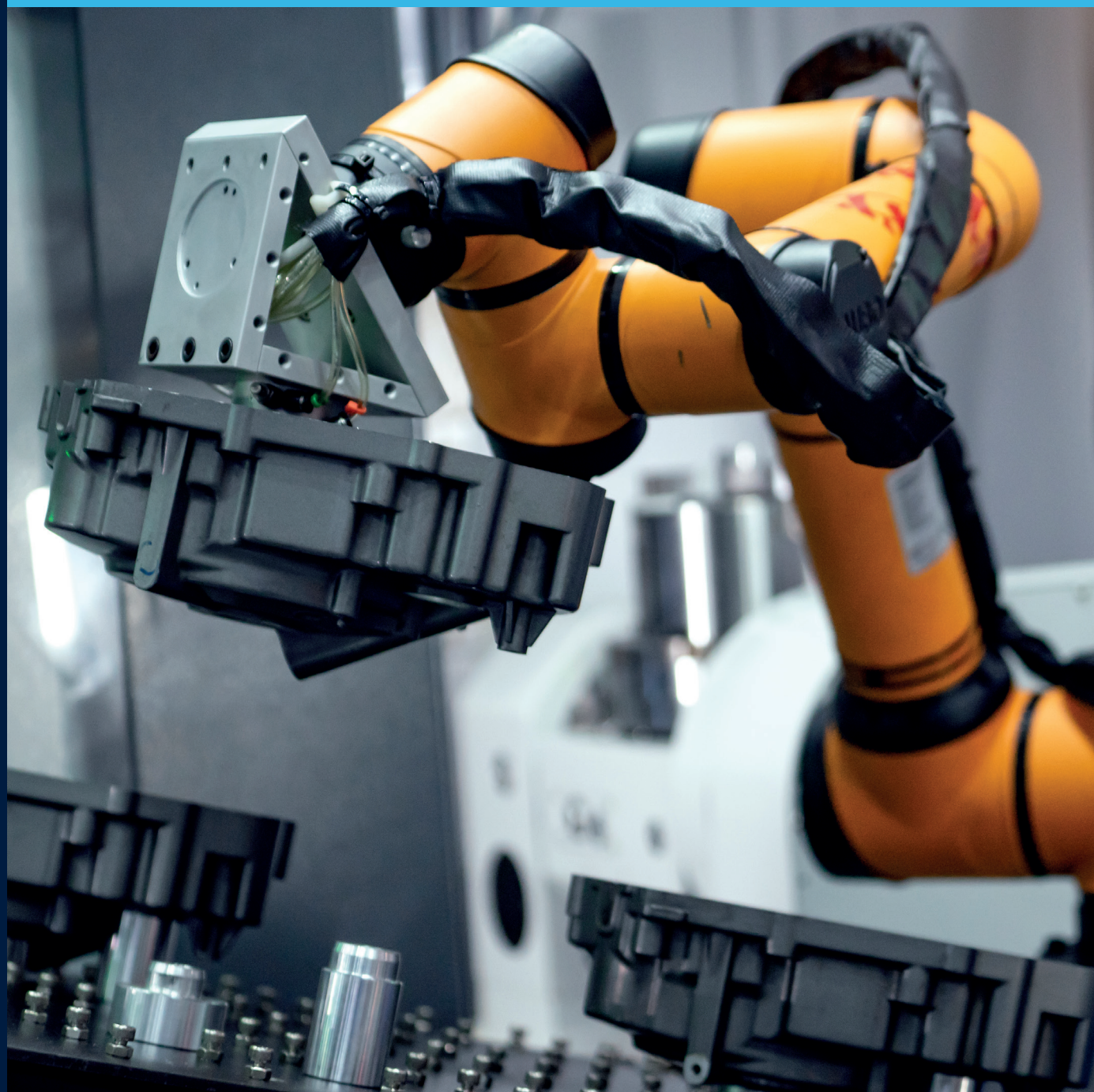




life.augmented

# Digital Isolators and Galvanically Isolated Sigma-Delta Modulators



# Typical application use cases: Motor control and servo drives



## Why digital isolators and galvanically isolated $\Sigma\Delta$ modulators are important in motor control applications?

Digital isolators and galvanically isolated analog-to-digital converters (ADCs), also known as isolated sigma-delta modulators, play a fundamental role in industrial applications where power and digital worlds must live together.

In servo drive applications, standalone sigma-delta modulators are typically used to sense the analog phase currents of a motor and convert them into 1-bit digital signals so they can be processed by the host controller. Afterwards, digital interfaces transfer high-speed input/output digital data to the human interface and to the actuators for driving the power stage. This means that sigma-delta modulators must be very accurate, immune to noise and very reliable in harsh environments so as to ensure the longest possible lifetime for the system.

