

Data Sheet 规格书

KD1911H

Normally-Closed SMT Vibration Wake-Up Sensor

贴片式常闭振动唤醒传感器



Description / 功能概述

KD1911H is a miniature normally-closed SMT vibration wake-up sensor designed for low-power motion-triggered applications. Under static conditions, the device remains in a closed and inactive state. When vibration or movement occurs along the sensitive axis, the internal contact structure generates pulse-type switching signals to wake up or trigger the external circuit. Continuous motion will result in continuous pulse output.

KD1911H 是一款贴片式常闭型振动唤醒传感器，专为低功耗动作触发类应用设计。在静止状态下，器件保持常闭且处于非工作状态；当沿敏感方向发生振动或动作时，内部接触结构会输出脉冲型开关信号，用于唤醒或触发外部电路。若动作持续，输出脉冲信号将相应持续。

The sensor adopts a sealed micro ball-contact mechanical structure, providing stable and repeatable vibration detection without requiring complex signal conditioning. Due to its passive switching behavior, the operating current is extremely low and is primarily determined by the external circuit configuration.

该产品采用全密封微型滚珠机械接触结构，可在无需复杂信号调理的情况下实现稳定、可重复的振动检测。由于其被动式开关工作方式，器件本身功耗极低，工作电流主要由外部应用电路决定。

KD1911H is optimized for ultra-low-power wake-up designs where simple motion detection is required. Its compact SMT package, sealed construction, and long mechanical life make it a practical replacement for traditional mechanical vibration switches in battery-powered systems.

KD1911H 特别适用于对功耗敏感的唤醒检测系统，其小型化 SMT 封装、密封结构及较长的机械寿命，使其成为传统机械振动开关的理想替代方案。

The digital switching output can be directly interfaced with MCU GPIO pins, and signal filtering or debounce processing can be implemented by firmware or simple external components as needed.

器件输出为数字开关信号，可直接连接 MCU 的 GPIO 引脚，必要时可通过软件或简单外围电路实现信号滤波与去抖处理

Features / 产品特性

- Normally-Closed vibration switch architecture
常闭型振动开关结构设计
 - Motion-triggered pulse output for wake-up applications
动作触发脉冲输出，适用于唤醒类应用
 - Ultra-low power passive operation
被动式工作方式，超低功耗特性
 - Sealed micro ball-contact mechanical structure
全密封微型滚珠机械接触结构
 - Stable and repeatable vibration response
振动响应稳定，重复性好
 - Sensitive-axis vibration detection
沿敏感方向的振动检测特性
 - Digital switching output compatible with MCU GPIO
数字开关输出，可直接连接 MCU GPIO 接口
 - External filtering or debounce configurable by circuit or firmware
可通过外围电路或软件实现信号滤波与去抖
 - Compact SMT package for automated assembly
小型化 SMT 封装，适合自动化贴装
 - Long mechanical operating life
具备较长的机械使用寿命
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Applications / 应用领域

This **normally-closed SMT vibration wake-up sensor** is designed for motion-triggered wake-up and simple vibration detection in ultra-low-power systems. It is suitable for compact electronic devices that require reliable triggering, minimal standby power consumption, and straightforward digital interfacing.

该贴片式常闭型振动唤醒传感器用于动作触发唤醒及基础振动检测，适用于对触发可靠性、超低待机功耗以及数字接口要求较高的小型电子设备。

Typical applications include:

典型应用包括：

- Smart fishing floats and water-based motion wake-up devices
智能鱼漂及水上动作唤醒设备
- Battery-powered wake-up circuits for MCU systems
MCU 系统的电池供电唤醒电路
- Wearable and portable low-power electronics
可穿戴及低功耗便携式电子产品
- Anti-theft, movement detection, and tamper alert devices
防盗、移动检测及防拆报警装置
- Asset trackers and simple motion-triggered tags
资产追踪器及动作触发类标签设备
- Smart toys and interactive consumer electronics
智能玩具及互动型消费电子产品
- Remote controllers and power-saving input triggers
遥控器及省电型触发输入设备
- IoT devices requiring vibration-based wake-up
需要基于振动实现唤醒的物联网终端设备

