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# HA12232FP

Audio Signal Pre-Amp. for Car Deck

# HITACHI

ADE-207-328 (Z)

Target Specifications  
1st Edition  
Sep. 2000

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## Description

HA12232FP is audio signal pre-amp. LSI providing PB equalizer op-amp. in one chip.

## Function

- PB equalizer    × 2 channel
- Vref buffer    × 1 channel

## Features

- Built-in referential voltage (VREF) for PB equalizer decreases external components.
- This IC is low noise.
- This IC is strong for a cellular phone noise.

## Operating Voltage Range

Product	Min	Max	Unit
HA12232FP	6.5	15	V

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Note: This IC is designed to operate on single supply.

# HA12232FP

**Pin Description, Equivalent Circuit** ( $V_{CC} = 9\text{ V}$  single supply,  $T_a = 25^\circ\text{C}$ , No Signal, The value in the table shows typical value.)

Pin No.	Pin Name	Note	Equivalent Circuit	Description
7	RIP	$V = V_{CC}/2$		Ripple filter
1	VREF	$V = V_{CC}/2$		Reference output
10	EQOUT(L)	$V = V_{CC}/2$		Equalizer output
5	EQOUT(R)			
2	PBIN(R)	—		PB equalizer input
13	PBIN(L)			
3	NFI(R)	$V = V_{CC}/2$		Equalizer output
12	NFI(L)			for time constant

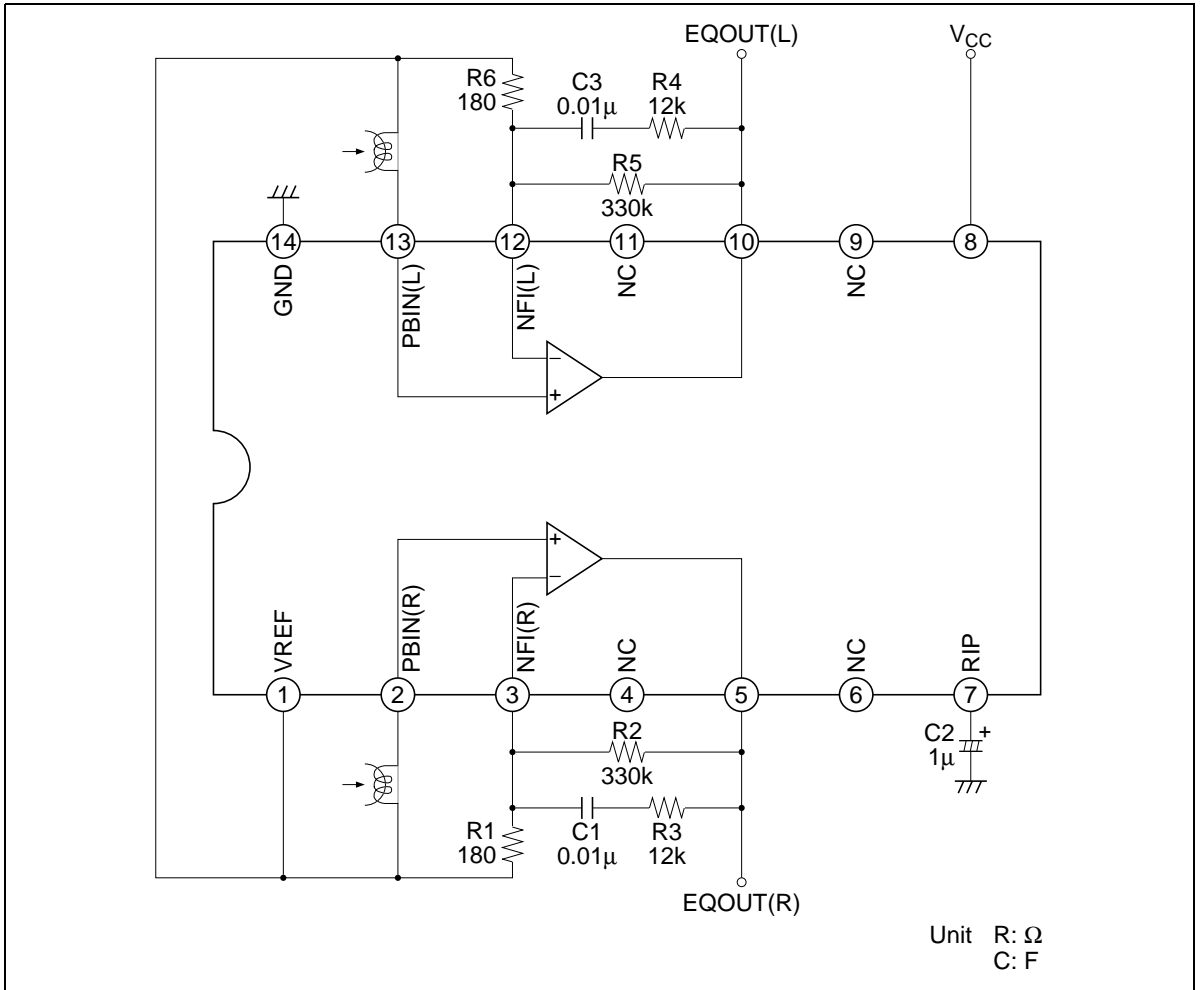
**Pin Description, Equivalent Circuit** ( $V_{CC} = 9\text{ V}$  single supply,  $T_a = 25^\circ\text{C}$ , No Signal, The value in the table shows typical value.) (cont.)

