



# Test Report: UHP-350-55

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## 350W Slim Type with PFC Switching Power Supply

### ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

### ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

### ■ RELIABILITY TEST

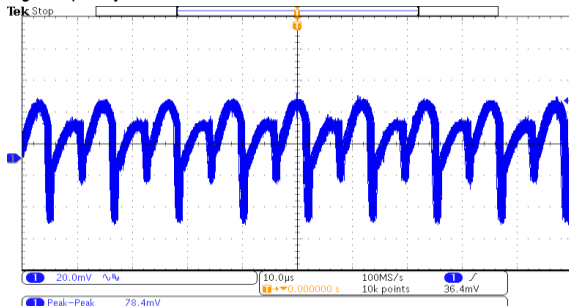
Environment Test

## DESIGN VERIFY TEST

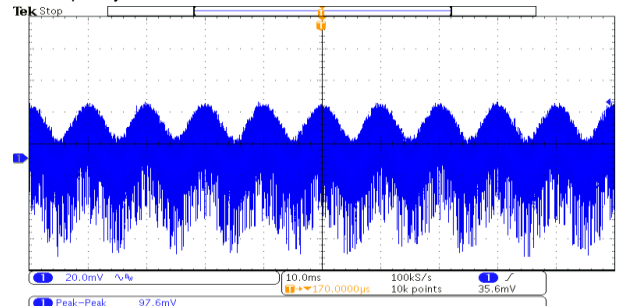
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	45V~58V	I/P: 230VAC/115VAC O/P: NO LOAD Ta: 25°C	38.41V~57.94V/230VAC 38.53V~57.92V/115VAC
2	OUTPUT VOLTAGE TOLERANCE	-1% ~1%	I/P: 90VAC /264VAC O/P: FULL/ NO LOAD Ta: 25°C	-0.2%~0.127%
3	LINE REGULATION	-0.3%~0.3%	I/P: 100VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	-0.02% ~ 0%
4	LOAD REGULATION	-0.5%~0.5%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	-0.07%~0.24%
5	OVER/UNDERSHOOT TEST	<± 5 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	1.0%
6	RIPPLE & NOISE (Max)	300mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	97.6mVp-p /CCH 100%load

high frequency :



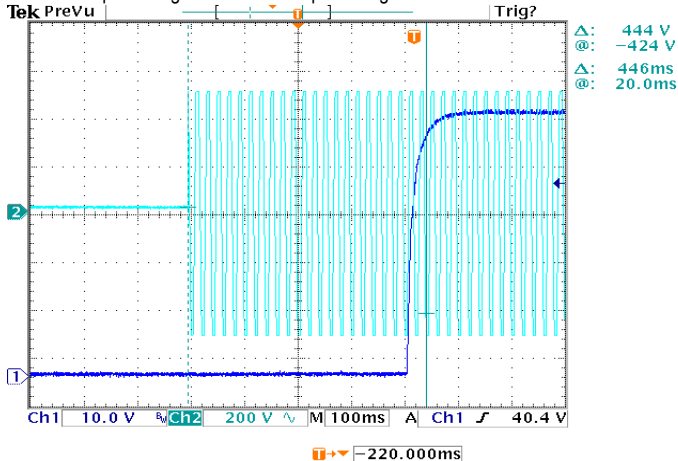
low frequency :



7	SET UP TIME(Max)	230VAC/ 550ms 115VAC/ 3000ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/446ms 115VAC/1870ms
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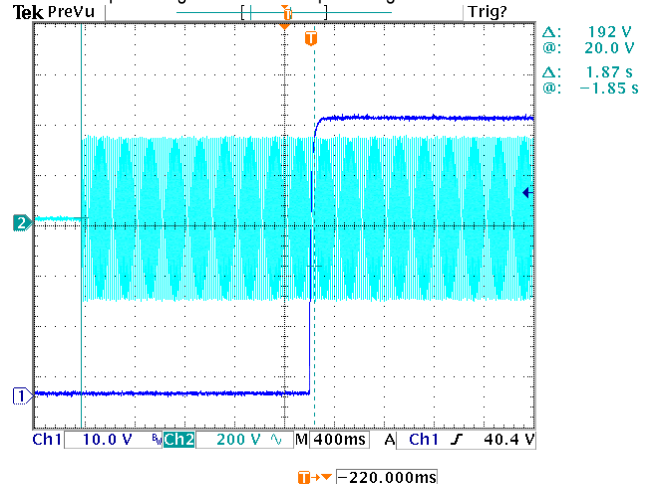
INPUT=230VAC/50HZ @ FULL LOAD

