Battery tests on CUBE02

Summary:

The CUBE02 series, can be expected to do 30.000+ transmissions on a single 3.6 V Primary lithium-thionyl chloride (Li-SOCl2) AA-size cell.

With a **one-hour transmission interval** (standard) this gives 30.000 [transmissions] / 365 [days] / 24 [hours] = **3.4 years** of life-time.

With a ten minute transmission interval (agriculture research) this gives 30.000 [transmissions] / 365 [days] / 24 [hours] / 6 [10 minute interval] = 0,57 years = 6.8 months (which cover the growing season OR the storage season, but not both)

With an 8 hour interval (tree care) this gives 30.000 [transmissions] / 365 [days] / 3 [times/day] = 27 years

Notes:
1) *The CUBE series can be equipped with a 20Ah D-cell size battery, which would multiply the above 8.3 times.*

2) *Please note that Li-SOCl2 AA size batteries are manufactured in a standard version, and a pulsed version. We strongly recommend the pulsed version, which is the battery tested here as the radio transmissions are pulse-like.*

Measurements

Battery
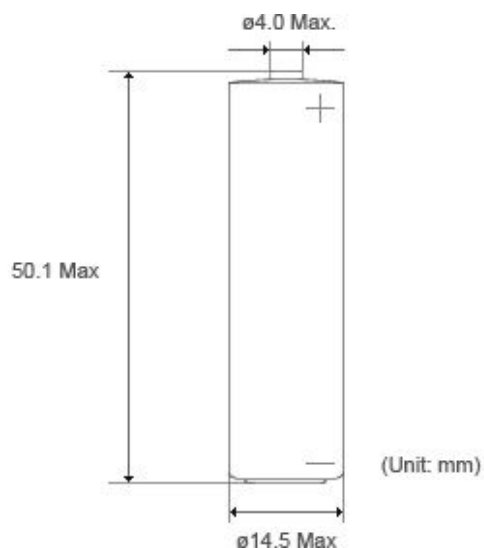
Xeno Energy 3.6V Lithium Battery XLP-060F 0320
AA cell, http://www.xenoenergy.com/eng/prod/pulse03.asp

Type	ANSI / IEC	AA / ER14505
Nominal Capacity	at 2mA, 20℃, to 2.0V	2.4Ah
Nominal Voltage		3.6V
Maximum Current	Continuous	60mA
	Pulse	200mA
Temperature Range		-55~+85℃

Test setup - No sensor board

One single AA cell in a plastic adapter to fit into the D-cell holder.

Tested for 65536 cycles in a cube with no sensors. SF12 transmissions. -25 degrees Celcius.

No sensor board was attached, just the LoRaWAN base board.

Software did not manage to talk to the LoRaWAN-server after 65536 transmissions. This is a known limitation in the current software version (CUBE02 software).
Leds still blinked as transmission was ongoing 14 hours after the end of last reception.

Reset did not restore functionality. Battery might be too low now?

Photo of climate test chamber and device under test. Snow formed due to air-leaky cable entrance.

LoRa Server

Organizations   Users   Network servers   andershedberg ▾

Organizations / Sensefarm ▾ / Applications / sensefarm-general / CUBE02-70B3D554600001F1

<div align="right">

DELETE DEVICE

</div>

Device configuration   Activate device (ABP)   Device activation   Live frame logs

