STM32H7 Series lifetime estimates

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 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

1 General information

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

The frequency and the applied voltage are translated by VOS (voltage scaling) according to the table below (refer to the product datasheet for more details).

Table 2. Frequency and voltage scaling relation

VOS	Cortex®-M7 Frequency (Mhz)	Cortex®-M4 Frequency (Mhz)
VOS0	480	240
VOS1	400	200
VOS2	300	150
VOS3	200	100

The junction temperature (Tj) of the device is an important variable influencing the product's lifetime. Hence, it is recommended to keep a low Tj of the device with an appropriate thermal management.

The table below presents an overview of the STM32H7 Series temperature range support.

Table 3. Temperature range support for STM32H742, STM32H743/753 and STM32H750 Value line

Power scale	Vcore source	Maximum Tj	Maximum frequency	Minimum VDD
VOS0	LDO	105°C	480 MHz	1.7 V
VOS1		125°C	400 MHz	1.62 V
VOS2			300 MHz	
VOS3			200 MHz	
SVOS4/SVOS5		105°C	NA	

Table 4. Temperature range support for STM32H747/757

Power scale	Vcore source	Maximum Tj	Maximum frequency	Minimum VDD
VOS0	LDO	105°C	480 MHz	1.7 V
	SMPS	-	-	-
VOS1	LDO	125°C	400 MHz	1.62 V
	SMPS			
VOS2	LDO		300 MHz	
	SMPS			
VOS3	LDO	105°C	64 MHz	1.2 V(1)
	LDO	125°C	200 MHz	1.62 V
SVOS4/SVOS5	LDO	105°C	-	
	SMPS	125°C	-	

1. *Only for power-up sequence when the SMPS step-down converter supplies the VDDLDO.*

Table 5. Temperature range support for STM32H745/755

Power scale	Vcore source	Maximum Tj	Maximum frequency	Minimum VDD
VOS0	LDO	105°C	480 MHz	1.7 V
	SMPS	-	-	-
VOS1	LDO	125°C	400 MHz	1.62 V
	SMPS			
VOS2	LDO		300 MHz	
	SMPS			
	SMPS	140°C(1)		
VOS3	LDO	105°C	64 MHz	1.2 V(2)
	LDO	125°C	200 MHz	1.62 V
	SMPS	140°C(1)		
SVOS4/SVOS5	LDO	105°	-	
	SMPS	125°	-	
	SMPS	140°(1)	-	

1. *Only for STM32H745/755 part numbers in temperature range "3".*
2. *Only for power-up sequence when the SMPS step-down converter supplies the VDDLDO.*

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 6. STM32H7 Series lifetime usage estimation for typical use conditions

