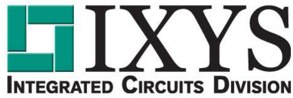

Reliability Report

Reliability Data for CPC5750

Report Title: Reliability Data for CPC5750

Report Number: 2012-003

Date: 3/14/12

Introduction:

This report summarizes the reliability data of IXYS Integrated Circuits Division CPC5750. The reliability data presented here were collected during IXYS ICD product qualification, ON Semiconductor process qualification and Greatek Electronics, Inc. package qualification. The purpose of this qualification was to verify the IXYS ICD quality and reliability requirements as outlined in IXYS ICD internal specifications. The CPC5750 silicon is foundered at ON Semiconductor and assembled at Greatek Electronics, Inc. in Taiwan. The ON Semiconductor process is D3N (reference qual by comparison for CPC5902, CPC5002).

Reliability Tests:

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

Table 1: Product CPC5750 Reliability Tests

Stress Test	Applicable Specs	Stress Conditions	Number of Lots	Sample Size (SS)	Total SS
HTOL	Mil-Std-883	125°C, 1000hrs	3	236	708
THB	JESD22, A101	85°C, 85% 1000hrs, 500 hrs	3 1	44 45	132 45
HAST	JESD22-A110	130°C, 85% RH, 96 hrs	3	84	252
ELFR	JESD74A	125°C, 168 hrs	3	236	708
Autoclave	JESD22-A104	121°C, 100% RH, 96 hrs	1	71	71
Temp Cycle (T/C)	JESD22-A112-A	-65 to 150°C, 500 cycles	3 1	84 45	252 45
Pressure Cooker Test	JESD22-A102	121°C, 2 atm, 168 hrs	1	45	45
High Temp Storage	JESD22-A103C	150°C, 1000hrs 500 hrs	3 1	84 45	252 45
MSL	J-STD-020D.1	IR Reflow, Level 1	1	135	135
MSL	J-STD-020D.1	IR Reflow, Level 3	1	135	135
Solderability	JESD22-B102E	245 +/- 5°C, 5 +/- 0.5 sec, dwell Steam Age 8 hrs	1	15	15
ESD	JESD22, A114-E	1.5kΩ, 100pF	1	15	15

Reliability Test Results:

The stress tests and associated results (10_d3_tep_rel_summary_2005081.doc in S:/REED/Projects/Development/CPC5750/Qual_Report/ESD) for the product CPC5750 qualification are summarized in Table 2. The devices chosen for the qualification were from standard material manufactured through normal production test flow

Table 2: Product CPC5750 Reliability Test Results

Stress Test	Process/Pkg	Readpoint / (Reject/ SS)	Comments
HTOL	D3N Technology	1000 hrs. 0/708	AMI/On Semiconductor Qual Report Data
THB	D3N Technology	1000 hrs. 0/132	AMI/On Semiconductor Qual Report Data
THB	24L SSOP	500 hrs. 0/45	Greatek Electronics, Inc. Qual Report Data
HAST	D3N Technology	96 hrs. 0/252	AMI/On Semiconductor Qual Report Data
ELFR	D3N Technology	168 hrs 0/708	AMI/On Semiconductor Qual Report Data
Autoclave	D3N Technology	96 hrs 0/71*	AMI/On Semiconductor Qual Report Data
Temp Cycle	D3N Technology	500 Cycles 0/252	AMI/On Semiconductor Qual Report Data
Temp Cycle	24L SSOP	500 Cycles 0/45	Greatek Electronics, Inc. Qual Report Data
Pressure Cooker Test	24L SSOP	168 hrs 0/45	Greatek Electronics, Inc. Qual Report Data
High Temp Storage	D3N Technology	1000 hrs 0/252	AMI/On Semiconductor Qual Report Data

Stress Test	Process/Pkg	Readpoint / (Reject/ SS)	Comments
High Temp Storage	24L SSOP	500 hrs.	Greatek Electronics, Inc. Qual Report Data
		0/45	
MSL	24L SSOP	Level 3	Greatek Electronics, Inc. Qual Report Data
		0/135	
Solderability	24L SSOP	Steam Age 8 hrs	Greatek Electronics, Inc. Qual Report Data
		0/15	
*Note: 3 parts failing for In_LKG Low FA050314; failures due to material on the package leads; leakage too low for FA (SEM0514AHTD).			

ESD Testing Results:

As part of this qualification, the product CPC5750 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 CPC5750 ESD Characterization Results

ESD Model	Product	Package	ESD Test Spec	RC Network	Highest Passed	Class
HBM	CPC5750	24L SSOP	JESD22, A114-E	1.5kΩ, 100pF	2000V	2

FIT (Failure in Time) Rate on the Product CPC5750:
Table 4 summarizes the number of devices used for the product CPC5750 reliability stress with associated failures. Using the HTOL 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. For THB stress, FITs were calculated based on the 85°C /85% RH test condition with 40°C/60% RH ambient use conditions at the activation energy of 0.7eV. The calculated FITs from the reliability stress came out to be 5.09 and 61.34 for HTOL and THB respectively.

Table 4: Product CPC5750 FIT Rate Summary

Qual#	Stress	Product/Pkg	# of Devices	# of Fails	Hours Tested	Act. Energy	Acc. Factor	Equivalent Dev. Hours	FIT Rate @ 60% CL
1	HTOL	CPC5750 24L SSOP	708	0	1000	0.7	255.41	180,827,424	5.09
1	THB	CPC5750 24L SSOP	132	0	1000	0.7	1.1363E+02	14,998,630	61.34

Conclusion:

The qualification of the product CPC5750 has been successfully completed for the production release. The reliability and process data for D3N can be found at S:/Quality/Qualifications/CPC5750/Qual_Reports & ESD.

APPROVAL:

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