SGS-THOMSON MICROELECTRONICS

# M112

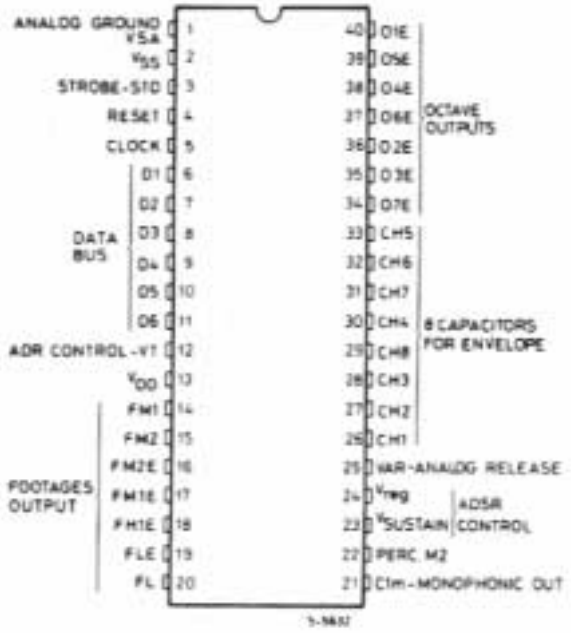
## POLYPHONIC SOUND GENERATOR

- 8μP PROGRAMMABLE SOUND GENERATOR CHANNELS
- 2MHz CLOCK
- INTERNAL TOS WITH POSSIBILITY OF EXTERNAL SYNCHRONIZATION FOR MULTICHIP USE
- 6 COMPLETE OCTAVE KEYBOARDS (72 KEYS)
- FIVE HOMOGENEOUS FOOTAGES μP PROGRAMMABLE BY ADDING A CONSTANT K TO THE KEYBOARD SITUATION
- SEVEN OCTAVE RELATED OUTPUTS ENVELOPED WITHOUT CONSTANT DC LEVEL (4 FOOTAGES)
- SEVEN FOOTAGE RELATED OUTPUTS WITH DIFFERENT CONFIGURATIONS FOR :
  - FOOTAGES WITH ENVELOPE (WITHOUT CONSTANT DC LEVEL) AND:
  - FOOTAGES WITHOUT ENVELOPE (WITH CONSTANT DC LEVEL) AND:
  - VARIOUS SOUND CHANNEL DIVISIONS (SEE OPTION I, II AND III)
- POSSIBILITY OF EXCLUDING ONE OR MORE SOUND CHANNELS FROM THE NON ENVELOPED FOOTAGE OUTPUTS
- ONE MONOPHONIC OUTPUT NON ENVELOPED RELATED TO SOUND CHANNEL 1 WITH THE POSSIBILITY OF CHOOSING THE FOOTAGE (TWO ADDITIONAL MONOPHONIC OUTPUTS ON OPTION II)
- 50% DUTY CYCLE ON ALL OUTPUTS
- DIGITAL DRAWBAR CONTROL (32 LEVELS)
- ATTACK - DECAY - SUSTAIN - RELEASE (ADSR) ENVELOPE DEFINITION WITH DIGITAL CONTROL ON A.D.R. AND ANALOG CONTROL ON S
- ADDITIONAL ANALOG CONTROL ON RELEASE
- ANALOG PERCUSSION INPUT TO ENVELOPE ONE FOOTAGE (M2) ON THE OCTAVE RELATED OUTPUTS
- SPECIAL EXTERNAL ENVELOPE POSSIBILITY USING HOLD AND/OR RELEASE ∞
  HOLD AND RELEASE ∞ ARE DEDICATED TO DECAY AND PEDAL EFFECT

DIP-40 Plastic

**ORDERING NUMBER:** M112B1

**PIN CONNECTION**




- N-CHANNEL TECHNOLOGY - 12V SINGLE SUPPLY.

