



Test Report: LRS-350 N2-48

350W Single Output High Peak 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

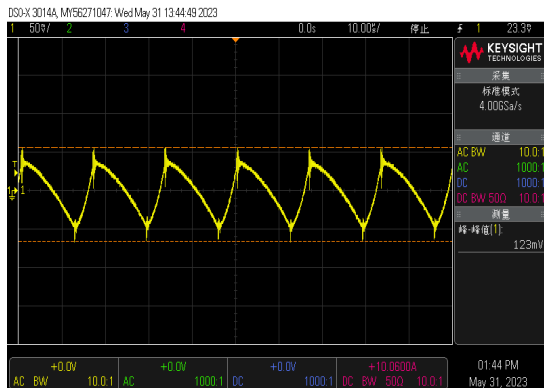
ENVIRONMENT TEST

DESIGN VERIFY TEST

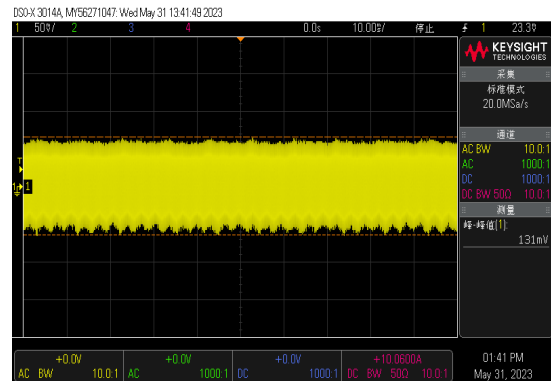
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 43.2V~ 52.8V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	41.5V~55.7V/230VAC 41.5V~55.7V/115VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1.0%~ +1.0 %	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.08%~0.13 %
3	LINE REGULATION	V1: -0.5 %~ +0.5 %	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.0%~ 0.0%
4	LOAD REGULATION	V1: 0.5%~ +0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.10%~ 0.10%
5	OVER/UNDERSHOOT TEST	<± 5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	0.13 %
6	RIPPLE & NOISE (Max)	V1: 200mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 131mVp-p

high frequency :



low frequency :



7	SET UP TIME(Max) 230VAC/1300ms 115VAC/1300ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 1120ms 115VAC/1140 ms
<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>	
8	RISE TIME (Max) 230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/5.0 ms 115VAC/5.0 ms
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>	
9	HOLD UP TIME (Typ.) 230VAC/16ms 115VAC/12ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/33 ms 115VAC/ 21ms
<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>	

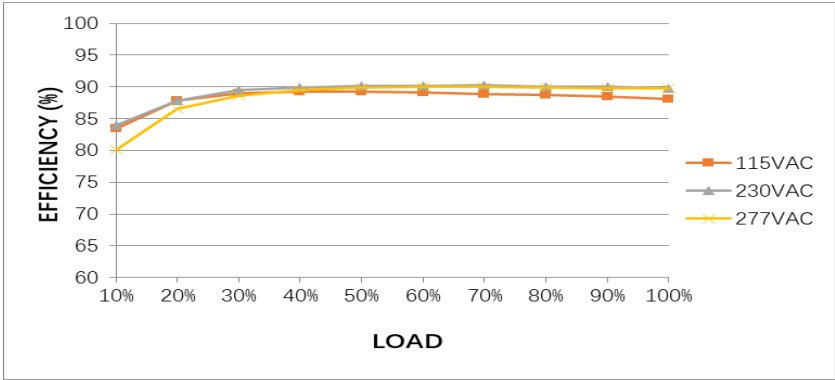
10	DYNAMIC LOAD	V1: 4800mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	527mVp-p 494mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>		

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 ~ 132VAC / 180 ~ 264VAC by switch 240 ~ 370VDC (switch on 230VAC)	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25°C I/P: LOW-LINE-3V=87 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)	(1) 90 V~ 264V (2) 240Vdc~370Vdc/FULL LOAD 240Vdc~370Vdc/50% LOAD (4) 240Vdc~370Vdc/FULL LOAD 240Vdc~370Vdc/50% LOAD TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:90 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/3.8A 115V/ 6.8 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =3.20A/ 230VAC I =5.89A/ 115VAC
4	LEAKAGE CURRENT	< 2mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.203mA N-FG : 0.205mA

5	NO CONSUMPTION	LOAD < 1W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	0.77W/115VAC 0.83W/230VAC
6	EFFICIENCY(Typ.)	89%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	89.79 %

