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Sunnyvale, CA 94086-3518
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May 25, 2001

American TCB
6731 Whittier Avenue
McLean, VA 22101

Gentlemen:

The enclosed documents constitute a formal submittal and application for a Grant of Equipment Authorization pursuant to Subpart C of Part 15 of FCC Rules (CFR 47) regarding intentional radiators. Data within this report demonstrates that the equipment tested complies with the FCC limits for intentional radiators.

Elliott Laboratories, as duly authorized agent prepared this submittal. A copy of the letter of our appointment as agent is enclosed.

If there are any questions or if further information is needed, please contact Elliott Laboratories for assistance.

Sincerely,

David W. Bare
Chief Technical Officer

DWB/pjp
Enclosures: Agent Authorization Letter
Emissions Test Report with Exhibits

File: R43532

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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C Specifications for an Intentional Radiator on the Schlumberger - RMS Div. Model: Residential Gas 3

FCC ID:	F9CCMM1402
GRANTEE:	Schlumberger - RMS Div. 125 Shoreway Road San Carlos, CA 94070
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	May 25, 2001
FINAL TEST DATE:	April 18 and April 19, 2001

AUTHORIZED SIGNATORY: _____

David W. Bare
Chief Technical Officer

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SCOPE

An electromagnetic emissions test has been performed on the Schlumberger - RMS Div. model Residential Gas 3 pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Schlumberger - RMS Div. model Residential Gas 3 and therefore apply only to the tested sample. The sample was selected and prepared by Jefferson Webster of Schlumberger - RMS Div.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units that are subsequently manufactured.

STATEMENT OF COMPLIANCE

The tested sample of Schlumberger - RMS Div. model Residential Gas 3 complied with the requirements of Subpart C of Part 15 of the FCC Rules for low power intentional radiators.

Maintenance of FCC compliance is the responsibility of the manufacturer. Any modification of the product that may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

EMISSION TEST RESULTS

The following emissions tests were performed on the Schlumberger - RMS Div. model Residential Gas 3. The actual test results are contained in an exhibit of this report.

LIMITS OF CONDUCTED INTERFERENCE VOLTAGE

Conducted emissions was not performed on the EUT as it does not have any AC power ports. FCC Rules Part 15 Section 15.207 does not have any requirements for measuring emissions on the DC power ports.

LIMITS OF ANTENNA CONDUCTED POWER

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.247.

The highest out-of-band (Un-restricted) emission recorded in any 100 kHz band was 46.8 dB below the in-band level at 1835 MHz. The actual test data and any correction factors are contained an exhibit of this report.

LIMITS OF RADIATED INTERFERENCE FIELD STRENGTH

Conducted emissions was not performed on the EUT as it does not have an AC power port and is intended to be battery operated.

LIMITS OF POWER AND BANDWIDTH

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.247.

The maximum power output was 21.5 dBm at 917.405 MHz. The minimum 6 dB bandwidth was 1.28 Megahertz at 917.58 MHz. The maximum power spectral density was 2.4 dBm at 917.405 MHz. The actual test data and any correction factors are contained in an exhibit of this report.

MEASUREMENT UNCERTAINTIES

ISO Guide 25 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.2

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Schlumberger - RMS Div. model Residential Gas 3 is a pulsed direct sequence spread spectrum transmitter designed to be used on residential gas meters. Normally, the EUT would be placed in a meter during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the EUT is 3 V DC supplied from a battery. The sample was received on April 19, 2001 and tested on April 18 and April 19, 2001. Three samples of the EUT were tested as shown below:

Manufacturer	Model	Description	Serial Number	FCC ID
Schlumberger	Residential Gas 3	Equimeter	6679408	-
Schlumberger	Residential Gas 3	Sprague	6690053	-
Schlumberger	Residential Gas 3	American	7956759	-

OTHER EUT DETAILS

Equimeter, Sprague and American are the names of the manufacturers of the base meters.

ENCLOSURE

The EUT enclosure is primarily constructed of molded plastic. It measures approximately 0 cm wide by 0 cm deep by 0 cm high. (TBP)

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the specifications.

SUPPORT EQUIPMENT

No remote or local support equipment was used during emissions testing.

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

		Cable(s)		
EUT Port	Connected To	Description	Shielded or Unshielded	Length (m)
Antenna	Antenna	Times LMR-195	Shielded	6.1

EUT OPERATION

The EUT was set to continuously pulse transmissions at one-second intervals at full power. Normally, the EUT would only transmit an average of once every 5 minutes.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on April 18 and April 19, 2001 at the Elliott Laboratories Open Area Test Site #2 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde and Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

POWER METER

A power meter and thermister mount are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS, SECTION 15.207

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.209

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - B = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

* Broadband Level - Per ANSI C63.4, 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

Conducted Emissions on Antenna Port, 16-Apr-01 05:35 PM
Engineer: David

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	787	12	2/14/2001	2/14/2002

Radiated Emissions, 30 - 1000 MHz, 18-Apr-01 04:56 PM
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	11	10/12/2000	10/12/2001
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	364	12	8/17/2000	8/17/2001
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	12	1/30/2001	1/30/2002
Rohde & Schwarz	Test Receiver, 20-1300MHz	ESVP	273	12	10/5/2000	10/5/2001

Radiated Emissions, 1 - 9 GHz, 18-Apr-01 04:57 PM
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)	3115	1142	12	1/29/2001	1/29/2002
Hewlett Packard	Microwave EMI test system (SA40, 30Hz - 40GHz)	84125C	1149	12	2/5/2001	2/5/2002

