

MPEG Clock Generator with VCXO

Features

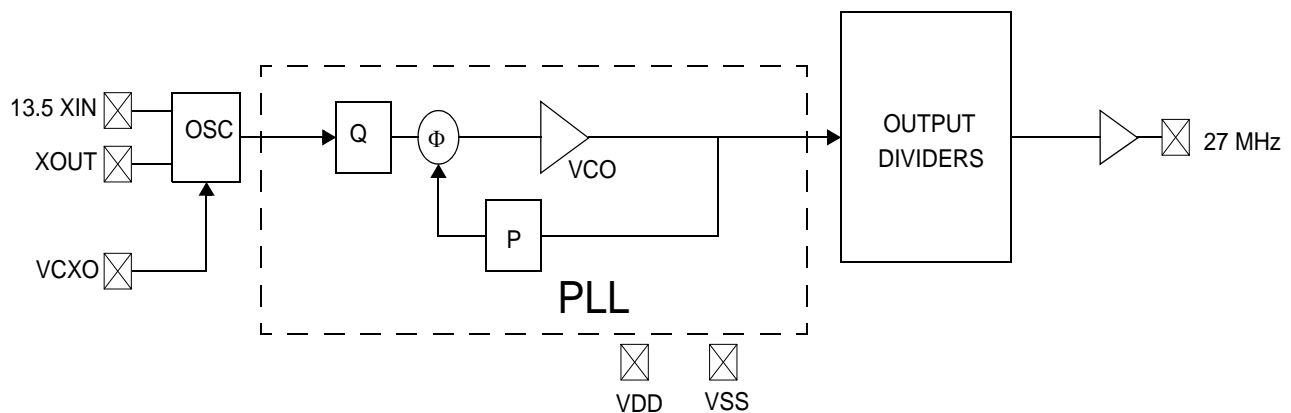
- Integrated phase-locked loop (PLL)
- Low-jitter, high-accuracy outputs
- VCXO with analog adjust
- 3.3V operation
- Compatible with MK3727 (-1, -5)

Benefits

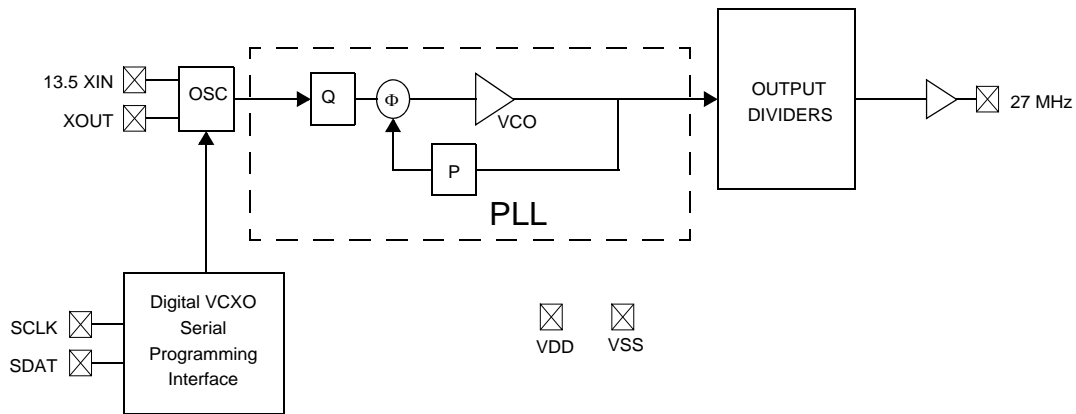
- Highest-performance PLL tailored for multimedia applications
- Meets critical timing requirements in complex system designs
- Large ± 150 -ppm range, better linearity
- Application compatibility for a wide variety of designs
- Enables design compatibility
- Advanced Features
 - Matches nonlinear MK3727A VCXO control curve (-5)
 - Digital VCXO control
- Electromagnetic interference (EMI) reduction for standards compliance
- Second source for existing designs

Part Number	Outputs	Input Frequency Range	Output Frequencies	VCXO Control Curve	Other Features
CY2410-1	1	13.5-MHz pullable crystal input per Cypress specification	1 copy of 27 MHz	linear	Compatible with MK3727
CY2410-5	1	13.5-MHz pullable crystal input per Cypress specification	1 copy of 27 MHz	nonlinear	Matches MK3727A nonlinear VCXO Control Curve

