



# TEST REPORT: HDR-30-24

## 30W Single Output Industrial DIN RAIL

### ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

### ■ SAFETY & E.M.C. TEST

Safety Test

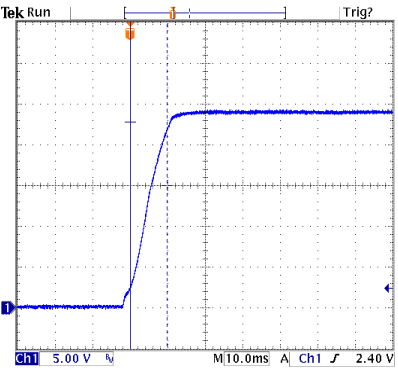
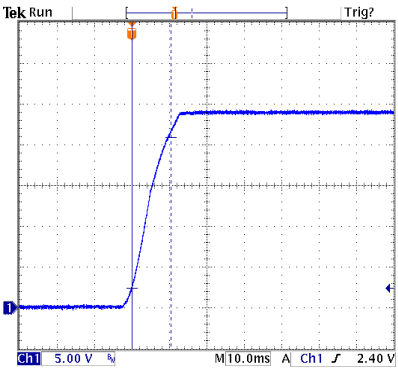
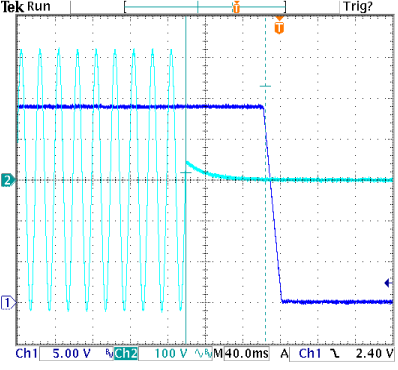
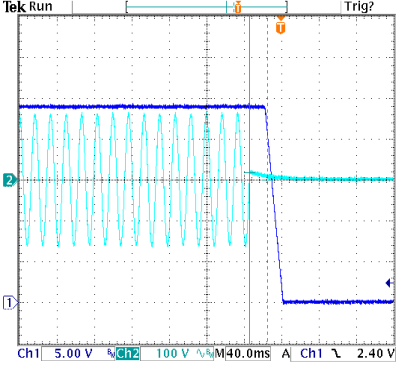
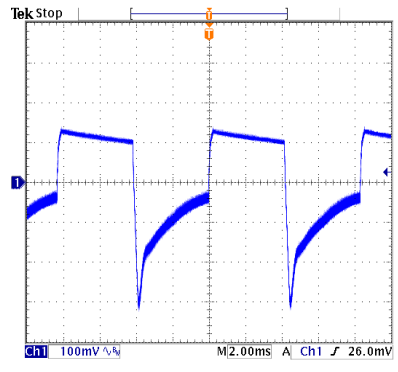
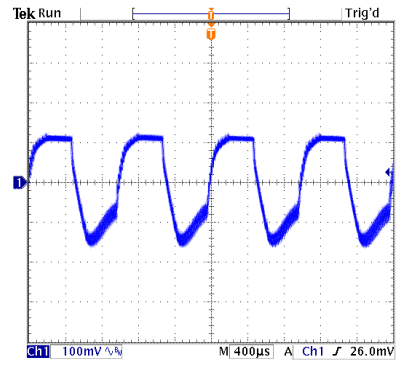
E.M.C. Test

