Application Note

Astra SL2610 Product Lifetime

Abstract: This document outlines the estimated product lifetime of the Astra™ SL2610.

Contents

1. Introduction 5
2. Device Qualification Level and Available PoH 6
   2.1. Terminology Used in This Document 6
3. Consumer Product Lifetime Estimates 7
   3.1. Consumer SL2610 product lifetime at Tj = 105°C for VL 7
   3.2. Consumer SL2610 product lifetime at Tj = 105°C for VH 7
4. Summary 9
5. References 10
6. Revision History 11

List of Figures

Figure 1. Astra SL2610 Consumer qualification product lifetime estimates 8

List of Tables

Table 1. Consumer Max VL = 0.825V (+IRdrop 25mV), CPU 1.7 GHz DDR4 3200 Mbps, GPU 700 MHz, NPU 800 MHz, Tj = 105°C 7
Table 2. Consumer Typ. VL = 0.800V (+IRdrop 25mV), CPU 1.7 GHz DDR4 3200 Mbps, GPU 700 MHz, NPU 800 MHz, Tj = 105°C 7
Table 3. Consumer Max VH = 0.900V (+IRdrop 25mV), CPU 2.0 GHz DDR4 3200 Mbps, GPU 800 MHz, NPU 1.0 GHz, Tj = 105°C 7
Table 4. Consumer Typ. VH = 0.875V (+IRdrop 25mV), CPU 2.0GHz DDR4 3200 Mbps, GPU 800 MHz, NPU 1.0 GHz, Tj = 105°C 7

1. Introduction

This document outlines the estimated product lifetime of the Astra™ SL2610, based on the criteria from the qualification process. It aims to help users understand the various SL2610 qualification levels concerning the device's target operating frequencies, the maximum supported junction temperature (Tj) of the processor, and their implications for the device's lifespan.

The provided product lifetime are estimates and do not constitute a guaranteed lifespan for the product.

2. Device Qualification Level and Available PoH

1. The product's lifetime is directly dependent on the voltage and temperature.
2. The junction temperature of the processor (Tj).
    a. The maximum junction temperature of the device is 105°C for consumer and 125°C for Industrial.
    b. Users must make sure their device is adequately thermally managed to prevent exceeding the maximum junction temperature.

All data provided in this document are Power-on Hours (PoH) estimates based on extensive qualification experience and testing with the Astra™ SL2610. These statistically derived estimates are not intended to define the product lifetime limit of any individual device, nor should they be interpreted as a guarantee from Synaptics regarding the actual lifespan of the device.

2.1. Terminology Used in This Document

- **VCORE:** Voltage supply for the CORE of the device.
- **VL:** Low voltage of the operating range power supply for the device.
- **VH:** High voltage of the operating range power supply for the device.

The device operates within two voltage ranges, depending on the CPU frequencies, and the leakage characteristics of the device:

- **Typical operating voltage range:** The typical range from VL to VH (see chart legend for detailed values).
- **Maximum operating voltage range:** The maximum allowable range from VL to VH (see chart legend for detailed values).

3. Consumer Product Lifetime Estimates

3.1. Consumer SL2610 product lifetime at Tj = 105°C for VL

VCORE LOW Max (VL) = Max VL (+IRdrop 25mV), Product Lifetime @Tj=105°C

Table 1. Consumer Max VL = 0.825V (+IRdrop 25mV), CPU 1.7 GHz DDR4 3200 Mbps, GPU 700 MHz, NPU 800 MHz, Tj = 105°C

CPU Speed	Soc Operating Voltage	Junction Temperature Tj	Power-on Hours (PoH)	Product Lifetime
(GHz)	(V)	(°C)	Hours	Years
1.7	0.850	105	952,946	109

VCORE LOW Typ. (VL) = Typ. VL (+IRdrop 25mV), Product Lifetime @Tj=105°C

Table 2. Consumer Typ. VL = 0.800V (+IRdrop 25mV), CPU 1.7 GHz DDR4 3200 Mbps, GPU 700 MHz, NPU 800 MHz, Tj = 105°C

CPU Speed	Soc Operating Voltage	Junction Temperature Tj	Power-on Hours (PoH)	Product Lifetime
(GHz)	(V)	(°C)	Hours	Years
1.7	0.825	105	1,457,616	166

3.2. Consumer SL2610 product lifetime at Tj = 105°C for VH

VCORE HIGH Max (VH) = Max VH (+IRdrop 25mV), Product Lifetime @Tj=105°C

Table 3. Consumer Max VH = 0.900V (+IRdrop 25mV), CPU 2.0 GHz DDR4 3200 Mbps, GPU 800 MHz, NPU 1.0 GHz, Tj = 105°C

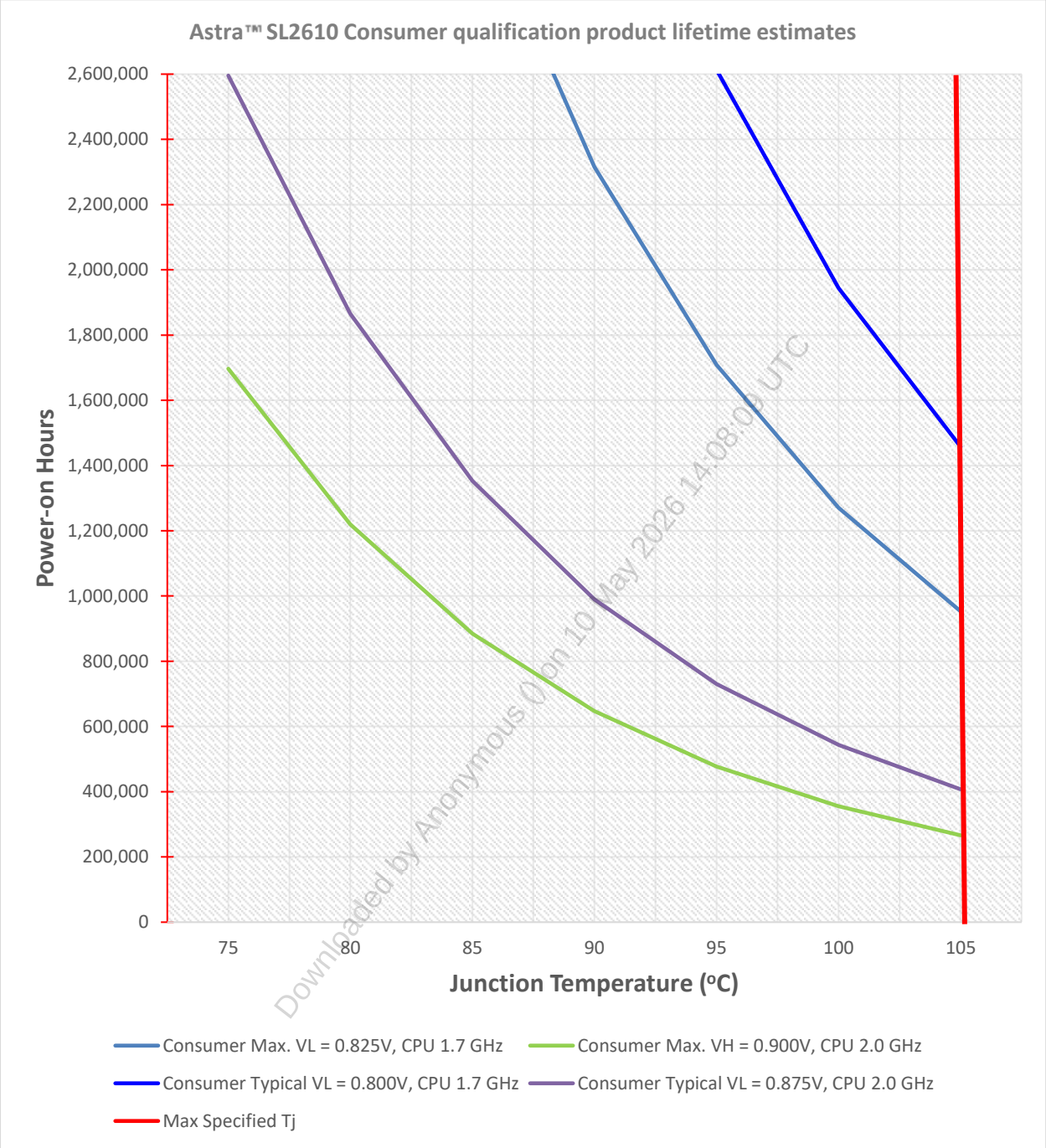
CPU Speed	Soc Operating Voltage	Junction Temperature Tj	Power-on Hours (PoH)	Product Lifetime
(GHz)	(V)	(°C)	Hours	Years
2.0	0.925	105	266,283	30

VCORE HIGH Typ. VH = Typ. VH (+IRdrop 25mV), Product Lifetime @Tj=105°C

Table 4. Consumer Typ. VH = 0.875V (+IRdrop 25mV), CPU 2.0GHz DDR4 3200 Mbps, GPU 800 MHz, NPU 1.0 GHz, Tj = 105°C

CPU Speed	Soc Operating Voltage	Junction Temperature Tj	Power-on Hours (PoH)	Product Lifetime
(GHz)	(V)	(°C)	Hours	Years
2.0	0.900	105	407,303	46

PoH can be directly retrieved from the Figure 1 to determine the necessary trade-offs between CPU frequency, and junction temperature in order to extend the estimated PoH of the device.



Note: The plot includes IRdrop 25mV.

Figure 1. Astra SL2610 Consumer qualification product lifetime estimates

4. Summary

Balancing the target operating voltage and frequency of the device with the processor's junction temperature (Tj) can significantly extend the device's lifespan.

Reducing the operating junction temperature is the most effective way to increase the device's product lifetime without impacting performance. This can be achieved by enhancing the application's thermal dissipation capacity.

Additionally, the junction temperature can be monitored, and performance can be adjusted to prevent it from exceeding the maximum allowable level.

5. References

- *SL2610 Embedded IoT Processor Electrical Specification Datasheet* (PN: 505-001501-01)

6. Revision History

Revision	Description
A	Initial release

Contact Us

Visit our website at www.synaptics.com to locate the Synaptics office nearest you.

PN: 506-001674-01 Rev A