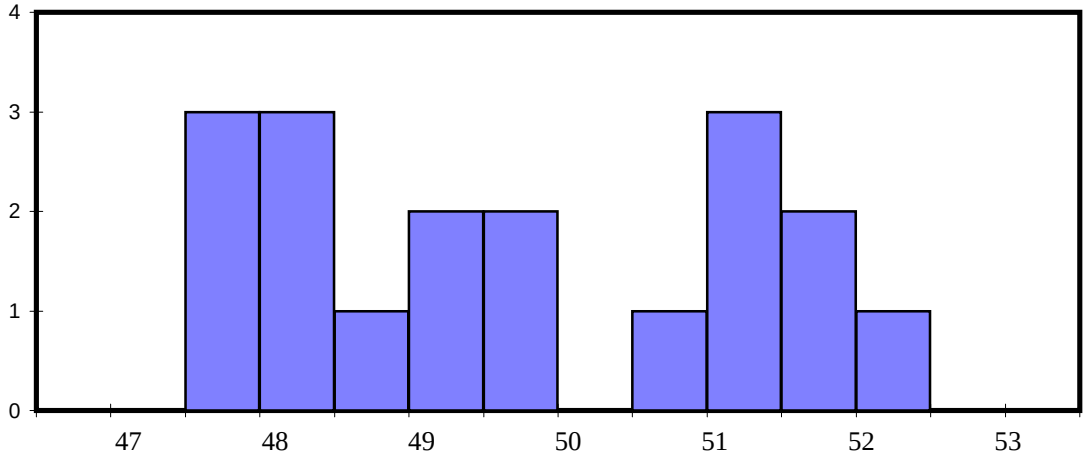
Manufacturer : MARTEC
Beacon Type : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

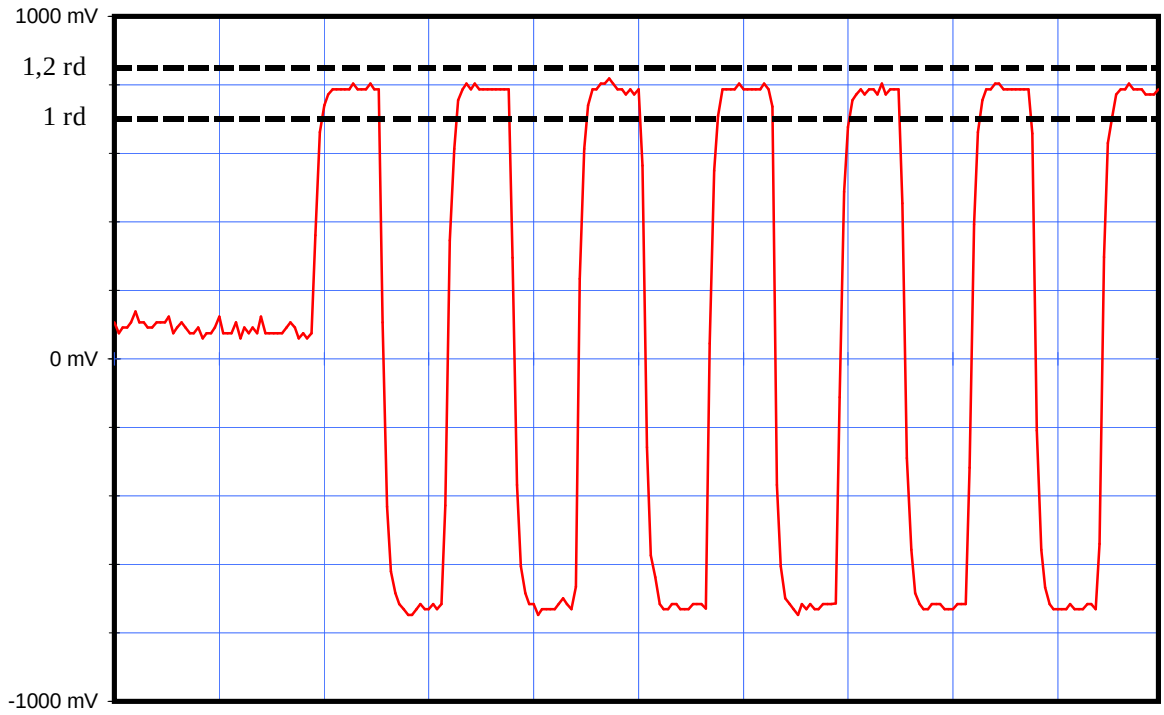
Message

Message received		FFFE2F8E3F3C260AE201775E7D770F2C0836
Format Flag	25	1
Protocol flag	26	0
Ident./Position code	27-85	0
Country Code/Country	27-36	227 / FRANCE
Protocol Code : U/Std-Nat	37-39/37-40	1111
Protocol Code Used	37-39/37-40	Test-National Location
Identification Data	40-85/41-64/41-58	
Identification Used		61592
Calculated BCH1	25-85	1D79F5
Encoded BCH1	86-106	1D79F5
Homing	112	1
Em.cod/nat.use/supp.data	107-112	110111
Encod pos data	111	1 Internal
Fixed Data "1"	108	1
Calculated BCH2	107-132	836
Encoded BCH2	147-144	836
Latitude position		Nord 43° 33' 34"
Longitude position		Est 1° 28' 44"
Delta position		0,076 km

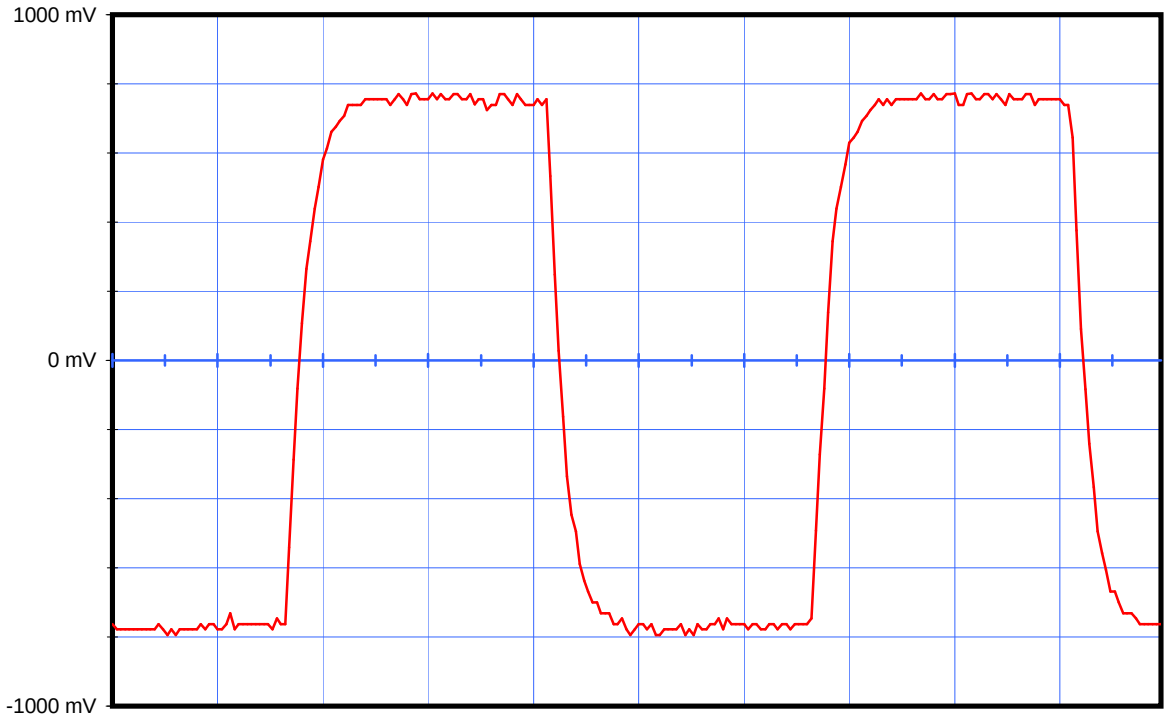
Electrical and other parameters

Rise time Modulation	ms			0,1796
Fall time Modulation	ms			0,1697
Phase deviation :positive	rd	1,00 <	< 1,20	1,13
Phase deviation : negative	rd	-1,20 <	< -1,00	-1,09
Symmetry measurement	%		<=5 %	0,80
Nominal frequency : F2	Hz			406028056,23





Vmarker1 850 mv ==> 1,2 rd 2 ms/div.
Vmarker2 700 mv ==> 1 rd



Duty Cycle : 0,008003976 0,5 ms/div.
falltime(1)<= 169,661 us risetime(1)<= 179,641 us
+width(1) 1,23752 ms -widht(1) 1,25749 ms

Certification Test VSWR at 22°C Date of test : 15 March 2007

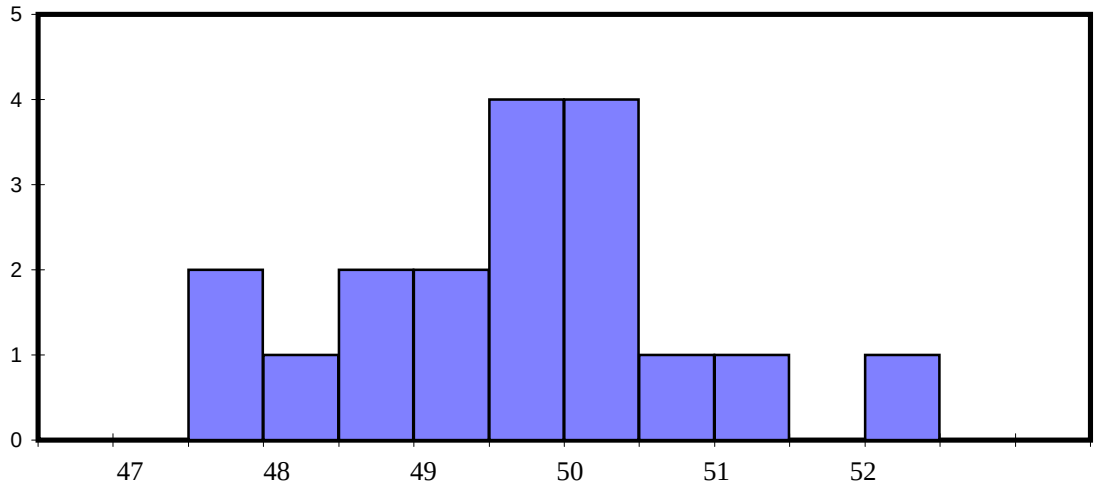
Manufacturer : MARTEC
Beacon Type : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

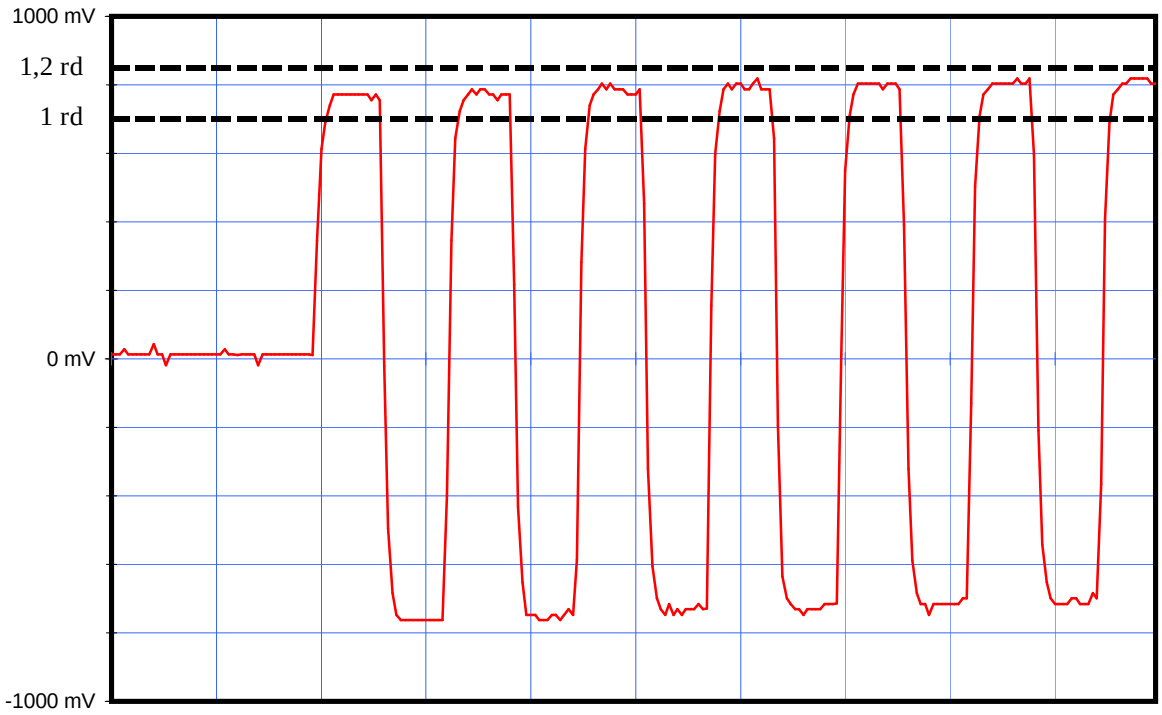
Message

Message received		FFFE2F8E3F2C260AE201775E7D770F2C0836
Format Flag	25	1
Protocol flag	26	0
Ident./Position code	27-85	0
Country Code/Country	27-36	227 / FRANCE
Protocol Code : U/Std-Nat	37-39/37-40	1111
Protocol Code Used	37-39/37-40	Test-National Location
Identification Data	40-85/41-64/41-58	
Identification Used		61592
Calculated BCH1	25-85	1D79F5
Encoded BCH1	86-106	1D79F5
Homing	112	1
Em.cod/nat.use/supp.data	107-112	110111
Encod pos data	111	1 Internal
Fixed Data "1"	108	1
Calculated BCH2	107-132	836
Encoded BCH2	147-144	836
Latitude position		Nord 43° 33' 34"
Longitude position		Est 1° 28' 44"
Delta position		0,076 km

Electrical and other parameters

Rise time Modulation	ms			0,1697
Fall time Modulation	ms			0,1497
Phase deviation :positive	rd	1,00 <	< 1,20	1,12
Phase deviation : negative	rd	-1,20 <	< -1,00	-1,11
Symmetry measurement	%		<=5 %	0,40
Nominal frequency : F2	Hz			406028037,86





Vmarker1 850 mv ==> 1,2 rd 2 ms/div.
Vmarker2 700 mv ==> 1 rd

Duty Cycle : 0,004020072 0,5 ms/div.
falltime(1)<= 149,701 us risetime(1)<= 169,661 us
+width(1) 1,23752 ms -widht(1) 1,24751 ms

Certification Test VSWR at 55°C Date of test : 16 March 2007

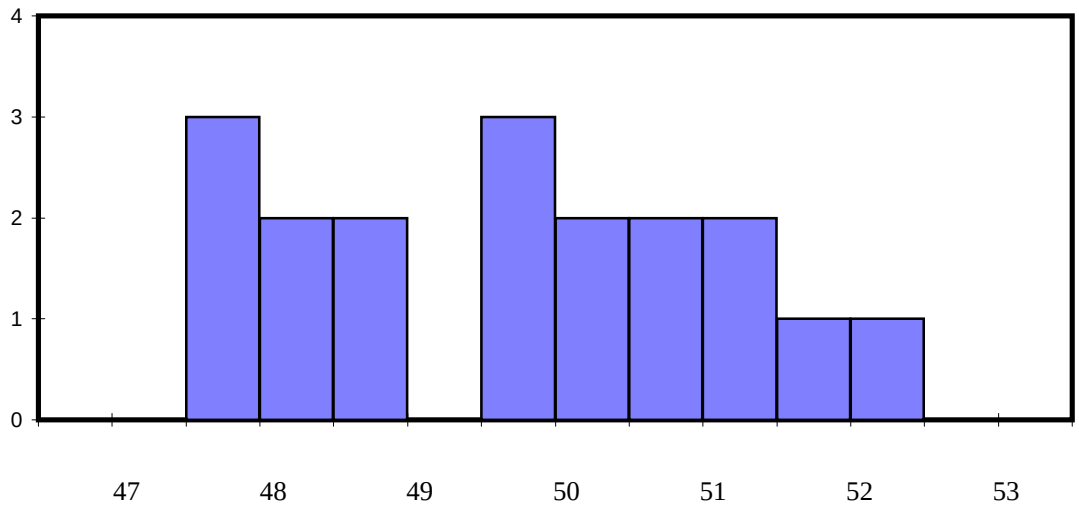
Manufacturer : MARTEC
Beacon Type : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

