Technical Information Manual

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MOD. A 992

16 CH IMPEDANCE ADAPTER

NPO:00112/00:A992x.MUTx/01

CAEN will repair or replace any product within the guarantee period if the Guarantor declares that the product is defective due to workmanship or materials and has not been caused by mishandling, negligence on behalf of the User, accident or any abnormal conditions or operations.

CAEN declines all responsibility for damages or injuries caused by an improper use of the Modules due to negligence on behalf of the User. It is strongly recommended to read thoroughly the CAEN User's Manual before any kind of operation.

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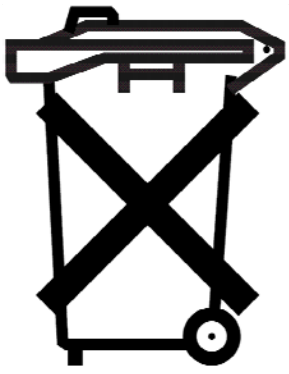
CAEN reserves the right to change partially or entirely the contents of this Manual at any time and without giving any notice.

Disposal of the Product

The product must never be dumped in the Municipal Waste. Please check your local regulations for disposal of electronics products.



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1. Introduction

The Mod. A992 is a plug-in card, provided with 16 independent input channels, to be mated with the Mod. V792 QDC (charge analog-to-digital converter). The card's features are:

- Matching the QDC's input impedance from 50 Ohm to 110 Ohm.
- Decoupling the QDC's and the source's ground.
- Converting differential signals into single ended signals.

This card is particularly useful when it is necessary to handle pulses with short rise times (~1÷10 ns), where a precise input impedance matching is required.

2. Hardware Description

2.1 Electrical and mechanical specifications

Input Channels:	16 channels on 17+17 pin, 3M 3431-6202 Header-type connector
Output Channels:	16 channels on 17+17 pin, 3M 89134-0101 Header-type connector
Electrical Transformer:	Core: PH 4322-020-34400; Coil-ratio: 7/5

2.2 Packaging

The Model A992 is a plug-in card to be inserted into the Model V792 QDC input connector. The card is housed in a metal case, thus shielded. The card does not require power supply, the ground reference is provided by the output connector's 33 and 34 pins.

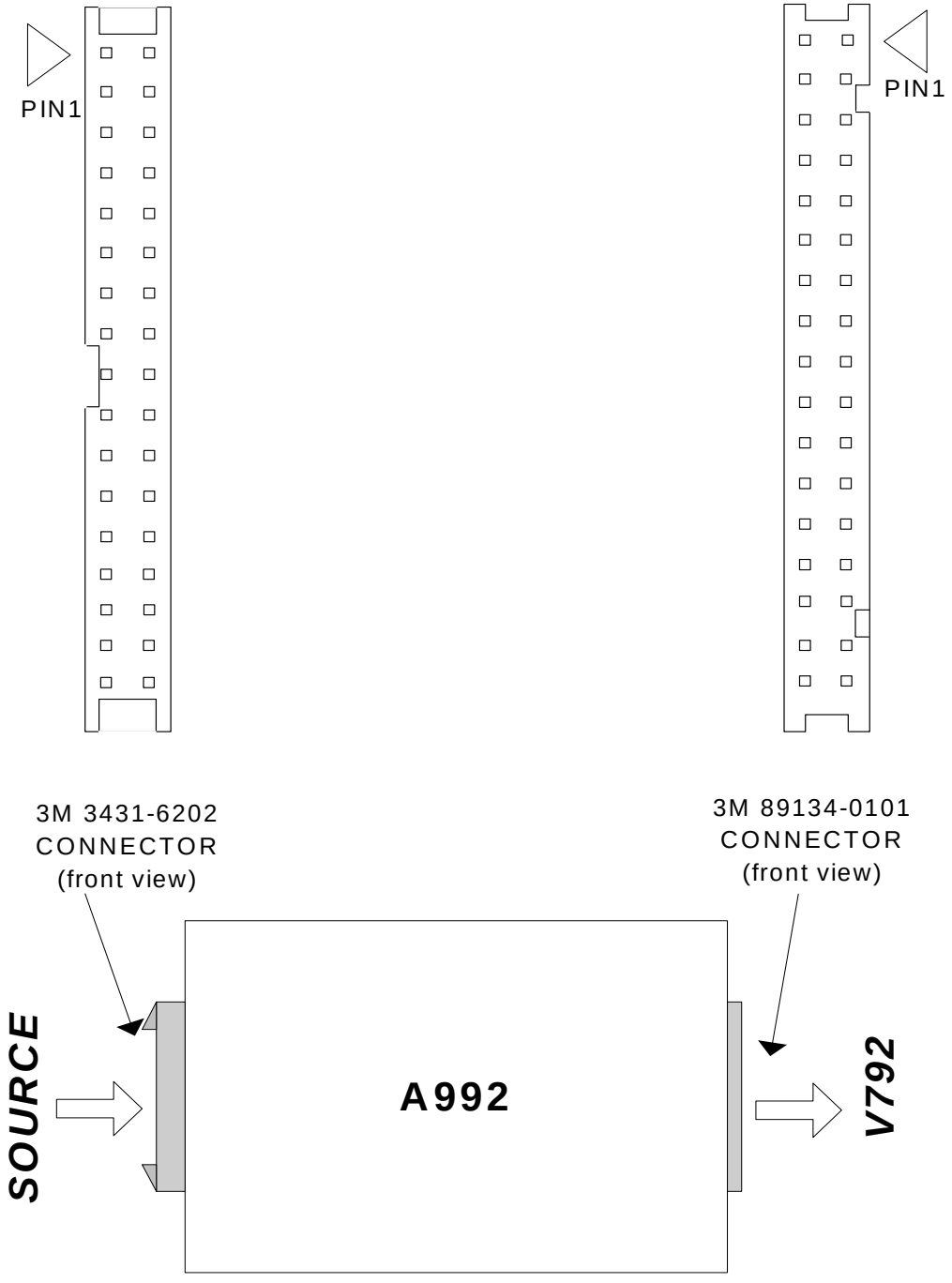

Fig. 2.1- The Mod. A992 input and output connectors

3. Functional Description

3.1 Mod. A992 Electrical and Mounting Schemes

The Fig 3.1 scheme illustrates the chain composed by <Source>+A992+V792. One A992 channel electrical scheme is also shown.

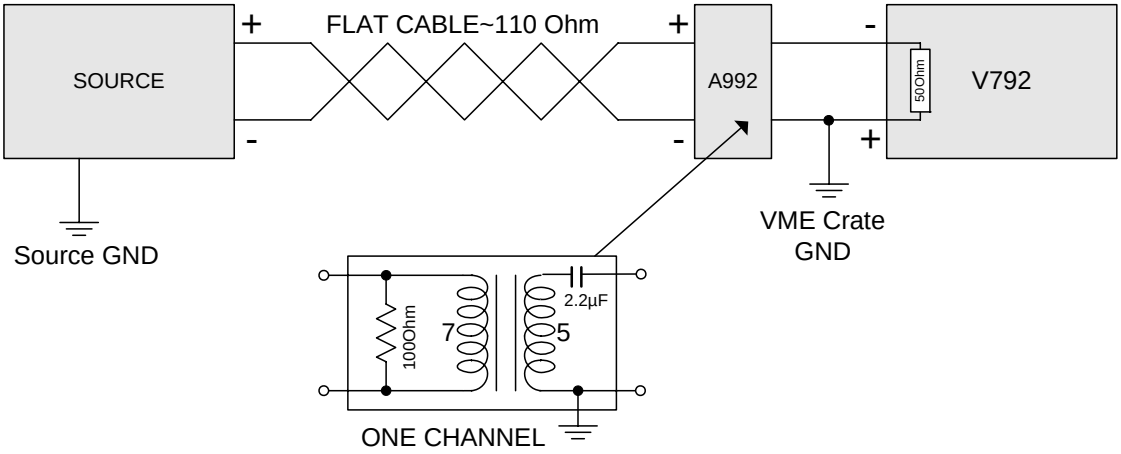

Fig. 3.1 - <Source>+A992+V792 Chain

3.2 Impedance matching

The input impedance of a device must be as close as possible to the impedance of the line which connects it with the source, otherwise the complete signal transfer is not possible and reflection takes place, especially if the input signal is a fast current pulse. The problem can be solved matching the cable's and the device's impedance. The Mod. A992 performs the impedance matching.

3.3 110 Ohm/50 Ohm Impedance Conversion

The Mod. V792 has a 50 Ohm input impedance while the flat cable, which connects it to the pulses' source, has (typically) 110 Ohm; so impedance matching is necessary in order to avoid reflection, especially when the input pulse (hit) is produced by devices such as fast photomultipliers (~1÷10 ns rise time). The Mod. A992 provides impedance matching (see Fig. 3.2) via a transformer with a 7/5 coil ratio.
The 100 Ohm resistor is added in order to avoid oscillations due to LC coupling: Fig. 3.2 shows the A992 output when it receives pulses from a photomultiplier:

- Lower trace: the 100 Ohm resistor is not present, LC coupling between the photomultiplier and the A992 primary coils, thus oscillations, occur.
- Upper trace: the 100 Ohm resistor is present and manages to perform oscillation damping, although it reduces the signal's amplitude.

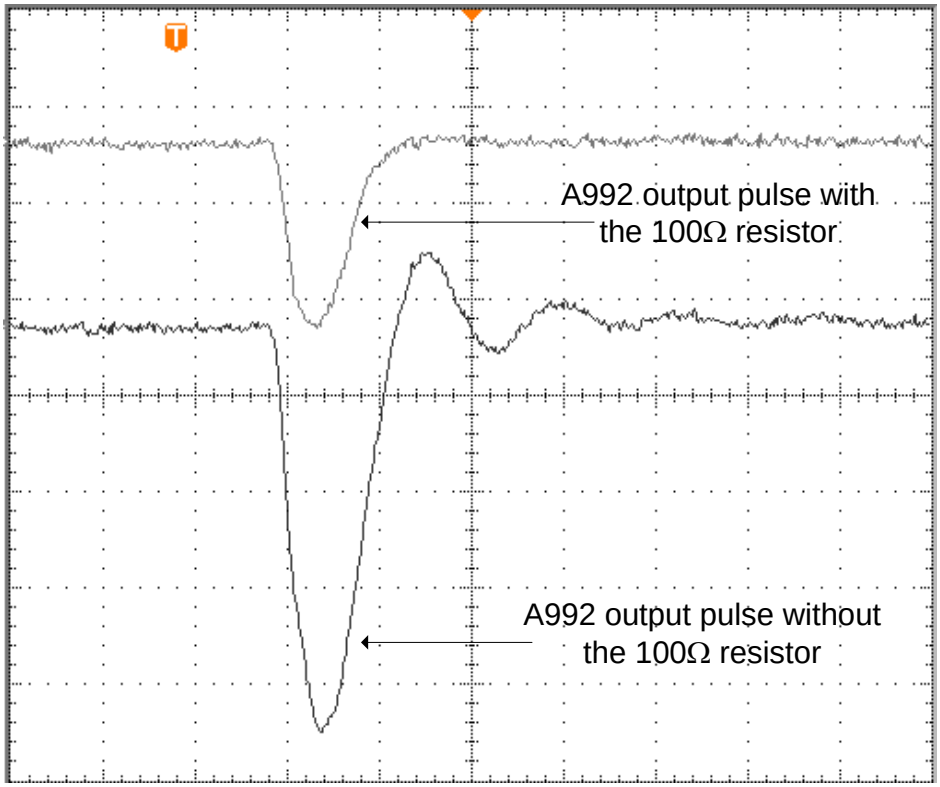

Fig. 3.2 – Effect of the 100 Ohm resistor on the A992 output pulses

The 2.2µF capacitance of the Mod. A992 eliminates low impedance loops which may cause malfunctioning of the Mod. V792 input circuit (see Fig. 3.3).

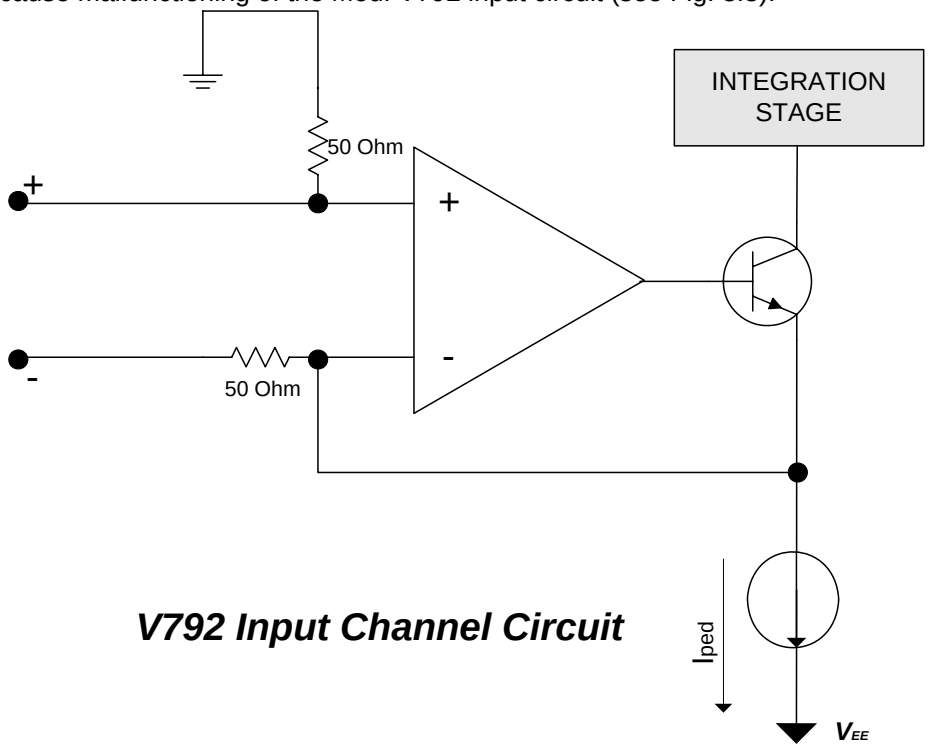

Fig. 3.3 – Mod. V792 Input Channel Circuit (simplified scheme)

3.4 Signal conversion

The Mod. A992 receives from the source *differential* signals (i.e. only the difference between the two poles value is fixed, but no ground reference is provided) and produces *single-ended* signals (i.e. signals provided with a ground reference), thus avoiding ground loops (i.e. the connection between the ground of the source and the ground of the crate, which, in general, do not coincide), which may increase noise level. The Fig. 3.4 illustrates the Mod. A992 input and output signals.

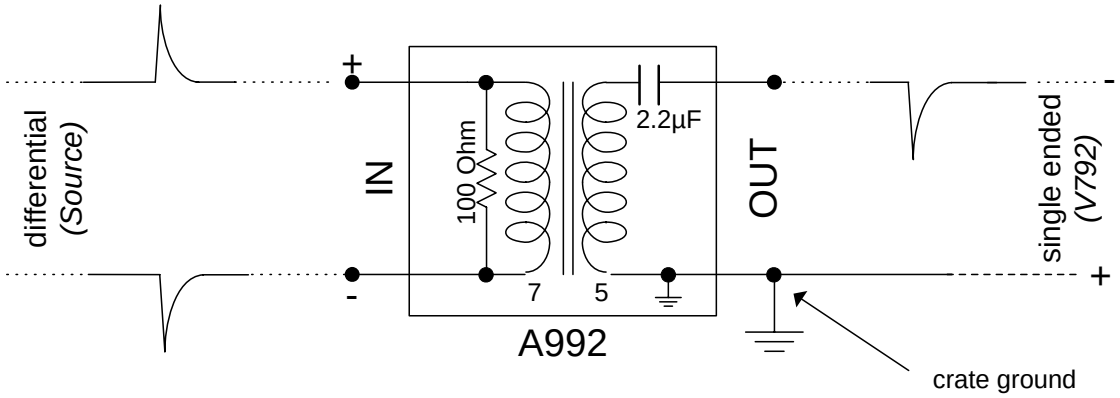

Fig. 3.4 –Mod. A992 input and output signals