

ORTEC[®]

Linear Gate and S



- For passing and blocking analog signals in the range from +0.1 to +10 V
- Ungated or gated with coincidence or anticoincidence gating
- Strobed linear output with internal or external strobe
- Adjustable output delay and width

The ORTEC Model 542 Linear Gate and Stretcher accepts a linear input pulse through an input linear gate, stretches the peak amplitude of the input pulse, and generates an output pulse with amplitude equal to the input, and shaped to a uniform rise time and width. It is useful for selecting and inhibiting linear signals according to chosen coincidence or timing conditions. The Model 542 features excellent temperature stability, integral linearity, response to high counting rates, and simplicity of operation. In addition, the Linear Gate section features total dc-coupling with essentially zero pedestal and feedthrough.

Each linear input pulse must exceed the adjustable discriminator level to enable generation of an output pulse. The linear output pulse has a fixed rise time, a 100:1 dynamic range, an adjustable width, and is delayed by an adjustable interval (0.5–5 μ s) after the peak of the linear input pulse. Operating in either coincidence or anticoincidence mode, the input linear gate can be disabled or enabled for an adjustable gate period following a Gate Input logic pulse. A switch-selectable external strobe input permits strobing the output during an adjustable interval (5–50 μ s) after the input pulse peak. A slide switch on the front panel permits selection of any one of three input connections: DC Couple, BLR Low, or BLR High. These features make the Model 542 suitable for inclusion directly after the linear amplifier in a system.

The pulse from a Busy Output on the rear panel indicates the time duration from the peak of a Linear Input pulse until the end of the output pulse, as set by the pulse Width control, or until the input discriminator has been reset, whichever is longer. This output can be counted in a scaler to indicate how many pulses are furnished through the system, or it can be integrated to indicate relative dead time.

PERFORMANCE

NOISE CONTRIBUTION <20 μ V rms, referred to input.

GATE FEEDTHROUGH <0.005% of signal amplitude with gate closed.

GATE PEDESTAL Essentially zero, factory-calibrated.

STRETCHER DROOP Typically <0.1 mV/ μ s/V output.

PILEUP REJECTION After the input pulse has reached its peak, subsequent inputs are rejected until both the output pulse has terminated and the input has recovered to the baseline.

GAIN Unity (nominal).

INTEGRAL NONLINEARITY $\leq \pm 0.2\%$ for pulse rise time >100 ns and pulse width >400 ns.

TEMPERATURE INSTABILITY Gain shift < $\pm 0.01\%/^{\circ}\text{C}$, 0 to 50 $^{\circ}\text{C}$ for $V_o = 5$ V.

COUNTING RATE dc-coupled throughout when DC Couple input is selected. The centroid of a pulser spectrum at 85% of full scale will

CONTROLS

INPUT

Slide Switch Front-panel 3-position slide switch selects input circuit desired: BLR High, BLR Low, or DC Couple.

Disc Level Front-panel screwdriver potentiometer adjusts sensitivity level for input discriminator; range +0.1 to +1 V; discriminator remains triggered while input level exceeds adjusted sensitivity.

OUTPUT

Delay Front-panel screwdriver potentiometer; adjusts delay period from peak detect to the start of the output pulse; typical range 0.5 to 5 μ s. (Delay ranges up to 50 μ s available on special request.)

Width Front-panel screwdriver potentiometer adjusts width of the output pulse; typical range 0.5 to 5 μ s.

NORMAL/GATED Front-panel locking toggle switch selects exclusion (Normal) or inclusion (Gated) of external gating function.

GATE PERIOD Front-panel screwdriver potentiometer adjusts duration of gating control from leading edge of Gate Input pulse; range 0.5 to 5 μ s, includes test point for monitoring



shift <0.1% when modulated by 5×10^4 counts/s of random signals from ^{137}Cs source-detector combination with photopeak at 70% of full scale (DC Couple mode and amplifier shaping time $\tau = 1 \mu\text{s}$).

ELECTRICAL AND MECHANICAL

POWER REQUIRED The Model 542 derives its power from a standard NIM bin/power supply. The power required is +24 V, 83 mA; -24 V, 80 mA; +12 V, 130 mA; -12 V, 30 mA.

WEIGHT

Net 0.9 kg (2.0 lb).

Shipping 1.9 kg (4.0 lb).

DIMENSIONS NIM-standard single-width module 3.43 X 22.13 cm (1.35 X 8.714 in.) per DOE/ER-0457T.

adjusted gate period.

COINC/ANTICOINC Front-panel locking toggle switch selects effective mode for Input Gate function.

OUTPUT DC ADJ Front-panel screwdriver potentiometer permits adjustment of output dc level between $\pm 1.5 \text{ V}$.

EXT/INT Rear-panel locking toggle switch selects between (External) strobe operation or (Internal) normal/gated operation.

INPUTS

GATE Front-panel BNC connector for optional external control for switch-selectable coincidence or anticoincidence mode triggering. NIM-standard slow logic pulse triggers selected gate function at +3 V (100 ns minimum width), protected to $\pm 25 \text{ V}$.

LINEAR Front-panel BNC connector.

Polarity Positive unipolar or bipolar with positive portion leading.

Amplitude +0.1 to +10 V linear; $\pm 12 \text{ V}$ maximum

Rise Time 100 ns to 10 μs .

Impedance $\sim 1000 \Omega$.

EXT STROBE Rear-panel BNC connector for optional external control of the output pulse timing. NIM-standard slow positive logic pulse triggers the strobe function at +3 V (100 ns minimum width), protected to $\pm 25 \text{ V}$.

OUTPUTS

OUTPUT Front-panel BNC connector furnishes linear positive output pulses through $Z_o < 1 \Omega$; rise time 300 ns; includes test point.

Polarity Positive.

Amplitude +0.1 to +10 V, equal to peak amplitude of the accepted linear input pulse.

Delay Adjusted by front-panel control; range 0.5 to 5 μs after peak detect.

Width Adjusted by front-panel control; range 0.5 to 5 μs .

Impedance $< 1 \Omega$ on front panel.

DC Offset Adjust $\pm 1.5 \text{ V}$.

93 Ω OUTPUT Rear-panel BNC connector furnishes the same linear signals as the front-panel output, except the output impedance is 93 Ω .

BUSY Rear-panel BNC connector furnishes +5 V nominal through $Z_o < 10 \Omega$ through all periods when input pulses cannot be accepted; may be used to control external equipment or for monitoring internally created dead time.

Busy +5 V nominal, linear pulse cannot be accepted.

Not Busy 0 V nominal, linear pulse can be accepted.