Test Report： PWM-120-24KN

120W PWM Output KNX LED Driver

■ DESIGN VERIFY TEST

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

■ SAFETY & E.M.C. TEST

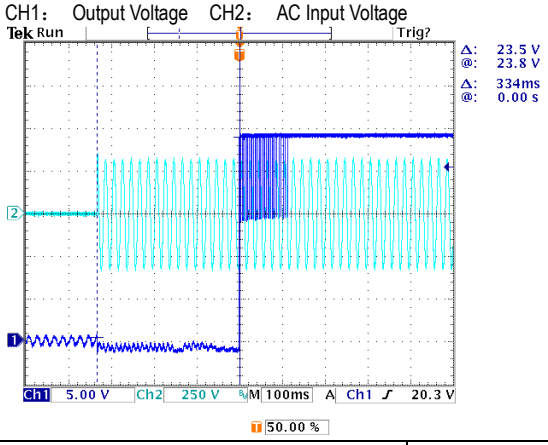
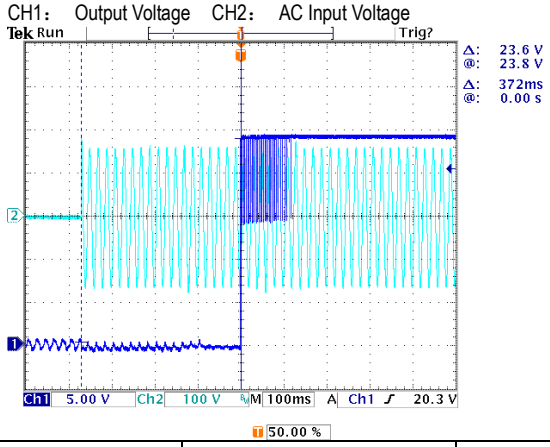
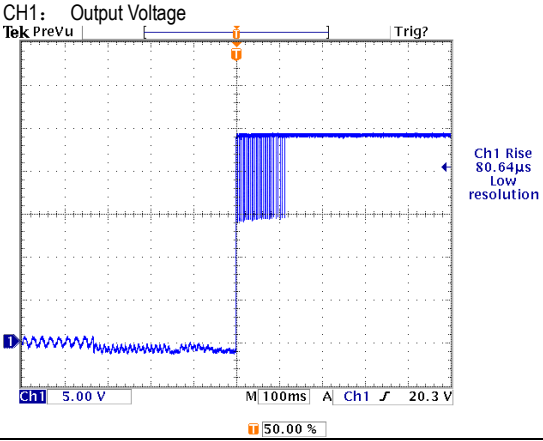
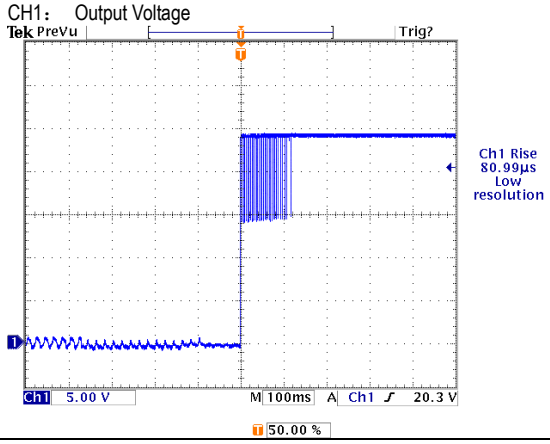
Safety Test
E.M.C. Test

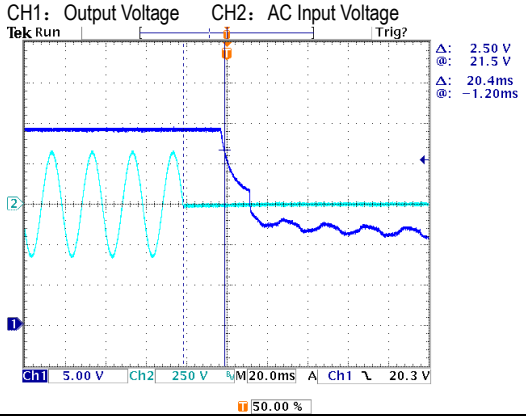
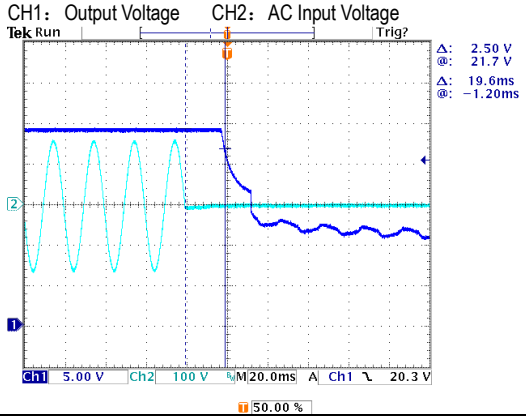
■ RELIABILITY TEST

