

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

Dynamic bass boost/Sound processor with BBE

DESCRIPTION

Home Audio, Radio-Cassette, TV, etc.

FEATURES

<DYNAMIC BASS BOOST FUNCTION>

- It is adaptable to the input level and the maximum boost quantity change.
- It is possible to change five maximum boost quantity modes.
 <+20dB,+15dB,+10dB,+5dB,flat>

<HIGH DEFINITION SOUND FUNCTION>

- Build-in BBE Sound (Low level=fixation/High level=3 steps can be changed.)

<INPUT SELECTOR>

- 5ch stereo input change.

<TONE CONTROL>

- BASS/TREBLE(±10dB,8dB,6dB,4dB,2dB,flat;2dB/Step)

<GAIN CONTROL>

- The passage profit variability (0dB~+14dB:2dB step)

<FUNCTION MODE SELECTOR FUNCTION>

- Monaural (L,R,L+R),Vocal cut

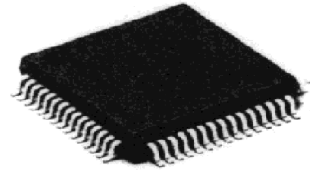
<ELECTRONIC VOLUME FUNCTION>

- 0dB~ -87dB, - ;1dB/step

<EXTENSION PORT OUTPUT FUNCTION>

- Eight output ports(Six pieces of NPN open collector output,Two pieces of three state output)

PACKAGE



64pinQFP
(Pitch:0.8mm)

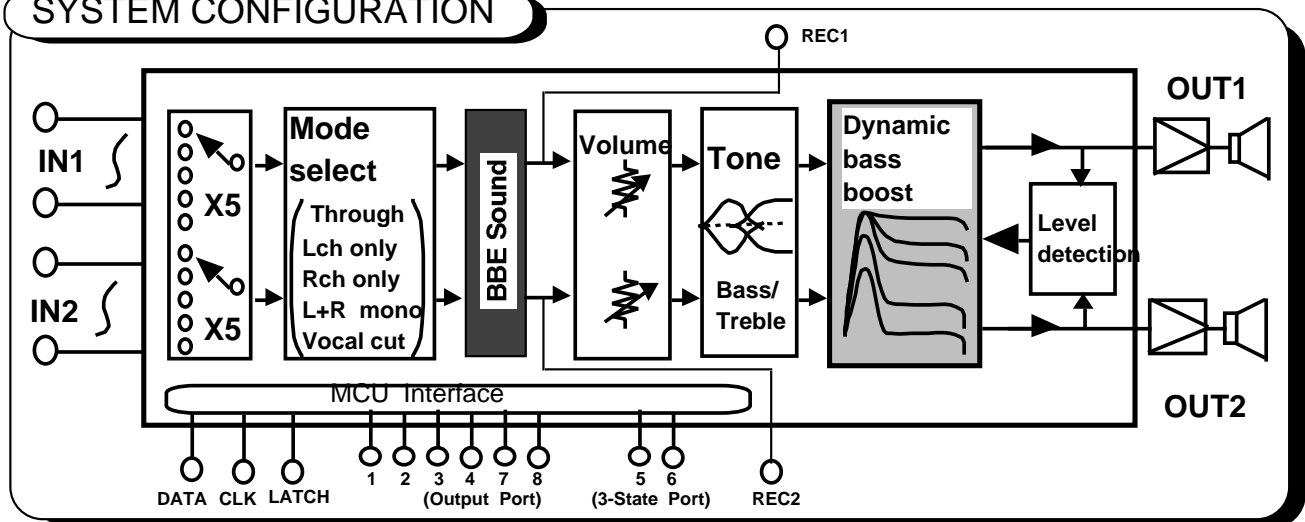
*BBE is the registration brand of the BBE Sound company.

As for this IC, only the brand of BBE and the person who was permitted to use a patent can do sale and supply.

RECOMMENDED OPERATING CONDITIONS

Supply voltage range •••• Analog VCC=3.5V(typ),VEE=-3.5V(typ)
 Digital VDD=5.0V(typ)

SYSTEM CONFIGURATION



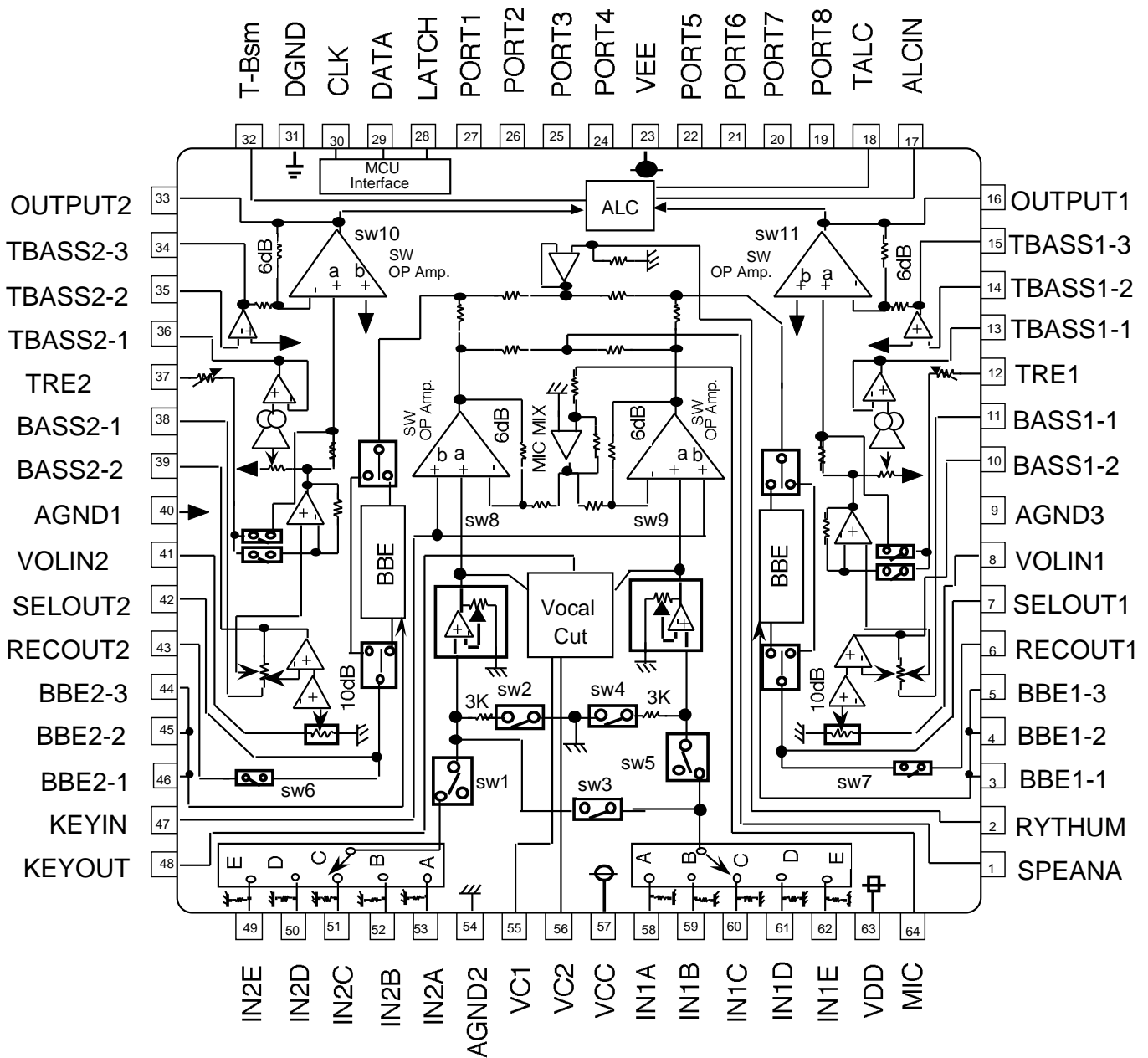
PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

