



Test Report: PWM-200-24IoT

200W Wireless Lighting Constant Voltage LED Driver Solution

■ 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

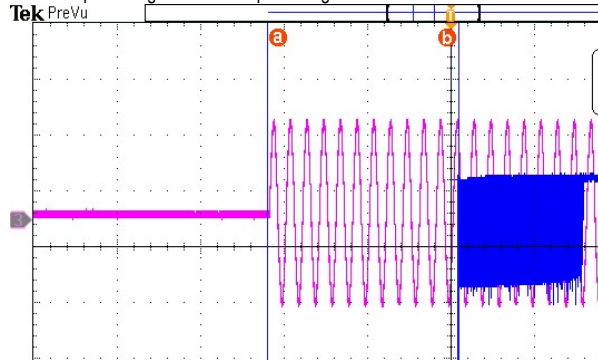
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Dimming Range	0~100%	I/P: 230 VAC O/P: 4KHz O/P: 2.5KHz O/P: 200Hz O/P: 1KHz Ta:25°C	V1: 0%~100%/3.97KHz for BLE V2: 0%~100%/2.5KHz for TY1 V3: 0%~100%/200 Hz for WZ V4: 0%~100%/1KHz for SVA
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/ 1000ms (Max) (except for SVA-type) 230VAC/ 2000ms (Max) (only for SVA-type) 115VAC/ 1000ms (Max) (except for SVA -type) 115VAC/ 2000ms (Max) (only for SVA-type)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/228 ms(except for SVA-type) 230VAC/ 1258 ms(only for SVA-type) 115VAC/300 ms(except for SVA -type) 115VAC/1262 ms(only for SVA-type)

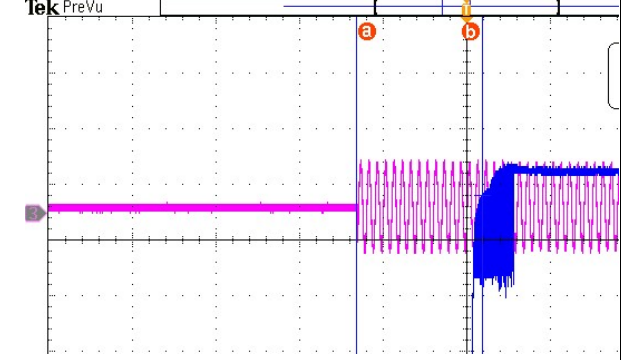
INPUT=230VAC/50HZ @ FULL LOAD (except for SVA-type)

CH1 : Output Voltage CH3 : AC Input Voltage



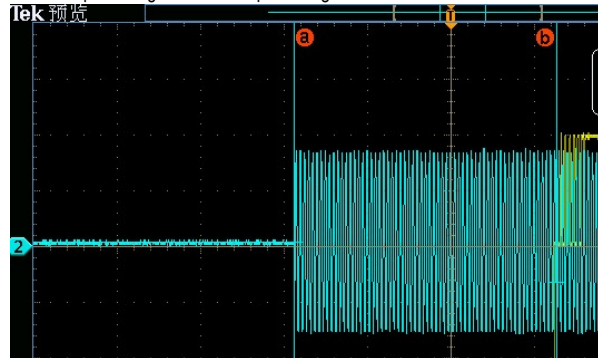
INPUT=115VAC/60HZ @ FULL LOAD (except for SVA-type)

CH1 : Output Voltage CH3 : AC Input Voltage



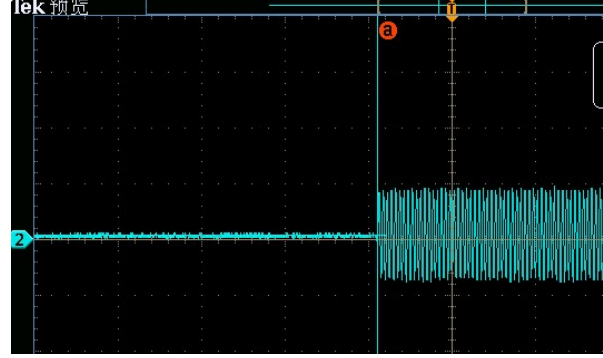
INPUT=230VAC/50HZ @ FULL LOAD(only for SVA-type)

CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD(only for SVA-type)