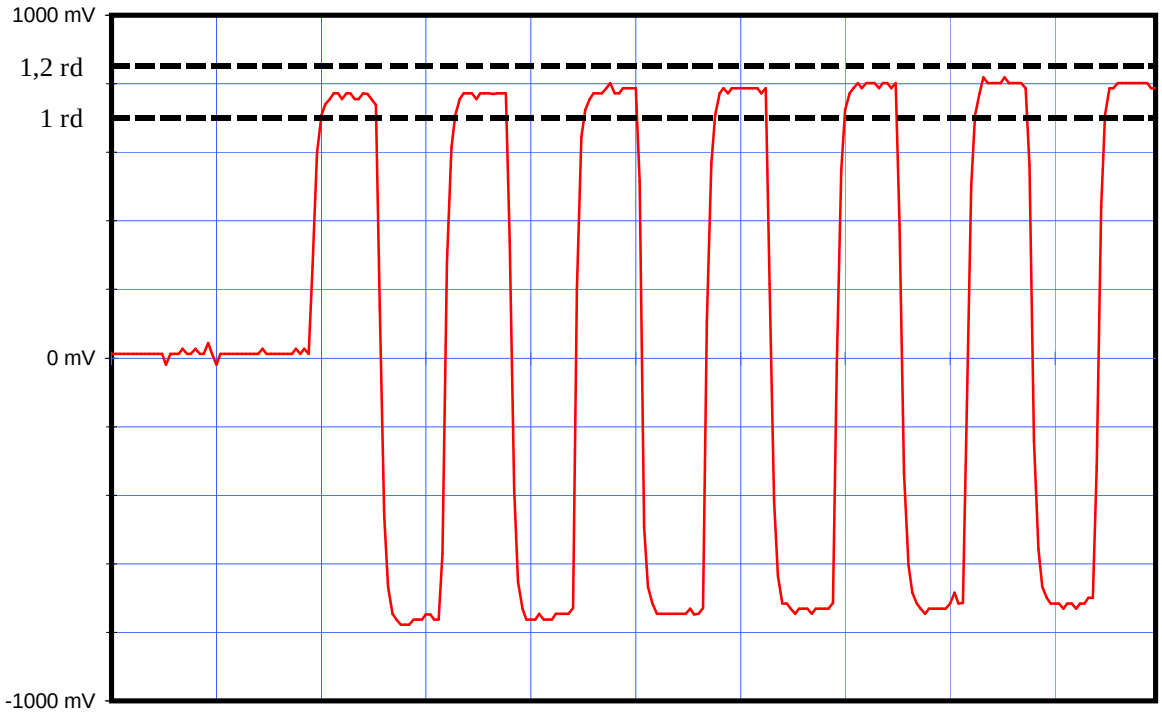
Message

Message received		FFFE2F8E3F2C260AE201775E7D770F2C0836
Format Flag	25	1
Protocol flag	26	0
Ident./Position code	27-85	0
Country Code/Country	27-36	227 / FRANCE
Protocol Code : U/Std-Nat	37-39/37-40	1111
Protocol Code Used	37-39/37-40	Test-National Location
Identification Data	40-85/41-64/41-58	
Identification Used		61592
Calculated BCH1	25-85	1D79F5
Encoded BCH1	86-106	1D79F5
Homing	112	1
Em.cod/nat.use/supp.data	107-112	110111
Encod pos data	111	1 Internal
Fixed Data "1"	108	1
Calculated BCH2	107-132	836
Encoded BCH2	147-144	836
Latitude position		Nord 43° 33' 34"
Longitude position		Est 1° 28' 44"
Delta position		0,076 km

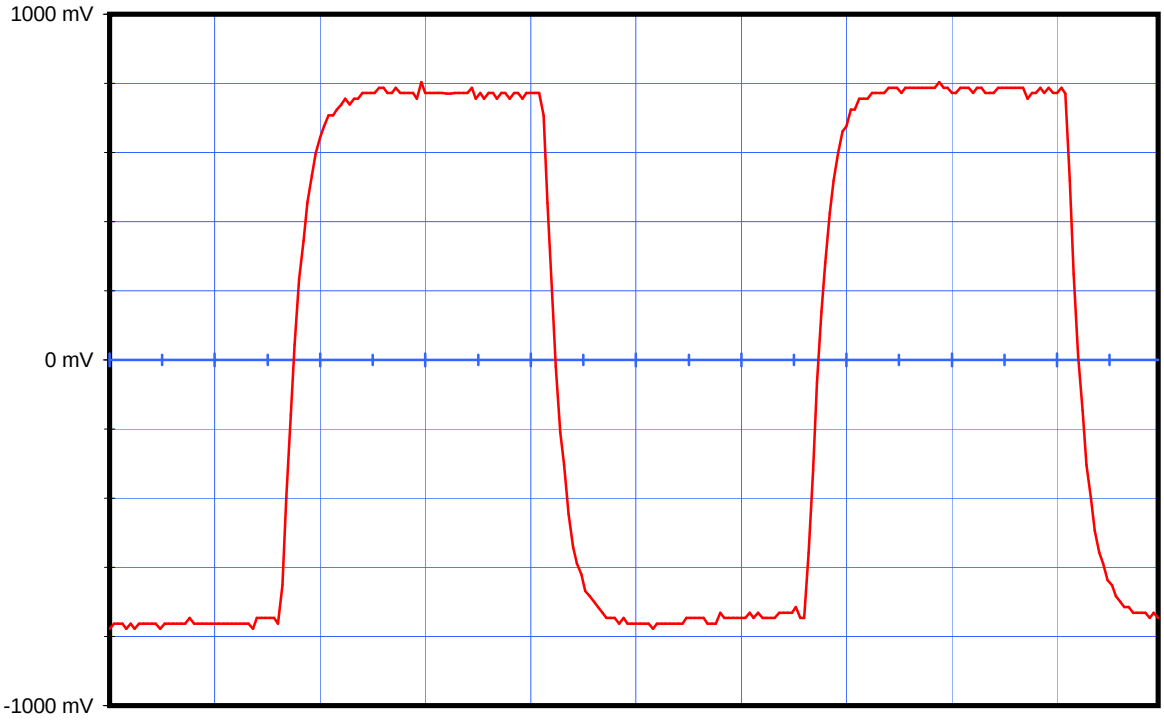
Electrical and other parameters

Rise time Modulation	ms			0,1697
Fall time Modulation	ms			0,1796
Phase deviation :positive	rd	1,00 <	< 1,20	1,11
Phase deviation : negative	rd	-1,20 <	< -1,00	-1,11
Symmetry measurement	%		<=5 %	0,40
Nominal frequency : F2	Hz			406028059,51





Vmarker1 850 mv ==> 1,2 rd 2 ms/div.
Vmarker2 700 mv ==> 1 rd



Duty Cycle : 0,004020072 0,5 ms/div.
falltime(1)<= 179,641 us risetime(1)<= 169,661 us
+width(1) 1,23752 ms -widht(1) 1,24751 ms

SELF-TEST MODE CONTROL ON
MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
at 22° C

Message at -20°C

Manufacturer	MARTEC
Beacon model	KANNAD AUTO/AUTO GPS
Serial number	61592 UUT6
Date of test	14 March 2007
Temperature	-20,2
Message received	FFFED08E3F3C261FC0FF001367779F3C0010
15 Hex ID	1C7E784C3F81FE0
Frame synchro. pattern	011010000

Total transmission time	ms	514.8<	< 525.2	520,30

Message at 22°C

Manufacturer	MARTEC
Beacon model	KANNAD AUTO/AUTO GPS
Serial number	61592 UUT6
Date of test	14 March 2007
Temperature	23,6
Message received	FFFED08E3F3C261FC0FF001367779F3C0010
15 Hex ID	1C7E784C3F81FE0
Frame synchro. pattern	011010000

Total transmission time	ms	514.8<	<525.2	520,06

Message at 55 °C

Manufacturer	MARTEC
Beacon model	KANNAD AUTO/AUTO GPS
Serial number	61592 UUT6
Date of test	15 March 2007
Temperature	54,7
Message received	FFFED08E3F3C261FC0FF001367779F3C0010
15 Hex ID	1C7E784C3F81FE0
Frame synchro. pattern	011010000

Total transmission time	ms	514.8<	<525.2	519,75

Sarsat decode of MARTEC UUT6 Beacon Self Test message

ITEM	BITS	VALUE
Message format: long format	**25**	**1**
Protocol: Location Protocol	**26**	**0**
Country code: 227	**27-36**	**0011100011**
Type of location protocol: National Location - Test	**37-40**	**1111**
Serial Number: 61592	**41-58**	**001111000010011000**
Latitude Flag: default	**59**	**0**
Latitude (Degrees): default	**60-66**	**1111111**
Latitude (Minutes): default	**67-71**	**00000**
Longitude Flag: default	**72**	**0**
Longitude (Degrees): default	**73-80**	**11111111**
Longitude (Minutes): default	**81-85**	**00000**
BCH 1 Encoded:	**86-106**	**00000010011011001101**
BCH 1 Calculated:	**86-106**	**00000010011011001101**
Fixed bits (110): Pass	**107-109**	**110**
Bits 113 - 132 provides offset data location	**110**	**1**
Position Data: Encoded Position Data Source From Internal Navigation Device	**111**	**1**
Aux Loc. Device: 121.5 MHz homer	**112**	**1**
Latitude Offset Sign: default	**113**	**1**
Latitude Offset Minutes: default	**114-115**	**00**
Latitude Offset Seconds: default	**116-119**	**1111**
Longitude Offset Sign: default	**120**	**1**
Longitude Offset Minutes: default	**121-122**	**00**
Longitude Offset Seconds: default	**123-126**	**1111**
Additional Id (Nat Use)	**127-132**	**000000**
BCH 2 Encoded:	**133-144**	**000000010000**
BCH 2 Calculated:	**N/A**	**000000010000**
Composite Latitude: default	**N/A**	**Composite Longitude: default**
15 Hex ID:	**N/A**	**1C7E784C3F81FE0**

THERMAL SHOCK TEST RESULT ON
MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
-31,5°C to -0,8°C

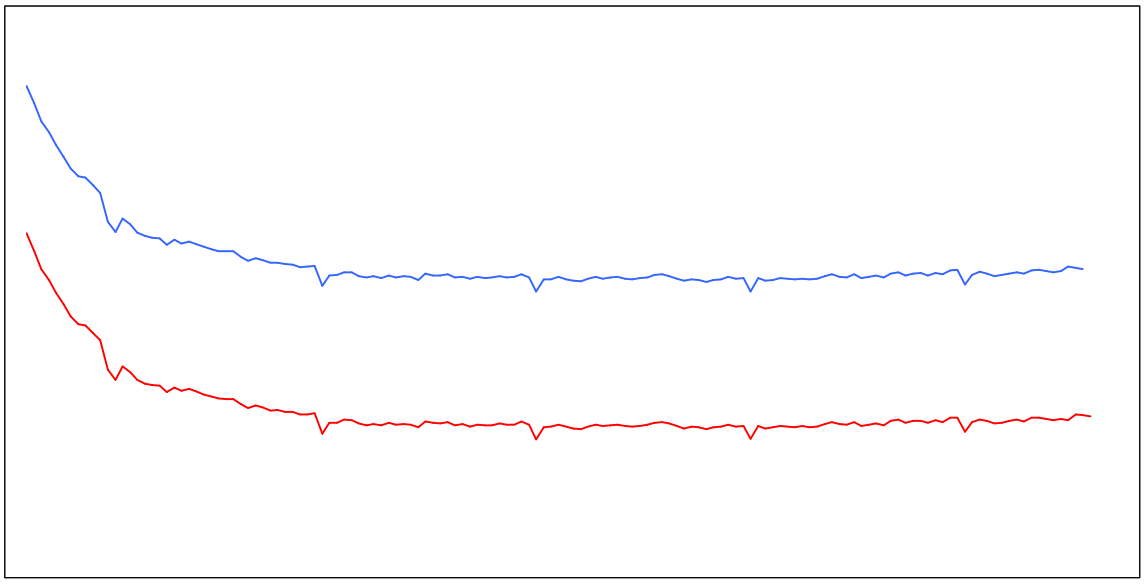
Temperature Soak : -31,5°C
Temperature Measure : -0,8°C

Warm Up	Δ Frequency (Hz)	Temp. (°C)	P406 (dBm)	P121.5 (dBm)
1	49904,86	-31,6	37,4	19,1
2	49894,59	-1,6	37,4	19,2
3	49886,87	-1,4	37,4	19,3
4	49879,46	-1,2	37,3	19,3
5	49874,88	-0,9	37,4	19,3
6	49869,53	-0,8	37,4	19,3
7	49863,93	-0,7	37,5	19,3
8	49858,25	-0,7	37,5	19,3
9	49852,54	-0,8	37,6	19,3
10	49849,15	-0,6	37,6	19,3
11	49847,90	-0,6	37,6	19,3
12	49846,94	-0,7	37,6	19,3
13	49845,89	-0,5	37,6	19,3
14	49844,94	-0,6	37,6	19,3
15	49844,13	-0,6	37,6	19,3
16	49843,48	-0,6	37,5	19,3
17	49842,63	-0,6	37,5	19,2
18	49842,05	-0,6	37,5	19,3

Bursts after Warm Up	Temp.	Slope	Sigma	P406	Short term	P121.5
1	-0,6	-8,7E-9	1,6E-8	37,5	9,1E-11	19,4
18	-0,5	-7,1E-10	7,2E-10	37,5	7,8E-11	19,4
31	-0,5	-1,5E-10	2,2E-10	37,5	1,1E-10	19,3
61	-0,5	-1,2E-11	1,2E-10	37,4	1,1E-10	19,3
91	-0,5	9,6E-12	1,2E-10	37,4	9,4E-11	19,2
121	-0,4	2,5E-11	9,6E-11	37,4	5,9E-11	19,2

Frequency variation

406027841,6



406027836,6

Initial tracing Smoothed tracing

Beacon message during the Thermal Shock Test :
FFFE2F8E3F2C260AE201775E7D770F2C0836

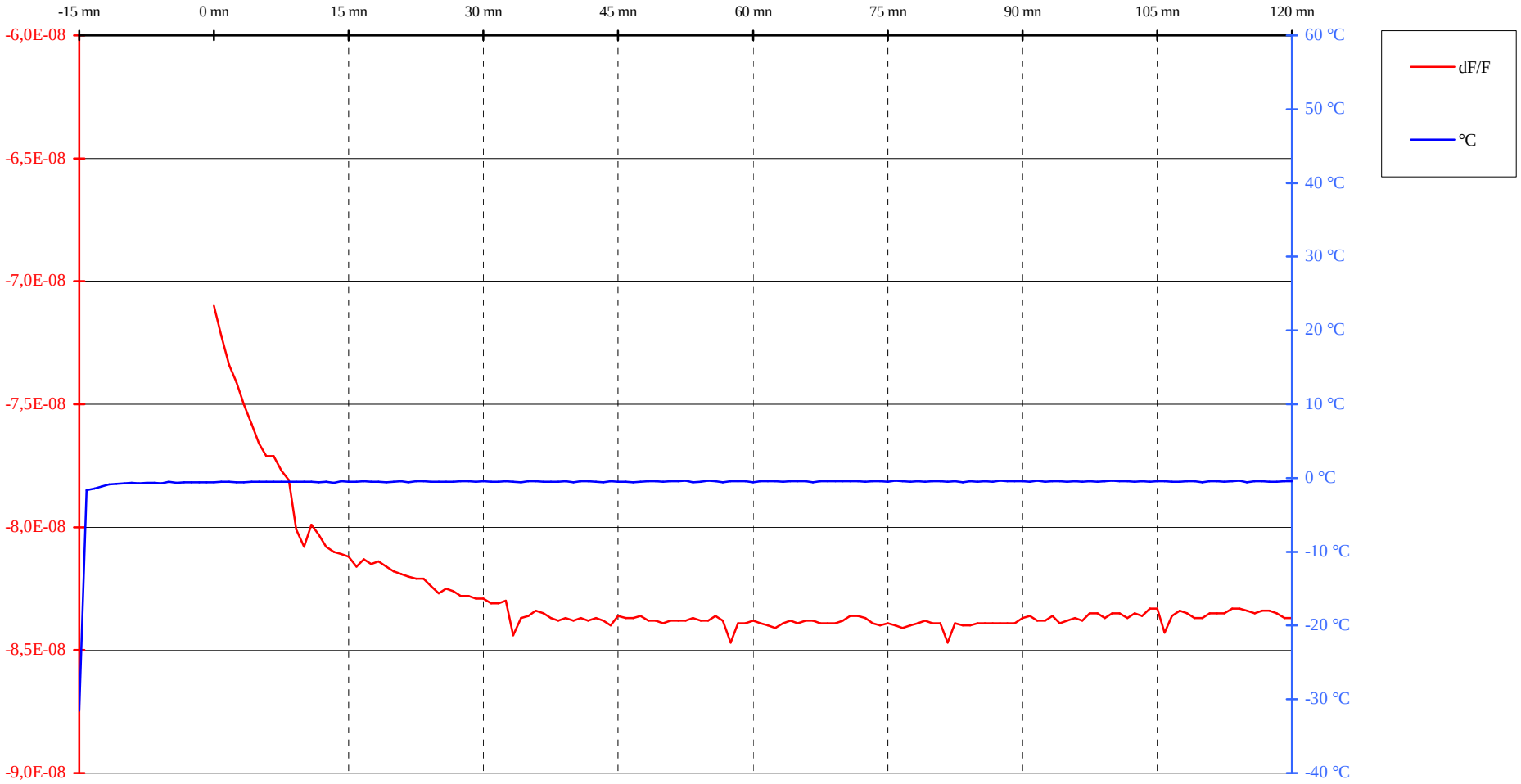
ITEM	BITS	VALUE
Message format: long format	**25**	**1**
Protocol: Location Protocol	**26**	**0**
Country code: 227	**27-36**	**0011100011**
Type of location protocol: National Location - Test	**37-40**	**1111**
Serial Number: 45208	**41-58**	**001011000010011000**
Latitude Flag: North	**59**	**0**
Latitude (Degrees): 43	**60-66**	**0101011**
Latitude (Minutes): 34	**67-71**	**10001**
Longitude Flag: East	**72**	**0**
Longitude (Degrees): 1	**73-80**	**00000001**
Longitude (Minutes): 28	**81-85**	**01110**
BCH 1 Encoded:	**86-106**	**11101011110011111010 1**
BCH 1 Calculated:	**86-106**	**00110000001110101011**
Fixed bits (110): Pass	**107-109**	**110**
Bits 113 - 132 provides offset data location	**110**	**1**
Position Data: Encoded Position Data Source From Internal Navigation Device	**111**	**1**
Aux Loc. Device: 121.5 MHz homer	**112**	**1**
Latitude Offset Sign: -	**113**	**0**
Latitude Offset Minutes: 0	**114-115**	**00**
Latitude Offset Seconds: 28	**116-119**	**0111**
Longitude Offset Sign: +	**120**	**1**
Longitude Offset Minutes: 0	**121-122**	**00**
Longitude Offset Seconds: 44	**123-126**	**1011**
Additional Id (Nat Use)	**127-132**	**000000**
BCH 2 Encoded:	**133-144**	**100000110110**
BCH 2 Calculated:	**N/A**	**100000110110**
Composite Latitude: 43.558888888888894 Degrees North	**N/A**	**Composite Longitude: 1.478888888888889 Degrees East**
15 Hex ID:	**N/A**	**1C7E584C3F81FE0**

THERMAL SHOCK TEST / 30 °C change (-31,5 °C to -0,8 ° C)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 14:09:43

