

**Reliability Report-Form A Relay VHV (500V – 800V)
Qualification No: 2013-004**



Reliability Report

Reliability Data for Form A Relay VHV (500V – 800V)

Report Title: Reliability Data for Form A Relay VHV (500V – 800V)

Report Number: 2013-004

Date: 2/13/13

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Introduction:

This report summarizes the Reliability data of IXYS Integrated Circuits Division. The Reliability data presented here were collected during IXYS IC Division product qualification. The purpose of this qualification was to verify the IXYS IC Division Quality and Reliability requirements as outlined in IXYS IC Division internal specifications. The Form A Relay VHV (represented by CPC1983Y/PLA170/PLA171/PLA192/PLA193) silicon is manufactured at IXYS IC Division in Beverly, MA and assembled at ATEC in the Philippines.

Reliability Tests:

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

Table 1: Product Form A Relay VHV Reliability Tests

Stress Test	Applicable Specs	Stress Conditions	Product/ Package	Number of Lots	Sample Size (SS)	Total SS
HTRB	JESD22-A108	125°C, 80% WVDC, 1000hrs	CPC1983Y Power SIP	1	105	105
HTRB	JESD22-A108	125°C, 80% WVDC, 1000hrs	PLA170 6-Pin DIP	1	135	135
HTRB	JESD22-A108	125°C, 80% WVDC, 1000hrs	PLA192 6-Pin DIP	1	77	77
HTRB	JESD22-A108	125°C, 80% WVDC, 1000hrs	PLA193 6-Pin DIP	1	105	105
Temp Cycle	JESD22-A104	-55°C to 125°C, 1000 cycles	PLA171 8-SMT	2	77	154
IOL	Mil-Std-750 Method 1037	Ta = 25°C, Delta Tj ≥ 100°C, 15,000 cycles 2 min on/2 min off	PLA171 8-SMT	2	77	154
Autoclave	JESD22-A102	Ta = 121°C, RH = 100% 15 psig, 96 hrs	PLA171 8-SMT	2	77	154
High Temp Storage	JESD22-A103C	125°C, 1000 hrs	PLA171 8-SMT	2	77	154

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Reliability Test Results:

The stress tests and associated results for the product Form A Relay VHV 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 Form A Relay VHV Reliability Test Results

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
HTRB	CPC1983Y TE2906	1000 hrs.	Qual Lot#1 Data
		0/105	
HTRB	PLA170 TE2873 TE2908	1000 hrs	Qual Lot#1 Data
		0/135	
HTRB	PLA192 TE2744	1000 hrs	Qual Lot#1 Data
		0/77	
HTRB	PLA193 TE2620	1000 hrs.	Qual Lot#1 Data
		1/105	
Temp Cycle	PLA171 TE3016	1000 cycles	Qual Lot#1 Data
		0/77	
Temp Cycle	PLA171 TE3038	1000 cycles	Qual Lot#2 Data
		0/77	
IOL	PLA171 TE3016	15,000 cycles	Qual Lot#1 Data
		0/77	
IOL	PLA171 TE3038	15,000 cycles	Qual Lot#2 Data
		0/77	
Autoclave	PLA171 TE3016	96 hrs	Qual Lot#1 Data
		0/77	
Autoclave	PLA171 TE3038	96 hrs	Qual Lot#2 Data
		0/77	
High Temp Storage	PLA171 TE3016	1000 hrs	Qual Lot#1 Data
		0/77	
High Temp Storage	PLA171 TE3038	1000 hrs	Qual Lot#2 Data
		0/77	

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FIT (Failure in Time) Rate on the Product Form A Relay VHV:

Table 3 summarizes the number of devices used for the product Form A Relay VHV 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 18.83 for HTRB.

Table 3: Product Form A Relay VHV 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	CPC1983Y TE2906 PLA170 TE2873 TE2908 PLA192 TE2774 PLA193 TE2620	422	0	1000	0.7	255.41	107,781,318	18.83

Conclusion:

The qualification of the product Form A Relay VHV has been successfully completed for the production release.