

Process Engineering Group



Process Engineering Group (R&D - GIL)

PEG 1

Organizational Processes' Needs

Genus
energizing lives

Objective :

PEG develop, maintain and institutionalize Organization's and projects' processes and metrics.

Scope :

This process is applicable to all activities under the purview of the R&D Division in Genus Innovation Ltd.

Vision :

- Development, maintenance and assimilation of processes to aid and support the organization's operations.
- Institutionalization of the aforesaid processes.
- Facilitation in adherence to the processes.
- To develop and maintain a quantitative insight into the organization's performance.

Roles and Responsibilities :

PEG was formed at Organizational level, Roles and Responsibilities also identified. [Project Team](#)
[Section of PEG Plan in EinFrame](#).

PEG 2

Organization Processes' Needs



Goals of Current Year

- Strengthen the Project Management Processes
 - Example : EinFrame as tool implemented for Project Management activities..
- Organization's Metrics review & revise :
 - Business objectives revised according to Business priorities and Vision, MBRs made, reviewed the current measurement goals, Line Rejection Percentage goal revised.

Business objectives to Process objectives mapped on basis of these measurement:

- Line Rejection Percentage (Quality)
- Schedule Variance (Delivery)

[BOTOPO](#)

PEG

3

Process

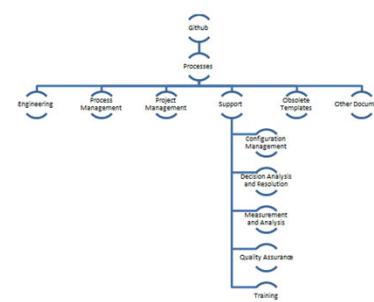


[PEG Annual Plan](#) was prepared for working of PEG, consists of

1. Budget Plan (IR and Benchmark Appraisal from KPMG, Stationery)
2. Resource Plan (SVN, EinFrame, MS Office etc.)
3. Roles & Responsibility Plan
4. Training Plan
5. Configuration Management Plan (This repository contains all artifacts of PEG working activities.)
6. Quality Plan (Consists of Audit, Senior Management Review)
7. Measurement & Analysis Plans
8. Monitor and Control
9. Action & Release Plan (Project Tasks).

Structure of QMS

[PRCD_CONFIG \(Page No. 10\)](#)



PEG

4

Quality Management System (QMS)



Policy : A policy is a deliberate system of principles to guide decisions and achieve rational outcomes. A policy is a statement of intent, and is implemented as a procedure or protocol.

For example:

Genus Development Policy ([POLC_DEVPOL](#))

Procedure : A fixed, step by step sequence of activities or course of action (with definite start and end points) that should be followed in the same order to correctly perform a task.

For example:

Project Planning Procedure ([PRCD_PRJPLN](#))

Templates / Tools : A template is a form or pattern used as a guide to making something.

For example:

Hardware Design Template ([TMPL_HWDWSN](#))

Checklist : A list of items to be noted, checked, or remembered.

For example:

Plan review checklist ([CHKL_PLNREV](#))

Guidelines : A principle put forward to set standards or determine a course of action.

For example:

Firmware Coding Standards guidelines ([GDLN_FRWSTD](#))

Logs : Project wise various review and testing defects available in Incident Management Report of EinFrame.

For example :

[Incident Management](#)

PEG

5

QMS Release and Deploy



QMS Release Audit : Pre-release audit is conducted with PQA Team member before Major release.

[Incident Management Report for Audit NCs](#)

QMS Release Note : It includes all necessary information related to QMS Release.

[QMS 4.1_QMSREL](#)

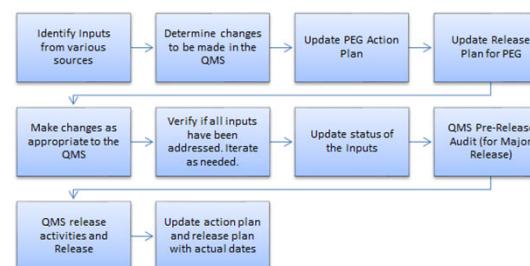
QMS Release Mail : New version of QMS is released for use and team is intimated via QMS Release Email which includes QMS release note.

[QMS released mails](#)

QMS Training : QMS release training is conducted by PEG. Venue and timings are intimated to team by Email.

[QMS 4.0_Training](#)

Typical workflow for QMS Revision



PEG

6

Process Improvements



Identify Process Improvement Opportunities through the following **inputs** :

- **Process Improvement Proposals** : Process Practitioners log their suggestions related to process improvement. For example : [Incident Management Report for Process Improvement Proposal](#)
- **Audit Report** : Auditor sends the "Audit Report" to PEG for analysis and identification of candidate process improvement opportunities. For example : [Audit Reports](#)
- **Training Report** : Training Report in EinFrame. For example : [Training Reports and Feedbacks via Mail](#)
- **Project Learning's** : During the Project and after the project closure, Project Practitioners forward the learnings in Incident learnings of EinFrame. For example : [Incident Learning](#)
- **Project Repository** : Project Risks, Plan etc.
For example : [Projects Repository in EinFrame](#)
- **Project Metric** : [Metrics Reports](#)
- **Process Appraisal** : IR done by KPMG in August 2022. For example : [Process Appraisal](#)
- **Tailoring Proposals** : From practitioners. For example : [Tailoring Proposals](#)

PEG

7

Process Improvements Implementation



All improvement opportunities / inputs captured in single sheet called [PEG_QMSREQ](#)

Pr. No.	Input	Source of Input	Decision	Artefacts to be modified	Size	Remarks	Repository Rev.
1	For new segment, project effort estimation template need to more align .	Process Improvement Proposal via Einframe	Accepted	Efforts Estimation Template	Medium	size in terms of Complexity more clearly defined and to identify complexity guidelines added.	2e7743a70c945ae bc315fb7cb0b270 613d02a22
2	Audit repetition in a phase : before and after Metrics report audit is time consuming for team, pls change to once after metrics report preparation only.	Process Improvement Proposal via Einframe	Accepted	Project Plan Procedure	Small	Updated in planning procedure	547dbdc3cd09e7b 9ecad634ee0fc56 91115e6ea
3	Audit checklist to be sync with GILef : Category of NC is to be sync with term functional/non-functional	Process Improvement Proposal via Einframe	Accepted	Audit checklist	Small	Major and Minor words replaced by Functional & Non-Functional respectively	be4787ad0e20208 cfa1468e98429759 a70c40490
4	Designer itself do module testing by making module test cases, so to do this formally like log the defects and resolve by himself is extra burden, practically it is part of design & implementation and do in each projects. So see this and revise processes accordingly.	Process Improvement Proposal via Einframe	Rejected	Implementation Procedure, Module Test Cases	Large	Already mentioned that log the incidents if required	NA
5	Audit Checklist updation w.r.t. Einframe	External Review (IR)	Accepted	Audit checklist	Medium	Asset, knowledge, technology related points mentioned in checklist	13ef27ab8de43dec 6dd69d9d99d39a7c1 414861a46
6	Measurement Goals should have some realistic figures, should not zero	External Review (IR)	Accepted	Organization performance goal page of Einframe	Small	Line rejection ration goal changed to 2.5	

PEG

8

Monitoring and Control



PEG Periodic Team Meetings : Minutes of Meeting (If Required).

Senior Management Review Plan : It includes plan of PEG activities review with Senior Management . During MBR release and Annual Plan release. [PEG Senior Management Review Checklist](#) and [PEG Senior Management Review and Discussion MOM](#)

Audit Plan : It includes audit plan of PEG activities. During major release of QMS and PEG audit in every 3 months. [PEG Annual Plan](#)

Incident Logged during PEG Audit :

Search Incidents
Enter search criteria and click 'Search' below

Search Again

ID	Identification Date	Description	Reproduction Steps	Configuration Info	Logged On	Resolved On
58	Jul 27, 2022	PEG activities after december'22 can not seen in project plan	project tasks are missing for Q4	PEG plan	Jul 28, 2022	Jul 30, 2022
59	Jul 27, 2022	SCAMPI words is not appropriate, task name to be appropriate, task category should be	project task contains "SCAMPI: CPR is CPR execution, project task to be appropriate, project review task is shortly mentioned in task.	PEG plan	Jul 28, 2022	Jul 30, 2022

PEG 9

Managing Performance & Measurement



- To measure, identify and address performance issue:**
In project plan ensure measurement and goals, tracked in project metric report. Organization metric monitored for all projects. [PEG Annual Plan](#) and [Project GGE302 Plan](#)
- Map org business objective to process objectives.**
Keep updated, define ,measure, analyze performance. [BOTOPO](#)
- Store measured data and analyze in project level and org level both.** [MBR & Data](#)
- Follow set processes and keep updated.** [Project GGE302 Plan](#) and [PRCD_MEASUR](#)
- Ensure data quality**
For Example : 1. Einframe Project report used as source to collect and verify the schedule variance data. These data verified during each milestone audits by PQA.
[Einframe Project Report](#)
- 2. Google sheet maintained by production & quality for production quantities and line rejection quantities, used as tool to collect the data and the QA head verify the data. Production quantity can also be verified by SAP "MB51" transaction.
[Production_Rejection_Google_sheet](#)
- Use org measurement repository**
 - Project actual efforts used during next similar project's efforts estimation activity.
[Einframe Project Report](#)
- Analyze org performance and identify improvement needs.** [MBR](#)
- Periodic sharing of performance measurement data to organization.** [MBR](#)

PEG 10

Tailoring



One standard process often cannot be fit all of an organization's projects, the solution to this problem is usually to allow for tailoring of the standard process to accommodate the attributes and characteristics of individual projects.

Example:

- [Tailoring Proposals](#) received from GGE295 DC-DC Converter Project
 - Matrix Report combined for RD & Planning Phase due to project time is one month and matrix report making in first phase is not possible due to unavailability of EVMS data in 3-4 day in EinFrame.
- [Tailoring Proposals](#) received from GGS151 3KVA MPPT PCU Project
 - Audit merge of RD phase and Planning Phase.
 - Implementation part of (Design and implementation phase) need to merge with Integration Phase

Tailoring requests approved keeping in mind of Project workflow and duration (size) of project.

[Tailoring guideline](#)

PEG

11

Guidelines



Generic Work Environment

The generic work environment for the project must contain all of these:

1. A well-lit and litter free office space
2. At least 20SqFt of work area
3. Ergonomic standard issue chair and work platform
4. Temperature close to 27°C
5. A well-stocked canteen
6. Appropriate personal workstation
7. Quiet working conditions
8. Personalized Email address
9. Internet connectivity

Besides these, the software and Hardware environment needed is maintained by the IT function at the organization level and the list maintained and updated as needed.

[Generic Work Environment](#)

Generic work environment includes basic requirements for Projects' execution at Organization level.

