

**SANYO**

No. 1409B

**LA7220****Electronic Switch for VCR/Audio Use****Overview**

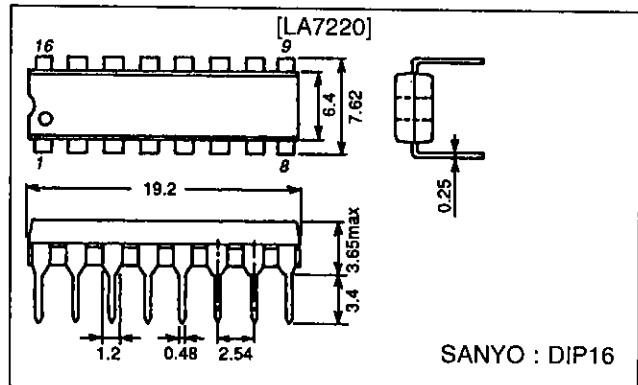
The LA7220 is a 3-channel 2-position high-performance analog switch having wide application from audio band to video band. It is also provided with 2 channels of muting function.

**Features**

- 3-channel 2-position switch
- Wide input dynamic range
- Low distortion
- Good frequency characteristic
- Muting available

**Package Dimensions**

unit : mm

**3006B-DIP16****Specifications****Maximum Ratings at Ta = 25°C**

| Parameter                   | Symbol       | Conditions                  | Ratings     | Unit             |
|-----------------------------|--------------|-----------------------------|-------------|------------------|
| Maximum supply voltage      | $V_{CC}$ max |                             | 15          | V                |
| Allowable power dissipation | $P_d$ max    | $T_a \leq 65^\circ\text{C}$ | 500         | mW               |
| Operating temperature       | $T_{opr}$    |                             | -20 to +70  | $^\circ\text{C}$ |
| Storage temperature         | $T_{stg}$    |                             | -40 to +125 | $^\circ\text{C}$ |

**Operating Conditions at Ta = 25°C**

| Parameter                  | Symbol     | Conditions | Ratings | Unit |
|----------------------------|------------|------------|---------|------|
| Recommended supply voltage | $V_{CC}$   |            | 12      | V    |
| Operating voltage range    | $V_{CCOP}$ |            | 9 to 13 | V    |

**Operating Characteristics at Ta = 25°C, V<sub>CC</sub> = 12 V**

| Parameter                 | Symbol           | Conditions   | min  | typ   | max     | Unit |
|---------------------------|------------------|--|------|-------|---------|------|
| Current drain             | $I_{CC}$         |  |      | 30.0  | 39.9    | mA   |
| Total harmonic distortion | THD              | $R_g = 600 \Omega$ , 4.5 Vp-p, $f = 1 \text{ kHz}$ , $R_L = \infty$ , (Note 1)                                 |      | 0.007 | 0.1     | %    |
| Noise voltage             | $V_{NO}$         | $R_g = 600 \Omega$ , $f = 20 \text{ Hz to } 20 \text{ kHz}$ , $R_L = \infty$ , (Note 1)                        |      | -93   | -80     | dBs  |
| Crosstalk                 | 1ch              | CR1<br>Input 1: $R_g = 50 \Omega$ , 2 Vp-p, $f = 3.58 \text{ MHz}$ ,<br>Input 2: $R_g = 500 \Omega$ , (Note 2) |      | -50   |         | dB   |
|                           | 2ch              | CR2<br>Input 1: $R_g = 50 \Omega$ , (Note 2)   | -60  |       |         | dB   |
|                           | 3ch              | CR3<br>Input 1: $R_g = 50 \Omega$ , (Note 2)   | -50  |       |         | dB   |
| Pedestal level            | $\Delta V_{ped}$ | $V_{CTL}$ (Pins 10, 13, 15) = 0 to 12 V, (Note 1)  | -100 |       | 0 + 100 | mV   |
| Maximum input voltage     | $V_{IN}$ max     | $R_g = 600 \Omega$ , $f = 1 \text{ kHz}$ , $R_L = \infty$ , THD = 1%, (Note 1)                                 | 5.0  |       |         | Vp-p |

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**SANYO Electric Co., Ltd. Semiconductor Business Headquarters**  
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

