RESEARCH IN MOTION

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Our Ref: 02165-CERT-FCC-12510 March 17, 2000

Mr. Frank Coperich
Federal Communications Commission,
Equipment Authorization Division
Application Processing Branch
7435 Oakland Mills Road
Columbia, MD 21045

Subject : Response to FCC correspondence dated March 6, 2000 Ref # 12510 for the Proton handheld FCC ID: L6AR957M-2-5, EA96074

ITEM 1:

The operating duty factor implemented in our Proton handheld device will be 10 % duty factor rather than the required 11% duty factor, providing additional margin.

The duty factor limiting algorithm for the Proton handheld is a firmware algorithm that directly inhibits the radio firmware which generates transmit pulses. This algorithm will be permanently integrated with the radio firmware and installed at time of manufacture in the production facility. The algorithm cannot be modified or disabled by the user.

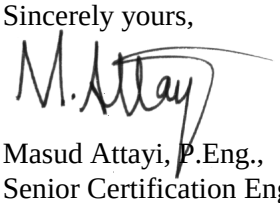
The radio within the Proton handheld device operates on a packet data network. The network controls the timing of most aspects of the radio signaling protocol. The shortest transmit event over which the mobile device has timing control is an entire uplink (transmit) transaction. From the perspective of the mobile device this in an "atomic" event – i.e. the network controls the timing of the signaling within the transaction and the transaction cannot be broken into smaller independent sub-parts. This transaction is a series of transmit pulses, whose timing is determined by the network, with a total transmitter on time of up to 6 seconds.

We have implemented and tested a modified duty factor limiting algorithm for the Proton handheld to comply with the requirement for limiting the duty factor at all times. To limit the duty factor at all times the algorithm controls the timing of when uplink (transmit) transactions are initiated. When an uplink (transmit) transaction occurs the algorithm accrues the actual transmit time. The algorithm ensures that the idle (transmitter off) time is sufficient to ensure the duty factor is less than the limit (10%) before the next uplink (transmit) transaction is initiated. This ensures that the duty factor is limited to the maximum allowable over all times.

ITEM 2:

Please refer to the response from APREL Laboratories attached below.

Should you have any questions please do not hesitate to call.
Sincerely yours,



Masud Attayi, P.Eng.,
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13 March, 2000

Mr. Frank Coperich
FCC Application Processing Branch

Re: Questions from the FCC

FCC ID:	**L6AR957M-2-5**
Correspondence Reference Number:	**12510**
731 Confirmation Number	**EA96074**
Date of Original E-Mail:	**03/06/2000**

Dear Mr. Coperich:

Pursuant to your e-mail to Research in Motion's Masud Attayi, I am forwarding to you our response to items 2. The relevant portions of the FCC's e-mail follow with our response inserted in the appropriate place:

> -----Original Message-----
> To: Masud Attayi, Research In Motion Limited
> From: Frank Coperich> fcoperic@fcc.gov <mailto:fcoperic@fcc.gov>
> FCC Application Processing Branch
>
> Re: FCC ID L6AR957M-2-5
> Applicant: Research In Motion Limited
> Correspondence Reference Number: 12510
> 731 Confirmation Number: EA96074
> Date of Original E-Mail: 03/06/2000
>
> 1. Please provide additional info to verify the proposed 11% duty
> factor qualifies for source-based time-averaging requirements of
> 2.1093. If it is firmware based, it must be permanently implemented
> at the factory. The proposed 6-minute averaging time is only
> applicable for controlled exposure environment. For uncontrolled
> exposure environment, the proposed 11% must be applicable at all
> times, please clarify these issues accordingly.

To be responded to by Research in Motion Limited.

> 2. The peak SAR location with keyboard up configuration appears to be
> at the upper left corner of the display region. Please confirm this
> is also the location for the keyboard down tests.

Figures 1 and 2 below show overlays of the Proton pager over the SAR data for the worst case measurement among the L, M or H channels, on each side of the device. In both cases the

SAR hot spot is located at the left edge of the display. With the keyboard up the hot spot is near the top of the left edge of the display while with the keyboard down the hot spot is near the center of the edge of the display.

