Guidelines for estimating STM32H7 MCUs lifetime

Introduction

This application note presents lifetime usage estimates for STM32H7 series microcontrollers (see applicable products on the table below). The presented profiles are dependent on the voltage scaling of the device (VOS) and the maximum supported junction temperature (Tj).

The product lifetime estimates presented in this document are estimated and do not represent the guaranteed lifetime for the product.

Table 1. Applicable products

Type	Product lines
Microcontrollers	STM32H742, STM32H743/753, STM32H745/755, STM32H747/757, STM32H750 Value line STM32H723/733, STM32H725/735, STM32H730 Value line

1 General information

This document presents the STM32H7 series lifetime usage estimation. These estimates are qualified depending on frequencies, voltage, and junction temperature.

The frequencies and applied voltages are provided in the device datasheets.

The STM32H7 series microcontrollers are Arm®-based devices.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2 STM32H7 series lifetime usage estimation

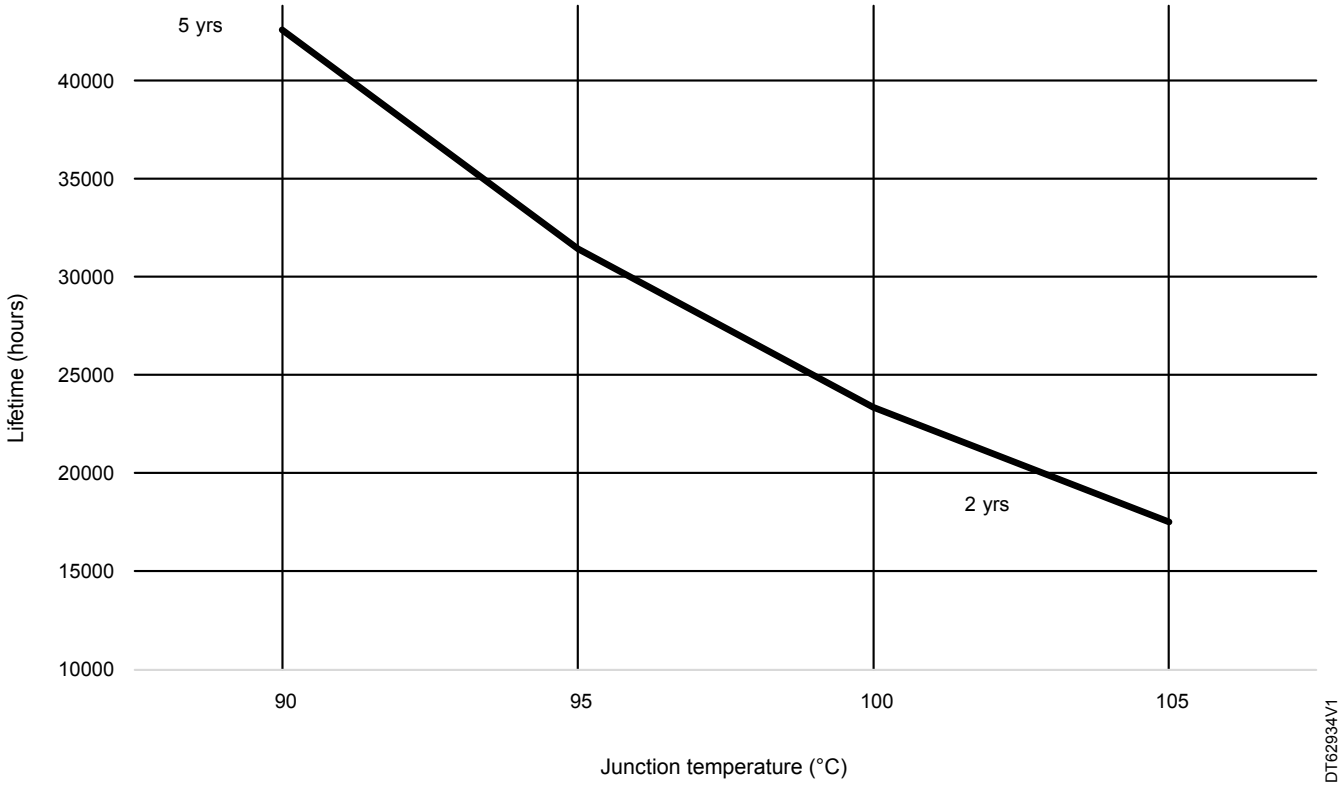
This section presents data and tables representing the lifetime usage estimation for STM32H7 series devices for typical use conditions.

