

Test Report

Battery Life Validation for the WSN-1101 Wireless Sensor

Introduction

The WSN-1101 wireless sensor was designed for very low power consumption which results in ultra-long (25+ years) battery life. This level of battery-powered performance provides the deployment flexibility and installation convenience of wireless with the predictability and operating longevity of wired systems.

Powercast provides wireless sensors that wake-up at a pre-configured interval (e.g. 60 seconds) to take a reading and transmit data. During the time between these active periods, the sensors are in a very low power “idle” state. This is represented in Figure 1 below. In many applications the duty cycle is less than 0.1%, which means the device is idle >99.9% of the time.

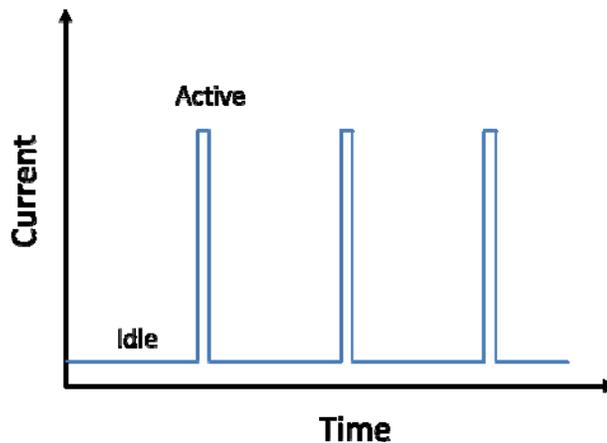


Figure 1 – Wireless Sensor Idle and Active Current

The WSN-1101 operates similar to the diagram shown in Figure 1, operating and transmitting data approximately every minute for greater than 25 years. To validate the battery lifetime of the WSN-1101, an accelerated battery life test was performed.

These tests replicated the above scenario but compress the idle time and increase the idle power to account for the idle current and battery leakage over the simulated test period.

Test Set-Up and Results

The WSN-1101 firmware was modified to accelerate the packet transmissions from once per 66 seconds to once per 143ms. This is an acceleration factor of 462 times. This acceleration effectively transmits the same amount of packets in a single day as a normal sensor sends in 1.27 years. Additionally, the sleep current and battery self-discharge current must be accelerated by 462 for the test to be valid. To accomplish this, test equipment was used to put a constant current drain on the battery during the duration of the test.

Test Parameters:

Acceleration Factor:	462 times	Low Battery Indicator:	3.1V
Packet Transmission:	66s ⇌ 143ms	End-of-Life:	3.0V
Idle Current:	Normal ⇌ 462x	Test Duration:	~21 days
Battery Leakage:	Normal ⇌ 462x	Data Logging:	15min increments
Temperature:	21 °C (70 °F)	Battery:	2.4Ahr, AA, 3.6V, Li-SOCl ₂

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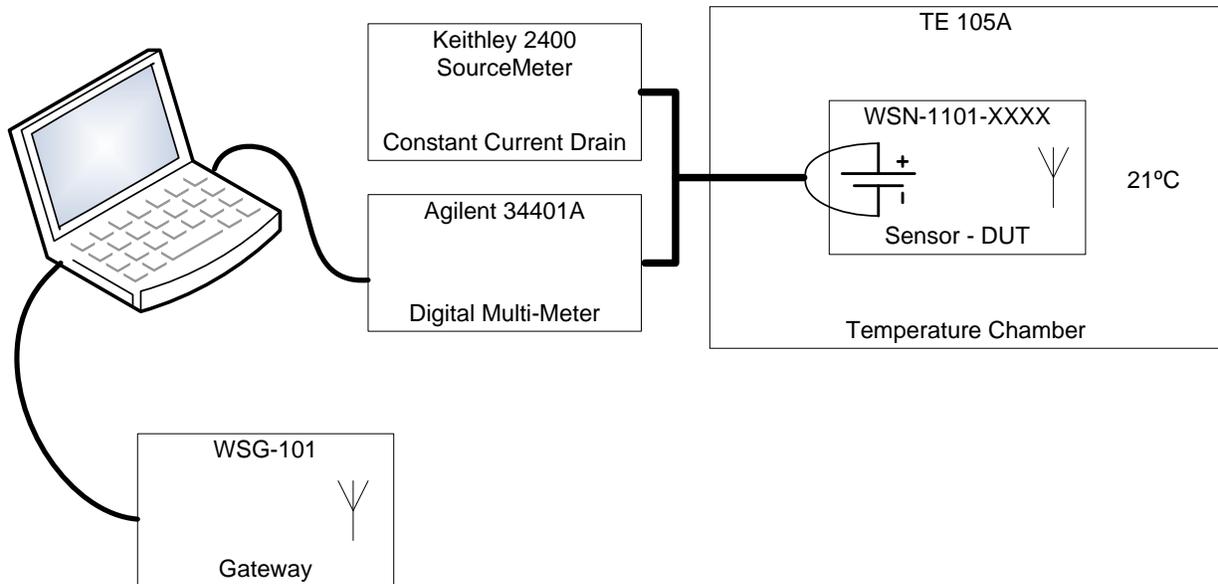


