



Testing and certification of, consultancy and
research concerning, electronic and electric
appliances, systems, installations and
telecommunication systems

**TEST REPORT OF A UHF REFLEX TELEMETRY
MODULE, BRAND ADVANTRA, MODEL AR100, IN
CONFORMITY WITH 47 CFR PART 2.1053 AND
PART 90.210 (J) (3).**

FCC listed : 90828
Industry Canada : IC3501

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Test specification(s): **47 CFR Part 2.1053 and Part 90.210 (j) (3)**
Description of EUT: **UHF Reflex Telemetry Module**
Manufacturer: **Advantra International Belgium**
Brand mark: **Advantra**
Model: **AR100**
FCC ID: **O33AR100**

MEASUREMENT/TECHNICAL REPORT

ADVANTRA INTERNATIONAL

MODEL: AR100

FCC ID: O33AR100

October 17, 2002

This report concerns:	<u>Original grant/certification</u>	Class 2 change	<u>Verification</u>
Equipment type:	UHF Reflex Telemetry Module		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	<u>Yes</u>	<u>No</u>	n.a.
Report prepared by:	<p>Name : P.A.J.M. Robben, B.Sc.E.E. Company name : TNO Electronic Products & Services (EPS) B.V. Address : Smidshornerweg 18 Postal code/city : 9822 ZG Niekerk Mailing address : P.O. Box 15 Postal code/city : 9822 TL Niekerk Country : The Netherlands Telephone number : + 31 594 505 005 Telefax number : + 31 594 504 804 E-mail : info@eps.tno.nl</p>		

The data taken for this test and report herein was done in accordance with 47 CFR Part 2.1053 and the measurement procedures of ANSI C63.4-1992. TNO Electronic Products & Services (EPS) B.V., Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: October 17, 2002

Signature:

P. de Beer
TNO Electronic Products & Services (EPS) B.V.



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Description of test item

Test item	:	UHF Reflex Telemetry Module
Manufacturer	:	Advantra International Belgium
Brand	:	Advantra
Model	:	AR100
Serial number	:	n.a.
Revision	:	n.a.
Receipt number	:	1
Receipt date	:	October 17, 2002

Applicant information

Applicant's representative	:	Mr. L. van Asch
Company	:	Advantra International Belgium
Address	:	Flanders Language Valley 90
Postal code	:	8900
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City	:	n.a.
Country	:	Belgium
Telephone number	:	+31 57 221 782
Telefax number	:	+31 57 221 701
Order number	:	n.a.

Test(s) performed

Location	:	Niekerk
Test(s) started	:	October 17, 2002
Test(s) completed	:	October 17, 2002
Purpose of test(s)	:	Type approval / certification
Test specification(s)	:	47 CFR Part 2.1053 and Part 90.210 (j) (3)

Test engineer : P.A.J.M. Robben, B.Sc.E.E.

Project leader : P.A.J.M. Robben, B.Sc.E.E.

Report written by : P.A.J.M. Robben, B.Sc.E.E.

Report approved by : P. de Beer

Report date : October 17, 2002

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The test results relate only to the item(s) tested.**



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1 General information.

1.1 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 2.1053 and Part 90.210 (j) (3).

The test methods, which have been used, are based on ANSI C63.4: 1992.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

For measurements below 1 GHz the detector type was a quasi peak detector for the final measurements.

For measurements above 1GHz an absorber lined screened room was used, which is acceptable in ANSI C63.4 in this frequency range. A minimum resolution and video bandwidth of 1 MHz was used above 1 GHz, and the detector type was an average detector.

The bandwidth of the receiver is switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.2 Test facility.

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at TNO Electronic Products & Services (EPS) B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 23, 2000.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under reference number 90828. The facility has been added to the list of those laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.



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2 System test configuration.

2.1 Justification.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 1992.

The transmitter (the EUT) is placed on a wooden table with cables suitably dressed. The output of the EUT is connected to a dummy, non-radiating, load of normal impedance matching that of the transmitter. At a distance of 3m from the transmitter (EUT), the radiated field from each spurious radiation, including harmonics from the carrier frequency, is detected and measured on a calibrated receiver which is fed from a calibrated log-periodic / horn antenna.

The antenna is positioned in the horizontal polarisation plane and is raised and lowered so as to ensure the maximum level of the spurious emission is detected. The EUT is rotated through 360°, the emission levels for each spurious, including harmonics of the carrier frequency, is observed on the receiver and recorded. The test above is repeated with the receiving antenna in the vertical polarisation plane. For each of the emissions detected the EUT is switched off to determine the emission was that of the EUT.

2.2 EUT mode of operation.

During the radiated emission measurements, the EUT was configured to transmit continuously and unmodulated in order to simulate a worst-case behavior.

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance with the appropriate sections of 47 CFR Part 15.

2.4 Equipment modifications.

None.

2.5 Configuration of the tested system.

Unit title	:	UHF Reflex Telemetry Module
Model number	:	AR100
Part number	:	n.a.
FCC ID	:	O33AR100
Frequency range	:	896 – 902 MHz
Output power range	:	0.06 – 1.6 Watts
Maximum power rating	:	1.6 Watts
DC voltage input	:	+3.3 to +4.5 VDC
DC current input	:	1.25 Amps



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3 Test results.

