



Test Report: LRS-35-15

35W 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

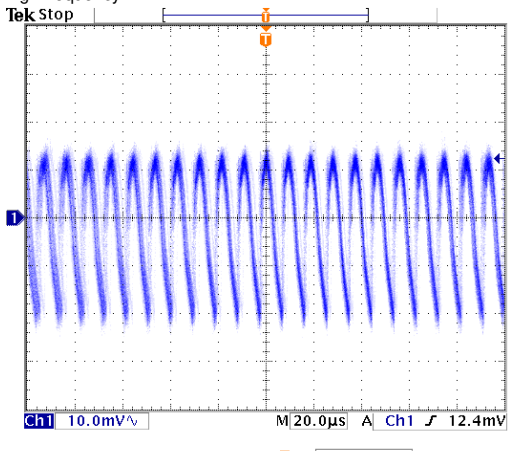
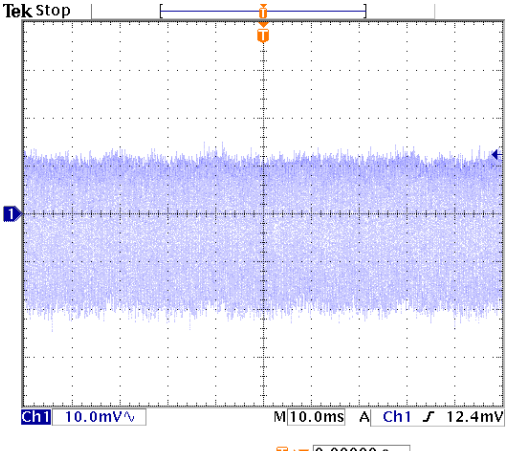
E.M.C. Test

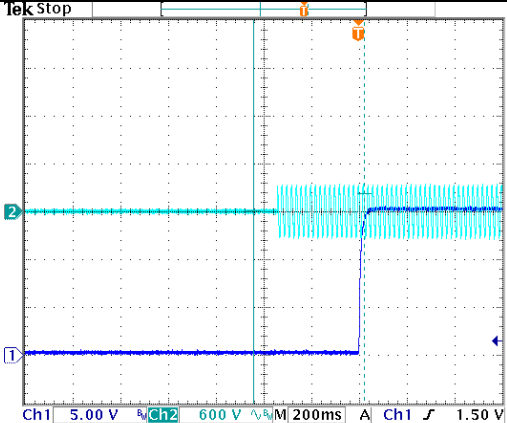
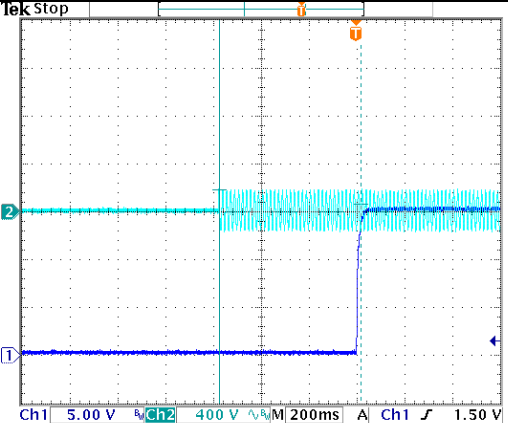
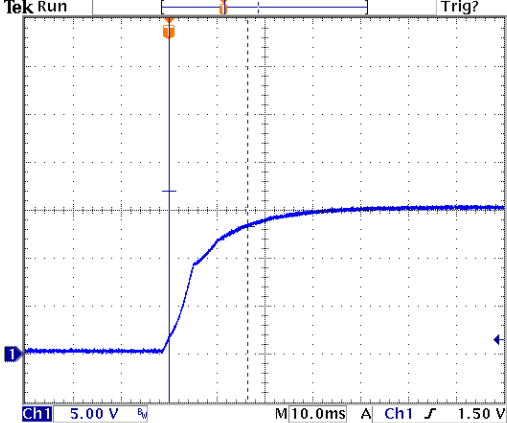
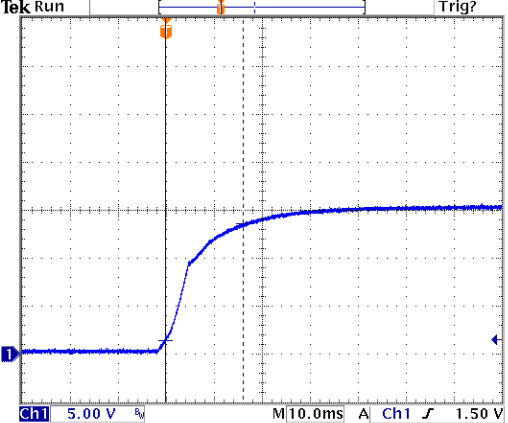
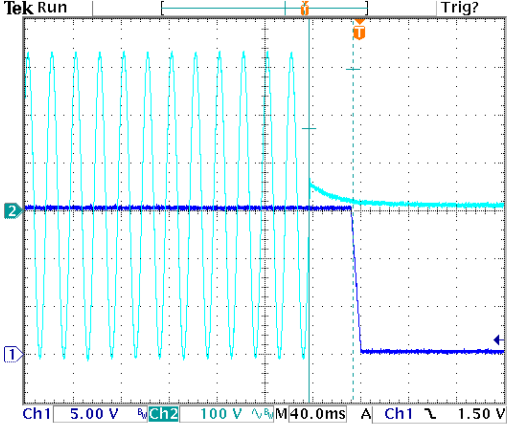
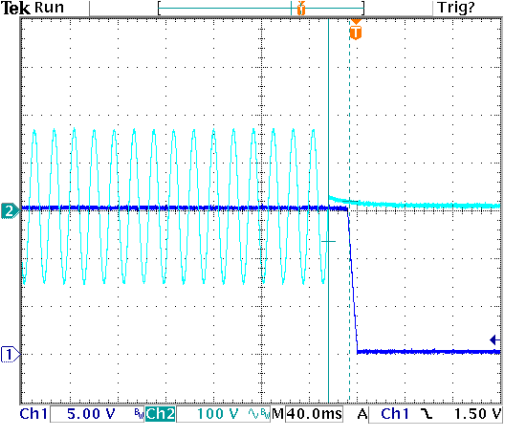
RELIABILITY TEST

