Sample Drivers for R8C/LA8A

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Application Note: <Sample Drivers for R8C/LA8A>

IThis document is designed to describe an outline of various sample driver software created for R8C/LA8A.

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1. File Composition of Sample Driver Software

- This document of sample driver software consists of a source list and directions (* pdf format) for each function.
  On decompression of a downloaded file, a “source” folder and a “doc” folder are generated.
  In the sub folders in the “source” folder, source lists of each function are stored.
  In the sub folders in the “doc” folder, directions for each function are stored.

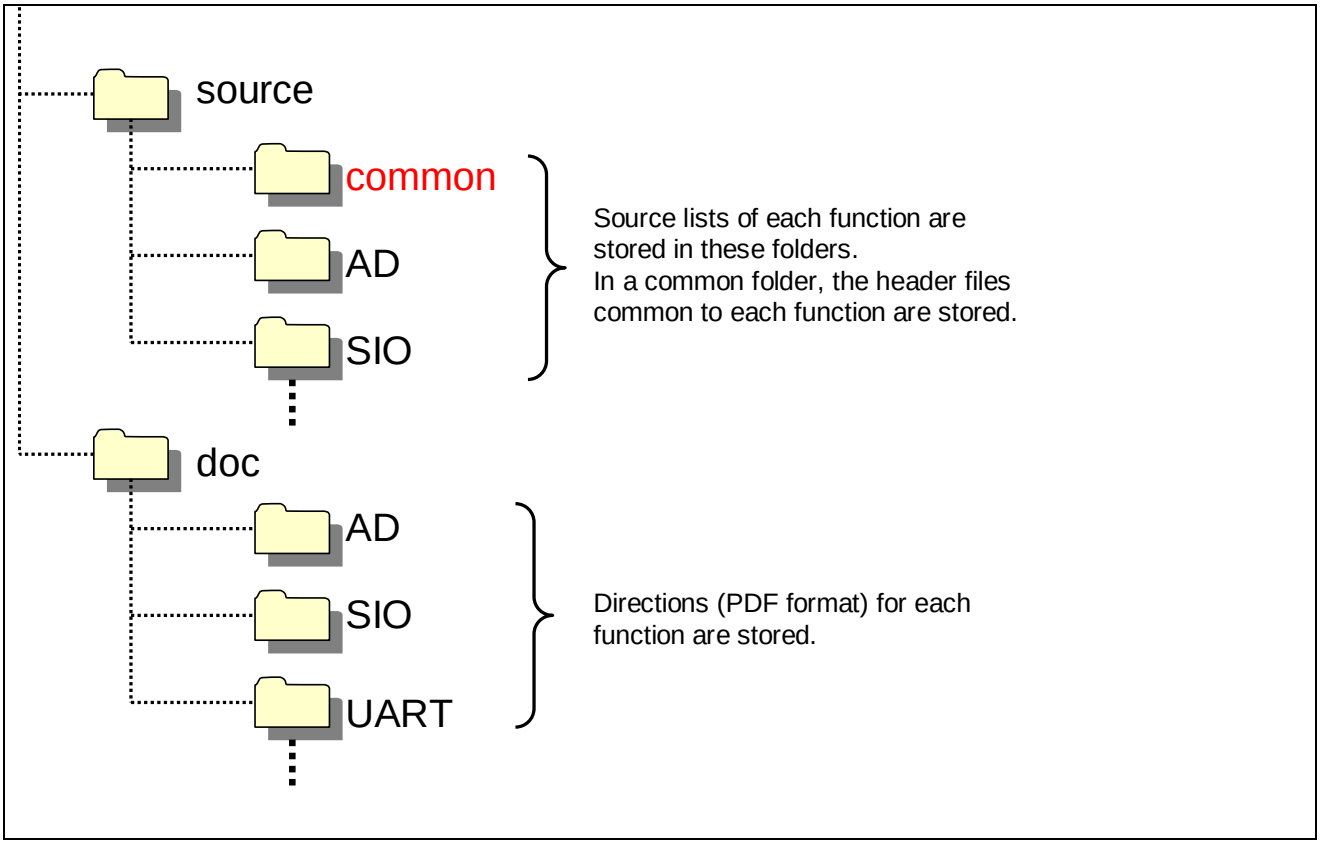

Figure 1 File Composition

2. Lists of Sample Driver Software

- The tables below show the lists of sample driver software described in this document.

