What is "[Embedded - Microcontrollers](#)"?

"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "[Embedded - Microcontrollers](#)"

Details	
Product Status	Active
Core Processor	F²MC-8L
Core Size	8-Bit
Speed	10MHz
Connectivity	EBI/EMI, Serial I/O, UART/USART
Peripherals	POR, PWM, WDT
Number of I/O	53
Program Memory Size	16KB (16K x 8)
Program Memory Type	Mask ROM
EEPROM Size	-
RAM Size	512 x 8
Voltage - Supply (Vcc/Vdd)	2.2V ~ 6V
Data Converters	A/D 8x10b
Oscillator Type	External
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	64-BQFP
Supplier Device Package	64-QFP (14x20)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/mb89635rpf-g-1461

8-bit Proprietary Microcontroller

CMOS

F²MC-8L MB89630R Series

MB89635R/636R/637R/P637/PV630

■ OUTLINE

The MB89630R series has been developed as a general-purpose version of the F²MC*-8L family consisting of proprietary 8-bit, single-chip microcontrollers.

In addition to a compact instruction set, the microcontrollers contain a variety of peripheral functions such as dual-clock control system, five operating speed control stages, a UART, timers, a PWM timer, a serial interface, an A/D converter, an external interrupt, and a watch prescaler.

* : F²MC is the abbreviation for Fujitsu Flexible Microcontroller.

■ FEATURES

- High-speed operating capability at low voltage
- Minimum execution time: 0.4 μs@3.5 V, 0.8 μs@2.7 V
- F²MC-8L family CPU core

Instruction set optimized for controllers
  - Multiplication and division instructions
  - 16-bit arithmetic operations
  - Test and branch instructions
  - Bit manipulation instructions, etc.

- Five types of timers
  - 8-bit PWM timer: 2 channels (Also usable as a reload timer)
  - 8-bit pulse-width count timer (Continuous measurement capable, applicable to remote control, etc.)
  - 16-bit timer/counter
  - 21-bit timebase timer

(Continued)

For the information for microcontroller supports, see the following web site.

http://edevice.fujitsu.com/micom/en-support/

FUJITSU

■ PRODUCT LINEUP

Part number / Item	MB89635R	MB89636R	MB89637R	MB89P637	MB89PV630
Classification	Mass-produced products (mask ROM products)			One-time PROM product	Piggyback/ evaluation product (for evaluation and development)
ROM size	16 K × 8 bits (internal mask ROM)	24 K × 8 bits (internal mask ROM)	32 K × 8 bits (internal mask ROM)	32 K × 8 bits (Internal PROM, to be programmed with general-purpose EPROM programmer)	32 K × 8 bits (external ROM)
RAM size	512 × 8 bits	768 × 8 bits	1024 × 8 bits	1024 × 8 bits	1024 × 8 bits
CPU functions	The number of instructions: 136 Instruction bit length: 8 bits Instruction length: 1 to 3 bytes Data bit length: 1, 8, 16 bits Minimum execution time: 0.4 μs/10 MHz, 61 μs@32.768 kHz Interrupt processing time: 3.6 to 57.6 μs/10 MHz, 562.5 μs@32.768 kHz				
Ports	Input ports: 5 (All also serve as peripherals.) Output ports (N-ch open-drain): 8 (All also serve as peripherals.) I/O ports (N-ch open-drain): 4 (All also serve as peripherals.) Output ports (CMOS): 8 (All also serve as bus control.) I/O ports (CMOS): 28 (27 ports also serve as bus pins and peripherals.) Total: 53				
Watch timer	21 bits × 1 (in main clock)/15 bits × 1 (at 32.768 kHz)				
8-bit PWM timer	8-bit reload timer operation (toggled output capable, operating clock cycle: 0.4 μs to 3.3 ms) × 2 channels 7/8-bit resolution PWM operation (conversion cycle: 51.2 μs to 839 ms) × 2 channels				
8-bit pulse width count timer	8-bit timer operation (overflow output capable, operating clock cycle: 0.4 to 12.8 μs) 8-bit reload timer operation (toggled output capable, operating clock cycle: 0.4 to 12.8 μs) 8-bit pulse width measurement operation (capable of continuous measurement, and measurement of "H" pulse width/ "L" pulse width/ from ↑ to ↑/from ↓ to ↓)				
16-bit timer/counter	16-bit timer operation (operating clock cycle: 0.4 μs) 16-bit event counter operation (rising edge/falling edge/both edge selectable)				
8-bit serial I/O	8 bits LSB first/MSB first selectable One clock selectable from four transfer clocks (one external shift clock, three internal shift clocks: 0.8 μs, 3.2 μs, 12.8 μs)				
UART	Capable of switching two I/O systems by software Transfer data length (6, 7, and 8 bits) Transfer rate (300 to 62500 bps. at 10 MHz oscillation)				
10-bit A/D converter	10-bit resolution × 8 channels A/D conversion mode (conversion time: 13.2 μs) Sense mode (conversion time: 7.2 μs) Capable of continuous activation by an external activation or an internal timer				

(Continued)

(Continued)

Part number Item	MB89635R	MB89636R	MB89637R	MB89P637	MB89PV630
External interrupt input	4 independent channels (edge selection, interrupt vector, source flag). Rising edge/falling edge selectable Used also for wake-up from stop/sleep mode. (Edge detection is also permitted in stop mode.)				
Standby mode	Sleep mode, stop mode, watch mode, and subclock mode				
Process	CMOS				
Operating voltage*	2.2 V to 6.0 V			2.7 V to 6.0 V	
EPROM for use					MBM27C256A-20CZ MBM27C256A-20TV

* : Varies with conditions such as the operating frequency. (See section "■ Electrical Characteristics.")
   In the case of the MB89PV630, the voltage varies with the restrictions of the EPROM for use.

