



Test Report: RT-125D

125W Triple Output Switching Power Supply

■ 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

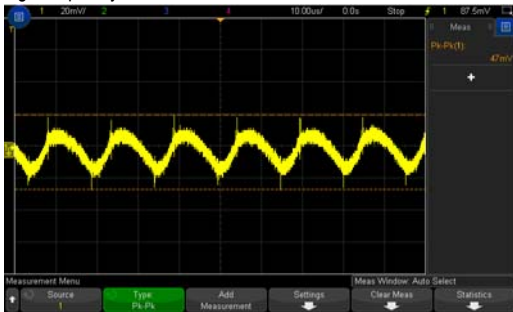
- ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.75V~ 5.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.60V~5.70V/230VAC 4.63V~5.69V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1 : -2%~2 % V2 : -8%~8% V3 : -6%~6 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1 : -0.11%~0.12% V2 : -1.64%~0.91% V3 : -0.78%~0.44%
3	LINE REGULATION (Max)	V1: -0.5%~0.5% V2: -1%~ 1% V3: -1%~ 1%	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1 : -0.01%~0.00% V2 : -0.00%~0.00% V3 : -0.01%~0.03%
4	LOAD REGULATION(Max)	V1: -1%~1% V2: -3%~3% V3: -6%~6%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1 : -0.11%~0.12% V2 : -1.64%~0.91% V3 : -0.78%~0.44%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	4.4%
6	RIPPLE & NOISE(Max)	V1: 80mVp-p V2: 150mVp-p V3: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 50mVp-p V2: 103mVp-p V3: 56mVp-p

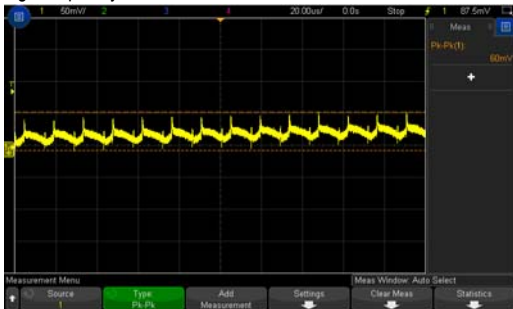
high frequency (V1) :



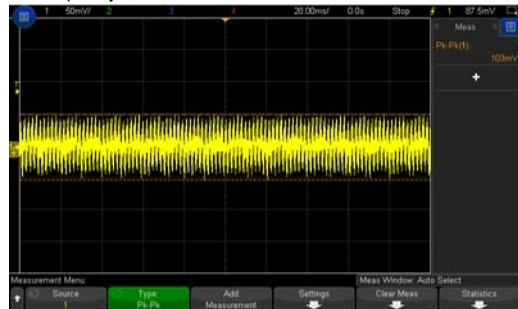
low frequency (V1) :



high frequency (V2) :



low frequency (V2) :

