



Product Specification
SpaceMouse® Module USB

3DX-700048

www.3dconnexion.com/module

Table of Contents

<u>1</u>	<u>PURPOSE</u>	<u>3</u>
<u>2</u>	<u>ABBREVIATIONS</u>	<u>3</u>
<u>3</u>	<u>PRODUCT DESCRIPTION</u>	<u>4</u>
3.1	GENERAL	4
3.2	COMPONENTS	4
3.3	AXIS ORIENTATION	5
3.4	USAGE NOTES	5
3.5	COMPATIBILITY	6
<u>4</u>	<u>PRODUCT SPECIFICATION</u>	<u>7</u>
4.1	ELECTRICAL	7
4.2	PROTOCOL	7
4.3	TRACKING	8
4.4	PHYSICAL	8
4.5	ENVIRONMENTAL CONDITIONS	8
4.6	COLORS	9
4.7	COMPLIANCE SPECIFICATION & CERTIFICATIONS	9
<u>5</u>	<u>TESTS</u>	<u>9</u>
5.1	DEGREES OF PROTECTION	9
5.2	TOLERANCE & RELIABILITY	10
5.3	LIFE TEST	10
<u>6</u>	<u>MECHANICAL DRAWING</u>	<u>11</u>
6.1	CASE OUTLINE	11
6.2	MOUNTING HOLE	12
6.3	PHOTOS	13

1 Purpose

This document lists the product specification of 3Dconnexion's SpaceMouse® Module USB. The purpose is to give a high level functional description of the sensor-module and to provide an overview of electrical and mechanical properties.

Furthermore this document outlines test conditions to ensure sustaining quality, reliability and specification conformity.



Figure 1: SpaceMouse® Module USB

2 Abbreviations

In this document the following technical abbreviations are used:

PCB: Printed Circuit Board
IP: International Protection Rating
DoF: Degree of Freedom

3 Product Description

3.1 General

The 3DX-Sensor Module USB is designed to be used as controller cap on a console. With its round flange it is intended to fit into a hole in a substrate plate - i.e. the side of a console.

3.2 Components

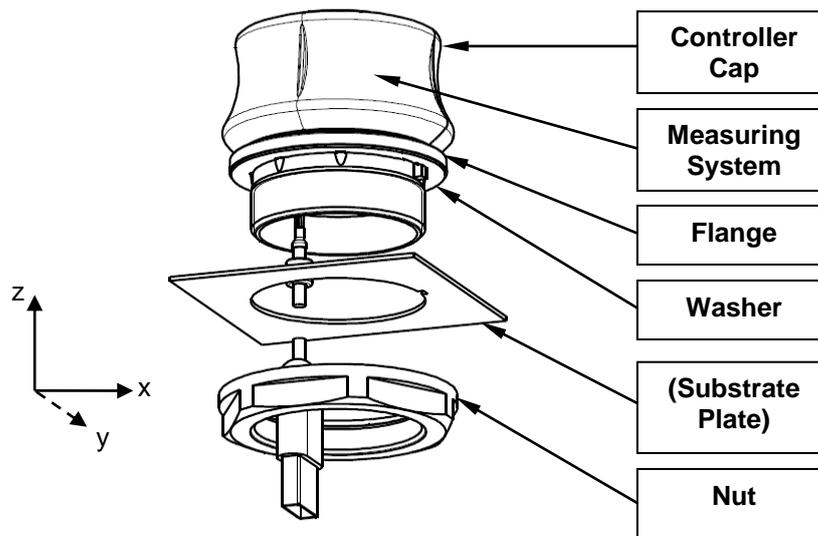


Figure 2: Components

3.2.1 Controller Cap

The shape of 3DX-Sensor cap meets the standard cap of 3DX-devices.
The cap is screwed on the upper PCB of the measuring system. The cap insert is glued and cannot be removed without damaging the device.

3.2.2 Measuring System

The movements of the cap in 6DOF are measured by an optoelectronic system. The system is protected from detrimental factors by a covering rubber seal.
Connector J1 has to be connected to an USB host, usually by an USB compliant shielded 4-core cable.

3.2.3 Flange Round

The flange is screwed to the main PCB of the measuring system.