Pin No.	Pin Name	Note	Equivalent Circuit	Description
8	$V_{CC}$	—		Power supply
14	GND	—		GND pin
4	NC	—		
6				
9				
11				

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# HA12232FP

## Block Diagram



**Absolute Maximum Ratings** (Ta = 25°C)

Item	Symbol	Rating	Unit	Note
Supply voltage	V <sub>cc</sub> Max	16	V	
Power dissipation	Pd	400	mW	Ta ≤ 85°C
Operating temperature	Topr	-40 to +85	°C	
Storage temperature	Tstg	-55 to +125	°C	

**Electrical Characteristics** (Ta = 25°C, V<sub>cc</sub> = 9 V, Rg = 680 Ω)

Item	Symbol	Test Condition	Specification			Unit	Remark
			Min	Typ	Max		
Quiescent current	I <sub>Q</sub>	No signal	1.5	2.2	3.2	mA	
Channel separation	CT RL	Fin = 1kHz, Vin = 6mVrms	50.0	60.0	—	dB	
EQ gain	G <sub>v</sub> 1k	Fin = 1kHz, Vin = 0.6mVrms	37.0	40.0	43.0	dB	
	G <sub>v</sub> 10k	Fin = 10kHz, Vin = 0.6mVrms	33.0	36.0	39.0	dB	
THD	THD	Fin = 1kHz, Vin = 2.4mVrms	—	0.1	0.5	%	
EQ maximum output	V <sub>OM</sub>	Fin = 1kHz, THD = 1%	300	600	—	mVrms	*1
Noise voltage level converted in input	VN	Rg = 680Ω, Din-Audio Filter	—	0.7	1.5	μVrms	

Note: 1. V<sub>cc</sub> = 6.5 V

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# HA12232FP

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## Functional Description

### Power Supply Range

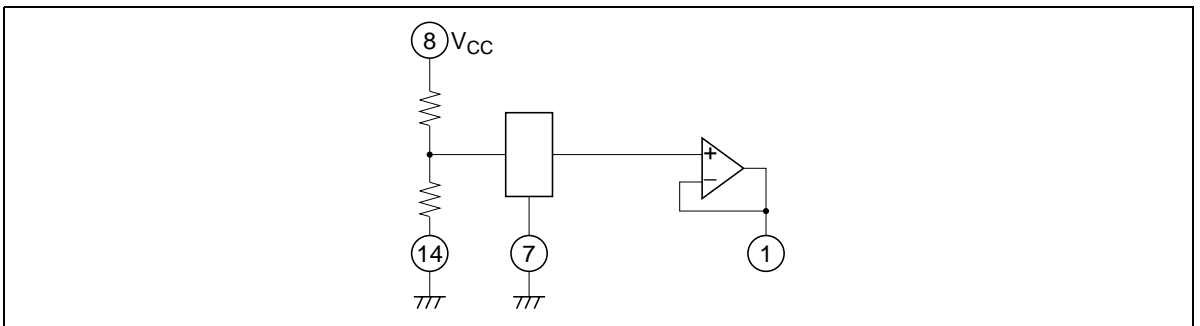
HA12232FP is designed to operate on single supply only.

