



# LA4538M

## Ripple Filter-Provided Stereo Power Amplifier for 1.5V Headphone Stereos

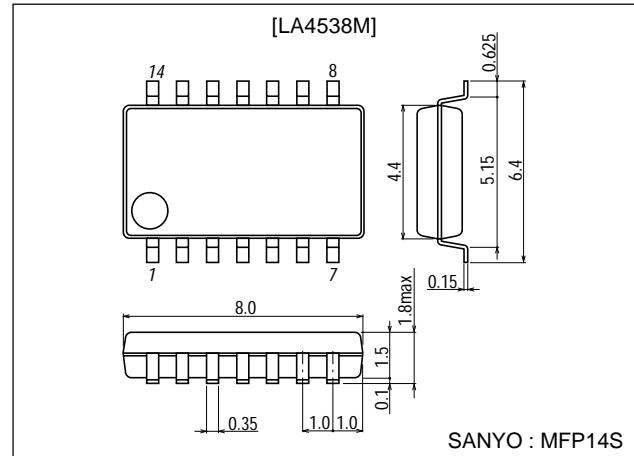
### Features

- Low current dissipation.
- Excellent reduced voltage characteristics.
- Minimum number of external parts required.
- On-chip power switch function.
- Power amplifier section
  - Output power 8mW typ ( $V_{CC}=1.5V$ ,  $R_L=16\Omega$ ,  $f=1kHz$ ,  $THD=10\%$ )
  - Ripple rejection 46dB typ ( $V_{CC}=1.0V$ ,  $V_R=-30dBm$ ,  $f_R=100Hz$ )
- Ripple filter section
  - Ripple rejection 39dB typ ( $V_{CC}=1.0V$ ,  $V_R=-35dBm$ ,  $f_R=100Hz$ )
  - Less output voltage loss
  - Pin 8 can be used to perform the muting current.

### Package Dimensions

unit:mm

3111-MFP14S



SANYO : MFP14S

### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ C$

| Parameter                   | Symbol        | Conditions             | Ratings     | Unit       |
|-----------------------------|---------------|------------------------|-------------|------------|
| Maximum supply voltage      | $V_{CC\ max}$ | Quiescent              | 4.5         | V          |
| Maximum output current      | $I_{O7}$      | Pin 7 flow-out current | 5.0         | mA         |
| Allowable power dissipation | $P_{d\ max}$  |                        | 300         | mW         |
| Operating temperature       | $T_{opr}$     |                        | -20 to +75  | $^\circ C$ |
| Storage temperature         | $T_{stg}$     |                        | -40 to +125 | $^\circ C$ |

#### Operating Conditions at $T_a = 25^\circ C$

| Parameter                     | Symbol       | Conditions | Ratings    | Unit     |
|-------------------------------|--------------|------------|------------|----------|
| Recommended operating voltage | $V_{CC}$     |            | 1.5        | V        |
| Operating voltage range       | $V_{CC\ op}$ |            | 0.9 to 4.0 | V        |
| Recommended load resistance   | $R_L$        |            | 16 to 32   | $\Omega$ |

#### Operating Characteristics at $T_a = 25^\circ C$ , $R_L=16\Omega$ , $R_g=600\Omega$ , See specified Test Circuit.

| Parameter               | Symbol       | Conditions   | Ratings |     |      | Unit    |
|-------------------------|--------------|--|---------|-----|------|---------|
|                         |              |  | min     | typ | max  |         |
| Quiescent current       | $I_{cco1}$   | $V_{CC}=1.20V$ , quiescent, $R_L3 \rightarrow OFF$                 |         | 4.5 | 7.0  | mA      |
|                         | $I_{cco2}$   | $V_{CC}=2.50V$ , pin 14 $\rightarrow GND$ , $R_L3 \rightarrow OFF$ |         | 1.5 | 2.5  | mA      |
|                         | $I_{cco3}$   | $V_{CC}=2.50V$ , pin 1 $\rightarrow GND$ , $R_L3 \rightarrow OFF$  |         |     | 1.0  | $\mu A$ |
| Voltage gain            | $V_G$        | $V_{CC}=0.90V$ , $f=1kHz$ , $V_O=-20dBm$                           | 27.5    | 29  | 31.5 | dB      |
| Voltage gain difference | $\Delta V_G$ | $V_{CC}=0.90V$ , $f=1kHz$ , $V_O=-20dBm$                           |         |     | 1.0  | dB      |

