系統組

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研究領域：類比 IC 設計與佈局、平面顯示器 IC、電力 IC

關 鍵 字：時間至數位轉換器、智慧型感測器、驅動器

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一、研究主題與目標

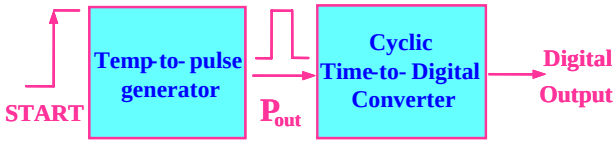
1. 時間至數位轉換器：解析度 20~30ps 以下、測量範圍無限、功耗低於 10mW、晶片面積小於 1mm^2，適用於諸如雷射測距儀、高能粒子量測、時脈抖動量測・・・等等高精度、低成本、低功耗之系統上。
2. 數位溫度感測器：解析度 0.1°C 以下、測量範圍超過 100°C、誤差低於 0.5°C，功耗低於 1mW、晶片面積小於 1mm^2，適用於諸如 VLSI 晶片之嵌入式感溫器、顯示器溫度補償、背光溫度監控、環境溫度監控・・・等高精度、低成本、低功耗之應用上。
3. 數位至時間轉換器：解析度 20~30ps 以下、輸出範圍無限、低功耗。
4. 其他：功率週期校正 IC、數位 PWM 控制器、數位至類比轉換器、高匹配佈局。

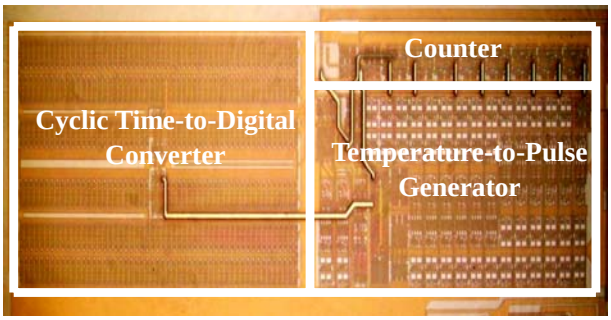
二、最近研究題目

以時間至數位轉換器為基礎之 CMOS 智慧型溫度感測器

面積：0.175mm^2、 誤差：-0.7~+0.9°C、

解析度 ＜0.16°C 、功耗 ＜10μW





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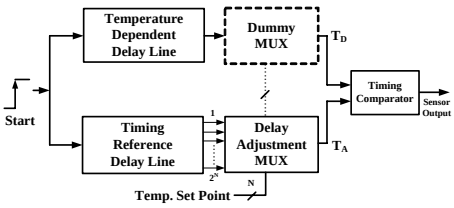
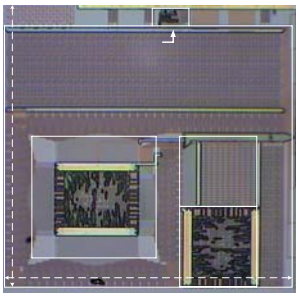
具可程式數位設定之時域混合模式溫度感測器

面積：0.4mm^2、 誤差：±0.8˚C、

解析度：0.5˚C 、 功耗：9uW@20 samples/s





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三、主要研究成果

(一) 論文

期刊論文

[1] C. Hwang, Poki Chen, and H.-W. Tsao, “A high-precision time-to-digital converter using a two-level conversion scheme”, IEEE Trans. Nuclear Science, vol.51, Issue.4, pp.1349-1352, Aug. 2004. (SCI, EI) (IF: 1.259) (*Regular Paper*)

[2] Poki Chen, C.-C. Chen, C.-C. Tsai, and W.-F. Lu, “A Time-to-Digital-Converter- Based CMOS Smart Temperature Sensor,”

IEEE JSSC, Vol. 40, Issue 8, pp. 1642 – 1648, Aug. 2005. (SCI, EI) (IF: 1.969) (*Regular Paper*)

