OPTICAL MOUSE SENSOR IC

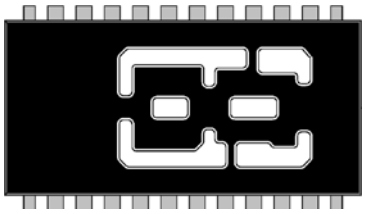
ATA1060XA

(ATA1080XA+ Mosart MA60H223)

Version 0_6

@Lab ATA1060XA

Wireless Optical Mouse Sensor Data Sheet



INTRODUCTION

Description

The ATA1060XA is an optical sensor with capability of replacing current track ball mouse of computer system. How the most common optical sensor for mouse works today is: The sensor captures "snapshots" of the work surface at 1,700 times per second, then the captured images are sent to an arithmetic unit to determine direction and magnitude of movement in accordance with speed and acceleration.

However, the key differences in ATA1060XA from other optical sensors are that it is designed based on a system level architecture so that it can eliminate side parts resulting in saving extra manufacturing costs. Additionally, ATA1060XA includes Mosart's MCU (MA60H223) within one package so that no additional MCU is needed. The MA60H223 is an encoder IC that can encode the data from the mouse optical sensor and sends these data via RF at 27MHz. The MA60H223 is equipped with a complete set of FSK modulator that also provides single RF channel solution This will reduce the extra external component for RF interface

ATA1060XA also tolerates to all different magnitudes of movement so that the sensor can be used for design purpose where accuracy is the most important factor as well as for gaming purpose where speed would be the critical factor.

The sensor is in a 24-pin optical DIP package. ATA1060XA comes with the "default" resolution of 400 counts per inch (cpi) and the rate of motion up to 12.75 inches per second.

General Features

- Optical navigation technology
- No mechanical parts
- High reliability
- Complete 2-D motion sensor
- High speed motion detection
- Proprietary enhanced navigation accuracy over a wide variety of surfaces
- No precision optical alignment
- Single 5.0 volt power supply
- Low operation current
- USB or PS/2 interface is included
- Power Conservation Mode during times of no movement (No Motion).
- No additional MCU is needed.

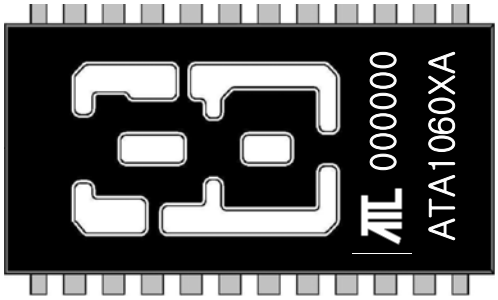
MA60H223's Features inside ATA1060XA.

- 76.8KHz clock rate (low power consumption)
- High speed & 32.768KHz OSC supported (optional).
- Build in data scrambler and error detection encoder.
- Build in single channel RF oscillator, modulator and power amplifier.
- 4Kbps Baud rate in air.
- ID change solution (256 random Ids) to resist the interference from the same device.
- 3V or 5V DC/DC embedded.
- Sensor degree Selection (0, 90, 270 degree)
- ID retention function when battery removed.
- Z axis supports for optical & mechanical inputs by application circuits.

Applications

- Mice for desktop PC's, Workstations, and notebook PC's
- Integrated input devices

Top View of ATA1060XA



Pinout

Pin	Name	Type	Description
1	Nreset	Input	Reset
2	DVDD	P	Power (5V)
3	XYLED	Output	LED On/Off
4	DGND	P	Ground
5	Z2IN	Input	Z axis Input (3D)
6	Z1IN	Input	Z axis Input (3D)
7	PD	Input/Output	Control Power Down signal of optical Sensor
8	TXD	Output	Digital encoded data
9	ORFO	Output	RF Internal Buffer output (27MHz Oscillator input)
10	ORFIN	Input	RF Internal Buffer Input Set (27MHz Oscillator input)
11	RFOUT	Output	Internal Modulated RF Output
12	LBUT	Input	Left Button
13	MBUT	Input	Middle Button
14	RBUT	Input	Right Button
15	VDD	P	Power
16	OSC2	Output	Oscillator Output
17	OSC1	Input	Oscillator Input
18	VL	Output	DC/DC Lx switch output
19	DCVR	Input	DC/DC Voltage Reference
20	SVDIN	Input	Supply Voltage Detect Input
21	TXCB	Input	ID Change Button
22	TYPESEL	Input/Output	Control serial degree of Optical sensor
23	AGND	P	Ground
24	AVDD	P	Power (5V)

