# TPM Series: OEM Touchpad Module, 3-inch, USB & PS/2

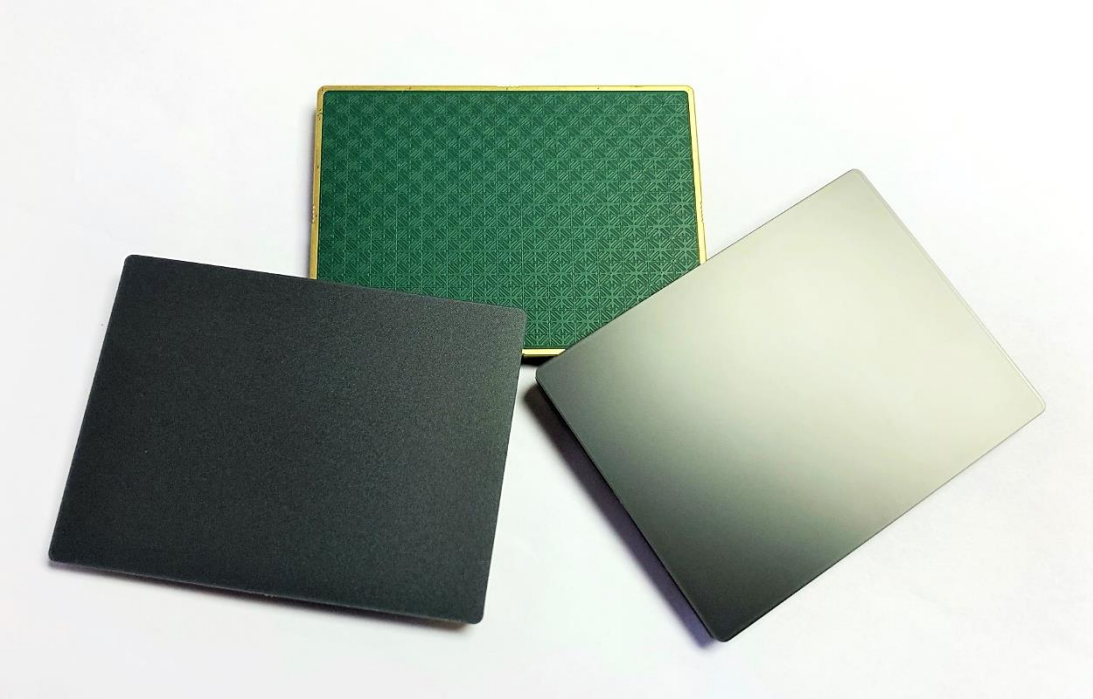


**Figure 1:** OEM Touchpad Modules

## 1. DESCRIPTION

Utilizing the latest and most advanced touch sensing technology, the TPM Series touchpad module is an extremely high specification pointing device, ideal for the most demanding of cursor control applications. The device provides both conventional X and Y-axis cursor movement with plug-and-play, multi-finger gesture support for enhanced user interaction. The mutual-capacitance based tracking engine combines the benefits of solid state sensing (no moving parts) with the precision, functionality and performance associated with the Cursor Controls product range.
The unit has been designed to be panel mounted as part of OEM keyboards and consoles.

## 2. FEATURES

- Solid state sensing technology – capacitive touch sensing tracking engine.
- Multi-finger gesture support
- Output: USB/PS2 (auto-select)
- Smooth operation in rugged environments
- Immunity to moisture, water and liquid contaminants
- Various overlay configurations available
- Custom connector options available

## 3. APPLICATIONS

- Industrial consoles
- Medical systems
- Marine systems
- Sound and lighting desks
- Video editing consoles
- Custom keyboard applications
- OEM custom solutions available