Table 2-1 A List of Sample Driver Software (1)

Types of Drivers		Process Summary	ROM (byte)	RAM (byte)	Function Name	Souce file
Voltage Monitor 1 Interrupt		Voltage Monitor 1 Interrupt Setting	167	0	R_VDET1_Create	r_vdet1_create.c
Voltage Monitor 2 Interrupt		Voltage Monitor 2 Interrupt Setting	162	0	R_VDET2_Create	r_vdet2_create.c
KEY ON WAKE UP (KI0-KI7)		KI0-KI7 Key Input Interrupt Setting	206	0	R_KWAKE_Create	r_kwake_create.c
Clock Synchronous Serial 0 Transmission		SI/O0 Setting for Transmission	136	8	R_SIO0_Create_Transmit	r_sio0_create_transmit.c
		SI/O0 Transmit Execution	124	0	R_SIO0_Control_Transmit	r_sio0_control_transmit.c
Clock Synchronous Serial 0 Reception		SI/O0 Setting for Reception	127	8	R_SIO0_Create_Receive	r_sio0_create_receive.c
		SI/O0 Receive Execution	126	0	R_SIO0_Control_Receive	r_sio0_control_receive.c
Clock Synchronous Serial 2 Transmission		SI/O2 Setting for Transmission	371	8	R_SIO2_Create_Transmit	r_sio2_create_transmit.c
		SI/O2 Transmit Execution	124	0	R_SIO2_Control_Transmit	r_sio2_control_transmit.c
Clock Synchronous Serial 2 Reception		SI/O2 Setting for Reception	371	8	R_SIO2_Create_Receive	r_sio2_create_receive.c
		SI/O2 Receive Execution	126	0	R_SIO2_Control_Receive	r_sio2_control_receive.c
UART0 Transmission		UART0 Setting for Transmission	173	16	R_UART0_Create_Transmit	r_uart0_create_transmit.c
		UART0 Transmit Execution	128	0	R_UART0_Control_Transmit	r_uart0_control_transmit.c
UART0 Reception		UART0 Setting for Reception	160	20	R_UART0_Create_Receive	r_uart0_create_receive.c
		UART0 Receive Execution	201	0	R_UART0_Control_Receive	r_uart0_control_receive.c
UART2 Transmission		UART2 Setting for Transmission	416	16	R_UART2_Create_Transmit	r_uart2_create_transmit.c
		UART2 Transmit Execution	128	0	R_UART2_Control_Transmit	r_uart2_control_transmit.c
UART2 Reception		UART2 Setting for Reception	416	20	R_UART2_Create_Receive	r_uart2_create_receive.c
		UART2 Receive Execution	201	0	R_UART2_Control_Receive	r_uart2_control_receive.c
SSU Transmission (Master)		SSU Setting for Transmit Master	339	3	R_SSU_Create_MTransmit	r_ssu_create_mtransmit.c
		SSU Transmit Master Status Check/ Erase	64	3	R_SSU_Status_MTransmit	r_ssu_status_mreceive.c
		SSU Transmit Master Process Execution	213	19	R_SSU_Control_MTransmit	r_ssu_control_mtransmit.c
SSU Reception (Master)		SSU Setting for Receive Master	339	2	R_SSU_Create_MReceive	r_ssu_create_mreceive.c
		SSU Receive Master Status Check/ Erase	93	2	R_SSU_Status_MReceive	r_ssu_status_mtransmit.c
		SSU Receive Master Process Execution	211	18	R_SSU_Control_MReceive	r_ssu_control_mreceive.c
SSU Transmission (Slave)		SSU Setting for Transmit Slave	502	3	R_SSU_Create_STransmit	r_ssu_create_stransmit.c
		SSU Transmit Slave Process Execution	249	19	R_SSU_Control_STransmit	r_ssu_control_stransmit.c
SSU Reception (Slave)		SSU Setting for Receive Slave	502	2	R_SSU_Create_SReceive	r_ssu_create_sreceive.c
		SSU Receive Slave Process Execution	247	18	R_SSU_Control_SReceive	r_ssu_control_sreceive.c
UART2 Simplified IIC-BUS Control (Single Master)		UART2 Simplified IIC-BUS Setting (Single Master)	363	8	R_IIC_UART2_Create_SMaster	r_iic_uart2_create_smaster.c
		UART2 Simplified IIC-BUS Status Check/ Erase (Single Master)	468	16	R_IIC_UART2_Status_SMaster	r_iic_uart2_status_smaster.c
		UART2 Simplified IIC-BUS Process Execution (Single Master)	63	8	R_IIC_UART2_Control_SMaster	r_iic_uart2_control_smaster.c
IIC-BUS Control (Single Master)		IIC-BUS Setting (Single Master)	276	6	R_IIC_Create_SMaster	r_iic_create_smaster.c
		IIC-BUS Status Check/ Erase (Single Master)	69	6	R_IIC_Status_SMaster	r_iic_status_smaster.c
