



Datecode Selectivity & Shelf Life of Hermetic Packages

Texas Instruments hermetic packaged devices are fabricated in accordance with MIL-PRF-38535 and TI's own world class quality and reliability standards. The only age requirement for QML products is stated in MIL-PRF-38535 paragraph 3.10: Solderability. All parts shall be capable of passing the solderability test in accordance with TM 2003 of MIL-STD-883 on delivery. These products are warranted to do so in accordance with the Texas Instruments Incorporated Standard Terms and Conditions of Sale for Semiconductor Products.

There are no intrinsic failure mechanisms that will degrade a non-powered hermetic device stored under normal conditions. Per MIL-PRF-38535 there are no datecode restrictions for hermetic devices.

In 2002, a National Electronic Distributors Association (NEDA) task force, comprised of distributors and their suppliers, was formed to develop an industry position paper concerning datecode selectivity and commercial semiconductors. The following companies participated, or were consulted, in this position paper and endorse the views expressed.

- *Advanced Micro Devices*
- *Analog Devices*
- *Anthem Electronics*
- *Avnet EMG*
- *Fujitsu Microelectronics*
- *Hewlett Packard*
- *Linear Technology*
- *Motorola SPS*
- *Philips Semiconductor*
- *Wyle Laboratories/EMG*
- *Arrow Electronics, Inc*
- *Bell Industries, Inc.*
- *Harris Semiconductor*
- *Lattice Semiconductor*
- *Marshall Industries*
- *National Semiconductor*
- *Pioneer-Standard Electronics*
- *TelCom Semiconductor, Inc.*
- *Texas Instruments*

Because of the advances made in the industry in terms of engineering, design, manufacturing technology, handling, and storage, there are no wear-out mechanisms that can possibly justify a datecode restriction. Product does not wear out, deteriorate, or age on the shelf to an extent that could adversely affect performance.

Originally MIL-PRF-38535 required performing a lot acceptance on product after three (3) years. This was changed over fifteen years ago to only require that the product will pass specification at the time of shipment. TI maintains a very strict first-in/first-out inventory control system.

Of primary concern to customers is solderability. Solderability may be affected by several variables. The first and most obvious is the condition of the lead material. All TI packages and lead-frames are sourced from certified dock-to-stock vendors utilizing statistical process control of critical in-process parameters and in-house lot acceptance. For TI devices offered with a gold lead finish, these controls assure the gold meets minimum thickness and uniformity requirements thereby ensuring adequate solderability in the end application. For TI devices offered with a solder lead finish, TI utilizes a hot solder dip process with the final solder dip occurring after all thermal sequences, such as burn-in and test, are complete. This ensures the solder finish is not degraded by in-process exposure to high temperatures or chemicals.

As part of MIL-STD-883 Quality Conformance Inspection (QCI), TI performs a solderability test as part of Group B acceptance once during each week of seal on a representative sample from each package family. This test is performed utilizing the dip and look method as specified in MIL-STD-883 Method 2003. Results of this acceptance testing are provided on the Processing

Conformance Report attached to the Certificate of Compliance shipped with each lot. TI records do not list a failure for this test in the last several years.

Apart from QCI, TI conducted a separate process monitor study of solderability. Over a two year period 46,000 units were subjected to solderability testing and 2,000 solder were tested for actual solder thickness. No failures occurred. Anecdotal evidence indicates that, depending on the type of lead finish and package type, devices will pass a solderability test, (without steam age which is used to simulate storage), ten, fifteen, or more years after manufacture.

Please note that device termination-finishes comply with MIL-PRF-38535 A.3.5.6.3 Microcircuit Finishes: "Finishes of all external leads or terminals and all external package elements shall conform to either A.3.5.6.3.2 or A.3.5.6.3.3 as applicable. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. The tin content of solder shall not exceed 97 percent. Tin shall be alloyed with a minimum of 3 percent lead by weight

Texas Instruments is very proud of our proven track record in supplying semiconductor devices of the highest quality and reliability to our customers. As a DSCC QML listed supplier, our commitment to delivering a quality product extends beyond just satisfying the minimum specification requirements.

In summary, there is little or no need for an OEM to specify datecode when ordering ICs from a distributor or direct from a manufacturer. Datecode restrictions serve only to delay deliveries and increase price. The semiconductor distribution and manufacturing community recommends that datecode age restrictions be eliminated from the ordering process.

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