



Test Report: PWM-200-24KN

200W PWM OUTPUT KNX LED DRIVER

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

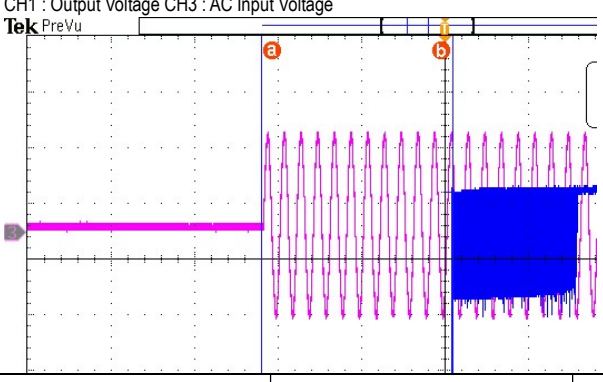
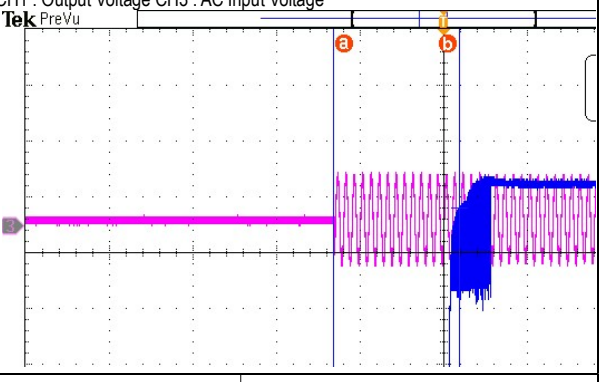
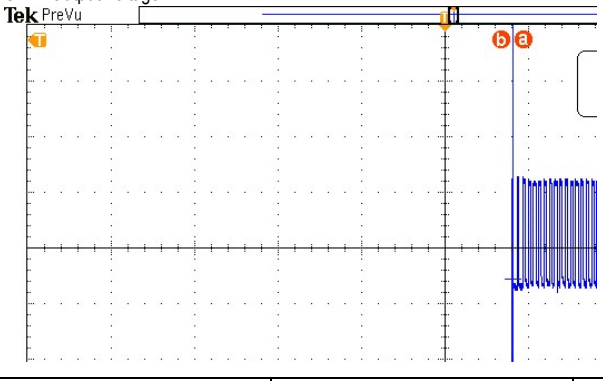
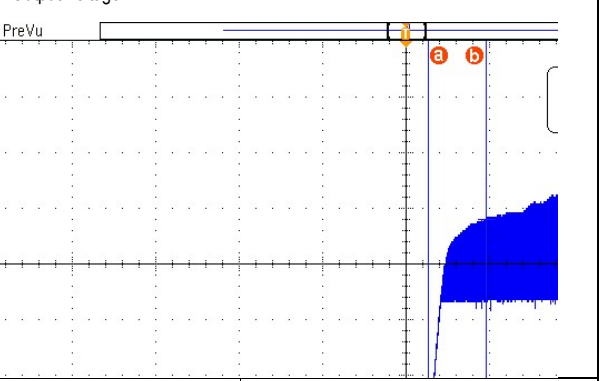
Safety Test
E.M.C. Test