Figure 2 – Test Setup

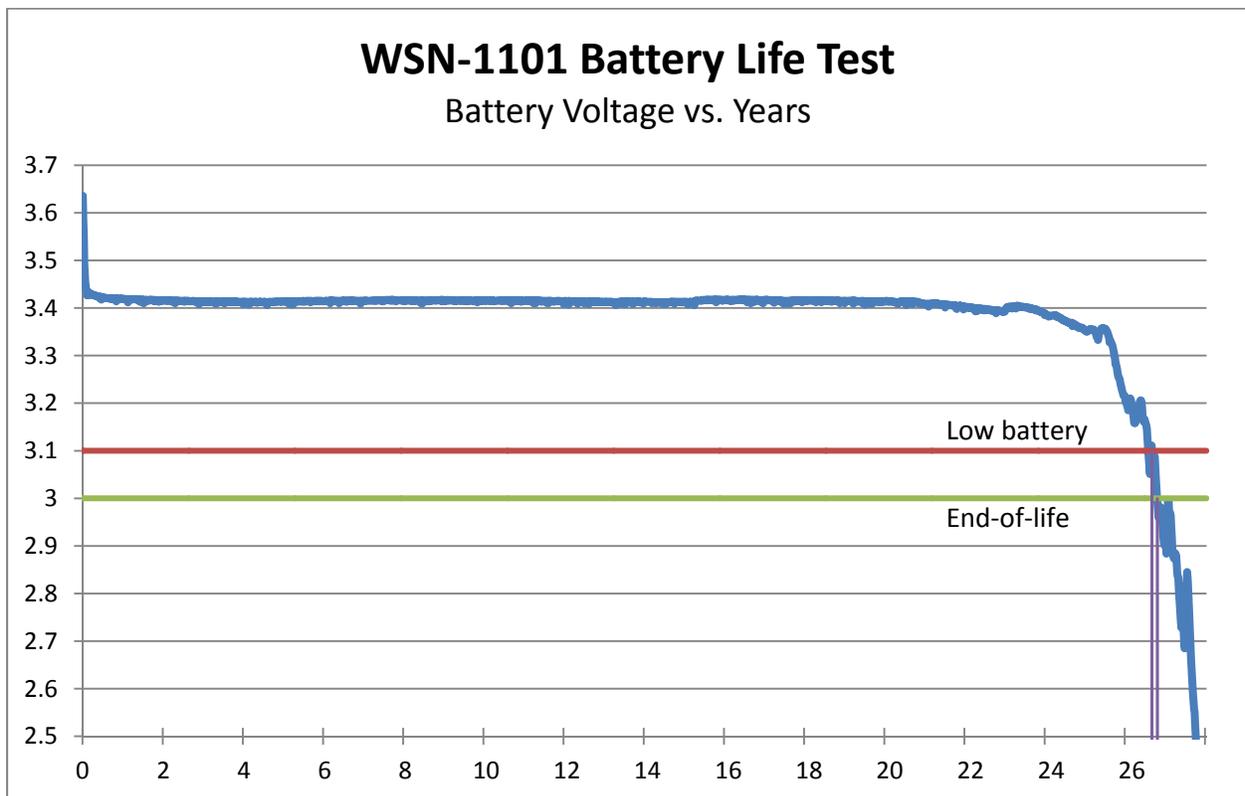


Figure 3 – WSN-1101 Battery Life Test

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Conclusions

The accelerated test results show that a low-battery (3.1V) was indicated at 26.55 years and the device operated until 26.69 years (3.0V), providing a low-battery warning period of 48 days. Both of these timeframes are beyond the specified 25-year life.

The WSN-1101 product line uses a battery with a field-proven life of 25+ years in harsh conditions. This accelerated battery-life test validates that the WSN-1101 will operate for 25+ years on this battery.

On-going Testing

This test was performed over a 22 day period which puts a heavy burden on the battery compared to its ratings. Powercast continues to perform longer term test that will be more representative of the final lifetime. However, this test is believed to be the worst case due to its short duration. Additional tests are expected to show an increase in lifetime when the test is extended to approximately twice the duration.

Please contact Powercast or an authorized sales representative for more information about the Lifetime Power[®] Wireless Sensor System