

Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1

Telephone (416) 246-1116, Fax (416) 246-1020

TEST REPORT

REPORT DATE: April 11, 2000 REPORT NO: 20118D

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SUBMITTOR: ATLINKS USA Inc.
101 W 103rd St.
Indianapolis, IN
46290-1102 USA

SUBJECT: Model No: 27700XXX-A
FCC ID: G9H2-7700

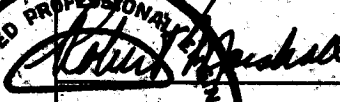
TEST SPECIFICATION: FCC CFR 47 15.233 AND 2.989
Sections: 15.35, 15.107, 15.109, 15.207 and 15.209
NOTE: Tests Conducted Are "Type" Tests.

DATE SAMPLE RECEIVED: N/A DATE TESTED: April 3, 2000

RESULTS: Equipment tested complies with referenced specification.

ALTERATIONS: NONE

Tested by: Timco Engineering, Inc.
Site Registration #95517

Approved and
Certified by: 
B. G. MARSHALL, P. Eng.
Date: April 12/00

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TECHNICAL REPORT - FCC 2.1033(b)

Applicant

ATLINKS USA Inc.
101 W 103rd. St.
Indianapolis, IN
46290-1102 USA

FCC Identifier

G9H2-7700

Manufacturer

Southern Telecommunication Development Co., Ltd.
Block 7, 21, Yunshan East Road, Jiangbei
Huizhou, Guangdong, The PRC

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APPENDIX D

(FCC Ref. 2.1033(b)(6))

"Report of Measurements"

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Appendix D(2) - Test Site Registration Letter

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EXHIBIT ATTACHMENTS:

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| EXHIBIT 12 a & b.... | POWER LINE CONDUCTED EMISSIONS |
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TEST EQUIPMENT LIST

1. X Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/ preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02, S/N 3008A00372 Cal. 10/17/99
2. Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
3. Signal Generator: HP 8614A, S/N 2015A07428 Cal. 5/29/99
4. Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N 9706-1211 Cal. 6/23/97
5. X Biconnical Antenna: Eaton Model 94455-1, S/N 1057
6. X Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
7. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153 Cal. 11/24/99
8. X Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180, 1-18 GHz, S/N 2319 Cal. 4/27/99
9. Horn 40-60GHz: ATM Part #19-443-6R
10. X Line Impedance Stabilization Network: Electro-Metrics Model ANS-25/2, S/N 2604 Cal. 2/9/00
11. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
12. AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
13. Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
14. Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
15. Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99
16. Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC. Shielded interface cables were used in all cases except for cables connecting to the telephone line and the power cords. A test program was run which simulated a normal data transmission on a network.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 76oF with a humidity of 55%.

BANDWIDTH 6.0dB: The measurements were made with the spectrum analyzer's resolution bandwidth(RBW)=1.0MHz and the video bandwidth(VBW)=3.0MHz and the span set as shown on plot.

POWER OUTPUT: The RF power output was measured at the antenna feed point using a peak power meter.

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ANTENNA CONDUCTED EMISSIONS: The RBW=100KHz, VBW=300KHz and the span set to 10.0MHz and the spectrum was scanned from 30MHz to the 10th Harmonic of the fundamental. Above 1.0GHz the resolution bandwidth was 1.0MHz and the VBW = 3.0MHz and the span to 50MHz.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth(RBW) of the spectrum analyzer was 100kHz up to 1GHz and 1.0MHz above 1GHz with an appropriate sweep speed. The VBW above 1.0GHz was = 3.0MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 71oF with a humidity of 56%.

PRODUCT DESCRIPTION:

The 27700XXX-A is a direct sequency spread spectrum cordless telephone radio that operates in the 2400-2483.5MHz band. The antenna used for the base and the handset is permanantly attached to the UUT. Its actual frequency range is;

| | |
|-------------|--------------------|
| Channel #1 | 2404.0MHz Lowest |
| Channel #40 | 2474.72MHz Highest |

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APPLICANT: MARSTECH LIMITED
FCC ID: 27700XXX-A - ASSEMBLY #1 AND #3
NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE
RULES PART NUMBER: 15.107(a)
REQUIREMENTS: .45 - 30 MHz 250 uV OR 47.96 dBuV
TEST PROCEDURE: ANSI STANDARD C63.4-1992. The spectrum
was scanned from .45 to 30 MHz.
TEST DATA:

THE HIGHEST EMISSION READ FOR LINE 1 WAS 12.0uV @ 9.55MHz.

THE HIGHEST EMISSION READ FOR LINE 2 WAS 2.69uV @ 27.64MHz.

THE GRAPHS IN EXHIBITS 12 a & b REPRESENT THE EMISSIONS TAKEN FOR THIS
DEVICE.