Radiated Emissions, 1 - 10GHz, 19-Apr-01 04:13 PM
Engineer: Chris

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)	3115	1142	12	1/29/2001	1/29/2002
Hewlett Packard	High Pass filter, 1.5GHz	P/N 84300-80037	1158	12	2/28/2001	2/28/2002

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T43034	18 Pages
Processing Gain	4 Pages
Maximum Permissible Exposure	2 Pages

Elliott

EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Emissions Spec:	FCC 15.247 DSSS	Class:	Radio
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Schlumberger

Model

Residential Gas 3

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Emissions Spec:	FCC 15.247 DSSS	Class:	Radio
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is a pulsed direct sequence spread spectrum transmitter which is designed to be used on residential gas meters. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the EUT is 3 V DC supplied from a battery.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Schlumberger	Residential Gas 3	Equimeter	6679408	-
Schlumberger	Residential Gas 3	Sprague	6690053	-
Schlumberger	Residential Gas 3	American	7956759	-

Other EUT Details

Equimeter, Sprague and American are the names of the manufacturers of the base meters.

EUT Enclosure

The EUT enclosures are primarily constructed of molded plastic. The American enclosure measures approximately 6.6875 in wide by 2.8125 in deep by 2.25 in high. The Equimeter enclosure measures approximately 5.875 in wide by 3.1875 in deep by 2.75 in high. The Sprague enclosure measures approximately 6.5 in wide by 3.125 deep by 2.75 in high.

Modification History

Mod. #	Test	Date	Modification
1	None	-	-

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EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Emissions Spec:	FCC 15.247 DSSS	Class:	Radio
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

EUT Interface Ports

		Cable(s)		
EUT Port	Connected To	Description	Shielded or Unshielded	Length(m)
Antenna	Antenna	Times LMR-195	Shielded	6.1

EUT Operation During Emissions

The EUT was transmitting at 917.77 Mhz

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EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/16/2001
Test Engineer: David W. Bare
Test Location: Chamber #2

Config. Used: **1 (sn 6679408)**
Config Change:
EUT Voltage: 3 V DC Battery

General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

All measurements made using client supplied 20' of Times Microwave LMR-195 cable.

Ambient Conditions:

Temperature: 20°C
Rel. Humidity: 44%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	6dB Bandwidth	15.247(a)	Pass	
2	Output Power	15.247(b)	Pass	
3	Power Spectral Density (PSD)	15.247(d)	Pass	
	Processing Gain	15.247(e)	N/A	Manufacturer to provide data.

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Run #1: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Graph reference #
Mid	917.58	100 kHz	1.280 MHz	

Run #2: Output Power

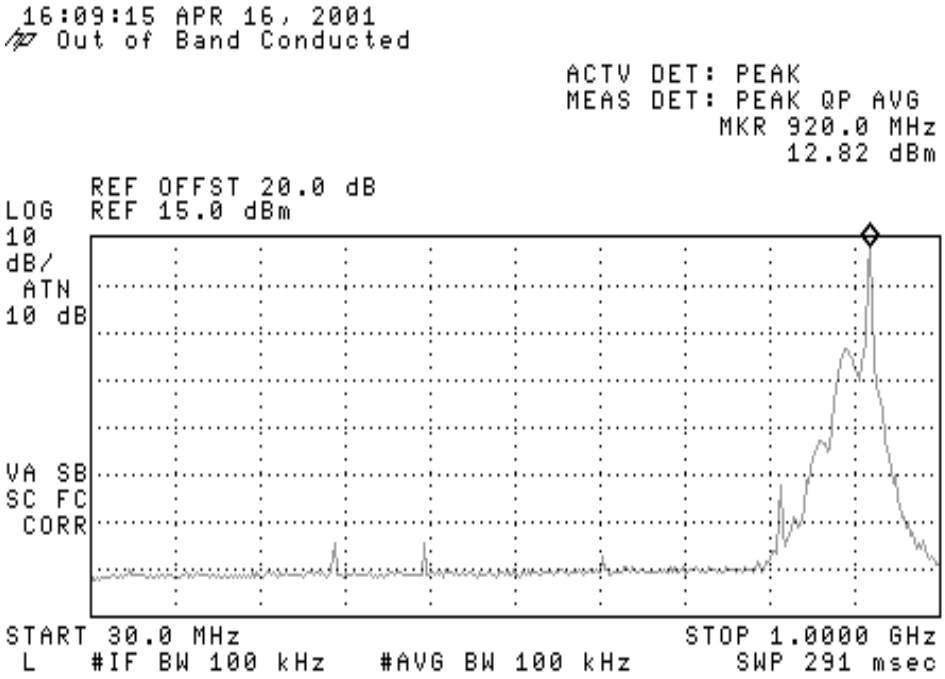
Channel	Frequency (MHz)	Res BW	Output Power	Graph reference #
Mid	917.58	3 MHz	20.6 dBm	