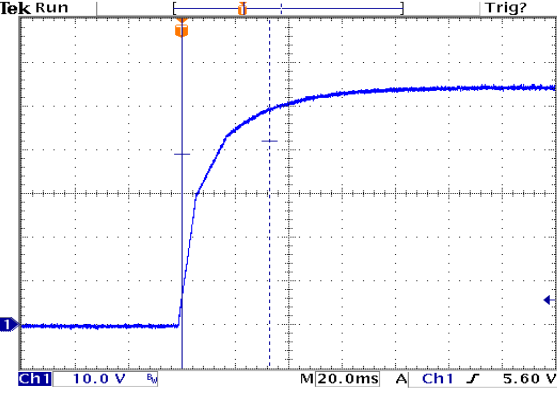
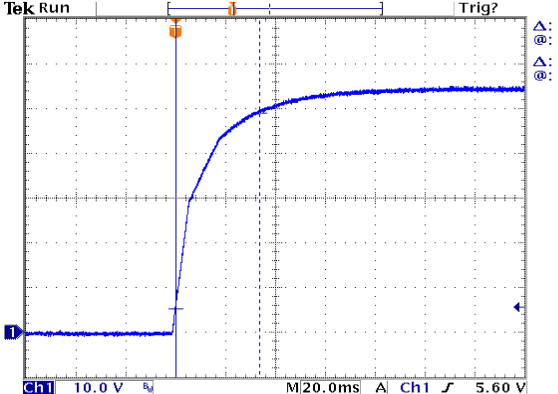
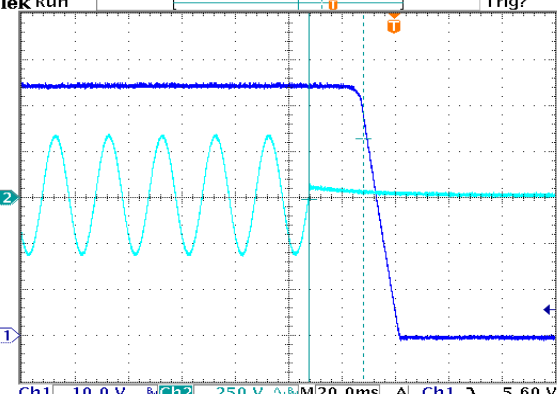
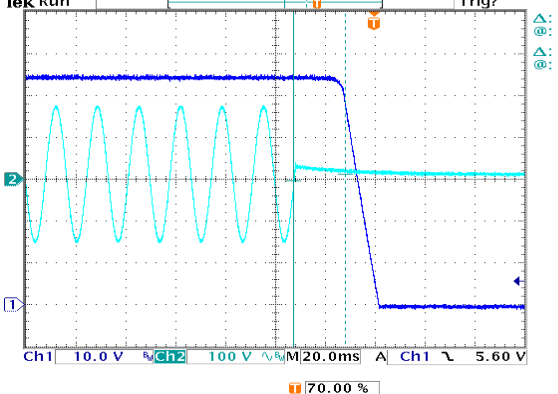
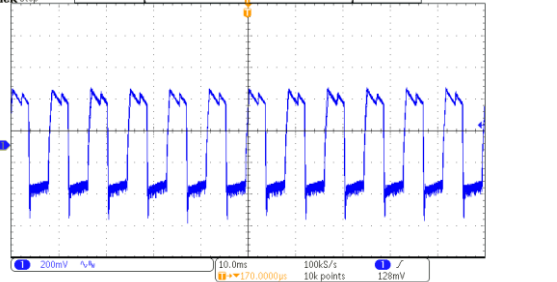
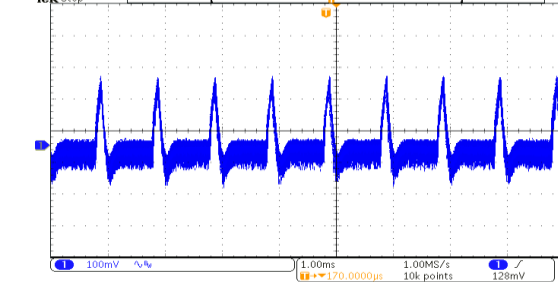
CH1: Output Voltage CH2: AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