PIN CONFIGURATION AND INTERNAL BLOCK DIAGRAM



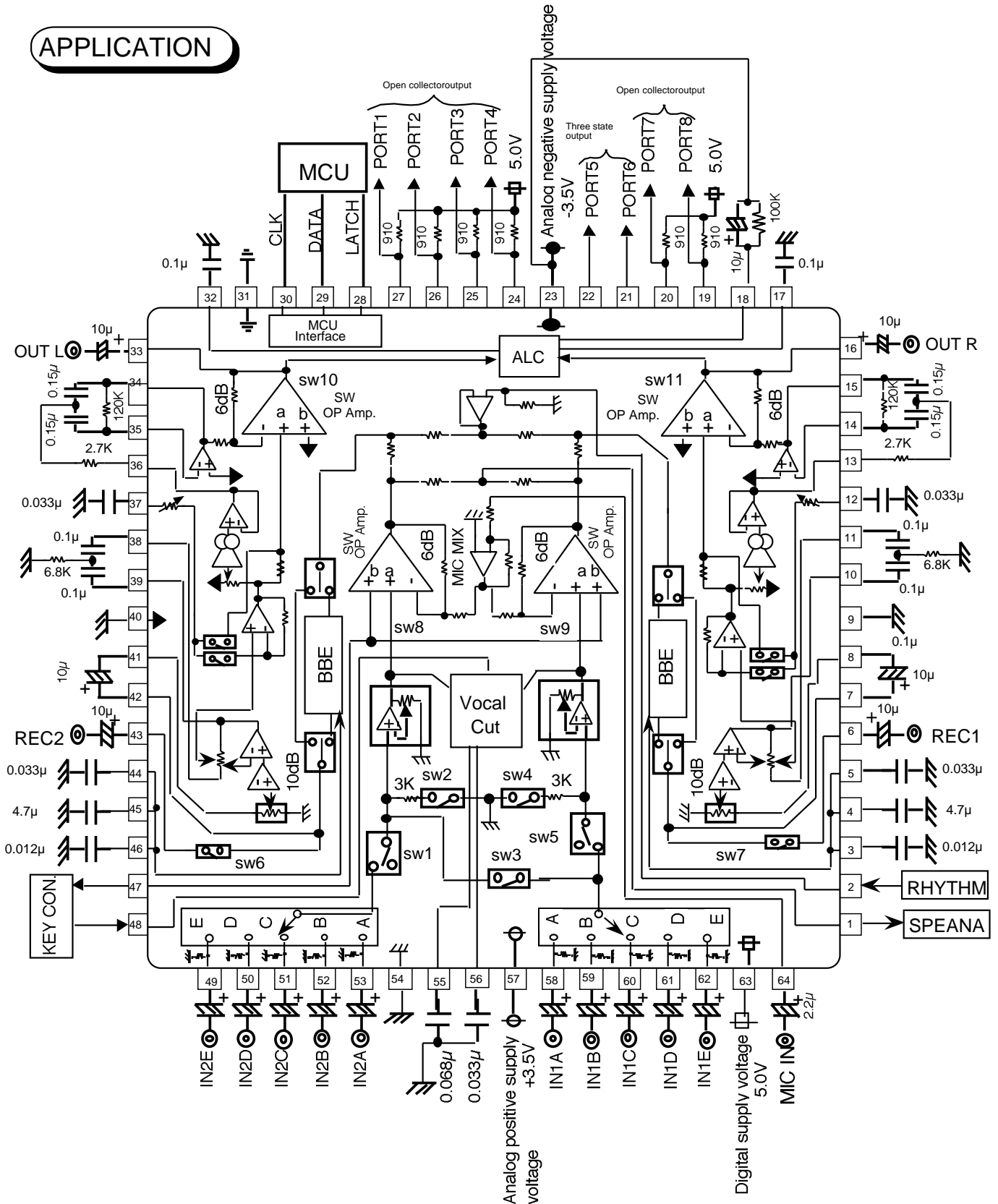
PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M6249FP

