



Test Report: ELG-200-12

200W 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

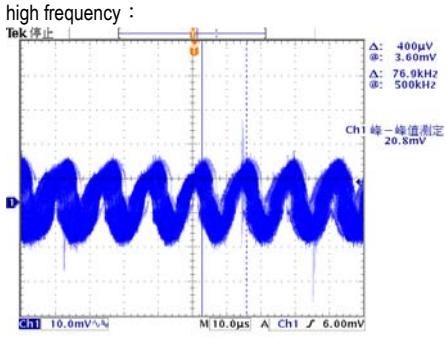
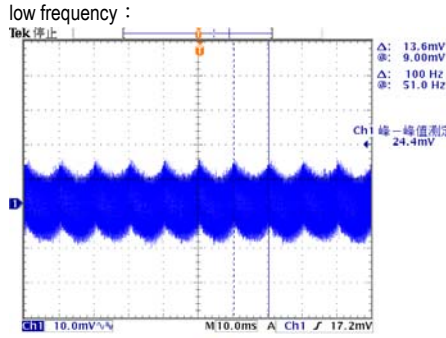
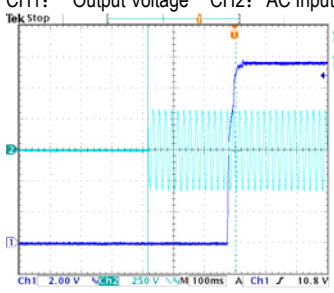
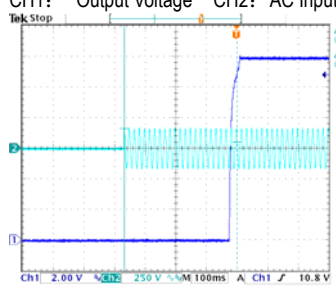
E.M.C. Test

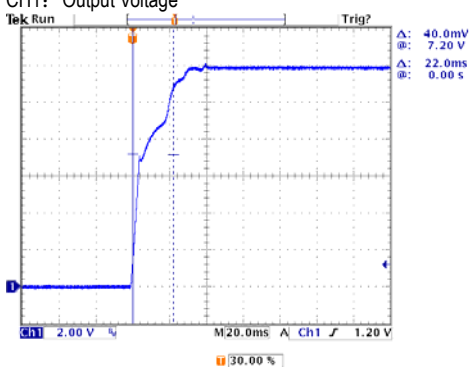
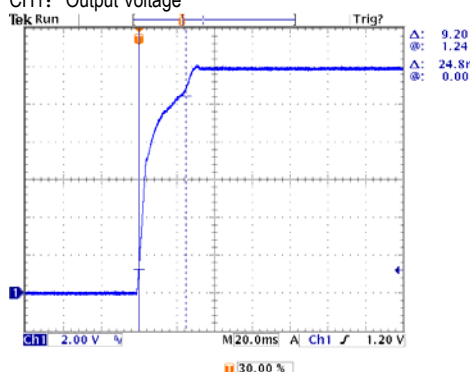
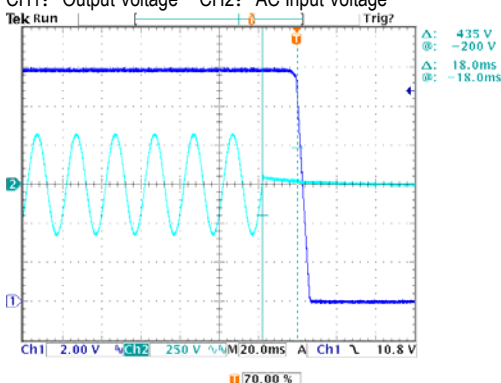
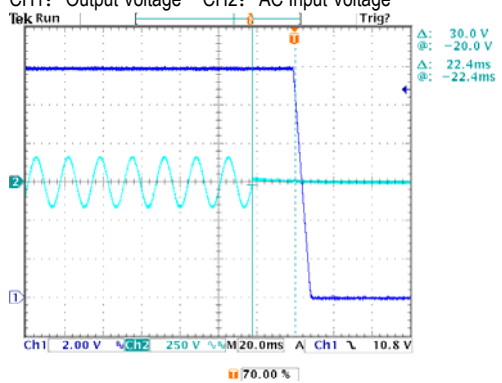
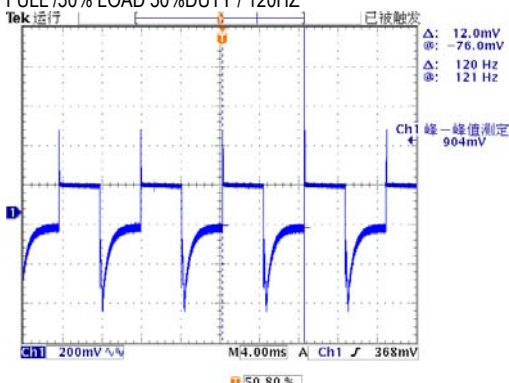
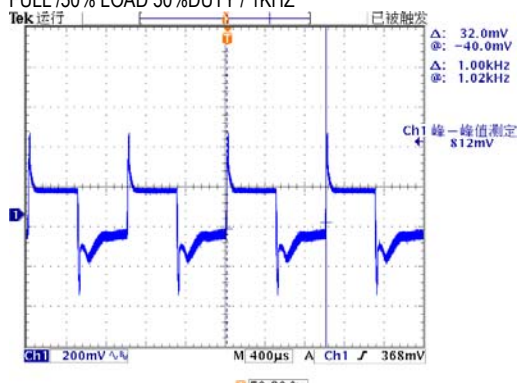
■ RELIABILITY TEST

