

## **Attachment**

### **User's Manual**

# **LYXN 96 USB MOUSE**

## **SPECIFICATIONS**

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## **WARNING**

**Note :** This equipment has been tested and found to comply with the limits for a Class B device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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.

### **Notice:**

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

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.

## **I SCOPE**

The purpose of this specification is to define the generic operational, Environmental, electrical and mechanical characteristics of the "LYNX 96 USB MOUSE " rubber mechanical keyswitch keyboard.

## **II GENERAL**

### **Description**

The LYNX 96 USB MOUSE is designed for use with the Pentium above compatible computers that with a USB connector. It is a 400 dot per inch (DPI) opto-mechanical mouse. A built in microprocessor uses multiple rotary optical encoders and a rubber coated ball to detect mouse movements. Count signals are sent to the host computer where they are translated into motion of the display screen cursor. Interface protocol is provided as follows:

### **Three Button-USB Mouse**

The interface connection consists of four (4) USB-A plug adapter that is used for Pentium above PC which support USB function.

### **Appearance / Durability**

This product is intended for user used in home and office environments. Therefore , the quality of appearance and touch are of great importance. Because of the environmental severity of the home and office place, longevity, durability, durability and resistance to contamination are also of major concern. Good engineering design practices shall be followed throughout, both mechanically and electrically.

## Controller Specifications

Parameter	Minimum	Typical	Maximum	Unit
Oscillating frequency	6-10%	6	6-10%	MHz
Key debounce	--	12	--	MS
Rising edge crossed width	75	--	300	NS
Falling edge crossed width	75	--	300	NS
Mouse CLK active time	--	83.3	--	NS
Mousse CLK inactive time	--	83.3	--	NS

## Performance specifications

Variable Resolution	400dpi-6400dpi
Hardware Resolution	400dpi
Tracking Speed	250mm/sec
Hysteresis	-678 to 678 count for both X, Y axes(unit moves any direction and returns same path. Distance=400 mm, Speed=100± mm/sec
Linear motion accuracy	$16 \times D \times \sin Q^\circ \pm 15\%$ for both X, Y axes (unit moves any direction. Q = moving angle, D (Distance)=400mm , Speed=100 ±5mm/sec
Encoder	Opto -Mechanical
Switch Life	1000,1000 cycle life
Supply voltage	4.0-5.25V Vmas-6.5V
Power dissipation	Maximum 300mw

### **III ENVIRONMENTAL SPECIFICATIONS**

#### **Temperature**

##### *Operating*

The operating temperature range shall be from 0°C to 50°C. There shall be an operational temperature test of a single cycle, ambient, cold, hot, ambient, and ambient, With a minimum of a 15 minute dwell (pause) for every 15°C increment of change. The rate of temperature change shall not exceed 20°C per hour. The Joystick will operate normally throughout the cycle requiring no operator Intervention or corrective actions, except to cause normal movement.

##### *Non-Operating*

The non-operating temperature range shall be from -10°C to 60°C. There Shall be a thermal shock test of five(5) cycles from -15°C to 55°C holding for 30 minutes at each extreme. The rate of temperature change shall not exceed 25°C per hour. Normal mouse operation will be verified before and after the thermal shock test.

#### **Humidity**

##### *Operating*

The operating relative humidity range shall be from 10% to 85% non condensing ambient temperature.

##### *Non-Operating*

The non-operating relative humidity range shall be from 10% to 85% non- Condensing. The mouse shall withstand an environment varying between 25°C and 55°C, 85% relative humidity, non condensing, for a period of 96 hours.

## **Vibration Test (*Packaged for shipment*)**

### *Non-operating*

1. 5 to 31 Hz 0.38 mm peak to peak  
displacement : Continuous logarithmic rates of 0.5 octave / minute  
back and forth.
2. 32 to 500 Hz:0.75 G force limitation:  
Continuous logarithmic rates of 0.5 octave / minute back and forth.
3. 5 to 500 Hz Random vibrations: 0.01 G<sup>2</sup>/ Hz for 30 minutes :  
Continuous logarithmic rates of 0.5 octave / minute back and forth

## **Shock Test**

### *Non-operating*

The mouse shall withstand a shock equal to 20G forces, half sine wave for 11 msec duration in all three (3) orthogonal axes.