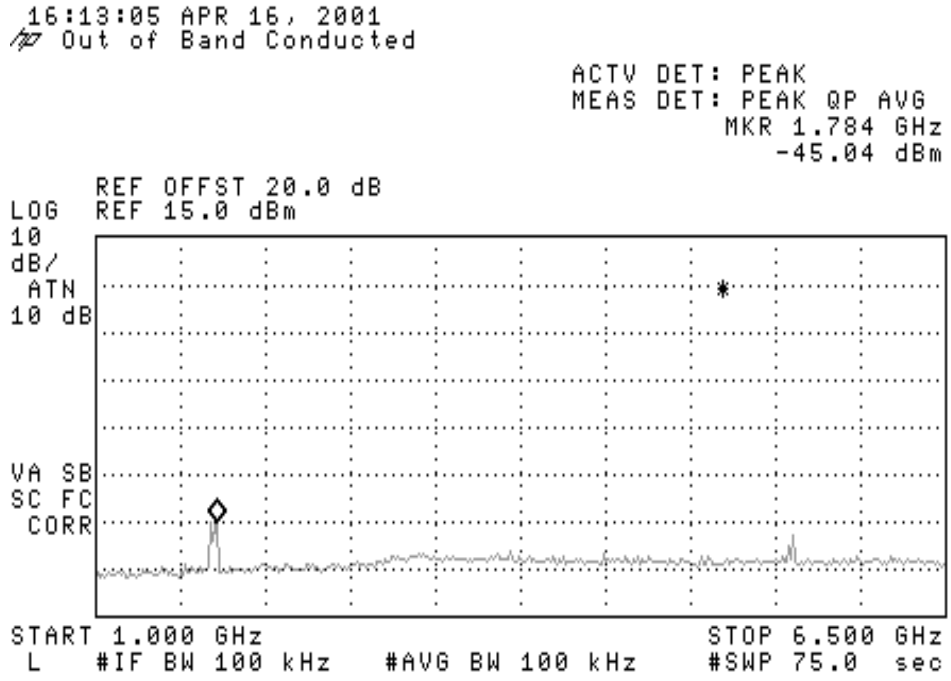
Note 1:	Due to the nature of the pulse emission, the power was measured on a spectrum analyzer

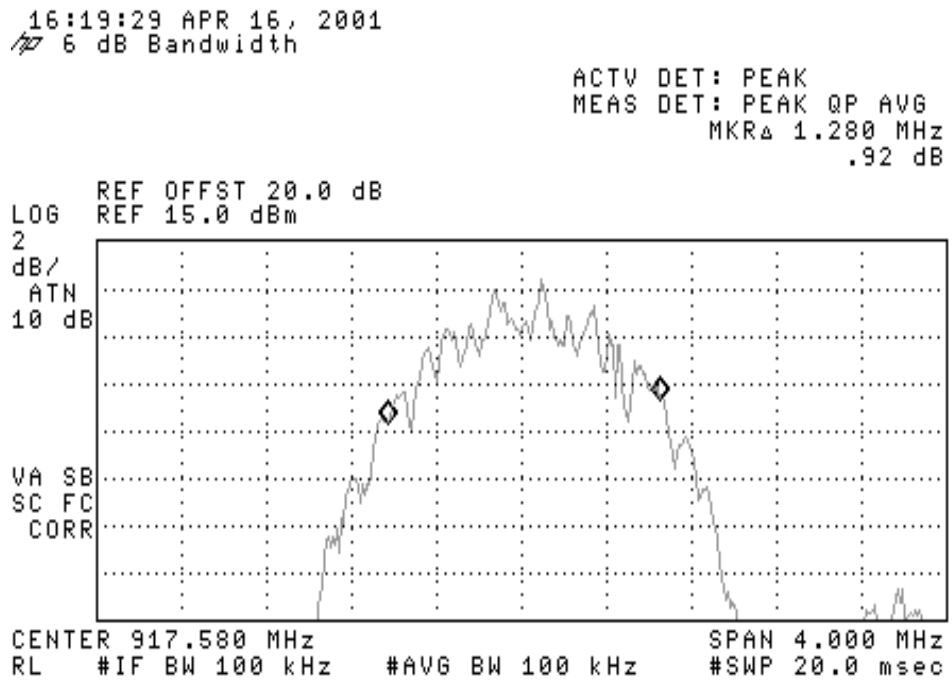
Run #3: Power Spectral Density

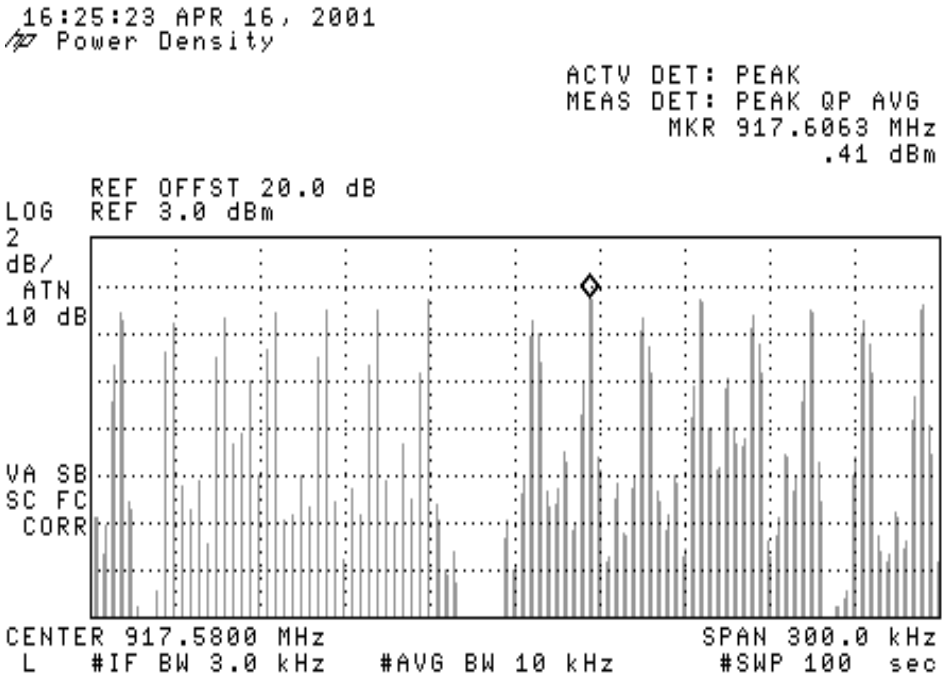
Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth)	Graph reference #
Mid	917.58	3 kHz	0.4 dBm	

