



164

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EmerythHacks

Am I a hacker yet?

Monday, April 22, 2013

Connecting an iPad retina LCD to a PC

Update: please read this post

This project was born at the [Warsaw Hackerspace](#), it was funded by my friend Spin, who wanted to use the display in a project of his.

In short, I've managed to drive the iPad retina display at maximum resolution from a regular PC with DisplayPort, no additional electronics required!

This is just a prototype, I'm working on a professional PCB with a DP connector so no wire splicing will be required in the future. :)



The screen

The "retina" LCD panel is LP097QX1-SPA1 manufactured by LG.
It's a 9.7" panel with a resolution of 2048x1536!
It's not exclusive to Apple, it can already be found in a couple of Chinese tablets.

What is great about this panel (except its resolution) is that it has an eDisplayPort interface (which is supposed to replace LVDS in the near future), and as this hack proves it is compatible with traditional DisplayPort outputs found on all modern video cards.

The panel is also surprisingly cheap - I got mine on ebay for \$55, shipped from China.

Hoping that eDisplayPort is compatible with regular DisplayPort (I couldn't find conclusive proof of this), I went on to interface the panel with a DP cable.

The interface board

About me

Emeryth

Hi, my name is Andrzej.
I play around with embedded stuff for fun and sometimes for money.

[View my complete profile](#)

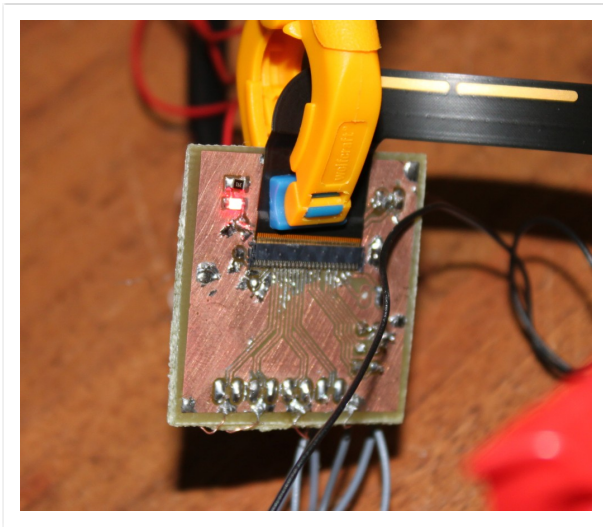
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The FPC of the panel has 51 really tiny pins, and requires a special connector to mate with a PCB. You can find it online just by looking for "ipad3 lcd connector", but I've figured out that it's a **Molex 502250-5191** connector. The cheapest I could find was \$14 for two of them at aliexpress.

Creating the PCB was fairly straightforward, I just had to route all the FPC connector pins out to pads where I would solder DP cable wires. It was possible on a single-sided home-made board.

I tried to make the traces for DP lanes to be of the same length (that's very important for high speed differential signals), and as it turns out, either my PCB design is pretty good, or DisplayPort is very forgiving. :)

Soldering everything was a little difficult, the FPC connector has tiny pins, but they stick out a little bit, so it's doable with a regular soldering iron.

After the PCB was done, I cut open a DP cable and soldered all the wires in their places. Unfortunately there is no standard for wire colors, so I had to open up the DP plug to trace them to the correct pins.

You can find the schematics and PCB layout on [github](#).

Power and backlight

The panel itself can be powered from the DP connector, as it should provide 3.3V at 500mA, which is enough for the logic. Although that power is meant for an active cable, so I had to solder an additional wire to a regular "dumb" cable I was using.

The backlight requires some external power source, as it can consume up to 4.4W. The datasheet is very misleading about driving the backlight, it only mentions something about "12V driver voltage", which is not the proper voltage (fortunately it's too low). After finding iPad3 schematics, I've found out that the backlight actually requires 20V for operation, as it consists of 12 LED strings, with 6 white LEDs in series, each.

For the prototype, I didn't bother with a proper LED driver, just attached 68R resistors to each

Adding Bluetooth remote control to computer speake...

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► 2010 (4)

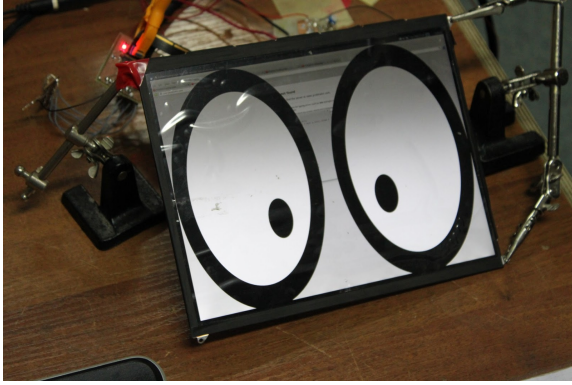
cathode, which resulted in a current draw of about 17mA per string.
The 20V was generated from a 5V using a TPS61175 step-up converter.

Results

It works! No glitches at full resolution.

The whole thing cost about \$70 in parts.

Here are some pictures for your enjoyment. Believe me, the display looks much better when viewed in person.



Posted by Emeryth at 1:19 AM

 +164 Recommend this on Google

251 comments:



rahul gairola April 22, 2013 at 3:57 AM

nice blog

Reply



Sales at Amazing-Sales.us April 22, 2013 at 8:24 PM

Can you say ultimate car computer monitor and interface? Very nice work. Now all I need is a breakout board, a driver and a touch interface and I am all set.

Reply

Replies



Zapro April 22, 2013 at 9:13 PM

There is no touch panel attached, and if there was, the touch-part on an iPad is not very straightforward, and requires a big amount of electronics to make it work. There isn't something you can just plug into USB.



Taylor Alexander April 22, 2013 at 10:49 PM

They do make capacitive touch driver boards that take a panel and break it out to USB. Then they translate touches to absolute screen position for the mouse (which is a technically standard way of a mouse behaving - they use it for drawing tablets mostly).

