

Model 2129 Differential Constant Fraction Discriminator

Features

- Dynamic range -20 mV to -2.5 V
- DC coupling for high count rate capability
- Walk less than 100 psec for 100:1 dynamic range
- Easy to set up and use

Description

The Model 2129 is a fully dc coupled Differential Constant Fraction Discriminator with upper and lower level settings that allow precise selection of energy ranges from which the timing signal is to be derived. Optimum time resolution can be obtained for Germanium Detectors using the slow rise time reject (CFRR) mode of operation while for faster detectors (NaI and plastic) best results can be obtained in the Constant Fraction Timing (CFT) mode.

The delay time is user selected and depends on the length of the cable connected to the two front panel BNC connectors.

The walk adjust control can be set for optimum walk characteristics of the experimental setup.

Specifications

INPUTS

INPUT - Accepts 20 mV to -2.5 V linear pulses; rise time 1 nsec or longer; dc coupled; front panel BNC connector; $Z_{in} \approx 50$ ohms. The Input is protected against overload.

DELAY - 2 BNC connectors for connection of a 50 ohm delay cable to form the internal Constant Fraction signal. Recommended lengths are based on a cable propagation delay of about 5 nsec/m to provide a delay $0.2 t_{rise}$ for Germanium Detectors and $0.8 t_{rise}$ for most other detector types.

OUTPUTS

WALK INSPECT - Displays output signal of zero crossing discriminator for use in trimming time walk.

OUTPUTS (Negative) - Two independent negative current outputs, each providing -16 mA into 50 ohms; rise time ≤ 3 nsec; pulse width 20 nsec nominal; dc coupled.

OUTPUT (Positive) - Positive voltage output providing 2.5 V (minimum) into 500 ohms; rise time ≥ 10 nsec; width adjustable by dead time trimming potentiometer; also determines internal dead time.

ULD - Negative current output providing -16 mA into 50 ohms; rise time ≤ 3 nsec. Output is activated when UPPER LEVEL discriminator is triggered; width 20 nsec nominal.

CONTROLS

LOWER LEVEL - Front panel 10-turn precision locking dial potentiometer to set threshold for input pulses; range -20 mV to -2.5 volts.

UPPER LEVEL - Front panel 10-turn precision locking dial potentiometer to set upper level for input pulses; range -20 mV to -2.5 volts.

WALK ADJUST - Front panel trimming potentiometer to compensate walk of the internal zero-crossing discriminator.

CFRR/CFT - Front panel toggle switch to select Constant Fraction slow Risetime Reject (CFRR) or Constant Fraction mode (CFT).

DEAD TIME - Front panel 22-turn screwdriver adjustable trimming potentiometer to set width of slow positive output pulse, which equals the internal dead time for the discriminator: 40 to 800 nsec.



PERFORMANCE

Dynamic range -250:1

WALK - ≤ 100 psec in CF mode for a 2 nsec rise time pulse.

Dynamic range 100:1.

COUNTING RATE - To 25 MHz, limited by dead time.

PULSE PAIR RESOLUTION - ≤ 40 nsec, or as limited by dead time.

THRESHOLD STABILITY - $\pm 0.02\%/^{\circ}\text{C}$ (± 100 ppm/ $^{\circ}\text{C}$).

TEMPERATURE RANGE - 0 to 50°C .

THRESHOLD LINEARITY - $\leq \pm 0.25\%$ of integral.

TYPICAL CABLE LENGTHS - (RG-58)

For Plastic, NaI and Si (SB) Detectors - 1.5 to 3.3 ft. (0.5 to 1.0 meters).

For Planar Germanium Detectors - 3.3 to 7 ft. (1.0 to 2.1 meters).

For Coaxial Ge(Li) - 7 to 14 ft. (2.1 to 4.3 meters).

POWER REQUIREMENTS

+12 V — 150 mA

-12 V — 600 mA*

*This power exceeds the normal bin power allotment of 167 mA for a single width NIM module.

PHYSICAL

SIZE - Single width NIM module (1.35 X 8.71 inches) (3.43 X 22.12 cm)

NET WEIGHT - 1.9 lb. (0.9 kg)

SHIPPING WEIGHT - 4.0 lb. (1.8 kg)