**Table 1**     **Supply Voltage Range**

Product	Single Supply
HA12232FP	6.5 V to 15.0 V

### Reference Voltage

HA12232FP provides the reference voltage of half the supply voltage that is the signal grounds. As the peculiarity of this device, the capacitor for the ripple filter is very small about 1/100 compared with their usual value. The block diagram is shown as figure 1.



**Figure 1**   **The Block Diagram of Reference Supply Voltage**

Input Block Diagram and Level Diagram

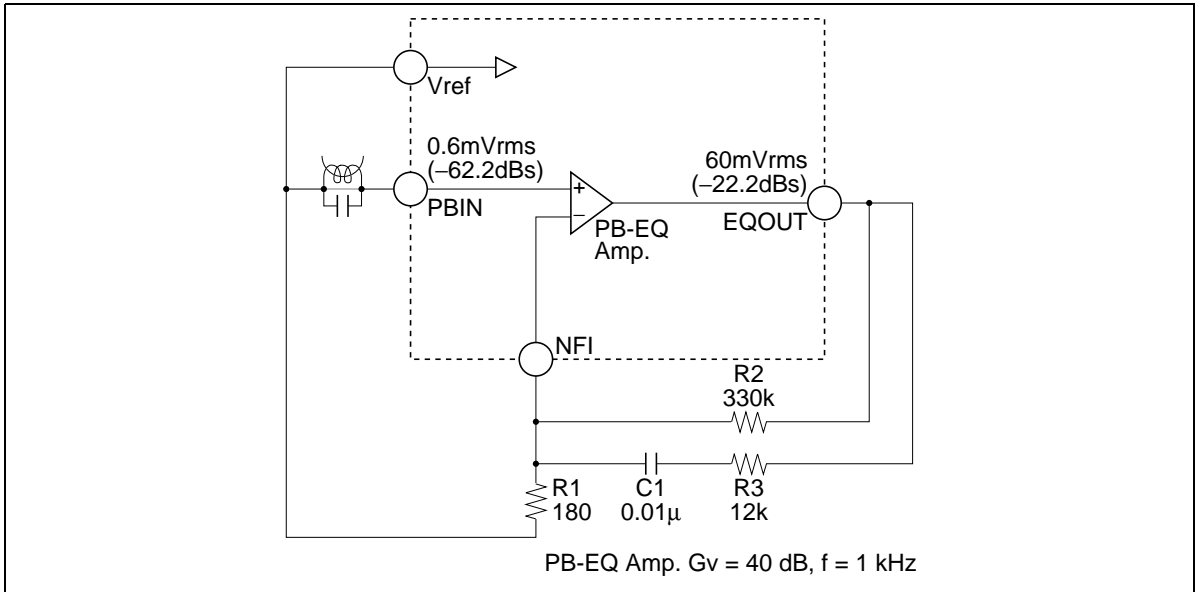


Figure 2 Input Block Diagram

Cutoff Frequency, Gain of PB-EQ Amp.

