



# TEST REPORT: HDR-30-12

## 30W Ultra Slim Step Shape DIN Rail

### ■ 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

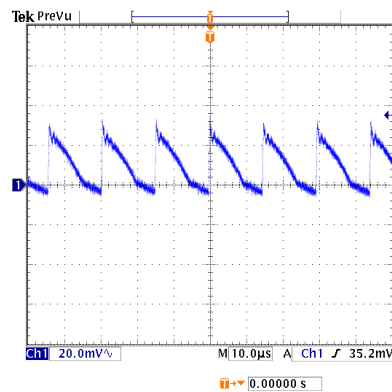
DESIGN VERIFY TEST  
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.80V ~ 13.80V	I/P : 230VAC O/P : MIN LOAD TA : 25°C	CH1: 9.73V ~ 15.21V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 277VAC O/P : FULL / MINLOAD TA= 25°C	V1: 0.42% ~ -0.17%
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 277VAC O/P : FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION(MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P : MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.25% ~ -0.33%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	TEST< 1.3 %
	RIPPLE & NOISE(Max)	V1 : 120 mVp-p	I/P : 230VAC O/P : FULL LOAD TA : 25°C	V1 : 52.8 mVp-p

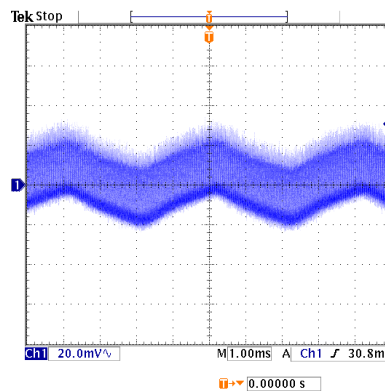
high frequency:

low frequency:

6



Ch1 Pk-Pk  
41.2mV



Ch1 Pk-Pk  
52.8mV

SET UP TIME (MAX.)

230VAC : 500ms  
115VAC : 500ms

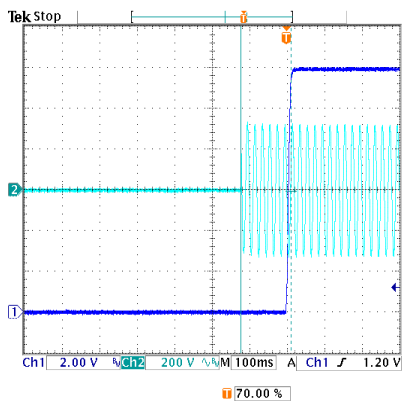
I/P : 230VAC  
I/P : 115VAC  
O/P : FULL LOAD  
TA : 25°C

230VAC : 134ms  
115VAC : 52ms

7

INPUT=230VAC/50HZ @ FULL LOAD

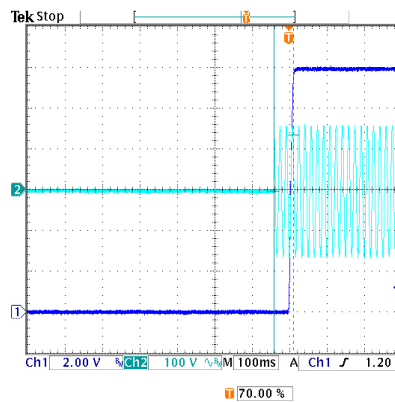
CH1 : Output Voltage CH2 : AC Input Voltage



