

ON Semiconductor

Is Now

onsemi™

To learn more about onsemi™, please visit our website at
www.onsemi.com

DISCONTINUED
THIS DEVICE IS NOT RECOMMENDED FOR NEW DESIGN
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION

onsemi and onsemi and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using onsemi products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by onsemi. "Typical" parameters which may be provided in onsemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. onsemi does not convey any license under any of its intellectual property rights nor the rights of others. onsemi products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use onsemi products for any such unintended or unauthorized application, Buyer shall indemnify and hold onsemi and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that onsemi was negligent regarding the design or manufacture of the part. onsemi is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.

LC88FC2H0A

- Base timer

- <1> Clock may be selected from OSC0 (32.768 kHz crystal oscillator) and frequency-divided output of system clock.
- <2> Interrupts can be generated in 7 timing schemes.

- Real time clock

- <1> Calendar with Jan. 1, 2000 to Dec.31, 2799 including automatic leapyear calculation function.
- <2> Consisted of Independent second-minute-hour-day-month-year-century counters.

- Serial interfaces

- SIO0 : 8-bit synchronous SIO

- <1> LSB first/MSB first mode selectable
- <2> Supports data communication with a data length of 8 bits or less (1 to 8 bits specifiable)
- <3> Built-in 8-bit baudrate generator (4 tCYC to 512 tCYC transfer clocks)
- <4> Continuous/automatic data transmission (9- to 32768-bit units specifiable)
- <5> Interval function (intervals specifiable in 0 to 64tSCK units)
- <6> Wakeup function

- SIO1 : 8-bit synchronous SIO

- <1> LSB first/MSB first mode selectable
- <2> Supports data communication with a data length of 8 bits or less (1 to 8 bits specifiable)
- <3> Built-in 8-bit baudrate generator (4 tCYC to 512 tCYC transfer clocks)
- <4> Continuous/automatic data transmission (9- to 32768-bit units specifiable)
- <5> Interval function (intervals specifiable in 0 to 64tSCK units)
- <6> Wakeup function

- SIO4 : 8-bit synchronous SIO

- <1> LSB first/MSB first mode selectable
- <2> Supports data communication with a data length of 8 bits or less (1 to 8 bits specifiable)
- <3> Built-in 8-bit baudrate generator (4 tCYC to 512 tCYC transfer clocks)
- <4> Continuous/automatic data transmission (9- to 32768-bit units specifiable)
- <5> Interval function (intervals specifiable in 0 to 64tSCK units)
- <6> Wakeup function

- SMIC0 : Single master I²C/8-bit synchronous SIO

Mode 0 : Single-master mode communication

Mode 1 : Synchronous 8-bit serial I/O (MSB first)

- SMIC1 : Single master I²C/8-bit synchronous SIO

Mode 0 : Single-master mode communication

Mode 1 : Synchronous 8-bit serial I/O (MSB first)

- SLIC0 : Slave I²C/8-bit synchronous SIO

Mode 0 : I²C slave mode communication

Mode 1 : Synchronous 8-bit serial I/O (MSB first)

Note: usable only with the external clock source

LC88FC2H0A

• UART0

- <1> Data length : 8 bits (LSB first)
- <2> Start bits : 1 bit
- <3> Stop bits : 1 bit
- <4> Parity bits : None/even parity/odd parity
- <5> Transfer rate : 4/8 cycle
- <6> Baudrate source clock : P07 input signal used as a 1 cycle signal (TOPWMH can be used as a clock source) or Timer4 cycle.
- <7> Full duplex communication

Note : The "cycle" refers to one period of the baudrate clock source.

• UART2

- <1> Data length : 8 bits (LSB first)
- <2> Start bits : 1 bit
- <3> Stop bits : 1/2 bit
- <4> Parity bits : None/even parity/odd parity
- <5> Transfer rate : 8 to 4096 cycle
- <6> Baudrate source clock : System clock/OSC0/OSC1/P26 input signal
- <7> Wakeup function
- <8> Full duplex communication

Note : The "cycle" refers to one period of the baudrate clock source.