■ PACKAGE AND CORRESPONDING PRODUCTS

Package	MB89635R	MB89636R MB89637R	MB89P637	MB89PV630
DIP-64P-M01	○	○	○	×
FPT-64P-M06	○	○	○	×
FPT-64P-M23	○	○	×	×
MQP-64C-P01	×	×	×	○
MDP-64C-P02	×	×	×	○

○ : Available   ×: Not available

Note: For more information about each package, see section "■ Package Dimensions."
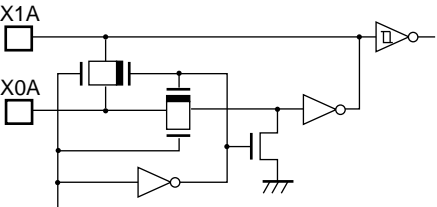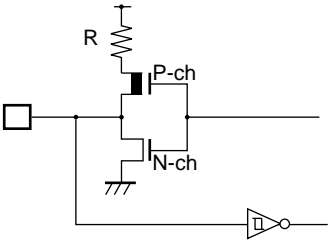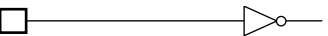
FUJITSU

■ PIN DESCRIPTION
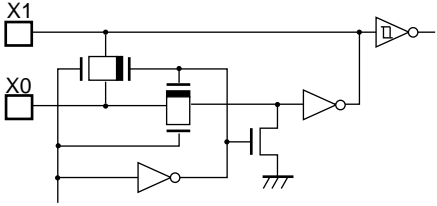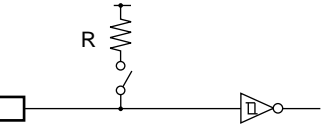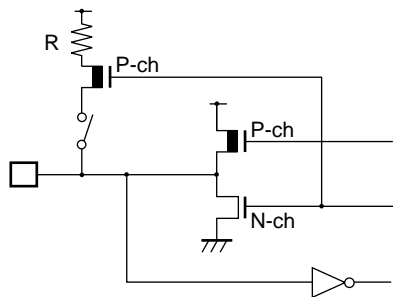
Pin no.			Pin name	Circuit type	Function
SH-DIP[*1] MDIP[*2]	QFP2[*3]	QFP1[*4] MQFP[*5]			
30	22	23	X0	A	Main clock crystal oscillator pins
31	23	24	X1		
28	20	21	MOD0	D	Operating mode selection pins Connect directly to V_{CC} or V_{SS}.
29	21	22	MOD1		
27	19	20	$\overline{RST}$	C	Reset I/O pin This pin is an N-ch open-drain output type with a pull-up resistor, and a hysteresis input type. "L" is output from this pin by an internal reset source. The internal circuit is initialized by the input of "L".
56 to 49	48 to 41	49 to 42	P00/AD0 to P07/AD7	F	General-purpose I/O ports When an external bus is used, these ports function as the multiplex pins of the lower address output and the data I/O.
48 to 41	40 to 33	41 to 34	P10/A08 to P17/A157	F	General-purpose I/O ports When an external bus is used, these ports function as an upper address output.
40	32	33	P20/BUFC	H	General-purpose output port When an external bus is used, this port can also be used as a buffer control output by setting the BCTR.
39	31	32	P21/$\overline{HAK}$	H	General-purpose output port When an external bus is used, this port can also be used as a hold acknowledge by setting the BCTR.
38	30	31	P22/HRQ	F	General-purpose output port When an external bus is used, this port can also be used as a hold request input by setting the BCTR.
37	29	30	P23/RDY	F	General-purpose output port When an external bus is used, this port functions as a ready input.
36	28	29	P24/CLK	H	General-purpose output port When an external bus is used, this port functions as a clock output.
35	27	28	P25/$\overline{WR}$	H	General-purpose output port When an external bus is used, this port functions as a write signal output.
34	26	27	P26/$\overline{RD}$	H	General-purpose output port When an external bus is used, this port functions as a read signal output.

*1: DIP-64P-M01
*2: MDP-64C-P02
*3: FPT-64P-M23
*4: FPT-64P-M06
*5: MQP-M64C-P01

(Continued)

FUJITSU

■ I/O CIRCUIT TYPE

Type	Circuit	Remarks
A	 X1 X0 Standby control signal	• Crystal or ceramic oscillation type (main clock) External clock input selection versions of MB89PV630, MB89P637, MB89635R, MB89636R, and MB89637R At an oscillation feedback resistor of approximately 1 MΩ@5.0 V
B	 X1A X0A Standby control signal	• Crystal or ceramic oscillation type (subclock) MB89PV630, MB89P637, MB89635R, MB89636R, and MB89637R with dual-clock system At an oscillation feedback resistor of approximately 4.5 MΩ@5.0 V
C	 R, P-ch, N-ch	• At an output pull-up resistor (P-ch) of approximately 50 kΩ@5.0 V • Hysteresis input
D		
E	 R	• Hysteresis input • Pull-up resistor optional (except P70 and P71)
F	 R, P-ch, P-ch, N-ch	• CMOS output • CMOS input • Pull-up resistor optional (except P22 and P23)

(Continued)

■ HANDLING DEVICES

1. Preventing Latchup

Latchup may occur on CMOS ICs if voltage higher than V_{CC} or lower than V_{SS} is applied to input and output pins other than medium- and high-voltage pins or if higher than the voltage which shows on "1. Absolute Maximum Ratings" in section "■ Electrical Characteristics" is applied between V_{CC} and V_{SS}.

When latchup occurs, power supply current increases rapidly and might thermally damage elements. When using, take great care not to exceed the absolute maximum ratings.

Also, take care to prevent the analog power supply (AV_{CC} and AVR) and analog input from exceeding the digital power supply (V_{CC}) when the analog system power supply is turned on and off.

2. Treatment of Unused Input Pins

Leaving unused input pins open could cause malfunctions. They should be connected to a pull-up or pull-down resistor.

3. Treatment of Power Supply Pins on Microcontrollers with A/D and D/A Converters

Connect to be AV_{CC} = DAVC = V_{CC} and AV_{SS} = AVR = V_{SS} even if the A/D and D/A converters are not in use.

4. Treatment of N.C. Pins

Be sure to leave (internally connected) N.C. pins open.

5. Power Supply Voltage Fluctuations

Although V_{CC} power supply voltage is assured to operate within the rated range, a rapid fluctuation of the voltage could cause malfunctions, even if it occurs within the rated range. Stabilizing voltage supplied to the IC is therefore important. As stabilization guidelines, it is recommended to control power so that V_{CC} ripple fluctuations (P-P value) will be less than 10% of the standard V_{CC} value at the commercial frequency (50 Hz to 60 Hz) and the transient fluctuation rate will be less than 0.1 V/ms at the time of a momentary fluctuation such as when power is switched.
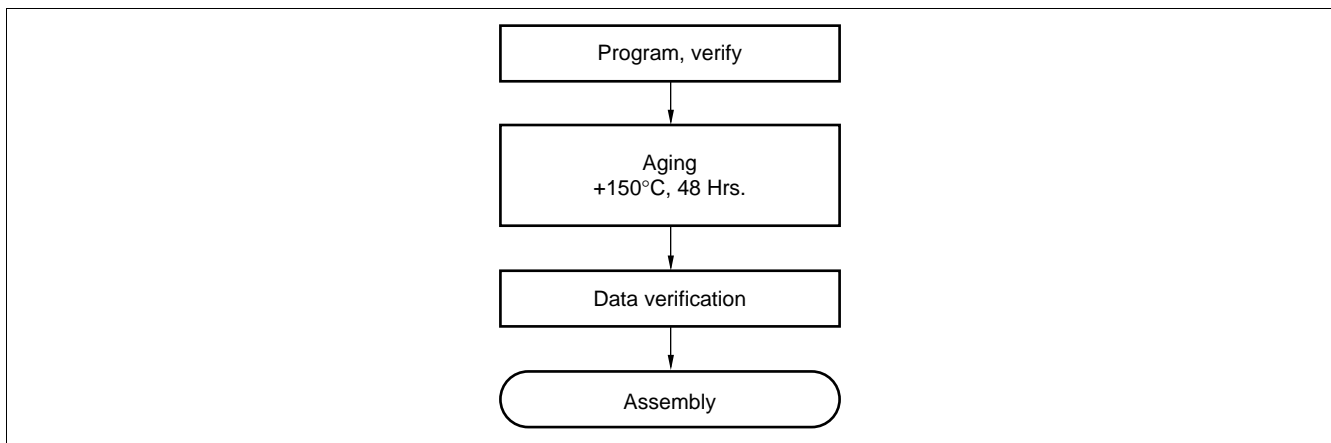
6. Precautions when Using an External Clock

When an external clock is used, oscillation stabilization time is required even for power-on reset (option selection) and wake-up from stop mode.

- **Programming procedure**

(1) Set the EPROM programmer to the MBM27C256A.

(2) Load program data into the EPROM programmer at 0007$_H$ to 7FFF$_H$. (Note that addresses 8000$_H$ to FFFF$_H$ in the operating mode assign to 0000$_H$ to 7FFF$_H$ in EPROM mode).

(3) Load option data into addresses 0000$_H$ to 0006$_H$ of the EPROM programmer.
(For information about each corresponding option, see "8. OTPROM Option Bit Map".)

(4) Program with the EPROM programmer.

4. Recommended Screening Conditions

High-temperature aging is recommended as the pre-assembly screening procedure for a product with a blanked OTPROM microcomputer program.

```
        Program, verify
              ↓
            Aging
        +150°C, 48 Hrs.
              ↓
        Data verification
              ↓
          Assembly
```

5. Programming Yield

All bits cannot be programmed at Fujitsu shipping test to a blanked OTPROM microcomputer, due to its nature. For this reason, a programming yield of 100% cannot be assured at all times.

2. Registers

The F²MC-8L family has two types of registers; dedicated registers in the CPU and general-purpose registers in the memory. The following dedicated registers are provided:

Program counter (PC):   A 16-bit register for indicating the instruction storage positions

Accumulator (A):   A 16-bit temporary register for storing arithmetic operations, etc. When the instruction is an 8-bit data processing instruction, the lower byte is used.

Temporary accumulator (T):   A16-bit register which performs arithmetic operations with the accumulator When the instruction is an 8-bit data processing instruction, the lower byte is used.

Index register (IX):   A16-bit register for index modification

Extra pointer (EP):   A16-bit pointer for indicating a memory address

Stack pointer (SP):   A16-bit register for indicating a stack area

Program status (PS):   A16-bit register for storing a register pointer, a condition code

		Initial value
◄— 16 bits —►		
PC	: Program counter	FFFD$_H$
A	: Accumulator	Indeterminate
T	: Temporary accumulator	Indeterminate
IX	: Index register	Indeterminate
EP	: Extra pointer	**Indeterminate**
SP	: Stack pointer	Indeterminate
PS	: Program status	I-flag = 0, IL1, IL0 = 11 The other bit values are indeterminate.

The PS can further be divided into higher 8 bits for use as a register bank pointer (RP) and the lower 8 bits for use as a condition code register (CCR). (See the diagram below.)

• Structure of the program status register

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PS			RP			Vacancy	Vacancy	Vacancy	H	I	IL1, IL0		N	Z	V	C

RP ⟵ (bits 15–8)   CCR ⟵ (bits 7–0)
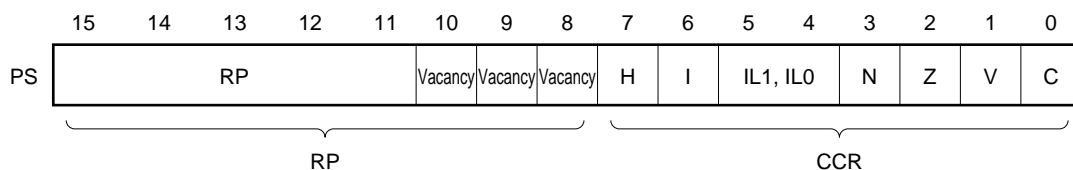
■ ELECTRICAL CHARACTERISTICS

