



Test Report: LRS-75-5

75W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

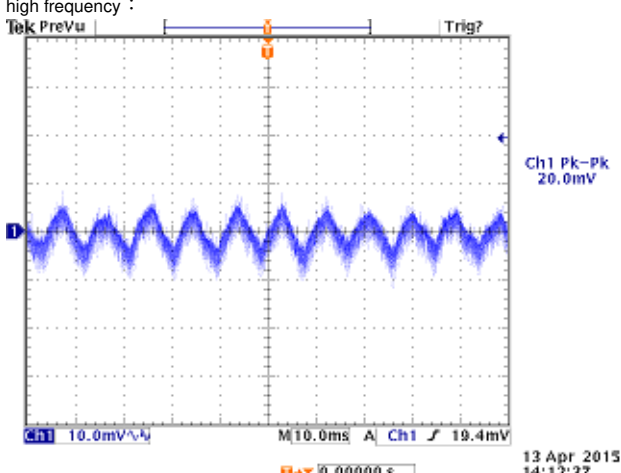
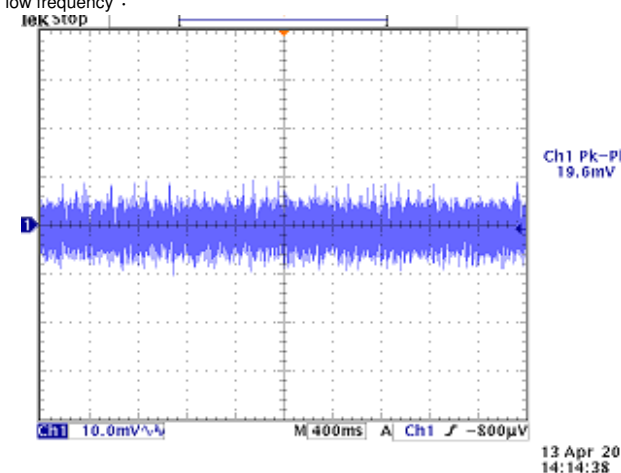
E.M.C. Test

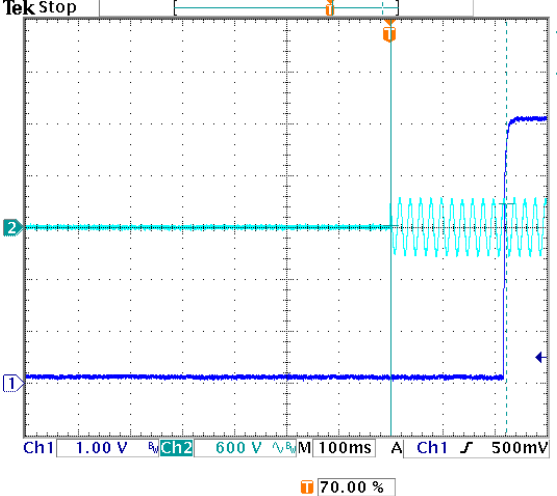
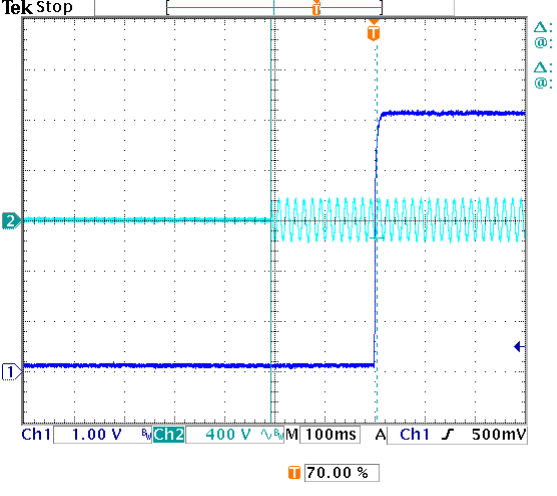
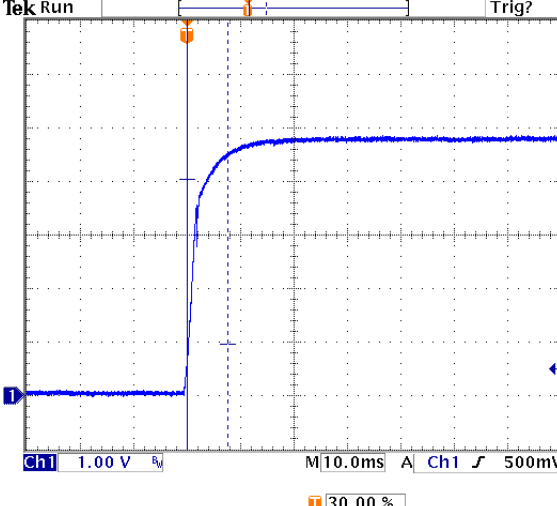
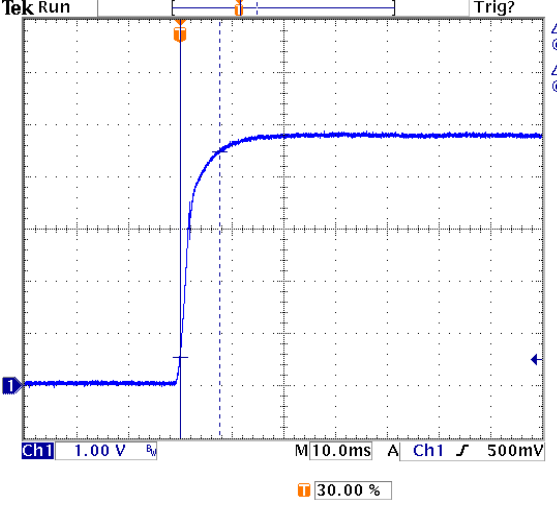
■ RELIABILITY TEST

