Cert. No. 1152.01
Electrical (EMC)

DATE: 17 November 2005

I.T.L. (PRODUCT TESTING) LTD.

EMC/Radio Test Report

for

The Sapling Company Inc.

Equipment under test:

Wireless Transmitter/Transceiver STR 2000

STR-200-056-1

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
E. Pitt, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Cert. No. 1152.01
Electrical (EMC)

Measurement/Technical Report for

The Sapling Company Inc.

Wireless Transmitter/Transceiver STR 2000

STR-200-056-1

FCC ID: R73STR001

20 November 2005

This report concerns: Original Grant: X Class II change:

Equipment type: Radio Telemetry Transmitter

Request Issue of Grant:

__x__ Immediately upon completion of review

Limits used:

CISPR 22 _____ Part 15 _x_

Measurement procedure used is ANSI C63.4-2003.

Application for Certification
prepared by:

Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
D.N. Shimshon 99780
Israel
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Applicant for this device:
(different from "prepared by")

Ilan Shemesh
The Sapling Company
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1. General Information

1.1 Administrative Information

Manufacturer:	The Sapling Company Inc.
Manufacturer's Address:	1633 Republic road Huntingdon Valley, PA 19006 U.S.A. Tel: +1-215-322-6063 Fax: +1-215-322-8498
Manufacturer's Representative:	Ziv Bakal
Equipment Under Test (E.U.T):	Wireless Transmitter/Transceiver STR 2000
Equipment Model No.:	STR-200-056-1
Equipment Serial No.:	1
Date of Receipt of E.U.T:	26.07.05
Start of Test:	26.07.05
End of Test:	27.07.05
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15, Sub-parts B, C

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

Sapling's High power Wireless Transceiver allows the user to create a wireless clock system from an existing hard-wired system.
The transceiver incorporates multi-function software so that every transceiver can transmit and receive signals. This means that the Sapling STR-200-056-1 can act as a master clock for the new system. It can act as a signal booster to extend the range of a wireless system, or it can be used to translate an existing system into a wireless system.

The innovative 914-928MHz frequency hopping technology transmits data along several alternating signal frequencies. This multi-layer approach guarantees an enhanced signal even if there is interference in one of the frequencies. The unit can both receive and transmit wireless signals which allows it to be used as a repeater, boosting the data stream, and sending it along the system.

The Wireless Transceiver transmits a stream of data every minute and is capable of transmitting and receiving data in distances of one kilometer/3,000 feet in open space.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing December 12, 2003).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ±4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. Product Labeling

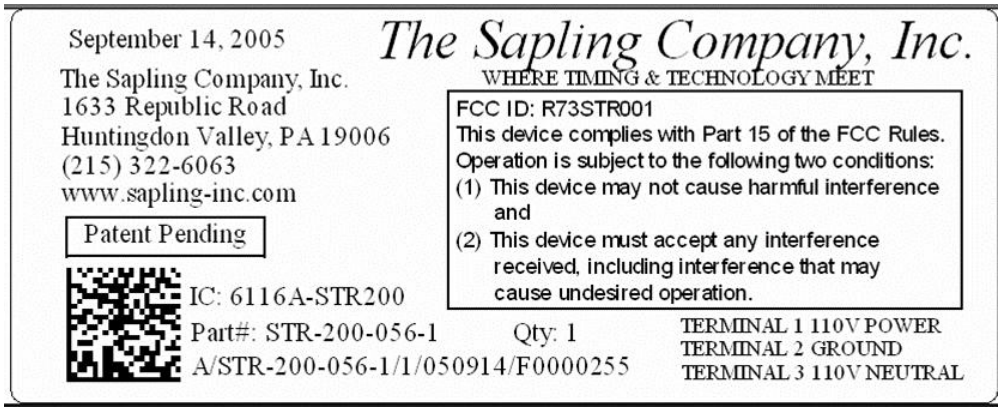


Figure 1. Product/FCC Label

Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 Justification

The E.U.T. is a fixed wall mounted installation, mounted in the vertical position.

3.2 EUT Exercise Software

Since the device transmits only every one minute we made special software for testing it. This software allows the user to select one of 10 modes by pushing the push button. Here are the modes:

1. Continuous transmission at lowest frequency (without modulation)
2. Continuous transmission at middle frequency(without modulation)
3. Continuous transmission at highest frequency(without modulation)
4. Continuous transmission at middle frequency (with modulation)
5. Continuous transmission at lowest frequency (with modulation)
6. Continuous transmission at highest frequency (with modulation)
7. Continuous reception at lowest frequency
8. Continuous reception at middle frequency
9. Continuous reception at highest frequency
10. Normal frequency hopping with modulation

The modulation was done with time message.

3.3 Special Accessories

No special accessories were needed to achieve compliance.

3.4 Equipment Modifications

1. A capacitor of 0.47nF was added between the phase to ground and neutral to ground.

3.5 Configuration of Tested System

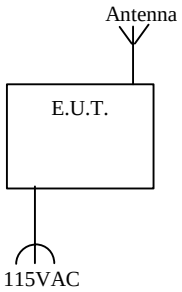


Figure 3. Configuration of Tested System

4. Block Diagram

4.1 Schematic Block/Connection Diagram

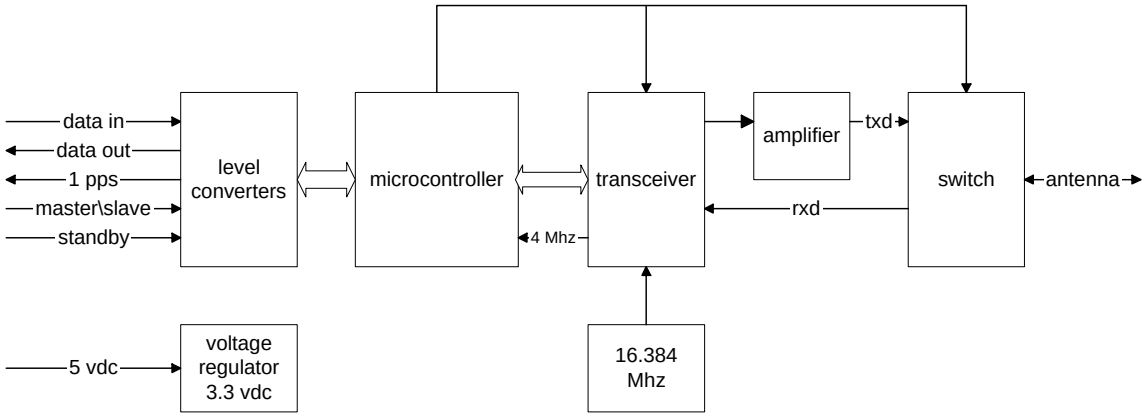


Figure 4. Block Diagram

4.2 Theory of Operation

This device has two modes of operation:

Master – Transceiver : In this mode the device receives time message thorough its serial communication input ‘data in’, and transmits RF message every 1 minute through its antenna.

Slave – Repeater : In this mode the device receives time message through its antenna , amplify the message and transmits it to the antenna.

The ‘master\slave’ input defines the mode of operation: 0 is master, 5v is slave. The micro-controller reads the ‘master\slave’ input to decide in which mode it operates. When it is in master mode it uses its UART to receive the message coming through its ‘data in’ input with baud rate 1200.

The device is based on micro-controller and a FSK transceiver. The micro-controller uses the transceiver to receive and transmit messages in frequency hopping technology in the 914-928 MHz frequency range. The micro-controller controls the direction of signals from the antenna by RF switch. When it transmits, the signals are coming out from the micro-controller to the transceiver, and from the transceiver to the amplifier. From the amplifier the signals move through the RF switch to the antenna. When it receives, the signals are coming from the antenna to the RF switch to the transceiver and from it to the micro-controller.

The device transmits the same time message in 51 different frequencies. It stays 10 milliseconds in every channel before it hops to the next channel but it transmits only 6.64 milliseconds during this time. After 51 different frequencies it transmits another 9 messages starting at the first frequency.

In worst case the device transmits the time message every 1 minute. The all transmission endure 600 milliseconds. Which mean, in worst case it stays 13.3 milliseconds at the same frequency during 1 minute.

The device is powered by 5VDC. It has voltage regulator which feeds the components of the circuit with 3.3 VDC.

The transceiver is connected to external antenna, but this antenna cannot be replaced by the user.

The 1 pps pin outputs a pulse every 1 second.

The ‘data out’ and ‘standby’ input are not used.

5. Customer's Declaration

September 13, 2005

The Sapling Company, Inc.
1633 Republic Road
Huntingdon Valley, PA. 19006
P: 215.322.6063
F: 215.322.8498
W: www.sapling-inc.com

DECLARATION

To whom it may Concern,

I hereby declare that the Wireless Transmitter/Transceiver STR 2000 Series, Model STR-200-056-1 complies with the following requirements of Part 15, Sub-part C, Section 15.247:

1. Channel average time occupancy, Section 15.247(a)(1).
2. Receiver B.W. matching to transmitter B.W. and frequencies in synchronization with transmitted signals, Section 15.247(a)(1).
3. Non-coordination requirement, Section 15.247(h).
4. Duty cycle is T_{on} = 6.64 milliseconds within 100 milliseconds.

Thank you,

Ilan Shemesh

6. Conducted Emission Test Data

6.1 Test Specification

FCC, Part 15, Subpart B: Class **B**

6.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room (see section 3), with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector

The E.U.T. was operated in the frequency of 921.21 MHz.

6.3 Test Data

JUDGEMENT: Passed by 11.0 dB

The margin between the emission levels and the specification limit is, in the worst case, 11.0 dB for the phase line at 22.01 MHz and 11.3 dB at 0.50 MHz for the neutral line.

The EUT met the FCC Part 15, Subpart B, Class B specification requirements.

The details of the highest emissions are given in Figure 5 to Figure 10.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.11.05

Typed/Printed Name: E. Pitt

Conducted Emission

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification:	FCC Part 15, Subpart B: Class **B**
Lead:	Phase
Detectors:	Peak, Quasi-peak, Average

Frequency (MHz)	Peak Amplitude (dBμV)	Quasi-peak Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.20	42.2	41.4	63.6	Pass	-22.2
0.30	36.7	35.7	60.2	Pass	-24.5
0.50	34.5	34.2	56.0	Pass	-21.8
11.01	29.7	28.2	60.0	Pass	-31.8
22.01	43.3	37.9	60.0	Pass	-22.1
27.51	35.6	33.6	60.0	Pass	-26.4

Figure 5. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dBμV)	Average Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.20	42.2	31.2	53.6	Pass	-22.4
0.30	36.7	28.5	50.3	Pass	-21.8
0.50	34.5	33.6	46.0	Pass	-12.4
11.01	29.7	27.5	50.0	Pass	-22.5
22.01	43.3	39.0	50.0	Pass	-11.0
27.51	35.6	32.5	50.0	Pass	-17.5

Figure 6. Detectors: Peak, AVERAGE .

Conducted Emission

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification:	FCC Part 15, Subpart B: Class **B**
Lead:	Phase
Detectors:	Peak, Quasi-peak, Average

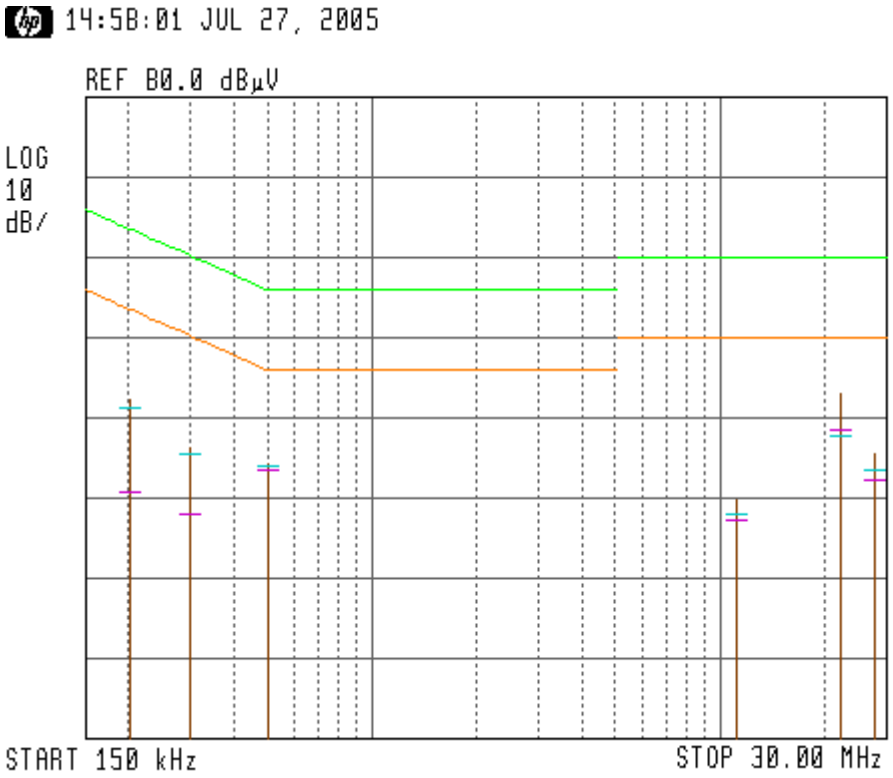


Figure 7. Detectors: Peak, Quasi-peak, Average

Notes:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*
5. *Average detection is designated by the second dash mark (from the top) of each vertical line.*

Conducted Emission

E.U.T Description Wireless Transmitter/Transceiver STR 2000
Type STR-200-056-1
Serial Number: 1

Specification: FCC Part 15, Subpart B: Class **B**
Lead: Neutral
Detectors: Peak, Quasi-peak

Frequency (MHz)	Peak Amplitude (dB µV)	Quasi-peak Amplitude (dB µV)	Specification (dB µV)	Pass/Fail	Margin (dB)
0.20	35.2	34.5	63.7	Pass	-29.2
0.30	38.7	38.0	60.3	Pass	-22.3
0.50	37.7	36.3	56.0	Pass	-19.7
11.01	25.7	24.9	60.0	Pass	-35.1
22.01	45.8	40.0	60.0	Pass	-20.0
27.51	40.7	36.7	60.0	Pass	-23.3

Figure 8. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dBµV)	Average Amplitude (dBµV)	Specification (dB µV)	Pass/Fail	Margin (dB)
0.20	35.2	26.7	53.7	Pass	-27.0
0.30	38.7	30.6	50.3	Pass	-19.7
0.50	37.7	34.7	46.0	Pass	-11.3
11.01	25.7	24.8	50.0	Pass	-25.2
22.01	45.8	36.0	50.0	Pass	-14.0
27.51	40.7	37.8	50.0	Pass	-12.2

Figure 9. Detectors: Peak, AVERAGE

Conducted Emission

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification:	FCC Part 15, Subpart B: Class **B**
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average

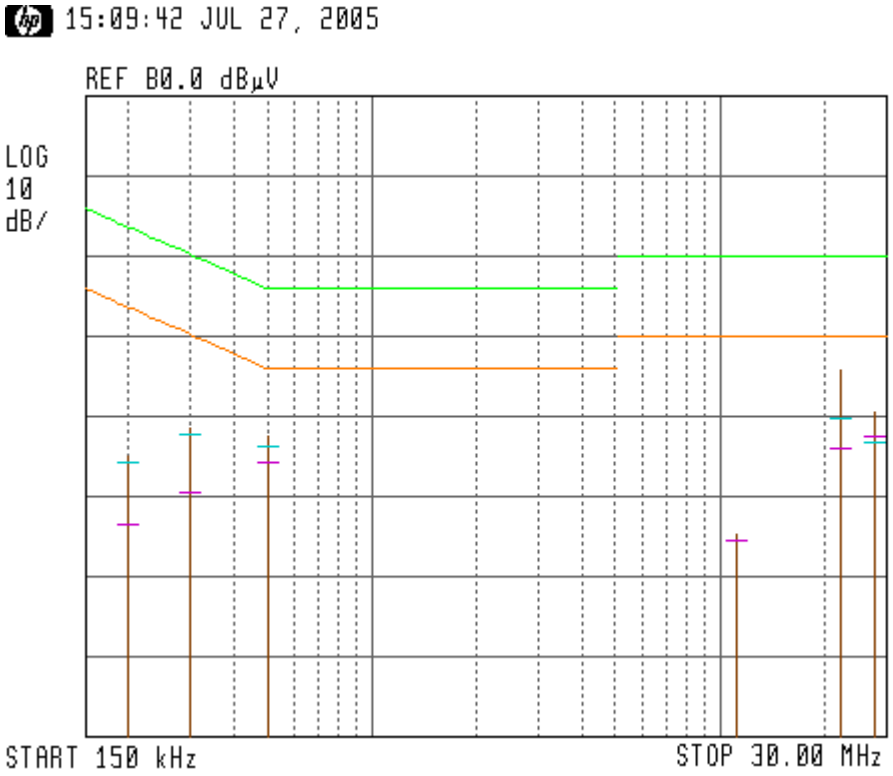


Figure 10. Detectors: Peak, Quasi-peak, Average

Notes:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*
5. *Average detection is designated by the second dash mark (from the top) of each vertical line.*

6.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
LISN	Fischer	FCC-LISN-2A	127	March 20, 2005	1 year
LISN	Fischer	FCC-LISN-2A	128	March 20, 2005	1 year
Receiver	HP	85420E/85422E	3427A00103/34	February 26, 2005	1 year
Printer	HP	ThinkJet2225	2738508357	N/A	N/A

7. Spurious Radiated Emission Test Data, Below 1 GHz

7.1 Test Specification

9kHz-1000 MHz, FCC, Part 15, Subpart C

7.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 30kHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter.
In the frequency range 30-1000MHz, the readings were maximized by adjusting the antenna height between 1-4 meters. The turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

Turning the E.U.T on and off.
Using a frequency span less than 10 MHz.
Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T. was operated at the frequencies of 914.81, 921.21, and 927.61 MHz.

7.3 Test Data

The signals in the band 9 kHz – 1.0 GHz were below the spectrum analyzer noise level which is at least 6dB below the specification limit.

The results for all three operating frequencies were the same.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.11.05

Typed/Printed Name: E. Pitt

7.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	February 26, 2005	1 year
RF Section	HP	85420E	3427A00103	February 26, 2005	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 14, 2005	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	October 20, 2004	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 10, 2004	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A

7.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

8. Spurious Radiated Emission Test Data Above 1 GHz

8.1 Radiated Emission Above 1 GHz

The E.U.T operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.
In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used. The test distance was 3 meters.
In the frequency range 2.9-9.5 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was operated in continuous mode.

