設計範例報告

標題	*採用 LYTSwitch™-0 LYT0006D 的 5.1 W 非調光、高功率因數 (PF)、非隔離降壓式 LED 驅動器*
規格	90 VAC – 132 VAC 輸入；38 V、135 mA 輸出
應用	GU10 LED 驅動器替換燈泡
作者	應用工程部門
文件編號	DER-387
日期	2013 年 9 月 25 日
修訂	1.0

摘要與功能

- Single-stage 高功率因數 (PF) (在 115 V 條件下大於 0.7) 與精準的定電流 (CC) 輸出
- 所需元件極少且 PCB 佔位面積小的低成本解決方案
- 高度節能，在 120 VAC 輸入條件下效率為 85%
- 快速啟動 (小於 20 ms) – 無可感延遲
- 整合式保護與信賴度特性
  - 具有高磁滯時間的自動恢復回復過溫保護，同時保護元件和 PCB
  - 在電壓關閉情況下，不會發生任何損壞
- 符合 IEC 振盪波、線差動電壓突波和 EN55015 傳導性 EMI 規定

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重要事項：

雖然此電路板的設計符合安全隔離要求，但工程原型尚未取得相關機構之認證。因此，執行所有測試應使用隔離變壓器才能提供 AC 輸入給原型板。

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1 簡介

本文件說明採用 LYTSwitch™-0 系列 (LYT0006D) 且具有極輕薄小巧型降壓式架構的成本效益型電源供應器。

此電源供應器在 90 VAC 至 132 VAC 的輸入電壓範圍內運作。使用降壓式架構時，DC 匯流排電壓足夠高，可支援 38 V 輸出。在降壓式轉換器中，輸出電壓必須始終低於輸入電壓。輸出電壓還受到 LYTSwitch-0 最大工作週期的限制，此裝置也要求輸入電壓必須大於輸出電壓。

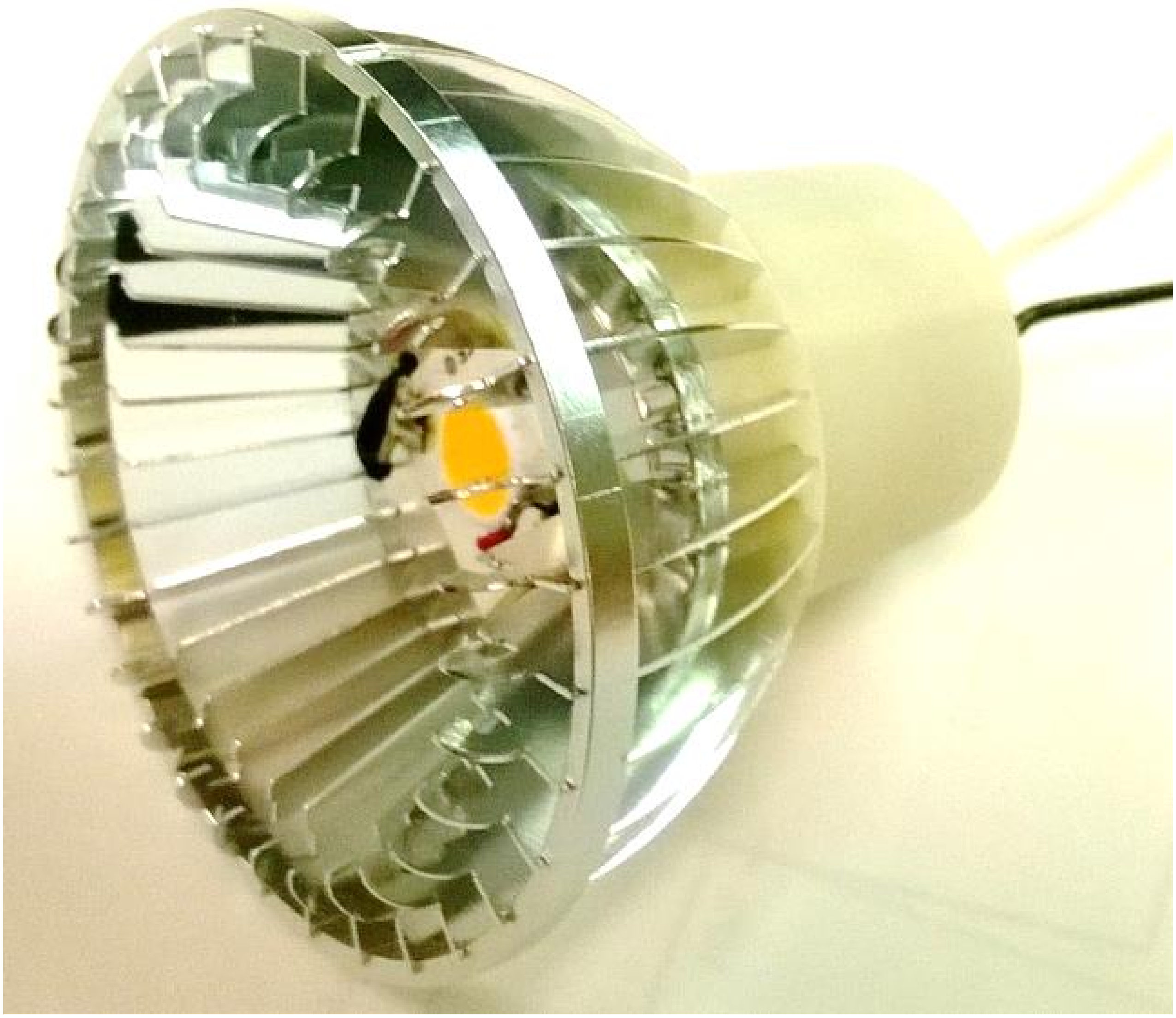

Figure 1 – GU10 Bulb from CREE.

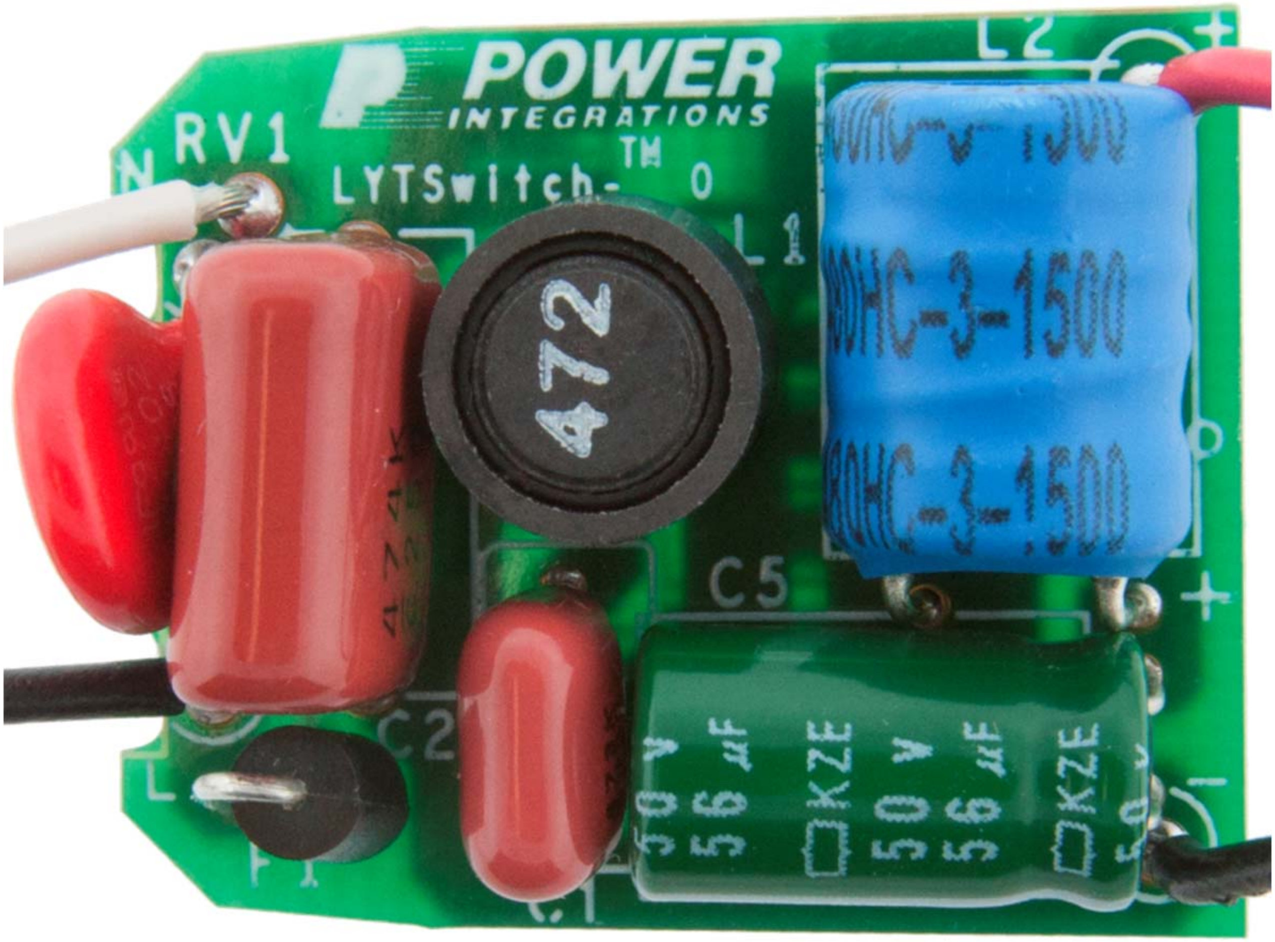

Figure 2 – Populated Circuit Board Photograph, Top.

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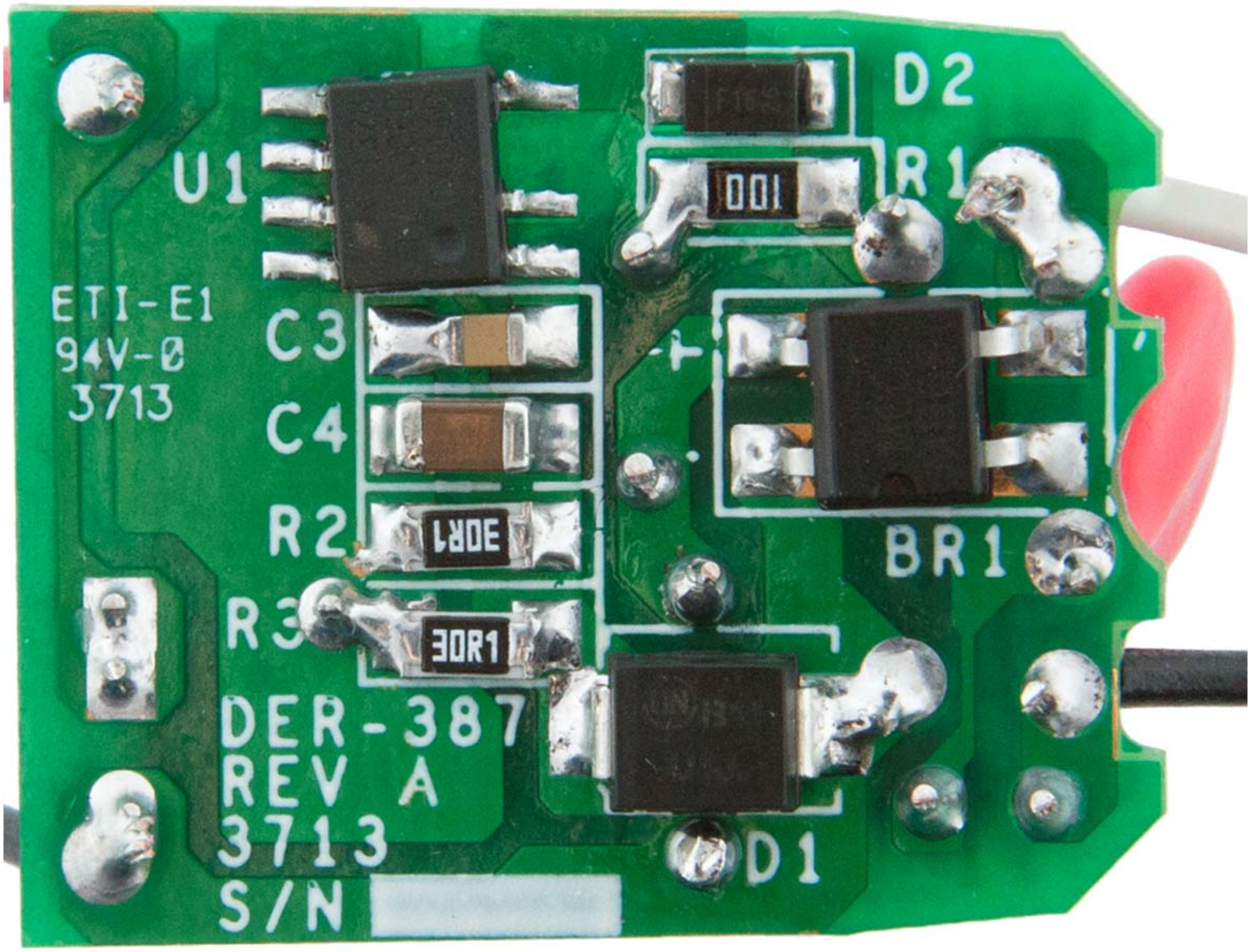

Figure 3 – Populated Circuit Board Photograph, Bottom.

