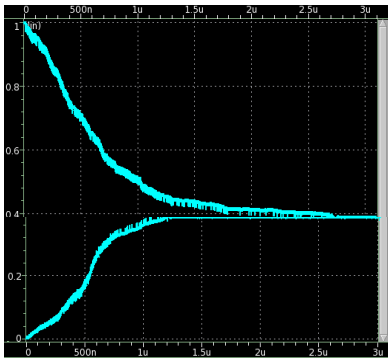
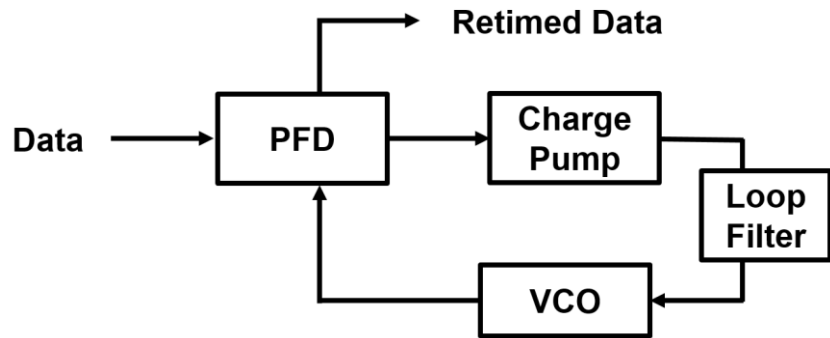
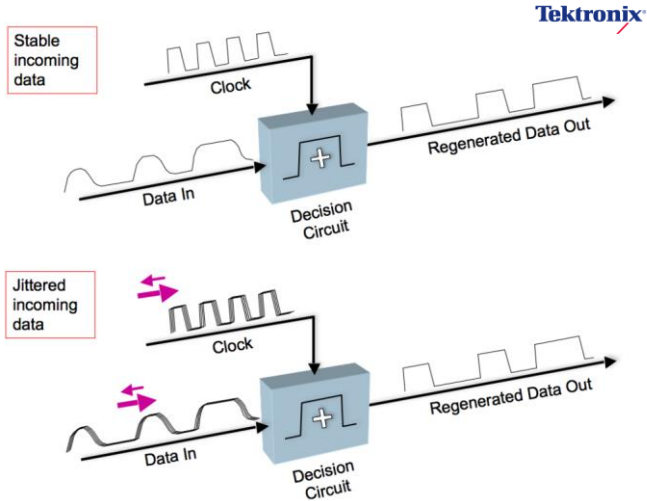
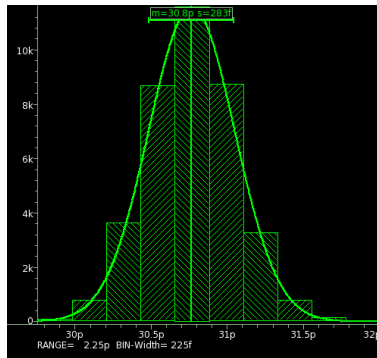


High-speed CDR circuit



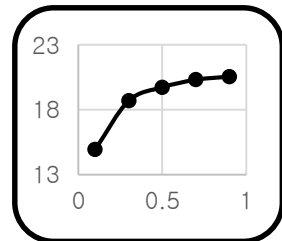
Control voltage vs time



Jitter @ locked

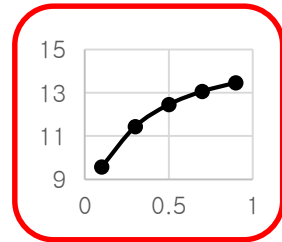
fullrate

0° 20GHz
90° 20GHz



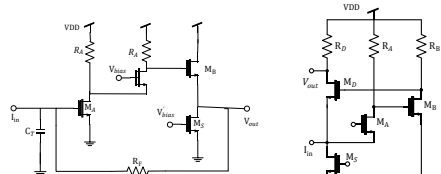
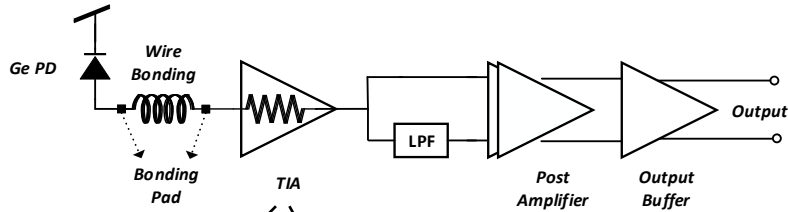
halfrate

45° 10GHz
135° 10GHz



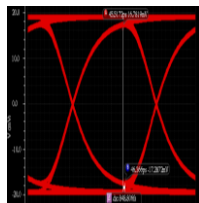
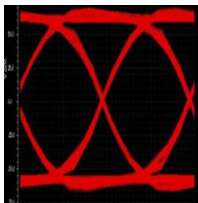
2019 Works

25Gb/s Optical Receiver(1906)



[Shunt Feedback]

[RGC]



- Input referal function for M_A and other Two Resistor +

$$\frac{I_{min}}{I_{max}} = \frac{1}{\frac{(C_T R_f + 1)(C_T R_L + 1)(C_T R_A + 1)}{\frac{C_T R_f}{\partial_{max} R_f} + 1}}$$
- Input referal function for M_B +

$$\frac{I_{min}}{I_{max}} = \frac{1}{\frac{(C_T R_f + 1)(C_T R_B + 1)(C_T R_A + 1)}{\frac{C_T R_f}{\partial_{max} R_f} + 1}}$$
- Input referal function for M_C +

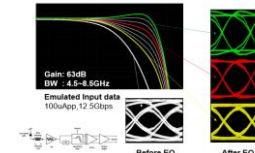
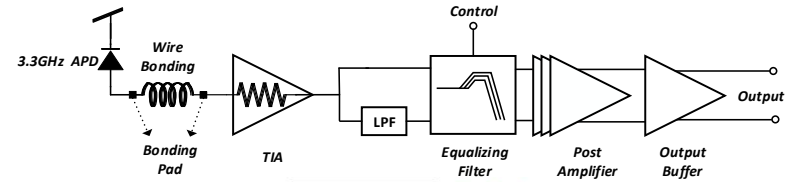
$$\frac{I_{min}}{I_{max}} = \frac{1}{\frac{(C_T R_f + 1)(C_T R_B + 1)(C_T R_A + 1)}{\frac{C_T R_f}{\partial_{max} R_f} + 1}}$$
- Input referal function for M_C +

$$\frac{I_{min}}{I_{max}} = \frac{1}{\frac{(C_T R_f + 1)(C_T R_B + 1)}{\frac{C_T R_f}{\partial_{max} R_f} + 1}}$$

[Noise optimization]

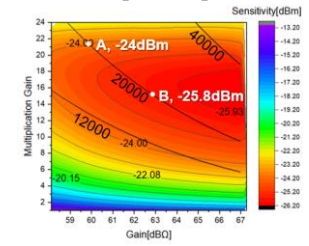
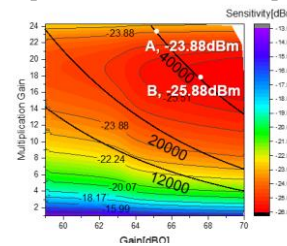
Performance	RGC TIA		SF TIA	
	Pre	Post	Pre	Post
Gain[dB]	51.9	51.6	52.7	52.6
Bandwidth[GHz]	17.1	13.9	16.6	16.5
Input RMS noise current[μ A/rms]	2.52	2.7	2.1	1.96

10Gb/s Optical Receiver with 3Gb/s APD(1910)



[Shunt Feedback]

[RGC]



Optical receiver total gain = circuit gain * APD gain

Optical receiver total gain = circuit gain * APD gain

Considered Input optical data
 $P_{opt} = -25.88\text{dBm}$, Data rate = 12.5Gbps

Considered Input optical data
 $P_{opt} = -25.8\text{dBm}$, Data rate = 12.5Gbps

