Ordering number : ENA0720A

SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

Bi-CMOS LSI

LV3311PNM — For Car Audio Systems Electronic Volume IC

Overview

The LV3311PNM is an electronic volume IC implements a rich set of audio control functions with a minimal number of external components. Functions include input selection switching function, an input gain, volume, loudness, balance, fader, bass/mid/treble and subwoofer control.

Features

- It is possible to eliminate from the external components of equalizer control block by SCF technology.
- Zero-cross switching circuits (Volume control block and Fader control block), soft step (3 band equalizer control and Suboofer control) and soft mute circuits used for low noise even when input signals are present.
- Low power consumption due to the use of BiCMOS process.
- All functions are controlled using serial data (CCB).

Features

- Input selector :
  Four of the input systems are single-end inputs, one uses differential inputs.
- Input gain control :
  The input single can be amplified by 0 to +18dB (1dB steps.)
- Loudness control :
  Taps are output starting at the -32dB position of the ladder resistor and a loudness function implemented with external capacitor and resistor components.
- Volume control : +10dB to -79dB/-∞ (1dB steps)
  L/R independent control.

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- Bass control :
  The bass control gain can be maximum boost +12dB position and maximum cut -12dB position.
  (+12dB to -12dB in 2dB steps.)
  The bass control center frequency 70Hz/100Hz/120Hz can be selected.
  The bass control quality factor 1.0/2.0 can be selected.
- Middle control :
  The middle control gain can be maximum boost +12dB position and maximum cut -12dB position.
  (+12dB to -12dB in 2dB steps.)
  The middle control center frequency 700Hz/1KHz/1.2KHz can be selected.
  The middle control quality factor 1.0/2.0 can be selected.
- Treble control :
  The treble control gain can be maximum boost +12dB position and maximum cut -12dB position.
  (+12dB to -12dB in 2dB steps.)
  The treble control center frequency 7KHz/10KHz/12KHz can be selected.
  The treble control quality factor 1.0/2.0 can be selected.
- Fader control :
  The fader volume can be attenuations by one of 16 levels. Independent control each four channels.
  (A total of 16 settings with attenuations of 0 to –2dB in 1dB steps, -2 to -20dB in 2dB steps, and
  -30, -45, -60, and -∞dB settings.)
- Subwoofer control :
  A total of 81 positions from 0 to -79dB in 1dB steps and -∞dB.
  The low pass filter 80Hz/120Hz/160Hz can be selected. Fedar two channels output only of rear or either of the subwoofer output is selected.
- Mute

Specifications

Absolute Maximum Ratings at Ta = 25°C, V_{SS} = 0V

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{DD} max	V_{DD}	9.5	V
Maximum input voltage	V_{IN} max	All input pins	V_{SS}-0.3 to V_{DD}	V
Allowable power dissipation	Pd max	Ta ≤ 85°C, when mounted on a printed circuit board *	600	mW
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-50 to +125	°C

* Specified circuit board : 114.3×76.1×1.6mm^3 : glass epoxy board

Allowable Operating Ratings at Ta = 25°C, V_{SS} = 0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage	V_{DD}	V_{DD}	7.0	8.0	9.0	V
High-level input voltage	V_{IH}	CL, DI, CE	4.5		5.5	V
Low-level input voltage	V_{IL}	CL, DI, CE	V_{SS}		1.0	V
Input voltage amplitude	V_{IN}		V_{SS}		V_{DD}	Vp-p
Input pulse width	TϕW	CL	1			μs
Setup time	Tsetup	CL, DI, CE	1			μs
Hold time	Thold	CL, DI, CE	1			μs
Operating frequency	fopg	CL			500	kHz

Electrical Characteristics at Ta = 25°C, V_{DD} = 8V, V_{SS} = 0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input block						
Input resistance	Rin	L1-L4, R1-R4		50		kΩ
Minimum input gain	Gin min	L1-L4, R1-R4	-1.0	0	+1.0	dB
Maximum input gain	Gi max		+17	+18	+19	dB
Inter-step setting error	ATerr		-1.0		+1.0	dB
Left/Right balance	BAL		-0.5		+0.5	dB
Volume block						
Input resistance	Rvr	LVRIN, RVRIN		50		kΩ
Inter-step setting error	ATerr	+10dB to -40dB	-0.5		+0.5	dB
Left/Right balance	BAL		-0.5		+0.5	dB
Bass block						
Bass control range	Gb max	max. boost/cut	±10	±12	±14	dB
Inter-step setting error	ATerr	-10dB to +10dB	-1.0		+1.0	dB
Left/Right balance	BAL		-1.0		+1.0	dB
Center frequency	f01	GAIN = ±12dB		70		Hz
	f02			100		Hz
	f03			120		Hz
Quality Factor	Q01	GAIN = ±12dB		1.0		
	Q02			2.0		
Mid block						
Mid control range	Gb max	max. boost/cut	±10	±12	±14	dB
Inter-step setting error	ATerr	-10dB to +10dB	-1.0		+1.0	dB
Left/Right balance	BAL		-1.0		+1.0	dB
Center frequency	f01	GAIN = ±12dB		700		Hz
	f02			1		kHz
	f03			1.2		kHz
Quality Factor	Q01	GAIN = ±12dB		1.0		
	Q02			2.0		
Treble block						
Treble control range	Gb max	max. boost/cut	±10	±12	±14	dB
Inter-step setting error	ATerr	-10dB to +10dB	-1.0		+1.0	dB
Left/Right balance	BAL		-1.0		+1.0	dB
Center frequency	f01	GAIN = ±12dB		7		kHz
	f02			10		kHz
	f03			12		kHz
Quality Factor	Q01	GAIN = ±12dB		1.0		
	Q02			2.0		
Subwoofer block						
Sub volume inter-step setting error	ATerr	0dB to -40dB	-0.5		+0.5	dB
LPF center frequency	f0			80		Hz
	f1			120		Hz
	f2			160		Hz
Fader block						
Input resistance	Rfed			50		kΩ
Inter-step setting error	ATerr	0dB to -2dB	-0.5		+0.5	dB
		-4dB to -20dB	-1.0		+1.0	dB
		-30dB	-2.0		+2.0	dB
		-45dB	-3.0		+3.0	dB
Left/Right balance	BAL	0dB to -30dB	-0.5		+0.5	dB

