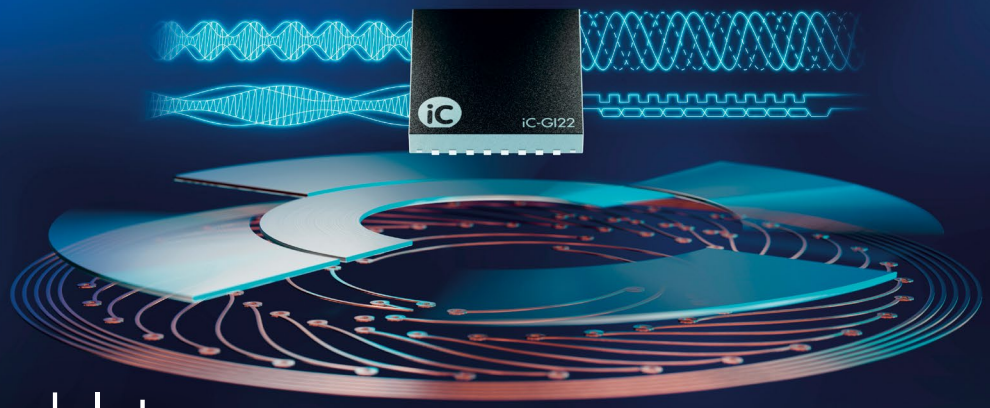
iC-GI22

Dual Channel Inductive Signal Demodulator



Description

The iC-GI22 is a space-saving front-end chip for evaluating inductive position sensors.

The device contains the complete circuit for energizing the transmitter coil, two independent receiver channels with signal demodulation, processing and error correction, as well as cable drivers for industrial-grade 1V signal output in the smallest possible space.

For further evaluation, a sine-to-digital converter with SSI output is included, allowing the initialization of the external MCU or the iC-TW29 encoder processor with a start angle, which considerably simplifies angle determination for absolute encoders.

Integrated diagnostic functions monitor start-up and operation, including RAM configuration. Status flags can be masked for alarm indication or messaging via SSI.

The iC-GI22 configures itself from an external EEPROM in stand-alone mode, or receives its setup via I2C from the microcontroller.

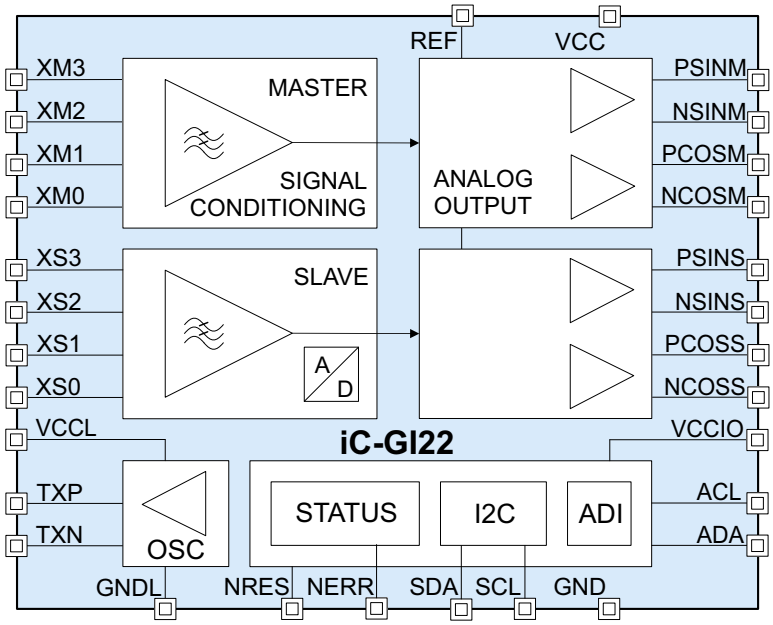
Key Features

- Adjustable transmitter with coil driver (2–5 MHz, up to 20 mA)
- Two independent receiver channels with demodulation and line driver (500 mV @ 100 Ω)
- High level output with selectable center voltage
- Adjustable coarse (×1...10) and fine gain (×1...20)
- Precision offset correction (via 11 bits up to 200 mV)
- Automatic gain control (per channel)
- Sin/cos interpolation with 8-bit resolution (1 channel)
- Angle output via SSI with error and warning
- I2C multi-master for self-configuration from external EEPROM
- I2C slave interface to the system (MCU)
- Operation monitoring with alarm masking: signal loss, I/O short circuit, RAM CRC
- Signal frequency up to 50 kHz (allows for > 90000 rpm)
- Power supply from 3.3 V to 5 V, approx. 15 mA
- Space-saving 32-pin QFN with 5×5 mm

Applications

- Robust absolute position sensors
- Drive speed and torque control
- Brushless motor commutation
- Robots, AGV, vending machines

Block Diagram



Key Specifications

General	
Power Supply	3.0 V to 5.5 V, 15 mA
Excitation Frequency	2 to 5 MHz (by external LC)
Input Pitch / Periods (n)	free by coil design / n=1 to 64 cpr
Input Speed (example)	188000 rpm (n=16), 250 m/s at 5 mm pitch linear