FREQUENCY VARIATION

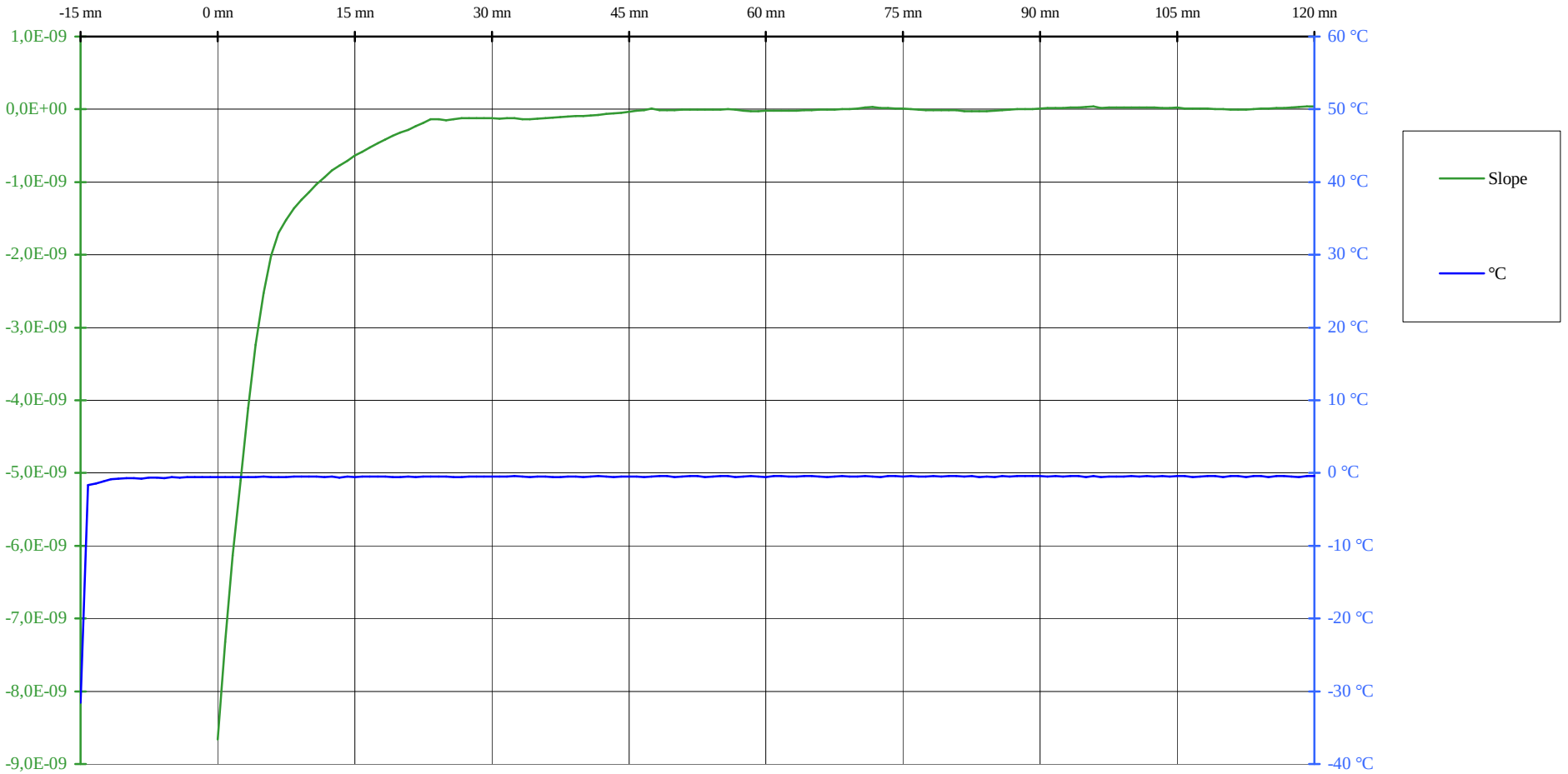


THERMAL SHOCK TEST / 30 °C change (-31,5 °C to -0,8 ° C)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 14:09:43

MEDIUM TERM STABILITY : MEAN SLOPE /mn (-1,0E-9 to 1,0E-9)

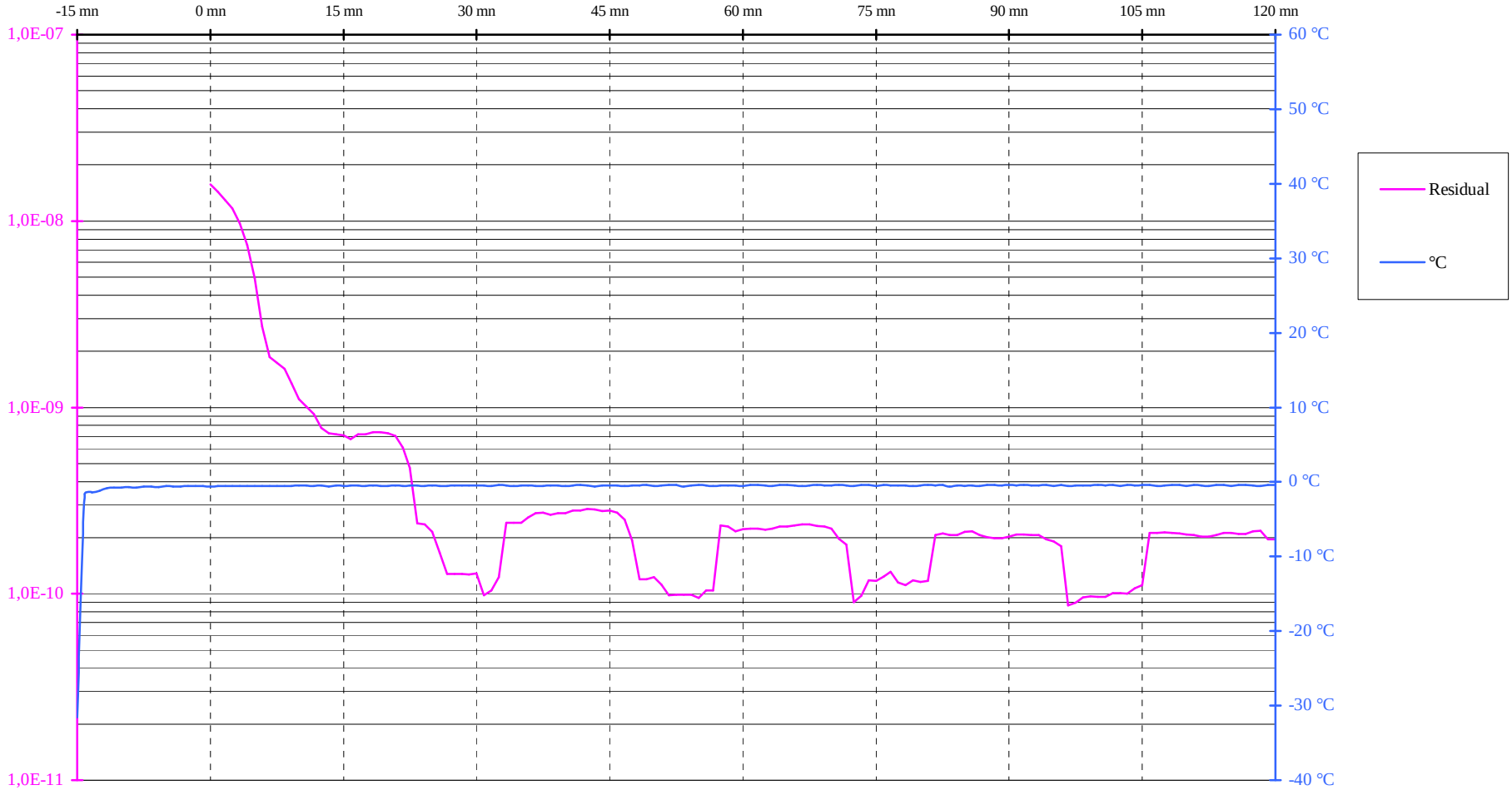


THERMAL SHOCK TEST / 30 °C change (-31,5 °C to -0,8 ° C)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 14:09:43

MEDIUM TERM STABILITY : RESIDUAL (≤ 3,0E-9)

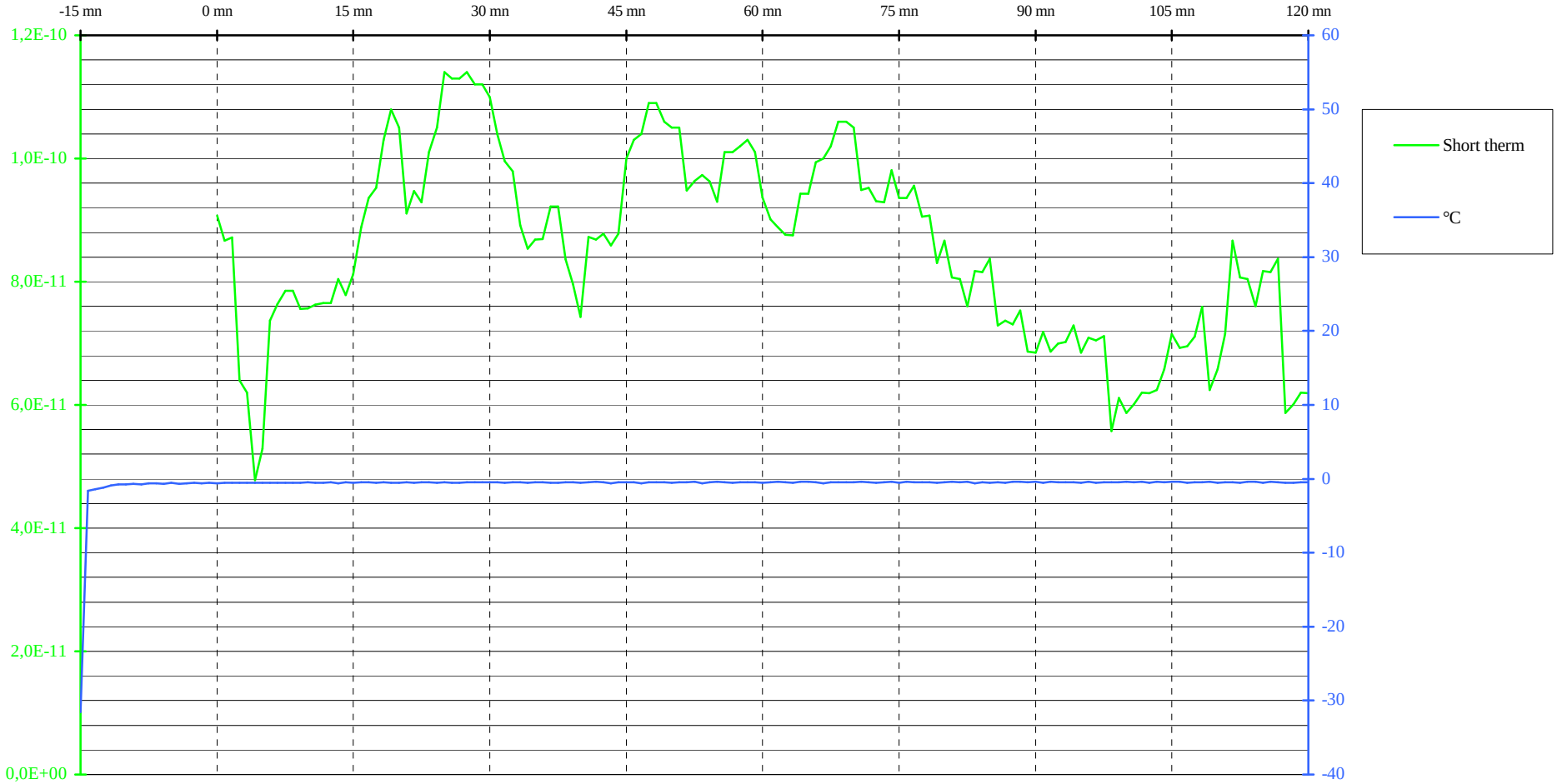


THERMAL SHOCK TEST / 30 °C change (-31,5 °C to -0,8 ° C)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 14:09:43

SHORT TERM STABILITY /100 mS (≤ 2,0E-9)

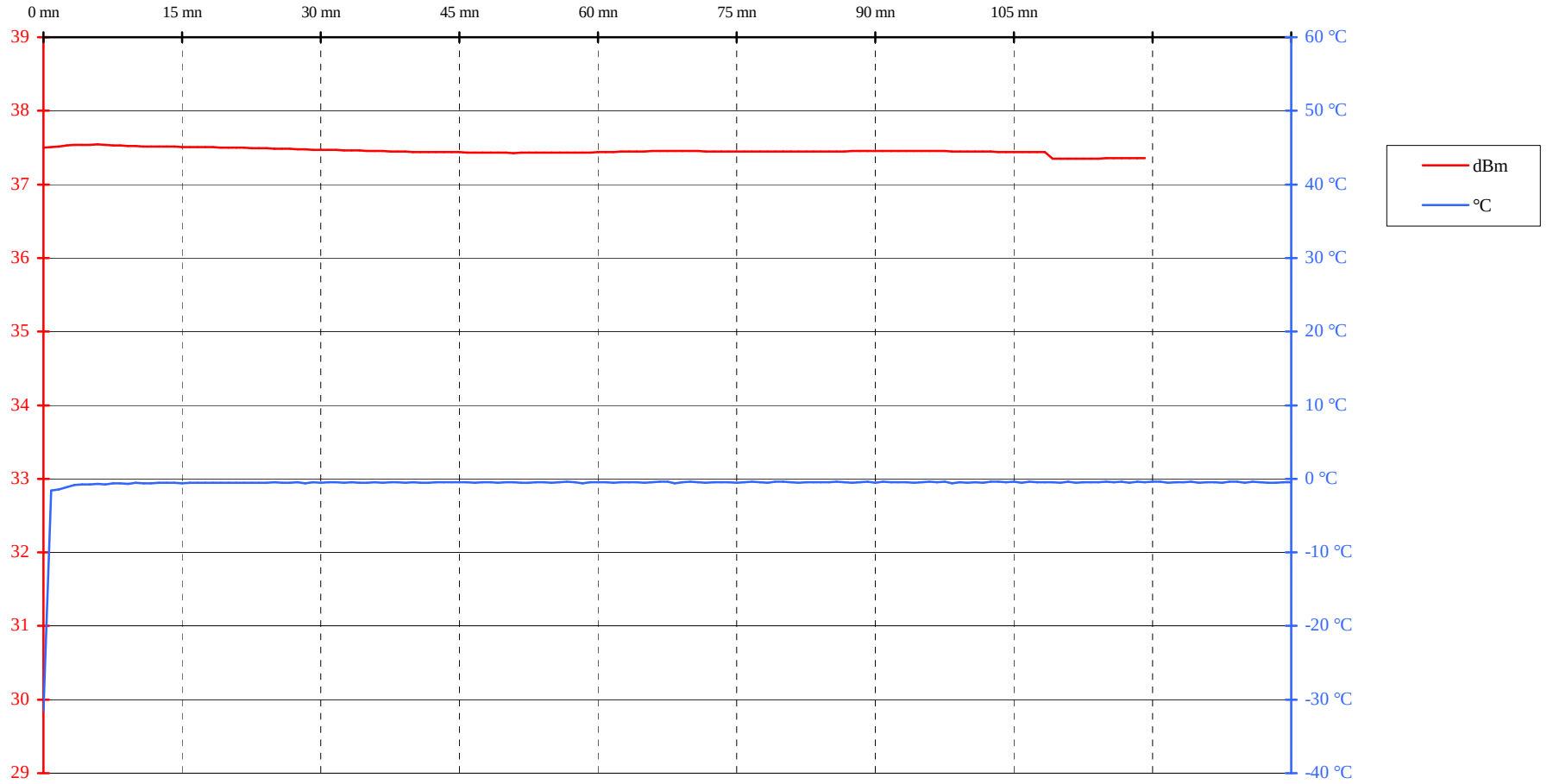


THERMAL SHOCK TEST / 30 °C change (-31,5 °C to -0,8 ° C)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 14:09:43

OUTPUT POWER (35 to 39 dBm)



OPERATING LIFE TEST RESULTS ON
MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
-20 °C

Note : Prior to the Operating Life Test and following manufacturer "Batteries Discharge Calculation " (Annex A) the battery pack capacity has been reduced by test laboratory during **22,42 hours**

The operating lifetime obtained is 78 hours

Warm Up	Δ Frequency (Hz)	Temp. (°C)	P406 (dBm)	P121.5 (dBm)
1	49885,62	-21,3	36,7	19,1
2	49883,13	-21,3	36,7	19,3
3	49880,44	-21,3	36,7	19,3
4	49877,61	-21,2	36,7	19,3
5	49874,86	-21,3	36,7	19,3
6	49871,89	-21,2	36,7	19,3
7	49868,78	-21,2	36,7	19,3
8	49865,32	-21,2	36,7	19,3
9	49861,82	-21,2	36,7	19,3
10	49858,66	-21,2	36,7	19,2
11	49856,79	-21,3	36,7	19,3
12	49855,94	-21,2	36,7	19,2
13	49855,36	-21,2	36,7	19,3
14	49854,87	-21,2	36,7	19,3
15	49854,61	-21,3	36,7	19,3
16	49854,37	-21,2	36,7	19,3
17	49854,21	-21,3	36,7	19,3
18	49854,21	-21,2	36,7	19,3

No	Temp.	Slope	Sigma	P406	Short term	P121.5
1	-21,2	-5,6E-10	1,9E-09	36,7	8,1E-11	19,3
18	-21,3	-5,9E-12	5,4E-10	36,7	7,3E-11	19,2
31	-21,3	-4,1E-11	5,5E-10	36,7	9,1E-11	19,2
61	-21,3	-5,1E-11	5,5E-10	36,7	7,1E-11	19,2
91	-21,3	-5,2E-11	5,6E-10	36,7	6,3E-11	19,2
121	-21,3	-7,8E-11	4,5E-10	36,7	6,9E-11	19,2
151	-21,3	-5,3E-11	4,3E-10	36,7	9,2E-11	19,2
181	-21,3	-1,1E-10	4,8E-10	36,7	9,6E-11	19,2
211	-21,3	-1,8E-10	8,7E-10	36,7	8,9E-11	19,1
241	-21,4	-1,5E-10	1,1E-09	36,7	6,3E-11	0,0
271	-21,4	5,7E-11	5,0E-10	36,7	6,0E-11	19,1
301	-21,4	3,5E-11	4,9E-10	36,7	7,3E-11	19,1
331	-21,4	4,3E-11	4,1E-10	36,7	9,2E-11	19,1
361	-21,4	6,1E-11	4,1E-10	36,7	8,9E-11	19,1
391	-21,3	3,8E-11	4,1E-10	36,7	7,4E-11	19,0
421	-21,3	3,3E-11	1,5E-10	36,7	9,4E-11	19,0
451	-21,4	4,8E-11	1,7E-10	36,7	8,6E-11	19,1
481	-21,4	2,8E-11	1,2E-10	36,7	7,6E-11	19,1
511	-21,3	1,2E-10	1,7E-10	36,7	1,2E-10	19,1
541	-21,3	1,1E-10	9,4E-11	36,7	8,3E-11	19,1
571	-21,3	1,6E-11	4,5E-10	36,7	6,4E-11	19,1
601	-21,3	-4,9E-11	7,4E-10	36,7	8,6E-11	19,1
631	-21,4	-3,2E-11	4,8E-10	36,7	7,5E-11	19,1
661	-21,4	-1,5E-10	8,1E-10	36,6	7,0E-11	19,1
691	-21,3	-7,9E-11	6,6E-10	36,7	6,8E-11	19,1
721	-21,3	-9,2E-11	7,2E-10	36,7	9,2E-11	19,1
751	-21,4	-1,8E-10	1,1E-09	36,7	9,7E-11	0,0
781	-21,4	-1,9E-11	1,1E-09	36,7	8,0E-11	19,1
811	-21,3	4,2E-11	4,9E-10	36,6	9,3E-11	19,1
841	-21,3	5,8E-11	4,4E-10	36,7	9,6E-11	19,0

No	Temp.	Slope	Sigma	P406	Short term	P121.5	
871	-21,3	6,4E-11	3,8E-10	36,6	7,2E-11	19,1	
901	-21,3	3,5E-12	1,4E-10	36,7	7,0E-11	19,0	
931	-21,4	3,3E-11	1,4E-10	36,6	6,2E-11	19,1	
961	-21,3	2,7E-11	1,2E-10	36,7	9,3E-11	19,1	
991	-21,4	4,9E-11	8,2E-11	36,6	5,4E-11	19,1	
1021	-21,4	1,9E-11	1,0E-10	36,6	7,1E-11	19,1	
1051	-21,3	1,4E-10	1,2E-10	36,7	8,9E-11	19,1	
1081	-21,3	-2,4E-11	5,2E-10	36,6	7,6E-11	19,1	
1111	-21,4	-5,0E-11	4,0E-10	36,7	7,9E-11	19,1	
1141	-21,3	-6,2E-11	4,8E-10	36,6	7,6E-11	19,1	
1171	-21,4	-2,7E-11	4,6E-10	36,7	7,3E-11	19,1	
1201	-21,3	-4,3E-11	4,8E-10	36,7	7,1E-11	19,1	
1231	-21,3	-2,1E-10	8,3E-10	36,7	9,7E-11	19,1	
1261	-21,3	-6,2E-11	1,0E-09	36,7	9,2E-11	19,1	
1291	-21,4	3,3E-11	3,7E-10	36,6	7,5E-11	19,1	
1321	-21,4	1,4E-11	8,4E-10	36,7	8,5E-11	19,1	
1351	-21,3	3,7E-11	4,1E-10	36,7	6,2E-11	19,1	
1381	-21,3	7,5E-11	5,4E-10	36,7	7,3E-11	19,1	
1411	-21,4	7,7E-11	3,4E-10	36,7	4,5E-11	19,1	
1441	-21,3	6,0E-11	4,5E-10	36,7	5,5E-11	19,1	
1471	-21,3	3,0E-11	1,2E-10	36,7	7,0E-11	19,1	
1501	-21,2	4,6E-11	1,3E-10	36,7	8,7E-11	19,1	
1531	-21,3	9,1E-12	1,1E-10	36,7	8,3E-11	19,1	
1561	-21,3	1,5E-10	1,5E-10	36,7	9,3E-11	19,1	
1591	-21,3	6,3E-11	1,9E-10	36,7	6,4E-11	19,1	
1621	-21,3	5,9E-12	5,1E-10	36,7	5,8E-11	19,1	
1651	-21,3	-3,9E-12	7,3E-10	36,7	6,3E-11	19,0	
1681	-21,3	1,5E-11	5,3E-10	36,7	5,1E-11	19,1	
1711	-21,3	-4,0E-11	5,0E-10	36,7	1,0E-10	19,1	
1741	-21,2	-2,2E-11	4,8E-10	36,7	1,0E-10	19,1	24h
1771	-21,2	-3,0E-11	5,0E-10	36,7	7,8E-11	19,1	
1801	-21,3	-3,4E-12	5,0E-10	36,7	5,3E-11	19,1	
1831	-21,3	4,1E-12	4,4E-10	36,7	9,3E-11	19,0	
1861	-21,2	-1,7E-12	7,7E-10	36,7	7,5E-11	19,1	
1891	-21,2	-7,8E-13	9,9E-10	36,7	6,8E-11	19,1	
1921	-21,2	8,3E-11	3,9E-10	36,7	8,5E-11	19,1	
1951	-21,2	1,5E-10	4,9E-10	36,7	1,4E-10	19,1	
1981	-21,2	6,6E-11	1,0E-10	36,7	5,8E-11	19,1	
2011	-21,3	7,0E-11	1,7E-10	36,7	9,4E-11	19,1	
2041	-21,2	4,0E-11	1,2E-10	36,7	8,4E-11	19,0	
2071	-21,2	3,1E-11	1,1E-10	36,7	7,4E-11	19,1	
2101	-21,2	-3,7E-11	4,2E-10	36,7	7,7E-11	19,1	
2131	-21,3	-9,3E-12	4,7E-10	36,7	9,4E-11	19,1	
2161	-21,3	-4,2E-11	4,3E-10	36,7	8,7E-11	19,1	
2191	-21,3	-4,0E-11	4,7E-10	36,7	7,8E-11	19,1	
2221	-21,2	-2,6E-10	1,0E-09	36,7	7,7E-11	19,1	
2251	-21,3	-5,0E-11	6,5E-10	36,7	8,3E-11	19,1	
2281	-21,2	-1,3E-11	4,9E-10	36,7	1,0E-10	19,0	
2311	-21,2	2,2E-11	4,8E-10	36,7	7,4E-11	19,1	
2341	-21,2	4,8E-11	4,7E-10	36,7	9,7E-11	19,1	
2371	-21,2	-8,5E-11	1,3E-09	36,7	8,1E-11	19,1	

No	Temp.	Slope	Sigma	P406	Short term	P121.5	
2401	-21,2	-8,8E-12	1,1E-09	36,7	7,4E-11	19,0	
2431	-21,2	5,9E-11	9,7E-10	36,7	6,4E-11	19,1	
2461	-21,2	9,1E-11	3,9E-10	36,7	6,9E-11	19,1	
2491	-21,2	1,7E-10	3,7E-10	36,7	8,8E-11	19,1	
2521	-21,3	2,1E-10	4,3E-10	36,7	8,6E-11	19,1	
2551	-21,2	5,3E-11	1,0E-10	36,7	8,4E-11	19,1	
2581	-21,2	3,7E-11	1,8E-10	36,7	5,6E-11	19,1	
2611	-21,3	1,3E-11	1,4E-10	36,7	6,0E-11	19,1	
2641	-21,2	1,6E-11	2,0E-10	36,7	1,0E-10	19,1	
2671	-21,3	-8,5E-12	4,6E-10	36,7	8,6E-11	19,1	
2701	-21,3	-7,8E-12	3,4E-10	36,7	1,1E-10	19,1	
2731	-21,2	-4,5E-11	4,0E-10	36,7	7,3E-11	19,0	
2761	-21,2	-2,1E-10	8,7E-10	36,7	1,1E-10	19,1	
2791	-21,3	4,5E-11	4,2E-10	36,7	7,1E-11	19,1	
2821	-21,3	-1,0E-11	4,6E-10	36,7	8,6E-11	19,1	
2851	-21,2	4,6E-12	4,3E-10	36,7	1,0E-10	19,1	
2881	-21,2	-9,5E-12	4,7E-10	36,7	8,2E-11	19,1	
2911	-21,3	3,3E-11	4,7E-10	36,7	1,1E-10	19,1	
2941	-21,3	3,7E-11	3,9E-10	36,7	1,0E-10	19,1	
2971	-21,2	5,5E-11	3,7E-10	36,7	6,8E-11	19,1	
3001	-21,3	3,2E-11	4,2E-10	36,7	8,2E-11	19,1	
3031	-21,3	-1,2E-11	1,7E-10	36,7	6,8E-11	19,1	
3061	-21,3	5,1E-11	1,1E-10	36,7	6,6E-11	19,1	
3091	-21,2	5,8E-11	9,5E-11	36,7	6,7E-11	19,1	
3121	-21,2	1,7E-11	1,2E-10	36,7	7,7E-11	19,1	
3151	-21,3	2,9E-11	1,5E-10	36,7	7,0E-11	19,1	
3181	-21,2	3,1E-11	1,4E-10	36,7	1,0E-10	19,1	
3211	-21,2	3,2E-12	4,8E-10	36,7	6,5E-11	19,1	
3241	-21,2	-7,2E-12	4,7E-10	36,7	7,0E-11	19,1	
3271	-21,2	-4,2E-11	4,7E-10	36,7	8,5E-11	19,1	
3301	-21,2	-3,0E-11	4,8E-10	36,7	9,6E-11	0,0	
3331	-21,3	-5,1E-11	4,6E-10	36,7	8,4E-11	19,1	
3361	-21,2	-1,7E-11	4,4E-10	36,7	8,5E-11	19,1	
3391	-21,2	-1,1E-10	8,2E-10	36,7	7,9E-11	19,1	
3421	-21,2	2,2E-11	4,8E-10	36,7	6,7E-11	19,1	
3451	-21,2	-2,5E-11	6,8E-10	36,7	9,9E-11	19,1	48h
3481	-21,2	-9,5E-11	1,2E-09	36,7	8,6E-11	19,1	
3511	-21,2	7,3E-11	4,0E-10	36,7	7,9E-11	19,1	
3541	-21,2	1,4E-10	4,5E-10	36,7	8,7E-11	19,1	
3571	-21,3	4,8E-11	1,6E-10	36,7	7,9E-11	19,1	
3601	-21,2	2,6E-11	1,5E-10	36,7	7,1E-11	19,1	
3631	-21,2	3,6E-11	1,4E-10	36,7	8,5E-11	19,0	
3661	-21,2	1,6E-10	1,5E-10	36,7	7,7E-11	19,1	
3691	-21,2	1,5E-10	1,5E-10	36,7	7,0E-11	19,1	
3721	-21,2	5,3E-11	1,4E-10	36,7	7,7E-11	19,0	
3751	-21,2	-1,4E-11	4,1E-10	36,7	7,2E-11	19,1	
3781	-21,2	-4,0E-11	4,3E-10	36,7	6,6E-11	19,0	
3811	-21,2	-2,5E-12	4,9E-10	36,7	7,7E-11	0,0	
3841	-21,2	-1,1E-10	7,0E-10	36,7	6,6E-11	0,0	
3871	-21,2	-4,6E-11	4,7E-10	36,7	8,6E-11	19,0	
3901	-21,2	-1,9E-11	4,3E-10	36,7	7,3E-11	19,0	

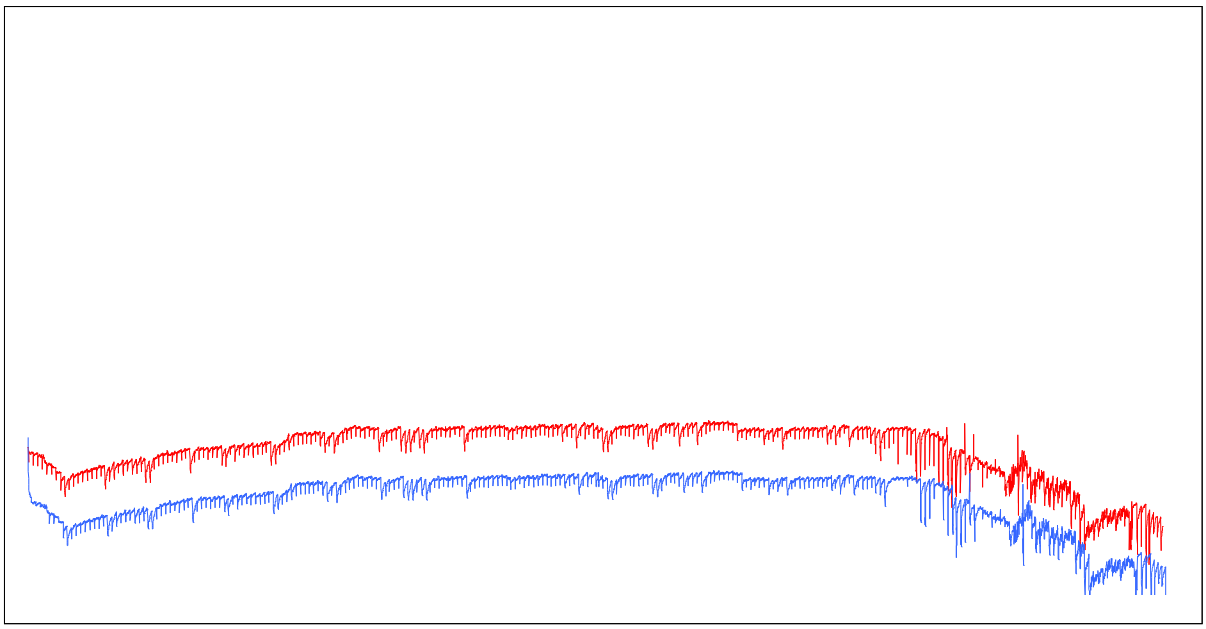
No	Temp.	Slope	Sigma	P406	Short term	P121.5
3931	-21,3	-2,7E-10	1,0E-09	36,7	7,8E-11	0,0
3961	-21,3	-1,4E-10	1,1E-09	36,7	5,2E-11	0,0
3991	-21,2	4,4E-11	6,4E-10	36,7	8,0E-11	19,0
4021	-21,2	4,0E-11	4,4E-10	36,7	9,1E-11	19,0
4051	-21,3	3,0E-11	3,8E-10	36,7	8,0E-11	19,0
4081	-21,3	1,1E-11	1,4E-10	36,7	8,6E-11	19,0
4111	-21,2	7,1E-11	1,0E-10	36,7	6,6E-11	19,0
4141	-21,3	1,4E-10	1,1E-10	36,7	9,1E-11	19,0
4171	-21,2	6,3E-11	7,7E-11	36,7	5,5E-11	19,0
4201	-21,2	5,9E-11	1,2E-10	36,7	8,4E-11	19,0
4231	-21,2	4,6E-11	1,2E-10	36,7	7,2E-11	19,0
4261	-21,2	4,2E-11	4,5E-10	36,7	8,9E-11	19,0
4291	-21,2	-3,5E-11	4,9E-10	36,7	8,2E-11	19,0
4321	-21,2	-5,0E-11	4,4E-10	36,7	9,1E-11	0,0
4351	-21,2	-3,5E-11	3,8E-10	36,7	8,3E-11	19,1
4381	-21,2	7,9E-14	3,3E-10	36,7	7,8E-11	19,0
4411	-21,2	-1,7E-11	3,8E-10	36,6	5,9E-11	19,0
4441	-21,2	-1,4E-11	3,7E-10	36,6	9,3E-11	19,0
4471	-21,2	-1,2E-11	4,3E-10	36,6	1,0E-10	19,0
4501	-21,2	-2,2E-11	9,3E-10	36,7	7,1E-11	19,0
4531	-21,2	3,1E-11	3,5E-10	36,7	7,4E-11	19,0
4561	-21,2	5,6E-11	4,0E-10	36,7	8,8E-11	19,0
4591	-21,2	4,1E-11	1,4E-10	36,7	9,4E-11	19,0
4621	-21,2	1,8E-11	1,2E-10	36,7	6,4E-11	19,0
4651	-21,2	1,4E-11	1,1E-10	36,7	5,6E-11	19,0
4681	-21,2	8,7E-11	1,3E-10	36,7	7,1E-11	19,0
4711	-21,2	3,3E-11	1,3E-10	36,7	7,8E-11	18,9
4741	-21,2	9,0E-11	1,6E-10	36,7	9,6E-11	19,0
4771	-21,2	4,1E-11	1,1E-10	36,7	7,0E-11	19,0
4801	-21,2	7,4E-11	4,4E-10	36,7	5,7E-11	19,0
4831	-21,2	1,0E-11	3,4E-10	36,7	7,1E-11	18,9
4861	-21,2	-3,8E-11	4,9E-10	36,7	8,1E-11	0,0
4891	-21,2	-3,3E-11	4,5E-10	36,7	6,2E-11	19,0
4921	-21,2	-4,5E-11	4,5E-10	36,7	6,4E-11	19,0
4951	-21,2	-1,3E-11	4,8E-10	36,7	6,9E-11	19,0
4981	-21,2	1,4E-11	4,0E-10	36,6	1,1E-10	19,0
5011	-21,1	1,2E-11	4,1E-10	36,5	6,2E-11	19,0
5041	-21,2	3,6E-11	4,0E-10	36,5	8,0E-11	19,0
5071	-21,2	7,5E-11	6,7E-10	36,5	7,3E-11	18,9
5101	-21,2	8,7E-11	1,5E-10	36,4	5,2E-11	18,9
5131	-21,2	1,0E-10	1,0E-10	36,4	7,1E-11	18,9
5161	-21,1	2,8E-11	1,4E-10	36,3	9,4E-11	18,9
5191	-21,1	-1,5E-11	1,1E-10	36,2	8,5E-11	18,9
5221	-21,1	1,2E-10	1,1E-10	36,1	8,6E-11	18,9
5251	-21,2	2,3E-11	1,1E-10	36,0	7,2E-11	18,9
5281	-21,2	-3,0E-11	5,2E-10	36,0	2,2E-10	18,9
5311	-21,2	-4,1E-11	4,7E-10	35,9	6,6E-11	18,8
5341	-21,2	-1,5E-10	8,5E-10	35,8	5,0E-10	0,0
5371	-21,2	-1,4E-10	1,3E-09	35,7	4,5E-10	0,0
5401	-21,2	-2,4E-10	1,6E-09	35,7	3,9E-10	0,0
5431	-21,1	4,0E-11	7,5E-10	35,6	1,4E-10	18,9