In fact... add a touch screen and this would make an excellent Wacom tablet replacement for 1/10th the cost!



John Cunningham April 25, 2013 at 6:18 AM

You could use something along the lines of this:
http://unitedtouch.en.alibaba.com/product/678126960-214102330/touch_screen_replacement_tablet_10_9_7_4_3_usb_multi_to_uch_overlay_kit_10_capacitive_touch_screen_tablet_supply_controller.html



Lava Vids May 13, 2013 at 2:47 PM

@Taylor Alexander

No, it wouldn't make a Wacom replacement at ALL.

Wacom uses a touch interface that only works with the specific pen (Accuracy and no accidental presses, plus you can rest your hand on it), it has different pressure levels (Hardness of the brush when used for Photoshop), it works from the air (That is actually very convenient, you only have to press the pen down when you're clicking), it has a right click (a button on the pen), and finally, it has GREAT accuracy, unlike most screens. And let's not forget it has a 1:1 representation of the image & screen. And of course the displays used are pro quality with accurate color reproductions at any angles, unlike iPad displays who are blueish just to look more vibrant.

Anonymous October 10, 2013 at 4:04 AM

@John Cunningham

Thanks for the link. I contacted the seller and they wouldn't sell a single piece. They have no dealers in North America so there is no way of getting these retail. =(

Reply



Pat Hartl April 22, 2013 at 9:11 PM

Awesome! Is the logic specific to the DisplayPort spec or can you do DVI->DisplayPort->This display?

Reply

Replies



Emeryth April 22, 2013 at 9:24 PM

Unfortunatelly this requires DisplayPort.
There are DVI to DisplayPort converters, but they cost about \$100.



Pat Hartl April 22, 2013 at 10:42 PM

Oh well. Good thing I'm buying a new card this summer!

Anonymous April 22, 2013 at 10:48 PM

are you mad? there are ones properly working between 5 and 10 bucks at ebay

http://www.ebay.com/itm/6FT-Display-Port-DP-Male-to-DVI-Male-Cable-Cord-Adapter-Gold-Plated-1080P-HD-/271183857623?pt=US_Video_Cables_Adapters&hash=item3f23d147d7

http://www.ebay.com/itm/M1-D-P-D-Male-to-DVI-D-Dual-Link-Female-Adapter-Gold-Plated-/390577211918?pt=US_Video_Cables_Adapters&hash=item5af0374a0e

-- these are the first results at ebay for "dvi to dp"

GOOD JOB to the author, i really want to see this project going with eyefinity ^^ . I'll be checking this blog for some time to track the progress. I would probably be going for a mass order of about 20 displays soon



Emeryth April 22, 2013 at 11:33 PM

Those cables don't work the way you think they do.
You can have a DP output that is backwards compatible with DVI, but those cables won't convert DVI signaling to DP!



Lava Vids May 13, 2013 at 2:49 PM

And @Anonymous

He's talking about DVI to Display Port, not Display Port to DVI. DVI to Display port would need an Active adapter, and would cost at least \$100. It
s pretty much an external graphics card.

DutchRam May 14, 2013 at 11:28 AM

Actually there are now Active adapters for about 20 bucks. Sapphire made one. <http://www.sapphiretech.com/presentation/product/?cid=4&gid=1010&sgid=1011&pid=357&psn=&lid=1&leg=0>

Anonymous May 14, 2013 at 11:52 AM

DutchRam, that's not DVI->DP, that's DP->DVI.

Reply



Olivier Serres April 22, 2013 at 9:21 PM

You rock !

Reply



Larry Maxwell April 22, 2013 at 9:36 PM

Just like those tv tuners turned software defined radios, expect a price jump on these displays.

Reply

Alex April 22, 2013 at 9:40 PM

Thank you from all my heart, stranger from the interwebz!

Reply

Replies



Emeryth April 22, 2013 at 9:46 PM

Don't thank me, thank VESA for designing DisplayPort. :)

Reply



Daniel Kennedy April 22, 2013 at 9:46 PM

What is the refresh rate of the display?

Reply

Replies

Anonymous April 22, 2013 at 10:22 PM

<http://apple.stackexchange.com/questions/8006/what-is-the-ipads-screen-refresh-rate>

Apparently 60Hz.



Daniel Kennedy April 23, 2013 at 5:23 PM

I found that the ipad3 has a 60Hz refresh rate, but that doesn't mean the display can't put out a higher rate.

Reply



Curto April 22, 2013 at 10:21 PM

Would you consider selling the board/cable preassembled?

Reply

Replies



Emeryth April 22, 2013 at 10:30 PM

Yes, I'm working on it.



Zhenka Saykin April 25, 2013 at 5:26 PM

Is there any way to connect this to an mhl cable? I ess thinking of using this set up to create an iPad screen dock for my android phone. I would buy the Chinese mockups but they have considerably slower soc and lower battery ratings.

Reply



Unknown April 22, 2013 at 10:25 PM

You'll make a lot of money selling proper converter boards if I can help it!

I would love to do this, but get a proper bezel machined, too.

Next step: touchscreen too -- this could be relatively easy and use an official iPad front. Most of them have an I2C interface if they have a controller.

Nice work!

Reply

Replies



Emeryth April 22, 2013 at 10:39 PM

Unfortunately the touchscreen controller is on the motherboard and I think it's a custom chip, so it's basically impossible to use the original touch panel.



Taylor Alexander April 22, 2013 at 10:52 PM

Nothing's impossible. Maybe not your area of expertise but come on, you just got a display working without any particularly expensive hardware, I'm sure others can figure out the touch panel. If it's i2c then you'd probably just need an arduino or ARM processor to interpret it - that's a \$2 processor in many instances!

Anonymous April 23, 2013 at 10:05 PM

I think you can easily connect Bus Pirate, and if it's I2C, SPI or anything else.. then you can easily try to send something to the registers trying to find out what you get back.

