

Timing Simplified

Skyworks offers a broad portfolio of frequency flexible timing products that enable hardware designers to simplify clock generation, distribution, and jitter attenuation. The portfolio includes:

- Network synchronizers
- Jitter attenuating clocks
- Clock generators
- Clock buffers
- PCIe clocks and buffers
- Oscillators (XO/VCXO)

Skyworks clocks use proprietary DSPLL and MultiSynth technologies to generate any combination of frequencies with ultra-low jitter, enabling best-in-class clock tree integration. Clock buffers provide low-jitter, low-skew clock distribution with integrated format/voltage level translation. PCIe clocks/buffers combine Gen 1/2/3/4/5 compliance with onchip series termination, simplifying design. XO/VCXOs are factory-customizable to any frequency, with samples available in one to two weeks.



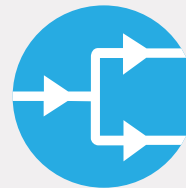
Oscillators

- Any frequency up to 3.0 GHz
- Ultra-low jitter: 80 fs RMS
- Short lead times: 1-2 weeks (samples)



Clock Generators

- Any-frequency, any-output
- Ultra-low jitter: 69 fs RMS
- Clock tree on a chip replaces clocks and XOs



Clock Buffers

- Integrated format/level translation
- Ultra-low additive jitter: 50 fs RMS
- PCI Express Gen 1/2/3/4/5 compliant



Jitter Attenuating Clocks/ Network Synchronizers

- Any frequency, any output
- Ultra-low jitter: 69 fs RMS
- Clock tree on a chip replaces clocks, XOs, VCXOs

Recommended Timing Solutions for Xilinx

*Yes, but without spread spectrum
 Note 1: Jitter integration band defined by jitter tolerance mask (receiver CDR) and XCVR PLL multiplying BW (20MHz default)
 Note 2: Jitter defined by standard or as budgeted fraction of transmitter eye closure

Industry Standard Interface		Jitter Band ¹ (MHz)	Max Jitter ² (fs rms)	Xilinx										Skyworks										
				Versal		Kintex			Artix	Zynq	Arria Cyclone			XO/VCXO				Buffer		Clock Gen			Jitter Atten. Clock	
				AI Core & Prime	Premium	Ultra Scale+	Ultra Scale	7	7	Ultra Scale+	Ultra Scale+	Ultra Scale	7	Si51x	Si59x	Si54x	Si56x	Si532xx	Si533xx	Si522xx	Si5332	Si5341	Si5391	Si534x/8x
OIF	CEI-6G-SR/LR	4-20	630	✓	✓		✓	✓			✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
	CEI-11G-SR	8-20	380	✓	✓		✓	✓			✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
	CEI-28G-VSR	16-20	150	✓	✓		✓	✓			✓	✓	✓	✓						✓	✓	✓	✓	✓
	CEI-56GPAM4-MR/LR	4-20	350	✓	✓							✓							✓	✓	✓	✓	✓	✓
	CEI-56GPAM4-MR/LR	4-20	240	✓	✓							✓							✓	✓	✓	✓	✓	✓
	CEI-112GPAM4-VSR	4-20	120 ⁽³⁾		✓																✓	✓	✓	✓
	SFI-5.1	4-20	1300	✓	✓		✓	✓			✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
SFI-5.2	4-20	380	✓	✓		✓	✓			✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	
IEEE 802.3	1000BASE-X (GbE)	0.6-10	3000	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
	10GBASE-R	0.6-20	430	✓	✓		✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓
	10GBASE-KR	0.6-20	430	✓	✓		✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓
	400GAUI-8 C2C	4-20	380	✓	✓		✓					✓							✓	✓	✓	✓	✓	✓
	400GAUI-8 C2M	4-20	275	✓	✓		✓					✓							✓	✓	✓	✓	✓	✓
	CDAUI-16 (400GbE)	4-20	480	✓	✓		✓	✓				✓			✓	✓	✓	✓			✓	✓	✓	✓
	CDAUI-8 (400GbE)	4-20	240	✓	✓		✓					✓							✓	✓	✓	✓	✓	✓
	CAUI-4	1.9-10	280	✓	✓		✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓
	CAUI-10	1.9-4	460	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓	✓
	XAUI 10GBASE-X	0.6-20	430	✓	✓		✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓
	XLAUI (40GbE)	0.6-20	430	✓	✓		✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓
	OTN (OTU/EPON)	0.6-20	430	✓	✓		✓	✓			✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
	SGMII/QSGMII	4-20	1400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
Proprietary	RXAUI/DXAUI	1.9-20	950	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	

