

IMPLEMENTATION OF POLY CRYSTALLINE FERRITE MATERIAL AS SENSOR FOR CO₂ DETECTION USING CYPRESS CY8C29466 BASED ON SoC

By

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ABSTRACT

Nowadays, to keep pace with requirements of smart instrumentation of various sectors and reduce the design time, the use of programmable system on-chip is the best solution. Moreover, use of mixed signal array based PSoC would be most suitable to design an embedded system with more preciseness. In present paper, the details regarding hardware and software co-design for embedded system, which is dedicated for detection and measurement of CO₂ gas are discussed. CO₂ sensor is prepared using polycrystalline ferrite material and deployed for detection. The system is designed with mixed signal based Cypress PSoC device CY8C29466-24PXI with PSoC Designer 5.1 as IDE. The high input impedance of on-chip PGA supports direct interfacing of CO₂ gas sensor, whereas on-chip ADC ensures the preciseness in the data. The system is implemented to detect the presence of CO₂ and could be extended to measure the concentration of CO₂ gas in percentage unit.

Keywords: Mixed Signal, PSoC, Polycrystalline Ferrite Material, CO₂ Gas Sensor.

INTRODUCTION

In the development of instrumentation for precise and reliable measurement of environmental parameters or physical quantity, the mixed signal SoC (System-on-Chip) design is highly suitable technology (Umbarkar et al., 2011). Nowadays, the system designers rely on digital devices like advanced microcontroller and VLSI devices like FPGA. However, a new technology, "The mixed signal SoC design" is emerging (Cypress, n.d.). The instrumentation based on reconfigurable hardware is found in robotics and control system. However, recently it also finds applications in the field of measurement and control required for various sectors such as agriculture, home appliances, sensor

networks, industrial applications etc. (de Albornoz et al., 2008; Pawar et al., 2013; Patil et al., 2016, 2017). In the scenario, wherein the trend to integrate analog as well as digital intelligence into mixed signal array device known as PSoC is becoming ubiquitous. Thus, to overcome the problems of an embedded system development, an intensive research work is done, which results into mixed signal SoC design (Doboli & Currie, 2010). Out of various corporations, the Cypress semiconductor is playing vital role in mixed signal SoC design.

A remarkable research work is going on in the field of CMOS as well as Bi-CMOS technologies (Razavi & Wooley, 1992). Bissiet et al. (2007) have used configurable analog blocks of Cypress PSoC and developed mixed signal architecture for smart capacitive sensor applications (Bissi et al., 2007). They ensure the dynamic reconfigurability of the PSoC devices. De Albornoz et al. (2008) have extensively studied the architecture of mixed signal PSoC and developed



This paper has objectives related to SDGS