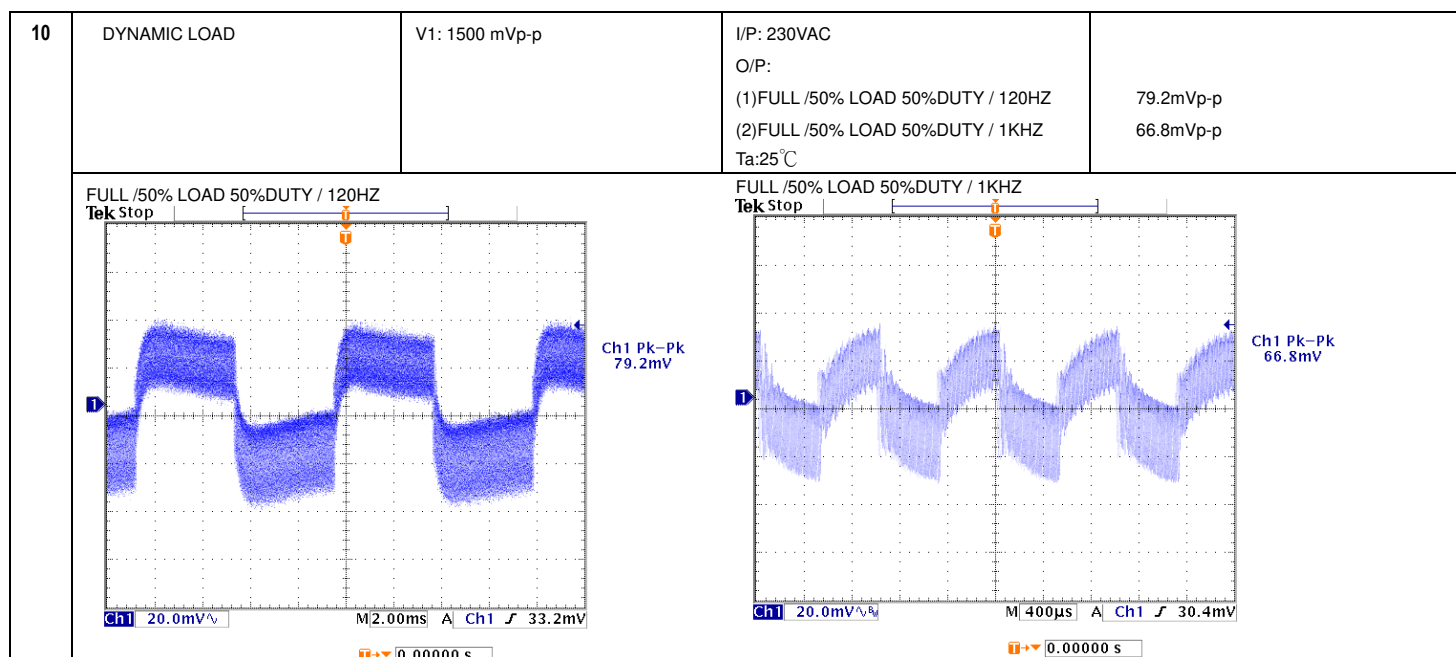
ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 13.5V~ 18 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	13.08V~18.43V/230VAC 13.08V~18.43V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1 %~ -1 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.04%~ 0.04%
3	LINE REGULATION (Max)	V1: 0.5 %~ -0.5 %	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0.04%
4	LOAD REGULATION(Max)	V1: 0.5 %~ -0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.04%~ 0%
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: 39.6mVp-p
high frequency :  Ch1 Pk-Pk 39.2mV low frequency :  Ch1 Pk-Pk 39.6mV				
7	SET UP TIME(Max)	230VAC/1000ms 115VAC/2000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/464ms 115VAC/ 592ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage			INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	

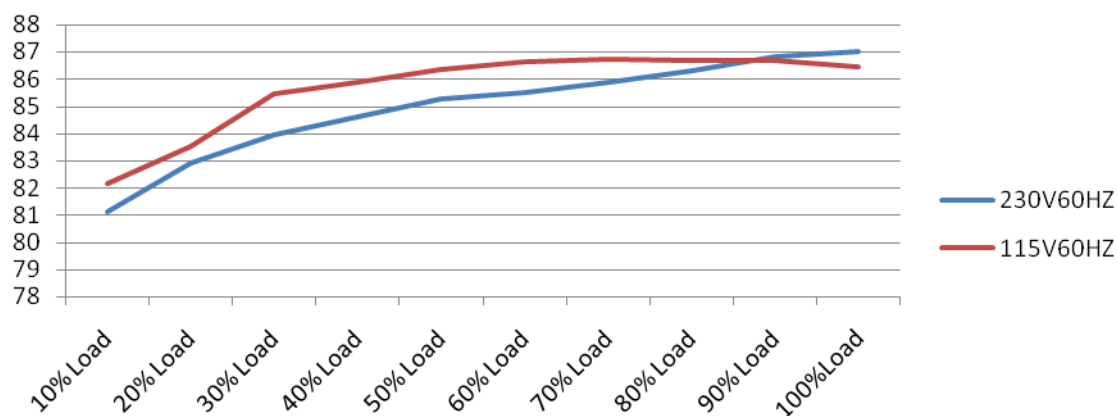
				
8	RISE TIME (Max)	230VAC/30ms 115VAC/30ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/16.4ms 115VAC/ 16.2ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage		
				
9	HOLD UP TIME (Typ.)	230VAC/30ms 115VAC/12ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/36.8ms 115VAC/ 17.6ms
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	63V~264V
			I/P: (1)LOW-LINE-3V=82 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (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/ 0.42 A 115V/ 0.7A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =0.330A/ 230VAC I =0.564A/ 115VAC
4	LEAKAGE CURRENT	<0.75 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.519 mA N-FG : 0.519 mA
5	NO LOAD CONSUMPTION	< 0.2W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.0762 W < 0.0683 W
6	EFFICIENCY(Typ.)	86%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	87.01%