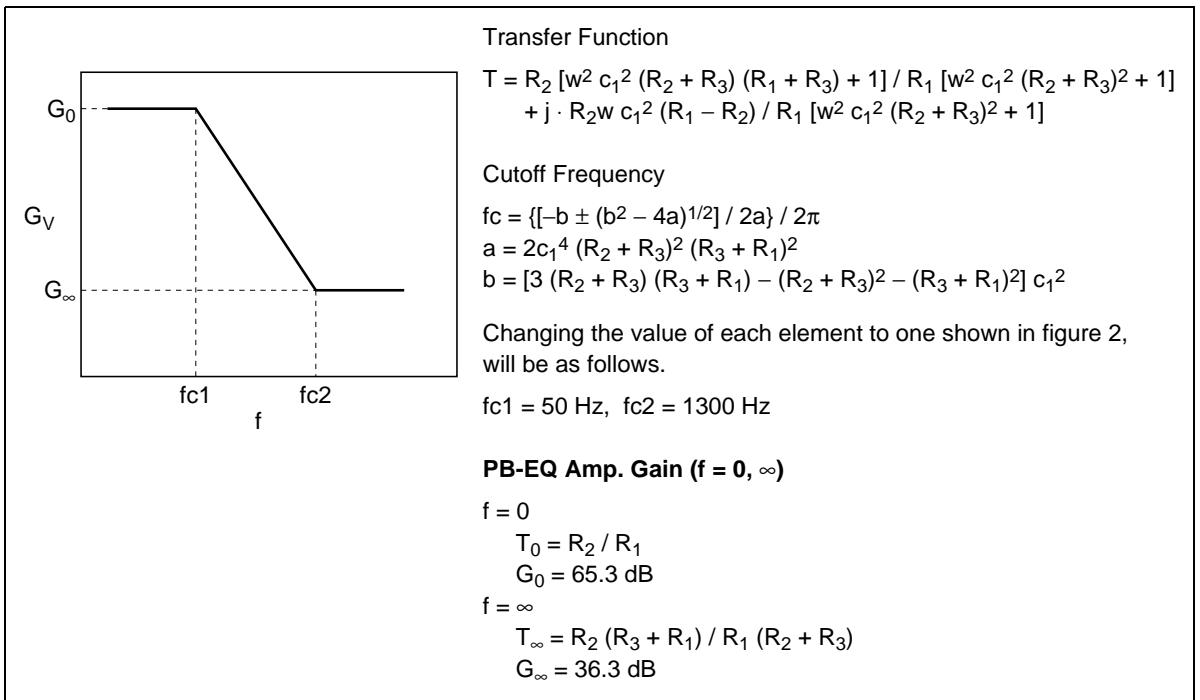
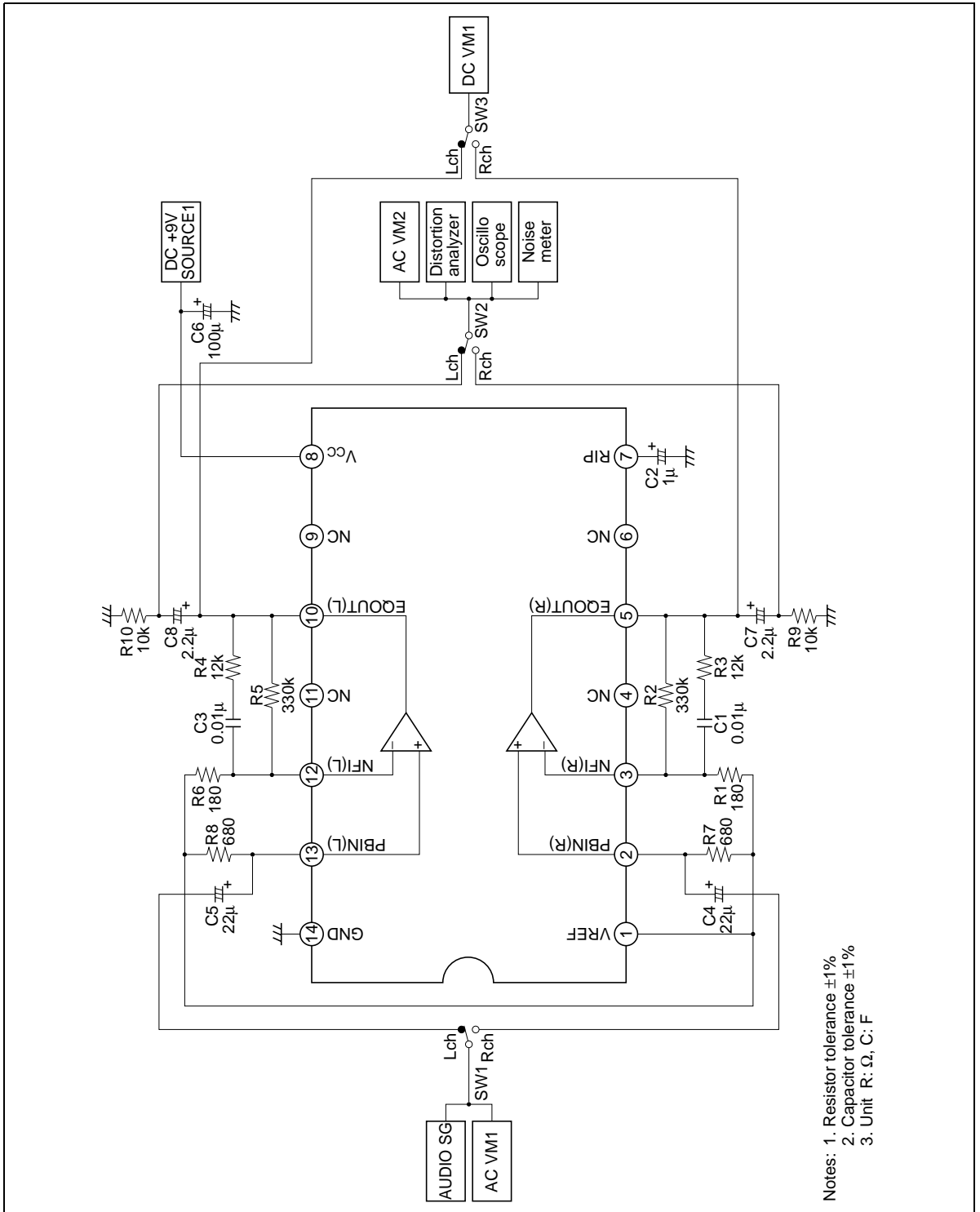


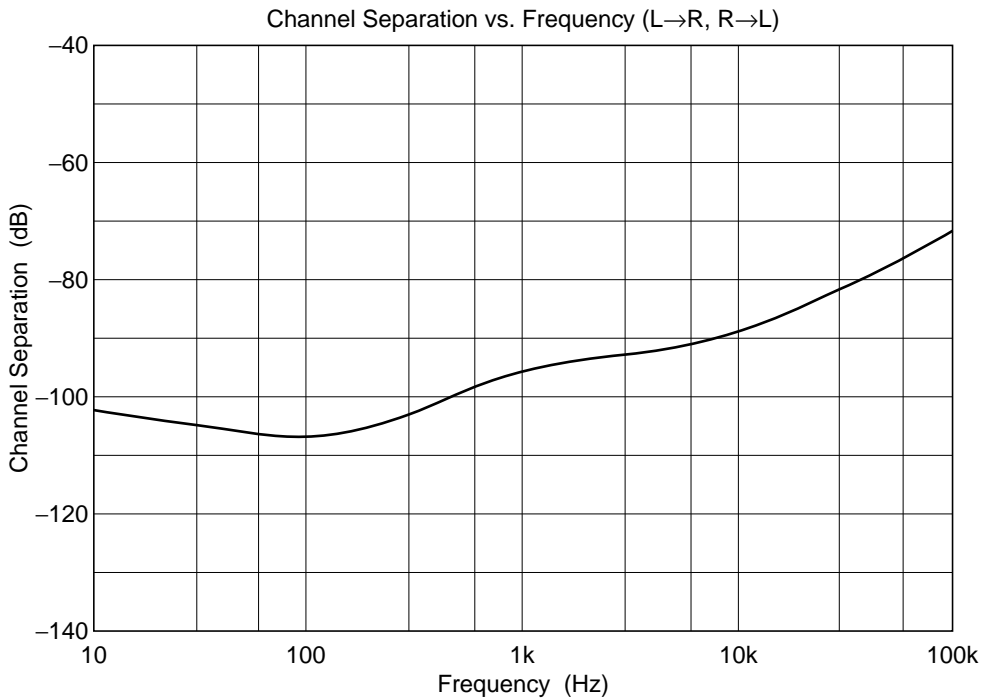
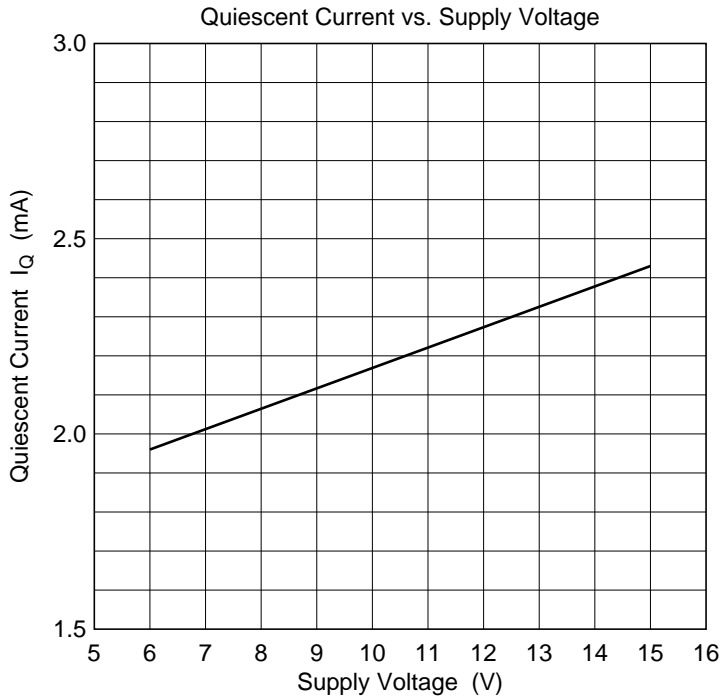
Figure 3 Cutoff Frequency of PB-EQ Amp.

