

R2S15902FP

6ch Electronic Volume with 4 Input Selector

REJ03F0152-0100

Rev.1.0

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Description

R2S15902FP is an audio signal processor for home audio. This IC contains 6 channels electronic volume, gain control, input selector and 2 band tone control.

Features

- 6 channels independent electronic volume (0 to -99dB/1dBstep, $-\infty$ dB)
- 6 channels independent gain control (0 to +14dB/ 2dB step)
- L/R channel 4 input selector (Input gain: 0 to +14dB/ 2dB step)
- Multi channel input: 6 channels input
- Tone control Bass: -14 to +14dB(2dB step),
Treble: -14 to +14dB(2dB step)
- Can use 1 input for REC output (REC output gain: 0, +2, +4, +6dB)
- Built-in ADC output (Input Att: 0/ -6/ -12/ -18dB)
- Built-in L+R/ L-R block
- Built-in digital power supply

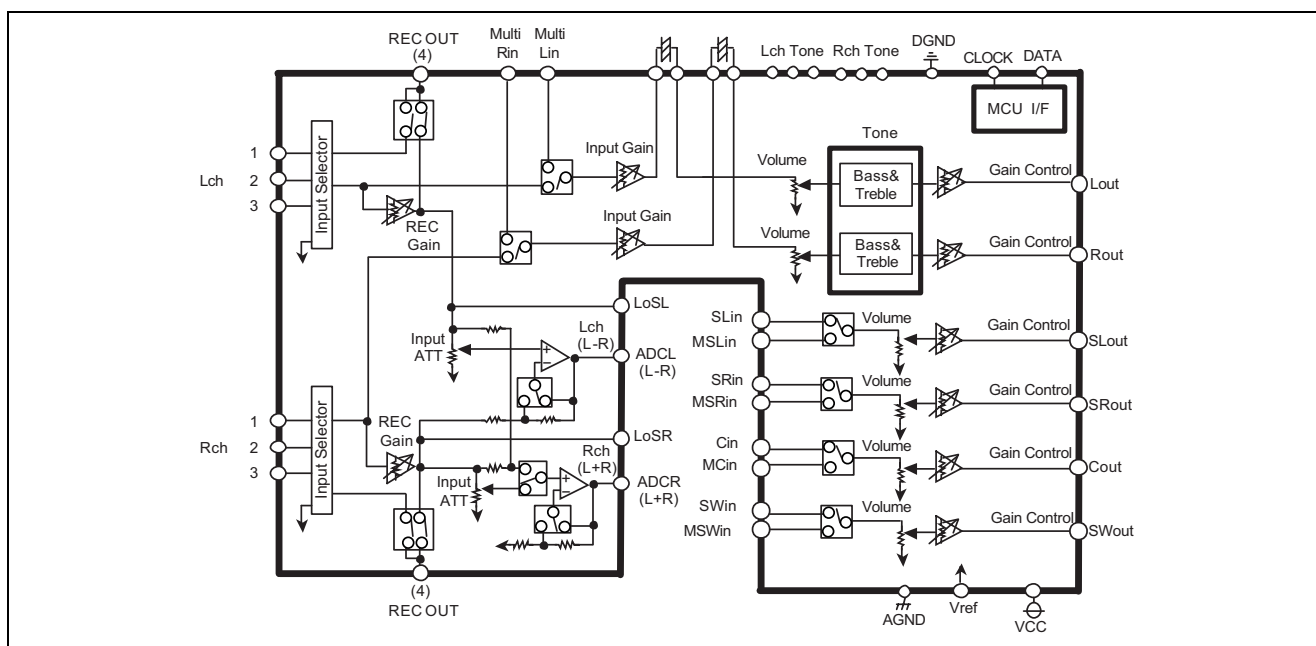
Recommended Operating Condition

Supply voltage range $V_{CC} = 8.0V$ to $10.0V$: $9.0V$ (typ)

