

Sixteen-Channel White LED Driver Solution with LED Current and Timing Control

General Description

The AAT2428 is a highly integrated, high efficiency white LED backlight solution for large size LCD panels used in LCD TVs. Integrated precision current sinks provide drive for up to 16 LED channels. The IC has user programmable options for current sinks to be controlled globally, in banks of 2, or 4 LED groups. A wide range of series LEDs is possible because the current sinks can withstand up to 50V.

A SPI compatible interface operates up to 15MHz, allowing fast, independent digital control of each current sink. 16 unique device addresses allow for control of up to 128 LED strings. Full scale LED current is programmed from 40mA to 150mA using an external resistor. LED brightness variation is compensated by setting relative current sink magnitudes with an 8-bit resolution dot correction register for each LED current sink. LED dimming and phase delay are programmable with 12-bit resolution through the SPI bus interface. Both the 12-bit resolution grayscale PWM brightness setting and phase delay are generated from an external VSYNC signal and an external or internally generated GSCLK signal.

The AAT2428 provides fault handling and fault reporting through the SPI interface. Reported fault conditions include over-temperature, open LED detection and short circuit LED detection. The threshold for short circuit LED detection is programmable. All fault conditions are reported on the open drain FAULT output pin.

The LED supply voltage may be regulated using a current sense feedback function that provides both voltage and current mode feedback. This analog feedback signal represents the highest VF string of LEDs. A current sense feedback input signal allows for cascading any number of AAT2428s.

The AAT2428 is available in Pb-free, thermally enhanced 48-pin 7mm x 7mm TQFN package.

Features

- V_{IN} Range: 10.8V – 28V
- 16 Programmable LED Current Sinks
 - $\pm 1.5\%$ Accuracy @ 25°C (101.72mA)
 - $\pm 2.0\%$ Matching @ 25°C (101.72mA)
- SPI Interface
 - Digitally Programmable LED Channels
 - LED Bank Control Options
 - 1 (all 16 channels)
 - 2 (2 x 8 Channels)
 - 4 (4 x 4 Channels)
 - Up to 15MHz Clock Speed
 - Read/Write Registers
- High Resolution Digital Control of LED Banks
 - 12-Bit Resolution Grayscale PWM Brightness
 - 12-Bit Resolution Channel Phase Delay
 - 8-Bit Resolution Current Setting (Dot Correction)
- V_{SYNC} PWM and Delay Synchronization
- V_{SYNC} range of up to 1kHz
- External or Internal Grayscale Clock
- 16 Unique Device Addresses
 - Up to 256 Current Sinks
- Integrated Fault Protection
 - Open Circuit LED(s)
 - Programmable Shorted-LED Threshold
 - Current Limit Protection
 - Over-Temperature Protection
- Soft-Start to Minimize Inrush Current
- 7mm x 7mm 48 pin TQFN Package

Applications

- Large Size LCD TVs, Panels
- Large Tile Direct LED Backlight
- LCD Monitors
- LED Backlighting Applications

AAT2428

Sixteen-Channel White LED Driver Solution with LED Current and Timing Control

Ordering Information

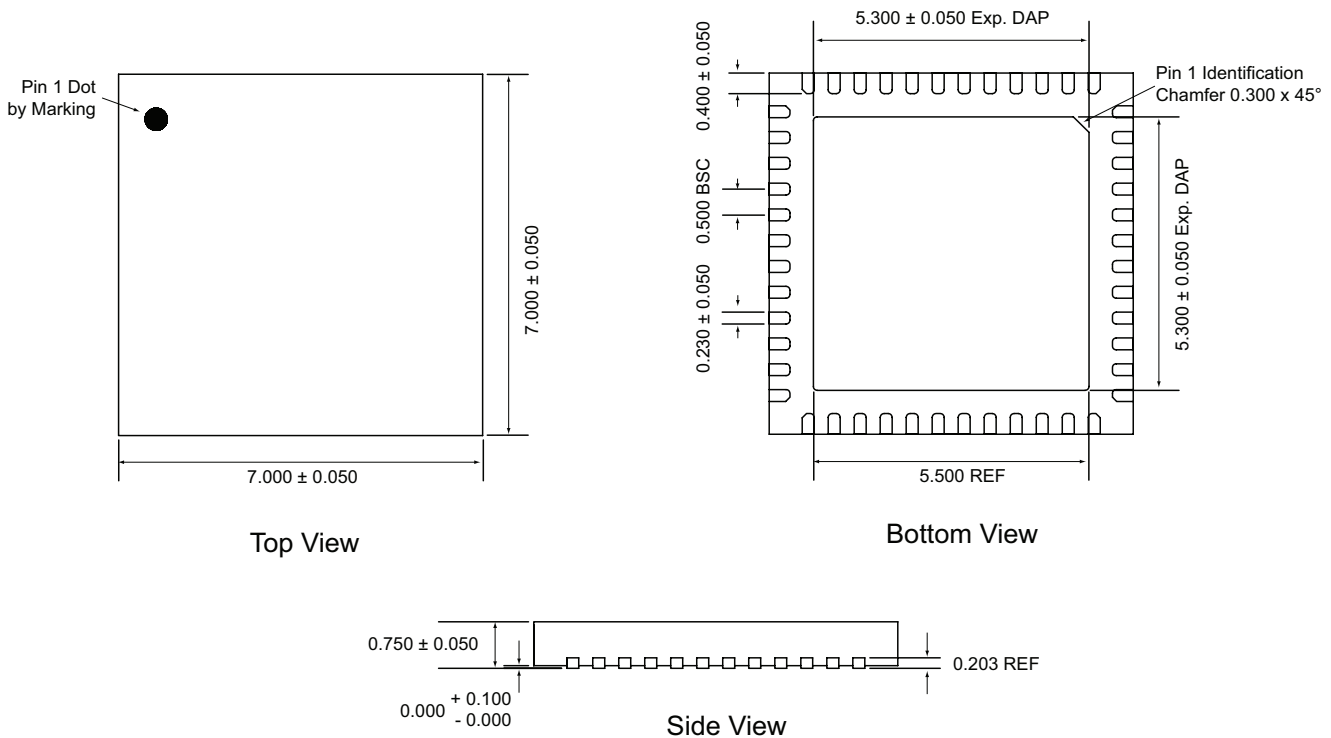
Package	Marking	Part Number ² (Tape and Reel)
TQFN77-48	S3XYY	AAT2428ISZ-T1



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

Package Information

TQFN77-48L³



All dimensions in millimeters.

1. XYY = Assembly and date code.
 2. Sample stock is generally held on part numbers listed in **BOLD**.
 3. The leadless package family, which includes QFN, TQFN, DFN, TDFN, and STDFN, has exposed copper (unplated) at the end of the lead terminals due to the manufacturing process. A solder fillet at the exposed copper edge cannot be guaranteed and is not required to ensure a proper bottom solder connection.

Sixteen-Channel White LED Driver Solution with LED Current and Timing Control

Copyright © 2012 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks, the Skyworks symbol, and "Breakthrough Simplicity" are trademarks or registered trademarks of Skyworks Solutions, Inc., in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at www.skyworksinc.com, are incorporated by reference.