2 電源供應器規格

下表列出此設計可接受的最低效能。實際效能列在結果部分。

說明	符號	最小值	典型值	最大值	單位	註解
輸入						
電壓操作	V_{IN}	90		132	VAC	雙線 – 無 P.E.
頻率	f_{LINE}	47	60		Hz	工作頻率不受限制。如果是針對 400 Hz 的線電壓頻率，請調整感測電阻器。
輸出						
輸出電壓	V_{OUT}		38		V	
輸出電流	I_{OUT}		135		mA	在 90 VAC - 132 VAC 條件下 ±5%
總輸出功率						
連續輸出功率	P_{OUT}		5.1		W	
效率						
120 VAC；38 V LED	η		85		%	在 P_{OUT} 25 °C 時測量
功率因數 (PF)						
120 VAC；38 V LED	功率因數 (PF)		0.7			在 P_{OUT} 25 °C 時測量
環境						
傳導性 EMI		符合 CISPR22B / EN55015B 標準				
線電壓突波 差模 (L1-L2)			0.5		kV	1.2/50 μs 突波，IEC 1000-4-5，串聯阻抗： 差模： 2 Ω
振盪波 (100 kHz) 差模 (L1-L2)			2.5		kV	500 A 短路 串聯阻抗： 差模： 2 Ω
環境溫度	T_{AMB}			50	°C	參閱<散熱成效>一節

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3 電路圖

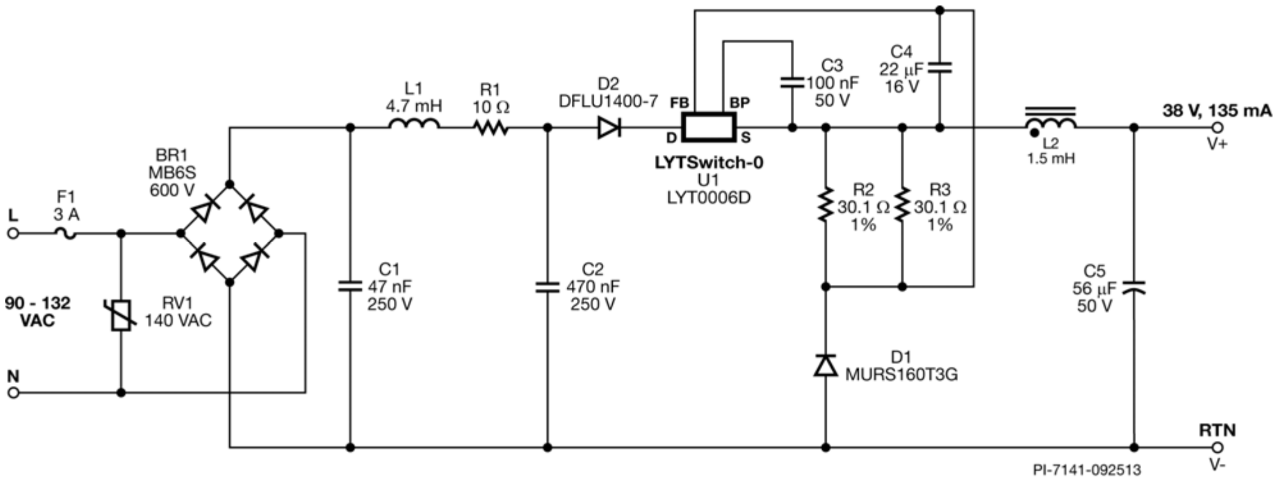

Figure 4 – Schematic.

4 電路說明

圖 4 中所示的電源供應器採用高壓降壓式結構的 LYT0006D (U1)，可在 38 VDC 輸出電壓下提供恆定的 135 mA 電流。該電源供應器專用於驅動 LED，而 LED 應始終透過定電流 (CC) 驅動。

4.1 輸入 EMI 濾波

保險絲 F1 在異常狀況下提供電路保護。橋式整流器 BR1 提供全波整流。電容器 C1 和 C2 及差模電感器 L1 構成 π 濾波器，以符合傳導性 EMI 標準。電阻器 R1 用於抑制輸入階段濾波器，以實現良好的功率因數 (PF) 效能。電容器 C1 和 C2 還用於能量儲存，以減少線間噪音並防止線電壓突波。

4.2 LYTSwitch-0

LYTSwitch-0 已經過最佳化，使得 LED 驅動器簡單易用、具有成本效益，且在 0 至 100°C (LYTSwitch-0 殼體溫度) 內提供良好的線間電壓與溫度調節。PIXls 試算表用於平衡功率電感器和感測電阻器，進而實現最佳線電壓調節。總輸入電容也有一定的效應，但可透過調整感測電阻器 (R2、R3) 進行更正，以最佳化效能。

LYTSwitch-0 系列具有內建過熱限制，可在燈泡承受過高溫度時保護電源供應器。

降壓式轉換器階段由 LYT0006D (U1) 內的整合式功率 MOSFET 切換開關、飛輪二極體 (D1)、感測電阻器 (R2、R3)、功率電感器 L2 和輸出電容器 (C5) 組成。轉換器通常在 DCM 中運作，以限制反向電流的週期。選用了快速飛輪二極體以將切換損失降至最低。

4.3 輸出整流

快速輸出二極體 (D1) 用於實現良好效率及降低溫度。通常在 LED 應用中，外殼中的環境溫度高於 70°C。建議使用 t_{RR} 較低 (小於 35 ns) 的輸出整流器，因為低 t_{RR} 可在二極體轉換至反向阻隔模式時將切換損失降至最低，尤其是功率 MOSFET 中的切換損失。

4.4 輸出回授

透過跳離切換週期來維持調節。當輸出電流上升時，流入 FB 接腳的電壓也會上升。如果此電壓超過 V_{FB}，則將跳離後續週期，直到電壓降至低於 V_{FB}。電流透過 R2-R3 進行感測並由 C4 進行濾波，然後饋送至 FB 接腳進行精確調節。實現良好線間電壓調節的關鍵在於，計算出最低電感後平衡功率電感器和感測電阻器的值。

BYPASS 電容器 (C4) 連接回授接腳和源極接腳，有助於降低輸出電流感測期間的功率損失。該電容器對饋送至 FB 接腳的回授電流資訊進行取樣與保持。FB 接腳與 C4 之間無需限制電阻器，因為峰值電壓不會超過裝置接腳的最大輸入電壓額定值。

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4.5 無開路負載保護

本設備無開路負載保護。

5 PCB 佈局

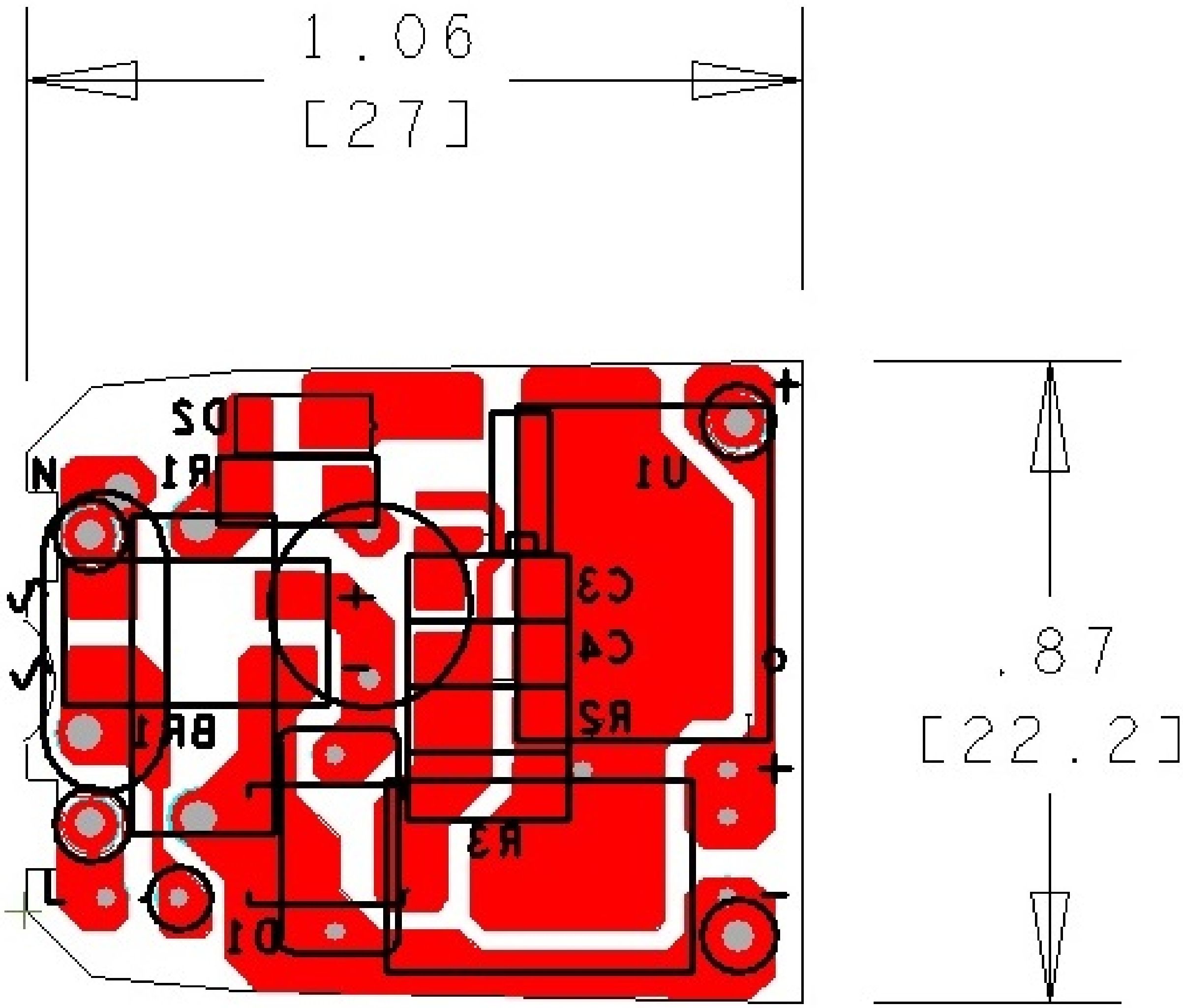

Figure 5 – Printed Circuit Layout, Bottom View.

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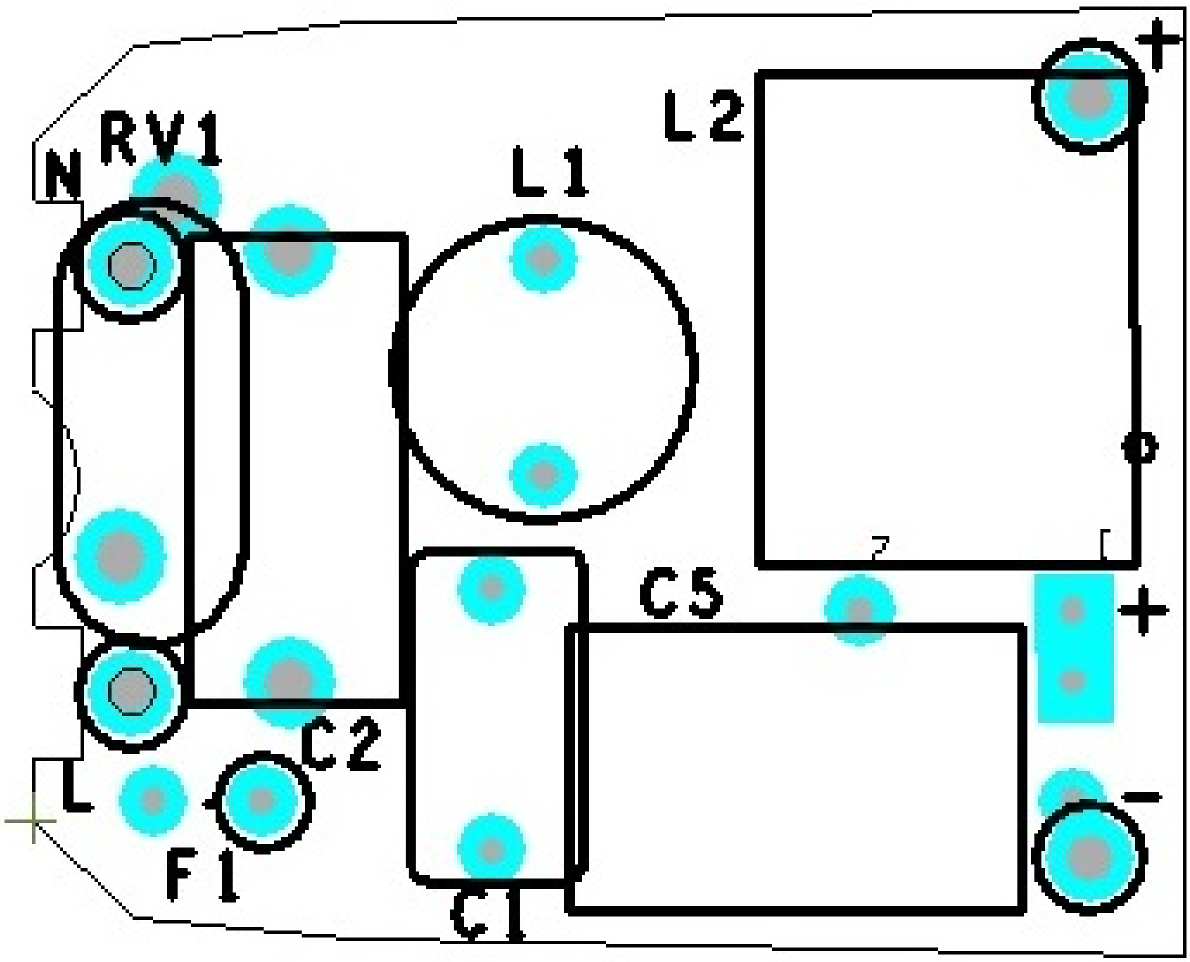

Figure 6 – Printed Circuit Layout, Top View.