Reply



J Schorzman April 22, 2013 at 10:30 PM

What game are you playing in the last image?

Reply

Replies



Emeryth April 22, 2013 at 10:33 PM
OpenTTD

Reply

Anonymous April 22, 2013 at 10:48 PM

High-resolution Oculus Rift clone, here we come!

Reply

Anonymous April 22, 2013 at 10:49 PM

Please sell this thing and take my money!

Reply



jcitme April 22, 2013 at 10:50 PM

Where did you purchase the panel? I would like to buy a LCD, but can't find the chinese sites at \$55 you're talking about...

Reply

Replies



Emeryth April 22, 2013 at 11:27 PM
Look for "ipad 3 lcd" on ebay.

Reply**Anonymous** April 22, 2013 at 10:50 PM

The connectors are \$5.70 at newark (element14):
<http://www.newark.com/molex/502250-5191/connector-fpc-rcpt-51pos-2row/dp/56R1204>

Reply

Anonymous April 22, 2013 at 10:56 PM

I talked to Andrew at AssetGenie, who said the wholesale price on iPad 3 panels went up recently due to increased demand. I ordered two of these panels for \$67 each (plus \$11 shipping for the pair), shipped today. I also bought the connectors from newark as mentioned in my previous post.

Reply

Replies

**Emeryth** April 22, 2013 at 11:36 PM

They are still available on ebay for \$55...

Anonymous April 24, 2013 at 2:10 AM

Really? You must have been using different search terms. I just bought it for \$115 (including shipping).

Anonymous April 27, 2013 at 9:43 AM

You need to search on ebay.com for "ipad 3 lcd"

Reply**Rokito Wonito** April 22, 2013 at 11:18 PM

if you decide to sell this, will be able at ebay?

Reply

Jon H April 22, 2013 at 11:33 PM

Too bad this isn't .3 mm:

http://www.seeedstudio.com/depot/lcd-ext-breakout-of-05mm-fpc-p-200.html?cPath=175_177

Reply

Markus Aho April 23, 2013 at 12:26 AM



Can you please make adapter with connectors for me? DP + power to this panel? i think pretty many people would buy one :)

Reply



Csaba Nagy April 23, 2013 at 12:56 AM

Great Post, May have to look into building one myself.

Do you know if this would work used as an external monitor for a camera? the camera has SDI out, I was wondering if after I convert the SDI signal to an HDMI signal, that that can be converted to a DP signal and output my 1080p video?

Thanks again, and great work!

Regards.

Reply

Anonymous April 23, 2013 at 1:02 AM

WTB a few of these adapters :) will be monitoring this post closely!

Reply

Anonymous April 23, 2013 at 1:19 AM

Awesome work! I will also be watching closely for those adapters. I'd plunk down some serious cash for 'em.

Reply



Emi April 23, 2013 at 1:28 AM

i hope you answer this . i am considering building a diy image projector (power led back light). as seen form the dimension and resolution this display would be perfect. the question is: is there a logic board to support this display or any other way without using a converter dvi to DP?

Reply

Anonymous April 23, 2013 at 1:33 AM

If we go back to the 'LCD + overhead-projector = beamer'-era, this makes a fancy fullHD+ beamer for not even close to 1k~. Whoah.

Reply

Anonymous April 23, 2013 at 1:45 AM

Could this be adapted to an hdmi input? I'm asking because this would be an excellent setup combined with a small arm board; however, most of them come with hdmi sockets. In fact, I haven't seen a DisplayPort board.

Reply

Replies

Anonymous April 23, 2013 at 7:50 AM

+1

Anonymous April 23, 2013 at 8:11 AM

No, it can't be adapted to HDMI without an expensive active adapter. I hope you're not even considering trying to drive a display of this resolution with a Raspberry Pi or similar...

Scheef April 23, 2013 at 8:26 AM

Well i would like to run mij Playstation on a retina display. Would be perfect for the small space i'm trying to work in.

What kind of adapter do you mean?



Chí-Thanh Christopher Nguyễn April 23, 2013 at 1:38 PM

There is one ARM board with embedded DisplayPort, the Samsung Arndale.

Most HDMI->DP converters on the market are limited to 1080p, so no chance to drive a retina display.

Anonymous April 23, 2013 at 2:34 PM

Maybe not drive retina scale video, but I don't see how this:
http://hardkernel.com/renewal_2011/products/prdt_info.php?g_code=G135341370451
couldn't at least display pictures and browse at the full resolution.



Chí-Thanh Christopher Nguyễn April 23, 2013 at 2:53 PM

Two problems. One is that you probably cannot set high enough clocks on the HDMI output (sometimes called "Fast HDMI") to drive 2048x1536@60Hz .

The other is that you will not (easily) find a HDMI->DP converter which accepts this as input.

Anonymous May 12, 2013 at 3:15 PM

great job!
I'd like to drive this display with a MacMini. Any chance?

Reply

John April 23, 2013 at 6:56 AM

Have added your blog to my favourites, so the moment you have these adapters on the market, I can buy one!

Reply



Soo-Hyun Yoo April 23, 2013 at 7:27 AM

This comment has been removed by the author.

Reply

Anonymous April 23, 2013 at 8:08 AM

Just out of curiosity, what does the display identify itself as to the computer?

Reply



Unknown April 23, 2013 at 8:19 AM

That's fantastic work! I'd definitely be up for buying a few interface kits if you do end up getting them made. Be so awesome for my portable work setup.

Reply



Tmin10 April 23, 2013 at 9:27 AM

It's best idea for DIY external display!

Reply

Anonymous April 23, 2013 at 9:29 AM

Can this board work hit the lcd?

http://www.alibaba.com/product-gs/620223915/lcd_panel_control_board.html

Reply

Replies

Anonymous April 23, 2013 at 2:41 PM

Do you found anything else about it? Looked over it and seems there is limit in resolution to 2560×1440. But looks very nice.

