



Test Report: LOP-300-27

300W 4"×2" Low Profile Open Frame Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

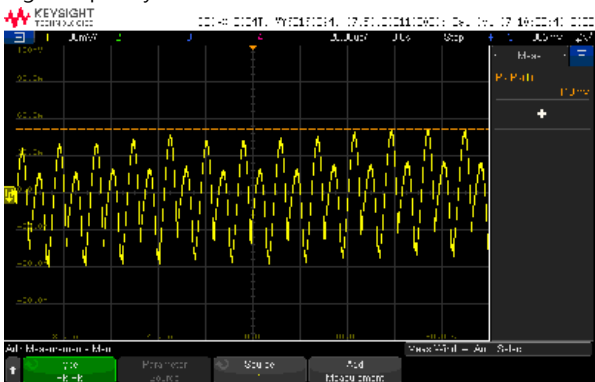
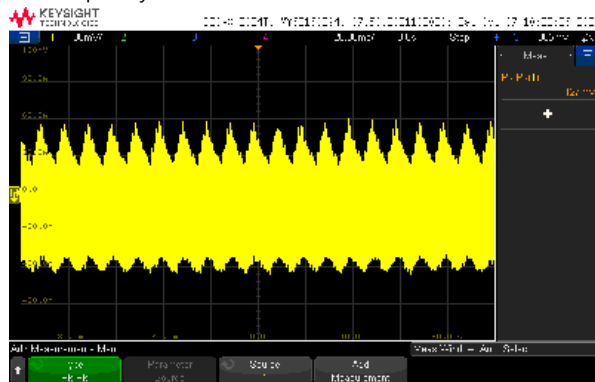
E.M.C. Test

■ RELIABILITY TEST

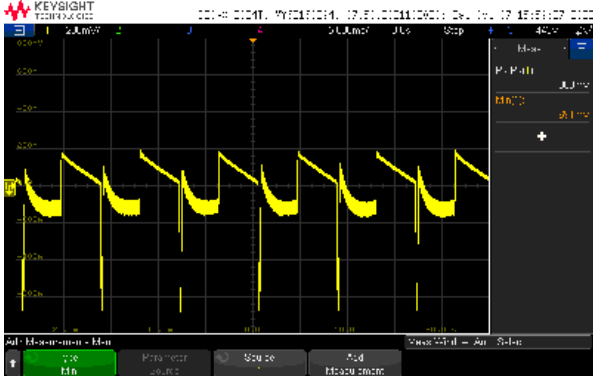
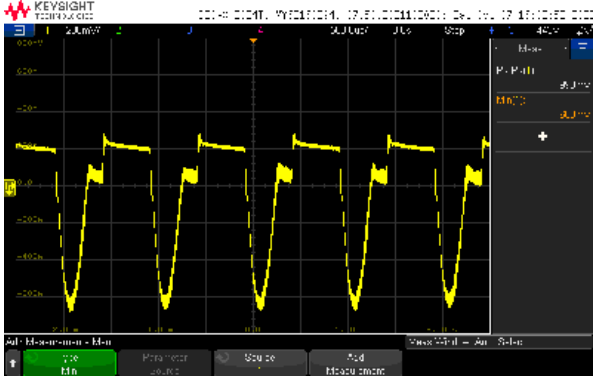
ENVIRONMENT TEST

