



# Test Report: LRS-75-12

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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

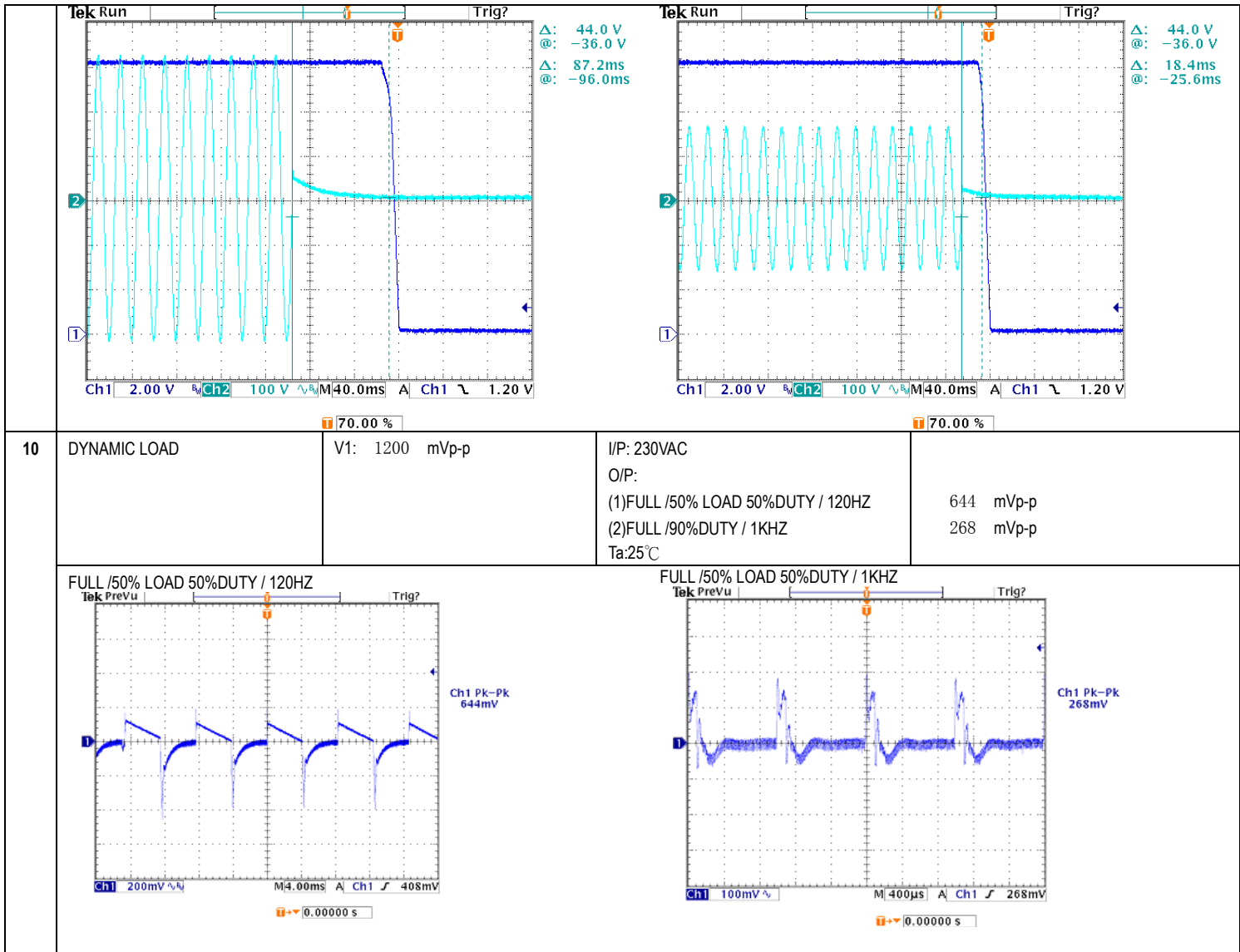
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.2V~13.8 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	9.84V~ 14.27V/230VAC 9.84V~ 14.27V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1 %~ 1 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.049 %~ 0.099%
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: -0.5%~ 0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.049 %~ 0.099%
5	OVER/UNDERSHOOT TEST	<± 5 %	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<± 5 %
6	RIPPLE & NOISE(Max)	V1: 120 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 50.8 mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>high frequency :</p> </div> <div style="text-align: center;"> <p>low frequency :</p> </div> </div>				
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/ 234 ms 115VAC/ 228 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> <math>\Delta</math>: 288 V  <math>@</math>: -24.0 V  <math>\Delta</math>: 234ms  <math>@</math>: -230ms         </p>		<p> <math>\Delta</math>: 128 V  <math>@</math>: 8.00 V  <math>\Delta</math>: 228ms  <math>@</math>: -224ms         </p>
<p>8 RISE TIME (Max)</p>	<p>230VAC/ 30 ms 115VAC/ 30 ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 4 ms 115VAC/ 5.2 ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p> <p> <math>\Delta</math>: 680mV  <math>@</math>: 6.04 V  <math>\Delta</math>: 4.00ms  <math>@</math>: 0.00 s         </p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p> <p> <math>\Delta</math>: 8.60 V  <math>@</math>: 1.24 V  <math>\Delta</math>: 5.20ms  <math>@</math>: 0.00 s         </p>	
<p>9 HOLD UP TIME (Typ.)</p>	<p>230VAC/ 60 ms 115VAC/ 12 ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 87.2 ms 115VAC/ 18.4 ms</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>	