No	Temp.	Slope	Sigma	P406	Short term	P121.5
5461	-21,1	3,7E-11	8,4E-10	35,5	1,6E-10	18,9
5491	-21,2	4,4E-11	6,8E-10	35,4	3,5E-10	18,9
5521	-21,2	1,3E-10	1,5E-09	35,2	2,5E-10	18,9
5551	-21,2	4,8E-11	3,5E-10	35,1	8,4E-11	18,9
5581	-21,2	1,2E-10	1,0E-09	35,0	2,5E-10	18,8
5611	-21,2	5,0E-11	1,1E-10	34,9	2,9E-10	18,8
5641	-21,2	1,4E-10	1,2E-10	34,9	8,0E-10	18,9
5671	-21,1	1,1E-10	1,5E-10	34,9	1,1E-9	18,8
5701	-21,2	5,8E-11	8,3E-11	34,8	1,1E-9	18,8
5731	-21,2	1,4E-11	1,0E-10	34,8	1,1E-9	18,8
5761	-21,2	4,5E-11	2,4E-10	34,7	1,1E-9	18,8
5791	-21,2	-1,6E-10	2,0E-09	34,7	9,0E-10	18,8
5821	-21,3	-3,6E-10	2,5E-09	34,6	1,0E-9	18,7
5851	-21,2	-4,5E-10	3,3E-09	34,5	2,4E-9	0,0
5881	-21,3	-3,4E-10	2,9E-09	34,5	2,7E-9	0,0
5911	-21,3	9,3E-11	2,1E-09	34,5	2,0E-9	18,7
5941	-21,2	-2,2E-10	2,1E-09	34,4	1,6E-9	18,7
5971	-21,2	-1,0E-10	1,6E-09	34,4	1,2E-9	18,7
6001	-21,2	-7,5E-11	1,1E-09	34,4	1,1E-9	18,7
6031	-21,2	-2,7E-11	2,5E-10	34,4	6,1E-10	18,6
6061	-21,2	4,2E-11	2,1E-10	34,4	6,6E-10	18,6
6091	-21,3	1,7E-11	2,0E-10	34,3	1,0E-9	18,6
6121	-21,2	-7,9E-14	2,5E-10	34,2	9,6E-10	18,5
6151	-21,3	-1,4E-11	4,5E-10	34,1	1,8E-9	18,5
6181	-21,2	-4,3E-11	4,9E-10	34,1	2,5E-9	18,4
6211	-21,2	-1,8E-11	9,5E-10	34,0	3,0E-9	18,4
6241	-21,2	1,8E-10	1,5E-09	33,9	3,6E-9	18,4
6271	-21,3	-2,4E-10	3,2E-09	33,8	1,9E-9	0,0
6301	-21,2	5,2E-11	1,6E-09	33,7	2,0E-9	0,0
6331	-21,2	-2,3E-10	1,2E-09	33,5	1,0E-9	0,0
6361	-21,2	2,2E-11	1,9E-09	33,3	1,6E-9	18,1
6391	-21,3	2,2E-10	8,5E-10	33,3	1,4E-9	18,1
6421	-21,2	4,5E-11	5,7E-10	33,0	5,1E-10	18,1
6451	-21,2	2,2E-10	8,4E-10	33,0	9,9E-10	17,9
6481	-21,2	1,7E-10	8,8E-10	32,9	8,4E-10	17,9
6511	-21,2	1,4E-10	5,2E-10	32,9	7,7E-10	17,9
6541	-21,2	1,2E-10	6,0E-10	32,8	7,4E-10	17,8
6571	-21,2	5,5E-11	6,2E-10	32,7	6,2E-10	17,8
6601	-21,3	-3,8E-10	1,7E-09	32,7	1,0E-9	17,7
6631	-21,2	-2,2E-10	1,4E-09	32,7	1,1E-9	17,5
6661	-21,2	-7,8E-10	2,4E-09	32,6	1,9E-9	17,5
6691	-21,2	-5,8E-10	2,0E-09	32,6	2,0E-9	0,0
6721	-21,2	-7,4E-11	6,5E-10	32,6	2,5E-9	0,0
6751	-21,2	-1,1E-10	8,0E-10	32,6	2,0E-9	0,0
6781	-21,2	-1,8E-10	8,3E-10	32,6	2,1E-9	0,0
6811	-21,3	-1,4E-11	9,1E-10	32,5	1,7E-9	17,0
6841	-21,2	-1,3E-10	8,1E-10	32,4	1,5E-9	16,8
6871	-21,3	1,2E-10	4,4E-10	32,3	1,6E-9	16,7
6901	-21,2	2,1E-10	6,1E-10	32,3	1,6E-9	16,7
6931	-21,2	8,7E-11	5,2E-10	32,2	1,5E-9	16,6
6961	-21,2	7,6E-13	5,2E-10	32,1	3,3E-9	16,5

Power lifetime = 78 hours

Frequency variation

406027,862 kHz



406027,844 kHz

Initial tracing Smoothed tracing

Sample of beacon message during and after 48 hours of Operating Lifetime Test :

FFFEFF8E3F3C260AE201775E7D770F2800DF
FFFEFF8E3F3C260AE201775E7D770F2C0836
FFFEFF8E3F3C260AE201775E7D770D240E22
FFFE2F8E3F3C260AE201775E7D770D2C0AC9

Sarsat decode of MARTEC UUT6 Beacon message :

FFFE2F8E3F3C260AE201775E7D770D2C0AC9

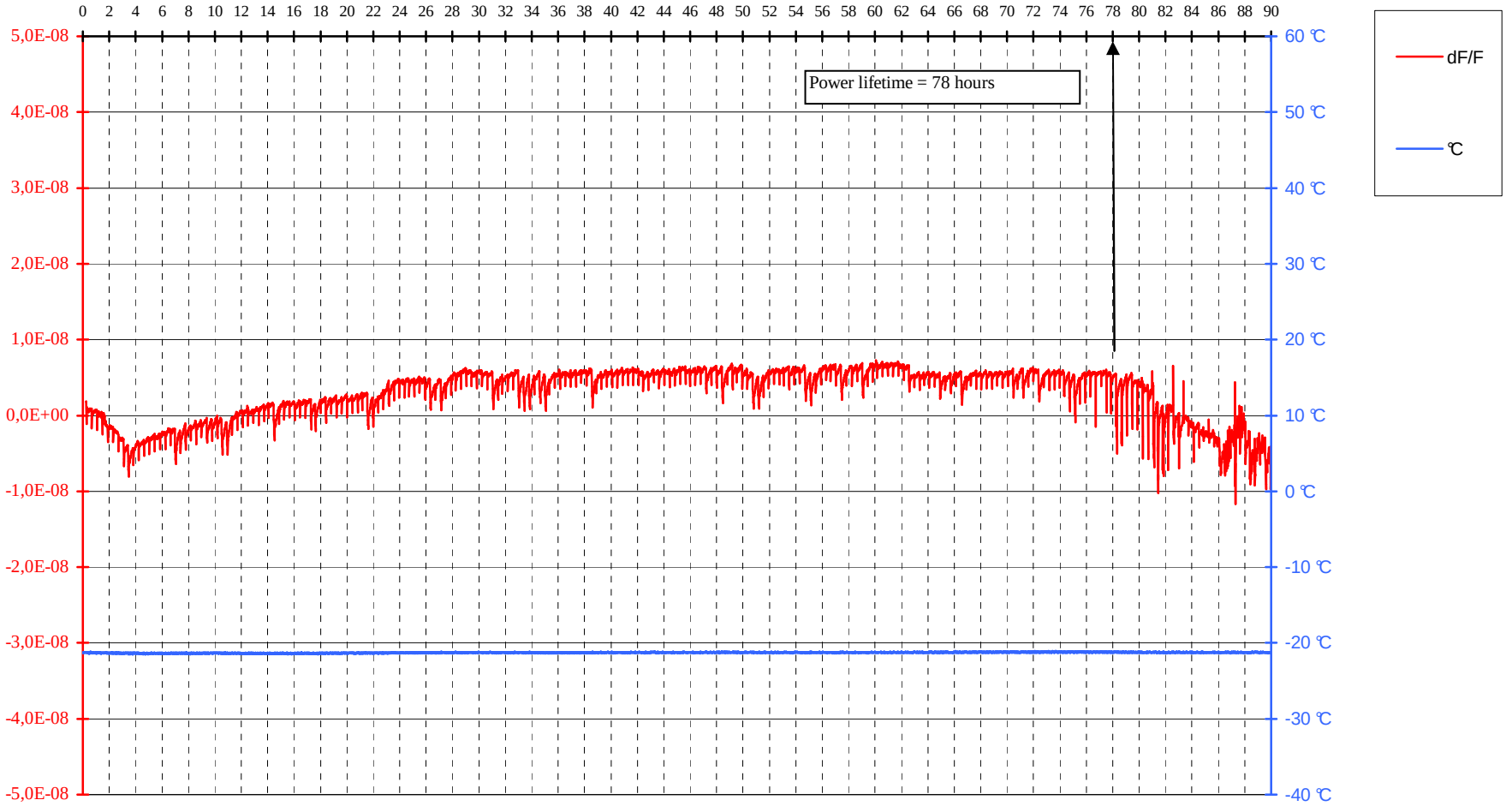
ITEM	BITS	VALUE
Message format: long format	**25**	**1**
Protocol: Location Protocol	**26**	**0**
Country code: 227	**27-36**	**0011100011**
Type of location protocol: National Location - Test	**37-40**	**1111**
Serial Number: 61592	**41-58**	**001111000010011000**
Latitude Flag: North	**59**	**0**
Latitude (Degrees): 43	**60-66**	**0101011**
Latitude (Minutes): 34	**67-71**	**10001**
Longitude Flag: East	**72**	**0**
Longitude (Degrees): 1	**73-80**	**00000001**
Longitude (Minutes): 28	**81-85**	**01110**
BCH 1 Encoded:	**86-106**	**11101011110011111010 1**
BCH 1 Calculated:	**86-106**	**11101011110011111010 1**
Fixed bits (110): Pass	**107-109**	**110**
Bits 113 - 132 provides offset data location	**110**	**1**
Position Data: Encoded Position Data Source From Internal Navigation Device	**111**	**1**
Aux Loc. Device: 121.5 MHz homer	**112**	**1**
Latitude Offset Sign: -	**113**	**0**
Latitude Offset Minutes: 0	**114-115**	**00**
Latitude Offset Seconds: 24	**116-119**	**0110**
Longitude Offset Sign: +	**120**	**1**
Longitude Offset Minutes: 0	**121-122**	**00**
Longitude Offset Seconds: 44	**123-126**	**1011**
Additional Id (Nat Use)	**127-132**	**000000**
BCH 2 Encoded:	**133-144**	**101011001001**
BCH 2 Calculated:	**N/A**	**101011001001**
Composite Latitude: 43.56 Degrees North	**N/A**	**Composite Longitude: 1.478888888888889 Degrees East**
15 Hex ID:	**N/A**	**1C7E784C3F81FE0**

LIFE TEST AT -20 °C

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20 Apr 2007
Time : 13:59:30

FREQUENCY VARIATION

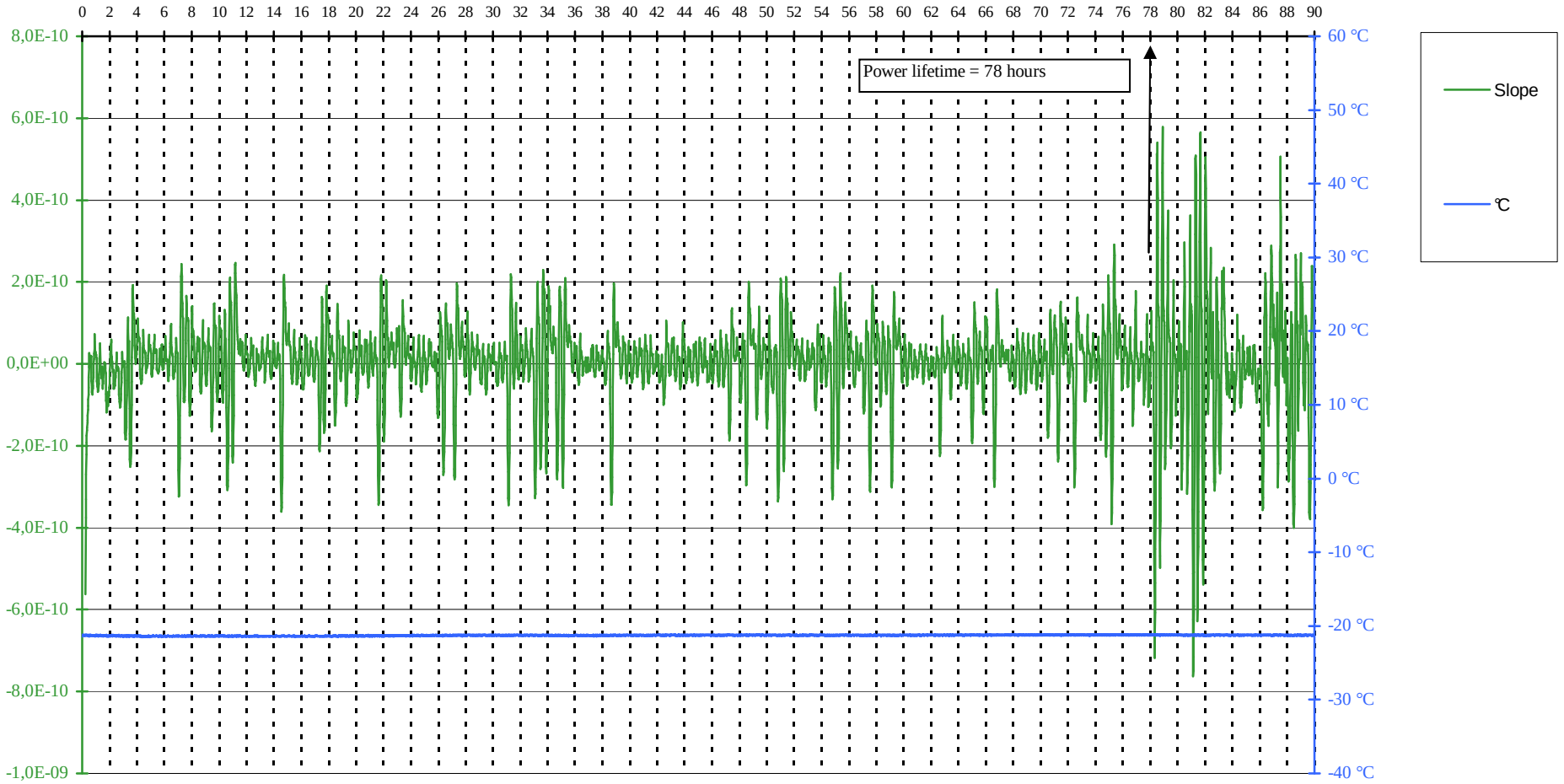


LIFE TEST AT -20 °C

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20 Apr 2007
Time : 13:59:30

MEDIUM TERM STABILITY : MEAN SLOPE /mn (-1,0E-9 to 1,0E-9)

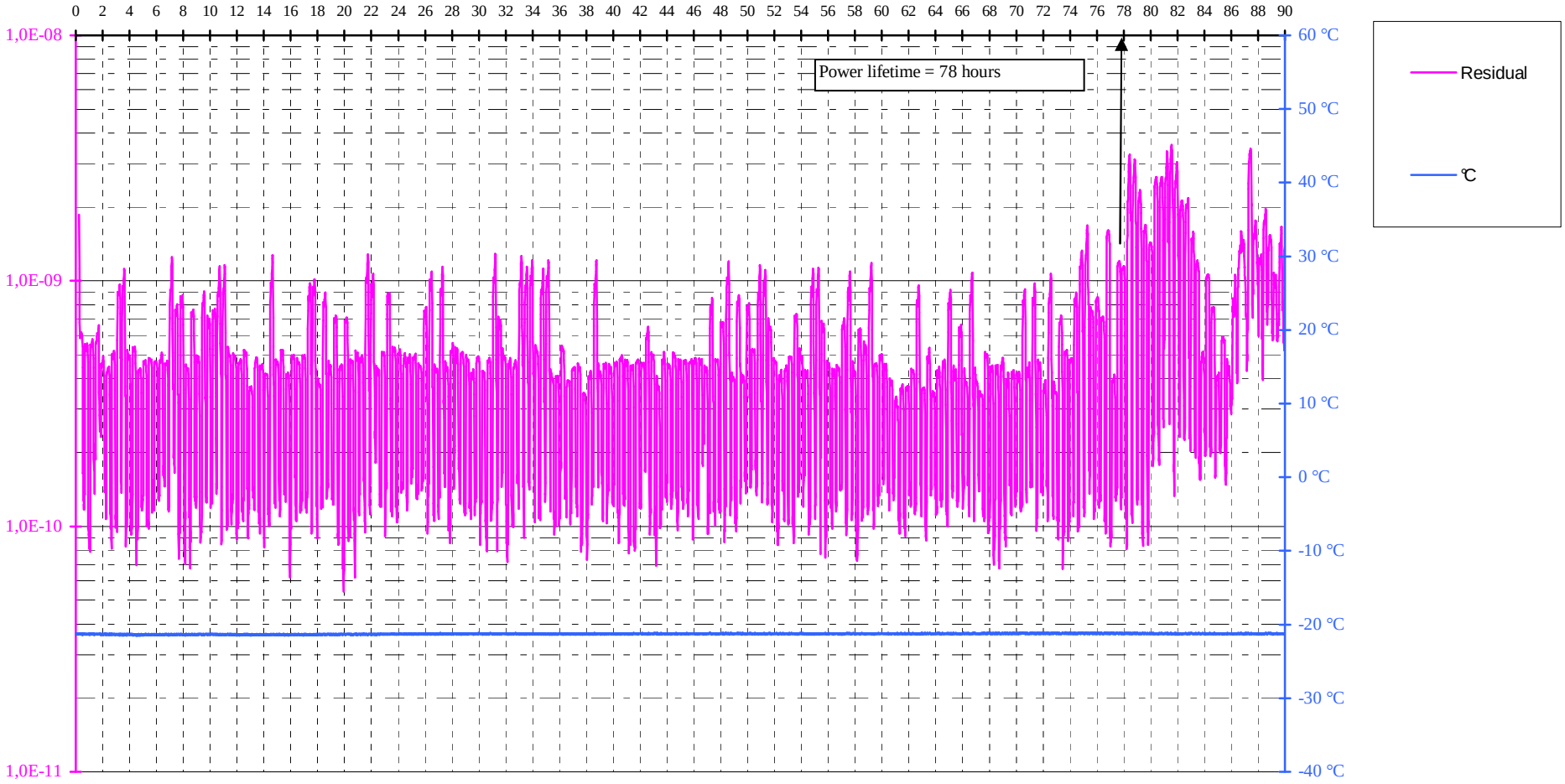


LIFE TEST AT -20 °C

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20 Apr 2007
Time : 13:59:30

MEDIUM TERM STABILITY : RESIDUAL (≤ 3,0E-9)

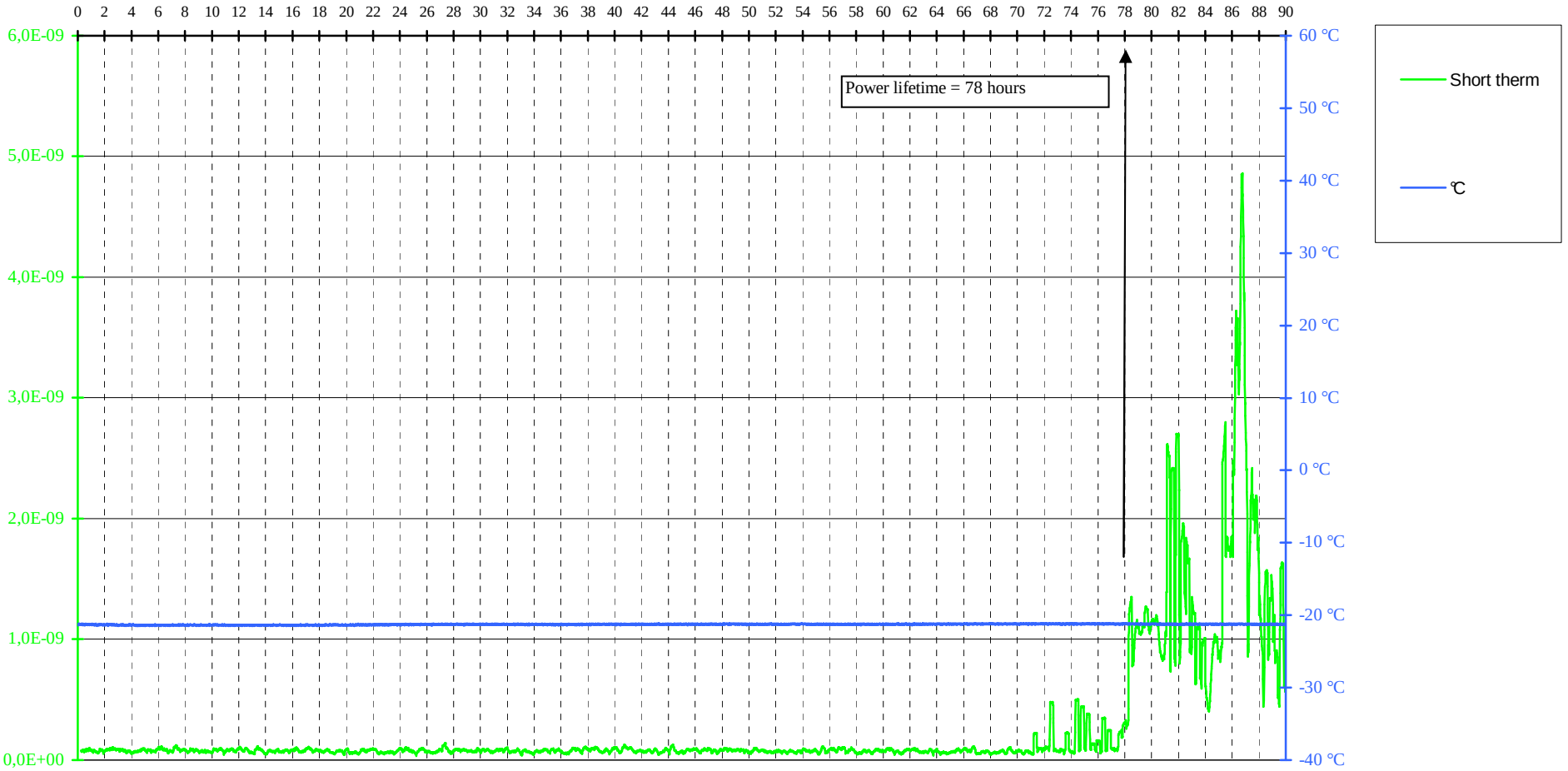


LIFE TEST AT -20 °C

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20 Apr 2007
Time : 13:59:30

SHORT TERM STABILITY /100 mS (≤ 2,0E-9)



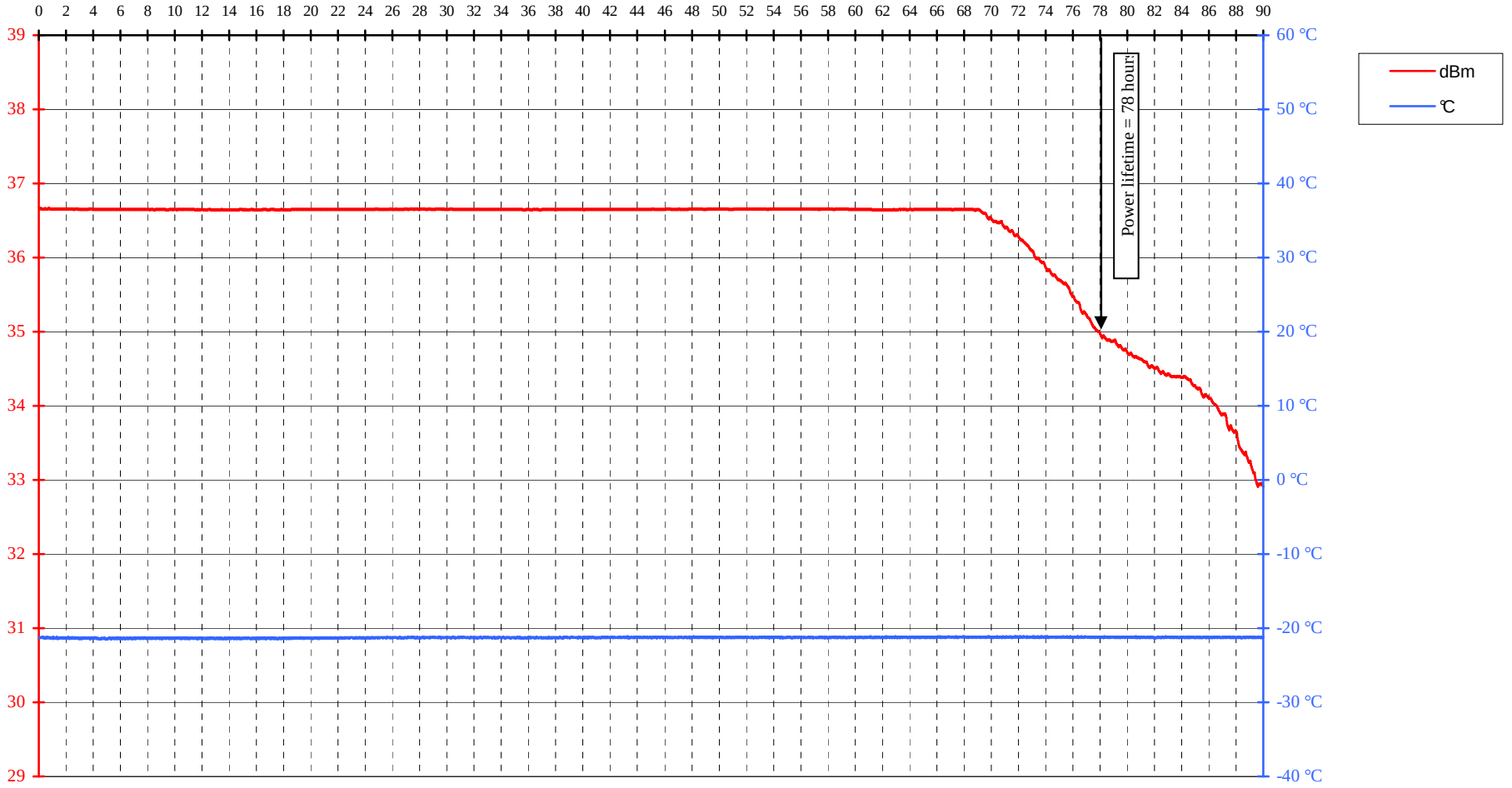
LIFE TEST AT -20 °C

80,75

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Numero : 61592 UUT6

Date : 20 Apr 2007
Time : 13:59:30

OUTPUT POWER (35 to 39 dBm)

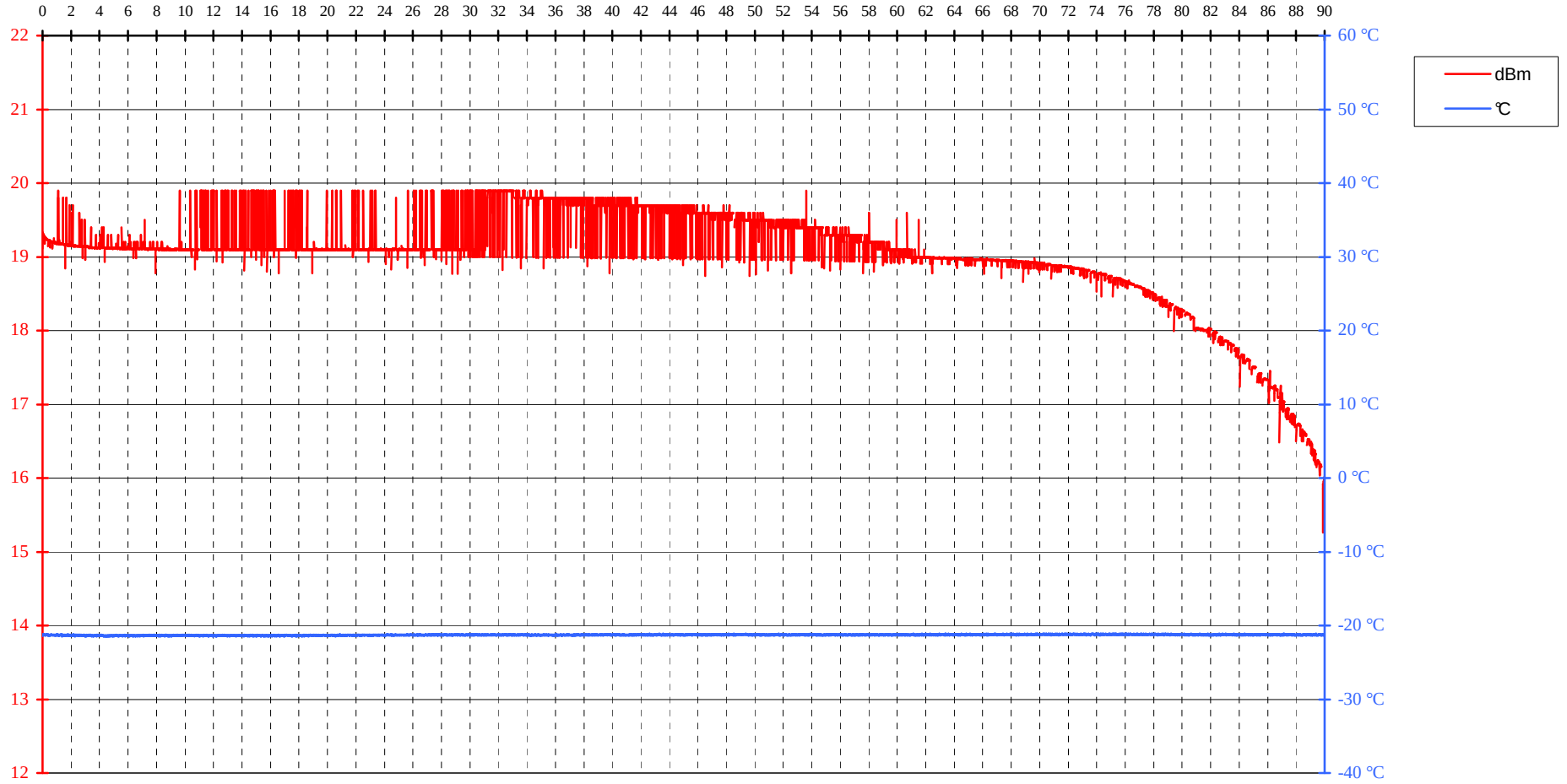


LIFE TEST AT -20 °C

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Numero : 61592 UUT6

Date : 20 Apr 2007
Time : 13:59:30

121,5 MHz OUTPUT POWER (14 to 20 dBm)



TEMPERATURE GRADIENT TEST RESULT ON
MARTEC
KANNAD AUTO/AUTO GPS
N° 61592 UUT6
at -20° C, 22° C and 55° C

Warm Up	Δ Frequency (Hz)	Temp. (°C)	P406 (dBm)	P121.5 (dBm)
1	49859,10	-21,2	36,6	0,0
2	49858,18	-21,2	36,7	0,0
3	49857,63	-21,1	36,7	18,7
4	49857,35	-21,2	36,7	18,8
5	49857,09	-21,2	36,1	18,8
6	49856,99	-21,2	36,7	18,9
7	49857,00	-21,2	36,7	18,9
8	49856,95	-21,2	36,7	18,9
9	49856,86	-21,2	36,7	18,9
10	49856,93	-21,2	36,7	18,9
11	49856,90	-21,2	36,6	18,9
12	49856,88	-21,2	36,6	18,9
13	49856,85	-21,2	36,6	18,9
14	49856,86	-21,2	36,6	19,0
15	49856,95	-21,2	36,6	19,0
16	49856,92	-21,2	36,7	19,0
17	49857,02	-21,2	36,6	19,0
18	49856,93	-21,2	36,7	19,0

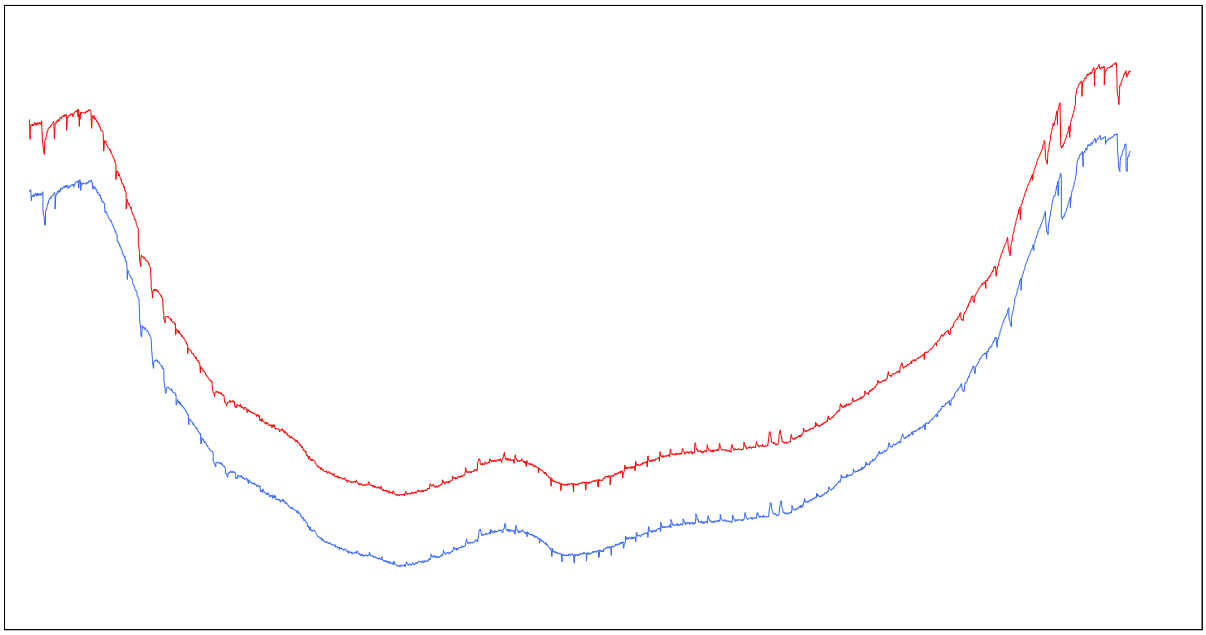
No	Temp.	Slope	Sigma	P406	Short term	P121.5
1	-21,2	-4,3E-10	2,1E-9	36,6	2,1E-9	19,0
18	-21,2	4,3E-11	6,9E-10	36,7	6,9E-10	19,0
31	-21,2	1,7E-11	1,9E-10	36,7	1,9E-10	19,0
61	-21,2	4,9E-11	6,5E-10	36,7	6,5E-10	19,0
91	-21,2	-2,2E-11	5,9E-10	36,7	5,9E-10	19,1
121	-21,2	-3,4E-11	6,9E-10	36,7	6,9E-10	9,7
151	-21,0	-8,6E-11	6,6E-10	36,7	6,6E-10	9,7
181	-19,0	-2,6E-10	6,0E-10	36,6	6,0E-10	19,2
211	-17,0	-2,9E-10	5,4E-10	36,6	5,4E-10	19,3
241	-14,9	-2,7E-10	6,3E-10	36,6	6,3E-10	19,3
271	-12,8	-4,7E-10	1,4E-9	36,6	1,4E-9	19,3
301	-10,7	-3,0E-10	1,3E-9	36,6	1,3E-9	19,4
331	-8,6	-2,0E-10	9,8E-10	36,6	9,8E-10	19,4
361	-6,6	-1,0E-10	3,9E-10	36,5	3,9E-10	19,4
391	-4,6	-1,0E-10	2,8E-10	36,5	2,8E-10	19,4
421	-2,5	-9,4E-11	2,7E-10	36,5	2,7E-10	19,3
451	-0,5	1,2E-11	2,1E-10	36,4	2,1E-10	19,2
481	1,6	4,8E-11	1,9E-10	36,4	1,9E-10	19,3
511	3,6	-3,5E-11	1,4E-10	36,4	1,4E-10	19,3
541	5,7	-4,8E-11	1,1E-10	36,4	1,1E-10	19,3
571	7,8	-4,3E-11	1,3E-10	36,4	1,3E-10	19,2
601	9,9	-2,0E-11	1,2E-10	36,3	1,2E-10	0,0
631	12,1	-5,7E-11	1,1E-10	36,3	1,1E-10	19,2
661	14,2	-1,4E-10	1,8E-10	36,3	1,8E-10	19,2
691	16,3	-8,3E-11	1,2E-10	36,3	1,2E-10	19,1
721	18,4	-4,2E-11	1,0E-10	36,2	1,0E-10	10,3
751	20,5	-4,0E-11	1,3E-10	36,2	1,3E-10	10,4
781	22,5	-3,5E-11	1,7E-10	36,2	1,7E-10	19,1
811	24,5	-1,8E-11	1,8E-10	36,2	1,8E-10	19,1
841	26,6	-4,4E-11	1,5E-10	36,1	1,5E-10	19,0

