



### 6 CHANNELS VOLUME CONTROLLER

#### GENERAL DESCRIPTION

The SM7346A is 6 channels electronic volume controlled by 3-wire serial data. The IC is suitable for use in DVD systems and AV.

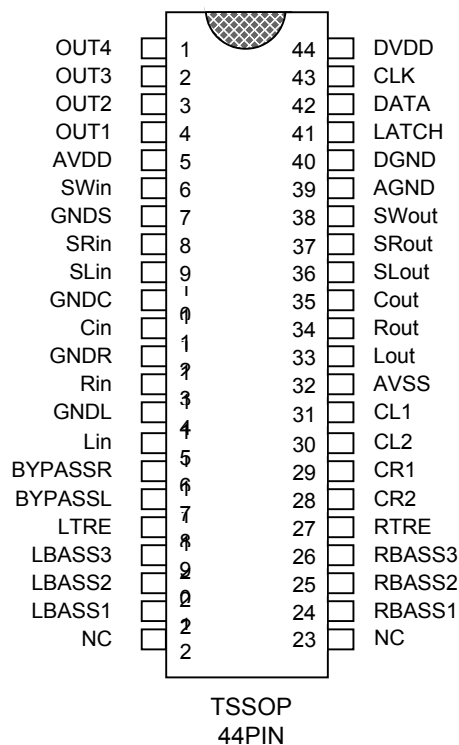
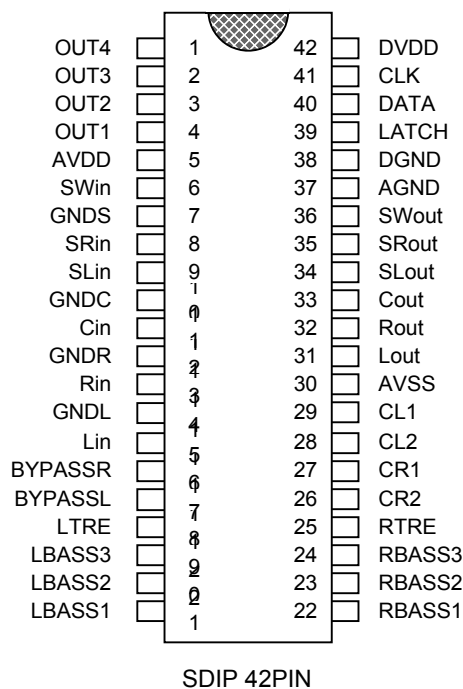
#### APPLICATIONS

- \* DVD Receivers
- \* Home Audio Equipment
- \* AV

#### FEATURES

- \* 4 Output ports
- \* Built-in microcomputer interface circuit controlled by 16-bit serial data.
- \* Electronic volume  
Volume level: 0dB~-95dB, -∞dB(1dB/step)
- \* Tone control  
Bass/Treble, 0dB~±14dB(2dB/step)

