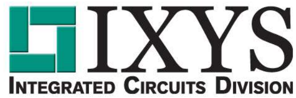

Reliability Report

Reliability Data for IX9908

Report Title: Reliability Data for IX9908

Report Number: 2013-009

Date: 6/26/13

Introduction:

This report summarizes the Reliability data of IXYS Integrated Circuits Division IX9908. The Reliability data presented here were collected during IXYS product qualification. The purpose of this qualification was to verify the IXYS Quality and Reliability requirements as outlined in IXYS internal specifications. The IX9908 silicon is manufactured at Vanguard and assembled at UTAC in the Philippines.

Reliability Tests:

Table 1 below provides the qualification tests that were performed. The stress tests and sample size are chosen based on the IXYS internal specification and with the approval of the product development team and quality assurance.

Table 1: Product IX9908 Reliability Tests

Stress Test	Applicable Specs	Stress Conditions	Product/ Package	Number of Lots	Sample Size (SS)	Total SS
HTRB	Mil-Std-883	125°C, 80% 1000hrs	IX9908 8L SOIC	4	110	440
HAST	JESD22, A110-C	130°C, 85%, 18.8 psi, 96 hrs 96 hrs	IX9908 8L SOIC	3	78	234
Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells, 15 cycles	IX9908 8L SOIC	1	55	55
Temp Cycle (T/C)	Mil-Std-883, N1010, "B"	-55 to 125°C, 10/10 dwells, 300 cycles	IX9908 8L SOIC	1	55	55
High Temp Storage	JESD22-A103C	125°C, 1000hrs	IX9908 8L SOIC	1	50	50
MSL	J-STD-020D.1	IR Reflow, Level 1	IX9908 8L SOIC	1	22	22
Latch-Up	JESD78	100mA, <5 sec trigger, +/-100mA For each IO, Vcc Overvoltage 19V – 27V	IX9908 8L SOIC	1	8	8
ESD HBM	JESD22, A114-E	1.5kΩ, 100pF	IX9908 8L SOIC	1	15	15

Reliability Test Results:

The stress tests and associated results for the product IX9908 qualification are summarized in Table 2. The devices chosen for the qualification were from standard material manufactured through normal production test flow and electrically tested to datasheet limits prior to stressing. Then reliability stresses were conducted and electrically tested to datasheet limit at each interval and final readpoints.

Table 2: Product IX9908 Reliability Test Results

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
HTRB	IX9908 AE0018	1000 hrs. 0/110	Qual Lot#1 Data
HTRB	IX9908 AE0019	1000 hrs. 0/110	Qual Lot#2 Data
HTRB	IX9908 AE0020	1000 hrs. 0/110	Qual Lot#3 Data
HTRB	IX9908 AE0021	1000 hrs. 0/110	Qual Lot#4 Data
HAST	IX9908 AE0018	1000 hrs. 0/78	Qual Lot#1 Data
HAST	IX9908 AE0020	1000 hrs. 0/78	Qual Lot#2 Data
HAST	IX9908 AE0021	1000 hrs. 0/78	Qual Lot#3 Data
Thermal Shock	IX9908 AE0018	15 Cycles 0/55	Qual Lot#1Data
Temp Cycle	IX9908 AE0018	300 Cycles 0/55	Qual Lot#1 Data
High Temp Storage	IX9908 AE0018	1000 hrs. 0/50	Qual Lot#1 Data
MSL	IX9908 AE0018	IR Reflow Level 1 0/22	Qual Lot#1 Data
Latch-Up	IX9908 AE0018	100mA 0/8	Qual Lot#1 Data

ESD Testing Results:

As part of this qualification, the product IX9908 was subjected to Human Body Model (HBM) ESD Sensitivity Classification testing using a KeyTek Zapmaster system. The results are summarized in Table 3. All samples were electrically tested to data sheet limits before and after ESD stressing and they passed after +/-3000V testing.

Table3: Product IX9908 ESD Characterization Results

ESD Model	Product/Kit Number	Package	ESD Test Spec	RC Network	Highest Passed	Class
HBM	IX9908 AE0018	8L SOIC	JESD22, A114-E	1.5kΩ, 100pF	3000V	2

FIT (Failure in Time) Rate on the Product IX9908:

Table 4 summarizes the number of devices used for the product IX9908 reliability stress with associated failures. Using the HTRB data, FITs were calculated based on the Acceleration Factor (AF) and equivalent device hours at 0.7eV of activation energy for 125°C test temperature and 40°C use temperatures. Using the HAST data, FITs were calculated based on the Acceleration Factor (AF) and equivalent device hours at 0.7eV of activation energy for 130°C test temperature and 40°C use temperatures.. The calculated FITs from the reliability stress came out to be 8.19 and 34.60 for HTRB and HAST, respectively.

Table 4: Product IX9908 FIT Rate Summary

Qual#	Stress	Product/Kit Number	# of Devices	# of Fails	Hours Tested	Act. Energy	Acc. Factor	Equivalent Dev. Hours	FIT Rate @ 60% CL
1	HTRB	IX9908 AE0018 AE0020 AE0021	440	0	1000	0.7	255.41	112,378,625	8.19
1	HAST	IX9908 AE0018 AE0020 AE0021	234	0	96	0.7	1.1363E+02	26,588,482	34.60

Conclusion:

The qualification of the product IX9908 has been successfully completed for the production release.

APPROVAL:

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