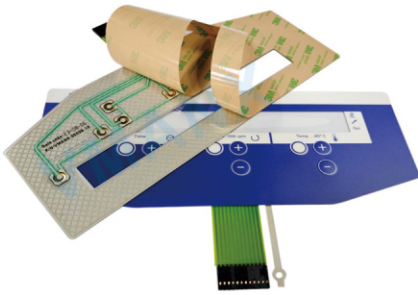


Membrane Switch Technical Specification



1. Product Overview

- The VMANX Membrane Switch is an integrated human-machine interface (HMI) solution designed for high-end electronic devices.
- Combines ultra-thin construction, military-grade reliability, and high customizability.
- Targets industrial controls, medical equipment, smart appliances, and automotive electronics in(Europe & North America) markets.
- Engineered for extended lifespan, high sensitivity, and aesthetic appeal in demanding environments.



2. Core Layer Structure (4-6 Configurable Layers)

Layer	Material/Process	Key Features
Graphic Overlay	PET/PC (0.1–0.25mm thickness)	Custom matte/gloss/textured finishes; UV coating (anti-yellowing), ISO 22196-certified antimicrobial coating.
EMI Shielding Layer	Metallized PET (optional)	EMI shielding ≥ 30 dB; compliant with FCC/CE standards.
Dome Layer	Stainless steel/nickel-silver domes	Tactile feedback: 150±50gf (tactile) / non-tactile flat type
Circuit Layer	Silver paste/Etched Cu (≤ 0.1 mm)	Resistance ≤ 100 m Ω /cm ² ; supports embedded LEDs, resistors
Adhesive Layer	3M™ PSA (0.05-0.1mm)	Temp. range: -40°C~+120°C (-40°F~248°F), VOC-free (EU Ecoregulation)
Backing Layer	Reinforced PET (optional)	Enhanced mechanical stability

Total Thickness: 0.5–1.2mm (configuration-dependent).

3. Key Performance Specifications

3.1 Electrical Performance

▶ Operating Voltage	: ≤ 50 VDC
▶ Rated Current	: ≤ 100 mA
▶ Contact Resistance	: ≤ 100 Ω (initial)
▶ Insulation Resistance	: ≥ 100 M Ω (500VDC)
▶ Loop resistance	: ≤ 1 Ω (with dome system)

3.2 Mechanical & Environmental Reliability

Test	Standard	Result
Operating Life	IEC 61058	$\geq 1,000,000$ cycles (tactile)
Thermal Cycling	-40°C to +85°C (1,000 cycles)	No cracking/performance loss
Damp Heat	85°C/85%RH, 1,000 hours	Δ Resistance $\leq 15\%$
Chemical Resistance	Alcohol/IPA (500 wipes)	No fading/delamination
UV Resistance	QUV-A 340nm, 500 hours	Δ Color ≤ 1.5 (UV-coated)
IP Rating	IP67 (sealed design)	Dustproof/immersion -resistant

4. Competitive Advantages

4.1 Ultra-Thin Flexible Design

- ▶ Bend radius $\geq 10\text{mm}$ (dynamic use), compatible with curved surfaces (e.g., medical grips, automotive dashboards)
- ▶ Total thickness $< 1\text{mm}$ option reduces device weight by 30%

4.2 Tactile Customization

- ▶ Tactile Type : Audible "click" (travel: $0.2\text{mm} \pm 0.05$)
- ▶ Non-Tactile Type : Silent actuation for medical environments

4.3 Embedded Electronics

- ▶ Direct bonding of 0402/0603 SMD LEDs (light transmission $\geq 85\%$)
- ▶ Optional capacitive sensing/RFID integration

4.4 Harsh Environment Resilience

- ▶ Operating Temp : $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ ($-40^{\circ}\text{F} \sim 185^{\circ}\text{F}$) / peak $+120^{\circ}\text{C}$ (248°F)
- ▶ Antimicrobial Efficacy : $\geq 99.9\%$ (vs. E. coli/S. aureus)

5. Customization Options

Module	Options
Surface Effects	Laser etching, embossed textures, brushed metal
Backlighting	EL panels, edge-lit guides, zoned LED arrays
Special Features	Anti-fingerprint coating, anti-fogging, ESD protection ($\pm 15\text{kV}$)
Certifications	UL, CE, RoHS, REACH, FDA (food-grade)

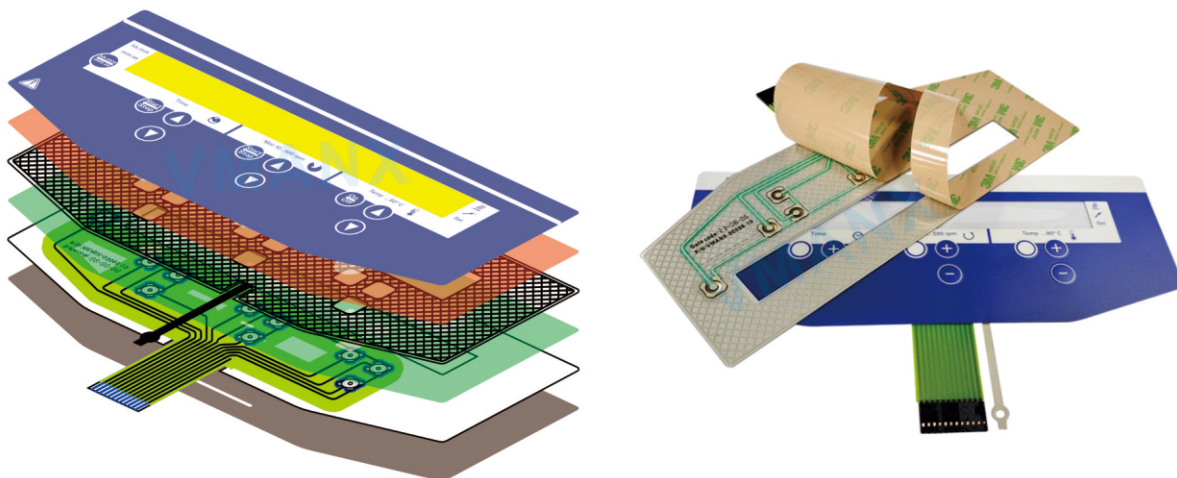
6. Applications

- ▶ Industrial Controls : PLC panels, outdoor instruments (UV-resistant models)
- ▶ Medical Devices : Sterilizable handles (antimicrobial), dialysis interfaces (IP67)
- ▶ Consumer Electronics : Smart kitchen panels, fitness equipment
- ▶ Transportation : In-car navigation keys, EV charger interfaces

7. Quality Assurance

- ▶ Design Validation : FEA simulation + 3D-printed prototypes
- ▶ Production : Class 1000 cleanroom, AOI optical inspection
- ▶ Testing : Per-batch IPC-620 certification + environmental data
- ▶ Warranty : 36 months (standard use)

8. Product diagram



RoHS
COMPLIANT