CY2410-1, -5 Logic Block Diagram



CY2410-3 Logic Block Diagram



Pin Configuration

Figure 1. CY2410-1, CY2401-5 8-Pin SOIC

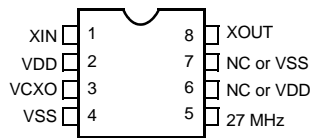


Table 1. Pin Definitions for CY2410-1, -5

Name	Pin Number	Description
X _{IN}	1	Reference crystal input
V _{DD}	2	Voltage supply
V _{CXO}	3	Input analog control for V _{CXO}
V _{SS}	4	Ground
27 MHz	5	27-MHz clock output
NC/V _{DD}	6	No Connect or voltage supply
NC/V _{SS}	7	No Connect or ground
X _{OUT} ^[1]	8	Reference crystal output

Note

1. Float X_{OUT} if X_{IN} is externally driven.

Pullable Crystal Specifications ^[2]

Parameter	Description	Condition	Min	Typ.	Max	Unit
F _{NOM}	Nominal crystal frequency	Parallel resonance, fundamental mode, AT cut	–	13.5	–	MHz
C _{LNOM}	Nominal load capacitance		–	14	–	pF
R ₁	Equivalent series resistance (ESR)	Fundamental mode	–	–	25	Ω
R ₃ /R ₁	Ratio of third overtone mode ESR to fundamental mode ESR	Ratio used because typical R ₁ values are much less than the maximum spec.	3	–	–	
DL	Crystal drive level	No external series resistor assumed	–	0.5	2.0	mW
F _{3SEPHI}	Third overtone separation from 3*F _{NOM}	High side	300	–	–	ppm
F _{3SEPLO}	Third overtone separation from 3*F _{NOM}	Low side	–	–	–150	ppm
C ₀	Crystal shunt capacitance		–	–	7	pF
C ₀ /C ₁	Ratio of shunt to motional capacitance		180	–	250	
C ₁	Crystal motional capacitance		14.4	18	21.6	pF

Note

2. Crystals that meet this specification includes: Ecliptek ECX-5788-13.500M, Siward XTL001050A-13.5-14-400, Raltron A-13.500-14-CL, PDI HA13500XFSA14XC.

Figure 2. Data Valid and Data Transition Periods

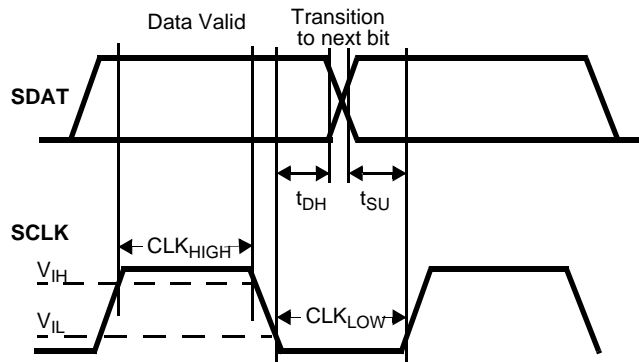


Figure 3. Start and Stop Frame

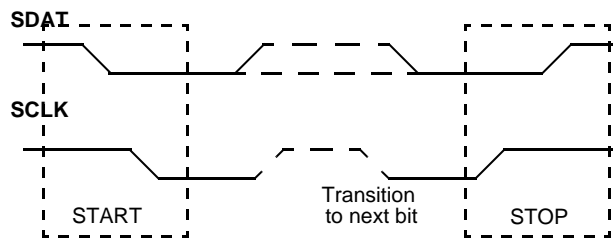


Figure 4. Duty Cycle Definition; $DC = t2/t1$

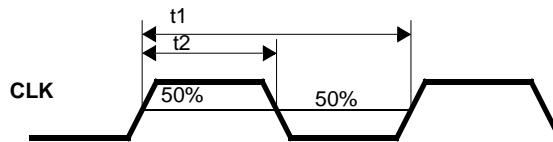
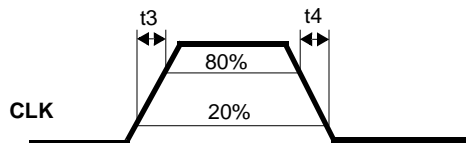


Figure 5. Rise and Fall Time Definitions: $ER = 0.6 \times VDD / t3$, $EF = 0.6 \times VDD / t4$



Absolute Maximum Conditions

Parameter	Description	Min	Max	Unit
V_{DD}	Supply Voltage	-0.5	7.0	V
T_S	Storage Temperature ^[3]	-65	125	°C
T_J	Junction Temperature	-	125	°C
	Digital Inputs	$V_{SS} - 0.3$	$V_{DD} + 0.3$	V
	Digital Outputs referred to V_{DD}	$V_{SS} - 0.3$	$V_{DD} + 0.3$	V
	Electrostatic Discharge	2000		V

Recommended Operating Conditions

Parameter	Description	Min	Typ.	Max	Unit
V_{DD}	Operating Voltage	3.135	3.3	3.465	V
T_A	Ambient Temperature	0	-	70	°C
C_{LOAD}	Max. Load Capacitance	-	-	15	pF
f_{REF}	Reference Frequency	-	13.5	-	MHz
t_{PU}	Power up time for V_{DD} to reach minimum specified voltage (power ramp must be monotonic)	0.05	-	500	ms

DC Electrical Specifications

Parameter	Name	Description	Min	Typ.	Max	Unit
I_{OH}	Output HIGH Current -1,-5	$V_{OH} = V_{DD} - 0.5, V_{DD} = 3.3V$	12	24	-	mA
I_{OL}	Output LOW Current -1,-5	$V_{OL} = 0.5, V_{DD} = 3.3V$	12	24	-	mA
C_{IN}	Input Capacitance		-	-	7	pF
I_{IZ}	Input Leakage Current		-	5	-	μA
$f_{\Delta XO}$	V_{CXO} pullability range:-1,-5		±150	-	-	ppm
V_{VCXO}	V_{CXO} input range		0	-	V_{DD}	V
I_{VDD}	Supply Current		-	30	35	mA

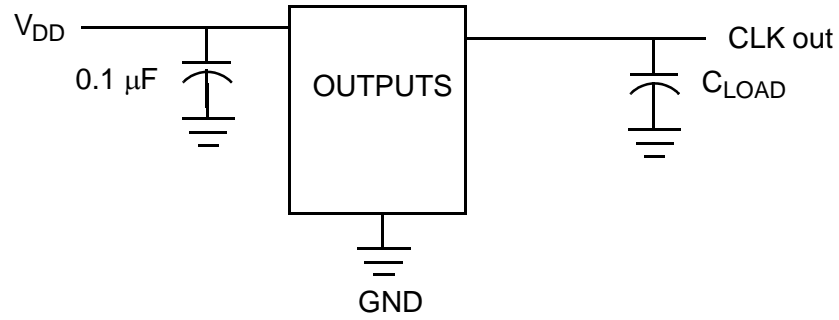
AC Electrical Specifications ($V_{DD} = 3.3V$)^[4]

Parameter ^[4]	Name	Description	Min	Typ.	Max	Unit
DC	Output Duty Cycle	Duty Cycle is defined in Figure 4 , 50% of V_{DD}	45	50	55	%
ER_{OR}	Rising Edge Rate -1, -5	Output Clock Edge Rate, Measured from 20% to 80% of V_{DD} , $C_{LOAD} = 15$ pF See Figure 5 .	0.8	1.4	-	V/ns
ER_{OF}	Falling Edge Rate -1, -5	Output Clock Edge Rate, Measured from 80% to 20% of V_{DD} , $C_{LOAD} = 15$ pF See Figure 5 .	0.8	1.4	-	V/ns
t_g	Clock Jitter -1, -5	Peak-to-peak period jitter	-	140	-	ps
t_{10}	PLL Lock Time		-	-	3	ms

