

5060-5061 Line trigger

Features

- Low-jitter mains trigger box
- Filtered or unfiltered, selectable by jumper
- 50 or 60 Hz filter depending on variant
- 9-12 V_{RMS} AC input power
- 5 V trigger signal
- Dual SMA outputs

Applications

- 50 or 60 Hz magnetic field noise cancellation

General Description

The 5060-5061 Line trigger is a 4hp Sinara EEM, designed as a low-jitter 50 Hz or 60 Hz mains trigger box. The 5060 variant features a filter optimized for an operating frequency of 50 Hz, whereas the 5061 variant is optimized for 60 Hz. Dual front-panel SMA outputs are provided.

9 V_{RMS} to 12 V_{RMS} at 50 Hz / 60 Hz should be fed to the card via front-panel barrel jack. A suitable power adapter for local mains voltage and frequency is required as external accessory.



Figure 1: Line trigger 60 Hz front panel

Source

5060-5061 Line trigger, like all the Sinara hardware family, is open-source hardware, and design files (schematics, PCB layouts, BOMs) can be found in detail at the repository https://github.com/sinara-hw/Line_trigger.

External Power Adapter

Any suitable 9 V_{RMS} or 12 V_{RMS} AC power adapter may be used to feed 5060-5061 Line trigger with mains power. Depending on region, examples include 77DE-06-09¹, WAU12-200², or 77DB-12-09³.

In Sinara crates ordered from M-Labs, a power adapter for requested mains frequency/voltage is included.

Configuring Filter

The use of Line trigger's output filter is configured by setting a jumper on the board. The jumper can be found at the lower left of the board, labeled `DIRECT` and `FILTER`.

When `FILTER` is selected, a bandpass filter is applied to the input. In environments where other electronics sharing a ring circuit with Line trigger may cause distortion of AC current or AC voltage in the mains input, use of this filter will reduce output jitter. The filter is optimized for 50 Hz or 60 Hz depending on variant. When `DIRECT` is selected, the filter has no influence, and the output of the 50 and 60 Hz variants are identical.

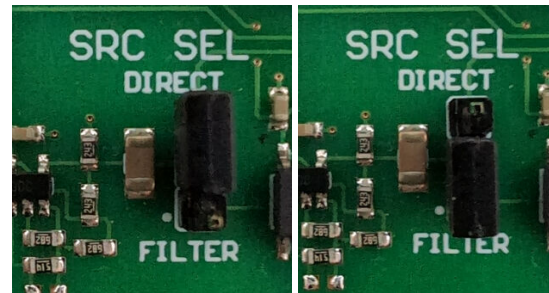


Figure 2: Jumper set to `DIRECT` (left) and `FILTER` (right) positions

Electrical Characteristics

Table 1: Electrical Characteristics

Parameter	Min.	Typ.	Max.	Unit	Conditions
Input voltage	9		12	V _{RMS}	
Output TTL voltage		5		V	High impedance
		2.29		V	50 Ω impedancet
Output frequency		50		Hz	Variant 5060
		60		Hz	Variant 5061

†In general, Line trigger outputs should not be connected to low-impedance inputs.

¹<https://www.digikey.com/en/products/detail/ideal-power-ltd/77DE-06-09/15667507>

²<https://www.digikey.com/en/products/detail/triad-magnetics/WAU12-200/4915294>

³<https://www.digikey.com/en/products/detail/ideal-power-ltd/77DB-12-09/15667513>

Measurement data

The following measurements compare the filter configurations (50 Hz and 60 Hz, on and off) of 5060-5061 Line trigger. Oscilloscope input is shown by yellow trace; Line trigger output is shown by pink trace.

Filtered input

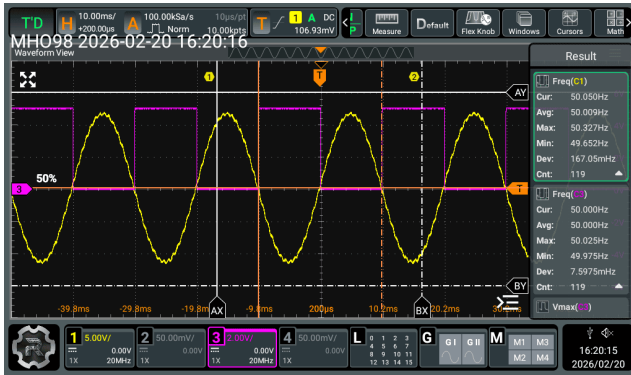


Figure 3: 50 Hz variant, 50 Hz input, filtered

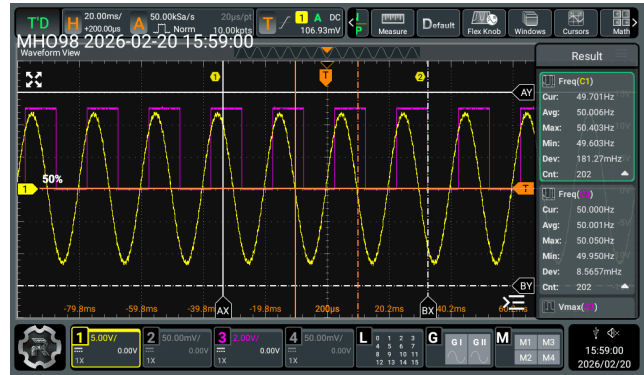


Figure 5: 60 Hz variant, 50 Hz input, filtered

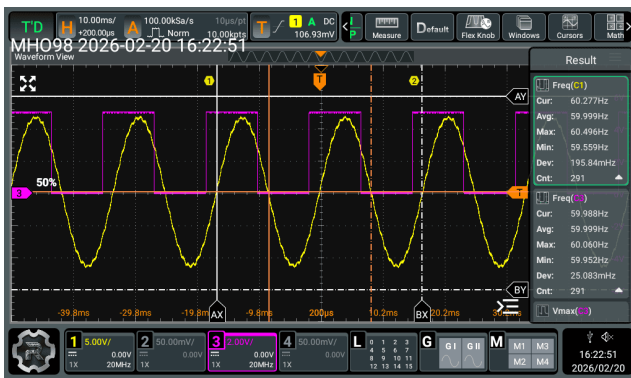


Figure 4: 50 Hz variant, 60 Hz input, filtered

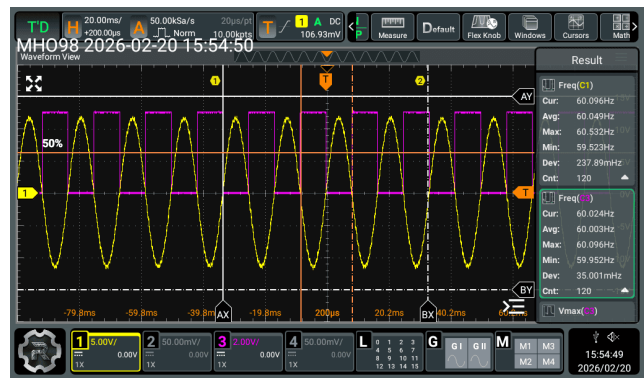


Figure 6: 60 Hz variant, 60 Hz input, filtered

Direct input

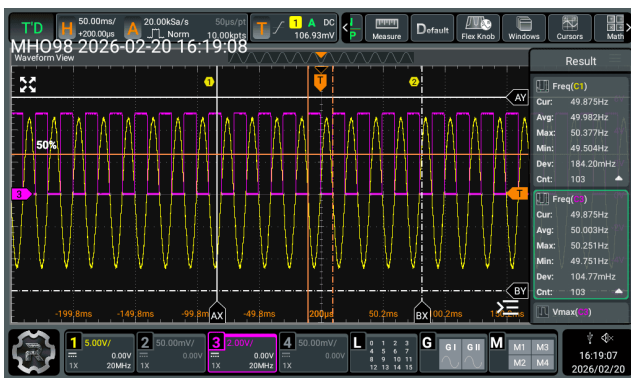


Figure 7: 50 Hz variant, 50 Hz input, direct

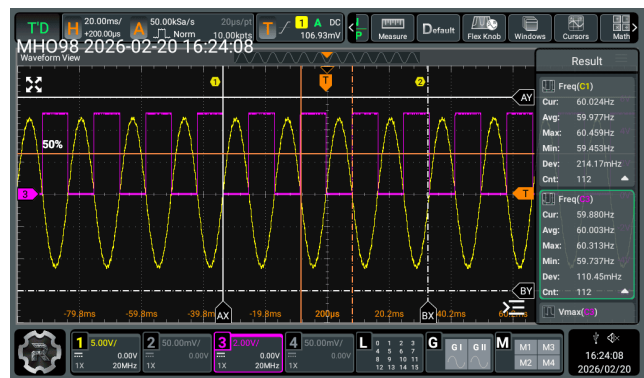


Figure 8: 50 Hz variant, 60 Hz input, direct

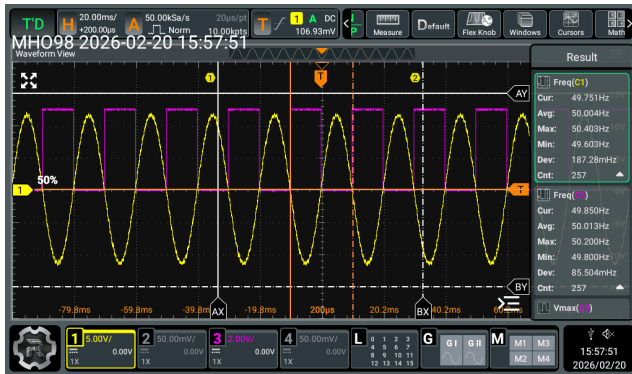


Figure 9: 60 Hz variant, 50 Hz input, direct

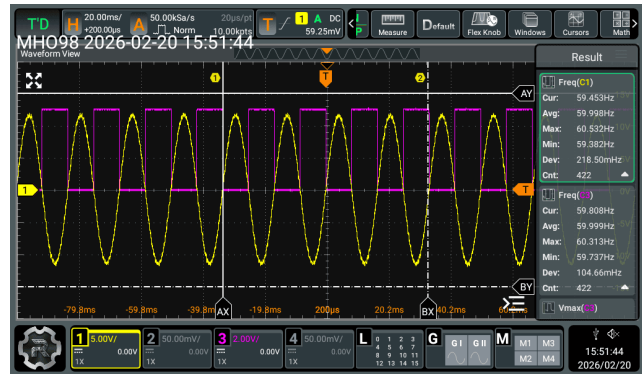


Figure 10: 60 Hz variant, 60 Hz input, direct

Ordering Information

To order, please visit <https://m-labs.hk> and choose 5060 Line trigger 50 Hz or 5061 Line trigger 60 Hz in the ARTIQ/Sinara hardware selection tool. Cards can be ordered as part of a fully-featured ARTIQ/Sinara crate or standalone through the 'Spare cards' option. Otherwise, orders can also be made by writing directly to <mailto:sales@m-labs.hk>.

Information furnished by M-Labs Limited is provided in good faith in the hope that it will be useful. However, no responsibility is assumed by M-Labs Limited for its use. Specifications may be subject to change without notice.