LGE Internal Use Only

SW Integration Test Guide

About This Document

Document Information

|  |  |
| --- | --- |
| Issuing authority | VS SW Process Unit |
| **Status of document** | In Progress / Approved / Released |

Revision History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Version | Date | Comment | Author | Approver |
| 1.0 | 2016-08-19 | Initial Release | EPG | VC SMART QE FD |
| 1.1 | 2018-02-08 | Update to current role name and standard document name | SW Process Team | VC SMART QE FD |
| 1.2 | 2019-02-12 | Update due to annual organization restructuring (VC --> VS) | SW Process Unit | SW Process Unit |
| 1.3 | 2021-06-15 | - Updated security notice of this template (Before: LGE Confidential->After: LGE Internal Use Only).  Security level related note (the last sentence in red color below) | SW Process Unit | SW Process Unit |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Table of Contents

[1 SW integration test plan 6](#_Toc110979059)

[1.1 SW Integration Test Goal Definition 6](#_Toc110979060)

[1.2 Defining SW Integration Test Roles and Responsibilities 8](#_Toc110979061)

[SW Integration Test Scope Definition 8](#_Toc110979062)

[1.3 Defining SW Integration Strategy 9](#_Toc110979063)

[1.4 SW Integration Test Strategy Definition 9](#_Toc110979064)

[1.5 SW Integration Regression Test Strategy Definition 9](#_Toc110979065)

[1.6 SW Integration Test Schedule Definition 9](#_Toc110979066)

[1.7 Defining SW Integration Test Case Design Criteria 10](#_Toc110979067)

[1.8 Defining the criteria for entering/stopping/resuming SW integration test 10](#_Toc110979068)

[1.9 Definition of SW Integration Test End Criteria 12](#_Toc110979069)

[1.10 SW Integration Test Environment Definition 12](#_Toc110979070)

[2 Review of SW Integration Test Plan 13](#_Toc110979071)

[2.1 Preparation for review meeting 13](#_Toc110979072)

[2.2 Conducting a review meeting 13](#_Toc110979073)

[2.3 Complementing the SW integrated test plan 13](#_Toc110979074)

[3 SW SW integration test case development 14](#_Toc110979075)

[3.1 SW Integration Test Case Development 14](#_Toc110979076)

[4 SW Integration Test Case Traceability 16](#_Toc110979077)

[4.1 SW Architecture Design and Trace Relationship Definition 16](#_Toc110979078)

[5 SW Integration Test Case Review 17](#_Toc110979079)

[5.1 Preparation for review meeting 17](#_Toc110979080)

[5.2 Conducting a review meeting 17](#_Toc110979081)

[5.3 SW Integration Test Case Supplement 18](#_Toc110979082)

[6 SW integration and integration testing 19](#_Toc110979083)

[6.1 SW integration 19](#_Toc110979084)

[6.2 SW Integration Test 19](#_Toc110979085)

[6.3 Perform regression test 19](#_Toc110979086)

[6.4 SW Integration Test Defect Management 20](#_Toc110979087)

[7 SW integration test result report 21](#_Toc110979088)

[7.1 Summary of SW Integration Test Results 21](#_Toc110979089)

[7.2 SW Integration Test Result Report 21](#_Toc110979090)

Figures

**그림 목차 항목을 찾을 수 없습니다.**

**Tables**

[Table 1 Sample - W Integration Test Strategy Definition 9](#_Toc110979053)

[Table 2 Test Case Design Criteria 10](#_Toc110979054)

[Table 3 SW Integration Test Entry/Stop/Resume Criteria 10](#_Toc110979055)

# SW integration test plan

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW test manager establishes the SW integration test goal that the project must achieve, and describes it in the SW integration test plan. It also defines the scope of the project's SW integration test. | 1.1 SW Integration Test Goal Definition [SW Test Manager]  1.2 Defining SW Integration Test Roles and Responsibilities [SW Test Manager]  1.3 SW Integration Test Scope Definition [SW Test Manager]  1.4 Defining SW Integration Strategy [SW ARCH.]  1.5 SW Integration Test Strategy Definition [SW Test Manager]  1.6 SW Integration Regression Test Strategy Definition [SW Test Manager]  1.7 SW Integration Test Schedule Definition [SW Test Manager]  1.8 Defining SW Integration Test Case Design Criteria [SW Test Manager]  1.9 Defining the criteria for entering/stopping/resuming SW integration test [SW Test Manager]  1.10 Definition of SW Integration Test End Criteria [SW Test Manager]  1.11 SW Integration Test Environment Definition [SW Test Manager] | SW Integration Test Plan, WBS |

## SW Integration Test Goal Definition

The SW test manager establishes the goals the project must achieve based on the needs of the organization and customers.