TEST RESULTS: Both lines were observed. The measurements in-
dicate that the unit DOES appear to meet the FCC requirements for this
class of equipment.

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NAME OF TEST: 6.0dB BANDWIDTH

RULES PART NUMBER: 15.247(a)(2)

REQUIREMENTS: The 6.0dB bandwidth must be greater than 500KHz.

MEASUREMENT: The 6.0dB bandwidth measured @ 2440.60MHz was
1.47MHz for the base.
The 6.0dB bandwidth measured @ 2440.60MHz was
1.60MHz for the handset.

MEASUREMENT DATA: The 6dB bandwidth was measured at the Low end of
band, middle of band, and the high end of the band for both the handset
& the base unit. See Plots in Exhibits #13 a-f,

NAME OF TEST: POWER OUTPUT

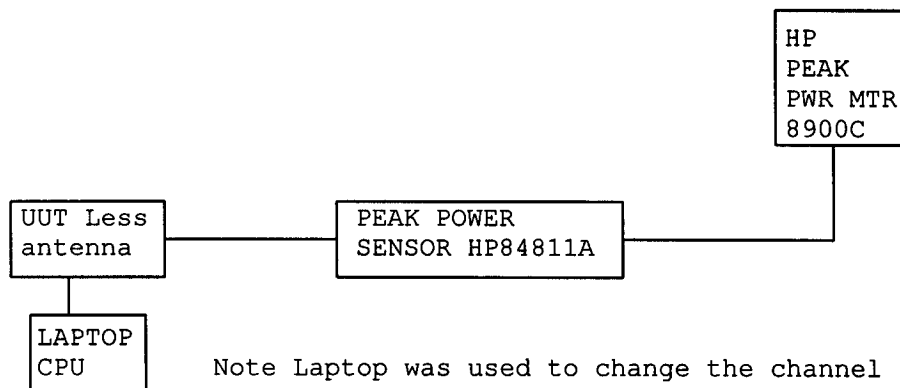
RULES PART NUMBER: 15.247(b) 1.0Watt or +30dBm

MEASUREMENT:

| Channel No. | Power Output milliwatts | Unit |
|-------------|----------------------------|---------|
| 1 | 5.60 | Base |
| 20 | 7.00 | Base |
| 40 | 10.0 | Base |
| 1 | 8.20 | Handset |
| 20 | 9.50 | Handset |
| 40 | 10.0 | Handset |

15.247(c) Method of Measuring RF Power output:

The antenna was disconnected and a Peak power Sensor was
connected in place of the antenna. The Power output was measured at
the Low end of band, middle of band, and the high end of the band
for both the handset & the base unit.



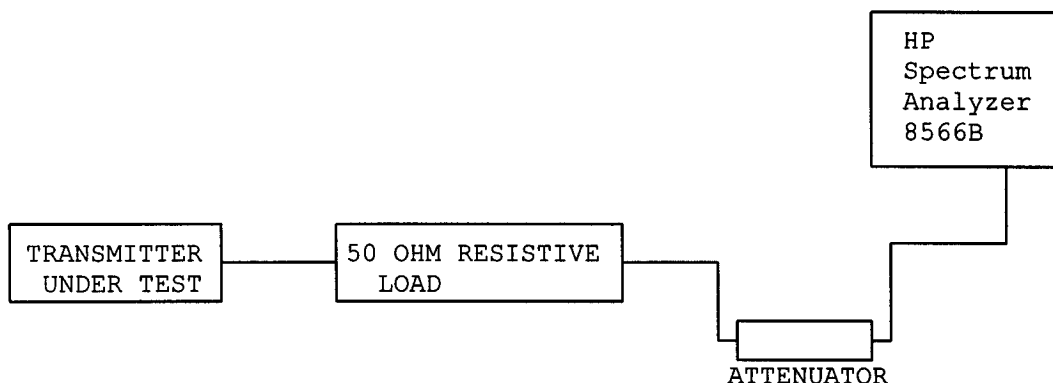
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15.247(c) Method of Measuring RF Conducted Spurious Emissions



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 100KHz

| | EMISSION FREQUENCY MHz | dB BELOW CARRIER |
|------------|------------------------------|---------------------|
| Channel 1 | 2404.0 | 00.0 |
| base | 4809.66 | -52.2 |
| | 7214.0 | -72.5 |
| Channel 20 | 2438.6 | 0.00 |
| | 4878.04 | -43.2 |
| Channel 40 | 2474.72 | 0.0 |
| | 4949.96 | -42.9 |
| HANDSET | | |
| Channel 1 | 2404.0 | 0.0 |
| | 4809.6 | -42.8 |
| | 7215.18 | -59.8 |
| Channel 21 | 2438.80 | 0.0 |
| | 4878.08 | -43.9 |
| | 7317.34 | -60.2 |
| Channel 40 | 2475.0 | 0.0 |
| | 4950.00 | -44.7 |
| | 7425.00 | -60.1 |

NOTE: THE SPECTRUM WAS SCANNED TO THE TENTH HARMONIC.

