



# Test Report: ODLC-45-500

---

45W Constant Current 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

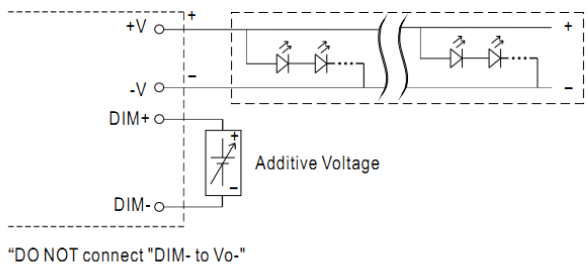
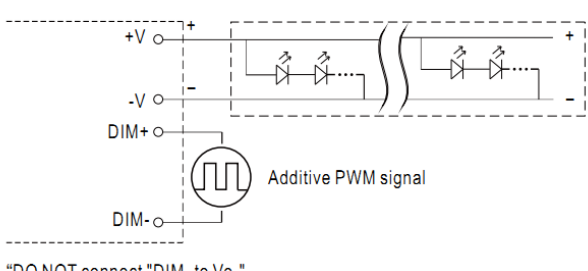
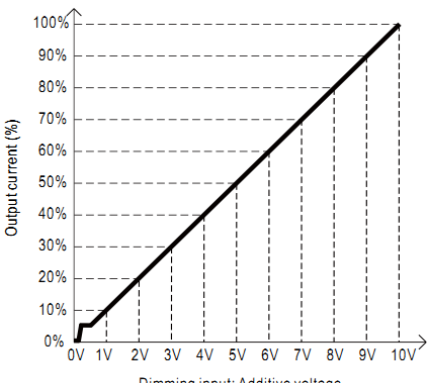
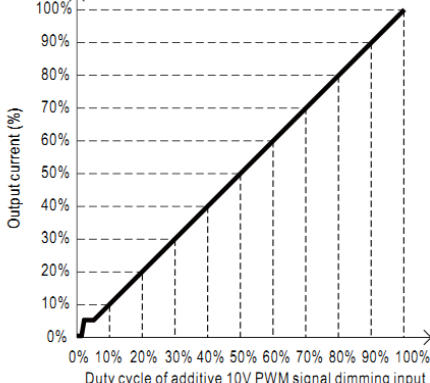
## ■ RELIABILITY TEST

Environment Test

■ DESIGN VERIFY TEST

**OUTPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	54V~90V	I/P: 230VAC O/P: LED MODE Ta: 25°C	20V~95V
2	CURRENT RIPPLE	5% max@rated current	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	3.95%
3	CURRENT TOLERANCE	±7%	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	±1.0%
4	OPEN CIRCUIT VOLTAGE (max)	115V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	110.11V
5	OVER/UNDERSHOOT TEST	<±5 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5 %
6	SET UP TIME	500ms/230VAC 1200ms/115VAC	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	312ms/230VAC 412ms/115VAC
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>		
7	AUXILIARY DC OUTPUT (A-Type only)	Nominal 12V ( deviation 11.4~12.6 ) @50mA	I/P: 230 VAC O/P:FULL LOAD	11.98V