6 物料清單

Item	Qty	Ref Des	說明	Mfg Part Number	Mfg
1	1	BR1	600 V, 0.5 A, Bridge Rectifier, SMD, MBS-1, 4-SOIC	MB6S-TP	Micro Commercial
2	1	C1	47 nF, 250 V, Film	ECQ-E2473KB	Panasonic
3	1	C2	470 nF, 250 V, Film	ECQ-E2474KB	Panasonic
4	1	C3	100 nF, 50 V, Ceramic, X7R, 1206	GRM319R71H104KA01D	Murata
5	1	C4	22 μF, 16 V, Ceramic, X5R, 1206	EMK316BJ226ML-T	Taiyo Yuden
6	1	C5	56 μF, 50 V, Electrolytic, Very Low ESR, 140 mΩ, (6.3 x 11)	EKZE500ELL560MF11D	Nippon Chemi-Con
7	1	D1	600 V, 1 A, Ultrafast Recovery, 35 ns, SMB Case	MURS160T3G	On Semi
8	1	D2	400 V, 1A, DIODE SUP FAST 1A PWRDI 123	DFLU1400-7	Diodes, Inc.
9	1	F1	3 A, 125 V, Fast, Microfuse, Axial	MQ3	Bel Fuse
10	1	L1	4.7 mH, 0.11 A, Shielded Radial Choke Coil	RL-8054-1-472KR11-S	Renco Electronics
11	1	L2	1.5 mH, 0.46 A, 10%	RL-5480HC-3-1500	Renco Electronics
12	1	R1	10 Ω, 5%, 1/4 W, Pulse Proof, Thick Film, 1206	SR1206JR-0710RL	Yago
13	1	R2	30.1 Ω, 1%, 1/4 W, Thick Film, 1206	ERJ-8ENF30R1V	Panasonic
14	1	R3	30.1 Ω, 1%, 1/4 W, Thick Film, 1206	ERJ-8ENF30R1V	Panasonic
15	1	RV1	140 V, 12 J, 7 mm, RADIAL	V140LA2P	Littlefuse
16	1	U1	LinkSwitch-TN, SMD-8C	LYT0006D	Power Integrations

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7 設計試算表

ACDC_LYTSwitch-0_062013; Rev.1.0; Copyright Power Integrations 2013	INPUT	OUTPUT	UNIT	LYTSwitch-0_Rev_1-0.xls:LYTSwitchZero Design Spreadsheet
INPUT VARIABLES				
VACMIN	90	90.00	Volts	Minimum AC Input Voltage
VACNOM	120	120.00	Volts	Nominal AC Input Voltage
VACMAX	132	132.00	Volts	Maximum AC Input Voltage
FL	60	60.00	Hertz	Select Line Frequency
VO	38	38.00	Volts	輸出電壓
IO	137.500	138	mA	輸出電流
Pout		5.23	W	Output Power
EFFICIENCY		0.90		Overall Efficiency Estimate (Adjust to match Calculated, or enter Measured Efficiency)
CIN	0.51	0.51	uF	Input Filter Capacitor
DC INPUT VARIABLES				
VMIN		38.1	Volts	Minimum DC Bus Voltage
VMAX		186.7	Volts	Maximum DC bus Voltage
LYTSwitchZero				
LYTSwitchZero	**LYT0006**	LYT0006		Selected LYTSwitchZero.Ordering info - Suffix P/G indicates DIP 8 package; suffix D indicates SO8 package; second suffix N indicates lead free RoHS compliance
ILIMIT		0.375	Amps	Typical Current Limit
ILIMIT_MIN		0.333	Amps	Minimum Current Limit
ILIMIT_MAX		0.401	Amps	Maximum Current Limit
FSMIN		62000	Hertz	Minimum Switching Frequency
IRMS		104.55	mA	Expected RMS current through LYTSwitch
VDS		4.8	Volts	Maximum On-State Drain To Source Voltage drop
DIODE				
VD		0.70	Volts	Freewheeling Diode Forward Voltage Drop
VRR		400	Volts	Recommended PIV rating of Freewheeling Diode
IF		1	Amps	Recommended Diode Continuous Current Rating
Diode Recommendation		BYV26C		Suggested Freewheeling Diode
OUTPUT INDUCTOR				
Core type	**Off-the-Shelf**	Off-the-Shelf		Select core type between Ferrite and Off-the-Shelf
Core size				Select core size
Custom Core	**RL-5480HC-3-1500**			Enter custom core description (if used)
AE		N/A	mm^2	Core Effective Cross Sectional Area
LE		N/A	mm	Core Effective Path Length
AL		N/A	nH/T^2	Ungapped Core Effective Inductance
BW		N/A	mm	Bobbin Physical Winding Width
NL		N/A		Number of turns on inductor
BP		N/A	Gauss	Peak flux density
LG		N/A	mm	Gap length
OD		N/A	mm	Maximum Primary Wire Diameter including insulation
INS		N/A	mm	Estimated Total Insulation Thickness (= 2 * film thickness)
DIA		N/A	mm	Bare conductor diameter
AWG		N/A	AWG	Primary Wire Gauge (Rounded to next smaller standard AWG value)
CM		N/A	Cmils	Bare conductor effective area in circular mils

CMA		N/A	Cmils/Amp	CAN DECREASE CMA < 500 (decrease L(primary layers),increase NS,use smaller Core)
L		N/A		Number of layers
LP_MIN	1500.00	1500	uH	Minimum value of Output Inductor, Recommended Standard Value
IO_Average		135.5	mA	Average output current (Nominal input voltage)
ILRMS		172.69	mA	Estimated RMS inductor current (at VMAX)
FEEDBACK COMPONENTS				
RFB	15.05	15.05	Ohms	Feedback Resistor.Use closest standard 1% value.Use Goal seek to adjust (or manually adadjust) value of RFB such that IO_VACNOM equals the specified value of IO
CFB		22	uF	Feedback Capacitor
OUTPUT REGULATION				
IO_VACMIN		135.5	mA	Output Current at VACMIN
IO_VACNOM		135.6	mA	Output Current at VACNOM
IO_VACMAX		135.0	mA	Output Current at VACMAX

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8 效能資料

All measurements performed at room temperature (≈25 ºC) unless otherwise specified.

8.1 針對 38 V LED 負載的測試資料

Input Measurement					Load Measurement			Calculation		
V_{IN} (V_{RMS})	I_{IN} (mA_{RMS})	P_{IN} (W)	功率因數 (PF)	%ATHD	V_{OUT} (V_{DC})	I_{OUT} (mA_{DC})	P_{OUT} (W)	P_{CAL} (W)	Efficiency (%)	Loss (W)
90.03	83.58	6.279	0.834	63.61	38.6900	136.910	5.356	5.30	85.30	0.92
100.00	79.13	6.286	0.794	72.99	38.7150	137.290	5.363	5.32	85.31	0.92
115.04	73.38	6.259	0.742	84.27	38.7350	136.910	5.338	5.30	85.28	0.92
120.03	72.09	6.249	0.722	88.02	38.7340	136.710	5.327	5.30	85.24	0.92
132.06	69.09	6.233	0.683	96.1	38.7390	136.340	5.307	5.28	85.14	0.93

Table 1 – Test Data for 38 V LED Load.

8.2 效率

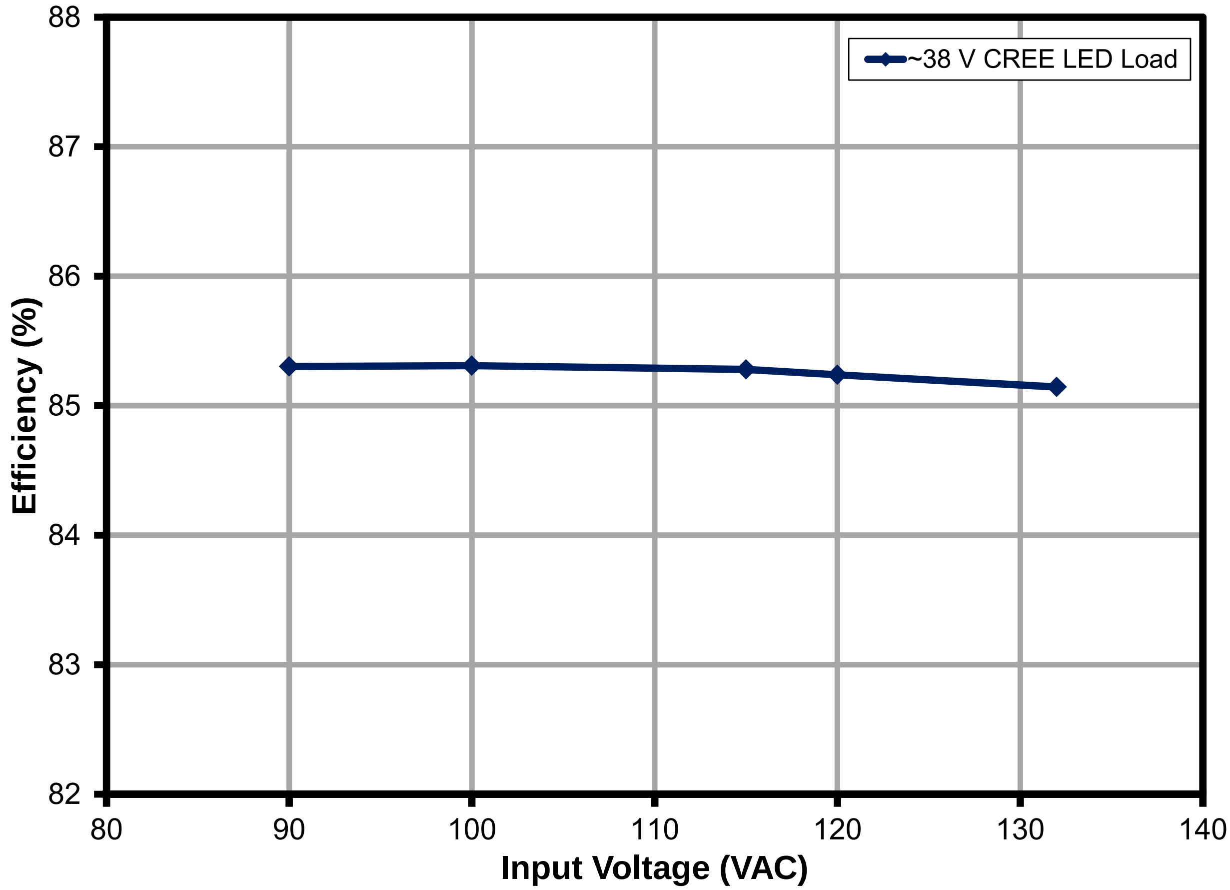

Figure 7 – Efficiency with Respect to AC Input Voltage.90-132 VAC (60 Hz) Input.

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8.3 輸出電流調節

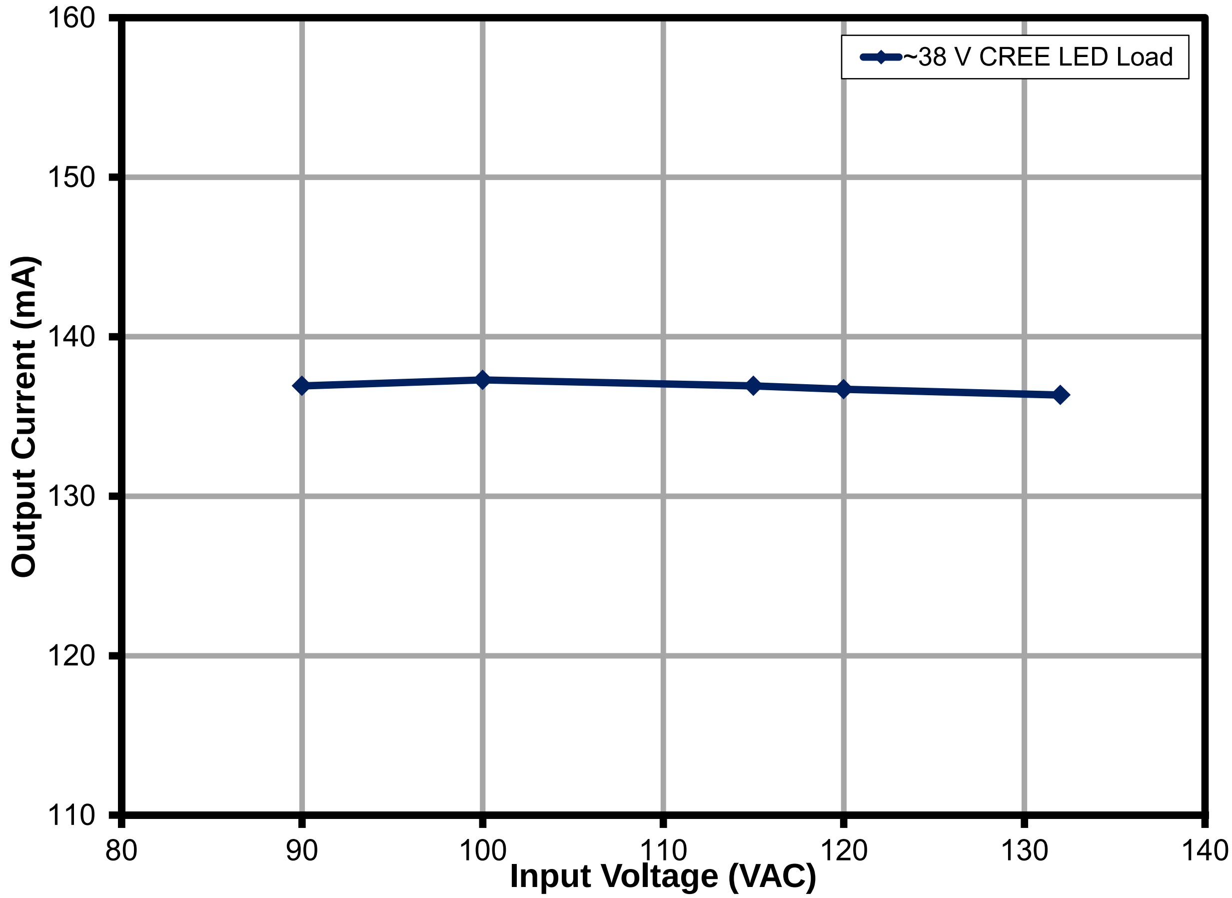

Figure 8 – Line Regulation.

8.4 功率因數 (PF)

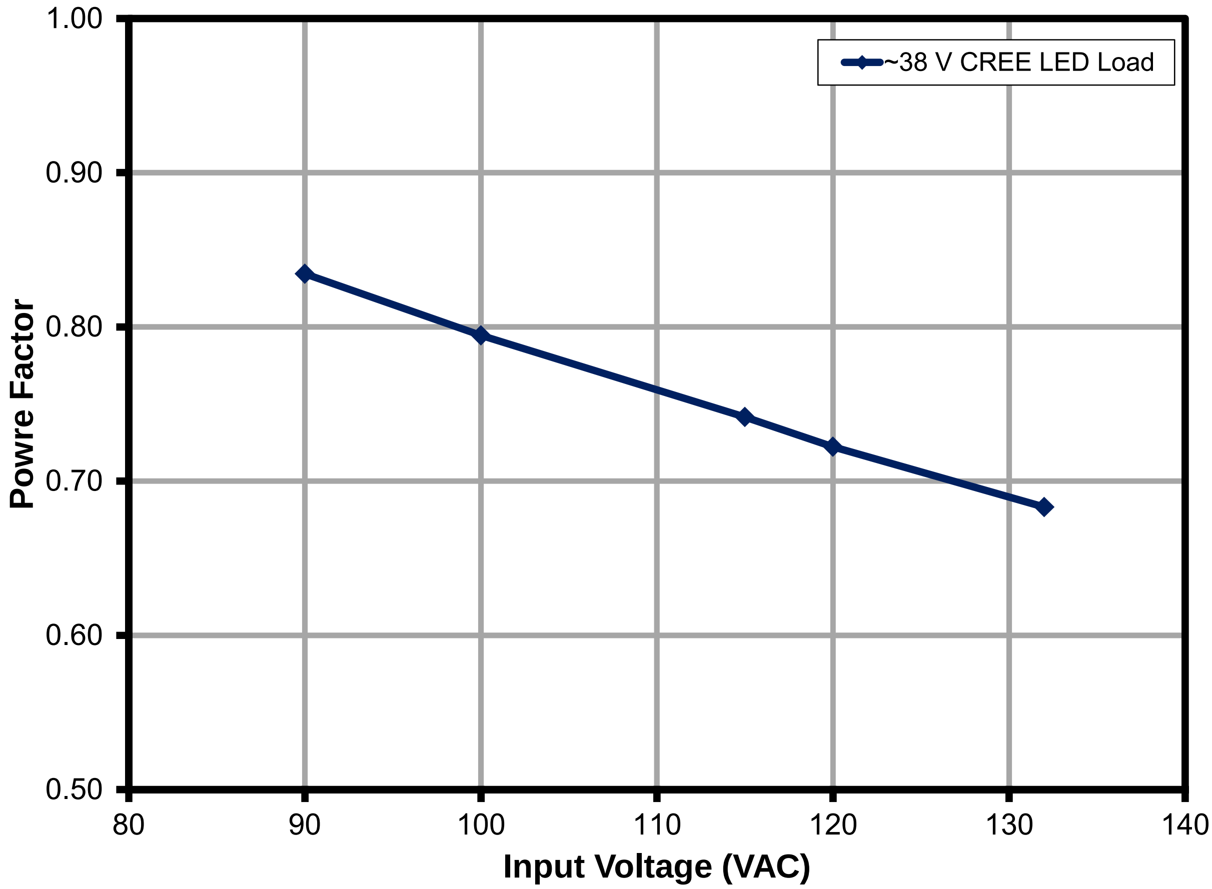

Figure 9 – Line Regulation.

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9 散熱效能

9.1 散熱設定

The LED Driver was placed inside a GU10 assembly provided by CREE and the thermal test was conducted with the unit placed inside the chamber.

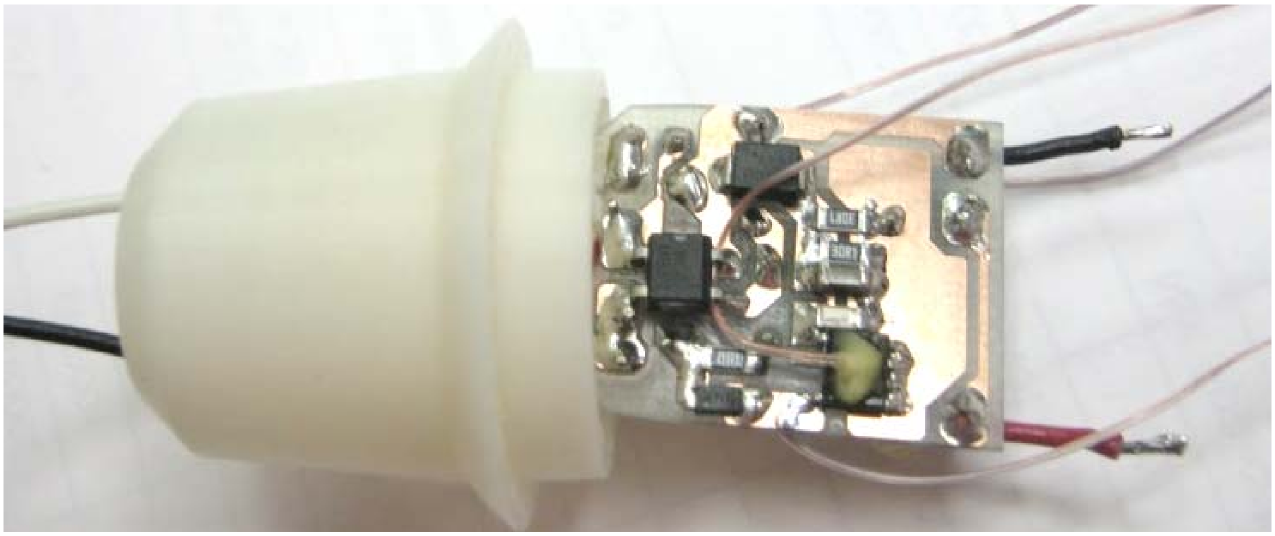

Figure 10 – Bottom Side Thermocouple Location.

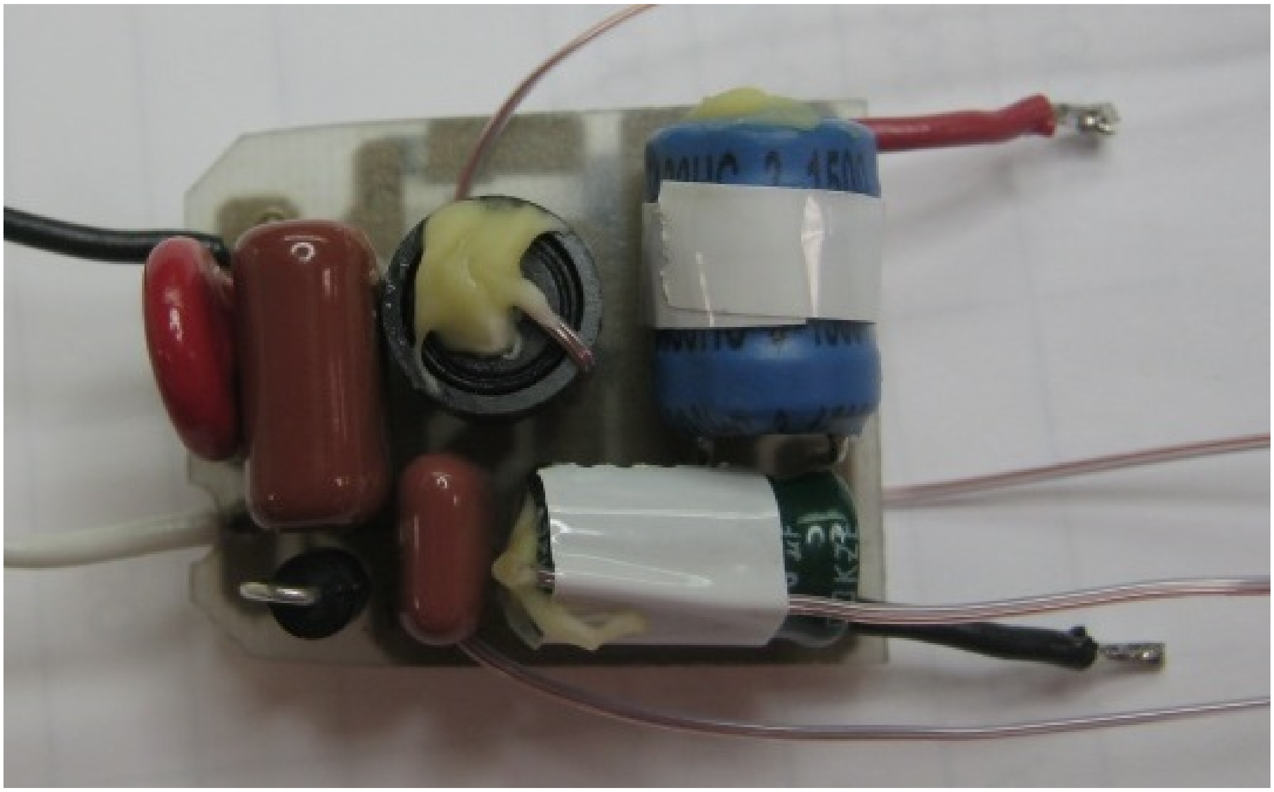

Figure 11 – Top Side Thermocouple Location.

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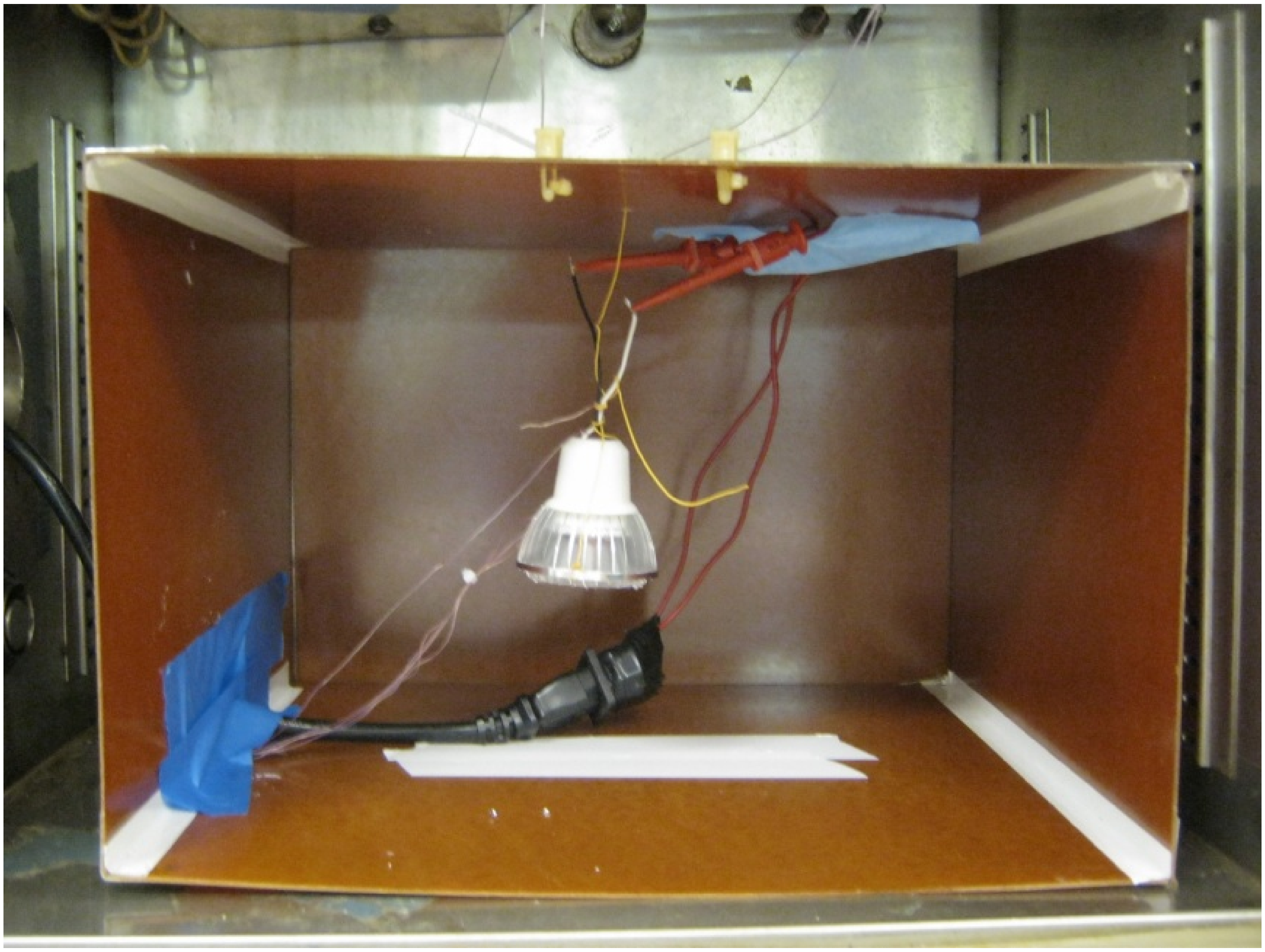

Figure 12 – GU10 Bulb Placed Inside an Enclosed Box to Prevent Air Flow from the Fan of the Thermal Chamber.

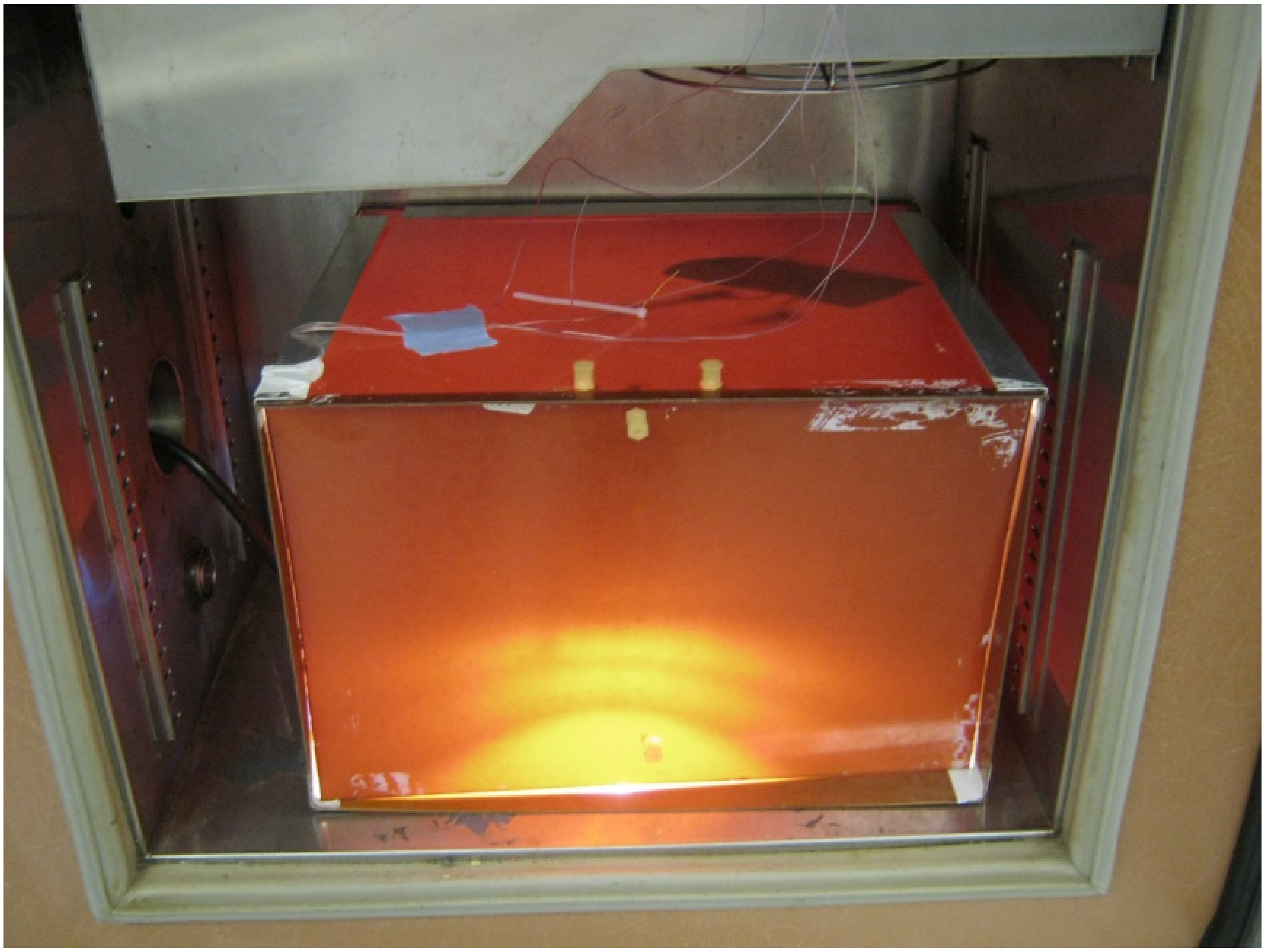

Figure 13 – UUT Placed Inside an Enclosed Box as Shown.

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9.2 散熱成效

9.2.1 輸入：90 VAC / 60 Hz
負載：38 V LED 負載

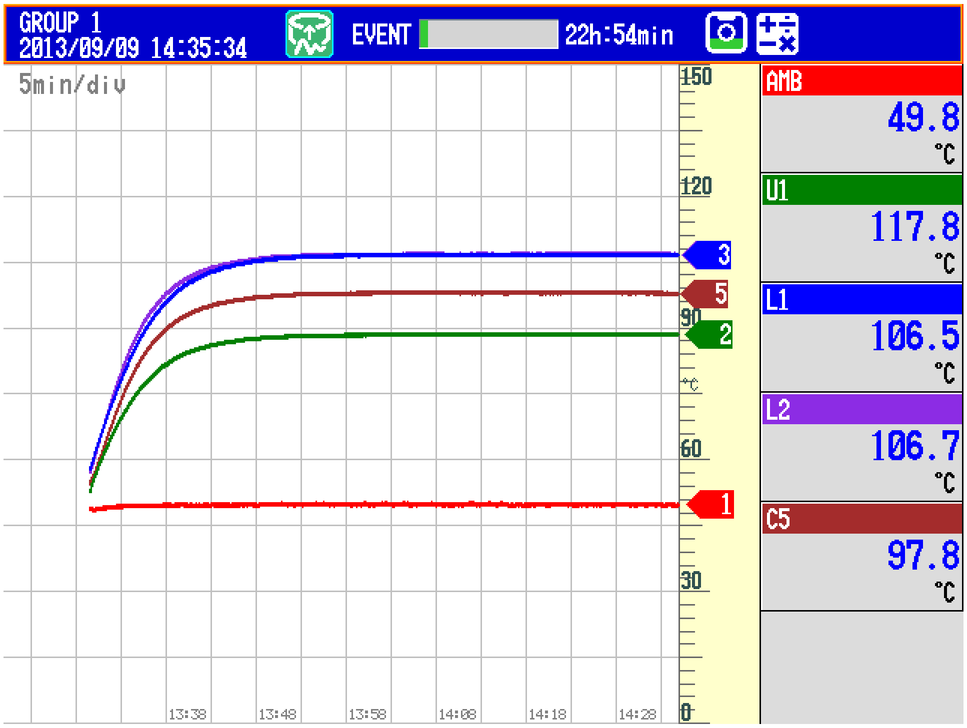

Figure 14 – Thermal Measurement at 90 VAC Input, ~50 ºC External Ambient.

Location	說明	**Temperature (ºC)**
AMB	External Ambient	49.8
U1	LYT0006D	117.8
L1	Differential Choke	106.5
L2	Power Inductor	106.7
C5	Output Capacitor	97.8

Table 2 – 90 VAC Input Critical Components Thermal Measurement.

9.2.2 輸入：120 VAC / 60 Hz
負載：38 V LED 負載

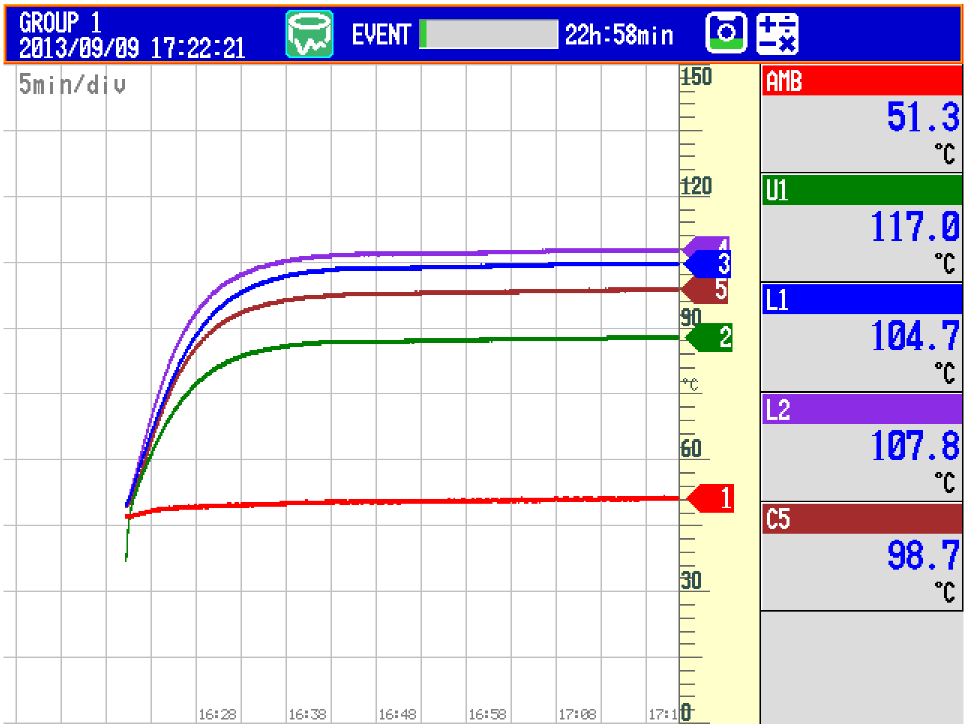

Figure 15 – Thermal Measurement at 120 VAC Input, ~50 ºC Ambient.

Location	說明	Temperature (ºC)
AMB	External Ambient	51.3
U1	LYT0006D	117
L1	Differential Choke	104.7
L2	Power Inductor	107.8
C5	Output Capacitor	98.7

Table 3 – 120 VAC Input Critical Components Thermal Measurement.

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9.2.3 輸入：132 VAC / 60 Hz
負載：38 V LED 負載

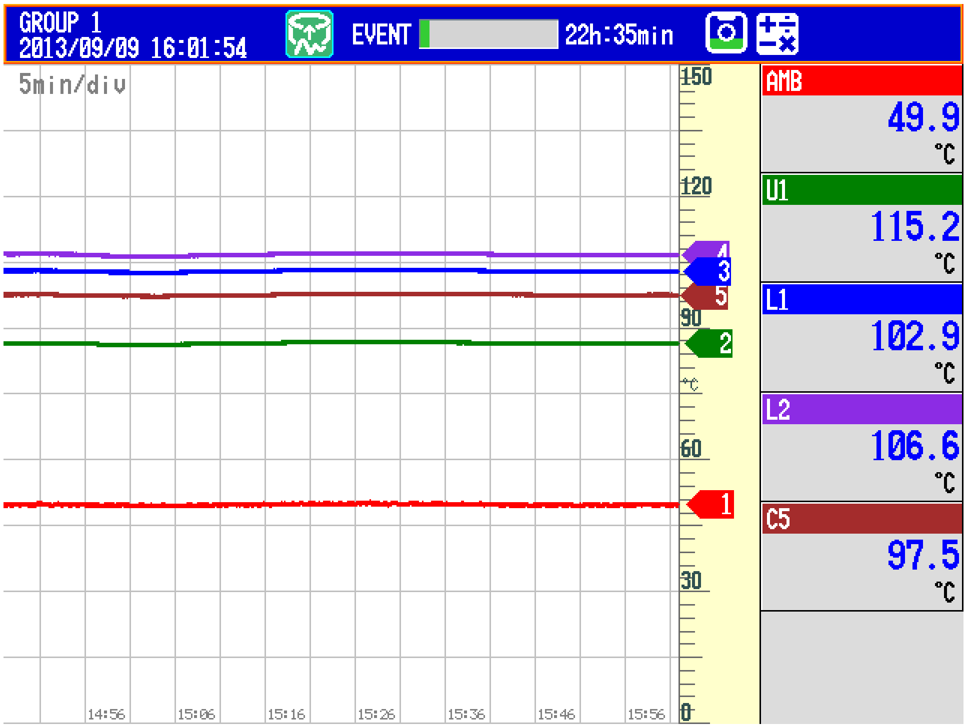

Figure 16 – Thermal Measurement at 132 VAC Input, ~50 ºC Ambient.