CH1 : Output Voltage CH2 : AC Input Voltage



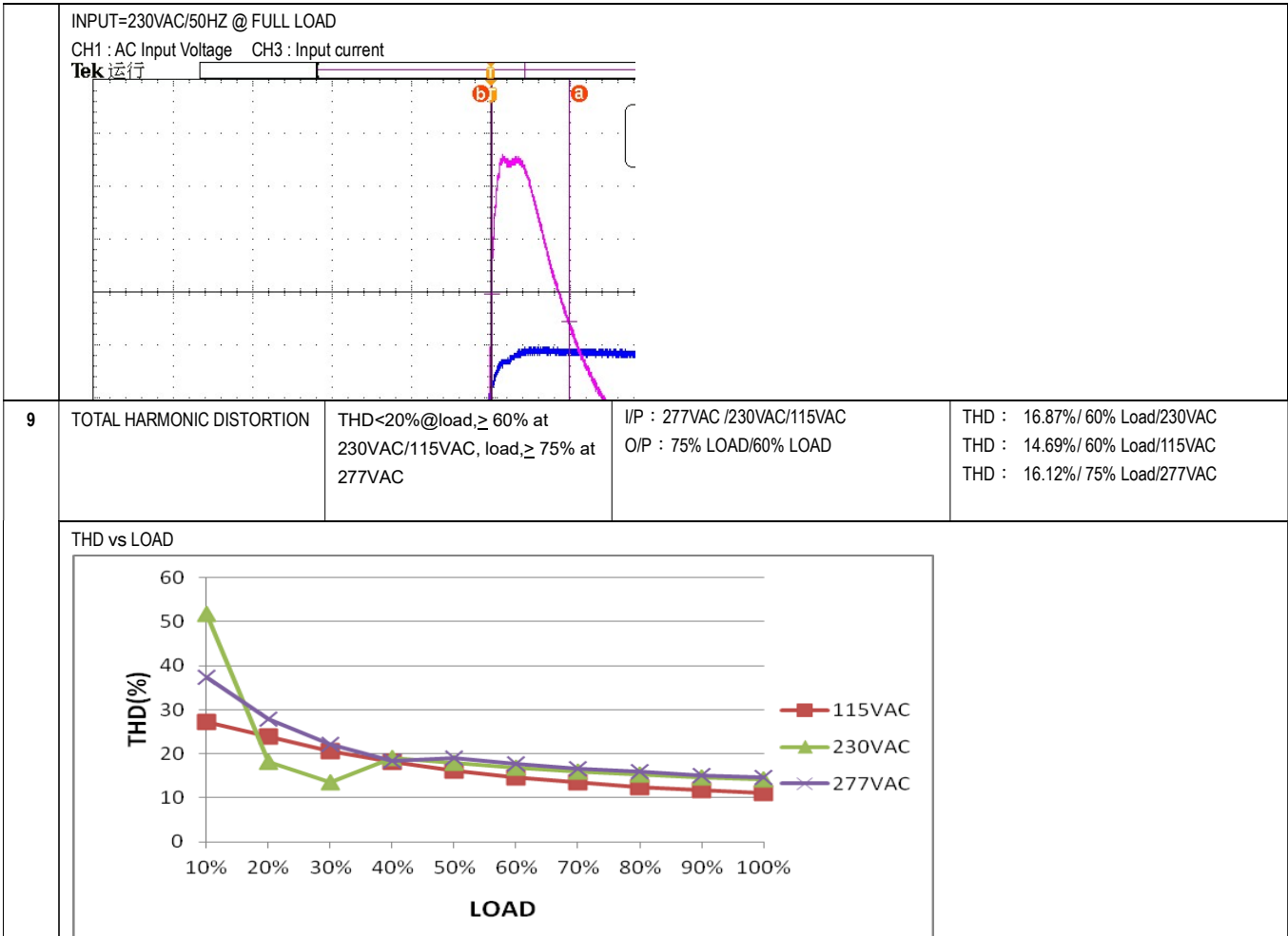
5	RISE TIME (Max)	230VAC/ 80ms (Max) 115VAC/ 80ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 0.026ms 115VAC/27.25ms
	<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p>	
6	HOLD UP TIME (Typ.)	230VAC/ 10ms (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
	<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH3 : AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p>	

