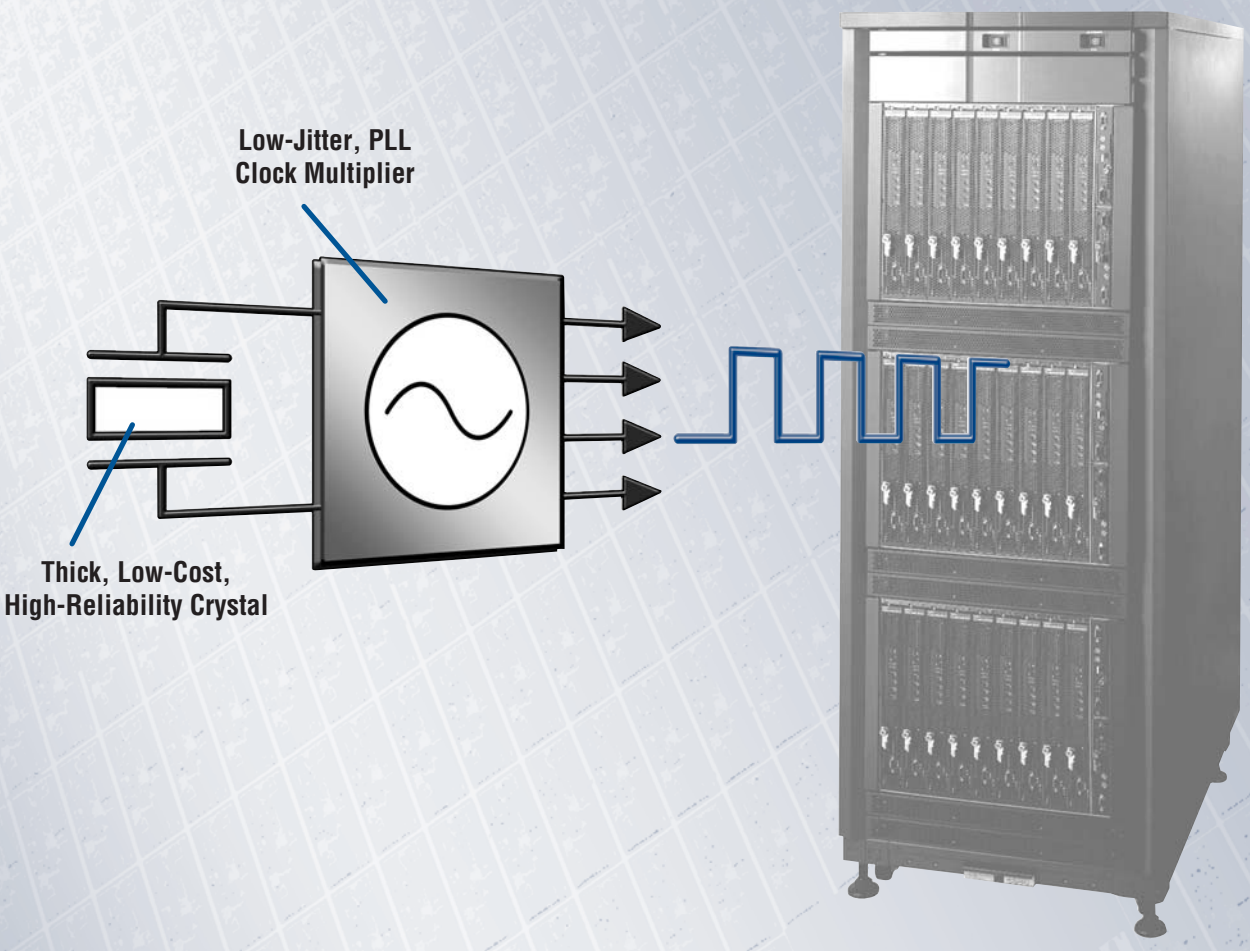
Maxim's Low-Jitter Clocks Are Ideal for Communications, Consumer, and Computation Applications



