CHAPTER 7

THERMAL SHOCK, LEAKAGE AND IMMERSION TESTS

7.1. TEST SPECIFICATIONS AND SEQUENCE

7.1.1 Test specifications

Following section A7.0 of RTCM Recommended Standards for 406 MHz Satellite PLBs
(Version 1.1 Feb 4, 2003)
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7.1.2 Test sequence

• Leave beacon in off position throughout test .

• Place the beacon in an atmosphere of + 65 ± 3°C for one hour.

• Fully immerse beacon in water at + 20 ± 3°C to a depth of 100 ± 5 mm measured from it highest point to the surface of water for a period of 48 hours (Test equipment : Pressure Chamber).

• At the end of test immersion period set the chamber to 0.1 kg/cm^2 to simulate a 1 meter head of water .

• Leave pressure on for five minutes.

• Remove beacon from chamber, wipe it dry and perform an aliveness test then check that there is no free water inside the case.

7.2. EQUIPMENT UNDER TEST

Beacon Unit	:	1/2 (with 50 ohm output)	2/2 (normal fitted PLB)
Name	:	MARTEC / KANNAD	MARTEC / KANNAD
Type	:	XS3_GPS	XS3 GPS
Number	:	UT1	UT2

7.3 TEST SITE

INTESPACE Metrology.

7.4. TEST EQUIPMENT

• Pressure chamber : Intespace 100 liters Pressure Chamber (see photo next page),

• Pressure sensor : LEYDOLD Vacuum Menbranovac - Type: DM11- SN: 15791 & 16813 – Validity: 11/2008

• Pressure reducer.

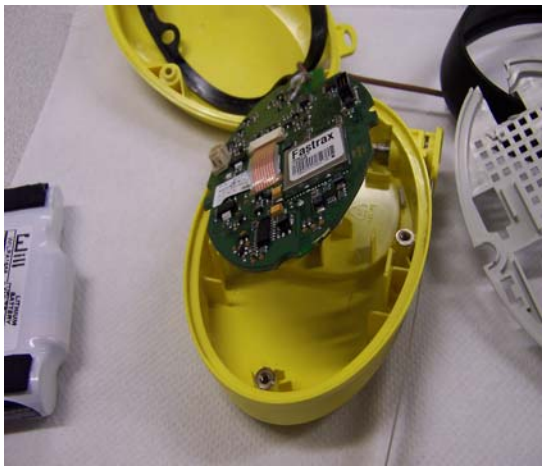
• Nitrogen cylinder.

• Argos - Cospas/Sarsat Test Bench.

LEAKAGE AND IMMERSION TEST

UT2 after test

UT1 after test



7.5. TEST RESULTS

7.5.1 Test implementation

Place : INTESPACE Laboratory

Date	Hour	Events - Observations
October 5th, 2007	11:30	Beacons leaved in thermal chamber at + 65 °C for one hour minimum
	12 :15	Beacons at + 64.5 °C
	14:15	Beacons submerged under 100 mm of water for 48 hours minimum in pressure chamber
October 8th, 2007	8 :30	End of thermal shock test : Beacons self test OK
	16:20	Beacons submerged and chamber pressurized to $1.1*10^4$ Pascal for five minutes (≈ one meter of water depth)
	16:25	Chamber depressurized and then beacons removed, wiped and dried.
	17 :00	Electrical checks on UUT1 : See results of aliveness test next page Self test control on UUT2 : OK
	19 :15	Beacons opened for visual inspection at ≈ 22 °C: **OK**. Nothing abnormal to note

7 . 5.2 BEACON CONTROL TEST RESULTS AFTER IMMERSION TEST

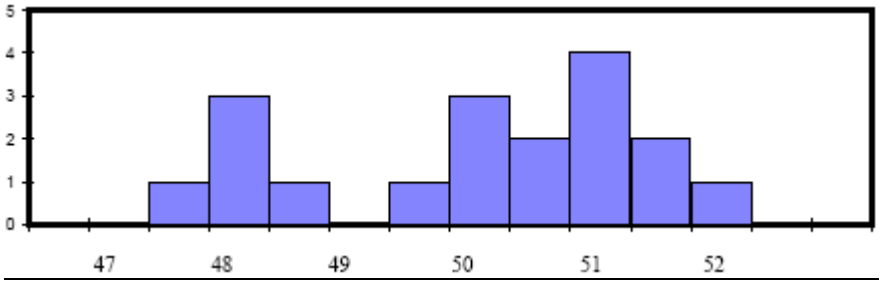
Beacon Unit : 1/2 (with 50 ohm output)
Name : MARTEC / KANNAD
Type : XS3_GPS
Number : UUT1

