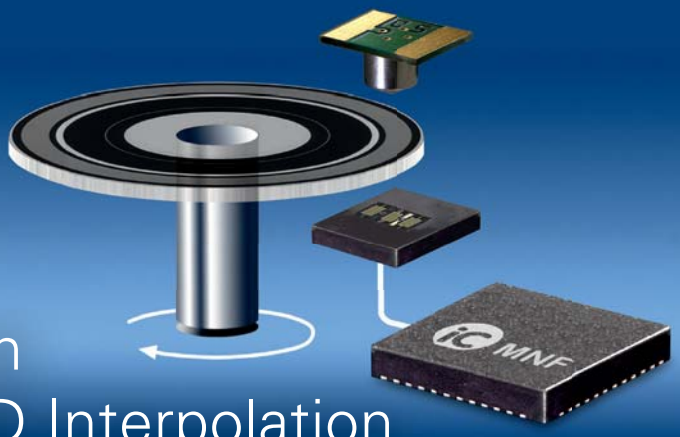
iC-MNF

26-bit Nonius Encoder with 3-Ch. Sampling 14-bit Sin/D Interpolation



Description

Encoder device iC-MNF is a 3-channel, simultaneous sampling sine-to-digital converter which interpolates sine/cosine sensor signals using a high precision SAR converter with a selectable resolution of up to 14 bits. Each input has a separate sample-and-hold stage which halts the track signal for the subsequent sequential digitization. Various 2- and 3-track Nonius scale computations and multiturn gear box synchronization modes can be configured for the calculation of high resolution angle positions; these computations allow for angle resolutions of up to 26 bits.

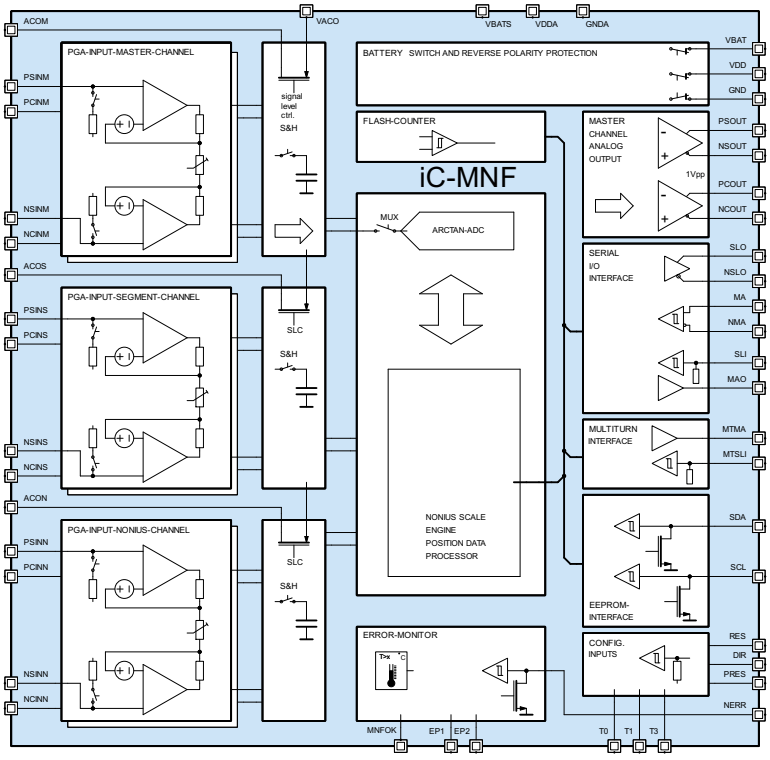
Applications

- Optical and magnetic position sensors
- Multi-channel sine-to-digital converter
- Singleturn and multiturn absolute encoders
- Linear scales for absolute position

Features

- Fast 14-bit sine-to-digital conversion within 3 µs
- Simultaneous sampling of 3 channels
- 2- or 3-track Nonius calculation of up to 26 bit singleturn position
- SPI interface and fail-safe RS422 transceiver for BiSS C, SSI
- Differential 1 Vpp sin/cos outputs to 100 Ω, short-circuit-proof
- Differential and single-ended PGA inputs for up to 200 kHz
- Input adaptation to current or voltage signals
- Adjustable signal conditioning for offset, amplitude and phase
- Input signal stabilization by LED or MR bridge current control
- Serial 2-wire interface to multiturn sensors (BiSS, SSI, 2-bit)
- Position preset function, selectable up/down code direction
- Reset input for external control of conversion
- Device setup via I/O interface (BiSS or SPI)
- CRC-protected configuration, OEM and USER data from external EEPROM
- Reverse-polarity-proof and tolerant against faulty output wiring
- Single 5 V supply, operation from - 40°C to + 125°C

Block Diagram



iC-MNF
3-Ch. Sampling 14-bit Sin/D Interpolation

Functional Details

The absolute angle position is output via the serial interface with clock rates of up to 4 Mbit/s (SSI compatible; up to 10 Mbit/s with BiSS C protocol). The RS422 transceiver required is integrated on the chip and has both a differential clock input and a differential line driver for data output.