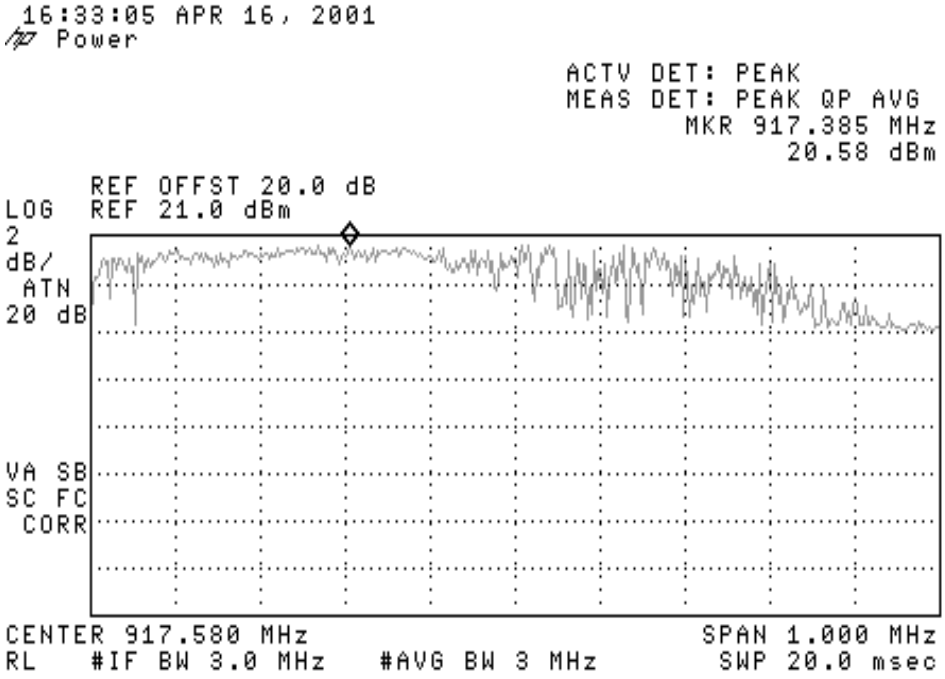
PLOTS OF TEST SESSION 4/16/01






16:19:29 APR 16, 2001
6 dB Bandwidth
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 1.280 MHz
.92 dB
REF OFFST 20.0 dB
LOG REF 15.0 dBm
2
dB/
ATN
10 dB
VA SB
SC FC
CORR
CENTER 917.580 MHz
SPAN 4.000 MHz
RL #IF BW 100 kHz #AVG BW 100 kHz #SWP 20.0 msec


16:25:23 APR 16, 2001
Power Density
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 917.6063 MHz
.41 dBm
REF OFFST 20.0 dB
LOG REF 3.0 dBm
2
dB/
ATN
10 dB
VA SB
SC FC
CORR
CENTER 917.5800 MHz
SPAN 300.0 kHz
L #IF BW 3.0 kHz #AVG BW 10 kHz #SWP 100 sec


16:33:05 APR 16, 2001
Power
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 917.385 MHz
20.58 dBm
REF OFFST 20.0 dB
LOG REF 21.0 dBm
2
dB/
ATN
20 dB
VA SB
SC FC
CORR
CENTER 917.580 MHz
SPAN 1.000 MHz
RL #IF BW 3.0 MHz #AVG BW 3 MHz
SWP 20.0 msec

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 4/17/2001
Test Engineer: jmartinez
Test Location: SVOATS #3
Config. Used: S/N: 7956759
Config Change: None
EUT Voltage: 3Vdc

General Test Configuration

The EUT was located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.
When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

All measurements made using client supplied 20' of Times Microwave LMR-195 cable.

Ambient Conditions:

Temperature: 18°C
Rel. Humidity: 43%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	6dB Bandwidth	15.247(a)	Pass	N/A
2	Output Power	15.247(b)	Pass	N/A
3	Power Spectral Density (PSD)	15.247(d)	Pass	N/A
N/A	Processing Gain	15.247(e)	N/A	Manufacturer to provide data.

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Run #1: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Graph reference #
High	917.405	100 kHz	1.363 MHz	N/A

Note 1:	Add note here
Note 2:	

Run #2: Output Power

Channel	Frequency (MHz)	Res BW	Output Power	Graph reference #
High	917.405	3 MHz	21.5 dBm	N/A

Run #3: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth)	Graph reference #
High	917.406	3 kHz	2.38 dBm	N/A

Elliott

EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 4/17/2001
Test Engineer: jmartinez
Test Location: SVOATS #3

Config. Used: **S/N: 0006-690-053**
Config Change: None
EUT Voltage: 3Vdc

General Test Configuration

The EUT was located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.
When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

All measurements made using client supplied 20' of Times Microwave LMR-195 cable.