61096HA(II)/9068YT/8215KI, TS No.1409-1/6

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| Parameter                   |          | Symbol      | Conditions   | min             | typ | max | Unit       |
|-----------------------------|----------|-------------|--|-----------------|-----|-----|------------|
| 2nd harmonic voltage        |          | H2          | $R_g = 50 \Omega$ , 4.0 Vp-p, $f = 1$ MHz, $R_L = \infty$ , (Note 1)   | -46             | -55 |     | dB         |
| 3rd harmonic voltage        |          | H3          | $R_g = 50 \Omega$ , 4.0 Vp-p, $f = 1$ MHz, $R_L = \infty$ , (Note 1)   | -46             | -55 |     | dB         |
| Switch changeover voltage   |          | $V_{CTLS}$  | (Note 1)   | 2.6             | 3.1 | 4.0 | V          |
| Mute threshold voltage      |          | $V_{ML}$    | Low level, (Note 3)  | 1.1             | 1.5 | 1.9 | V          |
|                             |          | $V_{MH}$    | High level, (Note 3)   | 6.6             | 7.3 | 8.0 | V          |
| Crosstalk between channels  | 1ch      |             | $R_g = 500 \Omega$ , $R_L = \infty$ , other channel input $R_g = 50 \Omega$ , 2 Vp-p, $f = 3.58$ MHz, (Note 4) | -50             | -68 |     | dB         |
|                             | 2ch      |             |  | -50             | -68 |     | dB         |
|                             | 3ch      |             |  | -50             | -68 |     | dB         |
| Mute compression ratio      |          |             | $R_g = 600 \Omega$ , 2 Vp-p, $f = 1$ kHz, $R_L = \infty$ , series resistance 10 k $\Omega$ , (Note 3)          |                 | -60 |     | dB         |
| Control pin flow-in current |          | $I_{CTL}$   | (Note 1)   |                 | 8   |     | $\mu$ A    |
| Input impedance             |          | $Z_{IN}$    | (Note 1)   |                 | 10  |     | k $\Omega$ |
| Output impedance            |          | $Z_{OUT}$   | (Note 1)   |                 | 29  |     | $\Omega$   |
| Pin voltage                 | (Pin 1)  | $V_{pin1}$  | $V_{pin15} = 0$ V  | Test point: V14 | 7.9 |     | V          |
|                             |          |             | $V_{pin15} = 12$ V   |                 | 7.9 |     | V          |
|                             | (Pin 2)  | $V_{pin2}$  |  | Test point: V2  | 7.2 |     | V          |
|                             | (Pin 5)  | $V_{pin5}$  | $V_{pin13} = 0$ V  | Test point: V16 | 7.9 |     | V          |
|                             |          |             | $V_{pin13} = 12$ V   |                 | 7.9 |     | V          |
|                             | (Pin 6)  | $V_{pin6}$  |  | Test point: V5  | 7.2 |     | V          |
|                             | (Pin 7)  | $V_{pin7}$  |  | Test point: V7  | 7.2 |     | V          |
|                             | (Pin 8)  | $V_{pin8}$  | $V_{pin10} = 0$ V  | Test point: V18 | 7.9 |     | V          |
|                             |          |             | $V_{pin10} = 12$ V   |                 | 7.9 |     | V          |
|                             | (Pin 9)  | $V_{pin9}$  | $V_{pin10} = 0$ V  | Test point: V17 | 7.9 |     | V          |
|                             |          |             | $V_{pin10} = 12$ V   |                 | 7.9 |     | V          |
|                             | (Pin 12) | $V_{pin12}$ | $V_{pin13} = 0$ V  | Test point: V15 | 7.9 |     | V          |
|                             |          |             | $V_{pin13} = 12$ V   |                 | 7.9 |     | V          |
|                             | (Pin 16) | $V_{pin16}$ | $V_{pin15} = 0$ V  | Test point: V13 | 7.9 |     | V          |
|                             |          |             | $V_{pin15} = 12$ V   |                 | 7.9 |     | V          |

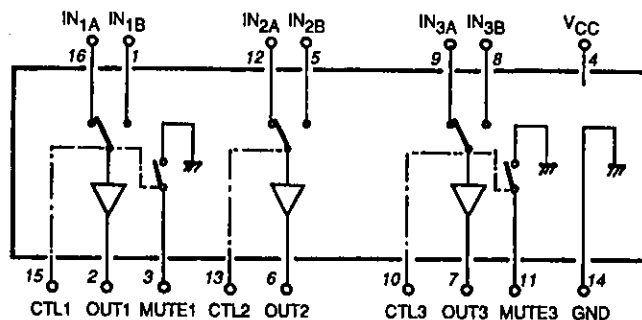
Note 1. Measurements are made for each of 1ch, 2ch, 3ch using input A and input B.

