Microsemi and Industrial IoT

The Challenge

Machines and various types of equipment are increasingly both connected and intelligent, imposing vastly increased networking and bandwidth requirements on network infrastructures in order to deliver real-time visibility and control. However, today's industrial network architectures are largely heterogeneous with vast installations of legacy equipment and specialized networked protocols still in use. Modernizing these networks requires a strategy to address the system reliability, determinism and security imperatives of industrial settings. With Ethernet increasingly the common denominator in these environments, Industrial Internet of Things (IIoT) networking has new requirements for deeply embedded, secure, and performance-optimized networking connectivity with accurate timing synchronization, ring protection, and line rate encryption, while demanding deterministic and reliable performance at low power.

The Solution

Microsemi's broad portfolio—including ICs, systems, software, IP and ecosystem solutions–is inherently optimized for IIoT Ethernet networking applications and needs.

ICs and Systems: Microsemi's flexible Industrial Ethernet solutions portfolio includes ICs such as Ethernet switches and PHYs, PLLs and oscillators, FPGAs/SoCs, Power over Ethernet (PoE) devices, and rubidium oscillators, complemented by system solutions such as industrial PoE injectors/midspans and grandmaster clocks. Unlike traditional Ethernet switch IC suppliers, Microsemi focuses on low-bandwidth and high-feature IC architectures that deliver sizeable low-power advantages and fit IIoT market needs such as port flexibility, long life cycle, deterministic behavior, and stringent reliability.

Software: To reduce development costs and time to market, Microsemi also offers comprehensive software choices that enrich our device portfolio, including IEEE 1588 timing and optimized managed switch software stacks.

IP: Microsemi SoC IP provides all the necessary building blocks for Industrial Ethernet communications to simplify communications from fieldbus interfaces to an Ethernet backbone.

Ecosystem Solutions: Through Microsemi's ecosystem, customers may also leverage multi-protocol Industrial Ethernet solutions as well as security and ODM turnkey solutions specifically for industrial applications.

The Value of Choosing Microsemi

Selecting a solutions provider that can meet your IIoT networking requirements is an important choice. Microsemi is a long-term supplier of Ethernet switching and PHY technology, with over 300 million Gigabit Ethernet ports shipped. Microsemi is also the only IC, systems, and software provider with a power-optimized, flexible, and reliable industrial Ethernet networking portfolio that supports Ethernet interfaces and fieldbus protocols for a broad range of Industrial Ethernet applications, enabling highly reliable and secure IIoT networks.

Contact us today to learn how you can get to market faster with Microsemi IIoT solutions.

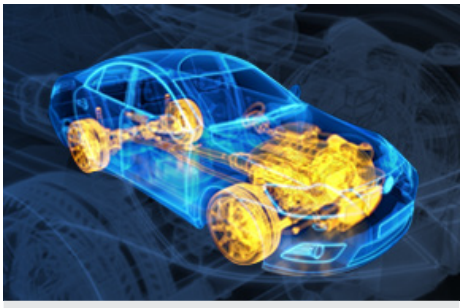
Industrial Automation

Process Control

Intelligent Transportation

Smart Energy

Physical Security



Automotive

Ethernet Solutions

Ethernet Switches, PHYs, Software, and PoE: Optimized for IIoT Networking

Microsemi has been at the forefront of the worldwide transition of industrial networks and other market segments to Ethernet, with a growing portfolio of products providing advanced features and efficient architectures that result in scalable, low-power and high-reliability performance in the transmission of voice, video, and data.

With over 300 million Gigabit Ethernet ports shipped, Microsemi is a global leader in Ethernet switch and physical layer IC technology and IP. Microsemi is also a leading provider of end-to-end PoE ICs and midspans/injectors since 1999, with a well-established track record in Enterprise applications.

Key Features

- Faster time-to-production with complete hardware and software solutions
- Industrial temperature range operation
- Ethernet switch solutions up to 100 Gbps of bandwidth, with low power and integrated PHYs
- Ethernet PHYs offer simplified designs with flexible clocking and management features, wide voltage interface ranges, and adjustable drive strength to reduce EMI
- Complete IEEE 1588-compliant 1 Gbps and 10 Gbps solutions with nanosecond-level timestamping accuracy and AES-256 MACsec security features that preserve accuracy
- Line monitoring features that gauge and react to the health of an active Ethernet link
- Solutions with low-alpha mold compound, improving overall SEU immunity
- Broadest PoE product portfolio for indoor and outdoor deployments with PoE ICs delivering power (PSE) and receiving power (PD), and a wide range of PoE injectors/ midspans injecting up to 95 W over a single Category 5/5E/6/6A/7 cable

