



# Test Report: IDLC-45-1400

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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	19V~32V	I/P: 230VAC O/P: LED MODE Ta: 25°C	17V~34V
2	CURRENT RIPPLE	5% max@rated current	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	2.42%
3	CURRENT TOLERANCE	±7%	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	±0.71%
4	OPEN CIRCUIT VOLTAGE (max)	50V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	44.44V
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	430ms/230VAC 440ms/115VAC
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p> <p>Trig?</p> <p>Δ: 28.9 V @: 28.8 V Δ: 430ms @: 128ms</p> <p>Ch1 6.00 V Ch2 250 V M 100ms A Ch1 24.2 V</p> <p>50.00 %</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p> <p>Δ: 15.0 V @: -2.00 V Δ: 440ms @: -278ms</p> <p>Ch1 6.00 V Ch2 100 V M 100ms A Ch1 25.6 V</p> <p>50.00 %</p> </div> </div>				
7	AUXILIARY DC OUTPUT (A-Type only)	Nominal 12V (deviation 11.4~12.6) @50mA	I/P: 230 VAC O/P: FULL LOAD	11.95 V

8	DIMMING TEST	<p>SPEC:</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> <li>• DO NOT connect "DIM-" to "Vo-".</li> </ul> <p>◎ Applying additive 0 ~ 10VDC:</p> <table border="1"> <tr> <td>Dimming input additive voltage</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>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> </table> <p>◎ Applying additive 10V PWM signal (frequency range 100Hz~3KHz):</p> <table border="1"> <tr> <td>Duty cycle of additive 10V PWM signal dimming input</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>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> </table> <p>TEST RESULT: I/P: 230 VAC; Ta: 25°C</p> <table border="1"> <tr> <td rowspan="3">1</td> <td>Dimming voltage</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>0.138</td><td>0.290</td><td>0.424</td><td>0.563</td><td>0.699</td><td>0.840</td><td>0.980</td><td>1.110</td><td>1.250</td><td>1.388</td> </tr> <tr> <td>Percentage of rated current</td> <td>0.00%</td><td>9.86%</td><td>20.71%</td><td>30.29%</td><td>40.21%</td><td>49.93%</td><td>60.00%</td><td>70.00%</td><td>79.29%</td><td>89.29%</td><td>99.14%</td> </tr> <tr> <td rowspan="3">2</td> <td>Dimming Duty cycle</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>0.145</td><td>0.294</td><td>0.432</td><td>0.566</td><td>0.703</td><td>0.837</td><td>0.970</td><td>1.107</td><td>1.243</td><td>1.365</td> </tr> <tr> <td>Percentage of rated current</td> <td>0.00%</td><td>10.36%</td><td>21.00%</td><td>30.83%</td><td>40.44%</td><td>50.19%</td><td>59.79%</td><td>69.29%</td><td>79.07%</td><td>88.79%</td><td>97.50%</td> </tr> </table>											Dimming input additive voltage	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Duty cycle of additive 10V PWM signal dimming input	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	1	Dimming voltage	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output Current	0A	0.138	0.290	0.424	0.563	0.699	0.840	0.980	1.110	1.250	1.388	Percentage of rated current	0.00%	9.86%	20.71%	30.29%	40.21%	49.93%	60.00%	70.00%	79.29%	89.29%	99.14%	2	Dimming Duty cycle	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output Current	0A	0.145	0.294	0.432	0.566	0.703	0.837	0.970	1.107	1.243	1.365	Percentage of rated current	0.00%	10.36%	21.00%	30.83%	40.44%	50.19%	59.79%	69.29%	79.07%	88.79%	97.50%
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**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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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=0.446A/ 115VAC I=0.225A/ 230VAC I=0.194A/ 277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-CASE: 0.0029 mA N-CASE: 0.0029 mA
5	NO LOAD POWER CONSUMPTION	< 0.5W for Blank-Type < 1.2W for A-Type	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.325W for Blank-Type 0.458W for A-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=22.5A/ 230VAC Twidth =80.8us
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: AC Input Voltage CH2: Input current</p> <p>△: 100mA @: 11.1 A △: 80.8µs @: 1.60µs</p> <p>Ch1 最大 326 V Ch2 最大 22.5 A</p> <p>40.0000µs</p>				
7	EFFICIENCY(Typ)	83%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	86.41%