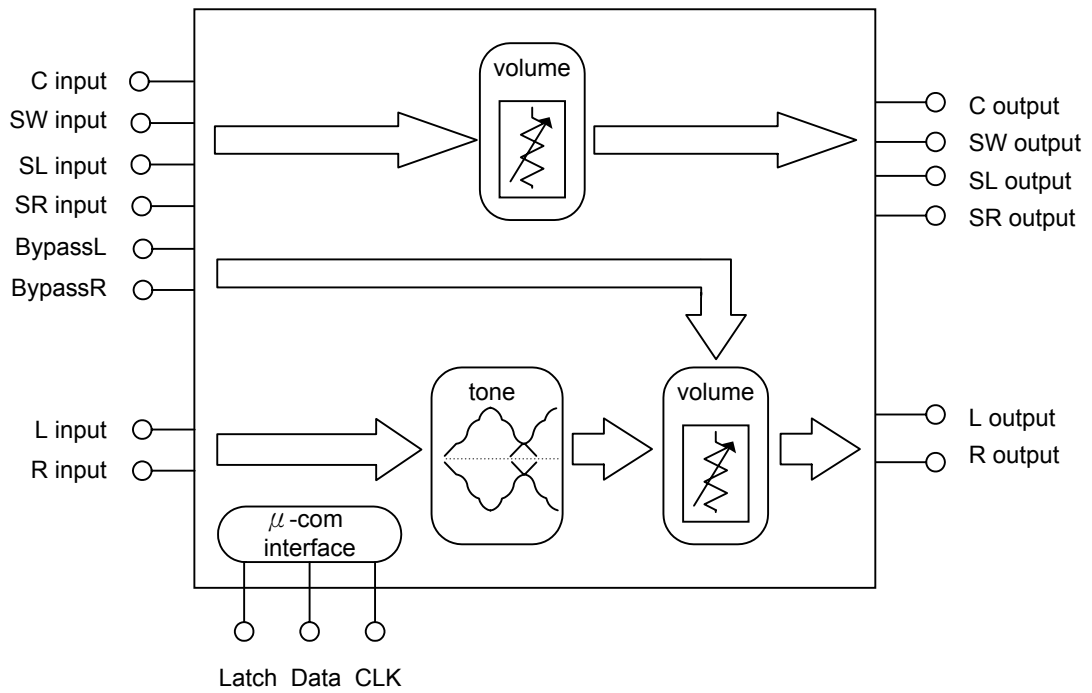
#### PIN ASSIGNMENTS





6 CHANNELS VOLUME CONTROLLER

BLOCK DIAGRAM





**6 CHANNELS VOLUME CONTROLLER**

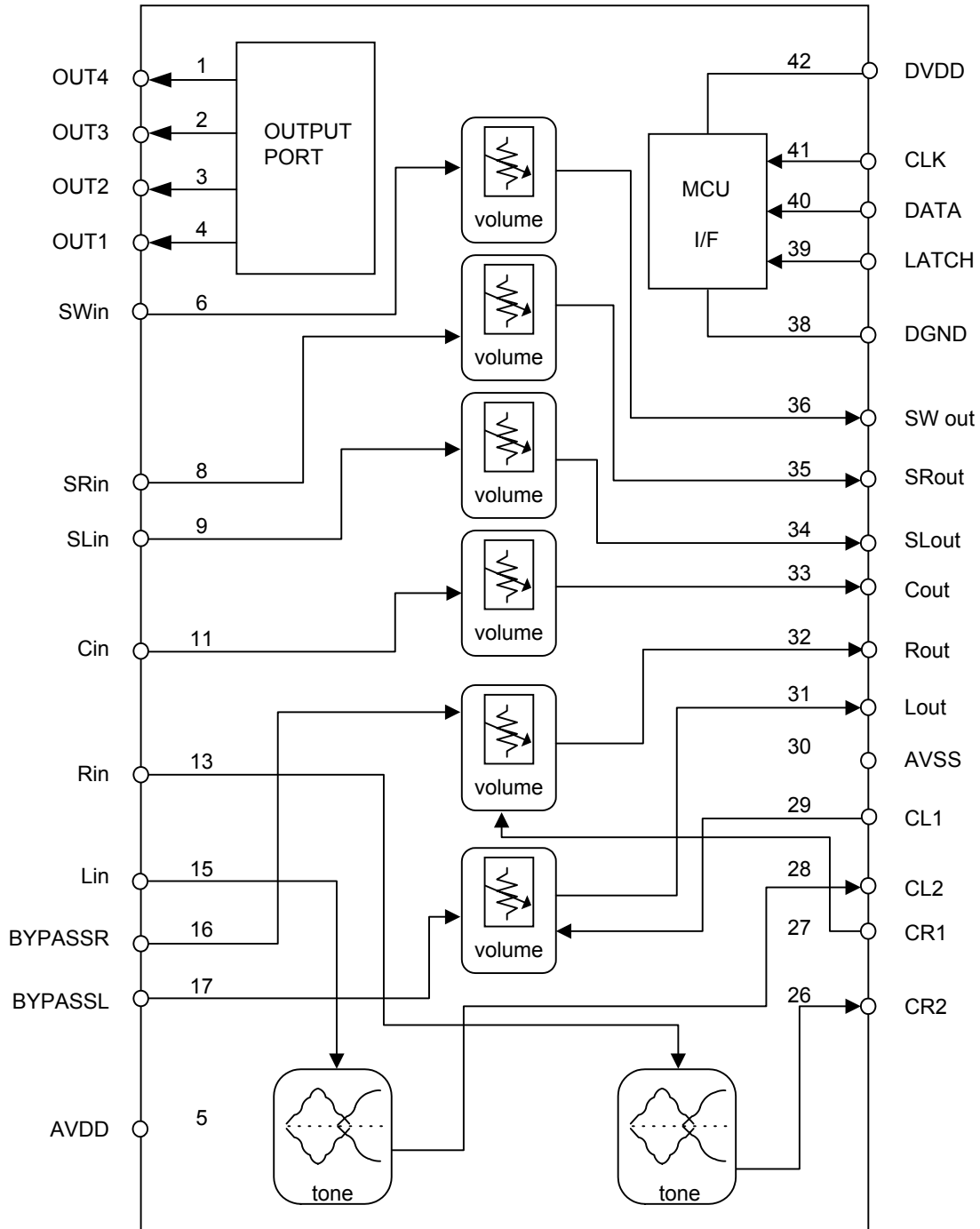
**PIN DESCRIPTION (Pin count base on 42pin SDIP)**

| Pin No. | Symbol  | Function                        | Circuit                                |
|---------|---------|---------------------------------|--|
| 1       | OUT4    | Port OUTPUT                     | OUTPUT: PMOS Transistor open drain<br> |
| 2       | OUT3    |                                 |  |
| 3       | OUT2    |                                 |  |
| 4       | OUT1    |                                 |  |
| 5       | AVDD    | Analog positive Power supply    | +7V                                    |
| 7       | GNDS    | GND                             | Connect to analog GND                  |
| 10      | GNDC    |                                 |  |
| 12      | GNDR    |                                 |  |
| 14      | GNDL    |                                 |  |
| 6       | SW in   | Volume INPUT                    |  |
| 8       | SR in   |                                 |  |
| 9       | SL in   |                                 |  |
| 11      | C in    |                                 |  |
| 36      | SW out  | Volume OUTPUT                   |  |
| 35      | SR out  |                                 |  |
| 34      | SL out  |                                 |  |
| 33      | C out   |                                 |  |
| 13      | R in    | Tone INPUT                      |  |
| 15      | L in    |                                 |  |
| 16      | BYPASSR | L.R Volume INPUT in BYPASS mode |  |
| 17      | BYPASSL |                                 |  |
| 31      | L out   | L OUTPUT                        |  |
| 32      | R out   | R OUTPUT                        |  |
| 18      | LTRE    | Tone Treble cycle control       |  |
| 25      | RTRE    |                                 |  |
| 19      | LBASS3  | Tone Bass cycle control         |  |
| 24      | RBASS3  |                                 |  |
| 20      | LBASS2  |                                 |  |
| 23      | RBASS2  |                                 |  |
| 21      | LBASS1  |                                 |  |
| 22      | RBASS1  |                                 |  |
| 26      | CR2     | Tone OUTPUT                     |  |
| 28      | CL2     |                                 |  |
| 27      | CR1     | L.R Volume INPUT                |  |
| 29      | CL1     |                                 |  |
| 31      | L out   | L OUTPUT                        |  |
| 32      | R out   | R OUTPUT                        |  |
| 30      | AVSS    | Analog negative Power supply    | -7V                                    |
| 37      | AGND    | Analog GND                      |  |
| 38      | DGND    | Digital GND                     |  |
| 39      | LATCH   | Latch INPUT                     |  |
| 40      | DATA    | Data INPUT                      |  |
| 41      | CLK     | Clock INPUT Forward data        |  |
| 42      | DVDD    | Digital Power supply            | +5V                                    |



6 CHANNELS VOLUME CONTROLLER

PIN CONFIGURATION AND IC INTERNAL BLOCK DIAGRAM ( Pin count base on 42pin )



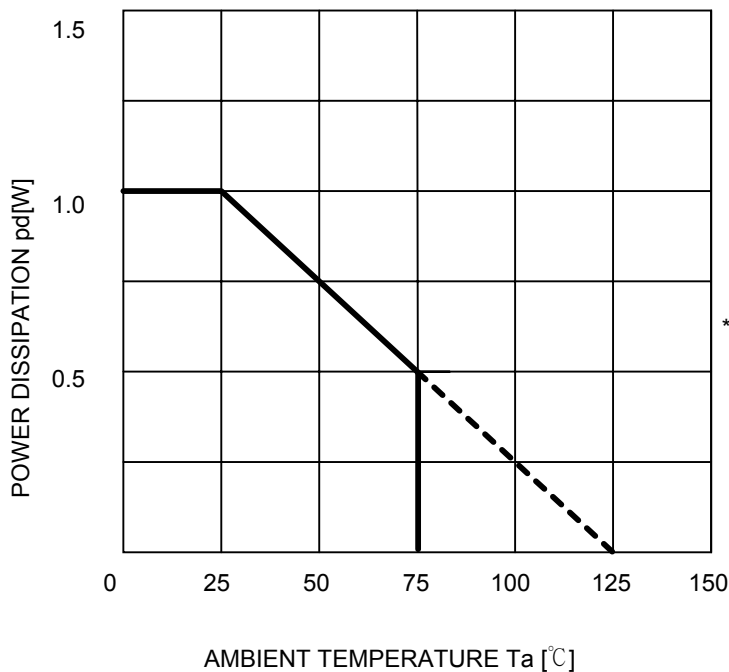


6 CHANNELS VOLUME CONTROLLER

ABSOLUTE MAXIMUM RATINGS

| Symbol         | Parameter             | Conditions                 | Ratings  | Unit    |
|----------------|-----------------------|----------------------------|----------|---------|
| Vsupply        | Supply Voltage        | AVDD-AVSS                  | 16.0     | V       |
| Pd             | Power dissipation     | Ta≤25°C                    | 1000     | mW      |
| K <sub>θ</sub> | Thermal derating      | Ta>25°C<br>*standard board | 10       | mW / °C |
| Topr           | Operating temperature |                            | -20~+75  | °C      |
| Tstg           | Storage temperature   |                            | -40~+125 | °C      |

