



# Low Power Multiclock Generator AK8146A

## Features

- 24.0MHz External Input or Crystal Input
- Clock out Frequencies:
  - 24.000MHz
  - 20.48MHz
  - 4.000MHz
- Low Jitter Performance
  - Period Jitter: 25 psec (Typ.) at CLK1-2
- Low Current Consumption: 5.0mA (Typ.) at 3.3V
- Supply Voltage: 3.0 – 3.6V
- Operating Temperature Range: -20 to +85°C
- Package: 8-pin MSOP (Lead free)

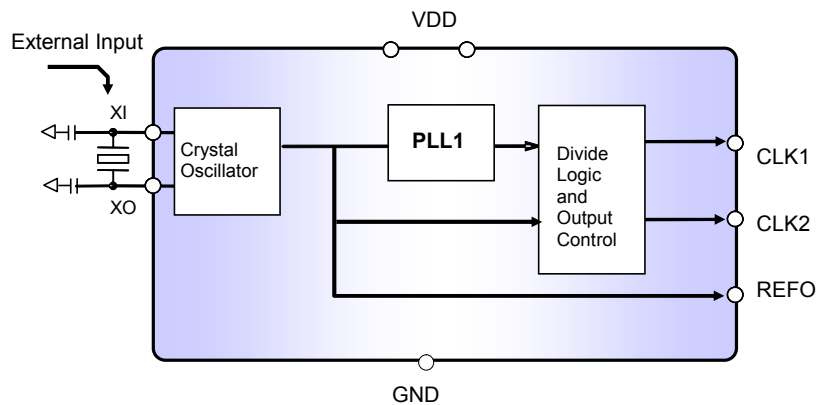
## Description

The AK8146A is a low power multi clock generator which generates different frequency clocks from a 24MHz crystal oscillator or external clock input. It provides up to three outputs. The PLL in the AK8146A is derived from AKM's high-performance clock device technology, enabling the clock output to perform with low jitter and to operate with very low current consumption. The AK8146A is available in an 8-pin MSOP package.

## Applications

- Digital TV Sets
- Personal Video Recorders
- Set-Top-Boxes
- Multi Media Receivers

## Block Diagram



**AK8146A Multi Clock Generator**

**Pin Descriptions**



**Package: 8-Pin MSOP(Top View)**

Pin No.	Pin Name	Pin Type	Description
1	XO	XO	Crystal connection, Connect to 24.000MHz crystal Leave this pin floating when the external clock is used.
2	GND	PWR	Ground
3	VDD	PWR	3.3V
4	CLK1	OUT	20.48MHz
5	CLK2	OUT	4.0MHz
6	REFO	OUT	24.000MHz
7	VDD	PWR	3.3V
8	XI	XI	Crystal Input or Reference Clock Input 24.000MHz

**Ordering Information**

Part Number	Marking	Shipping Packaging	Package	Temperature Range
AK8146A	146A	Tape and Reel	8-pin MSOP	-20 to 85 °C

## Absolute Maximum Rating

Over operating free-air temperature range unless otherwise noted <sup>(1)</sup>

Items	Symbol	Ratings	Unit
Supply voltage	VDD	-0.3 to 4.6	V
Input voltage	V <sub>in</sub>	VSS-0.3 to VDD+0.3	V
Input current (any pins except supplies)	I <sub>IN</sub>	±10	mA
Storage temperature	T <sub>stg</sub>	-55 to 130	°C

Note

(1) Stress beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to absolute-maximum-rating conditions for extended periods may affect device reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.



### ESD Sensitive Device

This device is manufactured on a CMOS process, therefore, generically susceptible to damage by excessive static voltage. Failure to observe proper handling and installation procedures can cause damage. AKEMD recommends that this device is handled with appropriate precautions.

## Recommended Operation Conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating temperature	T <sub>a</sub>		-20		85	°C
Supply voltage <sup>(1)</sup>	VDD		3.0	3.3	3.6	V
Output Load Capacitance	C <sub>p1</sub>	Pin: CLK1,2,REFO			15	pF

Note:

(1) Power to VDD requires to be supplied from a single source. A decoupling capacitor of 0.1μF for power supply line should be installed close to each VDD pin.

