Reg. No. DAT-P-051/95-10a

ACCREDITED
EMC/SAFETY

TELSTAR TELECOM INC. TEST REPORT

FOR THE

BASE STATION (TS1000BS0) AND WIRELESS DATA TERMINAL (TS1000UT0)

FCC PART 15 SUBPART B SECTIONS 15.107 & 15.109

COMPLIANCE

DATE OF ISSUE: NOVEMBER 27, 2001

PREPARED FOR:

Telstar Telecom Inc.
10423 Valley Blvd., Suite D
El Monte, CA 91731

W.O. No.: 77927

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Date of test: October 30 - November 1, 2001

Report No.: FC01-081

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	October 30 - November 1, 2001
DATE OF RECEIPT:	October 30, 2001
PURPOSE OF TEST:	To demonstrate the compliance of the Base Station (TS1000BS0) and Wireless Data Terminal (TS1000UT0), with the requirements for FCC Part 15 Subpart B Section 15.109 and 15.107 Class B devices.
TEST METHOD:	ANSI C63.4 (1992)
FREQUENCY RANGE TESTED:	450 kHz - 1000 MHz
MANUFACTURER:	Telstar Telecom Inc. 10423 Valley Blvd., Suite D El Monte, CA 91731
REPRESENTATIVE:	Weiping Zheng
TEST LOCATION:	CKC Laboratories, Inc. 110 Olinda Place Brea, CA 92621

SUMMARY OF RESULTS

As received, the Telstar Telecom Inc. Base Station (TS1000BS0) and Wireless Data Terminal (TS1000UT0), was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 15 Subpart B Section 15.107 Class B
- FCC Part 15 Subpart B Section 15.109 Class B
- ANSI C63.4 (1992) method

Canada

ICES-003 Class B using:

- FCC Part 15 Subpart B Section 15.107 Class B
- FCC Part 15 Subpart B Section 15.109 Class B
- ANSI C63.4 (1992) method

The results in this report apply only to the items tested, as identified herein.

REQUIRED EUT CHANGES TO COMPLY

The Wireless Data Terminal (TS1000UT0) is designed to operate with one FHSS transceivers, FCC ID: KNY-209228624168, which can be purchased by the end user for installation. The test data contained in this report is without the transceivers installed in the TS1000UT0. Paint around the power connector was removed and DC –ve routed to chassis in order to improve grounding of the DC power connector.

The Base Station (TS1000BS0) was tested with the transceivers installed and there were no modifications necessary for compliance.

APPROVALS

QUALITY ASSURANCE:

Dennis Ward, Quality Manager

Septimiu Apahidean, EMC/Lab Manager

TEST PERSONNEL:

Eddie Wong, EMC Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit.

A TS1000 wireless data terminal (WAT) is shipped from the factory pre-configured to operate together in point-to-point applications. WAT is preset for high speed data communications and to communicate only with each other. The Wireless Data Terminal (TS1000UT0) is a table top device that sends and receives data from a RS232 port. The Base Station (TS1000BS0) is a wall-mounted device that routes data.

The model TS100BS0 was named the Wireless Data Link Base System. The name has been changed to the Base Station and model number remains the same, TS100BS0.

EQUIPMENT UNDER TEST

Base Station
Manuf: Telstar Telecom, Inc.
Model: TS1000BS0
Serial: B0100001
FCC ID: P3CBS0151 (pending)

Wireless Data Terminal
Manuf: Telstar Telecom, Inc.
Model: TS1000UT0
Serial: M0100002
FCC ID: P3CUT0151 (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Transceiver
Manuf: Telstar Telecom, Inc.
Model: TS1000UT0
Serial: M0100001
FCC ID: pending

Transceiver
Manuf: Telstar Telecom, Inc.
Model: TS1000UT1
Serial: M0100003
FCC ID: pending

Parallel Printer
Manuf: Epson
Model: P156A
Serial: CMR1545596
FCC ID: DoC

Laptop
Manuf: Dell
Model: PPL
Serial: 0006692D-12800-9B0-0094
FCC ID: DoC

SPECIFICATIONS AND REQUIREMENTS

The following summarizes the specifications and requirements for the emission tests performed on the Base Station (TS1000BS0) and Wireless Data Terminal (TS1000UT0). If the actual test levels are higher or different than required, these levels are listed in the appropriate tables.

Test	Specification	Requirement
Radiated Emissions	FCC Part 15 Subpart B Section 15.109	Class B
Conducted Emissions	FCC Part 15 Subpart B Section 15.107	Class B

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the Base Station (TS1000BS0) and Wireless Data Terminal (TS1000UT0). All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: Six Highest Radiated Emission Levels – Base Station: 30-1000 MHz

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
132.717	45.1	16.5	-28.4	2.2		35.4	43.5	-8.1	V
361.066	41.1	18.0	-28.2	3.7		34.6	46.0	-11.4	V
368.634	46.3	17.5	-28.2	3.8		39.4	46.0	-6.6	H
368.634	44.8	17.5	-28.2	3.8		37.9	46.0	-8.1	H
398.156	43.1	15.6	-28.3	4.0		34.4	46.0	-11.6	H
638.305	36.5	20.4	-27.9	5.1		34.1	46.0	-11.9	V

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart B Section 15.109 Class B
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: Two FHSS transceivers are housed in the wall mount enclosure placed on the wooden table. Antenna 1 is connected to antenna port 1 and placed on top of the EUT. Antenna 2 is a short brass stub directly connected to antenna port #2. A remote laptop exercises remote transceiver #1 to establish communication with the EUT's transceiver #1. Remote transceiver #2 maintain RF link with the transceiver #2 of the EUT. 110Vac, 60 Hz, 20°C, 57% relative humidity.

Table 2: Six Highest Conducted Emission Levels – Base Station: 450 kHz- 30MHz									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Lisn dB	dB	dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
0.667308	36.6	0.0				36.6	48.0	-11.4	B
0.668980	36.2	0.0				36.2	48.0	-11.8	W
0.750888	39.0	0.0				39.0	48.0	-9.0	W
0.750888	38.6	0.0				38.6	48.0	-9.4	B
0.834468	37.6	0.0				37.6	48.0	-10.4	W
0.834468	37.3	0.0				37.3	48.0	-10.7	B

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart B Section 15.107 Class B

NOTES: B = Black Lead
W = White Lead

COMMENTS: Two FHSS transceivers are housed in the wall mount enclosure placed on the wooden table. Antenna 1 is connected to antenna port 1 and placed on top of the EUT. Antenna 2 is a short brass stub directly connected to antenna port #2. A remote laptop exercises remote transceiver #1 to establish communication with the EUT's transceiver #1. Remote transceiver #2 maintain RF link with the transceiver #2 of the EUT. 110Vac, 60 Hz, 20°C, 57% relative humidity.

