



Test Report: HLG-480H-42

480W Constant Voltage + Constant Current 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

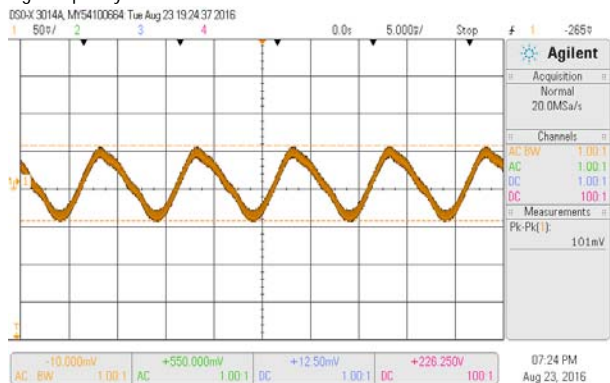
ENVIRONMENT TEST

DESIGN VERIFY TEST

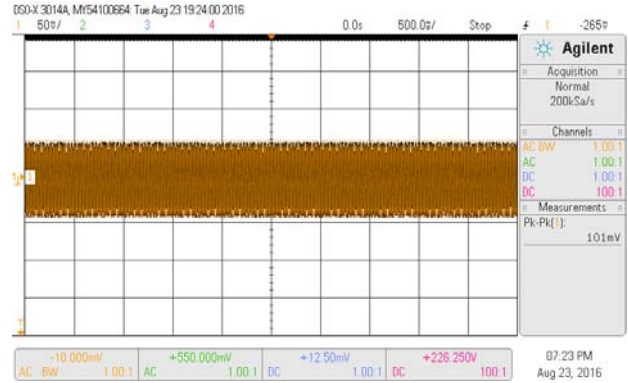
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	CH1: 21 V- 42V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	1V~41V /230VAC
2	VOLTAGE ADJUST RANGE	CH1: 35.7 V- 44.1V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	32.886V~45.269V /230VAC 32.887V~ 45.273V/115VAC
3	CURRENT ADJ. RANGE	CH1: 5.7 A- 11.4 A	I/P: 230 VAC I/P:115VAC O/P:CV MIN & CV MAX-1V Ta:25°C	4.660A~11.989A /230VAC@CV MAX-1V 4.670A~ 11.992A /230VAC@CV MIN 4.658A~11.991A/115VAC@CV MAX-1V 4.669A~11.992A/115VAC@CV MIN
4	OUTPUT VOLTAGE TOLERANCE (Max)	V1:1% ~ -1 %	I/P:100VAC /305AC O/P:FULL/ MIN LOAD Ta:25°C	V1: 0.12 %~-0.12%
5	LINE REGULATION (Max)	V1: 0.5% ~ -0.5 %	I/P:100VAC~305AC O/P:FULL LOAD Ta:25°C	V1: 0%~0%
6	LOAD REGULATION (Max)	V1: 0.5 % ~ -0.5 %	I/P: 230 VAC O/P:FULL -MIN LOAD Ta:25°C	V1: -0.12%-0.1%
7	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: <2.9%
8	RIPPLE & NOISE (Max)	V1: 250 mVp-p	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 101mVp-p

high frequency :