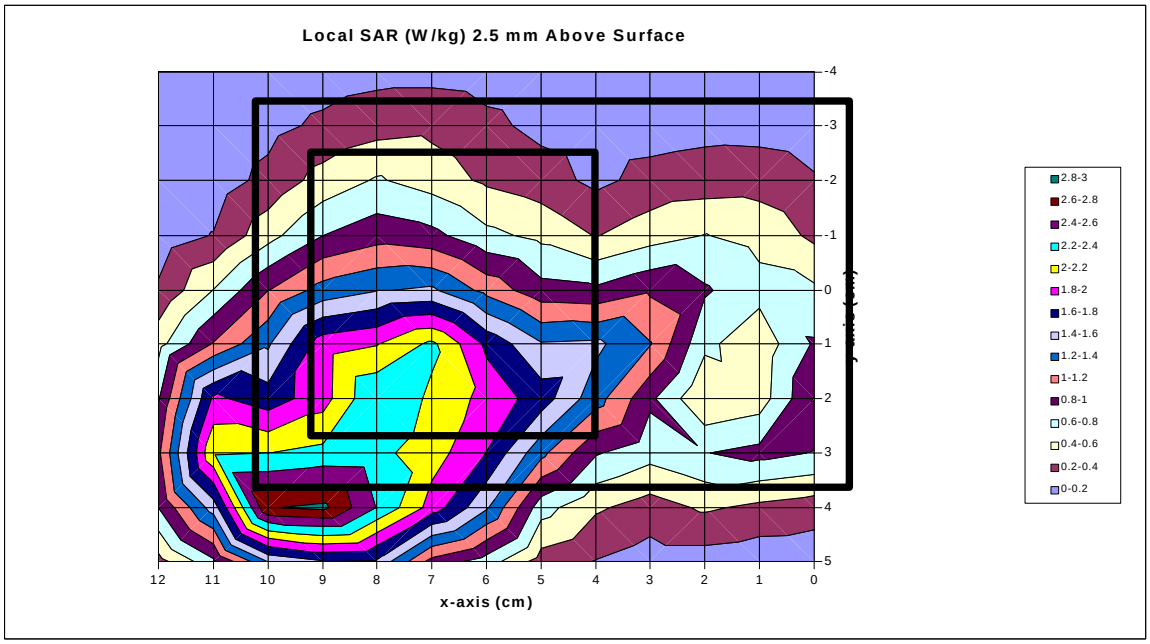

Figure 1. Overlay of outline of Proton pager with keyboard UP over SAR data for L channel

