GENERAL DESCRIPTION

lpf0428x is developed for analog conversion of PWM input and analog low pass filtering function for audio signal processing. The core consists of D-F/F and active R-C analog filter. And it has analog 2.3 volts supply operation.

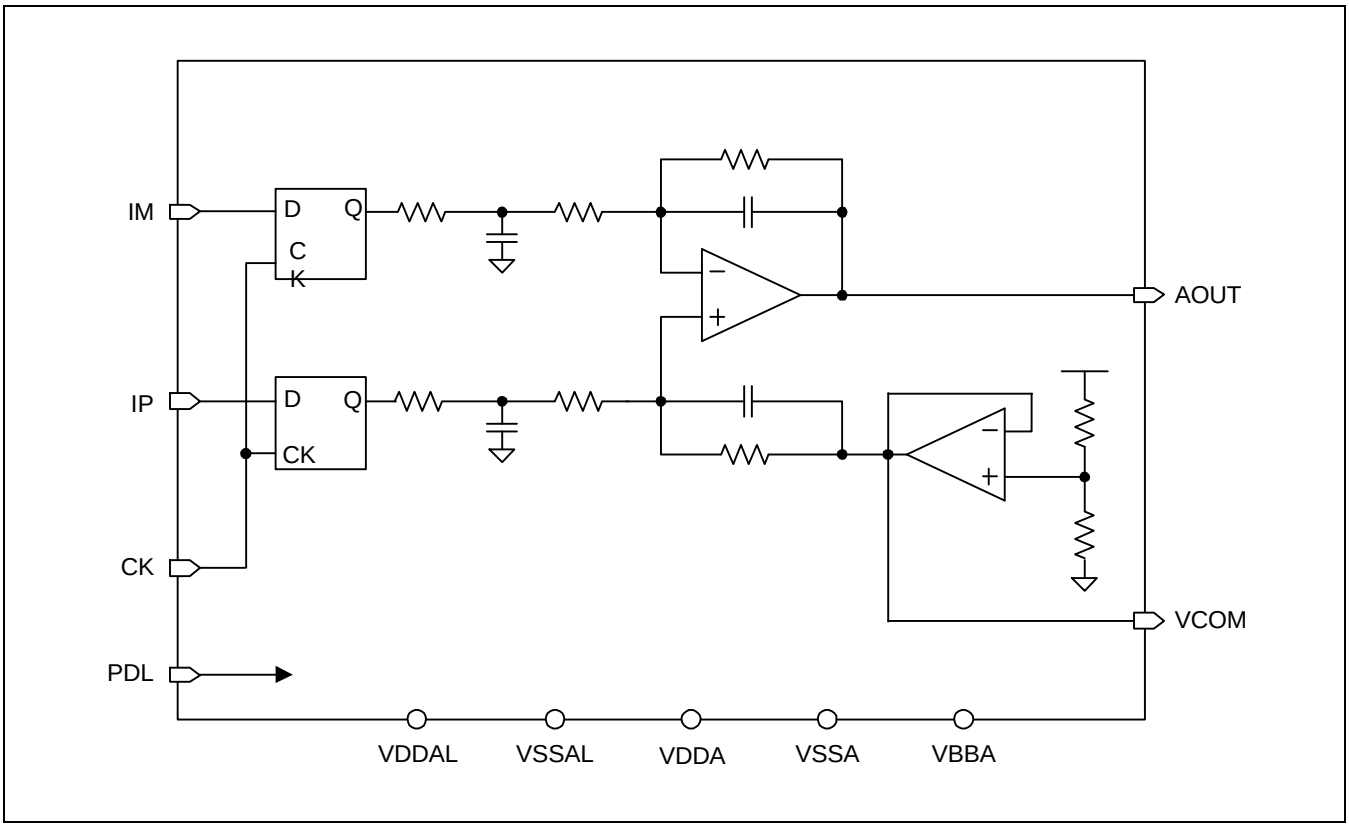
FEATURES

— Analog 2.3Volt Operation
— 2'nd Order Low Pass Filter
— On chip common level generator

APPLICATIONS

— Audio Signal Player

FUNCTIONAL BLOCK DIAGRAM



Ver 1.3 (Nov 2001)

