15 February, 2000

Mr. Errol Chang
FCC Application Processing Branch

Re: Questions from the FCC

FCC ID:	**NWJ10A001A**
Correspondence Reference Number:	**11037**
731 Confirmation Number	**EA94679**
Date of Original E-Mail:	**12/15/1999**

Dear Mr. Chang:

Pursuant to your e-mail to Panasonic – MMCD's Pieter Seidel I am forwarding to you our responses to items 1, 35-7 and 9-11. The relevant portions of the FCC's e-mail follow with our responses inserted in the appropriate place:

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> -----Original Message-----
> From: oetech@fccsun07w.fcc.gov [SMTP:oetech@fccsun07w.fcc.gov]
> Sent: Wednesday, December 15, 1999 9:05 AM
>
> To:      Pieter Seidel, Panasonic - MMCD
> From:    Errol Chang, echang@fcc.gov
>          FCC Application Processing Branch
>
> Re:                                FCC ID NWJ10A001A
> Applicant:                         Matsushita Mobile Communications
>                                    Development Corporation of USA
> Correspondence Reference Number: 11037
> 731 Confirmation Number:         EA94679
> Date of Original E-Mail:         12/15/1999
>
>
> 1. The conducted outputs indicated in response #1 for the cellular
> TDMA mode do not make sense, 5.16-6.27 ?  Please submit a copy of the
> measured results for conducted output for this operating mode.
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In the previous response dated November 22, 1999 by Panasonic the conducted outputs reported are the RF power meter readings measured by APREL Laboratories. To get the actual conducted power you have to add 15.15dB to account for the attenuators, cable loss, and power meter sensor correction factor (as per note below table in section 6.1 of each of the two SAR reports). The range of conducted power is then 20.31 – 21.42 dBm. Note that these are average power readings and since this TDMA operated on one time slot in three the peak transmit power within the slot

would be at least 3 times this. However, this was irrelevant during the SAR measurements as the purpose of these measurements was to determine the effect of the battery drain on the operation of the device. Below you will find scans of the two pages in Antonio Utano's labbook (APREL Notebook No. 286) logging the SAR measurements for the Panasonic EB-TX110A.