Environment Test

■ DESIGN VERIFY TEST

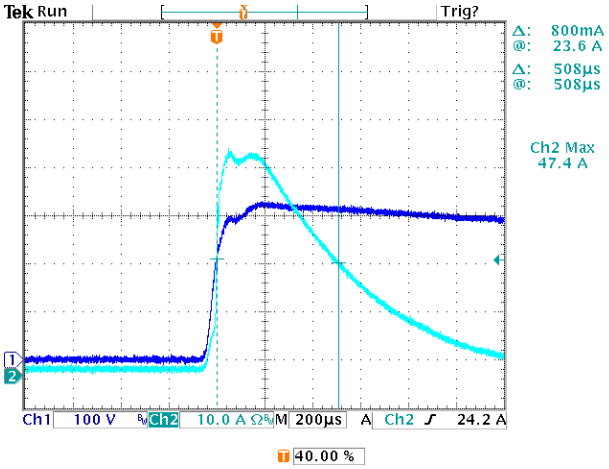
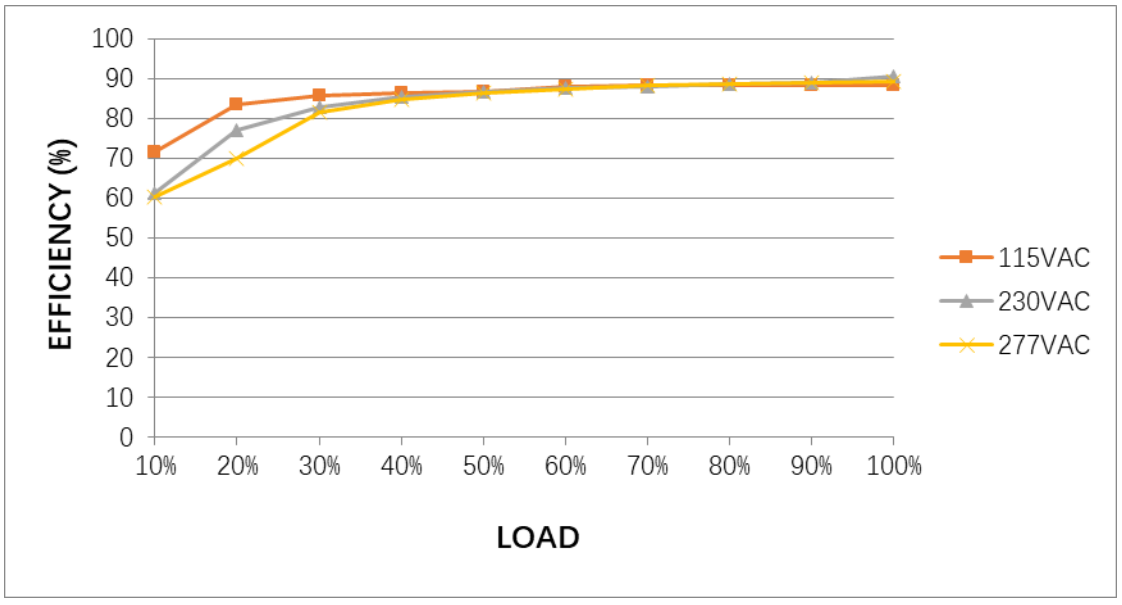
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM FREQUENCY	200~4000Hz	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	200~4000Hz
2	OVER/UNDERSHOOT TEST	<±5 %	I/P： 230VAC O/P：FULL LOAD Ta：25℃	<5 %
3	SET UP TIME(Max)	230VAC/ 500ms 115VAC/ 500ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 334ms 115VAC/ 372ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1： Output Voltage CH2： AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1： Output Voltage CH2： AC Input Voltage 	
4	RISE TIME (Max)	230VAC/ 80ms 115VAC/ 80ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/0.081ms 115VAC/0.081ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1： Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1： Output Voltage 	