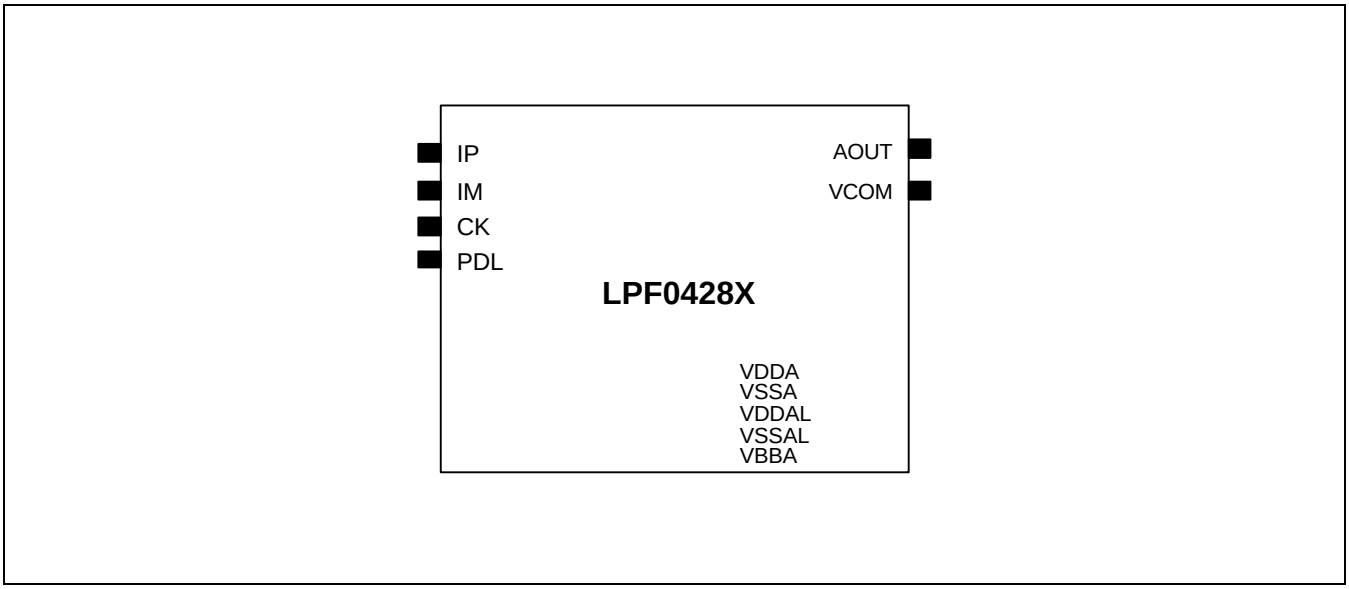
CORE PIN DESCRIPTION

Pin Name	I/O Type	I/O Pad	Pin Description
AOUT	AO	pmoa_abb	Analog Output
VCOM	AO	pmoa_abb	Analog Common Level Output
IP	DI	pmicc_abb	PWM Positive Input
IM	DI	pmicc_abb	PWM Negative Input
CK	DI	pmicc_abb	Master Clock Input
PDL	DI	pmicc_abb	Power Down (Active Low)
VDDA	AP	vdd2t_abb	Analog Power
VSSA	AG	vss2t_abb	Analog Ground
VDDAL	AP	vdd2t_abb	Analog Logic Power
VSSAL	AG	vss2t_abb	Analog Logic Ground
VBBA	AG	vbb_abb	Bulk

I/O Type Abbr.

— AI: Analog Input
— DI: Digital Input
— AO: Analog Output
— DO: Digital Output
— AB: Analog Bi-direction
— DB: Digital Bi-direction
— AP: Analog Power
— AG: Analog Ground
— DP: Digital Power
— DG: Digital Ground

CORE CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Value	Unit
Supply Voltage	VDDA, VDDAL	5.0	V
Analog Output Voltage	-	VSSA-0.15 ~ VDDA+0.15	V
Digital Input Voltage	-	VSSAL+0.5 ~ VDDAL-0.15	V
Storage Temperature Range	Tstg	-45 to 125	°C

NOTES:

1. ABSOLUTE MAXIMUM RATING specifies the values beyond which the device may be damaged permanently. Exposure to ABSOLUTE MAXIMUM RATING conditions for extended periods may affect reliability. Each condition value is applied with the other values kept within the following operating conditions and function operation under any of these conditions is not implied.
2. All voltages are measured with respect to VSSA unless otherwise specified.
3. 100pF capacitor is discharged through a 1.5KΩ resistor (Human body model)

