X19 Series – 19mm Laser Trackball, Panel Mount, Protocol Output

1. DESCRIPTION

Utilizing the latest and most advanced laser tracking technology, the X19 Series laser Trackerball™ is an extremely high specification, contact-less device, ideal for the most demanding of cursor control applications.

The laser tracking engine provides accurate cursor motion at all speeds and on virtually any ball, combining the benefits of solid state sensing (no moving parts except the ball) with the aesthetics, functionality and performance associated with the Cursor Controls product range.

The design incorporates a removable top ring as standard to allow for easy cleaning, decontamination, sterilisation and maintenance - ensuring continued optimum performance and operation under the harshest of conditions.

The X19 Series trackballs are available with a variety of electrical outputs, tracking force options, and sealing capabilities up to IP68.

The trackball has been designed to be back of panel mounted as part of OEM keyboards and consoles

2. FEATURES

- Solid state sensing technology – laser tracking engine
- Sealing up to IP68
- Output: USB/PS2 (auto-select) or SUN Systems
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options
- Various ball colours

3. APPLICATIONS

- Medical systems
- Marine systems
- Custom keyboard applications
- Industrial consoles
- OEM custom solutions available

4. SPECIFICATIONS

4.1 Mechanical

Weight	~30 grams
Ball size	Ø19mm (0.75")
Ball material	Phenolic, polyester, epoxy resin
Tracking force	10 grams nominal – damper ring (see section 8 for ordering code details)
	20-40 grams – silicone rubber seal (see section 8 for ordering code details)
Ball load	100N (10Kg) maximum downward pressure for 2 minutes @20°C
Resolvable ball speed	40 IPS (inches per second)
Mounting position	All angles
Tracking engine	Laser navigation technology - solid state sensing
Housing material	PC/ABS
Sealing gasket	Cellular silicone (supplied)

4.2 Electrical

Protocol	USB, PS/2 (auto-select) or SUN Systems (see section 8 for ordering code details)
Supply voltage	4.4V to 5.25V D.C.
Supply current	23mA typical, 25mA maximum
Resolution	425 counts per ball revolution @ 1 IPS (inches per second) +/- 10%
	850 counts per ball revolution @ 5 IPS (inches per second) +/- 10%
Output connector	6 Way JST, right-angled header, part no. S6B-PH-SM3-TB
Mating output connector	6 Way JST connector, part no. PH, CR or KR types (e.g. PHR-6)
Switch Inputs	3 switches: left, middle, and right.
	Connection through 4-way JST, right-angled header, part no: S4B-PH-SM3-TB
Mating switch connector	4 Way JST connector, part no: PH, CR or KR types (e.g. PHR-4)
Laser safety class	Embedded class 1M laser safety, IEC 60825-1

4.3 Environmental

Operating temperature	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temperature	-40°C to + 85 °C (IEC 60068-2-1, IEC60068-2-2)
Operating humidity	93% RH @ 40°C, non-condensing (IEC 60068-2-78)
Storage humidity	10%-95% non-condensing (IEC 60068-2-78)
Vibration	5g, 10-500Hz, 1 octave/min, 10 sweep cycles (IEC 60068-2-6)
Operating Shock	15g/11ms, ½ sine, 3 shocks in +ve and –ve direction, all 3 axes (IEC 60068-2-27)
Non-operating shock	50g/11ms, ½ sine, 3 shocks in +ve and –ve direction, all 3 axes (IEC 60068-2-27)
Mechanical lifetime	1 million ball revolutions
MTBF	in excess of 80,000 hours (MIL-STD-217F)
ESD	15kV air-discharge and 8kV contact discharge (IEC 61000-4-2)
EMC	Radiated immunity - limits according to level 3 of IEC 61000-4-3
	Radiated emissions to EN55022 class B
Sealing capability	IP68 (BS EN 60529)

4.4 Electrical Compatibility

The X19 Series trackball has been tested for compatibility with the following operating systems;

Windows 95
Windows 98
Windows 2000
Windows ME
Windows NT4
Windows XP
Windows Vista
Redhat Linux
Sun Sparc
Fully compliant with USB 1.1 framework (chapter 9) and HID specifications

5. CONNECTION DETAILS

Connection is made to the X19 Series trackball by means of two JST connectors (or equivalent). Tables 1 and 2 highlight the connection details. Custom connections are available (please contact your local sales office for further details).

5.1 Output Connector: P1

Description: 6 Way JST, right-angled header.
Manufacturer: JST (or equivalent)
Part No: S6B-PH-SM3-TB
Mating connector: PH, CR or KR types (e.g. PHR-6)

Pin Number	USB/PS/2	SUN Systems
1	EARTH	EARTH
2	SEE NOTE 1	SEE NOTE 1
3	5V D.C	5V D.C
4	PS/2 Data, D-	Data
5	PS/2 Clock, D+	Do not connect
6	0V	0V

Table 1 Output connections

NOTE 1: Pin to be left floating (unconnected)

