



Test Report: HVG-320-36

320W 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

E.M.C. Test

■ RELIABILITY TEST

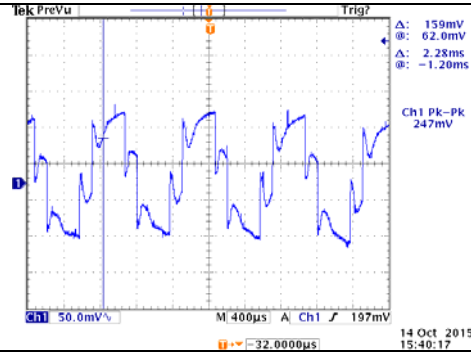
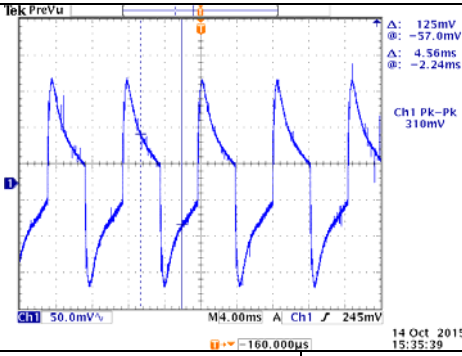
ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|--|--------------------------------|--|--|---|
| 1 | CONSTANT CURRENT REGION | CH1: 18V~ 36V | I/P: 347 VAC O/P:FULL LOAD Ta:25°C | 0.11V~ 35 V /347VAC |
| 2 | OUTPUT VOLTAGE ADJUST RANGE | CH1: 32V~ 39 V | I/P: 347 VAC I/P:230VAC O/P:MIN LOAD Ta:25°C | 31.075V~40.022V /347VAC 31.095V~40.18V/230VAC |
| 3 | CURRENT ADJ. RANGE | CH1:4.45 A~ 8.9A | I/P: 347 VAC I/P:230VAC O/P:CV MIN & CV MAX-1V Ta:25°C | 4.0216A~9.90A /347VAC@CV MAX-1V 4.027A~ 10.05 A /347VAC@CV MIN 4.0216A~10 A/230VAC@CV MAX-1V 4.021A~10.04A/230VAC@CV MIN |
| 4 | OUTPUT VOLTAGE TOLERANCE (Max) | V1: 1 % ~ -1 % | I/P:180VAC /528AC O/P:FULL/ MIN LOAD Ta:25°C | V1:-0.19 %~0.06 % |
| 5 | LINE REGULATION (Max) | V1: 0.5 % ~ -0.5 % | I/P:180VAC~528AC O/P:FULL LOAD Ta:25°C | V1: 0 %~0 % |
| 6 | LOAD REGULATION (Max) | V1: 0.5 % ~ -0.5 % | I/P: 347 VAC O/P:FULL ~MIN LOAD Ta:25°C | V1: -0.1%~0.09 % |
| 7 | OVER/UNDERSHOOT TEST | < ±5% | I/P: 347 VAC O/P:FULL LOAD Ta:25°C | TEST: 2.22 % |
| 8 | RIPPLE & NOISE (Max) | V1: 250 mVp-p | I/P: 347 VAC O/P:FULL LOAD Ta:25°C | V1: 48.6mVp-p |
| <p>low frequency :</p> | | | | |
| 9 | SET UP TIME | 480VAC/ 500 ms (Max) 347VAC/ 500 ms (Max) 230VAC/ 500 ms (Max) | I/P: 480 VAC I/P: 347 VAC I/P: 230 VAC O/P:FULL LOAD Ta:25°C | 480VAC/ 314 ms 347VAC/ 306 ms 230 VAC/ 334 ms |
| INPUT=347VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage | | | INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage | |

| | | | |
|--|--|---|---|
| | | <p>10 RISE TIME</p> | <p>480VAC/ 80 ms (Max) 347VAC/ 80 ms (Max) 230VAC/ 150 ms (Max)</p> <p>I/P: 480 VAC I/P: 347 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C</p> |
| <p>480VAC/ 27.8 ms 347VAC/ 27.4 ms 230 VAC/ 26.4 ms</p> | <p>INPUT=347VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p> | | <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p> |
| <p>11 HOLD UP TIME</p> | <p>480VAC/ 15ms (Max) 347VAC/ 15 ms (Max)</p> | <p>I/P: 480 VAC I/P: 347 VAC O/P: FULL LOAD Ta: 25°C</p> | <p>480VAC/ 23.2 ms 347VAC/ 22.8ms</p> |
| <p>INPUT=480VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> | <p>INPUT=347VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> | <p>12 DYNAMIC LOAD</p> <p>V1: 3600 mVp-p</p> <p>I/P: 347VAC O/P: (1) FULL /50% LOAD 50%DUTY / 120HZ (2) FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C</p> | |
| <p>FULL /50% LOAD 50%DUTY / 120HZ</p> | <p>310mVp-p 247mVp-p</p> | <p>FULL /50% LOAD 50%DUTY / 1KHZ</p> | |

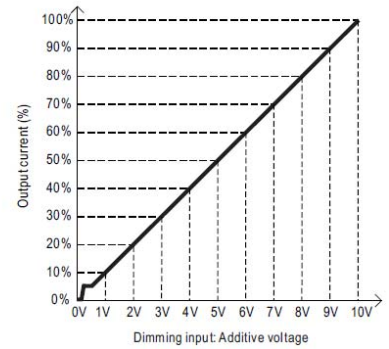
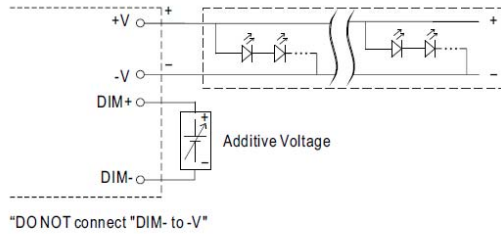


13 DIMMING OPERATION (for B-Type)

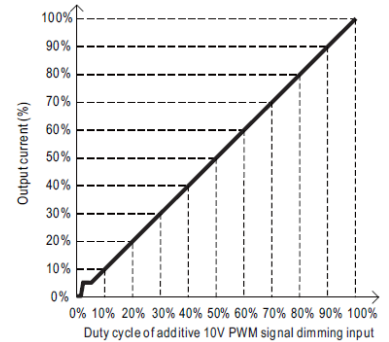
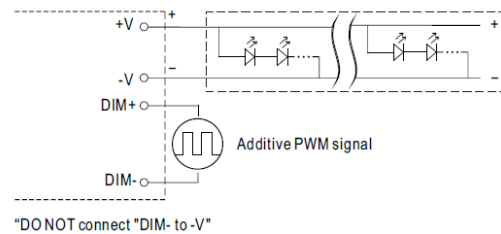
※3 in 1 dimming function

- ※Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.
- ※Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- ※Dimming source current from power supply: 100μA (typ.)

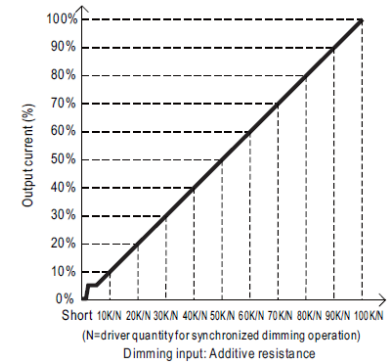
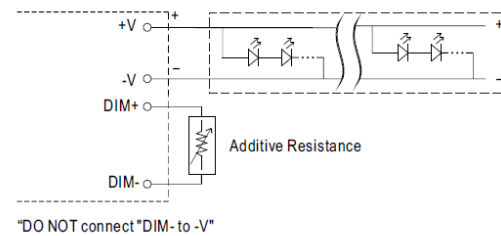
◎ Applying additive 0 ~ 10VDC



◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



◎ Applying additive resistance:



- Note : 1. Min. dimming level is about 5% and the output current is not defined when 0% < I_{out} < 5%.
 2. The output current could drop down to 0% when dimming input is about 0kΩ or 0Vdc, or 10V PWM signal with 0% duty cycle.

