

RENESAS TECHNICAL UPDATE

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|--------------------|--|----------|----------------------|---|------|------|
| Product Category | MPU/MCU | | Document No. | TN-RL*-A0120A/E | Rev. | 1.00 |
| Title | Correction for Incorrect Description Notice RL78/I1C (512KB) Descriptions in the User's Manual: Hardware Rev. 1.01 Changed | | Information Category | Technical Notification | | |
| Applicable Product | RL78/I1C Group | Lot No. | Reference Document | RL78/I1C (512KB) User's Manual: Hardware Rev. 1.01 R01UH0889EJ0101 (Nov. 2022) | | |
| | | All lots | | | | |

This document describes misstatements found in the RL78/I1C (512KB) User's Manual: Hardware Rev. 1.01 (R01UH0889EJ0211).

Corrections

| Applicable Item | Applicable Page | Contents |
|---------------------------------------|------------------------|--------------------------------|
| 43.3.2 Supply current characteristics | Page 1228 to Page 1233 | Incorrect descriptions revised |

Document Improvement

The above corrections will be made for the next revision of the User's Manual: Hardware.

Corrections in the User's Manual: Hardware

| No. | Corrections and Applicable Items | | | Pages in this document for corrections |
|-----|---------------------------------------|---------|------------------------|--|
| | Document No. | English | R01UH0889EJ0101 | |
| 1 | 43.3.2 Supply current characteristics | | Page 1228 to Page 1233 | Page 3 to Page 7 |

Incorrect: Bold with underline; Correct: Gray hatched

Revision History

RL78/I1C Correction for incorrect description notice

| Document Number | Issue Date | Description |
|-----------------|---------------|--|
| TN-RL*-A0120A/E | Jan. 20, 2023 | First edition issued Corrections No.1 revised (this document) |

1. 43.3.2 Supply current characteristics (Page 1228 to Page 1233)

Incorrect:

43.3.2 Supply current characteristics

(T_A = -40 to +85° C, 1.6 V ≤ AV_{DD} = EV_{DD} = V_{DD} ≤ 5.5 V, AV_{SS} = V_{SS} = EV_{SS} = 0V) (1/6)

| Parameter | Symbol | Conditions | | | | | MIN. | TYP. | MAX. | Unit |
|----------------------------------|------------------|----------------|---|--|------------------|-------------------------|------|------|------|------|
| Supply current ^{Note 1} | I _{DD1} | Operating mode | HS (high-speed main) mode ^{Note 5} | f _{HS} = 32 MHz ^{Note 3} | Basic operation | V _{DD} = 5.0 V | | 2.5 | | mA |
| | | | | | | V _{DD} = 3.0 V | | 2.5 | | mA |
| | | | | | Normal operation | V _{DD} = 5.0 V | | 5.6 | 9.1 | mA |
| | | | | | | V _{DD} = 3.0 V | | 5.6 | 9.1 | mA |
| | | | | f _{IL} = 15 kHz, T _A = +85°C ^{Note 7} | Normal operation | | | 5.0 | 13 | μA |

- Notes**
- Total current flowing into V_{DD}, EV_{DD}, and V_{RTC} including the input leakage current flowing when the level of the input pin is fixed to V_{DD}, EV_{DD}, V_{RTC} or V_{SS}, EV_{SS}. ~~The values below the MAX. column include the peripheral operation current. However, not including the current flowing into the LCD controller/driver, 12-bit A/D converter, ΔΣA/D converter, LVD circuit, battery backup circuit, I/O port, and on-chip pull-up/pull-down resistors.~~
 - When high-speed on-chip oscillator, middle-speed on-chip oscillator, low-speed on-chip oscillator, and subsystem clock are stopped.
 - When high-speed system clock, middle-speed on-chip oscillator, low-speed on-chip oscillator, and subsystem clock are stopped.
 - When high-speed on-chip oscillator, middle-speed on-chip oscillator, and high-speed system clock are stopped. When setting ultra-low current consumption (AMP_{HS}1 = 1), ~~However, not including the current flowing into independent power supply RTC, 12-bit interval timer.~~
 - Relationship between operation voltage width, operation frequency of CPU and operation mode is as below.
 - HS (high-speed main) mode: 2.8 V ≤ V_{DD} ≤ 5.5 V@1 MHz to 32 MHz
 - 2.4 V ≤ V_{DD} ≤ 5.5 V@1 MHz to 16 MHz
 - 2.1 V ≤ V_{DD} ≤ 5.5 V@1 MHz to 6 MHz
 - LS (low-speed main) mode: 1.8 V ≤ V_{DD} ≤ 5.5 V@1 MHz to 8 MHz
 - LP (low-power main) mode: 1.8 V ≤ V_{DD} ≤ 5.5 V@1 MHz
 - LV (low-voltage main) mode: 1.6 V ≤ V_{DD} ≤ 5.5 V@1 MHz to 4 MHz
 - When high-speed on-chip oscillator, low-speed on-chip oscillator, high-speed system clock, and subsystem clock are stopped.
 - When high-speed on-chip oscillator, middle-speed on-chip oscillator, high-speed system clock, and subsystem clock are stopped.