Table 3: Six Highest Radiated Emission Levels - Data Terminal: 30-1000 MHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY MHz	READING dBµV	Ant dB	Amp dB	Cable dB	Dist dB	READING dBµV/m	LIMIT dBµV/m	MARGIN dB	NOTES
153.851	45.7	17.5	-28.4	2.3		37.1	43.5	-6.4	H
162.182	49.7	17.6	-28.3	2.5		41.5	43.5	-2.0	HQ
197.260	47.1	16.9	-28.4	2.7		38.3	43.5	-5.2	HQ
294.897	43.6	21.8	-28.3	3.3		40.4	46.0	-5.6	HQ
336.033	45.1	19.7	-28.2	3.6		40.2	46.0	-5.8	HQ
368.625	50.0	17.5	-28.2	3.8		43.1	46.0	-2.9	HQ

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart B Section 15.109 Class B
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
Q = Quasi Peak Reading

COMMENTS: Battery operated EUT is placed on the wooden table. The RS232 port of the EUT is connected to the serial port of a laptop. Connected to the laptop is a parallel printer. The laptop runs communication program to exercise the EUT via RS232. Wireless transceiver is removed from the EUT. 12VDC, 20°C, 64% relative humidity.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ± 4dB measurement uncertainty.

TESTING

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected. The interval between different pieces of equipment was approximately 10 centimeters. All excessive interconnecting cable was bundled in 30-40 centimeter lengths.

EMISSIONS

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The radiated and conducted emissions data of the Base Station (TS1000BS0) and Wireless Data Terminal (TS1000UT0) was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS

	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect the radiated and conducted emissions data for the Base Station (TS1000BS0) and Wireless Data Terminal (TS1000UT0). For radiated measurements from 30 MHz to 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

TABLE B: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	450 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the Base Station (TS1000BS0) and Wireless Data Terminal (TS1000UT0).

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual was followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

RADIATED EMISSIONS

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

During the preliminary radiated scan, the EUT was powered up and operating in its defined test mode. The frequency range of 30 MHz to 88 MHz was scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. The frequency range of 100 to 300 MHz was then scanned in the same manner using the biconical antenna and the peaks recorded. Lastly, a scan of the FM band from 88 to 110 MHz was made, using a reduced resolution bandwidth and frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 to 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 to 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

CONDUCTED EMISSIONS

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 450 kHz to 1.705 MHz, 1.705 MHz to 3 MHz, and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

BASE STATION (TS1000BS0)

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	**None**
CRT was displaying:	**None**
Power Supply Manufacturer:	**N/A**
Power Supply Part Number:	**N/A**
AC Line Filter Manufacturer:	**N/A**
AC Line Filter Part Number:	**N/A**

I/O PORTS	
Type	#
RS232	2

CRYSTAL OSCILLATORS	
Type	Freq In MHz
14.7456	MHz

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
Route Data from RS232 Port	ADT1100	14.7456	4	Top

CABLE INFORMATION

Cable #:	2	Cable(s) of this type:	2
Cable Type:	LMR-195	Shield Type:	Shield
Construction:	Type N	Length In Meters:	2
Connected To End (1):	Yes	Connected To End (2):	Yes
Connector At End (1):	0	Connector At End (2):	0
Shield Grounded At (1):	0	Shield Grounded At (2):	0
Part Number:	N/A	Number of Conductors:	N/A
Notes and/or description:			

WIRELESS DATA TERMINAL (TS1000UT0)

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	**None**
CRT was displaying:	**None**
Power Supply Manufacturer:	**N/A**
Power Supply Part Number:	**N/A**
AC Line Filter Manufacturer:	**N/A**
AC Line Filter Part Number:	**N/A**

I/O PORTS	
Type	#
RS232	2

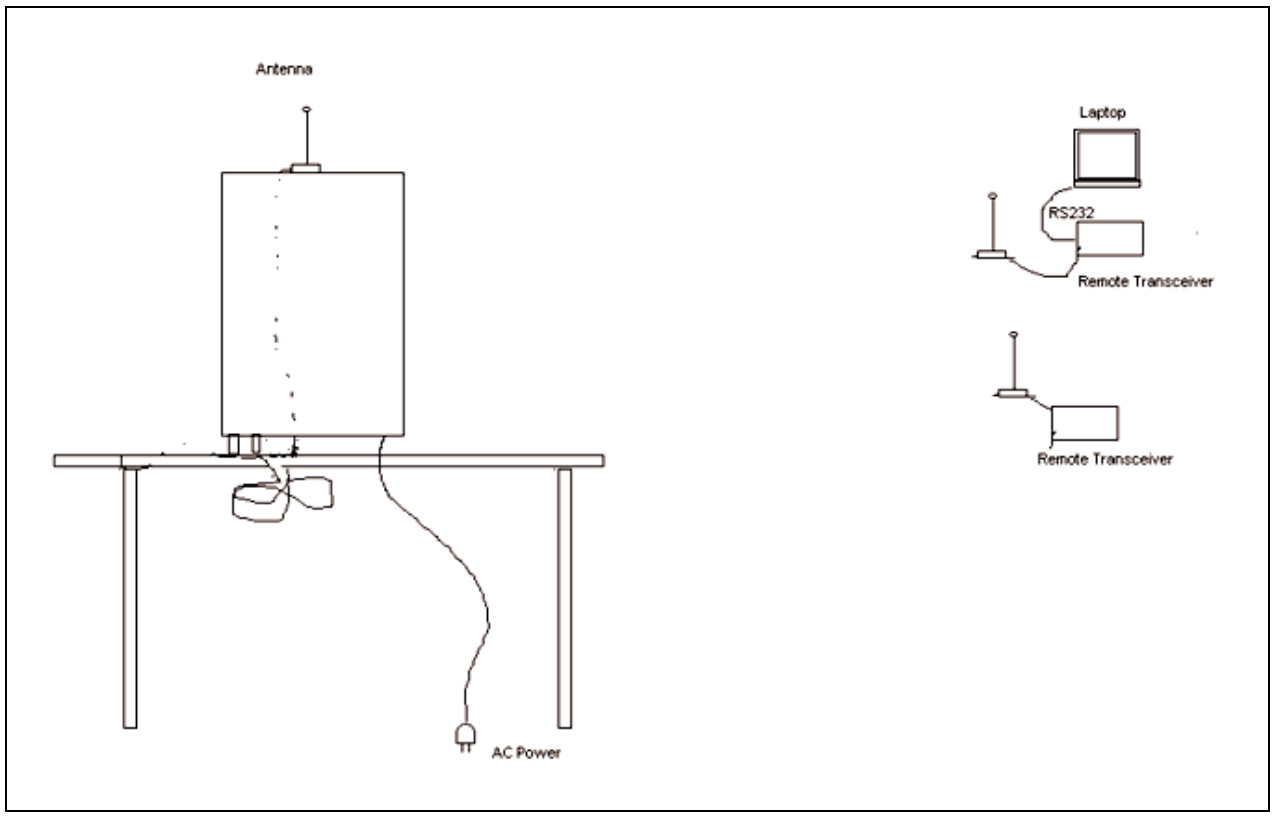
CRYSTAL OSCILLATORS	
Type	Freq In MHz
14.7456	MHz

