Test Report: XLC-40-H

40W Multiple-Stage Constant Power LED Driver

■ 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

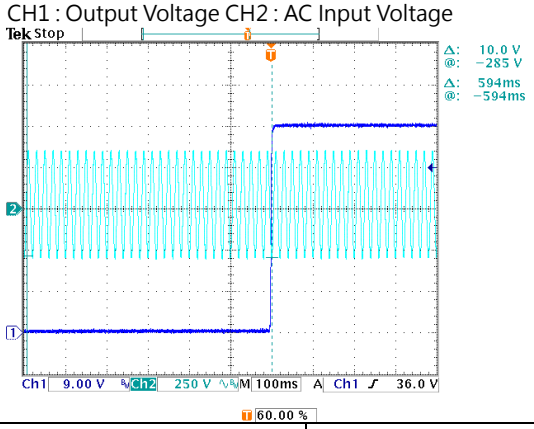
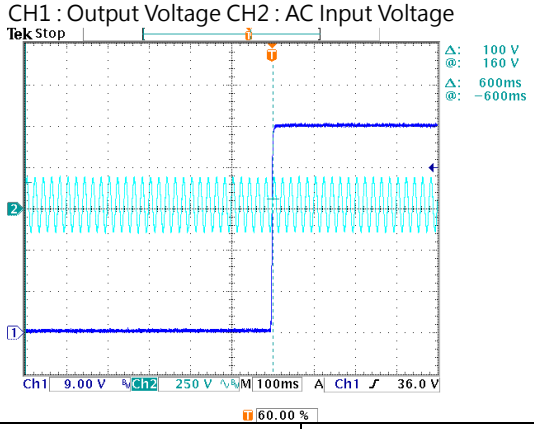
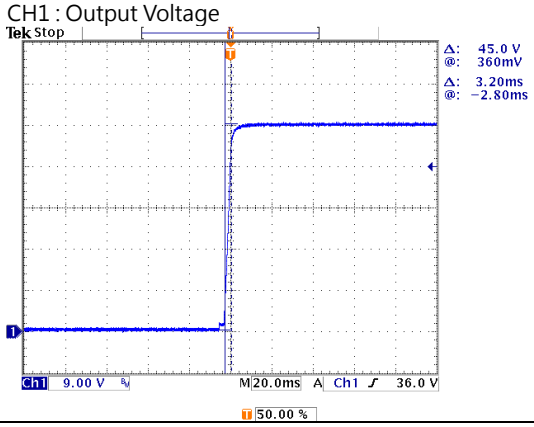
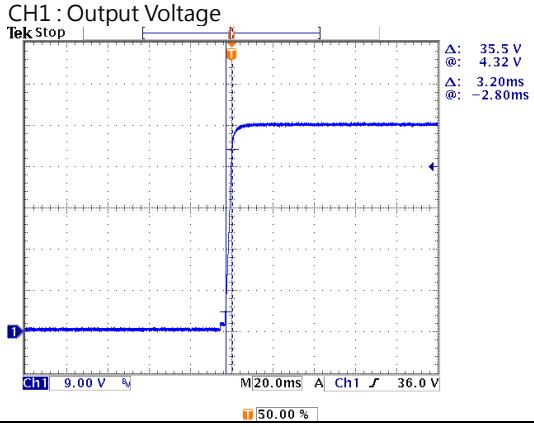
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

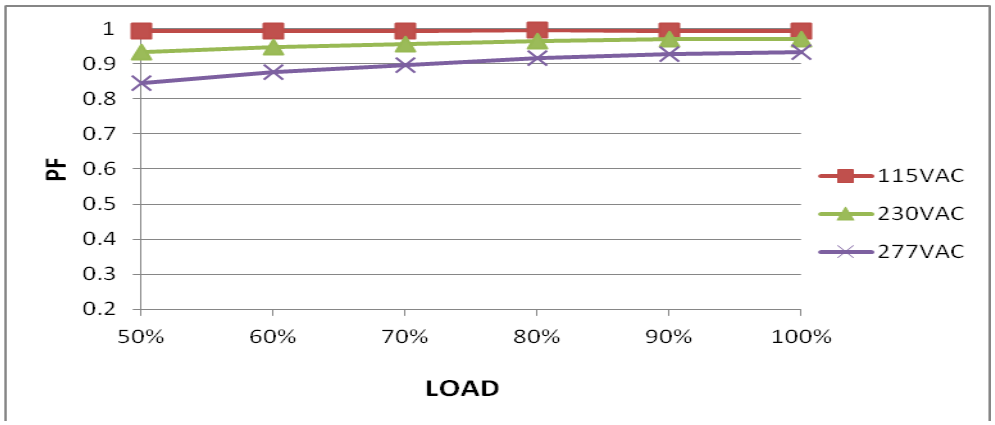
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	± 5%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	1.057 A /230VAC@CV MAX-1V 1.064A /230VAC@CV MIN 1.072A/115VAC@CV MAX-1V 1.062A/115VAC@CV MIN 2.09%
2	CURRENT ADJ. RANGE (BY DIP SWITCH)	CH1:600mA/700mA/800 mA/900mA/1050mA/ 1200mA/1300mA/14 00mA	I/P: 230VAC O/P:CVmin& CVmax-1V CP: 0.6A ~1.05A Ta:25℃	0.611mA/230VAC@CV MAX-1V 0.608mA /230VAC@CV MIN 0.707mA/230VAC@CV MAX-1V 0.704mA/230VAC@CV MIN 0.822mA/230VAC@CV MAX-1V 0.812mA/230VAC@CV MIN 0.899mA/230VAC@CV MAX-1V 0.895mA /230VAC@CV MIN 1.057mA/230VAC@CV MAX-1V 1.064mA /230VAC@CV MIN 1.208mA/230VAC@CV MAX-1V 1.203mA /230VAC@CV MIN 1.312mA/230VAC@CV MAX-1V 1.302mA /230VAC@CV MIN 1.395mA/230VAC@CV MAX-1V 1.393mA /230VAC@CV MIN
3	OPEN CIRCUIT VOLTAGE (max)	60V	I/P: 230VAC O/P: OPEN Ta:25℃	58V
4	CONSTANT CURRENT OPERATION VOLTAGE	CH1: 9V~ 54V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	7.9V~ 56.1V /230VAC
5	CURRENT RIPPLE	< 4%	I/P: 230 VAC I/P:115VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	230VAC: 2.45% 115VAC: 2.26%

6	SET UP TIME (Max)	230VAC/500ms 115VAC/1000ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	230VAC/ 594ms 115 VAC/ 600ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 	
7	RISE TIME (Max)	230VAC/100ms 115VAC/ 100ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	230VAC/ 3.2ms 115 VAC/3.2 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	

