

YM64A X X

FM MUSIC Player (FM MUSIC)

■ Overview

The YM64Axx series is an automatic performance IC that uses an FM sound source.

This IC has tone color information and performance information as a built-in ROM, and has a maximum of 511 steps (4 songs can be selected) at the same time.

It has a function of 4 notes and 3 octaves in the range, and it automatically plays.

And, by rewriting this built-in ROM, you can get various FM music.

Low-cost automatic performance with built-in DAC, water oscillator circuit, etc. to realize a simple circuit configuration.

System development is possible.

■ Features

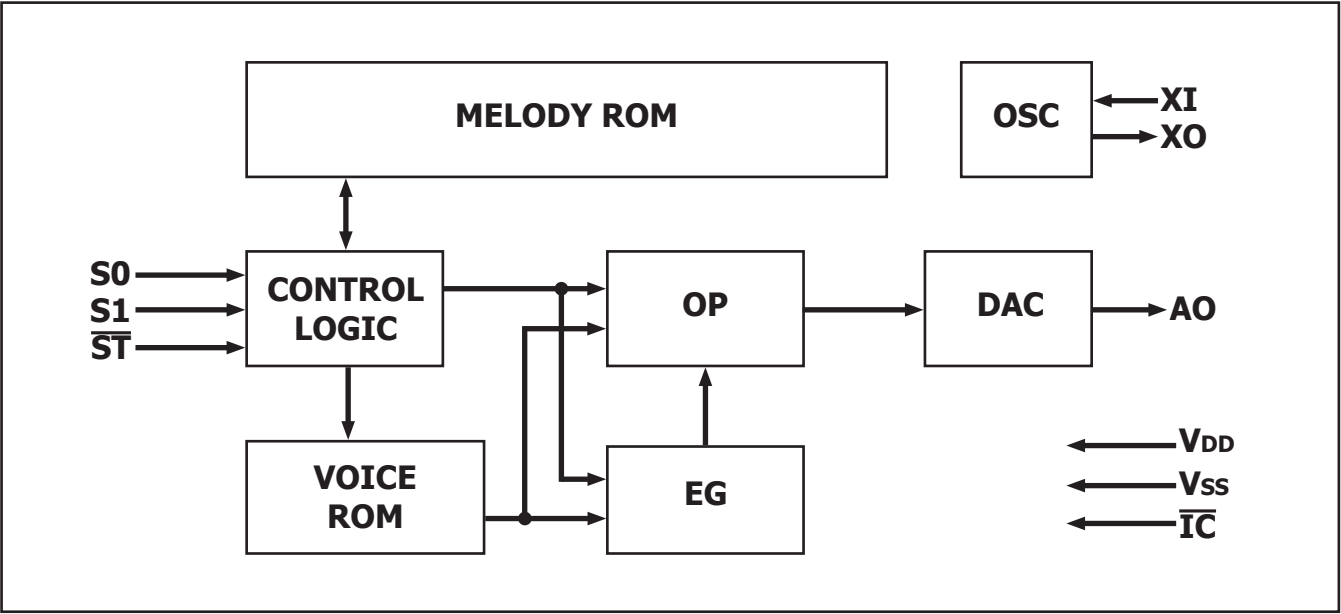
- Realistic sound by adopting FM sound source (2 operator mode).
- Polyphony: Maximum 4 sounds (4 independent tones are possible)
- Melody data: Select 4 songs (or 4 phrases) within a maximum of 511 steps.
- Tone data: Up to 4 tones can be set for each song (1 phrase).

Up to 16 tones preset for 4 songs.

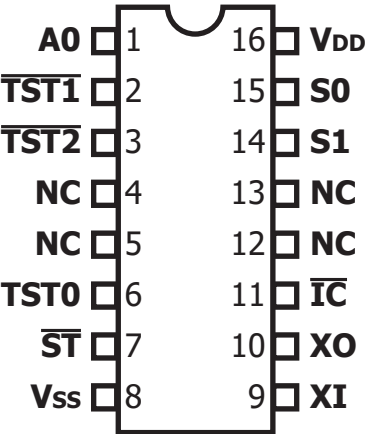
14 tones are available as maker tones.

- Performance mode: All songs or specified songs can be played repeatedly.
- It can be played repeatedly by the JUMP command.
- Built-in DAC and crystal oscillator circuit.
- CMOS low power consumption.
- + 5V single power supply operation.
- 16-pin plastic DIP (YM64Axx)

■ Block diagram



■ Pin layout



■ Pin function

| Pin # | Name | Function |
|-------|----------------------------|---------------------------------------|
| 1 | A0 | Analog output |
| 2 | $\overline{\text{TST1}}^*$ | Input terminal for internal check. |
| 3 | $\overline{\text{TST2}}^*$ | " |
| 4 | NC | NC |
| 5 | NC | NC |
| 6 | TST0 | Output terminal for internal check. |
| 7 | $\overline{\text{ST}}^*$ | Start terminal (playing at "L") |
| 8 | V _{SS} | GND |
| 9 | XI | Crystal oscillator input 0.447MHz |
| 10 | XO | Output |
| 11 | $\overline{\text{IC}}^*$ | Initializes the operation of this IC. |
| 12 | NC | NC |
| 13 | NC | NC |
| 14 | S1* | Song selection |
| 15 | S0* | |
| 16 | V _{DD} | +5V |

| | | | | |
|----|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| S1 | 0 | 1 | 0 | 1 |
| S0 | 0 | 0 | 1 | 1 |

