GENERAL

macropoxy 646 datasheet

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Introduction

The Macropoxy 646 series is a family of high performance analog switches that have become indispensable in modern mixed signal designs. Whether you are building a precision data acquisition system, a high speed digital to analog interface, or a flexible signal routing board, the Macropoxy 646 offers the reliability, low on resistance, and minimal crosstalk that engineers demand. This article provides an in depth look at the Macropoxy 646 datasheet, covering everything from pin configuration and electrical characteristics to typical applications and design best practices. By the end of this guide, you'll have a clear understanding of how to leverage this component in your next project.

Product Overview

The Macropoxy 646 series is a dual channel, CMOS analog switch that supports a wide supply voltage range, low on resistance, and high input voltage tolerance. It is engineered for low noise, low crosstalk performance, making it ideal for precision analog signal routing. Key attributes include:

- Dual channel architecture with independent control
- Low on resistance (RON as low as 15 :'•
- High input voltage tolerance (±20 V)
- Low leakage current ("d 50 pA)
- Fast switching times (rise/fall times
- Low crosstalk (
- Wide temperature range (" 55 /°C to +125 /°C)

Key Features

• High Speed Switching: The Macropoxy 646 can toggle between states in less than 20 nanoseconds, enabling real time signal routing in high frequency applications.

• Low On Resistance: With an on resistance as low as 15 :'Â F†R 0witch introduces minimal signal distortion and power loss.

• Wide Supply Range: The device operates from 2.5 /V to 5.5 /V, allowing designers to use a single component across multiple voltage domains.

• Low Leakage and Crosstalk: Leakage currents below 50 /pA and crosstalk better than " 70 /dB at 10 /MHz ensure signal integrity in sensitive analog paths.

• Robust Packaging: Available in a 10 pin QFN package, the Macropoxy 646 offers excellent thermal performance and compact board space.

Understanding the Macropoxy 646 Datasheet

The datasheet is the authoritative source for all technical details required to integrate the Macropoxy 646 into a circuit. It contains sections such as device description, electrical characteristics, pin configuration, mechanical dimensions, and typical application circuits. Let's walk through each section to understand what information you need to extract for your design.

Pin Configuration

The Macropoxy 646 features a 10 pin QFN (Quad Flat No Lead) package. The pinout is as follows:

- Pin /1: VDD (Supply Voltage)
- Pin /2: G1 (Channel /1 Gate)
- Pin /3: I1 (Channel /1 Input)
- Pin /4: O1 (Channel /1 Output)
- Pin /5: G2 (Channel /2 Gate)
- Pin /6: I2 (Channel /2 Input)
- Pin /7: O2 (Channel /2 Output)
- Pin /8: GND (Ground)
- Pin /9: NC (No Connect)
- Pin /10: NC (No Connect)

When designing a PCB, keep the ground pin (Pin 8) as close as possible to the device’s body to minimize ground loop noise. The no connect pins are left unpopulated, which helps reduce parasitic capacitance and improves high frequency performance.

Electrical Characteristics

Below is a summarized snapshot of the most critical electrical parameters. For a full specification list, refer to the official datasheet.

- Supply Voltage (VDD): 2.5 /V to 5.5 /V
- On Resistance (RON): 15 /:’ ‡G— –6 Â B "ãR õb’Â ó© (typical at 5.5 /V)
- Leakage Current: "d 50 /pA (typical)
- Switching Speed: Rise/Fall time
- Crosstalk:
- Input Voltage Range: ±20 /V (max)
- Temperature Range: " 55 /°C to +125 /°C
- Package Thickness: 0.7 /mm (typical)

Package and Mechanical Details

The Macropoxy 646 is offered in a 10 pin QFN package, which provides excellent thermal dissipation and a low profile. Key mechanical dimensions include:

- Body width: 1.5 /mm
- Body length: 1.5 /mm
- Body height: 0.7 /mm
- Lead pitch: 0.5 /mm

When routing traces to the device, maintain a minimum spacing of 0.15 mm between adjacent pins to avoid shorting, and keep the ground plane contiguous to reduce EMI.

Typical Applications

The Macropoxy 646’s versatility makes it suitable for a wide range of analog and mixed signal circuits. Below are some common use cases that demonstrate the switch’s strengths.

Analog Signal Routing

In data acquisition systems, the switch can route sensor outputs to an ADC channel without the need for multiple

dedicated amplifiers. Because of its low on resistance and minimal crosstalk, the signal integrity remains high even at high sampling rates.

Multiplexing and Demultiplexing

For systems that require time division multiplexing, the Macropoxy 646 can serve as a fast, low latency switch between multiple analog inputs and a single ADC. The dual channel architecture allows simultaneous routing of two distinct signals, improving system throughput.

Digital to Analog and Analog to Digital Interfaces

When interfacing digital logic with analog peripherals, the Macropoxy 646 can be used to isolate high voltage analog signals from low voltage digital logic. Its wide input voltage tolerance (±20 V) ensures that the device can handle signals from a variety of sensors and actuators.

Calibration and Test Equipment

In calibration rigs, the switch can quickly alternate between reference sources and measurement points. The fast switching time and low leakage make it ideal for high precision test setups where measurement accuracy is paramount.

Design Guidelines and Best Practices

Integrating the Macropoxy 646 into a circuit requires careful consideration of several design factors. The following guidelines will help you maximize performance and reliability.

Power Supply Considerations

- Use a clean, low noise supply to minimize switching noise. Decouple the VDD pin with a 0.1 /µF ceramic capacitor placed as close as possible to the device.
- Maintain a voltage margin of at least 0.5 /V between the supply rails to account for voltage drops during switching.
- When operating at the upper end of the supply range (5.5 /V), verify that the on resistance remains within specifications.

Signal Integrity

- Route input and output traces with minimal length to reduce parasitic capacitance and inductance.
- Use differential routing for high frequency signals to reduce common mode noise.
- Keep the ground plane continuous and use via stitching near the device to provide a low impedance return path.

Switching Speed and Timing

- Use fast, low skew logic drivers for the gate pins to achieve the advertised
- When timing is critical, add a small series resistor ("H 10 /:'' öâ F†R v FR Fò Æ–Ö—B inging.
- Consider the propagation delay of the gate driver when synchronizing with other system clocks.

Thermal Management

- Although the device dissipates minimal power (
- Use a copper pour or thermal pad beneath the QFN package to spread heat.
- Verify the thermal resistance from junction to ambient (R;„ A) in the datasheet to ensure safe operating temperatures.

Troubleshooting Common Issues

Even with careful design, some issues can arise during development. Below are common problems and recommended solutions.

- Unexpected Off Resistance: Check for solder bridges between gate and input pins. Inspect the PCB layout for shorted vias.
- High Crosstalk: Verify that the input signals are within the specified voltage range. Ensure that the ground plane is uninterrupted.

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