SOUND CONTROLLER WITH T-BASS and BBE

APPLICATION

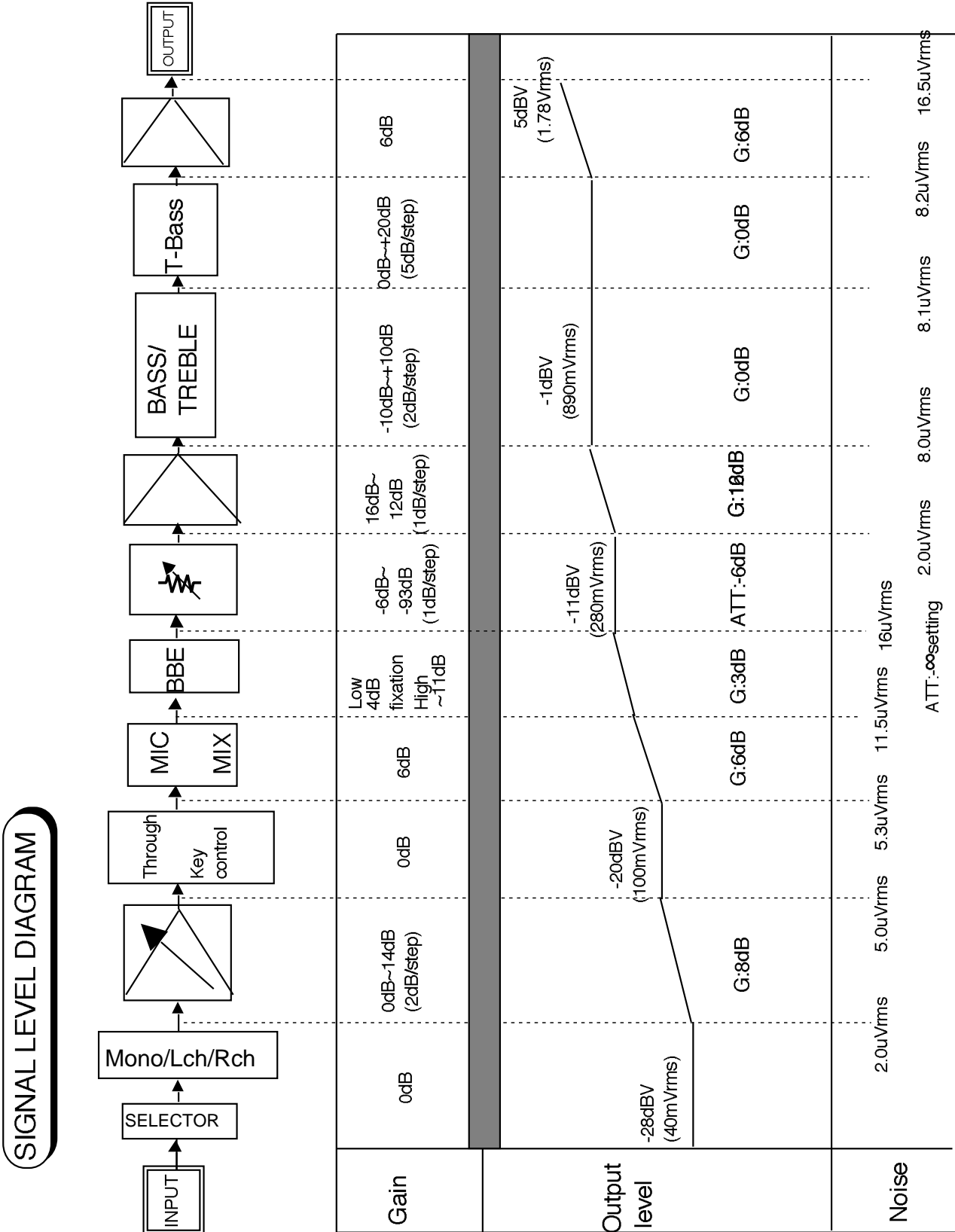


PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M6249FP

SOUND CONTROLLER WITH T-BASS and BBE



PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

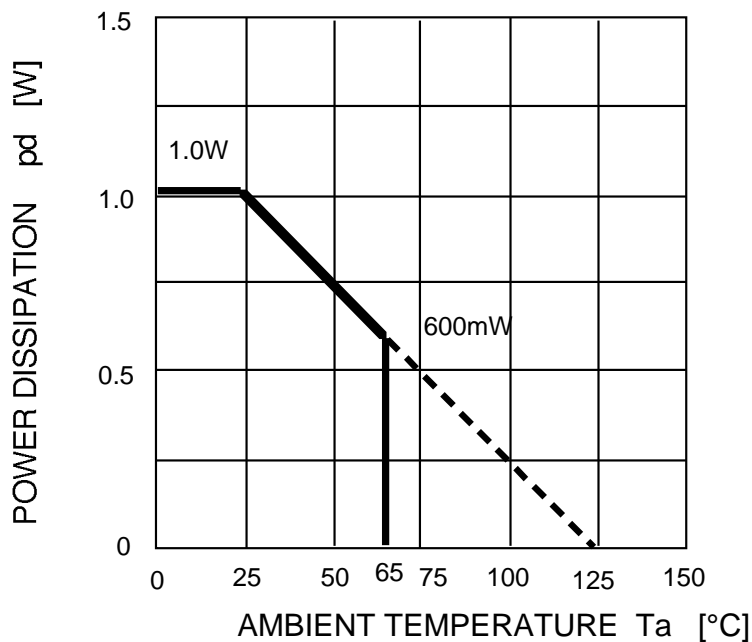
M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Conditions | Limits | Units |
|--------|--------------------------------|-----------------------------|----------|-------|
| VCC | Analog positive supply voltage | | +4.0 | V |
| VEE | Analog nagative supply voltage | | -4.0 | |
| VDD | Digital supply voltage | | 6.0 | V |
| Pd | Power dissipation | Ta 25°C | 1000 | mW |
| K | Thermal derating | Ta>25°C, (Note1)PC Board | 10 | mW/°C |
| Topr | Operating temperature | | -20~+65 | °C |
| Tstg | Storage temperature | | -40~+125 | °C |

THERMAL DERATING



(Note1)PC Board

PC Board Size
 70mmx70mm
 PC Board Thickness
 1.6mm
 PC Board Material
 Epoxy
 Copper Film Thickness
 18μm
 Copper Foil Size
 0.25mmx25mm

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

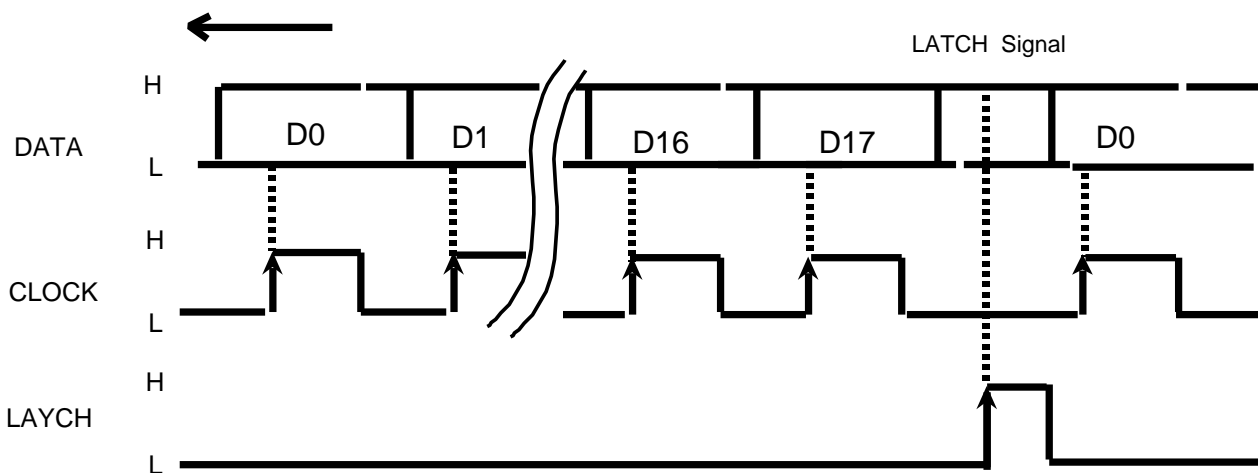
SOUND CONTROLLER WITH T-BASS and BBE

RECOMMENDED OPERATING CONDITION

(Ta=25°C, unless otherwise noted.)

| Parameter | Symbol | Conditions | Limits | | | Units |
|--------------------------------|--------|------------|--------|------|-------|-------|
| | | | MIN | TYP | MAX | |
| Analog positive supply voltage | VCC | | 3.25 | 3.5 | 3.75 | V |
| Analog negative supply voltage | VEE | | -3.75 | -3.5 | -3.25 | |
| Digital supply voltage | VDD | VDD VCC | 4.75 | 5.0 | 5.25 | V |
| Logic"H"level input voltage | VIH | | VDD-1 | — | VDD | V |
| Logic"L"level input voltage | VIL | | 0 | — | 0.8 | V |

RELATIONSHIP BETWEEN DATA AND CLOCK



Data signal is read at the rising edge of clock, and Signal is latched at the rising edge of the latch signal.

(DATA and CLOCK are "H" setting, it doesn't accept LATCH.)

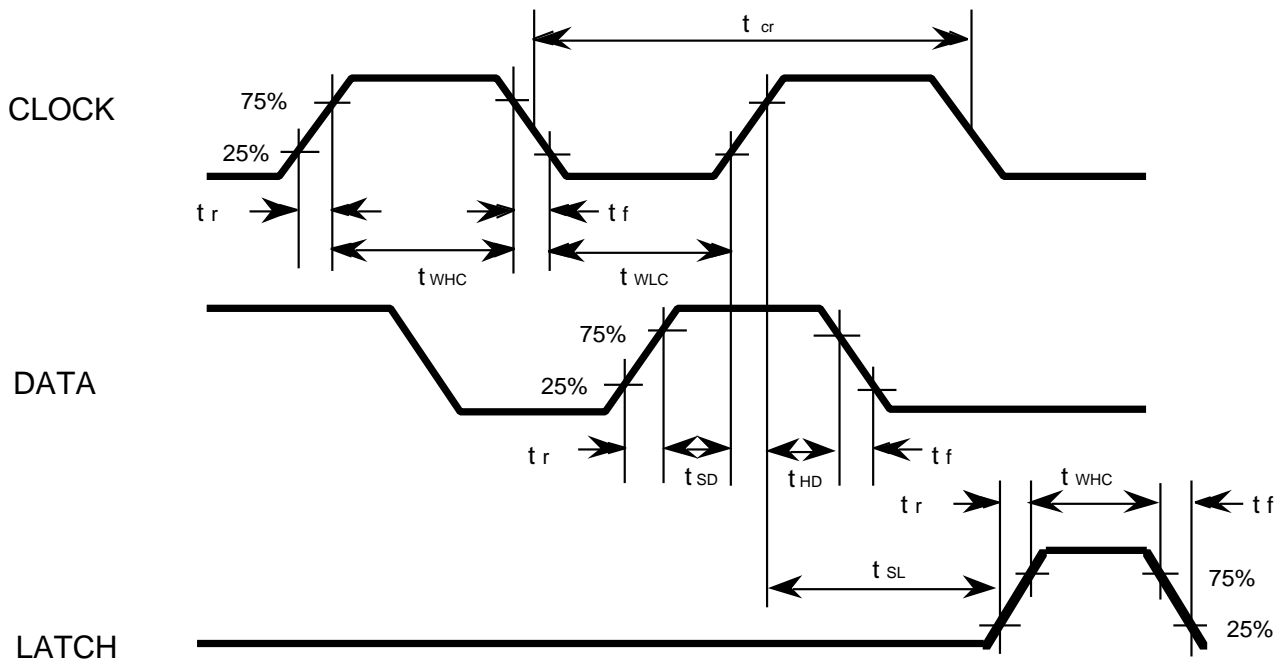
PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

