

> Scales EPS Rev. D calcs

Legend: /// Same calculations
/// Calculations are unique to this subsystem

> OBC Subsystem:

• LT8612 EUDE/PBF Calcs:

* TR/SS: Sets soft start time

$$\begin{aligned} \text{TR/SS pin } t_{ss} &= \frac{C_{ss} \times 0.97V}{2.1 \mu A} \\ \text{voltage} &= 0.97V \\ \text{current} &= 2.1 \mu A \\ &= \frac{2.2n \times 0.97V}{2.1 \mu A} \\ &\sim 1ms \end{aligned}$$

* RT: Sets Default Frequency (Pg. 12)

400 kHz is set by
 at 110k Ω resistor
 based on the table in
 the datasheet

* EN/UV: Sets undervoltage cutoff threshold (Pg. 15)

Based on lowest acceptable LiPO
 battery value, anything lower
 than 24v is unsafe.

$$V_{in(en)} = \left(\frac{R_3}{R_4} + 1 \right) \cdot 1.0V \quad \text{Let } V_{in} = 24V$$

* SW pin: Calculate required inductor value (Pg. 13)

$$L = \frac{V_{out} + V_{sw(BoT)}}{f_{sw}} \cdot 0.7$$

$$* V_{sw(BoT)} = 0.18V$$

$$* f_{sw} \text{ in MHz}$$

$$* L \text{ in } \mu H$$

$$\text{Let } V_{out} = 3.3V$$

$$\begin{aligned} L &= \frac{3.3V + 0.18V}{0.4} \cdot 0.7 \\ &= 8.7 \mu H \end{aligned}$$

$$V_{in(en)} - 1V = \frac{R_3}{R_4}$$

$$23V = \frac{R_3}{R_4}$$

$$\approx 23V = \frac{4.7k\Omega}{200\Omega}$$

* FB Pin: Set Output Voltage (Pg. 12)

$$R_1 = R_2 \left(\frac{V_{out}}{0.970V} - 1 \right) \quad \text{Let } V_{out} = 3.3V$$

$$\frac{R_1}{R_2} = \left(\frac{3.3V}{0.970V} - 1 \right)$$

$$\frac{R_1}{R_2} = 2.402$$

$$R_1 = 240k\Omega$$

$$R_2 = 22k\Omega$$

$$R_3 = 4.7k\Omega, R_4 = 200\Omega$$

• INA260 A1PWR:

* Set Address (Pg. 17)

$$AO \rightarrow V_s$$

$$AI \rightarrow GND$$

$$\text{Address} = 1000001$$

> Jetson Subsystem:

• LT8612EUDE/PBF Calcs:

* TR/SS: Sets soft start time

$$\begin{aligned} \text{TR/SS pin } t_{ss} &= \frac{C_{ss} \times 0.97V}{2.1\mu A} \\ \text{voltage} &= 0.97V \\ \text{current} &= 2.1\mu A \\ &= \frac{10n \times 0.97V}{2.1\mu A} \end{aligned}$$

$\sim 4ms$

* RT: Sets Default Frequency (Pg. 12)

400 kHz is set by
at 110k Ω resistor
based on the table in
the datasheet

* EN/UV: Sets undervoltage cutoff
Threshold (Pg. 15)

Based on lowest acceptable LiPO
battery value, anything lower
than 24V is unsafe.

Let V_{in}

$$V_{in(en)} = \left(\frac{R_3}{R_4} + 1\right) \cdot 1.0V = 24V$$

* SW pin: Calculate required inductor value (Pg. 13)

$$L = \frac{V_{out} + V_{sw(Bot)}}{f_{sw}} \cdot 0.7$$

* $V_{sw(Bot)} = 0.18V$

* f_{sw} in MHz

* L in μH

Let $V_{out} = 20V$

$$\begin{aligned} L &= \frac{20 + 0.18V}{0.4} \cdot 0.7 \\ &= 5.095\mu H \end{aligned}$$

$$V_{in(en)} - 1V = \frac{R_3}{R_4}$$

$$23V = \frac{R_3}{R_4}$$

$$\approx 23V = \frac{4.7k\Omega}{200\Omega}$$

$$\underline{R_3 = 4.7k\Omega}, \underline{R_4 = 200\Omega}$$

* FB Pin: Set Output Voltage (Pg. 12)

$$R_1 = R_2 \left(\frac{V_{out}}{0.970V} - 1 \right) \quad \text{Let } V_{out} = 20V$$

$$\frac{R_1}{R_2} = \left(\frac{20V}{0.970V} - 1 \right)$$

$$\frac{R_1}{R_2} = 19.61$$

$$\underline{R_1 = 196k\Omega}$$

$$\underline{R_2 = 10k\Omega}$$

• INA260A1PWR:

* Set Address (Pg. 17)

AD \rightarrow GND

AI \rightarrow GND

Address = 1000000

> Perif. Subsystem:

• LT8612EUDE/PBF Calcs:

* TR/SS: Sets soft start time

$$\begin{aligned} \text{TR/SS pin } t_{ss} &= \frac{C_{ss} \times 0.97V}{2.1\mu A} \\ \text{voltage} &= 0.97V \\ \text{current} &= 2.1\mu A \\ &= \frac{2.2nF \times 0.97V}{2.1\mu A} \end{aligned}$$

~ 1ms

* RT: Sets Default Frequency (Pg. 12)

400 kHz is set by
at 110k Ω resistor
based on the table in
the datasheet

* EN/UV: Sets undervoltage cutoff
Threshold (Pg. 15)

Based on lowest acceptable LiPO
battery value, anything lower
than 24V is unsafe.

Let V_{in}

$$V_{in(en)} = \left(\frac{R_3}{R_4} + 1\right) \cdot 1.0V = 24V$$

SW pin: Calculate required inductor value (Pg. 13)

$$L = \frac{V_{out} + V_{sw(Bot)}}{f_{sw}} \cdot 0.7$$

* $V_{sw(Bot)} = 0.18V$

* f_{sw} in MHz

* L in μH

Let $V_{out} = 5V$

$$\begin{aligned} L &= \frac{5V + 0.18V}{0.4} \cdot 0.7 \\ &= 12.95\mu H \Rightarrow 13\mu H \end{aligned}$$

$$V_{in(en)} - 1V = \frac{R_3}{R_4}$$

$$23V = \frac{R_3}{R_4}$$

$$\approx 23V = \frac{4.7k\Omega}{200\Omega}$$

$$\underline{R_3 = 4.7k\Omega}, \underline{R_4 = 200\Omega}$$

* FB Pin: Set Output Voltage (Pg. 12)

$$R_1 = R_2 \left(\frac{V_{out}}{0.970V} - 1 \right) \quad \text{Let } V_{out} = 5V$$

$$\frac{R_1}{R_2} = \left(\frac{5V}{0.970V} - 1 \right)$$

$$\frac{R_1}{R_2} = 4.15$$

$$\underline{R_1 = 20.8k\Omega}$$

$$\underline{R_2 = 5k\Omega}$$

• INA260A1PWR:

* Set Address (Pg. 17)

AD $\rightarrow V_S$

AI $\rightarrow V_S$

Address = 1000 101