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
Link to Notebook PC. Send and Receive data from RS232 port	ADT2100	14.7456	4	Top

CABLE INFORMATION

Cable #:	1	Cable(s) of this type:	
Cable Type:	LMR-195	Shield Type:	
Construction:	SMA	Length In Meters:	
Connected To End (1):	Yes	Connected To End (2):	
Connector At End (1):	0	Connector At End (2):	
Shield Grounded At (1):	0	Shield Grounded At (2):	
Part Number:	N/A	Number of Conductors:	
Notes and/or description:			

EQUIPMENT TEST SETUP DIAGRAM

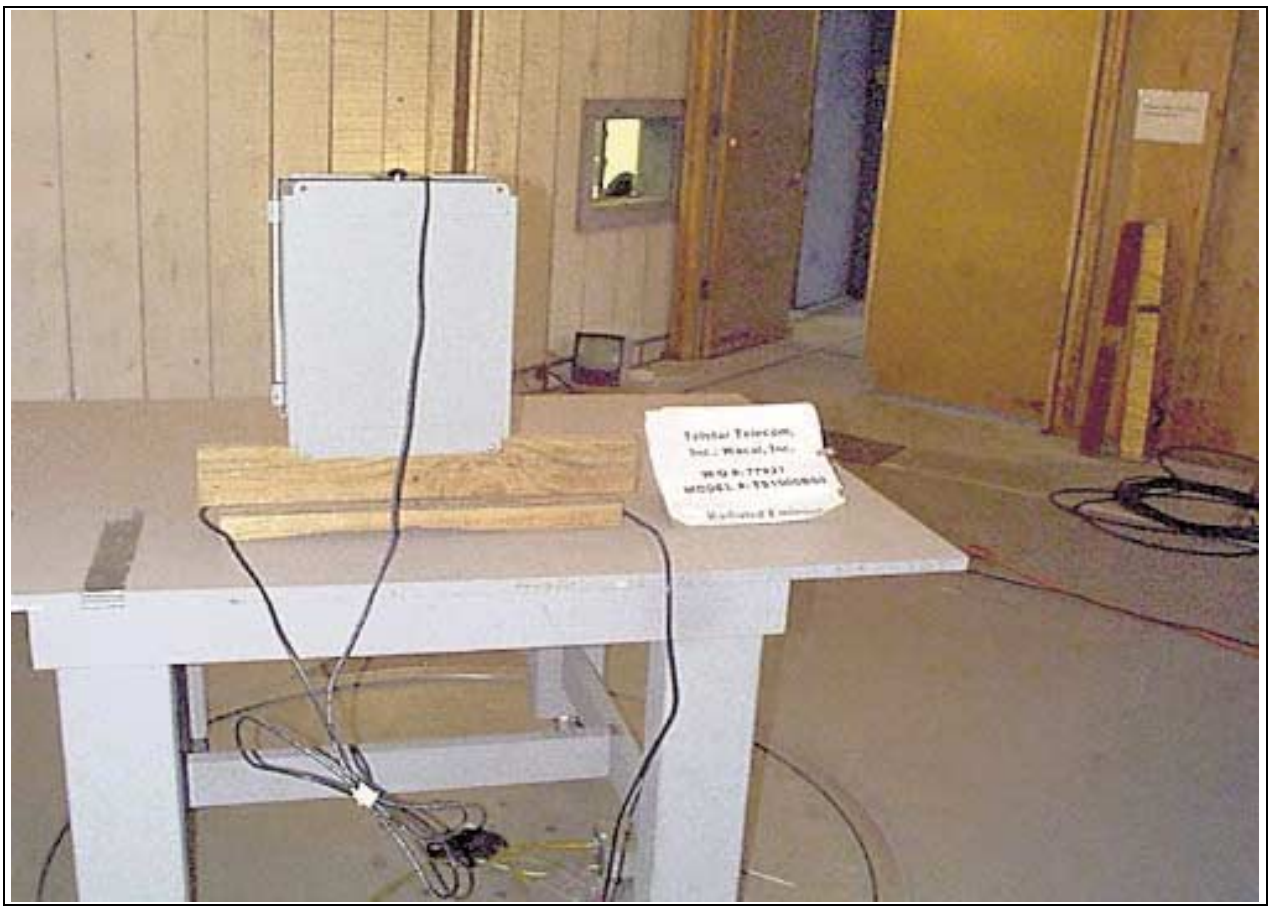


Base Station

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View of Base Station

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View of Base Station

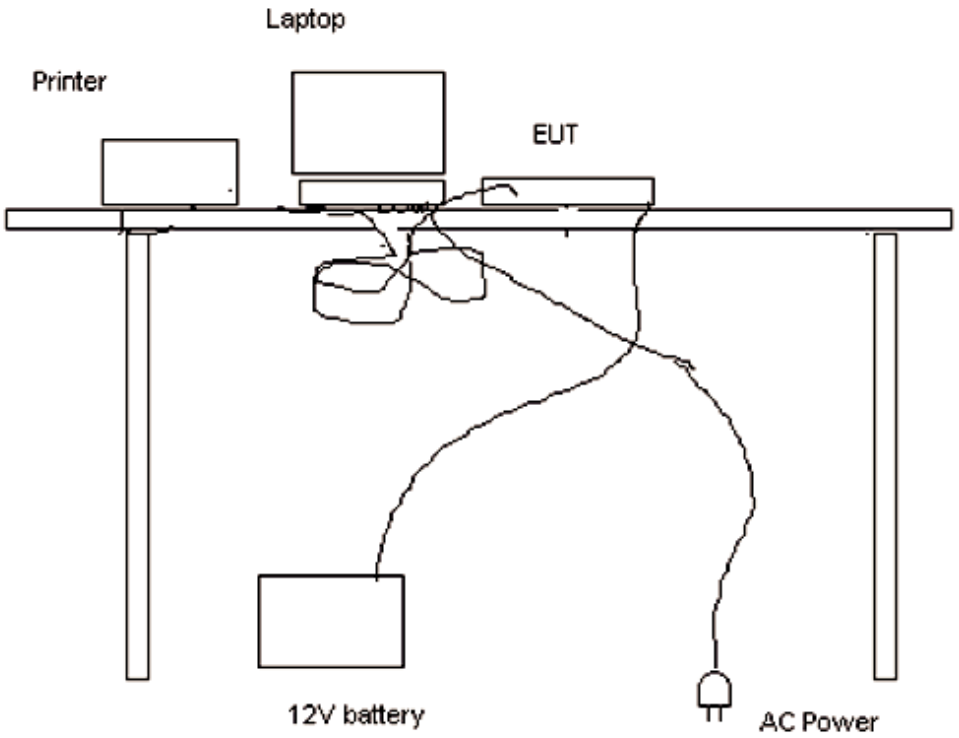
PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Front View of Base Station

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Side View of Base Station

EQUIPMENT TEST SETUP DIAGRAM

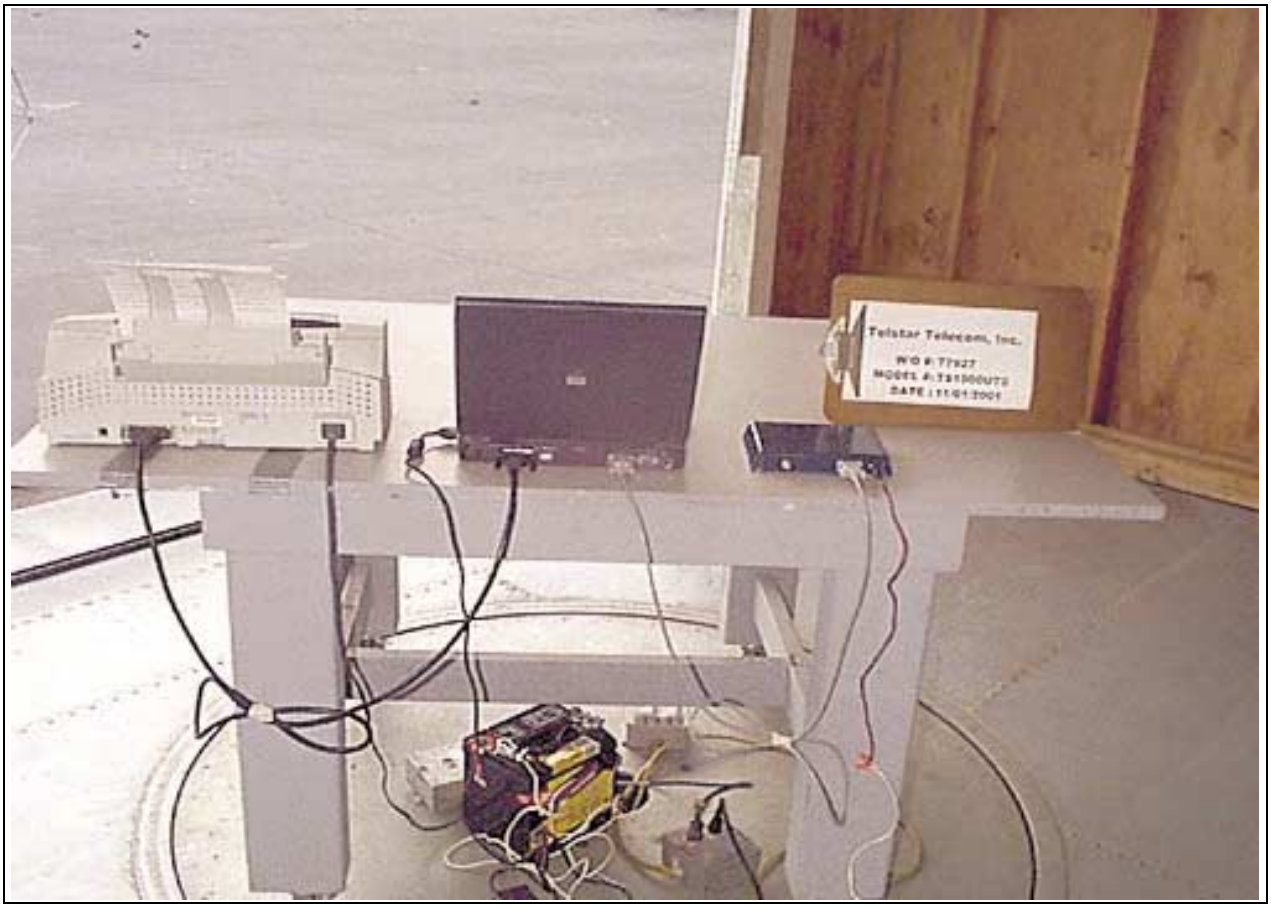


Data Terminal

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View of Data Terminal

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View of Data Terminal

APPENDIX B

TEST EQUIPMENT LIST

Brea A

Industry of Canada File No. IC 3172-A

Radiated Emissions

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092801	092802
QP Adapter	01437	HP	85650A	3303A01884	092801	092802
Bicon Antenna	306	AH	SAS200/540	220	092401	092402
Log Periodic Antenna	331	AH	SAS 00/516	330	092401	092402
Pre-amp	00309	HP	8447D	1937A02548	090501	090502
Antenna cable	NA	NA	RG214	Cable#15	122000	122001
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	071601	071602

Conducted Emissions

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092801	092802
QP Adapter	01437	HP	85650A	3303A01884	092801	092802
LISN	02128	EMCO	3816/2NM	9809-1090	030701	030702
LISN	00847	EMCO	3816/2NM	1104	101501	101502

APPENDIX C

MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Telstar Telecom, Inc.**
Specification: **FCC 15.109 Class B**
Work Order #: **77927** Date: 10/30/2001
Test Type: **Maximized Emissions** Time: 12:02:18
Equipment: **Wireless Data Link Base System** Sequence#: 1
Manufacturer: Telstar Telecom, Inc. Tested By: Eddie Wong
Model: TS1000BS0
S/N: B01-00001

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Wireless Data Link Base System*	Telstar Telecom, Inc.	TS1000BS0	B01-00001

Support Devices:

Function	Manufacturer	Model #	S/N
Transceiver	Telstar Telecom, Inc.	TS1000UT1	M0100003
Transceiver	Telstar Telecom, Inc.	TS1000UT0	M0100001
Laptop	Dell	PPL	0006692D-12800-9B0-0094

Test Conditions / Notes:

COMMENTS: Two FHSS transceivers are housed in the wall mount enclosure placed on the wooden table. Antenna 1 is connected to antenna port 1 and placed on top of the EUT. Antenna 2 is a short brass stub directly connected to antenna port #2. A remote laptop exercises remote transceiver #1 to establish communication with the EUT's transceiver #1. Remote transceiver #2 maintain RF link with the transceiver #2 of the EUT. 110Vac, 60 Hz, 20°C, 57% relative humidity. Frequency range tested: 30 - 1000 MHz.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Log 3 Pream dB	Bicon dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	368.634M	46.3	+17.5 -28.2	+0.0	+0.3	+3.5	+0.0 215	39.4	46.0	-6.6	Horiz 155
2	368.634M	44.8	+17.5 -28.2	+0.0	+0.3	+3.5	+0.0 242	37.9	46.0	-8.1	Horiz 132
3	132.717M	45.1	+0.0 -28.4	+16.5	+0.2	+2.0	+0.0 1	35.4	43.5	-8.1	Vert 112
4	361.066M	41.1	+18.0 -28.2	+0.0	+0.3	+3.4	+0.0 158	34.6	46.0	-11.4	Vert 100
5	398.156M	43.1	+15.6 -28.3	+0.0	+0.4	+3.6	+0.0 36	34.4	46.0	-11.6	Horiz 211
6	638.305M	36.5	+20.4 -27.9	+0.0	+0.4	+4.7	+0.0 1	34.1	46.0	-11.9	Vert 100
7	353.870M	40.1	+18.5 -28.2	+0.0	+0.3	+3.4	+0.0 3	34.1	46.0	-11.9	Horiz 132
8	383.380M	41.8	+16.5 -28.3	+0.0	+0.4	+3.5	+0.0 253	33.9	46.0	-12.1	Horiz 195
9	353.917M	39.7	+18.5 -28.2	+0.0	+0.3	+3.4	+0.0 303	33.7	46.0	-12.3	Vert 100
10	280.193M	38.2	+0.0 -28.3	+20.6	+0.3	+2.9	+0.0 149	33.7	46.0	-12.3	Vert 112

11	197.636M	38.8	+0.0 -28.4	+16.9	+0.3	+2.4	+0.0 87	30.0	43.5	-13.5	Horiz 149
12	193.498M	38.3	+0.0 -28.4	+17.0	+0.3	+2.4	+0.0 56	29.6	43.5	-13.9	Horiz 149
13	206.430M	38.3	+0.0 -28.4	+16.9	+0.3	+2.4	+0.0 119	29.5	43.5	-14.0	Horiz 149
14	162.174M	37.7	+0.0 -28.3	+17.6	+0.3	+2.2	+0.0 209	29.5	43.5	-14.0	Vert 112
15	398.128M	40.6	+15.6 -28.3	+0.0	+0.4	+3.6	+0.0	31.9	46.0	-14.1	Vert 100
16	339.137M	36.6	+19.5 -28.2	+0.0	+0.3	+3.3	+0.0 359	31.5	46.0	-14.5	Horiz 132
17	221.166M	39.4	+0.0 -28.3	+17.3	+0.3	+2.4	+0.0 101	31.1	46.0	-14.9	Horiz 149
18	73.707M	45.0	+0.0 -28.4	+6.9	+0.1	+1.4	+0.0 164	25.0	40.0	-15.0	Vert 112
19	361.940M	37.3	+17.9 -28.2	+0.0	+0.3	+3.5	+0.0 273	30.8	46.0	-15.2	Horiz 125
20	58.608M	43.4	+0.0 -28.6	+8.5	+0.1	+1.3	+0.0 360	24.7	40.0	-15.3	Vert 100
21	137.580M	37.4	+0.0 -28.4	+16.9	+0.2	+2.0	+0.0 3	28.1	43.5	-15.4	Vert 100
22	328.274M	34.9	+20.3 -28.2	+0.0	+0.3	+3.2	+0.0 2	30.5	46.0	-15.5	Vert 100
23	317.040M	33.8	+21.2 -28.3	+0.0	+0.3	+3.1	+0.0 250	30.1	46.0	-15.9	Horiz 125
24	311.086M	33.2	+21.6 -28.3	+0.0	+0.3	+3.1	+0.0 193	29.9	46.0	-16.1	Horiz 125
25	634.047M	32.1	+20.3 -27.9	+0.0	+0.4	+4.6	+0.0 197	29.5	46.0	-16.5	Horiz 149
26	309.635M	32.5	+21.7 -28.3	+0.0	+0.3	+3.1	+0.0 156	29.3	46.0	-16.7	Horiz 132
27	318.857M	32.9	+21.0 -28.3	+0.0	+0.3	+3.2	+0.0 344	29.1	46.0	-16.9	Horiz 125
28	206.411M	35.4	+0.0 -28.4	+16.9	+0.3	+2.4	+0.0 285	26.6	43.5	-16.9	Vert 112
29	182.728M	34.9	+0.0 -28.3	+17.2	+0.3	+2.3	+0.0 128	26.4	43.5	-17.1	Horiz 149
30	511.094M	35.6	+17.1 -28.5	+0.0	+0.4	+4.2	+0.0 191	28.8	46.0	-17.2	Horiz 155
31	383.355M	36.5	+16.5 -28.3	+0.0	+0.4	+3.5	+0.0 258	28.6	46.0	-17.4	Vert 100
32	180.416M	34.2	+0.0 -28.2	+17.3	+0.3	+2.3	+0.0 325	25.9	43.5	-17.6	Horiz 149
33	179.118M	34.2	+0.0 -28.2	+17.3	+0.3	+2.3	+0.0 80	25.9	43.5	-17.6	Horiz 149
34	140.092M	34.7	+0.0 -28.4	+17.1	+0.2	+2.0	+0.0 355	25.6	43.5	-17.9	Vert 100
35	412.869M	36.6	+15.7 -28.4	+0.0	+0.4	+3.7	+0.0 309	28.0	46.0	-18.0	Horiz 149
36	147.452M	34.3	+0.0 -28.4	+17.3	+0.2	+2.1	+0.0 213	25.5	43.5	-18.0	Vert 112

37	221.163M	36.1	+0.0 -28.3	+17.3	+0.3	+2.4	+0.0 17	27.8	46.0	-18.2	Vert 112
38	190.378M	33.8	+0.0 -28.3	+17.0	+0.3	+2.4	+0.0 355	25.2	43.5	-18.3	Horiz 149
39	457.107M	35.5	+16.3 -28.7	+0.0	+0.4	+3.9	+0.0 -1	27.4	46.0	-18.6	Horiz 149
40	265.392M	33.3	+0.0 -28.3	+19.2	+0.3	+2.9	+0.0 329	27.4	46.0	-18.6	Vert 112
41	471.836M	35.0	+16.5 -28.6	+0.0	+0.4	+4.0	+0.0 255	27.3	46.0	-18.7	Horiz 149
42	122.889M	35.3	+0.0 -28.4	+15.6	+0.2	+1.9	+0.0 356	24.6	43.5	-18.9	Vert 100
43	177.782M	32.3	+0.0 -28.2	+17.3	+0.3	+2.3	+0.0 205	24.0	43.5	-19.5	Horiz 149
44	452.274M	34.4	+16.3 -28.7	+0.0	+0.4	+3.9	+0.0 336	26.3	46.0	-19.7	Horiz 155
45	412.866M	34.6	+15.7 -28.4	+0.0	+0.4	+3.7	+0.0	26.0	46.0	-20.0	Vert 100
46	33.688M	31.3	+0.0 -28.5	+16.1	+0.1	+0.9	+0.0 360	19.9	40.0	-20.1	Horiz 149
47	545.594M	31.1	+17.9 -28.6	+0.0	+0.4	+4.4	+0.0 122	25.2	46.0	-20.8	Horiz 149
48	486.596M	32.7	+16.7 -28.6	+0.0	+0.4	+4.0	+0.0 171	25.2	46.0	-20.8	Horiz 149
49	516.091M	31.1	+17.2 -28.5	+0.0	+0.4	+4.2	+0.0 3	24.4	46.0	-21.6	Horiz 149
50	176.953M	30.0	+0.0 -28.2	+17.3	+0.3	+2.3	+0.0 46	21.7	43.5	-21.8	Vert 112
51	250.702M	31.3	+0.0 -28.2	+17.9	+0.3	+2.8	+0.0 138	24.1	46.0	-21.9	Vert 112
52	442.354M	31.5	+16.1 -28.6	+0.0	+0.4	+3.9	+0.0 9	23.3	46.0	-22.7	Vert 100
53	427.614M	31.4	+15.9 -28.5	+0.0	+0.4	+3.8	+0.0 186	23.0	46.0	-23.0	Horiz 149
54	69.353M	36.1	+0.0 -28.6	+7.0	+0.1	+1.4	+0.0 315	16.0	40.0	-24.0	Vert 100