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

Figure 1. Lifetime estimation VOS0

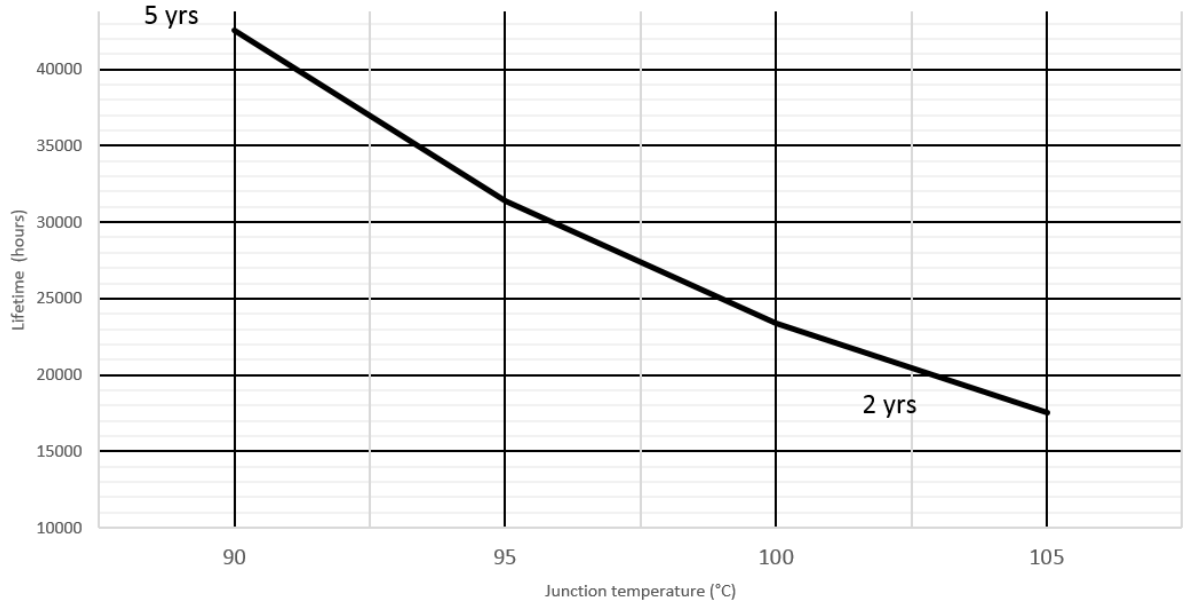


Figure 2. **Lifetime estimation VOS1**

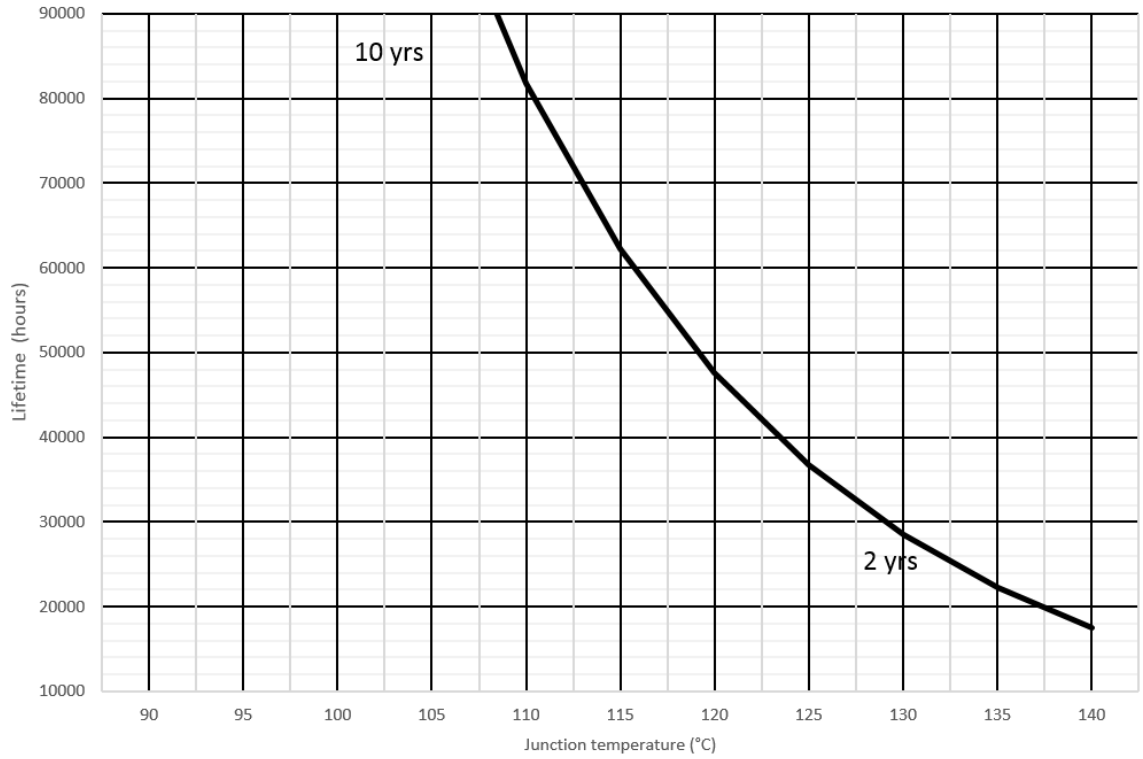
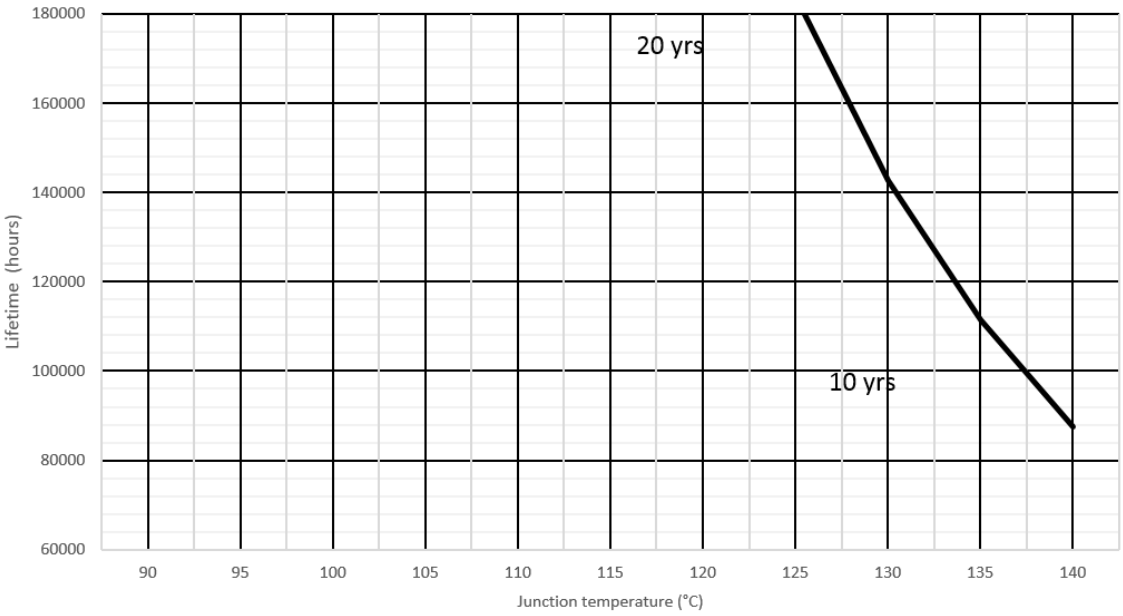


Figure 3. **Lifetime estimation VOS2 and VOS3**



Revision history

Table 7. **Document revision history**

Date	Version	Changes
19-Jun-2019	1	Initial release.

Contents

List of tables

List of figures

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