PEG

12



Process Quality Assurance (PQA)



- Objective
- PQA Plan
- PQA schedule
- Audit Inputs
- Audit Incident log
- Audit NC analysis & reporting
- Process Improvement incidents

1

Why PQA?

To objectively evaluate the Process Areas and Work Products.

To provide stakeholders and management with objective insight into compliance.

To track and communicate issues to ensure that they are resolved.

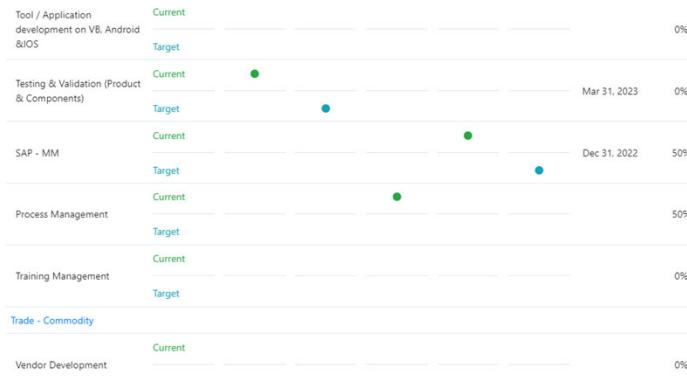
Select Project	QA-22-23_ADTPLN	Load
BASICS		EXECUTION
Project Type	Product Development	Scheduled Start 2022-4-1
Project Name	QA-22-23_ADTPLN	Target Finish 2023-3-31
Description	Oversight on the adherence to defined standards, methods, procedures and objectives of the organization to make the product quality exceed expectations. Goal= 10 NC/session (major #5 minor	Scheduled Finish 2023-3-31
Project Category	"G" Category	Priority High
Link to Project Data	http://10.141.1.9:8000/svn/PQA/	Add to Roadmap No
Project Classification	Continuous Improvement – Pro-active incremental	
Business Unit	Genus Innovation Limited	
Parent Project	None	
Project Manager	Shweta Aggarwal	
Marketing Manager	None	
		IMPACT
		Market -
		Customer -
		Targeted Prod. Specs -
		Primary KPI Affected -
		Intangible Impact -
		Knowledge Output -

2



PQA resource

Personal Data Base PQA is additionally responsible for providing process facilitation and assistance to the project team members.



- PQA is independent of the project and not directly supervised by any stakeholder, and maintain a reporting channel to Senior Management.

3

PQA activities

PQA tasks/schedule is for conducting Organization Audits, audit report analysis & review with senior management, PQA audit.

TECHNOLOGY DEVELOPMENT PROJECT		PROJECT TIMELINE				BUSINESS UNIT			
QA-22-23_ADTPLN		Apr 01, 2022 - Mar 31, 2023				Genus Innovation Limited			
PROJECT MANAGER		ACTUAL TIMELINES				PROJECT CUSTOMER			
Task ID & Description	Planned Start/End	Actual Start/End	Sch. Variance	Planned Efforts	Actual Efforts	Effort Variance	Planned Cost	Actual Cost	Cost Variance
[1101] Start	Apr 01, 2022 Apr 01, 2022	Apr 01, 2022 Apr 01, 2022	0%	0	0.08 ●	100%	0	0.08	100%
[1103] April SM review with metrics report	Apr 29, 2022 Apr 30, 2022	Apr 30, 2022 Apr 30, 2022	-100%	0.64	0.5 ●	-22%	0.64	0.5	-22%
[1104] May SM review with metrics report	May 30, 2022 May 31, 2022	May 31, 2022 May 31, 2022	-100%	0.64	0.5 ●	-22%	0.64	0.5	-22%
[1115] PQA audit-Q1	Jun 24, 2022	Aug 12, 2022	-	-	-	-	-	-	-

4

Tasks assigned to me

At Einframe home screen, there are pending tasks assigned to me. This reflects combined schedule for me.

13255	Release & Closure audit,Audit defect resolve and close	Oct 29, 2022	Oct 31, 2022 0%	Project Task SP10-GGE002 DC DC Synchronous Auto Grade	Sobhag Prajapat	
13353	Oct SM review with metrics report	Oct 29, 2022	Oct 31, 2022 0%	Project Task QA-22-23.ADTPLN	Me	
① 10917	Training on 3D Modeling & Rendering	Aug 18, 2022	Oct 31, 2022 0%	Trainings	Girija Singh	
13179	Audit of Validation Phase	Nov 02, 2022	Nov 03, 2022 0%	Project Task GNE114	Chandrashekhar Sharma	
13200	Team Meeting 2 in validation phase	Nov 02, 2022	Nov 03, 2022 0%	Project Task GNE114	Chandrashekhar Sharma	
13250	SAP Documentation	Nov 02, 2022	Nov 03, 2022 0%	Project Task SP11-GGE297 LAG00V03A EV CHARGER	Sobhag Prajapat	
① 10075	Training on Buck & boost technology by TI	Aug 05, 2022	Nov 03, 2022 0%	Trainings	Girija Singh	
① 10102	Training on LFFPAK MOSFAT In Inverter Application by NXP	Aug 05, 2022	Nov 03, 2022 0%	Trainings	Girija Singh	
13202	Final BOM updating in SAP	Nov 03, 2022	Nov 04, 2022 0%	Project Task GNE114	Chandrashekhar Sharma	
13191	Release note and review	Nov 04, 2022	Nov 05, 2022 0%	Project Task GNE114	Chandrashekhar Sharma	
① 10923	Training on CREO-Mechanism	Aug 18, 2022	Nov 10, 2022 0%	Trainings	Girija Singh	
13355	Nov SM review with metrics report	Nov 29, 2022	Nov 30, 2022 0%	Project Task QA-22-23.ADTPLN	Me	
13350	PQA audit-Q3	Dec 23, 2022	Dec 24, 2022 0%	Project Task QA-22-23.ADTPLN	Me	

5

Audit task in Project's tasks

Project's audit task is planned in project tasks itself, and assigned to me as per mutual agreement in kick off meeting.

Select Project:

Load

TECHNOLOGY DEVELOPMENT PROJECT	PROJECT TIMELINE	BUSINESS UNIT
GNE114	Sep 13, 2022 - Nov 05, 2022	Genus Innovation Limited
PROJECT MANAGER	ACTUAL TIMELINES	PROJECT CUSTOMER
Chandrashekhar Sharma	Sep 19, 2022 - Oct 28, 2022	-

Task ID & Description	Planned Start/End	Actual Start/End	Sch. Variance	Planned Efforts	Actual Efforts	Effort Va
<small>[1626] Audit of RD Phase</small> <small>Approved</small> <small>Latest Comments:</small> <small><i>Audit done.</i></small> <small>Chandrashekhar Sharma [12%]</small> <small>Shweta Aggarwal [8%]</small>	<small>Sep 23, 2022</small> <small>Sep 24, 2022</small>	<small>Sep 24, 2022</small> <small>Sep 24, 2022</small>	<small>-100%</small>	1.6	1.34	<small>6</small>
<small>[1531] Toll Gate 0</small> <small>Approved</small>						

6

Audit Inputs

Audit Checklists

Projects' Work Products

Organizational and Project Standards, and Process Definitions

Name	Audit Checklist for Design and Implementation Phase End			
	S. No	Checkpoint	Functional Non-Conformance/ Non-Functional Non-Conformance/ Observation	Log ID
E -Mails and MOM	1	Has the Design documents been prepared as per the defined and current Design template?	Conformance	
Hardware Design	2	Have the Design documents been reviewed?	Conformance	
Planning	3	Has all interfaces identified?	Conformance	
RD Phase	4	Has all Interfaces been reviewed?	Conformance	
Testing	5	Has the RTT been updated?	Conformance	
GNE114_AUDITT	6	Has the RTT been reviewed?	Conformance	
	7	Are all the external interfaces designed in the design phase clearly traceable and marked as such in the functional	Conformance	
	8	Has DAR been applied appropriately for critical design decisions? (If DAR applied)	Conformance	
	9	Is the problem statement for DAR clear and concise?	Conformance	
	10	Is the decision arrived at using DAR clearly stated and use sound judgment?	Conformance	
	11	Have the findings of the reviews conducted logged in Incident Management?	Conformance	
	12	Has the Design been approved by the project manager?	Major Non-Conformance	270
	13	Have the respective modules been allocated to individual	Conformance	

Revision History / Initiation & RD-RM / Planning / Design-Implementation / Integration / Validation and closure

7



Audit Incident log

PQA classify findings as Non-Functional/Functional/Observations based on Audit guidelines & definitions provided in procedure.

INCIDENT MANAGEMENT									
HOME / REPORTS / INCIDENT MANAGEMENT									
Search Incidents									
Enter search criteria and click 'Search' below									
<input type="button" value="Search Again"/>									
256	Oct 18, 2022	HDWDSN-sequence/numbering of modules is mismatched, 3.10 is coming after 4.0	HDWDSN document, module numbering	HDWDSN	Oct 18, 2022	Oct 08, 2022	-	Closed	Project Related OBIH012 Combo-Z 3200 4BV
257	Oct 18, 2022	No evidence is seen for RTT review.	RTT review log/timesheet not available.	RTT review	Oct 18, 2022	Oct 08, 2022	-	Closed	Project Related OBIH012 Combo-Z 3200 4BV
258	Oct 18, 2022	no evidence of test case review is seen.	no evidence of test case review is seen.	test case review	Oct 18, 2022	Oct 08, 2022	-	Closed	Project Related OBIH012 Combo-Z 3200 4BV
259	Oct 18, 2022	updated MOM is not available on SVN server.	latest MOM not on SVN	MNMET	Oct 18, 2022	Oct 08, 2022	-	Closed	Project Related OBIH012 Combo-Z 3200 4BV

8



Audit incident closure

PQA discuss the timelines to close the NCs with the Auditee, After resolving the NC's by Stakeholder, I check resolution and re-open if not suitable action. I ensure that all audit findings are resolved.

