

# D12-056

作品名稱	應用時脈產生器之內建抖動測試電路 <b>Built-in Jitter Measurement Circuit for Clock Generator</b>
隊伍名稱	感謝有你 / Thank you
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## 作品摘要 Abstract

近年來，時脈產生電路如鎖相迴路（Phase-locked Loop, PLL）和延遲迴路（Delay-locked Loop, DLL）在時脈同步系統中相當重要。在高速的電腦以及通訊系統中，時脈產生電路的抖動將可能導致系統錯誤的發生。因此，時脈抖動可視為影響系統表現的重要指標。而量測時脈抖動的方法也有不少，如外部抖動量測。由於系統整合於單晶片中以及操作頻率越來越高，使外部抖動量測困難度提高。此外，外部抖動量測的儀器需要較高的成本且量測結果容易受到探針的寄生電容電感影響。因此內建抖動量測電路（Built-in Jitter Measurement, BIJM）越來越受歡迎。

此研究將呈獻使用多相位取樣電路（Multi-phase Sampler, MPS）之內建抖動量測電路。此電路有4項優勢：第一為 MPS 比傳統的延遲電路具有較小的面積。第二是此電路採用時間放大器（Time Amplifier, TA）來改善時間解析度。第三，感測放大器（Sense-amplifier Latch, SA Latch）因為需要取樣時間（Setup time 和 Hold time）較短，可以使量測更為準確。最後，具有自動校正電路的自我取樣電路（Self-referenced circuit, SR）和使用校正技術的 TA 可以有效降低製程飄移所帶來的影響。

Nowadays, clock generators are important in clock synchronization systems such as phase-locked loop (PLL) and delay-locked loop (DLL). In high-speed computers and communication systems, timing jitters of PLL and DLL might result in system failure. Therefore, the clock jitter is one of the critical parameters that affect system performance. Many methods for jitter measuring were proposed. External measuring becomes difficult recently due to system on chip (SoC) and high operating speed. In addition, the external measuring equipments are expensive and influence test results because of the parasitic inductance and capacitance on probes. Therefore, built-in jitter measurement (BIJM) is popular recently.

A BIJM circuit using a multi-phase sampler is proposed. There are four advantages discussed. First, the proposed multi-phase sampler (MPS) can reduce the area much more than the conventional delay line. Second, this architecture adopts a TA to extend a timing resolution. Third, the bulk input sense amplifier DFF (SA DFF) can obtain shorter sampling time (setup time and hold time). The measured signal is more accurate through the sense-amplifier based DFF. Finally, the self-referenced circuit with an auto-calibration circuit and a time amplifier circuit with a calibration technique can reduce the effects of process variations.