

This Customer Design Review Supplement is provided to prevent problems that may arise in the system development of MB91660 series.  
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Item		Check	Reason for checking	Result	Remark	Update
CPU	External reset	Does the reset input width satisfy the standards of Fujitsu?	If the reset input width does not satisfy the relevant standards, the CPU may not be able to return.	Yes / No		2008/3/25
CPU	External reset IC	When external reset IC is used, are the low-voltage detection values within the operation guarantee range of the microcontroller? Do you take into account the voltage drop till generation after detection?	Malfunction may occur if a reset input is not within the operation guarantee range.	Yes / No	Check the operation guarantee range in the data sheet.	2008/3/25
CPU	Interrupt	Are interrupt vectors processed for undefined instruction exception interrupts ?	If an undefined instruction is executed such as by runaway, the runaway is accelerated.	Yes / No	When an undefined instruction is executed, a undefined instruction exception interrupt is caused. If a special type of processing is required, jump to the processing. If no special processing is required, it is recommended to jump to the reset vector.	2008/3/25
CPU	Interrupt	Are unused interrupt vectors processed?	If an unused interrupt is caused such as by runaway, the runaway is accelerated.	Yes / No	If a special type of processing is required, jump to the processing. If no special processing is required, it is recommended to jump to the reset vector.	2008/3/25
CPU	Bit operation instruction	In some resource registers, the use of the Read Modify Write instruction is prohibited. Do you use the Read Modify Write instruction in such registers?	Instruction execution may not normally be implemented and unexpected data may be written.	Yes / No		2008/3/25
CPU	Main clock oscillation stabilization wait	Do you obtain the matching data of system and oscillator and know the required oscillation stabilization wait time?	There is fear that the CPU operates without normal oscillation.	Yes / No	Ask the vendor of the oscillator used for oscillation evaluation.	2008/3/25
CPU	Subclock oscillation stabilization wait	Do you perform a transition from the main mode to the subclock mode while subclock oscillation is still not stable?	The subclock requires longer oscillation stabilization time than the main clock. When the main clock mode changes to the subclock mode, therefore, subclock oscillation must be stabilized in advance.	Yes / No	Applicable only when the subclock is used.	2008/3/25
CPU	Clock	Do you appropriately set the FLASH access size setting and the wait cycle setting by FLASH control register (FCTL).R)	Because the FLASH access size setting and the wait cycle setting influence the processing performance of CPU, set the most appropriate values according to the operation frequency.	Yes / No	See the relevant description in the manual.	2008/3/25
CPU	Clock	Do you switch to another mode during switching between internal clock operation modes (PLL, main, Sub)?	If you switch to another mode during switching between internal clock operation modes (PLL, main, Sub), a problem may occur at the switching timing. (It is prohibited to shift to the PLL mode during wait for stabilization of main clock oscillation.)  *Single clock product doesn't be supported Sub mode.	Yes / No	See the relevant description in the manual.	2008/3/25
CPU	Transition to standby mode	Do you know precautions on the transition to standby mode?	To enter the standby mode with synchronous standby operation (TBCR.SYNCS = 1) enabled, the STCR register must be read once after writing to the relevant control bits (sleep and stop bits). (LDI #value_of_standby, R0) ; // STCR write data is included in value_of_standby. (LDI #_STCR, R12) ; // _STCR is the STCR address (481H). STB R0, @R12 ; // Writes to the standby control register (STCR). LDUB @R12, R0 ; // STCR needs to be read for synchronous standby. LDUB @R12, R0 ; // Second dummy read of STCR NOP ; // Five NOPs are required to take timing. NOP NOP NOP NOP	Yes / No		2008/3/25
Peripheral function	I/O port	Is processing such as rewriting to important port I/O enabled for the purpose of fail safe in the system?	Basically, the status of a port does not change unless defined by software. For the purpose of fail safe in the system, however, it is recommended to insert a refresh function, implemented by software, such as for rewriting to important ports.	Yes / No		2008/3/25

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Peripheral function	I/O port	When the CMOS I/O port is used for output, is the PDRx register set first and then the DDRx register? (FR30 series) When the CMOS I/O port is used for output, are the PDRx, DDRx, and PFRx registers set sequentially in this order? (FR60 series)	Because the initial value of the PDRx register is undefined, undefined data is output if the DDRx register is set for output without setting the PDRx register. When the CMOS I/O port is used for output, set the PDRx register first and then set the PFRx register if used.	Yes / No		2008/3/25