The establishment of the project SW integration test goal should be considered from the following perspectives.

- Schedule: Objectives in terms of meeting key milestone schedules for organizations and customers

- Cost: Target in terms of development cost including human and material resources

- Quality: Objectives in terms of product quality and process quality

The goal of the organization's SW integration test is after 100% of the functional implementation,

Call coverage is 100%.

However, if there is a SW integration test goal requested by the customer or negotiated with the customer, the customer's goal will be followed.

## Defining SW Integration Test Roles and Responsibilities

The SW test manager writes the role related to the SW integration test test in the project and the responsibilities for each role.

SW Test Manager

• Establishment of SW integration test plan

• Review of SW integration test plan

• SW integration test case review

• Reporting of SW integration test results

SW Tester

• Participated in SW integration test case review

• SW integration test

SW ENG.

• Participated in SW integration test plan review

• SW integration test case development

• Participated in SW integration test case review

• SW integration test case tracking

SW PL

• Participated in SW integration test plan review

• Participated in SW integration test case review

• Participation in SW integration test result reporting

PL

• Participated in SW integration test plan review

• Participation in SW integration test result reporting

## SW Integration Test Scope Definition

The SW test manager defines the scope of the SW integration test to be performed in the project.

Basically, all SW components are included in the scope of SW integration test, except for SW implemented by the company, SW implemented by OEM companies and SW automatically created on the tool are excluded from the scope of SW integration test.

## Defining SW Integration Strategy

W ARCH. defines the SW integration strategy to be carried out in the project. Based on the FRP, the implementation strategy is established by identifying the SW components that can be implemented according to the sample release time.

## SW Integration Test Strategy Definition

The SW test manager defines the SW integration test strategy to be carried out in the project. Based on the FRP, the SW components that can be implemented are identified according to the sample release time, and the SW integration test time is defined so that the SW integration test can be performed. After 100% of function implementation, plan so that all components can perform SW integration test.

| SW Components | B2 | B3 | B4 | B5~ |
| --- | --- | --- | --- | --- |
| Component A | ● | ● | ● | ● |
| Component B |  | ● | ● | ● |
| Component C |  |  | ● | ● |
| Component D |  |  |  | ● |
| Component E |  |  |  | ● |

Table 1 Sample - W Integration Test Strategy Definition

## SW Integration Regression Test Strategy Definition

The SW test manager defines the regression test strategy for re-verification when a defect occurs through the SW integration test.

In case of critical rating issue, Full Test

If an issue below the major grade occurs, a regression test is performed.

## SW Integration Test Schedule Definition

The SW test manager establishes the SW integration test schedule and prepares the WBS in consideration of the SW integration test goal, scope, and strategy.

## Defining SW Integration Test Case Design Criteria

The SW test manager defines the SW integration test case design criteria of the project by referring to the table below.

However, if there is a special requirement for the SW integration test case design standard of the OEM, the SW integration test case design standard is defined according to the OEM requirements.

In the case of specific SW components, if it is difficult to apply the test case design criteria specified in the table below, the reason shall be specified in the SW integration test plan.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Type | Test Case Design Criteria | | | |
| Analysis of Requirements | Equivalence Partitioning | Analysis of Boundary Value | Error Guessing |
| SW Unit Test | ● | ○ | ○ | ○ |
| SW Integration Test | ● | ○ | ○ | ○ |
| SW Test | ● | ○ | ○ | ○ |
| System Integration Test | ● | ○ | ○ | ○ |
| System Test | ● | ● | ● | ● |

(●: Required, ○: Optional)

Table 2 Test Case Design Criteria

For details on TC Design when writing test cases, refer to the guide below.

1. LGE\_VSsmart\_SysT\_G02\_Test Technique Guide

## Defining the criteria for entering/stopping/resuming SW integration test

The SW test manager specifies the SW integration test entry/stop/resume criteria in the SW integration test plan.

|  |  |
| --- | --- |
| Criteria | |
| Entry | Completed the implementation of unit function |
| Suspension | Failed the build or coverage on unit function |
| Resumption | Completed the build and coverage on unit function |

Table 3 SW Integration Test Entry/Stop/Resume Criteria

## Definition of SW Integration Test End Criteria

The SW test manager can define the SW integration test termination criteria for each sample release according to the SW integration test strategy to be performed in the project.