Table 2. STM32H7 series lifetime usage estimation for typical use conditions

-	Lifetime (years)	Operating ratio (%)	V_{DD} nominal (V)	V_{CORE} nominal (V)	Junction temperature (T_J) (°C)
VOS0(1)	10	20	3.3	1.35	105
VOS1(2)	10	20	3.3	1.2	140(3)
VOS2 - VOS3	10	100	3.3	<1.10	140(3)

1. *Not applicable for STM32H757xxxxA.*
2. *Max CPU1 frequency of 480 MHz and max CPU2 frequency of 240 MHz is achievable with VOS1 only for STM32H757xxxxA.*
3. *The temperature of 140°C cannot be reached by all part numbers; it is exclusive to SMPS part numbers. Refer to the product datasheet for more details.*

Figure 1. Lifetime estimation VOS0



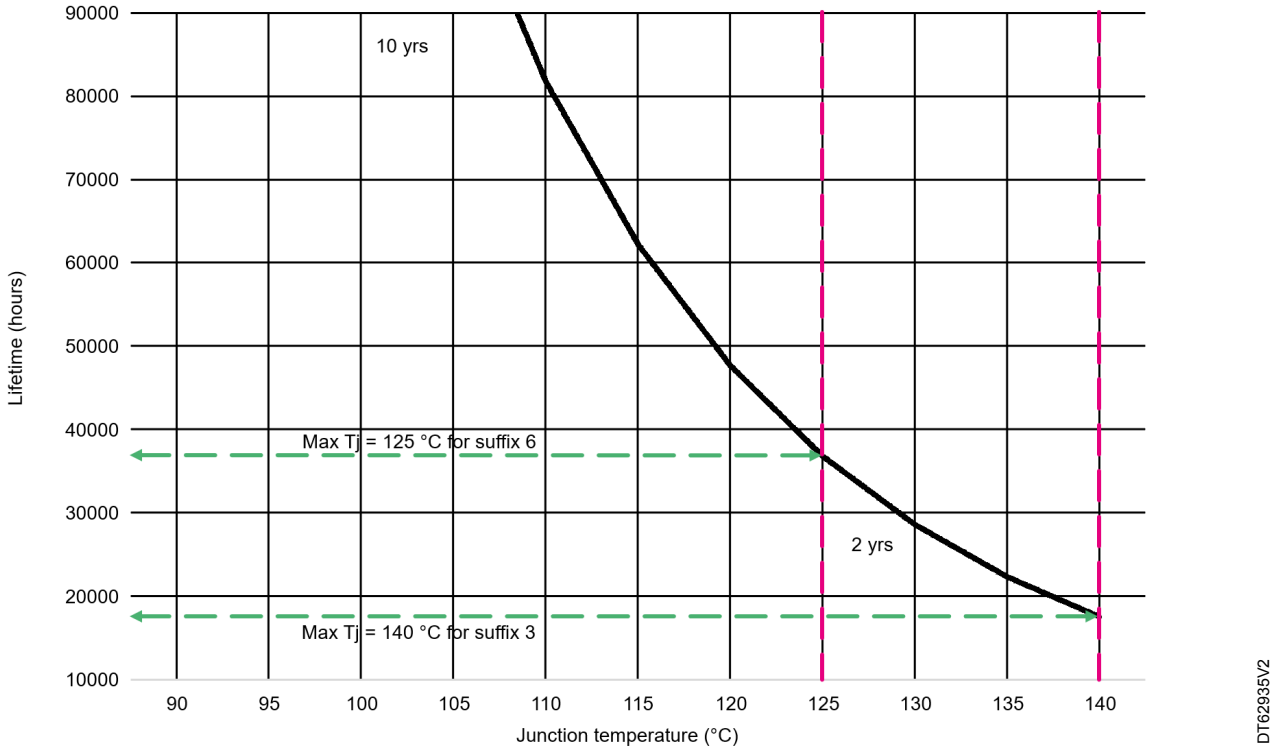
According to Figure 1, when VOS0, V_{DD} = 3.3 V, V_{CORE} = 1.35 V and operation ratio 100%. Some examples are illustrated such as:

- Tj = 105°C the lifetime estimation is 2 years
- Tj = 95°C the lifetime estimation is 3.5 years

In the same conditions and for an operation ratio of 20%, the lifetime estimation is as following:

- Tj = 105°C the lifetime estimation is 10 years
- Tj = 95°C the lifetime estimation is 17.5 years