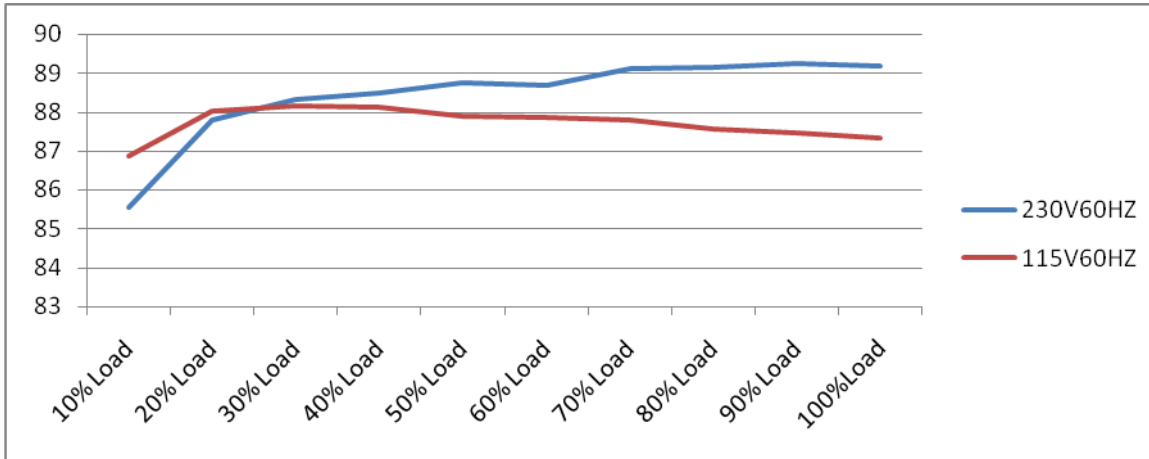


### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	71 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 = 0.617 A/ 230VAC I = 1.145 A/ 115VAC

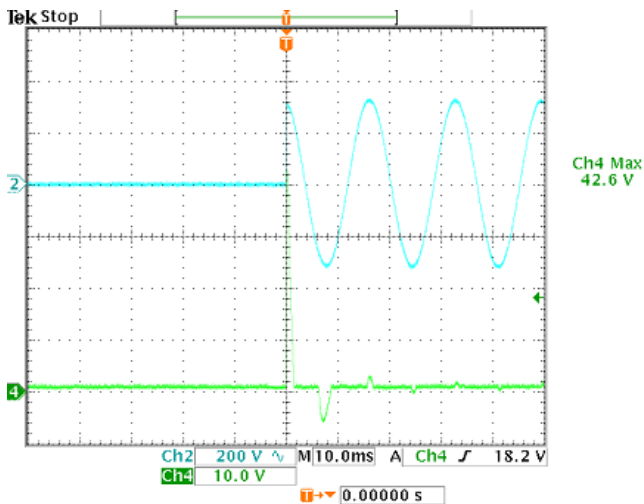
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.380 mA N-FG : 0.380 mA
5	NO LOAD CONSUMPTION	< 0.3W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.1369 W < 0.1839 W
6	EFFICIENCY(Typ.)	89%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	89.16%