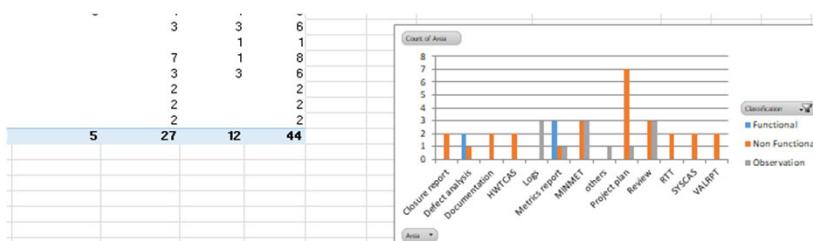
INCIDENT DETAILS		CONFIGURATION & IMPACT	
Incident Type	Project Related	Date of Identification	Sep 06, 2022
Project	SP9-GGE295 DC-DC Converter 12V-10A & 5V-1A	Resolution Expected By	Sep 06, 2022
Stage	Audit	Assigned To	Sobbag Prajapat
Classification	Observation	Raised By	Shweta Aggarwal
Description	No review evidence could seen for RTT review after adding design, integration, system IDs.	Attachment(s)	No attachments found
Reproduction Steps	RTT review log, timesheet not seen		
Configuration Information	RTT review		
RESOLUTION DETAILS		CONFIGURATION & IMPACT	
Date of Resolution	Sep 06, 2022	Found In	2022-09-06 - During audit at validation phase
Report Type	BUG	Fixed In	2022-09-06 - During audit at validation phase
Product KPI Affected	Reliability	Effort Spent	0 hrs.
Task Category	Testing	Material Cost	0
Defect Source	Modified Implementation	Schedule Impact	0
Resolution Type	Fixed	Learnings	2022-09-06 -
Resolution Steps	2022-09-06 - RTT is now update with relevant id and no observation found in all relevant documents		
ACTIVITY LOG			
Description	User	Date & Time	
Incident resolved	Sobbag Prajapat	Sep 06, 2022 17:21 (UTC)	
Incident created	Shweta Aggarwal	Sep 06, 2022 09:44 (UTC)	

9



Audit NC analysis & report

End of the month, I generate "[Audit Report](#)" using "Audit Reporting Tool" (TOOL_ADRPT) and send this report to PEG Head for identifying Process Improvement Opportunities.
Discuss audit report and PQA activities monthly with [senior management](#).



Problem	Elaboration	Impacts	Suggestions
Metrics report	Corrective actions, process & product defect density are not mentioned in final metrics report while calculated separately in draft report at local computer.	locally data management may impact loss of data and other team mates can not take ref data for other projects also	Keep daily habit of SVN commit, a minor software can be installed in all computers to remind everyone at 5:25 to do this job.
	metrics report- corrective actions are not filled phase wise, inappropriate,	-	
Defect analysis	no formal defect analysis is seen	help in prevention of re-occurrence of the defects and by reaching at root cause of the defects may help in prevention of new type of potential defects	Defect analysis to be done for testing defects (every stage), review defects at least. (Incident ID - 237, Process improvement)

10



Project's process defect density

4. Project's Process Defect Density

The process defect density found 0.22, whereas measurement goal was 0.20 ± 0.03 . So it is equal to limit. The total efforts expended on this project is 157 persons hrs. This means that in every 4.48 person hrs one major non conformance came in this project. That is equal to expected.

4.1. Corrective Actions

As this defect density documented during closure so corrective actions not applicable for this particular project, but may help to future projects. But in this project I monitored the process defect density, and try to not leave any blunder in process point of view, as previous project leanings also use full. During updation of RTT ensure that each and every needs track by something in design, implementation, testing, no any system test case id missing to link with needs. Now as organization goal decided for process defect density as 0.20 ± 0.02 , so in next project will plan accordingly.

4.2. Root Cause Analysis

Most of NCs main cause observed is negligence during planning upgradation, time sheet missing, negligence during RTT upgradation, so some of silly mistakes done, which actually effects more.

11



Process Improvement incidents

- If any best practices and process improvement opportunities are identified, I submit them to the PEG using “[Process Improvement Incidents](#)”.

55	Jul 25, 2022	Audit repetition in a phase	before and after Metrics report audit is time consuming for team, pls change to once after metrics report preparation only.	PRCD_PRJPLN
56	Jul 25, 2022	Audit checklist to be sync with GILef	Category of NC is to be sync with term functional/non-functional	CHKL_AUDITT

12

Organizational Training



OT :- The Purpose of Organizational Training is to support the Organization's Business Objectives and to meet the tactical training needs that are common across projects and support groups in the organization.

Scope

- Identification of Training needs
- Preparation of Strategic and Tactical Training Plan
- Identification of Internal and External Trainers
- Scheduling the Training
- Conduction of Training
- Maintenance of Training Records
- Analysis of Training feedbacks
- Maintaining the Talent map for skill inventory

1

✓ Identified Training Needs

✓ Project Overview

✓ Project Task

✓ Training mapping

✓ Preparation of Strategic and Tactical Training yearly Plan

✓ Organise training Event

✓ Attendance Sheet

G-form:-Feedback Response Sheet

3

Earlier collected the feedback in hardcopy but after PQA evaluation we have design google form

Maintain Training Records and Analyse Feedbacks
Google Drive:- Video recording, ppt etc.

Monthly meeting

Training Detail Report

Analysis of Training Data

4

PROJECT INTRODUCTION



Project Name: GNE114 4200 Static UPS

Objective- Export Sales team required Static UPS 3300W with 48V battery bank and Some new different looks like New Bezel and Graphical LCD with Multi color.

Scope- Increase Load capacity of 3.5KVA System, Change LCD and Chassis.

Measurement Goals - Schedule Variance: $\pm 20\%$, Product Defect Density: 0.10 ± 0.02 , Project's Process Defect Density: 0.20 ± 0.02 , BOM COST: $14000 \pm 10\%$ INR

Link to Project Data : http://10.141.1.9:8080/svn/HKVA_inv/GNE114

Team Size: 11 Nos.

Effort Size: 185 hrs.

Time Line : 13-9-2022 to 05-11-2022

Actual Scheduled Start to Finish Date: 13-9-2022 to

GNE114

1

PROJECT FLOW



Project Start:

- Assigned Project Manager
- Conveyed the Basic need of customer
- Conveyed required end date

Kick-off meeting :

- Discussed needs
- Discussed Scope & Vision
- Team decided for Requirement development

Preliminary Planning :

- Define end date and estimated efforts for requirement development.

To Develop Requirements :

- Capture Requirements

Functional Specification :

- Technically defined all captured needs with corresponding sources and interfaces.
- Review and approval taken from customer.
- Made baseline FS for further designing.
- RTT started to define related requirements.

-Effort Estimation Planning :

- Resource
- Roles and Responsibilities.
- Audit
- Review
- Test
- Validationsmart

GNE114

2

Configuration Management



- CI List in Project plan contains items list which placed under configuration management, where we mentioned location, owner, baseline or control and release or no release against each items. [List of Configurable Items, Access Details and Release Plan](#)
- Project repository at SVN Server used to perform version control of related artefacts.

1.1. List of Configurable Items, Access Details and Release Plan							
Configuration Item	Type	Location	When Baselined?	CI Owner	Candidate for release? (Yes, No)	Mode of release (Media)	
GNE114_PUREV	Controlled	http://10.141.1.9:8080/svn/HKVA_in/y/GNE114/Planning/	NA	Project Manager	No	NA	
GNE114_REQVAL	Controlled	http://10.141.1.9:8080/svn/HKVA_in	NA	Project	No	NA	

1.2. Project Repository

http://10.141.1.9:8080/svn/HKVA_inv/GNE114/
<https://gil.einframe.com/rptprojecttasks.aspx>
http://10.141.1.9:8080/svn/HW_10443/
http://10.141.1.9:8080/svn/MCH_14404/
http://10.141.1.9:8080/svn/FW_17801/
[http://10.141.1.9:8080/svn/FW_17865/Tunning Tool](http://10.141.1.9:8080/svn/FW_17865/Tunning%20Tool)

GNE114

3

Configuration Management



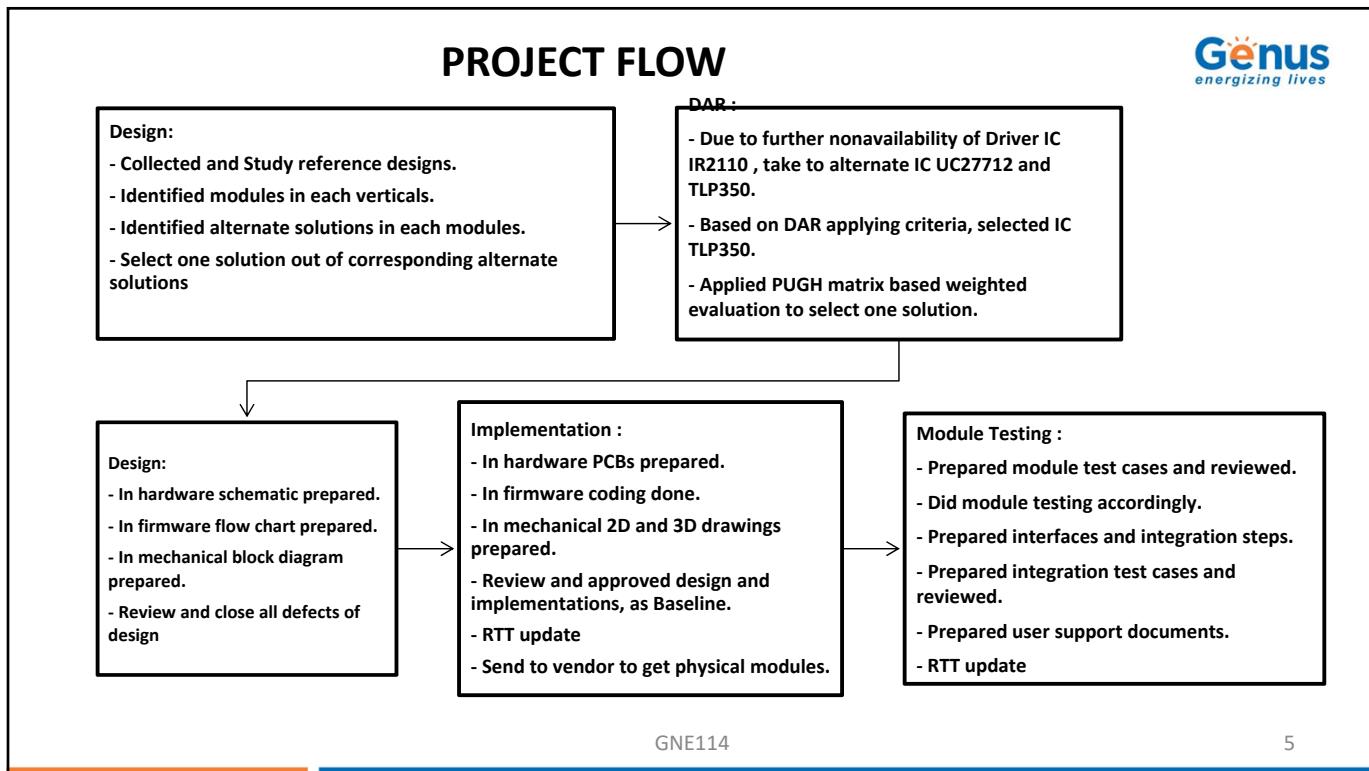
- Change in Firmware design during Integration Testing . Version History at SVN Server.
- Audit Checklist contains configuration audit related audit points that audited, section CM of each phase.
- Audit Log showing configuration audit done.