## **Drop Test**

Drop the mouse from  $75 \pm 2$  cm height above a wood board 15mm thick placed on a concrete floor, floor, 3 times in the same direction.

## **Related Documents**

### *FCC*

The mouse shall meet the requirements of FCC Part 15 for Class B Computing Devices.

## **Contaminants**

### *Dust*

The mouse shall be unaffected by the normal accumulation of airborne dust as found in the home or office place. This includes non-metallic dust and grime as might be carried into the work place or home from outside sources. Routine cleaning of necessary mechanical components is facilitated through easy access to those mechanical components.

### *Gases*

The mouse shall not be corroded or defaced or otherwise damaged acceptable to OSHA standards for the home and work place. This includes normal amounts of oxygen and ozone.

## **Operating Life Test**

### *Operating MTBF*

The mouse is moved 160Km in any direction at  $150 \pm 50$  mm/sec. Speed while 100gf vertical load is applied. The select switch is operated by operating force  $115 \pm 50$ gf and operating 1 million cycles.(Switch speed 3 cycles / sec.)

## **Electrostatic Destruction Test**

### *Non-Operative*

The mouse must have no soft errors up to 11KV discharge and no hard errors up to 14KV discharges at any point on the mouse:

1. Discharge capacitor: 104pF.

## **IV MECHANICAL SPECIFICATIONS**

### **Materials**

#### *Mouse body and ball cover*

Injection molded ABS Thermoplastic UL 94 HB.

#### *PC Board*

Paper Phenolic, UL-940 rated.

#### *Switch Housing*

Thermoplastic..

#### *Interconnect Cable*

Jacket: Low durometer PVC, 5mm nominal diameter.

Conductor Insulation : PVC

#### *Standard Connector*

USB-A plug

Insulator: Thermoplastic..

- Contacts: Tin flash plated with a minimum of 15 micro-inches in contact area.

Flex and Strain Relief: PVC.

Backshell: Molded PVC.



### ***Switch Material and MTBF***

Type : Momentary with tactile and audible feedback .

Contact Configuration: SPST.

Pre-travel:0.25-1.3mm.

Hysteresis : 0.04-0.18mm.

Contact Bounce: Switch shall have electronically debounced contacts

Actuation Force: 28-115gm.

Electromechanical Life: One million cycles at 3 cycles / second with a vertical actuation force of 115 gm.

## **Weight & dimension**

### ***Weight***

160 $\pm$ 20 grams

Dimension 116 x 66 x 37.5mm (LxWxH)

## **Cable MTBF Test**

### ***Cable Pull Test***

Cable shall be permanently secured to mouse housing and connector shell both shall withstand a 3kg force applied Parallel to cord entry plane for ten (10) seconds

### ***Cable bending Strength Test***

The mouse cable must withstand bending 45 degree any direction from its center line and be given the following conditions:

1. Load: 100gf
2. Angle:  $\pm$  45degree.
- 3.Cycles: Minimum 1000 cycles

## **Mechanical Life Test**

### ***Mechanical MTBF***

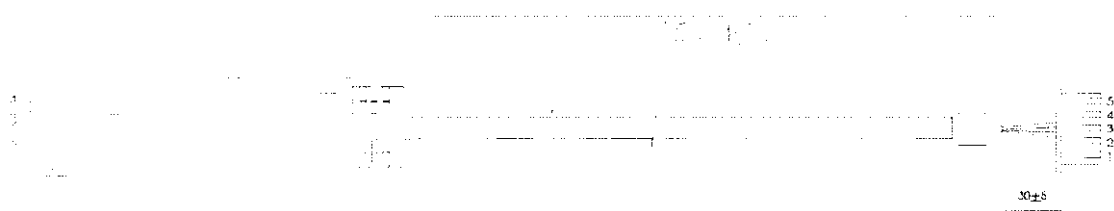
160KM at 20cm/sec with vertical pressure of 150gm

