

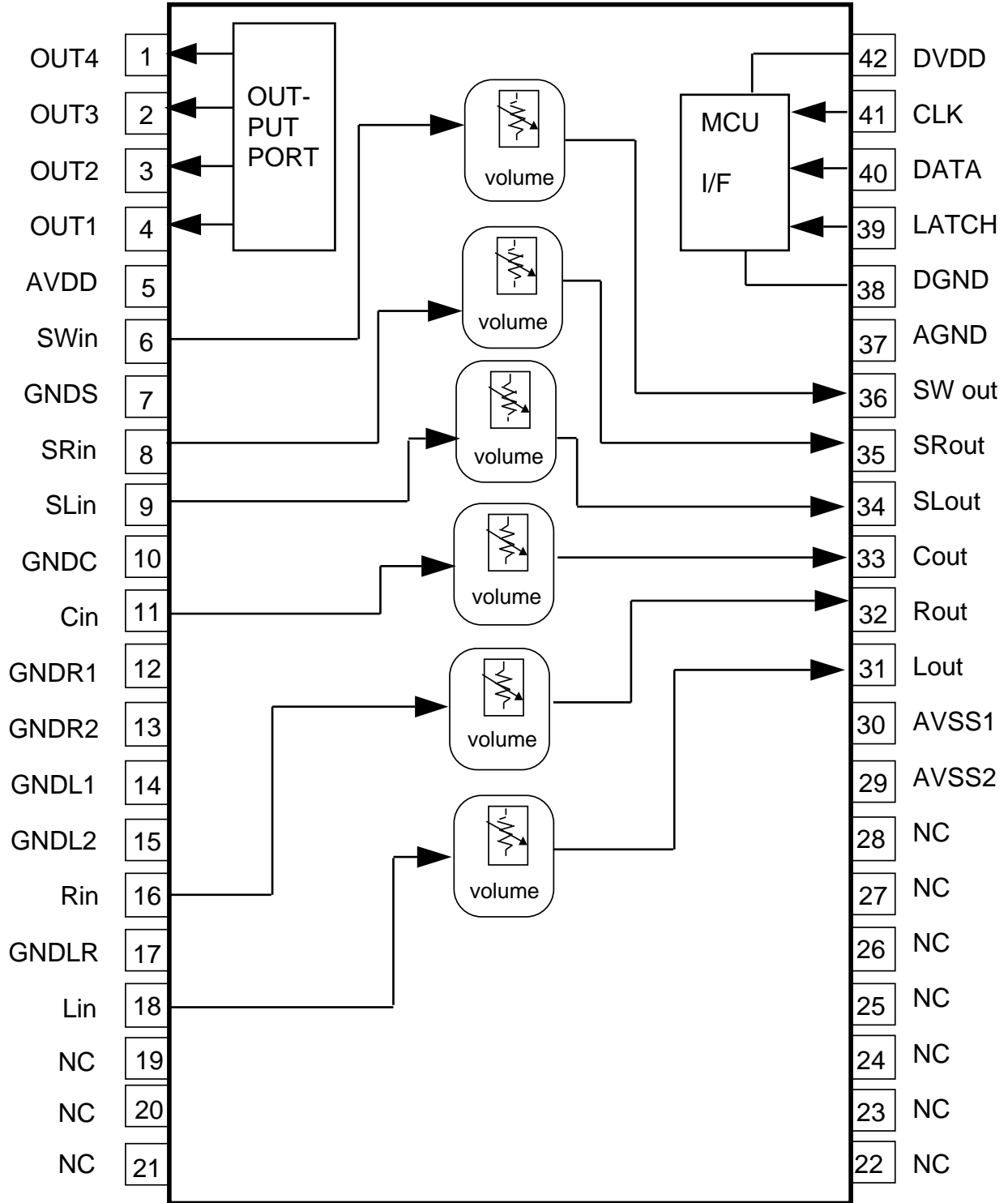


**PRELIMINARY**  
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 some parametric limits are subject to change.

MITSUBISHI SOUND PROCESSORS

**M62447SP**  
 6CH ELECTRIC VOLUME

**PIN CONFIGURATION AND IC INTERNAL BLOCK DIAGRAM**



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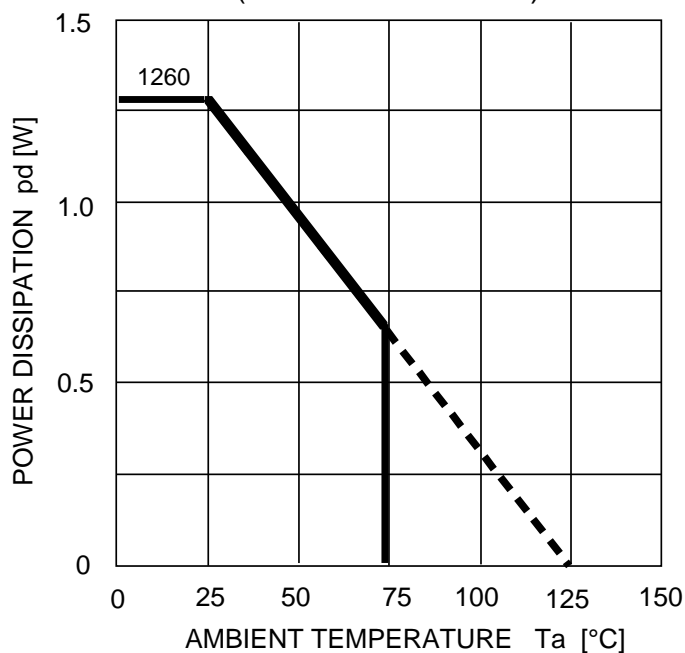
**M62447SP**

6CH ELECTRIC VOLUME

**ABSOLUTE MAXIMUM RATINGS**

| Symbol     | Parameter             | Conditions                  | Ratings    | Unit  |
|------------|-----------------------|-----------------------------|------------|-------|
| Vsupply    | Supply Voltage        | AVDD-AVSS                   | 15.0       | V     |
| Pd         | Power dissipation     | Ta 25°C                     | 1260       | mW    |
| K $\theta$ | Thermal derating      | Ta>25°C,<br>*standard board | 12.6       | mW/°C |
| Topr       | Operating temperature |                             | -20 ~ +75  | °C    |
| Tstg       | Storage temperature   |                             | -40 ~ +125 | °C    |