INPUT FUNCTION TEST

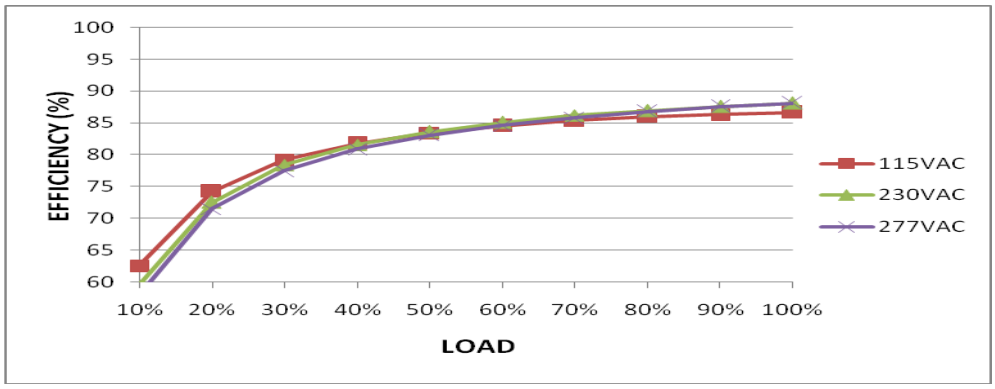
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~305VAC 141VDC~400VDC	(1) I/P: TESTING O/P: FULL LOAD (2) I/P: DC TESTING (L: + N:-) O/P: FULL / 50% LOAD (3) I/P: DC TESTING (L: - N: +) O/P: FULL / 50% LOAD (4) I/P: LOW-LINE=141VDC HIGH-LINE=431VDC O/P: Dim on/off 【for Dimming type】 Ta:25℃	(1) 97 VAC ~ 308VAC (2) 141Vdc~431Vdc/FULL LOAD 141 Vdc~431Vdc/50% LOAD (3) 141Vdc~431Vdc/FULL LOAD 141Vdc~431Vdc/50% LOAD (4)OK
			I/P: LOW-LINE-3V=97 VAC HIGH-LINE+10V=315 VAC O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) 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: 100VAC ~305VAC O/P:FULL~MIN LOAD Ta:25℃	OK
3	INPUT CURRENT (TYP)	277VAC/0.2A 230 VAC/0.25A 115 VAC/ 0.5A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	I= 0.171A/277VAC I = 0.201A/ 230VAC I = 0.403A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25℃	L-FG: 0.028mA N-FG:0.025mA
5	STANDBY POWER CONSUMPTION	Standby power consumption<0.5W(Dimming off)	I/P：230VAC O/P：TESTING Ta：25℃	0.4428W
6	POWER FACTOR(TYP)	0.95/230 VAC FULL LOAD 0.97/115 VAC FULL LOAD 0.92/277 VAC FULL LOAD	I/P: 230 VAC/115VAC/277VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	PF= 0.971/230V/100%LOAD PF= 0.994/115V/100%LOAD PF= 0.934/277V/100%LOAD