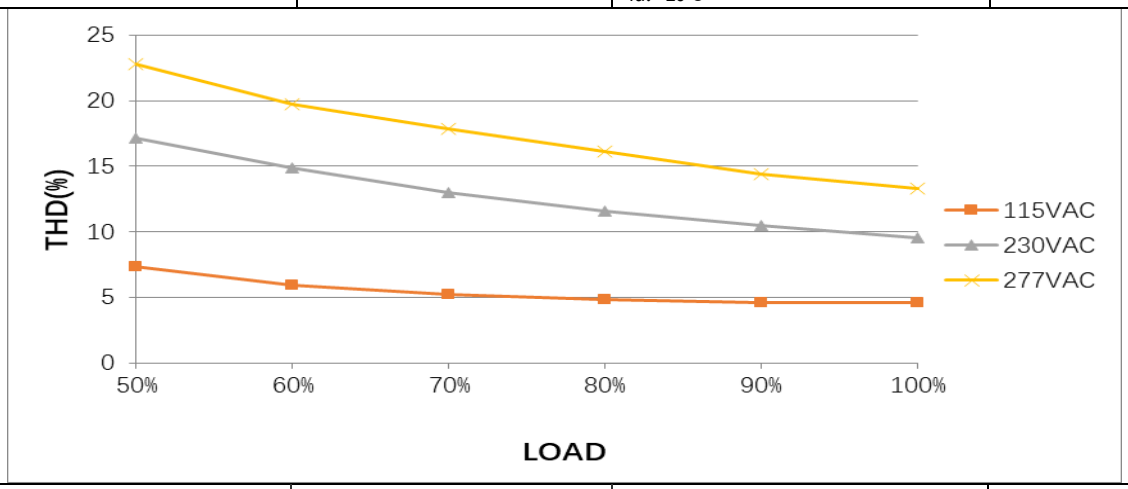
5	HOLD UP TIME(Typ)	230VAC/ 16ms 115VAC/ 16ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/20.4ms 115VAC/19.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1：Output Voltage CH2：AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1：Output Voltage CH2：AC Input Voltage 	

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305VAC	I/P：TESTING O/P：FULL LOAD Ta：25℃	87V~305V
			I/P： LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P：FULL/NO 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： 90 VAC ~305 VAC O/P：FULL~NO LOAD Ta：25℃	TEST：OK
3	AC CURRENT	1.3A/115VAC 0.65A/230VAC 0.55A/277VAC	I/P： 115 VAC I/P： 230 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	I =1.156A/ 115VAC I =0.587A/ 230VAC I =0.502A/ 277VAC
4	LEAKAGE CURRENT	< 0.25mA / 277VAC	I/P： 277 VAC O/P：NO LOAD Ta：25℃	L-FG： 0.003 mA N-FG： 0.003 mA

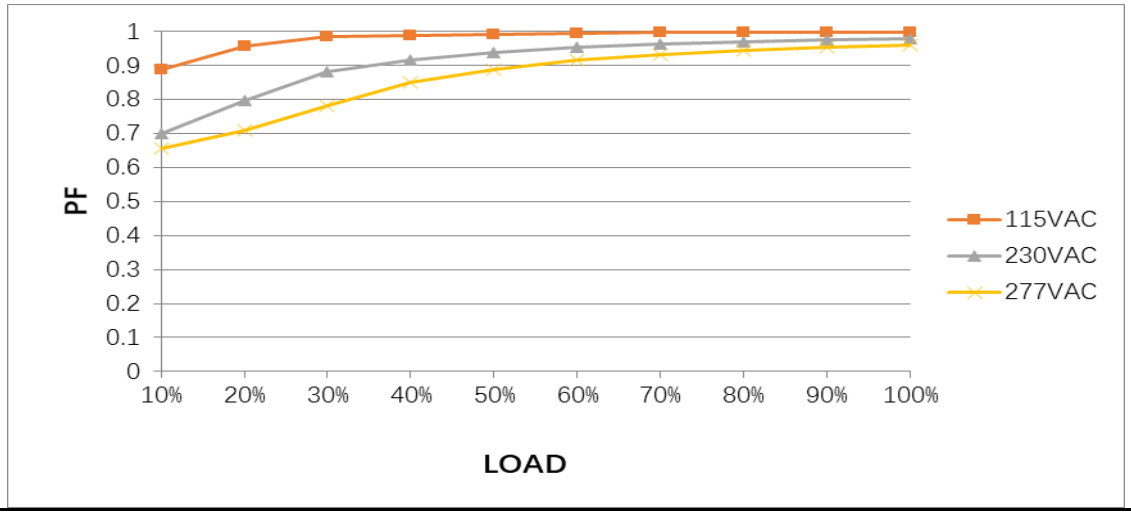
5	STANDBY POWER CONSUMPTION	< 0.5W	I/P：230VAC O/P：NO LOAD Ta：25℃	0.321W
6	INRUSH CURRENT(Typ)	60A/230VAC Twidth =520 us measured at 50% Ipeak COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I=47.4A/ 230VAC Twidth =508us
	INPUT=230VAC/50HZ @ FULL LOAD CH2：Input current CH1：AC Input Voltage 			
7	EFFICIENCY(Typ)	90%	I/P： 230VAC O/P：FULL LOAD Ta：25℃	90.45%
	EFFICIENCY vs LOAD 			

