

# Technical Disclosure Commons

---

Defensive Publications Series

---

May 2020

## ADAPTIVE PWM CPU THROTTLING IN DIFFERENT SYSTEM WORKLOAD

HP INC

Follow this and additional works at: [https://www.tdcommons.org/dpubs\\_series](https://www.tdcommons.org/dpubs_series)

---

### Recommended Citation

INC, HP, "ADAPTIVE PWM CPU THROTTLING IN DIFFERENT SYSTEM WORKLOAD", Technical Disclosure Commons, (May 21, 2020)

[https://www.tdcommons.org/dpubs\\_series/3248](https://www.tdcommons.org/dpubs_series/3248)



This work is licensed under a [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/).

This Article is brought to you for free and open access by Technical Disclosure Commons. It has been accepted for inclusion in Defensive Publications Series by an authorized administrator of Technical Disclosure Commons.

Adaptive PWM CPU throttling in different system workload

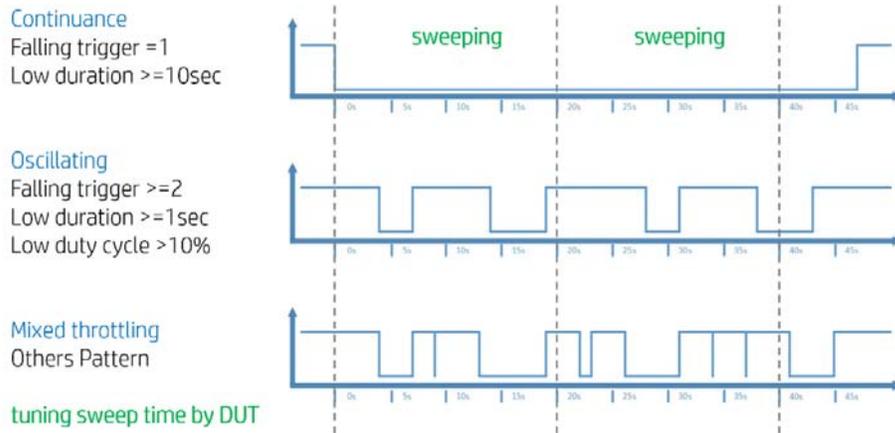
Disclosed is a method for switching CPU throttling duty cycle between different profiles, such as fixed PWM, progressive PWM and bypass mode. The method can classify throttling events then switch to a correlative profile in different system workload.

Conventional Approach: The PROCHOT# will let CPU enter LFM mode once system power overload, that cause a bad user experience. Currently there are difficult to have an adaptive system solution to improve hardware throttling events. Because the response time of software base power management is too slow to engage with hardware throttling.

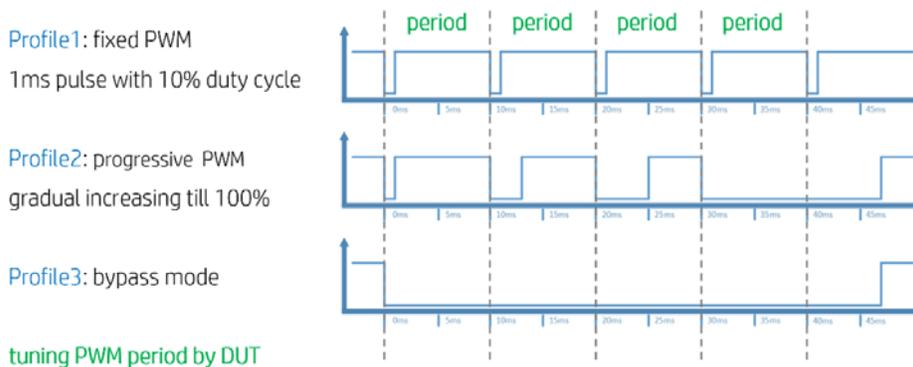
New Approach: The new approach is based on design ABS alike PROCHOT# to improve throttling as latch CPU power at 70% for preventing CPU in LFM mode. An optimized PWM throttling allows SoC performs higher peak power than before. Using hardware logic circuitry to real-time monitor and compute throttling events then report valuable information to EC (or SIO) for further control.

As shown in the figure below, this new method provides for a way to cumulate throttling trigger times and asserted duration to classify throttling event. The method defines 3 different PWM profiles to suit system workload in different user scenario.

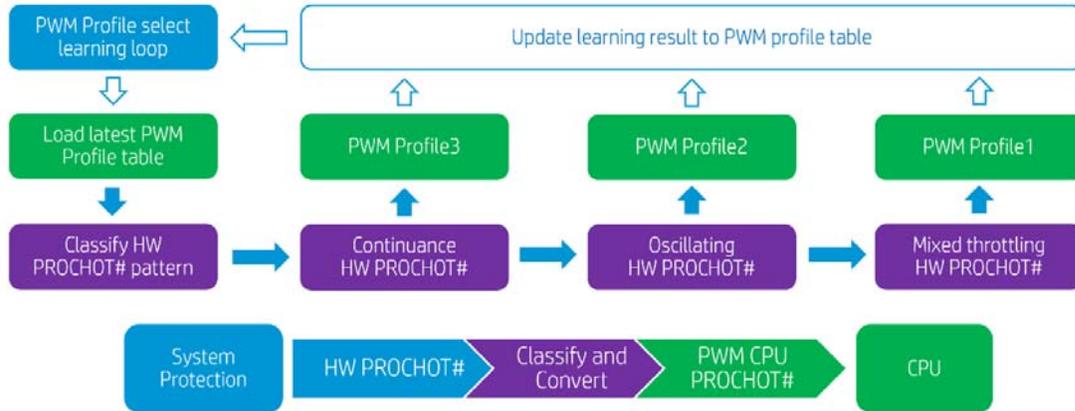
*Sweep and classify HW PROCHOT# pattern*



*Define PWM profile for PROCHOT# conversion*



In the following flow chart called PWM Profile select learning loop, it reveals how to real-time monitor the hardware PROCHOT# then classify throttling events and use PWM PROCHOT# instead of HW PROCHOT# for preventing CPU in LFM mode. It keeps analysing data then switch adaptive profile to convert a suitable PWM throttling, just like ABS control mechanism.



*Disclosed by Wendell Lo, Sam Wang, Ivan Liu and Alex Chou, HP Inc.*