Δ: 8.00 V  
@: 0.00 V  
Δ: 134ms  
@: -124ms

INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

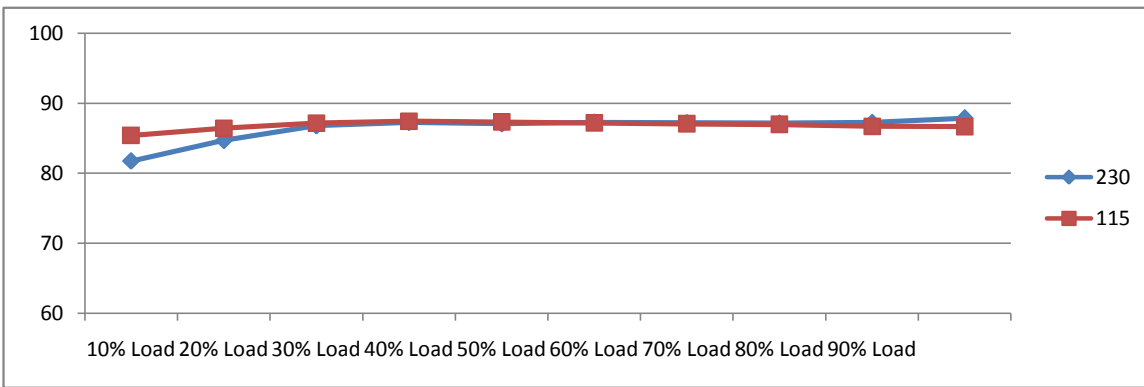


Δ: 138 V  
@: -4.00 V  
Δ: 52.0ms  
@: -42.0ms

8	RISE TIME (MAX.)	230VAC : 50ms 115VAC : 50ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 9.4ms 115VAC : 9.4ms
	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 : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 127.2ms 115VAC : 28.0ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		
10	DYNAMIC LOAD	V1 : 1200 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C	(1). 374mv (2). 245mv unit:mVp-p
	FULL /MIN LOAD 50%DUTY / 120HZ	FULL /MIN% LOAD 50%DUTY / 1KHZ		

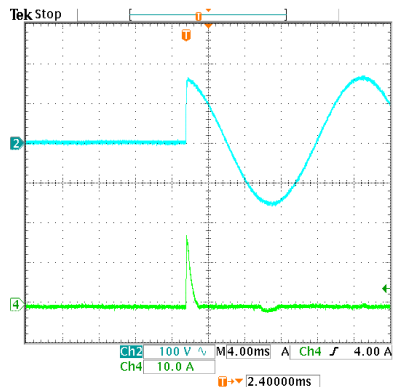
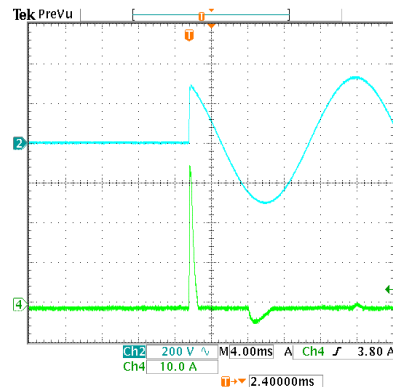
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC ~ 277VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	68.0VAC ~ 277VAC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 277VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.48A / 230VAC 0.88A / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.22A / 230VAC I= 0.38A / 115VAC
4	NO LOAD POWER CONSUMPTION	< 0.30W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0914 W
	EFFICIENCY (TYP.)	88.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	89.275 %



5	INRUSH CURRENT (TYP.)	45A / 230VAC 25A / 115VAC twidth= 555 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 35.0A / 230VAC I= 17.4A / 115VAC
		INPUT=230VAC/50HZ @ FULL LOAD	INPUT=115VAC/50HZ @ FULL LOAD	

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



**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105% ~ 160%	I/P: 277VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA : 25°C	128.00% 277VAC 128.00% 230VAC 129.00% 100VAC Constant Current Limiting
2	OVER VOLTAGE PROTECTION	15.00V ~ 18.00V	I/P: 277VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD TA : 25°C	16.10V 277VAC 16.10V 230VAC 16.10V 85VAC Shut down Re- power ON
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 277VAC I/P: 85VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Constant Current Limiting

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated : 600V 4.5A	I/P : 280VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 280VAC VDS: (1). 504.00V (2). 468.00V (3). 502.00V
2	O/P Diode	D100 Rated : 100V 20.0A	I/P : 280VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	D100 VDS : (1). 67.20V (2). 62.00V (3). 64.00V
3	Input Capacitor	C5 Rated : 68uf 400V	I/P : 280VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 388.00V (2). 386.00V (3). 386.00V
4	Control IC	U101 Rated : 38V (max) 0V (min) U1 Rated : 35V (max) 0V (min)	I/P : 280VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U101 U1 (1). 23.40V 12.40V (2). 11.90V 0.79V (3). 11.90V 3.56V (4). 31.10V 17.40V (5). 17.80V 9.84V
6	Clamp Diode	D5 Rated : 1000V 1.0A	I/P : 280VAC O/P : (1)Dynamic Load Full/Min Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1). 488.00V (2). 486.00V

