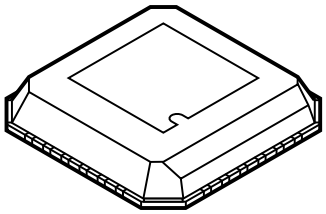
TOSHIBA Bipolar Linear IC Silicon Monolithic

# T A 2 1 5 2 F L

Low Current Consumption Headphone Amplifier (for 1.5-V/3-V Use)

The TA2152FL is a headphone amplifier of low current consumption type developed for portable digital audio.

It is especially suitable for portable CD players, portable MD players etc.



QON24-P-0505-0.50

Weight: 0.05 g (typ.)

Marking: 2152

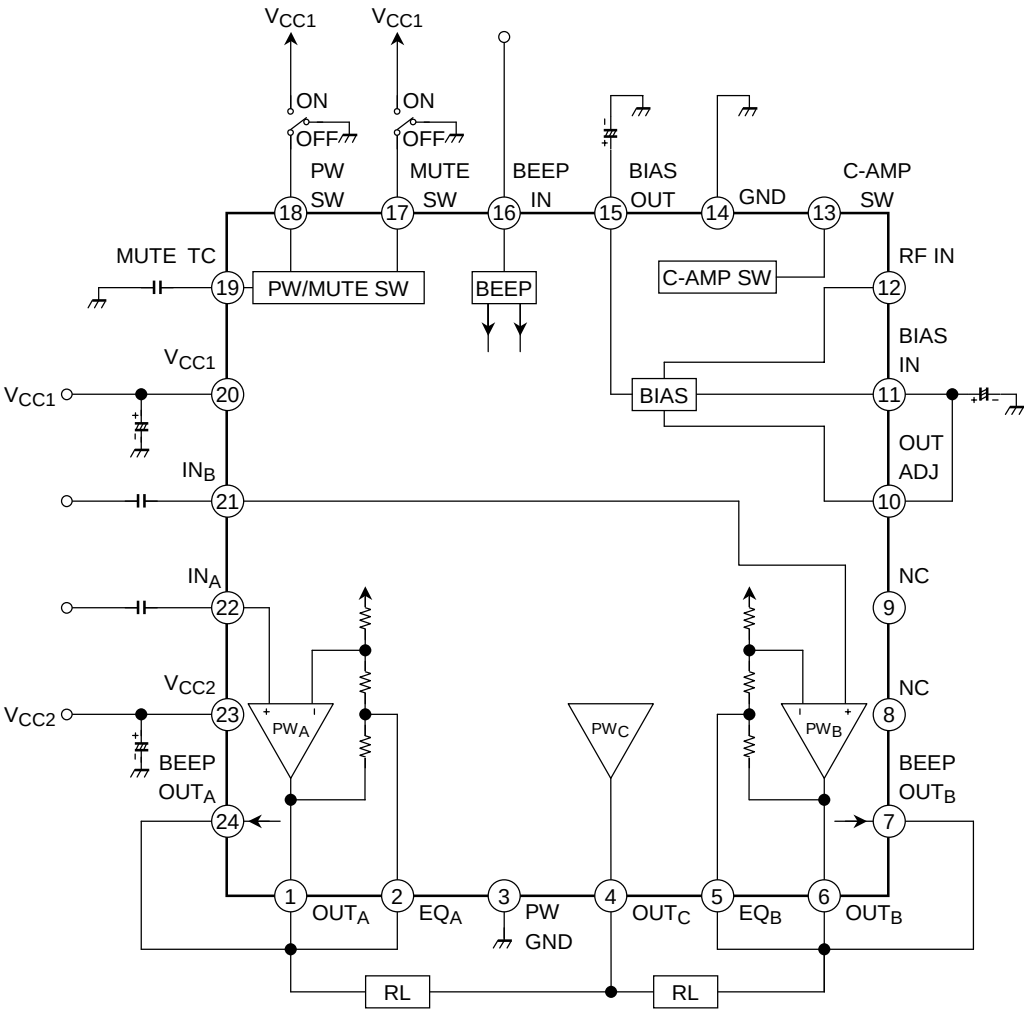
## Features

- Low current consumption
  - The power amplifier output stage can be driven using a single battery.
    As a result, overall current consumption is low.
  - Built-in center amplifier switch
    For the output-coupling type, the consumption current has been decreased still further.
  - Current value ($V_{CC1}$ = 2.4 V, $V_{CC2}$ = 1.2 V, f = 1 kHz, $R_L$ = 16 Ω, Ta = 25°C, typ.)

| Characteristic | Symbol | No Signal | 0.1 mW × 2 ch | 0.5 mW × 2 ch |
|---|---|---|---|---|
| Output-coupling type | $I_{CC}$ ($V_{CC1}$) | 0.4 mA | 0.5 mA | 0.5 mA |
| | $I_{CC}$ ($V_{CC2}$) | 0.3 mA | 2.2 mA | 5.0 mA |
| OCL type | $I_{CC}$ ($V_{CC1}$) | 0.7 mA | 0.7 mA | 0.8 mA |
| | $I_{CC}$ ($V_{CC2}$) | 0.7 mA | 4.5 mA | 10.0 mA |

- Output power: $P_o$ = 8 mW (typ.)
  ($V_{CC1}$ = 2.4 V, $V_{CC2}$ = 1.2 V, f = 1 kHz, $R_L$ = 16 Ω, THD = 10%, Ta = 25°C)
- Voltage gain: $G_V$ = 11.5dB (typ.)
- Built-in beep function
- Built-in low-pass compensation (output-coupling type)
- Built-in mute switch
- Built-in power switch
- Operating supply voltage range (Ta = 25°C)
  $V_{CC1}$ (opr) = 1.8 V~4.5 V
  $V_{CC2}$ (opr) = 0.9 V~4.5 V

**Block Diagram (of OCL Application)**



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

| Characteristic | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage 1 | $V_{CC1}$ | 4.5 | V |
| Supply voltage 2 | $V_{CC2}$ | 4.5 | |
| Output current | $I_{o\ (peak)}$ | 100 | mA |
| Power dissipation | $P_D$ (Note) | 550 | mW |
| Operating temperature | $T_{opr}$ | −25~75 | °C |
| Storage temperature | $T_{stg}$ | −55~150 | °C |

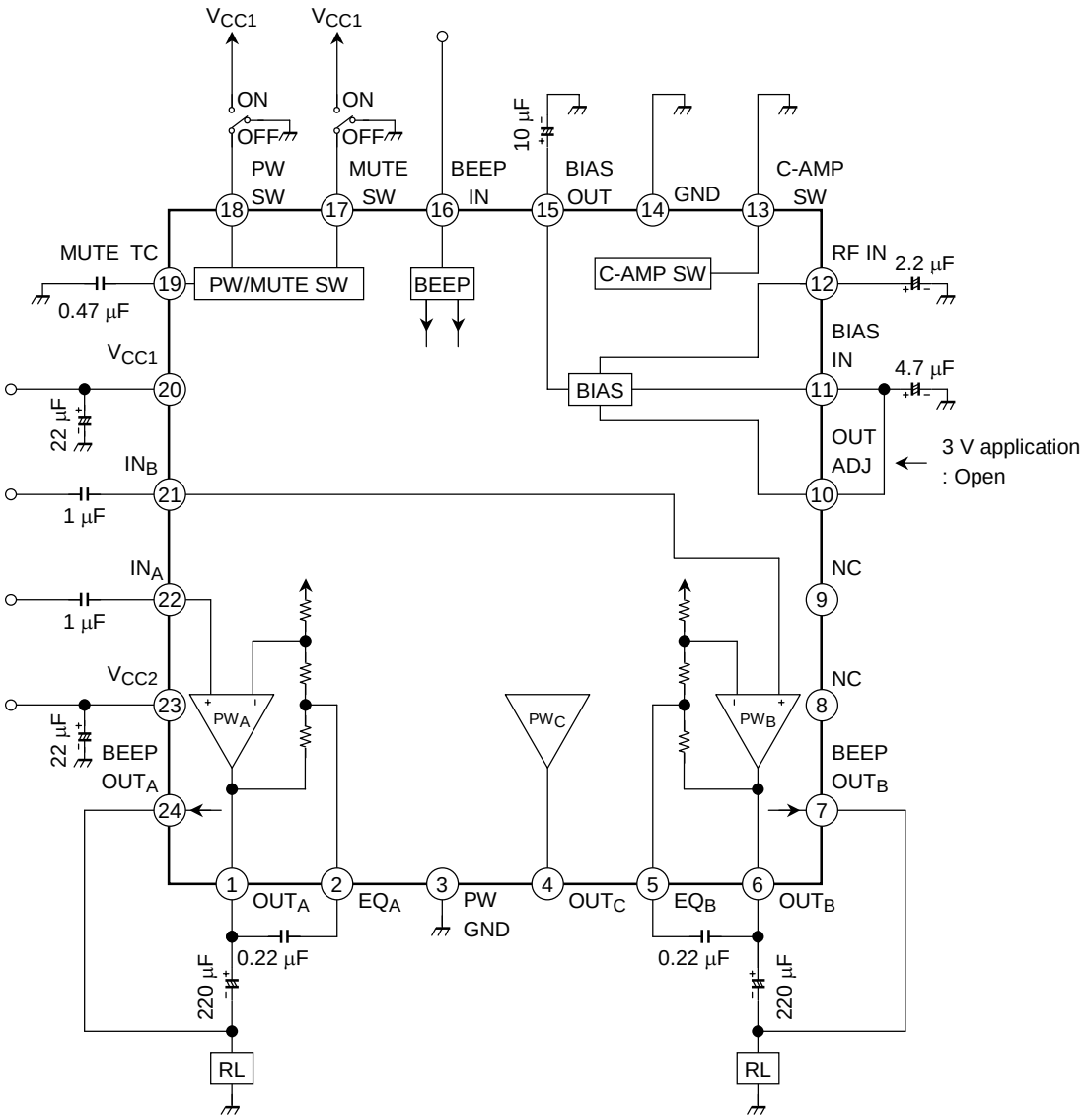
Note: Derated by 4.4 mW/°C above Ta = 25°C

