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| SOVY |
| Digital Calculator PO1\_DGC\_CRS |

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# Document Status

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| Name | SOVY |
| Version | 1.8 |
| Status | Released |
| Author | AAF |
| Date | 24/4/2021 |

# Document History

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| --- | --- | --- | --- |
| Version | Author | Date | Change |
| 1.0 | HMM | 12/2/2021 | Initial Creation. |
| 1.1 | HMM | 13/2/2021 | Adding system requirements. |
| 1.2 | AAF | 14/2/2021 | Edited Req: Req\_1ST123\_CRS\_overall\_004-V1.0 |
| 1.3 | HMM | 19/2/2021 | Edited Req:   * Req\_1ST123\_CRS\_overall\_001-V1.0   Deleted Req:   * Req\_1ST123\_CRS\_overall\_002-V1.0   Added Req:   * Req\_1ST123\_CRS\_overall\_002-V1.0 * Req\_1ST123\_CRS\_overall\_003-V1.0 * Req\_1ST123\_CRS\_overall\_004-V1.0 * Req\_1ST123\_CRS\_overall\_006-V1.0 * Req\_1ST123\_CRS\_overall\_007-V1.0 * Req\_1ST123\_CRS\_overall\_008-V1.0 * Req\_1ST123\_CRS\_overall\_009-V1.0 * Req\_1ST123\_CRS\_overall\_010-V1.0   Changed Req No:   * Req\_1ST123\_CRS\_overall\_003-V1.0 🡪 Req\_1ST123\_CRS\_overall\_005-V1.0 * Req\_1ST123\_CRS\_overall\_004-V1.0 🡪 Req\_1ST123\_CRS\_overall\_011-V1.0 |
| 1.4 | AEH | 19/2/2021 | Edited System Context Diagram:   * Added Switch after the power supply.   Added Req:   * Req\_1ST123\_CRS\_overall\_012-V1.0 * Req\_1ST123\_CRS\_overall\_013-V1.0 |
| 1.5 | AEH | 20/2/2021 | Edited Req:   * Req\_1ST123\_CRS\_overall\_003-V1.0 * Req\_1ST123\_CRS\_overall\_004-V1.0 * Req\_1ST123\_CRS\_overall\_009-V1.0 * Req\_1ST123\_CRS\_overall\_010-V1.0 * Req\_1ST123\_CRS\_overall\_011-V1.1 * Req\_1ST123\_CRS\_overall\_013-V1.0 |
| 1.6 | HMM | 5/3/2021 | Edited Req:   * Req\_1ST123\_CRS\_overall\_005-V1.0 * Req\_1ST123\_CRS\_overall\_011\_V1.2 * Req\_1ST123\_CRS\_overall\_013-V1.1 |
| 1.7 | HMM | 5/3/2021 | Edited System Context Diagram:   * Added Switch for LCD Backlights.   Edited Req:   * Req\_1ST123\_CRS\_overall\_008-V1.0 * Req\_1ST123\_CRS\_overall\_010-V1.1 * Req\_1ST123\_CRS\_overall\_006-V1.0 * Req\_1ST123\_CRS\_overall\_004-V1.1 * Req\_1ST123\_CRS\_overall\_007-V1.0 * Req\_1ST123\_CRS\_overall\_012-V1.0 * Req\_1ST123\_CRS\_overall\_009-V1.1 * Req\_1ST123\_CRS\_overall\_013-V1.2 |
| 1.8 | AAF | 24/4/2021 | Edited Req:   * Req\_1ST123\_CRS\_overall\_004-V1.3   Added Req:   * Req\_1ST123\_CRS\_overall\_014-V1.0 |

# Reference Documents

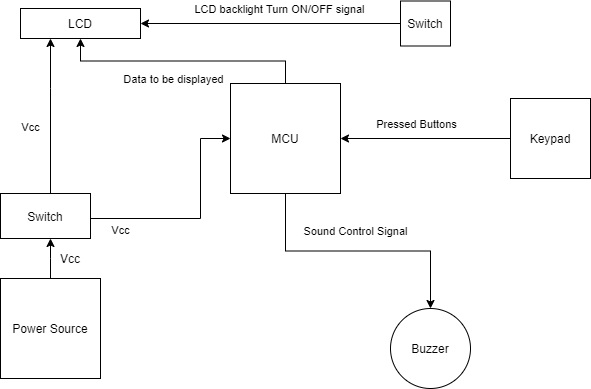
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| Ref. No. | Doc. Name | Version | Status |
| 1 | PO1\_DGC\_CR\_DigitalCalculator | 1.2 | Released |

# Project Description

“Sovy” is a simple digital calculator that performs basic mathematical operations and displays the operation on an LCD-screen, with an ON/OFF button and keypad for user input.

