The orbital period is obtained by the Third Kepler Law, with a radius of R_{earth}(6378.14 km) plus the altitude of the satellite (800 km) :

Orbital period $\tau = \frac{2\pi(r^{3/2})}{\sqrt{(\mu)}} =$ 6052.4 s

Bits Per Orbital Period

- **Mimmi**
  Mimmi takes pictures with a frequency of 0.5 Hz.
  Every measurement series will give $5 \cdot 10^6$ samples, each with 12 bits resolution.
  The amount of bits stored for transmission for each orbit is obtained by:

  $$frequency \cdot size\ image \cdot orbital\ period$$

  Where the size image has been obtained as:

  Resolution $5 \cdot 10^6$
  Size of 1 image $12 \cdot 5 \cdot 10^6 = 60$Mbits

  Total Amount of bits: 181.572 Gbits

- **Musse**
  At most, Musse's modes are changed once per day and each mode needs 128 bytes of data from ground.
  Total Amount of bits (Modes): 1024 bits
  The raw data from the instrument consists of 4 measurements sampled at a rate of 12 Hz, with 12 bits of resolution.
  The amount of bits per orbit then is obtained as:

  $$n.^o\ Instruments \cdot frequency \cdot Orbital\ period \cdot resolution$$

  Total Amount of bits: 3.486 Mbits

- **Kajsa**
  Kajsa is controlled through 3 signals, and depending on signal it will

perform a measurement with a resolution of 16 bits with a maximum sampling rate of 1 Hz.
The amount of bits per orbit then is obtained as:

$$frequency \cdot Orbital\ period \cdot resolution$$

Total Amount of bits: 96.838 Kbits

- **Kalle, Piff and Puff**
  Kalle,Piff and Puff are three instrument that may work separately or in combination in common measurement series in a number of combinations.
  At most they will work all three simultaneously and for a whole orbital period.
  The data exchanged by Kalle, Piff och Puff are controlled by the ground station.
  All three of them will perform measurement with a resolution of 16 bits and with a sampling rate of 12 Hz
  The amount of bits per orbit then is obtained as:

$$frequency \cdot Orbital\ period \cdot resolution$$

  Total Amount of bits: 871.546 Kbits (all three working and sending data at the same time)

- **House keeping signals**
  The system shall also monitor the following signals:
  - 50 temperature measurements each of 8 bits at 1 Hz
  - 10 voltage measurements on the power bus each of 8 bits at 1 Hz
  - 20 currents measurements each of 8 bits at 1 Hz
  - 8 pressure analysis each of 8 bits at 1 Hz
  - 43 single status bits at 0.02 Hz sampling rate
  - 8 re-reads of digital 8 bit control registers that shall be read when they are changed at 1 Hz

The amount of bits per orbit per sensor then is obtained as:

$$n.^o\ Instruments \cdot frequency \cdot Orbital\ period \cdot bits$$

Total Amount of bits (Temperature): 2.420 Mbits
Total Amount of bits (Power): 484.192 Kbits
Total Amount of bits (Current): 968.384 Kbits
Total Amount of bits (Pressure): 387.359 Kbits
Total Amount of bits (Others): 392.533 Kbits

Total Amount of bits: 3.781 Mbits

For all of the sensors, when not stated, it has been assumed a period of at 1 Hz between one measurament and the other.

Budget bits to be sent: 181.618 Gbits
Total bits available to be transferred in 10' using SpaceWire: 240.00 Gbits

bits budget per satellite's orbital period					
Mimmi	Musse	Kajsa	Kalle, Pich and Puff	House keeping	Total
181,572,000,000.00	3,486,182.00	96,838.00	871,546.00	3,781,000.00	181,618,057,500.00

Bits per Hz cycle

- Mimmie
  Total Amount of bits 1 Hz: 0 bits
  Total Amount of bits 0,0166 Hz: 181.572 Gbits

- Musse
  Total Amount of bits 1 Hz: 0 bits
  Total Amount of bits 12 Hz: 3.486 Mbits

- Kalle, Piff and Puff
  Total Amount of bits 1 Hz: 0 bits
  Total Amount of bits 12 Hz: 871.546 Kbits

- House keeping signals

  Total Amount of bits (Temperature) 1 Hz: 2.420 Mbits
  Total Amount of bits (Power) 1 Hz: 484.192 Kbits
  Total Amount of bits (Current) 1 Hz: 968.384 Kbits
  Total Amount of bits (Pressure) 1 Hz: 387.359 Kbits
  Total Amount of bits (Others) 1 Hz: 0
  Total Amount of bits (Temperature) 12 Hz: 0 bits
  Total Amount of bits (Power) 12 Hz: 0 bits
  Total Amount of bits (Current) 12 Hz: 0 bits
  Total Amount of bits (Pressure) 12 Hz: 0 bits
  Total Amount of bits (Others) 12 Hz: 0 bits