

RENESAS TECHNICAL UPDATE

TOYOSU FORESIA, 3-2-24, Toyosu, Koto-ku, Tokyo 135-0061, Japan
Renesas Electronics Corporation

Product Category	MPU/MCU		Document No.	TN-SY*-A0059A/E	Rev.	1.00
Title	S5D3 Group, S5D5 Group, S5D9 Group, VBATT minimum voltage level enhancement		Information Category	Technical Notification		
Applicable Product	S5D3 Group S5D5 Group S5D9 Group	Lot No.	Reference Document	S5D3 Microcontroller Group User's Manual Rev.1.10 S5D5 Microcontroller Group User's Manual Rev.1.30 S5D9 Microcontroller Group User's Manual Rev.1.30		
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VBATT minimum voltage level is enhanced from 1.8V to 1.65V. Examples are shown below.

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Table 52.2 Recommended operating conditions

Parameter	Symbol	Value	Min	Typ	Max	Unit
Power supply voltages	VCC	When USB is not used	2.7	-	3.6	V
		When USB is used	3.0	-	3.6	V
	VSS	-	0	-	V	
USB power supply voltages	VCC_USB	-	VCC	-	V	
	VSS_USB	-	0	-	V	
VBATT power supply voltage	VBATT	1.8	-	3.6	V	
Analog power supply voltages	AVCC0*1	-	VCC	-	V	
	AVSS0	-	0	-	V	

Note 1. Connect AVCC0 to VCC. When the A/D converter, the D/A converter, or the comparator are not in use, do not leave the AVCC0, VREFH/VREFH0, AVSS0, and VREFL/VREFL0 pins open. Connect the AVCC0 and VREFH/VREFH0 pins to VCC, and the AVSS0 and VREFL/VREFL0 pins to VSS, respectively.

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Table 52.2 Recommended operating conditions

Parameter	Symbol	Value	Min	Typ	Max	Unit
Power supply voltages	VCC	When USB is not used	2.7	-	3.6	V
		When USB is used	3.0	-	3.6	V
	VSS	-	0	-	V	
USB power supply voltages	VCC_USB	-	VCC	-	V	
	VSS_USB	-	0	-	V	
VBATT power supply voltage	VBATT	1.65 *2	-	3.6	V	
Analog power supply voltages	AVCC0*1	-	VCC	-	V	
	AVSS0	-	0	-	V	

Note 1. Connect AVCC0 to VCC. When the A/D converter, the D/A converter, or the comparator are not in use, do not leave the AVCC0, VREFH/VREFH0, AVSS0, and VREFL/VREFL0 pins open. Connect the AVCC0 and VREFH/VREFH0 pins to VCC, and the AVSS0 and VREFL/VREFL0 pins to VSS, respectively.

Note 2. Low CL crystal cannot be used below VBATT = 1.8V.

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Table 52.41 Battery backup function characteristics

Conditions: VCC = AVCC0 = VCC_USB = 2.7 to 3.6 V, 2.7 ≤ VREFH0/VREFH ≤ AVCC0, VBATT = 1.8 to 3.6 V

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Voltage level for switching to battery backup	V _{DETBATT}	2.50	2.60	2.70	V	Figure 52.70
Lower-limit VBATT voltage for power supply switching caused by VCC voltage drop	V _{BATTSW}	2.70	-	-	V	
VCC-off period for starting power supply switching	t _{VOFFBATT}	200	-	-	μs	

Note: The VCC-off period for starting power supply switching indicates the period in which VCC is below the minimum value of the voltage level for switching to battery backup (V_{DETBATT}).

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Table 52.41 Battery backup function characteristics

Conditions: VCC = AVCC0 = VCC_USB = 2.7 to 3.6 V, 2.7 ≤ VREFH0/VREFH ≤ AVCC0, VBATT = 1.65 to 3.6 V *1

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Voltage level for switching to battery backup	V _{DETBATT}	2.50	2.60	2.70	V	Figure 52.70
Lower-limit VBATT voltage for power supply switching caused by VCC voltage drop	V _{BATTSW}	2.70	-	-	V	
VCC-off period for starting power supply switching	t _{VOFFBATT}	200	-	-	μs	

Note: The VCC-off period for starting power supply switching indicates the period in which VCC is below the minimum value of the voltage level for switching to battery backup (V_{DETBATT}).

Note 1. Low CL crystal cannot be used below VBATT = 1.8V.