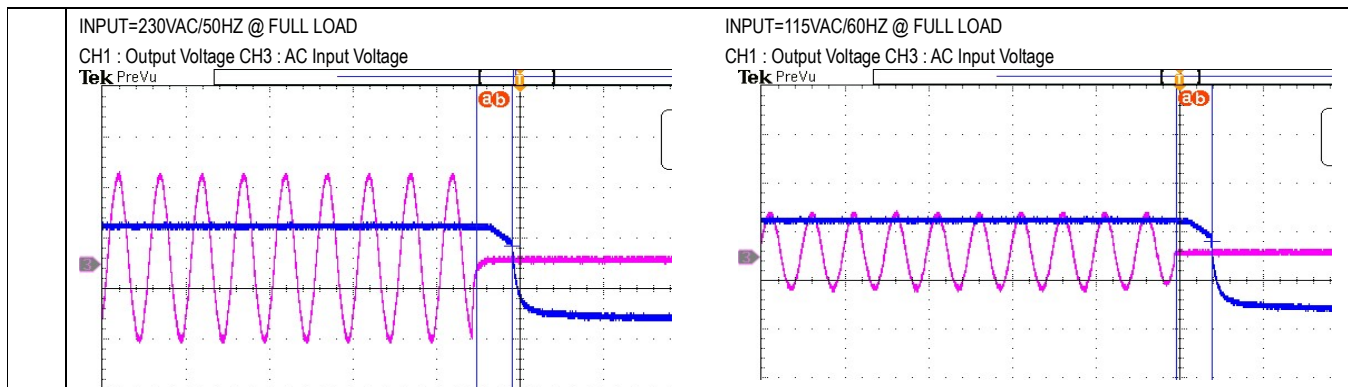
■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

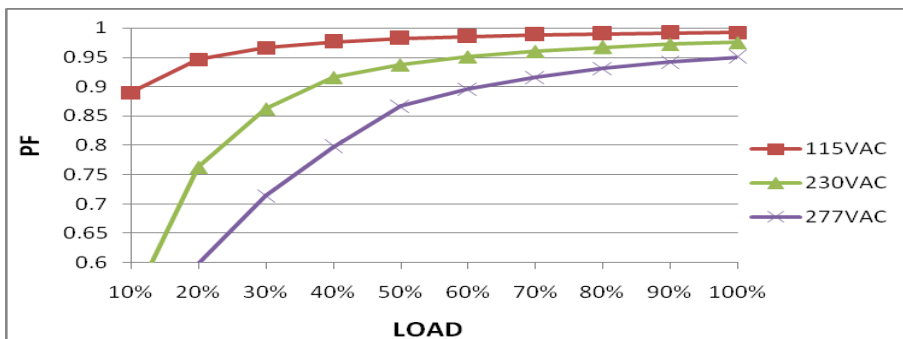
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Dimming Range	0~100%	I/P: 230 VAC O/P: 4KHz O/P: 200Hz Ta:25°C	V1: 1%~100%/3.97KHz V2: 1%~100%/200Hz
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -4% ~ +4% (Max)	I/P: 230VAC O/P:100%load Ta:25°C	V1: 0%~0.63%
3	OVER/UNDERSHOOT TEST	< +5%	I/P: 230VAC O/P:100% /0% Ta:25°C	3.82%
4	SET UP TIME(Max)	230VAC/ 500ms (Max) 115VAC/ 1200ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 228.2 ms 115VAC/300.9 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH3 : AC Input Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH3 : AC Input Voltage 				
5	RISE TIME (Max)	230VAC/ 80ms (Max) 115VAC/ 80ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 0.026ms 115VAC/27.25ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 				
6	HOLD UP TIME (Typ.)	230VAC/ 10ms (Typ) 115VAC/ 10ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/17.43ms 115VAC/16.85ms

