03 November, 1999

Mr. William Graff
M. Flom Associates Inc. for Niigata Seimitsu Co. Ltd
3356 North San Marcos Place, Suite 107
Chandler, Arizona, 85224-1571

Re: Questions from the FCC

FCC ID:	**NTRNSA2010**
Correspondence Reference Number:	**10242**
731 Confirmation Number	**EA95505**
Date of Original E-Mail:	**10/18/1999**

Dear Mr. Graff:

Pursuant to your e-mail and some investigation on our part I am forwarding to you our responses and a bit of additional support information to the FCC's points 1 & 2 as requested in your original e-mail (inserted below):

```
> -----Original Message-----
> From: William Graff [mailto:wgraff@mflom.com]
> Sent: Monday, October 18, 1999 6:11 PM
>
> Received the following today from the FCC engineer.
> Can you please address these issues ASAP?
```

The relevant portions of the FCC's e-mail follow with our responses inserted in the appropriate place:

```
> >-------- Original Message --------
> >Date: Mon, 18 Oct 1999 17:01:14 -0400
> >From: oetech@fccsun07w.fcc.gov (OET)
> >To:             Morton Flom, M. Flom Associates, Inc
> >From:           Greg Czumak   gczumak@fcc.gov
> >                 FCC Application Processing Branch
> >
> >Re:                                 FCC ID NTRNSA2010
> >Applicant:                          Niigata Seimitsu Co Ltd
> >Correspondence Reference Number:    10242
> >731 Confirmation Number:            EA95505
> >Date of Original E-Mail:            10/18/1999
> >
> >The following question(s) pertain to the RF exposure information
> >in your application.  Please note that the application has not yet
> >undergone technical review.  Additional questions may be asked at
```

```
> >that time.
> >
> >1. Device output is around 350 mW.  The slopes for temperature rise
> >and compensated voltages indicated in the E-field probe
> >calibration data do not seem to be very consistent at less than 400
> >mW, which could significantly affect the SAR results.  Please clarify
> >and refit the data if necessary, to obtain tissue conversion factor
> >that is more appropriate for the output power range of this device.
```

All the probes that we use for SAR measurements are calibrated once a year per simulated tissue mixture per frequency. The products we test vary in radiated/conducted power between 17dBm (50mW) and 33.5dBm (2.25W). We therefore perform a single calibration to cover all the potential projects. The whole data set is then used to determine the calibration coefficient. The data collection is not yet automated so the timing and thermal change data are manually determined with the possibility of human error. Normally two of these calibrations can be performed in a day (rarely three). Two other calibrations were done with the same probe on muscle tissue the day before. Their charts follow:

