

**SUBCONTRACTOR ASSEMBLY FACILITY
REQUIREMENTS FLOW-DOWN PER ELECTRONIC
COMPONENT MANAGEMENT PLAN
FOR
KORRY ELECTRONICS CO.**

CONTRACT NO. N/A

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Prepared for:
Internal Use

Prepared by:
Esterline Control & Communications Systems - Korry Electronics Co.
11910 Beverly Park Road
Everett, WA 98204
<http://www.korry.com>
CAGE 81590

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RECORD OF REVIEW AND HISTORY

REV	DESCRIPTION	APPROVED	
		DATE	BY
-	Initial release from updated WI35524SFD on ECO0125803	2014-05-16	RK
A	<u>Update to para. 7-Lead Free Control Plan</u> <u>Move current to 7.1</u> <u>Add 7.2 records retention for replating</u> <u>Add 7.3 records retention verification of conformal coat coverage and gap spacing on fine pitch components</u>	<u>2015-02-11</u>	<u>R. Kelly</u>

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Initiated by Rick Kelly, Component Engineer 2014-03-19

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1. INTRODUCTION

1.1 Scope

This document defines Korry’s flow down of requirements to subcontractors as part of Korry’s Electronic Component Management Plan (ECMP), prepared in accordance with IEC/TS 62239-1.

The subcontractor shall either demonstrate compliance to this plan or shall develop its own ECMP, and the information shall be accessible to Korry or Korry directed third parties.

1.2 IEC/TS 62239-1, Clause 4 Process Objectives

This ECMP defines the structures to assure customers and regulatory agencies that all of the electronic components used in aerospace and other high reliability equipment produced for Korry by contract manufactures are selected and applied in controlled processes, to accomplish all of the IEC/TS 62239-1 Clause 4 objectives:

Clause 4 Objectives	Contract Manufacturer Obligation	Korry Design Authority Obligation
component selection	No	Yes
component application	No	Yes
component qualification	No	Yes
component quality assurance	Yes	Yes

component dependability	No	Yes
component compatibility with the equipment manufacturing process	Yes	Yes
component data	Yes	Yes
configuration control	Yes	Yes

For purposes of this ECMP, Korry is the plan owner and the subcontractor is the equipment manufacturer.

2. APPLICABLE DOCUMENTS

2.1 Government Documents

(None)

2.2 Non-Government Documents

The following documents form a part of this document to the extent specified herein.

KORRY ELECTRONICS CO.

- 41247 Lead Free Control Plan
- 48054 Obsolescence Management Plan
- 48055 Counterfeit Parts Control Plan
- PA 9100 Quality Management System

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

- IEC/TS 62239-1 Ed. 1.0 Process Management for Avionics –
2012-07 Preparation of an Electronic
 Components Management Plan

IPC

- IPC-A-610 Acceptability of Electronic Assemblies

IPC/JEDEC

- J-STD-001 Requirements for Soldered Electrical
 and Electronic Assemblies

J-STD-020	Moisture/Reflow Sensitivity Classification for Non-hermetic Sold State Surface Mount Devices
J-STD-033	Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices

3. TERMS DEFINITIONS AND ABBREVIATIONS

3.1 Terms and Definitions

Terms and definitions are per 3.1 of IEC/TS 62239-1 and as follows:

3.2 Abbreviations

Abbreviations are per 3.2 of IEC/TS 62239-1 and as follows:

AHP	Aerospace and High Performance
BOM	Bill of Material
CAD	Computer Aided Design
CCA	Circuit Card Assembly
CIN	Configuration Information Notice
COTS	Commercial Off The Shelf
DRC	Design Rule Check
DSCC	Defense Supply Center Columbus
ECO	Engineering Change Order
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
ESR	Effective Series Resistance
ESS	Environmental Stress Screening
FHA	Functional Hazard Analysis
FPGA	Field programmable Gate Array
GSE	Ground Support Equipment
IHS	IHS Inc.
JFET	Junction Field Effect Transistor
LED	Light-Emitting Diode

MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MTBUR	Mean Time Between Unscheduled Removal
OMP	Obsolescence Management Plan
PLM	Product Lifecycle Management
PWB	Printed Wiring Board
QA	Quality Assurance
RFI	Radio Frequency Interference
SEB	Single Event Burnout
SEL	Single Event Latch-up
SEU	Single Event Upset
SSA	System Safety Assessment
STE	Special Test Equipment
TID	Total Ionizing Dose

4. TECHNICAL REQUIREMENTS

4.1 General

This plan documents applicable requirements of IEC/TC 62239-1 clause 4.

Each applicable paragraph in section 4 herein includes:

- a. Details of each requirement being flowed to the subcontractor;
- b. How compliance to the plan is demonstrated; and
- c. The evidence that is available to show that the requirements have been accomplished.