Figure 2. Lifetime estimation VOS1



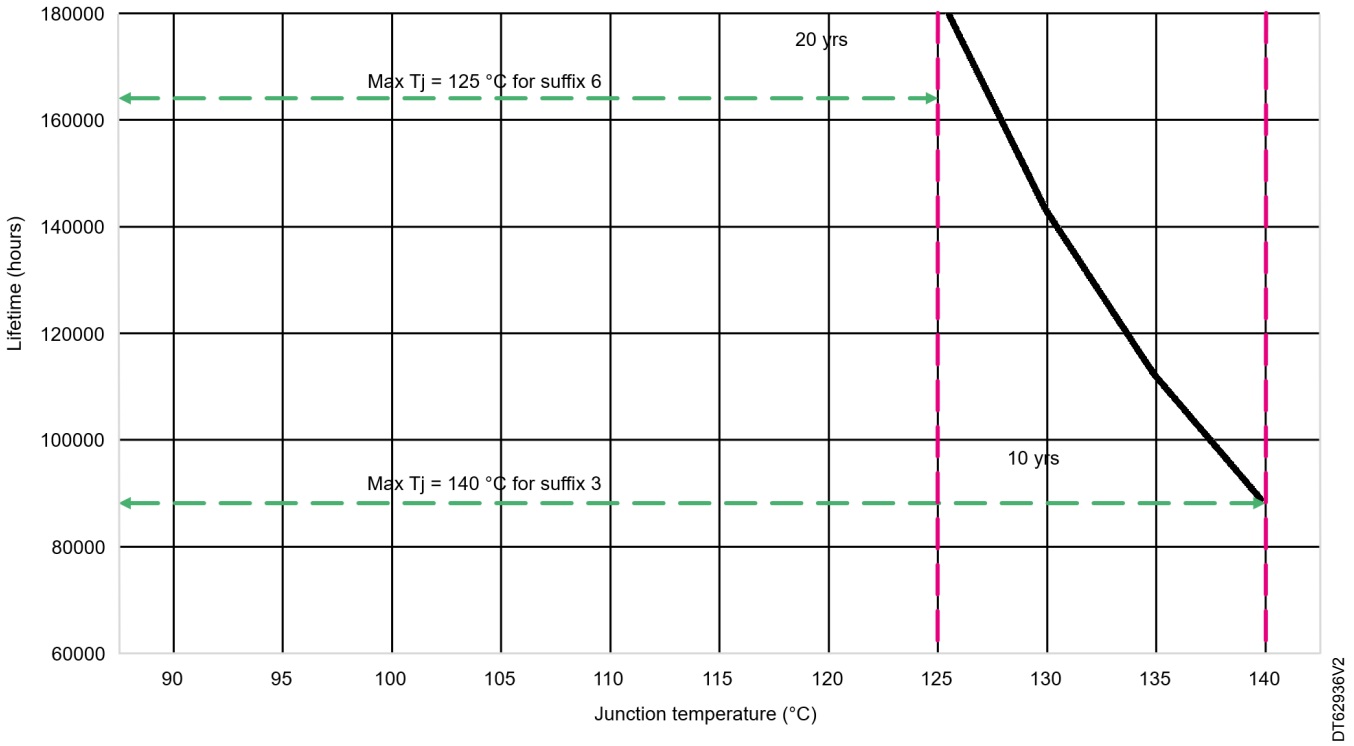
According to Figure 2, when VOS1, V_{DD} = 3.3 V, V_{CORE} = 1.2 V and operation ratio of 100%. Some examples are illustrated such as:

- Tj = 105°C the lifetime estimation is > 10 years
- Tj = 125°C the lifetime estimation is 4 years
- Tj = 140°C the lifetime estimation is 2 years

In the same conditions and for an operation ratio of 20%, the lifetime estimation is as following:

- Tj = 125°C the lifetime estimation is 20 years
- Tj = 140°C the lifetime estimation is 10 years

Figure 3. Lifetime estimation VOS2 and VOS3



According to Figure 3, when VOS2 or VOS3, VDD = 3.3 V, V_{CORE} < 1.10 V and operation ratio 100%. Some examples are illustrated such as:

- Tj = 125°C the lifetime estimation is > 20 years
- Tj = 130°C the lifetime estimation is 16 years
- Tj = 140°C the lifetime estimation is 10 years

Note: For more information about the suffix 3 or 6, refer to the product datasheet available on www.st.com.

Revision history

Table 3. **Document revision history**

Date	Version	Changes
19-Jun-2019	1	Initial release.
03-Jul-2020	2	Added STM32H723, STM32H733, STM32H725, STM32H735, and STM32H730 part numbers. Removed all the tables providing frequencies versus voltage scaling and temperature ranges for all product series.
18-Apr-2024	3	Updated: • Document title • Section 2: STM32H7 series lifetime usage estimation

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