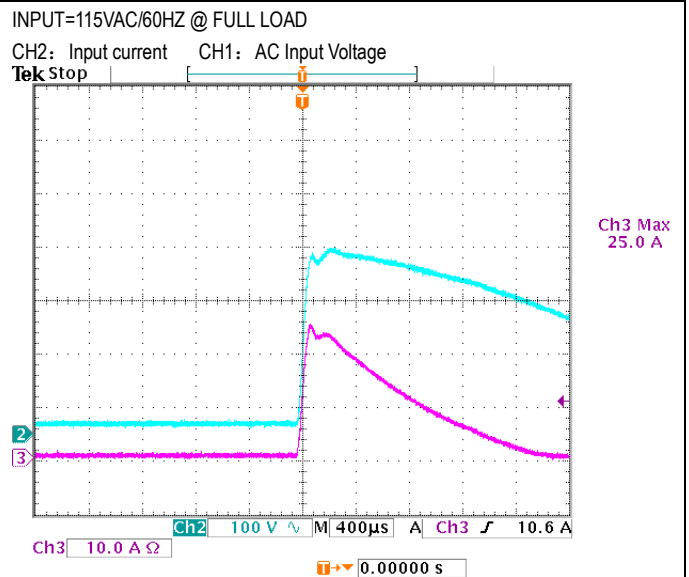
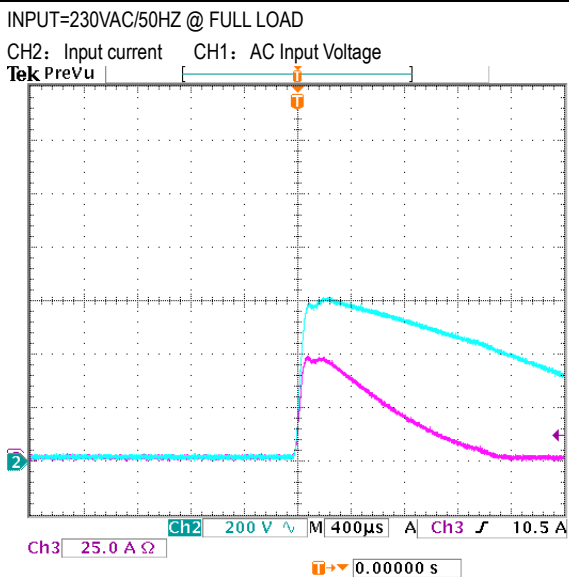
CH1: Output Voltage CH2: AC Input Voltage



8	RISE TIME (Max)  230VAC/ 80ms 115VAC/ 80ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/32.8ms 115VAC/33.6ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage</p>  <p>Δ: 3.00 V @: 39.0 V Δ: 32.8ms @: 0.00 s</p> <p>Ch1 10.0 V M20.0ms A Ch1 5.60 V</p> <p>30.00 %</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage</p>  <p>Δ: 43.8 V @: 5.20 V Δ: 33.6ms @: 0.00 s</p> <p>Ch1 10.0 V M20.0ms A Ch1 5.60 V</p> <p>30.00 %</p>	
9	HOLD UP TIME(Typ )  230VAC/ 10ms 115VAC/ 10ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/20.4ms 115VAC/20.8ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>  <p>Δ: 330 V @: -10.0 V Δ: 20.4ms @: -32.4ms</p> <p>Ch1 10.0 V Ch2 250 V M20.0ms A Ch1 5.60 V</p> <p>70.00 %</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>  <p>Δ: 16.0 V @: -4.00 V Δ: 20.8ms @: -32.8ms</p> <p>Ch1 10.0 V Ch2 100 V M20.0ms A Ch1 5.60 V</p> <p>70.00 %</p>	
10	DYNAMIC LOAD  5500mVp-p	I/P: 230VAC O/P: (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 856mVp-p (2) 336mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>  <p>200mV 10.0ms 100kS/s 128mV Peak-Peak 856mV</p>		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>  <p>100mV 1.00ms 1.00MS/s 128mV Peak-Peak 336mV</p>	

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	85 V~ 300 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P: FULL/NO LOAD ON: 30 Sec OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 90 VAC ~264 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	Withstand 300VAC Surge Test	300VAC input for 5 seconds No damage	I/P: 300VAC O/P: FULL LOAD Ta: 25°C	OK
4	AC CURRENT	4A/115VAC 2A/230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I = 3.25A/ 115VAC I = 1.62 A/ 230VAC
5	LEAKAGE CURRENT	< 0.75mA / 240VAC	I/P: 264 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.283mA N-FG: 0.298mA
6	NO LOAD CONSUMPTION	---	I/P: 115VAC I/P: 230VAC O/P: NO LOAD Ta: 25°C	1.5W/115VAC 1.21 W/230VAC
7	INRUSH CURRENT(Typ)	230V/ 60A 115V/ 30A COLD START	I/P: 230 VAC/115VAC O/P: FULL LOAD Ta: 25°C	I=47.5A/ 230VAC I=25A/ 115VAC



8	EFFICIENCY(Typ)	94%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	94.32%																																	
<p><b>EFFICIENCY vs LOAD</b></p> <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC Efficiency (%)</th> <th>230VAC Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>20</td><td>85</td><td>85</td></tr> <tr><td>30</td><td>90</td><td>91</td></tr> <tr><td>40</td><td>92</td><td>93</td></tr> <tr><td>50</td><td>93</td><td>94</td></tr> <tr><td>60</td><td>93</td><td>94</td></tr> <tr><td>70</td><td>93</td><td>94</td></tr> <tr><td>80</td><td>93</td><td>94</td></tr> <tr><td>90</td><td>93</td><td>94</td></tr> <tr><td>100</td><td>93</td><td>94</td></tr> </tbody> </table>					LOAD (%)	115VAC Efficiency (%)	230VAC Efficiency (%)	20	85	85	30	90	91	40	92	93	50	93	94	60	93	94	70	93	94	80	93	94	90	93	94	100	93	94			
LOAD (%)	115VAC Efficiency (%)	230VAC Efficiency (%)																																			
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90	93	94																																			
100	93	94																																			
9	POWER FACTOR	0.98/ 115VAC 0.94/ 230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	PF= 0.992/ 115VAC PF= 0.973/ 230VAC																																	
<p><b>P.F vs LOAD</b></p> <table border="1"> <caption>P.F vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC PF</th> <th>230VAC PF</th> </tr> </thead> <tbody> <tr><td>10</td><td>0.15</td><td>0.05</td></tr> <tr><td>20</td><td>0.85</td><td>0.50</td></tr> <tr><td>30</td><td>0.95</td><td>0.70</td></tr> <tr><td>40</td><td>0.98</td><td>0.80</td></tr> <tr><td>50</td><td>0.98</td><td>0.85</td></tr> <tr><td>60</td><td>0.98</td><td>0.90</td></tr> <tr><td>70</td><td>0.98</td><td>0.92</td></tr> <tr><td>80</td><td>0.98</td><td>0.93</td></tr> <tr><td>90</td><td>0.98</td><td>0.94</td></tr> <tr><td>100</td><td>0.98</td><td>0.94</td></tr> </tbody> </table>					LOAD (%)	115VAC PF	230VAC PF	10	0.15	0.05	20	0.85	0.50	30	0.95	0.70	40	0.98	0.80	50	0.98	0.85	60	0.98	0.90	70	0.98	0.92	80	0.98	0.93	90	0.98	0.94	100	0.98	0.94
LOAD (%)	115VAC PF	230VAC PF																																			
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**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	110%~140%	I/P: 110VAC I/P: 230VAC I/P: 264VAC O/P: TESTING Ta: 25°C	134.8%/ 110VAC 134.3%/ 230VAC 135.1%/ 264VAC ■ Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	60V~69V	I/P: 90VAC I/P: 230VAC I/P: 264VAC O/P: NO LOAD Ta: 25°C	63.60V/ 90VAC 63.66V/ 230VAC 63.74V/ 264VAC ■ Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 100VAC I/P: 230VAC I/P: 264VAC O/P: FULL LOAD	O.T.P. Active ■ Shut down o/p voltage, recovers automatically after temperature goes down

**CONTROL FUNCTION TEST**

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT
1	REDUNDANT CONTROL	For parallel connection protection:For parallel applications,when one PSU can not work,the another one will be automatically enabled.This can prevent the system crash,and provide the reliability of system	I/P: 230VAC O/P: NO LOAD /FULL LOAD Ta: 25°C	TEST : OK
2	DCOK CONTACT RATINGS	30VDC/1A RESISTIVE LOAD	I/P:230VAC O/P:FULL LOAD Ta:25°C	TEST : OK

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	Q11 Rated 24A/600V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load FULL Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load.  I/P:Low-Line -3V = 87V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load FULL Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load.	VDS: (1) 476V (2) 488V  (3) 476V (4) 476V (5) 476V (6) 480V (7) 476V  VDS: (1) 432V (2) 456V (3) 428V (4) 432V (5) 428V (6) 432V (7) 460V
2	Diode Peak Voltage	Q101 Rated 45A/150V  Q103 Rated 45A/150V	I/P:High-Line +3V =267V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load FULL Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD	Q101: VDS: (1) 126V (2) 8V (3) 126V (4) 128V (5) 128V (6) 126V (7) 36V (8) 128V  Q103: VDS: (1) 130V (2) 62V (3) 136V (4) 132V (5) 134V (6)136V (7) 68V (8)124V