P.F vs LOAD



7	EFFICIENCY (TYP)	88%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	88.29 %

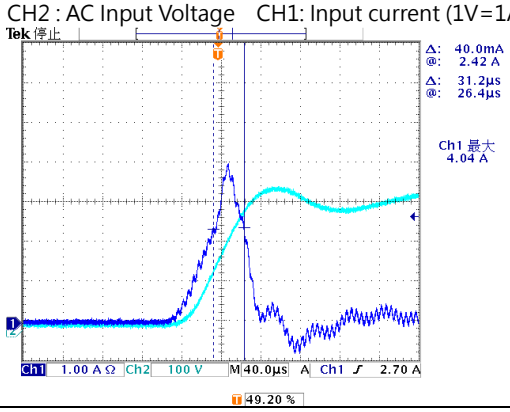
EFFICIENCY vs LOAD

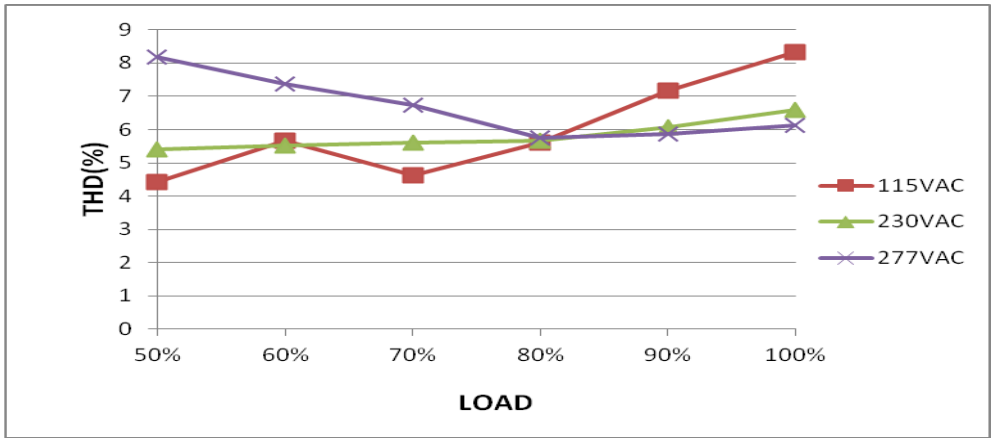


8	INRUSH CURRENT (TYP)	230 V/ 10A COLD START (twidth=100 us measured at 50% Ipeak) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25℃ **LEDH MODE TEST**	I =4.04A/ 230VAC T50= **31.2** us

INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH1: Input current (1V=1A)

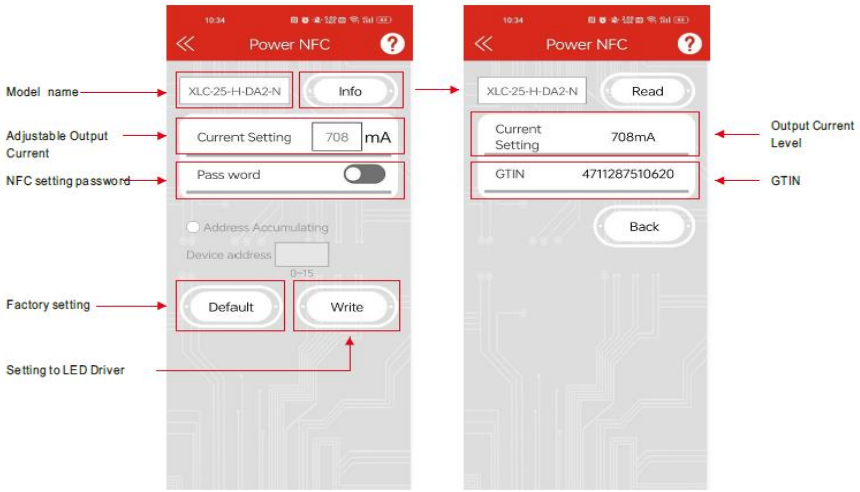
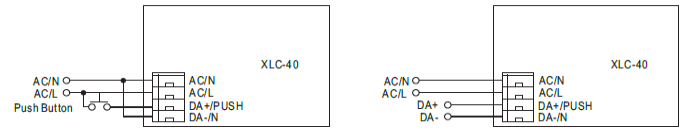


9	TOTAL HARMONIC DISTORTION	THD< 10%(@load ≥ 50%/230VAC; @load ≥ 75%/277VAC); THD<15%@load 50%/115VAC	I/P : 115VAC/230VAC/277VAC O/P : 50% /75% LOAD Ta : 25℃	THD : 5.4% 230VAC 50% THD : 7.04% 277VAC 75% THD : 4.42% 115VAC 50%
	THD vs LOAD 			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 305 VAC I/P: 100 VAC O/P:FULL LOAD	O.T.P. Active PROTECTION TYPE : Blank & B type: De-rating to lowest output level. Recovers automatically after fault condition is removed. DA2 type: Stage 1: De-rating to 75% loading; Stage 2: De-rating to 50% loading. Recovers automatically after fault condition is removed
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 100 VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	NFC Function Description	The output current of the NFC Mode LED driver can be adjusted using NFC via the mobile APP Operation Instruction: • Compatible phone Install an NFC-compatible smart mobile device or phone with Android™ 4.1 or IOS12 updates. • Steps for setting output current via NFC 1. Download Meanwell APP on mobile device or mobile phone, and enable NFC function. 2. Check the NFC antenna position of the mobile phone please. 3. Enter Meanwell APP ->Top left menu –Installation Manual/APP->PowerNFC， approach the LED driver NFC sensing position and perform sensing. 4. APP displays the functional parameters, and the relevant parameters are modified as required. 5. Tap the APP write button and quickly move the phone antenna close to the NFC sensing position of the LED driver. 6. The write completes when the mobile phone displays"Success". APP Function Description: ※ APP Interface:  • To be used through APP available on Apple Store and Google Play Store for iOS and Android. Search: MEAN WELL on Download on the App Store ANDROID APP ON Google play Note. Current accuracy : the numerical error between the set current and the actual current is within 2%. I/P: 230 VAC O/P:FULL LOAD Ta:25℃ TEST RESULT ： OK		
2	DA2 type (DALI-2 digital dimming function)	※Input wiring diagram  ※PUSH dimming (primary side) • The factory default dimming level is at 100%. • If the push action lasts less than 0.05 sec., it will not lead to a change for the status of the driver. • Up to 10 drivers can perform the PUSH dimming at the same time when utilizing one common push button. • The maximum length of the cable from the push button to the last driver is 20 meters. Action / Action duration / Function Short Push / 0.1~1s / Turn ON-OFF the driver Double Click / Click twice in 1.5s / Set up the dimming level to 100% Long Push / 1.5~10s / Every Long Push changes the dimming direction, dimming up or down I/P ： 230 VAC O/P ： DIMMING TEST Ta ： 25℃ TEST RESULT ： OK		

