



**THE DATASHEET OF  
CY24204ZXC-3T**



# MediaClock™ DTV, STB Clock Generator

## Features

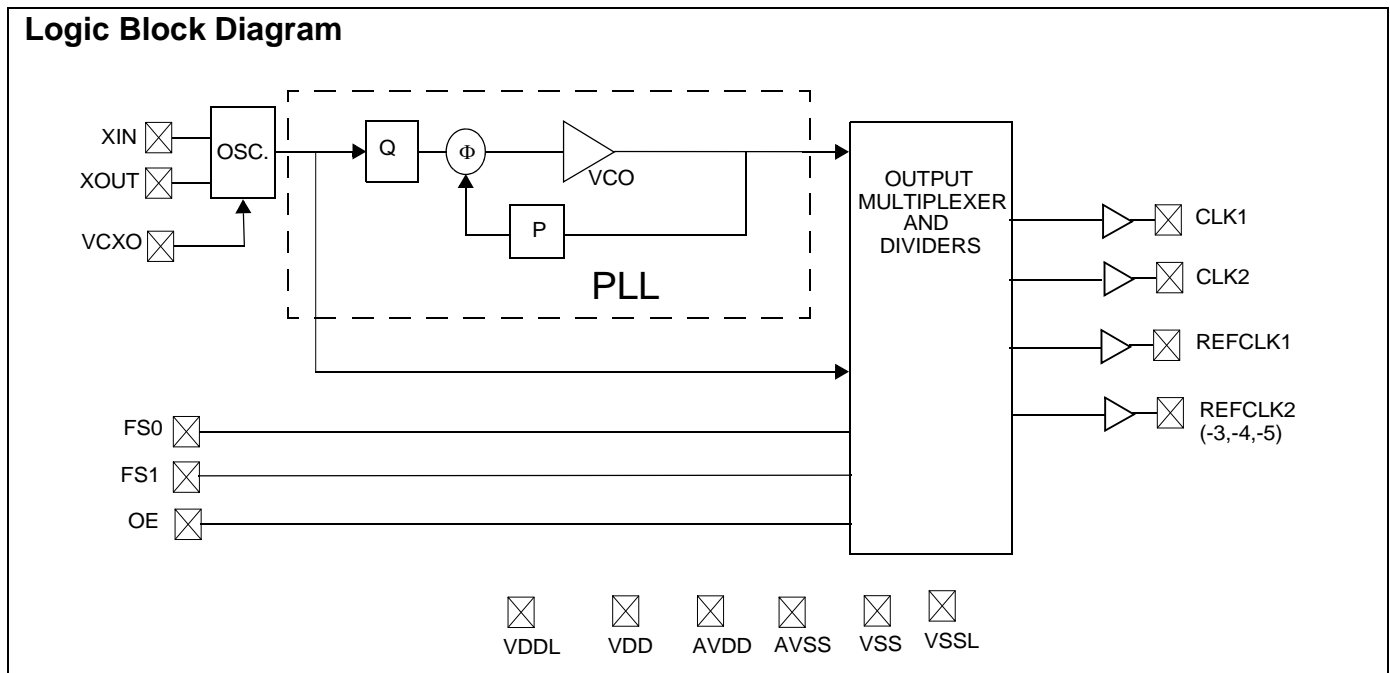
- Integrated phase-locked loop (PLL)
- Low jitter, high-accuracy outputs
- VCXO with Analog Adjust
- 3.3V operation

## Benefits

- Internal PLL with up to 400-MHz internal operation
- Meets critical timing requirements in complex system designs
- Large  $\pm 150$ -ppm range, better linearity
- Enables application compatibility

Part Number	Outputs	Input Frequency	Output Frequency Range
CY24204-3	4	27-MHz Crystal Input	Two copies of 27-MHz reference clock output, two copies of 27/27.027/74.250/74.17582418 MHz (frequency selectable)
CY24204-4	4	27-MHz Crystal Input	Two copies of 27-MHz reference clock output, two copies of 27/27.027/74.250/74.17582418 MHz (frequency selectable, Increased VCXO pull range)
CY24204-5	4	27-MHz Crystal Input	Two copies of 27-MHz reference clock output, two copies of 27/27.027/74.250/74.17582418 MHz (frequency selectable, Increased output drive strength)

