

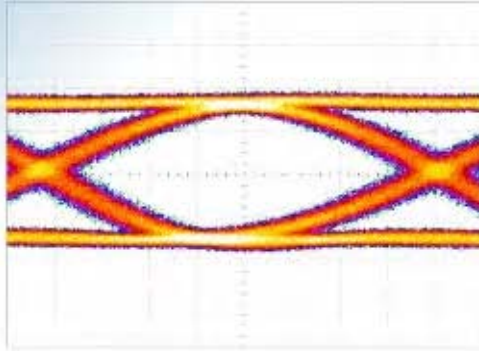


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Datasheet

SHF 5005 A

60 Gbps 4:1 Multiplexer





Description

The SHF 5005 A multiplexer generates a data stream of four times the input data rate from four data signals and one clock signal by using a single 4:1 multiplexer. A single master clock signal of half the output data rate is used to drive the multiplexer. Inside the instrument, all data and clock lines are adjusted to allow broadband operation from 2 Gbps to over 60 Gbps output data rate. A computer controlled delay line makes it possible to shift the phase of the clock with respect to the input data.

On the front panel, there is a clock/2 output, supporting the use of a pattern generator. The 60 Gbps complementary output signals can be adjusted from 2.0 V to 3.0 V. For additional flexibility, the crossing point of the output eyes can be adjusted left and right and up and down, giving the user additional control over the signal.

Each output driver amplifier is individually tuned for optimum pulse performance at the end of a 0.5 m low loss, high precision 50 GHz cable assembly, of which two pieces are supplied with this instrument. The very low rise time of the multiplexer circuit, in connection with the pulse shaping 45 GHz amplifiers, allows the generation of excellent 60 Gbps eye diagrams, facilitating easy testing of ultra high speed components and their assembly into complex communication systems.

A low jitter option is also available, which offers very low jitter by removing the output amplifiers. A data splitter can be built into the instrument which splits a single input signal into four data streams for the multiplexer. Delay lines are fitted so that the data streams are shifted relative to each other before multiplexing.

Features

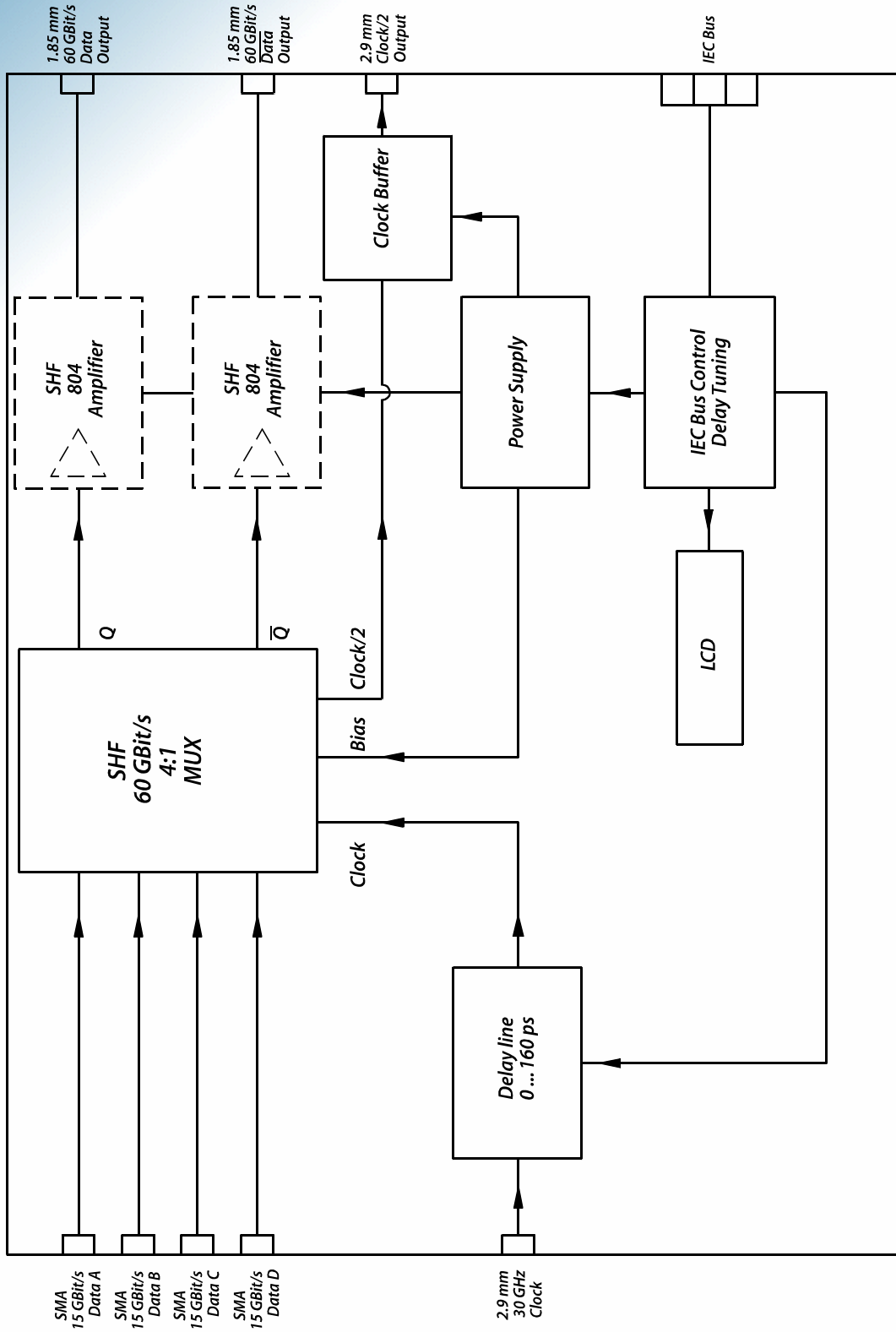
- Wideband operation of over 60 Gbps
- Very low risetime
- Low overshoot
- High amplitude complementary data outputs
- Data outputs can be individually disabled
- Computer controlled mechanical delay line
- All functions microprocessor controlled
- External GPIB control
- Ruggedized 1.85 mm male output connectors
- High precision, low loss 50 GHz cable assemblies included
- Adjustable vertical crossing point
- Adjustable clock bias to change symmetry of eye length
- Adjustable output levels

