GS5581 Application Note

Typical Application Circuit

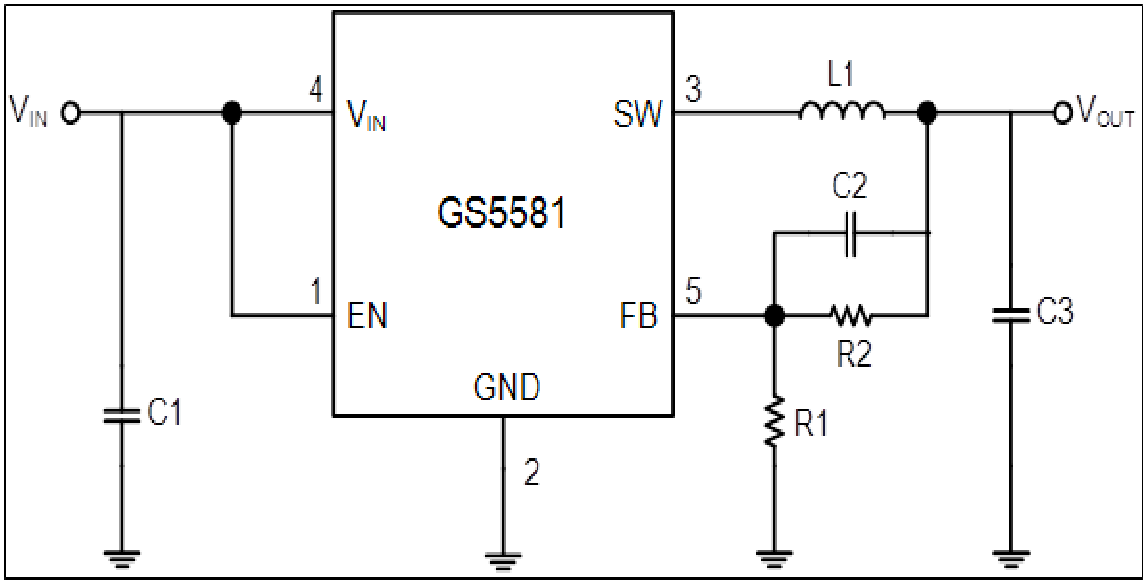

Table 1 recommended Component Selection

VOUT	R2	R1	C2	L1	C1	C3
3.3V	540K	120K	20~220pF	4.7 μH	22 μF	22 μF
2.5V	380K	120K	20~220pF	4.7 μH	22 μF	22 μF
1.8V	200K	100K	20~220pF	2.2 μH	22 μF	22 μF
1.5V	150K	100K	20~220pF	2.2 μH	22 μF	22 μF
1.2V	100K	100K	20~220pF	2.2 μH	22 μF	22 μF
1.0V	100K	150K	20~220pF	2.2 μH	22 μF	22 μF

Setting the Output Voltage

The internal reference V_{REF} is 0.6V(Typical).The output voltage is divided by a resistor,R1 and R2 to the FB pin. The output voltage is given by:

$$V_{OUT}=0.6Vx(1+\frac{R2}{R1})$$

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Inductor Selection

For most designs, the GS5581 operates with inductors of 1μH to 4.7μH. Low inductance values are physically smaller but require faster switching, which results in some efficiency loss. The inductor value can be derived from the following equation:

$$L = \frac{V_{OUT} \times (V_{IN} - V_{OUT})}{V_{IN} \times \Delta I_L \times f_{OSC}}$$

Where ΔI_L is inductor Ripple Current. Large value inductors result in lower ripple current and small value inductors result in high ripple current. For optimum voltage-positioning load transients, choose an inductor with DC series resistance in the 50mΩ to 150mΩ range.

Input Capacitor Selection

With the maximum load current at 1.0A, the maximum ripple current through input capacitor is about 0.6Arms. A typical X7R or better grade ceramic capacitor with 6V rating and greater than 10uF capacitance can handle this ripple current well. To minimize the potential noise problem, place this ceramic capacitor really close to the IN and
GND pins. Care should be taken to minimize the loop area formed by C_{IN}, and IN/GND pins.

Output Capacitor Selection

The output capacitor is required to keep the output voltage ripple small and to ensure regulation loop stability. The output capacitor must have low impedance at the switching frequency. Ceramic capacitors with X5R or X7R dielectrics are recommended due to their low ESR and high ripple current ratings.
The output ripple ΔV_{OUT} is determined by:

$$\Delta V_{OUT} \leq \frac{V_{OUT} x (V_{IN} - V_{OUT})}{V_{IN} x f_{OSC} x L} x \left(ESR + \frac{1}{8 x f_{OSC} x C3} \right)$$

A 10μF ceramic Capacitor can satisfy most applications.

