



Test Report: HBG-240-60

240W Constant Voltage + Constant Current LED Driver

■ 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

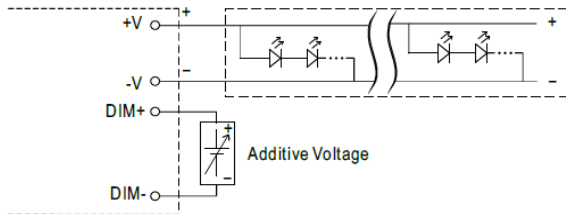
OUTPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|---------------------------------|---|--------------------------------------|
| 1 | CONSTANT CURRENT REGION | 36 V~ 60 V | I/P: 230VAC O/P: LED MODE Ta: 25°C | 36V~ 60 V |
| 2 | OUTPUT CURRENT ADJUST RANGE (For A-Type) | 2.4A~4A | I/P: 230VAC O/P: SETING Ta: 25°C | 1.515A~4.033A |
| 3 | OUTPUT VOLTAGE TOLERANCE | -2%~+2% | I/P: 90VAC / 305VAC O/P: FULL/ NO LOAD Ta: 25°C | -0.051%~ 0.520% |
| 4 | LINE REGULATION | -0.5%~+0.5% | I/P: 90VAC ~ 305VAC O/P: 80% ~ FULL LOAD Ta: 25°C | -0%~ 0 % |
| 5 | LOAD REGULATION | -0.5%~+0.5% | I/P: 230VAC O/P: FULL/ NO LOAD Ta: 25°C | -0.051%~ 0.042% |
| 6 | OVER/UNDERSHOOT TEST | <±5 % | I/P: 230VAC O/P: FULL LOAD Ta: 25°C | <5 % |
| 7 | RIPPLE & NOISE (Max) | 350mVp-p | I/P: 230VAC O/P: FULL LOAD Ta: 25°C | 150 mVp-p |
| 8 | SET UP TIME(Max) | 230VAC/ 500ms 115VAC/ 2500ms | I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C | 230VAC/ 444 ms 115VAC/ 1477 ms |
| 9 | RISE TIME (Max) | 230VAC/ 120ms 115VAC/ 120ms | I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C | 230VAC/ 38.9 ms 115VAC/ 39.44 ms |
| 10 | HOLD UP TIME(Typ) | 230VAC/ 15ms 115VAC/ 15ms | I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C | 230VAC/ 33.00 ms 115VAC/ 32.98 ms |
| 11 | DYNAMIC LOAD | V1: 6000 mVp-p | I/P: 230VAC O/P: (1) FULL/50% LOAD 50%DUTY / 120HZ (2) FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C | (1) 3760mVp-p (2) 368mVp-p |

12 DIMMING OPERATION (for B-Type)

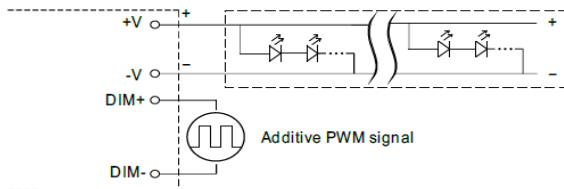
- Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-:
 - 1 ~ 10VDC, or 10V PWM signal or resistance.
- Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- Dimming source current from power supply: 100 μ A (typ.)

⊙ Applying additive 1 ~ 10VDC



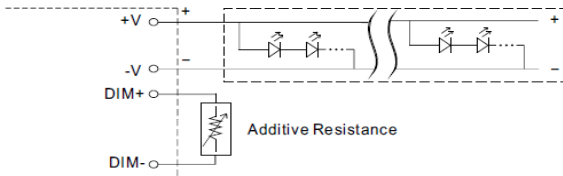
"DO NOT connect "DIM- to -V"

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



"DO NOT connect "DIM- to -V"

⊙ Applying additive resistance:



"DO NOT connect "DIM- to -V"

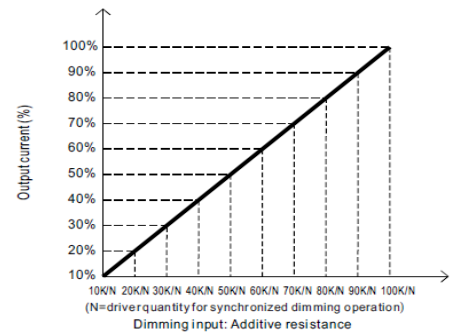
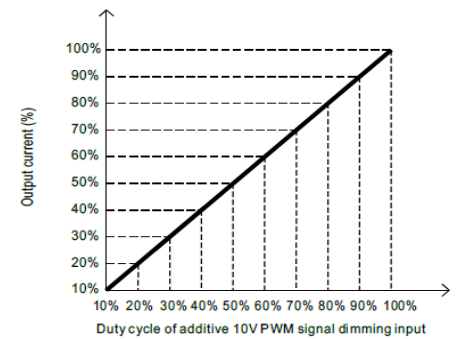
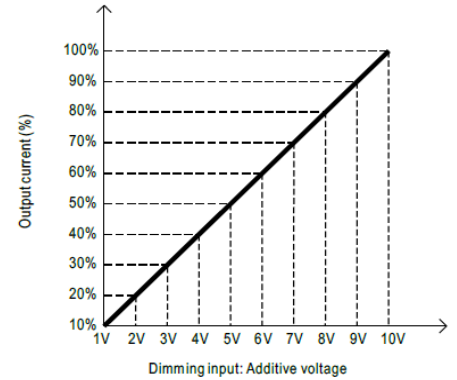
I/P: 230 VAC

O/P: DIMMING TEST

Ta: 25°C

| | DIMMING | Short | 1V | 2V | 3V | 4V | 5V | 6V | 7V | 8V | 9V | 10V |
|--------|----------------|--------|--------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1 | Output Current | 0 | 0.243A | 0.676A | 1.109A | 1.524A | 1.929A | 2.347A | 2.803A |
| | % | 0% | 6.08% | 16.90% | 27.73% | 38.10% | 48.23% | 58.68% | 70.08% | 80.98% | 91.80% | 101.0% |
| 0.493A | 1.001A | 1.506A | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| | Output Current | 0 | 0.278A | 0.700A | 1.126A | 1.532A | 1.941A | 2.358A | 2.777A | 3.202A | 3.622A | 4.010A |
| | % | 0% | 6.95% | 17.5% | 28.15% | 38.30% | 48.53% | 58.95% | 69.43% | 80.05% | 90.55% | 100.3% |
| 3 | R | 0% | 10K | 20K | 30K | 40K | 50K | 60K | 70K | 80K | 90K | 100K |
| | Output Current | 0 | 0.266A | 0.717A | 1.164A | 1.595A | 2.028A | 2.458A | 2.895A | 3.328A | 3.755A | 4.015A |
| | % | 0% | 6.65% | 17.93% | 29.10% | 39.88% | 50.70% | 61.45% | 72.38% | 83.20% | 93.88% | 100.4% |

TEST RESULT: OK



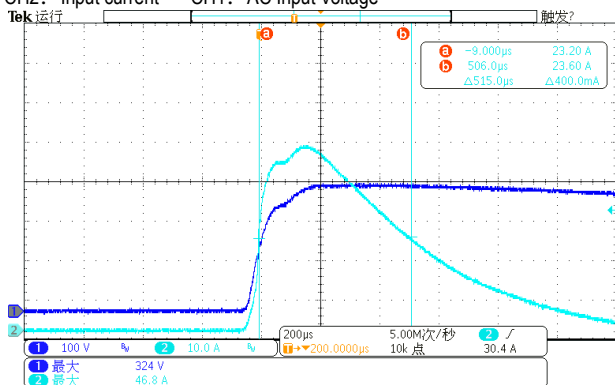
| | | |
|----|---|--|
| 13 | DALI DIMMING OPERATION (primary side; for DA-Type) | <p>※DALI Interface ·Apply DALI signal between DA+ and DA-. ·DALI protocol comprises 16 groups and 64 addresses. ·First step is fixed at 8% of output.</p> <p>I/P: 230 VAC O/P: DIMMING TEST Ta: 25°C TEST RESULT: OK</p> |
|----|---|--|

INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------|---|---|--|
| 1 | INPUT VOLTAGE RANGE | 90VAC~305VAC | I/P: TESTING O/P: 80% ~FULL LOAD Ta: 25°C | 87 V~ 305 V |
| | | | (1)I/P: LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P: 80% ~FULL LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230VAC ON: 0.5 Sec OFF: 0.5 Sec 20MIN (POWER ON/OFF NO DAMAGE) | TEST: OK |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE | I/P: 90 VAC ~305 VAC O/P: FULL ~NO LOAD Ta: 25°C | TEST: OK |
| 3 | AC CURRENT | 2.5A/115VAC 1.3A/230VAC 1.2A/277VAC | I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C | I = 2.31 A/ 115VAC I = 1.14 A/ 230VAC I = 0.96 A/ 277VAC |
| 4 | LEAKAGE CURRENT | < 0.75mA / 277VAC | I/P: 277 VAC O/P: NO LOAD Ta: 25°C | L-FG: 0.395 mA N-FG: 0.390 mA |
| 5 | INRUSH CURRENT(Typ) | 230V/ 75A Twidth =680us measured at 50% Ipeak COLD START | I/P: 230 VAC O/P: FULL LOAD Ta: 25°C | I = 46.8 A/ 230VAC Twidth =515 us |

INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage





| 6 | EFFICIENCY(Typ) | 93.5% | I/P: 230VAC O/P: FULL LOAD Ta: 25°C | 93.89% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---------------------------|--|---|--|----------|----------|----------|----------|------|------|------|------|-------|------|------|-------|-----|------|------|------|------|-------|------|------|-------|------|------|------|-----|------|------|------|-----|------|------|------|-----|------|------|------|-----|------|------|------|------|------|------|------|
| <p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>277V (%)</th> <th>230V (%)</th> <th>115V (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>84.5</td><td>84.0</td><td>79.5</td></tr> <tr><td>20%</td><td>86.0</td><td>85.5</td><td>80.5</td></tr> <tr><td>30%</td><td>88.0</td><td>87.0</td><td>83.0</td></tr> <tr><td>40%</td><td>89.5</td><td>88.5</td><td>85.0</td></tr> <tr><td>50%</td><td>90.5</td><td>89.5</td><td>86.5</td></tr> <tr><td>60%</td><td>91.5</td><td>90.5</td><td>87.5</td></tr> <tr><td>70%</td><td>92.0</td><td>91.0</td><td>88.0</td></tr> <tr><td>80%</td><td>92.5</td><td>91.5</td><td>88.5</td></tr> <tr><td>90%</td><td>93.0</td><td>92.0</td><td>89.0</td></tr> <tr><td>100%</td><td>93.5</td><td>92.5</td><td>89.5</td></tr> </tbody> </table> | | | | | LOAD (%) | 277V (%) | 230V (%) | 115V (%) | 10% | 84.5 | 84.0 | 79.5 | 20% | 86.0 | 85.5 | 80.5 | 30% | 88.0 | 87.0 | 83.0 | 40% | 89.5 | 88.5 | 85.0 | 50% | 90.5 | 89.5 | 86.5 | 60% | 91.5 | 90.5 | 87.5 | 70% | 92.0 | 91.0 | 88.0 | 80% | 92.5 | 91.5 | 88.5 | 90% | 93.0 | 92.0 | 89.0 | 100% | 93.5 | 92.5 | 89.5 |
| LOAD (%) | 277V (%) | 230V (%) | 115V (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10% | 84.5 | 84.0 | 79.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20% | 86.0 | 85.5 | 80.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30% | 88.0 | 87.0 | 83.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40% | 89.5 | 88.5 | 85.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50% | 90.5 | 89.5 | 86.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60% | 91.5 | 90.5 | 87.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70% | 92.0 | 91.0 | 88.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80% | 92.5 | 91.5 | 88.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90% | 93.0 | 92.0 | 89.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100% | 93.5 | 92.5 | 89.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | POWER FACTOR | 0.98/ 115VAC 0.95/ 230VAC 0.93/ 277VAC | I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C | PF= 0.996 / 115VAC PF= 0.977 / 230VAC PF= 0.947 / 277VAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>P.F vs LOAD</p> <table border="1"> <caption>P.F vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>277V</th> <th>230V</th> </tr> </thead> <tbody> <tr><td>50%</td><td>0.86</td><td>0.94</td></tr> <tr><td>60%</td><td>0.89</td><td>0.955</td></tr> <tr><td>70%</td><td>0.91</td><td>0.965</td></tr> <tr><td>80%</td><td>0.92</td><td>0.97</td></tr> <tr><td>90%</td><td>0.93</td><td>0.975</td></tr> <tr><td>100%</td><td>0.94</td><td>0.978</td></tr> </tbody> </table> | | | | | LOAD (%) | 277V | 230V | 50% | 0.86 | 0.94 | 60% | 0.89 | 0.955 | 70% | 0.91 | 0.965 | 80% | 0.92 | 0.97 | 90% | 0.93 | 0.975 | 100% | 0.94 | 0.978 | | | | | | | | | | | | | | | | | | | | | | | |
| LOAD (%) | 277V | 230V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50% | 0.86 | 0.94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60% | 0.89 | 0.955 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70% | 0.91 | 0.965 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80% | 0.92 | 0.97 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90% | 0.93 | 0.975 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100% | 0.94 | 0.978 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | TOTAL HARMONIC DISTORTION | THD < 20% (@load ≥ 60% / 115VAC, 230VAC; @load ≥ 80% / 277VAC) | I/P: 115 VAC / 60% LOAD I/P: 230 VAC / 60% LOAD I/P: 277 VAC / 80% LOAD Ta: 25°C | THD=5.92% @60% load / 115VAC THD=10.78% @60% load / 230VAC THD=11.06% @80% load / 277VAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>THD vs LOAD</p> <table border="1"> <caption>THD vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>277V (%)</th> <th>230V (%)</th> </tr> </thead> <tbody> <tr><td>50%</td><td>20</td><td>16</td></tr> <tr><td>60%</td><td>16</td><td>14</td></tr> <tr><td>70%</td><td>14</td><td>13</td></tr> <tr><td>80%</td><td>14</td><td>12</td></tr> <tr><td>90%</td><td>12</td><td>11.5</td></tr> <tr><td>100%</td><td>11</td><td>11</td></tr> </tbody> </table> | | | | | LOAD (%) | 277V (%) | 230V (%) | 50% | 20 | 16 | 60% | 16 | 14 | 70% | 14 | 13 | 80% | 14 | 12 | 90% | 12 | 11.5 | 100% | 11 | 11 | | | | | | | | | | | | | | | | | | | | | | | |
| LOAD (%) | 277V (%) | 230V (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50% | 20 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60% | 16 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70% | 14 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80% | 14 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90% | 12 | 11.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100% | 11 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------------|---|--|---|
| 1 | OVER CURRENT PROTECTION | 95%~108% | I/P: 90VAC I/P: 230VAC I/P: 305VAC O/P: TESTING Ta: 25°C | 100.78 %/ 90VAC 100.88 %/ 230VAC 100.67 %/ 305VAC Constant Current Limiting, recovers automatically after fault condition is removed |
| 2 | OVER VOLTAGE PROTECTION | 62V~85V | I/P: 90VAC I/P: 230VAC I/P: 305VAC O/P: NO LOAD Ta: 25°C | 66.6 V/ 90VAC 66.6 V/ 230VAC 66.6 V/ 305VAC Shut down and latch off o/p voltage ,re-power on to removed |
| 3 | OVER TEMPERATURE PROTECTION | NO DAMAGE | I/P: 230VAC O/P: FULL LOAD | O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down |
| 4 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P: 305VAC O/P: FULL LOAD Ta: 25°C | NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|----------------------|---------------------------|---|--|
| 1 | PWM Power Transistor | Q3 Rated 600V/20A | I/P: High-Line +3V =308V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C | (1) 462 V (2) 460 V (3) 452 V |
| 2 | O/P Diode (MOSFET) | Q101 Rated 200 V/ 30 A | I/P: High-Line +3V =308V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C | (1)142 V (2)19.3 V (3)136 V |
| 3 | Input Capacitor | C5 Rated 150u/450V | I/P: High-Line +3V =308 V O/P: (1) FULL LOAD input on/off (2) NO LOAD input on /Off (3) FULL LOAD /NO LOAD Change Ta: 25°C | (1) 446 V (2) 444 V (3) 444 V |
| 4 | Control IC | U70 Rated 16V (MAX.) | I/P: High-Line +3V =308 V O/P: (1) FULL LOAD (2) NO LOAD input on /Off (3) FULL LOAD /NO LOAD Change Ta: 25°C | (1) 14.9 V (2) 14.9 V (3) 14.9 V |
| 5 | PFC Power Transistor | Q 1 Rated 600V/20.2A | I/P: High-Line +3V =308V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C | (1) 556 V (2) 500 V (3) 502 V |

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|----------------------|---|--|--|
| 1 | WITHSTAND VOLTAGE | I/P-O/P: 3.75KVAC/min I/P-FG: 2.0KVAC/min O/P-FG: 0.5KVAC/min | I/P-O/P: 4.125KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG: 0.6 KVAC/min Ta: 25°C | I/P-O/P: 3.081 mA I/P-FG: 3.372 mA O/P-FG: 1.856 mA 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: >9999 MΩ I/P-FG: >9999 MΩ O/P-FG: >9999 MΩ |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 50 mΩ EN 60950-1 | 40 A / 2min Ta: 25°C /70% RH | 17MΩ |

