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SINCE 1975

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INSTRUCTIONS

MODEL AVI-MP

40 VOLT, 2 - 100 ns

HIGH SPEED PULSE GENERATOR MODULE

WITH 350 ps RISE TIME

SERIAL NUMBER: _____

WARRANTY

Avtech Electrosystems Ltd. warrants products of its manufacture to be free from defects in material and workmanship under conditions of normal use. If, within one year after delivery to the original owner, and after prepaid return by the original owner, this Avtech product is found to be defective, Avtech shall at its option repair or replace said defective item. This warranty does not apply to units which have been dissembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

TECHNICAL SUPPORT

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Manual Reference: /fileserver1/officefiles/instructword/avi/AVI-MP,editionD.odt.
Last modified February 29, 2024.

INTRODUCTION

The AVI-MP is a high performance DC-powered module capable of generating up to 40V pulses into 50Ω loads with 350 ps rise times and 2 ns fall times.

Instruments with the "-P" model suffix can generate +40V, whereas instruments with the "-N" model suffix can generate -40V.

The pulse width is controlled by a length of user-supplied open-circuited coaxial cable that must be connected to the AVI-MP. If no cable is connected, the output pulse width will be < 2 ns in width. Adding cable increases the pulse width at a rate of 3 ns per foot or 10 ns per meter, approximately.

The maximum pulse repetition frequency is also set by the cable length / pulse width. At minimum pulse width (2 ns or less), the pulse generator will operate at repetition rates to 1 MHz. At maximum pulse width (100 ns), the maximum frequency is 20 kHz.

The AVI-MP must be triggered by an external TTL pulse (> 50 ns) applied to the “IN” connector.

The output is designed to drive 50Ω loads. (A 50Ω load is required for proper operation.) The output is AC-coupled.

This instrument is intended for use in research, development, test and calibration laboratories by qualified personnel.

AVAILABLE OPTIONS

The AVI-MP is available with the following option(s):

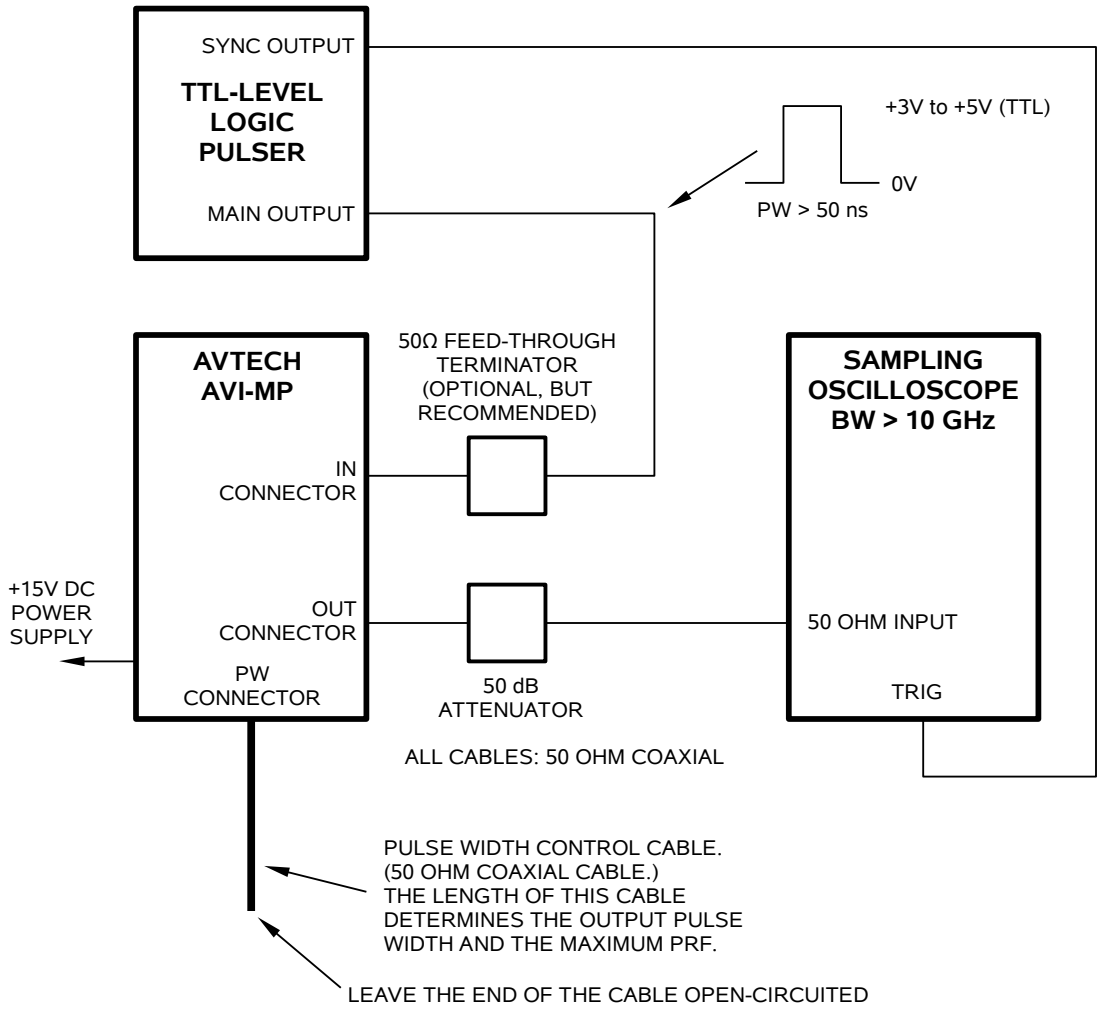
-OS Option: an externally generated DC offset can be added to the output.