Anonymous April 25, 2013 at 5:44 AM

The board seems to me is capable of driving the display but the connectors are wrong, looks to me hit a ttl type of connector and not a Flex Cable, plus eDP comes in different tips 30 pins 40 pins and ipad's 51 pins.

Anonymous April 26, 2013 at 11:45 AM

I'm not skilled in electronic - do you think that this is blocker? Or are these

connectors replaceable - to connect retina to it? Impossible? Possible?
should it work? thx

Anonymous April 26, 2013 at 2:02 PM

<http://wenku.baidu.com/view/26d2b6e65ef7ba0d4a733b4f.html>
2560x1600 max @60hz, edp output (but it seems not enough pins :-))

Reply



Kristoffer Berdal April 23, 2013 at 9:34 AM

Are you on IRC anywhere?

Reply

Replies



Emeryth April 23, 2013 at 6:27 PM

Nope, you can contact me via e-mail.

Reply

Anonymous April 23, 2013 at 9:38 AM

SAMSUNG LCD is better
Contrast 1000vs800
viewing angle 85vs80

http://www.panelook.com/LTL097QL01-W01_SAMSUNG_9.7_LCM_parameter_17823.html

http://www.panelook.com/LP097QX1-SPA1_LG%20Display_9.7_LCM_overview_15375.html

Reply

Replies

Anonymous April 23, 2013 at 10:24 AM

Find it for \$55 with DisplayPort input and I'll agree that it's better.

Reply

Anonymous April 23, 2013 at 9:49 AM

Shut up and take my money!

Reply



timmy April 23, 2013 at 10:55 AM

I did this last year, minus the ghetto part.

Includes a proper backlight driver, ESD protection on eDP port, 3 buttons for power/brightness/whatever, STM32 MCU for control, accelerometer (for whatever purpose), and a RGB led.

<http://i.imgur.com/1XFMqaM.jpg>

<http://i.imgur.com/TPB91F5.jpg>

Reply

Replies

Anonymous April 23, 2013 at 11:01 AM

price?

Anonymous April 23, 2013 at 12:24 PM

Perhaps you can share your schematics?



timmy April 23, 2013 at 1:38 PM

There's absolutely nothing special in the schematics. And it's pointless to duplicate this on home-drilled protoboard as you need 4L for differential lane impedance matching etc.

Anonymous April 23, 2013 at 1:42 PM

Hi timmy. I would be interested to see it still, even if using as a starting point. Getting some 4L boards printed wouldn't be a problem. Are you doing backlight control over USB? Regards



timmy April 23, 2013 at 2:08 PM

Yeah, I forgot to mention this is USB "bus powered" (lol) drawing around 800mA (but hey, what doesn't draw > 500mA these days?). STM32 has it's native USB pins connected, so it can enumerate as HID or whatever, there's actually a HID Monitor spec that Apple displays use for brightness/etc control from keyboard hotkeys.

Someone earlier asked what does it show up as on PC, the displayport part enumerates as "Apple Color LCD"

Anonymous April 23, 2013 at 8:10 PM

Give us anything needed to replicate it, or sell it on eBay. Or both.



Zach Whitesel April 23, 2013 at 9:27 PM

I am curious what you used for the back light driver, if you don't mind sharing.



Sam Zamora April 24, 2013 at 5:57 AM

I believe its a LP8545 if im not mistaken



utp April 25, 2013 at 5:25 AM

Hi Timmy, love your build, it looks so professional!!!!

Would you mind to share more build info with us?

Thanks

Anonymous April 25, 2013 at 9:27 AM

We did it last year too and now we can offer it to public - interface boards for sale at <http://dp2retina.rozsnyo.com/>

Reply

Fuxy April 23, 2013 at 10:57 AM

Now I know what I want to use next as a monitor.

Reply



Patrick Bregman April 23, 2013 at 11:28 AM

Is it possible to get it without (much) of a bezel so you could make this into a 3x3 display for gaming on a recent AMD card (eyefinity)?

Would be pretty damn awesome, you don't see stuff like this often :D Ultra high resolution gaming :P

Reply

Replies



Emeryth April 23, 2013 at 6:24 PM

The bezel you see is part of the panel, there is nothing left to remove.



Zach Whitesel April 23, 2013 at 9:33 PM

You need would need to spend at least \$600 in graphics cards to actually be able to run three of these displays at a respectable FPS in a game. Three displays is almost 9.5M pixels, a standard 1080 display is only about 2m pixels.

Reply

Anonymous April 23, 2013 at 2:13 PM

I dont know if anybody said this before but you should definitely have it mass produced or at least do a kickstarter run!

Reply



dnstje appel April 23, 2013 at 2:33 PM

Does someone has that PDF around? it's taken offline.

Reply

Replies

Anonymous April 23, 2013 at 4:33 PM

If you don't mind it being in chinese, oh well datasheets tend to have important bits in universal format.

<http://www.displayalliance.com/storage/1-spec-sheets/LP097QX1-SPA1.pdf>

Anonymous April 24, 2013 at 11:09 PM

it's korean.

Reply



Current Title April 23, 2013 at 5:57 PM

Would love to use this on my DIY overhead projector! Please take my money!

Reply



@mekpro April 23, 2013 at 6:09 PM

Is the brightness of the display evenly lighted ? From the picture it look like the upper part seems darker than the lower part, or is it just a reflection ?

Reply

Replies



Emeryth April 23, 2013 at 6:12 PM

Only half of the backlight LED strings were connected during that demonstration.

Reply



kontau April 23, 2013 at 6:29 PM

You can do boards and sell them.

Reply



Yakov Khovalkin April 23, 2013 at 11:34 PM

Amazing!

Reply



Zibri April 24, 2013 at 2:12 AM

On Ebay this display costs EUR 88 minimum :(

Reply

Replies



Zibri April 24, 2013 at 2:40 AM

But I found cheaper ones searching for "ipad3 lcd display"

US \$62,88

Circa EUR 48,25

Anonymous April 24, 2013 at 5:46 AM

try with "ipad3 panel"

Found some for 53-55USD.

