Model 2155
Quint Constant Fraction Trigger (Pent CFT)

FEATURES

- **Five-fold fully dc-coupled constant fraction discriminator**
- **Dynamic range 500 : 1**
- **Count rate up to ≥ 50 MHz, limited by dead time**
- **Three Modes: CFT, CFR constant fraction discriminator with slow risetime reject, and LET leading edge trigger**
- **Pulse pair resolution less than 10 ns, or as limited by dead time**
- **Threshold stability better than ± 0.02% / ^{0}C (± 200 ppm / ^{0}C)**
- **Threshold linearity ± 25 % integral**
- **Temperature range 0 ^{0}C to + 50 ^{0}C**

DESCRIPTION

The Model 2155 Pent CFT is a five-fold fully dc-coupled constant fraction discriminator with a dynamic range of up to 500:1. Selected fraction and three operating modes provide optimum time resolution for many detector types and applications.

The unit accepts negative polarity pulses to the 50Ω terminated dc-coupled inputs. On customer request the module can be modified to accept positive input signals. The constant fraction composite signal is formed by the sum of a direct, attenuated (fraction f) signal path and a delayed, unattenuated path. The delay time is selectable according to the propagation delay of a (external) 50Ω BNC cable. Careful selection of fraction and delay cable provides full compensation of timing distortions due to both amplitude and risetime variations in the input signal. Output signals are generated whenever the input signal exceeds the selected threshold set by a front panel potentiometer (T).

Four simultaneous, independent output signals are provided. The two positive NIM voltage outputs (at the rear panel) are adjustable (internal trim potentiometer) in width from 5 ns to 200 ns. The two independent negative NIM current outputs are derived as fixed width pulses.

The wide dynamic range of the pent CFT permits its use in many timing applications without the need of fast pulse amplifiers.

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SPECIFICATIONS

Inputs
Input: -10mV to about -3.5V linear pulses (ref. to common mode range of ultra fast comparators); risetime ≥ 700ps typically; Z_{in} = 50Ω; dc-coupled, front panel Lemo connector; minimum input width ≥ 1 ns; in the LET mode the unit accepts shorter input pulses.

Delay: two LEMO connectors for an external delay cable in order to form the internal constant fraction signal.

Outputs
Inspect Mon. displays output signal of zero crossing discriminator for use in trimming the time walk.

Neg output two independent negative current outputs, each providing -32 mA into 50Ω, risetime ≈ 2 ns, pulsewidth ≤ 5 ns nominal.

Pos output two independent positive voltage outputs at the rear panel, providing 2 V into 50Ω, risetime ≈ 4 ns, width adjustable by circuit board trimming potentiometer (**W**). The width can be adjusted from about 5 ns to 200ns. Larger width is possible by changing capacitor C4.

Controls

Threshold Thresh front panel (srewdriver) potentiometer to set acceptance level for input pulses (range ≈ -10 mV to -1 V). The threshold voltage can be measured at the test point T on the printed board.

Walk adjust Zero front panel trimming potentiometer (screwdriver) to compensate walk of the internal zero crossing discriminator

Leading edge L width of the leading edge signal is internally set to 20 ns.

width (see test point L on the printed board). If a variable width is wanted a circuit trimming potentiometer (10kOhm) can be inserted.

PERFORMANCE

Dynamic range 500 : 1 (regarding the linearity of the input pulses)

Walk (CFT mode) in CFT mode for a 1 ns risetime input pulse over a 100:1 dynamic range (reference – 2.5 V) ≈ 60 ps: typically ±30 ps

Count rate up to ≥ 50 MHz, limited by dead time

Pulse pair less than 10 ns, or as limited by dead time resolution

Threshold stability better than ±0.02% / ^{0}C (± 200 ppm / ^{0}C)

Threshold linearity ± 25 % integral

Temperature range 0 ^{0}C to + 50 ^{0}C

Delay cable typical lengths for fast pulses ≈ 0.25 m to 1m, for pulses from slow detectors (e.g. germanium) 1.5m to 4m (for better determination of the cable length ref. instruction manual). For very fast risetimes the internal cable lengths have to be taken into account (see instructions)

Power requirements +6.0V / 0.5A; -6.0V / -1.7A

Physical

Size single width 1/12 NIM module (3.43 x 22.13 cm; 1.35 x 8.71 inches) as per TID – 20893 (rev.)

Net weight 0.9 kg (2.0 lbs)

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