




DESIGN RELIABILITY VERIFICATION REPORT

Date Released	February 10, 2017	Reference Number	RE-PH17/014
Model No.	73-958-0001 (iHP Rack)	Manufacturing Site	Laguna
Product Spec Rev	Rev.08	Product Spec Release Date	06-03-2016
BOM Release Date	01-11-2017	Schematic Rev	AB
Sample Size	See page 4	Product Rev	EVT

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Revision Control		
Revision	Change History	Date
A	First Release	02/10/2017

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REPORT CONTENTS

Test Result Summary and Conclusion 3
References: 4
TEST DETAILS 5
1.0 Reliability Test..... 5
 1.1 ELECTROLYTIC CAPACITOR LIFE ESTIMATION 5
 1.2 OPTO-COUPLER CTR MARGIN CALCULATION 6
 1.3 MTBF PREDICTION 7
 1.4 COMPONENT STRESS ANALYSIS 8
 1.4.1 *Thermal Stress Measurement* 8
 1.4.2 *Electrical Stress Measurement* 9
Appendix 10

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 MTBF Prediction	P
1.4 Component Stress Analysis (DSA / WCSA)	
1.4.1 Thermal Stress Measurement	P
1.4.2 Electrical Stress Measurement	P
2.0 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 Specification: iHP Product Specification Rev. 08
- 2. DRV Test Plan No. QAP-1306/PH /PH revA
- 3. Design Derating Requirements 920-000114
- 4. Design Reliability Verification 920-000095
- 5. Schematic Diagram 705-003286-0000 Rev.AB
- 6. PCB Artwork P/N's: 509-021534-0005 Rev.AA
 509-021532-0007 Rev.AC

SAMPLE UNIT SUMMARY

Sample Unit #	Serial #	Date Code	Firmware	Product Revision
1	Sample 1	NA	ISO COMM: 03.04.00 PFC: 02.12.00	EVT
2	Sample 2	NA		EVT
3	Sample 3	NA		EVT

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	380-430Vac	Volts	
	Output Power	9600	Watts	
	Loading Conditions	48V/50A (x4Module)		
	Ambient Temp	30	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equip No.	Calibration Due Date
	Chroma DC Source	63203	TM15-023	8/30/2017
			QAE-649	7/23/2017
		63204	QAE-643	7/12/2016
			QAE-423	7/25/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/3/2017
	Tektronix Current Probe	TCP0020	QAE-583	11/16/2017
	Agilent Data Logger	34970A	TM15-058	3/7/2017
	Keysight Data Logger	34970A	QAE-661	10/22/2017
	Chroma AC Source	61512	TM15-176	9/23/2017
Thermotron Chamber	8800	Asset Tag:1276TET01459		
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
Product Useful Life / Cap Life Expectancy		10	Years	
Test Results	All capacitor reached the maximum life calculation of 15yrs.			
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	12000	Watts	
	Loading Conditions	48V/62.5A (x4Module)		
	Ambient Temp	50	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equip No.	Calibration Due Date
	Chroma DC Source	63203	TM15-023	8/30/2017
			QAE-649	7/23/2017
		63204	QAE-643	7/12/2016
			QAE-423	7/25/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/3/2017
	Tektronix Current Probe	TCP0020	QAE-583	11/16/2017
	Agilent Data Logger	34970A	TM15-058	3/7/2017
	Keysight Data Logger	34970A	QAE-661	10/22/2017
	Chroma AC Source	61512	TM15-176	9/23/2017
Thermotron Chamber	8800	Asset Tag:1276TET01459		
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
Product Useful Life		10	Years	
Test Results	Opto-coupler U302 and U313 exhibited the Lowest Opto-CTR margin with 78.78%.			
Test Remarks	Based on above test results, calculated CTR Margin result meets Product Useful Life requirement. See Opto-CTR calculation data on Appendix.			

