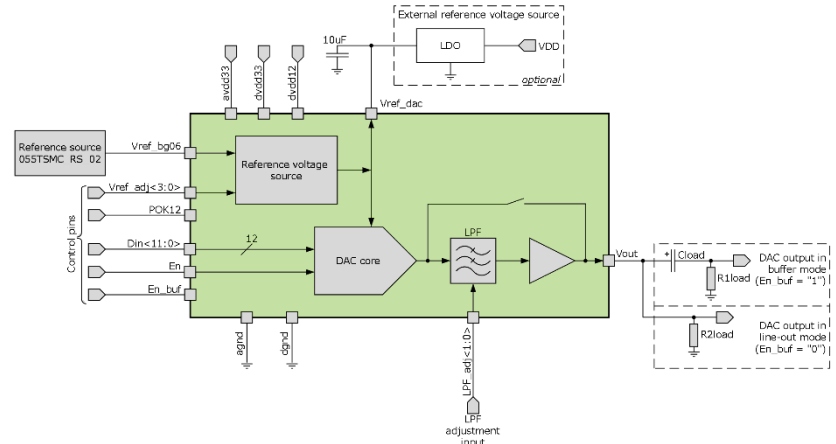


12-bit 1-channel 44 -200 kSPS R/2R DAC

OVERVIEW

055TSMC_DAC_02 is a 12-bit 1-channel R/2R DAC designed to generate analog audio-voice signals with a line output. The block consists of a reference voltage source, DAC core, low-pass filter (LPF) and a buffer.

IP technology: TSMC CMOS 55nm
 IP status: silicon proven
 Area: 0.091mm²



ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Value			Units	
			min	typ.	max		
Supply voltage	V _{avdd33}	-	2.25	2.5	3.6	V	
	V _{dvdd33}	-	2.25	2.5	3.6		
	V _{dvdd12}	-	1.08	1.2	1.32		
Operating temperature range	T _j	-	-45	25	+85	°C	
Current consumption in normal operation mode with internal bandgap	I _{vdd_bg_int}	Buffer mode output; R _{load} =200Ω	1.2	1.5	3.5	mA	
		Line output mode; R _{load} =100kΩ	0.08	0.1	0.13	mA	
Current consumption in normal operation mode with an external bandgap	I _{vdd_bg_ext}	Buffer mode output; R _{load} =200Ω	1.15	1.47	3.37	mA	
		Line output mode; R _{load} =100kΩ	52.55	66.07	74.93	uA	
Current consumption of digital part in shutdown mode	I _{vdd_shd}	-	1.3	6	39.6	nA	
Short-circuit current	I _{sh_c}	-	-	250	-	mA	
Reference voltage	V _{ref_bg06}	-	-	0.6	-	V	
Output impedance	R _{out}	Buffer mode output	-	0.1	-	Ω	
		Line output mode	20	30	40	kΩ	
Input logic-high level	V _{IH_12}	For digital inputs, except POK12 input	V _{dvdd12} -0.25	-	V _{dvdd12}	V	
Input logic-low level	V _{IL_12}		0	-	0.25		
Input logic-high level	V _{IH_33}	For POK12 digital input	V _{dvdd33} -0.25	-	V _{dvdd33}	V	
Input logic-low level	V _{IL_33}		0	-	0.25		
Resolution	N	-	-	12	-	bit	
Sampling rate	F _s	-	44	200	-	kSPS	
Output frequency	F _{out}	-	0	-	20	kHz	
Output signal amplitude	V _{FS}	V _{ref_adj} <3:0>	0.6	-	2.0	V	
Spurious-free dynamic range	SFDR	R _{load} =100kΩ	F _{out} =1kHz	-	73.5	-	dB
			F _{out} =5kHz	-	59.6	-	
		R _{load} =200Ω	F _{out} =1kHz	-	65.7	-	
			F _{out} =5kHz	-	65.4	-	
Signal-to-noise and distortion ratio	SINAD	R _{load} =100kΩ	F _{out} =1kHz	-	67.6	-	dB
			F _{out} =5kHz	-	55.0	-	
		R _{load} =200Ω	F _{out} =1kHz	-	62.4	-	
			F _{out} =5kHz	-	63.1	-	
Differential nonlinearity	DNL	-	-	-	±1	LSB	
Integral nonlinearity	INL	-	-	-	±2	LSB	
Load capacity	C _{load}	Buffer mode output	-	44	-	uF	
		Line output mode	-	-	30	pF	
Filter order	k	-	-	1	-	-	
LPF cutoff frequency at 3dB	F _{cut}	Adjustable	mode 1	38	49	64	kHz
			mode 2	20	25	33	
			mode 3	14	17	22	
			mode 4	10	13	16	