THERMAL DERATING (MAXIMUM RATING)  
Standard board



- \* Standard board
- board size :70mm X 70mm
- board thickness :1.6mm
- board material :glass epoxy
- copper pattern :
- copper thickness:18um
- copper size :0.25mm(wide)  
30mm(length/lead)



6 CHANNELS VOLUME CONTROLLER

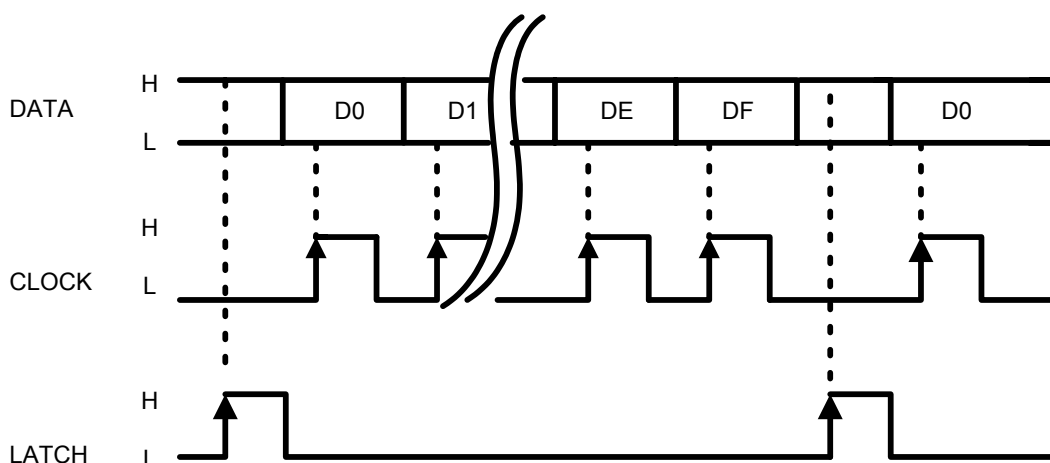
RECOMMENDED OPERATING CONDITION

| Parameter                      | Symbol | Condition | Min.     | Typ.  | Max.     | Unit |
|--------------------------------|--------|-----------|----------|-------|----------|------|
| Analog positive Supply Voltage | AVDD   |           | 6.0      | 7.0   | 8.0      | V    |
| Analog negative Supply Voltage | AVSS   |           | - 8.0    | - 7.0 | - 6.0    | V    |
| Digital Supply Voltage         | DVDD   |           | 4.5      | 5.0   | 5.5      | V    |
| High-level Input Voltage       | VIH    |           | DVDDX0.7 | —     | DVDD     | V    |
| Low-level Input Voltage        | VIL    |           | DGND     | —     | DVDDX0.3 | V    |

Note1 : AVSS≤DGND<DVDD≤AVDD or AVSS≤DGND<AVDD≤DVDD

Note2 : AGND=(AVSS+AVDD ) / 2

DATA TIMING(Recommended conditions)

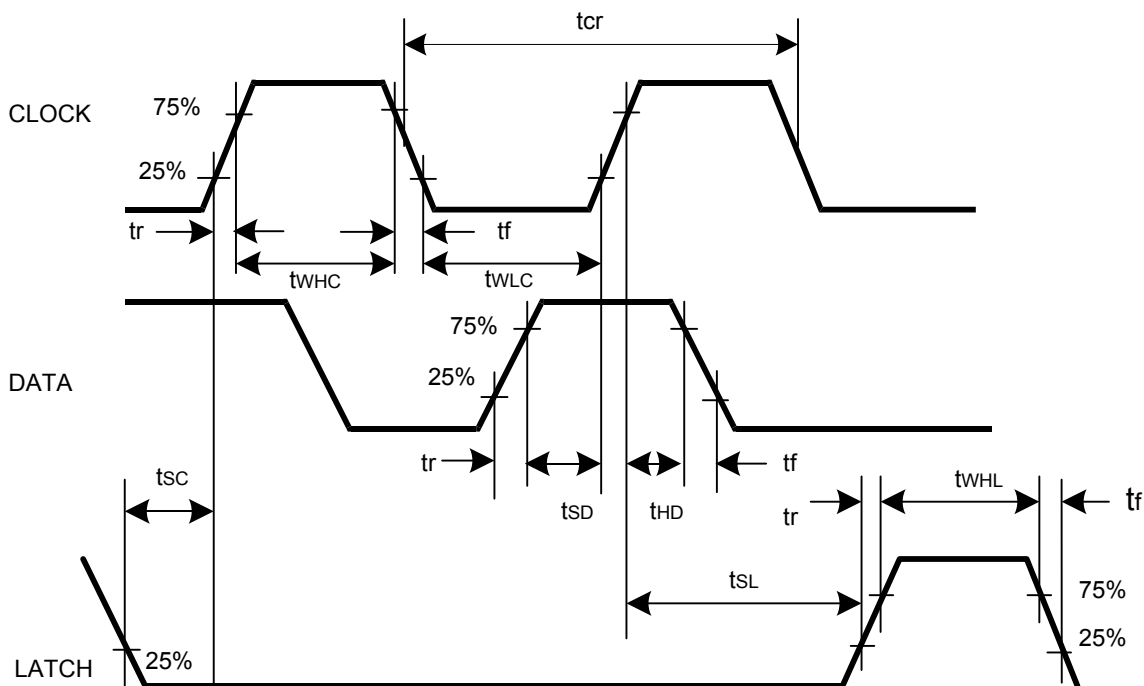


Note: CLOCK and LATCH function at raising edges of pulse.



6 CHANNELS VOLUME CONTROLLER

CLOCK, DATA, LATCH TIMING



DIGITAL BLOCK TIMING REGULATION

| Symbol    | Parameter                    | Limits |     |     | Unit      |
|-----------|------------------------------|--------|-----|-----|-----------|
|           |                              | Min    | Typ | Max |           |
| $t_{cr}$  | CLOCK cycle time             | 8      | —   | —   | $\mu$ sec |
| $t_{wHC}$ | 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    | —   | —   |           |
| $t_{sc}$  | CLOCK start time after LATCH | 3.2    | —   | —   |           |



**6 CHANNELS VOLUME CONTROLLER**

**DIGITAL CONTROL SPECIFICATION**

Four kinds of input format options are available by changing slot settings of DE and DF.

