Power Supply Calculations for Simrad WBT-Mini on Remus AUV

P. McGill

6Feb20

Define the nominal output voltage of the Linear Technology LTM4612 regulator.

```
Voutnom = 15
```

```
15
```

Find the feedback resistor according to page 11 of the data sheet. This resistor is R14 on the DC1297B demo board.

$$\text{Rfb} = \frac{100\,000}{\frac{\text{Voutnom}}{0.6} - 1}$$

```
4166.67
```

The closest standard value is 4.12 kΩ, which matches the value in table 1 on page 11 of the LTM4612 data sheet. Find the output voltage with this standard value.

$$\text{Vout} = 0.6\,\frac{100\,000 + 4120}{4120}$$

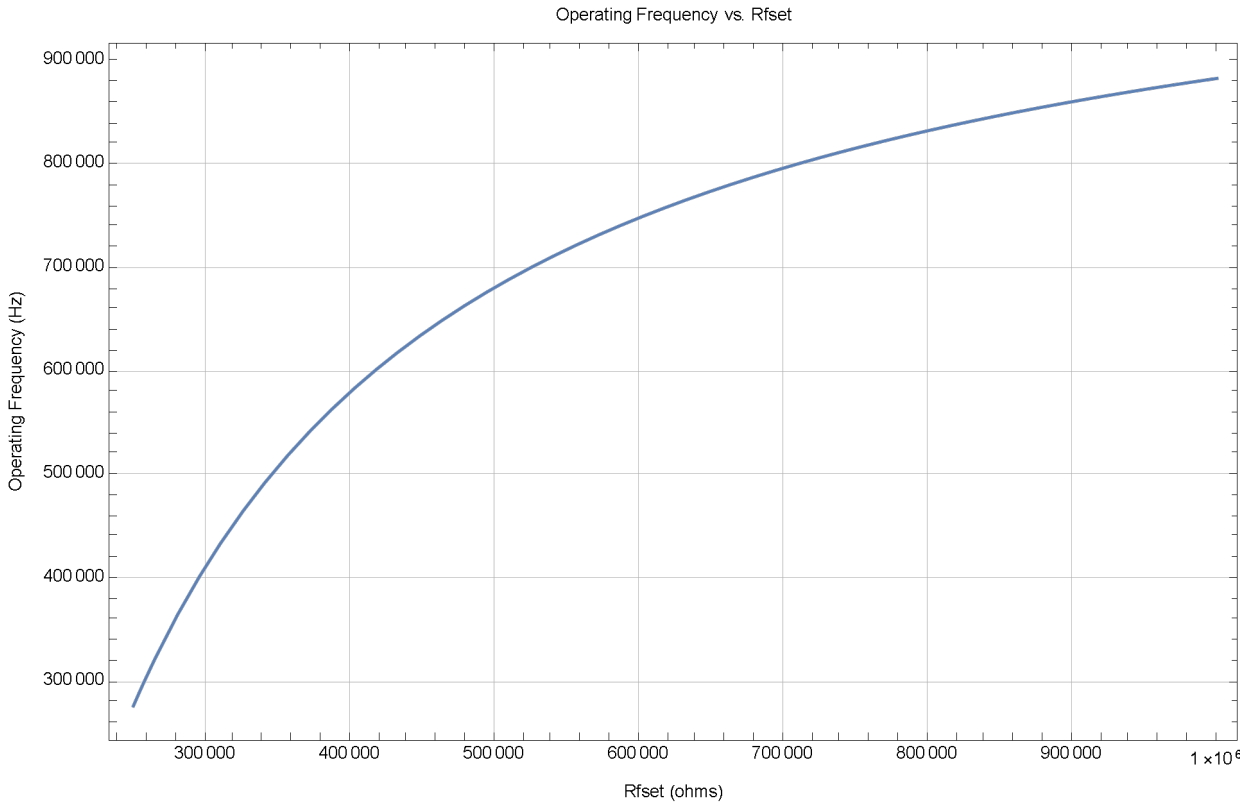
```
15.1631
```

Define the switching frequency as a function of the Rfset resistor according to page 12 of the data sheet. This resistor is R6 on the DC1297B demo board.

$$\text{f[Rfset\_]} := \frac{\text{Vout}}{5 \times 10^{-11}\left(\frac{3\,\text{Rfset}\,93\,100}{\text{Rfset}-2\times 93\,100}\right)}$$

Plot the switching frequency as a function of Rfset.

```
Plot[f[R], {R, 250 000, 1 000 000}, Frame → True,
 GridLines → Automatic, FrameLabel → {{"Operating Frequency (Hz)", None},
   {"Rfset (ohms)", "Operating Frequency vs. Rfset"}}]
```



Find the value of Rfset that yields a switching frequency of 520 kHz. We want the first subharmonic to be around 260 kHz, between the two sonar bands of 185–255 kHz and 270–445 kHz

```
NSolve[f[R] == 520 000, R]
```

```
{{R → 357 330.}}
```

Find the switching frequency for the 1% standard resistor value of 357 kΩ.

```
f[357 000] // N
```

```
519 478.
```

Find the first subharmonic.

```
% / 2
```

```
259 739.
```

Find the switching frequency for the 1% standard resistor value of 365 kΩ.

```
f[365 000] // N
```

```
531 890.
```

```
% / 2
```

```
265 945.
```

Either resistor value would work to place the first subharmonic close to the middle of the gap between the two bands.