8	TOTAL HARMONIC DISTORTION	THD＜20% （@load≥60%/115VAC，230VAC：@load≥75%/277VAC）	I/P：115 VAC/60% LOAD I/P：230 VAC/60% LOAD I/P：277 VAC/75% LOAD Ta：25℃	THD： 6.46 %@60% load /115VAC THD： 16.97 %@60% load /230VAC THD： 18.36 %@75% load /277VAC



9	POWER FACTOR	0.94/ 277VAC 0.96/ 230VAC 0.97/ 115VAC	I/P： 277 VAC I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF=0.960/ 277VAC PF=0.977/ 230VAC PF=0.997/ 115VAC

P.F vs LOAD



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	108 %~ 130 %	I/P： 230VAC O/P：TESTING Ta：25℃	113.65%/ 230VAC Hiccup mode，recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	28V~34V	I/P： 230VAC O/P：NO LOAD Ta：25℃	31.30V/ 230VAC Shut down o/p voltage，re-power on to recover

3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P： 230 VAC O/P：FULL LOAD	O.T.P. Active Shut down o/p voltage，re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 305VAC O/P：FULL LOAD Ta：25℃	NO DAMAGE Shut down o/p voltage，re-power on to recover

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) **Peak Voltage**	Q 2 Rated 730V/10A	I/P：High-Line +3V =308V O/P： (1) Full Load Turn on (2) Output Short (3) Full load continue Ta：25℃	 (1) 724V (2) 710V (3) 680V
2	**Diode Peak Voltage**	Q101 Rated 120V/56A	I/P：High-Line +3V =308V O/P： (1) Full Load Turn on (2) Output Short (3) Full load continue Ta：25℃	 (1) 101V (2) 103V (3) 99.6V
3	**Input Capacitor Voltage**	C5 Rated 100u/ 450V	I/P：High-Line +3V =308 V O/P：(1) Full Load input on/off (2) NO load input on /Off (3) Full Load /NO load Change Ta：25℃	 (1) 442V (2) 440V (3) 442V
4	**Control IC Voltage Test**	U1 Rated 28V	I/P：High-Line +3V =308 V O/P：(1) Full Load input on/off (2) NO load input on /Off (3) Full Load /NO load Change Ta：25℃	 (1) 17.1V (2) 17.1V (3) 17.1V
5	PFC Transistor (D to S) or (C to E) **Peak Voltage**	Q 1 Rated 600V/15A	I/P：High-Line +3V =308V O/P： (1) Full Load Turn on (2) Output Short (3) Full load continue Ta：25℃	 (1) 479V (2) 456V (3) 478V

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℃	I/P-O/P：1.895mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P：500VDC>100MΩ	I/P-O/P： 500VDC Ta：25℃	I/P-O/P： ＞9999MΩ