## Logic Block Diagram



## Pin Configuration

Figure 1. CY24204-3,4,5 16-Pin TSSOP

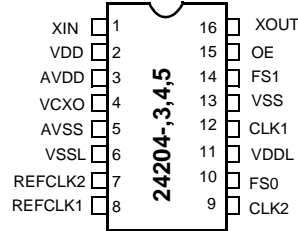


Table 1. Pin Definition

Name	Pin Number	Description
XIN	1	Reference Crystal Input.
V <sub>DD</sub>	2	Voltage Supply.
AV <sub>DD</sub>	3	Analog Voltage Supply.
VCXO	4	Input Analog Control for VCXO.
AV <sub>SS</sub>	5	Analog Ground.
V <sub>SSL</sub>	6	CLK Ground.
REFCLK2	7	Reference Clock Output.
REFCLK1	8	Reference Clock Output.
CLK1	9	27/27.027/74.250/74.17582418-MHz Clock Output (Frequency Selectable).
FS0	10	Frequency Select 0, Weak Internal Pull up.
V <sub>DDL</sub>	11	CLK Voltage Supply.
CLK2	12	27/27.027/74.250/74.17582418-MHz Clock Output (Frequency Selectable).
V <sub>SS</sub>	13	Ground.
FS1	14	Frequency Select 1, Weak Internal Pull up.
OE	15	Output Enable, Weak Internal Pull up.
XOUT	16	Reference Crystal Output.

## Frequency Select Options

OE	FS1	FS0	CLK1/CLK2 <sup>[1]</sup>	REFCLK 1/2	Unit
0	0	0	off	27	MHz
0	0	1	off	27	MHz
0	1	0	off	27	MHz
0	1	1	off	27	MHz
1	0	0	27	27	MHz
1	0	1	27.027	27	MHz
1	1	0	74.250	27	MHz
1	1	1	74.17582418	27	MHz

**Note**

1. "off" = output is driven HIGH.

## Maximum Ratings

Exceeding maximum ratings may impair the useful life of the device. These user guidelines are not tested.

Supply Voltage ( $V_{DD}$ ,  $AV_{DDL}$ ,  $V_{DDL}$ ) ..... -0.5 to +7.0V  
 DC Input Voltage ..... -0.5V to  $V_{DD} + 0.5$   
 Storage Temperature (Non-Condensing).... -55°C to +125°C

Junction Temperature ..... -40°C to +125°C  
 Data Retention at  $T_j=125^\circ\text{C}$  ..... > 10 years  
 Package Power Dissipation..... 350 mW  
 ESD (Human Body Model) MIL-STD-883..... 2000V

## Pullable Crystal Specifications

Parameter	Description	Comments	Min	Typ.	Max	Unit
$F_{NOM}$	Nominal crystal frequency	Parallel resonance, fundamental mode, AT cut	-	27.0	-	MHz
$C_{LNOM}$	Nominal load capacitance		-	14	-	pF
$R_1$	Equivalent series resistance (ESR)	Fundamental mode	-		25	$\Omega$
$R_3/R_1$	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	mW
$F_{3SEPHI}$	Third overtone separation from $3 \cdot F_{NOM}$	High side	300	-	-	ppm
$F_{3SEPLO}$	Third overtone separation from $3 \cdot F_{NOM}$	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	fF

## Recommended Operating Conditions

Parameter	Description	Min	Typ.	Max	Unit
$V_{DD}/AV_{DDL}/V_{DDL}$	Operating Voltage	3.135	3.3	3.465	V
$T_A$	Ambient Temperature	0	-	70	$^\circ\text{C}$
$C_{LOAD}$	Max. Load Capacitance	-	-	15	pF
$t_{PU}$	Power up time for all $V_{DD}$ s to reach minimum specified voltage (power ramps must be monotonic)	0.05	-	500	ms

## DC Electrical Specifications

Parameter <sup>[1]</sup>	Name	Description	Min	Typ.	Max	Unit
$I_{OH1}$	Output High Current for -3,-4,	$V_{OH} = V_{DD} - 0.5$ , $V_{DD}/V_{DDL} = 3.3V$	12	24	-	mA
$I_{OL1}$	Output Low Current for -3,-4	$V_{OL} = 0.5$ , $V_{DD}/V_{DDL} = 3.3V$	12	24	-	mA
$I_{OH2}$	Output High Current for -5	$V_{OH} = V_{DD} - 0.5$ , $V_{DD}/V_{DDL} = 3.3V$	18	26	-	mA
$I_{OL2}$	Output Low Current for -5	$V_{OL} = 0.5$ , $V_{DD}/V_{DDL} = 3.3V$	18	26	-	mA
$V_{IH}$	Input High Voltage	CMOS levels, 70% of $V_{DD}$	0.7	-	-	$V_{DD}$
$V_{IL}$	Input Low Voltage	CMOS levels, 30% of $V_{DD}$	-	-	0.3	$V_{DD}$
$I_{VDD}$	Supply Current	$AV_{DD}/V_{DD}$ Current	-	-	25	mA
$I_{VDDL}$	Supply Current	$V_{DDL}$ Current ( $V_{DDL} = 3.47V$ )	-	-	20	mA
$C_{IN}$	Input Capacitance		-	-	7	pF