Environment Test

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

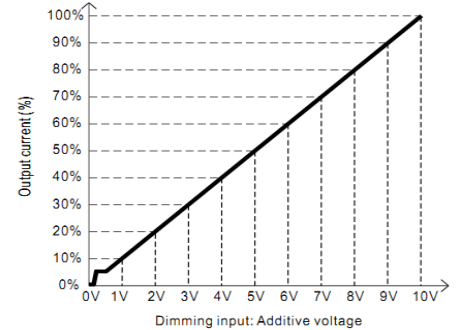
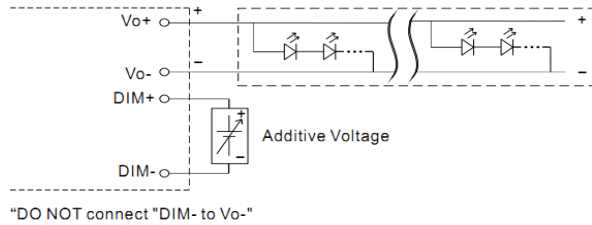
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	6V~12V	I/P: 230VAC O/P: LED MODE Ta: 25°C	3.6 V~ 12 V
2	OUTPUT VOLTAGE ADJUST RANGE (For A-Type only)	11.2V~12.8V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	10.78 V~ 13.29 V
3	OUTPUT CURRENT ADJUST RANGE (For A-Type only)	8A~16A	I/P: 230VAC O/P: SETTING Ta: 25°C	6.89 A~ 16.45 A
4	OUTPUT VOLTAGE TOLERANCE	-3%~+3%	I/P: 100VAC / 305VAC O/P: 95% / NO LOAD Ta: 25°C	-0.58%~ 0.58%
5	LINE REGULATION	-0.5%~+0.5%	I/P: 200VAC ~ 305VAC O/P: 95% LOAD Ta: 25°C	0%~ 0.25%
6	LOAD REGULATION	-2.0%~+2.0%	I/P: 230VAC O/P: 95% ~NO LOAD Ta: 25°C	-0.58%~ 0.58%
7	OVER/UNDERSHOOT TEST	<± 5 %	I/P: 230VAC O/P: 95% LOAD Ta: 25°C	<5 %
8	RIPPLE & NOISE (Max)	150mVp-p	I/P: 230VAC O/P: 95% LOAD Ta: 25°C	24.4 mVp-p
high frequency :  Δ: 400μV Φ: 3.60mV Δ: 76.9kHz Φ: 500kHz Ch1 峰-峰值測定 20.8mV Ch1 10.0mV 50.80% low frequency :  Δ: 13.6mV Φ: 9.00mV Δ: 100 Hz Φ: 51.0 Hz Ch1 峰-峰值測定 24.4mV Ch1 10.0mV 50.80%				
9	SET UP TIME(Max)	230VAC/ 500ms 115VAC/ 1000ms	I/P: 230 VAC I/P: 115 VAC O/P: 95% LOAD/75% LOAD Ta: 25°C	230VAC/ 286 ms 115VAC/ 368 ms
INPUT=230VAC/50HZ @ 95% LOAD CH1: Output Voltage CH2: AC Input Voltage  Δ: 10.0 V Φ: 0.00 V Δ: 286ms Φ: -254ms Ch1 2.00 V 70.00% INPUT=115VAC/60HZ @ 75% LOAD CH1: Output Voltage CH2: AC Input Voltage  Δ: 11.0 V Φ: 160 V Δ: 368ms Φ: -368ms Ch1 2.00 V 70.00%				

10	RISE TIME (Max)	230VAC/ 100ms 115VAC/ 100ms	I/P: 230 VAC I/P: 115 VAC O/P: 95% LOAD/75% LOAD Ta: 25°C	230VAC/ 22.0 ms 115VAC/ 24.8 ms
INPUT=230VAC/50HZ @ 95% LOAD CH1: Output Voltage				
INPUT=115VAC/60HZ @ 75% LOAD CH1: Output Voltage				
11	HOLD UP TIME(Typ)	230VAC/ 10ms 115VAC/ 10ms	I/P: 230 VAC I/P: 115 VAC O/P: 95% LOAD/75% LOAD Ta: 25°C	230VAC/ 18.0 ms 115VAC/ 22.4 ms
INPUT=230VAC/50HZ @ 95% LOAD CH1: Output Voltage CH2: AC Input Voltage				
INPUT=115VAC/60HZ @ 75% LOAD CH1: Output Voltage CH2: AC Input Voltage				
12	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 230VAC O/P: (1)95%/50% LOAD 50%DUTY / 120HZ (2)95%/50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 904mVp-p (2) 812mVp-p
FULL /50% LOAD 50%DUTY / 120HZ				
FULL /50% LOAD 50%DUTY / 1KHZ				

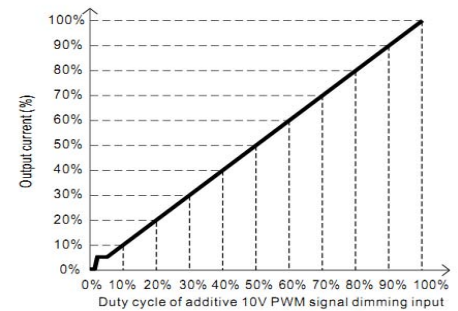
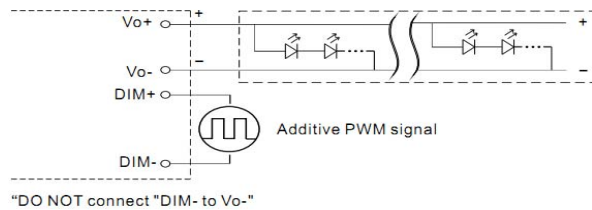
13 DIMMING OPERATION (for B-Type)

- 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: 100uA (typ.)

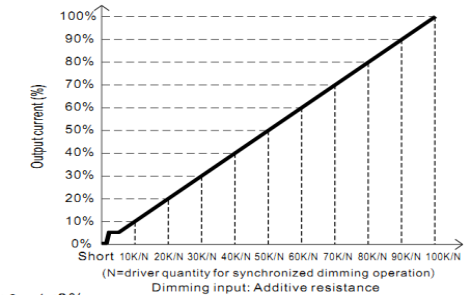
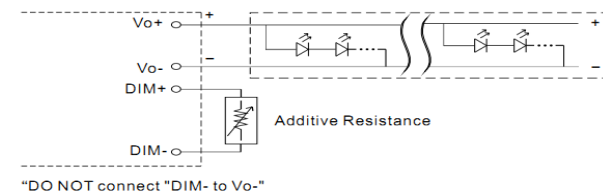
◎ Applying additive 0 ~ 10VDC



◎ 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 0kΩ or 0Vdc, or 10V PWM signal with 0% duty cycle.