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15.247(c),15.205 &15.209(b) Field strength of spurious emissions:

REQUIREMENTS:

| | | |
|------------------|----------------|---------------------------|
| FIELD STRENGTH | FIELD STRENGTH | S15.209 |
| of Fundamental: | of Harmonics | 30 - 88 MHz 40 dBuV/m @3M |
| 902-928MHz | | 88 -216 MHz 43.5 |
| 2.4-2.4835GHz | | 216 -960 MHz 46 |
| 127.38dBuV/m @3m | 54 dBuV/m @3m | ABOVE 960 MHz 54dBuV/m |

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 50 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

REQUIREMENTS: Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

TEST DATA:

| EMISSION FREQUENCY MHz | METER READING @ 3m dBuV | COAX LOSS dB | ACF dB | FIELD STRENGTH dBuV/m | FCC. LIMIT dB | MARGIN dB | ANT. |
|------------------------------|-------------------------------|--------------------|-----------|-----------------------------|---------------------|--------------|------|
|------------------------------|-------------------------------|--------------------|-----------|-----------------------------|---------------------|--------------|------|

BASE

| | | | | | | | |
|----------|-------------|---------|-------|-------|--------|-------|---|
| 2404.65 | 62.70 | 1.09 | 29.01 | 92.80 | 127.38 | 34.58 | V |
| 2483.5 | 92.80dBuV/m | - 56.00 | | 36.80 | 54.00 | 17.20 | |
| 4809.80R | 1.60 | 1.45 | 33.91 | 36.96 | 54.00 | 17.04 | V |
| 7214.95 | 3.90 | 1.81 | 36.62 | 42.33 | 54.00 | 11.67 | H |
| 9619.44 | 1.80 | 2.11 | 38.58 | 42.48 | 54.00 | 11.52 | H |
| | | | | | | | |
| 2438.82 | 63.10 | 1.10 | 29.10 | 93.29 | 127.38 | 34.09 | V |
| 2483.5 | 93.29dBuV/m | - 53.80 | | 39.49 | 54.00 | 14.51 | |
| 4878.22R | 3.10 | 1.46 | 33.99 | 38.55 | 54.00 | 15.45 | V |
| 7316.74R | 12.10 | 1.83 | 36.73 | 50.66 | 54.00 | 3.34 | V |
| 9756.20 | 0.70 | 2.12 | 38.67 | 41.49 | 54.00 | 12.51 | V |
| | | | | | | | |
| 2474.71 | 62.90 | 1.10 | 29.19 | 93.19 | 127.38 | 34.19 | V |
| 2483.5 | 93.19dBuV/m | - 52.60 | | 40.59 | 54.00 | 13.41 | |
| 4949.74R | -0.10 | 1.47 | 34.07 | 35.44 | 54.00 | 18.56 | V |
| 7424.92R | 7.70 | 1.84 | 36.85 | 46.40 | 54.00 | 7.60 | V |
| 9900.48 | -1.00 | 2.14 | 38.76 | 39.90 | 54.00 | 14.10 | V |

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TEST DATA:

| EMISSION FREQUENCY MHz | METER READING @ 3m dBuV | COAX LOSS dB | ACF dB | FIELD STRENGTH dBuV/m | FCC. LIMIT dB | MARGIN dB | ANT. |
|------------------------------|-------------------------------|--------------------|-----------|-----------------------------|---------------------|--------------|------|
|------------------------------|-------------------------------|--------------------|-----------|-----------------------------|---------------------|--------------|------|

HANDSET

| | | | | | | | |
|----------|-------------|---------|-------|-------|--------|-------|---|
| 2405.40 | 44.30 | 1.09 | 29.01 | 74.40 | 127.38 | 52.98 | H |
| 2483.5 | 74.40dBuV/m | - 53.40 | | 21.00 | 54.00 | 33.00 | |
| 4809.80R | 8.40 | 1.45 | 33.91 | 43.76 | 54.00 | 10.24 | H |
| 7214.70 | 0.30 | 1.81 | 36.62 | 38.73 | 54.00 | 15.27 | H |
| 9619.60 | 7.60 | 2.11 | 38.58 | 48.28 | 54.00 | 5.72 | H |
| 2438.71 | 49.50 | 1.10 | 29.10 | 79.69 | 127.38 | 47.69 | H |
| 2483.5 | 79.69dBuV/m | - 55.50 | | 24.19 | 54.00 | 29.81 | |
| 4878.25R | 12.70 | 1.46 | 33.99 | 48.15 | 54.00 | 5.85 | H |
| 7317.30R | 2.60 | 1.83 | 36.73 | 41.16 | 54.00 | 12.84 | H |
| 9756.43 | 8.80 | 2.12 | 38.67 | 49.59 | 54.00 | 4.41 | H |
| 2474.71 | 49.50 | 1.10 | 29.19 | 79.79 | 127.38 | 47.59 | V |
| 2483.5 | 79.79dBuV/m | - 50.60 | | 29.19 | 54.00 | 24.81 | |
| 4949.74R | 10.20 | 1.47 | 34.07 | 45.74 | 54.00 | 8.26 | H |
| 7425.31R | 5.90 | 1.84 | 36.85 | 44.60 | 54.00 | 9.40 | V |
| 9900.44 | 8.20 | 2.14 | 38.76 | 49.10 | 54.00 | 4.90 | H |

