

M62429P/FP

Serial Data Control Dual Electronic Volume

REJ03F0209-0300
Rev.3.00
Jun 15, 2007

Description

The M62429 is a dual channel electronic volume controlled with 2-wire serial data.

The built-in reference circuit can compose of an electronic volume with less external parts.

Features

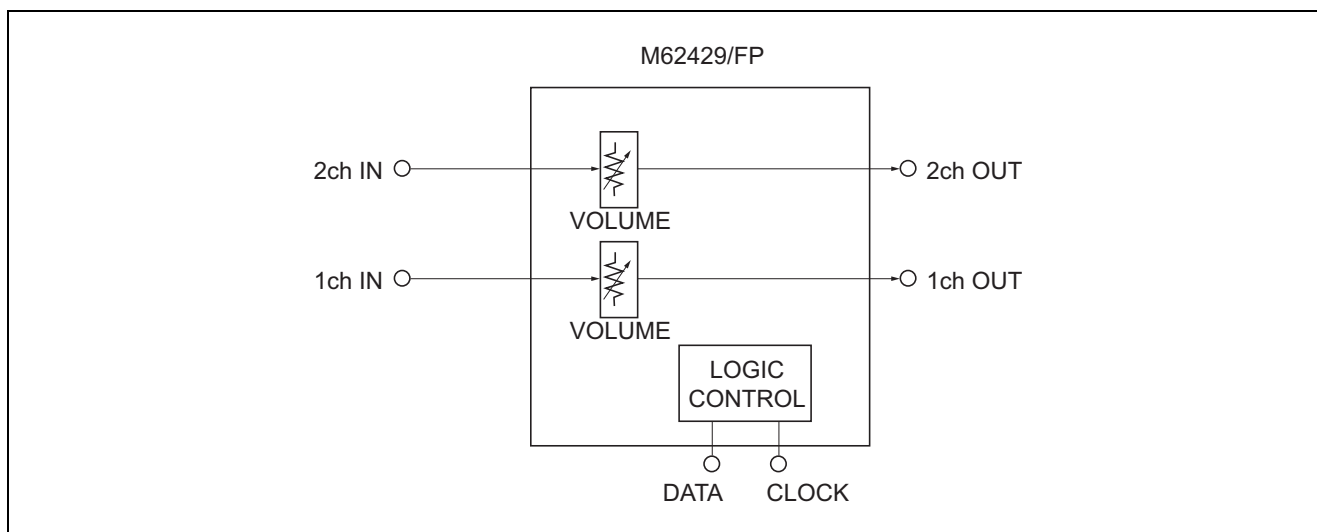
- Built-in reference circuit
- Control with serial data
Volume 0 to -83 dB (1 dB/step), $-\infty$
(Independent control is allowed in each channel)
- Low noise and low distortion
VNO = $5 \mu\text{Vrms}$ (ATT = $-\infty$, JIS-A)
THD = 0.01 % Typ. (V0 = 0.5 Vrms, DIN-AUDIO)

Recommended Operating Conditions

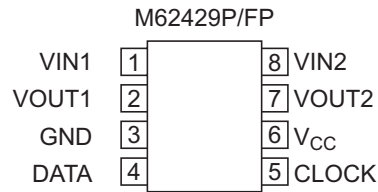
Supply voltage range: $V_{CC} = 4.5$ to 5.5 V