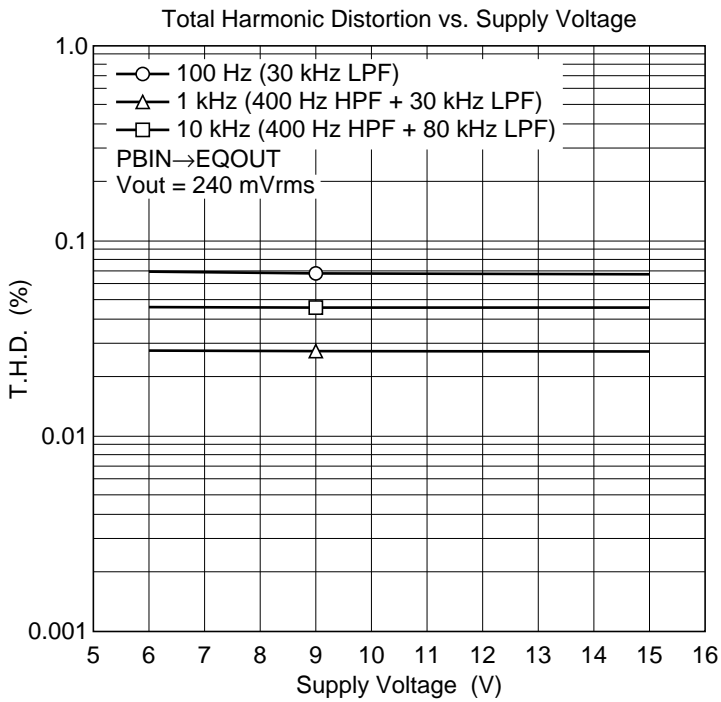
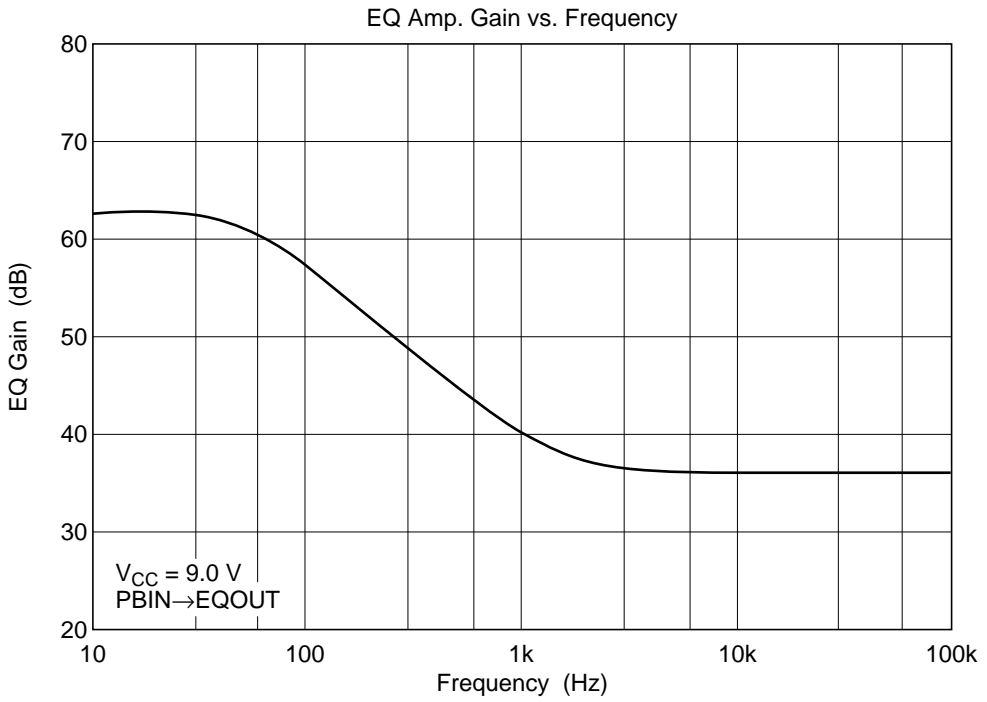
## Test Circuit

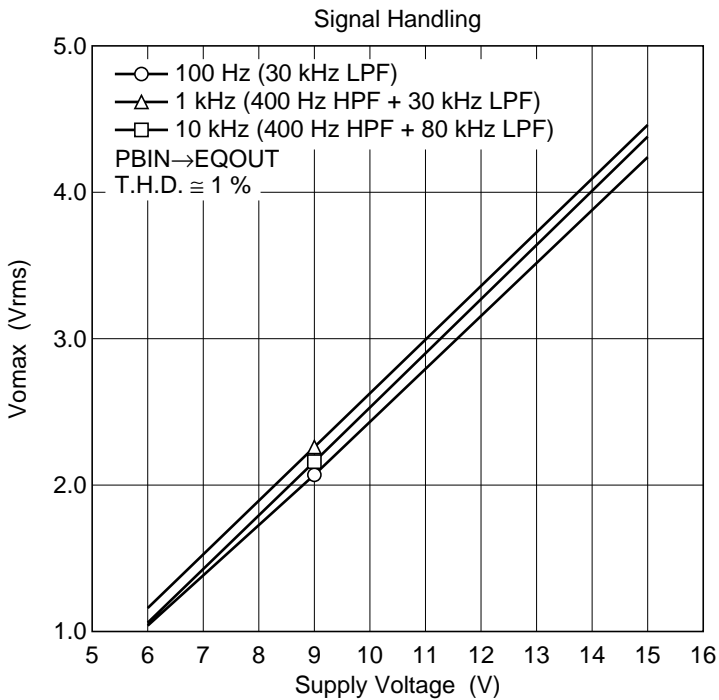
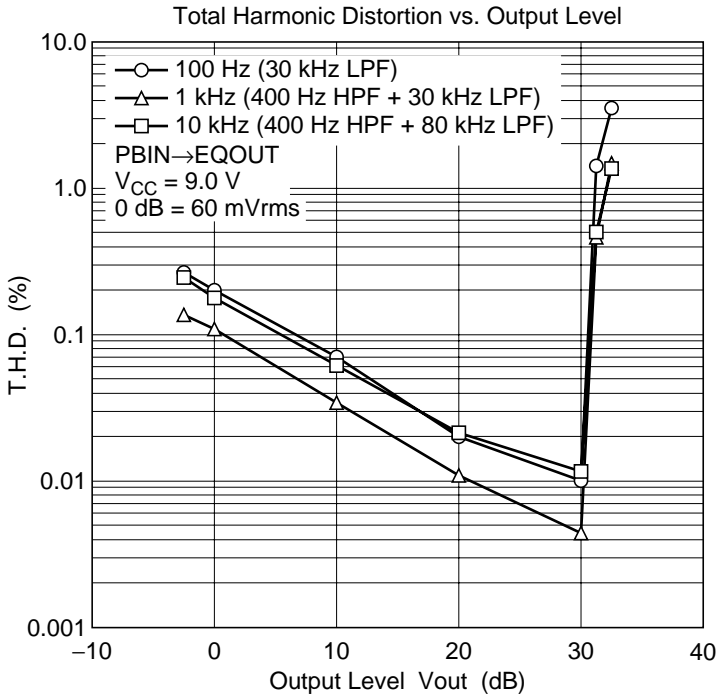