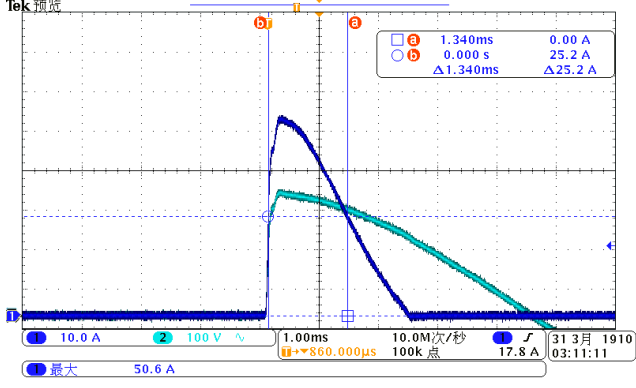
EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V/60A 115V/60A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 50.6A/ 230VAC I = 50.4A/ 115VAC T50=1340us/230V
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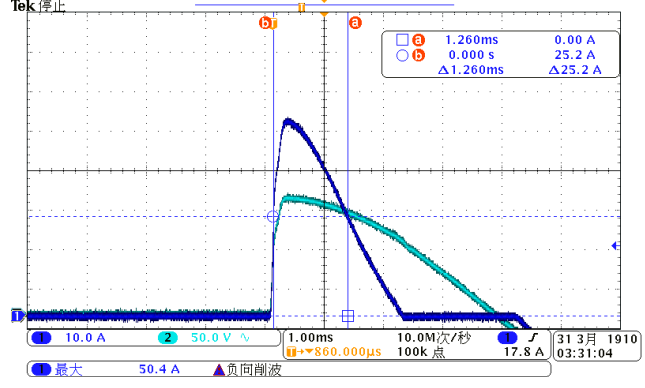
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current

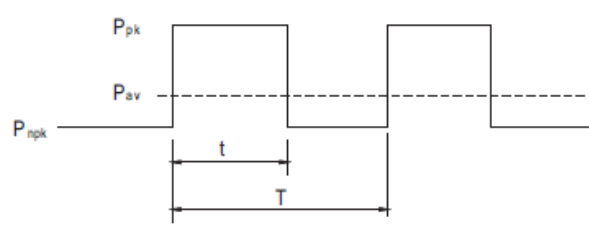


INPUT=115VAC/60HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current



FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PEAK POWER	I/P: 230 VAC O/P:PEAK LOAD (1Hour NO DAMGE) Ta:25°C Test Result : PASS Function Manual 1.Peak Power $P_{av} = \frac{P_{pk} \times t + P_{ngk} \times (T-t)}{T} \leq P_{rated}$ $Duty = \frac{t}{T} \times 100\% \leq 35\%$ $t \leq 5 \text{ sec}$ 		P _{av} : Average output power (W) P _{pk} : Peak output power (W) P _{ngk} : Non-peak output power(W) P _{rated} : Rated output power(W) t : Peak power width(sec) T: Period(sec)

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105 %~ 200%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25°C	121.51%/ 264VAC 121.64%/ 230VAC 121.37%/100VAC PROTECTION TYPE : Output power >105% rated for more than 5 seconds then shut down o/p voltage, re-power on to recover. 219.92%/ 264VAC 217%/ 230VAC 216.5%/100VAC PROTECTION TYPE : Ouput power >200% rated, hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	55.2V~64.8V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25°C	58.6V/ 264VAC 58.6V/ 230VAC 58.6V/ 90VAC PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recaver.



3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P:FULL LOAD	O.T.P. Active OK Protection type: Shut down and latch off o/p voltage, re-power on to recover.
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COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated 20A/650 V	<p>AC ON/OFF</p> <p>I/P:High-Line +3V =300V</p> <p>VDS:</p> <p>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)PEAK LOAD</p> <p>I/P:Low-Line -3V = 97V</p> <p>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)PEAK LOAD</p> <p>Ta:25°C</p>	<p>300VAC</p> <p>VDS:</p> <p>(1) 581V (2) 561V (3) 577V (4) 571V (5) 575V (6) 571V (7) 687V (8) 591V</p> <p>97VAC</p> <p>VDS:</p> <p>(1) 430V (2) 475V (3) 422V (4) 422V (5) 418V (6) 414V (7) 475V (8) 430V</p>