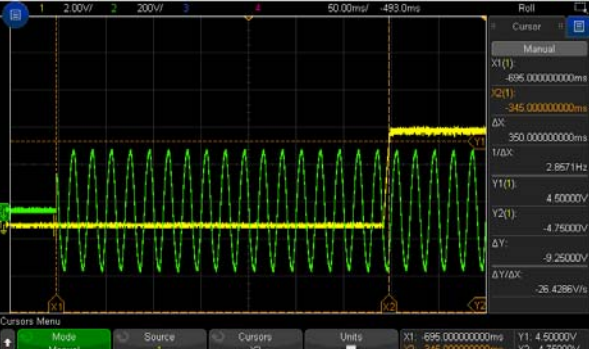
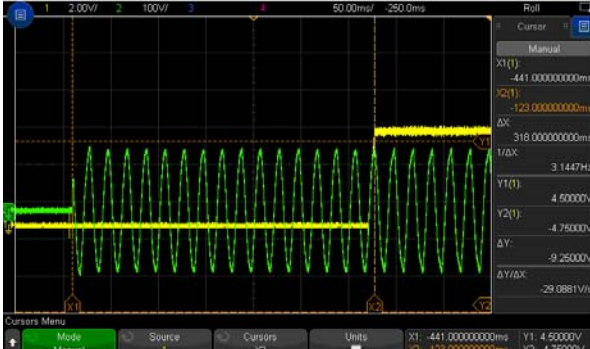
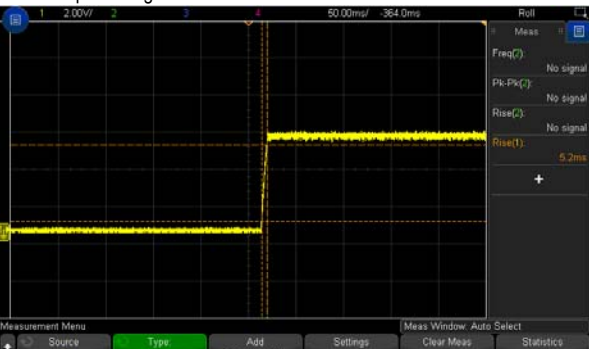
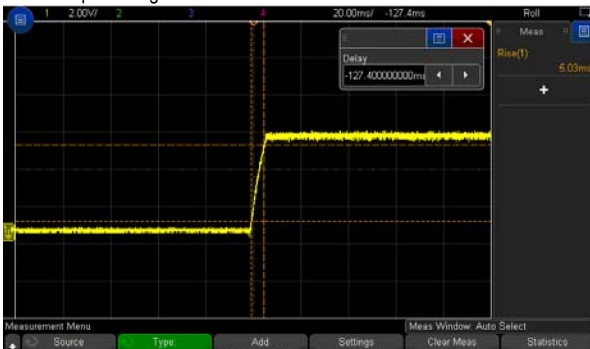
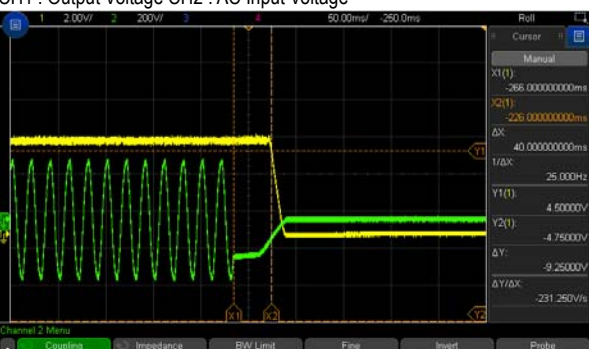



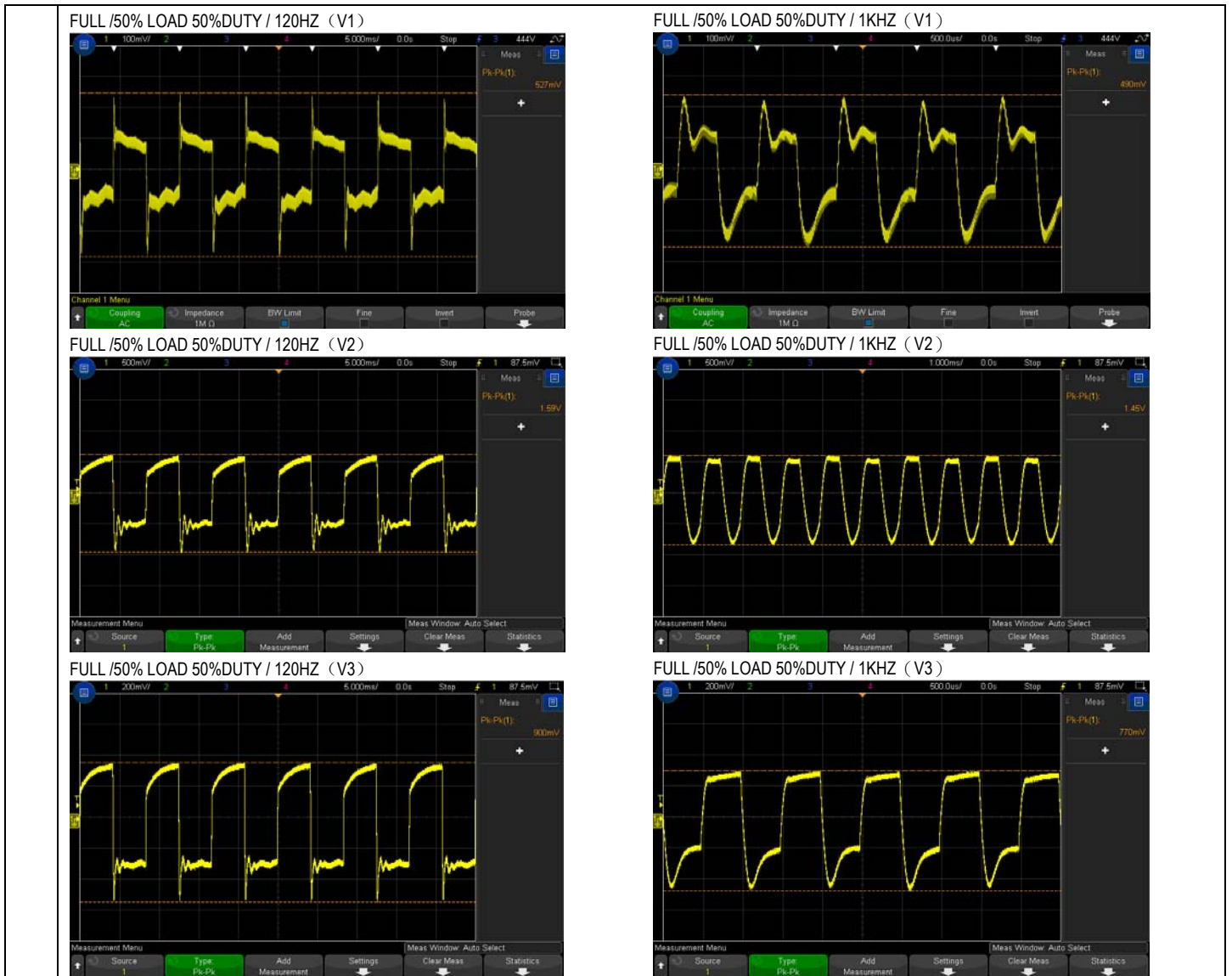
high frequency (V3) :



low frequency (V3) :



<p>7</p> <p>SET UP TIME(Max)</p>	<p>230VAC/500ms 115VAC/1200ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 350 ms 115VAC/ 318ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 	
<p>8</p> <p>RISE TIME (Max)</p>	<p>230VAC/20ms 115VAC/30ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 5.20ms 115VAC/ 5.03ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p> 	
<p>9</p> <p>HOLD UP TIME (Typ.)</p>	<p>230VAC/25ms 115VAC/30ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 40ms 115VAC/ 37ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 	
<p>10</p> <p>DYNAMIC LOAD</p>	<p>V1: 1000 mVp-p V2: 2400 mVp-p V3: 1200 mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C</p>	<p>(1) (2) V1: 527mVp-p 490mVp-p V2: 1590mVp-p 1450mVp-p V3: 900mVp-p 770mVp-p</p>



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	88VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	79V~264V
			I/P: LOW-LINE-3V=85 V HIGH-LINE+15%=300 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:88 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 2A 115V/ 3A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.10A/ 230VAC I =2.08A/ 115VAC

4	LEAKAGE CURRENT	<2 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.6 mA																						
5	EFFICIENCY(Typ.)	80%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	83.5%																						
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data (Approximate)</caption> <thead> <tr> <th>Load (%)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>69</td></tr> <tr><td>20%</td><td>74</td></tr> <tr><td>30%</td><td>76</td></tr> <tr><td>40%</td><td>78</td></tr> <tr><td>50%</td><td>80</td></tr> <tr><td>60%</td><td>81</td></tr> <tr><td>70%</td><td>82</td></tr> <tr><td>80%</td><td>83</td></tr> <tr><td>90%</td><td>83.5</td></tr> <tr><td>100%</td><td>84</td></tr> </tbody> </table>					Load (%)	Efficiency (%)	10%	69	20%	74	30%	76	40%	78	50%	80	60%	81	70%	82	80%	83	90%	83.5	100%	84
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6	INRUSH CURRENT(Typ.)	230V / 50A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	39.8A																						
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2 : AC Input Voltage CH4 : Input current</p> <p>Ch4 Max 39.8 A</p> <p>Ch2 200 V 2.00ms A Ch4 3.20 A</p> <p>Ch4 10.0 A</p> <p>0.00000 s</p>																										