1.3 MTBF Prediction

Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
MTBF Method		Telcordia Issue 3, Method I Case 3 MTBF XLS Calculator ver 2.1		
Test Conditions	Input Voltage	380-480Vac	Volts	
	Output Power	12000	Watts	
	Loading Conditions	48V/62.5A (x4Module)		
	Ambient Temp	25	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma DC Source	63203	TM15-023	8/30/2017
			QAE-649	7/23/2017
		63204	QAE-643	7/12/2016
			QAE-423	7/25/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/3/2017
	Tektronix Current Probe	TCP0020	QAE-583	11/16/2017
	Agilent Data Logger	34970A	TM15-058	3/7/2017
	Keysight Data Logger	34970A	QAE-661	10/22/2017
	Chroma AC Source	61512	TM15-176	9/23/2017
Thermotron Chamber	8800	Asset Tag:1276TET01459		
Test Sample	Serial Nos.	Sample 1, Sample 2		
	Date Code	See page 4		
MTBF Requirement		400	KHours	
Test Results	AC LINE (Volts)	AMBIENT TEMP (°C)	MTBF (Khrs)	
	380	25	1346	
	480	25	1303	
Test Remarks	Based on above test results, calculated MTBF prediction result meet MTBF requirement. See MTBF calculation data on Appendix.			

1.4 Component Stress Analysis


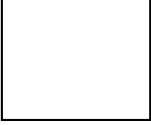
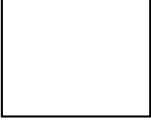

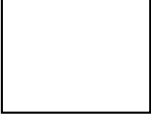
1.4.1 Thermal Stress Measurement

Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	342-528Vac	Volts	
	Output Power	12000	Watts	
	Loading Condition	48V/62.5A (x4Module) 48V/0A (Standby)		
	Ambient Temp	50	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma DC Source	63203	TM15-023	8/30/2017
			QAE-649	7/23/2017
		63204	QAE-643	7/12/2016
			QAE-423	7/25/2016
	Agilent Data Logger	34970A	TM15-058	3/7/2017
	Keysight Data Logger	34970A	QAE-661	10/22/2017
	Chroma AC Source	61512	TM15-176	9/23/2017
Thermotron Chamber	8800	Asset Tag:1276TET01459		
Test Sample	Serial Nos.	Sample 2		
	Date Code	See page 4		
Test Results	No issue found. All components are within Artesyn Component Thermal Derating Requirement.			
Test Remarks	Based on the above test results, the product passed the Thermal Derating CSA / WCSA. See CSA test data on Appendix.			

1.4.2 Electrical Stress Measurement

Reference Document		Reliability Test Instruction 920-000098		
Test Location		RE Eastwood		
Test Conditions	Input Voltage	380-430Vac	Volts	
	Output Power	12000	Watts	
	Loading Condition	48V/62.5A (x4Module)		
	Ambient Temp	25	°C	
	Cooling	Forced Air		
Test Equipment	Description	Model No.	Equipment No.	Calibration Due Date
	Chroma DC Source	63203	TM15-023	8/30/2017
			QAE-649	7/23/2017
		63204	QAE-643	7/12/2016
			QAE-423	7/25/2016
	Tektronix Oscilloscope	DPO 5034B	QAE-587	6/3/2017
	Tektronix Current Probe	TCP0020	QAE-583	11/16/2017
Variac	N/A	N/A	N/A	
Test Sample	Serial Nos.	Sample 1		
	Date Code	See page 4		
Test Results	No issue found. All components are within Artesyn Component Electrical Derating Requirement.			
Test Remarks	Based on the above test results, the product passed the Electrical Derating CSA / WCSA. See CSA test data on Appendix.			

Appendix

Attachment	Revision	File Name
	Rev A	73-958-0001 EVT E-cap Life Calculator Rev16.1.xls
	Rev A	73-958-0001 EVT Opto CTR Calculation.xls
	Rev A	73-958-0001 EVT DSA .xls
	Rev A	73-958-0001 EVT MTBF@ 380Vac revA.xls
	Rev A	73-958-0001 EVT MTBF@ 480Vac revA.xls