MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **Schlumberger Technologies**

MODEL: **Magic 9000 Base**

FCC ID: **NIQM9KRFBASE**

DATE: **September 22, 1998**

This report concerns (check one): Original grant_X_
Class II change_____

Equipment type: **Low Power Transmitter**

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No_X_

If yes, defer until:_____
date

__N.A.__ agrees to notify the Commission by__N.A.____
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

United States Technologies, Inc.
3505 Francis Circle
Alpharetta, GA 30004

Phone Number: (770) 740-0717
Fax Number: (770) 740-1508

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

FIGURES

TABLES

GENERAL INFORMATION

Product Description

The Equipment Under Test (EUT) is a Schlumberger Technologies 906.7 - 910.3 MHz Transceiver, Model Magic 9000 Base. The EUT is part of a system including a 906.7 - 910.3 MHz handset transceiver. The handset and base are used as point of sale terminals. The following page from Schlumberger supplies information regarding the antenna (This has been provided in a separate file).

Related Submittal(s)/Grant(s)

The EUT will be used with part of a system to send/receive data. The transceiver presented in this report will be used with one transceiver which has been submitted under FCC ID: NIQM9KRFHNDSET.

TESTS AND MEASUREMENTS

Configuration of Tested System

The sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992). Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are shown in Figure 2.

Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and submitted to the FCC, and accepted in their letter marked 31040/SIT. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number IC2982.

Test Equipment

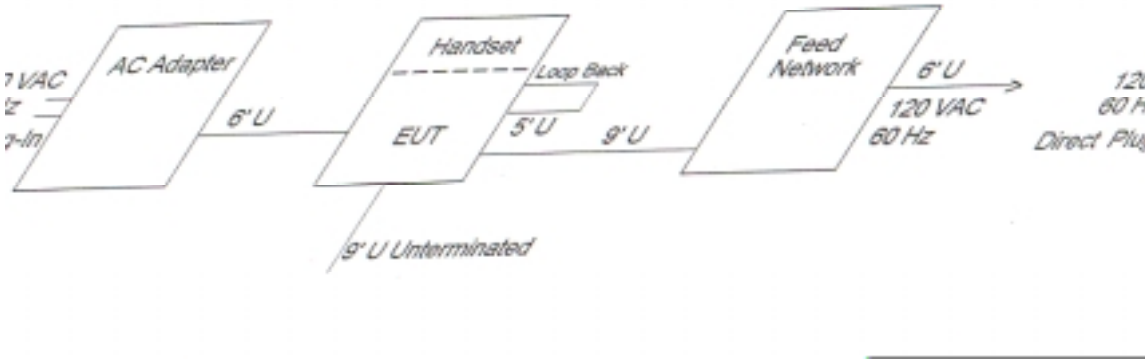
Table 2 describes test equipment used to evaluate this product.

Modifications

No modifications were made by US Tech, to bring the EUT into compliance with FCC Part 15, Class B Limits for the transmitter portion of the EUT or the Class A Digital Device Requirements.

FIGURE 1

TEST CONFIGURATION



NOTE: Handset positioned ON or OFF base as appropriate for each test

Test Date: August 17, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

FIGURE 2

Photograph(s) for Spurious and Fundamental Emissions

These have been provided in additional files (3 photos)

TABLE 1

EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Point Of Sale Terminal Base Schlumberger Technologies (EUT)	Magic 9000	Base	NIQM9KRFBASE (Pending)	9' U 9' U 5' U Loop Back
Hand Set Schlumberger Technologies (EUT)	Magic 9000 Handset	Handset	NIQM9KRHNDSET (Pending)	None
AC Adapter Sceptre	AEC-4812A	1398K	None	120 VAC 60 Hz Direct Plug-In
Feed Network US Tech	None	None	None	6' U 120 VAC 60 Hz Source