8.2 Test Data

JUDGEMENT: Passed by 5.2 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification. The worst cases were:

for 914.81 MHz, 12.0 dB margin at 2763.75 MHz frequency, vertical polarization.

for 921.21 MHz, 13.0 dB margin at 2744.54 MHz frequency, vertical polarization

for 927.61 MHz, 5.2 dB margin at 2782.95 MHz frequency, vertical polarization

The details of the highest emissions are given in Figure 11 to Figure 14.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.11.05

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
Frequency range: 1.0 GHz to 9.5 GHz
Test Distance: 3 meters
Detector: Peak

Operating Freq. (MHz)	Measured Freq. (MHz)	Peak Result* (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
914.81	2763.75	61.5	74.0	-12.5
921.21	2744.54	59.3	74.0	-14.7
927.61	2782.95	59.2	74.0	-14.8

Figure 11. Radiated Emission. Antenna Polarization: HORIZONTAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

*"Peak Result" includes correction factor.

"Correction Factor" = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description Wireless Transmitter/Transceiver STR 2000
Type STR-200-056-1
Serial Number: 1

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
Frequency range: 1.0 GHz to 9.5 GHz
Test Distance: 3 meters
Detector: Average

Operating Freq. (MHz)	Measured Freq. (MHz)	Average Result* (dBµV/m)	Average Specification (dB µV/m)	Avg. Margin (dB)
914.81	2763.75	28.0	54.0	-26.0
921.21	2744.54	28.5	54.0	-25.5
927.61	2782.95	33.7	54.0	-20.3

Figure 12. Radiated Emission. Antenna Polarization: HORIZONTAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

*"Average Result" includes correction factor.

Correction Factor = Antenna Factor + Cable Loss + Duty Cycle Factor

Duty Cycle Factor = $20\log\frac{6.64}{100} = -23.6dB$

The maximum transmission "ON" time is 6.64 msec. within a 100 msec. window.

Radiated Emission Above 1 GHz

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Frequency range: 1.0 GHz to 9.5 GHz
Test Distance: 3 meters
Detector: Peak

Operating Freq. (MHz)	Measured Freq. (MHz)	Peak Result* (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
914.81	2763.75	62.0	74.0	-12.0
921.21	2744.54	61.0	74.0	-13.0
927.61	2782.95	68.8	74.0	-5.2

Figure 13. Radiated Emission. Antenna Polarization: VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* "Peak Result" includes correction factor.

"Correction Factor" = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description: Wireless Transmitter/Transceiver STR 2000
Type: STR-200-056-1
Serial Number: 1

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Test Distance: 3 meters
Frequency range: 1.0 GHz to 9.5 GHz
Detector: Average

Operating Freq. (MHz)	Measured Freq. (MHz)	Average Result* (dBµV/m)	Average Specification (dB µV/m)	Avg. Margin (dB)
914.81	2763.75	31.3	54.0	-22.7
921.21	2744.54	32.3	54.0	-21.7
927.61	2782.95	36.4	54.0	-17.6

Figure 14. Radiated Emission. Antenna Polarization: VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

*"Average Result" includes correction factor.

Correction Factor = Antenna Factor + Cable Loss + Duty Cycle Factor

Duty Cycle Factor = $20\log\frac{6.64}{100} = -23.6dB$

The maximum transmission "ON" time is 6.64 msec. within a 100 msec. window.

8.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	February 26, 2005	1 year
RF Section	HP	85420E	3427A00103	February 26, 2005	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 24, 2005	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 17, 2004	2 year
Horn Antenna	ARA	SWH-28	1007	October 28, 2003	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	October 17, 2004	1 year
Spectrum Analyzer	HP	8592L	3926A01204	February 01, 2005	1 year

9. Number of Hopping Frequencies

9.1 Test procedure

The E.U.T. was set to hopping mode.
The E.U.T. antenna terminal was connected to the spectrum analyzer through a 32 dB external attenuator (4 × 8dB) and an appropriate coaxial cable (CL 0.5 dB).
The spectrum analyzer was set to the following parameters:

Span: Every 2.8 MHz Frequency
Band of Operation: 914-928 MHz
RBW: 30kHz
VBW: 30kHz
Detector Function: Peak
Trace: Maximum Hold

The number of hopping frequencies is 8+11+11+11+10=51 (See plots).

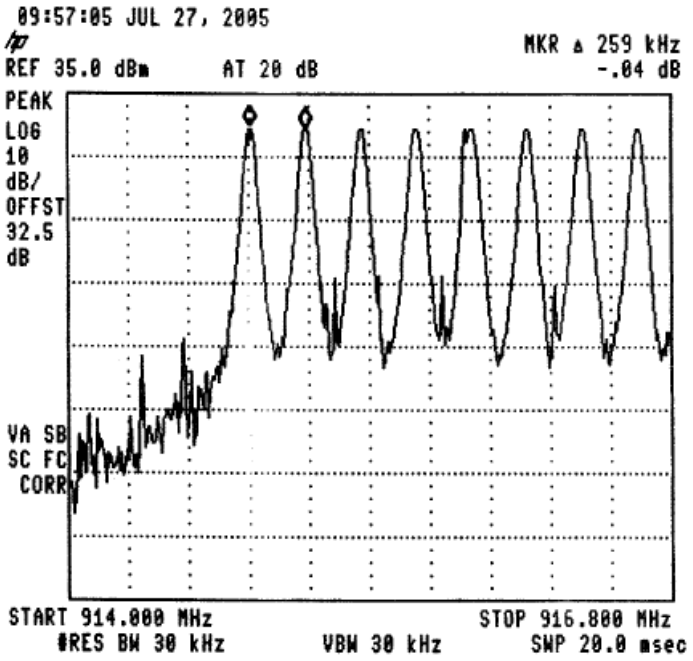


Figure 15.— 914.0-916.8 MHz

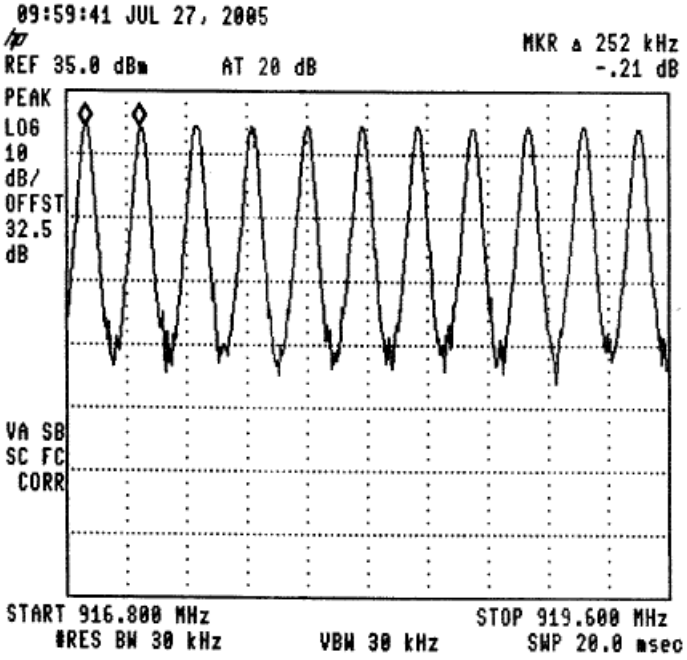


Figure 16.— 916.8-919.6 MHz

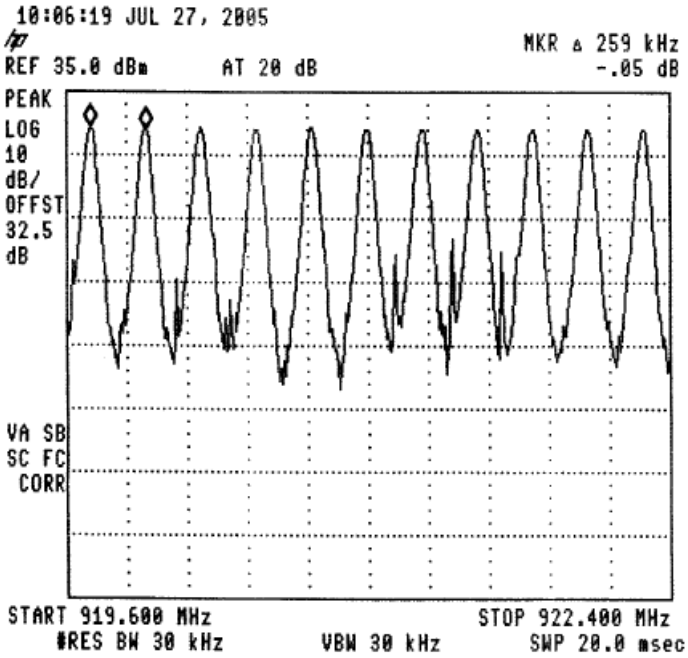


Figure 17.— 919.6-922.4 MHz

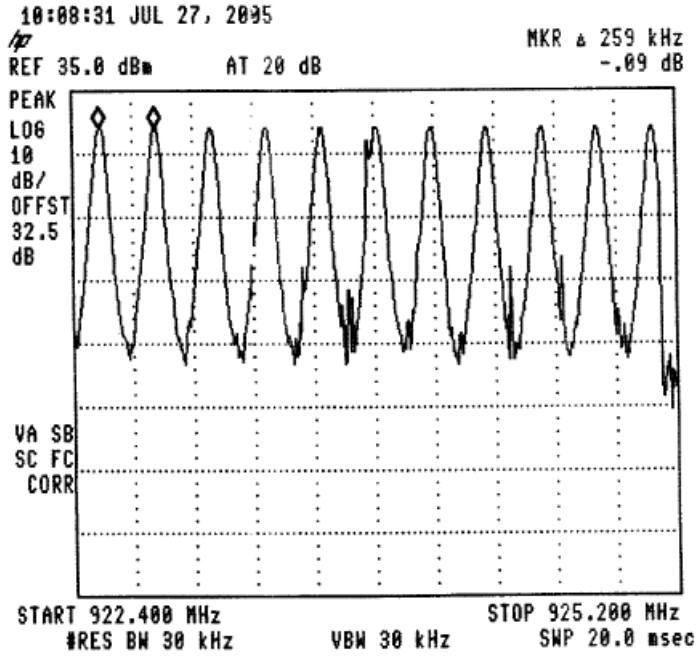


Figure 18.— 922.4-925.2 MHz

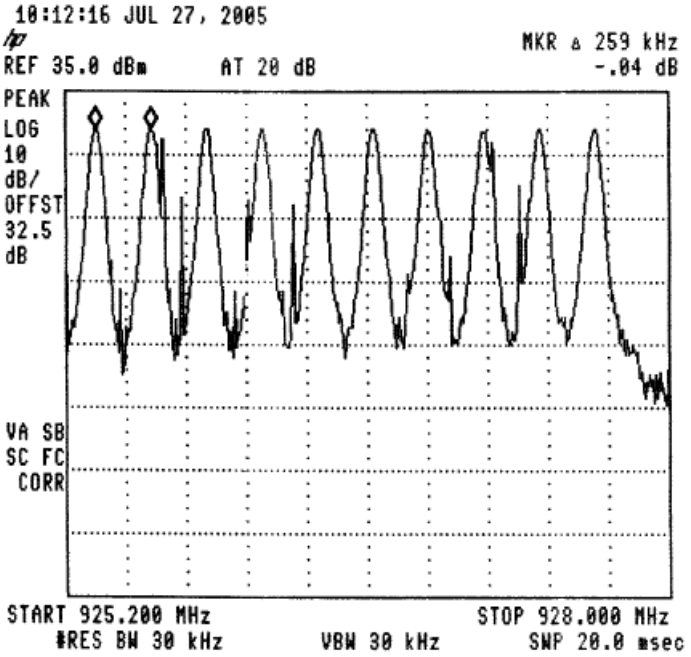


Figure 19.— 925.2-928.0 MHz

9.2 Results table

E.U.T. Description: Wireless Transmitter/Transceiver STR 2000
Model No.: STR-200-056-1
Serial Number: 1
Specification: FCC Part 15, Subpart C (15.247(a) (1)

Number of Hopping Frequencies	Specification
51	>50

Figure 20 Number of Hopping Frequencies

TEST PERSONNEL:
Tester Signature:  Date: 20.11.05
Typed/Printed Name: E. Pitt

9.3 Test Equipment Used.

Number of Hopping Frequencies

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 01, 2005	1 year
Cable	Avnet	MTS	N/A	February 18, 2005	1 year
Attenuator	MACOM	M3933/25-74	0056	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0202	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0211	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0050	November 9, 2004	1 year

Figure 21 Test Equipment Used

10. Channel Frequency Separation

10.1 Test procedure

The E.U.T. was set to hopping mode.
The E.U.T. antenna terminal was connected to the spectrum analyzer through a 32 dB attenuator (4 × 8dB) and an appropriate coaxial cable (CL 0.5 dB).
The spectrum analyzer was set to the following parameters:

Span: 0.5 MHz
RBW: 30 kHz
VBW: 30 kHz
Detector Function: Peak
Trace: Maximum Hold

The marker delta function to determine the separation between the peaks of the adjacent channels was used.

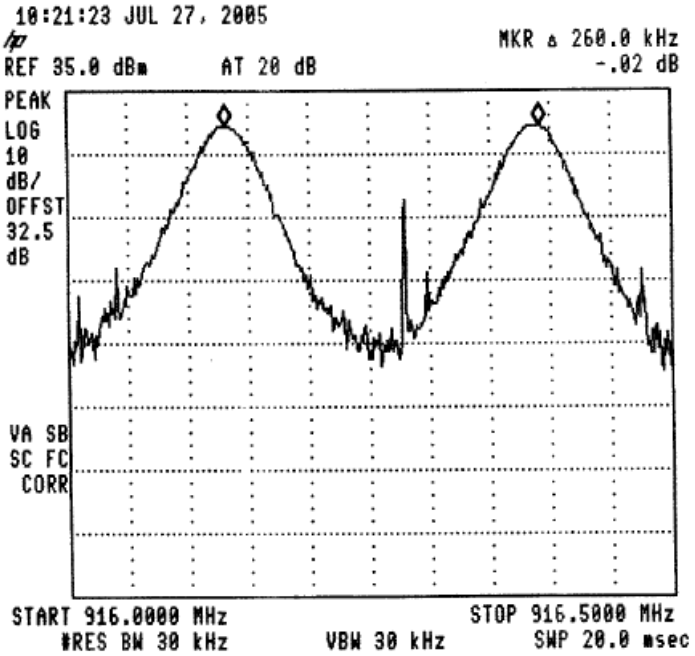


Figure 22.— 916.0-916.5 MHz

10.2 Results table

E.U.T. Description: Wireless Transmitter/Transceiver STR 2000
Model No.: STR-200-056-1
Serial Number: 1
Specification: FCC Part 15, Subpart C (15.247(a) (1)

Channel Frequency Separation (kHz)	Specification* (kHz)	Margin (kHz)
260	>205	55.0

Figure 23 Channel Frequency Separation

* Specification: 20 dB bandwidth channel (See Section 13).

JUDGEMENT: Passed by 55.0 kHz

TEST PERSONNEL:
Tester Signature: _____ Date: 20.11.05
Typed/Printed Name: E. Pitt

10.3 Test Equipment Used.

Channel Frequency Separation

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 01, 2005	1 year
Cable	Avnet	MTS	N/A	February 18, 2005	1 year
Attenuator	MACOM	M3933/25-74	0056	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0202	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0211	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0050	November 9, 2004	1 year

Figure 24 Test Equipment Used

11. Maximum Transmitted Peak Power Output

11.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an EXT ATTT=32 dB (4 × 8dB) and an appropriate coaxial cable=0.5 dB. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 300 kHz RBW. Peak power level was measured at selected operation frequencies.

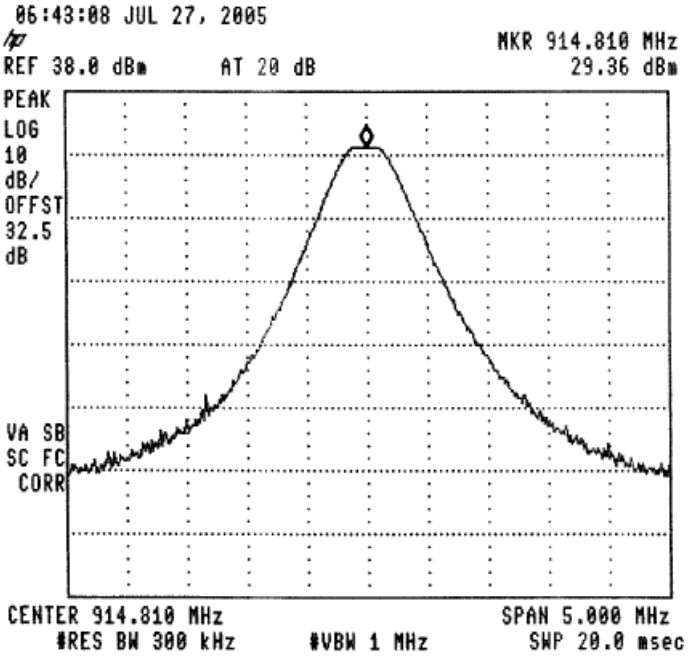


Figure 25.— 914.21 MHz

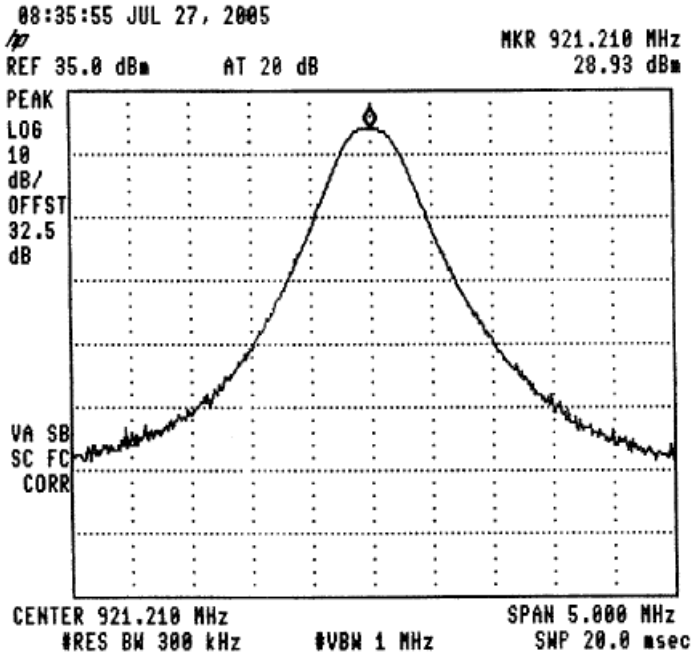


Figure 26.— 921.21 MHz

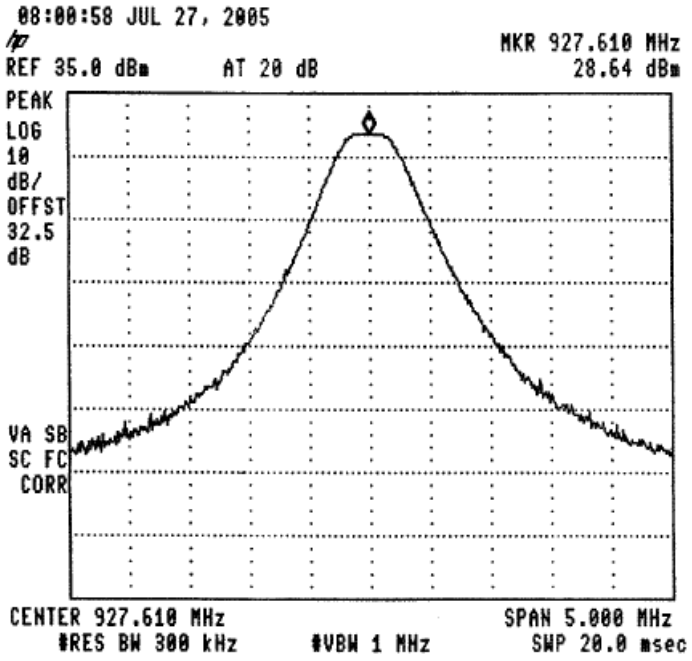


Figure 27.— 927.61 MHz

11.2 Results table

E.U.T. Description: Wireless Transmitter/Transceiver STR 2000
Model No.: STR-200-056-1
Serial Number: 1
Specification: FCC Part 15, Subpart C

Operation Frequency (MHz)	Peak Power Output (dBm)	Specification (dBm)	Margin (dB)
914.21	29.36	30.0	-0.64
921.21	28.93	30.0	-1.07
927.61	28.64	30.0	-1.36

Figure 28 Maximum Power Output

JUDGEMENT: Passed by 0.64 dB

TEST PERSONNEL:

Tester Signature:  Date: 20.11.05

Typed/Printed Name: E. Pitt

11.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 01, 2005	1 year
Cable	Avnet	MTS	N/A	February 18, 2005	1 year
Attenuator	MACOM	M3933/25-74	0056	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0202	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0211	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0050	November 9, 2004	1 year

Figure 29 Test Equipment Used

12. Peak Power Output Out of 902-928 MHz Band

12.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 32dB external attenuator (4 × 8 dB) and an appropriate coaxial cable (CL 0.5 dB). The spectrum analyzer was set to 1 kHz RBW for the frequency range 9 kHz to 150 kHz, 10 kHz RBW for the frequency range 150 kHz to 1.0 MHz, and 100 kHz RBW for the frequency range 1.0 MHz to 9.5 GHz. The frequency range from 9 kHz to 9.5 GHz was scanned. Level of spectrum components out of the 902-928 MHz was measured at the selected operation frequencies.

