



# 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

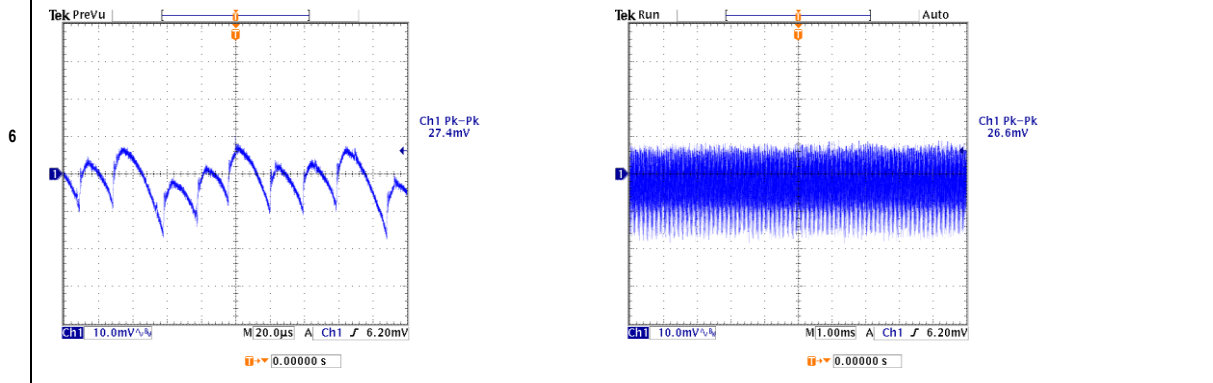
- ENVIRONMENT TEST

■ DESIGN VERIFY TEST  
OUTPUT FUNCTION TEST

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 %
	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:



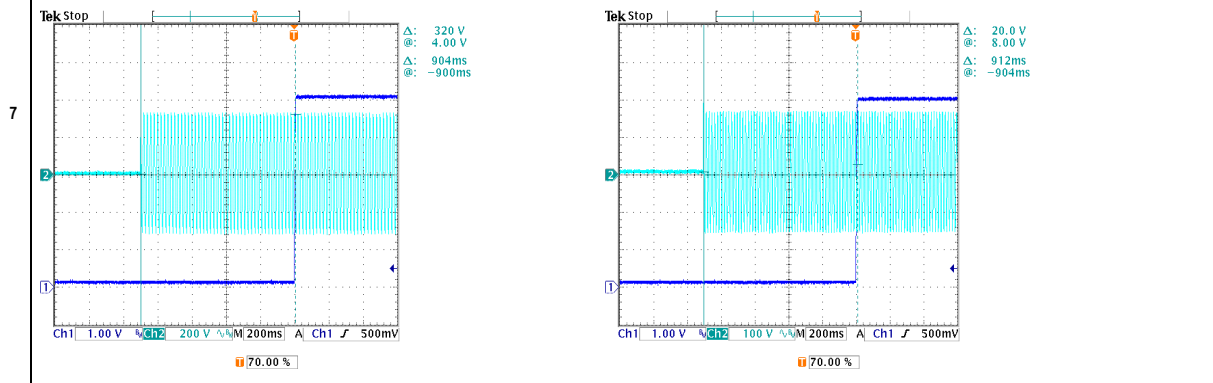
SET UP TIME (MAX.)	230VAC : 2000ms 115VAC : 2000ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 904ms 115VAC : 912ms
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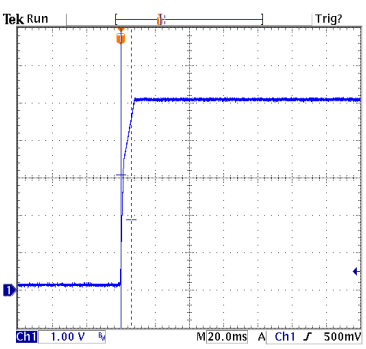
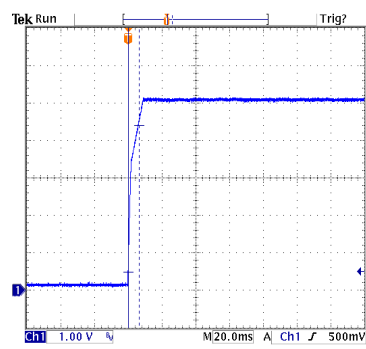
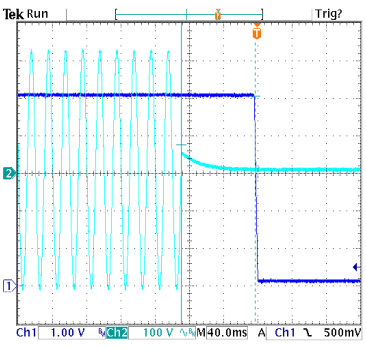
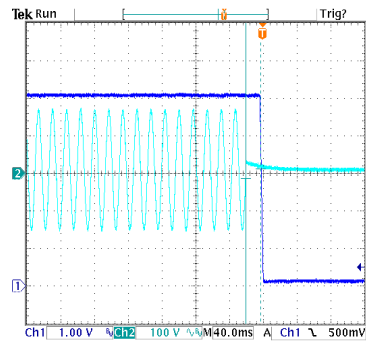
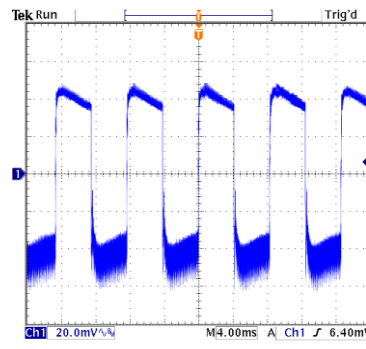
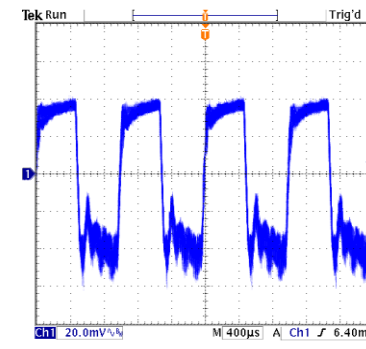
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