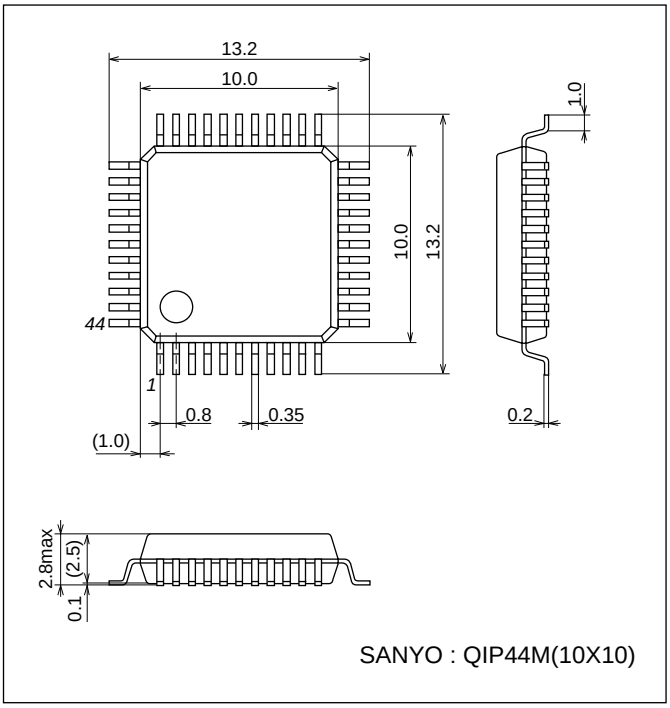
Overall Characteristics at Ta = 25°C, V_{DD} = 8V, V_{SS} = 0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
A loss of insertion	ATT		-1.0		+1.0	dB
Total harmonic distortion	THD	V_{IN} = 1Vrms, f = 1kHz		0.01		%
Inter-input crosstalk	CT	V_{IN} = 1Vrms, f = 1kHz		80		dB
Left/Right channel crosstalk	CT	V_{IN} = 1Vrms, f = 1kHz		80		dB
Maximum attenuation	V_O min	V_{IN} = 1Vrms, f = 1kHz		80		dB
Output noise voltage	VN			25		μV
Current drain	I_{DD}			20		mA
Input high-level current	I_{IH}	CL, DI, CE, V_{IN} = 5.5V			10	μA
Input low-level current	I_{IL}	CL, DI, CE, V_{IN} = 0V	-10			μA
Maximum input voltage	VCL	THD = 1% RL = 10kΩ all controls flat, f_{IN} = 1kHz		2.2		Vrms
Common-mode rejection ratio	CMRR	V_{IN} = 0dBV, f = 1kHz		50		dB

Package Dimensions

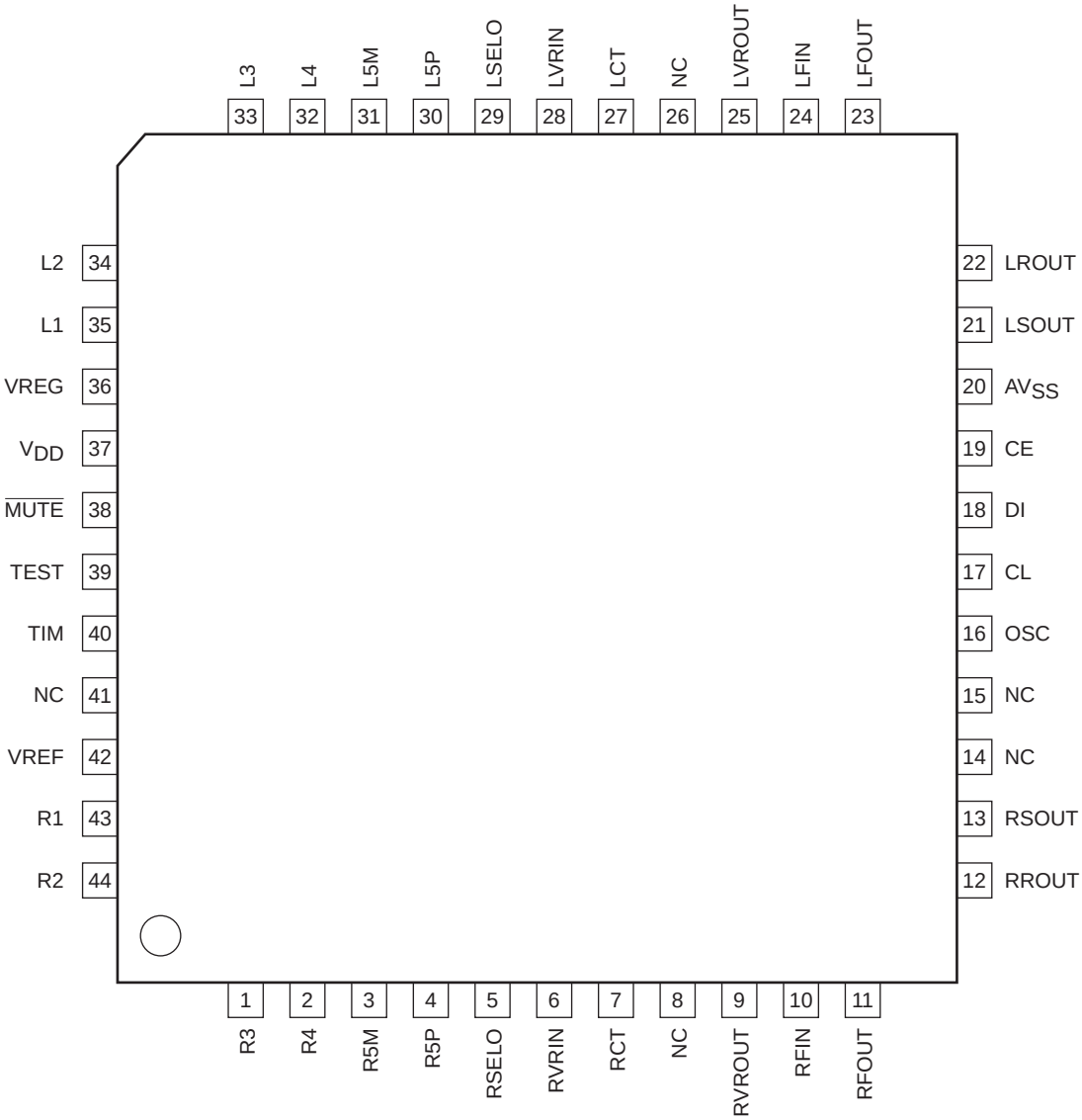
unit : mm (typ)