DESIGN VERIFY TEST

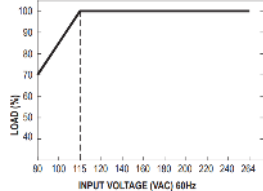
OUTPUT FUNCTION TEST

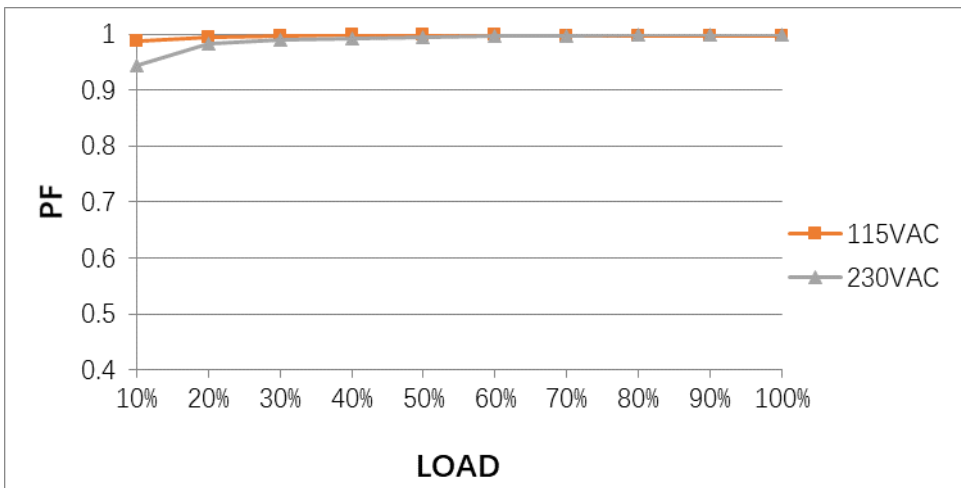
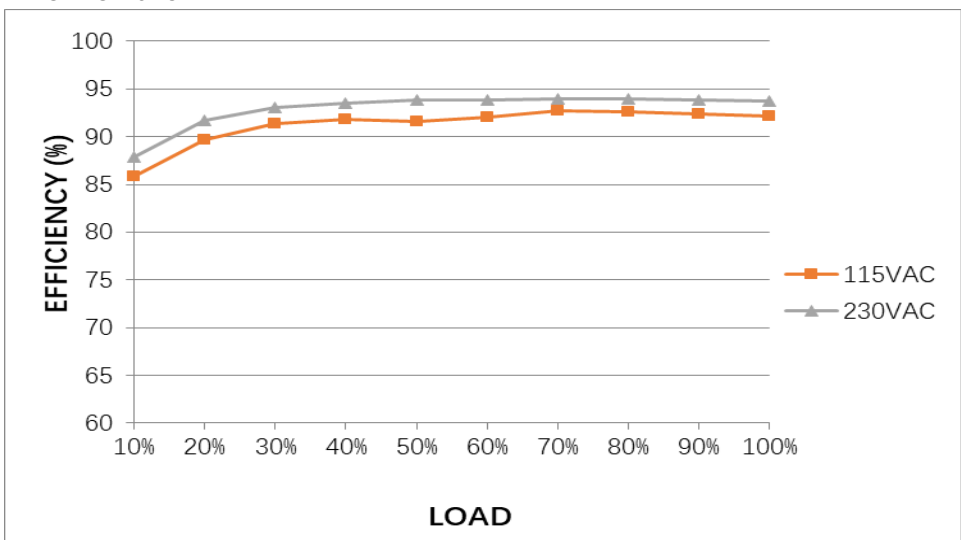
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 25.6V~28.4V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	24.590V~29.333V/230VAC 24.590V~29.333V/115VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ +1%	I/P: 80VAC~ 264VAC O/P:FULL~ MIN. LOAD Ta:25°C	V1: -0.05%~0.04%
3	LINE REGULATION	V1: -0.5% ~ +0.5%	I/P: 80VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~0.004%
4	LOAD REGULATION	V1: -1% ~ +1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.05%~0.04%
5	OVER/UNDERSHOOT TEST	<±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	0.4%
6	RIPPLE & NOISE (Max)	V1: 200mVp-p	I/P:230VAC O/P: FULL LOAD Ta:25°C	V1: 113mVp-p / high frequency 127mVp-p / low frequency
high frequency :				
low frequency :				
7	SET UP TIME(Max)	230VAC/1000ms 115VAC/1500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 417.68ms 115VAC/ 392.38ms
INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH3: AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage CH3: AC Input Voltage		