* Built-in pullup

■ Machine

Sound source

| | |
|-------------------------|---|
| Sound generation method | : FM sound source 2 operator mode |
| Number of sounds | : Simultaneous playing 4 sounds / 4 tones |
| Frequency range | : 3 octaves (C3 ~ C5) |

Tone parameters

| | |
|---------------|------------------------------------|
| Multiples | : 1/2, 1, 2, 3, 4 steps |
| Total level | : 0 - 47.25dB 64 steps |
| Feedback | : Self-feedback modulation 8 steps |
| Vibrato | : ON / OFF |
| EG type | : ADSR |
| Attack rate | : 0ms ~ 38s 16 steps |
| Decay rate | : 4.5ms ~ 73s 16 steps |
| Sustain level | : 0 ~ -45dB 16 steps |
| Release rate | : 4.5ms ~ 73s 16 steps |
| Sustain | : ON / OFF |

Melody control

| | |
|-----------------------|--|
| Tempo range | : ♩ = 40 ~ 200 |
| Note length | : ♩ ♩ ♩ ♩ ♩ ♩ ♩ |
| Rest length | : ♩ ♩ ♩ ♩ ♩ ♩ ♩ |
| Tie, slur | : Possible |
| Number of songs | : 4 songs (1 song / 1 frame) |
| Total number of steps | : 511 (4 phrases), notes, rests, JUMPs |
| Repeat function | : Specified phrase or song can be repeated |

DAC : 9 bit

■ Electrical characteristics

1. Absolute maximum rating

| Item | Rated value | Unit |
|-----------------------|-------------|------|
| Input voltage | -0.3 ~ 7.0 | V |
| Operating temperature | 0 ~ 70 | °C |
| Storage temperature | -50 ~ 125 | °C |

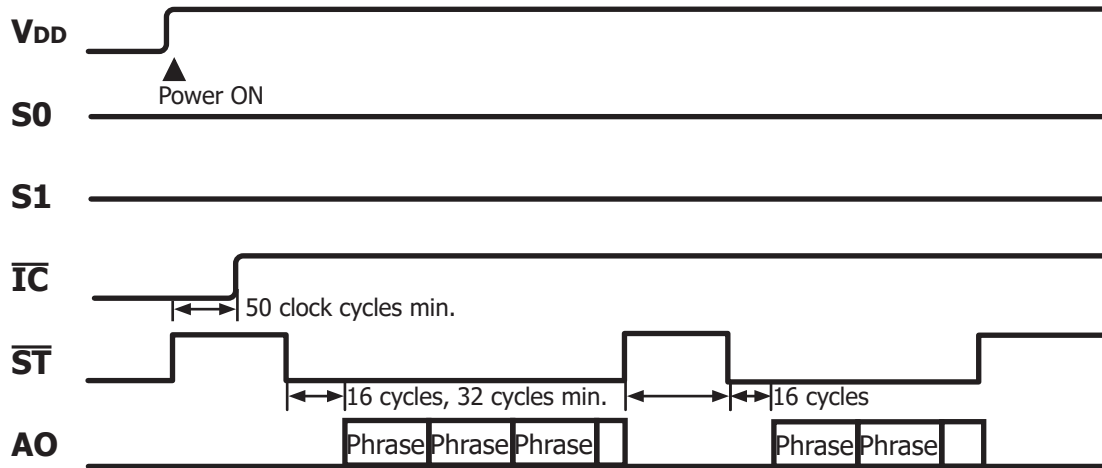
2. Recommended operating conditions

| Item | Name | Min. | Rec. | Max. | Unit |
|----------------------|-----------------|------|------|------|------|
| Power supply voltage | V _{CC} | 4.75 | 5.0 | 5.25 | V |
| | GND | 0 | 0 | 0 | V |

3. DC characteristics

| Item | Name | Conditions | Min. | Rec. | Max. | Unit |
|--------------------------------|-----------------|------------------------------------|------|------|-----------------|------|
| Low level input voltage | V _{IL} | V _I = 0 ~ 5V | -0.3 | | 0.8 | V |
| High level input voltage | V _{IH} | | 2.0 | | V _{DD} | V |
| Low level clock input voltage | V _{CL} | | -0.3 | | 0.8 | V |
| High level clock input voltage | V _{CH} | | 2.0 | | V _{DD} | V |
| Input leak electric current | I _{LI} | | -10 | | 10 | μA |
| Low level output voltage | V _{OL} | A _{OUT} maximum amplitude | | | 0.4 | V |
| High level output voltage | V _{OH} | | 4.0 | | | V |
| Analog output voltage | V _{OA} | | | | 2.5 | V |
| Electric current source max | I _{DD} | | | | 18 | mA |
| Input capacitance | C _I | | | | 10 | pF |
| Output capacitance | C _O | f = 1MHz | | | 10 | pF |

■ Timing chart



■ Reference circuit example