E.M.C TEST

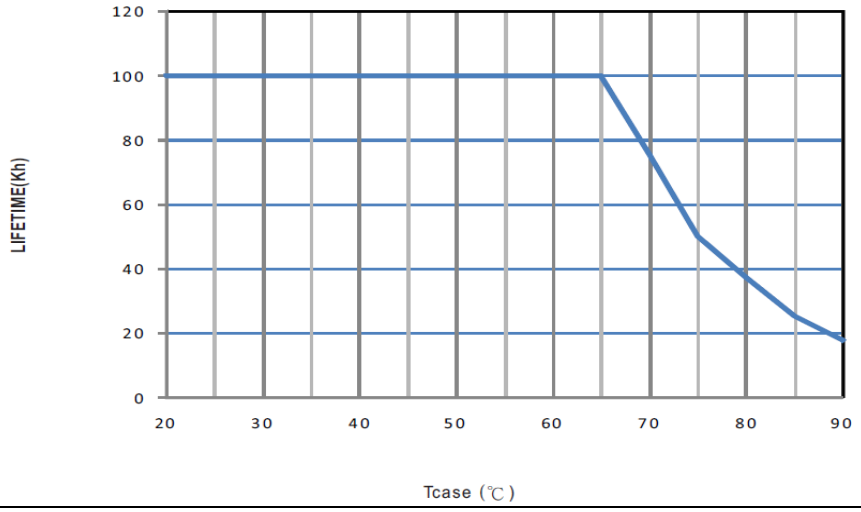
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P：230VAC/50HZ O/P：60%/FULL LOAD Ta:25℃	PASS
2	CONDUCTION	EN55015	I/P：230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55015	I/P：230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR：8KV Contact：4KV	I/P：230 VAC/50HZ O/P：FULL LOAD Ta：25℃	PASS
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT：1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	PASS
6	SURGE	EN61000-4-5 INDUSTRY L-N：2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	PASS
7	Test by certified Lab ＆ Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： PWM-120-24KN
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 25.9℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 44.8℃</td></tr>
<tr><td colspan="5">
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 25.9 ℃</th><th>HIGH AMBIENT Ta=44.8 ℃</th></tr>
<tr><td>1</td><td>BD1</td><td>71.8℃</td><td>88.8℃</td></tr>
<tr><td>2</td><td>L1</td><td>71.1℃</td><td>88.2℃</td></tr>
<tr><td>3</td><td>Q1</td><td>76.0℃</td><td>93.6℃</td></tr>
<tr><td>4</td><td>D6</td><td>76.4℃</td><td>93.9℃</td></tr>
<tr><td>5</td><td>R5</td><td>76.8℃</td><td>94.5℃</td></tr>
<tr><td>6</td><td>C5</td><td>71.1℃</td><td>88.7℃</td></tr>
<tr><td>7</td><td>D10</td><td>86.8℃</td><td>106.2℃</td></tr>
<tr><td>8</td><td>R7</td><td>83.4℃</td><td>102.5℃</td></tr>
<tr><td>9</td><td>Q2</td><td>83.0℃</td><td>101.5℃</td></tr>
<tr><td>10</td><td>U1</td><td>67.6℃</td><td>84.8℃</td></tr>
<tr><td>11</td><td>C41</td><td>57.9℃</td><td>76.6℃</td></tr>
<tr><td>12</td><td>T1</td><td>69.3℃</td><td>88.4℃</td></tr>
<tr><td>13</td><td>Q101</td><td>62.5℃</td><td>83.1℃</td></tr>
<tr><td>14</td><td>C105</td><td>63.0℃</td><td>82.7℃</td></tr>
<tr><td>15</td><td>C106</td><td>60.0℃</td><td>79.9℃</td></tr>
<tr><td>16</td><td>C107</td><td>59.4℃</td><td>78.7℃</td></tr>
<tr><td>17</td><td>C108</td><td>54.7℃</td><td>74.1℃</td></tr>
<tr><td>18</td><td>RTH3</td><td>66.5℃</td><td>84.1℃</td></tr>
<tr><td>19</td><td>R415</td><td>52.8℃</td><td>71.7℃</td></tr>
<tr><td>20</td><td>Tc</td><td>59.6℃</td><td>76.2℃</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 305VAC/100VAC
O/P：FULL LOAD
Ta= -45℃/-30℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 45 ℃
NO DAMAGE</td><td>I/P： 315VAC
O/P：FULL LOAD
Ta=45 ℃
HUMIDITY= 95% R.H</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>±0.03%/℃(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>±0.003%/℃(0~50℃)</td></tr>
</table>

5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -45℃~ +85℃ 2. Temperature change rate ： 25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：5 CYCLE 5. Input/Output condition： STATIC	TEST：OK
6	THERMAL SHOCK TEST	1. Thermal shock Temperature： -45℃~ +50℃ 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： 230VAC/Full Load AC ON/OFF TEST turn on 58 sec，turn off 2 sec；	TEST：OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：12min/sweep cycle (4) Acceleration：5G (5) Test Time：72min in each axis (X.Y.Z) (6) Ta：25℃	TEST：OK
8	CAPACITOR LIFE CYCLE	PWM-120-24KN：SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 45 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 45 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 45 ℃ LIFE TIME	(1) 257982 HRS (2) 61017 HRS (3) 117627 HRS (4) 170227 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 1915.2K hrs min. Telcordia SR-332 (Bellcore) ; 205.8K hrs min. MIL-HDBK-217F (25℃)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life)： Above 50000 hours @ TC 75℃	



TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY