



TEST REPORT: HDR-15-5

15W Ultra Slim Step Shape DIN Rail

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control Function Test
Component Stress Test

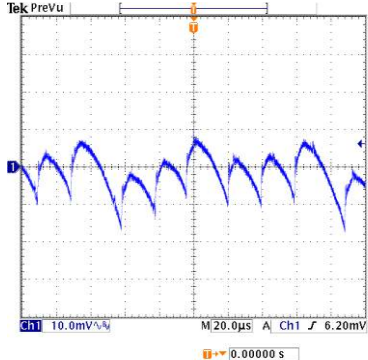
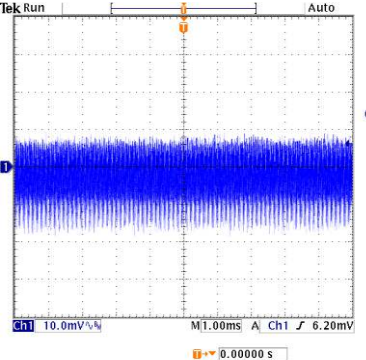
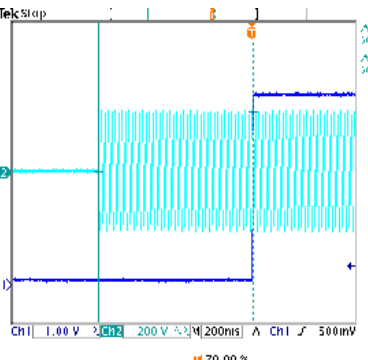
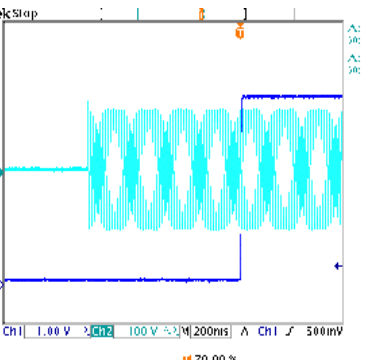
■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

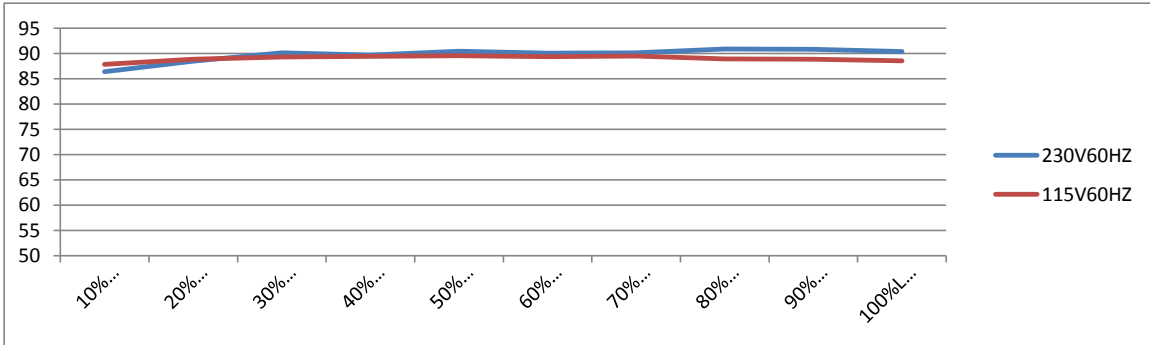
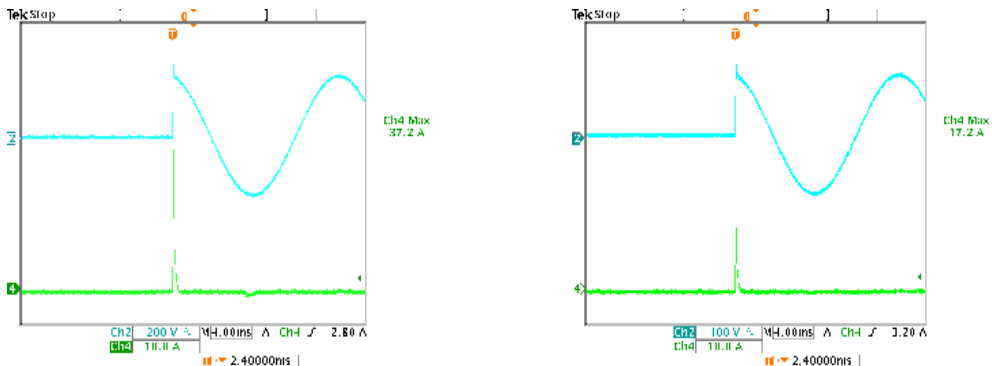
ENVIRONMENT TEST

DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.50V ~ 5.50V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 4.38V ~ 6.25V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 85VAC / 277VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.60% ~ -1.40%
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 85VAC / 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: 0.60% ~ 0.98%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.0 %
6	RIPPLE & NOISE(Max)	V1 : 80 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 27.4 mVp-p
		high frequency:		low frequency:
				