Ethernet Switches

Product Number	Ports*			Managed	Embedded PHYs		Interfaces					L2/L2+/ L3-Aware	1588	Ring Protection	Temp. Min.°C	Temp. Max. °C
	1G	2.5G	10G		10G	1G	SGMII	QSGMII	XAUI	SFI/XFI	PCIe					
VSC7420 SparX-III-10um™	10	2				8	•					L2			–40	125
VSC7421 SparX-III-17um™	17	2				12	•					L2			–40	125
VSC7422 SparX-III-25um™	25	1				12	•	•				L2			–40	125
VSC7423 Caracal Lite™	7	2		•		5	•					L2+	•	•	–40	125
VSC7428 Caracal-1™	11	2		•		8	•					L2+	•	•	–40	125
VSC7429 Caracal-2™	26	2		•		12	•	•				L2+	•	•	–40	125
VSC7414 SparX-III-11™	11	2		•			•				•	L2+	•		–40	125
VSC7460 Jaguar-1™	31	10	4	•			•		•			L2+/L3-Aware	•	•	–40	125
VSC7462 LynX-1™	20	10	4	•			•		•			L2+/L3-Aware	•	•	–40	125
VSC7438 Serval-2™	14	12	2	•	2		•	•	•	•	•	L2+/L3-Aware	•	•	–40	125
VSC7464 LynX-2™	26	16	4	•	4		•	•	•	•	•	L2+/L3-Aware	•	•	–40	125
VSC7468 Jaguar-2™	52	24	4	•	4		•	•	•	•	•	L2+/L3-Aware	•	•	–40	125
VSC7440 SparX-IV-34™	4	4	2	•	2	2	•			•	•	L2+/L3-Aware	•	•	–40	125
VSC7442 SparX-IV-52™	52			•			•	•			•	L2+/L3-Aware	•	•	–40	110
VSC7444 SparX-IV-44™	26	16	2	•	2		•	•	R	•	•	L2+/L3-Aware	•	•	–40	110
VSC7448 SparX-IV-80™	52	24	4	•	4		•	•	R	•	•	L2+/L3-Aware	•	•	–40	110
VSC7511 Ocelot-4um™	4					4	•				•	L2		•	–40	125
VSC7512 Ocelot-10um™	10	2				4	•	•			•	L2		•	–40	125
VSC7513 Ocelot-8™	8			•		4	•	•			•	L2	•	•	–40	125
VSC7514 Ocelot-10™	10	2		•		4	•	•			•	L2	•	•	–40	125

*Maximum port counts exclude the NPI port. Shall not surpass the device's max available I/O bandwidth.
"R" denotes both RXAUI and XAUI support
1G integrated ports support dual media Copper or Fibre applications

Ethernet Solutions

Ethernet PHYs

Product Number	Speed		Ports	MAC Interfaces	Cu-Only or Dual Media	256/128-bit MACsec	SyncE	1588v2 Accuracy	Temp. Min.°C	Temp. Max. °C
	FE	GE								
VSC8501-03		•	1	RGMII/GMII/MII (2.5 V/3.3 V)	Cu		•		–40	125
VSC8502-03		•	2	RGMII/GMII/MII (2.5 V/3.3 V)	Cu		•		–40	125
VSC8504-04		•	4	QSGMII/SGMII	Dual Media		•		–40	125
VSC8512		•	12	Q/SGMII	Dual Media		•		–40	125
VSC8514-03		•	4	QSGMII	Cu		•		–40	125
VSC8514-14		•	4	QSGMII	Cu				–40	125
VSC8530-03	•		1	RGMII/RMII (1.5 V/1.8 V/2.5 V/3.3 V)	Cu				–40	125
VSC8531-03		•	1	RGMII/RMII (1.5 V/1.8 V/2.5 V/3.3 V)	Cu				–40	125
VSC8540-03	•		1	RGMII/RMII/MII (1.5 V/1.8 V/2.5 V/3.3 V)	Cu		•		–40	125
VSC8541-03		•	1	RGMII/RMII/GMII/MII (1.5 V/1.8 V/2.5 V/3.3 V)	Cu		•	SOF	–40	125
VSC8552-04		•	2	QSGMII/SGMII/RGMII (2.5 V/3.3 V)	Dual Media		•		–40	125
VSC8562-14		•	2	QSGMII/SGMII	Dual Media	•	•		–40	125
VSC8564-14		•	4	QSGMII/SGMII	Dual Media	•	•		–40	125
VSC8572-04		•	2	QSGMII/SGMII/RGMII (2.5 V/3.3 V)	Dual Media		•	±10 nS	–40	125
VSC8574-04		•	4	QSGMII/SGMII	Dual Media		•	±10 nS	–40	125
VSC8575-14		•	4	QSGMII/SGMII	Dual Media		•	±4 nS	–40	125
VSC8582-14		•	2	QSGMII/SGMII	Dual Media	•	•	±4 nS	–40	125
VSC8584-14		•	4	QSGMII/SGMII	Dual Media	•	•	±4 nS	–40	125

All Gigabit Ethernet PHYs are also available with a 0° C to 125° C temperature range.

