

## ABSTRAK

Permana, Agustian Damar. 2025. Evaluasi Pengaruh Metode *Always On* dan *On Off* Terhadap Konsumsi Daya dan Suhu Operasional Modem *Stick* Pada Perangkat *Internet of Things* (IoT). Skripsi. Tanjungpinang : Jurusan Teknik Elektro. Fakultas Teknik Dan Teknologi Kemaritiman. Universitas Maritim Raja Ali Haji. Pembimbing I : Hollanda Arief Kusuma, S.IK., M.Si., Pembimbing II : Septia Refly, S.Pd., M.Si.

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Pada pengembangan perangkat *Internet of Things* (IoT), efisiensi konsumsi daya dan stabilitas suhu operasional menjadi tantangan utama, terutama saat menggunakan modem *stick* sebagai media konektivitas. Penelitian ini membandingkan dua metode operasional modem, yaitu *Always On* dan *On-Off* untuk mengetahui dampaknya terhadap konsumsi daya dan suhu kerja perangkat. Sistem dirancang menggunakan mikrokontroler ESP32, sensor suhu DS18B20, dan sensor arus INA219, serta diuji secara intensif melalui pengambilan data secara waktu nyata selama tiga hari. Berdasarkan hasil pengukuran, konsumsi daya rata-rata dapat ditekan dari 538,44 mW pada mode *Always On* menjadi 137,78 mW pada mode *On-Off*, dengan efisiensi hingga 74,41%. Suhu operasional juga menunjukkan penurunan dari 34,54°C menjadi 32,57°C. Uji statistik Wilcoxon *Signed Rank Test* menunjukkan perbedaan yang sangat signifikan, baik pada parameter daya maupun suhu dengan nilai *p-value* <0,001. Meskipun metode *Always On* memiliki performa komunikasi yang lebih stabil dengan nilai *Packet Delivery Ratio* (PDR) sebesar 99,65%, metode *On Off* tetap menunjukkan PDR yang cukup baik, yaitu sebesar 86,55%. Berdasarkan temuan tersebut, metode *On-Off* dinilai lebih efisien dan layak diterapkan pada perangkat IoT yang berbasis baterai atau energi terbarukan.

**Kata kunci:** ESP32, uji normalitas Shapiro Willk, uji Wilcoxon *signed rank test*.

## **ABSTRACT**

Permana, Agustian Damar. 2025. *Evaluation of the Impact of Always-On and On-Off Methods on Power Consumption and Operating Temperature of Modem Sticks in Internet of Things (IoT) Devices*. Thesis. TanjungPinang: Study Program of Electrical Engineering. Faculty of Engineering and Maritime Technology. University of Maritim Raja Ali Haji. Supervisor I : Hollanda Arief Kusuma, S.IK., M.Si., Supervisor II : Septia Refly, S.Pd., M.Si.

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*In the development of Internet of Things (IoT) devices, power consumption efficiency and operational temperature stability are key challenges, especially when using modem sticks as connectivity media. This study compares two modem operation methods Always On and On Off to determine their impact on power consumption and device operating temperature. The system was designed using an ESP32 microcontroller, a DS18B20 temperature sensor, and an INA219 current sensor, and was tested intensively through real-time data acquisition over three days. Based on the measurement results, the average power consumption was reduced from 538.44 mW in the Always On mode to 137.78 mW in the On-Off mode, achieving an efficiency of up to 74.41%. The operating temperature also decreased from 34.54°C to 32.57°C. The Wilcoxon Signed Rank Test showed a statistically significant difference in both power and temperature parameters, with a p-value of <0.001. Although the Always On method delivered more stable communication performance with a Packet Delivery Ratio (PDR) of 99.65%, the On-Off method still showed a reasonably good PDR of 86.55%. These findings suggest that the On-Off method is more efficient and suitable for battery-powered or renewable energy-based IoT devices.*

**Keywords:** *ESP32, Shapiro Willk normality test, Wilcoxon signed rank test.*