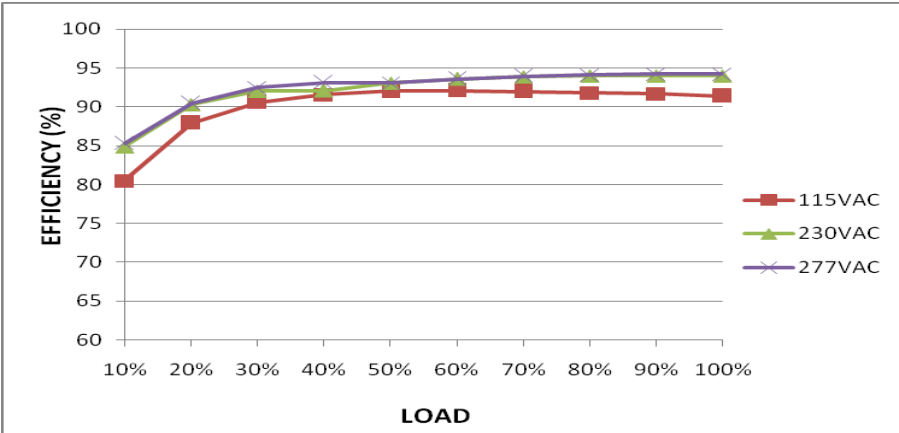
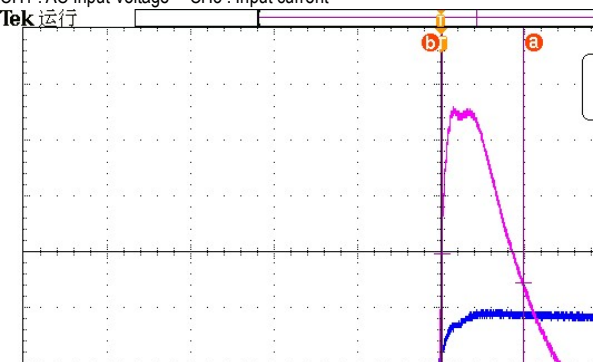
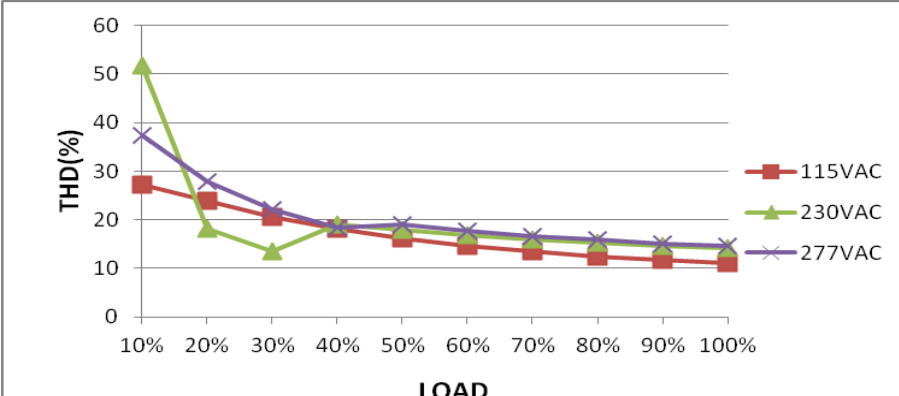


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~305VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	100VAC ~308VAC
			I/P: LOW-LINE-3V=97VAC HIGH-LINE+10=315VAC O/P: FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) 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: 110VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	TEST: OK
3	INPUT CURRENT (Typ.)	277 VAC/ 0.9A 230 VAC/ 1.1A 115 VAC/ 2.2A	I/P: 277VAC/230 VAC/115 VAC O/P: FULL LOAD Ta: 25°C	I = 0.8A/ 277VAC I = 0.94A/ 230VAC I = 1.89A/ 115VAC
4	LEAKAGE CURRENT	<0.75 mA / 277 VAC	I/P : 277VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.082 mA N-FG : 0.061 mA
5	STANDBY POWER CONSUMPTION	<0.5W	I/P : 230VAC Ta : 25°C	0.4172 W
6	POWER FACTOR (Typ.)	0.94/ 277 VAC/FULL LOAD 0.96/ 230 VAC/FULL LOAD 0.97/ 115 VAC/FULL LOAD	I/P: 277 VAC/230VAC/115VAC O/P: FULL LOAD Ta: 25°C	PF= 0.95/277VAC PF= 0.975/230VAC PF= 0.992/115VAC

