March 15, 2001

Mr. Scott Swanson
Senior Design Engineer
Schlumberger Resource Management Services, Inc.
313-B North Highway 11
West Union, SC 29696

Dear Mr. Swanson:

Enclosed please find Schlumberger Resource Management Services, Inc. file copy of the Part 15 Certification Application for the R300C Transmitter.

Schlumberger should expect to receive a certification grant for this product within the next 1-2 weeks.

If you have any questions, please don't hesitate to call. Thank you for your business.

Sincerely,

Timothy R. Johnson
NARTE Certified EMC Engineer
No. EMC-002205-NE

Schlumberger Resource
Management Services, Inc.
FCC Part 15, Certification Application
R300C

March 15, 2001

MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **Schlumberger Resource Management Services, Inc.**

MODEL: **R300C**

FCC ID: **F9CR300C-1**

DATE: **March 15, 2001**

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

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SECTION 1

GENERAL INFORMATION

GENERAL INFORMATION

1.1 Product Description

The Equipment Under Test (EUT) is a Schlumberger Resource Management Services, Inc., Model R300C. The R300C is a Centron solid state residential watt-hour meter (with a Time of Use/Demand register) combined with an RF Transmitter Model R300 Demand. The combined RF transmitter and meter are collectively referred to as a model R300C. The R300C periodically transmits the meter reading and an ID number to utility data collectors that may be stationary, handheld, or vehicular mounted. Operation is one way, as the R300 Demand does not receive. The R300C may contain an optional solid state relay output, which is not related to the RF operation.

The R300 Demand is a low power frequency hopping spread spectrum RF transmitter, however because the receivers that are used with this transmitter do not meet with the spread spectrum receiver requirements of 15.247, the transmitter has been designed to meet the requirements of 15.249. The R300 Demand physically consists of two small circuit boards. The RF control board has a linear power supply, a microprocessor, and the optional relay output. The RF transmit board has an RF oscillator and a stripline antenna

The EUT transmits on 32 different frequencies between 912 to 918 MHz. These frequencies are selected by changing the DC bias in a portion of the transmitter circuitry. Since the frequencies are not digitally controlled, the frequency accuracy of the transmitter will be approximately ±0.5 MHz.

Schlumberger plans to sell the R300C as a whole, but the R300 Demand may also be offered as an upgrade to the following model meters: C1ST, C1SL, CN1ST, or CN1SL. Since the differences between the 4 meter models are not considered to affect the transmitter board, a typical model C1ST was selected and used for all testing.

1.2 Related Submittal(s)/Grant(s)

The EUT will be used with part of a system to send/receive data. The transmitter presented in this report will be used with receivers which have been previously approved.

The EUT is subject to the following authorizations:

a) Certification as a transmitter
b) Verification as a digital device

The information contained in this report is presented for the certification & verification authorization(s) for the EUT.

SECTION 2

TESTS AND MEASUREMENTS

TEST AND MEASUREMENTS

2.1 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. 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.

The sample used for testing was received by U.S. Technologies on January 23, 2001 in good condition.

2.2 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.

2.3 Test Equipment

Table 2 describes test equipment used to evaluate this product.

2.4 Modifications

To bring the EUT into compliance with FCC Part 15 limits for the transmitter portion of the EUT, the following modifications were made by Schlumberger Resource Management Services, Inc.:

1) R7 was changed from 82 Ohms to 130 Ohms as shown in the ECO on the next page.

Number: ELE02115 ID: Database: PCO
Type: ELEC-PWB Design Group: CADD Created By: hamby 01/24/01

Title: spl r300c rf board (442357)
Reason: Per S Swanson, change r7 from 82 ohms to 130 & change part number from 512362-820 to 512362-131.

