



Test Report: LCM-40

40W Multiple-Stage Output Current LED Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control 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	VERDICT
1	RIPPLE & NOISE	V1 : 700 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	350mA : 75.2 mVp-p (Max) 500mA : 54.8 mVp-p (Max) 600mA : 38.8 mVp-p (Max) 700mA : 60.4 mVp-p (Max) 900mA : 36.8 mVp-p (Max) 1050mA : 36.6 mVp-p (Max)	P
2	NO LOAD O/P VOLTAGE	350mA : 100V~110V 500mA : 100V~110V 600mA : 100V~110V 700mA : 60V~65V 900mA : 60V~65V 1050mA : 60V~65V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	350mA : 102.69 V/230 VAC 500mA : 102.69 V/230 VAC 600mA : 102.69 V/230 VAC 700mA : 62.57 V/230 VAC 900mA : 62.57 V/230 VAC 1050mA : 62.57 V/230 VAC	P
3	RIPPLE CURRENT	±5%	I/P : 230VAC O/P : LED LOAD Ta : 25°C	350mA : ±1.9 % 500mA : ±2 % 600mA : ±1.8 % 700mA : ±1.7 % 900mA : ±1.5 % 1050mA : ±1.5 %	P
4	CURRENT ACCURACY	±5%	I/P : 230VAC O/P : MIN~MAX Ta : 25°C	350mA : ± 0.3 % 500mA : ± 0.2 % 600mA : ± 0.2 % 700mA : ± 0.1 % 900mA : ± 0.1 % 1050mA : ± 0.1 %	P
5	SET UP TIME	230VAC : 500 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 388 ms	P
6	RISE TIME	230VAC : 80 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 18 ms	P
7	HOLD UP TIME	230VAC : 16 ms (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 23 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~295 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	164 V~295V	P
			I/P : LOW-LINE-3V= 177 V (PLEASE CHECK DERATING CURVE) HIGH-LINE+10V=305 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST : OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 200 VAC ~ 295 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.975 / 230 VAC(TYP) 0.96 / 277 VAC(TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.993 / 230 VAC PF= 0.991 / 277 VAC	P
4	EFFICIENCY	91 % (TYP)	I/P : 230 VAC O/P : LED:80V @500mA Ta : 25°C	91.30 %	P
5	INPUT CURRENT	230V/ 0.23 A (TYP) 277V/ 0.2 A (TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.219 A/ 230 VAC I = 0.18 A/ 277 VAC	P
6	INRUSH CURRENT	230V/ 20 A (TYP) (twidth=260us measured at 50% Ipeak) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 18.2 A/ 230 VAC T50= 255 us	P
7	LEAKAGE CURRENT	< 0.5 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.003 mA N-FG : 0.002 mA	P
8	NO LOAD CONSUMPTION	< 1 W	I/P : 180VAC I/P : 230VAC I/P : 277VAC O/P : NO LOAD Ta : 25°C	< 0.955 W < 0.964 W < 0.979 W	P
9	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 75% or higher	I/P : 230 VAC O/P : 75% LOAD I/P : 277 VAC O/P : 75%LOAD Ta : 25°C	THD : 8.63 /230VAC THD : 11.82 /277VAC	P

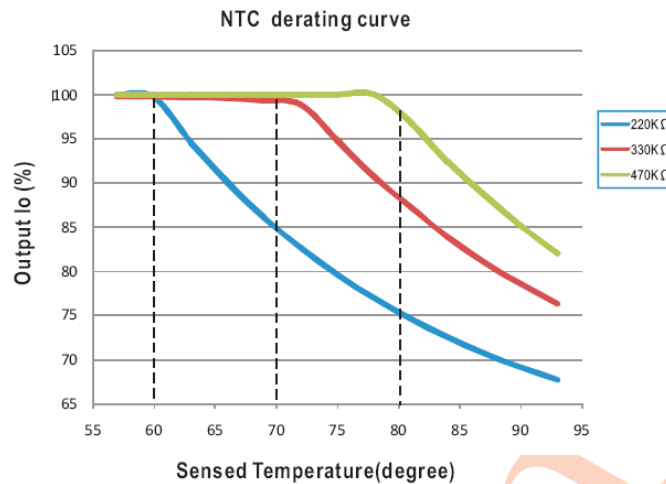
PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	CH1 : 110 V ~ 130 V	I/P : 230 VAC I/P : 180 VAC O/P : MIN LOAD Ta : 25°C	121.86V/ 230 VAC 122.09V/ 180VAC Shut down Re- power ON	P