3.1 Field strength of spurious radiation.

3.1.1 Carrier frequency of 896 MHz.

Frequency (GHz) (Polarisation)	Measurement results dBm (ERP)	Limit dBm (ERP)
1.77 (V)	-54.4	-20.0
2.67 (V)	-50.5	-20.0
3.55 (V)	-48.5	-20.0
1.77 (H)	-49.9	-20.0

Table 1

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 2.1053 and Part 90.210 (j) (3), with the EUT operating in continuous transmit mode on 896 MHz, are depicted in table 1.

Note:

- Field strength values of radiated emissions at frequencies not listed in table 1 are more than 20 dB below the applicable limit.
- Limit based on 47 CFR Part 90.210 (j) (3), out of band emissions should be attenuated by $50+10\log(P)$ dBc, equates to -20 dBm.
- Results were taken in $\text{dB}\mu\text{V/m}$ and converted to equivalent ERP values using free space theory, $\text{ERP}=(E.d/7.02)^2$, where ERP is the Effective Radiated Power in Watts, E is the field strength in V/m , d is the measurement distance in metres, and 7.02 is a constant to account for free space.

Test engineer

Signature :

Name : P.A.J.M. Robben, B.Sc.E.E.

Date : October 17, 2002



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3.1.2 Carrier frequency of 899 MHz.

Frequency (GHz) (Polarisation)	Measurement results dBm (ERP)	Limit dBm (ERP)
2.67 (V)	-50.5	-20.0
3.55 (V)	-48.9	-20.0
4.46 (V)	-46.9	-20.0
1.77 (H)	-50.7	-20.0

Table 2

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 2.1053 and Part 90.210 (j) (3), with the EUT operating in continuous transmit mode on 899 MHz, are depicted in table 2.

Note:

- Field strength values of radiated emissions at frequencies not listed in table 2 are more than 20 dB below the applicable limit.
- Limit based on 47 CFR Part 90.210 (j) (3), out of band emissions should be attenuated by $50+10\log(P)$ dBc, equates to -20 dBm.
- Results were taken in $\text{dB}\mu\text{V/m}$ and converted to equivalent ERP values using free space theory, $\text{ERP}=(E.d/7.02)^2$, where ERP is the Effective Radiated Power in Watts, E is the field strength in V/m , d is the measurement distance in metres, and 7.02 is a constant to account for free space.

Test engineer

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3.1.3 Carrier frequency of 902 MHz.

Frequency (GHz) (Polarisation)	Measurement results dBm (ERP)	Limit dBm (ERP)
1.77 (H)	-51.2	-20.0
2.67 (H)	-50.9	-20.0

Table 3

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 2.1053 and Part 90.210 (j) (3), with the EUT operating in continuous transmit mode on 899 MHz, are depicted in table 3.

Note:

- Field strength values of radiated emissions at frequencies not listed in table 3 are more than 20 dB below the applicable limit.
- Limit based on 47 CFR Part 90.210 (j) (3), out of band emissions should be attenuated by $50+10\log(P)$ dBc, equates to -20 dBm.
- Results were taken in $\text{dB}\mu\text{V/m}$ and converted to equivalent ERP values using free space theory, $\text{ERP}=(E.d/7.02)^2$, where ERP is the Effective Radiated Power in Watts, E is the field strength in V/m , d is the measurement distance in metres, and 7.02 is a constant to account for free space.

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4 List of utilized test equipment.

Inventory number	Description	Brand	Model
12471	Biconical antenna 20MHz-200MHz	EATON	94455-1
12473	Log-per antenna 200-1000MHz	EATON	96005
12476	Antenna mast	EMCO	TR3
12477	Antenna mast 1-4 mtr	Poelstra	--
12482	Loop antenna	EMCO	6507
12483	Guidehorn	EMCO	3115
12484	Guidehorn	EMCO	3115
12488	Guidehorn 18 - 26.5 GHz	EMCO	RA42-K-F-4B-C
12533	Signalgenerator	MARCONI	2032
12559	Digital storage oscilloscope	Le Croy	9310M
12561	DC Power Supply 20A/70V	DELTA	SM7020D
12567	Plotter	HP	7440A
12605	calibrated dipole 28MHz-1GHz	Emco	3121c
12608	HF milliwattmeter	Hewlett Packard	HP435a
12609	Power sensor 10MHz-18GHz	Hewlett Packard	HP8481A
12636	Polyester chamber	Polyforce	--
12640	Temperature chamber	Heraeus	VEM03/500
13664	Spectrum analyzer	HP	HP8593E
13078	Preamplifier 0.1 GHz - 12 GHz	Miteq	AMF-3D-001120-35-14p
13452	Digital multi meter	HP	34401A
13526	Signalgenerator 20 GHz	Hewlett & Packard	83620A
13594	Preamplifier 10 GHz - 25 GHz	Miteq	AMF-6D-100250-10p
13886	Open Area testsite	Comtest	--
14051	Anechoic room	Comtest	--
14450	2.4 GHz bandrejectfilter	BSC	XN-1783
15633	Biconilog Testantenna	Chase	CBL 6111B
15667	Measuring receiver	R&S	ESCS 30
99045	DC Power Supply 3A/30V	DELTA	E030/3
99055	Non-conducting support	NMi	--
99061	Non-conducting support 150cm	NMi	--
99068	Detector N-F/BNC-F	Radiall	R451576000
99069	Cable 5m RG214	NMi	--
99071	Cable 10m RG214	NMi	--
99076	Bandpassfilter 4 - 10 GHz	Reactel	7AS-7G-6G-511
99077	Regulating trafo	RFT	LTS006
99112	Tripod	Chase	--
99136	Bandpassfilter 10 - 26.5 GHz	Reactel	9HS-10G/26.5G-S11