Ambient Conditions:

Temperature: 18°C
Rel. Humidity: 43%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	6dB Bandwidth	15.247(a)	Pass	N/A
2	Output Power	15.247(b)	Pass	N/A
3	Power Spectral Density (PSD)	15.247(d)	Pass	N/A
N/A	Processing Gain	15.247(e)	N/A	Manufacturer to provide

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Run #1: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Graph reference #
High	917.65	100 kHz	1.3 MHz	N/A

Note 1:	Add note here
Note 2:	

Run #2: Output Power

Channel	Frequency (MHz)	Res BW	Output Power	Graph reference #
High	917.65	3 MHz	19.45	N/A

Note 1:	Add note here
Note 2:	

Run #3: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over	Graph reference #
High	917.65	3 kHz	-.16 dBm	N/A

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	Radio

Radiated Emissions

Test Specifics

Objective:

Date of Test: 4/18/2001
Test Engineer: jmartinez
Test Location: SVOATS# 3

Config. Used: American (S/N: 7956759)
Config Change:
EUT Voltage: 3 Vdc

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 17°C
Rel. Humidity: 33%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 1 - 10 GHz - Spurious Emissions in Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	-3.8dB @ 4587 MHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	Radio

Run #1: Radiated Spurious Emissions, 30-9175.8 MHz. High Channel @ 917.58 MHz

	H	V
Fundamental emission level @ 3m in 100kHz RBW:	110	116.72
Limit for emissions outside of restricted bands:	96.72 dBµV/m	

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1835.000	70.0	h	96.7	-26.8	Pk	73	1.6	
2752.000	64.3	h	74.0	-9.7	Pk	319	1.6	Restricted Band
2752.000	33.4	h	54.0	-20.6	Avg	319	1.6	Restricted Band
3670.000	60.1	h	74.0	-13.9	Pk	0	1.0	Restricted Band
3670.000	36.8	h	54.0	-17.2	Avg	0	1.0	Restricted Band
4587.000	70.3	h	74.0	-3.7	Pk	364	1.3	Restricted Band
4587.000	39.0	h	54.0	-15.0	Avg	364	1.3	Restricted Band
5505.000	61.7	h	74.0	-12.3	Pk	0	1.0	Restricted Band
5505.000	37.3	h	54.0	-16.7	Avg	0	1.0	Restricted Band
6423.000	54.1	h	74.0	-19.9	Pk	315	1.2	Restricted Band
6423.000	36.0	h	54.0	-18.0	Avg	315	1.2	Restricted Band
7340.000		h	74.0	-74.0	Pk			20-dB below Limit
8258.000		h	54.0	-54.0	Avg			20-dB below Limit
9175.800		h	74.0	-74.0	Pk			20-dB below Limit
1835.000	70.2	V	96.7	-26.5	PK	81	1.3	
2752.000	66.1	V	74.0	-7.9	Pk	263	1.3	Restricted Band
2752.000	28.9	V	54.0	-25.1	Avg	263	1.3	Restricted Band
3670.000	56.7	V	74.0	-17.3	Pk	236	1.2	Restricted Band
3670.000	35.6	V	54.0	-18.4	Avg	236	1.2	Restricted Band
4587.000	61.6	V	74.0	-12.4	Pk	0	1.0	Restricted Band
4587.000	35.3	V	54.0	-18.7	Avg	0	1.0	Restricted Band
5505.000	55.6	V	74.0	-18.4	Pk	0	1.5	Restricted Band
5505.000	34.5	V	54.0	-19.5	Avg	0	1.5	Restricted Band
6423.000	56.4	V	74.0	-17.6	Pk	174	1.1	Restricted Band
6423.000	35.4	V	54.0	-18.6	Avg	174	1.1	20-dB below Limit
7340.000								20-dB below Limit
8258.000								20-dB below Limit
9175.800								20-dB below Limit

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	American Gas Meter tested with WHIP antenna. Mounting screw installed.

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/19/2001
Test Engineer: Chris Byleckie
Test Location: SVOATS #3

Config. Used: Sprague S/N 6690053
Config Change:
EUT Voltage: 3 VDC

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 14°C
Rel. Humidity: 90%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 1 - 10 GHz - Spurious Emissions in Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	-1.7dB @ 4588.85MHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Run #1: Radiated Spurious Emissions in Restricted Bands, 1-10 GHz.

Whip Antenna

Fundamental frequency is 917.77 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2753.310	46.3	h	54.0	-7.7	Pk	150	1.0	Pk reading, Average limit
3671.080	66.2	h	74.0	-7.8	Pk	321	2.1	
3671.080	51.2	h	54.0	-2.8	Avg	321	2.1	
4588.850	68.8	h	74.0	-5.2	Pk	167	1.1	
4588.850	52.3	h	54.0	-1.7	Avg	167	1.1	
7342.160	56.4	h	74.0	-17.6	Pk	243	1.1	
7342.160	40.3	h	54.0	-13.7	Avg	243	1.1	
8259.930	54.7	h	74.0	-19.3	Pk	209	1.3	
8259.930	38.6	h	54.0	-15.4	Avg	209	1.3	
9177.700	51.8	h	74.0	-22.2	Pk	259	1.0	
9177.700	39.0	h	54.0	-15.0	Avg	259	1.0	
2753.313	49.5	v	74.0	-24.5	Pk	344	1.1	
2753.310	37.2	v	54.0	-16.8	Avg	344	1.1	
3671.080	67.5	v	74.0	-6.5	Pk	15	1.5	
3671.080	51.2	v	54.0	-2.8	Avg	15	1.5	
4588.850	67.8	v	74.0	-6.2	Pk	150	1.3	
4588.850	51.8	v	54.0	-2.2	Avg	150	1.3	
7342.160	57.8	v	74.0	-16.2	Pk	303	1.1	
7342.160	41.5	v	54.0	-12.5	Avg	303	1.1	
8259.930	49.8	v	74.0	-24.2	Pk	316	1.1	
8259.930	37.1	v	54.0	-16.9	Avg	316	1.1	
9177.700	51.5	v	74.0	-22.5	Pk	68	1.1	
9177.700	38.7	v	54.0	-15.3	Avg	68	1.1	