EFFICIENCY vs LOAD



8	INRUSH CURRENT(Typ.)	230V/ 50 A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 42.6 A/230VAC
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INPUT=230VAC/50HZ @ FULL LOAD  
CH2 : AC Input Voltage CH4 : Input current (1V=1A)



**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°C	133.3%/ 264VAC 134%/ 230VAC 124.16%/100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.8V~16.2 V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta: 25°C	15.4V/ 264VAC 15.3V/ 230VAC 15.4V/ 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°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 : 10A/ 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°C	VDS: (1) 566V (2) 556V (3) 560V
2	Diode Peak Voltage	Q100 Rated : 30A/ 65V	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full load continue Ta: 25°C	Q100: VDS: (1) 64.6V (2) 55.2V (3) 58.6V
3	Input Capacitor Voltage	C5 Rated: : 150 $\mu$ / 400 V 105 °C	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°C	(1) 368V (2) 370V (3) 370V
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°C	(1) 22.1 V (2) 13.1V (3) 20.4V (4) 22.1V (5) 14.3V

**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°C	I/P-O/P: 2. 459mA I/P-FG: 2. 86mA O/P-FG: 2. 318mA 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:>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°C	26 mΩ

**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	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 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 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 INDUSTRY INPUT : 2KV	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			

■ **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°C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=42.5°C																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=31.3°C</th> <th>HIGH AMBIENT Ta=42.5°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>57.2°C</td><td>67.1°C</td></tr> <tr><td>2</td><td>BD1</td><td>65.1°C</td><td>74.6°C</td></tr> <tr><td>3</td><td>C5</td><td>63.2°C</td><td>72.6°C</td></tr> <tr><td>4</td><td>D5</td><td>93.1°C</td><td>104.0°C</td></tr> <tr><td>5</td><td>Q1</td><td>84.2°C</td><td>95.8°C</td></tr> <tr><td>6</td><td>C35</td><td>75.3°C</td><td>86.4°C</td></tr> <tr><td>7</td><td>T1</td><td>81.6°C</td><td>91.9°C</td></tr> <tr><td>8</td><td>C106</td><td>81.9°C</td><td>91.4°C</td></tr> <tr><td>9</td><td>C110</td><td>69.0°C</td><td>80.3°C</td></tr> <tr><td>10</td><td>L100</td><td>77.1°C</td><td>89.0°C</td></tr> <tr><td>11</td><td>C107</td><td>76.8°C</td><td>89.3°C</td></tr> <tr><td>12</td><td>Q100</td><td>89.8°C</td><td>103.4°C</td></tr> <tr><td>13</td><td>U100</td><td>77.4°C</td><td>87.1°C</td></tr> <tr><td>14</td><td>D30</td><td>84.9°C</td><td>95.3°C</td></tr> <tr><td>15</td><td>D200</td><td>89.5°C</td><td>99.2°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=31.3°C	HIGH AMBIENT Ta=42.5°C	1	LF1	57.2°C	67.1°C	2	BD1	65.1°C	74.6°C	3	C5	63.2°C	72.6°C	4	D5	93.1°C	104.0°C	5	Q1	84.2°C	95.8°C	6	C35	75.3°C	86.4°C	7	T1	81.6°C	91.9°C	8	C106	81.9°C	91.4°C	9	C110	69.0°C	80.3°C	10	L100	77.1°C	89.0°C	11	C107	76.8°C	89.3°C	12	Q100	89.8°C	103.4°C	13	U100	77.4°C	87.1°C	14	D30	84.9°C	95.3°C	15	D200	89.5°C	99.2°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 120% LOAD Ta : 25°C	TEST : OK																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta=-30°C	TEST : OK																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C 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	±0.008%/°C (0~50°C)																																																																
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C~ +85°C 2. Temperature change rate : 25°C / 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°C~ +70°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 : 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