Guidelines for estimating STM32H5 MCUs lifetime

Introduction

This application note presents lifetime usage estimates for STM32H5 series microcontrollers. 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	Series
Microcontrollers	STM32H5

AN6246 - Rev 1 - January 2025
For further information, contact your local STMicroelectronics sales office.

www.st.com

1 General information

This document presents the STM32H5 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 STM32H5 series microcontrollers are Arm®-based devices.

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

arm

2   STM32H5 series lifetime usage estimation

This section provides data and tables representing the lifetime usage estimation for STM32H5 series devices for typical use conditions.

Table 2. STM32H5 series lifetime usage estimation for typical use condition

MCU category	Voltage scaling	Lifetime (years)	Operation ratio (%)	V_{DD} nominal (V)	V_{CORE} nominal (V)	Junction temperature (T_j) (°C)
General purpose	VOS0	10	20	3.3	1.35	105
	VOS1	10	20	3.3	1.2	130
Industrial	VOS1	10	100	3.3	1.2	105
	VOS2	10	100	3.3	1.1	130

Figure 1. Lifetime estimation VOS0 (general purpose MCU)
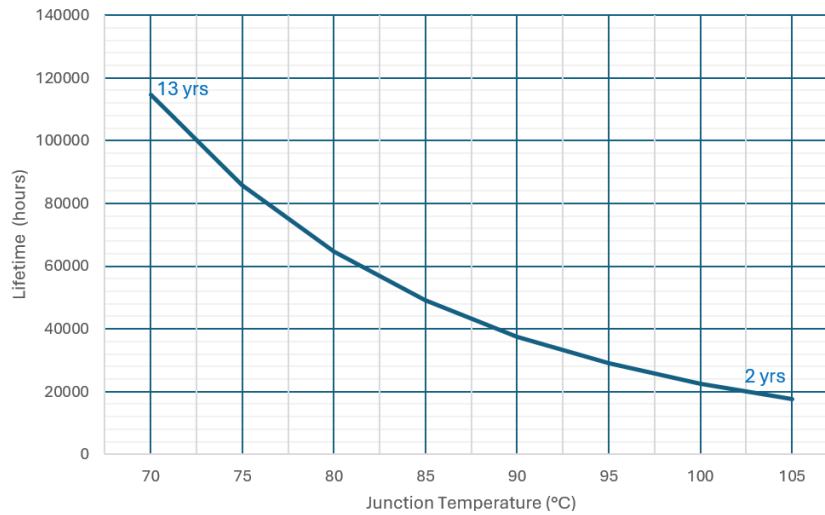
According to Figure 1, with VOS0, V_{DD} = 3.3 V, V_{CORE} = 1.35 V and operation ratio 100%. Some examples are illustrated such as:

• T_j = 105°C the estimated lifetime is 2 years
• T_j = 74°C the estimated lifetime is 10 years