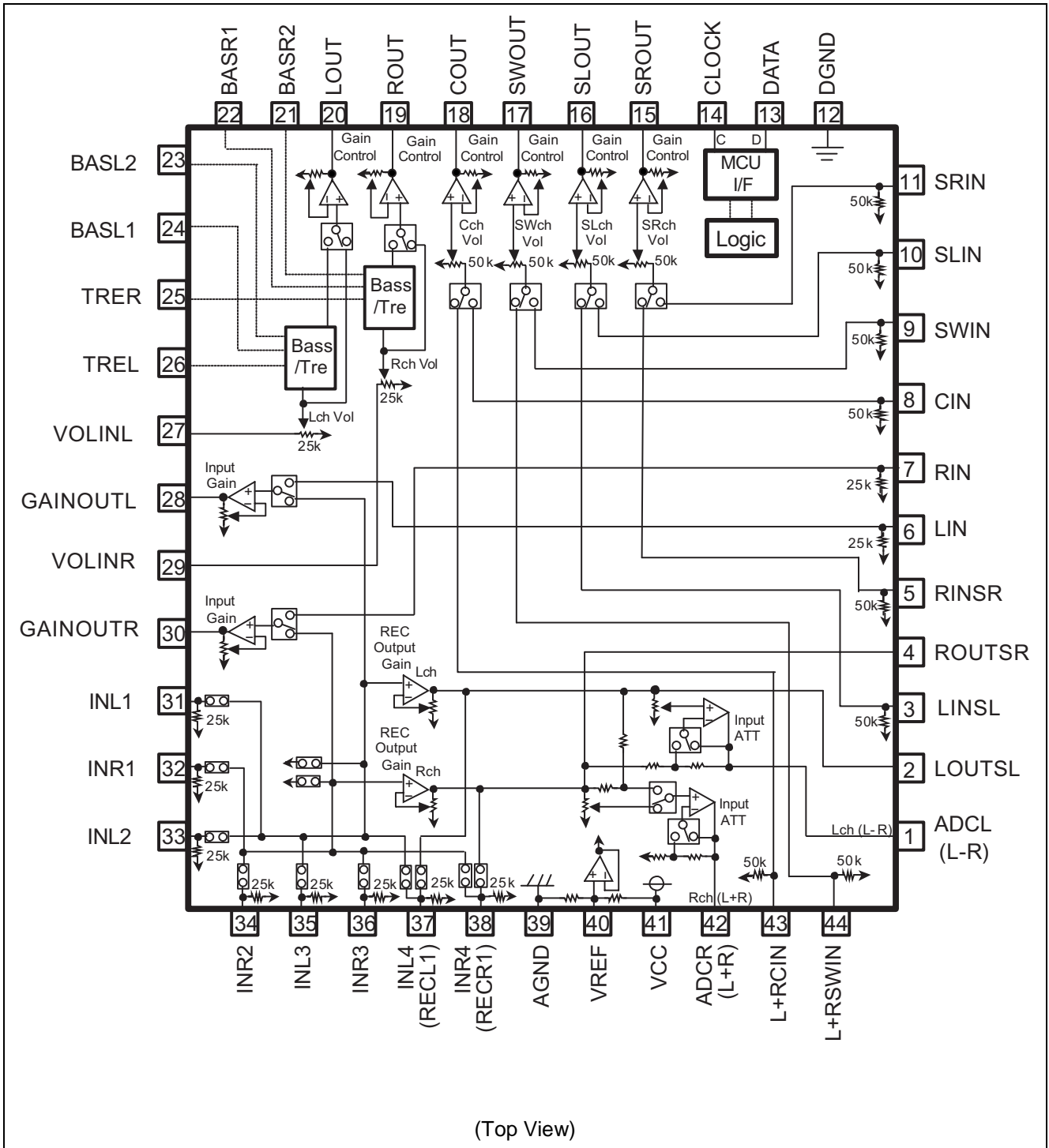
Application

Receiver, AV amp, Home theater, Mini stereo etc.

System Block Diagram



Block Diagram and Pin Configuration

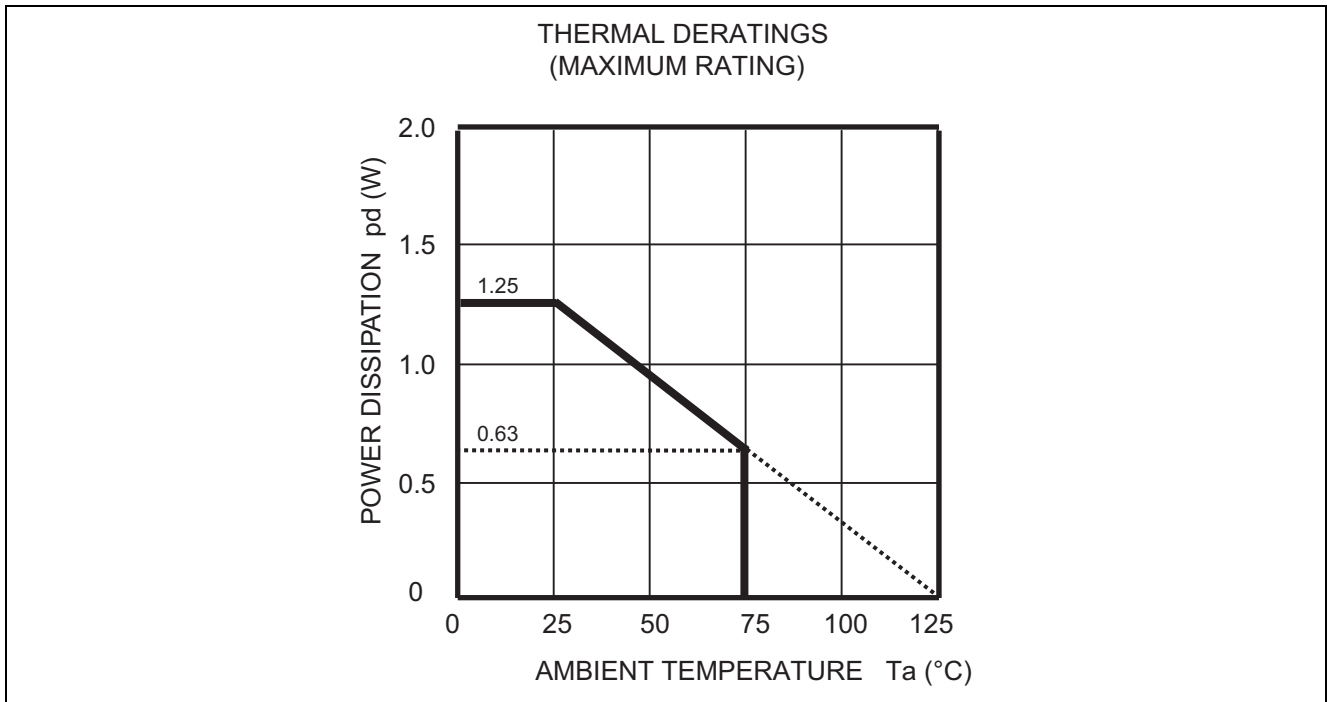


Pin Description

| Pin No. | Name | Function |
|------------------------------|---|---|
| 1 | ADCL (L-R) | Output pin for ADC (and L-R output) |
| 2 | LOUTSL | L channel pre-output (REC output) for SL channel |
| 3 | LINSL | SL channel input from L channel pre-output (REC output) |
| 4 | ROUTSR | R channel pre-output (REC output) for SR channel |
| 5 | RINSR | SR channel input from R channel pre-output (REC output) |
| 6, 7, 8, 9, 10, 11 | LIN, RIN, CIN, SWIN, SLIN, SRIN | Input pin of L/R/C/SW/SL/SR channel (Multi) |
| 12 | DGND | Digital ground |
| 13 | DATA | Input pin of control data |
| 14 | CLOCK | Input pin of control clock |
| 15, 16, 17, 18, 19, 20 | SROUT, SLOUT, SWOUT, COUT, ROUT, LOUT | Output pin of SR/SL/SW/C/R/L channel |
| 21, 22 23, 24 | BASR1, BASR2, BASL1, BASL2 | Frequency characteristic setting pin of R/L channel tone control (BASS) |
| 25, 26 | TRER, TREL | Frequency characteristic setting pin of R/L channel tone control (Treble) |
| 27, 29 | VOLINL, VOLINR | Input pin of L/R channel volume |
| 28, 30 | GAINOUTL, GAINOUTR | Output pin of L/R channel Input gain |
| 31,33,35, 32,34,36 | INL1, 2, 3, INR1, 2, 3 | Input pin of L/R channel (Input selector) |
| 37, 38 | INL4/RECL1, INR4/RECR1 | Input pin of L/R channel (Input selector) can use REC output pin |
| 39 | AGND | Analog ground |
| 40 | VREF | 1/2 V _{CC} input |
| 41 | VCC | Power supply to internal analog circuit |
| 42 | ADCR(L+R) | Output pin for ADC(and L+R output) |
| 43 | L+RCIN | L+R input for C channel |
| 44 | L+RSWIN | L+R input for SW channel |

Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit | Condition |
|-----------------------|----------------|-------------|----------------------|-----------------------------|
| Power supply | Supply voltage | 10.5 | V | V_{CC} |
| Power dissipation | P_d | 1.25 | W | $T_a \leq 25^\circ\text{C}$ |
| Thermal derating | K | 12.5 | mW/ $^\circ\text{C}$ | $T_a > 25^\circ\text{C}$ |
| Operating temperature | T_{opr} | -20 to +75 | $^\circ\text{C}$ | |
| Storage temperature | T_{stg} | -40 to +125 | $^\circ\text{C}$ | |