### ■ RELIABILITY TEST

ENVIRONMENT TEST

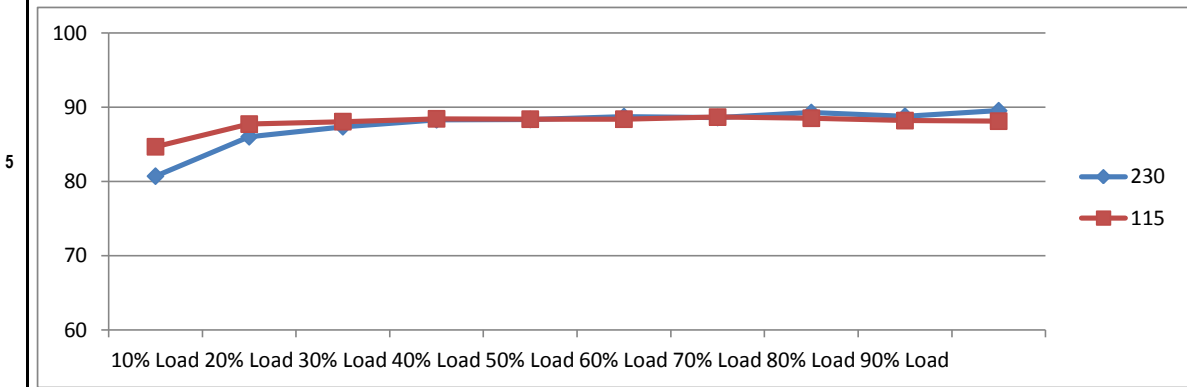
DESIGN VERIFY TEST  
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 21.60V ~ 29.00V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 19.53V ~ 30.03V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 85VAC / 277VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.33% ~ 0.04%
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 85VAC / 277VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ -0.04%
4	LOAD REGULATION(MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.12% ~ -0.12%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.1 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	high frequency:	low frequency:
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 118ms 115VAC : 54ms
7		INPUT=230VAC/50HZ @ FULL LOAD	INPUT=115VAC/60HZ @ FULL LOAD	

8	<b>RISE TIME (MAX.)</b>	230VAC : 50ms 115VAC : 50ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 9.8ms 115VAC : 10.4ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	
9	<b>HOLD UP TIME (TYP.)</b>	230VAC : 30ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 84.8ms 115VAC : 19.2ms
	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	<b>DYNAMIC LOAD</b>	V1 : 2400 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C	V1: (1). 456mv (2). 288mv unit:mVp-p
	FULL /MIN LOAD 50%DUTY / 120HZ 		FULL /MIN% LOAD 50%DUTY / 1KHZ 	

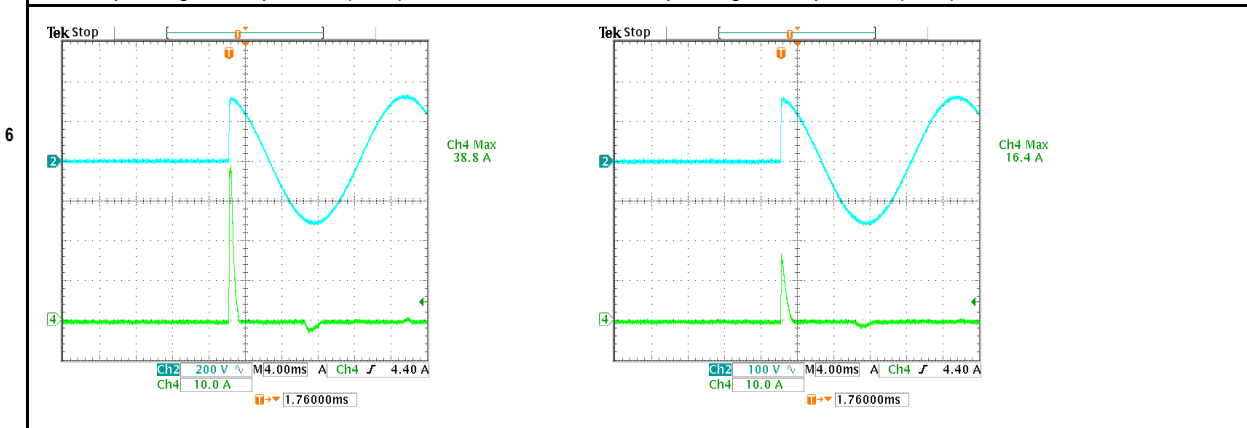
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC ~ 277VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	67.0VAC ~ 277VAC
			I/P : LOW-LINE = 82VAC 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 : 85VAC ~ 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= 0.30A / 230VAC I= 0.54A / 115VAC
4	NO LOAD POWER CONSUMPTION	< 0.30W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.1244 W
	EFFICIENCY (TYP.)	89.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	90.939 %



