MODEL TAC2038   TIME TO AMPLITUDE CONVERTER

Features:

- Usable time range: 10 ns to 1ms (2ms optional
- 15 ranges of Time-to-Amplitude Conversion
- Valid Start and Valid Conversion outputs
- Selectable output delay and width
- Output synchronized with a stop or external strobe signal
- Provision to reject unwanted start input signals
- Positive or negative input signals

Description:

The Model 2038 Time-to-Amplitude Converter generates a rectangular output pulse whose peak amplitude is linearly proportional to the time interval between a START and STOP input pulse pair. the Model 2038's flexibility for your nuclear timing analysis needs. The basic Time-to-Amplitude Conversion (TAC) analyzes the time relationships between random events, such as nuclear decay, that occur within a selected interval of time. The Model 2038 is ideal for time of flight, positron lifetime, pulse shape analysis in particle studies, and pulse pair timing in position-sensitive detector systems. To meet these needs, the Model 2038 offers 15 time ranges from 10ns to 1ms (2m opt).The positive unipolar TAC output is essentially flat topped for accurate measurement by an analog-to digital converter (ADC).

The Model 2038's start input can be inhibited by a pulse or a dc level at the rear-panel Gate Input connector. Valid Start and Valid Conversion outputs are provided for each accepted start and stop input, respectively. The duration of the Valid Start output indicates the interval from the accepted start until the end of reset. The Valid Conversion output occurs from the end of the internal delay after stop to the end of reset. The selectable TAC output width and variable delay, which are easily adjusted, further serve to make the Model 2038 a flexible instrument, easily adapted into many time spectroscopy systems. The output of the TAC may be synchronized with the stop signal or an external strobe signal to further enhance its versatility. The Model 2038 is dc-coupled and gated so that input count rates will not paralyze or otherwise hinder normal operation. The TAC output should be connected to the dc-coupled input of a multichannel analyzer for optimum high-count-rate performance.

Specifications:

INPUTS

All four inputs listed below are dc-coupled, edge triggered, and printed wiring board (PWB) jumper selectable to accept either negative or positive NIM standard signals. Input impedance is 50Ω in the negative position and >1kΩ in the positive position. The threshold is nominally −400 mV in the negative position and +2 V in the positive position.

STROBE Front-panel BNC connector provides an external means to strobe a valid output signal from the TAC in the Ext Strobe mode. The input signal, exceeding threshold within the Ext Strobe reset interval after the Stop input, initiates the read cycle for the linear gate to the TAC output. Factory-set in the positive input position. Ext Strobe reset interval has a minimum value of ~0.5 μs and a maximum value of nominally 10 μs.

START Front-panel BNC connector initiates time conversion when Start input signal exceeds threshold. Factory-set in the negative input position.

STOP Front-panel BNC connector terminates time conversion when Stop input signal exceeds threshold. Factory-set in the negative input position.

GATE Rear-panel BNC connector provides an external means of gating the Start circuitry in either Coincidence or Anticoincidence with the Start input signal. Gate input signal must cross threshold ≥10 ns prior to the Start input signal and must overlap the trigger edge of the Start input signal. Factory-set in the positive input position.
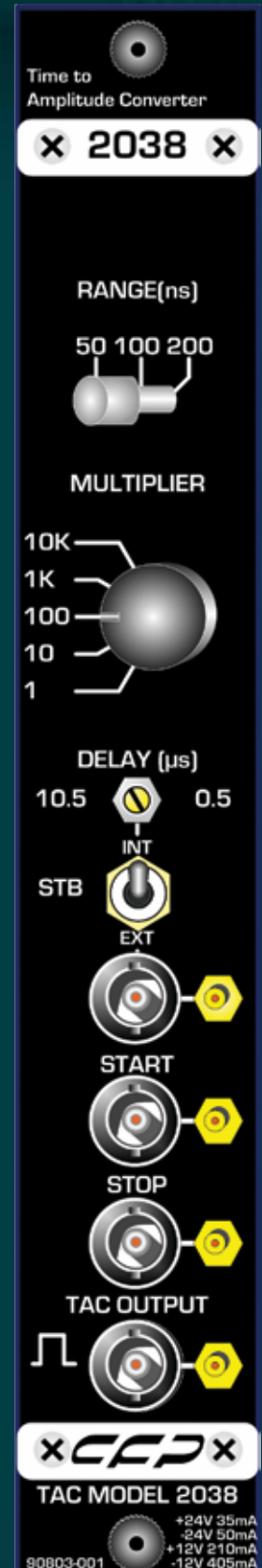
OUTPUTS

TAC OUTPUT Front-panel BNC connector provides unipolar pulse.
Amplitude 0 V to +10 V proportional to Start/Stop input time difference.
Time End of delay period in Int Strobe mode; prompt with Strobe input in Ext Strobe mode.
Width Adjustable by PWB potentiometer from ≤1 μs to ≥3 μs.
Impedance Zo<10Ω. Rise Time ~250 ns. Fall Time ~250 ns.