Ethernet Software

Product Number		Description	Market	Application	Basic L2	Advanced L2	Protection	IEEE 1588/ SyncE	Carrier Ethernet	iCLI, JSON/ RPC, SNMP
eCOS	LINUX									
VSC6810SDK	VSC6818SDK	CE Services	Service Provider	Turnkey	•	•	•	•	•	•
VSC6815SDK	VSC6817SDK	IStaX	Industrial IoT	Turnkey	•	•	•	•		•
VSC6813SDK	VSC6816SDK	SMBStaX	Enterprise	Turnkey	•	•				•
VSC6812SDK	VSC6819SDK	WebStaX	Enterprise	Turnkey	•					
VSC6802API		Unified API		Development						
VSC6803API		Open API		Development						
VSC6811SDK		WebConfig		Turnkey	•					
VSC6825SDK		Unmanaged		Turnkey	•					
VSC6830SDK		Linux BSP		Development						

Power over Ethernet (PoE)

Industrial PoE Solutions

Watts per Port	Product	Number of Ports	Power Input	Warranty
30 W	PD-9001GI/DC	1	DC	1 Year
60 W	PD-9501GI/DC	1	DC	1 Year

All Microsemi PoE products support Gigabit data rates

PoE PD Front End ICs

Product	IC Type	PoE Type	IEEE Compliant	Max Power [W]	Max Current [A]	Max Channel Impedance [Ω]
PD70100ILD	Front end	Type 1 – AF – 15 W	IEEE 802.3af	15.4	0.45	0.6
PD70101ILQ	Combo: Front + PWM controller	Type 1 – AF – 15 W	IEEE 802.3af	15.4	0.45	0.6
PD70200ILD	Front end	Type 2 – AT – 30 W	IEEE 802.3at	51	1.2	0.6
PD70201ILQ	Combo: Front + PWM controller	Type 2 – AT – 30 W	IEEE 802.3at	51	1.2	0.6
PD70210ILD/PD70210AILD	Front end	PoH – 95 W	PoH	95	2	0.3
PD70211ILQ	Combo: Front + PWM controller	PoH – 95 W	PoH	95	2	0.3
PD70224ILQ-TR	Ideal diode bridge	PoH – 95 W	PoH	95	2	NA

PoE PSE Manager

Product	Ports	FETs	Sense Resistor	MCU Options	Host I/F Options	LED Driving Options	Standards Supported	Max PM System	Evaluation Boards
PD69208ILQ	8	Internal 0.2 Ω	Internal 0.1 Ω	PD69200-VVVSS Marvell ISSR	I²C UART SPI	CPLD Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W PoH 95W	96 Ports	PD-IM-7648 PD-IM-7648H
PD69204ILQ	4	Internal 0.2 Ω	Internal 0.1 Ω	PD69200-VVVSS Marvell ISSR	I²C UART SPI	CPLD Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W PoH 95W	96 Ports	PD-IM-7648 PD-IM-7648H
PD69108ILQ/ PD69108FILQ	8	Internal 0.3 Ω	External 0.36 Ω	PD39100X-0YYY PD69100Y-GGGG Marvell ISSR	I²C UART SPI	CPLD Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W PoH 95W	96 Ports	PD-IM-7548 PD-IM-7548H
PD69104ILQ	4	Internal 0.3 Ω	External 0.36 Ω	PD39100X-0YYY PD69100Y-GGGG Marvell ISSR	I²C UART SPI	CPLD Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W PoH 95W	92 Ports	Use PD69108 EVB
PD69104B1ILQ/ PD69104B1FILQ	4	Internal 0.3 Ω	External 0.36 Ω	Auto Mode	I²C UART	Direct Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W PoH 95W	4 Ports	PD-IM-7504B
PD69101ILQ	1	Internal 0.3 Ω	External 0.5 Ω	Auto Mode	SPI	Direct Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W	2 Ports	PD-IM-7401
PD69012	12	External 0.1 Ω	External 0.5 Ω	PD69000XX-GGGG Marvell ISSR Auto Mode	I²C UART SPI	CPLD Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W	96 Ports	PD-IM-7448E PD-IM-7448A
PD69008	8	External 0.1 Ω	External 0.5 Ω	PD69000XX-GGGG Marvell ISSR Auto Mode	I²C UART SPI	CPLD Host	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W	88 Ports	PD-IM-7416A
PD64001	1	External 0.1 Ω	External 2 Ω	Auto Mode	none	Direct	IEEE 802.3af 15.4W IEEE 802.3at 30W IEEE 802.3at 60W	1 Port	PD-IM-7301

Miniature Atomic Clocks

Miniature Atomic Clocks: SWaP Optimized for Robust Industrial Holdover

Highly compact, lightweight, and low power, Microsemi's Miniature Atomic Clock (MAC) portfolio delivers significant advantages over traditional lamp-based rubidium clocks used in industrial holdover applications. With the industry's broadest operating temperature range (–10 °C to 70 °C), the SA.3Xm devices are the ideal choice for industrial applications requiring rubidium oscillator precision with no external physical connection.

