8401-0003
Wireless Sensor Networks Technical Note
MicroStrain, a LORD company

Wireless Sensor Node Power Profiles

Overview

Power consumption is an important consideration when deploying remote wireless sensors. MicroStrain's wireless sensor nodes including V-Link®-LXRS™ 8 Channel Wireless Analog Sensor Node, SG-Link®-LXRS™ 3 Channel Wireless Analog Sensor Node, and G-Link®-LXRS™ Wireless Accelerometer Node may be operated with their internal rechargeable battery or with close-by external batteries. The power profiles available for each of these wireless sensor nodes aid the user in determining how long a remote sensor may be operated without maintenance. This beforehand knowledge becomes particularly critical in hard-to-reach applications such as an interstate bridge superstructure, the canopy of a rain forest, or the nacelle of a windmill. This technical note assumes the user has some familiarity with MicroStrain Wireless Sensor Networks.

Test Method

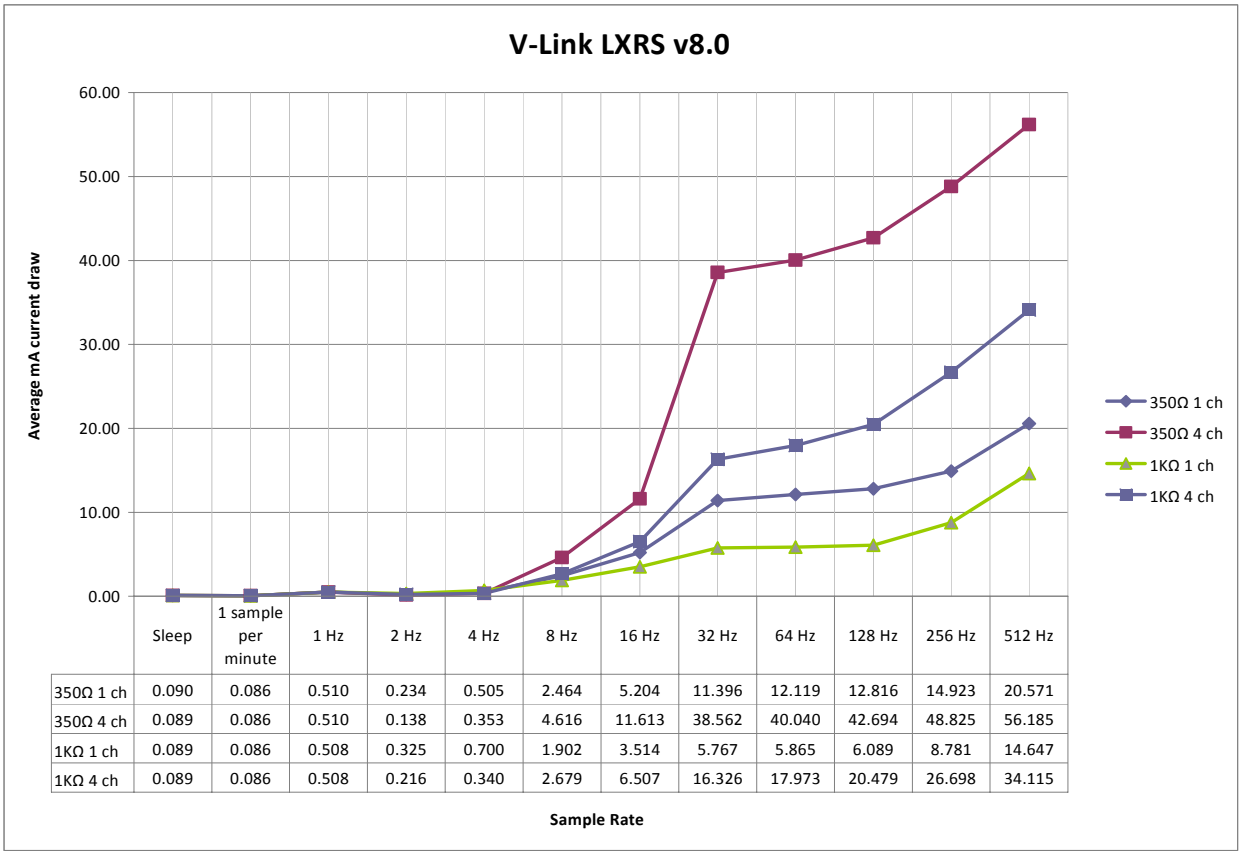
The V-Link®-LXRS™ and SG-Link®-LXRS™ are provisioned with a precision full bridge wheatstone test sensor on each of their differential input channels; the internal accelerometer channels are tested on the G-Link®-LXRS™. The node is switched to use external power and is powered with a regulated 5 VDC power supply. A high resolution digital multimeter is placed in series with the node and power supply to read the current draw during sensor sampling. Software communicates with both the wireless node (through its base station) and the multimeter. The software configures the node for **synchronized sampling** and operates the wireless node through the several sampling rates presented in the profile. The multimeter continuously averages the current draw over a ½ hour period for each of the sampling rates.

Reading and Using the Power Profile

Individual power profiles are found on the particular node's product page at http://www.microstrain.com. As an example, the V-Link®-LXRS™ power profile is shown in Figure 1. The Y-axis records the average current draw in milliamps (mA). The X-axis records 1 and 4 channel sampling of 350 ohm and 1000 ohm full bridge wheatstone sensors at various sampling rates.

Example: If we install a 350 ohm full bridge strain gauge on channels 1, 2, 3 and 4 of the V-Link®-LXRS™, and set the synchronized sampling rate to 16 Hz, we find power consumption to be 11.613 mA. The V-Link®-LXRS™ internal rechargeable battery has a 650 mAh (milliamp hour) capacity when fully charged. 650 mAh / 11.613 mA = 55 hours. The V-Link®-LXRS™ in this configuration will continuously sample about 55 hours before its internal battery needs recharging.

Example: If we install a 350 ohm full bridge strain gauge on channels 1, 2, 3 and 4 of the V-Link®-LXRS™, and set the synchronized sampling rate to 16 Hz, we find power consumption to be 11.613 mA. If we power the same V-Link®-LXRS™ externally with 3 each Tadiran TL-5903 Lithium Ion 3.6 V D-Cell batteries (19 Ah capacity), we can continuously sample 19 Ah x 3 each x 1000 mA / 11.613 mA = 4908 hours = 204 days.



	Sleep	1 sample per minute	1 Hz	2 Hz	4 Hz	8 Hz	16 Hz	32 Hz	64 Hz	128 Hz	256 Hz	512 Hz
350Ω 1 ch	0.090	0.086	0.510	0.234	0.505	2.464	5.204	11.396	12.119	12.816	14.923	20.571
350Ω 4 ch	0.089	0.086	0.510	0.138	0.353	4.616	11.613	38.562	40.040	42.694	48.825	56.185
1KΩ 1 ch	0.089	0.086	0.508	0.325	0.700	1.902	3.514	5.767	5.865	6.089	8.781	14.647
1KΩ 4 ch	0.089	0.086	0.508	0.216	0.340	2.679	6.507	16.326	17.973	20.479	26.698	34.115

Figure 1. *V-Link®-LXRS™ Power Profile*

Other Important Considerations

- The battery capacities used in our examples are nominal; the actual draw-down of batteries in the field will vary depending on temperature, sleep intervals, etc.
- The Power Profiles only reflect node operation using the Synchronized Sampling mode with transmit only set; current draw will vary during streaming, low duty cycle, and armed datalogging operation.

Support

MicroStrain support engineers are always available to expand on this subject and support you in any way we can.

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