Elliott Laboratories Inc. 684 West Maude Avenue 408-245-7800 Phone
www.elliottlabs.com Sunnyvale, CA 94086-3518 408-245-3499 Fax

RE: SchlumbergerSema
FCC ID: F9C-CBAMM

1) The address for SchlumbergerSema given on the 731 form does not match the FCC data base. The 731 lists Schlumberger Sema as the applicants name, yet the test report states Schlumberger-RMS. Please explain.

> Schlumberger-RMS is a division of SchlumbergerSema. This company has different divisions located in different states, each with a unique name to identify the type of product they design and make. All divisions pertaining to Schlumberger will used the assigned FCC grantee code for their product.

2) The Theory of Operations discusses this transmitter board being installed in the Landis & Gyr MS-II, MX, GE (excluding I70S) and ABB, yet only one meter is listed in the report. Please explain and provide detailed information as to what the differences in these meters?

> The transmitter can be used in various meters. We have previously submitted data to the FCC for the device tested in a single meter as being representative of all meters. The basic meters are very similar, with minor differences in the meter housings. The meters have a metal base and a plastic housing. The transmitter is optimized to radiate its maximum field strength when installed in the meter.
>
> If necessary, Schlumberger will apply for permissive changes to the device for different meter housings.

3) The submittal seems to support a modular approval but does not request this, provide the necessary information for modular approvals, nor was the sample tested in a stand alone configuration. The users manual also mentions retrofitting of the board. This also tends to suggest a modular approval. A limited modular approval (LMA) may be a suggestive course of action here.

> If tested in a stand-alone configuration (i.e. outside of a meter housing), the field strength is significantly reduced. The transmitter design is such that its output is optimized when it is installed into a meter. For this reason, Schlumberger have always tested similar devices installed in a meter.

4) From comparing the external photograph and the labeling information, it is not clear where the label is placed and if it is readable from the outside of the device. Please provide further information and/or photographs.

> A photograph of the location of the FCC ID label has been uploaded.

5) Please provide a photograph showing placement of the board inside the device.

Additional Photos of the internal meter has been uploaded. Photos will show were and how the transmitter board is located on the meter.

6) Please confirm that the EUT only operates on a single channel (note-test report states middle channel on certain tables).

The device does only transmit on a single channel in the center of the allocated band.

7) Please provide a better/higher resolution schematic (page 1 of 4). The copy provided is partially unreadable.

We have re-scanned page 1 of the schematics. The complete schematics will be uploaded as a revised file.

8) The theory of operation discusses that the unit is designed for low duty cycle and continuous transmissions are not possible (the TX will shut down due to excessive current draw). Please explain how the transmitter was exercised during radiated testing, and any special test methods that had to be applied to ensure maximization of the test results. Were the procedures given in the theory of operation (page 16 of 16) applied? If so, was the EUT in continuous transmit or was there still a duty cycle associated with its output?

The Transmitter was set to transmit every 1-second. For all the products, we have tested, we used the following spectrum settings: The span was set to 0 Hz to capture the emission in a simulated time-domain setting. The sweep time was set to 10 second to capture at least 10 spectral lines. This allows the continuous rotation of the turntable, without having to stop every 5 or 10 degrees increment. The display line function is manually changed as the spectral line amplitude changes. This will help determine the angle and height that yield the maximum level. We have had a lot of experience in testing this kind of device and so have developed test techniques to allow us to maximize the signals from the device.

9) Please explain how average measurements were made given the possible nature of low duty cycle. Please note that FCC guidance for average measurements expect the transmitter carrier to be in continuous transmit. Application of the RBW = 1 MHz and VBW = 10 Hz may be inappropriate depending on the answer for question 8).

The unit was transmitting once every second during testing (as stated in question # 8). Average measurements were made using RBW=1MHz, VBW=10Hz. Although not continuously transmitting, FCC has been approach with this unique transmitter. Since the transmitter is being force to transmit every 1 second (out of its ordinary true transmit protocol) FCC has allowed us to apply an additional Duty Cycle to the Average measurement for these particular transmitters only.

10) Please explain derivation of duty cycle correction factor for average measurements.

The duty cycle correction factor of 13.15dB is based on a maximum transmission length of 22 mS in any 100mS period. Plots of the Duty Cycle for both OOK and CCSK modulation has been uploaded.

NOTE: The lowest duty cycle correction value was used or applied for both OOK and CCSK modulations, average measurements during the radiated scan, if needed.

11) Please provide information regarding any change of the fundamental output radiated signal with respect to a variation of input voltage from 85% to 115% as specified by 15.31(e).