Correct:

43.3.2 Supply current characteristics

(T_A = -40 to +85° C, 1.6 V ≤ AV_{DD} = EV_{DD} = V_{DD} ≤ 5.5 V, AV_{SS} = V_{SS} = EV_{SS} = 0V) (1/6)

| Parameter | Symbol | Conditions | | | | | MIN. | TYP. | MAX. | Unit |
|----------------------------------|------------------|----------------|---|--|------------------|-------------------------|------|------|------|------|
| Supply current ^{Note 1} | I _{DD1} | Operating mode | HS (high-speed main) mode ^{Note 5} | f _{HS} = 32 MHz ^{Note 3} | Basic operation | V _{DD} = 5.0 V | | 2.5 | | mA |
| | | | | | | V _{DD} = 3.0 V | | 2.5 | | mA |
| | | | | | Normal operation | V _{DD} = 5.0 V | | 5.6 | 9.1 | mA |
| | | | | | | V _{DD} = 3.0 V | | 5.6 | 9.1 | mA |
| | | | | f _{IL} = 15 kHz, T _A = +85°C ^{Note 7} | Normal operation | | | 5.0 | 13 | μA |

- Notes**
- Total current flowing into V_{DD}, EV_{DD}, and V_{RTC} including the input leakage current flowing when the level of the input pin is fixed to V_{DD}, EV_{DD}, V_{RTC} or V_{SS}, EV_{SS}. The following points apply in the HS (high-speed main), LS (low-speed main), LV (low-voltage main), and LP (low-power main) modes.
 - The currents in the "TYP." column do not include the operating currents of the peripheral modules.
 - The currents in the "MAX." column include the operating currents of the peripheral modules, except for those flowing into the LCD controller/driver, 12-bit A/D converter, ΔΣA/D converter, LVD circuit, battery backup circuit, I/O port, and on-chip pull-up/pull-down resistors, and those flowing while the data flash memory is being rewritten.
 In the subsystem clock operation, the currents in both the "TYP." and "MAX." columns do not include the operating currents of the peripheral modules. However, in HALT mode, including the current flowing into the independent power supply RTC.
 - When high-speed on-chip oscillator, middle-speed on-chip oscillator, low-speed on-chip oscillator, and subsystem clock are stopped.
 - When high-speed system clock, middle-speed on-chip oscillator, low-speed on-chip oscillator, and subsystem clock are stopped.
 - When high-speed on-chip oscillator, middle-speed on-chip oscillator, and high-speed system clock are stopped. When setting ultra-low current consumption (AMP_{HS}1 = 1).

6. When high-speed on-chip oscillator, low-speed on-chip oscillator, high-speed system clock, and subsystem clock are stopped.
7. When high-speed on-chip oscillator, middle-speed on-chip oscillator, high-speed system clock, and subsystem clock are stopped.

- Remarks**
1. f_{MX} : High-speed system clock frequency (X1 clock oscillation frequency or external main system clock frequency)
 2. f_{IH} : High-speed on-chip oscillator clock frequency
 3. f_{IM} : Middle-speed on-chip oscillator clock frequency
 4. f_{IL} : Low-speed on-chip oscillator clock frequency
 5. f_{SUB} : Subsystem clock frequency (XT1 clock oscillation frequency)
 6. Except subsystem clock operation, temperature condition of the TYP. value is $T_A = 25^\circ\text{C}$

5. Relationship between operation voltage width, operation frequency of CPU and operation mode is as below.

HS (high-speed main) mode: $2.8\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }32\text{ MHz}$
 $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }16\text{ MHz}$
 $2.1\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }6\text{ MHz}$

LS (low-speed main) mode: $1.8\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }8\text{ MHz}$

LP (low-power main) mode: $1.8\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz}$

LV (low-voltage main) mode: $1.6\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }4\text{ MHz}$

6. When high-speed on-chip oscillator, low-speed on-chip oscillator, high-speed system clock, and subsystem clock are stopped.
7. When high-speed on-chip oscillator, middle-speed on-chip oscillator, high-speed system clock, and subsystem clock are stopped.

- Remarks**
1. f_{MX} : High-speed system clock frequency (X1 clock oscillation frequency or external main system clock frequency)
 2. f_{IH} : High-speed on-chip oscillator clock frequency
 3. f_{IM} : Middle-speed on-chip oscillator clock frequency
 4. f_{IL} : Low-speed on-chip oscillator clock frequency
 5. f_{SUB} : Subsystem clock frequency (XT1 clock oscillation frequency)
 6. Except subsystem clock operation, temperature condition of the TYP. value is $T_A = 25^\circ\text{C}$

(TA = -40 to +85° C, 1.6 V ≤ AVDD = EVDD = VDD ≤ 5.5 V, AVSS = VSS = EVSS = 0V) (3/6)

| Parameter | Symbol | Conditions | | | MIN. | TYP. | MAX. | Unit | |
|----------------------------------|------------------------------------|------------|---|---|-------------------------|------|------|------|----|
| Supply current ^{Note 1} | I _{DD2} ^{Note 2} | HALT mode | HS (high-speed main) mode ^{Note 7} | f _{HI} = 32 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.69 | 1.9 | mA |
| | | | | | V _{DD} = 3.0 V | | 0.68 | 1.9 | mA |
| | | | | f _{CLK} = 32 MHz ^{Note 4} | V _{DD} = 5.0 V | | 1.2 | 2.2 | mA |
| | | | | PLL operation | V _{DD} = 3.0 V | | 1.2 | 2.2 | mA |
| | | | | f _{HI} = 24 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.56 | 1.5 | mA |
| | | | | | V _{DD} = 3.0 V | | 0.56 | 1.5 | mA |
| | | | | f _{HI} = 16 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.49 | 1.2 | mA |
| | | | | | V _{DD} = 3.0 V | | 0.49 | 1.2 | mA |
| | | | | f _{HI} = 12 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.41 | 1.0 | mA |
| | | | | | V _{DD} = 3.0 V | | 0.41 | 1.0 | mA |
| | | | | f _{HI} = 6 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.36 | 0.8 | mA |
| | | | | | V _{DD} = 3.0 V | | 0.36 | 0.8 | mA |
| | | | | f _{HI} = 3 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.33 | 0.7 | mA |
| | | | | | V _{DD} = 3.0 V | | 0.33 | 0.7 | mA |
| | | | LS (low-speed main) mode ^{Note 7} (MCSEL = 0) | f _{HI} = 8 MHz ^{Note 4} | V _{DD} = 3.0 V | | 290 | 755 | μA |
| | | | | | V _{DD} = 2.0 V | | 290 | 755 | μA |
| | | | | f _{HI} = 6 MHz ^{Note 4} | V _{DD} = 3.0 V | | 240 | 655 | μA |
| | | | | | V _{DD} = 2.0 V | | 240 | 655 | μA |
| | | | | f _{HI} = 3 MHz ^{Note 4} | V _{DD} = 3.0 V | | 210 | 556 | μA |
| | | | | | V _{DD} = 2.0 V | | 210 | 556 | μA |
| | | | LS (low-speed main) mode ^{Note 7} (MCSEL = 1) | f _{HI} = 4 MHz ^{Note 4} | V _{DD} = 3.0 V | | 220 | 450 | μA |
| | | | | | V _{DD} = 2.0 V | | 220 | 450 | μA |
| | | | | f _{MI} = 4 MHz ^{Note 3} | V _{DD} = 3.0 V | | 60 | 350 | μA |
| | | | | | V _{DD} = 2.0 V | | 60 | 350 | μA |
| | | | LV (low-voltage main) mode ^{Note 7} | f _{HI} = 4 MHz ^{Note 4} | V _{DD} = 3.0 V | | 625 | 1200 | μA |
| | | | | | V _{DD} = 2.0 V | | 625 | 1200 | μA |
| | | | LP (low-power main) mode ^{Note 7} (MCSEL = 1) | f _{HI} = 1 MHz ^{Note 4} | V _{DD} = 3.0 V | | 200 | 410 | μA |
| | | | | | V _{DD} = 2.0 V | | 200 | 410 | μA |
| | | | | f _{MI} = 1 MHz ^{Note 3} | V _{DD} = 3.0 V | | 35 | 150 | μA |
| | | | | | V _{DD} = 2.0 V | | 35 | 150 | μA |
| | | | HS (high-speed main) mode ^{Note 7} | f _{MAX} = 20 MHz ^{Note 3} | Square wave input | | 0.31 | 1.15 | mA |
| | | | | | Resonator connection | | 0.53 | 1.35 | mA |
| | V _{DD} = 5.0 V | | | | | | | | |