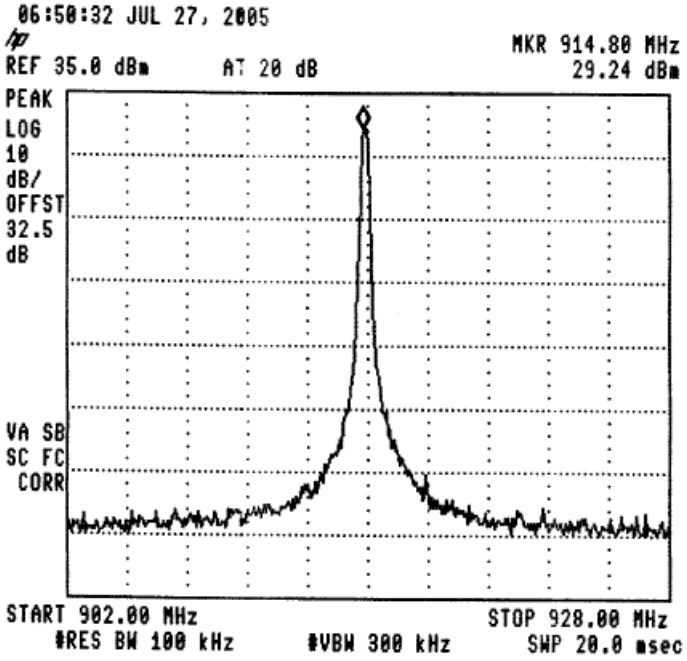


Figure 30.— 914.81 MHz

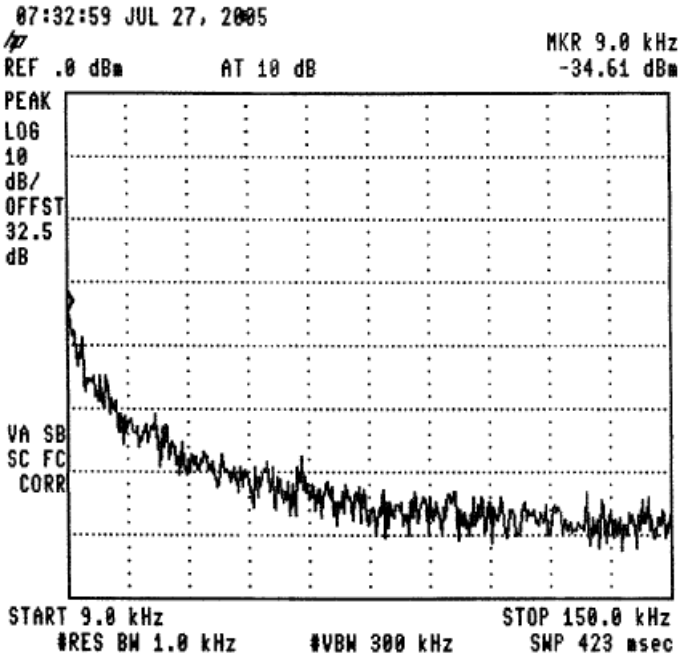


Figure 31.— 914.81 MHz

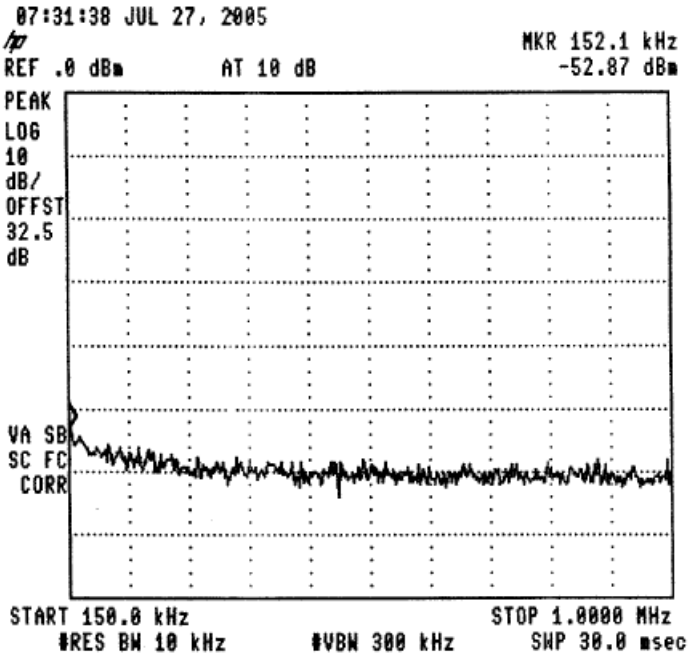


Figure 32.— 914.81 MHz

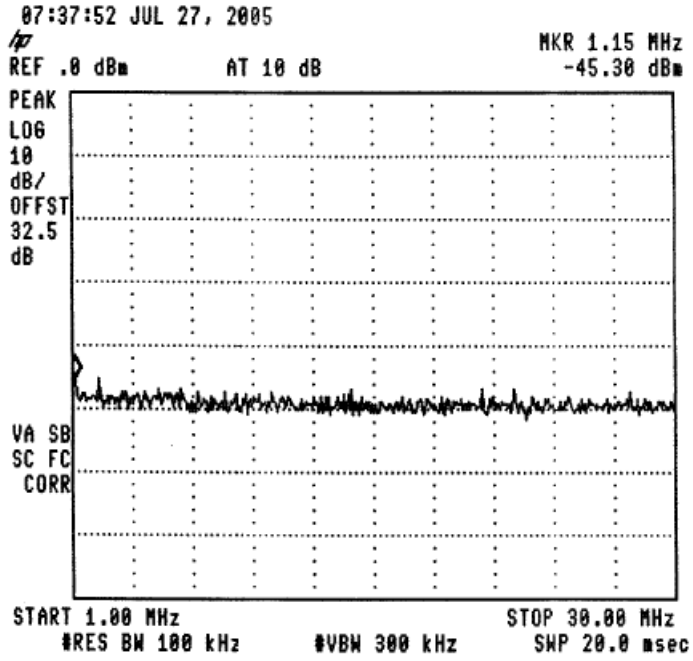


Figure 33.— 914.81 MHz

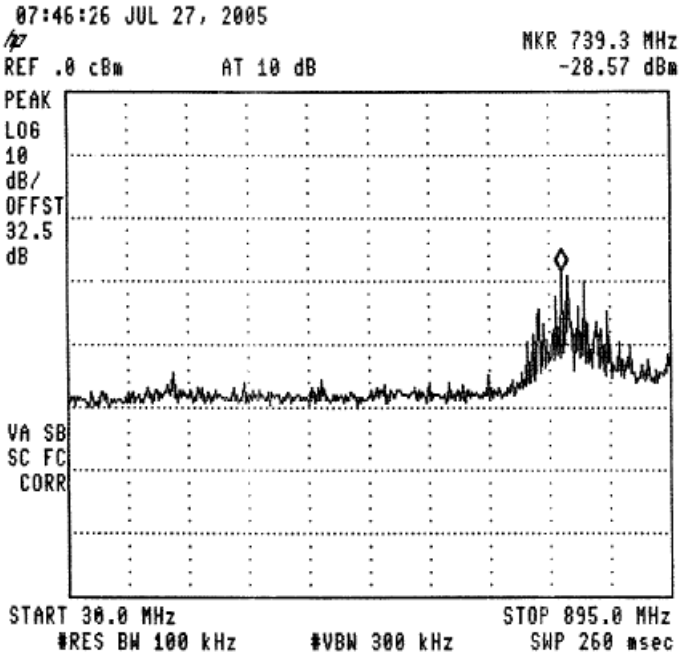


Figure 34.— 914.81 MHz

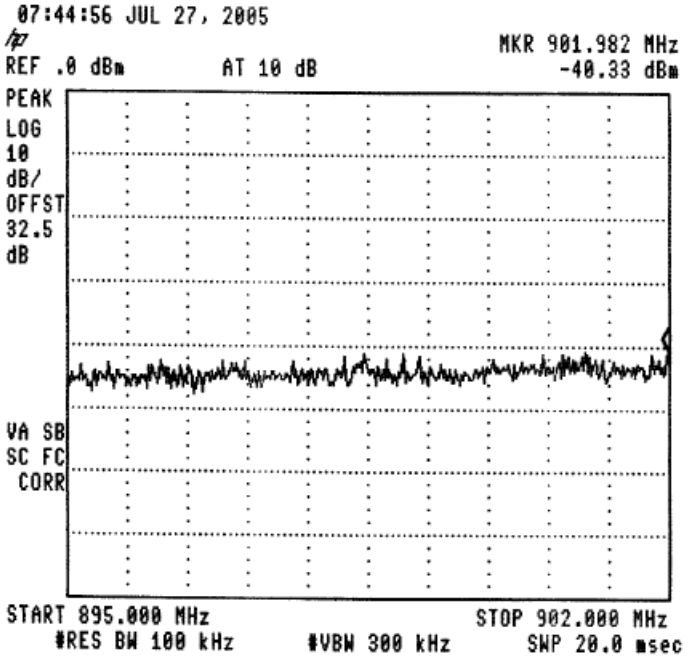


Figure 35.— 914.81 MHz

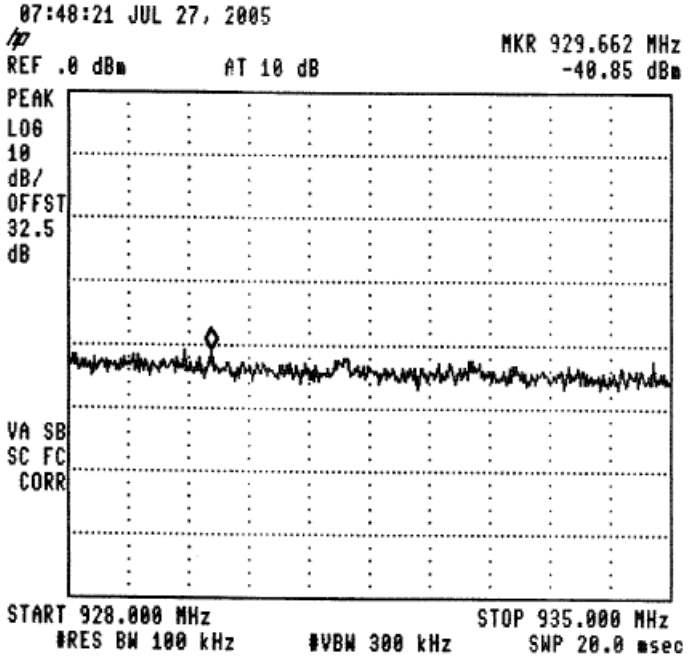


Figure 36.— 914.81 MHz

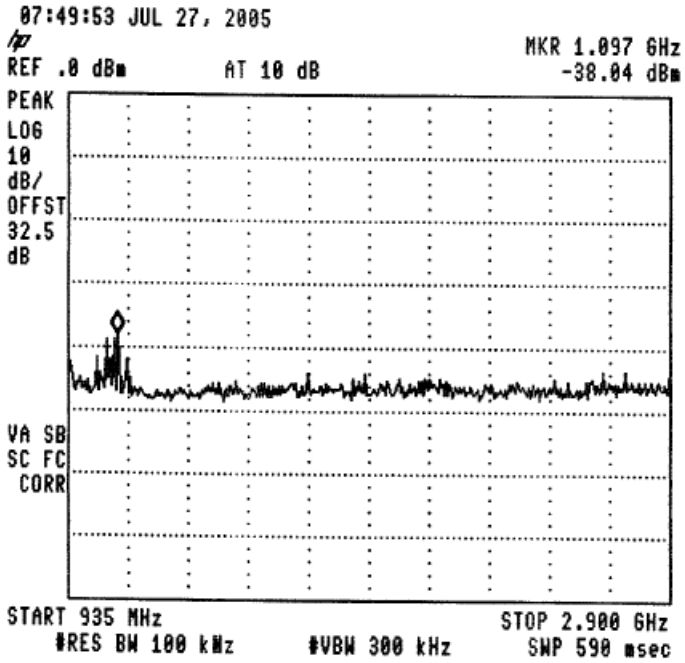


Figure 37.— 914.81 MHz

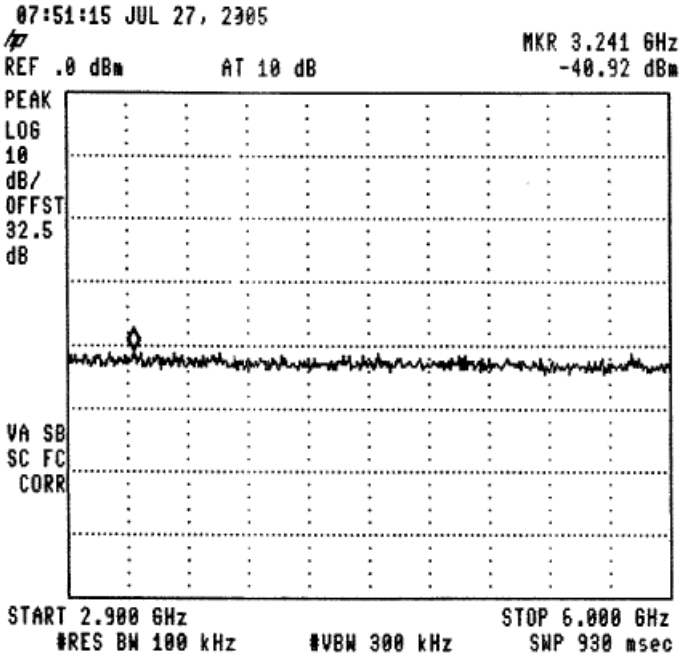


Figure 38.— 914.81 MHz

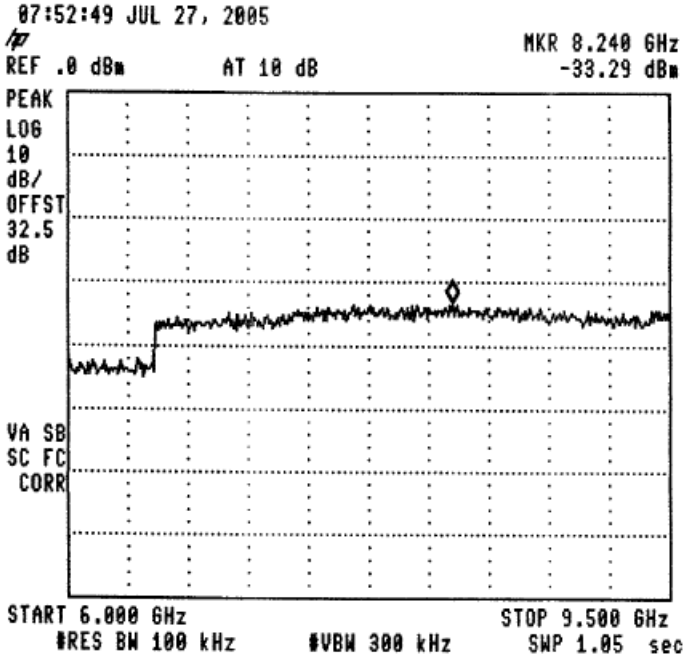


Figure 39.— 914.81 MHz

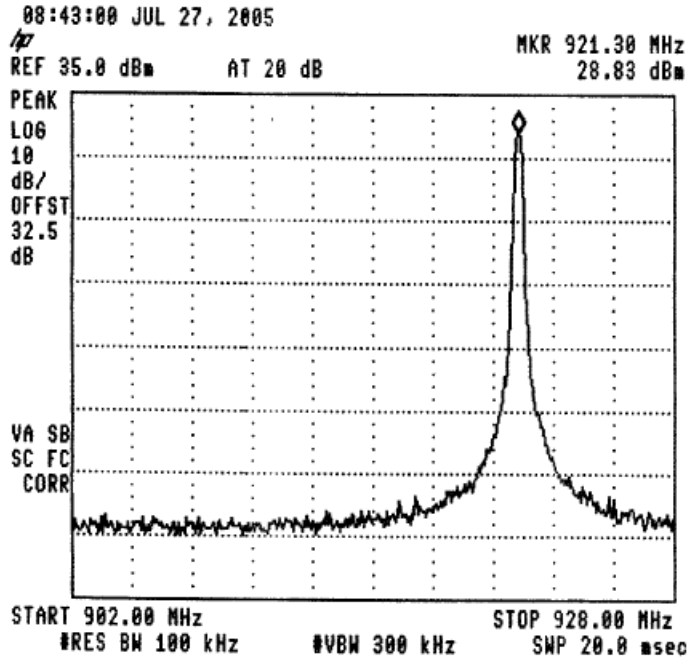


Figure 40.— 921.21 MHz

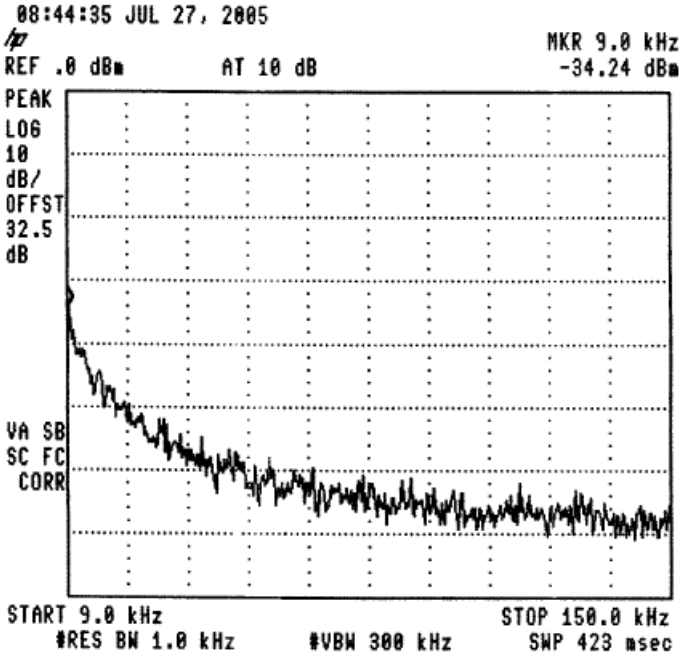


Figure 41.— 921.21 MHz

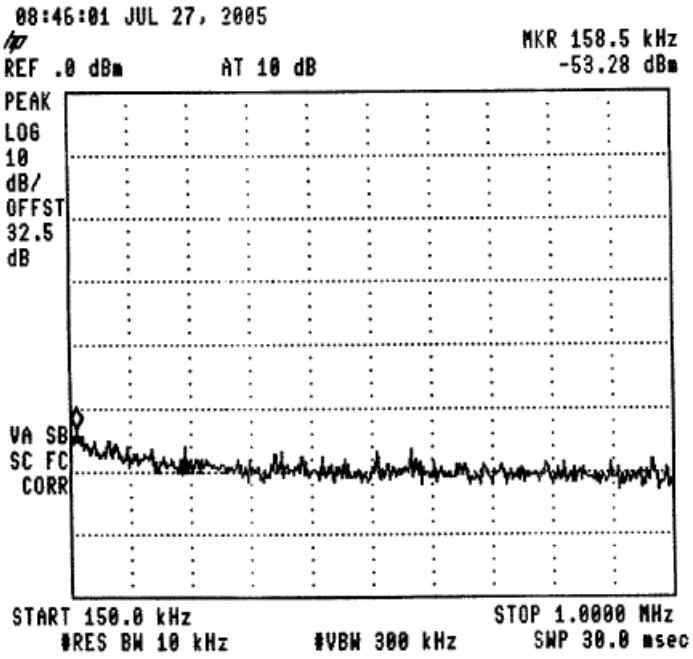


Figure 42.— 921.21 MHz

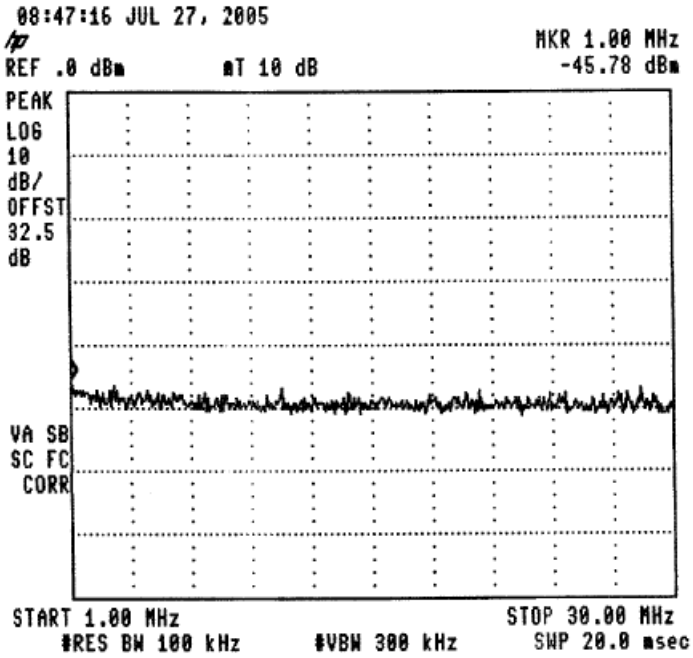


Figure 43.— 921.21 MHz

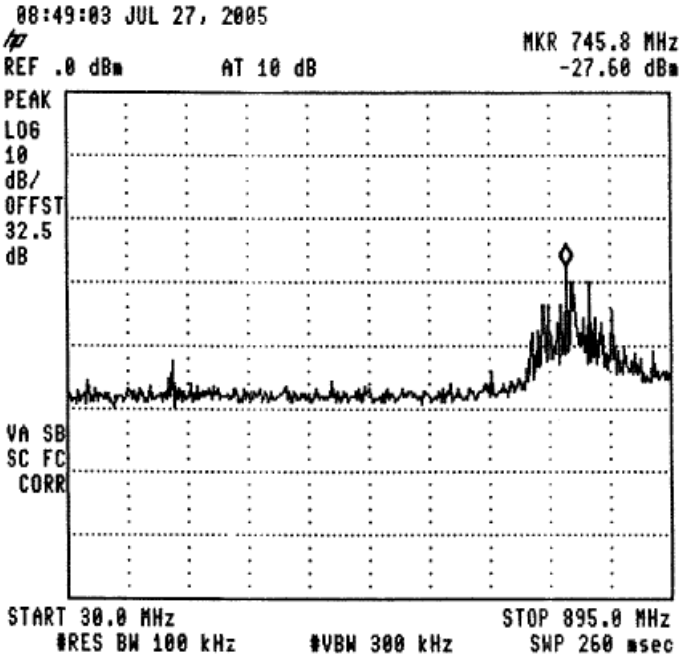


Figure 44.— 921.21 MHz

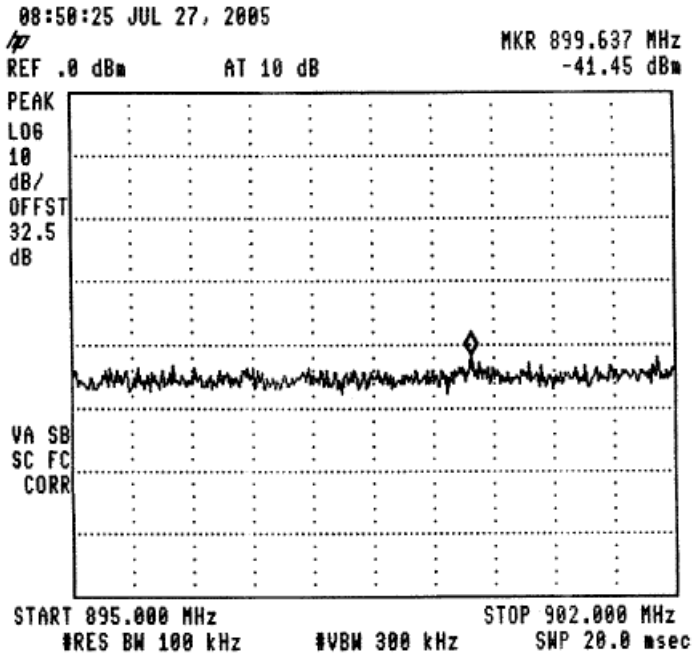


Figure 45.— 921.21 MHz

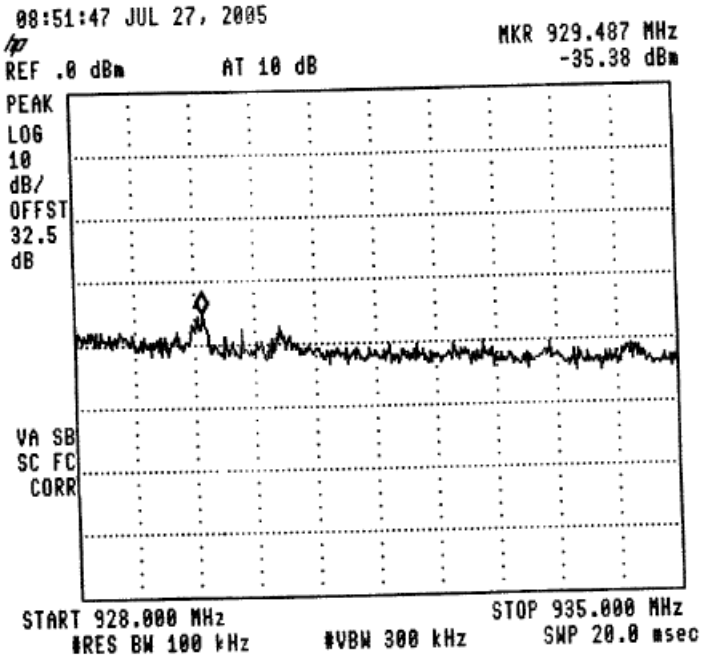


Figure 46.— 921.21 MHz

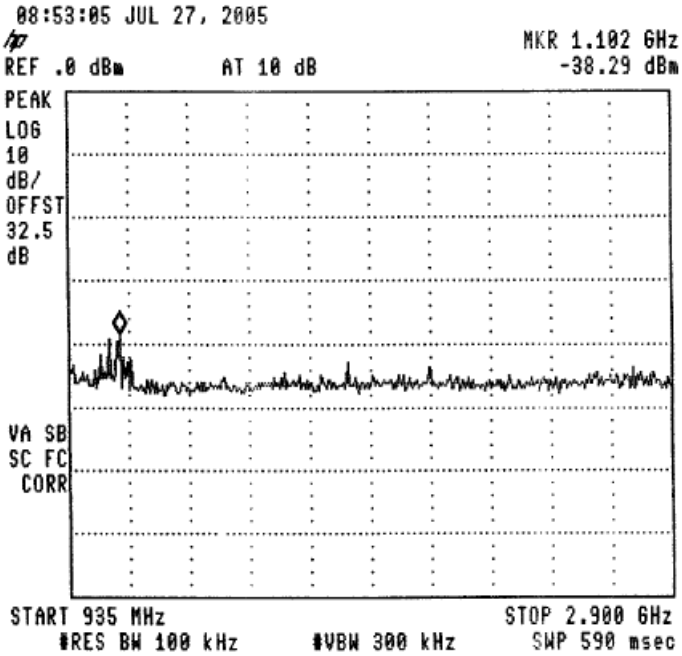


Figure 47.— 921.21 MHz

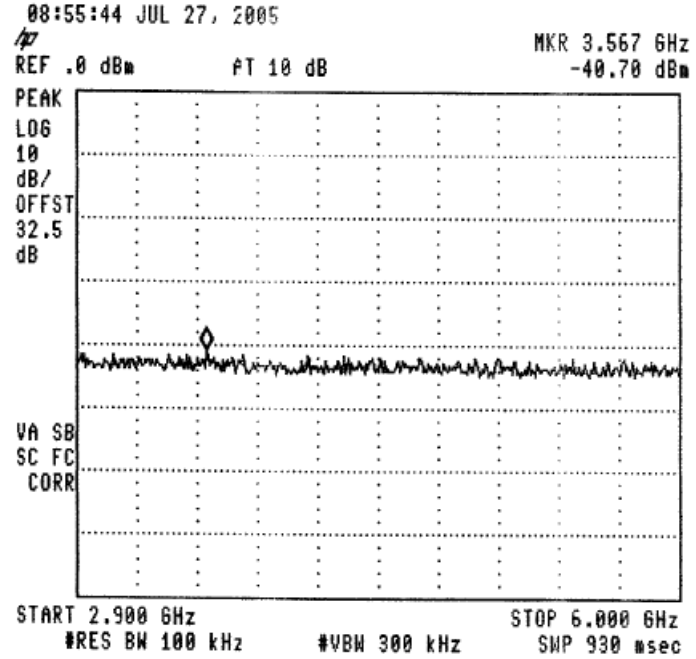


Figure 48.— 921.21 MHz

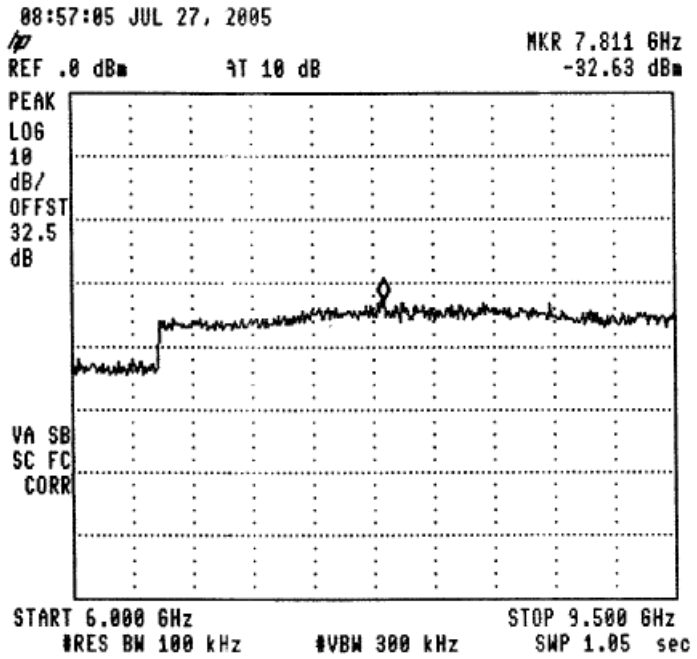


Figure 49.— 921.21 MHz

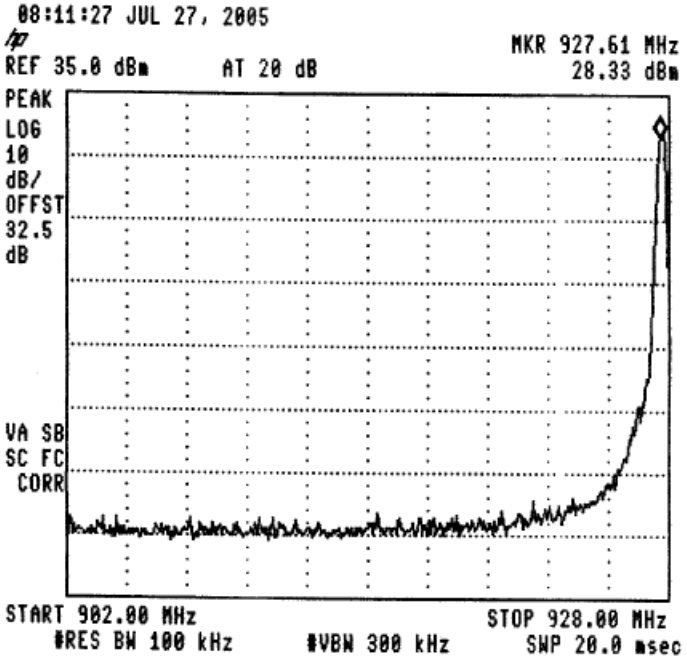


Figure 50.— 927.61 MHz

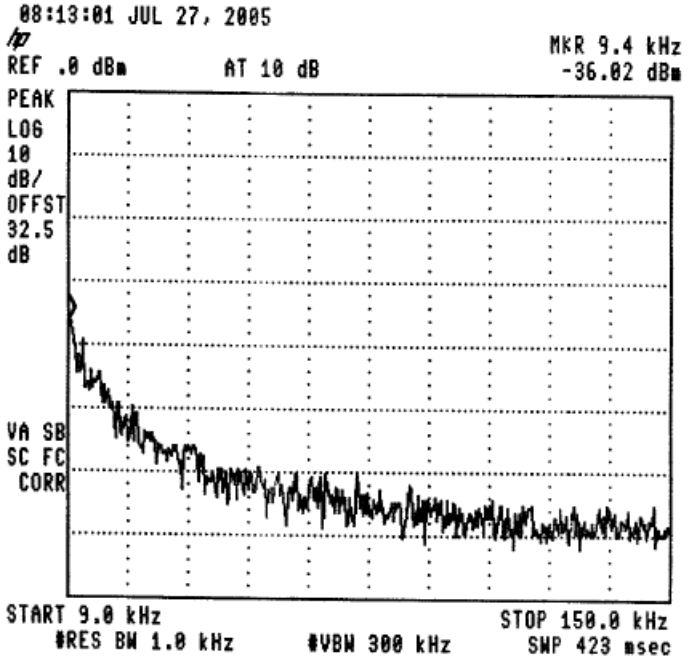


Figure 51.— 927.61 MHz

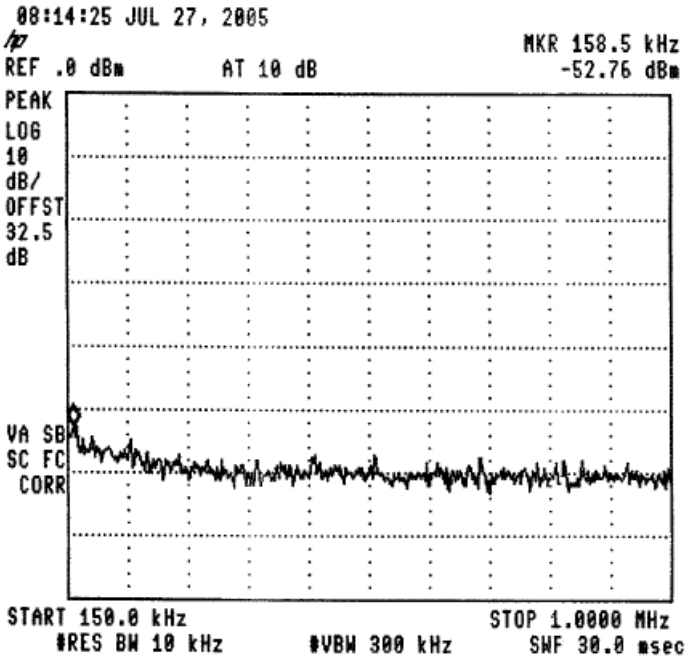


Figure 52.— 927.61 MHz

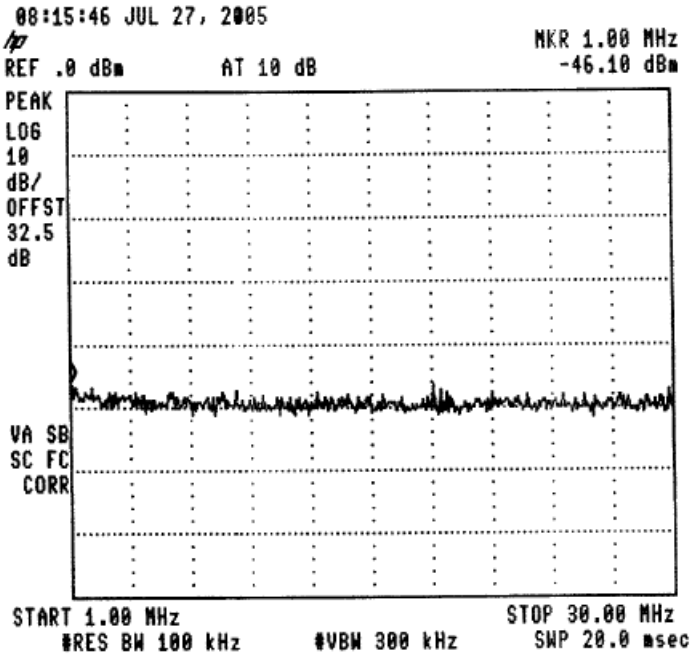


Figure 53.— 927.61 MHz

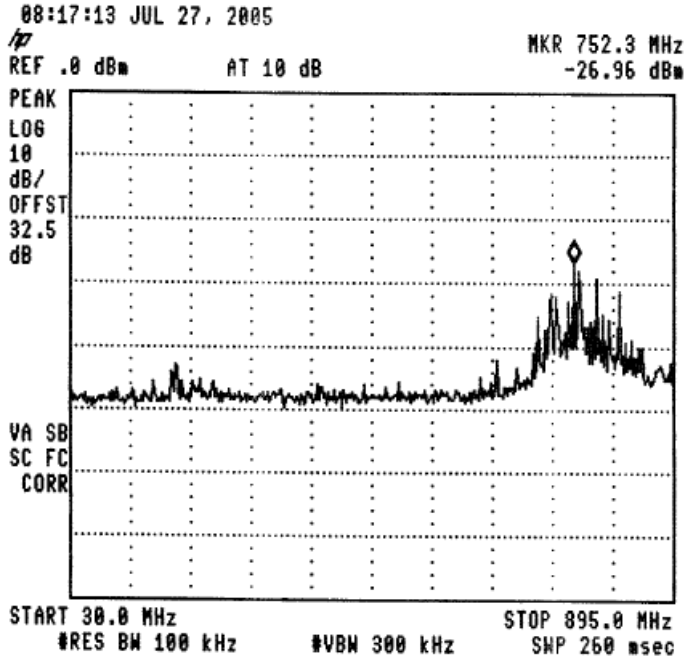


Figure 54.— 927.61 MHz

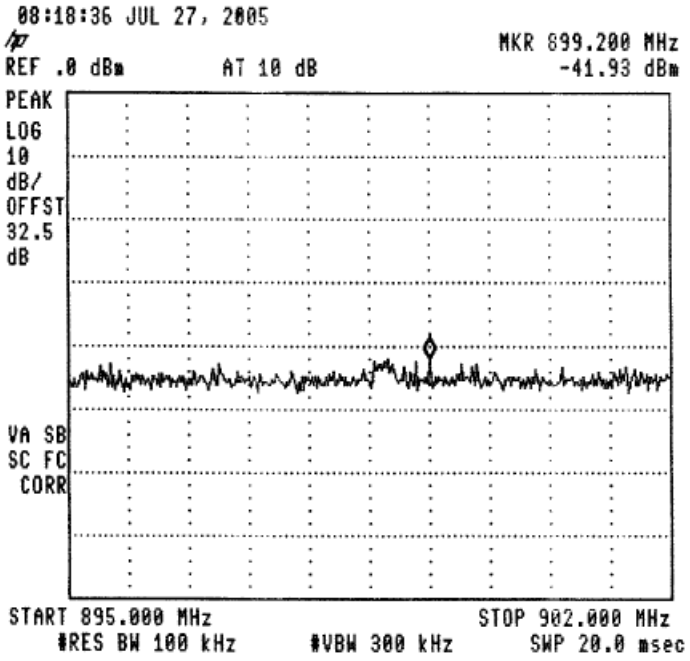


Figure 55.— 927.61 MHz

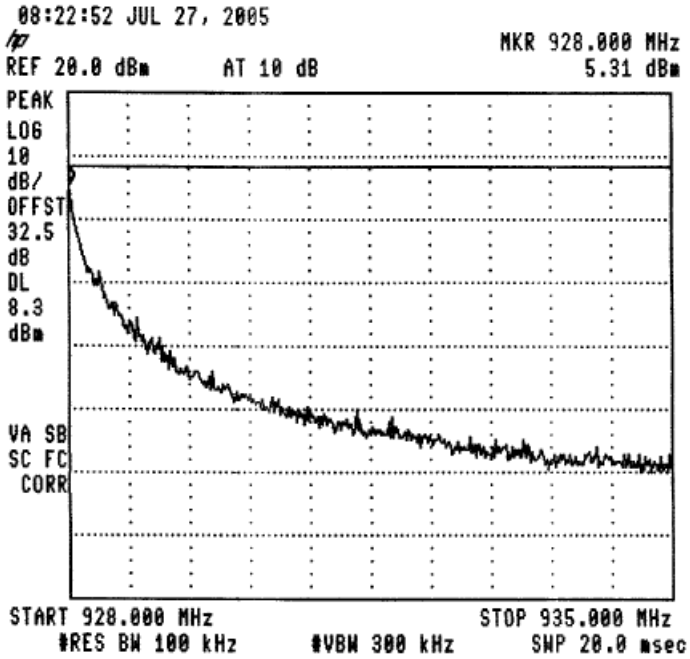


Figure 56.— 927.61 MHz

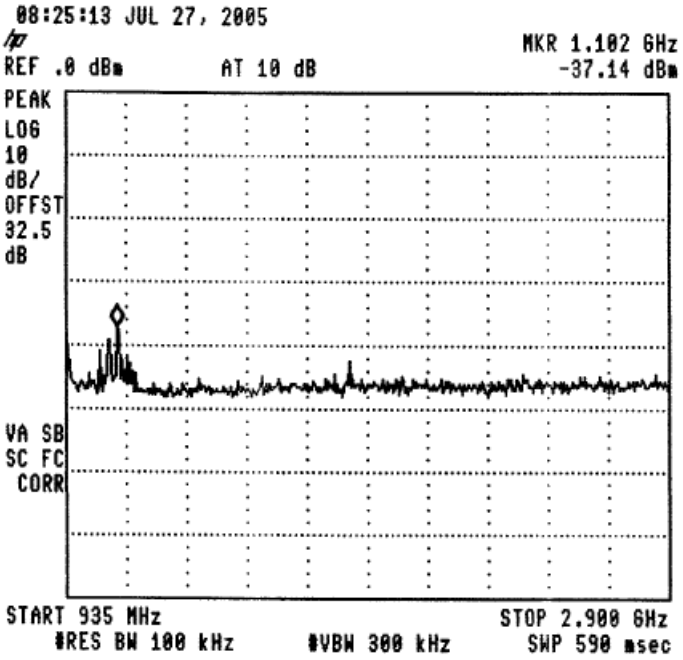


Figure 57.— 927.61 MHz

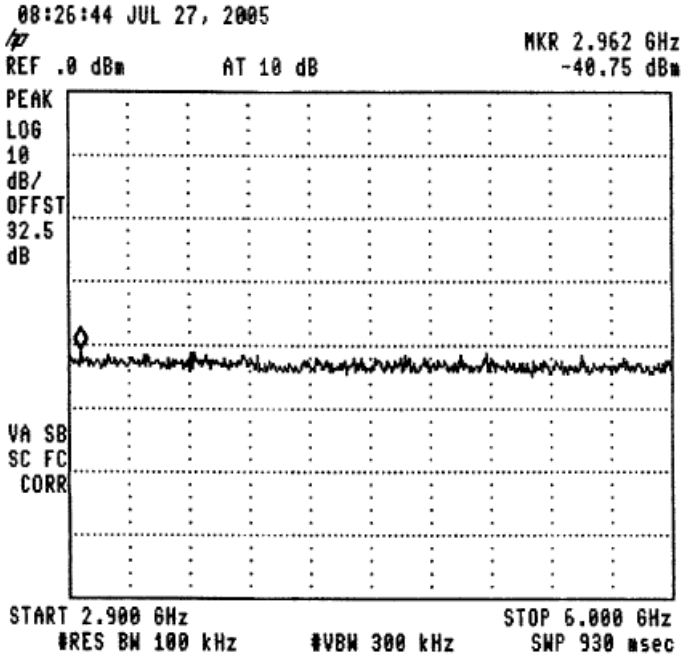


Figure 58.— 927.61 MHz

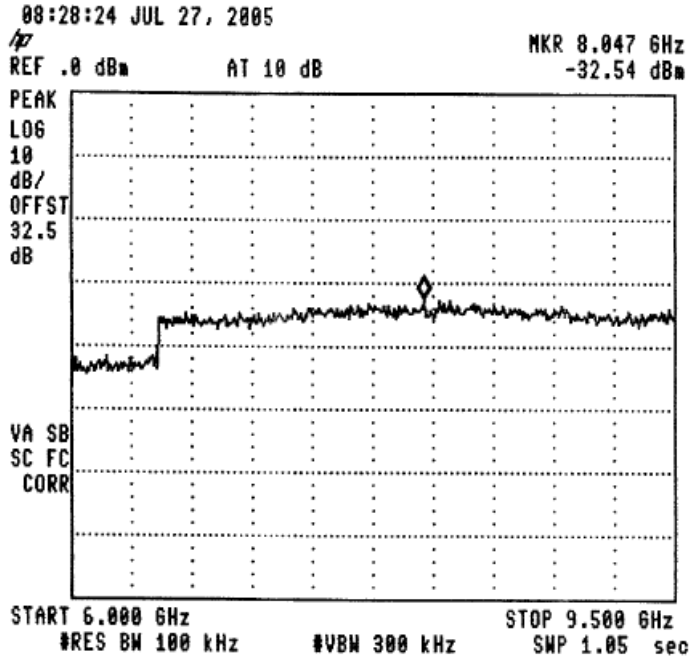


Figure 59.— 927.61 MHz

12.2 Results table

E.U.T. Description: Wireless Transmitter/Transceiver STR 2000

Model No.: STR-200-056-1

Serial Number: 1

Specification: FCC Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBc)	Specification (dBc)	Margin (dB)
914.81	57.8	20.0	-37.8
921.21	56.4	20.0	-36.4
927.61	23.2	20.0	-3.2

Figure 60 Peak Power Output of 902-928 MHz Band

JUDGEMENT: Passed by 3.2 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 20.11.05

Typed/Printed Name: E. Pitt

12.3 Test Equipment Used.

Peak Power Output Out of 902-928 MHz Band

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 01, 2005	1 year
Cable	Avnet	MTS	N/A	February 18, 2005	1 year
Attenuator	MACOM	M3933/25-74	0056	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0202	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0211	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0050	November 9, 2004	1 year

Figure 61 Test Equipment Used

13. 20 dB Bandwidth

13.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through a 32dB external attenuator (4 X 8dB) and an appropriate coaxial cable (CL 0.5 dB). The spectrum analyzer was set to 3 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 20 dB below maximum peak power was measured and recorded.

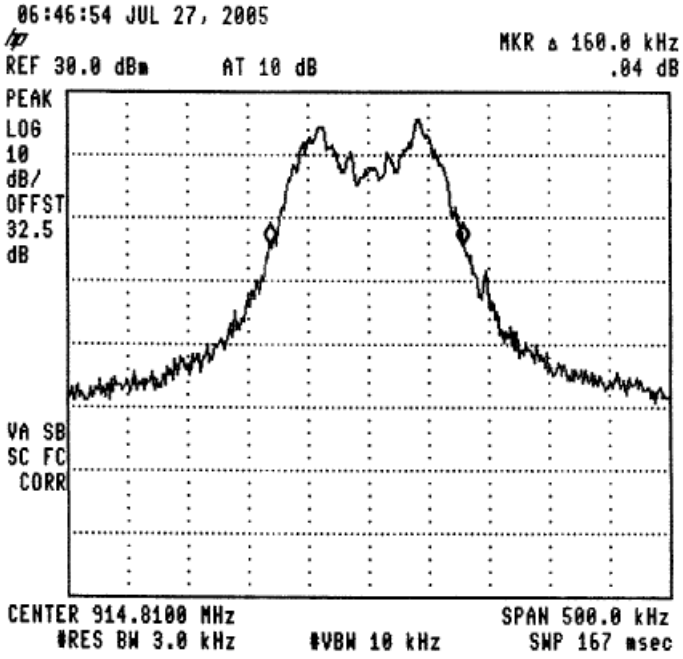


Figure 62 — 914.81 MHz

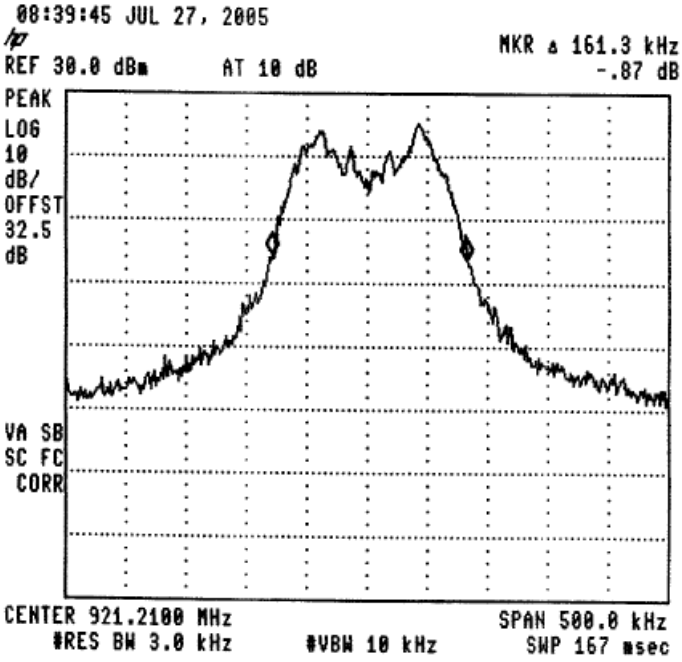


Figure 63 — 921.21 MHz

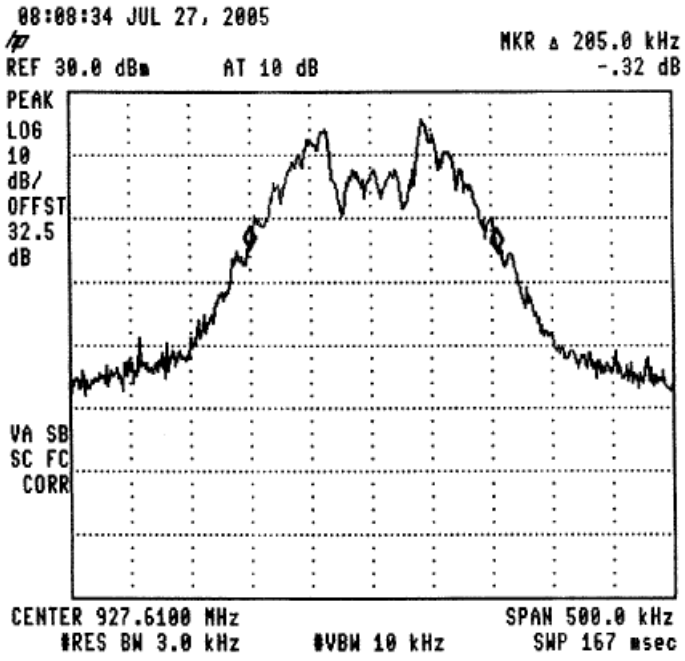


Figure 64 — 927.61 MHz

13.2 Results table

E.U.T. Description: Wireless Transmitter/Transceiver STR 2000
Model No.: STR-200-056-1
Serial Number: 1
Specification: FCC Part 15, Subpart C (15.247-a2)

Operation Frequency (MHz)	Reading (kHz)	Specification (kHz)	Margin (kHz)
914.81	160.0	500	340.0
921.21	161.3	500	338.7
927.61	205.0	500	295.0

Figure 65 20 dB Bandwidth

JUDGEMENT: Passed by 295.0 kHz

TEST PERSONNEL:
Tester Signature: _____ Date: 20.11.05
Typed/Printed Name: E. Pitt

13.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 01, 2005	1 year
Cable	Avnet	MTS	N/A	February 18, 2005	1 year
