



Test Report: LRS-350-12

350W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY TEST

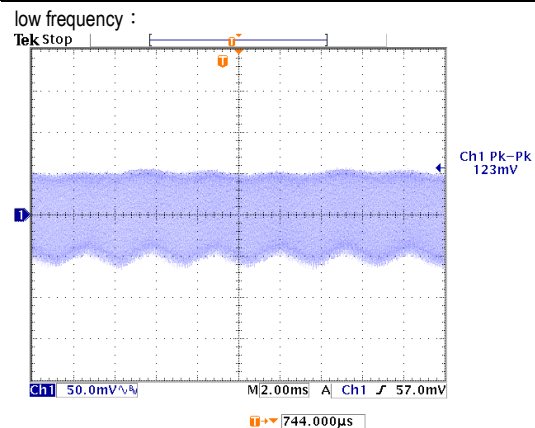
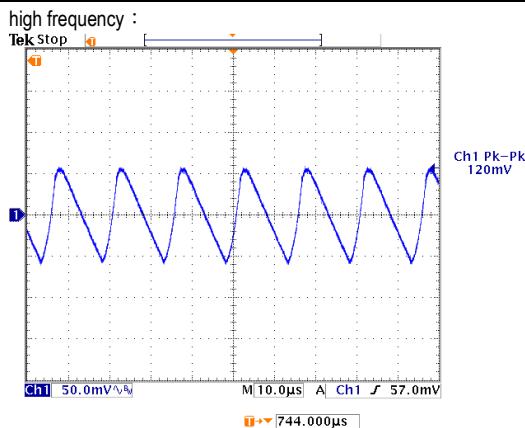
■ RELIABILITY TEST

ENVIRONMENT TEST

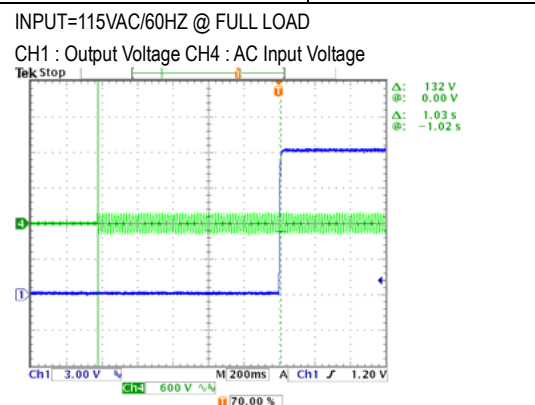
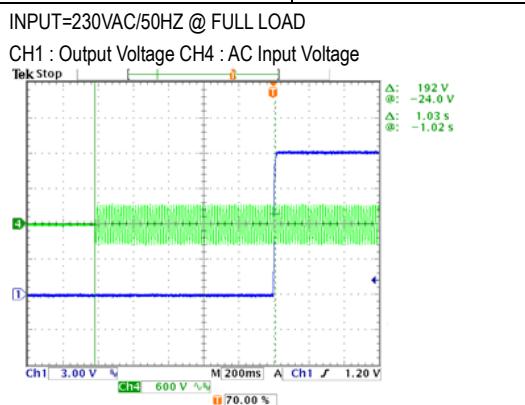
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.2V~ 13.8V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	9.609V~14.140V/230VAC 9.605V~14.151V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1.5%~ 1.5%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:- 0.08 %~ 0.08%
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.04%~-0.04%
4	LOAD REGULATION(Max)	V1: -1%~ 1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1:-0.%~ 0%
5	OVER/UNDERSHOOT TEST	< ±5%	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: 123mVp-p



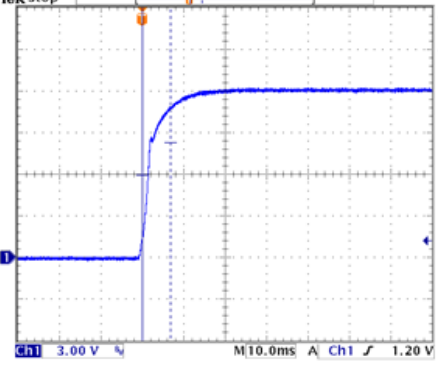
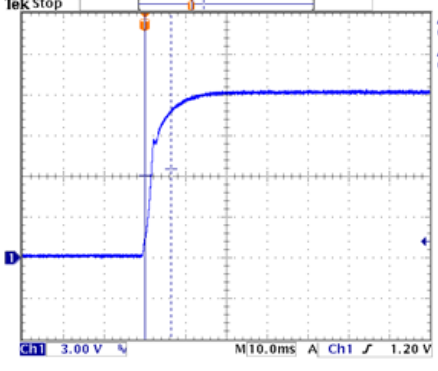
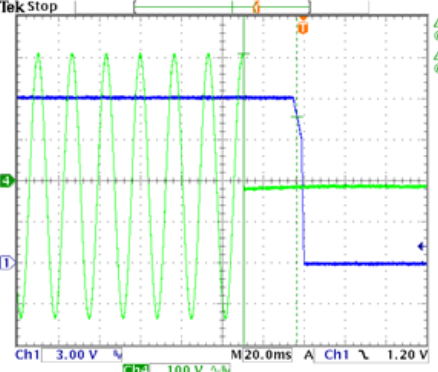
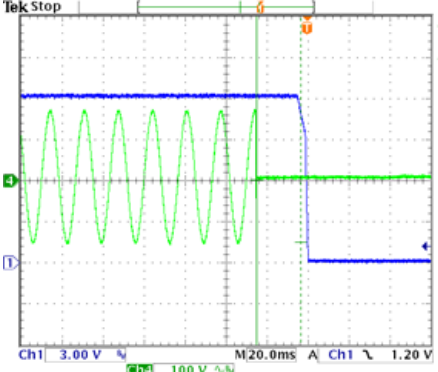
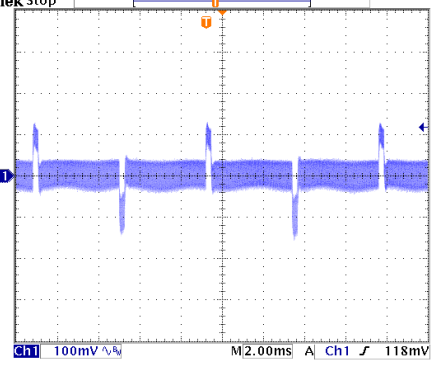
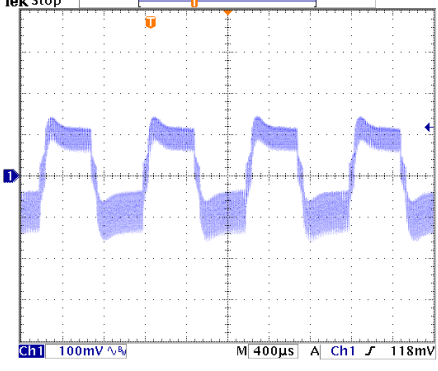
7	SET UP TIME(Max)	230VAC/1500ms 115VAC/ 1500ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 1028ms 115VAC/ 1032ms
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LRS-350 series

8	RISE TIME (Max)	230VAC/ 50ms 115VAC/ 50ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 6.80ms 115VAC/6.40ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 		
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/26.0ms 115VAC/ 21.6ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH4 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH4 : AC Input Voltage 		
10	DYNAMIC LOAD	V1: 1200mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	274mVp-p 304mVp-p
FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 		

