TECHNICAL REPORT

TITLE	**: Technical Report on Quad channel Level Adapter module**
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Technical Report on
Quad channel Level Adapter module

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Abstract

As a part of the on going nuclear instrumentation development activities, for HIRA/HYRA at IUAC, a Quad channel Level Adapter NIM module has been developed successfully. The unit accommodates four identical and independent channels of level translation while each channel facilitate interfacing between F/NIM and TTL logic signals. Each channel accepts either of the two inputs, F/NIM or TTL and convert it into direct and inverting TTL and F/NIM logic signals.

Acknowledgment

We would like to thank Dr D. Kanjilal and Dr. N. Madhavan for their continuous support and providing necessary infrastructure in order to accomplish this project successfully.

Specifications

Number of channels : Four

Logic inputs : F/NIM & TTL (input impedance 50/1000 ohm respectively)

Logic outputs : F/NIM & Complementary F/NIM
(delivers standard 16mA to generate 800mV step across 50 ohm)

TTL & Complementary TTL (series terminated by 22 ohm)

(All output signals width equal to input signal width)

Propagation delay (nS): 3**nS** (NIM_IN - TO - NIM_OUT)

8**nS** (NIM_IN - TO - TTL_OUT)

4**nS** (TTL_IN - TO - NIM_OUT)

8**nS** (TTL_IN - TO - TTL_OUT)

Power requirements : 6V / 250mA & -6V / 600mA

Description

Level Adapter module is a general purpose module to cater the need of logic translation from TTL to F/NIM & vice-versa. This in-house developed single width NIM module contains four identical and independent channels of TTL and F/NIM logic interface circuitry as shown in the block diagram. Each channel accepts either TTL or F/NIM logic input which is further processed to generate F/NIM and TTL logic outputs (direct as well as inverting logic).

All input and output signals are provided on the neatly labeled front panel through LEMO 00 series connectors. All the channels are supplied with DC power from rear panel NIM connector through pi-type LC filter.

The currently fabricated PCB is of FR4 glass epoxy, four layer and 1.6mm thick having dimensions of 110mm X 188mm. High quality SMT components are used to assemble these boards for compactness.

To perform logic conversion, input logic signals (TTL and F/NIM) are level translated to ECL signals using ultra fast 100EL series ECL chips and are wired-OR. To generate ideal complementary TTL pulses, the wired-OR signal is fed to ECL to

TTL translator followed by schmitt trigger buffer. An output transistor buffer stage has been added to improve current driving capability. TTL outputs are series terminated with low impedance to reduce signal attenuation.

To generate F/NIM logic output signals, the wired-OR signal is converted to differential ECL signal before feeding to ECL to F/NIM translator circuit which is designed using ultra wideband transistor pair to preserve bandwidth of the signal. Standard ECL termination and differential line layout techniques has been followed to retain signal characteristics.

Test Result

All the channels' functionality has been verified for expected outputs using F/NIM and TTL inputs.

Conclusion

We have successfully demonstrated implementation of a Quad channel Level Adapter single width NIM module. The module finds wide scope and is being used regularly to meet interfacing requirements in various test set-ups including experimental facilities at IUAC

References

1. MECL System Design Handbook (ON Semiconductor).

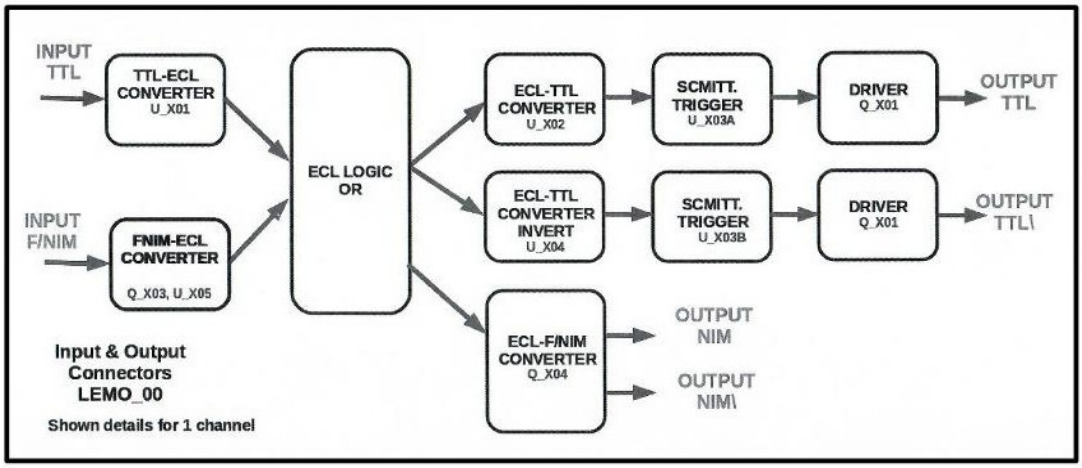

FIG1.: Block diagram of one channel of Level adapter module

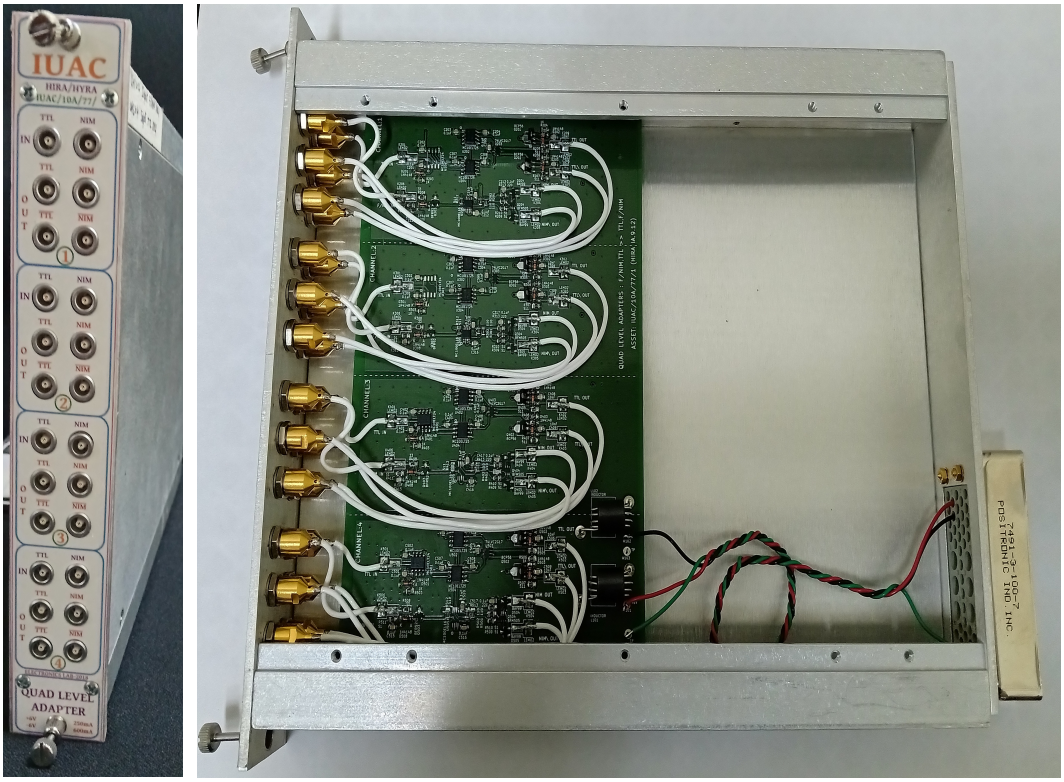

FIG 2: Front and Inside view of Quad channel Level adapter module

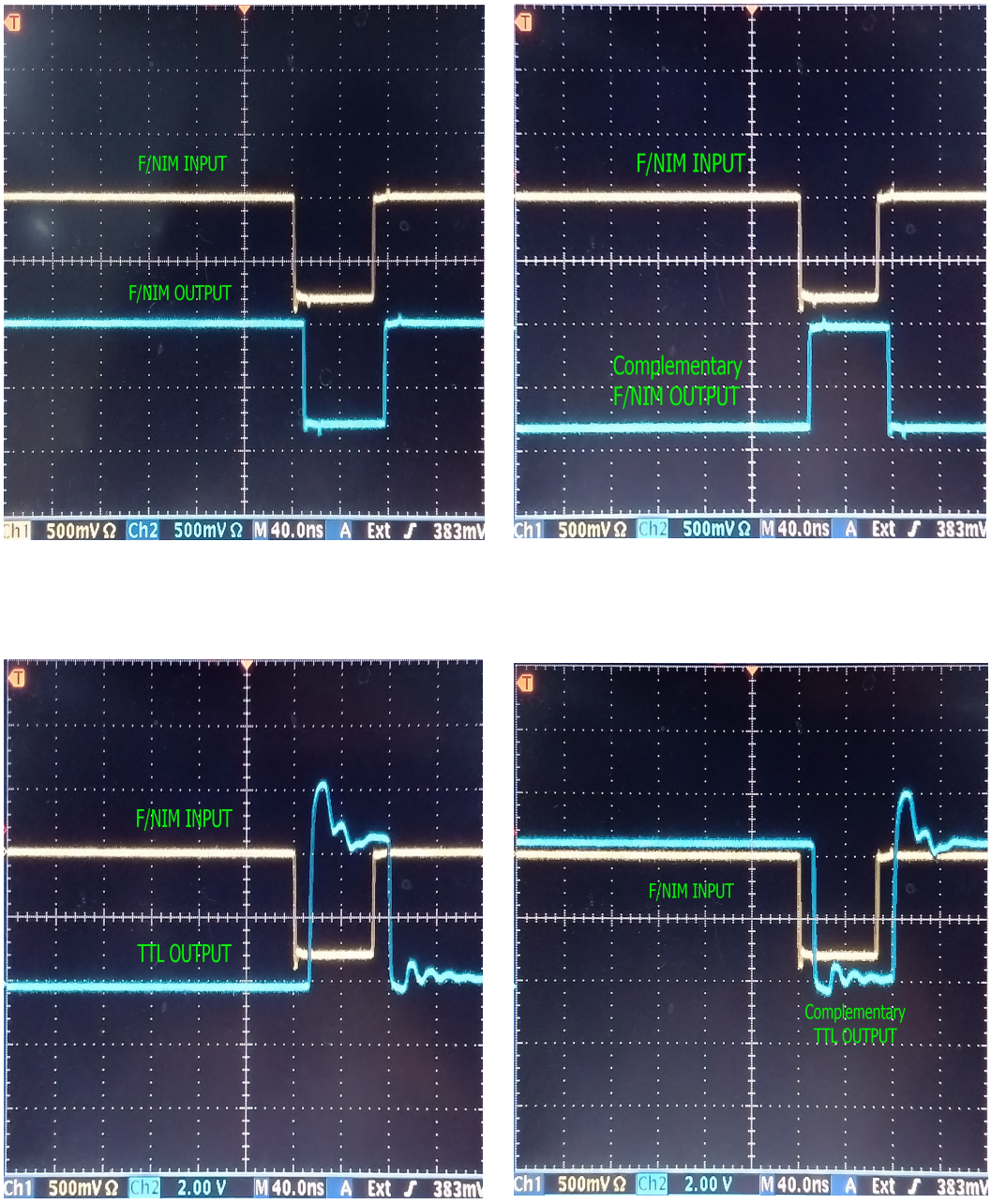

FIG 4: Input and output signals observed with Level adapter module

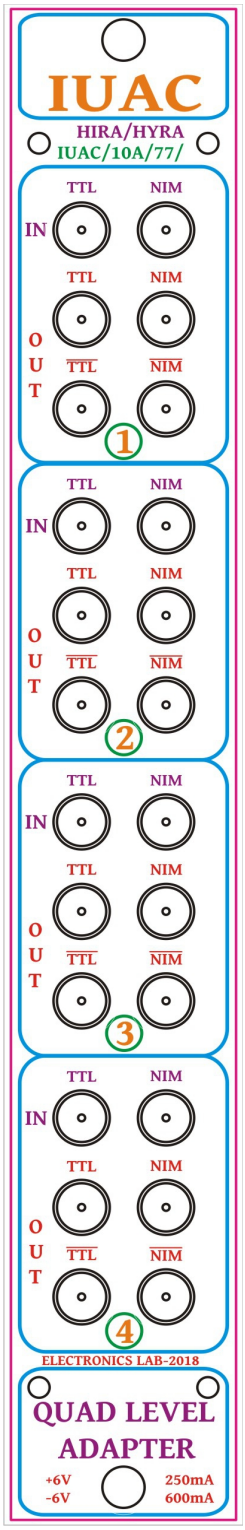

FIG 3: Front panel label details. All the holes are of 7mm diameter