



Test Report: XLC-60-H-MA

60W Multiple-Stage Constant Power 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

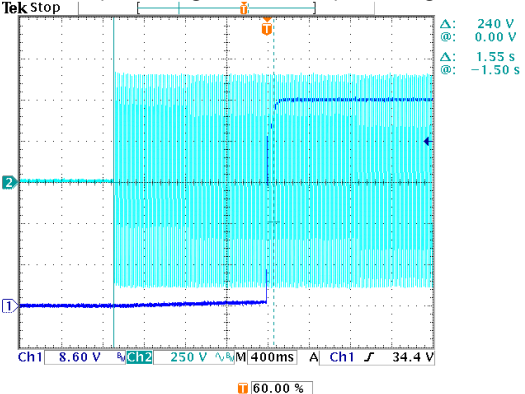
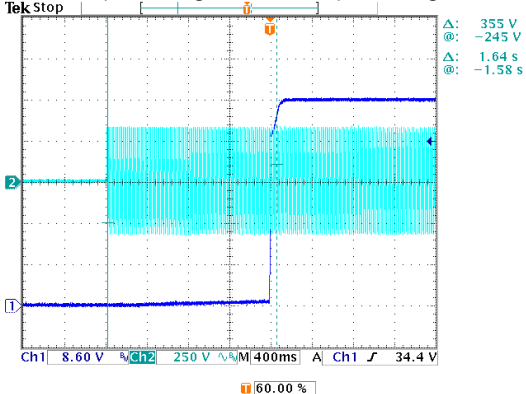
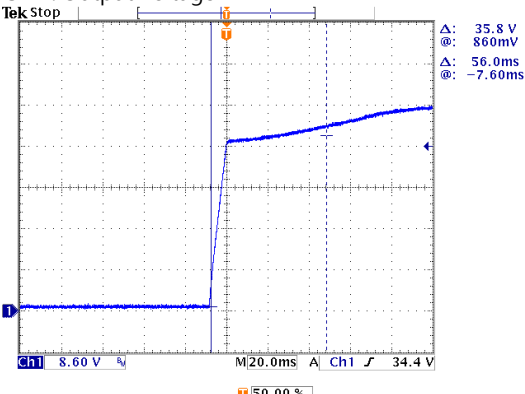
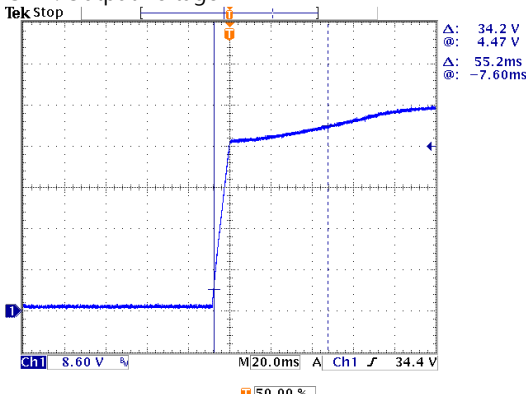
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