Time to
Amplitude Converter

× 2038 ×

RANGE(ns)

50 100 200

MULTIPLIER

10K
1K
100
10
1

DELAY (µs)

10.5   0.5

INT

STB

EXT

START

STOP

TAC OUTPUT

×CFP×

TAC MODEL 2038

90803-001

+24V 35mA
-24V 50mA
+12V 210mA
-12V 405mA

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VAL ST Rear-panel BNC connector provides NIM-standard slow positive logic level signal.
Amplitude Nominally +5 V. Complement signal selectable by PWB jumper.
Time and Width From accepted Start input to end of reset.
Impedance Zo <10Ω. **Rise Time** ≤50 ns. **Fall Time** ≤50 ns.
VALID CONV Rear-panel connector provides NIM-standard slow positive logic level signal to indicate a Valid Conversion.
Amplitude Nominally +5 V. Complement signal selectable by PWB jumper.
Time and Width From end of internal delay after Stop to end of reset.
Impedance Zo <10Ω. **Rise Time** ≤50 ns. **Fall Time** ≤50 ns.

CONTROLS (FRONT PANEL)

RANGE (ns) Three-position rotary switch selects full scale time interval of 50, 100, or 200 ns between accepted Start and Stop input signals.
MULTIPLIER Five-position rotary switch extends time range by a multiplying factor of 1, 10, 100, 1K, or 10K.
DELAY (µs) 10-turn screwdriver-adjustable potentiometer varies the delay of the TAC output from 0.5 μs to 10.5 μs, relative to an accepted Stop input signal; operable in the IN Strobe mode only.
STROBE MODE Two-position locking toggle switch selects either Internal or External source for initiating the strobe cycle to strobe valid information from the TAC output.

CONTROLS (REAR PANEL)

GATE MODE Two-position locking toggle switch selects Coincidence or Anticoincidence mode of operation for the Start circuitry. Start circuitry is enabled in the COINC position or inhibited in the ANTI position during the interval of a Gate input signal.

LOG CURR Two-position locking toggle switch selects the use of ±6 V or ±12 V bin lines to provide current for the internal logic circuitry. In the ±6 V position, the Model 2038 is within the current allotment for a single NIM width when using a NIM Standard Class V power supply. In the ±12 V position, the Model 2038 exceeds the current allotment for a single NIM width on the +12 V and –12 V bin lines. However, this position allows the Model 2038 to be used with power supplies not providing +6 V and –6 V.

PERFORMANCE

TIME RESOLUTION-FWHM - ≤0.01% of full scale plus 5ps for all ranges.

TEMPERATURE INSTABILITY - ≤±0.01%/°C (±100 ppm/°C) of full scale or ±10 ps/°C (whichever is greater), 0 to 50°C.

DIFFERENTIAL NONLINEARITY - Typically, <1% from 10 ns or 2% of full scale (whichever is greater) to 100% of full scale.

INTEGRAL NONLINEARITY - ≤±0.1% from 10 ns or 2% of full scale (whichever is greater) to 100% of full scale.

RESET CYCLE - Fixed 1.0 μs for X1 and X10 Multipliers, fixed 5 μs for X100 Multiplier, and fixed 50 μs for X1K, and X10K Multipliers. Occurs after Over Range, Strobe cycle, or Ext Strobe Reset cycle.

START-to-STOP CONVERSION TIME - Minimum ≤ 10ns.
INPUT COUNT RATE >30 MHz.

ELECTRICAL AND MECHANICAL POWER REQUIRED

Logic Current Switch ±6 V

+24 V, 45 mA; +12 V, 95 mA; +6 V, 140 mA; –24 V, 50 mA; –12 V, 140 mA; –6 V, 300 mA.

Logic Current Switch ±12 V

+24 V, 45 mA; +12 V, 210 mA; –24 V, 50 mA; –12 V, 405 mA.

WEIGHT
Net 1.5 kg (3.3 lb).
Shipping 3.0 kg (7 lb).
DIMENSIONS NIM-standard single-width module 3.43 X 22.13 cm (1.35 X 8.714 in.) per DOE/ER-0457T.

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