the heart rates and respiration in these results, and detect the signal up to 10m-distance. It can be better if we use higher source power, antenna which has high gain and directivity.

c. The measurement about a human behind the wall in 10GHz

Finally, we take an experiment whether this system can detect vital sign of a human behind the wall (marble) with 10cm thickness. Right and left sides of the wall are attached the absorber to prevent the unwanted scattering signals. We also obtain the signal of heart rates and respiration in the situation shown in Fig. 5. Although the magnitude of waveform is smaller than none wall case, we can note that totally waveform is similar to the former case. From these results, we are convinced that the vital sign of a person behind the wall can be detected with the remote sensing system. And this system will be applied to determine survival of buried person, or to observe an invader

4. Conclusion

We have detected heart rates and respiration in various cases clearly, and all results of this paper are detected by using peak search. We make the decision that 10GHz system is better than 1.9GHz system to detect far distance, because of short skin depth in the body according to the short wavelength. Using the remote sensing system, we get the agreeable results that heart rates are 0.9-1.6Hz (54-96 beats/min.) and the respiration is 0.2-0.3Hz (12-18 breaths/min). The wireless vital sign (heart rates and respiration) detecting system has many applications such as remote medical examination, portable vital sign sensing within PCS phone, decision either life or death of buried person, observation of invader, etc.

Acknowledgement

This work presented in this paper was carried out during the authers' affiliation at Digital Media Lab.

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	Dielectric Constant		Conductivity (S/m)	
	Skin	Muscle	Skin	Muscle
1.9 GHz	38.714	53.418	1.2245	1.3963
10 GHz	31.29	42.764	8.0138	10.626

Table 1. The dielectric constant and conductivity of skin and muscle