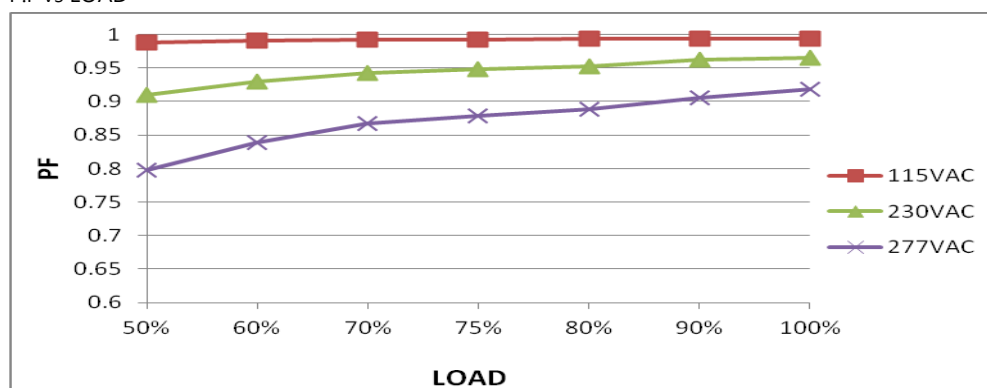
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	± 5%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	1.032A /230VAC@CV MAX-1V 1.054A /230VAC@CV MIN 1.033A/115VAC@CV MAX-1V 1.055A/115VAC@CV MIN -1.71%~0.38%
2	CURRENT ADJ. RANGE (BY DIP SWITCH)	CH1: 900mA/1050mA/1200mA /1300mA/1400mA/1500 mA/1600mA/1700mA	I/P: 230VAC O/P: CVmin& CVmax-1V CP: 0.9A ~1.7A Ta:25°C	888mA/230VAC@CV MAX-1V 888mA /230VAC@CV MIN 1040mA/230VAC@CV MAX-1V 1039mA/230VAC@CV MIN 1187mA/230VAC@CV MAX-1V 1185mA/230VAC@CV MIN 1288mA/230VAC@CV MAX-1V 1284mA /230VAC@CV MIN 1385mA/230VAC@CV MAX-1V 1382mA /230VAC@CV MIN 1486mA/230VAC@CV MAX-1V 1483mA /230VAC@CV MIN 1586mA/230VAC@CV MAX-1V 1583mA /230VAC@CV MIN 1688mA/230VAC@CV MAX-1V 1682mA /230VAC@CV MIN
3	OPEN CIRCUIT VOLTAGE (max)	60V	I/P: 230VAC O/P: OPEN Ta:25°C	57.81V
4	CONSTANT CURRENT OPERATION VOLTAGE	CH1: 9 V~ 54 V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	7.06V~54.1V /230VAC
5	CURRENT RIPPLE	< 4 %	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	230VAC: 1.61% 115VAC: 1.68%

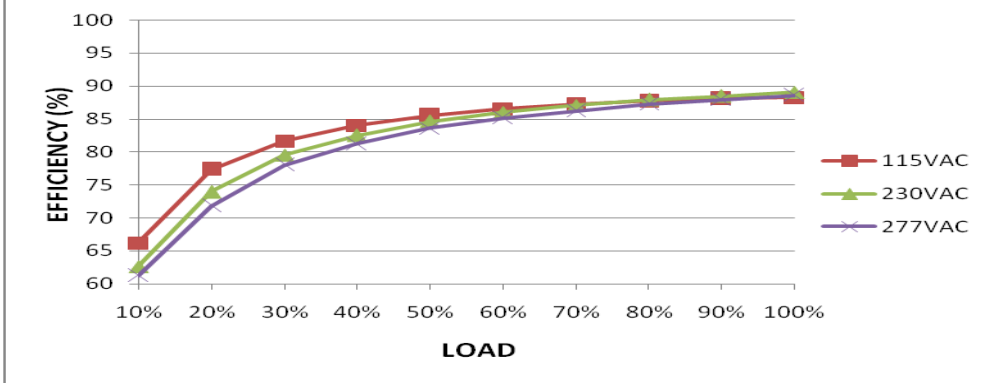
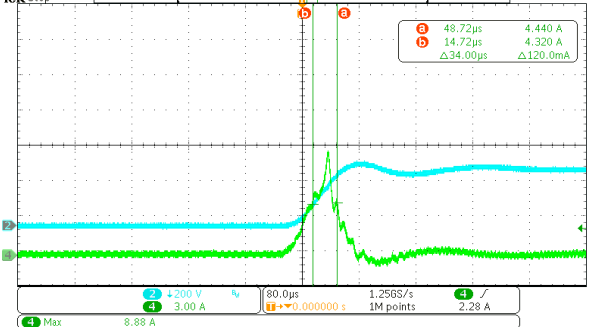
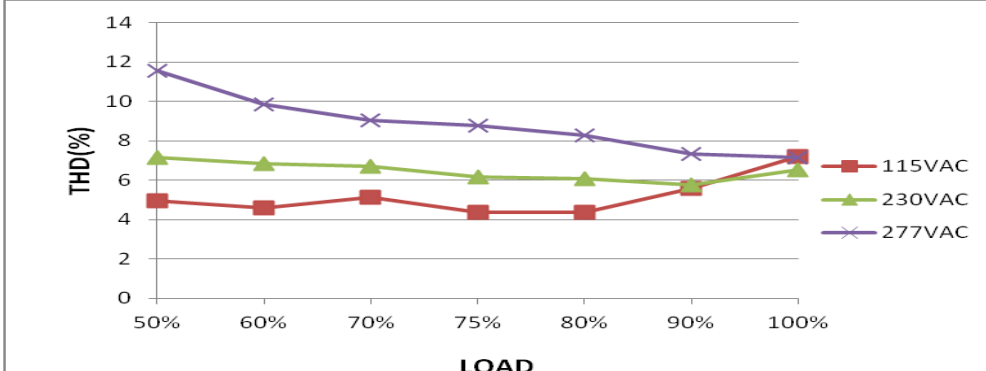
6	SET UP TIME (Max)	230VAC/ 2500 ms 115VAC/ 2500 ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	230VAC/ 1550ms 115 VAC/1640ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
7	RISE TIME (Max)	230VAC/ 100 ms 115VAC/ 100 ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	230VAC/56.0ms 115 VAC/55.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 			