- (1)
- | D01                 | D11 | D21 | D31 | D41                         | D51 | D61 | D71 | D81               | D91 | DA1 | DB1 | DC1 | DD1                      | DE | DF |
|---------------------|-----|-----|-----|-----------------------------|-----|-----|-----|-------------------|-----|-----|-----|-----|--------------------------|----|----|
| TONE CONTROL TREBLE |     |     |     | 1                           | 2   | 3   | 4   | TONE CONTROL BASS |     |     |     | 0   | BY PASS<br>1:ON<br>0:OFF | 0  | 0  |
|                     |     |     |     | OUTPUT PORT<br>1:High 0:Low |     |     |     |                   |     |     |     |     |                          |    |    |
- (2)
- | D02        | D12 | D22 | D32 | D42 | D52 | D62 | D72 | D82        | D92 | DA2 | DB2 | DC2 | DD2 | DE | DF |
|------------|-----|-----|-----|-----|-----|-----|-----|------------|-----|-----|-----|-----|-----|----|----|
| VOLUME Lch |     |     |     |     |     |     |     | VOLUME Rch |     |     |     |     |     | 0  | 1  |
- (3)
- | D03        | D32 | D23 | D33 | D43 | D53 | D63 | D73 | D83         | D93 | DA3 | DB3 | DC3 | DD3 | DE | DF |
|------------|-----|-----|-----|-----|-----|-----|-----|-------------|-----|-----|-----|-----|-----|----|----|
| VOLUME Cch |     |     |     |     |     |     |     | VOLUME SWch |     |     |     |     |     | 1  | 0  |
- (4)
- | D04         | D14 | D24 | D34 | D44 | D54 | D64 | D74 | D84         | D94 | DA4 | DB4 | DC4 | DD4 | DE | DF |
|-------------|-----|-----|-----|-----|-----|-----|-----|-------------|-----|-----|-----|-----|-----|----|----|
| VOLUME SLch |     |     |     |     |     |     |     | VOLUME SRch |     |     |     |     |     | 1  | 1  |

NOTE : When the IC is powered up, the internal setting of channel output are fixed to  $-\infty$ .





**6 CHANNELS VOLUME CONTROLLER**

**SETTING CODE**

**(1) Tone Control ( bass / treble )**

| ATT   | treble | D01 | D11 | D21 | D31 |
|-------|--------|-----|-----|-----|-----|
|       | bass   | D81 | D91 | DA1 | DB1 |
| -14dB |        | 1   | 1   | 1   | 1   |
| -12dB |        | 1   | 1   | 0   | 1   |
| -10dB |        | 1   | 1   | 1   | 0   |
| -8dB  |        | 1   | 1   | 0   | 0   |
| -6dB  |        | 1   | 0   | 1   | 1   |
| -4dB  |        | 1   | 0   | 1   | 0   |
| -2dB  |        | 1   | 0   | 0   | 1   |
| +0dB  |        | 0   | 0   | 0   | 0   |
| +2dB  |        | 0   | 0   | 0   | 1   |
| +4dB  |        | 0   | 0   | 1   | 0   |
| +6dB  |        | 0   | 0   | 1   | 1   |
| +8dB  |        | 0   | 1   | 0   | 0   |
| +10dB |        | 0   | 1   | 1   | 0   |
| +12dB |        | 0   | 1   | 0   | 1   |
| +14dB |        | 0   | 1   | 1   | 1   |

**(2) Port output**

| D41, D51, D61, D71 |   |
|--------------------|---|
| Out: L             | 0 |
| Out: H             | 1 |

**(3) BYPASS control**

| DD1    |   |
|--------|---|
| TONE   | 0 |
| BYPASS | 1 |

Note: Do not input other data than the above.



**6 CHANNELS VOLUME CONTROLLER**

(4)-1 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   |



**6 CHANNELS VOLUME CONTROLLER**

(4)-2 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   |



6 CHANNELS VOLUME CONTROLLER

(4)-3 VOLUME ( -80 ~ -∞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 |
| —           | ∞      | dB | 1   | 0   | 1   | 0   | 0   | 0   | 1   |
| —           | ∞      | dB | 1   | 0   | 1   | 0   | 0   | 1   | 0   |
| —           | ∞      | dB | 1   | 0   | 1   | 0   | 0   | 1   | 1   |
|             | ↓      |    |     |     |     |     |     |     |     |
| —           | ∞      | dB | 1   | 0   | 1   | 1   | 1   | 1   | 0   |
| —           | ∞      | dB | 1   | 0   | 1   | 1   | 1   | 1   | 1   |
| —           | 80     | dB | 1   | 1   | 0   | 0   | 0   | 0   | 0   |
| —           | 81     | dB | 1   | 1   | 0   | 0   | 0   | 0   | 1   |
| —           | 82     | dB | 1   | 1   | 0   | 0   | 0   | 1   | 0   |
| —           | 83     | dB | 1   | 1   | 0   | 0   | 0   | 1   | 1   |
| —           | 84     | dB | 1   | 1   | 0   | 0   | 1   | 0   | 0   |
| —           | 85     | dB | 1   | 1   | 0   | 0   | 1   | 0   | 1   |
| —           | 86     | dB | 1   | 1   | 0   | 0   | 1   | 1   | 0   |
| —           | 87     | dB | 1   | 1   | 0   | 0   | 1   | 1   | 1   |
| —           | 88     | dB | 1   | 1   | 0   | 1   | 0   | 0   | 0   |
| —           | 89     | dB | 1   | 1   | 0   | 1   | 0   | 0   | 1   |
| —           | 90     | dB | 1   | 1   | 0   | 1   | 0   | 1   | 0   |
| —           | 91     | dB | 1   | 1   | 0   | 1   | 0   | 1   | 1   |
| —           | 92     | dB | 1   | 1   | 0   | 1   | 1   | 0   | 0   |
| —           | 93     | dB | 1   | 1   | 0   | 1   | 1   | 0   | 1   |
| —           | 94     | dB | 1   | 1   | 0   | 1   | 1   | 1   | 0   |
| —           | 95     | dB | 1   | 1   | 0   | 1   | 1   | 1   | 1   |
| —           | ∞      | dB | 1   | 1   | 1   | 0   | 0   | 0   | 0   |
| —           | ∞      | dB | 1   | 1   | 1   | 0   | 0   | 0   | 1   |
|             | ↓      |    |     |     |     |     |     |     |     |
| —           | ∞      | dB | 1   | 1   | 1   | 1   | 1   | 1   | 0   |
| —           | ∞      | dB | 1   | 1   | 1   | 1   | 1   | 1   | 1   |

**6 CHANNELS VOLUME CONTROLLER****ELECTRICAL CHARACTERISTICS**

( Ta=25°C, AVDD=7.0V, AVSS=-7.0V, DVDD=5.0V, f=1kHz, unless otherwise noted. Rg=1KΩ, RI=10KΩ, TONE CONTROL, VOLUME are set to 0dB/FLAT )

**(1) Power Supply Characteristics ( Pin count base on 42pin version )**

| Parameter                       | Symbol | Test condition                 | Limits |     |     | Unit |
|---------------------------------|--------|--------------------------------|--------|-----|-----|------|
|                                 |        |                                | Min    | typ | Max |      |
| Analog positive circuit current | Aldd   | Current at pin 5<br>No signal  | –      | 24  | 35  | mA   |
| Analog negative circuit current | Alss   | Current at pin 30<br>No signal | –      | 24  | 35  | mA   |
| Digital circuit current         | Dldd   | Current at pin 42<br>No signal | –      | 1.0 | 2.0 | mA   |

**(2) Input/Output Characteristics ( Pin count base on 42pin version )**

| Parameter                    | Symbol   | Test condition   | Limits |       |      | Unit  |
|------------------------------|----------|--|--------|-------|------|-------|
|                              |          |  | Min    | typ   | Max  |       |
| Input resistance             | Rin      | 13,15,16,17,27,29pin   | 35     | 70    | 150  | KΩ    |
| Maximum output voltage       | VOM      | 6,8,9,11,13,15,16,17pin INPUT<br>31~36pin OUTPUT, THD=1%             | 3.0    | 4.2   | –    | Vrms  |
| Pass gain                    | Gv       | Vi=0.2Vrms, FLAT<br>6,8,9,11,13,15,16,17pin INPUT<br>31~36pin OUTPUT | -2.0   | 0     | 2.0  | dB    |
| Distortion                   | THD      | BW=400~30kHz<br>Vi=0.2Vrms, RL=10KΩ                                  | –      | 0.004 | 0.09 | %     |
| Output noise voltage         | Vn(VOL)  | 31~36pin<br>JIS-A, VOL=0dB   | –      | 4     | 6    | μVrms |
|                              | Vn(tone) | 31,32pin<br>JIS-A, VOL=0dB   | –      | 8     | 20   | μVrms |
| Signal to noise ratio        | S/N      | all gains=0dB; Vo=1Vrms  | –      | 98    | 105  | dB    |
| Maximum attenuation          | ATTmax   | 31~36 pin<br>JIS-A, VOL=-∞dB   | –      | -100  | -95  | dB    |
| Volume gain between channels | Dvol     |  | -1.5   | 0     | 1.5  | dB    |
| Crosstalk between channels   | CT       | Vo=0.5Vrms, RL=10KΩ,<br>JIS-A, Rg=1KΩ                                | –      | -100  | -80  | dB    |
| Port output current          | IL       | RL=22KΩ  | 0.2    | –     | –    | mA    |



**6 CHANNELS VOLUME CONTROLLER**

**(3) Tone Control Characteristics ( Pin count base on 42pin version )**

| Parameter                 | Symbol  | Test condition  | Limits |     |      | Unit |
|---------------------------|---------|---|--------|-----|------|------|
|                           |         |   | Min    | typ | Max  |      |
| Tone control voltage gain | T -14dB | Vo=0.2Vrms,f=1kHz<br>TREBLE(f=10kHz)<br>BASS(f=100Hz) | -16    | -14 | -12  | dB   |
|                           | T -12dB |   | -14    | -12 | -10  | dB   |
|                           | T -10dB |   | -12    | -10 | -8   | dB   |
|                           | T -8dB  |   | -10    | -8  | -6   | dB   |
|                           | T -6dB  |   | -7.5   | -6  | -4.5 | dB   |
|                           | T -4dB  |   | -5.5   | -4  | -2.5 | dB   |
|                           | T -2dB  |   | -3     | -2  | -1   | dB   |
|                           | T +2dB  | INPUT 13,15pin<br>OUTPUT 31,32pin                     | 1      | 2   | 3    | dB   |
|                           | T +4dB  |   | 2.5    | 4   | 5.5  | dB   |
|                           | T +6dB  |   | 4.5    | 6   | 7.5  | dB   |
|                           | T +8dB  |   | 6      | 8   | 10   | dB   |
|                           | T +10dB |   | 8      | 10  | 12   | dB   |
|                           | T +12dB |   | 10     | 12  | 14   | dB   |
|                           | T +14dB |   | 12     | 14  | 16   | dB   |
| Balance between channel   | BALT    | Input pin13,15 Vo=0.2 Vrms,Output pin31,32            | -1.5   | 0   | +1.5 | dB   |

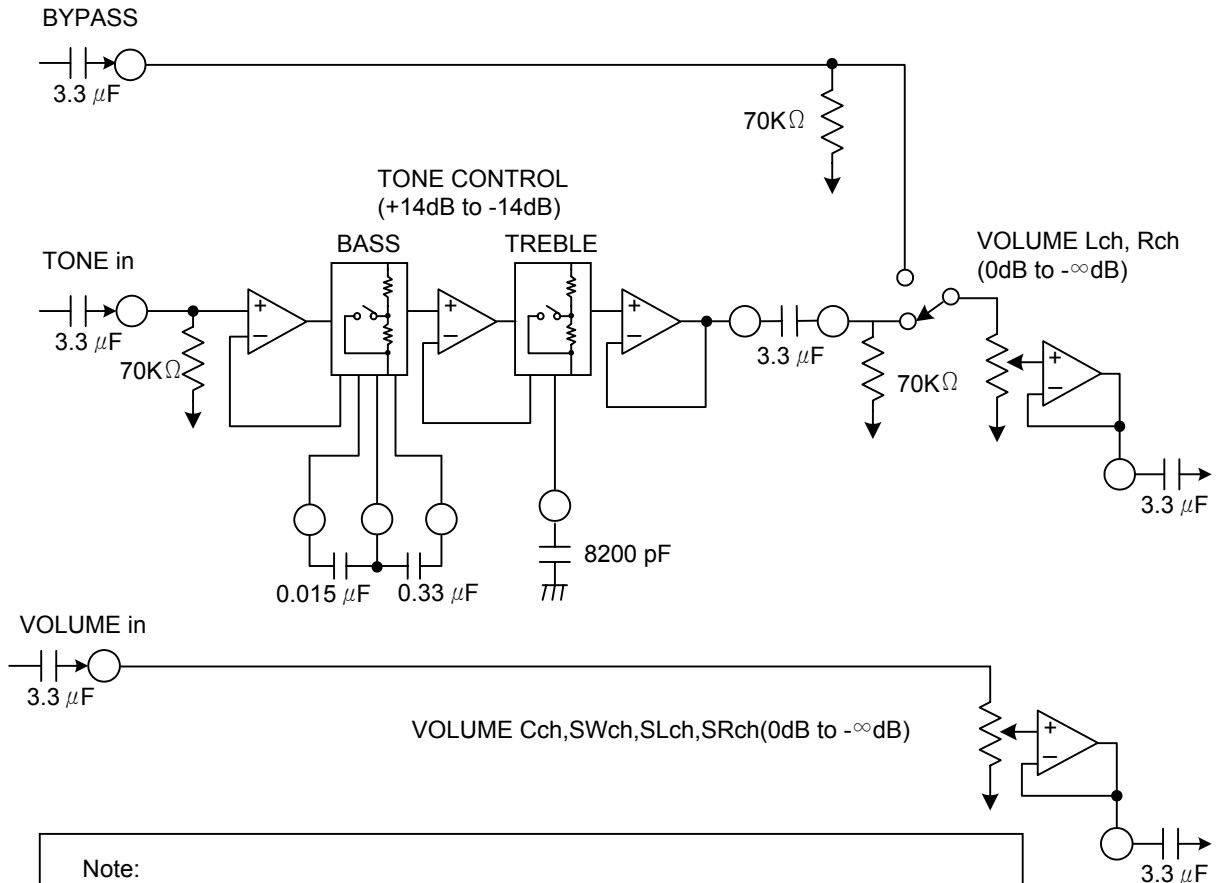
**RECOMMENDED OPERATING CONDITIONS**

|                      | Analog       | Digital    |
|----------------------|--------------|------------|
| Supply voltage range | ±6.0 ~ ±8.0V | 4.5 ~ 5.5V |
| Rated supply voltage | ±7.0V        | 5.0V       |



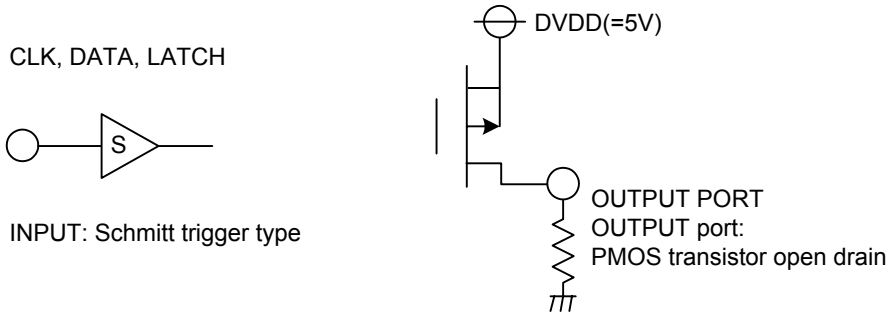
6 CHANNELS VOLUME CONTROLLER

SIGNAL PROCESSING DIAGRAM



**Note:**

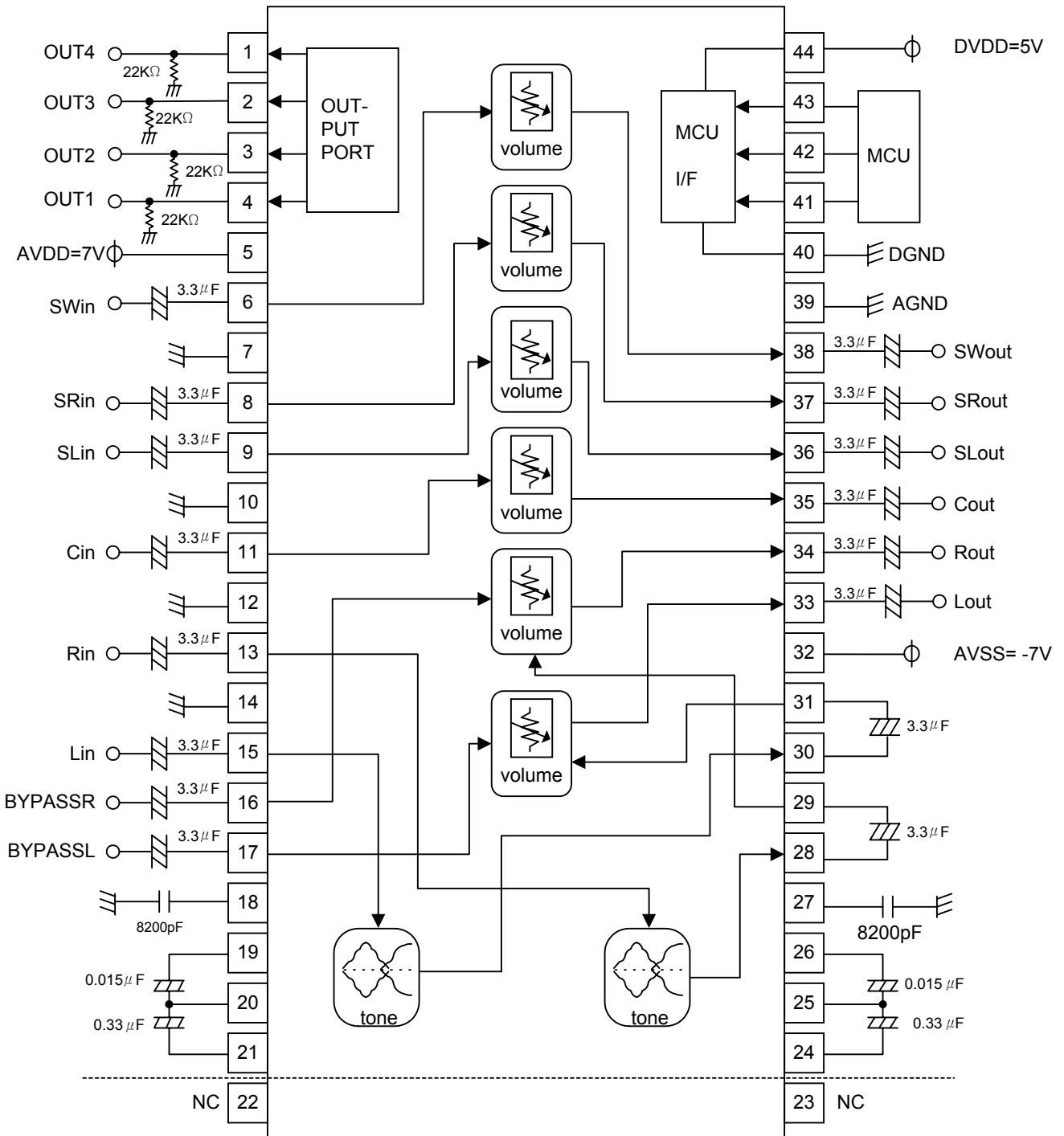
- (1) The resistance value of Volume change about 18 to 22KΩ by attenuated condition.
- (2) No built in a zero cross circuit.
- (3) When the mode changed (BYPASS/TONE), it is necessary the muting function.





