



Engineering and Testing for EMC and Safety Compliance

**APPLICATION FOR FCC CERTIFICATION  
UNLICENSED TRANSMITTER**

**MODEL: i-Q8C  
FCC ID: O2E-ILR-IQ8C**

**Identec Solutions, Inc.  
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**June 14, 2003**

<b>STANDARDS REFERENCED FOR THIS REPORT</b>	
<b>PART 2: 1999</b>	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
<b>PART 15: 1999</b>	RADIO FREQUENCY DEVICES
<b>ANSI C63.4-1992</b>	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
<b>RSS-210</b>	LOW POWER LICENSE-EXEMPT RADIO COMMUNICATION DEVICES (ALL FREQUENCY BANDS)

<b>FCC Rules Parts</b>	<b>Frequency Range (MHz)</b>	<b>Output Power (W)</b>	<b>Frequency Tolerance</b>	<b>Emission Designator</b>
15.249	916.5	0.00070	N/A	N/A

**REPORT PREPARED BY:**

**Test Engineer: Daniel Baltzell  
Administrative Writer: Daniel Baltzell**

**Rhein Tech Laboratories, Inc.**

*Document Number: 2003095*

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## 1 GENERAL INFORMATION

The following application for FCC certification of a transceiver is prepared on behalf of Identec Solutions, Inc. in accordance with Part 2, and Part 15, Subparts A and C of the Federal Communications Commission's rules and regulations and Industry Canada RSS-210. The Equipment Under Test (EUT) was Model i-Q8C, FCC ID: O2E-ILR-IQ8C. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier, and cables.

All radiated emissions measurements were performed manually at Rhein Tech Laboratories. The radiated emissions measurements required by the rules were performed on the three meter, open-field test range maintained by Rhein Tech Laboratories, 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. A complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emissions measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. The FCC accepts Rhein Tech Laboratories, Inc. as a facility available to do measurement work for others on a contractual basis.

### 1.1 MODIFICATIONS

Modifications were made to resistors R13 and R14; R13 from 24k ohm to 68k ohm, and R14 from 10k ohm to 27k ohm, to lower output power.

### 1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original certification submission.

### 1.3 TEST METHODOLOGY

Radiated testing was performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### 1.4 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report, submitted to and approved by the Federal Communications Commission, to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

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## 2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
<b>PART 2: 1999</b>	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
<b>PART 15: 1999</b>	RADIO FREQUENCY DEVICES
<b>ANSI C63.4-1992</b>	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
<b>RSS-210</b>	LOW POWER LICENSE-EXEMPT RADIO COMMUNICATION DEVICES (ALL FREQUENCY BANDS)

FCC Rules Parts	Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
15.249	916.5 MHz	0.00070	N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described above. See Section 1.1 for modifications which were made to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature: 

Date: June 14, 2003

Typed/Printed Name: Desmond A. Fraser

Position: President  
(NVLAP Signatory)

**NVLAP** Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

**Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.**

### 3 SYSTEM TEST CONFIGURATION

#### 3.1 JUSTIFICATION

To complete the test configuration required by the FCC, the transmitter was initiated by shorting a pad on the PCB. The EUT's crystal oscillators and harmonics of each were investigated. Conducted emissions are not required since the device is operated from a 3VDC battery. Furthermore, the EUT was tested and investigated in three orthogonal planes.

#### 3.2 EXERCISING THE EUT

The i-Q8C is a transmitter designed to function at 916.5 MHz. When a correct command from an interrogator is received, the transponder responds with a respective answer; this is a 110 ms burst, which is representative for a scan answer. A pseudo random generator changes the data content of this burst, so that each response is different. A pad on the PCB was shorted in order to activate the transmitter circuitry.

#### 3.3 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

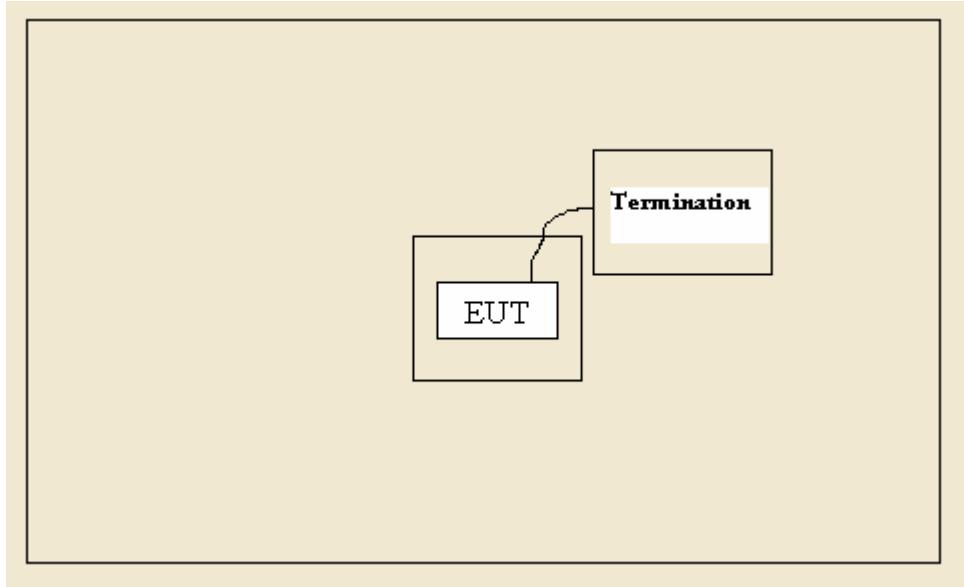
**TABLE 1: EQUIPMENT UNDER TEST (EUT)**

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
UHF INDUSTRIAL TAG SAMPLE #1	IDENTEC SOLUTIONS, INC.	i-Q8C	0.220.000.003 CW	O2E-ILR-IQ8C	TERMINATED 1M UNSHIELDED I/O	015283
UHF INDUSTRIAL TAG SAMPLE #2	IDENTEC SOLUTIONS, INC.	i-Q8C	0.220.000.003 MOD	O2E-ILR-IQ8C	TERMINATED 1M UNSHIELDED I/O	015284
UHF INDUSTRIAL TAG SAMPLE #3	IDENTEC SOLUTIONS, INC.	i-Q8C	0.220.000.004 CW	O2E-ILR-IQ8C	TERMINATED 1M UNSHIELDED I/O	015307

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### 3.4 CONFIGURATION OF TESTED SYSTEM



**FIGURE 1: TEST SYSTEM CONFIGURATION**

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## 4 CONDUCTED EMISSIONS

AC conducted emissions is not required since the device under test is not powered from AC mains, but has a 3.6 VDC input requirement.

## 5 RADIATED EMISSIONS

### 5.1 TEST METHODOLOGY FOR RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances, in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz using a spectrum analyzer, a quasi-peak adapter, and EMCO log periodic and biconical antenna. In order to gain sensitivity, a preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The second harmonic of the highest LO was tested. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

*Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech Quality Manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.*

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## 5.2 RADIATED EMISSION DATA

**TABLE 2: FUNDAMENTAL RADIATED EMISSIONS: FCC PART 15.249**

Temperature: 25°F      Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
916.500	Qp	V	0	1.0	97.6	-3.9	93.7	94.0	-0.3
916.500	Pk	V	0	1.0	97.0	-3.9	93.6	114.0	-20.4

**TABLE 3: HARMONIC RADIATED EMISSIONS: FCC PART 15.249**

Temperature: 83°F      Humidity: 63%									
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1833.000	Pk	H	180	1.4	56.7	6.9	63.6	74.0	-10.4
1833.000	Av	H	180	1.4	26.6	6.9	33.5	54.0	-20.5
2749.500	Pk	H	180	1.4	23.7	10.3	34	74.0	-40.0
2749.500	Av	H	180	1.4	15.7	10.3	26	54.0	-28.0
3666.000	Pk	H	180	1.4	18.3	9.0	27.3	74.0	-46.7
3666.000	Av	H	180	1.4	18.2	9.0	27.2	54.0	-26.8
4582.500	Pk	H	180	1.4	18.0	13.5	31.5	74.0	-42.5
4582.500	Av	H	180	1.4	13.7	13.5	27.2	54.0	-26.8
5499.000	Pk	H	180	1.4	21.0	13.8	34.8	74.0	-39.2
5499.000	Av	H	180	1.4	13.7	13.8	27.5	54.0	-26.5
6415.500	Pk	H	180	1.4	20.3	12.5	32.8	74.0	-41.2
6415.500	Av	H	180	1.4	13.8	12.5	26.3	54.0	-27.7
7332.000	Pk	H	180	1.4	22.0	11.6	33.6	74.0	-40.4
7332.000	Av	H	180	1.4	14.2	11.6	25.8	54.0	-28.2
8248.500	Pk	H	180	1.4	22.3	17.3	39.6	74.0	-34.4
8248.500	Av	H	180	1.4	13.8	17.3	31.1	54.0	-22.9
9165.000	Pk	H	180	1.4	22.2	17.4	39.6	74.0	-34.4
9165.000	Av	H	180	1.4	14.2	17.4	31.6	54.0	-22.4

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**TABLE 4: DIGITAL RADIATED EMISSIONS; FCC PART 15.209**

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Temperature: 25°F		Humidity: 32%				
			Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
31.666	Pk	H	0	1.0	36.3	-10.8	25.5		
31.666	Qp	H	0	1.0	33.6	-10.8	22.8	40.0	-17.2
38.134	Pk	H	0	1.0	36.4	-14.6	21.8		
38.134	Qp	H	0	1.0	34.0	-14.6	19.4	40.0	-20.6
108.172	Pk	H	0	1.0	37.5	-17.4	20.1		
108.172	Qp	H	0	1.0	31.8	-17.4	14.4	43.5	-29.1
114.551	Pk	H	0	1.0	41.2	-17.0	24.2		
114.551	Qp	H	0	1.0	38.1	-17.0	21.1	43.5	-22.4
120.945	Pk	H	0	1.0	37.4	-16.7	20.7		
120.945	Qp	H	0	1.0	38.7	-16.7	22.0	43.5	-21.5
480.689	Pk	H	0	1.0	35.6	-9.9	25.7		
480.689	Qp	H	0	1.0	34.5	-9.9	24.6	46.0	-21.4
1397.220	Pk	H	0	1.0	36.2	3.0	39.2		
1397.220	Av	H	0	1.0	26.2	3.0	29.2	54.0	-24.8

\*All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 14, 2003

Typed Name: Daniel W. Baltzell

**TABLE 5: EQUIPMENT USED FOR TESTING**

Radiated Emissions					
<b>RTL Asset</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Part Type</b>	<b>Serial Number</b>	<b>Calibration Date</b>
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/12/04
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	5/12/04
901053	Schaffner &Chase	CBL6112B	Bilog antenna (20 MHz - 2 GHz)	2648	6/17/03
900905	Rhein Tech Laboratories, Inc.	PR-1040	Pre Amplifier 40dB (10 MHz - 2 GHz)	1006	7/10/03
900969	Hewlett Packard	85650A	Quasi-Peak Adapter	2412A00414	5/12/04
901215	Hewlett Packard	8596EM (9kHz -12.8GHz)	EMC Analyzer	3826A00144	8/23/03
900932	Hewlett Packard	8449B OPT H02	Preamplifier 1 - 26.5 GHz	3008A00505	7/15/03
900772	EMCO	3161-02	Horn Antenna, 2 - 4 GHz	9804-1044	3/15/04
900323	EMCO	3160-07	Horn Antenna, 8.2 - 12.4 GHz	9605-1054	6/10/04
900321	EMCO	3161-03	Horn Antenna, 4.0 - 8.2 GHz	9508-1020	4/10/04

\* Note: The preamplifier's gain is included in the site correction factor.

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## 6 MODULATED BANDWIDTH - §15.247(A)(2)

### 6.1 MODULATED BANDWIDTH TEST PROCEDURE

The 26 dB bandwidth per ANSI C63.4 was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 10 kHz, and the video bandwidth set at 30 kHz.

### 6.2 TEST EQUIPMENT USED FOR TESTING

**TABLE 6: TEST EQUIPMENT USED FOR TESTING (MODULATED BANDWIDTH)**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/12/04
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	5/12/04

### 6.3 MODULATED BANDWIDTH TEST DATA

**TABLE 7: MODULATED 26 DB BANDWIDTH**

26 dB BANDWIDTH (kHz)
323.9

**TEST PERSONNEL:**

Daniel W. Baltzell		June 14, 2003
Test Engineer	Signature	Date Of Test

#### 6.4 MODULATED BANDWIDTH PLOTS

**Bandwidth Channel Frequency (MHz):** 916.5  
**Bandwidth Resolution (kHz):** 10  
**Bandwidth Video (kHz):** 30  
**Sweep Time (s):** 5.0

**PLOT 6-1: EMISSION BANDWIDTH (20 dB)**



#### TEST PERSONNEL:

Daniel W. Baltzell  
Test Technician/Engineer

Signature

June 14, 2003  
Date Of Test

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## 7 CONCLUSION

The data in this measurement report shows that the Identec Solutions, Inc. Model i-Q8C, FCC ID: O2E-ILR-IQ8C, complies with all the requirements of Parts 2 and 15.249 of the FCC Rules and Industry Canada RSS-210.