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~305 VAC 155VDC~400VDC	(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 (4) I/P: LOW-LINE=141VDC HIGH-LINE=431VDC O/P: Dim on/off 【for Dimming type】 Ta:25°C	(1) 97VAC ~308VAC (2) 155Vdc~431Vdc/FULL LOAD 155Vdc~431Vdc/50% LOAD (3) 155Vdc~431Vdc/FULL LOAD 155Vdc~431Vdc/50% LOAD (4)OK
			I/P: LOW-LINE-3V=97 VAC HIGH-LINE+10V=315 VAC 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: 100VAC ~305VAC O/P:FULL~MIN LOAD Ta:25°C	OK
3	INPUT CURRENT (TYP)	277VAC/ 0.30 A 230 VAC/ 0.35 A 115 VAC/ 0.75 A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	I= 0.243A/277VAC I =0.280A/ 230VAC I =0.542A/ 115VAC
4	POWER FACTOR(TYP)	0.95/230 VAC FULL LOAD 0.95/115 VAC FULL LOAD 0.9/277 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	PF= 0.965/230V/100%LOAD PF= 0.994 /115V/100%LOAD PF= 0.919/277V/100%LOAD

P.F vs LOAD



5	EFFICIENCY (TYP)	90 %	I/P: 230 VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	90.59%
EFFICIENCY vs LOAD 				
6	INRUSH CURRENT (TYP)	230 V/ 15A COLD START (twidh=310us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C LEDH MODE TEST	I =8.88A/ 230VAC T50= 34 us
INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) 				
7	TOTAL HARMONIC DISTORTION	THD< 20%(@load ≥ 60%/230VAC; @load ≥ 75%/277VAC); THD<10%@load 100%/230VAC	I/P : 230VAC/277VAC O/P : 60% /75% /100% LOAD Ta : 25°C	THD : 6.83% 230VAC 60% THD : 8.56% 277VAC 75% THD : 6.55% 230VAC 100%
THD vs LOAD 				

8	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.021 mA N-FG: 0.018 mA
9	STANDBY POWER CONSUMPTION	Standby power consumption<0.5W (Dimming OFF)	I/P : 230VAC O/P : TESTING Ta : 25°C	0.4592W