• UART3

- <1> Data length : 8 bits (LSB first)
- <2> Start bits : 1 bit
- <3> Stop bits : 1/2 bit
- <4> Parity bits : None/even parity/odd parity
- <5> Transfer rate : 8 to 4096 cycle
- <6> Baudrate source clock : System clock/OSC0/OSC1/P36 input signal
- <7> Wakeup function
- <8> Full duplex communication

Note : The "cycle" refers to one period of the baudrate clock source.

■ AD converter

- <1> 12/8 bits resolution selectable
- <2> Analog input : 16 channels
- <3> Comparator mode

■ PWM

• PWM0 : Multifrequency 12-bit PWM × 2 channels (PWM0A and PWM0B)

- <1> 2-channel pairs controlled independently of one another
- <2> Clock source selectable from system clock or OSC1
- <3> 8-bit prescaler : $TPWMR0 = (\text{prescaler value} + 1) \times \text{clock period}$
- <4> 8-bit fundamental wave PWM generator circuit + 4-bit additional pulse generator circuit
- <5> Fundamental wave PWM mode
 - Fundamental wave period : 16 TPWMR0 to 256 TPWMR0
 - High pulse width : 0 to (Fundamental wave period - TPWMR0)
- <6> Fundamental wave + additional pulse mode
 - Fundamental wave period : 16 TPWMR0 to 256 TPWMR0
 - Overall period : Fundamental wave period × 16
 - High pulse width : 0 to (Fundamental wave period - TPWMR0)

■ CRC operating circuit

■ Watchdog timer

- <1> Driven by the base timer + internal watchdog timer dedicated counter
- <2> Interrupt or reset mode selectable

■ Infrared Remote Controller Receiver Circuit

- 1) Noise rejection function (noise filter time constant: Approx. 120 μs when the 32.768 kHz crystal oscillator is selected as the reference clock source)
- 2) Supports data encoding systems such as PPM (Pulse Position Modulation) and Manchester encoding
- 3) X'tal HOLD mode release function

■ Internal Reset Function

- Power-on reset (POR) function
 - 1) POR reset is generated only at power-on time.
 - 2) The POR release level can be selected through option configuration.
- Low-voltage detection reset (LVD) function
 - 1) LVD and POR functions are combined to generate resets when power is turned on and when power voltage falls below a certain level.
 - 2) The use/disuse of the LVD function and the low voltage threshold level can be selected by option configuration.

■ Interrupts (peripheral function))

- 61 sources (33 modules), 14 vector addresses
- <1> Provides three levels (low (L), high (H), and highest (X)) of multiplex interrupt control.
Any interrupt requests of the level equal to or lower than the current interrupt are not accepted.
- <2> When interrupt requests to two or more vector addresses occur at the same time, the interrupt of the highest level takes precedence over the other interrupts. For interrupts of the same level, the interrupt into the smallest vector address takes precedence.

No.	Vector Address	Interrupt Module
1	08000H	Watchdog timer (1)
2	08004H	Base timer (2)
3	08008H	Timer 0 (2)
4	0800CH	INT0 (1)
5	08014H	INT1 (1)
6	08018H	INT2 (1) / timer 1 (2) / UART2 (4)
7	0801CH	INT3 (1) / timer 2 (4) / SMIIC0 (1) / SLIIC1 (1)
8	08020H	INT4 (1) / timer 3 (2) / Infrared remote control receiver (4)
9	08024H	INT5 (1) / timer 4 (1) / SIO1 (2)
10	0802CH	PWM0 (1) / SMIIC1 (1)
11	08030H	ADC (1) / timer 5 (1) / SIO4 (2)
12	08034H	INT6 (1) / timer 6 (1) / UART 3 (4)
13	08038H	INT7 (1) / SIO0 (2) / SIO0(2)
14	0803CH	Port 0 (3) / Port 5 (8) / RTC (1) / CRC (1)

- 3 priority levels selectable
- Of interrupts of the same level, the one with the smallest vector address takes precedence.
- A number enclosed in parentheses denotes the number of sources.

■ Subroutine stack : RAM area

- Subroutine calls that automatically save PSW, interrupt vector calls : 6 bytes
- Subroutine calls that do not automatically save PSW : 4 bytes

■ Multiplication/division instructions

- 16 bits × 16 bits (4 tCYC execution time)
- 16 bits ÷ 16 bits (18 to 19 tCYC execution time)
- 32 bits ÷ 16 bits (18 to 19 tCYC execution time)

LC88FC2H0A

■ Oscillator circuits

- RC oscillator circuit (internal) : For system clock
- CF oscillator circuit (built-in Rf circuit) : For system clock(OSC1)
- Crystal oscillator circuit (built-in Rf circuit) : For low-speed system clock (OSC0)
- SLRC oscillator circuit (internal) : For system clock (In the case of exception processing)
- VCO oscillator circuit : For timer3,4,5,6,7 clock

■ System clock divider function

- Can run on low current.
- 1/1 to 1/128 of the system clock frequency can be set.

■ Standby function

- HALT mode : Halts instruction execution while allowing the peripheral circuits to continue operation.
 - <1> Oscillation is not stopped automatically.
 - <2> Released by a system reset or occurrence of an interrupt.
- HOLD mode : Suspends instruction execution and the operation of the peripheral circuits.
 - <1> OSC1, RC, and OSC0 oscillations automatically stop.
 - <2> There are six ways of releasing the HOLD mode:
 - (1) Setting the reset pin to the low level
 - (2) Setting at least one of the INT0, INT1, INT2, INT4, INT5, INT6, and INT7 pins to the specified level
 - (3) Having an interrupt source established at port 0
 - (4) Having an interrupt source established at port 5
 - (5) Having an interrupt established at SIO0, SIO1 or SIO4
 - (6) Having an interrupt established at UART2 or UART3
- HOLDX mode : Suspends instruction execution and the operation of the peripheral circuits except those which run on OSC0.
 - <1> OSC1 and RC oscillations automatically stop.
 - <2> OSC0 maintains the state that is established when the HOLDX mode is entered.
 - <3> There are nine ways of releasing the HOLDX mode.
 - (1) Setting the reset pin to the low level
 - (2) Setting at least one of the INT0, INT1, INT2, INT4, INT5, INT6, and INT7 pins to the specified level
 - (3) Having an interrupt source established at port 0
 - (4) Having an interrupt source established at port 5
 - (5) Having an interrupt source established at the base timer circuit
 - (6) Having an interrupt established at SIO0, SIO1 or SIO4
 - (7) Having an interrupt established at UART2 or UART3
 - (8) Having an interrupt established at Infrared remote control receiver.
 - (9) Having an interrupt source established at the real time clock circuit

■ On-chip debugger function

- Supports software debugging with the IC mounted on the target board.
- Supports source line debugging and tracing functions, and breakpoint setting and real time display.
- Single-wire communication

■ Package form

- TQFP100 (14 × 14) : Pb-Free and Halogen Free type

■ Development tools

- On-chip debugger: EOCUIF1 or EOCUIF2 + LC88FC2H0A

■ Programming board

Package	Programming Board
TQFP100 (14 × 14)	W88F52TQ

LC88FC2H0A

■ Flash ROM Programmer

Maker		Model	Supported Version	Device
Flash Support Group Company (FSG)	Single programmer	AF9709C		
	Gang programmer	AF9723/AF9723B(Main body) (Include Ando Electric Co.,Ltd. models		
		AF9833(Unit) (Include Ando Electric Co.,Ltd. Models)		
Flash Support Group Company (FSG) + ON Semiconductor (Note 1)	On-board Single / Gang programmer	AF9101/AF9103(Main body) (FSG models)	(Note 2)	LC88FC2H0A
		SIB88 Type A (Interface driver) (ON Semiconductor model)		
ON Semiconductor	Single / Gang programmer	SKK Type C (SanyoFWS)	Application Version After 1.08 Chip Data Version After 2.45	LC88FC2H0A
	On-board Single programmer	FWS-X16DI Type 2	Application Version After 1.08 Chip Data Version After 2.45	LC88FC2H0A

For information about AF-Series :

Flash Support Group Company (TOA ELECTRONICS, Inc.)

TEL : +81-53-459-1050

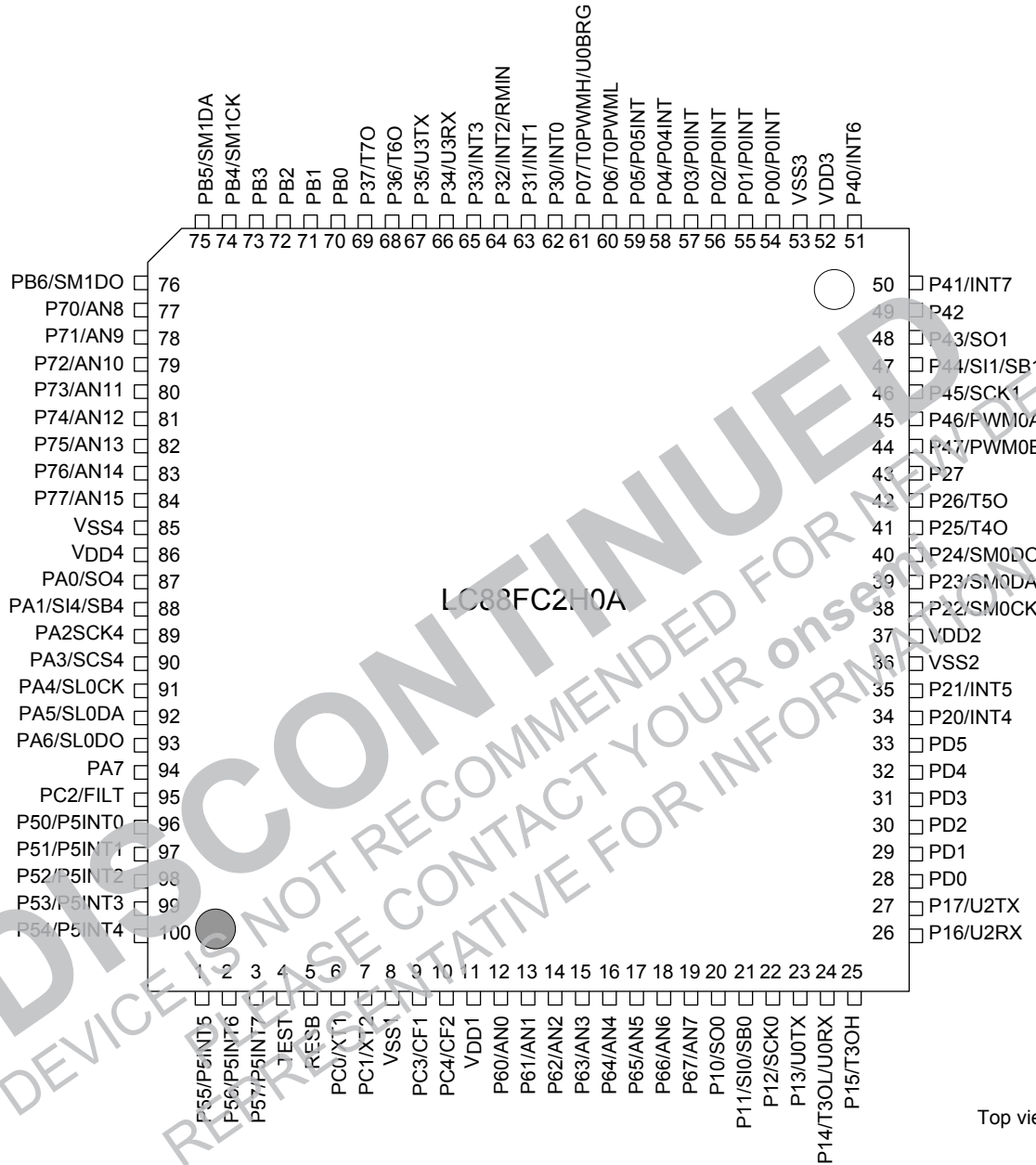
E-mail : sales@j-fsg.co.jp

Note1 : On-board-programmer from FSG (AF9101/AF9103) and serial interface driver from our company (SIB88-TypeA) together can give a PC-less, standalone on-board-programming capabilities.

Note2 : It needs a special programming devices and applications depending on the use of programming environment. Please ask FSG or our company for the information.

LC88FC2H0A

Pinout



Top view

TQFP100 (14x14) (Pb-Free and Halogen free type)