When combined with our thick-oxide galvanic-isolation technology it is possible to guarantee the required requirements for workplace safety by protecting humans against shocks and preventing ground potential differences or ground loops. Galvanic isolation eliminates stray currents flowing between power system and digital system that cause data transfer errors and effectively rejects fast transient noise signals.

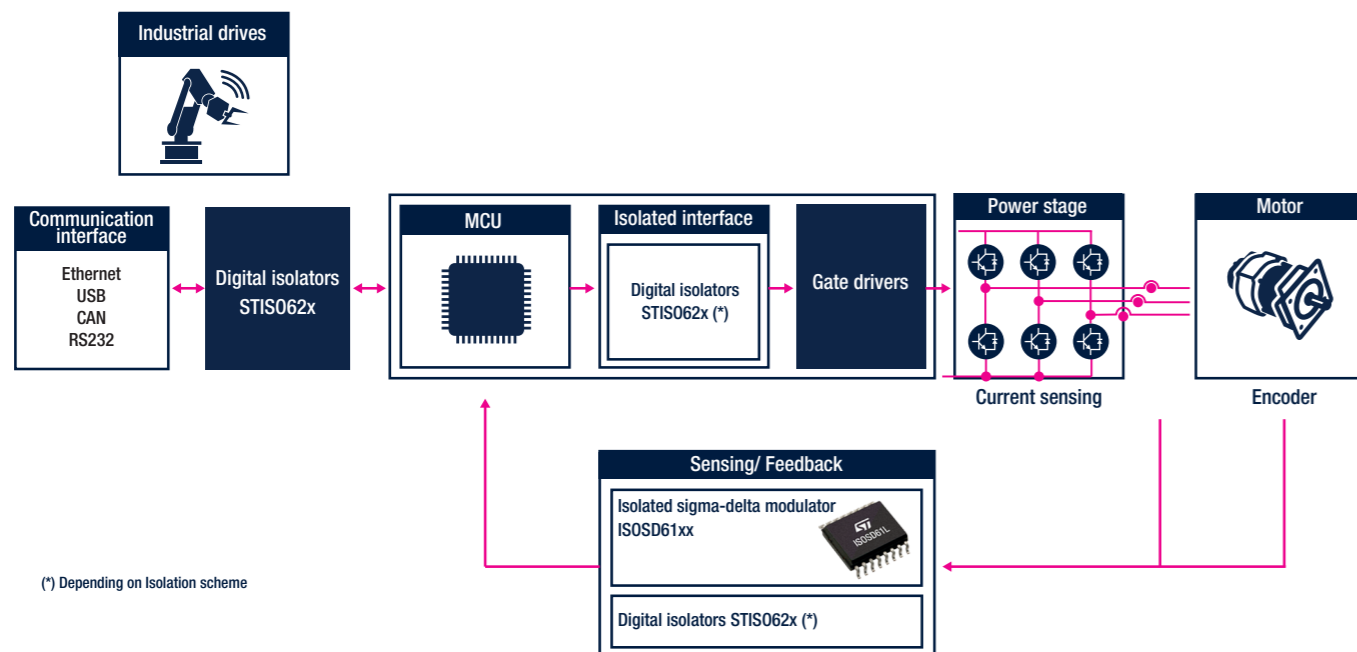
Thanks to the very accurate and robust galvanically isolated  $\Sigma\Delta$  modulators such as the ISOSD61, the host controller can drive the motor in real time and in a very precise way in terms of position, speed and torque. Furthermore, workplace personnel are protected against high-voltage bursts.

At the application level, a typical combination of a 1-bit  $\Sigma\Delta$  modulator and shunt are the perfect choice to achieve a good compromise for high-precision, low-cost solutions with a low form factor solution without the need for Hall-effect sensors.

Additionally, depending on the isolation scheme, digital isolators can be used each time digital signals must pass through the isolation required between the high-voltage power electronics and the controller section to close the control loop.

Leveraging ST's 6kV thick-oxide galvanic-isolation technology, the STISO621 dual-channel digital isolator transfers data between two isolated domains at up to 100 Mbit/s with pulse distortion below 3 ns. Very high typical common-mode transient immunity (CMTI) protects the low-voltage side against high switching transients in harsh environments. With a maximum working isolation voltage ( $V_{IOWM}$ ) of 1200V peak and high impulse-withstand voltage ( $V_{IOTM}$ ), galvanic insulation integrity is maintained over time and during any system faults.

ST's robust, reliable and flexible digital isolated interfaces also ensure faster data transmissions, a longer lifetime, and higher reliability in very demanding electrical environments than conventional optical isolators.

