# Memory Margin Analysis

To satisfy **DO-178C Objective A-7 #10**, a **Memory Margin Analysis** was conducted to ensure that memory resource usage remains within defined safety limits, thereby supporting system reliability and accommodating future scalability.

For the **Gateway board** in the **UH-60X Engine Data Acquisition Unit (EDAU)**, memory utilization was assessed for all relevant memory types, specifically **SRAM** and **FLASH**. The analysis adheres to the program-defined threshold that **no more than 85%** of the available memory may be used under peak operating conditions.

The current memory usage percentage was calculated using data extracted from the **build-time .map file** generated for the **STM32F407IGT6** processor. This measurement confirms that at least **15% of memory capacity** remains available, providing sufficient headroom for software growth, updates, or configuration changes without compromising system behaviour, determinism, or stability.

All tested Gateway software configurations meet the memory margin requirement and fully support the satisfaction of **DO-178C Objective A-7 #10** related to resource usage verification.

## **EDAU Gateway Module**

Memory Margin Analysis for Engine Data Acquisition Unit of Gateway Module for the baseline EDAU\_SOI3\_RELEASE\_03:

( <https://bitbucket.org/machglobaltech-sw/edau/Software/SourceCode/Release/EDAU_SOI3_RELEASE_03/Gateway> )

## **Flash Memory Analysis -H108E-856 - Flight Application Software**

Memory Margin Analysis for Engine Data Acquisition Unit of Gateway Module Flight Application Software.

Table 1: Flash Memory Analysis for H108E-856

|  |  |  |  |
| --- | --- | --- | --- |
| Partition | Size (KB) | Used (KB) | Current Usage ( %) |
| Flight Application | 256 | 107.95 | 42.16 |
| Total | 256 | 107.95 | 42.16 |
| Free Space | - | 228.05 | 57.84 |

## **Flash Memory Analysis -H108E-857 - Module Configuration Data.**

Memory Margin Analysis for Engine Data Acquisition Unit Module Configuration Data.

Table 2: Flash Memory Analysis for H108E-857

|  |  |  |  |
| --- | --- | --- | --- |
| Partition | Size (KB) | Used (KB) | Current Usage (%) |
| Module Configuration Data | 256 | 55.96 | 21.85 |
| Total | 256 | 55.96 | 21.85 |
| Free Space | - | 200.04 | 78.14 |

## **Flash Memory Usage for EDAU Gateway Module**

Table 3: Total Flash Memory Analysis for EDAU

|  |  |  |  |
| --- | --- | --- | --- |
| Partition | Size (KB) | Used (KB) | Current Usage (%) |
| Gateway Flight Application | 256 | 107.95 | 42.16 |
| Gateway Module Configuration Data | 256 | 55.96 | 21.85 |

## **SRAM Memory Usage for EDAU Gateway Module**

Table 4: SRAM Memory Analysis for EDAU

|  |  |  |  |
| --- | --- | --- | --- |
| Partition | Size (KB) | Used (KB) | Current Usage (%) |
| Gateway Flight Application (SRAM) | 128 | 104.86 | 81.92 |
| Free Space | - | 23.14 | 18.07 |

Note:

SRAM analysis for the H108E-857 (Module Configuration Data) was not performed separately, as the H108E-856 (Flight Application) represents the larger and more memory-intensive component of the system. Since H108E-856 utilizes only 31.28% of available SRAM and H108E-857 has minimal functionality limited to configuration data, its memory usage is inherently lower. Thus, SRAM analysis for H108E-856 is sufficient to demonstrate compliance with DO-178C Objective A-7 #10 for both modules.

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