MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

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MC68HC05J1AAD/D
REV. 1

MC68HC05J1A
MC68HCL05J1A
MC68HSC05J1A

Addendum to
MC68HC05J1A
HCMOS Microcontroller Unit
Technical Data

This addendum supplements *MC68HC05J1A Technical Data* (Motorola document number MC68HC05J1A/D) with the following additional information:

- Corrections to *MC68HC05J1A Technical Data* (including Typical RC responses).
- MC68HCL05J1A data — Appendix A contains data for the MC68HCL05J1A, a low-power version of the MC68HC05J1A
- MC68HSC05J1A data — Appendix B contains data for the MC68HSC05J1A, a high-speed version of the MC68HC05J1A

NOTE

For convenience, this manual contains change bars. These bars appear in the margin and highlight those areas of the manual that have been revised since the last publication.

CORRECTIONS
MC68HC05J1A/D

Corrections to the technical data manual are as follows:

1. Page 10-3, **Table 10-3. DC Electrical Characteristics (V_{DD} = 5.0 V)** — change the third table entry (Output Low Voltage) as follows:

   From:

Characteristic	Symbol	Min	Typ	Max	Unit
Output Low Voltage PA3–PA0 (I_{LOAD} = 1.6 mA) PA7–PA4 (I_{LOAD} = 8.0 mA)	V_{OL}	— —	— —	0.4 0.4	V V

   To:

Characteristic	Symbol	Min	Typ	Max	Unit
Output Low Voltage PA3–PA0, PB5–PB0 (I_{LOAD} = 1.6 mA) PA7–PA4 (I_{LOAD} = 8.0 mA)	V_{OL}	— —	— —	0.4 0.4	V V

2. Page 10-5. Replace the figure title for **Figure 10-1** as follows:

   From:

   Figure 10-1. V_{OH}/I_{OH} (V_{DD} = 5.0 V)

   To:

   Figure 10-1. Typical V_{OH}/I_{OH} (V_{DD} = 5.0 V)

3. Page 10-5. Replace the figure title for **Figure 10-2** as follows:

   From:

   Figure 10-2. V_{OH}/I_{OH} (V_{DD} = 3.3 V)

   To:

   Figure 10-2. Typical V_{OH}/I_{OH} (V_{DD} = 3.3 V)

4. Page 10-5. Replace the figure title for **Figure 10-3** as follows:

From:

Figure 10-3. V_{OL}/I_{OL} (V_{DD} = 5.0 V)

To:

Figure 10-3. Typical V_{OL}/I_{OL} (V_{DD} = 5.0 V)

5. Page 10-5. Replace the figure title for **Figure 10-4** as follows:

From:

Figure 10-4. V_{OL}/I_{OL} (V_{DD} = 3.3 V)

To:

Figure 10-4. Typical V_{OL}/I_{OL} (V_{DD} = 3.3 V)

6. Page 1-7. Add the following figure after Figure 10-6.

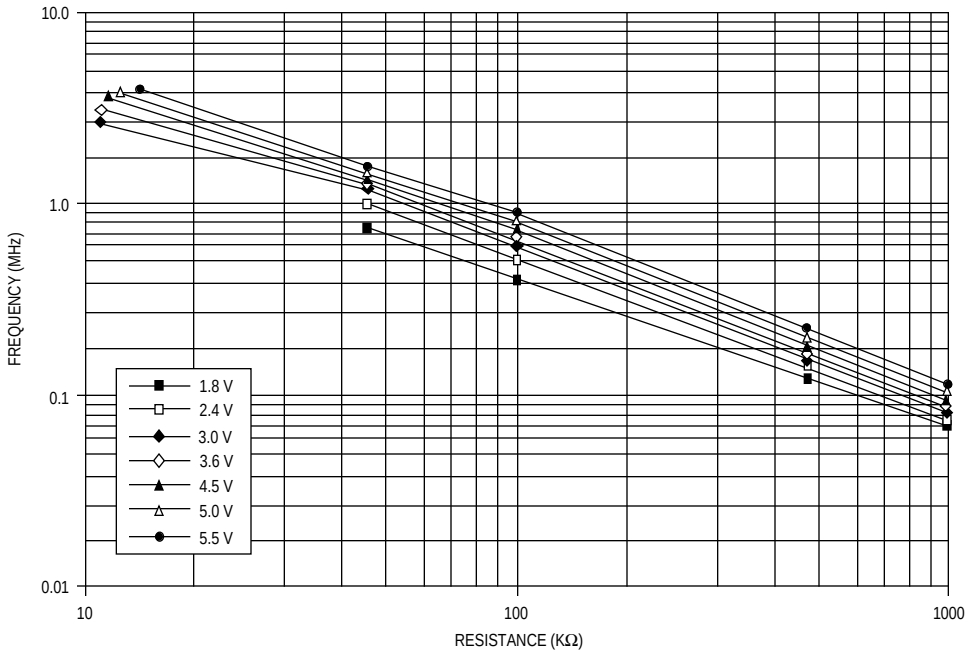

Figure 10-7. Typical Internal Operating Frequency for Various V_{DD} at 25 °C — *RC Option Only*

