



Benefits of VLCD over VFD Modules

Microtips Technology USA LLC.

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Microtips Technology is proud to introduce Vivid Liquid Crystal Display (VLCD); a re-engineered liquid crystal display (LCD). VLCD is positioned to offer a low cost alternative to the vacuum fluorescent display (VFD).

This white paper will describe how VLCD modules outperform VFD modules in fourteen characteristics and performance categories. VLCD technology will be compared to the specifications associated with VFD.

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Executive Summary

→ Overview

Microtips Technology is presenting a re-engineered liquid crystal display module that offers advantages over the current technology used in vacuum fluorescent displays (VFD). Within this white paper, Microtips will introduce the benefits of vivid liquid crystal displays (VLCD). Prior to VLCD, VFD held technological advantage over the standard liquid displays (LCD) in terms of brightness, contrast, wide viewing angles and wide temperature ranges. However the innovations behind the VLCD have overcome these advantages. While in some categories VLCD match specifications found in VFD's, in other categories VLCD offer technological advantage over VFD.

Traditional products associated with the use of VFD include vending machines, clocks, digital speedometers, message centers, and temperature control systems. Vacuum fluorescent displays (VFD) are also found in various kinds of audio equipment, (seen in home commercial theatres and car audio systems), electronic pole displays, and medical devices such as heart pumping systems and similar trauma equipment.

Microtips Technology is pleased to present an alternative to VFD, with its end product called vivid liquid crystal displays (VLCD). One of the main advantages that VLCD have over VFD is a much lower unit cost. Other advantages VLCD have over VFD include higher brightness, inclusion of a temperature compensation circuit, and the elimination of the added cost for a color filter necessary with the use of VFD. Another advantage to the VLCD are that customers do not have to worry about burn in issues or image sticking, which are both common with the VFD. The VLCD provide customers with a state of the art option that factor in the technological needs of today's display module user.

Business Challenge for VFD Users

The most common business challenge that current VFD users face are high unit price and high power consumptions. VLCD on the other hand:

- Provide a low cost alternative to VFD
- Provide high contrast
- Provide no image sticking
- Can be made into a custom module, (as a mechanical drop-in to VFD, so current users of VFD do not need to modify their housing)
- Come in white, red, blue and green colors; there is no need to use color filters with the VLCD, which is commonly used with VFD at an added cost

Technical Specifications (VFD vs. VLCD)

Prior to the introduction of VLCD, the VFD held technological advantage in terms of this module's brightness, contrast, wide viewing angle and wide temperature range. However, the innovation behind the VLCD have overcome these challenges and in some case VLCD now offer technological advantages over VFD, see table "A".

	VFD	VLCD	Remarks
Mechanical			
Size (OA, VA and AA)	Various sizes	Various sizes	VLCD can be made to custom size
Character Size (w x h)	2.400 x 4.70mm	3.065 x 5.56mm	Measured on a typical 2x20 VFD and VLCD. Other requirements welcomed

	VFD	VLCD	Remarks
Optical (Measured on a typical 2x20 VFD and 2x20 VLCD)			
Brightness (nits)	350nits (max) with brightness level set via software	<u>DIP settings</u> 100% brightness = 400nit 80% brightness = 320nit 60% brightness = 240nit 40% brightness = 160nit	The standard VLCD module has a DIP switch that can be set to yield different brightness and power values. VLCD with software control brightness can also be designed.
Contrast	N/A	800:1	
View Angle (deg)	L/R = 75/75 U/D = 75/75	L/R = 75/75 U/D = 75/50 (sold as Top view)	L/R = Left / Right and U/D = Up / Down VLCD is also available as Bottom view
Image Sticking / Retention	Extended period of static image can result in visible brightness differential	None	
Color Filter	Generally requires the use of color enhancement filter	None needed	Color filters are an added cost for VFD users

Table A- part I & II- Technical Comparison of a typical VLCD vs. VFD

	VFD	VLCD	Remarks																																				
Electrical (Measured on a typical 2x20 VFD and 2x20 VLCD)																																							
Voltage	5v	5v	3.3v design can be done																																				
Power	656mW with 1.5A in-rush current at start-up	<table><tr><td colspan="2"></td><td colspan="4">Approx Power (mW)</td></tr><tr><td>DIP</td><td>Brightness</td><td>White</td><td>Red</td><td>Blue</td><td>Green</td></tr><tr><td>100%</td><td>400nits</td><td>856</td><td>591</td><td>876</td><td>874</td></tr><tr><td>80%</td><td>320nits</td><td>683</td><td>465</td><td>649</td><td>650</td></tr><tr><td>60%</td><td>240nits</td><td>374</td><td>374</td><td>500</td><td>439</td></tr><tr><td>40%</td><td>160nits</td><td>300</td><td>264</td><td>323</td><td>278</td></tr></table> <u>No in-rush current</u>			Approx Power (mW)				DIP	Brightness	White	Red	Blue	Green	100%	400nits	856	591	876	874	80%	320nits	683	465	649	650	60%	240nits	374	374	500	439	40%	160nits	300	264	323	278	It has been reported 80% setting on VLCD provide equivalent brightness of a VFD set to 100% brightness
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DIP	Brightness	White	Red	Blue	Green																																		
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60%	240nits	374	374	500	439																																		
40%	160nits	300	264	323	278																																		
Interface	Parallel	Parallel	Serial available. Customer requirements welcomed																																				

Table A- part III- Technical Comparison of a typical VLCD vs. VFD

	VFD	VLCD	Remarks
Environmental (Measured on a typical 2x20 VFD and 2x20 VLCD)			
Temperature Range	OT = -40c to +85c ST = -50c to +85c	OT = -30c to +80c ST = -40c to +80c	OT= Operational temp ST = Storage temp With Heater OT= -40c
Lifetime	50,000 hrs	50,000 hrs for RED, Blue, Green and White VLCD	Generally VFD lifetime is given in terms of MTBF value whereas VLCD is actual lifetime.

Table A- part IV- Technical Comparison of a typical VLCD vs. VFD

VLCD Technology

There were many technological challenges faced by our R&D team in bringing the look, feel and functional characteristics of the VFD onto the VLCD. Although the details of the VLCD are proprietary, nonetheless here are some highlights as reference;

- Liquid Crystal recipe used in VLCD are different from a standard LCD
- VLCD use a special polarizer
- VLCD multiplexing drive scheme is different than an standard LCD
- VLCD backlight technology is different from a standard backlight used in normal LCD
- VLCD are available in white, red, blue and green

Look and Feel of VLCD vs. VFD

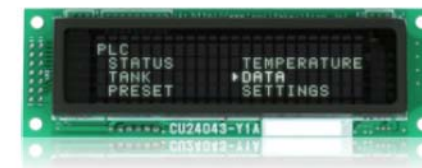
2x20 VLCD



Various VFD



Half covered
Red with color filter to
simulate the use of
color filter with VFD



Summary

The market position that VFD has traditionally enjoyed within the audio, transportation and medical equipment industries is being challenged. Vivid liquid crystal displays (VLCD) provide customers with a substantial price advantage over VFD. VLCD can be customized to allow for a high contrast over the existing VFD. Not requiring additional color filter attachments, VLCD provide customers with a clear undistorted image. Image sticking is eliminated and the life span of the end product is preserved with this better alternative.

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More Information

For the latest information about our product and services, please see the following resources:

Reference websites: Coming Soon

- Thomasnet.com
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- MDT.com

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