(TA = -40 to +85° C, 1.6 V ≤ AVDD = EVDD = VDD ≤ 5.5 V, AVSS = VSS = EVSS = 0V) (3/6)

| Parameter | Symbol | Conditions | | | | MIN. | TYP. | MAX. | Unit |
|----------------------------------|------------------------------------|------------|---|---|-------------------------|------|------|------|------|
| Supply current ^{Note 1} | I _{DD2} ^{Note 2} | HALT mode | HS (high-speed main) mode ^{Note 7} | f _{IH} = 32 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.69 | 1.9 | mA |
| | | | | V _{DD} = 3.0 V | | 0.68 | 1.9 | mA | |
| | | | | f _{CLK} = 32 MHz ^{Note 4} | V _{DD} = 5.0 V | | 1.2 | 2.2 | mA |
| | | | | PLL operation | V _{DD} = 3.0 V | | 1.2 | 2.2 | mA |
| | | | | f _{IH} = 24 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.56 | 1.5 | mA |
| | | | | V _{DD} = 3.0 V | | 0.56 | 1.5 | mA | |
| | | | | f _{IH} = 16 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.49 | 1.2 | mA |
| | | | | V _{DD} = 3.0 V | | 0.49 | 1.2 | mA | |
| | | | | f _{IH} = 12 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.41 | 1.0 | mA |
| | | | | V _{DD} = 3.0 V | | 0.41 | 1.0 | mA | |
| | | | | f _{IH} = 6 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.36 | 0.8 | mA |
| | | | | V _{DD} = 3.0 V | | 0.36 | 0.8 | mA | |
| | | | | f _{IH} = 3 MHz ^{Note 4} | V _{DD} = 5.0 V | | 0.33 | 0.7 | mA |
| | | | | V _{DD} = 3.0 V | | 0.33 | 0.7 | mA | |
| | | | LS (low-speed main) mode ^{Note 7} (MCSEL = 0) | f _{IH} = 8 MHz ^{Note 4} | V _{DD} = 3.0 V | | 290 | 755 | μA |
| | | | | V _{DD} = 2.0 V | | 290 | 755 | μA | |
| | | | | f _{IH} = 6 MHz ^{Note 4} | V _{DD} = 3.0 V | | 240 | 655 | μA |
| | | | | V _{DD} = 2.0 V | | 240 | 655 | μA | |
| | | | | f _{IH} = 3 MHz ^{Note 4} | V _{DD} = 3.0 V | | 210 | 556 | μA |
| | | | | V _{DD} = 2.0 V | | 210 | 556 | μA | |
| | | | LS (low-speed main) mode ^{Note 7} (MCSEL = 1) | f _{IH} = 4 MHz ^{Note 4} | V _{DD} = 3.0 V | | 220 | 450 | μA |
| | | | | V _{DD} = 2.0 V | | 220 | 450 | μA | |
| | | | | f _{IM} = 4 MHz ^{Note 5} | V _{DD} = 3.0 V | | 60 | 350 | μA |
| | | | | V _{DD} = 2.0 V | | 60 | 350 | μA | |
| | | | LV (low-voltage main) mode ^{Note 7} | f _{IH} = 4 MHz ^{Note 4} | V _{DD} = 3.0 V | | 625 | 1200 | μA |
| | | | | V _{DD} = 2.0 V | | 625 | 1200 | μA | |
| | | | LP (low-power main) mode ^{Note 7} (MCSEL = 1) | f _{IH} = 1 MHz ^{Note 4} | V _{DD} = 3.0 V | | 200 | 410 | μA |
| | | | | V _{DD} = 2.0 V | | 200 | 410 | μA | |
| | | | | f _{IM} = 1 MHz ^{Note 5} | V _{DD} = 3.0 V | | 35 | 150 | μA |
| | | | | V _{DD} = 2.0 V | | 35 | 150 | μA | |
| | | | HS (high-speed main) mode ^{Note 7} | f _{MAX} = 20 MHz ^{Note 3} | Square wave input | | 0.31 | 1.15 | mA |
| | | | | V _{DD} = 5.0 V | Resonator connection | | 0.53 | 1.35 | mA |
| | | | | | | | | | |