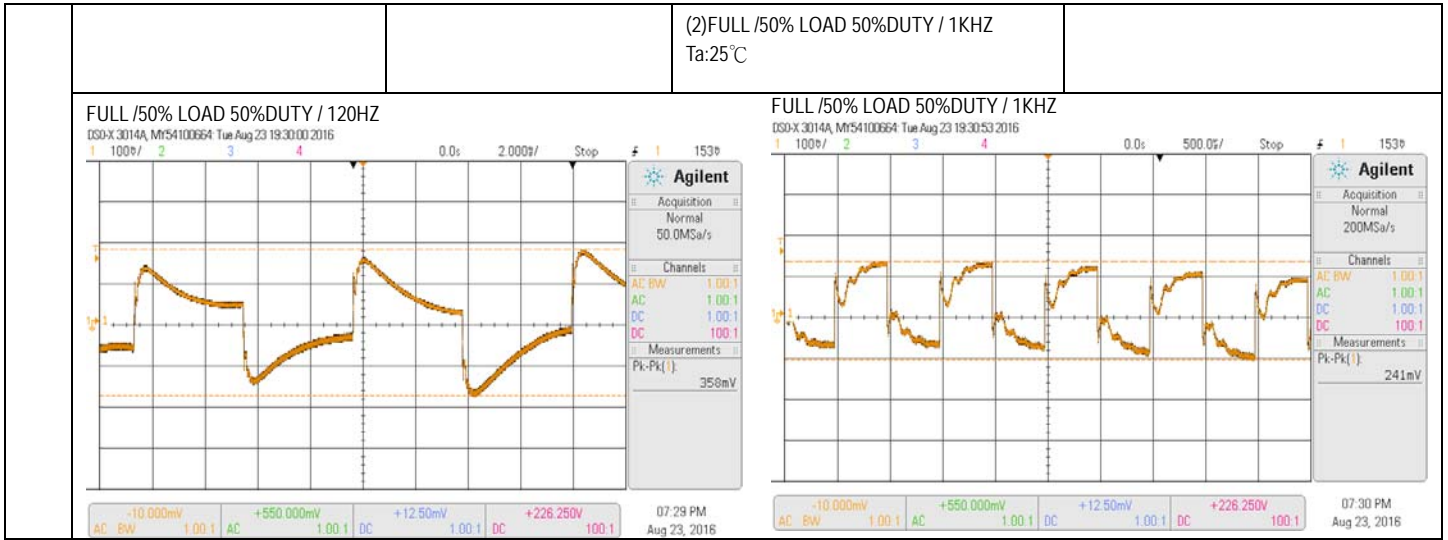
low frequency :



9	SET UP TIME (Max)	230VAC/ 500 ms 115VAC/ 500 ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/186ms 115 VAC/208 ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	

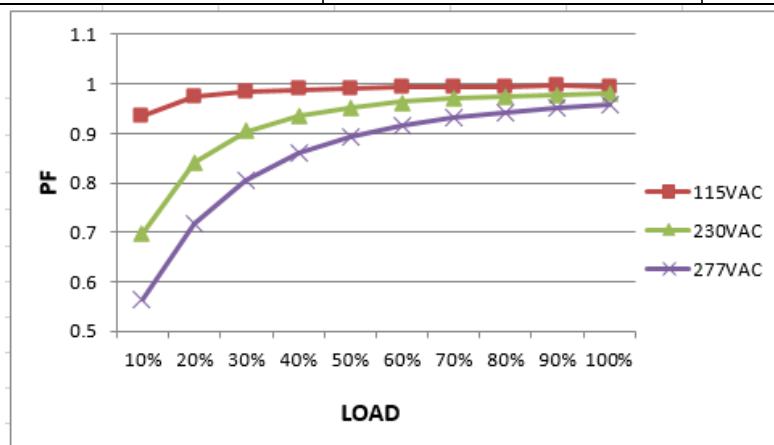
		<p>Δ: 204 V @: 12.0 V Δ: 186ms @: -138ms</p>		<p>Δ: 152 V @: 48.0 V Δ: 208ms @: -158ms</p>
10	RISE TIME (Max)	230VAC/ 80 ms 115VAC/ 80 ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta:25°C	230VAC/ 48.4ms 115 VAC/ 47.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage Tek Run 	<p>Δ: 7.60 V @: 33.8 V Δ: 48.4ms @: 0.00 s</p>	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage Tek Run 	<p>Δ: 33.4 V @: 4.60 V Δ: 47.6ms @: 0.00 s</p>
11	HOLD UP TIME (Typ.)	230VAC/ 16 ms 115VAC/ 16 ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta:25°C	230VAC/ 28s 115 VAC/27.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Tek Run 	<p>Δ: 60.0 V @: -18.0 V Δ: 28.0ms @: -38.8ms</p>	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Tek Run 	<p>Δ: 36.0 V @: -18.0 V Δ: 27.6ms @: -38.8ms</p>
13	DYNAMIC LOAD	V1: 4200 mVp-p	I/P: 230VAC O/P: (1) FULL /50% LOAD 50%DUTY / 120HZ	358mVp-p 241mVp-p