APPENDIX A
MC68HCL05J1A

This appendix introduces the MC68HCL05J1A, a low-power version of the MC68HC05J1A. All of the information in *MC68HC05J1A Technical Data* applies to the MC68HCL05J1A with the exceptions given in this appendix.

A.1 DC ELECTRICAL CHARACTERISTICS

The data in Table 10-3 and Table 10-4 of *MC68HC05J1A Technical Data* applies to the MC68HCL05J1A with the following exceptions in Table A-1, Table A-2, Table A-3, and Table A-4.

Table A-1. Low-Power Output Voltage (V_{DD} = 1.8–2.4 Vdc)

Characteristic	Symbol	Min	Typ	Max	Unit
Output High Voltage (I_{LOAD} = –0.1 mA) PA7–PA0, PB5–PB0	V_{OH}	V_{DD} –0.3	—	—	V
Output Low Voltage PA3–PA0 (I_{LOAD} = 0.2 mA) PA7–PA4 (I_{LOAD} = 2.0 mA)	V_{OL}	— —	— —	0.3 0.3	V

Table A-2. Low-Power Output Voltage (V_{DD} = 2.5–3.6 Vdc)

Characteristic	Symbol	Min	Typ	Max	Unit
Output High Voltage (I_{LOAD} = –0.2 mA) PA7–PA0, PB5–PB0	V_{OH}	V_{DD} –0.3	—	—	V
Output Low Voltage PA3–PA0 (I_{LOAD} = 0.4 mA) PA7–PA4 (I_{LOAD} = 5.0 mA)	V_{OL}	— —	— —	0.3 0.3	V

Table A-3. Low-Power Supply Current

Characteristic	Symbol	Min	Typ[1]	Max	Unit
Supply Current (V_{DD} = 4.5–5.5 Vdc, f_{OP} = 2.1 MHz)					
Run[2]	I_{DD}	—	3.0	4.0	mA
WAIT[3]		—	1.6	2.5	mA
STOP[4]					
25 °C		—	0.2	10	µA
0 °C to 70 °C (Standard)		—	2.0	20	µA
Supply Current (V_{DD} = 2.5–3.6 Vdc, f_{OP} = 1.0 MHz)					
Run(2)	I_{DD}	—	1.0	2.0	mA
WAIT(3)		—	0.5	1.0	mA
STOP(4)					
25 °C		—	0.1	5.0	µA
0 °C to 70 °C (Standard)		—	1.0	10.0	µA
Supply Current (V_{DD} = 2.5–3.6 Vdc, f_{OP} = 500 kHz)					
Run(2)	I_{DD}	—	0.5	1.0	mA
WAIT(3)		—	250	500	µA
STOP(4)					
25 °C		—	0.1	5.0	µA
0 °C to 70 °C (Standard)		—	1.0	10.0	µA
Supply Current (V_{DD} = 1.8–2.4 Vdc, f_{OP} = 500 kHz)					
Run(2)	I_{DD}	—	300	700	µA
WAIT(3)		—	150	400	µA
STOP(4)					
25 °C		—	0.1	2	µA
0 °C to 70 °C (Standard)		—	1.0	5	µA

1. Typical values reflect average measurements at midpoint of voltage range at 25 °C.
2. Run (operating) I_{DD} measured using external square wave clock source with all inputs 0.2 V from rail. No dc loads. Less than 50 pF on all outputs. C_L = 20 pF on OSC2.
3. WAIT I_{DD} measured using external square wave clock source with all inputs 0.2 V from rail. No dc loads. Less than 50 pF on all outputs. C_L = 20 pF on OSC2. All ports configured as inputs. V_{IL} = 0.2 V, V_{IH} = V_{DD} –0.2 V. OSC2 capacitance linearly affects WAIT I_{DD}.
4. STOP I_{DD} measured with OSC1 = V_{DD}. All ports configured as inputs. V_{IL} = 0.2 V, V_{IH} = V_{DD} –0.2 V.