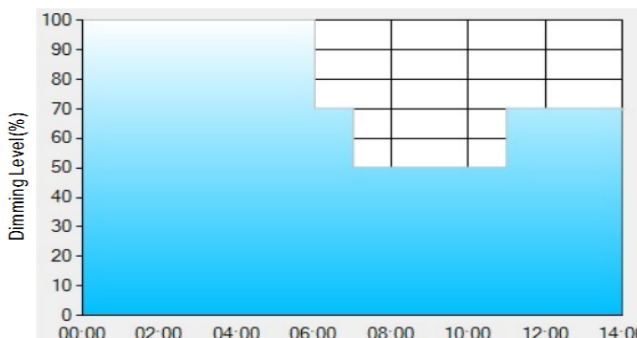
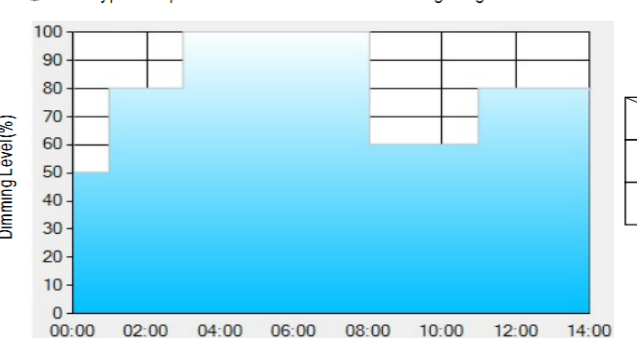
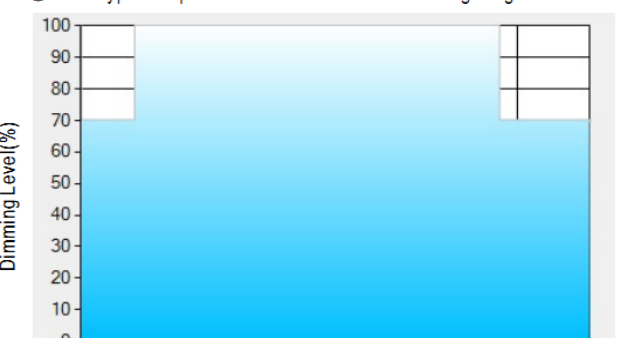
I/P: 230 VAC

O/P: DIMMING TEST

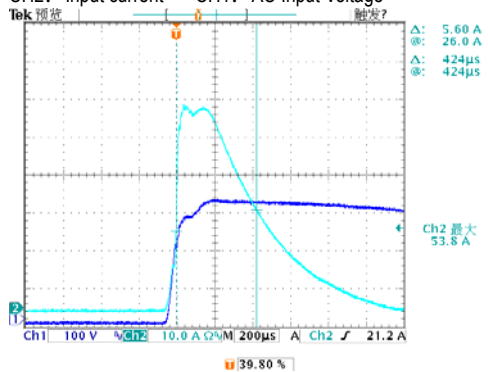
Ta: 25°C

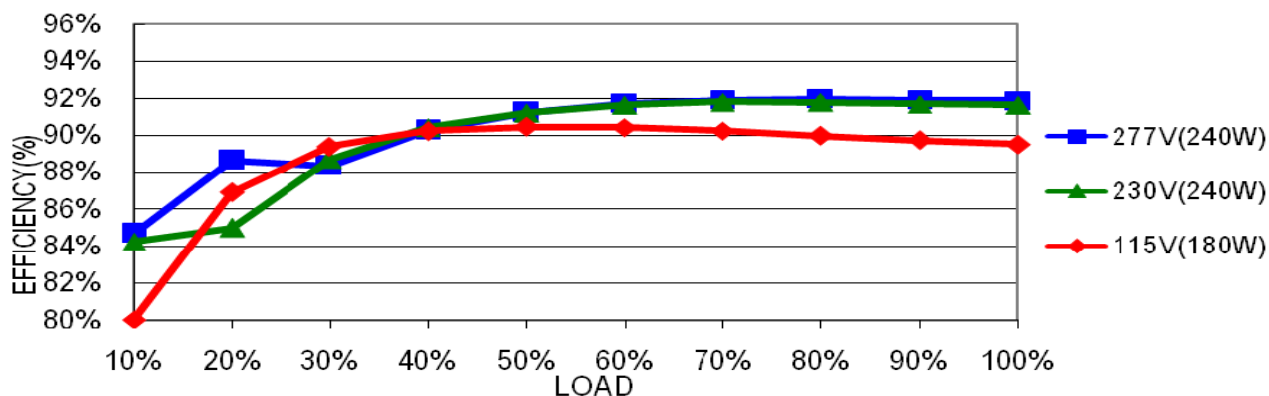
1	V	Short	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	1.383	3.113	4.776	6.499	8.181	9.932	11.652	13.277	14.979	16.302	16.314
	%	0%	8.64%	19.45%	29.85%	40.62%	51.13%	62.08%	72.83%	82.98%	93.62%	101.89%	101.96%
2	PWM(100Hz)	0V	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	1.224	2.911	4.601	6.257	7.920	9.581	11.242	12.906	14.567	16.049	16.201
	%	0%	7.65%	18.19%	28.75%	39.10%	49.50%	59.88%	70.26%	80.66%	91.04%	100.31%	101.26%
3	R	0%	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0	1.239	2.976	4.706	6.416	8.128	9.837	11.558	13.282	15.004	16.171	16.184
	%	0%	7.74%	18.60%	29.41%	40.10%	50.80%	61.48%	72.24%	83.01%	93.78%	101.07%	101.15%