This document is applicable to subcontracted work subject to ECMP. The subcontractor may either

- a. Comply with this document when ECMP is invoked in the contract; or
- b. Implement an ECMP conforming to IEC/TC 62239-1 or an equivalent standard (for subcontractor-controlled designs).

4.2 Component Selection

(This section is not applicable to subcontractors.)

4.3 Component Application

(This section is not applicable to subcontractors.)

4.4 Component Qualification

4.4.1 General

As part of Korry's ongoing qualification of components, some Korry requirements shall be flowed down to the subcontractor's sources of supply and some subcontractor component data is required to be shared with Korry, as detailed below.

4.4.2 General Component Qualification Requirements

(This section is not applicable to subcontractors.)

4.4.3 Component Manufacturer Quality Management

4.4.3.1 Quality System

(This section is only included because of references in 4.4.7 regarding distribution, and does not otherwise apply to subcontractors)

The component manufacturer shall have a quality system assessed to the relevant parts of the ISO 9000 series or equivalent. The documented quality management system of component manufacturers selected by the subcontractor is a major part of the Korry verification.

4.4.3.2 Quality system assessment

(This section is only included because of references in 4.4.7 regarding distribution, and does not otherwise apply to subcontractors)

Where the component manufacturer is not assessed in accordance with 4.4.3.1 above or an approved existing scheme, then the subcontractor shall demonstrate how the quality management system of the component manufacturer shall be maintained. Where the subcontractor conducts or enables an audit on the component manufacturing facility, then the audit shall be conducted by suitably trained auditors in accordance with the relevant standards of the ISO 9000 series or equivalent system.

4.4.4 Component Manufacturer Process Management Approval

(This section is not applicable to subcontractors.)

4.4.5 Demonstration of Component Qualification

(This section is not applicable to subcontractors.)

4.4.6 Qualification of Components from a Supplier that is Not Qualified

(This section is not applicable to subcontractors.)

4.4.7 Distributor Process Management Approval

The subcontractor shall verify that distributors have a documented quality management system.

The distributor quality management system shall be assessed according to 4.4.3.1 or 4.4.3.2 and applicable to distributors. The distributor shall have an ISO 9000 series or equivalent approved process management system for all its activities including storage, component handling, traceability, testing, shipment, information and technical data handling

If the distributor supplies parts other than from a franchised manufacturer then written approval must be provided by Korry.

When the distributor accepts returned stock from customers, these parts may not be used in Korry product without approval by Korry.

4.4.8 Subcontractor assembly facility quality and process management approval

The subcontractor shall have a documented quality management system in accordance with AS/EN/JISQ 9100 or equivalent, where specific attention is made to the following requirements for avionics plan owners.

- 1.) Component traceability is maintained to the original manufacturer.
- 2.) Component substitutions shall be approved by the plan owner.
- 3.) The requirements of 4.7 are met.

4.5 Continuous component quality assurance

4.5.1 General quality assurance requirements

(This section is not applicable to subcontractors.)

4.5.2 On-Going Component Quality Assurance

(This section is not applicable to subcontractors.)

4.5.3 Subcontractor in-house continuous monitoring

A process of identification, recovery and recording of component removals or replacements during in-house processing and testing shall be documented. Significant component replacement trends shall be investigated to determine the root cause, and be reported to Korry.

4.5.4 Component design and manufacturing process change monitoring

Component manufacturers' process change data shall be communicated to Korry. For the purposes of this document a process change is defined as a change in manufacturing source(s), process(es), inspection method(s), location of manufacture, tooling or materials, that can potentially affect fit, form or function.

4.6 Component availability and associated risk assessment

(This section is not applicable to subcontractors.)

4.7 Component Compatibility with the Equipment Manufacturing Process

The documented processes shall assure that the component is compatible with equipment manufacturing processes (without any quality or reliability impact) throughout.

- Component shipping, handling, and storage (short and long term).
- Equipment manufacturing, assembly, shipping, handling, long term storage, test, repair and rework by equipment manufacturer.
- Protection of components from electrostatic discharge (ESD) damage during component storage and handling, during each step of the equipment assembly process. Use of the relevant sections of MIL-HDBK-263, IEC 61340-5-1, and IEC/TR 61340-5-2 will aid in controlling ESD damage.
- (This bullet applies to lead-free solder processes, and does not apply to Korry subcontractors at this time.)
- Avoidance of moisture sensitivity damage (MSL) during each step of the equipment assembly process in accordance with IPC/JEDEC J-STD-20.

The documented processes shall identify the key manufacturing, assembly, shipping, handling, storage, test, repair and rework processes by the subcontractor, and the subcontractor shall describe how their impact on components is identified, documented, and controlled.

