



Test Report: LRS-100N2-12

100W 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

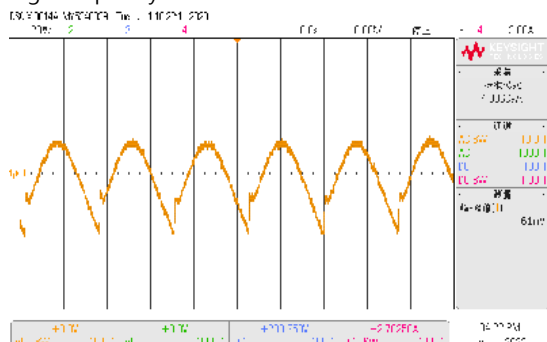
ENVIRONMENT TEST

DESIGN VERIFY TEST

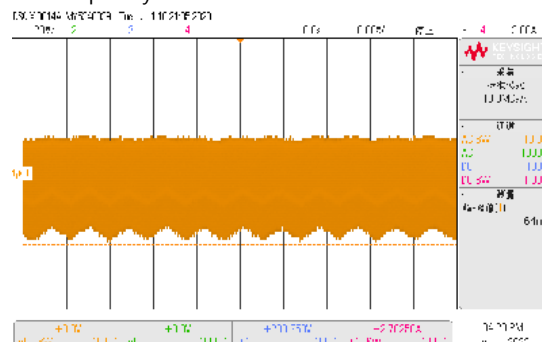
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.2 V~13.8V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	9.848V~14.59V/230VAC 9.945V~16.58V/115VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1.0%~1.0%	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.38%~ 0%
3	LINE REGULATION	V1: -0.5%~0.5 %	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0.03 %
4	LOAD REGULATION	V1:-0.5 %~0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.16%~ 0.23%
5	OVER/UNDERSHOOT TEST	<± 5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	0.4%
6	RIPPLE & NOISE (Max)	V1: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1:64mVp-p

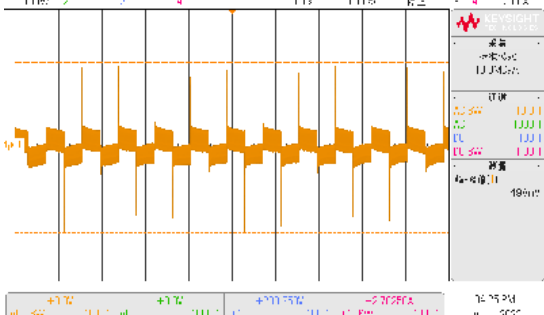
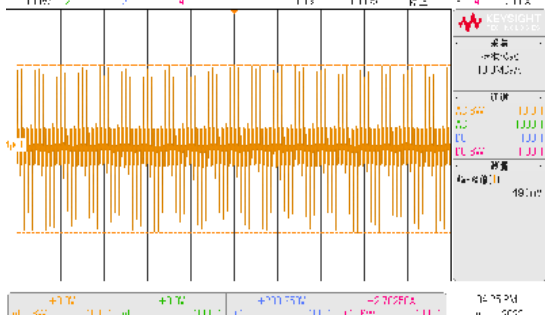
high frequency :



low frequency :



7	SET UP TIME(Max)	230VAC/500ms 115VAC/500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 209ms 115VAC/170ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage (Oscilloscope screenshot showing output voltage and AC input voltage waveforms)		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage (Oscilloscope screenshot showing output voltage and AC input voltage waveforms)		
8	RISE TIME (Max)	230VAC/30ms 115VAC/30ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/16ms 115VAC/16ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage (Oscilloscope screenshot showing output voltage rise time)		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage (Oscilloscope screenshot showing output voltage rise time)		
9	HOLD UP TIME (Typ.)	230VAC/55ms 115VAC/10ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/88 ms 115VAC/21ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage (Oscilloscope screenshot showing output voltage and AC input voltage waveforms)		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage (Oscilloscope screenshot showing output voltage and AC input voltage waveforms)		

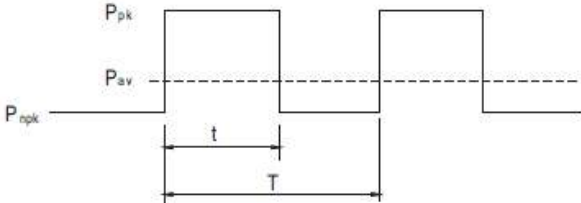
10	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	498mVp-p 490mVp-p
FULL /50% LOAD 50%DUTY / 120HZ  FULL /50% LOAD 50%DUTY / 1KHZ 				

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC 120VDC~ 373VDC	(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) 85V~264V (2) 120Vdc~373Vdc/FULL LOAD 120Vdc~373Vdc/50% LOAD (3) 120Vdc~373Vdc/FULL LOAD 120Vdc~373Vdc/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/ 1.2 A 115V/ 2.1 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.08A/ 230VAC I =1.83A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.3022 mA N-FG : 0.3135mA

