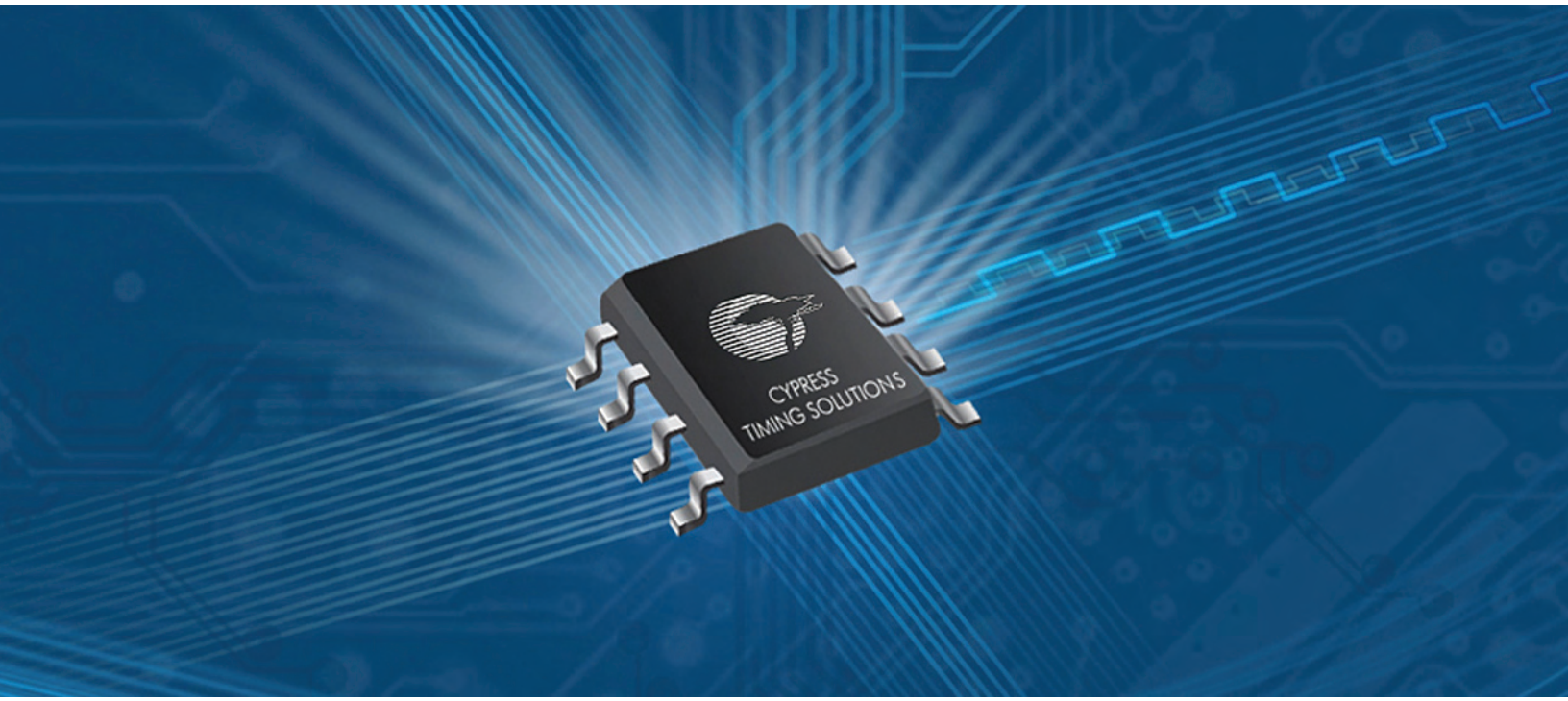
CYPRESS TIMING SOLUTIONS



THE HEART OF SYSTEMS EVERYWHERE

CYPRESS
PERFORM

EVERY SYSTEM NEEDS A CLOCK:
CYPRESS BUILDS A CLOCK FOR EVERY SYSTEM

THE CYPRESS PROMISE

BETTER THAN CRYSTALS AND OSCILLATORS

- Lower system cost
- Fewer components
- EMI reduction
- Programmability

BETTER THAN SILICON ALTERNATIVES

- Customizable
- EMI reduction technology
- Broad range of products
- Industry leadership

Precise signal timing is essential to digital systems and networks everywhere. This precision is best achieved through a broad portfolio of programmable generators and clocks from Cypress, the global leader in programmable timing solutions.