The M112 is a polyphonic sound generator that combines eight generators with envelope shapers and drawbar circuitry in a single package.
This versatile circuit simplifies the design of a wide range of polyphonic instruments and, interfacing directly with a microcomputer chip, gives designers an unprecedented degree of flexibility. The M112 is realized on a single monolithic silicon chip using low threshold N-channel silicon gate MOS technology. It is available in a 40 lead plastic package.

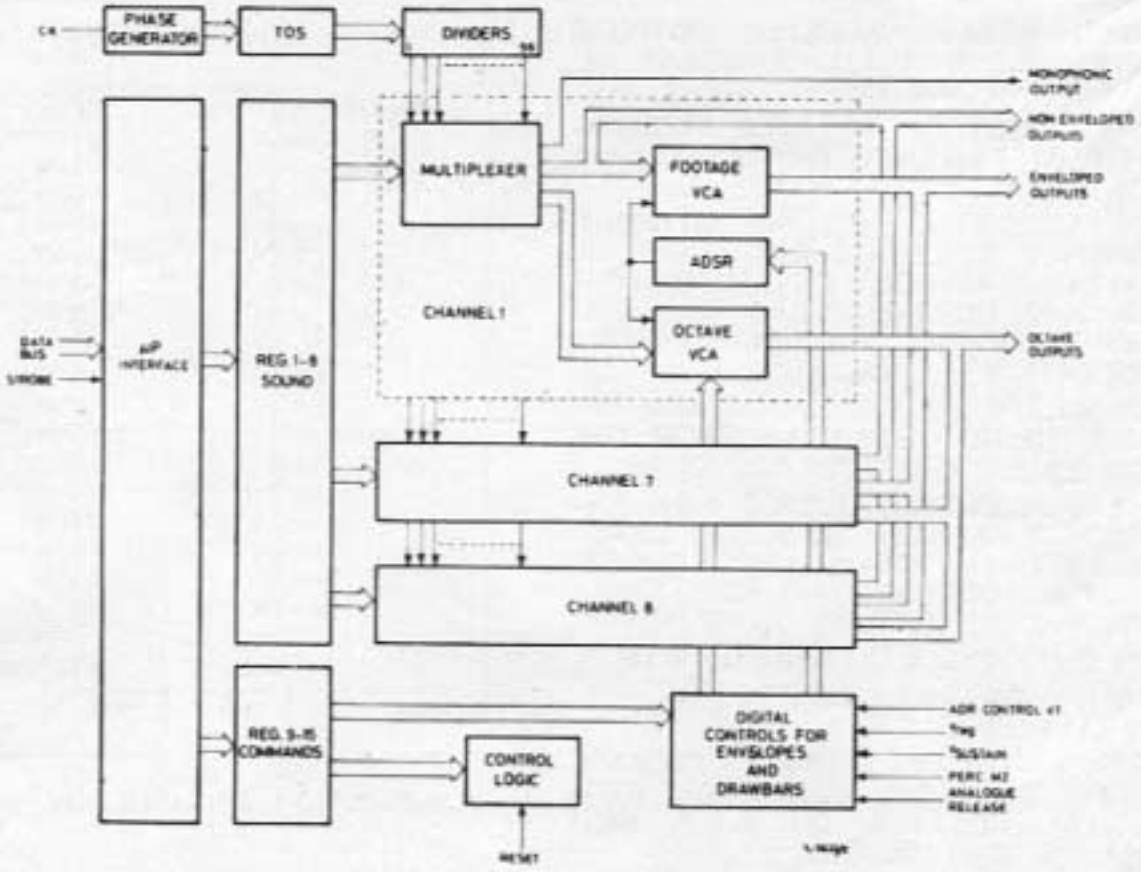
## ABSOLUTE MAXIMUM RATINGS

| | | |
|---|---|---|
| $V_{DD}$ * | Supply voltage | -0.3 to 20 V |
| $V_i$ | Input voltage | -0.3 to $V_{DD}$ |
| $V_{O\ (off)}$ | Off state output voltage | -0.3 to 20 V |
| $P_{tot}$ | Total power dissipation | 500 mW |
| $T_{stg}$ | Storage temperature | -65 to 150 °C |
| $T_{op}$ | Operating temperature | 0 to 70 °C |

Stresses above those listed under "Absolute Maximum Rarings" may cause permanent damage to the device. This i a stress rating only and functional operation of the device at these or any other conditions above those indicated i the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions fo extended periods may affect device reliability.

