



Test Engineer:	Lu Herong
Date:	2020-11-20

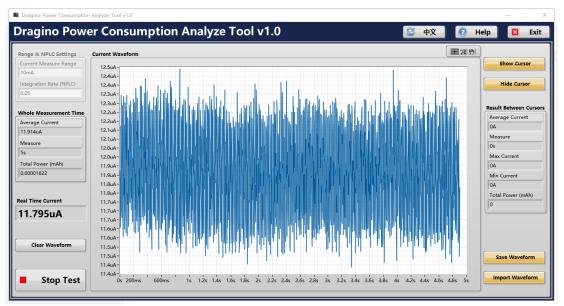
LSN50v2-S31 LoRa Sensor Node Power Test Report



1. Test Result

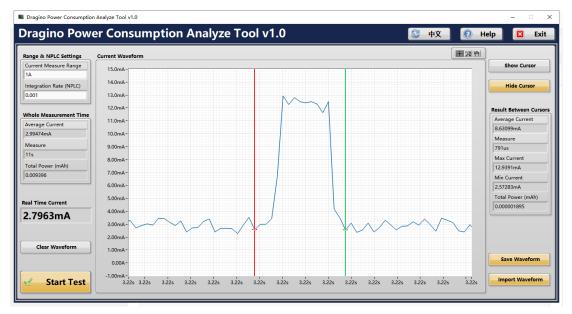
1.1. Deep Sleep Mode







1.2. Watchdog Power

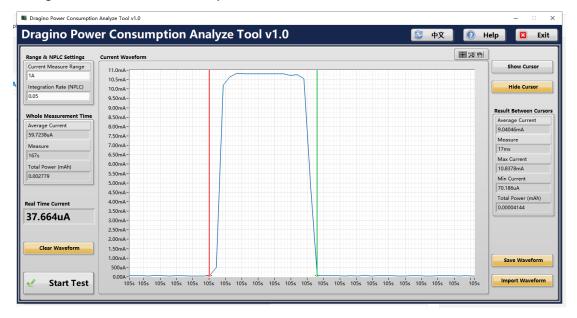


Average 8.631mA in 791us for every 18 seconds (watchdog period)



1.3. Alarm Power Consumption

Average 9.0405mA in 17ms for every 1 minute





1.4. EU868

1. 4. 1. **DR=0,TXP=0**

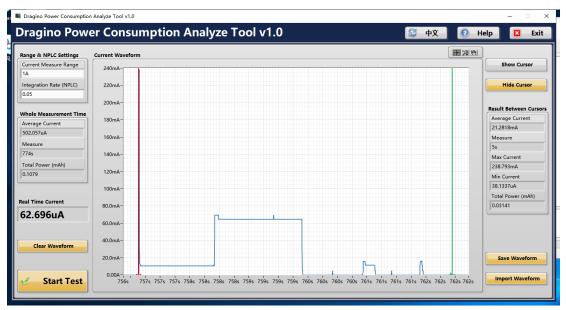
send data

Transmit Time: 5s

Average Current in transmit time: 21.2818mA

The total current to send a packet is

21.2818mA * 5s =106.409mA*s



Analyze Result

With Above test result and battery info, we can estimate the battery life.

For example, if we install the sensor node where the DR=0, Transmit one uplink every 20 minutes .

The average current for the end node composed of:

- ✓ Deep Sleep Mode Power Consumption in one period : 0.012mA *20*60s=(14.4mA*s)
- ✓ Watch Dog Current Power Consumption in one period: 0.000791s*8.631mA*(20*60s/18 s)=(0.4551mA*s)
- ✓ Alarm Power Consumption in one period: 9.0405mA*0.017s*(20*60s/60s)=(3.0738mA*s)
- ✓ Sampling & Uplink & Downlink Power Consumption Power Consumption in one period:106.409mA*s

AV_Current is :(14.4mA*s + 0.4551mA*s + 106.409mA*s+3.0738mA*s)/(20*60s)= 0.1036mA.

The battery used in LSN50V2-D20 is 8500mAh and of stable voltage in the most of life. With considering a max 2% discharge rate from the battery spec. So the battery life is y. so 8500(1 - 2%*y) = 0.1036mA * 24 * 365 * y

So 8500 – 170*y = AV_CURRENT * 8760 *y

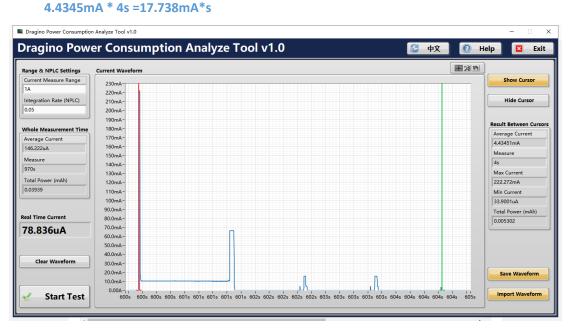


So8500=(AV_CURRENT * 8760 +170) * Y

So Y = 8500/ (AV_CURRENT * 8760+170) = 8500/ (0.1036* 8760+170) = 7.8(Years)

1. 4. 2. **DR=5,TXP=0**

send data Transmit Time: 4s Average Current in transmit time: 4.4345mA The total current to send a packet is



Analyze Result

With Above test result and battery info, we can estimate the battery life.

For example, if we install the sensor node where the DR=5, Transmit one uplink every 20 minutes .

