



# Test Report: LRS-350-5

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350W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

## ■ SAFETY TEST

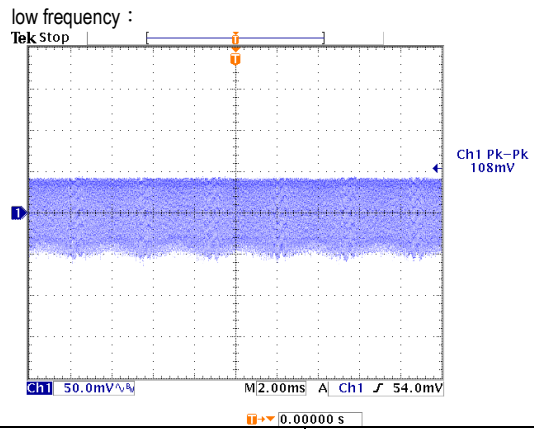
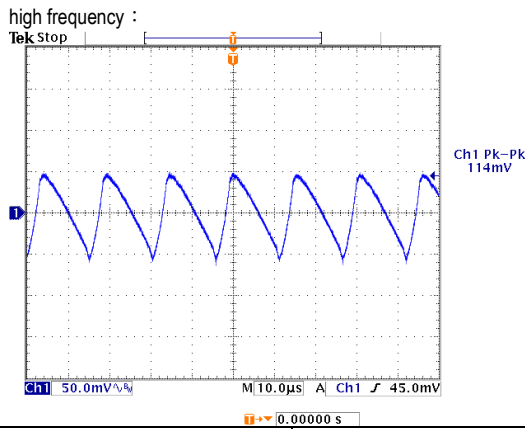
## ■ RELIABILITY TEST

ENVIRONMENT TEST

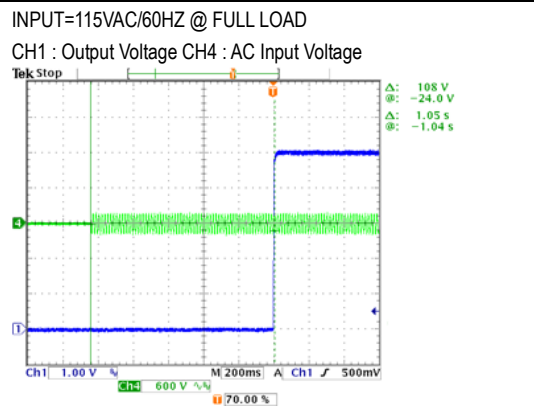
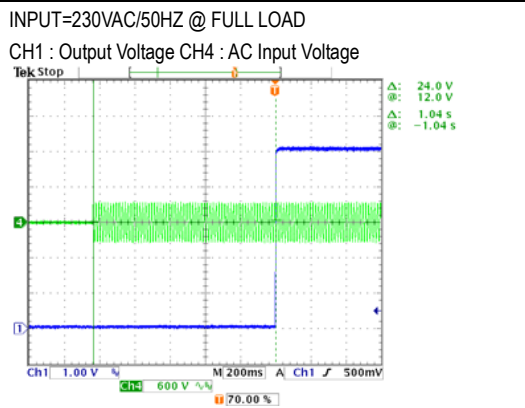
## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.5V~ 5.5V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	4.343V~5.779V/230VAC 4.318V~5.764V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -3%~ 3%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:- 0.0625%~ 0.0625%
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.0625%~-0.0625%
4	LOAD REGULATION(Max)	V1: -2.0%~ 2.0%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1:- 0%~ 0%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5%
6	RIPPLE & NOISE(Max)	V1: 150mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 114mVp-p