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/19/2001
Test Engineer: Chris Byleckie
Test Location: SVOATS #3

Config. Used: Equimeter S/N 6679408
Config Change:
EUT Voltage: 3 VDC

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 14°C
Rel. Humidity: 90%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 1 - 10 GHz - Spurious Emissions in Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	-.8dB @ 9177.78MHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Schlumberger	Job Number:	J43033
Model:	Residential Gas 3	T-Log Number:	T43034
		Proj Eng:	David W. Bare
Contact:	Jeff Webster		
Spec:	FCC 15.247 DSSS	Class:	N/A

Run #1: Radiated Spurious Emissions in Restricted Bands, 1-10 GHz.

Whip Antenna. Mounting screw tied together with braid and grounded to the turntable to simulate actual installation

Fundamental frequency is 917.77 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2753.310	62.8	v	74.0	-11.3	Pk	317	1.1	
2753.310	37.8	v	54.0	-16.2	Avg	317	1.1	
3671.080	67.1	v	74.0	-6.9	Pk	43	1.1	
3671.080	39.5	v	54.0	-14.5	Avg	43	1.1	
4588.850	57.7	v	74.0	-16.3	Pk	314	1.1	
4588.850	36.8	v	54.0	-17.2	Avg	314	1.1	
7342.160	66.6	v	74.0	-7.4	Pk	309	1.5	
7342.160	42.2	v	54.0	-11.8	Avg	309	1.5	
8259.930	52.7	v	74.0	-21.3	Pk	312	1.5	
8259.930	37.7	v	54.0	-16.3	Avg	312	1.5	
9177.700	73.2	v	74.0	-0.8	Pk	45	1.5	
9177.700	45.2	v	54.0	-8.8	Avg	45	1.5	
2753.313	71.4	h	74.0	-2.6	Pk	147	1.1	
2753.310	41.0	h	54.0	-13.0	Avg	147	1.1	
3671.080	61.9	h	74.0	-12.1	Pk	316	1.1	
3671.080	37.6	h	54.0	-16.4	Avg	316	1.1	
4588.850	58.8	h	74.0	-15.2	Pk	316	1.1	
4588.850	37.1	h	54.0	-16.9	Avg	316	1.1	
7342.160	53.6	h	74.0	-20.4	Pk	249	1.0	
7342.160	38.3	h	54.0	-15.8	Avg	249	1.0	
8259.930	51.1	h	74.0	-22.9	Pk	50	1.0	
8259.930	37.0	h	54.0	-17.0	Avg	50	1.0	
9177.700	51.3	h	74.0	-22.7	Pk	0	1.0	
9177.700	38.5	h	54.0	-15.5	Avg	0	1.0	

Test Name: **Processing Gain** **Test #: 3.B.1**
Test Summary: Verifies compliance to receiver processing gain specification at +25°C with an input signal level of -104 dBm.
Applies to Specification 3.2.2.7

Pass / Fail Criteria:
Every point must exhibit => 12 dB process gain. (FCC Requirement ≥ 10 dB)

Required Test Equipment:
HP9664B Signal Generator
Variable attenuator(s)
Power supply
Boonton Power Meter
HP8594E Spectrum Analyzer
IBM PC compatible computer with serial interface
Transceiver power cable, twisted pair, extended length
Transceiver serial cable, RJ45, extended length

Equipment Set Up:
The processing gain of the DSP receiver is measured by the spread signal to unspread signal method whereby a CW signal is injected in 50 KHz intervals from 917.3800 to 917.7800 MHz. The difference (in dB) of the correlated spread signal level applied separately, is the system process gain.

1. Each transceiver receive section will be programmed with default parameters using appropriate software/firmware. Select a receive frequency of 917.58 MHz for all tests.