## DC Characteristics

All specifications at VDD: over 3.0 to 3.6V, Ta: -20 to +85°C, 24MHz Crystal, unless otherwise noted

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
High Level Output Voltage	$V_{OH}$	Pin: CLK1-2, REFO $I_{OH}=-4mA$	0.8VDD			V
Low level Output Voltage	$V_{OL}$	Pin: CLK1-2, REFO $I_{OL}=+4mA$			0.2VDD	V
Current Consumption	$I_{DD}$	No load Ta=25°C		5.0		mA

## AC Characteristics

All specifications at VDD: over 3.0 to 3.6V, Ta: over -20 to +85°C, 24MHz Crystal, unless otherwise noted

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Crystal Clock Frequency <sup>(1)</sup>				24.0		MHz
External Clock Input		Pin: XI 500mVp-p or more Duty:30%-70% @0.5*(Input Swing)		24.0		MHz
Period Jitter <sup>(3)</sup>		CLK1-2		25		ps
Output Clock Duty Cycle		Pin: CLK1-2	45	50	55	%
		Pin: REFO	40	50	60	%
Output Clock Rise Time	$t_{rise}$	Pin: CLK1-2, REFO <sup>(2)</sup>		1.5	4.0	ns
Output Clock Fall Time	$t_{fall}$	Pin: CLK1-2, REFO <sup>(2)</sup>		1.5	4.0	ns
Power-up Time <sup>(4)</sup>		Pin: CLK1-2 <sup>(2)</sup>		1		ms

(1) AT cut, Fundamental mode

Recommended Crystal Unit : HC-49/U03C (RIVER ELETEC CORP.)

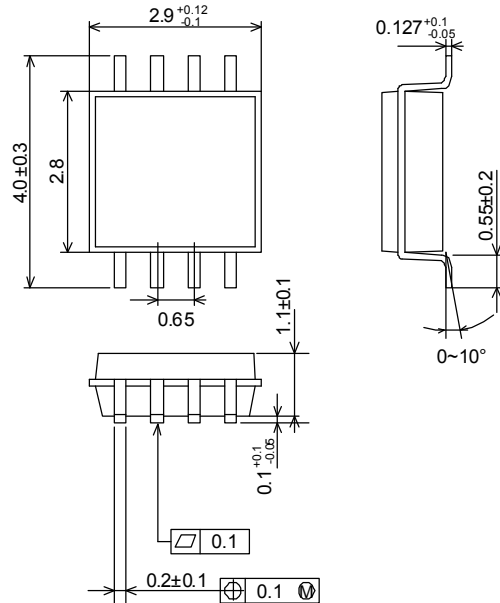
(2) Measured with load capacitance of 15pF

(3)  $1\sigma$  in 10000 sampling or more

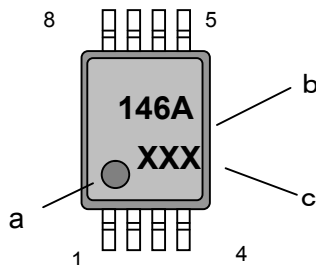
(4) The time that output reaches the target frequency within accuracy of  $\pm 0.1\%$  from the point that the power supply reaches VDD

## Package Information


### • Mechanical data



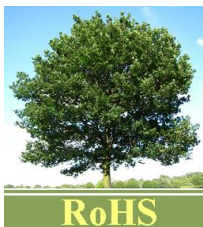
### • Marking



a: #1 Pin Index  
b: Part number  
c: Date code (3 digits)

**AKM** and the logo -  - are the brand of AKM's IC's and identify that AKM continues to offer the best choice for high performance mixed-signal solution under this brand.

### • RoHS Compliance



All integrated circuits from Asahi Kasei Microdevices (AKM) assembled in "lead-free" packages\* are fully compliant with RoHS.

(\*) RoHS compliant products from AKM are identified with "Pb free" letter indication on product label posted on the anti-shield bag and boxes.

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