LV3329PE

Electronic Volume IC for Car Audio System

ON Semiconductor®

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Overview

The LV3329PE is an electronic volume and tone IC that implements a rich set of audio control functions with a minimal number of external components. Functions include input selection switching, an input gain, volume, loudness, balance, fader, bass/mid/treble control, and fixed equalizer.

Features

It is possible to eliminate from the external components of equalizer control block by SCF technology.
Zero-cross switching circuits, soft steps (bass block and mid block) and soft mute circuits used for low noise even when input signals are present.
Low power consumption due to the use of BiMOS process.
All controls performed using serial data input (CCB*).

Functions

Input selector :
Four of the input systems are single-end inputs, one uses differential inputs.
Input gain control :
The input gain can be amplified by 0 to +19 dB (0 to 5 dB / 1.25 dB steps, 5 to 11 dB / 1.5 dB steps, 11 to 19 dB / 2 dB steps)
Loudness control :
Taps are output starting at the 32 dB position of the ladder resistor and a loudness function implemented with external capacitor and resistor components.
Volume control : 0 dB to 79 dB / (1 dB steps)
L/R independent control.
Bass control:
The bass control gain can be maximum boost +15 dB position and maximum cut 15 dB position.
(0 dB / ±1.25 dB / ±2.75 dB / ±4.75 dB / ±7 dB / ±9.5 dB / ±12.25 dB / ±15 dB) SCF.
The bass control center frequency 60 Hz / 80 Hz / 100 Hz / 200 Hz can be selected.
The bass control quality factor 1.0/1.25/1.5/2.0 can be selected.

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ORDERING INFORMATION

Electrical Characteristics

Input block						
						Ω

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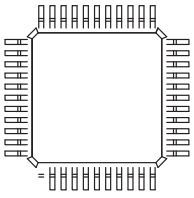
Fader block						
						Ω
Fixed equalizer:						

