

ADOMAX

TECHNOLOGY CO.,LTD

Requirements Specification

For

AM-2200UP OPTICAL
AM-2200U OPTICAL
AM-2200RX
27MHz RF Optical Mouse

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RF Optical Mouse Requirements Specification

1.0 Scope

1.1 Document

This document summarizes the requirements for the Wireless 3D Mouse (WLM).

1.2 Product Features

- Wireless mouse eliminates cable between mouse and the PC
- 800 cpi
- 3D mouse

1.3 Product Applications

- Laptop PC
- Desktop PC
- Operate OS: window 98/2000/ME/XP/MAC OS
- Includes software driver for window 98/2000/ME/XP/MAC OS

2.0 Items

2.1 Applicable Documents

N/A

2.2 Items Included

- Wireless 3D Mouse
- Base Unit with cable
- Floppy with driver and read me file in plastic bag
- AA batteries

3.0 Requirements

3.1 General Description

The WLM consists of the mouse unit and the base unit. The battery powered mouse unit transmits an RF signal to the base unit that is connected to the USB (PS/2) port on the PC or laptop computer.

3.1.1 Characteristics

The following sections identify the detailed specifications of the WLM.

3.1.1.1 Functional Block Diagram

The typical operational configuration for WLM is shown in Figure 1 below.

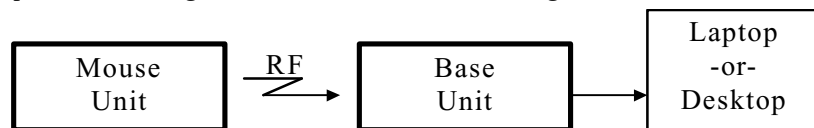


Figure 1. Overall System Block Diagram

The mouse unit and base unit block diagrams are shown in Figures 2 and 3.