Peripheral function	I/O port	Is the port used after the expansion port function register (EPFR) that sets the pin function assignment is set?	When the pin assignment is changed from the initial setting of the peripheral devices to use, the setting change of the EPFR register is required.	Yes / No		2008/3/25
Peripheral function	ADC	Is analog input impedance below that specified in the data sheet? If the analog input impedance is higher, the sample hold time needs to be set longer or a capacitor needs to be attached externally.	If analog input impedance is higher, the analog data sampling time may become insufficient.	Yes / No	Applicable only when an A/D converter is used.	2008/3/25
Peripheral function	ADC	Is sufficient analog sample hold time secured?	If analog input impedance is high, a glitch may occur in the analog input pin. The glitch is caused depending on the analog input impedance as the time constant of the internal capacitance. If the sample hold time is shorter, the sample hold time may be affected by the glitch. (Because differences may also occur with Flash or Mask, sufficient sample hold time should be secured when analog input impedance is higher.)	Yes / No	Applicable only when the recommended analog input impedance in the data sheet or higher is used.	2008/3/25
Peripheral function	ADC	Do you finish A/D conversion and start A/D simultaneously?	If the end of A/D conversion and A/D startup occur simultaneously, the second start may be ignored.	Yes / No	Applicable only when A/D is started while A/D is in progress.	2008/3/25
Peripheral function	ADC	Are the (AVR or AVRH) and AVCC voltage levels sufficiently stable?	Reactance may be put in AVR and AVCC to perform power separation between the analog and digital power supplies. In this case, circuits should be configured to enable sufficient power supply at A/D converter startup such as by adding a capacitance of several uF or more to AVR and AVCC.	Yes / No	Applicable only when the A/D converter is used.	2008/3/25
Peripheral function	Flash	Do you know that flash memory cannot be read during writing to memory or deletion of memory data (chip deletion, sector deletion)?	Interrupt vectors in flash memory cannot be read either during writing to memory or deletion of memory data (chip deletion, sector deletion). Note that interrupt processing thus cannot be performed during writing or deletion.	Yes / No	Applicable only when user writes data in flash memory.	2008/3/25
Peripheral function	Flash	When flash memory user writing is supported, is flash writing controlled by using the hardware sequence flag?	Because the FSTR register cannot be used for write/delete error checking, Fujitsu recommends using the hardware sequence flag to implement flash write/delete control.	Yes / No	Applicable only when user writes data in flash memory.	2008/3/25
Peripheral function	I2C	Is the operating frequency of this product type set in such a way that the data setup time standard of the communication destination is satisfied?	Set the operating frequency of this product type in such a way that the data setup time standard of the communication destination is satisfied	Yes / No	Applicable only when I2C is used.	2008/3/25
Peripheral function	I2C	Is the INT bit cleared at the end of interrupt routine processing?	In accordance with the specifications, the SCL pin goes low when INT bit is 1 and the SCL pin is open when the INT bit is cleared. Therefore, I2C data processing needs to be performed when INT bit = 1 (SCL pin = Low), and the INT bit needs to be cleared (making the SCL pin open) when transmission/reception of next data is enabled.	Yes / No		2008/3/25
Peripheral function	Watchdog timer	Is the watchdog timer cleared by a timer interrupt?	If watchdog reset intervals are not sufficiently specified, it is difficult to detect whether the program runs according to normal procedures.	Yes / No		2008/3/25
General	General	In linker layout/linkage, is the memory range set according to the ROM and RAM amounts of the Flash and Mask products?	The internal memory amount of the EVA chip for evaluation differs from those of the Flash and Mask products. For this reason, even if normal operation can be confirmed with the tool, operation may be disabled on the actual products.	Yes / No		2008/3/25

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General	General	Is the maximum usage of the stack checked?	Incorrect estimation of stack usage may result in damage to RAM.	Yes / No	The maximum usage of the stack should be checked using the Softune C analyzer. (Because the C analyzer cannot check dynamic stacks, it is necessary to check the maximum usage in consideration of the occurrence of concurrent multiple interrupts.)	2008/3/25
General	General	Do you issue a Read Modify Write instruction in a register that includes a write-only bit?	If a Read Modify Write instruction (such as BANDL) is used in a register that includes a write-only bit, an undefined value is read from the write-only bit and a problem may result. (This problem does not occur with the registers for which the manual describes, the use of Read Modify Write instructions causes no problem.)	Yes / No	For development with a C source, check whether a header file is used to set a RMW instruction in bit units in a register that includes a write-only bit. The Read Modify Write (RMW) instructions mean those for which * is marked for RMW in the instruction list	2008/3/25
General	General	Do the voltage range used, temperature range used, and operating frequency used satisfy the Fujitsu-specified standards? If not, do you consider or have any agreement for special guarantee?	Product guarantee is not available when the product is used out of the guarantee range.	Yes / No	Check the operation guarantee range in the data sheet.	2008/3/25
Noise countermeasures and others	Mode pin	Is the same level secured for MOD pin processing even during instruction execution?	There is fear that the MOD pin level is read incorrectly. (When the MOD pin is processed by a high impedance resistor, the MOD pin level may not be secured due to noise.)	Yes / No	If external noise is likely to intrude into the MOD pin, countermeasures against static electricity such as connecting a capacitor to the mode pin should be taken.	2008/3/25
Noise countermeasures and others	Mode pin	Is the MOD pin processing interconnect moderately short (not too long) and free from large current signals in the neighborhood?	There is fear that the MOD pin level may be read incorrectly due to power fluctuation or noise.	Yes / No		2008/3/25
Noise countermeasures and others	Oscillation	When a crystal oscillator is used, is an adequate dumping resistor inserted?	When a crystal oscillator is used, a dumping resistor is required for suppressing oscillation current.	Yes / No	Ask the vendor of the oscillator used for oscillation evaluation.	2008/3/25
Noise countermeasures and others	Oscillation	Do you collect oscillation matching data with mass-produced products?	Oscillation characteristics may differ between flash and mask products. It is recommended to collect oscillation matching data with mass-produced products.	Yes / No	Ask the vendor of the oscillator used for oscillation evaluation.	2008/3/25
Noise countermeasures and others	Oscillation	Are unnecessary radiant noise and oscillation amplitude recognized to determine the dumping resistance of the oscillating circuit?	Oscillation may not normally be performed, or unnecessary radiant noise may increase due to oscillation overshoot or undershoot.	Yes / No	If a problem of unnecessary radiant noise occurs, it is needed to study inserting a dumping resistor as measures against unnecessary radiant noise while confirming oscillation waveforms.	2008/3/25
Noise countermeasures and others	Oscillation	Is the oscillator placed as close to the chip as possible?	The CPU may cause a runaway due to external noise.	Yes / No	Be sure to place the oscillator near chips.	2008/3/25
Noise countermeasures and others	Vcc,GND	Is it designed to make Vcc and GND as resistant to noise as possible?	There is fear of unnecessary-radiant noise problems and the CPU running into out of control due to external noise.	Yes / No	Consider preventing unnecessary radiant noise and external noise in advance, and secure the power and GND areas as wide as possible. (Placing GND under chips can enhance GND.)	2008/3/25
Noise countermeasures and others	ESD, latch-up, noise	Are ESD, latch-up, and noise evaluations performed with mass-produced products?	Because ESD, latch-up, and noise performance differ between flash and mask products, it is recommended to evaluate such performance with mass-produced products.	Yes / No	For performance data with mask and flash products, Fujitsu is ready to submit internal measurement results as performance examples upon request.	2008/3/25
Noise countermeasures and others	Capacitor	Is a most appropriate capacitor connected near the product for countermeasures against noise?	The capacitor placed for measures against noise may be impaired by reactance components of lead lines. (Countermeasures with noise components taken into account are needed.)	Yes / No		2008/3/25
Noise countermeasures and others	Pin C	Is the capacity of the smoothing capacitor connected to Vcc greater than that of the smoothing capacitor connected to C pin?	The internal regulator may be unstable if the capacity of the smoothing capacitor connected to Vcc pin is smaller.	Yes / No		2008/3/25

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Noise countermeasures and others	Unused-pin processing	Is an unused pin pulled up or down with a 2kΩ or higher resistor? Or, is port output processing performed in the initial routine while the pin is left open?	If an unused pin is processed without intervention of a resistor, a problem such as latch up may occur if the port level output is opposite to the processing level due to CPU runaway.	Yes / No		2008/3/25
Noise countermeasures and others	Special guarantee	You may have a contract of special guarantee. If so, did you return the paper with "confirmation stamp (problem: yes/no)" clearly stated to your salesperson?	If you have a contract of special guarantee, a test change may be needed. Be sure to return the paper before the ROM release.	Yes / No	Because it may take a few months to respond to a test change, it may be too late to respond if you return the paper immediately before the ROM release.	2008/3/25