TABLE 2

TEST INSTRUMENTS

TYPE	MANUFACTURER	MODEL	SN.
SPECTRUM ANALYZER	HEWLETT-PACKARD	8593E	3205A00124
SPECTRUM ANALYZER	HEWLETT-PACKARD	8558B	2332A09900
S A DISPLAY	HEWLETT-PACKARD	853A	2404A02387
COMB GENERATOR	HEWLETT-PACKARD	8406A	1632A01519
RF PREAMP	HEWLETT-PACKARD	8447D	1937A03355
RF PREAMP	HEWLETT-PACKARD	8449B	3008A00480
HORN ANTENNA	EMCO	3115	3723
BICONICAL ANTENNA	EMCO	3110	9307-1431
LOG PERIODIC ANTENNA	EMCO	3146	9110-3600
LISN	SOLAR ELE.	8012	865577
LISN	SOLAR ELE.	8028	910494
LISN	SOLAR ELE.	8028	910495
THERMOMETER	FLUKE	52	5215250
MULTIMETER	FLUKE	85	53710469
FUNCTION GENERATOR	TEKTRONIX	CFG250	CFG250TW15059
PLOTTER	HEWLETT-PACKARD	7475A	2325A65394
BILOG	CHASE	CBL6112A	2238

Field Strength of Fundamental Emission (47 CFR 15.249a)

Measurements were made using a peak detector. Field strength of the peak fundamental emission is shown in Table 3 and Figure 4.

TABLE 3a

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: August 17, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Channel 0 - Low

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
906.7	-49.7	30.7	25,160.5	50,000

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-49.7 + 30.7 + 107)/20) = 25,160.5
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By
Signature: _____ **Name:** Brian Parks

TABLE 3b

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: August 17, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Channel 4 - Mid

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
908.3	-48.9	30.8	27,751.1	50,000

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-48.9 + 30.8 + 107)/20) = 27,751.1
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By
Signature: _____ **Name:** Brian Parks

TABLE 3c

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: August 17, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Channel 9 - High

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
910.3	-48.6	30.8	28,938.8	50,000

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-48.6 + 30.8 + 107)/20) = 28,938.8
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By
Signature: _____ **Name:** Brian Parks

FIGURE 4a

FIELD STRENGTH OF FUNDAMENTAL EMISSION 15.249(a)
CHANNEL 0 - LOW

Refer to file fig4a.jpg

FIGURE 4b

FIELD STRENGTH OF FUNDAMENTAL EMISSION 15.249(a)
CHANNEL 4 - MID

Refer to file fig4b.jpg

FIGURE 4c

FIELD STRENGTH OF FUNDAMENTAL EMISSION 15.249(a)
CHANNEL 9 - HIGH

Refer to file fig4c.jpg

Field Strength Of Spurious Emissions (47 CFR 15.249a)

Measurements were made using a peak detector. Field strength of Spurious Emissions are shown in Table 4 and Figures 5. For comparison to the average limits, duty cycle corrections were made as given in the previous section. Any emission less than 1000 MHz and falling within the restricted bands of 15.205 were not adjusted for averaging and the limits of 15.209 were applied.

TABLE 4a

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: August 17, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Channel 0 - Low

FREQ. (MHz.)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION - AMP GAIN	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
1813.25	-58.1	-3.8	180.7	500.0
2719.83**	-60.1	0.6	237.4	500.0

***Data adjusted by 1 dB for High Pass Filter loss**

**** Denotes restricted band of operation**

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-58.1 + -3.8 + 107)/20) = 180.7
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By
Signature: _____ **Name:** Brian Parks

TABLE 4b

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: August 17, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Channel 4 - Mid

FREQ. (MHz.)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION - AMP GAIN	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
1816.50	-58.2	-3.8	179.9	500.0
2724.68**	-60.6	0.6	224.1	500.0

***Data adjusted by 1 dB for High Pass Filter loss**

**** Denotes restricted band of operation**

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-58.2 + -3.8 + 107)/20) = 179.9
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By
Signature: _____ **Name:** Brian Parks

TABLE 4c

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: August 17, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Channel 9 - High

FREQ. (MHz.)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION - AMP GAIN	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
1820.49	-59.1	-3.8	162.2	500.0
2730.71**	-60.6	0.6	224.4	500.0

***Data adjusted by 1 dB for High Pass Filter loss**

**** Denotes restricted band of operation**

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-59.1 + -3.8 + 107)/20) = 162.2
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By
Signature: _____ **Name:** Brian Parks

FIGURE 5a

SPURIOUS EMISSIONS 15.249(a)
CHANNEL 0 - LOW

Refer to file fig5a.jpg

FIGURE 5b

SPURIOUS EMISSIONS 15.249(a)
CHANNEL 0 - LOW

Refer to file fig5b.jpg

FIGURE 6a

SPURIOUS EMISSIONS 15.249(a)
CHANNEL 4 - MID

Refer to file fig6a.jpg

FIGURE 6b

SPURIOUS EMISSIONS 15.249(a)
CHANNEL 4 - MID

Refer to file fig6b.jpg

FIGURE 7a

SPURIOUS EMISSIONS 15.249(a)
CHANNEL 9 - HIGH

Refer to file fig7a.jpg

FIGURE 7b

SPURIOUS EMISSIONS 15.249(a)
CHANNEL 9 - HIGH

Refer to file fig7b.jpg

Radiated Emissions (47 CFR 15.109a)

Radiated emissions were evaluated from 30 to 5000 MHz. Measurements were made with the analyzer's bandwidth set to 120 kHz. Emissions are shown in Table 6.