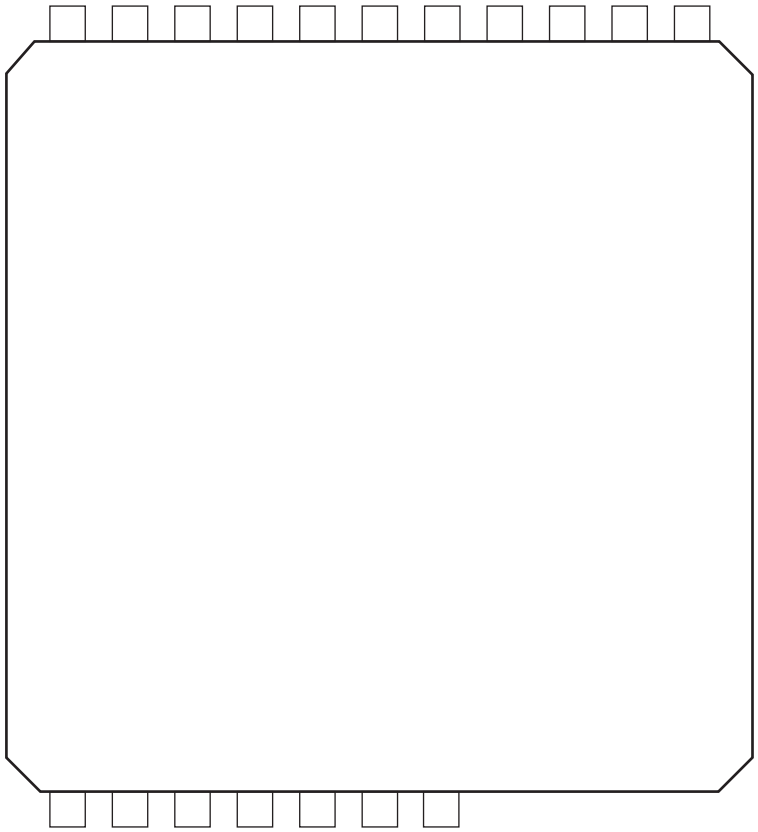
Overall Characteristics

		Ω				
		Ω				

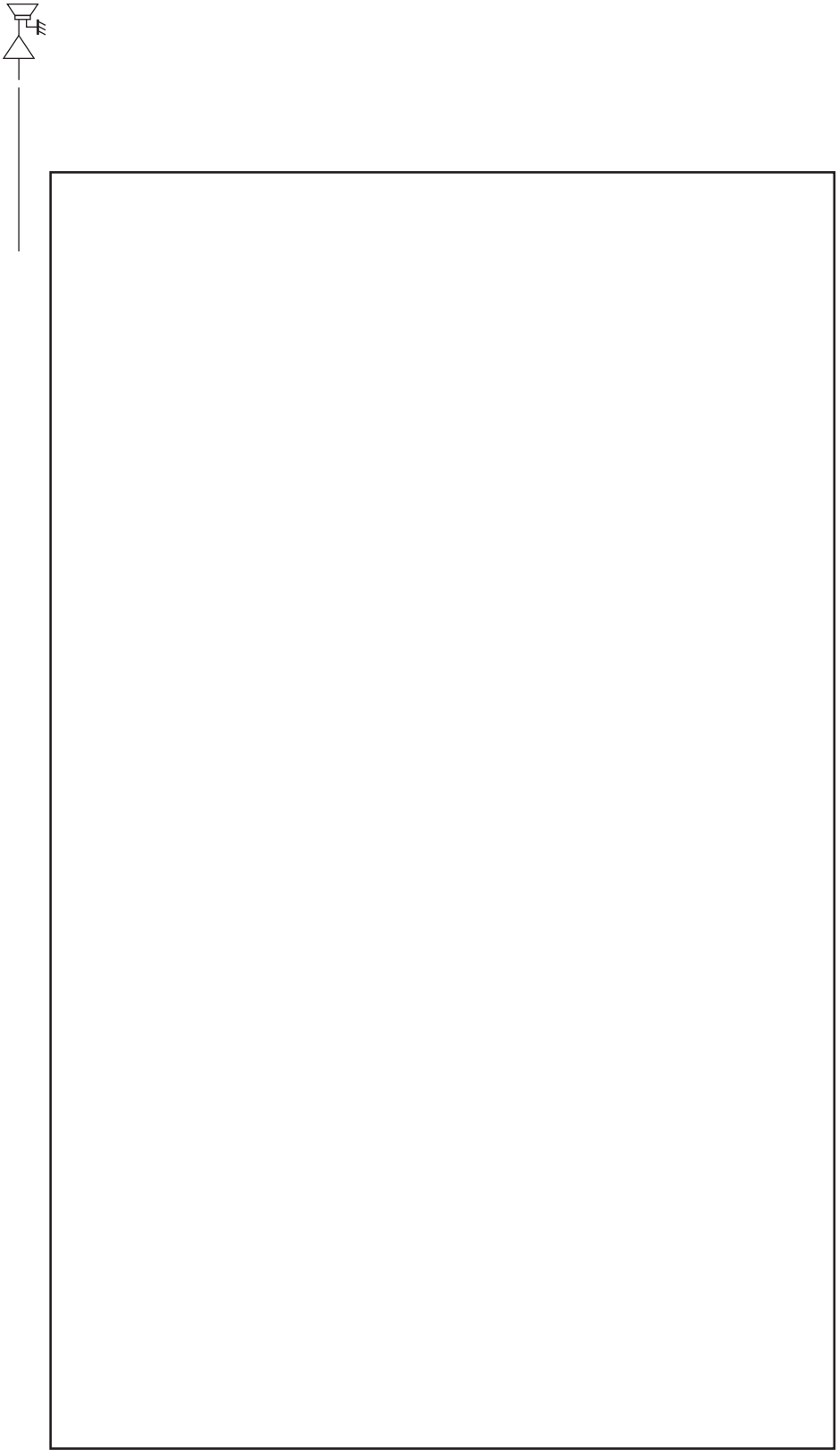
Package Dimensions



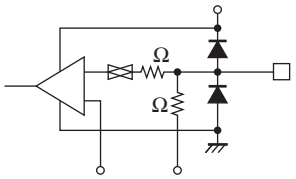
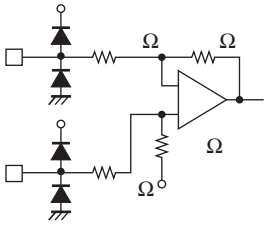
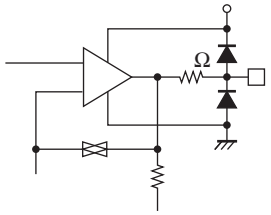
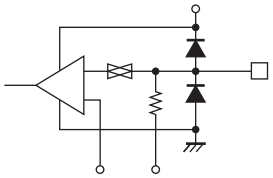
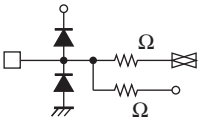
Pin Assignment



Block Diagram



Pin Functions

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Control System Timing and Data Format

The LV3329PE is controlled by applying the stipulated data to the CL, DI and CE pins.
The data consists of 8 address bits, 12 data bits for each command, and 4 command register bits.

Send to data

Address code

REG0 (Command register 0000)

Input switching control

Input gain control

Lch/0856.7 312.78 ref248.88 400.7 976

REG3 (Command register 1100)

Tone block

Bass

REG4 (Command register 0010)

Tone block

Mid

Lch/Rch switching

REG5 (Command register 1010)

Tone block

Treble

Lch/Rch switching

REG6 (Command register 0110)

Fader block (0dB to -39dB)

REG7 (Command register 1110)

Zero cross control

Zero cross detection

REG8 (Command register 0001)

FIXED EQ block
LOW_CUT

Channel select

REG11 (Command register 1101)

REG12 (Command register 0011)

Soft step/Soft mute control

Soft step/Soft mute settling time select control

REG13 (Command register 1011)

Soft step on/off select

Usage Cautions

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.

The LV3329PE have a function to switch zero cross comparator signal detection locations, enabling the selection of

$$T = -Ct \times (R1 + Rt) \times 1n \frac{Vs - Vcrt}{Vs \times \left(1 - \frac{Rt}{R1 + Rt}\right)} \cdots [1]$$

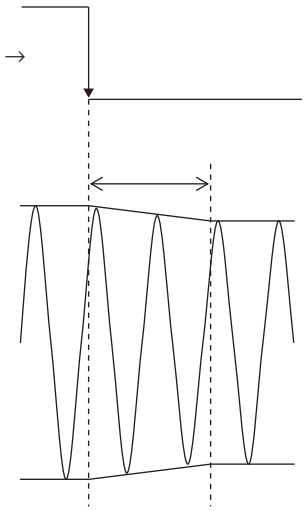
Calculation example)

V_{DD} = 8V, Vs = 4V
Vctr = 1.75V
R1 = 930k (TIM pin internal resistance)
Ct = 0.022 F (External Ct)
Rt = 150k (External Rt)

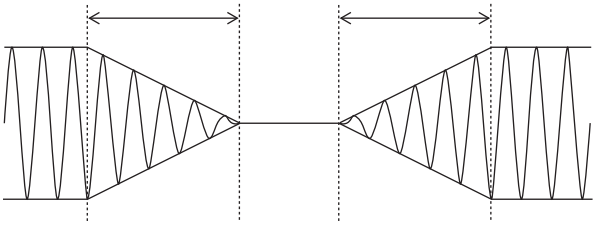
The timer time "T" is obtained by formula [1] above.

In this example, T = 10.1ms.

The LV3329PE has a soft step function at bass and mid-range blocks to minimize switching noise.
The soft step time for the bass and mid-range blocks is 10ms or 20ms and can be selected using serial data.
When set to soft step on, a soft step function for the bass or mid-range block can be implemented at the minimum resolution step intervals.



The LV3329PE 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)



In step mode, when the main volume is switched between 0dB and -32dB in 2-dB steps, the volume is first set to the midpoint level of before and after the setting, and then to the final value.
The volume is set at the zero cross operation timing.
(Condition: Set to zero cross mode.)
This operation further reduces the switching noise, in addition to the effects of countermeasures against switching noise due to zero cross operation.

1) Notes when transmitting data continuously
(1) Transmit the initial data once at power ON. (REG0, D0 to D11 = ALL “0”)
Set each register thereafter, but be sure

Application Circuit Example