Class: User Code [1]:
Originator: User Code [2]:

Expected Cost: 0.00 Mandatory:
Routing Slip: ELEC-PWB Submitted: 01/24/01
Distribution: PWB ASSY Approved: 02/10/01
Disposition: Released: 02/14/01
Effective: 02/19/01
Closed: yes Implemented: 02/20/01
PCO Ref: Closed Date: 02/20/01

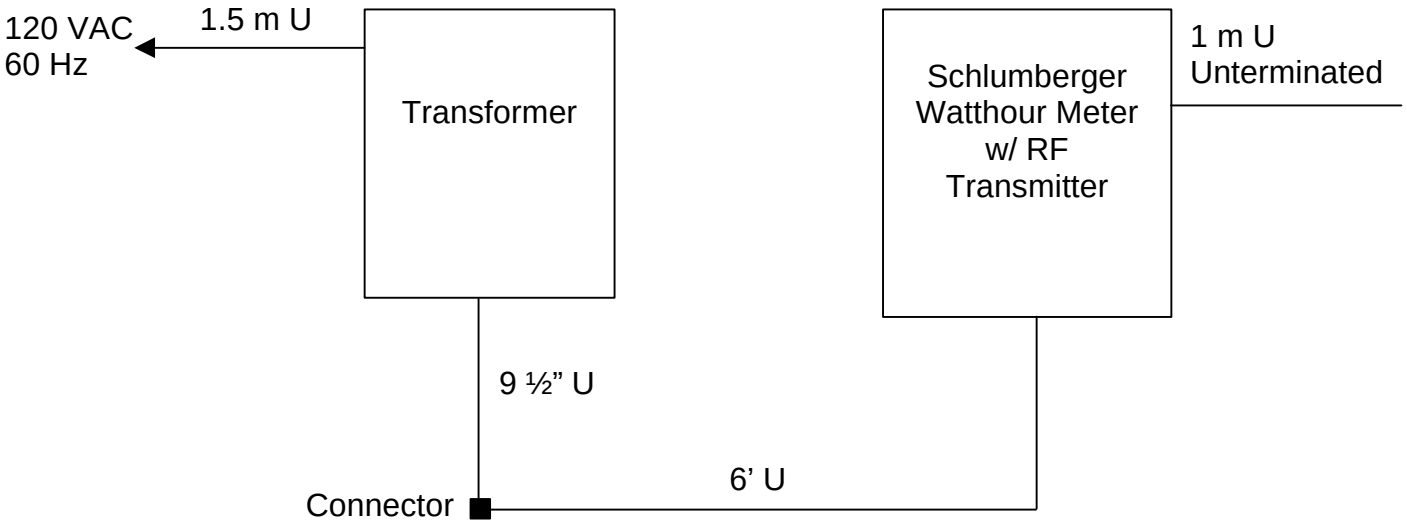
Approval Group	Sequence	Approved	Approved By	Approval Date
ELEC-PWB	0	yes	htaylor	01/29/01
ELEC-QA	0	yes	djones	01/25/01
MATL	0	yes	kimlee	01/30/01
PUR/PWB	0	yes	kimlee	02/10/01
QA	0	yes	pond	01/25/01

Item Number: 442357-001 PWB ASSY R300C,RF BRD FOR CENTRON
Disposition:

Category	Current Value	Net Change Prev Rel PCC	Net Change This PCC	Final Value
Prod Line	E82		E82	E82
Design Group	SPEC		SPEC	SPEC
Item Type	C		C	C
Status	L		L	L
Group	E9950		E9950	E9950
Drawing				
Drawing Loc				
Drawing Size				
New Rev	0001		0001	0001

