NORWEGIAN ACCREDITATION
TEST 031

COMLAB
Accredited Testing and Certification
EMC, Radio and Telecommunications

Nemko Comlab AS

Office address: Gåsevikveien 8, Kjeller
Postal address: P.O.Box 96, N-2027 Kjeller
Telephone: +47 64 84 57 00
Facsimile: +47 64 84 57 05
E-mail: post@comlab.no
http://www.comlab.no
Enterprise no: NO 984 592 418 MVA

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Test report :03/502/4

Item tested : UAIS transponder

Equipment type : TR-2500

Client : Jotron

Tested according to :

Part of
IEC 60945 Fourth Edition 2002-08

Date of issue : 2004.01.27

Authorised by :

Kjell G. Haga
Managing Director

Geir Antonsen
Technical Supervisor

Contents:

1 GENERAL INFORMATION

1.1 Test Laboratory

Name :	Nemko Comlab AS
Address :	Gåsevikveien 8, P.O.Box 96 N-2027 Kjeller, Norway
Telephone :	+47 64 84 57 00
Fax :	+47 64 84 57 05
E-mail :	Post@comlab.no
Managing Director:	Kjell G. Haga

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1.2 Client Information

Name :	Jotron Electronics AS
Address :	PO Box 54 N-3280 Tjodalyng
Telephone :	+47 33 13 97 14
Fax :	+47 33 12 67 80
Contact:	
Name :	Eirik Storjordet
E-mail :	eirik.storjordet@jotron.com

1.3 Manufacturer

Name :	Jotron Electronics AS
Address :	Kirkestien 1 N-3280 Tjodalyng
Telephone :	+47 33 13 97 14
Fax :	+47 33 12 67 80

2 TEST INFORMATION

2.1 Test Item

Name : UIAS Transponder

Model/version : TR-2500

Hardware identity:

Remarks

The tested equipment is UAIS transponder with junction box and port for VHF and GPS.

2.2 Test Environment

2.2.1 Normal Test Conditions

Temperature:	20.4 – 21.4°C
Relative humidity:	19.7 – 22.5 %
Normal test voltage:	230 V AC
Main frequency:	50 Hz

The values are the limits registered during the test period.

2.3 Test Period

Test item received date: 6.01.2004

Test period: 6-8.01.2004

2.4 Standards and Regulations

IEC 60945 Fourth Edition 2002-08 Maritime navigation and radiocommunication equipment and systems- General requirements- Methods of testing and required test results

2.5 Test Engineers

Egil Hauger, Per Magne Tveiten.

2.6 Additional information

2.6.1 Test Methods

Described in relevant basic standards.

2.6.2 Test Equipment

List of used test equipment, see page no. 14.

3 TEST REPORT SUMMARY

3.1 Abbreviations

P Passed, the equipment fulfils the requirement

F Failed, the equipment does not fulfil the requirement

NA Not applicable, the requirement is not applicable

NT Not tested, the test is not performed even though the requirement is relevant

Test Summary

Basic Standard	Port	Measurement	Result (Pass/Fail)
IEC 60945 Clause 9.3	Enclosure	Radiated Emissions 150 kHz - 2000 MHz	P
IEC 60945 Clause 9.2	24 V DC power	Conducted Emissions 0.01 - 30 MHz	P
IEC 60945 Clause 10.4 / IEC 61000-4-3 (1995)	Enclosure	Radiated, radio-frequency electromagnetic field - Immunity test	P
IEC 61000-4-2 (1995)	Enclosure	Electrostatic discharge (ESD) immunity test	P
IEC 60945 Clause 10.3 / IEC 61000-4-6 (1996)	24 V DC and Signal port	RF common mode, induced by radio-frequency fields - Immunity test Multilead, VHF antanna coax and GPS coax	P
IEC 61000-4-4 (1995)	Signal port	Electrical fast transient/burst (EFT/B) immunity test. Multilead, VHF antanna coax and GPS coax	P
IEC 61000-4-4 (1995)	DC	Electrical fast transient/burst (EFT/B) immunity test DC not mandatory in IEC 60945	P
IEC 60945 Caluse 10.8	DC	Power Failure i.e. voltage interruption, 60 seconds	P

4 OTHER COMMENTS

4.1 General:

The RF field tests are performed in a 10 meter semi anechoic room.

4.2 EUT (Equipment Under Test)

EUT is an UAIS transponder with junction box and antenna port for VHF and GPS.
EUT size is 244x108x124 mm.

4.3 List of ports

Signal ports:	VHF antenna port, GPS antenna port and communication port RS-422.
Power ports:	24 V

4.4 RF disturbance tests

During the RF field emission test the EUT was rotated in the test chamber and measured with the test antenna both vertical and horizontal.

4.5 RF immunity tests

The RF field immunity tests are performed at 3 meter distance with absorbers on the floor between the transmitting antenna and the EUT. A log periodic antenna is used in the frequency range 80 - 1000 MHz, and horn antenna is used above 1 GHz.

During the RF field immunity test the EUT was rotated in the test chamber and exposed for both vertical and horizontal field.

4.6 Performance Criteria, IEC 60945

4.6.1 Performance criteria A

The EUT shall continue to operate as intended during and after the test. No degradation or loss of function is allowed, as defined in the relevant equipment standard and in the technical specification published by the manufacturer.

4.6.2 Performance criteria B

The EUT shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed, as defined in the relevant equipment standard an in the technical specification published by the manufacturer. During the test, degradation or loss of function or performance which is self-recoverable is however, allowed, but no change of actual operating state or stored data is allowed.

4.6.3 Performance criteria C

Temporary degradation or loss of function or performance is allowed during the test, provided the function is self-recoverable, or can be restored at the end of the test by the operation of the controls, as defined in the relevant equipment standard and in the technical specification published by the manufacturer.

:

5 EMISSION MEASUREMENTS

5.1 Radiated emissions from Enclosure Port, IEC 60945 Clause 9.3

Test set up:

The test is performed in a semi anechoic chamber with a size of 22 × 13 × 9,5 meters (l × w × h). The The EUT was placed on a table with a height of 80 cm. on a turn table. The receiver antenna height was varied between 1 and 4 meters, both with horizontal and vertical polarisation. The EUT was rotated for 360° to maximise the emission. The set-up was according to IEC 60945 Clause 9.3.2. with test distance of 3 m between EUT and test antenna.

Cable configuration during test:

Investigation of the unwanted emission was made with the measuring receiver in “Overview mode”. The manufacturer has defined the interconnection cable between RF unit and junction box to be of maximum 10 m. This 10 m of cable is bundled at the centre of the cable as described in Clause 9.3.2, see picture on page 15.

EUT mode during test:

EUT was in normal test operation and monitored via external PC.
The RS422 port on a PC simulates the sensors output.

Frequency (MHz)	Detector / Polarisation	Level (dBµV/m)	Result (Pass/Fail)
18,55	QP/VP	<19,9	P
27,75	QP/VP	<19,4	P
163,35	Peak/VP	25,2	P
323,95	QP/HP	47,1	P
971,85	QP/HP	45,7	P
1296,1	Peak/VP	47,0	P
1619,7	Peak/VP	50,4	P
1943,6	Peak/VP	48,0	P
Limits:			
0,15-0,3	QP	80-52	
0,3-30	QP	52-34	
30-1000	QP	54	
156-165	Peak	30	
1000-2000	Peak	54	
Measurement Uncertainty			
0,15-30		**+1,8/-2,1**	
30-200 MHz		**± 4,7 dB**	
200-1000 MHz		**± 4,8 dB**	
1000-2000 MHz		**± 2,0 dB**	

Results:

See fig 4 to 16.

Test Equipment Used: 23, 41, 42, 43, 44, 45

5.2 Conducted Emission at 24 V Power Ports, IEC 60945 Clause 9.2

Test set up:

The test is performed in a shielded chamber with a size of >2x2 meters.
The EUT was placed on a table with a height of 80 cm. at a distance of 40 cm. to the vertical reference plane. The AMN and LISN was mounted on the horizontal reference plane 40 cm. from the vertical reference plane. The set-up was according to Clause 9.2.2 in IEC 60945.

EMC receiver with the following settings:

Frequency			Settings		
Start	Stop	Step	IF BW	Detector	Meas Time
0.01 MHz	0.15	100 Hz	200 Hz	Max. peak	20 ms
0.150 MHz	30.0 MHz	4.5 kHz	9 kHz	Max peak	20 mS

Cable configuration during test:

The screened power cable was cut to 80 cm and arranged according to Clause 9.2.2 IEC 60945.
The distance from the EUT to the networks was 80 cm.

EUT mode during test:

EUT was in normal mode during the test with sensor communication on 38,4 kbit/s transponder data and 4,8 kbit/s sensor data on screened communication cable.

Conducted Emission at 24 V DC Power Port:

Frequency (MHz)	**Detector (Peak/ Q-peak/Average)**	**Level (dBµV)**	**Result (Pass/Fail)**
0.0129	Peak	57.9	P
0.027	Peak	54.8	P
0.492	Q-peak	46.0	P
0.990	Q-peak	40.3	P
1.997	Q-peak	35.5	P
Limits: 0.01-0.15 0.15-0.35 0.35-30.0	 Peak Q-peak Q-peak	 96-50 60-50 50	
Measurement Uncertainty 0.15-30.0 MHz		**+ 2.9 / - 4.1 dB**	

Results:

See 1 to 3.

Test Equipment Used: 14, 23, 24

6 IMMUNITY TO ELECTROMAGNETIC ENVIRONMENT

6.1 Immunity to radiated radio frequencies, IEC 60945 Clause 10.4, EN 61000-4-3

The test is performed in a 10 meter semi anechoic chamber.

Test signal:

Test generator settings:

Frequency			Settings		
Start	Stop	Step	Modulation	Mod. freq.	Field strength
80 MHz	2000 MHz	1 %	80 %	1000 Hz	10 V/m (-0/+6dB)

Dwell time 1,6 sec.

Exclusion band:

153.87625 MHz – 170.12625 MHz.

Cable configuration during test:

Ferrites were used, so only 100 cm. of the cables were exposed for RF field.

EUT configuration during test:

EUT was placed on a wooden table with a height of 80 cm with the front and back facing the transmitting antenna and exposed for both horizontal and vertical RF field.

EUT mode during test:

EUT was in normal operation with sensor and transponder communication.

Test Level:

Test level was 10 V/m

Performance criteria for EUT:

During test: Performance criteria A (see 4.6 in this report).
After test: Operate as intended.
No loss of functions.
No degradation of performance.
No loss of stored data or user programmable functions.

