

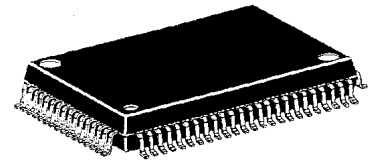
MITSUBISHI SOUND PROCESSORS
M62460FP
 “Super Single Chip” Surround Processor
 with Dolby Pro Logic Decoder

DESCRIPTION

The M62460FP is a “super” single chip LSI supporting the Dolby Pro Logic surround. This LSI contains all sorts of functions including delay circuit function. In addition, it has Digital Space Surround functions (Disco, Hall, Live mode etc.) and echo function for karaoke.
Note: Use of this LSI requires the license of Dolby Laboratories Licensing Corporation

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 This device available only to licensees of Dolby Lab.
 Licensing and application information may be obtained from Dolby Lab.

Outline

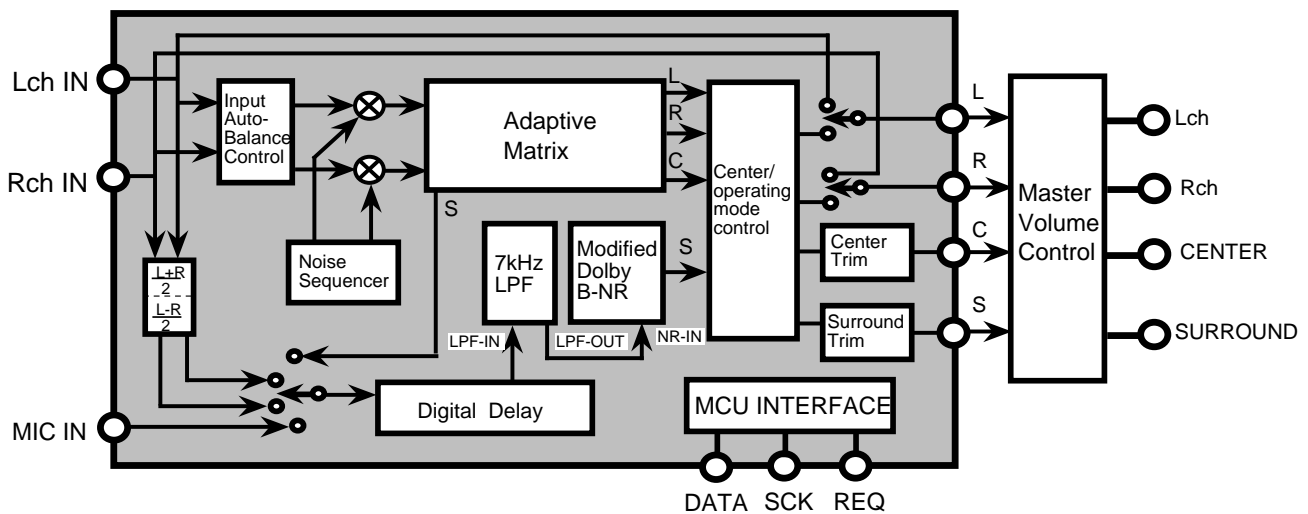


Outline 80P6N
 0.8mm pitch QFP
 (20.0mmX14.0mmX2.8mm)

Features (Mode)

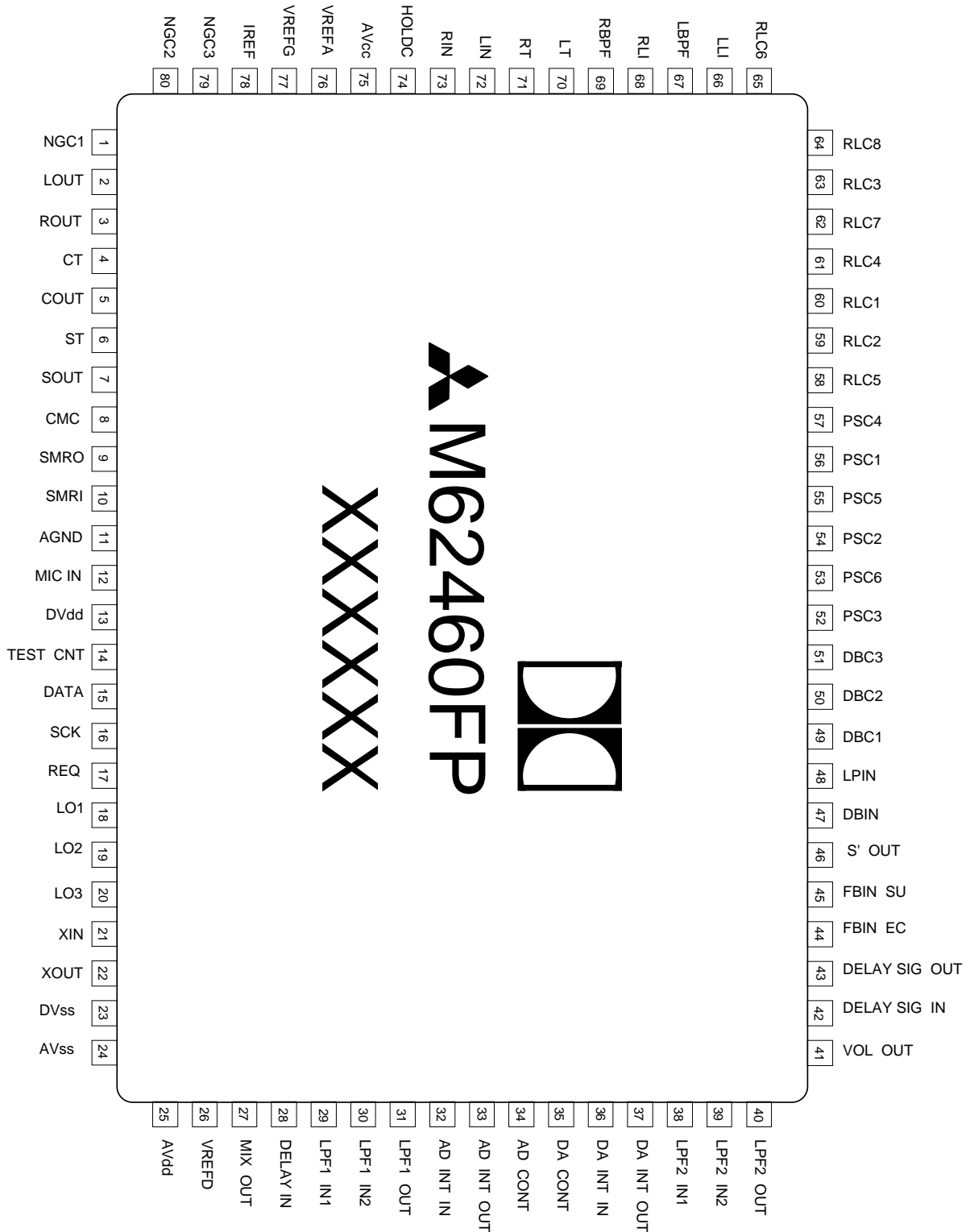
| | |
|-------------------------------|---|
| Dolby Pro Logic | Dolby Pro Logic Surround System which includes all of required functions. |
| Digital Space Surround | DISCO, Hall, LIVE mode and 5 delay time positions |
| Echo (KARAOKE) | Short echo: td=147.5msec, Long echo: td=196.6msec |
| BY-PASS | Input signal through mode |

