**Software Validation Test Specification**

HeadLights

|  |  |
| --- | --- |
| Maturity: | Draft |
| Author(s): | Espinosa-Guerrero, Jorge; Jiménez-López, Eduardo;  Carmona-Montes, Osmar |
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**Test Log**

|  |  |  |
| --- | --- | --- |
| Functionality | Baseline Reference | Target Software Release Version |
| LID $64 and $65 | Baseline 1 | Version 1.0 |
| Software Tester | Department | Date of Test Completion |
| Jiménez-López, Eduardo | Embedded Systems | 07/03/2016 |

List of Changes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ver.  (X.Y) | Date  (YYYY-MM-DD) | Maturity  (**D**raft/  **V**alid**/ W**ithdrawn) | Author  (Name/Departm.) | Description |
| # | YYYY-MMDD | Draft | Name/Dpt | Creation |

# Introduction

This project controls the output lights of a vehicle, by controlling a selector input or a light sensor depending on the user’s selection.

## Change Description

In order to get all the functionalities done the activation and configuration of ADC module is needed. A voltage divider arrangement with the light sensor and an extra resistor is also required.

## Solution Approach

Setting the ADC module is the easiest way to communicate the system with an analog input.

# Abbreviations and Definitions

SWDP Software Development Plan

SWAD Software Architecture and Design Document

SDD Software Design Document

SRS Software Requirement Specification

STS Software Test Strategy

MTS Module Test Specification

ITS Integration Test Specification

VTS Validation Test Specification

Add any other needed

Project specific abbreviations and definitions:

CAN Controlled Area Network

ECU Electronic Control Unit

SW Software

ADC Analog-Digital Converter

# References

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Document Name | Date/ Revision | Link (if applicable) |
|  | Software Architecture Design Document | 03/03/2016 |  |
|  | Reference 2 |  |  |
|  | Reference 3 |  |  |
|  | Reference 4 |  |  |
|  | Reference 5 |  |  |

# Test case formalism

A simple numeration system is used to identify the Test Cases.

## Test case number

|  |  |
| --- | --- |
| Numbering system | Positive Integer numbers starting with 1 are used to identify the Test Cases |
| Inserted test cases | The steps of each Test Cases use also positive integer numbers.  ie, 1.2 indicates Test Case #1, step 2. |

## Variant Management

Many tests do not apply to all variants of the product. Column V of the test form indicates applicable variants for each test.

|  |  |
| --- | --- |
| **Column V** | **Associated variant** |
| A | All variants |
| U | US variant |
| E | European variant |

## Regression Tests Identifier

Each test case is assigned a level that is in column R of the test form:

|  |  |  |
| --- | --- | --- |
| **Column R** | **Definition** | **When to be executed** |
|  | Nominal Test Case | Test cases for tests of modified or new SW modules/files |
| R | Regression Tests Cases | Subset of test cases for regression tests of unmodified / unaffected SW modules |

## Test Type Identifier

A column T permits to identify the type of the test:

|  |  |
| --- | --- |
| **Column N** | **Meaning** |
|  | Positive Tests |
| N | Negative tests for checking robustness |

# Functionality References & Traceability

## Functionality Overview

|  |  |
| --- | --- |
| Description of functionality | Put a description of the functionality to be changed |
| Reference to SRS / Version |  |
| Rating [when risk analysis required] | Medium |
| Test completeness criteria |  |

# Test Environment

This chapter defines the test environment. In case of several specific configurations the description effort can be reduced this way.

## Hardware

|  |  |
| --- | --- |
| No. | Description |
| Device | Hardware "Device" description |

## Software

|  |  |
| --- | --- |
| No. | Description |
| S1 | "S1" Description |
| S2 | "S2" Description |

## Test Environment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | HW Configuration | SW Configuration | EEPROM-Parameter | Description |
| Standard | Device | S1 |  |  |
|  |  |  |  |  |

## Default Preconditions

***Any Default Precondition for all the testcases***

## Relevant Input & Output Definitions

Inputs and outputs are specified within the procedure of each test case.

