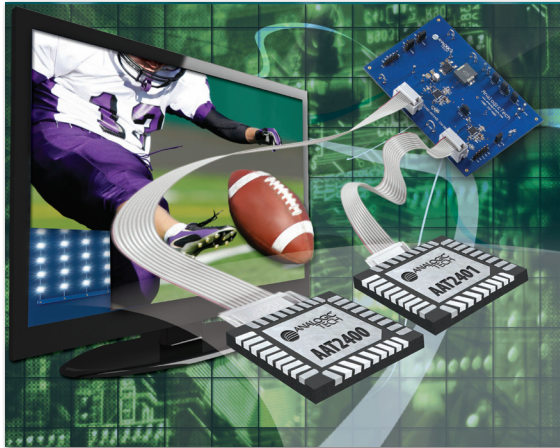


16-Channel White LED Driver IC Solution with Full LED Current and Timing Control



Features

- Step-Up Converter Switching Frequency Options
 - 600 kHz
 - Sync to External Clock (optional)
- 16 LED Current Sinks up to 100mA/ch
 - $\pm 2.5\%$ Accuracy (60mA)
 - $\pm 2.0\%$ Matching (60mA)
- SPI Interface
 - Digitally Programmable Individual Channels
 - Up to 30MHz Clock Speed
- V_{SYNC} Derived Internal Oscillator
- Device Addressing: Up to 256 Current Sinks
- Soft-Start to Minimize Inrush Current
- TQFN55-36 Low Profile Package
- -40°C to $+85^{\circ}\text{C}$ Temperature Range

General Description

The AAT2400/2401 is a highly integrated, high efficiency white LED back-light solution for large size LCD panels used in LCD TVs. To accommodate power requirements, the solution consists of two devices, a master device (AAT2400) and a slave device (AAT2401). The devices operate from a regulated 12V or 24V DC power supply.

The master device supplies a 40V rail to drive 10 series LEDs with a typical V_F of 3.6V with up to 100mA. Sixteen precision current sinks split evenly between the master and slave devices provide a constant current drive for up to 160 white LEDs. Feedback from each of the current sinks is fed back to the boost converter to ensure the optimum voltage is applied to the LED strings. A high speed, SPI compatible interface allows fast, independent digital control of each current sink programmed to a maximum value using an external resistor.

An 8-Bit Dot Correction register compensates for variations in LED brightness during LCD setup, while two 12-Bit registers control the grayscale current and delay time. Channel ON/OFF control is also included. Each Master and Slave contains a 2-Bit register which allows up to 256 LED strings to be controlled in a single system. The Grayscale PWM clock is internally generated or can be externally supplied.

Fault handling and detailed reporting is handled by the SPI bus while a fault is indicated via a fault pin. The system monitors open or short circuit LEDs, and over-voltage, over-current and over-temperature protection.

The AAT2400 and AAT2401 are available in Pb-free, thermally enhanced 36-pin 5x5mm TQFN packages.

Highlights

Efficient	Integrated 40V, 1.6A boost converter with up to 95% efficiency using a Lateral Trench DMOS output transistor enhancing reliability
Flexible	Master/Slave concept with 8 channels per IC, optimizing the number of ICs in a system. Wide input range allows the device to be used in 12V or 24V systems
Powerful	100mA/channel LED output current with 2.0% accuracy and matching
Easy	High speed SPI bus interface featuring 12-Bit control for Grayscale current, channel delay and 8-Bit DOT correction to simplify screen calibration and operation
Safe	Integrated fault protection for shorted & open circuit LEDs, over-current, over-voltage and over-temperature protection with fault reporting

16-Channel White LED Driver IC Solution with Full LED Current and Timing Control

Efficient

Using a Lateral Trench DMOS output transistor for enhanced reliability, the AAT2400/01 integrates a 40V, 1.6A boost converter with up to 95% efficiency. ModularBCD™ enables low resistance, high voltage, rugged Lateral Trench DMOS transistors along with other high and low voltage components on one IC. Lateral Trench DMOS transistors are inherently more rugged, can be avalanched and have a higher immunity to Hot Carrier Injection (HCI) than standard Lateral DMOS transistors.

Flexible

The AAT2400/01 is designed as a Master/Slave concept with 8 channels per IC. Dividing the chipset into a master/slave concept reduces the number of packages per system by integrating the power supply into the master and also by providing a solution that can be adapted for the given application. For example, for systems that require only 24 channels, one master can be used with two slaves to eliminate IC redundancy that occurs if 16-channel drivers are used.

Powerful

100mA/channel LED output current with 2.5% accuracy and 2.0% matching. Each current sink has a high voltage adjustable current sink (with internal sensing) which has an initial accuracy (as a function of the RSET resistor) of ±2.5%. Variation between current sinks is tighter at ±2%. This high output current and accuracy reduces the LCD calibration time during production and also improves the picture quality when in use. Competitor products that use external resistors to sense the LED current are normally specified at 25°C and ignore the tolerance of the ballast resistor.

Easy

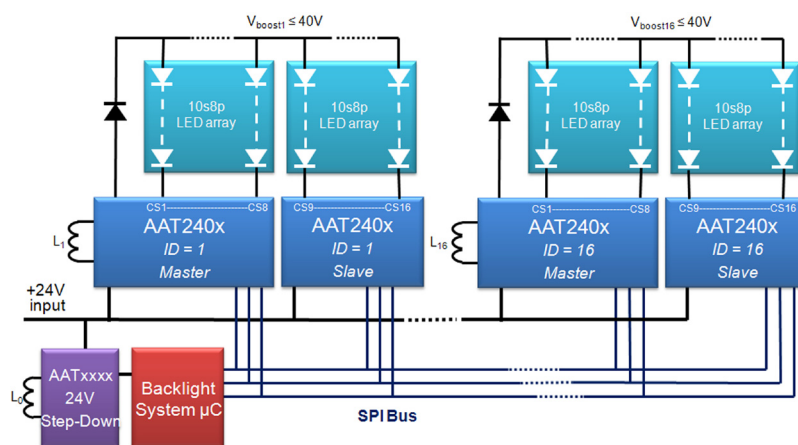
Screen calibration and operation are simplified by the use of a high speed SPI bus interface with 12-Bit control for Grayscale current, channel delay and 8-Bit DOT correction. The high speed bus allows control of up to 256 strings of LEDs at once. DOT correction can be adjusted during the LCD calibration procedure and LED brightness can be controlled according to the image

displayed. The 12-Bit delay function can compensate for transmission delay effects when controlling LEDs from one end of an LCD to the other. 42" or 50" is a long way to travel. A Wide voltage input range allows the device to be used in 12V or 24V systems. The input flexibility allows the AAT2400/1 to operate from both.

Safe

The AAT2400/1 includes several protection features to protect the device from the hostile environment of an LCD TV chassis. In many of these TVs the ambient temperature inside the TV can rise to almost 60°C, so any fault conditions can be catastrophic. The most unique feature of the fault protection is the early warning over-temperature protection where the system gets a pre-warning that unless something is done to reduce the heat generated in the system, the IC will shut down. The system can then decide on a course of action; to reduce the current in the LEDs, shut down the IC or allow the IC to operate as long as it can before shutting down.

Application Diagram



Part Number	Ordering Information
Part Ordering Number	AAT2400IIIH-T1 AAT2401IIIH-T1
Evaluation Board	AAT2400IIIH-DB1
http://www.analogictech.com/contactus/ordersamples.php	