

# Ridgetop Group INC

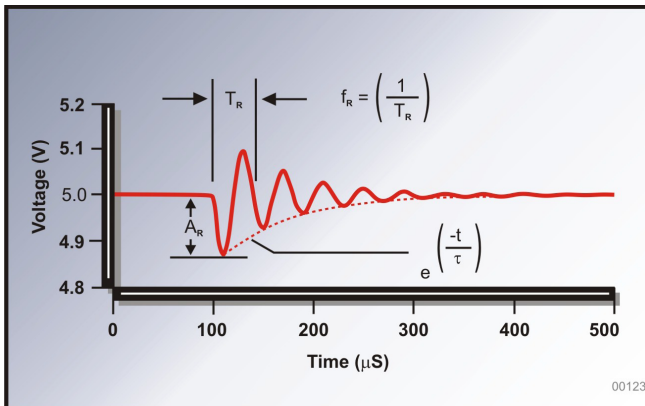
## RingDown™ Overview

### RingDown™ Power Prognostics

#### Non-Invasive Health Monitoring for Power Supplies

#### Extend the Reliability of Your Power Supplies

Power supplies are the major life-limiting component in most electronic systems. Ridgetop Group's RingDown™ uses a patent pending technology to create an advanced prognostics-enabler, the key to providing the higher reliability and improved serviceability needed in mission-critical systems and devices. Far superior to the current static load testing method, RingDown is a non-invasive health monitoring system that requires no modification to the power supply circuit.



Damped Sinusoid Response or 'Ringing' Signal in Response to a Load Change

At Ridgetop Group, we develop families of intelligent, prognostic tools and technologies covering the entire span of electronic devices and systems.

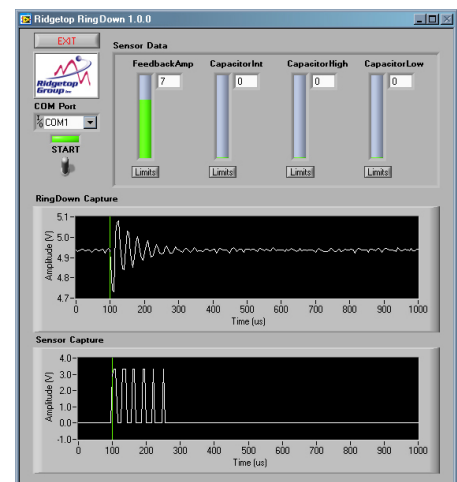
Our power prognostic technologies provide the metrics and methods for supporting condition-based maintenance, asset tracking, and readiness status of mission and safety critical equipment.

#### Ridgetop Group's RingDown™ Technology

Power supplies employ closed-loop feedback to keep the voltage or current under tight control and regulation. While the power system may still be in regulation, certain aging- or stress-related changes to internal components can indicate impending failure conditions on the supply.

By externally monitoring transient responses to source or load changes, RingDown™ accurately predicts wear-out by analyzing transient response to determine State-of-Health (SoH) and Remaining Useful Life (RUL) metrics. The transients on the power supply "rails" produce the characteristic "ringing" waveform, which reveals the characteristic, or eigenvalues, indicative of the system health. Departures from the standard response can be directly mapped to equipment degradation or devices approaching the end of their useful operational life, and provide the basis for a unique and non-intrusive prognostic for the power supply under test.

One of RingDown's best functions is superb sensitivity and precision – imagine the advantages of detecting failure signatures before performance is noticeably reduced.



Example Interface for RingDown™ Power Prognostics





## FEATURES AND BENEFITS

- Accurate advance notice of impending failures
- Provides SoH and RUL metrics for use as remote diagnostics
- Dual use for factory or field testing to detect degraded condition and perform proactive maintenance
- Improves fault coverage through dedicated prognostic circuitry
- Easy, snap-on installation without power supply circuit modification

## Benefits

## Specific Effects

### Power Supply Field Failure Reduction

When power supplies in electronic systems fail, the result can be higher costs and lower product ratings. Ridgetop Group's RingDown power sensor accurately predicts impending power supply failures so corrective action can be taken before a device fails while in field.

- Instant determination of a device's SoH during operation.
- Extraction of prognostic information to predict the module's RUL.
- Data collection and asset management from a central collection node linked to the on-board prognostics sensor.

### Snap-On Installation Without Circuit Modification

A dedicated external sensor is snapped onto the circuit with no need to modify the circuit. A special technique extracts values that characterize the control loop.

- Fast, in-house power supply testing can be conducted either online or offline.
- Reduction in overall testing costs.

### Remote Monitoring of Wear-Out Signatures

Wear-out signatures detected by RingDown prognostics can be linked to larger networks to provide a dynamically updated inventory of assets, indicating SoH and RUL.

- Software such as Ridgetop's Sentinel PHMPro® can be added to let you observe the amplitude and other feedback through a graphical user interface.

### Higher Reliability and Improved Serviceability

RingDown detects wear-out signatures prior to any noticeable reduction in performance using a standalone early warning approach. Topology independence allows it to work with a variety of power supplies.

- Comparison against other power supplies for expected operating life under various load conditions, facilitating purchasing decisions.
- Increased customer satisfaction.

