IXYS
INTEGRATED CIRCUITS DIVISION

Reliability Report

Reliability Data for IXD_630 Series VIS Foundry Process CU05UMS12010

Report Title: Reliability Data for IXD_630 Series VIS Foundry Process CU05UMS12010

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Introduction:

This report summarizes the Reliability data of IXYS Integrated Circuits Division IXD_630 Series. The Reliability data presented here were collected during IXYS IC Division product qualification. The purpose of this qualification was to verify IXYS IC Division Quality and Reliability requirements as outlined in IXYS IC Division internal specifications. The IXD_630 Series Gate Driver silicon is foundered at Vanguard International Semiconductor, Corp. (VIS) and assembled at Fastech in the Philippines. The VIS process is CU05UMS12010.

Reliability Tests:

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

Table 1: Product Family IXD_630 Series Reliability Tests

Stress Test	Applicable Specs	Stress Conditions	Product/ Package	Number of Lots	Sample Size (SS)	Total SS
HTRB	JESD22-A108	125C, 80% WVDC, 1000 hrs	IXDD609CI 5L TO-220 IXDD609PI 8 Pin DIP	1 1	45 110	45 110
Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells, 15 cycles	IXDD614CI 5L TO-220 IXDD614YI 5L TO-263 IXDN614YI 5L TO-263 IXDD609CI 5L TO-220	6	55	330
Temp Cycle (T/C)	Mil-Std-883, N1010, “B”	-55 to 125°C, 10/10 dwells, 300 cycles	IXDD614CI 5L TO-220 IXDD614YI 5L TO-263 IXDN614YI 5L TO-263 IXDD609CI 5L TO-220	6	55	330
High Temp Storage	JESD22-A103	125°C, 1000hrs	IXDD614CI 5L TO-220 IXDD614YI 5L TO-263 IXDN614YI 5L TO-263 IXDD609CI 5L TO-220	6	50	300

Stress Test	Applicable Specs	Stress Conditions	Product/ Package	Number of Lots	Sample Size (SS)	Total SS
MSL	J-STD-020D.1	IR Reflow, Level 1	IXDD614CI 5L TO-220 IXDD614YI 5L TO-263 IXDD609CI 5L TO-220	4	50	200
ESD HBM	JESD22, A114-E	1.5kΩ, 100pF	IXDD630YI 5L TO-263 IXDD609CI 5L TO-220	2	9	18

Reliability Test Results:

The stress tests and associated results for the product family IXD_630 Series 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 Family IXD_630 Series Reliability Test Results

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
HTRB	IXDD609CI C00154 1108	1000 hrs. 0/45	Qual Lot#1 Data
HTRB	IXDD609PI C00039 1023	1000 hrs. 0/110	Qual Lot#1 Data
Thermal Shock	IXDD614CI FFE049	15 Cycles 0/55	Qual Lot#1 Data
Thermal Shock	IXDD614CI C00044 1021	15 Cycles 0/55	Qual Lot#2 Data
Thermal Shock	IXDD614YI C00043 1021	15 Cycles 0/55	Qual Lot#3Data
Thermal Shock	IXDN614YI FFE047 1149	15 Cycles 0/55	Qual Lot#4Data
Thermal Shock	IXDD614YI FFE048 1149	15 Cycles 0/55	Qual Lot#5 Data

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
Thermal Shock	IXDD609CI C00154 1108	15 Cycles 0/55	Qual Lot#6 Data
Temp Cycle	IXDD614CI FFE049 1149	300 Cycles 0/55	Qual Lot#1 Data
Temp Cycle	IXDD614CI C00044 1021	300 Cycles 0/55	Qual Lot#2 Data
Temp Cycle	IXDD614YI C00043 1021	300 Cycles 0/55	Qual Lot#3 Data
Temp Cycle	IXDN614YI FFE047 1149	300 Cycles 0/55	Qual Lot#4 Data
Temp Cycle	IXDD614YI FFE048 1149	300 Cycles 0/55	Qual Lot#5 Data
Temp Cycle	IXDD609CI C00154 1108	300 Cycles 0/55	Qual Lot#6 Data
High Temp Storage	IXDD614CI FFE049 1149	1000 hrs. 0/50	Qual Lot#1 Data
High Temp Storage	IXDD614CI C00044 1021	1000 hrs. 0/50	Qual Lot#2 Data
High Temp Storage	IXDD614YI C00043 1021	1000 hrs. 0/50	Qual Lot#3 Data
High Temp Storage	IXDN614YI FFE047 1149	1000 hrs 0/50	Qual Lot#4 Data

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
High Temp Storage	IXDD614YI FFE048 1149	1000 hrs 0/50	Qual Lot#5 Data
High Temp Storage	IXDD609CI C00154 1108	1000 hrs 0/50	Qual Lot#6 Data
MSL	IXDD630YI C00278 1133	IR Reflow Level 1 0/50	Qual Lot#1 Data
MSL	IXDD614CI C00044 1021	IR Reflow Level 1 0/50	Qual Lot#2 Data
MSL	IXDD614YI C00043 1021	IR Reflow Level 1 0/50	Qual Lot#3 Data
MSL	IXDD609CI C00154 1108	IR Reflow Level 1 0/50	Qual Lot#4 Data

ESD Testing Results:

As part of this qualification, the product family IXD_630 Series 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 zapping.

Table3: Product Family IXD_630 Series ESD Characterization Results

ESD Model	Product/Kit Number	Package	ESD Test Spec	RC Network	Highest Passed	Class
HBM	IXDD630YI C00278 IXDD609CI C00154	5L TO-263 5L TO-220	JESD22, A114-E	1.5kΩ, 100pF	3000V	2

FIT (Failure in Time) Rate on the Product Family IXD_630 Series:
Table 4 summarizes the number of devices used for the product family IXD_630 Series 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. The calculated FITs from the reliability stress came out to be 23.24 for HTRB.

Table 4: Product Family IXD_630 Series 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	IXDD609CI C00154 1108 IXDD609PI C00039 1023	45 110	0	1000	0.7	1.4318E +03	39,587,925	23.24

Conclusion:

The qualification of the product family IXD_630 Series has been successfully completed for the production release. The reliability and process data for VIS CU05UMS12010 can be found at S:/REED/Projects/New Process Information/Vanguard and can be supplied at customer request.

APPROVAL:

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