3148A

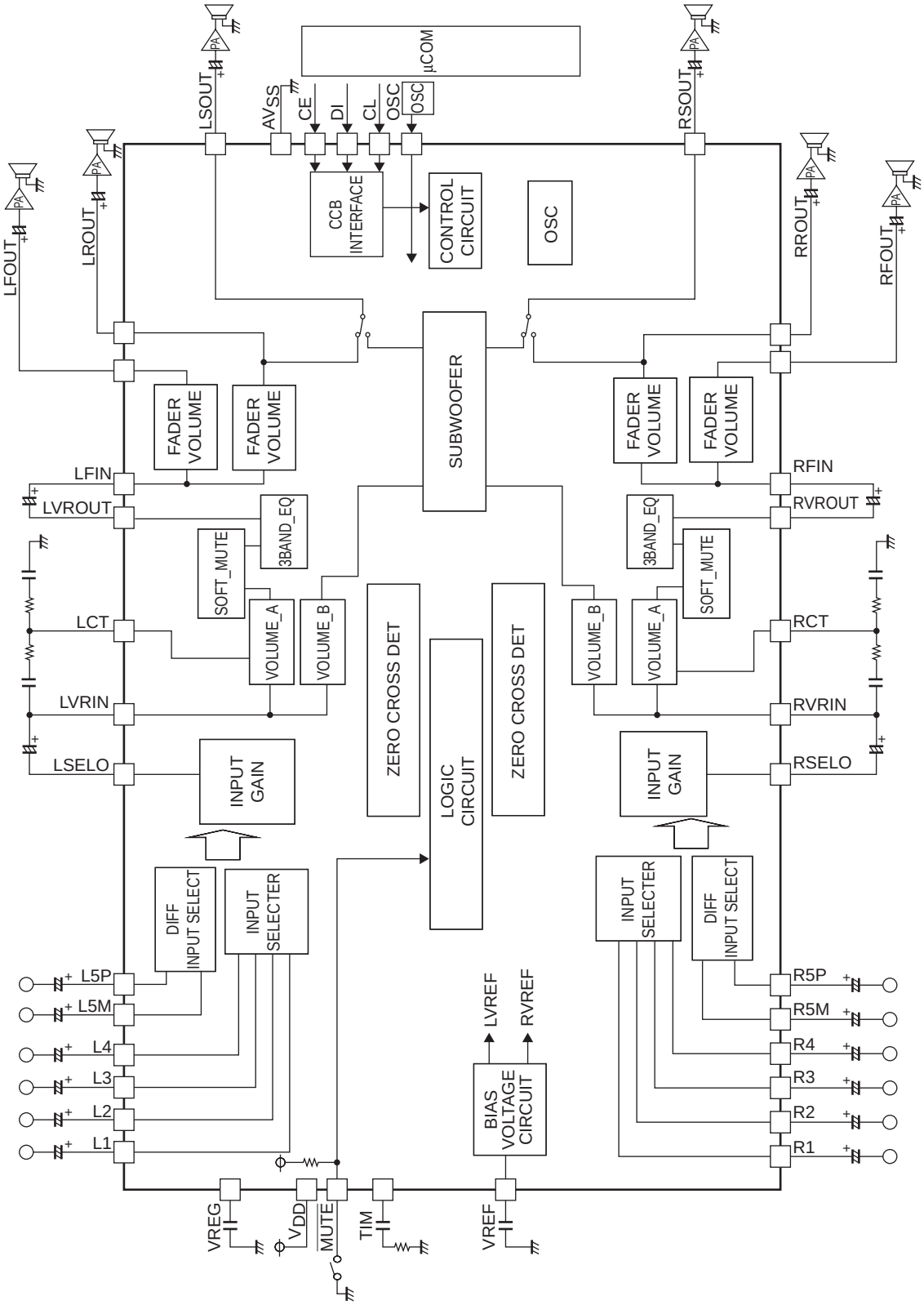


SANYO : QIP44M(10X10)

Pin Assignment

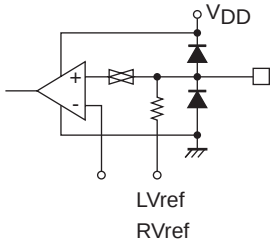
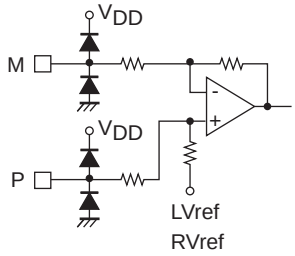
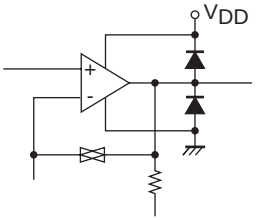
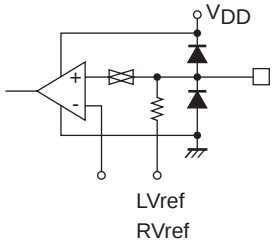
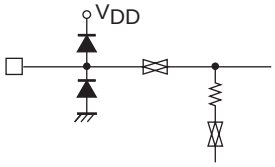
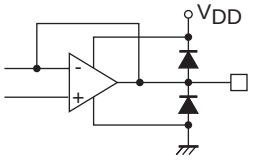
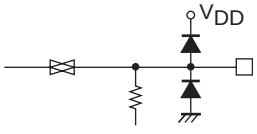


Block Diagram



* Note that VOLUME_A/B control data are interlocked with each other.