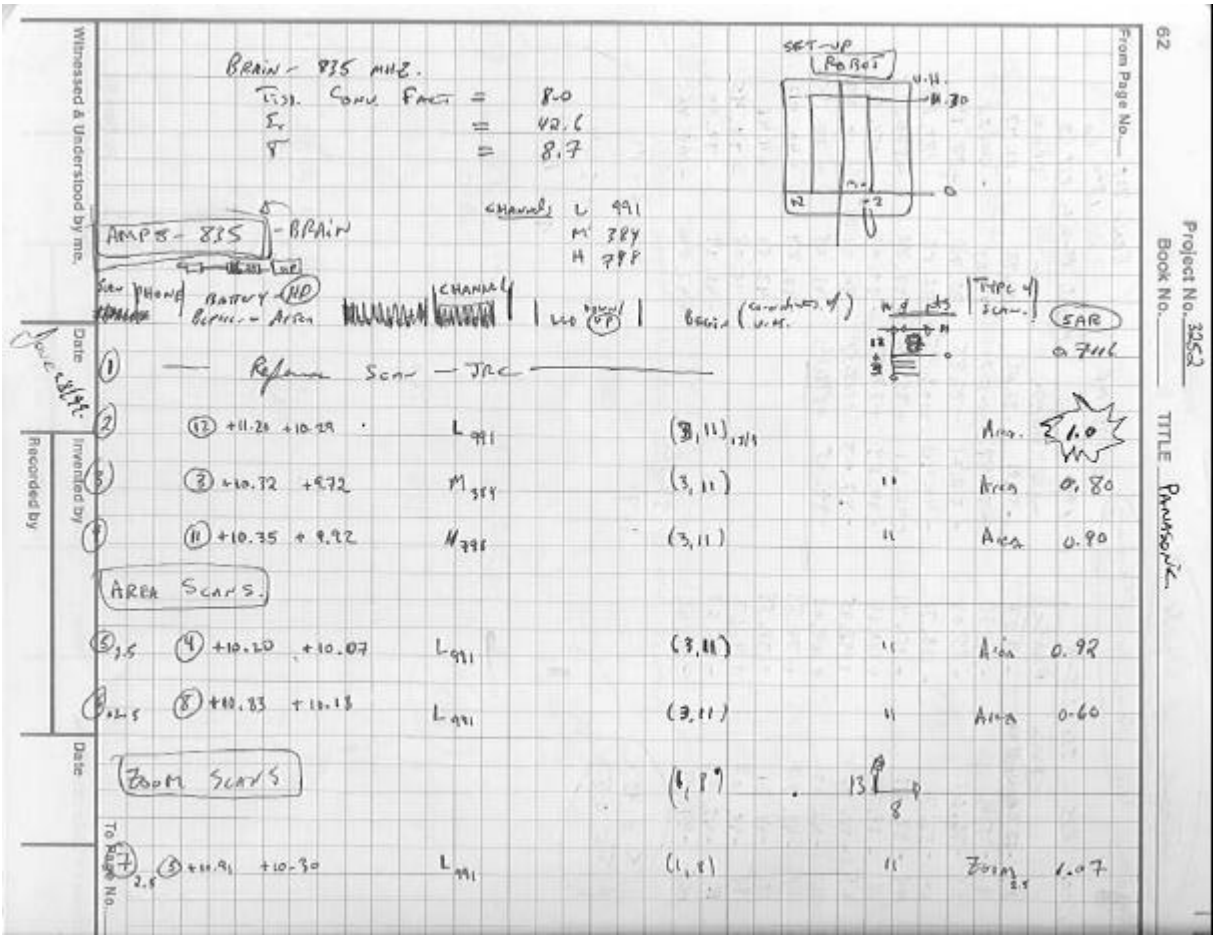

Figure 1. Page one of Panasonic Project Log (# 3252).

The first column notes the SAR scan number, the second the battery number used for this particular scan, the third column the power meter (HP 438A) reading at the beginning of this run and the fourth column the power meter reading at the end of the scan. Note that above the power reading column headings there is a small sketch of the RF conducted power measurement setup. This shows an estimated total correction factor of 16dB which was later determined to actually be 15.15dB.

The RF power readings reported in the previous correspondence dated November 22, 1999 can be found on the second page (see Figure 2 below) under a boxed heading of "TDMA 800" Brain.

