



# Test Report: HSN-300-4.2A

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300W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 150 mVp-p (Max)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	V1 : 85 mVp-p (Max)	PASS
2	OUTPUT VOLTAGE ADJUST RANGE	V1 : 3.6 V ~ 4.4 V	I/P : 115 VAC O/P : NO LOAD Ta : 25°C	V1 : 3.47V~ 4.50V / 115 VAC	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1 : -3%~ 3% (Max)	I/P : 90 VAC / 132 VAC O/P : FULL/ NO LOAD Ta : 25°C	V1 : -0.09 %~ 0.31 %	PASS
4	LINE REGULATION	V1 : -0.5%~ 0.5% (Max)	I/P : 90 VAC ~ 132 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.004 %~ 0.03 %	PASS
5	LOAD REGULATION	V1 : -2%~ 2% (Max)	I/P : 115 VAC O/P : FULL~NO LOAD Ta : 25°C	V1 : -0.09 %~ 0.10 %	PASS
6	SET UP TIME	115VAC : 2500 ms (Max)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	115VAC/ 1232 ms	PASS
7	RISE TIME	115VAC : 100 ms (Max)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	115VAC/ 3.9 ms	PASS
8	HOLD UP TIME	115VAC : 8 ms (TYP)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	115VAC/ 32.9 ms	PASS
9	OVER/UNDERSHOOT TEST	< ±10%	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	TEST : < ±10 %	PASS
10	DYNAMIC LOAD	V1 : 840 mVp-p	I/P : 115 VAC (1).O/P : FULL /NO LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /NO LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 528 mVp-p (2) 728 mVp-p	PASS

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~132 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	87 V~132 V	PASS
			I/P : (1)LOW-LINE-3V=87 V HIGH-LINE+15%=150 V O/P : FULL/MIN LOAD ON : 30 Sec OFF : 30 Sec 10MIN (2)230Vac ON : 0.5 Sec OFF : 0.5 Sec 20MIN (3)230Vac ON : 3Sec OFF : 3Sec 12HOURS ( POWER ON/OFF NO DAMAGE )	TEST : OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 90 VAC ~ 132 VAC O/P : FULL ~NO LOAD Ta : 25°C	TEST : OK	PASS
3	EFFICIENCY	85% (TYP)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	85.22%	PASS
4	INPUT CURRENT	115V/ 5.0 A (TYP)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 3.442 A/ 115 VAC	PASS
5	LEAKAGE CURRENT	< 1 mA	I/P : 132 VAC O/P : NO LOAD Ta : 25°C	L-CASE : 0.655 mA N-CASE : 0.643 mA	PASS

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~ 170 %	I/P : 100 VAC I/P : 115 VAC I/P : 132 VAC O/P : TESTING Ta : 25°C	149.9 %/ 100 VAC 150.8 %/ 115 VAC 151.7 %/ 132 VAC Hiccup mode,recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 4.7 V ~ 5.7 V	I/P : 90 VAC I/P : 115 VAC I/P : 132 VAC O/P : NO LOAD Ta : 25°C	5.02 V/ 90 VAC 5.01 V/ 115 VAC 5.02 V/ 132 VAC Hiccup mode,recovers automatically after fault condition is removed	PASS
3	OVER TEMPERATURE PROTECTION	SPEC : O.T.P. NO DAMAGE	I/P : 115 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 132 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup mode,recovers automatically after fault condition is removed.	PASS

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated 600 V 20A	I/P : High-Line +3V = 135 V O/P : (1)FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta : 25°C	(1) 446 V (2) 434 V (3) 438 V	PASS
2	Diode Peak Voltage	Q100 Rated 40 V 120 A  Q102 Rated 40 V 208 A	I/P : High-Line +3V = 135 V O/P : (1) FULL LOAD Turn on (2)Output Short (3) FULL LOAD continue Ta : 25°C	(1) 25.7 V (2) 25.3 V (3) 25.5 V  (1) 26.2 V (2) 26.6 V (3) 25.8 V	PASS
3	Input Capacitor Voltage	C5 Rated 470uF / 200 V	I/P : High-Line +3V = 135 V O/P : (1) FULL LOAD Turn on /Off (2) NO load Turn on /Off (3) FULL LOAD /Min load Change Ta : 25°C	(1) 194 V (2) 190 V (3) 195 V	PASS
4	Control IC Voltage Test	U1 Rated 30V	I/P : High-Line +3V = 135 V O/P : (1) FULL LOAD Turn on /Off (2) NO load Turn on /Off (3) FULL LOAD /Min load Change Ta : 25°C	(1) 20.5 V (2) 20.3 V (3) 20.6 V	PASS