Product Specification / 产品规格

Rated Voltage 额定电压	0.5-24Vdc
Rated Current 额定电流	2 μ A -10mA
Contact Resistance 接触电阻	30 M Ω Max
Insulation Resistance 绝缘电阻	>10M Ω
Temperature Range 耐温	-40 $^{\circ}$ C~85 $^{\circ}$ C
Vibration Lifetime 振动寿命	\geq 2,000,000 cycles

Functional Characteristics / 功能特性

1. Operating Principle / 工作原理

KD1911H operates as a normally-closed mechanical vibration switch based on an internal free-moving metallic ball. Under static conditions, the internal contact remains closed. When vibration or motion occurs along the sensitive axis, the movement of the ball causes intermittent contact transitions, generating pulse-type switching signals.

KD1911H 为一款常闭型机械振动开关，其内部采用自由滚动的金属滚珠结构。在静止状态下，内部触点保持闭合；当沿敏感方向发生振动或动作时，滚珠的运动会引起触点间歇性变化，从而输出脉冲型开关信号。

These switching pulses can be used to wake up or trigger external circuits. With continuous motion, the output pulses will continue accordingly. Signal filtering or debounce processing may be implemented by the application circuit or firmware as required.

该脉冲信号可用于唤醒或触发外部电路；当动作持续时，输出脉冲也将相应持续。根据系统需求，可通过外围电路或软件方式进行信号滤波与去抖处理

2. Directional Sensitivity / 方向灵敏特性

KD1911H responds primarily to vibration or displacement along its defined sensitive axis. The sensor's response characteristics are influenced by mounting orientation and installation direction.

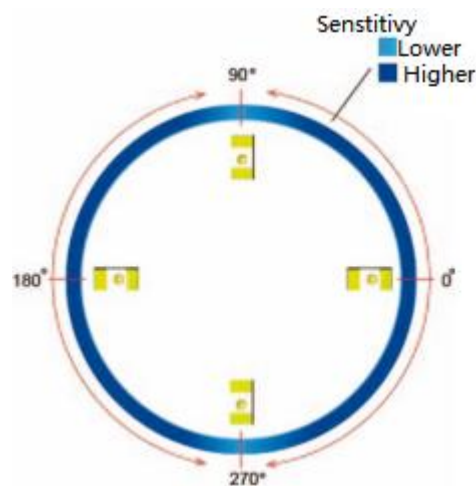
KD1911H 主要对其定义的敏感方向上的振动或位移作出响应，其触发特性与安装姿态和贴装方向密切相关。

Proper PCB orientation and mounting alignment are recommended to ensure consistent and reliable triggering performance in the target application.

为获得稳定可靠的触发效果，建议在应用设计中合理规划 PCB 放置方向与器件安装方向。

A visual representation of direction-based sensitivity is shown in the diagram below.

灵敏度分布请参见下图示意。



Unidirectional vertical vibration detection
单方向上下振动侦测

3. Switching Behavior / 开关响应特性

KD1911H is a normally-closed (NC) vibration switch. Under static conditions, the internal contact remains closed. When vibration or motion occurs along the sensitive axis, the contact intermittently opens and closes, generating pulse-type switching signals.

KD1911H 为常闭型振动开关。在静止状态下，内部触点保持闭合；当沿敏感方向发生振动或动作时，触点将产生间歇性开闭变化，从而输出脉冲型开关信号。

The switching behavior is influenced by the characteristics of the applied vibration and the mechanical motion of the internal structure. The output is intended for wake-up or trigger purposes rather than precise measurement.

其开关响应特性受振动特性及内部机械运动影响，输出信号适用于唤醒或触发用途，而非精确测量。

4. Power Consumption Behavior / 功耗特性

5. KD1911H operates as a passive mechanical switching device and does not require a dedicated bias supply for its internal operation.

KD1911H 作为被动式机械开关器件工作，其内部结构无需独立的驱动电源。

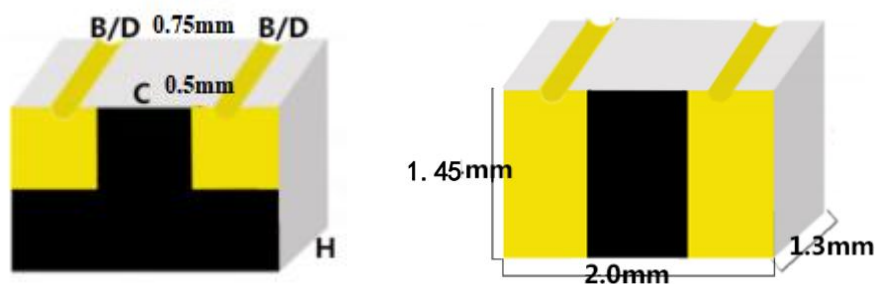
Any current consumption in the application is determined by the external circuit configuration, including pull-up, pull-down, or current-limiting components used in the user design.

实际应用中的电流消耗由用户电路配置决定，包括上拉、下拉或限流元件的设置。

Mechanical Dimensions / 机械尺寸

Mechanical dimensions are shown as follows. All dimensions are in millimeters unless otherwise specified.

产品机械尺寸如下，除特别说明外，单位均为毫米。



Application Guidance / 应用指南

1. Sensor Evaluation 传感器评估

The KD1911H normally-closed vibration wake-up sensor does not require power-down during standby. Under static conditions, the internal contact remains in a closed and stable state.

KD1911H 常闭型振动唤醒传感器在待机状态下无需断电处理。在静止条件下，内部触点保持闭合并处于稳定状态。

Due to its mechanical switching nature, minor vibrations or environmental disturbances may still generate brief switching pulses. For reliable wake-up behavior, it is recommended to implement software-based filtering, timing qualification, or event counting within the microcontroller.

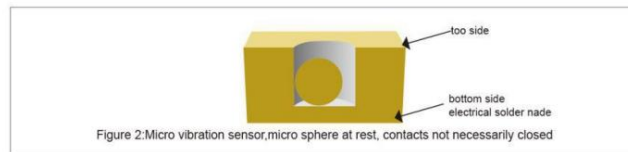
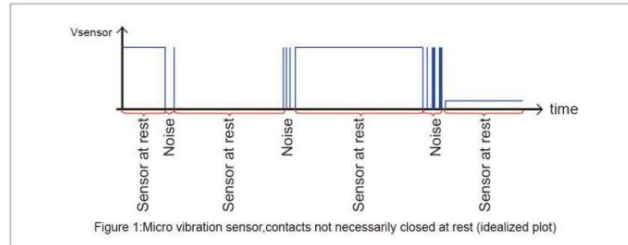
由于其机械式开关工作原理，轻微振动或环境扰动仍可能产生瞬态开关脉冲。为确保唤醒逻辑的可靠性，建议在 MCU 中采用软件滤波、时间判定或事件计数等方式进行处理。

When DC-level sensing is applied, hardware filtering alone may not fully suppress micro-motion-induced switching events. If a clearly defined resting output state is required, appropriate signal conditioning such as high-pass filtering or edge-detection logic should be used at the system level.

在采用直流电平检测的应用中，仅依赖硬件滤波可能无法完全抑制由微小动作引起的开关抖动。如应用系统对休眠状态下的电平稳定性有明确要求，可在系统层面引入高通滤波或边沿检测等信号调理方式。

For application logic, the MCU should monitor state transition events (open-to-close or close-to-open) rather than relying on a continuously maintained static logic level.