Receiver and Signal Conditioning	
Sin/Cos Frequency Range	DC to 50 kHz
Receiver Coarse/Fine Gain	×1 to ×10/×1 to ×20/auto gain
Offset Calibration	over 11 bit up to 200 mV

Sin/Cos Driver Outputs	
Diff. Amplitude (controlled)	500 mV into 100 Ohm, short-circuit-proof Up to 2 V w/o termination
Output Common-Mode Range	1.22 V, VCC/2, or external reference
Output Lag	2 µs/5 µs at high/low bandwidth
Driver Output Current	0 to 20 mA

Sine-to-Digital Conversion	
On-Chip Interpolation	8 bit (n=1)
System Resolution	18 bit (n=4) up to 26 bits max. by iC-TW29
System Accuracy/Latency	typ. +/–0.05 m° (n=4)/below 10 µs

Interfaces	
ADI Absolute Data IF	SSI, 2 MHz, 10-bit frame with error a. warning
I2C Master/Slave	100 kHz, startup from ext. EEPROM in 40 ms

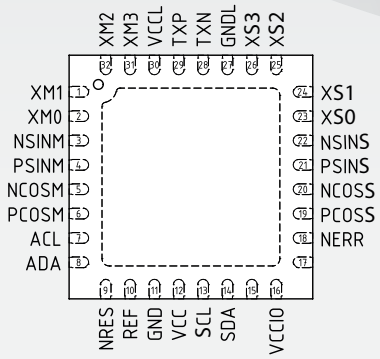
Monitoring Functions

Excitation failure, signal loss, gain control error, output shortage, excessive temperature

System Functions (combination with iC-TW29)

Dynamic error correction, condition monitoring, 24-bit revolution counting, BiSS (10 MHz), SSI, and SPI interfaces

Pin Configuration QFN32-5×5

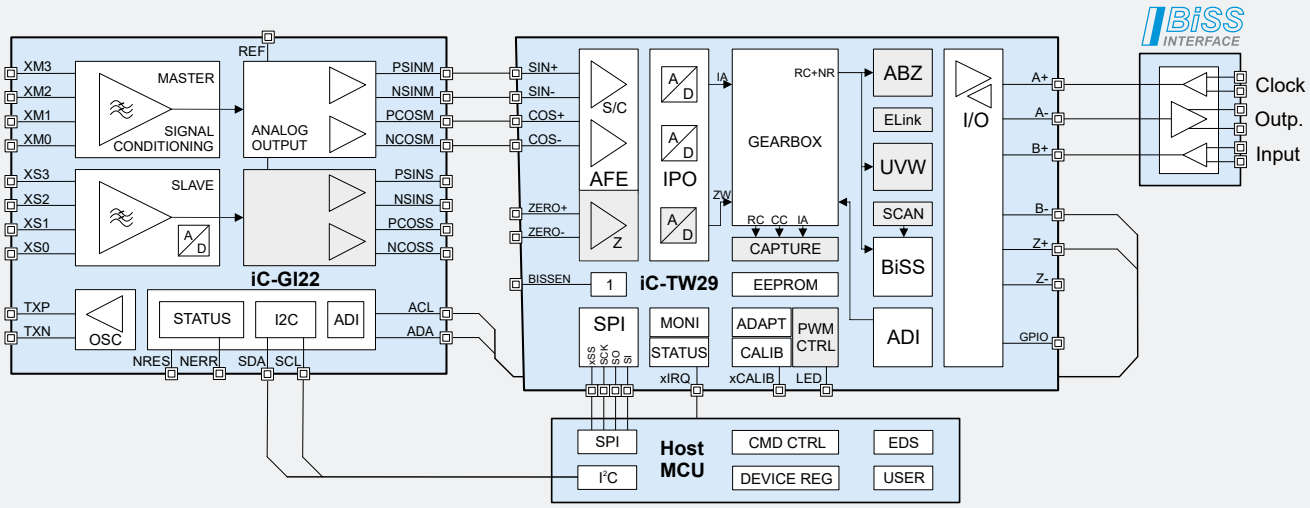


Master Channel	Function
XM0, XM1	Differential RX Coil Input Sine
XM2, XM3	Differential RX Coil Input Cosine
PSINM, NSINM	Diff. Driver Output Sine
PCOSM, NCOSM	Diff. Driver Output Cosine

Slave Channel	Function
XS0, XS1	Differential RX Coil Input Sine
XS2, XS3	Differential RX Coil Input Cosine
PCOSS, NCOSS	Diff. Driver Output Cosine
PSINS, NSINS	Diff. Driver Output Sine
TXN, TXP	Differential TX Coil Driver Outputs

General	Function
VCC	+3.0 V... 5.5 V Supply Input
VCCL	+3.0 V... 5.5 V TX Driver Supply Input
VCCIO	+3.0 V... 5.5 V I/O Supply Input
GND, GNDL	Grounds
REF	Driver Reference Voltage Input (optional)
SCL	I2C Interface, clock line (EEPROM/MCU)
SDA	I2C Interface, data line (EEPROM/MCU)
ACL	ADI Interface, clock input
ADA	ADI Interface, data output
NERR	Fault Output, active low
NRES	Reset Input, active low

System Example



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