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 305 VAC I/P: 100 VAC O/P:FULL LOAD	O.T.P. Active PROTECTION TYPE : Stage 1: Derating to 75% loading; stage2: Derating to 50% loading; Recovers automatically after fault condition is removed
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 110 VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 800 V11A	AC ON/OFF I/P: High-Line +3V =308v VDS: O/P: (1) LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short I/P: Low-Line -3V = 97V VDS: O/P: (1) LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short Ta:25°C	308V CP: 1.05A Q1 VDS: (1) 738V (2) 632V (3) 584V (4) 552V (5) 544V CP: 1.7A VDS: (1) 762V (2) 658V (3) 726V (4) 582V (5) 562V

				97V CP: 1.05A Q1 VDS: (1) 392V (2) 344V (3) 264V (4) 264V (5) 240V CP: 1.7A VDS: (1) 418V (2) 365V (3) 352V (4) 264V (5) 259V																								
2	Diode Peak Voltage	Q100 Rated : 20A/600V	AC ON/OFF I/P: High-Line +3V =308 V Q100 : VDS: O/P: (1) LEDmax (2) LEDmax continue (3) Output Short Ta:25°C	(1) 495V (2) 470V (3) 523V																								
3	Control IC Voltage Test	U236 8-100V U261 Rated 2.9V~3.3V	AC ON/OFF I/P: High-Line +3V =308 V O/P: (1) LEDmax (2) LEDmin (3) OUTPUTSHORT (4) NO LOAD (5) Dim off Ta:25°C	U236 (1) 74.4V (2) 72.8V (3) 72V (4) 71.2V (5) 70.8V U261 <table><tr><td>TEST CONDITION</td><td>Level</td><td>Ripple</td><td>Spike</td></tr><tr><td>LEDmax</td><td>3.332V</td><td>0.278%</td><td>2.08%</td></tr><tr><td>LEDmin</td><td>3.331V</td><td>0.29%</td><td>1.28%</td></tr><tr><td>Output Short</td><td>3.335V</td><td>0.301%</td><td>2.37%</td></tr><tr><td>NO LOAD VRmin.LOW LINE</td><td>3.336V</td><td>0.315%</td><td>1.34%</td></tr><tr><td>DIM OFF</td><td>3.336V</td><td>0.29%</td><td>1.264%</td></tr></table>	TEST CONDITION	Level	Ripple	Spike	LEDmax	3.332V	0.278%	2.08%	LEDmin	3.331V	0.29%	1.28%	Output Short	3.335V	0.301%	2.37%	NO LOAD VRmin.LOW LINE	3.336V	0.315%	1.34%	DIM OFF	3.336V	0.29%	1.264%
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4	Clamp Diode Peak Voltage	D 10 Rated : 1000V/1A	AC ON/OFF I/P : High-Line +3V = 308 V O/P: (1) LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) NO LOAD Ta : 25°C	(1)540V (2)540V (3)520V (4)520V (5)480V
5	Dimming MOS	Q 110 Rated : 100V /45A	AC ON/OFF I/P : High-Line +3V = 308 V O/P: (1) LEDmax (2) LEDmax continue (3) Short Ta:25°C	CP1.05A: (1)72.6V (2)74.2V (3)76.6V
6	Buck Diode	D112 Rated : 100V /20A	AC ON/OFF I/P : High-Line +3V = 308 V O/P: (1) LEDmax (2) LEDmax continue (3) Short Ta:25°C	CP1.05A: (1)74.2V (2) 74.2V (3)73.4V

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min	I/P-O/P: 4.125 KVAC/min Ta:25°C	I/P-O/P: 1.893mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25°C	I/P-O/P: >9999 MΩ 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	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55015	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 : 8KV / Contact : 4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	SURGE	IEC61000-4-5 L-N :1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
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 : XLC-60-H-MA 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=25.4 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=49.9 °C <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=25.4°C</th><th>HIGH AMBIENT Ta=49.9°C</th></tr><tr><td>1</td><td>Q1</td><td>70.6°C</td><td>95.1°C</td></tr><tr><td>2</td><td>U1</td><td>73.5°C</td><td>98.0°C</td></tr><tr><td>3</td><td>T1</td><td>71.7°C</td><td>96.2°C</td></tr><tr><td>4</td><td>D100</td><td>72.8°C</td><td>97.3°C</td></tr><tr><td>5</td><td>Q110</td><td>79.6°C</td><td>104.1°C</td></tr><tr><td>6</td><td>D112</td><td>75.4°C</td><td>99.9°C</td></tr><tr><td>7</td><td>U150</td><td>68.7°C</td><td>93.2°C</td></tr><tr><td>8</td><td>C101</td><td>70.6°C</td><td>95.1°C</td></tr><tr><td>9</td><td>L100</td><td>68.6°C</td><td>93.1°C</td></tr><tr><td>10</td><td>U236</td><td>66.1°C</td><td>90.6°C</td></tr><tr><td>11</td><td>U261</td><td>59.4°C</td><td>83.9°C</td></tr><tr><td>12</td><td>RT1</td><td>63.7°C</td><td>88.2°C</td></tr><tr><td>13</td><td>TC</td><td>61.0°C</td><td>85.5°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta=25.4°C	HIGH AMBIENT Ta=49.9°C	1	Q1	70.6°C	95.1°C	2	U1	73.5°C	98.0°C	3	T1	71.7°C	96.2°C	4	D100	72.8°C	97.3°C	5	Q110	79.6°C	104.1°C	6	D112	75.4°C	99.9°C	7	U150	68.7°C	93.2°C	8	C101	70.6°C	95.1°C	9	L100	68.6°C	93.1°C	10	U236	66.1°C	90.6°C	11	U261	59.4°C	83.9°C	12	RT1	63.7°C	88.2°C	13	TC	61.0°C	85.5°C
NO	Position	ROOM AMBIENT Ta=25.4°C	HIGH AMBIENT Ta=49.9°C																																																									
1	Q1	70.6°C	95.1°C																																																									
2	U1	73.5°C	98.0°C																																																									
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4	D100	72.8°C	97.3°C																																																									
5	Q110	79.6°C	104.1°C																																																									
6	D112	75.4°C	99.9°C																																																									
7	U150	68.7°C	93.2°C																																																									
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10	U236	66.1°C	90.6°C																																																									
11	U261	59.4°C	83.9°C																																																									
12	RT1	63.7°C	88.2°C																																																									
13	TC	61.0°C	85.5°C																																																									
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/110VAC O/P : 100 % LOAD Ta=-30 °C	TEST : OK																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta=50 °C HUMIDITY= 95 %R.H	TEST : OK																																																								
4	TEMPERATURE COEFFICIENT	± 0.03 %/(0°C~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.001 %/°C(0~50°C)																																																								
5	STORAGE TEMPERATURE TEST	-40~80°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 : 10CYCLE 5. Input/output condition : STATIC TEST : OK																																																									
6	THERMAL SHOCK TEST	-25~50°C	1. Thermal shock Temperature : -30°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																																																									

7	VIBRATION TEST	10 ~ 500Hz, 2G 10min./1cycle, period for 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
8	CAPACITOR LIFE CYCLE	SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Tc=75 °C LIFE TIME (2) I/P : 230VAC O/P : 75% LOAD Tc=75 °C LIFE TIME (3) I/P : 230VAC O/P : 50% LOAD Tc=75 °C LIFE TIME	(1) 90974HRS (2) 124663HRS (3) 277511HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 4130.5K hrs min. Telcordia SR-332 (Bellcore) ; 317.7K hrs min. MIL-HDBK-217F (25°C)	
10	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	WUWQIN/ZHOUBIAO	WENF	WUWQ

2020.10.1 TAG-QA-009