5	INRUSH CURRENT (TYP.)	45A / 230VAC 25A / 115VAC twidh= 555 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 38.8A / 230VAC I= 16.4A / 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: 85VAC O/P: TESTING  TA : 25°C	134.00% 277VAC 132.66% 230VAC 134.67% 85VAC  Hiccup mode when output voltage<50%, recovers automatically after fault condition is removed;  Constant current limiting within 50%~100% rated output voltage, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	30.00V ~ 36.00V	I/P: 277VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD TA : 25°C	33.10V 277VAC 33.10V 230VAC 33.10V 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  Hiccup mode

**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). 510.00V (2). 474.00V (3). 510.00V
2	O/P Diode	D100 Rated : 200V 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). 120.00V (2). 118.00V (3). 116.00V
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). 386.00V (2). 380.00V (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). 26.00V 24.30V (2). 11.90V 0.78V (3). 11.90V 3.46V (4). 34.00V 33.40V (5). 19.70V 19.70V
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). 494.00V (2). 492.00V

**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: 1.49mA 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	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-30-24 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>35.0°C</td><td>59.4°C</td></tr> <tr><td>2</td><td>LF2</td><td>43.5°C</td><td>67.8°C</td></tr> <tr><td>3</td><td>Q1</td><td>66.3°C</td><td>92.7°C</td></tr> <tr><td>4</td><td>T1 PRI</td><td>73.6°C</td><td>95.8°C</td></tr> <tr><td>5</td><td>C40</td><td>51.5°C</td><td>75.3°C</td></tr> <tr><td>6</td><td>T1 SEC</td><td>75.7°C</td><td>97.9°C</td></tr> <tr><td>7</td><td>C105</td><td>60.5°C</td><td>83.3°C</td></tr> <tr><td>8</td><td>D100</td><td>84.5°C</td><td>106.1°C</td></tr> <tr><td>9</td><td>LF101</td><td>45.2°C</td><td>68.5°C</td></tr> <tr><td>10</td><td>U1</td><td>57.0°C</td><td>80.9°C</td></tr> <tr><td>11</td><td>BD1</td><td>47.5°C</td><td>71.1°C</td></tr> <tr><td>12</td><td>D5</td><td>59.6°C</td><td>85.0°C</td></tr> <tr><td>13</td><td>RTH1</td><td>55.5°C</td><td>73.0°C</td></tr> <tr><td>14</td><td>LF1</td><td>42.7°C</td><td>65.3°C</td></tr> <tr><td>15</td><td>PCB(B</td><td>45.1°C</td><td>68.8°C</td></tr> <tr><td>16</td><td>C5</td><td>45.5°C</td><td>70.1°C</td></tr> </tbody> </table>	NO.	Positio	ROOM AMBIENT 24.7°C	HIGH AMBIENT Ta: 49.6°C	1	ZNR1	35.0°C	59.4°C	2	LF2	43.5°C	67.8°C	3	Q1	66.3°C	92.7°C	4	T1 PRI	73.6°C	95.8°C	5	C40	51.5°C	75.3°C	6	T1 SEC	75.7°C	97.9°C	7	C105	60.5°C	83.3°C	8	D100	84.5°C	106.1°C	9	LF101	45.2°C	68.5°C	10	U1	57.0°C	80.9°C	11	BD1	47.5°C	71.1°C	12	D5	59.6°C	85.0°C	13	RTH1	55.5°C	73.0°C	14	LF1	42.7°C	65.3°C	15	PCB(B	45.1°C	68.8°C	16	C5	45.5°C	70.1°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 121.00% LOAD Ta : 25°C	TEST : OK																																																																				
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 277VAC / 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 : 287VAC 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	±0.0000% /(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). 294387.5 HRS (2). 60225 HRS (3). 86233.8 HRS (4). 147695.4 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

2007/3/20 A5C