photomultiplier amplifier-discriminator
AD8 data sheet

ET Enterprises electron tubes

1 description

The AD8 amplifier-discriminator is a compact, low noise, high gain electronics module designed to be used in photomultiplier photon counting systems to generate TTL output pulses. An output pulse of fixed width and amplitude is produced for each photomultiplier output pulse that exceeds the input discriminator threshold level. The threshold level is fixed to -2mV, which is sufficiently sensitive to enable most photomultipliers with 10 or more dynodes to operate in single photon counting mode.

Two outputs are provided; one with a pulse-pair resolution of 25ns for input count rates up to 150Mcps, and the other with a pulse-pair resolution of 10µs for rates up to 100kcps. The slower output is intended to be used where it is required to eliminate photomultiplier afterpulses.

The AD8 is housed in a metal box and is compatible with the ET Enterprises MCS-CT3 multi-channel scaler/counter-timer. When used together, the AD8 can be powered from the MCS-CT3. These units are also compatible with the ET Enterprises range of ambient temperature and cooled photomultiplier housings, enabling high performance and cost-effective photon detection systems to be set up with minimal effort.

2 applications

- counting photomultiplier pulses exceeding a fixed threshold.
- single photon counting or applications involving multiple photodetection pulses.

3 features

- high input sensitivity and low noise
- count rates up to 150Mcps with dead time correction.
- signal and power compatible with the MCS-CT3 multi-channel scaler/counter-timer.
- input overload protection.
- can be used with negative or positive HV photomultiplier operation.

4 characteristics

	unit	min	typ	max
input pulse amplitude	mV	-1000		0
discriminator level	mV		-2	
input impedance	Ω		50	
input protection:				
limiting diodes				
supply voltage	V	4.5	5	5.5
supply current				
(@ 5V, no signal)	mA		40	
supply current				
(@ 5V, signal = 150Mcps)	mA		110	
output impedance	Ω		50	
output pulse				
TTL high level (terminated)	V	3.3		
pulse-pair resolution:				
17ns output	ns		25	
10µs output	µs		10	
dead-time				
17ns output	ns		25	
10µs output	µs		10	
output pulse rise and fall time:				
17ns output	ns		1.2	
10µs output	ns		1.2	
signal rate count				
(without deadtime correction)				
17ns output	cps			30M
10µs output	cps			100k
signal count rate				
(with deadtime correction)				
17ns output	cps			150M
warm-up time	s		1	
temperature (operating)	°C	5		55
temperature (storage)	°C	-40		60
humidity (non-condensing)	%			93
weight	g		160	

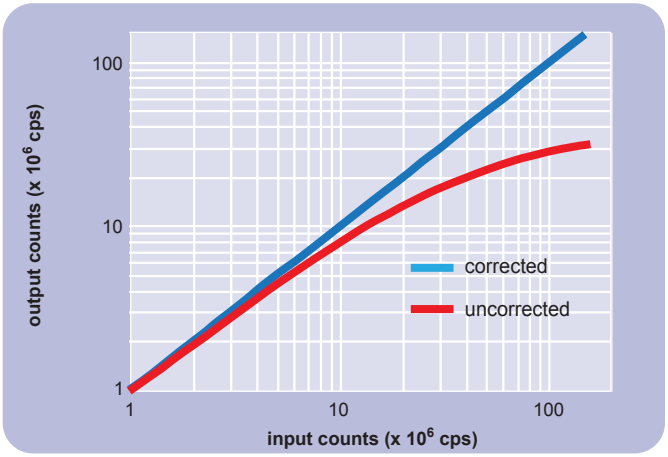
5 dynamic range

When using the fast (17ns) output, maximum dynamic range can be achieved by applying count rate correction to compensate for the departure from linearity due to pulse pile-up at high count rates. Dead time may be corrected for, as follows:

$$N = n/(1-nT)$$

where: N is the true count rate (cps),
n is the measured count rate (cps),
T is the count rate correction factor (25 x 10^{-9}s),

Using this correction, deviation from linearity is typically within +/-5% at 120Mcps.



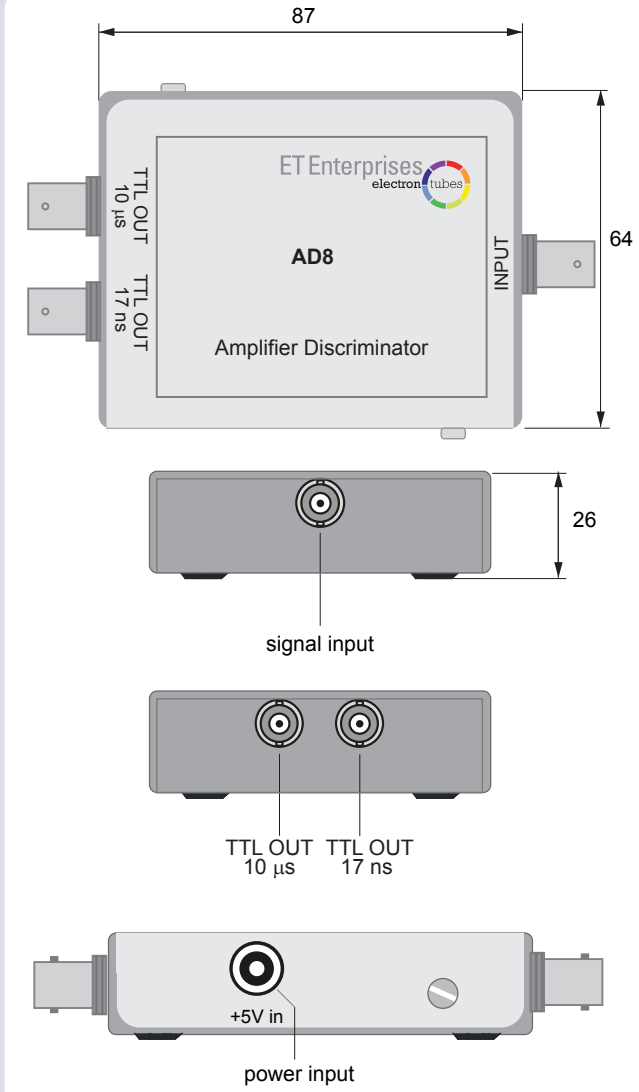
6 connections

The TTL output pulses from either the fast (17ns) or slow (10µs) BNC connectors may be connected to pulse counting equipment such as the ET Enterprises MCS-CT3 multi-channel scaler/counter-timer, or other compatible instrumentation. The AD8 can also be powered from the MCS-CT3, or from the auxiliary low voltage output of the ET Enterprises photomultiplier power supply HVLAB3000.

Although the AD8 is insensitive to most external sources of interference, it is recommended that the connection to the photomultiplier be made with a 50Ω terminated BNC screened cable of maximum length 50cm.

signal input	50Ω BNC socket
power input	2.1mm dc jack
signal output (17ns)	50Ω BNC socket
signal output (10µs)	50Ω BNC socket

7 external dimensions mm



8 ordering information

AD8	boxed electronic module
LEADAD8MCS-CT3	50 cm long power cable when used with MCS-CT3
AD8PSU	universal ac power adaptor
LEADBNC - 50cm	50 cm long 50Ω signal cable
LEADBNC - 100cm	100 cm long 50Ω signal cable

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