



# Test Report: LCM-25DA

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25W 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 : 400 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	350mA : 58.0 mVp-p (Max) 500mA : 62.4 mVp-p (Max) 600mA : 70.4 mVp-p (Max) 700mA : 62.0 mVp-p (Max) 900mA : 77.2 mVp-p (Max) 1050mA : 86.8 mVp-p (Max)	PASS
2	NO LOAD O/P VOLTAGE	350mA : 59V (Max) 500mA : 59V (Max) 600mA : 59V (Max) 700mA : 41V (Max) 900mA : 41V (Max) 1050mA : 41V (Max)	I/P : 230 VAC O/P : NO LOAD Ta : 25°C	350mA : 56.30 V 500mA : 56.30 V 600mA : 56.30 V 700mA : 39.59 V 900mA : 39.59 V 1050mA : 39.59 V	PASS
3	RIPPLE CURRENT	±5%	I/P : 230VAC O/P : LED LOAD Ta : 25°C	350mA : ± 4.57 % 500mA : ± 4.40 % 600mA : ± 4.00 % 700mA : ± 4.86 % 900mA : ± 4.00 % 1050mA : ± 4.95 %	PASS
4	CURRENT ACCURACY	±5%	I/P : 230VAC O/P : MIN-MAX Ta : 25°C	350mA : ± 2.66 % 500mA : ± 2.30 % 600mA : ± 2.68 % 700mA : ± 2.69 % 900mA : ± 2.87 % 1050mA : ± 1.19 %	PASS
5	SET UP TIME	230VAC : 500 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 358 ms	PASS
6	RISE TIME	230VAC : 50 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 16 ms	PASS
7	HOLD UP TIME	230VAC : 30 ms (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 40 ms	PASS
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	PASS

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~277 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	180 V~277V	PASS
			I/P : (1)LOW-LINE-3V=177 V HIGH-LINE+10V=287 V O/P:FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)I/P:230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)I/P:230Vac ON: 0.3 Sec OFF: 0.3 Sec 12HOURS ( AC POWER ON/OFF NO DAMAGE )	TEST: (1) OK (2) OK (3) OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 180 VAC ~ 295 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	PASS
3	POWER FACTOR	0.94 / 230 VAC(TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.978 / 230 VAC	PASS
		0.91 / 277 VAC(TYP)		PF= 0.957 / 277 VAC	
4	EFFICIENCY	86 % (TYP)	I/P : 230 VAC O/P : LED:50V @500mA Ta : 25°C	86.21 %	PASS
5	INPUT CURRENT	230V/ 0.17 A (TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.136 A/ 230 VAC	PASS
		277V/ 0.15 A (TYP)		I = 0.116 A/ 277 VAC	
6	INRUSH CURRENT	230V/ 20 A (TYP) (twidth=260us measured at 50% I <sub>peak</sub> ) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 15.3 A/ 230 VAC T50= 160 us	PASS
7	LEAKAGE CURRENT	< 0.5 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.0025 mA N-FG : 0.0025 mA	PASS
8	NO LOAD CONSUMPTION	< 0.5 W	I/P : 230VAC O/P : NO LOAD Ta : 25°C	0.452 W	PASS
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 : 50% LOAD I/P : 277 VAC O/P : 75%LOAD Ta : 25°C	THD : 15.19% /230VAC	PASS
				THD : 14.46% /277VAC	

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER TEMPERATURE PROTECTION	Shut down Re-power ON	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down	PASS
2	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, recovers automatically after fault condition is removed	PASS

