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## LIVE ELECTRONIC COMPONENT MONITORING

### HARDWARE, CIRCUITS, & SENSORS

Device that utilizes spread spectrum time domain reflectometry to measure degradation of electronic components while they are live.

#### TECHNOLOGY TYPE

Power Conversion  
Reflectometry  
Capacitor

#### STAGE OF DEVELOPMENT

Proof of concept  
demonstrated through initial  
testing.

#### IP PROTECTION

##### U.S. Utility Patent Issued

State of Health Estimation  
of Power Converters  
US9494657B2

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Reference Number: U-5342

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#### TECHNOLOGY SUMMARY

Reliable and uninterrupted operation of power converters is crucial – especially in industrial processes where failure-free operation is indispensable. Capacitors and switching devices, such as transistors and diodes, are the most likely to fail components in power converters. To ensure failure-free operation, converters are often operated with redundancy and require periodic maintenance and replacement, which is time and cost intensive. Additionally, the functionality and performance of power converters degrade over time. Conventional methods estimate wear by characterizing individual components, but fail to reflect the overall state of the converter.

*Live Electronic Component Monitoring* provides a real-time, non-invasive method for monitoring the overall state of health of power convertors. Using spread spectrum time domain reflectometry, the method assesses the impedance, resistance, and capacitance of various current paths within the converter. This information is then used to form a converter-specific matrix that predicts the age and reliability power converters. Measurements are implemented while the components are live or functioning within the overall system.

#### FEATURES AND BENEFITS

- Enables assessment of a converter's overall state of health.
- Predicts power convertors' remaining life.
- Enhances power convertors' effectiveness and utilization factor.

#### RECENT PUBLICATIONS

Nasrin, M.S., Khan, F.H. (2012). Use of spread spectrum time domain reflectometry to estimate state of health of power converters. *2012 IEEE 13th Workshop on Control and Modeling for Power Electronics (COMPEL)*. doi: [10.1109/compel.2012.6251790](https://doi.org/10.1109/compel.2012.6251790)

#### INVENTOR PROFILE

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