**Note**

1. Not 100% tested.

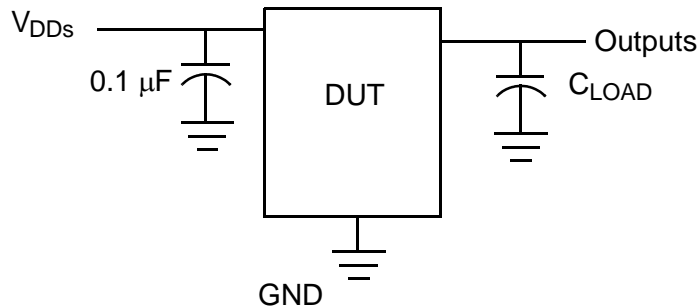
**DC Electrical Specifications (continued)**

Parameter <sup>[1]</sup>	Name	Description	Min	Typ.	Max	Unit
$f_{\Delta XO}$	$V_{CXO}$ pullability range	Nominal pullability for -3,-5	$\pm 150$	–	–	ppm
$f_{\Delta XO}$	$V_{CXO}$ pullability range	Extended pullability for -4	–	$\pm 200$	–	ppm
$V_{VCXO}$	$V_{CXO}$ input range		0	–	$V_{DD}$	V
$R_{UP}$	Pull up resistor on inputs	$V_{DD} = 3.14$ to $3.47V$ , measured at $V_{IN} = 0V$	–	100	150	$k\Omega$

**AC Electrical Specifications**

Parameter <sup>[1]</sup>	Name	Description	Min	Typ.	Max	Unit
DC	Output Duty Cycle	Duty Cycle is defined in Figure 3; $t_1/t_2$ , 50% of $V_{DD}$	45	50	55	%
$ER_1$	Rising Edge Rate for -3,-4	Output Clock Edge Rate, Measured from 20% to 80% of $V_{DD}$ , $C_{LOAD} = 15$ pF See Figure 4.	0.8	1.4	–	V/ns
$EF_1$	Falling Edge Rate for -3,-4	Output Clock Edge Rate, Measured from 80% to 20% of $V_{DD}$ , $C_{LOAD} = 15$ pF See Figure 4.	0.8	1.4	–	V/ns
$ER_2$	Rising Edge Rate for -5	Output Clock Edge Rate, Measured from 20% to 80% of $V_{DD}$ , $C_{LOAD} = 15$ pF See Figure 4.	1.0	1.8	–	V/ns
$EF_2$	Falling Edge Rate for -5	Output Clock Edge Rate, Measured from 80% to 20% of $V_{DD}$ , $C_{LOAD} = 15$ pF See Figure 4.	1.0	1.8	–	V/ns
$t_g$	Clock Jitter	CLK1, CLK2 Peak-Peak period jitter	–	120	–	ps
$t_{10}$	PLL Lock Time		–	–	3	ms

Figure 2. Test and Measurement Setup



**Voltage and Timing Definitions**

Figure 3. Duty Cycle Definition

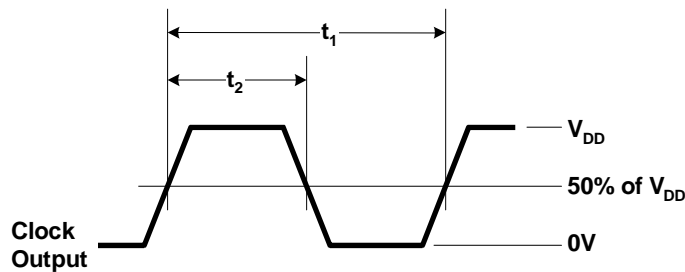
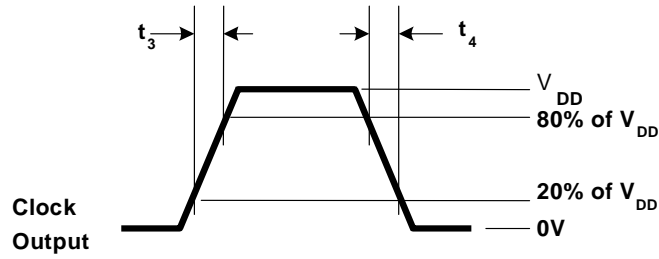


