

VLSI of magnetic position encoder

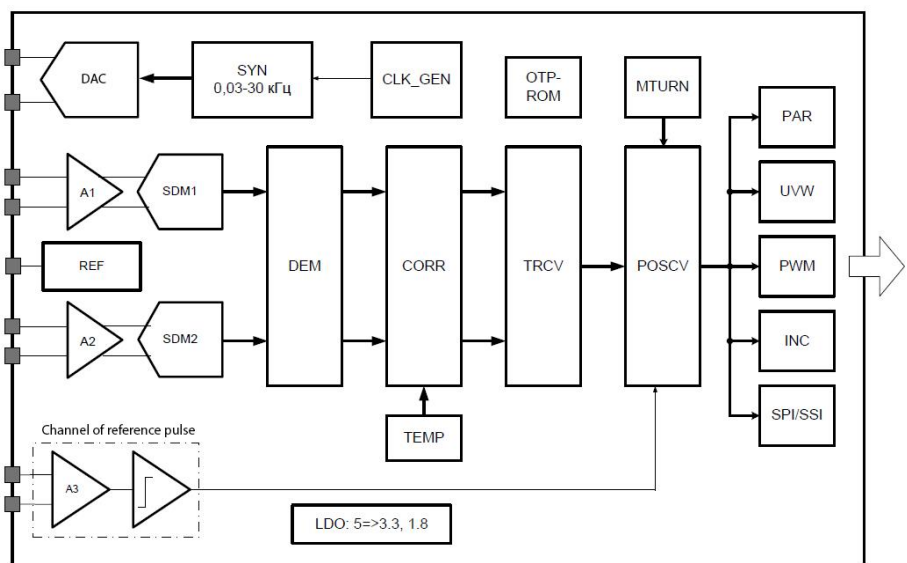
Purpose

IC is designed for converting sine-cosine signal from different position sensors into linear digital code, corresponding to the phase of sine-cosine signal (performing calculations of arctangent from input signals).

Principle of operation

IC has two converting channels for processing signals received from position sensor including programmable differential amplifiers A1, A2 and sigma-delta modulators SDM1, SDM2. Sent by modulators, output signal arrives in digital block DEM, providing quadrature amplitude demodulation, decimation and interpolation of input signal with up to 16 bit resolution and required time for conversion of 500 ns. Decimation filter provides programmable decimation from 32 to 4096 readings. For minimal decimation signal bandwidth constitutes 62.5 kHz.

Filtered and demodulated signal arrives in CORR unit, which provides signal correction, including temperature compensation for bias voltage drift of input signals by embedded temperature sensor TEMP, independently for each channel, tuning amplification coefficients of channels, as well as phase shift compensation between channels.



