



DESIGN RELIABILITY VERIFICATION REPORT

Date Released	June 23, 2016	Reference Number	RE-PH15/200B
Model No.	73-936-0024 (iHP Module)	Manufacturing Site	Laguna
Product Spec Rev	Rev.06	Product Spec Release Date	05-07-2015
BOM Release Date	10/15/2015	Schematic Rev	A
Sample Size	See page 4	Product Rev	DVT

	Name/s	Signature	Date
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Revision Control		
Revision	Change History	Date
A	First Release	11/29/2015
B	Updated section 1.3.1 test remark to pass Updated section 2.1 test remark to survived Added attachment 73-936-0024 DVT WCSA rev A.xlsx in Appendix	06/23/2016

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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 Specifcation rev 06 Draft Rev.06
2. DRV Test Plan No. QAP-1146/PH
3. Design Derating Requirements [920-000114](#)
4. Design Reliability Verification [920-000095](#)
5. Schematic Diagram [710-021500-0001](#) Rev.A
6. PCB Artwork P/N's: [509-021501-0002](#) Rev.A

SAMPLE UNIT SUMMARY

Sample Unit #	Serial #	Date Code	Firmware	Product Revision
1	Unit 1	n/a	2.11	DVT
2	Unit 2	n/a	2.11	DVT
3	Unit 3	n/a	2.11	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	380-480	Volts	
	Output Power	2880	Watts	
	Loading Conditions	24V/120A		
	Ambient Temp	30	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equip No.	Calibration Due Date
	Chroma	63203	QAE-573	9/29/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/8/2016
	TTI DMM	1705	QAE-391	8/27/2016
	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 Electrolytic capacitor meets life expectancy			
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	2880	Watts	
	Loading Conditions	24V/120.0A		
	Ambient Temp	50	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equip No.	Calibration Due Date
	Chroma	63203	QAE-573	9/29/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/8/2016
	TTI DMM	1705	QAE-391	8/27/2016
	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 488.08%			
	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	342-519Vac	Volts	
	Output Power	2880	Watts	
	Loading Condition	24V/120A		
	Ambient Temp	50	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma	63203	QAE-573	9/29/2016
	ESPEC Chamber	PSL-2K	QAE-231	4/15/2016
	TTI DMM	1705	QAE-391	8/27/2016
	Chroma	62150H-1000S	QAE-533	9/15/2016
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
Test Results	<p>The sample unit latches at 342Vac 50°C Ambient. These were highlighted to Design Engineers. Refer to Bugzilla issue 18308</p> <p>DE Corrective Actions Are:</p> <ul style="list-style-type: none"> - Rail_Imbalance protection circuit is now separated from the OCP circuit. - Code was updated to avoid mistriggering of protection during high temp condition. - PCB respin on the control board was performed to improved the grounding of the circuits to minimize signal noises. <p>See 73-936-0024 DVT WCSA rev A.xlsx for thermal verification.</p>			
Test Remarks	<p>Based on the above test results, the product passed the Thermal Derating CSA / Worst-Case CSA. See CSA test data on Appendix.</p>			

1.3.2 Electrical Stress Measurement




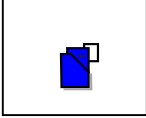
Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	400Vdc	Volts	
	Output Power	2880	Watts	
	Loading Condition	24V/120A		
	Ambient Temp	25	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma	63203	QAE-573	9/29/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/8/2016
	TTI DMM	1705	QAE-391	8/27/2016
	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	2880	Watts	
	Ambient Temperature	50+15+10	°C	
	Cooling	Forced Air by system box (Fan 19.8cfm)		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma DC source	62150H-1000S	QAE-538	9/14/2016
	Chroma E-load	63203	TM15-170	3/6/2016
	ESPEC Chamber	PSL-2K	QAE-231	4/14/2016
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	<p>The unit was able to operate beyond 70°C even after OTP was disabled.</p> <p>DE Corrective Actions Are:</p> <ul style="list-style-type: none"> - Rail_Imbalance protection circuit is now separated from the OCP circuit. - Code was updated to avoid mistriggering of protection during high temp condition. - PCB respin on the control board was performed to improved the grounding of the circuits to minimize signal noises. 			
Failure Analysis (Yes/NR)	NA			
Test remarks	Based on above test results, sample unit survived HTST.			

Appendix

Attachment	Revision	File Name
	Rev A	73-936-0024 E-cap Life Calculator Rev15.1.xls
	Rev A	73-936-0024 DVT DSA @ 50°C rev A.xlsx
	Rev A	73-936-0024 DVT Opto CTR Calculation.xls
	Rev A	73-936-0024 DVT WCSA rev A.xlsx