



Ken Eckert <eckertkp@gmail.com>

Tek TDS 3000 scope bandwidth hack and TDS3ENG module

5 messages

Ken Eckert <eckertkp@gmail.com>
To: maxim.vlasov@meteor-m.com

Fri, Mar 12, 2021 at 7:24 AM

For your question on hacking this should answer your questions along with the TDS3ENG module. The threads are on EEVBlog, this is the condensed version.

The B four channel mscopes can go to a 600 Mhz model ie TDS3064B. The two channel B can not, only 500 Mhz

----- Forwarded message -----

From: <maxim.vlasov@meteor-m.com>
Date: Thu, Mar 11, 2021 at 2:09 PM
Subject: Re: [TekScopes] Broke my TDS3000B
To: <TekScopes@groups.io>

TDS3000B are built on the MPC860 PowerQUICC. This is the main CPU. So, it has no boot ROM or the full fledged custom secure bootloader (too old), which is a great advantage for repairman. So, this thing can be sourced and replaced, IMHO.

Are you referring to the big PQFP240 National Semi thingy, right? IMHO, this is not the CPU, it's the ASIC DPO emulator with the ADC/RAM/etc crossbar, ADC clock generator PLL and DMA functionality.

Could you, please, check at which sampling rates you have a garbled response? If you run in X/Y mode, do you have the same stuff? Is it the same when running from the external trigger? Are all the traces garbled or just a subset of channels? Try to remove all the plug-ins and extension cartridges.

Also it could be the SRAM too (just two chips next to the ASIC). How about the linear power regulators in the vicinity of the tantalum cap? Are they OKAY?

Try to go around the o-scope and check the logic levels around the SRAM and National Semi ASIC. Maybe you can find a burned buffer or something. If it breaks below 400us, it could be the PLL.

I would go around and note the voltages and levels and post it to the forum.

Also the thermal image would be a good indication of something awkward.

You said that built-in self test runs OKAY. But how about running the calibration and service routines, would these fail?

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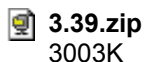
Group Owner: TekScopes+owner@groups.io

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3 attachments

 **TDS3UAM-TDS3HEX.docx**
1663K

 **TDS3000 Firmware upgrade v2.docx**
704K



maxim.vlasov@meteor-m.com <maxim.vlasov@meteor-m.com>
To: Ken Eckert <eckertkp@gmail.com>

Fri, Mar 12, 2021 at 10:14 AM

Hello Ken,

Thank you for sharing this info with me.

Did my hack of TEK TDS3014 converting it exactly as you have marked to TDS3054 a while ago. The OS was retrograded (transferred via floppies) and then upgraded again, with the famous PITBUL passwd.

In my e-mail, I wanted to help this poor guy who managed to leave some solder traces after replacing tantalum capacitors on the motherboard and burning something on the power on. Cause he thought that the big Nat Semi PQFP chip is actually the processor.

Suggested to him to check the linear power supplies in the vicinity of tantalum cap nearby Nat Semi ASIC and go around the pins to see if there are funny levels etc.

Since nearby there is a PLL ASIC generating the clock to 4 frontends (ADCs), having a garbled output could be related to it, or this could be the output video buffer memory. All the other memories are checked by power-on self test. His POST shows no errors.

However, I have a question to you. Do you know whether upgrading to TDS3064 has no long negative effects on the frontend?

I saw this possibility of switching to TDS3064 type but was humble and set the instrument type to 3054 (my friend who had 3014B had a sticker on the attenuator shield saying 500 MHz BW TEST OK). Never had any problems ever since. Got this scope almost for free, since it had a mains power supply problem. I've repaired it (you can read here):

<https://www.eevblog.com/forum/repair/a-tektronix-tds3014b-with-two-strange-issues/25/>

Thanks again and all the Best,

Maxim

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3 attachments



TDS3UAM-TDS3HEX.docx
1663K



TDS3000 Firmware upgrade v2.docx
704K



3.39.zip
3003K

Ken Eckert <eckertkp@gmail.com>
To: maxim.vlasov@meteor-m.com

Fri, Mar 12, 2021 at 11:00 AM

Hi Maxim;

I do not know if a non lettered TDS3000 will accept going to a 600 Mhz scope. I know on my TDS3014B there were no issues, the bandwidth was closer to 700 Mhz before it started to roll off. I've done two TDS3014B to TDS3064B with the same results on each.


My only concern would be bricking the non lettered scope. Same with trying a TDS3012B to a TDS3062B since Tek never made a 2 channel 600 Mhz version.

The TDS3ENG module is an easy one also if you haven't tried it. Some of the EEPROMs won't take being reprogrammed for some reason, but they are cheap and easy enough to replace. Data sheet attached

No problem, at all helping!

Ken

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 **ST-24C02-16 EEPROM.pdf**
439K

maxim.vlasov@meteor-m.com <maxim.vlasov@meteor-m.com>

Fri, Mar 12, 2021 at 1:53 PM

To: Ken Eckert <eckertkp@gmail.com>

Hi Ken,

You know, it's funny, when I saw the EEVBLOG article (if I remember well) 3 years ago about just a short string to be written in the EEPROM turning TDS3ENG, at first I've made exactly the same cartridge where I had the adapter hanging on the wires next to the socket. So, used the scope for a couple of months with the wires hanging out of the option bay ;)

Thank's for sending this info. It's nicely put together. In 2018 I remember I had to go around several forums to find out how to do that. So, now it seems that all the options are enabled.

Regarding the 500+ MHz bandwidth, I had quite an experience with THS710A->THS730A conversion. I've noticed shortly after the upgrade that the sampling Maxim ADC isn't stable at such a high sampling rate (not like portable Flukes). So, it seems that even if schematics allows the seamless reconfiguration, the choice of the component doesn't. I.e. the components with higher parameter deviations were downgraded and marketed as the lower bandwidth options, IMHO.

So, in short I was afraid to cause the permanent damage to the sampler ADC overclocking and then stopped at 3054 model. Never regretted ever since, because the o-scope seems very very stable and used frequently.

There is a very interesting project on EEVBLOG:

<https://www.eevblog.com/forum/testgear/reverse-engineering-tektronix-tds3gv-module-for-tds3000-series-oscilloscopes/msg3477696/#msg3477696>

regarding the DIYing the expansion module, which I'll try to build to get the Ethernet PHY connection.

This blog is very useful:

<https://hackaday.io/project/172242-extension-card-for-tds3000-scopes/log/179520-the-actual-informations>

Thank you and all the best,

Maxim

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ST-24C02-16 EEPROM.pdf
439K

Ken Eckert <eckertkp@gmail.com>
To: maxim.vlasov@meteor-m.com

Fri, Mar 12, 2021 at 2:13 PM

Hi Maxim;

No problem, I re wrote the module article to do the TDS3ENG hack. Originally it was called TDS3UAM and it loaded up three modules only. Then someone (not me) discovered the ENG code buried in the firmware. It was at a messy state following various threads so I took the UAM article and expanded it.

You know that the MDO30XX can be hacked with increased bandwidth and expansion modules. I've done one scope, worked like a charm! The DPO and MSO can have multiple modules enabled by taking the same module as the TDS3000 and writing the code to the module and then transferring the license to the scope.....

Ken

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