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Process Characterization Guideline

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PROCESS CHARACTERIZATION GUIDELINE

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PROCESS CHARACTERIZATION GUIDELINE

Introduction

Process characterization is an essential element of process control. A process is a combination of people, procedures, methods, machines, materials, measurement equipment, and/or environment for specific work activities to produce a given product or service. When properly defined and controlled, it is a repeatable sequence of activities with measurable inputs and outputs. The characterization of a process defines distinguishing features of a process and its output on which variables or attributes data may be collected. Thus, through process characterization, a manufacturer may define and measure the stability, repeatability, sensitivity, and robustness of a process. Additionally, it supplies inputs for modeling which may be used to identify critical variables, optimize efficiency and output, and provide avenues for continuous improvement. Furthermore, once process characterization has been established, the process predictability may be used for self-validation rather than auditing. Management support is essential to the effective implementation and maintenance of a process characterization system.

In this manner, the manufacturer determines appropriate characteristics for each critical process node. Target values for each characteristic chosen will be determined with variability around that value. The variability has to be identified, quantified, and minimized to acceptable process performance levels. These steps involve the use of various techniques (e.g., DOE, off-line data analysis, process mapping, etc.).

Process characterization and capability studies shall describe the process limitations with respect to critical characteristics. Both long and short term capability studies shall be performed and documented. Results must be substantiated by data. Process/product parameters for each node may change as process flow, process techniques, equipment, or other pertinent factors change.

The expected outcome to each clause of the characterization process is implementation of recommended actions and process changes. Implementation should result in tangible and measurable performance improvements, identification of critical variables and process capabilities, that results in a process control plan and in a controlled process.

PROCESS CHARACTERIZATION GUIDELINE

(From JEDEC Board Ballot JCB-18-23, formulated under the cognizance of JC-13 Committee: Government Liaison.)

1 Scope

This document is applicable to any manufacturing or service process (e.g., customer service, human resources, planning). It may be conducted on part of a process or on an entire process. While many approaches to process characterization exist, this document is provided as a guideline for analyzing a process. The tools and techniques presented within this guideline are basic tools that may be used to gain an understanding of a process. A general flow of characterization is presented, along with guidelines for documenting, training, self-assessment, and organizational responsibilities (RACI/ Responsible Accountable Consulted Informed).

This document provides a general methodology for the characterization of processes to achieve ongoing tangible and measurable performance improvements.

2 Terms and definitions

See Annex B.

3 References

3.1 Government Documents

MIL-PRF-38534, *General Specification for Hybrid Microcircuits*

MIL-PRF-38535, *General Specification for Integrated Circuit (Microcircuits) Manufacturing*

3.2 Industry Standards

JESD16B, *Assessment of Average Outgoing Quality Levels in Parts Per Million (PPM)*

JESD557C, *General Requirements for Statistical Process Control Systems*

ISO9001:2015, *Quality management systems - Requirements*

JESD671B, *Component Quality Problem Analysis and Corrective Action Requirements*

3.3 Examples of Process Characterization Related Documents

See Annex C.