

REPORT OF MEASUREMENTS
PART 15C (15.249) - INTENTIONAL RADIATOR

DEVICE: RF ID PC CARD

MODEL NUMBER: ILR CARD NA

MANUFACTURER: IDENTEC SOLUTIONS, INC.

ADDRESS: SUITE 102, 1860 DAYTON STREET
KELOWNA BRITISH COLUMBIA
CANADA V1Y 7W6

THE DATA CONTAINED IN THIS REPORT WAS COLLECTED
ON 27 JULY 2000 AND COMPILED BY:

PAUL G. SLAVENS
CHIEF EMC ENGINEER

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1. General

1.1 Purpose

The purpose of this report is to show compliance to the FCC regulations for narrow band unlicensed devices operating under section 15.249 of the Code of Federal Regulations title 47.

1.2 Manufacturer

Company Name: identec Solutions, Inc.
Contact: Ralf Koehler
Street Address: Suite 102, 1860 Dayton Street
City/Province: Kelowna British Columbia
Country/Postal Code: Canada V1Y 7W6
Telephone: 250 860-6567
Fax: 250 860-6541
E-mail: rkoehler@identec.com
Web: www.identec.com

1.3 Test location

Company: Acme Testing Inc.
Street Address: 2002 Valley Highway
Mailing Address: PO Box 3
City/State/Zip: Acme WA 98220-0003
Laboratory: Test Site 2
Telephone: 888 226-3837
Fax: 360 595-2722
E-mail: acmetest@acmetesting.com
Web: www.acmetesting.com

1.4 Test Personnel

Paul G. Slavens, Chief EMC Engineer

2. Test Results Summary

Summary of Test Results

Requirement	CFR Section	Test Result
Conducted Emissions < 48.0 dBuV	15.207	*
Radiated Emissions	15.249	PASS

* Not applicable, the EUT is DC Powered

The signed original of this report, supplied to the client, represents the only “official” copy. Retention of any additional copies (electronic or non-electronic media) is at Acme Testing’s discretion to meet internal requirements only. The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the “Correction Factor” documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the procedure ANSI C63.4 - 1992 and all applicable Public Notices received prior to the date of testing. All emissions from the device were found to be within the limits outlined in this report. Acme Testing assumes responsibility only for the accuracy and completeness of this data as it pertains to the sample tested.

Paul G. Slavens
Chief EMC Engineer

Date of Issuance

3. Description of Equipment and Peripherals

3.1 Equipment Under Test (EUT)

Device: RF ID PC Card
Model Number: ILR Card NA
FCC ID: O2E-ICARD-NA
Power: 5 VDC
Grounding: None
Antenna Distance: 3 meters

3.2 EUT Peripherals

Device	Manufacturer	Model Number	FCC ID	Serial Number
Laptop Computer	Daewoo	CPC-7550	D.O.C.	710N3557475
RS-232 Adapter	Identec Solutions	None	None	None
RS-232 Power Supply	Jameco	DC1210F5	None	None

3.3 Description of Interface Cables

EUT/Antenna

Shielded Yes	Unshielded No	Flat No	Round Yes	Length 0.3 m	Ferrite No
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EUT/RS-232 Adapter

Shielded Yes	Unshielded No	Flat No	Round Yes	Length 2.1 m	Ferrite No
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RS-232 Adapter/Laptop Computer

Shielded Yes	Unshielded No	Flat No	Round Yes	Length 3.6 m	Ferrite No
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RS-232 Adapter/RS-232 Power Supply

Shielded No	Unshielded Yes	Flat Yes	Round No	Length 1.9 m	Ferrite No
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ARRANGEMENT OF INTERFACE CABLES: All interface cables were positioned for worst case maximum emissions within the manner assumed to be a typical operation condition (please reference photographs).

3.4 Mode of Operation During Tests

The EUT was exercised by constantly transmitting a modulated signal.

3.5 Modifications Required for Compliance

1. None.

4. Antenna requirement

4.1 Regulation

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

4.2 Result

The EUT uses a MMCX connector.

5. Conducted Emissions Tests

Test Requirement: FCC CFR47, Part 15C, 15.207

Test Procedure: ANSI C63.4:1992

5.1 Test Equipment

- ⇒ Spectrum Analyzer (yellow): Hewlett-Packard 8566B, Serial Number 2403A06519, Calibrated: 7 January 2000, Calibration due Date: 7 January 2001
- ⇒ RF Preselector (yellow): Hewlett-Packard 85685A, Serial Number 2926A00971, Calibrated: 17 March 2000, Calibration due Date: 17 March 2001
- ⇒ Quasi Peak Adapter (yellow): Hewlett-Packard 85650A, Serial Number 2521A-00689, Calibrated: 19 November 1999, Calibration due Date: 19 November 2000
- ⇒ Line Impedance Stabilization Network: Rhode & Schwarz ESH2-Z5, Serial Number ACMERS1, Calibrated: 1 September 1999, Calibration due Date: 01 September 2000

5.2 Purpose

The purpose of this test is to evaluate the level of conducted noise the EUT imposes on the AC mains.

5.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that is placed above the groundplane. Floor standing equipment is placed directly on the groundplane. Any supplemental grounding mechanisms are connected, if appropriate. The EUT is connected to its associated peripherals, with any excess I/O cabling bundled to approximately 1 meter. The EUT is connected to a dedicated LISN and all peripherals are connected to a second separate LISN circuit. The LISNs are bonded to the groundplane.

Conducted Emissions Test Characteristics

Frequency range	0.45 MHz - 30.0 MHz
Test instrumentation resolution bandwidth	9 kHz
Lines Tested	Line 1/Line 2

5.4 Test Results

Not applicable, the EUT is DC powered.