3.3 Axis Orientation

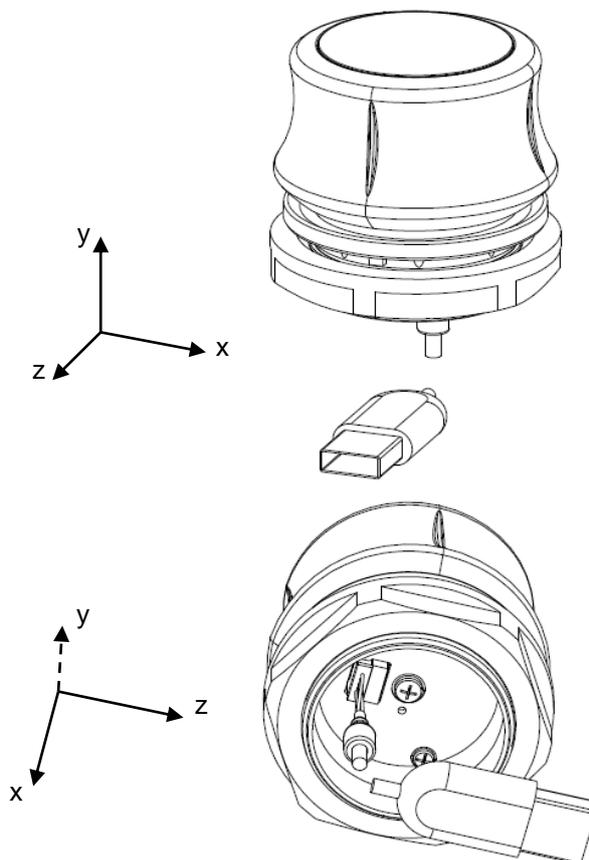


Figure 3: Default Axis Orientation

3.4 Usage notes

The controller cap mounted on the measuring system can be moved in 6 degrees of freedom: Horizontal shift in x-direction and z-direction, vertical shift in y-direction, rotational tilt around x-axis and z-axis, plus twist around y-axis. Manipulation in several axes can be done simultaneously.

3.5 Compatibility

The SpaceMouse® Module USB is recognized by the operating system as a standard joystick. The USB protocol follows the HID spec rev. 1.11, so no additional driver is needed.

The following operating systems are supported:

- Windows 8
- Windows 7
- Windows Vista
- Windows XP SP2
- Linux with USB host support
- Other systems which have support for USB joysticks

4 Product Specification

4.1 Electrical

4.1.1 Data interface:

SpaceMouse Module USB is designed for USB 1.1 and 2.0. No additional power source is needed.

4.1.2 5 Pin Connector J1

The 3DX-Sensor Module USB has a 5 pin male connector with 1,0mm grid pattern.
Cable connector: JST SHR-05V-S-B with crimp contact SSH-003T-P0.2
Connector on the module: JST BM05B-SRSS-TB

<i>Pin#</i>	<i>connector</i>	<i>function color</i>
1	shield	black
2	GND	black
3	VCC +5.0 V	red
4	D-	white
5	D+	green

4.1.3 Cable

For connector to 3DX-Sensor Module USB refer to chapter 4.1.2 5 Pin Connector J1

<i>Electrical</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Conditions/Comments</i>
Power rating				
Supply voltage	4.4V	5.0V	5.25V	
Supply current			60mA	
Suspend Current			0.5mA	

Figure 4 shows the pin out of USB connector:



Figure 4: Pin-out of USB connector

The following table shows the cable pin out:

<i>USB Plug</i>	<i>Wire Color</i>	<i>Pin Assigned in PCB</i>	<i>Signal</i>
1	Red	3	V _{cc}
2	White	4	D- (Inversed DATA)
3	Green	5	D+ (DATA)
4	Black	2	GND
Shell	Drain Wire	1	Shield

4.2 Protocol

The SpaceMouse Module USB acts like a standard USB joystick with 6 axes.

4.3 Tracking

Tracking	Typ	Comments
Resolution Controller Cap		
Translation	250 inc/mm	Digital resolution: 10 bit
Rotation	170 inc/degree	Digital resolution: 10 bit

4.4 Physical

Physical	Typical FO	Conditions /Comments
Dimensions		
Height	52.5 mm	
Max. Ø Cap	Ø53.8 mm	
Max. Ø Flange	Ø50 mm	
Mounting		
Hole diameter	Ø40.2mm	Slot for Orientation Nose: 3mm x 1.4mm
Substrate/Plate thickness min / max	1mm / 5.5mm	
Counter Nut	M40 x 1.5	SW 50
Weight (without cable)	60 g	
Controller Cap		
Vertical actuation force	11.0 N	To force cap vertically from rest position to stop (up and down)
Horizontal actuation force	7.4 N	To force cap horizontally from rest position to stop (all horiz. directions)
Torque (around vertical axis)	171 Nmm	To twist cap form rest position to stop
Vertical displacement (up and down)	1.5 mm	From rest position to stop
Horizontal displacement (all directions)	1.5 mm	From rest position to stop
Twist and tilt angle (clockwise and counterclockwise)	6°	From rest position to stop
Cable		
Length	1500 mm +/-50 mm	
Cable Configuration	See section 4.1.3 Cable	

4.5 Environmental Conditions

Environment	Min	Max	Conditions/Comments
Operating temperature	0 °C (32 °F)	50 °C (122 °F)	
Storage temperature	-30 °C(-22 °F)	70 °C (158 °F)	
Humidity (operating at T≤40°C)	10 %	85 %	Non condensing
Humidity (storage at T≤40°C)	10 %	95 %	Non condensing

4.6 Colors

Nr.	Component	Substrate		Paint/ Coating	Cosmetic treatment	Graphics
		Texture	Colour			
1	Cap	Micro-Matt	Midnight black	-	-	-
2	Cap Insert	Micro-Matt	Midnight black	-	-	-
3	Flange, Round	Micro-Matt	Midnight black	-	-	-
4	Nut	Micro-Matt	Midnight black	-	-	-
5	Washer	#1000	black	-	-	-
6	Label	-	-	-	-	PMS 877C

PBC Pantone Basic Colour
PMS Pantone Matching System

4.7 Compliance Specification & Certifications

This product is built with lead free solder process and all components are verified for RoHS compliance (Cd, Pb, CrVI, Hg, PBB & PBDE).

