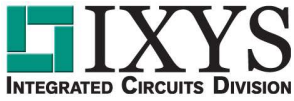


Reliability Report-IX21844
Qualification No: 2013-015



Reliability Report

Reliability Data for IX21844

Report Title: Reliability Data for IX21844

Report Number: 2013-015

Date: 12/17/13

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Introduction:

This report summarizes the Reliability data of IXYS Integrated Circuits Division IX21844. 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 IX21844 silicon is manufactured at IXYS IC Division using the P32 process and assembled at Greatek in Taiwan.

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 IX21844 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	IX21844N/ 14L SOIC IX21844G/ 14L DIP	2	111, 113	224
HAST	JESD22- A110-C	130°C, 85% 18.8PSI, 96hrs	IX21844N/ 14L SOIC IX21844G/ 14L DIP	3	110, 99, 102	311
Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells, 15 cycles	IX21844N 14L SOIC	1	55	55
Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells, 15 cycles	IX21844G 14L DIP	1	55	55
Temp Cycle (T/C)	Mil-Std-883, N1010, "B"	-55 to 125°C, 10/10 dwells, 300 cycles	IX21844N 14L SOIC	1	55	55
Temp Cycle (T/C)	Mil-Std-883, N1010, "B"	-55 to 125°C, 10/10 dwells, 300 cycles	IX21844G 14L DIP	2	55	110
MSL	J-STD- 020D.1	IR Reflow, Level 1	IX21844N 14L SOIC	1	50	50
MSL	J-STD- 020D.1	IR Reflow, Level 1	IX21844G 14L DIP	1	50	50
Hot Storage	JESD22- A103-C	125C, 1000 hrs	IX21844N 14L SOIC	1	50	50
Hot Storage	JESD22- A103-C	125C, 1000 hrs	IX21844G 14L DIP	1	50	50
ESD HBM	JESD22, A114-E	1.5kΩ, 100pF	IX21844N 14L SOIC	1	15	15

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Reliability Test Results:

The stress tests and associated results for the product IX21844 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 IX21844 Reliability Test Results

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
HTRB	IX21844N GE0029	1000 hrs.	Qual Lot#1 Data
		0/111	
HTRB	IX21844N GE0032	1000 hrs.	Qual Lot#2 Data Failure for IQCC
		1/113	
HAST	IX21844N GE0029	96 hrs.	Qual Lot#1 Data
		0/110	
HAST	IX21844N GE0029	96 hrs	Qual Lot#2 Data
		0/99	
HAST	IX21844G GE0033	96 hrs	Qual Lot#3 Data
		0/102	
Thermal Shock	IX21844N GE0029	15 Cycles	Qual Lot#1 Data
		0/55	
Thermal Shock	IX21844G GE0032	15 Cycles	Qual Lot#2 Data
		0/55	
Temp Cycle	IX21844N GE0029	300 Cycles	Qual Lot#1 Data
		0/55	
Temp Cycle	IX21844G GE0032	300 Cycles	Qual Lot#2 Data
		0/55	
Temp Cycle	IX21844G GE0033	300 Cycles	Qual Lot#3 Data
		0/55	
MSL	IX21844G GE0030	Level 1	Qual Lot #1 Data
		0/50	
MSL	IX21844N GE0029	Level 1	Qual Lot #2 Data
		0/50	
Hot Storage	IX21844N GE0029	1000 hrs	Qual Lot #1 Data
		0/50	
Hot Storage	IX21844G GE0030	1000 hrs	Qual Lot #2 Data Failure for IQBS
		1/50	

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ESD Testing Results:

As part of this qualification, the product IX21844 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 +/-2000V testing.

Table3: Product IX21844 ESD Characterization Results

ESD Model	Product/Kit Number	Package	ESD Test Spec	RC Network	Highest Passed	Class
HBM	IX21844N GE0029	14L SOIC	JESD22, A114-E	1.5kΩ, 100pF	2000V	1C

FIT (Failure in Time) Rate on the Product IX21844:

Table 4 summarizes the number of devices used for the product IX21844 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 temperature. For HAST stress, FITs were calculated based on the Acceleration Factor (AF) and equivalent device hours at 0.7eV activation energy for 130°C test temperature and 40°C use temperature. The calculated FITs from the reliability stress came out to be 35.48 and 21.52 for HTRB and HAST, respectively.

Table 4: Product IX21844 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	IX21844 GE0029 GE0032	224	1	1000	0.7	255.41	57,210,936	35.48
1	HAST	IX21844 GE0029 GE0033	311	0	96	0.7	1.4318E +03	42,747,390	21.52

Conclusion:

The qualification of the product IX21844 has been successfully completed for the production release.

APPROVAL:

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