CLOCK AND DATA TIMING



DIGITAL BLOCK TIMING REGULATION

| Symbol | Parameter | Limits | | | Units |
|-----------|------------------------------|--------|-----|-----|-------|
| | | Min | typ | Max | |
| t_{cr} | CLOCK cycle time | 4 | - | - | μsec |
| t_{WHC} | CLOCK pulse width ("H"level) | 1.6 | - | - | |
| t_{WLC} | CLOCK pulse width ("L"level) | 1.6 | - | - | |
| t_r | CLOCK,DATA,LATCH rise time | - | - | 0.4 | |
| t_f | CLOCK,DATA,LATCH fall time | - | - | 0.4 | |
| t_{SD} | DATA setup time | 0.8 | - | - | |
| t_{HD} | DATA hold time | 0.8 | - | - | |
| t_{SL} | LATCH setup time | 1 | - | - | |
| t_{WHL} | LATCH pulse width | 1.6 | - | - | |

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

INPUT DATA FORMAT

Fore kinds of input format options are available by address fixation bit of D15,D16 and D17.
 (When the IC powered up, the internal settings are not fixed.)

Fixation bit
 (For address)

| MSB | | ← Input direction | | | | | | | | | | | | | | | LSB | | |
|-----|--------------------|----------------------|-----|------------------|-----------------|-----|-----------------|--------------------|------------------|----|-------------|-----|-----|-----|----------|-----|-----|-----|-----|
| | | DO | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | D16 | D17 |
| (1) | Input selector | Gain control | | | Bass boost/Cut | | | | Treble boost/Cut | | | | 0 | 0 | 0 | 0 | | | |
| | I0 | I1 | I2 | G0 | G1 | G2 | B0 | B1 | B2 | B3 | T0 | T1 | | | | | T2 | T3 | |
| (2) | Port output 1-4 | Try state output 5,6 | | | Port output 7,8 | | KARAOKE control | | | | 0 | 1 | 0 | 0 | | | | | |
| | O0 | O1 | O2 | O3 | Ss0 | Ss1 | St0 | St1 | O8 | O9 | | | | | K0 | K1 | K2 | K3 | |
| (3) | Lch volume control | | | | | | 1 | Rch volume control | | | | | | 0 | 1 | 1 | | | |
| | L0 | L1 | L2 | L3 | L4 | L5 | | L6 | R0 | R1 | R2 | R3 | R4 | | | | R5 | R6 | |
| (4) | VOL Amp. gain(L) | | | VOL Amp. gain(R) | | | 1 | BBE | | 1 | T-Bass gain | | | 1 | Rec mute | 1 | 1 | 1 | |
| | VL0 | VL1 | VL2 | VR0 | VR1 | VR2 | | BE0 | BE1 | | TB0 | TB1 | TB2 | | M0 | | | | |

(Note.) In data transmission setting of slot 4, put interval of 100msec.

(1)-1 SETTING CODE OF INPUT SELECTOR

| Selector | I0 | I1 | I2 | Selector SW | SW 1,5 | SW MUTE |
|-------------|----|----|----|-------------|-----------|-----------|
| Input mute | 0 | 0 | 0 | Alloff | off | on |
| A | 0 | 0 | 1 | A | on | off |
| B | 0 | 1 | 0 | B | | |
| C | 0 | 1 | 1 | C | | |
| D | 1 | 0 | 0 | D | | |
| E | 1 | 0 | 1 | E | | |
| Prohibition | 1 | 1 | 0 | Unsettled | Unsettled | Unsettled |
| Prohibition | 1 | 1 | 1 | Unsettled | Unsettled | Unsettled |

(1)-2 SETTING CODE OF GAIN CONTROL

| Gain | G0 | G1 | G2 |
|-------|----|----|----|
| 0 dB | 0 | 0 | 0 |
| 2 dB | 0 | 0 | 1 |
| 4 dB | 0 | 1 | 0 |
| 6 dB | 0 | 1 | 1 |
| 8 dB | 1 | 0 | 0 |
| 10 dB | 1 | 0 | 1 |
| 12 dB | 1 | 1 | 0 |
| 14 dB | 1 | 1 | 1 |

(2)-3 SETTING CODE OF KARAOKE CONTROL

| | K0 | K1 | K2 | K3 | sw1 | sw2 | sw3 | sw4 | sw5 | sw8,9 |
|-----------------|----|----|----|----|-----|-----|-----|-----|-----|-------|
| STEREO | 1 | 1 | 0 | 0 | on | off | off | off | on | a |
| MONO(L+R) | 1 | 1 | 1 | 1 | on | off | on | on | off | b |
| L MPX | 1 | 0 | 1 | 1 | on | off | off | on | off | b |
| R MPX | 0 | 1 | 1 | 1 | off | off | on | on | off | b |
| Vocal cut (L-R) | 1 | 1 | 0 | 1 | on | off | off | off | on | b |

(4)-4 SETTING CODE OF REC MUTE

| Rec output | M0 |
|--------------|----|
| Rec Mute OFF | 0 |
| Rec Mute ON | 1 |

Note) Do not input other data than the above.

(There is not an operation guarantee except the specification data code.)

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

(2)-1 (Port output mode)
 Open collector output

| DATA | O0 | O1 | O2 | O3 | O6 | O7 |
|------|------------------------------|--------|--------|--------|--------|--------|
| Pin | Port 1 | Port 2 | Port 3 | Port 4 | Port 7 | Port 8 |
| 0 | Electric current suction OFF | | | | | |
| 1 | Electric current suction ON | | | | | |

(2)-2 (Try state port output mode)

| Ss0 | Ss1 | Port5 | St0 | St1 | Port6 |
|-----|-----|-------|-----|-----|-------|
| 0 | 0 | Low | 0 | 0 | Low |
| 1 | 0 | open | 1 | 0 | open |
| 0 | 1 | open | 0 | 1 | open |
| 1 | 1 | Hi | 1 | 1 | Hi |

(4)-2 BBE CONTROL

| BBE setting | BE0 | BE1 |
|-------------------|-----|-----|
| Bypass(BBE-->OFF) | 0 | 0 |
| BBE1 (High:+3dB) | 0 | 1 |
| BBE2 (High:+7dB) | 1 | 0 |
| BBE3 (High:+11dB) | 1 | 1 |

(4)-3 SETTING CODE OF DYNAMIC BASS
 BOOST

| Gain | TB0 | TB1 | TB2 | sw9,10 |
|-------------|-----|-----|-----|--------|
| Output Mute | 0 | 0 | 0 | b |
| T-Bass OFF | 1 | 0 | 0 | a |
| 5dB | 0 | 1 | 0 | |
| 10dB | 1 | 1 | 0 | |
| 15dB | 0 | 0 | 1 | |
| 20dB | 1 | 0 | 1 | |
| Prohibition | 0 | 1 | 1 | |
| Prohibition | 1 | 1 | 1 | ↓ |