2	Diode Peak Voltage	<p>D101 Rated 20A/ 400V</p> <p>D103 Rated 20A/400V</p>	<p>AC ON/OFF I/P:High-Line +3V =300 V 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</p> <p>Ta:25°C</p>	<p>D101: VDS: (1) 339V (2) 351V (3) 329V (4) 331V (5) 329V (6) 341V (7) 356V (8) 304V</p> <p>D103: VDS: (1) 374V (2) 322V (3) 378V (4) 378V (5) 378V (6) 378V (7) 326V (8) 378V</p>
3	Input Capacitor Voltage	<p>C5 Rated: 680uF / 200 V Surge voltage: 250V</p>	<p>I/P:High-Line +3V =300V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue</p> <p>Ta:25°C</p>	<p>(1)225V (2)215V (3)217V (4)213V</p>
4	Control IC Voltage Test	<p>U1 Rated 10 V~ 28 V</p>	<p>AC ON/OFF I/P:High-Line +3V =300V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(LOW LINE)</p> <p>Ta:25°C</p>	<p>(1) 19.3V (2) 19.7V (3) 19.3V (4) 18.7V (5) 19.1V</p>

■ SAFETY& E.M.C. TEST

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:0.5KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25°C	I/P-O/P:3.25mA I/P-FG:2.78mA O/P-FG:3.44m A 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	8 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EAC TP TC 020	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
2	RADIATION	EAC TP TC 020	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
3	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
4	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	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
6	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 : LRS-350N2-48 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=28.5 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=53 °C																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=28.5 °C</th> <th>HIGH AMBIENT Ta= 53°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>RTH1</td><td>81.9°C</td><td>106.4°C</td></tr> <tr><td>2</td><td>BD1</td><td>48.9°C</td><td>73.4°C</td></tr> <tr><td>3</td><td>C6</td><td>37.3°C</td><td>61.8°C</td></tr> <tr><td>4</td><td>U1</td><td>36.2°C</td><td>60.7°C</td></tr> <tr><td>5</td><td>T1 次</td><td>71.0°C</td><td>95.5°C</td></tr> <tr><td>6</td><td>C200</td><td>45.9°C</td><td>70.4°C</td></tr> <tr><td>7</td><td>L100</td><td>81.0°C</td><td>105.5°C</td></tr> <tr><td>8</td><td>D102</td><td>49.9°C</td><td>74.4°C</td></tr> <tr><td>9</td><td>D104</td><td>59.0°C</td><td>83.5°C</td></tr> <tr><td>10</td><td>C106</td><td>48.0°C</td><td>72.5°C</td></tr> <tr><td>11</td><td>R112</td><td>73.2°C</td><td>97.7°C</td></tr> <tr><td>12</td><td>J200</td><td>52.9°C</td><td>77.4°C</td></tr> <tr><td>13</td><td>Q1</td><td>45.8°C</td><td>70.3°C</td></tr> <tr><td>14</td><td>RTH3</td><td>52.3°C</td><td>76.8°C</td></tr> <tr><td>15</td><td>TC(D104)</td><td>46.2°C</td><td>70.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=28.5 °C	HIGH AMBIENT Ta= 53°C	1	RTH1	81.9°C	106.4°C	2	BD1	48.9°C	73.4°C	3	C6	37.3°C	61.8°C	4	U1	36.2°C	60.7°C	5	T1 次	71.0°C	95.5°C	6	C200	45.9°C	70.4°C	7	L100	81.0°C	105.5°C	8	D102	49.9°C	74.4°C	9	D104	59.0°C	83.5°C	10	C106	48.0°C	72.5°C	11	R112	73.2°C	97.7°C	12	J200	52.9°C	77.4°C	13	Q1	45.8°C	70.3°C	14	RTH3	52.3°C	76.8°C	15	TC(D104)	46.2°C	70.7°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 122 % 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/-25 °C	TEST : OK																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C/95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.003 %/°C(0~50°C)																																																																
6	STORAGE TEMPERATURE TEST	-40~85°C	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																																																																	



7	THERMAL SHOCK TEST	-25~50°C	1. Thermal shock Temperature : -30°C~ +55°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
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
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=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=50 °C LIFE TIME	(1) 972709HRS (2) 171952HRS (3) 267491HRS (4) 401338HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1857.9K hrs min. Telcordia SR-332 (Bellcore) ; 226.2K 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	WUWQ/HUANGMK	WENF	LINKX

2020.10.1 TAG-QA-009