THIS SPEC IS OBSOLETE

Spec No: 38-07317

Spec Title: CY2410, MPEG CLOCK GENERATOR WITH VCXO

Sunset Owner: Brijesh A Shah (bash)

Replaced by: None

CY2410

MPEG Clock Generator with VCXO

Features

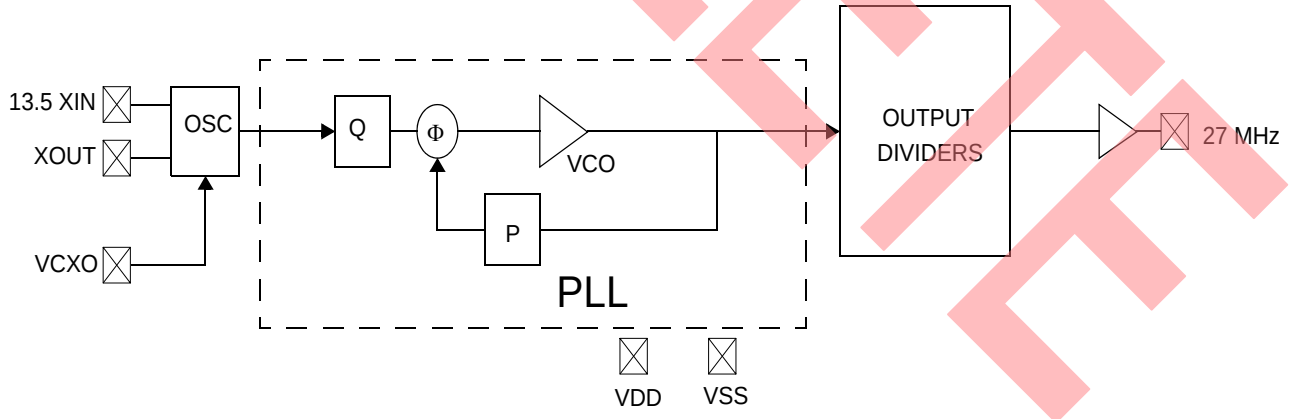
- Integrated phase-locked loop (PLL)
- Low-jitter, high-accuracy outputs
- VCXO with analog adjust
- 3.3 V operation
- Compatible with MK3727 (–1, –5)

Benefits

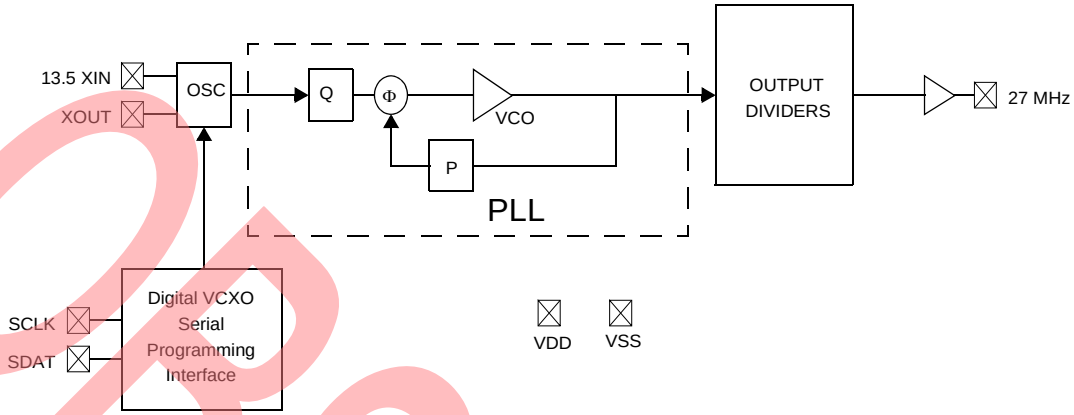
- Highest-performance PLL tailored for multimedia applications
- Meets critical timing requirements in complex system designs
- Large ±150-ppm range, better linearity
- Application compatibility for a wide variety of designs
- Enables design compatibility
- Advanced Features
- Matches nonlinear MK3727A 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



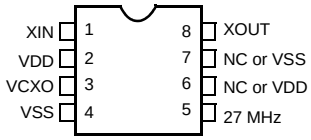
CY2410-3 Logic Block Diagram



Contents

Pin Configuration

Figure 1. CY2410-1, CY2410-5 8-pin SOIC



Pin Definitions for CY2410-1, CY2410-5

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

Parameter [2]	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 $3 \times F_{NOM}$	High side	300	–	–	ppm
F_{3SEPLO}	Third overtone separation from $3 \times F_{NOM}$	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