在软件设计上，建议 MCU 重点监测**状态变化事件**（由断开到导通或由导通到断开），而非持续保持的静态高低电平状态。

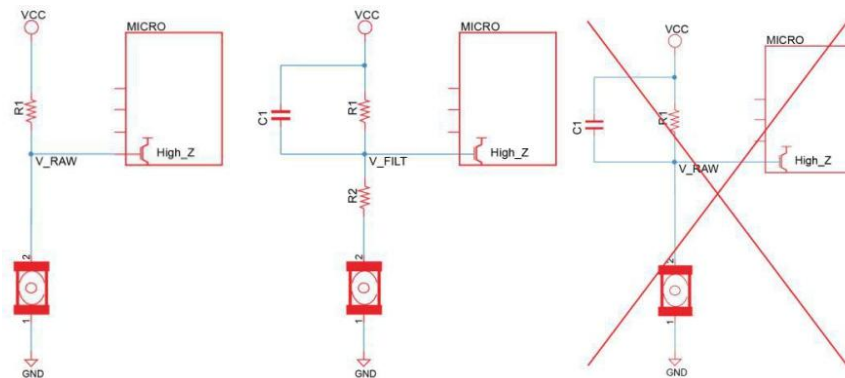


2. Recommended Application Circuit 推荐应用电路

2.1 Basic Connection 基本连接电路

Below shows correct and incorrect circuit connection examples for motion / wake-up sensing:

以下示例展示了动作/唤醒检测的正确和错误接法：



Design Notes / 设计注意事项：

- Select pull-up resistor based on current consumption and MCU IO characteristics
上拉电阻依据系统功耗与 MCU I/O 特性选择
- Software should perform debounce and event count filtering

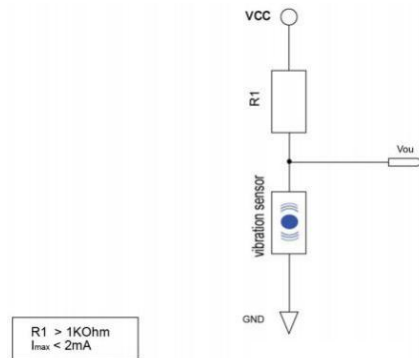
软件需加入去抖和事件计数过滤

- Additional signal conditioning improves noise immunity in high-sensitivity or noisy environments

在高灵敏度或噪声环境下，可通过信号调理提高系统抗干扰能力

- Do NOT short sensor directly to power rail

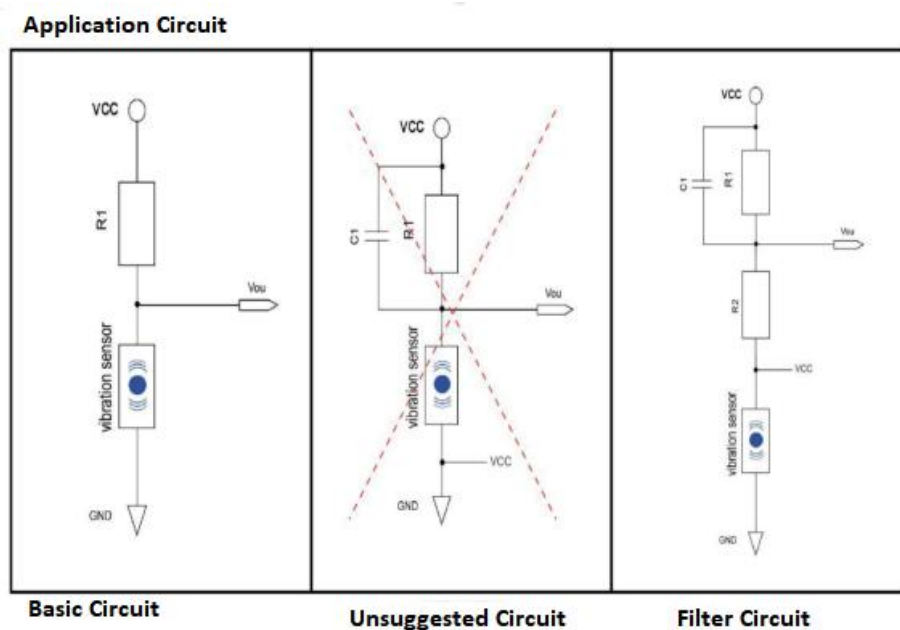
严禁将传感器直接短接至电源轨



2.2 Signal Conditioning Circuit (Debounce / Filtering) 信号调理电路（去抖 / 滤波）

If suppression of micro-motion or environmental noise is required, a simple RC conditioning network can be added at the signal output, as shown below.

当需要抑制微小动作或环境噪声引起的误触发时，可在信号输出端增加简单的 RC 信号调理网络。



The RC network helps limit transient switching current and smooth rapid contact transitions caused by mechanical vibration, improving overall wake-up stability.

该 RC 网络可限制由机械振动引起的瞬态开关电流，并对快速触点变化进行平滑处理，从而提升整体唤醒稳定性。

Using higher resistor values can help reduce system power consumption; however, the total circuit impedance and its impact on wake-up response timing should be carefully considered during design.

采用较高阻值电阻有助于降低系统功耗，但在设计时需综合考虑电路总阻抗对唤醒响应时间的影响。

Soldering Characteristics / 焊接特性

Manual Soldering

手工焊接

- Max tip temperature: **300°C ±5°C**

烙铁温度 **300°C ±5°C**

- Max contact time: **< 3 seconds**

接触时间 **< 3 秒**

Reflow Soldering (SMT)

回流焊接 (SMT)

- Preheating / 预热阶段

Preheat the PCB so that the copper surface temperature reaches **180°C**, The preheating duration should be **2 ± 0.3 minutes** before entering the reflow soldering zone.

电路板预热至铜箔表面温度达到 **180°C**，并在进入回流焊接区前保持 **2 ± 0.3 分钟**。

- Reflow Soldering / 回流阶段

The peak temperature on the copper surface shall not exceed **260°C**, and the duration above peak temperature must be **≤ 5 seconds**, then the PCB should move to the cooling



zone.

回流焊时铜箔表面峰值温度不得超过 **260°C**，且在峰值温度以上的停留时间须 ≤ 5 秒，随后进入冷却区。

Flux Requirements

助熔剂要求

- Do not use strong acid or alkaline flux
助焊剂不得使用强酸性或强碱性材料

General Caution

注意

- Avoid mechanical stress during and after soldering
焊接过程中及焊后需避免机械应力
- Do not reflow more than twice
不建议回流焊超过两次
- Allow full cooling before handling
冷却前请勿搬动或外力按压器件

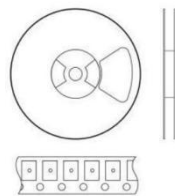
Packaging/包装

Tape&Reel packing

编带包装

5000pcs/Packing

5000pcs/盘



Notes & Safety Instructions/注意事项

1. Perform application-specific verification before use.

Before using this product, perform necessary tests and verification under actual application conditions to ensure proper functionality and reliability.

在使用本产品之前，应根据实际应用环境和条件进行必要的功能与可靠性测试，确认产品能够满足要求。

2. Use this product according to its intended purpose and specifications.

Refer to the datasheet for product characteristics, performance limits, and recommended operating conditions.

请依据产品特性、性能限制及规格书中规定的适用条件进行使用。

3. This product is not intended for life-support, safety-critical, or high-reliability systems.

Do not use the product in medical life-support equipment, safety protection systems, or devices requiring extremely high reliability.

本产品不得用于医疗生命维持设备、安全关键系统或其他需极高可靠性的装置。

4. Avoid contact with corrosive or conductive substances.

Keep the product away from acids, alkalis, corrosive chemicals, moisture, and conductive liquids to prevent damage.

Also avoid placing the product near strong magnetic or ferromagnetic materials.

请避免产品接触酸性、碱性、腐蚀性化学品及导电液体（如水、湿气），以防损坏。同时避免将产品置于强磁场或铁磁性物体附近。