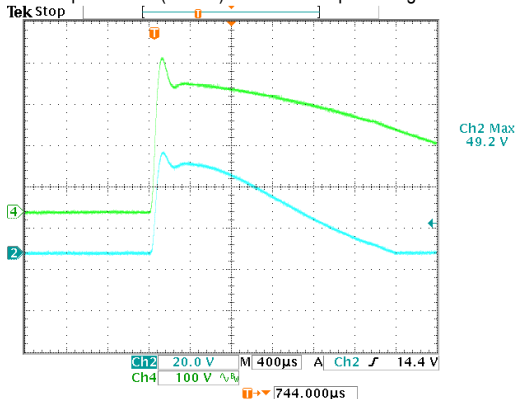


INPUT FUNCTION TEST

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)	80V~132V 149V~264V 230VDC ~ 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 =3.41A/ 230VAC I =6.25A/ 115VAC
4	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P: 240 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.481mA N-FG: 0.481mA
5	NO LOAD CONSUMPTION	< 0.75 W	I/P: 115VAC I/P: 230VAC O/P: NO LOAD Ta: 25°C	< 0.55W < 0.60 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 =49.2A/ 230VAC I =36.0A/ 115VAC

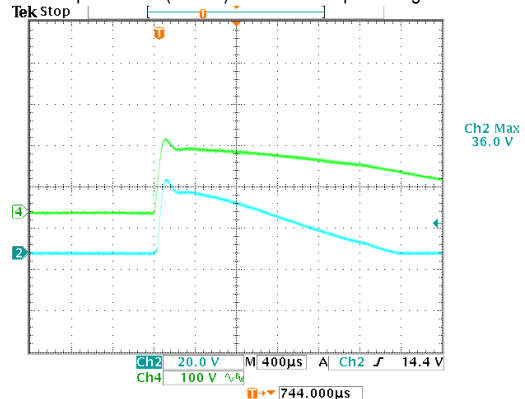
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : Input current (1V=1A) CH4 : AC Input Voltage



INPUT=115VAC/50HZ @ FULL LOAD

CH2 : Input current (1V=1A) CH4 : AC Input Voltage





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7	EFFICIENCY(Typ)	85%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	85.86%																																	
<p>效率與負載率關係圖</p> <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>Load (%)</th> <th>230V60HZ Efficiency (%)</th> <th>115V60HZ Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>79</td><td>78</td></tr> <tr><td>20%</td><td>84</td><td>83</td></tr> <tr><td>30%</td><td>85.5</td><td>84.5</td></tr> <tr><td>40%</td><td>86.2</td><td>85.2</td></tr> <tr><td>50%</td><td>86.5</td><td>85.5</td></tr> <tr><td>60%</td><td>86.5</td><td>85.5</td></tr> <tr><td>70%</td><td>86.2</td><td>85.2</td></tr> <tr><td>80%</td><td>85.8</td><td>84.8</td></tr> <tr><td>90%</td><td>85.5</td><td>84.5</td></tr> <tr><td>100%</td><td>85.2</td><td>84.2</td></tr> </tbody> </table>					Load (%)	230V60HZ Efficiency (%)	115V60HZ Efficiency (%)	10%	79	78	20%	84	83	30%	85.5	84.5	40%	86.2	85.2	50%	86.5	85.5	60%	86.5	85.5	70%	86.2	85.2	80%	85.8	84.8	90%	85.5	84.5	100%	85.2	84.2
Load (%)	230V60HZ Efficiency (%)	115V60HZ Efficiency (%)																																			
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50%	86.5	85.5																																			
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70%	86.2	85.2																																			
80%	85.8	84.8																																			
90%	85.5	84.5																																			
100%	85.2	84.2																																			

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	122.07%/ 230VAC 121.86%/115VAC Protection type : 110 %~ 140 % rated output power Hiccup mode, recovers automatically after fault condition is removed.
2	OVER VOLTAGE PROTECTION	CH: 13.8V~16.2 V Hiccup mode, recovers automatically after fault condition is removed.	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta:25°C	15.1V/ 230VAC 15.0V/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	Q 1 Rated 13 A/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)468V (2)484V (3)446V
2	Diode Peak Voltage	Q102 Rated 20 A/120V Q103 Rated 20A/120V	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)94.8V (2)89.2V (3)82.0V Q103:



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		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