Input A:  $V_{CTL}$  (pins 10, 13, 15) is 12 V at the measurement mode.

Input B:  $V_{CTL}$  is 0 V at the measurement mode.

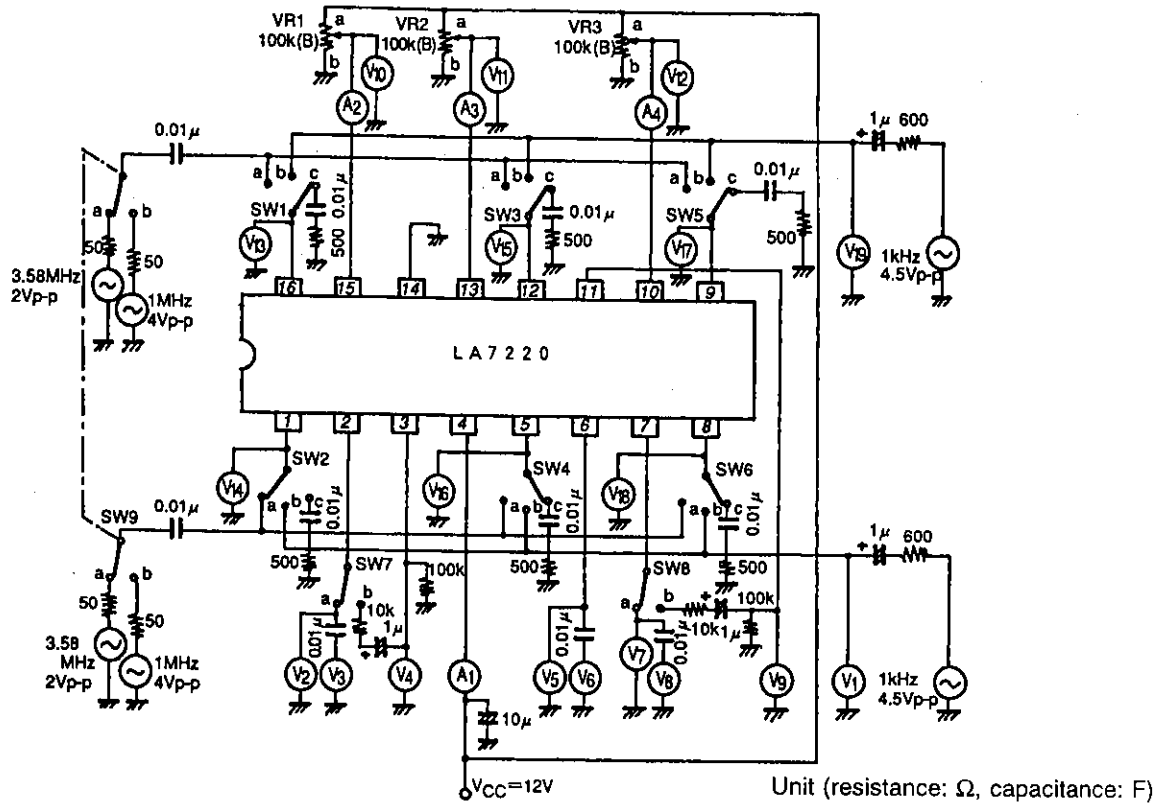
2. Measurements are made using input A and B.
3. Measurements are made for 1ch, 3ch.
4. Measurements are made for each of 1ch, 2ch, 3ch using input A and B on other channels.