E.M.C TEST

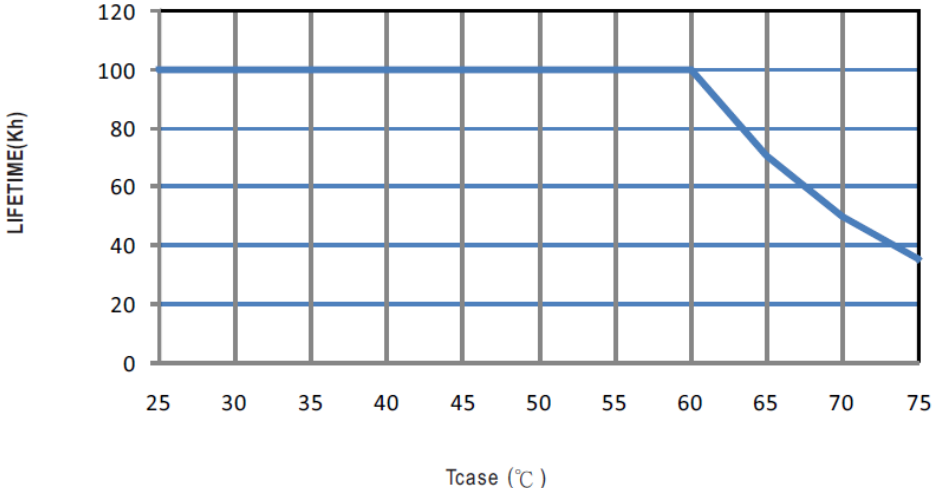
| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|---|--|-------------------------------|
| 1 | HARMONIC | EN61000-3-2 Class C | I/P: 230VAC/50HZ O/P: FULL/75% LOAD Ta: 25°C | PASS |
| 2 | CONDUCTION | EN55015 | I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C | PASS Test by certified Lab |
| 3 | RADIATION | EN55015 | I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C | PASS Test by certified Lab |
| 4 | E.S.D | EN61000-4-2 LIGHT INDUSTRY AIR: 8KV Contact: 4KV | I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C | PASS |
| 5 | E.F.T | EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV | I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C | PASS |
| 6 | SURGE | EN61000-4-5 INDUSTRY L-N: 2KV L,N-PE: 4KV | I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C | PASS |
| 7 | Test by certified Lab & Test Report Prepare | | | |