Revision	Actions	Author	Date	Message
91	1	harish.nagar	28 October 2022 10:49:19	Just open and close.
80	1	harish.nagar	21 October 2022 16:18:06	Changing current modification done.
73	1	harish.nagar	15 October 2022 09:50:23	Checked details
67	1	harish.nagar	11 October 2022 16:53:46	Updated report of some changes in firmware test cases.
64	1	harish.nagar	07 October 2022 14:41:34	Made correction in Frequency calculation point.
60	1	harish.nagar	03 October 2022 17:44:01	Added Firmware_17801/FW_17801/Inverter_Firmwares/Documents/GNE114

Audit Checklist for Integration Phase End						
Project		Audit				
GNE114		Shweta Aggarwal				
Audit Date		Chandra Shekhar Sharma				
S. No	Checkpoint	Functional Non-Conformance/ Non-Functional	Non-Conformance/ Observation	Log ID	Column	
1	Have the integration steps been verified? Have the defects been logged in the Incident Management?	Conformance				
2	Have all defects been closed?	Conformance				
3	Has product support documentation and user manual been prepared?	Conformance				
4	Have integration test cases been developed?	Minor Non-Conformance				271
5	Have the integration test cases been reviewed and the defects logged in Incident	Conformance				

GNE114

4



Decision Analysis and Resolution (DAR)

Analysis for selection of Driver IC.					
1657	Deepesh Jain [15%]	Sobhag Prajapati [15%]	Hardware	1631	Oct 07, 2022
Chandrashekhar Sharma [4%]					
<<Driver IC Selection>>					
Project Code : GNE114					
Problem Stmt: Already used Driver IC IR2110 will be obsolete, so need to any other Driver IC.					
Participants : Sobhag Deepesh					
Sr. no	Criterion	weightage	IC UCC27712	IC TLP350	
1	Component Availability	5	3	4	
2	Technical(Compare specifications)	4	5	5	
3	Cost	3	2	4	
4	Reusability	4	1	4	
5	Design Complexity	3	3	3	
	TOTAL		54	77	
Base of component availability					
Base of cost scoring					
Base of technical comparison scoring					
Base of Reusability					
Base of Design complexity					
Result : Select IC TLP350 for this project because component availability and reusability score of TLP350 is high as our requirements.					

GNE114

6

Decision Analysis and Resolution (DAR)



- Hardware Design Document section
 - Design Alternative Solution defined where we apply DAR.
- [GNE114 HDWDSN](#)

3.2.6. Design Alternative Consideration

We have explore new mosfet driver IC because IC IR2110 will not available in future . We already use ICTLP350 in solar PCU and Higher KVA inverters. For any other Mosfet driver IC we contact to TI team and suggested IC UCC27712. For selection of driver IC is critical decision due to mosfet is main component in any inverter and driver IC selection as per drive capability is most important.

Compare Both IC data sheet and any other selection area then decided that we will use in this product IC TLP350.

S.No	Agenda Item	Discussion	Decision/Action item/Issue
1	Pending action items	No Pending action item	
2	Project Status	<p>Chandrashekhar Said that no delay comes till planning phase ,only delayed Audit task of planning phase but we had been started design as per schedule so this delay not impact to further project .</p> <p>During design review we came to know that Driver IC IR2110 will be obsoleted in near recent future and recommended in new designs by manufacturer, so need to replace this IC. We have two option of driver IC UCC27712 and TLP350 for selection of IC we used technique PUGH matrix then decided that IC TLP350 was better for this project.</p> <p>Tarun Sir asked the what is the most critical criteria which you considered for selection of IC. Chandrashekhar said that We decided this IC because of its availability score was High. Tarun Sir said that decision is better but confirm the stock availability in our store for first order.</p>	<p>We'll use IC TLP350 for mosfet driver.(Decision)</p> <p>Check availability of IC TLP350 in our Production stock. (Action Item)</p>

GNE114

7

Root Cause Analysis : Integration Testing Defect



- The Problem identified during Integration testing.[Incident Management](#)
- Make team and add task in plan for root cause analysis.[Project Plan](#)
- Discussion with team for findout the root cause .[MOM\(RootCause Analysis\)](#)

253	Project Related GNE114	Pre Validation	Functional	When 18A Charging Current mode selecting by switch charging current comes 18A, and again becomes 0A....	Oct 18, 2022	Mayur Sharma	Harish Nagar
-----	------------------------	----------------	------------	---	--------------	--------------	--------------

1659	Team meeting for root cause analysis	Project Management	1636	Oct 19, 2022	7 day(s)	1 day(s)	Oct 20, 2022
------	--------------------------------------	--------------------	------	--------------	----------	----------	--------------

S.No	Agenda Item	Discussion	Decision/Action item/Issue
1	Pending action items	Complete.	
3		<p>Mayur said that I found the problem in charging section , when I select charging current 18A, then charging current reach from 0A to 20A and again becomes 0A. Its should be controlled at 18A and continuous comes 18A till battery voltage reach at 57.6V. When other option like 14A ,9A, 6A charging current comes with in limit and continuous charge battery till 57.6V. Chandrashekhar asked about hardware protection limit for charging current , mayur said that as per calculation and measurement data charging current limit set is 28A from hardware side . Mayur also said that this happened when system on at DG supply and DG output voltage vari from</p>	<p>Harish will be increase Charging current protection limit in firmware.(Action Item)</p> <p>Mayur will be verify change in firmware.(Action Item).</p> <p>Chandrashekhar and Harish update firmware and Hardware library (Action Item).</p>

GNE114

8

Root Cause Analysis : Integration Testing Defect



- 8 D CAPA based template [GNE114_ROCSAN](#) was used for root cause analysis of this selected outcome with team.

Discipline – 4	Root Cause Analyses
Using why why technique, we found the actual root cause that Charging current protection limit set at 22A in firmware and as per calculation its OK but charging current peak goes to 23A practically. Further found when system on at Grid supply then peak current goes to 20A, but system on at DG supply then peak current goes to 23A. DG Supply continues varies from 200V to 250V. Find the actual reasons for this problem that fluctuation in mains voltage is very fast and our controller sampling rate for analog signal is not that much fast to take care high cut and Low cut protection in UPS mode.	

- Corrective action for this problem change in Firmware design and code. Verify the impact of change during testing. Containment action identified that update in firmware library and incident proposed to approved learnings. [GNE114_ROCSAN](#).

Discipline - 5		Corrective Action Plan		
Root Cause	Action	Who	When	Status
Find the actual reasons for this problem that fluctuation in mains voltage is very fast and our controller sampling rate for analog signal is not that much fast to take care high cut and Low cut protection in UPS mode.	During meeting decide that Change in firmware for increase charging current protection limit till 26A and Mayur test and verify that problem is solved.	Harish, Mayur	20-Oct-22	

GNE114

9

Root Cause Analysis : Integration Testing Defect



- [Approved Learnings](#)

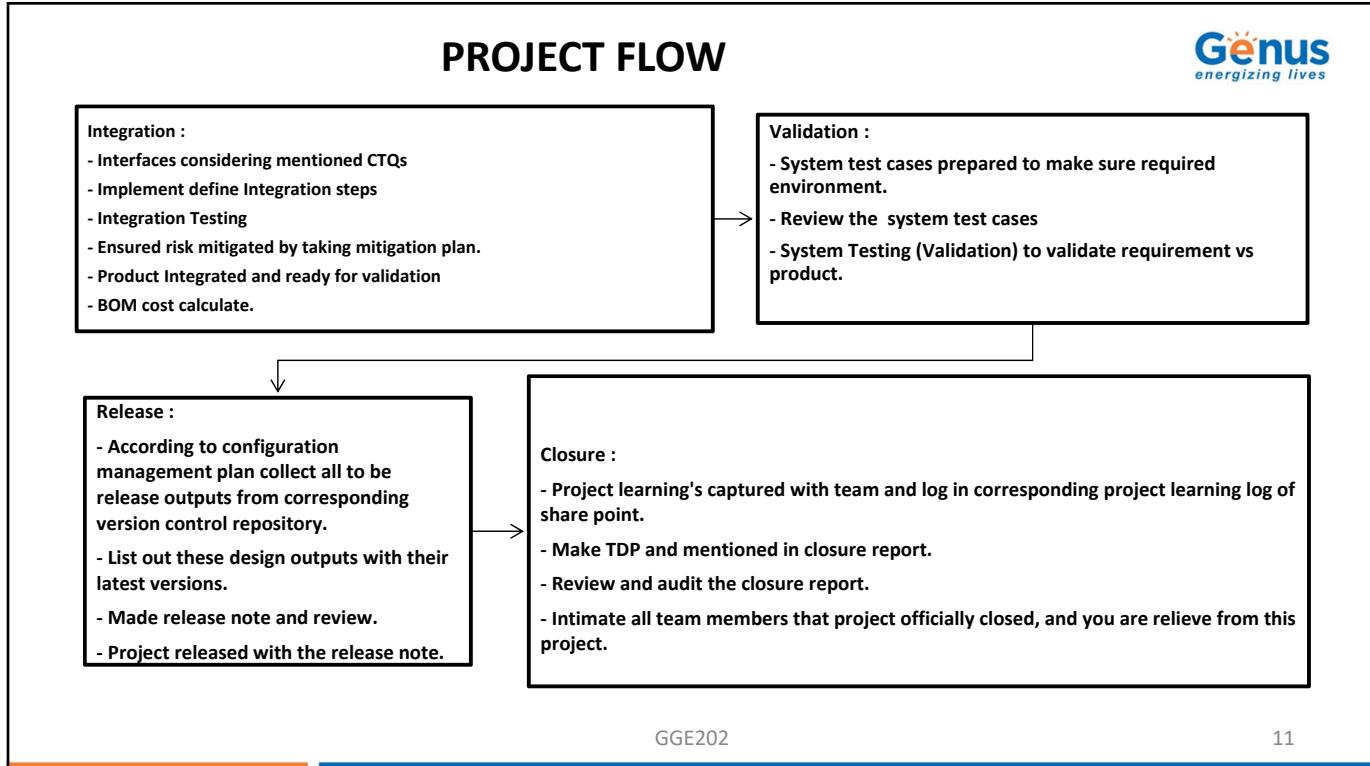
Oct 20, 2022	When 18A Charging Current mode selecting by switch charging current comes 18A, and again becomes 0A. Again goes to 20A and becomes 0A. Not continuous comes 18A.	2022-10-20 · 2022-10-20 ·	discussed. As DG power fluctuates more when compared to actual grid. We should implement this test in other models also.	Gap in Talent: No Gap in Asset: No Gap in Knowledge: Yes Risk Identified: No
--------------	--	---------------------------	--	---

- [Master firmware Library](#)

12	Charging Current Protection	1	This module used for charging current protection also, so in previous in this we take 22A as high charging current but in this modification we can go up to 26A charging current. When ever the charging current exceeds the 26A the charging will get stop as a protection.	GNE114_Rev_4.elf.S
----	-----------------------------	---	--	--------------------

GNE114

10



GGE202

11



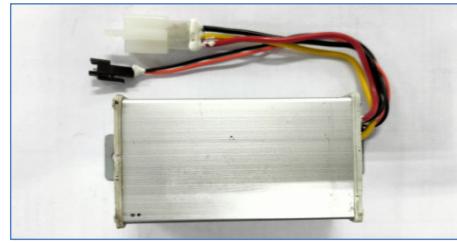
GNE114

12

INTRODUCTION (GGE295)

Project Name:

SP9-GGE295 DC-DC Converter 12V-10A & 5V-1A



Objective- To Development Electronics part (DC Power Supply) for E Vehicle .