## Equivalent Circuit Block Diagram



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## Test Circuit



## Test Conditions

| Item                      | Symbol               | SW, VR mode |     |     |     |     |     |     |     |     |     |     | Test point |     |
|---------------------------|----------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|-----|
|                           |                      | SW1         | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 | SW9 | VR1 | VR2 |            | VR3 |
| Current drain             | $I_{CC}$             | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | b   | b          | A1  |
| Total harmonic distortion | 1chA THD             | b           | c   | c   | c   | c   | c   | a   | a   | a   | a   | b   | b          | V3  |
|                           | 1chB THD             | c           | b   | c   | c   | c   | c   | a   | a   | a   | b   | b   | b          | V3  |
|                           | 2chA THD             | c           | c   | b   | c   | c   | c   | a   | a   | a   | b   | a   | b          | V6  |
|                           | 2chB THD             | c           | c   | c   | b   | c   | c   | a   | a   | a   | b   | b   | b          | V6  |
|                           | 3chA THD             | c           | c   | c   | c   | b   | c   | a   | a   | a   | b   | b   | a          | V8  |
|                           | 3chB THD             | c           | c   | c   | c   | c   | b   | a   | a   | a   | b   | b   | b          | V8  |
| Noise                     | 1chA $V_{NO}$        | c           | c   | c   | c   | c   | c   | a   | a   | a   | a   | b   | b          | V3  |
|                           | 1chB $V_{NO}$        | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | b   | b          | V3  |
|                           | 2chA $V_{NO}$        | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | a   | b          | V6  |
|                           | 2chB $V_{NO}$        | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | b   | b          | V6  |
|                           | 3chA $V_{NO}$        | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | b   | a          | V8  |
|                           | 3chB $V_{NO}$        | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | b   | b          | V8  |
| Crosstalk                 | 1chA CR              | c           | a   | c   | c   | c   | c   | a   | a   | a   | a   | b   | b          | V3  |
|                           | 1chB CR              | a           | c   | c   | c   | c   | c   | a   | a   | a   | b   | b   | b          | V3  |
|                           | 2chA CR              | c           | c   | c   | a   | c   | c   | a   | a   | a   | b   | a   | b          | V6  |
|                           | 2chB CR              | c           | c   | a   | c   | c   | c   | a   | a   | a   | b   | b   | b          | V6  |
|                           | 3chA CR              | c           | c   | c   | c   | c   | a   | a   | a   | a   | b   | b   | a          | V8  |
|                           | 3chB CR              | c           | c   | c   | c   | a   | c   | a   | a   | a   | b   | b   | b          | V8  |
| Pedestal level            | 1ch $\Delta V_{PED}$ | c           | c   | c   | c   | c   | c   | a   | a   | a   | a/b | b   | b          | V2  |
|                           | 2ch $\Delta V_{PED}$ | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | a/b | b          | V5  |
|                           | 3ch $\Delta V_{PED}$ | c           | c   | c   | c   | c   | c   | a   | a   | a   | b   | b   | a/b        | V7  |