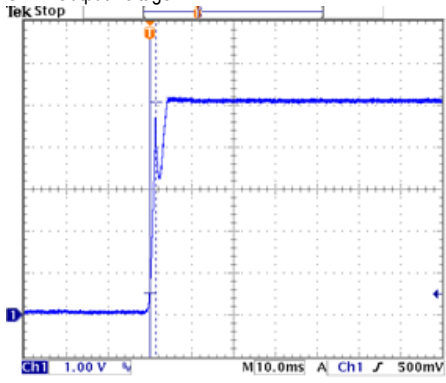
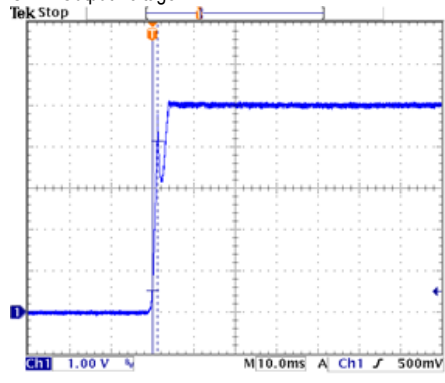
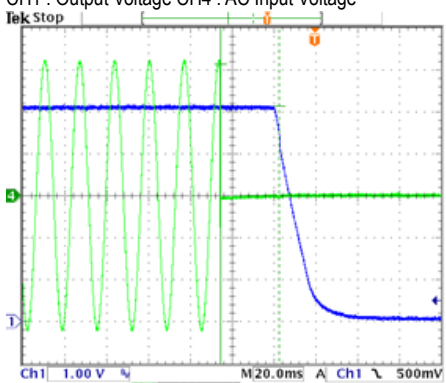
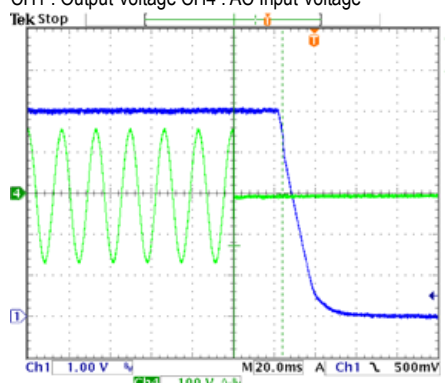
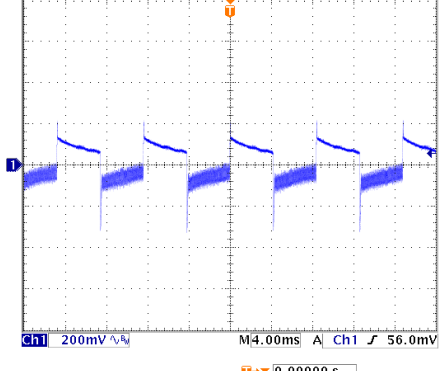
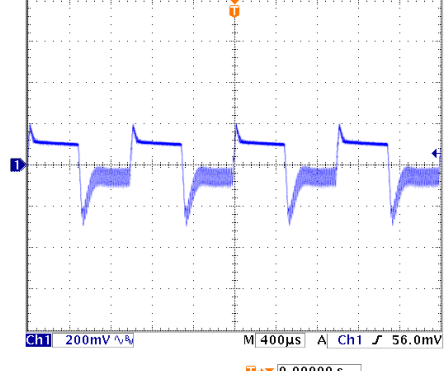
7	SET UP TIME(Max)	230VAC/1500ms 115VAC/ 1500ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 1036ms 115VAC/ 1048ms
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# 350W Single Output Switching Power Supply

