SMBus Controlled CCFL Power Supply

by Jim Williams

Figure 1 shows a cold cathode fluorescent lamp (CCFL) power supply that is controlled via the popular SMBus interface. The LT1786 CCFL switching regulator receives the SMBus instruction. The IC converts this instruction to a current, which appears at the I_{OUT} pin. This current, routed to the I_{CCFL} pin, provides a set point for switching regulator operation. The resultant duty cycle at the V_{SW} pin pulls current through L2. L2, acting as a switched current sink, drives a resonant Royer converter composed of Q1–Q2, C1 and L1. The high voltage sine wave produced at L2's secondary drives the floating lamp.

Current flow into the Royer converter is monitored by the IC at pin 13 ("Royer" in Figure 1).[1] Royer current correlates tightly with lamp current, which, in turn, is proportional to intensity. The IC compares the Royer current to the SMBus-derived current, closing a lamp-intensity control loop. The SMBus permits wide-range regulated lamp-intensity control and allows complete IC shutdown. Optimal display and lamp characteristics permit 90% efficiency. The circuit is calibrated by correlating SMBus instruction codes with attendant RMS lamp current. Detailed information on circuit operation and measurement techniques appears in the references below.

References:

1. Williams, Jim. Linear Technology Application Note 65: A Fourth Generation of LCD Backlight Technology. November 1995.
2. LT1786F Data Sheet. Linear Technology Corp. 1998.

[1] Local historians can't be certain, but this may be the only IC pin ever named after a person.

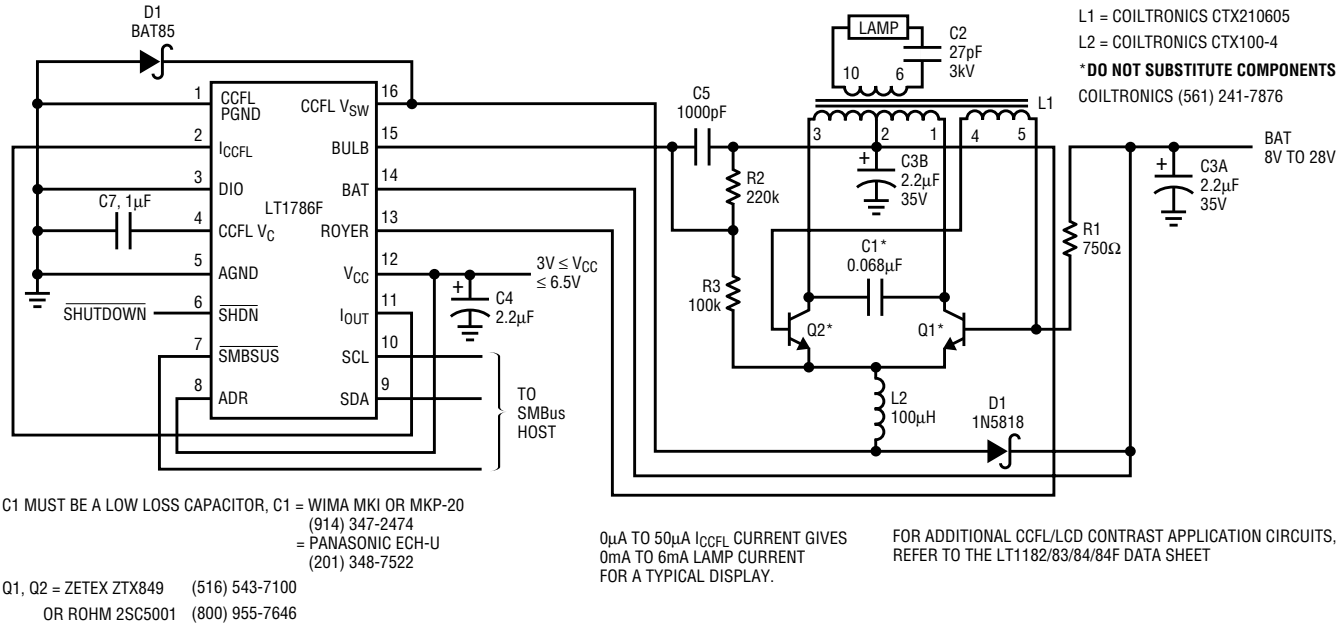

Figure 1. 90% efficient floating CCFL with 2-wire SMBus lamp-current control

Ring Tone, continued from page 29

Analog Inputs Welcome

The scaleable amplification system detailed in Figure 4 can be driven with analog inputs while still maintaining full isolation. Such a system is detailed in Figure 5, where the analog input is filtered (to prevent ailiasing) and converted to PWM. Figure 5 goes on to show the use of an RS485 differential driver to drive a twisted pair line. The receiver end of the twisted pair line is terminated with a resistor and put across the isolation barrier. This provides very good ESD protection on both ends of the line.

Conclusion

The LT1684 is useful in a wide variety of applications. The LT1684 is a highly integrated solution for use in any system that requires digital control of high output voltage or high output power.