2	OVER TEMPERATURE PROTECTION	Shut down Re-power ON	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down Re-power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 295 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Constant Current Limiting	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																	
1	AUXILIARY POWER	12V @ 50mA for driving fan; Tolerance $\pm 5\%$	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	12.085V/230V	P																																																	
2	DIP Switch Table	LCM-40 is a multiple-stage output current supply, selection of output current through DIP switch as table below. <table><tr><th>Io \ DIP S.W.</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr><tr><td>350mA</td><td>----</td><td>----</td><td>----</td><td>----</td><td>----</td><td>----</td></tr><tr><td>500mA</td><td>ON</td><td>----</td><td>----</td><td>----</td><td>----</td><td>----</td></tr><tr><td>600mA(Factory Setting)</td><td>ON</td><td>ON</td><td>----</td><td>----</td><td>----</td><td>----</td></tr><tr><td>700mA</td><td>ON</td><td>ON</td><td>ON</td><td>----</td><td>----</td><td>ON</td></tr><tr><td>900mA</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>----</td><td>ON</td></tr><tr><td>1050mA</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td></tr></table> TEST : OK			Io \ DIP S.W.	1	2	3	4	5	6	350mA	----	----	----	----	----	----	500mA	ON	----	----	----	----	----	600mA(Factory Setting)	ON	ON	----	----	----	----	700mA	ON	ON	ON	----	----	ON	900mA	ON	ON	ON	ON	----	ON	1050mA	ON	ON	ON	ON	ON	ON	P
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3	TEMP. COMPENSATION	SPECIFICATION: LCM-40 have the built-in temperature compensation function ($T \uparrow$, $I_o \downarrow$). By connecting a temperature sensor (NTC resistor) between the NTC +/- terminal of LCM-40 and the detecting point on the lighting system or the surrounding environment, output current of LCM-40 could be correspondingly changed to ensure the long life of LED. 1.LCM-40 can still be operated well when the NTC resistor is not connected and the value of output current will be the current level that you set 2. <table><tr><th>NTC resistance</th><th>Output Current</th></tr><tr><td>220K</td><td>< 60℃, 100% of the rated current (corresponds to the setting current level) < 70℃, 100% of the rated current (corresponds to the setting current level)</td></tr><tr><td>330K</td><td>< 80℃, 100% of the rated current (corresponds to the setting current level) > 60℃, output current begin to reduce, details please refer to the curve.</td></tr><tr><td>470K</td><td>> 70℃, output current begin to reduce, details please refer to the curve. > 80℃, output current begin to reduce, details please refer to the curve.</td></tr></table> Notes: 1. MW does not offer the NTC resistor and all the data above are measured by using THINKING TTC03 series. 2. If other brands of NTC resistor is applied,please check the temperature curve first. 3. Synchronization function of the power supply will be invalid when the "temperature compensation" function is in use TEST CONDITION : I/P : 230 VAC RESULT:OK			NTC resistance	Output Current	220K	< 60℃, 100% of the rated current (corresponds to the setting current level) < 70℃, 100% of the rated current (corresponds to the setting current level)	330K	< 80℃, 100% of the rated current (corresponds to the setting current level) > 60℃, output current begin to reduce, details please refer to the curve.	470K	> 70℃, output current begin to reduce, details please refer to the curve. > 80℃, output current begin to reduce, details please refer to the curve.	P																																									
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- 4** Dimming function
- .Built-in 2 in 1 dimming function, output constant current level can be adjusted through output terminal by 0 ~ 10Vdc or 10V PWM signal between DIM+ and DIM-.
- .Please DO NOT connect "DIM-" to "-V".
- .0 ~ 10V dimming function for output current adjustment (Typical)

O/P Current	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
0.5A	0%	11%	21.2%	31%	41.2%	51.4%	61.6%	71.6%	81.8%	92%	100%
1.05A	0%	11.33%	21.24%	31.24%	41.43%	51.62%	61.71%	71.71%	81.81%	91.9%	99.9%

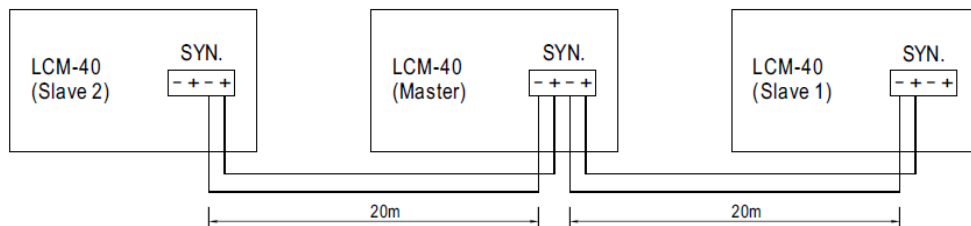
.10V PWM signal for output current adjustment (Typical): Frequency range :100Hz ~ 3KHz

O/P Current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0.5A	0%	13.2%	23%	32.8%	42.4%	52%	61.8%	71.2%	80.8%	90.4%	100%
1.05A	0%	13.9%	23.33%	32.95%	42.57%	52.19%	61.81%	71.24%	80.76%	90.38%	99.81%

- 5** SYNCHRONIZATION OPERATION

SPECIFICATION:

- 10 drivers(max.) synchronization (1 master + 9 slaves)
- Maximum cable length between each units : 20 meter.