SW integration test completion criteria

After 100% of function implementation, 100% of call coverage and Defect Zero must be satisfied.

If the defined termination criterion is not satisfied, the SW integration test is repeated according to the regression test strategy until the termination criterion is satisfied.

## SW Integration Test Environment Definition

The SW test manager describes the SW integration test environment in the SW integration test plan, and describes the resources necessary for establishing the SW integration test environment.

# Review of SW Integration Test Plan

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW test manager reviews the SW integration test plan and related deliverables with stakeholders. | 2.1 Preparation for review meeting [SW Test Manager]  2.2 Conducting a review meeting [SW Test Manager]  2.3 Complementing the SW integrated test plan [SW Test Manager] | SW Integration Test Plan, VR Report |

## Preparation for review meeting

Participants and convenes a review meeting.

• Ensure that the deliverables under review are ready.

• The subject of review may be the SW integration test plan.

• Prepare a review checklist.

• You can select the items to be reviewed from the standard checklist and add items to be reviewed if necessary.

• Schedule with review participants.

• Required Review Participants: Required Stakeholders: SW Test Manager, SW Test Manager, SW Arch. SW ENG., QA, SW PL, PL

• Additional review participants may be selected as needed.

• Distribute review materials in advance and convene review meetings.

## Conducting a review meeting

The SW test manager conducts a review meeting based on the review checklist.

For detailed review items, refer to ‘LGE\_VS Smart\_VR\_C01\_Review Checklist’.

## Complementing the SW integrated test plan

The SW test manager supplements the SW integration test plan based on the review results along with the SW PL. If necessary, VR (Verification Review) can be performed again.

※ The detailed review procedure follows the ‘LGE\_VS Smart\_VR\_P01\_Review Process Definition’.

# SW SW integration test case development

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| SW ENG. develops the SW integration test case referring to the SW integration test plan and detailed SW design. | 3.1 SW Integration Test Case Development [SW ENG.] | SW integration test case |

## SW Integration Test Case Development

* W ENG. develops the SW integration test case by referring to the SW integration test plan and the SW architecture design.
* • Consider the following when writing the SW integration test case.
* 1. LGE\_VSsmart\_SWAD\_T01\_SW Architecture Design (SAD)
* • The SW integration test case should include the following items.

| Item | Description |
| --- | --- |
| Requirements ID | Specify the Requirement ID to be tested. |
| TC ID | Specify TC ID, write TC\_Requirements ID\_#.  # is the test case no for the corresponding requirement.  Ex. Requirements ID: SAD\_38  TC ID: TC\_SAD\_38\_1, TC\_SAD\_38\_2 |
| TC Title | Enter the name of the test that can distinguish the test.  Ex. Sensor\_Monitoring, BrightnessControl |
| TC Design Type | Select and specify among Analysis of Requirements, Equivalence Partitioning, and Analysis of Boundary Value Error Guessing. |
| Preconditions | Write prerequisites for performing the test. |
| Input | When testing, describe the input value. |
| Expected Output | It describes the expected output value when the test input value is entered. |
| Observed Output | Write the observed output value through the actual test. |
| Pass/Fail/NA | Write whether the test is Pass/Fail/NA. |
| Remarks | Describe the specifics during testing. |

If a test case is automatically generated using a separate SW integrated test tool, the tool usage standards are followed.

• For details on TC Design when writing test cases, refer to the guide below.

1. LGE\_VSsmart\_SysT\_G02\_Test Technique Guide

# SW Integration Test Case Traceability

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| SW ENG. defines the trace relationship between the SW integration test case and the SW architecture design. | 4.1 SW Architecture Design and Trace Relationship Definition [SW ENG.] | Requirements Traceability Matrix |

## SW Architecture Design and Trace Relationship Definition

SW ENG. defines the trace relationship between the SW integration test case and the SW architecture design.

Consider the following when defining a tracking relationship.

- In principle, tracing is reflected in the output of 100% development stage without omission of requirements.

- The principle of requirements tracking follows the structure and scope of tracking management of deliverables defined in the 'Requirements Tracking Guide' document.

- Manage the tracking relationship by selecting a requirements tracking management tool (DOORS, Excel, etc.).

- A traceability relationship can be defined during the creation or completion of a requirement or traceable artifact.