	<p><b>RISE TIME (MAX.)</b></p> <p>230VAC : 80ms 115VAC : 80ms</p>	<p>I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA : 25°C</p>	<p>230VAC : 6.0ms 115VAC : 6.4ms</p>
<p>8</p>	<p><b>INPUT=230VAC/50HZ @ FULL LOAD</b> CH1 : Output Voltage</p> 		<p><b>INPUT=115VAC/60HZ @ FULL LOAD</b> CH1 : Output Voltage</p> 
<p>9</p>	<p><b>HOLD UP TIME (TYP.)</b></p> <p>230VAC : 30ms 115VAC : 12ms</p>	<p>I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA : 25°C</p>	<p>230VAC : 86.4ms 115VAC : 17.6ms</p>
	<p><b>INPUT=230VAC/50HZ @ FULL LOAD</b> CH1 : Output Voltage CH2 : AC Input Voltage</p> 		<p><b>INPUT=115VAC/60HZ @ FULL LOAD</b> CH1 : Output Voltage CH2 : AC Input Voltage</p> 
<p>10</p>	<p><b>DYNAMIC LOAD</b></p> <p>V1: 1000 mVp-p</p>	<p>I/P: 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C</p>	<p>V1: (1). 108mv (2). 96mv unit:mVp-p</p>
	<p><b>FULL /MIN LOAD 50%DUTY / 120HZ</b></p> 		<p><b>FULL /MIN% LOAD 50%DUTY / 1KHZ</b></p> 

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°C  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 96.16VDC ~ 390VDC  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.)	0.25A / 230VAC 0.50A / 115VAC	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA : 25°C	I= 0.113A / 230VAC I= 0.208A / 115VAC
4	NO LOAD POWER CONSUMPTION	< 0.30W	I/P: 230VAC O/P: MIN LOAD TA : 25°C	< 0.0672 W
5	EFFICIENCY (TYP.)	80.0%	I/P: 230VAC O/P: FULL LOAD TA : 25°C	80.881 %
	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°C	I= 37.2A / 230VAC I= 17.2A / 115VAC
6	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 Change (4) Low Line No Load Vo(min) Ta: 25°C	U1 (1). 21.20V (2). 21.20V (3). 21.20V (4). 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
2	CONDUCTION	BS EN/EN55032(CISPR32), CNS13438 CLASS B	I/P: 230VAC /50HZ O/P: FULL LOAD / 50% LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032(CISPR32), CNS13438 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-15-5		
		1. ROOM AMBIENT BURN-IN: 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 23.1°C		
		2. HIGH AMBIENT BURN-IN: 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 48.5°C		
			NO. Position ROOM AMBIENT 23.1°C HIGH AMBIENT Ta: 48.5°C	
			1 LF1 42.8°C 68.4°C	
			2 C5 52.6°C 77.5°C	
			3 Q1 71.4°C 96.8°C	
			4 T1 PRIMARY 68.6°C 92.6°C	
			5 T1 SECONDA 73.5°C 97.0°C	
			6 C40 54.5°C 79.4°C	
			7 C105 73.7°C 96.3°C	
			8 D100 87.8°C 111.2°C	
			9 C106 56.9°C 80.6°C	
	10 LF101 58.8°C 82.7°C			
	11 U1 50.2°C 75.0°C			
	12 BD1 54.4°C 79.0°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P: 230VAC O/P: 119.0% LOAD Ta: 25°C	TEST: OK
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P: 277VAC / 85VAC 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% /°C(0~50°C)	I/P: 230VAC O/P: FULL LOAD	±0.0160% /°C(0~50°C)
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45°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: 60min in each axis (X.Y.Z) (6) Ta: 25°C		TEST: OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P: 230VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (1). 284850.6 HRS (2) I/P: 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (2). 56761.6 HRS (3) I/P: 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (3). 91181.6 HRS (4) I/P: 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (4). 162241.9 HRS		
10	MTBF	3724.3K hrs min. Telcordia SR-332 (Bellcore) ; 1166.1K hrs min. MIL-HDBK-217F (25°C)		
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): 30000HRS @ TA 50°C O/P: FULL LOAD		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014