Pin Functions

Pin No.	Pin	Function	Equivalent Circuit
35 34 33 32 43 44 1 2	L1 L2 L3 L4 R1 R2 R3 R4	Single end input pins.	
31 30 3 4	L5M L5P R5M R5P	Differential input pins.	
29 5	LSELO RSELO	Input selector output pins.	
28 6	LVRIN RVRIN	Main volume input pins.	
27 7	LCT RCT	Loudness function pins.	
25 9	LVROUT RVROUT	Tone output pins.	
24 10	LFIN RFIN	Fader block input pins. Drive at low impedance.	
23 22 11 12	LFOUT LROUT RFOUT RROUT	Fader output pins.Attenuation is possible separately for the front end and rear end.	

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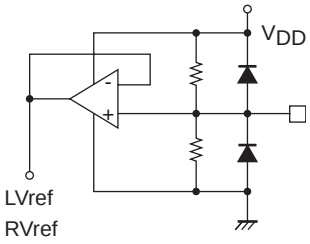
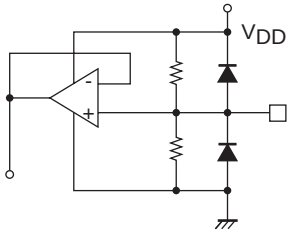
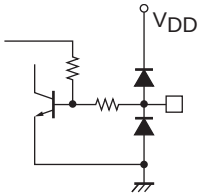
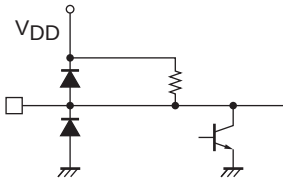
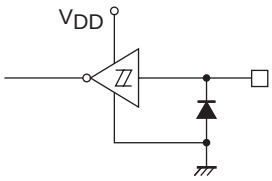
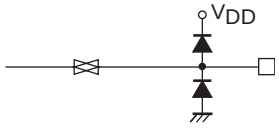
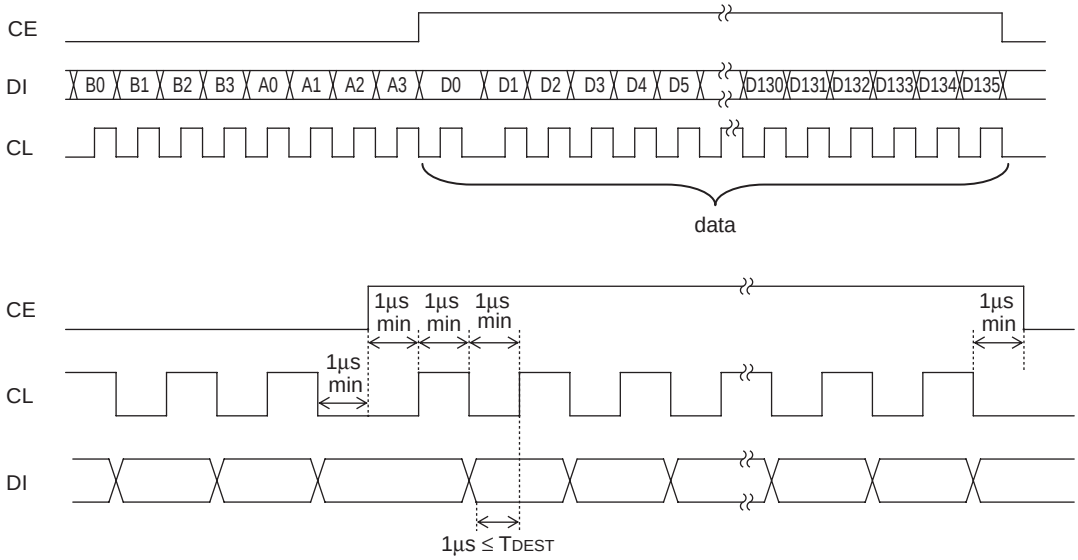
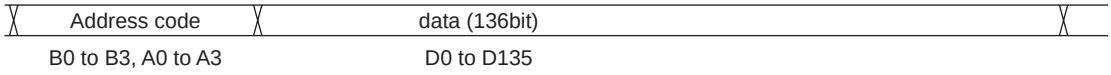
Pin No.	Pin	Function	Equivalent Circuit
42	Vref	Connect a capacitor of a few tens of uF between Vref and AV_{SS} (V_{SS}) as a 0.55 × V_{DD} voltage generator, current ripple countermeasure.	
36	VREG	Internal logic voltage pin.	
37	V_{DD}	Power supply pin.	
20	AV_{SS}	Ground pin.	
38	$\overline{MUTE}$	External muting control pin. Setting this pin to V_{SS} level sets forcibly fader volume block to -∞ level.	
40	TIM	Timer pin when there is no signal in the zero cross circuit.Forcibly set data when there is no zero cross signal, from the time the data is set until the timer ends.	
17 18	CL DI	Input pin for serial data and clock used for control.	
19	CE	Chip enable pin.Data is written to the internal latch and the analog switches are operated when the level changes from High to Low. Data transfer is enabled when the level is High.	
39	TEST	Normally this pin is OPEN.	
21 13	LSOUT RSOUT	Subwoofer output pin.	
16	OSC	External oscillat input pin.	
14 15 26 8 41	NC	no connect pin (Normally these pins are OPEN.)	

Control System Timing and Data Format

The LV3311PNM is controlled by applying the stipulated data to the CL, DI and CE pins. The data consists of a total of 144 bits, of which 8 bits are the device address, 136 bits are the control data.