6 CHANNELS VOLUME CONTROLLER

APPLICATION EXAMPLE ( Pin count base on 44pin )



Units Resistance:  $\Omega$  / Capacitance: F





6 CHANNELS VOLUME CONTROLLER

Figure1 : Tone Response of Treble

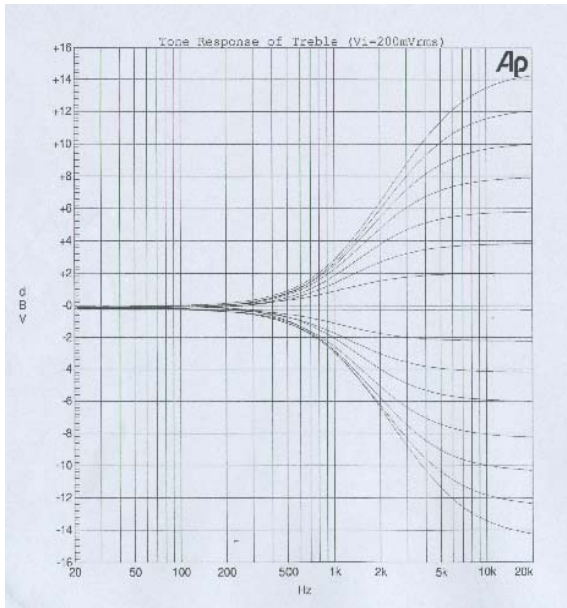


Figure2 : Tone Response of Bass

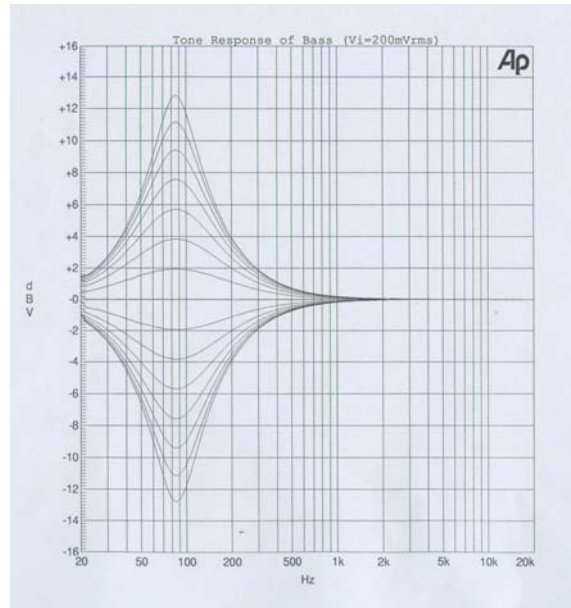


Figure3 : Crosstalk vs. R/L ch

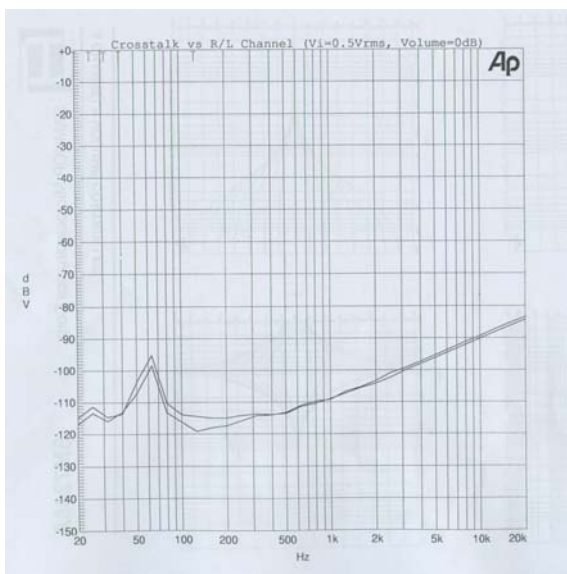
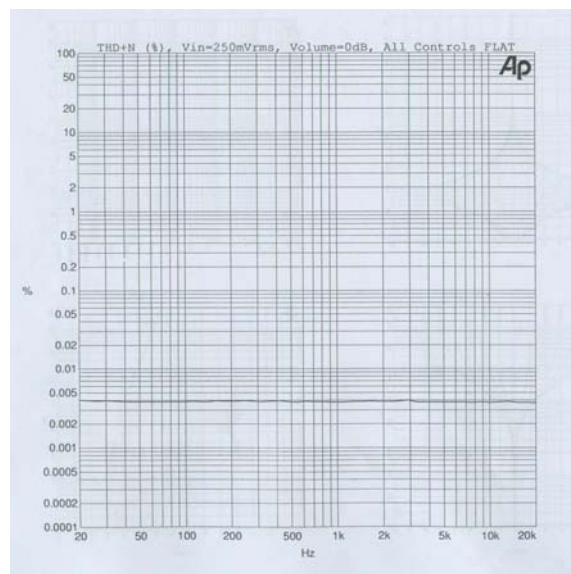


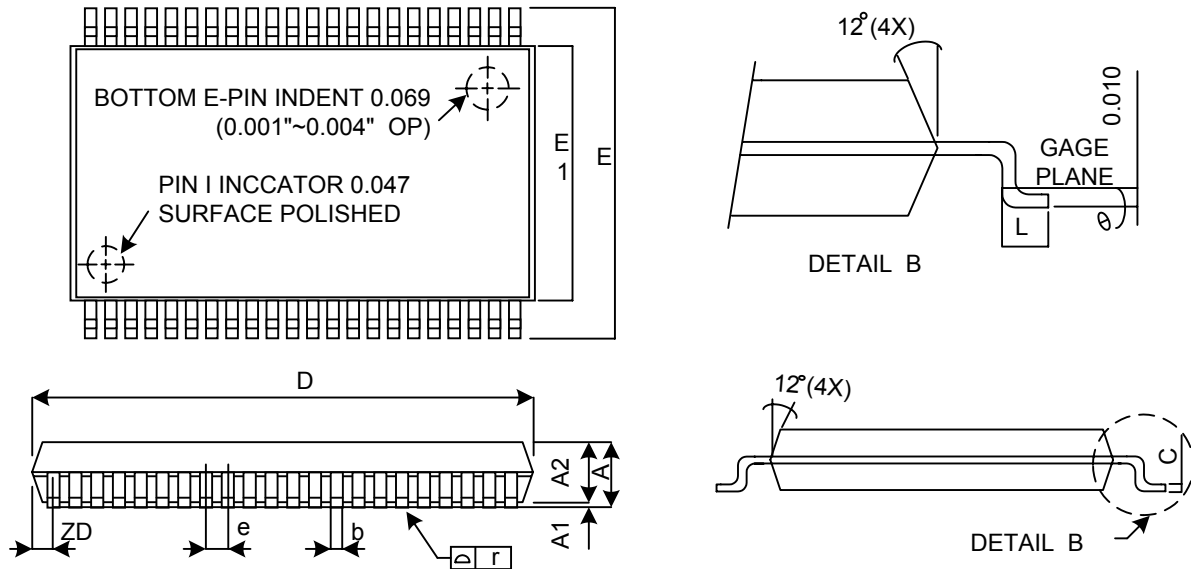
Figure4 : Distortion and Noise vs. Frequency  
( $V_{in}=250mV, AV=0dB, ALL CONTROLS FLAT, VOLUME=0dB, -20dB$ )