<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>78.0</td> <td>79.0</td> <td>79.0</td> </tr> <tr> <td>60%</td> <td>80.5</td> <td>81.5</td> <td>81.0</td> </tr> <tr> <td>70%</td> <td>82.5</td> <td>83.5</td> <td>82.5</td> </tr> <tr> <td>80%</td> <td>84.0</td> <td>84.5</td> <td>83.5</td> </tr> <tr> <td>90%</td> <td>85.5</td> <td>85.5</td> <td>84.5</td> </tr> <tr> <td>100%</td> <td>86.0</td> <td>86.5</td> <td>85.0</td> </tr> </tbody> </table>				LOAD	277V	230V	115V	50%	78.0	79.0	79.0	60%	80.5	81.5	81.0	70%	82.5	83.5	82.5	80%	84.0	84.5	83.5	90%	85.5	85.5	84.5	100%	86.0	86.5	85.0
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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=0.985/ 115VAC PF=0.980/ 230VAC PF=0.949/ 277VAC																											
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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=10.35% @60% load /115VAC THD=11.62% @60% load /230VAC THD=9.04% @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>12.0</td> <td>12.0</td> <td>11.5</td> </tr> <tr> <td>60%</td> <td>9.0</td> <td>11.5</td> <td>10.5</td> </tr> <tr> <td>70%</td> <td>9.0</td> <td>10.5</td> <td>10.0</td> </tr> <tr> <td>80%</td> <td>9.0</td> <td>10.0</td> <td>9.0</td> </tr> <tr> <td>90%</td> <td>9.5</td> <td>10.0</td> <td>8.5</td> </tr> <tr> <td>100%</td> <td>9.5</td> <td>9.5</td> <td>9.0</td> </tr> </tbody> </table>				LOAD	277V	230V	115V	50%	12.0	12.0	11.5	60%	9.0	11.5	10.5	70%	9.0	10.5	10.0	80%	9.0	10.0	9.0	90%	9.5	10.0	8.5	100%	9.5	9.5	9.0
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**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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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
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### 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) 758V (2) 752V (3) 720V
2	O/P Diode (MOSFET)	D100 Rated 400V/16A	I/P: High-Line +3V =298V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 246V (2) 253V (3) 242V
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) 15.0V (2) 14.6V (3) 14.5V
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) 494V (2) 484V

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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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: 1.630mA 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	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
6	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N: 1KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

