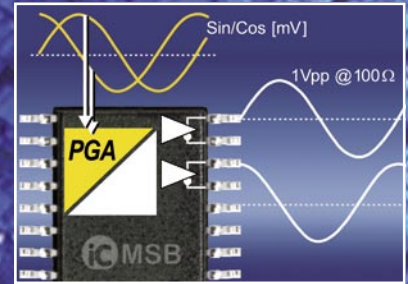


iC-MSB

SIN/COS SIGNAL CONDITIONER

WITH 1 Vpp DRIVER



Sensor signal conditioner iC-MSB provides highly accurate non-contact electronic trimming of sine and cosine sensor signals. The differential output signals can be calibrated to 1 Vpp; with the embedded signal level controller tracking sensor energizing the output levels are stabilized so that influences affecting the sensor's signal level (such as changes in supply, temperature, sensor efficiency etc.) are fully compensated for.

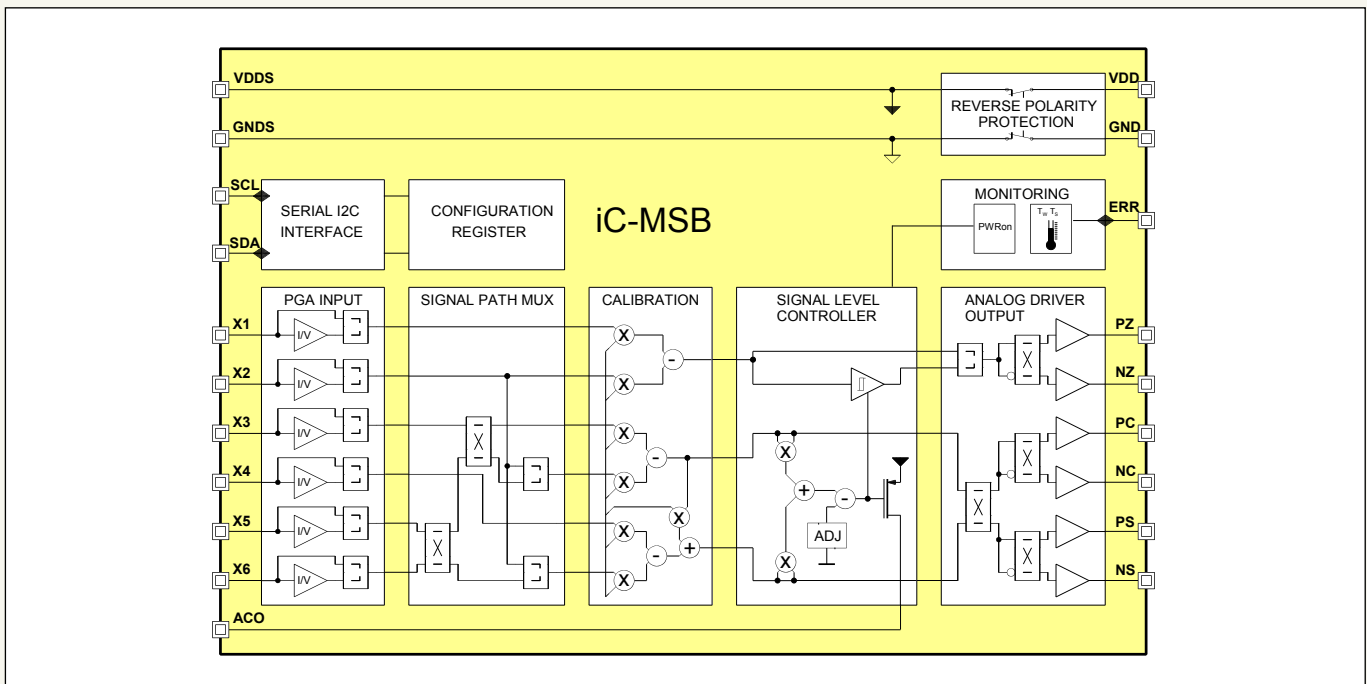
Programmable instrumentation amplifiers permit differential or single-ended input signals and have selectable coarse and fine gain levels. Direct connection of sine/cosine encoders, MR sensor bridges or photosensor arrays is possible and supported by a selectable input impedance.

Features

- Flexible pin assignment due to signal path multiplexers
- Differential or single-ended input signals
- Programmable instrumentation amplifiers
- Variable input resistance grants current/voltage conversion
- Signal conditioning for offset, amplitude and phase
- Short-circuit-proof analog output drivers (1 Vpp to 100 Ω)
- Controlled 50 mA current source as LED or MR bridge supply grants stabilized output signal levels
- Signal and system monitoring with configurable alarm output
- Device setup from serial EEPROM
- Sub-system power switch offers reverse polarity protection for the overall system
- Immune against faulty output or supply connections

Applications

- Programmable sensor interface for optical and magnetic position sensors
- Incremental encoders
- Linear scales



iC-MSB SIN/COS SIGNAL CONDITIONER WITH 1V_{pp} DRIVER

The signal conditioning unit includes several features, such as the balancing of various input signal amplitudes, the compensation of signal offset errors and the correction of phase errors between the sine and cosine signal.

