

VMANX P+R Keypad Interface Circuit Switch Product Specification

1. Product Overview



- VMANX P+R (Plastic + Rubber) Key Interface Circuit Switch is a high-performance , Highly integrated human-machine interface solution.
- It features a dual-layer structure:
- Upper Layer: P+R keypad assembly, integrally molded (keys, frame,silicone rubber) via precision injection molding. Surface treatments include laser engraving and painting for visual/tactile customization.
- Lower Layer: Flexible Printed Circuit (FPC) or rigid PCB, Integrating metal dome switches, LEDs, and SMT components.
- Bonding Method: High-precision double-sided adhesive Ensures structural stability and sealing.
- Core Functions: Silicone rubber and metal domes provide Tactile feedback; Silicone acts as a light guide for uniform LED illumination. Ideal for appliances, industrial controls, Medical devices, and automotive electronics.



ISO13485

2. Technical Specifications

2.1 2.1 Electrical Parameters

Parameter	Specification	Test Conditions
Operating Voltage	3–24 V DC	--
Rated Current	≤ 50 mA (touch point) / ≤ 20 mA (LED)	Normal temperature 25°C
Contact Resistance	≤ 100 mΩ	Initial state, 1kHz AC
Insulation Resistance	≥ 100 MΩ	500V DC, normal temp/humidity
Dielectric Strength	AC 500V, 1 min (no breakdown)	Between touch point and housing
LED Brightness & CCT	Customizable (White: 5000–6000K; RGB available)	Drive current: 10–15mA

2.2 Mechanical & Structural Parameters

Parameter	Specification
Key Travel	0.2–1.0 mm (customizable)
Operating Force	160±30 gf (std.), range 80–350 gf
Reset Force	≥ 70% of operating force
Lifespan	≥ 1,000,000 cycles
Silicone Hardness	40–60 Shore A (optimized for light guide)
Operating Temperature	-40°C to +85°C
Protection Rating	IP67 (dustproof, waterproof)

3. Performance & Reliability

3.1 Durability & Environmental Resistance

- ▶ Mechanical lifespan: ≥ 1 million presses (per IEC 60529, no structural/functional degradation).
- Environmental Resilience :**
- ▶ Temperature cycling (-40°C → 85°C, 100 cycles): No brittleness or silicone deformation.
- ▶ Humidity test (40°C, 93% RH, 240h): Contact resistance change ≤ 10%.
- ▶ Chemical resistance: Coating passes ISO 4611 tests (alcohol, sweat, cleaners; 500 wipes without peeling).

3.2 IP Rating (Protection Class)

- ▶ IP67 Certified
- ▶ Dustproof (6) : Impervious to dust (industrial-grade).
- ▶ Waterproof (7) : Survives 30 min immersion in 1m water.
- ▶ Sealing design : Silicone edges + full-perimeter adhesive prevent liquid/particle ingress.

4. Aesthetics & Ergonomics

4.1 Surface Finishes & Visual Options

Processing Options :

- ▶ Laser engraving : High-precision symbols/icons (resolution ≤ 0.1mm), wear-resistant..
- ▶ Spray coating : matte/glossy/metallic finish, custom Pantone colours (compliant with European and American brand VI systems).
- ▶ Light guide design : ≤ 15% light loss; glare-free, uniform LED diffusion..
- ▶ Customization : Key shapes, textures (grid/dot patterns), backlit zone designs.

4.2 Ergonomic & Tactile Feedback

Touch optimisation :

- ▶ Adjustable force curves (gradual/snap-action) for clear actuation (click ratio ≥ 60%)..
- ▶ Low-noise : ≤ 45 dB (measured at 30cm).
- ▶ Light uniformity : ≥ 85% (CIE L*a*b* standard).
- ▶ Tactile aids : Center bumps/border ridges for blind operation..

5. Flexibility & Customization

5.1 Circuit Layer Compatibility

Type	Advantages	Applications
flexible circuit	Bendable, vibration-resistant; ≤0.3mm	Curved devices, wearable products
Rigid PCB	Stability; complex multi-LED routing	Industrial/medical equipment

5.2 Custom Services

▶ Layouts : Non-standard shapes (round/irregular), multi-key matrices (e.g., 4×4).
Features :
▶ Zoned backlight control (independent LED groups).
▶ Pressure sensing (resistive/capacitive layers).
▶ ESD protection (±15kV air discharge; IEC 61000-4-2).
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6.Compliance & Certifications

Standard	Certification	Region
Electrical Safety	UL 94 V-0 (flame retardant) , CE Low Voltage	North America/EU
Eco-Compliance	RoHS 3, REACH (SVHC < 0.1%)	Global
Reliability Tests	IEC 60529, IEC 60068-2 (环境应力)	Industrial

7. Services & Support

▶ Design Collaboration : DFM (Design for Manufacturability) analysis & 3D models (STEP format).
Supply Chain
▶ Lead time : 30–45 days (MOQ 5,000pcs).
▶ Logistics : EU/NA local warehouses; DDP terms supported.
Warranty
▶ 18-month coverage (incl. environmental stress failures).
▶ FA support: Failure analysis report within 48h.

8. Product Diagram

