Amplifiers for Displays

LCD V_{COM} Buffers

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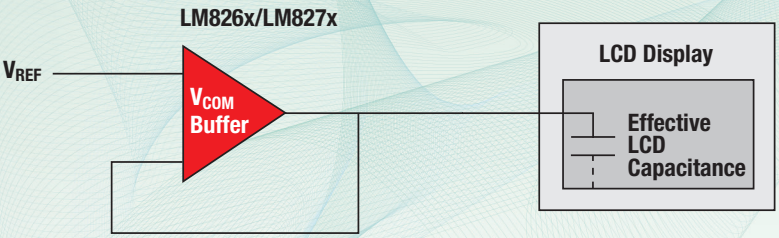


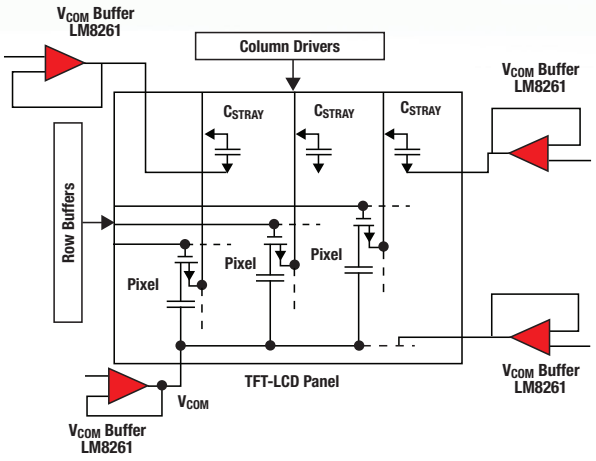
Overview

LCD displays are used in a wide range of applications including computer monitors, televisions, HMI panels and consumer devices such as tablets, notebooks, e-books, video players and gaming devices.

In today's high-resolution LCD displays, op amps are used for the following three functions: V_{COM} buffer, gamma buffer and panel repair buffer.

The V_{COM} voltage needs to be placed exactly at the midpoint of the video signal to avoid flicker. For larger screen sizes and touch-based displays, the backplane cannot be considered a single low-impedance node. Multiple corrections are needed in various locations of the screen, requiring as many as four V_{COM} buffer devices to tightly maintain the V_{COM} voltage throughout the display panel.

Texas Instruments has an extensive portfolio of amplifiers with **large output current drive, rail-to-rail input common mode range, rail-to-rail output swing and large gain bandwidth and slew rate**, all of which are critical to tightly control display V_{COM} levels.



Displays with larger screens and those that are touch-based often require more than one V_{COM} buffer.

Amplifiers for Displays

Key Design Considerations for V_{COM} Buffers

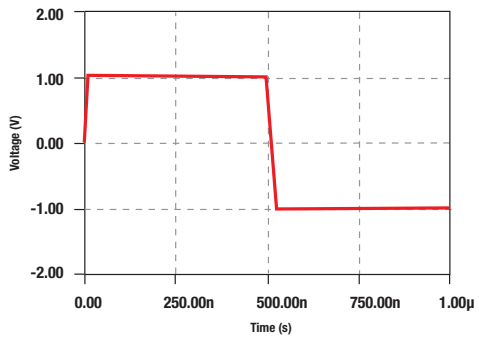
Wide V_{SUPPLY}/high output current/large capacitive load drive

Parameter	Typical Spec	Significance
Bandwidth/Slew Rate	Greater than 15 MHz,15 V/µs	• Large BW and settling time to accommodate rapid charging/discharging of alternate pixel voltages during refresh cycles. • Need to recover from 2V transients within 1 µs
Output Current	Greater than 50 mA	• Need to source/sink current to a large C_{LOAD} • Speed at which transients settle αI_{OUT} peak
Configuration	RRIO	• RRI: Gamma levels often within 500 mV of rails • RRO: Easy interface to other blocks

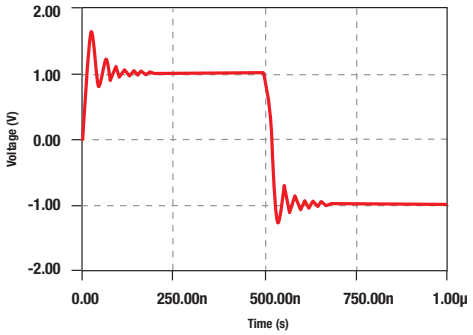
Recommended V_{COM} Buffer Solutions

Product	Operating Supply Voltage Range (V)	GBW (MHz)	Output Short Circuit Current (mA)	Supply Current/ch (max) (mA)	RRIO (Y/N)	Channels
LM8261	2.5 to 30	21	53	1.25	Y	1
LM8262	2.5 to 22	21	60	1.25	Y	2
LM8272	2.5 to 24	15	130	1.15	Y	2
LM7321	2.5 to 32	20	65	1.7	Y	1
LM7322	2.5 to 32	20	65	1.7	Y	2
LM6584	5 to 13	24	300	1.1	Y	4
LMH6647	2.5 to 12	55	66	1.6	Y	1

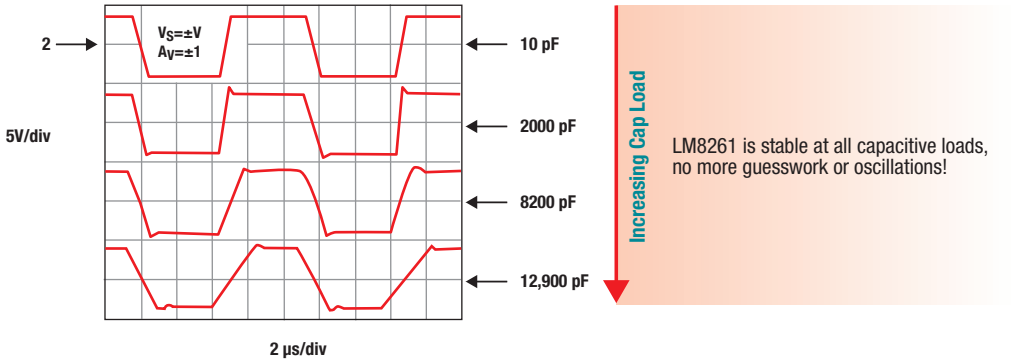
Ask about the extended V_{COM} buffer portfolio available for automotive qualification: **sds_amps@list.ti.com**



Step response of amplifier with large capacitive load drive: smooth transient response



Step response of amplifier with limited capacitive load drive: non-ideal behavior – ringing effect, slow recovery



Large step signal response

For more information, visit **ti.com/amplifiers**

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