Attenuator	MACOM	M3933/25-74	0056	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0202	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0211	November 9, 2004	1 year
Attenuator	MACOM	M3933/25-74	0050	November 9, 2004	1 year

Figure 66 Test Equipment Used

14. Antenna Gain

The gain of the antenna is +2 dBi.

15. Conducted Emission Test Data, Receiver

15.1 Test Specification

FCC, Part 15, Subpart B: Class **B**

15.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room (see section 3), with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector

The E.U.T. was operated in the frequency of 916.5 MHz.

15.3 Test Data

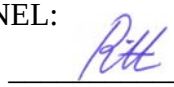
JUDGEMENT: Passed by 11.0 dB

The margin between the emission levels and the specification limit is, in the worst case, 11.0 dB for the phase line at 22.01 MHz and 11.3 dB at 0.50 MHz for the neutral line.

The EUT met the FCC Part 15, Subpart B, Class B specification requirements.

The details of the highest emissions are given in Figure 67 to Figure 72.

TEST PERSONNEL:

Tester Signature:  Date: 20.11.05

Typed/Printed Name: E. Pitt

Conducted Emission

E.U.T Description Wireless Transmitter/Transceiver STR 2000
Type STR-200-056-1
Serial Number: 1

Specification: FCC Part 15, Subpart B: Class **B**
Lead: Phase
Detectors: Peak, Quasi-peak, Average

Frequency (MHz)	Peak Amplitude (dBμV)	Quasi-peak Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.20	42.2	41.4	63.6	Pass	-22.2
0.30	36.7	35.7	60.2	Pass	-24.5
0.50	34.5	34.2	56.0	Pass	-21.8
11.01	29.7	28.2	60.0	Pass	-31.8
22.01	43.3	37.9	60.0	Pass	-22.1
27.51	35.6	33.6	60.0	Pass	-26.4

Figure 67. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dBμV)	Average Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.20	42.2	31.2	53.6	Pass	-22.4
0.30	36.7	28.5	50.3	Pass	-21.8
0.50	34.5	33.6	46.0	Pass	-12.4
11.01	29.7	27.5	50.0	Pass	-22.5
22.01	43.3	39.0	50.0	Pass	-11.0
27.51	35.6	32.5	50.0	Pass	-17.5

Figure 68. Detectors: Peak, AVERAGE .

Conducted Emission

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification:	FCC Part 15, Subpart B: Class **B**
Lead:	Phase
Detectors:	Peak, Quasi-peak, Average

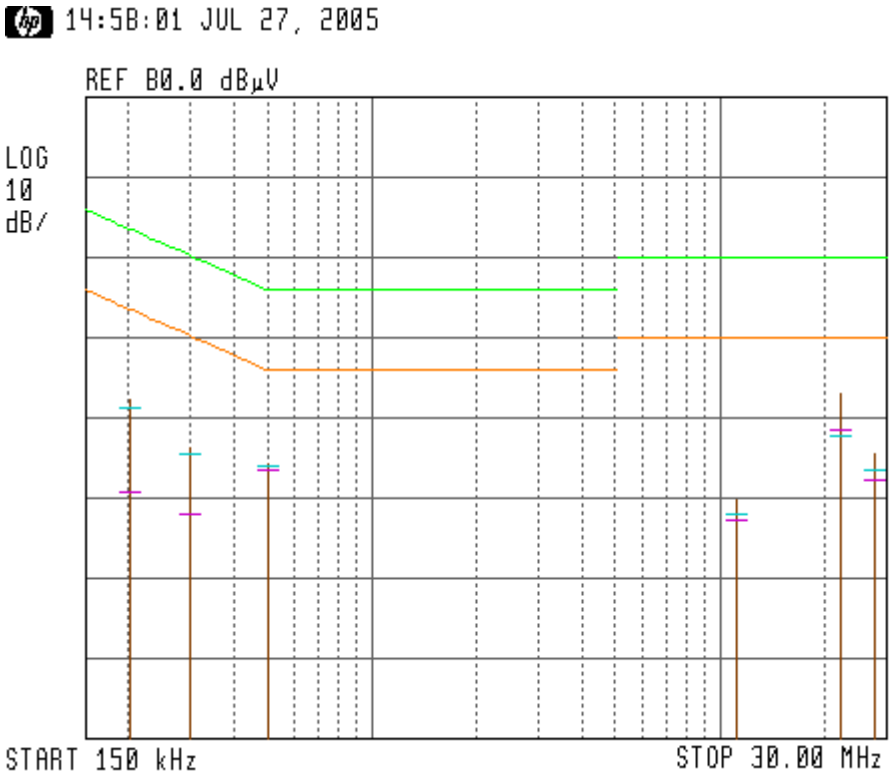


Figure 69. Detectors: Peak, Quasi-peak, Average

Notes:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

5. Average detection is designated by the second dash mark (from the top) of each vertical line.

Conducted Emission

E.U.T Description Wireless Transmitter/Transceiver STR 2000
Type STR-200-056-1
Serial Number: 1

Specification: FCC Part 15, Subpart B: Class **B**
Lead: Neutral
Detectors: Peak, Quasi-peak

Frequency (MHz)	Peak Amplitude (dB µV)	Quasi-peak Amplitude (dB µV)	Specification (dB µV)	Pass/Fail	Margin (dB)
0.20	35.2	34.5	63.7	Pass	-29.2
0.30	38.7	38.0	60.3	Pass	-22.3
0.50	37.7	36.3	56.0	Pass	-19.7
11.01	25.7	24.9	60.0	Pass	-35.1
22.01	45.8	40.0	60.0	Pass	-20.0
27.51	40.7	36.7	60.0	Pass	-23.3

Figure 70. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dBµV)	Average Amplitude (dBµV)	Specification (dB µV)	Pass/Fail	Margin (dB)
0.20	35.2	26.7	53.7	Pass	-27.0
0.30	38.7	30.6	50.3	Pass	-19.7
0.50	37.7	34.7	46.0	Pass	-11.3
11.01	25.7	24.8	50.0	Pass	-25.2
22.01	45.8	36.0	50.0	Pass	-14.0
27.51	40.7	37.8	50.0	Pass	-12.2

Figure 71. Detectors: Peak, AVERAGE

Conducted Emission

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification:	FCC Part 15, Subpart B: Class **B**
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average

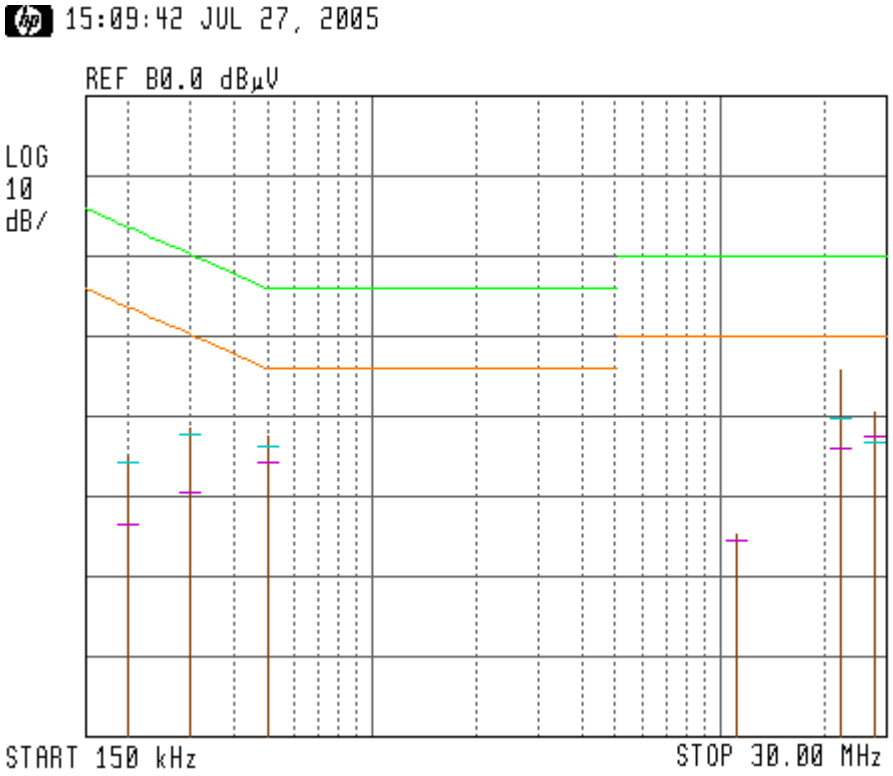


Figure 72. Detectors: Peak, Quasi-peak, Average

Notes:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

5. Average detection is designated by the second dash mark (from the top) of each vertical line.

15.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
LISN	Fischer	FCC-LISN-2A	127	March 20, 2005	1 year
LISN	Fischer	FCC-LISN-2A	128	March 20, 2005	1 year
Receiver	HP	85420E/85422E	3427A00103/34	February 26, 2005	1 year
Printer	HP	ThinkJet2225	2738508357	N/A	N/A

16. Radiated Emission Test Data, Receiver

16.1 Test Specification

30 MHz-5000 MHz, FCC, Part 15, Subpart B

16.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground.

The highest frequency of the local oscillator is 916.5 MHz

The frequency range 30-5000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

Turning the E.U.T on and off.

Using a frequency span less than 10 MHz.

Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The emissions were measured at a distance of 3 meters.

The measurements were performed at the minimum operating frequency of 903.5 MHz and the maximum operating frequency of 916.5 MHz.

16.3 Test Data

JUDGEMENT: Passed by 10.0 dB

The E.U.T met the requirements of the FCC Part 15, Subpart B ,Class B specification.

The results for both the minimum and maximum operating frequencies were the same.

The margin between the emission level and the specification limit is 10.0 dB in the worst case at the frequency of 33.02 MHz, vertical polarization.

The signals in the band 1 – 5 GHz were below the spectrum analyzer noise level which is at least 6dB below the specification limit.

The details of the highest emissions are given in Figure 73 to Figure 76.

TEST PERSONNEL:

Tester Signature: _____ Date: 20.11.05

Typed/Printed Name: E. Pitt

Radiated Emission

E.U.T Description Wireless Transmitter/Transceiver STR 2000
Type STR-200-056-1
Serial Number: 1

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance
Frequency range: 30 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

Frequency (MHz)	Peak Amp (dBµV/m)	QP Amp (dBµV/m)	Correction (dB)	Specification (dBµV/m)	Margin (dB)
253.12	39.1	35.9	20.5	46.0	-10.1
288.00	39.5	35.0	22.1	46.0	-11.0
304.00	40.6	35.5	23.0	46.0	-10.5
308.14	33.5	29.9	15.9	46.0	-16.1
352.17	35.7	30.4	17.4	46.0	-15.6
550.26	39.2	35.2	22.2	46.0	-10.8

Figure 73. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

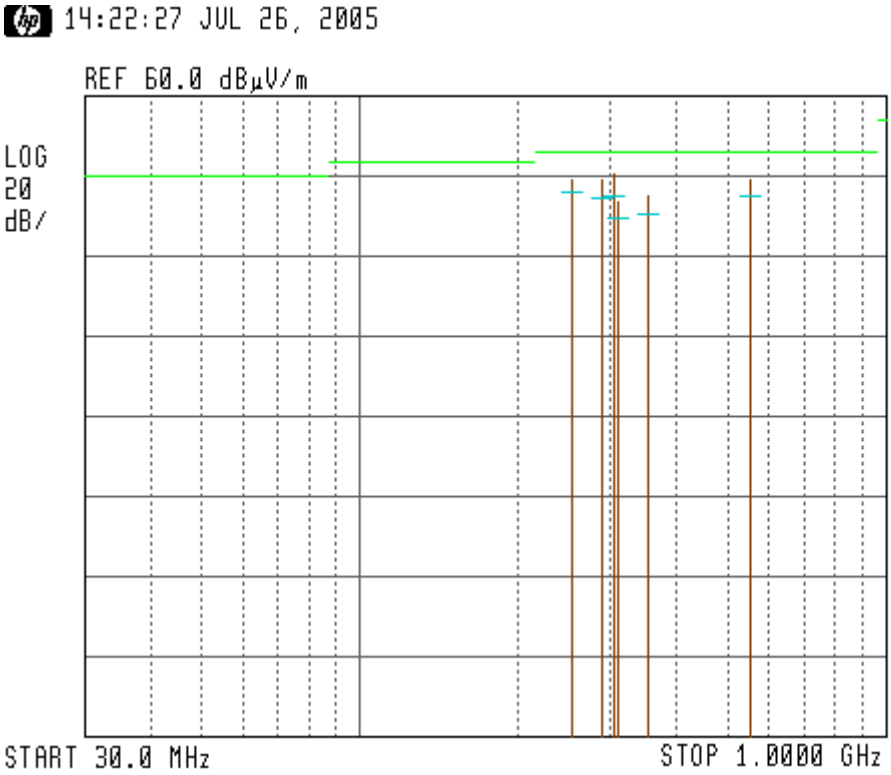


Figure 74. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description Wireless Transmitter/Transceiver STR 2000
Type STR-200-056-1
Serial Number: 1

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance
Frequency range: 30 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

Frequency (MHz)	Peak Amp (dBµV/m)	QP Amp (dBµV/m)	Correction (dB)	Specification (dBµV/m)	Margin (dB)
33.02	34.5	30.0	14.8	40.0	-10.0
44.02	31.4	26.6	12.2	40.0	-13.4
253.12	36.8	33.2	20.5	46.0	-12.8
264.12	38.7	34.9	21.1	46.0	-11.1
288.00	39.6	34.9	22.1	46.0	-11.1
480.00	39.2	34.9	20.1	46.0	-11.1

Figure 75. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	Wireless Transmitter/Transceiver STR 2000
Type	STR-200-056-1
Serial Number:	1

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

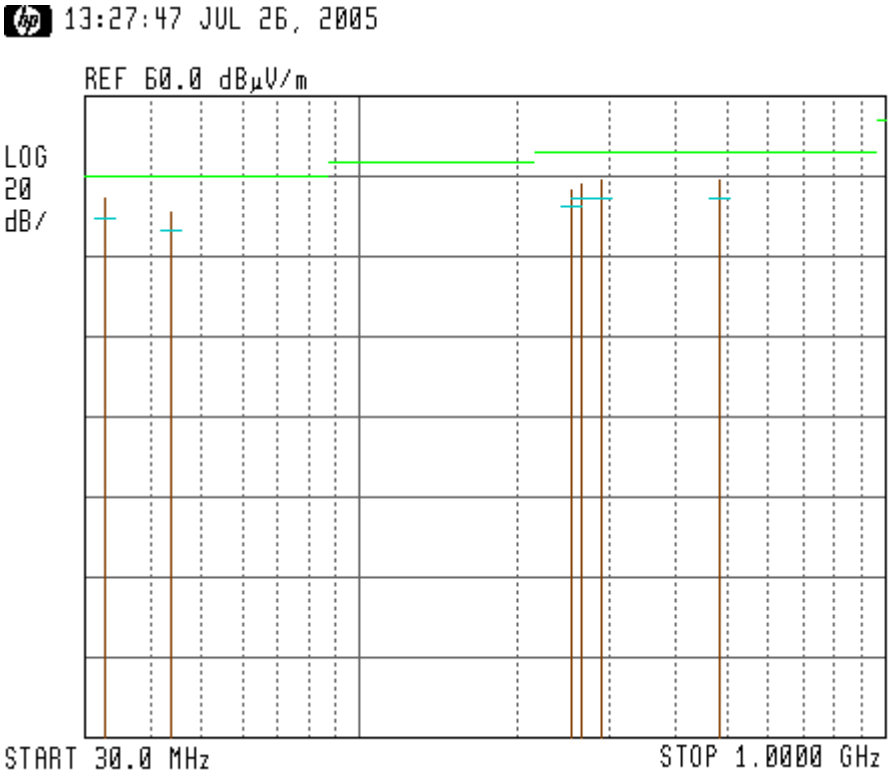


Figure 76. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

16.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85420E/85422E	3427A00103/34	February 26, 2005	1 year
Antenna - Biconical HP	ARA	BCD-235/B	1041	April 11, 2004	1 year
Antenna - Log Periodic	ARA	LPD-2010/A	1038	March 21, 2004	1 year
Antenna - Log Periodic	A.H. Systems	SAS-200/511	253	January 24,2005	2 year
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357.0	N/A	N/A

16.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

17. R.F Exposure/Safety

The E.U.T. is a wall mounted, fixed installation. The typical distance between the E.U.T. and the general population in normal use is at least 0.5m.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(a) Considering the worst case FCC limit at the operating frequency of 915.00 MHz the FCC limit is:

$$S = \frac{915}{1500} = 0.61 \frac{mW}{cm^2}$$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is given by:

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power: 29.4 dBm = 871 mW (max. measured power)

G_T- Antenna Gain: +2dBi = 1.6

R- Distance from Transmitter using 20cm worst case

(c) The peak power density is :

$$S_p = \frac{871x1.6}{4\pi(20)^2} = 0.28 \frac{mW}{cm^2}$$

(d) The duty cycle of transmission in actual worst case is 6.64msec “on” and this cycle may be repeated sixty times in each minute (See Note below).

The average power over 30 minutes is:

$$P_{AV} = \frac{871 \times 6.64 \times 60 \times 30}{30 \times 60 \times 1000} = 5.78mW$$

(e) The averaged power density of the E.U.T. is:

$$S_{AV} = \frac{5.78 \times 1.6}{4\pi(20)^2} = 1.9X10^{-5} \frac{mW}{cm^2}$$

(f) This is more than 4 orders of magnitude below the FCC limit.

Note: The device transmits the same time message in 51 different frequencies. It stays 10 milliseconds in every channel before it hops to the next channel but it transmits only 6.64 milliseconds during this time. After 51 different frequencies it transmits another 9 messages starting at the first frequency.

In worst case the device transmits the time message every 1 minute. The total transmission time per minute is 398 milliseconds.

18. Test Set-up Photos

Figure 77. Emissions on Antenna Ports Test Setup

Figure 78. Conducted Emissions on AC Lines Test Setup

Figure 79. Out of Band Emission (Radiated) and Radiated Emission Part 15 Test Setup

