TEST REPORT: HDR-30-24

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

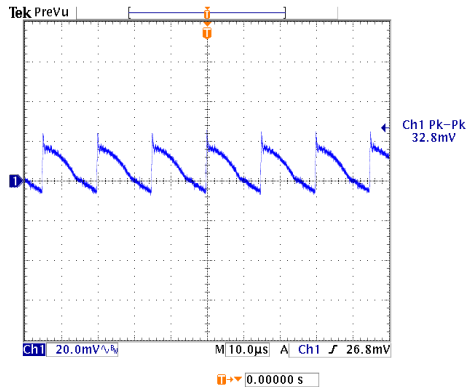
- ENVIRONMENT TEST

■ DESIGN VERIFY TEST

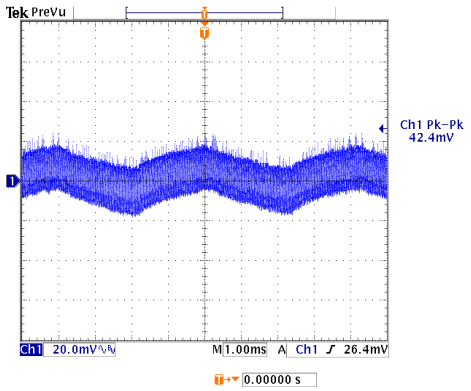
OUTPUT FUNCTION TEST

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℃	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℃	V1: 0.33% ~ 0.04%
3	LINE REGULATION (MAX.)	V1: 1.0% ~ -1.0%	I/P: 85VAC / 277VAC O/P: FULL LOAD TA : 25℃	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℃	V1: 0.12% ~ -0.12%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P: FULL LOAD TA : 25℃	TEST< 2.1 %
6	RIPPLE & NOISE(Max)	V1: 150 mVp-p	I/P: 230VAC O/P: FULL LOAD TA : 25℃	V1: 42.4 mVp-p

high frequency:



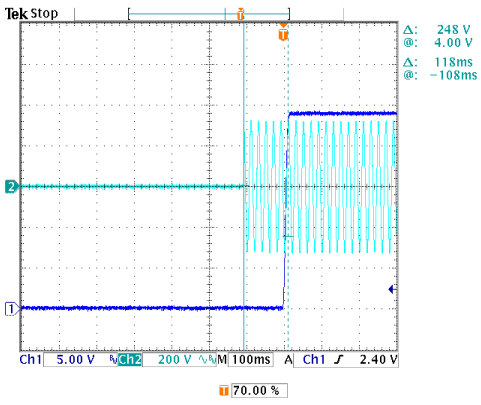
low frequency:



NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 118ms 115VAC : 54ms

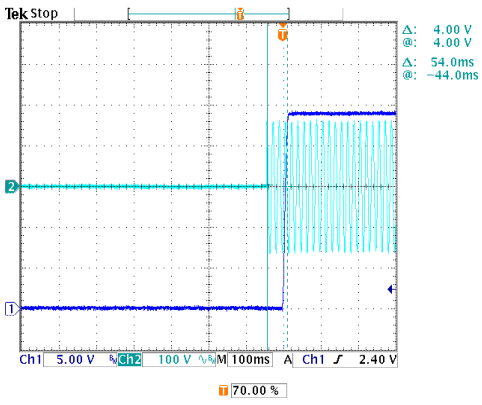
INPUT=230VAC/50HZ @ FULL LOAD

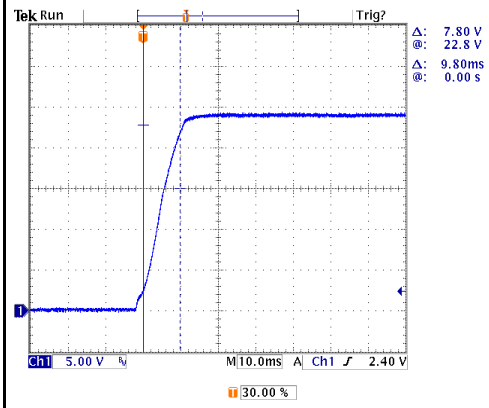
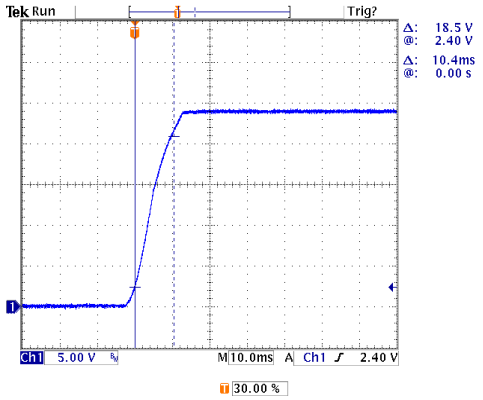
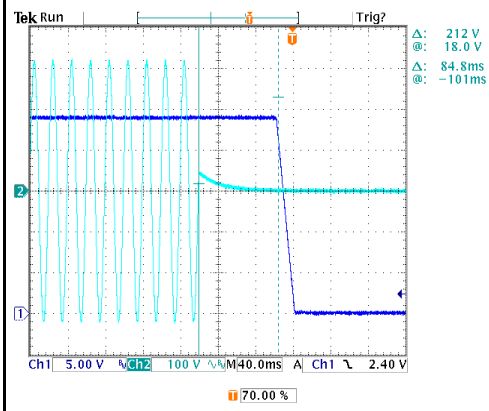
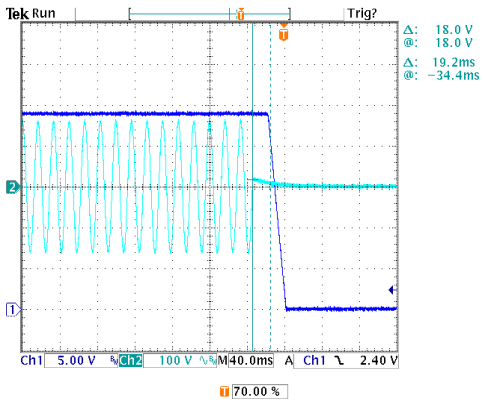
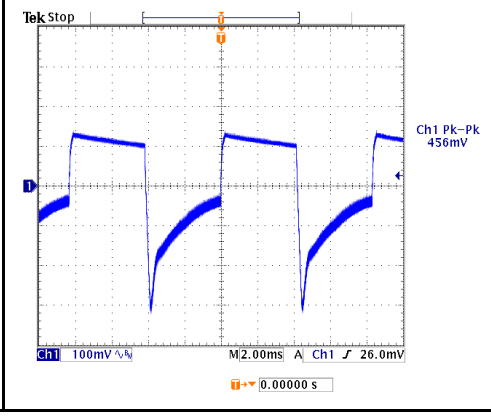
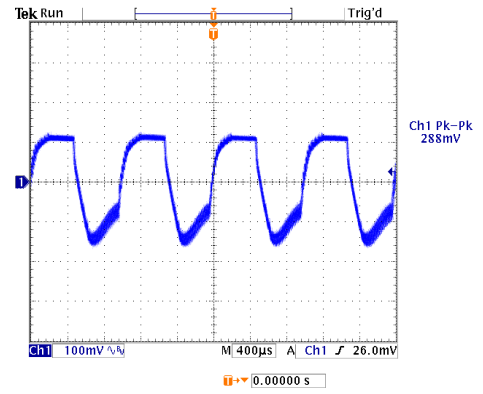
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

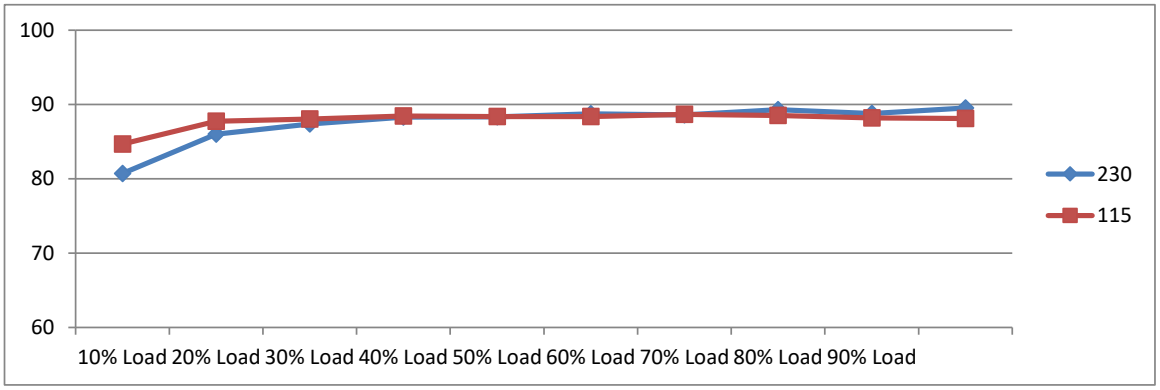
CH1 : Output Voltage CH2 : AC Input Voltage



8	RISE TIME (MAX.)	230VAC : 50ms 115VAC : 50ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 9.8ms 115VAC : 10.4ms	
	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℃	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	DYNAMIC LOAD	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℃	(1). (2). unit:mVp-p V1: 456mv 288mv	
	FULL /MIN LOAD 50%DUTY / 120HZ		FULL /MIN% LOAD 50%DUTY / 1KHZ		

INPUT FUNCTION TEST

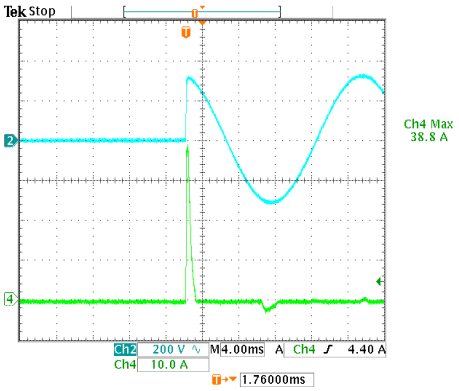
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC ~ 277VAC 120VDC ~ 390VDC	I/P: TESTING O/P: FULL LOAD Ta: 25℃	67.0VAC ~ 277VAC 98.78VDC ~ 390VDC
			I/P: LOW-LINE = 82VAC HIGH-LINE = 300VAC O/P: FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P: 85VAC ~ 277VAC O/P: FULL~MIN LOAD Ta: 25℃	TEST: OK
3	INPUT CURRENT (TYP.)	0.48A / 230VAC 0.88A / 115VAC	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA : 25℃	I= 0.30A / 230VAC I= 0.54A / 115VAC
4	NO LOAD POWER CONSUMPTION	< 0.30W	I/P: 230VAC O/P: MIN LOAD TA : 25℃	< 0.1244 W
5	EFFICIENCY (TYP.)	89.0%	I/P: 230VAC O/P: FULL LOAD TA : 25℃	90.939 %



6	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℃	I= 38.8A / 230VAC I= 16.4A / 115VAC

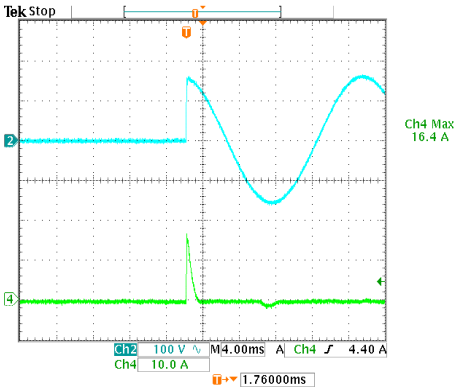
INPUT=230VAC/50HZ @ FULL LOAD

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



INPUT=115VAC/50HZ @ FULL LOAD

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℃	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℃	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℃	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)Fulll load continue Ta: 25℃	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)Fulll load continue Ta: 25℃	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℃	(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 Change (4)O.V.P (5)Low Line No Load Vo(min) Ta: 25℃	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)Fulll load continue Ta: 25℃	(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℃	I/P-O/P: 1.49mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500VDC Ta: 25℃/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℃	PASS
2	CONDUCTION	BS EN/EN55032(CISPR32), CNS13438 CLASS B	I/P： 230VAC /50HZ O/P： FULL LOAD / 50% LOAD Ta： 25℃	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032(CISPR32), CNS13438 CLASS B	I/P： 230VAC /50HZ O/P： FULL LOAD Ta： 25℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT： 2KV	I/P： 230VAC /50HZ O/P： FULL LOAD Ta： 25℃	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N： 2KV	I/P： 230VAC /50HZ O/P： FULL LOAD Ta： 25℃	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℃ 2. HIGH AMBIENT BURN-IN： 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 49.6℃		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230VAC O/P： 121.00% LOAD Ta： 25℃	TEST：OK
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 277VAC / 100VAC O/P： FULL LOAD Ta： -30.0℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P： 287VAC O/P： FULL LOAD Ta： 50℃ HUMIDITY= 95.0% RH	TEST：OK
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~50℃)	I/P： 230VAC O/P： FULL LOAD	±0.0000% /(0℃~50℃)
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -40℃ ~ +85℃ 2. Temperature change rate ： 25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle： 5 CYCLE 5. Input/Output condition： STATIC		TEST：OK

NO.	Position	ROOM AMBIENT Ta 24.7℃	HIGH AMBIENT Ta： 49.6℃
1	ZNR1	35.0℃	59.4℃
2	LF2	43.5℃	67.8℃
3	Q1	66.3℃	92.7℃
4	T1 PRI	73.6℃	95.8℃
5	C40	51.5℃	75.3℃
6	T1 SEC	75.7℃	97.9℃
7	C105	60.5℃	83.3℃
8	D100	84.5℃	106.1℃
9	LF101	45.2℃	68.5℃
10	U1	57.0℃	80.9℃
11	BD1	47.5℃	71.1℃
12	D5	59.6℃	85.0℃
13	RTH1	55.5℃	73.0℃
14	LF1	42.7℃	65.3℃
15	PCB(B	45.1℃	68.8℃
16	C5	45.5℃	70.1℃

7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -35℃ ~ +55℃ 2. Temperature change rate ： 25℃ / 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℃	TEST： OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25.0℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 50.0℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50.0℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50.0℃ LIFE TIME	(1). 294387.5 HRS (2). 60225 HRS (3). 86233.8 HRS (4). 147695.4 HRS
10	MTBF	3670.4K hrs min. Telcordia SR-332 (Bellcore) ; 968.1K hrs min. MIL-HDBK-217F (25 ℃)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50℃ O/P： FULL LOAD	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A5(