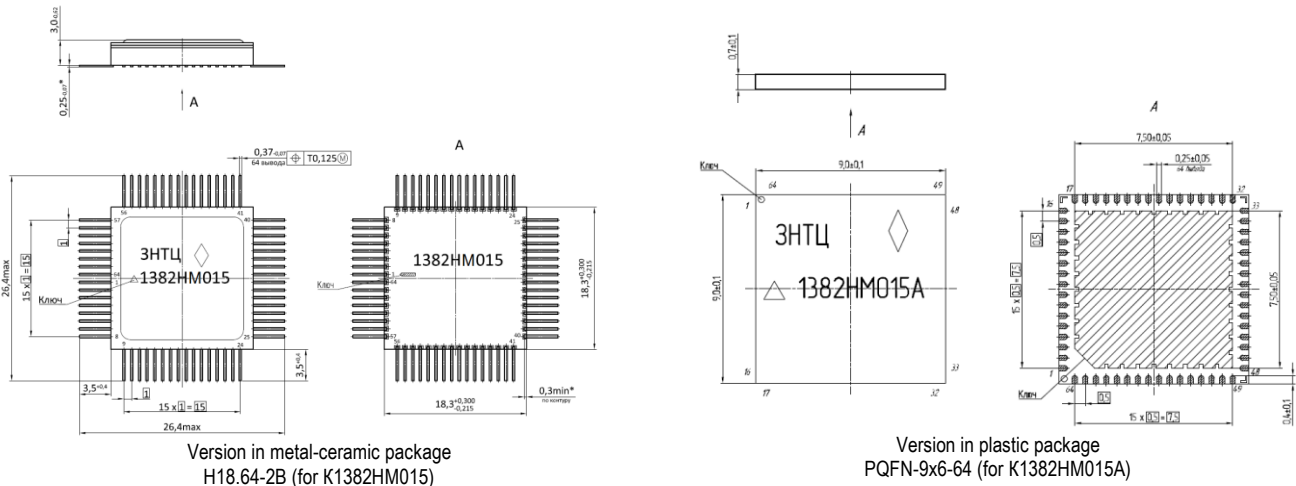
Technic specification

Conversion resolution, bit:	Res	13	14	15	16
Tracking rate (depending on resolution), not less than, Hz:	V Rate	244	122	61	30
Transformation time (depending on resolution), microseconds:	tc	8	10	12	15
Error coordinates of changing code values, E2:	number of low digits.	not more than 10			
Programmable reversible counter of revolutions:	Rev.	up to 1024			
Load current of digital inputs, mA:	IIO	not more than 4.0			
Output voltage by analogue output, V:	Uo	0. 25.4.75			
Resolution of embedded temperature sensor, °C:	REST	not more than 2			
Range of sine-cosine signal setting phase shift, deg:	DF0	- 30 ... +30			
Maximum operating frequency of interface SPI, MHz:	fspi	not less than 2			
Output synthesizer voltage amplitude (differential), V:	Uo.syn max	not less than 1.2			
Supply voltage, V	UCC	4.5 . 5.5			
Current consumption, mA:	ICC	15			
Output supply current of external sensor (at R _H = 100 Ohm), mA:	Io.sens	1.4			
Operating temperature range:	T	-0 . +120			

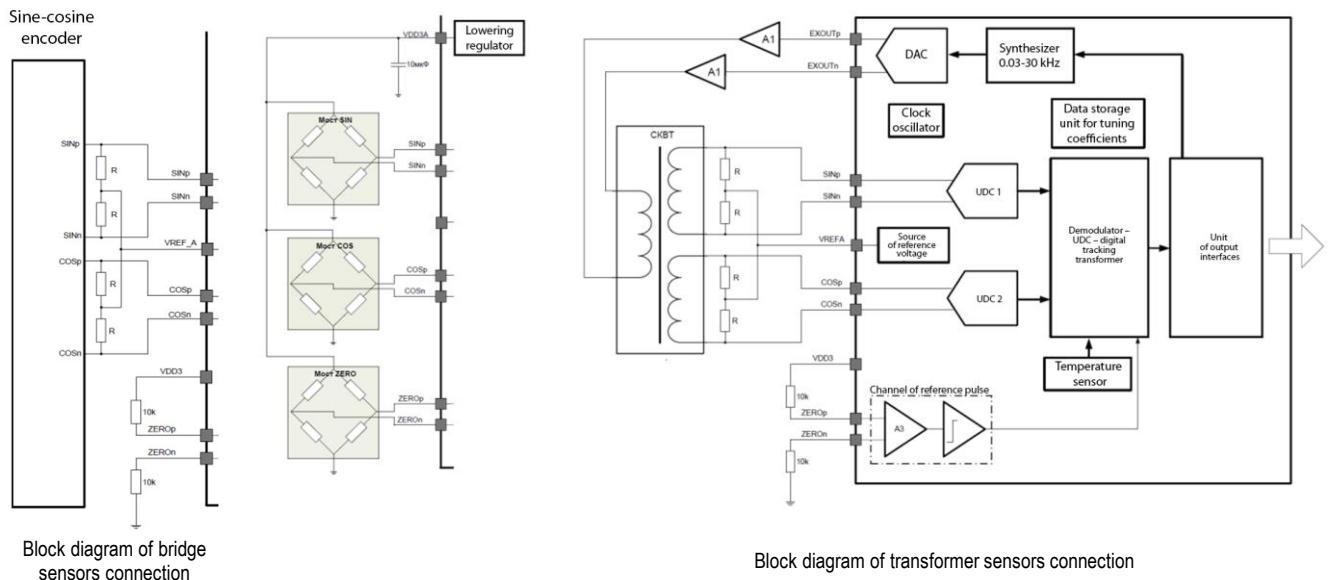
Output interfaces

- **Three-phase:** UVW-interface for collector-free engines with two- or four-pole rotor;
- **Serial:** SSI/SPI, used for setting (programming) ICs (in SPI mode), and issuing angular data (in SSI mode);
- **PDM output;**
- **Incremental:** forms signals of two types: A/B/INDEX; STEP/DIR.
- **Parallel:** forms hexadecimal code of angle;

Dimensions



Application diagrams



Applications

- ✓ Position sensors at Hall elements of magnetoresistor sensors;
- ✓ Sine-cosine encoders;
- ✓ Sine-cosine rotating transformers (SCRT);
- ✓ Linear differential transformers (LDT);