Reliability Report

Reliability Data for CPC5902G

Report Title: Reliability Data for CPC5902G

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Introduction:

This report summarizes the Reliability data of IXYS IC Division CPC5902G. 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 CPC5902G silicon is foundered at ON-SEMI and assembled at Atec in the Philippines. The ON-SEMI process is D3N (reference qual by comparison for CPC5750, CPC5002).

Reliability Tests:

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

Table 1: Product CPC5902G Reliability Tests

Stress Test	Applicable Specs	Stress Conditions	Product/ Package	Number of Lots	Sample Size (SS)	Total SS
HTOL	Mil-Std-883	125°C, 80%	CPC5902G 8 Pin Dip	1	105	105
THB	JESD22, A101	85°C, 85% 1000hrs	CPC5902G 8 Pin Dip	3	77	231
Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells, 15 cycles	CPC5902G 8 Pin Dip	3	55	165
Temp Cycle (T/C)	Mil-Std-883, N1010, “B”	-55 to 125°C, 10/10 dwells, 300 cycles	CPC5902G 8 Pin Dip	3	55	165
High Temp Storage	JESD22-A103C	125°C, 1000hrs	CPC5902G 8 Pin Dip	5	50	250
MSL	J-STD-020D.1	IR Reflow, Level 1	CPC5902G 8 Pin Dip	3	50	150
MSL	J-STD-020D.1	IR Reflow, Level 3	CPC5902G 8 Pin Dip	3	50	150
ESD HBM	JESD22, A114-E	1.5kΩ, 100pF	CPC5902G 8 Pin Dip	2	3	6

Reliability Test Results:

The stress tests and associated results for the product CPC5902G 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 CPC5902G Reliability Test Results

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
HTOL	CPC5902 TE3097	1000 hrs.	Qual Lot#1 Data
		0/105*	
THB	CPC5902 TE3078 1115	1000 hrs.	Qual Lot#1 Data
		0/76	
THB	CPC5902 TE3079 1118	1000 hrs.	Qual Lot#2 Data
		0/77	
THB	CPC5902 TE3093 1121	1000 hrs.	Qual Lot#3 Data
		0/77	
Thermal Shock	CPC5902 TE3078 1115	15 Cycles	Qual Lot#1 Data
		0/55	
Thermal Shock	CPC5902 TE3079 1118	15 Cycles	Qual Lot#2 Data
		0/33	
Thermal Shock	CPC5902 TE3093 1121	15 Cycles	Qual Lot#3 Data
		0/55*	
Temp Cycle	CPC5902 TE3078 1115	300 Cycles	Qual Lot#1 Data
		0/55	
Temp Cycle	CPC5902 TE3079 1118	300 Cycles	Qual Lot#2 Data
		0/33	

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
Temp Cycle	CPC5902 TE3093 1121	300 Cycles 0/54	Qual Lot#3 Data
High Temp Storage	CPC5902 TE3078 1115	1000 hrs. 0/50	Qual Lot#1 Data
High Temp Storage	CPC5902 TE3079 1118	1000 hrs. 0/33*	Qual Lot#2 Data
High Temp Storage	CPC5902 TE3093 1121	1000 hrs. 0/50*	Qual Lot# 3 Data
High Temp Storage	CPC5902 TE3136	1000 hrs. 0/50	Qual Lot# 4 Data
High Temp Storage	CPC5902 TE3137	1000 hrs. 0/50	Qual Lot# 5 Data
MSL	CPC5902 TE3078 1115	IR Reflow Level 3 0/50	Qual Lot#1 Data
MSL	CPC5902 TE3079 1118	IR Reflow Level 3 0/41	Qual Lot#2 Data
MSL	CPC5902 TE3093 1121	IR Reflow Level 3 0/51	Qual Lot#3 Data
MSL	CPC5902 TE3097	IR Reflow Level 1 0/50	Qual Lot#4 Data
MSL	CPC5902 TE3121	IR Reflow Level 1 0/50	Qual Lot#5 Data

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
MSL	CPC5902 TE3122	IR Reflow Level 1 0/50	Qual Lot#6 Data
*Note: I/O leakage, output voltage and timing failures reported, however, Failure Analysis Report FA11-106 results showed these failures to be related to a process anomaly with preventative action defined and initiated.			

ESD Testing Results:

As part of this qualification, the product CPC5902G 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 +/-6000V testing.

Table3: Product CPC5902G ESD Characterization Results

ESD Model	Product/Kit Number	Package	ESD Test Spec	RC Network	Highest Passed	Class
HBM	CPC5902G TE3063 TE3094	8 Pin Dip	JESD22, A114-E	1.5kΩ, 100pF	6000V	3A

FIT (Failure in Time) Rate on the Product CPC5902G:

Table 4 summarizes the number of devices used for the product CPC5902G 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 34.31 and 35.20 for HTOL and THB respectively.

Table 4: Product CPC5902G 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	HTOL	CPC5902G TE3097	105	0	1000	0.7	255.41	26,817,627	34.31
1	THB	CPC5902G TE3078, TE 3079, TE3093	230	0	1000	0.7	1.1363E +02	26,133,978	35.20

Conclusion:

The qualification of the product CPC5902G has been successfully completed for the production release. The reliability and process data for D3N can be found at S:/REED/Projects/New Process Information/On-Semi.

APPROVAL:

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