Programmable instrumentation amplifiers with a selectable gain and offset and phase correction can be adjusted separately for each channel and allow differential or single-ended input signals. At the same time, the inputs can either be set to high impedance for voltage signals from magneto resistor sensor bridges or to low impedance for adaptation and use with photosensors which provide current signals, for instance. This enables the device to be directly connected to a number of different optical and magnetic sensors.

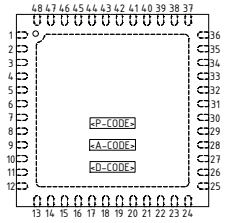
For the purpose of input signal stabilization, the conditioned signals are fed into signal level controllers featuring current source outputs of up to 50 mA (master channel) and of up to 10 mA (for each the Nonius and segment channels). These ACOx source pins either power the LEDs of an optical encoder or the magneto resistor bridges of a magnetic encoder. If the control thresholds are reached, this event can be released for alarm messaging using the serial interface or the NERR output.

Both major chip functions and sensor errors are also monitored and can be enabled for alarm indication. In this manner typical sensor errors, such as signal loss due to wire breakage, short circuiting, dirt, or aging, for example, can be signaled by alarms. Furthermore there are 3 error pins that can be configured to the error bit (SSI) or the error and warning bit (BiSS) to report additional statusinformation to the Programmable Logic Controller (PLC).

The device features further digital encoder functions covering the correction of phase errors between the tracks, for example, or the zeroing or presetting of a specific position offset for data output. Using the BiSS / SSI master also integrated on the chip, position data from multiturn sensors, provided by a second iC-MNF, for example, can be read in and synchronized.

An internal digital 8 bit temperature sensor with adjustable error/alarm thresholds for excessive and low temperature is included in the device. The temperature data can be read via a register or by enabling a second BiSS data channel. iC-MNF is protected against a reversed power supply voltage; the integrated supply switch for loads of up to 20 mA extends this protection to cover the overall system. The device is configured via an external EEPROM.

Pin Configuration QFN48-7x7



Pin Functions

No.	Name	Function
1 ... 4	PSINS, PCINS NSINS, NCINS	Signal Input Segment Channel
5 ... 8	PSINM, PCINM NSINM, NCINM	Signal Input Master Channel
9 ... 12	PSINN, PCINN NSINN, NCINN	Signal Input Nonius Channel
15	VBATS	Battery Supply Voltage Sensor Output
16	VBAT*	Battery Supply Voltage Input
17	DIR	Sense of Code Direction Preselection Input
18	PRES	Configurable Pres Input
19 ... 20	SCL, SDA	EEPROM I2C Interface
21 ... 26	MAO, SLI NMA*, MA* NSLO*, SLO*	Serial Interface (BiSS, SPI)
27	MTSLI	Multiturn Interface, data input
28	T3	External Trigger Input
29	MTMA	Multiturn Interface, clock output
30	RES	Reset Input
31	GND*	Ground
32	VDD*	+4.5 to 5.5 V Supply Voltage
33	NERR*	Error Message Output, System Error Message Input
34 ... 35	EP1, EP2	General purpose I/O pin
36	MNFOK	MNF Power OK
37 ... 40	PSOUT, PCOUT NSOUT, NCOUT	Analog Output Master Channel (1 Vpp)
41 ... 42	T0, T1	Calibration Signal Output
43, 45 ... 46	ACOM* ACON* ACOS*	Signal Level Controller Output (Master)
44	VACO*	+4.5 to 5.5V Signal Level Controller Supply
47	GNDA	Sub-System Ground Output
48	VDDA	Sub-System Positive Supply Output
	BP	Backside Pad

*) Pin is immune against faulty output or supply connection

Am Kuemmerling 18 · D-55294 Bodenheim, Germany · Phone: +49 (6135) 9292-300 · Fax: +49 (6135) 9292-192 · www.ichaus.com