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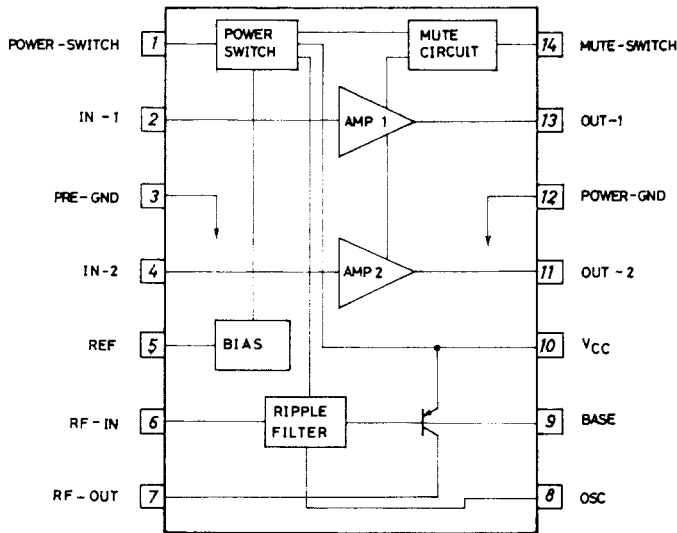
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| Parameter                            | Symbol        | Conditions   | Ratings |      |     | Unit    |
|--------------------------------------|---------------|--|---------|------|-----|---------|
|                                      |               |  | min     | typ  | max |         |
| Total harmonic distortion            | THD           | $V_{CC}=1.20V, f=1kHz, P_O=0.5mW$                            |         | 0.9  | 1.5 | %       |
| Output power                         | $P_O$         | $V_{CC}=1.50V, f=1kHz, THD=10\%$                             | 5       | 8    |     | mW      |
| Crosstalk                            | CT            | $V_{CC}=1.20V, f=100Hz, R_g=1k\Omega, V_O=-20dB$             | 40      | 45   |     | dB      |
| Ripple rejection (amplifier section) | SVRR1         | $V_{CC}=1.00V, f=100Hz, R_g=1k\Omega, V_R=-30dBm, BPF=100Hz$ | 40      | 46   |     | dB      |
| Ripple rejection (filter section)    | SVRR2         | $V_{CC}=1.00V, f=100Hz, V_R=-35dBm$                          | 34      | 39   |     | dB      |
| Output noise voltage                 | $V_{NO}$      | $V_{CC}=2.50V, R_g=1k\Omega, BPF=20Hz \text{ to } 20kHz$     |         | 55   | 80  | $\mu V$ |
| Power on current sensitivity         | $I_{1(on)}$   | $V_{CC}=0.85V, V_{pin5} \geq 0.5V$                           |         | 0.1  | 1.0 | $\mu A$ |
| Power off voltage sensitivity        | $V_{1(off)}$  | $V_{CC}=0.85V, V_{pin5} \leq 0.1V$                           | 0.5     | 0.6  |     | V       |
| Muting off current sensitivity       | $I_{14(off)}$ | $V_{CC}=0.85V, V_{pin5} \geq 0.5V$                           |         | 0.1  | 1.0 | $\mu A$ |
| Muting on voltage sensitivity        | $V_{14(on)}$  | $V_{CC}=0.85V, V_{pin5} \leq 0.1V$                           | 0.5     | 0.6  |     | V       |
| Ripple filter output voltage         | $V_F$         | $V_{CC}=1.00V, R_L=68\Omega$                                 | 0.90    | 0.94 |     | V       |

## Equivalent Circuit Block Diagram



## Test Circuit

Unit (resistance:  $\Omega$ , capacitance: F)