4.8 Component Data

(This section is not applicable to subcontractors.)

4.9 Configuration Control

(This section is not applicable to subcontractors.)

5. PLAN ADMINISTRATION REQUIREMENTS

5.1 Using Components Outside the Manufacturer's Specified Temperature Range

(This section is not applicable to subcontractors.)

5.2 Plan Organization

(This section is not applicable to subcontractors.)

5.3 Plan Terms and Definitions

(This section is not applicable to subcontractors.)

5.4 Plan Focal Point

(This section is not applicable to subcontractors.)

5.5 Plan References

(This section is not applicable to subcontractors.)

5.6 Plan Applicability

This ECMP applies to the following component types:

- a. Microcircuits and semiconductor devices;
- b. Electro-optical devices ([LEDs](#), photodetectors, photosensors, LCD, VF, and other display devices, etc.)
- c. Resistors (fixed or variable);
- d. Capacitors (fixed or variable);
- e. Magnetic components (transformers, inductors, ferrites, and filters);
- f. Electrical switches, encoders, and relays;
- g. Electrical connectors, terminals, pins, and sockets;
- h. Thermoelectric coolers.

ECMP applicability to equipment design is defined in 1.1 herein.

5.7 Plan Implementation

(This section is not applicable to subcontractors.)

5.8 Plan Acceptance

(This section is not applicable to subcontractors.)

5.9 Plan maintenance

(This section is not applicable to subcontractors.)

6. PLAN OWNER NOTES

(This section is not applicable to subcontractors.)

7. LEAD FREE CONTROL PLAN (LFCP)

7.1 Korry Lead free plating approvals

Approval of Lead Free plating and finish is indicated in the component definitions supplied by Korry in the technical data packages for each purchase order. Approval of lead free plating and finish is based on GEIA-STD-0005-1.

7.2 Re-plating process record retention

Supplier is to retain records related to verification of the re-plating of component termination finishes specified in Korry drawings. Supplier is to provide copy of records upon request.

7.3 Conformal Coat process record retention

Supplier to retain records related to conformal coat process controls for coverage and lead gap spacing per Korry D41247 (LFCP), section B.4.2. (reproduced in 7.3.1 below) Supplier is to provide copy of records upon request.

7.3.1 Verification of Conformal Coat Coverage and Lead Gap Spacing

For components with small lead spacing (not to be confused with pitch), the conformal coat on these parts may entirely fill the space providing a direct path for tin whisker growth between leads. **Error! Reference source not found.** illustrates the definition of edge-to-edge lead spacing, pitch and conformal coating thickness. As a result, the conformal coating selected should have a maximum thickness no greater than 1/3 of the edge-to-edge lead spacing.

- The thickest conformal coat that can be typically expected for UR/AR type coating is approx. 0.006", so the minimum lead spacing is set at 0.018" unless the part is granted deviation from this requirement by Korry, after taking into account the suitability of SAC finishes in the application, large lead spacing, special ball grid array (BGA) mitigations, and part criticality in the design.
- The thickest conformal coat that can be typically expected for X-Y type coating is approx. 0.002", so the minimum lead spacing is set at 0.0059" unless the part is granted deviation from this requirement by Korry, after taking into account the suitability of SAC finishes in the application, large lead spacing, special ball grid array (BGA) mitigations, and part criticality in the design.

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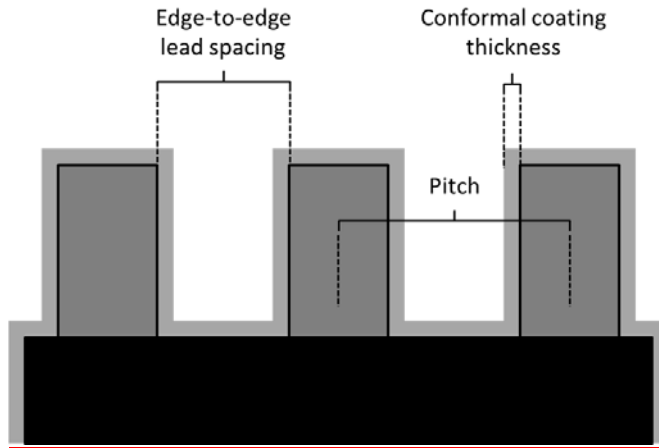


Figure 1: Diagram of conformal coated part geometries (from 41247 LFCP Figure 2)

8. COUNTERFEIT PART CONTROL PLAN (CPCP)

Contract manufacture shall maintain a counterfeit part control plan that complies with the applicable provisions on SAE-AS5553.

9. OBSOLESCENCE MANAGEMENT PLAN (OMP)

Contract manufacturer shall forward Product Change Notices (PCN) per purchase order Q-Note 15.