Reply



Jared Turner April 24, 2013 at 2:49 AM

Great hack! Was wondering if you know a way to remove the backlight panel (or if it seems easy to remove)...so it could be replaced with an overhead projector light :)

Reply

Replies

Anonymous April 25, 2013 at 1:56 AM

Having taken apart several similar tablet LCD panels, the backlight and reflector assembly is generally held on with adhesive and quite trivial to remove.

Reply



shelterbrook April 24, 2013 at 6:05 AM

now install one of these into a macbook air 11 inch. i wonder if the pinout is the same. they are both edp. i wonder if the mba has the edp 4 lane that will support it.

Reply

Replies

Anonymous April 24, 2013 at 9:35 PM

That was exactly what came to mind for me, id love to retina up my MBA, I would definately support a kickstarted or buy anything you get put together this is a great idea and I think a lot of people could use this for all sorts of things when it gets out to the masses (Hopefully soon)

Reply

Anonymous April 24, 2013 at 9:00 PM

I wonder if the same thing could be done with the iPhone displays...

Reply



Jbizzle April 25, 2013 at 5:29 AM

I want one too. This would be a great second screen for my MBP and it's portable.

Reply

Anonymous April 25, 2013 at 9:25 AM

Those who wants to have buy an interface board, have a look at mine:

<http://dp2retina.rozsnyo.com/>

Reply

Replies



utp April 25, 2013 at 10:46 AM

Emailed you, looking forward for your reply.

Reply



Kamil Krzywda April 25, 2013 at 10:19 AM

what about other apple displays (iphone, ipod nano?)
its same eDP interface?

2x ipod nano lcds would make cool 3d glasses :)

Reply

Anonymous April 25, 2013 at 2:21 PM

Can the bezel be sawed off without killing the display?

If so, maybe you can make a 29" 6144x4608 screen by gluing 9 of these guys in a 3x3 pattern

Reply

radek April 25, 2013 at 3:20 PM

Polak Potrafi. Miejmy nadzieję, że uda ci się stworzyć w pełni profesjonalny model
Reply

Anonymous April 26, 2013 at 12:42 AM

good job! Pena que vai ser difícil e caro encontrar a tela do ipad aqui no Brasil :(
Reply

Anonymous April 26, 2013 at 3:34 AM

Now this is great for the iPad 3 Retina Display.

Here's someone talking about the 15.x Retina from the Retina MBPro.
<http://www.ifixit.com/Answers/View/92815/What+is+the+model+number+of+the+2880x1800+LCD>

I am wondering on your thoughts about the same for 13.3 inc MBPro Retina Display.

If they all use eDP/ Display Port variant and not LVDS.

Do you think we could find / ask if there are any LAPTOPS besides the Retina MBPs that would also be using eDP and possibly be modded/ hacked with a Retina Display.

Reply

Replies

Daniel April 26, 2013 at 8:11 AM

I have a Sony Vaio Z1.. few years old but has a Full HD 13.1" display. Connected with 2 lane DP. I think that the motherboard won't be wired with 4 lanes in mind.

Reply

Zhen Jie April 26, 2013 at 6:23 AM

are there bigger panel options for the hi-res display? looking at 15 or 17".

Reply



Anthony Rossi April 26, 2013 at 6:30 AM

This project is awesome! Will work perfect with photo and video editing as a side preview screen. Is there a schematic available for your board?

Thanks!

Reply



Alexandru Pintia April 26, 2013 at 7:13 AM

Combine the LCD with some lenses and you got yourself a DIY projector

http://www.optolife.com/diy_projector_lenses.html

Reply

Replies

Anonymous April 26, 2013 at 11:41 AM

yeah! i'm planning to do so. LCD is on the way from HongKong, now the interface board. After that the show shall begin :-D

Anonymous May 25, 2013 at 4:28 PM

Did you ever get it working? As someone mentioned above I was wondering how one gets the back light reflector off without damaging the rest of the screen.

Reply



dwight doane April 27, 2013 at 3:15 AM

how do I print/etch the pcb?

Reply

fabio April 28, 2013 at 5:47 AM

How do I run that codes in the github's website to eagle pcb design?

Reply

Anonymous April 29, 2013 at 2:28 PM

ctrl + s

save as

run eagle - open sch or bdr file

Reply

Anonymous April 29, 2013 at 4:28 PM

Why is everyone more concerned with projector projects than getting this thing running in dash? For projectors go smaller, like the display in the HTC One!

I look forward to your work on this monitor idea, good work!

Reply

Anonymous April 29, 2013 at 8:01 PM

Will this work with the mini DP on a macbook air ?

Reply

Replies

**dwight doane** May 3, 2013 at 12:35 AM

i emailed him and asked if it would work with my macbook pro 13in mini DP and he said it should.

Reply**Anonymous** April 29, 2013 at 10:27 PM

any idea when a reasonably priced (\$15-\$30) adapter will be available, i saw one is available for \$99, which seems high.

Reply

Replies

Anonymous April 30, 2013 at 1:53 AM

Agreed. Paying more for a mostly passive adapter than an ultra high resolution screen seems a bit rich.

One of the first comments was someone else showing their version which is exactly what we are looking for, but he didn't release schematics "Because it was too simple to bother" (to paraphrase). Thing is, as has been said, we are dealing with high frequency signals that don't like different lane lengths, and most of us don't have the expertise to design them. Building from a schematic is far simpler. Or at least we can ask friends.

tl;dr Eagerly awaiting for the more professional schematic.

Anonymous April 30, 2013 at 3:28 AM

this is the one we are looking for, posted from timmy earlier, looks simple, and should be fairly cheap to manufacture

<http://i.imgur.com/1XFMqaM.jpg>

<http://i.imgur.com/TPB91F5.jpg>

Daniel Rozsnyo May 1, 2013 at 12:36 PM

That \$99 adapter of mine would go for \$49 (+shipment) if we can reach about 1000 orders.