I/P : 347VAC
 O/P : DIMMING TEST
 TA : 25°C

| R | SHORT | 10K | 20K | 30K | 40K | 50K | 60K | 70K | 80K | 90K | 100K | OPEN |
|---|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|-------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| O/P CURRENT | 0A | 1.020A | 1.888A | 2.706A | 3.681A | 4.549A | 5.422A | 6.314A | 7.174A | 8.064A | 8.852A | 9.089A |
| % | 0.00% | 11.46% | 21.21% | 30.40% | 41.36% | 51.11% | 60.92% | 70.94% | 80.61% | 90.61% | 99.46% | 102.12% |
| V | 0V | 1V | 2V | 3V | 4V | 5V | 6V | 7V | 8V | 9V | 10V | OPEN |
| O/P CURRENT | 0A | 1.079A | 1.899A | 2.821A | 3.785A | 4.625A | 5.522A | 6.356A | 7.251A | 8.149A | 9.031A | 9.089A |
| % | 0.00% | 12.12% | 21.34% | 31.70% | 42.53% | 51.97% | 62.04% | 71.42% | 81.47% | 91.56% | 101.47% | 102.12% |
| PWM (100HZ) | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | OPEN |
| O/P CURRENT | 0A | 1.093A | 1.985A | 2.879A | 3.804A | 4.678A | 5.566A | 6.443A | 7.318A | 8.194A | 9.062A | 9.089A |
| % | 0.00% | 12.28% | 22.30% | 32.35% | 42.74% | 52.56% | 62.54% | 72.39% | 82.22% | 92.07% | 101.82% | 102.12% |

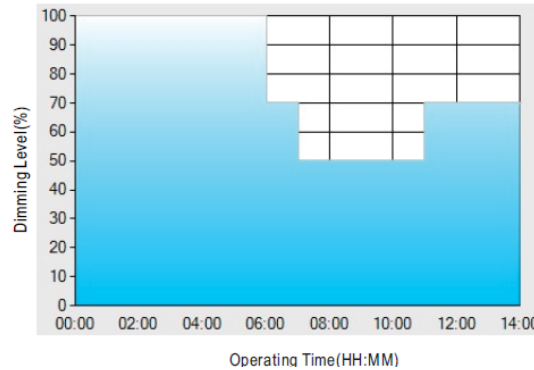
TEST RESULT : OK

14 DIMMING OPERATION (for Dxx-Type by User definition)

※Smart timer dimming function (for Dxx-Type by User definition)

MEAN WELL Smart timer dimming primarily provides the adaptive proportion dimming profile for the output constant current level to perform up to 14 consecutive hours. 3 dimming profiles hereunder are defined accounting for the most frequently seen applications. If other options may be needed, please contact MEAN WELL for details.

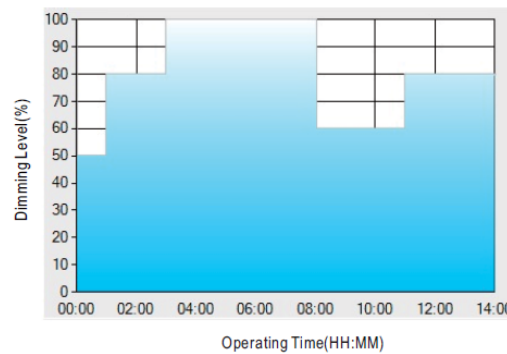
Ex : ☉ D01-Type: the profile recommended for residential lighting



Set up for D01-Type in Smart timer dimming software program:

| | T1 | T2 | T3 | T4 |
|---------|-------|-------|-------|-----|
| TIME** | 06:00 | 07:00 | 11:00 | -- |
| LEVEL** | 100% | 70% | 50% | 70% |

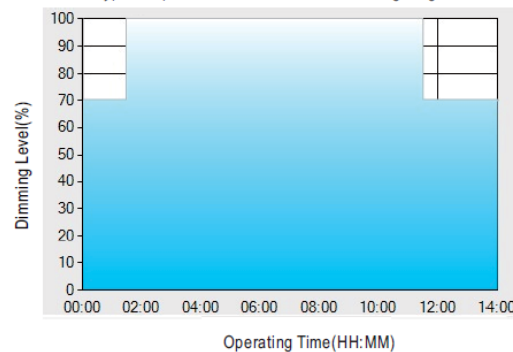
Ex : ☉ D02-Type: the profile recommended for street lighting



