

**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.

This document contains information on a new product. Specifications and information herein are subject to change without notice.





## CORRECTIONS MC68HC05J1A/D

Corrections to the technical data manual are as follows:

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

From:

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

To:

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

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

From:

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

To:

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

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

From:

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

To:

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

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:

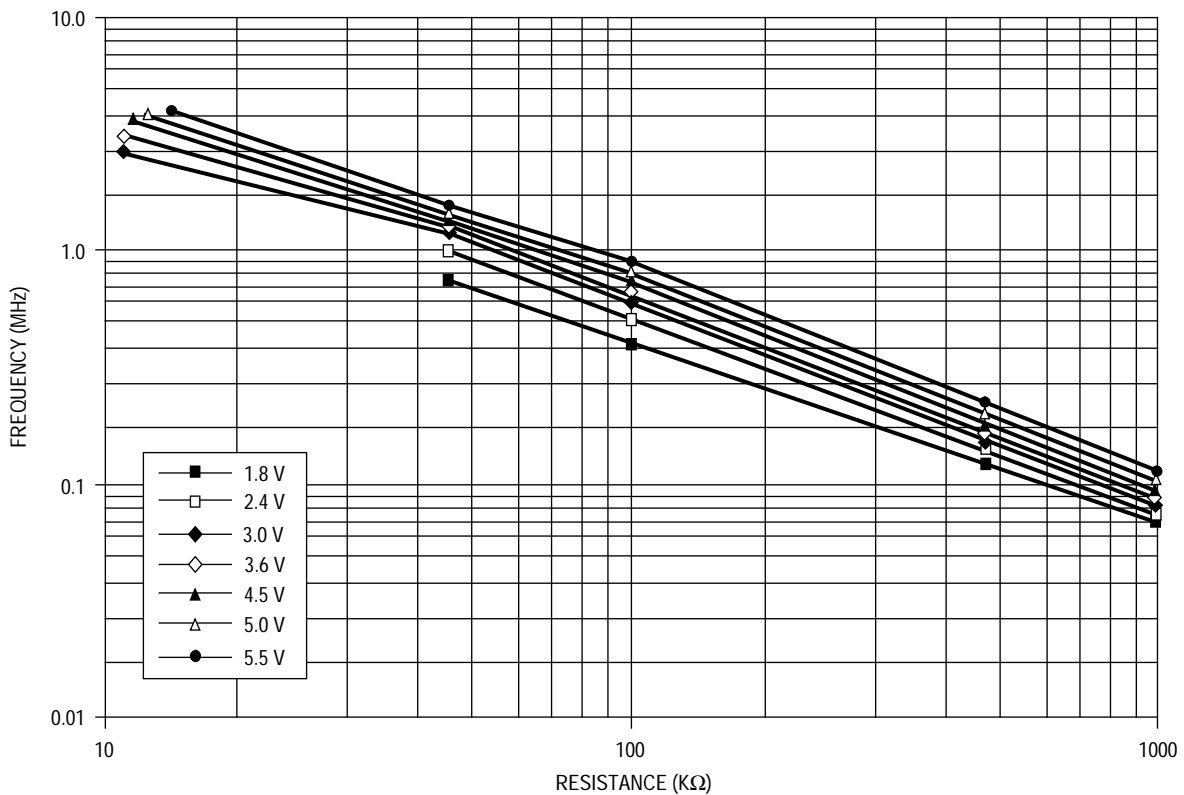
From:

