



Test Report: HSN-300-5A

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 : 95 mVp-p (Max) | PASS |
| 2 | OUTPUT VOLTAGE ADJUST RANGE | V1 : 4.5 V ~ 5.5 V | I/P : 115 VAC O/P : NO LOAD Ta : 25°C | V1 : 4.34V~ 5.61V / 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 : -0.06 %~ 0.47 % | PASS |
| 4 | LINE REGULATION | V1 : -0.5%~ 0.5% (Max) | I/P : 90 VAC ~ 132 VAC O/P : FULL LOAD Ta : 25°C | V1 : -0.003 %~ 0.003 % | PASS |
| 5 | LOAD REGULATION | V1 : -2%~ 2% (Max) | I/P : 115 VAC O/P : FULL~NO LOAD Ta : 25°C | V1 : -0.06 %~ 0.07 % | PASS |
| 6 | SET UP TIME | 115VAC : 2500 ms (Max) | I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 115VAC/ 941 ms | PASS |
| 7 | RISE TIME | 115VAC : 100 ms (Max) | I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 115VAC/ 4.2 ms | PASS |
| 8 | HOLD UP TIME | 115VAC : 8 ms (TYP) | I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 115VAC/ 27.9 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 : 1000 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) 488 mVp-p (2) 708 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 | 86% (TYP) | I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 86.24% | PASS |
| 4 | INPUT CURRENT | 115V/ 5.0 A (TYP) | I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | I = 3.354 A/ 115 VAC | PASS |
| 5 | LEAKAGE CURRENT | < 1 mA | I/P : 132 VAC O/P : NO LOAD Ta : 25°C | L-CASE : 0.665 mA N-CASE : 0.670 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 | 145.2 %/ 100 VAC 145.8 %/ 115 VAC 146.6 %/ 132 VAC Hiccup mode,recovers automatically after fault condition is removed | PASS |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 5.7 V ~ 7.0 V | I/P : 90 VAC I/P : 115 VAC I/P : 132 VAC O/P : NO LOAD Ta : 25°C | 6.05 V/ 90 VAC 5.99 V/ 115 VAC 6.01 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) 458 V (2) 432 V (3) 418 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) 26.4 V (2) 24.2 V (3) 24.6 V (1) 27.6 V (2) 26.7 V (3) 26.5 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) 190 V (2) 175 V (3) 180 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) 20.1 V (3) 20.4 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 : 2.908 mA I/P-FG : 2.809 mA O/P-FG : 2.023 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 | 11 mΩ | PASS |