[3] C.-C. Chen, Poki Chen, C.-S. Hwang, W. Chang , "A Precise Cyclic CMOS Time-to-Digital Converter with Low Thermal Sensitivity," IEEE Trans. Nuclear Science, Vol. 52, No. 4, pp.834-838, Aug. 2005. (SCI, EI) (IF: 1.259) (*Regular*)

[4] Poki Chen, M.-H. Chiang, Y.-H. Jen and C.-C. Chen "The Perfect Layouts for Matching Multiple Cascode Current Sources under Parabolic Parameter Gradient," *WSEAS trans. systems*, vol. 5, pp. 264-270, Jan. '06. (EI) (*Regular*)

[5] C.-C. Chen, Poki Chen, A.-W. Liu, W.-F. Lu and Y.-C. Chang, "An Accurate CMOS Delay-Line-Based Smart Temperature Sensor for Low-Power Low-Cost Systems," *Meas. Sci. Technol.*, Vol. 17, No 4, pp. 840-846, Apr. 2006. (SCI, EI) (IF: 1.097) (*Regular*)

[6] Poki Chen, C.-C. Chen and Y.-S. Shen, "A Low Cost Low Power CMOS Time-to-Digital Converter Based on Pulse Stretching," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 2215-2220, Aug. 2006. (SCI, EI) (IF: 1.259) (*Regular*)

會議論文

[1] Chorng-Sii Hwang, Poki Chen, and Hen-Wai Tsao, "A wide-range and fast-locking clock synthesizer IP based on delay-locked loop", IEEE ISCAS 2004, Vol.1, pp. 785-788, May 2004. (EI)

[2] Chun-Chi Chen, Wei Chang and Poki Chen, "A Precise Cyclic CMOS Time-to-Digital Converter with Low Thermal Sensitivity," *IEEE Nuclear Science Symposium 2004 Record*, vol. 3, pp. 1364-1367. (EI)

[3] Chun-Chi Chen, Wen-Fu Lu, Chin-Chung Tsai and Poki Chen, "A Time-to-Digital-Converter- Based CMOS Smart Temperature Sensor," IEEE ISCAS 2005, pp. 560-563, May 2005. (EI)

[4] Poki Chen, Jia-Chi Zheng and Chun-Chi Chen, "A Monolithic Vernier-Based Time-to-Digital Converter with Dual PLLs for Self-Calibration," IEEE CICC 2005, P-32, pp.321-324, Sep. 2005. (EI)

[5] Chun-Chi Chen, An-Wei Liu , Yu-Chi Chang, and Poki Chen, "An Accurate CMOS Time-to-Digital-Converter-Based Smart Temperature Sensor with Negative Thermal Coefficient," *IEEE 4th International Conference on Sensors*, pp. 849-852. Nov. 2005. (EI)

[6] Poki Chen, Chun-Chi Chen, Tuo-Kuang Chen and Shi-Wei Chen, "A Time-Domain Mixed-Mode Temperature Sensor with Digital Set-Point Programming," *IEEE CICC*, pp. 821-824, *Sept 2006.* (EI)

[7] Chun-Chi Chen, Poki Chen, and You-Sheng Shen, "A CMOS Time-to-Digital Converter Based on Duty-Cycle-Controlled Pulse Stretcher," *IEEE ESSCIRC*, pp.316-319, *Sept. 2006.* (EI)

(二) 專利

[1] 陳伯奇、劉深淵、曹恆偉、吳靜雄，"訊號處理裝置"，中華民國專利，發明第一零零四四九號，自民國八十八年一月十一日至一零六年五月二十九日止

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[3] 陳伯奇、劉深淵、吳靜雄，"具深次奈秒解析度之互補型金氧半脈衝縮減延遲元件"，中華民國專利，發明第一三零四一三號，自民國九十年四月十一日至一零七年十二月三十日止

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