*Yes, but without spread spectrum
 Note 1: Jitter integration band defined by jitter tolerance mask (receiver CDR) and XCVR PLL multiplying BW (20MHz default)
 Note 2: Jitter defined by standard or as budgeted fraction of transmitter eye closure

				Xilinx										Skyworks											
				Versal		Kintex			Artix	Zynq	Virtex			XO/VCXO				Buffer		Clock Gen			Jitter Atten. Clock		
Industry Standard Interface	Jitter Band ¹ (MHz)	Max Jitter ² (fs rms)		AI Core & Prime	Premium	M Series	10 TX	10 GX/SX	10 MX	V GX/GS	10 GT	10 GX/SX	10 GX	SI51x	SI59x	SI54x	SI56x	SI532xx	SI533xx	SI522xx	SI5332	SI5341	SI5391	SI534x/8x	SI539x
ITU	GPON	0.6-10	1500	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
CPRI	CPRI 10G	various	Various 10G+	✓	✓		✓	✓	✓		✓	✓	✓			✓	✓	✓			✓	✓	✓	✓	✓
	CPRI 12G	various	Various 12G+	✓	✓		✓	✓	✓		✓	✓	✓			✓	✓	✓			✓	✓	✓	✓	✓
	CPRI 24G	various	Various 24G+	✓	✓		✓	✓	✓		✓	✓	✓			✓	✓	✓				✓	✓	✓	✓
ANSI	Fibre Ch - 8G, 16G	0.6-10	240	✓	✓		✓	✓	✓		✓	✓	✓			✓	✓	✓			✓	✓	✓	✓	✓
	Fibre Ch - 32G	0.6-10	130	✓	✓		✓	✓	✓		✓	✓	✓			✓	✓					✓	✓	✓	✓
JEDEC	JESD204B	various	Per DAC/ADC	✓	✓		✓	✓	✓		✓	✓	✓									✓	✓	✓	✓
Intel	Interlaken - 6G	4-20	630	✓	✓		✓	✓			✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	Interlaken - 10G	4-20	380	✓	✓		✓	✓			✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	✓
	QPI	Intel	200	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PCI-SIG	PCI Express Gen3	various	1000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*	*	*	*	✓	✓	✓	✓	*	*	*	*
	PCI Express Gen4	various	500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*	*	*	*	✓	✓	✓	✓	*	*	*	*
	PCI Express Gen5	various	150	✓	✓									*	*	*	*	✓	✓	✓	✓	*	*	*	*
CCIX	CCIX-25G	various	350	✓	✓									*	*	*	*	✓	✓		✓	*	*	*	*
SATA-IO	SAS/SATA 6G	2.6-15	780	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	SAS/SATA 12G	2.6-15	390	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
SMPTE	SDI 3G, 6G	0.1-F/2	800	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓
	SDI 12G	0.1-F/2	400	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓
	SDI 24G	0.1-F/2	200	✓	✓		✓	✓	✓		✓				✓							✓	✓	✓	✓
RapidIO	RapidIO-1, -2, -3	4-20	410	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	RapidIO-4	1.9-10	290	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓
TU ANSI	SONET/SDH OC-48	1-20	1000	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	✓
	SONET/SDH OC-192	4-20	240	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓
	SONET/SDH OC-768	16-20	80	✓	✓											✓							✓		✓