THERMAL DERATING  
(MAXIMUM RATING)



\*Standard board

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# M62447SP

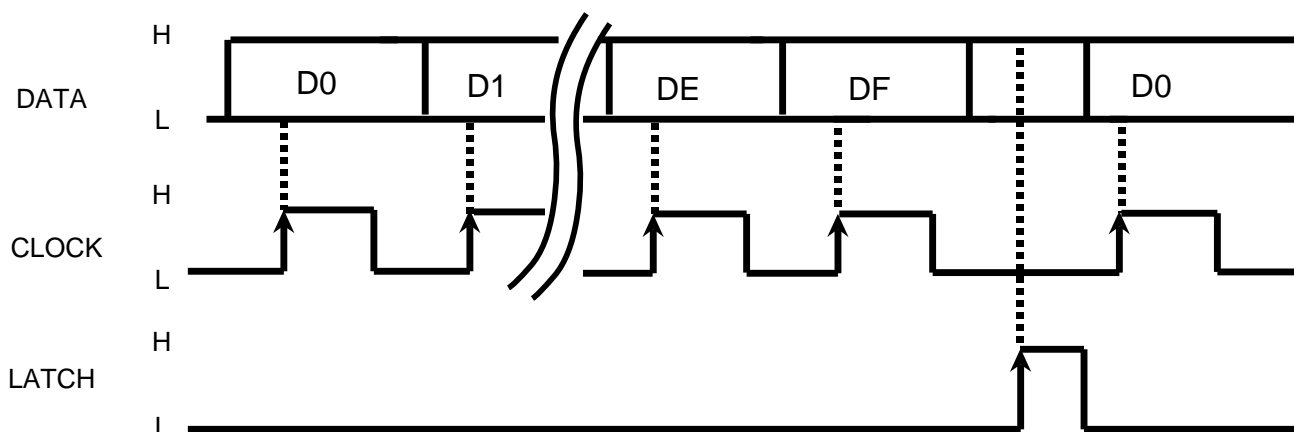
6CH ELECTRIC VOLUME

## RECOMMENDED OPERATING CONDITION

| Parameter                      | Symbol | Condition | MIN      | TYP  | MAX      | Unit |
|--------------------------------|--------|-----------|----------|------|----------|------|
| Analog positive Supply Voltage | AVDD   |           | 4.5      | 7.0  | 7.3      | V    |
| Analog negative Supply Voltage | AVSS   |           | -7.3     | -7.0 | -4.5     | V    |
| Digital Supply Voltage         | DVDD   |           | 4.5      | 5.0  | 5.5      | V    |
| High-level Input Voltage       | VIH    |           | DVDD/2+1 | —    | DVDD     | V    |
| Low-level Input Voltage        | VIL    |           | DGND     | —    | DVDD/2-1 | V    |

(note)AVSS DGND<DVDD AVDD

## DATA TIMING (Recommended conditions)



note : CLOCK and LATCH function at raising edges of pulse .