TEST RESULT: OK

14	DIMMING OPERATION (primary side;for DA-Type)	※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.Please contact MEAN WELL for other setup. I/P: 230 VAC O/P: DIMMING TEST Ta: 25℃ TEST RESULT: OK																																													
15	DIMMING OPERATION (for DXX-Type by User definition)	※Smart timer dimming function ·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 other setup. Ex : ☉ D01-Type: the profile recommended for residential lighting <table><caption>Set up for D01-Type in Smart timer dimming software program:</caption><thead><tr><th></th><th>T1</th><th>T2</th><th>T3</th><th>T4</th></tr></thead><tbody><tr><td>TIME**</td><td>06:00</td><td>07:00</td><td>11:00</td><td>---</td></tr><tr><td>LEVEL**</td><td>100%</td><td>70%</td><td>50%</td><td>70%</td></tr></tbody></table> Ex : ☉ D02-Type: the profile recommended for street lighting <table><caption>Set up for D02-Type in Smart timer dimming software program:</caption><thead><tr><th></th><th>T1</th><th>T2</th><th>T3</th><th>T4</th><th>T5</th></tr></thead><tbody><tr><td>TIME**</td><td>01:00</td><td>03:00</td><td>8:00</td><td>11:00</td><td>---</td></tr><tr><td>LEVEL**</td><td>50%</td><td>80%</td><td>100%</td><td>60%</td><td>80%</td></tr></tbody></table> Ex : ☉ D03-Type: the profile recommended for tunnel lighting <table><caption>Set up for D03-Type in Smart timer dimming software program:</caption><thead><tr><th></th><th>T1</th><th>T2</th><th>T3</th></tr></thead><tbody><tr><td>TIME**</td><td>01:30</td><td>11:00</td><td>---</td></tr><tr><td>LEVEL**</td><td>70%</td><td>100%</td><td>70%</td></tr></tbody></table> I/P: 230 VAC O/P: DIMMING TEST Ta: 25℃ TEST RESULT: OK		T1	T2	T3	T4	TIME**	06:00	07:00	11:00	---	LEVEL**	100%	70%	50%	70%		T1	T2	T3	T4	T5	TIME**	01:00	03:00	8:00	11:00	---	LEVEL**	50%	80%	100%	60%	80%		T1	T2	T3	TIME**	01:30	11:00	---	LEVEL**	70%	100%	70%
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	T1	T2	T3																																												
TIME**	01:30	11:00	---																																												
LEVEL**	70%	100%	70%																																												

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~305VAC	I/P: TESTING O/P: 95% LOAD Ta: 25°C	97 V~ 305 V
			I/P: LOW-LINE-3V=97 V HIGH-LINE+10V=315 V O/P: 95%/NO LOAD 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: 100 VAC ~305 VAC O/P: 95%-NO LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	1.8A/115VAC 1.2A/230VAC 1.0A/277VAC	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 95% LOAD/75% LOAD Ta: 25°C	I = 1.40 A/ 115VAC I = 0.88 A/ 230VAC I = 0.74 A/ 277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.367 mA N-FG: 0.367 mA
5	NO LOAD/STANDBY POWER CONSUMPTION	< 0.5W	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.370 W/ 230VAC
6	INRUSH CURRENT(Typ)	230V/ 60A Twidth =510us measured at 50% Ipeak COLD START	I/P: 230 VAC O/P: 95% LOAD Ta: 25°C	I = 53.8 A/ 230VAC Twidth =424 us
INPUT=230VAC/50HZ @ 95% LOAD CH2: Input current CH1: AC Input Voltage 				
7	EFFICIENCY(Typ)	90%	I/P: 230VAC O/P: 95% LOAD Ta: 25°C	91.62 %