## Electrical Characteristics

### (Unless otherwise specified $V_{CC1}$ = 2.4 V, $V_{CC2}$ = 1.2 V, Rg = 600 Ω, $R_L$ = 16 Ω, f = 1 kHz, Ta = 25°C, SW1: a, SW2: b, SW3: a)

| Characteristic | Symbol | Test conditions | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Quiescent supply current | $I_{CCQ1}$ | IC OFF ($V_{CC1}$), SW1: b | — | 0.1 | 5 | μA |
| | $I_{CCQ2}$ | IC OFF ($V_{CC2}$), SW1: b | — | 0.1 | 5 | |
| | $I_{CCQ3}$ | OCL, Mute ON ($V_{CC1}$), SW2: a | — | 400 | 600 | |
| | $I_{CCQ4}$ | OCL, Mute ON ($V_{CC2}$), SW2: a | — | 650 | 1400 | |
| | $I_{CCQ5}$ | C-Cup, Mute ON ($V_{CC1}$), SW2: a | — | 170 | 250 | |
| | $I_{CCQ6}$ | C-Cup, Mute ON ($V_{CC2}$), SW2: a | — | 85 | 170 | |
| | $I_{CCQ7}$ | OCL, no signal ($V_{CC1}$) | — | 0.7 | 1.1 | mA |
| | $I_{CCQ8}$ | OCL, no signal ($V_{CC2}$) | — | 0.7 | 1.5 | |
| | $I_{CCQ9}$ | C-Cup, no signal ($V_{CC1}$) | — | 0.4 | 0.6 | |
| | $I_{CCQ10}$ | C-Cup, no signal ($V_{CC2}$) | — | 0.3 | 0.6 | |
| Power supply current during drive | $I_{CC1}$ | OCL, 0.5 mW × 2 ch ($V_{CC1}$) | — | 0.8 | — | mA |
| | $I_{CC2}$ | OCL, 0.5 mW × 2 ch ($V_{CC2}$) | — | 10.0 | — | |
| | $I_{CC3}$ | C-Cup, 0.5 mW × 2 ch ($V_{CC1}$) | — | 0.5 | — | |
| | $I_{CC4}$ | C-Cup, 0.5 mW × 2 ch ($V_{CC2}$) | — | 5.0 | — | |
| Voltage gain | $G_V$ | $V_o$ = −22 dBV | 9.5 | 11.5 | 13.5 | dB |
| Channel balance | CB | $V_o$ = −22 dBV | −1.5 | 0 | +1.5 | |
| Output power | $P_o$ | THD = 10% | 5 | 8 | — | mW |
| Total harmonic distortion | THD | $P_o$ = 1 mW | — | 0.1 | 1.0 | % |
| Output noise voltage | $V_{no}$ | Rg = 600 Ω, Filter: IHF-A, SW3: b | — | −100 | −96 | dBV |
| Cross talk | CT | $V_o$ = −22 dBV | −25 | −35 | — | dB |
| Ripple rejection ratio 1 | RR1 | Inflow to $V_{CC1}$, SW3: b<br>$f_r$ = 100 Hz, $V_r$ = −20 dBV | −65 | −85 | — | |
| Ripple rejection ratio 2 | RR2 | Inflow to $V_{CC2}$, SW3: b<br>$f_r$ = 100 Hz, $V_r$ = −20 dBV | −85 | −100 | — | |
| Muting attenuation | ATT | $V_o$ = −12 dBV | −100 | −115 | — | |
| Beep sound output voltage | $V_{BEEP\ (OUT)}$ | $V_{BEEP\ (IN)}$ = 2 $V_{p-p}$ | −55 | −50 | −45 | dBV |
| PW SW ON current | I18 | $V_{CC1}$ = 1.8 V, $V_{CC2}$ = 0.9 V | 5 | — | — | μA |
| PW SW OFF voltage | V18 | $V_{CC1}$ = 1.8 V, $V_{CC2}$ = 0.9 V | 0 | — | 0.3 | V |
| Mute SW ON current | I17 | $V_{CC1}$ = 1.8 V, $V_{CC2}$ = 0.9 V | 5 | — | — | μA |
| Mute SW OFF voltage | V17 | $V_{CC1}$ = 1.8 V, $V_{CC2}$ = 0.9 V | 0 | — | 0.3 | V |

## Application Circuit1 (1.5 V Output Coupling Type)



## Application Circuit2 (1.5 V OCL Type)