

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

DEVICE: 1 CHANNEL 916.5 MHz 15.249
TRANSMITTER

MODEL: I-PORT

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 09 & 10 FEBRUARY 2000 AND COMPILED BY:

PAUL G. SLAVENS
CHIEF EMC ENGINEER

WORK ORDER: 32195REV1

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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

<u>Requirement</u>	<u>CFR Section</u>	<u>Test Result</u>
Conducted Emissions < 48.0 dBuV	15.207	PASS
Radiated Emissions	15.249	PASS

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: 1 Channel 916.5 MHz 15.249 Transmitter
Model Number: i-PORT/II
Serial Number: None
Power: 120 V/60 Hz
Grounding: Local
Antenna Distance: 3 meter

3.2 EUT Peripherals

Device	Manufacturer	Model Number	FCC ID	Serial Number
Antennas (4)	Astron Antenna Co.	HPD-9185	None	None
Radio Frequency Identification System	Identec Solutions Inc.	i-PORT	None	None
Laptop Computer	Daewoo	CPC-7550	FCC DOC	710N3557464
Ethernet Card	GVC	PE200	LNQ7S0811	8E190065

3.3 Description of Interface Cables

EUT/Antennas

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	2 m	No

i-Port/Laptop Computer(Ethernet Card)

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	Yes	No	2 m	No

3.4 Mode of Operation During Tests

The EUT was exercised by constantly transmitting. The EUT has 4 antenna ports. Only one antenna can transmit at any given time through the use of integrated antenna crossover switches. Therefore, the output from each antenna was measured separately and all signals were reported.

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 standard SMA connector. The EUT system must be professionally installed.