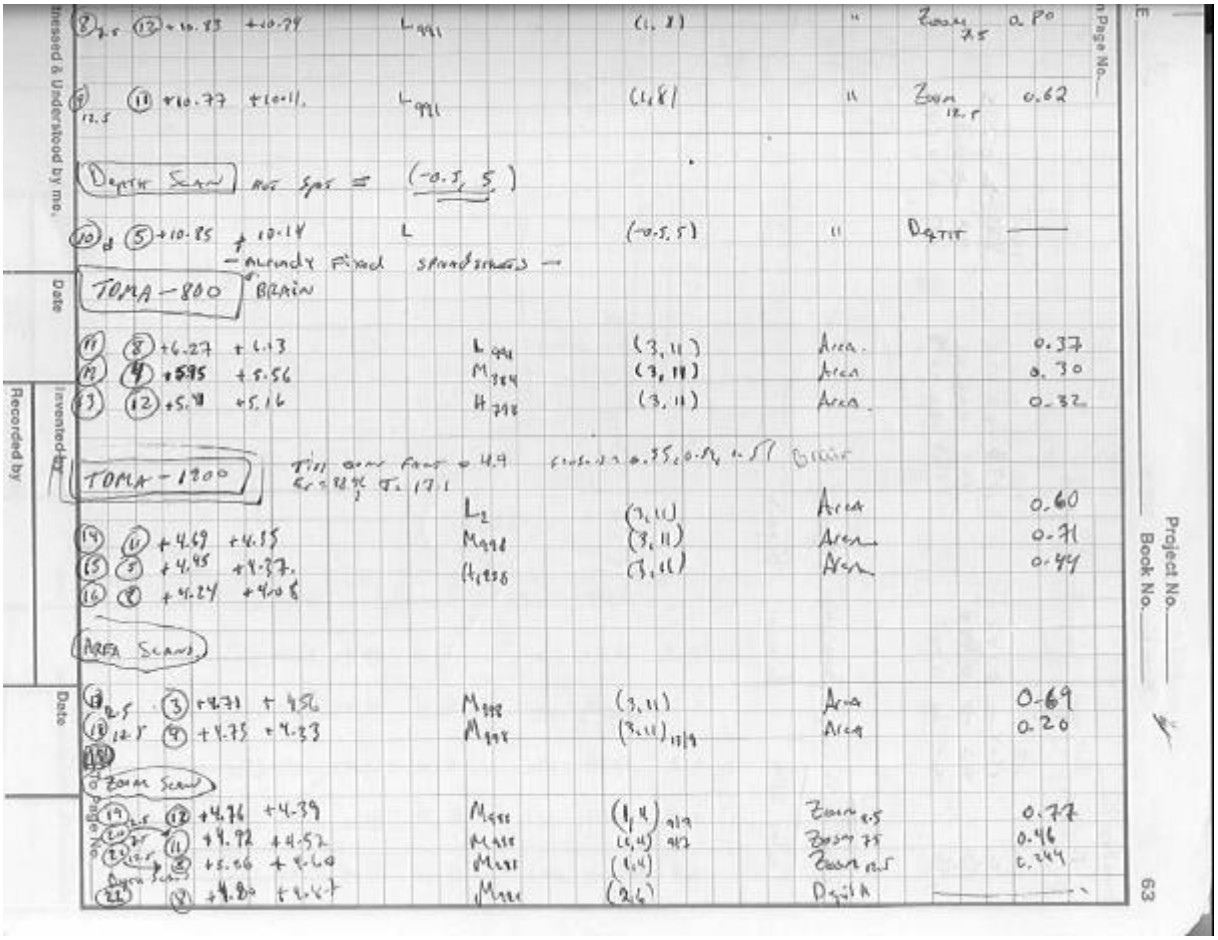

Figure 2. Page two of Panasonic Project Log (# 3252).

> 2. You may upload a scanned copy of your revised 731 form to cover
> letter exhibits or to clearly state the changes through a cover
> letter upload to correct output power. Note: output power indicated
> on the grant are ERP for Part 22 operations and EIRP for Part 24
> operations, as required or established in those rule sections. A
> phone with 400 mW conducted output listing for 600 mW ERP is not
> unreasonable, since it can all depend on the antenna gain and design
> or the particular phone. What is listed on the grant should be based
> on actual ERP or EIRP measurement data. If a device has an external
> detachable antenna, conducted output may be listed.
> Please revise the 731 form accordingly with respect to the actual
> radiated measurements. Note: ERP and/or EIRP are generally indicated
> as grant comments since a year or so ago.

Panasonic to address.

> 3. Response #3 indicated worst case battery conditions were tested
> and noted in the SAR report. The SAR report described output power
> variations due to battery conditions and had no indication of which
> battery was used. Worst case exposure and SAR due to different
> batteries opitions was not addressed in the SAR report. Please
> address this isssue for the head and body-worn operating
> configurations, for all the operating modes of this device (AMPS,
> TDMA, PCS etc.)

On page 5 of both SAR reports, at the end of Section 3, the battery type that was used for the reported measurements was noted by "… with a high capacity battery attached.". The actual measurements APREL made to determine which type of battery produced higher SAR were not reported back in June of 1999 because at that point in time the FCC had not asked our lab to pay attention to this issue yet. We were verbally advised to report on this from now on by Kwok Chan in July of 1999.