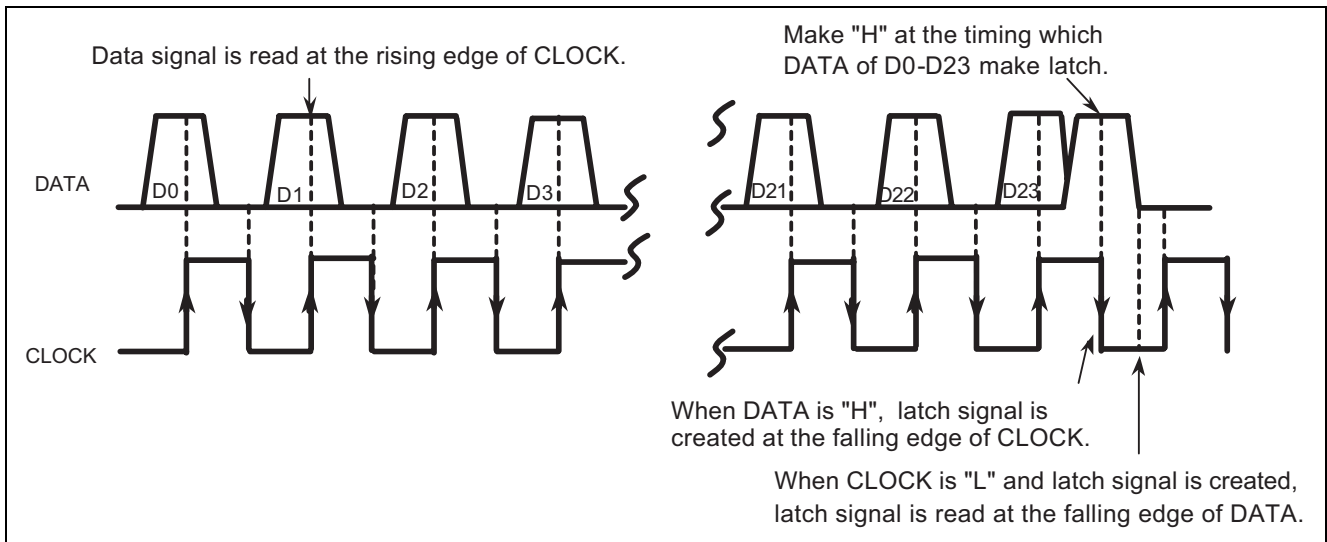


Recommended Operating Conditions

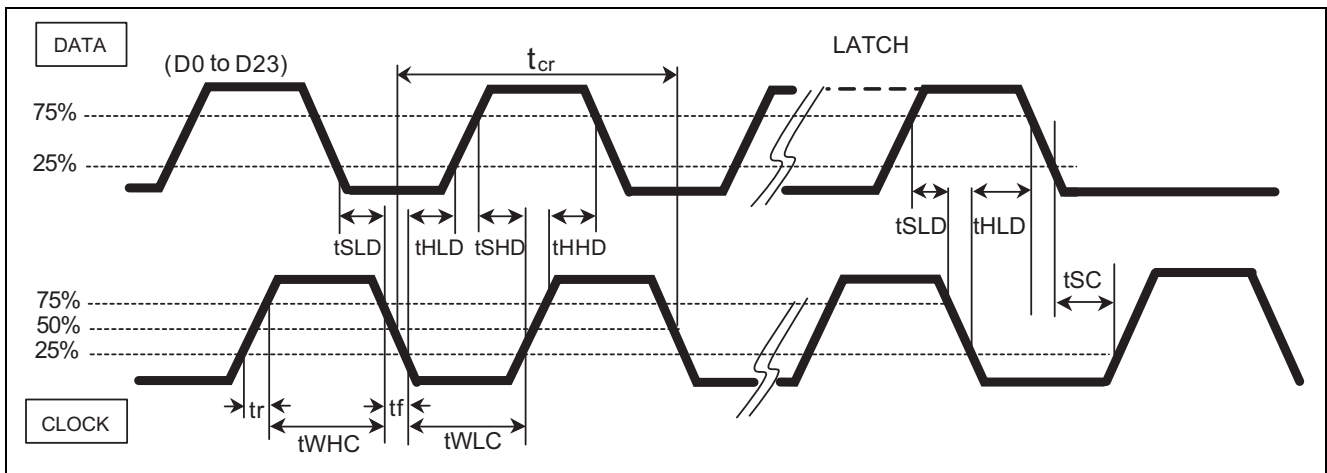
($T_a = 25^\circ\text{C}$, unless otherwise noted.)

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|-------------------------------|----------|-----|-----|------|------|----------------------|
| Supply voltage | V_{CC} | 8.0 | 9.0 | 10.0 | V | |
| Logic "H" level input voltage | V_{IH} | 2.7 | — | 5.5 | V | $V_{CC} = 9\text{V}$ |
| Logic "L" level input voltage | V_{IL} | 0 | — | 0.7 | V | $V_{CC} = 9\text{V}$ |