6. Radiated Emissions

Test Requirement: FCC CFR47, Part 15C, 15.249

Test Procedure: ANSI C63.4:1992

6.1 Test Equipment

- ⇒ Spectrum Analyzer (yellow): Hewlett-Packard 8566B, Serial Number 2403A06519, Calibrated: 7 January 2000, Calibration due Date: 7 January 2001
- ⇒ RF Preselector (yellow): Hewlett-Packard 85685A, Serial Number 2926A00971, Calibrated: 17 March 2000, Calibration due Date: 17 March 2001
- ⇒ Quasi Peak Adapter (yellow): Hewlett-Packard 85650A, Serial Number 2521A-00689, Calibrated: 19 November 1999, Calibration due Date: 19 November 2000
- ⇒ Broadband Biconical Antenna (red) (20 MHz to 200 MHz): EMCO 3110, Serial Number 1115, Calibrated: 28 December 1999, Calibration due Date: 28 December 2000
- ⇒ Broadband Log Periodic Antenna (red) (200 MHz to 1000 MHz): EMCO 3146, Serial Number 2853, Calibrated: 28 December 1999, Calibration due Date: 28 December 2000
- ⇒ EUT Turntable Position Controller: EMCO 1061-3M, Serial Number 9003-1441, No Calibration Required
- ⇒ Antenna Mast with Controller: EMCO 1051, Serial Number 9002-1457, No Calibration Required
- ⇒ 2 GHz to 10 GHz Low Noise Preamplifier: Milliwave 593-2898, Serial Number 2494, No Calibration Required
- ⇒ Double Ridge Guide Horn Antenna: EMCO 3115, Serial Number 9807-5534, Calibrated: 30 December 1999, Calibration due Date: 30 December 2000

6.2 Regulation

(a) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

(b) Field strength limits are specified at a distance of 3 meters.

(c) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

(d) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

(e) Parties considering the manufacture, importation, marketing or operation of equipment under this section should also note the requirement in Section 15.37(d).

6.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that sits on a flush mounted metal turntable. Floor standing equipment is placed directly on the flush mounted metal turntable. The EUT is connected to its associated peripherals with any excess I/O cabling bundled to approximately 1 meter.

Preview tests are performed to determine the “worst case” mode of operation. With the EUT operating in “worst case” mode, emissions from the unit are maximized by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions.

Radiated Emissions Test Characteristics

Frequency range	30 MHz – 10,000 MHz
Test distance	3 m
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1000 MHz) 1 MHz (1000 MHz – 10,000 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

6.4 Test Results

I-PORT/II WITH 1/4 WAVE WHIP ANTENNA PRODUCT EMISSIONS

No	EMISSION FREQUENCY MHz	SPEC LIMIT	MEASUREMENTS			POL	SITE HGT cm	AZM deg	CORR FACTOR dB
			ABS dBuV/m	dLIM dB	MODE				
1	916.606	94.0	88.9	-5.1	PK	H	161	39	27.2
2	916.610	94.0	87.8	-6.2	PK	V	107	81	27.2
3	1833.14	74.0	63.2	-10.8	PK	V	209	299	31.9
4	1833.19	54.0	45.3	-8.7	AVG	H	130	1	31.9
5	1833.21	74.0	66.3	-7.7	PK	H	130	1	31.9
6	1833.21	54.0	44.2	-9.8	AVG	V	209	299	31.9
7	2749.68	54.0	35.7	-18.3	AVG	H	100	345	3.9
8	2749.74	54.0	33.8	-20.2	AVG	V	175	113	3.9
9	2749.79	74.0	50.1	-23.9	PK	H	100	345	3.9
10	2749.87	74.0	45.6	-28.4	PK	V	175	113	3.9

I-PORT/II
WITH 5 dBi PATCH ANTENNA
PRODUCT EMISSIONS

No	EMISSION		SPEC LIMIT	MEASUREMENTS			SITE HGT cm	AZM deg	CORR FACTOR dB
	FREQUENCY MHz	MHz		ABS dBuV/m	dLIM dB	MODE			
1	916.603	94.0	91.6	-2.4	PK	H	141	0	27.2
2	916.604	94.0	93.0	-1.0	PK	V	115	15	27.2
3	1833.14	74.0	51.6	-22.4	PK	H	110	34	31.9
4	1833.19	54.0	39.7	-14.3	AVG	H	100	34	31.9
5	1833.21	74.0	57.6	-16.4	PK	V	122	360	31.9
6	1833.21	54.0	42.2	-11.8	AVG	V	122	360	31.9

I-PORT/II
WITH FOLDED DIPOLE
PRODUCT EMISSIONS

No	EMISSION		SPEC LIMIT	MEASUREMENTS			SITE HGT cm	AZM deg	CORR FACTOR dB	comments
	FREQUENCY MHz	MHz		ABS dBuV/m	dLIM dB	MODE				
1	916.597	94.0	91.2	-2.8	PK	V	152	73	27.2	
2	916.602	94.0	92.9	-1.1	PK	H	164	325	27.2	
3	1833.18	74.0	67.1	-6.9	PK	H	117	89	31.9	
4	1833.19	54.0	45.8	-8.2	AVG	H	117	89	31.9	
5	1833.21	74.0	60.3	-13.7	PK	V	200	53	31.9	
6	1833.21	54.0	43.3	-10.7	AVG	V	200	53	31.9	
7	2749.68	54.0	35.6	-18.4	AVG	H	100	7	3.9	
8	2749.74	54.0	33.0	-21.0	AVG	V	171	333	3.9	
9	2749.79	74.0	50.2	-23.8	PK	H	100	7	3.9	
10	2749.87	74.0	42.0	-32.0	PK	V	171	333	3.9	

7. Miscellaneous Comments and Notes

1. None

8. List of Attachments

1. None.