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

LINE 1

PEAK #	FREQ. (MHz)	AMPL (dBuV)
1	17.17	33.2
2	17.76	37.6
3	21.63	29.4

LINE 2

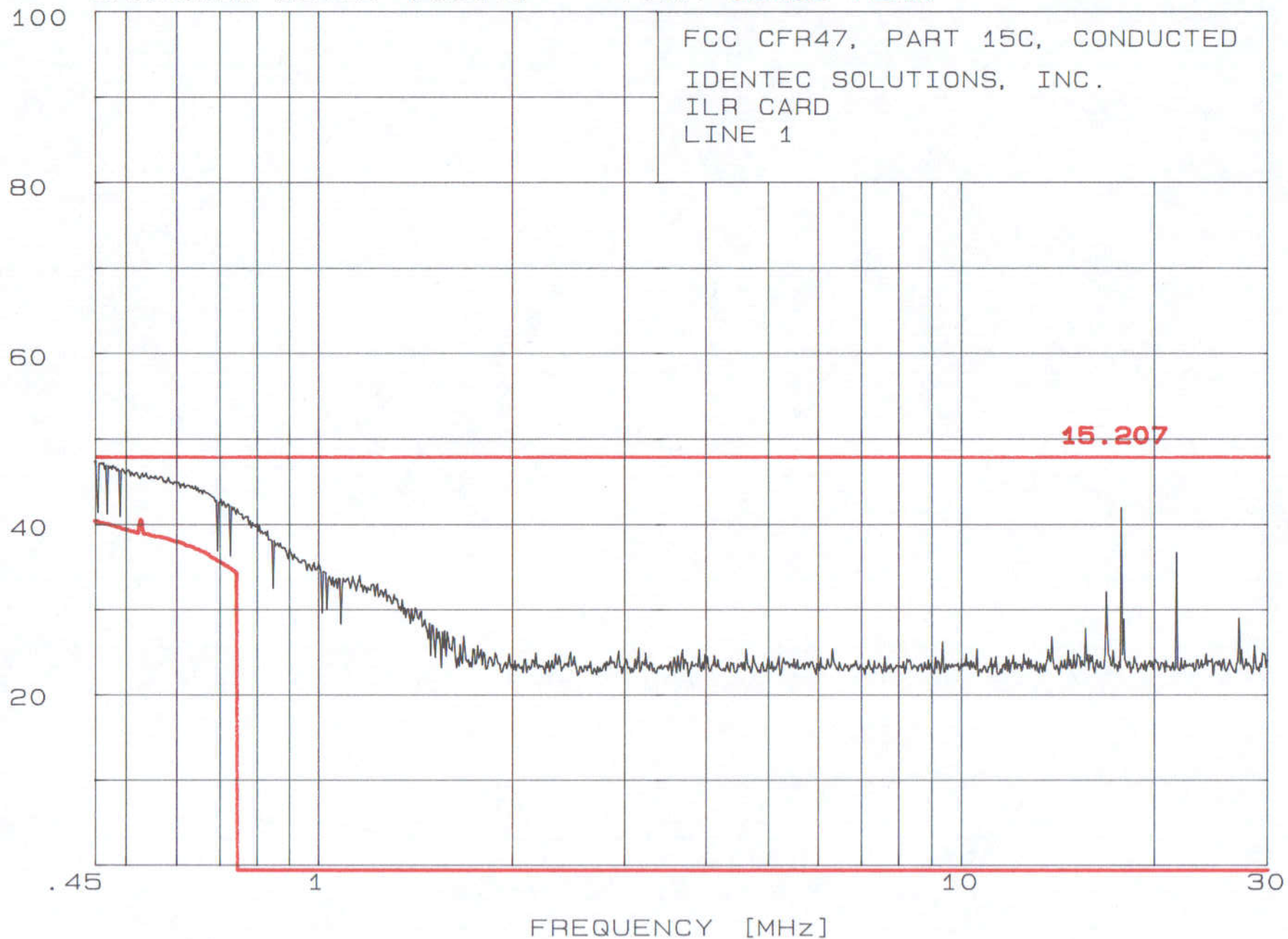
PEAK #	FREQ. (MHz)	AMPL (dBuV)
1	0.6846	43.1
2	0.7139	42.7
3	0.7603	41.8
4	0.7699	41.6
5	16.81	37.7
6	17.76	38.1

ACME TESTING - SITE #2
EMISSION LEVEL [dBuV]