Scope- DC DC Converter is converter which converter High DC voltage to Low voltage with below Spec.

Input Rating - 35-90V DC, Output Rating 12V-10A and 5V 1A DC , Enclosure- IP 65.

Hardware side - Designing part of this Converter using one of the SMPS topology based.

Software side- No any scope of work.

Mechanical Side- To develop IP 65 Enclosure in aluminum casing

Measurement Goals - SV: $\pm 20\%$, PDD: 0.10 ± 0.02 , PPDD : 0.20 ± 0.02

Link to Project Data : HTTP://192.168.100.9:8080/SVN/DC_DC_Converter/SP9_GGE295

Team Size: 10 Nos. Effort Size: 156 hrs. Time Line : 19-7-2022 to 20-8-2022

Actual Scheduled Start to Finish Date: 19-7-2022 to 31-8-2022

1

Requirement Development



- Initial Requirement received from Sr. management in form of VOC and one nos. sample product.
VOC Format link as [GGE295_Voice of Customer-Idea Vetting](#)
- Requirement capture form sample product testing result and making functional specification & requirement traceability table .

[GGE295_Requirement Capture & Elicitation](#)
[GGE295_FUNSPC](#)
[GGE295_REQTRT](#)

VOC

Product Power Ratings-120W
Input Parameters-Battery Voltage= 60 V
Output Parameters-12V 10A and 5V 1A for Mobile Charging

- Effort Estimation give us the estimated effort size 157.13 person hrs. . [GGE295_ESTFNL](#)

Project Planning in Einframe - Project Plan Link-
<HTTP://gil.einframe.com/rptprojectoverview.aspx>

Sr. No	Need Statement	Elaboration
1	Input source (Li-ion battery)	48/60/72V
2	Converter type (conman ground)	Non isolated
3	Input voltage range (40 to 84V)	35V to 90V DC
4	Output Voltage 12 VDC	12 +/- 0.5V DC
5	Output Current 10A	10A +/- 0.5 A DC
6	Output Voltage 5 VDC	5 +/- 0.5V DC
7	Output Current 1 A	1A +/- 0.5 A DC
8	Efficiency (> 88%)	>88% at working range
9	Over current Protection (>10A) at 12 V output	Output voltage start to reduce
10	short circuit protection at 12 V output	output voltage reduces to zero
11	Over current Protection (>1A) at 5 V output	Output voltage start to reduce
12	short circuit protection at 5 V output	output voltage reduces to zero
13	Enclosure Type aluminium IP 65	IP 65
14	Output cable for 12V	150 mm with 3 pin Connector
15	Output cable for 5V	150 mm with 2 pin Connector

2

Design and Implementation



To build a technical solution for meet the requirement hardware design , mechanical design and interface & integration design is done and respectively document developed.

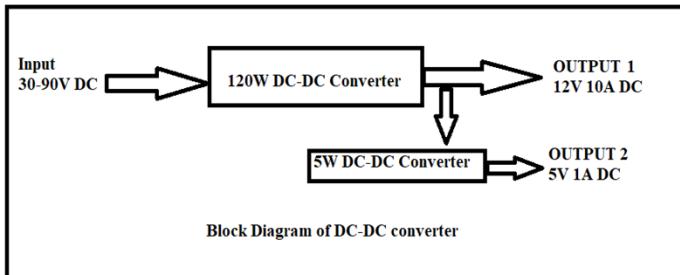
Design document as listed below.

GGE295_HDWDSN- Hardware design document is electrical requirement technical solution that is all hardware modules .

GGE295_MCHDSN- Mechanical design document is mechanical requirement technical solution ,that is enclosure and external part.

GGE295_INTDSN- This design document is interface and integration of all modules with to each other and build complete product as per requirement.

GGE295_HDWDSN



Hardware Modules-120W DC-DC Converter 12V-10A

- Description
- Topology selection
- Logical Flow
- External Interfaces (if any)
- Internal Dependencies
- Critical Design Consideration
- Design Alternative Consideration
- Development & Execution Environment
- Safety Consideration
- Component Selection and Details
- Prototyping and its results
- Schematic and Layout considerations
- Failure modes and Mitigation steps
- Reuse Components

3

Key Modules-

First- 120W DC-DC converter : Input 30-90V Dc and output 12V -10A DC.

Second- 5W DC-DC converter :Input 12V DC and output 5V -1A DC.

Criteria for design decisions-

Input Voltage =35-90VDC

Output Voltage = 12VDC

Output Current =10ADC

Efficiency=>85%

Isolation - NON- isolated

Input voltage > output voltage so applicable topology is buck and Fly back converter

Non isolated SMPS topology decided -Buck converter

Topology type Selection-

1. Synchronous Buck converter (comparatively high cost / high complex/ new part involvement)

2. Asynchronous Buck converter (low cost /low complex/ less new part involvement)

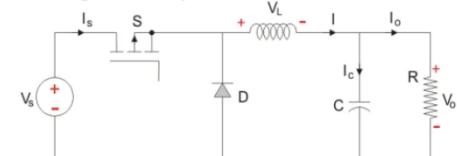
Design Alternative Consideration -Synchronous type buck converter ,but cost will be differ and higher side.

Reuse Components

PWM IC 3845 50% max Duty Cycle , Capacitor 100V 220uF , Capacitor 1000uH 25V, Mosfet IR4110 100V 120A , Diode FERD20H100ST 100V 20 A



Logical flow -Asynchronous Buck converter



Interface item consideration - 3 pin cable for input battery and output connection.

Design Document Review - Review using review check list

Outcomes

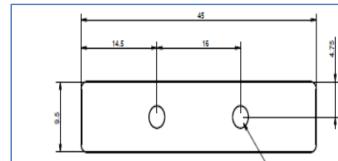
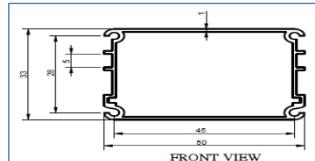
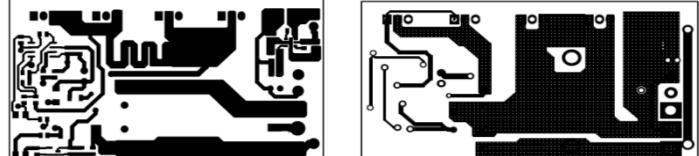
- Modules Schematics and its prototype result
- Layout consideration
- First Draft BOM (passive and active part)
- Basic design of enclosure

4



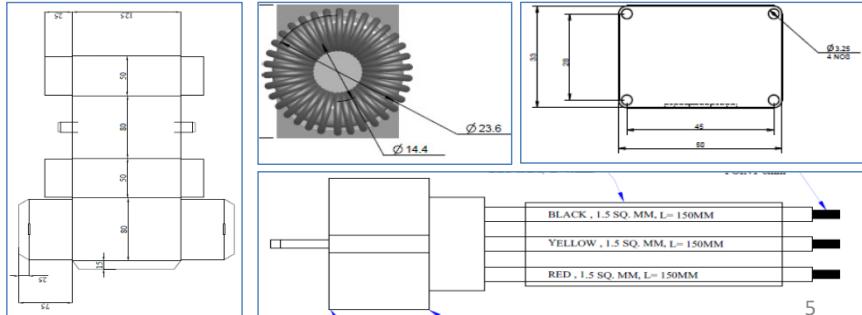
Interface document

- Interface for input and output 12V10A 3 pin cable on PCB Board
- Interface of 5V USB Supply cable on PCB Board
- PCB and enclosure interface .
- Thermal interface between Mosfet and enclosure using thermal pad
- Outer assembly(Grove met ,side plate ,gasket) interface for IP enclosure.
- Packaging related interface .



Implementation Outcomes

- Schematic No-G0449P1157 Rev. 1.0
- PCB Layout-G0449P1157 Rev. 1.0
- Enclosure Drawing-HW_2856
- Mounting Plate Drawing-HW_2859
- Packaging Box Drawing-HW_2875
- Inductor drawing -HW_2883
- Side plate Drawing-HW_2896
- 3 Pin Harness Drawing-HW_2857
- 2pin USB Drawing-HW_2858
- Thermal Pad Drawing-HW_2874



5

Hardware Module test Case and IDs

- UVLO and Start Up Test- HWD_3.1_A
- Voltage Regulation Test- HWD_3.1_B
- Voltage stress at Power device- HWD_3.1_C
- Efficiency Test - HWD_3.1_D
- Output Ripple Test- HWD_3.1_E
- Overload and short circuit test- HWD_3.1_F
- Heat Run Test- HWD_3.1_G



Integration document and Integration IDs

- Side Plate HW_2896 and Rubber grove-met Integration -INT_1
- harness HW_2857 and Harness HW_2858 integration INT_2
- PCB assembly integration INT_3
- Thermal Pad and Mosfet integration INT_4
- PCB assembly in enclosure integration INT_5
- Side cover on enclosure integration INT_6



Test Case ID	Test Case Description	Sub-Module Name	Tools Required	Testing Steps	Expected Result	Actual Result	PCB Number	Pass/Fail	Remarks
HWD_3.1_A	UVLO and Start Up Test	NA	Multimeter, Power Supply	1. Power supply Dc supply connected to modules 2.Increases voltage from 0 to 40 Volt 3.check output voltage ,measure low cut	Low cut recovery voltage - 30V+-5V Low cut voltage -20 V+-5V	No load Low Cut Voltage=29V o/p=10.5 No Load Low Cut Recovery=29.5 o/p=10.7 10A load Low Cut Voltage=24.7 o/p=10.5	G0449P1157 Rev1.0	Pass	