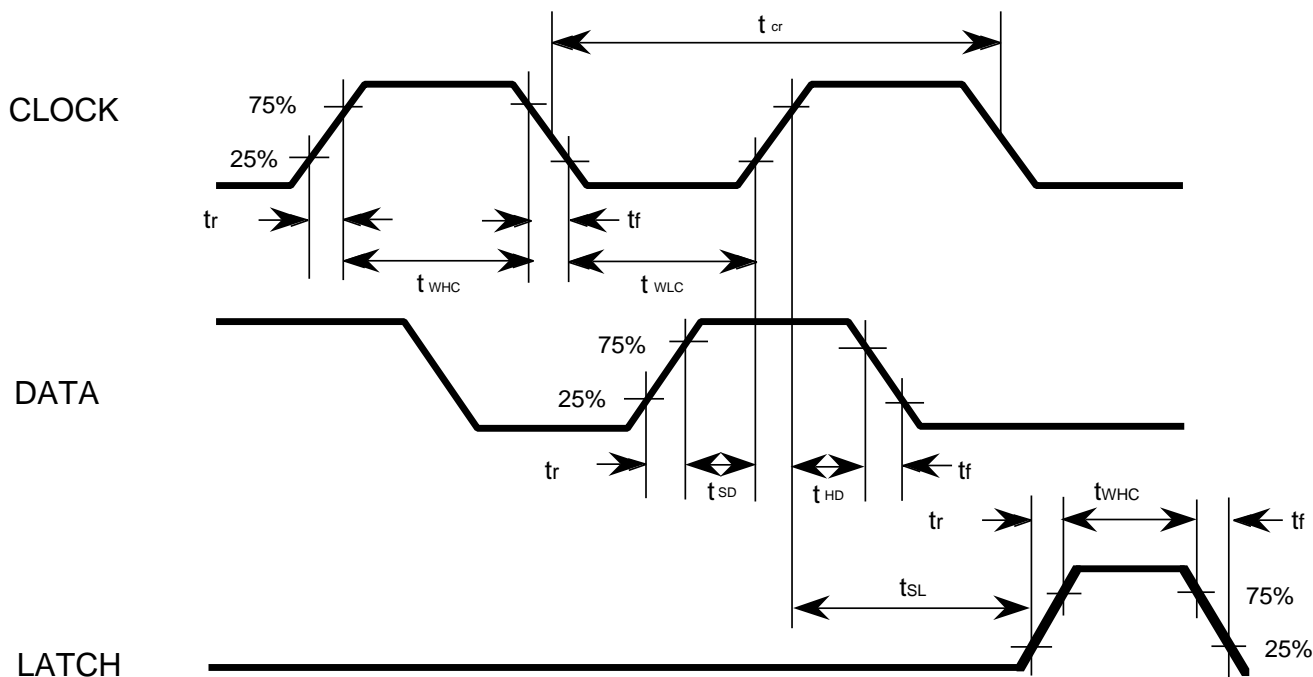
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MITSUBISHI SOUND PROCESSORS

**M62447SP**

6CH ELECTRIC VOLUME

**CLOCK, DATA, LATCH TIMING**



**DIGITAL BLOCK TIMING REGULATION**

| Symbol    | Parameter                     | Limits |     |     | Unit |
|-----------|-------------------------------|--------|-----|-----|------|
|           |                               | Min    | typ | Max |      |
| $t_{cr}$  | CLOCK cycle time              | 8      | -   | -   | μsec |
| $t_{wHC}$ | CLOCK pulse width ("H" level) | 3.2    | -   | -   |      |
| $t_{wLC}$ | CLOCK pulse width ("L" level) | 3.2    | -   | -   |      |
| $t_r$     | CLOCK, DATA, LATCH rise time  | -      | -   | 0.8 |      |
| $t_f$     | CLOCK, DATA, LATCH fall time  | -      | -   | 0.8 |      |
| $t_{SD}$  | DATA setup time               | 1.6    | -   | -   |      |
| $t_{HD}$  | DATA hold time                | 1.6    | -   | -   |      |
| $t_{SL}$  | LATCH setup time              | 2      | -   | -   |      |
| $t_{WHL}$ | LATCH pulse width             | 3.2    | -   | -   |      |

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6CH ELECTRIC VOLUME

**DIGITAL CONTROL SPECIFICATION**

Fore kinds of input format options are available by changing slot settings of DE and DF.  
 (When the IC is powered up , the internal settings are not fixed.)