9 Feb 2000 11:20:58

PEAK **QUASI-PEAK**

FCC CFR47, PART 15C, CONDUCTED
IDENTEC SOLUTIONS, INC.
ILR CARD
LINE 1

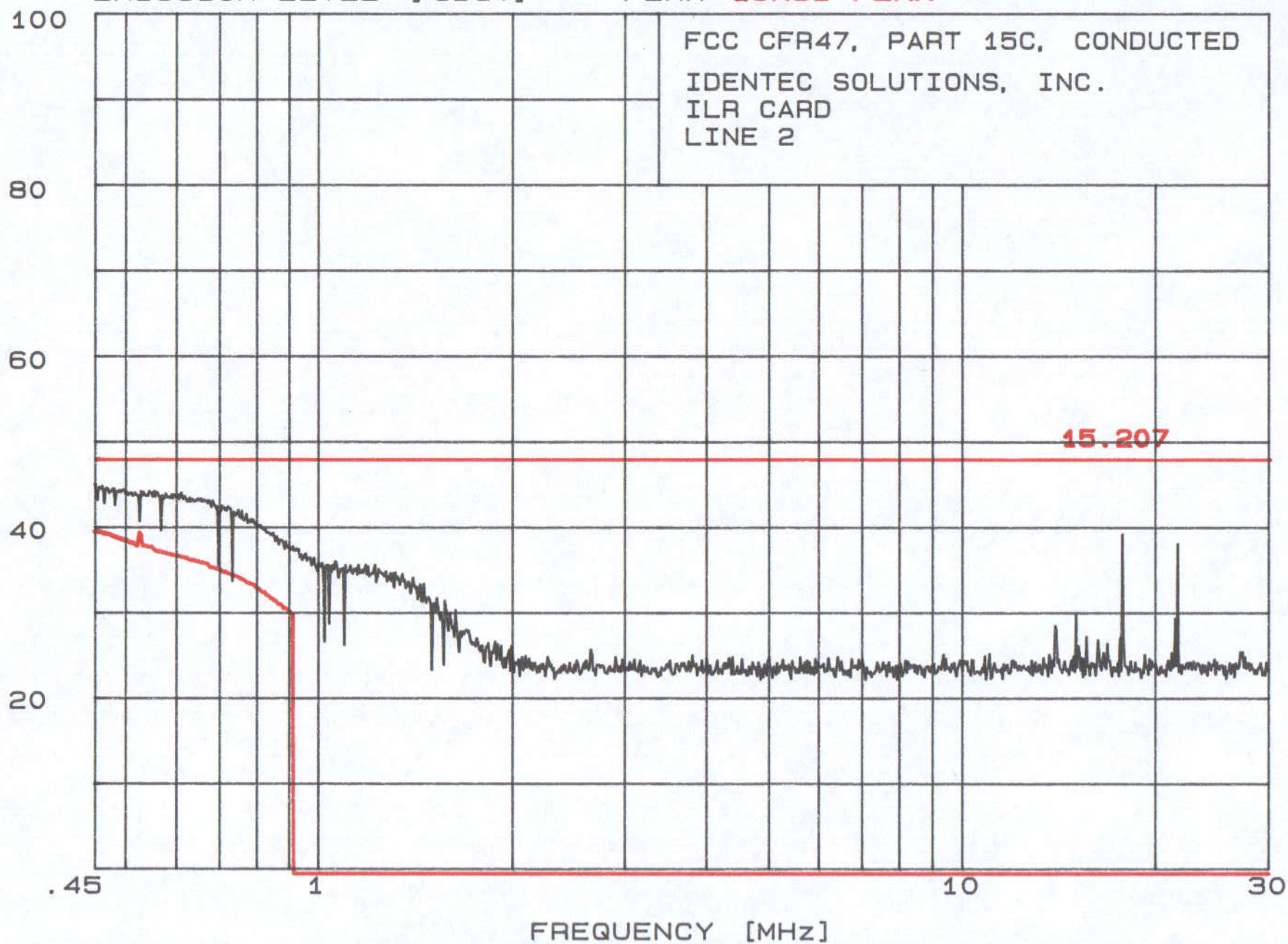


ACME TESTING - SITE #2
EMISSION LEVEL [dBuV]

9 Feb 2000 11:36:26

PEAK **QUASI-PEAK**

FCC CFR47, PART 15C, CONDUCTED
IDENTEC SOLUTIONS, INC.
ILR CARD
LINE 2



6. Single Channel Band Edge Plots

Test Requirement: FCC CFR47, Part 15C, 15.249

Test Procedure: ANSI C63.4:1992

6.1 Purpose

The purpose of these plots is to show compliance of the radiated emissions at the band edge of the 902 – 928 MHz band.

6.2 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
- ⇒ 10KHz – 1GHz Preamplifier: Amplifier Research LN1000A, Serial Number 21541, Calibrated: 25 October 1999, Calibration Due Date: 25 October 2000