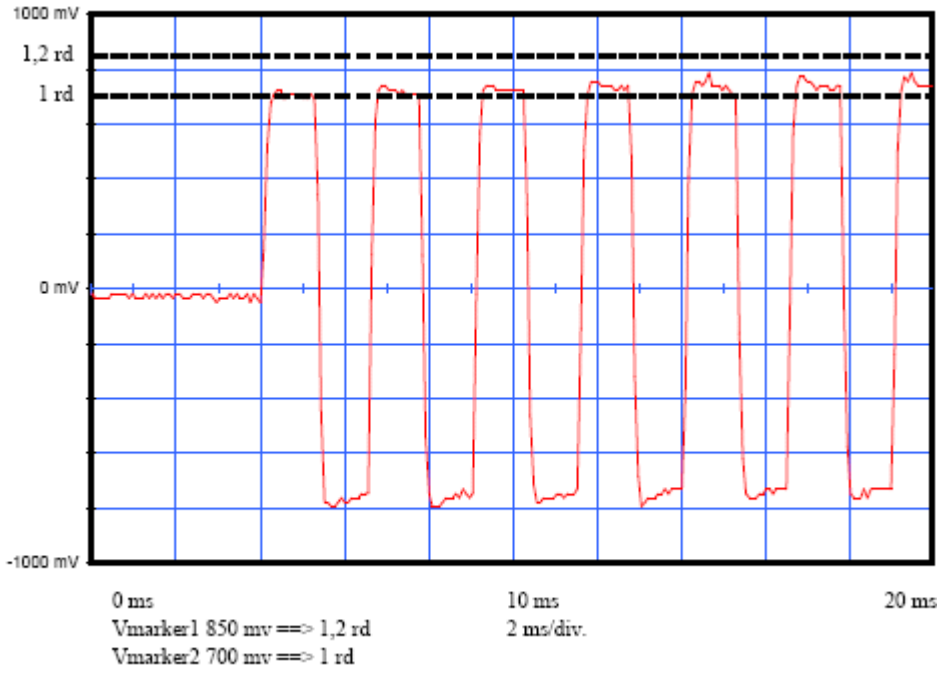
Message

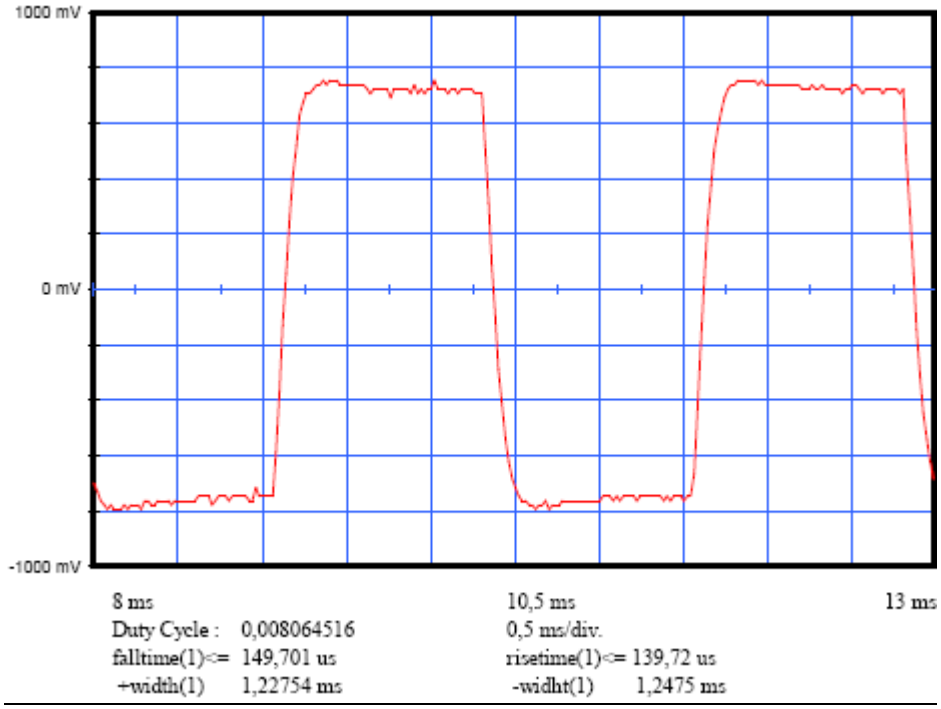
Message received		FFFE2F8E3E2293E02B8036AFFAF78E0159E3	
Format Flag	25	1	
Protocol flag	26	0	
Ident./Position code	27-85		
Country Code/Country	27-36	227 / FRANCE	
Protocol Code : U/Std-Nat	37-39/37-40	1110	
Protocol Code Used	37-39/37-40	Test-Standard Location	
Identification Data	40-85/41-64/41-58		
Identification Used			
Calculated BCH1	25-85	1ABFEB	
Encoded BCH1	86-106	1ABFEB	
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	9E3	
Encoded BCH2	133-144	9E3	
Latitude position		Nord 43° 33' 32"	
Longitude position		Est 1° 28' 40"	
Delta position	< 5 km	0,076 km	

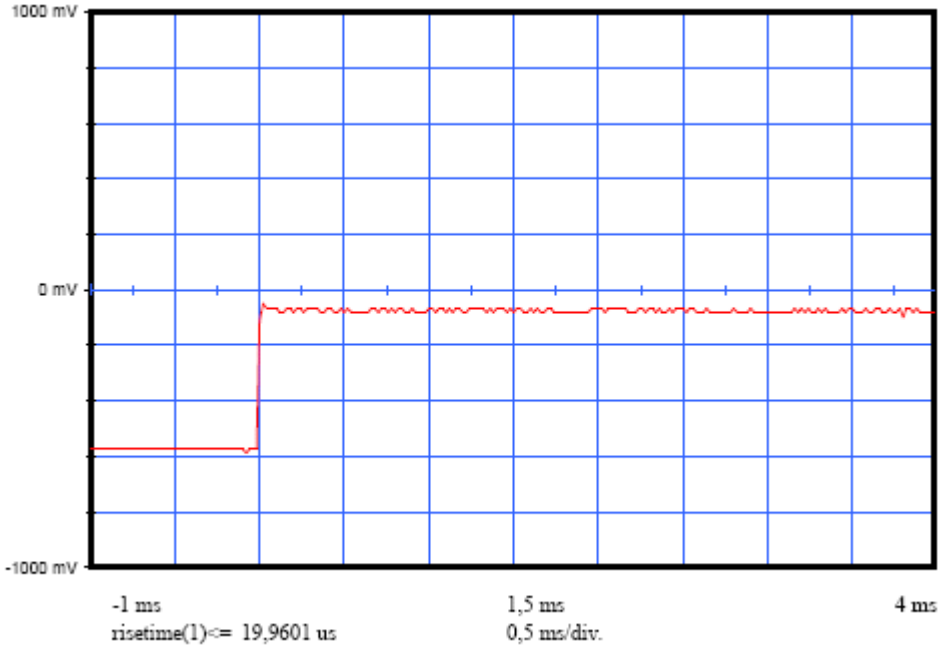
Electrical and other parameters

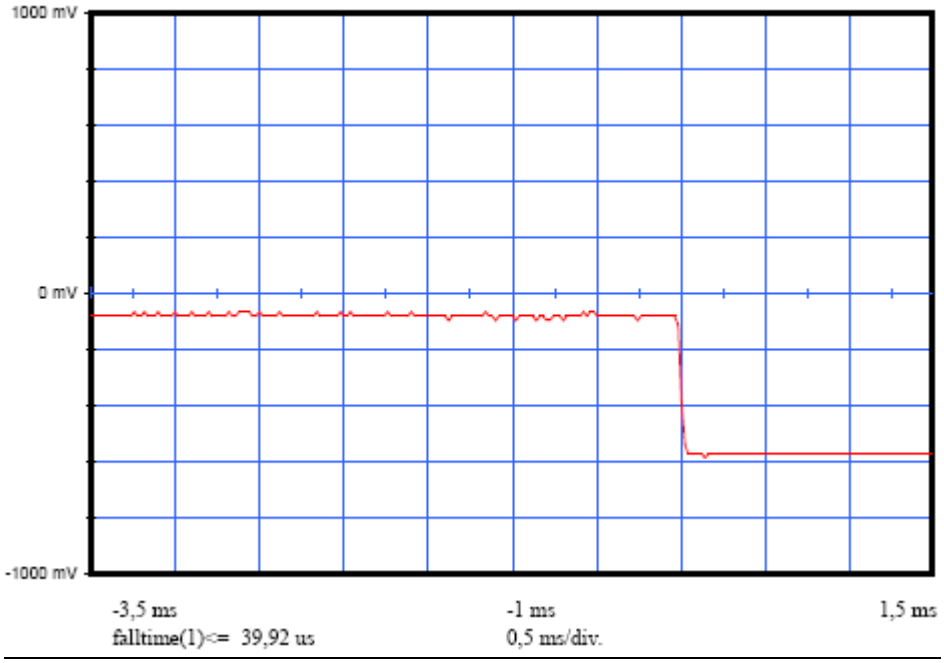
CW preamble	ms 158,4 <	< 161,6	160,36
Total transmission time	ms 514,8 <	<525,2	519,57
Modulation frequency	Hz 396<	< 404	401,51
Phase deviation : total	rd	<=2,40	2,15
Phase deviation : positive	rd 1,00 <	< 1,20	1,08
Phase deviation : negative	rd -1,20 <	< -1,00	-1,08
Symmetry measurement	%	<=5 %	0,81
Nominal frequency : F2	Hz		406027821,38
Short term2			6,27E-11
Short term3			1,18E-10
Slope			-1,11E-10
Residual			1,39E-10
406 MHz power output	dBm		35,5
Homing frequency	MHz		121,50
121,5 MHz power output	dBm		18,2
Soak temperature	°C		22,8
Extra feature			No
First Burst Delay	> 47,5 sec		> 50 sec

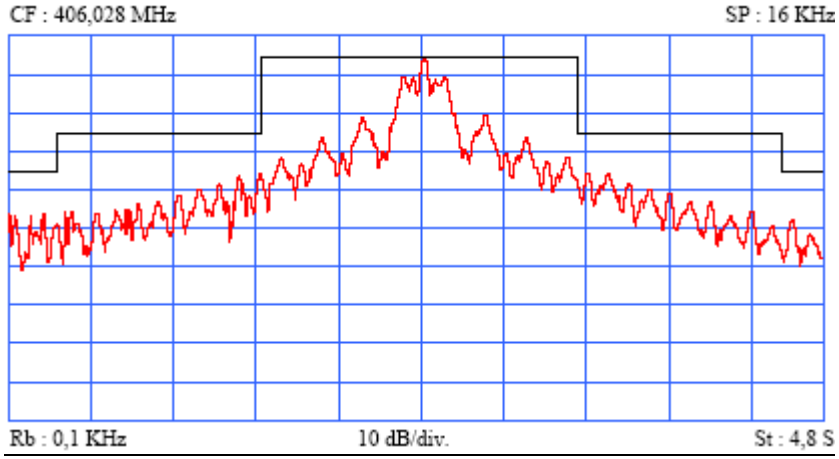


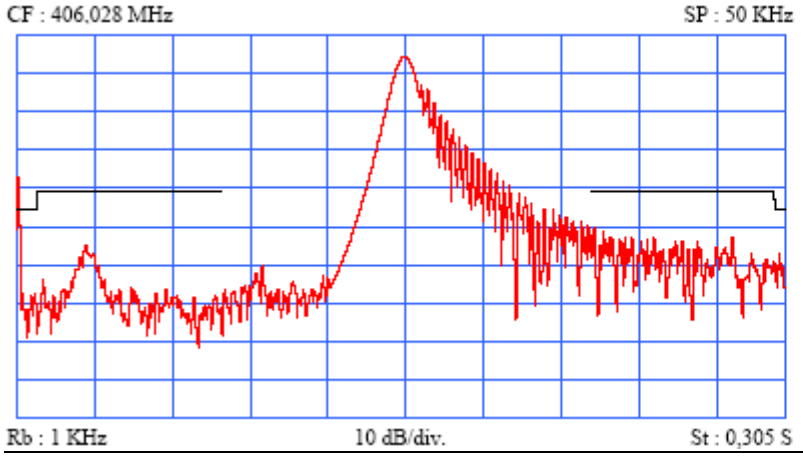

1000 mV
1,2 rd
1 rd
0 mV
-1000 mV
0 ms
10 ms
20 ms
Vmarker1 850 mv ==> 1,2 rd
Vmarker2 700 mv ==> 1 rd
2 ms/div.