See Inside

MAXIM

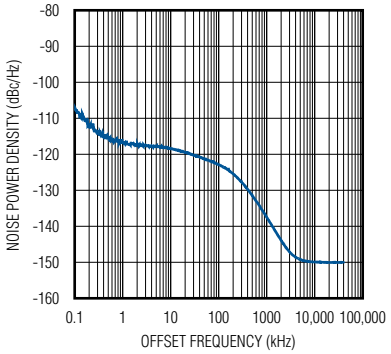
MAXIM 1983 • 2008 25 YEARS OF ENGINEERING SUCCESS

Maxim Achieves the Industry's Best Jitter

Maxim's Clock ICs Meet Timing Budgets for All Wireline Networking Standards

Enables High-Speed Communications Applications

0.36ps$_{RMS}$ AT 12kHz TO 20MHz INTEGRATED PHASE JITTER



Maxim's Clock IC Performance vs. Competition

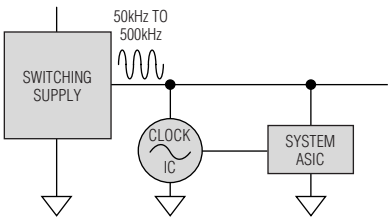
Part	Jitter (ps$_{RMS}$)			Power-Supply Noise Rejection (PSNR) at 100kHz (dBc)
	12kHz to 20MHz	637kHz to 20MHz	1.875MHz to 20MHz	
MAX3622 MAX3624 MAX3625	0.36	0.2	0.14	-57
Competitor	0.83	0.5	0.4	-32

No Performance Surprises on Design-In

Excellent PSNR Ensures System Performance Equals EV Kit Performance

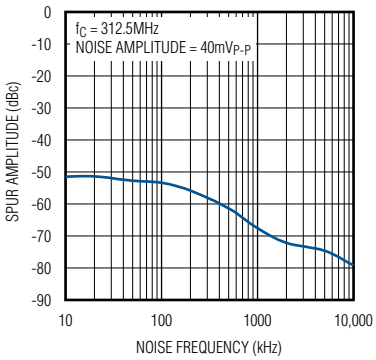
PROBLEM

ASICs INJECT SWITCHING NOISE ON THE POWER SUPPLY



SOLUTION

MAXIM'S CLOCK ICs ACHIEVE EXCELLENT PSNR



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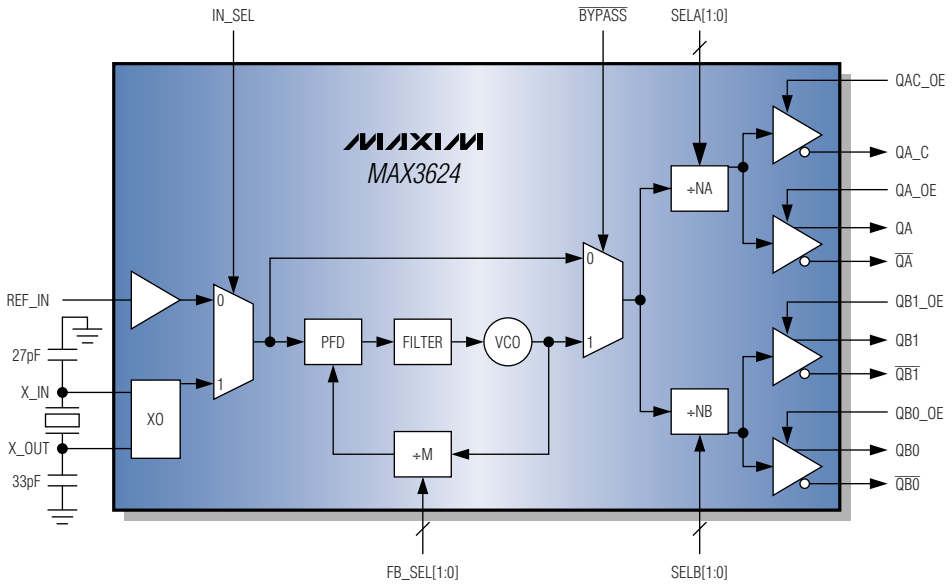
Maxim Achieves the Industry's Best Jitter

