



Post Office Box 84
 Sherman, Texas 75090
 6412 Highway 75 South
 Sherman, Texas 75090

(903) 868-7111

Texas Instruments Enhanced Products Reliability Report

(Subject To Attached Disclaimers)

Device Type/Device Family: REF3225AMDBVREP
 Package Type: SOT-23
 Wafer Fabrication Facility: TSMC
 Assembly/Test Facility: Carsem
 Compiled: 06/12

Biased Life Test

Test Method: JESD22-A108
 Test Condition: 150°/500 hours or Equiv.
 Sample Size: 2191
 Rejects: 0
 Activation Energy (eV): .5
 Equivalent Device Hours: 13.7E+6
 Failure Rate (FIT)*: 67.2

*Derated to +55°C with a 60% Confidence Level

Note: Data for EP product is specific to device technology and foundry. For this reason the FIT rate above may differ from Ti's external web page. This does not reflect a difference in quality but only a difference in sample size.

Package Related Tests

| <u>Description</u> | <u>Condition</u> | <u>Referenced Method</u> | <u>Sample Size/Rejects</u> | |
|-------------------------|--|----------------------------|----------------------------|---|
| Biased Humidity or HAST | 130°C / 85% / 250 hours | JESD22-A101 JESD22-A110 | 121/0 | * |
| Autoclave | 121 °C @ 2 atmospheres absolute for 96 hours | JESD22-A102 | 462/0 | * |
| Temperature Cycle | -65 °C to +150 °C non-biased for 1000 cycles | JESD22-A104 | 462/0 | * |
| High Temp Storage | 170 °C / 420 hours | JESD22-A103-A | 231/0 | * |

* Preconditioning per JEDEC Std. 22, Method A112/A113

Initial Product Qualification

The subject Enhanced Plastic device, device family, and/or package family have passed Texas Instruments product qualification as follows:

| <u>Description</u> | <u>Condition</u> | <u>Sample Size</u> | <u>Referenced Method</u> | |
|-------------------------------------|---|--------------------|------------------------------------|---|
| Electrical Characterization | TI Data Sheet | 50 units/lot | N/A | |
| Electrostatic Discharge Sensitivity | HBM MM | 3 units/voltage | EIA/JESD22-A114 EIA/JESD22-A115 | |
| Latch-up | Per Technology | 5/0 units/lot | EIA/JESD78 | |
| Physical Dimensions | TI Data Sheet | 5/0 | EIA/JESD22- B100 | |
| Thermal Impedance | Theta-JA on board | Per Pin-Package | EIA/JESD51 | |
| Bias Life Test | 125°C / 1000 hours or equivalent | 116/0 | JESD22-A108 | * |
| Biased Humidity | 85°C / 85% / 1000 hours or HAST | 77/0 | JESD22-A101 | * |
| | 130°C / 85% / 96 hours | | JESD22-A110 | |
| Autoclave | 121 °C @ 2 atmospheres absolute for 96 hours | 77/0 | JESD22-A102 | * |
| Temperature Cycle | -65 °C to +150 °C non-biased for 1,000 cycles | 77/0 | JESD22-A104 | * |
| Solder Heat | 260 °C for 10 seconds | 22/0 | JESD22-B106 | |
| Resistance to Solvents | Ink symbol only | 12/0 | JESD22-B107 | |
| Solderability | Condition A (steam age for 8 hours) | 22/0 | ANSI/J-STD-002-92 | |
| Flammability | Method A / Method B | 5/0 | UL-1964 | |
| Bond Strength | - | 76/0 wires | ASTM F-459 | |
| Die Shear | - | 5/0 | MIL-STD-883 Method 2019 | |
| High Temp Storage | 150 °C / 1,000 hours | 45/0 | JESD22-A103-A | * |
| Moisture Sensitivity | Surface Mount Only | 12/0 | J-STD-020-A | |

* Precondition performed

Supplemental Device Characteristics

Device Type: REF3225AMDBVREP

| | | | |
|-----------------|--|-------------------|-----------------------|
| Die Revision: | D | Assembly Site: | Carsem |
| Master Die: | 6ICC03300LWDS | Package Type: | DBV |
| Wafer Fab: | TSMC | Pin Count: | 6 |
| Fab Technology: | CMOS | Mold Compound: | Hitachi CEL9220 |
| Fab Process: | .6-DPDM | Mount Compound: | Ablestik 8290(GRN) |
| Process Code: | N/A | Bond: | 1.0 Au |
| Passivation: | Nitride | Lead Composition: | Cu |
| Metal 1: | Ti(0.4kA)/TiN(1kA)/AlCu(4kA)/ TiN(0.25kA) | Lead Finish: | NiPdAu |
| Metal 2: | TiN(1.5kA)/AlCu(8kA)/TiN(0.25kA) | Die Size: | 58x32 Mils |