System Configuration



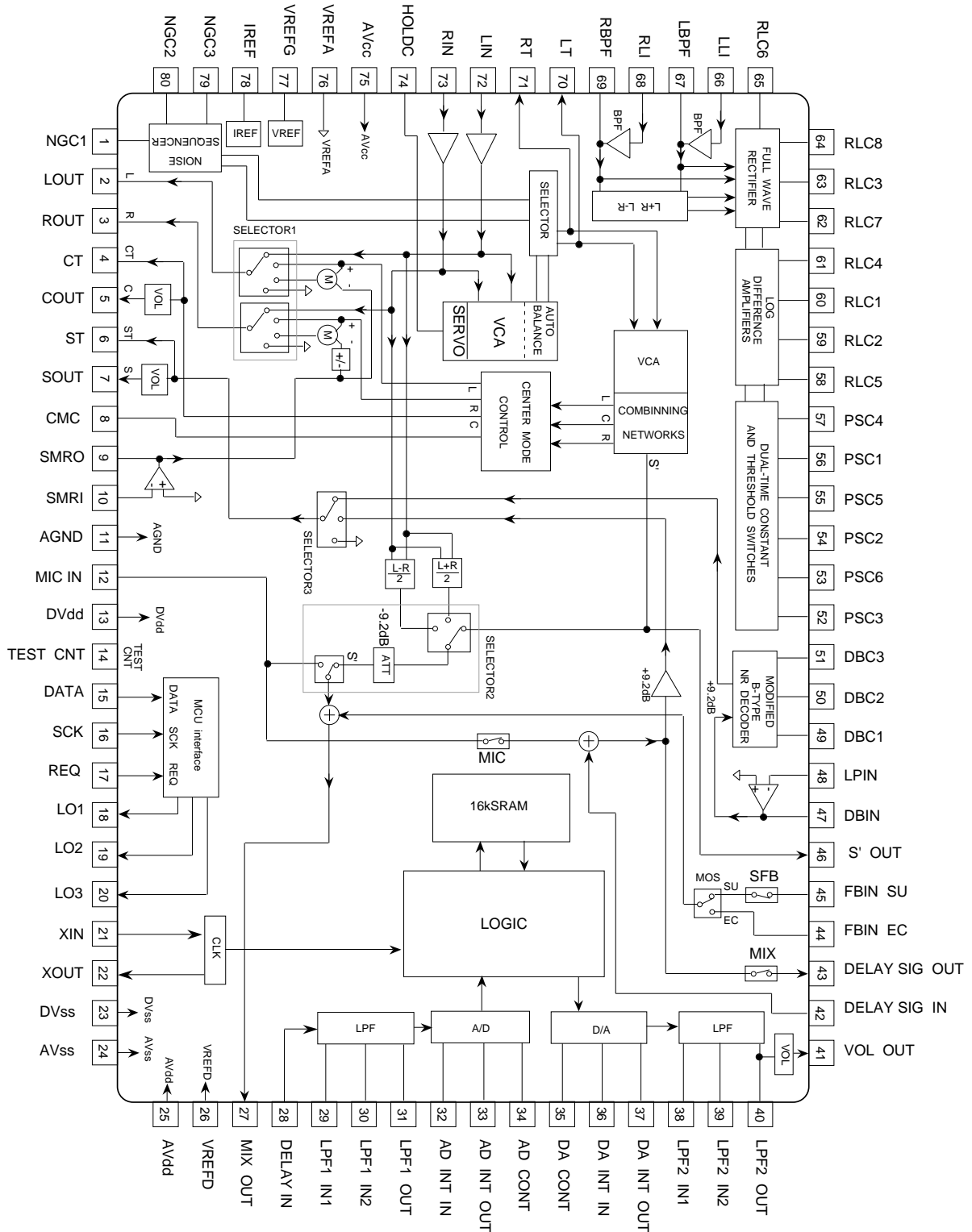
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PIN CONFIGURATION



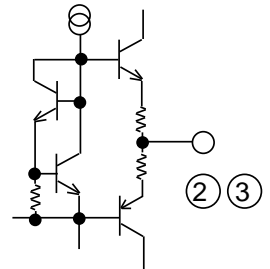
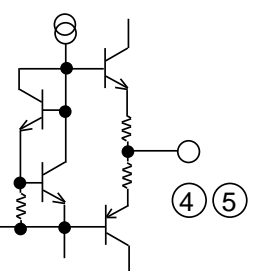
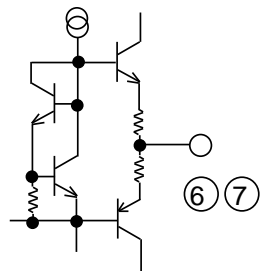
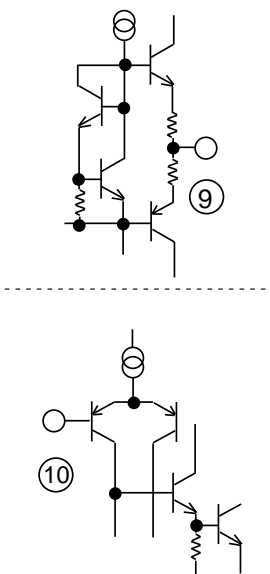
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BLOCK DIAGRAM

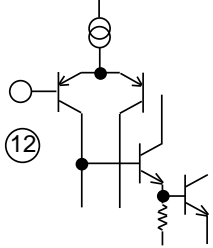
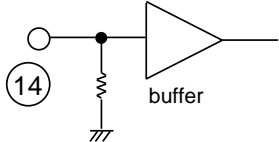
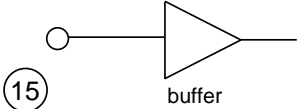
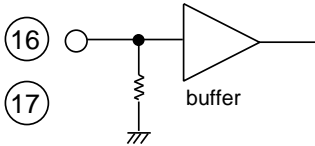
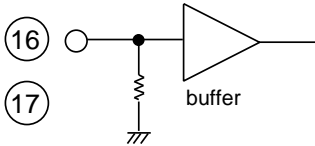
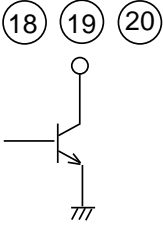
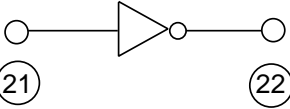
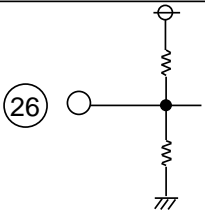


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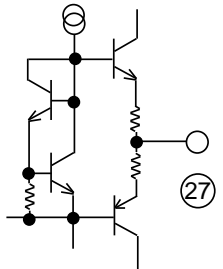
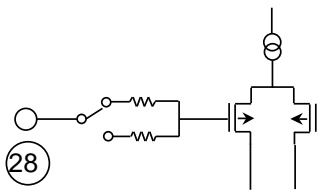
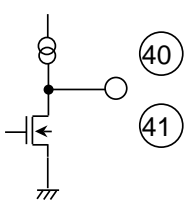
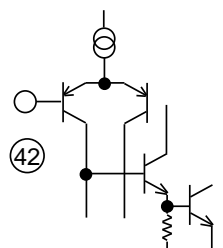
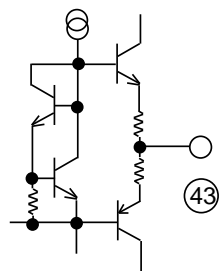
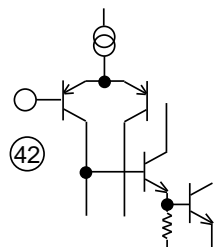
7. Discription of pin

| No. | Symbol | Funtion | Voltage | Discription of pin | Equivalent circuit |
|-----|--------|------------------|---------|---|---|
| ② | LOUT | Lch output | 4V | Direct output R-/L- channel when the operation mode is BY-PASS. When the mode is 4channel,they output Dolby prologic R-/L-channel signals. |  |
| ③ | ROUT | Rch output | | | |
| ④ | CT | Cch output | 4V | No output any signals when the operation mode is centermode is OFF or set to PHANTOM COUT is output from C.Trimmer. |  |
| ⑤ | COUT | Cch output | | | |
| ⑥ | ST | Sch output | 4V | This pin outputs surround signals.Output is selected from BNR out.Dout No output signal when the operation mode is 3 STEREO/MUTE. SOUT is output from S.Trimmer. |  |
| ⑦ | SOUT | Sch output | | | |
| ⑨ | SMRO | amplifier output | 4V | This is a amplifier to control mixed level of surround output with external resistance. |  |
| ⑩ | SMRI | amplifier input] | | | |