Cypress's timing solutions provide the flexibility, integration, and reliability that designers need to adapt to changing demands and get to market faster. They produce multiple, rock-solid frequencies to reduce BOM costs and chip count. Some even offer patented spread-spectrum modulation technology to protect against electromagnetic interference (EMI). Best of all, Cypress timing solutions are programmable, enabling unparalleled flexibility to optimize device parameters late into the design cycle.

With highly integrated and fully customizable timing technology on a single chip, it's no wonder Cypress timing solutions are the choice of designers everywhere.

TIMING SOLUTIONS LEADER: Backed by more than 15 years of timing experience and more than two billion clocks shipped, Cypress's programmable timing solutions are the heartbeat of today's most advanced electronic systems.

CISCO SWITCHES

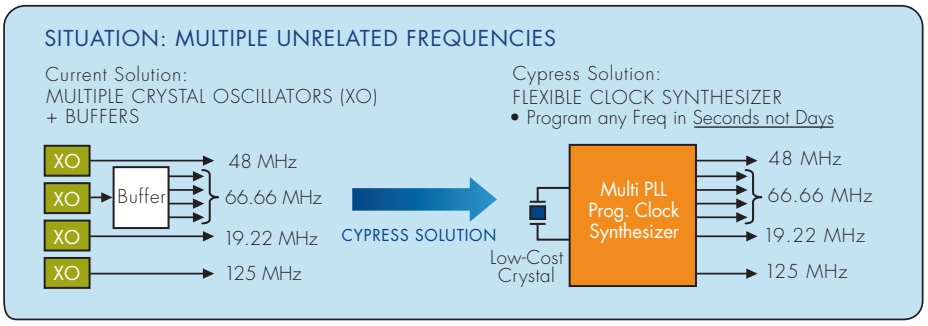
SONY BLU-RAY DISC PLAYER

FUJI-XEROX COPIER

MULTIPLE FREQUENCIES FROM A SINGLE CHIP

Cypress's clock generators use Phase-Locked Loops (PLLs) to generate up to nine unique frequencies from a single crystal. This approach slashes BOM costs, increases reliability, enhances performance, and delivers tremendous design flexibility. Moreover, it shortens system development time, so products can be brought to market more quickly.

Cypress clock chips are available in field-programmable versions, meaning that one part number can be ordered, stocked, and placed on different boards, then programmed or reprogrammed with specific frequencies through the I²C interface. Factory-programmable versions are also available.



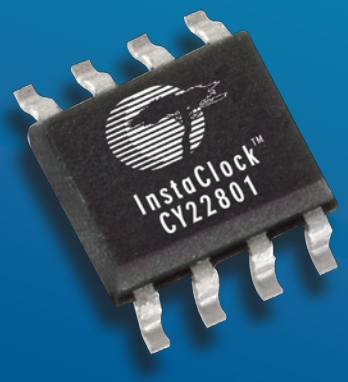
BOM REDUCTION — Cypress's timing solutions significantly reduce bill of materials costs by replacing multiple crystal oscillators with a single, multi-PLL programmable clock synthesizer that can generate multiple, unrelated frequencies.

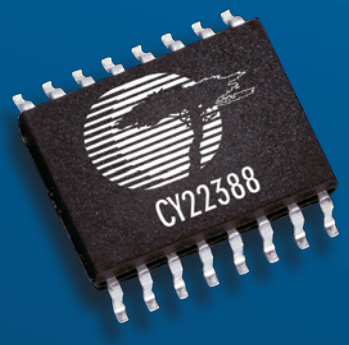
CYPRESS CLOCK GENERATORS

Feature	228XX	22388	254X	254X3
Number of PLLs	1	4	4	3
Number of Outputs	3	6	8	3
I²C Configurability			n	n
Programmability	Multi Time	Multi Time	One Time	One Time
Optional VCXO	n	n		
Optional Spread Spectrum	n		n	n
Output Frequency Range	200 MHz	200 MHz	166 MHz	166 MHz
Cycle-to-Cycle Jitter (Typ)	150 ps	250 ps	150 ps	150 ps
Output Voltage	3.3V	3.3V	3.3V/3.0V/2.5V	3.3V/3.0V/2.5V
Drive Strength Configurability	n	n	n	n

ADVANTAGES

- Fully configurable, low-power, integrated timing solution
- Generate wide range of frequencies using only one crystal
- Up to nine outputs





MOTOROLA SET-TOP BOX

HITACHI HDTV

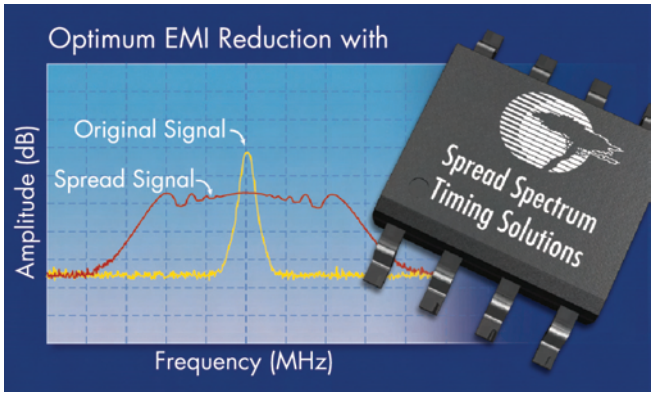
SUPERLATIVE EMI REDUCTION TECHNOLOGY FROM CYPRESS

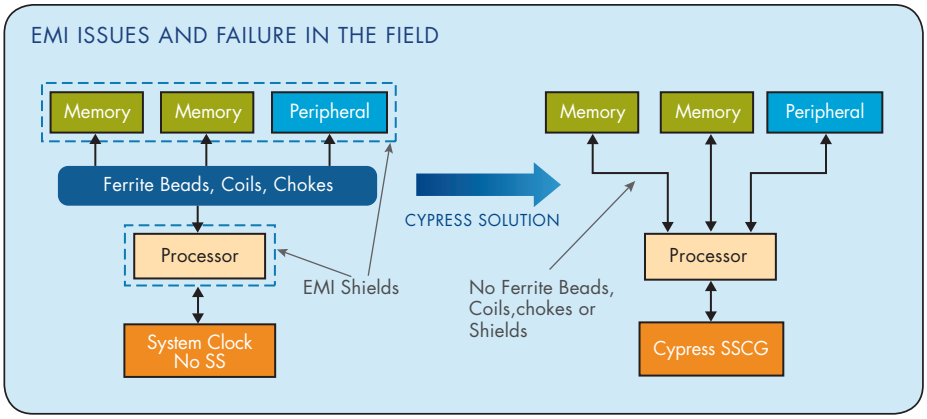
Electromagnetic interference is a major challenge for electronic device makers. Any device capable of generating signals with frequencies in the RF range is a potential source of EMI. EMI can disrupt the normal operation of radios, televisions, cell phones, and other equipment.

The traditional way to reduce radiated emissions is to filter or contain these signals. This can impact system cost and board space.

Cypress's spread-spectrum devices attack EMI at the source, reducing EMI peaks by spreading the energy generated by the clock across a wide frequency band. The result: EMI reduction of 10 dB or more, with minimal degradation of the clock signal. Cypress's spread-spectrum clock generators are also fully programmable using memory or multifunction programmable pins to control frequency, output level, power down, output state, and spread-spectrum functionality.

EMI REDUCTION CLOCK





EMI PROTECTION: Cypress's spread-spectrum clock generators eliminate the need for filters that impact both system cost and board space.

EMI REDUCTION CLOCK FAMILY

Feature	CY25701	CY25100	CY254XX
Number of PLLs	1	1	1-4
Number of Outputs	1	2	3-9
I²C Configurability			n
Programmability	Multi Time	Multi Time	One Time
SS On/Off	n	n	n
Frequency Margining			n
Output Frequency Range (max)	166 MHz	200 MHz	166 MHz
Package	4-PIN LCC SMD	8-SOIC/ 8-TSSOP	8-SOIC/ 20-TSSOP/24-QFN
Output Voltage	3.3V	3.3V	3.3V/3.0V/2.5V

DROP-IN CRYSTAL OSCILLATOR REPLACEMENTS

Replacement clock sources from Cypress provide superior EMI mitigation. Designers can drop a Cypress Spread Spectrum Crystal Oscillator (SSXO) into the socket used by the conventional crystal to solve a system EMI problem without performing a redesign. These highly accurate, crystal-based signal sources come in a standard crystal oscillator package (5 x 3.2 mm) and decrease BOM costs compared to conventional filter- or containment-type EMI-reduction schemes. They can also eliminate costly custom-tooled crystals that generate higher and non-standard frequencies. Cypress's drop-in crystal replacements also use premier Lexmark® Profile EMI-reduction technology to reduce peak EMI by as much as 20 dB. For design versatility, the spread-spectrum function can be toggled on or off. Additionally, the output spread of our SSXOs can be varied, allowing the EMI reduction to be adjusted to meet government regulations.

