December 22, 2004

Re:	FCC ID L2C0023TR
Applicant:	Delphi Delco Electronics Systems
Correspondence Reference Number:	28186
731 Confirmation Number:	EA384397

The following is in response to the questions raised in certification of the above application.

1) A sealed enclosure is insufficient justification for Confidentiality of the internal photos. If someone can still open the device, and take photos then the internal photos cannot be held confidential. Provide sufficient justification or submit a new confidential letter without the internal photos listed.

Delphi has decided that, since a sealed enclosure has been deemed insufficient justification for Confidentiality, they will remove their request to attain permanent internal photo confidentiality. However, Delphi does request short term confidentiality for the internal photos exhibit. This request is justified, as the device in question is scheduled for release in the 2006 automotive model year. Thus, these devices will not be available to the general public for 8 months. A set of updated cover letters has been uploaded with this response.

2) For UWB devices, a 20 dB/decade is used. Do not use a 40 dB/decade extrapolation factor. Please submit a corrected test report.

Please note that use of 20 dB/dec in the near-field of the device conflicts with the FCC's microwave measurement procedures document (FCC 20040514-002). Has the FCC decided to modify the microwave measurements procedures? If not, please justify why microwave measurement procedures do not apply to UWB devices operating in the microwave region, as the rate of field decay from such devices does not deviate from those of other microwave devices certified under other sections of the FCC regulations. Please also see our response to question 5) below.

3) Justify a clear demonstration of classification of the 8 GHz and 16 GHz emission as digital circuitry per 15.521(c).

The 16 GHz emission is an LO generated for use only in the receive chain of the radar (see block diagram), and as part of a receiver > 960 MHz should not subject per FCC 15.101(b).

The 8 GHz radiated emission is not an emission from the TX chain, but is believed to be a spurious emission emanating from the device receive chain LO (the doubler in the RX chain requires the largest portion of the LO power, the reference signal to the transmitter is 14 dB lower). The 8 GHz emission does not radiate at a level above the UWB emission from the transmitter's antenna, as computed from the theoretical performance of the BPSK digital encoder and both the calculated and measured response of the TX chain Bandpass Filter (-30 dB at 8 GHz). The waveform associated with the particular PN code has the center spectral line reduced by 36 dB relative to the first upper and lower spectral lines of the waveform. Thus, this emission is believed to be

solely an emission from the receiver portion of the radar. Thus, as a component of a receiver > 960 MHz, this emission should not subject per FCC 15.101(b).

In the test report, these emissions were "labeled" as digital emissions when demonstrating that they meet the FCC Class B limit. The test report has been revised and uploaded.

4) Provide a description of the measurement procedure used for measuring compliance with Section 15.515(c).

Initially, the peak level of the radiated emissions is measured over all azimuth and elevation angles. (The dominant source of radiated energy is the transmit antenna.) This peak occurs at the same angle that the antenna gain is maximized, which is perpendicular to the radome (azimuth = 0 degrees). This is measured with the radar in spread spectrum mode, operating as it would in the field, with the receive antenna co-polarized with the radar antenna.

Next, the radar module is placed in a CW test mode, with the spread spectrum modulation disabled. In this mode, the unit transmits higher power spectral density, providing a means of making the pattern measurement with sufficient dynamic range. With the device in this mode, the worst case azimuth and elevation patterns are measured.

Once antenna patterns are obtained, the peak UWB transmitted power level, measured at 24.0 GHz in Section 6.2, is assumed to correlate to the peak of the measured pattern. The off angle power is then computed by subtracting the sidelobe level (dBc) from the main lobe transmitted power.

5) In table 6.1, measurement distances at the upper frequencies are at 0.3, 0.1 and 0.05 meters. With regard to measuring in the near field- what is the beam width and antenna patterns at these frequencies? and can the full EUT be seen?

The antennas in question are standard gain horn antennas (NRL Rep. No. 4433), and thus they do not see the entire device at close range. Therefore, the DUT was rotated through all axes and angles in front of the antenna, keeping the separation distance listed. However, due to noise floor limitations, measurements must be made at these distances (with a 40 dB/dec conversion factor) in order to demonstrate compliance as discussed below.

Note: The use of a 20 dB/dec near-field attenuation rate will present a certification issue. Note that the measurements made in the frequency bands 40-65 GHz and 65-110 GHz are measurements at receiver noise floor, even with the use of high-end test equipment, mixers, and horn antennas. With a 40 dB/dec near field attenuation, the DUT meets the UWB limits by 3.1 dB in W-band. With a 20 dB/dec near-field extrapolation, the measurement receiver noise floor will be greater than the FCC UWB limit, even for RMS measurements at exceedingly small measurement distances. Thus, in order to decrease the measurement receiver's noise floor, 40-110 GHz LNA's will be required (to reduce the receiver noise due to mixer conversion loss). At this time, such devices are not economically feasible for the test and measurement community.