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| SOVY |
| Digital Calculator PO1\_DGC\_SRS |

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# Document Status

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| Name | SOVY |
| Version | 1.4 |
| Status | Proposed |
| Author | Habiba Mahmoud |
| Date | 15/4/2021 |

# Document History

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| --- | --- | --- | --- |
| Version | Author | Date | Change |
| 1.0 | AAF | 5/3/2021 | Initial Creation. |
| 1.1 | HMM | 7/3/2021 | Added Requirements:   * Req\_1ST123\_SRS\_overall\_001-V1.0 * Req\_1ST123\_SRS\_overall\_002-V1.0 * Req\_1ST123\_SRS\_overall\_003-V1.0 * Req\_1ST123\_SRS\_overall\_004-V1.0 * Req\_1ST123\_SRS\_overall\_005-V1.0 * Req\_1ST123\_SRS\_overall\_006-V1.0 * Req\_1ST123\_SRS\_overall\_007-V1.0 * Req\_1ST123\_SRS\_overall\_008-V1.0 * Req\_1ST123\_SRS\_overall\_009-V1.0 * Req\_1ST123\_SRS\_overall\_010-V1.0 * Req\_1ST123\_SRS\_overall\_011-V1.0 * Req\_1ST123\_SRS\_overall\_012-V1.0 |
| 1.2 | NKK | 7/3/2021 | Added Requirements:   * Req\_1ST123\_SRS\_overall\_013-V1.0 * Req\_1ST123\_SRS\_overall\_014-V1.0 * Req\_1ST123\_SRS\_overall\_015-V1.0 * Req\_1ST123\_SRS\_overall\_016-V1.0 * Req\_1ST123\_SRS\_overall\_017-V1.0 * Req\_1ST123\_SRS\_overall\_018-V1.0 * Req\_1ST123\_SRS\_overall\_019-V1.0 * Req\_1ST123\_SRS\_overall\_020-V1.0 * Req\_1ST123\_SRS\_overall\_021-V1.0 * Req\_1ST123\_SRS\_overall\_022-V1.0 * Req\_1ST123\_SRS\_overall\_023-V1.0 * Req\_1ST123\_SRS\_overall\_024-V1.0 * Req\_1ST123\_SRS\_overall\_025-V1.0 * Req\_1ST123\_SRS\_overall\_026-V1.0 |
| 1.3 | Habiba Mahmoud |  | Edited Requirements:   * Req\_1ST123\_SRS\_overall\_001-V1.0 * Req\_1ST123\_SRS\_overall\_003-V1.0 * Req\_1ST123\_SRS\_overall\_004-V1.0 * Req\_1ST123\_SRS\_overall\_005-V1.0 * Req\_1ST123\_SRS\_overall\_006-V1.0 * Req\_1ST123\_SRS\_overall\_009-V1.0 * Req\_1ST123\_SRS\_overall\_010-V1.0 * Req\_1ST123\_SRS\_overall\_011-V1.0 * Req\_1ST123\_SRS\_overall\_012-V1.0 |
| 1.4 | Habiba Mahmoud |  | -Adding Signal to mode mapping  -Edited Requirements:   * Req\_1ST123\_SRS\_overall\_002-V1.0 * Req\_1ST123\_SRS\_overall\_003-V1.1 * Req\_1ST123\_SRS\_overall\_004-V1.1 * Req\_1ST123\_SRS\_overall\_005-V1.1 * Req\_1ST123\_SRS\_overall\_006-V1.1 * Req\_1ST123\_SRS\_overall\_007-V1.0 * Req\_1ST123\_SRS\_overall\_008-V1.0 * Req\_1ST123\_SRS\_overall\_009-V1.1 * Req\_1ST123\_SRS\_overall\_010-V1.1 * Req\_1ST123\_SRS\_overall\_011-V1.1 * Req\_1ST123\_SRS\_overall\_012-V1.1 * Req\_1ST123\_SRS\_overall\_013-V1.0 * Req\_1ST123\_SRS\_overall\_014-V1.0 * Req\_1ST123\_SRS\_overall\_015-V1.0 * Req\_1ST123\_SRS\_overall\_016-V1.0 * Req\_1ST123\_SRS\_overall\_017-V1.0 * Req\_1ST123\_SRS\_overall\_018-V1.0 * Req\_1ST123\_SRS\_overall\_019-V1.0 * Req\_1ST123\_SRS\_overall\_020-V1.0 * Req\_1ST123\_SRS\_overall\_021-V1.0 * Req\_1ST123\_SRS\_overall\_022-V1.0 * Req\_1ST123\_SRS\_overall\_023-V1.0 * Req\_1ST123\_SRS\_overall\_024-V1.0 * Req\_1ST123\_SRS\_overall\_025-V1.0 * Req\_1ST123\_SRS\_overall\_026-V1.0   -Added Requirements:   * Req\_1ST123\_SRS\_overall\_027-V1.0 |

# Reference Documents

|  |  |  |  |
| --- | --- | --- | --- |
| Ref. No. | Doc. Name | Version | Status |
| 1 | PO1\_DGC\_CRS\_DigitalCalculator | 1.7 | Released |
| 2 | PO1\_DGC\_HSI\_DigitalCalculator | 1.4 | 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.