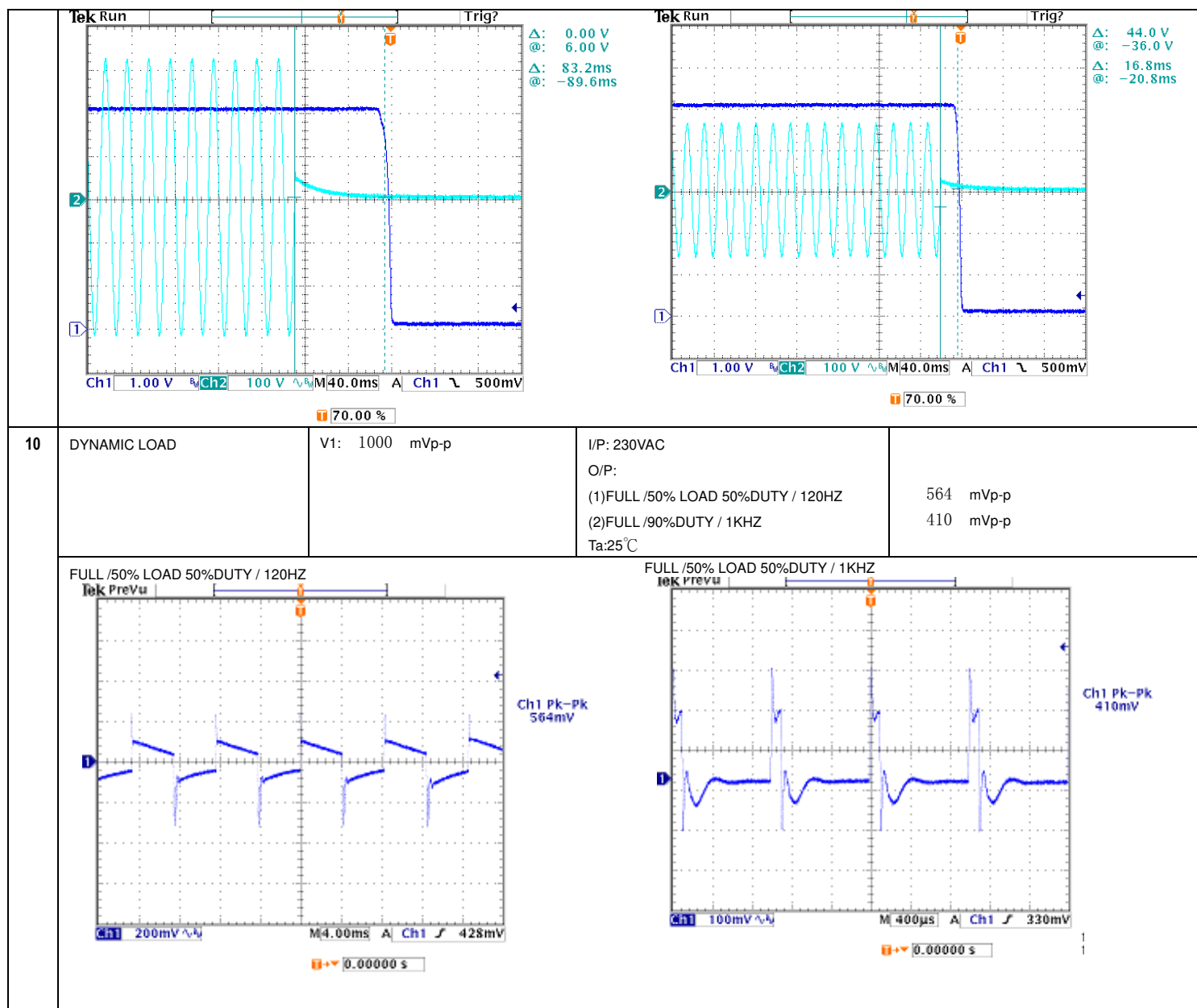
ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.5 V~5.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.26V~ 5.75 V/230VAC 4.26V~ 5.75 V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -2 %~ 2 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.355%~ 0.612%
3	LINE REGULATION (Max)	V1: -0.5 %~ 0.5 %	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0%
4	LOAD REGULATION(Max)	V1: -1%~ 1 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.355%~ 0.612%
5	OVER/UNDERSHOOT TEST	< ± 10 %	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ± 10%
6	RIPPLE & NOISE(Max)	V1: 100 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 20.0 mVp-p
high frequency :  Ch1 Pk-Pk 20.0mV 13 Apr 2015 14:12:37 low frequency :  Ch1 Pk-Pk 19.6mV 13 Apr 2015 14:14:38				
7	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/ 222 ms 115VAC/ 212 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	