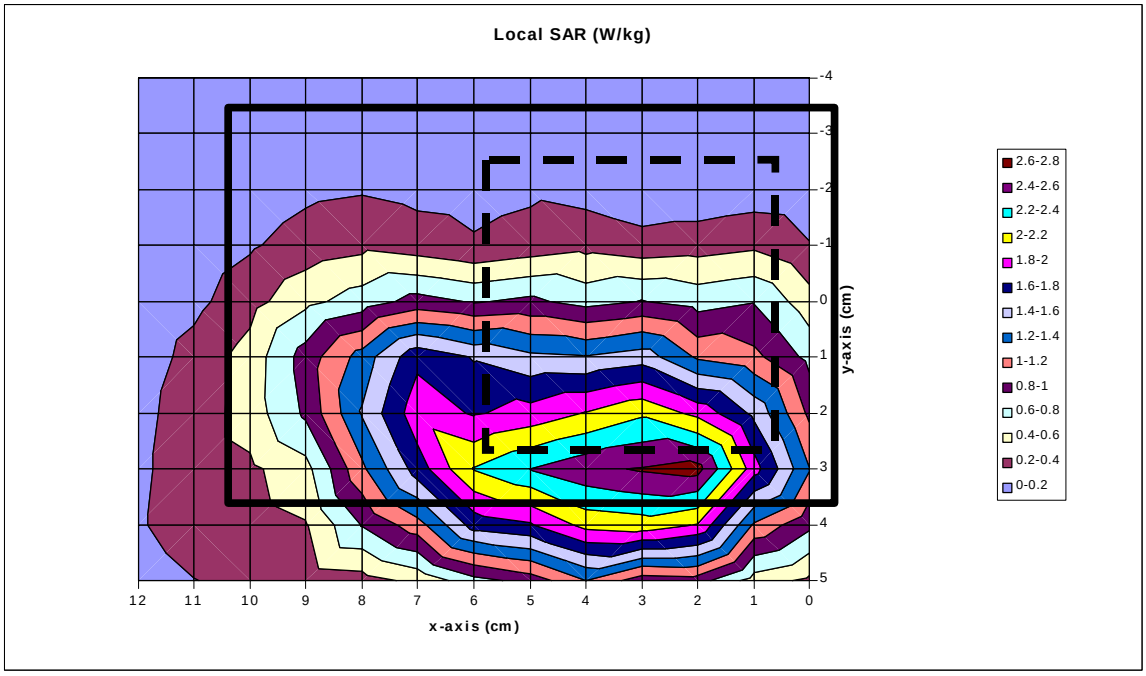

Figure 2. Overlay of outline of Proton pager with keyboard DOWN over SAR data for L channel

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> Since this device is generally held in a person's hand for typical
> operating configurations, please verify the peak SAR location is
> generally not within the operating or holding locations of a person's
> hand (left, right or both).

The peak SAR location is within the holding location of a person's left hand. This would apply to a user who use the keypad with their right hand (see Figures 3). Experienced users, however, will operate the keypad with both hands at the bottom of the device and their hands will not be exposed to the peak SAR location (see Figure 4).

Figure 3. Users of the Proton pager holding the pager in their left hand and typing with their right forefinger.

Figure 4. Experienced user typing with two thumbs holds Proton pager near the bottom of the device

> Note: SAR limit for the hand is higher (4 W/kg averaged over 10 g),
> but if the hand or fingers can be directly over the side of the
> device (configuration not tested) higher SAR could be expected.

> Please verify that hand SAR compliance is not an issue - either by
> device design and usage conditions, specific operating and/or caution
> instructions in the manual, by extrapolating existing SAR results, or
> with separate SAR measurements or simulations etc.

Wide area scans were performed for the low (480, 896 MHz) channel on the four edges of the pager as well as on the middle (720, 899 MHz) and high (880, 901 MHz) channels for the worst edge with a 21% duty factor. The peak single point SAR for the scans were:

Channel	Channel # [hexadecimal]	Frequency [MHz]	Proton Keyboard	Highest Peak SAR [W/kg]
Low	480	896	Top	0.55
Low	480	896	Right	0.46
Low	480	896	Bottom	0.15
Low	480	896	Left	5.48
Middle	720	899	Left	5.39
High	880	901	Left	5.19

Subsequent testing was performed on the low (480, 896 MHz) channel with the left edge of the pager against the bottom of the phantom. Figure 5 is a picture of the alignment of the pager with respect to the UniHead phantom; Figure 6 shows the contour plot of the worst case area scan.

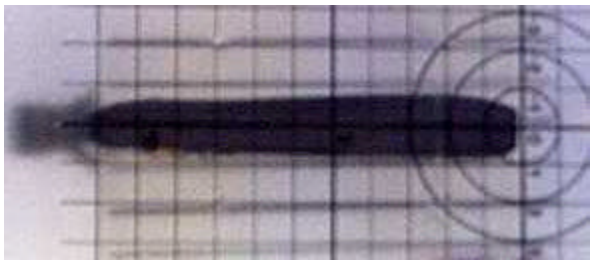

Figure 5. Pager-UhiHead alignment

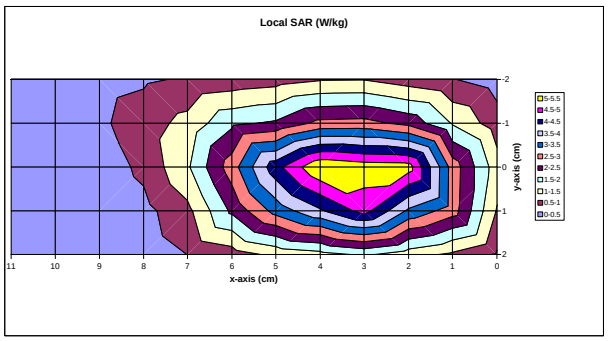

Figure 6. Worst case left edge scan

The low channel (480) SAR peak was then explored on a refined 5 mm grid in three dimensions with a 21 % duty factor. Measurements were made at 2.5, 7.5, 12.5, 17.5 and 22.5 mm. The SAR value averaged over 10 gram was determined from these measurements by

averaging the 125 points (5x5x5) comprising a 2 cm cube. The maximum SAR value measured, averaged over 10 gram, was determined from these measurements to be 1.71 W/kg.

