

TQ8223 Device Qualification

Abstract

This report summarizes the reliability testing that has been performed to qualify the TQ8223 product. The SC5068 is a Superset of the TQ8223 and was previously qualified. The TQ8213, which is also packaged in a 208 BGA, was used as an additional lot for dimensional qualification.

TQ8223 and SC5068

Both of these parts are fabricated on TriQuint's 0.6 μ m E/D MESFET GaAs process and are packaged in a 208 BGA package. Tests, test sample size and failure criteria were defined from TriQuint's Specification REL.021 (Policy and Procedure for Reliability Qualifications of ICs). Tests outlined in this procedure follow the JEDEC Standard Number 26-A or MIL-STD-883 when applicable.

For further information please contact:

TriQuint Semiconductor

2300 N.E. Brookwood Parkway
Hillsboro, OR 97124
Phone: (503) 615-9000
FAX: (503) 615-8900



Process Description

TriQuint's QEDA2 process is a Gallium Arsenide (GaAs) semiconductor process fabricated at TriQuint's Hillsboro, Oregon facility

Product Description

The TQ8223 is a TriQuint standard product, which is similar to the SC5068. Both parts are identical except for added circuitry in the SC5068 containing key customer intellectual property. The SC5068 was chosen to qualify both parts since it is a superset of the TQ8223.

The TQ8223 and SC5068 are multi-configuration SONET/SDH OC48/STM16 CDR/DEMUX that regenerate and re-time serial 2.48832 Gb/s data. They recover the 2.48832 GHz clock from the data stream and frequency divide it to generate control signals and clocks used to perform the demultiplexing function.

The TQ8223 and SC5068 operate in one of three different time-division demultiplexing modes, making it extremely flexible for telecom, ATM and networking applications. The serial 2.48832 Gb/s data stream can be demultiplexed into either an 8-bit wide 311.04 MHz TTL data bus, a 16-bit wide 155.52 MHz TTL data bus, or a 32-bit wide 77.76 MHz TTL data bus. Internal data inversion is also available. The device generates byte-wise parity check bits for the demultiplexed data and provides associated clock outputs for the different modes. Parity checking is not required for normal device operation.

The TQ8223 and SC5068 provide added flexibility through a selectable internal/external Voltage Controlled Oscillator (VCO) as well as a selectable internal Phase Locked Loop (PLL). If an external high frequency clock is utilized, a single-ended or differential AC coupled clock may be used. The internal PLL contains a NRZ phase detector which enables it to adjust the phase of the internal clock such that sampling of the incoming data stream occurs in the middle of the data eye. An offset control allows adjustment of 128pS around this nominal position.

Operating from a single +5V supply, the TQ8223 and SC5068 are fully compliant with SONET/SDH jitter tolerance and transfer specifications. A TTL level LOCK signal is supplied to indicate when the frequency difference between the internal 38.88 MHz clock and the external 38.88 MHz clock is less than 488 ppm.

**Test Plan:**

Table 1 lists the tests that were performed on the SC5068.

Table 1. Device Qualification Test Plan.

Item #	Test Name	Purpose	Specification - Method or Conditions	Sample Size
1	Autoclave	Determine the effect of temp, humidity & pressure on the device over time, unbiased	JEDEC A102, Condition C 121°C, 100% RH, 15 PSI for 96 Hours	1 Lot 45/0
2	Thermal Cycle (Air to Air)	Material Thermal Mismatch	JESD22A-104-A similar to Condition B -40°C to +125°C for 1,000 Cycles	1 Lot 45/0
3	HTOL Lifetest	Determine the effect of bias and temperature on the device over an extended period of time	MIL-STD-883D, Method 1015.8 VDD = 5.0 V, Junction Temp 150°C for 1000 Hours	1 Lot 45/0
4	ESD Stress	Determine the sensitivity of the device to levels of ESD	JESD22-A114A (HBM) >1,000 V	1 Lot 3/0
5	Mechanical	Verify the mechanical capabilities of the product	External VI Inspection JEDEC Std.22 M-B101	2 Lots
			Physical Dimensions JEDEC Std.22 M-B100	2 Lots
			Marking Permanency JEDEC Std 22, M-B107	2 Lots
6	Moisture Level Sensitivity	Determine/Classify the moisture sensitivity of plastic surface mount IC's	Moisture Level Sensitivity J-Std-020 Level 2	1 Lot



Summary of Results:

Table 2 lists the status and results of the qualification testing for SC5068.

Table 2. Qualification Test Results Summary.

Test Description	Sample Size	Status	Lot #1	Lot #2
Autoclave	1 Lot 45 (0)	Complete	45(0) Passed	
Temperature Cycle	1 Lot 45 (0)	Complete	45(0) Passed	
Bias Life test	1Lot 45 (0)	Complete	50(0) Passed	
ESD Sensitivity HBM	1 Lot 3	Complete	Passed at 1,000V	
Physical Dimensions	2 Lots 15 (0)	Complete	Passed	Passed Second lot of material was TQ-8213
Mark Permanency	2 Lots 25 (1)	Complete	Passed	Passed Second lot of material was TQ-8213
Moisture Sensitivity Level Testing	1 Lot	Complete	Passed Level 2	

Summary:

Moisture sensitivity testing has been completed, with level 2 rating established.

All other testing was successfully completed.

Based in the fact that the SC5068 has successfully completed the required qualification tests, the TQ8223 is qualified by similarity.

Appendix A

SC5068 Burn In Schematic