The plots of the Delta attenuation from the channel to the edge of the restricted band of 2483.5MHz are attached as exhibits 14 a-f.

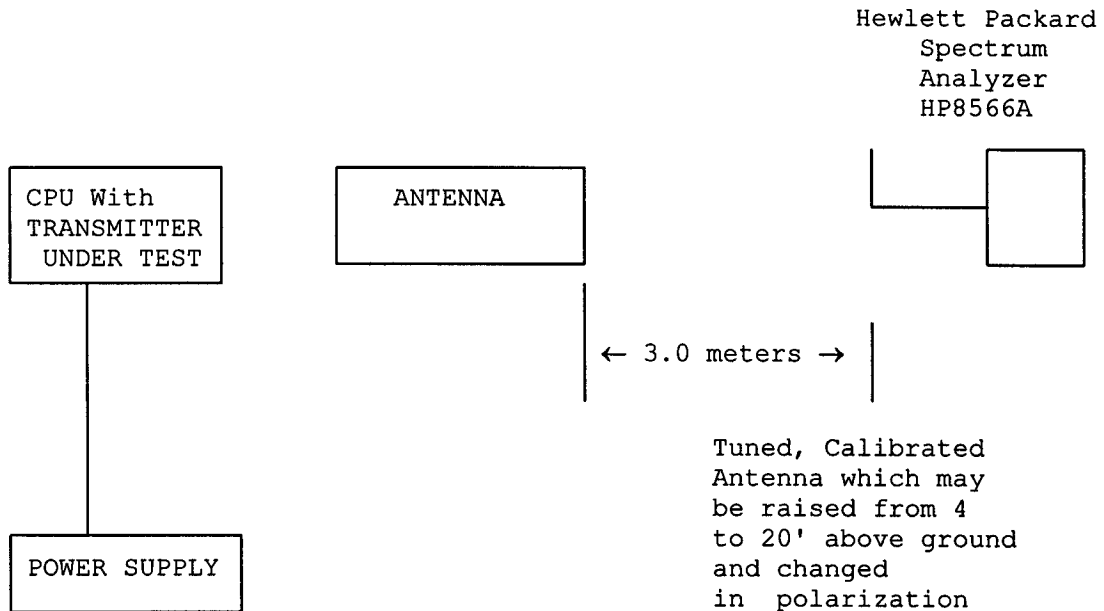
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2.993(a)(b)

2.993(a)(b) Continued Field strength of spurious emissions:

METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-1992 & the Guidance on Measurements for Direct Sequence Spread Spectrum Systems. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, NEWBERRY, FL 32669.

Method of Measuring Radiated Spurious Emissions



Equipment placed 4' above ground on a rotatable platform.

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APPLICANT: MARSTECH LIMITED

FCC ID: 27700XXX-A

NAME OF TEST: POWER SPECTRAL DENSITY

RULES PART NUMBER: 15.247(d)

REQUIREMENTS: The peak level measured must be no greater than +8.0dBm.

DATA: THE PLOTS ARE SHOWN IN EXHIBIT 15.

BASE UNIT The HIGHEST level was at 24789.41MHz +5.0dBm. The antenna was disconnected and the output was connected to a coaxial attenuator and to the Spectrum analyzer and the power spectral density was measured at the Low end of band, middle of band, and the high end of the band for both the handset & the base unit. The plots of the power spectral power density for the low end of the band, middle of the band, and the high end of the band for both the handset & the base are attached as exhibit 15 a-f.

RULES PART NUMBER: 15.247(e)

REQUIREMENTS:

DATA: The processing gain information supplied by the manufacturer is 12.0dB.

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NAME OF TEST: ANTENNA GAIN

RULES PART NUMBER: 15.247 (b) (3)

REQUIREMENTS: Antenna gain may not exceed 6 dBi without reducing peak power.

DATA: HANDSET: 0 dBi

 BASE: 0 dBi

APPLICANT: THOMSON CONSUMER ELECTRONICS

FCC ID: 27701XXX-M

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