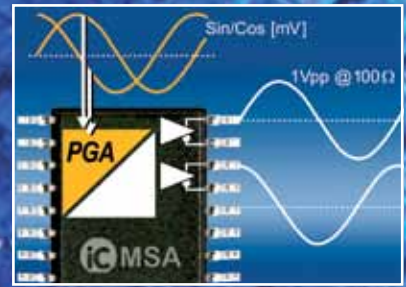


iC-MSA

SIN/COS SIGNAL CONDITIONER WITH AGC AND 1Vpp DRIVER



Sensor signal conditioner iC-MSA provides highly accurate non-contact electronic trimming of low frequency sine/cosine sensor signals. The differential output signals can be calibrated to 1 Vpp and are maintained by automatic gain control. Influences affecting the sensor's signal level (such as changes in supply, temperature, sensor efficiency etc.) are fully compensated for.

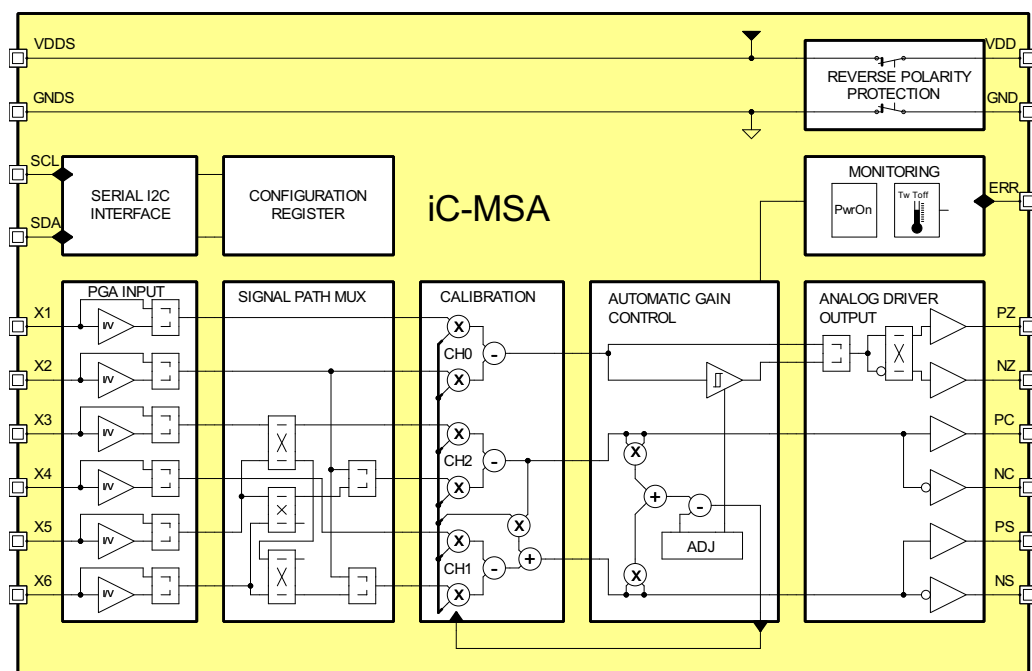
Programmable instrumentation amplifiers permit differential or single-ended input signals and have selectable coarse and fine gain levels. Direct connection of sine/cosine encoders, MR sensor bridges or photosensor arrays are possible and supported by a selectable input impedance.

Applications

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

Features

- Differential or single-ended inputs for up to 20 kHz
- Selectable adaptation to voltage or current signals
- Input multiplexers for flexible signal-to-channel assignment
- Programmable instrumentation amplifiers
- Signal conditioning for offset, amplitude and phase
- Automatic gain control with monitoring
- Short-circuit-proof analog output drivers (1 Vpp to 100 Ω)
- Immune against faulty output or supply connections
- Reverse polarity protection of the sub-system by power switch
- Adjustable thermal overload protection
- Monitoring functions with configurable error masking
- Alarm indication output
- Device setup from serial EEPROM (shared with iC-MSB)
- Footprint compatible to iC-MSB
- Single 5 V operation, from -40 °C to +115 °C





iC-MSA SIN/COS SIGNAL CONDITIONER WITH AGC

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.