The initial battery investigations on this phone were performed at the end of May 1999. Using muscle tissue and placing the phone against the phantom we performed SAR area scans 2.5mm from the inner phantom surface and noted the peak value. We did this for both sides of the device against the phantom, for all three operating modes with the high capacity battery. The result was that the worst case occurred for the middle channel in the AMPS mode with the LCD of the phone away from the body, i.e. with the battery against the body. We then used a low capacity battery under these worst case conditions, performed a single area scan and found the peak SAR to be 10% less. On the basis of these measurements we decided to perform all future measurements with the high capacity battery.

In light of the new requirements and the current request, we have performed SAR area scans to fill in missing low capacity battery peak SAR values where appropriate. Below in Table 1 the results with brain tissue simulation are presented. The highest peak SAR value is highlighted in each frequency range. Since our previous measurements showed that the 800 MHz TDMA peak SAR was about one third of the corresponding AMPS peak SAR, we decided that performing the low capacity battery scans for this mode was unnecessary.

These results show that for the 1900 MHz TDMA mode the previously reported maximum 1g SAR of 1.241 W/kg was indeed the maximum for this mode. However, for the 800 MHz AMPS mode, the low channel with the low capacity battery has a peak SAR 11% higher that the peak previously reported. Applying this to the previously reported maximum 1g SAR of 1.436 W/kg we get an expected maximum 1g SAR of 1.592 W/kg.

Table 1. Peak SAR vs Phone Mode, Channel and Battery Type for Head Tissue

Mode	Channel	Channel #	Frequency (MHz)	Battery	Peak Single Point SAR (W/kg)
AMPS	Low	991	824.07	LC	1.02
AMPS	Middle	384	836.52	LC	0.90
AMPS	High	798	848.97	LC	0.96
AMPS	Low	991	824.07	HC	0.92
AMPS	Middle	384	836.52	HC	0.80
AMPS	High	798	848.97	HC	0.90
TDMA-800	Low	991	824.07	LC	-
TDMA-800	Middle	384	836.52	LC	-
TDMA-800	High	798	848.97	LC	-
TDMA-800	Low	991	824.07	HC	0.37
TDMA-800	Middle	384	836.52	HC	0.30
TDMA-800	High	798	848.97	HC	0.32
TDMA-1900	Low	2	1850	LC	0.71
TDMA-1900	Middle	998	1880	LC	0.56
TDMA-1900	High	1998	1910	LC	0.55
TDMA-1900	Low	2	1850	HC	0.60
TDMA-1900	Middle	998	1880	HC	0.71
TDMA-1900	High	1998	1910	HC	0.44

Area scans were also performed with the phone inside a manufacturer supplied carrying cases, for all modes, high, middle and low channels and both battery types, with the hands free kit attached and the appropriate muscle tissue. These results are summarized in Table 2. Again we did not waste time on the 800 MHz TDMA mode based on our prior experience with this device. Most of the scans were performed with the fabric case ,and the case with the low channel with the high capacity battery was repeated with the leather case. Note that both cases used the same belt clip so the results are expected to be the same, which is supported by the results reported here. As expected the SAR with the case and belt clip is less that the SAR against the head.

Table 2. Peak SAR vs Phone Mode, Channel, Battery and Case Type for Muscle Tissue

Mode	Channel	Channel #	Frequency (MHz)	Case	Battery	Peak Single Point SAR (W/kg)
AMPS	Low	991	824.07	fabric	LC	0.73
AMPS	Middle	384	836.52	fabric	LC	0.64
AMPS	High	798	848.97	fabric	LC	0.63
AMPS	Low	991	824.07	fabric	HC	0.45
AMPS	Middle	384	836.52	fabric	HC	0.43
AMPS	High	798	848.97	fabric	HC	0.50
AMPS	Low	991	824.07	leather	HC	0.45
TDMA-1900	Low	2	1850	fabric	LC	0.50
TDMA-1900	Middle	998	1880	fabric	LC	0.48
TDMA-1900	High	1998	1910	fabric	LC	0.44
TDMA-1900	Low	2	1850	fabric	HC	0.42
TDMA-1900	Middle	998	1880	fabric	HC	0.35
TDMA-1900	High	1998	1910	fabric	HC	0.37
TDMA-1900	Low	2	1850	leather	LC	0.51