**SAFETY & E.M.C. TEST**

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min	I/P-O/P: 4.400KVAC /min Ta : 25°C	I/P-O/P: 1.45mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ NO DAMAGE

**E.M.C. TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230VAC /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 : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P : 230VAC /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 : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

**RELIABILITY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																				
1	TEMPERATURE RISE TEST	MODEL : HDR-30-5 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 24.7°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 49.6°C	<table border="1"> <thead> <tr> <th>NO.</th> <th>Positio</th> <th>ROOM AMBIENT 24.7°C</th> <th>HIGH AMBIENT Ta: 49.6°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>ZNR1</td><td>30.3°C</td><td>54.9°C</td></tr> <tr><td>2</td><td>LF2</td><td>36.0°C</td><td>60.7°C</td></tr> <tr><td>3</td><td>Q1</td><td>55.4°C</td><td>81.1°C</td></tr> <tr><td>4</td><td>T1 PRI</td><td>54.4°C</td><td>76.2°C</td></tr> <tr><td>5</td><td>C40</td><td>47.3°C</td><td>71.2°C</td></tr> <tr><td>6</td><td>T1 SEC</td><td>61.0°C</td><td>84.5°C</td></tr> <tr><td>7</td><td>C105</td><td>59.7°C</td><td>83.8°C</td></tr> <tr><td>8</td><td>D100</td><td>81.9°C</td><td>106.2°C</td></tr> <tr><td>9</td><td>LF101</td><td>50.7°C</td><td>74.9°C</td></tr> <tr><td>10</td><td>U1</td><td>49.3°C</td><td>73.5°C</td></tr> <tr><td>11</td><td>BD1</td><td>37.5°C</td><td>61.6°C</td></tr> <tr><td>12</td><td>D5</td><td>49.4°C</td><td>74.6°C</td></tr> <tr><td>13</td><td>RTH1</td><td>40.1°C</td><td>61.0°C</td></tr> <tr><td>14</td><td>LF1</td><td>35.9°C</td><td>59.6°C</td></tr> <tr><td>15</td><td>PCB(B</td><td>36.3°C</td><td>60.5°C</td></tr> <tr><td>16</td><td>C5</td><td>38.9°C</td><td>63.7°C</td></tr> </tbody> </table>	NO.	Positio	ROOM AMBIENT 24.7°C	HIGH AMBIENT Ta: 49.6°C	1	ZNR1	30.3°C	54.9°C	2	LF2	36.0°C	60.7°C	3	Q1	55.4°C	81.1°C	4	T1 PRI	54.4°C	76.2°C	5	C40	47.3°C	71.2°C	6	T1 SEC	61.0°C	84.5°C	7	C105	59.7°C	83.8°C	8	D100	81.9°C	106.2°C	9	LF101	50.7°C	74.9°C	10	U1	49.3°C	73.5°C	11	BD1	37.5°C	61.6°C	12	D5	49.4°C	74.6°C	13	RTH1	40.1°C	61.0°C	14	LF1	35.9°C	59.6°C	15	PCB(B	36.3°C	60.5°C	16	C5	38.9°C	63.7°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 123.00% LOAD Ta : 25°C	TEST : OK																																																																				
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK																																																																				
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50°C HUMIDITY= 95.0% RH	TEST : OK																																																																				
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0083% /(0°C~50°C)																																																																				
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°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		TEST : OK																																																																				



7	THERMAL SHOCK TEST	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 : 10 CYCLE 5. Input/Output condition : 230VAC Full Load AC ON/OFF test turn on 58sec ; turn off 2sec	TEST : OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 2G (5) Test Time : 60 min 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= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0°C LIFE TIME	(1). 158118 HRS (2). 56064 HRS (3). 125618 HRS (4). 158118 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 968.1K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