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

(3)-1 SETTING CODE OF MASTER VOLUME ATTENUATION

| ATT | Lch | L0 | L1 | L2 | L3 | L4 |
|-------|-----|----|----|----|----|----|
| | Rch | R0 | R1 | R2 | R3 | R4 |
| -0dB | | 0 | 0 | 0 | 0 | 0 |
| -2dB | | 1 | 0 | 0 | 0 | 0 |
| -4dB | | 0 | 1 | 0 | 0 | 0 |
| -6dB | | 1 | 1 | 0 | 0 | 0 |
| -8dB | | 0 | 0 | 1 | 0 | 0 |
| -10dB | | 1 | 0 | 1 | 0 | 0 |
| -12dB | | 0 | 1 | 1 | 0 | 0 |
| -14dB | | 1 | 1 | 1 | 0 | 0 |
| -16dB | | 0 | 0 | 0 | 1 | 0 |
| -18dB | | 1 | 0 | 0 | 1 | 0 |
| -20dB | | 0 | 1 | 0 | 1 | 0 |
| -22dB | | 1 | 1 | 0 | 1 | 0 |
| -24dB | | 0 | 0 | 1 | 1 | 0 |
| -26dB | | 1 | 0 | 1 | 1 | 0 |
| -28dB | | 0 | 1 | 1 | 1 | 0 |
| -30dB | | 1 | 1 | 1 | 1 | 0 |
| -32dB | | 0 | 0 | 0 | 0 | 1 |
| -34dB | | 1 | 0 | 0 | 0 | 1 |
| -36dB | | 0 | 1 | 0 | 0 | 1 |
| -40dB | | 1 | 1 | 0 | 0 | 1 |
| -44dB | | 0 | 0 | 1 | 0 | 1 |
| -48dB | | 1 | 0 | 1 | 0 | 1 |
| -52dB | | 0 | 1 | 1 | 0 | 1 |
| -56dB | | 1 | 1 | 1 | 0 | 1 |
| -60dB | | 0 | 0 | 0 | 1 | 1 |
| -64dB | | 1 | 0 | 0 | 1 | 1 |
| -68dB | | 0 | 1 | 0 | 1 | 1 |
| -72dB | | 1 | 1 | 0 | 1 | 1 |
| -76dB | | 0 | 0 | 1 | 1 | 1 |
| -80dB | | 1 | 0 | 1 | 1 | 1 |
| -84dB | | 0 | 1 | 1 | 1 | 1 |
| - | | 1 | 1 | 1 | 1 | 1 |

| ATT | L5 | L6 |
|------|----|----|
| | R5 | R6 |
| -0dB | 0 | 0 |
| -1dB | 1 | 0 |
| -2dB | 0 | 1 |
| -3dB | 1 | 1 |

The combination of L5,L6(R5,R6) works when setting equal to or less than -36dB. At equal to or more than -34dB, only L5,R5 are effective.

Note)The volume ATT quantity is a goal value.

By the equal to or less than -70dB setting,it sometimes shifts little.

(4)-1 SETTING CODE OF VOL AMP. GAIN SWITCHING

| VOL Amp. gain | VL0 | VL1 | VL2 |
|---------------|-----|-----|-----|
| | VR0 | VR1 | VR2 |
| 16dB | 0 | 0 | 0 |
| 15dB | 0 | 0 | 1 |
| 14dB | 0 | 1 | 0 |
| 13dB | 0 | 1 | 1 |
| 12dB | 1 | 0 | 0 |
| 11dB | 1 | 0 | 1 |
| 10dB | 1 | 1 | 0 |
| 9dB | 1 | 1 | 1 |

PRELIMINARY
 Notice ; This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

(1)-3 Tone control setting code

| BASS | | | | GAIN | TREBLE | | | |
|------|----|----|----|-------|--------|----|----|----|
| B0 | B1 | B2 | B3 | | T0 | T1 | T2 | T3 |
| 1 | 0 | 1 | 1 | +10dB | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | +8dB | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 | +6dB | 1 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | +4dB | 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | +2dB | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0dB | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0dB | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | -2dB | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | -4dB | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | -6dB | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | -8dB | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | -10dB | 1 | 0 | 1 | 0 |

(Note) Above-mentioned Gain is setting code name. Depending on the fixed number of putting outside, fixed gain doesn't sometimes output.

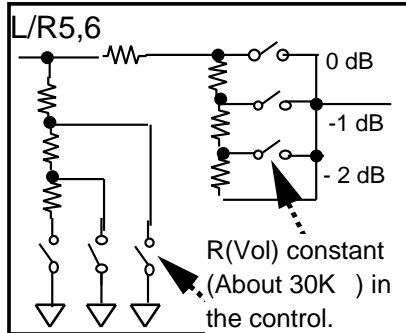
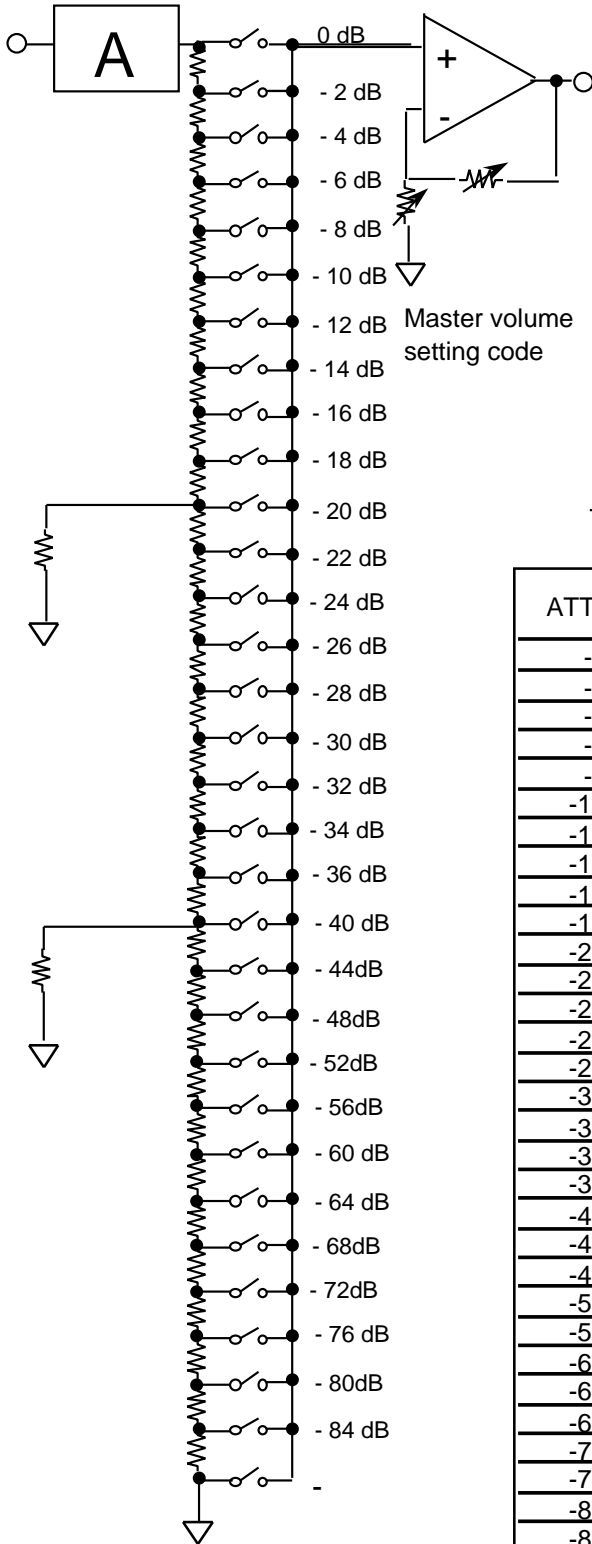
PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

MASTER VOLUME CIRCUIT



A part:3dB ATT

| L/R5 | L/R6 | ATT |
|------|------|--------|
| 0 | 0 | -0.0dB |
| 1 | 0 | -1.0dB |
| 0 | 1 | -2.0dB |
| 1 | 1 | -3.0dB |

| VOL Amp. gain | VI 0 | VI 1 | VI 2 |
|---------------|------|------|------|
| | VR0 | VR1 | VR2 |
| 16dB | 0 | 0 | 0 |
| 15dB | 0 | 0 | 1 |
| 14dB | 0 | 1 | 0 |
| 13dB | 0 | 1 | 1 |
| 12dB | 1 | 0 | 0 |
| 11dB | 1 | 0 | 1 |
| 10dB | 1 | 1 | 0 |
| 9dB | 1 | 1 | 1 |

| ATT | Lch | L0 | L1 | L2 | L3 | L4 |
|-------|-----|----|----|----|----|----|
| | Rch | R0 | R1 | R2 | R3 | R4 |
| -0db | 0 | 0 | 0 | 0 | 0 | 0 |
| -2dB | 1 | 0 | 0 | 0 | 0 | 0 |
| -4dB | 0 | 1 | 0 | 0 | 0 | 0 |
| -6dB | 1 | 1 | 0 | 0 | 0 | 0 |
| -8dB | 0 | 0 | 1 | 0 | 0 | 0 |
| -10dB | 1 | 0 | 1 | 0 | 0 | 0 |
| -12dB | 0 | 1 | 1 | 0 | 0 | 0 |
| -14dB | 1 | 1 | 1 | 0 | 0 | 0 |
| -16dB | 0 | 0 | 0 | 1 | 0 | 0 |
| -18dB | 1 | 0 | 0 | 1 | 0 | 0 |
| -20dB | 0 | 1 | 0 | 1 | 0 | 0 |
| -22dB | 1 | 1 | 0 | 1 | 0 | 0 |
| -24dB | 0 | 0 | 1 | 1 | 0 | 0 |
| -26dB | 1 | 0 | 1 | 1 | 0 | 0 |
| -28dB | 0 | 1 | 1 | 1 | 0 | 0 |
| -30dB | 1 | 1 | 1 | 1 | 0 | 0 |
| -32dB | 0 | 0 | 0 | 0 | 1 | 0 |
| -34dB | 1 | 0 | 0 | 0 | 1 | 0 |
| -36dB | 0 | 1 | 0 | 0 | 1 | 0 |
| -40dB | 1 | 1 | 0 | 0 | 1 | 0 |
| -44dB | 0 | 0 | 1 | 0 | 1 | 0 |
| -48dB | 1 | 0 | 1 | 0 | 1 | 0 |
| -52dB | 0 | 1 | 1 | 0 | 1 | 0 |
| -56dB | 1 | 1 | 1 | 0 | 1 | 0 |
| -60dB | 0 | 0 | 0 | 1 | 1 | 0 |
| -64dB | 1 | 0 | 0 | 1 | 1 | 0 |
| -68dB | 0 | 1 | 0 | 1 | 1 | 0 |
| -72dB | 1 | 1 | 0 | 1 | 1 | 0 |
| -76dB | 0 | 0 | 1 | 1 | 1 | 0 |
| -80dB | 1 | 0 | 1 | 1 | 1 | 0 |
| -84dB | 0 | 1 | 1 | 1 | 1 | 0 |
| - | 1 | 1 | 1 | 1 | 1 | 1 |

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

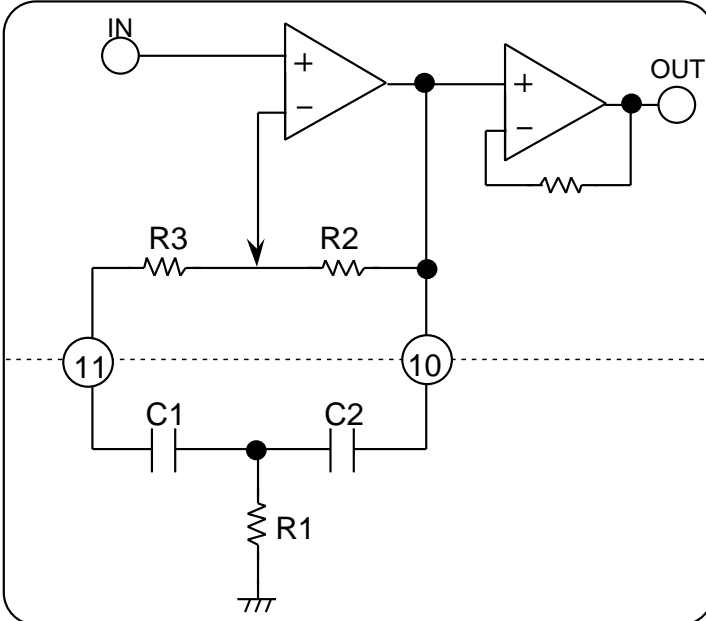
M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

FUNCTION DESCRIPTION

(1) TONE CONTROLLER (BASS) EQUIVALENT CIRCUIT

1-1. Bass Equivalent circuit (Boost setting)



Resonance Frequency f_0

$$f_0 = \frac{1}{2 \sqrt{R1 \cdot (R2+R3) \cdot C1 \cdot C2}} \text{ [Hz]}$$

Resonance park Q

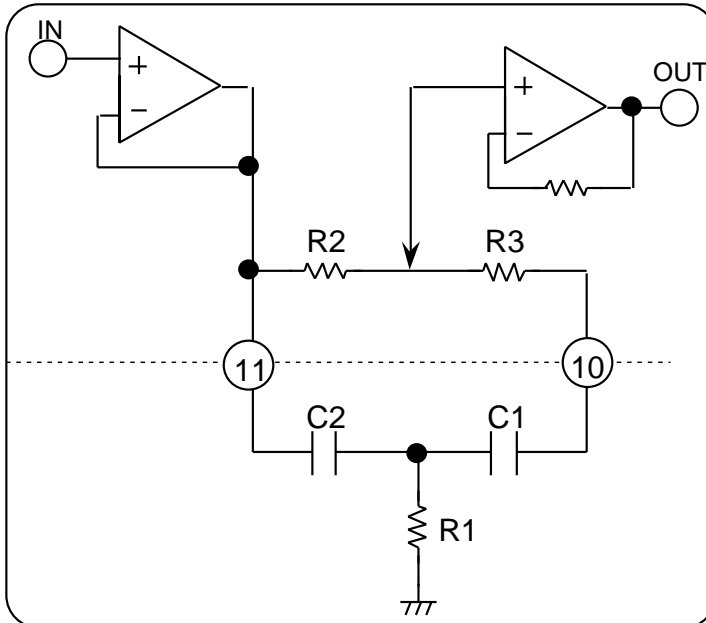
$$Q = \frac{1}{C1+C2} \sqrt{\frac{C1 \cdot C2 \cdot R2}{R1}}$$

Boost quantity G_v

Then $C1=C2$

$$G_v = 20 \log \left(\frac{\frac{R2+R3}{R1} + 2}{\frac{R3}{R1} + 2} \right) \text{ [dB]}$$

1-2. Bass Equivalent circuit (Cut setting)



Resonance Frequency f_0

$$f_0 = \frac{1}{2 \sqrt{R1 \cdot (R2+R3) \cdot C1 \cdot C2}} \text{ [Hz]}$$

Resonance park Q

$$Q = \frac{1}{C1+C2} \sqrt{\frac{C1 \cdot C2 \cdot R2}{R1}}$$

Boost quantity G_v

Then $C1=C2$

$$G_v = 20 \log \left(\frac{\frac{R3}{R1} + 2}{\frac{R2+R3}{R1} + 2} \right) \text{ [dB]}$$

(Ex.) Bass band setting [f=100Hz]

$R1=6.8K$, $C1=C2=0.068\mu F$

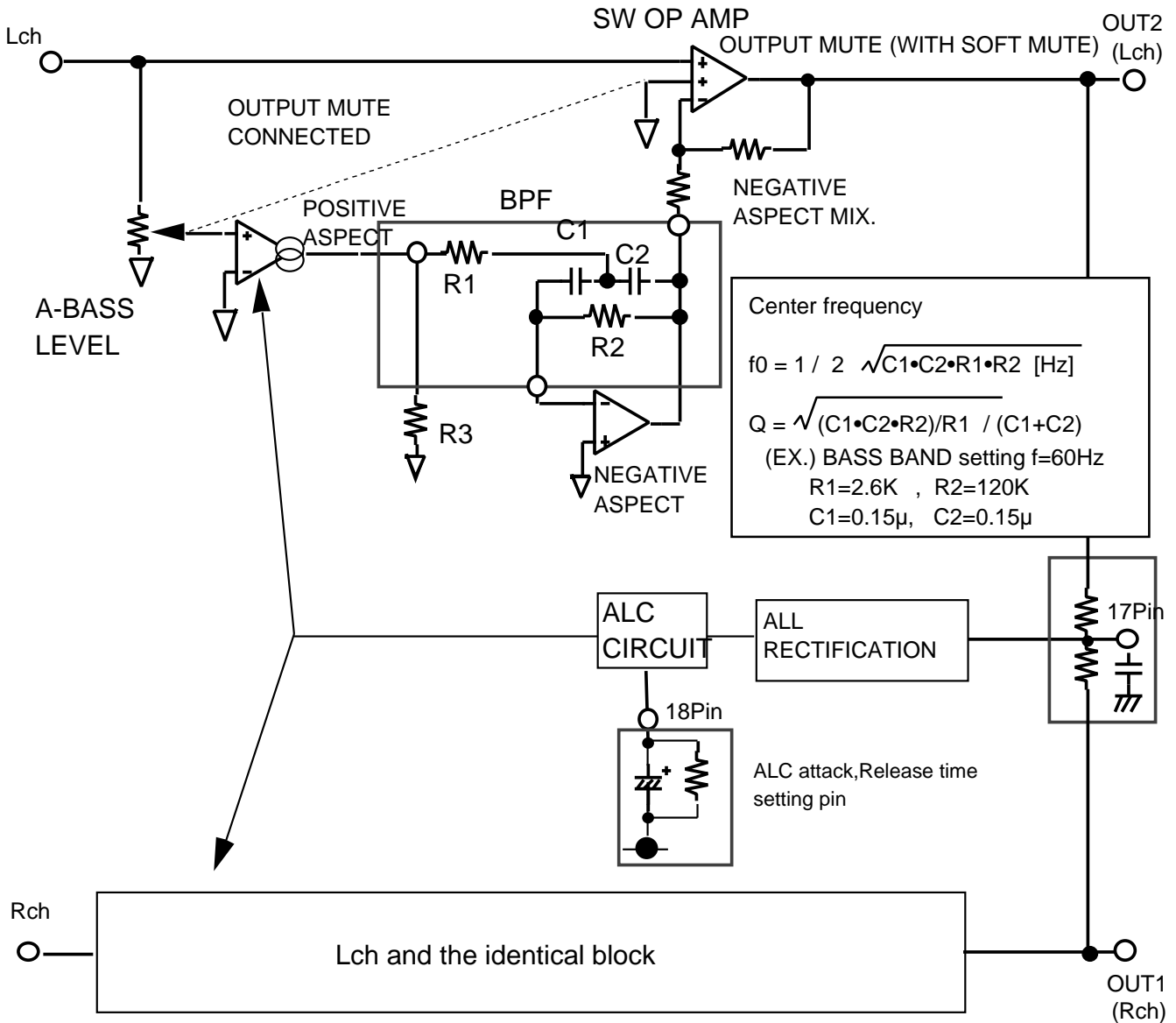
PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

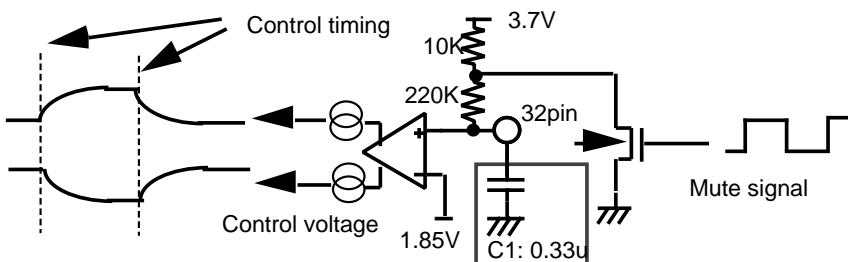
M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

BLOCK FUNCTION OF DYNAMIC BASS BOOST PART



<SOFT MUTE CIRCUIT EXPLANATION>



The fixed number is fixed in putting condenser C1 out of 32Pin at shock prevention operation, It became about 0.1sec at 0.33uF setting,

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

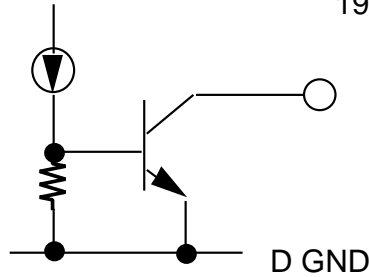
M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

OUTPUT PORT CIRCUIT

1) Output port circuit

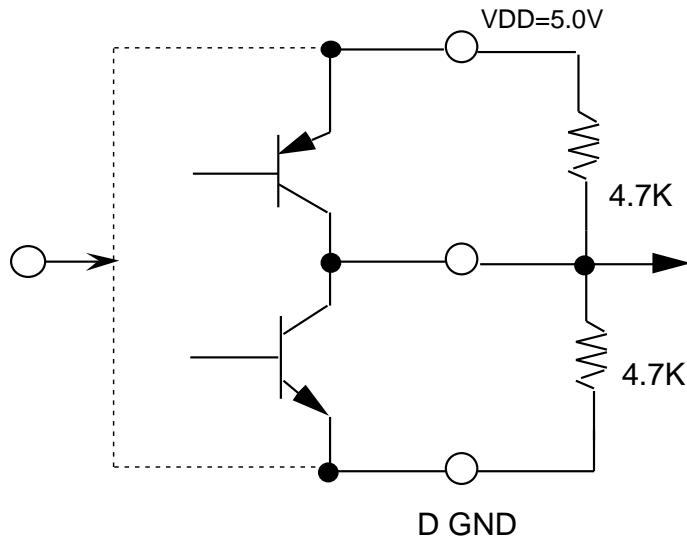
19,20,24,25,26,27Pin $I_o=10mA, V_c=0.2V(\text{typ})$



With output pin voltage being the inside of the range of D GND~9V and using.

2) Output port:Try state

21,22Pin



| | 3 value output example |
|-----|------------------------|
| Hi | 4.80V |
| Mid | 2.50V |
| Low | 0.25V |

With output pin voltage being the inside of the range of D GND~D VDD and using.

PRELIMINARY
Notice ; This is not a final specification.
some parametric limits are subject to
change.

