Reliability & Qualification Report

Applicable Products	AWG2015, AWG2017, AWG2020, AWG2023, AWG3015, AWG3017, AWG3020, AWG3023
Semiconductor Technology	InGaAs Enhanced-mode pHEMT Process
Package Type	SOT89

1. Introduction

This 'Qualification Report' is to provide insight to our customers concerning the reliability of ASB's AWG-series high linearity gain block amplifiers, which are manufactured by InGaAs Enhanced-mode pHEMT semiconductor process. Reliability is defined as product performance to specification over time in response to varied environmental stress. The ultimate goal of our qualification program is to achieve continuous improvement in the robustness of the product being evaluated. Finished product reliability is measured periodically to ensure that the product performance meets or exceeds internal and external qualification specifications. Qualification programs are executed in response to internal programs as well as to individual customer requirements. In-house tests are performed and supervised by experienced ASB employees per a qualification system that conforms to the requirements of ISO 9001:2000, ISO 14001:2004, and JEDEC standards. Several qualification tests are carried out periodically at our subcontractor site per its standard procedure. ASB has been ISO 9001- and ISO 14001-certified by Korea International Standards Certification (KIC) since September 2004 and October 2005. The company strives to provide cost effective and state-of-the-art solutions to its customers in a timely manner while consistently meeting or exceeding their quality, reliability, and service expectations.

2. An Image of SOT89 Encapsulated Plastic Package

A plastic encapsulated SOT89 package is assembled in our subcontractor assembly house at a highly reproducible volume with quality assurance. A very thinned semiconductor die is attached on a copper lead via thermally and electrically conductive silver epoxy and encapsulated by an epoxy molding compound (EMC) with a low thermal expansion coefficient. A bottom metal paddle provides good heat dissipation capability to the ground.

(Fig. 1) An image of a plastic encapsulated SOT89 package.

3. Qualification Method

ASB employs the reliability & qualification program to ensure that our products operate reliably and consistently against various environments for a long period of time. Pursuant to JEDEC standard, the tests are carried out to monitor the possible failure modes of the products, which arises from design robustness, semiconductor manufacturing process, and assembly process. The monitoring parameters for qualification test are a device current (I_D) and a small-signal gain (S_{21}) and failure criteria are 10% change in I_D and 1 dB change in S_{21}.

4. Qualification Tests

Test Name	Standard	Method & Condition	Sample Size (pcs)	No. of Failed Parts	Remarks
High Temp. Operating Life (HTOL)	JESD22-A108	. 1000 hrs @ 125°C case temp . DC-biased	64	0	
Unbiased Autoclave	JESD22-A102	. 96 hrs @ 121°C & 15 psig . Unbiased	150	0	
Temperature Cycling	JESD22-A104	. Cycling Temp: -65°C ~ +150°C . 500 cycles . Dwell Time: 10~15 minutes . Unbiased	150	0	
High Temp Storage	JESD22-A103	. 1000 hrs @ 150°C . Unbiased	150	0	
Solderability	JESD22-B102	. 260°C . Dwell Time: 5 sec	30	0	
Moisture/Reflow Sensitivity	J-STD-020D	. Soak: 192 hrs @ 30°C & 60% RH . 3 times IR reflow @ 260°C . Unbiased	30	0	
ESD Human Body Model (HBM)	JESD22-A114	. Record distribution of all failing pins	20	-	As in datasheet
ESD Machine Model (MM)	JESD22-A115	. Record distribution of all failing pins	20	-	As in datasheet