



Test Report: HBGC-300-M

300W Constant Power MODE 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

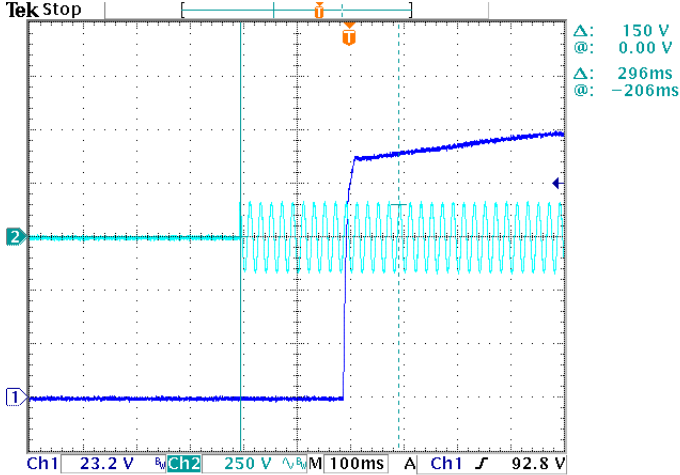
■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 100 VAC / 305 VAC O/P: FULL/ MIN LOAD Ta: 25°C	<±5%
2	CONSTANT CURRENT REGION	58 V~ 116 V	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	46 V~ 116 V
3	OPEN CIRCUIT VOLTAGE (max.)	120 V	I/P: 230 VAC O/P: NO LOAD	118V
4	CURRENT RIPPLE	5.0% max. @rated current	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	4.3%
5	CURRENT ADJ. RANGE	1.3A ~4.43A	I/P: 230 VAC O/P: TESTING Ta: 25°C	0.65 A ~ 5.2A
6	CONSTANT POWER	O/P: 301.6W	I/P: 230 VAC O/P: Vo×Io	TEST: OK
7	SET UP TIME(Max)	500ms/115VAC 500ms/230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	296 ms/115 VAC 304 ms/230 VAC

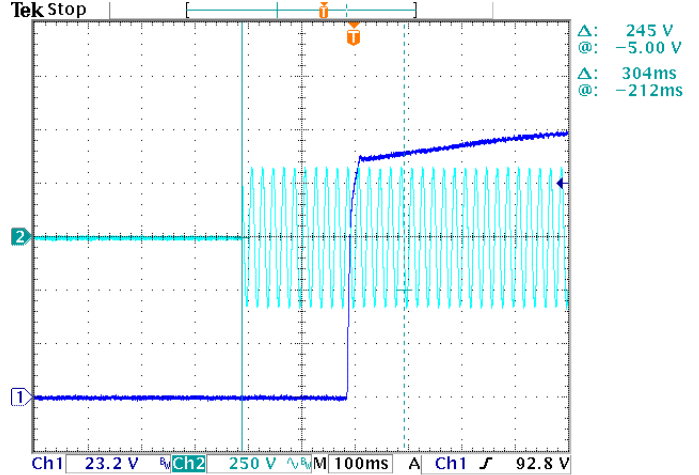
INPUT=115VAC/50HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage



INPUT=230 VAC/50HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage

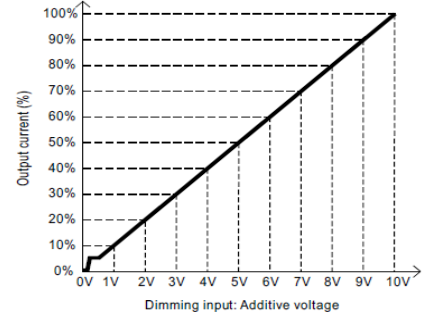
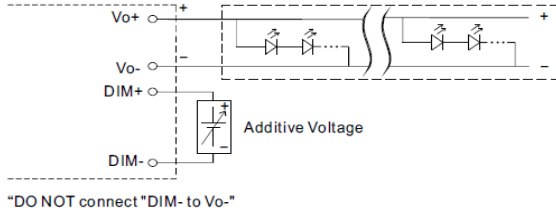


8 DIMMING OPERATION (for AB-Type)

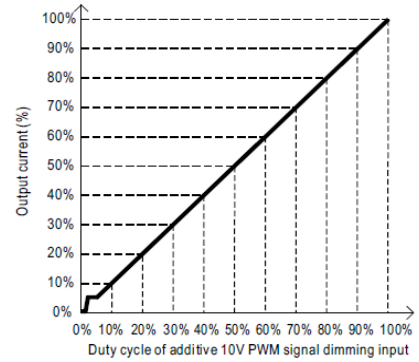
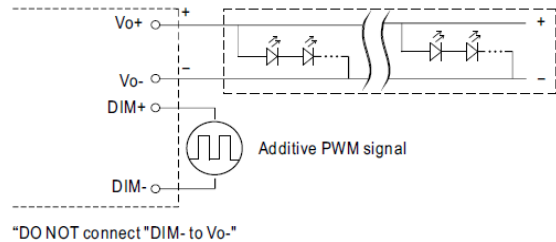
※ 3 in 1 dimming function(for B-Type)

- 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: 100 μ A (typ.)