		IIC-BUS Process Execution (Single Master)	515	14	R_IIC_Control_SMaster	r_iic_control_smaster.c
UART2 Simplified IIC-BUS Control (Slave)		UART2 Simplified IIC-BUS Setting (Slave)	357	3	R_IIC_UART2_Create_Slave	r_iic_uart2_create_slave.c
		UART2 Simplified IIC-BUS Process Execution (Slave)	485	11	R_IIC_UART2_Control_Slave	r_iic_uart2_control_slave.c
IIC-BUS Control (Slave)		IIC-BUS Setting (Slave)	248	3	R_IIC_Create_Slave	r_iic_create_slave.c
		IIC-BUS Process Execution (Slave)	374	11	R_IIC_Control_Slave	r_iic_control_slave.c
Timer RJ (0)	Timer Mode	Timer Mode Setting	77	0	R_TMR_RJ0_Create_Timer	r_tmr_rj0_create_timer.c
		Starting and Stopping Timer	51	0	R_TMR_RJ0_Control_Timer	r_tmr_rj0_control_timer.c
	Event Counter Mode	Event Counter Mode Setting	377	0	R_TMR_RJ0_Create_ECnt	r_tmr_rj0_create_ecnt.c
		Starting and Stopping Event Counter Mode	56	0	R_TMR_RJ0_Control_ECnt	r_tmr_rj0_control_ecnt.c
	Pulse Width Measurement Mode	Pulse Width Measurement Mode Setting	176	0	R_TMR_RJ0_Create_PWidth	r_tmr_rj0_create_pwidth.c
		Starting and Stopping Pulse Width Measurement	51	0	R_TMR_RJ0_Control_PWidth	r_tmr_rj0_control_pwidth.c
	Pulse Period Measurement Mode	Pulse Period Measurement Mode Setting	176	0	R_TMR_RJ0_Create_PPeriod	r_tmr_rj0_create_pperiod.c
		Starting and Stopping Pulse Period Measurement	51	0	R_TMR_RJ0_Control_PPeriod	r_tmr_rj0_control_pperiod.c
	Pulse Output Mode	Pulse Output Mode Setting	128	0	R_TMR_RJ0_Create_POutput	r_tmr_rj0_create_poutput.c
		Pulse Output Process	72	0	R_TMR_RJ0_Control_POutput	r_tmr_rj0_control_poutput.c
Timer RJ (1)	Timer Mode	Timer Mode Setting	77	0	R_TMR_RJ1_Create_Timer	r_tmr_rj1_create_timer.c
		Starting and Stopping Timer	51	0	R_TMR_RJ1_Control_Timer	r_tmr_rj1_control_timer.c
	Event Counter Mode	Event Counter Mode Setting	360	0	R_TMR_RJ1_Create_ECnt	r_tmr_rj1_create_ecnt.c
		Starting and Stopping Event Counter Mode	56	0	R_TMR_RJ1_Control_ECnt	r_tmr_rj1_control_ecnt.c
	Pulse Width Measurement Mode	Pulse Width Measurement Mode Setting	176	0	R_TMR_RJ1_Create_PWidth	r_tmr_rj1_create_pwidth.c
		Starting and Stopping Pulse Width Measurement	51	0	R_TMR_RJ1_Control_PWidth	r_tmr_rj1_control_pwidth.c
	Pulse Period Measurement Mode	Pulse Period Measurement Mode Setting	176	0	R_TMR_RJ1_Create_PPeriod	r_tmr_rj1_create_pperiod.c
		Starting and Stopping Pulse Period Measurement	51	0	R_TMR_RJ1_Control_PPeriod	r_tmr_rj1_control_pperiod.c
	Pulse Output Mode	Pulse Output Mode Setting	128	0	R_TMR_RJ1_Create_POutput	r_tmr_rj1_create_poutput.c
		Pulse Output Process	72	0	R_TMR_RJ1_Control_POutput	r_tmr_rj1_control_poutput.c
Timer RJ (2)	Timer Mode	Timer Mode Setting	77	0	R_TMR_RJ2_Create_Timer	r_tmr_rj2_create_timer.c
		Starting and Stopping Timer	51	0	R_TMR_RJ2_Control_Timer	r_tmr_rj2_control_timer.c
	Event Counter Mode	Event Counter Mode Setting	353	0	R_TMR_RJ2_Create_ECnt	r_tmr_rj2_create_ecnt.c
		Starting and Stopping Event Counter Mode	56	0	R_TMR_RJ2_Control_ECnt	r_tmr_rj2_control_ecnt.c
	Pulse Width Measurement Mode	Pulse Width Measurement Mode Setting	152	0	R_TMR_RJ2_Create_PWidth	r_tmr_rj2_create_pwidth.c
		Starting and Stopping Pulse Width Measurement	51	0	R_TMR_RJ2_Control_PWidth	r_tmr_rj2_control_pwidth.c
	Pulse Period Measurement Mode	Pulse Period Measurement Mode Setting	152	0	R_TMR_RJ2_Create_PPeriod	r_tmr_rj2_create_pperiod.c
		Starting and Stopping Pulse Period Measurement	51	0	R_TMR_RJ2_Control_PPeriod	r_tmr_rj2_control_pperiod.c
	Pulse Output Mode	Pulse Output Mode Setting	106	0	R_TMR_RJ2_Create_POutput	r_tmr_rj2_create_poutput.c
		Pulse Output Process	72	0	R_TMR_RJ2_Control_POutput	r_tmr_rj2_control_poutput.c

