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Application note

STM32MP1 series lifetime estimates

Introduction

This application note presents lifetime estimates for STM32MP1 series microprocessors. The presented profiles are dependent on the device voltage, device frequency, operation ratio and on the maximum supported junction temperature (Tj).

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

Related documents:

STM32MP13xx datasheets

STM32MP15xx datasheets

1 General information

This document applies to Arm® Cortex® core-based microprocessors of the STM32MP1 series.

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

2 STM32MP15xx lifetime estimation

The STM32MP15xx lifetime estimates depend on voltage and junction temperature, the table below details these lifetimes versus the applied voltage.

Table 1. STM32MP15xx lifetime estimates versus the mission profiles (Operating ratio = 100 %, V_{DD} max Domain 2 = 3.6 V)

Mission profile	Cortex-A7 frequency (MHz)	Domain 1 max [V_{DDCORE}] (V)	Lifetime (Years)	Junction Temperature (°C)
MP1: General purpose	650	1.25 (60 %) / 1.21 (40%)	2	-40 < T_J < 125
MP2: Industrial profile-1	600	1.25	10	-40 < T_J < 125
MP3: Industrial profile-2	650	1.25	10	-40 < T_J < 105
MP4: Enhanced Profile	800	1.38	2	-40 < T_J < 105

The junction temperature (T_J) of the device is an important variable influencing the product lifetime (as shown in the figures below). Hence, it is recommended to keep a low T_J of the device with an appropriate thermal management.

Figure 1. STM32MP15xx lifetime estimates (MP1)