1. Absolute Maximum Ratings

$(AV_{SS} = V_{SS} = 0.0 \text{ V})$

Parameter	Symbol	Value		Unit	Remarks
		Min.	Max.		
Power supply voltage	V_{CC}	$V_{SS} - 0.3$	$V_{SS} + 7.0$	V	*
	AV_{CC}	$V_{SS} - 0.3$	$V_{SS} + 7.0$	V	*
A/D converter reference input voltage	AVR	$V_{SS} - 0.3$	$V_{SS} + 7.0$	V	AVR must not exceed "$AV_{CC} + 0.3$ V".
Input voltage	V_I	$V_{SS} - 0.3$	$V_{CC} + 0.3$	V	Except P50 to P53
	V_{I2}	$V_{SS} - 0.3$	$V_{SS} + 7.0$	V	P50 to P53
Output voltage	V_O	$V_{SS} - 0.3$	$V_{CC} + 0.3$	V	Except P50 to P53
	V_{O2}	$V_{SS} - 0.3$	$V_{SS} + 7.0$	V	P50 to P53
"L" level maximum output current	I_{OL}	—	20	mA	
"L" level average output current	I_{OLAV}	—	4	mA	Average value (operating current $\times$ operating rate)
"L" level total maximum output current	ΣI_{OL}	—	100	mA	
"L" level total average output current	ΣI_{OLAV}	—	40	mA	Average value (operating current $\times$ operating rate)
"H" level maximum output current	I_{OH}	—	−20	mA	
"H" level average output current	I_{OHAV}	—	−4	mA	Average value (operating current $\times$ operating rate)
"H" level total maximum output current	ΣI_{OH}	—	−50	mA	
"H" level total average output current	ΣI_{OHAV}	—	−20	mA	Average value (operating current $\times$ operating rate)
Power consumption	P_D	—	500	mW	
Operating temperature	T_A	−40	+85	°C	
Storage temperature	Tstg	−55	+150	°C	

* : Use AV_{CC} and V_{CC} set at the same voltage.
　Take care so that AV_{CC} does not exceed V_{CC}, such as when power is turned on.

WARNING:　Semiconductor devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of absolute maximum ratings. Do not exceed these ratings.

3. DC Characteristics

(AV$_{CC}$ = V$_{CC}$ = 5.0 V, AV$_{SS}$ = V$_{SS}$ = 0.0 V, T$_A$ = −40°C to +85°C)

Parameter	Symbol	Pin name	Condition	Value Min.	Value Typ.	Value Max.	Unit	Remarks
"H" level input voltage	V$_{IH1}$	P00 to P07, P10 to P17, P22, P23, P31, P34, P37, P41, P43, P51 to P53	—	0.7 V$_{CC}$	—	V$_{CC}$ + 0.3	V	P51 to P53 with pull-up resistor
	V$_{IH2}$	P51 to P53		0.7 V$_{CC}$	—	V$_{SS}$ + 6.0	V	Without pull-up resistor
	V$_{IHS}$	$\overline{RST}$, MOD0, MOD1, P30, P32, P33, P35, P36, P40, P42, P50, P72 to P74		0.8 V$_{CC}$	—	V$_{CC}$ + 0.3	V	P50 with pull-up resistor
	V$_{IHS2}$	P50, P70, P71		0.8 V$_{CC}$	—	V$_{SS}$ + 6.0	V	Without pull-up resistor
"L" level input voltage	V$_{IL}$	P00 to P07, P10 to P17, P22, P23, P31, P34, P37, P41, P43		V$_{SS}$ − 0.3	—	0.3 V$_{CC}$	V	
	V$_{ILS}$	P30, P32, P33, P35, P36, P40, P42, P50 to P53, P70 to P74, $\overline{RST}$, MOD0, MOD1		V$_{SS}$ − 0.3	—	0.2 V$_{CC}$	V	
Open-drain output pin application voltage	V$_D$	P50 to P53		V$_{SS}$ − 0.3	—	V$_{SS}$ + 6.0	V	
"H" level output voltage	V$_{OH}$	P00 to P07, P10 to P17, P20 to P27, P30 to P37, P40 to P43	I$_{OH}$ = −2.0 mA	4.0	—	—	V	
"L" level output voltage	V$_{OL}$	P00 to P07, P10 to P17, P20 to P27, P30 to P37, P40 to P43, P50 to P53, P60 to P67, $\overline{RST}$	I$_{OL}$ = 4.0 mA	—	—	0.4	V	
Input leakage current (Hi-z output leakage current)	I$_{LI}$	P00 to P07, P10 to P17, P20 to P23, P30 to P37, P40 to P43, P50 to P53, P70 to P74, MOD0, MOD1	0.0 V < V$_I$ < V$_{CC}$	—	—	±5	μA	Without pull-up resistor

(Continued)

FUJITSU

(Continued)

(AV$_{CC}$ = V$_{CC}$ = 5.0 V, AV$_{SS}$ = V$_{SS}$ = 0.0 V, T$_A$ = –40°C to +85°C)

Parameter	Symbol	Pin name	Condition	Value			Unit	Remarks
				Min.	Typ.	Max.		
Power supply current[*1]	I$_A$	AV$_{CC}$	F$_{CH}$ = 10 MHz, when A/D conversion operates.	—	6	—	mA	
	I$_{AH}$		F$_{CH}$ = 10 MHz, T$_A$ = +25°C, when A/D conversion in a stop.	—	—	1	μA	
Input capacitance	C$_{IN}$	Other than AV$_{CC}$, AV$_{SS}$, V$_{CC}$, and V$_{SS}$	f = 1 MHz	—	10	—	pF	

*1: The power supply current is measured at the external clock.

    In the case of the MB89PV630, the current consumed by the connected EPROM and ICE is not counted.

*2: For information on t$_{inst}$, see "(4) Instruction Cycle" in "4. AC Characteristics".

4. AC Characteristics

(1) Reset Timing

(V$_{CC}$ = 5.0 V±10%, AV$_{SS}$ = V$_{SS}$ = 0.0 V, T$_A$ = –40°C to +85°C)

Parameter	Symbol	Condition	Value		Unit	Remarks
			Min.	Max.		
$\overline{RST}$ "L" pulse width	t$_{ZLZH}$	—	48 t$_{HCYL}$	—	ns	