Test Case ID	Test Case Description	Inputs	Tools Required	Testing Steps	Expected Result	Actual Result	Pass/Fail	Remarks
INT_1	Integrated side cover and grove-met	Side Plate HW_2896 Rubber grove-met	By Hand	Rubber grove-met push into the side cover hole by fingers	Rubbergrovemet must properly fixed	Fitment Ok	Pass	
INT_2	Integrated cover, grove met , Harness HW_2857 and Harness HW_2858	Step 1 outcome Harness HW_2857 Harness HW_2858	By Hand	Insert the each wire into the rubber grove met up to sleeve	Wire insertion shoud properly .	Wire intert properly .	Pass	

6

Hardware module test Report-REPORT_HWTCAS

HWD_3.1_Voltage stress at Power C device

At 100% Load					
Input V	Input C	Output V	Output C	Efficiency	
40	2.9	11.96	9.43	97.22655172	
50	2.4	11.96	9.43	93.98566667	
60	2	11.96	9.43	93.98566667	
70	1.7	11.96	9.43	94.77546218	
80	1.5	11.96	9.43	93.98566667	
90	1.4	11.96	9.43	89.51015873	

Test Case ID	Test Case Description	Inputs	Tools Required	Testing Steps	Expected Result	Actual Result	Pass/Fail
VAL_1	UVLO and Start Up Test	30V to 90V	Multimeter, Power Supply	1. Power supply Dc supply connected to modules 2.Increases voltage from 0 to 40 Volt 3.check output voltage ,measure low cut recovery and low cut voltage at no load and at 10A resistive load (1.2 OHM)	Low cut recovery voltage -30V+/-5V Low cut voltage -20 v+/-5V	No load Low Cut Voltage=29V o/p=10.5 No Load Low Cut Recovery=29.5 o/p=10.7 10A load Low Cut Voltage=24.7 o/p=10.5	Pass

7

Closure

GGE295_CLOSRE.DOCX

Project Closure Report

Date	7-9-2022
Project Code	GGE295 DC-DC Converter 12V-10A & 5V-1A
Project Manager	Sobhag Prajapat
Configuration Administrator	Jalaj Mathur
Audit Date	8-Sep-22
Participants	Sobhag Prajapat, Jalaj Mathur

Sr. No	Checkpoint	Location/Link	Remarks (PM/CA)	Remarks (Project Close Audit)
1.	Technical data package- Requirement Documents (Customer requirements, Functional specifications, Requirement Traceability Table)	http://192.168.100.9:8080/svn/DC_DC_Converter/SP9_GGE295/Requirement/	OK	Looks <u>Ok</u> , direct link will be better. (Will be checked separately)
	Planning Data (Project Plan, Risk Plan, Estimates, Schedule)	http://192.168.100.9:8080/svn/DC_DC_Converter/SP9_GGE295/Plan/	OK	Looks <u>Ok</u> , direct link will be better. (Will be checked separately)
	Source Codes, Schematics, BOMs, Mechanical drawings, PCB layouts	http://192.168.100.9:8080/svn/DC_DC_Converter/SP9_GGE295/Hardware%20Doc/	OK	Looks <u>Ok</u> , direct link will be better. (Will be checked separately)
	Design Documents	http://192.168.100.9:8080/svn/DC_DC_Converter/SP9_GGE2	OK	Looks <u>Ok</u> , direct link will be better. (Will be checked

8



INTRODUCTION (GGE302)

Project Name:

SP10-GGE302 DC DC Synchronous Auto Grade

Objective- To Development Electronics part (DC Supply) for with auto grade components

Scope- DC DC Converter is converter which converter High DC voltage in to Low voltage with below Spec.

Input -35-90V ,Output Rating 12V-10A and 5V 1A DC ,Enclosure- IP 66.

Hardware side - Designing part of his Converter using Synchronous buck converter

Software side- No any scope of work.

Mechanical Side- To develop IP 67 Enclosure in Aluminum casing

Measurement Goals - SV: $\pm 20\%$, PDD: 0.10 ± 0.02 , PPDD : 0.20 ± 0.02

Link to Project Data : http://192.168.100.9:8080/svn/DC_DC_Converter/SP10_GGE302

Team Size: 10 Nos. Effort Size: 201.04 hrs. Time Line : 07-09-2022 to 31-10-2022

Actual Scheduled Start to planed Finish Date: 19-7-2022 to 01-11-2022

1

Estimating and Planning

High Level Estimation in start meeting with Sr. Management.

- Complexity -Medium Type
- Cost approx 400-450 Rs (assumption with 2 nos Mosfet -160Rs , 2 Inductor 50Rs , 6 nos capacitor -60 ,enclosure-30rs and harness 30rs ,PWM controller-80rs and converter-25Rs)
- Duration-35-40 day (design-7 days, design implementation - 15 days,Testing 10days,validation 5 days , other activity-5 days)
- effort- high level reference of GGE295 approx 180-190person hours

S. No.	Reference Project Name	Why Selected as Reference	Actual Efforts in RD Phase & Planning Phase	Actual Efforts in Design and Implementation	Actual Efforts in Testing and Integration	Actual Efforts in Validation Phase , Closure	Actual Efforts in End
1	GGE295 DC-DC Converter 12V-10A & 5V-1A	Capacity Rating is approx equal and input na d output spec. also approx equal.	27	45	27	53	22

Average Efforts in person hours 27 45 27 53 22

	Estimated Efforts in RD Phase & Planning Phase	Estimated Efforts in Design and Implementation	Estimated Efforts in Testing and Integration	Estimated Efforts in Validation Phase , Closure	Estimated Efforts in End	
Past Projects	27	45	27	53	22	
Differences from reference projects	4	7	4	9	4	Total
Final estimates	31	52	31	62	26	202

	Difference from reference in detail	Impact in person hours due to the difference	Complexity	Remarks (Optional)
1	Enclosure Design	-8	H	First time development in Reference Project
2	Auto grade components selection and arrangement	8	H	First time development
3	Synchronous Buck converter Design	10	H	First time development
4	PCB layout and new component footprint making	8	H	First time development
5	5V design	4	M	First time development
6	5V PCB layout	4	M	First time development
7	Testing	10	H	First time testing
8	Readability of Power device and Inductor	-4	M	Reuse components
9	Testing Ids	-4	M	Reuse components

Total Impact 28

Size	5H+4M+OL
------	----------

2

Project Planning in Einframe - Project Plan Link-<https://gil.einframe.com/rptprojectoverview.aspx>

Genus
energizing lives

Project Team
Validate Plan
Add Team Member
Add New Task
Load Tasks from Template

Project Team

Project Manager-	SP
Hardware Designer-	SP,AK
Mechanical Designer-	BK
PCB Designer-	RP
Validation Manager-	JM
Integrator-	RJ
Validator-	RS
Material Management-	SJ
Reviewer-	SJ,SRS,SP,JM
Auditor-	SW
Senior Management-	TG
Assembler-	PK,RK

- Task list making
- Team assign in task with tools (asset and work environment)
- Task approval (Time sheet approval)
- Deployment of plan with team
- Operation and support transition plan
- Team Meeting Planning (6 Times)
- Sr. Management review (8 times)
- Critical dependency (two)
- Audit planning (3 times)
- Review planning at significant task
- CM planning

Add new task

Task Name:	Enter task name
Task Category:	Lead/Lag:
Duration:	day(s)
Start Date:	End Date:

Select Team Members:

Member Name	Role	Involved
Abhishek Gupta	designer	0 %
Bharat Kakra	designer	0 %
Bharti Sharma	designer	0 %
CRO 4 CHANNELS TEKTRONIX TPS2024	designer	0 %
CRO FLUKE 190-204	designer	0 %
Deepesh Jain	designer	0 %

Select Predecessors:

- 165 - Start
- 166 - Tori Gate 0
- 167 - Tori Gate 1
- 168 - Tori Gate 2
- 173 - mains instant power source development
- 170 - wiring Diagram

Skill Category	- ACTUAL -					- REQUIREMENT -					- GAPS -					ACTIONS	
Skill Name	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5		
Leadership Set																	
Project Management	0	0.64	0.1	0	0	0	0.2	0	0	0	0	0.44	0.1	0	0	[]	[]
General Management	0.1	0.4	0.3	0	0	0	0	0.05	0	0	0.1	0.4	0.25	0	0	[]	[]
Operational Set																	
Embedded (ST7/Expressive Platform)	0.19	0	0	0	0	0	0	0	0	0.15	0	0	0	0	0	[]	[]
Hardware Design like SMPS, H-Bridge etc	0.9	0.57	0.4	0	0	0	0.1	0.02	0	0	0.9	0.47	0.38	0	0	[]	[]
Hardware PFC Design	0.48	0	0.1	0	0	0	0	0	0	0.48	0	0.1	0	0	0	[]	[]
Schematic and PCB Design	0.19	0.3	0.9	0.1	0	0	0	0.11	0	0	0.15	0.3	0.79	0.1	0	[]	[]
2D & 3D Modeling	0	0	0.9	0.1	0	0	0	0.05	0	0	0	0.65	0.1	0	0	[]	[]
Tool / Application development on VB, Analysis etc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[]	[]
Testing & Validation (Product & Components)	0.17	0.5	0.57	0	0	0	0	0.35	0	0	0.17	0.5	0.22	0	0	[]	[]
SAP - MM	0.02	0.1	0	0.5	0	0	0	0.06	0	0	0.02	0.1	-0.06	0.5	0	[]	[]
Process Management	0	0.05	1.4	0	0	0	0	0.01	0	0	0	0.05	1.39	0	0	[]	[]

Name of Asset	Source	Status
CAD for mechanical design	In-House	Available
MS Office	In-House	Available
Multimeter	In-House	Available
Clamp Meters	In-House	Available
Einframe	In-House	Available
SVN Server	In-House	Available
Altium	In-House	Available
Heat Chamber	In-House	Available
CRO TPS 2024	In-House	Available
Power Analyzer WT 230	In-House	Available
Thermal Imager	In-House	Available
Multi-Sim Hardware Design Software	In-House	Available
CRO Yokogawa DLM 3024	In-House	Available
Vibration tester	Network of Excellence (Vibration Test Setup)	Relationship Exists

3

EXECUTION

Scheduled Start	2022-9-7
Target Finish	2022-10-31
Scheduled Finish	2022-11-1
Priority	Medium
Add to Roadmap	Yes

PROJECT TEAM

Team Member	Role
Sobhag Prajapat	Project Manager
Adarsh Kumar Bawira	Hardware designer
Bharat Kakra	Mechanical designer

ASSET REQUIREMENT

Name of Asset	Source	Status
CAD for mechanical design	In-House	Available
MS Office	In-House	Available
Multimeter	In-House	Available
Clamp Meters	In-House	Available
Einframe	In-House	Available

Efforts estimation (Project Size), Meeting for Planning

Sobhag Prajapat [40%]
Adarsh Kumar Bawira [20%]
Bharat Kakra [20%]