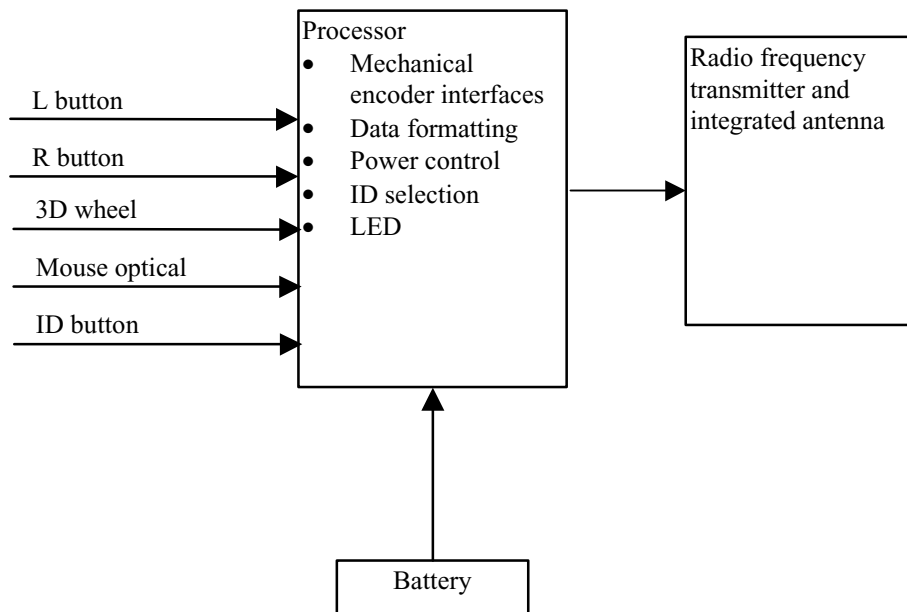


Figure 2. Mouse Unit Block Diagram

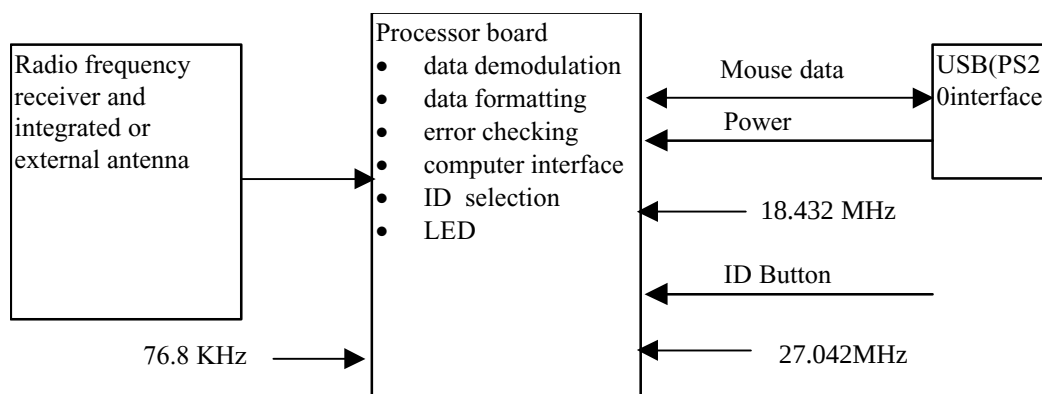


Figure 3. Receiver Block Diagram

3.1.1.2 Performance Requirements

3.1.1.2.1 Product Performance Requirements

The end-to-end system performance requirements are contained in the Table 1 below.

Table 1. System Performance Requirements

Rqmt No.	Parameter	Description	Value
3.1.1.2.1.1	<i>RF channel</i>	<i>Operating frequency bands</i>	27 MHz
3.1.1.2.1.2	<i>RF channel</i>	<i>Number of channels</i>	1 channels

3.1.1.2.2 Mouse Unit Performance Requirements

Optical sensor, the precise sensor detects motion on hundreds of surfaces, including wood, plastic, or even your pants leg.

The mouse unit performance requirements are contained in the Table 2 below. Performance tests shall be performed at 20 ± 5 °C (temperature) and $65 \pm 10\%$ (relative humidity).

Table 2. Mouse Unit Performance Requirements

Rqmt No.	Parameter	Description	Value
3.1.1.2.2.1	Battery	Type of battery	2 – Alkaline AA (type 3)
3.1.1.2.2.2	Battery	<i>Expected life of battery</i> <i>Operating conditions</i> - 4h/day - 5d/week - 15% usage	<i>See Appendix 5</i> <i>Target 2~ 3 months</i>
3.1.1.2.2.3	Mouse key	Operating force	50 ~ 75gf
3.1.1.2.2.4	Resolution		800 cpi
3.1.1.2.2.5	Tracking	Tracking speed	400 mm/sec
3.1.1.2.2.6	Power	<i>Maximum</i> <i>Standby</i> <i>Sleep (wake-up by move mouse)</i> <i>5 minutes before going into sleep mode – this will be revised based on prototype testing of unit</i>	28mA 0.7mA 0.02mA
3.1.1.2.2.7	Sensor	Operating Temperature Power supply Voltage Clock Frequency CLK ESD SPEED Reference plane to surface data sheet	0 ~40C VDD: 3.0~3.6V 17.4, 18.432, 18.7 MHz 2KV 14 in/sec
3.1.1.2.2.8		Sensor Light	RED LED Light output639nm

3.1.1.2.3 Base Unit Performance Requirements

The base unit performance requirements are contained in the Table 3 below.

Table 3. Receiver Performance Requirements

Rqmt No.	Parameter	Description	Value
3.1.1.2.3.1	RF frequency	Receive carrier frequencies	27MHZ
3.1.1.2.3.2	Receiver antenna	Antenna type	Wired-loop antenna integrated inside housing
3.1.1.2.3.3	Receiver dynamic range	Input signal level at receiver input port Maximum (Damage level) Minimum	+0dBm -50dBm
3.1.1.2.3.4	Power: USB Mode	Voltage range Consumption less than 50mA in average value Consumption in suspend mode (generic) less then 3mA in average value	4.75V to 5.25VDC

3.1.2 Interface Description

3.1.2.1 Mouse Unit Interfaces

The mouse unit external interfaces are contained in Table 4 below.

Table 4. Transmitter Main Unit External Interface Requirements

Rqmt No.	Interface	Description	Value
3.1.2.1.1	256 ID select	ID select switch	BUTTON

3.1.2.2 Base Unit Interfaces

The base unit external interfaces are contained in Table 5 below.