5 Tests

All tests and measurements were conducted under the following conditions unless otherwise specified:

- Temperature: 23°C (73.4°F) ± 10°C (50°F)
- Humidity: 65% ± 20%RH
- Atmospheric Pressure: 86kPa (860mBar) ~ 106kPa (1060mBar)

5.1 Degrees of protection

5.1.1 Tightness

Protection Class at least IP54.

Item	Test Conditions	Specifications
First Digit: 5 (Dust protected)	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact	
Second Digit: 4 (Splashing Water)	Test duration: 5 min. Water volume: 10 ltr./min. Pressure: 80-100kNm2	Water splashing against the enclosure from any direction shall have no harmful effect.

Mounting conditions must be regarded for achieving this protection class.

5.1.2 PWIS

Cap with cosmetic treatment and complete 3DX-Device were tested. No paint wetting impairment substances detected. (PWIS – free).

Item	Test Conditions	Specifications
Blast Test	Test item is hanging free Indicating substrate: cleaned Al-sheet Gas medium: N ₂ Blast time: 30 s Paint: Duplicolor 1-0400	Blowing gas blast on test item. Indicating substrate is in discharged gas blast. After blast, indicating substrate is covered with paint. No crater or impurity on painted sheet are accepted

No PWIS test with chloroform solvent.

(German: LABS – frei: keine lackbenetzungsstörende Substanzen)

5.1.3 Fire Protection

For plastic parts (Cap, Insert, Flange):
 Fire protection classification UL94: at least V1

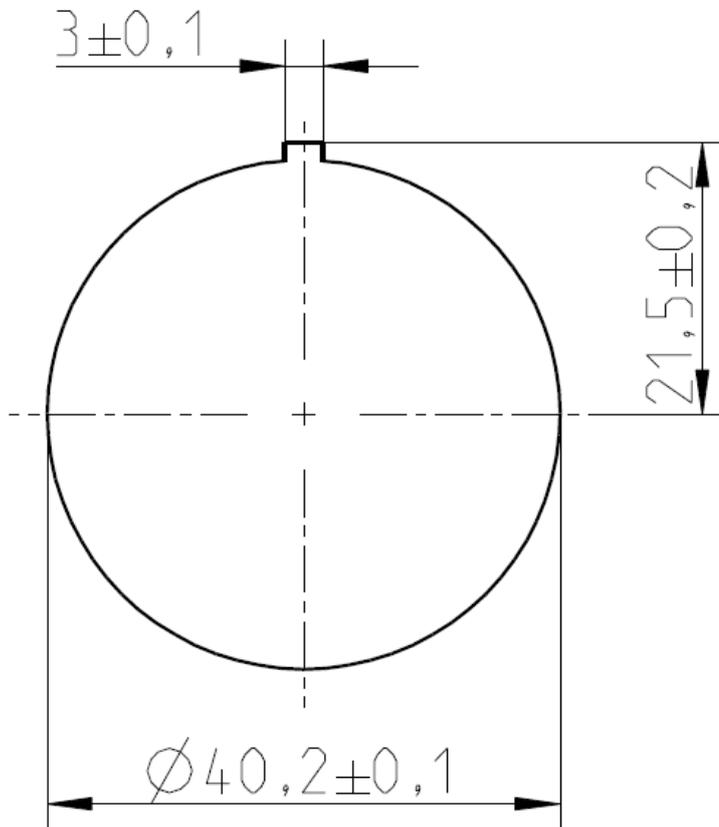
5.2 Tolerance & Reliability

Item	Test Conditions	Specifications
Controller Cap lifetime	(1) Operating speed: 2-3 times/s (2) Force applied at center of cap-side: 7.4N ± 0.9N (740gf ±90gf)	Number of actuations: 1,000,000 times No functional defects for the cap actuation
Drop test (only for reference)	(1) Height: 100cm (2) Floor surface: Steel or concrete (3) Direction: 5 faces, except cable face (4) Number of drops: 5 (one drop per face)	No cracks or breakage (excl. cosmetic scratches). No functional defects for the buttons and Controller Cap actuation. Pop out of buttons and cap-insert is accepted when they can be pushed in again without impact to function.

5.3 Life Test

Item	Test Conditions	Specifications
Burn-in test	Expose device 24hrs to a temperature of 45°C	No functional defects, no cosmetic degeneration
Mean Time Between Failure	30 EA for 84 day burn-in at 45°C (Can differ depending on the available resources at test lab.)	Confidence Level 80% MTBF = 150.000 hours

6.2 Mounting hole



6.3 Photos



Figure 6