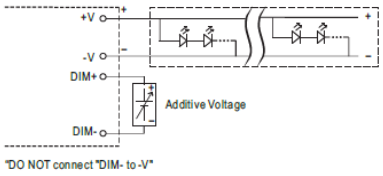
3 DIMMING OPERATION(B-Type)

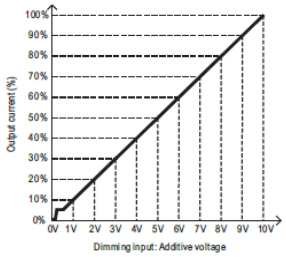
◎ B type

※ 3 in 1 dimming function

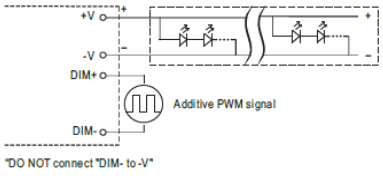
- Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10VDC, or 10V PWM signal or resistance.
- Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- Dimming source current from power supply: 100 μA (typ.)

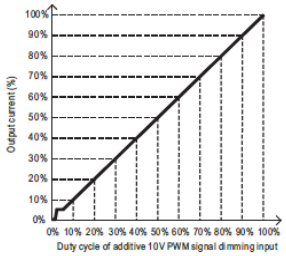
◎ Applying additive 0 ~ 10VDC



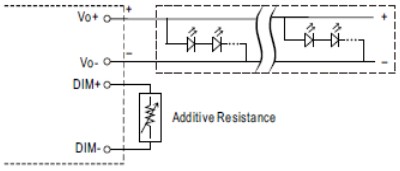


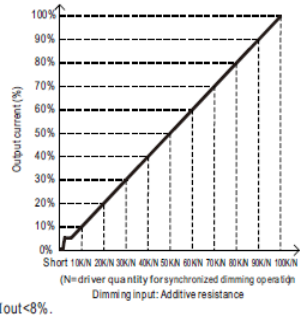
◎ Applying additive 10V PWM signal (frequency range 300Hz~3KHz):





◎ Applying additive resistance: 0~100kΩ





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℃

1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0	0.160A	0.303A	0.448A	0.593A	0.737A	0.879A	1.021A	1.162A	1.303A	1.378A	1.376A
	Output Current duty	0%	11.40%	21.63%	32.00%	42.37%	52.66%	62.77%	72.91%	83.03%	93.06%	98.46%	98.26%
2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	0.153A	0.289A	0.422A	0.560A	0.698A	0.837A	0.972A	1.109A	1.244A	1.372A	1.372A
	Output Current duty	0%	10.94%	20.66%	30.14%	40.03%	49.89%	59.77%	69.40%	79.23%	88.83%	98.00%	97.97%
3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.158A	0.294A	0.428A	0.565A	0.701A	0.840A	0.972A	1.104A	1.238A	1.364A	1.368A
	Output Current duty	0%	11.29%	20.97%	30.60%	40.37%	50.09%	60.00%	69.40%	78.83%	88.46%	97.46%	97.74%