					
8	RISE TIME (Max)	230VAC/ 30 ms 115VAC/ 30 ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 7.6 ms 115VAC/ 7.6 ms	
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage			
					
9	HOLD UP TIME (Typ.)	230VAC/ 60 ms 115VAC/ 12 ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 83.2 ms 115VAC/ 16.8 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			

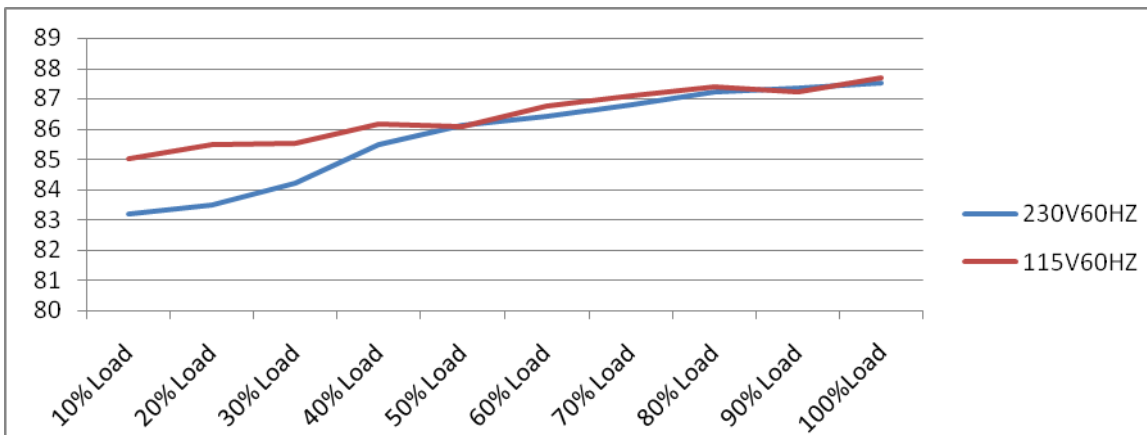


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	63 V~264V
			I/P: LOW-LINE-3V=82V 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:100 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK

3	INPUT CURRENT (Typ.)	230V/ 0.85 A 115V/ 1.4 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.598 A/ 230VAC I = 1.225 A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.381 mA N-FG : 0.381 mA
5	NO LOAD CONSUMPTION	< 0.3W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.092 W < 0.2315 W
6	EFFICIENCY(Typ.)	86.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	87.51%

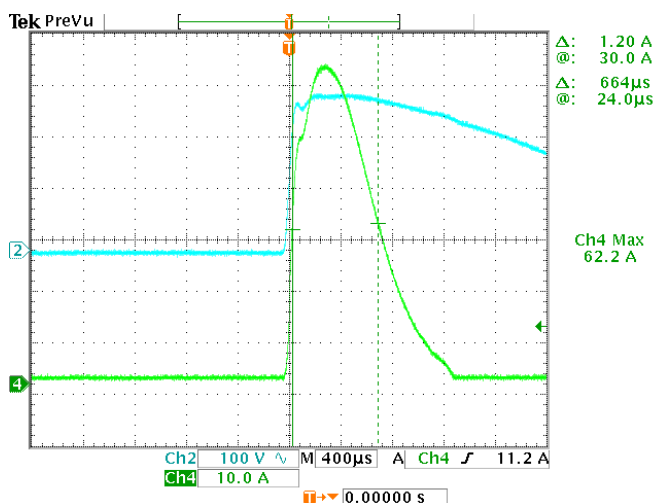
EFFICIENCY vs LOAD



8	INRUSH CURRENT(Typ.)	230V/ 65 A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 62.2 A/ 230VAC
---	----------------------	------------------------------	---	--------------------

INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110 %~ 150 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta:25℃	129.0%/ 264VAC 128.42%/ 230VAC 120.5%/100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	5. 75V~ 6.75 V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25℃	6.28V/ 264VAC 6.26V/ 230VAC 6.24V/ 90VAC PROTECTION TYPE : shut down o/p voltage, re-power on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD Ta:25℃	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 : 11A/ 600V	I/P: High-Line +3V =267V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full load continue Ta:25℃	VDS: (1) 538V (2) 596V (3) 530V
2	Diode Peak Voltage	Q100 Rated : 110A/ 60V	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full load continue Ta:25℃	Q100: VDS: (1) 53.7V (2) 54.8V (3) 49.2V
3	Input Capacitor Voltage	C5 Rated: : 150 μ / 400 V 105 ℃	I/P: High-Line +3V =267 V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change Ta:25℃	(1) 352V (2) 356V (3) 366V
4	Control IC Voltage Test	PWM IC U1 Rated : 28V 9.5V(MIN.)	I/P: High-Line +3V =267 V AC ON/OFF O/P(1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VR MIN .LOW LINE Ta:25℃	(1) 21.8V (2) 20.1V (3) 19.5V (4) 17.5V (5) 12.0V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min I/P-FG :2KVAC/min O/P-FG:1.25KVAC/min	I/P-O/P: 4. 5 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1. 5 KVAC/min Ta:25℃	I/P-O/P: 2. 352 mA I/P-FG: 2. 85 mA O/P-FG: 2. 243 mA 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℃	I/P-O/P:>9999 MΩ I/P-FG: >9999MΩ O/P-FG: >9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	26mΩ

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℃	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25℃	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25℃	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℃	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																
1	TEMPERATURE RISE TEST	MODEL : LRS-75-5 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=31.3℃ 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=42.5℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=31.3℃</th><th>HIGH AMBIENT Ta=42.5℃</th></tr><tr><td>1</td><td>LF1</td><td>57.2℃</td><td>67.1℃</td></tr><tr><td>2</td><td>BD1</td><td>65.1℃</td><td>74.6℃</td></tr><tr><td>3</td><td>C5</td><td>63.2℃</td><td>72.6℃</td></tr><tr><td>4</td><td>D5</td><td>93.1℃</td><td>104.0℃</td></tr><tr><td>5</td><td>Q1</td><td>84.2℃</td><td>95.8℃</td></tr><tr><td>6</td><td>C35</td><td>75.3℃</td><td>86.4℃</td></tr><tr><td>7</td><td>T1</td><td>81.6℃</td><td>91.9℃</td></tr><tr><td>8</td><td>C106</td><td>81.9℃</td><td>91.4℃</td></tr><tr><td>9</td><td>C110</td><td>69.0℃</td><td>80.3℃</td></tr><tr><td>10</td><td>L100</td><td>77.1℃</td><td>89.0℃</td></tr><tr><td>11</td><td>C107</td><td>76.8℃</td><td>89.3℃</td></tr><tr><td>12</td><td>Q100</td><td>89.8℃</td><td>103.4℃</td></tr><tr><td>13</td><td>U100</td><td>77.4℃</td><td>87.1℃</td></tr><tr><td>14</td><td>D30</td><td>84.9℃</td><td>95.3℃</td></tr><tr><td>15</td><td>D200</td><td>89.5℃</td><td>99.2℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta=31.3℃	HIGH AMBIENT Ta=42.5℃	1	LF1	57.2℃	67.1℃	2	BD1	65.1℃	74.6℃	3	C5	63.2℃	72.6℃	4	D5	93.1℃	104.0℃	5	Q1	84.2℃	95.8℃	6	C35	75.3℃	86.4℃	7	T1	81.6℃	91.9℃	8	C106	81.9℃	91.4℃	9	C110	69.0℃	80.3℃	10	L100	77.1℃	89.0℃	11	C107	76.8℃	89.3℃	12	Q100	89.8℃	103.4℃	13	U100	77.4℃	87.1℃	14	D30	84.9℃	95.3℃	15	D200	89.5℃	99.2℃
NO	Position	ROOM AMBIENT Ta=31.3℃	HIGH AMBIENT Ta=42.5℃																																																																	
1	LF1	57.2℃	67.1℃																																																																	
2	BD1	65.1℃	74.6℃																																																																	
3	C5	63.2℃	72.6℃																																																																	
4	D5	93.1℃	104.0℃																																																																	
5	Q1	84.2℃	95.8℃																																																																	
6	C35	75.3℃	86.4℃																																																																	
7	T1	81.6℃	91.9℃																																																																	
8	C106	81.9℃	91.4℃																																																																	
9	C110	69.0℃	80.3℃																																																																	
10	L100	77.1℃	89.0℃																																																																	
11	C107	76.8℃	89.3℃																																																																	
12	Q100	89.8℃	103.4℃																																																																	
13	U100	77.4℃	87.1℃																																																																	
14	D30	84.9℃	95.3℃																																																																	
15	D200	89.5℃	99.2℃																																																																	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 120% LOAD Ta : 25℃	TEST : OK																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -30℃	TEST : OK																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=40℃ HUMIDITY= 95 %R.H	TEST : OK																																																																
5	TEMPERATURE COEFFICIENT	± 0.03%/℃ (0~50℃)	I/P : 230 VAC O/P : FULL LOAD	±0.008%/℃ (0~50℃)																																																																
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃~ +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		OK																																																																
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30℃~ +70℃ 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 58sec ; turn off 2sec		OK																																																																



8	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 : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
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=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) 56064HRS (2) 28119HRS (3) 157680HRS (4) 325360HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 681.2 KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C	

TEST RESULT	TESTER	APPROVAL
PASS	Frank	WANGDZ

2007/3/20 A50-S014