Set up for D02-Type in Smart timer dimming software program:

| | T1 | T2 | T3 | T4 | T5 |
|---------|-------|-------|------|-------|-----|
| TIME** | 01:00 | 03:00 | 8:00 | 11:00 | -- |
| LEVEL** | 50% | 80% | 100% | 60% | 80% |

Ex : ☉ D03-Type: the profile recommended for tunnel lighting



Set up for D03-Type in Smart timer dimming software program:

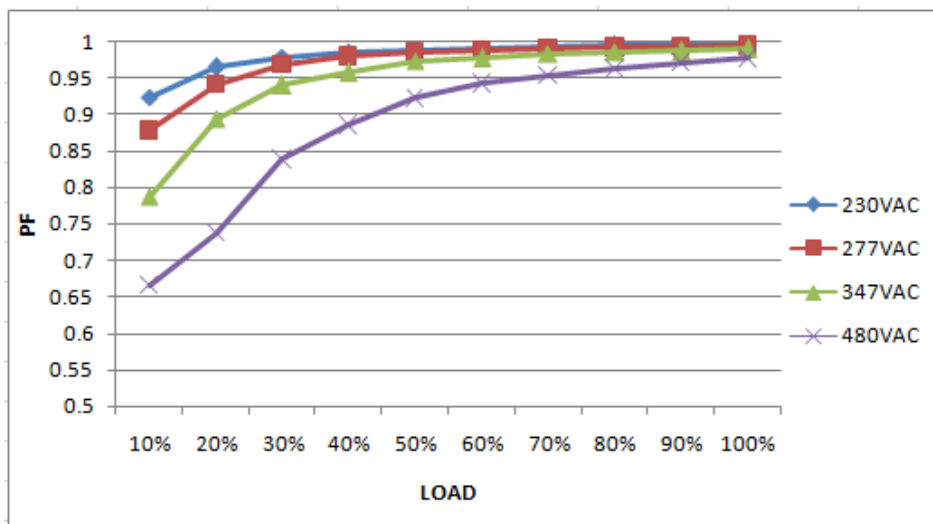
| | T1 | T2 | T3 |
|---------|-------|-------|-----|
| TIME** | 01:30 | 11:00 | -- |
| LEVEL** | 70% | 100% | 70% |

I/P : 347VAC
 O/P : DIMMING TEST
 TA : 25°C
 TEST RESULT : OK

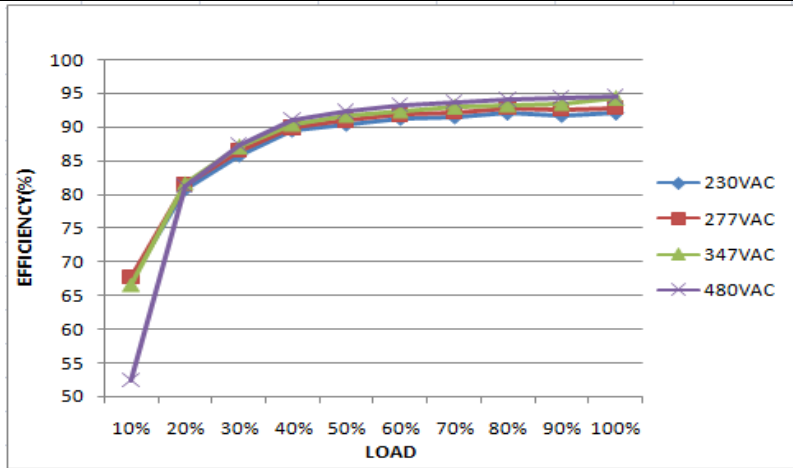
INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------|--|--|---|
| 1 | INPUT VOLTAGE RANGE | 180VAC~528 VAC | I/P:TESTING O/P:FULL LOAD Ta:25°C | 102V~528 V |
| | | | I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE) | TEST:OK |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE | I/P: 180 VAC ~528VAC O/P:FULL-MIN LOAD Ta:25°C | OK |
| 3 | INPUT CURRENT (TYP) | 480VAC/ 0.8 A 347 VAC/ 1.1 A | I/P: 480VAC/347 VAC O/P:FULL LOAD Ta:25°C | I=0.72 A /480VAC I =0.981A/ 347VAC |
| 4 | LEAKAGE CURRENT | < 0.75 mA/ 480VAC | I/P : 480 VAC O/P : Min LOAD Ta : 25°C | L-FG: 0.25 mA N-FG: 0.44 mA L,N -V(+):0.162 mA L,N-V(-): 0.16 mA |
| 5 | POWER FACTOR(TYP) | 0.93/480 VAC FULL LOAD 0.95/347 VAC FULL LOAD 0.98/230 VAC FULL LOAD 0.97/277 VAC FULL LOAD | I/P: 480VAC/347VAC/230VAC/277VAC O/P:FULL LOAD Ta:25°C | PF=0.98/480V/100%LOAD PF=0.9924/347V/100%LOAD PF=0.9948 /230V/100%LOAD PF=0.9933/277V/100%LOAD |