Options

- Option LJ: Low jitter – jitter below 500 fs by removal of output amplifiers (see eye diagrams for measurement conditions)
- Option AT: 65 GHz selected attenuator to match output level to input level of SHF 806 E, SHF 810 or the SHF 5003 range of optical transmitters
- Option DS: Internal 1:4 data splitter including adjustable delay lines.



Functional Block Diagram





Specifications – SHF 5005 A

Parameter	Unit	Min.	Typ.	Max.	Conditions
Clock input (AC coupled)					
Frequency range	GHz	1		30	half bit rate
S ₁₁	dB			-10	
Input level	V _{pp}	0.4		0.8	
Clock delay range	ps	0		160	in 1ps steps
Max. AC input	V _{pp} (dBm)			1 (4)	
Max. DC input	V			16	
Data inputs (AC coupled)					
Bit rate	Gbps	0.5		15	
S ₁₁	dB			-10	
Input level	V _{pp}	0.4		0.8	
Max. AC input	V _{pp} (dBm)			1 (4)	
Max. DC input	V			16	
Clock output (AC coupled)					
Output level	V _{pp}	0.4		0.8	
S ₂₂	dB			-10	
Data outputs (AC coupled)					
Output bit rate	Gbps	2		60	
Electrical data outputs	dBm V _{amp}		14 3		adjustable from 2...3 V in 100mV steps. accuracy ±200mV (at 50Gbps)
Output jitter	fs			800	RMS
Maximum DC level	V			16	
Rise/fall time	ps			8	20% to 80%
S ₂₂	dB			-10	
General					
Power supply	V	90 180	110 230	135 270	47...73 Hz
Power consumption	W		60		
Weight	kg		10.5		
Dimensions (LxWxH)	mm				472x365x110
Operating temperature	°C	10		35	
Clock input/output connectors					2.9 mm (K) ruggedized male
Data input connectors					SMA female
Data output connectors					1.85 mm (V) ruggedized male



Option LJ

Parameter	Unit	Min.	Typ.	Max.	Conditions
Output jitter	fs		450	500	RMS
Output data level	dBm mV _{amp}	300	400		

Option DS

Parameter	Unit	Min.	Typ.	Max.	Conditions
Max input power	dBm V			4 1	
Delay of channel B Delay of channel C Delay of channel D	ns		2 4 6		relative to channel A
Delay adjustment	ps	0		160	in 1ps steps
Positioning error	ps		0.4		

Output Waveforms

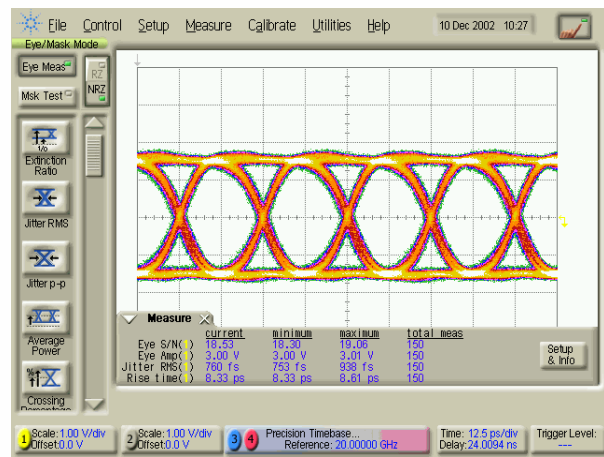
The following eye diagrams were measured using an Agilent 86100 A digitizing oscilloscope (including enhanced trigger option) with a 70 GHz plug-in sampling head.

Note: The 60 Gbps measurements were taken without the precision time base, as it was unable to lock at this frequency.