Table 5. Base Unit Interface Requirements

Rqmt No.	Interface	Description	Value
3.1.2.2.1	256 ID select	256 ID select switch	BUTTON
3.1.2.2.2	PC interface	The USB mode is using the low speed interface defined the USB specification.	IBM USB (PS2) mouse compatible and Microsoft IntelliMouse compatible
3.1.2.2.3	PC interface	Extended line: Cable length Cable color	150 cm Black
3.1.2.2.4	Receive signal indicator	Indicator light showing presence of wireless mouse signal - Receive ID	Single RED color LED

3.1.3 Physical Characteristics

3.1.3.1 Mouse Unit Physical Characteristics

The board design parameters are shown in Table 6.

Table 6. Mouse Unit Physical Characteristics

Rqmt No.	Parameter	Description	Value
3.1.3.1.1	Outline dimensions Length Width Height	Maximum length Maximum width Maximum height	125mm 68mm 30mm
3.1.3.1.2	Battery	Provide room for battery compartment	AA x 2 (two pieces) Type 3 Alkaline battery

3.1.3.2 Base Unit Physical Characteristics

The board design parameters are shown in Table 7.

Table 7. Base Unit Physical Characteristics

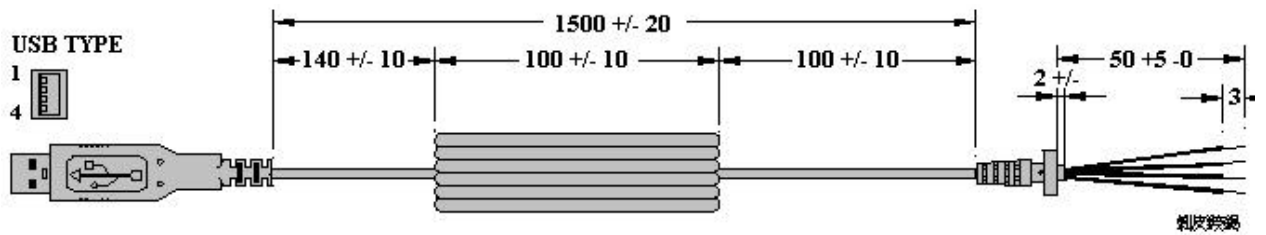
Rqmt No.	Parameter	Description	Value
3.1.3.2.1	Outline dimensions Length Width Height	Maximum length Maximum width Maximum height	78mm 30mm 80mm m

PICTURE:



3.1.3.3 CABLE SPECIFICATION





3.1.4 Maintainability

No maintainability shall be required for the base unit. The mouse unit shall use standard commercially available batteries.

3.1.5 Environmental Conditions

The mouse and base units shall function over the following conditions. The unit will be used for indoor use.

Table 8. Environmental Conditions

Rqmt No.	Parameter	Description	Value
3.1.5.1	Operating temperature High Low	No condensed	40 °C 0 °C
3.1.5.2	Storage temperature High Low Battery not included in storage temperature testing		60 °C -10 °C
3.1.5.3	Relative humidity	Maximum	85 %

3.1.6 Reliability

Reliability testing of the mouse unit shall be performed under the following conditions.

