

# TLVH431-EP Production Flow and Reliability Report

## ABSTRACT

This report presents the reliability and qualification results for the TLVH431B-EP Enhanced Plastic 0.5% low-voltage, wide-operating, current adjustable precision shunt regulator. The TLVH431B-EP is manufactured with a controlled baseline and has the following:

- Product traceability
- Extended product-change notification

## Contents

1	Texas Instruments Enhanced Product Qualification and Reliability Report .....	1
2	Qualification by Similarity (Qualification Family) .....	1
3	Technology Family FIT / MTBF Data .....	3
4	Device Family Qualification Data .....	3
5	Ongoing Reliability Monitoring .....	3

## Trademarks

All trademarks are the property of their respective owners.

## 1 Texas Instruments Enhanced Product Qualification and Reliability Report

TI qualification testing is a risk mitigation process that is engineered to assure device longevity in customer applications. Wafer fabrication processes and package level reliability are evaluated in a variety of ways that may include accelerated environmental test conditions with subsequent derating to actual use conditions. Manufacturability of the device is evaluated to verify a robust assembly flow and assure continuity of supply to customers. TI Enhanced Products are qualified with industry standard test methodologies performed to the intent of Joint Electron Devices Engineering Council (JEDEC) standards and procedures. Texas Instruments Enhanced Products are certified to meet GEIA-STD-0002-1 Aerospace Qualified Electronic Components.

## 2 Qualification by Similarity (Qualification Family)

A new device can be qualified either by performing full scale quality and reliability tests on the actual device or using previously qualified device(s) through "Qualification by Similarity" (QBS) rules. By establishing similarity between the new device and those qualified previously, repetitive tests will be eliminated, allowing for timely production release. When adopting QBS methodology, the emphasis is on qualifying the differences between a previously qualified product and the new product under consideration. The QBS rules for a technology, product, test parameters or package shall define which attributes are required to remain fixed in order for the QBS rules to apply. The attributes which are expected and allowed to vary will be reviewed and a QBS plan shall be developed, based on the reliability impact assessment above, specifying what subset of the full complement of environmental stresses is required to evaluate the reliability impact of those variations. Each new device shall be reviewed for conformance to the QBS rule sets applicable to that device. See JEDEC JESD47 for more information.

DEVICE BASELINE <sup>(1)</sup>				
TI Device	TLVH431BMDBZREP		Assembly Site	Subcon HANA
DLA VID	V62/19622		Test Site	Subcon HANA

<sup>(1)</sup> Baseline information in effect as of the date of this report

DEVICE BASELINE <sup>(1)</sup>				
Wafer Fab	SFAB		Pin/Package Type	SOT-23 (DBZ)   3
Fab Process	J12		Leadframe	Cu
Fab Technology	J1		Termination Finish	NiPdAu
Die Revision	- ("- denotes initial release)		Mount Compound	HENKEL ABLEBOND 2200D
Die Name	STLVBC431PS		Bond Wire	25.4 μm Au
ESD CDM	±1000 V		Mold Compound	Sumitomo EME-G600
ESD HBM	±2000 V		Moisture Sensitivity	MSL 2 / 260°C

ENHANCED PRODUCTS NEW DEVICE QUALIFICATION MATRIX				
Note that qualification by similarity ("qualification family") per JEDEC JESD47 is allowed				
DESCRIPTION	CONDITION	SAMPLE SIZE USED/REJECTS	LOTS REQUIRED	TEST METHOD
Electromigration	Maximum Recommended Operating Conditions	N/A	N/A	Per TI Design Rules
Wire Bond Life	Maximum Recommended Operating Conditions	N/A	N/A	Per TI Design Rules
Electrical Characterization	TI Data Sheet	15	3	N/A
Electrostatic Discharge Sensitivity	HBM	3 units/voltage	N/A	EIA/JESD22-A114
	CDM			EIA/JESD22-C101
Latch-up	Per Technology	5/0	3	EIA/JESD78
Physical Dimensions	TI Data Sheet	5/0	1	EIA/JESD22- B100
Thermal Impedance	Theta-JA on board	Per Pin-Package	N/A	EIA/JESD51
Bias Life Test	125°C / 1000 hours or equivalent	45/0	3	JESD22-A108*
Biased Humidity	85°C / 85% / 1000 hours	77/0	3	JESD22-A101*
	or			or
Biased HAST	130°C / 85% / 96 hours			JESD22-A110*
Extended Biased Humidity	85°C / 85% / 2600 hours (for reference)	77/0	1	JESD22-A101*
	or			or
Extended Biased HAST	130°C / 85% / 250 hours (for reference)			JESD22-A110*
Unbiased HAST	130°C / 85% / 96 hours	77/0	3	JESD22-A.118*
Temperature Cycle	-65°C to +150°C non-biased for 500 cycles	77/0	3	JESD22-A104*
Solder Heat	260°C for 10 seconds	22/0	1	JESD22-B106
Resistance to Solvents	Ink symbol only	12/0	1	JESD22-B107
Solderability	Condition A (steam age for 8 hours)	22/0	1	ANSI/J-STD-002-92
Flammability	Method A / Method B	5/0	1	UL-1964
Bond Shear	Per wire size	5 units x 30/0 bonds	3	JESD22-B116
Bond Pull Strength	Per wire size	5 units x 30/0 bonds	3	ASTM F-459
Die Shear	Per die size	5/0	3	TM 2019
High Temp Storage	150°C / 1,000 hours	15/0	3	JESD22-A103-A*
Moisture Sensitivity	Surface Mount Only	12	1	J-STD-020-A*
*Precondition performed per JEDEC Std. 22, Method A112/A113				

### 3 Technology Family FIT / MTBF Data

Mean Time Between Fails (MTBF) and Failures in Time (FIT) rates are device reliability statistics calculated based on data collected from TI's internal reliability testing (life test).

TI's DPPM/FIT/MTBF Estimator Search Tool reports the generic data based on technology groupings and shows conditions under which the rates were derived. All terms used in the tool and definitions can be found on the TI reliability terminology page. Failure rates are summarized by technology and mapped to the associated material part numbers. The failure rates are highly dependent on the number of units tested, therefore, it is not recommended to compare failure rates.

TI DPPM/FIT/MTBF Estimator Search Tool webpage link:

[www.ti.com/quality/docs/estimator.tsp](http://www.ti.com/quality/docs/estimator.tsp)

### 4 Device Family Qualification Data

TI's Qualification Summary Search Tool reports generic qualification data representative of the material sets, processes, and manufacturing sites used by the device family and may not include all of the testing performed for a specific EP device. See the Enhanced Products New Device Qualification Matrix above for the full suite of qualification testing performed to release Enhanced Product devices.

TI Qualification Summary Search webpage link:

<https://www.ti.com/qualificationsummary/qualsumm/home>

### 5 Ongoing Reliability Monitoring

TI periodically monitors the reliability of its products, wafer fab processes, and package technologies through its Ongoing Reliability Monitor (ORM) program. The ORM program involves collecting environmental reliability stress data on representative sets of devices, processes, and packages. The results from the ORM program are updated quarterly in this report.

TI Ongoing Reliability Monitoring Search webpage link:

<https://www.ti.com/orm/home?actionId=2801.html>

### 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 © 2011, Texas Instruments Incorporated, all rights reserved.

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale ([www.ti.com/legal/termsofsale.html](http://www.ti.com/legal/termsofsale.html)) or other applicable terms available either on [ti.com](http://ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2019, Texas Instruments Incorporated