( 1 )

| DO1 | D11 | D21 | D31 | D41                                | D51 | D61 | D71 | D81 | D91 | DA1 | DB1 | DC1 | DD1 | DE | DF |
|-----|-----|-----|-----|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
|     |     |     |     | 1                                  | 2   | 3   | 4   |     |     |     |     |     |     |    |    |
| 0   | 0   | 0   | 0   | OUTPUT PORT n<br>1: High<br>0: Low |     |     |     | 0   | 0   | 0   | 0   | 0   | 1   | 0  | 0  |

( 2 )

| DO2        | D12 | D22 | D32 | D42 | D52 | D62 | D72        | D82 | D92 | DA2 | DB2 | DC2 | DD2 | DE | DF |
|------------|-----|-----|-----|-----|-----|-----|------------|-----|-----|-----|-----|-----|-----|----|----|
| VOLUME Lch |     |     |     |     |     |     | VOLUME Rch |     |     |     |     |     |     | 0  | 1  |

( 3 )

| DO3        | D13 | D23 | D33 | D43 | D53 | D63 | D73         | D83 | D93 | DA3 | DB3 | DC3 | DD3 | DE | DF |
|------------|-----|-----|-----|-----|-----|-----|-------------|-----|-----|-----|-----|-----|-----|----|----|
| VOLUME Cch |     |     |     |     |     |     | VOLUME SWch |     |     |     |     |     |     | 1  | 0  |

( 4 )

| DO4         | D14 | D24 | D34 | D44 | D54 | D64 | D74         | D84 | D94 | DA4 | DB4 | DC4 | DD4 | DE | DF |
|-------------|-----|-----|-----|-----|-----|-----|-------------|-----|-----|-----|-----|-----|-----|----|----|
| VOLUME SLch |     |     |     |     |     |     | VOLUME SRch |     |     |     |     |     |     | 1  | 1  |

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**M62447SP**  
6CH ELECTRIC VOLUME

**SETTING CODE**

Note : Do not input other data than the above.

(1) Port output

|       |   | D41 | D51 | D61 | D71 |
|-------|---|-----|-----|-----|-----|
| PORT1 | 0 | L   | -   | -   | -   |
|       | 1 | H   |     |     |     |
| PORT2 | 0 | -   | L   | -   | -   |
|       | 1 |     | H   |     |     |
| PORT3 | 0 | -   | -   | L   | -   |
|       | 1 |     |     | H   |     |
| PORT4 | 0 | -   | -   | -   | L   |
|       | 1 |     |     |     | H   |

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MITSUBISHI SOUND PROCESSORS

# M62447SP

6CH ELECTRIC VOLUME

(2) VOLUME ( 0 ~ -39dB)

Note : Do not input other data than the above.