(2)FULL /50% LOAD 50%DUTY / 1KHZ
Ta:25°C

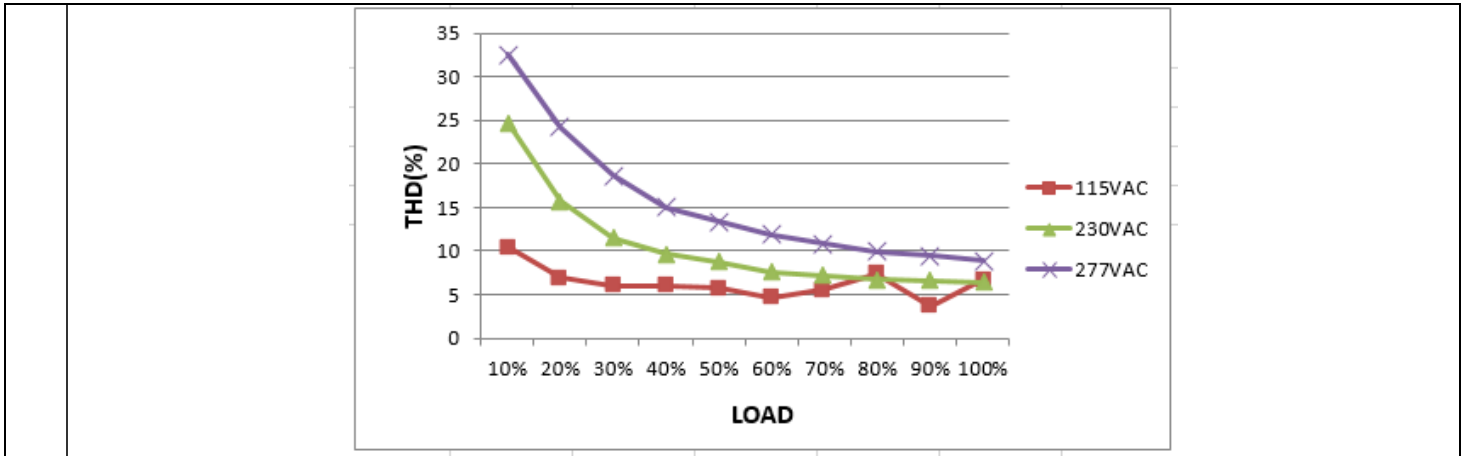


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	76V~305 V
			I/P: LOW-LINE-3V=87 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:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 100 VAC ~305VAC O/P:FULL-MIN LOAD Ta:25°C	OK
3	INPUT CURRENT (TYP)	277VAC/ 2 A 230 VAC/ 2.45 A 115 VAC/ 5 A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25°C	I=1.877A/277VAC I=2.225A/ 230VAC I=4.488A/ 115VAC
4	LEAKAGE CURRENT	< 0.75 mA/ 277VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-FG: 0.32 mA N-FG: 0.32 mA
5	POWER FACTOR(TYP)	0.97/230 VAC FULL LOAD 0.98/115 VAC FULL LOAD 0.95/277 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25°C	PF=0.9826/230V/100%LOAD PF= 0.9948/115V/100%LOAD PF= 0.9620 /277V/100%LOAD



<p>6</p> <p>EFFICIENCY (TYP)</p>	<p>95 % 95.5%</p>	<p>I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta:25°C</p>	<p>95.41% /230V 95.71% /277V</p>
<p>7</p> <p>INRUSH CURRENT (TYP)</p>	<p>230 V/35A COLD START (twidh=1800us measured at 50% Ipeak) COLD START</p>	<p>I/P: 230 VAC O/P: FULL LOAD Ta:25°C</p>	<p>I =33.1A/ 230VAC T50= 1500 us</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)</p>			
<p>8</p> <p>TOTAL HARMONIC DISTORTION</p>	<p>THD < 20% @ output load ≥ 40% at 115VAC/230/277VAC input</p>	<p>I/P : 115VAC O/P : 100% LOAD 40% LOAD Ta : 25°C</p>	<p>THD : 6.26 % THD : 5.85 %</p>
		<p>I/P : 230VAC O/P : 100% LOAD 40% LOAD Ta : 25°C</p>	<p>THD : 6.19 % THD : 9.58 %</p>
		<p>I/P : 277VAC O/P : 100% LOAD 40% LOAD Ta : 25°C</p>	<p>THD : 9.21 % THD : 15.51 %</p>



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 %~ 108 % PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta:25°C	105.9%/ 305VAC 105.6%/ 230VAC 105%/100VAC PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 46 V~ 55 V PROTECTION TYPE : Shut down output voltage, re-power on to recovery	I/P: 305VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	47.496V/ 305VAC 47.412V/ 230VAC 47.85V/ 90VAC PROTECTION TYPE : Shut down output voltage, re-power on to recovery
3	OVER TEMPERATURE PROTECTION	PROTECTION TYPE : Shut down output voltage, re-power on to recovery	I/P: 305 VAC I/P: 90 VAC O/P: FULL LOAD	O.T.P Active PROTECTION TYPE : Shut down output voltage, re-power on to recovery
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed	I/P: 305VAC I/P: 90 VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Constant current limiting, 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 10 Rated 13 A/ 650 V Q 13Rated 13 A/ 650V	I/P: High-Line +3V =308V AC ON/OFF 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	Q10 Q13 VDS: VDS: (1)551V (1)539V (2)543V (2)527V (3)551V (3)535V (4)547V (4)539V (5)547V (5)539V (6)547V (6)539V (7)503V (7)479V

			(6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25°C	
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 13 A/650V	I/P:High-Line +3V =308 V AC ON/OFF 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. Ta:25°C	308V VDS: (1)523V (2)459V (3)531V (4)527V (5)531V (6)439V (7)479V
3	P.F.C DIODE	D8 Rated 12A/ 600V	I/P:High-Line +3V =308 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	VDS: 308V (1)489V (2)457V (3)489V (4)489V
4	Diode Peak Voltage	Q100 Rated 60A/ 120V Q101 Rated 6A/ 120V	I/P:High-Line +3V =308 V AC ON/OFF 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. (8).NO LOAD Ta:25°C	Q100: Q101: VDS: VDS: (1)99.3V (1)103V (2)15.6V (2)16V (3)105V (3)90V (4)110V (4)94V (5)109V (5)98V (6)105V (6)96V (7)56.7V (7)94V (8)91.2V (8)92V
5	Input Capacitor Voltage	C5 Rated: 150 μ / 450V	I/P:High-Line +3V =308V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta:25°C	(1)442V (2)450V (3)450V (4) 442V
6	Control IC Voltage Test	PWM IC U2 Rated 16V- 8.85V(MIN.) PFC IC U1 Rated 20V~10.5V(MIN.)	I/P:High-Line +3V =308 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25°C	U2 U1 (1) 13.12V (1) 14.1V (2) 13.12V (2) 14.1V (3) 12.68V (3) 14.1V (4) 13.37V (4) 14.1V

