

# Summary of MELTAC Platform Design

Non-Proprietary

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## **Signature History**

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## **Revision History**

Revision	Date	Page (section)	Description
0	January 2015	All	Initial issue
1	May 2016	1 (2.0)  14 - 23 (Appendix A)	<ul style="list-style-type: none"> <li>- Modified the description related to the contents of Appendix A.</li> <li>- Deleted the MRP related description.</li> <li>- Updated information regarding the MELTAC Platform Design documents in accordance with "Mapping of MELTAC Platform Licensing Documents to the DI&amp;C-ISG-06 Guidance" (JEXU-1041-1012-P,R0).</li> </ul>
2	October 2016	1 (2.0)  15,16,18 (Appendix A)  24 - 30 (Appendix B)  31-37 (Appendix C)	<ul style="list-style-type: none"> <li>- Added the description for Appendix B and C to reflect the RAI response(RAI#1(Question No.1 for JEXU-041-1023)).</li> <li>- Modified Power Interface Module and Digital Input Module Hardware Requirement Specification document/revision number according to the design progress.</li> <li>- Deleted some documents for RM Module according to the design progress.</li> <li>- Modified some revision number of RM Module's document.</li> <li>- Added the contents of Appendix B for conformance evaluation of Software Requirements Specification (SRS) to reflect the RAI response.</li> <li>- Added the contents of Appendix C for conformance evaluation of Software Design Specification (SDS) to reflect RAI response.</li> </ul>

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## 1.0 INTRODUCTION

This summary describes the design documents associated with the Mitsubishi Electric Corporation (MELCO) Energy Systems Center (ESC) Mitsubishi Electric Total Advanced Controller (MELTAC) Platform. The MELCO ESC design documents encompass the MELTAC Platform hardware and the basic software, which includes the firmware and Field Programmable Gate Arrays (FPGAs) on all MELTAC Platform modules.

This document supports the “Safety System Digital Platform - MELTAC - Topical Report” (JEXU-1041-1008) and satisfies the commitments made under Table 1 sections 1.12, 1.13, 2.3, 2.9, 3.1, 3.3, 3.7, 3.8, 3.9 and 3.10 of “Mapping of MELTAC Platform Licensing Documents to the DI&C-ISG-06 Guidance” (JEXU-1041-1012).

## 2.0 DOCUMENTATION TREE AND CATEGORIZATION

Figure 1 shows the MELTAC Platform Documentation Tree. These documents are internal documents, which are categorized into three groups according to the following phases: Design Phase, Qualification Phase, and V&V Phase. The scope of this summary is the design documents prepared in the Design Phase.