Rated supply voltage: $V_{CC} = 5$ V

System Block Diagram



Pin Arrangement



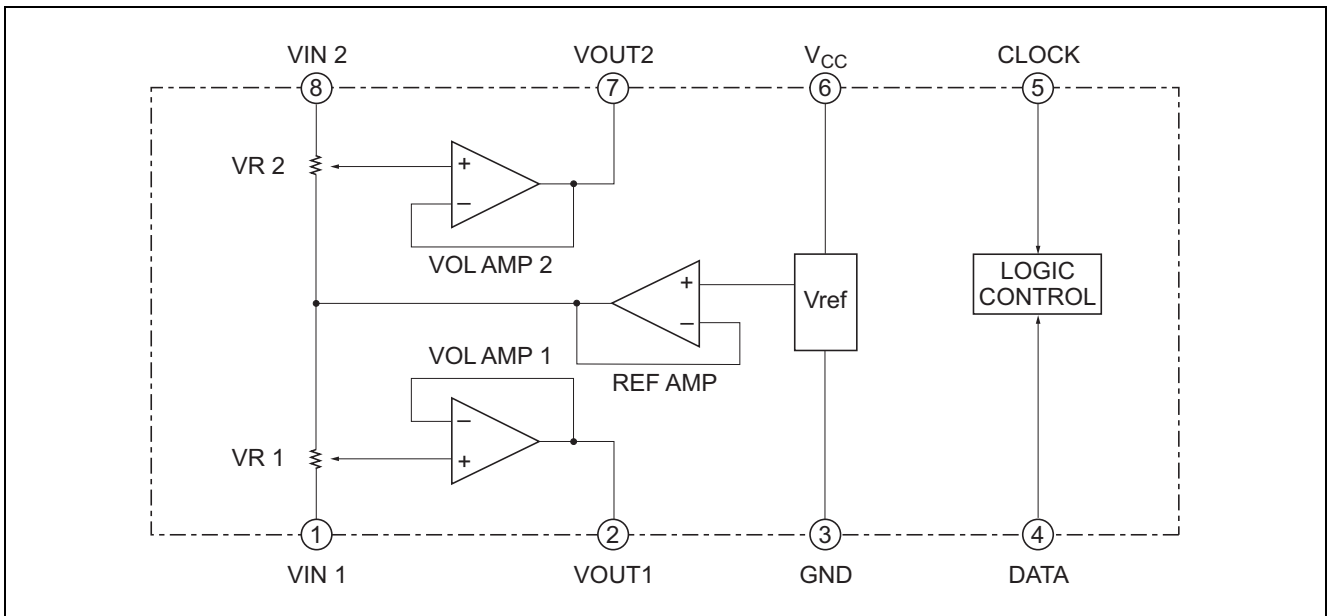
(Top view)

Outline: PRDP0008AA-A (8P4) [P]
 PRSP0008DE-C [FP] (recommend)
 PRSP0008DA-A (8P2S-A) [FP] (not recommend for new design)

Pin Description

| Pin No. | Symbol | Function |
|---------|-----------------|--|
| 1 | VIN1 | 1-ch input pin |
| 2 | VOUT1 | 1-ch output pin |
| 3 | GND | Ground pin |
| 4 | DATA | Control data input pin. Inputs data in synchronization with clock. |
| 5 | CLOCK | Clock input pin for transferring serial data. |
| 6 | V _{CC} | Power supply pin. Stabilize the pin with decoupling capacitor. |
| 7 | VOUT2 | 2-ch output pin |
| 8 | VIN2 | 2-ch input pin |

IC Internal Block Diagram



Absolute Maximum Ratings

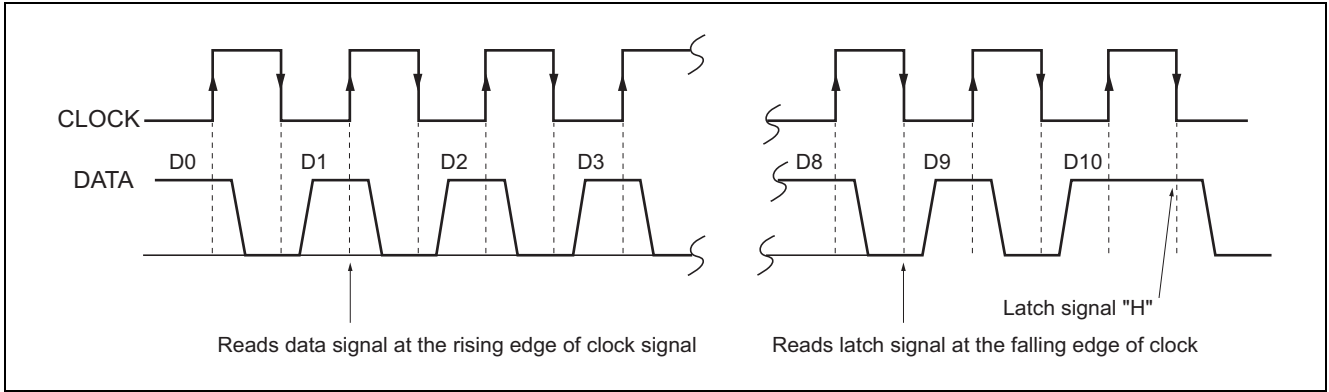
| Item | Symbol | Ratings | Unit |
|-----------------------|------------------|-------------------|------|
| Supply voltage | V_{CC}, V_{DD} | 6.0 | V |
| Power dissipation | P_d | 625 (P), 440 (FP) | mW |
| Operating temperature | T_{opr} | -20 to +75 | °C |
| Storage temperature | T_{stg} | -55 to +125 | °C |

Electrical Characteristics

($V_{CC} = 5\text{ V}$, $T_a = 25\text{ °C}$, unless otherwise noted)

| Item | Symbol | Limits | | | Unit | Conditions |
|---------------------------|-----------------|--------|------|------|---------------------|--|
| | | Min | Typ | Max | | |
| Circuit current | I_{CC} | — | 8 | 16 | mA | |
| Maximum attenuation | A_{TT} | — | -90 | -80 | dB | $A_{TT} = -\infty$ |
| Attenuation error | ΔA_{TT} | -2.0 | 0 | 2.0 | dB | $A_{TT} = 0$ |
| Maximum input voltage | V_{IM} | 1.5 | 1.7 | — | V _{rms} | THD = 1 %, $A_{TT} = -6\text{ dB}$ |
| Maximum output voltage | V_{OM} | 0.8 | 1.3 | — | V _{rms} | THD = 1 % |
| Output noise voltage | V_{NO1} | — | 4 | 10 | μV_{rms} | $A_{TT} = 0$, $R_g = 0$, JIS-A |
| | V_{NO2} | — | 5 | 10 | | $A_{TT} = -\infty$, $R_g = 0$, JIS-A |
| Total harmonic distortion | THD | — | 0.01 | 0.05 | % | $f = 1\text{ kHz}$, $V_o = 0.5\text{ V}_{rms}$, $A_{TT} = 0$ |
| Channel separation | CS | — | -80 | -70 | dB | $f = 1\text{ kHz}$, JIS-A |

Relationship between Data and Clock



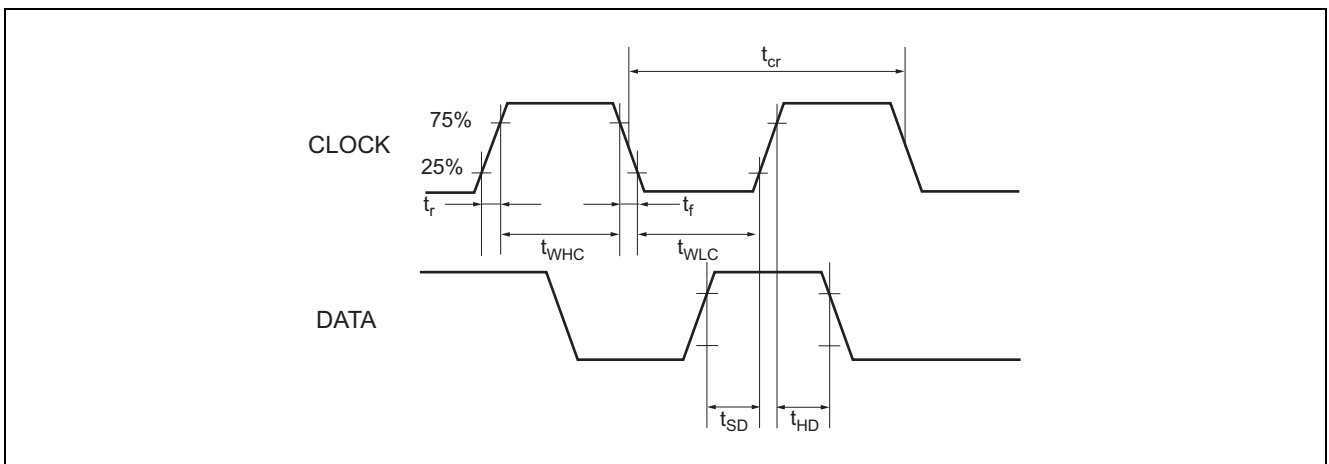
DC Characteristics of Digital Block

| Item | Symbol | Limits | | | Unit | Test Conditions | |
|-------------------------|----------|--------------|-----|--------------|---------|-----------------|-----------------|
| | | Min | Typ | Max | | | |
| "L" level input voltage | V_{IL} | 0 | ~ | $0.2 V_{CC}$ | V | Data, clock pin | |
| "H" level input voltage | V_{IH} | $0.8 V_{CC}$ | ~ | V_{CC} | V | | |
| "L" level input current | I_{IL} | -10 | — | 10 | μA | $V_I = 0$ | Data, clock pin |
| "H" level input current | I_{IH} | — | — | 10 | μA | $V_I = 5 V$ | |

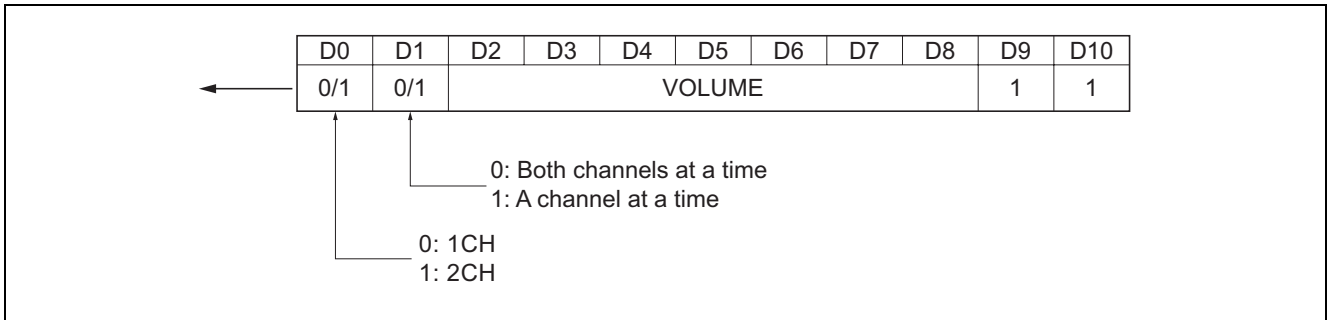
AC Characteristics of Digital Block

| Item | Symbol | Limits | | | Unit |
|----------------------------------|-----------|--------|-----|-----|---------|
| | | Min | Typ | Max | |
| Cycle time of clock | t_{cr} | 4 | — | — | μS |
| Pulse width of clock ("H" level) | t_{WHC} | 1.6 | — | — | μS |
| Pulse width of clock ("L" level) | t_{WLC} | 1.6 | — | — | μS |
| Clock rising time | t_r | — | — | 0.4 | μS |
| Clock falling time | t_f | — | — | 0.4 | μS |
| Data setup time | t_{SD} | 0.8 | — | — | μS |
| Data hold time | t_{HD} | 0.8 | — | — | μS |

Clock and Data Timing



Data Input Format

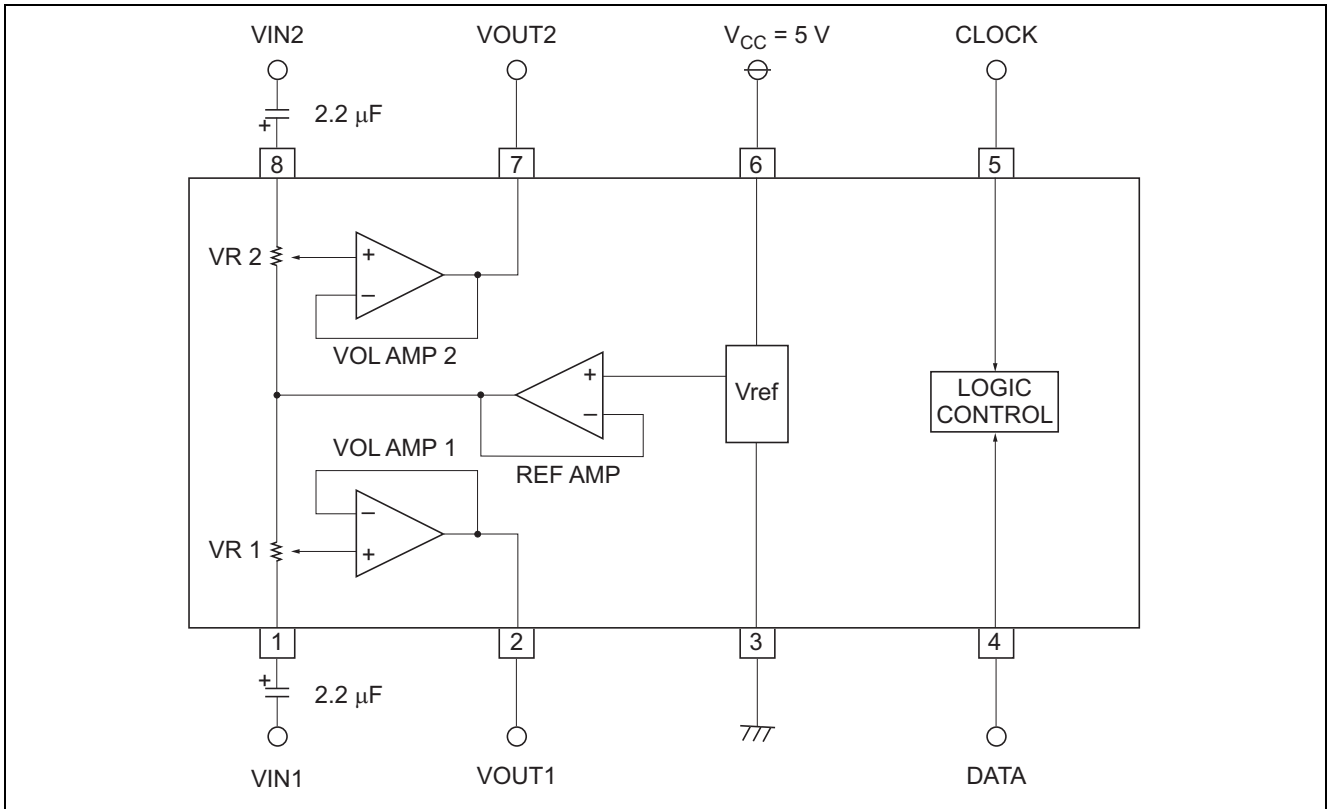


Volume Code

| ATT1 | D2 | D3 | D4 | D5 | D6 |
|--------|----|----|----|----|----|
| 0 dB | H | L | H | L | H |
| -4 dB | L | L | H | L | H |
| -8 dB | H | H | L | L | H |
| -12 dB | L | H | L | L | H |
| -16 dB | H | L | L | L | H |
| -20 dB | L | L | L | L | H |
| -24 dB | H | H | H | H | L |
| -28 dB | L | H | H | H | L |
| -32 dB | H | L | H | H | L |
| -36 dB | L | L | H | H | L |
| -40 dB | H | H | L | H | L |
| -44 dB | L | H | L | H | L |
| -48 dB | H | L | L | H | L |
| -52 dB | L | L | L | H | L |
| -56 dB | H | H | H | L | L |
| -60 dB | L | H | H | L | L |
| -64 dB | H | L | H | L | L |
| -68 dB | L | L | H | L | L |
| -72 dB | H | H | L | L | L |
| -76 dB | L | H | L | L | L |
| -80 dB | H | L | L | L | L |
| -∞ | L | L | L | L | L |

| ATT2 | D7 | D8 |
|-------|----|----|
| 0 dB | H | H |
| -1 dB | L | H |
| -2 dB | H | L |
| -3 dB | L | L |

Application Example



Package Dimensions

| | | | |
|----------------------|---------------|---------------|------------|
| JEITA Package Code | RENEASAS Code | Previous Code | MASS[Typ.] |
| P-DIP8-6.3x8.84-2.54 | PRDP008AA-A | 8P4 | 0.5g |

