

# RF SAFETY ANALYSIS OF A NOVEL ULTRA-WIDEBAND FETAL MONITORING SYSTEM

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Abstract—The LifeWave Ultra-Wideband RF sensor (LWUWBS) is a monitoring solution for a variety of physiologic assessment applications, including maternal fetal monitoring in both the antepartum and intrapartum periods. The system uses extremely low power radio frequency (RF) ultra-wide band (UWB) signals to provide continuous fetal heart rate and contractions monitoring during labor and delivery. Even with the incorporation of three very conservative assumptions, (1) concentration of the RF energy in 1 cm<sup>3</sup>, (2) minimal (2.5 cm) maternal tissue attenuation of fetal exposure, and (3) absence of normal thermoregulatory compensation, the maternal whole body spatial-averaged specific absorption rate (WBSAR) would be 34,000 times below the FCC public exposure limit of 0.08 W kg<sup>-1</sup> and, at 8 wk or more gestation, the peak spatial-averaged specific absorption rate (PSSAR) in the fetus would be more than 160 times below the localized exposure limit of 1.6 mW g<sup>-1</sup>. Even when using very conservative assumptions, an analysis of the LWUWBS's impact on tissue heating is a factor of 7 lower than what is allowed for fetal ultrasound and at least a factor of 650 compared to fetal MRI. The actual transmitted power levels of the LWUWBS are well below all Federal safety standards, and the potential for tissue heating is substantially lower than associated with current ultrasonic fetal monitors and MRI. *Health Phys.* 112(5):478–485; 2017

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