# Software Context Diagram

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1. **Software Req****uirements**

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| **Operation Signal Modes** | **Sub Mode** |
|  | **Add Mode** |
| **Mul Mode** |
| **Div Mode** |
| **Equal Mode** |
| **Clear mode** |

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| **Data Signal Modes** | **Result Mode** |
|  | **Data Mode** |
| **Math Error Mode** |
| **Syntax Error Mode** |

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| **Command Signal Modes** | **Function Set mode**” |
|  | **Cursor display mode**” |
| **Clear Command mode** |
| **Entry mode** |
| **Change cursor position mode** |

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| **Pressed Button Signal Modes** | **Number pressed Mode** |
|  | **Clear pressed Mode** |
| **Sub pressed Mode** |
| **Add pressed Mode** |
| **Mul pressed Mode** |
| **Div pressed Mode** |
| **Equal pressed Mode** |
| **Button not pressed Mode** |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_001-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_001-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Handler shall read “**Button Pressed**” signal. | | | | |
| Inputs: | “**Button not pressed**” mode | Outputs: | | **No signal** | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_002-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_002-V1.0 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | When Keypad Handler receives Button Pressed signal **“Number pressed mode”** it sends “**Number Signal”** to System Manager. | | | | |
| Inputs: | **“Number pressed mode”** | Outputs: | | **“Number Signal”** | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_003-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_003-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Handler shall do subtraction operation when Pressed button signal mode “**Sub pressed mode**” is received. | | | | |
| Inputs: | “**Sub pressed mode**” | Outputs: | | **“ Sub mode”** | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_004-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_003-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Handler shall do add operation when Pressed button signal mode “**Add pressed mode**” is received. | | | | |
| Inputs: | “**Add pressed mode**” | Outputs: | | “ **Add mode**” | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_005-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_003-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Handler shall do multiply operation when Pressed button signal mode “**Mul pressed mode**” is received. | | | | |
| Inputs: | “**Mul pressed mode**” | Outputs: | | “ **Mul mode** ” | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_006-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_003-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Manager shall do Division operation when Pressed button signal mode “**Div pressed mode**” is received from the Keypad Handler. | | | | |
| Inputs: | “**Div pressed mode**” | Outputs: | | “ **Div mode** ” | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_007-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_003-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The Keypad Handler shall send Operation signal “**Clear mode**” to System Manager when Pressed Buttons signal is received. | | | | |
| Inputs: | “ **Clear pressed mode** ” | Outputs: | | “**Clear mode**” | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_008-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_003-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | when Operation signal “**Equal mode**” is received, the system manager shall calculate the result and send Data signal “**Result mode**” to Lcd Handler | | | | |
| Inputs: | “ **Equal mode**” | Outputs: | | “**Result mode**” | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_009-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_006-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Handler shall do another operation on the result when operation signal mode **“ Mul pressed mode”, “Add pressed mode”, “Sub pressed mode”**, **“Div pressed mode”** is received after a “**Result mode**” | | | | |
| Inputs: | **“Mul pressed mode”,**  **“Add pressed mode”,**  **“Sub pressed mode”**,  **“ Div pressed mode”** | Outputs: | | **“Mul mode”,**  **“Add mode”,**  **“Sub mode”**,  **“ Div mode”** | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_010-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_004-V1.2 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Handler shall support multi operation modes in one line.  E.g: 2+4\*2= 10 | | | | |
| Inputs: | **“Mul pressed mode”,**  **“Add pressed mode”,**  **“Sub pressed mode”**,  **“ Div pressed mode”** | Outputs: | | **“Mul mode”,**  **“Add mode”,**  **“Sub mode”**,  **“ Div mode”** | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_011-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_008-V1.1 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Handler shall secure operation division mode by zero and send data signal “**Math Error mode**” to the Lcd Handler | | | | |
| Inputs: | **“Div mode”** | Outputs: | | **“Math Error mode”** | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_012-V1.2 | | Covers: | | Req\_1ST123\_CRS\_overall\_010-V1.2 |
| Author: | Habiba Mahmoud | | Date: | | 7/3/2021 |
| Description: | The System Manager shall send Data Signal “**Syntax Error mode**” to the Lcd Handler when two operation signal modes are sent consecutively. | | | | |
