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APPLICANT: HYBRID TELECOM, INC.  
FCC ID: OUJCYTEL-1900  
REPORT #: T:\CUS\H\HYBRID\HYB467B9\HYB467B9.RPT  
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SECURITY CODING INFORMATION

15.214(d) - THIS DEVICE COMPLIES WITH THE SECURITY CODE REQUIREMENTS OF 15.214(d)(1)(2) AND (3) BY MEANS OF THE FOLLOWING:

THIS PHONE IS EQUIPPED WITH A DIGITAL SECURITY SYSTEM WITH OVER 1 MILLION CODE COMBINATIONS.

WHEN MAKING A CALL, THE TELEPHONE SEARCHES THROUGH ITS 60 AVAILABLE CHANNELS AUTO CHANNEL SCAN TO FIND THE CLEAREST ONE.

THE RECEIVER PORTION OF THIS TELEPHONE, FCC ID: OUJCYTEL-1900, WAS TESTED WITH PASSING RESULTS. A VERIFICATION REPORT HAS BEEN ISSUED PER FCC RULES PART 15.109.

TEST EQUIPMENT LIST

1. 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. Biconical Antenna: Eaton Model 94455-1, S/N 1057
6. 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. 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. Line Impedance Stabilization Network: Electro-Metrics Model FCC-25/2, S/N 2512 Cal. 11/18/99
11. Line Impedance Stabilization Network: Electro-Metrics Model ANS-25/2, S/N 2604 Cal. 11/30/99
12. Line Impedance Stabilization Network: Electro-Metrics Model EM-7820, S/N 2682 Cal. 12/1/99
13. Line Impedance Stabilization Network: Electro-Metrics Model EM-7821, S/N 101 Cal. 12/1/99
14. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
15. AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
16. Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
17. Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
18. Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99
19. 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.

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#### TEST PROCEDURE (CONT)

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz. Above 1.0GHz the RBW = 1.0MHz and the VBW=3.0MHz. The ambient temperature of the UUT was 53oF with a humidity of 70%.

ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The UUT was placed flush with the back of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSI C63.4-1992 with the EUT 40 cm from the vertical ground wall.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF = FS  
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 53oF with a humidity of 70%.

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APPLICANT: HYBRID TELECOM, INC.  
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CIRCUIT\_DESCRIPTION:

RF UNIT

The incoming signal comes in on the antenna and is fed through the duplexer to the bandpass filter (BPF) then to the LNA, and then to a another bandpass filter. The frequency range of the base receiver is 926.12-927.29MHz and the transmitter is 902.12-903.29MHz. On the handset the frequencies are reversed from the base unit. From the bandpass filter the signal is fed to the mixer, which converts the signal down to 10.7MHz. From 1st mixer the signal is fed to the IF filter MCF and then to the intergrated circuit that makes up the balance of the receiver. The RF channels are generated from the PLL IC303. IN the transmit mode the signal from the PLL is fed into the Frequency amplifier and the to the power amplifier and then through a BPF and then to the antenna.

MICROPROECESSOR UNIT The received is fed into a amplifier IC4b & IC4c and also to an expander. The amplified data is fed in to the MPU where the audio and signaling codes are decoded. If the MPU has received the proper signal it will then perform its proper functions like going off-hook and dialing a phone number. In the telephone answer mode the base will receive the ring signal and the MPU will cause the transmitter to come on and transmit a ringing signal to the handset. When the handset is answered the handset will send the correct signal with security code to the base unit. If it is a proper security signal then the base will decode and put the telephone into an off-hook mode.

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APPLICANT: HYBRID TELECOM, INC.  
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CIRCUIT\_DESCRIPTIONS CONTD.

HANDSET

The incoming signal comes in on the antenna and is fed through the duplexer to the LNA, Q100 and then to a SAW 903MHz bandpass filter. The frequency range of the handset receiver is 902-904MHz. From the bandpass filter the signal is fed to the mixer, Q101 which converts the signal down to 26.05MHz. From Q101 the signal is fed to the IF filter FL102 and then to the integrated circuit U100. In the U100 the signal is converted down to 450KHz and then to the detector for FM signal. From the detector, p/o U100 the audio is fed to a low pass filter and to the RING Detector Indicator. From the low pass filter the audio is fed simultaneously to the earphone element and to the CPU, U101. The earphone audio is fed into U2 and then to U4 then to the receiver element, RC1. The CPU uses the data to continuously monitor the security code.

The transmitter frequency range is 926-928MHz. The outgoing audio is picked up by the microphone and fed to the audio integrated circuit U2. This audio integrated circuit feeds a low pass filter then feed the signal to the VCO, VT. From the VCO the signal is fed in to the amplifier Q107 and Q108 to the duplexer and then to the antenna.

ANTENNA\_AND\_GROUND\_CIRCUITRY

This unit makes use of a short, antenna. The antenna is inductively coupled. The antenna is self contained, no provision is made for an external antenna.