19. Photographs of Tested E.U.T.

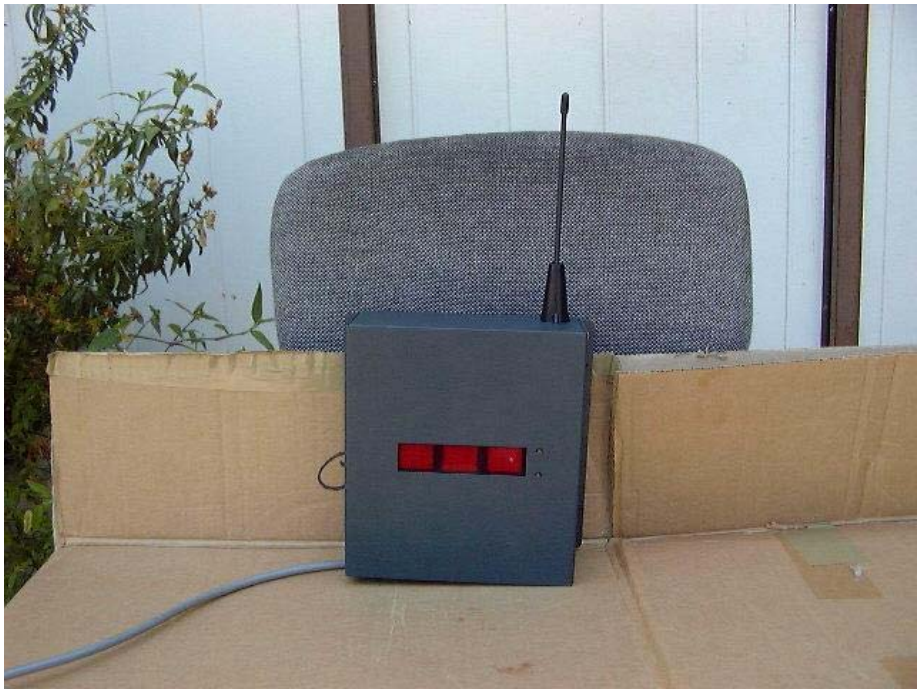


Figure 80 Front View

Figure 81 Rear View

Figure 82 Top View/Antenna

Figure 83 Bottom View

Figure 84 Internal View

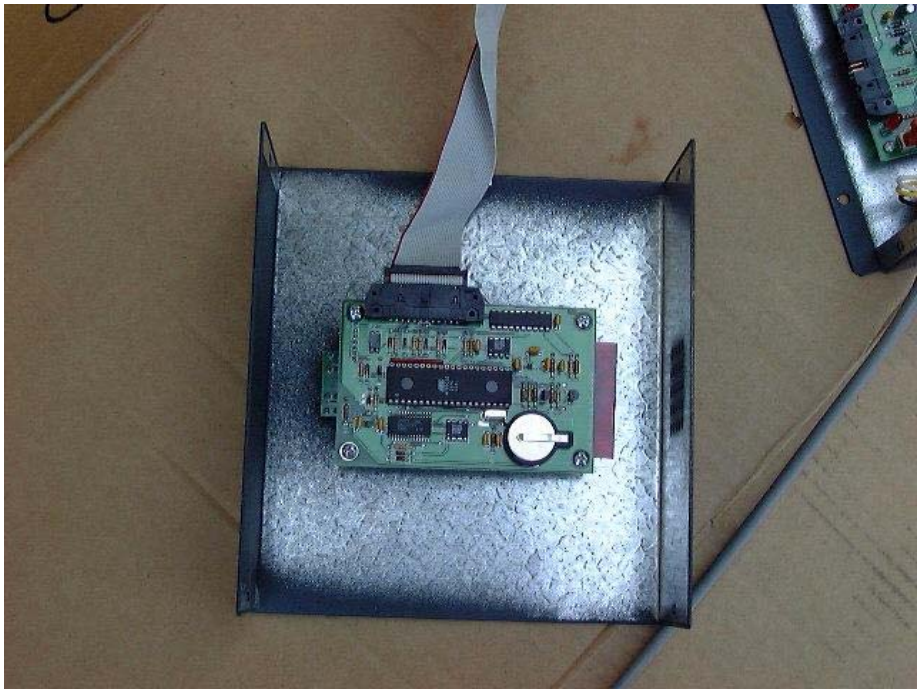


Figure 85 Clock and Display in Cover

Figure 86 Digital Display in Cover

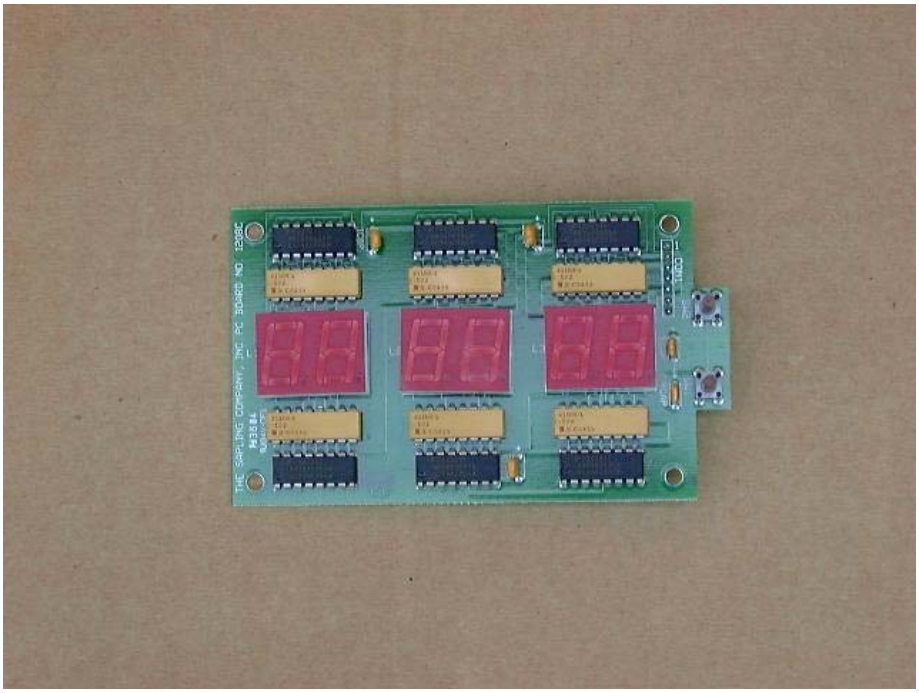


Figure 87 Digital Display Side 1

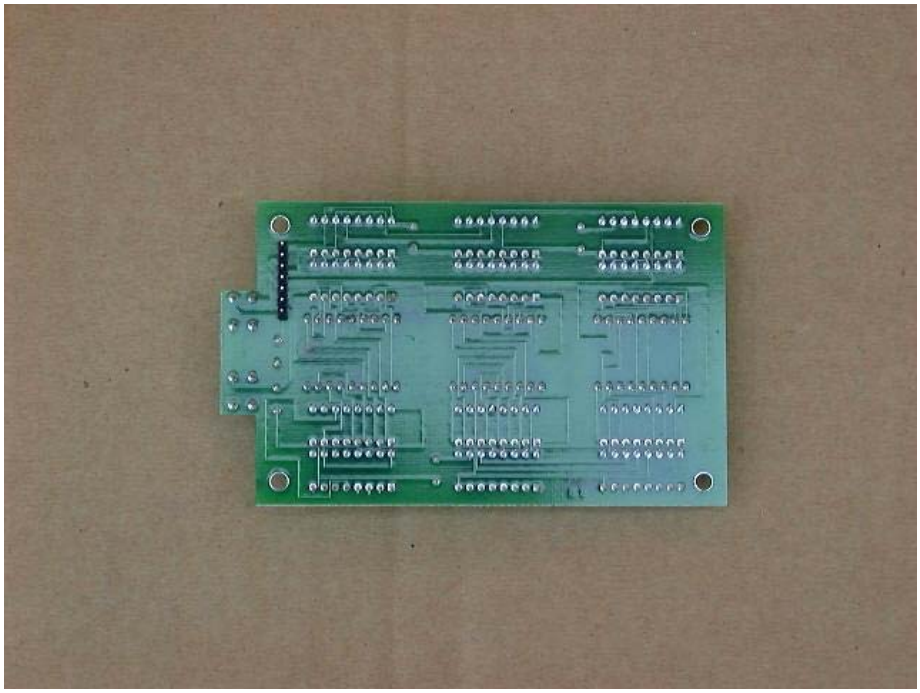


Figure 88 Digital Display Side 2

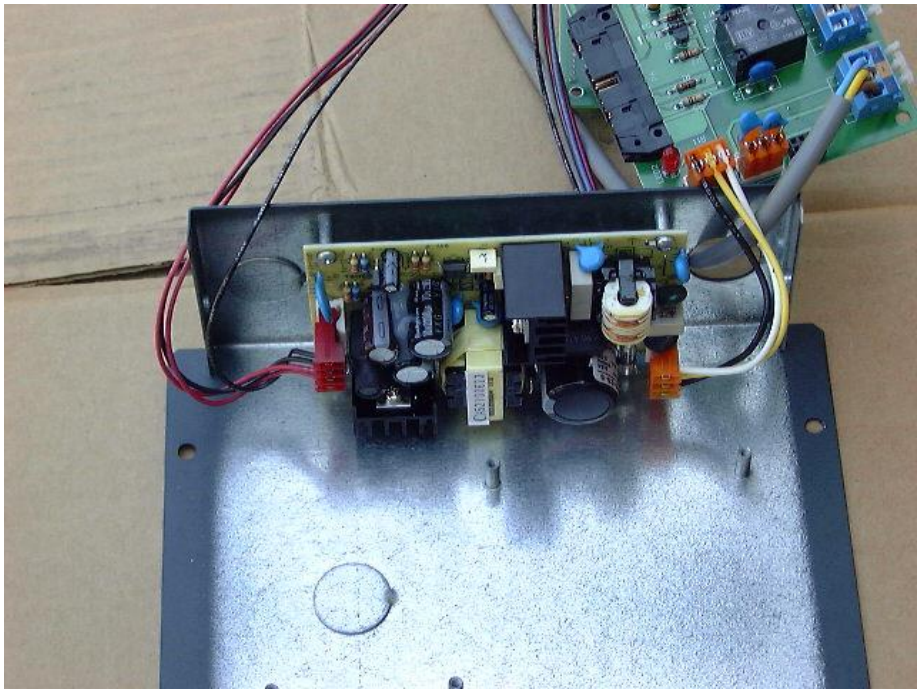


Figure 89 AC Power Supply Side

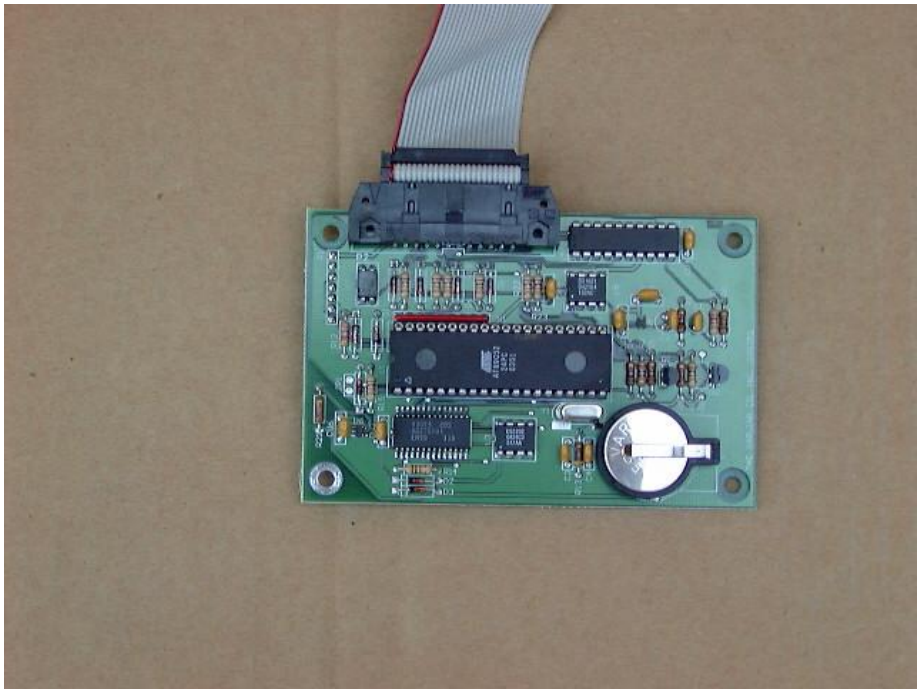


Figure 90 Clock Side 1

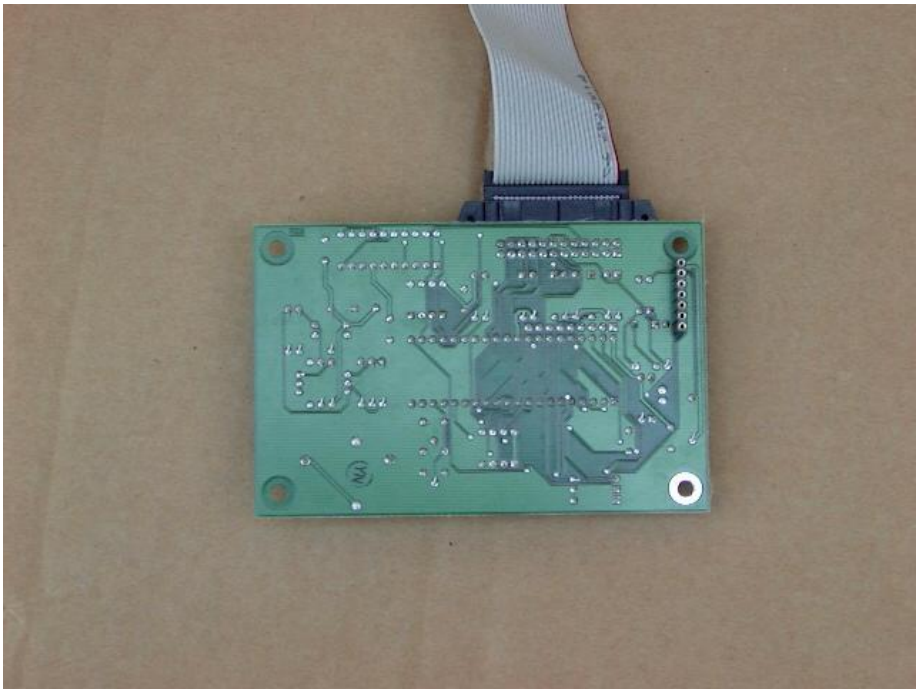


Figure 91 Clock Side 2

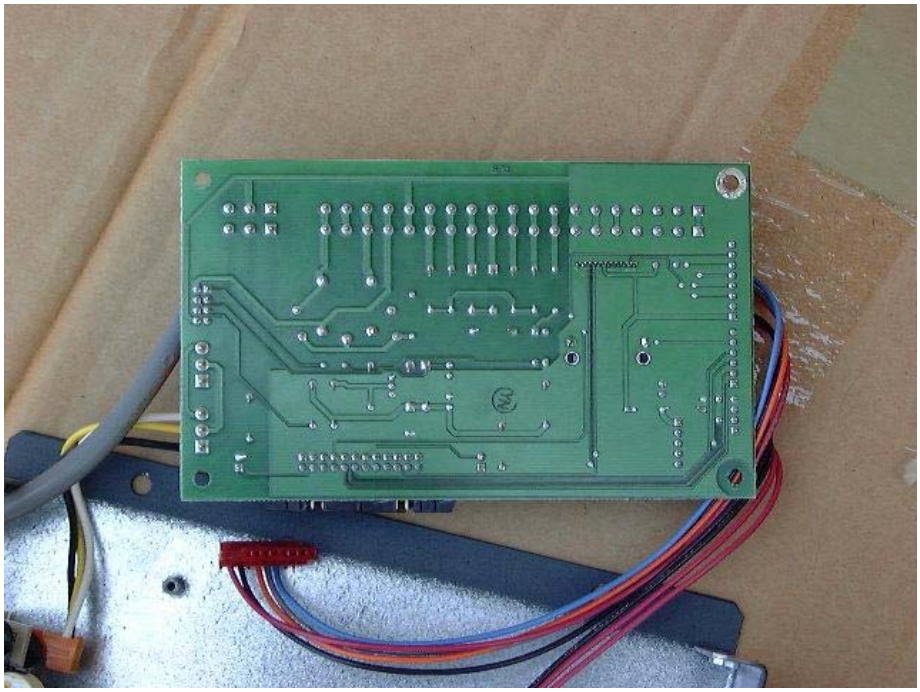


Figure 92 Communication Converter Card Side 1

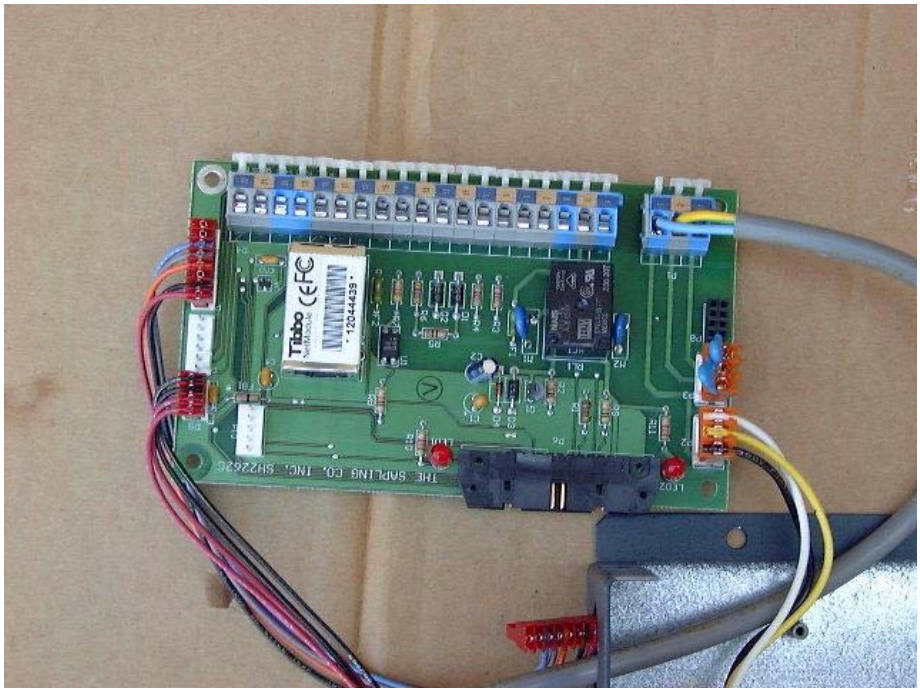


Figure 93 Communication Converter Card Side 2

Figure 94 Transmitter Side 1

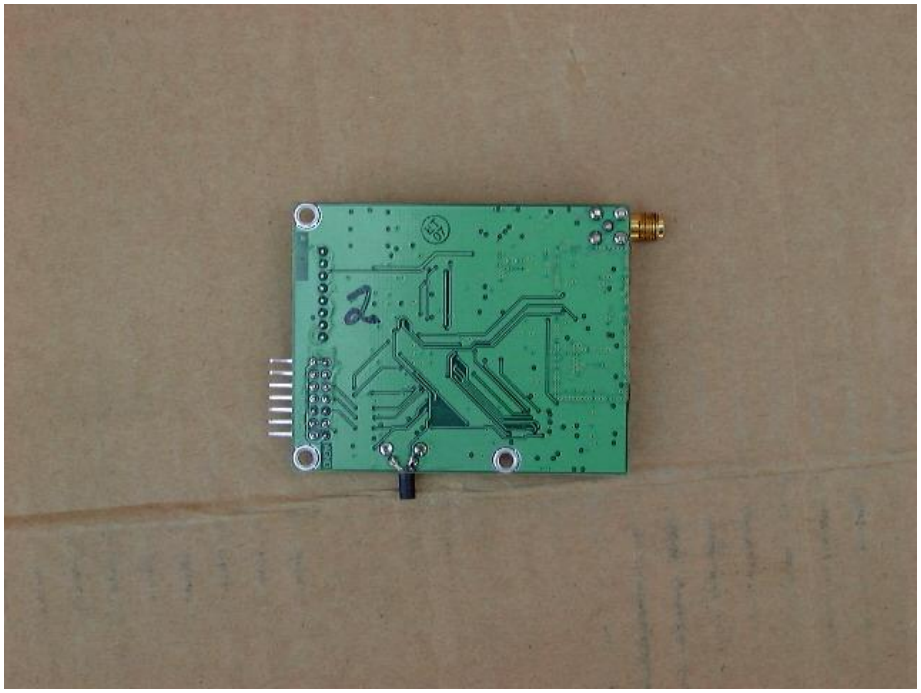


Figure 95 Transmitter Side 2

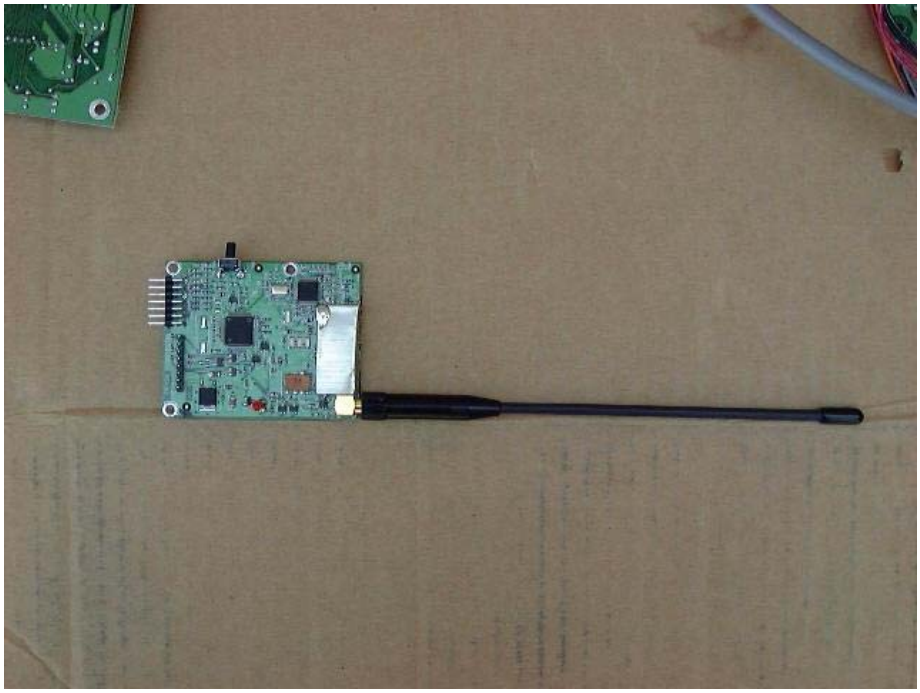


Figure 96 Transmitter and Antenna

20. APPENDIX A - CORRECTION FACTORS

20.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.5
20.0	0.7
30.0	1.0
40.0	1.2
50.0	1.3
60.0	1.5
70.0	1.6
80.0	1.7
90.0	1.8
100.0	1.9
150.0	2.4
200.0	2.7
250.0	3.0
300.0	3.3
350.0	3.7
400.0	4.0
450.0	4.3
500.0	4.7
600.0	4.9
700.0	5.4
800.0	5.8
900.0	6.3
1000.0	6.7

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	7.5
1400.0	8.2
1600.0	9.0
1800.0	9.6
2000.0	10.7
2300.0	11.1
2600.0	11.8
2900.0	12.8

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 27 meters.

