|  |  |  |  |
| --- | --- | --- | --- |
|  | Power | Light Sleep | Deep Sleep |
| PID |  |  |  |
| Fuzzy |  |  |  |

Calculations:  
PID:

Power: 0.313971 + 2664.466667 =

Light Sleep: 0.284162 + 2664.466667 =

Deep Sleep: 0.293191 + 2664.466667 =

Fuzzy:

Power: 0.313971 + 2793.547619 =

Light Sleep: 0.284162 + 2793.547619 =

Deep Sleep: 0.293191 + 2793.547619 =

Errors:  
PID:

Power: X + X =

Light Sleep: X + X =

Deep Sleep: X + X =

Fuzzy:

Power: X + X =

Light Sleep: X + X =

Deep Sleep: X + X =

**Final Combined Power Calculations Table (Including Sleep Mode Power Added to PID and Fuzzy):**

|  | **Power (mW)** | **Light Sleep (mW)** | **Deep Sleep (mW)** |
| --- | --- | --- | --- |
| **PID** | 2664.466667 + 0.313971 = **2664.780638** | 2664.466667 + 0.284162 = **2664.750829** | 2664.466667 + 0.293191 = **2664.759858** |
| **Fuzzy** | 2793.547619 + 0.313971 = **2793.861590** | 2793.547619 + 0.284162 = **2793.831781** | 2793.547619 + 0.293191 = **2793.840810** |

**Final Combined Power Error Propagation Table:**

**Adding Errors for PID and Fuzzy (Power + Sleep Mode Errors):**

* **Error propagation rule when adding two independent errors:**

ΔPtotal=(ΔPPID/Fuzzy)2+(ΔPSleep)2\Delta P\_{\text{total}} = \sqrt{(\Delta P\_{\text{PID/Fuzzy}})^2 + (\Delta P\_{\text{Sleep}})^2}ΔPtotal​=(ΔPPID/Fuzzy​)2+(ΔPSleep​)2​

**PID Errors:**

|  | **Power Error (mW)** | **Light Sleep Error (mW)** | **Deep Sleep Error (mW)** |
| --- | --- | --- | --- |
| **PID** | 1593.64662+0.0992≈1593.646563\sqrt{1593.6466^2 + 0.099^2} \approx 1593.6465631593.64662+0.0992​≈1593.646563 | 1593.64662+0.0922≈1593.646563\sqrt{1593.6466^2 + 0.092^2} \approx 1593.6465631593.64662+0.0922​≈1593.646563 | 1593.64662+0.0712≈1593.646561\sqrt{1593.6466^2 + 0.071^2} \approx 1593.6465611593.64662+0.0712​≈1593.646561 |

**Fuzzy Errors:**

|  | **Power Error (mW)** | **Light Sleep Error (mW)** | **Deep Sleep Error (mW)** |
| --- | --- | --- | --- |
| **Fuzzy** | 1939.07232+0.0992≈1939.072525\sqrt{1939.0723^2 + 0.099^2} \approx 1939.0725251939.07232+0.0992​≈1939.072525 | 1939.07232+0.0922≈1939.072522\sqrt{1939.0723^2 + 0.092^2} \approx 1939.0725221939.07232+0.0922​≈1939.072522 | 1939.07232+0.0712≈1939.072521\sqrt{1939.0723^2 + 0.071^2} \approx 1939.0725211939.07232+0.0712​≈1939.072521 |

**Final Summary Table – Combined Power and Errors (PID and Fuzzy):**

|  | **Power (mW)** | **Power Error (mW)** |
| --- | --- | --- |
| **PID – Power Mode** | **2664.780638** | **1593.646563** |
| **PID – Light Sleep** | **2664.750829** | **1593.646563** |
| **PID – Deep Sleep** | **2664.759858** | **1593.646561** |
| **Fuzzy – Power Mode** | **2793.861590** | **1939.072525** |
| **Fuzzy – Light Sleep** | **2793.831781** | **1939.072522** |
| **Fuzzy – Deep Sleep** | **2793.840810** | **1939.072521** |

**Key Points for Report (Discussion Section):**

1. **Sleep Mode Power Consumption is Negligible**:
   * Sleep mode power values are extremely low compared to PID/Fuzzy power values.
   * Their addition makes only a small difference in the final combined values.
2. **Error Dominated by PID/Fuzzy Measurements**:
   * The errors from sleep mode power calculations are extremely small.
   * Final error is almost entirely driven by PID and Fuzzy power measurement uncertainty.
3. **Result Interpretation**:
   * Combined power values for **PID** and **Fuzzy** are practically the same across **Power, Light Sleep, and Deep Sleep** due to the small sleep power contribution.
   * **Uncertainty is large** (on the order of 1500–1900 mW) compared to the small sleep mode corrections.

**Final Key Formula Used for Error Propagation:**

ΔPtotal=(ΔPPID/Fuzzy)2+(ΔPSleep)2\Delta P\_{\text{total}} = \sqrt{(\Delta P\_{\text{PID/Fuzzy}})^2 + (\Delta P\_{\text{Sleep}})^2}ΔPtotal​=(ΔPPID/Fuzzy​)2+(ΔPSleep​)2​

This is the standard approach for **combining independent errors** when adding measurements.

A screenshot of a computer

AI-generated content may be incorrect.

A screenshot of a report

AI-generated content may be incorrect.

A white background with black text

AI-generated content may be incorrect.

A screenshot of a power measurement strategy

AI-generated content may be incorrect.

A screenshot of a computer error

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

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AI-generated content may be incorrect.

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