P.F vs LOAD



| | | | | |
|--------------------|------------------|-------|--|--------|
| 6 | EFFICIENCY (TYP) | 93.5% | I/P: 347 VAC O/P:FULL LOAD Ta:25°C | 93.84% |
| EFFICIENCY vs LOAD | | | | |

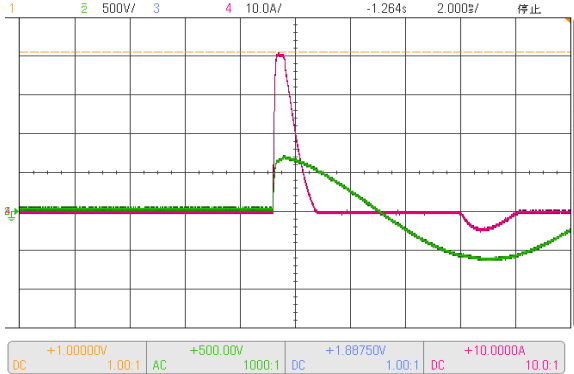


| | | | | |
|---|----------------------|--|---|------------------|
| 7 | INRUSH CURRENT (TYP) | 480 V/ 50 A COLD START | I/P: 480VAC O/P: FULL LOAD Ta: 25°C | I = 41 A/ 480VAC |
| | | (twidth= 850 us measured at 50% Ipeak) COLD START | | T50= 770 us |

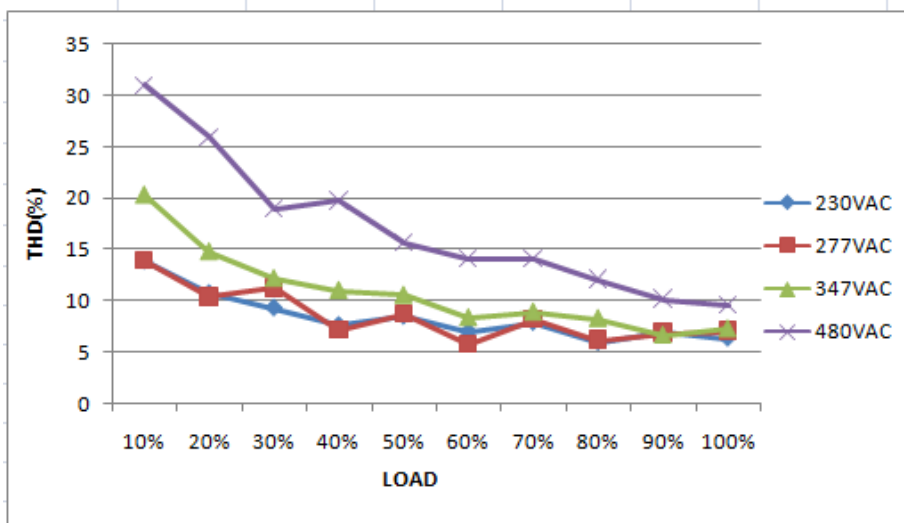
INPUT=480VAC/60HZ @ FULL LOAD

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

DSO-X 3014A, MY62161480 Wed Jul 22 15:48:20 2015



| | | | | |
|---------------------|---------------------------|--|---|---|
| 8 | TOTAL HARMONIC DISTORTION | Total harmonic distortion will be lower than 20% when output loading is 50% or higher at 230V/277V/347V/480V | I/P : 347VAC O/P : 100% LOAD 50% LOAD | THD : 7.8639 % THD : 10.694 % |
| | | | I/P : 230VAC/277VAC/480V O/P : 50% LOAD Ta : 25°C | THD : 7.3488 % THD : 6.4042 % THD : 18.00 % |
| THD&LOAD | | | | |



PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------------|---|---|--|
| 1 | OVER LOAD PROTECTION | 95 %- 108 % PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed | I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P: TESTING Ta:25°C | 102.36%/ 528VAC 102.48%/ 347VAC 102.47%/180VAC PROTECTION TYPE : Constant current limiting, recovers automatically after condition is removed |
| 2 | OVER VOLTAGE PROTECTION | V1: 40 V- 46 V PROTECTION TYPE : Shut down o/p voltage with auto-recovery or re-power on to recovery | I/P: 528VAC I/P: 347VAC I/P: 180VAC O/P: MIN LOAD Ta:25°C | 41.27V/ 528VAC 41.30V/ 347VAC 41.29V/ 180VAC PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover. |
| 3 | OVER TEMPERATURE PROTECTION | PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover | I/P: 528 VAC I/P: 180 VAC O/P: FULL LOAD | O.T.P. Active PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover. |
| 4 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed | I/P: 528VAC I/P: 180 VAC O/P: FULL LOAD Ta:25°C | NO DAMAGE PROTECTION TYPE : Constant current limiting, recovers automatically after condition is removed |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|--|----------------------|---|--|
| 1 | P.F.C Transistor (D to S) or (C to E) Peak Voltage | Q1 Rated 9A/ 950V | I/P: High-Line +3V =531 V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Dynamic Load Full Load/ | VDS: (1) 828V (2) 820V (3) 824V |

| | | | | |
|---|---|--|--|---|
| | | | <p>Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25°C</p> | <p>(4)828V (5)836V (6)824V (7)828V</p> |
| 2 | PWM Transistor (D to S) or (C to E) Peak Voltage | Q901 Rated 9A/ 950V | <p>I/P:High-Line +3V =531V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25°C</p> | <p>VDS: (1)824V (2)824V (3)808V (4)820V (5)828V (6)816V (7)820V</p> |
| 3 | Diode Peak Voltage | Q102 Rated: 80A/100 V | <p>I/P:High-Line +3V =531 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)NO LOAD Ta:25°C</p> | <p>Q102: VDS: (1)90.8V (2)88.4V (3)90.4V (4)92.4V (5)92.4V (6)88V (7)87.6V (8)82V</p> |
| 4 | Input Capacitor Voltage | C5 Rated: 120 μ /450 V | <p>I/P:High-Line +3V =531V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta:25°C</p> | <p>(1)382V (2)406V (3)390V (4)374V</p> |
| 5 | Control IC Voltage Test | PWM IC U901 Rated 8.85V-16V PFC IC U1 Rated: 10 V-20V | <p>I/P:High-Line +3V =531 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25°C</p> | <p>(1) 12.8V (2) 12.6V (3) 12.7V (4) 12.8V</p> |

SAFETY & EMC TEST REPORT

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|----------------------|--|---|---|
| 1 | WITHSTAND VOLTAGE | IEC60950-1 I/P-O/P: 3.75KVAC/min I/P-FG:2 KVAC/min<4.5mA O/P-FG:1.5KVAC/min | I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C | I/P-O/P: 1.78mA I/P-FG: 2.01mA O/P-FG: 1.016mA NO DAMAGE |
| 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 | I/P-O/P: 30.0GΩ I/P-FG: 19.3GΩ O/P-FG: 30.0GΩ NO DAMAGE |
| 3 | GROUNDING CONTINUITY | IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ | 40A / 2min Ta:25°C | mΩ |

