Two methods for D-dot sensor designed

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***Abstract*— With the development of the technology, there are more and more electronic devices around us, forming the complex and harmful electromagnetic environment. Nowadays people pay more attention to the high power electromagnetic environment which can affect the work of the electronical equipment and the health of people, electromagnetic interference covers wide spectrum, ranging from few Hz to few GHz. Therefore, we need some effective method to test electromagnetic field so that we can take the appropriate measurement. According to two methods of measuring transient electric field, we designed two different D-dot transient electric field sensors which have wide bandwidth and good sensitivity**

Keywords- HPEM; D-dot sensor; Bandwidth; TEM cell; Signal recovery

I. INTRODUCTION

We have made two kinds of D-dot sensors, as is shown in Fig.1. The one is monopole antenna, and the other is dipole antenna. The bandwidth of the two D-dot sensors designed is around 1 GHz, The characteristic impedance of the sensors designed is 50Ω. The sensors are available for most of the situation, we make it by ourselves, the volume of the sensors are small and the cost is cheap.

Figure 1. Two kinds of D-dot sensors

The sensors' sensitivity and bandwidth is tested in the TEM cell. The Specific parameters of the two kinds of D-dot sensors are listed in the table.1.

TABLE I. parameters of the two kinds of D-dot

type	Physical height/mm	equivalent capacitance/ pF	equivalent area/cm^2	turning frequency/G Hz
dipole	25	0.367	9.37×10^{-4}	1
monopole	25	3.183	7.72×10^{-3}	1

In the test, Gaussian pulse generator as source and digital oscilloscope which has wide bandwidth were used, as is shown in Fig.2. We use Matlab software to remove interference of the noise and get the original signal. We get the practical bandwidth and sensitivity of the sensors. The later work is to increase the sensor's bandwidth for better application.

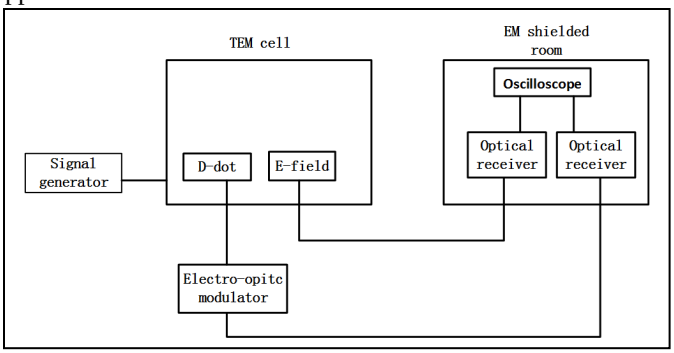

Figure 2. The test system

REFERENCES

[1] De, N. C., et al. "Design and experimental investigation of the asymptotic conical dipole antenna." Electromagnetic Compatibility, IEEE Transactions on 37.2 (1995): 282-285.

[2] Baum, Carl E. "Tiny fast-pulse B-dot and D-dot sensors in dielectric media." Sens. Simulation (2009).

[3] Cui Z, Mao C, Nie X. "E-field sensor design for subnanosecond fast transient." 2012 6th Asia-Pacific Conference on. IEEE(2012): 108-110.

[4] Farr, Everett G., and Joseph S. Hofstra. "An incident field sensor for EMP measurements." IEEE transactions on electromagnetic compatibility 33.2 (1991): 105-112.