UM1660
Evaluation Board
User's Guide
V1.0

Version	Date	Prvoider	Approve	Note
1.0	2012-05-02			Initial version.

Table of Contents

1 . Board Information

The UM1660 is a high-frequency boost converter dedicated for small to medium LCD bias supply and white LED backlight supplies. The part can also be used to generate standard 3.3V/5V to 12V power conversions.

The UM1660 EVB board is an evaluation test platform. The board can be used for the chip performance test validation, to modify some components of the parameters, the user can verify the circuit characteristics and parameters, to ensure the practical application of user interests. UM1660 EVB board also can demonstrate the main function of the chip, allowing users to fully experience the advantages of using the chip.

1.1 Schematic

Fig 1.1 is UM1660 EVB board design schematic.

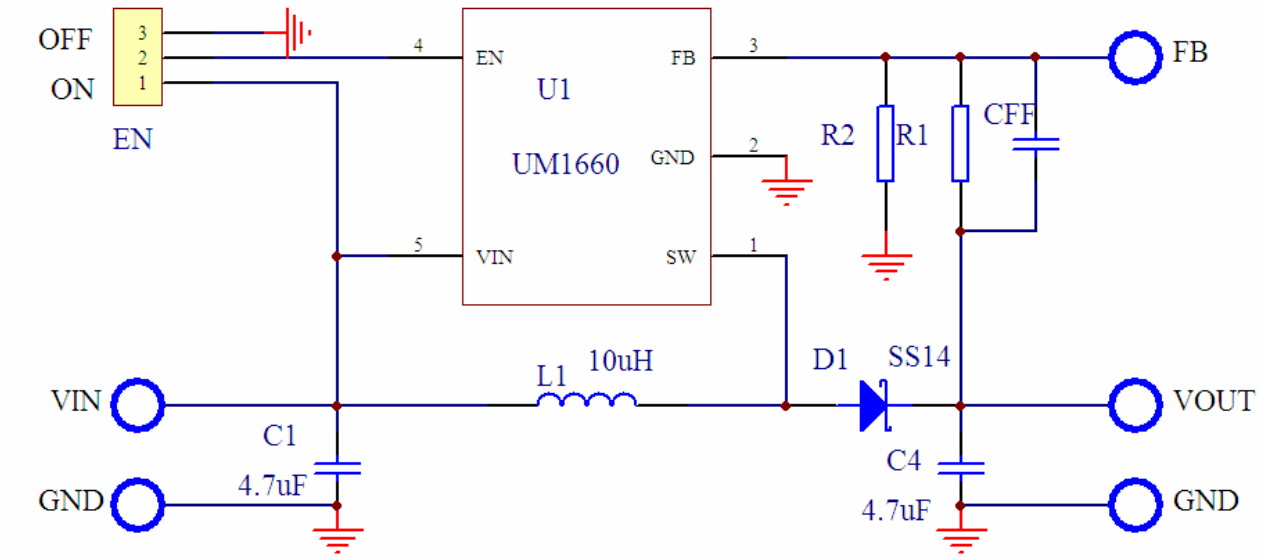

Fig 1.1 UM1660 EVB board schematic

1.2 PCB Layout

Fig 1.2, Fig 1.3 is PCB layout and components location diagram of UM1660 EVB board.

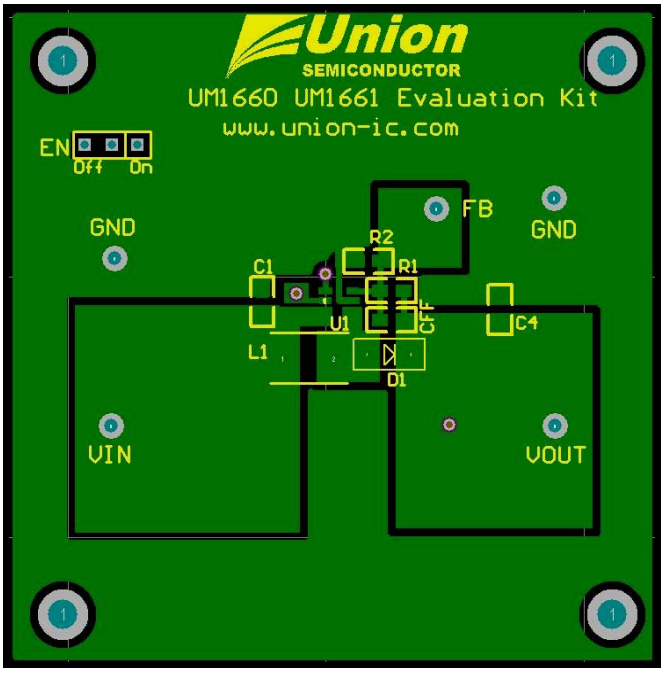

Fig 1.2 UM1660 EVB board PCB top layer

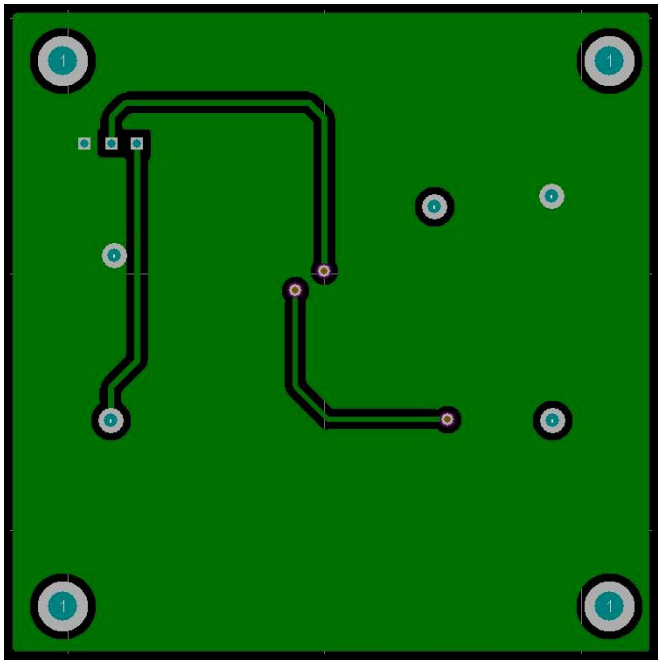

Fig 1.3 UM1660 EVB board PCB bottom layer

1.3 Interface Define

Tab 1.1 is the directions of UM1660 EVB board interface signals

Tab 1.1 UM1660 EVB board interface Output up to 28V

Interface	Function	Note
VIN	Power supply input .	2.0V -- 6.0V power supply.
GND	Ground.	
EN	Chip enable/disable option.	EN=ON (1): enable. EN=OFF (0): disable.
VOUT	The board output.	5-28V Output Voltage
GND	Ground	
FB	The output feedback.	

2 . Board Operation

Use UM1660 EVB board, you need to properly connect an external power supply and external LED or other load, set EN signal. As it is constant output voltage, you should calculate the R1.R2 resistance to change the output voltage for different led load (see part 2.3).

2.1 Power Supply

UM1660 EVB board's input supply voltage VIN range: 2.0V - 6.0V, can use the power supply or Li battery and so on.

Power supply when using, you need to confirm there is sufficient margin with the current limit set. Input power cable should be thicker to reduce the loss of input voltage when the load current is larger.

2.2 Enable

EN signal should be set to ON, UM1660 EVB board is in normal working condition.

2.3 LED Load and Output Voltage

LED load can be used to all kind LED for panel back light. Before used to LED load, some circuit parameters need re-calculate to get right output voltage. The output voltage is calculated as:

$$V_{out} = 1.233\,V \times \left(1 + \frac{R1}{R2}\right)$$

For battery powered applications a high impedance voltage divider should be used with a typical value for R2 of 200kΩ and a maximum value for R1 of 2.2MΩ.

As a DC/DC convertor, Modify R1 resistance can get 5V/12V/24V standard output voltage.

The EVB board output voltage is 25V and can drive 1*8 whit LED load.

3. Board Component

Tab 3.1 is the BOM list of UM1660 EVB board.

Tab 3.1 UM1660 EVB board BOM list VOUT=26V

Reference	Description	Part No.
U1	LED Driver Chip.	UM1660
C1	Capacitor,4.7uF,10V,Ceramic,0805.	
C4	Capacitor,4.7uF,50V,Ceramic,0805.	
L1	Inductor,10uH,500mA,SMT.	
D1	Schottky diode,SS14,SMT.	SS14
R2	Resistor, 100kOhm,0603.	
R1	Resistor, 2MOhm,0603.	
CFF	(No used.)	
EN	Option jumper	

3.1 Capacitor

The input current is discontinuous during UM1660 switching on-off, and therefore an input capacitor is necessary to ensure the VIN does not drop excessively. The recommended input capacitance is 2.2uF to 22uF depending on the application. The EVB board use a 4.7uF capacitor.

A low ESR capacitor is required to reduce the noise and increase stability. The surface mount multilayer ceramic capacitors (MLCC) have very low ESR and are strongly recommended to use .The X5R, X7R type MLCC are good choices for input capacitors, the tantalum and low-ESR electrolytic capacitors may also suffice.

The output capacitor is required to maintain output voltage low ripple. The recommended output capacitor is 4.7uF minimum.

The ESR characteristics of the output capacitor also affect the stability of system, and a low ESR capacitor is necessary. Like input capacitor, recommended to use the X5R, X7R type MLCC for output capacitor. For the tantalum and electrolytic type, the ESR need less than 50mOhm.

When a string load have a lot of LED light, the output voltage is higher, and the output capacitor operating voltage require to double check for MLCC type.

3.2 Inductor

The inductor maintain a continuous current to the output load.. The recommended inductor value is 2.2uH to 10uH, suit to the load current less than 40mA.

When selecting an inductor, make sure that it is capable of supporting the peak input current without saturating. Inductor staturation will result in a sudden reduction in inductance and prevent the regulator from operating correctly. The inductor saturation current is recommended 1.3 to 1.5 time of the peak input current, while the peak input current is 450mA.

3.3 Schottky Diode

During the switch off, the schottky diode keep current continuous.The schottky diode reverse voltage must be greater than maximum VOUT. The recommended reverse voltage is 1.2 to 1.5 time of the maximum VOUT. The schottky diode peak forward current require greater than maximum output current. The recommended value is 1.5 time of the peak output current.

In this demo board, SS14, RB551, MBR0530 can be use.

4. Circuit Protect

4.1 Over Current Protect

OCP can effectively protect the on-chip MOS unit, output will be closed when load current is too large.

4.2 Under-voltage Lockout

An under-voltage lockout prevents mis-operation of the device at input voltages below typical 1.5V. When the input voltage is below the under-voltage threshold the main switch is turned off.

5. Other Application

5.1 Dimming Control Application

When adding the PWM signal to EN pin, the UM1660 is turned on or off by the PWM signal, so the LED work at either zero or full current. The average LED current

increase proportionally with the duty cycle of the PWM signal. The frequency range of the PWM signal is from 50Hz to 500Hz and the duty range is from 5% to 90%.