## 4. SPECIFICATIONS

| 4.1. MECHANICAL | | |
|---|---|---|
| 4.1.1. | Dimensions | 65.0mm x 49.0mm |
| 4.1.2. | Weight | ~15 grams |
| 4.1.3. | PCB Overlay Material (membrane) | PCB overlay options include:<br>• Polyester - 0.25mm thick<br>• Glass - 1.1mm thick<br>• No overlay<br>Please see Section 10 Ordering Code for further details. |
| 4.1.4. | PCB Overlay Colour | RAL 7015 Slate Grey |

| 4.2. OPERATIONAL | | |
|---|---|---|
| 4.2.1. | Motion Detection Method | Mutual capacitance sensing |
| 4.2.2. | X/Y Position Reporting | Relative |
| 4.2.3. | Sample Rate | Up to 100 samples/sec. |

| 4.3. ELECTRICAL | | |
|---|---|---|
| 4.3.1. | Protocol | USB, PS/2 (auto-select) |
| 4.3.2. | Supply Voltage | 4.40 – 5.25V |
| 4.3.3. | Supply Current | 10mA typical, 15mA max |
| 4.3.4. | Resolution (X, Y) | 500 x 300 counts (~8 counts per mm) – linear tracking mode |
| 4.3.5. | Output Connector (CN1) | 12-way connector, Molex PicoBlade Series PN: 53261-1271 |
| 4.3.6. | Switch Connector (CN2) | 6-way connector, Molex PicoBlade Series PN: 53261-0671 |

| 4.4. ENVIRONMENTAL | | |
|---|---|---|
| 4.4.1. | Operating Temperature | 0° to 70°C |
| 4.4.2. | Operating Humidity | 5% to 95% relative humidity |
| 4.4.3. | Storage Temperature | -40° to +85°C |
| 4.4.4. | ESD | 15kV air-discharge and 8kV contact discharge (IEC 61000-4-2) |
| 4.4.5. | EMC | Radiated immunity - limits according to level 3 of IEC 61000-4-3<br>Radiated emissions to EN55022 class B |

| 4.5. OPERATING SYSTEM COMPATIBILITY | | |
|---|---|---|
| 4.5.1. | USB | Windows, Linux, Mac OS, and Android |
| | | Fully compliant with USB 2.0 framework (chapter 9) & HID specifications |
| 4.5.2. | PS/2 | Windows, Linux |

## 5. CONNECTION DETAILS

### 5.1. Output Connector: CN1

| | |
|---|---|
| **Description** | 12-way, 1.25mm pitch, right-angled connector |
| **Manufacturer** | Molex (or equivalent) – Pico Blade Series |
| **Manufacturer Part Number:** | 53261-1271 (or equivalent) |
| **Mating Connector:** | 51021-1200 Crimp Housing (or equivalent) |

| PIN No. | USB | PS/2 |
|---|---|---|
| 1 | NC [1] | NC [1] |
| 2 | NC [1] | NC [1] |
| 3 | NC [1] | NC [1] |
| 4 | NC [1] | NC [1] |
| 5 | EARTH [2] | EARTH [2] |
| 6 | NC [1] | NC [1] |
| 7 | VBUS (+5V) | $V_{CC}$ (+5V) |
| 8 | D - | DATA |
| 9 | D + | CLK |
| 10 | GND (0V) | GND (0V) |
| 11 | NC [1] | NC [1] |
| 12 | NC [1] | NC [1] |

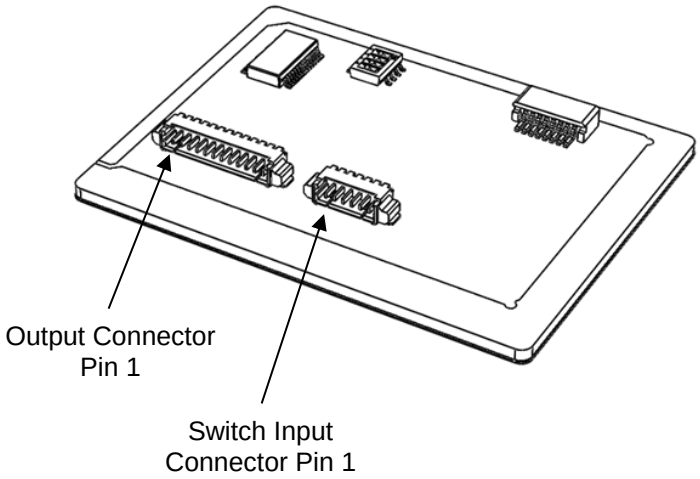



**Table 1:** Output Connector Pinout

*Notes:*

1. *Pin to be left unconnected (floating).*
2. *Earth connection required for ESD management. Please refer to Section 7 for details.*