ACME TESTING - SITE #2

MKR 915.00 MHz

hp REF 87.0 dBuV ATTN 0 dB + 10 dB 15.10 dBuV

10 dB/

POS PK

OFFSET

-10.0
dB

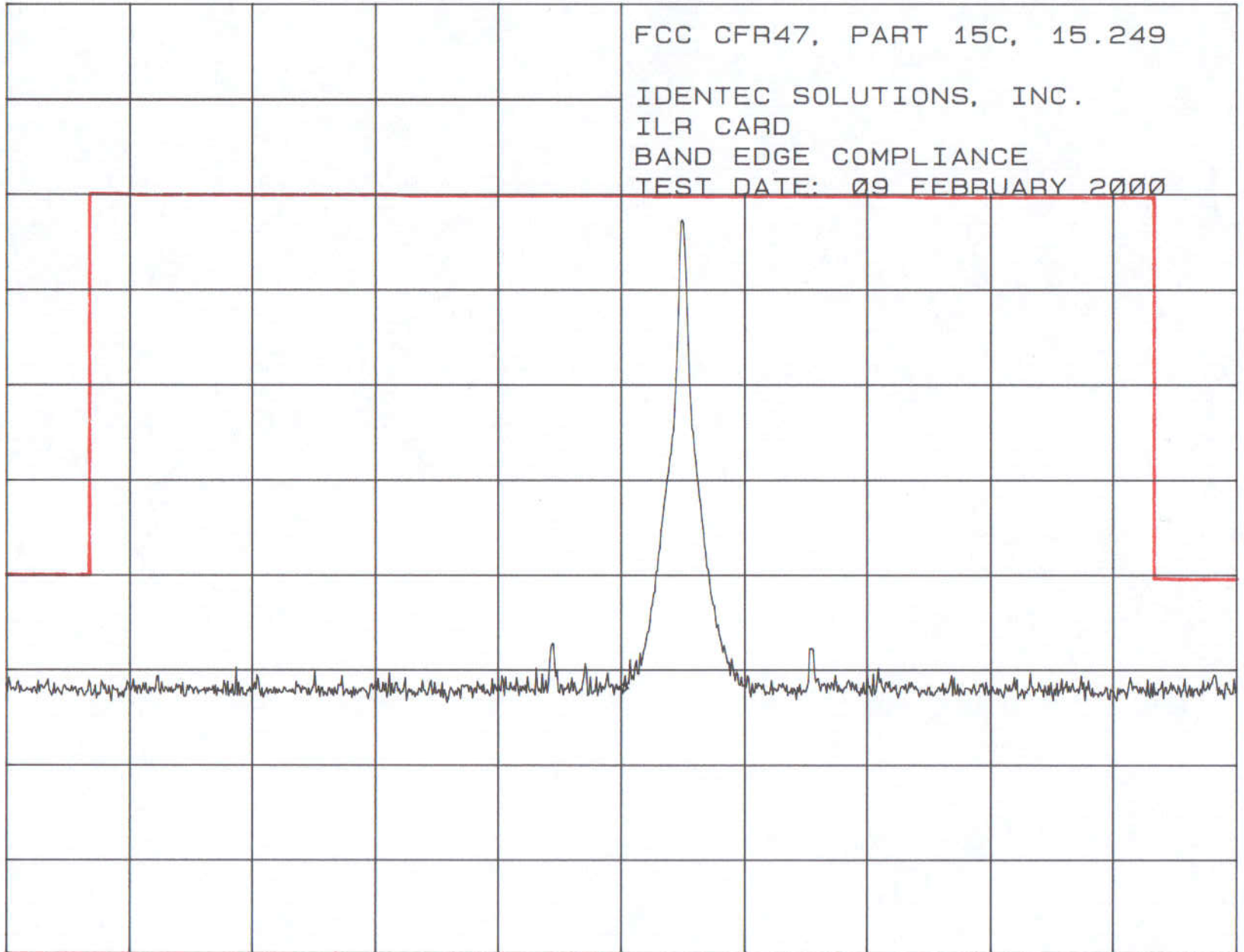
FCC CFR47, PART 15C, 15.249

IDENTEC SOLUTIONS, INC.

ILR CARD

BAND EDGE COMPLIANCE

TEST DATE: 09 FEBRUARY 2000



START 900.0 MHz

STOP 930.0 MHz

RES BW 1 MHz

VBW 1 MHz

SWP 1.00 sec

7. Radiated Emissions

Test Requirement: FCC CFR47, Part 15C, 15.249

Test Procedure: ANSI C63.4:1992

7.1 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
- ⇒ 10KHz – 1GHz Preamplifier: Amplifier Research LN1000A, Serial Number 21541, Calibrated: 25 October 1999, Calibration Due Date: 25 October 2000

7.2 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).

