Application Note: 23-07-2013

AS1390A

Power Management IC for 2D and 3D

Table of Contents

Revision History

Revision	Date	Owner	Description
1.0	23.07.2013		

1   Need for High Power Boost Controller

There are many applications with the need for a high power boost converter. For example, in modern TV backlighting applications there is need for high voltage output, with high load current to drive a large number of LEDs in series and parallel combination. DC supply on the TV PC board is usually 12V or 24V and the voltage needed to drive LEDs is typically 60V for 2D and 80V for 3D or higher. For this reason, voltage boost conversion is needed. AS1390A is a DC/DC boost controller that, with the correct external components, offers both needed conversions for 2D and 3D (Fig.1).
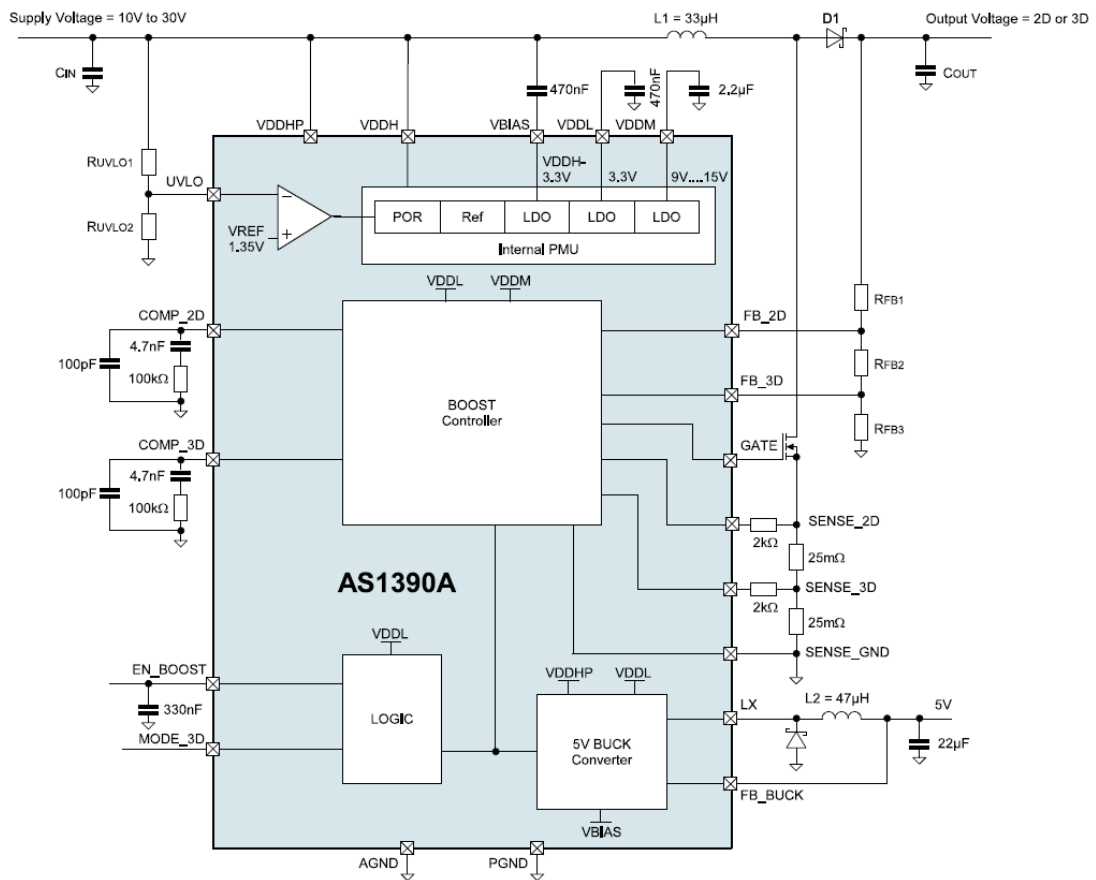

Fig.1: Typical Aplication AS1390A

2   What is really needed?

Creating a boost converter circuit to support these requirements would be relatively easy, if there were no other considerations affecting the design. But in the TV market, two features are of the utmost importance. First, normal and stand-by power consumption must fall within increasingly tight limits set by regulators such as the US Department of Energy and the European Commission. This means that losses everywhere in the system, including in the power supply, must be kept to a minimum.

Second, picture quality in the reproduction of high-definition and 3D content is one of the most important ways consumers discriminate between one model of TV and another. A stable and precisely regulated power supply to the LED backlight is a necessary element of a high-quality picture, enabling the system to consistently reproduce colors, contrast and brightness.

The boost converter circuit must therefore not only meet the basic requirement of providing a high voltage output while supporting high peak current throughput; it must also operate at high efficiency and maintain highly accurate voltage regulation across widely and rapidly varying load conditions.

In a typical backlighting system, an input voltage of 12V must be boosted to 60V at the output, and in 3D display mode the output current can peak at 3A. This means:

$$I_{in} > 3A*60V/12V = 15A$$

Fully integrated boost converter ICs are not rated to carry such a high current, so external components are required: an N-channel mosfet (NMOS in Fig. 1) and a diode (D1 in Fig. 1).

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3 How is this implemented in AS1390A?

The AS1390A is a high-power, constant-frequency boost controller with an integrated buck converter. It can be used for the boost converter in TV sets which are optimized for 2D and 3D mode. The continuous conduction mode of the AS1390 provides superior bandwidth and transient response. The two output voltages for the boost controller (2D and 3D mode) can be programmed with an external resistor divider. The buck converter is optimized for supplying a µP with 5V. As1390A is offered in 20 Pins QFN 4x4mm Package (Fig. 2). Supply input range is 10V to 30V, and output voltage range is 30V to 90V.
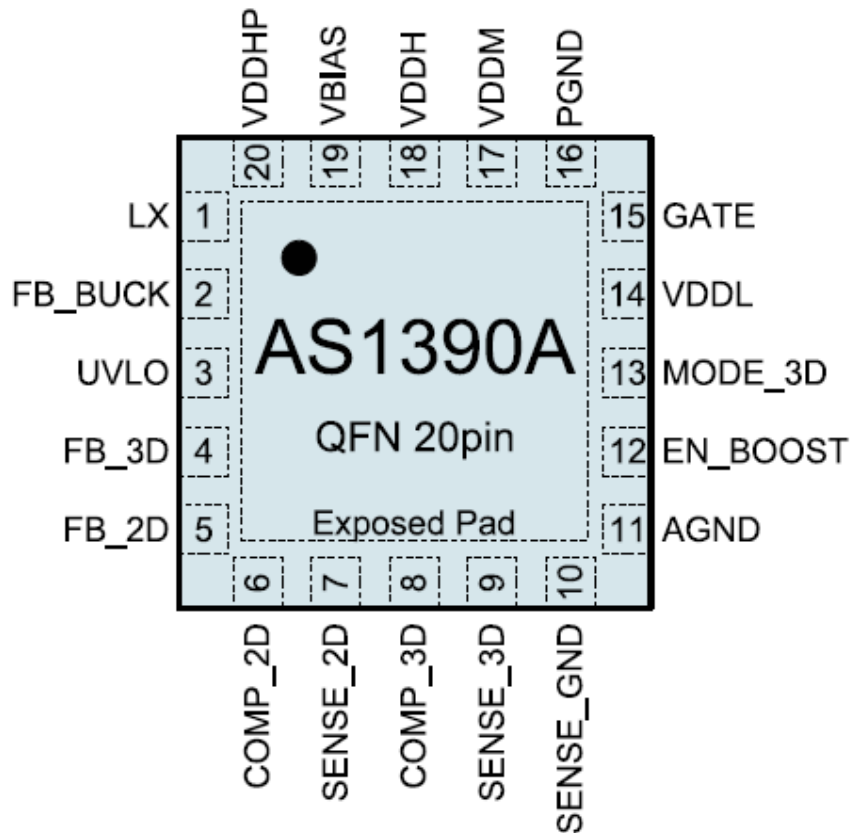
Fig. 2: Pin Assesments for AS1390A

4 Results

The AS1390A features high efficiency over all load range (Fig. 3). At 24V supply voltage and 60V output voltage the device reaches typ. up to 4A load. At 12V supply voltage load capatibility is smaller, but it is still posible to reach typ. more then 2,5A (Fig. 4).
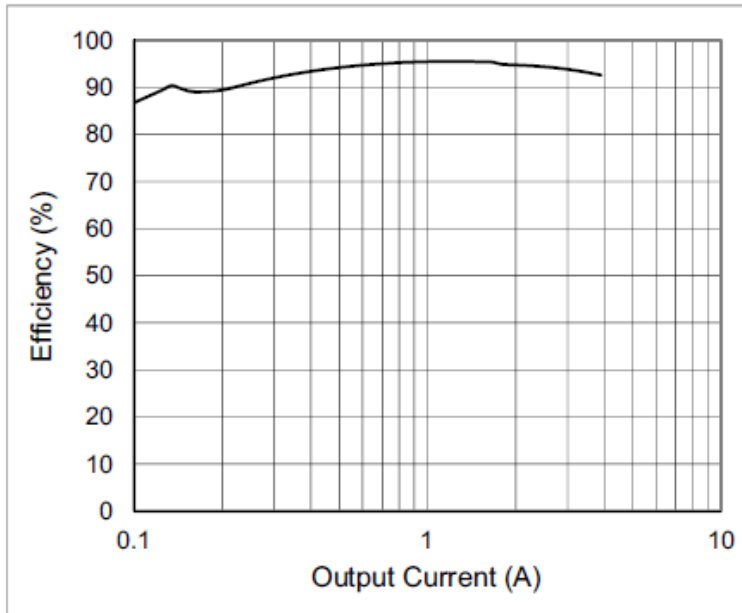

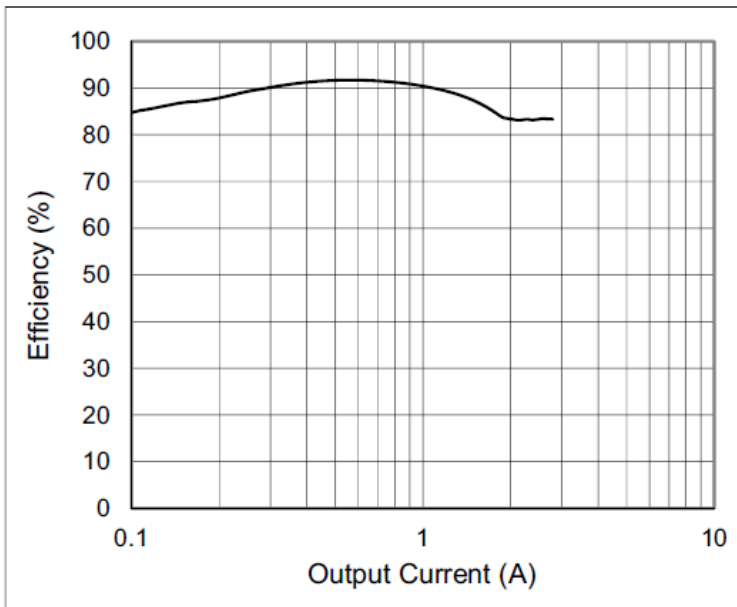Fig. 3: Efficiency vs. load current, for VIN =24V and VOUT=60V

Fig. 4: Efficiency vs. load current, for VIN =12V and VOUT=60V

5   Ordering Information

Ordering Code: AS1390A-BQFT

Marking: AS1390A

Delivery Form: Tape and Reel

Package: 20-pin QFN (4x4mm)