| A<br>T<br>T | VOLUME | D0X | D1X | D2X | D3X | D4X | D5X | D6X |
|-------------|--------|-----|-----|-----|-----|-----|-----|-----|
|             |        | D7X | D8X | D9X | DAX | DBX | DCX | DDX |
| - 0         | dB     | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| - 1         | dB     | 0   | 0   | 0   | 0   | 0   | 0   | 1   |
| - 2         | dB     | 0   | 0   | 0   | 0   | 0   | 1   | 0   |
| - 3         | dB     | 0   | 0   | 0   | 0   | 0   | 1   | 1   |
| - 4         | dB     | 0   | 0   | 0   | 0   | 1   | 0   | 0   |
| - 5         | dB     | 0   | 0   | 0   | 0   | 1   | 0   | 1   |
| - 6         | dB     | 0   | 0   | 0   | 0   | 1   | 1   | 0   |
| - 7         | dB     | 0   | 0   | 0   | 0   | 1   | 1   | 1   |
| - 8         | dB     | 0   | 0   | 0   | 1   | 0   | 0   | 0   |
| - 9         | dB     | 0   | 0   | 0   | 1   | 0   | 0   | 1   |
| - 10        | dB     | 0   | 0   | 0   | 1   | 0   | 1   | 0   |
| - 11        | dB     | 0   | 0   | 0   | 1   | 0   | 1   | 1   |
| - 12        | dB     | 0   | 0   | 0   | 1   | 1   | 0   | 0   |
| - 13        | dB     | 0   | 0   | 0   | 1   | 1   | 0   | 1   |
| - 14        | dB     | 0   | 0   | 0   | 1   | 1   | 1   | 0   |
| - 15        | dB     | 0   | 0   | 0   | 1   | 1   | 1   | 1   |
| - 16        | dB     | 0   | 0   | 1   | 0   | 0   | 0   | 0   |
| - 17        | dB     | 0   | 0   | 1   | 0   | 0   | 0   | 1   |
| - 18        | dB     | 0   | 0   | 1   | 0   | 0   | 1   | 0   |
| - 19        | dB     | 0   | 0   | 1   | 0   | 0   | 1   | 1   |
| - 20        | dB     | 0   | 0   | 1   | 0   | 1   | 0   | 0   |
| - 21        | dB     | 0   | 0   | 1   | 0   | 1   | 0   | 1   |
| - 22        | dB     | 0   | 0   | 1   | 0   | 1   | 1   | 0   |
| - 23        | dB     | 0   | 0   | 1   | 0   | 1   | 1   | 1   |
| - 24        | dB     | 0   | 0   | 1   | 1   | 0   | 0   | 0   |
| - 25        | dB     | 0   | 0   | 1   | 1   | 0   | 0   | 1   |
| - 26        | dB     | 0   | 0   | 1   | 1   | 0   | 1   | 0   |
| - 27        | dB     | 0   | 0   | 1   | 1   | 0   | 1   | 1   |
| - 28        | dB     | 0   | 0   | 1   | 1   | 1   | 0   | 0   |
| - 29        | dB     | 0   | 0   | 1   | 1   | 1   | 0   | 1   |
| - 30        | dB     | 0   | 0   | 1   | 1   | 1   | 1   | 0   |
| - 31        | dB     | 0   | 0   | 1   | 1   | 1   | 1   | 1   |
| - 32        | dB     | 0   | 1   | 0   | 0   | 0   | 0   | 0   |
| - 33        | dB     | 0   | 1   | 0   | 0   | 0   | 0   | 1   |
| - 34        | dB     | 0   | 1   | 0   | 0   | 0   | 1   | 0   |
| - 35        | dB     | 0   | 1   | 0   | 0   | 0   | 1   | 1   |
| - 36        | dB     | 0   | 1   | 0   | 0   | 1   | 0   | 0   |
| - 37        | dB     | 0   | 1   | 0   | 0   | 1   | 0   | 1   |
| - 38        | dB     | 0   | 1   | 0   | 0   | 1   | 1   | 0   |
| - 39        | dB     | 0   | 1   | 0   | 0   | 1   | 1   | 1   |



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MITSUBISHI SOUND PROCESSORS

**M62447SP**

6CH ELECTRIC VOLUME

VOLUME ( -40 ~ - dB)

Note : Do not input other data than the above.

| A<br>T<br>T | VOLUME | D0X | D1X | D2X | D3X | D4X | D5X | D6X |
|-------------|--------|-----|-----|-----|-----|-----|-----|-----|
|             |        | D7X | D8X | D9X | DAX | DBX | DCX | DDX |
| - 40        | dB     | 0   | 1   | 0   | 1   | 0   | 0   | 0   |
| - 41        | dB     | 0   | 1   | 0   | 1   | 0   | 0   | 1   |
| - 42        | dB     | 0   | 1   | 0   | 1   | 0   | 1   | 0   |
| - 43        | dB     | 0   | 1   | 0   | 1   | 0   | 1   | 1   |
| - 44        | dB     | 0   | 1   | 0   | 1   | 1   | 0   | 0   |
| - 45        | dB     | 0   | 1   | 0   | 1   | 1   | 0   | 1   |
| - 46        | dB     | 0   | 1   | 0   | 1   | 1   | 1   | 0   |
| - 47        | dB     | 0   | 1   | 0   | 1   | 1   | 1   | 1   |
| - 48        | dB     | 0   | 1   | 1   | 0   | 0   | 0   | 0   |
| - 49        | dB     | 0   | 1   | 1   | 0   | 0   | 0   | 1   |
| - 50        | dB     | 0   | 1   | 1   | 0   | 0   | 1   | 0   |
| - 51        | dB     | 0   | 1   | 1   | 0   | 0   | 1   | 1   |
| - 52        | dB     | 0   | 1   | 1   | 0   | 1   | 0   | 0   |
| - 53        | dB     | 0   | 1   | 1   | 0   | 1   | 0   | 1   |
| - 54        | dB     | 0   | 1   | 1   | 0   | 1   | 1   | 0   |
| - 55        | dB     | 0   | 1   | 1   | 0   | 1   | 1   | 1   |
| - 56        | dB     | 0   | 1   | 1   | 1   | 0   | 0   | 0   |
| - 57        | dB     | 0   | 1   | 1   | 1   | 0   | 0   | 1   |
| - 58        | dB     | 0   | 1   | 1   | 1   | 0   | 1   | 0   |
| - 59        | dB     | 0   | 1   | 1   | 1   | 0   | 1   | 1   |
| - 60        | dB     | 0   | 1   | 1   | 1   | 1   | 0   | 0   |
| - 61        | dB     | 0   | 1   | 1   | 1   | 1   | 0   | 1   |
| - 62        | dB     | 0   | 1   | 1   | 1   | 1   | 1   | 0   |
| - 63        | dB     | 0   | 1   | 1   | 1   | 1   | 1   | 1   |
| - 64        | dB     | 1   | 0   | 0   | 0   | 0   | 0   | 0   |
| - 65        | dB     | 1   | 0   | 0   | 0   | 0   | 0   | 1   |
| - 66        | dB     | 1   | 0   | 0   | 0   | 0   | 1   | 0   |
| - 67        | dB     | 1   | 0   | 0   | 0   | 0   | 1   | 1   |
| - 68        | dB     | 1   | 0   | 0   | 0   | 1   | 0   | 0   |
| - 69        | dB     | 1   | 0   | 0   | 0   | 1   | 0   | 1   |
| - 70        | dB     | 1   | 0   | 0   | 0   | 1   | 1   | 0   |
| - 71        | dB     | 1   | 0   | 0   | 0   | 1   | 1   | 1   |
| - 72        | dB     | 1   | 0   | 0   | 1   | 0   | 0   | 0   |
| - 73        | dB     | 1   | 0   | 0   | 1   | 0   | 0   | 1   |
| - 74        | dB     | 1   | 0   | 0   | 1   | 0   | 1   | 0   |
| - 75        | dB     | 1   | 0   | 0   | 1   | 0   | 1   | 1   |
| - 76        | dB     | 1   | 0   | 0   | 1   | 1   | 0   | 0   |
| - 77        | dB     | 1   | 0   | 0   | 1   | 1   | 0   | 1   |
| - 78        | dB     | 1   | 0   | 0   | 1   | 1   | 1   | 0   |
| - 79        | dB     | 1   | 0   | 0   | 1   | 1   | 1   | 1   |
| -           | dB     | 1   | 0   | 1   | 0   | 0   | 0   | 0   |

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**ELECTRICAL CHARACTERISTICS**

(Ta=25°C, AVDD=7.0V , AVSS=-7.0V , DVDD=5.0V , f=1kHz, unless otherwise noted.

TONE CONTROL , VOLUME are set to 0dB )

(1) Power supply characteristics

| Parameter                       | Symbol | Test condition                      | Limits |     |     | Unit |
|---------------------------------|--------|-------------------------------------|--------|-----|-----|------|
|                                 |        |                                     | Min    | typ | Max |      |
| Analog positive circuit current | AIdd   | Current at pin 5<br>No signal       | —      | 25  | 35  | mA   |
| Analog negative circuit current | AISS   | Current at pin 29 ~ 30<br>No signal | —      | 25  | 35  | mA   |
| Digital circuit current         | DIdd   | Current at pin 42<br>No signal      | —      | 0.5 | 2.0 | mA   |