Relationship Between Data and Clock



Clock and Data Timings



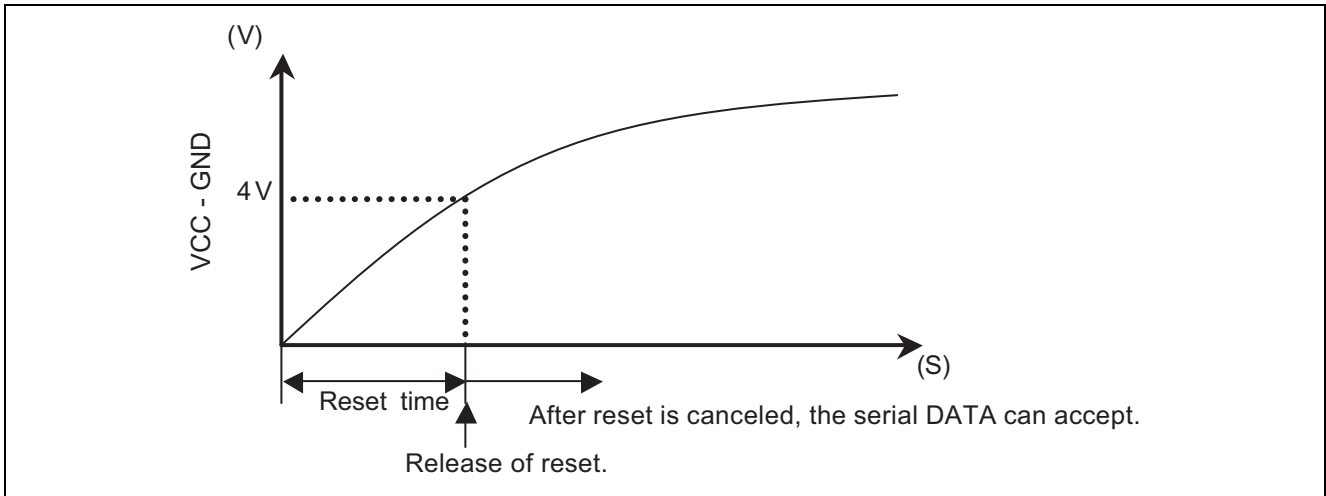
Timing Definition of Digital Block

| Parameter | Symbol | Limits | | | Unit |
|---|--------|--------|-----|-----|------|
| | | Min | Typ | Max | |
| CLOCK cycle time | tcr | 8 | — | — | μs |
| CLOCK pulse width ("H" level) | tWHC | 3.2 | — | — | |
| CLOCK pulse width ("L" level) | tWLC | 3.2 | — | — | |
| Rising time of clock and data | tr | — | — | 0.8 | |
| Falling time of clock and data | tf | — | — | 0.8 | |
| DATA setup time (Rising time of clock) | tSHD | 1.6 | — | — | |
| DATA setup time (Falling time of clock) | tSLD | 1.6 | — | — | |
| DATA hold time ("H" level) | tHHD | 1.6 | — | — | |
| DATA hold time ("L" level) | tHLD | 1.6 | — | — | |
| CLOCK setup time | tSC | 1.6 | — | — | |

Power on Reset

This IC built-in the power on reset function.

The voltage of VCC-GND less than 4V, the serial DATA can not accept.



Data Control Specification


Initialize all data of the 4 formats when digital power supply (V_{CC}) turns on.

Prohibit using except specified data code as follows.

| Slot1 | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|-----|------------------|-----------------------------|-----|-------------------|-----|---------------|-------------------------------|-----|------------------|------|------------|------|------|-----------------------|----------------|------|------|------|------|------|-----|-----|
| D0a | D1a | D2a | D3a | D4a | D5a | D6a | D7a | D8a | D9a | D10a | D11a | D12a | D13a | D14a | D15a | D16a | D17a | D18a | D19a | D20a | D21a | D22 | D23 |
| (1) Input Selector | | (2) REC Out | (3) REC-Output Gain Control | | (4) ADC Input ATT | | (5) L/R Input | (6) Bass/ Tone Control Bypass | | | | (7) Treble | | | (8) SL/SR /C/SW Input | (9) Input Gain | | | 0 | 0 | 0 | | |
| Slot2 | | | | | | | | | | | | | | | | | | | | | | | |
| D0b | D1b | D2b | D3b | D4b | D5b | D6b | D7b | D8b | D9b | D10b | D11b | D12b | D13b | D14b | D15b | D16b | D17b | D18b | D19b | D20b | D21b | D22 | D23 |
| (10) Lch Gain Control | | (11) Lch Volume | | | | | | (10) Rch Gain Control | | (11) Rch Volume | | | | | | 0 | 0 | 0 | 1 | | | | |
| Slot3 | | | | | | | | | | | | | | | | | | | | | | | |
| D0c | D1c | D2c | D3c | D4c | D5c | D6c | D7c | D8c | D9c | D10c | D11c | D12c | D13c | D14c | D15c | D16c | D17c | D18c | D19c | D20c | D21c | D22 | D23 |
| (10) Cch Gain Control | | (11) Cch Volume | | | | | | (10) SWch Gain Control | | (11) SWch Volume | | | | | | 0 | 0 | 1 | 0 | | | | |
| Slot4 | | | | | | | | | | | | | | | | | | | | | | | |
| D0d | D1d | D2d | D3d | D4d | D5d | D6d | D7d | D8d | D9d | D10d | D11d | D12d | D13d | D14d | D15d | D16d | D17d | D18d | D19d | D20d | D21d | D22 | D23 |
| (10) SLch Gain Control | | (11) SLch Volume | | | | | | (10) SRch Gain Control | | (11) SRch Volume | | | | | | 0 | 0 | 1 | 1 | | | | |

Note: No guarantee except for these codes.

Setting Code

 It's initial setting when power is turned on.

(1) Input Selector

| Setting | D0a | D1a | D2a |
|---------|-----|-----|-----|
| ALL OFF | 0 | 0 | 0 |
| IN1 | 0 | 1 | 0 |
| IN2 | 1 | 0 | 0 |
| IN3 | 1 | 1 | 0 |
| IN4*1 | 0 | 0 | 1 |

Note: No guarantee except for these codes.

(2) REC Output

| REC output | REC1 |
|------------|------|
| Setting | D3a |
| OFF | 0 |
| ON | 1*1 |

*1: When IN4 selected, REC1 can not use.

| IN4 | REC1 | D0a | D1a | D2a | D3a |
|-----|------|-----|-----|-----|-----|
| ON | OFF | 0 | 0 | 1 | 1 |

(3) REC-Output Gain Control

| Gain setting | D4a | D5a |
|--------------|-----|-----|
| 0dB | 0 | 0 |
| +2dB | 0 | 1 |
| +4dB | 1 | 0 |
| +6dB | 1 | 1 |

(4) ADC Input ATT


*2

| ATT setting | D6a | D7a |
|-------------|-----|-----|
| 0dB | 0 | 0 |
| -6dB | 0 | 1 |
| -12dB | 1 | 0 |
| -18dB | 1 | 1 |

*2: When L ± R selected, ADC input ATT can not use.

(5) L/R Input

| Setting | D8a |
|-------------|-----|
| Selector in | 0 |
| Multi in | 1 |

 It's initial setting when power is turned on.

(6) Bass/Bypass (Tone control is bypass)

| Gain setting | D9a | D10a | D11a | D12a |
|----------------------|-----|------|------|------|
| +14dB | 1 | 1 | 1 | 1 |
| +12dB | 1 | 1 | 1 | 0 |
| +10dB | 1 | 1 | 0 | 1 |
| +8dB | 1 | 1 | 0 | 0 |
| +6dB | 1 | 0 | 1 | 1 |
| +4dB | 1 | 0 | 1 | 0 |
| +2dB | 1 | 0 | 0 | 1 |
| 0dB | 1 | 0 | 0 | 0 |
| -2dB | 0 | 0 | 0 | 1 |
| -4dB | 0 | 0 | 1 | 0 |
| -6dB | 0 | 0 | 1 | 1 |
| -8dB | 0 | 1 | 0 | 0 |
| -10dB | 0 | 1 | 0 | 1 |
| -12dB | 0 | 1 | 1 | 0 |
| -14dB | 0 | 1 | 1 | 1 |
| Bypass ^{*3} | 0 | 0 | 0 | 0 |

*3: Tone control is bypass.

(7) Treble

| Gain setting | D13a | D14a | D15a | D16a |
|--------------|------|------|------|------|
| +14dB | 1 | 1 | 1 | 1 |
| +12dB | 1 | 1 | 1 | 0 |
| +10dB | 1 | 1 | 0 | 1 |
| +8dB | 1 | 1 | 0 | 0 |
| +6dB | 1 | 0 | 1 | 1 |
| +4dB | 1 | 0 | 1 | 0 |
| +2dB | 1 | 0 | 0 | 1 |
| 0dB | 1/0 | 0 | 0 | 0 |
| -2dB | 0 | 0 | 0 | 1 |
| -4dB | 0 | 0 | 1 | 0 |
| -6dB | 0 | 0 | 1 | 1 |
| -8dB | 0 | 1 | 0 | 0 |
| -10dB | 0 | 1 | 0 | 1 |
| -12dB | 0 | 1 | 1 | 0 |
| -14dB | 0 | 1 | 1 | 1 |

(8) SL/ SR/ C/ SW Input ^{*2}

| Setting | D17a |
|----------|-----------------|
| L ± R in | 0 ^{*2} |
| Multi in | 1 |

*2: When L ± R selected, ADC input ATT can not use.


(9) Input Gain

| Gain setting | D18a | D19a | D20a |
|--------------|------|------|------|
| 0dB | 0 | 0 | 0 |
| +2dB | 0 | 0 | 1 |
| +4dB | 0 | 1 | 0 |
| +6dB | 0 | 1 | 1 |
| +8dB | 1 | 0 | 0 |
| +10dB | 1 | 0 | 1 |
| +12dB | 1 | 1 | 0 |
| +14dB | 1 | 1 | 1 |

(10) Gain Control

| Gain setting | Lch | D0b | D1b | D2b |
|--------------|------|------|------|------|
| | Rch | D10b | D11b | D12b |
| | Cch | D0c | D1c | D2c |
| | SWch | D10c | D11c | D12c |
| | SLch | D0d | D1d | D2d |
| | SRch | D10d | D11d | D12d |
| 0dB | 0 | 0 | 0 | 0 |
| +2dB | 0 | 0 | 0 | 1 |
| +4dB | 0 | 0 | 1 | 0 |
| +6dB | 0 | 0 | 1 | 1 |
| +8dB | 1 | 0 | 0 | 0 |
| +10dB | 1 | 0 | 0 | 1 |
| +12dB | 1 | 1 | 1 | 0 |
| +14dB | 1 | 1 | 1 | 1 |

(11) 6channels Volume

 It's initial setting when power is turned on.

| ATT | Lch | D3b | D4b | D5b | D6b | D7b | D8b | D9b |
|-------|------|------|------|------|------|------|------|------|
| | Rch | D13b | D14b | D15b | D16b | D17b | D18b | D19b |
| | Cch | D3c | D4c | D5c | D6c | D7c | D8c | D9c |
| | SWch | D13c | D14c | D15c | D16c | D17c | D18c | D19c |
| | SLch | D3d | D4d | D5d | D6d | D7d | D8d | D9d |
| | SRch | D13d | D14d | D15d | D16d | D17d | D18d | D19d |
| 0dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| -2dB | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| -3dB | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| -4dB | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| -5dB | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| -6dB | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| -7dB | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| -8dB | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| -9dB | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| -10dB | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| -11dB | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| -12dB | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| -13dB | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| -14dB | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| -15dB | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| -16dB | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| -17dB | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| -18dB | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| -19dB | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| -20dB | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| -21dB | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| -22dB | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| -23dB | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| -24dB | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| -25dB | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| -26dB | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| -27dB | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| -28dB | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| -29dB | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |
| -30dB | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| -31dB | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| -32dB | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| -33dB | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| -34dB | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| -35dB | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| -36dB | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| -37dB | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| -38dB | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| -39dB | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| -40dB | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| -41dB | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| -42dB | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| -43dB | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |

| ATT | Lch | D3b | D4b | D5b | D6b | D7b | D8b | D9b |
|-------|------|------|------|------|------|------|------|------|
| | Rch | D13b | D14b | D15b | D16b | D17b | D18b | D19b |
| | Cch | D3c | D4c | D5c | D6c | D7c | D8c | D9c |
| | SWch | D13c | D14c | D15c | D16c | D17c | D18c | D19c |
| | SLch | D3d | D4d | D5d | D6d | D7d | D8d | D9d |
| | SRch | D13d | D14d | D15d | D16d | D17d | D18d | D19d |
| -44dB | 0 | 1 | 0 | 1 | 1 | 0 | 0 | |
| -45dB | 0 | 1 | 0 | 1 | 1 | 0 | 1 | |
| -46dB | 0 | 1 | 0 | 1 | 1 | 1 | 0 | |
| -47dB | 0 | 1 | 0 | 1 | 1 | 1 | 1 | |
| -48dB | 0 | 1 | 1 | 0 | 0 | 0 | 0 | |
| -49dB | 0 | 1 | 1 | 0 | 0 | 0 | 1 | |
| -50dB | 0 | 1 | 1 | 0 | 0 | 1 | 0 | |
| -51dB | 0 | 1 | 1 | 0 | 0 | 1 | 1 | |
| -52dB | 0 | 1 | 1 | 0 | 1 | 0 | 0 | |
| -53dB | 0 | 1 | 1 | 0 | 1 | 0 | 1 | |
| -54dB | 0 | 1 | 1 | 0 | 1 | 1 | 0 | |
| -55dB | 0 | 1 | 1 | 0 | 1 | 1 | 1 | |
| -56dB | 0 | 1 | 1 | 1 | 0 | 0 | 0 | |
| -57dB | 0 | 1 | 1 | 1 | 0 | 0 | 1 | |
| -58dB | 0 | 1 | 1 | 1 | 0 | 1 | 0 | |
| -59dB | 0 | 1 | 1 | 1 | 0 | 1 | 1 | |
| -60dB | 0 | 1 | 1 | 1 | 1 | 0 | 0 | |
| -61dB | 0 | 1 | 1 | 1 | 1 | 0 | 1 | |
| -62dB | 0 | 1 | 1 | 1 | 1 | 1 | 0 | |
| -63dB | 0 | 1 | 1 | 1 | 1 | 1 | 1 | |
| -64dB | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| -65dB | 1 | 0 | 0 | 0 | 0 | 0 | 1 | |
| -66dB | 1 | 0 | 0 | 0 | 0 | 1 | 0 | |
| -67dB | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| -68dB | 1 | 0 | 0 | 0 | 1 | 0 | 0 | |
| -69dB | 1 | 0 | 0 | 0 | 1 | 0 | 1 | |
| -70dB | 1 | 0 | 0 | 0 | 1 | 1 | 0 | |
| -71dB | 1 | 0 | 0 | 0 | 1 | 1 | 1 | |
| -72dB | 1 | 0 | 0 | 1 | 0 | 0 | 0 | |
| -73dB | 1 | 0 | 0 | 1 | 0 | 0 | 1 | |
| -74dB | 1 | 0 | 0 | 1 | 0 | 1 | 0 | |
| -75dB | 1 | 0 | 0 | 1 | 0 | 1 | 1 | |
| -76dB | 1 | 0 | 0 | 1 | 1 | 0 | 0 | |
| -77dB | 1 | 0 | 0 | 1 | 1 | 0 | 1 | |
| -78dB | 1 | 0 | 0 | 1 | 1 | 1 | 0 | |
| -79dB | 1 | 0 | 0 | 1 | 1 | 1 | 1 | |
| -80dB | 1 | 0 | 1 | 0 | 0 | 0 | 0 | |
| -81dB | 1 | 0 | 1 | 0 | 0 | 0 | 1 | |
| -82dB | 1 | 0 | 1 | 0 | 0 | 1 | 0 | |
| -83dB | 1 | 0 | 1 | 0 | 0 | 1 | 1 | |
| -84dB | 1 | 0 | 1 | 0 | 1 | 0 | 0 | |
| -85dB | 1 | 0 | 1 | 0 | 1 | 0 | 1 | |
| -86dB | 1 | 0 | 1 | 0 | 1 | 1 | 0 | |
| -87dB | 1 | 0 | 1 | 0 | 1 | 1 | 1 | |
| -88dB | 1 | 0 | 1 | 1 | 0 | 0 | 0 | |
| -89dB | 1 | 0 | 1 | 1 | 0 | 0 | 1 | |
| -90dB | 1 | 0 | 1 | 1 | 0 | 1 | 0 | |