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| No. | Symbol | Funtion | Voltage | Discription of pin | Equivalent circuit |
|-----|----------|--------------------------|---------|---|---|
| ⑫ | MIC IN | MIC input | 4V | Microphone input with ECHO MODE |  |
| ⑭ | TEST CNT | TEST control | 0 | Fixed to GND |  |
| ⑮ | DATA | serial data "DATA" input | — | input via serial data from MCU. |  |
| ⑯ | SCK | serial data "SCK" input | 0 | |  |
| ⑰ | REQ | serial data "REQ" input | | |  |
| ⑱ | LO1 | port output | — | Open collector output pin(NPN Tr) |  |
| ⑲ | LO2 | | | | |
| ⑳ | LO3 | | | | |
| ㉑ | XIN | Osillator input | — | connect a 4 - MHz ceramic resonator |  |
| ㉒ | XOUT | Osillator output | | | |
| ㉔ | VREFD | reference output | 2.5V | 1/2 Vcc output. Connect a filter capacitor. |  |

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| No. | Symbol | Funtion | Voltage | Discription of pin | Equivalent circuit |
|-----|--------------|-----------------------------|---------|--|---|
| ②7 | MIX OUT | S',L+R,L-R and MIC output | 4V | Signal output precedent to delay generator that is S',L+R,L-R and MIC output |  |
| ②8 | DELAY IN | delay input | 2.5V | This is s delay input. Please input by AC cupping. |  |
| ④0 | LPF2 OUT | delay signal output | 2.5V | delay signal output |  |
| ④1 | VOL OUT | output of a delay volum | | This is output of a delay volum that possible to control +3dB~ | |
| ④2 | DELAYSIG IN | | 4V | Delay signal input to a mixing amplifier |  |
| ④3 | DELAYSIG OUT | input from mixing amplifier | 4V | Delay signal output from a mixing amplifier |  |
| ④4 | FBIN EC | Feedback signal input | 4V | Feedback signal input with ECHO MODE |  |
| ④5 | FBIN SU | | | Feedback signal input with SURROUND MODE | |

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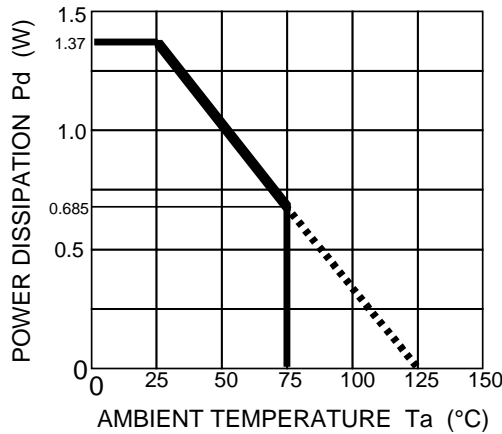
| No. | Symbol | Funtion | Voltage | Discription of pin | Equivalent circuit |
|-----|--------|-------------------------|---------|--|--------------------|
| ④⑥ | S'OUT | Sch output | 4V | Sorround channel output to delay generator. Always outputs signals,irrespective of the operation mode (2-/3-/4-channel) | |
| ④⑦ | LPIN | Negative input of LPF | 4V | This amplifier compnent 7KHz-LPF with external resistances and capaciter. LPF output is conected to input of Modifide BNR. | |
| ④⑧ | DBIN | LPF output | | | |
| ⑦② | LIN | Lch input | 4V | Input of Lch and Rch that is non-inverted input type. Please pul-up to VREF by external resistances for DC bias. | |
| ⑦③ | RIN | Rch input | | | |
| ⑦① | LT | Auto-balance Lch output | 4V | Auto-balance output. | |
| ⑦① | RT | Auto-balance Rch output | | | |

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ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Test conditions | Limits | Unit |
|------------------|-----------------------|---------------------|----------|-------|
| V _{CC} | Supply voltage | | 10.5 | V |
| V _{DD} | | | 6.5 | V |
| P _d | Power dissipation | standard board | 1.37 | W |
| K _θ | Thermal derating | T _a 25°C | 13.7 | mW/°C |
| T _{opr} | Operating temperature | | -20~+75 | °C |
| T _{stg} | Storage temperature | | -40~+125 | °C |

TERMAL DERATING



* Standard board

- board size 70mmX70mm
- board thickness 1.6mm
- board material glass epoxy
- copper pattern
 - copper thickness 18μm
 - copper size 0.25mm(width)
 - 30mm(length / lead)

RECOMMENDED OPERATING CONDITION

| Symbol | Parameter | Conditions | Ratings | | | Unit |
|-----------------|------------------------|------------|---------|-----|------|------|
| | | | Min | Typ | Max | |
| V _{CC} | Analog supply voltage | | 8.0 | 9.0 | 10.0 | V |
| V _{DD} | Digital supply voltage | | 4.5 | 5.0 | 5.5 | V |
| f _{ck} | OSC clock | | | 4 | | MHz |

M62460FP

“Super Single Chip” Surround Processor
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ELECTRICAL CHARACTERISTICS (DECODER)

V_{CC}=9V, V_{DD}=5V 0dB Reference=300mV_{rms}/1KHz at C-OUT unless otherwise noted.
(Cch Trimmer=0dB)

| Symbol | Parameter | Conditions | Limits | | | Unit |
|--|--|---|--------|-------|------|------|
| | | | Min | Typ | Max | |
| Overall | | | | | | |
| I _{CC} | Circuit Current | Quiescent | — | 25 | 50 | mA |
| I _{DD} | Circuit Current | Quiescent | — | 25 | 50 | mA |
| V _{ref} | Reference Voltage | Quiescent | 3.5 | 4.0 | 4.5 | V |
| Input Auto Balance | | | | | | |
| CPR | Capture Range | | — | ±5 | — | dB |
| CER | Error Correction | | — | ±4 | — | dB |
| Adaptive Matrix | | | | | | |
| VoL | Output Level Accuracy relative to C ch | L,R,S'ch out | -0.5 | 0 | 0.5 | dB |
| MR | Matrix Rejection relative | L,R,C,S'ch out | 25 | 40 | — | dB |
| HRAM | Headroom | L,R,C,S' out | 15 | 17 | — | dB |
| THDAM | Total Harmonic Distortion | L,R,C,S'ch out 4ch mode | — | 0.05 | 0.2 | % |
| | | L,Rch out 2ch mode | — | 0.002 | 0.05 | |
| SNAM | Signal to Noise Ratio | R _g =0 ,weighted CCIR/AMR 4ch mode | 75 | 80 | — | dB |
| | | L,Rch out 2ch mode | 95 | 100 | — | |
| Noise Sequencer (0dB Reference is input at NR-IN when adjust to 0dB (300mV_{rms}/100Hz) at S out. | | | | | | |
| V _{no} | Output Noise Level | | -15 | -12.5 | -10 | dB |
| V _{no} | Output Level Accuracy relative to C ch | L,R,S'ch out | -0.5 | 0 | 0.5 | dB |
| Modified B type Noise Reduction | | | | | | |
| VGNR | Voltage Gain | V _{in} =0dBd,f=100Hz | — | 9.2 | — | dB |
| DEC1 | Decode Responce 1 | V _{in} =0dBd,f=1.0kHz | -1.6 | -0.1 | 1.4 | dB |
| DEC2 | Decode Responce 2 | V _{in} =-15dBd,f=1.4kHz | -3.0 | -1.5 | 0 | |
| DEC3 | Decode Responce 3 | V _{in} =-20dBd,f=1.4kHz | -4.9 | -3.4 | -1.9 | |
| DEC4 | Decode Responce 4 | V _{in} =-40dBd,f=5.0kHz | -6.8 | -5.3 | -3.8 | |
| THDNR | Total Harmonic Distortion | V _{in} =0dBd,f=1kHz | — | 0.07 | 0.3 | % |
| HRNR | Headroom | THD=1% | 15 | 17 | — | dB |
| SNNR | Signal to Noise Ratio | R _g =0 ,weighted CCIR/AMR | 73 | 78 | — | dB |
| C,S ch Trimmer | | | | | | |
| ATT-12 | attenuation level:-12dB | Digital Input=-12 | -14 | -12 | -10 | dB |
| ATT _{max} | Maximum attenuation | Digital Input=-31 | -37 | -31 | -25 | dB |
| TS | Trimmer step | | 0.6 | 1.0 | 1.4 | dB |
| Surround (L+R,L-R) <MIXOUT> | | | | | | |
| THDSU | Total Harmonic Distortion | V _{in} =0dBd,f=1kHz | — | 0.05 | 0.2 | % |
| SNSU | Signal to Noise Ratio | R _g =0 ,weighted CCIR/AMR | 85 | 90 | — | dB |