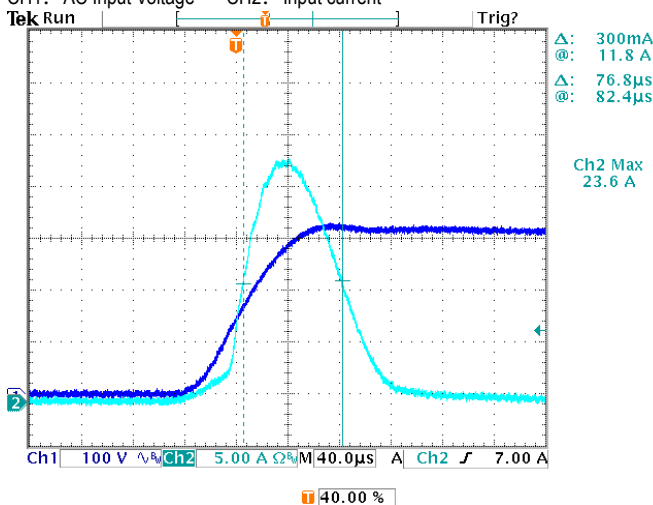
<p>8 DIMMING TEST(For Blank -Type)</p>	<ul style="list-style-type: none"> <li>• Output constant current level can be adjusted by applying one of the two methodologies between DIM+ and DIM-: 0 ~ 10Vdc, or 10V PWM signal.</li> <li>• Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.</li> </ul> <p>◎ Applying additive 0 ~ 10VDC</p>  <p>◎ Applying additive 10V PWM signal (frequency range 300Hz ~ 3KHz):</p>  <p>Note : 1. Min. dimming level is about 8% and the output current is not defined when 0% &lt; I<sub>out</sub> &lt; 8%.          2. The output current could drop down to 0% when dimming input is about 0Vdc or 10V PWM signal with 0% duty cycle.</p> <p>I/P: 230 VAC          O/P: DIMMING TEST          Ta: 25°C</p> <table border="1" data-bbox="295 1299 1428 1702"> <tr> <td rowspan="3">1</td> <td>v</td> <td>0V</td> <td>1V</td> <td>2V</td> <td>3V</td> <td>4V</td> <td>5V</td> <td>6V</td> <td>7V</td> <td>8V</td> <td>9V</td> <td>10V</td> </tr> <tr> <td>Output Current</td> <td>0A</td> <td>0.040</td> <td>0.099</td> <td>0.147</td> <td>0.198</td> <td>0.248</td> <td>0.300</td> <td>0.350</td> <td>0.398</td> <td>0.448</td> <td>0.497</td> </tr> <tr> <td>%</td> <td>0.00%</td> <td>7.90%</td> <td>19.74%</td> <td>29.48%</td> <td>39.66%</td> <td>49.58%</td> <td>59.90%</td> <td>70.06%</td> <td>79.56%</td> <td>89.58%</td> <td>99.30%</td> </tr> <tr> <td rowspan="3">2</td> <td>PWM(100Hz)</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> <tr> <td>Output Current</td> <td>0A</td> <td>0.043</td> <td>0.101</td> <td>0.151</td> <td>0.200</td> <td>0.250</td> <td>0.299</td> <td>0.348</td> <td>0.398</td> <td>0.447</td> <td>0.491</td> </tr> <tr> <td>%</td> <td>0.00%</td> <td>8.58%</td> <td>20.12%</td> <td>30.24%</td> <td>40.06%</td> <td>50.04%</td> <td>59.86%</td> <td>69.66%</td> <td>79.56%</td> <td>89.34%</td> <td>98.12%</td> </tr> </table> <p>TEST RESULT: OK</p>	1	v	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output Current	0A	0.040	0.099	0.147	0.198	0.248	0.300	0.350	0.398	0.448	0.497	%	0.00%	7.90%	19.74%	29.48%	39.66%	49.58%	59.90%	70.06%	79.56%	89.58%	99.30%	2	PWM(100Hz)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output Current	0A	0.043	0.101	0.151	0.200	0.250	0.299	0.348	0.398	0.447	0.491	%	0.00%	8.58%	20.12%	30.24%	40.06%	50.04%	59.86%	69.66%	79.56%	89.34%	98.12%	 