No	Temp.	Slope	Sigma	P406	Short term	P121.5
871	28,8	-4,5E-11	1,6E-10	36,1	1,6E-10	19,0
901	30,9	-5,1E-13	1,6E-10	36,1	1,6E-10	19,0
931	33,2	4,9E-12	1,1E-10	36,1	1,1E-10	19,0
961	35,1	-5,8E-12	2,0E-10	36,1	2,0E-10	18,9
991	37,3	-2,5E-12	1,6E-10	36,1	1,6E-10	18,9
1021	39,4	3,3E-11	1,2E-10	36,0	1,2E-10	18,9
1051	41,4	2,7E-11	9,2E-11	36,0	9,2E-11	18,8
1081	43,5	1,7E-11	1,0E-10	36,0	1,0E-10	18,6
1111	45,7	2,2E-11	9,9E-11	36,0	9,9E-11	0,0
1141	47,7	-1,4E-11	1,1E-10	36,0	1,1E-10	18,7
1171	49,9	-2,1E-11	1,5E-10	35,9	1,5E-10	18,7
1201	51,9	-6,7E-11	1,9E-10	35,9	1,9E-10	18,7
1231	53,9	-1,1E-10	2,8E-10	35,8	2,8E-10	18,7
1261	54,5	-3,5E-11	2,9E-10	35,8	2,9E-10	18,7
1291	54,5	-1,0E-11	3,4E-10	35,8	3,4E-10	18,7
1321	54,5	-4,8E-12	3,2E-10	35,8	3,2E-10	18,6
1351	54,6	1,4E-11	3,6E-10	35,8	3,6E-10	18,7
1381	54,4	3,8E-11	3,5E-10	35,9	3,5E-10	18,7
1411	52,7	8,2E-11	4,2E-10	35,9	4,2E-10	18,8
1441	50,7	2,5E-11	3,2E-10	35,9	3,2E-10	18,8
1471	48,6	1,8E-11	3,8E-10	36,0	3,8E-10	18,8
1501	46,5	9,8E-12	3,1E-10	36,0	3,1E-10	18,1
1531	44,4	4,0E-13	9,8E-11	36,0	9,8E-11	18,7
1561	42,3	1,1E-11	1,1E-10	36,0	1,1E-10	0,0
1591	40,2	-2,4E-11	1,4E-10	36,0	1,4E-10	19,0
1621	38,1	5,9E-12	1,1E-10	36,0	1,1E-10	19,0
1651	36,1	-1,6E-11	7,4E-11	36,0	7,4E-11	19,0
1681	33,9	-2,8E-12	7,1E-11	36,1	7,1E-11	19,0
1711	31,9	7,4E-12	7,7E-11	36,1	7,7E-11	19,0
1741	29,8	-1,7E-12	9,3E-11	36,1	9,3E-11	19,1
1771	27,6	1,6E-10	6,0E-10	36,1	6,0E-10	19,1
1801	25,5	7,5E-11	2,8E-10	36,1	2,8E-10	19,1
1831	23,4	8,7E-11	2,7E-10	36,2	2,7E-10	19,1
1861	21,3	5,0E-11	2,1E-10	36,2	2,1E-10	19,2
1891	19,2	6,2E-11	2,1E-10	36,2	2,1E-10	19,2
1921	17,2	7,6E-11	2,6E-10	36,2	2,6E-10	19,2
1951	15,1	5,0E-11	2,1E-10	36,3	2,1E-10	19,2
1981	13,0	5,9E-11	2,1E-10	36,3	2,1E-10	19,2
2011	10,9	5,3E-11	2,1E-10	36,3	2,1E-10	19,3
2041	8,7	6,5E-12	2,1E-10	36,4	2,1E-10	19,3
2071	6,6	-1,9E-12	2,4E-10	36,4	2,4E-10	19,3
2101	4,6	5,5E-11	8,8E-11	36,4	8,8E-11	0,0
2131	2,6	7,5E-11	9,0E-11	36,4	9,0E-11	19,3
2161	0,4	9,2E-11	1,3E-10	36,4	1,3E-10	19,4
2191	-1,6	1,5E-10	1,2E-10	36,4	1,2E-10	19,4
2221	-3,7	2,0E-10	1,2E-10	36,4	1,2E-10	19,4
2251	-5,8	1,2E-10	1,2E-10	36,4	1,2E-10	19,4
2281	-7,9	6,7E-11	5,2E-10	36,4	5,2E-10	19,3
2311	-9,9	-1,4E-11	8,5E-10	36,5	8,5E-10	19,3
2341	-12,1	2,6E-10	5,3E-10	36,5	5,3E-10	19,2
2371	-14,2	2,1E-10	2,7E-10	36,5	2,7E-10	19,1

No	Temp.	Slope	Sigma	P406	Short term	P121.5
2401	-16,2	-1,5E-10	1,1E-9	36,5	1,1E-9	19,1
2431	-18,3	1,2E-10	1,7E-9	36,5	1,7E-9	19,1
2461	-20,3	3,0E-10	4,8E-10	36,6	4,8E-10	19,1
2491	-21,0	8,8E-11	6,1E-10	36,6	6,1E-10	19,1
2521	-21,0	7,7E-11	7,0E-10	36,6	7,0E-10	19,1
2551	-21,1	1,3E-10	4,9E-10	36,6	4,9E-10	19,1
2581	-21,1	3,2E-10	7,3E-10	36,6	7,3E-10	19,1

Frequency variation

406027861



406027830

Initial tracing Smoothed tracing

Samples of beacon message transmitted during Frequency Stability Test with Temperature Gradient :

FFFEFF8E3F3C260AE201775E7D770F2C0836
FFFEFF8E3F3C260AE201775E7D770F2800DF
FFFEFF8E3F3C260AE201775E7D770D240E22

Sarsat decode of MARTEC UUT6 Beacon message :

FFFEFF8E3F3C260AE201775E7D770D240E22

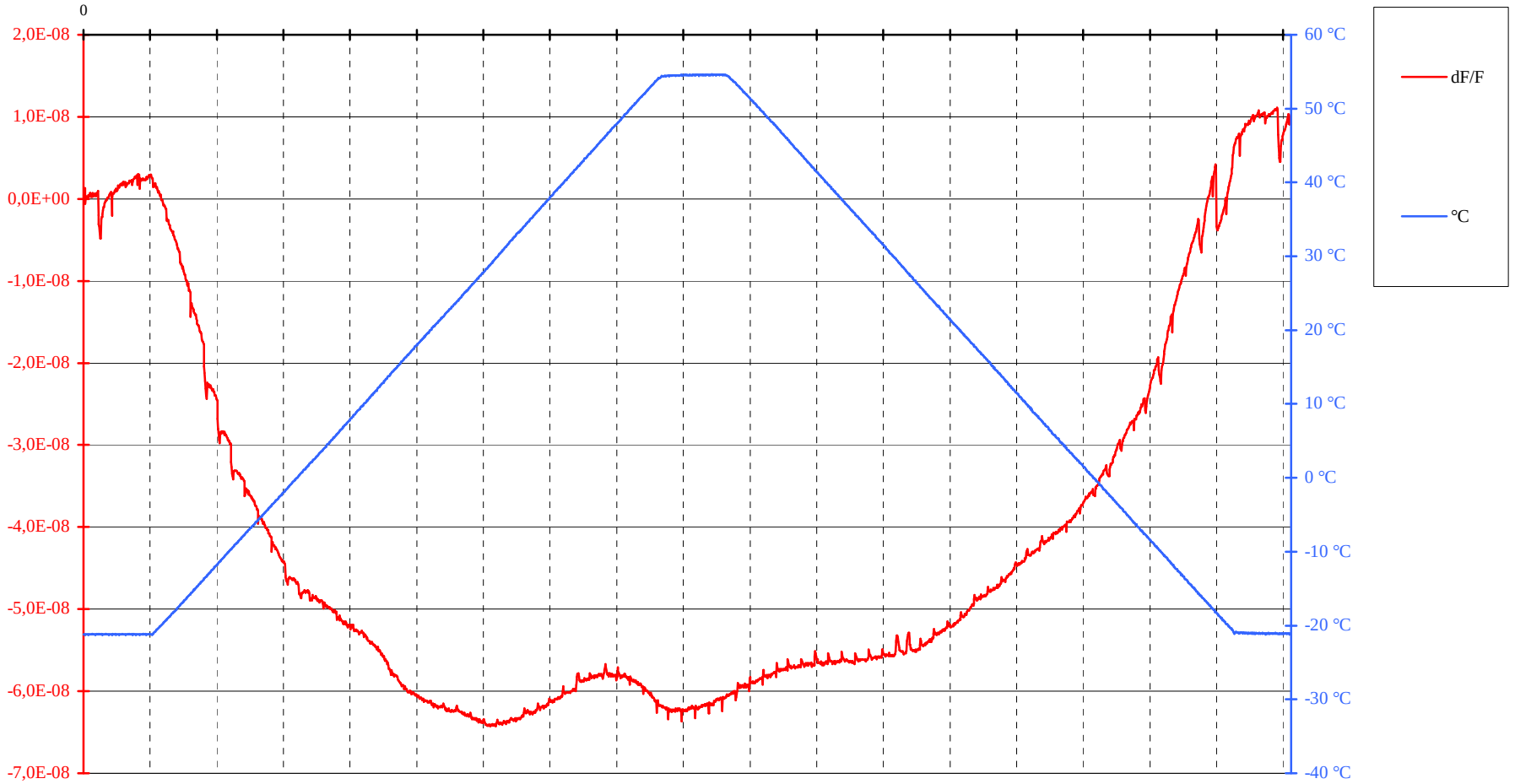
ITEM	BITS	VALUE
Message format: long format	**25**	**1**
Protocol: Location Protocol	**26**	**0**
Country code: 227	**27-36**	**0011100011**
Type of location protocol: National Location - Test	**37-40**	**1111**
Serial Number: 61592	**41-58**	**001111000010011000**
Latitude Flag: North	**59**	**0**
Latitude (Degrees): 43	**60-66**	**0101011**
Latitude (Minutes): 34	**67-71**	**10001**
Longitude Flag: East	**72**	**0**
Longitude (Degrees): 1	**73-80**	**00000001**
Longitude (Minutes): 28	**81-85**	**01110**
BCH 1 Encoded:	**86-106**	**11101011100111110101**
BCH 1 Calculated:	**86-106**	**11101011100111110101**
Fixed bits (110): Pass	**107-109**	**110**
Bits 113 - 132 provides offset data location	**110**	**1**
Position Data: Encoded Position Data Source From Internal Navigation Device	**111**	**1**
Aux Loc. Device: 121.5 MHz homer	**112**	**1**
Latitude Offset Sign: -	**113**	**0**
Latitude Offset Minutes: 0	**114-115**	**00**
Latitude Offset Seconds: 24	**116-119**	**0110**
Longitude Offset Sign: +	**120**	**1**
Longitude Offset Minutes: 0	**121-122**	**00**
Longitude Offset Seconds: 36	**123-126**	**1001**
Additional Id (Nat Use)	**127-132**	**000000**
BCH 2 Encoded:	**133-144**	**111000100010**
BCH 2 Calculated:	**N/A**	**111000100010**
Composite Latitude: 43.56 Degrees North	**N/A**	**Composite Longitude: 1.4766666666666668 Degrees East**
15 Hex ID:	**N/A**	**1C7E784C3F81FE0**

TEMPERATURE GRADIENT TEST RESULTS (5 °C / hour)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 17:55:37

FREQUENCY VARIATION

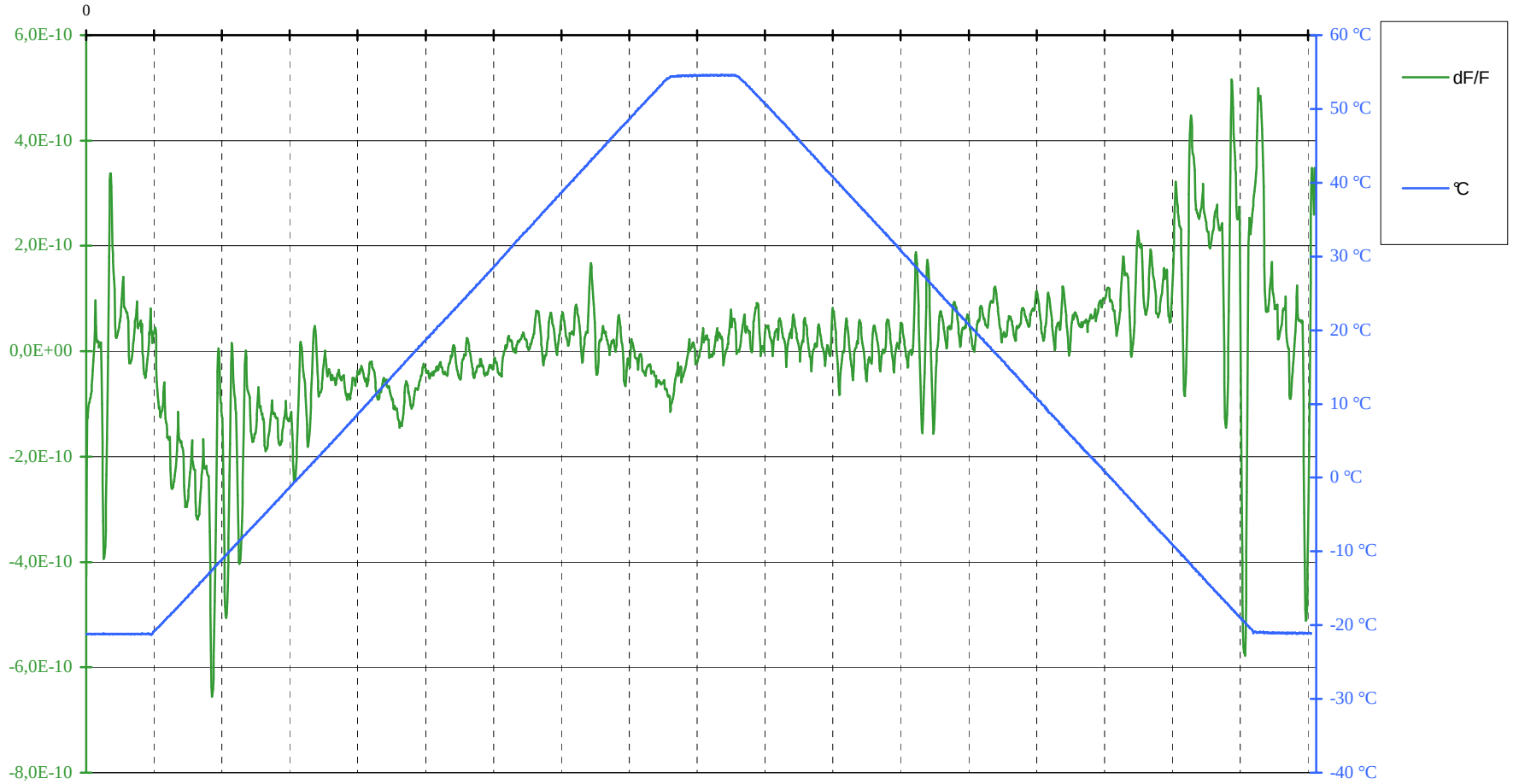


TEMPERATURE GRADIENT TEST RESULTS (5 °C / hour)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number :

Date : 20/03/2007
Time : 17:55:37

MEDIUM TERM STABILITY : MEAN SLOPE /mn A to B, C+15 to D, and E+15 to F (-1,0E-9 to 1,0E-9)
MEAN SLOPE /mn B to C+15, and D to E+15 (-2,0E-9 to 2,0E-9)