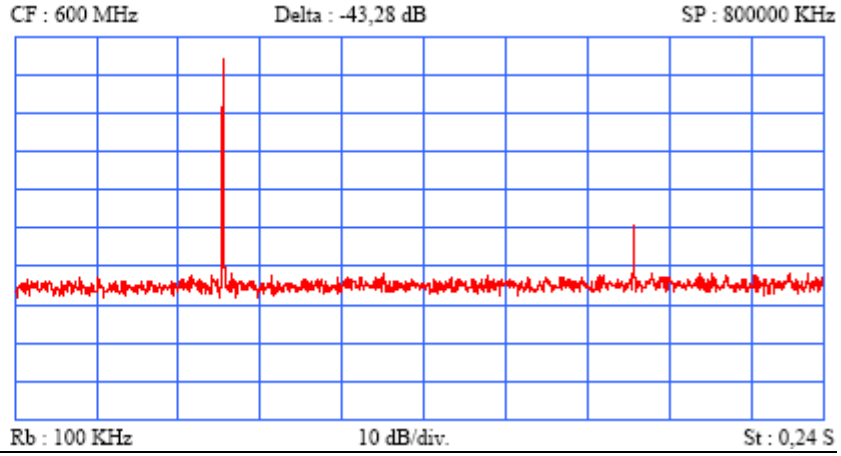

1000 mV
0 mV
-1000 mV
8 ms
10,5 ms
13 ms
Duty Cycle : 0,008064516
falltime(1)<= 149,701 us
+width(1) 1,22754 ms
0,5 ms/div.
risetime(1)<= 139,72 us
-widht(1) 1,2475 ms


1000 mV
0 mV
-1000 mV
-1 ms
1,5 ms
4 ms
risetime(1)<= 19,9601 us
0,5 ms/div.

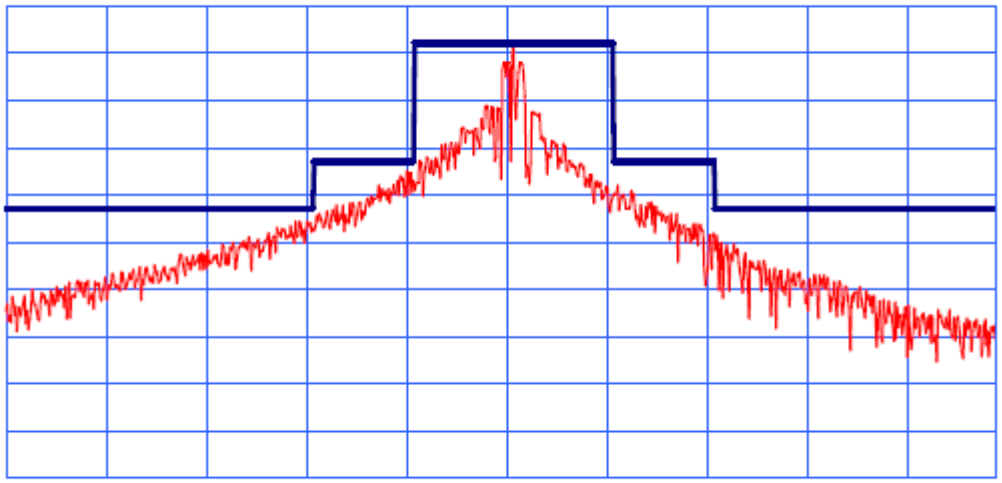

1000 mV
0 mV
-1000 mV
-3,5 ms
-1 ms
1,5 ms
falltime(1)<= 39,92 us
0,5 ms/div.


CF : 406,028 MHz
SP : 16 KHz
Rb : 0,1 KHz
10 dB/div.
St : 4,8 S


CF : 406,028 MHz
SP : 50 KHz
Rb : 1 KHz
10 dB/div.
St : 0,305 S


CF : 600 MHz
Delta : -43,28 dB
SP : 800000 KHz
Rb : 100 KHz
10 dB/div.
St : 0,24 S

CF : 121,5 MHz SP : 125 KHz



Rb : 0,1 KHz 10 dB/div. St : 37,5 S