



## ASNT6902-MOD

### 56Gbaud PAM4 Data Generator with USB Control

- Adjustable data output amplitude and eye quality
- Output data eye cross point adjustment
- Internal precision low jitter (below 1ps p-p) frequency synthesizer
- Alternate external reference clock input
- Differential CML PAM4 data output interface
- Can be used as a PRBS Data Generator up to 56Gbaud
- Reference clock-divided-by-2 outputs for four external PRBS generators
- Precision delay adjustment on clock input
- USB port for connection to an external PC
- Full functional control from GUI software
- Single +12V power supply from an external AC-DC converter
- High speed 1.85mm connectors for PAM4 differential data output
- Low jitter and limited temperature variation over industrial temperature range



Fig. 1. Front and back views of the unit



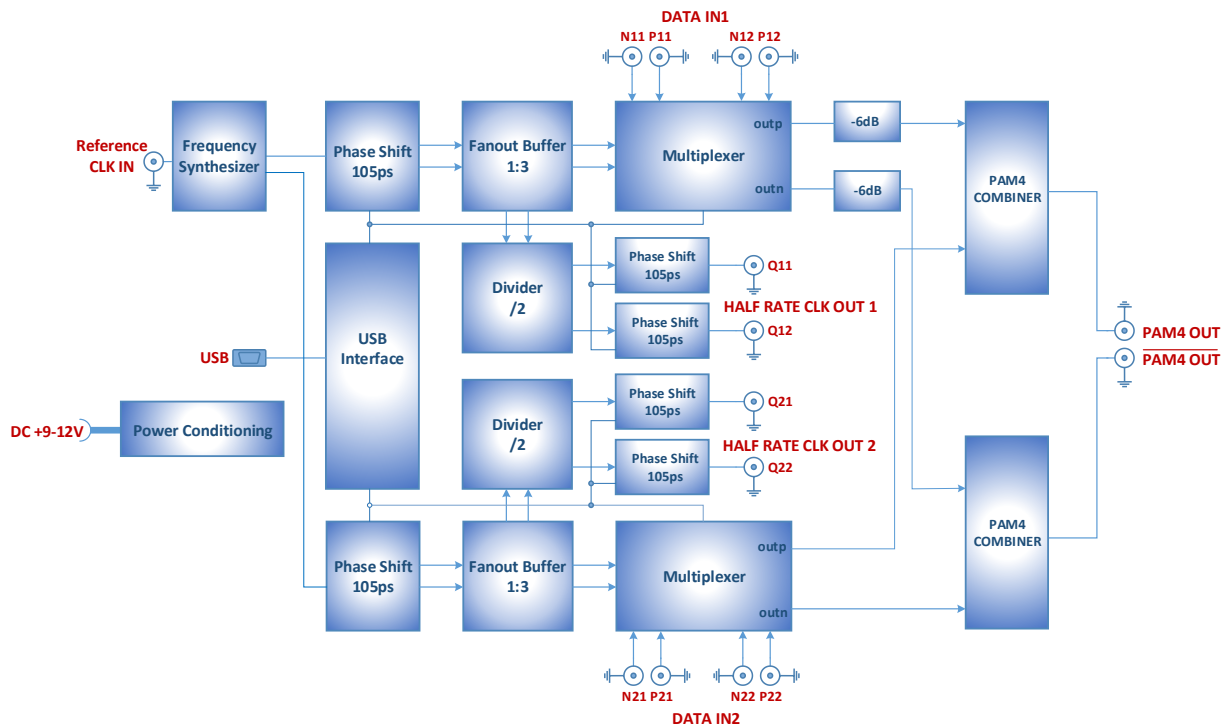
## DESCRIPTION

The ADSANTEC’s differential PAM4 generator unit can be used for test applications, design verification, and R&D environments. The fully self-sustained device is integrated in a box with power conditioning, control circuitry, and a USB computer interface. All signal I/O’s are CML-type. The front panel of the instrument is shown in Fig. 1 (top). It includes connectors as described in Table 1.