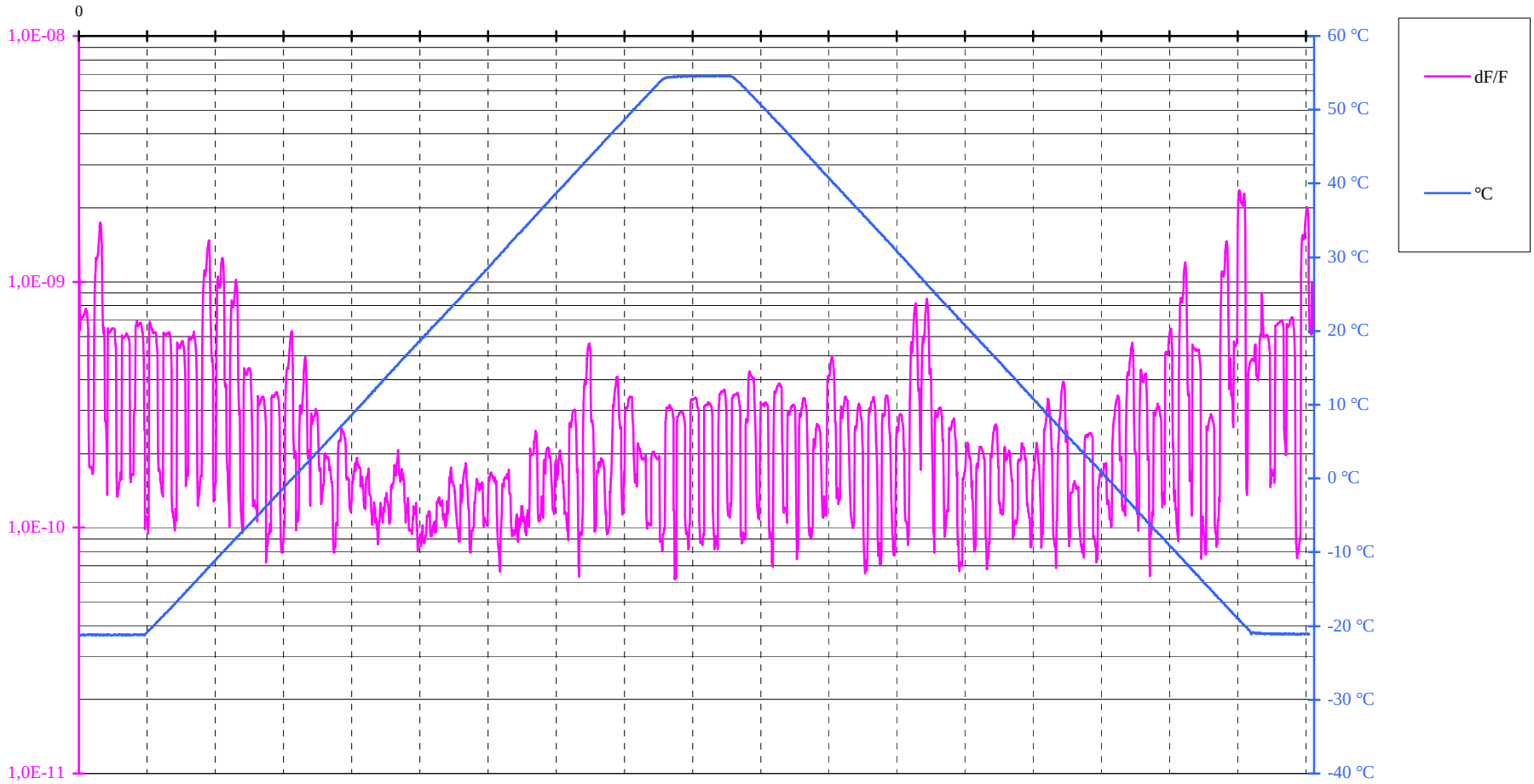


TEMPERATURE GRADIENT TEST RESULTS (5 °C / hour)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 17:55:37

MEDIUM TERM STABILITY : RESIDUAL (≤ 3,0E-9)

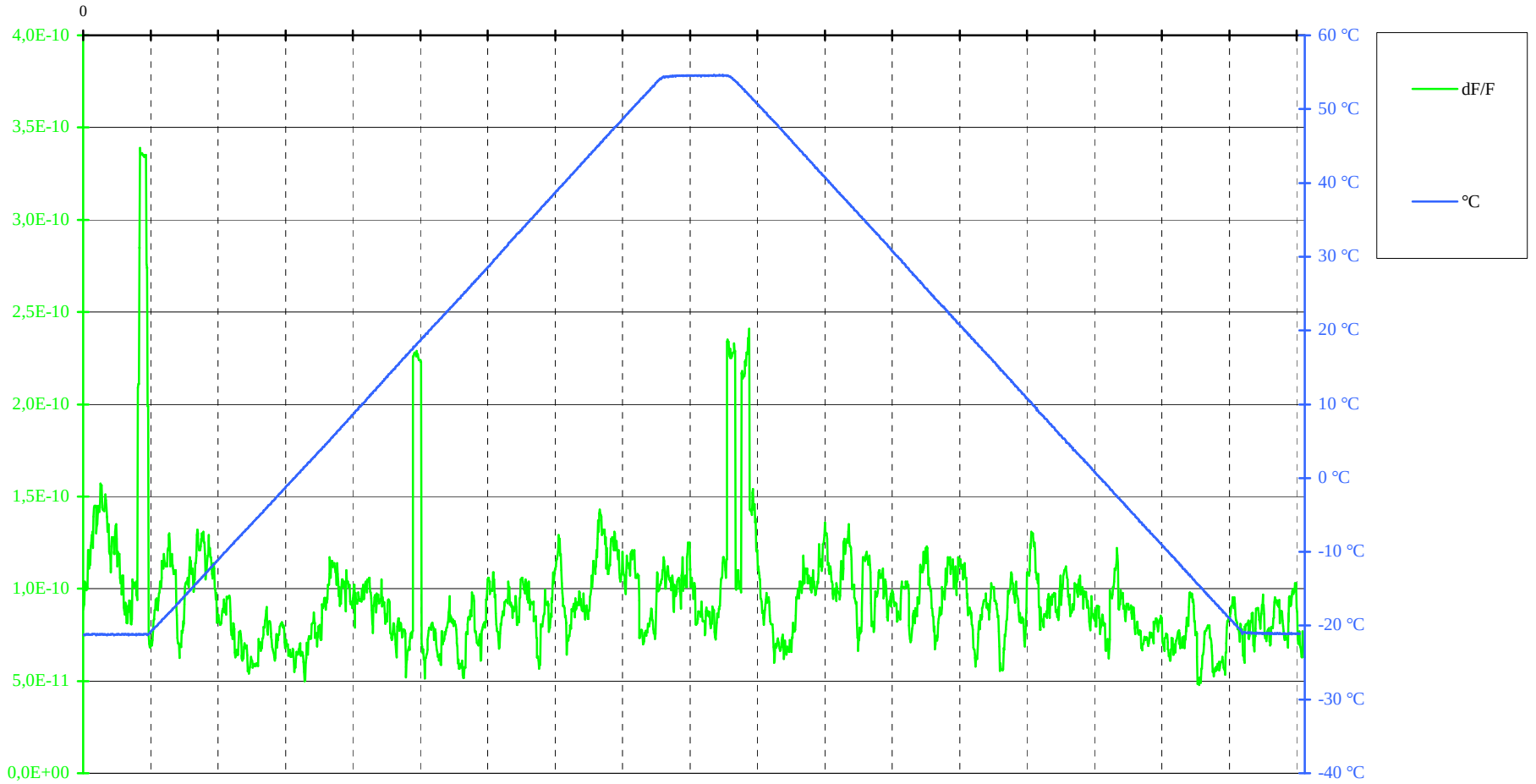


TEMPERATURE GRADIENT TEST RESULTS (5 °C / hour)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 17:55:37

SHORT TERM STABILITY /100 mS (≤ 2,0E-9)

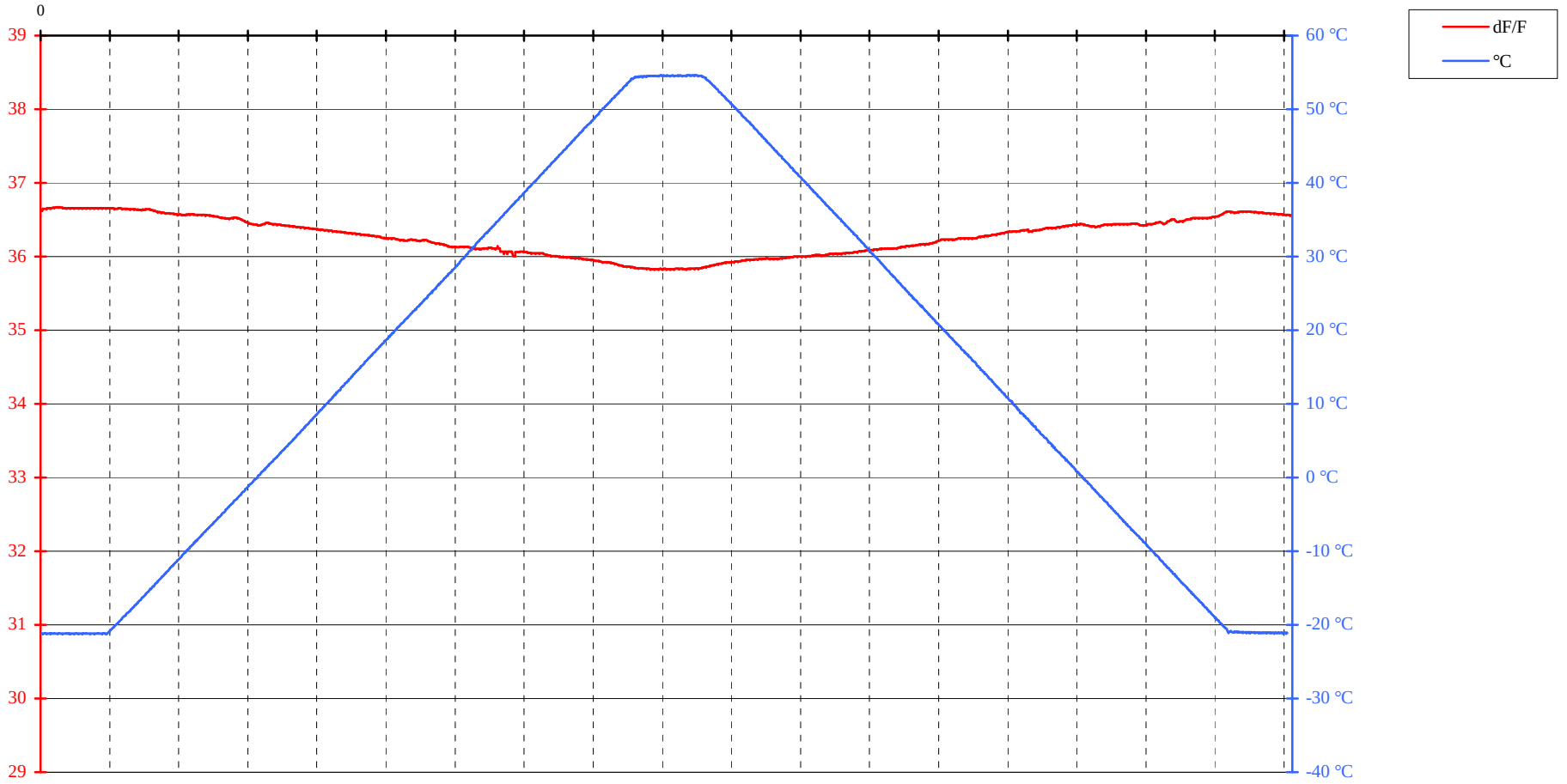


TEMPERATURE GRADIENT TEST RESULTS (5 °C / hour)

Manufacturer : MARTEC
Model : KANNAD AUTO/AUTO GPS
Number : 61592 UUT6

Date : 20/03/2007
Time : 17:55:37

OUTPUT POWER (35 to 39 dBm)



CHAPTER 4

OPERATING LIFE, STROBE LIGHT AND SELF TESTS

4.1 TEST SPECIFICATIONS AND PROGRAMME

Following :

- Section A13.0 of RTCM Recommended Standards for 406 MHz Satellite EPIRBs (Version 2.1 June 20, 2002)
- Section 10.1 & 10.2 of ETSI EN 300 066 V1.3.1(2006-01);
- Section A1.12 & A1.13 of IEC 61097-2 (Second edition –2002-09) and
- Section A2.3 of Cospas/Sarsat T.007 Type Approval Standard (Issue 1, 10/2006)

• Using a fresh battery pack, turn ON the EUT (at the ambient temperature) for a period of time equal to the extension interval gived by the constructor .

•Place the EUT turned OFF inside climatic chamber stabilized at - 20° C (class II) for a period of 10 hours

•At the conclusion of this period the EUT is turned ON and continually monitor the following parameters until the end of the battery life :

- Frequency (nominal carrier, short and medium term stability),
- RF output power,
- Homing transmitter peak envelope output power.
- Strobe light flash rate every 12 hours.

4.2. EQUIPMENT UNDER TEST

Beacon Unit : UUT 6
Name : MARTEC
Type : KANNAD Auto / Auto GPS
Number : 61592(06)
Class : II

Beacon Battery Type
Chemistry : Li-MnO_2
Manufacturer & model n° : DURACELL (Williamson packaging, WILPA1388)
Size & number of cells : DL123 x 16 cells

4.3. TEST SITE

Toulouse Space Center (C.S.T./ ITS) - Beacon certification laboratory .

4.4. TEST EQUIPMENT

• Climatic chamber: CLIMATS F.C.H. – Type: Austral 137H60/1,5E - S/N: S4880.

• Argos - Cospas/Sarsat Test Bench

4.5. RESULTS

These tests have been performed at the end of the ETS, IEC, RTCM Environmental Tests .

The strobe light test and the self test have been, also, performed with Cospas Sarsat Type Approval tests (chapter 3) at three temperature (-20° C, 22° C and 55° C). This test has run during 78 hours. This time compliant to 48 hours of minimum runtime request

Before the C/S Operating Life Test we have verified the manufacturer calculation of the loss in battery capacity due to self-testing as well as battery pack self-discharge during the useful lifetime of battery pack (see chapter 3 : C/S Type Approval Test Report § "OPERATING LIFE TEST RESULTS ON KANNAD Auto/Auto GPS/Manual/Manual GPS/Manual+/Manual+ GPS")

Beacon Unit : UUT 6
Name : MARTEC
Type : KANNAD Auto / Auto GPS
Number : 61592(06)
Class : II

Operating Life Test implementation

Date	Hour	Operations	Results
April.18th, 2007	10:30	Following the manufacturer "Previous Time Battery Discharge" the beacon at Lab temperature and connected into 50 Ohm load Argos Cospas Sarsat Test Bench is manually activated for the 22.42 hours .	See page 5
April.19th, 2007	8:55	Beacon Off	
April.19th, 2007	18:00	The beacon, in the ready condition, is thermally saoked at - 20° C in the temperature-controled oven .	
April.20th, 2007	14:00	The beacon in the oven at –20° C and connected into 50 Ohm load Argos Cospas Sarsat Test Bench is manually activated .Simultaneously an Automatic Operational Life Test begin.	OK
April.24th, 2007	08:00	End of Automatic Operational Life Test.	
April.24th, 2007	08:30	Analysis of Operating Life Test Results :	Correct during ≈ 78 hours

Electrical results of Operating Life, StrobeLight and Self Tests

see C/S T.A. Test Report in Chapter 3 (E7965-CS, p 49)

Measurement Temperature : -20 °C

SPECIFICATIONS	12 h	24 h	48 h	60 h	78 h
1 - FREQUENCY (MHz)					
Nominal Carrier 406.028 ± 0.001	406.0278532	406.0278547	406.0278557	406.0278557	406.0278552
Short term stab. < $2x10^{-9}$/100 ms	9E-11	1E-10	8E-11	8E-11	3.1E-10
Slope < $1x10^{-9}$/mn	3E-11	-4E-11	2E-11	-4E-12	-5.8E-11
Sigma < $3x10^{-9}$	9E-11	5.1E-10	1.2E-10	5.0E-10	1.14E-09
2 - RF OUTPUT 5 W $^{+2.9}_{-1.8}$ (37 dBm ± 2 dBm)	36.7	36.7	36.7	36.7	35.0
3 - STROBE LIGHTS 20 to 30 flashes/min Intensity ≥ 0.75 cand.	22 -	22	22 -	22	22 -
4 - HOMING Transmitter : - peak envelope output power (14 dBm $^{+6\ dB}_{-0\ dBm}$)	19.9	19.1	19.6	19.1	18.5
5 – DIGITAL MESSAGE Correct Satellite EPIRB coding	OK	OK	OK	OK	OK

See data and graphs of results on chapter 3 “ Cospas-Sarsat Type Approval Tests Report ”.

BATTERY CAPACITY
KANNAD 406 TOPAZE

TEST CONSUMPTION

	I instant (mA)	Ton (s)		
406 test burst	3900	0,52	0,563	mA
121,5 test burst	37	0,1	0,001	mA
logic, led and oscillator consumption	17	10	0,047	mA
		total for 1 test	0,612	mA
		total for 6 years with 1 test per week	190,814	mAh
		with correction coefficient of 1,65	**314,843**	**mAh**

AVERAGE CONSUMPTION PRIOR TO ACTIVATION BEACON

	I instant (mA)	Ton (s)		
Consumption	0,002	3600	0,002	mA
		Total for 6 years	105,120	mAh
		with correction coefficient of 1,65	**173,448**	**mAh**

NORMAL CONSUMPTION (at -20°C)

	I instant (mA)	Ton (s)	Toff		
406 test burst	3900	0,52	50	40,544	mA
Logic, led and oscillator	17	1	0	17,000	mA
121,5 MHz	37	48	2	35,520	mA
GPS receiver	76	40	1500	1,974	mA
flash	500	0,1	2,900	16,667	mA
			Total	111,704	mA
		after 48h 406 MHz + 48h 121.5 MHz		**5361,815**	**mAh**

ENERGY MARGIN

	Derating		
Fresh battery capacity at +20°C	100%	11200	mAh
Derating for battery capacity at -20°C	15	1680	mAh
6 years weekly test		314,843	mAh
self discharge after 6 years at +20°C	18	2016,00	mAh
Requested energy for 6 years constant operation prior to activation		173,448	mAh
Requested energy for total operations		5361,815	mAh

Margin	**1653,894**	**mAh**
Or	14,8	%

PREVIOUS TIME OF BATTERY DISCHARGE

Battery capacity loss after 6 years at +20°C	2504,291	mAh
Previous time of battery discharge	**22,42**	**heures**