RECOMMENDED OPERATING CONDITIONS

Characteristics	Symbol	Min	Typ	Max	Unit
Supply Voltage	VDDA, VDDAL	-	2.3	-	V
Digital Input High Voltage		1.8	-	-	V
Digital Input Low Voltage		-	-	0.5	V
Operating Temperature	Topr	0	-	70	°C

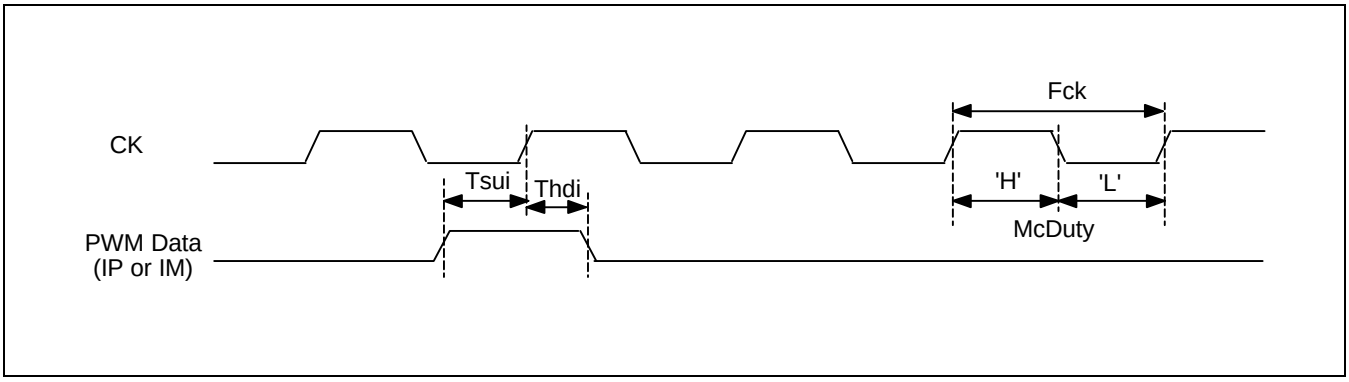
NOTE: It is strongly recommended that all the supply pins (VDDA, VDDAL) be powered from the same source to avoid power latch-up.

AC ELECTRICAL CHARACTERISTICS

(Measurement Bandwidth is 20Hz~20kHz. Full scale input sine wave 1kHz, CK=16.9344MHz, VDDA=2.3V, VDDAL=2.3V Ta=55°C,Unless otherwise specified.)

Characteristics	Symbol	Min	Typ	Max	Unit	Conditions
Total Harmonic Distortion	THD	-	TBD	-	%	0dB 1kHz Sine Wave Input
Clock Frequency	Fck	-	16.9344	-	MHz	-
Signal to Noise Ratio	SNR	-	TBD	-	dB	0dB 1kHz Sine Wave Input
Offset Voltage	Vos	-	-	±20	mV	Zero Level Input
Analog Output Maximum Range	Vmax	-	2.0	-	Vpp	-
Common Level Voltage	Vcom	-	VDDA/2	-	V	-
Analog Output Load Resistor	Rld	10	-	-	kΩ	-
Analog Output Load Capacitor	Cld	-	-	10	pF	-
Operating Current	Iopr	-	1.1	-	mA	-
Power Down Current	Ipwdn	-	1	-	uA	-

TIMING DIAGRAM



Parameter	Symbol	min	typ	max	Units
Data Setup Time	Tsui	-	20	-	ns
Data Hold Time	Thdi	-	20	-	ns
CK Clock frequency	Fck	-	16.9344	-	MHz
CK Duty ratio	McDuty	-	50	-	%

FUNCTION DESCRIPTION

Power Down

PDL control the power down function of lpf0428x.

PDL	Function
L	Power Down Digital inputs (CK, IP, IM) is blocked by nand gate
H	Normal Operation

HISTORY CARD

Version	Date	Modified Items	Comments
Ver 1.0	Aug 2001	1. First preliminary version published.	
Ver 1.1	Sep 2001	1. Delay Cell Included by customer request. So 6 pins were added. (SA,SB,SC,SD,DLYIM,DLYIP)	
Ver 1.2	Sep 2001	1. The modified items of ver. 1.1 was canceled. 2. The PDL_DF pin added. The buffered output of D-F/F (IMQ,IPQ) was added.	
Ver 1.3	Nov 2001	1. Ver 1.2 was canceld. 2. Return to ver 1.0	