

623B Octal, 100 MHz Discriminator

821 Quad, 100 MHz Discriminator

4608C Octal, 150 MHz Discriminator *(Note - the 4608C is no longer available)*

- NIM Packaging
- High Speed
- Variable Threshold and Output Width Per Channel
- Good Stability
- No Multiple Pulsing

GENERATION OF LOGIC PULSES FROM ANALOG SIGNALS

A discriminator generates precise logic pulses in response to its input exceeding a given threshold. Output pulses are of standard amplitude and of preset duration or proportional to the input rate. The threshold is a specific voltage of interest to the user (which can be set above some critical noise level or correspond to a physical quantity such as energy). In other applications, the threshold level can correspond to a certain level of integrated rates (coincidence events).

The output of a discriminator can be used to trigger or gate associated portions of the data collection system or to generate pulses which are to be counted. It may also be integrated into a complex logic system allowing sophisticated decisions to be made in real time.

LeCroy's family of NIM discriminators offers flexibility and versatility with features such as at least three outputs per channel, adjustable output width and variable threshold level settings. The low minimum threshold levels permit the use of lower gain photomultipliers, long input cables and often avoid the need for preamplifiers.

FUNCTIONAL DESCRIPTION

LeCroy's NIM discriminators offer versatility, high speed, multiple input and high performance packaged in single -width NIM modules. All models have small double pulse resolution times and have updating capabilities to reduce dead time. Input signal threshold levels as well as output pulse widths are fully adjustable over a wide range for each channel. Each module offers at least three outputs per channel for added convenience and has a maximum counting rate exceeding 100 MHz. In addition, a common Veto or Inhibit is provided.

Each module offers a variable threshold from -30 mV (-15 mV for the Model 4608C) to -1 V via a front-panel screwdriver adjustment for each channel. The low threshold level is useful when working with signals directly from photomultipliers and other detectors. A monitor point is provided to permit measurement of the threshold level with a voltmeter, assuring accurate results even in varied operating environments. Threshold stability is 0.3%/°C or better. Low input reflections make these units less sensitive to multiple pulsing.

The Model 623B and the Model 821 operate at maximum rates of 100MHz while the Model 4608C operates up to 150 MHz. All modules have updating capability which permits retriggering while an output from a previous input is still present. A second pulse, which exceeds threshold while an output is already occurring extends the present output by the preset width. However, if the second threshold crossing occurs within the double pulse resolution time, the module will not respond. This configuration is useful when the discriminators are used in DC coincidence logic.

The 821 and 4608C have a selectable Burst Guard operation. In this mode, the output is extended until the falling edge of the last pulse of the burst when input pulses are separated by less than the resolving time. This feature is particularly important when the module is used in Veto applications.

Although the actual width depends on the rate of input and the mode of operation, outputs of the modules are NIM Standard (see Application Note AN-34) level signals with minimum widths set by the front-panel controls. There are a minimum of three standard negative NIM outputs per channel. In addition, the 821 and the 4608C

both have one complementary output per channel.

The 4608C includes a built-in test feature which simulates an input signal for each channel. The test feature is enabled with the receipt of a NIM level applied to the front-panel Lemo connector and permits rapid simultaneous testing of all channels.

SPECIFICATIONS

Model 821

INPUT

Signal Inputs: Four inputs via Lemo connectors, 50 ohm $\pm 5\%$ protected to ± 5 A for 0.5 μ sec, clamping at +1 and -7V. Reflections: $< 1\%$ for input pulses of 3nsec rise time. Offset 0 ± 2 mV.

Threshold: -30mV to -1.0 V; front-panel screwdriver adjustment. Stability: 0.2%/°C over 20°C to 60°C operating range. Threshold Monitor has 10:1 ratio of monitor voltage to actual voltage, $\pm 5\%$. Hysteresis: 15 mV.

Veto: Front-panel connector permits simultaneous inhibiting of all channels; 50 ohm; requires NIM-level signal; direct-coupled, must overlap leading edge of input signal. Must precede input by approximately 5 nsec to inhibit. Minimum width 5nsec.

Bin Gate: Slow gate via rear connector and rear-panel ON-OFF switch; rise times and fall times approximately 50 nsec; clamp to ground from +5 inhibits; direct-coupled.

OUTPUT

Negative Outputs: Two bridged pairs (0 mA quiescently, -32 mA during output). Amplitude limit of -1.2 V. Rise time < 2.0 nsec, fall time < 2.5 nsec typical but slightly longer on wider output durations. Width Stability is $< \pm 0.2\%/^{\circ}\text{C}$ maximum. Duration of output depends on mode of operation selected by front panel switch.

Update Only Mode: 5 nsec to 1 μ sec, continuously variable up to 600 nsec with a setting for 1 μ sec via front - panel screwdriver control. (Narrower widths possible at slight expense of amplitude.)

Burst Guard Mode: Output duration is either equal to the time-over-threshold of the input signal or equal to the preset duration, whichever is greater. For input burst rates greater than the DPR of the unit, the output is equal to the duration of the burst.

Fast Negative Timing Output: Differential type current source (0 mA quiescently, -16 mA in 50 ohm during output). Rise time is typically 1.5 nsec.

Complementary Output: As above except levels opposite.

GENERAL

Maximum Rate: 110 MHz typical, input and output.

Double Pulse Resolution: < 9 nsec.

Time Slewing: < 1 nsec for input amplitudes 110% of threshold and above.

Input-Output Delay: 9.5 nsec, typical.

Multiple Pulsing: None; one and only one output pulse of preset duration is produced for each input pulse regardless of input pulse amplitude or duration.

Rate LED: One per channel. Indicates discriminator output; 10 msec stretching.

Model 4608C

INPUT

Signal Inputs: Eight inputs via Lemo front-panel connectors, 50 W $\pm 5\%$ protected to ± 5 A for 0.5 μ sec clamping at ± 5 V. Reflections: $< 4\%$ for input pulses of 2 nsec rise time.

Threshold: -15 mV to -1 V ± 2.5 mV or $\pm 5\%$, whichever is greater. Stability: better than 0.3%/°C to 60°C operating range. Offset ± 3 mV. Threshold Monitor: front-panel test point has 10:1 ratio of monitor voltage to actual voltage $\pm 5\%$. Hysteresis: Typical 3.5 mV.

Test Input: One NIM input via a Lemo connector on the front-panel, 50 ohm $\pm 5\%$, triggers all channels. Minimum width: 3 nsec. Maximum rate: 150 MHz.

Veto Input: One NIM input via a Lemo front-panel connector, 50 W $\pm 5\%$, permits simultaneous fast inhibiting of all channels. Must precede input signal by approximately 1 nsec and overlap its leading edge in Update Mode or completely overlap input signal in Burst Guard Mode. Minimum duration: 3 nsec.

OUTPUT

Negative Outputs: Three outputs, NIM (0 mA quiescently, -50 mA ± 6 mA during output, -800 mV into three 50 W loads). Amplitude limited to -1.2 V. Duration 4.5 nsec to > 100 nsec. Rise times and fall times less than 2 nsec. Width stability better than 0.3%/°C, 821, 4608C max.

Complementary Output: One output, NIM (16 mA ± 2 mA quiescently, 0 mA during output). Duration, rise times, fall times, and width stability specifications are identical to those of negative outputs.

[*Veto Input to 4608C with Updating and Burst Guard Operations Diagram.*](#)

GENERAL

Maximum Rate: 150 MHz.

Double Pulse Resolution: Typical, 5 nsec.

Time Slewing: 500 psec for input amplitudes from

2x to 20x over threshold.

Input-Output Delay: < 18 nsec.

Test-Output Delay: < 18 nsec.

Multiple Pulsing: None, one and only one output pulse is produced for each input pulse regardless of input pulse amplitude and duration.

Burst Guard: A front-panel switch enables the Burst Guard or Updating operation for all channels.

[*Comparison of Updating and Burst Guard Modes with various fast input signals. DPR is the Double Pulse Resolution.*](#)

[NIM DISCRIMINATORS SELECTION CHART](#)

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