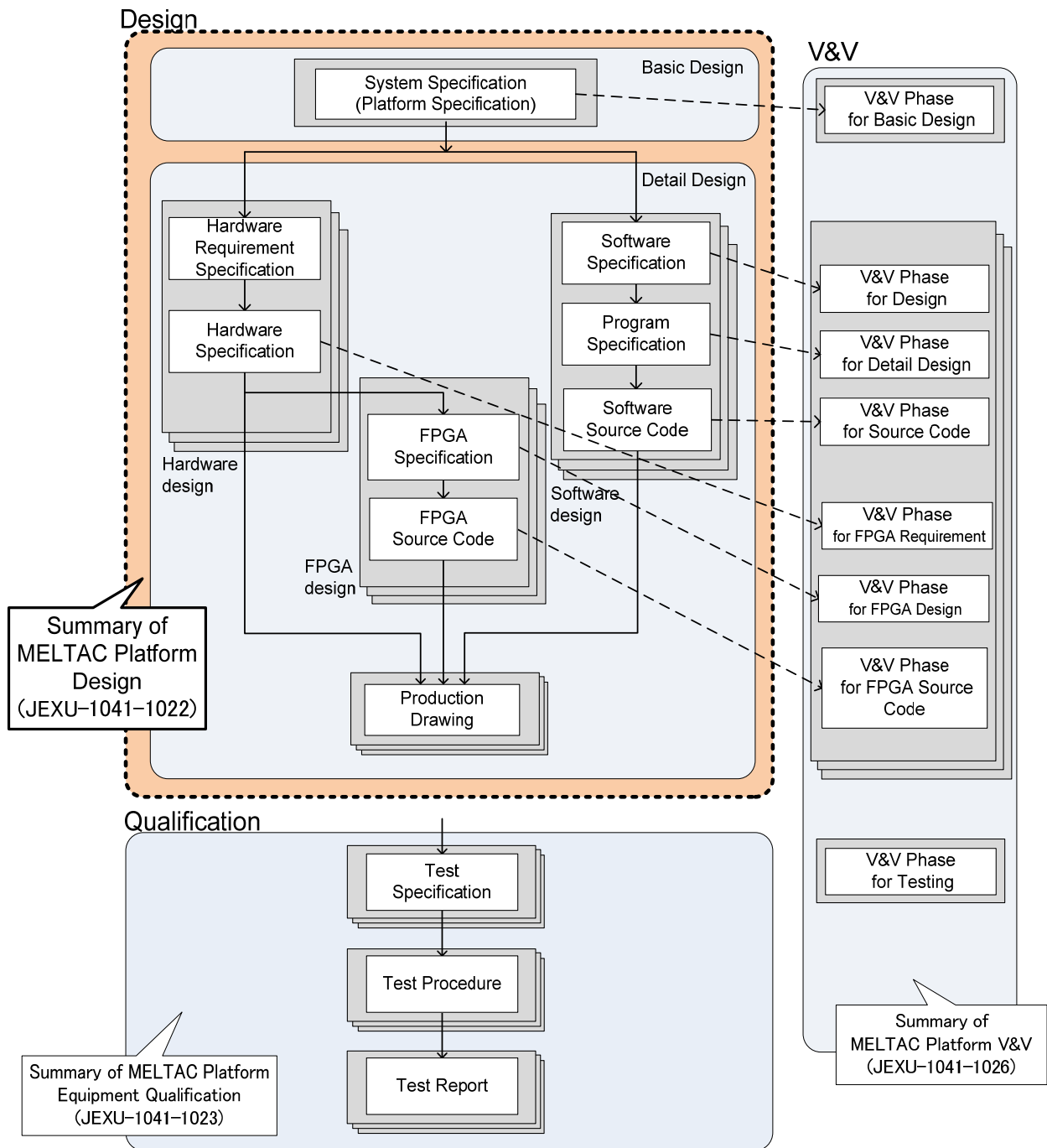
The Qualification Phase documents are described in “Summary of MELTAC Platform Equipment Qualification” (JEXU-1041-1023), and the V&V Phase documents are described in “Summary of MELTAC Platform V&V” (JEXU-1041-1026).

The MELTAC Platform Design documents corresponding to the information required by DI&C-ISG-06 “Licensing Process” (ISG-06) Enclosure B (Tier 3) are listed in Section 3. Specific document numbers are identified in Appendix A.

The types and summaries of the design documents related to the MELTAC Platform are listed in Section 4.

The conformance of Software Requirements Specification (SRS), regarding NRC Standard Review Plan (SRP) Section 7-14, “Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems,” Section B.3.3.1 acceptance criteria for SRS, is evaluated in Appendix B.

The conformance of Software Design Specification (SDS), regarding NRC Standard Review Plan (SRP) Section 7-14, “Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems,” Section B.3.3.3 acceptance criteria for SDS, is evaluated in Appendix C.

**Figure 1 MELTAC Platform Documentation Tree**



### 3.0 MELTAC DOCUMENTS CORRESPONDING TO THE DOCUMENTS IN ISG-06 ENCLOSURE B TIER 3

The MELTAC Platform documents corresponding to the information required by ISG-06 Enclosure B (Tier 3) are listed in Table 1. Specific document numbers are identified in Appendix A.

**Table 1 MELTAC Platform Documents Corresponding to Documents in ISG-06 Enclosure B (Tier 3)**

ISG-06 Enclosure B Tier 3 Document		Applicable ISG-06 Section	MELTAC Documents
1.12	Software Requirements Specification (SRS)	D.4.4.3.1	System Specification (Platform Specification)
1.13	Software Design Specification (SDS)	D.4.4.3.3	Software Specification Hardware Specification Program Specification FPGA Specification
2.3	As-Manufactured, System Configuration Documentation	D.4.4.2.3	Standard Item Description Configuration Management Sheet
2.9	System Build Documents	D.4.4.3.5	Standard Item Description
3.1	Software Integration Report	D.4.4.1.4 D.4.4.2.2	Integration Test Report
3.3	Configuration Management Reports	D.4.4.2.3	Configuration Management Sheet
3.7	Code Listings	D.4.4.3.4	Software Code FPGA Code
3.8	Software Project Risk Management Report	D.10.4.2.3.6	Risk Matrix
3.9	Circuit Schematics	None	Schematic Diagram
3.10	Detailed System and Hardware Drawings	None	Production Drawing

## **4.0 CONTENTS OF MELTAC PLATFORM DESIGN DOCUMENTS**

The following describes the contents of each design document shown in Figure 1.