## Workmanship

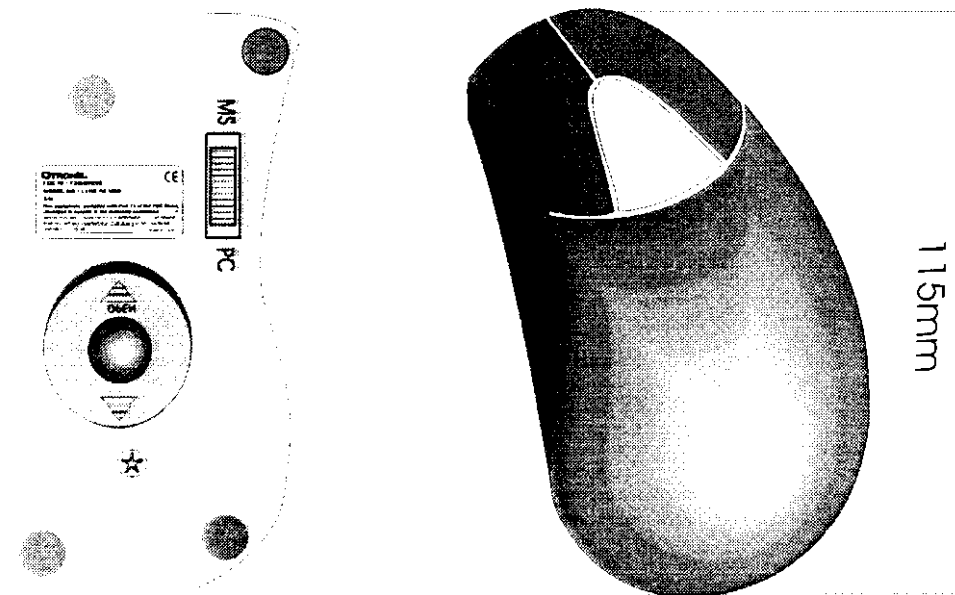
### *Normal Workmanship*

There shall be no nick, scratches , burrs or defects in material that may affect the function serviceability or appearance of the mouse.

## Cable Specification



## Physical Dimensions



## **Cleaning your Mouse**

After time and use, your mouse may require that you clean the mechanism for continued smooth tracking. Your mouse has a special feature that allows you to remove the ball for cleaning of it and the rollers. To do so, please follow these simple procedures:

- Turn off your computer first.
- With your fingers, press down on the ring that surrounds the ball of your mouse bottom.
- Once you have press down the ring, remove it and the ball from the trackball housing.
- Now, take a cotton swab or other clean soft material and lightly soak it in a non-caustic cleaning solution(such as that for the cleaning of a stereo cassette tape head).
- Gently clean the surface of the ball and the two black rollers besides the housing to remove any dust or lint that has built up over time.
- After cleaning and allowing the surfaces to dry, replace the ball into the housing and secure the ring by pulling it up until tight. Turn on your computer.

## V ELECTRICAL SPECIFICATIONS

### General

#### *Components*

All component will be of the highest commercial grade and shall be mounted according to IPC and recommended vendor practices. Standard values are to be adhered to at all times . Single sources, unusual values or designs outside specified component ratings shall be avoided.

#### *PC Boards*

PC Board shall be made of UL (Underwriters Laboratories) rated material, 94V-0 or better as per UL 478.

#### *Design Practice.*

All components shall perform well within their design ratings. Good IC design with respect to unused inputs and number of outputs shall be observed. Trace width and spacing shall be conservative wherever possible and shall meet IPC minimums at all times. Bypass capacitors shall be used liberally and some on-board filtering is expected when possible . Power consumption shall be minimized.