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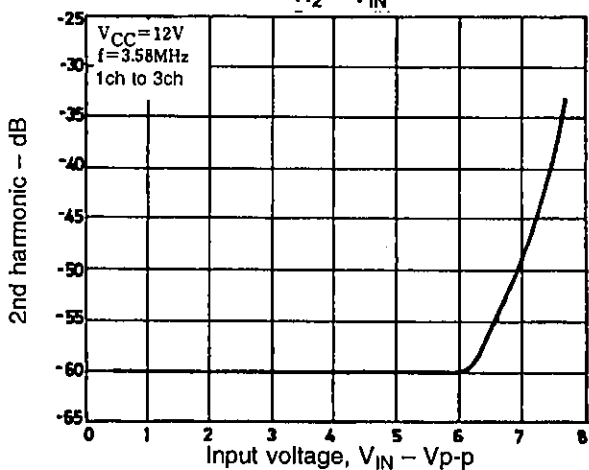
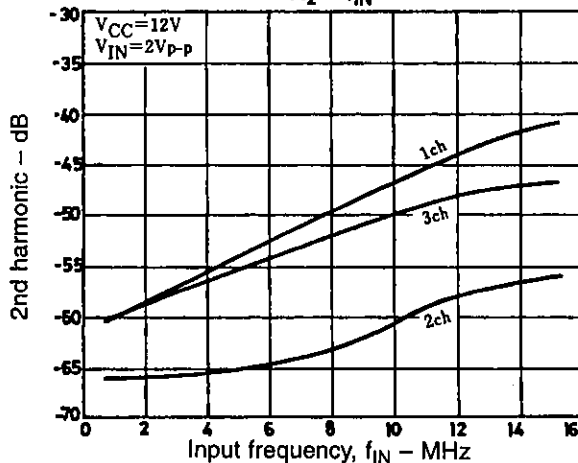
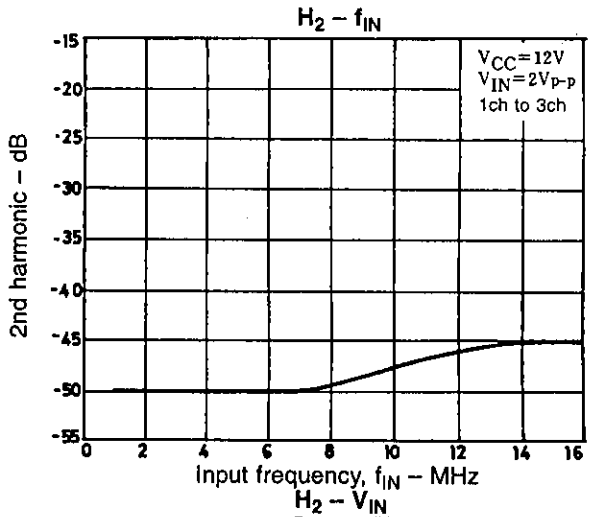
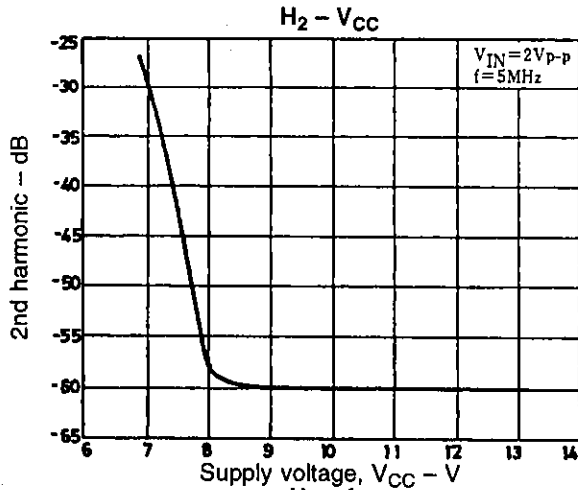
| Item                       | Symbol                 | SW, VR mode         |     |     |     |     |     |     |     |     |     |      | Test point |      |      |    |
|----------------------------|------------------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------------|------|------|----|
|                            |                        | SW1                 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 | SW9 | VR1 | VR2  |            | VR3  |      |    |
| Maximum input voltage      | 1chA                   | V <sub>IN max</sub> | b   | c   | c   | c   | c   | c   | a   | a   | a   | a    | b          | b    | V19  |    |
|                            | 1chB                   | V <sub>IN max</sub> | c   | b   | c   | c   | c   | c   | a   | a   | a   | b    | b          | b    | V1   |    |
|                            | 2chA                   | V <sub>IN max</sub> | c   | c   | b   | c   | c   | c   | a   | a   | a   | b    | a          | b    | V19  |    |
|                            | 2chB                   | V <sub>IN max</sub> | c   | c   | c   | b   | c   | c   | a   | a   | a   | b    | b          | b    | V1   |    |
|                            | 3chA                   | V <sub>IN max</sub> | c   | c   | c   | c   | b   | c   | a   | a   | a   | b    | b          | a    | V19  |    |
|                            | 3chB                   | V <sub>IN max</sub> | c   | c   | c   | c   | c   | b   | a   | a   | a   | b    | b          | b    | V1   |    |
| 2nd harmonic voltage       | 1chA                   | H2-1                | a   | c   | c   | c   | c   | c   | a   | a   | b   | a    | b          | b    | V3   |    |
|                            | 1chB                   | H2-1                | c   | a   | c   | c   | c   | c   | a   | a   | b   | b    | b          | b    | V3   |    |
|                            | 2chA                   | H2-2                | c   | c   | a   | c   | c   | c   | a   | a   | b   | b    | a          | b    | V6   |    |
|                            | 2chB                   | H2-2                | c   | c   | c   | a   | c   | c   | a   | a   | b   | b    | b          | b    | V6   |    |
|                            | 3chA                   | H2-3                | c   | c   | c   | c   | a   | c   | a   | a   | b   | b    | b          | a    | V8   |    |
|                            | 3chB                   | H2-3                | c   | c   | c   | c   | c   | a   | a   | a   | b   | b    | b          | b    | V8   |    |
| 3rd harmonic voltage       | 1chA                   | H3-1                | a   | c   | c   | c   | c   | c   | a   | a   | b   | a    | b          | b    | V3   |    |
|                            | 1chB                   | H3-1                | c   | a   | c   | c   | c   | c   | a   | a   | b   | b    | b          | b    | V3   |    |
|                            | 2chA                   | H3-2                | c   | c   | a   | c   | c   | c   | a   | a   | b   | b    | a          | b    | V6   |    |
|                            | 2chB                   | H3-2                | c   | c   | c   | a   | c   | c   | a   | a   | b   | b    | b          | b    | V6   |    |
|                            | 3chA                   | H3-3                | c   | c   | c   | c   | a   | c   | a   | a   | b   | b    | b          | a    | V8   |    |
|                            | 3chB                   | H3-3                | c   | c   | c   | c   | c   | a   | a   | a   | b   | b    | b          | b    | V8   |    |
| Switch changeover voltage  | 1ch                    | V <sub>CTLS</sub>   | a   | a   | c   | c   | c   | c   | a   | a   | a   | Var* | b          | b    | V10  |    |
|                            | 2ch                    | V <sub>CTLS</sub>   | c   | c   | a   | a   | c   | c   | a   | a   | a   | b    | Var*       | b    | V11  |    |
|                            | 3ch                    | V <sub>CTLS</sub>   | c   | c   | c   | c   | a   | a   | a   | a   | a   | b    | b          | Var* | V12  |    |
| Mute threshold             | 1ch                    | V <sub>ML</sub>     | b   | b   | c   | c   | c   | c   | b   | a   | a   | Var* | b          | b    | V10  |    |
|                            | 1ch                    | V <sub>MH</sub>     | b   | b   | c   | c   | c   | c   | b   | a   | a   | Var* | b          | b    | V10  |    |
|                            | 3ch                    | V <sub>ML</sub>     | c   | c   | c   | c   | b   | b   | a   | b   | a   | b    | b          | Var* | V12  |    |
|                            | 3ch                    | V <sub>MH</sub>     | c   | c   | c   | c   | b   | b   | a   | b   | a   | b    | b          | Var* | V12  |    |
| Crosstalk between channels | 1ch                    |                     | c   | c   | c   | c   | a   | c   | a   | a   | a   | a    | a          | a    | V3   |    |
|                            | 1ch                    |                     | c   | c   | c   | c   | c   | a   | a   | a   | a   | a    | a          | b    | V3   |    |
|                            | 1ch                    |                     | c   | c   | c   | c   | a   | c   | a   | a   | a   | a    | b          | a    | V3   |    |
|                            | 1ch                    |                     | c   | c   | c   | c   | c   | a   | a   | a   | a   | a    | b          | b    | V3   |    |
|                            | 1ch                    |                     | c   | c   | a   | c   | c   | c   | a   | a   | a   | b    | a          | a    | V3   |    |
|                            | 1ch                    |                     | c   | c   | a   | c   | c   | c   | a   | a   | a   | b    | a          | b    | V3   |    |
|                            | 1ch                    |                     | c   | c   | c   | a   | c   | c   | a   | a   | a   | b    | b          | a    | V3   |    |
|                            | 1ch                    |                     | c   | c   | c   | a   | c   | c   | a   | a   | a   | b    | b          | b    | V3   |    |
|                            | 2ch                    |                     | c   | c   | c   | c   | a   | c   | a   | a   | a   | a    | a          | a    | V6   |    |
|                            | 2ch                    |                     | c   | c   | c   | c   | c   | a   | a   | a   | a   | a    | a          | b    | V6   |    |
|                            | 2ch                    |                     | c   | c   | c   | c   | a   | c   | a   | a   | a   | b    | a          | a    | V6   |    |
|                            | 2ch                    |                     | c   | c   | c   | c   | c   | a   | a   | a   | a   | b    | a          | b    | V6   |    |
|                            | 2ch                    |                     | a   | c   | c   | c   | c   | c   | a   | a   | a   | a    | b          | a    | V6   |    |
|                            | 2ch                    |                     | a   | c   | c   | c   | c   | c   | a   | a   | a   | a    | b          | b    | V6   |    |
|                            | 2ch                    |                     | c   | a   | c   | c   | c   | c   | a   | a   | a   | b    | b          | a    | V6   |    |
|                            | 2ch                    |                     | c   | a   | c   | c   | c   | c   | a   | a   | a   | b    | b          | b    | V6   |    |
|                            | 3ch                    |                     | c   | c   | a   | c   | c   | c   | a   | a   | a   | a    | a          | a    | V8   |    |
|                            | 3ch                    |                     | c   | c   | c   | a   | c   | c   | a   | a   | a   | a    | b          | a    | V8   |    |
|                            | 3ch                    |                     | c   | c   | a   | c   | c   | c   | a   | a   | a   | b    | a          | a    | V8   |    |
|                            | 3ch                    |                     | c   | c   | c   | a   | c   | c   | a   | a   | a   | b    | b          | a    | V8   |    |
|                            | 3ch                    |                     | a   | c   | c   | c   | c   | c   | a   | a   | a   | a    | a          | b    | V8   |    |
|                            | 3ch                    |                     | a   | c   | c   | c   | c   | c   | a   | a   | a   | a    | b          | b    | V8   |    |
|                            | 3ch                    |                     | c   | a   | c   | c   | c   | c   | a   | a   | a   | b    | a          | b    | V8   |    |
|                            | 3ch                    |                     | c   | a   | c   | c   | c   | c   | a   | a   | a   | b    | b          | b    | V8   |    |
|                            | Mute compression ratio | 1ch                 |     | b   | b   | c   | c   | c   | c   | b   | a   | a    | Var*       | b    | b    | V4 |
|                            |                        | 3ch                 |     | c   | c   | c   | c   | b   | b   | a   | b   | a    | b          | b    | Var* | V9 |

