

10-bit 1-channel 1 - 100 MSPS current DAC
OVERVIEW

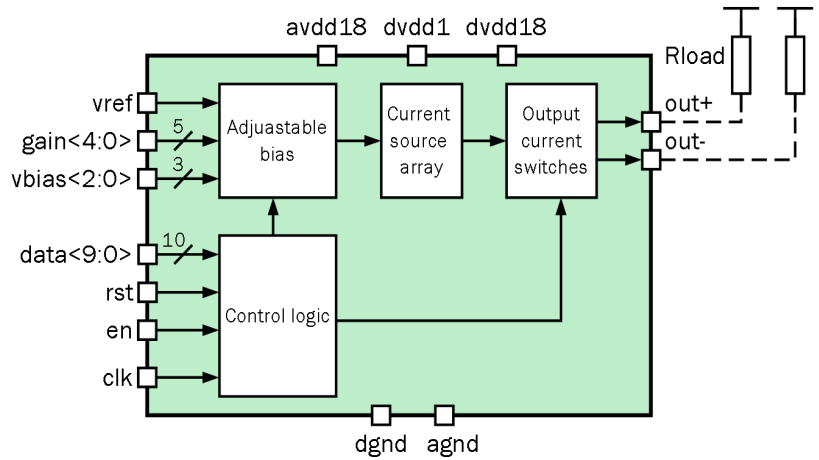
090TSMC_DAC_01 is based on current steering architecture, which provides high-speed conversion rate and good dynamic performance. DAC consists of four principal blocks: adjustable bias, control logic, current source array and current output switches. DAC requires 1V digital supply, 1.8V digital and analog supply, and digital and analog ground to work properly.

The DAC provides differential current outputs to support single ended or differential configurations. The output currents can be used to drive directly two external resistive loads to obtain two complementary single-ended output voltages, or can be used to drive an external transformer (or amplifier) to obtain a single-ended output voltage. The DAC uses a segmented thermometer decoded current steering architecture, with 8 thermometers and 2 binary bits to achieve simultaneously high update rate and good dynamic characteristics. External voltage reference is used to set the full-scale current of the DAC and operating points of subcircuits.

IP technology: TSMC CMOS 90nm.

IP status: silicon proven.

Area: 0.0984mm².


ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Value			Units
			min	typ.	max	
Analog and digital supply voltage	V _{avdd18}	-	1.7	1.8	1.9	V
Analog and digital supply voltage	V _{dvdd1}	-	0.9	1.0	1.1	V
Operating temperature range	T _j	-	-40	27	+125	°C
Resolution	N	-	-	10	-	bit
Spurious-free dynamic range	SFDR	Measured in Nyquist band F _{in} ≤ 25MHz	60	60	66	dB
Sampling rate	F _s	-	1	-	100	MSPS
Differential nonlinearity	DNL	-	-	±1	-	LSB
Integral nonlinearity	INL	-	-	±1	-	LSB
Output current	I _{out}	Minimal gain	-	1.50	-	mA
		Maximal gain	-	18.50	-	
Load resistor	R _{load}	-	-	25	-	Ohm
Reference voltage	V _{ref}	-	-	1.2	-	V
Output compliance range	V _{out compl}	-	1	-	2	V
Clock duty cycle	DC _{clk}	-	45	50	55	%
Startup time	T _{start}	From En = "0" to En = "1", Bias+DAC core	-	3	-	us
Setup time	T _{st}	-	-	0.5	-	ns
Hold time	T _h	-	-	0.5	-	ns
Power consumption	P _{diss}	Minimal gain	-	3.1	-	mW
		Maximal gain	-	35.5	-	
DAC core power consumption	P _{DAC_core}	Minimal gain	-	2.7	-	mW
		Maximal gain	-	33.3	-	
Standby current	I _{sb}	-	-	10	-	uA
Input high-logic level	V _{IH}	-	0.7*V _{dvdd1}	-	V _{dvdd1}	V
Input low-logic level	V _{IL}	-	0	-	0.3*V _{dvdd1}	