(2) Input / Output characteristics

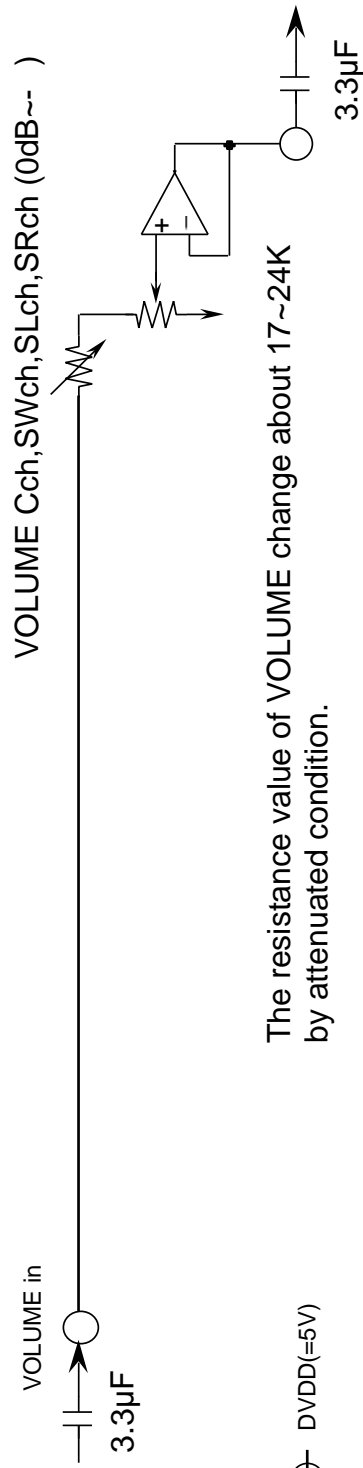
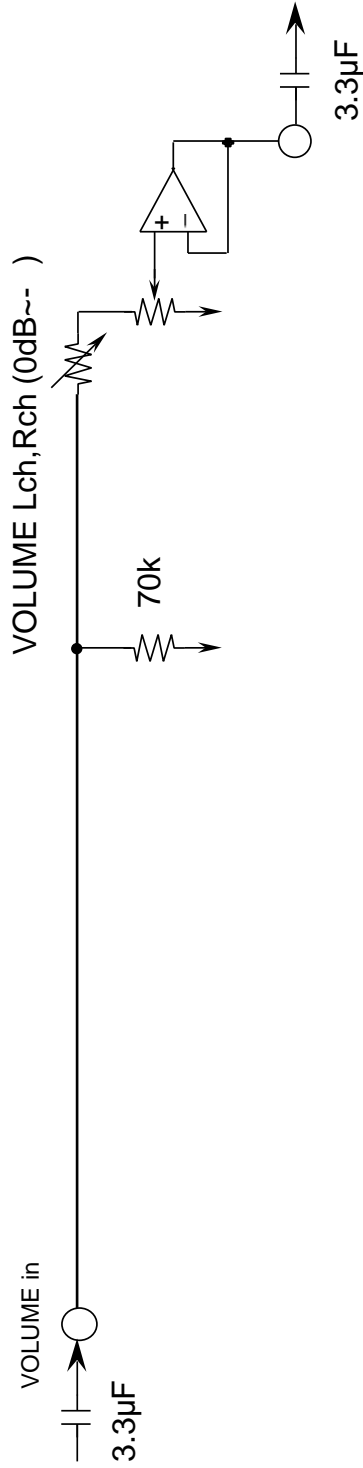
| Parameter                    | Symbol  | Test condition  | Limits |      |      | Unit  |
|------------------------------|---------|---|--------|------|------|-------|
|                              |         |   | Min    | typ  | Max  |       |
| Maximum output voltage       | VOM     | 6,8,9,11,16,18pin INPUT<br>31 ~ 36pin OUTPUT<br>RL =10K ,THD=1% | 3.0    | 4.0  | —    | Vrms  |
| Pass gain                    | Gv      | Vi=0.2Vrms,FLAT<br>6,8,9,11,16,18pin INPUT<br>31 ~ 36pin OUTPUT | -2.0   | 0    | 2.0  | dB    |
| Distortion                   | THD     | BW=400 ~ 30kHz<br>Vi=0.2Vrms , RL=10K                           | —      | 0.02 | 0.09 | %     |
| Output noise voltage         | Vn(VOL) | 31 ~ 36pin,Rg=0K ,<br>JIS-A,VOL=0dB                             | —      | 2    | 6    | μVrms |
| Maximum attenuation          | ATTmax  | 31 ~ 36pin,Rg=1K ,<br>JIS-A,VOL=- dB                            | -86    | —    | —    | dB    |
| Volume gain between channels | Dvol    |   | -1.5   | 0    | 1.5  | dB    |
| Crosstalk between channels   | CT      | Vo=0.5Vrms , RL=10K ,JIS-A<br>Rg=1K                             | —      | -80  | -65  | dB    |
| Port output current          | IL      |   | 0.2    | —    | —    | mA    |

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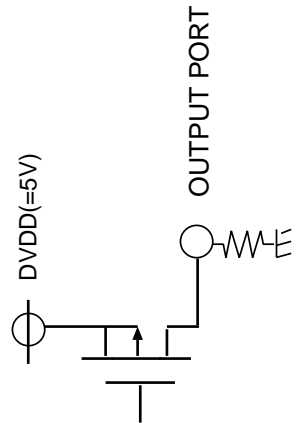
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**SYSTEM DIAGRAM**



The resistance value of VOLUME change about 17~24K by attenuated condition.