Table A-4. Low-Power Pulldown Current

Characteristic	Symbol	Min	Typ[1]	Max	Unit
Pulldown Current (V_{DD} = 4.5–5.5 Vdc, f_{OP} = 2.1 MHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	I_{IL}	50	100	200	µA
Pulldown Current (V_{DD} = 2.5–3.6 Vdc, f_{OP} = 1.0 MHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	I_{IL}	8	30	100	µA
Pulldown Current (V_{DD} = 2.5–3.6 Vdc, f_{OP} = 500 kHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	I_{IL}	3	10	50	µA
Pulldown Current (V_{DD} = 1.8–2.4 Vdc, f_{OP} = 500 kHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	I_{IL}	3	10	50	µA

1. Typical values reflect average measurements at midpoint of voltage range at 25 °C.

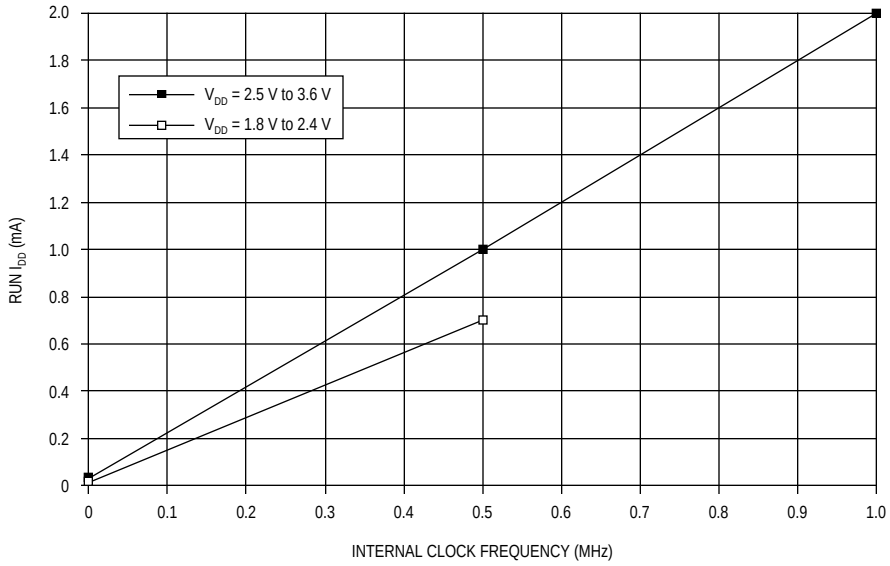

Figure A-1. Maximum Run Mode I_{DD} vs Frequency

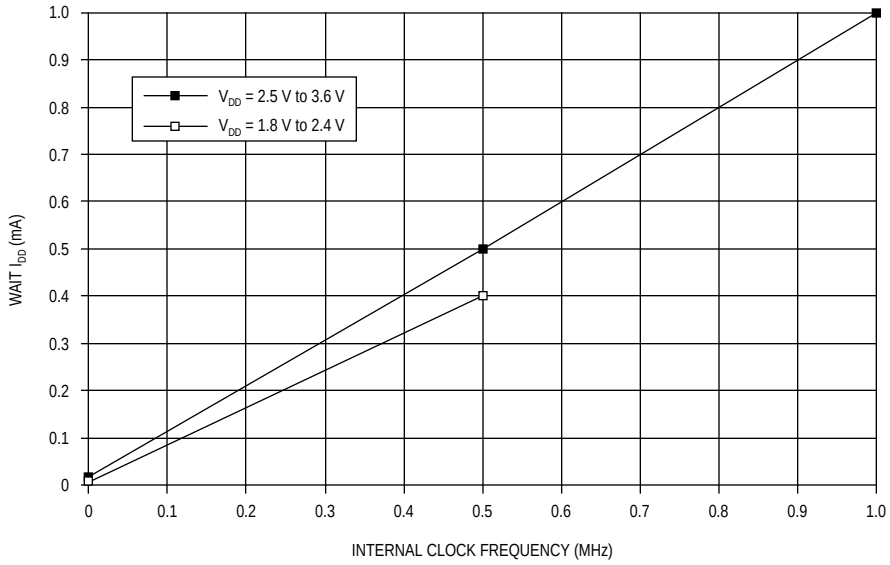

Figure A-2. Maximum WAIT Mode I_{DD} vs Frequency

A.2 MC ORDERING INFORMATION

Table A-5 gives order numbers for the available package types.

Table A-5. MC Order Numbers

Package Type	Temperature Range	Order Number
20-Pin Dual In-Line Package (DIP)	0 °C to 70 °C	MC68HCL05J1AP
20-Pin Small Outline Integrated Circuit (SOIC)	0 °C to 70 °C	MC68HCL05J1ADW

APPENDIX B
MC68HSC05J1A

This appendix introduces the MC68HSC05J1A, a high-speed version of the MC68HC05J1A. All of the information in *MC68HC05J1A Technical Data* applies to the MC68HSC05J1A with the exceptions given in this appendix.