| ATT | Lch | D3b | D4b | D5b | D6b | D7b | D8b | D9b |
|-------|------|------|------|------|------|------|------|------|
| | Rch | D13b | D14b | D15b | D16b | D17b | D18b | D19b |
| | Cch | D3c | D4c | D5c | D6c | D7c | D8c | D9c |
| | SWch | D13c | D14c | D15c | D16c | D17c | D18c | D19c |
| | SLch | D3d | D4d | D5d | D6d | D7d | D8d | D9d |
| | SRch | D13d | D14d | D15d | D16d | D17d | D18d | D19d |
| -91dB | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| -92dB | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| -93dB | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| -94dB | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| -95dB | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| -96dB | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| -97dB | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| -98dB | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| -99dB | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| -∞dB | 1 | 1 | 1/0 | 1/0 | 1 | 1 | 1/0 | 1/0 |

Note: No guarantee except for these codes.

Electrical Characteristics

Unless otherwise noted, $T_a = 25^\circ\text{C}$, $V_{CC} = 9\text{V}$, $f = 1\text{kHz}$, Volume = 0dB, Input selector = IN1, Input gain = 0db, Gain control = 0dB, ADC input ATT = 0dB, Tone = Bypass, L/R input = Selector in, SL/SR/C/SW input = L±R in

(1) Power supply characteristics

| Parameter | Symbol | Limits | | | Unit | Test condition |
|-------------------------------------|----------|--------|-----|-----|------|---|
| | | Min | Typ | Max | | |
| Analog power supply circuit current | I_{CC} | — | 35 | 55 | mA | With $V_{CC} = 9\text{V}$ V_{CC} current, when no signal is provided |

(2) Input/Output characteristics (OVER ALL)

| Parameter | Symbol | Limits | | | Unit | Test condition | |
|----------------------------|--------|--------|-------|------|------------|---|-----------------------------|
| | | Min | Typ | Max | | | |
| Input resistance | Rin | 17 | 25 | 33 | k Ω | 6 to 11, 31 to 36 pin | |
| Maximum output voltage | VOM | 1.8 | 2.2 | — | Vrms | 6 to 11pin input, 15 to 20pin output, THD = 1%, RL = 10k Ω , Output gain control = +6dB | |
| Pass gain | Gv | -2.0 | 0 | 2.0 | dB | 6 to 11pin input, 15 to 20pin output, Vi = 0.3Vrms, FLAT | |
| Total harmonic distortion | THD | — | 0.005 | 0.02 | % | 6 to 11pin input, 15 to 20pin output, BW: 400Hz to 30kHz, f = 1kHz, Vo = 0.5Vrms, RL = 10k Ω | |
| Balance of mutual channels | CBAL | -0.5 | 0 | 0.5 | dB | 31,32pin input, 19,20pin output, Vi = 0.3Vrms | |
| Output noise voltage | Vono1 | — | 2 | 6 | μ Vrms | JIS-A, Rg = 0 Ω , 19,20pin output, Volume = $-\infty$ dB setting | Output gain control = 0dB |
| | | — | 9 | 18 | | JIS-A, Rg = 0 Ω , 19,20pin output, Volume = 0dB setting | Output gain control = +14dB |
| | Vono2 | — | 2 | 6 | | JIS-A, Rg = 0 Ω , 19,20pin output, Volume = 0dB setting | Output gain control = 0dB |
| | | — | 9 | 18 | | JIS-A, Rg = 0 Ω , 15 to 18pin output, Volume = 0dB setting | Output gain control = +14dB |
| | Vono3 | — | 2 | 6 | | JIS-A, Rg = 0 Ω , 15 to 18pin output, Volume = 0dB setting | Output gain control = 0dB |
| | | — | 9 | 18 | | JIS-A, Rg = 0 Ω , 15 to 18pin output, Volume = 0dB setting | Output gain control = +14dB |
| Selector separation | SS1 | — | -90 | -70 | dB | < Input selector > Vo = 1Vrms, Rg = 0 Ω , RL = 10k Ω , JIS-A | |
| | SS2 | — | -90 | -70 | | < Multi input selector > Vo = 1Vrms, Rg = 0 Ω , RL = 10k Ω , JIS-A | |
| Channel separation | CS | — | -90 | -70 | | Vo = 1Vrms, Rg = 0 Ω , RL = 10k Ω , JIS-A | |

(3) 6 channel Volume characteristics

| Parameter | Symbol | Limits | | | Unit | Test condition |
|---|--------|--------|------|------|------|---------------------------------------|
| | | Min | Typ | Max | | |
| Maximum attenuation | ATTmax | — | -105 | -95 | dB | Vi = 2Vrms, JIS-A, VOL = $-\infty$ dB |
| Volume gain gang error of mutual channels | Dvol | -0.5 | 0 | +0.5 | dB | Volume = 0dB |

(4) Tone control characteristics

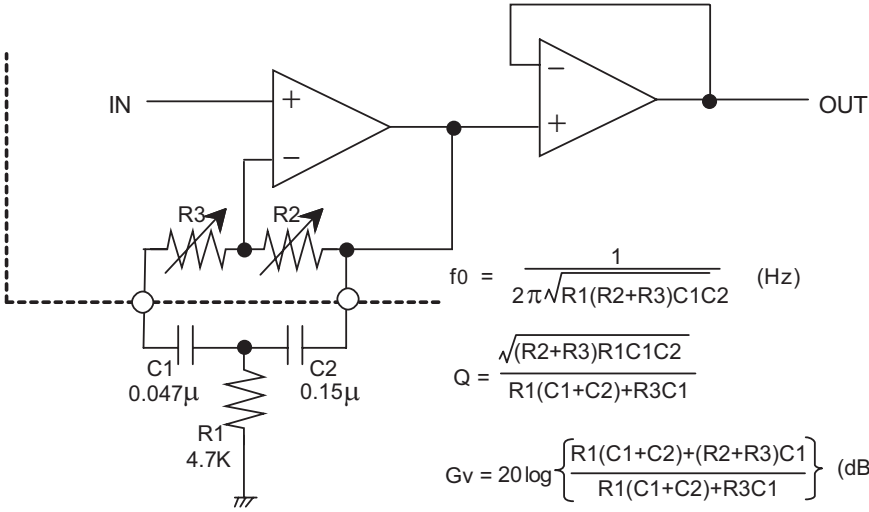
Unless otherwise noted, Tone ON/OFF = ON

| Parameter | Symbol | Limits | | | Unit | Test condition |
|--|------------|--------|-----|-----|------|--|
| | | Min | Typ | Max | | |
| Tone control voltage gain (Boost/Bass) | G (BASS) B | +11 | +14 | +17 | dB | f = 100Hz Bass +14dB setting |
| Tone control voltage gain (Cut/Bass) | G (BASS) C | -17 | -14 | -11 | dB | f = 100Hz Bass -14dB setting |
| Tone control voltage gain (Boost/Treble) | G (TRE) B | +11 | +14 | +17 | dB | f = 10kHz Treble +14dB setting |
| Tone control voltage gain (Cut/Treble) | G (TRE) C | -17 | -14 | -11 | dB | f = 10kHz Treble -10dB setting |
| Balance of mutual channels | BALT | -2 | 0 | +2 | dB | Bass setting +14, -14dB Treble setting +14, -14dB |

Tone Control

(1) Bass

< Boost >

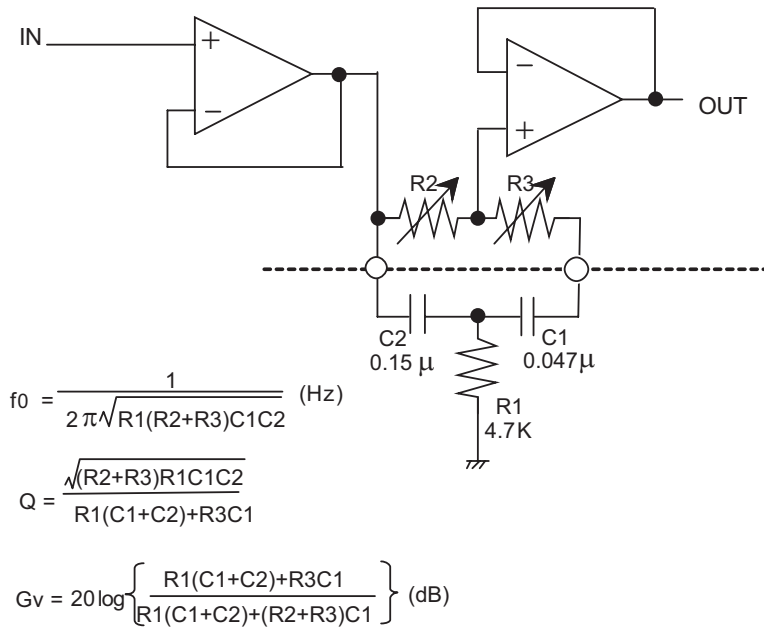


[Designed Parameter]

R1=4.7kΩ, C1=0.047μF, C2=0.15μF

| Gain Setting | Designed Parameter | |
|--------------|--------------------|--------|
| | R3(kΩ) | R2(kΩ) |
| +14dB | 0.19 | 79.81 |
| +12dB | 5.21 | 74.66 |
| +10dB | 11.83 | 68.17 |
| +8dB | 19.99 | 60.01 |
| +6dB | 30.27 | 49.73 |
| +4dB | 43.21 | 36.79 |
| +2dB | 59.49 | 20.51 |

< Cut >



[Designed Parameter]

R1=4.7kΩ, C1=0.047μF, C2=0.15μF

| Gain Setting | Designed Parameter | |
|--------------|--------------------|--------|
| | R2(kΩ) | R3(kΩ) |
| -14dB | 79.81 | 0.19 |
| -12dB | 74.66 | 5.21 |
| -10dB | 68.17 | 11.83 |
| -8dB | 60.01 | 19.99 |
| -6dB | 49.73 | 30.27 |
| -4dB | 36.79 | 43.21 |
| -2dB | 20.51 | 59.49 |

(2) Treble

< Boost >

$G_v = 20 \log \left[\frac{\sqrt{(R_4+R_5)^2 + RC^2}}{\sqrt{R_4^2 + RC^2}} \right] \text{ (dB)}$

< Cut >

$G_v = 20 \log \left[\frac{\sqrt{R_4^2 + RC^2}}{\sqrt{(R_4+R_5)^2 + RC^2}} \right] \text{ (dB)}$

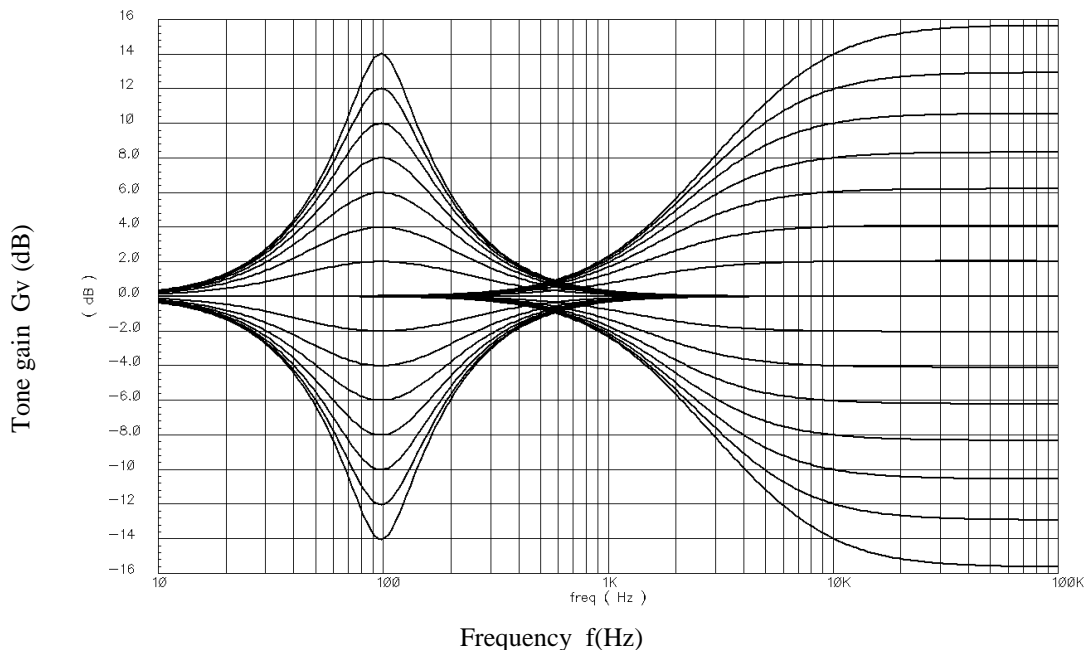
[Designed Parameter]
RC=0.022μF

| Gain Setting | Designed Parameter | |
|--------------|--------------------|--------|
| | R4(kΩ) | R5(kΩ) |
| +14dB | 1.03 | 5.23 |
| +12dB | 1.41 | 4.85 |
| +10dB | 1.86 | 4.40 |
| +8dB | 2.40 | 3.86 |
| +6dB | 3.06 | 3.20 |
| +4dB | 3.90 | 2.36 |
| +2dB | 4.95 | 1.31 |

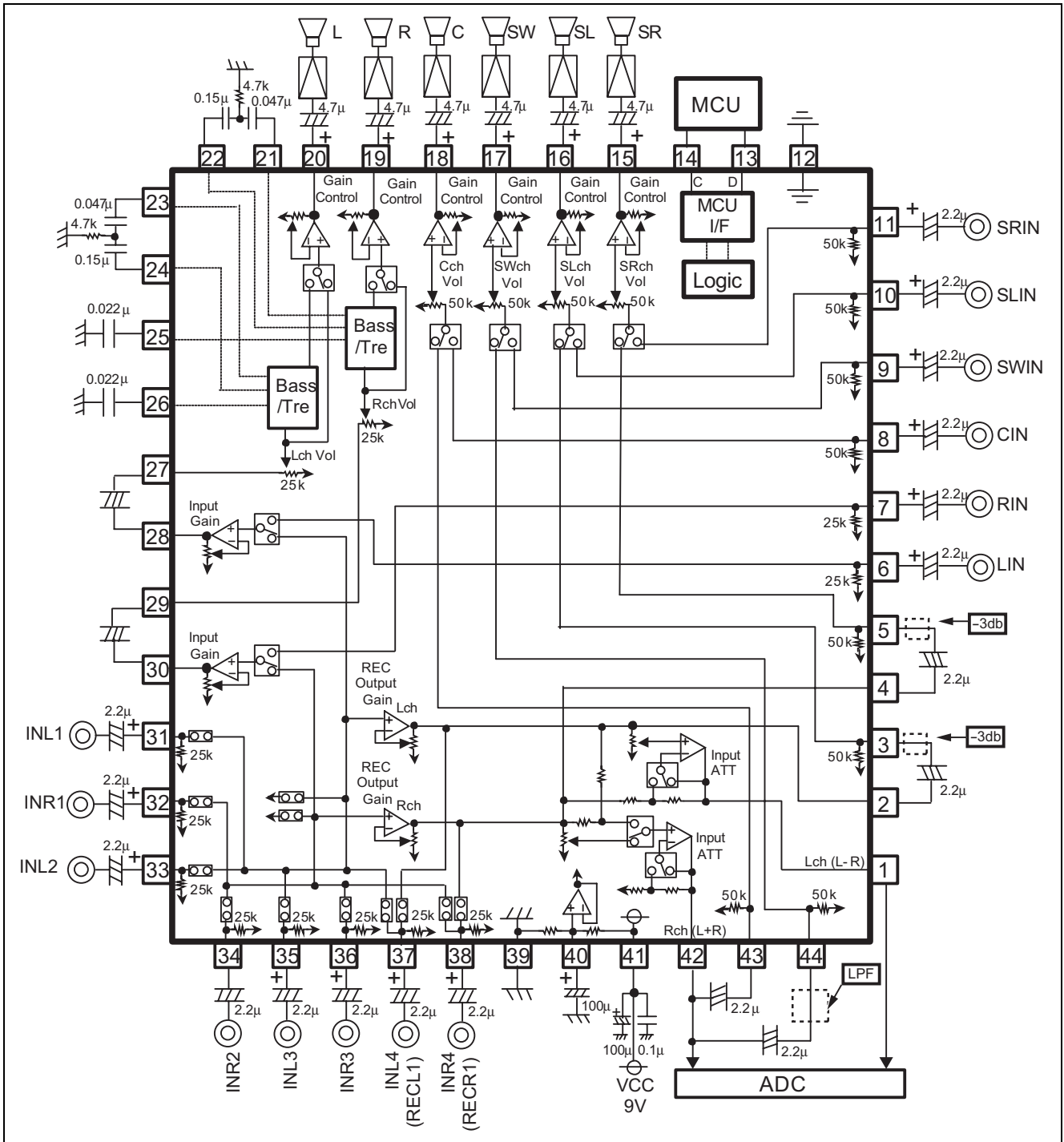
[Designed Parameter]
RC=0.022μF

| Gain Setting | Designed Parameter | |
|--------------|--------------------|--------|
| | R5(kΩ) | R4(kΩ) |
| -14dB | 5.23 | 1.03 |
| -12dB | 4.85 | 1.41 |
| -10dB | 4.40 | 1.86 |
| -8dB | 3.86 | 2.40 |
| -6dB | 3.20 | 3.06 |
| -4dB | 2.36 | 3.90 |
| -2dB | 1.31 | 4.95 |

Curve of characteristics



Application Example



Keep safety first in your circuit designs!

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