NOTE)

- DIMENSIONS "1" AND "2" DO NOT INCLUDE MOLD FLASH.
- DIMENSION "3" DOES NOT INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|------------------|--------------------------|------|------|
| | Min | Nom | Max |
| e ₁ | 7.32 | 7.62 | 7.92 |
| D | 8.7 | 8.9 | 9.1 |
| E | 6.15 | 6.3 | 6.45 |
| A | — | — | 4.5 |
| A ₁ | 0.51 | — | — |
| A ₂ | — | 3.3 | — |
| b _p | 0.4 | 0.5 | 0.6 |
| b ₂ | 0.9 | 1.0 | 1.3 |
| b ₃ | 1.4 | 1.5 | 1.8 |
| c | 0.22 | 0.27 | 0.34 |
| θ | 0° | — | 15° |
| e | 2.29 | 2.54 | 2.79 |
| L | 3.0 | — | — |

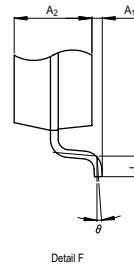
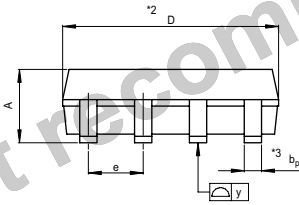
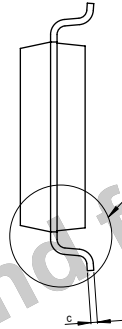
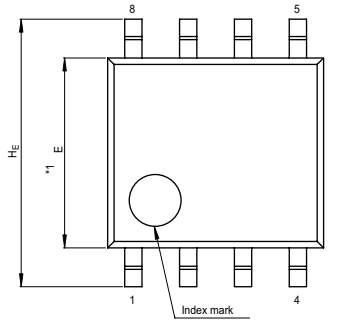
| | | | |
|----------------------|---------------|---------------|------------|
| JEITA Package Code | RENEASAS Code | Previous Code | MASS[Typ.] |
| P-SOP8-4.4x4.85-1.27 | PRSP008DE-C | — | 0.1g |

NOTE)

- DIMENSIONS "1 (Nom)" AND "2" DO NOT INCLUDE MOLD FLASH.
- DIMENSION "3" DOES NOT INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|------------------|--------------------------|------|------|
| | Min | Nom | Max |
| D | 4.65 | 4.85 | 5.05 |
| E | 4.2 | 4.4 | 4.6 |
| A ₂ | — | 1.85 | — |
| A ₁ | 0.00 | 0.1 | 0.20 |
| A | — | — | 2.03 |
| b _p | 0.34 | 0.4 | 0.46 |
| b ₁ | — | — | — |
| c | 0.15 | 0.20 | 0.25 |
| c ₁ | — | — | — |
| θ | 0° | — | 8° |
| HE | 5.7 | 6.2 | 6.5 |
| ⊕ | 1.12 | 1.27 | 1.42 |
| x | — | — | 0.12 |
| y | — | — | 0.10 |
| Z | — | — | 0.75 |
| L | 0.25 | 0.45 | 0.65 |
| L ₁ | — | 0.90 | — |

| | | | |
|--------------------|--------------|---------------|------------|
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
| P-SOP8-4.4x5-1.27 | PRSP0008DA-A | 8P2S-A | 0.07g |



NOTE)
 1. DIMENSIONS $*1$ AND $*2$
 DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION $*3$ DOES NOT
 INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|------------------|--------------------------|------|------|
| | Min | Nom | Max |
| D | 4.8 | 5.0 | 5.2 |
| E | 4.2 | 4.4 | 4.6 |
| A_2 | — | 1.5 | — |
| A_1 | 0.05 | — | — |
| A | — | — | 1.9 |
| b_p | 0.35 | 0.4 | 0.5 |
| c | 0.13 | 0.15 | 0.2 |
| θ | 0° | — | 10° |
| H_E | 5.9 | 6.2 | 6.5 |
| e | 1.12 | 1.27 | 1.42 |
| y | — | — | 0.1 |
| L | 0.2 | 0.4 | 0.6 |

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