



DESIGN RELIABILITY VERIFICATION REPORT

Date Released	March 8, 2016	Reference Number	RE-PH16/012B
Model No.	73-936-0080 (iHP module)	Manufacturing Site	Laguna
Product Spec Rev	Rev.05	Product Spec Release Date	10-16-2014
BOM Release Date	12-16-2015	Schematic Rev	A
Sample Size	See page 4	Product Rev	DVT

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Revision Control		
Revision	Change History	Date
A	First Release	01-27-2016
B	Updated report to Pass remark. Updated section 2.1 to survive HTST.	03/08/2016

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Test Result Summary and Conclusion

TEST	DRV Result
	(P-Pass / F-Fail / NR-Not Required)
1.0 Reliability Test	
1.1 Electrolytic Capacitor Life Prediction	P
1.2 Opto-coupler CTR Margin Calculation	P
1.3 Component Stress Analysis (DSA / WCSA)	
1.3.1 Thermal Stress Measurement	P
1.3.2 Electrical Stress Measurement	P
2.0 Robustness Test	
2.1 High Temperature Stress Test (HTST)	Survive
3.0 Appendix	

Test Report Conclusion	This product had completed the DRV tests as outlined in this report. Based on the test results depicted in this report, the product passed the DRV test.
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References:

1. Product Specifications: iHP Product Specificaton rev 05 Draft Rev.05
2. DRV Test Plan No. QAP-1146/PH
3. Design Derating Requirements [920-000114](#)
4. Design Reliability Verification [920-000095](#)
5. Schematic Diagram [710-021500-0000](#) Rev.A
6. PCB Artwork P/N's: [509-021911-0005](#) Rev.A

SAMPLE UNIT SUMMARY

Sample Unit #	Serial #	Date Code	Firmware	Product Revision
1	Unit 1	n/a	03.06.00	DVT
2	Unit 2	n/a	03.06.00	DVT
3	Unit 3	n/a	03.06.00	DVT

TEST DETAILS

1.0 Reliability Test

1.1 Electrolytic Capacitor Life Estimation

Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	380-480Vac	Volts	
	Output Power	2400 (80% FL)	Watts	
	Loading Conditions	80V/30A		
	Ambient Temp	30	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equip No.	Calibration Due Date
	Chroma	63204	QAE-424	6/26/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/8/2016
	HP	401A	QAE-222	1/7/2017
	Chroma	62150H-1000S	QAE-533	9/15/2016
	ESPEC Chamber	PSL-2K	QAE-231	4/15/2016
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
Product Useful Life / Cap Life Expectancy		87,600	Hours	
Test Results	All E-cap meets life requirements			
Test Remarks	Based on above test results, calculated E-cap prediction result meets Life Expectancy requirement. See E-cap Life calculation data on Appendix.			

1.2 Opto-coupler CTR Margin Calculation

Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	342Vac	Volts	
	Output Power	3000	Watts	
	Loading Conditions	80V/37.5A		
	Ambient Temp	25	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equip No.	Calibration Due Date
	Chroma	63204	QAE-424	6/26/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/8/2016
	HP	401A	QAE-222	1/7/2017
	Chroma	62150H-1000S	QAE-533	9/15/2016
	ESPEC Chamber	PSL-2K	QAE-231	4/15/2016
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
Product Useful Life		10	Years	
Test Results	Opto coupler U809 has the lowest CTR margin of 293.86% Refer to the attachment at the appendix section for details.			
Test Remarks	Passed			

1.3 Component Stress Analysis

1.3.1 Thermal Stress Measurement

Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	342/528Vac	Volts	
	Output Power	3000	Watts	
	Loading Condition	80V/37.5A		
	Ambient Temp	50	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma	63204	QAE-424	6/26/2016
	ESPEC Chamber	PSL-2K	QAE-231	4/15/2016
	HP	401A	QAE-222	1/7/2017
	Chroma	62150H-1000S	QAE-533	9/15/2016
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
Test Results	All components are found within Artesyn Component Thermal Derating Requirement.			
Test Remarks	Based on the above test results, the product passed the Thermal Derating CSA / Worst-Case CSA. See CSA test data on Appendix.			

1.3.2 Electrical Stress Measurement

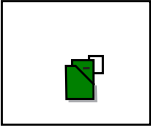
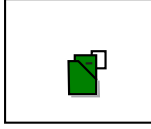
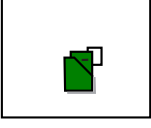
Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	400Vdc	Volts	
	Output Power	3000	Watts	
	Loading Condition	80V/37.5A		
	Ambient Temp	25	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma	63204	QAE-424	6/26/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/8/2016
	HP	401A	QAE-222	1/7/2017
	Chroma	62150H-1000S	QAE-533	9/15/2016
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
Test Results	All components are found within Artesyn Component Electrical Derating Requirement.			
Test Remarks	Based on the above test results, the product passed the Electrical Derating CSA / Worst-Case CSA. See CSA test data on Appendix.			

2.0 Robustness Test

2.1 High Temperature Stress Test (HTST)

Reference Document		Robustness Test Instruction 920-000099-0000		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	400Vdc (4days)		Volts
	Output Power	3000		Watts
	Ambient Temperature	50+15+15		°C
	Cooling	Forced Air by system box (Fan 19.8cfm)		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma	63204	QAE-424	6/26/2016
	ESPEC Chamber	PSL-2K	QAE-231	4/15/2016
	HP	401A	QAE-222	1/7/2017
	Chroma	62150H-1000S	QAE-533	9/15/2016
Test Sample	Serial No.	Sample 3		
	Date Code	See page 4		
1.) Load Cycling Test	Output Loading	Min Load	0	A
		Full Load	62.5	A
	Cycling Sequence	16 hours FL, 8 hours ML		
	Duration	96 hours		
2.) Output Short Circuit Test	Input Line	On all the time		
	Output	ML then, short output to common, repeat 10X.		
Test Results	The unit was damaged during short circuit test. Bugzilla 19007 was issued to document the issue.			
Failure Analysis (Yes/NR)	FA: Hardware check: No hardware fail Connectivity check: found gatedrive connection open. Root Cause: Intermittent crimp terminal contact Initial Action: Recrimp the terminal. After recrimping unit become GOOD. Long Term Action: Revisit and improve the crimping process in Factory.			
Test remarks	Based on above test results, sample unit did survive HTST.			

Appendix

Attachment	Revision	File Name
	Rev A	73-936-0080 DVT Opto CTR Calculation.xls
	Rev A	73-936-0080 DVT E-cap Life Calc revA.xlsx
	Rev A	73-936-0080 DVT WCSA revA.xlsx