7	SET UP TIME (MAX.)	230VAC : 2000ms 115VAC : 2000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 904ms 115VAC : 912ms
	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 : 80ms 115VAC : 80ms	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	230VAC : 6.0ms 115VAC : 6.4ms
	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 : 86.4ms 115VAC : 17.6ms
	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 : 1000 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). 108mv (2). 96mv 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℃ 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)	68.0VAC ~ 277VAC 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.)	0.25A / 230VAC 0.50A / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 0.113A / 230VAC I= 0.208A / 115VAC
4	NO LOAD POWER CONSUMPTION	< 0.30W	I/P : 230VAC O/P: MIN LOAD TA : 25℃	< 0.0672 W
5	EFFICIENCY (TYP.)	80.0%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	80.881 %
				
6	INRUSH CURRENT (TYP.)	45A / 230VAC 25A / 115VAC twidth= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 37.2A / 230VAC I= 17.2A / 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	110% ~ 145%	I/P: 277VAC I/P: 230VAC I/P: 85VAC O/P: TESTING Ta: 25°C	125.40% 277VAC 125.00% 230VAC 123.30% 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	5.75V ~ 6.75V	I/P: 277VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta: 25°C	6.40V 277VAC 6.40V 230VAC 6.40V 85VAC Shut off o/p voltage, clamping by zener diode
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 4.0A	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). 544.00V (2). 428.00V (3). 540.00V
2	O/P Diode	D100 Rated : 45V 10.0A	I/P : 280VAC VDS : O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	D100 VDS : (1). 31.20V (2). 30.50V (3). 31.20V
3	Input Capacitor	C5 Rated : 27uf 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). 352.00V (2). 352.00V (3). 352.00V
4	Control IC	U1 Rated : 35V (max) 9V (min)	I/P : 280VAC O/P : (1) Full (2) Output Short (3) O.L.P (4) Low Line No Load Vo(min) Ta : 25°C	U1 (1). 21.20V (2). 21.20V (3). 21.20V (5). 21.20V
6	Clamp Diode	D5 Rated : 1000V 1.0A	I/P : 280VAC (2) Full load continue Ta : 25°C	(2). 506.00V

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: 2.13mA 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
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
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RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT						
1	TEMPERATURE RISE TEST	MODEL : HDR-15-5								
		1. ROOM AMBIENT BURN-IN : 1.0hrs								
		IP: 230VAC O/P: 100% LOAD TA= 23.1℃								
		2. HIGH AMBIENT BURN-IN : 1.0hrs								
		IP: 230VAC O/P: 100% LOAD TA= 48.5℃								
		NO. Position ROOM 23.1℃ HIGH AMBIENT Ta: 48.5℃								
		1 LF1 42.8℃ 68.4℃								
		2 C5 52.6℃ 77.5℃								
		3 Q1 71.4℃ 96.8℃								
		4 T1 PRIMARY 68.6℃ 92.6℃								
		5 T1 SECONDA 73.5℃ 97.0℃								
		6 C40 54.5℃ 79.4℃								
		7 C105 73.7℃ 96.3℃								
2	OVER LOAD BURN-IN TEST	NO DAMAGE	I/P : 230VAC	TEST : OK						
		1 HOUR (MIN)	O/P : 119.0% LOAD							
			Ta : 25℃							
		3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE	I/P : 277VAC / 85VAC	TEST : OK				
				1 HOUR (MIN)	O/P : FULL LOAD					
					Ta : -30.0℃					
				4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS	I/P : 287VAC	TEST : OK		
						IN CHAMBER ON	O/P : FULL LOAD			
						CONTROL 50℃	Ta : 50℃			
						NO DAMAGE	HUMIDITY= 95.0% RH			
						5	TEMPERATURE COEFFICIENT	±0.03% /℃(0~50℃)	I/P : 230VAC	±0.0160% /℃(0~50℃)
									O/P : FULL LOAD	
6	STORAGE TEMPERATURE TEST							1. Thermal shock Temperature : -45℃ ~ +85℃		TEST : OK
								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								
		7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35℃ ~ 55℃				TEST : OK		
				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						
				8	VIBRATION TEST	1 Carton & 1 Set		TEST : OK		
(1) Waveform : Sine Wave										
(2) Frequency : 10~500Hz										
(4) Acceleration : 2G										
(5) Test Time : 60min in each axis (X.Y.Z)										
(6) Ta : 25℃										
9	CAPACITOR LIFE CYCLE	:SUPPOSE C106 IS THE MOST CRITICAL COMPONENT								
		(1) I/P : 230VAC O/P : FULL LOAD Ta= 25℃ LIFE TIME	(1). 284850.6 HRS							
		(2) I/P : 230VAC O/P : FULL LOAD Ta= 50℃ LIFE TIME	(2). 56761.6 HRS							
		(3) I/P : 230VAC O/P : FULL LOAD Ta= 50℃ LIFE TIME	(3). 91181.6 HRS							
		(4) I/P : 230VAC O/P : FULL LOAD Ta= 50℃ LIFE TIME	(4). 162241.9 HRS							
		10	MTBF	Conducted by Parts Stress Analysis Prediction						
				1166K hrs min. MIL-HDBK-217F (25℃)						
				11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life):	30000HRS @ TA 50℃			

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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