



Test Report: NSP-320-12

320W AC/DC High Reliable Multi-Industries Enclosed Type 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

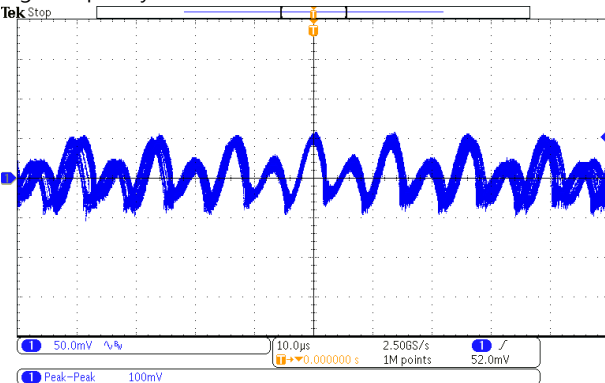
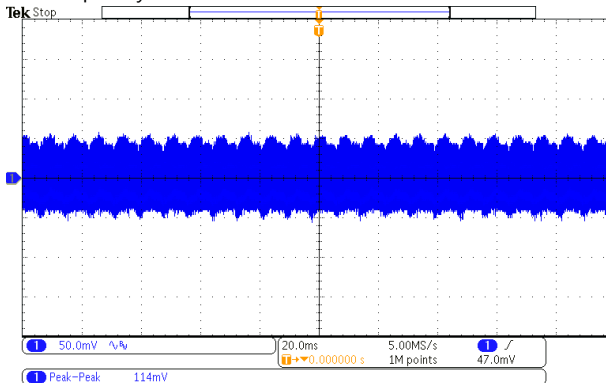
E.M.C. Test

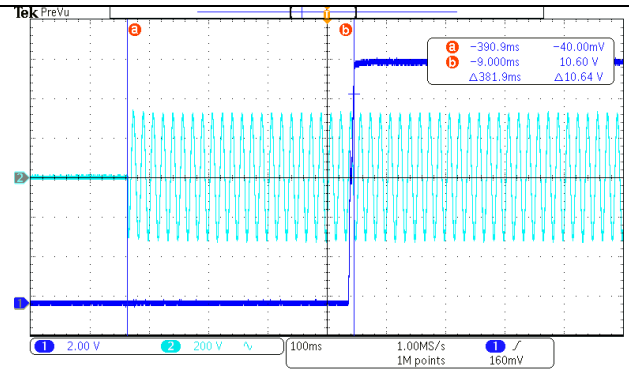
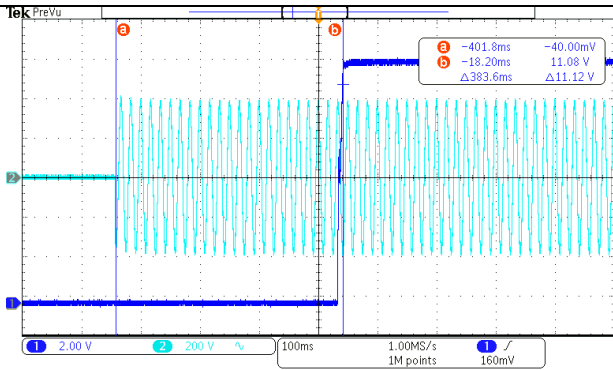
■ RELIABILITY TEST

ENVIRONMENT TEST

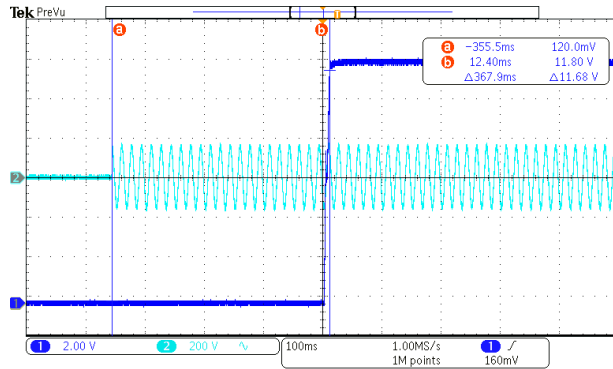
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.8V~14V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	10.32V~14.79V/230VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -2%~2%	I/P: 85VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:-0.25%~ 0.25%
3	LINE REGULATION	V1: -0.5%~0.5%	I/P: 85VAC~ 305VAC O/P:FULL LOAD Ta:25°C	V1: 0%~0 %
4	LOAD REGULATION	V1: -0.5%~0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1:-0.16%~0.16%
5	OVER/UNDERSHOOT TEST	< ± 5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	2.6%
6	RIPPLE & NOISE (Max)	V1:200mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta:25°C	V1: 114mVp-p
		high frequency :	low frequency :	
				
7	SET UP TIME(Max)	277VAC/1000ms 230VAC/1000ms 115VAC/1500ms	I/P : 277 VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	277VAC/383.6ms 230VAC/381.9ms 115VAC/367.9ms
		INPUT=277VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



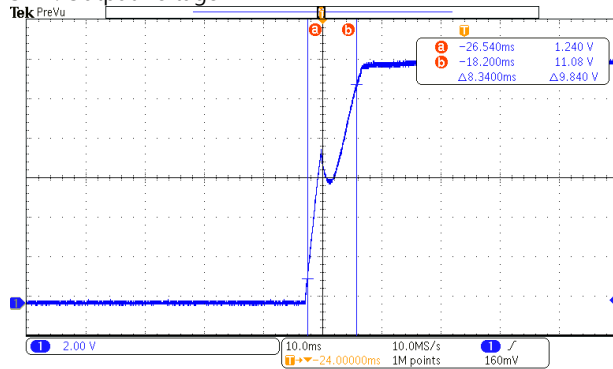
8 RISE TIME (Max)

277VAC/80ms
230VAC/80ms
115VAC/80ms

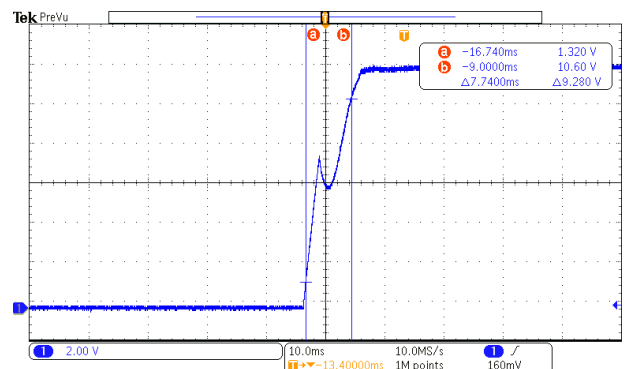
I/P : 277 VAC
I/P : 230 VAC
I/P : 115VAC
O/P : FULL LOAD
Ta : 25°C

277VAC/8.34ms
230VAC/7.74ms
115VAC/7.94ms

INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>			
9	<p>HOLD UP TIME (Typ.)</p>	<p>277VAC/16ms 230VAC/16ms 115VAC/16ms</p>	<p>I/P : 277VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C</p>	<p>277VAC/25.97ms 230VAC/25.74ms 115VAC/24.97ms</p>
<p>INPUT=277VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		
<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>				
10	<p>DYNAMIC LOAD</p>	<p>V1:1200mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C</p>	<p>476mVp-p 616mVp-p</p>

11	TRANSIENT RECOVERY TIME	V1:1200mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	236mVp-p 104us

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~305VAC 120VDC~ 431VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25°C	(1) 80V~308V (2) 117Vdc~434Vdc/FULL LOAD 117 Vdc~434Vdc/50% LOAD (3) 117Vdc~ 434Vdc/FULL LOAD 117Vdc~ 434 Vdc/50% LOAD
			I/P: LOW-LINE-3V=82 V HIGH-LINE+10V=315 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST:PASS
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 85VAC ~305 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: PASS
3	INPUT CURRENT (Typ.)	277VAC/1.4A 230VAC/1.6A 115VAC/3.2A	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.22A/ 277VAC I =1.47A/ 230VAC I =3.00A/ 115VAC
4	LEAKAGE CURRENT	Earth leakage current <350μA(rms)@277Vac, touch current<100μA(rms) @ 277Vac	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	262μA for Earth 26μA for touch
5	POWER FACTOR (Typ.)	0.90/ 277VAC 0.93/ 230VAC 0.98/115VAC	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC	PF=0.989/277VAC PF=0.994/230VAC PF=0.997/115VAC

