

PSG10M

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1 Power supply

Power is received via a USB C connector and negotiated to 5V at 3A using 5.1k resistors on CC lines.

This voltage is boosted to 20V and all other voltage levels derive from this one.

15 V rail is loosely regulated using a capacitance multiplier. 5V rail is generated using a 7805 IC.

-20 V are generated by inverting the aforementioned 20 V rail. -15 V and -5V rails are obtained the same way as their positive counterparts.

1.1 Expected load

Worst case load is 10V into 50 ohms, yielding 200 mA of current. This current is however limited by the output buffer to 150 mA.

Say 50 mA for all operational amplifiers, and 50 mA for the MCU and the display. Total current capacity of the capacitance multiplier BJTs has to be 250 mA.

At 5V drop, this results in 1.25W of waste heat. That's too much.

1.2 Revision 1

150 mA is fixed, but there is no need to power the LCD and the MCU with clean power. Only the AD DDS chip.

Further reducing the voltage drop to around 3V, yields a loss of 0.45 W. Bordering on manageable, considering this is an edge case only occurring on one voltage multiplier at a time.

5V still gets generated by 7805 family, while the MCU and LCD get direct VBUS power.

2 User interface

2.1 16x2 LCD Display

First row displays currently modified parameter: either frequency, amplitude, dc offset, signal shape, duty cycle. Second row lists those parameters: Freq Amp DC Sig Duty On/Off ... with scroll functionality.

2.1.1 Display mounting

Soldering on the front panel PCB directly by removing the I2C converter, and pouring solder in the mounting holes to attach to front panels back side.

Other option is mounting it using a screw terminal and its 3 mm screw.

2.2 Rotary encoder

First rotary encoder "Value encoder" modifies the currently active parameter. When amplitude is selected in the bottom row "menu row", than rotating the value encoder changes amplitude.

Second rotary encoder, "menu encoder", changes the currently active parameter in the menu row.

2.2.1 Frequency menu

Shows current frequency when non PWM mode. If PWM, shows duty cycle as well. Pressing menu encoder shows period instead. If PWM, shows on vs off time. Pressing value encoder changes current digit.

2.2.2 Amplitude menu

Shows current amplitude and DC offset. Pressing menu encoder shows min and max values as well. Pressing value encoder changes current digit.

2.2.3 Sig menu

Shows current signal type and output enable state Pressing menu encoder TBD. Pressing value encoder changes current digit.

3 Mechanical

3.1 Box

Box could be the Kradex Z4A in black.

4 References

AD9833 Waveform Generator by vwlowen