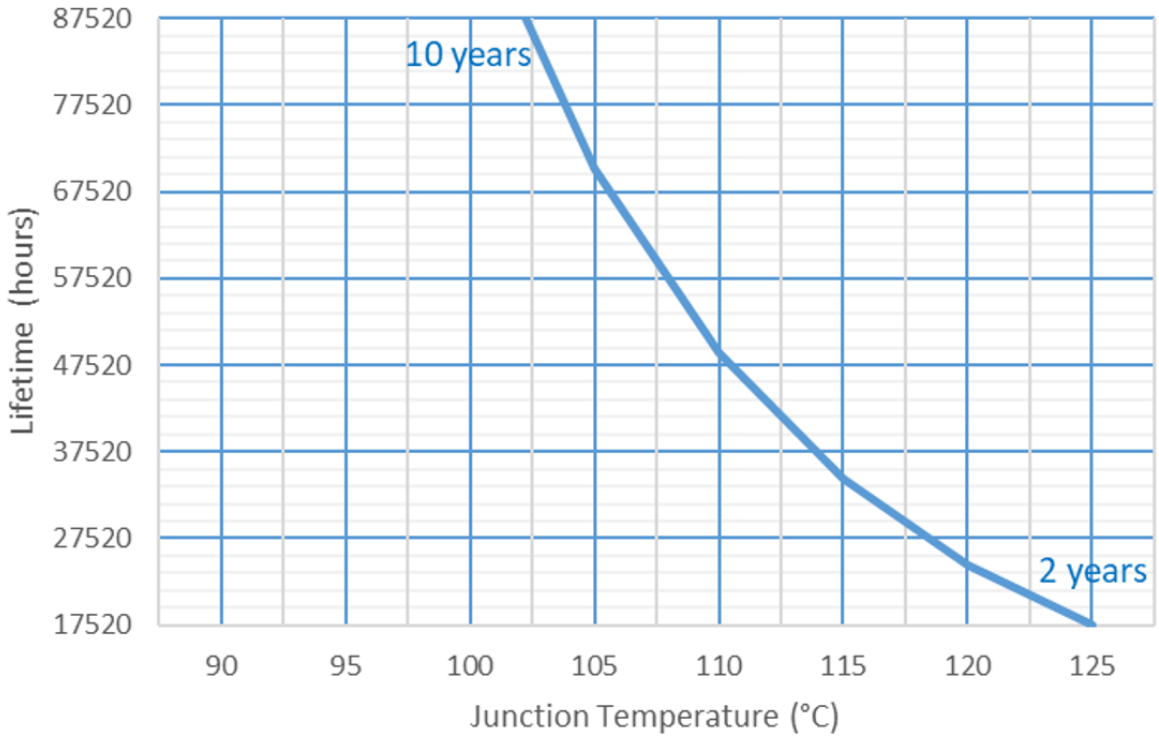


Figure 2. **STM32MP15xx lifetime estimates (MP2)**

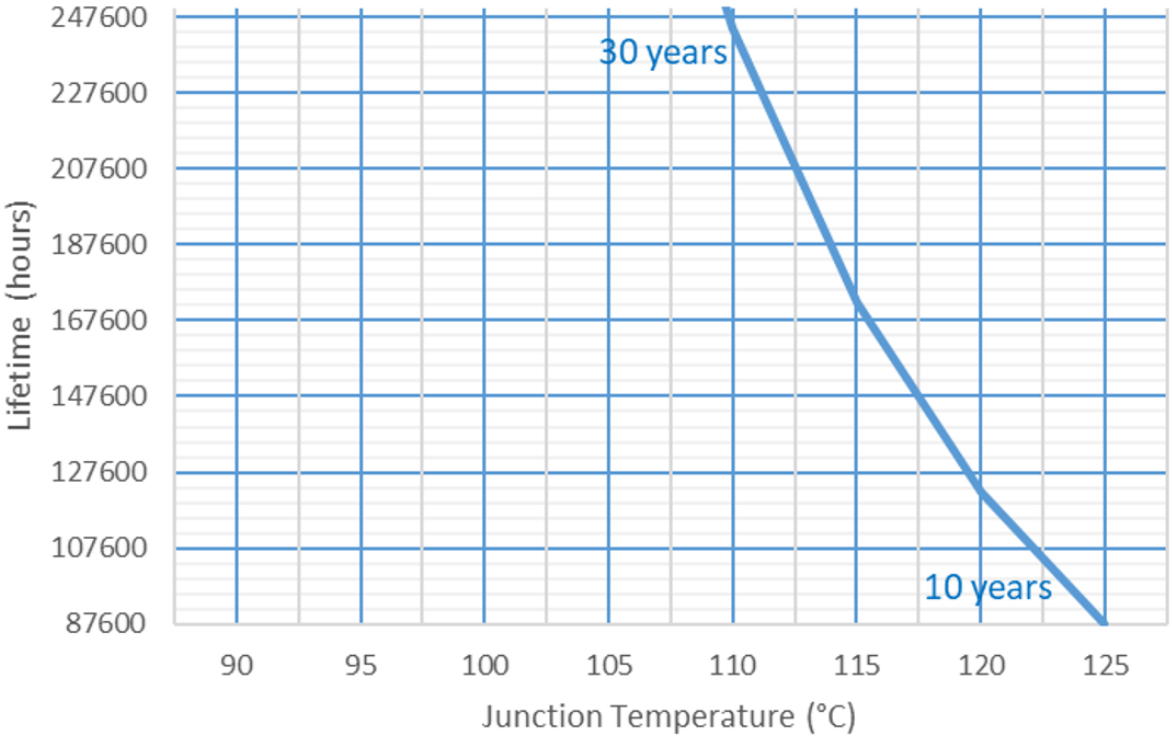


Figure 3. **STM32MP15xx lifetime estimates (MP3)**