Send to data



Address code

B0	B1	B2	B3	A0	A1	A2	A3
1	0	0	0	0	0	0	1

Data setting

Input switching control

D0	D1	D2	Operation
0	0	0	INIT
1	0	0	L1 (R1)
0	1	0	L2 (R2)
1	1	0	L3 (R3)
0	0	1	L4 (R4)
1	0	1	L5 (R5)

Input gain control

D3	D4	D5	D6	D7	Lch
D8	D9	D10	D11	D12	Rch
0	0	0	0	0	0dB
1	0	0	0	0	+1dB
0	1	0	0	0	+2dB
1	1	0	0	0	+3dB
0	0	1	0	0	+4dB
1	0	1	0	0	+5dB
0	1	1	0	0	+6dB
1	1	1	0	0	+7dB
0	0	0	1	0	+8dB
1	0	0	1	0	+9dB
0	1	0	1	0	+10dB
1	1	0	1	0	+11dB
0	0	1	1	0	+12dB
1	0	1	1	0	+13dB
0	1	1	1	0	+14dB
1	1	1	1	0	+15dB
0	0	0	0	1	+16dB
1	0	0	0	1	+17dB
0	1	0	0	1	+18dB

Volume control (10dB to -43dB)

D13	D14	D15	D16	D17	D18	D19	D20	Lch
D21	D22	D23	D24	D25	D26	D27	D28	Rch
0	1	1	0	1	1	1	0	10dB
1	1	1	0	1	1	1	0	9dB
0	0	0	1	1	1	1	0	8dB
1	0	0	1	1	1	1	0	7dB
0	1	0	1	1	1	1	0	6dB
1	1	0	1	1	1	1	0	5dB
0	0	1	1	1	1	1	0	4dB
1	0	1	1	1	1	1	0	3dB
0	1	1	1	1	1	1	0	2dB
1	1	1	1	1	1	1	0	1dB
0	0	0	0	0	0	0	0	0dB
1	0	0	0	0	0	0	0	-1dB
0	1	0	0	0	0	0	0	-2dB
1	1	0	0	0	0	0	0	-3dB
0	0	1	0	0	0	0	0	-4dB
1	0	1	0	0	0	0	0	-5dB
0	1	1	0	0	0	0	0	-6dB
1	1	1	0	0	0	0	0	-7dB
0	0	0	1	0	0	0	0	-8dB
1	0	0	1	0	0	0	0	-9dB
0	1	0	1	0	0	0	0	-10dB
1	1	0	1	0	0	0	0	-11dB
0	0	1	1	0	0	0	0	-12dB
1	0	1	1	0	0	0	0	-13dB
0	1	1	1	0	0	0	0	-14dB
1	1	1	1	0	0	0	0	-15dB
0	0	0	0	1	0	0	0	-16dB
1	0	0	0	1	0	0	0	-17dB
0	1	0	0	1	0	0	0	-18dB
1	1	0	0	1	0	0	0	-19dB
0	0	1	0	1	0	0	0	-20dB
1	0	1	0	1	0	0	0	-21dB
0	1	1	0	1	0	0	0	-22dB
1	1	1	0	1	0	0	0	-23dB
0	0	0	1	1	0	0	0	-24dB
1	0	0	1	1	0	0	0	-25dB
0	1	0	1	1	0	0	0	-26dB
1	1	0	1	1	0	0	0	-27dB
0	0	1	1	1	0	0	0	-28dB
1	0	1	1	1	0	0	0	-29dB
0	1	1	1	1	0	0	0	-30dB
1	1	1	1	1	0	0	0	-31dB
0	0	0	0	0	1	0	0	-32dB
1	0	0	0	0	1	0	0	-33dB
0	1	0	0	0	1	0	0	-34dB
1	1	0	0	0	1	0	0	-35dB
0	0	1	0	0	1	0	0	-36dB
1	0	1	0	0	1	0	0	-37dB
0	1	1	0	0	1	0	0	-38dB
1	1	1	0	0	1	0	0	-39dB
0	0	0	1	0	1	0	0	-40dB
1	0	0	1	0	1	0	0	-41dB
0	1	0	1	0	1	0	0	-42dB
1	1	0	1	0	1	0	0	-43dB

Volume control (-44dB to -∞)

D13	D14	D15	D16	D17	D18	D19	D20	Lch
D21	D22	D23	D24	D25	D26	D27	D28	Rch
0	0	1	1	0	1	0	0	-44dB
1	0	1	1	0	1	0	0	-45dB
0	1	1	1	0	1	0	0	-46dB
1	1	1	1	0	1	0	0	-47dB
0	0	0	0	1	1	0	0	-48dB
1	0	0	0	1	1	0	0	-49dB
0	1	0	0	1	1	0	0	-50dB
1	1	0	0	1	1	0	0	-51dB
0	0	1	0	1	1	0	0	-52dB
1	0	1	0	1	1	0	0	-53dB
0	1	1	0	1	1	0	0	-54dB
1	1	1	0	1	1	0	0	-55dB
0	0	0	1	1	1	0	0	-56dB
1	0	0	1	1	1	0	0	-57dB
0	1	0	1	1	1	0	0	-58dB
1	1	0	1	1	1	0	0	-59dB
0	0	1	1	1	1	0	0	-60dB
1	0	1	1	1	1	0	0	-61dB
0	1	1	1	1	1	0	0	-62dB
1	1	1	1	1	1	0	0	-63dB
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1	1	0	0	0	0	1	0	-67dB
0	0	1	0	0	0	1	0	-68dB
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1	1	1	0	0	0	1	0	-71dB
0	0	0	1	0	0	1	0	-72dB
1	0	0	1	0	0	1	0	-73dB
0	1	0	1	0	0	1	0	-74dB
1	1	0	1	0	0	1	0	-75dB
0	0	1	1	0	0	1	0	-76dB
1	0	1	1	0	0	1	0	-77dB
0	1	1	1	0	0	1	0	-78dB
1	1	1	1	0	0	1	0	-79dB
0	0	0	0	1	0	1	0	-∞