5. When operating independent power supply RTC and setting ultra-low current consumption (AMPHS1 = 1). When high-speed on-chip oscillator, middle-speed on-chip oscillator, and high-speed system clock are stopped. ~~However, not including the current flowing into the 12-bit interval timer and watchdog timer. When high-speed on-chip oscillator and high-speed system clock are stopped.~~
6. ~~When high-speed on-chip oscillator, high-speed system clock, and subsystem clock are stopped. However, not including the current flowing into independent power supply RTC, 12-bit interval timer, and watchdog timer.~~
7. Relationship between operation voltage width, operation frequency of CPU and operation mode is as below.
 - HS (high-speed main) mode: $2.8\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }32\text{ MHz}$
 $2.7\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }24\text{ MHz}$
 $2.5\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }16\text{ MHz}$
 $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }12\text{ MHz}$
 $2.1\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }6\text{ MHz}$
 - LS (low-speed main) mode: $1.9\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }8\text{ MHz}$
 - LP (low-power main) mode: $1.9\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz}$
 - LV (low-voltage main) mode: $1.7\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }4\text{ MHz}$
8. If operation of the subsystem clock when STOP mode, same as when HALT mode of subsystem clock operation.
9. When high-speed on-chip oscillator, middle-speed on-chip oscillator, and high-speed system clock are stopped.

- Remarks**
1. f_{MX} : High-speed system clock frequency (X1 clock oscillation frequency or external main system clock frequency)
 2. f_{IH} : High-speed on-chip oscillator clock frequency
 3. f_{IM} : Middle-speed on-chip oscillator clock frequency
 4. f_{IL} : Low-speed on-chip oscillator clock frequency
 5. f_{SUB} : Subsystem clock frequency (XT1 clock oscillation frequency)
 6. Except subsystem clock operation, temperature condition of the TYP. value is $T_A = 25^\circ\text{C}$

2. During HALT instruction execution by flash memory.
3. When high-speed on-chip oscillator, middle-speed on-chip oscillator, low-speed on-chip oscillator, and subsystem clock are stopped.
4. When high-speed system clock, middle-speed on-chip oscillator, low-speed on-chip oscillator, and Subsystem clock are stopped.
5. When high-speed on-chip oscillator system clock, low-speed on-chip oscillator, high-speed system clock, and Subsystem clock are stopped.
6. When operating independent power supply RTC and setting ultra-low current consumption (AMPHS1 = 1). When high-speed on-chip oscillator, middle-speed on-chip oscillator, and high-speed system clock are stopped.
7. Relationship between operation voltage width, operation frequency of CPU and operation mode is as below.
 - HS (high-speed main) mode: $2.8\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }32\text{ MHz}$
 $2.7\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }24\text{ MHz}$
 $2.5\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }16\text{ MHz}$
 $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }12\text{ MHz}$
 $2.1\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }6\text{ MHz}$
 - LS (low-speed main) mode: $1.9\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }8\text{ MHz}$
 - LP (low-power main) mode: $1.9\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz}$
 - LV (low-voltage main) mode: $1.7\text{ V} \leq V_{DD} \leq 5.5\text{ V}@1\text{ MHz to }4\text{ MHz}$
8. If operation of the subsystem clock when STOP mode, same as when HALT mode of subsystem clock operation.
9. When high-speed on-chip oscillator, middle-speed on-chip oscillator, and high-speed system clock are stopped.

- Remarks**
1. f_{MX} : High-speed system clock frequency (X1 clock oscillation frequency or external main system clock frequency)
 2. f_{IH} : High-speed on-chip oscillator clock frequency
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 4. f_{IL} : Low-speed on-chip oscillator clock frequency
 5. f_{SUB} : Subsystem clock frequency (XT1 clock oscillation frequency)
 6. Except subsystem clock operation, temperature condition of the TYP. value is $T_A = 25^\circ\text{C}$