Location	說明	**Temperature**
AMB	External Ambient	49.9
U1	LYT0006D	115.2
L1	Differential Choke	102.9
L2	Power Inductor	106.6
C5	Output Capacitor	97.5

Table 4 – 132 VAC Input Critical Components Thermal Measurement.

10 波形

10.1 正常運作下的汲極電壓

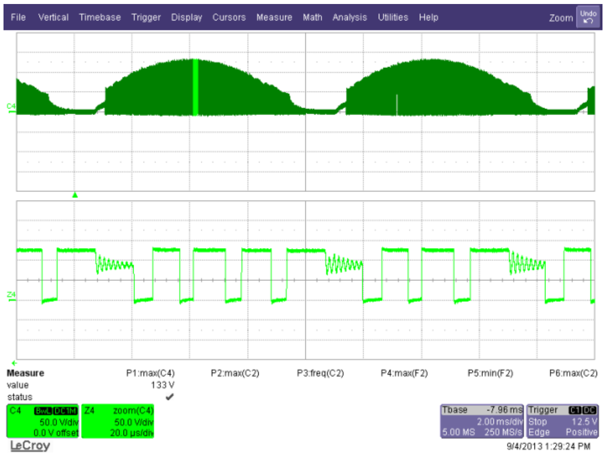

Figure 17 – 90 VAC, 60Hz, Full Load.
Ch4:V_{D-S}, 50 V / div., 2 ms / div.
Z4:V_{D-S}, 50 V, 20 µs / div.

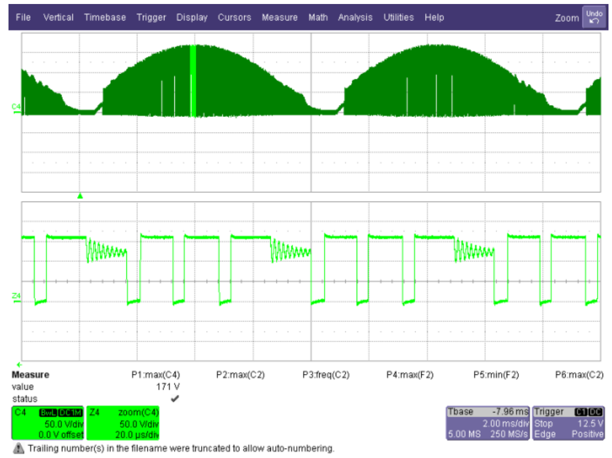

Figure 18 – 115 VAC, Full Load.
Ch4:V_{D-S}, 50 V / div., 2 ms / div.
Z4:V_{D-S}, 50 V, 20 µs / div.

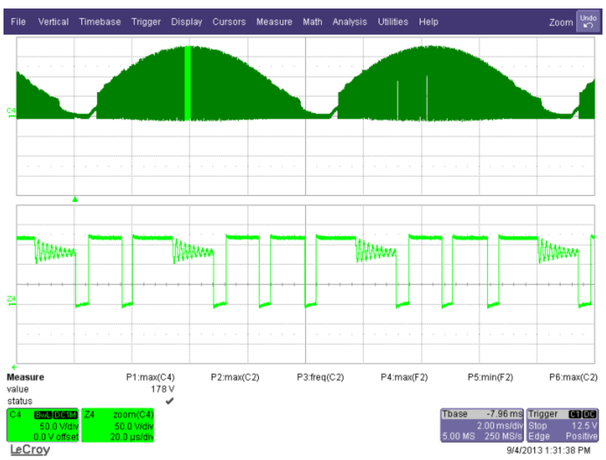

Figure 19 – 120 VAC, 60Hz, Full Load.
Ch4:V_{D-S}, 50 V / div., 2 ms / div.
Z4:V_{D-S}, 50 V, 20 µs / div.

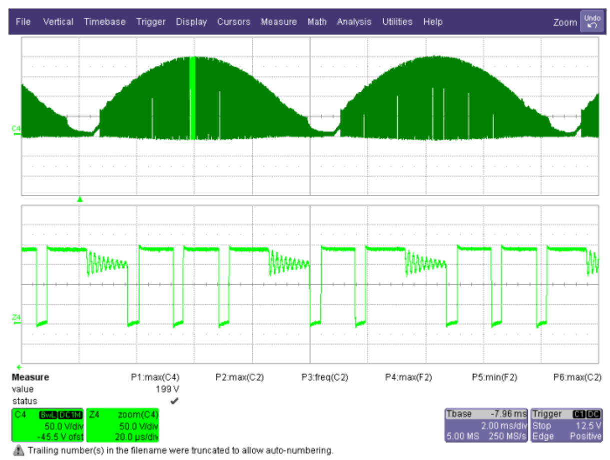

Figure 20 – 132 VAC, Full Load.
Ch4:V_{D-S}, 50 V / div., 2 ms / div.
Z4:V_{D-S}, 50 V, 20 µs / div.

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10.2 正常運作下的汲極電流

Missing pulses are normal and are used to regulate the output current.These missing pulses are present every time the sense resistor (R2, R3) voltage-drop reaches 1.65 V. The unit will enter into auto-restart if there is not at least one missing pulse within 50 ms. For some designs wherein the power inductance is high and operating mostly in CCM, a reverse current may be present.One way to avoid this is by increasing the device size or increase input capacitance or adding a blocking diode in the drain.See AN-60 for more details.

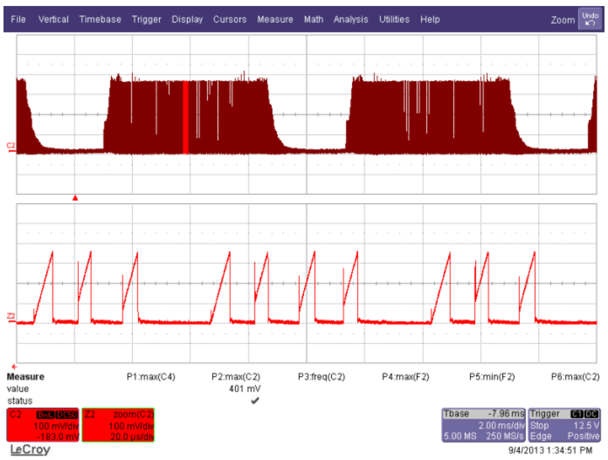

Figure 21 – 90 VAC, 60 Hz, 38 V_{LED}.
Ch2:I_{D-S}, 100 mA / div., 2 ms / div.
Z2:I_{D-S}, 100 mA, 20 μs / div.

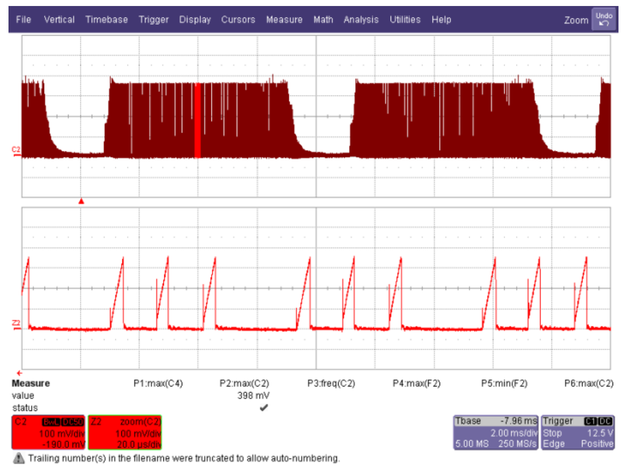

Figure 22 – 115 VAC, 60 Hz, 38 V_{LED}.
Ch2:I_{D-S}, 100 mA / div., 2 ms / div.
Z2:I_{D-S}, 100 mA, 20 μs / div.

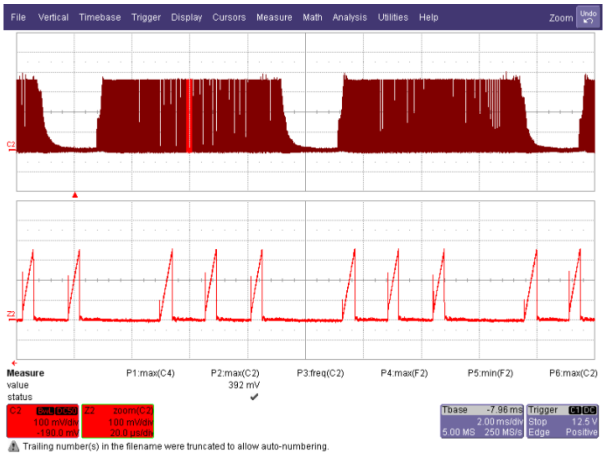

Figure 23 – 120 VAC, 60 Hz, 38 V_{LED}.
Ch2:I_{D-S}, 100 mA / div., 2 ms / div.
Z2:I_{D-S}, 100 mA, 20 µs / div.

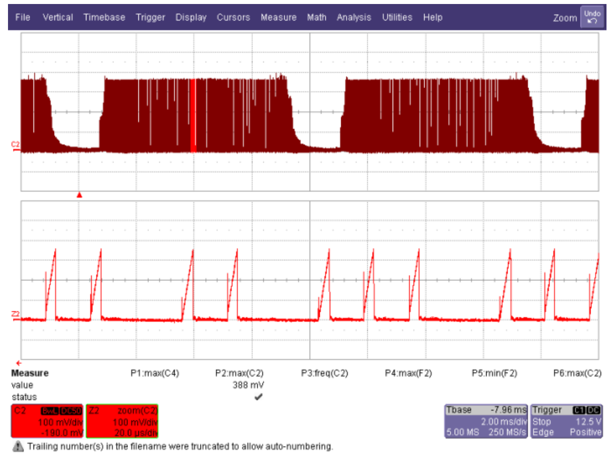

Figure 24 – 132 VAC, 60 Hz, 38 V_{LED}.
Ch2:I_{D-S}, 100 mA / div., 2 ms / div.
Z2:I_{D-S}, 100 mA, 20 µs / div.

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10.3 輸出短路時的汲極電壓和電流

Device is operating within the range and no inductor saturation was observed.

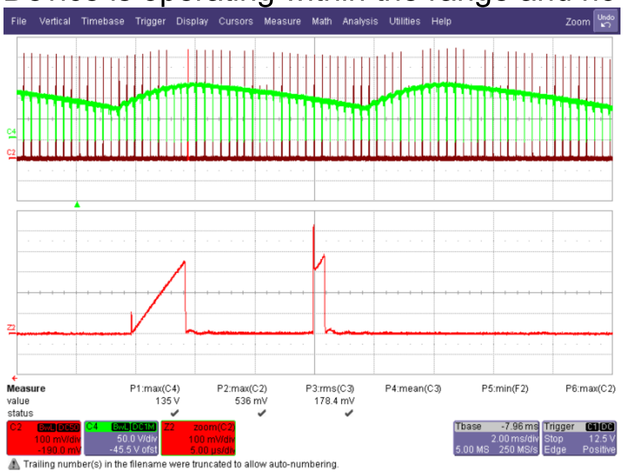

Figure 25 – 90VAC Input, Output Short.
Ch4:V_{D-S}; 50 V / div., 2 ms / div
Ch2:I_{D-S}; 100 mA / div., 2 ms /div
Z2:I_{D-S}; 100 mA / div., 5 µs / div

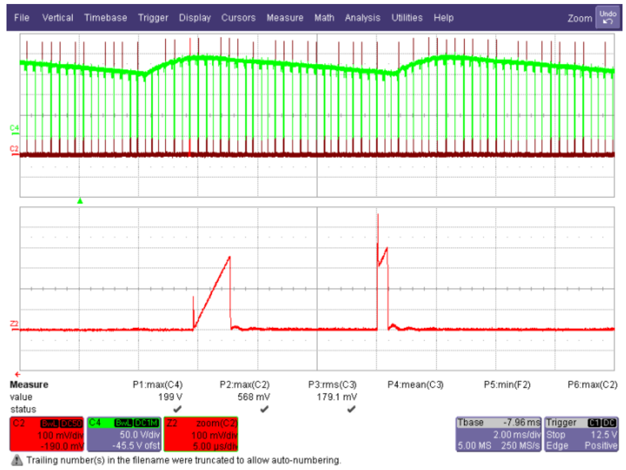

Figure 26 – 132VAC Input, Output Short.
Ch4:V_{D-S}; 50 V / div., 2 ms / div.
Ch2:I_{D-S}; 100 mA / div., 2 ms /div.
Z2:I_{D-S}; 100 mA / div., 5 µs / div.

10.4 汲極電壓和電流啟動分析

Device is operating within the range and no inductor saturation was observed.