**SAFETY TEST**

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 2.916 mA I/P-FG : 2.822 mA O/P-FG : 2.008 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩ	I/P-O/P : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C/70% RH	I/P-O/P : >9999MΩ I/P-FG : >9999MΩ O/P-FG : >9999MΩ NO DAMAGE	PASS
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta : 25°C	10 mΩ	PASS

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																												
1	TEMPERATURE RISE TEST	MODEL : HSN-300-4.2A 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 115VAC O/P : FULL LOAD Ta=36.3℃ 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 115VAC O/P : FULL LOAD Ta=48.8℃			PASS																																																																												
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 36.3℃</th> <th>HIGH AMBIENT Ta= 48.8℃</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>76.9℃</td><td>82.2℃</td></tr> <tr><td>2</td><td>Q1</td><td>69.0℃</td><td>81.8℃</td></tr> <tr><td>3</td><td>Q2</td><td>70.0℃</td><td>81.4℃</td></tr> <tr><td>4</td><td>C166</td><td>73.3℃</td><td>85.2℃</td></tr> <tr><td>5</td><td>T1</td><td>80.2℃</td><td>94.1℃</td></tr> <tr><td>6</td><td>Q100</td><td>64.5℃</td><td>73.5℃</td></tr> <tr><td>7</td><td>Q101</td><td>61.6℃</td><td>71.5℃</td></tr> <tr><td>8</td><td>Q102</td><td>64.1℃</td><td>76.8℃</td></tr> <tr><td>9</td><td>Q103</td><td>61.7℃</td><td>74.3℃</td></tr> <tr><td>10</td><td>L100</td><td>79.7℃</td><td>93.8℃</td></tr> <tr><td>11</td><td>C106</td><td>68.2℃</td><td>80.4℃</td></tr> <tr><td>12</td><td>U1</td><td>66.4℃</td><td>76.9℃</td></tr> <tr><td>13</td><td>R106</td><td>69.9℃</td><td>81.3℃</td></tr> <tr><td>14</td><td>U160</td><td>78.7℃</td><td>85.5℃</td></tr> <tr><td>15</td><td>D6</td><td>78.3℃</td><td>88.5℃</td></tr> <tr><td>16</td><td>TSW1</td><td>70.4℃</td><td>82.7℃</td></tr> <tr><td>17</td><td>T2</td><td>69.6℃</td><td>81.6℃</td></tr> <tr><td>18</td><td>Tc</td><td>55.1℃</td><td>65.8℃</td></tr> </tbody> </table>	NO	Position		ROOM AMBIENT Ta= 36.3℃	HIGH AMBIENT Ta= 48.8℃	1	C5	76.9℃	82.2℃	2	Q1	69.0℃	81.8℃	3	Q2	70.0℃	81.4℃	4	C166	73.3℃	85.2℃	5	T1	80.2℃	94.1℃	6	Q100	64.5℃	73.5℃	7	Q101	61.6℃	71.5℃	8	Q102	64.1℃	76.8℃	9	Q103	61.7℃	74.3℃	10	L100	79.7℃	93.8℃	11	C106	68.2℃	80.4℃	12	U1	66.4℃	76.9℃	13	R106	69.9℃	81.3℃	14	U160	78.7℃	85.5℃	15	D6	78.3℃	88.5℃	16	TSW1	70.4℃	82.7℃	17	T2	69.6℃	81.6℃	18	Tc	55.1℃	65.8℃		
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 132VAC/100VAC O/P : FULL LOAD Ta= -20℃	TEST : OK	PASS																																																																												
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45℃ NO DAMAGE	I/P : 136 VAC O/P : FULL LOAD Ta= 45℃ HUMIDITY= 95% R.H	TEST : OK	PASS																																																																												
4	TEMPERATURE COEFFICIENT	±0.03%(0~60℃)	I/P : 115 VAC O/P : FULL LOAD	±0.01%(0~60℃)	PASS																																																																												
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45℃~+90℃ 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		OK	PASS																																																																												

6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -20°C~ +50°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 : 115VAC/FULL LOAD AC ON/OFF TEST turn on 58sec ; turn off 2sec	OK	PASS
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 4G (5) Test Time : 90min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	HSN-300-4.2A: SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P : 115VAC O/P : FULL LOAD Ta=25 °C LIFE TIME (2) I/P : 115VAC O/P : FULL LOAD Ta=45 °C LIFE TIME (3) I/P : 115VAC O/P : 75% LOAD Ta=45°C LIFE TIME (4) I/P : 115VAC O/P : 50% LOAD Ta=45°C LIFE TIME	(1) 191020 HRS (2) 48759 HRS (3) 105963 HRS (4) 243457 HRS	PASS
9	MTBF	Conducted by Parts Stress Analysis Prediction 1758.2K hrs min. Telcordia SR-332 (Bellcore) ; 226.5K hrs min. MIL-HDBK-217F (25°C)		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20000 hours @ Tcase 70°C		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY