



# **SEMTECH**

GENNUM PRODUCTS

## **GS3440/GS3441**

## **Reliability Qualification Report**

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# Revision History

Version	ECO	Date	Modifications / Changes
0	ECO-009983	Nov 2012	New document

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# 1 Device Specifics

## 1.1 Manufacturing Summary

Table 1.: Manufacturing Summary

<b>Gennum Device Codes</b>	GS3440	GS3441
<b>Silicon Fab Technology</b>	Jazz SiGe120 SBC18HAZ	
<b>Package Assembly</b>	ASE-M	
<b>Package Type</b>	16 QFN, 4x4 mm, 0.65 mm pitch	24 QFN, 4x4 mm, 0.5 mm pitch

## 1.2 Product Information

The GS3440 and GS3441 are high-speed BiCMOS integrated circuits designed to equalize and restore signals received over 75Ω coaxial cable. These devices are designed to support SMPTE 424M, SMPTE292M and SMPTE 259M, and is optimized for performance at 270Mb/s, 1.485Gb/s and 2.97Gb/s.

The GS3441 has dual high-speed outputs in a 24 QFN package. The GS3440 has a single high-speed output in a 16 QFN package.

The GS3441 and GS3440 are Pb-free, and the encapsulation compound does not contain halogenated flame retardant. This component and all homogeneous subcomponents are RoHS compliant.

The devices shall be fully functional and shall meet all operational specifications over the ambient temperature range -40°C to +85°C.

## 1.3 Process Qualification

The die is manufactured by Jazz using their SiGe120 SBC18HA process. The Jazz process qualification report has been accepted and is stored in GenDoc ID# 48070. The GS3441 and GS3440 are packaged at ASE-M in 24 pin and 16 pin QFN packages respectively. The internal qualification of GN2033 copper wire ASE-M packaged test vehicle, was selected as a strategic opportunity to qualify the copper wire technology. The internal ASE-M copper wire qualification report is in Gendoc ID#56784.

## 1.4 Product Qualification Approach

The GS3441 and GS3440 share the same die in different package configurations. The features available on the GS3441 are a superset of those available on the GS3440, thus HTOL for the GS3440 is bridged to the GS3441.

The GN2033 test vehicle (with copper wires) contain a die from the same fab process in a larger 5x5 mm 32 QFN package than the GS3440 and GS3441, a number of package stresses have been bridged to the GN2033 (copper wire) qualification. Highly Accelerated Stress Test is bridged to the GN2036, which uses a die from the same fab process as the GS3440 and GS3441 in a larger 5x6 mm 44 QFN package using copper wires. The results obtained with the GN2033 copper wires test vehicle and GN2036 are considered representative for the GS3440 and GS3441 ASE-M QFN.

MSL and Temperature cycling is planned on the GS3441 because it has a larger die size and represents the worse case die –to –paddle ratio.

Details of the tests to be performed and bridged qualification tests are presented on the next page.

## 2 Reliability Qualification Stresses

### 2.1 Environmental Tests

Table 2.: Environmental Tests

Stress	Conditions	Duration	Qualification Vehicle	Sample Size	Failures
High Temperature Operating Life	JESD22-A108	1000 hours	GS3441	80	0
	$T_j \geq 125^\circ\text{C}$ , $V_{cc} \geq V_{ccmax}$				
Temperature Cycling	JESD22-A104	1000 cycles	GS3441	25	0
	MSL Preconditioning, -55°C to +125°C (Condition B)				
Highly Accelerated Stress Test (HAST)	JESD22-A110	1000 hours	Bridge to GN2036	77 each from 3 lots	0
	MSL Preconditioning, 130°C, 85% R.H., $V_{ccmax}$				
High Temperature Storage	JEDSE22-A103	1000 hours	Bridge to GN2033 (Cu wire test vehicle)	80 each from 3 lots	0
Unbiased HAST	JESD22-A118	96 hours	Bridge to GN2033 (Cu wire test vehicle)	80 each from 3 lots	0
	MSL Preconditioning, 130°C/85% RH				
Moisture Sensitivity Level	J-STD-020		GS3441	50	0
	MSL1, Tmax=260°C		Bridge to GN2033 (Cu wire test vehicle)	160 each from 3 lots	0

## 2.2 Electrostatic Discharge and Latch Up Tests

**Table 3.:** Electrostatic Discharge and Latch Up Tests

Stress	Conditions	Qualification Vehicle	Stress Levels	Sample Size/ Level	Results
Human Body Model ESD		GS3441	4KV, 5KV	3	Pass 5KV
JEDEC22-A114					
Machine Model ESD		GS3441	100V, 200 V	3	Pass 200V
JESD22-A115					
Charged Device Model ESD	JESD22-C101	GS3440	1KV, 1.5KV, 2KV	3	Pass 2KV
		GS3441	1KV, 1.5KV, 2KV	3	Pass 2KV
Latch Up		GS3441	25°C	6	Pass
JESD78			85°C	6	Pass
V <sub>cc</sub> =3.5 V, 5.25 V; +/- 100 mA					
Level II, Class A					

### 3 Conclusion

Process qualification reports demonstrate that the processes are in volume production and are fully qualified by the suppliers and Semtech Corporation – Genum Products Group.

Semtech Corporation considers these processes and libraries acceptable for use for the design and manufacture of Semtech products.

The product GS3440 and GS3441 passed reliability tests, no performance degradation was observed during the evaluation. This device meets Semtech's Reliability Standards and it is considered fit for Customer use.