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Ms. Marlene Dortch
Secretary
Federal Communications Commission
445 Twelfth Street SW
Washington DC 20554

Re: ET Docket No. 98-153, Ultra-Wideband Transmission Systems

M/A-COM, a division of Tyco Electronics, submits this letter in response to the Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, FCC 03-33 ("Further Notice"). This letter discusses the relationship between frequency hopping automotive radars (Further Notice, para. 156-161) and the requirement in Section 15.521(d), which states

If pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on.

M/A-COM has designed a 24 GHz UWB automotive radar that emits 64 dithered pulses on and followed by 192 pulse periods off; each pulse period is 333 ns. So a complete pulse train, including blanking interval, is 85.3 microseconds, which is short compared to the 1 millisecond averaging time but long compared to a single pulse time. FCC Rule Section 15.35 allows averaging over the complete pulse train including blanking interval, while Section 15.521(d) prohibits this time averaging. For this product, the prohibition on time averaging imposes a 6 dB penalty in performance.

This product would be used for these beneficial purposes: Driver assistance applications such as parking aids, stop and go driving, advanced autonomous cruise control. Also, active and passive safety systems such as blind spot detection, pre-crash detection, pedestrian protection, lane change warning. A 6 dB reduction of transmit spectrum would result in 30% reduction in range performance. For example, a system capable of detecting vehicles to 30m in range would be limited to 21m if the transmit power were reduced 6 dB. Such a reduction in performance would severely reduce the benefits and marketability of the sensor applications.

For 24 GHz UWB automotive radars, the potential interference victims are Earth Exploration Science passive sensors and Radio Astronomy receivers in the 23.6-24.0 GHz band, and Fixed Service receivers in other bands around 24 GHz. Interference from 24 GHz automotive radars in the EESS and RAS receivers is based on an aggregation of emissions from many radars in the satellite antenna footprint or the RAS antenna pattern. Since the radars are not synchronized in time, time averaging of their gated emissions should be permitted in evaluating interference. Since the Commission has adopted a peak emission limit as well as an average limit, interference into FS receivers is governed by that peak limit and not affected by whether the pulsing is gated or continuous. Moreover, despite the FCC's Further Notice, no party with an interest in the provision of fixed terrestrial service in the bands around 24 GHz has filed comments indicating a concern with time averaging, and the FCC should interpret this silence as an indication that its peak limit provides a sufficient safeguard against potential interference to the fixed terrestrial service.

In the Further Notice, the Commission is examining the frequency hopping design of a Siemens automotive radar, and whether or not its emissions should be measured with the hopping stopped. The issue of time averaging over hopped frequencies is essentially the same as time averaging over gated pulse trains. In both cases, time averaging should be permitted because the potential for interference into EESS and RAS comes from radars that are not synchronized in time. Interference into FS receivers is evaluated using the Commission's peak limits, and time averaging is not relevant.

Finally, the Commission should note that European administrations will probably adopt rules for UWB automotive radars that permit time averaging over a complete pulse train including blanking interval. In the recent meetings of ITU-R Task Group 1/8 in Boston, the group declined to accept language contributed by the United States that reflects Section 15.521(d), and instead suggested that the U.S. language "*should be reconsidered in the next meeting because of over-estimate of power*". See Document 1-8/TEMP/64 at Section 6.1.7.3.

In light of these considerations, in acting on the Further Notice, the Commission should permit 24 GHz UWB automotive radars such as the M/A-COM device to benefit from time averaging over actual gated pulse trains, rather than requiring that pulses be gated on.

Sincerely,

Jeffrey Krauss
Consultant to M/A-COM