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	<1.5W(except for WZ1-type) <2.5W(for WZ1-type)	I/P : 230VAC Ta : 25°C	0.8648W(except for WZ1-type) 1.842W(for WZ1-type)																																												
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>P.F vs LOAD</p> <table border="1"> <caption>P.F vs LOAD Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC PF</th> <th>230VAC PF</th> <th>277VAC PF</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.89</td><td>0.60</td><td>0.60</td></tr> <tr><td>20%</td><td>0.94</td><td>0.76</td><td>0.60</td></tr> <tr><td>30%</td><td>0.96</td><td>0.86</td><td>0.72</td></tr> <tr><td>40%</td><td>0.97</td><td>0.92</td><td>0.80</td></tr> <tr><td>50%</td><td>0.98</td><td>0.94</td><td>0.87</td></tr> <tr><td>60%</td><td>0.98</td><td>0.95</td><td>0.90</td></tr> <tr><td>70%</td><td>0.99</td><td>0.96</td><td>0.92</td></tr> <tr><td>80%</td><td>0.99</td><td>0.96</td><td>0.93</td></tr> <tr><td>90%</td><td>0.99</td><td>0.97</td><td>0.94</td></tr> <tr><td>100%</td><td>0.99</td><td>0.97</td><td>0.95</td></tr> </tbody> </table>					LOAD (%)	115VAC PF	230VAC PF	277VAC PF	10%	0.89	0.60	0.60	20%	0.94	0.76	0.60	30%	0.96	0.86	0.72	40%	0.97	0.92	0.80	50%	0.98	0.94	0.87	60%	0.98	0.95	0.90	70%	0.99	0.96	0.92	80%	0.99	0.96	0.93	90%	0.99	0.97	0.94	100%	0.99	0.97	0.95
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7	EFFICIENCY(Typ.)	93% (except for WZ1-type) 92.5%(for WZ1-type)	I/P:230 VAC O/P:FULL LOAD Ta:25°C	93.14%(except for WZ1-type) 93.22(for WZ1-type)																																												
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>EFFICIENCY 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>80</td><td>85</td><td>85</td></tr> <tr><td>20%</td><td>88</td><td>90</td><td>90</td></tr> <tr><td>30%</td><td>91</td><td>92</td><td>93</td></tr> <tr><td>40%</td><td>92</td><td>93</td><td>94</td></tr> <tr><td>50%</td><td>92</td><td>93</td><td>94</td></tr> <tr><td>60%</td><td>92</td><td>93</td><td>94</td></tr> <tr><td>70%</td><td>92</td><td>93</td><td>94</td></tr> <tr><td>80%</td><td>92</td><td>93</td><td>94</td></tr> <tr><td>90%</td><td>92</td><td>93</td><td>94</td></tr> <tr><td>100%</td><td>91</td><td>93</td><td>94</td></tr> </tbody> </table>					LOAD (%)	115VAC (%)	230VAC (%)	277VAC (%)	10%	80	85	85	20%	88	90	90	30%	91	92	93	40%	92	93	94	50%	92	93	94	60%	92	93	94	70%	92	93	94	80%	92	93	94	90%	92	93	94	100%	91	93	94
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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																																												



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
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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 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) 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	
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°C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 48.4°C																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=26 °C</th> <th>HIGH AMBIENT Ta=48.4 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>RTH1</td><td>67.0°C</td><td>85.5°C</td></tr> <tr><td>2</td><td>L2</td><td>64.6°C</td><td>87.7°C</td></tr> <tr><td>3</td><td>BD1</td><td>64.9°C</td><td>87.7°C</td></tr> <tr><td>4</td><td>Q1</td><td>66.0°C</td><td>89.0°C</td></tr> <tr><td>5</td><td>U1</td><td>63.6°C</td><td>86.4°C</td></tr> <tr><td>6</td><td>Q73</td><td>65.1°C</td><td>88.8°C</td></tr> <tr><td>7</td><td>C36</td><td>65.9°C</td><td>89.9°C</td></tr> <tr><td>8</td><td>T1</td><td>77.4°C</td><td>102.5°C</td></tr> <tr><td>9</td><td>C5</td><td>62.0°C</td><td>84.9°C</td></tr> <tr><td>10</td><td>U101</td><td>66.8°C</td><td>92.2°C</td></tr> <tr><td>11</td><td>Q100</td><td>61.0°C</td><td>87.3°C</td></tr> <tr><td>12</td><td>C613</td><td>60.4°C</td><td>84.7°C</td></tr> <tr><td>13</td><td>C105</td><td>57.1°C</td><td>83.1°C</td></tr> <tr><td>14</td><td>C106</td><td>58.0°C</td><td>84.1°C</td></tr> <tr><td>15</td><td>Q200</td><td>55.4°C</td><td>82.3°C</td></tr> <tr><td>16</td><td>RTH5</td><td>64.0°C</td><td>87.7°C</td></tr> <tr><td>17</td><td>TC</td><td>54.8°C</td><td>79.1°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=26 °C	HIGH AMBIENT Ta=48.4 °C	1	RTH1	67.0°C	85.5°C	2	L2	64.6°C	87.7°C	3	BD1	64.9°C	87.7°C	4	Q1	66.0°C	89.0°C	5	U1	63.6°C	86.4°C	6	Q73	65.1°C	88.8°C	7	C36	65.9°C	89.9°C	8	T1	77.4°C	102.5°C	9	C5	62.0°C	84.9°C	10	U101	66.8°C	92.2°C	11	Q100	61.0°C	87.3°C	12	C613	60.4°C	84.7°C	13	C105	57.1°C	83.1°C	14	C106	58.0°C	84.1°C	15	Q200	55.4°C	82.3°C	16	RTH5	64.0°C	87.7°C	17	TC	54.8°C	79.1°C
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5	U1	63.6°C	86.4°C																																																																									
6	Q73	65.1°C	88.8°C																																																																									
7	C36	65.9°C	89.9°C																																																																									
8	T1	77.4°C	102.5°C																																																																									
9	C5	62.0°C	84.9°C																																																																									
10	U101	66.8°C	92.2°C																																																																									
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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°C	TEST : OK																																																																								
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/110VAC O/P : 100 % LOAD Ta=-45/-35 °C	TEST : OK																																																																								
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45°C /95 %R.H NO DAMAGE	I/P : 305VAC O/P : FULL LOAD Ta= 45°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	-40-45°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 712.8K hrs min. Telcordia SR-332 (Bellcore) ; 178.7K 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