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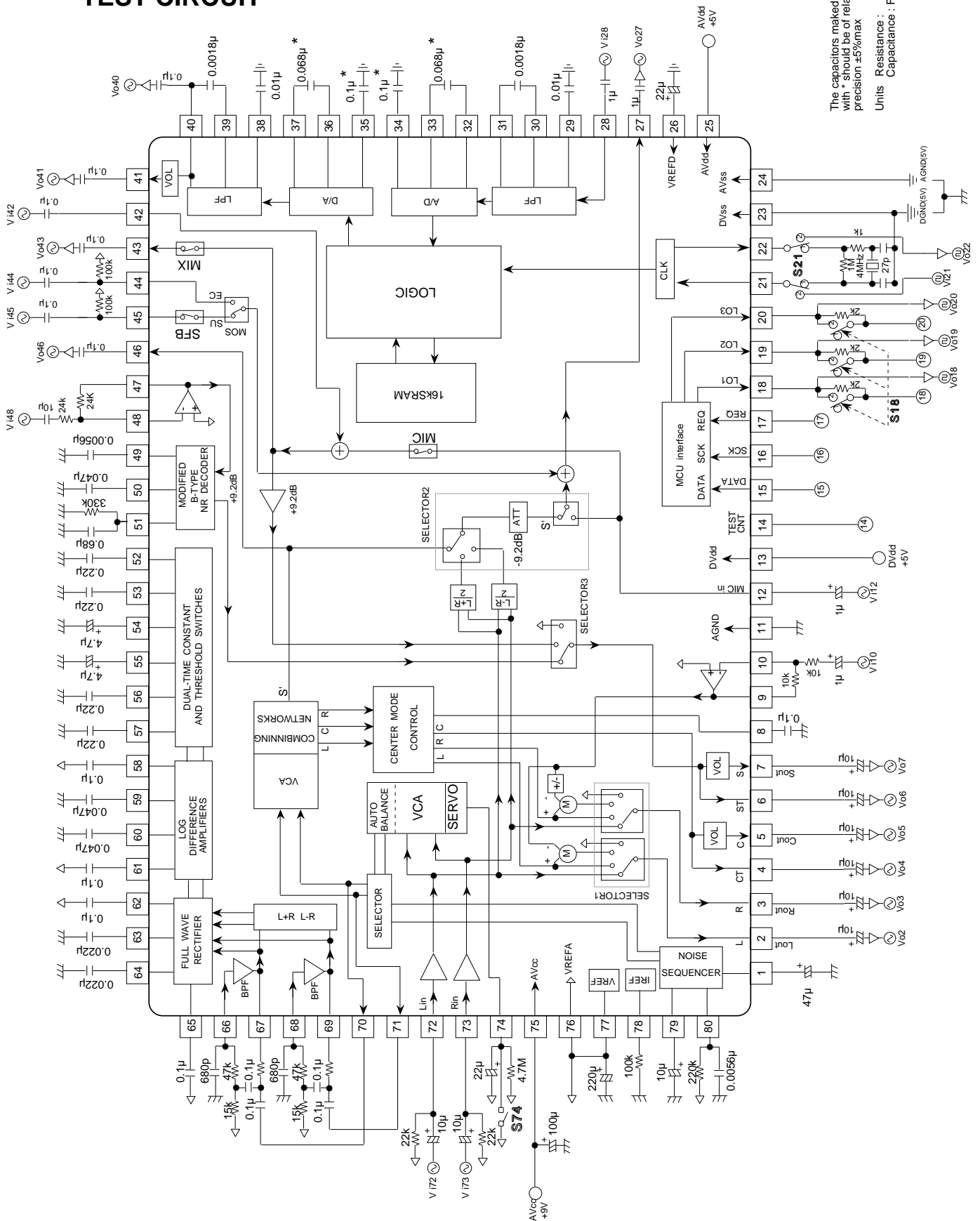
ELECTRICAL CHARACTERISTICS (DIGITAL DELAY)

($T_a=25^{\circ}\text{C}$, $V_{cc}=9\text{V}$, $V_{DD}=5\text{V}$, $V_{in}=200\text{mVrms}$, $f_{ck}=4\text{MHz}$ unless otherwise noted)

| Symbol | Parameter | Conditions | Limits | | | Unit | |
|------------------------|------------------------|--|------------|-------|-------|------|-----|
| | | | Min | Typ | Max | | |
| Digital Delay | | | | | | | |
| Td | Delay time | See Delay time control (14/20) for delay time setting. | 12.4 | 15.4 | 18.4 | ms | |
| | | | 17.0 | 20.0 | 23.0 | | |
| | | | 25.6 | 28.6 | 31.6 | | |
| | | | 38.0 | 41.0 | 44.0 | | |
| | | | 46.2 | 49.2 | 52.2 | | |
| | | | 137.5 | 147.5 | 157.5 | | |
| | | | 186.6 | 196.6 | 206.6 | | |
| Gv | Input-output gain | | -3.0 | 0 | 3.0 | dB | |
| THD | Output distortion | 30kHz LPF | Td=15.4ms | — | 0.3 | 0.6 | % |
| | | | Td=20.0ms | — | 0.3 | 0.6 | |
| | | | Td=28.6ms | — | 0.5 | 1.0 | |
| | | | Td=41.0ms | — | 0.6 | 1.2 | |
| | | | Td=49.2ms | — | 0.7 | 1.4 | |
| | | | Td=147.5ms | — | 1.5 | 3.0 | |
| | | | Td=196.6ms | — | 2.0 | 4.0 | |
| Vomax | Maximum output voltage | 30kHz LPF, THD=10% | 0.7 | 1.0 | — | Vrms | |
| No | Output noise voltage | Rg=620 Vi=0mVrms, IHF-A | Td=15.4ms | — | -92 | -80 | dBv |
| | | | Td=20.0ms | — | -92 | -80 | |
| | | | Td=28.6ms | — | -92 | -80 | |
| | | | Td=41.0ms | — | -90 | -75 | |
| | | | Td=49.2ms | — | -90 | -75 | |
| | | | Td=147.5ms | — | -82 | -67 | |
| | | | Td=196.6ms | — | -77 | -62 | |
| Delay Volume (VOL OUT) | | | | | | | |
| Gv | Input-output gain | Volume max | 0 | 3 | 6 | dB | |
| ATTmax | Maximum attenuation | Delay off mode, Volume min, IHF-A | — | -70 | -60 | dB | |

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TEST CIRCUIT

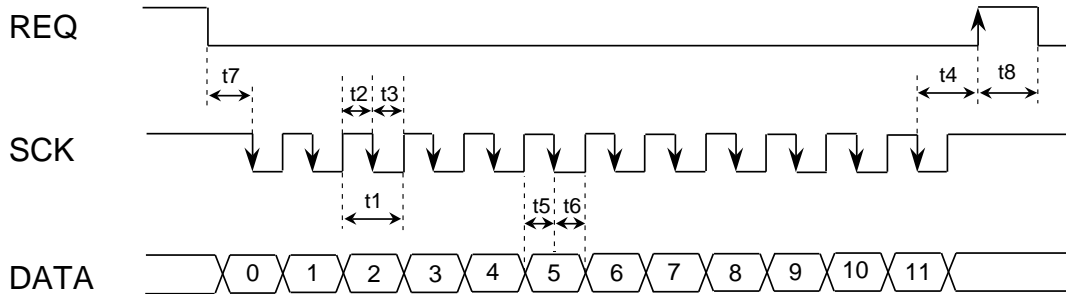


The capacitors marked with * should be of relative precision ±5% max
 Units Resistance : F
 Capacitance : F



DIGITAL CONTROL SPECIFICATIONS

(1) DATA TIMING



(note1) SCK is not accept when REQ is high
 (Note2)REQ must turn to high after SCK pulse turn to high.

| Symbol | Name | Min | Typ | Max | Unit |
|--------|---------------------|-----|-----|-----|------|
| t1 | SCK clock duration | 2 | — | — | μs |
| t2 | SCK “H” pulse width | 0.8 | — | — | μs |
| t3 | SCK “L” pulse width | 0.8 | — | — | μs |
| t4 | REQ hold time | 1.6 | — | — | μs |
| t5 | DATA setup time | 0.8 | — | — | μs |
| t6 | DATA hold time | 0.8 | — | — | μs |
| t7 | SCK setup time | 0.8 | — | — | μs |
| t8 | REQ “H” pulse width | 1.6 | — | — | μs |

(2) DATA FORMAT

| Serial Data Format | | | | | | | | | | | |
|--------------------|-----------|-----------|-------|-----------|--------------|-------------|-------|--------|-------|---------|--------|
| DATA | | | | | | | | | | ADDRESS | |
| BIT 0 | BIT 1 | BIT 2 | BIT 3 | BIT 4 | BIT 5 | BIT 6 | BIT 7 | BIT 8 | BIT 9 | BIT 10 | BIT 11 |
| ADD/SUB | NOISE SEQ | | | SELECTOR1 | | CENTER MODE | | No use | | 0 | 0 |
| SELECTOR2 | | SELECTOR3 | | MIX | LO1 | LO2 | LO3 | No use | | 0 | 1 |
| Cch. TRIMMER | | | | | Sch. TRIMMER | | | | | 1 | 0 |
| S1 | S2 | S3 | V1 | V2 | V3 | V4 | SFB | MOS | MIC | 1 | 1 |

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(3)DECODER

ADDRESS(BIT10,11)=0,0

| ADD/SUB | | NOISE SEQ | | | | | SELECTOR1 | | | CENTER MODE | | |
|---------|------|-----------|------|------|------|------|-----------|------|------|-------------|------|------|
| mode | BIT0 | mode | BIT1 | mode | BIT2 | BIT3 | mode | BIT4 | BIT5 | mode | BIT6 | BIT7 |
| ADD | 0 | OFF | 0 | L | 0 | 0 | PRO LOGIC | 0 | 0 | WIDE | 0 | 0 |
| SUB | 1 | ON | 1 | C | 0 | 1 | BY-PASS | 0 | 1 | NORMAL | 0 | 1 |
| | | | | R | 1 | 0 | OTHER SUR | 1 | 0 | PHANTOM | 1 | 0 |
| | | | | S | 1 | 1 | L/R MUTE | 1 | 1 | OFF | 1 | 1 |

ADDRESS(BIT10,11)=0,1

| SELECTOR2 | | | SELECTOR3 | | | DELAY MIX SWITCH | | |
|-----------|------|------|--------------|------|------|------------------|--------|------------|
| mode | BIT0 | BIT1 | mode | BIT2 | BIT3 | BIT4(MIX) | DMIXSW | Remarks |
| S' | 0 | 0 | BNR OUT | 0 | 0 | 0 | OFF | Mixing OFF |
| L+R | 0 | 1 | D OUT | 0 | 1 | 1 | ON | Mixing ON |
| L-R | 1 | 0 | 3STEREO/MUTE | 1 | 0 | | | |
| MIC | 1 | 1 | | 1 | 1 | | | |

| LO(LOGIC DATA OUT) Open Collector | | | |
|-----------------------------------|------------|------------|------------|
| mode | BIT5 (LO1) | BIT6 (LO2) | BIT7 (LO3) |
| OUTPUT DATA "L" | 0 | 0 | 0 |
| OUTPUT DATA "H" | 1 | 1 | 1 |

ADDRESS(BIT10,11)=1,0

| Cch. TRIMMER | | | | | | Sch. TRIMMER | | | | | |
|--------------|------|------|------|------|-------|--------------|------|------|------|------|-------|
| DATA | BIT0 | BIT1 | BIT2 | BIT3 | BIT4 | DATA | BIT5 | BIT6 | BIT7 | BIT8 | BIT9 |
| 0 | ±0dB | ±0dB | ±0dB | ±0dB | ±0dB | 0 | ±0dB | ±0dB | ±0dB | ±0dB | ±0dB |
| 1 | -1dB | -2dB | -4dB | -8dB | -16dB | 1 | -1dB | -2dB | -4dB | -8dB | -16dB |

Volume code

| C(S)ch. TRIMMER | | | | | | | | | | | |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| ATT(dB) | BIT0(5) | BIT1(6) | BIT2(7) | BIT3(8) | BIT4(9) | ATT(dB) | BIT0(5) | BIT1(6) | BIT2(7) | BIT3(8) | BIT4(9) |
| ±0 | 0 | 0 | 0 | 0 | 0 | -16 | 0 | 0 | 0 | 0 | 1 |
| -1 | 1 | 0 | 0 | 0 | 0 | -17 | 1 | 0 | 0 | 0 | 1 |
| -2 | 0 | 1 | 0 | 0 | 0 | -18 | 0 | 1 | 0 | 0 | 1 |
| -3 | 1 | 1 | 0 | 0 | 0 | -19 | 1 | 1 | 0 | 0 | 1 |
| -4 | 0 | 0 | 1 | 0 | 0 | -20 | 0 | 0 | 1 | 0 | 1 |
| -5 | 1 | 0 | 1 | 0 | 0 | -21 | 1 | 0 | 1 | 0 | 1 |
| -6 | 0 | 1 | 1 | 0 | 0 | -22 | 0 | 1 | 1 | 0 | 1 |
| -7 | 1 | 1 | 1 | 0 | 0 | -23 | 1 | 1 | 1 | 0 | 1 |
| -8 | 0 | 0 | 0 | 1 | 0 | -24 | 0 | 0 | 0 | 1 | 1 |
| -9 | 1 | 0 | 0 | 1 | 0 | -25 | 1 | 0 | 0 | 1 | 1 |
| -10 | 0 | 1 | 0 | 1 | 0 | -26 | 0 | 1 | 0 | 1 | 1 |
| -11 | 1 | 1 | 0 | 1 | 0 | -27 | 1 | 1 | 0 | 1 | 1 |
| -12 | 0 | 0 | 1 | 1 | 0 | -28 | 0 | 0 | 1 | 1 | 1 |
| -13 | 1 | 0 | 1 | 1 | 0 | -29 | 1 | 0 | 1 | 1 | 1 |
| -14 | 0 | 1 | 1 | 1 | 0 | -30 | 0 | 1 | 1 | 1 | 1 |
| -15 | 1 | 1 | 1 | 1 | 0 | -31 | 1 | 1 | 1 | 1 | 1 |

