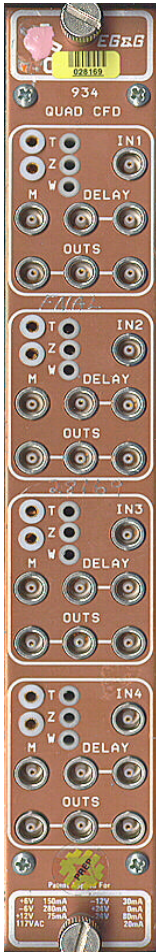


EG&G ORTEC 934 QUAD CONSTANT-FRACTION 100-MHz DISCRIMINATOR

(<http://www-esd.fnal.gov/esd/catalog/main/egg/934-spec.htm>)



1. DESCRIPTION

The EG&G ORTEC 934 Quad Constant-Fraction 100- MHz Discriminator is a single-width NIM module that includes four independent fast constant-fraction discriminators. Each section of this instrument accepts negative input pulses and generates three simultaneous NIM-standard fast negative logic pulses for each input pulse that exceeds the adjusted threshold level. The design of this instrument utilizes advanced EG&G ORTEC hybrid circuit technology to achieve maximum performance and high reliability in a high-density package.

The constant-fraction technique permits optimum timing measurements to be made with photomultiplier tubes or fast solid-state detectors. Each input signal is split so that a portion of the signal is delayed and subtracted from a fraction of the undelayed signal. The resulting bipolar constant-fraction signal has a baseline crossover that is virtually independent of the input signal amplitude. The zero crossing point is detected and used to provide precisely timed logic pulses for a wide dynamic range of Input signals.

Each of the four channels includes an independently adjustable threshold level to prevent output signals from being generated in response to noise or small-amplitude Input signals. The input circuit has an impedance of 50 Ohm and is protected against overload. The input signals should be furnished through 50 Ohm coaxial cable to ensure proper termination with minimum reflections at the input of the 934 and output voltage driver circuit. This circuit generates three simultaneous negative NIM fast logic signals for each input signal that satisfies the discriminator criteria. The constant-fraction shaping delay for each discriminator channel is determined by the length of 50 Ohm coaxial cable that must be added between two front panel LEMO connectors. The shaping delay can be optimized for each specific application. This optimization requires prior knowledge of the risetime and nominal width of the input signals to the 934.

A common gating circuit can be used to control responses in all four channels simultaneously. The position of a rear panel switch determines whether the gating signals from the bin are accepted or not. The bin must be constructed with a Gate input connector on the rear panel and distribution of the gating line through pin 36 of each power connector in the bin.

The 934 operates in an EG&G ORTEC 401A/402D or M400/N NIM BIN that includes distribution of dc power at +/-24 V, +/-12 V, and +/-6 V. By using either of these recommended bins and power supplies, a full complement of 12 EG&G ORTEC 934 modules can be operated in the bin, with a total capacity of 48 constant-fraction discriminator channels.

2. SPECIFICATIONS

PERFORMANCE

- NUMBER OF CHANNELS Four, completely independent except for gating
- INPUT/OUTPUT RATE >100MHz (typ. >110MHz) for Input >50 mV.
- PULSE-PAIR RESOLUTION <10 nSec (typically <9 nSec) for Input >50 mV
- WALK $\leq \pm 150$ ps, 200:1 dynamic range(-50mV to -10V) with $t_r \leq 1$ nSec, $T_{pw} \sim 10$ nSec, $t_d(\text{Tot}) \sim 3$ ns, threshold = 30 mV.
- TIME SLEWING ≤ 750 ps from half-fire, measured with $T_r = 1.8$ nSec, $t_r = 2.0$ nSec, $T_{pw} = 3.1$ nSec at half-height, $t_d(\text{Tot}) = 1.5$ nSec, threshold = 30 mV
- PROPAGATION DELAY 13 nSec typical from input to output using $T_d(\text{Tot}) = 1.5$ nSec
- OPERATING TEMP. RANGE 273 to 323 K (0 to 50°C)
- THRESHOLD TEMP. INSTABILITY <0.1% per degree from 273 to 323 K (0 to 50°C). Referenced to -12 V bin power supply level
- PROPAGATION DELAY INSTABILITY <15 ps per degree (typically <10 ps per degree) from 273 to 323 K (0 to 50°C)
- OUTPUT WIDTH TEMP. INSTABILITY <0.2% per degree from 273 to 323 K (0 to 50°C)
- CONTROLS THRESHOLD (T) 20-turn front panel screwdriver adjustment for each discriminator channel; variable from -30 to -1000 mV
- THRESHOLD MONITOR Front panel test point to monitor discriminator threshold setting, located to left of Threshold adjustment; voltage is -0.3 to -10 V, which is ten times actual threshold
- WALK (Z) 20-turn screwdriver front panel adjustment in each channel for precise setting of the walk compensation network for each application
- WALK MONITOR Front panel test point permits monitoring the actual dc voltage level that is set for the zero-crossing reference, normally set in the range from -0.5 mV to -1.5 mV; located to left of Walk adjustment
- UPDATING WIDTH (W) 20-turn front panel screwdriver adjustment for each discriminator channel; variable range <6 nSec to >150 nSec
- SHAPING DELAY A pair of LEMO connectors for each discriminator channel accepts 50 Ohm coaxial cable to adjust the required shaping delay; total shaping delay is ~ 0.7 nSec plus delay of external cable
- CF MONITOR (M) Front panel LEMO connector for each discriminator channel permits observation of the constant-fraction shaped signal; 50 Ohm cable required
- GATE Rear panel On/Off toggle switch to control use of a master gate signal that can be furnished to all four channels in the module
- INPUTS INPUT Front panel LEMO connector for each discriminator channel. Linear range 0 to -10 V. Signal input impedance, 50 Ohm, dc coupled. Input protected. Input reflections <10% for signals with risetime >2 nSec
- GATE Master gate signal enabled by the rear panel Gated-Ungated locking toggle switch; connected through pin 36 in the NIM power connector to a gate line that is common to pin 36 at all module locations in the bin. When the switch is set at Gated, a clamp to ground from +5 V inhibits operation of all four discriminator channels
- OUTPUTS OUT Three bridged, updated negative outputs are furnished through front panel LEMO connectors; each discriminator channel is independent from the other channels in the module. Amplitude at each connector, nominally -800 mV into 50 Ohm; width adjustable from <6 nSec to >150 nSec; rise and fall times typically <2 nSec
- ELEC. & MECH. POWER REQUIRED +6V, 150mA; -6V, 380mA;
- +12V, 75 mA; -12 V, 30 mA;
- +24 V, 0 mA; -24 V, 12 mA;
- 117 V ac, 30 mA.
- Total dissipation 8.0 W.
- DIMENSIONS NIM-standard single width module (1.35 by 8.714 in. front panel) per TID-20893 (Rev)
- ACCESSORY A small screwdriver is included with each 934 Quad CF Discriminator, and can be used for threshold, width, and walk adjustments