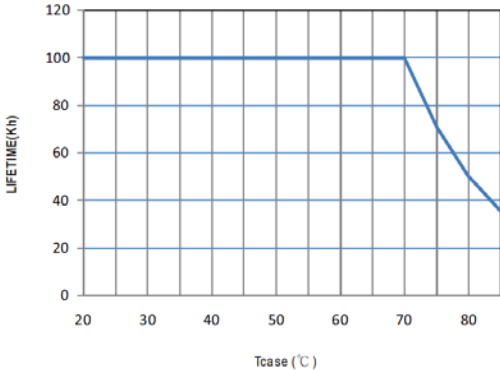
E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|--|--|-------------------------------|
| 1 | CONDUCTION | FCC Part 15 Subpart B | I/P: 440 VAC /60HZ O/P:FULL/30% LOAD Ta:25°C | PASS Test by certified Lab |
| 2 | RADIATION | FCC Part 15 Subpart B | I/P: 480 VAC /60HZ O/P:FULL LOAD Ta:25°C | PASS Test by certified Lab |
| 3 | E.S.D | EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV | I/P: 230VAC/50HZ O/P:FULL LOAD Ta:25°C | CRITERIA A |
| 3 | E.F.T | EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV | I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C | CRITERIA A |
| 5 | SURGE | IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV | I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C | CRITERIA A |
| 6 | Test by certified Lab & Test Report Prepare | | | |