P.F vs LOAD



7	EFFICIENCY(Typ.)	93%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	93.98%
	EFFICIENCY vs LOAD 			
8	INRUSH CURRENT(Typ.)	230V/ 65A (twidth=550 us measured at 50% Ipeak) COLD START	I/P : 230 VAC/50Hz O/P : FULL LOAD Ta : 25°C	I =62.4A/ 230VAC T50=389.6 us/230V
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : AC Input Voltage CH3 : Input current 			
9	TOTAL HARMONIC DISTORTION	THD<20% @load, ≥ 60% at 230VAC/115VAC, load, ≥ 75% at 277VAC	I/P : 277VAC /230VAC/115VAC O/P : 75% LOAD/60% LOAD	THD : 16.87%/ 60% Load/230VAC THD : 14.69%/ 60% Load/115VAC THD : 16.12%/ 75% Load/277VAC
	THD vs LOAD 			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	108%~ 135%	I/P: 305VAC I/P: 230 VAC I/P: 110 VAC O/P: TESTING Ta:25°C	125.6%/305VAC 125.5%/ 230VAC 125.3%/ 100VAC PROTECTION TYPE: Hiccup mode or Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	27V~34V	I/P: 305 VAC I/P: 230 VAC I/P: 110 VAC O/P: MIN LOAD Ta:25°C	31.47V/305VAC 31.17V/ 230VAC 31.52V/ 110VAC PROTECTION TYPE: Shut down o/p voltage, re-power on to recover after fault condition is removed
3	OVER TEMPERATURE PROTECTION	Protection type : NO DAMAGE	I/P: 305VAC I/P: 230VAC I/P: 110VAC O/P: FULL LOAD	O.T.P. Active Protection type : Shut down o/p voltage, re-power on to recover after fault condition is removed
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 230VAC I/P: 110VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Shut down o/p voltage, re-power on to recover

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	
1	PWM Power Transistor (D to S) or (C to E) Peak Voltage	Q73 Rated 11A/600V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load I/P: Low-Line -3V = 107VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C	308VAC VDS: (1) 560V (2) 552V (3) 452V (4) 460V (5) 548V (6) 556V	107VAC VDS: (1) 484V (2) 556V (3) 456V (4) 464V (5) 536V (6) 560V

2	LED DIMMING Transistor (D to S) or (C to E) Peak Voltage	Q200 Rated 208A/40V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C	VDS: (1) 25.2V (2) 26V (3) 1.2V (4) 33.2V (5) 23.2V (6) 26V		
3	Diode Peak Voltage	Q100 Rated 80V/100A Q101 Rated 80V/100A	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)No Load Ta:25°C	Q100: VDS: (1) 52.4V (2) 47.6V (3) 50.8V (4) 1.2V (5) 48.8V (6) 40.2V Q101: VDS: (1) 52.4V (2) 48V (3) 50.4V (4) 1.6V (5) 51.6V (6) 9.2V		
4	Input Capacitor Voltage	C5 Rated: 100uF / 450 V	AC ON/OFF I/P: High-Line +3V =308VAC O/P: (1)Full Load input (CRH Mode) (2) Full load continue(CRH Mode) (3) Dimming off (4) OLP (100%-OLP) Ta:25°C	(1) 448V (2) 442V (3) 448V (4) 445V		
5	Control IC Voltage Test	PWM IC U2 Rated -0.3V~20V PFC IC U1 Rated -0.3V~35V AUX IC U500 Rated -0.3V~725V	AC ON/OFF I/P: High-Line +3V =308VAC O/P:(1) Full Load input (CRH Mode) (2) Output Short (3) O.L.P (4) O.V.P (5) NO LOAD VR LOW LINE (6) Dim off(continue) Ta:25°C	U2 (1) 17.5V (2) 17.2V (3) 17.4V (4) 0.9V (5) 17.6V (6) 0.8V	U1 (1) 17.6V (2) 17.5V (3) 17.6V (4) 17.6V (5) 17.4V (6) 1.7V	U500 (1) 553V (2) 548V (3) 551V (4) 537V (5) 542V (6) 539V
6	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 26A/600V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load	308VAC VDS: (1) 524V (2) 536V (3) 512V (4) 520V (5) 532V (6) 536V	107VAC VDS: (1) 524V (2) 516V (3) 512V (4) 512V (5) 504V (6) 512V	

			I/P: Low-Line -3V = 107VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C		
7	VCC Diode Peak Voltage	D 501Rated: :2A/400V D601 Rated: : 2A/400V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C	(1) 145.1V (2) 136.4V (3) 137.9V (4) 141.3V (5) 137.4V (6) 139.1V	(1) 116.5V (2) 112.1V (3) 114.5V (4) 116.2V (5) 108.9V (6) 108.6V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min	I/P-O/P: 4.125KVAC/min Ta:25°C	I/P-O/P: 2.251mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500VDC Ta:25°C	I/P-O/P:9999MΩ NO DAMAGE

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% 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 LIGHT INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV	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 : PWM-200-24B 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 26℃ 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 48.4℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=26 ℃</th><th>HIGH AMBIENT Ta=48.4 ℃</th></tr><tr><td>1</td><td>RTH1</td><td>67.0℃</td><td>85.5℃</td></tr><tr><td>2</td><td>L2</td><td>64.6℃</td><td>87.7℃</td></tr><tr><td>3</td><td>BD1</td><td>64.9℃</td><td>87.7℃</td></tr><tr><td>4</td><td>Q1</td><td>66.0℃</td><td>89.0℃</td></tr><tr><td>5</td><td>U1</td><td>63.6℃</td><td>86.4℃</td></tr><tr><td>6</td><td>Q73</td><td>65.1℃</td><td>88.8℃</td></tr><tr><td>7</td><td>C36</td><td>65.9℃</td><td>89.9℃</td></tr><tr><td>8</td><td>T1</td><td>77.4℃</td><td>102.5℃</td></tr><tr><td>9</td><td>C5</td><td>62.0℃</td><td>84.9℃</td></tr><tr><td>10</td><td>U101</td><td>66.8℃</td><td>92.2℃</td></tr><tr><td>11</td><td>Q100</td><td>61.0℃</td><td>87.3℃</td></tr><tr><td>12</td><td>C613</td><td>60.4℃</td><td>84.7℃</td></tr><tr><td>13</td><td>C105</td><td>57.1℃</td><td>83.1℃</td></tr><tr><td>14</td><td>C106</td><td>58.0℃</td><td>84.1℃</td></tr><tr><td>15</td><td>Q200</td><td>55.4℃</td><td>82.3℃</td></tr><tr><td>16</td><td>RTH5</td><td>64.0℃</td><td>87.7℃</td></tr><tr><td>17</td><td>TC</td><td>54.8℃</td><td>79.1℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta=26 ℃	HIGH AMBIENT Ta=48.4 ℃	1	RTH1	67.0℃	85.5℃	2	L2	64.6℃	87.7℃	3	BD1	64.9℃	87.7℃	4	Q1	66.0℃	89.0℃	5	U1	63.6℃	86.4℃	6	Q73	65.1℃	88.8℃	7	C36	65.9℃	89.9℃	8	T1	77.4℃	102.5℃	9	C5	62.0℃	84.9℃	10	U101	66.8℃	92.2℃	11	Q100	61.0℃	87.3℃	12	C613	60.4℃	84.7℃	13	C105	57.1℃	83.1℃	14	C106	58.0℃	84.1℃	15	Q200	55.4℃	82.3℃	16	RTH5	64.0℃	87.7℃	17	TC	54.8℃	79.1℃
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 118.3 % LOAD Ta : 25℃	TEST : OK																																																																								
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/110VAC O/P : 100 % LOAD Ta=-45/35 ℃	TEST : OK																																																																								
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45℃ /95 %R.H NO DAMAGE	I/P : 305VAC O/P : FULL LOAD Ta= 45℃ HUMIDITY= 95 %R.H	TEST : OK																																																																								
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃(0~50℃)	I/P : 230 VAC O/P : FULL LOAD	± 0.013 %/℃(0~50℃)																																																																								
6	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature : -45℃~ +90℃ 2. Temperature change rate : 25℃ / 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	-40~45°C	1. Thermal shock Temperature : -45°C~ +50°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	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=45 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=45 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=45 °C LIFE TIME	(1) 389349HRS (2) 75137HRS (3) 139478HRS (4) 202430HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 553.6K hrs min. Telcordia SR-332 (Bellcore) ; 170K 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	WUWQ/HUANGMK	WENF	LINKX

2018.4.30 GP-A50-F010