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.**

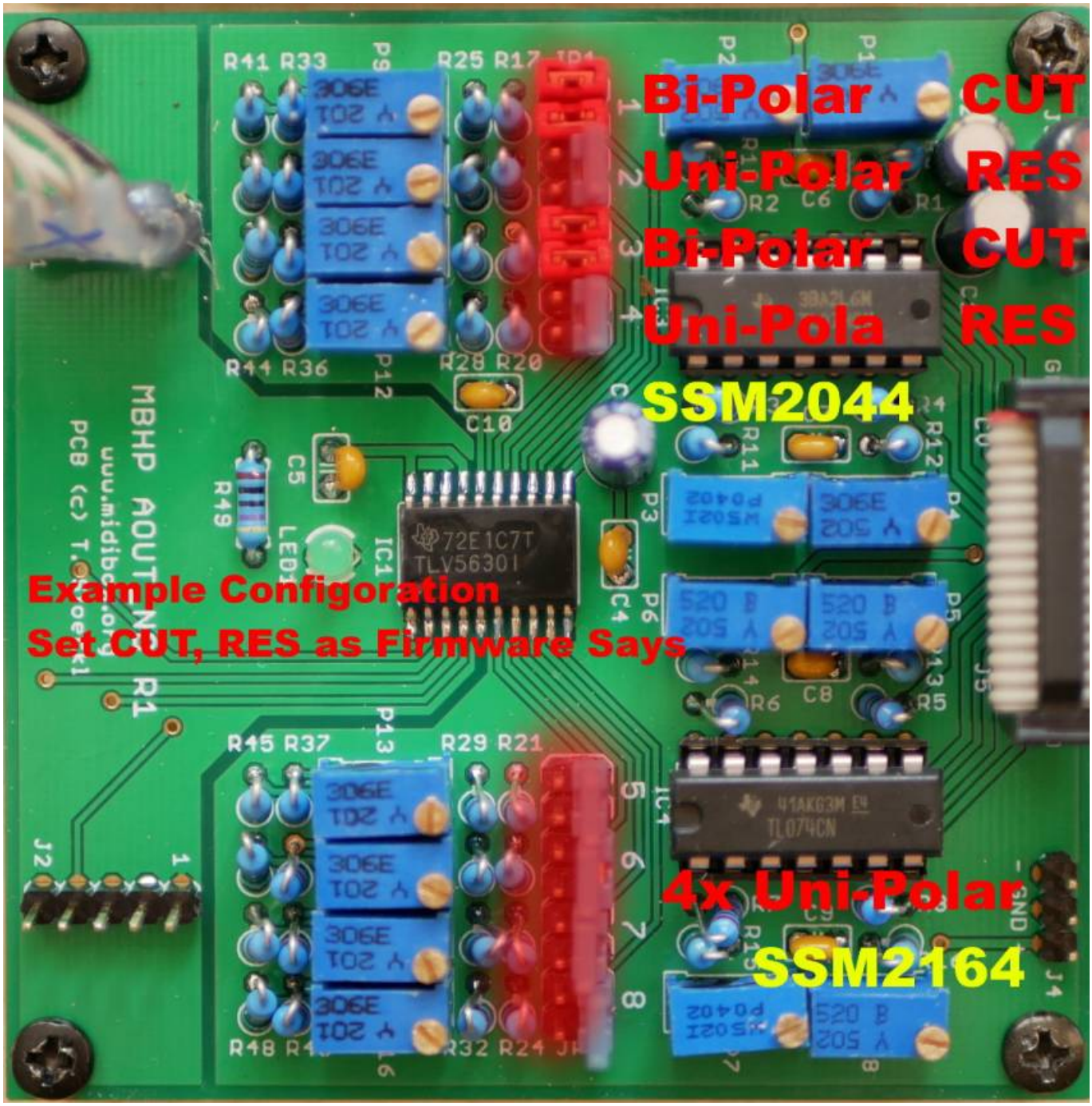
CV

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

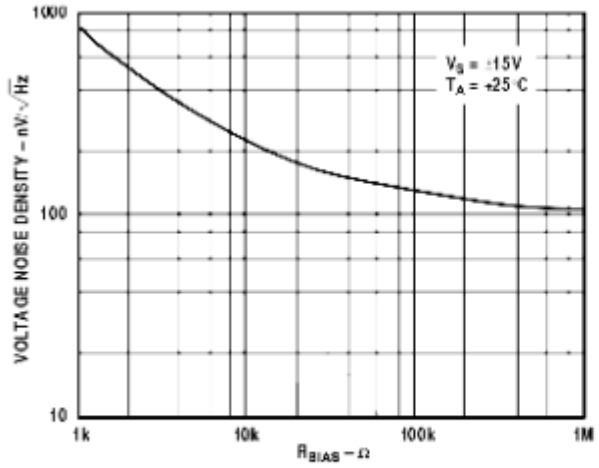


Figure 11. Voltage Noise Density vs. R_{BIAS}

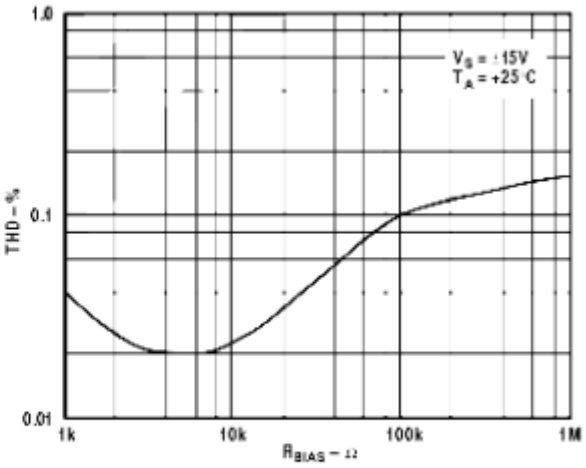


Figure 12. THD vs. R_{BIAS}

Figures 11 and 12 show the THD and noise performance of the SSM2164 as the bias current is adjusted

I_MODE = ((V+)−0.6V)/ RB
1,52mA = (12V-0.6V) / 7,5K
Leaving the MODE pin open sets the SSM2164 in Class AB with 30 µA in the Gain-Core