**■ RELIABILITY TEST****ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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1	TEMPERATURE RISE TEST	<p>MODEL: IDLC-45-1400</p> <p>1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 24.8°C</p> <p>2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 38.5°C</p> <table border="1" data-bbox="507 443 1380 1146"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.8°C</th> <th>HIGH AMBIENT Ta=38.5 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>L1</td><td>85.6°C</td><td>99.2°C</td></tr> <tr><td>2</td><td>C7</td><td>74.2°C</td><td>86.6°C</td></tr> <tr><td>3</td><td>BD1</td><td>81.0°C</td><td>93.8°C</td></tr> <tr><td>4</td><td>D1</td><td>90.7°C</td><td>99.5°C</td></tr> <tr><td>5</td><td>Q1</td><td>88.6°C</td><td>103.5°C</td></tr> <tr><td>6</td><td>U1</td><td>76.3°C</td><td>88.9°C</td></tr> <tr><td>7</td><td>T1</td><td>88.8°C</td><td>103.1°C</td></tr> <tr><td>8</td><td>C16</td><td>74.5°C</td><td>87.2°C</td></tr> <tr><td>9</td><td>RG1</td><td>102.1°C</td><td>113.5°C</td></tr> <tr><td>10</td><td>D100</td><td>97.0°C</td><td>111.3°C</td></tr> <tr><td>11</td><td>C201</td><td>87.7°C</td><td>100.6°C</td></tr> <tr><td>12</td><td>Q100</td><td>93.6°C</td><td>107.6°C</td></tr> <tr><td>13</td><td>L100</td><td>98.3°C</td><td>115.3°C</td></tr> <tr><td>14</td><td>C106</td><td>80.5°C</td><td>95.0°C</td></tr> <tr><td>15</td><td>C107</td><td>73.4°C</td><td>92.2°C</td></tr> <tr><td>16</td><td>U100</td><td>95.6°C</td><td>107.1°C</td></tr> <tr><td>17</td><td>D103</td><td>82.4°C</td><td>93.8°C</td></tr> <tr><td>18</td><td>R136</td><td>96.2°C</td><td>105.4°C</td></tr> <tr><td>19</td><td>TC</td><td>67.4°C</td><td>78.4°C</td></tr> </tbody> </table>			NO	Position	ROOM AMBIENT Ta= 24.8°C	HIGH AMBIENT Ta=38.5 °C	1	L1	85.6°C	99.2°C	2	C7	74.2°C	86.6°C	3	BD1	81.0°C	93.8°C	4	D1	90.7°C	99.5°C	5	Q1	88.6°C	103.5°C	6	U1	76.3°C	88.9°C	7	T1	88.8°C	103.1°C	8	C16	74.5°C	87.2°C	9	RG1	102.1°C	113.5°C	10	D100	97.0°C	111.3°C	11	C201	87.7°C	100.6°C	12	Q100	93.6°C	107.6°C	13	L100	98.3°C	115.3°C	14	C106	80.5°C	95.0°C	15	C107	73.4°C	92.2°C	16	U100	95.6°C	107.1°C	17	D103	82.4°C	93.8°C	18	R136	96.2°C	105.4°C	19	TC	67.4°C	78.4°C
NO	Position	ROOM AMBIENT Ta= 24.8°C	HIGH AMBIENT Ta=38.5 °C																																																																																	
1	L1	85.6°C	99.2°C																																																																																	
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6	U1	76.3°C	88.9°C																																																																																	
7	T1	88.8°C	103.1°C																																																																																	
8	C16	74.5°C	87.2°C																																																																																	
9	RG1	102.1°C	113.5°C																																																																																	
10	D100	97.0°C	111.3°C																																																																																	
11	C201	87.7°C	100.6°C																																																																																	
12	Q100	93.6°C	107.6°C																																																																																	
13	L100	98.3°C	115.3°C																																																																																	
14	C106	80.5°C	95.0°C																																																																																	
15	C107	73.4°C	92.2°C																																																																																	
16	U100	95.6°C	107.1°C																																																																																	
17	D103	82.4°C	93.8°C																																																																																	
18	R136	96.2°C	105.4°C																																																																																	
19	TC	67.4°C	78.4°C																																																																																	
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 295VAC/90VAC O/P: FULL/80% LOAD Ta= -25°C	TEST: OK																																																																																
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta=40 °C HUMIDITY= 95 %R.H	TEST: OK																																																																																
4	TEMPERATURE COEFFICIENT	±0.03 %/°C(0~40°C)	I/P: 230 VAC O/P: FULL LOAD	±0.006%/°C																																																																																
5	STORAGE TEMPERATURE TEST	<p>1. Thermal shock Temperature: -45°C~ +85°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle: 5 CYCLE</p> <p>5. Input/Output condition: AC OFF STATIC</p>																																																																																		
6	THERMAL SHOCK TEST	<p>1. Thermal shock Temperature: Tcase=-25°C~ +85°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle: 16 CYCLE</p> <p>5. Input/Output condition: 230VAC/Full Load AC ON/OFF TEST AC on 3 sec/AC off 1 sec TEST</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°C	TEST: OK
8	CAPACITOR LIFE CYCLE	IDLC-45-1400: 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= 40 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 40 °C LIFE TIME (4) I/P: 230VAC O/P: MIN LOAD Ta= 40 °C LIFE TIME	(1) 78208 HRS (2) 26118 HRS (3) 35037 HRS (4) 46968 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 75°C ; 50,000 hours @ Tcase 65°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Carychen/ZHUOKB	SKY	LIUWY