

Integration Simplifies TFT Power Designs

Application Brief 120

Clinton Jensen

Highlights

- Operates from 1 or 2 Cell Li-Ion Batteries
- Low Profile TSSOP Packages
- High Level of Integration for Reduced Size and Increased Performance
- Adjustable Output Voltage
- High Overall Circuit Efficiency

Flat-panel video screens are becoming increasingly popular as the cost decreases and the performance increases. One major attraction of these screens is the vast amount of space saved versus the CRT displays that have been the standard for years.

LM2710/11

The LM2710 and LM2711 contain a current mode, Pulse Width Modulated (PWM) DC/DC step-up regulator with a 1.6A switch. This allows boosting the voltage from a Lithium Ion battery to 8V with enough current for powering large displays. It can run at 600 kHz or 1.25 MHz allowing for easy filtering and small external component sizes, and includes external compensation allowing for the use of low ESR ceramic output capacitors. The current mode design gives it a fast transient response needed for TFT power. An internal softstart feature is also included to reduce inrush current when powering up with the option of using a softstart pin to customize

TFT Switchers	Switch Current	V _{COM} Amplifier	Gamma Buffer(s)	Internal Row Control Switch	Package
LM2622	1.65A				MSOP-8
LM2700	2.5A				TSSOP-14
LM2702	2A	1	1	1	TSSOP-16
LM2710	1.6A	1	4		TSSOP-20
LM2711	1.6A		4		TSSOP-20

Table 1

Another factor driving their popularity is the vast performance improvements over the past few years. They are now capable of brilliant full motion video. Like all electronics, flat screens stand to gain further improvements in performance and a reduction in overall size by way of integrating the electronic building blocks.

Current TFT-LCD (Thin Film Transistor Liquid Crystal Display) flat-panel designs incorporate a good number of circuit blocks to operate. One of these is a DC/DC step-up regulator for panel power with two discrete charge pump circuits connected to generate positive and negative bias voltages. Some others include an operational amplifier to control the common backplane (V_{COM}), one or more buffers to control the column drivers (called Gamma buffers), and a controllable switch for row driver control. The following circuits can aid design by integrating some or all of these functions onto one integrated circuit. For a quick reference of our TFT switchers, please see Table 1.

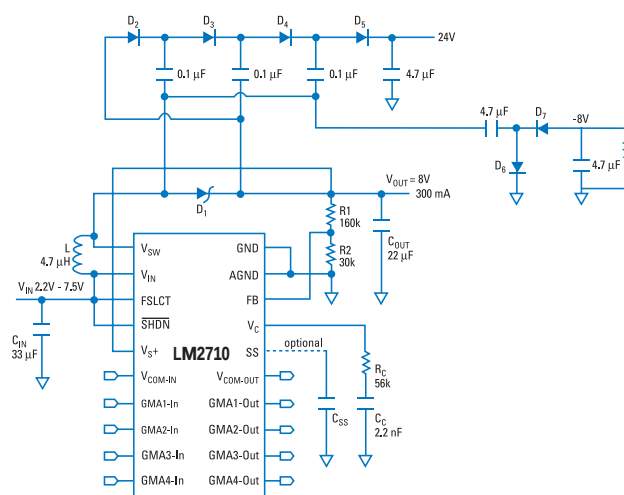


Figure 1: LM2710 In An 8V Configuration

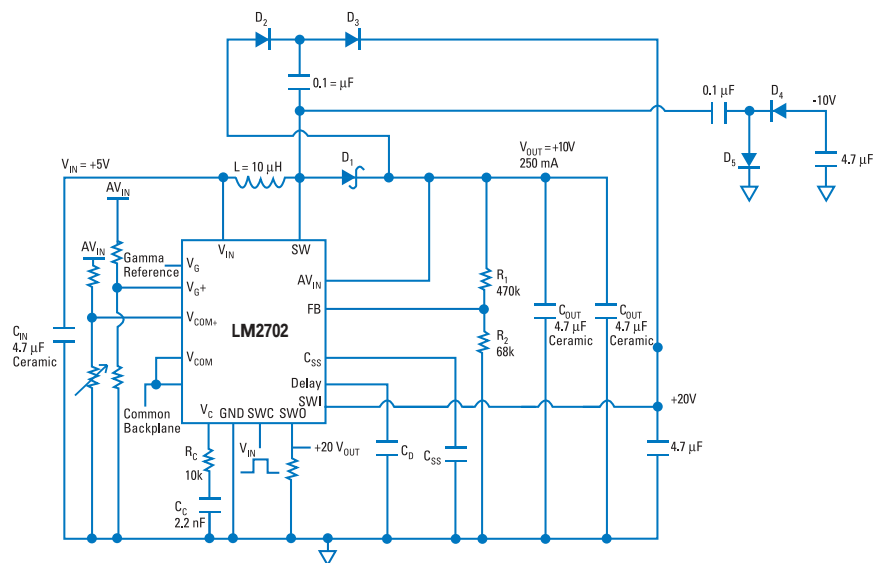


Figure 2: LM2702 In A 10V Configuration

the startup time. Also integrated into these parts are four Gamma buffers for use with the column drivers. The LM2710 even adds a V_{COM} buffer for controlling the common backplane. All buffers are rail-to-rail and can source/sink 50 mA with a high slew rate which is desirable for a TFT application. *Figure 1* shows the LM2710 in an 8V configuration.

LM2702

The LM2702 contains a current mode, PWM 600 kHz DC/DC step-up regulator with a 2.0A switch and softstart. This allows it to supply even more power at 8V or 10V. It also includes external compensation and has a high transient response just as the LM2710/11. Its softstart feature also allows for customizing the startup time to the users needs. *Figure 2* shows the LM2702 used in a 10V configuration. The LM2702 contains one Gamma buffer and also includes a V_{COM} amplifier for the backplane and an internal controllable P-channel MOSFET (PMOS) switch for controlling the row drivers. A delay pin is included which allows the user to delay turn on of the PMOS switch to a set time after the switching regulator is powered up. The switch, amplifier, and buffer are all capable of the high slew rates required for the task.

Both of these solutions cut down on the component count and amount of board space needed for these functions of driving a TFT-LCD display. The integration of these functions also improves overall system performance and system efficiency. For stand alone switchers suitable for large panel TFT power, see the LM2622 and the LM2700. Keep watching National Semiconductor for higher performance and levels of integration in the future.

Additional Information

www.national.com/pf/LM/LM2622.html
www.national.com/pf/LM/LM2700.html
www.national.com/pf/LM/LM2702.html
www.national.com/pf/LM/LM2710.html
www.national.com/pf/LM/LM2711.html
power.national.com

Visit **The National Edge**, our online technical journal for an archive of Application Briefs and other interesting information.
edge.national.com

National Semiconductor
 2900 Semiconductor Dr.
 PO Box 58090
 Santa Clara, CA 95052
 1-800-272-9959

Visit our Web site at:
www.national.com

For more information,
 send email to:
new.feedback@nsc.com