

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Implementation of digital feedback control system for switching power amplifiers on HIT-SI Y. KIKUCHI, University of Hyogo, B.A. NELSON, A.S. NELSON, D.A. ENNIS, J.S. WROBEL, T.R. JARBOE, University of Washington, M. NAGATA, University of Hyogo — Recent developments in high-power switching devices such as insulated gate bipolar transistors (IGBTs) have greatly reduced feedback-controlled power supply costs for fusion plasma experiments. The HIT-II experiment has successfully used a pulse width modulation (PWM) method for analog-based feedback control of switching power amplifiers (SPAs). However, the analog-based feedback controllers are not suited to modification of different feedback methods and applications for the other experimental devices. In the present work, a micro-controller (Analog Devices Inc. Blackfin model 537) was used as a digital feedback controller for SPAs in HIT-SI. The Blackfin 537 is available in an inexpensive (\$200) evaluation board (BF537-STAMP) that has a 500 MHz processor clock, 125 MHz peripheral clock, 64 MB of SDRAM, 8 programmable timers, and can host an inexpensive (\$40) daughter card with a 12-bit 1 MHz digitizer. The present new feedback controller was successfully implemented for flux coil circuits in HIT-SI. The measured flux coil signal was much better than that based on the analog feedback control by adjusting the feedback gains. The detail technical information about the digital feedback control system and the experimental results will be shown.

Yusuke Kikuchi
University of Hyogo

Date submitted: 15 Jul 2009

Electronic form version 1.4