Four-Output Clock Generator Is Programmable for Ethernet, Fibre Channel, and SONET



- Two Banks of Outputs
  - 2 LVPECL
  - 1 LVPECL and 1 LVCMOS
- 5mm x 5mm, 32-Pin TQFN Package
- Each Bank Is Frequency Programmable
  - Ethernet: 62.5, 125, 156.25, and 312.5MHz
  - Fibre Channel: 106.25, 159.375, 212.5, and 318.75MHz
  - SONET: 77.76, 155.52, and 311.04MHz

Multi-Output, Low-Jitter, Precision Ethernet Clock Generators

Two-Output, Fixed Frequency (MAX3622)

- One LVCMOS Output at 125MHz and One LVPECL Output at 156.25MHz
- 4.4mm x 5mm, 16-Pin TSSOP Package

Three-Output, Programmable Frequency (MAX3625)

- Three LVPECL Outputs, Each Programmable to 125, 156.25, or 312.5MHz
- 4.4mm x 7.8mm, 24-Pin TSSOP Package

Precision Crystal Oscillators for Highly Accurate Timing Applications

Maxim offers a complete line of TCXO, VCXO, XO, and RTC products for precision timing applications. These devices support high-speed data communications including SONET, Ethernet, SAS/SATA, PCI, PCI Express®, Fibre Channel, and InfiniBand℠ applications.

High-precision TCXO devices, including the DS4026, provide better than ±1ppm accuracy with < ±4.6ppm aging over 15 years. High-frequency XO products, such as the DS4-XO product series, are provided in miniature 5mm x 3.2mm ceramic packages and cover frequencies from 77.76MHz to 622.08MHz. Accurate RTC solutions include the award-winning DS3231 accurate RTC, which can provide < ±2min/yr accuracy for real-time clocks. The DS4077 VCXO provides excellent phase-noise performance for applications such as base stations, routers, and HD-SDI video systems.

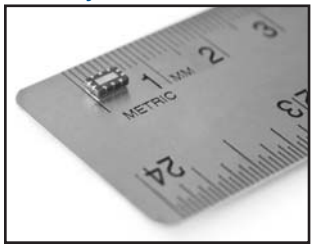
Crystal Oscillators

Part	Frequency (MHz)	Frequency Standards						Operating Voltage (V)	Output Type				Features		
		SONET/SDH	Ethernet	SAS/SATA	Fibre Channel	PCI Express	InfiniBand		CMOS	LVDS	LVPECL	HCSL	Stability (ppm)	Jitter (ps_{RMS}, typ) [12kHz to 20MHz]	Absolute Pullability
Crystal Oscillators (XOs)															
DS4-XO	77.76 to 622.08	✓	✓	✓			✓	3.3 ±5%		✓	✓		±50	< 1.0	
DS4106	106.25				✓			3.3 ±10%		✓	✓		±50	< 1.0	
DS4212	212.50				✓			3.3 ±10%		✓	✓		±50	< 1.0	
DS4425	425.00				✓			3.3 ±10%		✓	✓		±50	< 1.0	
DS4100H	100.00					✓		3.3 ±5%				✓	±50	< 1.0	
Voltage-Controlled Crystal Oscillator (VCXO)															
DS4077	50.00 to 122.88	✓						3.3 ±5%	✓	✓			±30	< 1.0	±69
Temperature-Compensated Crystal Oscillators (TCXOs)															
DS32KHz	32.768k							2.7 to 5.5	✓				< ±3.5		
DS4026	10.00 to 51.84	✓						3.3 ±5%	✓				< ±1.0		±8