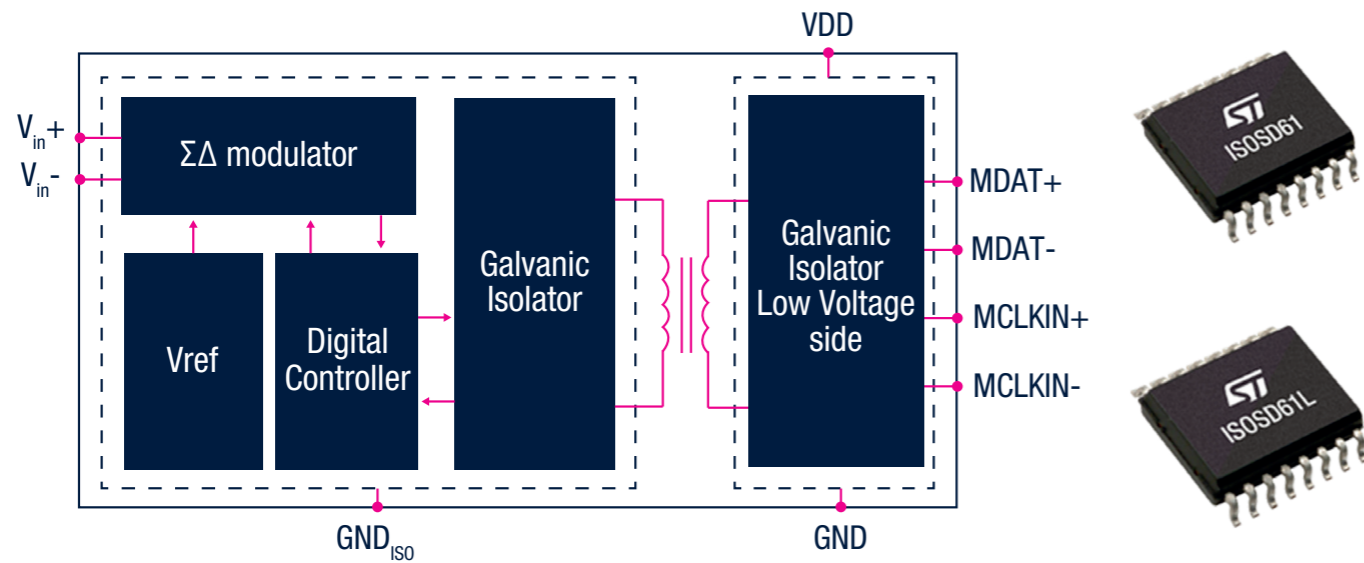




## KEY FEATURES

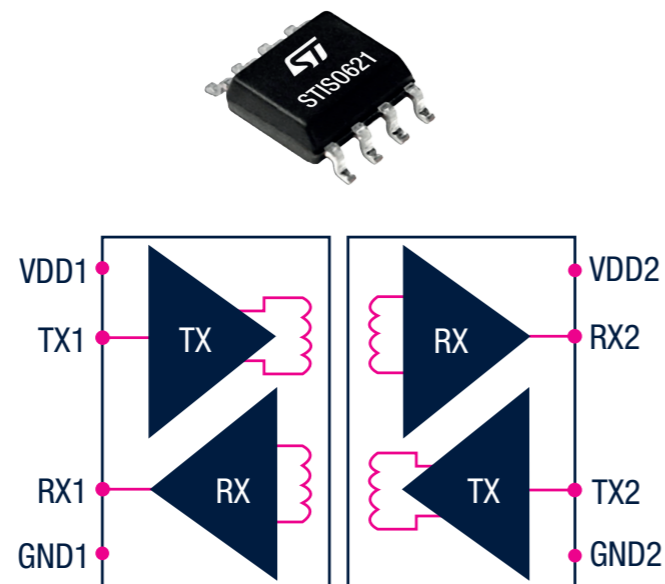
### ISOSD61/ISOSD61L SIGMA-DELTA MODULATORS:

- 16-bit resolution
- $\pm 320$  mV input range
- $\pm 250$  mV input linear range
- Up to 25 MHz external clock
- 50 kHz bandwidth
- SNR: 86 dB (typical)
- THD: -83 dB (typical)
- CMTI: 30 kV/ $\mu$ s (typical)
- 6 kV peak isolation ( $V_{IOTM}$ )
- 1.2 kV peak working voltage ( $V_{IORM}$ )
- LVDS and TTL options
- SO16 wide package
- UL1577 Certified (File Number: E362869)



### STISO621 AND STISO621W DIGITAL ISOLATORS:

- Dual channel, digital isolator with 1 – 1 channel direction
- 6 kV peak isolation ( $V_{IOTM}$ )
- 1.2 kV peak working voltage ( $V_{IORM}$ )
- High common-mode transient immunity: >50 kV/ $\mu$ s
- Data rate up to 100 Mbps
- Pulse width distortion: < 3ns
- 3 to 5.5 V supplies
- 3.3 V and 5V level translation
- UL1577 Certified (File Number: E362869)
- -40 to +125°C extended industrial temperature range
- SO8 wide- and narrow-body package options



## DEVELOPER RESOURCES

A variety of evaluation boards and reference designs are available to help you develop applications based on ST's portfolio of digital isolators and galvanically isolated modulators.

Based on the ISOSD61 galvanically isolated sigma-delta modulator with low-voltage differential signaling (LVDS) and single-ended (TTL/CMOS) options, the EVALST-ISOSD61T board comes with all the necessary documentation and resources to reduce evaluation and design phase.

A 15kW Infield Inverter reference design (STSYS-EMC002) based on 1200V SiC MOSFETs and a field-oriented control (FOC) encoder interface for industrial servo drives will be available in Q4 2022. Its isolated modulators simultaneously measure the inline motor currents by guarantying fast response to load variations with high accuracy and noise immunity. Moreover, its small PCB fits inside the motor, avoiding cables.

A dual-channel digital isolator evaluation board is also available to evaluate STISO62x digital isolated interfaces with both SO8 and SO8W packages.

A complete library of technical documentation including datasheets, application notes, user manuals, gerber files, and schematics is available for developers.

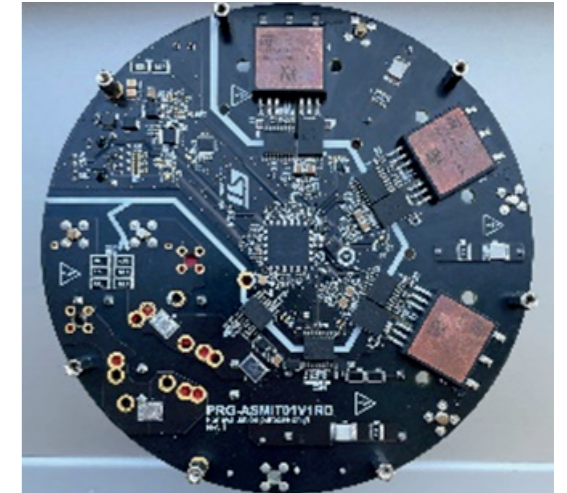


Figure 1: STSYS-EMC002

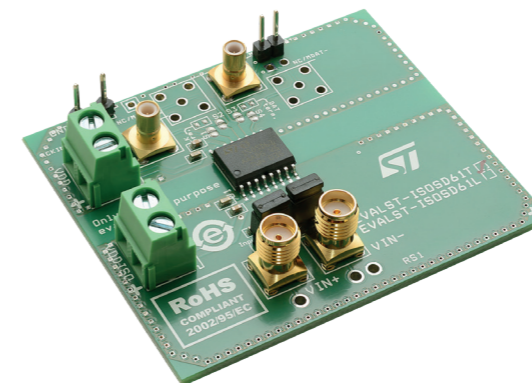


Figure 2 EVALST-ISOSD61T

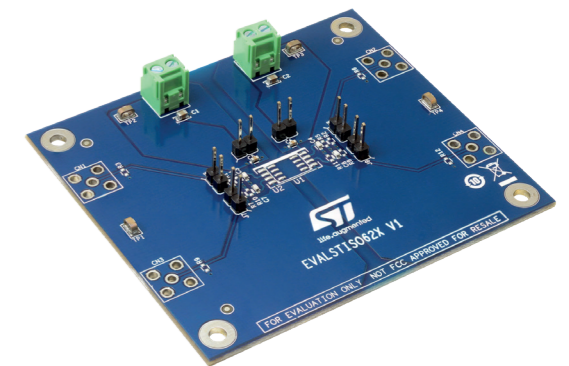


Figure 3 EVALSTISO62XV1

# life.augmented



Order code: BR2207ISOINTERFACES

For more information on ST products and solutions, visit [www.st.com](http://www.st.com)

© STMicroelectronics - July 2022 - Printed in the United Kingdom - All rights reserved  
ST and the ST logo are registered and/or unregistered trademarks of STMicroelectronics International NV or its affiliates in the EU and/or elsewhere. In particular, ST and the ST logo are Registered in the US Patent and Trademark Office. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks).  
All other product or service names are the property of their respective owners.