5.2 Switch Input Connector: P2
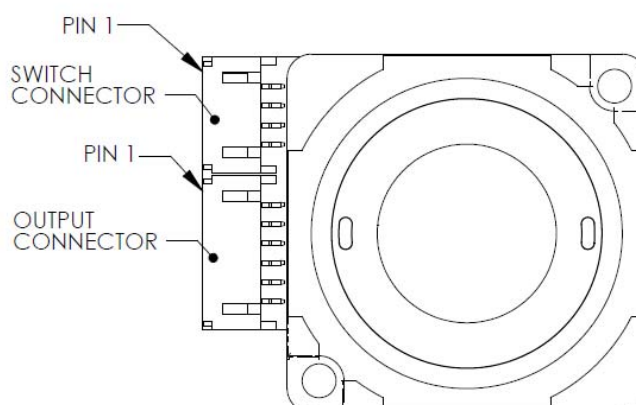
Description: 4-way JST, right-angled header.
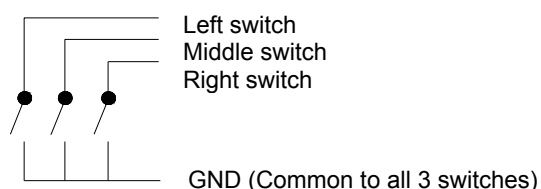Manufacturer: JST (or equivalent)
Part No: S4B-PH-SM3-TB
Mating connector: PH, CR or KR types (e.g. PHR-4)

Pin Number	Function
1	Left switch
2	Middle switch
3	Right switch
4	0V

Table 2 Switch connections

5.3 Switch Schematic

Left switch
Middle switch
Right switch

GND (Common to all 3 switches)

For alternative switch options and configurations please contact your local sales office.

6. TRACKBALL CONFIGURATION

The X19 Series trackball provides features that may be selected using the DIP switch located on the printed circuit board. Table 3 details the assigned function of each switch.

6.1 DIP Switch Functions

DIP Switch	Function	OFF	ON
1	Orientation 1 Setting	See Figure.1	See Figure.1
2	Orientation 2 Setting	See Figure.1	See Figure.1
3	Factory Setting	N/A	N/A
4	Not used	N/A	N/A

Table 3 DIP switch functions

Factory default setting: All DIP switches OFF

6.2 Orientation

The orientation function allows the user to mount the X19 Series trackball device in one of four positions (see figure. 1 below). The orientation of the device is determined by the direction in which the output connector is facing (when viewed from the top of Trackerball device). The Tracker ball orientation can be selected to accommodate customer requirements for connector location and wiring.
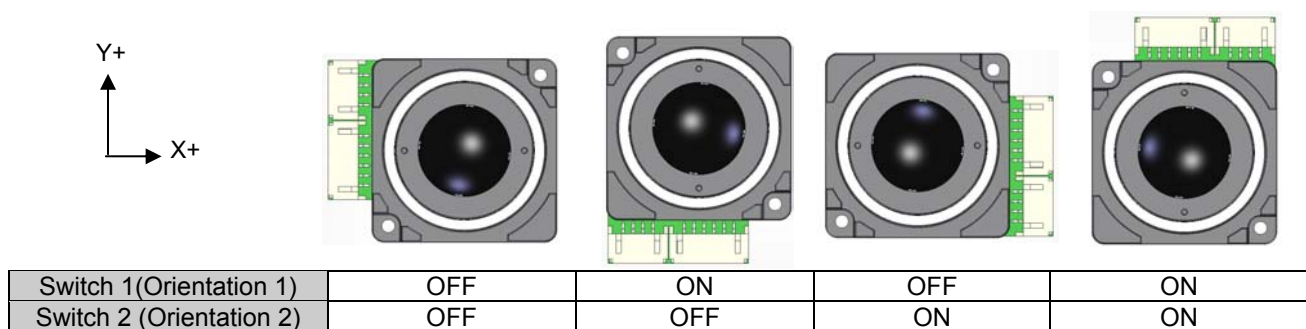

Switch 1(Orientation 1)	OFF	ON	OFF	ON
Switch 2 (Orientation 2)	OFF	OFF	ON	ON

Figure 1 Mounting Orientations

7. DIMENSION DRAWING

PIN 1
SWITCH
CONNECTOR

PIN 1
OUTPUT
CONNECTOR

Y+

X+

37

18.5

15.2

15.2
18.5

37

15.2

Ø3.5 THRO. TYP

15.2

Ø27.8

Ø19.0 BALL

7.1

6.0

3.5

3.0

6.1

14.5

16.9

45.7

DIP SWITCH

NO

28.1

R4.8

R2.5

90°

Dimensional drawing specifies factory default orientation.
All dimensions are in mm unless otherwise stated.
Tolerances +/- 0.2mm unless otherwise stated
Please note that an IGES model is available on request. Please contact your local sales office for more information.

8. PRODUCT ORDERING CODE SYSTEM

Please construct your standard product ordering code by selecting the numbers and letters to suit your specification:

| X | 19 | - | 7 | X | 0 | 2 | X | D |

Product range
X = X Series

Ball size
(Nominal mm)

Sealing capabilities

7 = IP68

Electrical output*

6 = USB/PS2 (auto-select)
8 = SUN Systems

Integrated switches

0 = No external Switches

Mounting option

2 = Mount to back of panel

Top plate & body style*

1 = Black top ring & body - damper ring
2 = Black top ring & body – silicone rubber seal

Ball colour*

D = Metallic grey

*For further options please contact your local sales representative

8.1 Ordering Example

X19-76021D: X19, IP68, USB/PS/2, no switches, mount to back of panel, black top ring - damper ring, metallic grey ball.

9. DOCUMENT HISTORY

Issue	Date	Author	Remarks
A	08.07.08	SdB	Document released
B	17.09.08	N.S	ECN 1109
C	17.03.09	SdB	ECN 1156
D	06.08.09	SdB	ECN 1180