



CYPRESS

CY24713

Set-top Box Clock Generator with VCXO

Features

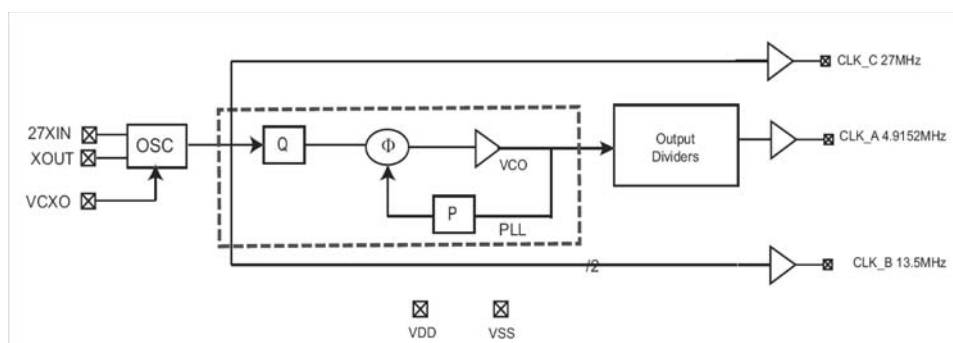
- Integrated phase-locked loop (PLL)
- Low-jitter, high-accuracy outputs
- VCXO with analog adjust
- 3.3V Operation
- 8-pin SOIC

Benefits

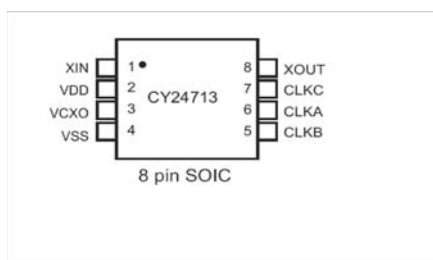
- High-performance PLL tailored for Set Top Box applications
- Meets critical timing requirements in complex system designs
- Large ± 150 -ppm range, better linearity
- Meet industry standard voltage platforms
- Industry standard packaging saves on board space

Part Number	Outputs	Input Frequency Range	Output Frequencies
CY24713	3	27-MHz pullable crystal input per Cypress specification	4.9152 MHz, 13.5 MHz, 27 MHz

Logic Block Diagram



Pin Configuration



Pin Description

Name	Number	Description
XIN	1	Reference Crystal Input
VDD	2	3.3V Voltage Supply
VCXO	3	Input Analog Control for VCXO
VSS	4	Ground
CLK_B	5	13.5-MHz Clock Output
CLK_A	6	4.9152-MHz Clock Output
CLK_C	7	27-MHz Clock Output
XOUT ^[1]	8	Reference Crystal Output

Absolute Maximum Conditions

Parameter	Description	Min.	Max.	Unit
V _{DD}	Supply Voltage	−0.5	7.0	V
T _S	Storage Temperature ^[2]	−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
	Analog Input	−0.5	7.0	V

Pullable Crystal Specifications

Parameter	Description	Condition	Min.	Typ.	Max.	Unit
F _{NOM}	Nominal crystal frequency	Parallel resonance, fundamental mode, AT cut	−	27	−	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

Notes:

1. Float X_{OUT} if X_{IN} is externally driven.
2. Rated for 10 years

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
t_{PU}	Power-up time for all VDDs to reach minimum specified voltage (power ramps must be monotonic)	0.05	–	500	ms

DC Electrical Characteristics

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
I_{OH}	Output High Current	$V_{OH} = V_{DD} - 0.5$, $V_{DD} = 3.3V$	12	24	–	mA
I_{OL}	Output Low Current	$V_{OL} = 0.5$, $V_{DD} = 3.3V$	12	24	–	mA
C_{IN}	Input Capacitance		–	–	7	pF
I_{IZ}	Input Leakage Current		–	5	–	μA
$f_{\Delta XO}$	VCXO pullability range		±150	–	–	ppm
V_{VCXO}	VCXO input range		0	–	V_{DD}	V
I_{VDD}	Supply Current		–	25	30	mA

AC Electrical Characteristics ($V_{DD} = 3.3V$)

Parameter ^[3]	Description	Conditions	Min.	Typ.	Max.	Unit
DC	Output Duty Cycle	Duty Cycle is defined in <i>Figure 1</i> 50% of V_{DD}	45	50	55	%
ER_0	Rising Edge Rate	Output Clock Edge Rate, Measured from 20% to 80% of V_{DD} , $C_{LOAD} = 15$ pF <i>Figure 2</i> .	0.8	1.4	–	V/ns
EF_1	Falling Edge Rate	Output Clock Edge Rate, Measured from 80% to 20% of V_{DD} , $C_{LOAD} = 15$ pF <i>Figure 2</i> .	0.8	1.4	–	V/ns
t_9	Clock Jitter	Peak-Peak period jitter maximum absolute jitter	–	200	250	ps
t_{10}	PLL Lock Time		–	–	3	ms

Notes:

3. Not 100% tested

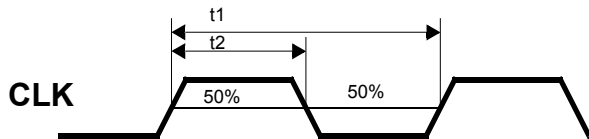
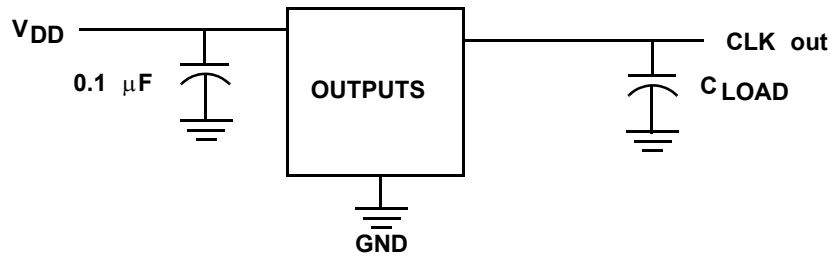
Test Circuit


Figure 1. Duty Cycle Definition; $DC = t_2/t_1$

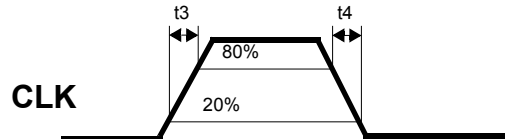
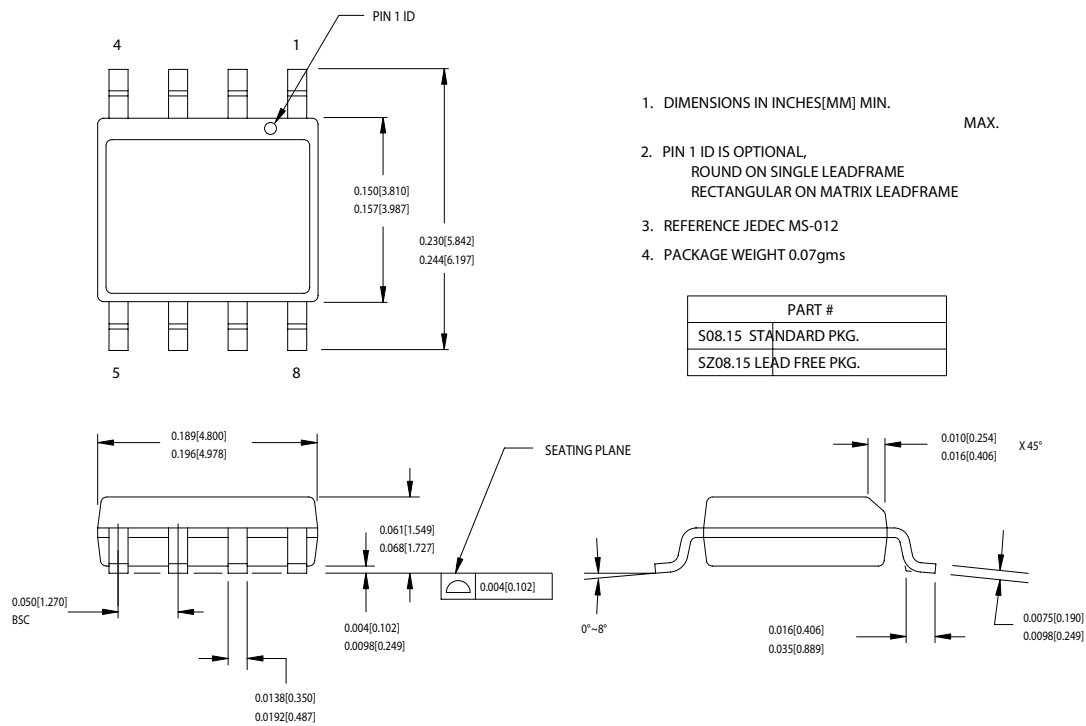


Figure 2. Rise and Fall Time Definitions: $ER = 0.6 \times V_{DD}/t_3$,
 $EF = 0.6 \times V_{DD}/t_4$

Ordering Information

Ordering Code	Package Type	Operating Range	Operating Voltage
CY24713SC	8-pin SOIC	Commercial	3.3V
CY24713SCT	8-pin SOIC	Commercial	3.3V
Lead-free			
CY24713SXC	8-pin SOIC	Commercial	3.3V
CY24713SXCT	8-pin SOIC	Commercial	3.3V

Package Diagram
8-lead (150-Mil) SOIC S8


51-85066-°C

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Document History Page

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**	333175	See ECN	RGL	New Data Sheet