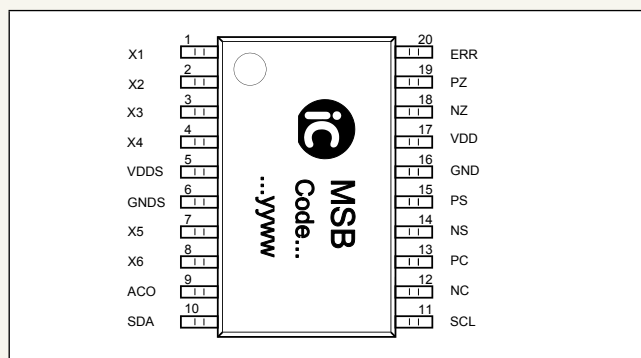
The conditioned signals are fed into the signal level controller which has a 50 mA driver stage (pin ACO). This output either powers the LED of an optical encoder or the magneto resistor bridges of a magnetic encoder. If the control thresholds are reached this is signaled at alarm message output ERR (signal loss due to wire breakage, short circuiting, dirt or aging, for example).

iC-MSB 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 Functions

No.	Name	Function
1	X1	Input Signal (Index)
2	X2	Input Signal (Index)
3	X3	Input Signal
4	X4	Input Signal
5	VDDS	Sub-system Positive Supply Output
6	GNDS	Sub-system Ground Output
7	X5	Input Signal
8	X6	Input Signal
9	ACO	Signal Level Controller Highside Output
10	SDA	Serial E2PROM Interface, data line
11	SCL	Serial E2PROM Interface, clock line
12	NC	S4 Neg. Cosine Output / Test Signal Output
13	PC	S3 Pos. Cosine Output / Test Signal Output
14	NS	S2 Neg. Sine Output / Test Signal Output
15	PS	S1 Pos. Sine Output / Test Signal Output
16	GND	Ground
17	VDD	+4.3 ... 5.5 V Supply Voltage
18	NZ	S6 Neg. Index Output / Test Signal Output
19	PZ	S5 Pos. Index Output / Test Signal Output
20	ERR	Alarm Message Output, Test Mode Trigger Input

Pin Configuration TSSOP20 4.4 mm



Key Specifications

Inputs and Signal Conditioning	
Differential Input Signal Range	10 mV _{pp} to 0.5 V _{pp} 40 mV _{pp} to 2 V _{pp}
Single-Ended Input Signal Range	20 mV _{pp} to 1 V _{pp} 80 mV _{pp} to 4 V _{pp}
Input Current Range	+/- 10 µA to +/- 300 µA
Input Resistance	typ. 1.6 kΩ to 4.6 kΩ (current mode) typ. 20 kΩ, or high impedance (voltage mode)
Permissible Input Frequency	to 500 kHz
Input Gain Range	0.5x to 25x and 2x to 100x
Gain Ratio Calibration Range	40 % to 250 % (sine vs. cosine)
Gain Calibration Step	0.09 %
Offset Calibration Range*	to +/- 100 %, +/- 200 %, +/- 600 %, +/- 1200 %
Offset Calibration Step*	0.1 %, 0.2 %, 0.6 %, 1.2 % (sin/cos channel) 3.2 %, 6.2 %, 18.8 %, 37.4 % (index channel)
*) based on calibration reference	
Calibration References	0.25 V, 0.5 V, VDC, 5 % V(ACO)
Phase Calibration Range	+/- 10.4 degree (sine vs. cosine)
Phase Calibration Step	0.02 degree

Analog Outputs

Output Amplitude	to 300 mV _p (@ RL 100 Ω pin-to-pin)
Output Short-Circuit Current	typ. 30 mA
Output Cutoff Frequency (-3dB)	> 500 kHz

Signal Level Controller

Control Modes	constant current, sine square, sum
Selectable Operating Ranges	to 5 mA, 10 mA, 25 mA, 50 mA (short-circuit-proof)
Source Saturation Volt.	1 V max.
Control Alarm Thresholds	approx. 2 % and 100 % of range limit

Sub-System Power Switch

Permissible Load Current	to 20 mA
Drop Out Voltage	200 mV per switch (@ 20 mA)

Other Operational Data

Supply Voltage	single 4.3 to 5.5 V, 30 mA max. (no current draw with reversed polarity)
Operational Temp. Range	-25 °C to +100 °C (ext. -40 °C to +125 °C)
Package	TSSOP20 4.4 mm (6.5mm x 6.4mm) or bare die
Device Configuration	via I2C multi-master interface from serial EEPROM or microcontroller
Monitoring and Alarms	lack of input signal (due to wire breakage, short-circuit, loss of magnet, etc.), excessive input signal level, signal level controller out of range, thermal overload, power up configuration error
Other Operational Modes	bias and temperature sensor calibration mode, device test mode

Compatible Sensors

Photodiode arrays, AMR sensors, GMR sensors
