ADVANCED WIRELESS SOLUTIONS BY IDEAL®

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Test Report *- Battery Life Validation for the 1101 Series Wireless Sensor*

Introduction

The 1101 Series 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.

IDEAL 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.

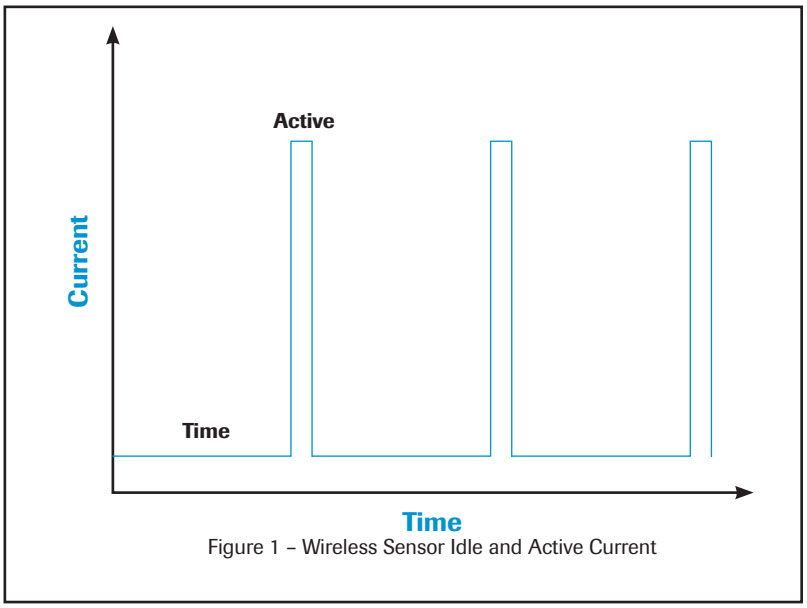


Figure 1 – Wireless Sensor Idle and Active Current

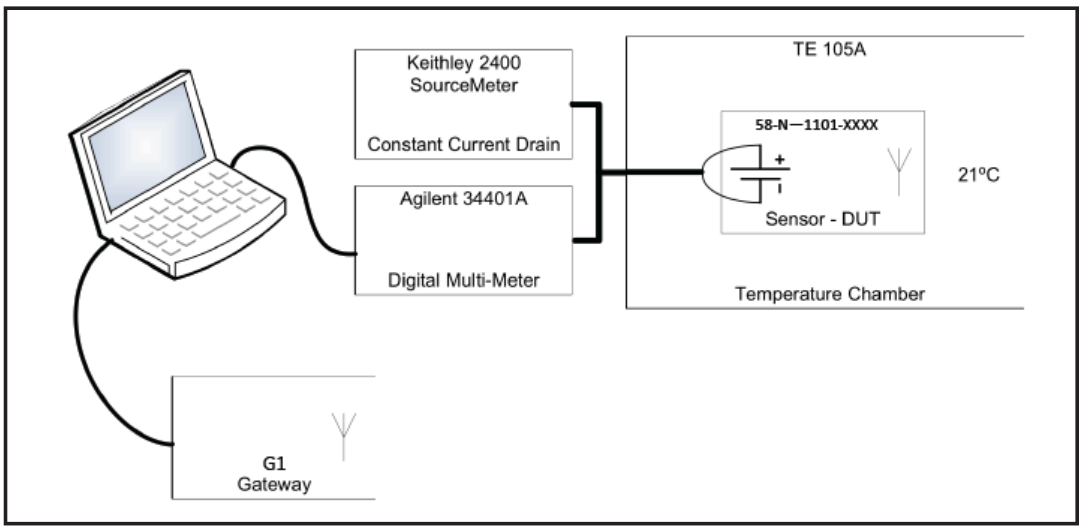
The 1101 Series operates similar to the diagram shown in Figure 1, operating and transmitting data approximately every minute for greater than 25 years. To validate the battery lifetime of the 1101 Series, an accelerated battery life test was performed.

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.

Note: The 1201 Series sensor is the 900 MHz equivalent of the 1101 SERIES. The1201 Series has even lower power consumption than the 1101 Series and the results provided here will be even better for the 1201 Series.

Test Set Up

Test equipment and a temperature chamber were used for the simulation. Since batteries have leakage.



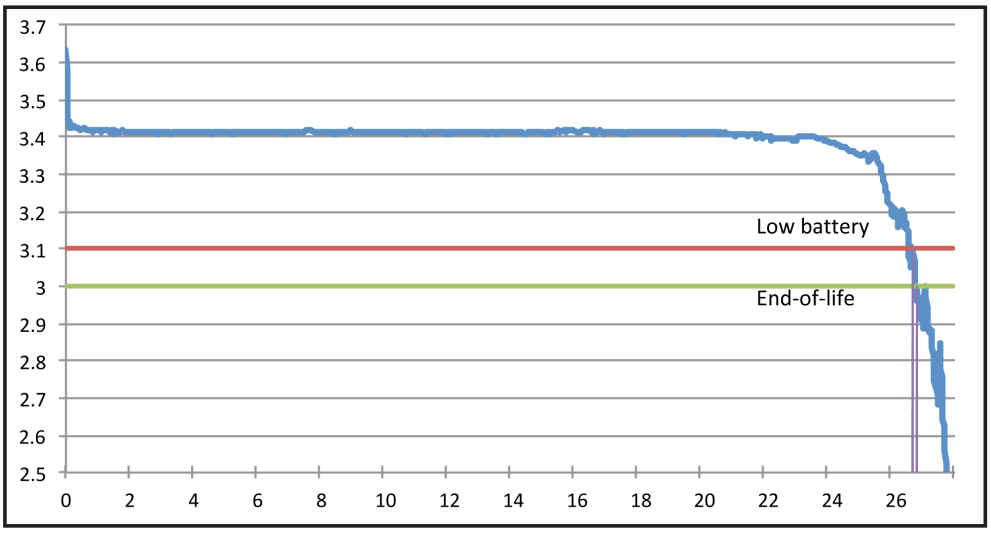
Test Scenario #1 – Fast Accelerated Life Test

The 1101 Series 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.

Test #1 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:	~21days
Battery Leakage:	Normal → 462x	Data Logging:	15min increments
Temperature:	21°C (70°F)	Battery:	2.4Ahr, 3.6V, Li-$SOCl_2$

Figure 3 – 1101 Series Battery Life Test #1 Battery Voltage vs. Years

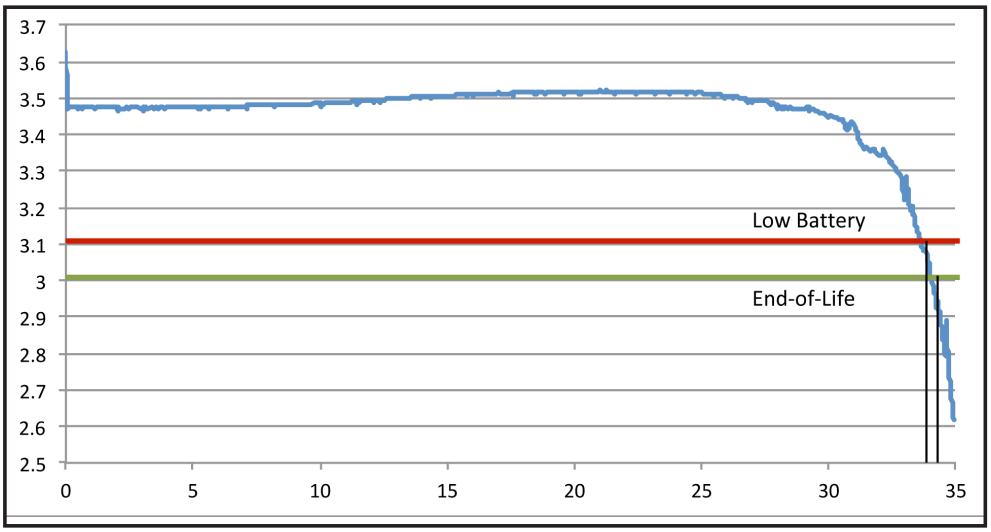


Test Scenario #2 – Moderate Accelerated Life Test

Test #2 Parameters

Acceleration Factor:	242 times	Low Battery Indicator:	3.1V
Packet Transmission:	66s → 273ms	End-of-Life:	3.0V
Idle Current:	Normal → 242x	Test Duration:	~53days
Battery Leakage:	Normal → 242x	Data Logging:	15min increments
Temperature:	21°C (70°F)	Battery:	2.4Ahr, 3.6V, Li-$SOCl_2$

Figure 4 – 1101 Series Battery Life Test #2 Battery Voltage vs. Years



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