Jalaj Mathur [20%]
Rakesh Pandey [20%]
Ravi Jindal [20%]

Rohit Kumar Sachan [20%]
Sandeep Jain [20%]
Shweta Aggarwal [20%]

Syajiram Sharma [20%]

Module testing and Support documentation ; defects resolve & Close

ClampMeter Meter [30%]
Multimeter Meter [30%]
Adarsh Kumar Bawira [25%]

Thermal Imager [15%]
CRO 4 CHANNELS TEKTRONIX TPS2024 [10%]

Heat Chamber Setup [10%]
Sobhag Prajapat [6%]
Pawan Kumar Sharma [5%]

POWER ANALYZER WT 230 [2%]
LCR METER [1%]
MICRO OHM METER [1%]

Team Meeting on integration phase

Adarsh Kumar Bawira [4%]
Bharat Kakra [4%]
Jalaj Mathur [4%]
Rakesh Pandey [4%]

Ravi Jindal [4%]
Rohit Kumar Sachan [4%]
Sandeep Jain [4%]
Shweta Aggarwal [4%]

Sobhag Prajapat [4%]

Plan Review with checklist; defects resolve & Close

Sobhag Prajapat [24%]
Jalaj Mathur [12%]

Meeting to deploy plan , Plan Approval & Publish

Sobhag Prajapat [20%]
Adarsh Kumar Bawira [6%]
Bharat Kakra [6%]

Jalaj Mathur [6%]
Rakesh Pandey [6%]
Ravi Jindal [6%]
Rohit Kumar Sachan [6%]

Sandeep Jain [6%]
Shweta Aggarwal [6%]
Syajiram Sharma [6%]
Tanum Gupta [6%]

Senior Management Review with Metrics Report , Audit in RD Phase , Audit NC defect and close

Sobhag Prajapat [70%]
Shweta Aggarwal [18%]
Tanum Gupta [6%]

Project Creation and Preliminary Planning up to TGI

Task ID	Description	Manager	Start Date	End Date	Duration	Effort (days)	Notes
1461	Kick Off Meeting , ICDM	Sobhag Prajapat	2022-9-1	2022-9-1	0 days	1 (days)	Effort: 0.00 person-days
1462	Requirement Capture & Elicitation	Adarsh Kumar Bawira	2022-9-1	2022-9-1	0 days	1 (days)	Effort: 0.00 person-days
1463	Functional Specifications And RTT	Jalaj Mathur	2022-9-1	2022-9-1	0 days	1 (days)	Effort: 0.00 person-days
1464	Validation Manager Review	Sobhag Prajapat	2022-9-1	2022-9-1	0 days	1 (days)	Effort: 0.00 person-days

4



Record task completion

Task ID & Description	Planned Start/End	Actual Start/End	Sch. Variance	Planned Efforts	Actual Efforts	Effort Variance	Planned Cost	Actual Cost	Cost Variance
[1482] Kick Off Meeting , MOM Approved Latest Comments: <i>Task completed and MOM shared with team</i> Jaij Mathur (6%) Sandeep Jain (6%) Shweta Aggarwal (6%) Sobhag Prajapat (6%) Tarun Gupta (6%)	Sep 09, 2022 Sep 10, 2022	Sep 10, 2022 Sep 10, 2022	-100%	2.4	3.25	35%	2.4	3.25	35%

TASK APPROVAL

HOME / DATA CAPTURE / INNOVATIVE DEVELOPMENT / TASK APPROVAL

APPROVE TIME SHEET ENTRIES AGAINST PROJECT TASKS

Select Project * SP10-GGE302 DC DC Synchronous Auto Gate View Ad-hoc Tasks

Select Task * 1551 - Sr. M Review in design phase with Me View Timesheet

First Timesheet Entry Oct 15, 2022

Last Timesheet Entry Oct 15, 2022

Person Hours 0.25 Hrs

Marked Finished by All No

Actual Start * Oct 15, 2022

Actual End * Oct 15, 2022

Comments *

View Timesheet

Task Name: [1482] Kick Off Meeting , MOM

Team Member	Activity Type	Description	Date & Time Range	Status
Tarun Gupta	Project Assigned	Take care of Schedule variance	Sep 10, 2022 10:45 to 11:30	Finished
Jaij Mathur	Project Assigned	As validation manager kick off meeting attended.	Sep 10, 2022 10:45 to 11:30	Finished
Sobhag Prajapat	Project Assigned	Team meeting done	Sep 10, 2022 10:45 to 11:30	Finished
Sobhag Prajapat	Project Assigned	MOM Making	Sep 10, 2022 14:00 to 14:15	Finished
Sandeep Jain	Project Assigned	Attend Meeting and understand the project	Sep 10, 2022 10:45 to 11:30	Finished

5

INCIDENT MANAGEMENT

HOME / REPORTS / INCIDENT MANAGEMENT

Search Incidents Enter search criteria and click Search below

Status	All	Additional Search Criteria (for closed incidents)	Product (R) Affected	Search
Business Unit	Getul Innovation		Defect Source	Search
Type	Project Related		Filed In Task Category	Search
Project	SP10-GGE302 DC DC Sync		Resolution Type	Search
Stage	All		Resolution Date Range	Search
Report Type	All		Contains Learning	Search
Assignee	Select User			
Logged Date Range				

Open Defects raised for development

(1554) HW, FW & Mech Library update
Last Comment: 1 day ago
Assigned: Jaij Mathur
Priority: Medium
Status: Open

(1554) HW, FW & Mech Library update
Last Comment: 1 day ago
Assigned: Jaij Mathur
Priority: Medium
Status: Open

(1548) Module and Integration test
Last Comment: 1 day ago
Assigned: Jaij Mathur
Priority: Medium
Status: Open

6. Minutes of Meeting Details

Name of Meeting	Team Meeting on integration phase
Date and Time	Oct 18, 2022 17:00 to 17:29 (20 min.)
Project's Phase	Integration phase
Participants	Sobhag Prajapat, Adarsh Kumar, Ravi Jindal, Rakesh Panday, Sandeep Jain, Rohit Sachan, Jaij Mathur, Bharat Kakra
Absent	Shweta Aggarwal

S.No	Agenda Item	Discussion	Decision/Action Item/Issue
1	Pending action items	Not available	
2	Discussion on Delay Task	Design implementation and review task delay by 150day	
3	Corrective action for managing project cycle or delay schedule.	We have to take action on PCB and prototype assembly approx 8 nos so below action item is generated . 1. Adash identify the required material and request via google form. 2. Sundeep sir will take necessary action for requested material .	

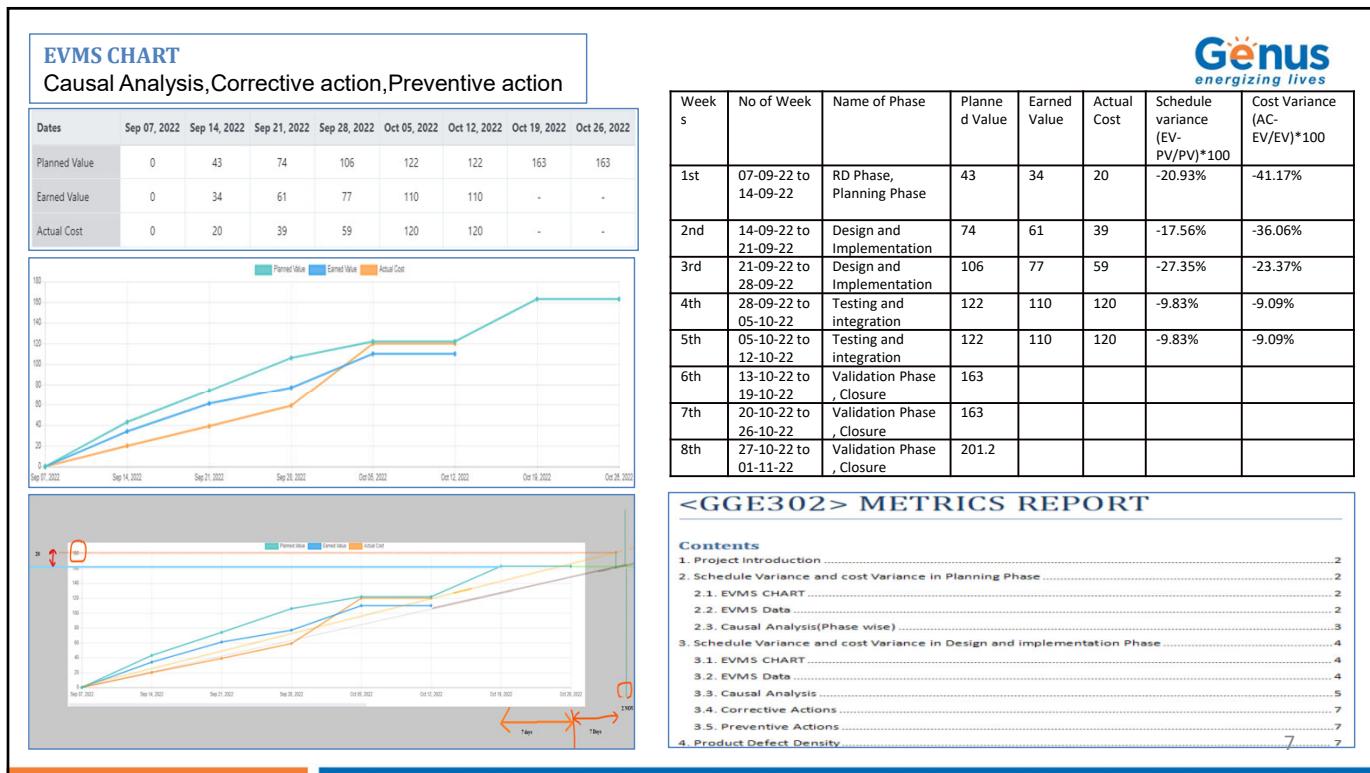
Sept 28, 2022 Oct 04, 2022 900% 1.44 2 30% 1.44 2 30%
Sept 29, 2022 Oct 14, 2022