FUJITSU
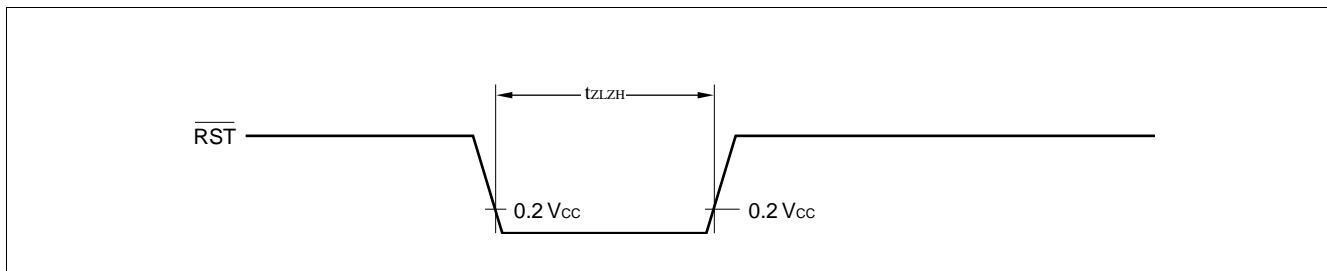
(4) Instruction Cycle

Parameter	Symbol	Value (typical)	Unit	Remarks
Instruction cycle (minimum execution time)	t_{inst}	$4/F_{CH}$, $8/F_{CH}$, $16/F_{CH}$, $64/F_{CH}$	µs	$(4/F_{CH})$ t_{inst} = 0.4 µs, operating at F_{CH} = 10 MHz
		$2/F_{CL}$	µs	t_{inst} = 61.036 µs, operating at F_{CL} = 32.768 kHz

Note: Operating at 10 MHz, the cycle varies with the set execution time.

(5) Clock Output Timing

$(V_{CC}$ = 5.0 V±10%, AV_{SS} = V_{SS}= 0.0 V, T_A = –40°C to +85°C)

Parameter	Symbol	Pin name	Condition	Value Min.	Value Max.	Unit	Remarks
Cycle time	t_{CYC}	CLK	—	$1/2$ t_{inst}*	—	µs	
CLK ↑ → CLK ↓	t_{CHCL}	CLK		$1/4$ t_{inst}* – 70 ns	$1/4$ t_{inst}*	µs	

* : For information on t_{inst}, see "(4) Instruction Cycle".
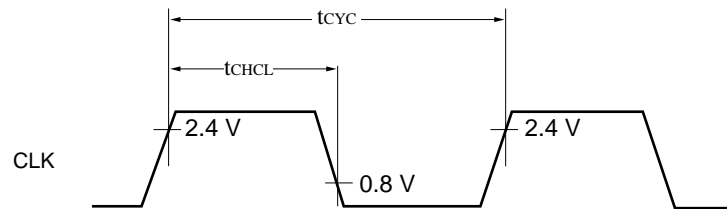
• **Internal shift clock mode**
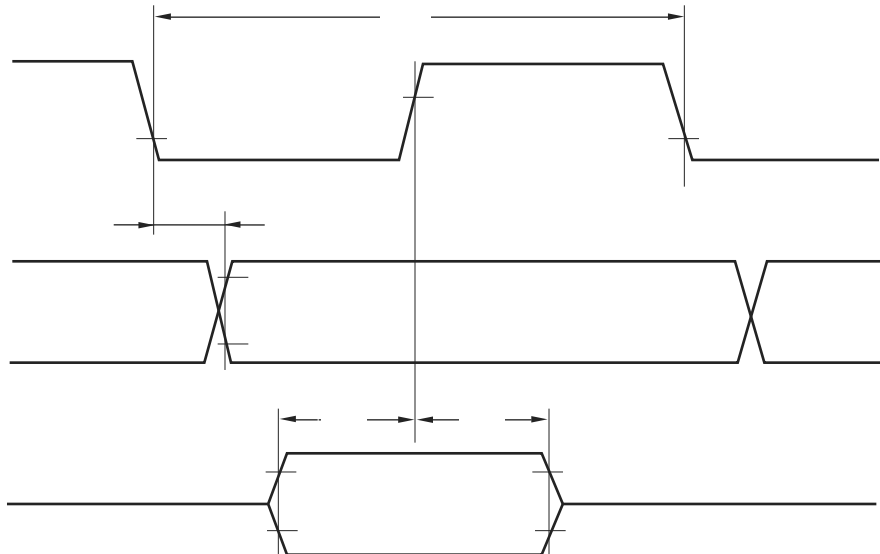
• **External shift clock mode**
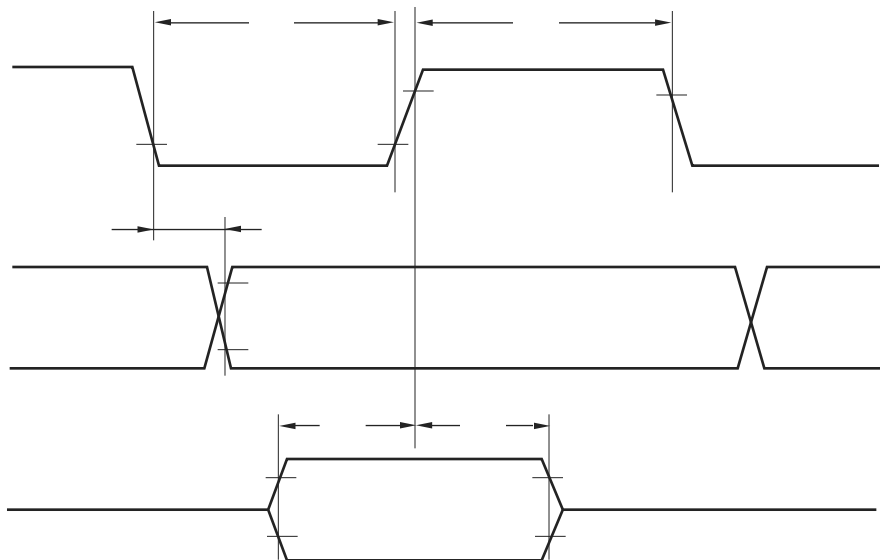
6. A/D Converter Glossary

- Resolution
  Analog changes that are identifiable with the A/D converter
- Linearity error
  The deviation of the straight line connecting the zero transition point ("00 0000 0000" $\leftrightarrow$ "00 0000 0001") with the full-scale transition point ("11 1111 1110" $\leftrightarrow$ "11 1111 1111") from actual conversion characteristics
- Differential linearity error
  The deviation of input voltage needed to change the output code by 1 LSB from the theoretical value
- Total error (unit: LSB)
  The difference between theoretical and actual conversion values caused by the zero transition error, full-scale transition error, linearity error, quantization error, and noise
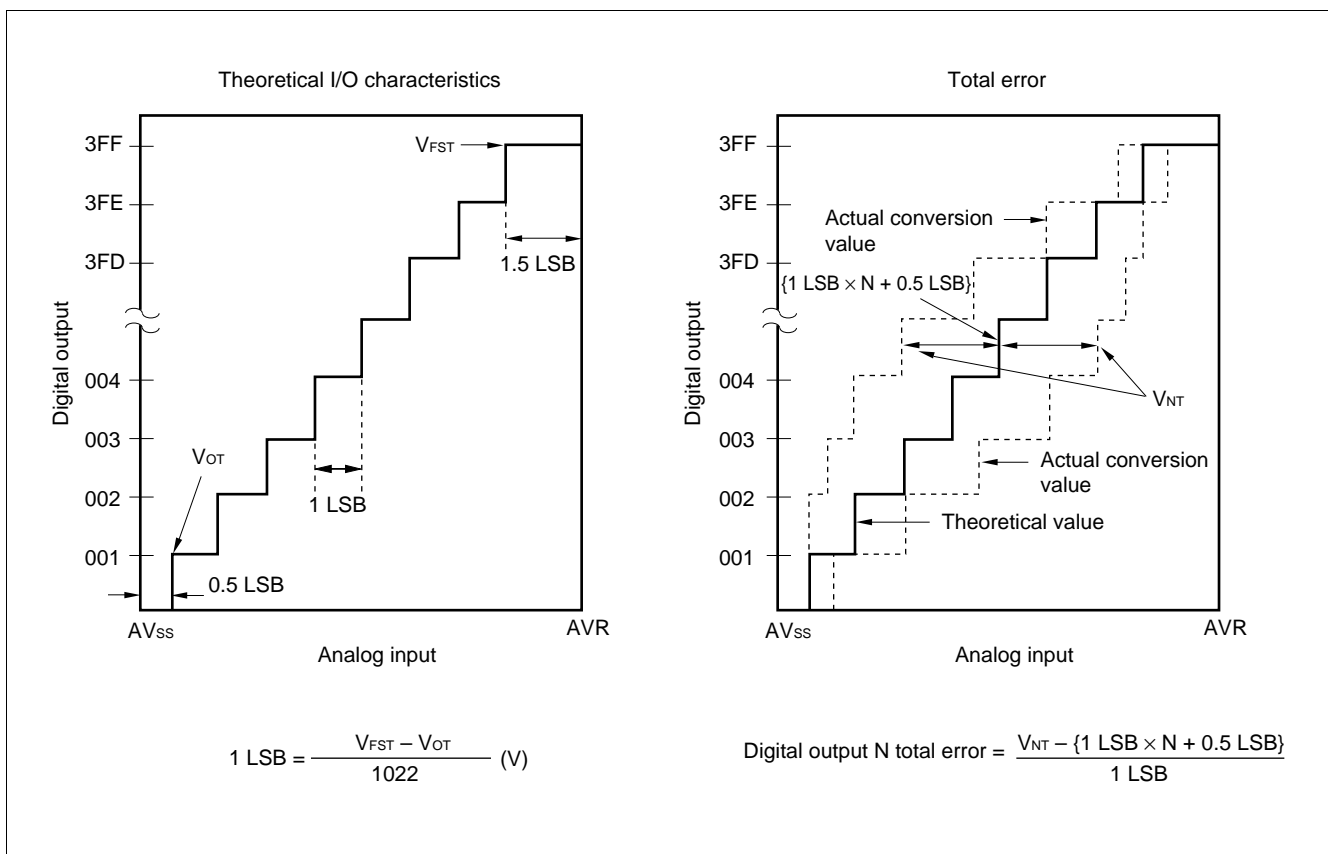
(Continued)

7. Notes on Using A/D Converter

• **Input impedance of the analog input pins**
  The output impedance of the external circuit for the analog input must satisfy the following conditions.
  If the output impedance of the external circuit is too high, an analog voltage sampling time might be insufficient (sampling time = 6 μs at 10 MHz oscillation.) Therefore, it is recommended to keep the output impedance of the external circuit below 10 kΩ.

• **Analog input circuit model**

Analog input

R_{ON1} R_{ON2} C_0 Converter

C_1

R_{ON1}: Approx. 1.5 kΩ
R_{ON2}: Approx. 1.5 kΩ
C_0:   Approx. 60 pF
C_1:   Approx. 4 pF
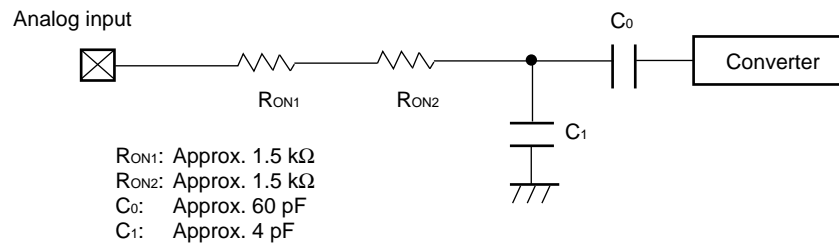
Note: The values mentioned here should be used as a guideline.

• **Error**
  The smaller the | AVR–AVss |, the greater the error would become relatively.

■ PACKAGE DIMENSIONS
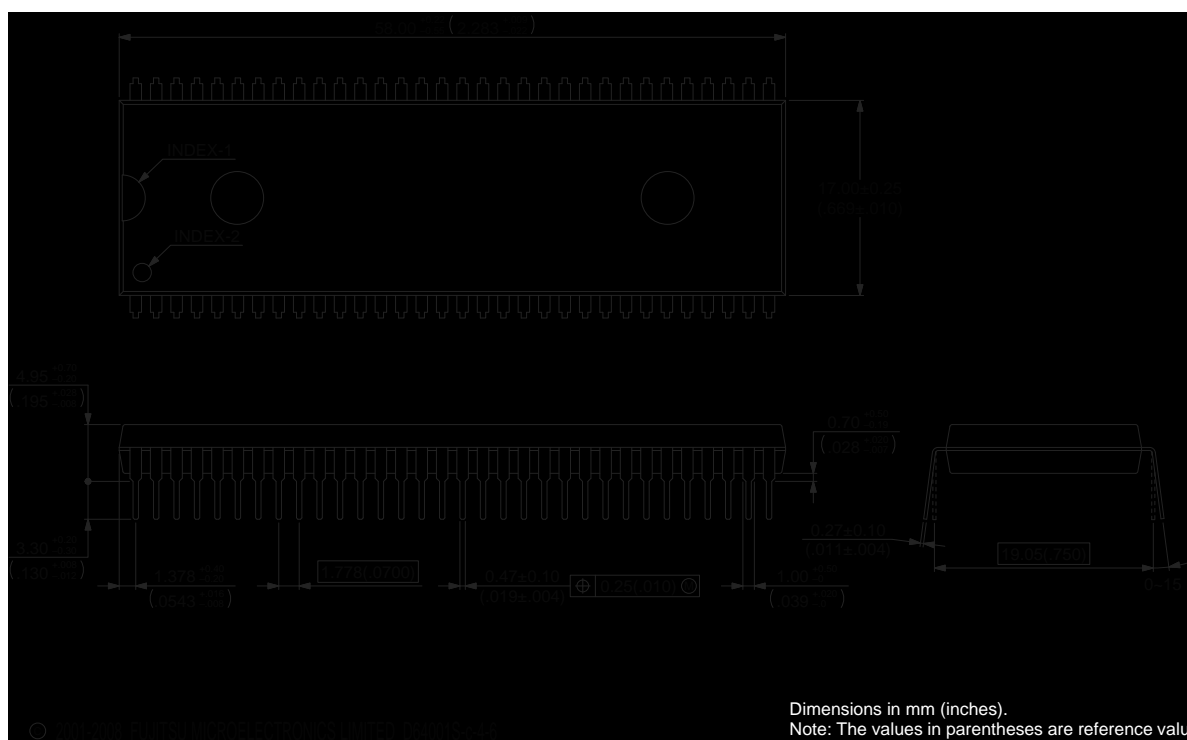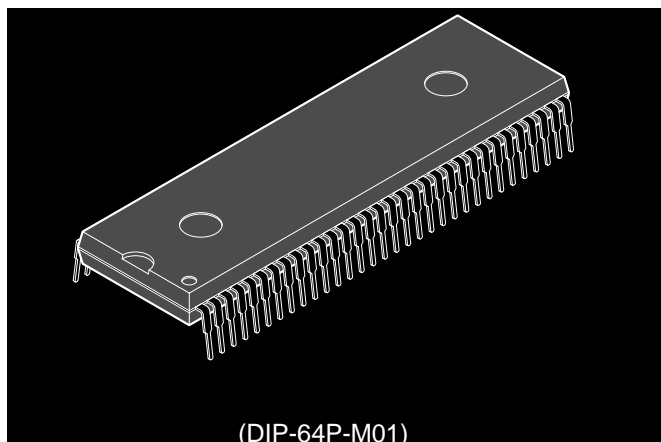
(DIP-64P-M01)

Dimensions in mm (inches).
Note: The values in parentheses are reference values

Please confirm the latest Package dimension by following URL.
http://edevice.fujitsu.com/package/en-search/

(Continued)

(MQP-64C-P01)

Dimensions in mm (inches).
Note: The values in parentheses are reference values.

Please confirm the latest Package dimension by following URL.
http://edevice.fujitsu.com/package/en-search/
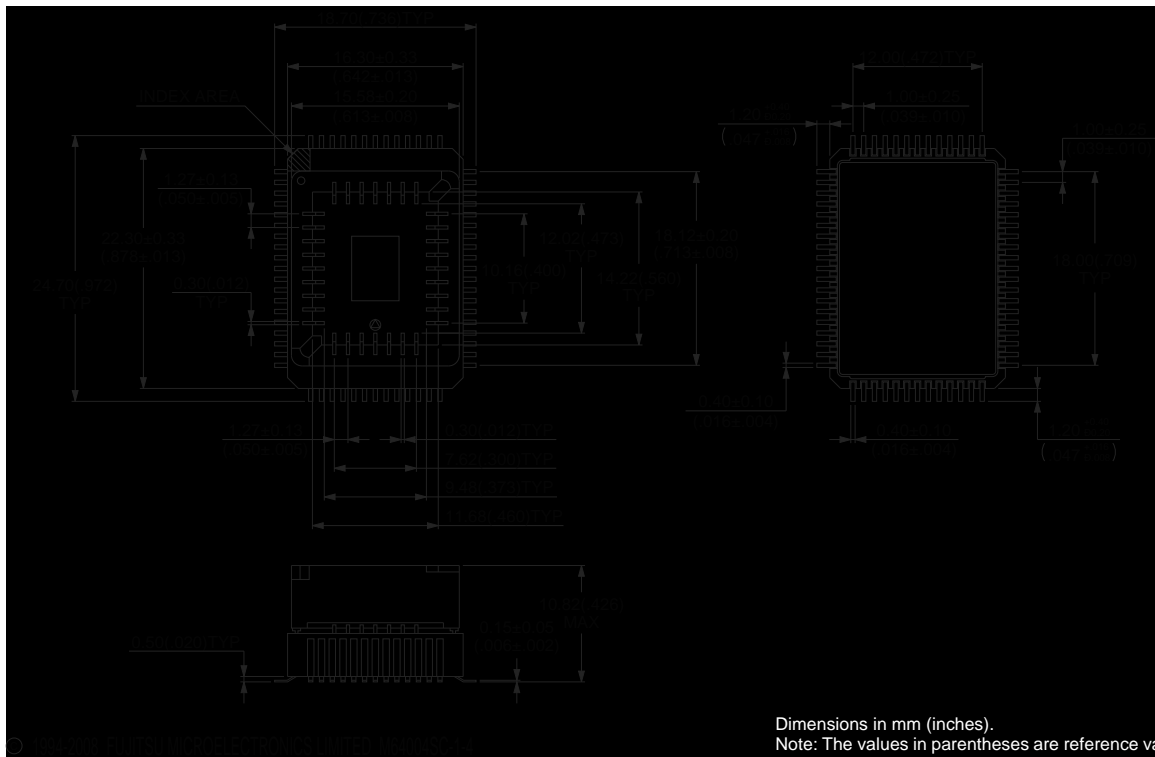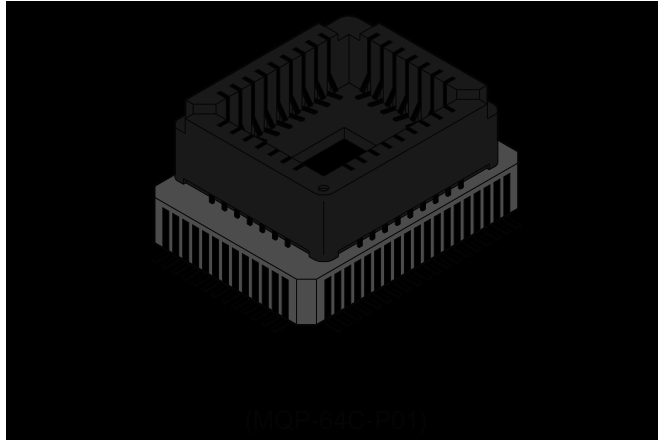
(Continued)