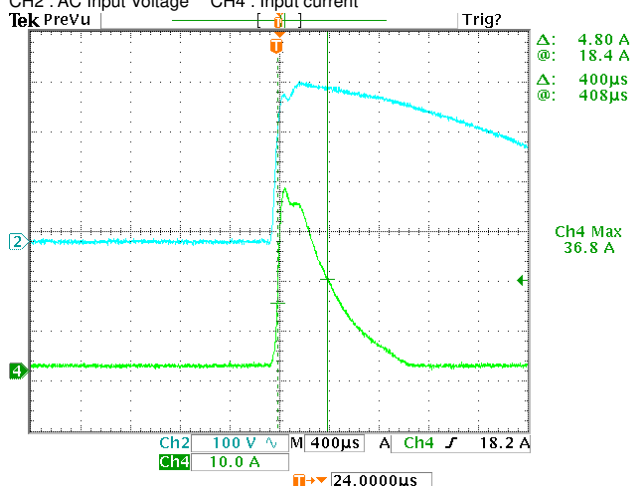
EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V/45A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =36.8A/ 230VAC
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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°C	132.08%/ 264VAC 131.79%/ 230VAC 125.83%/100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	18.75V~21.75 V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta: 25°C	19.7V/ 264VAC 19.8V/ 230VAC 19.8V/ 85VAC 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: 85VAC 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	Q 1 Rated 6A/ 600 V	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) 502V (2) 412V (3) 498V
2	Diode Peak Voltage	Q100 Rated 20A/ 100V	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) 79.2V (2) 66.8V (3) 78.4V
3	Input Capacitor Voltage	C5 Rated: :68 μ / 400 V 105 °C/CLAIR Series	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) 374V (2) 372V (3) 374V
4	Control IC Voltage Test	PWM IC U1 Rated 10.8 V~30V	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) 15.8V (2) 14.6V (3) 14.6V (4) 19.7V (5) 14.4V
5	Clamp Diode Peak Voltage	D5 Rated : 3A/600V	I/P : High-Line +3V = 267 V AC ON/OFF O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 462V (2) 462V

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: 4.125KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5 KVAC/min Ta:25°C	I/P-O/P:2.77mA I/P-FG:3.74mA O/P-FG:3.76mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω I/P-FG: 500VDC>100M Ω O/P-FG:500VDC>100M Ω	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 9999M Ω I/P-FG: 9999M Ω O/P-FG: 9999M Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40A / 2min Ta:25°C	22m Ω

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100%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-35-5 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=24.6℃ 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=48.6℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 24.6 ℃</th><th>HIGH AMBIENT Ta=48.6 ℃</th></tr><tr><td>1</td><td>LF1</td><td>47.5℃</td><td>71.4℃</td></tr><tr><td>2</td><td>BD1</td><td>50.0℃</td><td>73.5℃</td></tr><tr><td>3</td><td>C5</td><td>50.6℃</td><td>74.0℃</td></tr><tr><td>4</td><td>D5</td><td>70.4℃</td><td>93.2℃</td></tr><tr><td>5</td><td>Q1</td><td>67.6℃</td><td>90.6℃</td></tr><tr><td>6</td><td>C35</td><td>61.3℃</td><td>83.9℃</td></tr><tr><td>7</td><td>T1coil</td><td>65.0℃</td><td>86.6℃</td></tr><tr><td>8</td><td>T1core</td><td>67.3℃</td><td>88.4℃</td></tr><tr><td>9</td><td>C105</td><td>67.8℃</td><td>90.3℃</td></tr><tr><td>10</td><td>C106</td><td>60.0℃</td><td>83.0℃</td></tr><tr><td>11</td><td>L100</td><td>57.6℃</td><td>81.5℃</td></tr><tr><td>12</td><td>Q100</td><td>81.3℃</td><td>104.5℃</td></tr><tr><td>13</td><td>U1</td><td>61.0℃</td><td>83.8℃</td></tr><tr><td>14</td><td>D30</td><td>67.5℃</td><td>89.8℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 24.6 ℃	HIGH AMBIENT Ta=48.6 ℃	1	LF1	47.5℃	71.4℃	2	BD1	50.0℃	73.5℃	3	C5	50.6℃	74.0℃	4	D5	70.4℃	93.2℃	5	Q1	67.6℃	90.6℃	6	C35	61.3℃	83.9℃	7	T1coil	65.0℃	86.6℃	8	T1core	67.3℃	88.4℃	9	C105	67.8℃	90.3℃	10	C106	60.0℃	83.0℃	11	L100	57.6℃	81.5℃	12	Q100	81.3℃	104.5℃	13	U1	61.0℃	83.8℃	14	D30	67.5℃	89.8℃
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9	C105	67.8℃	90.3℃																																																													
10	C106	60.0℃	83.0℃																																																													
11	L100	57.6℃	81.5℃																																																													
12	Q100	81.3℃	104.5℃																																																													
13	U1	61.0℃	83.8℃																																																													
14	D30	67.5℃	89.8℃																																																													



35W Single Output Switching Power Supply

LRS-35 series

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 115% 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= -25 ℃	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 ℃ 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 : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25℃		TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=50 ℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 ℃ LIFE TIME		(1) 133770HRS (2) 28709HRS (3) 64621HRS (4) 90758HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 763.6KHRS		
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50℃		

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ

2007/3/20 A50-S014