MITSUBISHI SOUND PROCESSORS

M62499FP

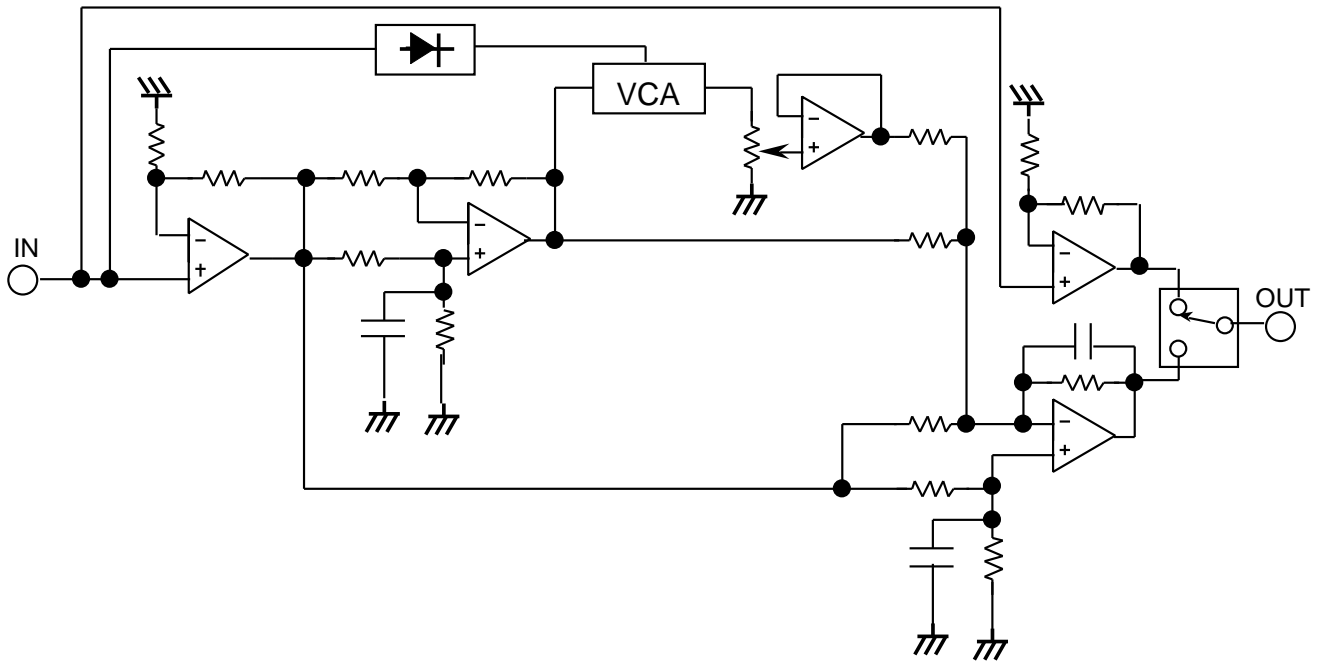
SOUND CONTROLLER WITH T-BASS and BBE

BBE BLOCK

This system brings a replay sound close to the field sound boundlessly.

Low boost (f=20HZ)=+3dB fixation

High boost (f=10KHZ)=+11dB/+7dB/+3dB possible variably



PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

ELECTRICAL CHARACTERISTICS

(Ta=25°C, VCC=+3.5V, VEE=-3.5V, VDD=5.0V, f=1kHz, unless otherwise noted.

GAIN Cont.=8dB, VOL=0dB, TONE Cont.=0dB(Flat), T-Bass=0dB(OFF), BBE=0dB(OFF))

(1) Power supply characteristics

| Parameter | Symbol | Test condition | Limits | | | Units |
|---|--------|--------------------|--------|-----|-----|-------|
| | | | Min | Typ | Max | |
| Circuit current of analog positive supply voltage | ICC | No signal setting. | — | 35 | — | mA |
| Circuit current of negative positive supply voltage | IEE | No signal setting. | — | -35 | — | mA |
| Circuit current of digital supply voltage | IDD | No signal setting. | — | — | — | mA |

(2) Input/Output characteristics

| | Parameter | Symbol | Test condition | Limits | | | Units |
|----------------------------|---|--|---|--------|------|------|-------|
| | | | | Min | Typ | Max | |
| General characteristics | Input resistance | Rin | | — | 51 | — | K |
| | Cross talk between selector | ST | Vi=0.04Vrms, RL=10K, JIS-A Rg=10K, 1pin=GND | — | -80 | -60 | dB |
| | Input mute attenuation | MTATTIN | Vi=0.04Vrms, JIS-A, 1Pin=GND (Input Selector-->Mute) | — | -90 | -80 | dB |
| | Maximum output voltage | VOM | RL =10K, THD=1% | 2.0 | 2.4 | — | Vrms |
| | Pass gain | Gv | Vi=0.04Vrms, FLAT | 27 | 30 | 33 | dB |
| | Distortion factor | THD | BW=400~30kHz Vo=1.0Vrms, RL=10K | — | 0.02 | 0.05 | % |
| | | THD(REC) | BW=400~30kHz Vo=0.16Vrms, RL=10K | — | 0.01 | 0.05 | |
| | Output noise voltage (Remaining noise voltage) | Vno1 | Rg=0, JIS-A, VOL=0dB, Gain Cont.=0dB | — | 60 | 100 | μVrms |
| | | Vno2 | Rg=0, JIS-A, VOL= - dB, Gain Cont.=0dB | — | 12 | 24 | |
| | | VNO(REC) | Rg=0, JIS-A, Gain Cont.=0dB | — | 10 | 20 | |
| Crosstalk between channels | CT | Vo=0.04Vrms, RL=10K, JIS-A Rg=10K, 1pin=GND | — | -70 | -60 | dB | |
| Volume | Volume step resolution ability | VOLSTEP | | — | 1 | — | dB |
| | Profit deviation between volume | DVOL | Gv deviation of volume part | -1.5 | 0 | 1.5 | |

PRELIMINARY
 Notice : This is not a final specification.
 some parametric limits are subject to
 change.

MITSUBISHI SOUND PROCESSORS

M62499FP

SOUND CONTROLLER WITH T-BASS and BBE

| Parameter | | Symbol | Test condition | Limits | | | Units |
|----------------|--|--------------------|--|--------|-----|------|-------|
| | | | | Min | Typ | Max | |
| Gain control | GAIN CONTROL MAXIMUM PROFIT OF GAIN | GC _{MAX} | Vo=0.04Vrms , RL=10K ,JIS-A Rg=10K ,Gain:14dB~0dB | 12 | 14 | 16 | dB |
| | GAIN CONTROL RESOLUTION ABILITY | GC _{STEP} | | — | 2 | — | |
| | BALANCE BETWEEN CHANNEL | BALT | Logic control reference | -1.5 | 0 | +1.5 | |
| Tone control | TONE CONTROL VOLTAGE GAIN | T -10dB | Vo=0.04Vrms Treble (f=10KHz) Bass (f=150Hz) | -13 | -10 | -7 | dB |
| | | T +10dB | | -13 | -10 | -7 | |
| | TONE CONTROL RESOLUTION ABILITY | TC _{STEP} | Logic control reference | — | 2 | — | |
| | BALANCE BETWEEN CHANNEL | BALT | | -1.5 | 0 | +1.5 | |
| T-Bass control | T-BASS VOLTAGE GAIN MAX. LANGE | TBB20dB | f=60Hz,Vi=0.01Vrms Logic control reference | 15 | 20 | 25 | dB |
| | T-BASS RESOLUTION ABILITY | TB _{STEP} | | — | 5 | — | |
| | BALANCE BETWEEN CHANNEL | BALT | | -2.0 | 0 | +2.0 | |
| BBE | BYPASS GAIN | BBE-BP | f=20to20KHz,Vi=0.02Vrms | — | 0 | — | dB |
| | LOW BOOST (f=20Hz) | BBE-Lo | f=20Hz,Vi=0.02Vrms | — | 3 | — | |
| | HIGH BOOST (f=10kHz) | BBE-Hi | f=10KHz,Vi=0.02Vrms | — | 11 | — | |

(4) PORT OUTPUT (VDD=5.0V setting)

| Parameter | Symbol | Test condition | Limits | | | Units |
|--|--------|----------------------------|--------|-----|-----|-------|
| | | | Min | Typ | Max | |
| PORT OUTPUT REMAINDER VOLTAGE 19,20,24,25,26,27Pin (Open collector output) | VpOC | RL=450 (10mA) | — | 0.2 | 0.6 | V |
| THREE STATE HIGH OUTPUT | VpTH | R(GND):4.7K R(Vdd):5.6K | 4.5 | 4.8 | — | |
| THREE STATE LOW OUTPUT | VpTL | R(GND):4.7K R(Vdd):5.6K | — | 0.2 | 0.5 | |