



Application Note

Astra™ SL1640 Product Lifetime

Abstract: This document outlines the estimated product lifetime of the Astra™ SL1640.

Downloaded by Anonymis () on 11 Jan 2026 18:20:38 UTC

Contents

| | | |
|------|--|----|
| 1. | Introduction | 5 |
| 2. | Device Qualification Level and Available Power-on Hours (PoH) | 6 |
| 3. | Consumer Product Lifetime Estimates | 7 |
| 3.1. | Consumer SL1640 Product Lifetime at $T_j = 105^\circ\text{C}$ for VL | 7 |
| 3.2. | Consumer SL1640 Product Lifetime at $T_j = 105^\circ\text{C}$ for VH | 8 |
| 4. | Industrial Product Lifetime Estimates | 11 |
| 4.1. | Industrial SL1640 Product Lifetime at $T_j = 105^\circ\text{C}$ for VL | 11 |
| 4.2. | Industrial SL1640 Product Lifetime at $T_j = 105^\circ\text{C}$ for VH | 12 |
| 5. | Summary | 15 |
| 6. | References | 16 |
| 7. | Revision History | 17 |

Downloaded by Anonymous () on 7 Jan 2026 18:20:38 UTC

List of Figures

| | |
|---|----|
| Figure 1. Astra SL1640 VCPU Consumer qualification product lifetime estimates..... | 9 |
| Figure 2. Astra SL1640 VCORE Consumer qualification product lifetime estimates..... | 10 |
| Figure 3. Astra SL1640 VCPU Industrial qualification product lifetime estimates..... | 13 |
| Figure 4. Astra SL1640 VCORE Industrial qualification product lifetime estimates..... | 14 |

Downloaded by Anonymous () on 7 Jan 2026 18:20:38 UTC

List of Tables

| | |
|--|----|
| Table 1. Consumer VCPU Max VL = 0.900V (+IRdrop 25mV), CPU 1.8GHz, Tj=105°C | 7 |
| Table 2. Consumer VCPU Typ. VL = 0.8125V (+IRdrop 25mV), CPU 1.8GHz, Tj=105°C | 7 |
| Table 3. Consumer VCORE Max. VL = 0.8875V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, Tj=105°C | 7 |
| Table 4. Consumer VCORE Typ. VL = 0.7875V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, Tj=105°C | 7 |
| Table 5. Consumer VCPU Max VH = 0.975V (+IRdrop 25mV), CPU 2GHz, Tj=105°C | 8 |
| Table 6. Consumer VCPU Typ. VH = 0.875V (+IRdrop 25mV), CPU 2GHz, Tj=105°C | 8 |
| Table 7. Consumer VCORE Max VH = 0.900V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, Tj=105°C | 8 |
| Table 8. Consumer VCORE Typ. VH = 0.825V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, Tj=105°C | 8 |
| Table 9. Industrial VCPU Max VL = 0.925V (+IRdrop 25mV), CPU 1.8GHz, Tj=105°C | 11 |
| Table 10. Industrial VCPU Typ. VL = 0.8375V (+IRdrop 25mV), CPU 1.8GHz, Tj=105°C | 11 |
| Table 11. Industrial VCORE Max VL = 0.925V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, Tj=105°C | 11 |
| Table 12. Industrial VCORE Typ. VL = 0.825V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, Tj=105°C | 11 |
| Table 13. Industrial VCPU Max VH = 1.000V (+IRdrop 25mV), CPU 2GHz, Tj=105°C | 12 |
| Table 14. Industrial VCPU Typ. VH = 0.900V (+IRdrop 25mV), CPU 2GHz, Tj=105°C | 12 |
| Table 15. Industrial Max VH = 0.9375V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, Tj=105°C | 12 |
| Table 16. Industrial Typ. VH = 0.8625V (+IRdrop 25mV), CPU 2GHz, DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, Tj=105°C | 12 |

1. Introduction

This document outlines the estimated product lifetime of the Astra™ SL1640, based on the criteria from the qualification process. It aims to help users understand the various SL1640 qualification levels concerning the device's target operating frequencies, the maximum supported junction temperature (T_j) of the processor, and their implications for the device's lifespan.

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

Downloaded by Anonymous () on 7 Jan 2026 18:20:38 UTC

2. Device Qualification Level and Available Power-on Hours (PoH)

1. The product's lifetime is directly dependent on the voltage and temperature.
2. The junction temperature of the processor (T_j).
 - 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™ SL1640. 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.