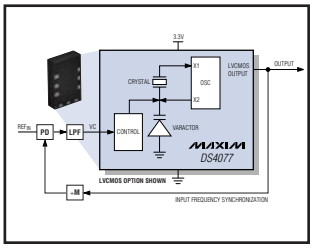
Accurate RTCs

Part	Frequency Output (kHz)	Digital Temp Sensor	Temp Accuracy (°C)	On-Board Memory (Bytes)	Operating Voltage (V)	CMOS Output	Stability	SQW INT	V_{BAT} Supply
DS3231	32.768	✓	±3.0	—	2.3 to 5.5	✓	< ±3.5	✓	✓
DS3232				236					
DS3234				256					

DS4-XO
Crystal Oscillators

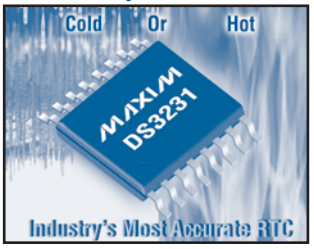


DS4077
50MHz to 122.88MHz VCXO



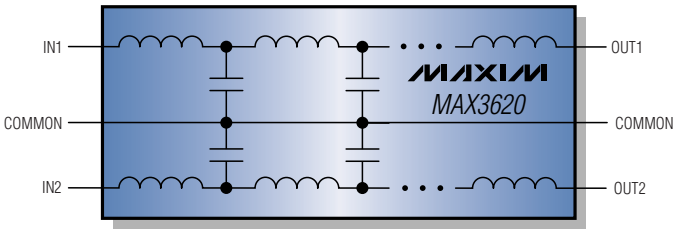
DS4026
10MHz to 51.84MHz TCXO

DS3231
Extremely Accurate RTC



Completely Passive Delay Lines Have Zero Power Dissipation for High-Speed Clock Distribution Systems

- ♦ 0.75, 1.0, 1.25, and 1.5ns Differential Delay Lines
- ♦ 3mm x 3mm, 6-Pin TDFN Package

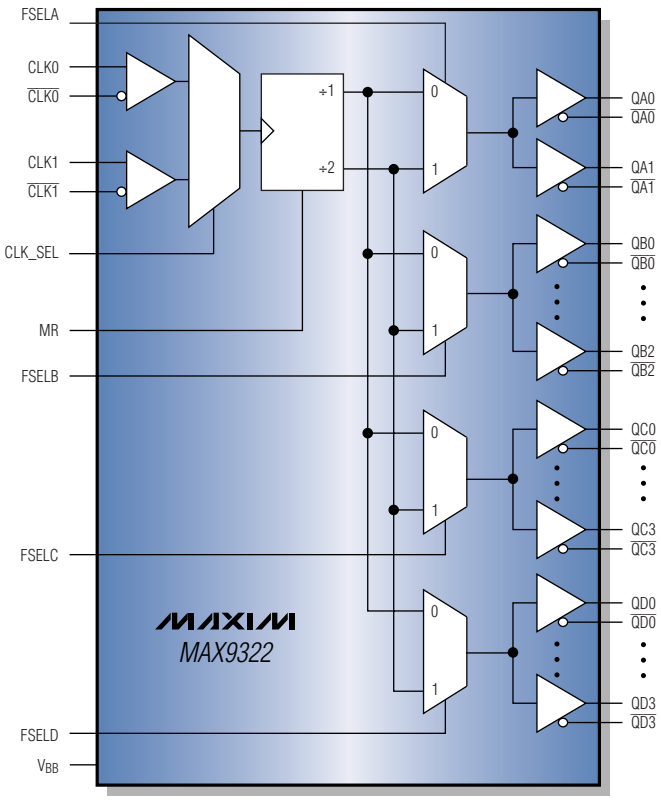


Complete Your Custom Clock Tree with Maxim's Complete Family of LVPECL and LVDS Fanout Buffers

