

**IPC-9194** 

# Implementation of Statistical Process Control (SPC) Applied to Printed Board Assembly Manufacture Guideline

Developed by the Statistical Process Control Subcommittee (7-22) of the Process Control Management Committee (7-20) of IPC

Users of this publication are encouraged to participate in the development of future revisions.

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# **Table of Contents**

1 SC	<b>COPE</b>			
1.1	Purpose 1			
1.2	Interpretation 1			
2 NORMATIVE REFERENCES				
2.1	IPC			
2.2	International Organization for Standardization 1			
2.3	Automotive Industry Action Group 1			
3 TE	RMS AND DEFINITIONS 1			
4 SF	PC OBJECTIVES 1			
4.1	General and Specific Objectives 1			
4.2	Financial Objectives 2			
5 CC	DNDITIONS FOR SPC 2			
5.1	Management Support 2			
5.1.1	Organizational Structure 3			
5.1.2	Implementation Plan 3			
5.1.2.1	Elements 3			
5.1.2.2	Action Plan 3			
5.2	Understanding of SPC Tools and Methods 3			
5.2.1	Executive Overview 4			
5.2.2	Basic Statistics and SPC Tools 5			
5.2.3	Advanced Problem Solving Tools 5			
5.3	Integration with Quality System 5			
6 ELEMENTS OF STATISTICAL PROCESS				
6.1	Process Documentation			
6.1.1	Process Mapping			
6.1.2	Establishing Process Targets and Limits and Performance Baseline			
6.1.3	Process Prioritization Matrix 5			
6.1.4	Parameter Identification 5			
6.2	Measurement System Evaluation 8			
6.3	Process Characterization			
6.3.1	Process Characterization Method			
6.3.2	Determining Parameter Capability 10			
6.4	Practicing SPC 10			
6.4.1	Employee Training and Involvement 10			
6.4.2	Control Plan 11			

6.4.3	Data Collection 11	
6.5	Data Analysis 12	
6.6	Documented Work Instructions 12	
6.7	Interpretation and Process Controls 12	
6.8	SPC Reporting - Process Levels and Trends 12	
6.9	Internal SPC Audits 12	
6.10	Management Review 12	
6.11	Improving Process Capability 12	
6.11.1	SPC Projects and Teams 12	
6.11.2	Process Improvement and Optimization 13	
6.12	Customer Information System 13	
A1: IPC-9191 to IPC-9194 Correlation Matrix 15		
A2: IPC-9194 to IPC-9191 Correlation Matrix		

## Figures

Figure 4-1	Example of a Cost of Quality Report Format (Estimated Annual Sales \$200M) 2
Figure 5-1	Steps to Statistical Process Control 3
Figure 6-1	Electronics Manufacturing Process Flowchart
Figure 6-2	Example of a Fishbone Diagram for Solder Shorts due to Solder Printing Process
Figure 6-3	Gage R&R Analysis Output of Optical Inspection System for Solder Paste Height 9
Figure 6-4	PBA SMT Solder Printing Process Control Plan 11
Figure 6-5	DOE Strategy Example (Number of Factors <6)

## Tables

Table 5-1	Elements of an SPC Implementation Plan (Not Inclusive)	4
Table 5-2	Printed Board Assembler Training Plan	5
Table 6-1	Printed Board Assembly Process Prioritization Matrix (Values shown are benchmarks)	7
Table 6-2	Parameter Identification Matrix for Solder Paste Deposition	8
Table 6-3	Acceptance Levels	9
Table 6-4	Gage R&R Analysis (ANOVA)	9
Table 6-5	Process Characterization Guidelines 1	0

# Implementation of Statistical Process Control (SPC) Applied to Printed Board Assembly Manufacture Guideline

### 1 SCOPE

The IPC-9194 should be used in conjunction with IPC-9191. The IPC-9191 provides general guidelines for implementing SPC in electronics industry.

This standard is intended to aid in interpretation of the requirements in IPC-9191 specifically for Printed Board Assembly (PBA) manufacture. This standard promotes process thinking and control of process inputs, in-process parameters and process outputs, including product parameters. The standard organizes various aspects of process control in the Plan, Do, Check and Act (PDCA) cycle.

**1.1 Purpose** Purpose of the IPC-9194 is to establish practical guidelines for implementation of SPC in the electronics manufacturing operations for continually improving processes and reducing waste.

The standard includes establishing conditions for SPC, implementation of SPC and sustaining SPC. The Implementation phase includes the following elements:

- 1. Preparation
- 2. Set up and Process Characterization
- 3. Practicing SPC
- 4. Monitoring Effectiveness of SPC
- 5. Improving Process Capability

Successful implementation of SPC is contingent on effectiveness of the quality management system that includes controlled documentation, calibration, corrective action and management review elements.

**1.2 Interpretation** "Should" and "may" are used whenever it is necessary to express nonmandatory provisions.

"Will" is used to express a declaration of purpose.

"Applicable" reflects mutual agreements between customer and organizations.

"Documentation" is factual or substantial support for statement made.

"References" are intended to clarify and to add information not to be used as auditable criteria. Any reference is noted by the author's last name, followed by the year of publication in parenthesis.

"Examples" provide additional information only and are not to be interpreted as requirements. These examples are shown in the outlined sections. "Where appropriate" indicates the organization is expected to provide rationale for appropriateness.

#### **2 NORMATIVE REFERENCES**

#### 2.1 IPC<sup>1</sup>

**IPC-T-50** Terms and Definitions for Interconnecting and Packaging Electronic Circuits

**IPC-9191** General Guidelines for Implementation of Statistical Process Control

IPC-9199 Statistical Process Control (SPC) Quality Rating

#### 2.2 International Organization for Standardization<sup>2</sup>

**ISO 9001:2000** Quality Management System Requirements

**ISO 10012** Calibration System Requirements

**ISO 10017** Guidance on Statistical Techniques for ISO 9001:2000

**ISO 11462-1** Guidelines for Implementation of Statistical Process Control (SPC) - Part 1: Elements of SPC

#### 2.3 Automotive Industry Action Group<sup>3</sup>

AIAG-APQP-2 Advanced Product Quality Planning and Control Plan

AIAG-MSA-3 Measurement Systems Analysis

#### **3 TERMS AND DEFINITIONS**

Terms and definitions **shall** be in conformance with IPC-T-50 and as defined in IPC-9191.

#### **4 SPC OBJECTIVES**

**4.1 General and Specific Objectives** General objectives of Statistical Process Control (SPC) are: Increasing knowledge about the process; steering a process to behave in the desired way; reducing variation of final-product parameters, or in other ways improving performance of a process.

<sup>1.</sup> www.ipc.org

<sup>2.</sup> www.iso.org

<sup>3.</sup> www.aiag.org