



An Industry Standard Benchmark Consortium

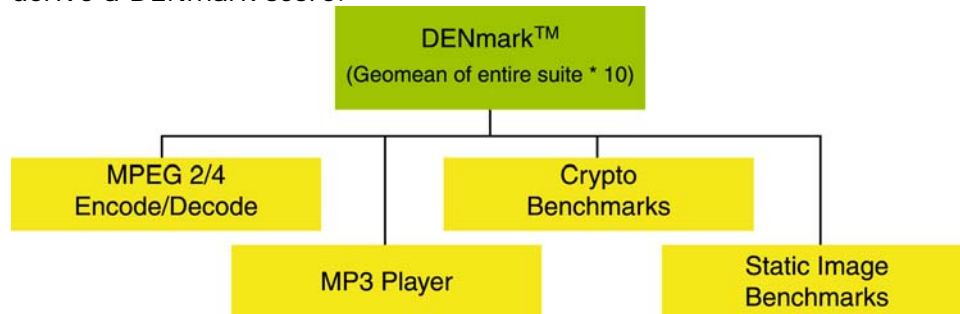
## DENBench™ Version 1.0

## Calculating the DENmark™ and other DENBench™ Consolidated Scores

The DENmark,™ MPEG Decodemark™, MPEG Encodemark™, Cryptomark™, and Imagemark™ are single-number scores that EEMBC provides, in addition to scores based on individual benchmark applications within its DENBench suite, to enhance the presentation of comparative data on processor performance. These numbers are intended to provide a first-order representation of processor performance in tasks related to digital entertainment applications. The detailed scores on individual benchmarks and datasets will continue to offer the highest value to system designers, allowing comparison of the individual applications that are specific to their designs.

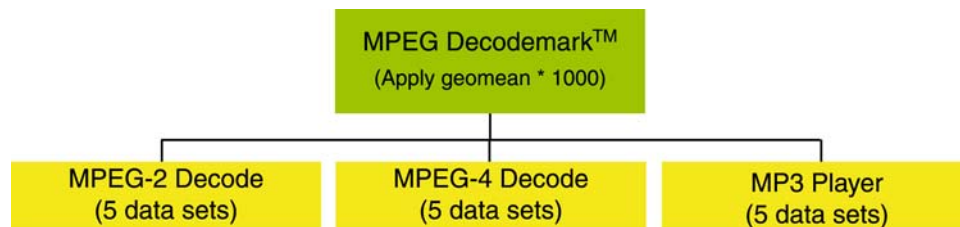
### DENmark™

An overall "DENmark" score provides a single-number performance rating for the DENBench suite. A member must run all tests in this suite, except for the MPEG-2 Encode (Floating-Point) benchmark with its five datasets, in order to derive a DENmark score.



### MPEG Decodemark™

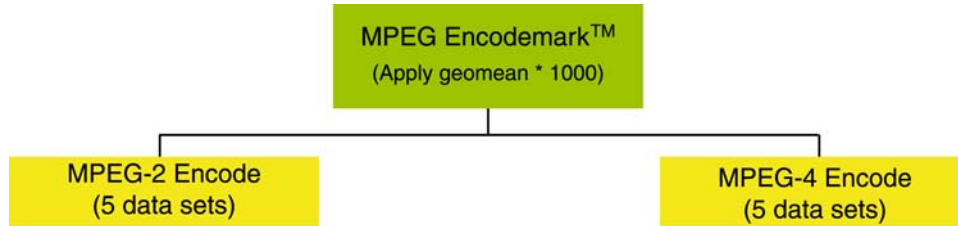
The MPEG Decodemark consolidated scores provide a snapshot of performance in specific test groups:



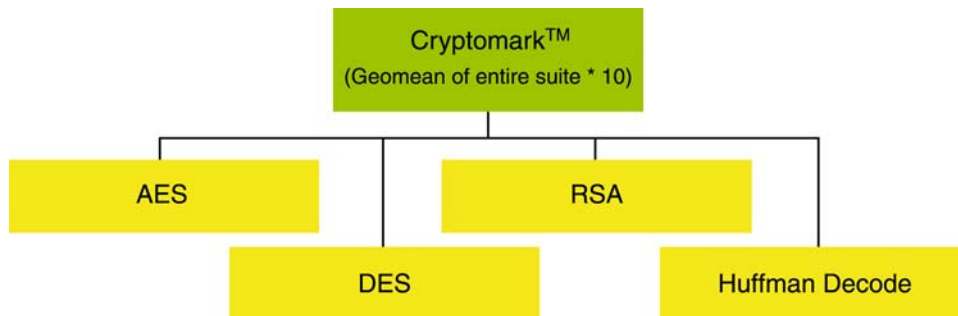


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**MPEG Encodemark™** The MPEG Encodemark consolidated scores provide a snapshot of performance in specific test groups:



**Cryptomark™** The Cryptomark consolidated scores provide a snapshot of performance in specific test groups:



Members are not required to publish all scores in the DENBench suite. In other words, they can choose to run only the benchmark applications that make sense for their processors.

The method used in calculating each of the “mark” scores is shown in the following table. The geometric mean of each ‘mark’ is multiplied by a normalizing factor intended to keep most of the ‘marks’ within the same order of magnitude.

Consolidated score name	Apply geometric mean to:	The <i>n</i> th root used to calculate geometric mean	Multiply geometric mean result by this normalizing factor:
MPEG Decodemark	the 5 scores from each of MPEG-2 Decode benchmark, MPEG-4 Decode benchmark, MP3 player benchmark	15	1000
MPEG Encodemark	the 5 scores from each of MPEG-2 Encode benchmark and MPEG-4 Encode benchmark	10	1000



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Consolidated score name	Apply geometric mean to:	The <i>n</i> th root used to calculate geometric mean	Multiply geometric mean result by this normalizing factor:
Cryptomark	each of the scores from AES, DES, RSA, and Huffman Decode benchmarks	4	10
Imagemark	the 7 scores from each of RGB/YIQ, RGB/HPG, RGB/CMYK, JPEG Compression, and JPEG Decompression	35	10
DENmark	each of the 64 individual scores/datasets from the DENBench suite	64	10

*The DENBench suite also includes an MPEG-2 Encode (Floating-Point) benchmark with five datasets. The consolidated score is calculated by taking the geometric mean of the five scores generated and multiplying the result by 100. The result does not contribute to the overall DENmark score and no distinct "mark" score is calculated.*

**Note on the use of geometric mean versus arithmetic mean**

The geometric mean is used in calculating the consolidated, single-number scores to assure equal weighting for all benchmarks in each category. An arithmetic mean of raw data is not statistically valid because of the extremely wide variation of the results. Individual results that yield a very small number of iterations would have virtually no effect on an arithmetic mean when combined with raw results that yield a very high number of iterations. In effect, an arithmetic mean of results would impose an arbitrary weighting system that heavily favors the tests with the most iterations per second.

Cryptomark, DENBench, DENmark, Imagemark, MPEG Decodemark and MPEG Encodemark are trademarks and EEMBC is a registered trademark of the Embedded Microprocessor Benchmark Consortium.