OPA2356-EP Reliability Report

ABSTRACT

This report presents the reliability and qualification results for the OPA2356-EP 200-MHz, CMOS operational amplifier. The OPA2356-EP is manufactured with a controlled baseline and has the following:

- Product Traceability
- Extended Product-Change Notification

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Trademarks

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 process 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 a full scale quality and reliability test on the actual device or using previously qualified devices through "Qualification by Similarity" (QBS) rules. By establishing similarity between the new device and those previously qualified, repetitive tests are 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 parameter, or package defines which attributes are required to remain fixed in order for the QBS rules to apply. The attributes that are expected and allowed to vary are reviewed and a QBS plan is 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 is reviewed for the conformance to the QBS rule sets applicable to the device. See the JEDEC JESD47 for more information.

Device Baseline[1]			
TI Device:	OPA2356MDGKTEP	Pin/Package Type:	VSSOP (DGK) | 8
	V62/18609-01XE	Moisture Sensitivity:	LEVEL3-260CG
Wafer Fab:	TSMC		
Fab Technology:	0.60UM-TSMC		
Die Revision:	-		
Die Name:	6ICC03003BHDS		
[1]Baseline information in effect as of the date of this report			

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Enhanced Products 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**
THB or HAST	130°C / 85% / 96 hours	3/231/0	3	JESD22.A101
AC	Autoclave: 121°C / 15 psig for 96 hours	3/231/0	3	JESD22.A102
TC	Temperature Cycle: -65°C to 150°C for 500 cycles	3/231/0	3	JESD22.A104
	Post Temperature Cycle Bond Pull: 3 grams minimum	1/5/0	1	
HTSL	High Temperature Storage Life: 175°C for 500 hours	1/45/0	1	JESD22.A103
HTOL	High Temperature Operating Life: 150°C for 408 hours	3/231/0	3	JESD22.A108
ELFR	Early Life Failure Rate: **125°C / 48 hours** 150°C / 24 hours	3/2400/0	3	AEC-Q100-008
WBS	Wire Bond Shear Test: (Ppk > 1.67 and Cpk > 1.33)	30/0 bonds	1	JESD22-B116
WBP	Wire Bond Pull: Each bonder used (Ppk > 1.67 and Cpk > 1.33 or 0 Fails after TC)	30/0 bonds	1	Mil-Std-883 Method 2011
SD	Solderability: (>95% lead coverage)	1/15/0	1	JESD22.B102
PD	Physical Dimensions: (Ppk > 1.67 and Cpk > 1.33)	3/30/0	3	JESD22.B100, JESD22.B108
EM	Maximum Recommended Operating Conditions	NA	NA	Per TI Design Rules
HBM	Electrostatic Discharge, Human	500V 1/3/0 1000V 1/3/0 1500V 1/3/0 2000V 1/3/0	1	JESD22.A114
CDM	Electrostatic Discharge, Charged Device Model; (750 V corner leads, 500 V for all other pins)	250V 1/3/0 500V 1/3/0 750V 1/3/0 1000V 1/3/0 1500V 1/3/3	1	JESD22.C101
LU	Latch-Up:	1/6/0	1	EIA/JESD78
ED	Electrical Distributions: (Test across recommended operating temperature range) (Cpk >	1/30/0 -55C 1/30/0 25C 1/30/0 125C	1	Per TI Design Rules

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 te 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 web page link: www.ti.com/quality/docs/estimator.tsp

4 Device Family Qualification Data

TI's Qualification Summary Search Tool reports generic 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 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 web page link: 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 environment 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 web page link: www.ti.com/orm/home?actionId=2801.html

For additional information or technical support please contact the Texas Instruments Customer Support Center at www.ti.com/support or send an email to support@ti.com. For more information on TI Enhanced Products, visit www.ti.com/ep.

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