# System Context Diagram

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1. **System Req****uirements**

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_001-V1.1 | Covers: | Req\_1ST123\_CR\_overall\_02-V1.0 |
| Description: | The MCU waits for a signal from a button pressed on the keypad | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_002-V1.0 | Covers: | Req\_1ST123\_CR\_overall\_02-V1.0 |
| Description: | When The MCU recognizes the signal **“button pressed”**, it identifies which button is pressed through checking which row and column is high. | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_003-V1.1 | Covers: | Req\_1ST123\_CR\_overall\_01-V1.0 |
| Description: | The MCU should receive 16 different signal “**button pressed”**, 10 from the numbers 4 from the operations, clear signal and the equal signal. | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_004-V1.3 | Covers: | Req\_1ST123\_CR\_overall\_07-V1.0 |
| Description: | Calculator should have four keypad buttons signals for add, subtract, multiply and divide operations, a button to show the result, and a button to clear.  Calculator should support multiline operation up to 4 operations per line  e.g: “2+2\*5= 12” | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_005-V1.0 | Covers: | Req\_1ST123\_CR\_overall\_05-V1.0 |
| Description: | The display should be like this example:  operation, number and result should be displayed  |5+5 |  | 10| | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_006-V1.1 | Covers: | Req\_1ST123\_CR\_overall\_08-V1.0 |
| Description: | Operations should be sequential, when the result is shown from an operation user can do another operation on the result.  e.g:  |3-2 | 🡪 1 should still appear as the first operand in the first row when user  | 1| presses on an operation right after  |1+6 | 🡪 If user pressed **‘+’**  | 7| | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_007-V1.1 | Covers: | Req\_1ST123\_CR\_overall\_09-V1.0 |
| Description: | Size of digits in each operand should not exceed: (length of LCD / 2) -1. | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_008-V1.1 | | |
| Description: | Division by zero should be handled and shown as **“Math Error”.** | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_009-V1.2 | | |
| Description: | If operation signal is received initially before any number signal or after clear signal, it should be ignored (not displayed).  e.g: “/” 🡪 nothing should be displayed | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_010-V1.2 | | |
| Description: | If equal signal is received immediately after any operation, without a second operand, an error message is displayed **“Syntax Error”**  e.g : “2+=” 🡪 should be 🡪 Syntax error | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_011-V1.2 | Covers: | Req\_1ST123\_CR\_overall\_04-V1.2 |
| Description: | A tune with frequency 500 HZ, for 300 to 400 ms, should be fired from a buzzer whenever a “**Button Pressed** “signal is received. | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_012-V1.1 | Covers: | Req\_1ST123\_CR\_overall\_01-V1.0 |
| Description: | To turn “ON/OFF” the calculator:   * When “**Turn ON”** signal received, the calculator power should be turned on. * When “**Turn OFF”** signal received, the calculator power should be turned off. | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_013-V1.3 | Covers: | Req\_1ST123\_CR\_overall\_010-V1.0 |
| Description: | To turn “ON/OFF” the LCD backlight:   * When “**Backlight Turn ON** “signal received, The LCD backlight should be turned on. * When “**Backlight Turn OFF** “signal received, The LCD backlight should be turned off. | | |
| Test Scope: | VTD |  |  |

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| Req\_ID: | Req\_1ST123\_CRS\_overall\_014-V1.0 | Covers: | Req\_1ST123\_CR\_overall\_011-V1.0 |
| Description: | The result and the operands shall support floating point numbers with accuracy of 3 digits after the floating point. | | |
| Test Scope: | VTD |  |  |