			O/P : FULL LOAD Ta : 25°C																																													
	<p>P.F vs LOAD</p> <table border="1"> <caption>P.F vs LOAD Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC</th> <th>230VAC</th> <th>277VAC</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.95</td><td>0.75</td><td>0.55</td></tr> <tr><td>20%</td><td>0.96</td><td>0.95</td><td>0.85</td></tr> <tr><td>30%</td><td>0.97</td><td>0.96</td><td>0.94</td></tr> <tr><td>40%</td><td>0.97</td><td>0.97</td><td>0.96</td></tr> <tr><td>50%</td><td>0.97</td><td>0.97</td><td>0.96</td></tr> <tr><td>60%</td><td>0.97</td><td>0.97</td><td>0.96</td></tr> <tr><td>70%</td><td>0.97</td><td>0.97</td><td>0.96</td></tr> <tr><td>80%</td><td>0.97</td><td>0.97</td><td>0.97</td></tr> <tr><td>90%</td><td>0.97</td><td>0.97</td><td>0.97</td></tr> <tr><td>100%</td><td>0.97</td><td>0.97</td><td>0.97</td></tr> </tbody> </table>				LOAD (%)	115VAC	230VAC	277VAC	10%	0.95	0.75	0.55	20%	0.96	0.95	0.85	30%	0.97	0.96	0.94	40%	0.97	0.97	0.96	50%	0.97	0.97	0.96	60%	0.97	0.97	0.96	70%	0.97	0.97	0.96	80%	0.97	0.97	0.97	90%	0.97	0.97	0.97	100%	0.97	0.97	0.97
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6	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	93.62%																																												
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100%	91	92	94																																													
7	NO LOAD POWER CONSUMPTION(Typ.)	Remote Power ON : 3W/277VAC 3W/230VAC 3W/115VAC Remote Power OFF : 0.50W/277VAC 0.50W/230VAC 0.30W/115VAC	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : RC ON/RC OFF Ta : 25°C	Remote Power ON : 1.47W/277VAC 1.62W/230VAC 1.56W/115VAC Remote Power OFF : 0.42W/277VAC 0.31W/230VAC 0.13W/115VAC																																												

8	INRUSH CURRENT(Typ.)	277VAC/50A 230VAC/40A 115VAC/20A COLD START	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =45.6A/ 277 VAC T50=997us/277 VAC I =36.4A/ 230 VAC T50=1038us/230 VAC I =16.8A/ 115 VAC T50=997us/115 VAC
	INPUT=277VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current		INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current	
	INPUT=115VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~200%	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: TESTING Ta:25°C	120.5%/ 305VAC 120.8%/ 230VAC 120.6%/85VAC Protection type: 1、Normally works within 105 ~ 200% rated output power for more than 5 seconds and then constant current limiting without shutdown(Vout>30%), recovers automatically after fault condition is removed, or shut

				<p>down o/p voltage when $V_{out} < 30\%$, AC re-power on to recover</p> <p>2 >200% rated power, constant current limiting ($V_{out} > 30\%$) with auto-recovery after fault condition is removed,</p>
2	OVER VOLTAGE PROTECTION	15V~19V	<p>I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta: 25°C</p>	<p>16.8V/ 305VAC 16.8V/ 230VAC 16.8V/ 85VAC Protection type : Shut down o/p voltage, AC re-power on to recover</p>
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage, AC re-power on to recover	<p>I/P: 305VAC I/P: 85VAC O/P: FULL LOAD</p>	<p>O.T.P. Active Protection type : Shut down o/p voltage, AC re-power on to recover</p>
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	<p>I/P: 305VAC I/P: 85VAC O/P: FULL LOAD Ta: 25°C</p>	<p>NO DAMAGE Protection type : Constant current limiting for more than 5 seconds ($V_{out} < 30\%$) and then shut down a/p voltage, AC re-power on to recover</p>

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT						
1	REMOTE CONTROL	<p>Power ON: Pin5 and Pin6 open or keep 0~0.8Vdc</p> <p>Power OFF: Pin5 and Pin6 keep 3.3~10Vdc</p>	<p>I/P: 230VAC O/P: FULL LOAD Ta: 25°C</p>	TEST: <u>OK</u>						
2	REMOTE SENSE	<p>S+ / S- The remote sensing compensates voltage drop on the load wiring up to 0.3V</p>	<p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C</p>	TEST: <u>OK</u>						
3	DC OK SIGNAL	<p>15Vdc/10mA resistive load</p> <table border="1" data-bbox="523 1818 837 1912"> <tr> <td>PSU Vo Status</td> <td>Photo transistor</td> </tr> <tr> <td>POWER ON</td> <td>Conduct(Low impedance)</td> </tr> <tr> <td>POWER OFF</td> <td>Open(High impedance)</td> </tr> </table> <p>Optocoupler Rating(max.) 15Vdc/10mA resistive load</p>	PSU Vo Status	Photo transistor	POWER ON	Conduct(Low impedance)	POWER OFF	Open(High impedance)	<p>I/P: 230VAC O/P: FULL LOAD Ta: 25°C</p>	TEST: <u>OK</u>
PSU Vo Status	Photo transistor									
POWER ON	Conduct(Low impedance)									
POWER OFF	Open(High impedance)									

4	FAN CONTROL & NOISE	<p>(1) Fan ON/OFF control : $RTH4 \geq 50^{\circ}C \pm 10^{\circ}C$ FAN ON $RTH4 \leq 40^{\circ}C \pm 10^{\circ}C$ FAN OFF</p> <p>(2) FAN NOISE : $< 40dB @ 100\% \text{ load with } T_a = 25^{\circ}C$</p>	<p>I/P: 230VAC O/P: FULL LOAD</p>	<p>TEST: (1) <u>ok</u> (2) <u>39.6</u> dB $T_a: 25^{\circ}C$</p>
5	PEAK Power	<p>I/P: 100/305VAC O/P:</p> <p>-----100VAC ————200VAC</p>		<p>TEST: <u>OK</u></p>

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q6 Rated 650V/15A	<p>AC ON/OFF I/P: High-Line +3V = 308V 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. $T_a: 25^{\circ}C$</p>	<p>VDS: (1) 496V (2) 520V (3) 504V (4) 500V (5) 504V (6) 504V (7) 520V</p>
2	Diode Peak Voltage	Q101 Rated 80 A/60 V	<p>AC ON/OFF I/P: High-Line +3V = 308 V O/P: (1) Full Load (2) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (3) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz</p>	<p>Q101: VDS: (1) 36.4V (2) 36.4V (3) 36V (4) 9.6V</p>

			(4)0%→400% Load. Ta:25°C	
3	Control IC Voltage Test	PFC/PWM IC U2 Rated 9.6V~ 36 V O/P IC U101 Rated 3V~ 30 V	AC ON/OFF I/P:High-Line +3V =308 V O/P(1)FULL LOAD (2) Output Short (3)O.L.P Ta:25°C	U2 (1) 19.4V (2) 19.4V (3) 19.4V U101 (1) 13.2V (2) 12.6V (3) 12.6V

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4.2 K VAC/min I/P-FG : 2.1 K VAC/min O/P-FG: 1.5 KVAC/min	I/P-O/P: 4.62 KVAC/min I/P-FG: 2.52 KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P-O/P: 2.381 mA I/P-FG: 2.167 mA O/P-FG: 1.875 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500 VDC>100MΩ I/P-FG: 500 VDC>100MΩ O/P-FG: 500 VDC >100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 9999 MΩ I/P-FG: 9999 MΩ O/P-FG: 9999 MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	11mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	■PASS □FAIL
2	CONDUCTION	BS EN/EN55032(CISPR32),CNS 15936 EN/EN55014-1(CISPR14-1) EN/EN55011(CISPR11)	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032(CISPR32),CNS 15936 EN/EN55014-1(CISPR14-1) EN/EN55011(CISPR11)	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

5	E.F.T	EN61000-4-4 INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 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 : NSP-320-12 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=25.5 °C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=62.3°C																																																																																						
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 120.8 % LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/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 60°C/95 %R.H NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 60°C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.05 %/°C(0~60°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.0067 %/°C(0~60°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	-30~60°C	1. Thermal shock Temperature : -35°C~ +65°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 : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 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= 60°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 60°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 60°C LIFE TIME	(1) 564504.5HRS (2) 51298.4HRS (3) 98473.1HRS (4) 170307.3HRS	
10	MTBF	Conducted by Parts Stress Analysis Prediction 1699.1K hrs min. Telcordia SR-332 (Bellcore) ; 257.1K 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 : 50,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Hanxr	Liutt	Wangzd

2020.10.1 TAG-QA-009