PC Board Layout Checklist

When laying out the printed circuit board, the following checking should be used to ensure proper operation of the GS5581. Check the following in your layout:

1. The power traces, consisting of the GND trace, the SW trace and the V_{IN} trace should be kept short, direct and wide.
2. Does the (+) plates of C_{IN} connect to V_{IN} as closely as possible.
   This capacitor provides the AC current to the internal power MOSFET.
3. Keep the switching node, SW, away from the sensitive V_{OUT} node.
4. Keep the (-) plates of C_{IN} and C_{OUT} as close as possible.

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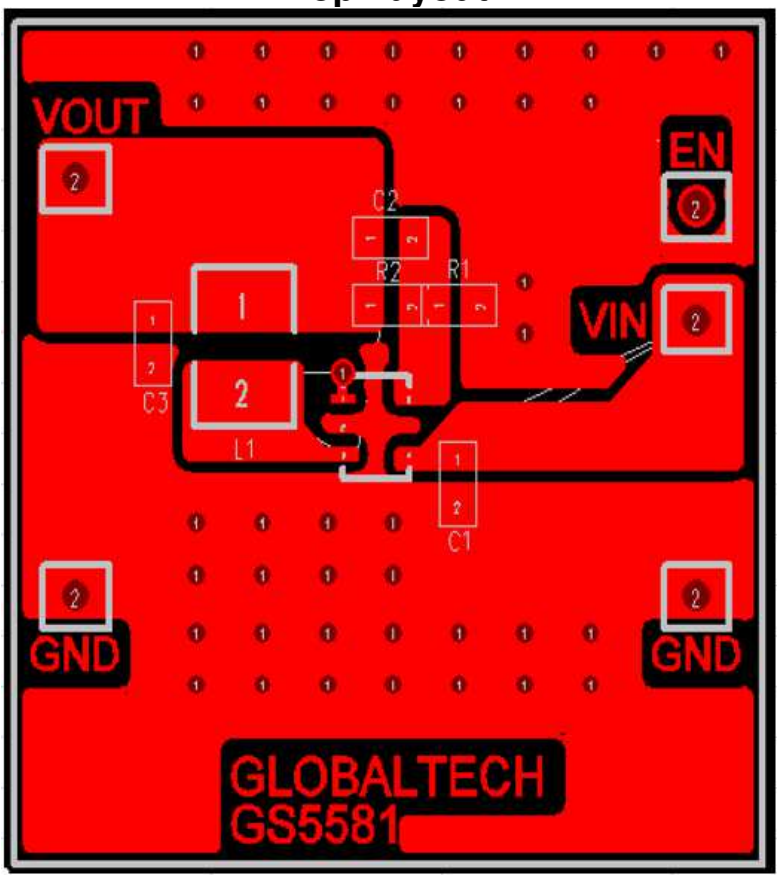
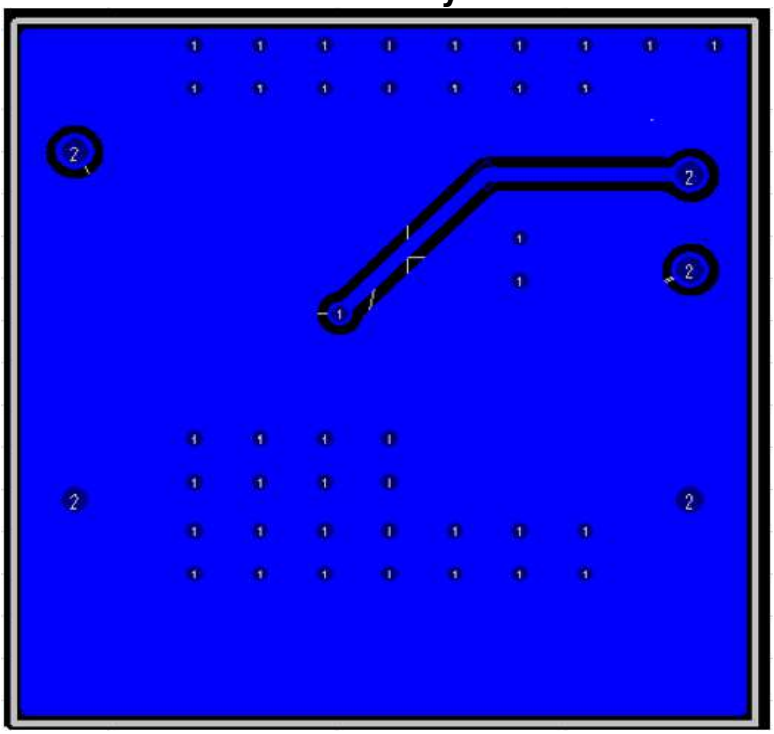
Top Layout



Bottom Layout



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