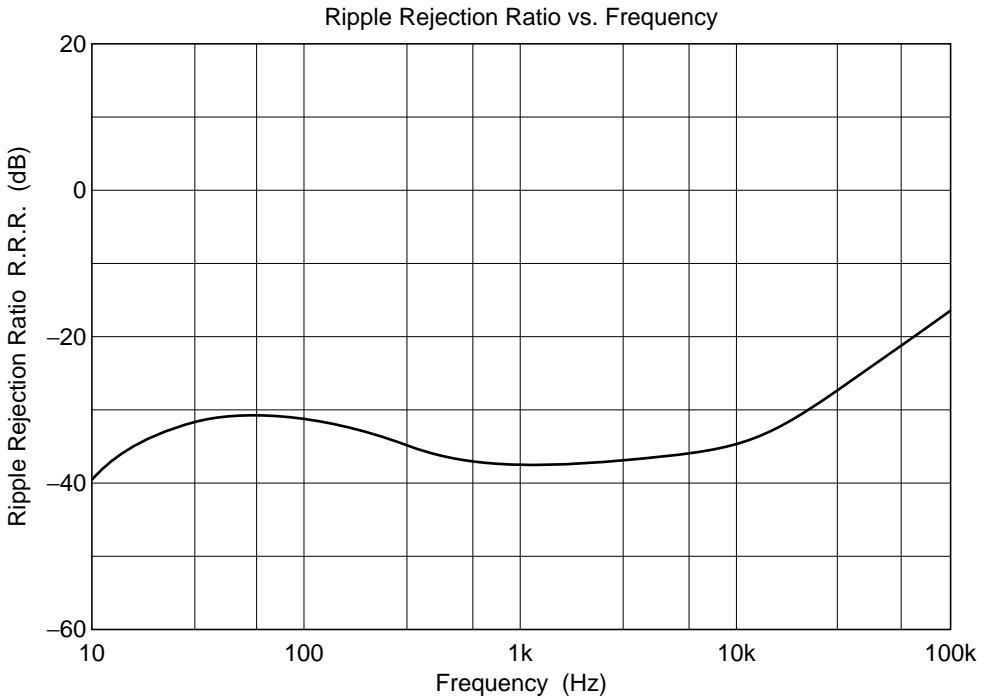
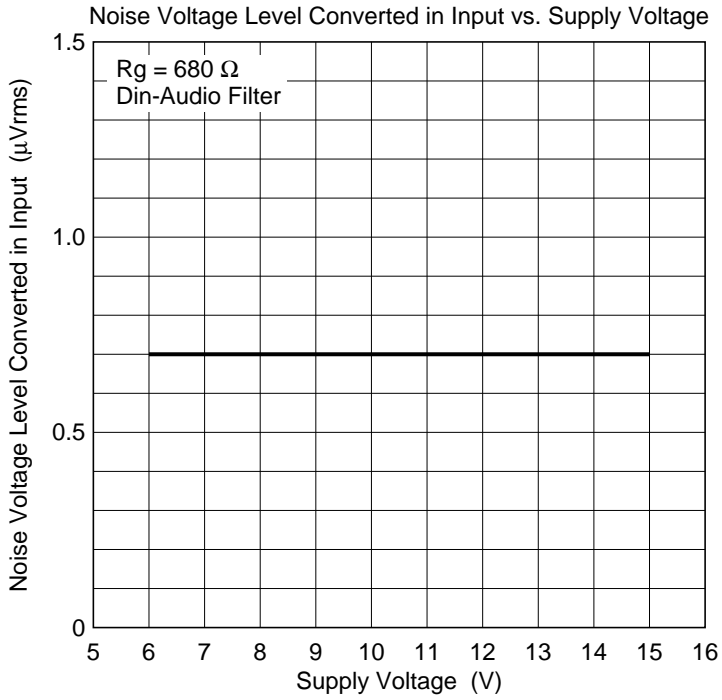


Characteristic Curves



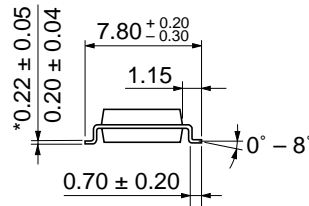
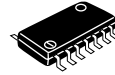
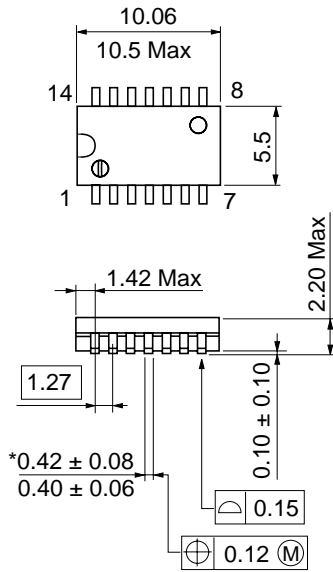






Package Dimensions

Unit: mm



\*Dimension including the plating thickness  
 Base material dimension

Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.23 g

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