Notes

3. Rated for ten years.
4. Not 100% tested.

Figure 6. Test and Measurement Setup

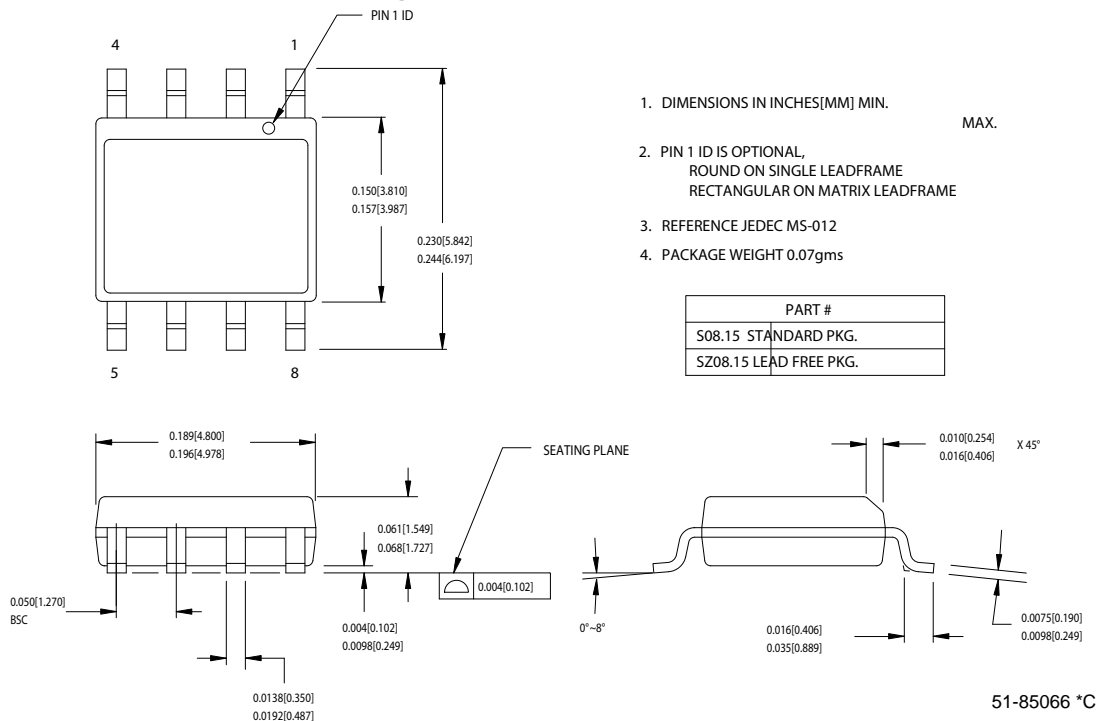


Ordering Information

Ordering Code	Package Type	Operating Range	Operating Voltage	Features
Pb-Free				
CY2410SXC-1 ^[5]	8-pin SOIC	Commercial	3.3V	Linear VCXO control curve
CY2410SXC-1T ^[5]	8-pin SOIC - Tape and Reel	Commercial	3.3V	Linear VCXO control curve
CY2410SXC-5 ^[5]	8-pin SOIC	Commercial	3.3V	Matches nonlinear MK3727A VCXO control curve
CY2410SXC-5T ^[5]	8-pin SOIC - Tape and Reel	Commercial	3.3V	Matches nonlinear MK3727A VCXO control curve
CY2410KSXC-5	8-pin SOIC	Commercial	3.3V	Matches nonlinear MK3727A VCXO control curve
CY2410KSXC-5T	8-pin SOIC - Tape and Reel	Commercial	3.3V	Matches nonlinear MK3727A VCXO control curve

Package Drawing and Dimensions

Figure 7. 8-Lead (150-Mil) SOIC



Note

5. Not recommended for new designs.

Document History Page

Document Title: CY2410 MPEG Clock Generator with VCXO Document Number: 38-07317				
REV.	ECN NO.	Submission Date	Orig. of Change	Description of Change
**	111553	02/12/02	CKN	New Data Sheet
*A	114937	09/24/02	CKN	Added -6 to data sheet, Advance Information to Final
*B	121418	12/06/02	CKN	Updated the Pullable Crystal Specifications table on page 2
*C	126905	06/17/03	RGL	Added -7 part to data sheet Added new parameter on the Pullable Crystal table Power up requirements added to the operating conditions
*D	131100	01/20/03	RGL	Added VCXO -7 pullability range in the DC Specs with min. value of ± 115 ppm
*E	2440886	See ECN	AESA	Updated template. Added Note "Not recommended for new designs." Added part number CY2410SXC-1, CY2410SXC-1T, CY2410SXC-5, CY2410SXC-5T, CY2410KSXC-5, and CY2410KSXC-5T in ordering information table. Removed all part numbers for non-Pb-free packages (part numbers beginning CY2410SC). Removed details specific to the -3, -4, -6 and -7 versions.

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