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Tucson Corporation

**High Performance Analog Products**

Analytical Services

**Reliability Report  
For**

**Qualifying TPS62000YEG in a new package**

**09/15/2003**

**Texas Instruments  
High Performance Analog Products**

Approved by:

Mark Yampolsky  
Supervisor/Reliability Engineering

The **TPS62000YEG** is qualified and fully meets the Texas Instruments quality and reliability standards for High Performance Analog Products per the testing described below.

Packaging Information			Manufacturing Information	
Assembly Site:	Unitive/TI-Tucson		Die Name:	BLBD62000C9W
Package Type:	WCSP/YEG		Die Size:	60 x 86 mils
Solder Bump Alloy:	63%/37% Tin/Lead		Mask Revision:	C
Solder Bump Diameter:	300µm		Wafer Fab Site:	Dfab
Bump Pitch:	500µm		Process:	LBC3S (non Cu)
Number of Solder Bumps:	12		Technology:	LinBiCMOS
Wafer Coating Material:	LC2850		Metal 1:	TiW/AlCu (2%)
Redistribution Layer 1:	Electroplated Copper		Metal 2:	0.3µmTiW/ 1.52µm AlSiCu (0.5%)
Flammability Rating	UL94 V-O and IEC Standard 695-2-2		Passivation:	10KA CN
Moisture Sensitivity Level	1	NA	Transistor Count:	1739
Reflow Temperature	240°C	N/A		

### Thermal Information

Absolute Max Junction Temp $T_{J-MAX}$	-40°C to +150°C	
Recommended Junction Temp $T_J$	-40°C to +125°C	
$\theta_{JC}$	21.2°C/W	
$\theta_{JB}$	N/A	
Specification Operating Temperature $T_A$	-40°C to +85°C	
Lead Soldering Temperature 1.6mm from case	N/A	
Storage Temperature $T_{STG}$	-65°C to +150°C	

### Qualification Evaluation & Results:

Qualify TPS62000YEG in Nanostar™ package.

Qualification Material			
HTOL assem/wafer/lot :	0304403/0415602; 0315205/0456001; 0315205/0456002	Latch Up assem/wafer/lot	0301319/3013939, 3013941,3013942
HAST assem/wafer/lot :	0304403/0415602; 0315205/0456001; 0315205/0456002	ESD assem/wafer/lot	0301319/3013939, 3013941,3013942
Autoclave assem/wafer/lot :	0304403/0415602; 0315205/0456001; 0315205/0456002	X-Ray assem/wafer/lot	N/A
Temp Cycle assem/wafer/lot :	0304403/0415602; 0315205/0456001; 0315205/0456002	MSL assem/wafer/lot	0304403/0415602; 0315205/0456001; 0315205/0456002

**Qualification by Similarity (QBS):**

Reliability data on similar packages and wafer fab processes may be used to support generic qualifications as approved by QRE.

**Reliability Test Results:**

Test	Conditions	Lot 1 SS/F	Lot 2 SS/F	Lot 3 SS/F	QBS Reference and Results
Life Test	150°C, 300 Hrs.	116/0	116/0	116/0	
HAST	130°C, 85%RH, 33.5 psia, 96 Hrs.	80/0	80/0	80/0	
Autoclave	121°C, 15 psia, 100%RH, 240 Hrs.	80/0	80/0	80/0	
Temp Cycle	-55°C to 125°C, 500 cycles	80/0	79/0	79/0	
BLR Temp Cycle	-40°C to 125°C, 1500 cycles, 5°C/ min Temp Ramp Rate, 12 min dwell	36/0			
BLR 3 Point Bend Test	Strain Rate 5 mm/min., 85 mm span	8/0			
BLR Key Push Test	100 cycles/min, 1300 $\mu$ <sup>a</sup> displacement = 2.7 mm max	8/0			
BLR Drop Test	50 cm	8/0			
ESD	HBM/500 volts	3/0			
	HBM/1000 volts	3/0			
	HBM/1500 volts	3/0			
	HBM/2000 volts	3/0			
	HBM/3000 volts	3/0			
	HBM/4000 volts	3/0			
	CDM/500 volts	3/0			
	CDM/750 volts	3/0			
	CDM/1000 volts	3/0			
	MM/100 volts	3/0			
	MM/200 volts	3/0			
MM/300 volts	3/0				
Latch Up				6/0	
Elec. Charac. over Temp	PDS	20/0	10/0	10/0	
Physical Dimensions		96/0			
Flammability		15/0			OPA2347YED
Ball Shear		150/0			
Manufacturability		passed			
Hi Temp Storage Life Test	150°C/ 1000 Hrs.	45/0	45/0	45/0	
Hi Temp Storage Life Test	170°C/ 420 Hrs.	45/0	45/0	45/0	
Moisture Sensitivity	Level 1 @ 240°C	12/0	12/0	12/0	

\*Preconditioning bake and humidity soak condition prior to Life test, HAST, Temp Cycle, High Temp Storage Life, and Autoclave: 4 hour bake followed by 24 Hours@ 85°C/85%RH. The shortened bake and humidity soak was based on data from moisture absorption and desorption analysis from this package.

The FIT rate for this device is based upon qualification data from this qualification, process qualification data, and/or ongoing reliability monitoring. Current FIT information is available from the product quality web page.

<b>Reliability Calculations</b>				
<b>MODEL</b>	<b>TPS62000YEG</b>		<b>ACTIVATION ENERGY (eV)</b>	
<b>OVEN TEMP C°</b>	<b>150</b>		<b>0.7</b>	
<b>TEST DEVICES</b>	<b>348</b>		<b>(90% Confidence level)</b>	
<b>PROCESS</b>	<b>LBC3S</b>			
	<b>READ POINTS (HOURS)</b>	<b>TOTAL FAILURES</b>	<b>PASS</b>	<b>DEVICE HOURS</b>
	300	0	348	104400
	Total Failures	0		104400
<b>TEMP.</b>		<b>FAILRATE (FITS)</b>	<b>MTTF (HOURS)</b>	<b>MTTF (YEARS)</b>
25		7.00E+00	1.43E+08	16310.3
30		1.10E+01	9.11E+07	10401.6
35		1.70E+01	5.90E+07	6731.1
40		2.58E+01	3.87E+07	4416.8
45		3.89E+01	2.57E+07	2936.8
50		5.77E+01	1.73E+07	1977.6
<b>55</b>		<b>8.47E+01</b>	<b>1.18E+07</b>	<b>1347.8</b>
60		1.23E+02	8.14E+06	929.3
65		1.76E+02	5.67E+06	647.8
70		2.50E+02	4.00E+06	456.3
75		3.52E+02	2.84E+06	324.7
80		4.89E+02	2.04E+06	233.3
<b>85</b>		<b>6.75E+02</b>	<b>1.48E+06</b>	<b>169.2</b>
90		9.22E+02	1.08E+06	123.8
95		1.25E+03	8.00E+05	91.3
100		1.68E+03	5.95E+05	67.9
105		2.24E+03	4.46E+05	50.9
110		2.97E+03	3.37E+05	38.5
115		3.90E+03	2.56E+05	29.3
120		5.09E+03	1.96E+05	22.4
125		6.60E+03	1.51E+05	17.3

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