Product	Inputs				Outputs			Features				V_{CC} (V)	
	LVCMOS	Differential	LVPECL	LVDS	Differential	LVPECL	LVDS	Delay (ns)	Input Select	Crosspoint	Dividers	2.5	3.3
MAX3620A		1			1			0.8					
MAX3620B		1			1			1					
MAX3620C		1			1			1.3					
MAX3620D		1			1			1.5					
MAX9150				1			10						✓
MAX9152				2			2			✓			✓
MAX9169				1			4						✓
MAX9170	1						4						✓
MAX9311			2			10			✓			✓	✓
MAX9312			2			10						✓	✓
MAX9313			2			10			✓			✓	✓
MAX9314			2			10						✓	✓
MAX9315			2			5			✓			✓	✓
MAX9316	1		1			5			✓			✓	✓
MAX9317			2			10						✓	✓
MAX9320			1			2						✓	✓
MAX9322			2			15			✓		✓	✓	✓
MAX9323	2					5			✓				✓
MAX9324			1			4							✓
MAX9325			2			8			✓			✓	✓
MAX9326			1			9						✓	✓

1:15 Divide-by-1/Divide-by-2 Clock Driver (MAX9322)

- ♦ Two Selectable, Differential LVPECL Inputs
- ♦ 15 LVPECL Outputs in 4 Banks
- ♦ 12mm x 12mm, 68-Pin TQFN Package



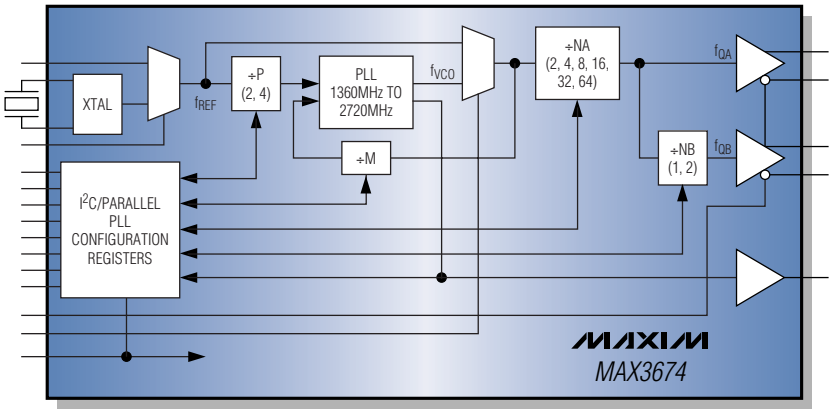
High-Performance, Two-Output, Network Clock Synthesizer

Features

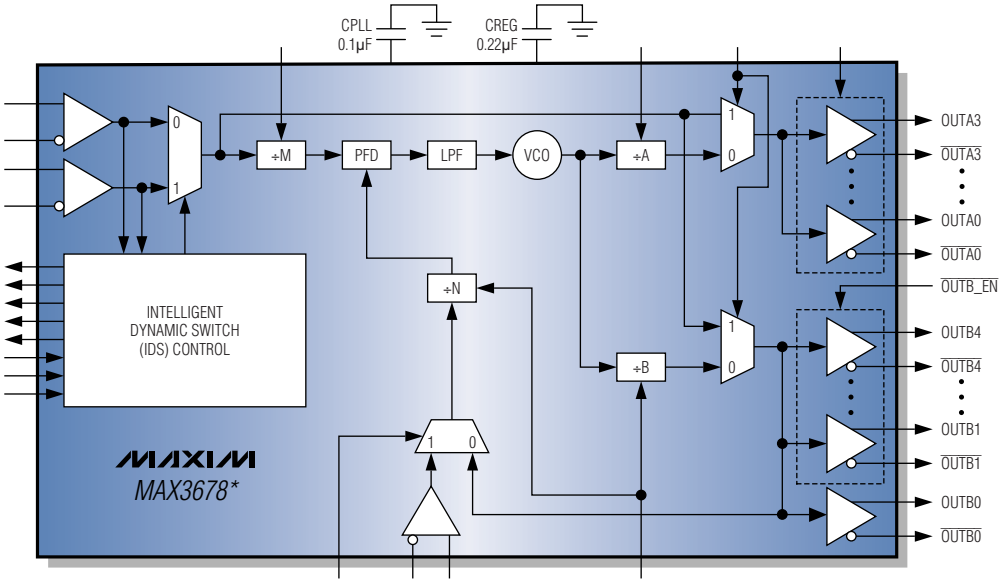
- ♦ Very Low Jitter: 1.6ps$_{RMS}$ Cycle-to-Cycle, 0.9ps$_{RMS}$ Period
- ♦ Pin-Programmable Frequency from 21.25MHz to 1360MHz; Override Using I^{2}C-Compatible Interface
- ♦ 7mm x 7mm, 48-Pin LQFP Package