3. Terminology used in this document:
 - **V_{CPU}**: Voltage supply for the Central Processing Unit (CPU) of the device.
 - **V_{CORE}**: Voltage supply for the CORE of the device.
 - **V_L**: Low voltage of the operating range power supply for the device.
 - **V_H**: High voltage of the operating range power supply for the device.

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

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

3. Consumer Product Lifetime Estimates

3.1. Consumer SL1640 Product Lifetime at Tj = 105°C for VL

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

Table 1. Consumer VCPU Max VL = 0.900V (+IRdrop 25mV), CPU 1.8GHz, Tj=105°C

| CPU Speed | SoC Operating Voltage | Junction Temperature Tj | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|-------------------------|----------------------|------------------|
| (GHz) | (V) | (°C) | Hours | Years |
| 1.8 | 0.925 | 105 | 266,282 | 30.4 |

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

Table 2. Consumer VCPU Typ. VL = 0.8125V (+IRdrop 25mV), CPU 1.8GHz, Tj=105°C

| CPU Speed | SoC Operating Voltage | Junction Temperature Tj | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|-------------------------|----------------------|------------------|
| (GHz) | (V) | (°C) | Hours | Years |
| 1.8 | 0.8375 | 105 | 1,178,570 | 134.5 |

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

Table 3. Consumer VCORE Max. VL = 0.8875V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, Tj=105°C

| SoC Operating Voltage | Junction Temperature Tj | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|-------------------------|----------------------|------------------|
| (V) | (°C) | Hours | Years |
| 0.9125 | 105 | 329,329 | 37.5 |

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

Table 4. Consumer VCORE Typ. VL = 0.7875V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, Tj=105°C

| SoC Operating Voltage | Junction Temperature Tj | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|-------------------------|----------------------|------------------|
| (V) | (°C) | Hours | Years |
| 0.8125 | 105 | 1,802,730 | 205.7 |

3.2. Consumer SL1640 Product Lifetime at $T_j = 105^\circ\text{C}$ for VH

VCPU HIGH Max (VH) = Max VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 5. Consumer VCPU Max VH = 0.975V (+IRdrop 25mV), CPU 2GHz, $T_j=105^\circ\text{C}$

| CPU Speed | SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|----------------------------|----------------------|------------------|
| (GHz) | (V) | ($^\circ\text{C}$) | Hours | Years |
| 2 | 1 | 105 | 74,407 | 8.5 |

VCPU HIGH Typ. (VH) = Typ. VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 6. Consumer VCPU Typ. VH = 0.875V (+IRdrop 25mV), CPU 2GHz, $T_j=105^\circ\text{C}$

| CPU Speed | SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|----------------------------|----------------------|------------------|
| (GHz) | (V) | ($^\circ\text{C}$) | Hours | Years |
| 2 | 0.900 | 105 | 407,303 | 46.5 |

VCORE HIGH Max (VH) = Max. VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 7. Consumer VCORE Max VH = 0.900V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, $T_j=105^\circ\text{C}$

| SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|----------------------------|----------------------|------------------|
| (V) | ($^\circ\text{C}$) | Hours | Years |
| 0.925 | 105 | 266,282 | 30.4 |

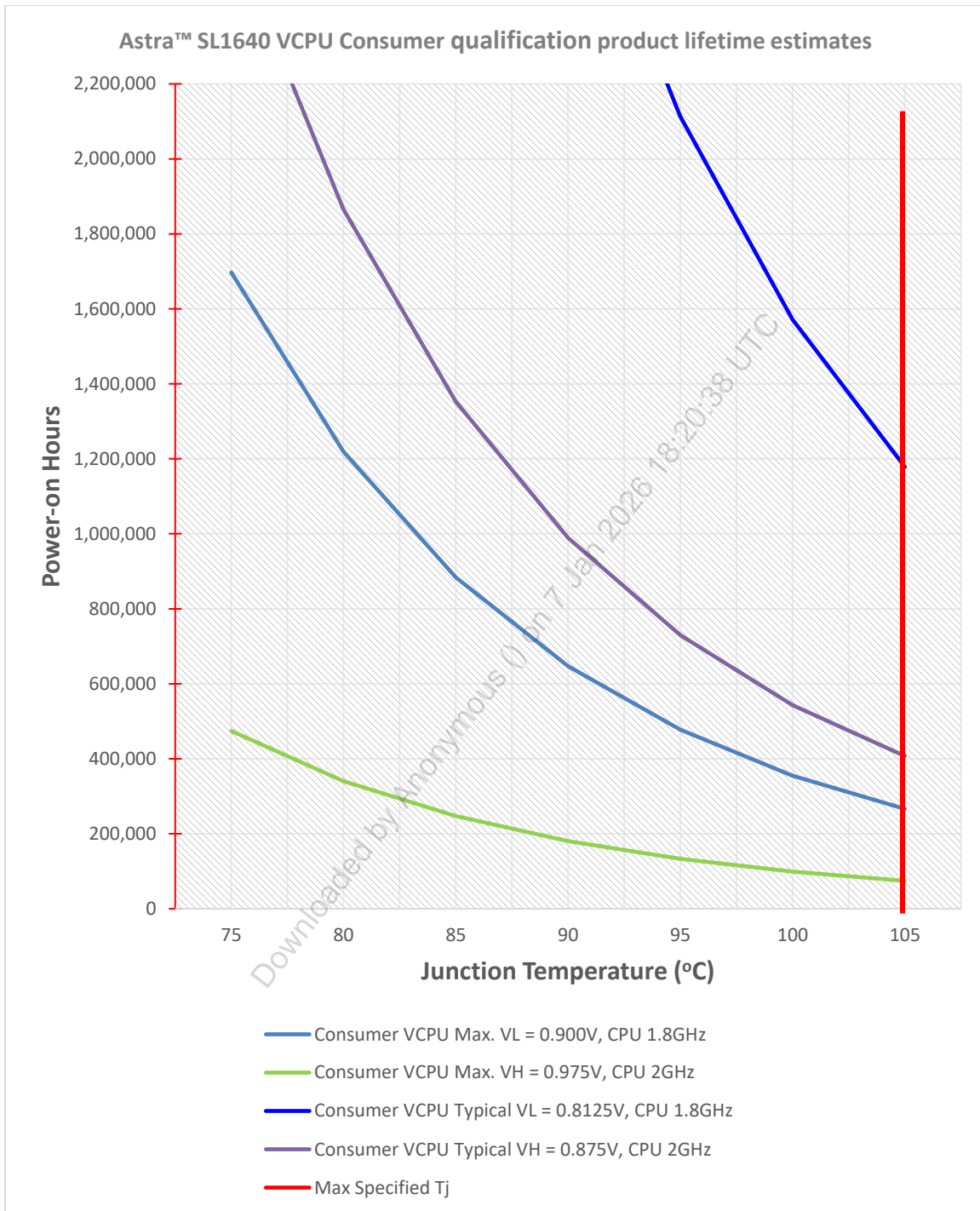
VCORE HIGH Typ. (VH) = Max. VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 8. Consumer VCORE Typ. VH = 0.825V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, $T_j=105^\circ\text{C}$

| SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|----------------------------|----------------------|------------------|
| (V) | ($^\circ\text{C}$) | Hours | Years |
| 0.850 | 105 | 952,945 | 108.8 |

PoH can be directly retrieved from

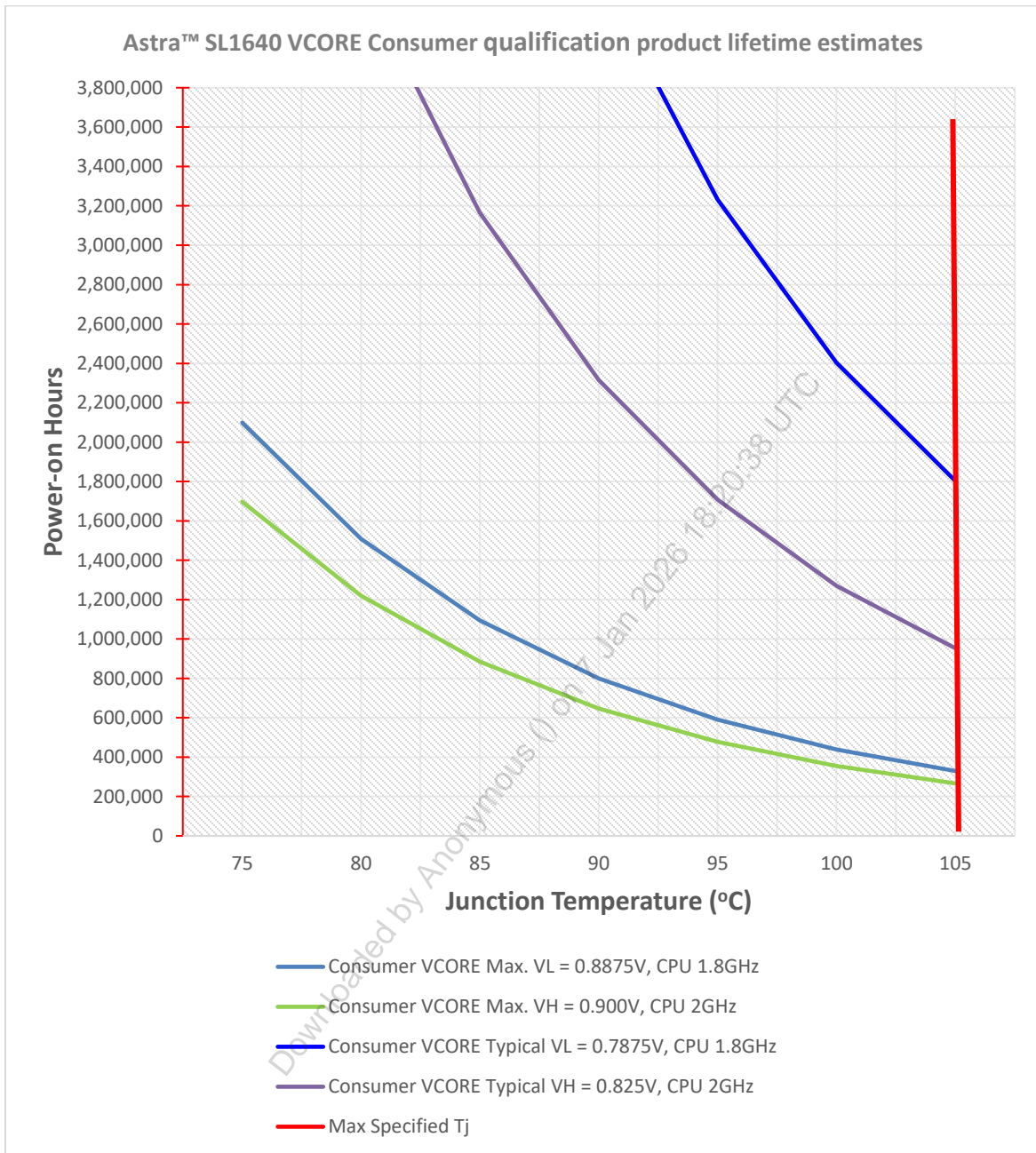
Figure 1 to determine the necessary trade-offs between CPU frequency and junction temperature in order to extend the estimated PoH of the device.



Note: The plot includes IRdrop 25mV.

Figure 1. Astra SL1640 VCPU Consumer qualification product lifetime estimates

PoH can be directly retrieved from Figure 2 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 2. Astra SL1640 VCORE Consumer qualification product lifetime estimates

4. Industrial Product Lifetime Estimates

4.1. Industrial SL1640 Product Lifetime at $T_j = 105^\circ\text{C}$ for VL

VCPU LOW Max (VL) = Max VL (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 9. Industrial VCPU Max VL = 0.925V (+IRdrop 25mV), CPU 1.8GHz, $T_j=105^\circ\text{C}$

| CPU Speed | SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|----------------------------|----------------------|------------------|
| (GHz) | (V) | ($^\circ\text{C}$) | Hours | Years |
| 1.8 | 0.950 | 105 | 348,174 | 39.7 |

VCPU LOW Typ. (VL) = Typ. VL (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 10. Industrial VCPU Typ. VL = 0.8375V (+IRdrop 25mV), CPU 1.8GHz, $T_j=105^\circ\text{C}$

| CPU Speed | SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|----------------------------|----------------------|------------------|
| (GHz) | (V) | ($^\circ\text{C}$) | Hours | Years |
| 1.8 | 0.8625 | 105 | 1,541,027 | 176 |

VCORE LOW Max (VL) = Max VL (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 11. Industrial VCORE Max VL = 0.925V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, $T_j=105^\circ\text{C}$

| SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|----------------------------|----------------------|------------------|
| (V) | ($^\circ\text{C}$) | Hours | Years |
| 0.950 | 105 | 348,174 | 40 |

VCORE LOW Typ. (VL) = Typ. VL (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 12. Industrial VCORE Typ. VL = 0.825V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 700MHz, GPU/V4G/DSP 800MHz, $T_j=105^\circ\text{C}$

| SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|----------------------------|----------------------|------------------|
| (V) | ($^\circ\text{C}$) | Hours | Years |
| 0.850 | 105 | 1,905,891 | 217.5 |

4.2. Industrial SL1640 Product Lifetime at $T_j = 105^\circ\text{C}$ for VH

VCPU HIGH Max (VH) = Max VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 13. Industrial VCPU Max VH = 1.000V (+IRdrop 25mV), CPU 2GHz, $T_j=105^\circ\text{C}$

| CPU Speed | SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|----------------------------|----------------------|------------------|
| (GHz) | (V) | ($^\circ\text{C}$) | Hours | Years |
| 2 | 1.025 | 105 | 97,290 | 11 |

VCPU HIGH Typ. (VH) = Typ. VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 14. Industrial VCPU Typ. VH = 0.900V (+IRdrop 25mV), CPU 2GHz, $T_j=105^\circ\text{C}$

| CPU Speed | SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------|-----------------------|----------------------------|----------------------|------------------|
| (GHz) | (V) | ($^\circ\text{C}$) | Hours | Years |
| 2 | 0.925 | 105 | 532,565 | 60.8 |

VCORE HIGH Max (VH) = Max. VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 15. Industrial Max VH = 0.9375V (+IRdrop 25mV), DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, $T_j=105^\circ\text{C}$

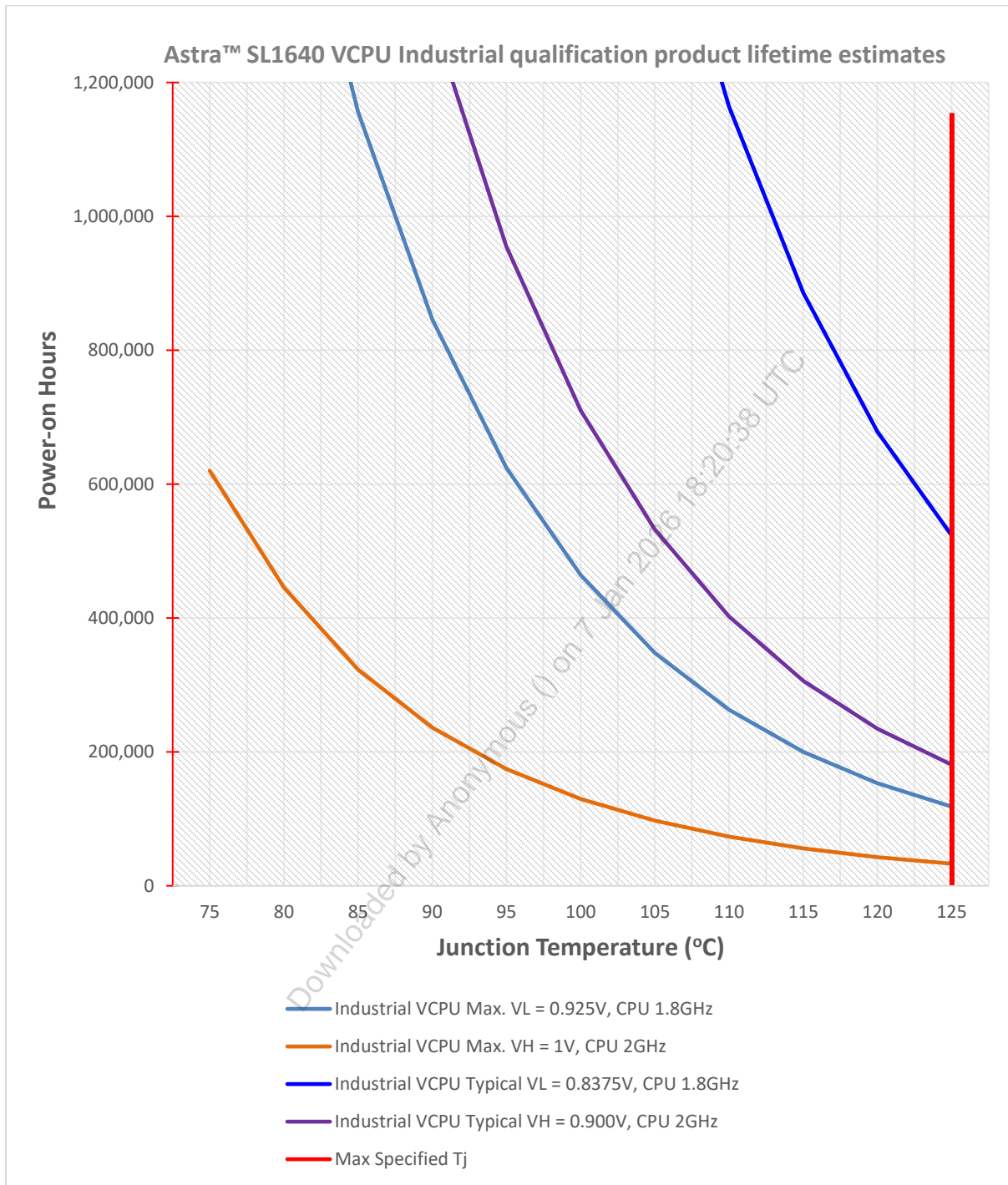
| SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|----------------------------|----------------------|------------------|
| (V) | ($^\circ\text{C}$) | Hours | Years |
| 0.9625 | 105 | 281,520 | 32 |