3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

20.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

20.3 Correction factors for CABLE

from EMI receiver to test antenna

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.1
20.0	0.1
30.0	0.2
40.0	0.2
50.0	0.2
60.0	0.2
70.0	0.3
80.0	0.3
90.0	0.3
100.0	0.3
150.0	0.4
200.0	0.4
250.0	0.4
300.0	0.5
350.0	0.6
400.0	0.6
450.0	0.6
500.0	0.7
600.0	0.8
700.0	0.8
800.0	1.0
900.0	1.1
1000.0	1.1

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	1.4
1400.0	1.5
1600.0	1.5
1800.0	1.7
2000.0	1.7
2300.0	2.0
2600.0	2.1
2900.0	2.2

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 5.5 meters.

20.4 Correction factors for CABLE

from spectrum analyzer to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

20.5 Correction factors for CABLE

from EMI receiver to test antenna at 10 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.6
20.0	1.1
30.0	1.3
40.0	1.6
50.0	1.7
60.0	1.9
70.0	2.0
80.0	2.2
90.0	2.3
100.0	2.4
150.0	3.1
200.0	3.6
250.0	4.2
300.0	4.5
350.0	4.8
400.0	5.2
450.0	5.5
500.0	6.2
600.0	6.4
700.0	7.0
800.0	7.5
900.0	8.1
1000.0	8.6

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	9.7
1400.0	10.5
1600.0	11.5
1800.0	12.6
2000.0	13.5
2300.0	14.3
2600.0	15.5
2900.0	16.4

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 34 meters.

3. The above data is located in file 34M10MO.CBL on the disk marked "Radiated Emissions Tests EMI Receiver".

20.6 Correction factors for LOG PERIODIC ANTENNA

Type LPD 2010/A
at 3 and 10 meter ranges.

Distance of 3 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	11.4
400.0	14.5
500.0	15.2
600.0	17.3
700.0	19.0
850.0	20.1
1000.0	22.2

Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.2
400.0	14.4
500.0	15.2
600.0	17.2
700.0	19.0
850.0	20.1
1000.0	22.1

NOTES:

1. *Antenna serial number is 1038.*
2. *The above lists are located in file number 38M3O.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.*
3. *The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".*

20.7 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

NOTES:

1. *Antenna serial number is 253.*
2. *The above lists are located in file number SAS3M0.ANT for a 3 meter range.*
3. *The files mentioned above are located on the disk marked "Antenna Factors".*

20.8 Correction factors for BICONICAL ANTENNA

Type BCD-235/B, at 3 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	19.4
30.0	14.8
40.0	11.9
50.0	10.2
60.0	9.1
70.0	8.5
80.0	8.9
90.0	9.6
100.0	10.3
110.0	11.0
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13.0
180.0	13.5
190.0	14.0
200.0	14.8
210.0	15.3
220.0	15.8
230.0	16.2
240.0	16.6
250.0	17.6
260.0	18.2
270.0	18.4
280.0	18.7
290.0	19.2
300.0	19.9
310	20.7
320	21.9
330	23.4
340	25.1
350	27.0

NOTES:

1. Antenna serial number is 1041.

2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

20.9 Correction factors for BICONICAL ANTENNA

Type BCD-235/B, 10 meter range

FREQUENCY (MHz)	AFE (dB/m)
30.0	12.1
40.0	10.6
50.0	10.6
60.0	8.9
70.0	8.5
80.0	9.6
90.0	9.4
100.0	9.6
110.0	10.3
120.0	10.7
130.0	12.6
140.0	12.7
150.0	12.7
160.0	13.8
170.0	13.7
180.0	14.9
190.0	13.4
200.0	13.1
210.0	14.0
220.0	14.5
230.0	15.8
240.0	16.0
250.0	16.6
260.0	16.7
270.0	18.3
280.0	18.5
290.0	19.3
300.0	20.9

NOTES:

1. *Antenna serial number is 1041.*
2. *The above list is located in file 41BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".*

20.10 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2

17.11 Correction factors for Double-Ridged Waveguide Horn

Model: 3115, S/N 29845
at 1 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.5	5.8	10.0	37.9	12.3
1.5	25.8	8.0	10.5	38.0	12.6
2.0	27.8	8.5	11.0	38.2	12.8
2.5	28.5	9.7	11.5	38.8	12.6
3.0	30.1	9.6	12.0	38.7	13.1
3.5	31.3	9.8	12.5	38.7	13.5
4.0	32.8	9.5	13.0	39.7	12.8
4.5	32.4	10.8	13.5	40.0	12.8
5.0	33.8	10.4	14.0	40.8	12.4
5.5	34.3	10.8	14.5	40.3	13.1
6.0	34.6	11.1	15.0	39.0	14.8
6.5	34.9	11.5	15.5	37.4	16.6
7.0	35.9	11.2	16.0	37.6	16.7
7.5	37.0	10.7	16.5	39.0	15.5
8.0	36.9	11.3	17.0	41.3	13.5
8.5	37.3	11.5	17.5	44.3	10.8
9.0	37.5	11.8	18.0	46.7	8.6
9.5	37.4	12.3			

17.12 Correction factors for Double-Ridged Waveguide Horn

Model: 3115, S/N 29845
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

17.13 Correction factors for ***Horn Antenna***

Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

17.14 Correction factors for BICONICAL ANTENNA

Type 3109,
1.0 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	11.1
30.0	12.0
40.0	12.0
50.0	11.4
60.0	10.3
70.0	10.7
80.0	8.3
90.0	9.0
100.0	10.0
110.0	11.6
120.0	13.6
130.0	14.2
140.0	13.5
150.0	12.7
160.0	12.7
170.0	13.6
180.0	15.3
190.0	14.6
200.0	14.7
210.0	15.3
220.0	15.8
230.0	17.0
240.0	18.0
250.0	18.1
260.0	18.0
270.0	17.5
280.0	18.2
290.0	19.7
300.0	21.8

NOTES:

1. Antenna serial number is 3244.

2. The above list is located in file 44BIC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

17.15. Correction factors for BICONICAL ANTENNA

Type 3109,
3 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	18.4
30.0	14.0
40.0	12.3
50.0	10.6
60.0	8.3
70.0	8.7
80.0	7.2
90.0	8.6
100.0	10.1
110.0	11.2
120.0	11.8
130.0	12.3
140.0	12.7
150.0	12.5
160.0	12.4
170.0	12.1
180.0	12.2
190.0	12.8
200.0	13.7
210.0	14.5
220.0	15.4
230.0	15.9
240.0	16.3
250.0	16.7
260.0	17.1
270.0	17.2
280.0	17.5
290.0	18.1
300.0	18.9

NOTES:

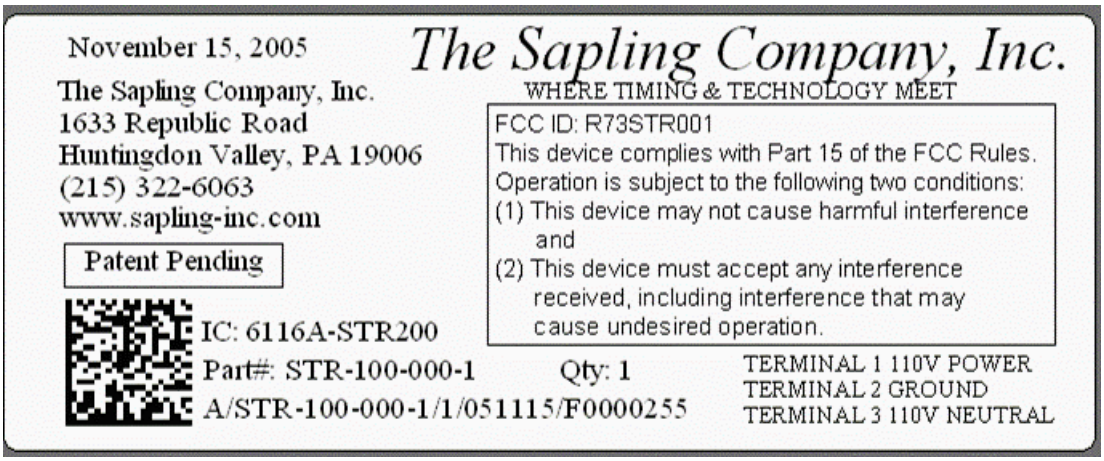
1. Antenna serial number is 3244.

2. The above list is located in file 44BIC3M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

21. APPENDIX B – Additional Models

In addition to the Model STR-200-056-1, which was fully tested, the additional model to be covered under this application (by agreement with the FCC and the TCB, (See Appendix D correspondence)) is:

Wireless Repeater STR 1000, M/N STR-100-000-1



FCC Label

22. Appendix C: Photographs of STR 1000

Figure 97 Front View

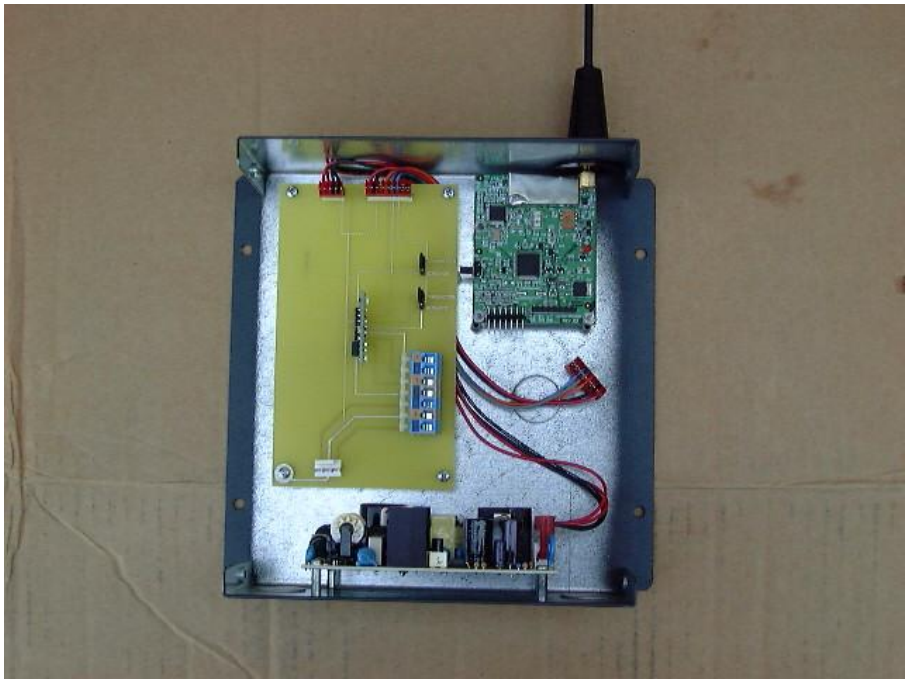


Figure 98 Internal View

23. APPENDIX D - Correspondence

Date: 11/11/05
From: Bruno
To: EMC
CC: Sid sanders
Subject: RE: FCC ID # and Industry Canada Application for STR 2000/STR 1000 FHSS Transceivers-Sapling

Dear Shaike,

1. Thank you for the additional info.
2. It appears that the two devices could be filed under the same FCCID.
3. OK
4. Yes, it did help

Regards,
Bruno Clavier

-----Original Message-----
From: Emc [mailto:emc@itl.co.il]
Sent: Thursday, November 10, 2005 7:15 AM
To: Bruno Clavier (E-mail)
Cc: Sid Sanders (E-mail); Lior Yehoshua (E-mail); Shmuel Hazon (E-mail)
Subject: FW: FCC ID # and Industry Canada Application for STR 2000/STR 1000 FHSS Transceivers-Sapling

Dear Bruno,

1. Thank you for your response of 10 November 2005.
2. Please see below further explanation of the customer concerning the STR 2000/STR 1000.
3. The STR 2000 was tested by ITL in transmit and receive modes. The test report will include also the receive mode results.
4. I hope that this helps.

Regards
Shaike Raz
EMC Laboratory Manager
EMC Laboratory
ITL (Product Testing) Ltd.
Kfar Bin Nun
Israel
Tel: +972-8-979-7799
Fax: +972-8-979-7702
Email: sraz@itl.co.il/emc@itl.co.il
http://www.itl.co.il

-----Original Message-----
From: lior [mailto:lior@roseman.co.il]

Sent: Thursday, November 10, 2005 10:28 AM
To: Emc
Subject: RE: FCC ID # and Industry Canada Application for STR 2000/STR 1000 FHSS Transceivers-Sapling

David shalom,
But, It is exactly the same rf module that we install in this 2 devices.
The RF portions are electrically identical. There are no Differences between the models, such as those prohibited under part 2.1043 (e.g. change in power output or maximum field strength, frequency determining and stabilizing circuitry, modulator, saw filter, etc.).
The schematic of the RF portion of each device is identical (i.e. no components removed or added).
The difference is only change in mode of operation. This two modes has been tested by ITL.
The device STR-2000 is a transceiver, it receives wired message and transmits wireless message.
The device STR-1000 is a repeater, it receives wireless message and transmits wireless message.
This is done by the same rf module. There is an input to the module which defines the mode of operation.
More detailed explanation:
This device has two modes of operation:

Master - Transceiver : In this mode the device receives time message thorough its serial communication input 'data in', and transmits RF message every 1 minute through its antenna.

Slave - Repeater : In this mode the device receives time message through its antenna , and retransmits it to the antenna.

The 'master\slave' input defines the mode of operation: 0 is master, 5v is slave. The microcontroller reads the 'master\slave' input to decide in which mode it operates. When it is in master mode it uses its UART to receive the message coming through its 'data in' input with baud rate 1200.

Lior Yehoshua

cheif engineer

Roseman engineering

Date: 10/11/05
From: Bruno
To: EMC
CC: Sid sanders
Subject: RE: FCC ID # and Industry Canada Application for STR 2000/STR 1000 FHSS Transceivers-Sapling
Hi Shaike,
Sorry for this late response. Sid is traveling and he asked me to provide you with a reply.
According to part 2.924, two models can be marketed under the same FCC ID if the RF portions are electrically identical. Differences between models, such as those prohibited under part 2.1043 (e.g. change in power output or maximum field strength, frequency determining and stabilizing circuitry, modulator, saw filter, etc.), would require two FCC IDs. Electrically identical also implies that the schematic of the RF portion of each device must be identical (i.e. no components removed or added, etc.).
If one device is a repeater, it seems unlikely that all the above conditions would be met for filing the two models under one FCCID. Please kindly comment on the above for the specifics of model STR2000 and STR1000.
Regards,
Bruno Clavier

From: Emc
Sent: Tuesday, October 11, 2005 10:52 AM
To: 'Sid Sanders'
Cc: Lior Yehoshua (E-mail)
Subject: RE: FCC ID # and Industry Canada Application for STR 2000/STR 1000 FHSS Transceivers-Sapling

Hi Sid,
1. Sorry for my delayed response due to a vacation. I hope that you did not suffer any damages from the recent hurricanes.
2. Your response in this case surprised us since the tested unit (STR 2000) uses the same radio unit as the STR 1000. Also, the STR 1000 is a sub-set of the STR 2000 differing only by removal of some circuitry used in the STR 2000.
3. Please explain your rationale for your opinion.
Regards
Shaike Raz
EMC Laboratory Manager
EMC Laboratory
ITL (Product Testing) Ltd.
Kfar Bin Nun
Israel
Tel: +972-8-979-7799
Fax: +972-8-979-7702
Email: sraz@itl.co.il/emc@itl.co.il
http://www.itl.co.il

mail message in error, please return by forwarding the message and its attachments to the sender.

-----Original Message-----
From: Sid Sanders [mailto:sid@timco.cc]
Sent: Wednesday, September 21, 2005 4:44 PM
To: Emc
Subject: RE: FCC ID # and Industry Canada Application for STR 2000/STR 1000 FHSS Transceivers-Sapling

21 September 2005
David,
It is our opinion that the STR2000 & the STR 1000 should have different FCC Identifiers and be certified separately.
Regards,
Sid

From: Emc

Sent: Wednesday, August 17, 2005 4:09 PM

To: Sid Sanders (E-mail)

Cc: Lior Yehoshua (E-mail); Shmuel Hazon (E-mail)

Subject: FCC ID # and Industry Canada Application for STR 2000/STR 1000 FHSS Transceivers-Sapling

Importance: High

Hi Sid,

1. The STR 2000 is a wireless 915-928 MHz frequency hopping spread spectrum RF clock.

2. We completed full testing on this product and are preparing the report and application for FCC ID and IC.

3. The customer would like to include under the same application his STR 1000 product.The STR 1000 functions as a repeater extending distances between system clocks.The STR 1000 differs from the STR 2000 only by:

   a. No display + display circuitry.

   b. Housing has no display opening.

   c. No TCPIP connection.

   d. No auxiliary programmable relay.

4. Attached are photos of the STR 2000. <<Image10.jpg>> <<Image11.jpg>> <<Image15.jpg>> <<Image16.jpg>>

5. Attached are photos of the STR 1000. <<Image33.jpg>> <<Image30.jpg>>

6. Please comment/advise.

Regards

Shaike Raz
EMC Laboratory Manager
EMC Laboratory
ITL (Product Testing) Ltd.
Kfar Bin Nun
Israel
Tel: +972-8-979-7799
Fax: +972-8-979-7702
Email: sraz@itl.co.il/emc@itl.co.il
http://www.itl.co.il