LU6000F0/LU6000F1

16-Bit Single-Chip Microcomputers (With Built-In Flash Memory)

DESCRIPTION

The LU6000F0/F1 are single-chip 16-bit micro-computers, flash memory versions of SM6000 series. LU6000F0 is packaged in 100-pin QFP and LU6000F1 in 100-pin LQFP (0.5 mm pin-pitch).

The LU6000F0/F1's internal flash memory is user programmable : it can be programmed using a PROM writer, through the serial interface (UART) (on-board writing), or by copying data stored in a PROM by using the copy board designed for this purpose.

LU6000F0/F1 are compatible with SM6000 series which contains ROM instead of flash memory. LU6000F0/F1 can be programmed to operate as ROM version. Once the program has been imported into the ROM, the user can run the program without having to verify it.

FEATURES

- Flash memory capacity : 126 976 x 8 bits
- RAM capacity : 3 584 x 8 bits
- External memory expansion function :
    On chip bus controller for external memory
    - Bus multiplexing/nonmultiplexing selection
    - Bus width selection
    - Auto wait control
- CPU :
    - General purpose registers : 16-bit x 16
    - 62 basic instructions (bit manipulation instructions suitable for controlling, bit transfer instructions, bit branch instructions, high speed multiplication and division instructions (16 bits x 16 bits, 16 bits ÷ 16 bits, 32 bits ÷ 16 bits))
    - 10 addressing modes
    - 16 M bytes of address space
    - An interrupt request starts a high performance automatic data transfer (DTS). Appropriate settings of interrupts and registers enable hardware automatic data transfer. Various functions can be operated successively and the resultant data can also successively be stored.

- System clock cycle :
    0.133 µs (MIN.) (V_{DD} = 4.5 to 5.5 V, at 30 MHz main clock cycle)
    0.2 µs (MIN.) (V_{DD} = 2.7 to 3.6 V, at 20 MHz main clock, single chip mode)
  Selectable system clocks divided by 2 up to 16 main clocks for low power operation.
- Built-in main clock oscillator for system clock
- Interrupts : Total 27, software interrupts
    - 24 maskable interrupts (external 4, internal 20)
    - 3 nonmaskable interrupts
    A nonmaskable interrupt, when used in conjunction with BST instruction, can trigger the software reset.
- Standby function : Halt mode/Stop mode
- I/O ports x 88/specific purpose function pin x 3 :
    - Input ports x 8 (also serve as A/D input)
    - I/O ports x 80 (also serve as function pins)
    - Specific purpose function pin x 3 (D/A output pin x 2, bus mode selection pin x 1)
- Timer : 16-bit multifunction timers x 6
    - 5-stage capture + 2-stage compare type x 1
    - 1-stage compare type x 2
    - 2-stage capture type (or capture + compare) x 2
    - 2-stage compare, PWM output type x 1
- Watchdog timer (overrun detect timer) : 8 bits x 1
- Serial interfaces :
    - Selectable universal asynchronous receiver transmitter (UART) / serial I/O interface (SIO) x 2
    - Serial I/O interface (SIO) x 1
- A/D converter :
    Resolution   10 bits
    Channel   8
    Auto start by triggering with timer output
- D/A converter : 8-bit x 2
- High precision PWM outputs : 14-bit x 2
- Real time outputs : 4-bit x 2

• Debug function :

 Program execusion breaks can be made on arbitrary program memory address.

• Supply voltages :

 4.5 to 5.5 V (main clock at 30 MHz)

 2.7 to 3.6 V (main clock at 20 MHz, single chip mode)

• Packages :

 100-pin LQFP (LQFP100-P-1414)(LU6000F1)
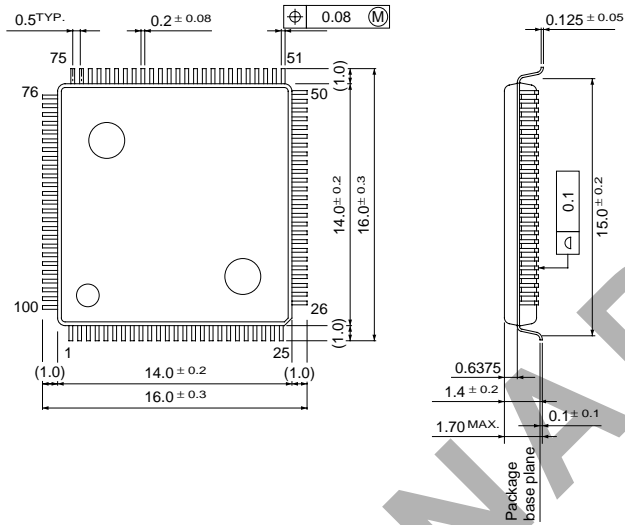
 100-pin QFP (QFP100-P-1420)(LU6000F0)

NOTES :

• Refer to the SM6000 series concerning about system/ functional information of LU6000F0/F1.

• Electrical characteristics are partly changed from SM6000 series.

FLASH MEMORY FEATURES

• Writing method

 Using instruction : in the same way as used for SHARP 8 M bits flash memory LH28F008SA

 Auto byte write : through the command user interface CUI

 V_{PP} : 12 V (external)

• Erasing method

 Auto block erase by CUI

• Block configuration

 8 blocks (1 block by 12 k bytes, 7 blocks by 16 k bytes)

 Each block can be cleared independently.

• Reliability

 Write/erase cycles : 100

• 3 writing modes

 PROM mode

 Program can be stored/erased by using general purpose PROM writer.

 Serial mode (on-board mode)

 Data can be read/written/erased from PC.

 Copy mode

 When the dedicated copy board is used, data stored in PROM can be copied into the internal flash memory.

To write data into the internal flash memory, special adapter and board are required.

100 LQFP (LQFP100-P-1414)

100 QFP (QFP100-P-1420)