To extrapolate the maximum SAR value averaged over 10 gram to the inner surface of the UniHead phantom a series of measurements were made at a few (x,y) coordinates within the refined grid as a function of depth, with 2.5 mm spacing. Figure 7 shows the data gathered and the exponential curves fit to them. The average exponential coefficient was determined to be (-0.097 ± 0.006) / mm.

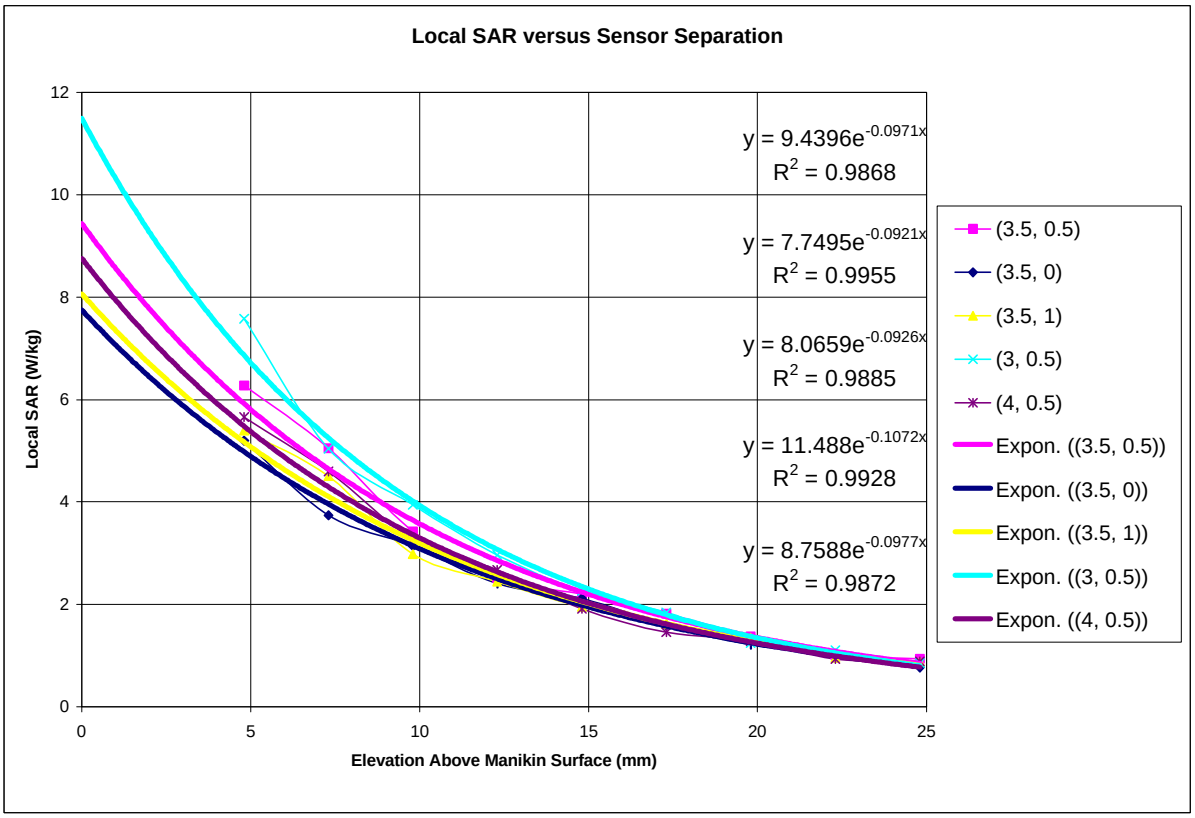

Figure 7.

The distance from the probe tip to the inner surface of the head phantom for the lowest point is 2.5 mm. The distance from the probe tip to the tip of the measuring dipole within the APREL Triangular Dosimetric Probe Model E-009 is 2.3 mm. The total extrapolation distance is 4.8 mm, the sum of these two.

Applying the exponential coefficient over the 4.8 mm to the maximum SAR value average over 10 gram that was determined previously, we obtain the maximum SAR value at the surface averaged over 10 gram of 2.73 W/kg.

Since this is within the 4.0 W/kg allowed by the FCC 96-326 safety guideline with the pager operating at 21% the most severe restriction of the device will be imposed by pocket use as previously reported.

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