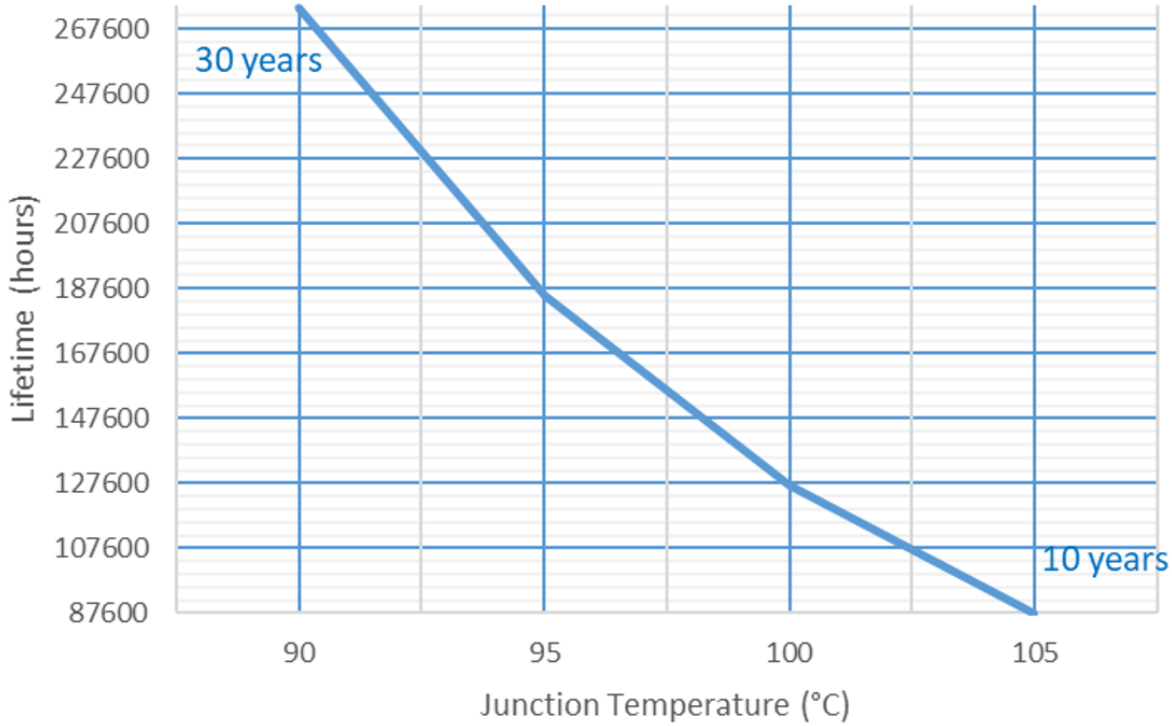
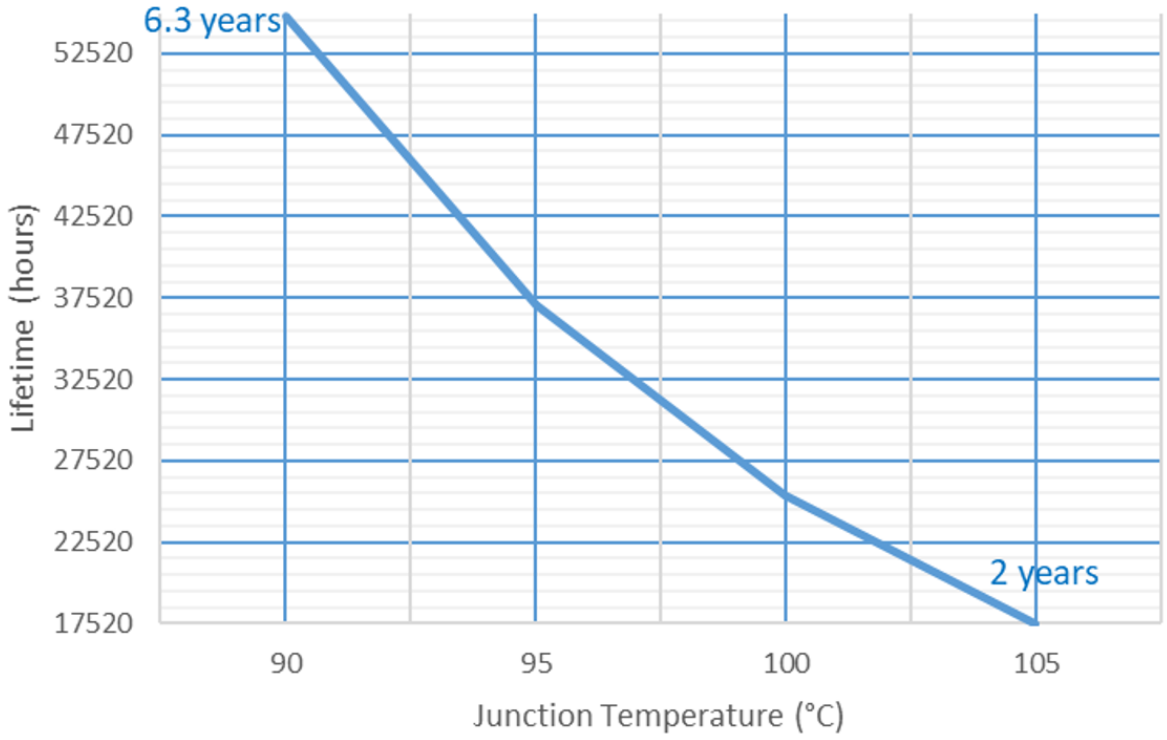


Figure 4. **STM32MP15xx lifetime estimates (MP4)**



3 STM32MP13xx lifetime estimation

The STM32MP13xx lifetime estimates depend on voltage and junction temperature, the table below details these lifetimes versus the applied voltage.

Table 2. STM32MP13xx lifetime estimates versus the mission profiles

Mission profile	Cortex-A7 frequency (MHz)	Domain 1 max [V_{DDCPU}] (V)	Domain 2 max [V_{DD}] (V)	Activity rate / Lifetime	Junction Temperature (°C)
MP1: Industrial profile	650	1.29	3.6	100% / 10 years	-40 < T_J < 125
MP2: Industrial profile -2	900	1.38	3.6	100% / 10 years	-40 < T_J < 105
MP3: Enhanced profile	1000	1.38	3.6	25% / 10 years	-40 < T_J < 105

The junction temperature (T_J) of the device is an important variable influencing the product lifetime (as shown in the figures below). Hence, it is recommended to keep a low T_J of the device with an appropriate thermal management.

Figure 5. STM32MP13xx lifetime estimates (MP1)

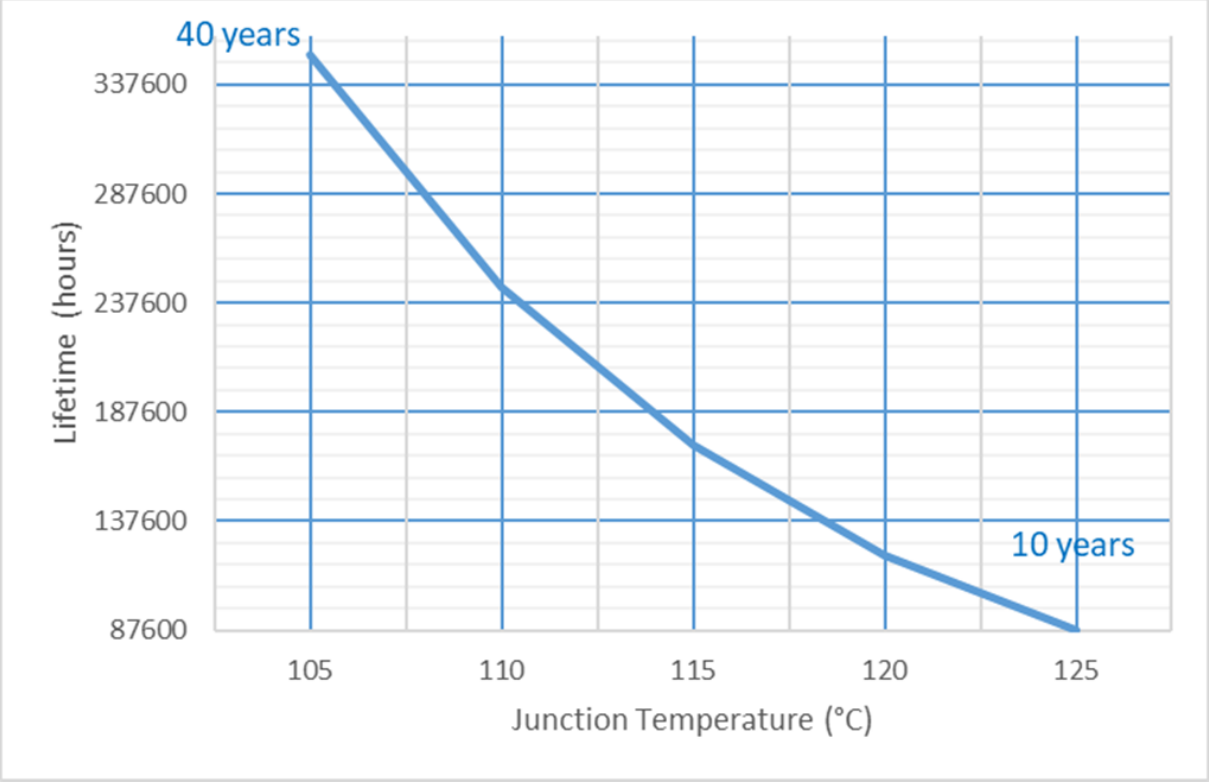


Figure 6. **STM32MP13xx lifetime estimates (MP2)**

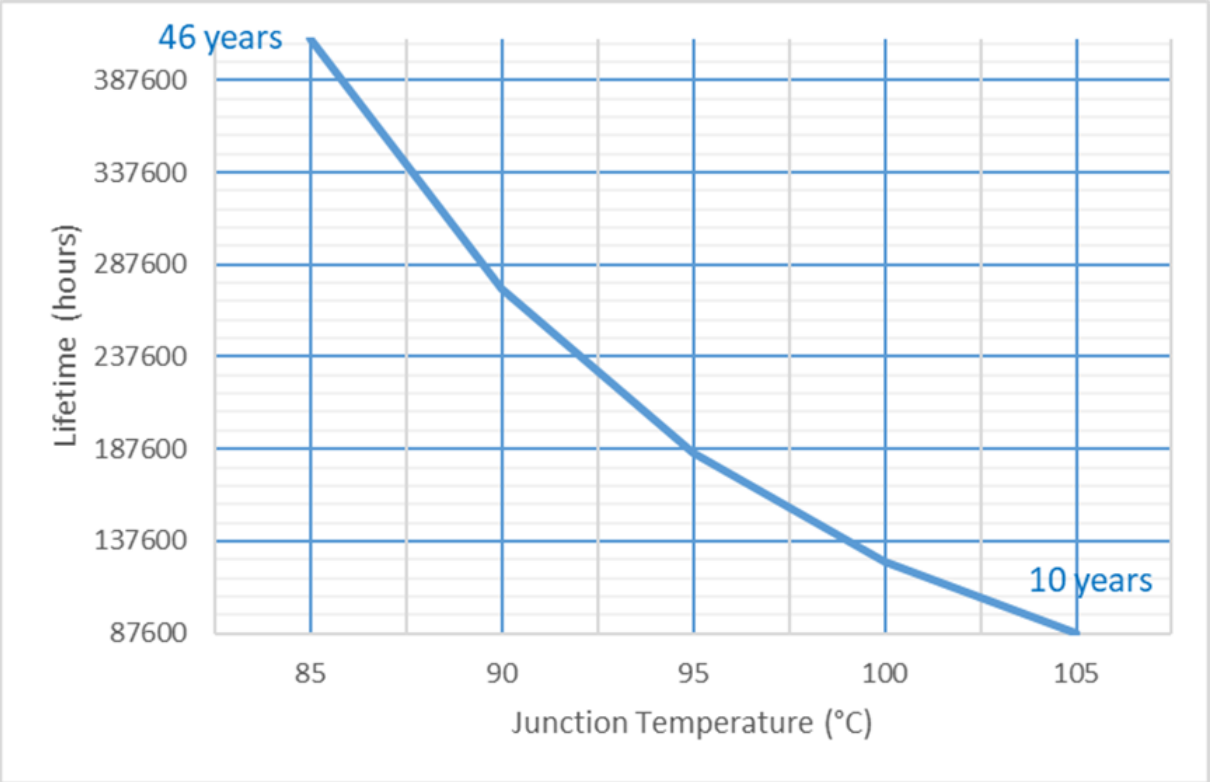
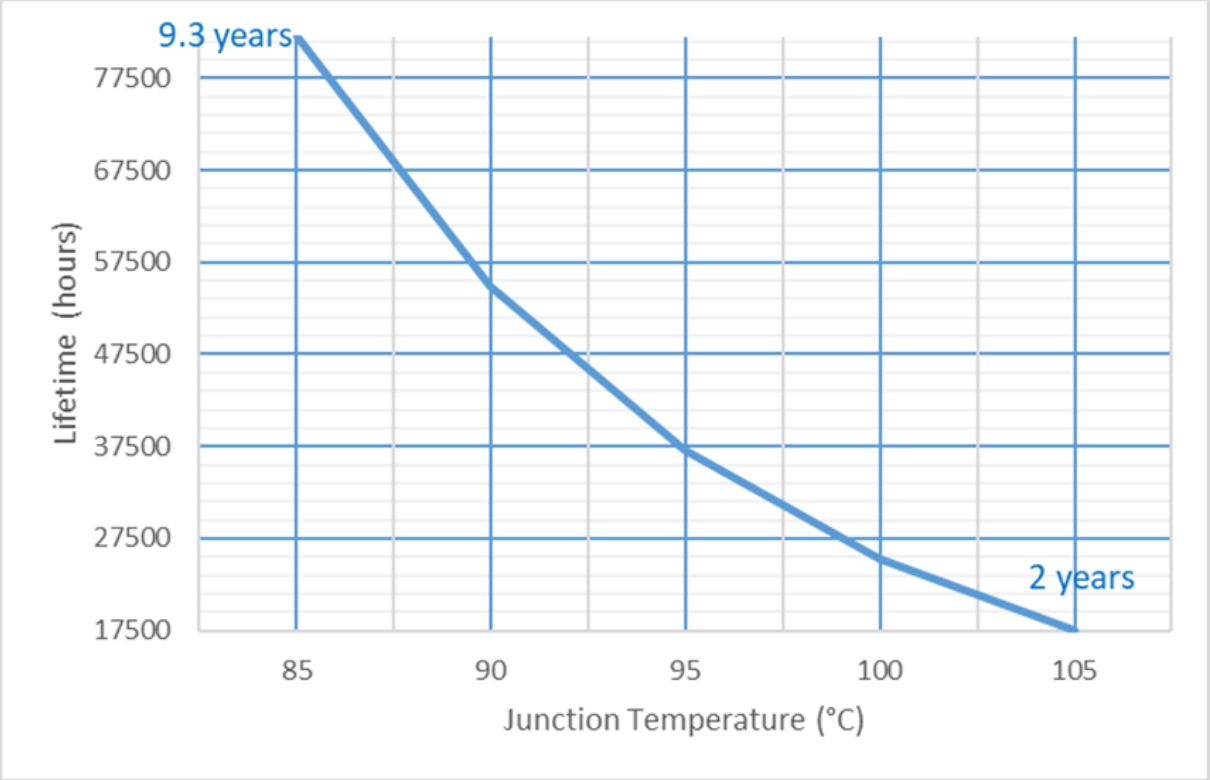


Figure 7. **STM32MP13xx lifetime estimates (MP3)**



Revision history

Table 3. **Document revision history**

Date	Version	Changes
27-Jan-2020	1	Initial release.
28-Feb-2023	2	Introduced STM32MP13x lines. Updated Section Introduction. Updated Section 1: General information. Updated Section 2: STM32MP15xx lifetime estimation. Added Section 3: STM32MP13xx lifetime estimation.
26-Jan-2024	3	Replaced V_{DDCORE} by V_{DDCPU} in Table 2. STM32MP13xx lifetime estimates versus the mission profiles.

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