ssm2164_seppoman pcb introduction

seppomans building information;ssm2164_pcb
the following informations are take from the midibox forum, its a collection of infos, without the claim to be 100% true, i will try to test the given information.

Power

+ GND -
J5 is obviously the only connector where you could come to the conclusion that it might have something to do with power supply.Just like the:
AOUT(NG), the 2044 board, the MB_FM module etc, **it expects a bipolar power supply of +/- 12 V and GND.**

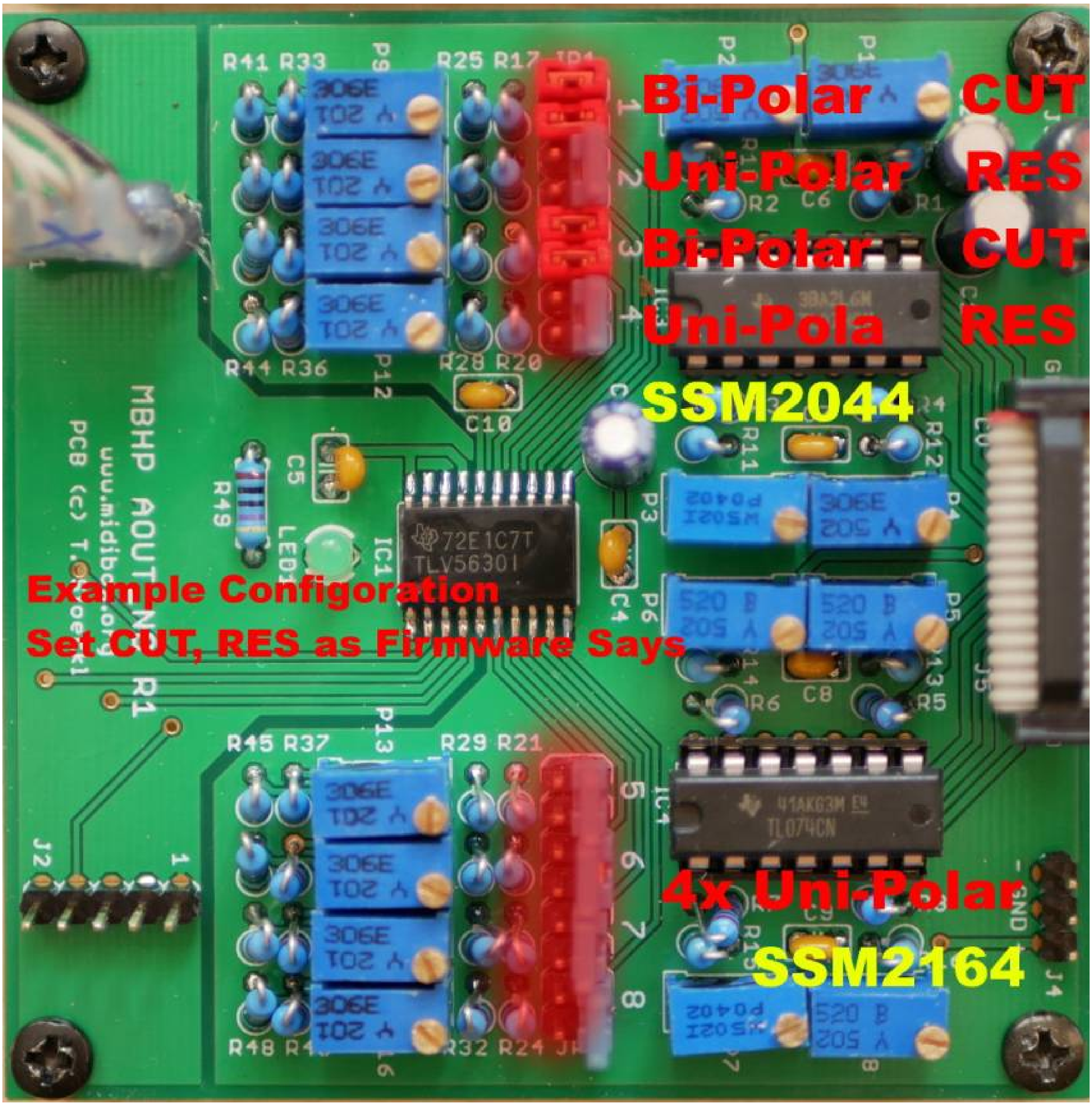
CV

as a general rule of thumb you can assume that everything that doesn't specifically mention a bipolar control voltage will expect an unipolar CV.
In the case of this module, IIRC the dynamic range of the regular **CV range (0 .. 11.67V)** (uni-polar!) is about 65 dB, with 0V being "silence" and 11.67V being unity gain.
I have never thought about what happens if you apply a negative voltage to the CV input…

Note also that generally a bipolar control voltage (CV) still doesn't mean that there are more than two wires involved,
just the one signal can be above or below GND.

AOUT_NG Connect and Setup

Unipolar Jumpering like shown:



AOUT_NG Stuffing Parts PCB

Resistor Solution stock - very low voltage

if you followed aout_ng built plan you will get following Stock-CV-Voltages @+-12V PSU:
Uni-Polar CV-Range: 0-11,4V
Bi-Polar CV-Range: +-3V

SSM2164 & Stock AOUT_NG:
As the SSM2164 is UniPolar, and seppoman designed it as a couple with AOUT_NG. stock is ok

SSM2044 & Stock AOUT_NG:

As the CUT-Off-CV is UniPolar, and seppoman designed it as a couple with AOUT_NG. stock is ok
I guess for proper +/- 5V operation I'll have to try out a few other resistor values on the SSM module, but this will only apply if you if you're using a different CV source than an AOUT_NG.

If you need more CV-Range: for more distortion, drive, range, or other modules:

if you sum two voltages through two resistors of same value, you'll get (V1+V2) / 2 as a result…

Resistor Solution low voltage - seppomans prefered

R9…R16 > 5.6k (only on the channels that are setup for bipolar mode)
+-3.5V to +-5.8V Bi-Polar calibration range
Pro: easy job, still have a decent precision when calibrating.
Con: “just change the jumpers if you need some channel in bipolar mode” thought will not work. (Fix Me! really?)

Resistor Solution Stock - -5V Level shifter - NorthernLightX prefered

we came to the conclusion that it's probably much easier to have the AOUT only output **unipolar 0 to 10 volt**, and design **a simple -5v level shifter board** that can be used as an add-on (or separate module with hands-on access to the level shifting) to **shift the output to -5 to +5 volt** where needed.

Things to consider are:

- not a lot of equipment actually makes use of negative voltages

- equipment that needs bipolar CV input can be retrofitted with a fixed level shifter at the input to make it compatible with your other modules

- negative voltages can be used for CV modulation purposes (modulate one CV source with another) so it's certainly not useless

Resistor Solution high voltage

R1…R8 > 10k

R9…R16 >2.2k (on all channels). (QUESTION WHY ON ALL? Fix Me!)
+9.5V to +22V Uni-Polar calibration-range

+-2.4V to +-5.5V Bi-Polar calibration-range (dont think so Fix Me!)
Pro: preserve the “just change the jumpers if you need some channel in bipolar mode” thought behind this option.
Con:dramatically increase the calibration range, i.e. exactly calibrating the outputs will get harder because the same angle of turning the pot will have much more impact.

MODs

MODE Resistor - Noise vs Distortion

SSM2164 Pin 1 (the first pin) sets the “Mode”

Class AB

Pin is Open, no Resistor to +12V (PCB Default)
Lower current results in higher distortion/lower noise.

Class A

Pin is Connected to +12V via a Resistor
Higher current results in lower distortion/higher noise
lets look in the datasheet:

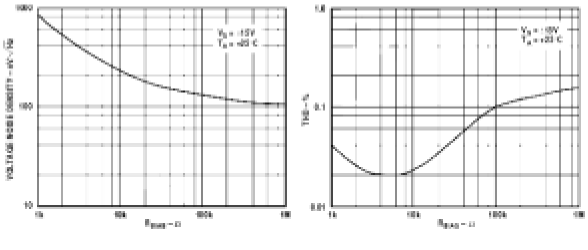


Figure 11. Voltage Noise Density vs. R_{BIAS} *Figure 12. THD vs. R_{BIAS}*

Figures 11 and 12 show the THD and noise performance of the SSM2164 as the bias current is adjusted. Notice the two characteristics have an inverse characteristic. The quiescent current in the core is set by adding a single resistor from the positive supply to the MODE pin. As the simplified schematic shows, the potential at the MODE pin is one diode drop above the ground pin. Thus, the formula for the MODE current is: I MODE = (V +) − 0. 6 V R B With 15 V supplies, an RB of 7.5k gives Class A biasing with a current of 1.9 mA. Leaving the MODE pin open sets the SSM2164 in Class AB with 30 µA in the Gain-Core