	SA.35m	SA.33m	SA.31m
Size (volume)	46 cm^3/2.8 in^3		
Power (W) @ 25 °C	5		
Phase Noise (dBc/Hz) 1 Hz 10 Hz 100 Hz 1 KHz 10 KHz	 ≤ –70 ≤ –87 ≤ –114 ≤ –130 ≤ –140	 ≤ –70 ≤ –87 ≤ –114 ≤ –130 ≤ –140	 ≤ –65 ≤ –85 ≤ –112 ≤ –130 ≤ –140
Aging (monthly)	<±1E–10	<±1E–10	<±3E–10
TempCo (–10 °C to 75 °C)	<1E–10	<1.5E–10	<1E–9
Allan Deviation 1 s 10 s 100 s	 ≤3E–11 ≤1.6E–11 ≤8E–12	 ≤3E–11 ≤1.6E–11 ≤8E–12	 ≤5E–11 ≤2.5E–11 ≤1E–11

Timing ICs

Timing ICs: From the Market Leader in SyncE

Microsemi provides both SyncE alone (with an easy migration path to IEEE 1588) or combined SyncE and IEEE 1588 for frequency and time alignment. The market leader in Synchronous Ethernet timing devices, Microsemi was the first to introduce Synchronous Ethernet PLLs in 2006. Microsemi now offers the industry's most comprehensive portfolio of SyncE timing devices, providing G.8262 compliance and ultra-low jitter for PHYs up to 100G.

SyncE for Timing Card

Product	Description	DPLLs / NCOs	BW (Hz)	Split XO Feature	Inputs	Input Frequency	Embedded PPS & EPP2S	Diff. Outputs	CMOS Outputs	Output Frequency	Low-Jitter APLLs	GP Clock Gen	Jitter ps RMS	Pkg Size mm
ZL30142	10 GbE Single SyncE and Telecom DPLL	1	01. m–890		3 SE	2k, N x 8K, SDH, SyncE		1	2	2k, N x 8K, SDH, SyncE	1	1	1.0	9 x 9
ZL30143	10 GbE Dual SyncE and Telecom DPLL	2	01. m–890		8 SE	2k, N x 8K, SDH, SyncE		2	6	2k, N x 8K, SDH, SyncE	1	2	1.0	9 x 9
ZL30161	10 GbE Any-Frequency SyncE PLL/NCO	1	0.1 m–1 k		11	1 Hz–750 MHz		6	6	1 Hz–750 MHz	3	0	0.6	13 x 13
ZL30162	10 GbE Any-Frequency Quad SyncE PLL/NCO	4	0.1 m–1 k		11	1 Hz–750 MHz		8	8	1 Hz–750 MHz	4	0	0.6	13 x 13
ZL30163	10 GbE Any-Frequency Dual SyncE PLL/NCO	2	0.1 m–1 k		11	1 Hz–750 MHz		8	8	1 Hz–750 MHz	4	0	0.6	13 x 13
ZL30164	10 GbE Any-Frequency Triple SyncE PLL/NCO	3	0.1 m–1 k		11	1 Hz–750 MHz		8	8	1 Hz–750 MHz	4	0	0.64	13 x 13
ZL30621	10 GbE and above Single SyncE PLL/NCO	1	0.1 m–10		2 D/SE + 1 SE	8 kHz–1250 MHz		3	6	<1 Hz–1035 MHz	1	0	0.25	5 x 10
ZL30622	10 GbE and above Single SyncE PLL/NCO	1	0.1 m–500		2 D/SE + 1 SE	8 kHz–1250 MHz		3	6	<1 Hz–1035 MHz	1	0	0.25	5 x 5
ZL30623	10 GbE and above Dual SyncE PLL/NCO	2	0.1 m–500		4 D/SE + 1 SE	8 kHz–1250 MHz		6	12	<1 Hz–1035 MHz	2	0	0.25	5 x 10
ZL30601	Single Channel Network Synchronizer	1	0.1 m–448	•	5 D/10 SE	0.5 Hz–900 MHz	•	6	14	0.5 Hz–900 MHz	2 or 3	1	0.25	10 x 10
ZL30602	Dual Channel Network Synchronizer	2	0.1 m–448	•	5 D/10 SE	0.5 Hz–900 MHz	•	6	14	0.5 Hz–900 MHz	2 or 3	1	0.25	10 x 10
ZL30603	Triple Channel Network Synchronizer	3	0.1 m–448	•	5 D/10 SE	0.5 Hz–900 MHz	•	6	14	0.5 Hz–900 MHz	2 or 3	1	0.25	10 x 10
ZL30604	Quad Channel Network Synchronizer	4	0.1 m–448	•	5 D/10 SE	0.5 Hz–900 MHz	•	6	14	0.5 Hz–900 MHz	2 or 3	1	0.25	10 x 10

