

JEDEC STANDARD

MULTICHIP MODULES (MCM)

JESD93A

(Revision of JESD93, September 2005)

OCTOBER 2022

JEDEC SOLID STATE TECHNOLOGY ASSOCIATION



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Introduction/history of multichip modules (MCM)

Multichip Module (MCM) is a single package containing at least two microcircuits which perform a function. The first MCMs were Hybrid Microcircuits having active, and passive devices combined in a single package.

Hybrids were invented in the late 1950s by the U. S. ARMY Signal Corps program, with RCA as Prime contractor to facilitate dense electronic assemblies.¹

One of the advantages of the MCMs is reduction of package Interconnect delays by a factor of three.²

Reference #3 gives additional information on Multichip modules.

There are different package configurations for MCMs and new technologies such as 3D and novel stacking and embedding schemes bring new advantages and challenges which have to be taken into consideration as part of the design, manufacture and Qualification of MCMs.

References

1) COMPUTER HISTORY MUSEUM: 1964: HYBRID MICROCIRCUITS REACH PEAK PRODUCTION VOLUMES.

<https://www.computerhistory.org/siliconengine/hybrid-microcircuits-reach-peak-production-volumes/>

2) 12 Multichip Modules (MCMs) - Smithsonian Chip

http://smithsonianchips.si.edu/ice/cd/PKG_BK/CHAPT_12.PDF

3) Introduction to Multichip Modules. <http://extra.ivf.se/ngl/documents/ChapterF/chapterF1.pdf>

MULTICHIP MODULES (MCMs)

(From JEDEC Board ballot JCB-21-67, formulated under the cognizance of the JC-14.3 Subcommittee on hybrid, RF/Microwave, and MCM Technology.)

1 Scope

This specification establishes the general requirements for Multi-Chip Modules (MCM); hereafter referred to as devices (see Terms and Definitions section). An MCM may consist of two or more microcircuits and/or active and passive components packaged in any configuration and dimension; and may comprise the functionality of an entire system, sub□system, or specific function.

Similarly, the physical package can range from a simple IC package with two die to a complex module that incorporates two or more Integrated circuits with active and/or passive components on a silicon interposer that is attached to an organic substrate. Section 8 describes how to determine if other reliability data is needed in addition the data acquired during single die device standard qualification.

Detailed performance requirements for a specific device are specified in the applicable device acquisition document. In the event of a conflict between this document and the agreed device acquisition document, the agreed device acquisition document will take precedence. For example, for military applications applicable MIL-PRF/MIL-Q documents shall be used, unless otherwise agreed in the acquisition document.

The purpose of this specification is to define requirements for and facilitate manufacturing, Qualification, and procurement of MCMs for a wide range of applications. Prerequisites for successful Reliability Qualification are good practices such as described in sections 4,5,6, etc. As specific MCMs or multi-dimensional designs mature, new qualifications guidelines will become available. This document is intended as a tool, for both device users and producers, which if effectively used, will result in the successful manufacture, qualification and delivery of devices that perform properly in the intended application.

2 General requirements

The general requirements for the design and manufacturing of MCMs are provided in the following paragraphs. Devices delivered in accordance with this specification shall meet both the following general requirements and requirements specified by the device acquisition document, except for those requirements specifically identified as deviations by either the device acquisition document or contract.