2. HP9664A Signal Generator:

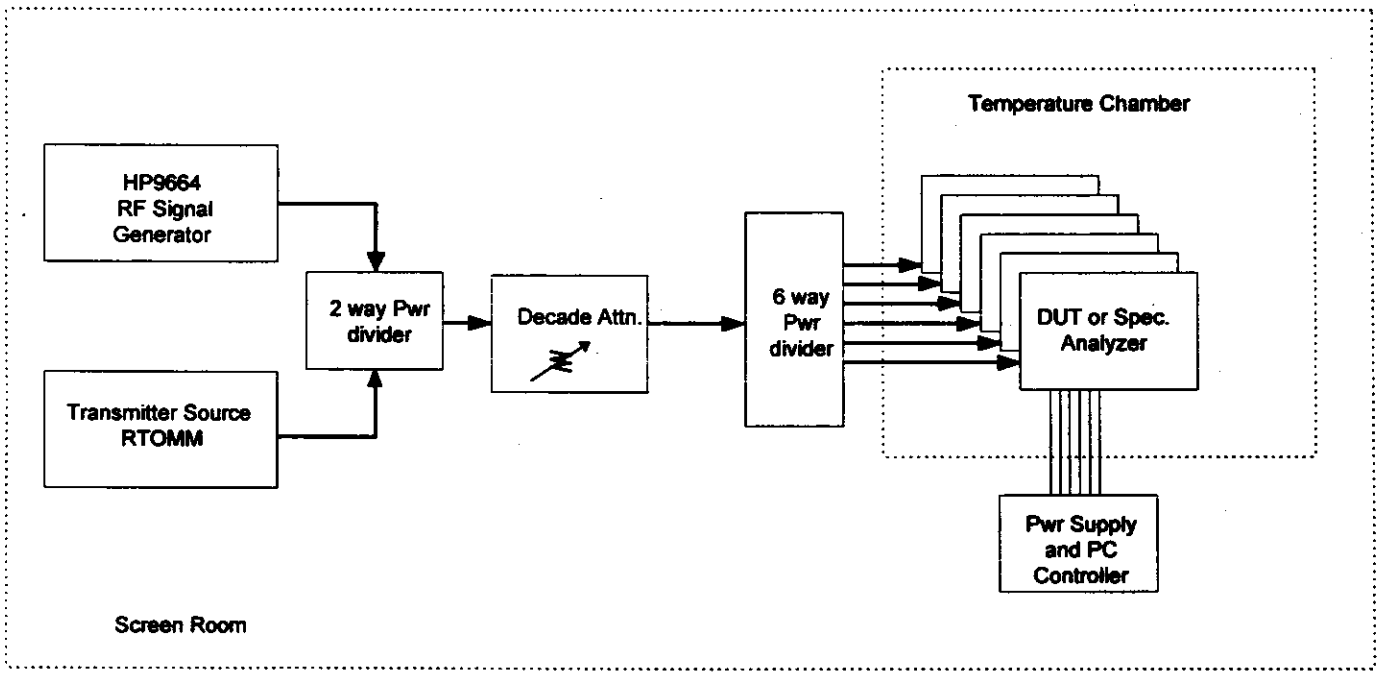
Center Frequency	=	917.38000 MHz
Signal Level	=	-30 dBm

3. HP8594E Spectrum Analyzer

Resolution Bandwidth	=	3 MHz
Video Bandwidth	=	1 MHz
Sweep	=	50 msec
Span	=	0 MHz
Attenuation	=	10 dB

4. Variable Attenuator = as required to achieve a -95 dBm spread signal.

Note: Ensure that all test equipment has been warmed up for 30 minutes and calibrated before measurements are taken.



3.B.1 Test Configuration for Process Gain

Procedure:

1. Place the transceiver(s) to be tested in the temperature chamber.
2. Label and route each wire and cable described below outside the temperature chamber.
3. Use the transceiver power cable to connect the device under test to the DC supply. Set the DC supply to provide 13.5 VDC to the device under test.
4. Determine the amount of power difference between the injected spread signal at 917.58 MHz and the injected CW signal at 917.58 MHz that produced the same signal level on the spectrum analyzer.
   a. Measure and record the power of the spread signal present at the input to any one of the DUTs by connecting it to the spectrum analyzer. Measure power during preamble portion of the message packet.
   b. Then, after turning the Spread signal OFF and switching ON the CW signal, measure and record the power of the CW signal present at the input of the same DUT by routing again the spectrum analyzer.
   c. Determine a calibration factor based on the difference between the measurements made in steps a. and b. This amount of attenuation shall be added or removed (as appropriate) from the circuit when configured for CW input measurements.
5. Apply a spread signal to the receiver. Record the indicated level of this signal after correlation.
6. Reconfigure the set-up to apply a CW signal at 917.58 MHz to the DSP input.
7. Apply (or remove) the appropriate amount of attenuation, as determined in step 4 above, such that the CW signal is at the same indicated input power level as the spread signal from step 5.
8. Input a spread signal level at - 80 dBm at 917.58 MHz, and then, input a CW signal beginning at 917.3800 MHz, and increment up in 50 KHz steps to 917.7800, record the delta (change in attenuator settings) that produces the same indicated output for the CW signal as the - 80 dBm spread signal. The indicated output is first of the last three bites in the reported packet as is a number between 0 and 255 which roughly corresponds to -128 and -30 dBm respectively.
9. Determine average process gain by averaging the linear equivalent in Watts of the values in the table below and then converting back to dB's.

PROCESS CAIN TEST

+25 C (only)	Frequency Offset (KHz)								
UNIT #	-200	-150	-100	-50	0	+50	+100	+150	+200
1	*14.8*	*14.5*	*14.5*	*14.0*	*15.0*	*14.4*	*15.0*	*15.7*	*15.1*
2	*16.3*	*16.0*	*15.7*	*15.0*	*15.0*	*15.7*	*16.1*	*17.0*	*16.2*
3	*16.2*	*15.8*	*15.7*	*15.2*	*16.0*	*15.8*	*16.4*	*16.6*	*16.6*
4	*16.0*	*16.0*	*15.0*	*14.4*	*15.0*	*14.5*	*15.3*	*15.6*	*15.5*
Pass/Fail (dB)	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12 dB

DUT # 1 Average Process Gain = *14.8* dB
DUT # 2 Average Process Gain = *16.0* dB
DUT # 3 Average Process Gain = *16.1* dB
DUT # 4 Average Process Gain = *15.3* dB

Acceptance Block:	**A signature below denotes that this test has met all pass criteria.**	
Signature:	*Gordon Furze*	Gordon Furze
Date:	*July 30, 1997*	July 30 1997

Title: Evaluation of RF Exposure from CellNet Transmitters for General Population / Uncontrolled Exposure

Methodology:

Using Table 1 in Appendix A of FCC OET Bulletin 65 (Edition 97-01), the Maximum Permissible Exposure limit for general population / uncontrolled exposure is specified as a power density:

$MPE = f / 1500$ milliwatts per square centimeter, where f is in MHz (between 300 and 1500 MHz)

averaged over 30 minutes. Based on spherical surface around the source, the minimum distance D can be computed as:

$D = \mathrm{SQRT}(EIRP / (4\pi * MPE)$

where D is in centimeters, $EIRP$ is in mW, and MPE is in mW per square centimeters.