SyncE for Line Card

Product	Description	DPLLs	BW (Hz)	Inputs	Input Frequency	Embedded PPS	Outputs (Diff/CMOS)	Output Frequency	Low-Jitter APLLs/GP Clock Gen	Jitter ps RMS	Pkg Size mm
ZL30151	10 GbE and above Single SyncE PLL	1	1–500	2 D/SE + 1 SE	1 kHz–650 MHz		0–3/0–6	<1 Hz–650 MHz	1/0	0.25	5 x 5
ZL30165	10 GbE Any-Frequency Quad SyncE PLL/NCO	4 or (4 NCO)	5–896	8 D/SE	1 kHz–750 MHz		8/8	1 kHz–750 MHz	4/0	0.63	13 x 13
ZL30166	10 GbE Any-Frequency Triple SyncE PLL/NCO	3 or (3 NCO)	5–896	9 D/SE + 2 SE	1 kHz–750 MHz		8/8	1 kHz–750 MHz	4/0	0.63	13 x 13
ZL30167	10 GbE Any-Frequency Dual SyncE PLL/NCO	2 or (2 NCO)	5–896	9 D/SE + 2 SE	1 kHz–750 MHz		8/8	1 kHz–750 MHz	4/0	0.63	13 x 13
ZL30611	SyncE Line Card	1 or (1 NCO)	14–448	5 D/10 SE	1 kHz–900 MHz	•	6/14	0.5 Hz–650 MHz	3/1	0.25	10 x 10
ZL30612	Dual SyncE Line Card	2 or (2 NCO)	14–448	5 D/10 SE	1 kHz–900 MHz	•	6/14	0.5 Hz–650 MHz	3/1	0.25	10 x 10
ZL30614	Quad SyncE Line Card	4 or (4 NCO)	14–448	5 D/10 SE	1 kHz–900 MHz	•	6/14	0.5 Hz–650 MHz	3/1	0.25	10 x 10

IEEE 1588 PLL

IEEE 1588 is a protocol-based synchronization mechanism useful for existing unaware networks where frequency syntonization is required. When coupled with physical layer technologies such as Synchronous Ethernet, IEEE 1588 can also provide robust time alignment. Microsemi offers the industry's most comprehensive and cost effective IEEE 1588 solution with a range of products offering ultra-low jitter for PHYs up to 100G and IEEE 1588 profiles.

IEEE 1588 for Timing Cards

Product	Description	DPLLs	BW (Hz)	Split XO Feature	Inputs	Input Frequency	Embedded PPS & EPP2S	Diff. Outputs	CMOS Outputs	Output Frequency	Low-Jitter APLLs	GP Clock Gen	Jitter ps RMS	Pkg Size mm
ZL30342	SyncE/SONET/SDH G.8262/ Stratum 3 and IEEE 1588 Packet G.8261 Synchronizer	1 NCO	0.1–890		3 SE	N x 8K, SyncE		1	2	N x 8K, SDH, SyncE	1-Int-N	1	1.0	9 x 9
ZL30343	SyncE/SONET/SDH G.8262/ Stratum 3 and IEEE 1588 Packet G.8261 Synchronizer	2 NCO	0.1–890		8 SE	N x 8K, SyncE		2	6	N x 8K, SDH, SyncE	1-Int-N	2	1.0	9 x 9
ZL30361	Single Channel Combined IEEE 1588 ToP and SyncE Device	1 NCO	0.1–896		11	1 Hz– 750 MHz		6	6	1 Hz– 750 MHz	3	0	0.6	13 x 13
ZL30362	Quad Channel Combined IEEE 1588 ToP and SyncE Device	4 NCO	0.1–896		11	1 Hz– 750 MHz		8	8	1 Hz– 750 MHz	4	0	0.6	13 x 13
ZL30363	Dual Channel Combined IEEE 1588 ToP and SyncE Device	2 NCO	0.1–896		11	1 Hz– 750 MHz		8	8	1 Hz– 750 MHz	4	0	0.6	13 x 13
ZL30364	Triple Channel Combined IEEE 1588 ToP and SyncE Device	3 NCO	0.1–896		11	1 Hz– 750 MHz		8	8	1 Hz– 750 MHz	4	0	0.64	13 x 13
ZL30721	Single Channel Combined IEEE 1588 ToP and SyncE Device	1 NCO	0.1–10		2 D/SE + 1 SE	8 kHz– 1250 MHz		3	6	<1 Hz– 1035 MHz	1	0	0.25	5 x 10
ZL30722	Single Channel Combined IEEE 1588 ToP and SyncE Device	1 NCO	0.1–500		2 D/SE + 1 SE	8 kHz– 1250 MHz		3	6	<1 Hz– 1035 MHz	1	0	0.25	5 x 5
ZL30723	Dual Channel Combined IEEE 1588 ToP and SyncE Device	2 NCO	0.1–500		4 D/SE + 1 SE	8 kHz– 1250 MHz		6	12	<1 Hz– 1035 MHz	2	0	0.25	5 x 10
ZL30701	Single Channel IEEE 1588 Synchronizer	1 or (1 NCO)	0.1 m–448	•	5 D/ 10 SE	0.5 Hz– 900 MHz	•	6	14	0.5 Hz– 900 MHz	2 or 3	1	0.25	10 x 10
ZL30702	Dual Channel IEEE 1588 Synchronizer	2 or (2 NCO)	0.1 m–448	•	5 D/ 10 SE	0.5 Hz– 900 MHz	•	6	14	0.5 Hz– 900 MHz	2 or 3	1	0.25	10 x 10
ZL30703	Triple Channel IEEE 1588 Synchronizer	3 or (3 NCO)	0.1 m–448	•	5 D/ 10 SE	0.5 Hz– 900 MHz	•	6	14	0.5 Hz– 900 MHz	2 or 3	1	0.25	10 x 10
ZL30704	Quad Channel IEEE 1588 Synchronizer	4 or (4 NCO)	0.1 m–448	•	5 D/ 10 SE	0.5 Hz– 900 MHz	•	6	14	0.5 Hz– 900 MHz	2 or 3	1	0.25	10 x 10