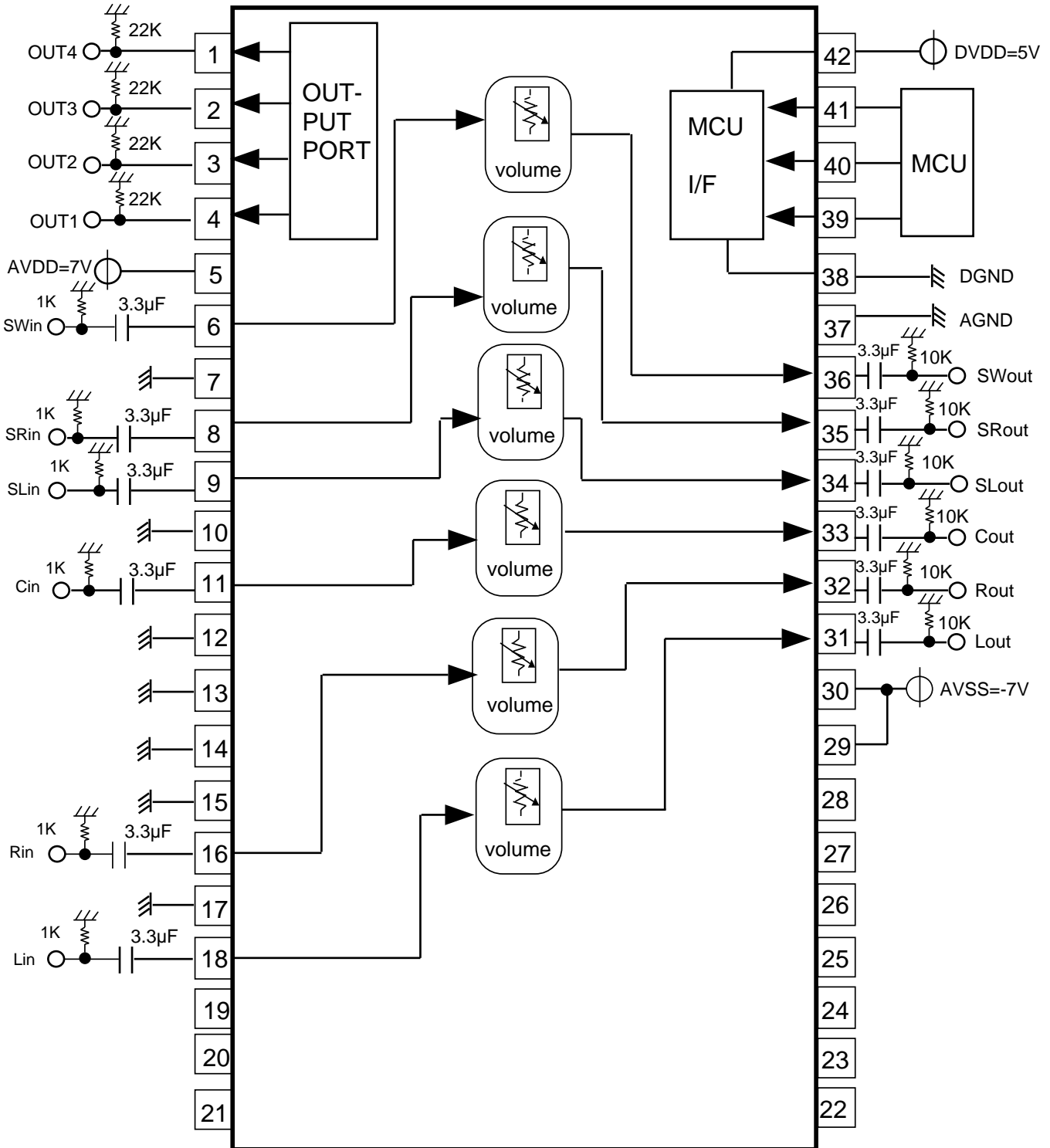
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6CH ELECTRIC VOLUME

## APPLICATION EXAMPLE



Units Resistance :  
 Capacitance : F