EFFICIENCY vs LOAD


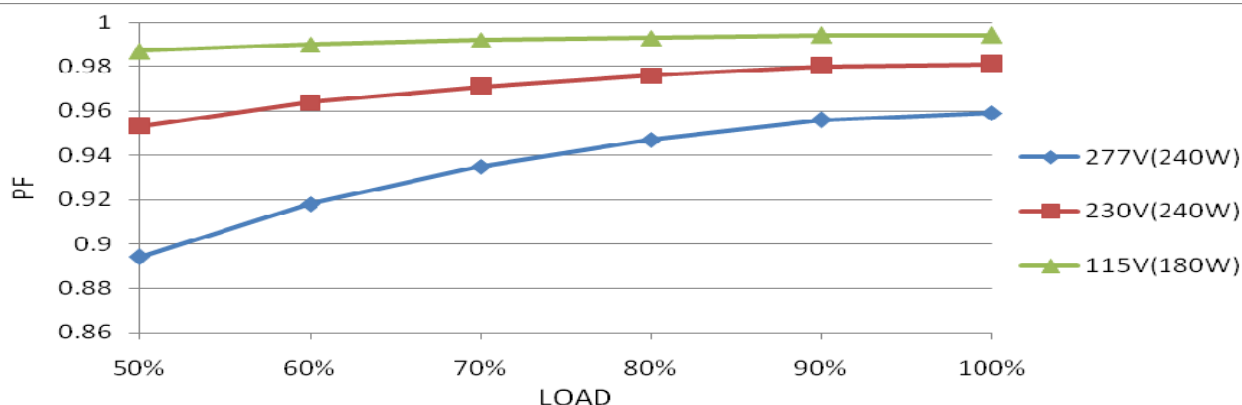
8

POWER FACTOR

0.97/ 115VAC
0.95/ 230VAC
0.92/ 277VAC

I/P: 115 VAC
I/P: 230 VAC
I/P: 277 VAC
O/P: 95% LOAD/75% LOAD
Ta: 25°C

PF= 0.994 / 115VAC
PF= 0.981 / 230VAC
PF= 0.959 / 277VAC

P.F vs LOAD


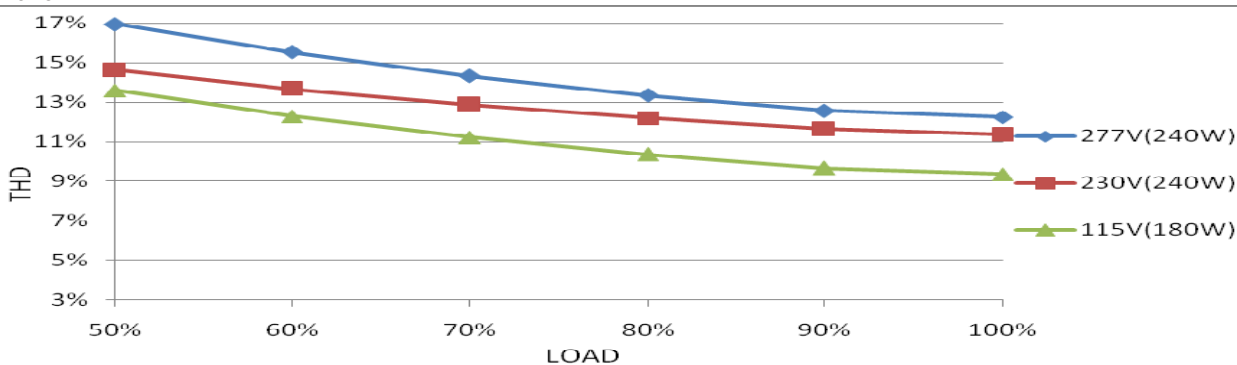
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TOTAL HARMONIC DISTORTION

THD < 20%
(@load ≥ 50%/115VAC, 230VAC;
@load ≥ 75%/277VAC)

I/P: 115 VAC/50% LOAD
I/P: 230 VAC/50% LOAD
I/P: 277 VAC/75% LOAD
Ta: 25°C

THD=13.60% @50% load /115VAC
THD=14.61% @50% load /230VAC
THD=13.86% @75% load /277VAC