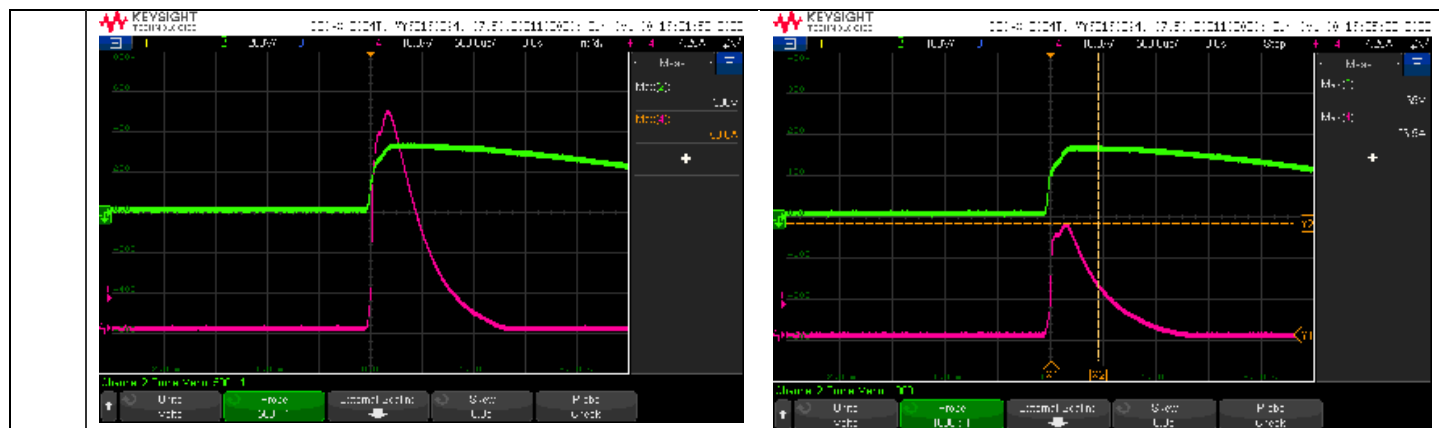
8	RISE TIME (Max)	230VAC/30ms 115VAC/30ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C
	INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage
9	HOLD UP TIME (Typ.)	8ms /300W load 16ms /180W load	I/P : 230 VAC O/P : TESTING Ta : 25°C
	INPUT=230VAC/50HZ @ 300W load CH1: Output Voltage CH3: AC Input Voltage		INPUT=230VAC/50HZ @ 180W load CH1: Output Voltage CH3: AC Input Voltage
10	DYNAMIC LOAD	V1: 2700mVp-p	I/P: 230VAC O/P: (1) FULL/0% LOAD 50%DUTY / 120HZ (2) FULL/0% LOAD 50%DUTY / 1KHZ Ta:25°C

	FULL /0% LOAD 50%DUTY / 120HZ		FULL /0% LOAD 50%DUTY / 1KHZ	
				
11	TRANSIENT RECOVERY TIME	V1: 2700mVp-p < 500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	331mVp-p 0us
12	PEAK LOAD	150% PEAK LOAD@3S	I/P: 264VAC I/P: 115VAC O/P: PEAK LOAD	TEST : OK

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC~264VAC 113VDC~ 370VDC 	(1) I/P: TESTING O/P: FULL / 70% LOAD (2) I/P: DC TESTING (L: + N: -) O/P: FULL / 70% LOAD (3) I/P: DC TESTING (L: - N: +) O/P: FULL / 70% LOAD Ta:25°C I/P: HIGH-LINE+15%=300V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1) 74.8V~264V/ FULL LOAD 74.5V~264V/ 70% LOAD (2) 106.29Vdc~370Vdc/FULL LOAD 106.19Vdc~370Vdc/70% LOAD (3) 106.29Vdc~370Vdc/FULL LOAD 106.19Vdc~370Vdc/70% LOAD TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:80 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST : OK
3	INPUT CURRENT (Typ.)	230V/ 1.8A 115V/ 3.5A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.39A/ 230VAC I =2.96A/ 115VAC
4	LEAKAGE CURRENT	Earth leakage current < 500uA(rms) @ 264VAC Touch current < 70uA(rms) @ 264VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	Earth: 265.6uA / 264VAC Touch:40.7uA / 264VAC
5	NO LOAD CONSUMPTION	<0.5W	I/P : 230VAC I/P : 115VAC	0.206W/ 230VAC 0.135W/ 115VAC

			O/P : NO LOAD Ta : 25°C																																		
6	POWER FACTOR (Typ.)	0.95/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF=0.9881/230VAC PF=0.9909/115VAC																																	
P.F vs LOAD  <table><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>0.95</td><td>0.95</td></tr><tr><td>20%</td><td>0.98</td><td>0.98</td></tr><tr><td>30%</td><td>0.99</td><td>0.99</td></tr><tr><td>40%</td><td>0.99</td><td>0.99</td></tr><tr><td>50%</td><td>0.99</td><td>0.99</td></tr><tr><td>60%</td><td>0.99</td><td>0.99</td></tr><tr><td>70%</td><td>0.99</td><td>0.99</td></tr><tr><td>80%</td><td>0.99</td><td>0.99</td></tr><tr><td>90%</td><td>0.99</td><td>0.99</td></tr><tr><td>100%</td><td>0.99</td><td>0.99</td></tr></tbody></table>					LOAD (%)	115VAC PF	230VAC PF	10%	0.95	0.95	20%	0.98	0.98	30%	0.99	0.99	40%	0.99	0.99	50%	0.99	0.99	60%	0.99	0.99	70%	0.99	0.99	80%	0.99	0.99	90%	0.99	0.99	100%	0.99	0.99
LOAD (%)	115VAC PF	230VAC PF																																			
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7	EFFICIENCY(Typ.)	93%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	94.3%																																	
EFFICIENCY vs LOAD  <table><caption>EFFICIENCY vs LOAD Data</caption><thead><tr><th>LOAD (%)</th><th>115VAC Efficiency (%)</th><th>230VAC Efficiency (%)</th></tr></thead><tbody><tr><td>10%</td><td>86</td><td>88</td></tr><tr><td>20%</td><td>90</td><td>92</td></tr><tr><td>30%</td><td>92</td><td>93</td></tr><tr><td>40%</td><td>92</td><td>94</td></tr><tr><td>50%</td><td>92</td><td>94</td></tr><tr><td>60%</td><td>92</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 (%)	10%	86	88	20%	90	92	30%	92	93	40%	92	94	50%	92	94	60%	92	94	70%	93	94	80%	93	94	90%	93	94	100%	93	94
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90%	93	94																																			
100%	93	94																																			
8	INRUSH CURRENT(Typ.)	230V/80A 115V/40A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =53.8A/ 230VAC I =26.9A/ 115VAC T50= 440us/230V																																	
INPUT=230VAC/50HZ @ FULL LOAD CH1: AC Input Voltage CH4: Input current		INPUT=115VAC/ 60HZ @ FULL LOAD CH1: AC Input Voltage CH4: Input current																																			



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 150% PROTECTION TYPE : Hiccup after 3 sec, recovers automatically(3 sec) after fault condition is removed.	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING Ta:25°C	131.53%/ 264VAC 14.6A 131.53%/ 230VAC 14.6A 131.08%/ 115VAC 14.55A PROTECTION TYPE : Hiccup after 3 sec, recovers automatically(3 sec) after fault condition is removed.
2	OVER VOLTAGE PROTECTION	29.7V~35.1V Protection type: Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 80VAC O/P: MIN LOAD Ta:25°C	31.8 V/ 264VAC 31.4V/ 80VAC Protection type: Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type: Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P Active OK Protection type : Shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE Protection type: Hiccup mode, recovers automatically after fault condition is removed	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE OK PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	EXTERNAL FAN SUPPLY	12V@0.5A for driving a fan / 12V@0.5A without fan cooling ; (10.98CFM) tolerance -15%~+15% at main output 20% rated current	I/P: 230 VAC O/P: TESTING Ta:25°C	TEST : -1.4%~ 1.5%