> 4. Response #4 did not fully address the original question. Please
> review previous correspondence and address issues, including
> qualification for categorical exclusion, 20 cm or more installation
> and operating requirement, antenna gain issues etc. If this device
> allows operating configurations using external antennas, the
> operating and installation requirements for such operations must be
> addressed and specified to users and installers to satisfy MPE
> requirements. Leaving it up to the installers but without telling
> them how to comply with MPE requirements is not acceptable. At a
> minimum, the antenna gain and installation configurations that
> qualify this device for categorical exclusion (see 2.1091) and/or MPE
> compliance should be determined and given to users and installers to
> satisfy compliance. The purpose of such requirements should also be
> stated - for purpose of FCC RF exposure compliance.

Panasonic to address.

> 5. Based on information received regarding the belt-clip
> configurations and body-worn SAR test distance, it does not appear
> that the mentioned belt-clip was used during the body-worn SAR tests.
> Different separation distances were indicated - 1.1 cm was used in
> the tests and the belt-clip actually provides 2.4 cm separation.
> Since that belt-clip has a bent spring steel in it, body-worn SAR

> must be tested with the actual metallic belt-clip in place because
> the metal can enhance SAR. Please clarify and provide the necessary
> body-worn SAR to demonstrate compliance and identify which battery
> option(s) produces the worst case SAR for head and body-worn
> configurations.

The belt-clip phone holster was used for one SAR area scan and was reported on the last line of the table in section 6.2.5. This result fit in with the results obtained as a function of separation of the phone without a case and clip. Additional results with the belt clip now exist and can be found above in Table 2 above. The conclusion from these measurements is that having the phone in its case in hands free mode does not expose the user to SAR level as high as those experienced when the phone is used against the side of the head.

> 6. Based on responses for item #5 above, the statement in the manual
> (currently page 5) should be revised accordingly. The SAR report
> indicated a "Warning" will be placed in the manual, please revise the
> belt-clip and body-worn info to reflect a warning statement. The
> statement should also indicate it is for FCC RF exposure compliance
> and other non-tested body-worn accessories and configurations may not
> comply with SAR limits and should not be used.

Panasonic to address.

> 7. Response # 5 from APREL, please take into account worst case SAR
> (as indicated in original correspondence) with respect to battery
> options issues (item # 3 of original correspondence and also item #3
> above). Note: should the number in the table be +7.9% instead of
> - 7.9 %?

Addressing the note first – yes, you are correct, the last number in the table should be +7.9%.

Item #3 above showed an 10.9% higher SAR with the low capacity battery with the phone operating on the low channel versus the reported high capacity battery measurements. Item #5 from the previous correspondence showed a SAR possibly 7.9% higher with a “typical” fiberglass head. Adding these two would give the absolute worst case increase to the reported SAR of 18.8%. Applying this increase to the reported maximum 1g SAR in the AMPS mode of 1.436 W/kg would result in a maximum 1g SAR of 1.706 W/kg.

> 8. Response #9 from APREL, please clarify how the difference in slope
> between the raw data and regression line for the compensated voltages
> in figure 9 may change the reported body-worn SAR; also take into
> account belt-clip issues in item #5 above.

The tissue conversion calibration was performed with RF power delivered to the dipole under the phantom varying from 175mW up to 10W. This covers the range of powers of devices that we are asked to measure SAR for. Our method of determining the tissue conversion factor is conservative in that taking a larger range of data decreased the magnitude of the factor. Since the resultant SAR has this factor in the denominator, decreasing this factor has the consequence of increasing SAR. In this particular example if we use all the data we obtain a tissue conversion

factor of 7.2, while if we use only the data up to 600mW we get a tissue conversion factor of 11.5. Consequently, the SAR using the smaller range of data would be 63% of the SAR using the full set of data.