But doing a low cost version in low volume - 10 pieces or so, is not viable. The biggest issue is that the backlight significantly changes its properties with temperature (there are 84 LEDs) - that really needs a constant current driver to guarantee that the wear-out of the back-light is low.

Arguing with the low price of the hi-def display is not correct here - try to buy a standard model, even the Z1's replacement screen (FullHD on 13.1") costs \$300-\$400. The thanks here goes to Apple, that it spread its devices on so big scale.

So at the end, the total cost is divided by different ratio than with a standard solution.

And remember - in any piece of electronics, you are wrong if you see just the components cost.

Anonymous May 1, 2013 at 3:23 PM

Very nicely done, A couple of quick question if you don't mind: How many layers is your pcb? I am guessing 4. Did this really only take you a week or were you working on this before blog post.

York May 2, 2013 at 4:14 AM

Daniel Rozsnyo:

If we were to attempt to aggregate orders, how do you recommend doing it? 49USD (x2 in my case) + 15EUR shipping is a much better price than before.

I will apologise for the comment I made before about the price being unreasonable. Having actually looked at the product page, it is a fair bit more complex than I expected. I guess I was expecting it without buttons and a switcher, and forgot about variable backlight control. Personally I wouldn't be using the switching (surely passive adapters would cover DP to miniDP) but backlight control is important.

Daniel Rozsnyo May 2, 2013 at 6:46 AM

Well.. it would make sense to create separate DP and miniDP models later. The PCB is 4 layer and it was put together over a weekend. We had the schematics from the prototype (a 10x10 cm board on the pictures) and also from modules (separate backlight, DP in, DP mux, ipad out) which we use for development of more complex systems.

To do aggregate orders - you would need some way to reserve the amount from the buyers credit card for few months until the delivery can be made from a significant batch. I am not sure how fast can one gather that number of orders.

In few months we will introduce other products and for those to order and pre-order we will definitely have to setup a deal with a credit card company. But now the priority is for me in engineering those products.

If you reply, please drop a copy of the message to my email too.. I am not going to regularly checking this site, thanks.

Reply



Benjamin May 1, 2013 at 12:08 AM

Excellent hack!

Reply

Anonymous May 3, 2013 at 5:23 PM

How would we go about running a 13" or 15" MBP Retina Display with eDP as an External Display?

Reply

Replies

Anonymous May 4, 2013 at 1:26 AM

mac retinas is the same thing
you need only make straight forward adapter board + proper PSU

Reply

Anonymous May 6, 2013 at 3:39 PM

Does anyone know if there's a list of screens that use eDP? It would be nice screen options for something like a DIY Oculus Rift.

Reply

Anonymous May 9, 2013 at 12:22 AM

few screens with eDP connection:
M116NWR1 R5 11.6" 1366×768
B156XW02 V2 HW0A 15.6" 1366×768
N156BGE-E21 15.6" 1366×768
B140XTN01.0 14.0" 1366×768
LP140WD1-TPD1 LG14.0" 1600×900
B131HW02 V0 13.1" 1920×1080
B131HW01 V0 13.1" 1920×1080
CLAA133UA03 13.3" 1600×900
LP133WP1-TPB1 LG13.3" 1440×900
LP116WH4-TJA1 TLA2 TPA1 LG11.6" 1366×768
LTN116AT01-A04 11.6" 1366×768
B141PW04 V1 HW0A 14.1" 1440×900
LP156WH6-TJA1 LG15.6" 1366×768
B116XW05 V004 V001 V1 V6 11.6" 1366×768

and more and more...

Reply

Replies

Anonymous May 9, 2013 at 4:33 AM

The following ones from your list - Which laptops have them and would it be possible to plug in a MBP Pro Retina in their place?

LP140WD1-TPD1 LG14.0" 1600×900
B131HW02 V0 13.1" 1920×1080

B131HW01 V0 13.1" 1920×1080
CLAA133UA03 13.3" 1600×900
LP133WP1-TPB1 LG13.3" 1440×900



Emeryth May 9, 2013 at 1:32 PM

It would be possible in theory, but in practice it would take a lot of work trying to fit in the panel.

Anonymous May 25, 2013 at 11:45 AM

Let say I dont care about fitting the panels.

What could I used to successfully and conveniently drive a 13" or 15" Retina Display as external screen, using a laptop that supports DP/miniDP output.

Reply



Wolftousen May 11, 2013 at 5:20 AM

Love the project, hope you are trying to make a board that you can sell. I would love to see the ability for the board to hook into an ipad 3/4 battery pack for it's power though instead of forcing an ac plugin. I like to remain completely portable for as long as possible :) The batteries are only 50\$ on ebay too, so not adding to terribly much to the cost.

Reply

Anonymous May 12, 2013 at 6:22 PM

will you need an external power supply in order to make it work? or is it emedded in the DisplayPort flow?

Reply

Replies



Wolftousen May 13, 2013 at 4:08 AM

The one in this hack and the one at <http://dp2retina.rozsnyo.com/> both require external power at the moment. I suggested modifying the circuitry to connect to the ipad 3 battery so we could get around that though (1 cell of that battery has the right wattage, but not voltage...)

After browsing through all the posts I see one about the 15in MBPro retina screens and would much rather shelve out the extra \$ to get one of those, but these boards don't appear to work with it.

Reply

Wolf May 14, 2013 at 1:28 AM



Emailed re: some pin mapping clarifications, looking forward to your reply. Will be posting up a GPL-licensed adapter board with miniDP connector and back-light power circuitry once those clarifications are supplied.

Reply

Anonymous May 16, 2013 at 12:22 AM

Hey, could you connect 6 of these displays as one huge resolution display? You'd obviously need a badass computer with 2 or 3 graphics cards (like HD7970).