B.1 DC ELECTRICAL CHARACTERISTICS

The data in Table 10-3 and Table 10-4 of *MC68HC05J1A Technical Data* applies to the MC68HSC05J1A with the exceptions given in Table B-1.

Table B-1. High-Speed Supply Current

Characteristic	Symbol	Min	Typ[1]	Max	Unit
Supply Current (V_{DD} = 4.5–5.5 Vdc, f_{OP} = 4.0 MHz)					
Run[2]	I_{DD}	—	4.5	6.0	mA
WAIT[3]		—	2.5	3.25	mA
STOP[4]					
25 °C		—	0.2	10	µA
–40 °C to +85 °C		—	2.0	20	µA
Supply Current (V_{DD} = 3.0–3.6 Vdc, f_{OP} = 2.1 MHz					
Run	I_{DD}	—	2.0	4.0	mA
WAIT		—	1.0	2.0	mA
STOP					
25 °C		—	0.1	5.0	µA
–40 °C to +85 °C		—	1.0	10	µA

1. Typical values reflect average measurements at midpoint of voltage range at 25 °C.
2. Run (operating) I_{DD} measured using external square wave clock source with all inputs 0.2 V from rail. No dc loads. Less than 50 pF on all outputs. C_L = 20 pF on OSC2.
3. WAIT I_{DD} measured using external square wave clock source with all inputs 0.2 V from rail. No dc loads. Less than 50 pF on all outputs. C_L = 20 pF on OSC2. All ports configured as inputs. V_{IL} = 0.2 V, V_{IH} = V_{DD} –0.2 V. OSC2 capacitance linearly affects WAIT I_{DD}.
4. STOP I_{DD} measured with OSC1 = V_{DD}. All ports configured as inputs. V_{IL} = 0.2 V, V_{IH} = V_{DD} –0.2 V.

B.2 CONTROL TIMING

The data in Table 10-5 and Table 10-6 of *MC68HC05J1A Technical Data* applies to the MC68HSC05J1A with the exceptions given in Table B-2 and Table B-3.

Table B-2. High-Speed Control Timing (V_{DD} = 5.0 V ± 10%)

Characteristic	Symbol	Min	Max	Unit
Oscillator Frequency Crystal Oscillator[1] Ceramic Resonator External Clock	f_{OSC}	— — —	8.0 8.0 8.0	MHz
Internal Operating Frequency ($f_{OSC} \div 2$) Crystal Oscillator(1) Ceramic Resonator External Clock	f_{OP}	— — —	4.0 4.0 4.0	MHz
Cycle Time ($1 \div f_{OP}$)	t_{CYC}	250	—	ns
$\overline{IRQ}$ Pulse Width Low (Edge-Triggered)	t_{ILIL}	63	—	ns
PA3–PA0 Interrupt Pulse Width (Edge-Triggered)	t_{IHIL}	63	—	ns
OSC1 Pulse Width	t_{OH} or t_{OL}	45	—	ns

1. Use only AT-cut crystals.

Table B-3. High-Speed Control Timing (V_{DD} = 3.3 V ± 10%)

Characteristic	Symbol	Min	Max	Unit
Oscillator Frequency Crystal Oscillator[1] Ceramic Resonator External Clock	f_{OSC}	— — —	4.2 4.2 4.2	MHz
Internal Operating Frequency ($f_{OSC} \div 2$) Crystal Oscillator(1) Ceramic Resonator External Clock	f_{OP}	— — —	2.1 2.1 2.1	MHz
Cycle Time ($1 \div f_{OP}$)	t_{CYC}	480		ns
$\overline{IRQ}$ Pulse Width Low (Edge-Triggered)	t_{ILIL}	125	—	ns
PA3–PA0 Interrupt Pulse Width (Edge-Triggered)	t_{IHIL}	125	—	ns
OSC1 Pulse Width	t_{OH} or t_{OL}	90		ns

1. Use only AT-cut crystals.

B.3 MC ORDERING INFORMATION

Table B-4 gives order numbers for the available package types.

Table B-4. MC Order Numbers

Package Type	Temperature Range	Order Number
20-Pin Dual In-Line Package (DIP)	0 °C to 70 °C	MC68HSC05J1AP
20-Pin Small Outline Integrated Circuit (SOIC)	0 °C to 70 °C	MC68HSC05J1ADW

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