**CONTROL FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																								
1	DIP Switch Table	<p>LCM-25DA is a multiple-stage output current supply, selection of output current through DIP switch as table below</p> <table border="1"> <thead> <tr> <th>Io</th> <th colspan="6">DIP S.W.</th> </tr> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> </thead> <tbody> <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</td> <td>ON</td> <td>ON</td> <td>----</td> <td>----</td> <td>----</td> <td>----</td> </tr> <tr> <td>700mA(Factory Setting)</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> </tbody> </table> <p>TEST : OK</p>	Io	DIP S.W.							1	2	3	4	5	6	350mA	----	----	----	----	----	----	500mA	ON	----	----	----	----	----	600mA	ON	ON	----	----	----	----	700mA(Factory Setting)	ON	ON	ON	----	----	ON	900mA	ON	ON	ON	ON	----	ON	1050mA	ON	ON	ON	ON	ON	ON			PASS
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2	Dimming function	<p>※ PUSH dim(primary side)</p> <table border="1"> <tbody> <tr> <td>Ignore</td> <td>To avoid reaction on AC spike</td> <td>&lt;0.05 sec.</td> </tr> <tr> <td>Short push</td> <td>Push to turn ON-OFF</td> <td>0.1~1 sec.</td> </tr> <tr> <td>Long push</td> <td>Dimming up or down</td> <td>1.5~10 sec.</td> </tr> <tr> <td>Reset push</td> <td>Setting light to 100%</td> <td>&gt;11 sec.</td> </tr> </tbody> </table> <p>.Maximum number of drivers up to 10 pcs.          .Maximum length of the cable, from push button to the last driver is 135 meter.          .Factory setting at 100%.          .Every long pushing action will change the dimming direction.</p> <p>Warning: The push button can only be connected in between the PUSH terminal of LCM-25DA and AC/L (brown or black color). It would cause short circuit if it is connected to AC/N.</p> <p>※DALI interface(primary side)          .DALI protocol including 16 groups and 64 addresses.          .First step is fixed at 6% light output.          TEST CONDITION : I/P : 230 VAC FULL LOAD          RESULT : OK</p>	Ignore	To avoid reaction on AC spike	<0.05 sec.	Short push	Push to turn ON-OFF	0.1~1 sec.	Long push	Dimming up or down	1.5~10 sec.	Reset push	Setting light to 100%	>11 sec.			PASS																																												
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3	SYNCHRONIZATION OPERATION	<p>SPECIFICATION:</p> <ul style="list-style-type: none"> <li>- Synchronization up to 10 drivers (1 master + 9 slaves)</li> <li>- Dimming operating range : 10%~100%</li> <li>- Sync cable length : &lt; 5m</li> <li>- Sync cable type : Flat cable</li> <li>- Sync cable cross section area : 22 - 24AWG (0.2~0.3mm<sup>2</sup>)</li> </ul> <p>- CN100, CN101 : used to synchronously control the LCM units in parallel.</p> <p>TEST CONDITION : I/P : 230 VAC FULL LOAD          RESULT : OK</p>			PASS																																																								

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q2 Rated 950V/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) 808 V (2) 442 V (3) 800 V	PASS
2	Diode Peak Voltage	D101 Rated 200V/4A	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) 166 V (2) 149 V (3) 136 V	PASS
3	Input Capacitor Voltage	C5 Rated 10u/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) 436 V	PASS
4	Control IC Voltage Test	U2 Rated 26V  U1 Rated 22.5V	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	U2 (1) 17.9 V (2) 18.0 V (3) 17.9 V  U1 (1) 19.5 V (2) 19.6 V (3) 19.5 v	PASS
5	Power Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated 600V/4A	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) 488 V (2) 416 V (3) 426 V	PASS

### ■ SAFETY & E.M.C. TEST

#### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min I/P-DA±: 1.875KVAC O/P-DA±: 1.875KVAC	I/P-O/P: 4.2 KVAC/min I/P-DA±: 2.25KVAC O/P-DA±: 2.25KVAC Ta : 25°C	I/P-O/P: 0.978 mA I/P-DA±: 0.032 mA O/P-DA±: 0.031 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500 VDC Ta: 25°C /70%RH	I/P-O/P : >9999 MΩ NO DAMAGE	PASS