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| Item                        | Symbol             | SW,VR mode         |     |     |     |     |     |     |     |     |     |     | Test point |     |   |     |     |
|-----------------------------|--------------------|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|-----|---|-----|-----|
|                             |                    | SW1                | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 | SW9 | VR1 | VR2 |            | VR3 |   |     |     |
| Control pin flow-in current | 1ch                | I <sub>CTL1</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | A2  |     |
|                             | 2ch                | I <sub>CTL2</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | a | b   | A3  |
|                             | 3ch                | I <sub>CTL3</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | a   | A4  |
| Pin voltage                 | (Pin 1)            | V <sub>pin1</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V14 |
|                             | (Pin 1)            | V <sub>pin1</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | a   | b | b   | V14 |
|                             | (Pin 2)            | V <sub>pin2</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V2  |
|                             | (Pin 5)            | V <sub>pin5</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V16 |
|                             | (Pin 5)            | V <sub>pin5</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | a | b   | V16 |
|                             | (Pin 6)            | V <sub>pin6</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V5  |
|                             | (Pin 7)            | V <sub>pin7</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V7  |
|                             | (Pin 8)            | V <sub>pin8</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V18 |
|                             | (Pin 8)            | V <sub>pin8</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | a   | V18 |
|                             | (Pin 9)            | V <sub>pin9</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V17 |
|                             | (Pin 9)            | V <sub>pin9</sub>  | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | a   | V17 |
|                             | (Pin 12)           | V <sub>pin12</sub> | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V15 |
|                             | (Pin 12)           | V <sub>pin12</sub> | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | a | b   | V15 |
|                             | (Pin 16)           | V <sub>pin16</sub> | c   | c   | c   | c   | c   | c   | c   | a   | a   | a   | a          | b   | b | b   | V13 |
| (Pin 16)                    | V <sub>pin16</sub> | c                  | c   | c   | c   | c   | c   | c   | a   | a   | a   | a   | a          | b   | b | V13 |     |

(Note) Var\*: While monitoring pins 2, 6, 7, adjust so that the minimum output is obtained.

Mute Threshold: While monitoring pins 3, 11, measure the minimum and maximum values of V10, V12 when the minimum output is obtained.



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