ARTESYN EMBEDDED TECHNOLOGIES

Reliability Engineering
Philippines

PASSED

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

	Name/s	**Signature**	**Date**
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Revision Control		
Revision	**Change History**	**Date**
A	First Release	02/10/2017

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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.

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