Figure 4.  $ER = (0.6 \times V_{DD}) / t_3$ ,  $EF = (0.6 \times V_{DD}) / t_4$



### Ordering Information

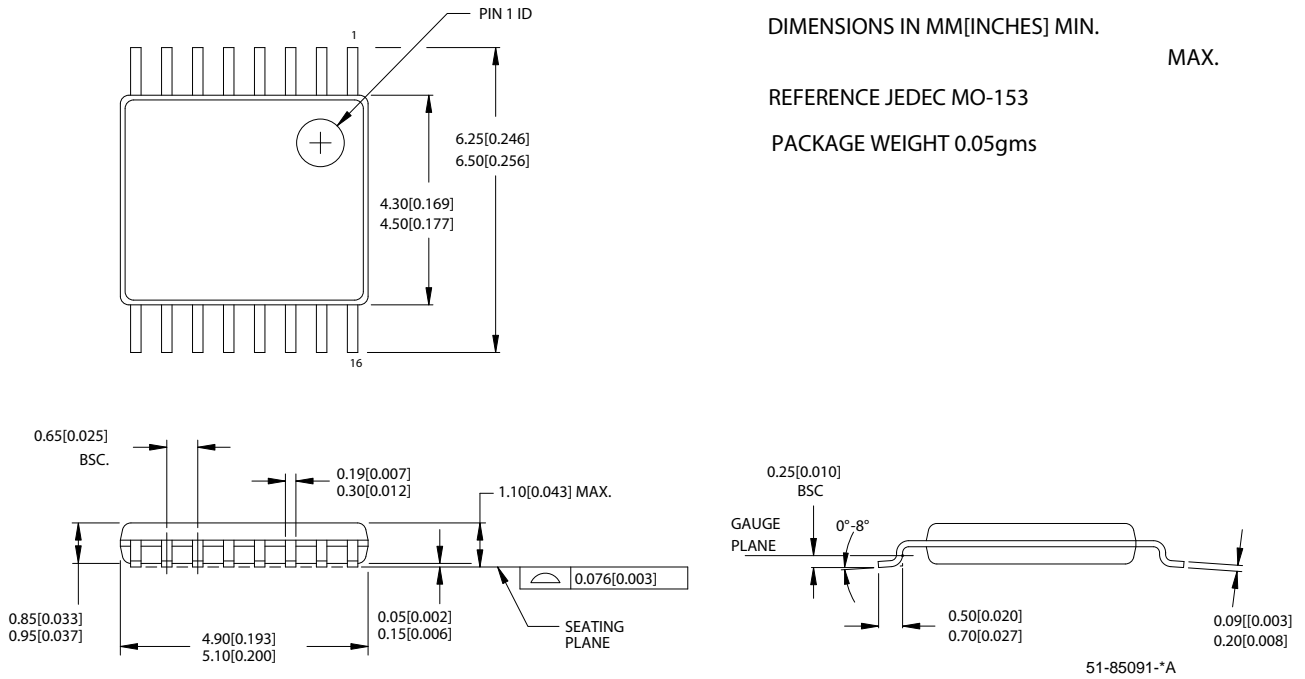
Ordering Code	Package Name	Package Type	Operating Range	Operating Voltage
<b>Pb-Free</b>				
CY24204ZXC-3 <sup>[2]</sup>	ZZ16	16-Pin TSSOP	Commercial	3.3V
CY24204ZXC-3T <sup>[2]</sup>	ZZ16	16-Pin TSSOP-Tape and Reel	Commercial	3.3V
CY24204ZXC-4 <sup>[2]</sup>	ZZ16	16-Pin TSSOP	Commercial	3.3V
CY24204ZXC-4T <sup>[2]</sup>	ZZ16	16-Pin TSSOP-Tape and Reel	Commercial	3.3V
CY24204ZXC-5 <sup>[2]</sup>	ZZ16	16-Pin TSSOP	Commercial	3.3V
CY24204ZXC-5T <sup>[2]</sup>	ZZ16	16-Pin TSSOP-Tape and Reel	Commercial	3.3V
CY24204KZXC-3	ZZ16	16-Pin TSSOP	Commercial	3.3V
CY24204KZXC-3T	ZZ16	16-Pin TSSOP-Tape and Reel	Commercial	3.3V

**Note**

2. Not recommended for new designs.

Package Drawing

Figure 5. 16-Lead TSSOP 4.40mm Body 16.173



## Document History Page

Document Title: CY24204 MediaClock™ DTV, STB Clock Generator				
Document Number: 38-07450				
REV.	ECN NO.	Submission Date	Orig. of Change	Description of Change
**	123842	04/10/03	CKN	New Data Sheet
*A	128775	09/0803	IJA	Added -4 and -5 parts
*B	214080	See ECN	RGL	Added -6 part
*C	310573	See ECN	RGL	Removed -1,-2 and -6 parts Added Lead-free devices for -3, -4, and -5 parts
*D	2440886	See ECN	KVM/AESA	Updated template. Added Note "Not recommended for new designs." Added part number CY24204KZXC-3, and CY24204KZXC-3T in ordering information table. Removed non-Pb-free part numbers (those beginning CY24204ZC). Replaced "Lead-free" with "Pb-Free".

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