RELIABILITY TEST

ENVIRONMENT TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|---|--|---|---|----|----------|-------------------------|-------------------------|---|------|--------|--------|---|-----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|-----|--------|--------|---|----|--------|--------|----|----|--------|--------|----|----|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|----|--------|--------|
| 1 | TEMPERATURE RISE TEST | MODEL: HBG-240-60 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: 95% LOAD Ta=24.6 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: 95% LOAD Ta=58.3 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | <table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=24.6 °C</th> <th>HIGH AMBIENT Ta=58.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>RTH1</td><td>68.5°C</td><td>93.7°C</td></tr> <tr><td>2</td><td>BD1</td><td>54.9°C</td><td>86.6°C</td></tr> <tr><td>3</td><td>C5</td><td>52.0°C</td><td>83.3°C</td></tr> <tr><td>4</td><td>L1</td><td>51.5°C</td><td>82.8°C</td></tr> <tr><td>5</td><td>Q1</td><td>53.0°C</td><td>85.2°C</td></tr> <tr><td>6</td><td>D2</td><td>53.3°C</td><td>85.5°C</td></tr> <tr><td>7</td><td>U1</td><td>49.3°C</td><td>81.1°C</td></tr> <tr><td>8</td><td>C39</td><td>47.6°C</td><td>79.9°C</td></tr> <tr><td>9</td><td>Q3</td><td>53.3°C</td><td>85.7°C</td></tr> <tr><td>10</td><td>Q4</td><td>49.3°C</td><td>84.4°C</td></tr> <tr><td>11</td><td>T1</td><td>60.0°C</td><td>92.3°C</td></tr> <tr><td>12</td><td>Q101</td><td>56.8°C</td><td>88.9°C</td></tr> <tr><td>13</td><td>C103</td><td>51.1°C</td><td>82.8°C</td></tr> <tr><td>14</td><td>TSW1</td><td>49.5°C</td><td>81.5°C</td></tr> <tr><td>15</td><td>TC</td><td>41.7°C</td><td>73.2°C</td></tr> </tbody> </table> | NO | Position | ROOM AMBIENT Ta=24.6 °C | HIGH AMBIENT Ta=58.3 °C | 1 | RTH1 | 68.5°C | 93.7°C | 2 | BD1 | 54.9°C | 86.6°C | 3 | C5 | 52.0°C | 83.3°C | 4 | L1 | 51.5°C | 82.8°C | 5 | Q1 | 53.0°C | 85.2°C | 6 | D2 | 53.3°C | 85.5°C | 7 | U1 | 49.3°C | 81.1°C | 8 | C39 | 47.6°C | 79.9°C | 9 | Q3 | 53.3°C | 85.7°C | 10 | Q4 | 49.3°C | 84.4°C | 11 | T1 | 60.0°C | 92.3°C | 12 | Q101 | 56.8°C | 88.9°C | 13 | C103 | 51.1°C | 82.8°C | 14 | TSW1 | 49.5°C | 81.5°C | 15 | TC | 41.7°C | 73.2°C |
| NO | Position | ROOM AMBIENT Ta=24.6 °C | HIGH AMBIENT Ta=58.3 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | RTH1 | 68.5°C | 93.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | BD1 | 54.9°C | 86.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | C5 | 52.0°C | 83.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | L1 | 51.5°C | 82.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Q1 | 53.0°C | 85.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | D2 | 53.3°C | 85.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | U1 | 49.3°C | 81.1°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | C39 | 47.6°C | 79.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Q3 | 53.3°C | 85.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Q4 | 49.3°C | 84.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | T1 | 60.0°C | 92.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Q101 | 56.8°C | 88.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | C103 | 51.1°C | 82.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | TSW1 | 49.5°C | 81.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | TC | 41.7°C | 73.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P: 305VAC/100VAC O/P: FULL 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: 305VAC O/P: FULL LOAD Ta=60°C HUMIDITY= 95 %R.H | TEST: OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | TEMPERATURE COEFFICIENT | ±0.03 %/°C (0~50°C) | I/P: 230 VAC O/P: FULL LOAD | ±0.004 %/°C (0~50°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | THERMAL SHOCK TEST | 1. Thermal shock Temperature: -45°C~ +65°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/95% LOAD AC ON/OFF TEST AC on 3 sec/AC off 1 sec TEST | | TEST: 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: 180min in each axis (X.Y.Z) (6) Ta: 25°C | TEST: OK | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|-----------------------------|--|--|------------|---------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|----|----|----|----|----|
| 8 | CAPACITOR LIFE CYCLE | HBG-240-60: SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P: 230VAC O/P: FULL LOAD Ta= 25 °C LIFE TIME (2) I/P: 230VAC O/P: FULL LOAD Ta= 60 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 60 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 60 °C LIFE TIME | (1) 603284 HRS (2) 61230 HRS (3) 89809 HRS (4) 109222 HRS | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | MTBF | Conducted by Parts Stress Analysis Prediction 1792.9K hrs min. Telcordia SR-332 (Bellcore) ; 172.4K hrs min. MIL-HDBK-217F (25°C) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 70°C  <table border="1" data-bbox="496 920 1433 1413"> <caption>Approximate data points from the Lifetime vs Tcase graph</caption> <thead> <tr> <th>Tcase (°C)</th> <th>Lifetime (Kh)</th> </tr> </thead> <tbody> <tr><td>25</td><td>100</td></tr> <tr><td>30</td><td>100</td></tr> <tr><td>35</td><td>100</td></tr> <tr><td>40</td><td>100</td></tr> <tr><td>45</td><td>100</td></tr> <tr><td>50</td><td>100</td></tr> <tr><td>55</td><td>100</td></tr> <tr><td>60</td><td>100</td></tr> <tr><td>65</td><td>70</td></tr> <tr><td>70</td><td>45</td></tr> <tr><td>75</td><td>35</td></tr> </tbody> </table> | | Tcase (°C) | Lifetime (Kh) | 25 | 100 | 30 | 100 | 35 | 100 | 40 | 100 | 45 | 100 | 50 | 100 | 55 | 100 | 60 | 100 | 65 | 70 | 70 | 45 | 75 | 35 |
| Tcase (°C) | Lifetime (Kh) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 45 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 65 | 70 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 75 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|---------------|--------|----------|
| PASS | SHENJW/ZHUOKB | SKY | LIUWY |