TABLE 6a

CLASS A
RADIATED EMISSIONS

Test Date: September 3, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

FREQ. (MHz)	TEST DATA (dBm) @ 10m	ANT. FACTOR + CABLE ATTEN.	RESULTS (uV/m) @ 10m	FCC LIMITS (uV/m) @ 10m	MARGIN BELOW FCC LIMIT
30.0	-90.0	15.0	39.8	90.0	7.1
32.0	-90.0	14.5	37.8	90.0	7.5
35.5	-89.0	13.7	38.6	90.0	7.3
41.6	-89.0	12.5	33.5	90.0	8.6
44.1	-88.0	12.2	36.3	90.0	7.9
49.6	-86.0	11.5	42.4	90.0	6.5
53.8	-89.0	11.5	29.7	90.0	9.6

SAMPLE CALCULATIONS:

RESULTS uV/m @ 10m = Antilog ((-90.0 + 15.0 + 107)/20) = 39.8
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By
Signature: _____ **Name:** Brian Parks

TABLE 6b

CLASS A
RADIATED EMISSIONS

Test Date: September 3, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Measurements >1GHz

FREQ. (GHz)	TEST DATA (dBm) @ 3m	AMP GAIN	ANT. FACTOR	CABLE LOSS	RESULTS (uV/m) @ 10m	FCC LIMITS (uV/m) @ 10m
1.79	-54.8	35.1	28.3	3.0	78.2	300.0
2.69	-58.2	34.6	31.4	3.8	88.2	300.0

SAMPLE CALCULATIONS:
Results uV/m @10m = Antilog ((-54.8 - 35.1 + 28.3 + 3.0 - 10.46 + 107)(20) = 78.2
Conversion from dB to dBuV = 107 dB
Correction for 3m to 10m = 20log (3/10) = -10.46

Tested By
Signature: _____ **Name:** Brian Parks

Power Line Conducted Emissions (47 CFR 15.107a & 15.207)

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are recorded, data is shown in Table 7.

TABLE 7

CLASS B
CONDUCTED EMISSIONS

Test Date: September 3, 1998
UST Project: 98-385
Customer: Schlumberger Technologies
Model: Magic 9000 Base

Worse case mode of operation = Handset removed from base

FREQUENCY (MHz)	TEST DATA (dBm)		RESULTS (uV)		FCC LIMITS (uV)
	PHASE	NEUTRAL	PHASE	NEUTRAL	
0.45	-62.0	-64.0	177.8	141.3	250
6.5	-76.0	-74.0	35.5	44.7	250
12.0	-70.0	-69.0	70.8	79.4	250
22.1	-69.0	-73.0	79.4	50.1	250
24.8	-70.0	-77.0	70.8	31.6	250
27.5	-68.0	-69.0	89.1	79.4	250

SAMPLE CALCULATIONS:

RESULTS uV = Antilog ((-62.0 + 107)/20) = 177.8
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By: _____ **Name:** Brian Parks

PHOTOS OF THE TESTED EUT

The following photos are attached:

Photo 1. EUT, Both Handset and Base Together
Photo 2. EUT, Base Only, Front View
Photo 3. EUT, Base Only, Rear View
Photo 4. EUT, Base Only, Showing Ports on Rear of Unit
Photo 5. EUT, Case Open, Showing Digital Board and Antenna Board
Photo 6. EUT, Case Open, Showing Position of Transmitter Board
Photo 7. Digital Board, Top View
Photo 8. Digital Board, Bottom View
Photo 9. Top View of TX Board - Shield Installed
Photo 10. Top View of TX Board - Shield Removed
Photo 11. Bottom View of TX Board
Photo 12. Top View of Antenna Board
Photo 13. Bottom View of Antenna Board

These have been provided in separate files