* All voltages are with respect to $V_{SS}$.

## BLOCK DIAGRAM




## RECOMMENDED OPERATING CONDITIONS

| Parameter | | Test conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $V_{DD}$ | Highest Supply Voltage | | 11.4 | 12 | 12.6 | V |

## STATIC ELECTRICAL CHARACTERISTICS

($V_{DD}$ = 12V ± 5%, $V_{SS}$ = 0V, $T_{amb}$ = 0 to 50°C unless otherwise specified)

| Parameter | | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **INPUT SIGNALS** | | | | | | |
| $V_{IH}$ | Input High Voltage | Pins 3, 6 to 11 | 2.4 | | $V_{DD}$ | V |
| | | All other inputs | 6 | | $V_{DD}$ | V |
| $V_{IL}$ | Input Low Voltage | Pins 3, 6 to 11 | -0.3 | | 0.8 | V |
| | | All other inputs | -0.3 | | 1 | V |
| VSA | Analog Ground | R < 10Ω C = 100µF | 0 | 0 | 1 | V |
| VT | ADR Control Time | R = 1K C = 1µF (note 3) | 0 | | $V_{DD}$ | V |
| VAR | Analog Release | R = 10K C = 0.1µ | 0 | | $V_{DD}$ | V |
| $V_{reg}$ | Control OFF Asymptote | R < 10Ω C = 100µ | 0 | 0 | 1 | V |
| $V_{SUST.}$ | Control Level Sustain | R = 1K C = 100µ (note 2) | 0 | | $V_{DD}$ | V |
| Perc. M2 | Control Level Percussion | R = 10K | 0 | | $V_{DD}$ | V |
| $I_{LI}$ | Input Leakage Current | $V_I = V_{DD}$ | | | 1 | µA |
| **OUTPUT SIGNALS (One key pressed)** | | | | | | |
| $I_{OL}$ | Output Low current | $V_{OL} = V_{DD/2-1V}$ (note 1) | 10 | 30 | 50 | µA |
| $I_{OH}$ | Output High Current | $V_{OH} = V_{DD/2+1V}$ (note 1) | 10 | 30 | 50 | µA |
| | | $V_{OH}$ = 10V $V_{CHN} = V_{DD}/2$(*) | 100 | 300 | 500 | µA |
| | | $V_{OH}$ = 10V $V_{CHN} = V_{DD}/2$ | 10 | 30 | 50 | µA |
| $I_{O(off)}$ | Off state output current | $V_O = V_{DD}$ (all output pins) | | | 1 | µA |
| | | $V_O = V_{SS}$ (pins 14-15-20 in 3rd state) | | | -1 | µA |
| **POWER DISSIPATION** | | | | | | |
| $I_{DD}$ | Supply current | $T_{amb}$ = 25°C | | | 50 | mA |

Notes: 1. Refers only to FL, FM1, FM2 (pins 20, 15, 14).
2. With a standard ADSR $V_{SUST} \leq 4.5V$
3. The best region is $V_T - V_{SUST} \geq 4V$
(*) Refers only to octave outputs with drawbar max.

## DYNAMIC ELECTRICAL CHARACTERISTICS

| Parameter | | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **CLOCK** | | | | | | |
| $f_i$ | Input Clock Frequency | | 250 | 2000.24 | 2.300 | kHz |
| $t_r$, $t_f$ | Rise and Fall Times 10% to 90% | | | | 30 | ns |
| $t_{on}$, $t_{off}$ | ON and OFF Times | | 150 | | | ns |
| **RESET** | | | | | | |
| $t_w$ | Pulse Width | Clock = 2 MHz | 10 | | | µs |
| $t_f$ | Fall Time | | | | 30 | ns |
| **OUTPUT SIGNALS** | | | | | | |
| $t_{on}$, $t_{off}$ | Outptu duty cycle | | | 50 | | % |