It would be cool to make a 3 horizontal by 2 vertical at a mega huge resolution in eyefinity.

Reply

Replies



utp May 16, 2013 at 4:13 AM

you will need a system that support 6 displayport there...

Anonymous May 18, 2013 at 5:19 AM

I have dual 7970s and they can run 5400x1920 across 5 1080p monitors, but for games like Metro and I'm sure much newer games, it chugs. I wouldn't bet on the investment being worth it, but if you have the money, why not?

The main card has 4 displayPorts and in my opinion, it's the exact card you need to run Eyefinity. Attempting to use a card that doesn't use 3 or more DP on one card, will result it screen tearing.

Reply

Anonymous May 17, 2013 at 3:02 AM

in a 1-2 months I will make 3x1portrait retina ;)
so I will get 20" 9:4 4608x2048 res monitor

Reply

Replies



James Angell May 21, 2013 at 12:50 AM

that would be awesome.

Reply



Darien May 18, 2013 at 5:24 AM

Any updates on the adapter? MiniDP support? I want to combine one with my wacom tablet to make a DIY cintiq.

Reply

Replies



Emeryth May 19, 2013 at 1:44 AM

My next prototype PCB, with a DP connector, is already manufactured, now I'm waiting for delivery.

MiniDP is only different mechanically, you can get an adapter to DP for \$3.

Anonymous May 21, 2013 at 7:32 PM

That sounds great, can't wait for an update.

Reply

Anonymous May 19, 2013 at 2:19 AM

what about estimated price?

Reply



Alexandru Pintia May 20, 2013 at 5:53 PM

Hi found an alternative screen, it's from the Nexus 10.

<http://www.powerbookmedic.com/Google-Nexus-10-LCD-and-Digitizer-Assembly-p-24377.html>

it's using eDP and I believe to be better for most people's needs.

I'm not sure of the confectioner :/

16:10 aspect ratio, 2560×1600 pixel

LCD Type: PLS

Luminance : 450 nit

Viewing Angle : 85/85/85/85

Response time(ON/Off) : 16ms

Power consumption(B/L) : 2.26W (Max @W/O LED Driver)

Interface : eDP (Ver 1.1)

screens from

http://www.howchip.com/shop/item.php?it_id=LCD1010A

Reply

Vegan Dessert May 21, 2013 at 9:40 AM

Have just encountered your page and I guess you should be complimented for this piece. More power to you!

Reply



Eric Limegrover May 24, 2013 at 6:33 AM

This comment has been removed by the author.

Reply

Antonio Carvalho May 24, 2013 at 10:15 PM

Hi, did anyone here buy the ROZSNYO adapter? If so, did it arrive? They mentioned May 6th as the day the first batch would ship so it's about time for it to reach the customers.

Reply

Replies



utp May 27, 2013 at 4:57 AM

I did, I was on the first lot but ROZSNYO says there were last minute delay and it was shipped about 21 May, and no, I still haven't got mine.

Finger cross.

Daniel Rozsnyo May 27, 2013 at 9:43 AM

There is one guy from Germany who had already confirmed the receipt of the board (and send me a screenshot, not a photo of the setup). Others are further away in the world. The 1st series packages were sent out actually on May 22.



utp June 5, 2013 at 9:47 AM

Thanks Daniel, confirm received the board, am in office now so cannot test, will update you info with the build!

Reply

Anonymous May 24, 2013 at 11:19 PM

does any one know if there are smaller size lcd panels with edp conenctor? maybe a 5" one? these will be great for a low cost hd projector

Reply

Anonymous May 28, 2013 at 2:37 AM

How can i open the schematic and PCB layout?
I use EageL 6.2

Loading C:/Users/cassiopeia/Desktop/ipad3_lcd.sch ...
error:

Line 5, column 6: This is not EAGLE file.

Reply

Replies

**Emeryth** May 28, 2013 at 2:44 AM

It is an Eagle 6.2 file, make sure you downloaded the file from git correctly.

Reply**Anonymous** May 28, 2013 at 2:55 AM

Ohhh thanks... it works!

Reply**Anonymous** June 2, 2013 at 10:18 AM

Hi

There this is slightly off topic but have you or anyone in these comments thought about doing this for the 15 inch macbook pro Retina Display? I'm not sure what the interface is, it may not be eDisplayPort so that could be a problem, iv been trying to find out what it is without success for the past hour, but you can definitely buy the lcd panels on ebay! :-) It would be so epic to have two of these 15 inch retina displays hooked up to my desktop!

Reply**tv recycle st. charles mo** June 15, 2013 at 12:50 AM

May I know the overall cost of these project and can it be used as a PC monitor?

Reply**Dárvini Aranes Fook** June 28, 2013 at 4:05 PM

OMG this blog it's amazing!

Reply**edward erick** July 20, 2013 at 4:35 AM

Nice I also share with you something hope this helpful for you. This is the most important point to consider while buying a tablet PC. Make sure to select a tablet with processor speed that suits your need and performs the job. Check it out thanks.
iphone 5 repairs

Reply**Anonymous** July 21, 2013 at 8:02 AM

Amazing tutorial! I will definitely be using this display for my carputer!

O.T. Does anyone know of a circuit to breakout the 8 channel audio available in the displayport cable specs? My only other option would be to use a 2 channel

headphone jack. =[

Reply



Markus Bernhardt July 25, 2013 at 3:57 AM

Have you ever tried to display a protected video stream from a DVD? According to the specs this display does not support HDCP, but ASSR, which I doubt a regular graphic card to speak.

Cheers and thanks for that great hack

Reply



jimmy paul July 25, 2013 at 8:51 AM

Thats cool, i am looking such kind of information on lcd screen. Thank u for giving the information on LCD screens to connect with Screen.