**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/50% LOAD Ta : 25°C	PASS	<b>PASS</b>
2	CONDUCTION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	<b>PASS</b>
3	RADIATION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	<b>PASS</b>
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	<b>PASS</b>
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	<b>PASS</b>
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	<b>PASS</b>
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-25DA      DIP switch : 1050mA 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= 42.1 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 28.2 °C</th> <th>HIGH AMBIENT Ta= 42.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>76.1°C</td><td>85.5°C</td></tr> <tr><td>2</td><td>C61</td><td>70.8°C</td><td>80.2°C</td></tr> <tr><td>3</td><td>C11</td><td>71.2°C</td><td>80.5°C</td></tr> <tr><td>4</td><td>C42</td><td>82.2°C</td><td>91.6°C</td></tr> <tr><td>5</td><td>LF1</td><td>55.1°C</td><td>64.9°C</td></tr> <tr><td>6</td><td>Q1</td><td>81.1°C</td><td>90.2°C</td></tr> <tr><td>7</td><td>Q2</td><td>98.9°C</td><td>108.9°C</td></tr> <tr><td>8</td><td>T1</td><td>91.2°C</td><td>100.6°C</td></tr> <tr><td>9</td><td>L1</td><td>64.0°C</td><td>73.5°C</td></tr> <tr><td>10</td><td>RTH1</td><td>83.6°C</td><td>92.6°C</td></tr> <tr><td>11</td><td>C2</td><td>62.0°C</td><td>71.8°C</td></tr> <tr><td>12</td><td>C105</td><td>87.8°C</td><td>96.8°C</td></tr> <tr><td>13</td><td>C106</td><td>72.9°C</td><td>82.3°C</td></tr> <tr><td>14</td><td>C203</td><td>77.7°C</td><td>87.0°C</td></tr> <tr><td>15</td><td>BD1</td><td>68.0°C</td><td>77.4°C</td></tr> <tr><td>16</td><td>U1</td><td>77.7°C</td><td>87.2°C</td></tr> <tr><td>17</td><td>U100</td><td>71.1°C</td><td>80.5°C</td></tr> <tr><td>18</td><td>ZNR1</td><td>52.1°C</td><td>62.5°C</td></tr> <tr><td>19</td><td>D101</td><td>102.5°C</td><td>111.4°C</td></tr> <tr><td>20</td><td>L3</td><td>71.3°C</td><td>80.6°C</td></tr> <tr><td>21</td><td>RTH2</td><td>78.8°C</td><td>88.4°C</td></tr> <tr><td>22</td><td>U301</td><td>66.1°C</td><td>75.7°C</td></tr> <tr><td>23</td><td>U905</td><td>73.3°C</td><td>83.0°C</td></tr> <tr><td>24</td><td>CASE</td><td>68.6°C</td><td>79.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 28.2 °C	HIGH AMBIENT Ta= 42.1 °C	1	C5	76.1°C	85.5°C	2	C61	70.8°C	80.2°C	3	C11	71.2°C	80.5°C	4	C42	82.2°C	91.6°C	5	LF1	55.1°C	64.9°C	6	Q1	81.1°C	90.2°C	7	Q2	98.9°C	108.9°C	8	T1	91.2°C	100.6°C	9	L1	64.0°C	73.5°C	10	RTH1	83.6°C	92.6°C	11	C2	62.0°C	71.8°C	12	C105	87.8°C	96.8°C	13	C106	72.9°C	82.3°C	14	C203	77.7°C	87.0°C	15	BD1	68.0°C	77.4°C	16	U1	77.7°C	87.2°C	17	U100	71.1°C	80.5°C	18	ZNR1	52.1°C	62.5°C	19	D101	102.5°C	111.4°C	20	L3	71.3°C	80.6°C	21	RTH2	78.8°C	88.4°C	22	U301	66.1°C	75.7°C	23	U905	73.3°C	83.0°C	24	CASE	68.6°C	79.5°C		PASS
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 277VAC/200VAC O/P : 100% LOAD Ta= -30 °C	TEST : OK	PASS																																																																																																				
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 285 VAC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK	PASS																																																																																																				
4	TEMPERATURE COEFFICIENT	±0.03 %/°C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.003 %/°C (0~50°C)	PASS																																																																																																				

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	OK	PASS
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +45°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/Full Load AC ON/OFF TEST turn on 58sec; turn off 2sec	OK	PASS
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 90min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	LCM-25DA : SUPPOSE C105 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= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 44646 HRS (2) 22160 HRS (3) 28026 HRS (4) 42583 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 298.6 KHRS		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 85°C		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHOUB/ ZHUOKB	SKY	LIUWY

2009/08/04 A50-G058