RELIABILITY TEST

ENVIRONMENT TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|---|--|--|---|----|----------|-----------------------------|-----------------------------|---|-----|--------|--------|---|----|--------|--------|---|----|--------|---------|---|------|--------|--------|---|------|--------|--------|---|----|--------|--------|---|----|--------|--------|---|-----|--------|--------|---|------|--------|--------|----|-----|--------|--------|----|----|--------|--------|----|----|--------|--------|----|-----|--------|--------|----|------|--------|--------|----|----|--------|---------|----|----|--------|--------|----|----|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|----|--------|--------|----|------|--------|--------|
| 1 | TEMPERATURE RISE TEST | MODEL : HVG-320-24 1. ROOM AMBIENT BURN-IN : 3 HRS I/P : 347VAC O/P : FULL LOAD Ta= 30.5 °C 2. HIGH AMBIENT BURN-IN : 14 HRS I/P : 347VAC O/P : FULL LOAD Ta= 55.9 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | <table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 30.5 °C</th> <th>HIGH AMBIENT Ta= 55.9 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>67.7°C</td><td>92.5°C</td></tr> <tr><td>2</td><td>Q1</td><td>66.8°C</td><td>92.6°C</td></tr> <tr><td>3</td><td>D1</td><td>77.5°C</td><td>100.2°C</td></tr> <tr><td>4</td><td>Q901</td><td>67.2°C</td><td>93.5°C</td></tr> <tr><td>5</td><td>RTH3</td><td>62.4°C</td><td>88.1°C</td></tr> <tr><td>6</td><td>L2</td><td>64.3°C</td><td>89.4°C</td></tr> <tr><td>7</td><td>C2</td><td>62.6°C</td><td>87.4°C</td></tr> <tr><td>8</td><td>LF1</td><td>63.4°C</td><td>87.7°C</td></tr> <tr><td>9</td><td>ZNR1</td><td>62.2°C</td><td>86.6°C</td></tr> <tr><td>10</td><td>C11</td><td>64.3°C</td><td>89.9°C</td></tr> <tr><td>11</td><td>D2</td><td>65.4°C</td><td>90.9°C</td></tr> <tr><td>12</td><td>C5</td><td>66.9°C</td><td>92.2°C</td></tr> <tr><td>13</td><td>C46</td><td>64.5°C</td><td>90.2°C</td></tr> <tr><td>14</td><td>C902</td><td>66.2°C</td><td>92.0°C</td></tr> <tr><td>15</td><td>T1</td><td>74.7°C</td><td>102.4°C</td></tr> <tr><td>16</td><td>L1</td><td>67.2°C</td><td>93.7°C</td></tr> <tr><td>17</td><td>T2</td><td>67.1°C</td><td>92.8°C</td></tr> <tr><td>18</td><td>C200</td><td>64.9°C</td><td>90.6°C</td></tr> <tr><td>19</td><td>Q102</td><td>63.4°C</td><td>89.4°C</td></tr> <tr><td>20</td><td>C102</td><td>61.3°C</td><td>87.0°C</td></tr> <tr><td>21</td><td>U1</td><td>62.1°C</td><td>87.4°C</td></tr> <tr><td>22</td><td>ZNR5</td><td>65.1°C</td><td>90.5°C</td></tr> </tbody> </table> | NO | Position | ROOM AMBIENT Ta= 30.5 °C | HIGH AMBIENT Ta= 55.9 °C | 1 | BD1 | 67.7°C | 92.5°C | 2 | Q1 | 66.8°C | 92.6°C | 3 | D1 | 77.5°C | 100.2°C | 4 | Q901 | 67.2°C | 93.5°C | 5 | RTH3 | 62.4°C | 88.1°C | 6 | L2 | 64.3°C | 89.4°C | 7 | C2 | 62.6°C | 87.4°C | 8 | LF1 | 63.4°C | 87.7°C | 9 | ZNR1 | 62.2°C | 86.6°C | 10 | C11 | 64.3°C | 89.9°C | 11 | D2 | 65.4°C | 90.9°C | 12 | C5 | 66.9°C | 92.2°C | 13 | C46 | 64.5°C | 90.2°C | 14 | C902 | 66.2°C | 92.0°C | 15 | T1 | 74.7°C | 102.4°C | 16 | L1 | 67.2°C | 93.7°C | 17 | T2 | 67.1°C | 92.8°C | 18 | C200 | 64.9°C | 90.6°C | 19 | Q102 | 63.4°C | 89.4°C | 20 | C102 | 61.3°C | 87.0°C | 21 | U1 | 62.1°C | 87.4°C | 22 | ZNR5 | 65.1°C | 90.5°C |
| NO | Position | ROOM AMBIENT Ta= 30.5 °C | HIGH AMBIENT Ta= 55.9 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | BD1 | 67.7°C | 92.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Q1 | 66.8°C | 92.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | D1 | 77.5°C | 100.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Q901 | 67.2°C | 93.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | RTH3 | 62.4°C | 88.1°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | L2 | 64.3°C | 89.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | C2 | 62.6°C | 87.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | LF1 | 63.4°C | 87.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | ZNR1 | 62.2°C | 86.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | C11 | 64.3°C | 89.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | D2 | 65.4°C | 90.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | C5 | 66.9°C | 92.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | C46 | 64.5°C | 90.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | C902 | 66.2°C | 92.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | T1 | 74.7°C | 102.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | L1 | 67.2°C | 93.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | T2 | 67.1°C | 92.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | C200 | 64.9°C | 90.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | Q102 | 63.4°C | 89.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | C102 | 61.3°C | 87.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | U1 | 62.1°C | 87.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | ZNR5 | 65.1°C | 90.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P : 528VAC/180VAC O/P : 100 % LOAD Ta= -45 °C | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE | I/P : 538 VAC O/P : FULL LOAD Ta= 60°C HUMIDITY= 95%R.H | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | TEMPERATURE COEFFICIENT | ± 0.03 %/°C (0-60°C) | I/P : 347 VAC O/P : FULL LOAD | ± 0.005 %/°C (0-60°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|----|-----------------------------|---|--|
| 6 | THERMAL SHOCK TEST | 1. Thermal shock Temperature : $-45^{\circ}\text{C} \sim +65^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 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 | OK |
| 7 | VIBRATION TEST | 1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 5G (5) Test Time : 72min in each axis (X.Y.Z) (6) Ta : 25°C | TEST : OK |
| 8 | CAPACITOR LIFE CYCLE | SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 347VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (2) I/P : 347VAC O/P : FULL LOAD Ta= 60°C LIFE TIME (3) I/P : 347VAC O/P : 75% LOAD Ta= 60°C LIFE TIME (4) I/P : 347VAC O/P : 50% LOAD Ta= 60°C LIFE TIME | (1) 594908HRS (2) 55587HRS (3) 81296HRS (4) 103622HRS |
| 9 | MTBF | Conducted by Parts Stress Analysis Prediction 124.3K hrs min. MIL-HDBK-217F (25°C) | |
| 10 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 80°C  | |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|------------|------------|--------------|
| PASS | DANIEL GAO | SANFORD SU | VINCENT ZENG |

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