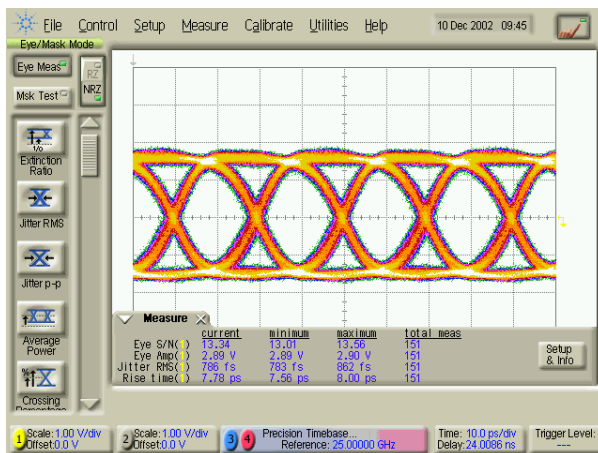
All results measured at the end of a 0.5 m cable (supplied with instrument)



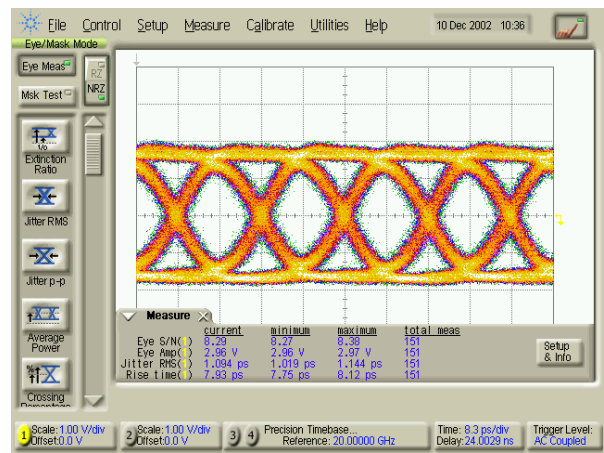
10 Gbps



40 Gbps



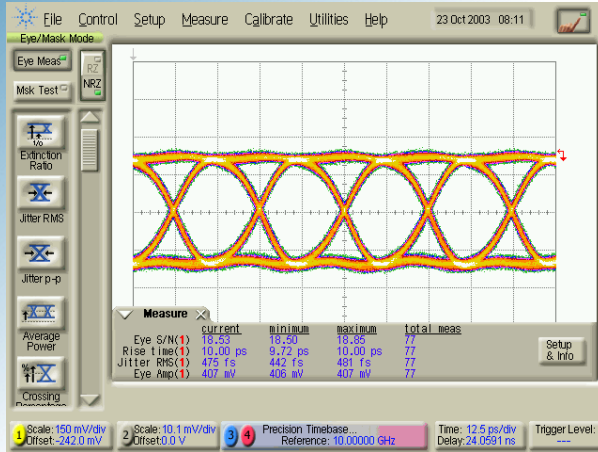
50 Gbps



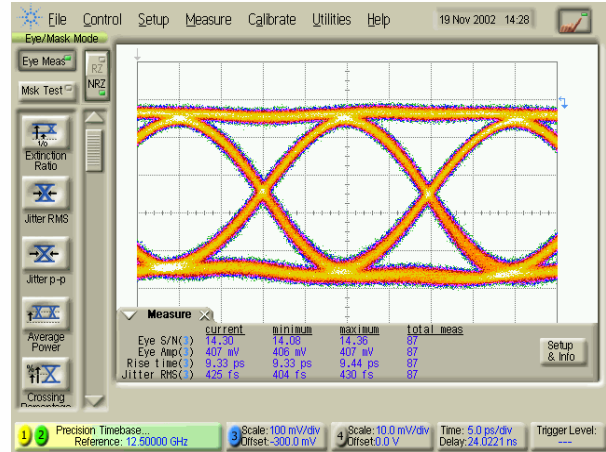
60 Gbps (without precision timebase)



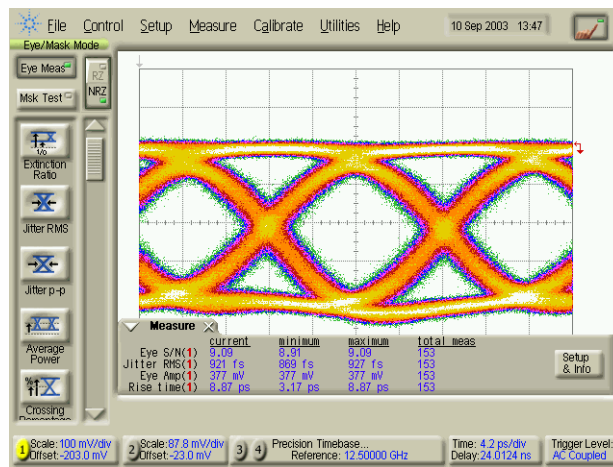
Option LJ



40 Gbps



50 Gbps



60 Gbps (without precision timebase)

Clock output