Table 1. Front-Panel Connectors

Connector		DESCRIPTION
Name	Type	
<b>High-Speed I/Os</b>		
PAM4 DATA OUT P	1.85mm female	DC-coupled CML differential data output port, requires external SE 50Ohm terminations to ground
PAM4 DATA OUT N		
CLOCK IN	2.92mm female	AC-coupled CML SE clock input port with internal SE 50Ohm terminations to ground
DATA IN P11 DATA IN N11 DATA IN P12 DATA IN N12 DATA IN P21 DATA IN N21 DATA IN P22 DATA IN N22	2.92mm female	DC-coupled CML differential data input ports, requires external SE 50Ohm terminations to ground
CLOCK 1/2 OUT1 Q11, Q12 CLOCK 1/2 OUT2 Q21, Q22	SMA	AC-coupled CML SE clock output ports, require external SE 50Ohm terminations to ground

The back panel of the instrument is shown in Fig. 1 (bottom). It contains a power switch (Power), a power supply female connector (+9-12V DC) for connecting a male 2.5x5.5-barrel jack from an external AC-DC adapter (included), and a USB-A connector (USB) for connecting an external PC with installed Windows GUI control software (USB cable included).



*Fig.2 Block diagram of the 56Gbaud PAM4 Data Generator with USB control*

The system consists of four main parts: Frequency Synthesizer, two high-speed 2:1 Multiplexers, two high-speed differential PAM4 combiners, and a Power Supply unit.

The Frequency Synthesizer generates internal clock signals that are used by other parts of the system.

The two incoming pairs of PRBS signals are processed by two 2:1 MUXes to produce two PRBS signals with doubled data rate. The MUXes also provide the clocks required for the Four-Channel external PRBS Generator. The clock phases may be individually adjusted in each MUX2:1 module via the system's USB control interface.

The output signals from 2:1 MUXes are mixed in two PAM4 combiners to form a differential PAM4 signal. The output amplitude of this signal may be adjusted. The amplitude of the middle eye opening can be individually adjusted without affecting the top and bottom eye opening amplitudes. Alternatively, the system may be programmed to output high-speed PRBS data instead of PAM4 data through the same I/Os (Fig. 3a).

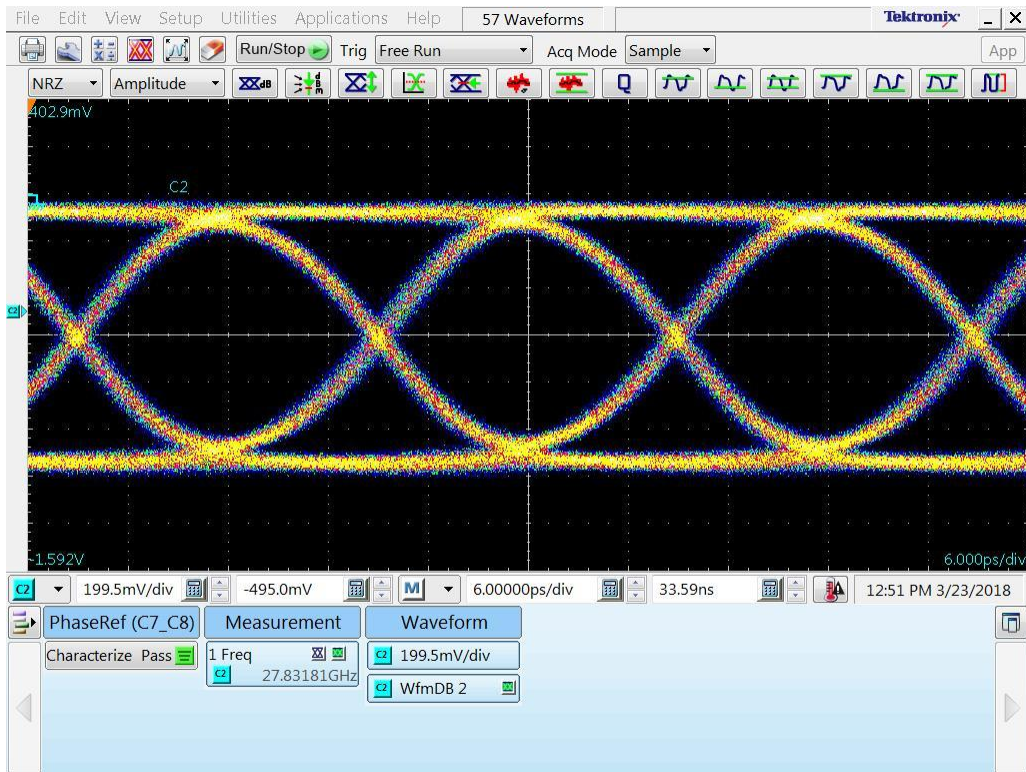
All the parameters of this PAM4 Generator are controlled by an external PC through a USB port. A special GUI software is installed on the PC to simplify the system control.