### **4.1 System Specification (Platform Specification)**

This document describes the specifications for the entire MELTAC Platform, including software, FPGAs and hardware. The document's contents are described below.

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## **4.2 Hardware Requirement Specification**

This document describes the requirements related to hardware extracted from the System Specification. The document's contents are described below.

[

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## **4.3 Hardware Specification**

This document provides detailed module specifications to implement the requirements described in the Hardware Requirement Specification. The document's contents are described below.

[

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#### **4.4 FPGA Specification**

This document describes the specifications implemented in FPGA extracted from the Hardware Specification. The document's contents are described below.

[

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#### **4.5 Software Specification**

This document describes the specifications related to software from those described in the System Specification. The document's contents are described below.

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#### **4.6 Program Specification**

This document describes detailed specifications for function described in the Software Specification. The document's contents are described below.

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#### **4.7 FPGA Code**

The FPGA source code coded is based on the contents of the FPGA Specification.

#### **4.8 Source Code**

The software source code coded is based on the contents of the Program Specification.



## 4.9 Production Drawings

The Production Drawings provide the necessary information to manufacture the MELTAC Platform modules. There are various types of Production Drawings as described below.

### 4.9.1 Standard Item Description

A Standard Item Description is a table that includes information (i.e. drawings, documents, parts lists etc.) used to provide instructions to manufacturing.

[		]

**Figure 2 Content of Standard Item Description (Sample)**

### 4.9.2 Hardware Drawings

#### 4.9.2.1 Schematic Diagram

This diagram shows the interconnection of parts based on the Hardware Specification requirements.

#### 4.9.2.2 Parts List

This list identifies the parts used for implementing the requirements described in the Hardware Specification. Each part is provided with a location number, which is linked to the location number in the Pattern Layout described below.

#### 4.9.2.3 Pattern Layout

This drawing shows the parts layout and connections for implementing the circuitry specified on the Schematic Diagram.

#### **4.9.2.4 Assembly Drawing**

This drawing provides the required information needed to assemble components as described in the Hardware Specification.

#### **4.9.3 Software (including FPGA) Drawing**

##### **4.9.3.1 Writing Instruction (Basic Software Installation Drawing)**

The Writing Instruction contains the following information.

- Software identification information (product number)
- Software Version
- Checksum or CRC value
- Loading instructions

This information is used by the Manufacturing Department to verify that the Software installation was completed correctly.

### **5.0 CONTENTS OF OTHER RELATED DOCUMENTS**

#### **5.1 Risk Matrix**

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#### **5.2 Configuration Management Sheet**

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### 5.3 Integration Test Report

The Integration Test Report documents test results and evaluations, and contains the following items.

- Test Report name, number, and revision level
- Project name, number and applicable phase
- Applicable procedure
- Computer program, module or unit name and version tested
- Computer hardware used
- Test equipment serial number and calibrations
- Software tools used, including version number
- Persons performing the test or recording the test data
- Test results and acceptability (against acceptance criteria)
- Test log (chronological record of test-relevant details)
- Person evaluating test results
- Test data used and/or produced
- List of identified V&V Anomalies

**APPENDIX A LIST OF MELTAC PLATFORM DESIGN DOCUMENTS**

MELTAC Platform Design documents are listed.

(1) Basic Design Document


### a. Hardware Requirement Specification

[illegible]



[illegible]

[illegible]





[illegible]


a. FPGA Specification

[illegible]


**APPENDIX B CONFORMANCE EVALUATION OF SOFTWARE REQUIREMENT SPECIFICATION**

Table B-1 Conformance of SRP Section BTP 7-14  
Section B.3.3.1.1 Functional Characteristics of SRS






Table B-2 Conformance of SRP Section BTP 7-14  
Section B.3.3.1.2 Process Characteristics of SRS




APPENDIX C CONFORMANCE EVALUATION OF SOFTWARE DESIGN SPECIFICATIONS

Table C-1 Conformance of SRP Section BTP 7-14  
Section B.3.3.3.1 Functional Characteristics of SDS




Table C-2 Conformance of SRP Section BTP 7-14  
Section B.3.3.3.2 Process Characteristics of SDS