Table 1. Maximum Permissible Exposure (MPE) Limit for General Population / Uncontrolled Exposure

Hardware	average transmit power (dBm)	antenna gain (dBi)	duty cycle (averaged over 30 minutes)	avg EIRP (dBm)	avg EIRP (mW)	frequency (MHz)	MPE (mW per sq. cm)	minimum distance (cm)	minimum distance (inches)
CM	32	11	100%	43.00	19953	953	0.6353	50	20
RR	28	11	10%	29.00	794	929	0.6193	10	4
RAMWAN	33	5	2%	21.01	126	902	0.6013	4	2
cellphone	34.8	5	2%	22.81	191	880	0.5867	5	2
Repeater (Selective)	27	5	4%	18.02	63	918	0.6120	3	1
Repeater (Repeat All)	27	5	25%	25.98	396	918	0.6120	7	3
LAN xcvr	27	5	2%	15.01	32	918	0.6120	2	1
TOMM	30	0	0.01%	-11.15	0	918	0.6120	0	0
MCC (with Remote Radio & LAN Transceiver)					826.03	929 , 918	0.6120	10	4
MCC (with RAMWAN Radio & LAN Transceiver)					157.89	902 , 918	0.6013	5	2
MCC (with Cellphone WAN & LAN Transceiver)					222.70	880 , 918	0.5867	5	2

Notes:

1. Minimum safe distance to Cell Master Antenna for uncontrolled exposure is 20 inches.
2. Minimum safe distance to an MCC with unknown WAN type for uncontrolled exposure is 4 inches.
3. Minimum safe distance to a Repeater with unknown configuration for uncontrolled exposure is less than 3 inches.
4. Duty cycle denotes how long the transmitter is ON over the thirty-minute averaging period. A duty cycle of 100% means the transmitter is ON for 30 minutes.
5. A remote read of all TOU+Demand meters on an MCC is representative of heavy WAN load. This can result in about 80 bytes of WAN payload (after data compression) per TOMM or 60,000 bytes for 750 TOMMs. Additional WAN traffic due to MCC health checks, polling, etc., are assumed to have a small contribution to the duty cycle.
6. The 9QPR WAN protocol limits transmissions from the MCC to less than 10% duty cycle.
7. RAMWAN has a 1,000 byte per second rate and so will be transmitting for 60 seconds out of 30 minutes for a duty cycle of less than 1% for the heavy WAN load shown above. A similar duty cycle for cell phones is assumed. A 2% duty cycle was entered in the table above for margin.
8. Simple Repeater assumes extreme LAN utilization and no transmit attenuation.
9. Selective Repeater assumes 250 plain vanilla electric TOMMs in the repeater table being received at high PSR and no transmit attenuation.

Reference:

[1] FCC OET Bulletin 65 (97-01 Edition), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields", August 1997.
[2] FCC OET Bulletin 56 (under revision).

Enclosure

* Practice limited to matters and proceedings before federal courts and agencies.

RF Emissions Statement

The instant device, a Part 15 spread spectrum transmitter, is a fixed device professionally installed inside an enclosed utility meter. Accordingly, the device is not designed to be used by any person. The antenna associated with the device is not external but is rather also contained within the same utility meter enclosure. The device communicates with a fixed local area network.

This transmitter does not fit within the definition of a "mobile device" set forth in section 2.1091(b) of the Commission's rules, 47 C.F.R. § 2.1091(b), because it is designed to be used in fixed locations. In addition, the transmitter does not meet the definition of a "portable device" contained in section 2.1093(b), because it is not designed to be used by any person. Furthermore, section 1.1307(b)(1), which is referenced by section 15.247(b)(4), categorically excludes this Part 15 device from the requirement to conduct a routine environmental evaluation for RF exposure since the device is neither a millimeter wave device, nor an unlicensed personal communications service device.

In any event, based on the maximum output power (+30 dBm) and antenna gain information contained in the underlying equipment authorization application for this device, the emissions for the device are well below the maximum exposure limits set forth in sections 1.1310 and 2.1093(d). Furthermore, the device only emits approximately six very brief transmissions in any given one-half hour period, each with a duration approximately 0.0027 seconds. Accordingly, the RF emissions for the device are well within the limits set by the Commission.

EXHIBIT 3: Radiated Emissions Test Configuration Photographs

2 Pages

EXHIBIT 4: Proposed FCC ID Label & Label Location

3 Pages

EXHIBIT 5: Detailed Photographs of Schlumberger - RMS Div. Model Residential Gas 3 Construction

External Photographs 6 Pages
Internal Photographs 12 Pages

EXHIBIT 6: Operator's Manual for Schlumberger - RMS Div. Model Residential Gas 3

8 Pages

EXHIBIT 7: Block Diagram of Schlumberger - RMS Div. Model Residential Gas 3

1 Page

EXHIBIT 8: Schematic Diagrams for Schlumberger - RMS Div. Model Residential Gas 3

9 Pages

EXHIBIT 9: Theory of Operation for Schlumberger - RMS Div. Model Residential Gas 3

3 Pages