Table 2-2 A List of Sample Driver Software (2)

Types of Drivers		Process Summary	ROM (byte)	RAM (byte)	Function Name	Souce file	Function manual
Timer RB (0)	Timer Mode	Timer Mode Setting	81	0	R_TMR_RB0_Create_Timer	r_tmr_rb0_create_timer.c	R8C_LA8A_timer_RB0_timer_e.pdf
		Starting and Stopping Timer	51	0	R_TMR_RB0_Control_Timer	r_tmr_rb0_control_timer.c	
	Programmable Waveform Mode	Programmable Waveform Generation Mode Setting	142	0	R_TMR_RB0_Create_PWave	r_tmr_rb0_create_pwave.c	R8C_LA8A_timer_RB0_pwave_e.pdf
		Programmable Waveform Generation Process	66	0	R_TMR_RB0_Control_PWave	r_tmr_rb0_control_pwave.c	
	Programmable One-Shot Generation Mode	Programmable One-Shot Generation Mode Setting	218	0	R_TMR_RB0_Create_POneshot	r_tmr_rb0_create_poneshot.c	R8C_LA8A_timer_RB0_poneshot_e.pdf
		Programmable One-Shot Generation Process	36	0	R_TMR_RB0_Control_POneshot	r_tmr_rb0_control_poneshot.c	
	Programmable Wait One-Shot Generation Mode	Programmable Wait One-Shot Generation Mode Setting	215	0	R_TMR_RB0_Create_PWOneshot	r_tmr_rb0_create_pwoneshot.c	R8C_LA8A_timer_RB0_pwoneshot_e.pdf
		Programmable Wait One-Shot Generation Process	41	0	R_TMR_RB0_Control_PWOneshot	r_tmr_rb0_control_pwoneshot.c	
Timer RB (1)	Timer Mode	Timer Mode Setting	81	0	R_TMR_RB1_Create_Timer	r_tmr_rb1_create_timer.c	R8C_LA8A_timer_RB1_timer_e.pdf
		Starting and Stopping Timer	51	0	R_TMR_RB1_Control_Timer	r_tmr_rb1_control_timer.c	
	Programmable Waveform Mode	Programmable Waveform Generation Mode Setting	126	0	R_TMR_RB1_Create_PWave	r_tmr_rb1_create_pwave.c	R8C_LA8A_timer_RB1_pwave_e.pdf
		Programmable Waveform Generation Process	66	0	R_TMR_RB1_Control_PWave	r_tmr_rb1_control_pwave.c	
	Programmable One-Shot Generation Mode	Programmable One-Shot Generation Mode Setting	202	0	R_TMR_RB1_Create_POneshot	r_tmr_rb1_create_poneshot.c	R8C_LA8A_timer_RB1_poneshot_e.pdf
		Programmable One-Shot Generation Process	36	0	R_TMR_RB1_Control_POneshot	r_tmr_rb1_control_poneshot.c	
	Programmable Wait One-Shot Generation Mode	Programmable Wait One-Shot Generation Mode Setting	199	0	R_TMR_RB1_Create_PWOneshot	r_tmr_rb1_create_pwoneshot.c	R8C_LA8A_timer_RB1_pwoneshot_e.pdf
		Programmable Wait One-Shot Generation Process	41	0	R_TMR_RB1_Control_PWOneshot	r_tmr_rb1_control_pwoneshot.c	
Timer RC	Common for All Modes	Common Setting for All Modes	214	0	R_TMR_RC_Create	r_tmr_rc_create.c	R8C_LA8A_timer_RC_e.pdf
	Shared Register Setting Process	Shared Register Setting	59	0	R_TMR_RC_Create_Reg	r_tmr_rc_create_reg.c	
	Timer RC Execution Process	Timer RC Count Start Process	100	0	R_TMR_RC_Control	r_tmr_rc_control.c	
	Timer Mode (Input Capture)	Timer Mode (Input Capture) Setting	398	0	R_TMR_RC_Create_ICap	r_tmr_rc_create_icap.c	
	Timer Mode (Output Compare)	Timer Mode (Output Compare) Setting	399	0	R_TMR_RC_Create_OCmp	r_tmr_rc_create_ocmp.c	
	PWM Mode	PWM Mode Setting	148	0	R_TMR_RC_Create_Pwm	r_tmr_rc_create_pwm.c	
	PWM2 Mode	PWM2 Mode Setting	205	0	R_TMR_RC_Create_Pwm2	r_tmr_rc_create_pwm2.c	
Timer RH	Output Compare Mode	Output Compare Mode Setting	67	0	R_TMR_RH_Create_OCmp	r_tmr_rh_create_ocmp.c	R8C_LA8A_timer_RH_outcomp_e.pdf
		Output Compare Output Process	101	0	R_TMR_RH_Control_OCmp	r_tmr_rh_control_ocmp.c	
	Real-Time Clock Basic Setting	Real-Time Clock Mode Setting	121	0	R_TMR_RH_Create_Rtc	r_tmr_rh_create_rtc.c	R8C_LA8A_timer_RH_e.pdf
	Real-Time Clock Control	Starting and Stopping Real-Time Clock Mode	38	0	R_TMR_RH_Control_Rtc	r_tmr_rh_control_rtc.c	
	Real-Time Clock Data Setting	Real-Time Clock Data Setting (Year/Month/Day/Day-of-the-Week/Hour/Minute/Second)	82	0	R_TMR_RH_Create_Time	r_tmr_rh_create_time.c	
	Real-Time Clock Interrupt Setting	Real-Time Clock Interrupt Setting	243	0	R_TMR_RH_Create_Int	r_tmr_rh_create_int.c	
	Real-Time Clock Alarm Setting	Alarm Data Setting (Day-of-the-Week/Hour/Minute)	141	0	R_TMR_RH_Create_Alarm	r_tmr_rh_create_alarm.c	
	Real-Time Clock Automatic Correction Setting	Automatic Correction Setting	59	0	R_TMR_RH_Create_Adjust	r_tmr_rh_create_adjust.c	
	Real-Time Clock Reset Control	Starting Real-Time Clock Reset	22	0	R_TMR_RH_Control_Reset	r_tmr_rh_control_reset.c	
AD Conversion	Basic Setting	AD Conversion Setting	142	0	R_ADC_Create	r_adc_create.c	R8C_LA8A_AD_e.pdf
	One-Shot Mode	Conversion Start Process	199	0	R_ADC_Control_Oneshot	r_adc_control_oneshot.c	
	Repeat Mode 0	Conversion Start Process	202	0	R_ADC_Control_Repeat0	r_adc_control_repeat0.c	
	Repeat Mode 1	Conversion Start Process	202	0	R_ADC_Control_Repeat1	r_adc_control_repeat1.c	
	Single Sweep Mode	Conversion Start Process	272	0	R_ADC_Control_SSweep	r_adc_control_ssweep.c	
	Repeat Sweep Mode	Conversion Start Process	272	0	R_ADC_Control_RSweep	r_adc_control_rsweep.c	
	A/D Data Read Process	A/D Conversion Data Read Process	357	16	R_ADC_Read	r_adc_read.c	
	Gain Amplifier	Gain Amplifier Setting	27	0	R_ADC_Create_GainAmp	r_adc_create_gainamp.c	
Comparator B1 Interrupt		Comparator B1 Setting	160	0	R_CMP_B1_Create	r_cmp_b1_create.c	R8C_LA8A_comp_b1_e.pdf
		Comparator B1 Control	56	0	R_CMP_B1_Control	r_cmp_b1_control.c	
Comparator B3 Interrupt		Comparator B3 Setting	160	0	R_CMP_B3_Create	r_cmp_b3_create.c	R8C_LA8A_comp_b3_e.pdf
		Comparator B3 Control	56	0	R_CMP_B3_Control	r_cmp_b3_control.c	
INT0 Interrupt		INT0 Setting	82	0	R_INT0_Create	r_int0_create.c	R8C_LA8A_int0_e.pdf
		INT0 Control	73	0	R_INT0_Control	r_int0_control.c	
INT1 Interrupt		INT1 Setting	86	0	R_INT1_Create	r_int1_create.c	R8C_LA8A_int1_e.pdf