VCORE HIGH Typ. (VH) = Max. VH (+IRdrop 25mV), Product Lifetime @ $T_j=105^\circ\text{C}$

Table 16. Industrial Typ. VH = 0.8625V (+IRdrop 25mV), CPU 2GHz, DDR4 3200Mbps, NPU/TSP 800MHz, GPU/V4G/DSP 900MHz, $T_j=105^\circ\text{C}$

| SoC Operating Voltage | Junction Temperature T_j | Power-on Hours (PoH) | Product Lifetime |
|-----------------------|----------------------------|----------------------|------------------|
| (V) | ($^\circ\text{C}$) | Hours | Years |
| 0.8875 | 105 | 1,007,477 | 115 |

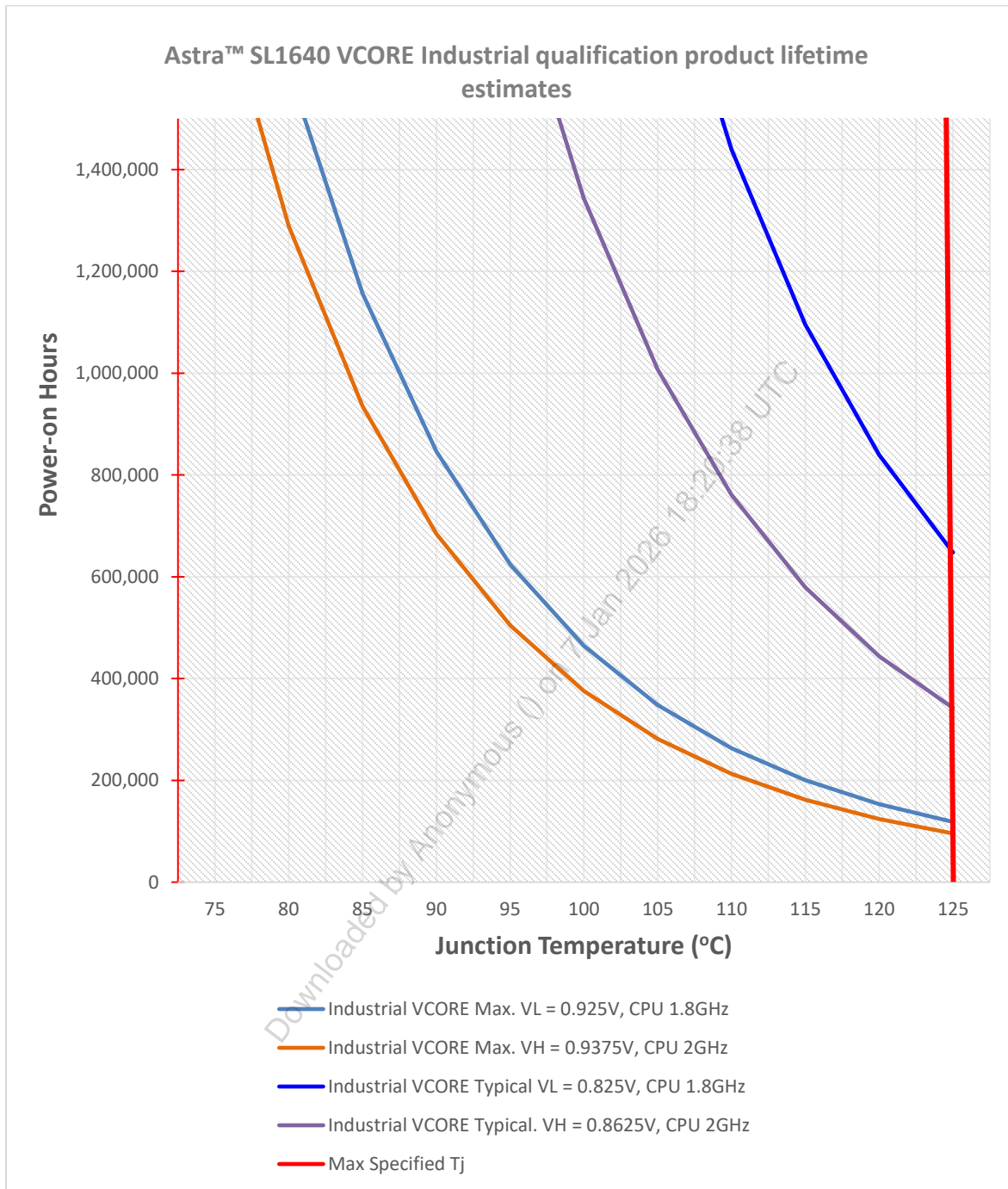
PoH can be directly retrieved from Figure 3 to determine the necessary trade-offs between CPU frequency and junction temperature in order to extend the estimated PoH of the device.



Note: The plot includes IRdrop 25mV.

Figure 3. Astra SL1640 VCPU Industrial qualification product lifetime estimates

PoH can be directly retrieved from Figure 4 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 IDrop 25mV.

Figure 4. Astra SL1640 VCORE Industrial qualification product lifetime estimates

5. Summary

Balancing the target operating voltage and frequency of the device with the processor's junction temperature (T_j) 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.

Downloaded by Anonymous () on 7 Jan 2026 18:20:38 UTC

6. References

- *SL1640 Embedded IoT Processor Electrical Specification Datasheet* (PN: 505-001415-01)

Downloaded by Anonymous () on 7 Jan 2026 18:20:38 UTC

7. Revision History

| Revision | Description |
|----------|-----------------|
| A | Initial release |