SPECIFICATIONS

Model:	AVI-MP
Amplitude[1]:	≥ 40V, fixed. (50Ω load required)
Rise time (20%-80%):	≤ 350 ps
Fall time (80%-20%):	≤ 2 ns
Pulse width (FWHM):	2 to 100 ns
Maximum pulse repetition frequency (PRF):	1 MHz at 2 ns PW, falling to 20 kHz at 100 ns PW. See the graph later in this manual.
Propagation delay:	≤ 70 ns
Polarity[1]:	Positive or negative (specify -P or -N)
Jitter:	±15 ps
DC offset or bias insertion:	Optional[2]. Apply DC offset in the range of ±50V (250 mA max) to back panel solder terminal.
Trigger required:	+5 Volts, 50 to 500 ns (TTL)
Connectors:	Out: SMA, In: SMA, Power: Solder terminal
Power required:	+15 Volts, 200 mA
Dimensions:	58 x 36 x 28 mm (2.3” x 1.4” x 1.1”)
Temperature range:	+5°C to +40°C

1) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative).
2) For DC offset option suffix model number with -OS. Avtech Model AVX-T bias tee can also be used to obtain DC offset (http://www.avtechpulse.com/bias/avx-t).

BASIC TEST ARRANGEMENT



PULSE WIDTH CONTROL

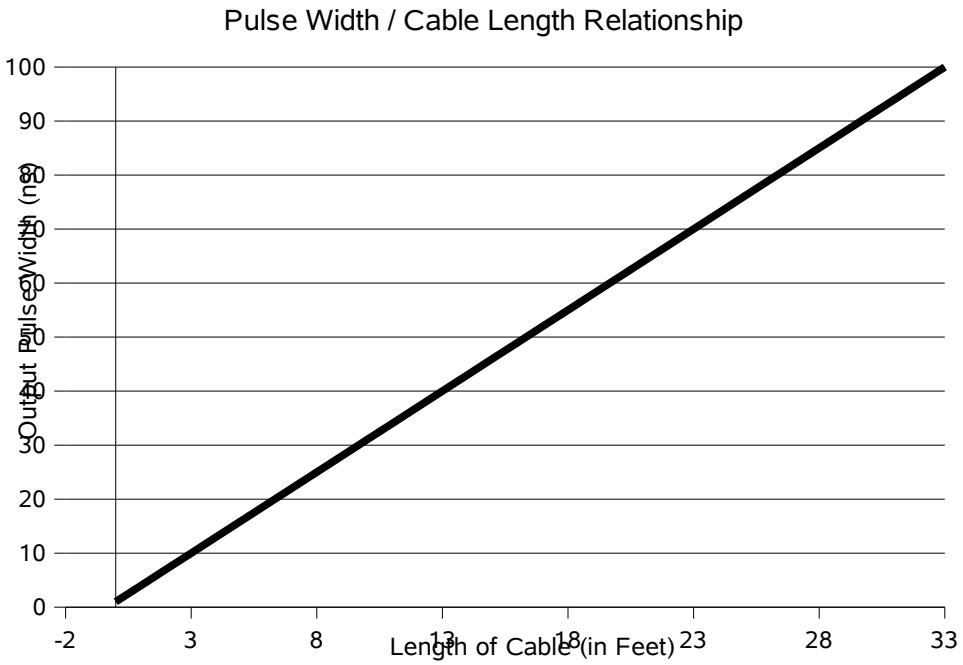
The output pulse width is a linear function of the length of open circuited coaxial cable connected to the "PW" connector (see the figure above). The open circuited delay line should be formed from high-quality semi-rigid 50 Ohm coaxial cable (e.g. 0.085 inch copper 50 Ohm semi-rigid). Miniature flexible coaxial cable (e.g., RG174A/U) may be used, but will result in a degraded fall time.