ADVANTAGES

FLEXIBILITY

- Fully programmable operating output clock frequency range: 10 MHz to 166 MHz
- Single solution can generate any frequency cost-effectitvely across range
- Synthesizes non-standard frequencies
- Advanced low-power options

EMI MITIGATION

- Programmable spread-spectrum with nominal 31.5 kHz modulation frequency delivers wide range of spread percentages for maximum EMI reduction

STANDARD 5 x 3.2 mm PACKAGE

- Easily replaces standard crystal oscillators while reducing EMI

SPREAD-SPECTRUM VS. CONVENTIONAL XOs

Feature	Conventional Crystal Oscillator (XO)	Cypress Spread-Spectrum Crystal Oscillator (SSXO)
Spread Spectrum	No	Yes
>50 MHz	Overtone crystals ($$)	Standard, low-cost crystal
Non-Standard Frequencies	Cut custom crystal ($$)	Program output, no extra cost

APPLICATIONS

- Set-top boxes
- Digital televisions
- Digital video recorders
- Multi-function printers
- Digital projectors
- Network routers and switches
- WiMAX devices
- Medical monitoring devices
- Industrial automation systems
- Complex embedded control systems of all types

CLOCK DISTRIBUTION DEVICES

High-speed logic systems require precise signal-arrival, with tight skew management and minimal jitter. That's why Cypress augments its clock generator devices with advanced clock distribution, including PLL-based or Zero Delay Buffers (ZDB products), Non-PLL or Non Zero Delay Buffers (NZDB devices) and skew management clocks (RoboClock™ chips).Cypress's ZDB family consists of standard performance, Enhanced Performance (EP), Spread Aware, FailSafe™ ZDB and field-programmable buffer product lines.

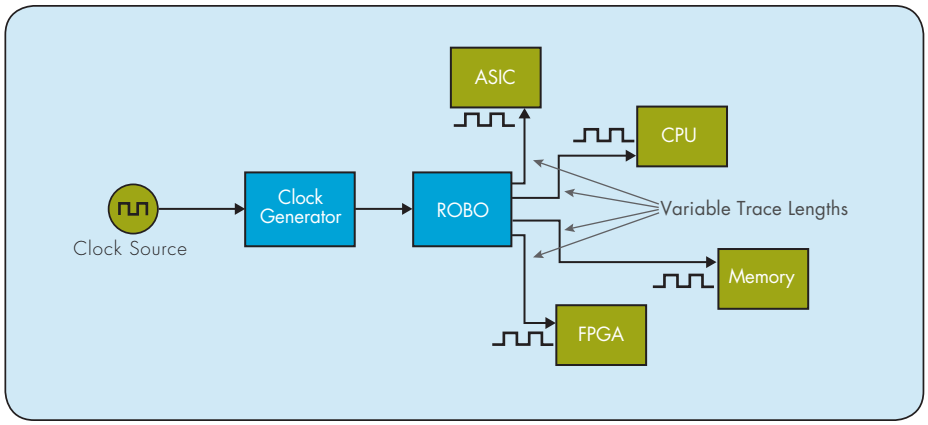
The EP clock buffers offer solid frequency and jitter performance and are pin-compatible with the standard performance ZDB devices. Cypress's FailSafe clock buffers protect against reference clock failure by providing a consistent output clock signal. The Spread Aware ZDBs receive a spread-spectrum-modulated input signal and have PLLs that track the frequency modulation on the input signal and ensure EMI reduction is also present on the buffer's output. Finally, Cypress's RoboClock clock distribution chips manage skew to ensure synchronous timing.

