



Reliability Report

Reliability Data for CPC10XXN-4 Pin SOP Product (Low Voltage 60v – 150v)

Report Title: Reliability Data for CPC10XXN-4 Pin SOP Product
(Low Voltage 60v – 150v)

Report Number: 2010-004

Date: 11/15/12

Introduction

This report summarizes the Reliability data of Clare’s CPC10XXN 4-Pin SOP family products. The Reliability data presented here were collected during Clare’s product qualification and ongoing monthly Reliability Monitoring Program (RMP). The silicon die level data collected on multiple product types, but share the same process technology and design rules (DMOS P27) wafer fabrication facility and subcontract assembly location. The 4-Pin SOP package data were included from CPC102XXN, CPC103XXN, and CPC123XXN since the package construction materials, leadframe and subcontract assembly location are the same for these 4-pin SOP products.

Reliability Tests:

Table 1 below outlined Reliability stresses performed on various products that are transferable to CPC10XXN, CPC12XXN and certain CPC2XXXN products.

Table 1: CPC10XXN Reliability Tests

Product/ Package	Stress	Applicable Specs	Stress Conditions	# of Kits	Sample Size (SS)	Total SS
CPC1008N/ 4-SOP	HTRB	JESD22-A108	125C, 80% WVDC, 1000 hrs	3	100	300
CPC1017N/ 4-SOP	HTRB	JESD22-A108	125C, 80% WVDC, 1000 hrs	3 1	55 129	294
CPC1008N/ 4-SOP	THB	JESD22-A101	85C/85% RH, Biased 1000 hrs	3	48	144
CPC1008N/ CPC1017N/ CPC1035N/ 4-SOP	Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells 15 cycles	4	55	220
CPC1008N/ CPC1017N/ CPC1035N/ 4-SOP	Temp Cycle (T/C)	Mil-Std-883 M1010, “B”	-55 to 125°C, 10/10 dwells, 300 cycles	4	55	220

Product/ Package	Stress	Applicable Specs	Stress Conditions	# of Kits	Sample Size (SS)	Total SS
CPC1035N/ CPC1008N/ 4-SOP	ESD- HBM	ESD Assoc. STM5.1	1.5kΩ, 100pF	1	15	15
CPC1035N/ CPC1017N/ 4-SOP	Construction Analysis	NA	Die coat, Bond quality, Die attach, Bondline	2	5	10
CPC1230N/ 4-SOP	Solder Heat Resistance (SHRT)	JESD22-A112	Bake: 24 hrs 125°C, Soak: MSL Level-3, IR Reflow: 260°C (max.), 3X	1	25	25
CPC1001N/ 4-SOP	Cold Storage Test	JESD22-A119	-55C, 1000hrs	1	55	55

Reliability Test Results:

Table 2 below provides the Reliability results from the stress tests that were performed on the CPC10XXN family products.

Table 2: CPC10XXN Reliability Test Results

Product/ Package	Stress/ Kits	Readpoint 1 / Reject/ SS	Readpoint 2 / Reject/ SS	Readpoint 3 / Reject/ SS	Readpoint 4 / Reject/ SS	Comments
CPC1017N/ 4-SOP	HTRB/ T38953	168 hrs.	500 hrs.	750 hrs.	1000 hrs.	
		0/294	0/294	0/294	0/294	
CPC1008N 4-SOP	HTRB/ TE2190 TE2228 TE2232	168 hrs.	500 hrs.	750 hrs.	1000 hrs.	
		0/300	0/300	0/300	0/300	
CPC1008N 4-SOP	THB/ TE2190 TE2228 TE2232	168 hrs.	500 hrs.	750 hrs.	1000 hrs.	
		0/144	0/144	0/144	0/144	
CPC1008N 4-SOP	T/S / TE2190 TE2228	15 Cycles				
		0/110				
CPC1008N 4-SOP	T/C / TE2190 TE2228	300 Cycles				
		0/110				
CPC1017N/ 4-SOP	T/S / T38953	15 Cycles				
		0/55				
CPC1017N/ 4-SOP	T/C / T38953	300 Cycles				
		0/55				

Reliability Report: CPC10XXN-4 Pin SOP Product (Low Voltage 60v – 150v)
 Qualification Report No.: 2010-004

Product/ Package	Stress/ Kits	Readpoint 1 / Reject/ SS	Readpoint 2 / Reject/ SS	Readpoint 3 / Reject/ SS	Readpoint 4 / Reject/ SS	Comments
CPC1035/ 4-SOP	T/S / T21031	15 Cycles 0/55				
CPC1035/ 4-SOP	T/C / T21031	300 Cycles 0/55				Same parts as T/S
CPC1230/ 4-SOP	SHRT TE2291	125°C, 24 hrs Bake, Soak @ MSL 3, 260°C Max, Reflow 3X 0/25				Lead Free Reflow
CPC1017N/ 4-SOP	T38953	Die Coat, Bond Quality, Die Attach, Bondline Thickness 0/5				
CPC1035/ 4-SOP	T21031	Die Coat, Bond Quality, Die Attach, Bondline Thickness 0/5				
CPC1001N/ 4-SOP	Cold Storage	-55C, 1000hrs 0/55				

ESD Testing Results:

CPC10XXN was subjected to Human Body Model (HBM) ESD Sensitivity Classification testing using the KeyTek Zapmaster test 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 8000V.

Table3: CPC10XXN ESD Results

ESD Model	Product/ Kit	Package	ESD Test Spec	RC Network	Highest Tested	Class
HBM	CPC1008N/ TE2228	4-SOP	JESD22, A114-B	1.5kΩ, 100pF	8KV (passed)	3B

FIT (Failure in Time) Rate on CPC10XXN-4 Pin SOP Product:

Table 4 below summarizes the FIT rate from the HTRB and THB data. Using the Reliability HTRB data, FIT rate was calculated at Activation Energy (AE) of 0.7 eV based on the equivalent device hours at use condition of 40°C and stressed condition of 125°C. 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 0.7 eV and equivalent device hours. The FIT rate came out to be 6.06 and 56.23 for HTRB and THB, respectively.

Table 4: CPC10XXN-4 Pin SOP Product FIT Rate Summary

Product/ Stress	Lot Number	# of Devices	# of Failed	Hours Tested	Eq. Device Hours	FITs @ 60% CL
CPC1017N/ HTRB	T38953 TE2190	594	0	1000	151,711,144	6.06
CPC1008N/ HTRB	TE2228 TE2232					
CPC1008N/ THB	TE2190 TE2228 TE2232	144	0	1000	16,362,143	56.23