MUSICR1: 8 channel Multiple Use IC for SiPM anode readout

PCB Board description

Issue:	First Version
Revision:	1.2
Reference:	MUSICR1
Created:	17th January 2016
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1. Usage Problems

Problem

The music software detects more than one board. The command line shows the following error:

> > F Exception : There's more than one board detected. Which board
> do you want to use?

Solution

The problem comes from the FTDI. The specific FTDI drivers are not installed. Please refer to the software manual to see how to install the FTDI driver.

For linux installations: Make sure that the ftdi_sio and usbserial modules are not loaded. If they are, please unload them with:

rmmod ftdi_sio
rmmod usbserial

and blacklist them in the /etc/modprobe.d/blacklist.conf by adding

blacklist ftdi_sio
blacklist usbserial

Problem

The analog signal appears with negative pulses; hence the digital pulses also appears negative.

Solution

Analog output pulses are positive. Check if you are using the proper bias for the SiPM. HV should be connected to the cathode and it should be positive. The Anode connection is directly connected to the input of the ASIC

Problem

You can not see the sipm signal on the oscilloscope.

Solution

This problem might happen for several reasons.

1. The SiPM is not connected in the proper direction.
2. The power supply is not properly established.
3. High voltage is not properly set.
4. The MUSIC outputs/inputs are not properly configured via the MUSIC software.
5. If you are using a laser to illuminate the sipm, it might happen that either the laser is not pointing properly to the sensor or the laser illumination is too low

Problem

Excessive current is seen in the High Voltage source coming from a sipm.

Solution

1. Once the MUSIC board is switched on, a led is also light on. You shoul perform a config command using the MUSIC software in order to light off the LED (the light coming from the led will illuminate excessively the Sipm).
2. If the music board is tested inside a black box, it might happen that the black box is not perfectly closed on.

Problem

Signal seems to be affected by the clock used in the FPGA. In this case, you can see regular peaks in the output of the signal with a frequency of repetition of 60Mhz.

Solution

1. Use a probe to check if the clock is only enabled during the execution of a music software command. Use pin P14 to check the clock signal in the music board.

Problem

When the signal is strong (-50 mV) I can see the both single ended and sum signals. However when I low down the signal to -30 mV or lower the single ended signal disappears.
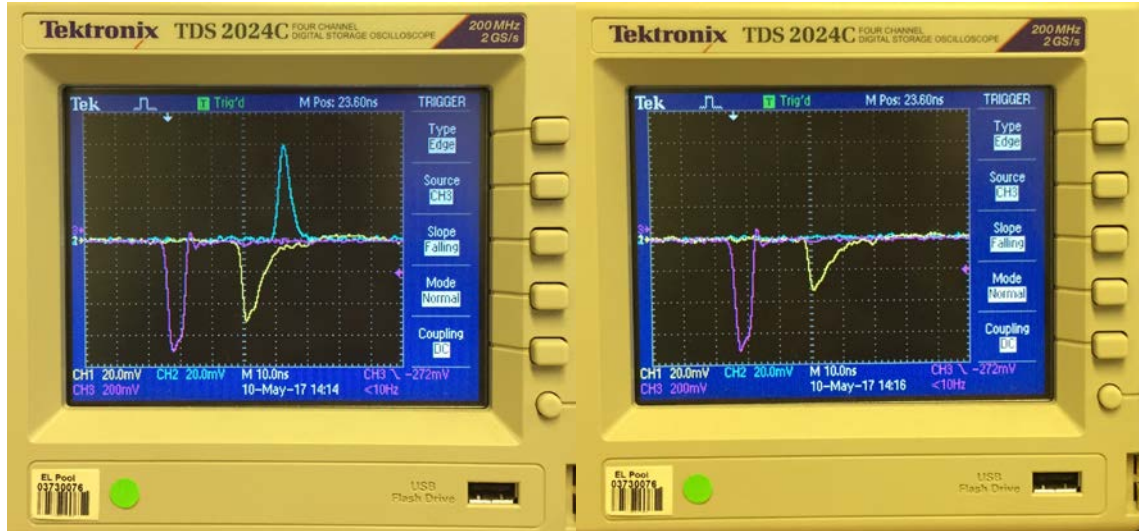
Solution

You see that the single ended signal disappears when you decrease the laser intensity and this is not happening to the differential output. This is happening because you might not have properly set the dc level of the single ended output. This DC level is set with the configuration file.

First, check if the calibration file (MUSIC_MX.vdc) is the one corresponding to your music board. Check the content of the file and check if the values are properly computed. You will expect that all single outputs must have a DC level around 300mV. For the summation outputs, negative differential signal must have a DC value at 1.9V and positive differential signal must have a DC value at 0.9V.

If you are using it, first check the dc level of the single ended channel. Use a tester and measure the DC level on socket P13 of your desired channel. Here you should see a value close to 300mV. The "dissapearing" happens when the DC level is rather slow than this value.

How to configure manually one channel to see if this solves the problem.

1. Configure the ASIC with your desired set up (config the vdc file and enable the desired channel)
2. Save the actual configuration of the ASIC into a file: music show_config -o MUSIC_USER_CONF.calib
3. Load this dumped configuration in interactive mode: music config_file   -f MUSIC_USER_CONF.calib   -a
4. Edit the VDC_CH parameter (it can take values from 0 to 255, normally a number between 100-150 works) so you can obtain 300mV of DC level at the single ended output.
5. Repeat the experiment of disappearing: Get 50mV single ended and summation output and then decrease the laser inteinsity and you must see that both signals disappear at the same time.

Here it is explained for the single ended, but the procedure is exactly the same for the summation outputs.

2. Revision history

1. 12 – February – 2017: Creation of this document
2. 23 – May – 2017: Added a note to tell the user to reconfigure the music board after an abrupt exit of the software. Added also the explanation why the single ended might disappear.