TEST CONDITION : I/P : 230 VAC FULL LOAD

RESULT:OK

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	U2 Rated 550V/5.2A	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 438 V (2) 432 V (3) 436 V	P
2	Diode Peak Voltage	D100 Rated 300V/10A	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 122 V (2) 9 V (3) 88.8 V	P
3	Input Capacitor Voltage	C5 Rated: 22u/450V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 436 V (2) 436 V (3) 440 V	P
4	Control IC Voltage Test	U2 Rated 11.4V ~15V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 13 V (2) 12.8 V (3) 13 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 7.3A/650V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 444 V (2) 444 V (3) 440 V	P

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min	I/P-O/P : 4 KVAC/min Ta : 25°C	I/P-O/P : 2.29 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70%RH	I/P-O/P : 30 GΩ NO DAMAGE	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
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	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																																
1	TEMPERATURE RISE TEST	MODEL : LCM-40 DIP switch : 1050mA 1. ROOM AMBIENT BURN-IN : 14 HRS I/P : 230VAC O/P : FULL LOAD Ta=24.4 °C 2. HIGH AMBIENT BURN-IN : 52 HRS I/P : 230VAC O/P : FULL LOAD Ta= 51.4 °C <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 24.4 °C</th><th>HIGH AMBIENT Ta= 51.4 °C</th></tr></thead><tbody><tr><td>1</td><td>C11</td><td>70.9°C</td><td>90.7°C</td></tr><tr><td>2</td><td>C12</td><td>69.5°C</td><td>90.7°C</td></tr><tr><td>3</td><td>RG1</td><td>65.2°C</td><td>92.1°C</td></tr><tr><td>4</td><td>LF2</td><td>61.5°C</td><td>81.0°C</td></tr><tr><td>5</td><td>BD1</td><td>70.1°C</td><td>90.0°C</td></tr><tr><td>6</td><td>L1</td><td>60.5°C</td><td>81.9°C</td></tr><tr><td>7</td><td>L2</td><td>69.2°C</td><td>88.8°C</td></tr><tr><td>8</td><td>C60</td><td>66.1°C</td><td>87.2°C</td></tr><tr><td>9</td><td>C5</td><td>68.8°C</td><td>93.8°C</td></tr><tr><td>10</td><td>C61</td><td>73.8°C</td><td>93.8°C</td></tr><tr><td>11</td><td>U2</td><td>74.3°C</td><td>107.2°C</td></tr><tr><td>12</td><td>D91</td><td>72.9°C</td><td>101.0°C</td></tr><tr><td>13</td><td>C36</td><td>60.9°C</td><td>91.4°C</td></tr><tr><td>14</td><td>C92</td><td>76.6°C</td><td>104.2°C</td></tr><tr><td>15</td><td>RTH2</td><td>70.8°C</td><td>96.8°C</td></tr><tr><td>16</td><td>T1</td><td>82.8°C</td><td>106.5°C</td></tr><tr><td>17</td><td>C203</td><td>68.5°C</td><td>88.3°C</td></tr><tr><td>18</td><td>C105</td><td>57.3°C</td><td>80.9°C</td></tr><tr><td>19</td><td>LF100</td><td>57.7°C</td><td>78.7°C</td></tr><tr><td>20</td><td>Q1</td><td>69.1°C</td><td>88.2°C</td></tr><tr><td>21</td><td>D8</td><td>72.2°C</td><td>89.2°C</td></tr><tr><td>22</td><td>D100</td><td>76.0°C</td><td>105.1°C</td></tr><tr><td>23</td><td>U905</td><td>66.9°C</td><td>84.4°C</td></tr></tbody></table>			NO	Position	ROOM AMBIENT Ta= 24.4 °C	HIGH AMBIENT Ta= 51.4 °C	1	C11	70.9°C	90.7°C	2	C12	69.5°C	90.7°C	3	RG1	65.2°C	92.1°C	4	LF2	61.5°C	81.0°C	5	BD1	70.1°C	90.0°C	6	L1	60.5°C	81.9°C	7	L2	69.2°C	88.8°C	8	C60	66.1°C	87.2°C	9	C5	68.8°C	93.8°C	10	C61	73.8°C	93.8°C	11	U2	74.3°C	107.2°C	12	D91	72.9°C	101.0°C	13	C36	60.9°C	91.4°C	14	C92	76.6°C	104.2°C	15	RTH2	70.8°C	96.8°C	16	T1	82.8°C	106.5°C	17	C203	68.5°C	88.3°C	18	C105	57.3°C	80.9°C	19	LF100	57.7°C	78.7°C	20	Q1	69.1°C	88.2°C	21	D8	72.2°C	89.2°C	22	D100	76.0°C	105.1°C	23	U905	66.9°C	84.4°C	P
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 230VAC/100VAC O/P : 100 % LOAD Ta= -35 °C	TEST : OK	P																																																																																																
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																																
4	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.00009 %/°C (0~50°C)	P																																																																																																
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	P																																																																																																

6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35℃~ +50℃ 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/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec	OK	P
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℃	TEST : OK	P
8	CAPACITOR LIFE CYCLE	LCM-40 ;SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40 ℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 ℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 ℃ LIFE TIME	(1) 265887HRS (2) 118973HRS (3) 118973HRS (4) 119786HRS	P
9	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 193.6 KHRS		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 75℃ 50,000 hours @ Tcase 65℃		P

TESTER	REVIEW	APPROVAL
DANIEL GAO	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023