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(4)DELAY

ADDRESS(BIT10,11)=1,1

| DELAY TIME CONTROL | | | | |
|--------------------|--------------|--------------|------------------------------------|---------------------------------|
| BIT0 (S1) | BIT1 (S2) | BIT2 (S3) | DELAY TIME (Sampling frequency) | DelayLPF (Cut-off frequency) |
| 0 | 0 | 0 | 15.4 ms (1MHz) | 7.0kHz |
| 0 | 0 | 1 | 20.0 ms (667kHz) | |
| 0 | 1 | 0 | 28.6 ms (500kHz) | |
| 0 | 1 | 1 | 41.0 ms (400kHz) | |
| 1 | 0 | 0 | 49.2 ms (333kHz) | |
| 1 | 0 | 1 | 147.5 ms (111.1kHz) | 3.0kHz |
| 1 | 1 | 0 | 196.6 ms (83.3kHz) | |
| 1 | 1 | 1 | Delay off mode (clock off) | |

| VOLUME CONTROL | | | | |
|----------------|--------------|--------------|--------------|-----------------|
| BIT3 (V1) | BIT4 (V2) | BIT5 (V3) | BIT6 (V4) | VOL attenuation |
| 1 | 1 | 1 | 1 | +3dB |
| 1 | 1 | 1 | 0 | 0dB |
| 1 | 1 | 0 | 1 | -2dB |
| 1 | 1 | 0 | 0 | -3dB |
| 1 | 0 | 1 | 1 | -4dB |
| 1 | 0 | 1 | 0 | -6dB |
| 1 | 0 | 0 | 1 | -8dB |
| 1 | 0 | 0 | 0 | -9dB |
| 0 | 1 | 1 | 1 | -10dB |
| 0 | 1 | 1 | 0 | -12dB |
| 0 | 1 | 0 | 1 | -15dB |
| 0 | 1 | 0 | 0 | - |
| 0 | 0 | 1 | 1 | - |
| 0 | 0 | 1 | 0 | - |
| 0 | 0 | 0 | 1 | - |
| 0 | 0 | 0 | 0 | - |

| FEEDBACK SWITCH | | |
|-----------------|--------|--------------|
| BIT7(SFB) | SFB SW | Remarks |
| 0 | OFF | Feedback OFF |
| 1 | ON | Feedback ON |

(In surround mode only)

| MODE SELECTOR | |
|---------------|---------|
| BIT8(MOS) | MODESEL |
| 0 | SU line |
| 1 | EC line |

| MICROPHONE MIXING SWITCH | | |
|--------------------------|----------|----------------|
| BIT9(MIC) | MICMIXSW | Remarks |
| 0 | OFF | Mic mixing OFF |
| 1 | ON | Mic mixing ON |

(Note)Settings in power-on

When power is turned on, data is setting in under table by power on reset circuit.

| DECODER | | DELAY | |
|---------------|------------|--------------------------|----------|
| Mode | Settings | Mode | Settings |
| ADD/SUB | ADD | DELAY TIME CONTROL | 20.0ms |
| NOISE SEQ | OFF | VOLUME CONTROL | - |
| SELECTOR1 | PRO LOGIC | FEEDBACK SWITCH | OFF |
| CENTER MODE | WIDE | MODE SELECTOR | SU line |
| SELECTOR2 | S' | DELAY MIX SWITCH | OFF |
| SELECTOR3 | BNR OUT | MICROPHONE MIXING SWITCH | OFF |
| LO(LOGIC OUT) | "L" | | |
| Cch.TRIMMER | 0dB,ATT(-) | | |
| Sch.TRIMMER | 0dB,ATT(-) | | |

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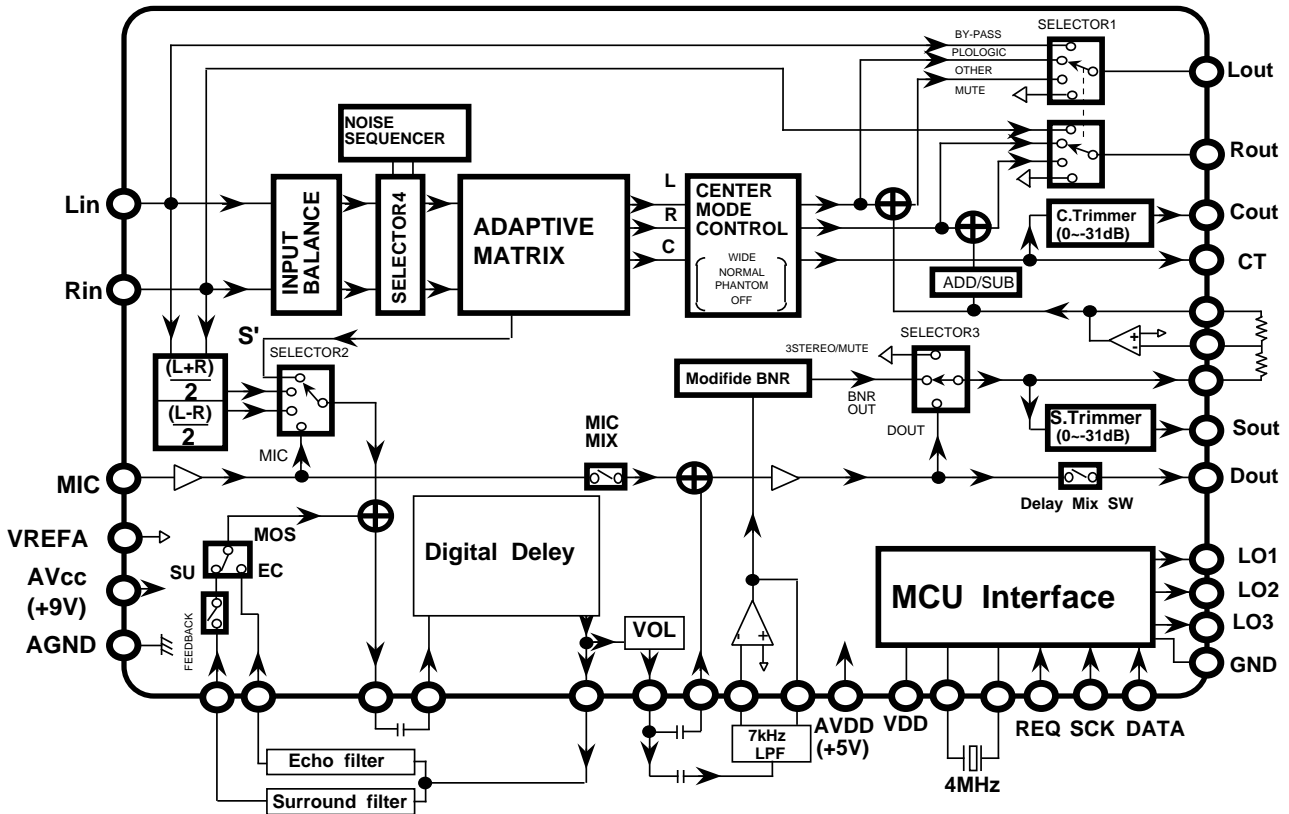
FUNCTION MODE (EXAMPLE)