### 5.2. Switch Input Connector: CN2

| | |
|---|---|
| **Description** | 6-way, 1.25mm pitch, right-angled connector |
| **Manufacturer** | Molex (or equivalent) – Pico Blade Series |
| **Manufacturer Part Number:** | 53261-0671 (or equivalent) |
| **Mating Connector:** | 51021-0600 Crimp Housing (or equivalent) |

| PIN No. | FUNCTION |
|---|---|
| 1 | Left Switch |
| 2 | GND (0V) |
| 3 | Middle Switch |
| 4 | GND (0V) |
| 5 | Right Switch |
| 6 | GND (0V) |

**Table 2:** Switch Connector Pin Out

### 5.3. Switch Connection Schematic

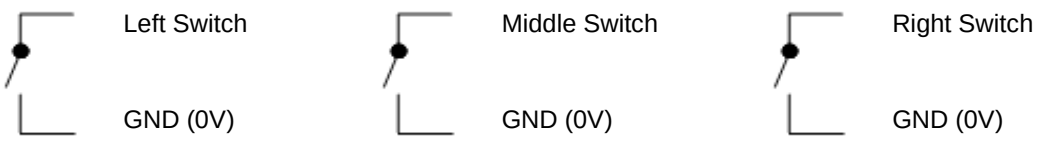



**Figure 2:** Switch connection schematic

## 6. TOUCHPAD CONFIGURATION

The touchpad provides embedded features that may be selected using the DIP switches located on the printed circuit board. Table 3 below details the assigned function of each switch;

### 6.1. DIP Switch Functions

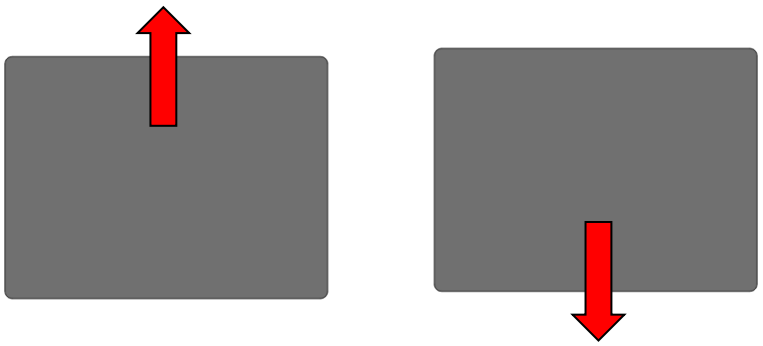
| DIP SWITCH | FUNCTION | OFF | ON |
|---|---|---|---|
| 1 | **Orientation** | Connector Up (See Section 6.2) | Connector Down (See Section 6.2) |
| 2 | **Gesture Mode** | Gestures Enabled (See Section 6.3) | Gestures Disabled (See Section 6.3) |
| 3 | **Tracking Mode** | Ballistic Tracking Mode (See Section 6.4) | Linear Tracking Mode (See Section 6.4) |
| 4 | **Factory Setting** | Switch must be set to OFF | |

**Table 3:** DIP Switch Functions

**Factory default setting:** All DIP switches OFF

### 6.2. Orientation

The orientation function allows the user to mount the touchpad in one of two positions (see table 4 below). The orientation of the device is determined by the direction of which the output connector is facing when viewed from the top of the touchpad device. The direction of the connector is indicated by the red arrow. The touchpad orientation can be selected to accommodate customer requirements for connector location and wiring.



| ORIENTATION SWITCH | OFF | ON |
|---|---|---|

**Table 4:** Orientation Settings

### 6.3. Gesture Operations

The touchpad incorporates an in-built gesture recognition engine designed to enhance user experience and increase the overall efficiency of user interaction with a host system. Use of gesture control enables the user to access frequented functions such as button clicks, scrolling and zooming by means of highly intuitive multi-finger operations. Disabling the gestures via DIP switch 2 will result in the touchpad outputting X & Y movement data only. Please note that not all gestures are available when operating in PS/2 mode. See table 5 below for details on the available gesture actions.

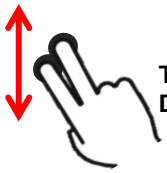
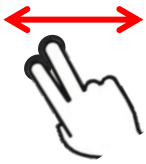
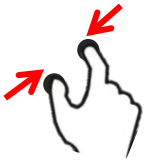
| GESTURE ACTION | FUNCTION | PROTOCOL | |
|---|---|---|---|
| | | USB | PS/2 |
|  **Single-Finger Tap** | Left mouse button click<br><br>Double/triple tap supported | ✓ | ✓ |
|  **Two-Finger Tap** | Right mouse button click<br><br>Double/triple tap supported | ✓ | ✓ |
|  **Three-Finger Tap** | Middle mouse button click<br><br>Double/triple tap supported | ✓ | ✓ |
|  **Two-Finger Vertical Drag** | Scroll Up/Down | ✓ | ✓ |
|  **Two-Finger Horizontal Drag** | Scroll Left/Right [1] | ✓ | ✗ |
|  **Two-Finger Splay** | Zoom In [1] | ✓ | ✗ |
|  **Two-Finger Pinch** | Zoom Out [1] | ✓ | ✗ |

**Table 5:** Gesture Operations

*Notes:*

*1. Horizontal scroll and zoom functions are dependent on application support.*

### 6.4. Tracking Mode

*Ballistic Tracking*: Intuitive tracking algorithm to provide increased cursor resolution when tracking fast whilst retaining the original resolution for tracking accurately at slow speeds.

*Linear Tracking*: No tracking algorithm. 500 x 300-count resolution is achieved at all tracking speeds.

## 7. ELECTROSTATIC DISCHARGE (ESD) PROTECTION

The TPM series touchpad module provides measures to protect against hardware damage due to ESD however, in order to achieve a high-level of immunity to ESD events (up to 15kV), it is necessary to provide adequate earthing methods during system/panel integration, thus providing a low impedance path for charge to dissipate.

The most likely route for ESD is the creepage path between the user accessible touch surface and the touchpad PCB. The touchpad module provides a conductive perimeter frame on both the top and bottom layers to protect the circuit from ESD strikes (see figure 3). It is necessary to provide a suitable connection between the perimeter frame and earth or chassis-ground.

Recommended earthing methods include;

1. Housing the touchpad module within an earthed conductive interface panel (e.g., metal keyboard frame), ensuring that there is sufficient contact between the perimeter frame of the touchpad module and the interface panel.

2. Attaching an earth connection to Pin 5 (EARTH) of the output connector CN1 – this pin is internally connected to the perimeter frames. A convenient method for providing an earth connection to this pin is to use the USB or PS/2 cable shield or drain wire.

3. Attach an earth wire directly to the perimeter frame.

In addition, it is important that customer interface panels made up of conductive or non-conductive materials are suitably earthed as follows:

- Conductive interface panel: In this case, there is no requirement for an earth connection to the touchpad device. It is, however, essential that the conductive interface panel is earthed and in sufficient contact with the perimeter frame of the touchpad in order to provide adequate ESD protection as detailed in Method 1 above.

- Non-conductive interface panel: An earth connection must be attached to the touchpad module. Methods 2 & 3 recommended above can be used to achieve this.

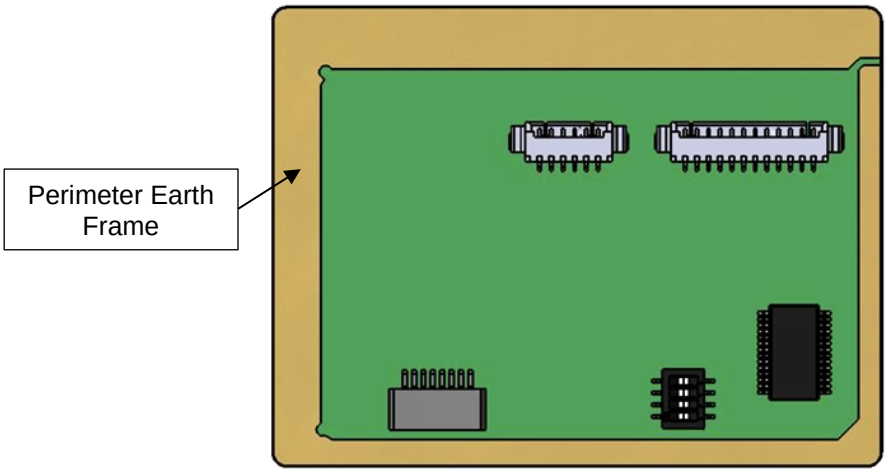
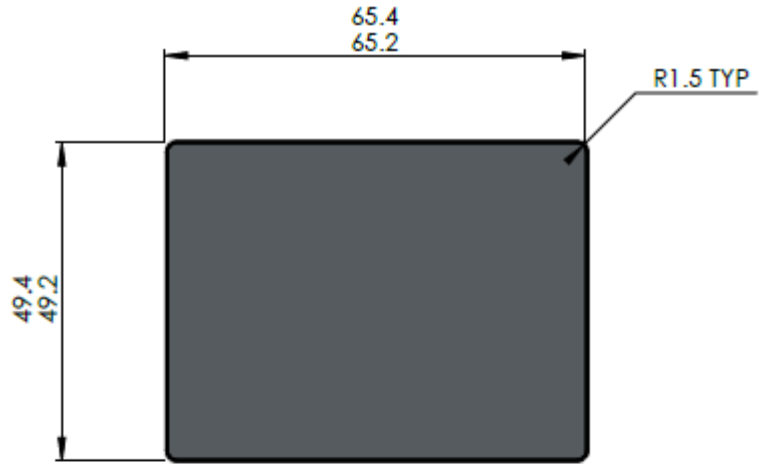
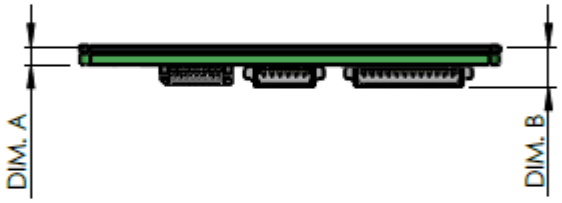


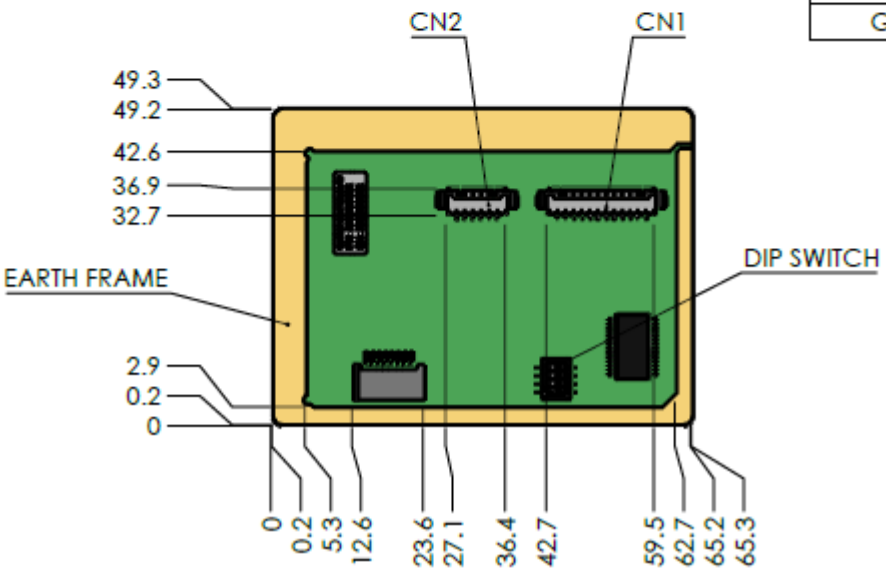

Figure 3: Perimeter Earth Frame on TPM Series PCB.

## 8. TOUCHPAD DIMENSION DRAWING




| | DIM. A | DIM. B |
|---|---|---|
| NO OVERLAY | 1.6 | 5.0 |
| POLYESTER OVERLAY | 1.9 | 5.3 |
| GLASS OVERLAY | 3.0 | 6.4 |




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.