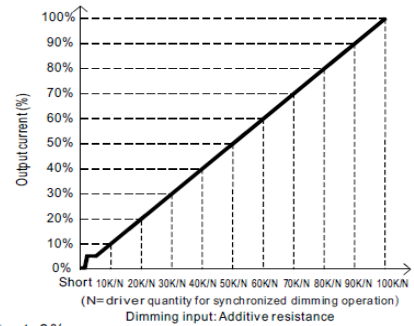
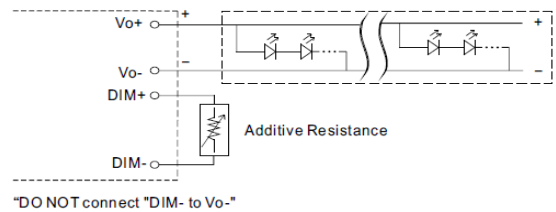
◎ Applying additive 0 ~ 10VDC



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



◎ Applying additive resistance:



Note : 1. Min. dimming level is about 8% and the output current is not defined when 0% < Iout < 8%.
 2. The output current could drop down to 0% when dimming input is about 0k Ω or 0Vdc, or 10V PWM signal with 0% duty cycle.

I/P: 230 VAC

O/P: DIMMING TEST

Ta: 25 $^{\circ}$ C

1	DIMMING	Short	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	0.4783	0.8704	1.2654	1.7275	2.1248	2.5917	2.9939	3.4330	3.8740	4.2900	4.3013
%	0%	11.05%	20.10%	29.22%	39.90%	49.07%	59.85%	69.14%	79.28%	89.47%	99.08%	99.34%	
2	PWM	0V	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.4764	0.8700	1.3300	1.7278	2.1263	2.5940	2.9970	3.4277	3.8600	4.3000	4.3100
%	0%	11.00%	20.09%	30.72%	39.90%	49.11%	59.91%	69.21%	79.16%	89.15%	99.31%	99.54%	
3	R	0%	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0	0.4757	0.8700	1.3300	1.7262	2.1240	2.5914	2.9940	3.4320	3.8750	4.2980	4.3023
%	0%	10.99%	20.09%	30.72%	39.87%	49.05%	59.85%	69.15%	79.26%	89.49%	99.26%	99.36%	

TEST RESULT: OK

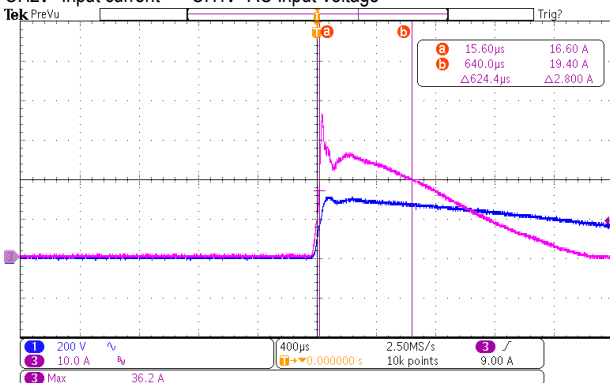
TEST RESULT: OK

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P: TESTING O/P: FULL LOAD (PLEASE CHECK DERATING CURVE) Ta: 25°C	87V~305 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+10V=315 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: 90 VAC ~305 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	115VAC/ 3.0 A 230 VAC/ 1.6 A 277 VAC/ 1.3 A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	I =2.806A/ 115VAC I = 1.392A/ 230VAC I = 1.081A/277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.324mA N-FG: 0.329mA
5	NO LOAD/STANDBY POWER CONSUMPTION	<0.5W for A/B/DA-Type	I/P: 230VAC O/P: NO LOAD/STANDBY Ta: 25°C	0.3417W
6	INRUSH CURRENT(Typ)	230 V/ 45A COLD START (twidth=1300us measured at 50% Ipeak) COLD START at 230V	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I=36.2A/ 230VAC Twidth = 624us

INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



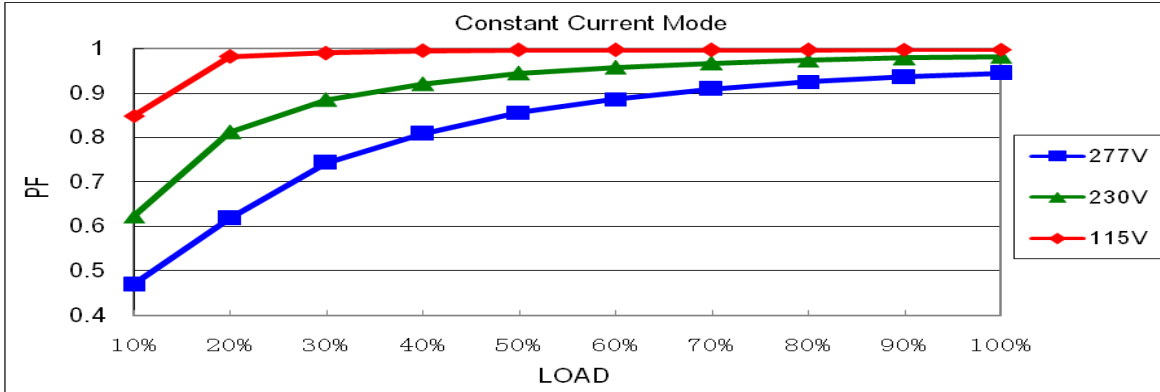


300W Constant Power Mode LED Driver

HBGC-300 series

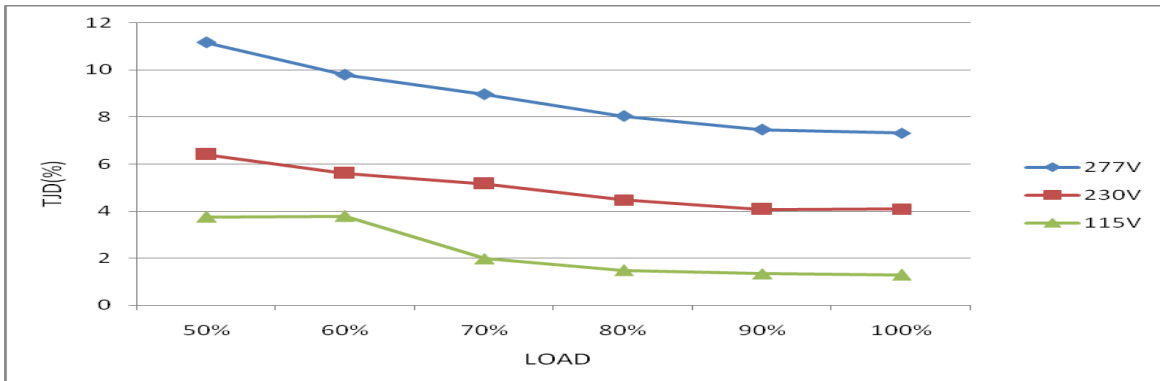
7	POWER FACTOR	0.97/ 115VAC@ FULL LOAD 0.95/ 230VAC@ FULL LOAD 0.92/ 277VAC@ FULL LOAD	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	PF=0.999 @ FULL LOAD /115VAC PF=0.987 @ FULL LOAD /230VAC PF=0.951@ FULL LOAD /277VAC
---	--------------	---	--	---

PF vs LOAD



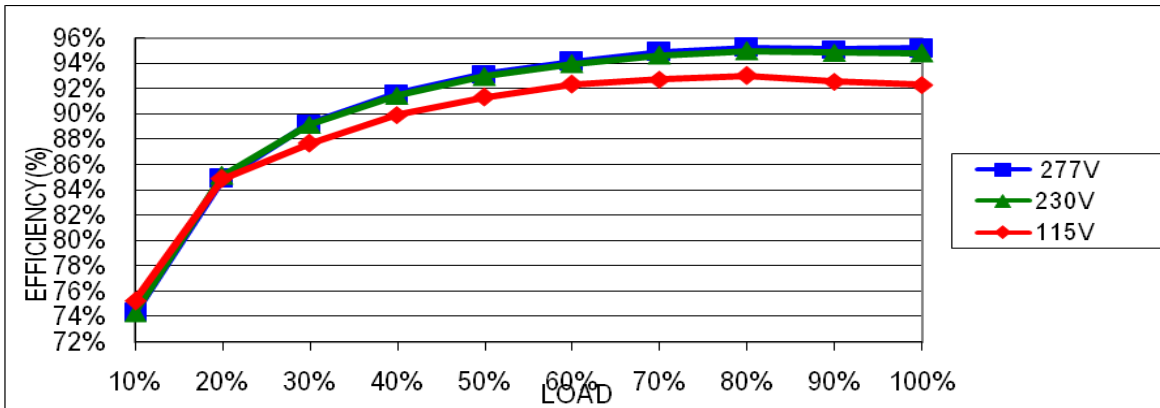
8	TOTAL HARMONIC DISTORTION	THD < 10% (@load ≥ 50%/115VAC; @load ≥ 50%/230VAC; @load ≥ 75%/277VAC)	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 50% /75% LOAD Ta: 25°C	THD=3.75% @50% load /115VAC THD=6.41% @50% load /230VAC THD=8.42% @75% load /277VAC
---	---------------------------	---	--	---

THD vs LOAD



9	EFFICIENCY(Typ)	93.5%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	94.97%
---	-----------------	-------	---	--------

EFFICIENCY vs LOAD



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	121V~145V	I/P: 100VAC I/P: 230VAC I/P: 305VAC O/P: NO LOAD	127.47V/ 100VAC 127.33V/ 230VAC 127.30V/ 305VAC Shut down o/p voltage, re-power on to recovery
2	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 100VAC I/P: 230VAC I/P: 305VAC O/P: FULL LOAD	O.T.P. Active T _{case} >85°C±5°C, derate power automatically by 6%/°C max
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 100VAC I/P: 230VAC I/P: 305VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE constant current limiting ,recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q5 Rated 23.9A/600V	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 450V (2) 522V (3) 454V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 23.9A/600V	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 474V (2) 442V (3) 474V
3	P.F.C DIODE	D1 Rated 12A/600V	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1)426V (2)406V (3)430V
4	Diode Peak Voltage	Q100 Rated 20A/400V	I/P: High-Line +3V =308V O/P: (1)Full Load (2)Output Short (3) Full Load continue (4) No Load Ta: 25°C	(1)257V (2)37.0V (3)255V (4)248V
5	Input Capacitor Voltage	C5 Rated: 150 μ / 450 V	I/P: High-Line +3V =308 V 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	(1)440V (2)444V (3)466V (4)440V

6	Control IC Voltage Test	U2 Rated 16 V	I/P: High-Line +3V =308V O/P(1)FULL LOAD (2) Output Short (3)O.V.P. (4)NO LOAD VR.LOW LINE Ta: 25°C	(1) 12.7V (2) 12.7V (3) 12.4V (4) 12.5V
---	-------------------------	------------------	--	--

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	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: 2.446 mA I/P-FG: 2.940mA O/P-FG: 3.826mA 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: >9999GΩ I/P-FG: >9999 G Ω O/P-FG: >9999 G Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	22mΩ

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/50% LOAD Ta: 25°C	PASS
2	CONDUCTION	EN55015	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
3	RADIATION	EN55015	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
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: 2KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
6	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N : 4KV L-PE: 6KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
7	Test by certified Lab & Test Report Prepare. Any contradictions of the test results please refer to the latest EMC test report.			

■ **RELIABILITY TEST**

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																
1	TEMPERATURE RISE TEST	MODEL: HBGC-300-M 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 28.2°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=54.6°C																																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 28.2 °C</th> <th>HIGH AMBIENT Ta=54.6 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>53.8°C</td><td>79.5°C</td></tr> <tr><td>2</td><td>BD1</td><td>58.8°C</td><td>84.7°C</td></tr> <tr><td>3</td><td>D1</td><td>58.2°C</td><td>83.9°C</td></tr> <tr><td>4</td><td>Q1</td><td>57.8°C</td><td>83.8°C</td></tr> <tr><td>5</td><td>L1</td><td>54.7°C</td><td>80.4°C</td></tr> <tr><td>6</td><td>C5</td><td>55.2°C</td><td>80.8°C</td></tr> <tr><td>7</td><td>C41</td><td>48.8°C</td><td>74.5°C</td></tr> <tr><td>8</td><td>U1</td><td>47.4°C</td><td>73.2°C</td></tr> <tr><td>9</td><td>U2</td><td>49.7°C</td><td>75.7°C</td></tr> <tr><td>10</td><td>Q6</td><td>61.0°C</td><td>87.6°C</td></tr> <tr><td>11</td><td>T1</td><td>67.0°C</td><td>94.1°C</td></tr> <tr><td>12</td><td>Q100</td><td>61.8°C</td><td>87.7°C</td></tr> <tr><td>13</td><td>Q101</td><td>61.2°C</td><td>87.1°C</td></tr> <tr><td>14</td><td>R271</td><td>48.8°C</td><td>74.3°C</td></tr> <tr><td>15</td><td>U107</td><td>53.2°C</td><td>79.3°C</td></tr> <tr><td>16</td><td>T500</td><td>50.3°C</td><td>76.0°C</td></tr> <tr><td>17</td><td>C105</td><td>51.4°C</td><td>77.0°C</td></tr> <tr><td>18</td><td>R8</td><td>58.3°C</td><td>84.3°C</td></tr> <tr><td>19</td><td>Tc</td><td>45.0°C</td><td>70.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 28.2 °C	HIGH AMBIENT Ta=54.6 °C	1	LF2	53.8°C	79.5°C	2	BD1	58.8°C	84.7°C	3	D1	58.2°C	83.9°C	4	Q1	57.8°C	83.8°C	5	L1	54.7°C	80.4°C	6	C5	55.2°C	80.8°C	7	C41	48.8°C	74.5°C	8	U1	47.4°C	73.2°C	9	U2	49.7°C	75.7°C	10	Q6	61.0°C	87.6°C	11	T1	67.0°C	94.1°C	12	Q100	61.8°C	87.7°C	13	Q101	61.2°C	87.1°C	14	R271	48.8°C	74.3°C	15	U107	53.2°C	79.3°C	16	T500	50.3°C	76.0°C	17	C105	51.4°C	77.0°C	18	R8	58.3°C	84.3°C	19	Tc	45.0°C	70.7°C
NO	Position	ROOM AMBIENT Ta= 28.2 °C	HIGH AMBIENT Ta=54.6 °C																																																																																	
1	LF2	53.8°C	79.5°C																																																																																	
2	BD1	58.8°C	84.7°C																																																																																	
3	D1	58.2°C	83.9°C																																																																																	
4	Q1	57.8°C	83.8°C																																																																																	
5	L1	54.7°C	80.4°C																																																																																	
6	C5	55.2°C	80.8°C																																																																																	
7	C41	48.8°C	74.5°C																																																																																	
8	U1	47.4°C	73.2°C																																																																																	
9	U2	49.7°C	75.7°C																																																																																	
10	Q6	61.0°C	87.6°C																																																																																	
11	T1	67.0°C	94.1°C																																																																																	
12	Q100	61.8°C	87.7°C																																																																																	
13	Q101	61.2°C	87.1°C																																																																																	
14	R271	48.8°C	74.3°C																																																																																	
15	U107	53.2°C	79.3°C																																																																																	
16	T500	50.3°C	76.0°C																																																																																	
17	C105	51.4°C	77.0°C																																																																																	
18	R8	58.3°C	84.3°C																																																																																	
19	Tc	45.0°C	70.7°C																																																																																	
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 305VAC/90VAC O/P: FULL LOAD/80% LOAD Ta= -45°C/-35°C	TEST: OK																																																																																
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta=50 °C HUMIDITY= 95% R.H	TEST: OK																																																																																
4	TEMPERATURE COEFFICIENT	±0.03%/°C (0~60°C)	I/P: 230 VAC O/P: FULL LOAD	±0.013%/°C (0~60°C)																																																																																
5	STORAGE TEMPERATURE TEST	-40~+80°C	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: 200CYCLE 5. Input/Output condition: STATIC																																																																																	



300W Constant Power Mode LED Driver

HBGC-300 series

6	THERMAL SHOCK TEST	-40~+50°C	1. Thermal shock Temperature: -45°C~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle: 16CYCLE 5. Input/Output condition: 15cycle:230VAC/ FULL LOAD AC on 3 sec/AC off 1 sec TEST 1cycle:230VAC/ FULL LOAD Burn In Test TEST: OK
7	VIBRATION TEST	10~ 500Hz, 5G 12min./1cycle, period for 72min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 10min/sweep cycle (4) Acceleration: 6G (5) Test Time: 180min in each axis (X.Y.Z) (6) Ta: 25°C
8	CAPACITOR LIFE CYCLE	HBGC-300-M: SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P: 230VAC O/P: FULL LOAD Tc= 70 °C LIFE TIME (2) I/P: 230VAC O/P: 75% LOAD Tc= 70 °C LIFE TIME (3) I/P: 230VAC O/P: 50% LOAD Tc= 70 °C LIFE TIME	(1) 100032 HRS (2) 107667 HRS (3) 112825 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 1772.9K hrs min. Telcordia SR-332 (Bellcore); 175.4K hrs min. MIL-HDBK-217F (25°C)	
10	Ongoing Reliability Test	I/P: 230VAC O/P: FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/ZHOUB	WENF	LIUWY