

Device Statistics – Temperature

T13 Technical Proposal – e06183r9

By
Steve Livaccari, IBM, and
Joseph Chen, Samsung
Revision 9, 2008-07-10

[This document is a proposal for the T13 to describe the Device Statistics for the device to report. The device temperature statistics is the information for the collected temperature information in the device. The statistics supported are optional, and only applicable to the applicable devices.]

A.5 Device Statistics (Log Address 04h)

A.5.1 Overview

The Device Statistics log contains selected statistics about the device. This log shall be read-only, and shall only be accessed via the GPL feature set. This log is supported if there is a non-zero length for log address 04h in the General Purpose Log Directory. The format of the data is defined in table TBD. If the Device Statistics log is supported, only the Structure Version field is required. Each statistic is composed of a 1-byte flag field and a value field. If the bit 7 of the flag field is set to one then the value field of that statistic is valid. Each statistic shall be a multiple of 8 bytes long. The number of log pages may be greater than one.

A.5.2 Device Temperature Statistics (Page TBD)

A.5.2.1 Overview

Device Statistics log page TBD contains general information about the device as described in table TBD. The value in the temperature field is a two's complement integer in degrees Celsius.

The summary of this temperature statistics is as followed:

- a) Structure Version;
- b) Current Temperature;
- c) Average Short Term Temperature;
- d) Average Long Term Temperature;
- e) Highest Temperature (Lifetime);
- f) Lowest Temperature (Lifetime);
- g) Highest Average Short Term Temperature (Lifetime);
- h) Lowest Average Short Term Temperature (Lifetime);
- i) Highest Average Long Term Temperature (Lifetime); and
- j) Lowest Average Long Term Temperature (Lifetime).

Table TBD – Temperature Statistics

| Offset | Type | Content | | | | | | |
|------------|--|--|------------|----------------|-------|--|-----------|-------------------|
| 0-7 | QWord | Structure Version | | | | | | |
| | | <table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:24</td> <td>Reserved</td> </tr> <tr> <td>23:16</td> <td>TBDh, Page Number</td> </tr> <tr> <td>15:0</td> <td>Device Statistics Version Number = 0001h</td> </tr> </table> | Bit | Meaning | 63:24 | Reserved | 23:16 | TBDh, Page Number |
| Bit | Meaning | | | | | | | |
| 63:24 | Reserved | | | | | | | |
| 23:16 | TBDh, Page Number | | | | | | | |
| 15:0 | Device Statistics Version Number = 0001h | | | | | | | |
| 8-15 | QWord | Current Temperature | | | | | | |
| | | <table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Current Temperature</td> </tr> </table> | Bit | Meaning | 63:56 | Device Statistics Flags, (See Table TBD) | 55:32 | Reserved |
| Bit | Meaning | | | | | | | |
| 63:56 | Device Statistics Flags, (See Table TBD) | | | | | | | |
| 55:32 | Reserved | | | | | | | |
| 31:0 | Current Temperature | | | | | | | |
| 16-23 | QWord | Average Short Term Temperature | | | | | | |
| | | <table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td><u>62</u></td> <td>Reserved</td> </tr> <tr> <td>7:0</td> <td>Average Short Term Temperature</td> </tr> </table> | Bit | Meaning | 63:56 | Device Statistics Flags, (See Table TBD) | <u>62</u> | Reserved |
| Bit | Meaning | | | | | | | |
| 63:56 | Device Statistics Flags, (See Table TBD) | | | | | | | |
| <u>62</u> | Reserved | | | | | | | |
| 7:0 | Average Short Term Temperature | | | | | | | |
| 24-31 | QWord | Average Long Term Temperature | | | | | | |