# Test Case Specification (Systematic and Intuitive)

## Test Procedures

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Backward-Traceability** | | | | |  | | | |  |
| **Test Environment** | | | | | Standard | | | |  |
| **Test Configuration** | | | | |  | | | |  |
| **TC-Identifier** | **A** | **R** | **N** | **Description** | **Precondition** | **Test procedures** | **Expected results** | **Ok/ Nok**  **Comments /description** | **Requirements** |
| Selector\_switch needs to be powered and grounded in respective terminals. | | | | | | | | |  |
| **1** | X |  |  | Test the output signal from selector\_switch. | Connect a voltage supply of 5V to the switch | 1.1 Set selector\_switch to 00  1.2 Set selector\_switch to 10  1.3 Set selector\_switch to 01  1.4 Set selector\_switch to 11 | 1.1 leds\_state = 00  1.2 leds\_state = 01 (Park lamps must be ON and Head lights OFF (Half –light state))  1.3 leds\_state = 11 Park lamps must be ON and Head lights OFF (Half –light state)  1.4 System in AUTO state | OK | ID\_1  ID\_2  ID\_4  ID\_5  ID\_8  ID\_9 ID\_10  ID\_11  ID\_24  ID\_25  ID\_26  ID\_27  ID\_28 |
| Use a variable voltage source and gradually increment the input voltage with an increment of 1V to 5V | | | | | | | | | |
| **2** | X |  |  | **Test the behavior of ADC module in a range from 1V to 5V input.** | Connect a voltage supply to the ADC port. | **2.1- Set voltage supply to 1V**  **2.2- Set voltage supply to 2V**  **2.3- Set voltage supply to 3V**  **2.4- Set voltage supply to 4V**  **2.5- Set voltage supply to 5V** | 2.1 An integer value from 0 to 65536 that is proportional to 1V input.  2.2 An integer value from 0 to 65536 that is proportional to 2V input.  2.3 An integer value from 0 to 65536 that is proportional to 3V input.  2.4 An integer value from 0 to 65536 that is proportional to 4V input.  2.5 An integer value from 0 to 65536 that is proportional to 5V input. | OK | ID\_21  ID\_2  ID\_23 |
| **Connect sensor to the ADC module in a voltage divider arrangement.** | | | | | | | | |  |
| **3** | X |  |  | **Test if light sensor is sending correct values to the ADC module.** | Make a voltage divider arrangement with the sensor and another resistor. | **3.1- Check the value stored in ADC register and compare it with similar input votage (check test identifier 2).**  **3.2- Put light over the sensor, check and compare the value again.**  **3.3- Reduce light over the sensor to the minimum possible, then check and compare the value in ADC register.** | 3.1 An integer value stored in ADC register, that is proportional to the value in volts.  3.2 An integer value stored in ADC register, proportional to the value in volts in voltage divider output.  3.3 An integer value stored in ADC register, proportional to the value in volts in voltage divider output. | OK | ID\_3  ID\_21  ID\_22  ID\_23 |
| **Behavior of state machine depends on the voltage divider arrangement that is made.** | | | | | | | | |  |
| **4** | X |  |  | **Test state machine in system mode auto.** | **The whole system (sensor, selector, ADC module) must be working properly. Selector\_switch needs to be in state 11.** | **4.1- Check default state of state machine.**  **4.2- Put light over the sensor to an approximate value of 60%**  **4.3- Put light over the sensor to an approximate value of 80%** | **4.1 Lights ON, Head lights ON and park lights ON.**  **4.2 Head lights must be OFF but park lights must remain ON.**  **4.3 Head lights must remain OFF, park lights must be OFF.** | OK | ID\_29  ID\_30  ID\_31  ID\_32  ID\_33  ID\_34  ID\_35  ID\_36  ID\_37  ID\_38  ID\_43 |
| **5** | X |  |  | **Verify that after a reset the system sets to the state indicated by selector\_switch.** | **Set selector\_switch = 01** | **5.1 Set Power = Reset**  **5.2 Read\_leds\_state** | **leds\_state = 01** | OK | ID\_39  ID\_40  ID\_41 |
| **6** | X |  | X | **Induce an invalid range in the ADC module and verify that it stays in the last valid state.** | **Selector\_switch=11** | **6.1 Set ADC counting to 30%**  **6.2 Set ADC counting to 50%**  **6.3 Read\_leds\_state** | **leds\_state= 11** | OK | ID\_30 |

# Test Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SW VALIDATION TEST REPORT** | | | **Date**  (dd/mm/yyyy) | |
| **dd/mm/yyyy** | |
| **Product** | | | | |
| **Project name** | **HeadLights** | | | |
| **Functionality** | **Turns on and off head lights and park lights, using a selector and a sensor** | | | |
| **SW Tested Baseline** (ccaavtMMmm) |  | | | |
| **Test specification name** | **HeadLights1.0** | | | |
| **Work Package Reference** |  | | | |
| **Test Environment** | | | | |
| **Test bench release report**  (link to file) |  | | | |
| **Test environment deviations** |  | | | |
| **General Test Results** | | | | |
| ***Estimated test time*** *(hours)****:*** | **X.X hrs** | ***Final test time*** *(hours)****:*** | | **X.X hrs** |
| ***Existing number of tests:*** | **4** | ***Number of planned tests***  *Subset of existing test according to STS* | | **4** |
| ***Number of performed tests:*** | **4** | ***Number of tests not done:*** | | **0** |
| ***Number of deviations:*** | **0** | ***Number of failed tests:*** | | **0** |
|  | | | | |
| **Test performed by**  (first name, last name - department) | | **Test approved by**  (first name, last name - department) | | |
| Espinosa-Guerrero, Jorge;  Jiménez-López, Eduardo;  Carmona-Montes, Osmar | |  | | |

|  |
| --- |
| ***Test Status Abbreviations: OK - test result correct (passed)***  ***F - test failed***  ***C - test procedure/description complaint***  ***N/A - not applicable*** |

***Tests not done – Reasons***

|  |  |
| --- | --- |
| **Test No.** | **Reason** |
|  |  |

***Failed Tests (default for all anomalies)***

|  |  |  |
| --- | --- | --- |
| **Test No.** | **Result Observed** | **CR number**/  After submission to CS |
|  |  |  |

***Test deviations (proven incorrect/unclear test specification only)***

|  |  |  |  |
| --- | --- | --- | --- |
| **Test No.** | **Wrong description** | **Corrected description** | **CR number**  Optional |
|  |  |  |  |

**Other comments:**