Downloaded by Anonymous () on 7 Jan 2026 18:20:38 UTC



Copyright

Copyright © 2025 Synaptics Incorporated. All Rights Reserved.

Trademarks

Astra, Synaptics; the Synaptics logo; add other trademarks here, are trademarks or registered trademarks of Synaptics Incorporated in the United States and/or other countries.

All other trademarks are the properties of their respective owners.

Contact Us

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

PN: 506-001583-01 Rev A

Notice

Use of the materials may require a license of intellectual property from a third party or from Synaptics. This document conveys no express or implied licenses to any intellectual property rights belonging to Synaptics or any other party. Synaptics may, from time to time and at its sole option, update the information contained in this document without notice.

INFORMATION CONTAINED IN THIS DOCUMENT IS PROVIDED "AS-IS," AND SYNAPTICS HEREBY DISCLAIMS ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES OF NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT SHALL SYNAPTICS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OF THE INFORMATION CONTAINED IN THIS DOCUMENT, HOWEVER CAUSED AND BASED ON ANY THEORY OF LIABILITY, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, AND EVEN IF SYNAPTICS WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. IF A TRIBUNAL OF COMPETENT JURISDICTION DOES NOT PERMIT THE DISCLAIMER OF DIRECT DAMAGES OR ANY OTHER DAMAGES, SYNAPTICS' TOTAL CUMULATIVE LIABILITY TO ANY PARTY SHALL NOT EXCEED ONE HUNDRED U.S. DOLLARS.