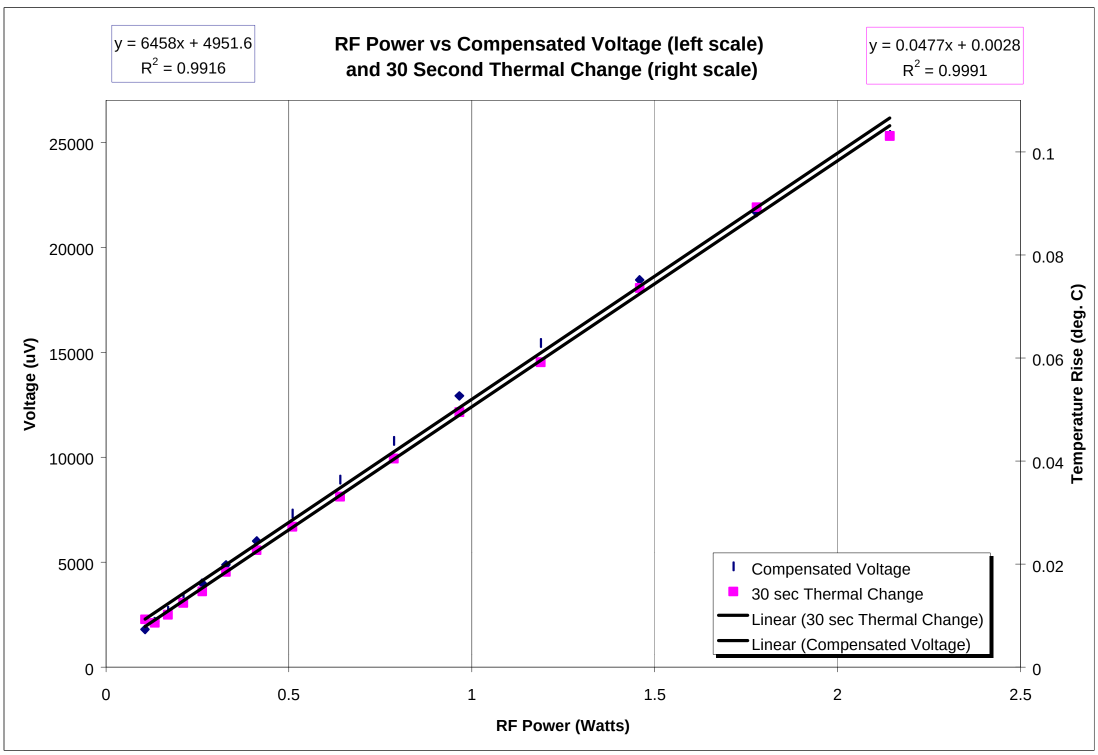

Figure 1. Thermal calibration chart for Probe E-009 s/n 115 at 835 MHz with Muscle Tissue

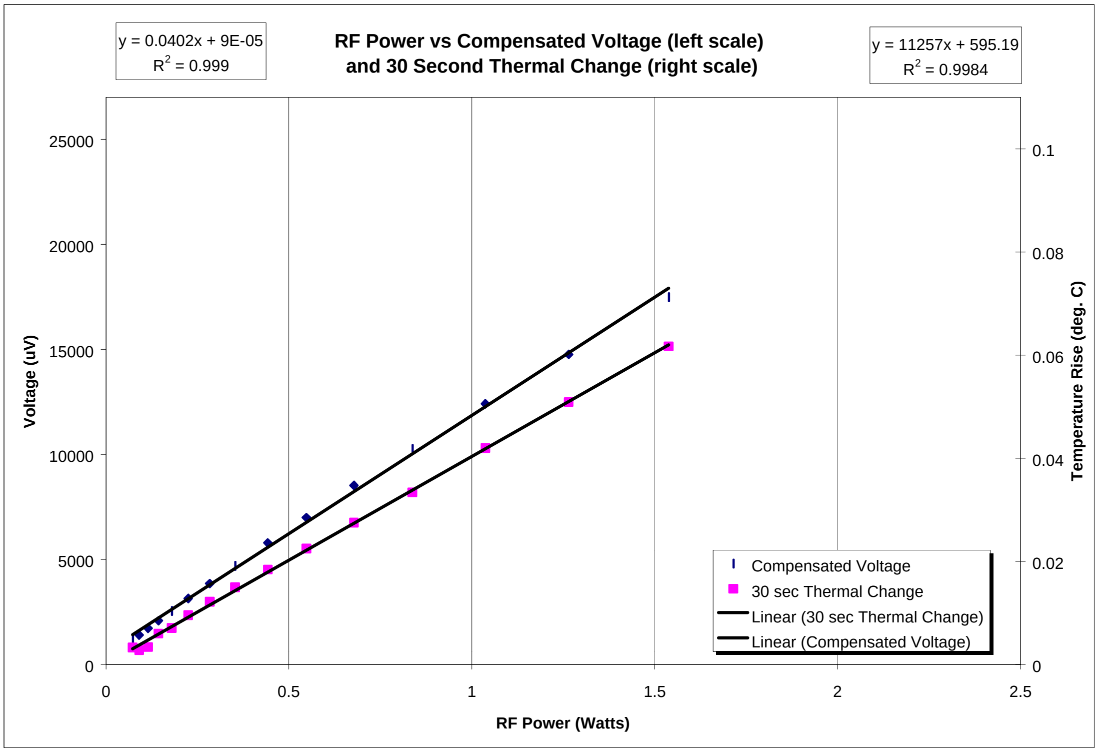

Figure 2. Thermal calibration chart for Probe E-009 s/n 115 at 899 MHz with Muscle Tissue

These two figures show that the E-field probe calibration data is usually very consistent, with the expected increased relative scatter at the low RF powers. Therefore, we have to conclude that measurement error is responsible for the point at ~300mW input RF power that does not lie near the thermal line (see Figure 3). However the effect of this single point on the calibration is negligible. If we eliminate this data point from the calibration then the thermal conversion factor (γ) will be 7.96 instead of 8.00. Since the maximum 1g SAR is inversely proportional to γ, this means that it will increase by 0.5% (i.e. 1.218 => 1.224 W/kg, which to two decimal places is still 1.22 W/kg).

We can also look at the effect of using a subset of our calibration data for lower RF powers. Since the diode behaviour is not linear we have also fitted a quadratic curve to the data in Figure 3. As you can see this produced an excellent fit. Since the thermal conversion factor (γ) is linearly proportional to the slope of this curve, it is obvious that if we use a subset of the data for lower RF powers that γ will be larger and consequently the maximum 1g SAR will be reduced. As an example, using only the voltage data below 600 mW, while using all the thermal change data, will produce a γ of 8.9 (maximum 1g SAR of 1.10 W/kg) compared to using the whole set of data which results in a γ of 8.0 (maximum 1g SAR of 1.22 W/kg). Consequently, we are being conservative in using the whole set of data to determine the thermal conversion factor.

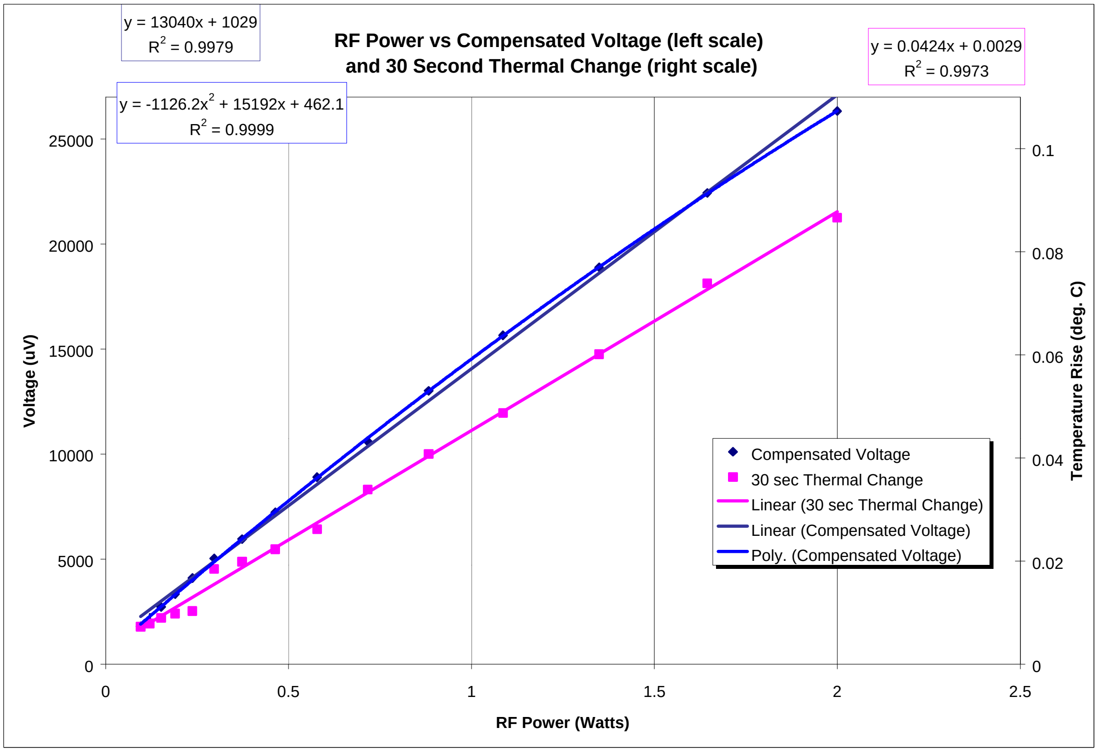

Figure 3. Thermal calibration chart for Probe E-009 s/n 115 at 835 MHz with Brain Tissue

```
> >2. Based on the SAR determined in item #1 above, clarify that the SAR
> >obtained using the Uni-Head phantom for this device is substantially
> >equivalent to that obtained using a typical head model, such as those
> >used previously by the SAR lab, for left and right side positioning
> >appropriate for determining worst-case exposure under normal
> >operating conditions for this device.  If the differences in SAR
> >between the Uni-Head and regular head phantoms are expected to be
> >larger than that allowed by the SAR margin for satisfying compliance,
> >additional test results using a regular head phantom should be used
> >to demonstrate SAR compliance.
```

The worst case conditions found during the UniHead testing were used during the Left and Right "typical head model" verification. The maximum 1g SAR obtained on the three phantoms is:

Phantom Type	UniHead	Left "typical" head	Right "typical" head
Maximum 1g SAR (W/kg)	1.22	1.21	1.29
D wrt UniHead	-	-1.1%	+5.7%

The highest "typical" head value is well within "that allowed by the SAR margin for satisfying compliance" (+5.7% higher vs ± 10.7% measurement uncertainty for UniHead). Figures 4 and 5 show the phantoms used.

Figure 4. Left hand "realistic" phantom used for verification measurements.

Figure 5. Right hand "realistic" phantom used for verification measurements.