Xilinx UltraScale+ Phase Noise Mask Requirements

Xilinx Virtex, Kintex UltraScale+ GTH Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-111	-140	-132	-129	-130	-128	-140	-136	-136	-125	-136	-136	-137
100 kHz	-130	-145	-139	-134	-142	-133	-150	-146	-141	-132	-141	-145	-145
1 MHz	-136	-152	-151	-145	-150	-144	-154	-150	-150	-145	-150	-150	-150

Xilinx Zync Ultrascale+ GTH Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-111	-140	-132	-129	-130	-132	-140	-136	-136	-125	-136	-136	-137
100 kHz	-130	-145	-139	-134	-142	-142	-150	-146	-141	-132	-141	-145	-145
1 MHz	-136	-152	-151	-145	-150	-148	-154	-150	-150	-145	-150	-150	-150

Xilinx UltraScale Phase Noise Mask Requirements

Xilinx Virtex, Kintex UltraScale+ GTY Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-112	-140	-132	-129	-130	-128	-140	-136	-136	-125	-136	-136	-137
100 kHz	-128	-145	-139	-134	-142	-133	-150	-146	-141	-132	-141	-145	-145
1 MHz	-145	-152	-151	-145	-150	-144	-154	-150	-150	-145	-150	-150	-150

Xilinx Zync Ultrascale+ GTY Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-112	-140	-132	-129	-130	-132	-140	-136	-136	-125	-136	-136	-137
100 kHz	-128	-145	-139	-134	-142	-142	-150	-146	-141	-132	-141	-145	-145
1 MHz	-145	-152	-151	-145	-150	-148	-154	-150	-150	-145	-150	-150	-150

Xilinx UltraScale Phase Noise Mask Requirements

Xilinx Virtex, Kintex UltraScale+ GTM Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-112	-140	-132	-129	-130	-128	-140	-136	-136	-125	-136	-136	-137
100 kHz	-130	-145	-139	-134	-142	-133	-150	-146	-141	-132	-141	-145	-145
1 MHz	-145	-152	-151	-145	-150	-144	-154	-149	-149	-145	-150	-150	-150

Xilinx Zync Ultrascale+ GTM Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-111	-140	-132	-129	-130	-132	-140	-136	-136	-125	-136	-136	-137
100 kHz	-130	-145	-139	-134	-142	-142	-150	-146	-141	-132	-141	-145	-145
1 MHz	-136	-152	-151	-145	-150	-148	-154	-149	-149	-145	-150	-150	-150

Xilinx UltraScale Phase Noise Mask Requirements

Xilinx Virtex, Kintex UltraScale GTH Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/ Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-111	-140	-132	-129	-130	-132	-140	-136	-136	-125	-136	-136	-137
100 kHz	-130	-145	-139	-134	-142	-142	-150	-146	-141	-132	-141	-145	-145
1 MHz	-136	-152	-151	-145	-150	-148	-154	-150	-150	-145	-150	-150	-150

Xilinx Virtex, Kintex UltraScale GTJ Transceiver		XO			VCXO		Clock Buffer	Clock Generator			Jitter Attenuating Clock		Network Synchronizers (SyncE/1588)
Offset (dBc/Hz)	QPLL PN 156.25 MHz	Si545	Si540	Si570/ Si53x	Si56x	Si55x	Si5330x Universal Buffers	Si5391	Si5341 Si5340	Si5332	Si5347/6/5/4/2	Si5392/5	Si5383/48
10 kHz	-112	-140	-132	-129	-130	-132	-140	-136	-136	-125	-136	-136	-137
100 kHz	-128	-145	-139	-134	-142	-142	-150	-146	-141	-132	-141	-145	-145
1 MHz	-145	-152	-151	-145	-150	-148	-154	-150	-150	-145	-150	-150	-150

For more information, visit www.skyworksinc.com/en/Products/Timing