SAFETY & EMC TEST REPORT

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min I/P-FG:2 KVAC/min O/P-FG:1.5KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P-O/P:5.34mA I/P-FG:4.62 mA O/P-FG: 5.72mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 24.6GΩ I/P-FG:16G Ω O/P-FG:30G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	25mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230 VAC/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 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 : HLG-480H-48 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 29.4 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 63.8 °C																																																																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 29.4 °C</th> <th>HIGH AMBIENT Ta= 63.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD2</td><td>84.4°C</td><td>97.6°C</td></tr> <tr><td>2</td><td>C10</td><td>81.5°C</td><td>94.7°C</td></tr> <tr><td>3</td><td>Q1</td><td>82.4°C</td><td>95.6°C</td></tr> <tr><td>4</td><td>D8</td><td>84.6°C</td><td>97.6°C</td></tr> <tr><td>5</td><td>Q10</td><td>83.0°C</td><td>96.2°C</td></tr> <tr><td>6</td><td>Q12</td><td>83.7°C</td><td>96.9°C</td></tr> <tr><td>7</td><td>RY1</td><td>83.1°C</td><td>95.9°C</td></tr> <tr><td>8</td><td>ZNR2</td><td>77.8°C</td><td>89.2°C</td></tr> <tr><td>9</td><td>C1</td><td>76.8°C</td><td>88.2°C</td></tr> <tr><td>10</td><td>C5</td><td>77.8°C</td><td>89.8°C</td></tr> <tr><td>11</td><td>L3</td><td>83.0°C</td><td>96.5°C</td></tr> <tr><td>12</td><td>U1</td><td>78.4°C</td><td>89.9°C</td></tr> <tr><td>13</td><td>U2</td><td>79.1°C</td><td>91.1°C</td></tr> <tr><td>14</td><td>T1 Primary side</td><td>83.2°C</td><td>98.0°C</td></tr> <tr><td>15</td><td>T2 Primary side</td><td>85.1°C</td><td>99.2°C</td></tr> <tr><td>16</td><td>Q100</td><td>82.9°C</td><td>98.0°C</td></tr> <tr><td>17</td><td>Q121</td><td>83.0°C</td><td>98.2°C</td></tr> <tr><td>18</td><td>C115</td><td>77.6°C</td><td>91.8°C</td></tr> <tr><td>19</td><td>C117</td><td>75.1°C</td><td>89.2°C</td></tr> <tr><td>20</td><td>LF100</td><td>74.5°C</td><td>88.9°C</td></tr> <tr><td>21</td><td>T500</td><td>78.6°C</td><td>91.6°C</td></tr> <tr><td>22</td><td>C511</td><td>78.8°C</td><td>91.8°C</td></tr> <tr><td>23</td><td>U501</td><td>78.0°C</td><td>91.1°C</td></tr> <tr><td>24</td><td>J101</td><td>77.9°C</td><td>92.5°C</td></tr> <tr><td>25</td><td>RTH2</td><td>79.3°C</td><td>91.8°C</td></tr> <tr><td>26</td><td>C93</td><td>80.6°C</td><td>93.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 29.4 °C	HIGH AMBIENT Ta= 63.8 °C	1	BD2	84.4°C	97.6°C	2	C10	81.5°C	94.7°C	3	Q1	82.4°C	95.6°C	4	D8	84.6°C	97.6°C	5	Q10	83.0°C	96.2°C	6	Q12	83.7°C	96.9°C	7	RY1	83.1°C	95.9°C	8	ZNR2	77.8°C	89.2°C	9	C1	76.8°C	88.2°C	10	C5	77.8°C	89.8°C	11	L3	83.0°C	96.5°C	12	U1	78.4°C	89.9°C	13	U2	79.1°C	91.1°C	14	T1 Primary side	83.2°C	98.0°C	15	T2 Primary side	85.1°C	99.2°C	16	Q100	82.9°C	98.0°C	17	Q121	83.0°C	98.2°C	18	C115	77.6°C	91.8°C	19	C117	75.1°C	89.2°C	20	LF100	74.5°C	88.9°C	21	T500	78.6°C	91.6°C	22	C511	78.8°C	91.8°C	23	U501	78.0°C	91.1°C	24	J101	77.9°C	92.5°C	25	RTH2	79.3°C	91.8°C	26	C93	80.6°C	93.4°C
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25	RTH2	79.3°C	91.8°C																																																																																																													
26	C93	80.6°C	93.4°C																																																																																																													
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : 100 % LOAD Ta= -45 °C	TEST : OK																																																																																																												
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 60°C HUMIDITY= 95 %R.H	TEST : OK																																																																																																												
4	TEMPERATURE COEFFICIENT	± 0.02 %/°C(0-60°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.004 %/°C(0-60°C)																																																																																																												



5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -50°C~ +125°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 100 CYCLE 5. Input/Output condition : STATIC	OK
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°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	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°C	TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C116 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) 88718HRS (2) 91767HRS (3) 104488HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 345.5K hrs min. Telcordia SR-332 (Bellcore) ; 95.3K 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 : 62,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

12.10.30 A50-F031