

Customer Service Note

Micron Known Good Die Definitions

Introduction

Micron performs standard wafer-level known good die testing (KGD-C1) on all DRAM products to determine the functionality of parts to be used in bare die applications. Only those products that meet the stringent quality controls of Micron's wafer-level testing are eligible for KGD applications. For a part to qualify, its parametric data must fall within the predefined criteria for that part to continue as a KGD product. Deviations are prohibited.

Micron also offers enhanced testing (KGD-C2) of certain parts to verify full functionality at the AC and DC specifications published in Micron's data sheets. KGD-C1 addresses reliability, while KGD-C2 addresses quality. Together, the tests enable Micron to produce KGD devices that meet most application requirements. For additional information about Micron's KGD program, refer to TN-00-14, "[Understanding the Quality and Reliability Requirements for Bare Die Applications.](#)"

KGD-C1 Stress Testing

KGD-C1 testing includes subjecting wafer-level parts to highly accelerated DC voltage stress. Performed at high temperatures, typically, 90°C, the DC voltage stress test can detect most memory array defects by applying static bias to the main terminals of the array, the row lines, the digit lines, and the cell plate.

While this test is not the same as wafer-level burn-in, it does help reduce the number of defects that can render a part unusable before it leaves the factory. More importantly, when combined with additional screening, it can be used to identify known good die.

KGD-C2 Stress Testing

Parts that meet all the requirements of KGD-C1 testing undergo additional testing at the C2 level. Micron performs a hot die sort (HDSRT) at the upper temperature limit (90°C) to ensure devices conform to the full AC and DC parameters of their respective data sheets. Depending on the product, cold die sort (CDSRT) testing may be done to screen parts for full conformity to specifications at the lower temperature limit as defined in the device data sheet.

KGD-C2 Target Parameters

Micron monitors testing parameters on an ongoing basis through burn-in testing of packaged parts.

- Quality (measured in defective parts per million [DPM])
 - 500 DPM = 99.95% yield at time 0 for all AC and DC parameters across the entire voltage and temperature ranges
- Reliability (measured in failures in time [FITs])
 - EFR = <500 DPM in the first month of operation
 - Latent = <200 FITs

KGD Wafer Flows

- KGD-C1
 - Hot testing and repair of the memory array utilizing design for test (DFT) techniques, highly accelerated stress testing is also performed at this step
- Lot disposition
 - Used to confirm parts meet KGD requirements
- KGD-C2 Hot
 - Native mode testing of the part to confirm all AC and DC parameters meet data sheet specifications at the upper temperature limit
- KGD-C2 Cold
 - Native mode testing of the part to confirm all AC and DC parameters meet data sheet specifications at the lower temperature limit



8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-3900
prodmtg@micron.com www.micron.com Customer Comment Line: 800-932-4992

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Revision History

Rev. B	7/08
	<ul style="list-style-type: none">Deleted “-150°C” typical testing temperature from “KGD-C1 Stress Testing” on page 1Deleted “ambient die sort (ADSRT) or” from “KGD-C2 Stress Testing” on page 1Deleted “(or ambient) ” from “KGD Wafer Flows” on page 2
Rev. A	7/04
	<ul style="list-style-type: none">Initial release