■ RELIABILITY TEST

ENVIRONMENT TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|---|---|--|-----------------|-------------|----------------------------|-----------------------------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|------|--------|--------|---|----|--------|--------|---|------|--------|--------|---|------|--------|--------|---|------|--------|--------|---|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|----|--------|--------|----|------|--------|--------|----|-----|--------|--------|----|----|--------|--------|----|----|--------|--------|----|------|--------|--------|----|----|--------|--------|----|------|--------|--------|----|----|--------|--------|--|--|
| 1 | TEMPERATURE RISE TEST | MODEL : HSN-300-5A 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 115VAC O/P : FULL LOAD Ta=36.3 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 115VAC O/P : FULL LOAD Ta=48.8 °C | | | PASS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 36.3°C</th> <th>HIGH AMBIENT Ta= 48.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>90.2°C</td><td>89.2°C</td></tr> <tr><td>2</td><td>Q1</td><td>80.1°C</td><td>90.0°C</td></tr> <tr><td>3</td><td>Q2</td><td>80.9°C</td><td>89.8°C</td></tr> <tr><td>4</td><td>C166</td><td>81.7°C</td><td>92.2°C</td></tr> <tr><td>5</td><td>T1</td><td>83.0°C</td><td>92.3°C</td></tr> <tr><td>6</td><td>Q100</td><td>68.9°C</td><td>77.6°C</td></tr> <tr><td>7</td><td>Q101</td><td>71.3°C</td><td>79.1°C</td></tr> <tr><td>8</td><td>Q102</td><td>69.6°C</td><td>80.8°C</td></tr> <tr><td>9</td><td>Q103</td><td>66.7°C</td><td>77.7°C</td></tr> <tr><td>10</td><td>L100</td><td>83.7°C</td><td>96.2°C</td></tr> <tr><td>11</td><td>C106</td><td>74.0°C</td><td>85.3°C</td></tr> <tr><td>12</td><td>U1</td><td>75.9°C</td><td>83.2°C</td></tr> <tr><td>13</td><td>R106</td><td>72.3°C</td><td>87.7°C</td></tr> <tr><td>14</td><td>C35</td><td>77.2°C</td><td>88.3°C</td></tr> <tr><td>15</td><td>T2</td><td>83.0°C</td><td>92.9°C</td></tr> <tr><td>16</td><td>D5</td><td>88.4°C</td><td>96.9°C</td></tr> <tr><td>17</td><td>U160</td><td>85.9°C</td><td>84.5°C</td></tr> <tr><td>18</td><td>D6</td><td>83.4°C</td><td>92.8°C</td></tr> <tr><td>19</td><td>TSW1</td><td>78.1°C</td><td>88.5°C</td></tr> <tr><td>20</td><td>Tc</td><td>62.0°C</td><td>71.5°C</td></tr> </tbody> </table> | NO | Position | | ROOM AMBIENT Ta= 36.3°C | HIGH AMBIENT Ta= 48.8 °C | 1 | C5 | 90.2°C | 89.2°C | 2 | Q1 | 80.1°C | 90.0°C | 3 | Q2 | 80.9°C | 89.8°C | 4 | C166 | 81.7°C | 92.2°C | 5 | T1 | 83.0°C | 92.3°C | 6 | Q100 | 68.9°C | 77.6°C | 7 | Q101 | 71.3°C | 79.1°C | 8 | Q102 | 69.6°C | 80.8°C | 9 | Q103 | 66.7°C | 77.7°C | 10 | L100 | 83.7°C | 96.2°C | 11 | C106 | 74.0°C | 85.3°C | 12 | U1 | 75.9°C | 83.2°C | 13 | R106 | 72.3°C | 87.7°C | 14 | C35 | 77.2°C | 88.3°C | 15 | T2 | 83.0°C | 92.9°C | 16 | D5 | 88.4°C | 96.9°C | 17 | U160 | 85.9°C | 84.5°C | 18 | D6 | 83.4°C | 92.8°C | 19 | TSW1 | 78.1°C | 88.5°C | 20 | Tc | 62.0°C | 71.5°C | | |
| NO | Position | ROOM AMBIENT Ta= 36.3°C | HIGH AMBIENT Ta= 48.8 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | C5 | 90.2°C | 89.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Q1 | 80.1°C | 90.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Q2 | 80.9°C | 89.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | C166 | 81.7°C | 92.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | T1 | 83.0°C | 92.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Q100 | 68.9°C | 77.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Q101 | 71.3°C | 79.1°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Q102 | 69.6°C | 80.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Q103 | 66.7°C | 77.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | L100 | 83.7°C | 96.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | C106 | 74.0°C | 85.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | U1 | 75.9°C | 83.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | R106 | 72.3°C | 87.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | C35 | 77.2°C | 88.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | T2 | 83.0°C | 92.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | D5 | 88.4°C | 96.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | U160 | 85.9°C | 84.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | D6 | 83.4°C | 92.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | TSW1 | 78.1°C | 88.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | Tc | 62.0°C | 71.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P : 132VAC/100VAC O/P : FULL LOAD Ta= -20°C | TEST : OK | PASS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 45 °C NO DAMAGE | I/P : 136 VAC O/P : FULL LOAD Ta= 45 °C HUMIDITY= 95% R.H | TEST : OK | PASS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | TEMPERATURE COEFFICIENT | ±0.03 %(0~60°C) | I/P : 115 VAC O/P : FULL LOAD | ±0.01 %(0~60°C) | PASS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | STORAGE TEMPERATURE TEST | 1. Thermal shock Temperature : -45°C ~ +90°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 | | OK | PASS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|----|-----------------------------|--|---|------|
| 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-300-5A: 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) 127823 HRS (2) 34731 HRS (3) 103784 HRS (4) 217920 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 |