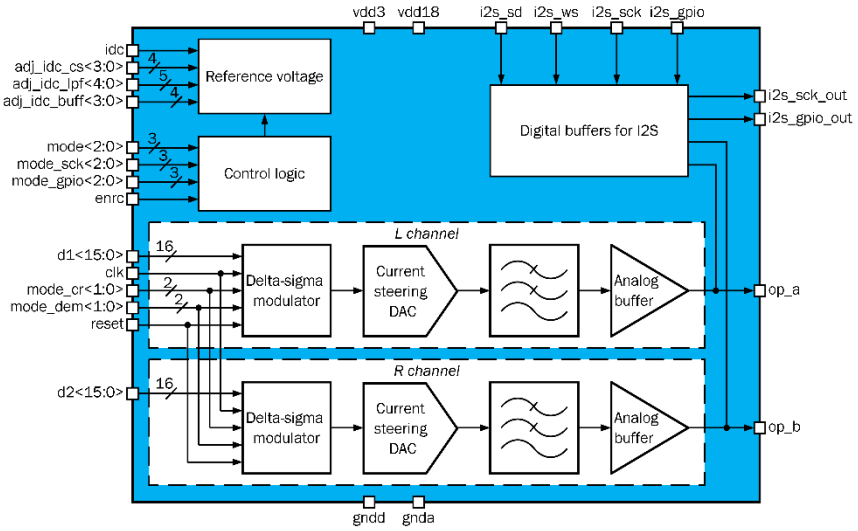
16-bit 2-channel 25 kHz bandwidth delta-sigma stereo, audio DAC

OVERVIEW



180TSMC_DAC_03 contains: reference voltage, control logic, digital buffers I2S interface, two identical channels L and R: 2-order delta-sigma modulator, current steering DAC, low pass filter, analog buffer. Delta-sigma stereo, audio DAC requires 2.8 ÷3.6V analog supply, 1.62 ÷ 1.98V digital supply, reference current 4.95 ÷ 5.05uA, input clock with duty cycle 45 ÷ 55%. Delta-sigma stereo, audio DAC supports standby mode. There is the ability to configure the operating modes of the delta-sigma stereo, audio DAC with digital registers: register **mode<2:0>** controls the modes of the delta-sigma stereo, audio DAC and I2S interface, register **mode_sck<2:0>** controls the modes of I2S interface, register **mode_gpio<2:0>** controls the modes of I2S interface. There is the ability to configure current consumption of the delta-sigma stereo, audio DAC with digital register: register **adj_idc_buff<3:0>** adjusts current of the analog buffer, register **adj_idc_cs<3:0>** adjusts current of the current steering DAC, register **adj_idc_lpf<4:0>** adjusts current of the low pass filter, signal **enrc** adjusts current of current steering DAC changing linearity of the current steering DAC.

IP technology: TSMC SiGe BiCMOS 0.18 um.

IP status: silicon proven.

Area: 0.57mm^2.

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions		Value			Units
				min	typ.	max	
Analog blocks supply voltage	V_{dd3}	-		2.8	3.0	3.6	V
Digital blocks supply voltage	V_{dd18}	-		1.62	1.8	1.98	V
Operating temperature range	T_j	-		-40	+27	+80	°C
Reference current	I_{idc}	-		4.95	5.00	5.05	uA
Duty cycle	S	-		45	50	55	%
Resolution	N	-		-	16	-	bit
Clock frequency	F_{clk}	-		8	-	32	MHz
Oversampling ratio	OSR	-		-	512	-	-
Standby current	I_{stb}	Analog parts		1.0	1.2	8.9	nA
		Digital parts		0.008	0.05	5.4	uA
Output voltage range peak to peak	A_{INp-p}	-		-	1	-	V
Input signal bandwidth	F_b	-		7.8	-	31.25	kHz
Low power dissipation	P_d	Low impedance mode R_{load} = 32Ohm		-	61.3	-	mW
		Low impedance mode R_{load}=32kOhm		-	5.95	-	mW
Current consumption digital parts	I_{cc_d}	F_{clk} = 25MHz, F_b = 12.2kHz		-	0.5	-	mA
Current consumption analog parts	I_{cc_a}	F_{clk} = 25MHz, F_b = 12.2kHz	R_{load} = 32Ohm	-	20	-	mA
			without R_{load}	11.8	13	16.22	mA
			R_{load} = 32kOhm	1.52	1.55	1.63	mA
Spurious-free dynamic range	SFDR	F_{clk}=25MHz, F_b=12.2kHz	R_{load} = 32Ohm	-	83	-	dB
			R_{load}=32kOhm	-	76	-	dB
Signal-to-noise ratio	SNR	F_{clk}=25MHz, F_b=12.2kHz	R_{load} = 32Ohm	-	69	-	dB
			R_{load}=32kOhm	-	73	-	dB
Clock frequency I2S interface	F_{clk}	C_{load} = 10pF		-	-	32	MHz
High input voltage level	V_{IH}	-		$0.7V_{dd18}$	-	-	V
Low input voltage level	V_{IL}			-	-	$0.3V_{dd18}$	V