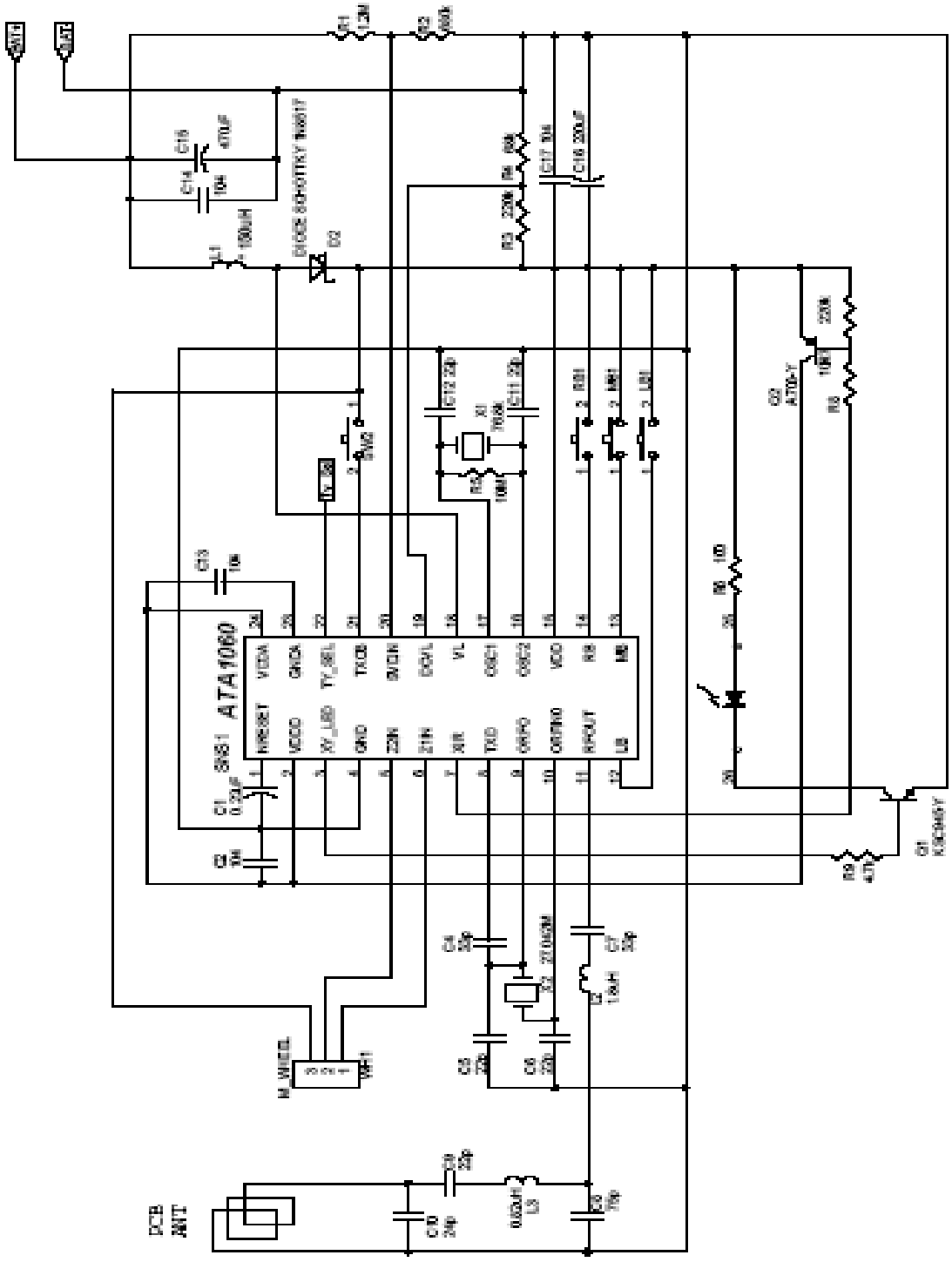
Note: Pin assignments can be altered without notice