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~150%	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: TESTING Ta: 25°C	122.7%/ 264VAC 122.2%/ 230VAC 129.4%/88VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	5.75V~6.75V	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: MIN LOAD Ta: 25°C	6.29V/ 264VAC 6.29V/ 230VAC 6.29V/ 88VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 88VAC 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	Q1 Rated : 900 V	AC ON/OFF I/P:High-Line +3V =267V VDS: O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	VDS: (1) 726V (2) 806V (3) 694V
2	O/P Diode	D55 Rated : 200 V D60 Rated : 40 V D50 Rated : 600 V	AC ON/OFF I/P:High-Line +3V =267 V O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	D55 (1) 124V (2) 112V (3) 106V D60 (1) 37.4V (2) 30.8V (3) 31.2V D50 (1) 50.1V (2) 40.9V (3) 36.9V
3	Input Capacitor Voltage	C5 Rated :330 μ / 200 V	I/P:High-Line +3V =267V 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) 194V (2) 188V (3) 188V (4) 186V
4	Control IC Voltage Test	U1 Rated : 8.4V~ 21 V	AC ON/OFF I/P:High-Line +3V =267 V O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(LOW LINE) Ta:25°C	(1) 18.4V (2) 12.6V (3) 18.2V (4) 13.0V (5) 13.0V
5	Clamp Diode Peak Voltage	D1 Rated : 1000 V	AC ON/OFF I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 646V (2) 605V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG:2 KVAC/min O/P-FG: 0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P- FG: 2.4 KVAC/min O/P - FG: 0.6 KVAC/min Ta:25°C	I/P-O/P:3.24mA I/P-FG:1.36mA O/P-FG:1.26mA 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: 600 VDC I/P- FG: 600 VDC Ta:25°C	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta: 25°C/70%RH	6mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 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 <u>INDUSTRY</u> 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 <u>INDUSTRY</u> INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 <u>INDUSTRY</u> 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 : RT-125D 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 24.0 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=49.9°C																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.0 °C</th> <th>HIGH AMBIENT Ta=49.9 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>51.9°C</td><td>78.1°C</td></tr> <tr><td>2</td><td>BD1</td><td>66.0°C</td><td>90.0°C</td></tr> <tr><td>3</td><td>C5</td><td>61.8°C</td><td>85.9°C</td></tr> <tr><td>4</td><td>D1</td><td>75.7°C</td><td>101.1°C</td></tr> <tr><td>5</td><td>D55</td><td>88.1°C</td><td>113.1°C</td></tr> <tr><td>6</td><td>Q1</td><td>75.8°C</td><td>104.5°C</td></tr> <tr><td>7</td><td>U1</td><td>75.1°C</td><td>101.3°C</td></tr> <tr><td>8</td><td>ZD2</td><td>77.4°C</td><td>103.8°C</td></tr> <tr><td>9</td><td>T1coil</td><td>87.6°C</td><td>111.5°C</td></tr> <tr><td>10</td><td>D60</td><td>90.5°C</td><td>116.1°C</td></tr> <tr><td>11</td><td>T1core</td><td>79.8°C</td><td>104.8°C</td></tr> <tr><td>12</td><td>C10</td><td>64.9°C</td><td>90.9°C</td></tr> <tr><td>13</td><td>L60</td><td>94.4°C</td><td>118.4°C</td></tr> <tr><td>14</td><td>C62</td><td>76.7°C</td><td>103.2°C</td></tr> <tr><td>15</td><td>D50</td><td>79.1°C</td><td>104.6°C</td></tr> <tr><td>16</td><td>L56</td><td>73.1°C</td><td>100.3°C</td></tr> <tr><td>17</td><td>L61</td><td>68.0°C</td><td>95.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 24.0 °C	HIGH AMBIENT Ta=49.9 °C	1	LF1	51.9°C	78.1°C	2	BD1	66.0°C	90.0°C	3	C5	61.8°C	85.9°C	4	D1	75.7°C	101.1°C	5	D55	88.1°C	113.1°C	6	Q1	75.8°C	104.5°C	7	U1	75.1°C	101.3°C	8	ZD2	77.4°C	103.8°C	9	T1coil	87.6°C	111.5°C	10	D60	90.5°C	116.1°C	11	T1core	79.8°C	104.8°C	12	C10	64.9°C	90.9°C	13	L60	94.4°C	118.4°C	14	C62	76.7°C	103.2°C	15	D50	79.1°C	104.6°C	16	L56	73.1°C	100.3°C	17	L61	68.0°C	95.5°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 119% LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/88VAC O/P : 100 % LOAD Ta= -25°C	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL40°C /95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=40 °C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.01%/°C (0~50°C)
6	STORAGE TEMPERATURE TEST	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		TEST : OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +45°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		TEST : OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C62 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=40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME		(1) 97394.7HRS (2) 33052.5HRS (3) 70700.4 HRS (4) 128698.9HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 209.3K 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 : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		Wangdz

2018.4.30 GP-A50-F010