| Inputs: | **“Mul mode”,**  **“Add mode”,**  **“Sub mode”**,  **“ Div mode”** | Outputs: | | **“Syntax Error mode”** | |
| Test Scope: | ITD/ VTD | |  | |  |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_013-V1.1 | | Covers: | | Req\_1ST123\_ HSI\_overall\_006-V1.0 |
| Description: | If the system manager sendsLcd initialization sequence signals stated below to the lcd handler, the Lcd handler shall initialize the Lcd.  1. “**Function Set mode**”  2. **“Cursor display mode mode** ”  3. **“Clear mode** ”  4. “**Entry Mode mode** ” | | | | |
| Inputs: | “**Function Set mode**”  **“Cursor display mode signal**”  **“Clear mode** ”  “**Entry Mode mode** ” | Outputs: | | **“Data to be Displayed signal**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_014-V1.1 | | Covers: | | Req\_1ST123\_CRS\_ overall\_004-V1.2 |
| Description: | If The system manager receives “**Operation** **signal**”, it shall send “**Data mode**” as data signal to the Lcd handler. | | | | |
| Inputs: | **“Operation** **signal”** | Outputs: | | “**Data mode**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_015-V1.1 | | Covers: | | Req\_1ST123\_CRS\_ overall\_004-V1.2 |
| Description: | If The system manager receives operation signal “**Sub mode**”**,** it shall send “**Data mode**” as data signal to the Lcd handler. | | | | |
| Inputs: | “**Sub mode**” | Outputs: | | “**Data mode**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_016-V1.1 | | Covers: | | Req\_1ST123\_CRS\_ overall\_004-V1.2 |
| Description: | If The system manager receives operation signal “**Add mode**”**,** it shall send “**Data mode**” as data signal to the Lcd handler. | | | | |
| Inputs: | “**Add mode**” | Outputs: | | “**Data mode**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_017-V1.1 | | Covers: | | Req\_1ST123\_CRS\_ overall\_004-V1.2 |
| Description: | If The system manager receives operation signal “**Mul mode**”**,** it shall send “**Data mode**” as data signal to the Lcd handler. | | | | |
| Inputs: | “**Mul mode** ” | Outputs: | | **“Data mode**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_018-V1.1 | | Covers: | | Req\_1ST123\_CRS\_ overall\_004-V1.2 |
| Description: | If The system manager receives operation signal “**Div mode**”**,** it shall send “**Data mode**” as data signal to the Lcd handler. | | | | |
| Inputs: | “**Div mode**” | Outputs: | | “**Data mode** ” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_019-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_005-V1.0 |
| Description: | When the system manager receives an “**Equal mode**”, it shall send “**Change cursor position mode**” as command signal to the Lcd handler. | | | | |
| Inputs: | “**Equal mode**” | Outputs: | | **“Change cursor position mode**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_020-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_005-V1.0 |
| Description: | When the system manager receives an “**Equal mode**”, it shall send “**Result** **mode**” as data signal to the Lcd handler. | | | | |
| Inputs: | “ **Equal mode** ” | Outputs: | | “ **Result** **mode** ” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_021-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_010-V1.2 |
| Description: | If the Lcd manager receives **“Syntax Error mode”**, it shall display **“Syntax Error”** on the lcd screen | | | | |
| Inputs: | **“Syntax Error mode”**, | Outputs: | | **“Data to be Displayed signal**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_022-V1.1 | | Covers: | | Req\_1ST123\_ CRS\_overall\_008-V1.1 |
| Description: | If the Lcd manager receives **“Math Error mode”**, it shall display **“Math Error** on the lcd screen | | | | |
| Inputs: | “ **Math Error mode**” | Outputs: | | **“Data to be Displayed signal**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_023-V1.1 | | Covers: | | Req\_1ST123\_ CRS\_overall\_009-V1.2 |
| Description: | The system manager shall ignore any received operation signal if it is received after **“Clear command mode**” or before any “**Data signal**”. | | | | |
| Inputs: | **“Add pressed signal”**  **“Sub pressed signal”**  **“Mul pressed Signal”**  **“Div pressed Signal”** | Outputs: | | No output | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_024-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_007-V1.1 |
| Description: | The Lcd handler shall receive maximum number of “**Data signal**” equals to the (length of LCD / 2) -1, before or after any signal operation. | | | | |
| Inputs: | “**Data** **signal**” | Outputs: | | **“Data to be Displayed signal**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_025-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_004-V1.2 |
| Description: | If the Lcd handler receives **“Clear command mode”** as command signal, the lcd handler shall clear the Lcd display. | | | | |
| Inputs: | **“Clear command mode”** | Outputs: | | **“Data to be Displayed signal**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_026-V1.1 | | Covers: | | Req\_1ST123\_CRS\_overall\_011-V1.2 |
| Description: | If the System manager receives **“Numbers signal”**, **“Operation signal”,** it shall send a **“Buzzer signal**” to the Buzzer handler. | | | | |
| Inputs: | **“ Numbers signal”**  “**Operation** **signal”** | Outputs: | | **“Tone signal**” | |

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| Req\_ID: | Req\_1ST123\_SRS\_overall\_027-V1.0 | | Covers: | | Req\_1ST123\_CRS\_overall\_011-V1.2 |
| Description: | If the Buzzer handler receives **“Tone signal”** it shall send a **“Sound signal**” to the Buzzer. | | | | |
| Inputs: | **“Tone signal”** | Outputs: | | **“Sound signal** ” | |