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Unit	Min.	Typ.	Max.	Note
Absolute Maximum Ratings						
Storage Temperature	Tstg	°C	–20		70	
Operating Temperature	Topr	°C	0		50	
Supply Voltage	Vdd	V	–0.5		7.0	
Input Voltage	Vin	V	Vss–0.3		Vdd+0.3	
ESD	-	V	200			All pins, machine model
			2000			All pins, human body model
Recommended Operating Conditions						
Operating Temperature	Topr	°C	0	25	40	
Supply Voltage	Vdd	V	4.5	5.0	5.5	
System clock (OSC)	Fclk	Khz	-	76.8	-	
Distance from lens reference plane to surface	D	mm	2.0	2.2	2.4	
Speed	S	Inch/sec	-	-	12.75	Default (400cpi)
AC Electrical Specification (Recommended operating conditions: Temp=25°C, Vdd=5.0V, and CLK=6MHz)						
Motion Scale Factor		counts /sec	-	400	-	Default (400cpi)
Response Time (Default)	Trsp1	msec	8.7	10.9	13.1	Movement to data in no motion mode.
Power-On Reset	Tres	msec	300	426	500	
DC Electrical Specification (Recommended operating conditions: Temp=25C and Vdd=3.0V)						
Supply Current (in Motion)	Idd	mA	-	28	36	DC/DC OUT=3.5V
Supply Current (No Motion)	Idd1	mA	-	2.3	5	DC/DC OUT=3.5V
Supply Current (Power Down)	Iddpd	mA		0.3	0.5	DC/DC OUT=3.5V
Input Low Voltage	V_{IL}	V	-	-	0.8	
Input High Voltage	V_{IH}	V	2.0	-	-	
Output Low Voltage (LED)	V_{OLL}	V	-	0.3	0.5	
Output High Current (LED)	I_{OHLED}	mA	1.5	4	6.5	

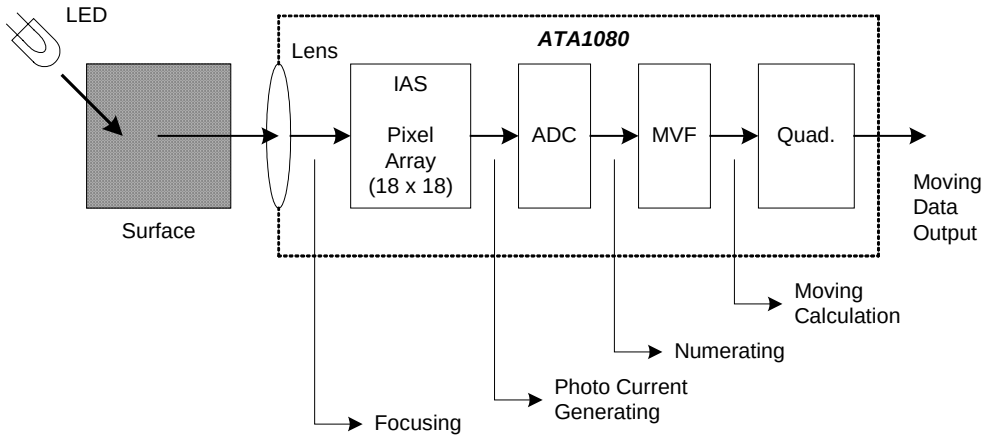
TYPICAL APPLICATION

Application circuit for ATA1060XA



OPERATIONS

Theory of Operation



ATA1060XA is based on Optical Navigation Technology. It contains an Image Acquisition System (IAS), a Motion Vector Finding Processor (MVFP), a two-channel quadrature output.

The IAS acquires microscopic surface images via the lens and illumination system provided by other parts. These images are processed by the MVF processor to determine the direction and distance of motion. The MVF processor generates the Δx and Δy relative displacement values that are converted into two-channel quadrature signals.

Description of Operation

Once power is up, it requires 75.3 msec to be stabilized in Motion mode. In order to minimize the power consumption, when there is no motion in the sensor, ATA1060XA turns its operation into no-motion mode. That is, when there is no motion for one second (default time period) in Motion mode, ATA1060XA turns into No-Motion mode.