(Continued)

(MDP-64C-P02)
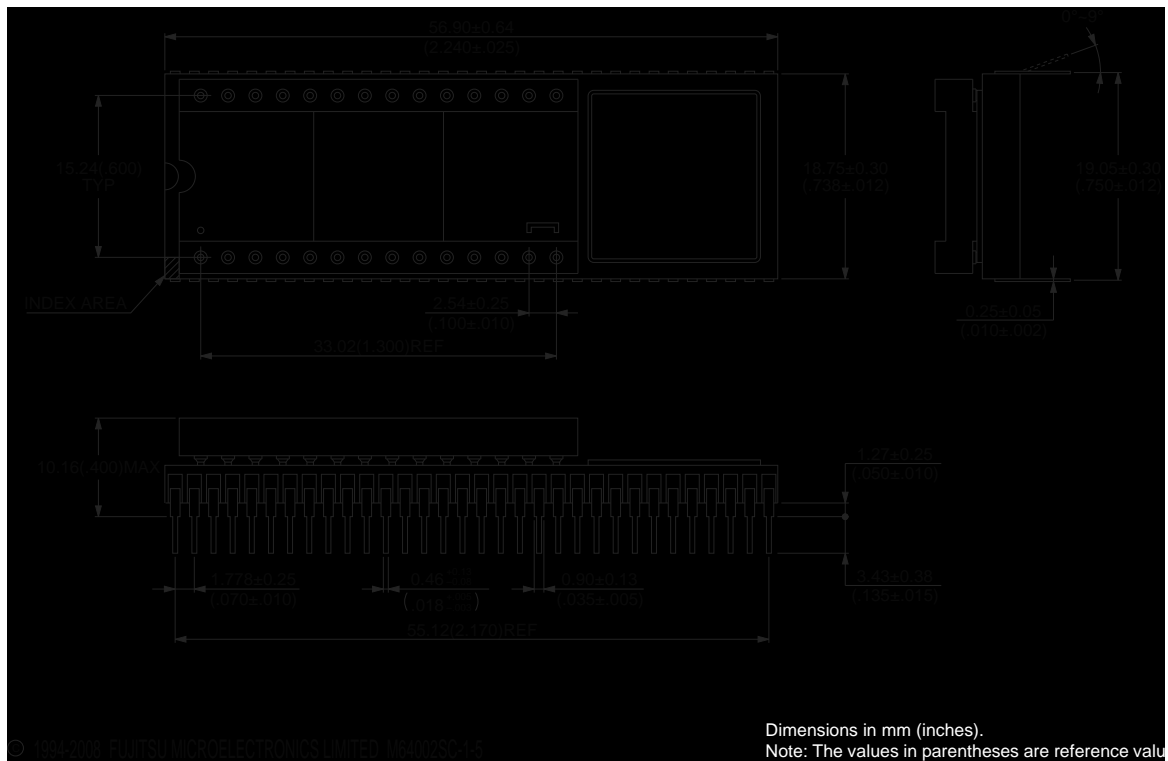
Dimensions in mm (inches).
Note: The values in parentheses are reference values.

Please confirm the latest Package dimension by following URL.
http://edevice.fujitsu.com/package/en-search/

FUJITSU

■ **MAIN CHANGES IN THIS EDITION**

Page	Section	Change Results
49	■ MASK OPTIONS	Changed the explanation for "*" in "■ MASK OPTIONS".

The vertical lines marked in the left side of the page show the changes.

FUJITSU MICROELECTRONICS LIMITED

Shinjuku Dai-Ichi Seimei Bldg., 7-1, Nishishinjuku 2-chome,

Shinjuku-ku, Tokyo 163-0722, Japan

Tel: +81-3-5322-3329

http://jp.fujitsu.com/fml/en/

For further information please contact:

North and South America
FUJITSU MICROELECTRONICS AMERICA, INC.
1250 E. Arques Avenue, M/S 333
Sunnyvale, CA 94085-5401, U.S.A.
Tel: +1-408-737-5600   Fax: +1-408-737-5999
http://www.fma.fujitsu.com/

Europe
FUJITSU MICROELECTRONICS EUROPE GmbH
Pittlerstrasse 47, 63225 Langen, Germany
Tel: +49-6103-690-0 Fax: +49-6103-690-122
http://emea.fujitsu.com/microelectronics/

Korea
FUJITSU MICROELECTRONICS KOREA LTD.
206 Kosmo Tower Building, 1002 Daechi-Dong,
Gangnam-Gu, Seoul 135-280, Republic of Korea
Tel: +82-2-3484-7100 Fax: +82-2-3484-7111
http://kr.fujitsu.com/fmk/

Asia Pacific
FUJITSU MICROELECTRONICS ASIA PTE. LTD.
151 Lorong Chuan,
#05-08 New Tech Park 556741 Singapore
Tel : +65-6281-0770 Fax : +65-6281-0220
http://www.fmal.fujitsu.com/

FUJITSU MICROELECTRONICS SHANGHAI CO., LTD.
Rm. 3102, Bund Center, No.222 Yan An Road (E),
Shanghai 200002, China
Tel : +86-21-6146-3688 Fax : +86-21-6335-1605
http://cn.fujitsu.com/fmc/

FUJITSU MICROELECTRONICS PACIFIC ASIA LTD.
10/F., World Commerce Centre, 11 Canton Road,
Tsimshatsui, Kowloon, Hong Kong
Tel : +852-2377-0226 Fax : +852-2376-3269
http://cn.fujitsu.com/fmc/en/

Edited: Sales Promotion Department