Reply

Anonymous August 14, 2013 at 2:12 PM

Kickstart this already man

Reply



Thejeepjunky August 17, 2013 at 7:09 AM

I have a DP2Retina display adapter for sale on eBay.
<http://bit.ly/14SSAlb>

Reply



Rashed Ahmmed September 2, 2013 at 12:04 AM

This is really a nice site. I liked it. I also liked your writing. Matemingler is the number one dating site for singles seeking long-term relationships. Join for free to be matched with compatible singles.

dating website

dating sites

dating site

the best dating websites

number one dating website

Reply

Anonymous September 8, 2013 at 1:10 AM

I would be interested in buying one of these already set up and ready to work with a usb input.. I have a microscope that I work with and need a good monitor.
If you are interested I am interested in paying for one complete.

Reply



rex danim September 9, 2013 at 8:22 AM

I'm also after the best place to get replacement **lcd screens** - - but occasionally other
Reply



rex danim September 9, 2013 at 8:24 AM

I'm also after the best place to get replacement **lcd screens** but occassionaly others.
Many thanks
Reply



Steven B September 18, 2013 at 3:27 PM

To echo others I would be very interested in buying a pcb from you, I don't know if you could do a group buy or something but I'd like to buy a couple.

Also, I love openttd. Good game.
Reply



Vincent Martel September 27, 2013 at 7:45 PM

Did you try this adapter with a large scale display panel ? like a 27in. I think 27 inches from all-in-one computers use embedded displayport. Same as Ipad screen ?

thanks
Reply



GreenEV October 2, 2013 at 10:19 PM

I have a cheap HD TV with HDMI input so I can connect my camera to directly to view my images. I'd love to use one of these monitors as a mini tv with hdmi input so I can view my video or images from my camera while I am out in the field. If anyone has the proper parts I'd be very willing to put together a camera viewing monitor in HD. Yes, I am sure I'd have to have a portable power source but I do actually have a nice 12volt Lithium battery that is very light to take in the field to use as my external power source. Easy to carry and rather light weight.

Reply



mahasiswa teladan October 9, 2013 at 8:53 AM

hi..Im student from Informatics engineering, this article is very informative, thanks for sharing :)
Reply



Brandon Hudson October 9, 2013 at 10:34 AM

This comment has been removed by a blog administrator.
Reply



Octavian Constantin Tudora October 14, 2013 at 8:50 PM

This comment has been removed by the author.

Reply



Octavian Constantin Tudora October 14, 2013 at 9:55 PM

This comment has been removed by the author.

Reply

Replies



Emeryth October 15, 2013 at 1:02 AM

You're looking at an entirely different datasheet, I used the TPS61175 from Texas Instruments.

The schematics are in the datasheet.

There are hundreds of different step-up converters that you could use instead.



Octavian Constantin Tudora October 16, 2013 at 7:33 PM

This comment has been removed by the author.



Octavian Constantin Tudora October 29, 2013 at 6:46 PM

This comment has been removed by the author.



Octavian Constantin Tudora November 5, 2013 at 3:16 PM

Hello Emeryth. What are SV1 and SV2 in the schematic?

I think that maybe are the resistors?

How are the connection inside of SV1 and SV2. If you have used a array of resistors maybe you can give me the part code to find on the Internet the data-sheet.

Thanks in advance and God bless you.



Octavian Constantin Tudora November 5, 2013 at 3:25 PM

This comment has been removed by the author.



Octavian Constantin Tudora November 5, 2013 at 3:46 PM

This comment has been removed by the author.



Octavian Constantin Tudora November 5, 2013 at 4:32 PM

This comment has been removed by the author.

Reply

Anonymous October 23, 2013 at 7:49 AM

Finding a DP video cards is no problem, but anybody know of any mini-itx motherboards with internal DP? Say maybe, for an all-in-one type PC?
i found a Gigabyte MSH87DI with internal LVDS 24bit, but it wouldn't work for retina display. I ask cause I'm working on a All-in-one case mod and don't want to run the cable back into the box.

Reply



Jerry Gene October 28, 2013 at 9:45 AM

Nice post with awesome points! Can't wait for the next one.

MSI - 17.3" Laptop - 16GB Memory - 750GB Hard Drive + 128GB Solid State Drive - Brush Aluminum Gray

MSI - 17.3" Laptop - 16GB Memory - 1TB Hard Drive + Dual 128GB Solid State Drives - Brush Aluminum Gray

Reply



Octavian Constantin Tudora October 29, 2013 at 6:59 PM

This comment has been removed by the author.

Reply



Octavian Constantin Tudora October 30, 2013 at 1:42 PM

This comment has been removed by the author.

Reply



Octavian Constantin Tudora October 31, 2013 at 11:34 AM

This comment has been removed by the author.

Reply



jdr November 4, 2013 at 7:48 PM

Hi,

great work so far:)

But I am working on a little bit more robust Layout and I was wondering if you check how many data line pairs the iphone display needs to work. 1 or 2 or 4?

And did you know anything about the needed impedance for each line?
Thanks!

Best Regards Jonas

Reply



Octavian Constantin Tudora November 5, 2013 at 5:16 PM

Hello Emeryth, in the PCB layout made with Eagle the tracks are too narrow and has too small clearance between the tracks. The Kicad PCB is double side and has narrow tracks and small clearance too. Any solution?

Reply

Replies



Emeryth November 5, 2013 at 5:22 PM

The tracks have to be narrow because the LCD connector has very narrow pins, there's no way around it.



Octavian Constantin Tudora November 6, 2013 at 1:34 PM

This comment has been removed by the author.



Octavian Constantin Tudora November 8, 2013 at 7:12 PM

Hello Emeryth. How you solder the tiny LCD connector?
Have you try to drive the LCD just with 2 or 1 eDP LANE?
Will be nice for example to drive two LCD by splitting the cable in two.
Driving each LCD with just two lane is possible?. If is working with only one lane then maybe one cable can drive 4 LCDs.
Would you be so kind to try it out?

Reply



Octavian Constantin Tudora November 6, 2013 at 12:27 PM

This comment has been removed by the author.

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