6 CHANNELS VOLUME CONTROLLER

PACKAGE OUTLINE ( TSSOP44)



| SYMBOLS | DIMENSIONS IN MILLIMETERS |        |        | DIMENSIONS IN INCHES |        |        |
|---------|---------------------------|--------|--------|----------------------|--------|--------|
|         | MIN                       | NOM    | MAX    | MIN                  | NOM    | MAX    |
| A       | 1.00                      | —      | 1.20   | 0.039                | —      | 0.047  |
| A1      | 0.05                      | —      | 0.15   | 0.002                | —      | 0.006  |
| A2      | 0.95                      | 1.00   | 1.05   | 0.037                | 0.039  | 0.041  |
| b       | 0.30                      | 0.35   | 0.45   | 0.012                | 0.014  | 0.018  |
| C       | 0.12                      | —      | 0.21   | 0.0047               | —      | 0.0083 |
| D       | 18.313                    | 18.415 | 18.517 | 0.721                | 0.725  | 0.729  |
| E       | 11.684                    | 11.836 | 11.938 | 0.460                | 0.466  | 0.47   |
| E1      | 10.058                    | 10.160 | 10.262 | 0.396                | 0.400  | 0.404  |
| e       | —                         | 0.800  | —      | —                    | 0.315  | —      |
| L       | 0.40                      | 0.50   | 0.60   | 0.0157               | 0.020  | 0.0236 |
| ZD      | —                         | 0.805  | —      | —                    | 0.0317 | —      |
| θ       | 0°                        | —      | 8°     | 0°                   | —      | 8°     |
| y       | 0.00                      | —      | 0.076  | 0.000                | —      | 0.003  |

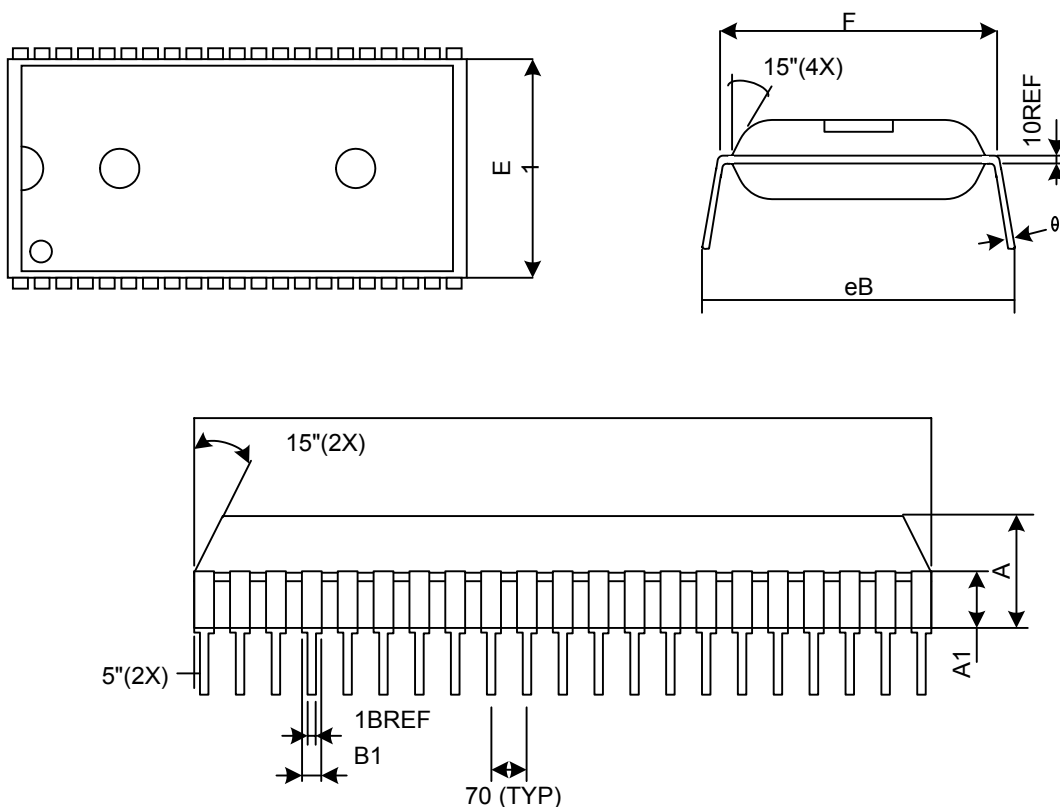
NOTE:

1. CONTROLLING DIMENSION 1 INCH.
2. LEAD FRAME MATERIAL ALLOY 42.
3. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, THE BAR BURRS AND GATE BURRS.  
MOLD FLASH, THE BAR BURRS AND GATE BURRS SHALL NOT EXCEED 0.066"(0.15mm) PER END DIMENSION "E1" DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH NOT EXCEED 0.010" (0.25mm) PER SIDE.
4. DIMENSION "b" DOES NOT INCLUDE DAMBAR PROTRUSION.  
ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.003"(0.08mm) TOTAL IN EXCESS OF THE "b" DIMENSION AT MAXIMUM MATERIAL CONDITION DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD TO BE 0.0028"(0.07mm).
5. TOLERANCE +0.010"(0.25mm) UNLESS OTHERWISE SPECIFIED.
6. OTHERWISE DIMENSION FOLLOW ACCEPTABLE SPEC.
7. REFERENCE DOCUMENT: JEDEC SPEC MS-024.



**6 CHANNELS VOLUME CONTROLLER**

**PACKAGE OUTLINE ( SDIP42 )**



| SYMBOL | Dimonation in mil |      |      | Dimenation in mm |        |        |
|--------|-------------------|------|------|------------------|--------|--------|
|        | MIN               | NOM  | MAX  | MIN              | NOM    | MAX    |
| A      | 155               | 160  | 165  | 3.937            | 4.064  | 4.2    |
| A1     | 70                | 72.5 | 74   | 1.78             | 1.842  | 1.88   |
| B1     | 36                | 40   | 44   | 0.914            | 1.270  | 1.118  |
| D      | 1448              | 1450 | 1452 | 36.78            | 36.83  | 36.88  |
| E1     | 549               | 550  | 551  | 13.945           | 13.970 | 13.998 |
| F      | 592               | 800  | 608  | 15.037           | 15.240 | 15.443 |
| eB     | 600               | 650  | 700  | 15.24            | 16.510 | 17.78  |
| θ      | 0°                | 7.5° | 15°  | 0°               | 7.5°   | 15°    |

PACKAGE OUTLINE DIMENSION FOR P-SDIP 42 PIN