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q5/ Q6 Rated: 18A/600V	AC ON/OFF I/P: High-Line +3V =267V 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 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load (8) Peak Load Ta:25°C	Q5: VDS: (1) 437V (2) 463V (3) 437V (4) 437V (5) 433V (6) 437V (7) 450V (8) 437V Q6: VDS: (1) 450V (2) 478V (3) 450V (4) 454V (5) 450V (6) 450V (7) 466V (8) 450V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated: 22A/600V	AC ON/OFF I/P: High-Line +3V =267V 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 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load (8) Peak Load Ta:25°C	VDS: (1) 454V (2) 441V (3) 458V (4) 458V (5) 466V (6) 441V (7) 417V (8) 462V
3	P.F.C DIODE	D1 Rated: 8A/ 600V	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (5) Peak Load Ta:25°C	(1) 435V (2) 419V (3) 436V (4) 431V (5) 443V

4	Diode Peak Voltage	Q100/Q101 Rated: 120A/80V	AC ON/OFF I/P: High-Line +3V =267 V Vo=Vomax 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 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD (9) burst Mode 脫離前 (10) Peak Load Vo=Vnormal O/P: (1) Full Load Ta:25°C	Q100: Vo=Vomax VDS: (1) 70.2V (2) 69.6V (3) 70.8V (4) 69.6V (5) 69.6V (6) 70.8V (7) 64.8V (8) 64.8V (9) 64.8V (10) 71.4V Vo=Vnormal (1) 66.6V	Q101: Vo=Vomax VDS: (1) 69.6V (2) 69.6V (3) 70.8V (4) 70.8V (5) 69.6V (6) 70.8V (7) 65.4V (8) 65.5V (9) 66.0V (10) 71.4V Vo=Vnormal (1) 67.2V
5	Input Capacitor Voltage	C5 Rated: 100μ / 420V	I/P: High-Line +3V =267V O/P: (1)Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change (4) Full load continue (5) Peak Load on/off (6) Peak Load continue Ta:25°C	(1) 403V (2) 397V (3) 403V (4) 409V (5) 403V (6) 403V	
6	Control IC Voltage Test	PFC /PWM IC U1: Rated : 18.2V~ 28.7V O/P IC U101 Rated : 4.75V~38V	AC ON/OFF I/P: High-Line +3V =267 V O/P: (1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VRmin (LOW LINE) Ta:25°C	U1 (1) 26.8V (2) 19.2V (3) 27.2V (4) 27.0V (5) 19.4V	U101 (1) 19.4V (2) 10.7V (3) 19.4V (4) 20.8V (5) 17.0V

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min I/P-FG :2KVAC/min O/P-FG:1.5KVAC/min	I/P-O/P: 4.4 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.8 KVAC/min Ta:25°C	I/P-O/P:1.527mA I/P-FG:2.51mA O/P-FG: 0.446mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25°C	I/P-O/P:50GΩ I/P-FG:50GΩ O/P-FG:50GΩ NO DAMAGE

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS
2	CONDUCTION	BS EN/EN55032(CISPR32) BS EN/EN55011(CISPR11) Class I : Class B , Class II: Class A BS EN/EN55014(CISPR32) Class I : Class B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032(CISPR32) BS EN/EN55011(CISPR11) Class I : Class B , Class II: Class A BS EN/EN55014(CISPR32) Class I : Class B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	BS EN/EN61000-4-2 ■ MEDICAL AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	■ CRITERIA A
5	E.F.T	BS EN/EN61000-4-4 ■ INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	■ CRITERIA A
6	SURGE	IEC61000-4-5 ■ INDUSTRY L-N : 2KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	■ CRITERIA A
7	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																																																								
1	TEMPERATURE RISE TEST	MODEL : LOP-300-24 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 °C																																																																																																																																										
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 126.35 % LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC 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	± 0.013 %/°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	-40~50°C	1. Thermal shock Temperature : -45°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, 2G 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 : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	
9	CAPACITOR LIFE CYCLE	SUPPOSE C106 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) 770816.6 HRS (2) 98376.6 HRS (3) 189337.6 HRS (4) 298983.2 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 2805.6K hrs min. Telcordia SR-332 (Bellcore) ; 384.4K 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	YUWEI	LIUTT	WANGDZ

2020.10.1 TAG-QA-009