August 17, 2004

RE: Fujitsu Ten Limited
FCC ID: BAB271000297

The following is in response to the comments made on this application:

1) Is a photograph of the PCB layout Photo-2 (RF-unit solder-side) available without the metal "bar" across the board?

A photograph has been requested, and if available that photo will be provided. However, please note that this particular metal assembly is the mounting structure / heatsink of the MMIC, and separation of the ground metal from the device will likely destroy the MMIC. (This may be liked to removing the packaging from an IC.) No recognizable components will lye between the metal structure and the MMIC wafer, as this structure simply acts as a heatsink for the components within the MMIC structure.

2) It appears that only part of the RF schematics may have been provided. Please explain and/or provide as necessary.

A request has been made with the manufacturer for more complete schematics of the RF subsection, and if available they will be provided. However, much of the high frequency RF sub-system is enclosed in the MMIC device; custom manufactured for this application and pre-packaged as the PCB RF UNIT. Since, in general, RF schematics of RFIC's are not required during certification (only block diagram information), it may be expected that the schematics for a similar MMIC structure (which may be the property of a third party vendor) also would not be required. Please comment on the requirement for RF schematics of RFIC's and MMIC's during the certification process so that we may proceed in acquiring the schematics requested.

4) Please provide an appropriate labeling exhibit for this device.

Our apologies, the exhibit has been uploaded.

5) According to the mm wave procedures, the EWB should be based on the 26 dB bandwidth, not 20 dB. Please provide the proper EWB. Note that the application mentions several modulations, including FM and CW. What is the worse case EWB for each modulation, especially CW. First impressions is that the EBW is close to 110 MHz. Is this actually the EWB?

110 MHz is the max-held measurement of total chirp/CW bandwidth while in the standard FM(chirp)/CW modulation mode. It does not represent the instantaneous bandwidth (EBW) of the chirp/CW radar. An updated test report has been uploaded which demonstrates the CW EBW of the radar.

6) It appears that the emissions were not adjusted by 10 log (EWB/RBW). Please correct or explain why this was not necessary.

Please see the updated test report. Therein, the EWB of the radar is demonstrated to be lower than the input bandwidth of the Spectrum Analyzer used during the peak power measurement.

7) Mobile RF exposure information was calculated for safe distance. Note that the FCC is not interested in should be calculated for 20 cm distance, not safe distance.

The RF Exposure exhibit has been modified and re-uploaded as requested.

8) None of the plots appear to be labeled. Plot 5.6 is referenced as if showing both FM and CW. No such plot appears to be provided. Please explain.

A revised test report has been uploaded. In addition, figure 5.6 demonstrates the CW and FM emissions time of operation and is correct. This plot demonstrates the CW and FM signals at a frequency other than the CW center frequency. Thus, the FM emission is shown as a high-pulse in time, while the CW emission is shown as a low period.

9) Plot 5.6 is referenced as if showing both FM and CW. No such plot appears to be provided.
Please explain.

See above.

10) It appears that the Peak to Average Ratio given in 6.1 is based upon the 2/3 TX On/Off time. How does the CW modulation affect this calculation in 6.1.

Peak emissions from the DUT were measured using CW (no switching or FM) with the antenna physically scanning. Since the peak emission was directly measured (possible because the scanning rate is slow – 5 Hz), the total duty factor applied to determine the average power is the complete -6.5 dB as calculated in Section 6.1 of the Test Report.

11) Regarding the duty cycle, is there circuitry to determine if there is a mechanical problem with the positioner of the device. For instance, if the positioner stops working, what will be the duty cycle?

The DUT will not function correctly if the mechanical scanning mechanism is dysfunctional, and thus the device should be replaced. However, if the positioner where to fail, the duty cycle of the device would then be increased by the 2(2.7/16) ratio (see Section 6.1), resulting in an overall peak to average power duty factor of -3.6 dB. Also note that the device is only functional while the automobile is moving.

12) Page 14 mentions Class A limits. Class A does not appear to be relevant. Additionally, please explain the test distance associated with "Digital Device Emissions".

Digital device emissions are measured at a 3 meter distance. Digital emissions were measured so as to characterize the device, but since the system is for vehicular use only, they are not subject to regulation.

13) Please explain the derivation of dBm/cm^2 to uW/cm^2. and dBuV/m to dBm/cm^2.

dBm/cm^2 to uW/cm^2:

$10 \text{ Log}_{10}(\text{uW/cm}^2) - 30 \text{ dB} = \text{dBm/cm}^2$

dBuV/m to dBm/cm^2:

$S \text{ (mW/cm}^2) = \text{EIRP (mW)} / (4 \pi R^2)$
$\text{EIRP (dBm)} = S \text{ (dBm/cm}^2) + 10 \text{ Log}_{10}(4 \pi R(\text{cm})^2)$
$\text{EIRP (dBm)} = \text{Pr (dBuV/m)} - 95.2 \text{ dB}$

Thus, at a 3m distance:

$\text{Pr (dBuV/m)} = S \text{ (dBm/cm}^2) + 10 \text{ Log}_{10}(4 \pi (300)^2) + 95.2 \text{ dB} = S \text{ (dBm/cm}^2) + 155.74 \text{ dB}$

IC Issues

14) The application form specifies P0N on the 731 and PQN on the IC form. Please justify or correct as necessary.

The typographical error has been corrected. Please see the updated application forms exhibit.