# LRS-350 series

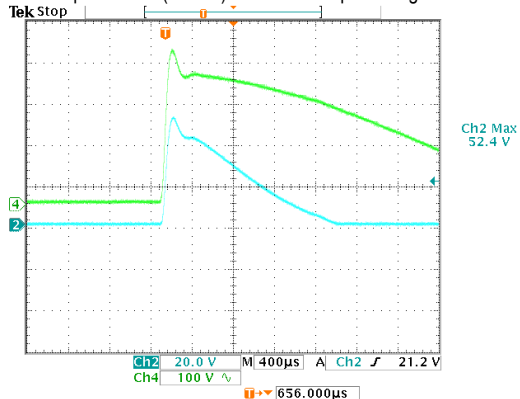
8	RISE TIME (Max)	230VAC/ 50ms 115VAC/ 50ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/1.40ms 115VAC/1.20ms
INPUT=230VAC/50HZ @ FULL LOAD		INPUT=115VAC/60HZ @ FULL LOAD		
<p>CH1 : Output Voltage</p> 				
9	HOLD UP TIME(Typ )	230VAC/ 16ms 115VAC/ 12ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/28.0ms 115VAC/ 23.6ms
INPUT=230VAC/50HZ @ FULL LOAD		INPUT=115VAC/60HZ @ FULL LOAD		
<p>CH1 : Output Voltage CH4 : AC Input Voltage</p> 				
10	DYNAMIC LOAD	V1: 1000mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	540mVp-p 496mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		
				



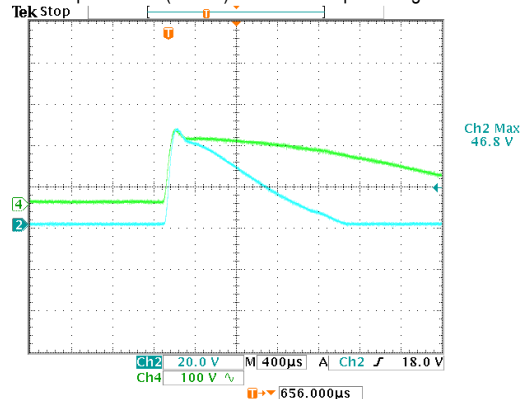
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 ~ 132VAC / 180 ~ 264VAC by switch 240 ~ 370VDC (switch on 230VAC)	I/P:TESTING O/P:FULL LOAD Ta:25°C  I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD 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 )	81V~132V 134V~264V 231VDC ~ 370VDC(switch on 230VAC)  TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 180 VAC ~264 VAC 90 VAC ~132 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ)	230V/ 3.4A 115V/ 6.8A	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I =2.57A/ 230VAC I =4.76A/ 115VAC
4	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P: 240 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.483mA N-FG: 0.483mA
5	NO LOAD CONSUMPTION	< 0.75 W	I/P: 115VAC I/P: 230VAC O/P: NO LOAD Ta: 25°C	< 0.68W < 0.74 W
6	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 =52.4A/ 230VAC I =46.8A/ 115VAC

INPUT=230VAC/50HZ @ FULL LOAD  
CH2 : Input current (1V=1A) CH4 : AC Input Voltage



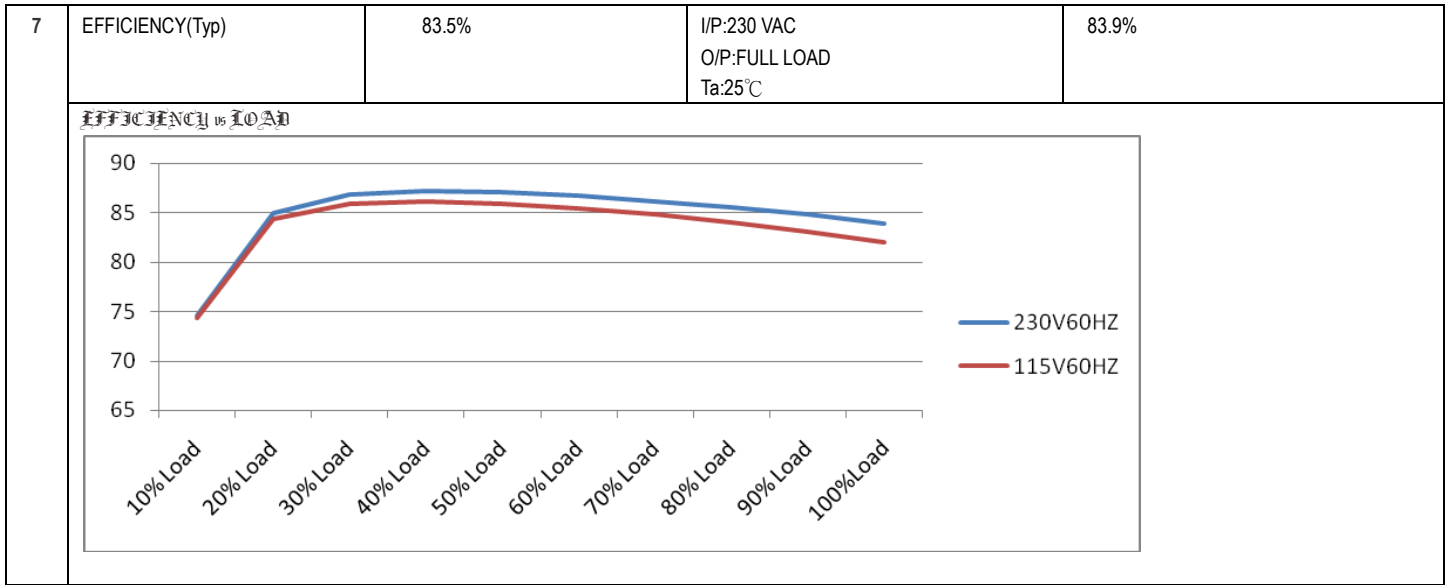
INPUT=115VAC/50HZ @ FULL LOAD  
CH2 : Input current (1V=1A) CH4 : AC Input Voltage





### 350W Single Output Switching Power Supply

# LRS-350 series



## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110 %~ 140 % rated output power Hiccup mode, recovers automatically after fault condition is removed.	I/P: 230VAC I/P: 115VAC O/P: TESTING Ta:25°C	118.56%/ 230VAC 116.67%/115VAC Protection type : 110 %~ 140 % rated output power Hiccup mode, recovers automatically after fault condition is removed.
2	OVER VOLTAGE PROTECTION	CH:5.75V~6.75V Hiccup mode, recovers automatically after fault condition is removed.	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta:25°C	6.52V/ 230VAC 6.50V/115VAC Protection type : Hiccup mode, recovers automatically after fault condition is removed.
3	OVER TEMPERATURE PROTECTION	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed.	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Protection type : Hiccup mode, recovers automatically after fault condition is removed.
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE 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	Q2 Rated 13A/500V	I/P: High-Line +3V =267V O/P: (1) Full Load Turn on (2) Output Short (3) Full Load Continue Ta:25°C	(1)436V (2)436V (3)422V
2	Diode Peak Voltage	Q102 Rated 120 A/40V  Q103 Rated 120A/40V	I/P: High-Line +3V =267 V O/P: (1) Full Load input on/off (2) Output Short (3) Full Load Continue Ta:25°C	Q102 (1)34.2V (2)34.4V (3)34.6V  Q103:





350W Single Output Switching Power Supply

**LRS-350 series**

		NO	Position	ROOM AMBIENT Ta= 23.5 °C	HIGH AMBIENT Ta=52.9 °C
		9	Q1	41.5°C	73.0°C
		10	Q103	58.3°C	90.3°C
		11	Q102	59.4°C	92.4°C
		12	Q104	57.1°C	88.7°C
		13	U1	29.9°C	58.6°C
		14	U100	60.1°C	91.5°C
		15	D10	35.7°C	65.1°C
		16	C36	27.5°C	56.3°C
		17	RTH3	50.9°C	80.3°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )		I/P: 230 VAC O/P: 113 % 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= -25 °C	TEST: OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C 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%/°C (0~50°C)
6	STORAGE TEMPERATURE TEST	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: 5 CYCLE 5. Input/Output condition: STATIC			OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature: -25°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: 10min/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 C105 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) 276816HRS (2) 36335HRS (3) 108557HRS (4) 220246HRS
10	MTBF	2099.9K hrs min. Telcordia SR-332 (Bellcore) ; 328.6Khrs min. MIL-HDBK-217F (25°C)			
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C			

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDEZHAO