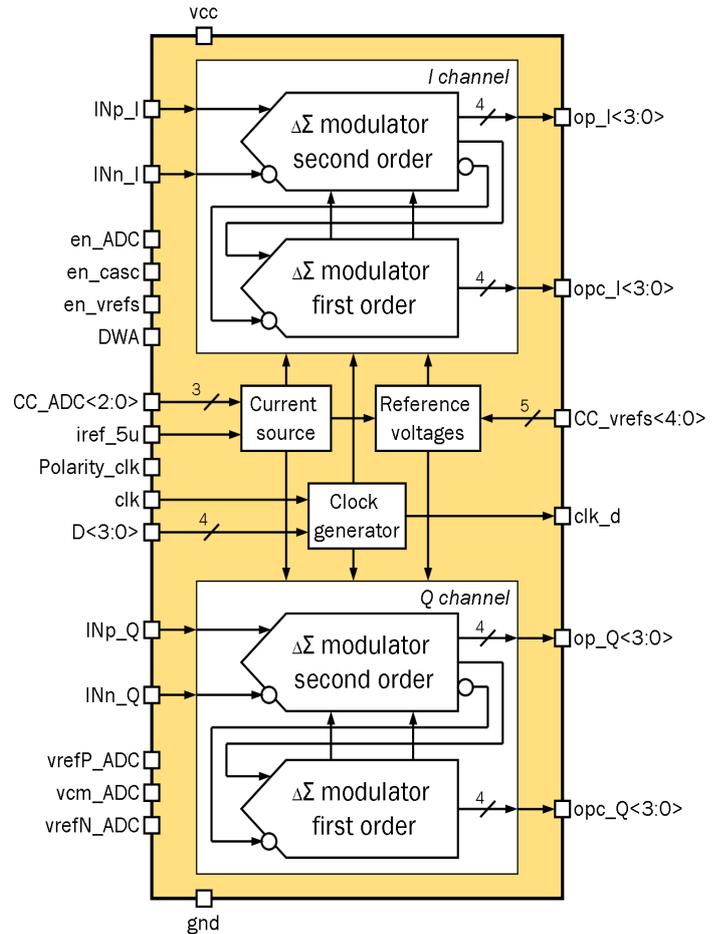


## 12-bit 2-channel 5 to 7.5 MSPS cascade delta-sigma ADC

### OVERVIEW

The block is third order cascade (2-1) delta-sigma ADC with 5-level quantizer in both stages. The block consists of: two delta-sigma modulators second and first order, coupled in series and combined by noise cancellation logic; clock splitter; block of bias currents, tunable (3-bit control); block of reference voltages, tunable (5-bit control); clock frequency divider (4-bit control); DWA-correction of capacitors' mismatch. Output signal is represented in thermometer code at the output of each stage. There is a possibility to disable the second stage of modulator to save the power with decreased accuracy. Next to options included: DWA correction algorithm; tuning of reference voltages buffers; tuning of bias current for operational amplifiers with 3-bit control; the clock frequency divider with integer ratio 1-15. Input signal common mode voltage is 1.65 V; recommended values of reference voltages:  $0.9 \pm 0.4$  V; recommended differential input signal amplitude - 0.64 V p-p; allowable duty cycle:  $50 \pm 5\%$ . IP technology: iHP SiGe BiCMOS 0.13  $\mu\text{m}$ . IP status: silicon proven. Area:  $0.23\text{mm}^2$ .



### ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Value			Units
			min	typ.	max	
Supply voltage	$V_{CC}$	-	2.7	3.3	3.6	V
Operating temperature	$T_j$	-	-40	+27	+85	$^{\circ}\text{C}$
Reference voltage	$V_{REF}$	-	0.5	0.9	1.3	V
Voltage reference supply current	$I_{VREFS}$	-	0.59	0.64	0.64	mA
Supply current (one channel)	$I_{ADC}$	With second cascade on	0.21	0.34	0.36	mA
		With second cascade off	0.17	0.25	0.26	mA
Total supply current	$I_{TOTAL}$	Both channels with second cascade on	1.11	1.40	1.47	mA
		Both channels with second cascade off	0.99	1.12	1.23	mA
Resolution	N	-	-	12	-	bit
Oversampling ratio	OSR	-	-	16	-	-
Bandwidth	BW	-	150	-	230	kHz
Sampling rate	$F_s$	-	5	-	7.5	MSPS
Duty cycle	DC	-	45	50	55	%
Standby power	$P_{STB}$	-	0.18	1.08	3.43	$\mu\text{W}$
Total power	$P_{TOTAL}$	Both channels with second cascade on	2.99	4.62	5.29	mW
		Both channels with second cascade off	2.67	3.70	4.43	mW
Differential input voltage range	$A_{IN,p-p}$	-	-	0.64	-	V p-p
Common mode voltage	U	-	-	1.65	-	V
Signal to noise ratio	SNR	Band 150 kHz	47	-	62	dB
Spurious-free dynamic range	SFDR	-	60	-	70	dB
Input high-logic level	$V_{IH}$	For digital inputs	$0.7 \cdot V_{CC}$	-	$V_{CC} + 0.25$	V
Input low-logic level	$V_{IL}$		-0.25	-	$0.3 \cdot V_{CC}$	V