1	v		0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V																																																															
	Output Current		0A	0.040	0.099	0.147	0.198	0.248	0.300	0.350	0.398	0.448	0.497																																																															
	%	0.00%	7.90%	19.74%	29.48%	39.66%	49.58%	59.90%	70.06%	79.56%	89.58%	99.30%																																																																
2	PWM(100Hz)	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%																																																																
	Output Current	0A	0.043	0.101	0.151	0.200	0.250	0.299	0.348	0.398	0.447	0.491																																																																
	%	0.00%	8.58%	20.12%	30.24%	40.06%	50.04%	59.86%	69.66%	79.56%	89.34%	98.12%																																																																
<p>9 DALI DIMMING OPERATION (primary side: for DA-Type)</p>	<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~295VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V~305V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+10V=305 V O/P: FULL/MIN 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 ~295 VAC O/P: FULL~MIN LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	0.6A/115VAC 0.4A/230VAC 0.3A/277VAC	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	I =0.434A/ 115VAC I =0.219A/ 230VAC I =0.188A/ 277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-CASE: 0.0027 mA N-CASE: 0.0027 mA
5	NO LOAD/STANDBY POWER CONSUMPTION	< 0.5W for Blank-Type < 1.2W for A-Type < 0.5W for DA-Type	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.468W for Blank-Type 0.568W for A-Type 0.453W for DA-Type
6	INRUSH CURRENT(Typ)	230V/ 30A Twidth =100 us measured at 50% Ipeak COLD START	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I =23.6A/ 230VAC Twidth =76.8us