No ground connection is provided. The unit relies on the ground tract of the printed circuit board.

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APPLICANT: HYBRID TELECOM, INC.

FCC ID: OUJCYTEL-1900 (BASE)

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.249

REQUIREMENTS: Carrier frequency will not exceed 94.0 dBuV/m

FREQUENCY	LEVEL
MHz	dBuV/M
902- 928 MHz	54.0 dBuV/M
ABOVE 960 MHz	54.0 dBuV/M

BASE FREQUENCY RANGE: 902.10-905.00 MHz

TEST DATA:

EMISSION FREQUENCY MHz	METER READING dBuV	COAX LOSS dB	ANTENNA CORRECTION FACTOR	FIELD STRENGTH dBuV/m@3m	MARGIN dB	ANT. POL.
902.81	65.70	2.90	24.19	92.79	1.21	V
1805.60	24.40	1.00	27.22	52.62	1.38	V
2708.00	6.70	1.14	29.77	37.61	16.39	V
3611.00	4.00	1.27	32.03	37.30	16.70	V
904.72	64.90	2.90	24.18	91.98	2.02	V
1809.44	22.90	1.00	27.24	51.14	2.86	V
2714.16R	5.80	1.14	29.79	36.72	17.28	V
3618.88R	3.80	1.27	32.05	37.12	16.88	V

SAMPLE CALCULATION:  $FS_{dBuV/m} = MR_{(dBuV)} + ACF_{dB}$ .

METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD. Measurements were made at Timco Engineering, Inc. 6051 N.W. 19th Lane, Gainesville, FL 32605.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: \_\_\_\_\_ DATE: DECEMBER 9, 1999

APPLICANT: HYBRID TELECOM, INC.  
FCC ID: OUJCYTEL-1900 (HANDSET)  
NAME OF TEST: RADIATION INTERFERENCE PAGE 1 OF 1  
RULES PART NO.: 15.249  
REQUIREMENTS: Carrier frequency will not exceed 94.0 dBuV/m

FREQUENCY	LEVEL
MHz	dBuV/M
902- 928 MHz	54.0 dBuV/M
ABOVE 960 MHz	54.0 dBuV/M

HANDSET FREQUENCY RANGE: 924.00-927.00 MHz

TEST DATA:

EMISSION FREQUENCY MHz	METER READING dBuV	COAX LOSS dB	ANTENNA CORRECTION FACTOR	FIELD STRENGTH dBuV/m@3m	MARGIN dB	ANT. POL.
HANDSET TUNED FREQUENCY 925.11MHz						
925.31	57.10	2.90	24.10	84.10	9.90	H
1850.00	8.20	1.01	27.40	36.61	17.39	V
2776.00	3.30	1.15	29.94	34.39	19.61	V
926.45	56.90	2.90	24.11	83.91	10.09	H
1852.90	8.10	1.01	27.41	36.52	17.48	V
2779.35R	3.00	1.15	29.95	34.10	19.90	V

SAMPLE CALCULATION:  $FS_{dBuV/m} = MR_{(dBuV)} + ACF_{dB}$ .

METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-1992 with the following exception: the unit was operated into its own antenna with the antenna at a height of four feet. Measurements were made at Timco Engineering, Inc. 6051 N.W. 19th Lane, Gainesville, FL 32605.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: \_\_\_\_\_ DATE: DECEMBER 9, 1999

APPLICANT: HYBRID TELECOM, INC.

FCC ID: OUJCYTEL-1900

NAME OF TEST: Occupied Bandwidth

RULES PART NO.: 15.233

REQUIREMENTS: The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits of 15.209, whichever permits the higher emission levels.

THE GRAPHS IN EXHIBITS 17A-17D REPRESENT THE EMISSIONS TAKEN FOR THIS DEVICE.

METHOD OF MEASUREMENT: A small sample of the transmitter output was fed into the spectrum analyzer and the above photo was taken. The vertical scale is set to -10 dBm per division. The horizontal scale is set to 5 kHz per division.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: \_\_\_\_\_ DECEMBER 9, 1999

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APPLICANT: HYBRID TELECOM, INC.

FCC ID: OUJCYTEL-1900

NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE

RULES PART NUMBER: 15.207

MINIMUM REQUIREMENTS: FREQUENCY LEVEL  
\_\_\_\_MHz\_\_\_\_ uV  
0.450-30 250

TEST PROCEDURE: ANSI STANDARD C63.4-1992

THE HIGHEST EMISSION READ FOR LINE 1 WAS 16.768 uV @ 28.94 MHz.

THE HIGHEST EMISSION READ FOR LINE 2 WAS 14.604 uV @ 28.88.

THE GRAPHS IN EXHIBITS 16A-16B REPRESENT THE EMISSIONS READ FOR POWERLINE CONDUCTED FOR THIS DEVICE.

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

PERFORMED BY: \_\_\_\_\_ DATE: DECEMBER 9, 1999

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