Table 9. Reliability Test

Rqmt No.	Parameter	Description	Base Unit Value	Mouse Unit Value
3.1.6.1	Mouse life test	Load Speed Travel	Not applicable	100 gf vertical force 400 ± 40 mm/sec 300 miles in any direction
3.1.6.2	Switch life test	Switching speed Operating force Operating cycles	Not applicable	3 cycle/sec 100 ± 15 gf 1,000,000 cycles
3.1.6.3	High temperature test After this test, mouse shall be left at room temperature for 1 hour, relative humidity < 95%	Temperature Storage time	65 ± 2 °C 96 hours	65 ± 2 °C 96 hours
3.1.6.4	Low temperature test After this test, mouse shall be left at room temperature for 1 hour, relative humidity < 95%	Temperature Storage time	-15 ± 2 °C 96 hours	-15 ± 2 °C 96 hours
3.1.6.5	Moisture test After this test, mouse shall be left at room temperature for 1 hour	Temperature Relative humidity Storage time	40 ± 2 °C 90 to 95% 96 hours	40 ± 2 °C 90 to 95% 96 hours
3.1.6.6	Heat cycle test (complete unit) After this test, mouse shall be left at room temperature for 1 hour, relative humidity < 95%	High temperature Low temperature Dwell time Total cycles	65 ± 2 °C -10 ± 2 °C 60 minutes at high, 60 minutes at low 5 cycles	65 ± 2 °C -10 ± 2 °C 60 minutes at high, 60 minutes at low 5 cycles
3.1.6.7	PCB heat cycle test After this test, mouse shall be left at room temperature for 1 hour, relative humidity < 95%	High temperature Low temperature Dwell time Total cycles	65 ± 2 °C -15 ± 2 °C 30 minutes at high, 30 minutes at low 200 cycles	65 ± 2 °C -15 ± 2 °C 30 minutes at high, 30 minutes at low 200 cycles
3.1.6.8	Shock test	Total cycles Height Floor condition	6 drops 65 cm Plastic floor tile	6 drops 65 cm Plastic floor tile
3.1.6.9	Electrostatic discharge (ESD) Level I	Level Cycles Conditions Function	± 10 kV 3 times 150 pF, 330 Ohm Unit shall function as specified in this document after testing.	± 10 kV 3 times 150 pF, 330 Ohm Unit shall function as specified in this document after testing.

3.1.6.10	Electrostatic discharge Level II	Level Cycles Conditions Function	± 15 kV 3 times 150 pF, 330 Ohm No physical damage to electronic components shall result from test.	± 15 kV 3 times 150 pF, 330 Ohm No physical damage to electronic components shall result from test.
3.1.6.11	Color box packaged unit shock test	Total cycles Height Floor condition	6 faces 2 edges 1 corner 65 cm Plastic floor tile	
3.1.6.12	Color box packaged unit vibration test	Frequency Force Dwell time Direction Cycles	5 to 50 Hz 3.0 g 6 minutes each axis 3 axis vibration 10 cycles	

3.1.7 Manufacturing Requirement

The objective is to drive the manufacturing cost down through fewer parts, higher volume, lower SMT cost, higher yield and lower manufacturing overhead.

3.1.7.1 Design and Construction

The unit shall be designed with consumer grade parts and construction techniques.

3.1.7.2 Enclosures

The customer shall provide industrial design and tooling.

3.1.7.3 Labeling

3.1.7.3.1 Mouse Unit Labeling

Silkscreen of company logo on top of unit – Customer will provide silkscreen film and computer files.

Single sticker on bottom of unit – CUSTOMER will provide sticker film and computer files.
CUSTOMER shall provide the sticker material type. Sticker shall be serialized.

3.1.7.3.2 Base Unit Labeling

Silkscreen of company logo on top of unit – CUSTOMER will provide silkscreen film and computer files.

Single sticker on bottom of unit – CUSTOMER will provide sticker film and computer files.
CUSTOMER shall provide the sticker material type. Sticker shall be serialized.

4.0 Quality Assurance Provisions

4.1 General Test Philosophy

Requirement verification shall be performed using the following methods:

Inspection – physical inspection of unit under test verifying compliance.

Test – measurement of specific design parameter and recording of measured results.

Design – compliance ensured by the nature of the design, verified by ensuring that the design includes provisions for meeting that parameter.

5.0 Appendix

Parameter	Click to wake-up	Notes	
Battery type	AA	Type 2	
Capacity (mAh)	1200	Alkaline (duracell web page)	
Usage percentage of batteries	80%	Operation voltage > 2.2V	
CURRENT USAGE			
Transmit (mA)	28	RF and Digital	
Standby (mA)	0.7	Digital only	
Sleep	0.02	RF and Digital power Microprocessor	
MOUSE USAGE			
Hours per day	4		
Days per week	5		
Percent usage	15%		
Total Mouse usage per week (hours)	3.00		
Transmit percentage during Usage	40%	Estimated from lab	
Standby percentage during Usage	60%	measurements	
Transmit time per week (hours)	1.2		
Standby time per week (hours)	1.8		
Sleep time per week (hours)	165		
Total Battery consumption per week (mAh)	38.16		
Number of weeks between battery changes	25		
Number of months between battery changes	5.8		