Quality and Reliability Data Disclaimer

The attached quality and reliability information is specific to the TI Enhanced Plastic product family of plastic encapsulated commercial-off-the-shelf (COTS) semiconductor products and components. Due to possible differences in product assembly and test baselines, this information is NOT APPLICABLE to TI standard, industrial, or automotive catalog commercial products.

Plastic encapsulated TI semiconductor devices are not designed and are not warranted to be suitable for use in some military applications and/or military environments. Use of plastic encapsulated TI semiconductor devices in military applications and/or military environments, in lieu of hermetically sealed ceramic devices, is understood to be fully at the risk of Buyer.

Quality and reliability data provided by Texas Instruments is intended to be an estimate of product performance based upon history only. It does not imply that any performance levels reflected in such data can be met if the product is operated outside the conditions expressly stated in the latest published data sheet for a device.

Existing industry standards for plastic encapsulated microcircuit qualification and reliability monitors are based upon historical data, experiments, and field experience with the use of these devices in commercial and industrial applications. The applicability of these standards in determining the suitability for use and safety performance in military and aerospace applications has not been established. Due to the multiple variations in field operating conditions, a component manufacturer can only base estimates of product life on models and the results of package and die level qualification.

The buyer's use of this data, and all consequences of such use, is solely the buyer's responsibility. Buyer assumes full responsibility to perform sufficient engineering and additional qualification testing in order to properly evaluate the buyer's application and determine whether a candidate device is suitable for use in that application. The information provided by TI shall not be considered sufficient grounds on which to base any such determination.

THIS INFORMATION IS PROVIDED "AS IS" WITHOUT ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND INCLUDING WARRANTIES OF MERCHANTABILITY, NONINFRINGEMENT OF INTELLECTUAL PROPERTY, OR FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT SHALL TI OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, LOSS OF INFORMATION) ARISING OUT OF THE USE OF OR INABILITY TO USE THE INFORMATION, EVEN IF TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THIS INFORMATION SHOULD NOT BE USED TO ASSIST IN THE PRACTICE OF "UPRATING" OR "UPSCREENING" DEVICES FOR USE BEYOND THEIR RATED LIMITS.

TI may provide technical, applications or design advice, quality characterization, and reliability data or service providing these items shall not expand or otherwise affect TI's warranties as set forth in the Texas Instruments Incorporated Standard Terms and Conditions of Sale for Semiconductor Products and no obligation or liability shall arise from TI's provision of such items.

Quality and Reliability Data copyright © 2002, Texas Instruments Incorporated, all rights reserved.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46C and to discontinue any product or service per JESD48B. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

Products

| | |
|------------------------|--|
| Audio | www.ti.com/audio |
| Amplifiers | amplifier.ti.com |
| Data Converters | dataconverter.ti.com |
| DLP® Products | www.dlp.com |
| DSP | dsp.ti.com |
| Clocks and Timers | www.ti.com/clocks |
| Interface | interface.ti.com |
| Logic | logic.ti.com |
| Power Mgmt | power.ti.com |
| Microcontrollers | microcontroller.ti.com |
| RFID | www.ti-rfid.com |
| OMAP Mobile Processors | www.ti.com/omap |
| Wireless Connectivity | www.ti.com/wirelessconnectivity |

Applications

| | |
|-------------------------------|--|
| Automotive and Transportation | www.ti.com/automotive |
| Communications and Telecom | www.ti.com/communications |
| Computers and Peripherals | www.ti.com/computers |
| Consumer Electronics | www.ti.com/consumer-apps |
| Energy and Lighting | www.ti.com/energy |
| Industrial | www.ti.com/industrial |
| Medical | www.ti.com/medical |
| Security | www.ti.com/security |
| Space, Avionics and Defense | www.ti.com/space-avionics-defense |
| Video and Imaging | www.ti.com/video |

TI E2E Community e2e.ti.com