| | | |
|--------|-------|--|
| | | Bit Meaning 63:56 Device Statistics Flags, (See Table TBD) 55:8 Reserved 7:0 Average Temperature |
| 32-39 | QWord | Highest Temperature (Lifetime) |
| | | Bit Meaning 63:56 Device Statistics Flags, (See Table TBD) 55:8 Reserved 7:0 Highest Temperature (Lifetime) |
| 40-47 | QWord | Lowest Temperature (Lifetime) |
| | | Bit Meaning 63:56 Device Statistics Flags, (See Table TBD) 55:8 Reserved 7:0 Lowest Temperature (Lifetime) |
| 48-55 | QWord | Highest Average Short Term Temperature (Lifetime) |
| | | Bit Meaning 63:56 Device Statistics Flags, (See Table TBD) 61:56 Reserved for flags 55:8 Reserved 7:0 Highest Average Short Term Temperature (Lifetime) |
| 56-63 | QWord | Lowest Average Short Term Temperature (Lifetime) |
| | | Bit Meaning 63:56 Device Statistics Flags, (See Table TBD) 55:8 Reserved 7:0 Lowest Average Short Term Temperature (Lifetime) |
| 64-71 | QWord | Highest Average Long Term Temperature (Lifetime) |
| | | Bit Meaning 63:56 Device Statistics Flags, (See Table TBD) 55:8 Reserved 7:0 Highest Average Long Term Temperature(Lifetime) |
| 72-79 | QWord | Lowest Average Long Term Temperature (Lifetime) |
| | | Bit Meaning 63:56 Device Statistics Flags, (See Table TBD) 55:8 Reserved 7:0 Lowest Average Long Term Temperature(Lifetime) |
| 80-511 | Byte | Reserved |

A.5.2.2 Structure Version

A.5.2.2.1 Description

Structure Version defines the version of the data structure arrangement for this statistics. The structure is defined by the T13 committee. When a new structure is defined the version number will be assigned.

Bit 23:16 is used for the page number of the Log Page for this statistics. Bit 15:0 is used for the revision number of the statistics structure.

A.5.2.2.2 Update Interval

Update interval is not applicable to the Structure Version field.

A.5.2.2.3 Measurement Units

Measurement units is not applicable to the Structure Version field.

A.5.2.2.4 Initialization

Structure Version shall be initialized to the corresponding version number at the time of manufacture.

A.5.2.3 Current Temperature

A.5.2.3.1 Description

Current Temperature is the current temperature measured by the device.

A.5.2.3.2 Update Interval

None

A.5.2.3.3 Measurement Units

Degrees Celsius

A.5.2.3.4 Initialization

None

A.5.2.4 Average Short Term Temperature

A.5.2.4.1 Description

Average Short Term Temperature is a value based on the most recent 144 temperature samples in 24 hours period. The device enters the current temperature sample into the Average Short Term Temperature FIFO once every nominal ten minutes period. The Average Short Term Temperature FIFO consists of at least 144 temperature entries (i.e., 24 recorded hours). The Average Short Term Temperature is calculated by averaging the last 144 Average Short Term Temperature FIFO entries.

A.5.2.4.2 Update Interval

The Average Short Term Temperature value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.4.3 Measurement Units

Degrees Celsius

A.5.2.4.4 Initialization

The Average Short Term Temperature is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the device collects 144 temperature samples. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the device collects 144 temperature samples.

A.5.2.5 Average Long Term Temperature

A.5.2.5.1 Description

Average Long Term Temperature is a value based on the most recent 42 Average Short Term temperature values in 1008 hours period. The device enters the current value of the Average Short Term Temperature into the Average Long Term Temperature FIFO once every nominal 24 hour period. The Average Long Term Temperature FIFO consists of at least 42 temperature entries (i.e., 1008 recorded hours). The Average Long Term Temperature is calculated by averaging the last 42 Average Long Term Temperature FIFO entries.

A.5.2.5.2 Update Interval

The Average Temperature value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.5.3 Measurement Units

Degrees Celsius

A.5.2.5.4 Initialization

The Average Long Term Temperature is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the device collects 42 Average Short Term Temperature data samples. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the device collects 42 Average Short Term Temperature data samples.

A.5.2.6 Highest Temperature (Lifetime)

A.5.2.6.1 Description

Highest Temperature (Lifetime) is the highest temperature measured after the device is manufactured. This data is calculated by comparing the Current Temperature value and the Highest Temperature (Lifetime) value and storing the higher value. The comparison shall occur when a new temperature value is entered into the Average Short Term Temperature FIFO.

A.5.2.6.2 Update Interval

The Highest Temperature (Lifetime) value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.6.3 Measurement Units

Degrees Celsius

A.5.2.6.4 Initialization

The Highest Temperature (Lifetime) is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the first temperature value is entered into the Average Short Term Temperature FIFO. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the first temperature value is entered into the Average Short Term Temperature FIFO.

A.5.2.7 Lowest Temperature (Lifetime)

A.5.2.7.1 Description

Lowest Temperature (Lifetime) is the lowest temperature measured after the device is manufactured. This data is calculated by comparing the Current Temperature value and the Lowest Temperature (Lifetime) value and storing the lower value. The comparison shall occur when a new temperature value is entered into the Average Short Term Temperature FIFO.

A.5.2.7.2 Update Interval

The Lowest Temperature (Lifetime) value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.7.3 Measurement Units

Degrees Celsius

A.5.2.7.4 Initialization

The Highest Temperature (Lifetime) is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the first temperature value is entered into the Average Short Term Temperature FIFO. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the first temperature value is entered into the Average Short Term Temperature FIFO.

A.5.2.8 Highest Average Short Term Temperature (Lifetime)

A.5.2.8.1 Description

Highest Average Short Term Temperature (Lifetime) is a value that records the highest device Average Short Term Temperature after the device is manufactured. This data is calculated by comparing the current Average Short Term Temperature value and the Highest Average Short Term Temperature (Lifetime) value and storing the higher value.

A.5.2.8.2 Update Interval

The Highest Average Short Term Temperature (Lifetime) value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.8.3 Measurement Units

Degrees Celsius

A.5.2.8.4 Initialization

The Highest Average Short Term Temperature is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the device collects 144 temperature samples. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the device collects 144 temperature samples.

A.5.2.9 Lowest Average Short Term Temperature (Lifetime)

A.5.2.9.1 Description

Lowest Average Short Term Temperature (Lifetime) is a value that records the lowest device Average Short Term Temperature after the device is manufactured. This data is calculated by comparing the current Average Short Term Temperature value and the Lowest Average Short Term Temperature (Lifetime) value and storing the lower value.

A.5.2.9.2 Update Interval

The Lowest Average Short Term Temperature (Lifetime) value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.9.3 Measurement Units

Degrees Celsius

A.5.2.9.4 Initialization

The Lowest Average Short Term Temperature is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the device collects 144 temperature samples. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the device collects 144 temperature samples.

A.5.2.10 Highest Average Long Term Temperature (Lifetime)

A.5.2.10.1 Description

Highest Average Long Term Temperature (Lifetime) is a value that records the highest device Average Long Term Temperature after the device is manufactured. This data is calculated by comparing the current Average Long Term Temperature value and the Highest Average Long Term Temperature (Lifetime) value and storing the higher value.

A.5.2.10.2 Update Interval

The Highest Average Long Term Temperature (Lifetime) value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.10.3 Measurement Units

Degrees Celsius

A.5.2.10.4 Initialization

The Highest Average Long Term Temperature (Lifetime) is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the device collects 42 Average Short Term Temperature data samples. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the device collects 42 Average Short Term Temperature data samples.

A.5.2.11 Lowest Average Long Term Temperature (Lifetime)

A.5.2.11.1 Description

Lowest Average Long Term Temperature (Lifetime) is a value that records the lowest device Average Long Term Temperature after the device is manufactured. This data is calculated by comparing the current Average Long Term Temperature value and the Lowest Average Long Term Temperature (Lifetime) value and storing the lower value.

A.5.2.11.2 Update Interval

The Lowest Average Long Term Temperature (Lifetime) value is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.11.3 Measurement Units

Degrees Celsius

A.5.2.11.4 Initialization

The Lowest Average Long Term Temperature (Lifetime) is not initialized at the time of manufacture. The Valid bit (Device Statistics Flag) shall be cleared to zero and the data in bits (7:0) is not valid until the device collects 42 Average Short Term Temperature data samples. The Valid bit (Device Statistics Flag) shall be set to one and the data in bits (7:0) is valid after the device collects 42 Average Short Term Temperature data samples.