IEEE 1588 for Line Cards

Product	Description	DPLLs	BW (Hz)	Inputs	Input Frequency	Diff. Outputs	CMOS Outputs	Output Frequency	Low-Jitter APLLs	GP Clock Gen	Jitter ps RMS	Pkg Size mm
ZL30347	10 GbE Any Frequency Stratum 2/3E/3 DPLL	1	0.5 m–400	2 D/SE	Nx8k, SyncE	2	6	N x 8K, SDH, SyncE	1-Int-N	2	1.0	9 x 9
ZL30365	Quad Channel Combined IEEE 1588 ToP and SyncE Device	4 NCO	5–890	8 D/SE	1 Hz– 750 MHz	8	8	<1 Hz– 750 MHz	4	0	0.65	13 x 13
ZL30367	Dual Channel Combined IEEE 1588 ToP and SyncE Device	2 NCO	5–890	9 D/ SE+2 SE	1 Hz– 750 MHz	6	6	<1 Hz– 750 MHz	3	0	0.65	13 x 13

Clock Management

Microsemi's clock management portfolio provides devices for clock synthesis, frequency conversion, jitter attenuation, and fan out buffers to reduce bill of material costs and board space requirements, improve performance reliability, and simplify design complexity. Key features include industry-leading ultra-low jitter, high integration, wide frequency range, and highly programmable outputs.

Clock Synthesis Devices

Product	Independent Output Freq. Families	Inputs	Crystal Input Freq. Range	Xtal Osc. or CMOS Input Freq. Range	Diff Input Freq. Range	Typical Jitter fs RMS	NCO ppb	Outputs Diff/CMOS	Output Freq. Range	NV Memory	Host Bus	Pkg Size, mm
MAX24405	2	1 XTAL/SE, 3 D/SE	25 M–52 M	9.72 M–160 M	9.72 M–750 M	180[1]	–	0-5/0-10	<1 Hz–750 M	Ext EE	SPI	10 x 10
MAX24505	2	1 XTAL/SE, 3 D/SE	25 M–52 M	9.72 M–160 M	9.72 M–750 M	180[1]	–	0-5/0-10	<1 Hz–750 M	Int EE	SPI	10 x 10
MAX24410	2	1 XTAL/SE, 3 D/SE	25 M–52 M	9.72 M–160 M	9.72 M–750 M	180[1]	–	0-10/0-20	<1 Hz–750 M	Ext EE	SPI	10 x 10
MAX24510	2	1 XTAL/SE, 3 D/SE	25 M–52 M	9.72 M–160 M	9.72 M–750 M	180[1]	–	0-10/0-20	<1 Hz–750 M	Int EE	SPI	10 x 10
ZL30250	1	1 XTAL/SE, 3 D/SE	25 M–60 M	9.72 M–300 M	9.72 M–1250 M	160[1]	0.01	0-3/0-6	<1 Hz–1035 M[2]	Ext EE[3]	SPI/I2C	5 x 5
ZL30251	1	1 XTAL/SE, 3 D/SE	25 M–60 M	9.72 M–300 M	9.72 M–1250 M	160[1]	0.01	0-3/0-6	<1 Hz–1035 M[2]	Int EE[3]	SPI/I2C	5 x 5
ZL30244	2	2 XTAL/SE, 6 D/SE	25 M–60 M	9.72 M–300 M	9.72 M–1250 M	160[1]	0.01	0-6/0-12	<1 Hz–1035 M[2]	Ext EE[3]	SPI/I2C	5 x 10
ZL30245	2	2 XTAL/SE, 6 D/SE	25 M–60 M	9.72 M–300 M	9.72 M–1250 M	160[1]	0.01	0-6/0-12	<1 Hz–1035 M[2]	Int EE[3]	SPI/I2C	5 x 10

Abbreviation Key:
D = Differential
Ext EE = External EEPROM
1 = Integer-mode APLL-only operation
SE = Single-ended (CMOS)
Int EE = Internal EEPROM
2 = Spread spectrum capable
NCO = Numerically controlled oscillator
Supply Voltage = 3.3+1.8
3 = Up to four configurations pin-selectable

Rate Conversion/Jitter Attenuation Devices

Product	Independent Output Freq. Families	Inputs	Crystal Input Freq. Range	XTAL Osc. or CMOS Input Freq. Range	Diff Input Freq. Range	Typical Jitter fs RMS	DPLL Features: Ref. Switching/ Holdover/ Bandwidth	NCO ppb	Outputs Diff/CMOS	Output Freq. Range	NV Memory	Host Bus	Pkg Size, mm
MAX24605	2	1 XTAL/SE, 3 D/SE	25 M–52 M	2 KHz–160 M	2 KHz–750 M	180[1]	Glitchless/ Digital Hold/ 4 Hz–400 Hz	<0.001	0-5/0-10	<1 Hz–750 M	Ext EE	SPI	10 x 10
MAX24610	2	1 XTAL/SE, 3 D/SE	25 M–52 M	2 KHz–160 M	2 KHz–750 M	180[1]	Glitchless/ Digital Hold/ 4 Hz–400 Hz	<0.001	0-10/0-20	<1 Hz–750 M	Ext EE	SPI	10 x 10
ZL30252	1	1 XTAL/SE, 3 D/SE	25 M–60 M	1 kHz–300 M	1 kHz–1250 M	160[1]	Glitchless/ Digital Hold/ 14 Hz–500 Hz	0.01	0-3/0-6	<1 Hz–1035 M[2]	Ext EE[3]	SPI/ I2C	5 x 5
ZL30253	1	1 XTAL/SE, 3 D/SE	25 M–60 M	1 kHz–300 M	1 kHz–1250 M	160[1]	Glitchless/ Digital Hold/ 14 Hz–500 Hz	0.01	0-3/0-6	<1 Hz–1035 M[2]	Int EE[3]	SPI/ I2C	5 x 5
ZL30254	1	1 XTAL, 2 SE	49.152 MHz	8 kHz or 25 MHz	–	<1ps	Glitchless/ Digital Hold/ 25 Hz	–	2/0	125 MHz or 156.25 MHz	–	None	5 x 5
ZL30255	2	2 XTAL/SE, 6 D/SE	25 M–60 M	1 kHz–300 M	1 kHz–1250 M	160[1]	Glitchless/ Digital-Hold/ 14 Hz–500 Hz	0.01	0-6/0-12	<1 Hz–1035 M[2]	Int EE[3]	SPI/ I2C	5 x 10

Abbreviation Key:
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Microsemi high-performance buffers deliver industry leading power supply noise rejection performance and low additive jitter. This preserves signal integrity resulting in high performance while simplifying engineering board design efforts.

Precision Differential Fanout Buffers

Product	Output Type	Inputs	Outputs	Input Termination	Switching	750 MHz Additive Jitter fs RMS typ	Input Type	Input Coupling	Operating Frequency	Power Supply, V	Operating Temp., °C	Pkg	Pkg Size, mm
ZL40200	LVPECL	1	2	External	N/A	30–40	LVPECL LVDS HCSL CML	DC or AC	Up to 750 MHz	2.5 or 3.3	–40 to 85	QFN-16	3 x 3
ZL40201				Internal									
ZL40202			4	External									
ZL40203				Internal									
ZL40204			6	External								QFN-32	5 x 5
ZL40205				Internal									
ZL40206			8	External									
ZL40207				Internal									
ZL40224		2		External	Simple								
ZL40225				Internal									
ZL40208			6	External	Glitch Free	106–121							
ZL40209				Internal									
ZL40210			8	External									
ZL40211				Internal									
ZL40212	LVDS	1	2	External	N/A	78–138						QFN-16	3 x 3
ZL40213				Internal									
ZL40214			4	External									
ZL40215				Internal									
ZL40216			6	External								QFN-32	5 x 5
ZL40217				Internal									
ZL40218			8	External									
ZL40219				Internal									
ZL40226		2		External	Simple								
ZL40227				Internal									
ZL40220			6	External	Glitch Free	165–194							
ZL40221				Internal									
ZL40222			8	External									
ZL40223				Internal									

FPGAs: Best-in-Class for Industrial IoT Infrastructure

Microsemi SmartFusion2 SoC FPGAs offer more resources in low density devices with the lowest power, proven security features, and exceptional reliability. These Flash FPGA devices are ideal for general purpose functions such as Gigabit Ethernet or dual PCI Express control planes, bridging functions, input/output (I/O) expansion and conversion, video/image processing, system management, and secure connectivity. Microsemi's SoC FPGAs enable a wide variety of these complex systems, deployed at the lowest power and smallest form factor. These FPGAs also deploy best-in-class security solutions that prevent tampering, counterfeiting, and installation of malicious code.