THD vs LOAD


PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	95%~108%	I/P: 200VAC I/P: 230VAC I/P: 305VAC O/P: TESTING Ta: 25°C	101.23 %/ 200VAC 101.21 %/ 230VAC 100.60 %/ 305VAC Constant Current Limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.5V~18V	I/P: 100VAC I/P: 230VAC I/P: 305VAC O/P: NO LOAD Ta: 25°C	14.68 V/ 100VAC 14.69 V/ 230VAC 14.68 V/ 305VAC Shut down o/p voltage, re-power on to recovery
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 200VAC I/P: 230VAC I/P: 305VAC O/P: 95% LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recovery
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 200VAC I/P: 305VAC O/P: 95% 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	Q 2 Rated 600V/11A	I/P: High-Line +3V =308V O/P: (1) 95% LOAD Turn on (2) Output Short (3) 95% LOAD continue Ta: 25°C	(1) 559 V (2) 512 V (3) 456 V
2	O/P Diode (MOSFET)	Q101 Rated 40V/208A	I/P: High-Line +3V =308V O/P: (1) 95% LOAD Turn on (2) Output Short (3) 95% LOAD continue Ta: 25°C	(1) 27.3 V (2) 35.5 V (3) 29.9 V
3	Input Capacitor	C5 Rated 100u/ 450V	I/P: High-Line +3V =308 V O/P: (1) 95% LOAD input on/off (2) NO LOAD input on /Off (3) 95% LOAD /NO LOAD Change Ta: 25°C	(1) 446 V (2) 444 V (3) 446 V
4	Control IC	U3 Rated 20V (MAX.)	I/P: High-Line +3V =308 V O/P: ((1) 95% LOAD (2) Output Short (3) O.L.P (4) O.V.P (5) Low Line No Load Vo(min) Ta: 25°C	(1) 15.9 V (2) 15.8 V (3) 15.8 V (4) 15.9 V (5) 15.4 V
5	PFC Power Transistor	Q 3 Rated 600V/20A	I/P: High-Line +3V =308V O/P: (1) 95% LOAD Turn on (2) Output Short (3) 95% LOAD continue Ta: 25°C	(1) 548 V (2) 562 V (3) 484 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: 1.5KVAC/min	I/P-O/P: 4.2KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG: 1.8 KVAC/min Ta: 25°C	I/P-O/P: 2.459 mA I/P-FG: 2.864 mA O/P-FG: 2.423 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