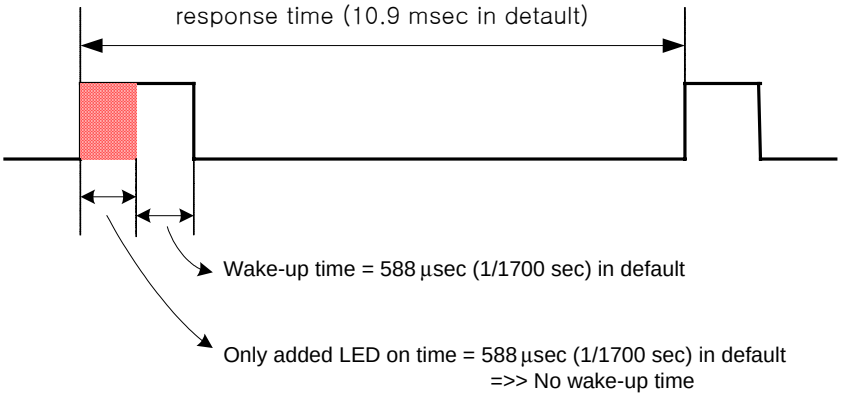
In default, from No-Motion mode, ATA1060XA wakes up every 10.9 msec for one report time (588 usec) and compares with the previous wake-up in order to check whether there is any movement.

Optical Sensor Power saving flow.

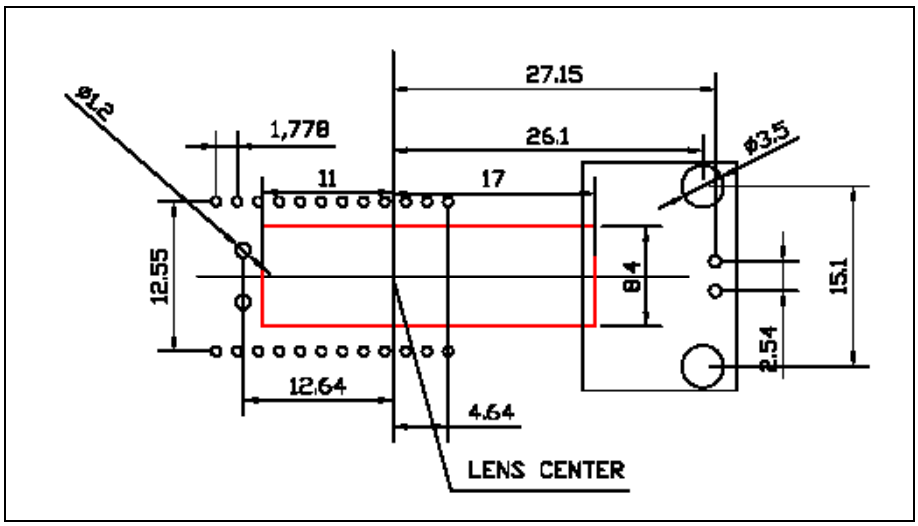
1. Step1 : Sensor is in charge of the power control
2. Step2 : Controller takes charge of the control for 8 minutes.
3. Step3 : Power down completely. Power up mode is activated by any one of the keys or scroll bar.

Notes : PD pin is active low

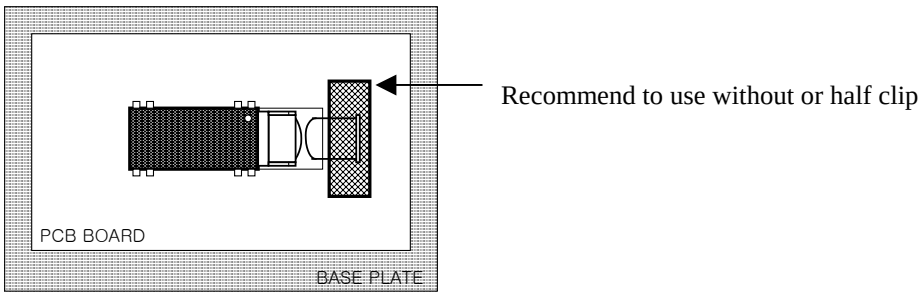
Timing in No-Motion Mode

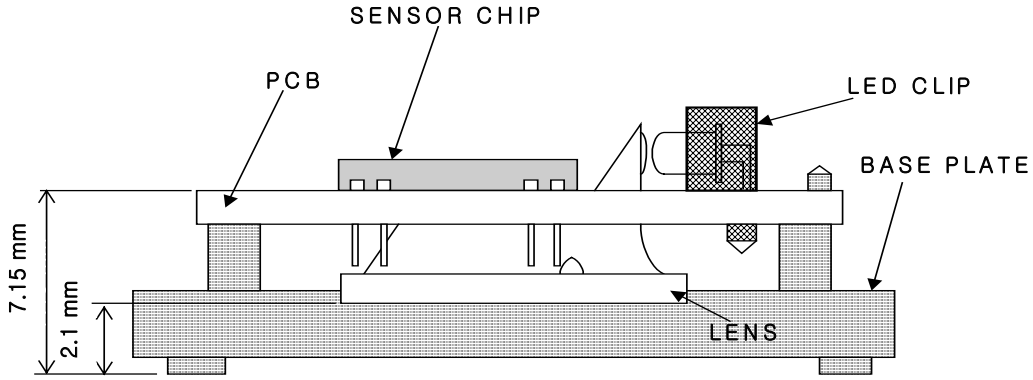


Recommended PCB mechanical Drawing (Unit: mm)