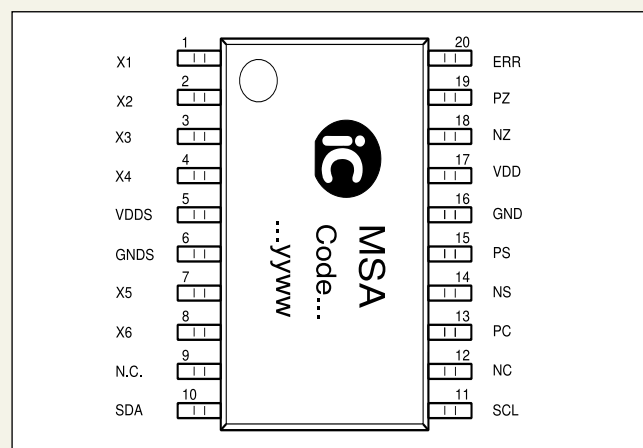
If the gain control thresholds are reached this is signalled at alarm message output ERR (signal loss for example due to wire breakage, short circuiting, dirt or aging).

iC-MSA 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 3
4	X4	Input Signal 4
7	X5	Input Signal 5
8	X6	Input Signal 6
5	VDDS	Switched Supply Output
6	GNDS	Sub-system Ground Output
9	N.C.	Not Connected
10	SDA	Serial Configuration Interface, data line
11	SCL	Serial Configuration Interface, clock line
12	NC	Negative Cosine Output
13	PC	Positive Cosine Output
14	NS	Negative Sine Output
15	PS	Positive Sine Output
16	GND	Ground
17	VDD	+4.3 V to +5.5 V Supply Voltage
18	NZ	Negative Index Output
19	PZ	Positive Index Output
20	ERR	Error Signal (In/Out), Test Mode Trigger Input

Pin Configuration TSSOP20 4.4 mm



Key Specifications

Inputs and Signal Conditioning	
Diff. Input Signal	10 mVpp to 0.5 Vpp, 40 mVpp to 2 Vpp
Single-Ended Input Signal	20 mVpp to 1 Vpp, 80 mVpp to 4 Vpp
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 imp. (V mode)
Permissible Input Frequency	to 20 kHz
Input Gain Range	nominal 0.75x to 7.83x, 2.98x to 31.3x with full-scale AGC 0.2x to 29x, 0.8x to 116x
Automatic Gain Control (AGC)	range +/-13 dB, step 0.09 dB, settling 2 ms/6 dB
Gain Ratio Calibration Range	approx. +/-20 % (sine vs. cosine, and index vs. sin/cos channel)
Gain Ratio Calibration Step	0.15 %
Offset Calibration Range*	+/-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, 5 % VDDS
Phase Calibration Range	+/-10.4 degree (sine vs. cosine)
Phase Calibration Step	0.02 degree

Analog Outputs

Output Amplitude	typ. 500 mVpp (controlled), open or terminated (by 100 Ω pin-to-pin)
Output Short-Circuit Current	typ. 30 mA, 50 mA max.
Output Offset Error	typ. +/-200 µV

Monitoring Functions

Lissajous Monitoring	min. 40 % Vpp, max. 130 % Vpp
AGC Alarm	beyond +/-11.4 dB
Temperature Alarm	typ. 12 K ahead of shutdown
Thermal Shutdown	adjustable between +80 °C to +155 °C
Configuration	CRC verification upon power up
Supply Voltage	undervoltage shutdown

Sub-System Power Switch

Permissible Load Current	to 20 mA
Voltage Drop	250 mV max. per switch (@ 20 mA)

Other Operational Data

Supply Voltage	single 4.3 V to 5.5 V, 50 mA max. (no current draw with reversed polarity)
Operational Temp. Range	-40 °C to +115 °C
Package	TSSOP20 4.4 mm (6.5 mm x 6.4 mm)
Device Configuration	via I ² C multi-master interface from serial EEPROM or microcontroller
Other Operational Modes	test and calibration modes

Compatible Sensors

Photodiode arrays (iC-PDxx series), AMR sensors, GMR sensors

This preliminary information is not a guarantee of device characteristics or performance. All rights to technical changes reserved.