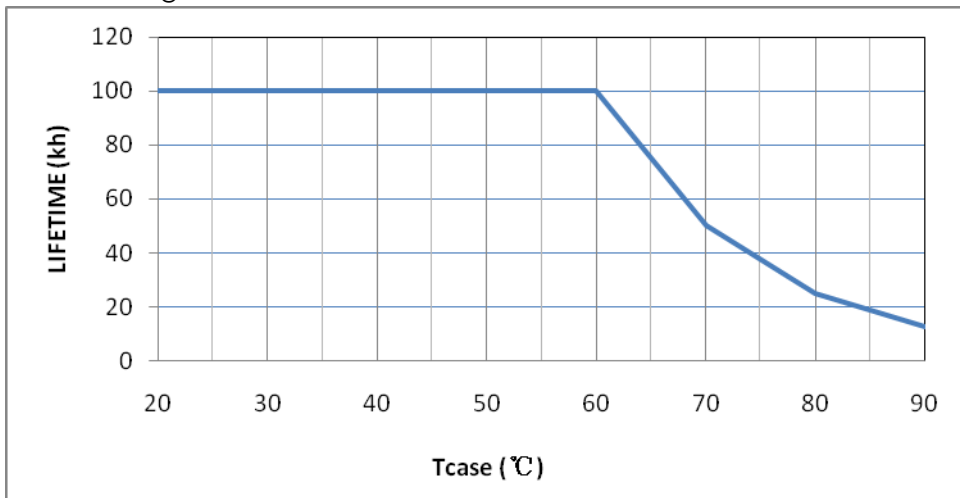
E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230VAC/50HZ O/P: 95%/50% LOAD Ta: 25°C	PASS
2	CONDUCTION	EN55015	I/P: 230 VAC (50HZ) O/P: 95% LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55015	I/P: 230 VAC (50HZ) O/P: 95% 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: 95% LOAD Ta: 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P: 95% LOAD Ta: 25°C	CRITERIA A
6	SURGE	EN61000-4-5 INDUSTRY L-N: 4KV L,N-PE: 6KV	I/P: 230VAC/50HZ O/P: 95% LOAD L-N: 4KV L,N-PE: 6KV Ta: 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																
1	TEMPERATURE RISE TEST	MODEL: ELG-200-12 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: 95% LOAD Ta=32.4 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: 95% LOAD Ta=54.0 °C <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=32.4 °C</th><th>HIGH AMBIENT Ta=54.0 °C</th></tr><tr><td>1</td><td>BD1</td><td>66.3°C</td><td>87.7°C</td></tr><tr><td>2</td><td>L2</td><td>66.4°C</td><td>88.2°C</td></tr><tr><td>3</td><td>D4</td><td>65.8°C</td><td>87.4°C</td></tr><tr><td>4</td><td>Q3</td><td>68.6°C</td><td>90.2°C</td></tr><tr><td>5</td><td>C7</td><td>66.3°C</td><td>87.8°C</td></tr><tr><td>6</td><td>D3</td><td>68.1°C</td><td>89.9°C</td></tr><tr><td>7</td><td>C5</td><td>65.1°C</td><td>86.6°C</td></tr><tr><td>8</td><td>Q1</td><td>67.7°C</td><td>90.1°C</td></tr><tr><td>9</td><td>Q2</td><td>67.8°C</td><td>90.3°C</td></tr><tr><td>10</td><td>C16</td><td>67.4°C</td><td>89.4°C</td></tr><tr><td>11</td><td>U3</td><td>67.6°C</td><td>88.9°C</td></tr><tr><td>12</td><td>T1</td><td>73.5°C</td><td>96.4°C</td></tr><tr><td>13</td><td>Q101</td><td>72.1°C</td><td>94.5°C</td></tr><tr><td>14</td><td>Q102</td><td>72.0°C</td><td>94.3°C</td></tr><tr><td>15</td><td>C102</td><td>71.2°C</td><td>93.6°C</td></tr><tr><td>16</td><td>C103</td><td>69.7°C</td><td>91.9°C</td></tr><tr><td>17</td><td>RTH3</td><td>64.0°C</td><td>85.4°C</td></tr><tr><td>18</td><td>C47</td><td>66.0°C</td><td>87.8°C</td></tr><tr><td>19</td><td>TC</td><td>59.4°C</td><td>80.1°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta=32.4 °C	HIGH AMBIENT Ta=54.0 °C	1	BD1	66.3°C	87.7°C	2	L2	66.4°C	88.2°C	3	D4	65.8°C	87.4°C	4	Q3	68.6°C	90.2°C	5	C7	66.3°C	87.8°C	6	D3	68.1°C	89.9°C	7	C5	65.1°C	86.6°C	8	Q1	67.7°C	90.1°C	9	Q2	67.8°C	90.3°C	10	C16	67.4°C	89.4°C	11	U3	67.6°C	88.9°C	12	T1	73.5°C	96.4°C	13	Q101	72.1°C	94.5°C	14	Q102	72.0°C	94.3°C	15	C102	71.2°C	93.6°C	16	C103	69.7°C	91.9°C	17	RTH3	64.0°C	85.4°C	18	C47	66.0°C	87.8°C	19	TC	59.4°C	80.1°C
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 305VAC/100VAC O/P: 95% LOAD/75% LOAD Ta= -45°C /-15°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: 95% LOAD Ta=50°C HUMIDITY= 95 %R.H	TEST: OK																																																																																
4	TEMPERATURE COEFFICIENT	±0.03 %/°C (0~50°C)	I/P: 230 VAC O/P: 95% LOAD	±0.004 %/°C (0~50°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		TEST: OK																																																																																

6	THERMAL SHOCK TEST	1. Thermal shock Temperature: -45℃ ~ +55℃ 2. Temperature change rate : 25℃ / 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: 72min in each axis (X.Y.Z) (6) Ta: 25℃	TEST: OK																		
8	CAPACITOR LIFE CYCLE	ELG-200-12: SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P: 230VAC O/P: 95% LOAD Ta= 25 ℃ LIFE TIME (2) I/P: 230VAC O/P: 95% LOAD Ta= 50 ℃ LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 50 ℃ LIFE TIME	(1) 255980 HRS (2) 42835 HRS (3) 63406 HRS (4) 127007 HRS																		
9	MTBF	Conducted by Parts Stress Analysis Prediction 826.7K hrs min. Telcordia SR-332 (Bellcore) 200.8K hrs min. MIL-HDBK-217F (25℃)																			
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50000 hours @ Tc 70℃ <table><caption>Data points for Lifetime vs Tcase</caption><thead><tr><th>Tcase (°C)</th><th>Lifetime (kh)</th></tr></thead><tbody><tr><td>20</td><td>100</td></tr><tr><td>30</td><td>100</td></tr><tr><td>40</td><td>100</td></tr><tr><td>50</td><td>100</td></tr><tr><td>60</td><td>100</td></tr><tr><td>70</td><td>50</td></tr><tr><td>80</td><td>25</td></tr><tr><td>90</td><td>15</td></tr></tbody></table>		Tcase (°C)	Lifetime (kh)	20	100	30	100	40	100	50	100	60	100	70	50	80	25	90	15
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TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY