

## Integrated Power Supply for TFT-LCD Panels with 6-Channel White LED Driver

### Features

- 2.5V to 5.5V Input Supply Range
- Boost Regulator
  - ◆ 1.2MHz Fixed Frequency
  - ◆ Current-Mode Control
  - ◆ Fast Transient Response to Pulse Load
  - ◆  $\pm 1\%$  Accurate Output Voltage
  - ◆ Built-In 20V/2A, 0.2 $\Omega$  N-Channel MOSFET
  - ◆ High Efficiency up to 90%
  - ◆ Programmable Soft-Start
  - ◆ Over-Current Protection
  - ◆ Output Under-Voltage Protection
- White-LED Driver
  - ◆ Wide 4.2V to 24V Input Supply Range
  - ◆ 1.2MHz Fixed Frequency
  - ◆ High Efficiency up to 90%
  - ◆ 40V/2A, 0.2 $\Omega$  n-channel MOSFET
  - ◆ Input Under-Voltage Protection
  - ◆ Over Current Protection
  - ◆ Over Voltage Protection
  - ◆ Maximum Programmable LED Channel Current 30mA
  - ◆ Current accuracy  $\pm 3\%$  and current balance  $\pm 2\%$
  - ◆ 100Hz~25kHz PWM Dimming
  - ◆ Mixed mode and PWM Dimming method
- High-Performance Operational Amplifiers
  - ◆  $\pm 200\text{mA}$  Output Short-Circuit Current
  - ◆ 12V/ $\mu\text{s}$  Slew Rate
  - ◆ 12MHz, -3dB Bandwidth
  - ◆ Rail-to-Rail Input and Output
- Low Dropout Voltage Linear Regulator
  - ◆ 350mA Maximum Output Current
  - ◆ Adjustable Output Voltage
- On-Chip GPM Controller
  - ◆ Flicker Compensator
  - ◆ Power-On Sequence Control
- Linear Regulator Controller for VGL
- Low Voltage Detector
  - ◆ Programmable Detecting Voltage and Delay Time
- Thermal Protection
- RoHs Compliant
- TQFN5X5-40 Package

### Applications

- Notebook Computer Displays
- UMPCs
- LCD Monitor

### General Description

The G2511 includes a high-performance boost regulator, 6-channel LED driver, a low dropout linear regulator (LDO), a gate pulse modulator (GPM), a voltage detector, a VCOM buffer (unity-gain OPA), and a VGL linear regulator for active-matrix thin-film transistor (TFT) liquid-crystal displays (LCDs).

The boost converter provides the regulated supply voltage for the panel source driver ICs. The converter is a high switching frequency (1.2MHz) current-mode regulator with an integrated 20V N-Channel 0.2 $\Omega$  MOSFET that allows the use of ultra-small inductors and ceramic capacitors. It provides fast transient response to pulsed loading while achieving efficiency over 90%. The device can produce output voltage as high as 15V from an input as low as 2.8V. Soft-Start is programmed by external capacitor, which sets the input-current ramp-rate.

The LED driver automatically regulated supply voltage for the LED light bars without the need to calculate the output for different LED types. It also integrates a 40V n-channel MOSFET that provides high output power. The 6-channel current driver is ideal for constant current driving, and, well matched less than 3%. To set the maximum driving current, the ISET pin is used to determine reference current. Each channel of the current drivers is set to 800 times of this reference current. A PWM pin can be used to perform PWM dimming from the range of 100Hz to 25kHz.

The MODE pin in G2511 is used to set the dimming mode. If MODE pin set to VCC or floating, the dimming mode is in the PWM mode, the current driver ON/OFF is synchronized with the PWMB signal. If Mode pin set to GND, PWMB and ILED current is set at PWMB duty multiplied by ISET current when PWMB duty  $\geq 25\%$ . If the PWMB duty  $< 25\%$ , the ILED current is fixed at 0.25xISET, and the dimming duty is 4 x PWMB duty. Open LED-string automatically disable the channel from entering over voltage protection.

The low-dropout (LDO) linear regulator can supply up to 350mA current while input voltage is 3.3V. It uses an internal PMOS as the pass device. It is suitable for the supply voltage of the timing controller.

The GPM is controlled by frame signals from timing controller to modulate the Gate-On voltage, VGHM, which acts a flicker compensation circuit to reduce the coupling effect between gate lines and pixels. It also can delay the Gate-On voltage by the internal timer (60ms) while power-on for achieving a corrected power-on sequence for gate driver ICs. The falling time of the Gate-On voltage is programmable by external capacitor and resistor.

The voltage detector monitors the supply voltage to issue a reset signal while the detected voltage is too low. The detecting level is decided by an external resistor divider and the delay time is programmable by an external capacitor.

The VCOM buffer can drive the LCD VCOM voltage that features high short-circuit current (200mA), fast slew rate (12V/ $\mu\text{s}$ ), wide bandwidth (12MHz) and rail-to-rail input/output.

The gate-off linear regulator controller provides regulated TFT gate-off supplies using external charge pump attached to the switching node. Using the gate-low regulator after the produced negative voltage can regulate the exceeded voltage.

## Ordering Information

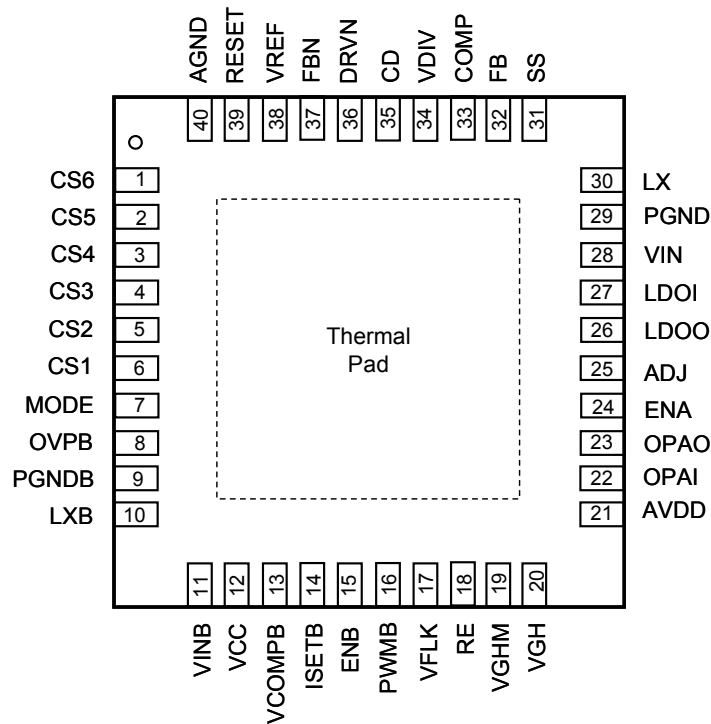
ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G2511RG1U	2511	-40°C to +85°C	TQFN5X5-40

Note: RG:TQFN5x5-40

1: Bonding code

U: Tape & Reel

## Pin Configuration



**G2511 TQFN5X5-40**

Note: Recommend connecting the Thermal Pad to the Ground for excellent power dissipation.