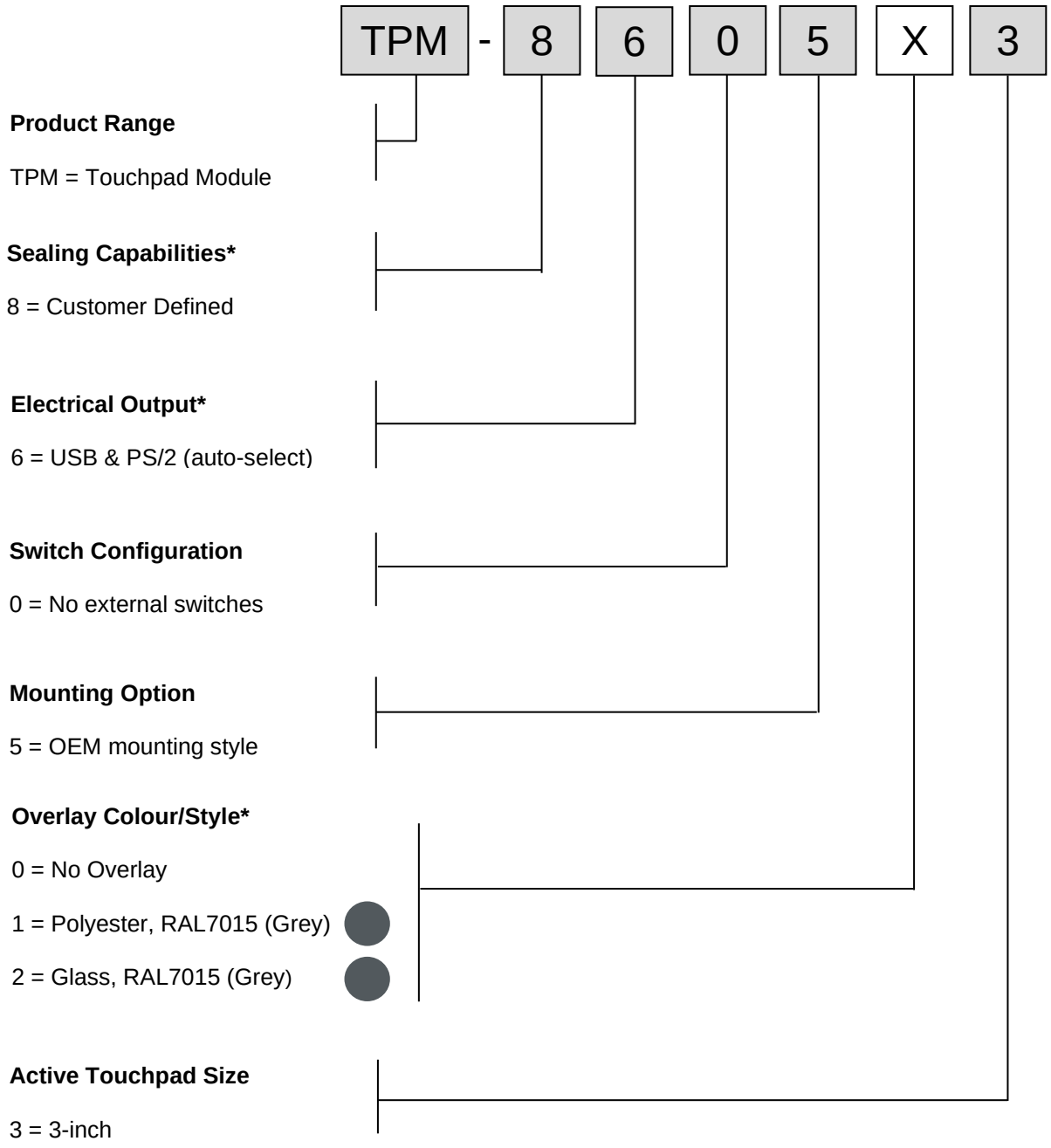
## 9. MOUNTING RECOMMENDATIONS

The TPM series touchpad module can be mounted into panels and consoles using various methods.

For details of typical mounting methods applicable to this module, please refer to Cursor Controls Ltd Application Note AN0053. Please contact your local sales office for further details.

## 10. PRODUCT ORDERING CODE SYSTEM

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




**For further options please contact your local sales representative.*

### 10.1. Ordering Example

**TPM-860513**: Touchpad, Customer defined sealing, USB & PS/2 Interface, no external switches, OEM style, RAL7015 polyester overlay, 3-inch.

## 11. DOCUMENT HISTORY

| Issue | Date | Author | Remarks |
|---|---|---|---|
| A | 12/04/17 | O. O | • Document released |
| B | 10/09/19 | O. O | • Overlay colour specification clarified<br>• ESD protection section updated to include guidance for customer panel materials. |
| C | 22/07/21 | O. O | • Dimension drawing updated<br>• Product image updated |