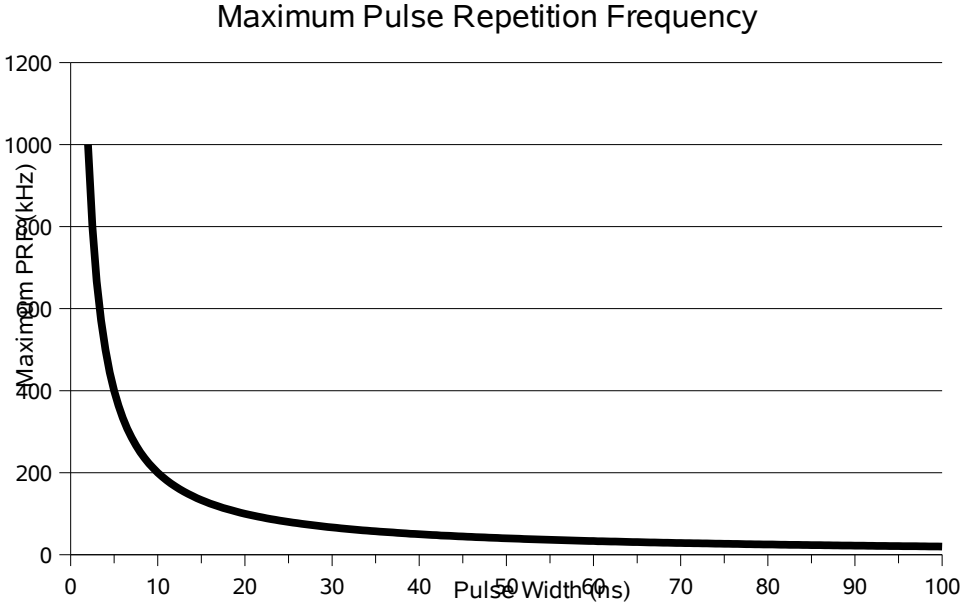
If no cable is connected, the output pulse width will be < 2 ns in width. Adding cable increases the pulse width at a rate of 3 ns per foot or 10 ns per meter, approximately.

The maximum pulse repetition frequency is also set by the cable length / pulse width. At minimum pulse width (2 ns or less), the pulse generator will operate at repetition rates to 1 MHz. At maximum pulse width (100 ns), the maximum frequency is 20 kHz. In general:

$$PW \text{ (in ns)} \times PRF \text{ (in kHz)} \leq 2000$$

These relationships are summarized below:





GENERAL OPERATING NOTES

1) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed 10 GHz.

2) The use of 40 dB attenuator on the output will ensure a peak input signal to the sampling scope of less than 1 Volt.

3) When testing using a general purpose 50Ω laboratory pulse generator as the input trigger signal source, the input signal should be applied via a 50Ω feed-through terminator. This will prevent reflection (and degradation of the input pulse waveform) caused by the high impedance at the IN port.

4) The input trigger pulse width should be greater than 50 ns and less than one half of the pulse repetition frequency period. The unit triggers on the leading edge of the input trigger signal.

DC OFFSET OPTION

Models with the -OS option have an “OS” solder terminal. An externally-generated DC voltage in the range of ±50V (250 mA max) may be applied to this terminal. This voltage will be added to the output signal.

MINIMIZING WAVEFORM DISTORTIONS

USE 50 OHM TRANSMISSION LINES AND LOADS

Connect the load to the pulse generator with 50Ω transmission lines (e.g. RG-58 or RG-174 cable).

This instrument requires a 50Ω load for proper operation. It will not properly drive a high-impedance load. The output stage will be damaged if it is operated into an open circuit (or any other high impedance). Failures due to improper output loading are not covered by the warranty.

USE LOW-INDUCTANCE LOADS

Lenz's Law predicts that for an inductive voltage spike will be generated when the current through an inductance changes. Specifically, $V_{SPIKE} = L \times dI_{LOAD}/dt$, where L is the inductance, I_{LOAD} is the load current change, and t is time. For this reason, it is important to keep any parasitic in the load low. This means keeping wiring short, and using low inductance components. In particular, wire-wound resistors should be avoided.

PREVENTING DAMAGE

The AVI-MP may fail if PW (in ns) × PRF (in kHz) is greater than 2000.

This unit is designed to operate into a load impedance of 50 Ohms and the output stage will be damaged if it is operated into an open circuit (or any other high impedance). Failures due to improper output loading are not covered by the warranty.

The lifetime of the switching elements in the pulse generator module is proportional to the running time of the instrument. For this reason the prime power to the instrument should be turned off when the instrument is not in use.

PERFORMANCE CHECK SHEET