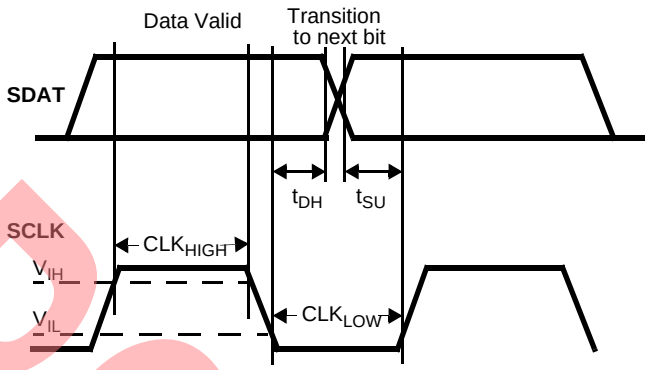


Figure 3. Start and Stop Frame

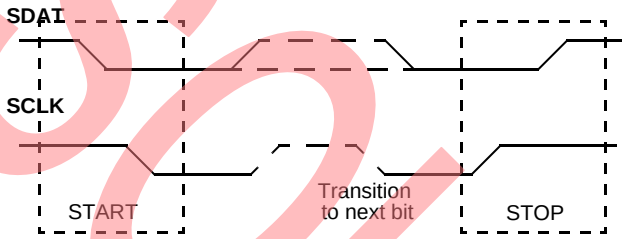


Figure 4. Duty Cycle Definition; DC = t_2/t_1

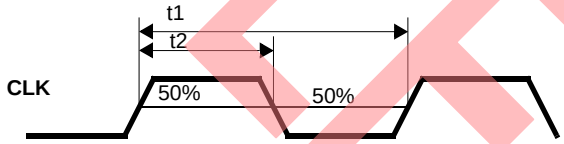
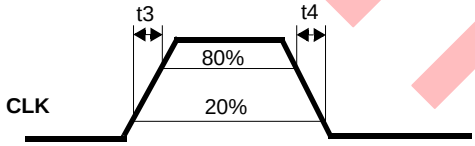


Figure 5. Rise and Fall Time Definitions: ER = 0.6 × V_{DD} / t_3, EF = 0.6 × V_{DD} / t_4



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

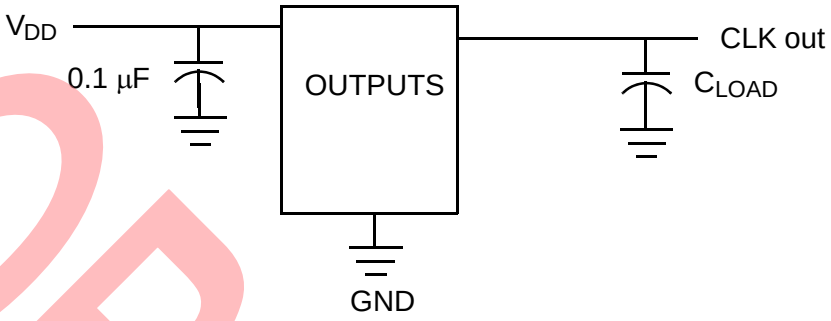
Parameter	Name	Description	Min	Typ	Max	Unit
I_{OH}	Output HIGH Current: -1, -5	$V_{OH} = V_{DD} – 0.5$, $V_{DD} = 3.3$ V	12	24	–	mA
I_{OL}	Output LOW Current: -1, -5	$V_{OL} = 0.5$, $V_{DD} = 3.3$ V	12	24	–	mA
C_{IN}	Input Capacitance		–	–	7	pF
I_{IZ}	Input Leakage Current		–	5	–	µA
$f_{\Delta XO}$	V_{CXO} 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} = 3.3 V)

Parameter[4]	Name	Description	Min	Typ	Max	Unit
DC	Output Duty Cycle	Duty Cycle is defined in Figure 4 on page 6, 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 on page 6.	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 on page 6.	0.8	1.4	–	V/ns
t_9	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.

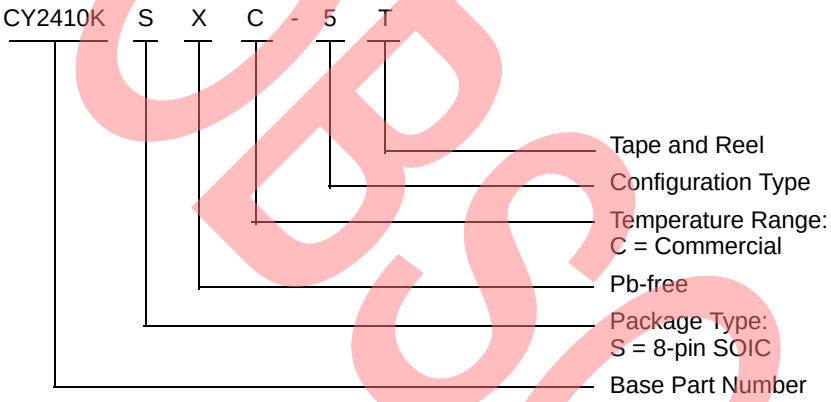
Figure 6. Test and Measurement Setup



Ordering Information

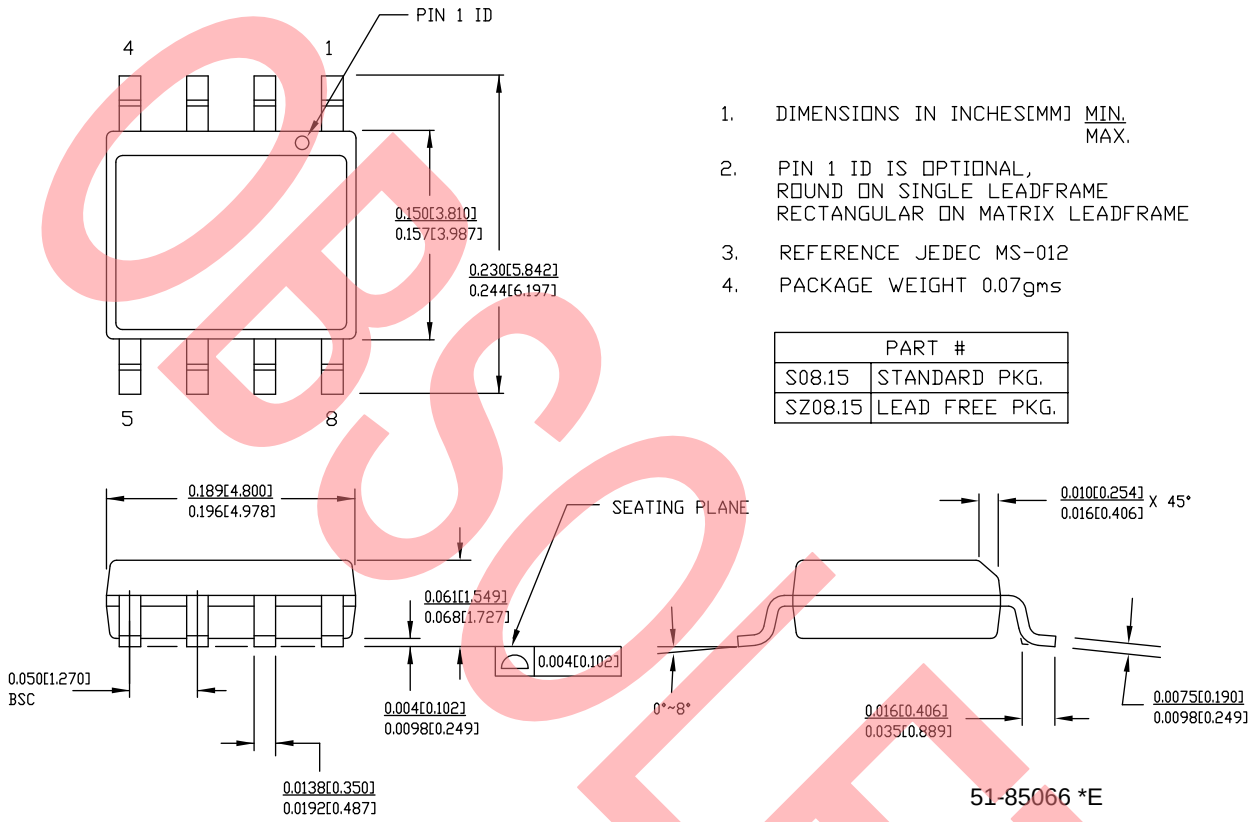
Ordering Code	Package Type	Operating Range	Operating Voltage	Features
Pb-free				
CY2410KSXC–5	8-pin SOIC	Commercial	3.3 V	Matches nonlinear MK3727A VCXO control curve
CY2410KSXC–5T	8-pin SOIC - Tape and Reel	Commercial	3.3 V	Matches nonlinear MK3727A VCXO control curve

Ordering Code Definitions



Package Diagram

Figure 7. 8-pin SOIC (150 Mils), 51-85066



Acronyms

Acronym	Description
PLL	phase-locked loop
EMI	electromagnetic interference
ESD	electrostatic discharge
ESR	equivalent series resistance
PLL	phase locked loop
SOIC	small outline integrated circuit
VCXO	voltage controlled crystal oscillator

Document Conventions

Units of Measure

Symbol	Unit of Measure
°C	degree Celsius
MHz	Mega Hertz
µF	micro Farad
mA	milli Amperes
ms	milli seconds
mW	milli Watts
Ω	ohms
ppm	parts per million
%	percent
pF	pico Farad
ps	pico seconds
V	Volts

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.
*F	2897373	03/22/10	CXQ	Updated ordering information table. Removed part numbers CY2410SXC-1, CY2410SXC-1T, CY2410SXC-5T, and CY2410SXC-5 Updated package diagram. Updated copyright section.
*G	3317009	07/16/2011	BASH	Added Ordering Code Definitions. Updated Package Diagram. Updated Acronyms and Units of Measure. Updated in new template.
*H	3401996	10/11/2011	BASH	Obsolete document.

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