Results:

Frequency (MHz)	EUT side facing the RF field and polarity of the RF field	Field strength (V/m)	Performance (se Note)	
			During test	After test
80 – 2000 2)	Front/back Horizontal Vertical	10	1)	1)
Measurement Uncertainty (generating disturbing signal):			**+2,1 / -2,4 dB**	

Note:

1) Within the performance criteria described above.
2) 1000-2000 MHz not accredited.

Test Equipment Used:8, 9, 26, 27, 32,

6.2 Electrostatic Discharge (ESD) Immunity Test at Enclosure port IEC 61000-4-2

The Electrostatic Discharges were applied according to the following test plan:

Discharges applied to EUT		ESD generator:			Result
Application mode:	Test point	Voltage (kV)	Coupling mode:	Number of discharges	
DA	EUT Enclosure, >	+/- 2,4 & 6	CD	> 60	P
DA	EUT Enclosure, plastic front cover	+/- 2,4 & 8	AD	> 60	P
IA	Horizontal Coupling Plane (HCP)	+/- 2,4 & 6	CD	> 40	P
IA	Vertical Coupling Plane (VCP)	+/-2,4 & 6	CD	> 40	P

ABBREVIATIONS USED IN THE TABLE:

Application mode: DA = Direct application of discharges; IA = Indirect application of discharges
Coupling mode: CD = Contact discharges mode; AD = Air discharges mode

Cable configuration during test:
The AIS units were placed in parallel on a 0.5 mm thick bakelite plate on the ground plane and connected to the DC supply. The grounding terminal on Aluminium case was connected with 20 cm strap to the coupling plane, in accordance with manufacturer instruction and IEC 61000-4-2 2001 article 7.1

Test set-up:
The test set-up was according to IEC 61000-4-2 clause 7.1. A Ground Reference Plane (GRP) of 5 mm thick aluminium (2mx4m) was placed on the floor. The GRP was connected to the protective earth with a 10 mm^2 thick copper cable.
The EUT was tested as a TABLE TOP EQUIPMENT according to IEC 61000-4-2, clause 7.1.1 and the test set-up consists of the following: A wooden table (0.8 m high) was located on the GRP. A Horizontal Coupling Plane (HCP) consisting of 1.5mm thick aluminium (0.8mx1.6m) was placed on the table. An insulating bakelite plate (0.5 mm thick) was placed on the HCP and the EUT was placed on the insulating plate during the test.

EUT mode during test:
EUT was in normal operation with sensor and transponder communication.

Test Level:
The test level was selected on basis of IEC 60945

Performance criteria for EUT:

After each exposure:	Performance criteria B (see page 6 in this report).
	No unintentional transmission (during or after each exposure)
After the test:	Operate as intended.
	No loss of functions.
	No degradation of performance.
	No loss of stored data or user programmable functions.

Results:

No loss of communication burst messages. A performance check at the conclusion of the total test showed that no stored data or user control functions were lost, and the EUT was operating as intended. No unintentional transmissions were observed.

Test Equipment Used: 28 plus general-purpose spectrum analyser and DC power supply

6.3 Immunity to conducted radio frequency disturbance, IEC 60945 Clause 10.3, IEC 61000-4-6.

Test signal:

Test generator settings:

Frequency			Settings		
Start	Stop	Step	Modulation	Mod.freq.	Voltage
0,15 MHz	80 MHz	1.0 %	80 %	1000 Hz	5 V (EMF)
Spot frequencies, *)			80 %	1000 Hz	10 V (EMF)

***) Spot frequencies: 2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22.0 and 25.0 MHz.**

Dwell time 1,6 sec.

Cable configuration during test:

According to Clause 10.3.2 in IEC 60945.

Test method:

According to IEC 60945 Clause 10.3.2. EUT was tested as tabletop equipment, and the RF injection was made with coupling networks. A ground plane was placed on a wooden table with a height of 80 cm, and the coupling network was placed on the ground plane. The EUT was placed on a non-conducting stand with a height of 10 cm. above the ground plane.

EUT mode during test:

EUT was in normal operation with sensor and transponder communication.

Test Level:

The test level was 5 V (EMF) for sweep test and 10 V (EMF) for spot frequencies.

Performance criteria for EUT:

During test: Performance criteria A (see 4.6 in this report).
After test: Operate as intended.
No loss of functions.
No degradation of performance.
No loss of stored data or user programmable functions.

Results:

Frequency (MHz)	Port	Test method	Voltage (V EMF)	Performance (se Note)	
				During test	After test
0.150 - 80	24 V Power	Coupling network	5/10	1)	1)
0.150 - 80	Signal port	Clamp	5/10	1)	1)
0.150 - 80	VHF antenna	Coupling network	5/10	1)	1)
0.150 -80	GPS antenna	Coupling network	5/10	1)	1)
Measurement Uncertainty (generating disturbing signal):				**150kHz – 26 MHz:** **26 MHz – 80 MHz**	**+2,5 / -2,8 dB** **+3,3 / -3,7 dB**

Note:

1) Within the performance criteria described above.

Test Equipment Used: 12, 14, 27

6.4 Electrical Fast Transient/Burst (EFT/B) Immunity Test. EN 61000-4-4

The Electrical Fast Transients were applied as follows:

DC power supply input port (coupling network) [This is in addition to requirements in IEC 60954:]

Test voltage peak (kV)	Repetition rate (kHz)	Burst duration (ms)	Burst period (ms)	Test period (s)	Result
0,5 1 & 2	5	15	300	60	P

Signal port (capacitive clamp) [Multilead cable, VHF Antenna Cable and GPC Coax cable]:

Test voltage peak (kV)	Repetition rate (kHz)	Burst duration (ms)	Burst period (ms)	Test period (s)	Result
0.5 & 1	5	15	300	60	P

Comments: The EUT was tested according to EN 61000-4-4 clause 7.2.2.

Cable configuration during test:

The cables from the EUT were isolated from the Horizontal Coupling Plane (HCP) by positioning them on a wooden table with a height of 80 cm.

Test set-up:

The test set-up was according to EN 61000-4-4 clause 7.2. A Ground Reference Plane (GRP) of 5 mm thick aluminium. (2mx4m) was placed on the floor. The GRP was connected to the protective earth with a 10 mm^2 thick copper cable. The EFT/B-generator including the coupling/decoupling network was placed on the GRP and connected to the GRP with a braided copper band (which provides minimum inductance).
The EUT was tested as a TABLE TOP EQUIPMENT and placed on a wooden table (0.8 m high) located on the GRP during the test.
Test on the telecomm / signal . ports were performed by applying the EFT/B pulses to the capacitive coupling clamp. The cable was stretched trough the capacitive clamp, and the clamp was closed as mush as possible during the test. The clamp was located on a secondary GRP (1.5 mm thick aluminium 0.8mx1.6m). The HV-cable from the EFT/B-generator was connected to the end of the clamp nearest to the EUT.

EUT mode during test:

The AIS was operating in a mode with occasional transmissions as during normal operating.
The associated simulating PC was actively providing “ship” data to the EUT.

Test Level:

The test level for communication / signal ports were selected on basis of IEC 60945.
The test level for DC port was selected on basis of ETSI EN 301 489-22.

Performance criteria for EUT:

After each exposure:	No user noticeable loss of the communication link.
	No unintentional transmission (during or after each exposure)
After the test:	Operate as intended.
	No loss of functions
	No degradation of performance
	No loss of stored data or user programmable functions

Results:

No loss of communication burst messages. A performance check at the conclusion of the total test showed that no stored data or user control functions were lost, and the EUT was operating as intended. No unintentional transmissions were observed.

Test Equipment Used: 16, 33, 40 plus general-purpose spectrum analyser and DC power supply.

6.5 Power supply failure i.e. voltage interruption Clause 10.8 IEC 609451

The different type of disturbances were applied as follows on the DC power supply input port:

Voltage dips:

Operation voltage	Interrupted voltage	Duration
24 Volt DC	0V	60 seconds

3 sequences

The supply lead was disconnected. IEC 60945 does not specify pull down of DC supply during this test.

Test Level:
100% 60 Seconds

Performance criteria for EUT:

During the test: N.A.

After the test: Resume operating and operate as intended.
No loss of functions.
No degradation of performance.
No loss of stored data or user programmable functions.

Results:
The results comply with the performance criteria described above during and after the test.

Comments:
The EUT resumed operating.

Test Equipment Used: General purpose spectrum analyser.

7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

No	Instrument/Ancillary	Type	Manufacturer	Ref. No.
1	Amplifier	25A100M1	Amplifier Research	LR 1155
2	Test fixture		B&K	
3	Measuring Amp. w/microphone	2606	B&K	LT 0508
4	Power Amp.	2706	B&K	LT 5002
5	Artificial Mouth	4227	B&K	LT 5085
6	Acoustic tube		Comlab	LR 1259
7	Feeding bridge		Comlab	LT 0642
8	Field probe	FP4000	Amplifier Research	LR 1352
9	System Interface	SI-200	EMC Automation	LR 1353
10	Switch Module	SM-1	EMC Automation	LR 1153
11	Power supply	D100	Farnell	LT 5149
12	Current probe (injection)	F-120-9	Fischer	LR 1316
13	Current probe	F-33-2	Fischer	LR 1315
14	Coupling/decoupling network	FCC-801-M2-16	Fischer	LR 1312
15	Coupling/decoupling network	FCC-801-T2	Fischer	LR 1320
16	EFT/B generator	PEFT Junior	Haefely	LR 1297
17	Line Interference tester	PLINE 1610	Haefely	LR 1298
18	Surge tester	PSURGE	Haefely	LR 1307
19	Plotter	HP 7475A	Hewlett Packard	LR 1063
20	Audio Analyser	3582A	HP	LR 1019
21	Spectrum Analyser	HP8561B	HP	LR 1085
22	Radiocom. Analyser	CMD60	R&S	LR 1335
23	Test Receiver	ESAI	R&S	LR 1089/1090
24	Pulse Limiter	ESH3-Z2	R&S	LR 1074
25	AMN	ESH3-Z5	R&S	LR 1076
26	Antenna	HL 023A1	R&S	LR 282
27	Generator	SMT 03	R&S	LR 1230
28	ESD generator	NSG435	Schaffner	LR 1281
29	T-ISN	NTFM8132	Schwarzbeck	LR 1254
30	Cable	RG223	Suhner	No. 1
31	GTEM	5311	EMCO	LR 1171
32	Amplifier	500W AF500	Amplifier Research	LR 1354
33	Generator, AF	Mod. 23	Wavetek	LT 5142
34	Radiocom. Analyser	CMTA	R&S	LR 1047
35	Radiocom. Analyser	CMTA	R&S	LR 1113
36	Acoustical Calibrator	4231	B&K	LT 5275
37	Coupling network	IP6.2	Haefely	LR 1305
38	Decoupling network	DEC1A	Haefely	LR 1306
39	Radiocom. Analyser	CMTA	R&S	LR 1087
40	Coupling Clamp	IP4A	Haefely	LR 1301
41	Spectrum analyzer	FSEK	R&S	LR1337
42	Loop antenna	HFH2-Z2	R&S	LR 285
43	Bicon. antenna	HK116	R&S	LR 1260
44	Log.per. antenna	HL223	R&S	LR 1261
45	Ampflier	8449B	HP	LR 1322
46	Spectrum analyzer	ESAI	R&S	LR 1090
47				