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) **Peak Voltage**	Q 1 Rated 800 V/10A	AC ON/OFF I/P: High-Line +3V =308v VDS: O/P: (1) LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short I/P: Low-Line -3V = 97V VDS: O/P: (1) LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short Ta:25℃	308V **CP: 1.4A** Q1 VDS: (1) 644V (2) 612V (3) 604V (4) 556V (5) 564V **CP: 0.6A** **VDS:** (1) 716V (2) 564V (3) 652V (4) 620V (5) 556V 97V **CP: 1.4A** Q VDS: (1) 382V (2) 370V (3) 382V (4) 334V (5) 318V **CP: 0.6A** VDS: (1) 261V (2) 251V (3) 362V (4) 342V (5) 254V
2	**Diode Peak** Voltage	D100 Rated 3A/ 600 V D112 Rated 20 A/ 100V	AC ON/OFF I/P: High-Line +3V =308 V Q101 : VDS: O/P: (1) LEDmax (2) LEDmax continue (3) Output Short Ta:25℃	D100 (1) 410V (2) 406V (3) 402V D112 (1) 72.4V (2) 72.4V (3) 70V

<table>
<tr>
<td>3</td>
<td>Control IC Voltage Test</td>
<td>U1Rated
-0.3V~18V

U150 Rated
-0.3V~82V

U261 Rated
1.7V-3.6V</td>
<td>AC ON/OFF
I/P: High-Line +3V =308 V

O/P: (1) LEDmax
(2) LEDmax continue
(3) LEDmin
(4) LEDmin continue
(5) NO LOAD
(6) Dim off
Ta:25℃</td>
<td>U1
(1) 15.3V
(2) 13.9V
(3) 15.3V
(4) 14.1V
(5) 14.1V
(6) 113.5V

U150
(1) 74V
(2) 74V
(3) 72.4V
(4) 71.6V
(5) 70.8V
(6) 69.2V

U261
<table>
<tr><th>FOR C.V MODE TYPE</th><th>Level</th><th>Ripple</th><th>Spike</th></tr>
<tr><td>LEDmax continue</td><td>3.306</td><td>0.35%</td><td>0.14%</td></tr>
<tr><td>LEDmin continue</td><td>3.305</td><td>0.26%</td><td>0.135%</td></tr>
<tr><td>NO LOAD</td><td>3.305</td><td>0.25%</td><td>0.218%</td></tr>
<tr><td>Dim off</td><td>3.305</td><td>0.27%</td><td>0.145%</td></tr>
</table>
</td>
</tr>
<tr>
<td>4</td>
<td>Clamp Diode Peak Voltage</td>
<td>D10 Rated：
1000V/1A</td>
<td>AC ON/OFF
I/P：High-Line +3V = 308 V
O/P: (1) LEDmax
(2) LEDmax continue
(3) LEDmin
(4) LEDmin continue
(5) NO LOAD
Ta：25℃</td>
<td>(1)682V
(2)569V
(3)718V
(4)545V
(5)722V</td>
</tr>
<tr>
<td>5</td>
<td>Dimming MOS</td>
<td>Q110 Rated：
100V /35A</td>
<td>AC ON/OFF
I/P：High-Line +3V = 308 V
O/P: (1) LEDmax
(2) LEDmax continue
(3) Short
Ta:25℃</td>
<td>CP: 0.6A
(1)76V
(2) 75.2V
(3) 76V