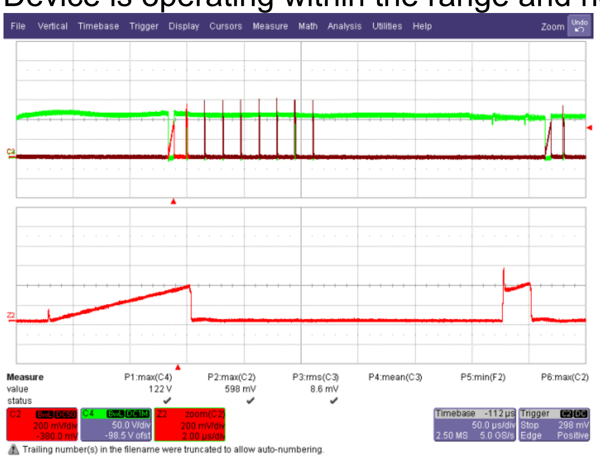

Figure 27 – 90 VAC / 60 Hz Start-up.
Ch4:V_{D-S}; 50 V / div., 50 µs / div.
Ch2:I_{D-S}; 200 mA / div., 50 µs / div.
Z2:I_{D-S}; 200 mA / div., 2 µs / div.

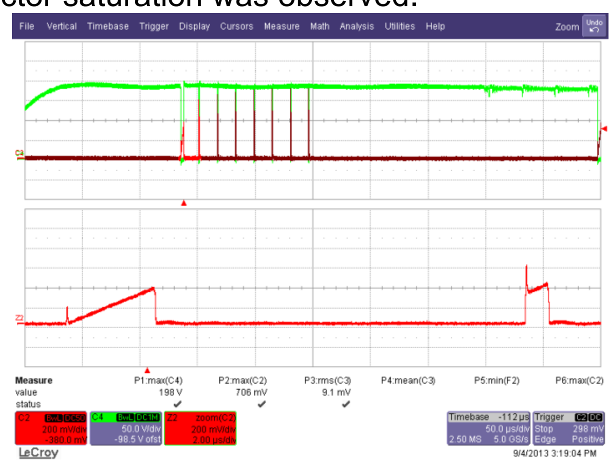

Figure 28 – 132 VAC / 60 Hz Start-up.
Ch4:V_{D-S}; 50 V / div., 50 µs /div.
Ch2:I_{D-S}; 200 mA / div., 50 µs /div.
Z2:I_{D-S}; 200 mA / div., 2 µs /div.

10.5 輸出電流啟動和關閉分析

Output current/light is present in just one AC cycle, <20 ms.

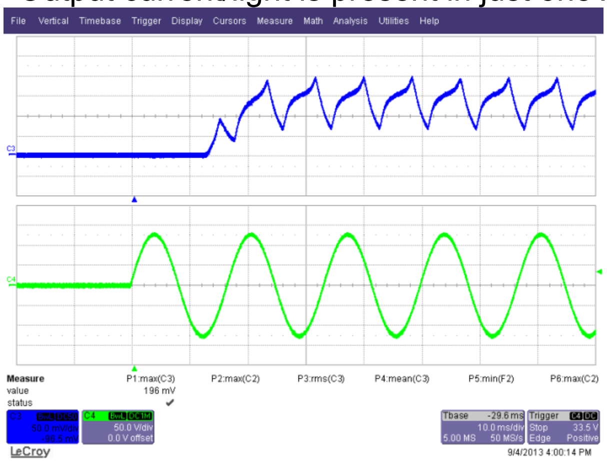

Figure 29 – 90 VAC, 60Hz, Full Load Start-up.
Ch3:I_{OUT}, 50 mA / div., 10 ms / div.
Ch4:V_{IN}, 50 V / div., 10 ms /div.

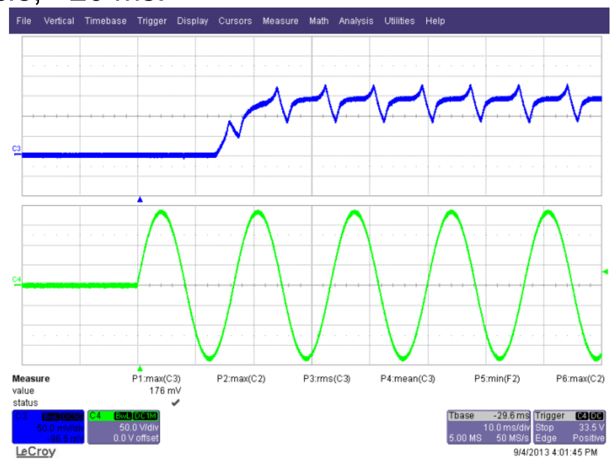

Figure 30 – 132 VAC, 60Hz, Full Load Start-up.
Ch3:I_{OUT}, 50 mA / div., 10 ms / div.
Ch4:V_{IN}, 50 V / div., 10 ms / div.

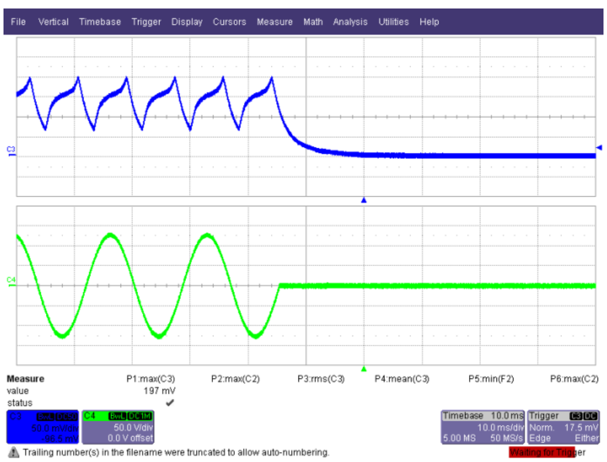

Figure 31 – 90 VAC, 60Hz, Full Load, Power Down.
Ch3:I_{OUT}, 50 mA / div., 10 ms / div.
Ch4:V_{IN}, 50 V / div., 10 ms / div.

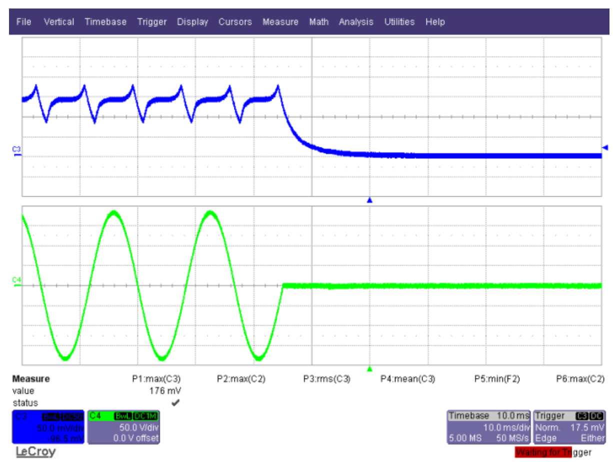

Figure 32 – 132 VAC, 60Hz, Full Load, Power Down.
Ch3:I_{OUT}, 50 mA / div., 10 ms / div.
Ch4:V_{IN}, 50 V / div., 10 ms / div.

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10.6 輸入-輸出分析

There is no limitation to the amount of output capacitance that can be added.If the application requires less output current ripple then increasing the output capacitance is straight forward.Note that the output current waveform below will vary depending on LED load impedance and will vary according to LED type.

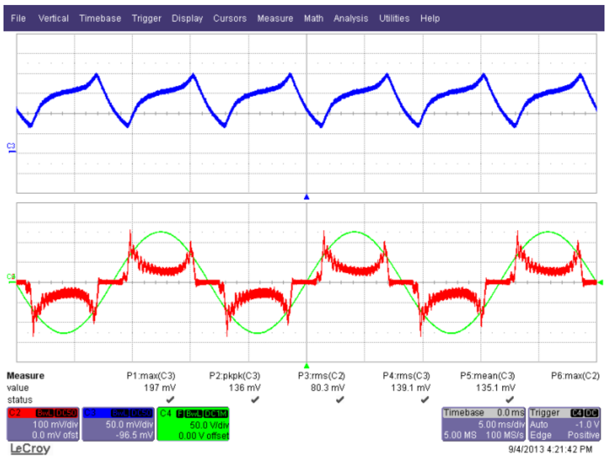

Figure 33 – 90 VAC, 60 Hz, Full Load.
Ch3:I_{OUT}, 50 mA / div., 5 ms / div.
Ch2:I_{IN}, 100 mA / div., 5 ms / div.
Ch4:V_{IN}, 50 V / div., 5 ms / div.

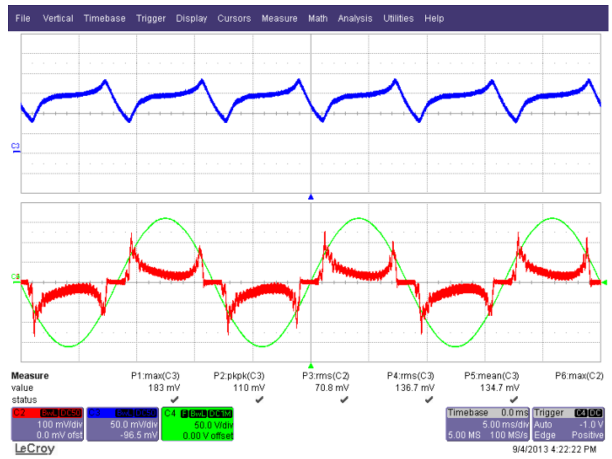

Figure 34 – 115 VAC, Full Load.
Ch3:I_{OUT}, 50 mA / div., 5 ms / div.
Ch2:I_{IN}, 100 mA / div., 5 ms / div.
Ch4:V_{IN}, 50 V / div., 5 ms / div.

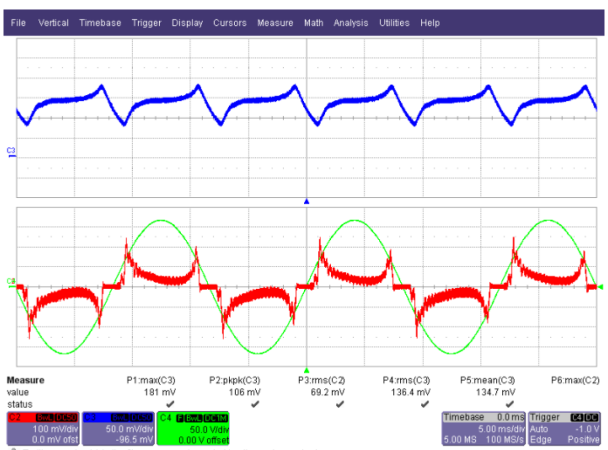

Figure 35 – 120 VAC, 60 Hz, Full Load.
Ch3:I_{OUT}, 50 mA / div., 5 ms / div.
Ch2:I_{IN}, 100 mA / div., 5 ms / div.
Ch4:V_{IN}, 50 V / div., 5 ms / div.

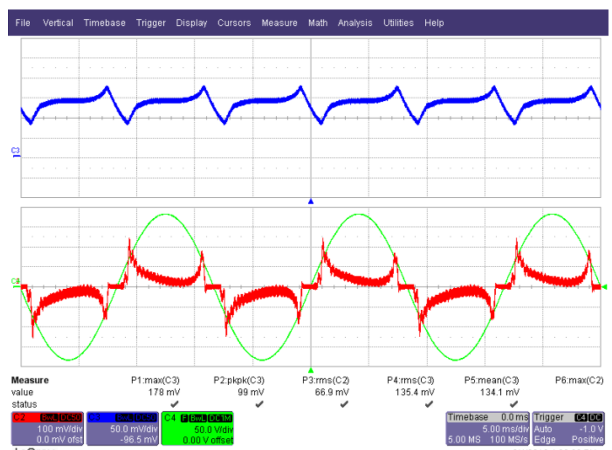

Figure 36 – 132 VAC, Full Load.
Ch3:I_{OUT}, 50 mA / div., 5 ms / div.
Ch2:I_{IN}, 100 mA / div., 5 ms / div.
Ch4:V_{IN}, 50 V / div., 5 ms / div.

10.7 電壓關閉/電壓啟動

No failure of any component during brown-out test of 0.5 V / sec AC cut-in and cut-off.

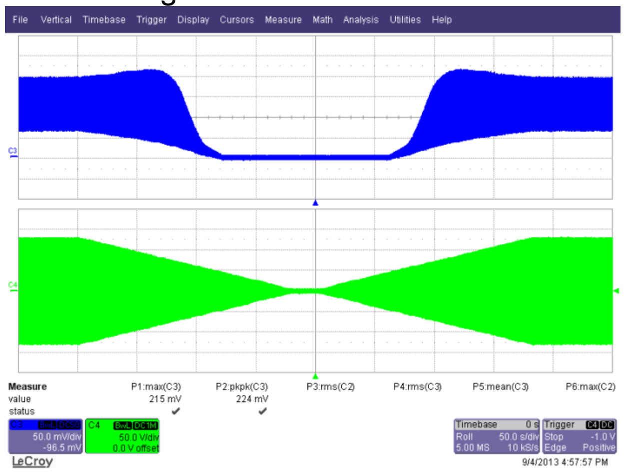

Figure 37 – Brown-out Test at 0.5 V / s. The Unit is Able to Operate Normally Without Any Failure and Without Flicker.Ch4:V_{IN}, 50 V / div.
Ch3:I_{OUT}, 50 mA / div.
Time Scale:50 s / div.