INPUT=230VAC/50HZ @ FULL LOAD

CH1: AC Input Voltage CH2: Input current



7	EFFICIENCY(Typ)	85%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	89.87%																												
<p><b>EFFICIENCY vs LOAD</b></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>50%</td> <td>82.0</td> <td>83.5</td> <td>85.0</td> </tr> <tr> <td>60%</td> <td>84.5</td> <td>85.5</td> <td>86.5</td> </tr> <tr> <td>70%</td> <td>86.5</td> <td>87.5</td> <td>87.5</td> </tr> <tr> <td>80%</td> <td>87.5</td> <td>88.5</td> <td>88.5</td> </tr> <tr> <td>90%</td> <td>88.5</td> <td>89.0</td> <td>89.0</td> </tr> <tr> <td>100%</td> <td>89.0</td> <td>89.5</td> <td>89.5</td> </tr> </tbody> </table>					LOAD	277V	230V	115V	50%	82.0	83.5	85.0	60%	84.5	85.5	86.5	70%	86.5	87.5	87.5	80%	87.5	88.5	88.5	90%	88.5	89.0	89.0	100%	89.0	89.5	89.5
LOAD	277V	230V	115V																													
50%	82.0	83.5	85.0																													
60%	84.5	85.5	86.5																													
70%	86.5	87.5	87.5																													
80%	87.5	88.5	88.5																													
90%	88.5	89.0	89.0																													
100%	89.0	89.5	89.5																													
8	POWER FACTOR	0.95/ 115VAC 0.92/ 230VAC 0.90/ 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=0.976/ 230VAC PF=0.942/ 277VAC																												
<p><b>P.F vs LOAD</b></p> <table border="1"> <caption>P.F vs Load Data</caption> <thead> <tr> <th>LOAD</th> <th>277V</th> <th>230V</th> <th>115V</th> </tr> </thead> <tbody> <tr> <td>50%</td> <td>0.86</td> <td>0.94</td> <td>0.99</td> </tr> <tr> <td>60%</td> <td>0.89</td> <td>0.95</td> <td>0.99</td> </tr> <tr> <td>70%</td> <td>0.91</td> <td>0.96</td> <td>0.99</td> </tr> <tr> <td>80%</td> <td>0.92</td> <td>0.97</td> <td>0.99</td> </tr> <tr> <td>90%</td> <td>0.93</td> <td>0.97</td> <td>0.99</td> </tr> <tr> <td>100%</td> <td>0.94</td> <td>0.98</td> <td>0.99</td> </tr> </tbody> </table>					LOAD	277V	230V	115V	50%	0.86	0.94	0.99	60%	0.89	0.95	0.99	70%	0.91	0.96	0.99	80%	0.92	0.97	0.99	90%	0.93	0.97	0.99	100%	0.94	0.98	0.99
LOAD	277V	230V	115V																													
50%	0.86	0.94	0.99																													
60%	0.89	0.95	0.99																													
70%	0.91	0.96	0.99																													
80%	0.92	0.97	0.99																													
90%	0.93	0.97	0.99																													
100%	0.94	0.98	0.99																													
9	TOTAL HARMONIC DISTORTION	THD < 20% ( @load ≥ 60% / 115VAC, 230VAC; @load ≥ 75% / 277VAC )	I/P: 115 VAC / 60% LOAD I/P: 230 VAC / 60% LOAD I/P: 277 VAC / 75% LOAD Ta: 25°C	THD=6.89% @60% load / 115VAC THD=9.80% @60% load / 230VAC THD=11.85% @75% load / 277VAC																												
<p><b>THD vs LOAD</b></p> <table border="1"> <caption>THD vs Load Data</caption> <thead> <tr> <th>LOAD</th> <th>277V</th> <th>230V</th> <th>115V</th> </tr> </thead> <tbody> <tr> <td>50%</td> <td>11.5</td> <td>10.0</td> <td>7.0</td> </tr> <tr> <td>60%</td> <td>11.8</td> <td>10.5</td> <td>7.0</td> </tr> <tr> <td>70%</td> <td>11.8</td> <td>10.8</td> <td>7.0</td> </tr> <tr> <td>80%</td> <td>12.0</td> <td>11.0</td> <td>7.2</td> </tr> <tr> <td>90%</td> <td>12.2</td> <td>11.2</td> <td>7.5</td> </tr> <tr> <td>100%</td> <td>12.5</td> <td>11.5</td> <td>7.2</td> </tr> </tbody> </table>					LOAD	277V	230V	115V	50%	11.5	10.0	7.0	60%	11.8	10.5	7.0	70%	11.8	10.8	7.0	80%	12.0	11.0	7.2	90%	12.2	11.2	7.5	100%	12.5	11.5	7.2
LOAD	277V	230V	115V																													
50%	11.5	10.0	7.0																													
60%	11.8	10.5	7.0																													
70%	11.8	10.8	7.0																													
80%	12.0	11.0	7.2																													
90%	12.2	11.2	7.5																													
100%	12.5	11.5	7.2																													

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	SHORT CIRCUIT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 90VAC I/P: 295VAC 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	Q 1 Rated 800V/9A	I/P: High-Line +3V =298V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 608V (2) 524V (3) 542V
2	O/P Diode (MOSFET)	D101 Rated 1000V/5A	I/P: High-Line +3V =298V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 808V (2) 796V (3) 804V
3	Control IC	U1 Rated 35V (MAX)	I/P: High-Line +3V =298V O/P: (1) FULL LOAD (2) Output Short (3) Low Line No Load Ta: 25°C	(1) 17.9V (2) 17.9V (3) 17.9V
4	Clamp Diode	D 1 Rated 1000V/1A	I/P: High-Line +3V = 298V O/P: (1) Full Load input on/off (2) Output Short Ta: 25°C	(1) 490V (2) 458V



## SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min	I/P-O/P: 4.2 KVAC/min Ta: 25°C	I/P-O/P: 2.487mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500 VDC Ta: 25°C/70% RH	I/P-O/P: >9999MΩ

## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230 VAC/50HZ O/P: FULL/60% 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 LIGHT INDUSTRY L-N: 1KV	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: ODL-45-700 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 32.5℃ 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 53.7℃																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 32.5 ℃</th> <th>HIGH AMBIENT Ta=53.7 ℃</th> </tr> </thead> <tbody> <tr><td>1</td><td>L1</td><td>69.7℃</td><td>91.0℃</td></tr> <tr><td>2</td><td>BD1</td><td>66.5℃</td><td>87.2℃</td></tr> <tr><td>3</td><td>D1</td><td>68.5℃</td><td>90.2℃</td></tr> <tr><td>4</td><td>Q1</td><td>72.1℃</td><td>93.8℃</td></tr> <tr><td>5</td><td>U1</td><td>66.2℃</td><td>87.1℃</td></tr> <tr><td>6</td><td>T1</td><td>71.1℃</td><td>92.3℃</td></tr> <tr><td>7</td><td>C16</td><td>65.5℃</td><td>86.7℃</td></tr> <tr><td>8</td><td>D101</td><td>73.3℃</td><td>94.1℃</td></tr> <tr><td>9</td><td>C201</td><td>63.5℃</td><td>84.5℃</td></tr> <tr><td>10</td><td>Q100</td><td>62.4℃</td><td>83.6℃</td></tr> <tr><td>11</td><td>L100</td><td>61.1℃</td><td>82.7℃</td></tr> <tr><td>12</td><td>C106</td><td>59.9℃</td><td>80.9℃</td></tr> <tr><td>13</td><td>C110</td><td>59.4℃</td><td>80.6℃</td></tr> <tr><td>14</td><td>Tc</td><td>60.9℃</td><td>80.3℃</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 32.5 ℃	HIGH AMBIENT Ta=53.7 ℃	1	L1	69.7℃	91.0℃	2	BD1	66.5℃	87.2℃	3	D1	68.5℃	90.2℃	4	Q1	72.1℃	93.8℃	5	U1	66.2℃	87.1℃	6	T1	71.1℃	92.3℃	7	C16	65.5℃	86.7℃	8	D101	73.3℃	94.1℃	9	C201	63.5℃	84.5℃	10	Q100	62.4℃	83.6℃	11	L100	61.1℃	82.7℃	12	C106	59.9℃	80.9℃	13	C110	59.4℃	80.6℃	14	Tc	60.9℃	80.3℃
NO	Position	ROOM AMBIENT Ta= 32.5 ℃	HIGH AMBIENT Ta=53.7 ℃																																																													
1	L1	69.7℃	91.0℃																																																													
2	BD1	66.5℃	87.2℃																																																													
3	D1	68.5℃	90.2℃																																																													
4	Q1	72.1℃	93.8℃																																																													
5	U1	66.2℃	87.1℃																																																													
6	T1	71.1℃	92.3℃																																																													
7	C16	65.5℃	86.7℃																																																													
8	D101	73.3℃	94.1℃																																																													
9	C201	63.5℃	84.5℃																																																													
10	Q100	62.4℃	83.6℃																																																													
11	L100	61.1℃	82.7℃																																																													
12	C106	59.9℃	80.9℃																																																													
13	C110	59.4℃	80.6℃																																																													
14	Tc	60.9℃	80.3℃																																																													
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 295VAC/90VAC O/P: FULL/80% LOAD Ta= -25℃	TEST: OK																																																												
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃ NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta=50 ℃ HUMIDITY= 95 %R.H	TEST: OK																																																												
4	TEMPERATURE COEFFICIENT	±0.03 %/℃(0~40℃)	I/P: 230 VAC O/P: FULL LOAD	±0.001%/℃																																																												
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45℃~ +85℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle: 5 CYCLE 5. Input/Output condition: AC OFF STATIC		TEST: OK																																																												





6	THERMAL SHOCK TEST	1. Thermal shock Temperature: Tcase=-25°C~ +45°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle: 16 CYCLE 5. Input/Output condition: 230VAC/Full 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: 10min/sweep cycle (4) Acceleration: 2G (5) Test Time: 60min in each axis (X.Y.Z) (6) Ta: 25°C	TEST: OK
8	CAPACITOR LIFE CYCLE	ODL-45-700: SUPPOSE C106 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= 50 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 50 °C LIFE TIME (4) I/P: 230VAC O/P: MIN LOAD Ta= 50 °C LIFE TIME	(1) 555640 HRS (2) 84189 HRS (3) 99615 HRS (4) 107091 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 408.8K hrs min. MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 85°C ; 50,000 hours @ Tcase 75°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY