TEST REPORT

No 203 936 EMC Ed. 1.0

AIS AtoN V3

KANNAD

ELECTROMAGNETIC COMPATIBILITY

SPECIFICATIONS : IEC 60945 Fourth edition 2002-08
EN 301843-1 V1.2.1 (2004-06)

Date: May 2011

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CONTENTS

1. INTRODUCTION

This report only concerns the product submitted for tests and described on page 7.

This product doesn't be sold.

2. TEST HOUSE

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Country : France
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People in charge : M. DELLASCHIAVA Dominique

2.2. MANUFACTURER INFORMATION

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3. SPECIFICATIONS REFERENCES

3.1. SPECIFICATION APPLIED FOR THE PRODUCT ON TEST

All testing are made in accordance with this generic or product specification.

EN 60945 : 2002 **Maritime navigation and radiocommunication equipment and systems. Genenral requirements. Methods of testing and required test results.**

EN 301843 –1 V1.2.1 (2004-06)
Electromagnetic compatibility and Radio spectrum Matters; Electromagentic Compatibility standard for marine radio equipment and services;
Part 1: Common technical requirements

EN 301843 –2 V1.2.1 (2004-06)
Electromagnetic compatibility and Radio spectrum Matters; Electromagentic Compatibility standard for marine radio equipment and services;
Part 2: Specific conditions for VHF radiotelephone transmitters and receivers

3.2. DIFFERENTIAL APPLICATION

As defined by manufacturer

§ 8.4.2.6 Method of test (exposed equipment)

The test is realized in a temperature of -40°C ±3°C

4. THE PRODUCT

4.1. PRODUCT DESCRIPTION

The beacon AIS AtoN V3 is a transceiver in the 160MHz band according to Type 3 AIS AtoN station capability.
The transceiver is housed in a dome composed by a cover and a manufactured base.

4.2. GENERAL SPECIFICATIONS

Height: 160mm
Diameter: 170mm

Weight: 1040g

Voltage: 12 or 24Vdc

Other characteristics:

RF output power :	High: 12W/Low: 2W
Frequencies:	Tx: 161.975 and 162.025 MHz
	Rx: 161.975 and 162.025 MHz

4.3. PRODUCT IDENTIFICATION

Model	AIS AtoN V3
Serial number:	AVS0001, AVS0002 & AVS0003
Soft version:	
State:	Serial

Note: The product must be full representative of commercial equipment.

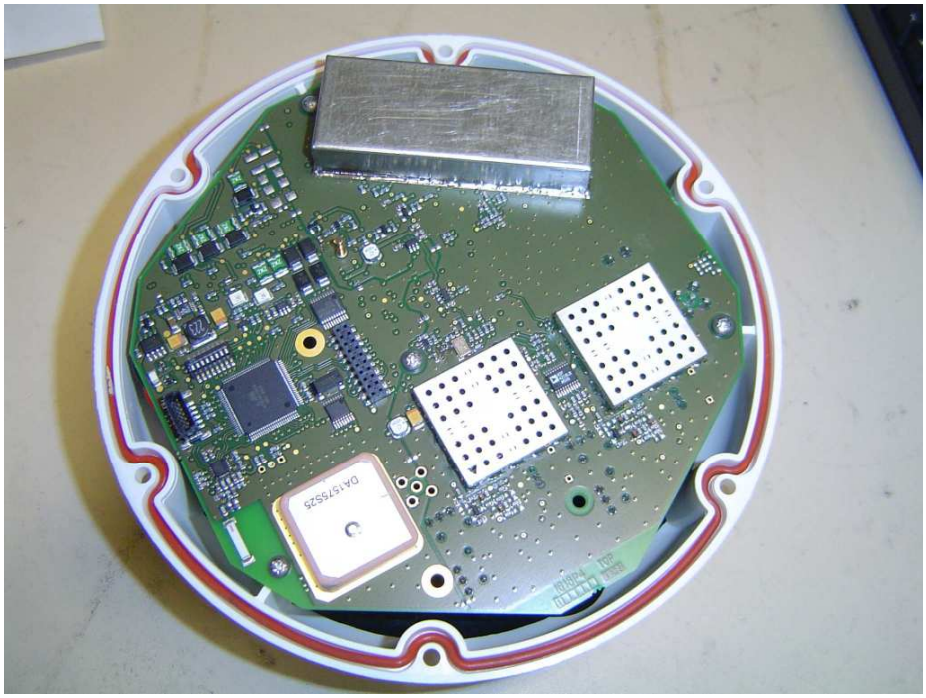
4.4. INTERCONNECTION CABLES

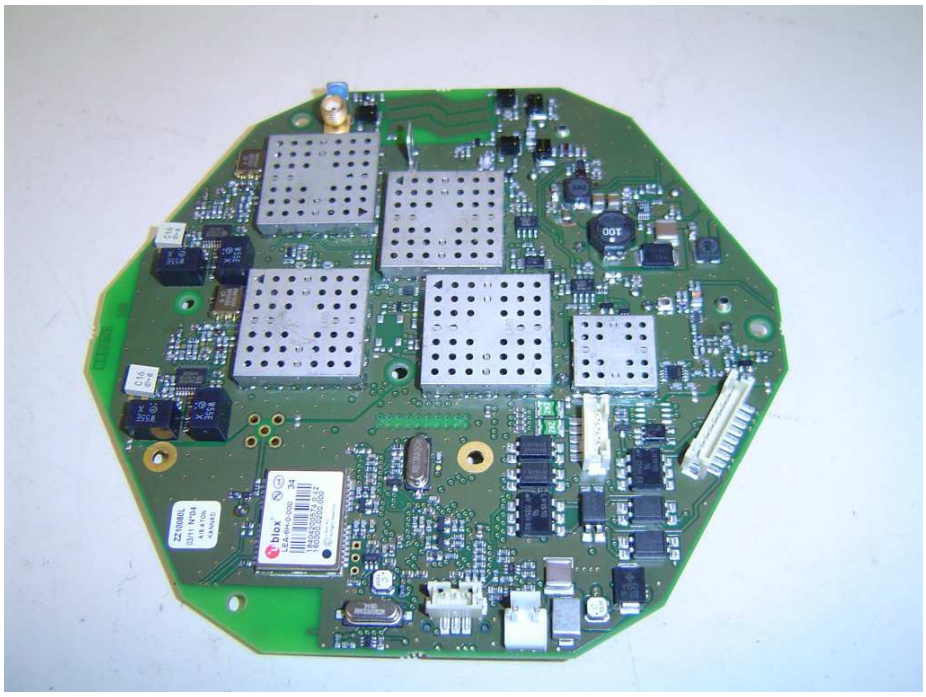
Cable (Ref)	Identification	Timbering		Lenght (m)	Qty
		braid	sheet		
1	Power supply & RS232 cable	X		5	1
2	RS485 cable	X		5	1
3	Coaxial cable (RG213)	X		5	1
4					

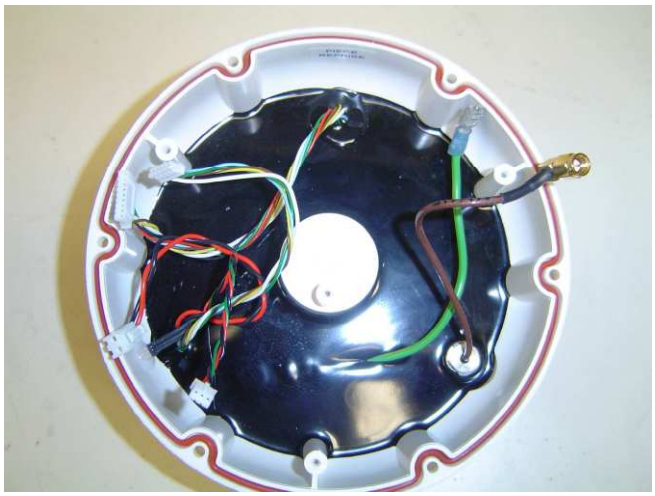
4.5. PERIPHERICAL EQUIPMENTS

Périphérical 1	Type : Serial n°:	Manufacturer :
Périphérical 2	Type : serial n°:	Manufacturer :
Périphérical 3	Type : serial n°:	Manufacturer :
Périphérical 4	Type : serial n°:	Manufacturer :

5. PICTURE







6. MEASUREMENTS

6.1. GENERAL CONDITIONS DURING THE TESTS

Made inside anechoïd room.

Temperature : 20°C

Humidity : 71%

6.2. MEASUREMENT INSTRUMENTATION UNCERTAINTY

Conducted distrubance (mains port) (150kHz – 30MHz)	±3,6dB
Vertically polarised radiated disturbance at a distance of 3m : - From 30MHz to 200MHz : - From 200MHz to 1GHz	 ±4.7dB ±4.7dB
Horizontally polarised radiated disturbance at a distance of 3m : - From 30MHz to 200MHz - From 200MHz to 1GHz	 ±4.9dB ±4.9dB
Immunity to continuous conducted signals (frequencies>150kHz)	±2.6dB
Immunity to surges on signal lines, AC and DC ports	±5.0dB
Immunity to electrical fast trensients	±3.8dB
Immunity to radiated electromagnetic fields	±2.8dB
Immunity to electrostatic discharge	±5.4dB
Temperature	±1°C
Humidity	±10%

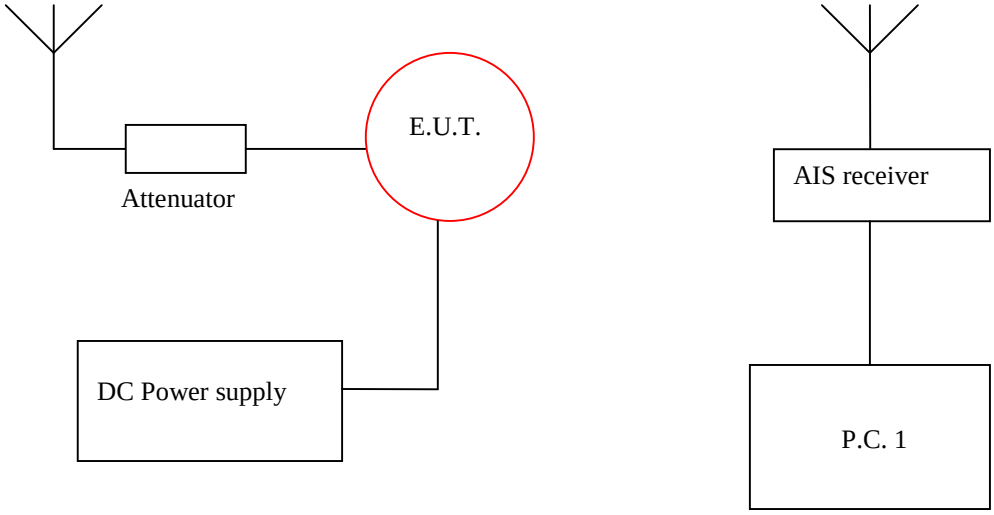
7. DOCUMENTS ON THE PRODUCT

- **See 203936DOC**
- **Radio report n° 203936RADIO Ed 1.0 by KENTA ELECTRONIC**
- **Safety report n° 203936ES Ed 1.0 by KENTA ELECTRONIC**
- **Functional report n° DRD11072A by KANNAD**

8. OPERATIONAL STATE

All tests were carried out with unmodified test sample, which were operating in normal operation mode for receiver part and test or normal operation mode for transmitter part.

Configuration of transmitter's test :



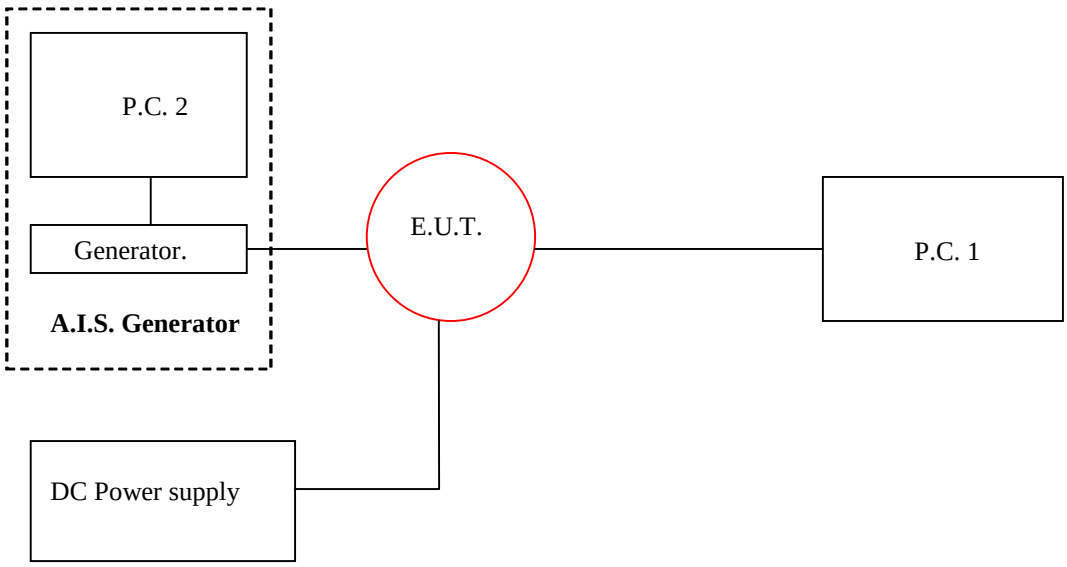
Normal operation mode:

The transmitter send a AIS message on 161.975 MHz and on 162.025 MHz every 6min with a delay of 3min between each transmition. Every message is received by the AIS receiver and displayed on the P.C. 1.

Test operation mode :

The transmitter is configured by switch to send on 161.975 MHz or 162.025 MHz a test message (AIVDM . . MoMoMo…) every 5s. Every message is received by the AIS receiver and displayed on the P.C. 1.

Configuration of receiver's test :



The AIS generator send, on 161.975 MHz or on 162.025 MHz, one message by second and each message contains four packets. Every packet received by the AtoN is displayed and recorded on the P.C. 1.

The quality of the reception is specified by the Packet Error Rate (PER).

Calculation of the PER

$PER\ (\%) = (P_{TX} - P_{RX})/P_{TX} \times 100$

P_{TX} is the number of transmitted packets.
P_{RX} is the number of packets received without errors.

9. TESTING EQUIPMENTS

9.1. VIBRATIONS

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
Magnetic vibrator Gearing & Watson	V400LD		
Amplifier Gearing & Watson	DSA4-6K	*93/A6Q/6148*	
Control Accelerometer DYTRAN	Model 3055B2	*6452*	2011.01
Measurement Accelerometer DYTRAN	Model 3055B2	*6453*	2011.01
Driving and acquisition system PUMA system	SD 2402-9700-2 Software option: Sinus: - SD 2400-9418 Search & Dwell: - 2400-9465	*2400-2259*	12/2010

9.2. DRY HEAT, DAMP HEAT AND LOW TEMPERATURE

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
Climatic Test Chamber Vötsch	VC^3 4100	59566127890 010	06/09/2008

9.3. EMISSION

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
Spectrum Analyser Rhode & Schwartz	100Hz-5GHz FSQ8	200207	08/2010
Log Periodic Antenna n°1	30MHz – 1GHz		
Log Periodic Antenna n°4	HyperLog 30180	022	
Large loop Antenna	RF300	9043	
Coaxial cable n°1	1.5m		
Coaxial cable n°2	4m		
Anechoïd room			
Rotating board			

9.4. CONDUCTED EMISSION

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
Dual Phase V Network Telmeter Electronic	NNB-2/16Z	03/10206	09/2010
EMI test receiver Rohde et Schwarz	E.S.P.C.	843756/024	09/2010

9.5. CONDUCTED DISTURBANCE

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
Signal Generator Marconi Instrument	2024	112255/061	09/2010
Power Amplifier RFPA	RF12	158	
Current injection probe Solar Electronics	9108-1N	031214	09/2010

9.6. RADIATED DISTURBANCE

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
Signal Generator Marconi Instrument	2024	112255/061	09/2010
Power Amplifier PST	AR1658-50 AR4819-50		
Power Amplifier RFPA	AP9002000-10	073481	
Fieldmeter Chauvin Arnoux	C.A. 43		09/2010
Log Periodic Antenna n°1	30MHz – 1GHz		
Log Periodic Antenna n°2	1GHz – 4GHz		

9.7. TRANSIENTS

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
EFT Generator EMC PARTNER.	Transient 2000IN4	1101	11/2009
Capacitive coupling clamp	KCT	198	

9.8. ELCTROSTATIC DISCHARGE

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
ESD Generator EMC Partner	Transient 2000IN4	1101	11/2009
EMC Partner	ESD2000	327	

9.9. ANCILLARIES ADDITIONALY USED FOR TESTING

NAME AND MARK OF INSTRUMENT	MODEL	SERIAL N°	CALIBRATION
P.C 2 DELL	Optiplex GX620	B6STC2J	
P.C. 1 DELL	Latitude 120L	1JT1P2J	
Signal Generator AGILENT	E4438C	MY45092482	23/09/2010
AIS Receiver SevenStar Electronics Ltd	S.287	287010	
Attenuator SPINNER	745395 200W 30dB 50Ω	22714	

10. CONCLUSION

Tests are made from the 24th Febuary 2011 to 14th April 2011.

All measurements complied with the specifications EN 60945 : 2002

Durability and resistance to environmental condition:
- Dry heat
- Damp heat
- Low temperature
- Vibration

Emission :
- Radiated emission
- Conducted emission

Immunity :
- RF common mode
- RF electromagnetic field
- Fast transients
- Power supply failure
- Electrostatic discharge

	Nom	Date	Signature
Tests made by :	T. RONARC'H	12th May 2011	
Tests approved by :	JY. CHRISTIEN	12th May 2011	

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Edition	Report Status	Date of issue
Ed. 1.0	Creation	12 May 2011

This test report n° 203 936EMC Ed 1.0 contains 149 pages numbered 1/149 à 149/149 and 1 annex.

11. POWER SUPPLY – METHODS OF TESTING AND REQUIRED TEST RESULTS

11.1. EXTREME POWER SUPPLY

The extreme variations in the power supplies in ships are described in IEC 60092-101. To test for these, the combinations of power supply variations given in table 1 shall be used as appropriate to the EUT.

Table 1 – Extreme power supply variation

Power supply	Voltage variation	Frequency variation %
d.c.	+10Vdc to +30Vdc	Not applicable

Tests and performance checks at extreme power supply conditions shall be performed under the environmental conditions indicated in table 2.

Table 2 – Schedule of performance tests and checks

Environment	Normal power supply	Extrem power supply
Dry heat	Performance test	Performance check
Damp heat	Performance check	-
Low temperature	Performance test	Performance check
Normal Temperature	Performance test	Performance test

11.2. EXCESSIVE CONDITIONS

These conditions exceed the extreme test conditions in which the EUT is required to operate, with or without performance degradation, as indicated in the equipment standard. Excessive current is defined as greater than normal working current.

Excessive voltage is greater than that specified in 11.1 Protection shall be provided against such excesses at an appropriate level chosen by the manufacturer and, when activated, may require the EUT to be reset, for example by fuse replacement. The power supply shall be adjusted to cause activation of the protection and after EUT reset, a performance check under normal test conditions shall be carried out.

Power supply misconnections are also regarded as excessive conditions. Where appropriate, the EUT shall be subjected to an input from a power supply of reversed polarity or improper phase sequence for a period of 5 min. After completion of the test, and reset of the protection of the EUT, if required, the power supply shall be connected normally and a performance check shall be carried out.

12. DURABILITY AND RESISTANCE TO ENVIRONMENTAL CONDITIONS –METHODS OF TESTING AND REQUIRED TEST RESULTS

Table 3 – Durability and resistance to environmental conditions

Dry heat	**§12.1**
Damp heat	**§12.2**
Low temperature	**§12.3**
Thermal shock	NA
Drop onto hard surface	NA
Drop into water	NA
Vibration	**§12.4**
Rain and spray	**§12.5**
Water immersion	NA
Solar radiation	NA
Oil resistance	NA
Corrosion	NA

Position of the equipment in the climatic chamber

12.1. DRY HEAT

12.1.1. STORAGE TEST (PORTABLE, EXPOSED AND SUBMERGED EQUIPMENT)

12.1.1.1. PURPOSE

To simulate the effects of temperature stress on equipment in the non-operating (un-powered) mode. A temperature of +70 °C is the maximum likely to be encountered in enclosed spaces on ships and in equipment exposed to the full effects of solar radiation in ports.

12.1.1.2. METHOD OF TEST

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be raised to and maintained at +70 °C ± 3 °C, for a period of 10 h to 16 h.
At the end of the test, the EUT shall be returned to normal environmental conditions and then subjected to a performance check as specified in the relevant equipment standard.
Further information is given in IEC 60068-2-2 and IEC 60068-2-48.

12.1.1.3. RESULTS

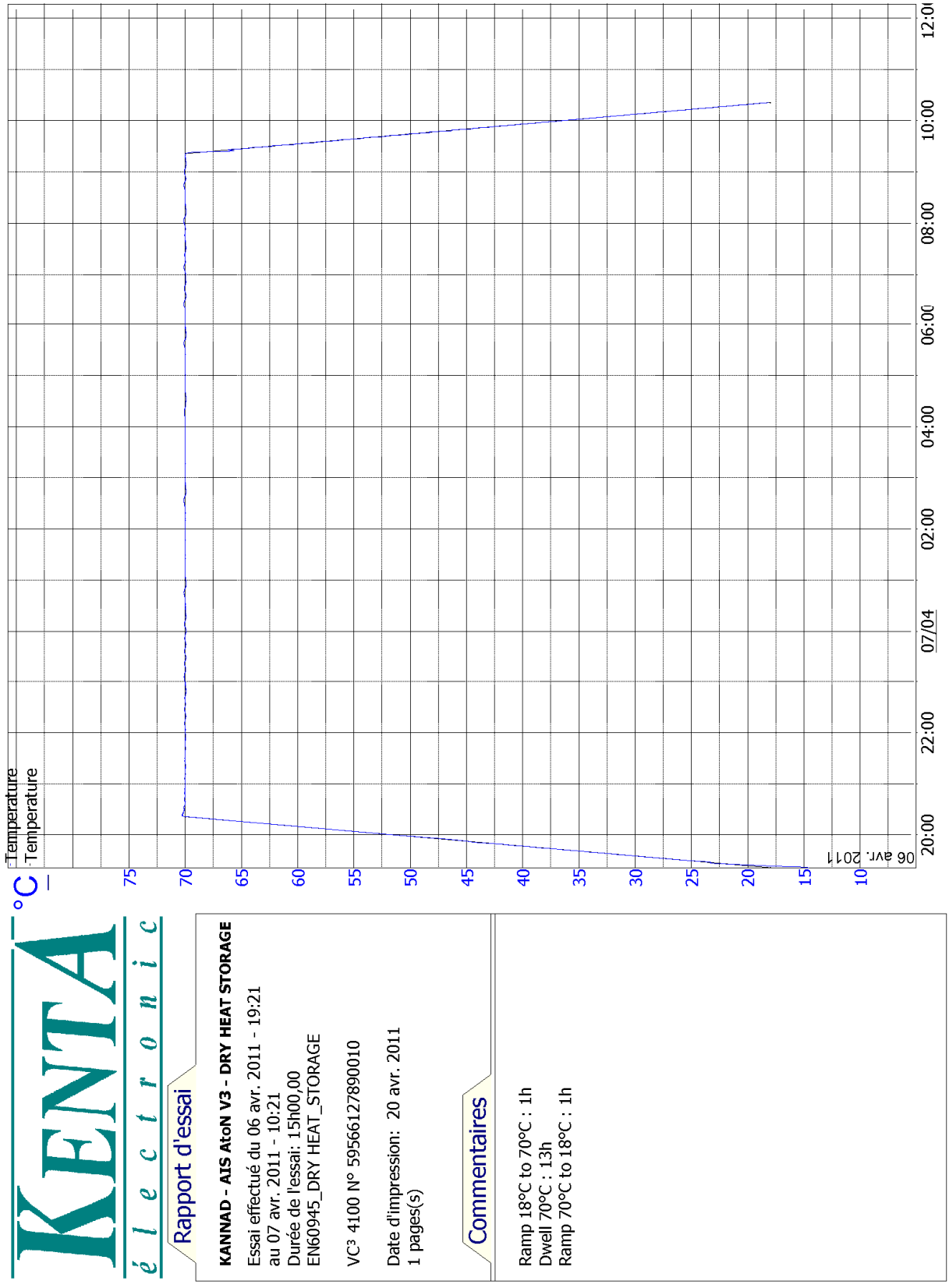
Start: **06th April 2011 – 19h21**
Stop: **07th April 2011 – 10h21**
Duration: **15h00**
Performance Check: **test ok**

Check transmitter :

"07/04/2011 16:48:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRK=flsAs4cP0RN23k`4m0E2CkP,0*32
"07/04/2011 16:51:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRH=fluis4cP0RN23k`4m0E2CkP,0*1C
"07/04/2011 16:54:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRM=flwQs4cP0RN23k`4m0E2CkP,0*20
"07/04/2011 16:57:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndR;=flt1s4cP0RN23k`4m0E2CkP,0*36
"07/04/2011 17:00:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRD=flwQs4cP0RN23k`4m0E2CkP,0*29
"07/04/2011 17:03:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndR<=flt1s4cP0RN23k`4m0E2CkP,0*31
"07/04/2011 17:06:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndR4=flt1s4cP0RN23k`4m0E2CkP,0*3A
"07/04/2011 17:09:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRD=flt1s4cP0RN23k`4m0E2CkP,0*49
"07/04/2011 17:12:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRB=flvAs4cP0RN23k`4m0E2CkP,0*3E

Check receiver :
Test ok (PER < 1%)

COMPLIANT



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Rapport d'essai

KANNAD - AIS AtoN V3 - DRY HEAT STORAGE

Essai effectué du 06 avr. 2011 - 19:21
au 07 avr. 2011 - 10:21
Durée de l'essai: 15h00,00
EN60945_DRY HEAT_STORAGE

VC³ 4100 N° 5956127890010

Date d'impression: 20 avr. 2011
1 pages(s)

Commentaires

Ramp 18°C to 70°C : 1h
Dwell 70°C : 13h
Ramp 70°C to 18°C : 1h

12.1.2. FUNCTIONAL TEST

12.1.2.1. PURPOSE

This test determines the ability of equipment to be operated at high ambient temperatures and to operate through temperature changes. The reasonable maximum air temperature likely to be encountered over the sea is +32 °C and the maximum solar gain at sea is +23 °C giving +55 °C as the maximum temperature likely to be encountered by ships at sea.

12.1.2.2. METHODE OF TEST

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The EUT and, if appropriate, any climatic control devices with which it is provided shall then be switched on. The temperature shall then be raised to and maintained at +55 °C ± 3 °C.
At the end of a soak period of 10 h to 16 h at +55 °C ± 3 °C, the EUT shall be subjected to a performance test and check as specified in the relevant equipment standard.
The temperature of the chamber shall be maintained at +55 °C ± 3 °C during the whole performance test period.
At the end of the test, the EUT shall be returned to normal environmental conditions.

Procedure according to IEC 60068-2-2

12.1.2.3. RESULTS

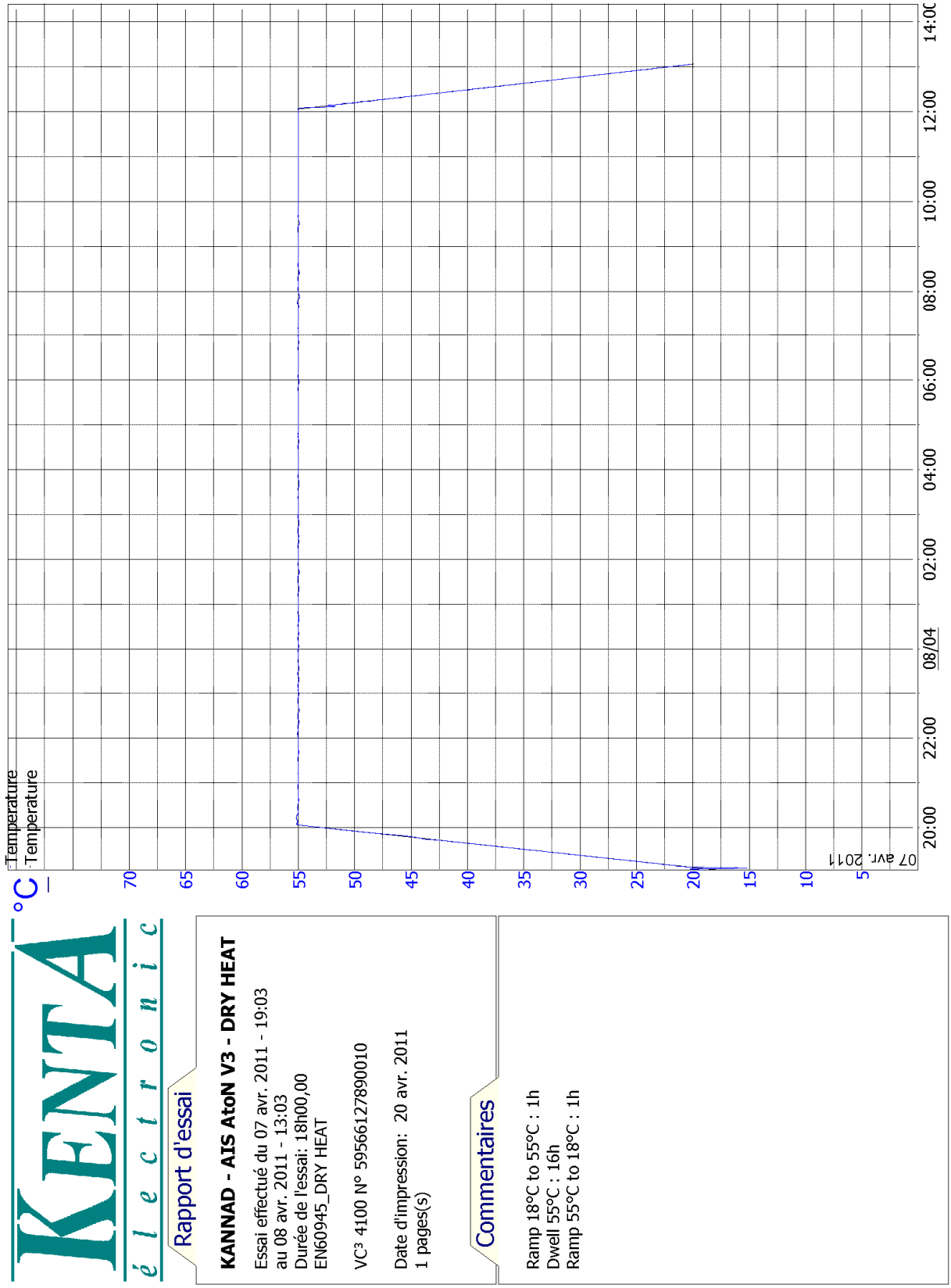
Start: **07th April 2011 – 29h03**
Stop: **08th April 2011 – 13h03**
Duration: **18h00**
Performance Check: **test ok**

Check transmitter :

"11/04/2011 10:06:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRT=fluis4cP0R>23k`4m0E2CkP,0*73
"11/04/2011 10:09:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRc=fm0As4cP0RN23k`4m0E2CkP,0*5B
"11/04/2011 10:12:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRL=fm1Qs4cP0RN23k`4m0E2CkP,0*66
"11/04/2011 10:15:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndR@=fm0As4cP0RN23k`4m0E2CkP,0*78
"11/04/2011 10:18:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRK=fm0As4cP0RN23k`4m0E2CkP,0*70
"11/04/2011 10:21:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRH=flvAs4cP0RN23k`4m0E2CkP,0*37
"11/04/2011 10:24:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRB=flwQs4cP0RN23k`4m0E2CkP,0*2F
"11/04/2011 10:27:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRb=fm0As4cP0RN23k`4m0E2CkP,0*5A
"11/04/2011 10:30:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRI=fm0is4cP0RN23k`4m0E2CkP,0*5A

Check receiver :
Test ok (PER < 1%)

COMPLIANT



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Rapport d'essai

KANNAD - AIS AtoN V3 - DRY HEAT

Essai effectué du 07 avr. 2011 - 19:03
au 08 avr. 2011 - 13:03
Durée de l'essai: 18h00,00
EN60945_DRY HEAT

VC³ 4100 N° 595661278900010

Date d'impression: 20 avr. 2011
1 pages(s)

Commentaires

Ramp 18°C to 55°C : 1h
Dwell 55°C : 16h
Ramp 55°C to 18°C : 1h

12.2. DAMP HEAT

12.2.1. FUNCTIONAL TEST (PORTABLE, PROTECTED AND EXPOSED EQUIPMENT)

12.2.1.1. PURPOSE

This test determines the ability of equipment to be operated under conditions of high humidity.
A single cycle is used with an upper temperature limit of +40 °C which is the maximum that occurs in the earth's surface atmosphere with a relative humidity of 95 %.

12.2.1.2. METHOD OF TEST

The EUT shall be placed in a chamber at normal room temperature and relative humidity.
The temperature shall then be raised to +40 °C ± 2 °C, and the relative humidity raised to 93 % ± 3 % over a period of 3 h ± 0,5 h. These conditions shall be maintained for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period.
The EUT shall be switched on 30 min later, or after such period as agreed by the manufacturer, and shall be kept operational for at least 2 h during which period the EUT shall The temperature and relative humidity of the chamber shall be maintained as specified during the whole test period.
At the end of the test period and with the EUT still in the chamber, the chamber shall be brought to room temperature in not less than 1 h.
At the end of the test the EUT shall be returned to normal environmental conditions.

Further information is given in IEC 60068-2-30.

12.2.1.3. RESULTS

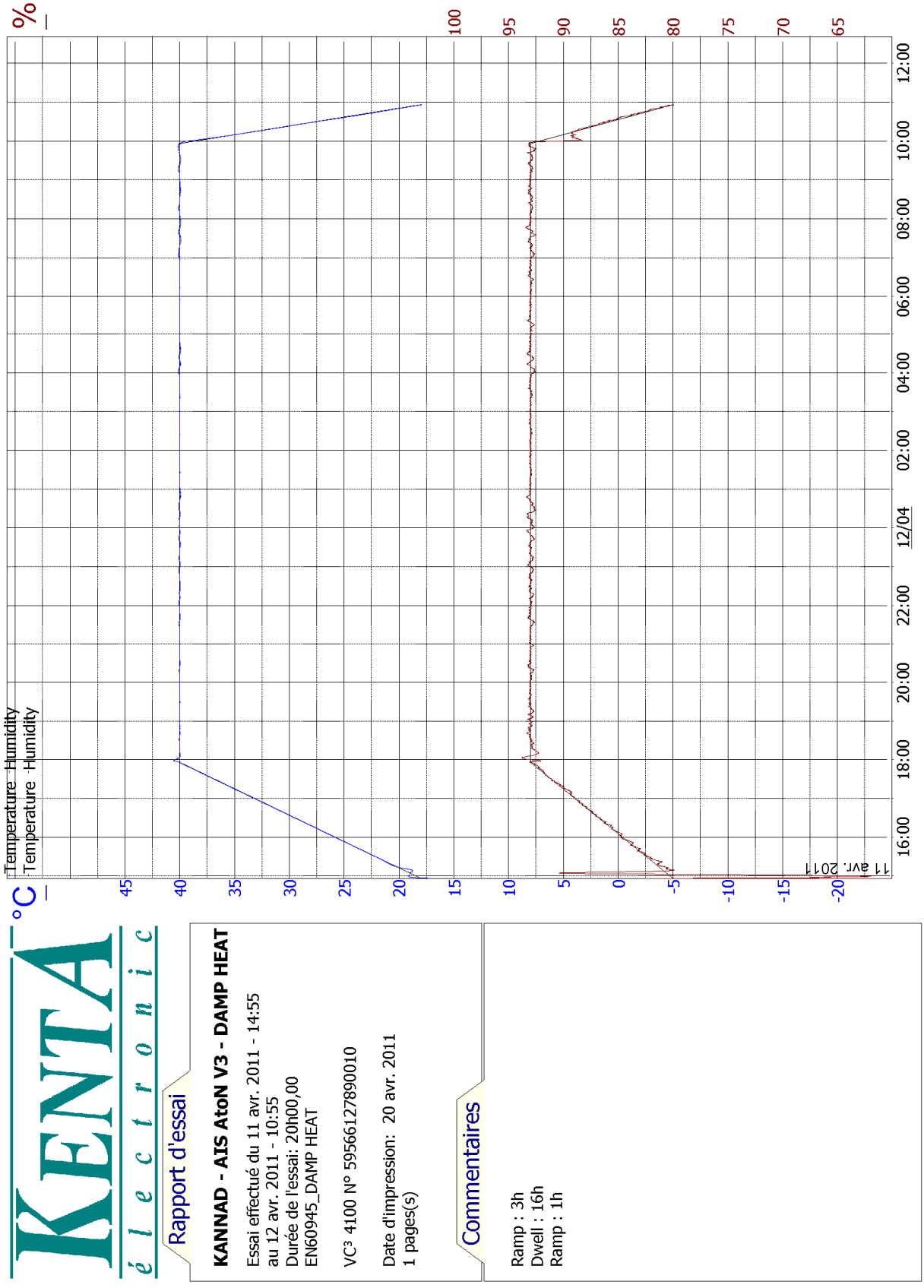
Start: **11th April 2011 – 14h55**
Stop: **12th April 2011 – 10h55**
Duration: **20h00**
Performance Check: **test ok**

Check transmitter :

"12/04/2011 13:51:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0b?ndS<=flt1s4cP0R>23k`4m0E2CkP,0*30
"12/04/2011 13:54:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRF=fm6As4cP0R>23k`4m0E2CkP,0*0B
"12/04/2011 13:57:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndR==fm1Qs4cP0RN23k`4m0E2CkP,0*14
"12/04/2011 14:00:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRP=fm0is4cP0RN23k`4m0E2CkP,0*43
"12/04/2011 14:03:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRP=fm3is4cP0RN23k`4m0E2CkP,0*43
"12/04/2011 14:06:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRp=fm4Qs4cP0RN23k`4m0E2CkP,0*5F

Check receiver :
Test ok (PER < 1%)

COMPLIANT


%
°C
Temperature Humidity
Temperature Humidity
100
95
90
85
80
75
70
65
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
16:00
18:00
20:00
22:00
12/04
02:00
04:00
06:00
08:00
10:00
12:00
11 avr. 2011
KENTA électronic
Rapport d'essai
KANNAD - AIS AtoN V3 - DAMP HEAT
Essai effectué du 11 avr. 2011 - 14:55
au 12 avr. 2011 - 10:55
Durée de l'essai: 20h00,00
EN60945_DAMP HEAT
VC³ 4100 N° 595661278900010
Date d'impression: 20 avr. 2011
1 pages(s)
Commentaires
Ramp : 3h
Dwell : 16h
Ramp : 1h

12.3. LOW TEMPERATURE

12.3.1. FUNCTIONAL TEST

12.3.1.1. PURPOSE

These tests determine the ability of equipment to be operated at low temperatures and also to demonstrate the ability of equipment to start up at low ambient temperatures.

12.3.1.2. METHODE OF TEST

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be reduced to, and maintained at –40 °C ± 3 °C, for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period.
The EUT shall be switched on 30 min later, or after such period as agreed by the manufacturer, and shall be kept operational for at least 2 h during which period the EUT shall be subjected to a performance check test and check as specified in the relevant equipment standard.
The temperature of the chamber shall be maintained at –40 °C ± 3 °C during the whole test period.
At the end of the test the EUT shall be returned to normal environmental conditions.

Procedure according to IEC 60068-2-1

12.3.1.3. RESULTS

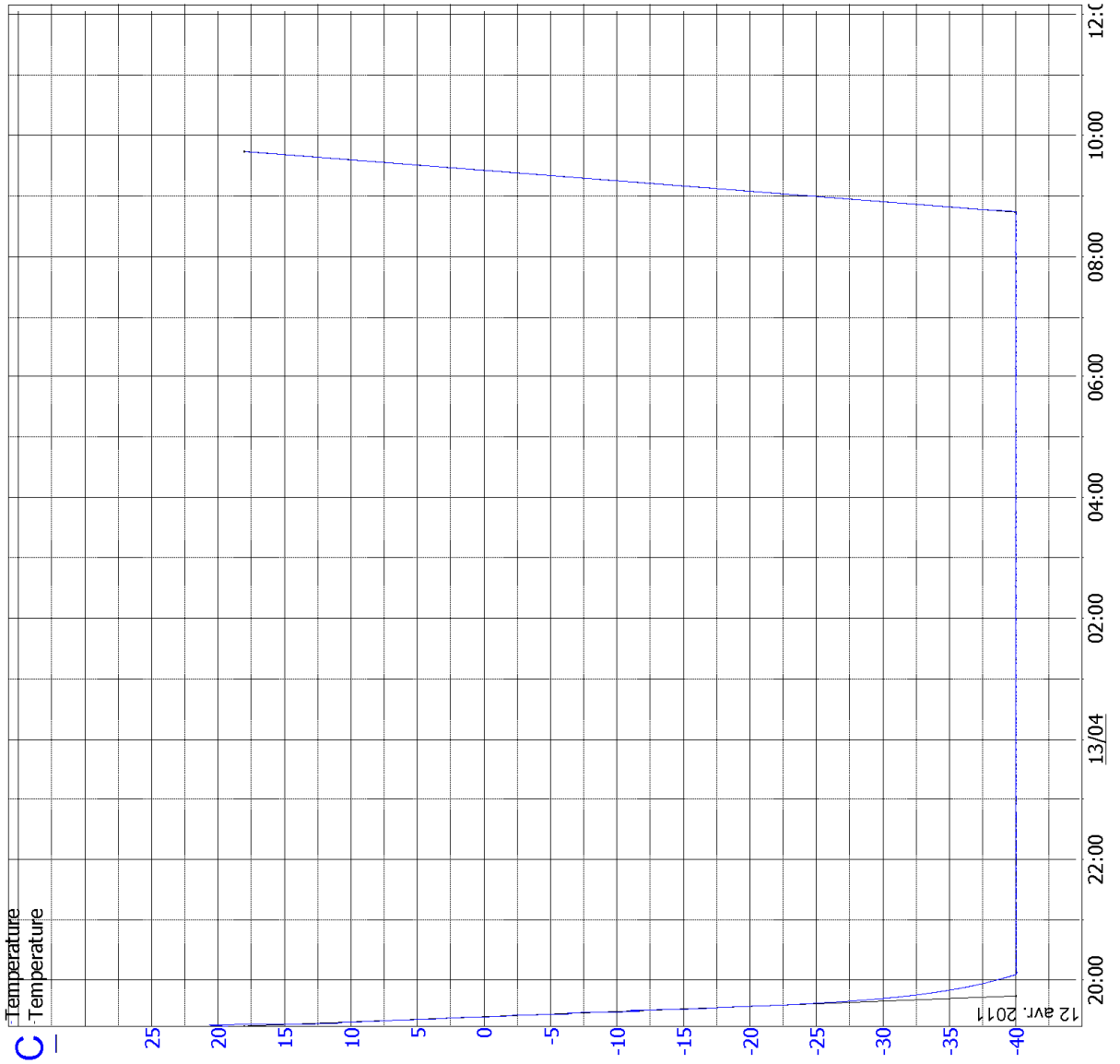
Start: **12th April 2011 – 19h14**
Stop: **13st April 2011 – 09h44**
Duration: **14h30**
Performance Check: **test ok**

Check transmitter :

"13/04/2011 10:39:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRB=fm0As4cP0RN23k`4m0E2CkP,0*7A
"13/04/2011 10:42:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRD=fltQs4cP0RN23k`4m0E2CkP,0*2A
"13/04/2011 10:45:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRH=flvAs4cP0RN23k`4m0E2CkP,0*37
"13/04/2011 10:48:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRJ=fltQs4cP0RN23k`4m0E2CkP,0*24
"13/04/2011 10:51:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRG=fltQs4cP0RN23k`4m0E2CkP,0*2A
"13/04/2011 10:54:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRf=fm0is4cP0RN23k`4m0E2CkP,0*75
"13/04/2011 10:57:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRc=fm1Qs4cP0RN23k`4m0E2CkP,0*4A
"13/04/2011 11:00:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRT=fm2Qs4cP0RN23k`4m0E2CkP,0*7D

Check receiver :
Test ok (PER < 1%)

COMPLIANT



KENTA électronic

Rapport d'essai

KANNAD - AIS AtoN V3 - LOW TEMPERATURE

Essai effectué du 12 avr. 2011 - 19:14
au 13 avr. 2011 - 09:44
Durée de l'essai: 14h30,00
EN60945_COLD_EXPOSED_-40°C

VC³ 4100 N° 5956127890010

Date d'impression: 20 avr. 2011
1 pages(s)

Commentaires

Ramp 18°C to -40°C : 30min
Dwell -40°C : 13h
Ramp -40°C to 18°C : 1h

12.4. VIBRATION

12.4.1. PURPOSE

This test determines the ability of equipment to withstand vibration without resulting in mechanical weakness or degradation in performance. The test simulates the effect of vibration induced in a ship's hull by its propeller and machinery. This is generally at frequencies of up to 13 Hz and predominantly vertical. The tests at higher frequencies simulate the effect of slamming which occurs in irregular stormy seas, and is predominantly horizontal. The test does not simulate the effect of regular seas giving the translational components of surging, swaying and heaving, and the corresponding rotational components of rolling, pitching and yawing which generally produce accelerations too small to be of consequence to electronic equipment.

12.4.2. METHODE OF TEST

The EUT, complete with any shock and vibration absorbers with which it is provided, shall be fastened to the vibration table by its normal means of support and in its normal attitude. The EUT may be resiliently suspended to compensate for weight not capable of being withstood by the vibration table. Provision may be made to reduce or nullify any adverse effect on EUT performance which might be caused by the presence of an electromagnetic field due to the vibration unit.
The EUT shall be subjected to sinusoidal vertical vibration at all frequencies between:

- **2 Hz to 5 Hz and up to 13,2 Hz with an excursion of ±1 mm ± 10 % (7 m/s2 maximum acceleration at 13,2 Hz);**
- **above 13,2 Hz and up to 100 Hz with a constant maximum acceleration of 7 m/s2.**

The frequency sweep rate shall be 0,5 octaves/min in order to allow the detection of resonances in any part of the EUT as mounted.
A resonance search shall be carried out throughout the test. During the resonance search the EUT shall be externally observed, by unaided visual and aural means, for obvious signs of any resonances of components or sub-assemblies, that may affect the integrity of the EUT. Such observations shall be recorded in the test report. If any resonance, as measured by a sensor fixed to the outside of the EUT at the location where obvious signs of resonance have been observed, has a magnitude ratio ≥5 measured relative to the surface where the EUT is fastened, **the EUT shall be subjected to a vibration endurance test at each resonant frequency at the vibration level specified in the test with a duration of 2 h**. When resonant frequencies with magnitude ratios ≥5 are harmonically related, only the fundamental frequency shall be tested. If no resonance with a magnitude ratio ≥5 occurs, the endurance test shall be carried out at one single observed frequency. **If no resonance occurred, the endurance test shall be carried out at a frequency of 30 Hz.**
Performance check(s) shall be carried out at least once during each endurance test period, and once before the end of each endurance test period.
The procedure shall be repeated with vibration in each of two mutually perpendicular directions in the horizontal plane.

Procedure according to IEC 60068-2-6

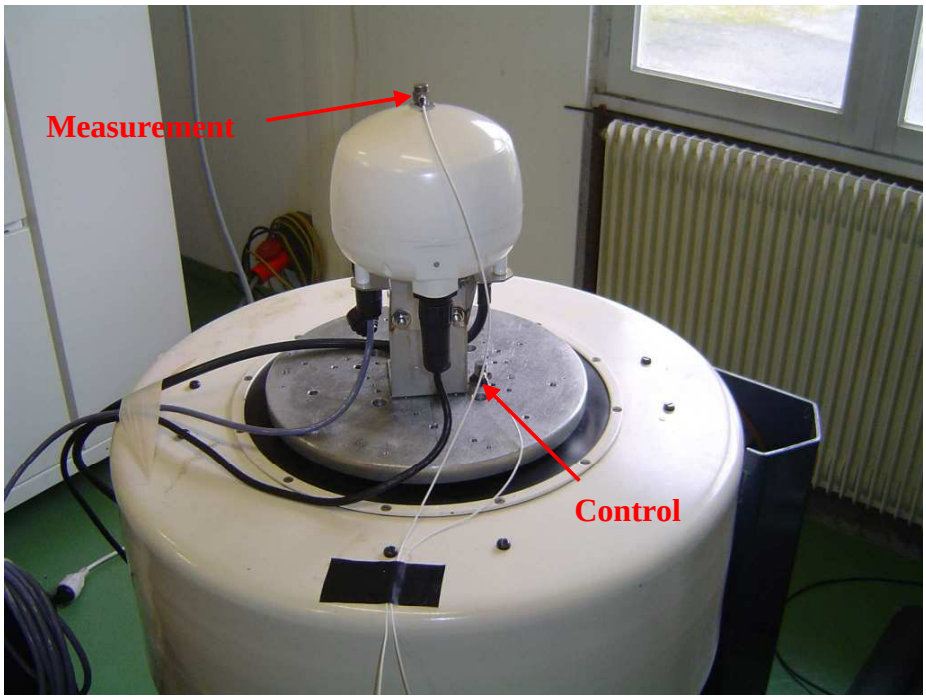
12.4.2.1. RESULTS

Setting up the test and Position of the Sensors

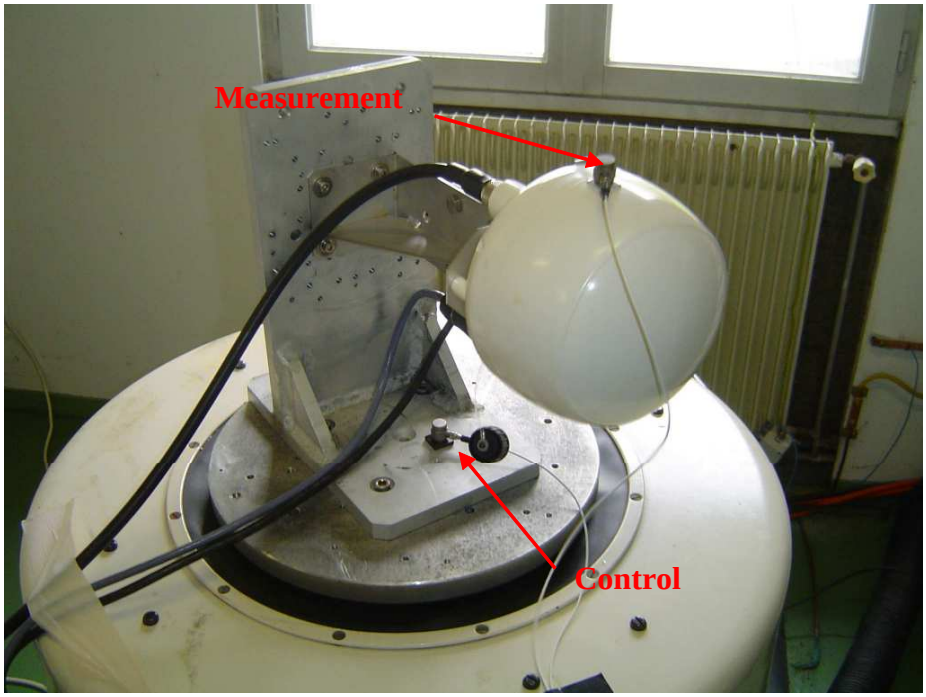
	Status	Frequency (Hz)	Type	m/s²	m/s	mm	- Alarm (dB)	+ Alarm (dB)	- Abort (dB)
1	On	13.200	Displacement	6.8787	0.082938	2.000000	3.0	3.0	6.0
2	On	100.000	Acceleration	7.0000	0.011141	0.035462	3.0	3.0	6.0

The product is disposed as show below:

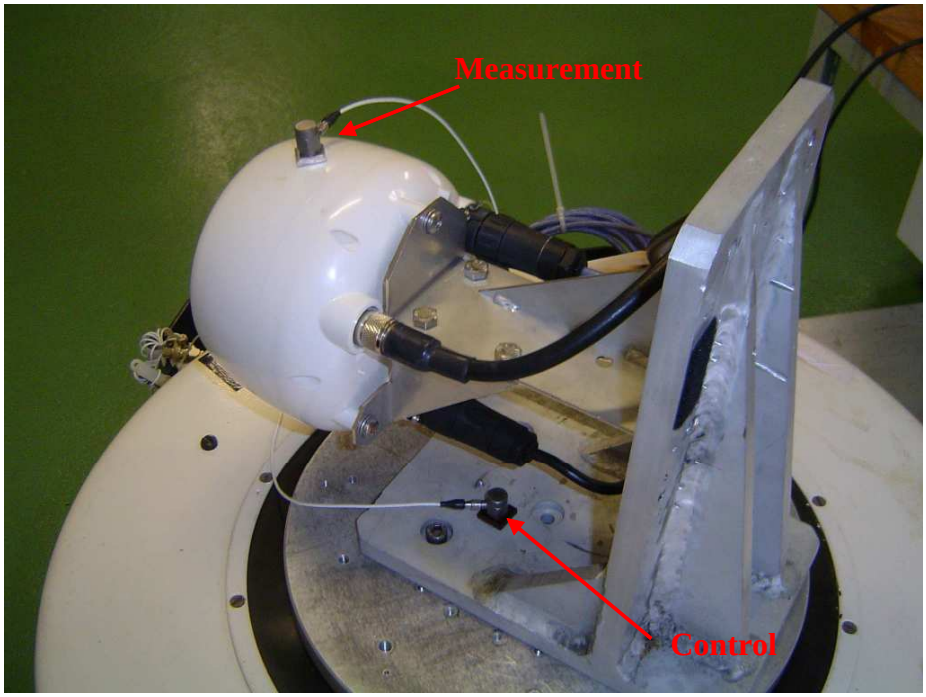
Axe : Y



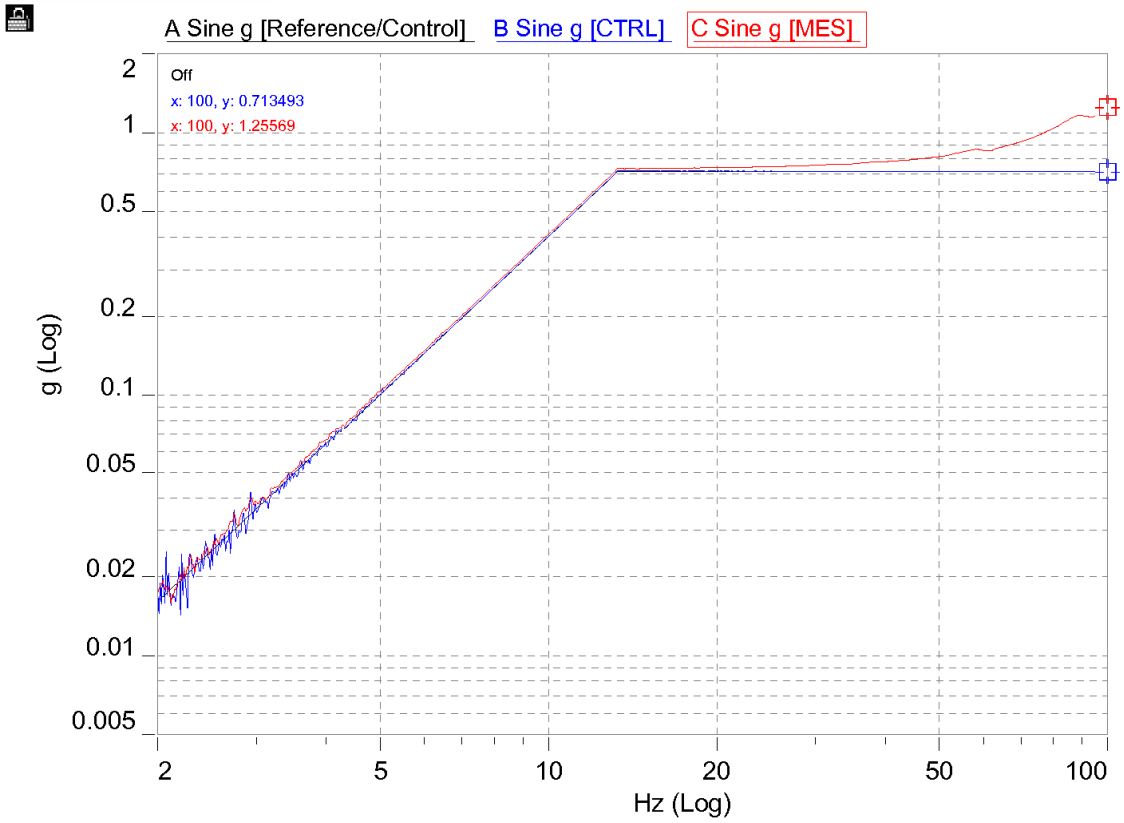
Axe : X

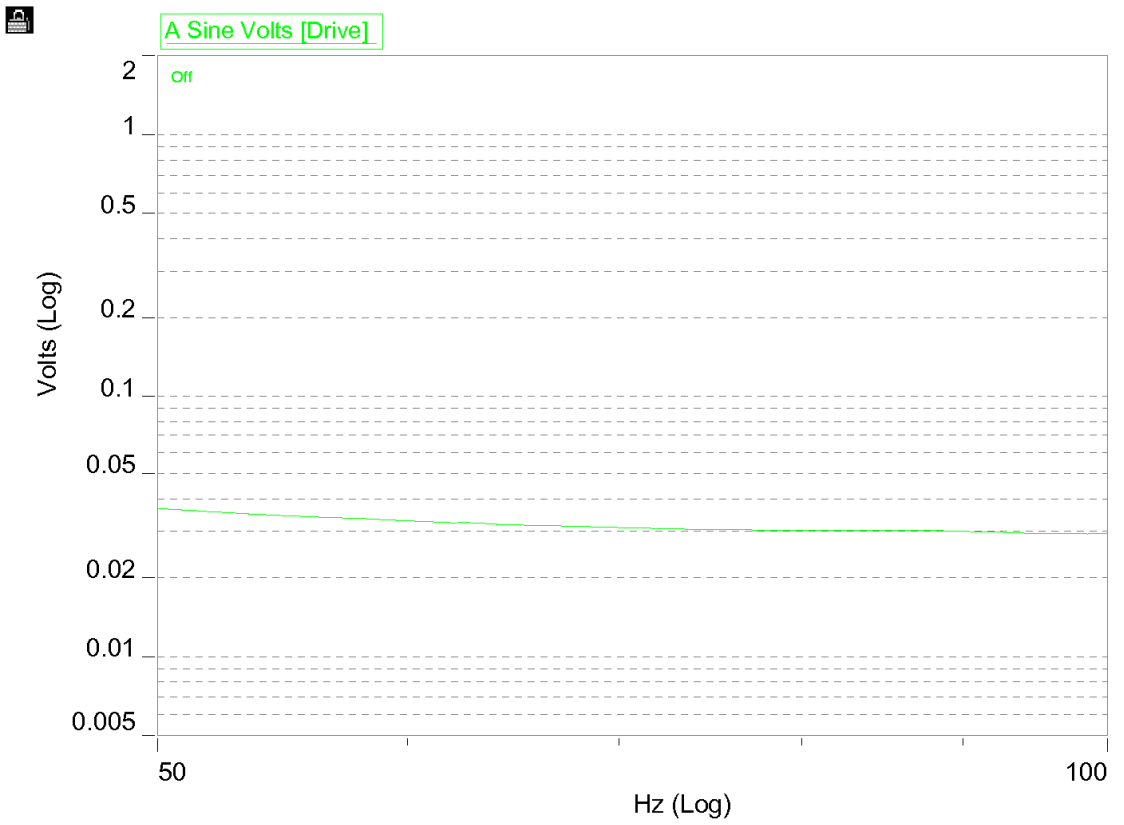


Axe : Z



Y Resonance search result:


A Sine g [Reference/Control]
B Sine g [CTRL]
C Sine g [MES]
Off
x: 100, y: 0.713493
x: 100, y: 1.25569
g (Log)
2
1
0.5
0.2
0.1
0.05
0.02
0.01
0.005
2
5
10
20
50
100
Hz (Log)


A Sine Volts [Drive]
Off
Volts (Log)
2
1
0.5
0.2
0.1
0.05
0.02
0.01
0.005
50
100
Hz (Log)

Y vibration duration test report:

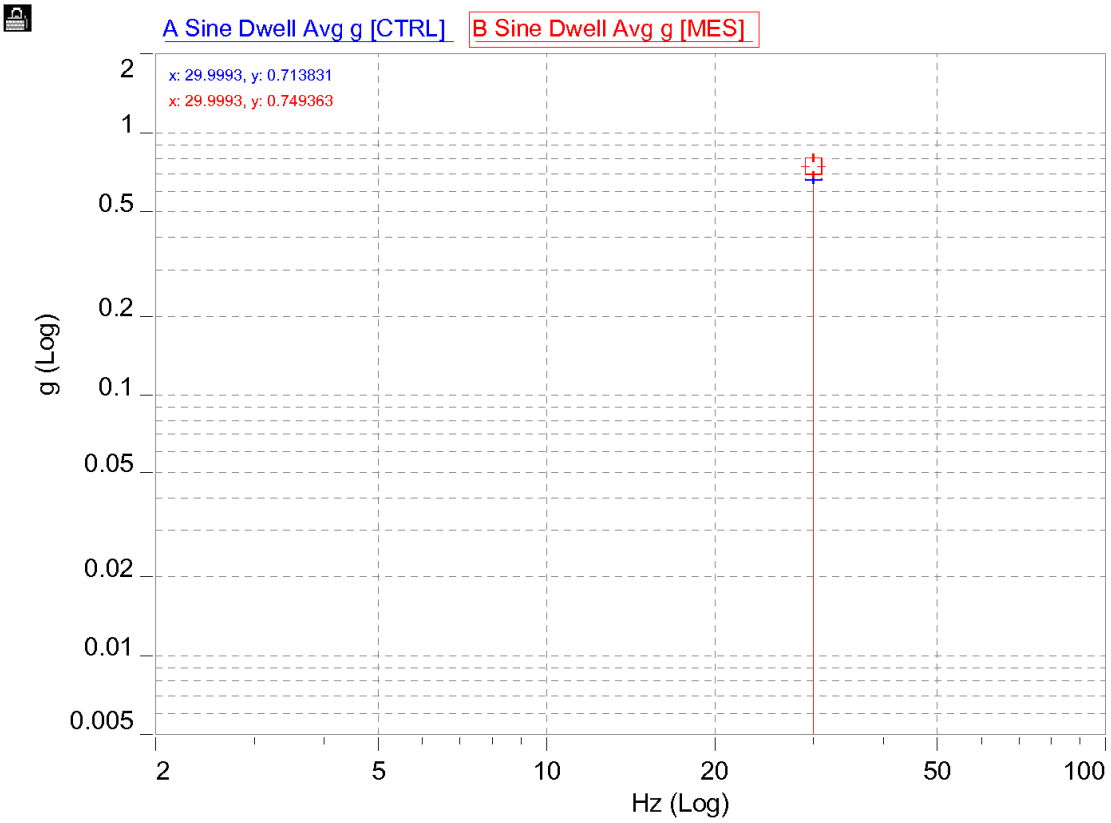
Resonant frequency : **None**

Test Summary:

RSD Display

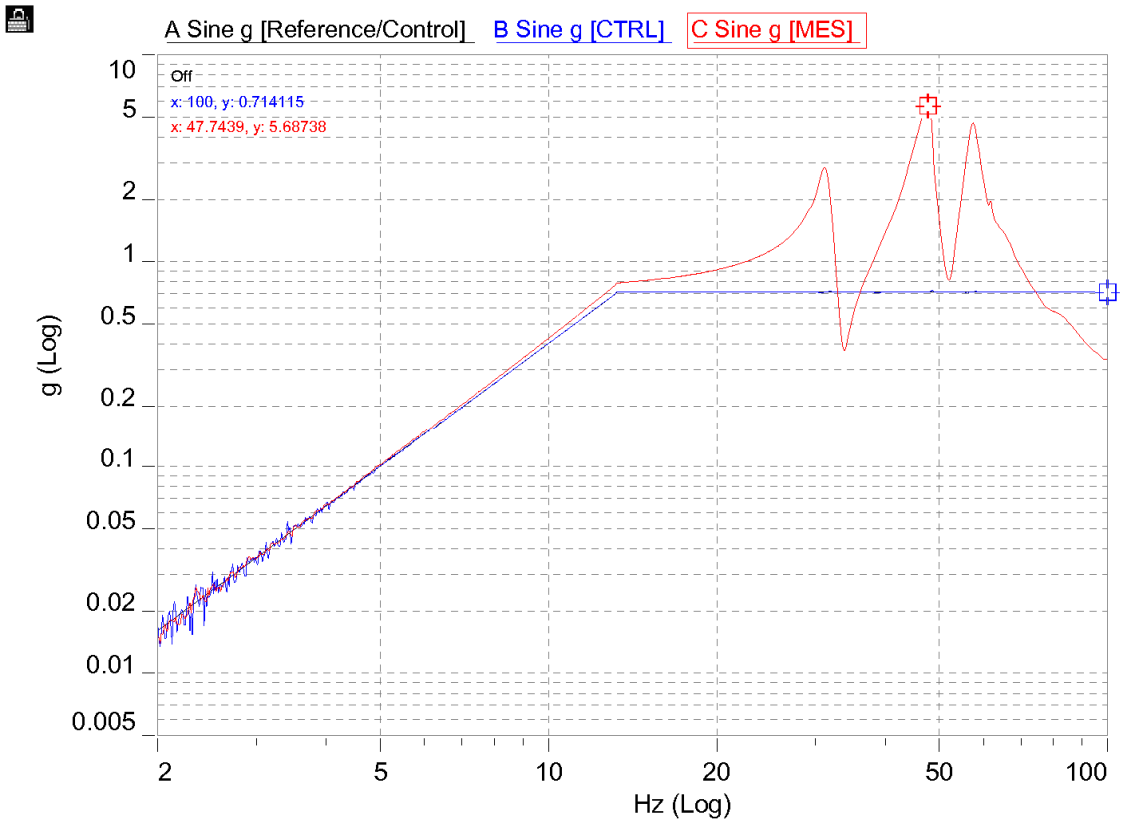
	Level	Duration	Freq	Dwell Level	Dwell Level Units	Status	Dwell Duration
1		0002:000:000	30.00	7.0000000	m/s²	Completed	0002:000:000

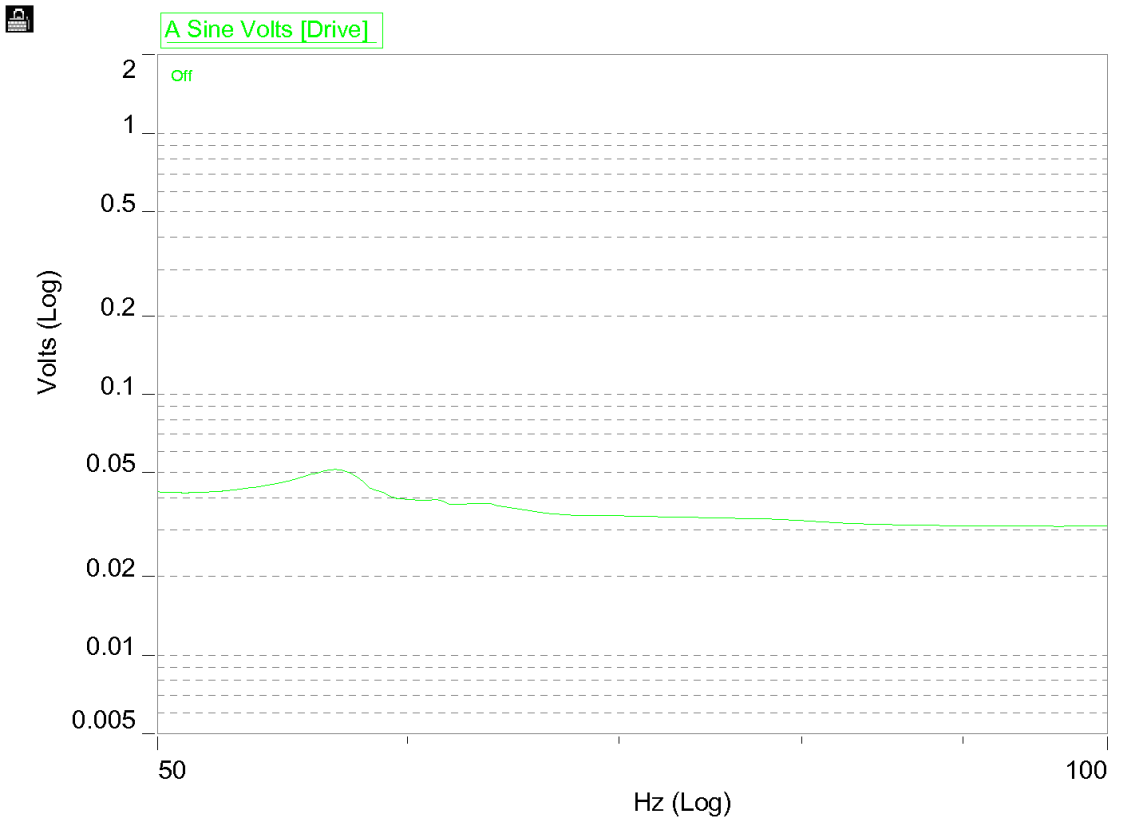
09:15 - Auto Mode Active
09:15 - Ambient Noise Check...
09:15 - Channel[2] FS voltage range = 12.000 Volts
09:15 - Channel[1] FS voltage range = 0.442 Volts
09:15 - Cal File Status: Ready
09:15 - Check data channels w/Test coupling
09:15 - Ch[1] Avg: -0.000 Max: 0.003 Rms: 0.0026 (volts)
09:15 - Ch[2] Avg: -0.005 Max: 0.006 Rms: 0.0015 (volts)
09:15 - Max Allowed Amb Noise: 50 mv
09:15 - Ch mRMS CSLth CSLmn LCdB LCth Status
09:15 - 1 2.567 4.454 3.50 12.00 14.452 OK
09:15 - 2 1.544 4.486 3.50 12.00 8.694 OK
09:15 - Starting Loop Check...
09:16 - Loop OKAY!
09:16 - Max Accel: 1.13 g [11.09 m/sec^2]
09:16 - Max Vel : 0.072 m/sec
09:16 - Max Disp : 0.9248 mm
09:16 - Tracked Dwell[1] @ 30 hz (Accel Amp: 0.713801 Phase: Auto Time: 7200 secs)
09:16 - Channel[2] FS voltage range = 12.000 Volts
09:16 - Channel[1] FS voltage range = 0.442 Volts
09:16 - Raising to Test Level...
09:17 - Dwell Level Reached...
09:17 - Dwell Ready...
09:17 - Auto Sweep Hold...
09:17 - Rate: 0.1 Oct/Min
09:17 - Auto Phase Detect: -358.3 deg @ 30.0 hz
11:17 - Ramping down drive...
11:17 - Resonance Table completed.
11:17 - Elapsed Test Time = 2:00:00
11:17 - Final Control Level in g's = 0.712
11:17 - Elapsed Sweeps = 0.000
11:17 - Test Stopped



Endurance test graph

X Resonance search result:





X vibration duration test report:

Resonant frequency : **47.21Hz & 57.51Hz**

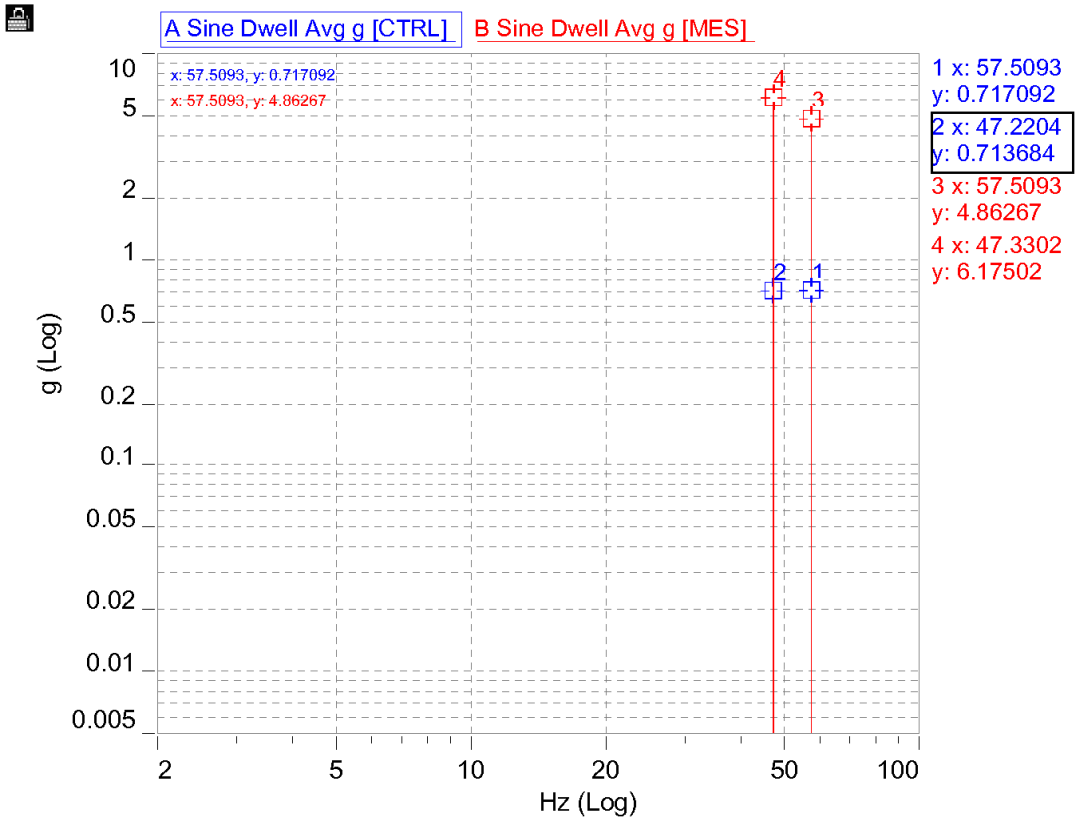
Test Summary:

RSD Display

	Level	Duration	Freq	Dwell Level	Dwell Level Units	Status	Dwell Duration
1		0002:000:000	47.21	0.7136860	g	Completed	0002:000:000
2		0002:000:000	57.51	0.7170990	g	Completed	0002:000:000

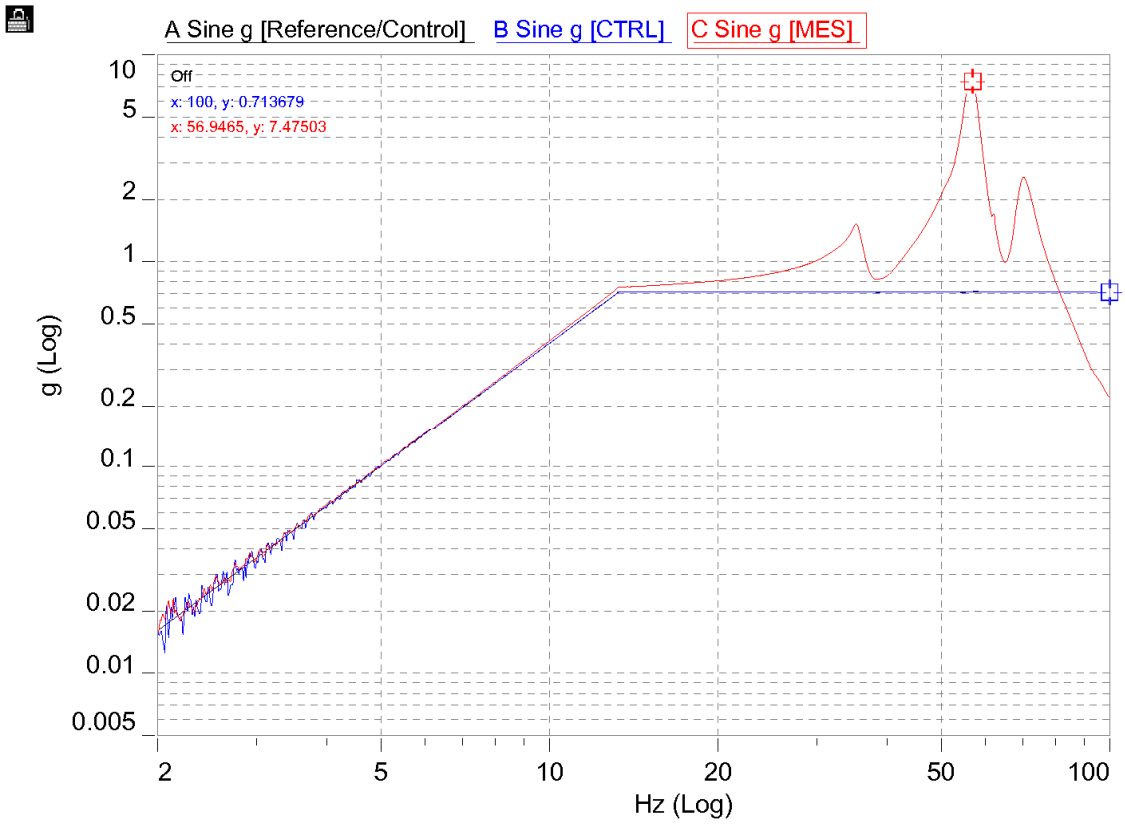
13:32 - Auto Mode Active
13:32 - Ambient Noise Check...
13:32 - Channel[2] FS voltage range = 12.000 Volts
13:32 - Channel[1] FS voltage range = 0.442 Volts
13:32 - Cal File Status: Ready
13:32 - Check data channels w/Test coupling
13:32 - Ch[1] Avg: -0.001 Max: 0.004 Rms: 0.0019 (volts)
13:32 - Ch[2] Avg: -0.004 Max: 0.005 Rms: 0.0015 (volts)
13:32 - Max Allowed Amb Noise: 50 mv
13:32 - Ch mRMS CSLth CSLmn LCdB LCth Status
13:32 - 1 1.889 4.454 3.50 12.00 10.635 OK
13:32 - 2 1.474 4.485 3.50 12.00 8.300 OK
13:32 - Starting Loop Check...
13:33 - Loop OKAY!
13:33 - Max Accel: 1.13 g [11.09 m/sec^2]
13:33 - Max Vel : 0.045 m/sec
13:33 - Max Disp : 0.3612 mm
13:33 - Tracked Dwell[1] @ 47.51 hz (Accel Amp: 0.713686 Phase: Auto Time: 7200 secs)
13:33 - Channel[2] FS voltage range = 12.000 Volts
13:33 - Channel[1] FS voltage range = 0.442 Volts
13:33 - Raising to Test Level...
13:33 - Dwell Level Reached...
13:33 - Dwell Ready...
13:33 - Auto Sweep Hold...
13:33 - Rate: 0.1 Oct/Min
13:33 - Auto Phase Detect: -52.3 deg @ 47.5 hz
15:33 - Ramping down drive...
15:33 - Max Accel: 1.14 g [11.15 m/sec^2]
15:33 - Max Vel : 0.036 m/sec
15:33 - Max Disp : 0.2313 mm
15:33 - Tracked Dwell[2] @ 57.51 hz (Accel Amp: 0.717099 Phase: Auto Time: 7200 secs)
15:33 - Channel[2] FS voltage range = 12.000 Volts
15:33 - Channel[1] FS voltage range = 0.442 Volts

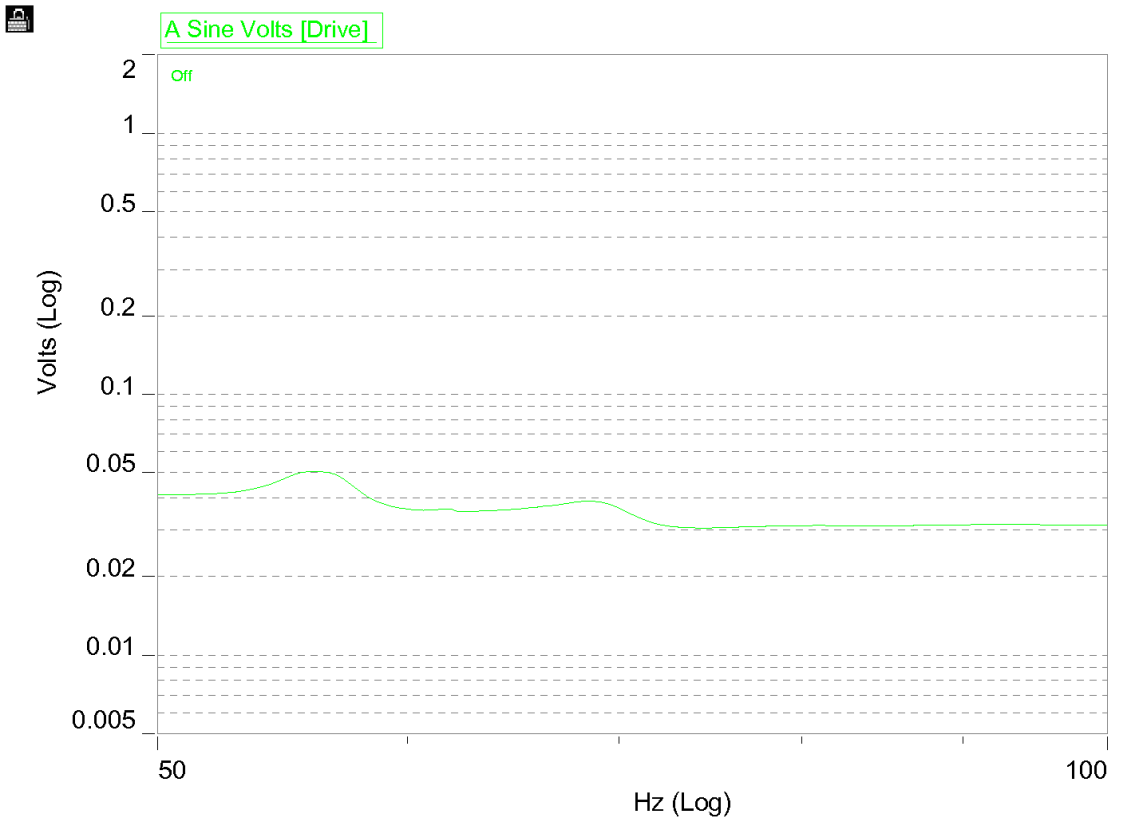
15:33 - Raising to Test Level...
15:34 - Dwell Level Reached...
15:34 - Dwell Ready...
15:34 - Auto Sweep Hold...
15:34 - Rate: 0.1 Oct/Min
15:34 - Auto Phase Detect: -106.7 deg @ 57.5 hz
17:34 - Ramping down drive...
17:34 - Resonance Table completed.
17:34 - Elapsed Test Time = 2:00:00
17:34 - Final Control Level in g's = 0.715
17:34 - Elapsed Sweeps = 0.000
17:34 - Test Stopped



Endurance test graph

Z Resonance search result:





Z vibration duration test report:

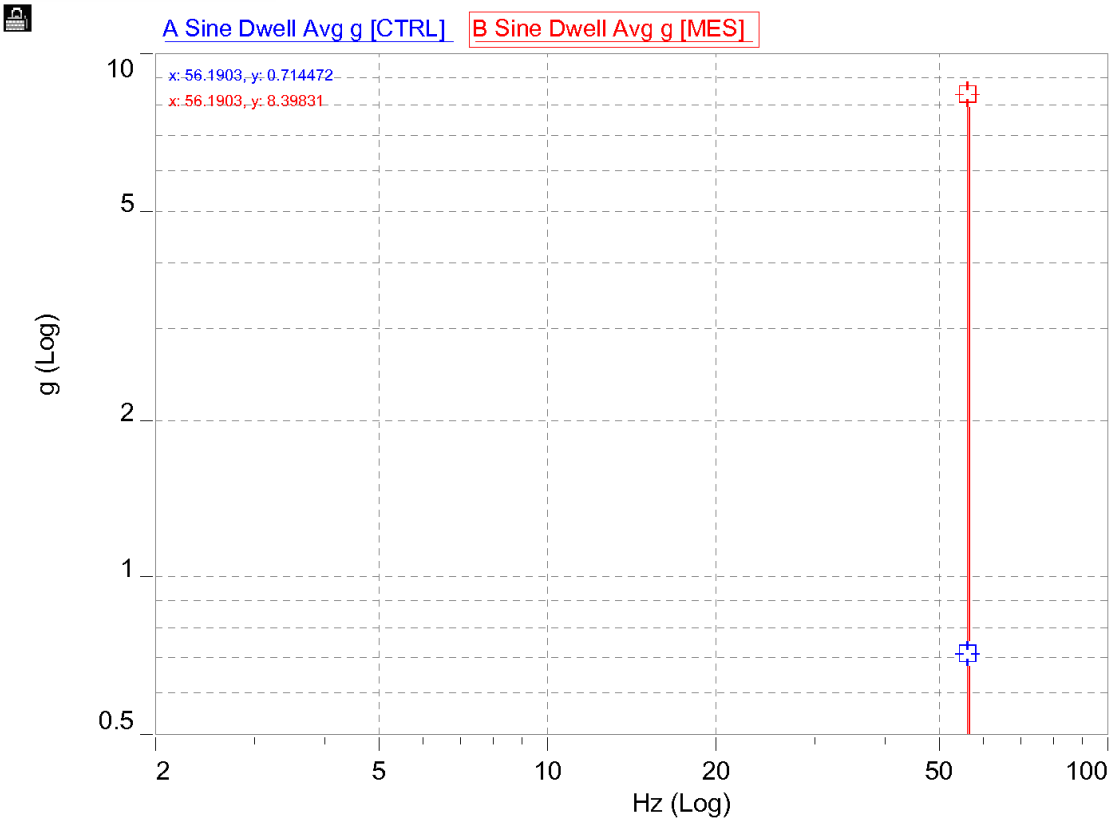
Resonant frequency : **56.67 Hz**

Test Summary:

RSD Display

	Level	Duration	Freq	Dwell Level	Dwell Level Units	Status	Dwell Duration
1		0002:000:000	56.13	0.7144780	g	Completed	0002:000:000

08:58 - Auto Mode Active
08:58 - Ambient Noise Check...
08:58 - Channel[2] FS voltage range = 12.000 Volts
08:58 - Channel[1] FS voltage range = 0.442 Volts
08:58 - Cal File Status: Ready
08:58 - Check data channels w/Test coupling
08:58 - Ch[1] Avg: -0.001 Max: 0.006 Rms: 0.0029 (volts)
08:58 - Ch[2] Avg: -0.005 Max: 0.007 Rms: 0.0023 (volts)
08:58 - Max Allowed Amb Noise: 50 mv
08:58 - Ch mRMS CSLth CSLmn LCdB LCth Status
08:58 - 1 2.927 4.458 3.50 12.00 16.477 OK
08:58 - 2 2.345 4.490 3.50 12.00 13.200 OK
08:58 - Starting Loop Check...
08:58 - Loop OKAY!
08:58 - Max Accel: 1.13 g [11.10 m/sec^2]
08:58 - Max Vel : 0.040 m/sec
08:58 - Max Disp : 0.2858 mm
08:58 - Tracked Dwell[1] @ 56.67 hz (Accel Amp: 0.714478 Phase: Auto Time: 7200 secs)
08:58 - Channel[2] FS voltage range = 12.000 Volts
08:58 - Channel[1] FS voltage range = 0.442 Volts
08:58 - Raising to Test Level...
08:59 - Dwell Level Reached...
08:59 - Dwell Ready...
08:59 - Auto Sweep Hold...
08:59 - Rate: 0.1 Oct/Min
08:59 - Auto Phase Detect: -74.8 deg @ 56.7 hz
10:59 - Ramping down drive...
10:59 - Resonance Table completed.
10:59 - Elapsed Test Time = 2:00:00
10:59 - Final Control Level in g's = 0.713
10:59 - Elapsed Sweeps = 0.148
10:59 - Test Stopped



Endurance test graph

Performance Check: test ok

Check transmitter :

"15/04/2011 11:18:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndR@=flw1s4cP0RN23k`4m0E2CkP,0*4D
"15/04/2011 11:21:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRA=flw1s4cP0RN23k`4m0E2CkP,0*4F
"15/04/2011 11:24:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndQs=fm0is4cP0RN23k`4m0E2CkP,0*63
"15/04/2011 11:27:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRf=fm21s4cP0RN23k`4m0E2CkP,0*2C
"15/04/2011 11:30:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRB=fm6As4cP0RN23k`4m0E2CkP,0*7F
"15/04/2011 11:33:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRJ=fm6As4cP0RN23k`4m0E2CkP,0*74
"15/04/2011 11:36:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndQj=fm4Qs4cP0RN23k`4m0E2CkP,0*46
"15/04/2011 11:39:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndQU=fm0is4cP0RN23k`4m0E2CkP,0*46
"15/04/2011 11:42:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndR9=fm1Qs4cP0RN23k`4m0E2CkP,0*13
"15/04/2011 11:45:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndQa=fm5is4cP0RN23k`4m0E2CkP,0*77

Check receiver :

Test ok (PER < 1%)

COMPLIANT

12.5. RAIN AND SPRAY

12.5.1. PURPOSE

This test simulates the effects of rain, sea spray and light breaking seas on equipment. It is applicable to exposed equipment mounted above deck level such as antennas. It is not applicable to portable equipment, as these are required to meet a more stringent immersion test.

12.5.2. METHOD OF TEST

The test shall be carried out by spraying the EUT from all practicable directions with a stream of water from a standard test nozzle (hose) as shown in figure 6 of IEC 60529.
The EUT shall operate throughout the test.
The conditions to be observed are as follows:
– internal diameter of nozzle: 12,5 mm;
– delivery rate: 100 l/min ± 5 % ;
– water pressure: to be adjusted to achieve the specified delivery rate;
– core of substantial stream: circle of approximately 120 mm diameter at distance 2,5 m from nozzle;
– test duration: approximately 30 min;
– distance from nozzle to the equipment surface: approximately 3 m.
At the end of the test the EUT shall be subjected to a performance check, and shall then be examined for damage and for unwanted ingress of water. Following examination, the EUT shall be resealed in accordance with the manufacturer's instructions.
Alternatively, if there are no external signs of unwanted ingress of water, an internal examination which involves disturbance to seals may be carried out after all environmental tests have been completed.

12.5.3. RESULTS

Start: 13th April 2011
Duration: 30min
Performance Check: test ok

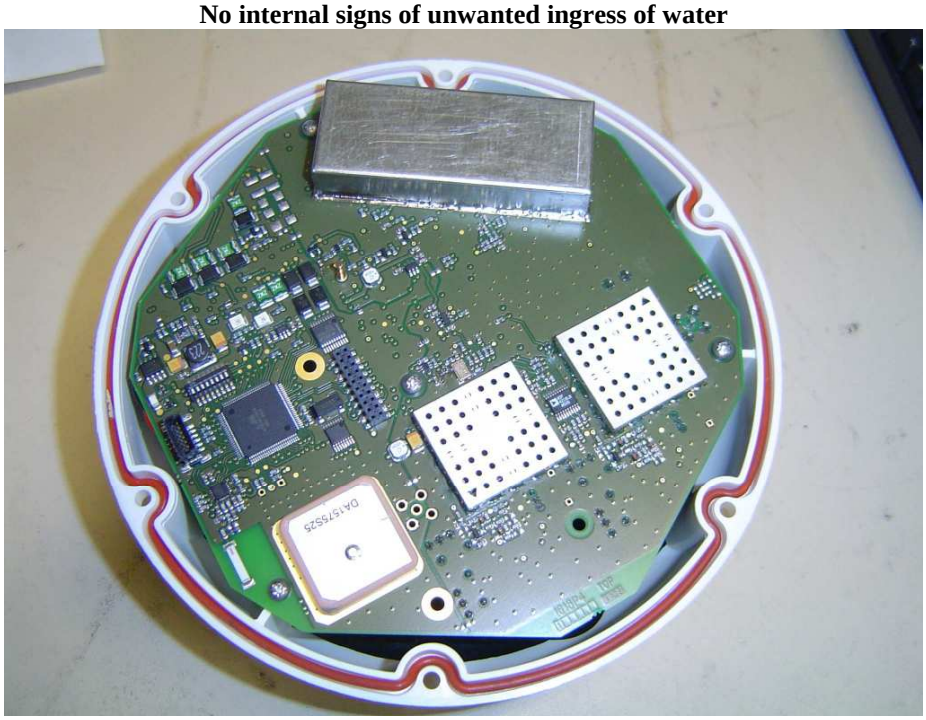
Check transmitter :

"13/04/2011 10:51:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRG=fltQs4cP0RN23k`4m0E2CkP,0*2A
"13/04/2011 10:54:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRf=fm0is4cP0RN23k`4m0E2CkP,0*75
"13/04/2011 10:57:02",!AIVDM,1,1,,B,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRc=fm1Qs4cP0RN23k`4m0E2CkP,0*4A
"13/04/2011 11:00:02",!AIVDM,1,1,,A,E>iD:1h:2ab@367Pb4W3h0Tah0bOndRT=fm2Qs4cP0RN23k`4m0E2CkP,0*7D

Check receiver :

Test ok (PER < 1%)

No internal signs of unwanted ingress of water



COMPLIANT

13. ELECTROMAGNETIC EMISSION – IEC 60945 CLAUSE 9

13.1. CONDUCTED SPURIOUS EMISSIONS

13.1.1. RECEIVER : ON 24 VDC POWER LINE

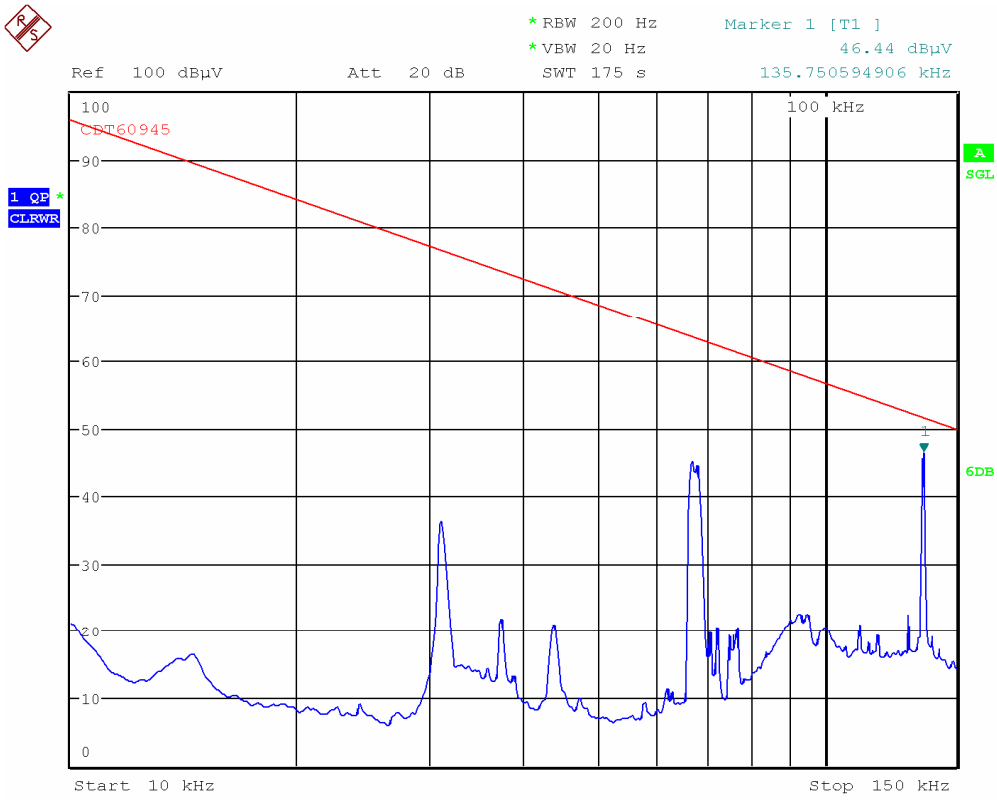
FREQUENCY BAND : 10kHz – 150kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
135.75	**46.44**	**96dBµV – 50dBµV**

FREQUENCY BAND : 150kHz – 350kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
150.0	**40.20**	**60dBµV – 50dBµV**
154.0	**40.12**	
162.0	**43.92**	
169.0	**43.12**	
183.0	**36.76**	
202.0	**55.92**	
270.0	**48.58**	
338.0	**40.62**	

FREQUENCY BAND : 350kHz – 30MHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (MHz)	**Results**	**Limits**
0.36	**38.18**	**50dBµV**
0.53	**33.72**	
0.62	**34.98**	
1.40	**34.58**	
2.37	**43.02**	
3.17	**33.42**	
3.24	**34.78**	
4.32	**33.68**	

Result : **COMPLIANT**

13.2. CONDUCTED EMISSION GRAPHS



Date: 4.APR.2011 11:13:25

ElectroMagetic Compatibility

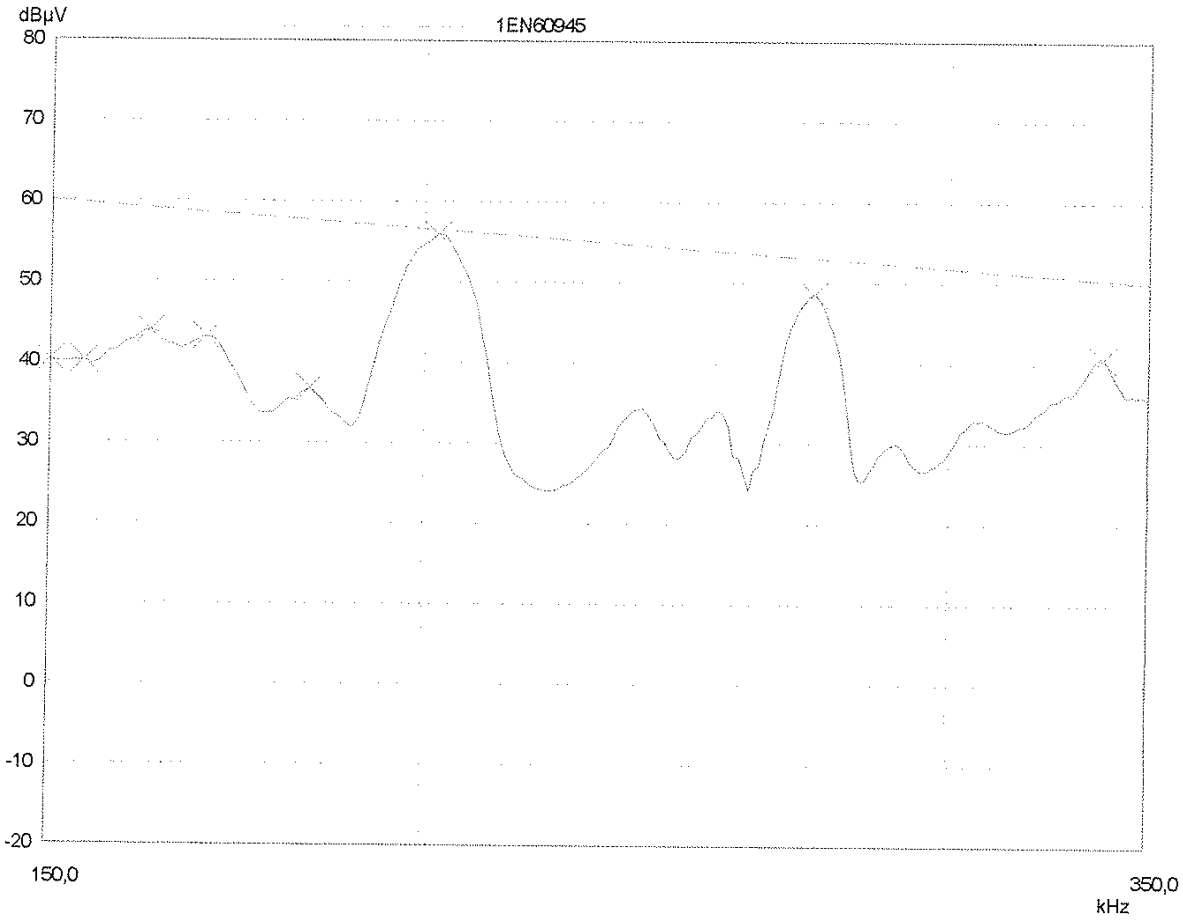
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vdc power line Rx F1

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



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ElectroMagetic Compatibility
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vdc power line Rx F1

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency kHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
150,0	40,20	60,00	19,80
154,0	40,12	59,69	19,57
162,0	43,92	59,09	15,17
169,0	43,12	58,59	15,47
183,0	36,76	57,65	20,89
202,0	55,92	56,49	0,57
270,0	48,58	53,06	4,48
338,0	40,62	50,41	9,79

* limit exceeded

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ElectroMagetic Compatibility

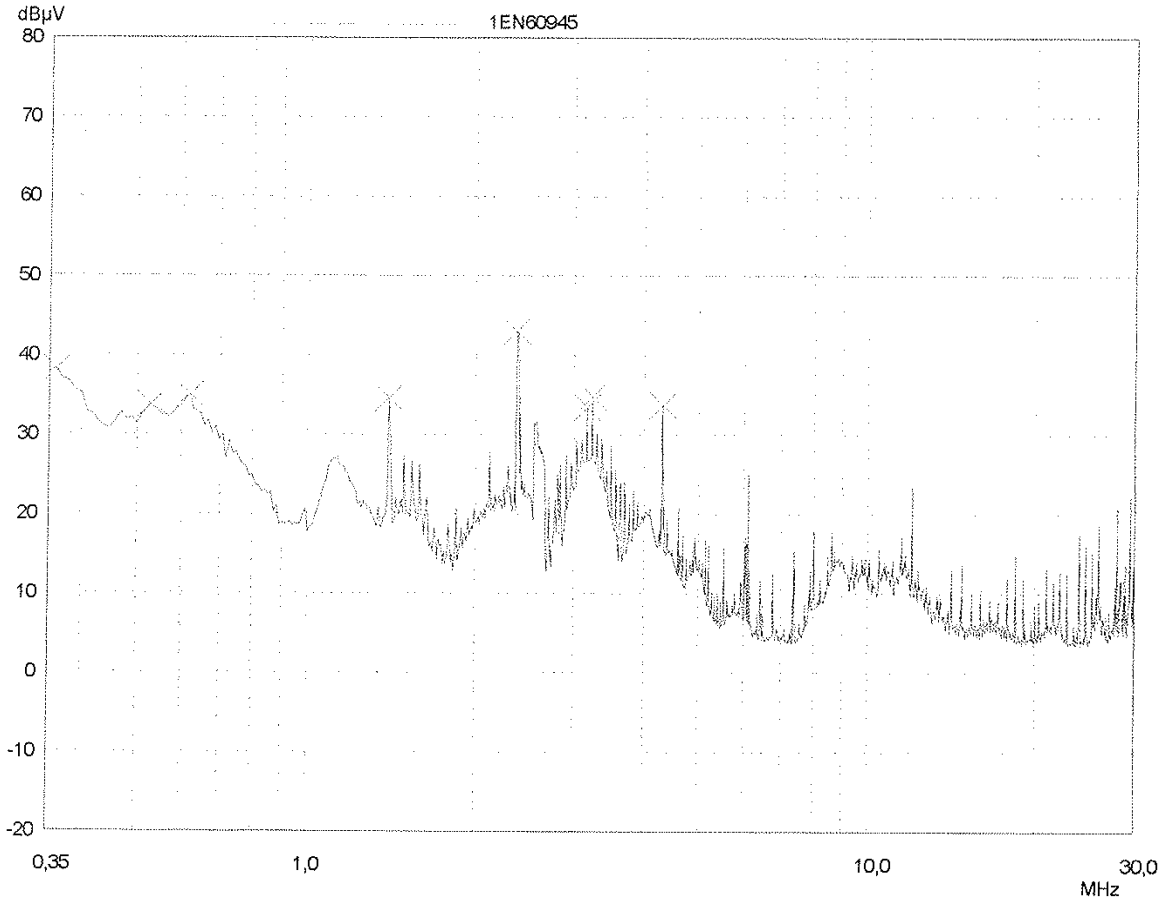
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vdc power line
	Rx F1

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



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e-mail : KENTA.ELECTRONIC@wanadoo.fr - Web : KENTA-ELECTRONIC.com

ElectroMagetic Compatibility
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vdc power line
	Rx F1

Scan Settings (1 Range)

Frequencies		Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0,36	38,18	50,00	11,82
0,53	33,72	50,00	16,28
0,62	34,98	50,00	15,02
1,4	34,58	50,00	15,42
2,37	43,02	50,00	6,98
3,17	33,42	50,00	16,58
3,24	34,78	50,00	15,22
4,32	33,68	50,00	16,32

* limit exceeded

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13.2.1. RECEIVER : ON 12 VDC POWER LINE

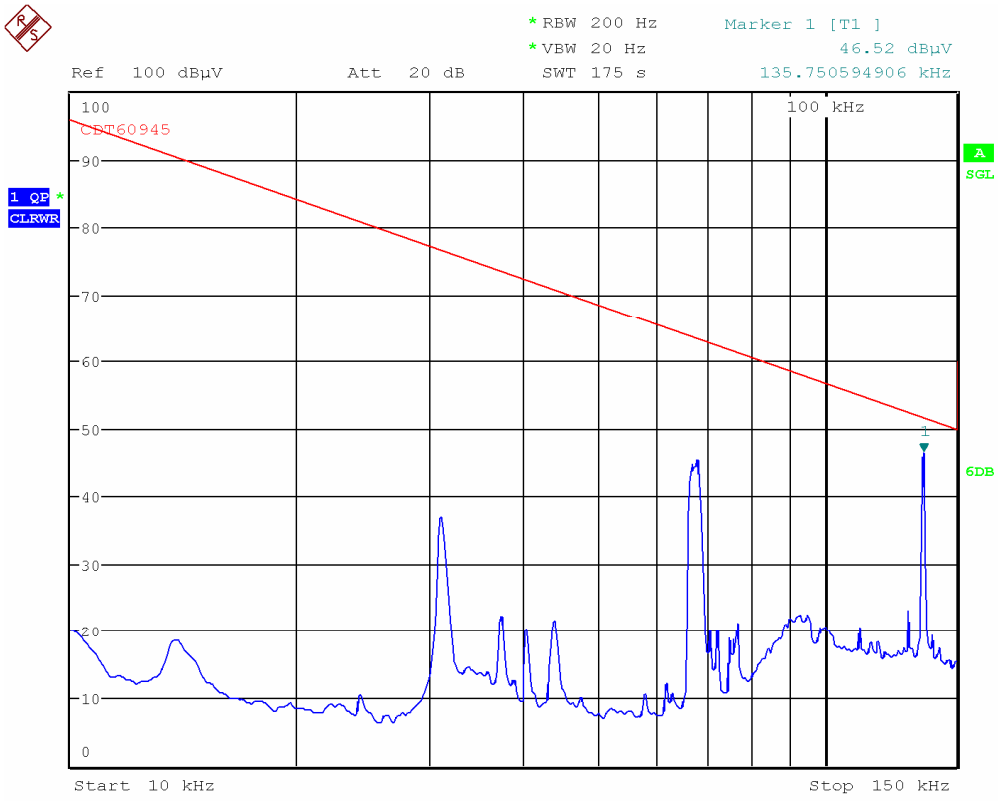
FREQUENCY BAND : 10kHz – 150kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
135.75	**46.52**	**96dBµV – 50dBµV**

FREQUENCY BAND : 150kHz – 350kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
150.0	**40.58**	**60dBµV – 50dBµV**
153.0	**40.28**	
161.0	**43.82**	
169.0	**42.88**	
183.0	**36.72**	
202.0	**55.82**	
270.0	**48.54**	
337.0	**40.64**	

FREQUENCY BAND : 350kHz – 30MHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (MHz)	**Results**	**Limits**
0.35	**37.26**	**50dBµV**
0.38	**36.52**	
0.54	**34.80**	
0.62	**34.52**	
0.64	**33.62**	
1.40	**34.48**	
1.61	**35.70**	
1.68	**44.40**	

Result :	**COMPLIANT**

13.3. CONDUCTED EMISSION GRAPHS



Date: 4.APR.2011 11:09:05

ElectroMagetic Compatibility

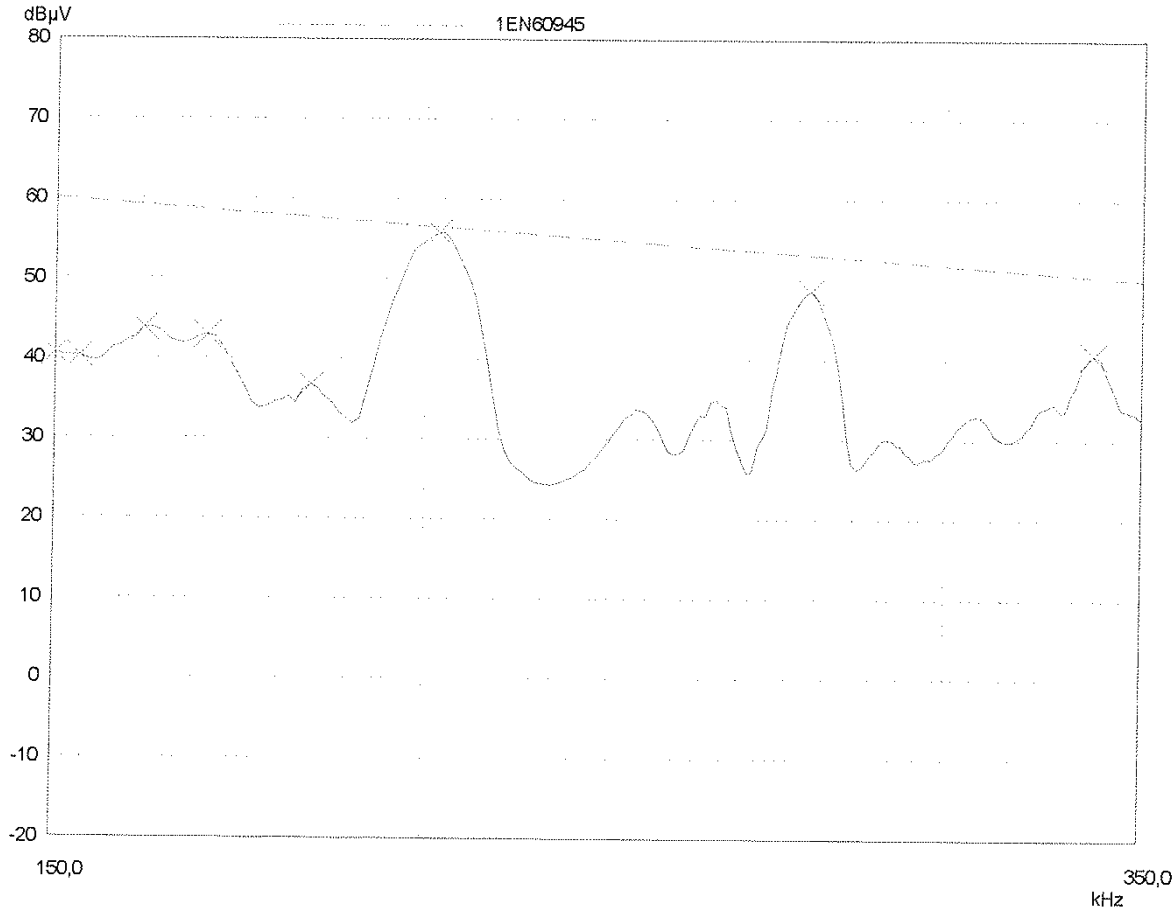
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vdc power line
	Rx F2

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



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e-mail : KENTA.ELECTRONIC@wanadoo.fr - Web : KENTA-ELECTRONIC.com

ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vdc power line
	Rx F2

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP

Meas Time: see scan settings

Peaks: 8

Acc Margin: 25 dB

Peak Search Results:

Frequency kHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
150,0	40,58	60,00	19,42
153,0	40,28	59,77	19,49
161,0	43,82	59,16	15,34
169,0	42,88	58,59	15,71
183,0	36,72	57,65	20,93
202,0	55,82	56,49	0,67
270,0	48,54	53,06	4,52
337,0	40,64	50,45	9,81

* limit exceeded

PAGE 2

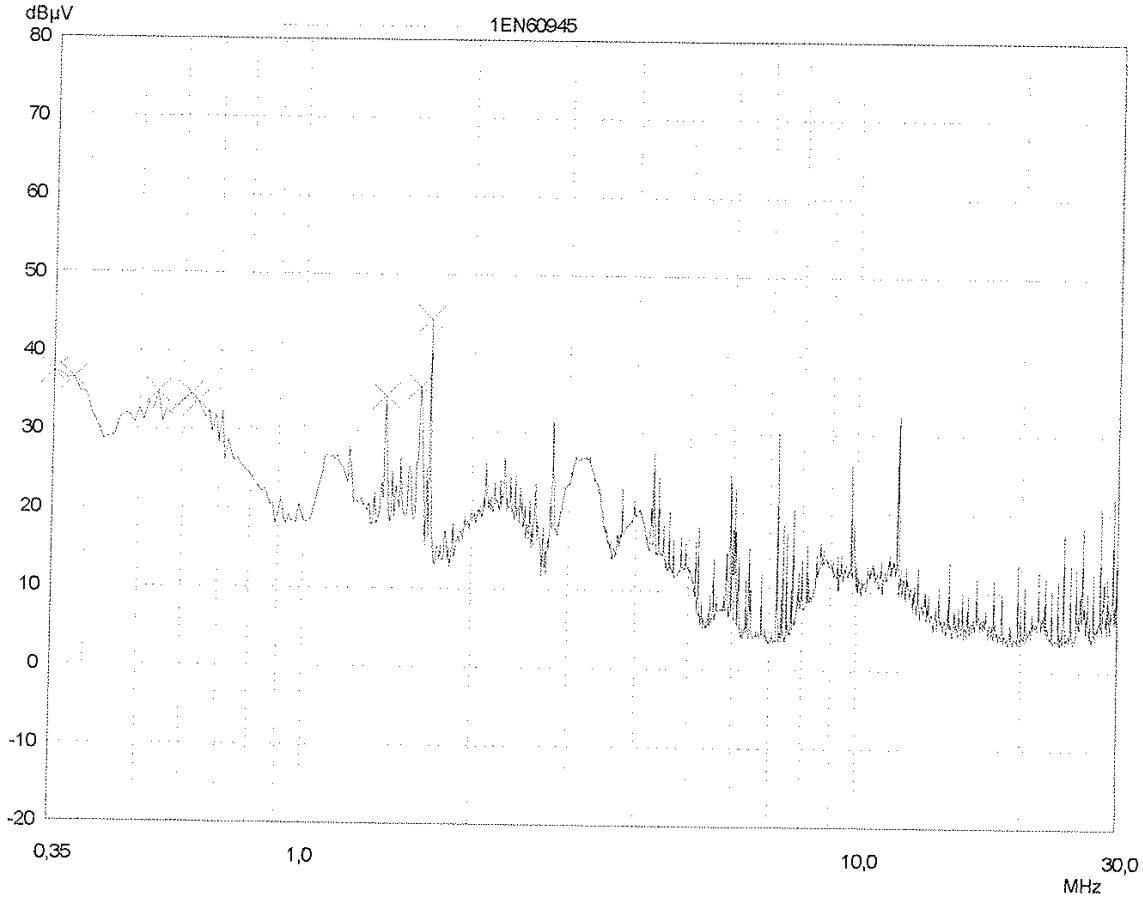
ElectroMagetic Compatibility
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vdc power line Rx F2

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



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ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vdc power line
	Rx F2

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0,35	37,26	50,00	12,74
0,38	36,52	50,00	13,48
0,54	34,80	50,00	15,20
0,62	34,52	50,00	15,48
0,64	33,62	50,00	16,38
1,4	34,48	50,00	15,52
1,61	35,70	50,00	14,30
1,68	44,40	50,00	5,60

* limit exceeded

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13.3.1. TRANSMITTER 12W : ON 24 VDC POWER LINE

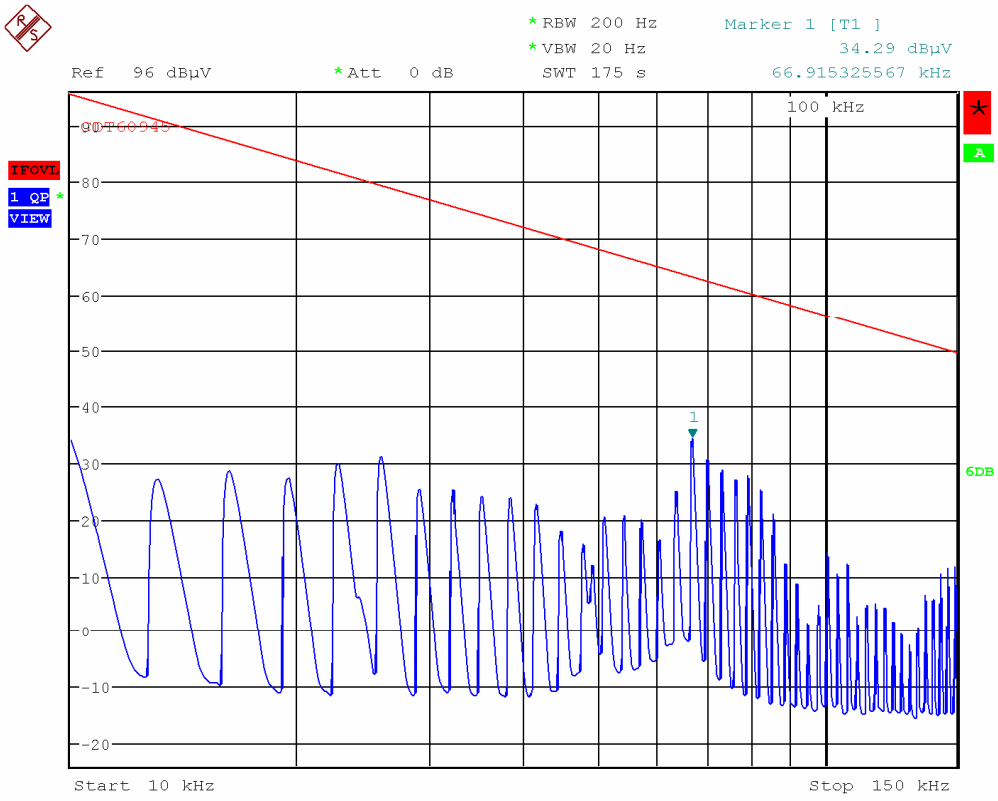
FREQUENCY BAND : 10kHz – 150kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
66.92	**34.29**	**96dBµV – 50dBµV**

FREQUENCY BAND : 150kHz – 350kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
326.0	**26.48**	**60dBµV – 50dBµV**

FREQUENCY BAND : 350kHz – 30MHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (MHz)	**Results**	**Limits**
0.62	**19.30**	**50dBµV**
3.08	**15.66**	
4.31	**22.00**	
5.54	**16.34**	
26.00	**16.38**	
28.00	**19.14**	
29.49	**21.46**	
30.00	**19.40**	

Result :	**COMPLIANT**

13.4. CONDUCTED EMISSION GRAPHS



Date: 29.MAR.2011 15:48:03

ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line
	F2 - 12W

Scan Settings (1 Range)

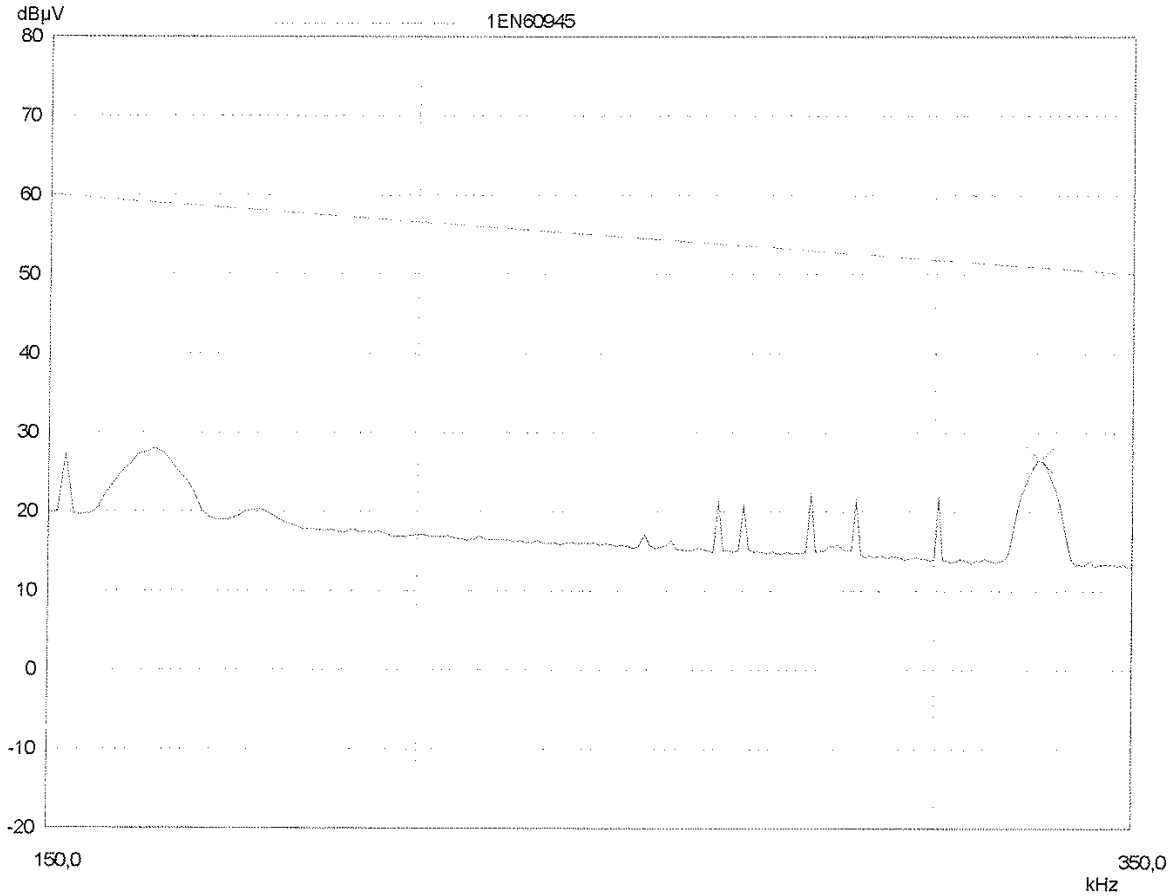
Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP

Meas Time: see scan settings

Peaks: 8

Acc Margin: 25 dB



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ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line
	F2 - 12W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP

Meas Time: see scan settings

Peaks: 8

Acc Margin: 25 dB

Peak Search Results:

Frequency kHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
326,0	26,48	50,84	24,36

* limit exceeded

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ElectroMagetic Compatibility

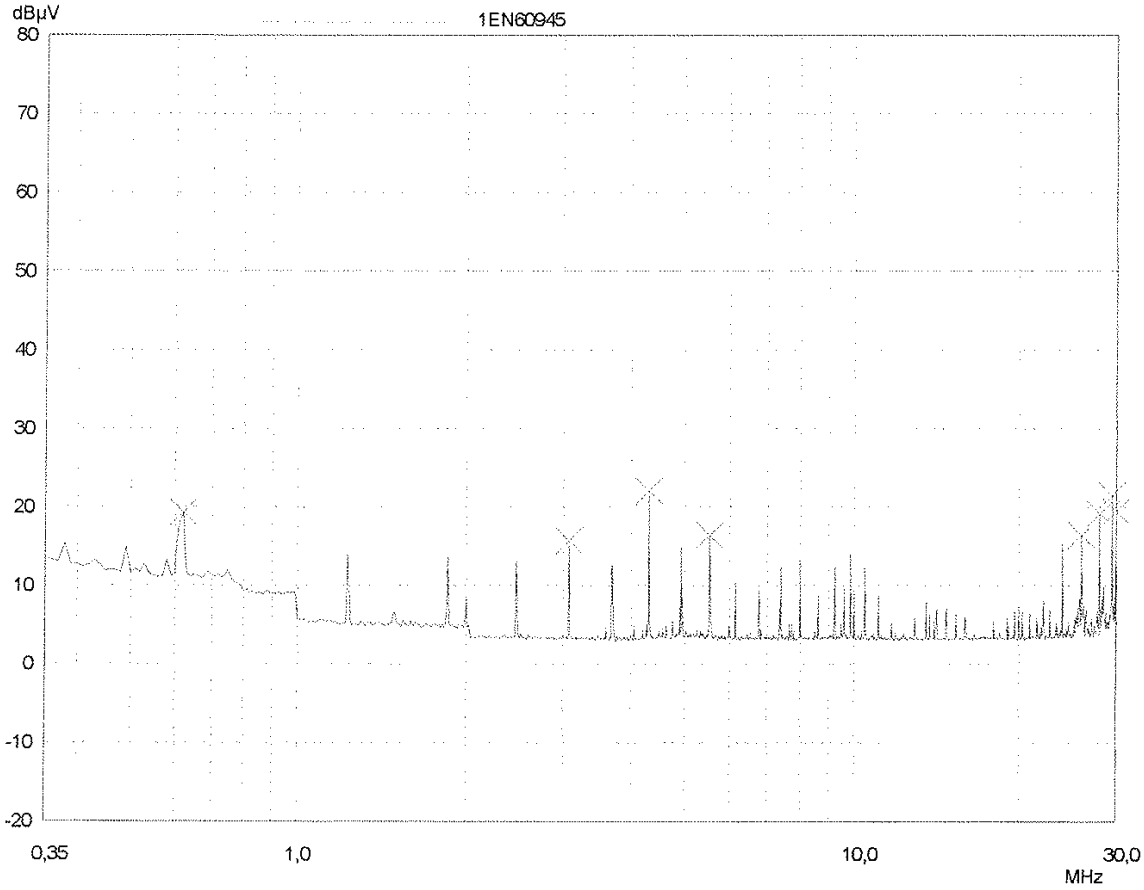
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line
	F2 - 12W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



PAGE 1

ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line
	F2 - 12W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0,62	19,30	50,00	30,70
3,08	15,66	50,00	34,34
4,31	22,00	50,00	28,00
5,54	16,34	50,00	33,66
26,0	16,38	50,00	33,62
28,0	19,14	50,00	30,86
29,49	21,46	50,00	28,54
30,0	19,40	50,00	30,60

* limit exceeded

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13.4.1. TRANSMITTER 12W : ON 12 VDC POWER LINE

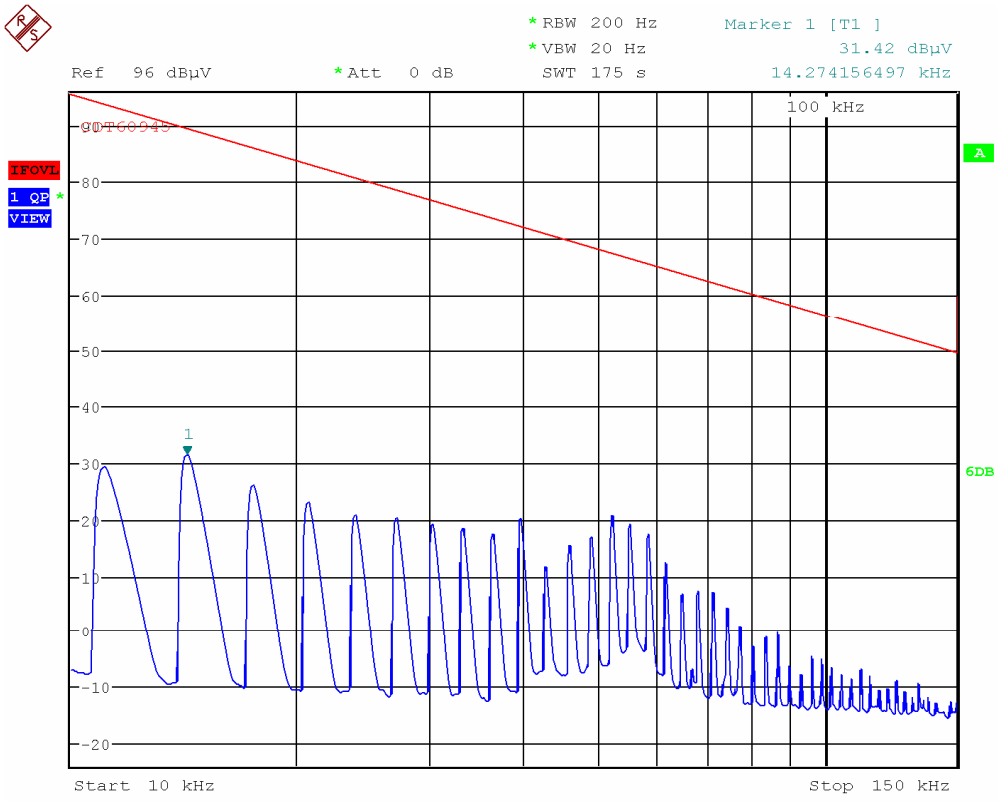
FREQUENCY BAND : 10kHz – 150kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
14.27	**31.42**	**96dBµV – 50dBµV**

FREQUENCY BAND : 150kHz – 350kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
326.0	**26.78**	**60dBµV – 50dBµV**

FREQUENCY BAND : 350kHz – 30MHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (MHz)	**Results**	**Limits**
0.38	**14.92**	**50dBµV**
17.40	**17.40**	
23.22	**23.22**	
16.10	**16.10**	
16.36	**16.36**	
19.80	**19.80**	
21.12	**21.12**	
19.32	**19.32**	

Result :	**COMPLIANT**

13.5. CONDUCTED EMISSION GRAPHS



Date: 29.MAR.2011 16:10:53

ElectroMagetic Compatibility

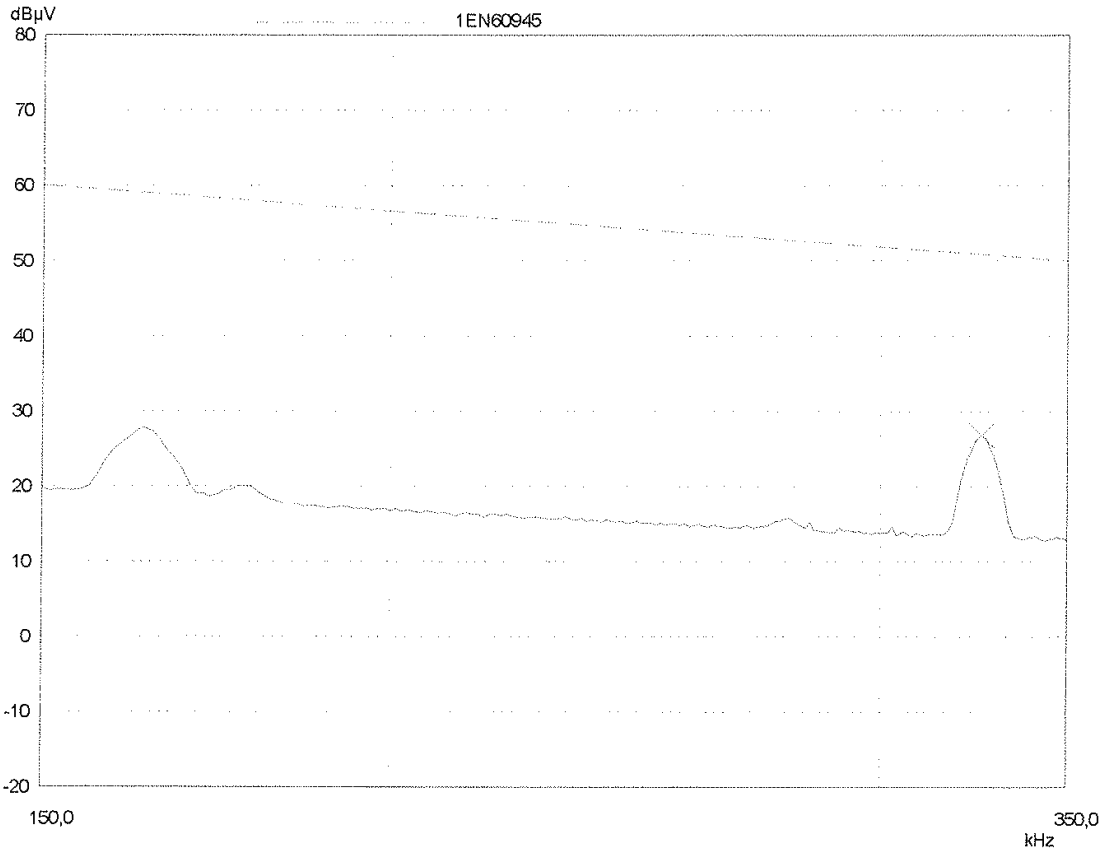
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vcc power line F2 - 12W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



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ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vcc power line
	F2 - 12W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency kHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
326,0	26,78	50,84	24,06

* limit exceeded

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ElectroMagetic Compatibility

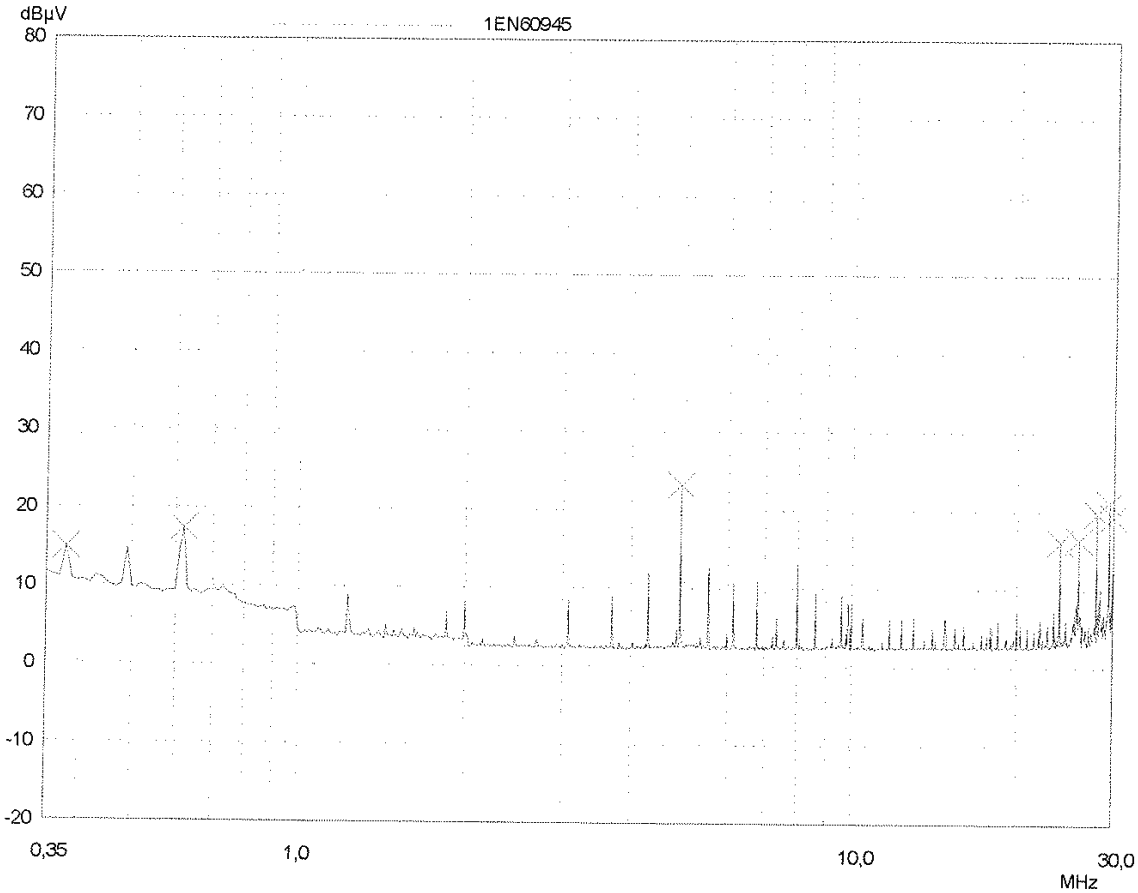
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vdc power line
	F2 - 12W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 50 dB



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ElectroMagetic Compatibility
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vdc power line F2 - 12W

Scan Settings (1 Range)

Frequencies		Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 50 dB

Peak Search Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0,38	14,92	50,00	35,08
0,62	17,40	50,00	32,60
4,93	23,22	50,00	26,78
24,0	16,10	50,00	33,90
26,0	16,36	50,00	33,64
28,0	19,80	50,00	30,20
29,49	21,12	50,00	28,88
30,0	19,32	50,00	30,68

* limit exceeded

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13.5.1. TRANSMITTER 2W : ON 24 VDC POWER LINE

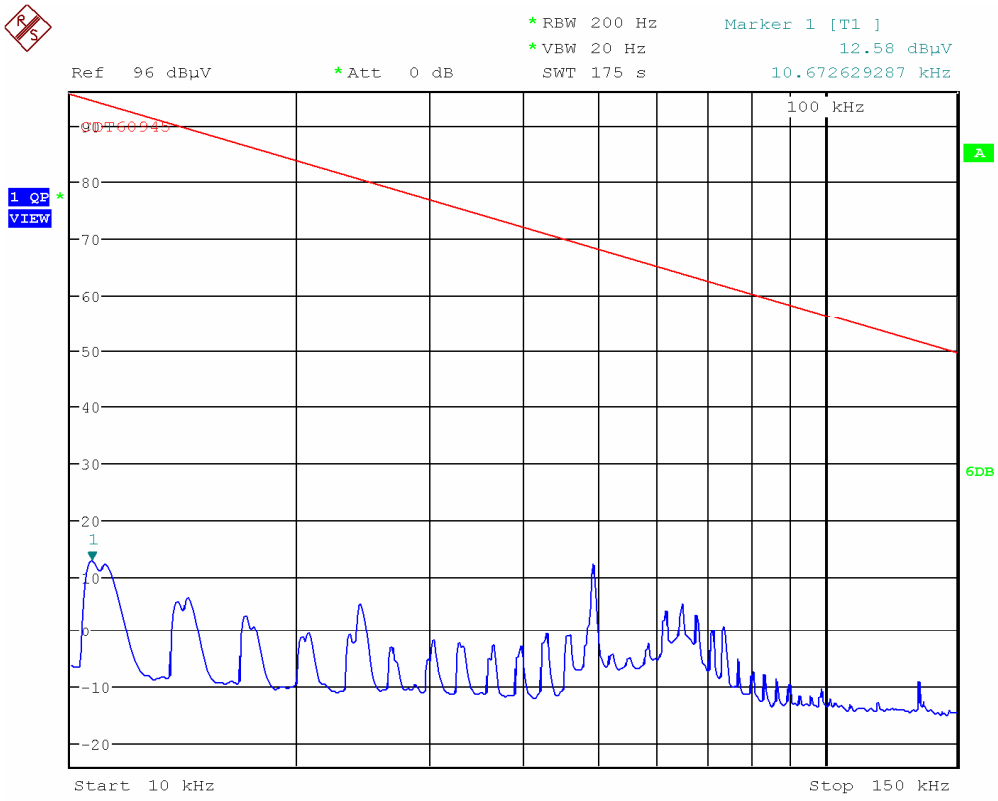
FREQUENCY BAND : 10kHz – 150kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
10.67	**12.58**	**96dBµV – 50dBµV**

FREQUENCY BAND : 150kHz – 350kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
326.0	**26.62**	**60dBµV – 50dBµV**

FREQUENCY BAND : 350kHz – 30MHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (MHz)	**Results**	**Limits**
0.38	**15.78**	**50dBµV**
0.62	**19.68**	
3.08	**15.74**	
4.31	**22.00**	
26.00	**16.42**	
28.00	**19.02**	
29.49	**21.30**	
30.00	**19.54**	

Result :	**COMPLIANT**

13.6. CONDUCTED EMISSION GRAPHS



Date: 29.MAR.2011 16:01:32

ElectroMagetic Compatibility

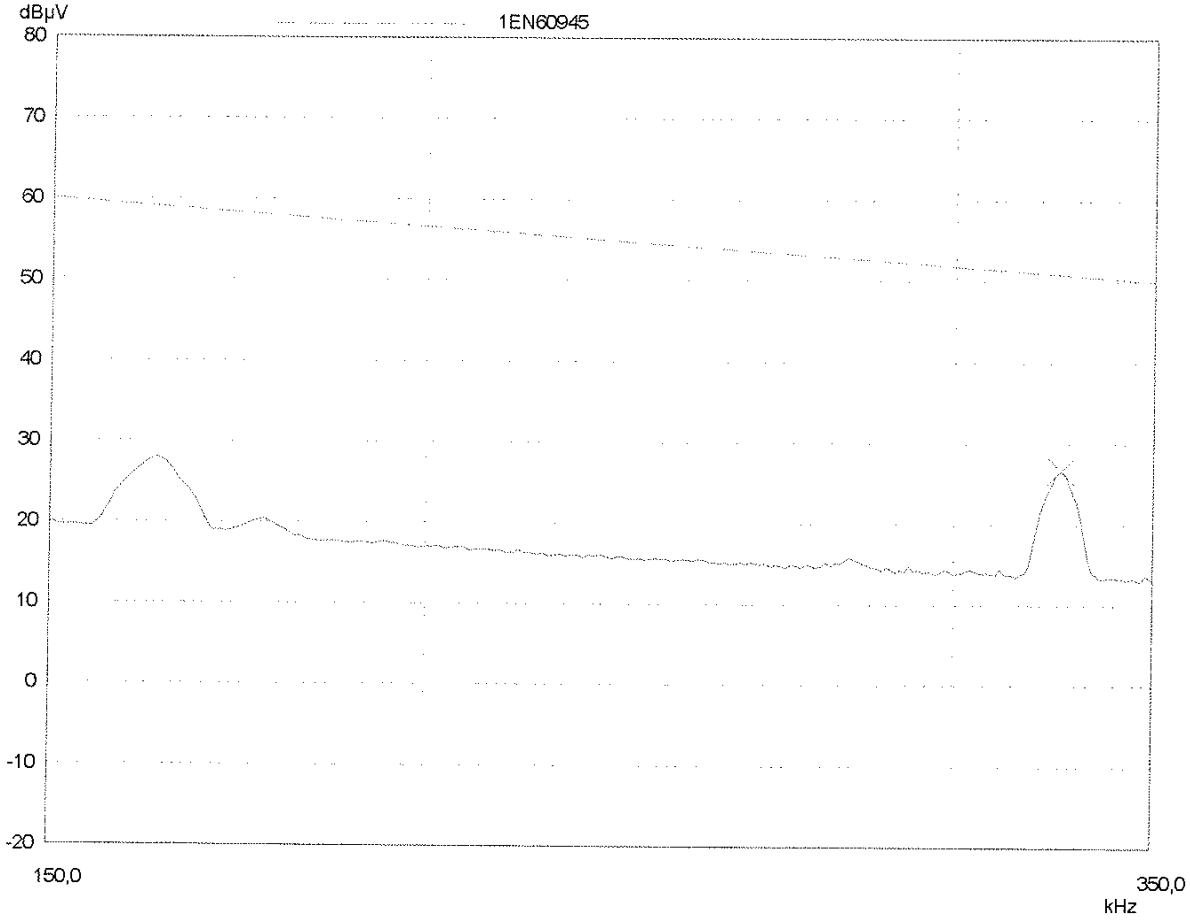
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line
	F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement:	X QP	
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	25 dB



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ElectroMagetic Compatibility
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency kHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
326,0	26,62	50,84	24,22

* limit exceeded

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ElectroMagetic Compatibility

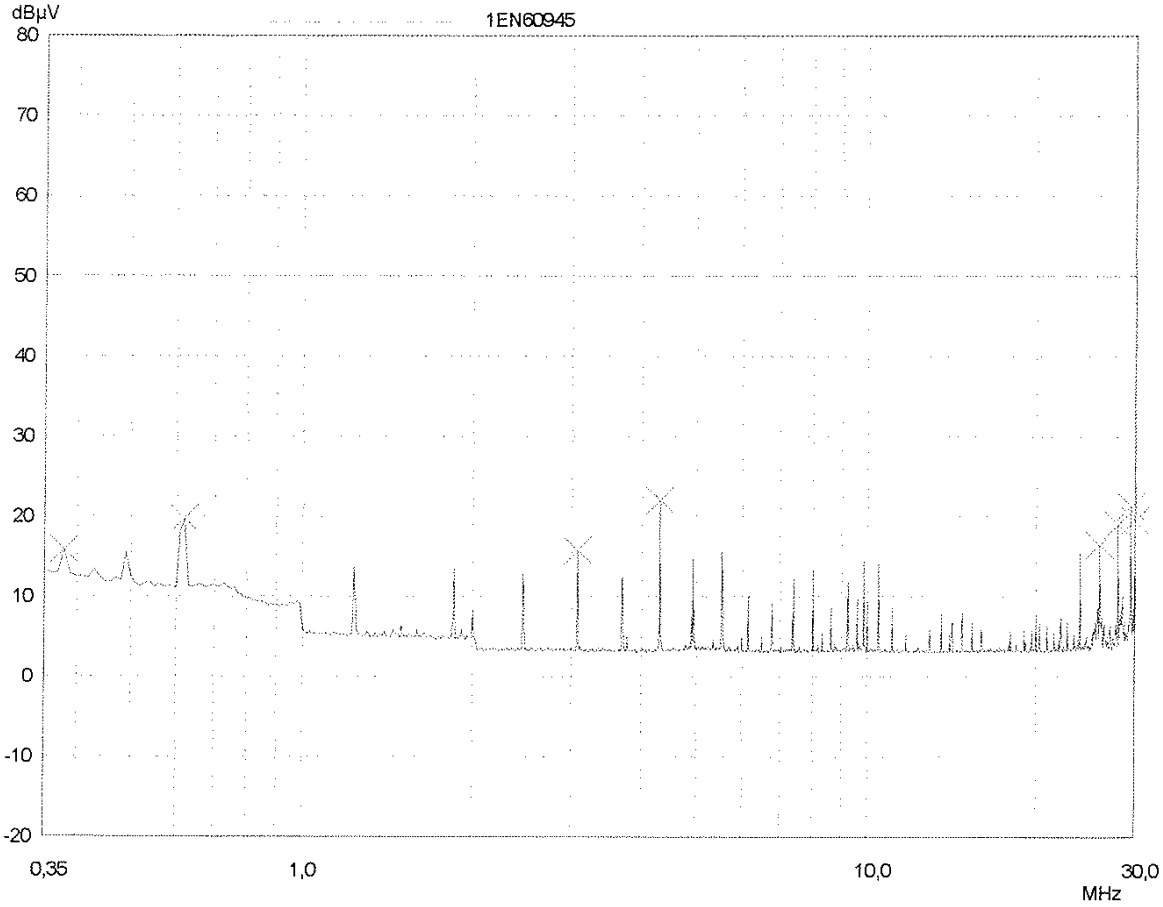
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line
	F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



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ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 24Vcc power line
	F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0,38	15,78	50,00	34,22
0,62	19,68	50,00	30,32
3,08	15,74	50,00	34,26
4,31	22,00	50,00	28,00
26,0	16,42	50,00	33,58
28,0	19,02	50,00	30,98
29,49	21,30	50,00	28,70
30,0	19,54	50,00	30,46

* limit exceeded

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13.6.1. TRANSMITTER 2W : ON 12 VDC POWER LINE

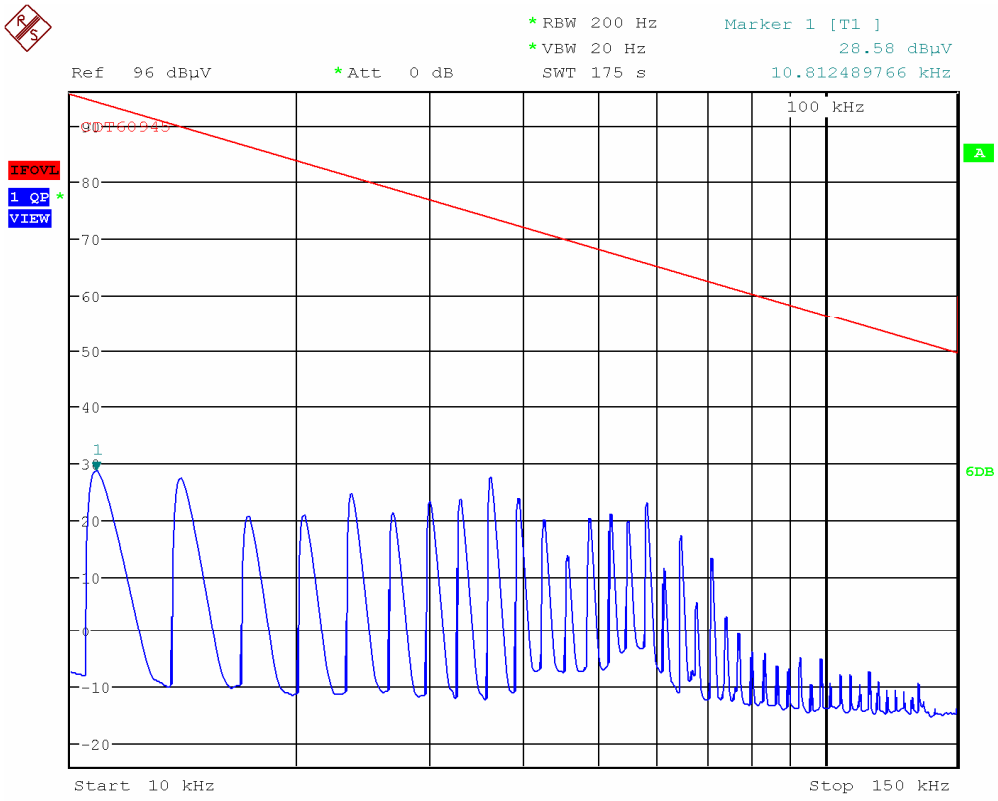
FREQUENCY BAND : 10kHz – 150kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
10.81	**28.58**	**96dBµV – 50dBµV**

FREQUENCY BAND : 150kHz – 350kHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (kHz)	**Results**	**Limits**
326.0	**26.70**	**60dBµV – 50dBµV**

FREQUENCY BAND : 350kHz – 30MHz SPURIOUS EMISSION LEVELS DBµV QUASI-PEAK		
Frequency (MHz)	**Results**	**Limits**
0.38	**15.84**	**50dBµV**
0.62	**19.10**	
4.93	**21.92**	
5.55	**15.74**	
26.00	**16.34**	
28.00	**19.10**	
29.49	**20.94**	
30.00	**19.42**	

Result :	**COMPLIANT**

13.7. CONDUCTED EMISSION GRAPHS



Date: 29.MAR.2011 16:06:11

ElectroMagetic Compatibility

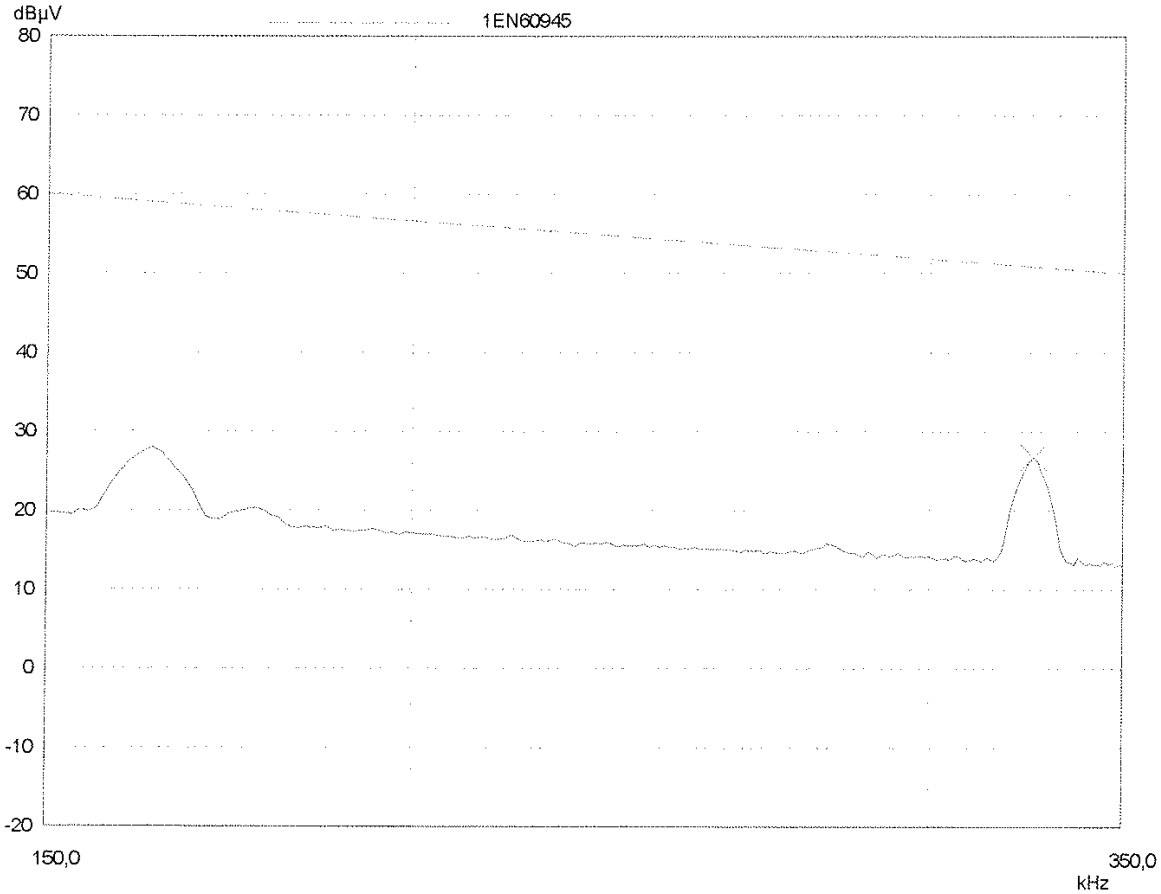
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vcc power line
	F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB



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ElectroMagetic Compatibility
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vcc power line F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
150kHz	350kHz	1kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 25 dB

Peak Search Results:

Frequency kHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
326,0	26,70	50,84	24,14

* limit exceeded

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ElectroMagetic Compatibility

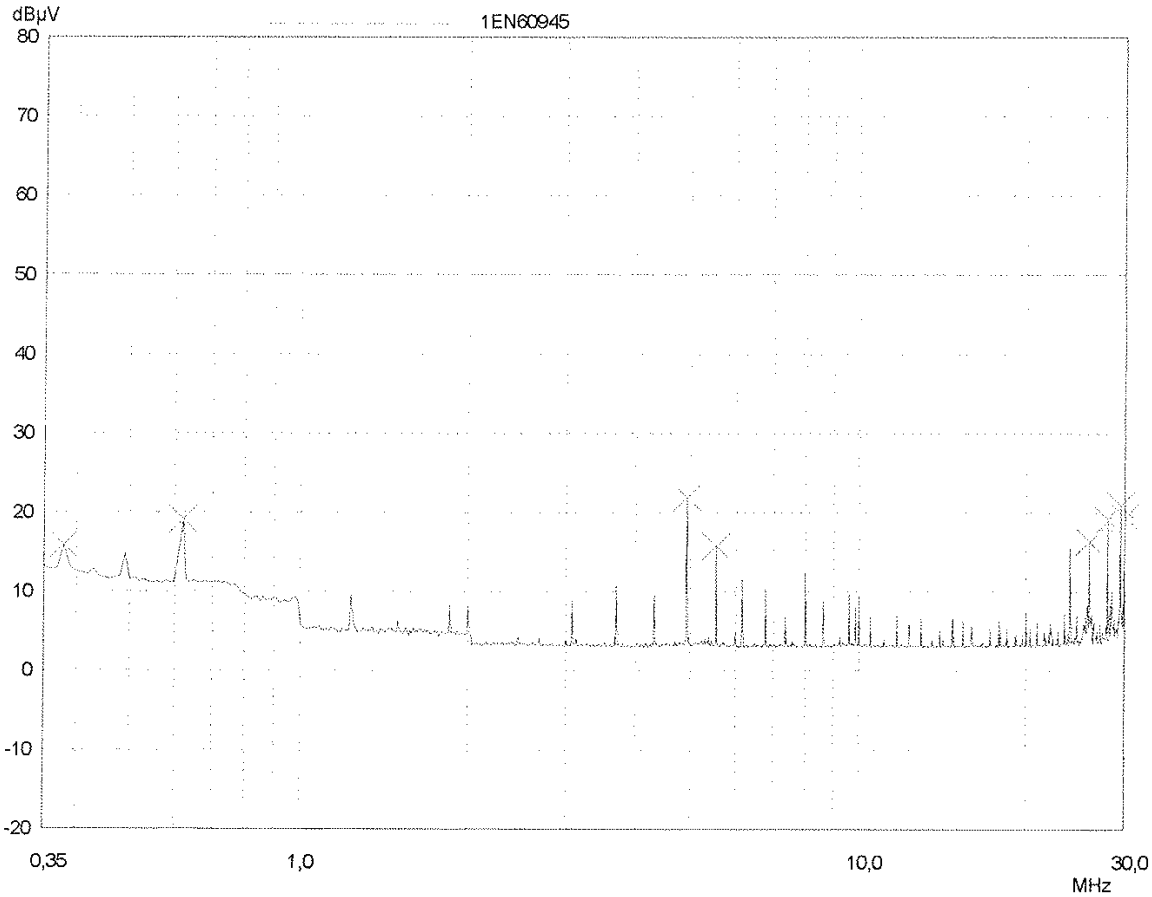
Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vcc power line
	F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 50 dB



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ElectroMagetic Compatibility

Conducted Emission

EUT:	Balise AIS AtoN V3
Manuf:	Kannad
Op Cond:	In Anechoic Chamber
Operator:	T. Ronarc'h
Test Spec:	EN 60945
Comment:	On 12Vcc power line
	F1 - 2W

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
350kHz	30MHz	10kHz	10kHz	QP	50msec	Auto	60dB

Prescan Measurement: X QP
Meas Time: see scan settings
Peaks: 8
Acc Margin: 50 dB

Peak Search Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0,38	15,84	50,00	34,16
0,62	19,10	50,00	30,90
4,93	21,92	50,00	28,08
5,55	15,74	50,00	34,26
26,0	16,34	50,00	33,66
28,0	19,10	50,00	30,90
29,49	20,94	50,00	29,06
30,0	19,42	50,00	30,58

* limit exceeded

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