Under the same conditions and with operation ratio of 20%, the lifetime estimation is 10 years at T_j = 105°C.
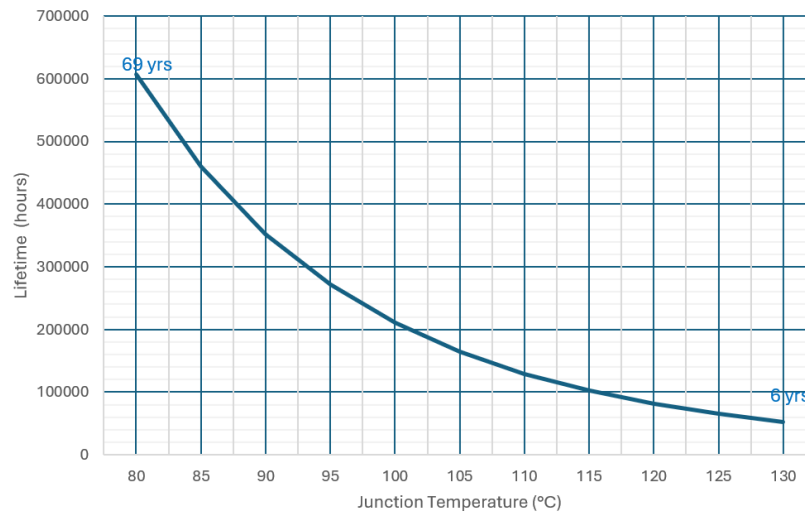
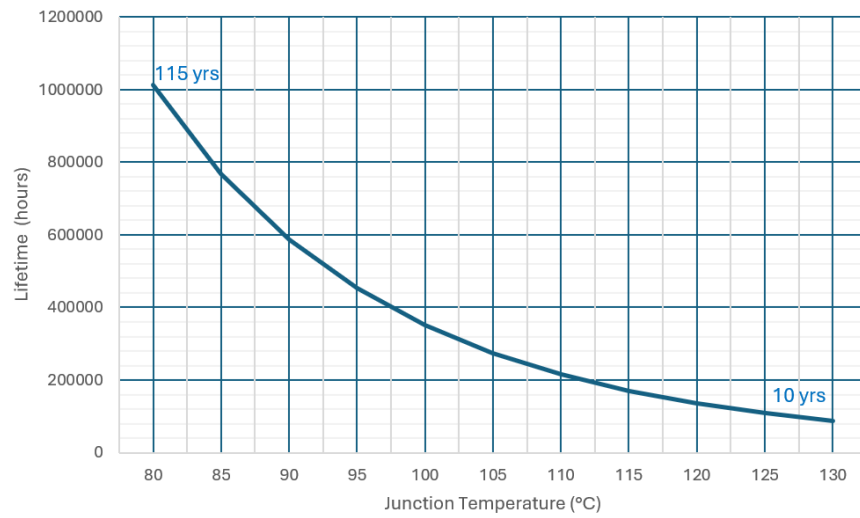**Figure 2. Lifetime estimation VOS1 (general purpose MCU)**
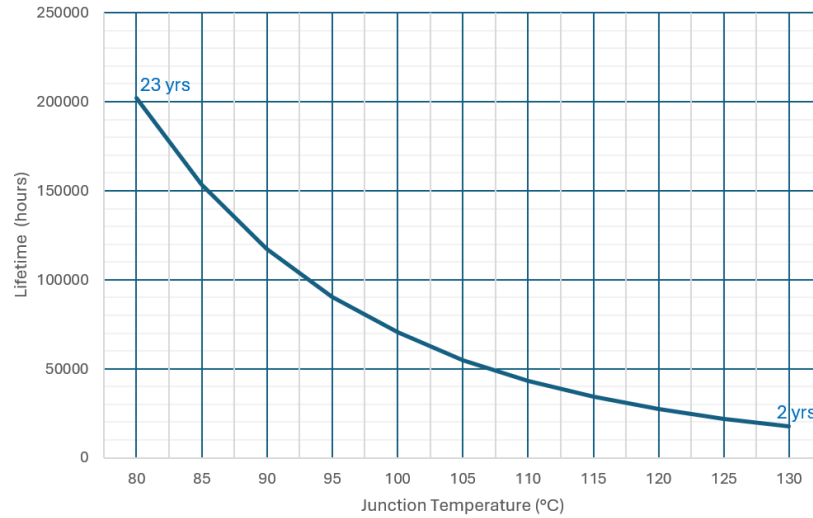
According to Figure 2, with VOS1, V_{DD} = 3.3 V, V_{CORE} = 1.2 V and operation ratio 100%. Some examples are illustrated such as:

- T_j = 130°C the estimated lifetime is 2 years
- T_j = 80°C the estimated lifetime is 23 years

Under the same conditions and with operation ratio of 20%, the lifetime estimation is 10 years at T_j = 130°C.

Figure 3. Lifetime estimation VOS1 (industrial MCU)

According to Figure 3, with VOS1, V_{DD} = 3.3 V, V_{CORE} = 1.2 V and operation ratio 100%. Some examples are illustrated such as:

- T_j = 130°C the estimated lifetime is 6 years
- T_j = 105°C the estimated lifetime is 10 years

Under the same conditions and with operation ratio of 20%, the lifetime estimation is 30 years at T_j = 130°C.

Figure 4. Lifetime estimation VOS2 (industrial MCU)

According to Figure 4, with VOS2, V_{DD} = 3.3 V, V_{CORE} = 1.1 V and operation ratio 100%. Some examples are illustrated such as:

- T_j = 130°C the estimated lifetime is 10 years
- T_j = 80°C the estimated lifetime is 115 years

Under the same conditions and with operation ratio of 20%, the lifetime estimation is 50 years at T_j = 130°C.

Revision history

Table 3. Document revision history

Date	Version	Changes
17-Jan-2025	1	Initial release.

Contents

List of tables

List of figures

IMPORTANT NOTICE – READ CAREFULLY