8 PICTURE OF TEST SET UP.

9 FREQUENCY PLOT

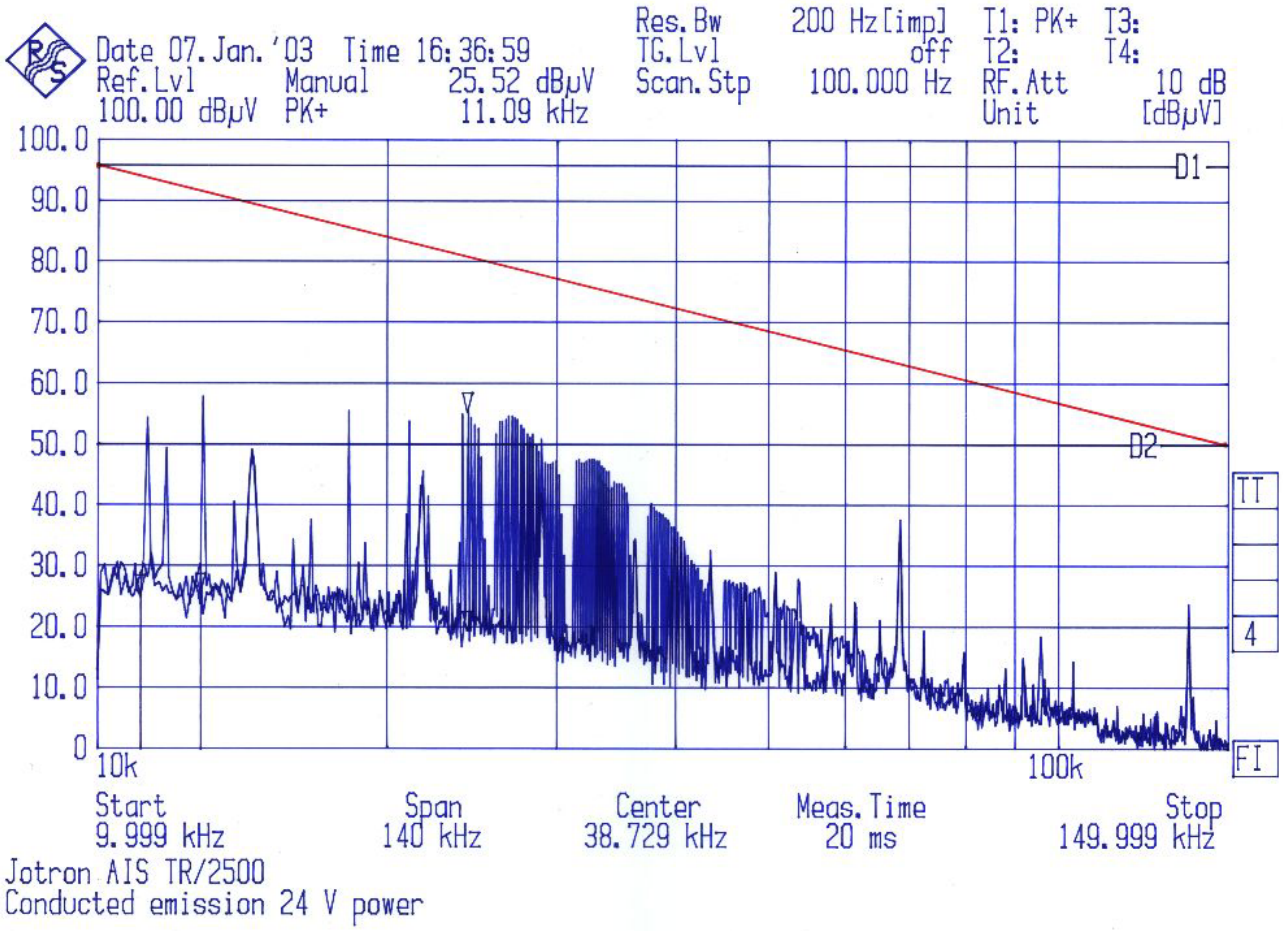

Fig 1 Conducted emission 24 V Power 0.01 – 0.15 MHz

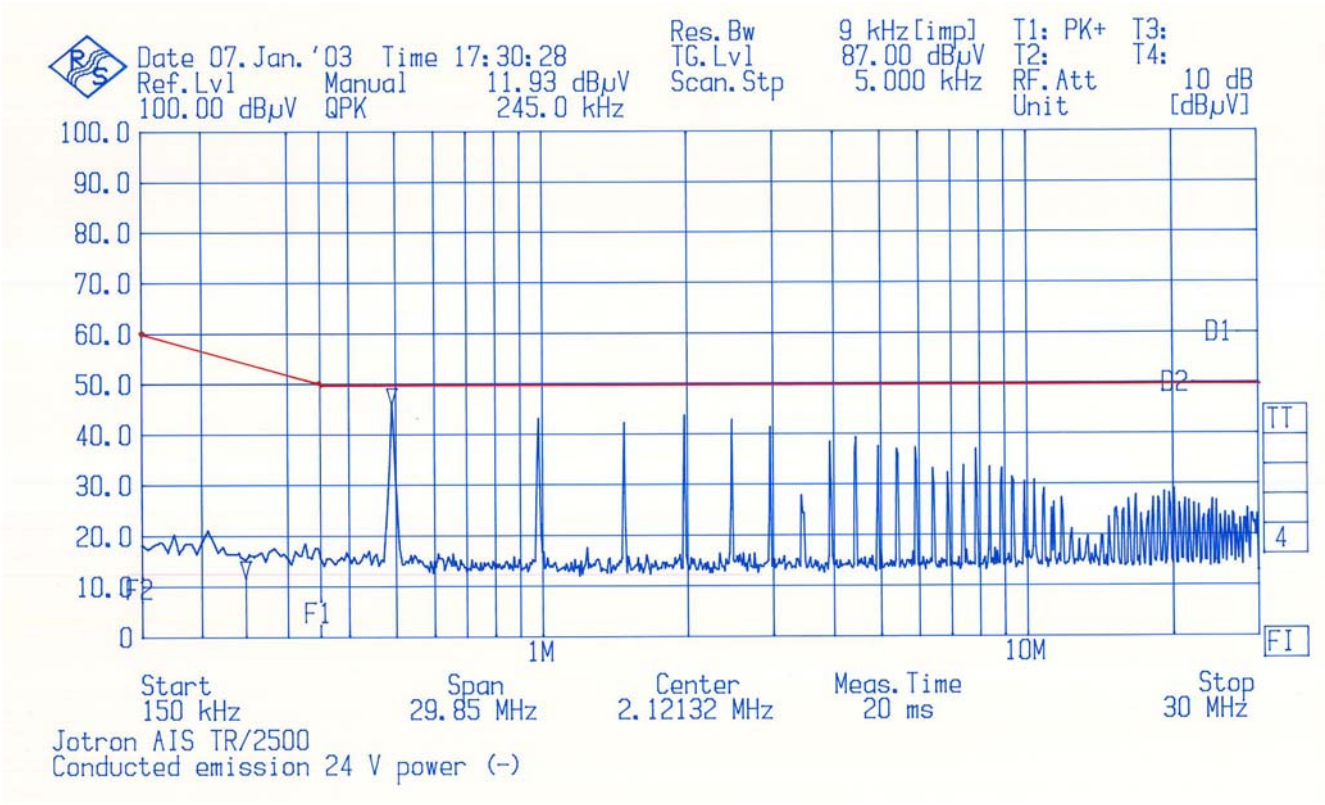

Fig 2 Conducted emission 24 V Power (-)

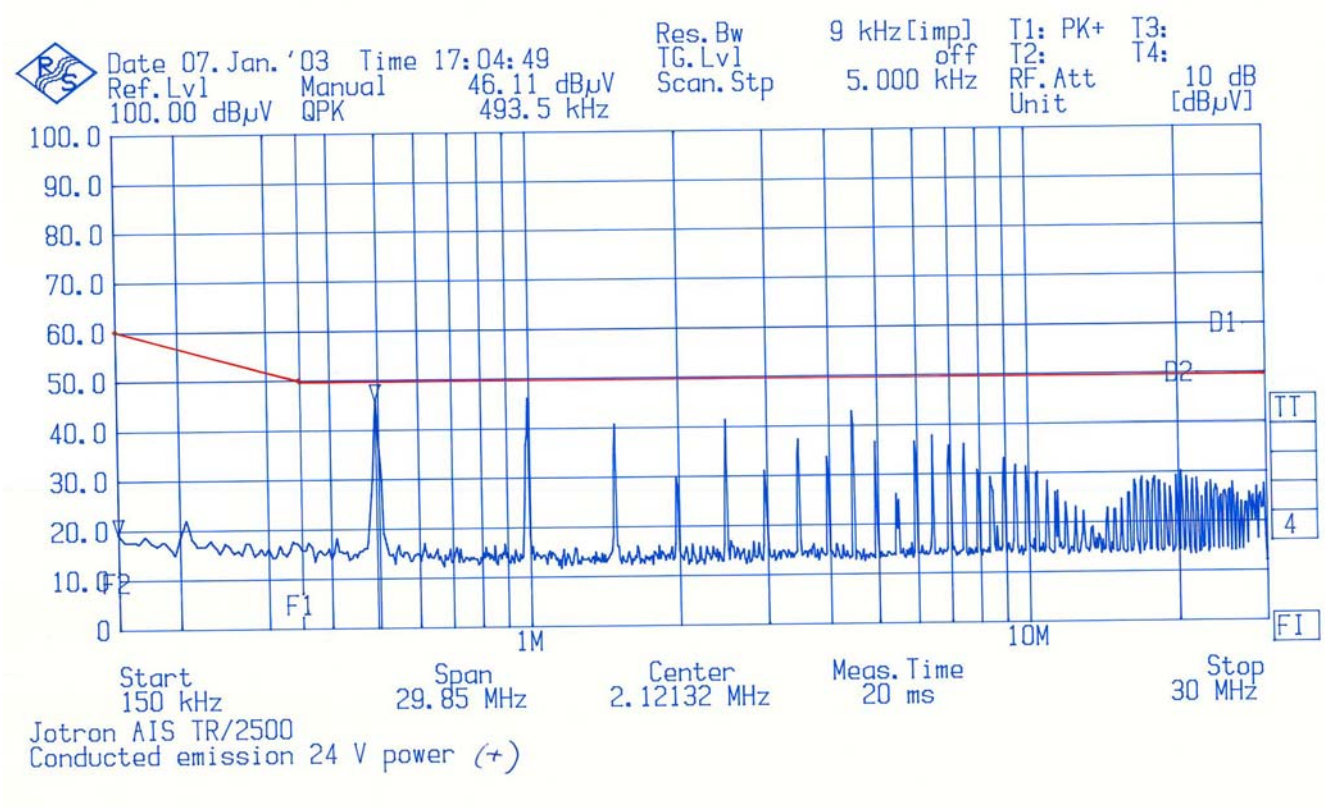

Fig 3 Conducted emission 24 V Power (+)

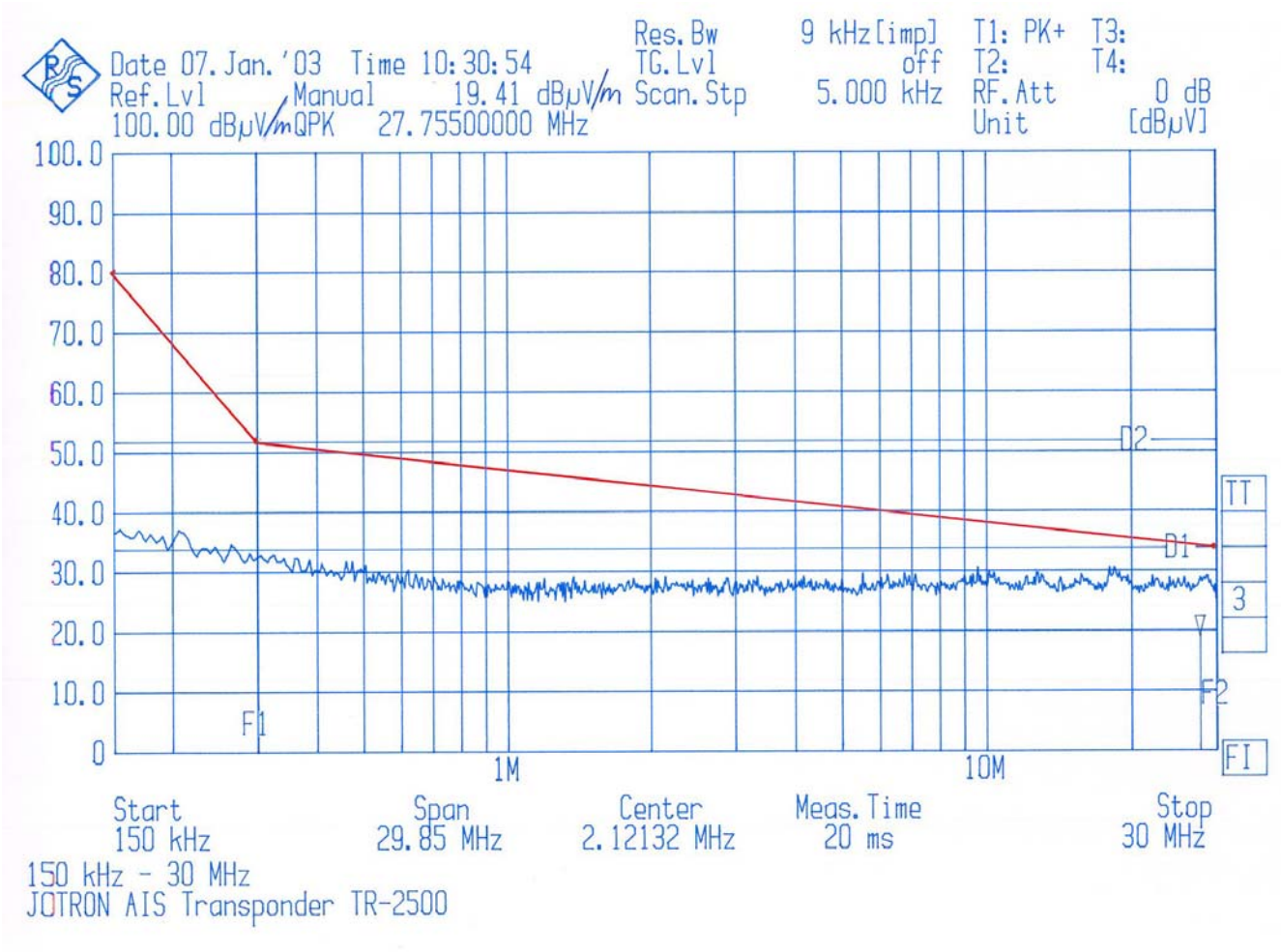

Fig 4 Radiated emission 0.15-30 MHz

Nemko Comlab AS
Peak

EUT:	AIS Transponder TR/2500
Manuf:	Jotron
Op Cond:	d 3 m, H 1 m HP
Operator:	Egh
Test Spec:	60945
Date:	07. Jan 04 10:57

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	156M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	20	30M	200M	HK116

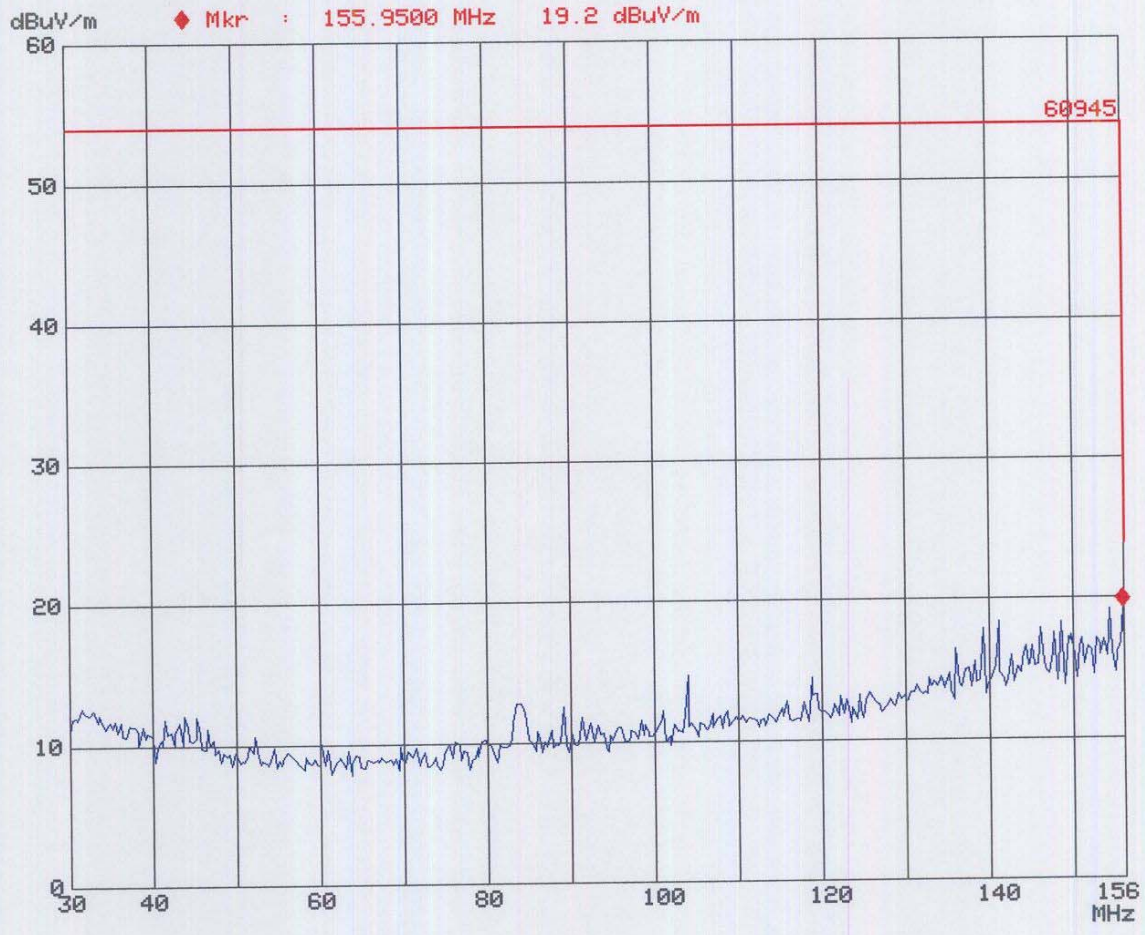

Fig 5 Radiated emission 30-200 MHz Horizontal polarized

Nemko Comlab AS
Peak
EUT: AIS Transponder TR/2500
Manuf: Jotron
Op Cond: d 3 m, H 1 m VP
Operator: Egh
Test Spec: 60945
Date: 07. Jan 04 10:50

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	156M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	20	30M	200M	HK116