Key Features

- 166 MHz ARM Cortex-M3 with hard 10/100/100 Ethernet MAC
- Industrial Ethernet protocol support on a single FPGA platform, lowering TCO
- Ethernet protocols supported: MII, RGMII, GMII, SGMII
- Continued use of heterogenous installed base of Ethernet/fieldbus equipment
- Broad array of SoC IP with all the different building blocks needed for Industrial Ethernet communications (including system I/O expansion, glue logic, and other communications interfaces)

	Features[2,3]	M2S005	M2S010	M2S025	M2S050	M2S060	M2S090	M2S150
Logic/DSP	Maximum Logic Elements (4LUT + DFF)[1]	6,060	12,084	27,696	56,340	56,520	86,184	146,124
	Math Blocks (18x18)	11	22	34	72	72	84	240
	Fabric Interface Controllers (FICs)	1	2		1	2		
	PLLs and CCCs	2		6		8		
	Data Security	AES256, SHA256, RNG			AES256, SHA256, RNG, ECC, PUF			
MSS	Cortex-M3 + Instruction cache	Yes						
	eNVM (K Bytes)	128	256		512			
	eSRAM (K Bytes)	64						
	eSRAM (K Bytes) Non SECDED	80						
	CAN, 10/100/1000 Ethernet, HS USB	1 each						
	Multi-Mode UART, SPI, I2C, Timer	2 each						
Fabric Memory	LSRAM 18K Blocks	10	21	31	69	69	109	236
	uSRAM1K Blocks	11	22	34	72	72	112	240
	Total RAM (K bits)	191	400	592	1314	1314	2074	4488
High Speed	DDR Controllers (Count x Width)	1x18	2x36	271		1x18	2x36	
	SERDES Lanes (T)	0	4	8	4	4	16	
	PCIe End Points	0	1		2		4	
User I/Os	MSIO (3.3 V)	115	123	157	139	271	309	292
	MSIOD (2.5 V)	28	40	40	62	40	40	106
	DDRIO (2.5 V)	66	70	70	176	76	76	176
	Total User I/O	209	233	267	377	387	425	574
Grades	Commercial (C), Industrial (I), Military (M)	C, I			C, I, M			

1 Total logic may vary based on utilization of DSP and memories in your design. Please see the IGLOO2 Fabric UG for details
2 Feature availability is package dependent
3 Data security features are only available in 'S' and 'TS' devices

Signal Conditioners and Crosspoint Switches

Signal Conditioners and Crosspoint Switches: For the Ultimate in Flexibility & Performance

Microsemi offers a wide range of signal conditioner and crosspoint switch ICs across port speeds, channel counts, and practical feature sets for industrial applications. Microsemi products deliver many industry-leading features such as very low jitter as well as autonomous equalization for demanding backplane, module host, and high port count Layer-1 switching applications. Microsemi's low power, multi-protocol family of signal conditioners includes both redrivers and retimers and delivers the ultimate in flexibility and performance.

Key Features

- Data rates up to 16 Gbps
- Per channel adaptive input equalization and gain adjustment
- Per channel output multi-tap de-emphasis and drive level adjustment
- Power-saving green mode options including ability to power down unused ports

Product Number	Ports	Device Type	Min Temp (Ambient)	Max Temp (Junction)	Max Data Rate
VSC7111	Dual 2x2	Redriver	–40 °C	110 °C	11.5 Gbps
VSC7113	Dual 2x2	Redriver	–40 °C	110 °C	10.3 Gbps
VSC7223	4	Retimer	–40 °C	90 °C	16 Gbps
VSC7224	4	Retimer	–40 °C	110 °C	12.5 Gbps
VSC7227	12	Retimer	–40 °C	100 °C	14.5 Gbps
VSC8247	4	Retimer	0 °C	95 °C	11.3 Gbps
VSC8248	4 (bi-dir)	Retimer	0 °C	95 °C	11.3 Gbps
VSC3308	8x8	Redriver	–40 °C	100 °C	11.5 Gbps
VSC3316	16x16	Redriver	–40 °C	100 °C	11.5 Gbps

Why Microsemi for IIoT Networking?

Microsemi is the only IC, systems, and software provider with a power-optimized, flexible, and reliable industrial Ethernet networking portfolio that supports Ethernet interfaces and fieldbus protocols for a broad range of Industrial Ethernet applications, enabling highly reliable, and secure IIoT networks.

Contact us today to learn how you can get to market faster with Microsemi IIoT solutions.

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Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California and has approximately 4,800 employees globally. Learn more at www.microsemi.com.