CYPRESS'S ZDB SOLUTIONS

Parameter	Standard ZDBs	Enhanced Performance ZDBS			
	CY2305 / CY2309	CY23EP05		CY23EP09	
Voltage DD (V_{DD})	3.3	3.3	2.5	3.3	2.5
Freq (MHz)	10 to 133	10 to 220	10 to 200	10 to 200	10 to 200
Duty Cycle (%) Low Freq High Freq	 45 to 55 40 to 60	 47 to 53 45 to 55	 47 to 53 45 to 55	 47 to 53 45 to 55	 47 to 53 45 to 55
|Static Phase Error| (PS)	350	100	200	100	200
Output Skew (PS) Max Same BanK	250	100	100	100	110
C2C Jitter (PS) Max 66 MHz	200	55	80	55	65

ROBOCLOCK SKEW MANAGEMENT PRODUCTS

Skew issues may corrupt timing systems during tests. If timing signals aren't reaching critical components at exactly the right times, Cypress's RoboClock skew management devices correct these discrepancies. These high-speed, multi-phase, PLL-controlled clock buffers provide features such as programmable output skew, programmable multiply/divide factor, and user-selectable redundant reference clocks. They make it possible to achieve precisely synchronous timing without the necessity of matching trace lengths. RoboClock chips also enable the resolution of timing violations without redesigning the system.



SKEW BUSTER: Cypress's programmable RoboClock high-speed clock buffers correct skew issues ensuring that timing signals reach critical components at exactly the right time.

FLEXO™ HIGH-PERFORMANCE CLOCKS

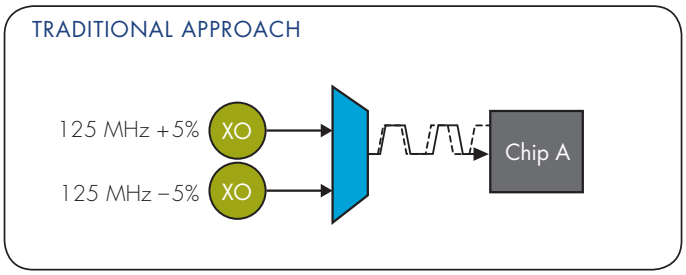
Cypress's FleXO family of high-performance timing solutions serves networking, communications, and enterprise storage applications. These devices are more flexible and cost-effective than traditional, high-frequency crystal oscillators, while offering superior performance and flexibility compared to competing external crystal silicon timing devices.

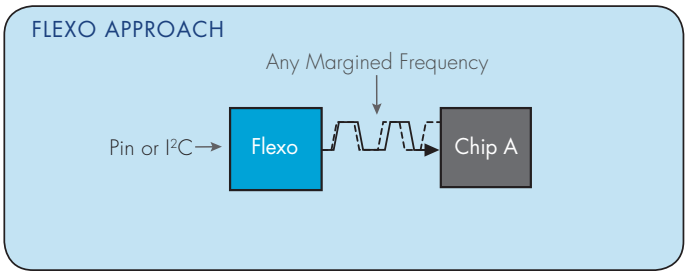
FEATURES:

- High-frequency clock outputs (up to 690 MHz)
- Clocks high-speed serial interfaces: 1/10GbE, 1/10Gb Fiber Channel, Backplane SERDES, SATA, PCIe, SONET/SDH, Serial RapidIO
- Low phase noise (-138 dBc/Hz at 1 MHz offset, on a 100 MHz output)
- Ultra-low phase jitter < 1ps RMS (Offset frequency range from 12 kHz to 20 MHz)
- Pin and I²C frequency margining

KEY APPLICATIONS:

- Routers
- Switches
- Storage servers
- Blade servers
- Enterprise HDD
- Test equipment





FREQUENCY MARGINING: Voltage, temperature, or other variables can affect a traditional clock's frequency, as shown below. Cypress's FleXO clocks enable programmable frequency margining tests during both design and production phases.

UNICLOCK™ — SMALLEST, LOWEST-POWER CLOCKS

Cypress's UniClock devices replace single-crystal oscillators (XOs) with a more affordable, smaller, and more flexible solution. Low-power MoBL® UniClock devices are ideal for portable applications.

FEATURES:

- Produces frequency of up to 200 MHz with very low jitter (80 MHz output frequency for MoBL UniClock)
- Uses lower-cost crystal
- More affordable package than XO
- Programmable frequency: enables quicker sample time, and design flexibility
- Crystal is not needed when reference clock is used.
- 3.2 mm² package is 40% smaller than alternate solutions
- Interfaces (USB, Wi-Fi, Bluetooth)

KEY APPLICATIONS:

- Handsets
- Digital cameras
- Portable media players
- Digital TVs/Set-top boxes
- PCs and peripherals
- Medical, industrial, automotive

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Job line: 0309/UTR/GOPA/JOPS/EWR/JONA/VYM/Amulya/CGRAFX/JPG/5K | Part number: 2-0309TimingBro

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