Appendix x

Quality Assurance Plan

Revision History

Date	Version	Description	Author
12th October, 2017	1	The software quality management plan is created in MS office Microsot Word.	-

Table of Contents

1. Introduction

This document contains the plan for quality assurance. The software under development is ABS system which is part of automotive system. In this documents the managent process, different documentations regarding ABS system and the methods and tools required to use are explicitly reported.

1.1. Purpose

This Quality Assurance (QA) Plan details the overall approach to quality assurance activities for Automotive ABS System. This QA Plan documents how the project defines, implements and assures quality during the software development process.This QA Plan is a communication vehicle for the entire project team, including the project manager, development manager, developers, test analysts, SQA analysts, technical writers, functional analysts, other project teams, and users.

1.2. Scope

This QA plan document is about the planning of software system quality management. This document is associated with Automotive ABS software System. This document plans the quality checking criteria for the selected software system.

The items which lies under this document is software system for Electronic Control Unit (ECU). The other systems like sensors, modulators or hardware items etc, are out of the scope of this document.

1.3. Definitions and Abbreviations

1.3.1. Definitions

No.	Term	Description
1.	Process	Series of actions or steps taken in order to achieve a particular goal.
2.	Proactive	A person or action creating or controlling a situation rather than just responding to it after it has happened.
3.	Staff function	A staff function is an alternate function of people that do not partake instantly in an activity as they help the line functions to reach their targets.
4.	Prevent defects	Getting the critical risks defined allows people to know the types of defects that are most likely to occur and the ones that can have the greatest system impact.
5.	Quality Audit	Quality audit is the process of systematic examination of a quality system carried out by an internal or external quality auditor or an audit team.
6.	Training	The action of teaching person a particular skill.

1.3.2. Abbreviations

No.	Term	Description
1.	ABS	Anti-lock Braking System
2.	QA	Quality Assurance
3.	SQA	Software Quality Assurance
4.	RS	Requirement Specifications
5.	QUEST	Quality Assurance and Testing

1.4. References

Below are the referenced documents which can be used in multiple sections of QA document.

ID	Tittle
	System specifications
	Performance specifications & performance data manual
	System qualification test report
	ISO – 26262:10 – Guidelines and methods for conducting the safety assessment process on automotive systems
	Functional Safety Assessment Plan
	PMAS Guide Section 6.4.1

2. Quality Objectives

The document refered in as system specification document, which contains all of the system requirement. During that stage we have also developed the quality requirement as well.

3. Management

3.1. Organization

The organization responsible for the quality assurance is QUEST lab private limited. The evaluation of the software product would be done by the representative of this lab. Following documents would be provided on demand of certification organizations

- QA Organization Chart (to include Program Management, Program Executive Office, Portfolio and Software Development)
- Project Team Organization Chart (to include the project SQA team)

- Additional supporting organizational documents, to include other internal teams, external vendors, and any other teams/organizations participating in the project's QA process.

3.2. Reviews

The reviews to be conducted in quality assurance activity are listed below. These reviews will assure the implementation of software system upon the standard ISO-26262.

- **Peer Review** - the evaluation of an artifact or its performance by peers in order to maintain or enhance the quality or performance of the artifact.
- **Formal Review** - a structured examination of an artifact by an assigned formal review team.
- **Milestone Reviews** - Milestone Reviews are mandatory and ensure that the work required in the current state is complete and the project is ready to enter the next state. PMAS Guide Section 6.4.1. Defines these reviews.
    1. The Milestone 0 Review occurs in Project Initiation after the Formal Review of the requirements.
    2. The Milestone 1 Review occurs in Project Planning after review by the project responsobles. Projects require a Milestone 1 review to establish if in full compliance before transitioning to Active.
    3. The Milestone 2 Review occurs after the Initial operational capability. The review also ensures the project is ready to enter the active Implementation stage. Projects can deliver multiple increments and each increment would receive a Milestone 2 Review.
    4. The Milestone 3 Review occurs at the end of the active state and establishes that the project has completed all of its Active state activities. The review also ensures the project is ready to enter the closed state.
    5. The Milestone 4 Review occurs at the end of the closed state. The review ensures that the project has completed all of the activities of the closed state. It also ensures that the project is ready to end all activities. At this review, the project is closed and the delivered capabilities are in use.
    6. A Milestone 4 Review is also required if a project is closed-stopped; no other review is necessary.

4. Documentation

The number of planning documents have been reported in the reference section. All of the refered documents are related to the ABS system under development.

5. Standards and Guidelines

ID	Title
	Parent standard for template documents i.e. IEC - 61508
	ISO 26262 Automotive standard to follow
	PMAS Guide Section 6.4.1

6. Documentation Reviews

6.1. Artifacts

The project artifacts that will be the subject of the review would be software system models developed in matlab, the modified models according to the software requirements and the final source code generated from these model used.

6.2. Review Plan

The review plan for each of the artifact would be followed according to the table below.

Artifact	Resources	Method	Time Line
Requirement Specifications (RS)	Domain Experts Personal	Peer Review, Milestone Review	2 weeks
Model Development from RS	Project Manager, Developers	Milestone Review	2 weeks
Model Refinement	Domain Experts Personal, Project Manager	Formal Review, Milestone Review	2 weeks
Source Code	Domain Experts Personal, Project Manager	Formal Review, Milestone Review	1 weeks
End Product	End Users, Domain Experts Personal, Project Manager	Peer Review	1 weeks

6.3. Review Schedule

Artifact	Version	Modifcation	Milestone	Time Line
Requirement	1…n	Changed requirement	Milestone 0	2 Weeks

Specifications (RS)		details		
Model Refinement	1…n	Modification document details	Milestone 1, 2	1 Weeks
Source Code	1…n	Updated versions	Milestone 3, 4	1 Weeks
End Product	1…n	Running Application	Milestone 4	1 Weeks

6.4. Organization and Responsibilities

Group / Indivisual	Review Activity	Task	Standard
Project Manager	Formal Review	Manage the development according to standard	ISO-26262
Team Lead	Milestone Review, Formal Review	Implement rules according to standard	ISO-26262
Quality Assurance	Milestone Review, Formal Review	Implement rules according to standard	ISO-26262
Domain Experts	Peer Review	Provide feedbacks, Assign tasks	ISO-26262

6.5. Tools, Techniques and Methodologies

Tools	**PinPoint Review**
Techniques	Inspections, UML Class Diagrams Reviews
Methodology	Checklist Document

6.6. Quality Records

Quality records include documentation established and maintained to provide evidence of conformance to requirements and to the effective operation of the quality management system In this plan we will use checklist, meeting agendas and meeting minutes documentations.

7. Test and Evaluation

Test and Evaluation plan is separately developed i.e. Appendix y.

8. Tools, Techniques and Methodologies

Tools	Matlab, PinPoint Review
Techniques	Code inspection, UML Diagrams
Methodologies	Check list, Reviews

9. Configuration Management

The configuration plan for the ABS software system is developed seperatly according to the ISO-26262 standard i.e. Appendix z.

10. Risk Management

The Risk management plan is the sub section in functional safety assessment plan document i.e. Appendix A.