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11 線電壓突波

Differential input line 500 V surge testing was completed on a single test unit to IEC61000-4-5. Input voltage was set at 120 VAC / 60 Hz.

Surge Level (V)	Input Voltage (VAC)	Injection Location	Injection Phase (°)	Test Result (Pass/Fail)
+500	120	L to N	90	Pass
-500	120	L to N	90	Pass
+500	120	L to N	0	Pass
-500	120	L to N	0	Pass

Unit passed under all test conditions.

Differential ring input line surge testing was completed on a single test unit to IEC61000-4-5. Input voltage was set at 120 VAC / 60 Hz.Output was loaded at full load and operation was verified following each surge event.

Surge Level (V)	Input Voltage (VAC)	Injection Location	Injection Phase (°)	Test Result (Pass/Fail)
+2500	120	L to N	90	Pass
-2500	120	L to N	90	Pass
+2500	120	L to N	0	Pass
-2500	120	L to N	0	Pass

Unit passed under all test conditions.

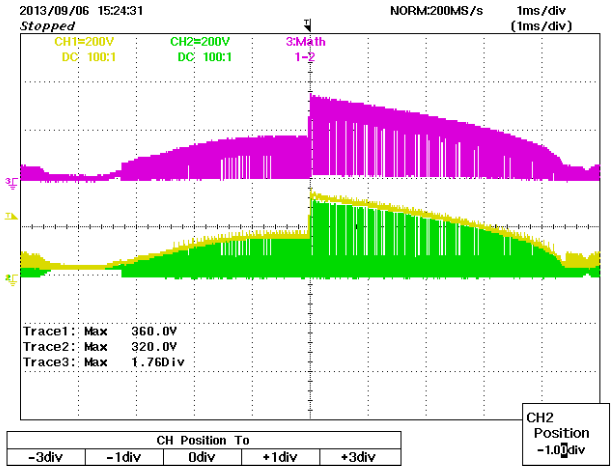

Figure 38 – Differential Line Surge at 500 V / 90°.Peak Drain Voltage Recorded is 360 V.
Ch1:V_{DRAIN}, 200 V / div.
Ch2:V_{SOURCE}, 200 V / div.
Ch3:V_{D-S}, 200 V / div.
Time Scale:1 ms / div.

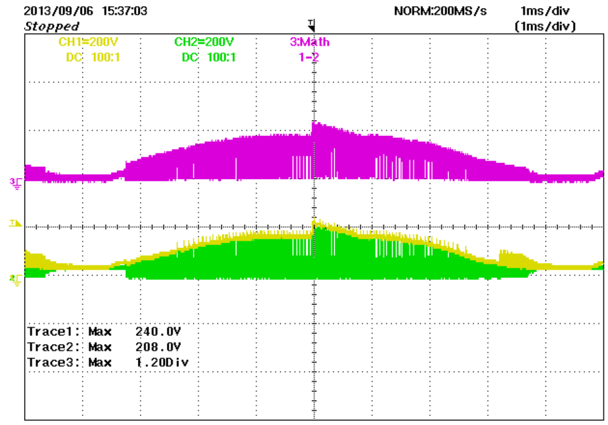

Figure 39 – Differential Ring Surge at 2500 V / 90°.Peak Drain Voltage Recorded is 240 V.
Ch1:V_{DRAIN}, 200 V / div.
Ch2:V_{SOURCE}, 200 V / div.
Ch3:V_{D-S}, 200 V / div.
Time Scale:1 ms / div.

12 傳導性 EMI

12.1 測試裝置

The LED driver was placed inside a GU10 assembly with 38 V LED load and then mounted inside a metallic cone as shown in Figure 40.

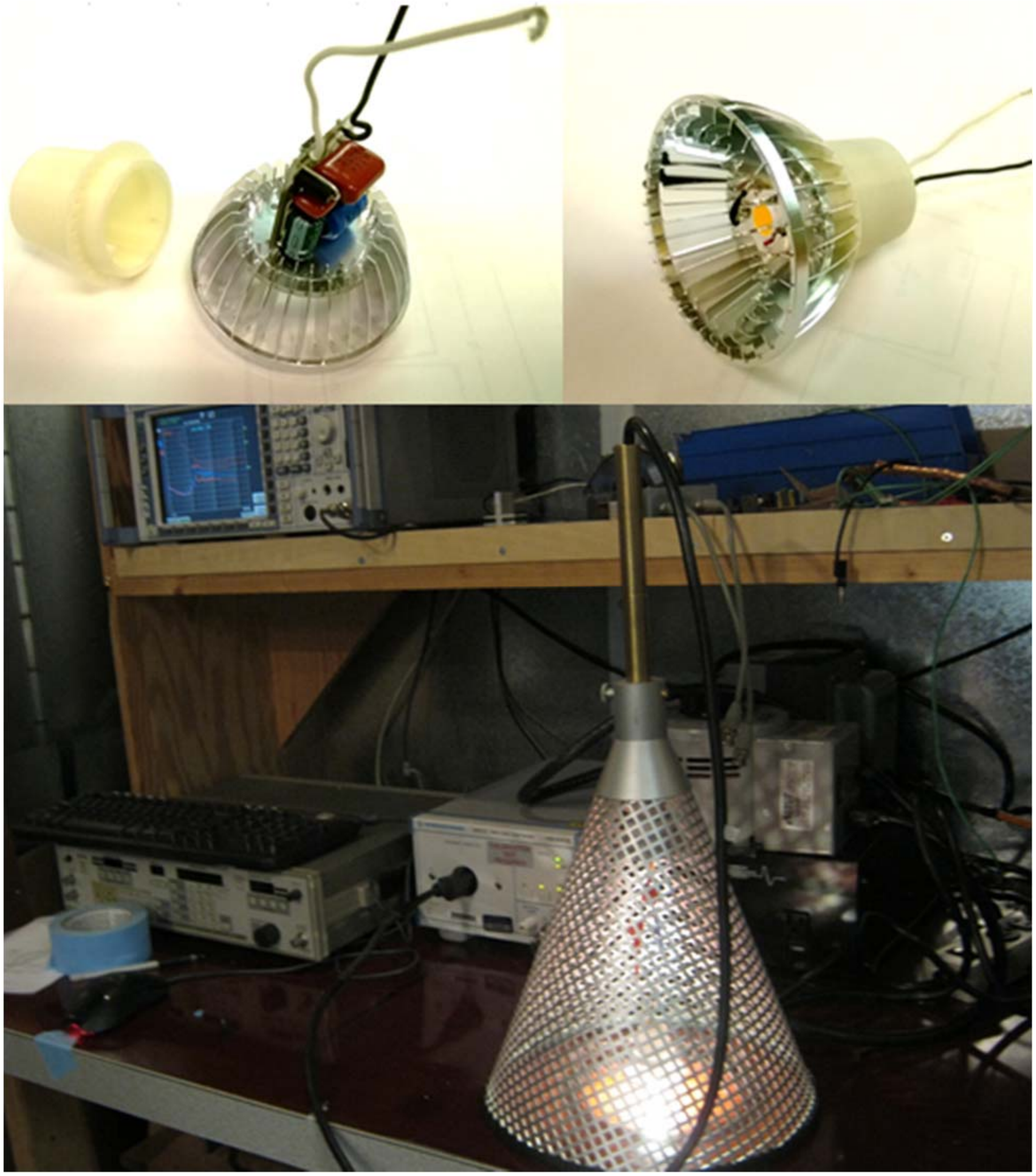

Figure 40 – Conducted EMI Test Set-up.UUT mounted inside the metallic cone.

12.2 測試結果

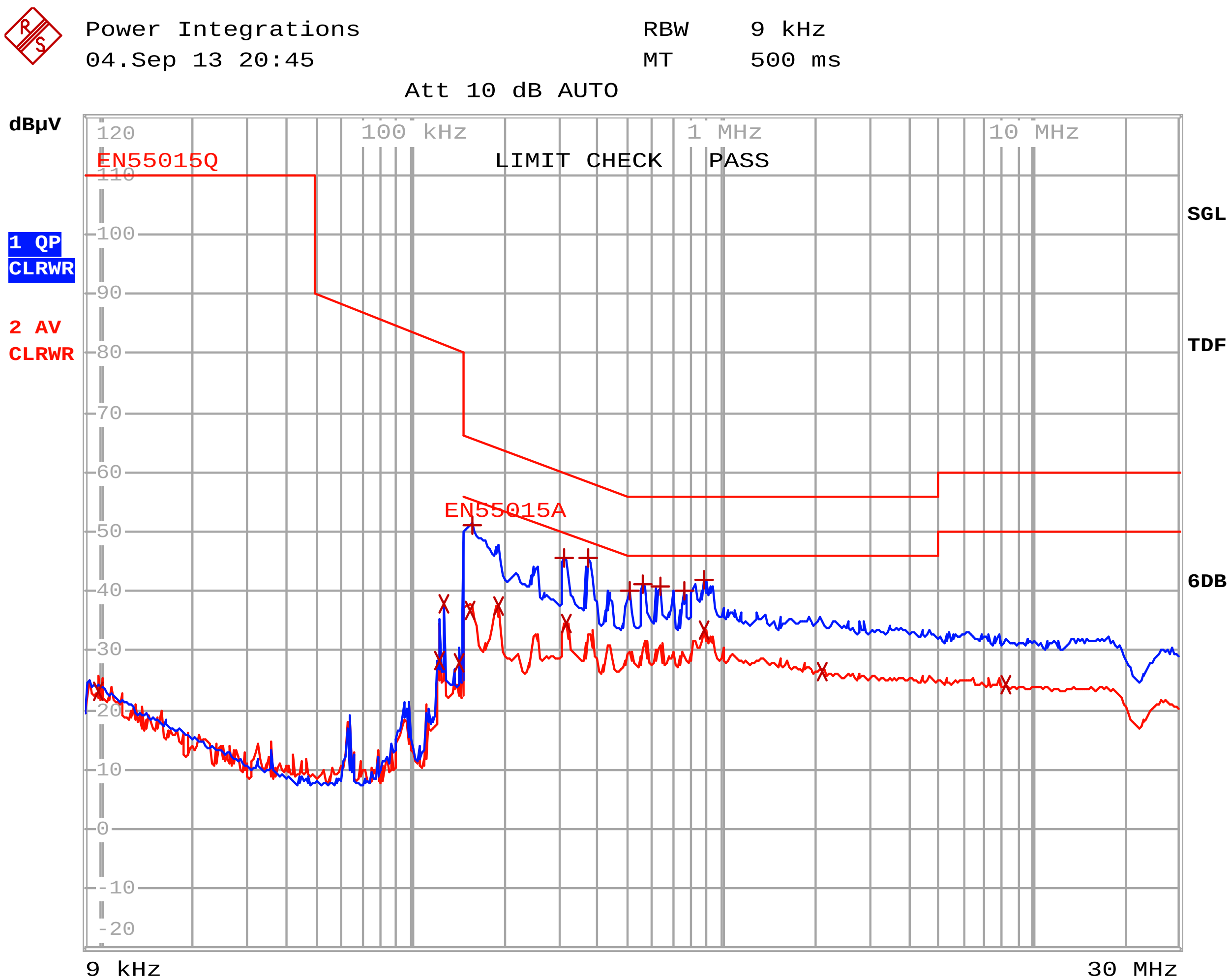

Figure 41 – Conducted EMI, Maximum Steady State Load, 115 VAC, 60 Hz, and EN55015 B Limits.

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EDIT PEAK LIST (Final Measurement Results)

Trace1: EN55015Q
Trace2: EN55015A
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	Average	9.74571035065 kHz	23.12	N gnd	
2	Average	123.243440661 kHz	28.25	N gnd	
2	Average	126.977840157 kHz	37.69	L1 gnd	
2	Average	143.081808561 kHz	28.08	L1 gnd	
2	Average	154.54515 kHz	36.76	L1 gnd	-18.99
1	Quasi Peak	157.651507515 kHz	51.02	L1 gnd	-14.56
2	Average	190.46019728 kHz	37.61	L1 gnd	-16.39
1	Quasi Peak	310.135545783 kHz	45.43	L1 gnd	-14.52
2	Average	316.369270253 kHz	34.57	L1 gnd	-15.23
1	Quasi Peak	370.967850209 kHz	45.66	L1 gnd	-12.81
1	Quasi Peak	505.008700673 kHz	40.00	L1 gnd	-15.99
1	Quasi Peak	557.843784289 kHz	41.32	L1 gnd	-14.67
1	Quasi Peak	634.878262431 kHz	40.64	L1 gnd	-15.35
1	Quasi Peak	759.408030975 kHz	39.95	L1 gnd	-16.04
1	Quasi Peak	881.64914842 kHz	41.95	L1 gnd	-14.04
2	Average	881.64914842 kHz	33.28	L1 gnd	-12.71
2	Average	2.09534389698 MHz	26.61	L1 gnd	-19.38
2	Average	8.18999279463 MHz	24.27	N gnd	-25.72

Table 5 – Conducted EMI Final Measurements, Maximum Steady State Load, 115 VAC, 60 Hz, and EN55015 B Limits.

13 修訂記錄

日期	作者	修訂	**Description & changes**	**Reviewed**
25-Sep-13	CA	1.0	Initial Release	Apps & Mktg

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