FIGURE 1

TEST CONFIGURATION

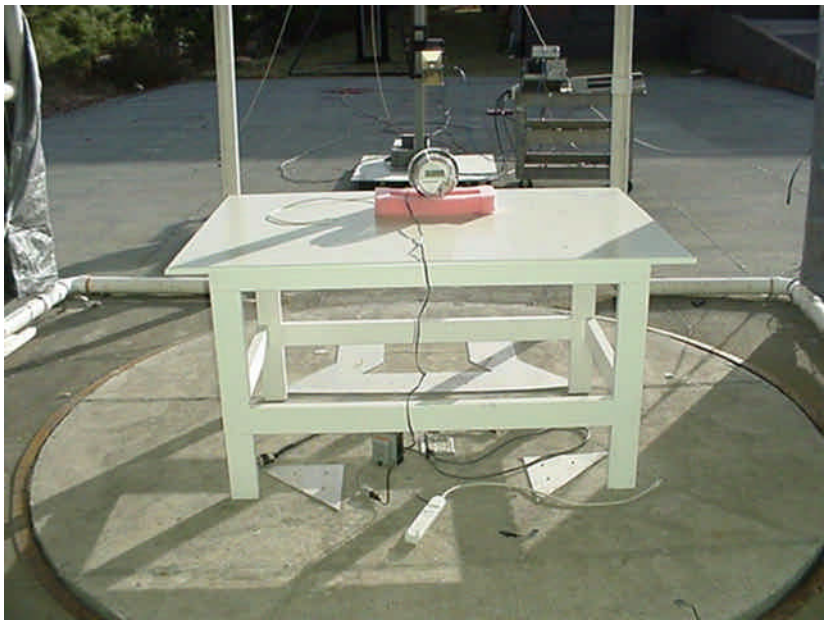


S = Shielded
U = Unshielded

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Model: R300C

FIGURE 2a

Photograph(s) for Spurious and Fundamental Emissions (Front)



Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Model: R300C

FIGURE 2b

Photograph(s) for Spurious and Fundamental Emissions (Back)

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Model: R300C

FIGURE 2c

Photograph(s) for Conducted Emissions

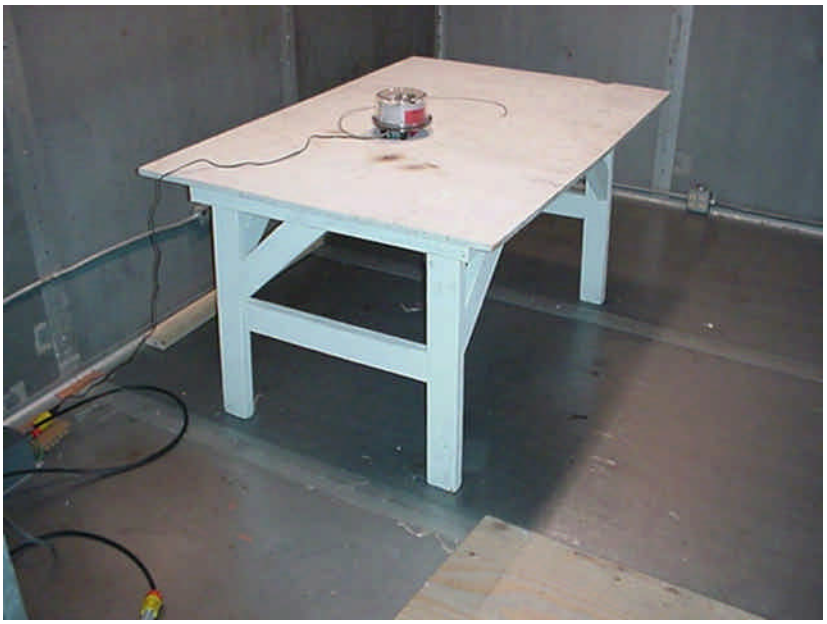


TABLE 1

EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Watthour Meter Schlumberger	C1ST	21419218	N/A	3’ U Unterm. 6’ U Power Cord
Transmitter Schlumberger	R300 Demand	None	F9CR300C-1 (Pending)	
Transformer	N/A	N/A	N/A	9 ½” U 5’5” U Power Cord 120V / 60Hz

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
HORN ANTENNA	EMCO	3116	9505-2255
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

2.6 Antenna Description (Paragraph 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The Model Schlumberger Resource Management Services, Inc. R300C incorporates an internal stripline antenna only.

2.7 Field Strength of Fundamental within the Band 902-928 MHz per FCC Section 15.249(a)

Peak power within the band 902-928 MHz has been measured with a spectrum analyzer. Peak measurements were made using a peak or quasi-peak detector. Average emissions are not considered applicable since the measurement was below 1000 MHz.

The results of the measurements for peak fundamental emissions are given in Table 3a and Figure 3a through Figure 3b.

Table 3a

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Model: R300C

(Low Channel / Worst Case Polarization)

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
912.720	-47.20	30.9	34,104.2	50,000

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-47.20 + 30.9 + 107)/20) = 34,104.2
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By: Austin Thompson **Name:** Austin Thompson

Table 3b

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Model: R300C

(High Channel / Worst Case Polarization)

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
918.245	-45.73	31.0	41,119.1	50,000

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog ((-45.73 + 31.0 + 107)/20) = 41,119.1
CONVERSION FROM dBm TO dBuV = 107 dB

Tested By: _____ **Name:** Austin Thompson

Figure 3a.
Field Strength of Fundamental Emissions 15.249(a) (Low)

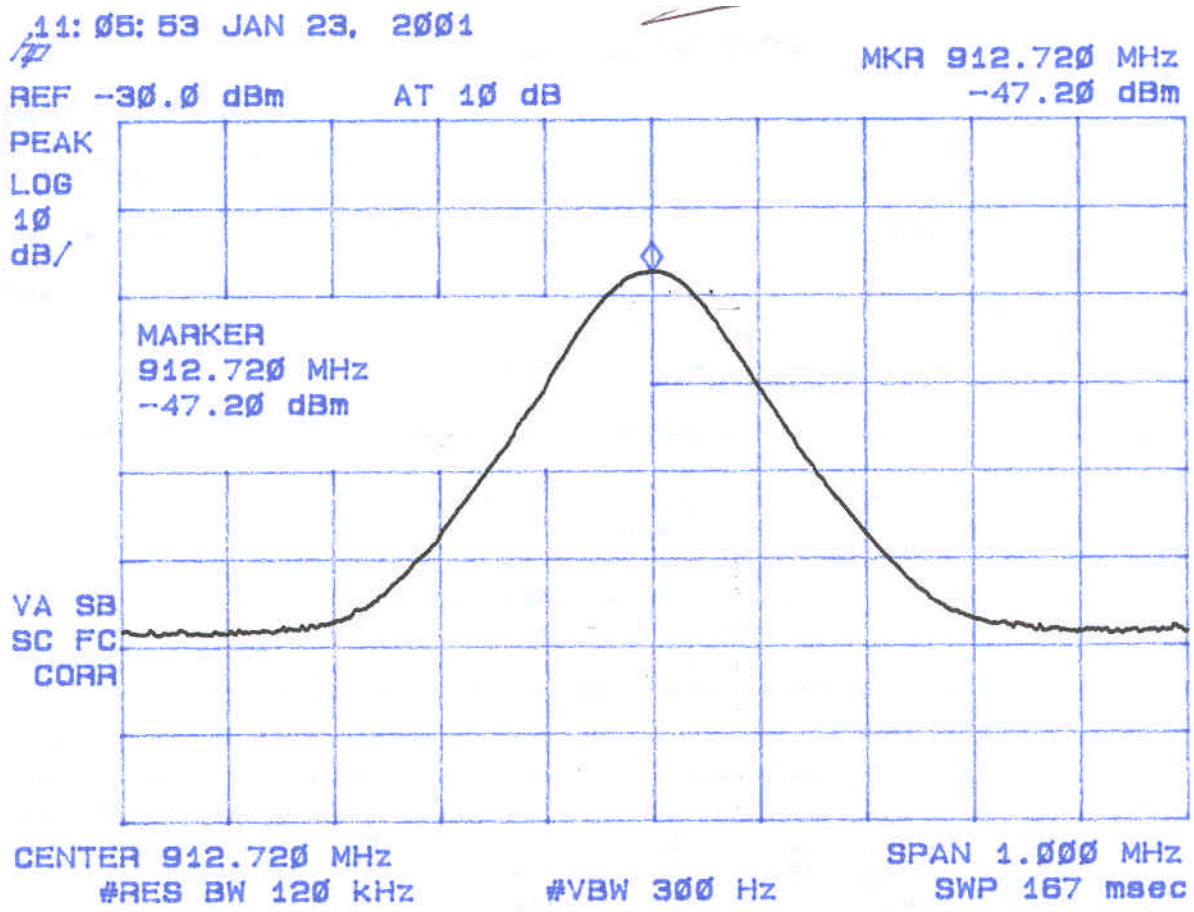


Figure 3b.
Field Strength of Fundamental Emissions 15.249(a) (High)

Plot Not Available

2.8 Peak Radiated Spurious Emissions in the Frequency Range 30 - 10000 MHz (FCC Section 15.249(c))

A preliminary scan was performed on the EUT to determine frequencies that were caused by the transmitter portion of the product. Radiated measurements below 1 GHz were tested with a RBW = 120 kHz. Radiated measurements above 1 GHz were measured using a RBW = VBW = 1 MHz. The results of peak radiated spurious emissions are given in Table 4a (low) – Table 4b (high).

Table 4a Peak Radiated Spurious Emissions (Low)

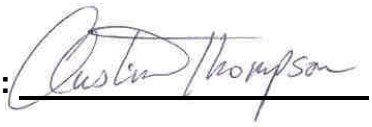
Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
0.0753	-82.0	-	9.8	1.8	66.9	100
1.82450	-38.1	35.2	28.5	3.4	1910.1	5000
2.73736	-59.1	34.8	30.9	4.2	258.0	5000

Table 4b Peak Radiated Spurious Emissions (High)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
0.0796	-83.0	-	9.8	1.8	60.3	100
1.83605	-35.1	35.2	28.6	3.4	2731.1	5000
2.75428	-58.8	34.8	31.0	4.2	268.7	5000
3.67240	-58.4	34.2	33.4	5.3	453.2	5000
4.59045	-59.7	33.9	34.0	7.3	537.5	5000

Note: To frequencies that were not considered harmonics, the general limits of 15.209 were applied.

SAMPLE CALCULATION:
RESULTS (uV/m @ 3m) = Antilog ((-38.1 - 35.2 + 28.5 + 3.4 + 107)/20) = 1910.1
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature:  **Name: Austin Thompson**

2.9 Average Spurious Emission in the Frequency Range 30 - 10000 MHz (FCC Section 15.247(c))

The Average measurement was derived from applying any possible duty cycle correction to the peak reading. The results of average radiated spurious emissions are given in Table 5a (low) – 5b (high).

Duty Cycle Correction During 100 msec:

Schlumberger has specified that the maximum transmit duty cycle of the R300C is 2.93 msec per 125 msec. Therefore for purposes of average measurements, the following duty cycle has been applied:

Duty Cycle Correction = 20 log (0.0293) = -30.7 dB

Table 5a Average Radiated Spurious Emissions (Low)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
0.0753	-82.0	-	9.8	1.8	66.9	100
1.82450	-68.8	35.2	28.5	3.4	55.6	500
2.73736	-89.8	34.8	30.9	4.2	7.5	500

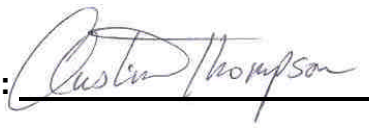
Table 5b Average Radiated Spurious Emissions (High)

Freq. (GHz)	Test Data* (dBm) @3m	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) @3m	FCC Limits (uV/m) @3m
0.0796	-83.0	-	9.8	1.8	60.3	100
1.83605	-65.8	35.2	28.6	3.4	79.4	500
2.75428	-89.5	34.8	31.0	4.2	7.8	500
3.67240	-89.1	34.2	33.4	5.3	13.2	500
4.59045	-90.4	33.9	34.0	7.3	15.8	500

*** - Harmonics readings have been adjusted for Duty Cycle Correction by 20 log (0.0293) = -30.7 dB**

Note: To frequencies that were not considered harmonics, the general limits of 15.209 were applied.

SAMPLE CALCULATION:
RESULTS (uV/m @ 3m) = Antilog ((-68.8 - 35.2 + 28.5 + 3.4 + 107)/20) = 55.6
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature:  **Name: Austin Thompson**

2.10 Power Line Conducted Emissions for Transmitter FCC Section 15.207

The conducted voltage measurements have been carried out in accordance with FCC Section 15.207, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmit. The results are given in Table 6.

Table 6. Conducted Emissions Data
Class B

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Product: R300C

Worse case mode of operation = Transmit on High Channel

Frequency (MHz)	Test Data (dBm)		RESULTS (uV)		FCC Limits (uV)
	Phase	Neutral	Phase	Neutral	
0.17	-71.0	-72.0	63.1	56.2	250
4.19	-70.0	-70.0	70.8	70.8	250
28.07	-78.0	-71.0	28.2	63.1	250
27.85	-77.0	-70.0	31.6	70.8	250
27.63	-78.0	-70.0	28.2	70.8	250
27.41	-79.0	-70.0	25.1	70.8	250

SAMPLE CALCULATIONS:

RESULTS uV = ANTILOG ((-71.0 + 107)/20) = 63.1
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature: Austin Thompson **Name: Austin Thompson**

2.11 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 for measurements made less than 1 GHz and 1 MHz for measurements made 1 GHz and higher. Results for less than 1 GHz are shown in Table 7a. Measurements made over 1 GHz results are shown in Table 7b.

Table 7a. Radiated Emissions Data

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Product: R300C

Frequency (MHz)	Receiver Reading (dBm) @3m	Correction Factor (dB)	Corrected Reading (uV/m)	FCC Limit (uV/m) @3m
Since the EUT transmitter circuitry is used only to enable operation of the transmitter and did not control additional functions or capability, testing of receiver and digital device emissions was deemed not necessary.				

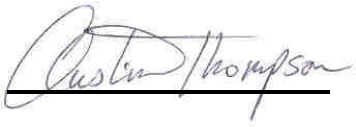
Tester Signature: Austin Thompson **Name:** Austin Thompson

Table 7b. Radiated Emissions Data

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Product: R300C

Measurements >1GHz

FREQ. (GHz)	TEST DATA (dBm) @ 3m	AMP GAIN (dB)	ANT. FACTOR (dB)	CABLE LOSS (dB)	RESULTS (uV/m) @ 10m	FCC LIMITS (uV/m) @ 3m
Since the EUT transmitter circuitry is used only to enable operation of the transmitter and did not control additional functions or capability, testing of receiver and digital device emissions was deemed not necessary.						

Tester Signature:  **Name:** Austin Thompson

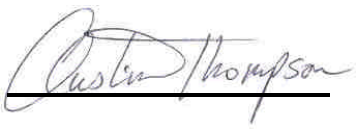
2.12 Power Line Conducted Emissions for Digital Device FCC Section 15.107

The conducted voltage measurements have been carried out in accordance with FCC Section 15.107, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmit. The results are given in Table 8.

Table 8. Conducted Emissions Data – Digital Device

Test Date: January 23, 2001
UST Project: 01-0054
Customer: Schlumberger Resource Management Services, Inc.
Product: R300C

Frequency (MHz)	Test Data (dBm) Phase Neutral	RESULTS (uV) Phase Neutral	FCC Limits (uV)
Since the EUT transmitter circuitry is used only to enable operation of the transmitter and did not control additional functions or capability, testing of receiver and digital device emissions was deemed not necessary.			

Tester Signature:  **Name:** Austin Thompson