Assembly Drawing (Unit: mm)

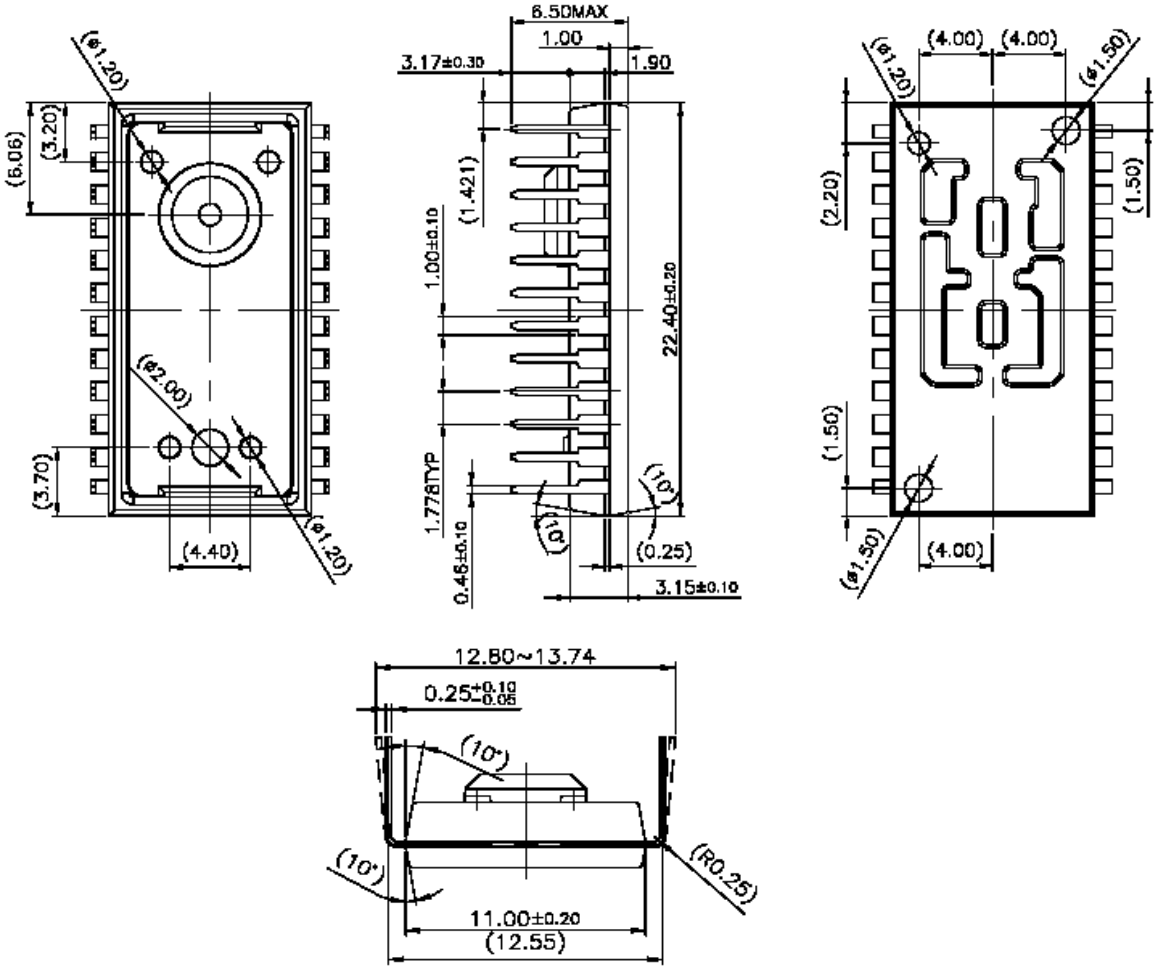




The maximum performance of optical mouse set can be achieved from applying the distances shown above. Lens to surface distance tolerance is ±0.2mm

ATA1060XA PACKAGE (Unit: mm)

Package Outline Drawing



Marking Information