Tone block

Bass

GAIN

D29	D30	D31	D32	Lch
D37	D38	D39	D40	Rch
0	1	1	1	+12dB
1	0	1	1	+10dB
0	0	1	1	+8dB
1	1	0	1	+6dB
0	1	0	1	+4dB
1	0	0	1	+2dB
0	0	0	0	0dB
1	0	0	0	-2dB
0	1	0	0	-4dB
1	1	0	0	-6dB
0	0	1	0	-8dB
1	0	1	0	-10dB
0	1	1	0	-12dB

f0

D33	D34	Lch
D41	D42	Rch
0	0	70Hz
1	0	100Hz
0	1	120Hz

Q

D35	D36	Lch
D43	D44	Rch
0	0	1.00
1	0	2.00

Mid

GAIN

D45	D46	D47	D48	Lch
D53	D54	D55	D56	Rch
0	1	1	1	+12dB
1	0	1	1	+10dB
0	0	1	1	+8dB
1	1	0	1	+6dB
0	1	0	1	+4dB
1	0	0	1	+2dB
0	0	0	0	0dB
1	0	0	0	-2dB
0	1	0	0	-4dB
1	1	0	0	-6dB
0	0	1	0	-8dB
1	0	1	0	-10dB
0	1	1	0	-12dB

f0

D49	D50	Lch
D57	D58	Rch
0	0	700Hz
1	0	1kHz
0	1	1.2kHz

Q

D51	D52	Lch
D59	D60	Rch
0	0	1.00
1	0	2.00

Treble

GAIN

D61	D62	D63	D64	Lch
D69	D70	D71	D72	Rch
0	1	1	1	+12dB
1	0	1	1	+10dB
0	0	1	1	+8dB
1	1	0	1	+6dB
0	1	0	1	+4dB
1	0	0	1	+2dB
0	0	0	0	0dB
1	0	0	0	-2dB
0	1	0	0	-4dB
1	1	0	0	-6dB
0	0	1	0	-8dB
1	0	1	0	-10dB
0	1	1	0	-12dB

f0

D65	D66	Lch
D73	D74	Rch
0	0	7kHz
1	0	10kHz
0	1	12kHz

Q

D67	D68	Lch
D75	D76	Rch
0	0	1.00
1	0	2.00

Sub volume control (0dB to -54dB)

D77	D78	D79	D80	D81	D82	D83	D84	Operation
0	0	0	0	0	0	0	0	0dB
1	0	0	0	0	0	0	0	-1dB
0	1	0	0	0	0	0	0	-2dB
1	1	0	0	0	0	0	0	-3dB
0	0	1	0	0	0	0	0	-4dB
1	0	1	0	0	0	0	0	-5dB
0	1	1	0	0	0	0	0	-6dB
1	1	1	0	0	0	0	0	-7dB
0	0	0	1	0	0	0	0	-8dB
1	0	0	1	0	0	0	0	-9dB
0	1	0	1	0	0	0	0	-10dB
1	1	0	1	0	0	0	0	-11dB
0	0	1	1	0	0	0	0	-12dB
1	0	1	1	0	0	0	0	-13dB
0	1	1	1	0	0	0	0	-14dB
1	1	1	1	0	0	0	0	-15dB
0	0	0	0	1	0	0	0	-16dB
1	0	0	0	1	0	0	0	-17dB
0	1	0	0	1	0	0	0	-18dB
1	1	0	0	1	0	0	0	-19dB
0	0	1	0	1	0	0	0	-20dB
1	0	1	0	1	0	0	0	-21dB
0	1	1	0	1	0	0	0	-22dB
1	1	1	0	1	0	0	0	-23dB
0	0	0	1	1	0	0	0	-24dB
1	0	0	1	1	0	0	0	-25dB
0	1	0	1	1	0	0	0	-26dB
1	1	0	1	1	0	0	0	-27dB
0	0	1	1	1	0	0	0	-28dB
1	0	1	1	1	0	0	0	-29dB
0	1	1	1	1	0	0	0	-30dB
1	1	1	1	1	0	0	0	-31dB
0	0	0	0	0	1	0	0	-32dB
1	0	0	0	0	1	0	0	-33dB
0	1	0	0	0	1	0	0	-34dB
1	1	0	0	0	1	0	0	-35dB
0	0	1	0	0	1	0	0	-36dB
1	0	1	0	0	1	0	0	-37dB
0	1	1	0	0	1	0	0	-38dB
1	1	1	0	0	1	0	0	-39dB
0	0	0	1	0	1	0	0	-40dB
1	0	0	1	0	1	0	0	-41dB
0	1	0	1	0	1	0	0	-42dB
1	1	0	1	0	1	0	0	-43dB
0	0	1	1	0	1	0	0	-44dB
1	0	1	1	0	1	0	0	-45dB
0	1	1	1	0	1	0	0	-46dB
1	1	1	1	0	1	0	0	-47dB
0	0	0	0	1	1	0	0	-48dB
1	0	0	0	1	1	0	0	-49dB
0	1	0	0	1	1	0	0	-50dB
1	1	0	0	1	1	0	0	-51dB
0	0	1	0	1	1	0	0	-52dB
1	0	1	0	1	1	0	0	-53dB
0	1	1	0	1	1	0	0	-54dB

Sub volume control (-55dB to -∞)

D77	D78	D79	D80	D81	D82	D83	D84	Operation
1	1	1	0	1	1	0	0	-55dB
0	0	0	1	1	1	0	0	-56dB
1	0	0	1	1	1	0	0	-57dB
0	1	0	1	1	1	0	0	-58dB
1	1	0	1	1	1	0	0	-59dB
0	0	1	1	1	1	0	0	-60dB
1	0	1	1	1	1	0	0	-61dB
0	1	1	1	1	1	0	0	-62dB
1	1	1	1	1	1	0	0	-63dB
0	0	0	0	0	0	1	0	-64dB
1	0	0	0	0	0	1	0	-65dB
0	1	0	0	0	0	1	0	-66dB
1	1	0	0	0	0	1	0	-67dB
0	0	1	0	0	0	1	0	-68dB
1	0	1	0	0	0	1	0	-69dB
0	1	1	0	0	0	1	0	-70dB
1	1	1	0	0	0	1	0	-71dB
0	0	0	1	0	0	1	0	-72dB
1	0	0	1	0	0	1	0	-73dB
0	1	0	1	0	0	1	0	-74dB
1	1	0	1	0	0	1	0	-75dB
0	0	1	1	0	0	1	0	-76dB
1	0	1	1	0	0	1	0	-77dB
0	1	1	1	0	0	1	0	-78dB
1	1	1	1	0	0	1	0	-79dB
0	0	0	0	1	0	1	0	-∞

LPF

D85	D86	Operation
0	0	80Hz
1	0	120Hz
0	1	160Hz
1	1	OFF

Sub output select

D87	D88	Operation
0	0	FADER_REAR OUTPUT (LCH/RCH together)
1	0	LCH : FADER_REAR OUTPUT, RCH : SUBWOOFER OUTPUT
0	1	RCH : FADER_REAR OUTPUT, LCH : SUBWOOFER OUTPUT
1	1	SUBWOOFER OUTPUT (LCH/RCH together)

Fader block

D89	D90	D91	D92	D93	D94	LFOUT
D95	D96	D97	D98	D99	D100	LROUT
D101	D102	D103	D104	D105	D106	RFOUT
D107	D108	D109	D110	D111	D112	RROUT
0	0	0	0	0	0	0dB
1	0	0	0	0	0	-1dB
0	1	0	0	0	0	-2dB
1	1	0	0	0	0	-4dB
0	0	1	0	0	0	-6dB
1	0	1	0	0	0	-8dB
0	1	1	0	0	0	-10dB
1	1	1	0	0	0	-12dB
0	0	0	1	0	0	-14dB
1	0	0	1	0	0	-16dB
0	1	0	1	0	0	-18dB
1	1	0	1	0	0	-20dB
0	0	1	1	0	0	-30dB
1	0	1	1	0	0	-45dB
0	1	1	1	0	0	-60dB
1	1	1	1	0	0	-∞

Loudness control

D113	Operation
0	off
1	on

Zero cross control

D114	Operation
0	off
1	on

Zero cross signal detection block control

D115	D116	Operation
0	0	Input gain (LSELO)
1	0	Volume (LVROUT)
0	1	Fader (LFOUT)
1	1	Fader (LROUT)

D117	D118	Operation
0	0	Input gain (RSELO)
1	0	Volume (RVROUT)
0	1	Fader (RFOUT)
1	1	Fader (RROUT)

Soft step/Soft mute control

D119	Operation
0	Soft mute mode off
1	Soft mute mode on

D120	Operation
0	mute set off
1	mute set on

D121	Operation
0	Soft set off
1	Soft set on

D122	D123	Operation
0	0	normal mode
1	0	test mode

Soft step/Soft mute settling time select control

D124	D125	Operation
0	0	mute time 0.64ms
1	0	mute time 5.12ms
0	1	mute time 40ms
1	1	mute time 80ms

D126	D127	Operation
0	0	Soft step time 10ms
1	0	Soft step time 20ms
0	1	Soft step time 40ms
1	1	Soft step time 80ms

D128	D129	D130	D131	D132	D133	D134	D135
0	0	0	0	0	0	0	0

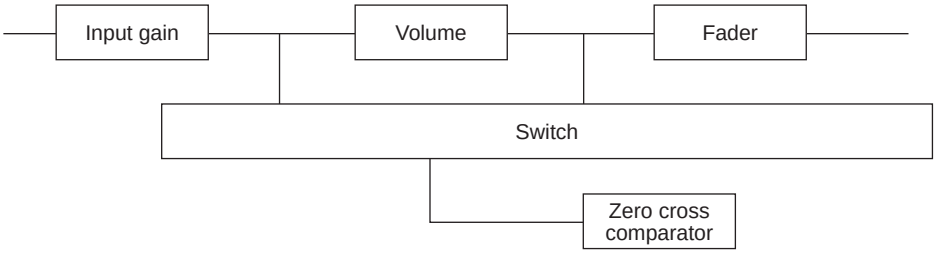
Usage Cautions

(1) Data Transmission at power on

- The status of internal analog switches is unstable at power on. Therefore, perform muting or some other countermeasure until the data has been set.
- At power on, initial setting data must be sent once in order to stabilize the bias of each block in a short time.

(2) Description of zero cross switching circuit operation

The LV3311PNM have a function to switch zero cross comparator signal detection locations, enabling the selection of the optimum detection location for blocks whose data is to be updated.Basically, the switching noise can be minimized by inputting the signal immediately following the block whose data is to be updated to the zero cross comparator, so it is necessary to switch the detection location every time.



LV3311PNM zero cross detection circuit

(3) Zero Cross Switching Control method

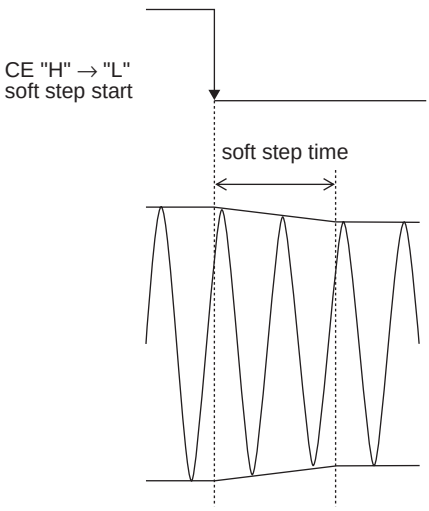
The zero cross switching control method consists of setting the zero cross control bits to the zero cross detection mode, and specifying the detection blocks before transmitting the data. These control bits are latched immediately following data transfer, that is to say beforehand in sync with the falling edge of CE, so when updating data of volumes, etc., it is possible to perform mode setting and zero cross switching with one data transfer.

(4) Zero cross timer setting

If the input signal becomes lower than the zero cross comparator detection sensitivity, or if only low-frequency signals are input, zero cross detection continues to be impossible, and data is not latched during this time. The zero cross timer can set a time for forcible latch during such a status when zero cross detection is not possible.

(5) Soft step operation

The LV3311PNM have a soft step function at 3 band equalizer block and subwoofer block for low switching noise.
The Soft step time can be selected by send to CCB control. (l0ms, 20ms, 40ms, 80ms)
A soft step function can be implemented by set to soft step on. (Set to minimum step)

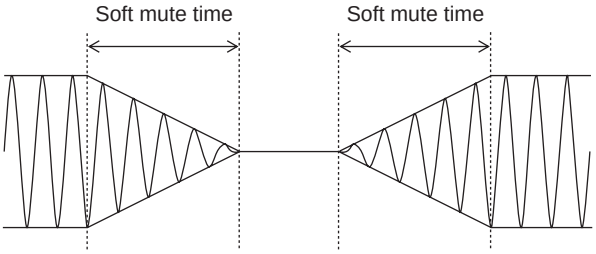


(6) Soft mute operation

The LV3311PNM have a soft mute function for low switching noise, when this mute function set operation. (mute/unmute function select)

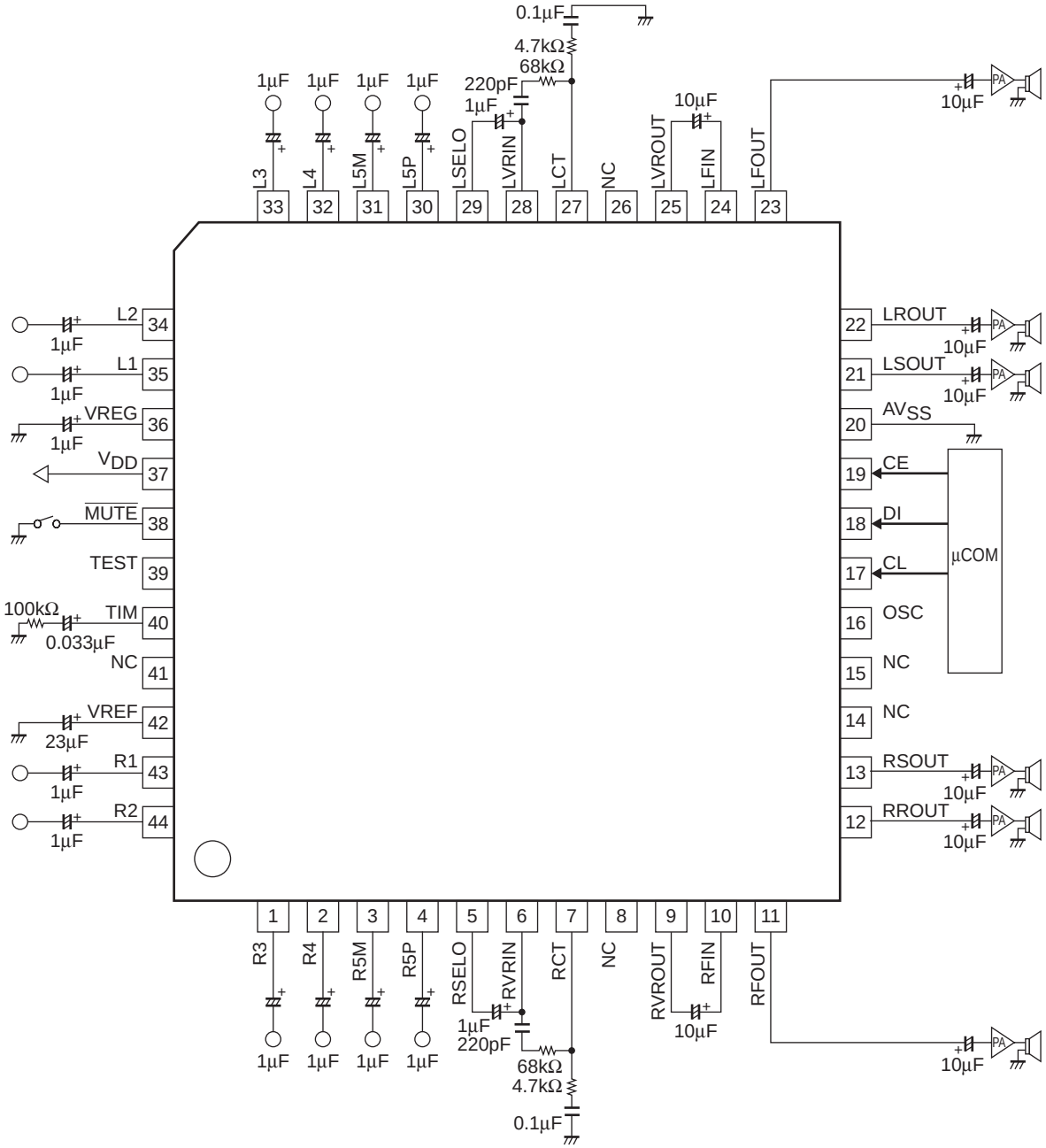
The Soft mute time can be selected by send to CCB control. (0.6ms, 5ms, 40ms, 80ms)

A soft mute function can be implemented by set to soft mute on. (Set to mute on/off)



(7) The next set data must not be sent when zero cross operation is enabled or soft step/soft mute operation is performed.

Application Circuit Example



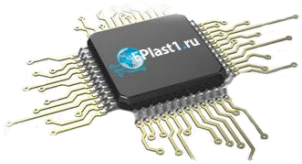
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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