- If requirements or traceable artifacts are changed, review whether the traceability should be adjusted due to the change and reset the traceability.

- The structure and scope of tracking management and tracking management tools can be adjusted and used according to the characteristics of the project (eg, development environment).

SW ENG. reinforces the test case when checking omissions through tracking.

• For details on tracking management when defining a tracking relationship, refer to the guide below.

1. LGE\_VSsmart\_REQM\_G01\_Product Traceability Guide

# SW Integration Test Case Review

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| Software test manager reviews software integration test cases with stakeholders. | 5.1 Preparation for review meeting [SW Test Manager]  5.2 Conducting a review meeting [SW Test Manager]  5.3 SW Integration Test Case Supplement [SW ENG.] | SW Integration Test Case, VR Report |

## Preparation for review meeting

The SW test manager identifies the review participants and convenes a review meeting.

• Ensure that the deliverables under review are ready.

• The subject of review may be a SW integration test case.

• Prepare a review checklist.

• You can select the items to be reviewed from the standard checklist and add items to be reviewed if necessary.

• Schedule with review participants.

• Required review participants: SW Test Manager, SW Test Manager, SW Arch. SW ENG., QA, SW PL

• Additional review participants may be selected as needed.

• Distribute review materials in advance and convene review meetings..

## Conducting a review meeting

Based on the review checklist, the SW test manager conducts a review meeting focusing on the following items:

Completeness: Are all TCs defined in the test scope of the test plan designed?

Consistency: Is the TC defined by reflecting the technique defined in the Test Methodology of the test plan?

Traceability: Is a unique ID assigned to the TC? Is the TC defined and traceable?

Individual TC Testability: Are the TC performance procedures, input data, and Expected Result testable in detail?

## SW Integration Test Case Supplement

SW ENG. complements the SW integration test plan based on the review results together with the SW test manager. VR can be performed again if necessary.

※ The detailed review procedure follows the ‘LGE\_VS Smart\_VR\_P01\_Review Process Definition’.

# SW integration and integration testing

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| SW ARCH. will proceed with SW integration according to the SW integration strategy.  The SW test manager performs the SW integration test according to the schedule set in the SW integration test plan, and records and handles defects.  The SW test manager checks the test results and decides/performs the regression test with the stakeholders. | 6-1 SW integration [SW ARCH.]  6-2 SW Integration Test [SW Test Manager]  6-3 Perform regression test [SW Test Manager.]  6-4 SW Integration Test Defect Management [SW Test Manager] | Issue,  SW integration test result |

## SW integration

SW ARCH. performs SW integration according to the SW integration test plan.

## SW Integration Test

SW ENG. performs SW integration test according to the SW integration test plan. SW integration test can be performed through a separate SW tool (eg, controller test, Junit, etc.) specified in the SW integration test plan.

## Perform regression test

The SW test manager plans to perform the regression test according to the SW integration test regression test strategy (Section 1.6).

Under the supervision of the SW test manager, PL, SW PL, SW ARCH, and the person in charge of resolving issues establish a regression test plan.

The regression test plan procedure is as follows.

1. Issue impact analysis: Identify the part where the issue occurred, and analyze the impact relationship with other parts (RTM)

2. Test range selection: Select the test range based on the impact analysis result.

3. Selection of test cases to be performed: Select test cases within the selected range.

4. Regression test person and schedule planning: Establish a test person and schedule plan and reflect it in WBS.

According to the plan established by the SW test manager, the SW test manager performs the regression test.

## SW Integration Test Defect Management

The SW test manager manages defects resulting from the SW integration test according to the ‘LGE\_VS Smart\_IM\_P01\_Issue Management Process Definition’.

# SW integration test result report

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW test manager organizes the SW integration test results and reports the results to stakeholders. | 7-1 Summary of SW Integration Test Results [SW Test Manager]  7-2 SW Integration Test Result Report [SW Test Manager] | SW integration test result |

## Summary of SW Integration Test Results

The SW test manager collects and organizes the SW integration test results performed by the SW test manager according to the SW integration test plan.

The SW integration test result includes the following items.

1. SW integration test case (specify check result)

2. test coverage

3. Test Pass/Fail

## SW Integration Test Result Report

The SW test manager prepares the SW integration test result and shares it with stakeholders.

• Essential stakeholders: SW test manager, SW test manager, SW Arch. SW ENG., QA, SW PL, PL

• Additional stakeholders may be selected as needed.