7.3 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

7.4 Test Results

I-PORT/II
ANTENNA PORT #1
PEAK OR QUASI-PEAK PRODUCT EMISSIONS

No	EMISSION	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	FREQUENCY MHz		ABS	dLIM dB	MODE		HGT cm	AZM deg		
1	916.640	94.0	90.6	-3.4	QP	H	140	49	27.2	
2	916.648	94.0	91.4	-2.6	QP	V	121	27	27.2	
3	1833.30	74.0	49.8	-24.2	PK	V	130	42	31.9	

I-PORT/II
ANTENNA PORT #1
AVERAGE PRODUCT EMISSIONS

No	EMISSION	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	FREQUENCY MHz		ABS	dLIM dB	MODE		HGT cm	AZM deg		
1	1833.26	54.0	41.2	-12.8	AVG	V	130	42	31.9	

I-PORT/II
ANTENNA PORT #2
PEAK OR QUASI-PEAK PRODUCT EMISSIONS

No	EMISSION FREQUENCY	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	MHz	dBuV/m	ABS	dLIM	MODE		HGT	AZM	dB	
1	916.636	94.0	90.2	-3.8	QP	V	122	284	27.2	
2	916.637	94.0	91.5	-2.5	QP	H	149	307	27.2	
3	1833.94	74.0	49.6	-24.4	PK	V	100	56	31.9	

I-PORT/II
ANTENNA PORT #2
AVERAGE PRODUCT EMISSIONS

No	EMISSION FREQUENCY	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	MHz	dBuV/m	ABS	dLIM	MODE		HGT	AZM	dB	
1	1833.32	54.0	40.2	-13.8	AVG	V	100	56	31.9	

I-PORT/II
ANTENNA PORT #3
PEAK OR QUASI-PEAK PRODUCT EMISSIONS

No	EMISSION FREQUENCY	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	MHz	dBuV/m	ABS	dLIM	MODE		HGT	AZM	dB	
1	916.637	94.0	92.1	-1.9	QP	H	140	122	27.2	
2	916.637	94.0	90.4	-3.6	QP	V	126	119	27.2	
3	1833.30	74.0	49.2	-24.8	PK	V	100	225	31.9	

I-PORT/II
ANTENNA PORT #3
AVERAGE PRODUCT EMISSIONS

No	EMISSION FREQUENCY	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	MHz	dBuV/m	ABS	dLIM	MODE		HGT	AZM	dB	
1	1833.13	54.0	41.5	-12.5	AVG	V	100	225	31.9	

I-PORT/II

ANTENNA PORT #4
PEAK OR QUASI-PEAK PRODUCT EMISSIONS

No	EMISSION	SPEC LIMIT	MEASUREMENTS				SITE		CORR FACTOR	comments
	FREQUENCY MHz		ABS	dLIM	MODE	POL	HGT	AZM		
							cm	deg	dB	
1	916.638	94.0	89.5	-4.5	QP	V	128	187	27.2	
2	916.644	94.0	90.9	-3.1	QP	H	151	208	27.2	
3	1833.30	74.0	51.8	-22.2	PK	V	100	222	31.9	

I-PORT/II
ANTENNA PORT #4
AVERAGE PRODUCT EMISSIONS

No	EMISSION	SPEC LIMIT	MEASUREMENTS				SITE		CORR FACTOR	comments
	FREQUENCY MHz		ABS	dLIM	MODE	POL	HGT	AZM		
							cm	deg	dB	
1	1833.26	54.0	43.2	-10.7	AVG	V	100	222	31.9	

8. Miscellaneous Comments and Notes

1. None

9. List of Attachments

1. Photographs of test set-ups. (2)