

New Method for Estimating the Remaining Life of Power Converters in Real-Time

Patent Title: Power Converter Remaining Life Estimation
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This invention enables continuous online life monitoring of switching power supplies. It tells in advance when a power supply will expire.

Market Opportunity

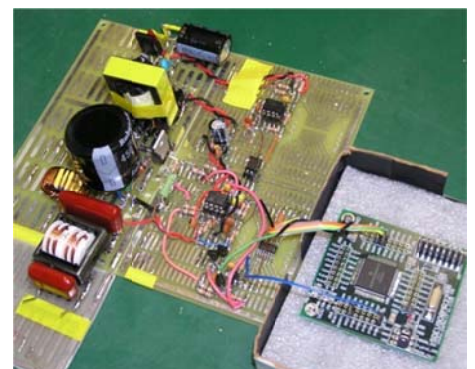
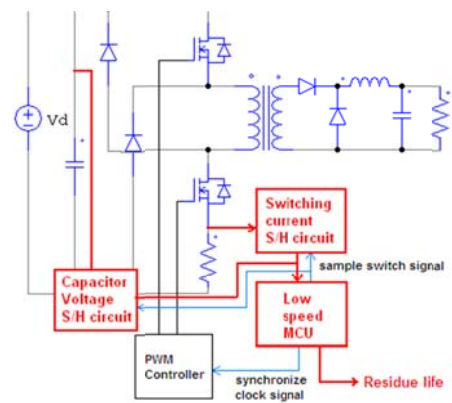
Predicting the expected life of a switching power supply is essential since unexpected failure of the subsystem can produce major inconvenience or even enormous loss. Virtually all electronic equipment, such as computers, communication switches and base stations, medical monitoring systems, etc, employ switching power supplies to convert AC power obtained from wall sockets to DC power for their operations. According to Frost & Sullivan, the worldwide AC-DC switching power supplies market was estimated at US\$ 8.7 billion in 2008 with a shipment of 54.7 million units. The market is forecast to have a CAGR of 1.5%.

Our invention enables users to undertake preventive measures to avoid unexpected equipment failures as well as to minimize system downtime.

The HKU Invention

Currently, most power supplies only have their life estimation done in the design stage [1]. This is neither sufficient nor accurate. The working environment varies for different installations of power supplies and such variation dominates their life expectations. Our invention gives intelligence to the power supply so that it can monitor the working conditions and tell the user how long it can operate without problems. This is useful information for those who perform preventive maintenance, especially in large systems where maintenance costs are significant.

There are a few researchers working on the life prediction of power supply. Their focus is on high reliability, high power and cost insensitive applications. Most of these require expensive sensing equipment and calculation units [2]. Others only work under fixed topology which is insufficient for varying loading conditions [3]. Our technology gets rid of expensive units, suits all favorable topologies and favors mass production.



With advanced technologies, the current market is looking for more reliable power supply systems, especially for those installed in remote areas. Power supplies with a self-monitoring function favor scheduled maintenance. This invention helps to reduce the costs of downtime and repairs, in addition to increasing the utilization of equipment.

About the Lead Inventor

Dr. Bryan M.H. Pong graduated from Birmingham University and obtained his PhD degree from Cambridge University. Currently, Dr Pong is an Associate Professor at the Hong Kong University and his research interest is Power Electronics & Switching Power Supply. Dr. Pong is a co-inventor of several US patents and has authored and co-authored a number of technical publications.

References

- [1] Xijin Tian, "Design-for-reliability and implementation on power converters", Reliability and Maintainability Symposium 2005, 24-27 Jan. 2005, pp. 89- 95
- [2] Riz, D. Fodor, O. Klug and Z. Karaffy, "Inner gas pressure measurement based life-span estimation of electrolytic capacitors", Power Electronics and Motion Control Conference, 2008. 13th, 1-3 Sept. 2008, pp. 2096-2101
- [3] Yaow-Ming Chen, Hsu-Chin Wu, Ming-Wei Chou and Kung-Yen Lee, "Online Failure Prediction of the Electrolytic Capacitor for LC Filter of Switching-Mode Power Converters", IEEE Transactions on Industrial Electronics, Volume 55, Issue 1, Jan. 2008, pp.400-406

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