CP:1.4A
(1) 75.2V
(2) 74.4V
(3) 72.8V</td>
</tr>
</table>

■ SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min	I/P-O/P: 4.125 KVAC/min Ta:25℃	I/P-O/P: 2.865mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25℃	I/P-O/P: 9999MΩ NO DAMAGE
3	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P:Min LOAD Ta:25℃	L-FG: 0.028mA N-FG:0.025mA

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 LOAD Ta:25℃	PASS
2	CONDUCTION	EN55015	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab
3	RADIATION	EN55015	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 AIR：8KV / Contact：4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A
6	SURGE	IEC61000-4-5 L-N :1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A
	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL：XLC-40-H-DA2
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=22.9 ℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=53.2 ℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=22.9 ℃</th><th>HIGH AMBIENT Ta=53.2℃</th></tr>
<tr><td>1</td><td>BD1</td><td>66.8℃</td><td>93.8℃</td></tr>
<tr><td>2</td><td>Q1</td><td>77.5℃</td><td>104.7℃</td></tr>
<tr><td>3</td><td>U1</td><td>68.8℃</td><td>95.8℃</td></tr>
<tr><td>4</td><td>D10</td><td>80.5℃</td><td>107.8℃</td></tr>
<tr><td>5</td><td>R38</td><td>73.7℃</td><td>100.5℃</td></tr>
<tr><td>6</td><td>T1</td><td>68.2℃</td><td>94.5℃</td></tr>
<tr><td>7</td><td>D101</td><td>77.6℃</td><td>103.9℃</td></tr>
<tr><td>8</td><td>Q110</td><td>82.4℃</td><td>109.0℃</td></tr>
<tr><td>9</td><td>D112</td><td>89.1℃</td><td>114.7℃</td></tr>
<tr><td>10</td><td>Q111</td><td>72.5℃</td><td>99.4℃</td></tr>
<tr><td>11</td><td>L100</td><td>80.1℃</td><td>106.7℃</td></tr>
<tr><td>12</td><td>C101</td><td>72.5℃</td><td>99.1℃</td></tr>
<tr><td>13</td><td>RT1</td><td>67.7℃</td><td>93.7℃</td></tr>
<tr><td>14</td><td>U150</td><td>87.2℃</td><td>115.1℃</td></tr>
<tr><td>15</td><td>TC</td><td>57.6℃</td><td>84.1℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 305VAC/110VAC
O/P： 100 % LOAD
Ta=-30 ℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50 ℃
NO DAMAGE</td><td>I/P： 315 VAC
O/P：FULL LOAD
Ta=50 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %(0℃~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.002 %/℃(0~50℃)</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE
TEST</td><td>-40~80℃</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +90℃
2. Temperature change rate ：25℃ / MIN
3. Dwell time low and high temperature ： 30 MIN/EACH
4. Total test cycle：10CYCLE
5. Input/output condition： STATIC
TEST：OK</td></tr>
</table>

6	THERMAL SHOCK TEST	-25~50℃	1. Thermal shock Temperature： -30℃~ +55℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：16 CYCLE 5. Input/output condition： 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test
7	VIBRATION TEST	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：10min/sweep cycle (4) Acceleration：3G (5) Test Time：180min in each axis (X.Y.Z) (6) Ta：25℃
8	CAPACITOR LIFE CYCLE	SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Tc=75 ℃ LIFE TIME (2) I/P： 230VAC O/P：75% LOAD Tc=75 ℃ LIFE TIME (3) I/P： 230VAC O/P：50% LOAD Tc=75 ℃ LIFE TIME	 (1) 44175HRS (2) 47567HRS (3) 52398HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 3935.2K hrs min. Telcordia SR-332 (Bellcore) ; 342.9K hrs min. MIL-HDBK-217F (25℃)	
10	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/HUANGMK	WENF	LINKX

2020.10.1 TAG-QA-009