| MODE | SUB-MODE | DIGITAL DELAY | VOLUME LEVEL | | | SWITCH CONDITION | | | | | | DIGITAL DELAY INPUT | NOTE | | | | |
|------------------------|------------|--|--|---------------------|---------------|--|------------|------------|-------------|---------|--------------|---------------------|------|------|----------|---|--|
| | | | Cch Trimmer | Sch Trimmer | Delay VOL | SELECTOR 1 | SELECTOR 2 | SELECTOR 3 | CENTER MODE | ADD/SUB | Delay MIX SW | | | MODE | FEEDBACK | MIC MIX | |
| DOLBY PRO LOGIC | WIDE | td=15.4ms, 20.0ms, 28.6ms | 0~-31dB 1dB/step | 0~-31dB 1dB/step | VOL OFF (0dB) | PLO LOGIC | S' | BNR OUT | WIDE | — | OFF | SU | OFF | OFF | S' | Feedback level can be changed by output port control(see block diagram) | |
| | NORMAL | | | | | | | | NORMAL | | | | | | | | |
| | PHANTOM | | | | | | | | 3STEREO | PHANTOM | | | | | | | |
| DIGITAL SPACE SURROUND | DISCO | td=20ms | *Pro Logic decoder function is alive. For example C/S trimmer can be available. | | | VOL ATT +3dB 0dB -2dB -3dB -4dB -6dB -8dB -9dB -10dB -12dB -15dB - | OTHER SUR | L-R | DOUT | PHANTOM | SUB | OFF | SU | ON | OFF | (L-R) 2 | |
| | Hall | td=49.2ms | | | | | | | | | | | | | | | |
| | LIVE | td=28.6ms | | | | | | | | | | | | | | | |
| | Option | 5step delay time (BW=7kHz,fck=4MHz) | | | | | | | | | | | | | | | |
| KARAOKE/ECHO | SHORT ECHO | td=147.5ms | BW=3KHZ | | | | BY PASS | MIC | ADD | ON | EC | OFF | ON | OFF | MIC | | |
| | LONG ECHO | td=196.6ms | | | | | | | | | | | | | | | |
| BY-PASS | BY-PASS | td=20.0ms | -31dB | | | | BY PASS | MIC | ADD | OFF | SU | OFF | OFF | OFF | S' | | |

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14.FUNCTION

Block Diagram



| Block name | Function |
|--------------------------------|---|
| INPUT BALANCE | Correction of a level error between the input Lch and Rch for optimum decoder performance |
| NOISE SEQUENCER | A noise sequencer circuit for adjustment of output level |
| ADAPTIVE MATRIX | Determine the direction and relative magnitude of encoded soundfield. |
| CENTER MODE CONTROL | Select 4 - center mode position (WIDE,NORMAL,PHANTOM,OFF) |
| C.Trimmer S.Trimmer | This is the level adjustment volume of Cch and Sch. (0~ -30 dB : 1dB/step) |

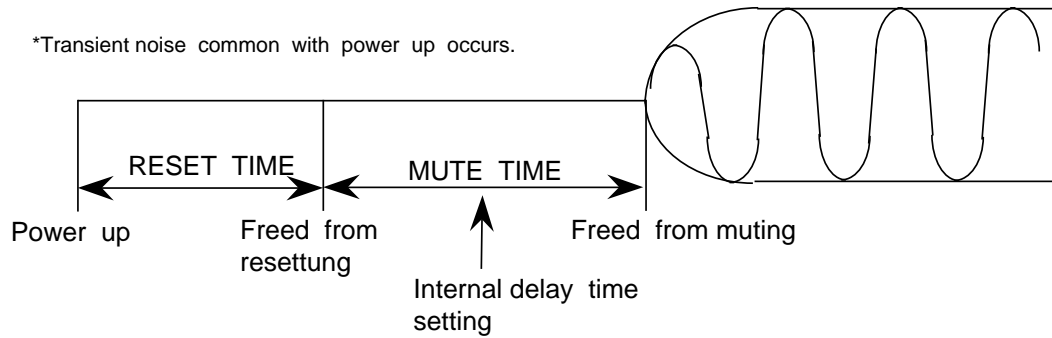
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| Block name | Function |
|----------------------|--|
| Modifide BNR | This block restores the signal to its original spectrum while reducing noise and certain crosstalk signals in a final stage of the surround chain. |
| ADD/SUB | Select a positive phase signal or a negative phase signal with DIGITAL SPACE SURROUND MODE. |
| SELECTOR1 | This is a selective switch to select the output signal of Lout and Rout from BY-PASS,PRO LOGIC,OTHER SUR and MUTE . |
| SELECTOR2 | This is a selective switch to select the output signal of Sout from S',L+R,L-R and MIC. |
| SELECTOR3 | This is a selective switch to select the output signal of Sout from BNRout,Dout and 3STEREO/MUTE. |
| SELECTOR4 | This is a switch to connect a noise sequencer output to ADAPTIVE MATRIX stage for level adjustment. |
| Digital Deley | Make 7 kinds of delay signal s.(15.4msec~196.6msec) The delay function and CLK signal stop at DELAY OFF MODE. This mode is for suppress bad effect of digital noize. |
| FEEDBACK | This is a switch to select feedback mode(ON/OFF) for SURROUND MODE . |
| MODE SEL(MOS) | This is a switch to select a feedback signal from surround signal and echo signal. |
| VOL | Control the ATT level of delay signal from 3dB to - (12-step) |
| MIC MIX | This is a switch to mix miclophone signal to a main signal (Lch,Rch) |
| Delay Mix SW | This is a switch to select output or not a mixed signal to DOUT pin. |

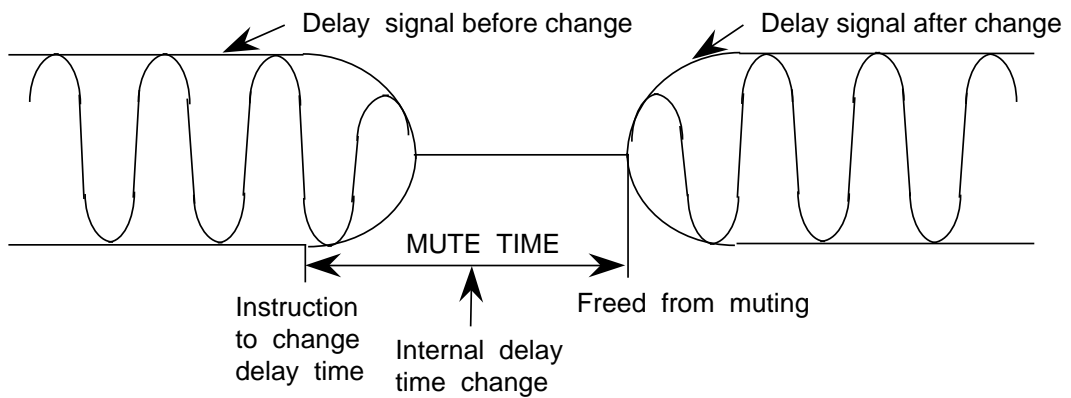
AUTO MUTE FUNCTION

The IC carries out auto mute function at the time of powering up, delay time setting change, and cancelling delay off mode, in order to suppress shock noise that the digital delay may produce.