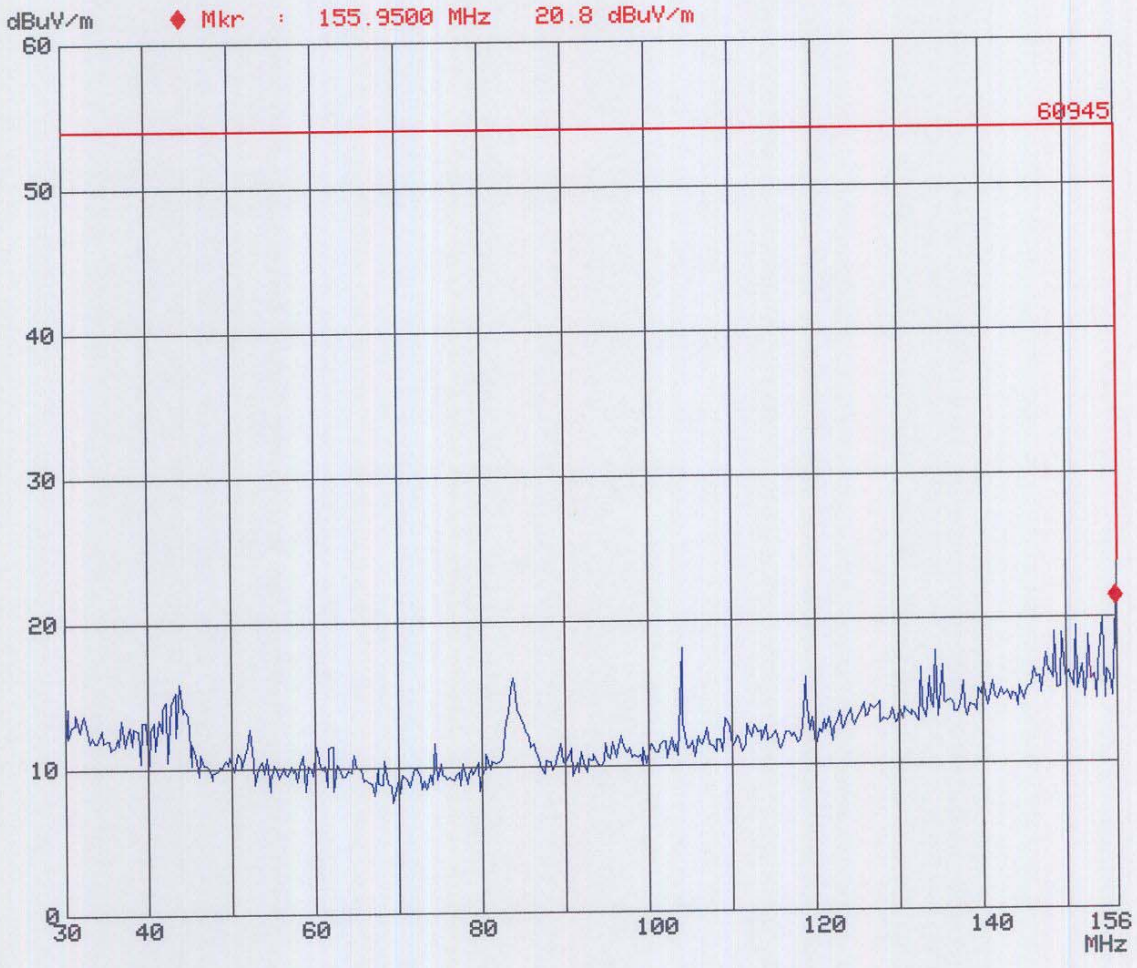

Fig 6 Radiated emission 30-156 MHz Vertical polarization

Nemko Comlab AS
Peak
EUT: AIS Transponder TR/2500
Manuf: Jotron
Op Cond: d 3 m, H 1 m HP
Operator: Egh
Test Spec: 60945
Date: 07. Jan 04 11:07

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
156M	165M	5k	10k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	20	30M	200M	HK116

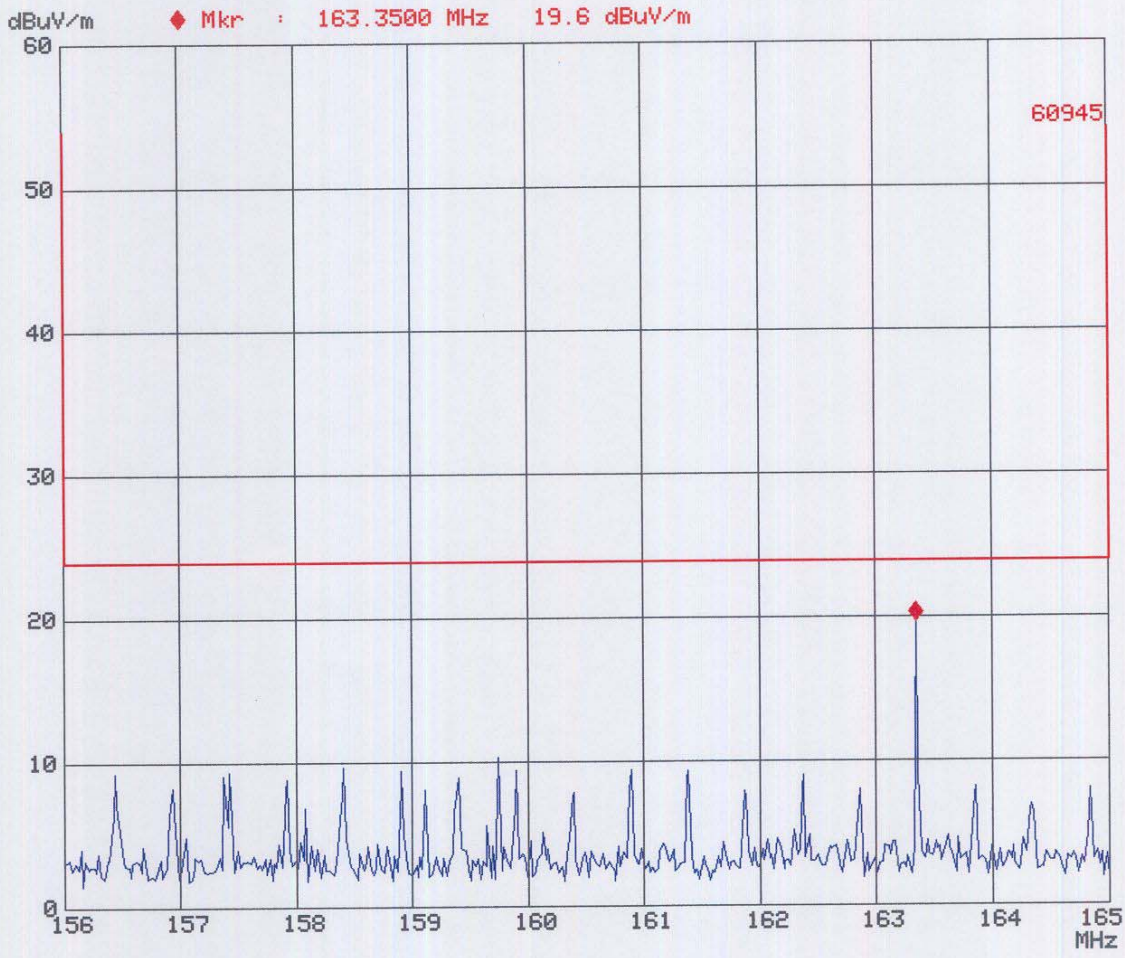

Fig 7 Radiated emission 156 – 165 MHz Horizontal polarization

Nemko Comlab AS
Peak
EUT: AIS Transponder TR/2500
Manuf: Jotron
Op Cond: d 3 m, H 1 m VP
Operator: Egh
Test Spec: 60945
Date: 07. Jan 04 11:02

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
156M	165M	5k	10k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	20	30M	200M	HK116

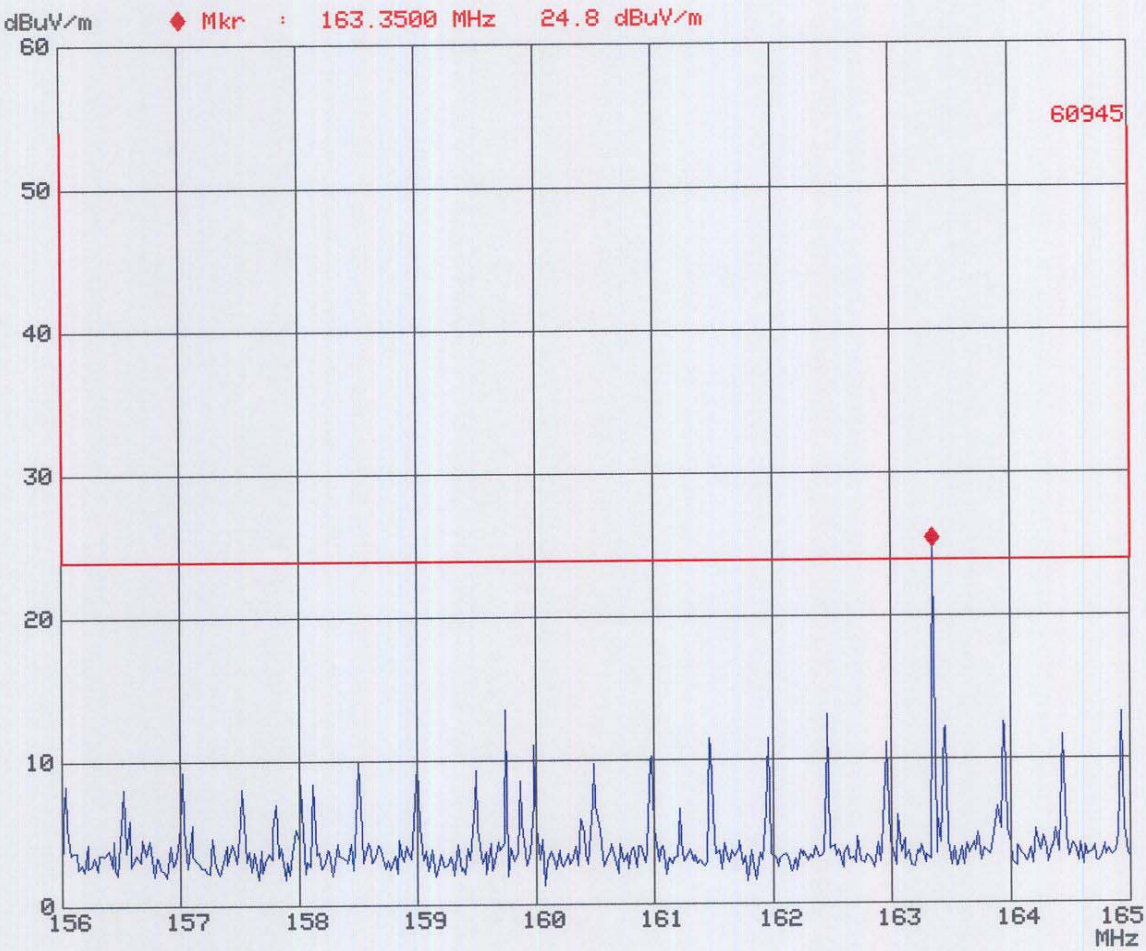

Fig 8 Radiated emission 156 – 165 MHz Vertical polarization

Nemko Comlab AS
Peak
EUT: AIS Transponder TR/2500
Manuf: Jotron
Op Cond: d 3 m, H 1 m HP
Operator: Egh
Test Spec: 60945
Date: 07. Jan 04 11:22

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
165M	200M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	20	30M	200M	HK116

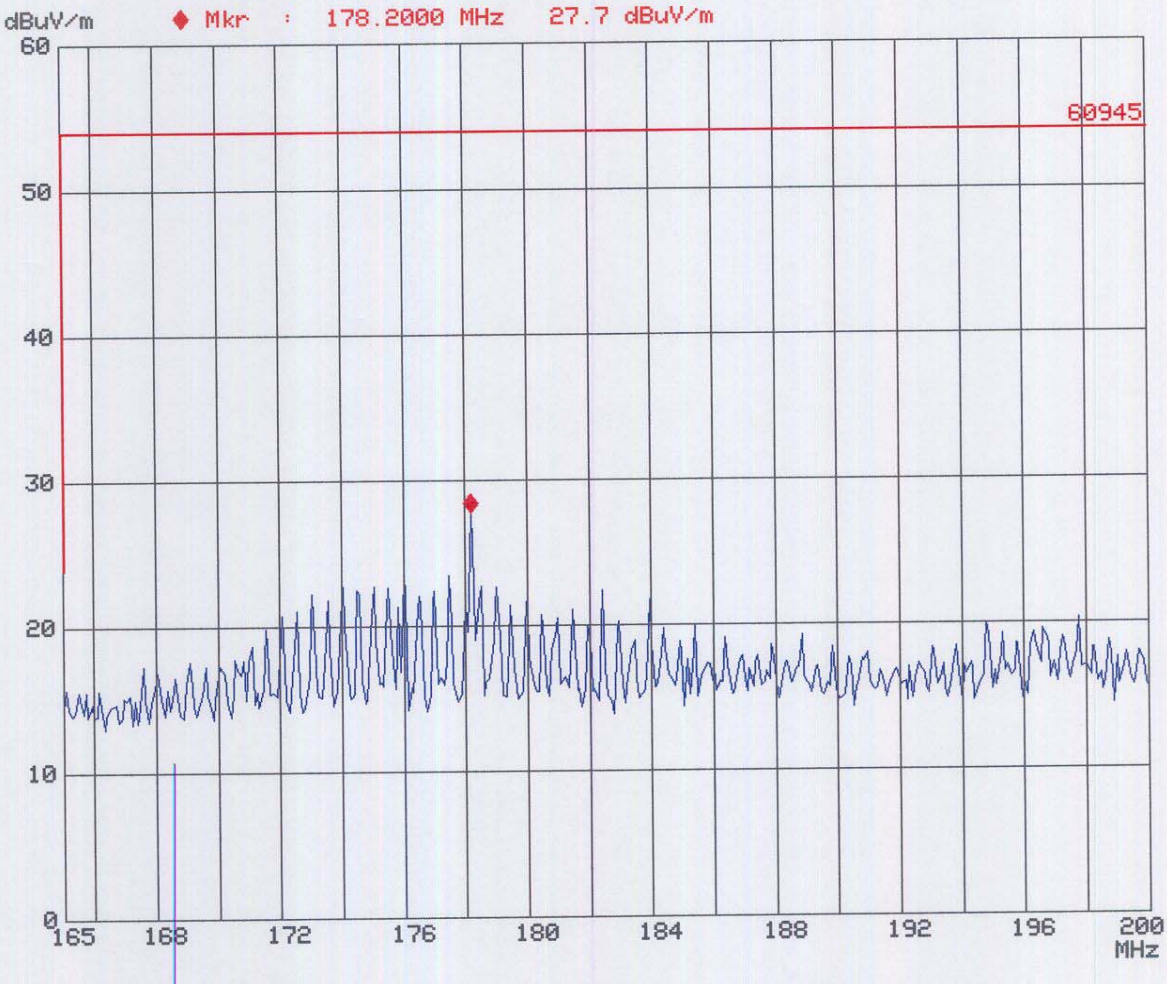

Fig 9 Radiated emission 165 – 200 MHz Horizontal polarization

Nemko Comlab AS
Peak
EUT: AIS Transponder TR/2500
Manuf: Jotron
Op Cond: d 3 m, H 1 m VP
Operator: Egh
Test Spec: 60945
Date: 07. Jan 04 11:18

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
165M	200M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	20	30M	200M	HK116

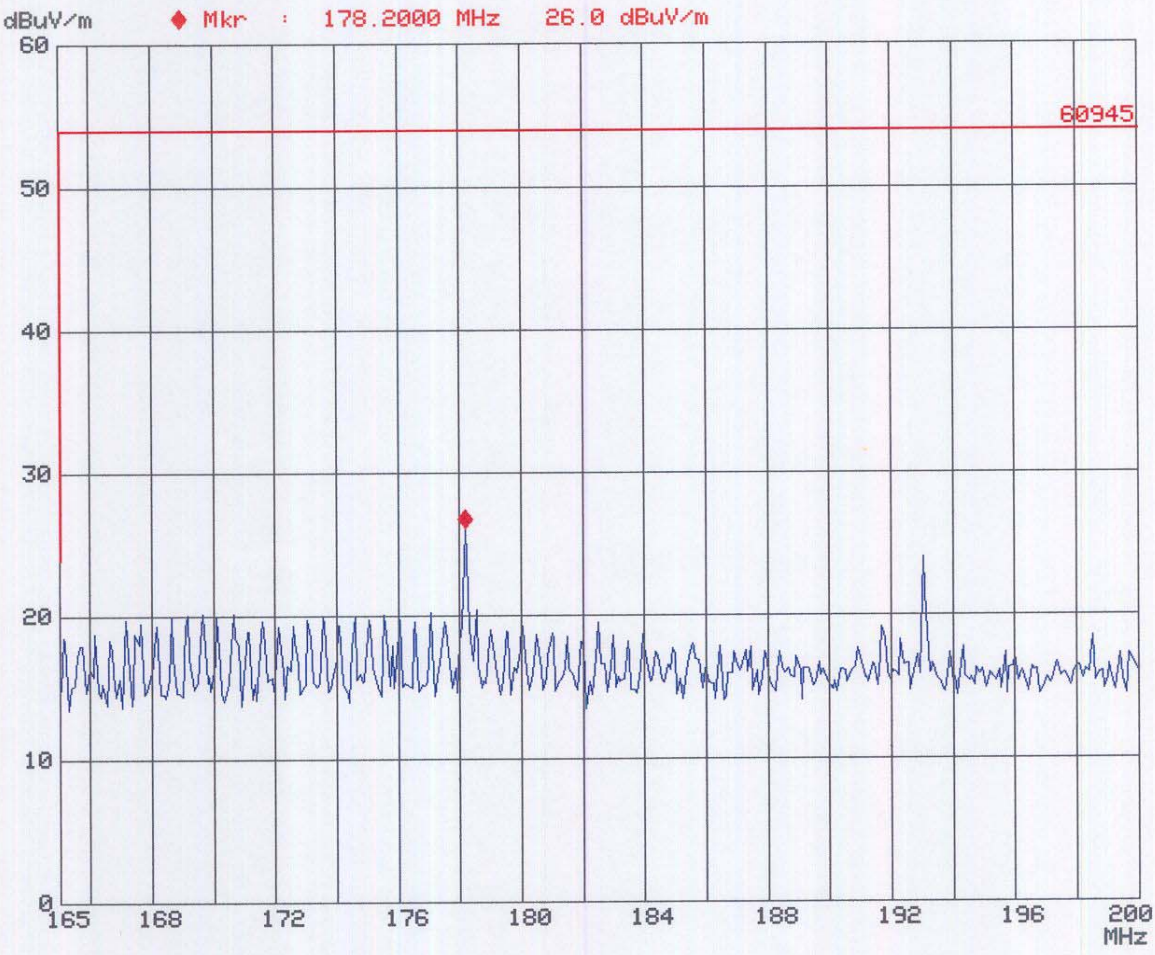

Fig 10 Radiated emission 165 –200 MHz Vertical polarization

Nemko Comlab AS
Peak
EUT: AIS Transponder TR/2500
Manuf: Jotron
Op Cond: d 3 m, H 1 m HP
Operator: Egh
Test Spec: 60945
Date: 07. Jan 04 11:37

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	21	200M	1000M	HL223

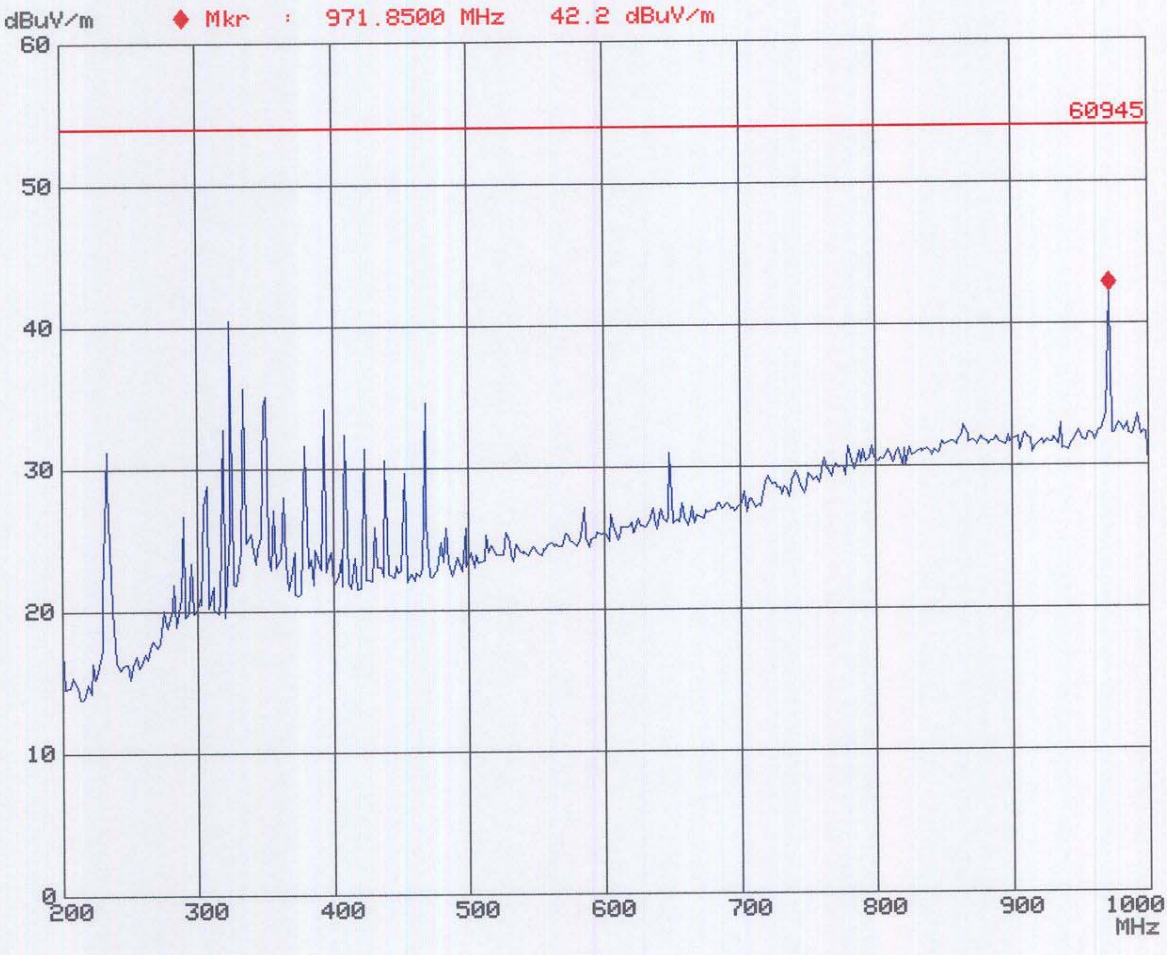

Fig 11 Radiated emission 200 –1000 MHz Horizontal polarization

Nemko Comlab AS
Peak
EUT: AIS Transponder TR/2500
Manuf: Jotron
Op Cond: d 3 m, H 1 m VP
Operator: Egh
Test Spec: 60945
Date: 07. Jan 04 11:26

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
200M	1000M	50k	120k	PK	20ms	AUTO	LN ON	60dB

Transducer	No.	Start	Stop	Name
	21	200M	1000M	HL223

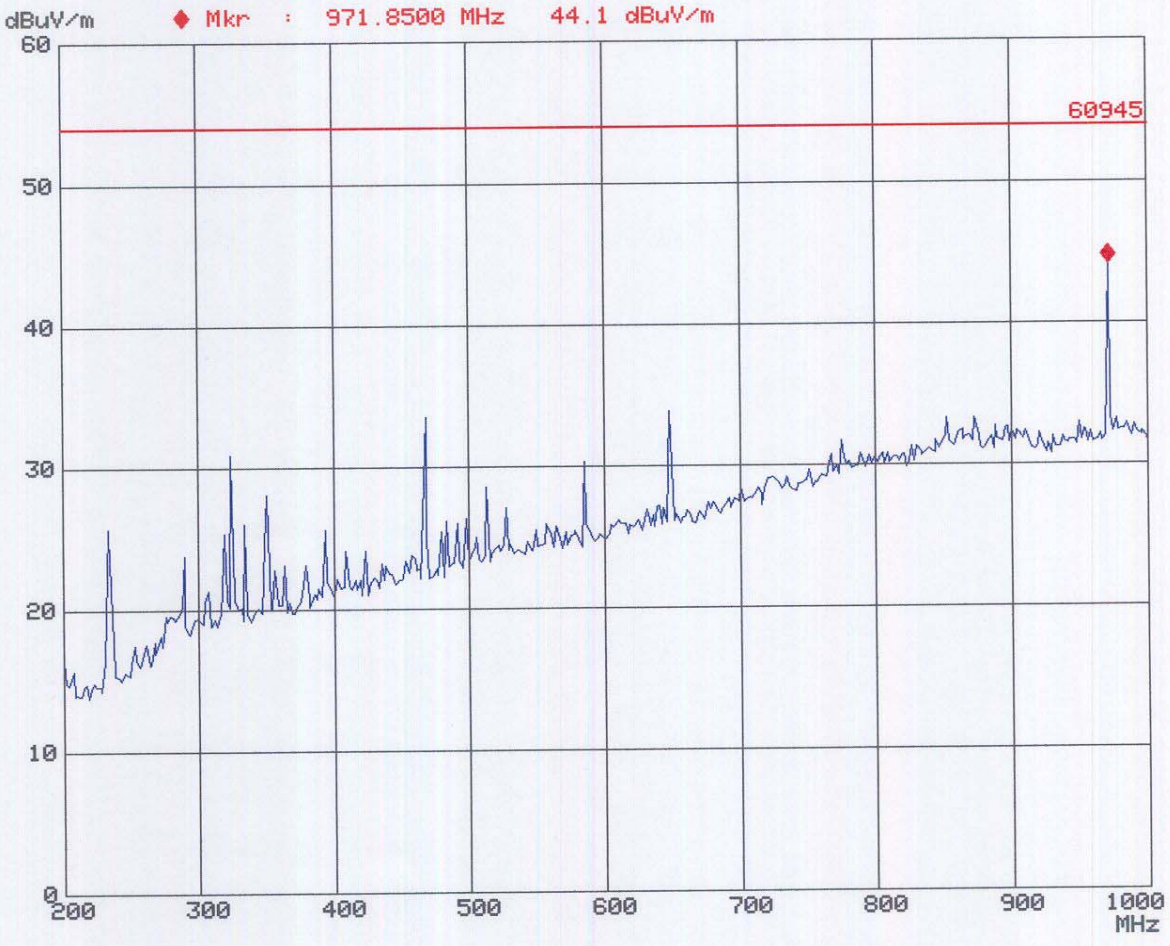

Fig 12 Radiated emission 200 –1000 MHz Vertical polarization

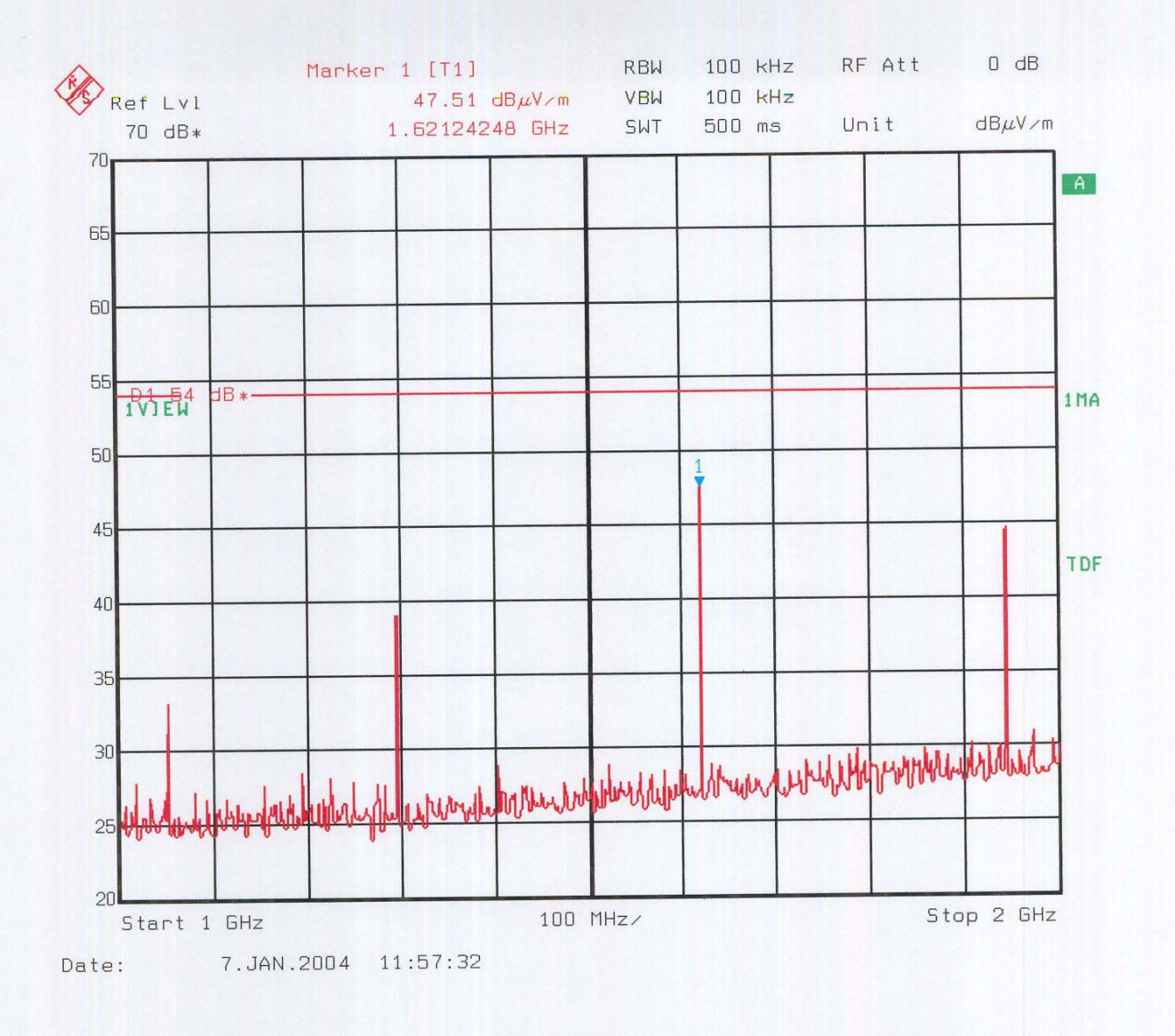

Fig 13 Radiated emission 1000 –2000 MHz

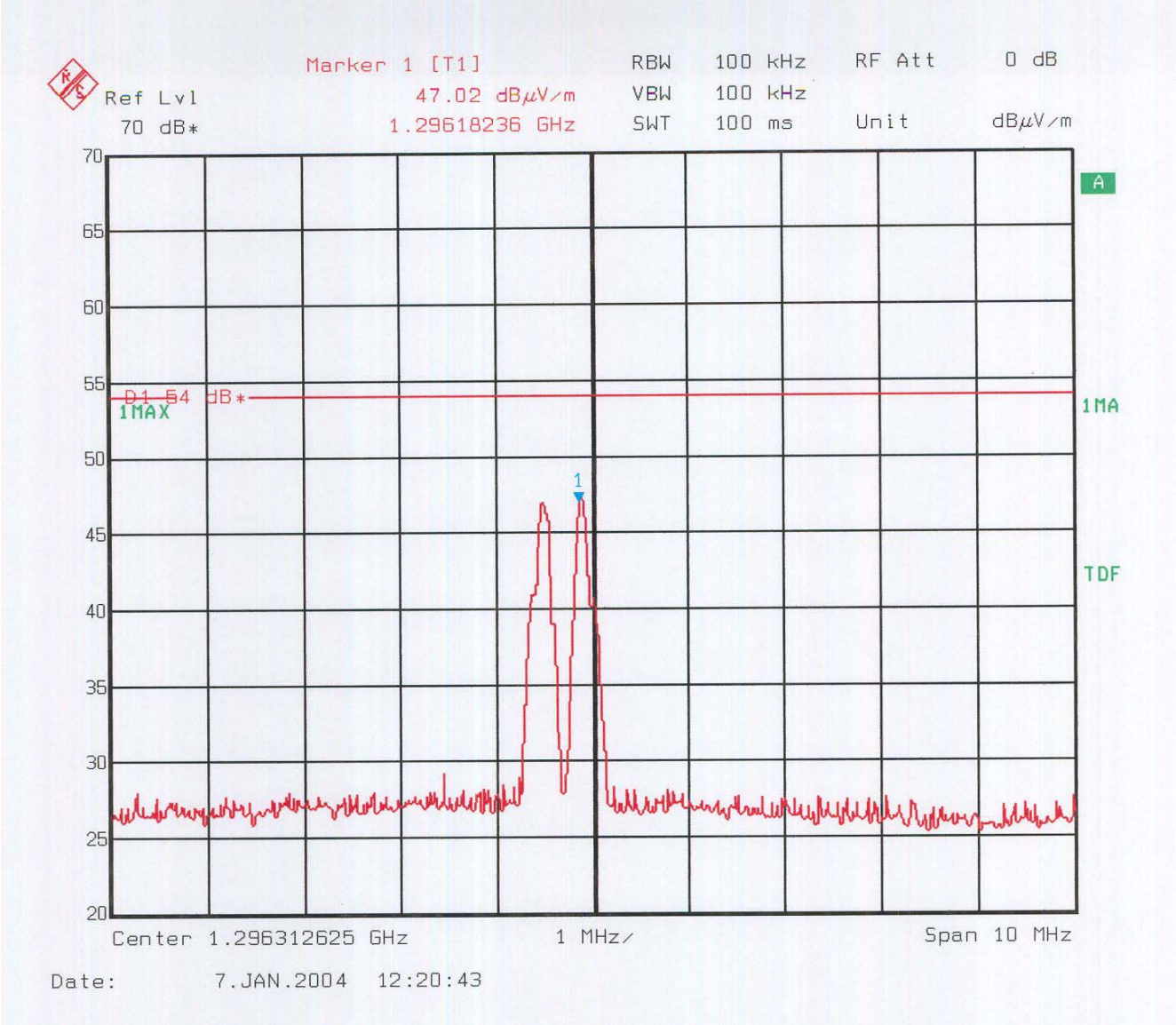

Fig 14 Radiated emission 1296 MHz

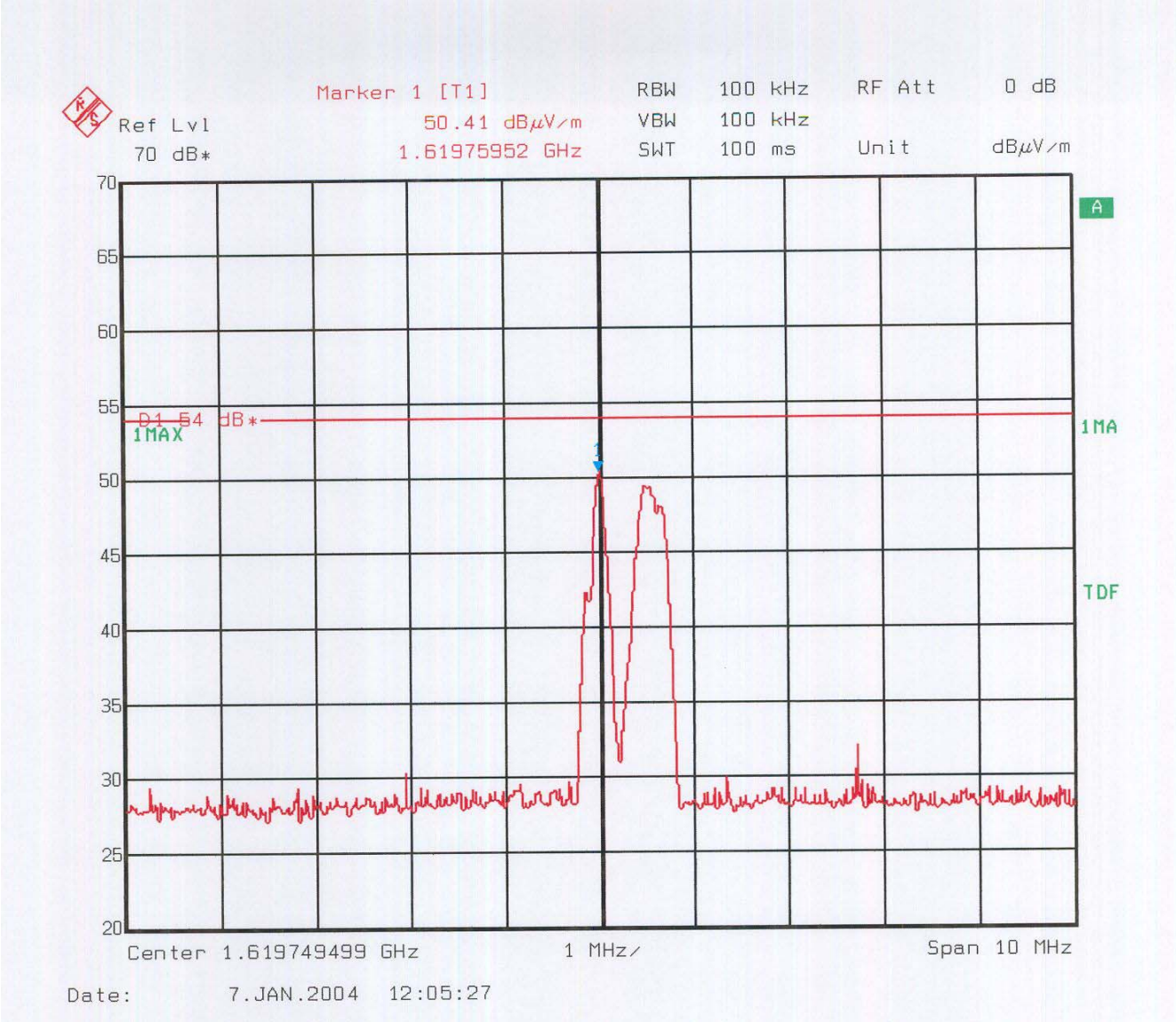

Fig 15 Radiated emission 1619 MHz

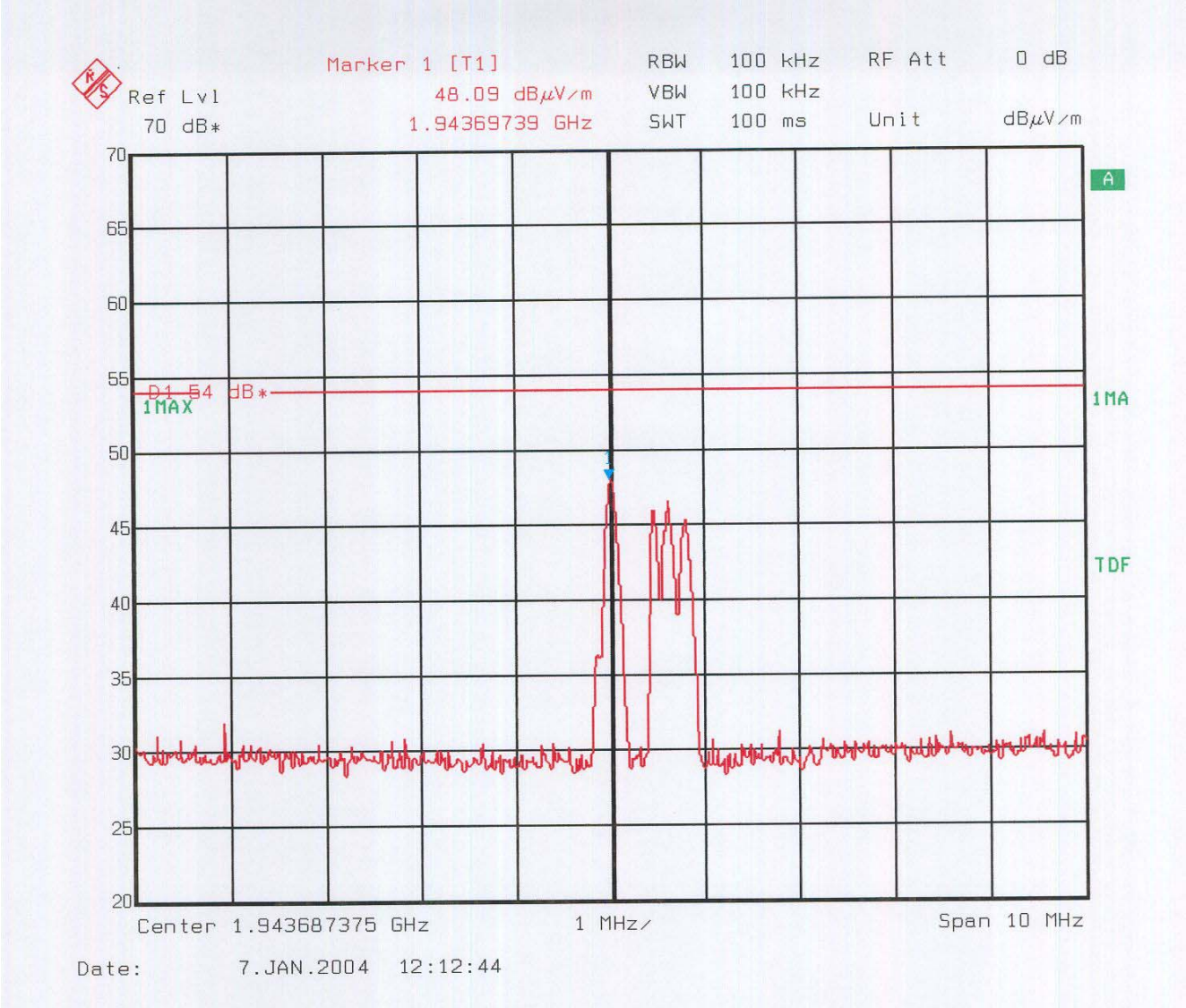

Fig 16 Radiated emission 1943 MHz