Applications

- ♦ Frequency Margining for System ASICs
- ♦ Dynamic Power Management



Intelligent Dynamic Switching Enables 1+1 Clock Redundancy

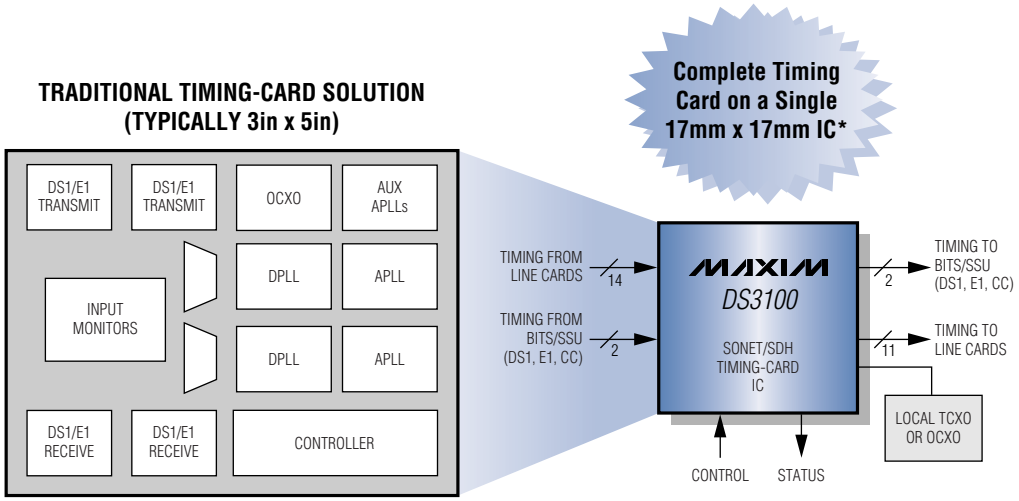


- ♦ Protects Against Clock Failures; Enables Hot-Swap
- ♦ Low-Frequency Transient Response for Hitless Switching
- ♦ Very Low Jitter: 0.3ps$_{RMS}$ at 12kHz to 20MHz
- ♦ Input and Output Frequencies: 66.67, 133.33, 266.67, and 333.33MHz
- ♦ Two Inputs, Nine Outputs
- ♦ 8mm x 8mm, 56-Pin TQFN Package

*Future product—contact factory for availability.

SONET/SDH and Synchronous Ethernet Timing-Card and Line-Card ICs

Maxim offers a full product family that supports SONET/SDH, PDH, and 1G/10G Synchronous Ethernet rates. Utilizing mixed DPLL and APLL architectures, these devices allow flexible frequency conversions while maintaining superior performance and stability. The timing-card ICs provide Stratum 3E performance, while the line-card ICs provide fully flexible APLLs for robust frequency support across many common telecom, datacom, and Synchronous Ethernet rates.



