Accelerated Lifetime Test for Isolated Components in Linear Drivers of High-Voltage LED System

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degradation of electrolytic capacitors in the entire system are investigated in this test.

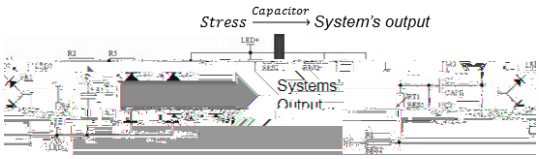

Fig 3: Isolated Accelerated Lifetime Test Method

2. Accelerated Lifetime Test

As mentioned before, this work proposes an isolated component accelerated lifetime testing of high-voltage LED driver. In this method, a critical component(s) will be isolated from the

As illustrated in Fig.6, similar to lumen maintenance, at the time of capacitors exceed their lifetimes, power consumption reduce about 0.5%, but compares to the ±0.01% accuracy of electrical measuring, it is much more accurate to be measured. Therefore, in this work, power consumption and power factor are considered as the indicator of capacitor degradation instead of lumen maintenance.

Fig.6 Power Maintenance vs Capacitance

In this accelerated test, the electrolytic capacitors in the linear drivers are put in 55℃, 105℃ and 145℃. As mentioned above, an electrolytic capacitor degrade much faster in 145℃ than in 55℃ and 105℃, so in the first 300 hours of aging, the electrolytic capacitors in 145℃ had already exceeded their lifetime, while the electrolytic capacitors in other condition are still operating well within their lifetime.

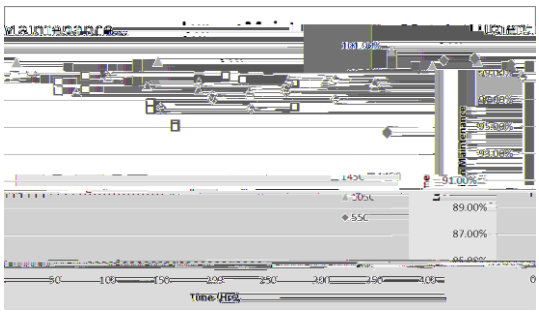

Fig.7 Relative Lumen Flux Trend

Fig.8 Relative Power Consumption Trend

As the most significant indicator, shown in Fig.7,

high-voltage LED system; 3) Although circuit modification is unavoidable, this test method can minimize failure interactions between components in the system.

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References

1. Han L. *et al*, "Developing an accelerated life test method for LED drivers," *IEEE Transactions on Power Electronics*, Vol. 26, No. 8 (2011), pp. 2249-2257.
2. *IEEE Industry Applications Conference*, 1996.
3 Sankaran V. A. *et al* tic Capacitor Life