		INT1 Control	73	0	R_INT1_Control	r_int1_control.c	
INT2 Interrupt		INT2 Setting	86	0	R_INT2_Create	r_int2_create.c	R8C_LA8A_int2_e.pdf
		INT2 Control	73	0	R_INT2_Control	r_int2_control.c	
INT3 Interrupt		INT3 Setting	86	0	R_INT3_Create	r_int3_create.c	R8C_LA8A_int3_e.pdf
		INT3 Control	73	0	R_INT3_Control	r_int3_control.c	
INT4 Interrupt		INT4 Setting	82	0	R_INT4_Create	r_int4_create.c	R8C_LA8A_int4_e.pdf
		INT4 Control	73	0	R_INT4_Control	r_int4_control.c	
INT5 Interrupt		INT5 Setting	82	0	R_INT5_Create	r_int5_create.c	R8C_LA8A_int5_e.pdf
		INT5 Control	73	0	R_INT5_Control	r_int5_control.c	
INT6 Interrupt		INT6 Setting	82	0	R_INT6_Create	r_int6_create.c	R8C_LA8A_int6_e.pdf
		INT6 Control	73	0	R_INT6_Control	r_int6_control.c	
INT7 Interrupt		INT7 Setting	82	0	R_INT7_Create	r_int7_create.c	R8C_LA8A_int7_e.pdf
		INT7 Control	73	0	R_INT7_Control	r_int7_control.c	

3. Usage Outlines of Sample Driver Software

- Source lists of each function are attached to this document.
  A source file of the function to be used can be diverted without any change.
  Header files (*.h) required for use of each function are stored in the same folders where each function is stored.
  Common header files such as a definition file of a special function register, etc. are stored in a .source/common folder.
  For the details of how to use each function, please refer to the descriptions of each function before actual use.

Website and Support

Renesas Electronics Website
http://www.renesas.com/

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Revision Record

Rev.	Date	Description	
		Page	Summary
1.00	Jan.31, 2011	—	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins
   Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.
   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.
2. Processing at Power-on
   The state of the product is undefined at the moment when power is supplied.
   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.
3. Prohibition of Access to Reserved Addresses
   Access to reserved addresses is prohibited.
   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.
4. Clock Signals
   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.
   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.
5. Differences between Products
   Before changing from one product to another, i.e. to one with a different type number, confirm that the change will not lead to problems.
   — The characteristics of MPU/MCU in the same group but having different type numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different type numbers, implement a system-evaluation test for each of the products.

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