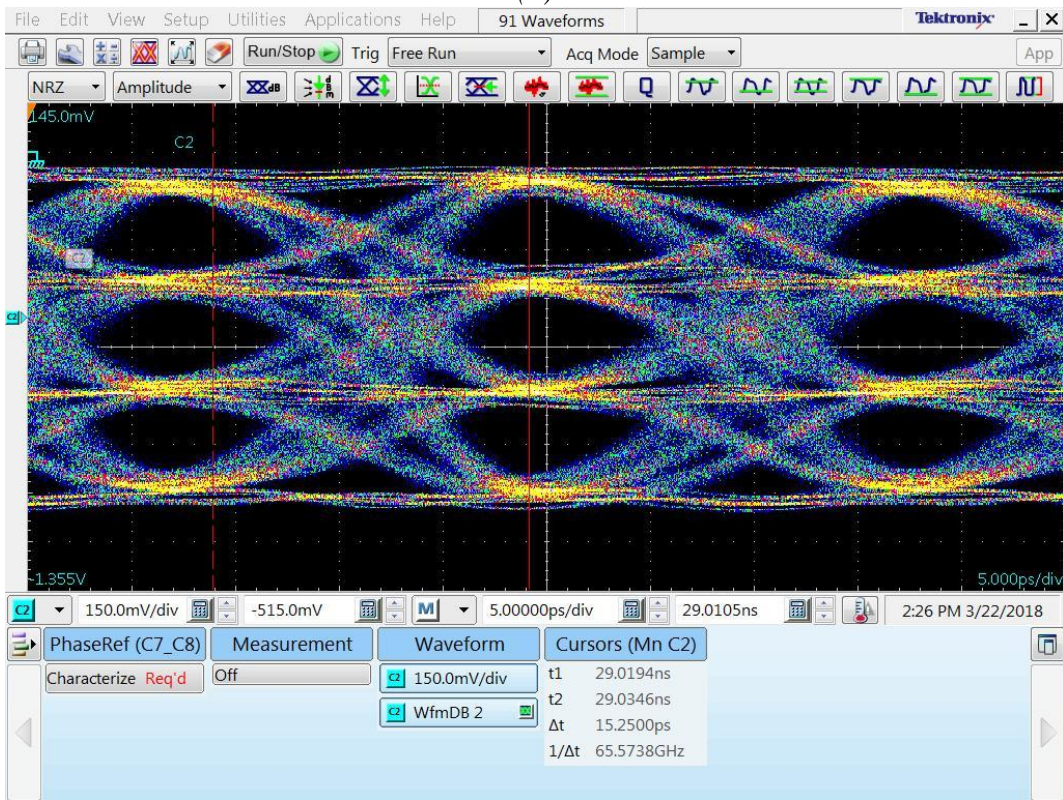
## ELECTRICAL CHARACTERISTICS

Table 2. PAM4 Generator Specifications

PARAMETER	TYPICAL	UNIT	COMMENT
<b>General Parameters</b>			
Vcch	9-12	V	Power Supply
Vccm	5	V	Internal Power Supply
Vccl	3.3	V	Internal Power Supply
Vee	0	V	External Ground
Power Consumption	22.5	W	
<b>Input Reference Clock</b>			
Frequency	1.5-2	GHz	From External Frequency Synthesizer
Jitter	1	ps	
<b>Output Data</b>			
Data Rate	1-56	Gbaud	
Maximum Output Amplitude	1.2	V	Differential pk-pk
Rise / Fall Time	8	ps	80%-20%
TDECQ (no FFE)	1.5	dB	With Rx Optimizer
TDECQ (with 5-tap FFE)	1.2	dB	With Rx Optimizer
<b>Output Clock</b>			
Frequency	12-16	GHz	Internal Clock divided by 2



(a)



(b)



Fig.3 a). Measured 56 Gb/s NRZ EYE diagram of the ASNT PAM4 Generator unit with Tektronix Analyzer; b) Measured 56 Gbaud/s PAM4 EYE diagram of the ASNT PAM4 Generator unit with Tektronix Analyzer

## MECHANICAL DIMENSIONS

PARAMETER	TYP	UNIT	COMMENTS
Length	TBD	mm	
Width	TBD	mm	
Height	TBD	mm	

## REVISION HISTORY

Revision	Date	Changes
1.0.2	07-2019	Updated Letterhead
1.0.1	05-2018	Corrected title Corrected description Added Table with connector descriptions
0.0.1	01-2018	Initial Release