5	NO LOAD CONSUMPTION	LOAD <
---	---------------------	---

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 $P_{av} = \frac{P_{pk} \times t + P_{npgk} \times (T-t)}{T} \leq P_{rated}$ $Duty = \frac{t}{T} \times 100\% \leq 35\%$ $t \leq 5 \text{ sec}$ 		Pav : Average output power (W) Ppk : Peak output power (W) Pnpgk : Non-peak output power(W) Prated : 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	139.2%/ 264VAC 139.2%/ 230VAC 139.2%/100VAC PROTECTION TYPE : Output power >105% rated for more than 5 seconds then shut down o/p voltage, re-power on to recover 211.9%/ 264VAC 223.3%/ 230VAC 223.5%/100VAC Ouput power >200% rated, hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.8V~16.2V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P:MIN LOAD Ta:25°C	14.79V/ 264VAC 14.79V/ 230VAC 14.79V/ 85VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated :24A/650V	AC ON/OFF I/P:High-Line +3V =300V VDS: 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 I/P:Low-Line -3V = 97V 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 Ta:25°C	VDS: (1) 621V (2) 628V (3) 634V (4) 630V (5) 632V (6) 632V (7) 638V (8) 597V VDS: (1) 329V (2) 357V (3) 377V (4) 361V (5) 357V (6) 385V (7) 389V (8) 309V
2	Diode Peak Voltage	D101 Rated 30A/100V	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 Ta:25°C	D101: VDS: (1) 80.6V (2) 65.3V (3) 82.2V (4) 83.0V (5) 83.8V (6) 83.0V (7) 80.6V (8) 80.6V

3	Input Capacitor Voltage	C5 Rated: 180 μ /400V Surge voltage:450V	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 Ta:25°C	(1)420V (2)427V (3)423V (4)419V
4	Control IC Voltage Test	PWM IC U1 Rated : 9.5V~28V O/P IC U102 Rated 0.3V~40V	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) Ta:25°C	U1 (1) 13.7V (2) 12.3V (3) 13.9V (4) 13.7V (5) 11.1V U102 (1)12.1V (2)0.7V (3)12.3V (4)14.9V (5) 9.7V

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min I/P-FG :2KVAC/min O/P-FG:1.25KVAC/min	I/P-O/P: 4.4 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5KVAC/min Ta:25°C	I/P-O/P:2.343mA I/P-FG:1.776mA O/P-FG:1.029m A 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:9999 M 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	9m 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: ≤80% LOAD Ta:25°C	PASS
2	CONDUCTION	Compliance to EAC TP TC 020	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	Compliance to EAC TP TC 020	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 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-100N2-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=29.1 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=51.9 °C <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=29.1 °C</th><th>HIGH AMBIENT Ta=51.9 °C</th></tr><tr><td>1</td><td>RTH1</td><td>92.8°C</td><td>108.5°C</td></tr><tr><td>2</td><td>BD1</td><td>65.9°C</td><td>90.6°C</td></tr><tr><td>3</td><td>C5</td><td>54.4°C</td><td>79.5°C</td></tr><tr><td>4</td><td>D5</td><td>85.2°C</td><td>112.1°C</td></tr><tr><td>5</td><td>R7</td><td>90.6°C</td><td>116.3°C</td></tr><tr><td>6</td><td>R15</td><td>78.4°C</td><td>102.8°C</td></tr><tr><td>7</td><td>Q1</td><td>77.5°C</td><td>105.4°C</td></tr><tr><td>8</td><td>C35</td><td>64.7°C</td><td>90.6°C</td></tr><tr><td>9</td><td>U1</td><td>66.2°C</td><td>91.1°C</td></tr><tr><td>10</td><td>T1</td><td>82.4°C</td><td>107.5°C</td></tr><tr><td>11</td><td>D100</td><td>77.8°C</td><td>102.7°C</td></tr><tr><td>12</td><td>D101</td><td>79.1°C</td><td>104.1°C</td></tr><tr><td>13</td><td>C105</td><td>68.5°C</td><td>93.7°C</td></tr><tr><td>14</td><td>R100</td><td>73.5°C</td><td>98.3°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta=29.1 °C	HIGH AMBIENT Ta=51.9 °C	1	RTH1	92.8°C	108.5°C	2	BD1	65.9°C	90.6°C	3	C5	54.4°C	79.5°C	4	D5	85.2°C	112.1°C	5	R7	90.6°C	116.3°C	6	R15	78.4°C	102.8°C	7	Q1	77.5°C	105.4°C	8	C35	64.7°C	90.6°C	9	U1	66.2°C	91.1°C	10	T1	82.4°C	107.5°C	11	D100	77.8°C	102.7°C	12	D101	79.1°C	104.1°C	13	C105	68.5°C	93.7°C	14	R100	73.5°C	98.3°C
NO	Position	ROOM AMBIENT Ta=29.1 °C	HIGH AMBIENT Ta=51.9 °C																																																													
1	RTH1	92.8°C	108.5°C																																																													
2	BD1	65.9°C	90.6°C																																																													
3	C5	54.4°C	79.5°C																																																													
4	D5	85.2°C	112.1°C																																																													
5	R7	90.6°C	116.3°C																																																													
6	R15	78.4°C	102.8°C																																																													
7	Q1	77.5°C	105.4°C																																																													
8	C35	64.7°C	90.6°C																																																													
9	U1	66.2°C	91.1°C																																																													
10	T1	82.4°C	107.5°C																																																													
11	D100	77.8°C	102.7°C																																																													
12	D101	79.1°C	104.1°C																																																													
13	C105	68.5°C	93.7°C																																																													
14	R100	73.5°C	98.3°C																																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 139%/223% LOAD Ta : 25°C	TEST : OK																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/115VAC O/P : 100 % LOAD Ta=-35/-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	± 0.022 %/°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	-30~50°C	1. Thermal shock Temperature : -35°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 C 105 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) 176336HRS (2) 26394HRS (3) 61008HRS (4) 127167HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 2802.6K hrs min. Telcordia SR-332 (Bellcore) ; 536.6K 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