3	P.F.C Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	Q2 Rated 24A/600V	I/P:High-Line +3V =267V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load FULL Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load.  I/P:Low-Line -3V = 87V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load FULL Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load.  Ta:25°C	VDS: (1) 432V (2) 428V (3) 448V (4) 424V (5) 448V (6) 452V (7) 436V  VDS: (1) 532V (2) 448V (3) 536V (4) 536V (5) 536V (6) 504V (7) 448V
4	<b>Input Capacitor Voltage</b>	C5 Rated: : 180 μ / 450 V	I/P:High-Line +3V =267V O/P: (1)Full Load (2) No Load (3)Full Load /No Load Change	(1) 444V (2) 444V (3) 432V
5	<b>Control IC Voltage Test</b>	PWM IC U1Rated 11 V ~20 V  O/P IC U100Rated 8 V ~24V	I/P:High-Line +3V =267V AC ON/OFF O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VR.LOW LINE	U1            U100 (1) 13.1V    12.4V (2) 13.1V    2.4V (3) 13.1V    5.16V (4) 12.9V    12.6V (5) 11.5V    8.16V
6	<b>VCC Diode Peak Voltage</b>	D44Rated: 1.1A/200V D201 Rated: 1.1A/200V	I/P:High-Line +3V =267V O/P: (1) FULL Load (2) Output Short (3) NO Load (4) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz	D44            D201 (1) 85.2V    28.8V (2) 104V    23.2V (3) 69.6V    28.8V (4) 92.8V    29.2V

■ **SAFETY & E.M.C. TEST**

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-FG: 2.0 KVAC/min I/P-O/P: 3.75 KVAC/min O/P-FG: 1.25 KVAC/min	I/P-FG: 2.4 KVAC/min I/P-O/P: 4.125 KVAC/min O/P-FG: 1.5 KVAC/min Ta:25°C	I/P-FG: 2.729mA I/P-O/P: 2.381mA O/P-FG: 3.627mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-FG: 500VDC>100MΩ I/P-O/P:500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-FG: 500 VDC I/P-O/P: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-FG: 9999MΩ I/P-O/P: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	13mΩ

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2	I/P: 230VAC/50HZ O/P: FULL/75% LOAD Ta: 25°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 HEAVY INDUSTRY AIR: 8KV Contact: 4KV	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA
5	E.F.T	EN61000-4-4 HEAVY INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA
6	SURGE	EN61000-4-5 HEAVY INDUSTRY L-N: 2KV L,N-PE: 4KV	I/P: 230VAC/50HZ O/P: FULL LOAD L-N: 2KV L,N-PE: 4KV Ta: 25°C	CRITERIA
7	Test by certified Lab & Test Report Prepare			



■ **RELIABILITY TEST**

**ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																				
1	TEMPERATURE RISE TEST	MODEL: UHP-350-55 1. ROOM AMBIENT BURN-IN: 2HRS I/P: 230VAC O/P: FULL LOAD Ta=29.1 °C 2. HIGH AMBIENT BURN-IN: 2HRS I/P: 230VAC O/P: FULL LOAD Ta=51.8 °C																																																																																																						
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P: 230 VAC O/P: 131%LOAD Ta: 25°C	TEST: OK																																																																																																				
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 264VAC/110VAC O/P: 100% LOAD Ta= -35°C	TEST: OK																																																																																																				
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C/95 %R.H NO DAMAGE	I/P: 272 VAC O/P: FULL LOAD Ta= 50°C HUMIDITY= 95 %R.H	TEST: OK																																																																																																				
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0-50°C)	I/P: 230 VAC O/P: FULL LOAD	± 0.016%/°C(0-50°C)																																																																																																				

6	STORAGE TEMPERATURE TEST	-40~85°C	1. Thermal shock Temperature : -45°C~+90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC
7	THERMAL SHOCK TEST	-30~50°C	1. Thermal shock Temperature : -35°C~+55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 12min/sweep cycle (4) Acceleration: 6G (5) Test Time: 180min in each axis (X.Y.Z) (6) Ta: 25°C
9	CAPACITOR LIFE CYCLE	UHP-350-55: SUPPOSE C108 IS THE MOST CRITICAL COMPONENT (1) I/P: 230VAC O/P: FULL LOAD Ta= 25 °C LIFE TIME (2) I/P: 230VAC O/P: FULL LOAD Ta=50 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta=50 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta=50 °C LIFE TIME	(1) 779402HRS (2) 174396HRS (3) 290265HRS (4) 398628HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1791.2K hrs min. Telcordia SR-332 (Bellcore) ; 253.4K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P: 230VAC O/P: FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/HUANGMK	WENF	LIUWY

2018.4.30 GP-A50-F010