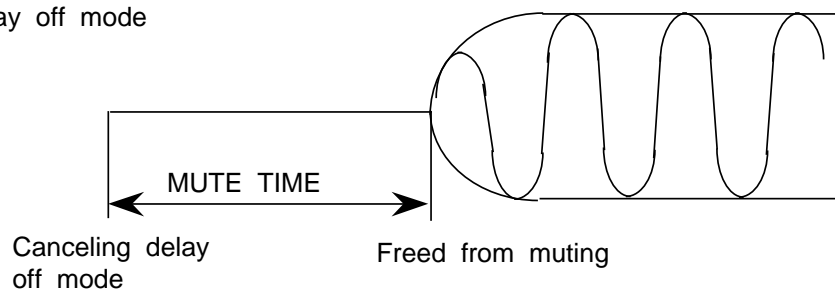
- At power-on



- At delay time setting change



- At canceling delay off mode

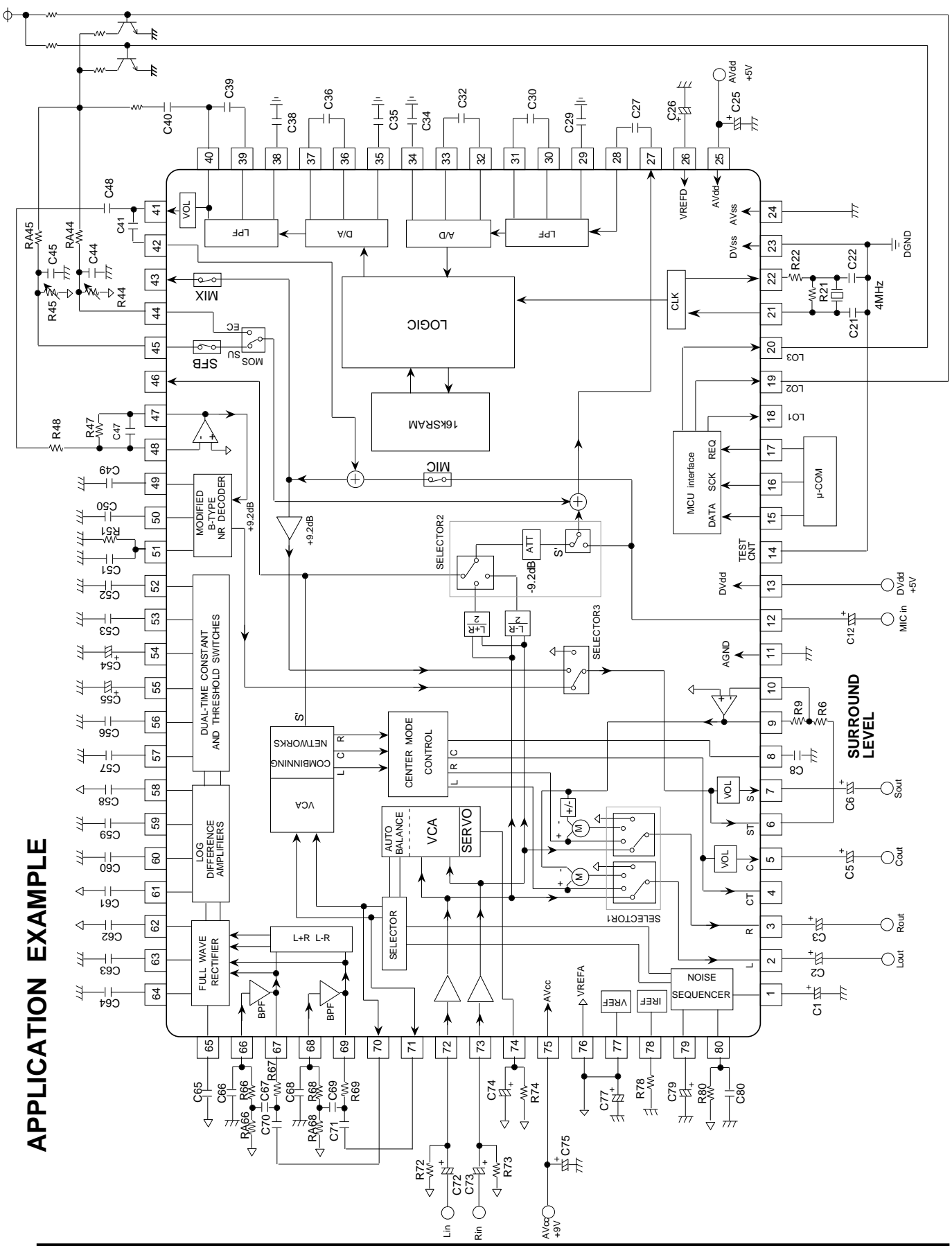


Mute time changes depending on set (or preset) delay time.

| DELAY TIME | MUTE TIME |
|------------------|-----------|
| 15.4~49.2 ms | 123 ms |
| 147.5 , 196.6 ms | 492 ms |

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APPLICATION EXAMPLE



(EXAMPLE) FEEDBACK LEVEL CONTROL

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OPTIONAL PARTS LIST

| Parts No. | Values | Unit | Tol. | Parts No. | Values | Unit | Tol. |
|-----------|--------|------|------|-----------|--------|------|------|
| C1 | 47 | μF | | C65 | 0.1 | μF | 20% |
| C2 | 10 | μF | | C66 | 680 | pF | 5% |
| C3 | 10 | μF | | C67 | 0.1 | μF | 5% |
| C5 | 10 | μF | | C68 | 680 | pF | 5% |
| C6 | 10 | μF | | C69 | 0.1 | μF | 5% |
| C8 | 0.1 | μF | 10% | C70 | 0.1 | μF | 5% |
| C12 | 1 | μF | | C71 | 0.1 | μF | 5% |
| C21 | 27 | pF | | C72 | 10 | μF | |
| C22 | 27 | pF | | C73 | 10 | μF | |
| C25 | 100 | μF | | C74 | 22 | μF | 20% |
| C26 | 22 | μF | | C75 | 100 | μF | |
| C27 | 1 | μF | 5% | C77 | 220 | μF | |
| C29 | 0.01 | μF | 5% | C79 | 10 | μF | 10% |
| C30 | 0.0018 | μF | 5% | C80 | 0.0056 | μF | 5% |
| C32 | 0.068 | μF | 5% | | | | |
| C34 | 0.1 | μF | 5% | | | | |
| C35 | 0.1 | μF | 5% | R6 | 10 | K | |
| C36 | 0.068 | μF | 5% | R9 | 20 | K | |
| C38 | 0.01 | μF | 5% | R21 | 1 | M | |
| C39 | 0.0018 | μF | 5% | R22 | 1 | K | |
| C40 | 0.1 | μF | | RA44 | 51 | K | |
| C41 | 0.1 | μF | | RA45 | 51 | K | |
| C44 | 1200 | pF | | R44 | Vol | | |
| C45 | 470 | pF | | R45 | Vol | | |
| C47 | 820 | pF | 10% | R47 | 24 | K | 5% |
| C48 | 0.1 | μF | | R48 | 24 | K | 5% |
| C49 | 0.0056 | μF | 5% | R51 | 330 | K | 10% |
| C50 | 0.047 | μF | 5% | R66 | 47 | K | 5% |
| C51 | 0.68 | μF | 10% | RA66 | 15 | K | 5% |
| C52 | 0.22 | μF | 10% | R67 | 7.5 | K | 5% |
| C53 | 0.22 | μF | 10% | R68 | 47 | K | 5% |
| C54 | 4.7 | μF | 20% | RA68 | 15 | K | 5% |
| C55 | 4.7 | μF | 20% | R69 | 7.5 | K | 5% |
| C56 | 0.22 | μF | 10% | R72 | 22 | K | |
| C57 | 0.22 | μF | 10% | R73 | 22 | K | |
| C58 | 0.1 | μF | 20% | R74 | 4.7 | M | 10% |
| C59 | 0.047 | μF | 5% | R78 | 100 | K | 1% |
| C60 | 0.047 | μF | 5% | R80 | 220 | K | 5% |
| C61 | 0.1 | μF | 20% | | | | |
| C62 | 0.1 | μF | 20% | | | | |
| C63 | 0.022 | μF | 5% | | | | |
| C64 | 0.022 | μF | 5% | | | | |