Sept 28, 2022 Oct 04, 2022 900% 0.96 1 48% 0.96 1 48%
Sept 29, 2022 Oct 14, 2022

Sept 28, 2022 Oct 05, 2022 -100% 3.60 3.25 3.25 -120% 3.60 3.25 -120%

Sept 29, 2022 Oct 05, 2022

6



Project is Running in Module testing
GGE302_HWTCA

Test Case ID	Test Case Description	Sub-Module	Tools Required	Testing Steps	Expected Result	Actual Result	PCB Number	Pass/Fail
HWD_31_A	Initial start up Test	NA	Multimeter, Power Supply	1. Power supply DC supply connected to modules 2.Increases voltage from 0 to 40 Volt 3.Check output voltage, measure low load recovery and low load voltage at no load and at 10A resistive load (1.2 OHM) 4. Step change from 0% load to 100% load at 40V input 5.Capture the DC voltage wave form and measure overshoot.	Low cut recovery voltage -30v +/- 5V Low cut voltage -20 v +/- 5V			
HWD_31_B	Voltage Regulation Test	NA	Multimeter, Power Supply,CRO	1. Step change from 0% load to 100% load at 40V input 2.Capture the DC voltage wave form and measure overshoot. 3. Step change form 40 V to 50V at 100% load, capture the DC voltage waveform and measure overshoot. 4. Step change form 50V to 40 V at 100% load,capture the DC voltage waveform and measure overshoot.	voltage regulation +/- 5%			

GGE302_MTCAS

Test Case ID	Test Case Description	Part Name	Tools Required	Testing Steps	Expected Result	Actual Result	Drawing Number	Pass/Fail	Remarks
MCHT_1	Measure Outer size and all bendings of aluminium part	BODY	Vernier caliper, Tape,Scale	Measurement as per drawing.	85X50X33MM				
MCHT_2	Measure position and hole dia. for mosfet support clip	Body	Vernier caliper, scale	Match the dimensions c to c Check fitment	As per drawing				

GGE302_INTCAS

Test Case ID	Test Case Description	Inputs	Tools Required	Testing Steps	Expected Result	Actual Result	Pass/Fail	Remarks
INT_1	Integrated side cover and grove-met	Side Plate HW_2896 Rubber grove-met	By Hand	Rubber grove-met push into the side cover hole by fingers	Rubber grove met must properly fixed			
INT_2	Integrated cover, grove met, Harness HW_2857 and Harness HW_2858	Step 1 outcome Harness HW_2857 Harness HW_2858	By Hand	Insert the each wire into the rubber grove met up to sleeve	Wire insertion shoud properly.			

PROJECT INTRODUCTION



Project Name: GGE300_BMS 20S 40A NMC 72V

Objective- Make a BMS with following specification. Cell no.=20cell, Cell type=NMC, Battery nominal voltage=72V, Continuous discharging current=40A

Scope- A Battery Management System (BMS), which manages the electronics of a rechargeable 20 cells , whole combines a battery pack thus becomes a crucial factor in ensuring safety. It safeguards both the user and the battery by ensuring that the cell operates within its safe operating limits . This particular BMS will be used for operating 72V battery pack having all controlling features for the safe limits of the working of the cell.

Measurement Goals - Schedule Variance: $\pm 20\%$, Product Defect Density: 0.10 ± 0.02 , Project's Process Defect Density: 0.20 ± 0.02 .

Link to Project Data : <http://192.168.100.9:8080 svn/BMS/BMS 20S 40A/>

Team Size: 10 Nos.

Effort Size: 132hrs.

Time Line : 19-07-2022 to 31-08-2022

Actual Scheduled Start to Finish Date: 19-07-2022 to 31-08-22

Target Customer : In-house use and domestic Market

GGE300

1

Risk Identification, Analysis and Opportunity



Description	Risk Identification date	Source	Sub-Category of source	Severity	Likelihood	Risk Priority Number	Performance parameter affected	Assigned to
Sample components (MOSFETs and BMS ic) availability :- In present scenario all electronics production industries are facing so semiconductor shortage.	23-07-2022	External	Components	2	0	0	Schedule, Design & Implementation	Project Manager
BMS Failure in Temperature controlling of Li-ION battery :- If BMS lose Temperature controlling ,BMS or cells of LiFEPO4 Battery will be more heat that why cells of LiFEPO4 Battery temperature will be rise, may be LiFEPO4 cells blast or act misbehavior.	23-07-2022	External	Components	4	1	4	Reliability, Schedule, Design & Implementation	Project Manager
BMS Failure in Vibration test :- This BMS will be used in EV Battery ,during EV move on way ,any components fail, EV shall stop on the way. Thats why vibration test is important for BMS.	23-07-2022	External	vendors	4	1	4	Reliability, Schedule, Design & Implementation	Project Manager
Availability of Aluminium encloser for Heat control of power components of BMS	23-07-2022	External	vendors	2	0	0	Schedule, Design & Implementation	Project Manager
Opportunity - BMS currently as captive use , design in modular way then can be sale to other Li-ION battery manufacturers"thus shall open new business segment for company.	23-07-2022	Internal	specs	9	9	81	Tarun Gupta Senior Company buss management	

http://192.168.100.9:8080 svn/BMS/BMS 20S 40A/GGE300_RSKMTX.xlsx

- To identify a potential problem before they occur so that risk handling activities can be planned and invoked as needed across the life of the product or project.
- To achieve project performance goals and objectives within defined cost, schedule, and performance constraints.
- Identify Risk source, subcategory. show in above table.
- For analysis determine the risk rating based on its severity/likelihood. parameters affected show in above table
- All activities are done with the team in the team meeting.

GGE300

2



Risk Mitigation Action Plan

Risk ID	Risk Description	Action	Who	When	Status
1	Samples components (MOSFETs and BMS ic) availability :- In present scenario all electronics production industries are facing to semiconductor shortage.	Syoji :- shall provide list of sample components with details to sandeep jain. Sandeep jain:- shall Ensure to sample module testing start.	Syoji & Sandeep Jain	During D&I	Finished
2	BMS Failure in Temperature controlling of LI-ION battery :- If BMS loseTemperature controlling ,BMS or cells of LIFEPO4 Battery will be more heat thats why cells of LIFEPO4 Battery temperature will be rise, may be LIFEPO4 cells blast or act misbehavior.	Syoji:- shall be use all autograde components with high accuracy,better quality PCB and better quality soldering paste .	Syoji	During complete project cycle	Finished
3	BMS Failure in Vibration test:- This BMS will be used in EV Battery ,during EV move on way ,any components fail, EV shall stop on the way.Thats why vibration test is important for BMS.	Sandeep Jain: shall Ensure to Availability of external agency for BMS vibration test.	Sandeep Jain	Just after product finalize	Finished
4	Availability of Aluminium encloser for Heat control of power components of BMS	Sandeep Jain:shall Talk to vendors and Ensure to Availability of Aluminium encloser.	Sandeep Jain	Befor product integration	Finished
5	Opportunity leverage. -BMS currently as captive use , design in modular way then can be sale to other LI-ION battery manufacturers"thus shall open new business segment for company.	Design module as per marketing and sales department inputs and market requirement. Informed to senior managment after product finalise during (MOM)Senior management review with metrics report task.	Syoji	During D&I	Ongoing

http://192.168.100.9:8080/svn/BMS/BMS_20S_40A/GGE300_RSKMTX.xlsx

- Outline a course of action for each major risk that is to be mitigated to minimize its likelihood. Periodically discuss with designer and confirm if he is planning for such kind of leaves, then ask him to hand over the design to functional head before he goes on leave.
- Assign responsibility. showed in above table
- Track and monitor the level of risks on a project throughout the Project Lifecycle by a team meeting.

GGE300

3

Risk Contingency Action Plan

Risk ID	Risk Description	Action	Who	When	Status
1	Samples components (MOSFETs and BMS ic) availability :- In present scenario all electronics production industries are facing to semiconductor shortage.	Project manager shall be also work on components availability with components dealers with alternate option	Syoji	during design and implementation	Not Required
2	BMS Failure in Temperature controlling of LI-ION battery :- If BMS loseTemperature controlling ,BMS or cells of LIFEPO4 Battery will be more heat thats why cells of LIFEPO4 Battery temperature will be rise, may be LIFEPO4 cells blast or act misbehavior.	Project manager shall also work on autograde components source with alternative options and use 2 protection in design on temprature controlling.	Syoji	During complete project cycle	Finished
3	BMS Failure in Vibration test:- This BMS will be used in EV Battery ,during EV move on way ,any components fail, EV shall stop on the way.Thats why vibration test is important for BMS.	Sandeep Jain shall be contact two or more Vibration test external agency. syoji:- BMS shall be check on drop test with 1ft height.	Sandeep Jain	End of validation phase	Finished
4	Availability of Aluminium encloser for Heat control of power components of BMS	Project manager also shall be talk to Aluminium enclosure vendors	Syoji	during design and implementation	Not Required

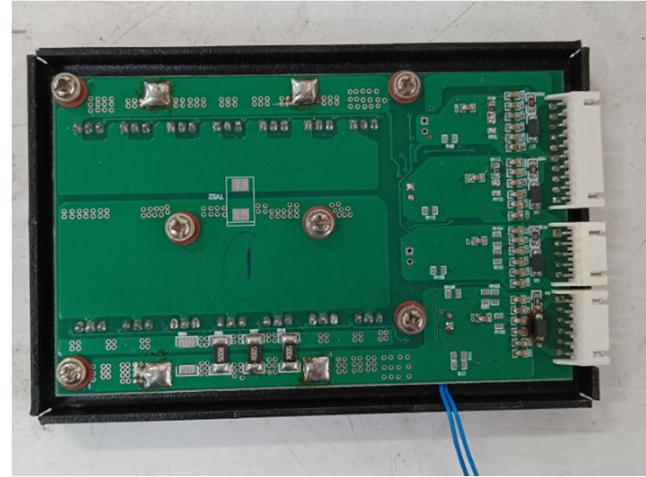
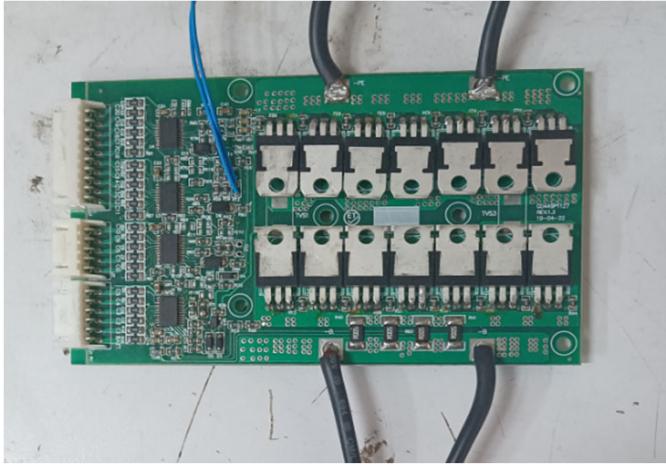
http://192.168.100.9:8080/svn/BMS/BMS_20S_40A/GGE300_RSKMTX.xlsx

- Outline a course of action for each major risk that is to be mitigated to minimize its likelihood.
- Assign responsibility. Showed above table
- Track and monitor the level of risk on a project throughout the Project Lifecycle by a team meeting.

GGE300

4

PRODUCT PICTURE



GGE300

5