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Telstar Telecom, Inc.**
Specification: **FCC 15.107 Class B**
Work Order #: **77927** Date: 10/30/2001
Test Type: **Conducted Emissions** Time: 5:19:46 PM
Equipment: **Wireless Data Link Base System** Sequence#: 1
Manufacturer: Telstar Telecom, Inc. Tested By: Eddie Wong
Model: TS1000BS0
S/N: B01-00001

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Wireless Data Link Base System*	Telstar Telecom, Inc.	TS1000BS0	B01-00001

Support Devices:

Function	Manufacturer	Model #	S/N
Transceiver	Telstar Telecom, Inc.	TS1000UT1	M0100003
Transceiver	Telstar Telecom, Inc.	TS1000UT0	M0100001
Laptop	Dell	PPL	0006692D-12800-9B0-0094

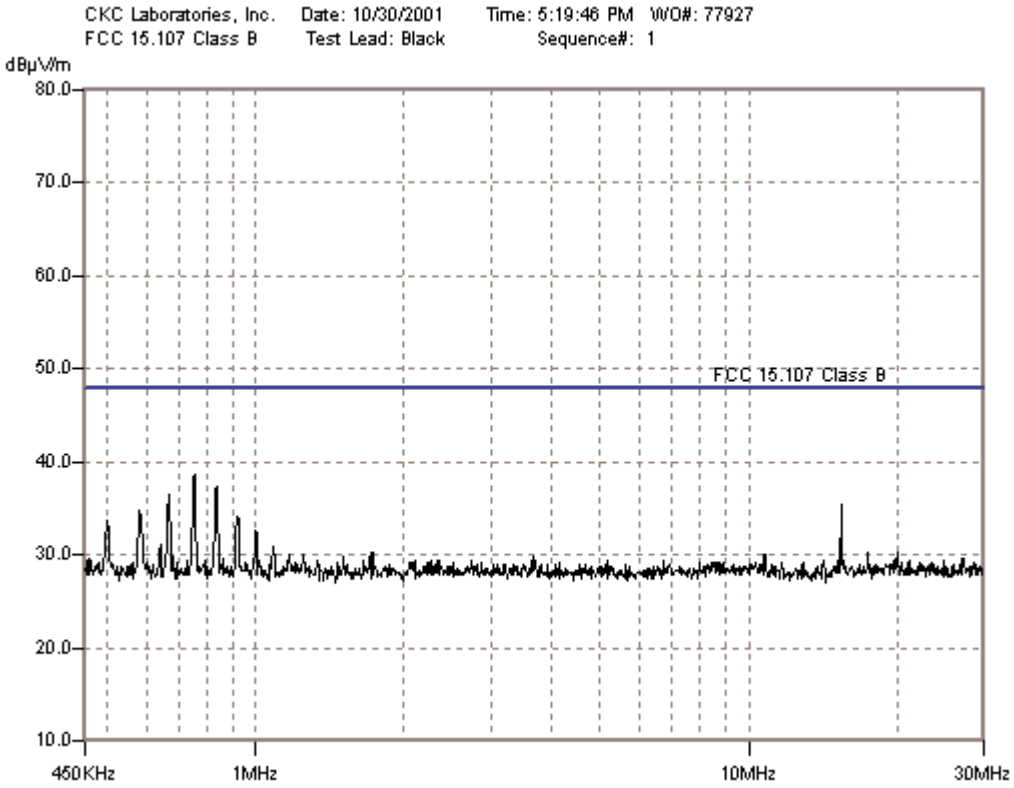
Test Conditions / Notes:

COMMENTS: Two FHSS transceivers are housed in the wall mount enclosure placed on the wooden table. Antenna 1 is connected to antenna port 1 and placed on top of the EUT. Antenna 2 is a short brass stub directly connected to antenna port #2. A remote laptop exercises remote transceiver #1 to establish communication with the EUT's transceiver #1. Remote transceiver #2 maintain RF link with the transceiver #2 of the EUT. 110Vac, 60 Hz, 20°C, 57% relative humidity.

Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	750.888k	38.6					+0.0	38.6	48.0	-9.4	Black
2	834.468k	37.3					+0.0	37.3	48.0	-10.7	Black
3	667.308k	36.6					+0.0	36.6	48.0	-11.4	Black
4	15.446M	35.5					+0.0	35.5	48.0	-12.5	Black
5	580.385k	34.7					+0.0	34.7	48.0	-13.3	Black
6	916.376k	34.1					+0.0	34.1	48.0	-13.9	Black
7	500.148k	33.8					+0.0	33.8	48.0	-14.2	Black
8	999.956k	32.7					+0.0	32.7	48.0	-15.3	Black
9	641.398k	31.2					+0.0	31.2	48.0	-16.8	Black
10	1.089M	31.0					+0.0	31.0	48.0	-17.0	Black

11	20.011M	30.2	+0.0	30.2	48.0	-17.8	Black
12	17.514M	30.2	+0.0	30.2	48.0	-17.8	Black
13	1.728M	30.2	+0.0	30.2	48.0	-17.8	Black
14	10.783M	30.1	+0.0	30.1	48.0	-17.9	Black
15	1.169M	30.0	+0.0	30.0	48.0	-18.0	Black


CKC Laboratories, Inc. Date: 10/30/2001 Time: 5:19:46 PM WO#: 77927
FCC 15.107 Class B Test Lead: Black Sequence#: 1
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC 15.107 Class B
450KHz
1MHz
10MHz
30MHz

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Telstar Telecom, Inc.**
Specification: **FCC 15.107 Class B**
Work Order #: **77927** Date: 10/30/2001
Test Type: **Conducted Emissions** Time: 5:22:05 PM
Equipment: **Wireless Data Link Base System** Sequence#: 2
Manufacturer: Telstar Telecom, Inc. Tested By: Eddie Wong
Model: TS1000BS0
S/N: B01-00001

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Wireless Data Link Base System*	Telstar Telecom, Inc.	TS1000BS0	B01-00001

Support Devices:

Function	Manufacturer	Model #	S/N
Transceiver	Telstar Telecom, Inc.	TS1000UT1	M0100003
Transceiver	Telstar Telecom, Inc.	TS1000UT0	M0100001
Laptop	Dell	PPL	0006692D-12800-9B0-0094

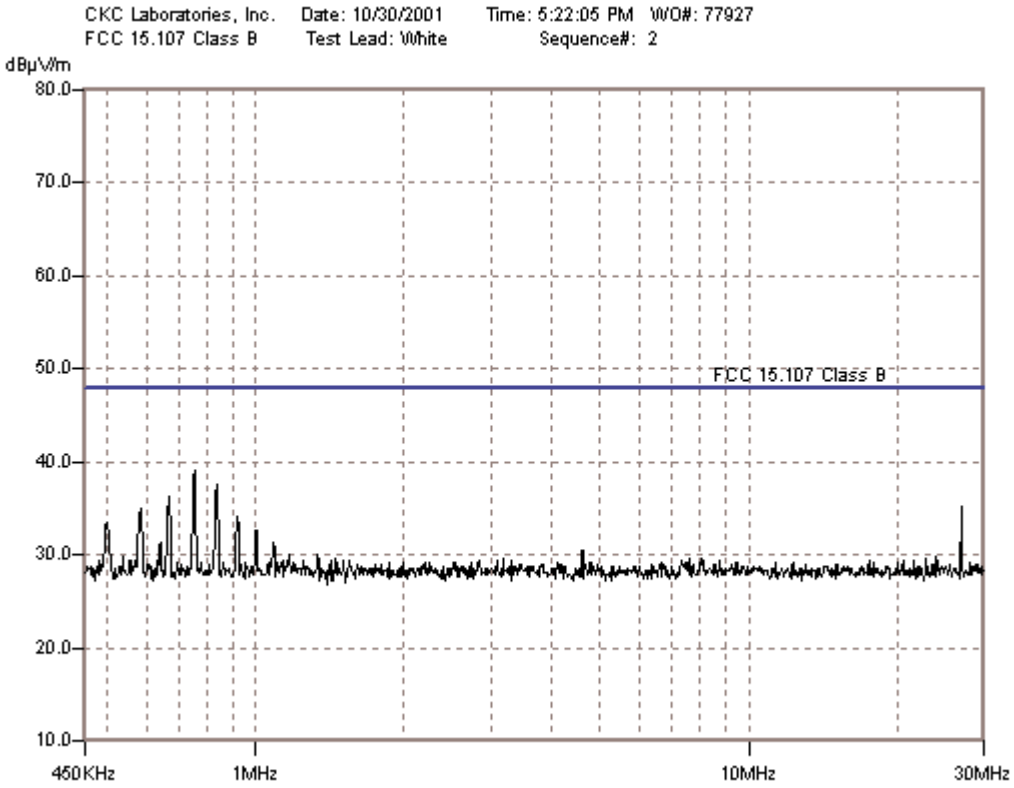
Test Conditions / Notes:

COMMENTS: Two FHSS transceivers are housed in the wall mount enclosure placed on the wooden table. Antenna 1 is connected to antenna port 1 and placed on top of the EUT. Antenna 2 is a short brass stub directly connected to antenna port #2. A remote laptop exercises remote transceiver #1 to establish communication with the EUT's transceiver #1. Remote transceiver #2 maintain RF link with the transceiver #2 of the EUT. 110Vac, 60 Hz, 20°C, 57% relative humidity.

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	750.888k	39.0					+0.0	39.0	48.0	-9.0	White
2	834.468k	37.6					+0.0	37.6	48.0	-10.4	White
3	668.980k	36.2					+0.0	36.2	48.0	-11.8	White
4	27.054M	35.2					+0.0	35.2	48.0	-12.8	White
5	583.728k	34.9					+0.0	34.9	48.0	-13.1	White
6	919.720k	34.1					+0.0	34.1	48.0	-13.9	White
7	500.148k	33.4					+0.0	33.4	48.0	-14.6	White
8	1.003M	32.7					+0.0	32.7	48.0	-15.3	White
9	641.398k	31.4					+0.0	31.4	48.0	-16.6	White
10	1.087M	31.3					+0.0	31.3	48.0	-16.7	White

11	4.595M	30.5	+0.0	30.5	48.0	-17.5	White
12	1.167M	30.1	+0.0	30.1	48.0	-17.9	White
13	1.336M	30.0	+0.0	30.0	48.0	-18.0	White
14	24.147M	29.9	+0.0	29.9	48.0	-18.1	White
15	536.923k	29.8	+0.0	29.8	48.0	-18.2	White


CKC Laboratories, Inc. Date: 10/30/2001 Time: 5:22:05 PM WO#: 77927
FCC 15.107 Class B Test Lead: White Sequence#: 2
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC 15.107 Class B
450KHz
1MHz
10MHz
30MHz

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Telstar Telecom, Inc.**
Specification: **FCC 15.109 Class B**
Work Order #: **77927** Date: 11/01/2001
Test Type: **Maximized Emissions** Time: 16:41:27
Equipment: **Wireless Data Terminal** Sequence#: 4
Manufacturer: Telstar Telecom, Inc. Tested By: Eddie Wong
Model: TS1000UT0
S/N: M0100002

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Wireless Data Terminal*	Telstar Telecom, Inc.	TS1000UT0	M0100002

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Dell	PPL	0006692D-12800-9B0-0094
Parallel Printer	Epson	P156A	CMR1545596

Test Conditions / Notes:

COMMENTS: Battery operated EUT is placed on the wooden table. The RS232 port of the EUT is connected to the serial port of a laptop. Connected to the laptop is a parallel printer. The laptop runs communication program to exercise the EUT via RS232. Wireless transceiver is removed from the EUT. 12VDC, 20°C, 64% relative humidity.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Bicon Pream dB	Log 3 dB	Cable dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	162.182M QP	49.7	+17.6 -28.3	+0.0	+0.3	+2.2	+0.0 280	41.5	43.5	-2.0	Horiz 150
^	162.192M	50.5	+17.6 -28.3	+0.0	+0.3	+2.2	+0.0 280	42.3	43.5	-1.2	Horiz 150
3	368.625M QP	50.0	+0.0 -28.2	+17.5	+0.3	+3.5	+0.0 116	43.1	46.0	-2.9	Horiz 109
^	368.625M	52.2	+0.0 -28.2	+17.5	+0.3	+3.5	+0.0 116	45.3	46.0	-0.7	Horiz 109
5	197.260M QP	47.1	+16.9 -28.4	+0.0	+0.3	+2.4	+0.0 -1	38.3	43.5	-5.2	Horiz 124
^	197.260M	50.5	+16.9 -28.4	+0.0	+0.3	+2.4	+0.0 -1	41.7	43.5	-1.8	Horiz 124
7	294.897M QP	43.6	+21.8 -28.3	+0.0	+0.3	+3.0	+0.0 245	40.4	46.0	-5.6	Horiz 228
^	294.907M	44.5	+21.8 -28.3	+0.0	+0.3	+3.0	+0.0 245	41.3	46.0	-4.7	Horiz 228
9	336.033M QP	45.1	+0.0 -28.2	+19.7	+0.3	+3.3	+0.0 240	40.2	46.0	-5.8	Horiz 136
^	336.015M	47.8	+0.0 -28.2	+19.7	+0.3	+3.3	+0.0 240	42.9	46.0	-3.1	Horiz 136
11	153.851M	45.7	+17.5 -28.4	+0.0	+0.2	+2.1	+0.0 158	37.1	43.5	-6.4	Horiz 134

12	333.432M	44.2	+0.0	+19.9	+0.3	+3.3	+0.0	39.5	46.0	-6.5	Horiz
	QP		-28.2				28				100
^	333.478M	45.4	+0.0	+19.9	+0.3	+3.3	+0.0	40.7	46.0	-5.3	Horiz
			-28.2				28				181
14	221.161M	47.6	+17.3	+0.0	+0.3	+2.4	+0.0	39.3	46.0	-6.7	Horiz
	QP		-28.3				200				155
^	221.174M	48.9	+17.3	+0.0	+0.3	+2.4	+0.0	40.6	46.0	-5.4	Horiz
			-28.3				200				155
16	117.979M	48.2	+14.9	+0.0	+0.2	+1.8	+0.0	36.7	43.5	-6.8	Vert
			-28.4				168				100
17	198.049M	45.6	+16.8	+0.0	+0.3	+2.4	+0.0	36.7	43.5	-6.8	Vert
			-28.4				99				100
18	353.890M	44.8	+0.0	+18.5	+0.3	+3.4	+0.0	38.8	46.0	-7.2	Horiz
			-28.2				120				130
19	186.110M	44.8	+17.1	+0.0	+0.3	+2.3	+0.0	36.2	43.5	-7.3	Horiz
			-28.3				332				200
20	147.447M	45.0	+17.3	+0.0	+0.2	+2.1	+0.0	36.2	43.5	-7.3	Horiz
			-28.4				361				148
21	147.431M	44.9	+17.3	+0.0	+0.2	+2.1	+0.0	36.1	43.5	-7.4	Vert
			-28.4				264				206
22	144.005M	44.7	+17.2	+0.0	+0.2	+2.1	+0.0	35.8	43.5	-7.7	Horiz
			-28.4				12				188
23	147.422M	44.6	+17.3	+0.0	+0.2	+2.1	+0.0	35.8	43.5	-7.7	Horiz
			-28.4				5				138
24	398.138M	47.0	+0.0	+15.6	+0.4	+3.6	+0.0	38.3	46.0	-7.7	Horiz
			-28.3				143				185
25	194.573M	44.5	+16.9	+0.0	+0.3	+2.4	+0.0	35.7	43.5	-7.8	Horiz
			-28.4				362				165
26	103.223M	49.8	+12.2	+0.0	+0.2	+1.7	+0.0	35.5	43.5	-8.0	Vert
			-28.4				17				100
27	243.380M	45.3	+17.7	+0.0	+0.3	+2.7	+0.0	37.8	46.0	-8.2	Horiz
			-28.2				361				127
28	199.838M	44.1	+16.8	+0.0	+0.3	+2.4	+0.0	35.2	43.5	-8.3	Vert
	QP		-28.4				38				100
^	199.853M	48.6	+16.8	+0.0	+0.3	+2.4	+0.0	39.7	43.5	-3.8	Vert
			-28.4				38				132
30	354.771M	43.7	+0.0	+18.4	+0.3	+3.4	+0.0	37.6	46.0	-8.4	Horiz
			-28.2				357				99
31	366.769M	44.1	+0.0	+17.6	+0.3	+3.5	+0.0	37.3	46.0	-8.7	Horiz
	QP		-28.2				120				100
^	366.772M	50.5	+0.0	+17.6	+0.3	+3.5	+0.0	43.7	46.0	-2.3	Horiz
			-28.2				120				100
33	162.182M	42.0	+17.6	+0.0	+0.3	+2.2	+0.0	33.8	43.5	-9.7	Vert
	QP		-28.3				361				100
^	162.218M	45.8	+17.6	+0.0	+0.3	+2.2	+0.0	37.6	43.5	-5.9	Vert
			-28.3				361				111
35	214.738M	42.0	+17.1	+0.0	+0.3	+2.4	+0.0	33.5	43.5	-10.0	Horiz
			-28.3				176				150
36	265.407M	41.4	+19.2	+0.0	+0.3	+2.9	+0.0	35.5	46.0	-10.5	Horiz
			-28.3				281				165
37	427.657M	43.2	+0.0	+15.9	+0.4	+3.8	+0.0	34.8	46.0	-11.2	Horiz
			-28.5				234				165

38	178.821M	40.2	+17.3 -28.2	+0.0	+0.3	+2.3	+0.0 283	31.9	43.5	-11.6	Horiz 100
39	442.346M	42.5	+0.0 -28.6	+16.1	+0.4	+3.9	+0.0 163	34.3	46.0	-11.7	Horiz 163
40	670.893M	35.1	+0.0 -27.9	+21.7	+0.4	+4.8	+0.0 103	34.1	46.0	-11.9	Vert 155
41	191.986M	39.7	+17.0 -28.3	+0.0	+0.3	+2.4	+0.0 241	31.1	43.5	-12.4	Horiz 100
42	383.362M	41.3	+0.0 -28.3	+16.5	+0.4	+3.5	+0.0 201	33.4	46.0	-12.6	Horiz 100
43	169.569M	38.7	+17.5 -28.2	+0.0	+0.3	+2.3	+0.0 153	30.6	43.5	-12.9	Horiz 192
44	188.168M	39.1	+17.1 -28.3	+0.0	+0.3	+2.4	+0.0	30.6	43.5	-12.9	Horiz 133
45	132.694M	38.1	+16.5 -28.4	+0.0	+0.2	+2.0	+0.0 245	28.4	43.5	-15.1	Vert 162
46	202.718M	37.1	+16.9 -28.4	+0.0	+0.3	+2.4	+0.0 281	28.3	43.5	-15.2	Horiz 150
47	197.098M QP	33.9	+16.9 -28.4	+0.0	+0.3	+2.4	+0.0 40	25.1	43.5	-18.4	Horiz 100
^	197.095M	38.4	+16.9 -28.4	+0.0	+0.3	+2.4	+0.0 239	29.6	43.5	-13.9	Horiz 100