Pages 7 - 9 of the Theory of Operations detail the power supply circuitry. The device is designed to operate with no change in supply voltage to the rf circuits with input voltage fluctuations exceeding the +/- 15% of the nominal 240V AC. The actual operating voltage range is 192V – 288V (page 4 of the Theory of Operations).

12) Please provide information showing sample calculations of Output Power (page 7 of 15 & 13 of 15). Were the units of the output power (dBm or mW)?

The output power is calculated from the field strength using the formula:

$$E = \sqrt{\frac{30\ P\ G}{d}}.$$

where E = field strength (V/m), P = output power (Watts), G = antenna gain and d is the distance from the device under test (metres).

From this equation:

$$EIRP = PG = \frac{E^2 d^2}{30}$$

The output power stated in the report is the calculated effective isotropic radiated power expressed in dBm, based on the peak field strengths recorded.

13) Please provide information showing sample calculations of PSD (page 8 of 15 & 14 of 15). Were the units of the output power (dBm or mW)? Since the transmitter may not have been capable of continuous transmit (see above), and the plots show a 100 second sweep time, please explain how these measurements were made. Depending on the duty cycle of the transmitter, it may have been necessary to increase the sweep time.

> The PSD was calculated using the same equation as detailed in (12) above. Although the sweep time was 100 seconds, the graphs show the result of multiple sweeps. The analyzer is swept through the frequency range in a max-hold function until the screen no longer refreshes new "peaks" to ensure that the maximum PSD is determined.
>
> The sweep time of 100 seconds is calculated by taking the span of the analyzer (300kHz) and dividing it by 3kHz to ensure we average the power in each 3kHz band over a 1 second period as required. Increasing the sweep time would result in averaging the power over a longer period.

14) Both PSD plots provided are labeled OOK modulation (page 8 & 14 of 15). Is this correct?

> No, the plot on page 8 is for CCSK modulation and the plot on page 14 is for OOK modulation. The plot, for page 8, has been properly label.

15) The test report equipment list does not show any antennas for covering the range of 30 MHz – 200 MHz. The EUT should also have been tested for digital device emissions (radiated) from 30 MHz to approximately 5 GHz. Please explain.

> This data was located in a different spreadsheet. This has been included in the report for your review.

16) The test results on page 4 of 13 mention the results of conducted emissions, but there is not any data within the test report to support this. Please provide this information.

> The conducted emissions data has been included in the test log and a revised report has been uploaded to the ATCB website.

17) The MPE statements in the manual should be denoted in a fashion that is conspicuous to the reader (such as IMPORTANT NOTE, special graphic warning symbols, special text, etc). Please adjust the manual to make these statements more conspicuous.

Revised Manual has been uploaded (IMPORTANT has been included page 7 of 13. In addition a photograph of the location of the Permanent antenna on the RF board has been also uploaded due to FCC past inquiries (RF exposure exhibit).

18) Please justify the use of duty cycle in the MPE calculations and how the percentage of time is derived. Is this percentage based on the worse case duty cycle? Please explain the derivation of the correction factor (it appears that the percentage vs. correction factor may be off by a factor of 10). The time averaging must be based upon inherent property to the device and will be listed as part of the conditions of the grant.

The device transmits the data signal every 5 minutes. It also sends an additional transmission containing administrative information once every hour.

Each transmission is 22 mS long.

In an 30 minute period the maximum number of transmissions would be 7 data signals and one administration signal. The total transmit time would, therefore, be 8 times 22 mS.

The duty cycle in a 30 minute period would therefore be 0.01. This source-based time averaging duty cycle was used in the MPE calculation.

19) Please provide theoretical processing gain calculations.

The actual processing gain was calculated using the worst case J/S ratio of 6.6dB. This number is corrected using the system loss and theoretical signal to noise level as detailed in the calculation to give a processing gain of 20.5dB

20) I believe the limit for the second entry on page 5 & 11 of 15 should be 54 dBuV. The note 2 (page 5 of 15) does not appear to be appropriately applied throughout the table. Was note 3 ever used? Please explain.

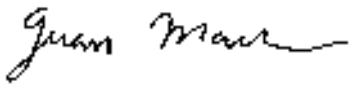
The limit should have been 54dBuV/m and this has been corrected and included in the revised report uploaded to the ATCB website.

Note 2 references the average correction factor being applied to the AVERAGE reading as per the FCC. This has been applied for all average measurements. Note that the factor is not applied to the peak measurement to determine the average value.

Note 3: No, this was performed for customer personal information. This comment has been removed.

Hopefully this answers all of your questions. Please contact me via doc@elliottlabs.com if you require more information.

Regards,



Juan Martinez
Sr. EMC Engineer