**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 ( $V_{DD} = 1.8\text{--}2.4\text{ Vdc}$ )**

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

**Table A-2. Low-Power Output Voltage ( $V_{DD} = 2.5\text{--}3.6\text{ Vdc}$ )**

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

**Table A-3. Low-Power Supply Current**

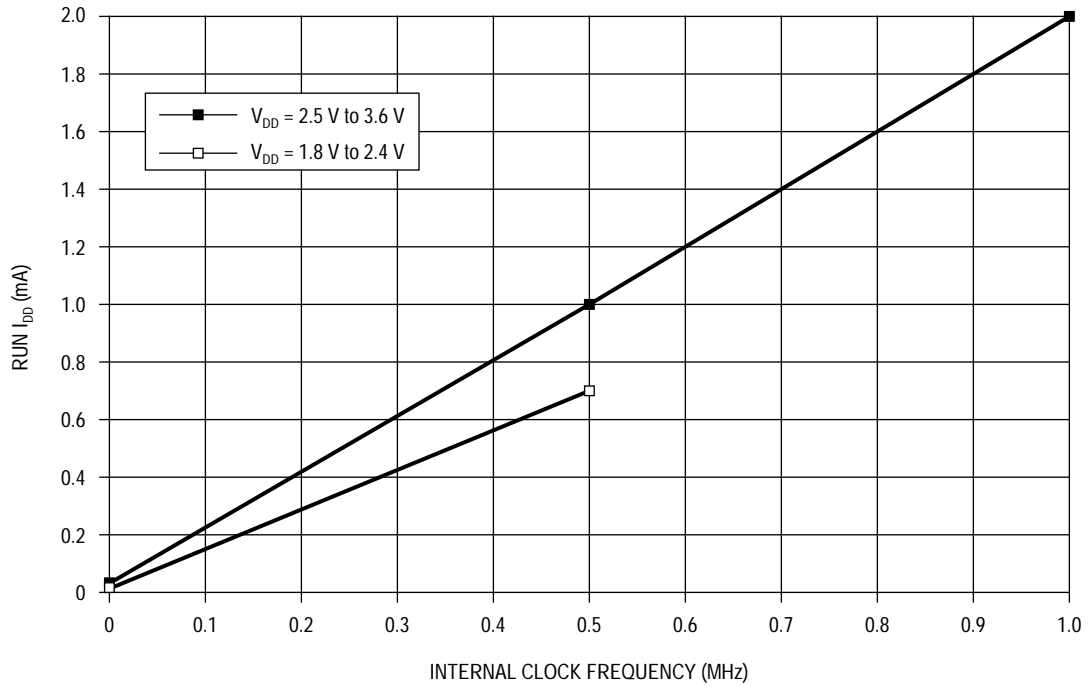
Characteristic	Symbol	Min	Typ <sup>1</sup>	Max	Unit
Supply Current ( $V_{DD} = 4.5\text{--}5.5$ Vdc, $f_{OP} = 2.1$ MHz) Run <sup>2</sup> WAIT <sup>3</sup> STOP <sup>4</sup> 25 °C 0 °C to 70 °C (Standard)	$I_{DD}$	— — — —	3.0 1.6 0.2 2.0	4.0 2.5 10 20	mA mA $\mu$ A $\mu$ A
Supply Current ( $V_{DD} =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

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.

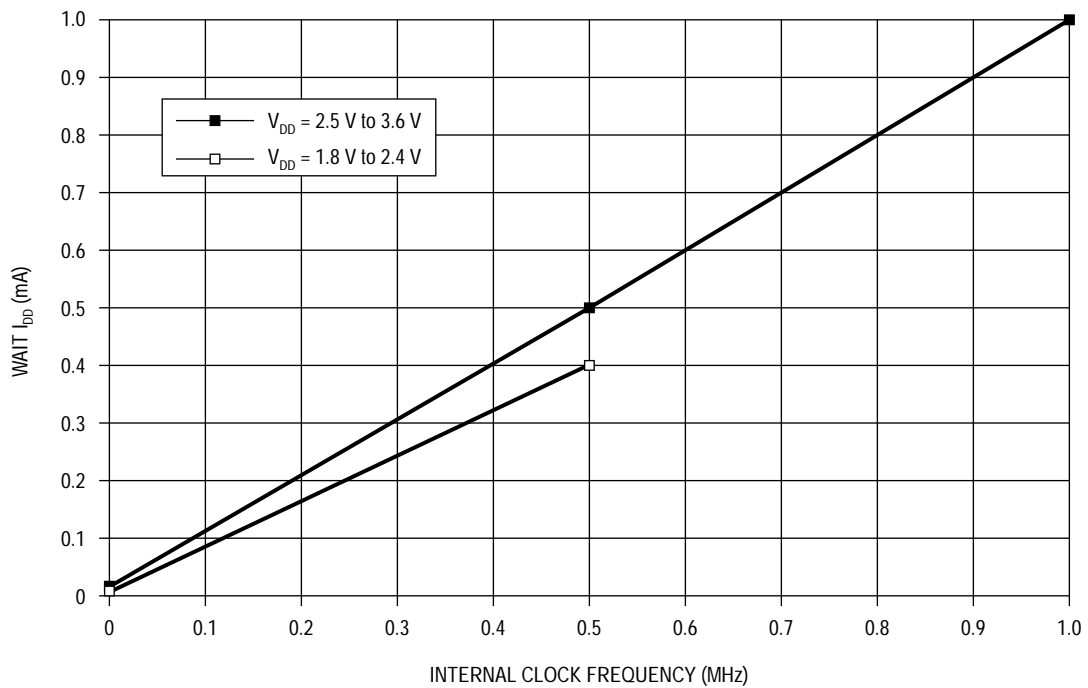
**Table A-4. Low-Power Pulldown Current**

Characteristic	Symbol	Min	Typ <sup>1</sup>	Max	Unit
Pulldown Current ( $V_{DD} = 4.5\text{--}5.5$ Vdc, $f_{OP} = 2.1$ MHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	$I_{IL}$	50	100	200	$\mu$ A
Pulldown Current ( $V_{DD} = 2.5\text{--}3.6$ Vdc, $f_{OP} = 1.0$ MHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	$I_{IL}$	8	30	100	$\mu$ A
Pulldown Current ( $V_{DD} = 2.5\text{--}3.6$ Vdc, $f_{OP} = 500$ kHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	$I_{IL}$	3	10	50	$\mu$ A
Pulldown Current ( $V_{DD} = 1.8\text{--}2.4$ Vdc, $f_{OP} = 500$ kHz) PA7–PA0, PB5–PB0 (Pulldown Device On)	$I_{IL}$	3	10	50	$\mu$ A

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**

<b>Package Type</b>	<b>Temperature Range</b>	<b>Order Number</b>
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 <sup>1</sup>	Max	Unit
Supply Current ( $V_{DD} = 4.5\text{--}5.5$ Vdc, $f_{OP} = 4.0$ MHz)					
Run <sup>2</sup>	$I_{DD}$	—	4.5	6.0	mA
WAIT <sup>3</sup>		—	2.5	3.25	mA
STOP <sup>4</sup>		—	0.2	10	$\mu$ A
25 °C		—	2.0	20	$\mu$ A
–40 °C to +85 °C					
Supply Current ( $V_{DD} = 3.0\text{--}3.6$ Vdc, $f_{OP} = 2.1$ MHz)					
Run	$I_{DD}$	—	2.0	4.0	mA
WAIT		—	1.0	2.0	mA
STOP		—	0.1	5.0	$\mu$ A
25 °C		—	1.0	10	$\mu$ A
–40 °C to +85 °C					

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 ( $V_{DD} = 5.0\text{ V} \pm 10\%$ )**

Characteristic	Symbol	Min	Max	Unit
Oscillator Frequency Crystal Oscillator <sup>1</sup> Ceramic Resonator External Clock	$f_{OSC}$	—	8.0	MHz
Internal Operating Frequency ( $f_{OSC} \div 2$ ) Crystal Oscillator <sup>(1)</sup> Ceramic Resonator External Clock	$f_{OP}$	—	4.0	MHz
Cycle Time ( $1 \div f_{OP}$ )	$t_{CYC}$	250	—	ns
$\overline{IRQ}$ Pulse Width Low (Edge-Triggered)	$t_{LIL}$	63	—	ns
PA3–PA0 Interrupt Pulse Width (Edge-Triggered)	$t_{HIL}$	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 ( $V_{DD} = 3.3\text{ V} \pm 10\%$ )**

Characteristic	Symbol	Min	Max	Unit
Oscillator Frequency Crystal Oscillator <sup>1</sup> Ceramic Resonator External Clock	$f_{OSC}$	— — —	4.2 4.2 4.2	MHz
Internal Operating Frequency ( $f_{OSC} \div 2$ ) Crystal Oscillator <sup>(1)</sup> 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)	$t_{LIL}$	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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

**How to reach us:**

**MFAX:** RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244-6609

**INTERNET:** <http://Design-NET.com>

**USA/EUROPE:** Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki, 6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

**HONG KONG:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



**MOTOROLA**

---