Industry's Most Highly Integrated SONET/SDH Timing-Card IC (DS3100)

- Two Integrated BITS/SSU Transceivers Support DS1, E1, 2048kHz, and 6312kHz Timing Signals and Also SSM
- Stratum 3E Holdover Accuracy
- Hitless Reference Switching on Loss of Input
- Phase Buildout and Transient Absorption
- Frequency, Accuracy, and Activity Monitoring
- Fully Programmable Bandwidth, 0.5mHz to 70Hz

SONET/SDH Line-Card IC with Most Supported Frequencies Available (DS3104-SE)

- Ethernet xMII: 25, 125, 156.25, and 312.5MHz‡
- SONET/SDH: 6.48, n x 19.44, and n x 51.84MHz
- Arbitrary: n x 8kHz Up to 125MHz
- Custom Inputs: Any Multiple of 2kHz Up to 131.072MHz, and Any Multiple of 8kHz Up to 155.52MHz
- Custom Outputs: Any Multiple of 2kHz Up to 77.76MHz, Any Multiple of 8kHz Up to 311.04MHz, and Any Multiple of 10kHz Up to 388.79MHz

See Maxim's Complete Line of Timing-Card and Line-Card Product at: www.maxim-ic.com/timing-and-line-card-ICs

*Requires a local TCXO or OCXO.
‡Denotes input only.

Clock-Generator ICs

Product	Inputs				Outputs				Output Frequencies (MHz)					Programming				V_{CC} (V)		
										Fixed										
	VCXO	XTAL	LVCMOS	LVPECL	LVCMOS	LVPECL	LVDS	HSTL	Tunable Range	Ethernet	Fibre Channel	SONET/SDH	Server/CPU	Pin	I^2C	SPI™	OTP	2.5	3.3	5
MAX3610		✓				1	1				✓			✓					✓	
MAX3622		✓			1	1				✓									✓	
MAX3624		✓	1		1	3				✓	✓	✓		✓					✓	
MAX3625		✓	1			3				✓	✓			✓					✓	
MAX3670	✓			1		2						✓		✓					✓	✓
MAX3672	✓			1		2						✓		✓					✓	✓
MAX3674		✓				2			20 to 1300					✓	✓				✓	
MAX3678*				2		9							✓	✓					✓	
MAX9450		✓		2		2			15 to 160						✓	✓		✓	✓	
MAX9451		✓					2		15 to 160						✓	✓		✓	✓	
MAX9452		✓						2	15 to 160						✓	✓		✓	✓	
MAX9471		✓			4				4 to 133						✓		✓		✓	
MAX9472		✓			4				4 to 133						✓		✓		✓	
MAX9485		✓			3										✓				✓	
MAX9486		✓			7							✓							✓	
MAX9489		✓			15					✓			✓		✓				✓	
MAX9491		✓			1				4 to 133								✓		✓	
MAX9492		✓			6					✓			✓		✓				✓	

SONET/SDH/Sync Ethernet Synchronization ICs

Product	Stratum	Use			Key Features						I/Os				V_{CC} (V)	
		Timing Card	Line Card	Sync Ethernet	BITS Transceivers	Composite Clocks	S3E Holdover	S3 Holdover	Hitless Switching	Input Activity	Clock Inputs	Clock Outputs	Sync Inputs	Sync Outputs	Core	I/Os
DS3100	3/3E	✓			2	✓	✓	✓	✓	✓	14	9	1	2	1.8	3.3
DS3101	3/3E	✓				✓	✓	✓	✓	✓	14	9	1	2	1.8	3.3
DS3102	3	✓		✓				✓	✓	✓	8	7	3	2	1.8	3.3
DS3104-SE			✓	✓					✓	✓	8	7	3	2	1.8	3.3
DS3105			✓	✓					✓	✓	5	2	3	2	1.8	3.3
DS3106*			✓	✓						✓	2	2	0	2	1.8	3.3

SPI is a trademark of Motorola, Inc.
*Future product—contact factory for availability.

www.maxim-ic.com/clocks-brochure

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