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Requirements Specification

For

AM-1300UP; AM-1300U

27MHz Wireless 3D Mouse

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Wireless 3D 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 dpi
- 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
- AAA 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 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.

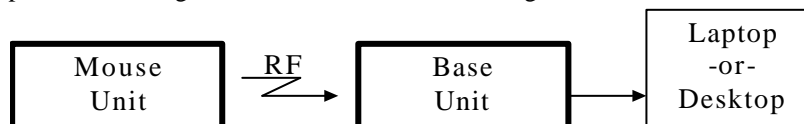


Figure 1. Overall System Block Diagram

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

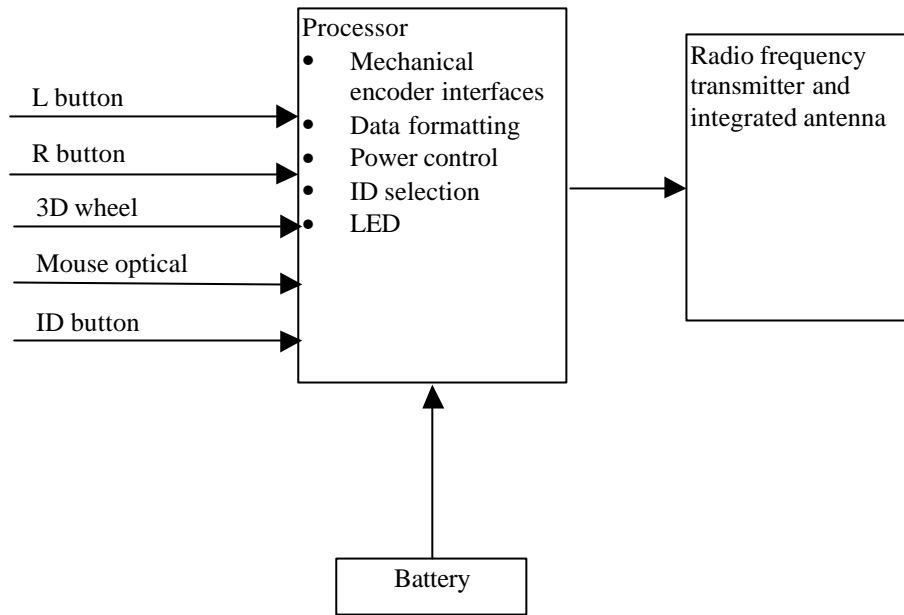


Figure 2. Mouse Unit Block Diagram

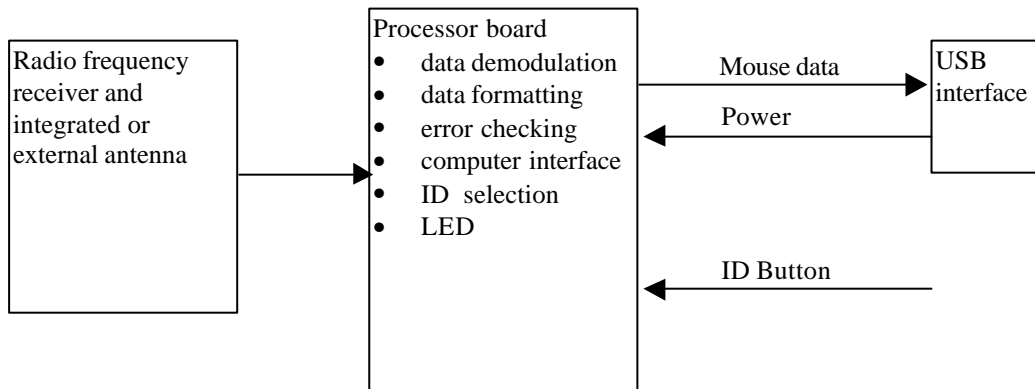


Figure 3. Receiver Block Diagram

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	RF channel	Operating frequency bands	27 MHz
3.1.1.2.1.2	RF channel	Number of channels	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 AAA (type 3)
3.1.1.2.2.2	Battery	Expected life of battery Operating conditions - 4h/day - 5d/week - 15% usage	See Appendix 10 Target 4~ 6. months
3.1.1.2.2.3	Mouse key	Operating force	50 ~ 75gf
3.1.1.2.2.4	Resolution		800 dpi
3.1.1.2.2.5	Tracking	Tracking speed	400 mm/sec
3.1.1.2.2.6	Power	Maximum Standby Sleep (wake-up by move mouse) 5 minutes before going into sleep mode – this will be revised based on prototype testing of unit	30mA 0.7mA 0.2mA
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 -90dBm
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	8 ID select	ID select switch	SWITCH

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	8 ID select	8 ID select switch	SWITCH
3.1.2.2.2	PC interface	The USB mode is using the low speed interface defined the USB specification.	IBM USB mouse compatible and Microsoft IntelliMouse compatible
3.1.2.2.3	PC interface	Cable length Cable color	130 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	120mm 60mm 22mm
3.1.3.1.2	Battery	Provide room for battery compartment	AAA 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
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3.1.3.2.1	Outline dimensions		
	Length	Maximum length	42mm
	Width	Maximum width	25mm
	Height	Maximum height	11mm

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	No condensed	
	High		40 °C
	Low		0 °C
3.1.5.2	Storage temperature		
	High		60 °C
	Low		-10 °C
	Battery not included in storage temperature testing		
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	$65 \pm 2^{\circ}\text{C}$ $-10 \pm 2^{\circ}\text{C}$ 60 minutes at high, 60 minutes at low 5 cycles	$65 \pm 2^{\circ}\text{C}$ $-10 \pm 2^{\circ}\text{C}$ 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	$65 \pm 2^{\circ}\text{C}$ $-15 \pm 2^{\circ}\text{C}$ 30 minutes at high, 30 minutes at low 200 cycles	$65 \pm 2^{\circ}\text{C}$ $-15 \pm 2^{\circ}\text{C}$ 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	$\pm 10\text{ kV}$ 3 times 150 pF, 330 Ohm Unit shall function as specified in this document after testing.	$\pm 10\text{ kV}$ 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	$\pm 15\text{ kV}$ 3 times 150 pF, 330 Ohm No physical damage to electronic components shall result from test.	$\pm 15\text{ kV}$ 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

FEDERAL COMMUNICATIONS COMMISSION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.