The average current for the end node composed of:

- ✓ Deep Sleep Mode Power Consumption in one period : 0.012mA *20*60s=(14.4mA*s)
- ✓ Watch Dog Current Power Consumption in one period: 0.000791s*8.631mA*(20*60s/18 s)=(0.4551mA*s)
- ✓ Alarm Power Consumption in one period: 9.0405mA*0.017s*(20*60s/60s)=(3.0738mA*s)
- ✓ Sampling & Uplink & Downlink Power Consumption Power Consumption in one period:17.738mA*s

AV_Current is :(14.4mA*s + 0.4551mA*s + 17.738mA*s+3.0738mA*s)/(20*60s)= 0.0297mA.

The battery used in LSN50V2-D20 is 8500mAh and of stable voltage in the most of life. With considering a max 2% discharge rate from the battery spec. So the battery life is y. so



8500(1 - 2%*y) =0.0297mA * 24 * 365 * y

So 8500 - 170*y = AV_CURRENT * 8760 *y

So8500=(AV_CURRENT * 8760 +170) * Y

So Y = 8500/ (AV_CURRENT * 8760+170) = 8500/ (0.0297* 8760+170) = 19.7(Years)

1.5. US915

1.5.1. **DR=0,TXP=0**

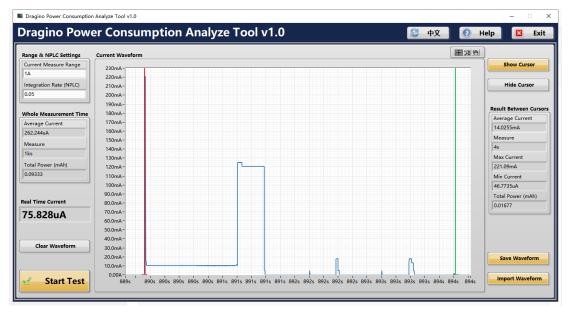
send data

Transmit Time: 4s

Average Current in transmit time: 14.0255mA

The total current to send a packet is

14.0255mA * 4s =56.102mA*s



Analyze Result

With Above test result and battery info, we can estimate the battery life.

For example, if we install the sensor node where the DR=0, Transmit one uplink every 20 minutes .

The average current for the end node composed of:

- ✓ Deep Sleep Mode Power Consumption in one period : 0.012mA *20*60s=(14.4mA*s)
- ✓ Watch Dog Current Power Consumption in one period: 0.000791s*8.631mA*(20*60s/18 s)=(0.4551mA*s)
- ✓ Alarm Power Consumption in one period: 9.0405mA*0.017s*(20*60s/60s)=(3.0738mA*s)

✓ Sampling & Uplink & Downlink Power Consumption Power Consumption in one LSN50v2-S31 LoRa Sensor Node Power Test Report ⁷



period:56.102mA*s

AV_Current is :(14.4mA*s + 0.4551mA*s + 56.102mA*s+3.0738mA*s)/(20*60s)= 0.0617mA.

The battery used in LSN50V2-D20 is 8500mAh and of stable voltage in the most of life. With considering a max 2% discharge rate from the battery spec.So the battery life is y. so $8500(1 - 2\%^*y) = 0.0617$ mA * 24 * 365 * y

So 8500 – 170*y = AV_CURRENT * 8760 *y

So8500=(AV_CURRENT * 8760 +170) * Y

So Y = 8500/ (AV_CURRENT * 8760+170) = 8500/ (0.0617* 8760+170) = 11.9(Years)

1. 5. 2. **DR=3,TXP=0**

send data Transmit Time: 4s Average Current in transmit time: 5.342mA The total current to send a packet is 5.342mA * 4s = 21.368mA*s



Range & NPLC Settings	Current Waveform	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Current Measure Range	220mA-r	Show Cursor
1A	210mA-	
Integration Rate (NPLC)	200mA-	Hide Cursor
0.05	190mA-	
]	180mA-	Result Between Cursor
Vhole Measurement Time	170mA-	
Average Current	160mA-	Average Current 5,34202mA
137.387uA	150mA-	
Measure	140mA-	Measure 4s
1ks	130mA-	
Total Power (mAh)	120mA-	Max Current
0.03848	110mA-	210.198mA
0.03040	100mA-	Min Current
	90.0mA-	38.3935uA
eal Time Current	- Am0.08	Total Power (mAh)
	70.0mA-	0.006395
18.823uA	60.0mA-	
	50.0mA-	
	40.0mA-	
Clear Waveform	30.0mA-	
	20.0mA-	Save Waveform
	10.0mA-	

Analyze Result

With Above test result and battery info, we can estimate the battery life.

For example, if we install the sensor node where the DR=3, Transmit one uplink every 20 minutes .

The average current for the end node composed of:

- ✓ Deep Sleep Mode Power Consumption in one period : 0.012mA *20*60s=(14.4mA*s)
- ✓ Watch Dog Current Power Consumption in one period: 0.000791s*8.631mA*(20*60s/18 s)=(0.4551mA*s)
- ✓ Alarm Power Consumption in one period: 9.0405mA*0.017s*(20*60s/60s)=(3.0738mA*s)
- ✓ Sampling & Uplink & Downlink Power Consumption Power Consumption in one period:21.368mA*s

AV_Current is :(14.4mA*s + 0.4551mA*s + 21.368mA*s+3.0738mA*s)/(20*60s)= 0.0327mA.

The battery used in LSN50V2-D20 is 8500mAh and of stable voltage in the most of life. With considering a max 2% discharge rate from the battery spec.So the battery life is y. so 8500(1 - 2%*y) = 0.0327mA * 24 * 365 * y So 8500 - 170*y = AV_CURRENT * 8760 *y So8500=(AV_CURRENT * 8760 +170) * Y

So Y = 8500/ (AV_CURRENT * 8760+170) = 8500/ (0.0327* 8760+170) = 18.6Years)