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Device address

010001f1

Network session key

84d170477b250dbf841aee65e8ff5042

Application session key

4b2ac19357c1fd6276919be934791fc9

Uplink frame-counter

65536

Downlink frame-counter

11

Disable frame-counter validation

☑ Disable frame-counter validation

Note that disabling the frame-counter validation will compromise security as it enables people to perform replay-attacks. This setting can only be set for ABP devices.
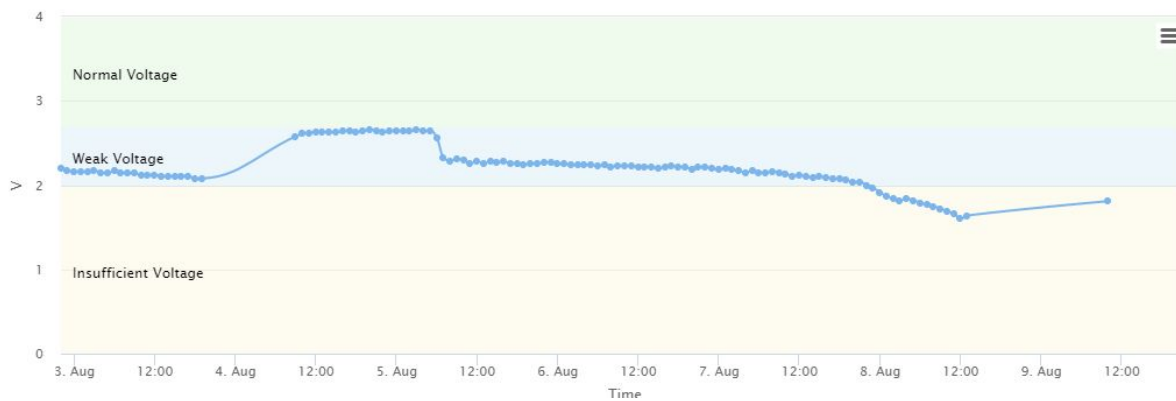
Battery and RSSI charts

Rssi

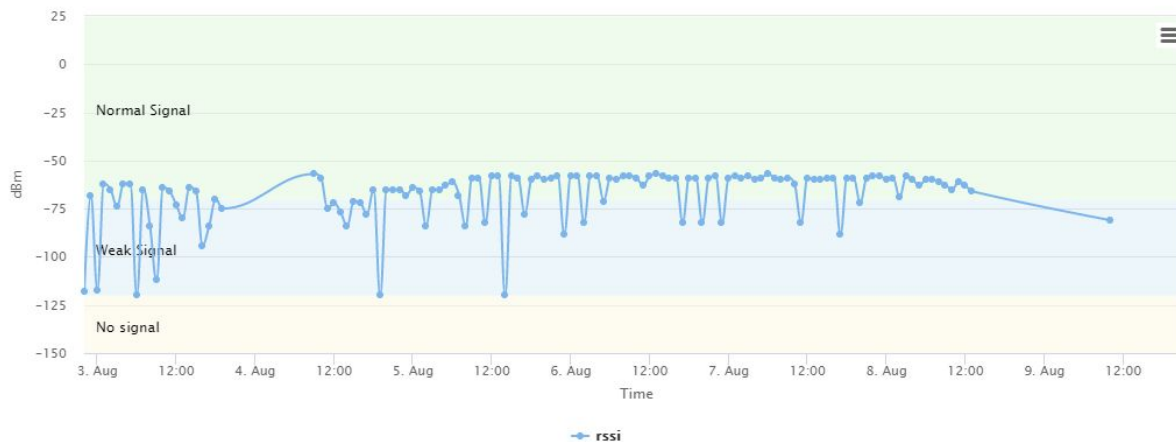**Battery**

Test setup with sensor board

Sensor board with built in temperature sensor, one-wire translator chip and 2 channels of soil moisture was attached to the LoRaWAN base board.
1k ohm resistors was attached to simulate moisture sensors and correct packet transmissions with kPa values transmitted.No external one-wire sensors were attached.

Klimatskåp -25 grader batteritest
Xeno Energy 3.6V Lihium XLP-060F 0320
Augusti

4	5	6	7	8			
15*60*6	24*60*6	24*60*6	24*60*6	13*60*6			
5400	8640	8640	8640	4680		36000	Totala sändningar
			1*60*15				
5400	8640	8640	8640	360		31680	Sändningar med data från markfuktssensorerna
					3 sändningar på 30.78 sekunder		
						10.26	sekunder per sändning

Rssi

Battery

Moisture

Moisture sensing can not work at the very lowest of battery voltage. Therefore it dropped out of measurements while the temperature sensor kept working.

Temperature