#### *Reset*

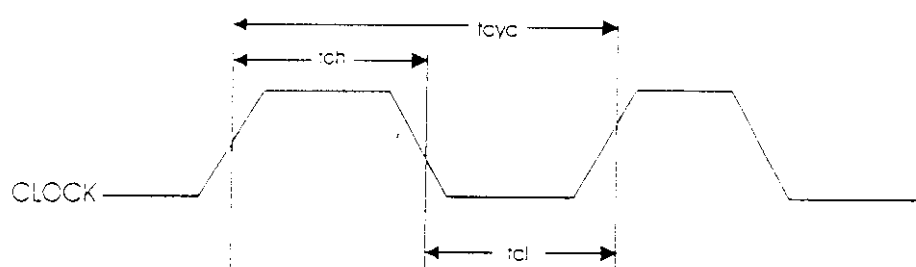
The mouse shall reset on power up. The power supplied to the mouse shall have a rise time of less than 100 msec.

### Operation voltage and current consumption

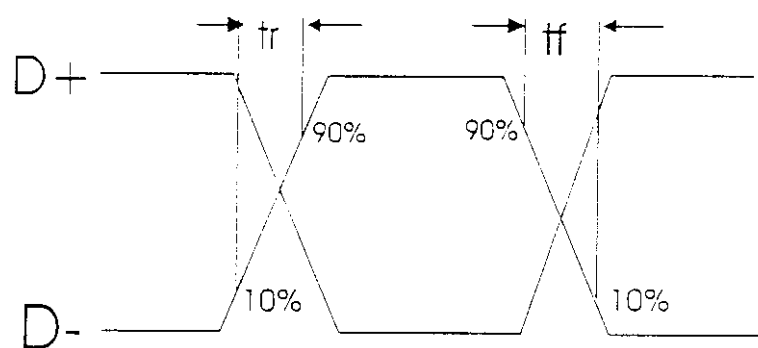
Parameter	Min	Typ	Max	Unit
Operating voltage	4.0	5.0	5.25	V
Operating current(no load) @6MHz	--	--	50	mA
X1, X2, Y1,Y2 input reference current	70	--	106	uA
X1,X2,Y1,Y2 sink current (O) lowest current	0.1	--	0.3	mA
X1,X2,Y1,Y2 sink current (F) highest current	0.5	--	1.5	mA
USB Interface VOH ,static output high	2.8	--	3.6	V
USB Interface VOL,static output low	--	--	0.3	V

## Data format

Parameter	Description	Min	Max	Unit
$t_{cyc}$	Input click cycle time	165.0	168.3	ns
$t_{ch}$	Clock high time	$0.45t_{cyc}$	--	ns
$t_{cl}$	Clock low time	$0.45t_{cyc}$	--	ns
$t_r$	Transition rise time	75	300	ns
$t_f$	Transition fall time	75	300	ns



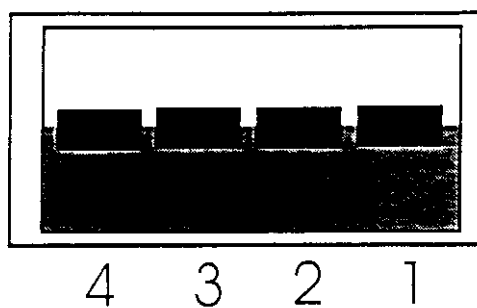
Clock Timing



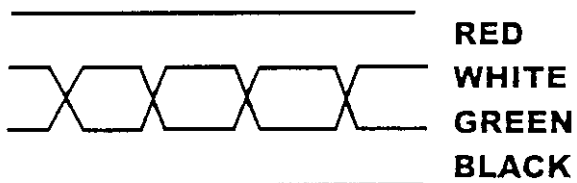
USB Data signal Timing

## Connector Pin Assignments

The standard connector pin out for USB-A plug is as follow:



## WIRING DIAGRAM



## Schematic

The schematic of the mouse is as follow:

