MICROCHIP

Product Change Notification - SYST-16XJSP228

Date:

17 May 2019

Product Category:

Sensor conditioning ICs

Affected CPNs:

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Notification subject:

ERRATA - MCP9600 Rev. A Silicon Errata and Data Sheet Clarification

Notification text:

SYST-16XJSP228

Microchip has released a new DeviceDoc for the MCP9600 Rev. A Silicon Errata and Data Sheet Clarification of devices. If you are using one of these devices please read the document located at MCP9600 Rev. A Silicon Errata and Data Sheet Clarification.

Notification Status: Final

Description of Change: Added Errata Modules 2, 3 and 4.

Impacts to Data Sheet: None

Reason for Change: To Improve Productivity

Change Implementation Status: Complete

Date Document Changes Effective: 17 May 2019

NOTE: Please be advised that this is a change to the document only the product has not been changed.

Markings to Distinguish Revised from Unrevised Devices: N/A

Attachment(s):

MCP9600 Rev. A Silicon Errata and Data Sheet Clarification

Please contact your local Microchip sales office with questions or concerns regarding this notification.

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Affected Catalog Part Numbers (CPN)

MCP9600-E/MX
MCP9600-E/MX-1
MCP9600-I/MX
MCP9600T-E/MX
MCP9600T-E/MX-1
MCP9600T-I/MX

MCP9600/L00/RL00

Silicon Errata and Data Sheet Clarification

The MCP9600/L00/RL00 parts you have received conform functionally to the Device Data Sheet (DS20005426E), except for the anomalies described below.

All of the issues listed here will be addressed in future revisions of the MCP9600 silicon.

Contact Microchip for the latest silicon fix.

1. Module: T_{H_ACY}, or the T_H Hot-Junction Temperature Accuracy

The Hot-Junction (T_H) Temperature Accuracy T_{H_ACY} of the MCP9600 devices before Date Code 1723 or Device ID/Revision value of 0x4011, may not meet the specified accuracy in the data sheet, starting from revision C data sheet (DS20005426C) to the latest data sheet. This issue affects the T_H temperature register only.

The Cold-Junction (T_C) and the Junctions Delta (T_Δ) Temperature registers are not affected by this issue. These registers meet the accuracy performance as specified in the data sheet.

Work around

Convert the T_C and the T_Δ temperature data from the units of Degree Celsius (°C) to millivolt (mV) using the NIST ITS-90 conversion look-up table or polynomial equation. Then sum the two voltages, and convert the summed value from millivolt to Degree Celsius using the NIST ITS-90 conversion table or polynomial equation.

Date Codes that pertain to this issue:

All production devices before Data Code 1723 and with Device ID/Revision register value of 0x4011 are affected, as shown in Table 1.

Fix

Devices with Date Code of 1723 or later are not affected. These devices have a Device ID/Revision value of 0x4012.

2. Module: Intermittent I²C Read Command Clock Stretching Failure

During I²C Sequential Read communication for two or more bytes, the MCP9600/L00/RL00 may intermittently fail to Clock Stretch, $t_{STRETCH}$, as described in the data sheet, for bus frequencies greater than 85 kHz (typical). When this failure occurs, the MCP9600/L00/RL00 continues to output the previously transmitted data. For example, when reading the two byte T_H temperature register, if the device fails to clock stretch for the Least Significant Byte, then the device will output the Most Significant Byte.

Work around

Since this issue is intermittent, repeat the Sequential Read instruction until the second byte read is different from the Most Significant Byte.

Date Codes that pertain to this issue:

All production devices before Data Code 1845 and with Device ID/Revision register value of 0x4012 or lower are affected, as shown in Table 1.

Fix

Devices with Date Code of 1845 or later are not affected. These devices have a Device ID/Revision value of 0x4013.

3. Module: Input Range bit (Bit 4 of the Status Register)

When Bit 4 of Status Register, Input Range bit, is set to '1', T_H, T_C and T_Δ registers are not updated as indicated in the Rev E data sheet bit description (DS20005426E). This characteristic may result in what appears to be unpredictable temperature data, if the temperature register is not updated when the thermocouple temperature is near the upper or the lower temperatures limits for the specified thermocouple range. For example, if the thermocouple EMF is within the specified range, but the sum with the Cold Junction EMF exceeds the specified thermocouple range, then the Input Range bit is set to '1' and the temperature registers are not updated.

Work around

None.

Date Codes that pertain to this issue:

All production devices before Date Code 1845 and with Device ID/Revision register value of 0x4012 or lower are affected, as shown in Table 1.

Fix

Devices with Date Code 1845 or later are not affected. These devices have a Device ID/Revision value of 0x4013.

Devices with the Device ID/Revision value of 0x4013 update the temperature registers as follows, when the Bit 4 of the Status Register, Input Range bit, is set to '1':

- If the thermocouple EMF exceeds the specified range, then T_H and T_Δ Registers are not updated, but T_C Register is updated with a valid temperature data at the specified interval, or t_{CONV}.
- If the thermocouple EMF is within the specified range, but the sum with the Cold-Junction EMF exceeds the specified range, then T_H Register is not updated, but T_Δ and T_C Registers are updated with valid temperature data at the specified interval, or t_{CONV}. The value of T_Δ and T_C Registers can be used to calculate valid Hot-Junction temperature data using the NIST ITS-90 conversion look-up table or polynomial equation.

4. Module: Outputs Extra 0x00 data during Sequential Read

When the MCP9600/L00/RL00 Registers are Sequentially Read, the device outputs 0x00 between the Least Significant Byte of the Alert 4 Register and the Most Significant Byte of the Device ID/Revision Register values.

Work around

Ignore the byte.

Date Codes that pertain to this issue:

All production devices before Date Code 1845 and with Device ID/Revision register value of 0x4012 are affected, as shown in Table 1.

Fix

Devices with Date Code 1845 or later are not affected. These devices have a Device ID/Revision value of 0x4013.

Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS20005426**E**):

> The Input Range Bit of the Status Register (Bit 4) will be clarified on the next data sheet revision, as described in Module 3.

TABLE 1: SILICON ISSUE SUMMARY

Module	Feature	Issue Summary	Affected Device ID/Revision [1]			Fixed Date Code
			0x4011	0x4012	0x4013	
1	T_{H_ACY}	This parameter may not meet data specification starting from Rev C data sheet DS20005426C (MCP9600 only)	X	—	—	1723
2	$t_{STRETCH}$	This parameter may not meet data specification (MCP9600/L00/RL00)	X	X	—	1845
3	Input Range	Device Characteristics changed from the data sheet description (MCP9600/L00/RL00)	X	X	—	1845
4	Extra Byte	Correction to the Device Characteristics (MCP9600/L00/RL00)	X	X	—	1845

Note 1: The Device ID/Revision Register is found in the user register pointer 0x20.

APPENDIX A: DOCUMENT REVISION HISTORY

Rev. C Document (5/2019)

• Added Errata Modules 2, 3 and 4.

Rev. B Document (9/2017)

• Added Fix regarding the devices with Date Code of 1723.

• Added Note 1 to Table 1.

Rev. A Document (5/2017)

• Initial release of this document.

Note the following details of the code protection feature on Microchip devices:

• Microchip products meet the specification contained in their particular Microchip Data Sheet.

• Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.

• There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.

• Microchip is willing to work with the customer who is concerned about the integrity of their code.

• Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

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